

# **Oracle® Application Express**

Application Builder User's Guide

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# Preface

*Oracle Application Express Application Builder User's Guide* describes how to use the Oracle Application Express development environment to build and deploy database-centric web applications. Oracle Application Express 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.

## Topics:

- [Topic Overview](#)
- [Audience](#)
- [Documentation Accessibility](#)
- [Related Documents](#)
- [Conventions](#)

## Topic Overview

This document contains the following chapters:

Title	Description
<a href="#">Changes in This Release</a>	Describes changes in this document for Oracle Application Express, release 4.2.
<a href="#">Quick Start</a>	Offers a quick introduction to using the Oracle Application Express.
<a href="#">Application Builder Concepts</a>	Provides basic conceptual information about Application Builder. Use Application Builder to assemble an HTML interface (or application) on top of database objects such as tables and procedures.
<a href="#">Utilizing Packaged Applications</a>	Describes how to install and run the sample applications provided with Oracle Application Express.
<a href="#">Managing the Development Process</a>	Describes how to use Team Development, a built-in development management tool, to manage the development process by tracking new features, non-feature related tasks (or To Do tasks), bugs, and milestones.
<a href="#">About Websheet Applications</a>	Describes how to use Application Builder to create and add content to a Websheet application.

Title	Description
Using Application Builder	Provides important background information about using Application Builder to build dynamically rendered applications.
Working with Database Application Pages	Provides important background information about creating and managing pages within an application.
About Database Applications	Describes how to use Application Builder to build a database application and manage application components.
Working with Database Application Pages	Describes important background information about working with pages within a database application.
Creating Reports	Describes how to create interactive reports and classic reports in a database application.
Adding Database Application Components and Controls	Describes how to use Application Builder to create various application components (such as forms, calendars, maps, and charts) and page controls (such as buttons, list of values, shortcuts, and trees).
Adding Navigation	Describes how to implement navigation in your database application using different types of navigation controls, including navigation bar entries, tabs, breadcrumbs, and lists.
Controlling Page Layout	Describes different ways you can customize your database application's page layout by customizing regions, editing item attributes, and incorporating images.
Managing Themes and Templates	Describes different ways you can alter your database application's user interface and page layout through themes and templates.
Debugging an Application	Describes approaches to debugging an application including running Oracle Application Express Advisor (Advisor), viewing Debug Mode, enabling SQL tracing, and viewing page reports.
Managing Application Security	Describes how to provide security for an Application Builder application by understanding security best practices, securing file uploads, authentication, and authorization.
Deploying an Application	Explains how to package an application built within Application Builder and how to export, import, and install an application and related files.
Advanced Programming Techniques	Provides information about advanced programming techniques including establishing database links, using collections, running background SQL, utilizing web services, implementing plug-ins, creating dynamic actions, using screen reader and high contrast modes, and creating applications that load data.
Managing Application Globalization	Explains how to translate an application built-in Application Builder.
Appendix A: About Item Types	Describes available item types and important item attributes that control item behavior.
Appendix B: Oracle Application Express Limits	Lists limits associated with Oracle Application Express development environment and application components.
Appendix C: Available Conditions	Describes many Application Builder conditions.
Appendix D: About Granted Privileges	Describes grant privilege in Oracle Application Express.

Title	Description
<a href="#">Appendix E: Accessibility in Oracle Application Express</a>	Provide information for users who are accessing Oracle Application Express utilizing only a keyboard or Freedom Scientific's screen reader JAWS.

## Audience

*Oracle Application Express Application Builder User's Guide* is intended for application developers who are building database-centric web applications using Oracle Application Express. The guide describes how to use the Oracle Application Express 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 Application Express.

**See Also:** *Oracle Database 2 Day + Application Express Developer's Guide*

## 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 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.

## Related Documents

For more information, see these Oracle resources:

- *Oracle Application Express Release Notes*
- *Oracle Application Express Installation Guide*
- *Oracle Database 2 Day + Application Express Developer's Guide*
- *Oracle Application Express End User Guide*
- *Oracle Application Express Administration Guide*
- *Oracle Application Express SQL Workshop Guide*
- *Oracle Application Express API Reference*
- *Oracle Application Express Application Migration Guide*
- *Oracle Database Concepts*
- *Oracle Database Development Guide*
- *Oracle Database Administrator's Guide*
- *Oracle Database SQL Language Reference*

■ *SQL\*Plus User's Guide and Reference*

For additional documentation available on Oracle Technology Network (OTN), visit the Oracle Application Express website located at:

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

For additional application examples, go to the Learning Library. Search for free online training content, including Oracle by Example (OBE), demos, and tutorials. To access the Oracle Learning Library, go to:

<http://www.oracle.com/technetwork/tutorials/index.html>

Printed documentation is available for sale in the Oracle Store at:

<http://shop.oracle.com/>

If you have a user name and password for OTN, then you can go directly to the documentation section of the OTN website at:

<http://www.oracle.com/technetwork/indexes/documentation/index.html>

## Conventions

The following text conventions are used in this document:

Convention	Meaning
<b>boldface</b>	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	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.



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# Changes in This Release

This preface contains:

- [Changes in Oracle Application Express Release 4.X](#)

## Changes in Oracle Application Express Release 4.X

The following are changes in *Oracle Application Express Application Builder User's Guide* for Oracle Application Express release 4.X.

### New Features

The following features are new in this release:

- Mobile Application Building

Developers can declaratively define mobile applications and mobile application components. Applications can now have both desktop and mobile user interfaces with automatic detection. Details include:

- List View Region Type

Incorporated new List View region type which is a common presentation mode for mobile applications and is used in place of report views.

- New Common Pages for Different User Interfaces

Developers can define a separate Global Page (formerly Page 0), Login Page, and Home Page for each user interface. This facilitates different pages being shown to end users when they access the application from a mobile device as opposed to a desktop system.

See "[Creating a Global Page to Display Components on Every Page](#)" on page 12-2.

- User Interface Specific Components

Based on the user interface defined for the page, different region types and item types are available by default. For example, Interactive Reports and Tabular Forms are standard region types for desktop pages and List View is standard for mobile pages. The new Slider item type is standard for mobile pages only.

See "[Managing the Application User Interface](#)" on page 7-29.

- Mobile Themes and Templates

By leveraging jQuery Mobile, mobile themes function on all major mobile platforms without need for modification and include features such as page transitions and HTML5 item types. Details include:

- Support for Grid Layouts

Within page templates it is now possible to specify which Grid Layout to use for the placement of regions and page items. This is an alternative to HTML table-based layouts used by Oracle Application Express in previous releases.

See ["Page Templates"](#) on page 13-27.

- Page and Popup Transitions

For mobile page templates, page and popup transitions (for example slip, flip, and fade) can be specified to make the user experience more native for mobile devices.

- Declarative support for Cascading Style Sheets and JavaScript File Substitutions

New page and page template attributes for inline Cascading Style Sheets (CSS) and JavaScript files provide declarative support for developers to load files into their applications.

See ["About Page Attributes"](#) on page 8-21 and ["Page Templates"](#) on page 13-27.

- Content Delivery Network

A new application-level attribute, Content Delivery Network, within User Interface provides support for jQuery and jQuery Mobile files being loaded from a Content Delivery Network (for example, Google, Microsoft, or jQuery).

See ["Accessing the User Interface Page"](#) on page 7-29

- HTML5 Charts

HTML5 charting enables charts to be rendered without Flash.

See ["About Creating a HTML5 Charts"](#) on page 10-48.

- HTML5 Item Types

Specifying item types for number, email, telephone, and URL greatly enhances the user experience when entering data for modern mobile devices that are HTML5 aware. Details include:

- Slider Item Type

Slider renders an HTML5 range input type which is switched to a nice slider in mobile pages and can also be utilized on non-mobile pages.

- Yes/No Item Type

Yes/No renders as a flip toggle switch on mobile pages and as a radio group on non-mobile pages.

- New Display Orientation

For check box and radio group item types there is a new Display Orientation attribute which can be set to either Vertical (default) or Horizontal.

See ["Understanding Page-Level Items"](#) on page 7-55 and ["About Item Types"](#) on page A-1.

- Packaged Applications

A collection of productivity applications enable users to immediately start utilizing their database investment. The ability to unlock these applications also enables developers to customize and learn best practices.

See ["Utilizing Packaged Applications"](#) on page 3-1.

- Other New Features

- Named Branches

Developers can now specify names for branches to help to identify different branches.

See ["Controlling Navigation Using Branches"](#) on page 11-32.

- Read-Only Pages and Regions

Developers can now specify read-only pages or regions enabling them to readily build view-only components.

See ["About Page Attributes"](#) on page 8-21 and ["How Item Attributes Affect Page Layout"](#) on page 12-14.

- Share Session State across Applications

Large logical applications are often separated into several physical applications that share the same session by configuring the same cookie name. Application items can now be shared between these applications by defining the item scope as Global.

See ["Creating an Application-level Item that Functions as a Global Variable"](#) on page 7-77.

## Deprecated Features

The following features are deprecated in this release, and may not be supported in a future release:

- Set Memory Cache for DML Fetch process

DML Fetch processes should always use the Set Memory Cache on Fetch option to avoid confusion and issues with the setting of session state. Therefore the Set Memory Cache On Display option has been deprecated and is only be visible if the DML Fetch process is currently defined with that option.

- Placeholders to Include Standard CSS and Standard JavaScript Files

The page-level attribute Include Standard JavaScript and CSS is deprecated and is only displayed for existing applications if the value is set to **No**. New applications no longer have this page-level attribute.

In page templates developers can now use the placeholders #APEX\_CSS# and #APEX\_JAVASCRIPT# to indicate if and where the standard Oracle Application Express CSS and JavaScript files should be loaded. If these placeholder are not included in the page template, they will not be loaded.

## Other Changes

The following are additional changes in the release:

- Dynamic Actions

Dynamic actions provide developers with a way to define client-side behavior declaratively without the need of JavaScript. Enhancements in this release include:

- Enable jQuery Mobile

Existing item types have been modified so that they work with jQuery Mobile when JavaScript and Dynamic Actions are used to manipulate them (for example Set Value, Enable, and Hide).

- Expose jQuery Mobile Events

The jQuery Mobile framework exposes a number of events that provide useful hooks for developers of mobile applications. The Dynamic Actions framework has been extended to incorporate these events.

- Asynchronous AJAX Calls

Change server-side actions to always fire asynchronously and provide developers the ability to define how subsequent actions are fired.

- Extend Affected Elements

Enables developers to add buttons to the components that can be specified as the affected element of a dynamic action.

See ["Implementing Dynamic Actions"](#) on page 17-35.

- Plug-Ins

Plug-ins enable developers to enhance the existing built-in functionality by writing PL/SQL components for item types, regions, and processes. Enhancements in this release include:

- Increase Custom Attributes to 25

The number of custom attributes has been increased from 15 to 25.

- Add Fetched Rows and No Data Found Message to Region Type Settings

The attributes Number of Fetched Rows, Number of Fetched Rows (item), and No Data Found Message have been added as standard attributes which can be exposed for region type plug-ins to determine how many rows should be displayed or fetched for pagination of the region source data or displayed when nothing is found.

- Support Data Type Checking

The Region SQL Statement Column attribute has been added to support data type checking.

See ["Implementing Plug-ins"](#) on page 17-25.

- Interactive Reports

- Immutable ID to Preserve Saved Interactive Reports

By introducing an immutable identifier for saved reports, subscriptions can be preserved when the application is upgraded by importing a new application definition (for example, importing from development into production). This identifier works even if the application being imported has a different application identifier.

- Column Formatting

HTML expressions to be used in column definitions which can be rendered in the report and included in HTML and email downloads.

- Define From Address

For subscriptions and email downloads users can now specify the "from" address.

- API for Runtime SQL Query

A new API returns an interactive report's current SQL query to help developers determine the exact query being executed. This can be very useful when the output from an interactive report is used in some other functionality where user defined conditions such as filters, sorting, and columns displayed are required for customization.

- Date Columns can use Equal (=) Operator

Enables users to filter on a specific date using the equal (=) operator.

See ["Customizing Interactive Reports"](#) on page 9-4 and ["Editing Interactive Reports as a Developer"](#) on page 9-27.

- Websheets

Websheet applications are interactive web pages that combine text with data. Enhancements in this release include:

- Improved Create Websheet Wizard

Application developers can now specify to Allow SQL and PL/SQL when creating the application rather than having to create the Websheet and then edit the application properties.

- Toolbar Menu Enhancement

The existing toolbar menu options have been moved and new options added for Reports. These changes are designed to make it easier, more productive, and more intuitive for users to navigate with from within Websheets.

- Link Directly to Data Grids

Provide users with the ability to use a link directly to edit a data grid or data grid row (form view) which can be exposed or emailed for easier access.

See ["About Websheet Applications"](#) on page 5-1.

- Team Development Attachments

Team Development enables developers to manage the development process by tracking new features, non-feature related tasks (or To Do tasks), bugs, and milestones. With this release, developers can now add external documents as attachments to features, bugs, and ToDos.

See ["Managing the Development Process"](#) on page 4-1.

- All content, screen captures, and graphics have been updated to reflect Oracle Application Express release 4.2 functionality and user interface enhancements.

- Additional administration enhancements:

- Maximum Items per Page Raised to 200

Maximum enterable items on a page has changed from 100 to 200.

- Debugging Enhancements

Developers no longer need to change the Debugging Allowed flag to Yes to view debugging information when they run a application from Application Builder. Oracle Application Express now makes better use of the different debugging levels and provides better controls to manage what level of detail is returned.

- On-Demand Improvements

Authorizations and conditions can now be utilized with on-demand processes. By default, on-demand processes are now created with an initial authorization of **Must Not Be Public User** to avoid execution by users in unauthenticated sessions.

- Globalization Enhancements

To improve productivity within the translation repository, developers can edit text messages using a grid.

---

## Quick Start

This section offers a quick introduction to using Oracle Application Express. It is assumed you have completed the installation process.

### Topics:

- [What is Oracle Application Express?](#)
- [About Oracle Application Express](#)
- [Understanding Application Express User Roles](#)
- [Logging In To Oracle Application Express](#)
- [About the Workspace Home Page](#)
- [About the Oracle Application Express Documentation](#)

**See Also:** *Oracle Database 2 Day + Application Express Developer's Guide*

## What is Oracle Application Express?

Oracle Application Express 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, Oracle Application Express accelerates the application development process.

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

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

To learn more about Oracle Application Express, click the **Learn More** link on the Workspace home page. The About Oracle Application Express page appears.

**See Also:** ["Logging In To Oracle Application Express"](#) on page 1-3 and ["About Learn More"](#) on page 1-10

## About Oracle Application Express

Oracle Application Express installs with your Oracle database and consists of data in tables and PL/SQL code.

Whether you run the Oracle Application Express development environment or an application you built using Oracle Application Express, the process is the same. Your browser sends a URL request that is translated into the appropriate Oracle Application Express 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.

The application session state is managed in the database tables within Application Express. It does not use a dedicated database connection. Instead, each request is made through a new database session, consuming minimal CPU resources.

### About the Application Express Engine

The Application Express engine renders and processes pages. It also performs these tasks:

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

### Different Oracle Application Express Environments

When you install Oracle Application Express, you can install two different environments:

- A **runtime environment** is the appropriate choice for production implementations in which users can run applications that cannot be modified.
- A **full development environment** provides complete access to the Application Builder environment to develop applications as described in this document.

**See Also:** *Oracle Application Express Installation Guide*

## Understanding Application Express User Roles

To access the Oracle Application Express development environment, users log in to a shared work area called a workspace. Users are divided into four primary roles:

- **Developers** are users who create and edit applications
- **Workspace administrators** are users who perform administrator tasks specific to a workspace such as managing user accounts, monitoring workspace activity, and viewing log files
- **End users** are application users without any access to development or administrative capabilities
- **Instance administrators** are superusers that manage an entire hosted instance using the Application Express Administration Services application

**See Also:** *Oracle Application Express Administration Guide*



## Logging In To Oracle Application Express

When you log in to Oracle Application Express you log in to a workspace. A workspace is an area within the Oracle Application Express development environment where developers can create applications.

How you log in to Oracle Application Express depends upon whether you have configured your development environment:

- If you have recently installed Oracle Application Express, you must configure your development environment. See ["Configuring Your Oracle Application Express Environment"](#) on page 1-3.
- If you are a developer logging into a previously configured development environment, an administrator must grant you access to a workspace. See ["Configuring Your Oracle Application Express Environment"](#) on page 1-3.

### Topics:

- [About Browser Requirements](#)
- [Configuring Your Oracle Application Express Environment](#)
- [Logging In To Oracle Application Express as a Developer](#)

## About Browser Requirements

o view or develop Oracle Application Express applications, web browsers must support Java Script and the HTML 4.0 and CSS 1.0 standards. The following browsers are required to develop applications in Oracle Application Express:

- Microsoft Internet Explorer 7.0 or later version
- Mozilla Firefox 14 or later version
- Google Chrome 21 or later version
- Apple Safari 5.0 or later version

Application Express applications can be developed that support earlier web browser versions, including Microsoft Internet Explorer 6.0.

## Configuring Your Oracle Application Express Environment

How you set up Oracle Application Express depends upon your user role. If you are a developer accessing a hosted development environment, an administrator must grant you access to a workspace. If you are an Oracle Application Express administrator, you must perform the following steps:

1. **Log in to Oracle Application Express Administration Services.** Oracle Application Express Administration Services is a separate application for managing an entire Oracle Application Express instance. You log in using the ADMIN account and password created or reset during the installation process.
  - a. In a web browser, navigate to the Oracle Application Express Administration Services application. By default, Oracle Application Express Administration Services installs to the following location:
    - If your setup uses the Oracle Application Express Listener, go to:

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

Where:

*hostname* is the name of the system where Oracle Application Express Listener is installed.

*port* is the port number assigned when configuring the Oracle Application Express Listener. In a default installation, this number is 8080. To learn more, see *Oracle Application Express Listener Installation and Configuration Guide*.

*apex* is the service name defined when configuring the Oracle Application Express Listener.

- If your setup uses the embedded PL/SQL gateway, go to:

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

Where:

*hostname* is the name of the system where Oracle XML DB Protocol Server is installed.

*port* is the port number assigned to HTTP on the Oracle XML DB Protocol Server. In a default installation, this number is 8080. If you are using the Oracle Database 12c Pluggable Databases architecture, then each PDB will have a distinct port number. See ["Verifying the Port Assigned to HTTP on the Oracle XML DB Protocol Server"](#) on page 1-7.

*apex* is the database access descriptor (DAD) defined in the configuration file.

- If your setup uses Apache and `mod_plsql`, go to:

`http://hostname:port/pls/apex/apex_admin`

Where:

*hostname* is the name of the system where Oracle HTTP Server is installed.

*port* is the port number assigned to HTTP on the Oracle HTTP Server. In a default installation, this number is 7777.

`pls` is the indicator to use the `mod_plsql` cartridge.

*apex* is the database access descriptor (DAD) defined in the `mod_plsql` configuration file.

- b. On the Login page:

- In Username, enter `admin`.
- In Password, enter the Oracle Application Express administrator account password you specified when you installed Oracle Application Express.
- Click **Login**.

**See Also:** "Logging In To Oracle Application Express Administration Services" in *Oracle Application Express Administration Guide*

2. **Specify a provisioning mode.** In Oracle Application Express Administration Services you must determine how the process of creating (or provisioning) a workspace works. See "About Workspace Provisioning" in *Oracle Application Express Administration Guide*.

3. **Create a Workspace.** A **workspace** is a virtual private database allowing multiple users to work within the same Oracle Application Express installation while keeping their objects, data and applications private. Each workspace has a unique ID and name. An Oracle Application Express administrator can create a workspace manually or have users submit requests. See "Creating Workspaces" and "Managing Workspace Requests" in *Oracle Application Express Administration Guide*.
4. **Log in to a Workspace.** Once you create a workspace in Oracle Application Express Administration Services, return to the Oracle Application Express Login page and log in to that workspace. See "[Logging In To Oracle Application Express as a Developer](#)" on page 1-5.

## Logging In To Oracle Application Express as a Developer

When you log in to Oracle Application Express, you log in to a workspace. If you are a developer, an administrator must grant you access to a workspace.

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**Note:** Before users can request a workspace or change their passwords, an Oracle Application Express administrator must configure Oracle Application Express environment preferences.

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**See Also:** "Managing Environment Settings" in *Oracle Application Express Administration Guide*

### Topics:

- [Requesting a Workspace](#)
- [Logging In To a Workspace](#)
- [Finding Your Workspace Name](#)
- [Resetting Your Password](#)
- [Logging Out of a Workspace](#)

## Requesting a Workspace

---

---

**Note:** This section applies only if your Oracle Application Express administrator has configured Oracle Application Express to support workspace requests.

---

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**See Also:** *Oracle Application Express Administration Guide*

Before you can log in to Oracle Application Express, an administrator must grant you access to a workspace. Each workspace has a unique ID and name.

To request a workspace:

1. In a web browser, navigate to the Oracle Application Express Login page.  
If you do not know the URL for logging in to Application Express, see "[Logging In To a Workspace](#)" on page 1-6.  
The Login page appears.
2. Under Workspace, click **Request a Workspace**.

The Request Service Wizard appears.

3. Click **Get Started** and follow the on-screen instructions.

**See Also:** "Creating Workspaces" in *Oracle Application Express Administration Guide*

## Logging In To a Workspace

After an Oracle Application Express administrator approves a workspace request, an e-mail arrives with your login credentials (the workspace name, user name, and password).

Note that if your administrator selected Email Verification as the automated method for handling new workspace requests, you might first receive an email containing a verification link. This step ensures that your email is a valid one before the workspace request is approved.

**See Also:** *Oracle Application Express Administration Guide*

To log in to Oracle Application Express:

1. In a web browser, navigate to the Oracle Application Express Login page. By default, Oracle Application Express installs to the following location:

- If your setup uses the Oracle Application Express Listener, go to:

`http://hostname:port/apex`

Where:

- `hostname` is the name of the system where Oracle Application Express Listener is installed.
- `port` is the port number assigned to Oracle Application Express Listener. In a default installation, this number is 8080. To learn more, see *Oracle Application Express Listener Installation and Configuration Guide*
- `apex` is the service name defined when configuring the Oracle Application Express Listener.

- If your setup uses the embedded PL/SQL gateway, go to:

`http://hostname:port/apex`

Where:

- `hostname` is the name of the system where Oracle XML DB Protocol Server is installed.
- `port` is the port number assigned to HTTP on the Oracle XML DB Protocol Server. In a default installation, this number is 8080. If you are using the Oracle Database 12c Pluggable Databases architecture, then each PDB will have a distinct port number. [See ["Verifying the Port Assigned to HTTP on the Oracle XML DB Protocol Server"](#) on page 1-7.
- `apex` is the database access descriptor (DAD) defined in the configuration file.

For users who have upgraded from earlier releases, or who have a custom configuration, this value may be `html.db` or something else. Verify your DAD with your Oracle Application Express administrator.

- If your setup uses Apache and `mod_plsql`, go to:

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

Where:

- *hostname* is the name of the system where Oracle HTTP Server is installed.
- *port* is the port number assigned to Oracle HTTP Server. In a default installation, this number is 7777. You can find information about your Oracle HTTP Server installation's port number from either of the following files:

```
ORACLE_BASE\ORACLE_HOME\install\portlist.ini
ORACLE_BASE\ORACLE_HTTPSERVER_HOME\Apache\Apache\conf\httpd.conf
```

Be aware that if you change a port number, it is not updated in the `portlist.ini` file. You can only rely on this file immediately after installation.

- `pls` is the indicator to use the `mod_plsql` cartridge.
- `apex` is the database access descriptor (DAD) defined in the `mod_plsql` configuration file.

For users who have upgraded from earlier releases, or who have a custom configuration, this value may be `htmldb` or something else. Verify your DAD with your Oracle Application Express administrator.

**See Also:** "Managing Oracle Database Port Numbers" in *Oracle Database Installation Guide* and `ORACLE_BASE\ORACLE_HTTPSERVER_HOME\Apache\modplsql\conf\dads.readme` for more information on database access descriptors

The Login page appears.

**2.** Under Login, enter the following:

- In the Workspace field, enter the name of your workspace.
- In the Username field, enter your user name.
- In the Password field, enter your case-sensitive password.

**3.** Click **Login**.

Note that, depending on your setup, you might be required to change your password when you log in for the first time.

**Verifying the Port Assigned to HTTP on the Oracle XML DB Protocol Server** To verify the port number assigned to HTTP on the Oracle XML DB Protocol Server:

**1.** Start SQL\*Plus and connect to the database where Oracle Application Express is installed 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*

2. Enter the following statement to verify the port number:

```
SELECT DBMS_XDB.GETHTTPPORT FROM DUAL;
```

If the port number returns 0, the Oracle XML DB Protocol Server is disabled.

**See Also:** *Oracle Application Express Installation Guide* to learn how to enable the Oracle XML DB Protocol Server

## Finding Your Workspace Name

If you cannot remember your workspace name, you can request a list of all workspace names associated with your email address.

To find your workspace name:

1. On the Login page, click **Find My Workspace** on the Tasks list.
2. Enter your email address and click **Find Workspace**.

An email with the list workspace names is sent to you.

## Resetting Your Password

You can reset your password by clicking the **Change Password** link on the Workspace home page.

To reset your password from the Workspace home page:

1. Log in to Oracle Application Express. See "[Logging In To Oracle Application Express](#)" on page 1-3.
2. Click the **Administration** icon.  
The Administration page appears.
3. From the Administration list, click **Change My Password**.  
The Change Password page appears.
4. In Change Password, enter the following:
  - Enter Current Password - Enter your current password.
  - Enter New Password - Enter your new password.
  - Confirm New Password - Enter your new password again.
5. Click **Apply Changes**.

**Tip:** You can also reset your password on the Login page by clicking the **Reset Password** link.

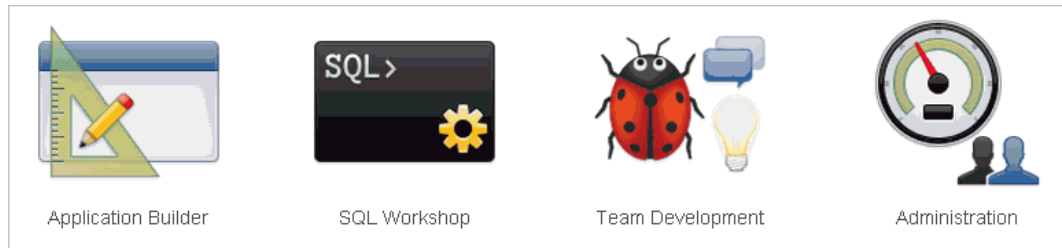
**See Also:** "Changing an End User Password" in *Oracle Application Express Administration Guide*

## Logging Out of a Workspace

To log out of Oracle Application Express, click the **Logout** link in the upper right corner of the window.

## About the Workspace Home Page

When you log in to Oracle Application Express, the Workspace home page appears. A **workspace** is a virtual private database allowing multiple users to work within the same Oracle Application Express installation while keeping their objects, data and applications private.

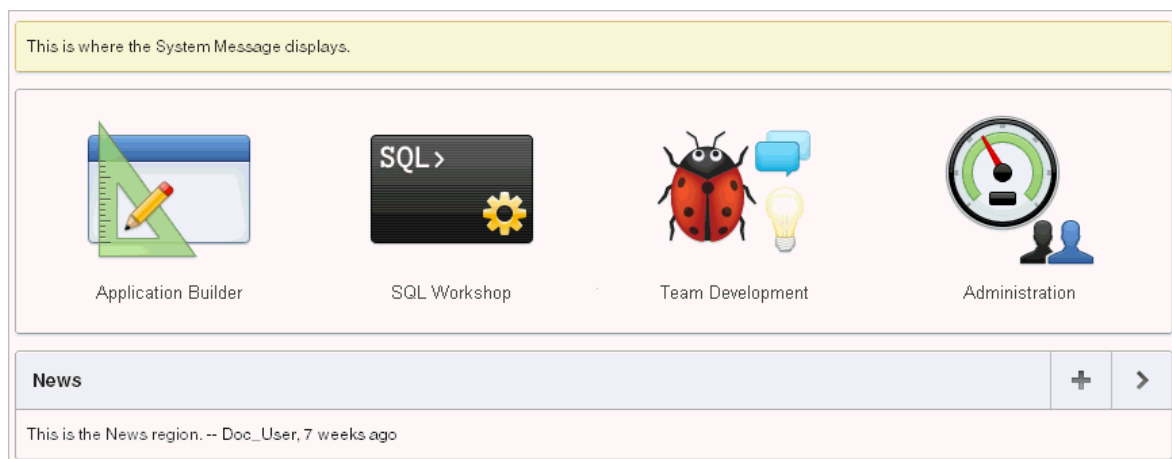


The following large icons display in the center of the page:

- **Application Builder.** Use Application Builder to create an application, composed of a set of HTML pages, based on database objects. See "[Application Builder Concepts](#)" on page 2-1 and "[Using Application Builder](#)" on page 6-1.
- **SQL Workshop.** Use the SQL Workshop to access tools for viewing and managing database objects. See *Oracle Application Express SQL Workshop Guide*.
- **Team Development.** Use Team Development to track new features, non-feature related tasks (or To Do tasks), bugs, and milestones. Users can also provide real-time feedback which then can be categorized into features, general tasks, or bugs. See "[Managing the Development Process](#)" on page 4-1.
- **Administration** links to the Workspace Administration page. See "Workspace and Application Administration" in *Oracle Application Express Administration Guide*.

Click the **Learn more** link in the About box to view an informative introduction to Oracle Application Express. Topics covered include architecture, self service, security, Websheets, application development, SQL Workshop, Team Development, administration, and managing development.

### About the System Message and News Regions



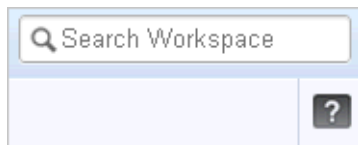
The system message displays at the top of the Workspace home page. The News region displays in the center of the page. Use these regions to communicate with other

users in the workspace. To learn more, see "Defining a System Message" in *Oracle Application Express Administration Guide* and "[Managing News Entries](#)" on page 4-22.

### About Top Applications and Top Users

The Top Applications and Top Users dashboards display at the bottom of the page. These regions offer real time information about development activities in the current workspace.

### About Search Workspace



The Search Workspace field displays in the upper right corner of the Workspace home page. Use this field to search for application names, application ID and page, workspace images, workspace theme names, and other workspace components. By default, this field is case sensitive and supports regular expressions.

For example, to navigate to a specific application and page use the following formats:

*page*  
*application\_ID:page*  
*application\_ID-page*

Where:

- *application\_ID* is the numeric identification number (or ID) that identifies an application.
- *page* is the numeric identification number that identifies a specific page.

Consider the following examples:


10  
570-10  
570:10

### About Learn More





## Team Development

Team Development	
Features	<a href="#">2</a>
To do's	<a href="#">1</a>
Milestones	<a href="#">0</a>
Bugs	<a href="#">0</a>
Feedback	<a href="#">0</a>
Show: <b>All</b>	
Release: <b>All Releases</b>	

Team Development enables you to manage the development process by tracking features, non-feature related tasks (or to dos), milestones, bugs, feedback, and milestones. To manage these items click the numbered link. To learn more, see ["Managing the Development Process"](#) on page 4-1

### About Available Updates

This region displays whether a newer version of Oracle Application Express or Oracle Application Express Listener is available.

### About Accessibility Mode

The Accessibility Mode list displays in the lower right side of the page. Use the Accessibility Mode list to identify if a page is optimized for screen readers. Available options include: Standard, Screen Reader, and High Contrast. To learn more, see ["Accessibility in Oracle Application Express"](#) on page E-1, ["Using Screen Reader Mode in Your Database Applications"](#) on page 17-50, and ["Using High Contrast Mode in Your Database Applications"](#) on page 17-51.

## About the Oracle Application Express Documentation

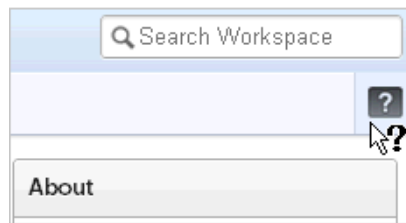
Oracle Application Express provides a hosted online documentation library and Field-Level Help.

### Topics:

- [Accessing the Online Documentation Library](#)
- [Downloading the Online Documentation Library](#)
- [About Field-Level Help](#)

## Accessing the Online Documentation Library

You can access the online Oracle Application Express documentation library by clicking the **Help** icon in the upper right corner of most Oracle Application Express pages.



Clicking the **Help** icon displays the Documentation page. To view the entire library, click the Full Library **HTML** link, or click a specific HTML or PDF link.

**Tip:** You can redirect the Help icon at the instance level in Instances Settings in Oracle Application Express Administration Services. To learn more, see "Configuring Online Help" in *Oracle Application Express Administration Guide*

### Searching the Online Documentation Library

To perform a keyword search of the online documentation library:

1. Click the **Help** icon.  
The Documentation page appears.
2. To search the entire library:
  - a. Click the Full Library **HTML** link.  
The Overview page appears.
  - b. Enter keywords in the Search field in the upper right corner and click **Search**.  
Search results display.
  - c. Select a topic to review.
3. To search a specific book:
  - a. Select the book **HTML** link.
  - b. Enter keywords in the Search field in the upper left corner.
  - c. To narrow or broaden your search, select either **This Book** or **Entire Library**.  
Search results display.
  - d. Select a topic to review.

**Tip:** Selecting the **Hide Navigation** link hides the left Navigation pane. To display the Navigation pane again, click the left edge of the browser window or restart your browser.

### Using the Master Index in the Online Documentation Library

To search the master index in the online documentation library:

1. Click the **Help** icon.  
The Documentation page appears.
2. Click the Full Library **HTML** link.  
The Overview page appears.
3. Under Index, click the Master Index **HTML** link.
4. Click a letter to view specific topics.

Entries are organized by index term and book.

5. Click an index term.

**Tip:** You can also access the Master Index from within a specific book. Click the **Master Index** link under Quick Lookup.

## Downloading the Online Documentation Library

You can download the Oracle Application Express documentation library locally from the Oracle Application Express Documentation page.

To download the online documentation library:

1. Go to the Oracle Application Express Documentation page:

<http://www.oracle.com/technetwork/developer-tools/apex/application-express/apex-094287.html>

2. Locate the Oracle Application Express library you want to download and click the **ZIP** link.
3. Download ZIP file and extract it locally.
4. Open the extracted folder and click **welcome.html**.

The Oracle Application Express Documentation Library welcome page appears.

## Searching a Downloaded Documentation Library

You can use the provided Acrobat search index to fast search across PDFs in the downloaded library.

**Tip:** You must have access to the Internet to be able to use the global search capability and master index as described in "[Searching the Online Documentation Library](#)" on page 1-12 and "[Using the Master Index in the Online Documentation Library](#)" on page 1-12.

To perform a global search on the downloaded documentation:

1. Go to the location of the downloaded documentation.
2. Double click **index.pdx**.
3. Click **Shift+Ctrl+F**.

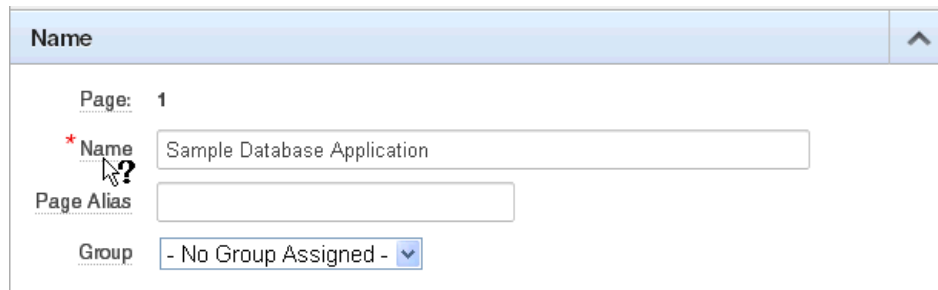
The Search window appears.

4. Enter your search criteria and click **Search**.

Search results appear.

## About Field-Level Help

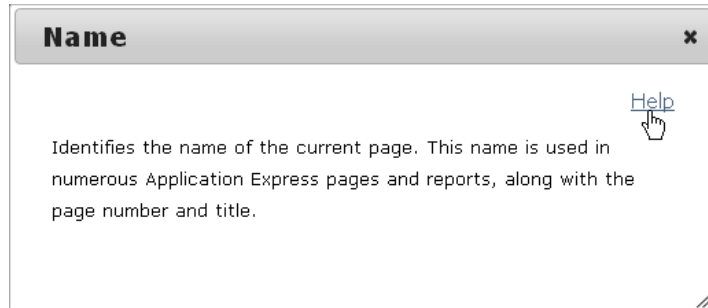
Most select lists, check boxes, items, and fields within the Oracle Application Express user interface include field-level Help. Items within the user interface that have Field-level Help have a light gray underline. If field-level Help is available, the cursor changes to an arrow and question mark when you pass your cursor over it.



The screenshot shows a property editor window titled "Name". It contains the following fields:

- Page:** 1
- \* Name:** A text input field containing "Sample Database Application". A mouse cursor is hovering over a question mark icon next to the label.
- Page Alias:** An empty text input field.
- Group:** A dropdown menu showing "- No Group Assigned -".

Click the item label to display a description in a separate window.



Clicking the **Help** link in the upper-right corner links to the online documentation library.

---

## Application Builder Concepts

This section provides basic conceptual information about Application Builder. Use Application Builder to create an application, composed of a set of HTML pages, based on database objects. Each application is a collection of pages linked together using tabs, buttons, or hypertext links.

### Topics:

- [What is an Oracle Application Express Application?](#)
- [What Is a Page?](#)
- [Understanding Page Processing and Page Rendering](#)
- [Understanding Session State Management](#)
- [Understanding URL Syntax](#)
- [Managing Session State Values](#)
- [Understanding Substitution Strings](#)

**See Also:** ["Using Application Builder"](#) on page 6-1

## What is an Oracle Application Express Application?

An Oracle Application Express application enables you to manage and display data from an Oracle database. You build an application using Application Builder. Using Application Builder you can create two different types of applications: database applications and Websheet applications.

### Topics:

- [Understanding the Difference Between Database and Websheet Applications](#)
- [About the Create Application Wizard](#)

**See Also:** ["Using Application Builder"](#) on page 6-1

## Understanding the Difference Between Database and Websheet Applications

An application is an HTML interface that exists on top of database objects such as tables or procedures. You create both database applications and Websheet applications using the Create Application Wizard. The main difference between these two types of applications is the intended audience. While database applications are geared toward application developers, Websheet applications are designed for end users with no development experience.

### About Database Applications

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

To create a database application, an application developer runs wizards 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, check boxes, 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. See "[About Database Applications](#)" on page 7-1.

### About Websheet Applications

By creating Websheet applications, end users can manage structured and unstructured data without developer assistance. Page sections contain unstructured data which can be edited using a WYSIWYG editor. Data Grids enable users to manage structured data without the need for writing SQL. Using runtime dialog boxes, users can add columns, rename columns, and validations. Each page and row of data grid data can be annotated with files, tags, notes, and links. Pages can contain sections, reports, and data grids and everything can be linked together using navigation. All information is searchable and completely controlled by the end-user. See "[About Websheet Applications](#)" on page 5-1.

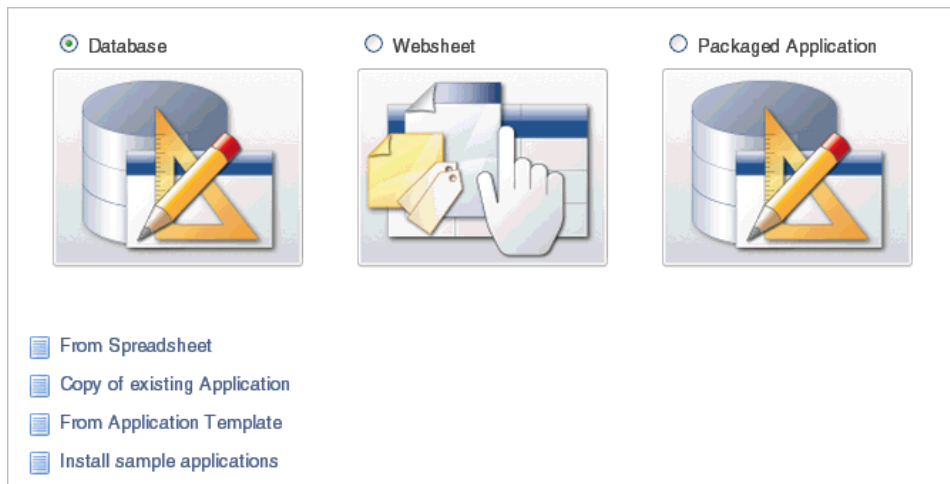
**Tip:** For more information on applications, click the **Learn More** link on the Application Express home page

## About the Create Application Wizard

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

### Key Decision Points in the Create Application Wizard

When you run the Create Application Wizard, the wizard prompts you to choose the type of application you want to create.



Options include:

- **Database.** Database applications enable developers to have full control over all aspects of development process and final application functionality. With database applications, developers can directly leverage their SQL and PL/SQL programming skills. Database applications use declarative control over flow control and support full user interface controls through the use of templates and themes. See ["About Database Applications"](#) on page 7-1.
- **Websheet.** Websheet applications enable users to build data centric applications without any SQL programming knowledge. Websheet applications are simplified and support pages, data grids, and reports. These applications are easy to build and support community contributions. For more information on Websheet applications, click the **Learn More** link on the Application Express home page. See ["About Websheet Applications"](#) on page 5-1.
- **Packaged Application.** Packaged applications are fully functional applications that have been designed to address a specific business need. You can install, run, and use packaged applications as is, or unlock productivity applications to customize the solution provided or analyze them to better understand how to use Application Builder to build specific types of functionality. See ["About Packaged Applications"](#) on page 3-1.

**See Also:** ["Creating an Application from a Spreadsheet"](#) on page 7-6, ["Copying a Database Application"](#) on page 7-7, ["Creating a Database Application from a Template"](#) on page 7-9, and ["Installing a Packaged Application"](#) on page 3-3

## What Is a Page?

A page is the basic building block of an application. When you build an application in Application Builder, you create pages that contain user interface elements, such as tabs, lists, buttons, items, and regions.

Page creation wizards automatically add controls to a Page Definition and you can add controls to a page in the Page Definition

To view the Page Definition of an existing page:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. Select a page.

The Page Definition appears and is divided into three main sections:

- **Page Rendering** lists user interface controls and logic that are executed when a page is rendered. Page Rendering is the process of generating a page from the database. See ["Using Page Rendering Icons"](#) on page 8-10.
- **Page Processing** lists logic controls (such as computations and processes) that are evaluated and executed when the page is processed. See ["Using Page Processing Icons"](#) on page 8-10.
- **Shared Components** lists common components that can be used by one or more pages within an application. See ["Using Shared Components Icons"](#) on page 8-11.

**See Also:** ["About the Page Definition"](#) on page 8-1 and ["Editing a Page in Component View"](#) on page 8-8

## Understanding Page Processing and Page Rendering

When you create an application in Application Builder, you link pages together using tabs, buttons, or hypertext links. Each page can have buttons and items and can include application logic. You can branch from one page to the next using conditional navigation, perform calculations and validations, and display reports, calendars, and charts. You can generate reports, charts, and forms using built-in wizards, static HTML, or deliver more custom rendering with PL/SQL programming.

### Topics:

- [How the Application Express Engine Renders and Processes Pages](#)
- [Understanding Conditional Rendering and Processing](#)
- [Verifying User Identity](#)
- [Controlling Access to Controls and Components](#)

## How the Application Express Engine Renders and Processes Pages

The Application Express 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 Application Express engine. When you run an application, the Application Express engine relies on two processes:

- **Show Page** is the page rendering process. It assembles all the page attributes (including regions, items, and buttons) into a viewable HTML page.
- **Accept Page** performs page processing. It performs any computations, validations, processes, and branching.

When you request a page using a URL, the engine is running **Show Page**. When you submit a page, the Application Express 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.

## Understanding Conditional Rendering and Processing

A condition is a small unit of logic that helps you control the display of regions, items, buttons, charts, 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 page control (such as a 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 by editing the control or component and making a selection from the Condition Type attribute. Depending upon the Condition Type you select, you enter the appropriate values in the Expressions fields. The condition evaluates to true or false based on the values you enter in the Expression fields.



---

**Note:** Whether you use the Expression fields depends upon the selected condition type. Some condition types do not require values in either field, others require a value only for Expression 1, and other condition types require values in both fields. Although these fields are labeled "Expression 1" and "Expression 2", the values for a given condition type do not necessarily conform to any formal definition of the term **expression**. They are simply text values appropriate for the selected condition type.

---

**Conditions**

Condition Type

Value of User Preference in Expression 1 = Expression 2

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

Expression 1

Expression 2

To view a complete list of all available conditions for a given component or control, click the arrow to the right of the Condition Type list. Shortcuts to common selections appear directly beneath the list. If your condition requires an expression, enter it in the appropriate field.

The following sections offer examples of some commonly used condition types.

**See Also:** [Appendix C, "Available Conditions"](#) on page C-1 for a detailed listing of available condition types

### Current Page in Expression 1

**Current page in Expression 1** evaluates to true if the current page number is contained within the comma-delimited list of pages in Expression 1. For example:

3,100,203

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

### Exists

**Exists (SQL query returns at least one row)** is expressed as a SQL query. If the query returns at least one row, 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 item 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:** ["About Bind Variable Syntax"](#) on page 2-16

### PL/SQL Expression

Use **PL/SQL 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.

## 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 Application Express 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"](#) on page 15-25 for more information

## 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"](#) on page 15-37

## Understanding Session State Management

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. In addition, 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 Application Express transparently maintains session state and provides developers with the ability to get and set session state values from any page in the application.

### Topics:

- [What Is a Session?](#)

- [Understanding Session IDs](#)
- [Referencing Session State](#)

## 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 Application Express 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 browsers.

Sessions are logically and physically distinct from Oracle database sessions used to service page requests. A user runs an application in a single Oracle Application Express session from log in to log out with a typical duration measured in minutes or hours. Each page requested during that session results in the Application Express 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 Application Express Administration Guide*

## Understanding Session IDs

The Application Express 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, for example:

`http://apex.somewhere.com/pls/apex/f?p=4350:1:220883407765693447`

In this example, the session ID is 220883407765693447.

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 Application Express engine during authentication and is maintained for the life of the application (or browser) session.

Oracle Application Express 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 the URL that Displays for a Page" on page 2-9

## Viewing Session State

The behavior of an Oracle Application Express application is usually driven by values in session state. For example, a button may display conditionally based on the value of an item session state. You can view the session state for a page by clicking **Session** on the Developer toolbar.

### About the Session State Page

The Session State page provides valuable information about the session in which the application is currently running. To locate a specific page, enter the page number in the page field and click **Go**. [Table 2–1](#) describes the various types of information available on the Session State page.

**Table 2–1 Information Available on the Session State Page**

Heading	Description
Application	Identifies the application name.
Session	Summarizes session state for the current session.
User	Identifies the current user.
Workspace	Identifies the current workspace ID.
Browser Language	Identifies the current browser language.
Page Items	<p>Identify attributes of the page item, including the application ID, page number, item name, how the item displays (for example, check box, date picker, display only, text field, hidden, popup, radio group, and so on), the item value in session state, and status.</p> <p>The Status column indicates the status of the session state. Available values include:</p> <ul style="list-style-type: none"> <li>■ I - Inserted</li> <li>■ U - Updated</li> <li>■ R - Reset</li> </ul> <p><b>See Also:</b> <a href="#">"Understanding Page-Level Items"</a> on page 7-55</p>
Application Items	<p>Application items are items that do not reside on a page. Application items are session state variables without the associated user interface properties.</p> <p><b>See Also:</b> <a href="#">"Understanding Application-Level Items"</a> on page 7-74 and <a href="#">"Understanding Substitution Strings"</a> on page 2-17 for information about referencing item values</p>

**See Also:** ["Managing Session State Values"](#) on page 2-13

## Understanding URL Syntax

The URL that displays for each page identifies the location of Oracle Application Express, the address of Oracle Application Express, the application ID, the page number, and the session ID.

The **application ID** is a unique number that identifies each application. Similarly, the **page number** uniquely identifies each page within an application. Applications and pages may also have alphanumeric aliases. Application aliases are unique within a workspace and page aliases are unique within each application. When you run an application, the Application Express engine generates a session number that serves as a key to the user's session state.

### Topics:

- [Understanding the URL that Displays for a Page](#)

- [Using f?p Syntax to Link Pages](#)
- [Calling a Page Using an Application and Page Alias](#)
- [Calling a Page from a Button URL](#)
- [Facilitating Bookmarks by Using Zero as the Session ID](#)

## Understanding the URL that Displays for a Page

The URL that displays for each page indicates the location of Oracle Application Express and identifies the address of Oracle Application Express, the application ID, page number, and session ID. For example:

```
http://apex.somewhere.com/pls/apex/f?p=4350:1:220883407765693447
```

This example indicates:

- `apex.somewhere.com` is the URL of the server
- `pls` is the indicator to use the `mod_plsql` cartridge
- `apex` is the database access descriptor (DAD) name. The DAD describes how HTTP Server connects to the database server so that it can fulfill an HTTP request. The default value is `apex`.
- `f?p=` is a prefix used by Oracle Application Express
- `4350` is the application being called
- `1` is the page within the application to be displayed
- `220883407765693447` is the session number

**See Also:** ["About Publishing the Database Application URL"](#) on page 16-32

## Using f?p Syntax to Link Pages

You can create links between pages in your application using the following syntax:

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

[Table 2–2](#) describes the arguments you can pass when using `f?p` syntax.

**Table 2–2** *f?p Syntax Arguments*

Syntax	Description
App	Indicates an application ID or alphanumeric alias.
Page	Indicates a page number or alphanumeric alias.
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 style="list-style-type: none"> <li>■ Short substitution string: <code>&amp;SESSION</code>.</li> <li>■ PL/SQL: <code>V ( 'SESSION' )</code></li> <li>■ Bind variable: <code>:APP_SESSION</code></li> </ul>

**Table 2–2 (Cont.) f?p Syntax Arguments**

Syntax	Description
Request	<p>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:</p> <ul style="list-style-type: none"> <li>■ Substitution string: &amp;REQUEST.</li> <li>■ PL/SQL: V ( ' REQUEST ' )</li> <li>■ Bind variable: :REQUEST</li> </ul>
Debug	<p>Displays application processing details. Valid values for the DEBUG flag include:</p> <ul style="list-style-type: none"> <li>■ YES.</li> <li>■ LEVEL<math>n</math></li> <li>■ NO</li> </ul> <p>Setting this flag to YES displays details about application processing. Setting this flag to LEVEL<math>n</math> (where <math>n</math> is between 1 and 9) controls the level of debug detail that displays. The value of YES equals LEVEL4.</p> <p>You can reference the Debug flag using the following syntax:</p> <ul style="list-style-type: none"> <li>■ Short substitution string: &amp;DEBUG.</li> <li>■ PL/SQL: V ( ' DEBUG ' )</li> <li>■ Bind variable: :DEBUG</li> </ul> <p><b>See Also:</b> <a href="#">"Debugging an Application"</a> on page 14-1</p>
ClearCache	<p>Clears the cache. This sets the value of items to null.</p> <p>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.</p> <p><b>See Also:</b> <a href="#">"Clearing Session State"</a> on page 2-14</p>
itemNames	Comma-delimited list of item names used to set session state with a URL.
itemValues	<p>List of item values used to set session state within a URL. Item values cannot include colons, but can contain commas if enclosed with backslashes. To pass a comma in an item value, enclose the characters with backslashes. For example:</p> <pre>\123,45\</pre>

**Table 2–2 (Cont.) f?p Syntax Arguments**

Syntax	Description
PrinterFriendly	<p>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:</p> <pre>V ( ' PRINTER_FRIENDLY' )</pre> <p>When referenced, the Application Express engine does not display tabs or navigation bars, and all items are displayed as text and not as form elements.</p>

It is important to understand how f?p syntax works. Application Builder includes many wizards that automatically create these references for you. However, you may have to create the syntax yourself in some situations. The following sections describe specific instances that use f?p syntax to link pages.

## Calling a Page Using an Application and Page Alias

Application and page aliases must consist of valid Oracle identifiers, cannot contain any whitespace, and are not case-sensitive. The following example calls a page using an application and a page alias from within an application. It runs the page *home* of the application *myapp* 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
```

## Calling 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.

**See Also:** ["Creating Buttons"](#) on page 10-63 and ["APP\\_SESSION"](#) on page 2-23

## Facilitating Bookmarks by Using Zero as the Session ID

If the pages within an application are public and do not require authentication, you help application users to bookmark pages by using zero as the session ID.

Application pages that do not require authentication can be accessed with "f?p" URLs where the session ID is zero (that is, the single digit 0). When you request a page by

either entering the URL in the browser or by clicking on a link having 0 for the session ID, the Application Express engine assigns a new session ID and sends a session cookie containing this new session ID to your browser. As you navigate through the application's public pages, you see that all generated links to public pages contain 0 for the session ID and all branches to public pages have new URLs that use 0 as the visible session ID. Behind the scenes, however, the Application Express engine uses the session ID in the cookie as the actual session ID to locate session state.

This feature is useful when you want to hide the actual session ID. By hiding the session ID, you enable users to bookmark pages without needing to include the session ID in the bookmark link. As an added benefit, using zero as the session ID also keeps the actual session ID hidden from search engines.

To use zero as the session ID in your application, must generate at least one link having a zero session ID. The use of this first link starts the zero session ID mechanism. One approach would be to provide a single static link with a zero session ID on the application home page. For example, where you might normally code the link to page 2 as `f?p=&APP_ID.:2:&APP_SESSION`, you would code `f?p=&APP_ID.:2:0`.

### About APEX\_UTIL.PREPARE\_URL

Oracle provides a utility function to enable developers to use PL/SQL to generate anchors to application pages using the `f?p` syntax. Use `APEX_UTIL.PREPARE_URL` whenever PL/SQL in the application produces `f?p` anchors that might require a zero session ID. To learn more, see "PREPARE\_URL" in *Oracle Application Express API Reference*.

### How the Zero Session ID Feature Works

The zero session ID feature provides support for pages having anchors in the HTML (such as in templates or HTML regions). When the Application Express engine encounters `f?p` anchors it recognizes them and replaces the session ID with zero, if certain criteria are met.

The Application Express engine replaces the session ID component with zero when it detects the following situations:

- The numeric ID of the current application
- One of the following patterns:
  - the all-uppercase or all-lowercase alphanumeric alias of the current application followed by a colon followed by the numeric ID of a public page in the current application
  - the all-uppercase or all-lowercase alphanumeric alias of a public page in the current application followed by a colon followed by `&APP_SESSION.` or `&SESSION.`

Examples of patterns in HTML that are candidates for zero-session ID replacement include:

- Page 10 is a public page:  
`"f?p=&APP_ID.:10:&APP_SESSION.`
- Page 100 is a public page:  
`"f?p=100:10:&APP_SESSION.`
- home is an alias for a public page:



```
"f?p=&APP_ID.:home:&APP_SESSION.
```

- HOME is an alias for a public page:

```
"f?p=&APP_ID.:HOME:&APP_SESSION.
```

- PEOPLE is an application alias and HOME is an alias for a public page:

```
"f?p=PEOPLE:HOME:&APP_SESSION
```

In these examples, the pattern `&APP_SESSION.` (or `&SESSION.`, not shown) is replaced with zero if the application is operating in zero-session ID mode and the user is a public user. Note that the user is considered a public user if the following PL/SQL expression is true:

```
:app_user in ('nobody', 'HTMLDB_PUBLIC_USER', 'PUBLIC_USER', 'ANONYMOUS', 'APEX_PUBLIC_USER') "
```

**Tip:** For links not prepared by the Application Express engine, use the built-in substitution `APP_SESSION_VISIBLE` which returns '0' for the session ID when a user is not authenticated to an application and they are using the zero-session ID feature of Oracle Application Express. See "[APP\\_SESSION\\_VISIBLE](#)" on page 2-23.

## Managing Session State Values

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

### Topics:

- [Referencing Session State](#)
- [Setting Session State](#)
- [Clearing Session State](#)
- [About Bind Variable Syntax](#)

**See Also:** "[Referencing Item Values](#)" on page 7-69

## Referencing Session State

You can 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 check box. [Table 2-3](#) describes the supported syntax for referencing item values.

**Table 2–3 Syntax for Referencing Item Values**

Type	Syntax	Description
SQL	Standard item syntax: :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.
	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.
PL/SQL	V ( 'MY_ITEM' )	Use PL/SQL syntax to reference an item value using the V function.  <b>See Also:</b> <i>Oracle Application Express API Reference</i>
PL/SQL	NV ( 'MY_NUMERIC_ITEM' )	Use standard PL/SQL syntax referencing the numeric item value using the NV function.  <b>See Also:</b> <i>Oracle Application Express API Reference</i>
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.

## Setting Session State

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

- Form submission. See ["Form Submission Example"](#) on page 2-14.
- Bind variable. See ["About Bind Variable Syntax"](#) on page 2-16.
- Computation. See ["Understanding Application Computations"](#) on page 8-59.
- f?p syntax. See ["Using f?p Syntax to Link Pages"](#) on page 2-9

### Form Submission Example

When a user submits a page, the Application Express 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 *P2\_PhoneNo*. On the second page, you want to display the information the user enters in the form.

When the page is submitted, Oracle Application Express captures the value entered in the phone number field and stores the value for future use. The phone number entered by the user can then be retrieved from session state by referencing the item associated with the field on the page.

## Clearing Session State

As you develop your applications, you may find it useful to clear the cached value for specific items, all items on a page, all pages in an application, or the current user session. Clearing a cached value resets the value to null. The topics that follow offer specific examples of clearing session state.

**Topics:**

- [Clearing Cache by Item](#)
- [Clearing Cache by Page](#)
- [Clearing Cache for an Entire Application](#)
- [Clearing Cache for the Current User Session](#)

**Clearing Cache by 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.

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
```

**Clearing Cache by Page**

Caching application items provides 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.

**Clearing Session Cache for Two Pages While 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)

**Clearing Session 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

**Clearing Session Cache on a Page and Passing Values to Multiple Items** This example is similar to the previous example, except it 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 debug information should be hidden (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

### Clearing Cache for an Entire Application

You can clear an application's cache by using f?p syntax and creating a `Clear Cache` argument using the keyword `APP`. For example:

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

---

---

**Note:** 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 Application Express 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.

---

---

### Clearing 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
```

## About Bind Variable Syntax

You can use bind variables syntax anywhere in Oracle Application Express where you are using SQL or PL/SQL to reference session state of a specified item. For example:

```
SELECT * FROM employees WHERE last_name like '%' || :SEARCH_STRING || '%'
```

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

### Using Bind Variables in Regions Based on a SQL Query or 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 THE\_DEPTNO into a region defined from a SQL Query.

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

**See Also:** ["Understanding Regions"](#) on page 12-3 for information about creating regions

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

For region types 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 `employee_id`, `first_name`, and `job_id` are populated by the values of `P1_EMP_ID`, `P1_NAME`, and `P1_JOB`.

## Understanding Substitution Strings

You can use substitution strings within a page template or region source to replace a character string with another value. As you design your application and enable users to edit items, you use substitution strings to pass information.

#### Topics:

- [Using Substitution Strings](#)
- [About Built-in Substitution Strings](#)

### Using Substitution Strings

You can use substitution strings in Application 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

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

#ABC#

To reference page or application items using substitution variables:

1. 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 an HTML region, a region title, an item label, or in any of numerous other contexts in which static text is used, for example:

&F101\_X.

Notice the required trailing period. When the page is rendered, Application Express engine replaces value the substitution string with the value of item F101\_X.

### Determining Substitution String Usage within a Given Template

You can determine what template-specific substitution strings are supported in which templates by viewing the template definition. See ["Customizing Templates"](#) on page 13-11.

## About Built-in Substitution Strings

Application Builder supports several built-in substitution strings. You may must reference these values to achieve specific types of functionality.

The following sections describe these substitution strings, when to use them, and what supported syntax is currently available. 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.

### Topics:

- [APEX\\$ROW\\_NUM](#)
- [APEX\\$ROW\\_SELECTOR](#)
- [APEX\\$ROW\\_STATUS](#)
- [APP\\_ID](#)
- [APP\\_ALIAS](#)
- [APP\\_DATE\\_TIME\\_FORMAT](#)
- [APP\\_IMAGES](#)
- [APP-NLS\\_DATE\\_FORMAT](#)
- [APP-NLS\\_TIMESTAMP\\_FORMAT](#)
- [APP-NLS\\_TIMESTAMP\\_TZ\\_FORMAT](#)
- [APP\\_IMAGES](#)
- [APP\\_PAGE\\_ID](#)
- [APP\\_SESSION](#)

- APP\_SESSION\_VISIBLE
- APP\_UNIQUE\_PAGE\_ID
- APP\_USER
- AUTHENTICATED\_URL\_PREFIX
- BROWSER\_LANGUAGE
- CURRENT\_PARENT\_TAB\_TEXT
- DEBUG
- HOME\_LINK
- IMAGE\_PREFIX
- LOGIN\_URL
- LOGOUT\_URL
- PRINTER\_FRIENDLY
- PROXY\_SERVER
- PUBLIC\_URL\_PREFIX
- REQUEST
- SCHEMA\_OWNER
- SQLERRM
- SYSDATE\_YYYYMMDD
- WORKSPACE\_IMAGES

**See Also:**

- ["Substitutions"](#) on page 7-20 for information about defining static substitution strings as an application attribute
- ["Establishing User Identity Through Authentication"](#) on page 15-25 for information about authentication

## 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 2–4](#) describes the supported syntax for referencing APEX\$ROW\_NUM.

**Table 2–4 APEX\$ROW\_NUM**

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

## APEX\$ROW\_SELECTOR

Use APEX\$ROW\_SELECTOR in validations, processes, and conditions associated with a tabular form to refer to the row selector check box in a tabular form. This placeholder returns X if the tabular form row selector check box of the currently processed tabular

form row is checked and NULL if it unchecked. [Table 2–5](#) describes the supported syntax for referencing APEX\$ROW\_SELECTOR.

**Table 2–5 APEX\$ROW\_SELECTOR**

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

## 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 C if created, U if updated, or D if deleted for the currently processed tabular form row. [Table 2–6](#) describes the supported syntax for referencing APEX\$ROW\_STATUS.

**Table 2–6 APEX\$ROW\_STATUS**

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

## APP\_ID

APP\_ID identifies the application ID of the currently executing application. [Table 2–7](#) describes the supported syntax for referencing APP\_ID.

**Table 2–7 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.

The following is an example of a substitution string reference:

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

## 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 2–8 describes the supported syntax for referencing APP\_ALIAS.

**Table 2–8 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>

## 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 2–9 describes the supported syntax for referencing APP\_DATE\_TIME\_FORMAT.

**Table 2–9 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.

## APP\_IMAGES

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 2–10 describes the supported syntax for referencing APP\_IMAGES.

**Table 2–10 APP\_IMAGES Syntax**

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

**See Also:** "IMAGE\_PREFIX" on page 2-27, "WORKSPACE\_IMAGES" on page 2-31, and "Managing Images" on page 12-17

**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 Application Express engine.

[Table 2–11](#) describes the supported syntax for referencing APP\_NLS\_DATE\_FORMAT.

**Table 2–11 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.

**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 Application Express engine. [Table 2–12](#) describes the supported syntax for referencing APP\_NLS\_TIMESTAMP\_FORMAT.

**Table 2–12 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.

**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 Application Express engine.

[Table 2–13](#) describes the supported syntax for referencing APP\_NLS\_TIMESTAMP\_TZ\_FORMAT.

**Table 2–13 APP\_NLS\_TIMESTAMP\_TZ\_FORMAT Syntax**

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

**APP\_PAGE\_ID**

APP\_PAGE\_ID is the current application 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 2–14](#) describes the supported syntax for referencing APP\_PAGE\_ID.

**Table 2–14 APP\_PAGE\_ID Syntax**

Reference Type	Syntax
Bind variable	: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.
```

## 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 2–15](#) describes the supported syntax for referencing APP\_SESSION.

**Table 2–15 APP\_SESSION Syntax**

Reference Type	Syntax
Bind variable	:APP_SESSION
PL/SQL	V ( ' APP_SESSION' )
Short PL/SQL	V ( 'SESSION' )
Substitution string	&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,'clickme') FROM DUAL;
```

## 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 Oracle Application Express. [Table 2–16](#) describes the supported syntax for referencing APP\_SESSION\_VISIBLE.

**Table 2–16 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;
```

## 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 2–17](#) describes the supported syntax for referencing APP\_UNIQUE\_PAGE\_ID.

**Table 2–17 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.

## 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 APP\_USER is set by the authentication

scheme, usually to the user name used during authentication. [Table 2–18](#) describes the supported syntax for referencing APP\_USER.

**Table 2–18 APP\_USER Syntax**

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

Consider the following examples:

- From within an HTML region:  
Hello you are logged in as &APP\_USER.
- Using PL/SQL:  

```
http.p('Hello you are logged in as'||V('APP_USER'));
```
- As a bind variable:  

```
SELECT * FROM some_table WHERE user_id = :APP_USER
```

**See Also:** ["Authentication"](#) on page 7-21 for information about the Public User attribute

## 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 2–19](#) describes the supported syntax for referencing AUTHENTICATED\_URL\_PREFIX.

**Table 2–19 AUTHENTICATED\_URL\_PREFIX Syntax**

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

## BROWSER\_LANGUAGE

BROWSER\_LANGUAGE refers to the web browser's current language preference. [Table 2–20](#) describes the supported syntax for referencing BROWSER\_LANGUAGE.

**Table 2–20 BROWSER\_LANGUAGE Syntax**

Reference Type	Syntax
Bind variable	:BROWSER_LANGUAGE
Direct PL/SQL	APEX_APPLICATION.G_BROWSER_LANGUAGE

**Table 2–20 (Cont.) BROWSER\_LANGUAGE Syntax**

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

**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 2–21](#) describes the supported syntax for referencing CURRENT\_PARENT\_TAB\_TEXT.

**Table 2–21 CURRENT\_PARENT\_TAB\_TEXT Syntax**

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

**DEBUG**

Valid values for the DEBUG flag are Yes or No. 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 Yes. [Table 2–22](#) describes the supported syntax for referencing DEBUG.

**Table 2–22 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 DEBUG:

```
f?p=100:1:&APP_SESSION.::&DEBUG
```

**HOME\_LINK**

HOME\_LINK is the home page of an application. The Application Express 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 Link on the Application Attributes page.

[Table 2–23](#) describes the supported syntax for referencing HOME\_LINK.

**Table 2–23 HOME\_LINK Syntax**

Reference Type	Syntax
Direct PL/SQL	APEX_APPLICATION.G_HOME_LINK

**Table 2–23 (Cont.) HOME\_LINK Syntax**

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

**See Also:** ["Authentication"](#) on page 7-21 for information about the Home Link attribute

## IMAGE\_PREFIX

The value of IMAGE\_PREFIX determines the virtual path the web server uses to point to the images directory distributed with Oracle Application Express. To reference uploaded images, use WORKSPACE\_IMAGES and APP\_IMAGES. [Table 2–24](#) describes the supported syntax for referencing IMAGE\_PREFIX.

**See Also:** ["APP\\_IMAGES"](#) on page 2-21, ["WORKSPACE\\_IMAGES"](#) on page 2-31, and ["Editing the Application Definition"](#) on page 7-14

**Table 2–24 IMAGE\_PREFIX Syntax**

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

## LOGIN\_URL

Use LOGIN\_URL to display a link to a login page for users that are not currently logged in. [Table 2–25](#) describes the supported syntax for LOGIN\_URL.

**See Also:** ["Authentication"](#) on page 7-21 and ["About the Security Attributes Page"](#) on page 7-21

**Table 2–25 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#

## 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 2–26](#) describes the supported syntax for referencing LOGOUT\_URL.

**Table 2–26 LOGOUT\_URL Syntax**

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

## PRINTER\_FRIENDLY

The value of PRINTER\_FRIENDLY determines if the Application Express 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 2–27](#) describes the supported syntax for referencing PRINTER\_FRIENDLY.

**Table 2–27 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.

## 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
```

## 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 2–28](#) describes the supported syntax for referencing PUBLIC\_URL\_PREFIX.

**Table 2–28 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#

## 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.

**Referencing the Value of `REQUEST`** `REQUEST` is typically referenced during Accept processing (that is, the processing that occurs when you post a page). [Table 2–29](#) describes the supported syntax for referencing `REQUEST`.

**Table 2–29** *REQUEST Syntax*

Reference Type	Syntax
Bind variable	: <code>REQUEST</code>
Direct PL/SQL	<code>APEX_APPLICATION.G_REQUEST</code>
PL/SQL	<code>V ( 'REQUEST' )</code>
Substitution string	<code>&amp;REQUEST</code> <code>&amp;REQUEST.</code> (exact syntax match)

**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`.

**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.

**Referencing `REQUEST` Using Declarative Conditions** It is common to reference `REQUEST` using conditions. For example, you may want to reset pagination when a user clicks **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**.

**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
    http.p('hello');
END IF;
```

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

**See Also:**

- *Oracle Database Development Guide* for information about developing web applications with PL/SQL
- *Oracle Database PL/SQL Packages and Types Reference* for information about http packages

## SCHEMA OWNER

If you are generating calls to applications from within your PL/SQL code, you may must reference the owner of the Oracle Application Express 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).

## SQLERRM

`SQLERRM` is a template substitution only available in the Applications Region Error Message. The following describes the correct syntax for a region template substitution reference:

```
#SQLERRM#
```

## 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 2–30** ***SYSDATE\_YYYYMMDD Syntax***

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

**WORKSPACE\_IMAGES**

Use this substitution string to reference uploaded images, JavaScript, and cascading style sheets that are shared over many applications within a workspace. [Table 2–31](#) describes the supported syntax for referencing `WORKSPACE_IMAGES`.

**Table 2–31** ***WORKSPACE\_IMAGES Syntax***

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

**See Also:** ["APP\\_IMAGES"](#) on page 2-21 and ["IMAGE\\_PREFIX"](#) on page 2-27



---

## Utilizing Packaged Applications

This section describes how to install and run the packaged applications available with Oracle Application Express.

### Topics:

- [About Packaged Applications](#)
- [Managing Packaged Applications](#)
- [About Sample Database Application](#)
- [About Sample Websheet - AnyCo IT Department](#)

**See Also:** "Disabling the Creation of Sample Applications in a New Workspace" in *Oracle Application Express Administration Guide* and "Downloading Public Packaged Applications and Sample Code" in *Oracle Database 2 Day + Application Express Developer's Guide*

### About Packaged Applications

Oracle Application Express includes two types of packaged applications:

- Sample applications
- Productivity applications

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

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

### Managing Packaged Applications

This section describes how to view, install, run, and remove packaged applications.

### Topics:

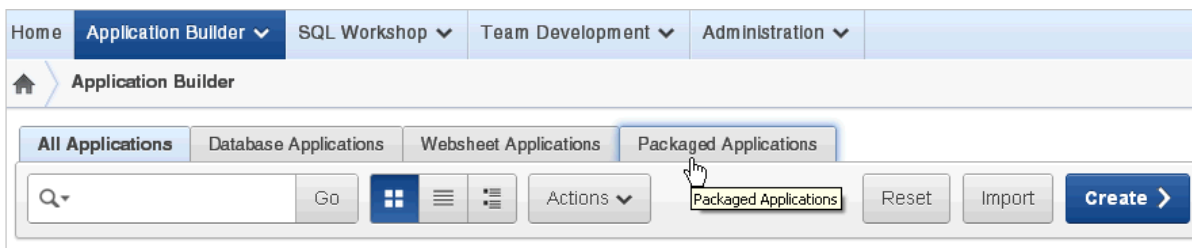
- [Accessing the Packaged Applications Page](#)
- [Installing a Packaged Application](#)
- [Running an Installed Packaged Application](#)

- [Removing an Installed Packaged Application](#)
- [Unlocking an Installed Productivity Application](#)
- [Exporting an Installed Packaged Application](#)
- [Changing Authentication for an Installed Packaged Application](#)
- [Updating a Packaged Application](#)

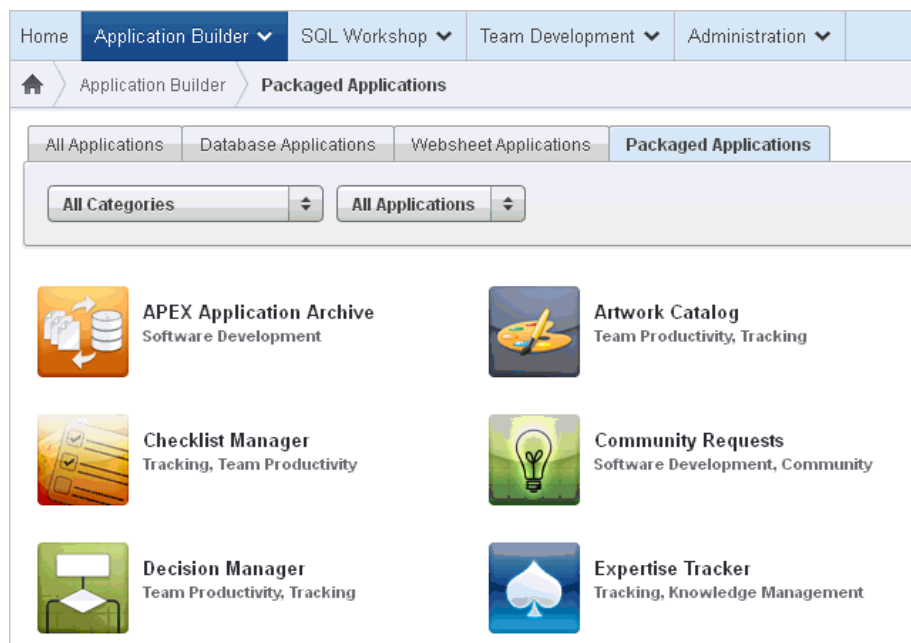
## Accessing the Packaged Applications Page

To access the Packaged Applications page:

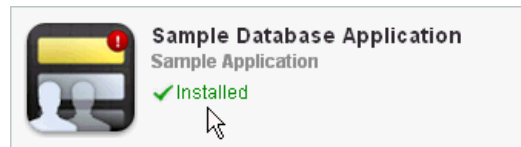
1. Log in to Oracle Application Express.  
The Workspace home page appears.
2. Click the **Application Builder** icon.  
The Application Builder home page appears.
3. Select the **Packaged Applications** tab.



The Packaged Applications page appears.



Note that the application category (for example, Software Development or Sample Websheet) displays beneath the application title. You can identify installed applications by the green Installed tag that displays beneath the product category.



4. Use the following lists at the top of the page to filter the display:
  - Category - Sort by application category. Options include: Community, IT Management, Knowledge Management, Marketing, Project Management, Sample, Software Development, Team Productivity, Tracking, and so on.
  - Type - Sort by application type. Options include: All Applications, Only Installed, Not Installed, Database Applications, or Websheets
5. To view information about a packaged application, or install or remove a previously installed packaged application, click the application image.

## Installing a Packaged Application

To install a packaged application:

1. Go to the Packaged Applications page. See "[Accessing the Packaged Applications Page](#)" on page 3-2.

The Packaged Applications page appears.

2. Locate the application to be installed.

**Tip:** Use the Category and Type lists to filter the display.

3. Click the application image.

A summary page appears.

4. Click **Install Application**.

5. Select an Authentication scheme and click **Next**.

6. Click **Install Application** again.

A success message appears.

7. To run the application, click the **Run Application** icon.

8. Enter the appropriate login credentials:

- a. Username - Enter your workspace username.
- b. Password - Enter your workspace password.
- c. Click **Login**.

## Running an Installed Packaged Application

To run an installed packaged application:

1. Go to the Packaged Applications page. See "[Accessing the Packaged Applications Page](#)" on page 3-2.

The Packaged Applications page appears.

2. Locate the application.

**Tip:** Use the Category and Type lists to filter the display.

3. Click the application image.
4. Click **Run**.
5. Enter the appropriate login credentials:
  - a. Username - Enter your workspace username.
  - b. Password - Enter your workspace password.
  - c. Click **Login**.

## Removing an Installed Packaged Application

To run an installed packaged application:

1. Go to the Packaged Applications page. See ["Accessing the Packaged Applications Page"](#) on page 3-2.

The Packaged Applications page appears.

2. Locate the application to be removed.

**Tip:** Use the Category and Type lists to filter the display.

3. Click the application image.
4. Click **Remove**.
5. When prompted, click **Remove Application**.

## Unlocking an Installed Productivity Application

The main difference between a sample and productivity packaged application is the level of support. Once a productivity application is installed you must unlock it before you can edit it. By default, sample applications are fully editable.

**Note:** Unlocking a productivity application makes it ineligible for future upgrades or support by Oracle Support.

To unlock an installed productivity packaged application:

1. Go to the Packaged Applications page. See ["Accessing the Packaged Applications Page"](#) on page 3-2.

The Packaged Applications page appears.

2. Locate the application to be unlocked.

**Tip:** Use the Category and Type lists to filter the display.

3. Click the application image.
4. Click **Manage**.
5. Click **Unlock Application** and click **Next**.
6. When prompted, click **Unlock Application**.

## Exporting an Installed Packaged Application

If you wish to export a locked productivity application into a different instance then you need to generate scripts from the Packaged Applications tab. For example, in a



runtime-only environment you would need to create scripts to install the productivity application.

To export an installed packaged application:

1. Go to the Packaged Applications page. See "[Accessing the Packaged Applications Page](#)" on page 3-2.

The Packaged Applications page appears.

2. Locate and select the application to be exported.

**Tip:** Use the Category and Type lists to filter the display.

3. Click **Manage**.

4. Select **Export Application** and click **Next**.

5. On the Export Packaged Application page, click the download links:

- **Export Application Download**
- **Export Supporting Objects Download**

Each link downloads a SQL script.

6. Run the downloaded scripts to import the application and supporting objects in a new workspace.

**Tip:** You can run the downloaded scripts from SQL\*Plus, SQL Developer, or using Oracle Application Express SQL Scripts. To learn more, see "Using SQL Scripts" in *Oracle Application Express SQL Workshop Guide*.

## Changing Authentication for an Installed Packaged Application

To change the authentication for an installed packaged application:

1. Go to the Packaged Applications page. See "[Accessing the Packaged Applications Page](#)" on page 3-2.

The Packaged Applications page appears.

2. Locate and select the installed application.

3. Click **Manage**.

4. Select **Change Authentication** and click **Next**.

The Authentication Scheme page appears.

5. Under Name:

- a. Name - Enter the name used to reference the authentication scheme by other application developers.
- b. Scheme Type - Select a new authentication scheme.

6. Fill in the appropriate fields.

7. To learn more about a specific field, see item Help.

When help is available, the cursor changes to a question mark. See "[About Field-Level Help](#)" on page 1-13.

**See Also:** "[Establishing User Identity Through Authentication](#)" on page 15-25

## Updating a Packaged Application

You can update a packaged application if it has the message *Update Available* message adjacent to its name.

To update a packaged application:

1. Go to the Packaged Applications page. See "[Accessing the Packaged Applications Page](#)" on page 3-2.

The Packaged Applications page appears.

2. Locate and click the application to be updated.
3. Click **Update**.

The Update Application Wizard appears.

4. Click **Update Application**.

Once updated, the Packaged Application Updated page appears.

**See Also:** "[Running an Installed Packaged Application](#)" on page 3-3

## About Sample Database Application

This section describes the sample packaged application, *Sample Database Application*. Like all sample packaged applications, *Sample Database Application* is fully editable. This packaged application features an easy-to-use interface for viewing, updating, and searching order and customer information for clothing products. Users can navigate among the pages using the Home, Customers, Products, Orders, and Reports tabs.

### Topics:

- [Installing and Running Sample Database Application](#)
- [Understanding Sample Database Application](#)
- [Modifying Sample Database Application](#)

## Installing and Running Sample Database Application

To install *Sample Database Application*:

1. Go to the Packaged Applications page. See "[Accessing the Packaged Applications Page](#)" on page 3-2.

The Packaged Applications page appears.

2. From the Category list, select **Sample**.
3. From the Type list, select **Not Installed**.
4. Locate *Sample Database Application*.

**Tip:** Use the Category and Type lists to filter the display.

5. Click the application image.

A summary page appears.

6. Click **Install Application**.
7. Select an Authentication scheme and click **Next**.
8. Click **Install Application** again.

A success message appears.

9. To run the application, click the **Run Application** icon.
10. Enter the appropriate login credentials:
  - a. Username - Enter your workspace username.
  - b. Password - Enter your workspace password.
  - c. Click **Login**.

**See Also:** ["Running an Installed Packaged Application"](#) on page 3-3

## Understanding Sample Database Application

*Sample Database Application* demonstrates the following functionality:

- Examples of ways to display summary information, including a dial chart and summary reports
- Reports and forms for viewing, updating, and adding customers, products, and orders
- Flash charts and maps available in Oracle Application Express
- A Calendar report
- Mobile pages to replicate the majority of functionality available in the desktop pages

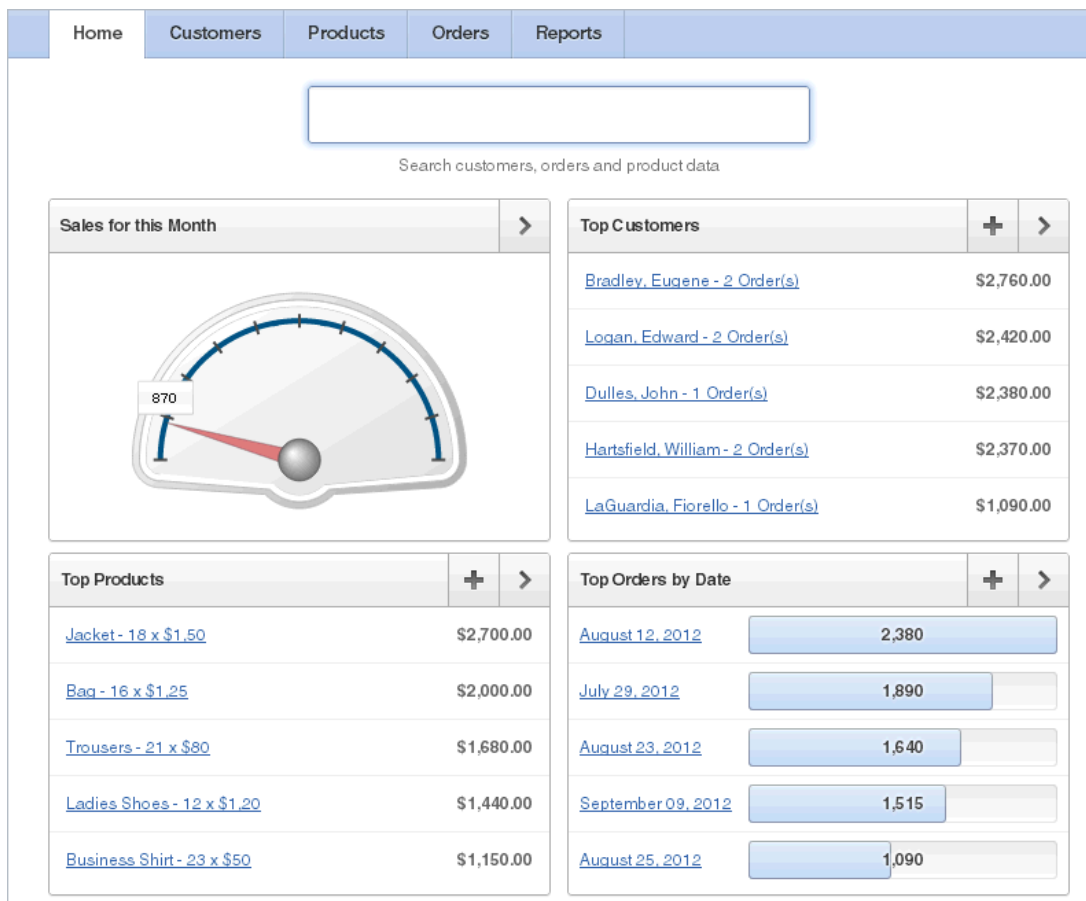
The following sections describe specific functionality available on each page.

### Topics:

- [About the Home Page](#)
- [About the Customers Page](#)
- [About the Products Page](#)
- [About the Orders Page](#)
- [About the Reports Page](#)
- [About the Administration Page](#)
- [About the Mobile Version](#)

**See Also:** ["What Is a Page?"](#) on page 2-3

## About the Home Page



The home page contains four main regions:

- Sales Quota for this Month
- Top Customers
- Top Products
- Top Orders by Date

**Sales for this Month** demonstrates the use of a Flash Dial chart. This chart displays a value based on an underlying SQL statement. Although not demonstrated in this example, you can enable an asynchronous refresh by editing the attributes of a Flash chart.

**Top Customers** is a report based on a SQL query and displays a subset of the information that appears on the Customers page. Users can link to additional details by clicking the customer name or by clicking the View Customer icon (a right arrow) in the upper right corner of the region.

**Top Products** is also a report based on an SQL query. This report displays a subset of the information that displays on the Products page. Users can link to product details by clicking the product name or by clicking the **View Products** icon in the upper right corner of the region.

**Top Orders by Date** displays orders by date and order amount. Users can view the Orders page by clicking the right arrow in the upper right corner.

**See Also:** ["Creating Reports"](#) on page 9-1, ["Creating Charts"](#) on page 10-46, ["Creating a Region"](#) on page 12-3, and ["Creating Lists"](#) on page 11-7

## About the Customers Page

The Customers page enables users to view and edit customer information.

Customer Name	Address	City	State	ZIP Code	Tags
<a href="#">Bradley, Eugene</a>	Schoephoester Road	Windsor Locks	CT	06096	REPEAT CUSTOMER
<a href="#">Dulles, John</a>	45020 Aviation Drive	Sterling	VA	20166	
<a href="#">Hartsfield, William</a>	6000 North Terminal Parkway	Atlanta	GA	30320	REPEAT CUSTOMER
<a href="#">LaGuardia, Fiorello</a>	Hangar Center, Third Floor	Flushing	NY	11371	
<a href="#">Lambert, Albert</a>	10701 Lambert International Blvd.	St. Louis	MO	63145	
<a href="#">Logan, Edward</a>	1 Harborside Drive	East Boston	MA	02128	REPEAT CUSTOMER
<a href="#">OHare, Frank</a>	10000 West OHare	Chicago	IL	60666	
<a href="#">Peters, Susan</a>	9000 Reston Parkway	Reston	VA	20191	
<a href="#">Uncle, Bob</a>	888 Mason St	San Francisco	CA	94110	
<a href="#">Williams, Peter</a>	1212 Technology Way	Denver	CO	80227	

**Customers** is an interactive report for tracking customer information. To search for a customer, enter a customer name in the Search field and click **Go**. To sort by customer name, click the column heading and then select the Up or Down arrow to sort in ascending or descending mode. See ["Customizing Interactive Reports"](#) on page 9-4.

You can change the appearance of the report using the Actions menu. See ["About the Actions Menu"](#) on page 9-6. To update existing customer information, click the **Edit** icon. To add a new customer, click the **Create Customer** button. To upload data, click the **Upload Data** button.

**See Also:** ["Customizing Interactive Reports"](#) on page 9-4

## About the Products Page

The Products page enables users to view and edit product information. The Products region displays product information. This region is based on a SQL query that uses a custom function for displaying images stored in the database.

Home

Customers

Products

Orders

Reports

Home


Products

Q-

Go

Actions ▾

Create Product >



Bag

Category: Accessories

Available: Yes

Last Date Sold: 9/28/2012

Description: Unisex bag suitable for carrying laptops with room for many additional items

Price

Units

Sales


Customers

\$125.00

16

\$2,000.00

6



Belt

Category: Accessories

Available: Yes

Last Date Sold: 9/14/2012

Description: Leather belt

Price

Units

Sales


Customers

\$30.00

11

\$330.00

3



Blouse

Category: Womens

Available: Yes

Last Date Sold: 9/28/2012

Description: Silk blouse ideal for all business women

Price

Units

Sales

Customers

\$60.00

16

\$960.00

5

By default, this page display in Detail view. You can change the view by clicking **View Icons** and **View Report** to the right of the Go button. In Report view, you can sort by product category by clicking the column heading and then selecting the Up or Down arrow to sort in ascending or descending mode. Users can change the appearance of the report using the Actions menu. See "[About the Actions Menu](#)" on page 9-6. To edit a product description, click the **Edit** icon. To add a new product, click the **Create Product** button at the top of the page.

### About the Orders Page

The Orders page enables users to view and edit customer orders.

Home

Customers

Products

Orders

Reports

Home

Orders

Report

Calendar

Q-

Go

Reports

1. Primary Report

Actions

Enter New Order

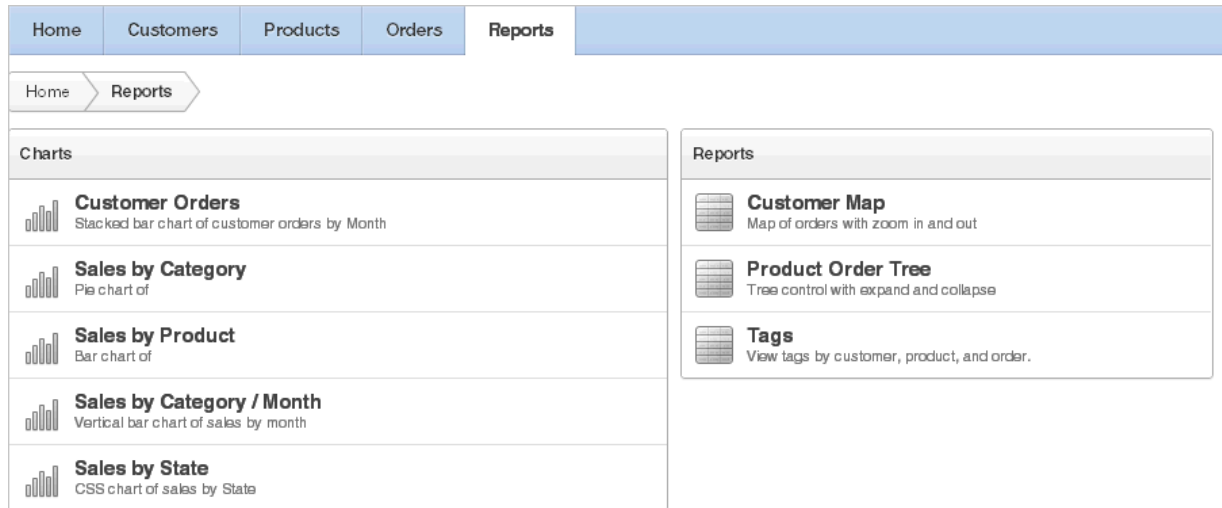
Order #	Customer Name	Sales Rep	Order Items	Order Total	Tags	Order Date	Order Month
0010	Bradley, Eugene	DEMO	3	\$870.00	-	10/1/2012	October 2012
0009	Hartfield, William	DEMO	3	\$730.00	-	9/28/2012	September 2012
0008	OHare, Frank	DEMO	4	\$1,060.00	-	9/22/2012	September 2012
0007	Logan, Edward	DEMO	7	\$905.00	-	9/14/2012	September 2012
0006	Logan, Edward	DEMO	4	\$1,515.00	-	9/9/2012	September 2012
0005	Lambert, Albert	DEMO	5	\$950.00	-	9/4/2012	September 2012

**My Orders** is an interactive report for tracking order information. To sort by column, click the column heading and then select the Up or Down arrow to sort in ascending or descending mode.

You can change the appearance of the report using the Actions menu. To view orders in a calendar, click **Calendar**. The Calendar appears. In the Order Calendar, you can link to a specific order, by clicking a calendar entry. To update existing customer information, click the **Edit** icon. To add a new order, click the **Enter New Order** button.

**See Also:** ["Creating Reports"](#) on page 9-1

## About the Reports Page



The Reports page enables you to view information in various formats, including bar chart, pie chart, map, tree, and tags. To view a report or chart, select it.

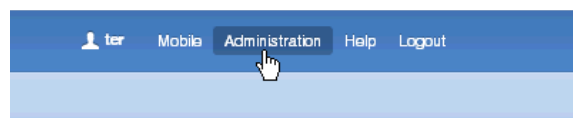
**See Also:** ["Creating Charts"](#) on page 10-46, ["Creating Maps"](#) on page 10-40, and ["Creating Trees"](#) on page 10-78

## About the Administration Page

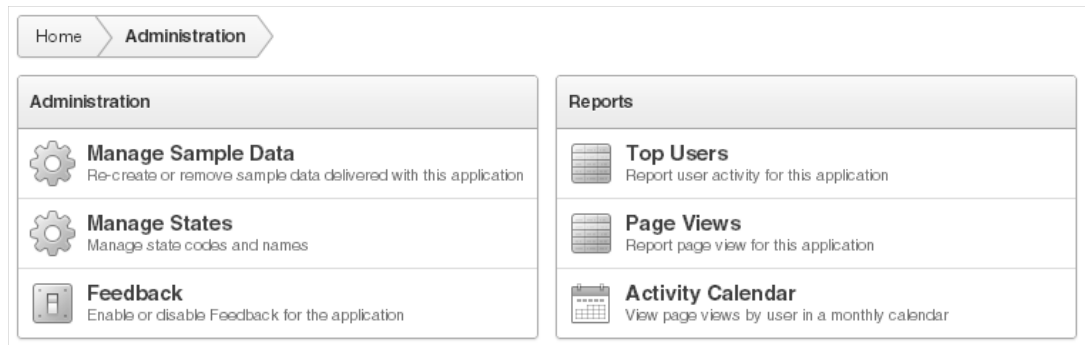
Clicking the **Administration** link in the upper right corner displays the Administration page. Use the Administration page to manage sample data, manage state codes and names, and enable user feedback capability. Use the reports on the right side of the page to view user activity, view pages views, and view page views in a monthly calendar.

To access the Administration page:

1. Go to the Packaged Applications page and run *Sample Database Application*. See ["Running an Installed Packaged Application"](#) on page 3-3.
2. On the home page, click the **Administration** link in the upper right corner.



The Administration page appears and contains two regions: Administration and Reports.



The Administration region contains these sections:

- **Manage Sample Data** - Remove or re-create the sample data that ships with *Sample Database Application*.
- **Manage States** - Add, edit, or delete states.
- **Feedback** - Enable, disable, and manage feedback for the application. To learn more, see "[Managing Feedback](#)" on page 4-17.

The Reports region contains these sections:

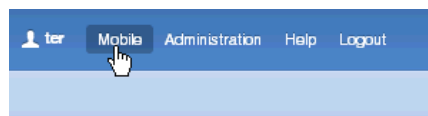
- **Top Users** - Displays use activity in the application.
- **Page Views** - Displays page views by user in the application.
- **Activity Calendar** - Displays page views by user in a calendar format.

### About the Mobile Version

Clicking the **Mobile** link in the upper right corner of the home page displays *Sample Database Application* in a format compatible with a mobile device. This mobile version replicates the majority of functionality available in the desktop version.

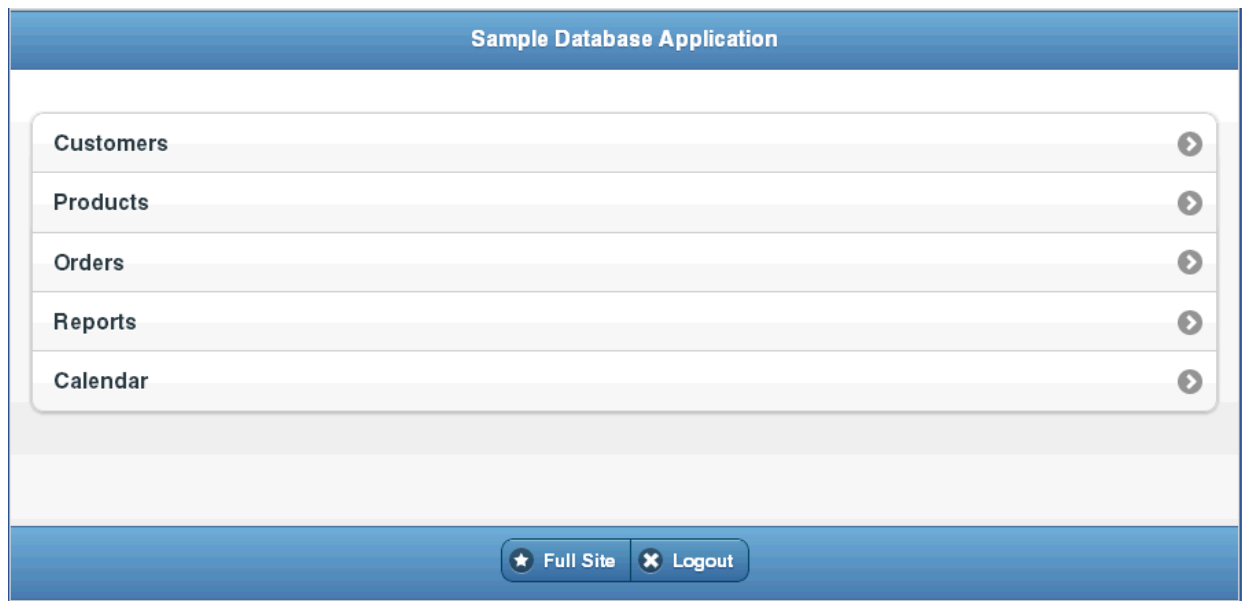
To access the mobile version of *Sample Database Application*:

1. Go to the Packaged Applications page and run *Sample Database Application*. See "[Running an Installed Packaged Application](#)" on page 3-3.
2. Click the **Mobile** link in the upper right corner.

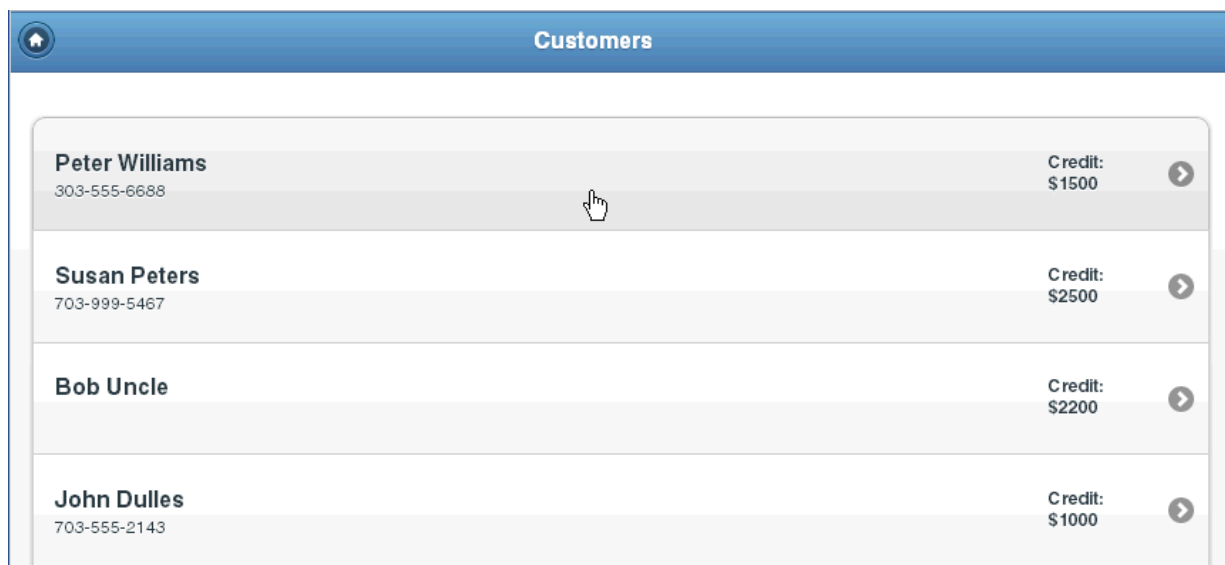


The Mobile version of *Sample Database Application* appears.





3. To view a page, select it.
4. To edit a specific customer or product, select it.



A form appears.

5. To return to the home page, click the **Home** icon in the upper left corner.  
The home page appears.
6. On the home page:
  - Click **Full Site** to return to the desktop version of *Sample Database Application*.
  - Click **Logout** to return to Application Builder.

## Modifying Sample Database Application

Once you understand the type of functionality available in a packaged application, such as *Sample Database Application*, the next step is to learn more about the

construction of each page. An efficient way to speed up the learning process is to analyze and deconstruct the pages in the packaged applications. If you happen to break something, you can quickly delete the packaged application and install it again. See ["Managing Packaged Applications"](#) on page 3-1.

**Tip:** Oracle Application Express includes two types of packaged applications: *sample* and *productivity* applications. By default, sample applications are fully editable. In contrast, you must unlock a productivity application before you can edit it. Unlocking a productivity packaged application makes it ineligible for future upgrades or support by Oracle Support.

#### Topics:

- [About the Developer Toolbar](#)
- [Editing Sample Database Application](#)

**See Also:** *Oracle Database 2 Day + Application Express Developer's Guide* for an introduction to building database application

### About the Developer Toolbar

You edit existing pages in an application, add pages to an application, or create entirely new applications using Application Builder.

The Developer toolbar displays at the bottom of any editable running page in a desktop application. Use the Developer toolbar to quickly edit the current application, the current running page, create a new page, control, or component, view session state, or turn edit links on or off.

The screenshot displays the Oracle Application Express interface. At the top, there is a navigation bar with tabs: Home, Customers, Products, Orders, and Reports. Below this is a breadcrumb trail: Home > Customers. A search bar with a magnifying glass icon and a 'Go' button is present, along with an 'Actions' dropdown menu, an 'Upload Data' button, and a 'Create Customer' button with a right arrow. The main content area features a table with the following data:

	Customer Name	Address	City	State	ZIP Code	Tags
	Dulles, John	45020 Aviation Drive	Sterling	VA	20166	
	Hartsfield, William	6000 North Terminal Parkway	Atlanta	GA	30320	REPEAT CUSTOMER
	Logan, Edward	1 Harborside Drive	East Boston	MA	02128	REPEAT CUSTOMER
	OHare, Frank	10000 West OHare	Chicago	IL	60666	
	LaGuardia, Fiorello	Hangar Center, Third Floor	Flushing	NY	11371	
	Lambert, Albert	10701 Lambert International Blvd.	St. Louis	MO	63145	

At the bottom, the Developer Toolbar is visible, containing links: Home, Application 100628, Edit Page 2, Create, Session, Caching, View Debug, Debug, Show Edit Links, and Show Grid. A mouse cursor is pointing at the 'Home' link, which has a tooltip that reads 'Application Express Home Page'.

The Developer toolbar consists of the following links:

- **Home** links you to the Workspace home page. See ["About the Workspace Home Page"](#) on page 1-9.
- **Application ID** links you to the Application home page. See ["About the Application Home Page"](#) on page 6-3.

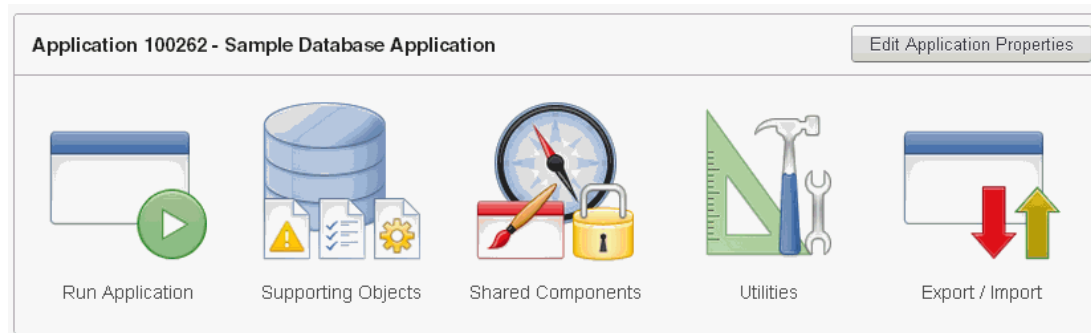
- **Edit Page** accesses the Page Definition for the current running page. See ["About the Page Definition"](#) on page 8-1.
- **Create** links to wizards for creating a page, region, page control (item, button, branch, computation, process, or validation), or a shared control (navigation bar icon, tab, list of values, list, or breadcrumb). See ["About Database Applications"](#) on page 7-1.
- **Session** links you to session state information for the current page. See ["Viewing Session State"](#) on page 2-7.
- **Caching** links to the Caching page. See ["Managing Cached Regions"](#) on page 12-10.
- **View Debug** displays the Debug window. See ["Accessing Debugging Mode"](#) on page 14-4.
- **Debug** toggles the page between Debug and No Debug mode. See ["Accessing Debugging Mode"](#) on page 14-4.
- **Show Edit Links** toggles between **Show Edit Links** and **Hide Edit Links**. Clicking **Show Edit Links** displays a small orange icon next to each editable object on the page. Each icon is orange and contains a triangle with two rules beneath it. Clicking the link displays another window in which to edit the object.
- **Show Grid** enables you see how regions and page items are positioned on a page if a grid layout is used.

**Note:** The Developer toolbar does not display on locked packaged applications pages or on jQuery Mobile Smartphone pages.

**See Also:** ["About the Developer Toolbar"](#) on page 8-19

### Editing Sample Database Application

To edit a running application, click the **Application** link on the Developer toolbar. The Application home page appears. The application ID and application name display at the top of the page.



You can run the current application, edit supporting objects, create shared components, or export and import information by clicking one of the following:

- **Run Application** submits the pages in the current application to the Application Express engine to render viewable HTML. See ["How the Application Express Engine Renders and Processes Pages"](#) on page 2-4.
- **Supporting Objects** links to the Supporting Objects page. See ["How to Create a Custom Packaged Application"](#) on page 16-5.

- **Shared Components** links to a list of shared components and user interface controls that can display or be applied on every page within an application. See ["Working with Shared Components"](#) on page 8-49.
- **Utilities** links to the Utilities page. Use this page to monitor developer activity, view dashboards, run Advisor, and view numerous other reports. See ["Using Application Builder Utilities"](#) on page 7-77.
- **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 ["Exporting an Application and Related Files"](#) on page 16-12.

The pages that comprise the application appear on the Application home page. To access a specific page, simply click it. To search for a specific page, enter a case insensitive query for the page title or page number in the Page field and click **Go**.

**See Also:** ["About the Application Home Page"](#) on page 6-1 and ["About the Page Definition"](#) on page 8-1

## About Sample Websheet - AnyCo IT Department

This section describes the packaged application, *Sample Websheet - AnyCo IT Department*. *Sample Websheet - AnyCo IT Department* highlights the features and capabilities of Websheets.

### Topics:

- [Installing and Running AnyCo IT Department](#)
- [About Websheet Navigation](#)
- [Understanding AnyCo IT Department](#)
- [Common Websheet User Interface Elements](#)
- [Modifying Websheet Content](#)

**See Also:** ["About Websheet Applications"](#) on page 5-1 to learn more about creating Websheet applications.

## Installing and Running AnyCo IT Department

To install and run *Sample Websheet - AnyCo IT Department*:

1. Go to the Packaged Applications page. See ["Accessing the Packaged Applications Page"](#) on page 3-2.  
The Packaged Applications page appears.
2. From the Category list, select **Sample**.
3. From the Type list, select **Websheets**.
4. Locate *Sample Websheet - AnyCo IT Department*.
5. Click the application image.  
A summary page appears.
6. Click **Install Application**.
7. Select an Authentication scheme and click **Next**.
8. Click **Install Application** again.

A success message appears.

9. To run the application, click the **Run Application** icon.

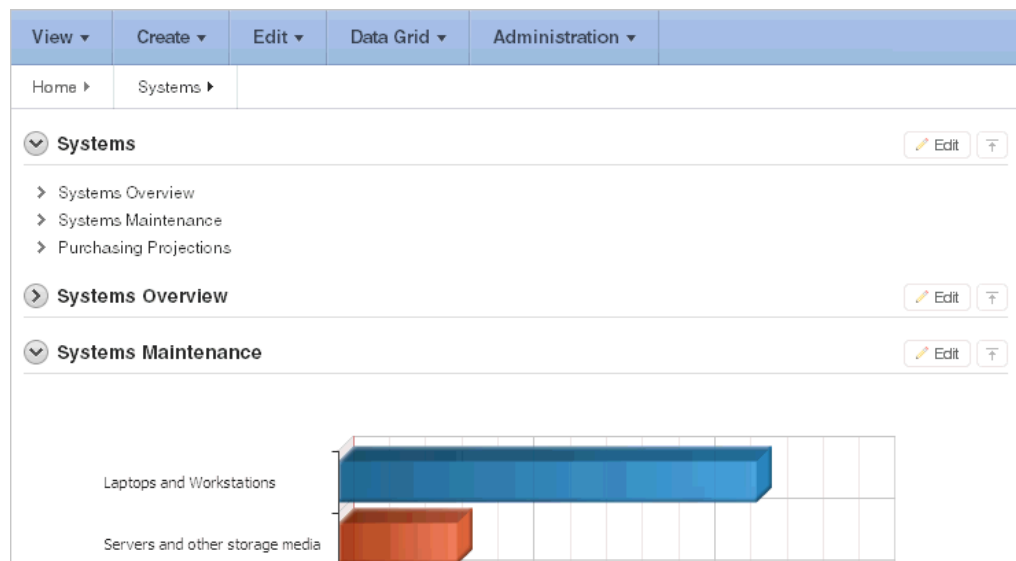
10. Enter the appropriate login credentials:

- a. Username - Enter your workspace username.
- b. Password - Enter your workspace password.
- c. Click **Login**.

The home page appears.

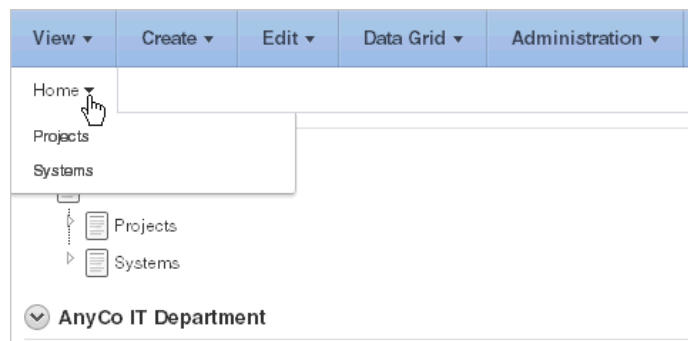
## About Websheet Navigation

Every Websheet contains common navigation elements that enable you to quickly move within a page or between pages. Each Websheet page is divided into sections. You can hide and unhide a page section by clicking the arrow to the left of the Section title. In the following example, Systems Overview is hidden.



## Using Breadcrumbs to Navigate Between Websheet Pages

A breadcrumb displays at the top of every Websheet page. Positioning the mouse over the **Home** breadcrumb displays a submenu of links to all the pages in the Websheet.



**See Also:** ["Viewing the Page Directory"](#) on page 5-47

## Understanding AnyCo IT Department

*Sample Websheet - AnyCo IT Department* demonstrates the following functionality:

- Examples of ways to share text, data, and images using a Websheet pages
- Hierarchical navigation between page sections and pages
- Formatted text that include easily formatted links
- Display of tabular data by creating Data Grids and displaying the content as reports, interactive report, or charts.

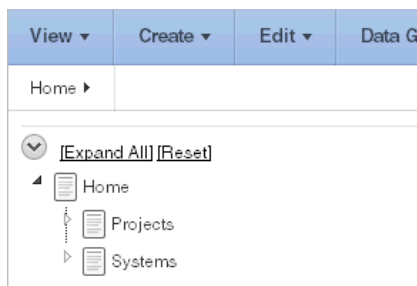
The following sections describe specific functionality available on each page.

### Topics:

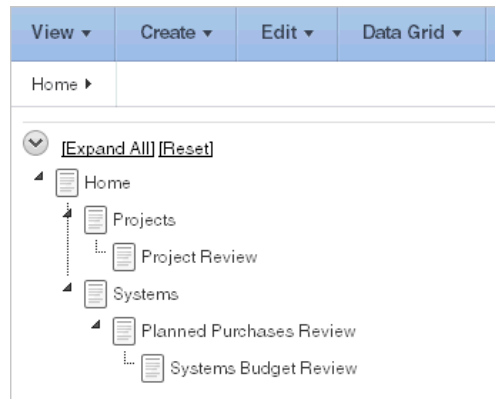
- [Understanding Navigation](#)
- [About the Home Page](#)
- [About the Project Review Page](#)
- [About the Systems Page](#)
- [About Planned Purchase Review](#)
- [About Systems Budget Review](#)

### Understanding Navigation

The hierarchical tree displays at the top of the home page enables you to navigate between Websheet pages. Click the arrow to the left of the Home breadcrumb to expand or collapse the tree. To learn more about adding navigation, see "[About Navigation Sections](#)" on page 5-14.



To view subsections (or children) within a section, click the arrow to the left of a section name. Click **Expand All** to view all pages and page subsections and **Reset** to return the tree to the default display. To link to another page, select the page name.



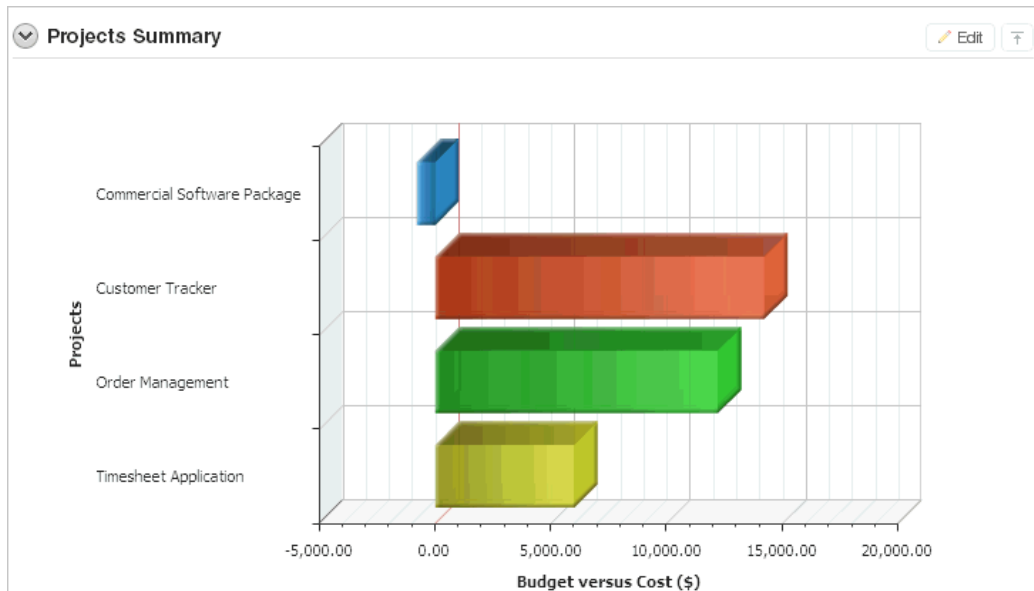
## About the Home Page

The *Sample Websheet - AnyCo IT Department* home page contains four sections:

- Page navigation tree
- AnyCo IT Department
- Projects Summary
- Systems Summary

**AnyCo IT Department** is a text section that includes links to other pages and an embedded image.

**Projects Summary** is a data grid that displays as 3D chart. Passing the cursor over a bar changes the color and displays a dollar amount.



**Systems Summary** is a report of hardware, software, and cloud services. The bottom of the section includes links to Systems Management report and to the Systems page.

**Systems Summary**

Systems include hardware, software and cloud services. The IT team has classified 6 items. Below is a summary of the Total Costs:

System	Name	Total Cost Incurred
Cloud	InitCloud	\$4,300.00
Hardware	Laptops and Workstations	\$115,800.00
Hardware	Printers, VoIP and Telephony	\$10,600.00
Hardware	Servers and other storage media	\$33,000.00
Software	OS and desktop tools	\$12,350.00
Software	Database, and modeling tool	\$18,400.00

For details on costs incurred, see [Systems Maintenance](#) . For more information on purchasing projections, see [Systems](#) .

**See Also:** ["Using SQL and SQLVALUE Syntax"](#) on page 5-32



## About the Projects Page

Home ▸

Projects ▸

▼ Projects Breakdown

Edit




⌵

Below are the major projects the IT department are involved with. Also see project summaries within [Project Review](#).

🔍 Search Report

Search

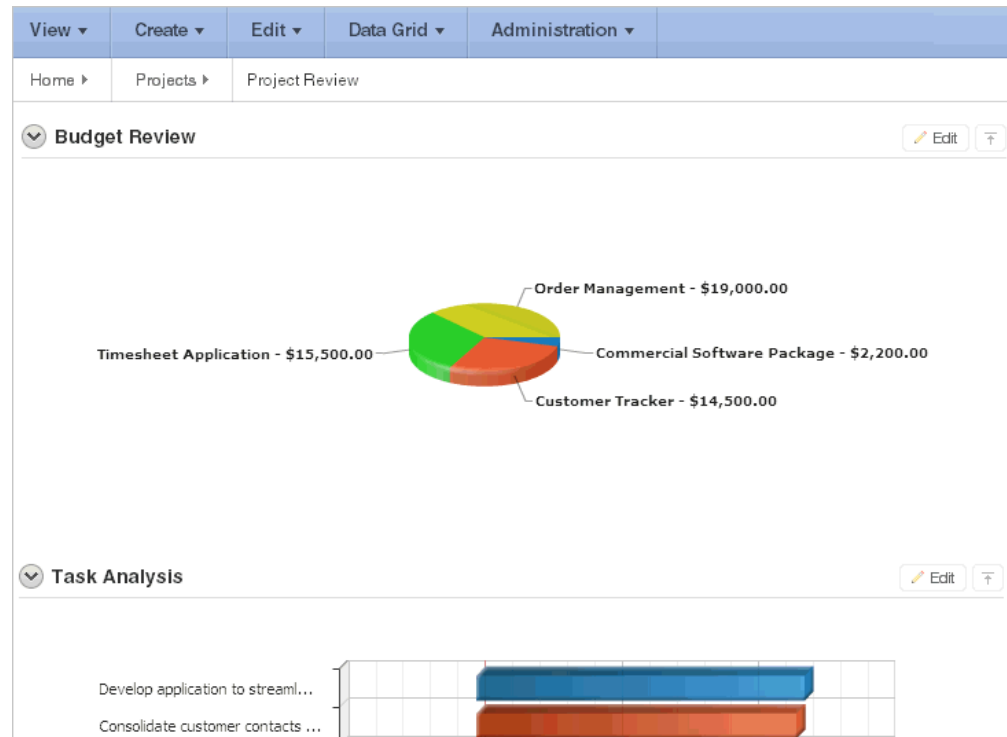
Add Row

	Project	Task	Start Date	End Date	Status	Assigned To	Cost	Budget
	Timesheet Application	Determine business rules	15-MAR-2010	15-NOV-2010	Open	Pam King	2500	4000
	Timesheet Application	Create prototype and trial testing	20-MAR-2010	30-NOV-2010	Open	James Cassidy	6000	10000
	Order Management	Develop application to streamline process	01-AUG-2010	18-DEC-2010	Open	Mark Nile	6000	18000

The Project contains one section, Projects Breakdown. The Projects Breakdown section includes a link to the Project Review page and an updatable report of major IT projects. To edit a specific project, click the **Edit Row** icon. To add another projects, click the **Add Row** icon.

**See Also:** ["Using SQL and SQLVALUE Syntax"](#) on page 5-32

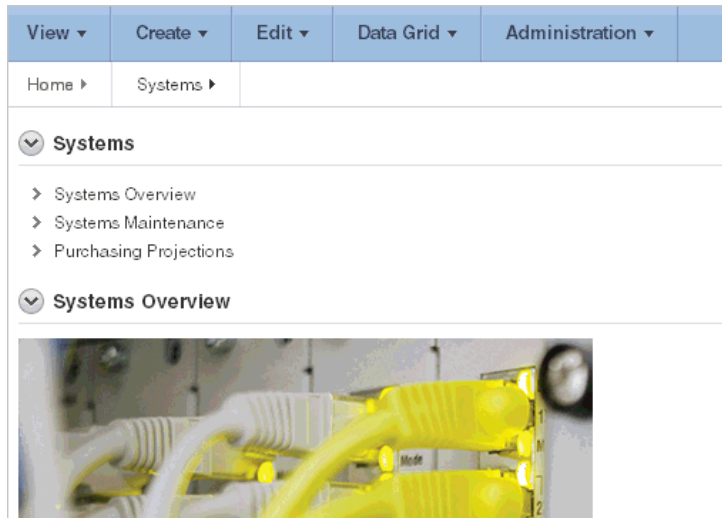
## About the Project Review Page



The Project Review page contains two sections, **Budget Review** and **Task Analysis**. Both sections are data grids that display as different types of 3-D charts.

**See Also:** ["About Chart Sections"](#) on page 5-28

## About the Systems Page



The Systems page contains three sections:

- System (navigation)
- System Overview
- Systems Maintenance
- Purchasing Projections

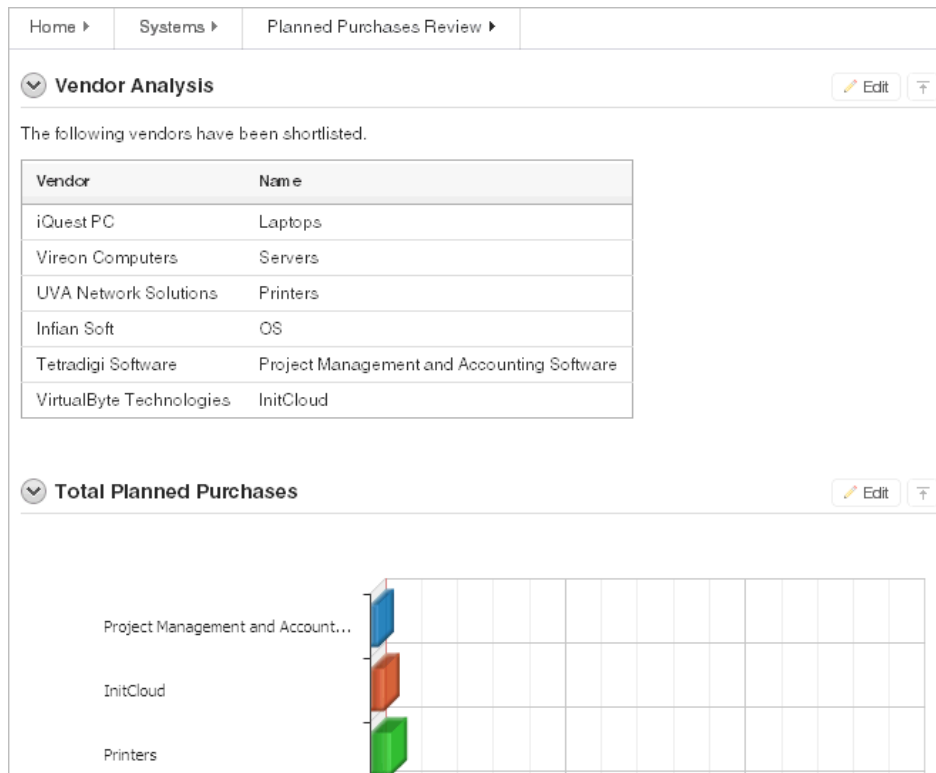
**System** is a navigation section that includes links to the sections, Systems Overview, Systems Maintenance, and Purchasing Projections.

**System Overview** is a text section that includes an embedded image and links to other pages.

**System Maintenance** is a data grid that displays as a 3D horizontal chart. Passing the cursor over a bar changes the color and displays a dollar amount.

**Purchasing Projections** features a report of planned purchases and a link to the Planned Purchases Review page. To add entries, click **Add Row**.

## About Planned Purchase Review



The Planned Purchase Review page contains two sections:

- Vendor Analysis
- Total Planned Purchases







**Vendor Analysis** is report of vendors.

**Total Planned Purchases** is a data grid that displays as 3D horizontal chart. Passing the cursor over a bar changes the color and displays a dollar amount.

## About Systems Budget Review

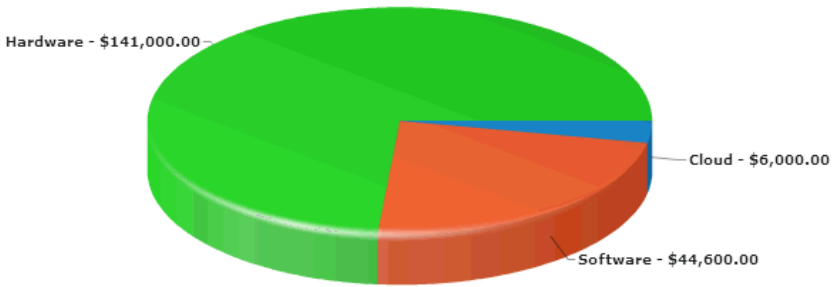
Annual Budget Allocation

The following is the item-wise annual budget allocation:

System	Name	Annual Budget
	Cloud InitCloud	\$10,000.00
	Hardware Servers	\$85,000.00
	Hardware Laptops	\$172,000.00
	Hardware Printers	\$28,000.00
	Software Project Management and Accounting Software	\$15,000.00
	Software OS	\$62,000.00

For information on item-wise total costs incurred, see [Systems Summary](#).

Remaining Budget for the Year



The Systems Budget Review page contains two sections:

- Annual Budget Allocation
- Remaining Budget for the Year

**Annual Budget Allocation** is a report budget categories. To update report item, click the **Edit Row** icon.

**Remaining Budget for the Year** is a data grid that displays as 3D pie chart. Passing the cursor over a pie section displays the dollar amount. Selecting a section, removes it slightly from the pie.

## Common Websheet User Interface Elements

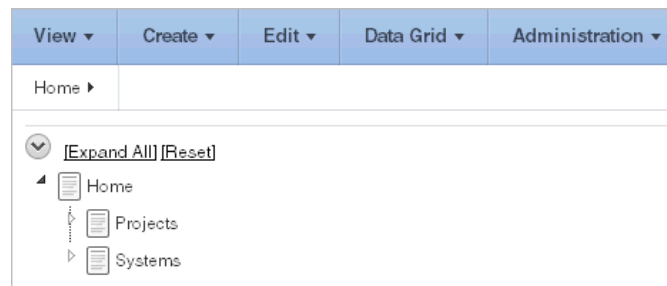
The sections that follow describe interface elements common of all Websheets.

### Topics:

- [About Websheet Menus](#)
- [About Websheet Search](#)
- [About the Control Panel](#)

- [About the Files Region](#)
- [About the Tags Region](#)
- [About the Notes Region](#)

## About Websheet Menus



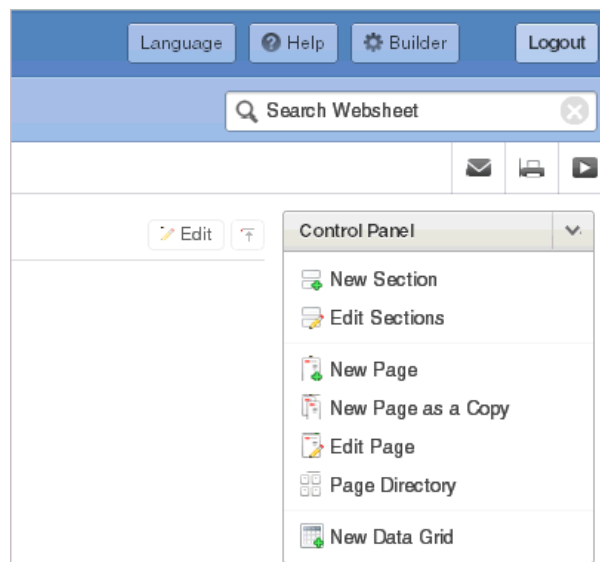
Five menus display at the top of the each Websheet:

- View
- Create
- Edit
- Data Grid
- Administration

Many of the create and edit options within these menus are duplicated on the Control Panel that displays on the right side of the page. To learn more, see "[About Websheet Applications](#)" on page 5-1.

## About Websheet Search

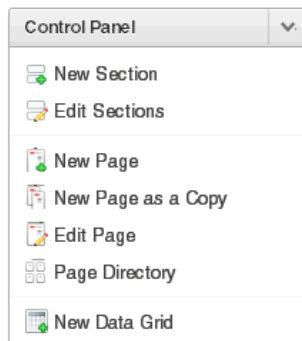
The Search Websheet field displays in the upper right of each Websheet page.



Use Search Websheet to perform case insensitive searches of application content. To learn more, see "[About Websheet Search](#)" on page 5-4.

## About the Control Panel

The Control Panel displays on the right side of each Websheet page and includes commands available in the Create, Edit, and View menus at the top of the page. To hide or display the Control Panel, click the arrow to the right of the region title.



The Websheet Control Panel contains the following options:

- New Sections. See ["About Adding and Editing Page Sections"](#) on page 5-10.
- Edit Sections. See ["About Adding and Editing Page Sections"](#) on page 5-10.
- New Page. See ["Adding a New Page"](#) on page 5-8.
- New Page as a Copy. See ["Copying an Existing Page"](#) on page 5-9.
- Edit Page. See ["Editing Page Details"](#) on page 5-9.
- Page Directory. See ["Viewing the Page Directory"](#) on page 5-47.
- New Data Grid. See ["Creating a Data Grid"](#) on page 5-16.

## About the Files Region

The Files region displays below the Control Panel. The Files region displays files currently upload to the current page. To hide or display the Control Panel, click the arrow to the right of the region title.

**See Also:** ["Managing Uploaded Files and Images"](#) on page 5-34

## About the Tags Region

Use the Tags region to enter tags that identify the current page and facilitate searching. To hide or display the Tags region, click the arrow to the right of the region title.

**See Also:** ["Adding Tags"](#) on page 5-36

## About the Notes Region

The Notes region displays notes associated with current page. To hide or display the Notes region, click the arrow to the right of the region title.

**See Also:** ["Adding Notes"](#) on page 5-37

## Modifying Websheet Content

Once you understand the type of functionality available in *AnyCo IT Department*, the next step is to learn more about the construction of each page. Analyzing the deconstruction of an application is an efficient way to speed up the learning process. If

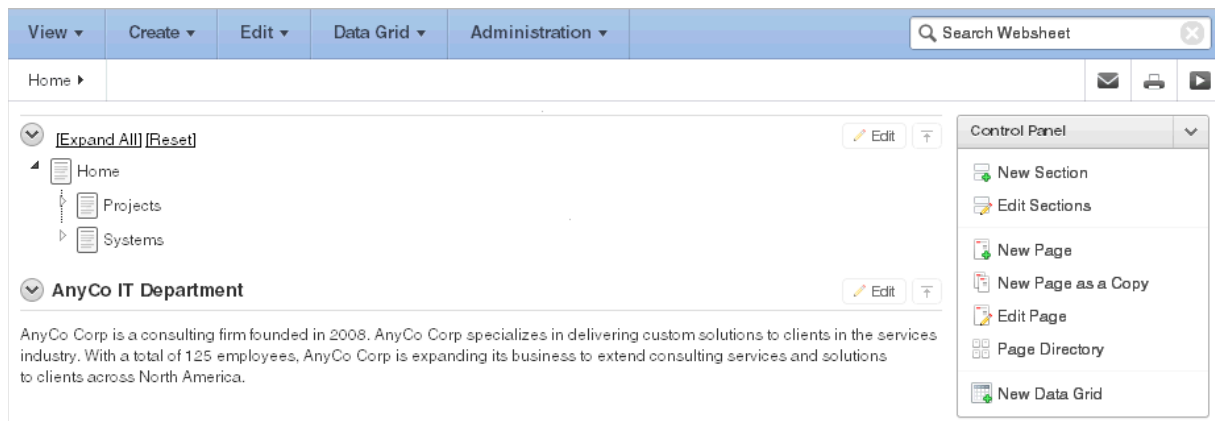
you break something, you can quickly delete the demonstration application and install it again. See ["Managing Packaged Applications"](#) on page 3-1.

**Tip:** Oracle Application Express includes two types of packaged applications: *sample* and *productivity* applications. By default, sample applications are fully editable. In contrast, you must unlock a productivity application before you can edit it. Unlocking a productivity packaged application makes it ineligible for future upgrades or support by Oracle Support.

The section that follows offers a high-level discussion of editing a Websheet. To learn more, see ["About Websheet Applications"](#) on page 5-1.

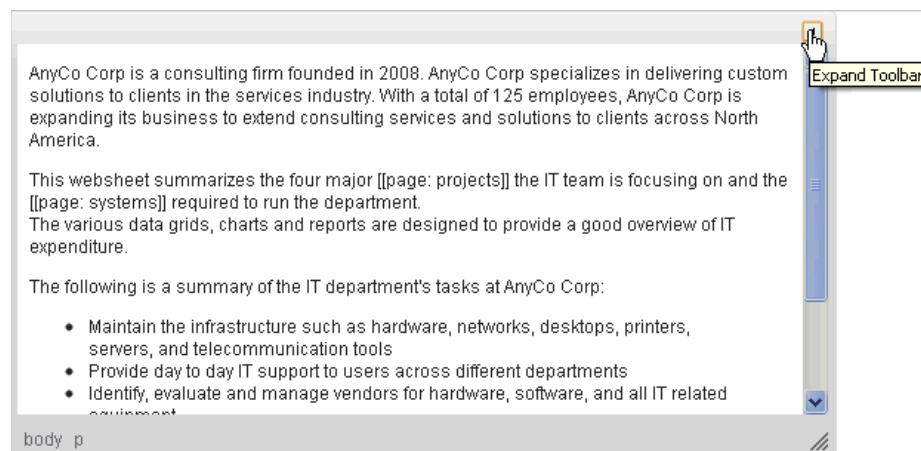
To update a Websheet section:

1. Run the Websheet as described in ["About Packaged Applications"](#) on page 1.
2. Click the Edit icon that displays in the upper right of the section.



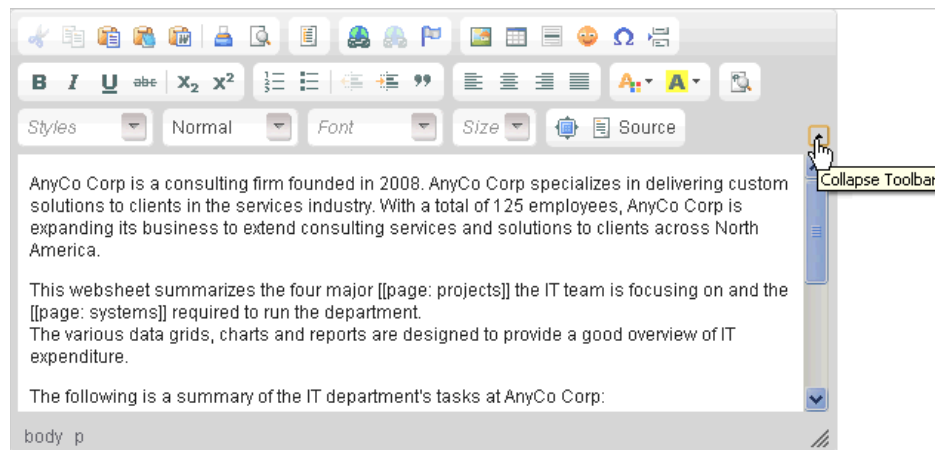
The Edit Section page appears. How you edit a specific section depends upon the section type.

3. Edit the fields provided.
4. To change the formatting, click the **Expand Toolbar** icon in the upper right corner.



The Toolbar appears. When you pass your cursor over an icon, a descriptive tooltip displays.

5. To hide the toolbar, click the **Collapse Toolbar** icon.



6. To save your changes, click **Apply Changes**.

**See Also:** ["About Adding and Editing Page Sections"](#) on page 5-10 to learn more about editing Websheets



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## Managing the Development Process

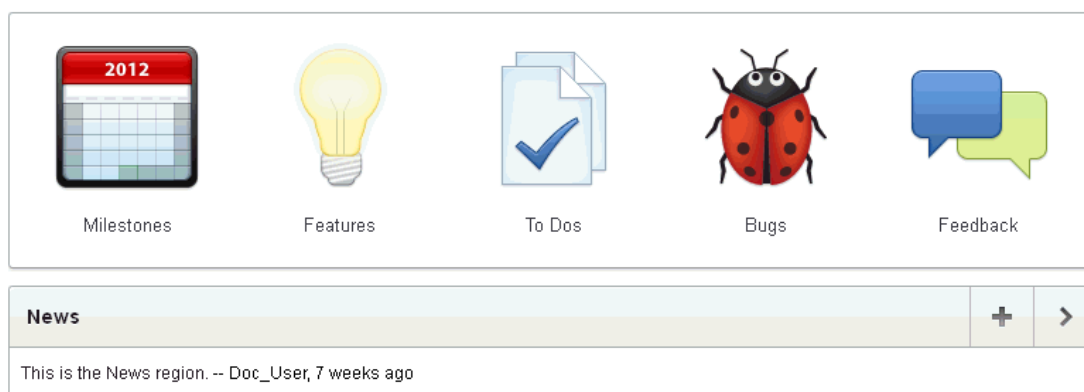
Team Development is a built-in development management tool that enables you to manage the development process by tracking new features, non-feature related tasks (or To Dos), bugs, and milestones. Users can provide real-time feedback which then can be categorized into To Dos, bugs, or features.

### Topics:

- [About the Team Development Home Page](#)
- [Tracking Features](#)
- [Tracking Milestones](#)
- [Tracking To Dos](#)
- [Managing Bugs](#)
- [Managing Feedback](#)
- [Utilizing the Tags Summary](#)
- [Managing Team Actions](#)

### About the Team Development Home Page

The Team Development home page functions as a starting point for managing features, milestones, To Dos, bugs, and feedback.



The following large icons display in the center of the page:

- **Milestones.** Track events associated with the development process. You can associate milestones with features, bugs, and To Dos. See "[Tracking Milestones](#)" on page 4-8.

- **Features.** Track features from initial concept through implementation. You can organize features by release, assignee, tags, or associated milestones. See ["Tracking Features"](#) on page 4-3.
- **To Dos.** Manage action items that can be assigned, prioritized, tagged, and tracked. To dos can also have related parent tasks. To dos may or may not be associated with a feature or milestone. See ["Tracking To Dos"](#) on page 4-10.
- **Bugs.** Track software defects or bugs. Bugs can be assigned, associated with milestones, and tracked by due date, status, and other attributes. See ["Managing Bugs"](#) on page 4-14.
- **Feedback.** Gathering real-time comments, enhancement requests, and bugs from your application users. See ["Managing Feedback"](#) on page 4-17.

### About News

Use the News region to communicate with other developers. You can add new or view news entries posted by other workspace users. News displays on the Application Express home page, the Team Development home page, and the News page. See ["Managing News Entries"](#) on page 4-22.

### About Team Actions

The Team Actions list displays on the right side of the page.

Team Actions
<a href="#">Manage Links</a>
<a href="#">Manage News</a>
<a href="#">Team Development Settings</a>
<a href="#">Release Summary</a>
<a href="#">Utilities</a>
<a href="#">Manage Focus Areas</a>
<a href="#">View Files</a>

The Team Actions list contains the following links:

- [Manage Links](#). See ["Managing Links"](#) on page 4-21.
- [Manage News](#). See ["Managing News Entries"](#) on page 4-22.
- [Team Development Settings](#). See ["Managing Team Development Settings"](#) on page 4-24.
- [Release Summary](#). See ["Viewing a Release Summary"](#) on page 4-24.
- [Utilities](#). See ["About Utilities"](#) on page 4-25.
- [Manage Focus Areas](#). See ["Editing Focus Areas"](#) on page 4-26.
- [View Files](#). See ["Viewing Files Attached to Features, To Dos and Bugs"](#) on page 4-26.

**Tip:** The last item on the Team Actions list toggles between **View Files** and **Enable Files** depending upon whether your administrator has enabled file upload capability. If **Enable Files** displays, then file upload capability has not yet been enabled by your administrator.

### About Team Development Summaries

The bottom of the Team Development home page includes the following summaries:

- **Dashboard.** Provides a summary of days before final release milestone, complete features, complete To Dos, and closed bugs.
- **Feedback.** See "[Managing Feedback](#)" on page 4-17.
- **Tags.** See "[Utilizing the Tags Summary](#)" on page 4-20.

## Tracking Features

Use the Features page to track features from initial concept through implementation. You can organize features by release, assignee, tags, or associated milestones.

### Topics:

- [Viewing Features](#)
- [Creating a Feature](#)
- [Updating a Feature](#)
- [About Attaching Files to a Feature](#)
- [Viewing Feature Reports](#)

## Viewing Features

To view features:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Features** icon.

The Features Dashboard appears.

The Features Dashboard displays an overview of features defined within the workspace for the selected assignee, release, or application. Click the hyperlinks to drill into the selected feature, owner, contributor, and so on. See "[About the Features Dashboard](#)" on page 4-6.

3. Click the **Features** tab. See "[About the Features Page](#)" on page 4-3.

### About the Features Page

The Features page displays an interactive report that displays details about each feature. You can further customize the appearance of the page using the Search bar at the top of the page. Available controls on the Search bar include:

- **Select columns to search** - This icon resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Report** - Displays each feature as a line in a report. Use the Actions menu to customize this report.
- **View Detail** - Displays detailed information about each feature. To display less information, click **Basic**.

- **Actions menu** - Use this menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Creating a Feature

To create a feature:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Features** icon.  
The Features Dashboard appears.
3. Click **Create Feature**.
4. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (\*).
5. To learn more about a specific field, see item Help. See ["About Field-Level Help"](#) on page 1-13.
6. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Feature Owner list, enter a value in New Feature owner.

The value you enter is added.

7. Click **Create Feature**.

**See Also:** ["Editing Focus Areas"](#) on page 4-26

### Creating Parent Features

You can group features hierarchically using the Parent Feature attribute. Selecting a Parent Feature creates a parent/child relationship. When viewing features in Tree view, features are grouped first by release and then by parent. To learn more, see ["About Tree"](#) on page 4-6.

## Updating a Feature

To update a feature:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Features** icon.  
The Features Dashboard appears.
3. Click the **Features** tab.  
The Features page appears.
4. How you edit a feature description depends upon the View selected in the Search bar. Options include:
  - View Detail - Click the feature number.
  - View Report - Click the **Edit** icon.
5. Edit the appropriate fields.
6. To add new values to editable select lists, enter a value in the field with the title *New* (for example, *New Owner*).

For example, to add a name to the Feature Owner list, enter a value in New Owner.

The value you enter is added.

7. Click **Apply Changes**.

**See Also:** ["Editing Focus Areas"](#) on page 4-26

## About Attaching Files to a Feature

If enabled at the workspace-level, you can attach files to features. To learn more, see "Enabling Support for File Attachments in Team Development" in *Oracle Application Express Administration Guide*.

### Topics:

- [Attaching a File to a Feature](#)
- [Viewing, Editing, and Removing Attached Files](#)

**See Also:** ["Viewing Files Attached to Features, To Dos and Bugs"](#) on page 4-26

### Attaching a File to a Feature

To attach a file to a feature:

1. Navigate to the Feature page. See ["Updating a Feature"](#) on page 4-4.
2. From Actions, click **Add File**.
3. On Add File:
  - a. File - Locate the file to be uploaded.
  - b. Description - Enter a description of the file.
  - c. Click **Add File**.

A new region, called Files, displays at the bottom of the Feature page.

### Viewing, Editing, and Removing Attached Files

To view, edit, or remove attached files:

1. Navigate to the Feature page. See ["Updating a Feature"](#) on page 4-4.
2. Scroll down to Files.
3. Click **View and Manage Files**.  
The Files page appears.
4. To view a file, click the name.
5. To edit the file description, click the **Edit** icon.
6. To delete an attached file, click the **Delete** icon.

## Viewing Feature Reports

Use feature reports to view features from different perspectives.

### Topics:

- [About the Features Dashboard](#)
- [About Tree](#)

- [About Calendar](#)
- [About History](#)
- [About Progress Log](#)
- [About Focus Areas](#)
- [About Owners](#)
- [About Utilities](#)

**See Also:** ["About Feature Utilities"](#) on page 4-25

### About the Features Dashboard

The Features Dashboard displays an overview of features defined within the workspace for the selected assignee, release, or application. Click the hyperlinks to drill into the selected feature, owner, contributor, and so on. The Dashboard page contains the following regions:

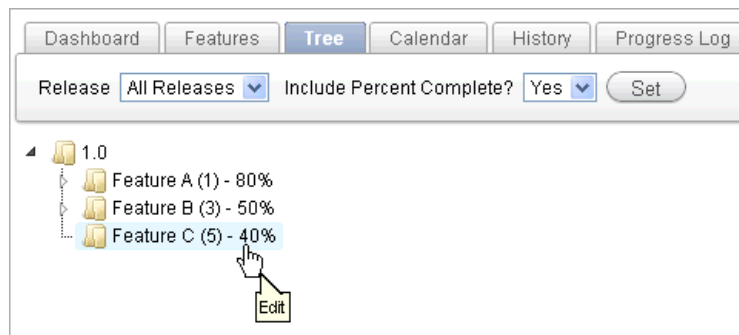
- Percent Complete
- Development Progress
- Owners
- New Features

To edit the dashboard:

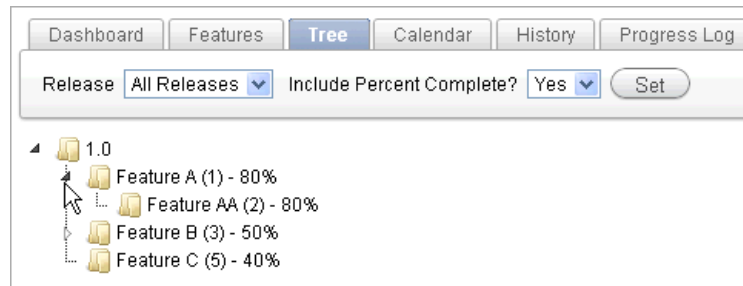
1. Edit the following fields at the top of the page and click **Set**.
  - Assignee
  - Release
  - Application
2. To reset the dashboard to the default display, click the **Reset** button.

### About Tree

The Tree page displays features in a hierarchical tree by release. To select a new release, make a selection from the Release list. The feature number and percent complete display to the right of the feature name. To hide or display the percent complete, select **Yes** or **No** from Include Percent Complete and click **Set**. To edit a feature, simply click it.



Features are grouped first by release and then by parent. To expand a grouping, click the small triangle to the left of the feature name.



**Tip:** When displaying features by a given release, features with parent or children features in different releases do not display.

Click the **Expand All** and **Collapse All** buttons to expand or collapse all grouping. To view or edit a feature, click the feature name. The Feature page appears. To create a feature, click **Create Feature** and follow the online instructions.

**See Also:** ["Creating a Feature"](#) on page 4-4

### About Calendar

The Calendar page displays features by due date or date completed in a calendar format. Click the **Previous** and **Next** buttons to view other months. To view feature milestones for the current day, click **Today**. To view a specific feature, click the feature name. To create a feature, click **Create Feature** and following the online instructions.

**See Also:** ["Creating a Feature"](#) on page 4-4

If a parent features have been defined, the due date or date completed displays in a calendar format. Click the **Previous** and **Next** buttons to view other months. To view feature milestones for the current day, click **Today**. To view a specific feature, click the feature name. To create a feature, click **Create Feature** and following the online instructions.

### About History

Displays a report of recently changed features, including the old value and new value and who made the update. To view a specific feature, click the feature name.

The Change History page displays as an interactive report. To customize the report, use the Search bar at the top of the page. To learn more, see ["Customizing Interactive Reports"](#) on page 9-4.

### About Progress Log

Displays a report of progress log entries. The progress log shows all the progress entries across all features. To view log entries by release, make a selection from the Release select list and click **Set**. To edit the log, click the **Edit** icon.

The Progress Log page displays as an interactive report. To customize the report, use the Search bar at the top of the page. To learn more, see ["Customizing Interactive Reports"](#) on page 9-4.

### About Focus Areas

Displays a chart of the number of features per defined focus area by release. To alter the chart, select another release or another assignee and click **Set**. To return to the default chart, click **Reset**.

### About Owners

Displays a chart of the number of features by owner. To alter the chart, select another release, minimum status, or maximum status and click **Set**. To return to the default chart, click **Reset**.

### About Utilities

Use the Feature Utilities page to manage milestones for multiple features. Select one of the following and follow the on-screen instructions:

- Assign milestones to features (only those with no milestone currently assigned).
- Set feature due date to milestone date (only affects features).
- Change milestone for overdue features.
- Push due date of open features.

See "[About Feature Utilities](#)" on page 4-25.

## Tracking Milestones

Use the Milestones page to manage important milestones. Milestones track events. You can associate milestones with features, bugs, and To Dos

### Topics:

- [Viewing Milestones](#)
- [Creating a Milestone](#)
- [Updating a Milestone](#)
- [Viewing Milestone Reports](#)

## Viewing Milestones

To view milestones:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Milestones** icon.

The Milestones Dashboard appears.

The Milestones Dashboard displays an overview of milestones within the workspace. You can filter by release or link to a specific milestone or milestones by owner. See "[About the Milestones Dashboard](#)" on page 4-10.

3. Click the **Milestones** tab.

The Milestones page appears. "[About the Milestones Page](#)" on page 4-8.

### About the Milestones Page

The Milestones page displays as a report. You can customize the appearance of page, using the Search bar at the top of the page. Available controls on the Search bar include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.



- **Go button** - Executes a search or applies a filter.
- **Actions menu** - Displays the Actions menu. Use this menu to customize the report. See "[About the Actions Menu](#)" on page 9-6.

## Creating a Milestone

To create a milestone:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Milestones** icon.  
The Milestones Dashboard page appears and displays the following regions:
  - Milestone calendar
  - Days to final milestone
  - Component Counts
  - Milestone Owners
3. Click **Create Milestone**.
4. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (\*).
5. To learn more about a specific field, see item Help. See "[About Field-Level Help](#)" on page 1-13.
6. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Owner list, enter a value in New Owner.  
The value you enter is added.
7. Click **Create Milestone**.

## Updating a Milestone

To update a milestone:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Milestones** icon.
3. Click the **Milestones** tab.  
The Milestones page appears.
4. Click the **Edit** icon to the left of the description.
5. Edit the appropriate fields.
6. To learn more about a specific field, click the item label. See "[About Field-Level Help](#)" on page 1-13.
7. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Owner list, enter a value in New Owner.  
The value you enter is added.
8. Click **Apply Changes**.

## Viewing Milestone Reports

Use milestone reports to view milestones from different perspectives.

**Topics:**

- [About the Milestones Dashboard](#)
- [About Calendar View](#)
- [By Owner](#)
- [About Features by Milestone](#)

**See Also:** ["About Feature Utilities"](#) on page 4-25

**About the Milestones Dashboard**

The Milestones Dashboard displays an overview of milestones within the workspace. To filter by release, make a selection from the Release list. To view specific milestones, click the milestone hyperlinks or the milestone owner.

The Milestones Dashboard page appears and displays the following regions:

- Milestone calendar
- Days to final milestone
- Component Counts
- Milestone Owners

To edit the dashboard:

1. Edit the following Show and Release lists at the top of the page and click **Set**.
2. To reset the dashboard to the default display, click the **Reset** button.

**About Calendar View**

The Calendar page displays milestones by date in a calendar format. To filter by release, make a selection from the Release list. Click the **Previous** and **Next** buttons to view other months. To view milestones for the current day, click **Today**. To view a specific milestone, click the hyperlink. To create a milestone, click **Create Milestone** and following the online instructions.

**By Owner**

The By Owner page enables you to select a milestone and view Team Development objects associated with it (for example, features by owner, feature metrics, milestone exceptions, and so on). To view milestones associated with a specific owner, click the appropriate section of the pie chart. A report appears displaying milestones by owner.

To alter the chart, select another release or milestone and click **Set**. To return to the default chart, click **Reset**.

**About Features by Milestone**

Feature by Milestone displays a report of features associated with each milestone. This report is useful in tracking progress. To edit the report, select another release and click **Set**. To return to the default report, click **Reset**.

## Tracking To Dos

To dos are action items that can be assigned, prioritized, tagged, and tracked. To dos can also have related parent tasks. To dos may or may not be associated with a feature or milestone.

**Topics:**

- [Viewing To Dos](#)
- [About the To Dos Page](#)
- [Creating a To Do](#)
- [Updating a To Do](#)
- [About Attaching Files to a To Do](#)
- [Viewing To Do Reports](#)

## Viewing To Dos

To view To Dos:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **To Dos** icon.

The To Dos Dashboard appears. The To Dos Dashboard displays an overview of To Dos within the workspace. You can filter by release, assignee, or application. See ["About the To Do Dashboard"](#) on page 4-13.

3. Click the **To Dos** tab.

The To Dos page appears.

### About the To Dos Page

The To Dos page displays details about each task. To view your personal To Dos, click the **My To Dos** button at the top of the page. You can customize the appearance of page, using the Search bar at the top of the page. Available controls on the Search bar include:

- **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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Report** - Displays each item as a line in a report. Use the Actions menu to customize this report.
- **View Detail** - Displays detailed information about each item. To display less information, click **Basic**.
- **Actions menu** - Use this menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Creating a To Do

To create a To Do:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **To Dos** icon.

The To Dos dashboard appears.

3. Click **Create To Do**.
4. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (\*).

5. To learn more about a specific field, see item Help. See ["About Field-Level Help"](#) on page 1-13.
6. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Assigned To list, enter a value in New Assignee.  
  
The value you enter is added.
7. Click **Create To Do**.

## Updating a To Do

To update a To Do:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **To Dos** icon.  
  
The To Dos Dashboard appears.
3. Click the **To Dos** tab.
4. How you edit a To Do depends upon the View selected in the Search bar. Options include:
  - View Detail - Click the To Do number.
  - View Report - Click the To Do number or click the **Edit** icon.
5. Edit the appropriate fields.
6. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Assigned To list, enter a value in New Assignee.  
  
The value you enter is added.
7. Click **Apply Changes**.

## About Attaching Files to a To Do

If enabled at the workspace-level, you can attach files to a To Do. To learn more, "Enabling Support for File Attachments in Team Development" in *Oracle Application Express Administration Guide*.

### Topics:

- [Attaching a File to a To Do](#)
- [Viewing, Editing, and Removing Attached Files](#)

**See Also:** ["Viewing Files Attached to Features, To Dos and Bugs"](#) on page 4-26

### Attaching a File to a To Do

To attach a file to a To Do:

1. Navigate to the To Do page. See ["Updating a To Do"](#) on page 4-12.
2. From Actions, click **Add File**.
3. On Add File:
  - a. File - Locate the file to be uploaded.

- b. Description - Enter a description of the file.
- c. Click **Add File**.

A new region, called Files, displays at the bottom of the page.

### Viewing, Editing, and Removing Attached Files

To manage attached files:

1. Navigate to the To Do page. See ["Updating a To Do"](#) on page 4-12.
2. Scroll down to Files.
3. Click **View and Manage Files**.

The Files page appears.

4. To view a file, click the name.
5. To edit the file description, click the **Edit** icon.
6. To delete an attached file, click the **Delete** icon.

## Viewing To Do Reports

Use To Do reports to view To Dos from different perspectives.

### Topics:

- [About the To Do Dashboard](#)
- [About Calendar View](#)
- [About Progress Log](#)

### About the To Do Dashboard

The To Dos Dashboard displays an overview of To Dos within the workspace. You can filter by release, assignee, or application. The page is divided into the following sections:

- Developer Percent Complete  
To view To Dos associated with specific owner, click the assignee name.
- Open To do's

To edit the dashboard:

1. Edit the following fields at the top of the page and click **Set**.
  - Show
  - Release
  - Assignee
  - Application
2. To reset the dashboard to the default display, click the **Reset** button.

### About Calendar View

The Calendar page displays To Dos by due date or date completed in a calendar format. To filter the display by completion status or release, make a selection from the Show and Release select lists and click **Set**. Click the **Previous** and **Next** buttons to view other months. To view To Dos for the current day, click **Today**. To view a specific

To Do, click the To Do name. To create a To Do, click **Create To Do** and following the online instructions.

### About Progress Log

Displays a report of progress log entries. The progress log shows all the progress entries across all To Dos. To edit the log, click the **Edit** icon.

The Progress Log page displays as an interactive report. To customize the report, use the Search bar at the top of the page. To learn more, see "[Customizing Interactive Reports](#)" on page 9-4.

## Managing Bugs

Bugs track software defects. Bugs can be assigned, associated with milestones, and tracked by due date, status, and other attributes.

### Topics:

- [Viewing Bugs](#)
- [About the Bugs Page](#)
- [Creating a Bug](#)
- [Editing a Bug](#)
- [About Attaching Files to a Bug](#)
- [Viewing Bug Reports](#)

## Viewing Bugs

To view bugs:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Bugs** icon.

The Bugs Dashboard appears. The Bugs Dashboard displays an overview of known software defects. See "[About the Bugs Dashboard](#)" on page 4-17.

3. Click the **Bugs** tab.

The Bugs page appears. See "[About the Bugs Page](#)" on page 4-14.

### About the Bugs Page

The Bugs page displays details about each bug. You can further customize the appearance of the page using the Search bar at the top of the page. Available controls on the Search bar include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Report** - Displays each bug as a line in a report. Use the Actions menu to customize this report.

- **View Detail** - Displays detailed information about each bug. To display less information, click **Basic**.
- **Actions menu** - Use this menu to customize the report view. See "[About the Actions Menu](#)" on page 9-6.

## Creating a Bug

To create a bug:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Bugs** icon.  
The Bugs Dashboard appears.
3. Click **Create Bug**.
4. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (\*).
5. To learn more about a specific field, see item Help. See "[About Field-Level Help](#)" on page 1-13.
6. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Assigned To list, enter a value in New Assignee.  
The value you enter is added.
7. Click **Create**.

## Editing a Bug

To edit a bug:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Bugs** icon.  
The Bugs Dashboard appears.
3. Click the **Bugs** tab.  
The Bugs page appears.
4. How you edit a bug depends upon the View selected in the Search bar. Options include:
  - **View Detail** - Click the bug number or click the **Edit** icon.
  - **View Report** - Click the **Edit** icon.
5. Edit the appropriate fields.
6. To add new values to editable select lists, enter a value in the field with the title *New*. For example, to add name to the Assigned To list, enter a value in New Assignee.  
The value you enter is added.
7. Click **Apply Changes**.

## About Attaching Files to a Bug

If enabled at the workspace-level, you can attach files to a To Do. To learn more, see "Enabling Support for File Attachments in Team Development" in *Oracle Application Express Administration Guide*.

### Topics:

- [Attaching a File to a Bug](#)
- [Viewing, Editing, and Removing Attached Files](#)

**See Also:** ["Viewing Files Attached to Features, To Dos and Bugs"](#) on page 4-26

### Attaching a File to a Bug

To attach a file to a bug:

1. Navigate to the To Do page. See ["Editing a Bug"](#) on page 4-15.
2. From Actions, click **Add File**.
3. On Add File:
  - a. File - Locate the file to be uploaded.
  - b. Description - Enter a description of the file.
  - c. Click **Add File**.

A new region, called Files, displays at the bottom of the page.

### Viewing, Editing, and Removing Attached Files

To manage attached files:

1. Navigate to the Bug page. See ["Editing a Bug"](#) on page 4-15.
2. Scroll down to Files.
3. Click **View and Manage Files**.

The Files page appears.
4. To view a file, click the name.
5. To edit the file description, click the **Edit** icon.
6. To delete an attached file, click the **Delete** icon.

## Viewing Bug Reports

Use bug reports to view bugs from different perspectives.

### Topics:

- [About the Bugs Dashboard](#)
- [About Calendar](#)
- [About By Developer](#)
- [About By Day](#)



### About the Bugs Dashboard

The Bugs Dashboard displays an overview of known software defects. The Dashboard page contains the following regions:

- Percent Closed
- Assigned Developer
- Severity
- Status

To edit the dashboard:

1. Edit the following fields at the top of the page and click **Set**.
  - Show
  - Release
2. To reset the dashboard to the default display, click the **Reset** button.

### About Calendar

Use the Show list on the Calendar page to display open bugs with an estimated close date, open bugs with no estimated close date, or closed bugs. Click the **Previous** and **Next** buttons to view other months. To view a specific bug, click the bug description. To create a new bug, click **Create Bug**.

### About By Developer

The By Developer page displays bugs by developer. To view bugs associated with a specific assignee, click the appropriate section of the chart. A report appears displaying bugs by developer.

To alter the chart, select another release and click **Set**. To return to the default chart, click **Reset**. To create a new bug, click **Create Bug**.

### About By Day

The By Day page displays number of bugs opened and closed by day. To alter the chart, select another release and click **Set**. To return to the default bar chart, click **Reset**. To create a new bug, click **Create Bug**.

## Managing 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.

### Topics:

- [Viewing Feedback](#)
- [Adding a Feedback Page to an Application](#)
- [Reviewing Feedback](#)
- [Viewing Feedback Reports](#)

### Viewing Feedback

To view feedback:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Feedback** icon.  
The Feedback Dashboard appears. See "[About the Feedback Dashboard](#)" on page 4-20.
3. Click the **Feedback** tab.  
The Feedback page appears.

### About the Feedback Page

The Feedback page displays details about feedback entries. You can further customize the appearance of the page using the Search bar at the top of the page. Available controls on the Search bar include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Report** displays each item as a line in a report. Use the Actions menu to customize this report.
- **View Detail** displays detailed information about each item. To display less information, click **Basic**.
- **Actions menu** - Use this menu to customize the report view. See "[About the Actions Menu](#)" on page 9-6.

## Adding a Feedback Page to an Application

To use the Feedback module in Team Development, you must add a Feedback page to the target application.

### Topics:

- [Creating a Feedback Page](#)
- [Using the Feedback Page](#)

### Creating a Feedback Page

To add a feedback page to an application:

1. On the Workspace home page, click **Application Builder**.
2. Select the application for which you want feedback.  
The Application home page appears.
3. Click the **Create Page** button.
4. For Page Type, select **Feedback Page**.
5. For Create Page, customize any settings.
6. For Navigation Bar, specify whether to create a navigation bar entry. If you select **Yes**, enter an entry label.
7. Click **Create**.

## Using the Feedback Page

To submit feedback:

1. Run the application for which you want to submit feedback.
2. Click the **Feedback** link.  
A Feedback window appears.
3. In Feedback, enter a comment.  
Note that the application and page are noted and this information is made available to the developers.
4. From Feedback Type, select General Comment, Enhancement Request, or Bug.
5. Click **Submit Feedback**.

## Reviewing Feedback

To review feedback:

1. On the Workspace home page, click the **Team Development** icon.
2. Click the **Feedback** icon.  
The Dashboard appears.
3. Click the **Feedback** tab.
4. How you access a specific feedback depends upon the View:
  - View Detail - Click the feedback ID.
  - View Report - Click the **Edit** icon.
 The feedback entry displays at the top of the page.
5. Under Disposition:
  - a. Status - Select a new status.
  - b. Tags are keywords that further describe this feedback. Separate multiple tags with commas.
  - c. Developer Comment - Enter additional comments.
  - d. Public Response - Enter a public response.
6. To create a bug, To Do, or feature, select the following buttons:
  - a. **Log as Bug**. Enter the appropriate information and click **Create Bug**.
  - b. **Log as To Do**. Enter the appropriate information and click **Create To Do**.
  - c. **Log as Feature**. Enter the appropriate information and click **Log as Feature**.
7. Click **Apply Changes**.

## Viewing Feedback Reports

Use feedback reports to view feedback from different perspectives.

**Topics:**

- [About the Feedback Dashboard](#)
- [About Calendar](#)

- [About By Application](#)
- [About By Filing User](#)

### About the Feedback Dashboard

The Feedback Dashboard contains the following regions:

- Percent Closed
- Distinct Filers
- Feedback by Status
- Top Feedback Filers
- Summary

To refresh the content, click the **Refresh** button.

### About Calendar

The Calendar page displays the number of feedback comments provided by application by day. Click the **Previous** and **Next** buttons to view other months.

### About By Application

The By Application page displays a chart of feedback by application. Click a section of the chart to view a more detailed report.

### About By Filing User

The By Filing User page displays a chart of open feedback by filing user. Click a section of the chart to view a more detailed report.

## Utilizing the Tags Summary

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

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

## Managing Team Actions

The Team Actions list displays on the right side of the Team Development home page.

Team Actions
<a href="#">Manage Links</a>
<a href="#">Manage News</a>
<a href="#">Team Development Settings</a>
<a href="#">Release Summary</a>
<a href="#">Utilities</a>
<a href="#">Manage Focus Areas</a>
<a href="#">View Files</a>

**Topics:**

- [Managing Links](#)
- [Managing News Entries](#)
- [Managing Team Development Settings](#)
- [Viewing a Release Summary](#)
- [About Utilities](#)
- [Editing Focus Areas](#)
- [Viewing Files Attached to Features, To Dos and Bugs](#)

**Tip:** The last item on the Team Actions list toggles between **View Files** and **Enable Files** depending upon whether your administrator has enabled file upload capability. If **Enable Files** displays, then file upload capability has not yet been enabled by your administrator.

## Managing Links

Use the Links page to share links within Team Development.

**Topics:**

- [Accessing the Links Page](#)
- [Adding a Link](#)
- [Editing or Deleting a Link](#)

### Accessing the Links Page

To access the links page:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Manage Links**.

The Links page appears.

3. Use the Search bar to filter the display.

Available controls on the Search bar include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **Actions menu** - Displays the Actions menu. Use this menu to customize an interactive report. See ["About the Actions Menu"](#) on page 9-6.

### Adding a Link

To add a link:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Manage Links**.  
The Links page appears.
3. Click **Create Link**.  
The Links page appears.
4. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (\*).
5. To learn more about a specific field, see item Help. See ["About Field-Level Help"](#) on page 1-13.
6. Click **Create Link**.

### Editing or Deleting a Link

To edit or delete a link:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Manage Links**.  
The Links page appears.
3. To edit a link:
  - a. Click the **Edit** icon.  
The Links page appears.
  - b. Edit the appropriate fields.
  - c. Click **Apply Changes**.
4. To delete a new link:
  - a. Click the **Edit** icon.  
The Links page appears.
  - b. Click **Delete**.

## Managing News Entries

News	+	>
This is the News region. -- Doc_User, 31 hours ago		

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

**Topics:**

- [Accessing the News Page](#)
- [Adding a News Entry](#)
- [Editing or Deleting News](#)

**Accessing the News Page**

To access the News page:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Manage News**.

The News page appears.

3. Use the Search bar to filter the display. Available controls include:
  - **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Report** - Displays each entry as a line in a report.
  - **View Detail** - Displays detailed information about each news entry.
  - **Actions menu** - Displays the Actions menu. Use this menu to customize an interactive report. See "[About the Actions Menu](#)" on page 9-6.

**Adding a News Entry**

To add a news entry:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Manage News**.

The News page appears.

3. To add news:
  - a. Click **Add News**.  
The News page appears.
  - b. Enter text in the News Entry field.
  - c. Click **Add News**.

**Editing or Deleting News**

To edit or delete news:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Manage News**.

The News page appears.

3. To edit a news item:
  - a. Click the **Edit** icon.
  - b. Edit the news item.
  - c. Click **Apply Changes**.
4. To delete a news item:
  - a. Click the **Edit** icon.
  - b. Click **Delete**.

## Managing Team Development Settings

Team Development Settings enable you specify how To Dos and bugs display, default values for release, owner, and priority, and what tracking attributes are enabled for the current workspace.

To edit Team Development settings:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Team Development Settings**.  
The Settings page appears.
3. Edit the appropriate attributes.
4. To learn more about a specific field, see item Help. See "[About Field-Level Help](#)" on page 1-13.
5. Click **Apply Changes**.

**Tip:** Click **Reset to Default** to return the settings to the default values.

## Viewing a Release Summary

The Release Summary report enables you to organize features, To Dos, and bugs.

To access the Release Summary report:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Release Summary**.  
The Release Summary page appears.
3. Use the Search bar to restrict the view. To filter the view, select a developer or release and click **Set**.
4. To email the report:
  - a. Click **Email**.  
The Email Report page appears.
  - b. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (\*).
  - c. To learn more about a specific field, see item Help. See "[About Field-Level Help](#)" on page 1-13.
5. Click **Email**.

**Tip:** Click **Reset** to return the report to the default view.



## About Utilities

Use Team Development Utilities to manage team development data.

To access Team Development Utilities:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Utilities**.
3. Options include:
  - **Push past due Bugs** - Enables you to extend the estimated fix date of bugs that are not yet complete. You can filter and then select just the bugs you want to push and then extend for any number of days.
  - **Update Assignees** - Enables you to reassign selected components from one user to another user, for all releases or just a selected release. Only incomplete components are reassigned (that is, those components having a status less than 100% or milestone date in the future).
  - **Purge Data** - Deletes all entries for the selected components. This is useful when beginning a new development cycle or after using a workspace for testing.
  - **Manage Team Development Settings** - See "[Managing Team Development Settings](#)" on page 4-24.
  - **Feature Utilities** - See "[About Feature Utilities](#)" on page 4-25

## About Feature Utilities

Use the Feature Utilities page to manage milestones for multiple features at once. Use this feature to:

- Assign milestones to features
- Set the feature due date to a milestone date
- Change milestone for overdue features
- Push due date of open features

To access the Feature Utilities page:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Team Actions list, click **Utilities**.
3. On the Utilities page, click the **Feature Utilities** link.
4. On the Feature Utilities page:
  - a. Select one of the following:
    - **Assign milestones to features (only those with no milestone currently assigned).**
    - **Set feature due date to milestone date (only affects features).**
    - **Change milestone for overdue features.**
    - **Push due date of open features.**
  - b. Click **Next**.
5. Follow the on-screen instructions.

6. To learn more about a specific field, see item Help. See ["About Field-Level Help"](#) on page 1-13.

## Editing Focus Areas

When you create or update a feature, you can assign it to a Focus Area.

To edit an existing feature Focus Area:

1. On the Workspace home page, click the **Team Development** icon.
2. From the Team Actions list, click **Manage Focus Areas**.

The Manage Focus Areas page appears.

3. Locate the Focus Area and click the **Edit** icon.
4. In Change To, enter your edits.
5. Click **Apply Changes**.

## Viewing Files Attached to Features, To Dos and Bugs

If enabled at the workspace-level, you can attach files to a feature, To Do, or bug. To learn more, see "Enabling Support for File Attachments in Team Development" in *Oracle Application Express Administration Guide*.

**Tip:** If not enabled, administrators can access the Set Workspace Administration page directly from Team Development by clicking **Enable Files** on the Team Actions list.

To view files attached to features, To Dos, and bugs:

1. On the Workspace home page, click the **Team Development** icon.
2. From the Team Actions list, click the View Files.

The Manage Focus Areas page appears.

3. To view a file, click the name.

---

## About Websheet Applications

Websheet applications are interactive web pages that combine text with data. These applications are highly dynamic and defined by their users. Websheet applications include navigation controls, search capabilities, and the ability to add annotations such as files, notes, and tags. Websheet applications can be secured using access control lists and several built-in authentication models.

To learn more about viewing the sample Websheet applications that ship with Oracle Application Express, see ["About Sample Websheet - AnyCo IT Department"](#) on page 16.

### Topics:

- [About Using Websheet Applications](#)
- [About Creating a Websheet Application](#)
- [About Adding and Editing Page Sections](#)
- [About Text Sections](#)
- [About Navigation Sections](#)
- [About Adding Data Grids](#)
- [About Adding and Editing Data Content](#)
- [About Adding Data Reports](#)
- [About Data Sections](#)
- [About Chart Sections](#)
- [About PL/SQL Sections](#)
- [Understanding Markup Syntax](#)
- [Managing Annotations](#)
- [Managing Websheet Applications](#)
- [Viewing Websheets](#)

**See Also:** ["Understanding the Difference Between Database and Websheet Applications"](#) on page 2-1 and ["Managing Websheet Database Objects"](#) in *Oracle Application Express Administration Guide*

### About Using Websheet Applications

This section describes interface elements common to all Websheet applications.

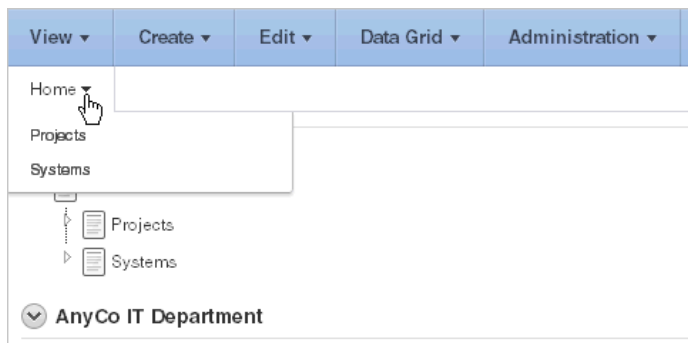
**Topics:**

- [Navigating Between Websheet Pages and Sections](#)
- [About Language](#)
- [About the Help Link](#)
- [About Builder Link](#)
- [About Logout Link](#)
- [About Websheet Search](#)
- [About the Control Panel](#)

**See Also:** ["About Websheet Navigation"](#) on page 3-17

## Navigating Between Websheet Pages and Sections

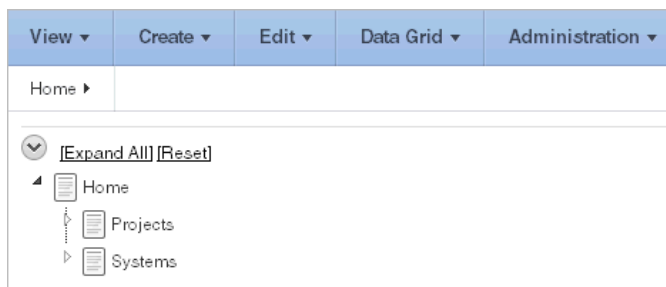
A breadcrumb displays at the top of every Websheet page. Positioning the mouse over the **Home** breadcrumb displays a submenu of links to all Websheet pages. To view another page, click the child breadcrumb entry.



**See Also:** ["Viewing the Page Directory"](#) on page 5-47

## Using Navigation Sections

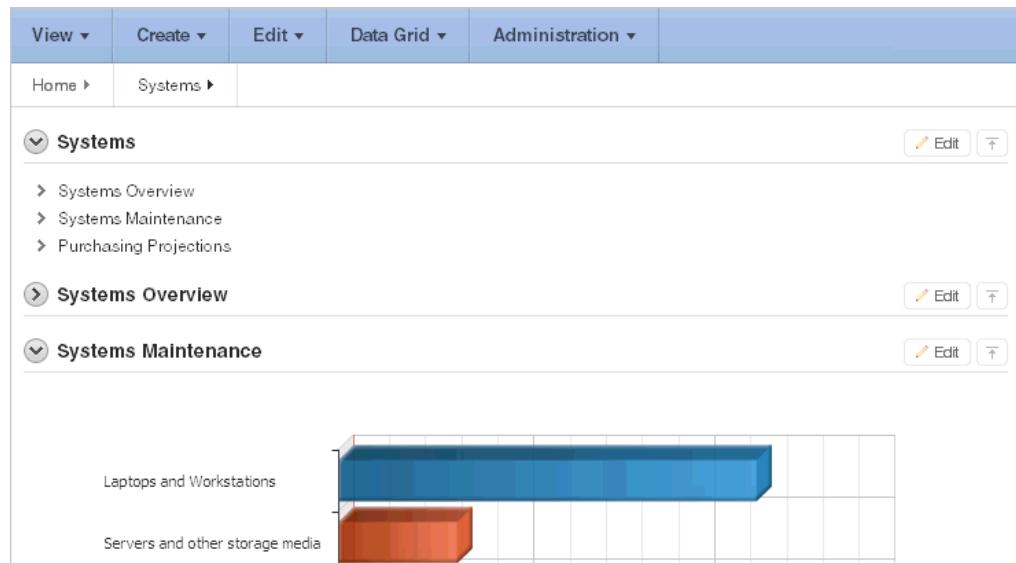
Websheets can contain multiple pages. Many Websheets include dynamically generated navigation sections. Each navigation section includes a hierarchical tree that enables you to navigate between pages or page sections.



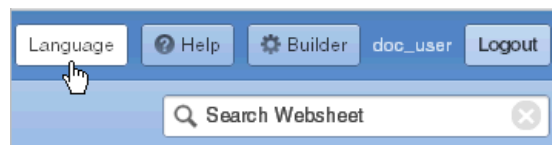
Click the arrows on the left to expand or collapse the tree. To link to a specific section or page, simply select it. Click **Expand All** to view all pages and page subsections and click **Reset** to return the tree to the default display. To learn more, see ["About Navigation Sections"](#) on page 14.

## Showing and Hiding Page Sections

You can hide and show page sections. To expand or hide a section, click the arrow to the left of a section name.



## About Language

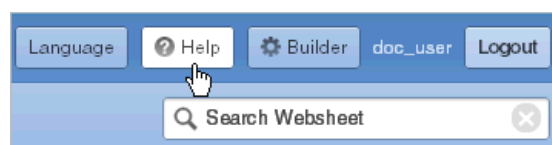


Clicking the **Language** button displays the Select Language section of Websheet Properties page. Options include:

- **Language** - Select the language used when running this application. Users can only select from the languages installed into Oracle Application Express. If cookies are enabled in your web browser, this language preference is written to a cookie and controls your language preference for all Websheet applications on this instance. The language list is determined by the translated versions of Oracle Application Express which are installed.
- **Territory** - Select the territory preference used when running this application. This controls how dates, numbers, and calendars display by default. If cookies are enabled in your browser, this territory preference is written to a cookie and controls your territory preference for all Websheet applications on this instance.

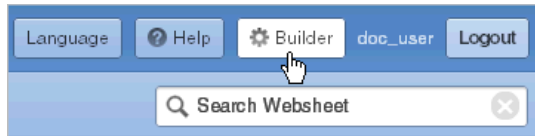
**See Also:** ["Editing Websheet Properties"](#) on page 5-40

## About the Help Link



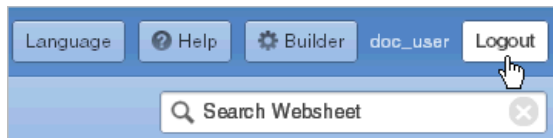
Clicking the **Help** link displays a small Help system that provides an overview of Websheet functionality. Available tabs include: About, Overview, Access Control, Markup Syntax, Data Grid, Application Content and FAQ. Note the content in this online Help system is also covered within this guide.

## About Builder Link



The **Builder** icon only displays if you run your Websheet from Application Builder. Click the **Builder** icon to return to the Application Builder home page.

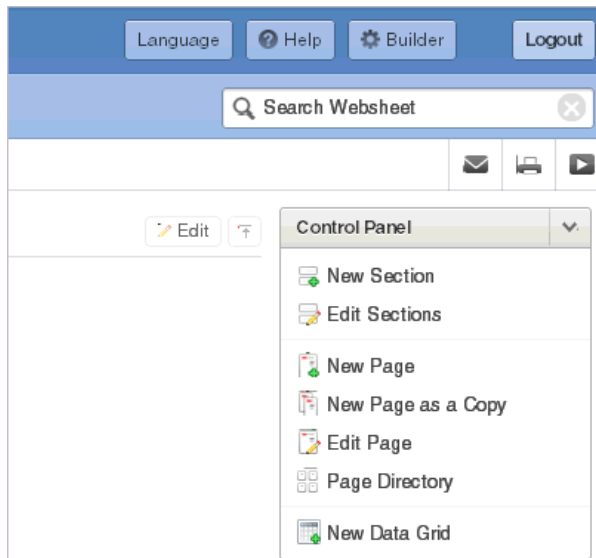
## About Logout Link



To log out of running a Websheet, click the **Logout** link in the upper right of the page. The Login page appears. To return to Application Builder, click **Return to Development**.

## About Websheet Search

The Search Websheet field displays in the upper right of each Websheet page.



Use **Search Websheet** to perform case insensitive searches of application content. Search results display in a report.

View ▾	Create ▾	Edit ▾	Data Grid ▾	Administration ▾			
Home ▸	Search						
<div><input type="text"/></div> <div>Search</div> <div>Reset</div>							
Found In	Content Name	Section	Context	Updated ▾	Updated By	Created	Created By
<a href="#">Data Grid</a>	Systems Maintenance		HARDWARE LAPTOPS AND WORKSTATIONS LAPTOPS AND WORKSTATIONS FOR DIFFERENT TEAMS IQUEST PC	45 seconds ago	terri	45 seconds ago	terri
<a href="#">Data Grid</a>	Planned Purchases		HARDWARE LAPTOPS LAPTOPS FOR NEW EMPLOYEES IQUEST PC	46 seconds ago	terri	46 seconds ago	terri

1 - 2

Once the search result displays, you can control the search by selecting or deselecting the search options in the Search region which displays on the right side of the page.

Search

Case insensitive search of application content.

**Searchable Content**
☒ Page Name
 ☒ Page Alias
 ☒ Page Description
 ☒ Section title
 ☒ Section content
 ☒ File Name, Alias, Description
 ☒ Tags
 ☒ Notes
 ☒ Data Grid Data

To refresh the view, click the **Search** button.

## About the Control Panel

The Control Panel displays on the right side of most Websheet pages. This region includes commands that are also available on the Create, Edit, and View menus. To hide or display the Control Panel, click the arrow to the right of the region title.

Control Panel ▾

The Websheet Control Panel contains the following options:

- New Section. See ["About Adding and Editing Page Sections"](#) on page 5-10.
- Edit Sections. See ["About Adding and Editing Page Sections"](#) on page 5-10.
- New Page. See ["Adding a New Page"](#) on page 5-8.
- New Page as a Copy. See ["Copying an Existing Page"](#) on page 5-9.
- Edit Page. See ["Editing Page Details"](#) on page 5-9.
- Page Directory. See ["Viewing the Page Directory"](#) on page 5-47.
- New Data Grid. See ["Creating a Data Grid"](#) on page 5-16.

## About Creating a Websheet Application

You create a Websheet application by running the Create Application wizard. After you create a Websheet page, you add content either as text or data.

### Topics:

- [Creating a Websheet from Application Builder](#)
- [Creating a Websheet Application from a Running Websheet](#)
- [Running a Websheet](#)
- [Adding a New Page](#)
- [Copying an Existing Page](#)
- [Editing Page Details](#)
- [Deleting a Websheet](#)

## Creating a Websheet from Application Builder

To create a Websheet application:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. For Method, select **Websheet** and click **Next**.
4. On Create Websheet:
  - a. Websheet - Identifies a unique integer value to identify the application. Application IDs between 3000 to 9000 are reserved for internal use.
  - b. Name - Enter a name to identify the application.
  - c. Allow SQL and PL/SQL - Determines whether you can define SQL tags, SQL reports, and PL/SQL sections. Select **Yes** or **No**. By default, this attribute is disabled and set to **No**.
  - d. Include Getting Started Guide - Select this option to include basic information about using Websheets in the first text section of the Websheet home page.  
  
Once reviewed, you can edit or remove this text section. See ["About Adding and Editing Page Sections"](#) on page 5-10.
5. Confirm your selections and click **Create Websheet**.  
A success message appears.
6. To view a rendered version of your application:



- a. Click **Run Websheet**.
- b. On the Login page, enter your Websheet credentials:
  - Username - Enter your workspace username.
  - Password - Enter your workspace password.
  - Click **Login**.

By default, your Websheet credentials are the same as you workspace login credentials.

Your Websheet application appears.

7. Add Websheet content.

**See Also:** ["About Adding and Editing Page Sections"](#) on page 5-10

## Creating a Websheet Application from a Running Websheet

To create a Websheet application from a running Websheet:

1. Run a Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Create menu, click **New Websheet**.
3. For Create Websheet:
  - a. Websheet - Identifies a unique integer value to identify the application. Application IDs between 3000 to 9000 are reserved for internal use.
  - b. Name - Enter a name to identify the application.
  - c. Description - Enter a description of your application.
  - d. Click **Next**.
4. Confirm your selections and click **Create**.
5. To view a rendered version of your application, click **Run**.

Your Websheet application appears.
6. Add Websheet content. See ["About Adding and Editing Page Sections"](#) on page 5-10.

**See Also:** ["Running a Websheet"](#) on page 5-7

## Running a Websheet

To view a rendered version of your application, you run or submit it to the Application Express engine.

### Topics:

- [Running a Websheet from the Application Builder Home Page](#)
- [Running a Websheet from the Application Home Page](#)
- [Running a Websheet from a URL](#)

**See Also:** ["Navigating Between Websheet Pages and Sections"](#) on page 5-2

## Running a Websheet from the Application Builder Home Page

To run a Websheet from the Application Builder home page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Websheet Applications** tab.
3. From the Search bar, click the **View Report** icon.
4. Locate the Websheet application in the Applications list.
5. Click the **Run** icon in the far right column.
6. On the Login page, enter your Websheet credentials:
  - Username - Enter your workspace username.
  - Password - Enter your workspace password.
  - Click **Login**.

Your Websheet application appears.

## Running a Websheet from the Application Home Page

To run an entire application from the Application home page:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select the Websheet application.
3. Click the **Run** icon.
4. On the Login page, enter your Websheet credentials:
  - Username - Enter your workspace username.
  - Password - Enter your workspace password.
  - Click **Login**.

Your Websheet application appears.

## Running a Websheet from a URL

Once you complete your Websheet application, you can publish your production URL.

You can determine the URL to your Websheet application by selecting the Websheet application from the Application home page and positioning the mouse over the **Run** icon. The URL displays in the status bar at the bottom of the page.

Consider the following example:

`http://apex.somewhere.com/pls/apex/ws?p=123:home`

To learn more, see ["About Publishing the Websheet Application URL"](#) on page 16-32.

## Adding a New Page

To add a new Websheet page:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Create menu, select **New Page**.
3. On Create Page:

- a. Name - Enter a page name. The page name displays as the window title and in the breadcrumb.
- b. Page Alias - Identify the page alias. This alias enables you to link to this page. See ["Linking to a Page"](#) on page 5-31.
- c. Parent Page - If this page is part of a page hierarchy, select the parent page.
- d. Click **Create Page**.

## Copying an Existing Page

To copy an existing page:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Create menu, select **New Page as a Copy**.
3. On New Page as a Copy, enter the name of the new page.
4. Click **Copy Page**.

A success message appears.

5. Select one of the following:

- **View Current Page**
- **View New Page**

**Tip:** You can change the parent page by editing the Page Details. See ["Editing Page Details"](#) on page 5-9.

## Editing Page Details

On Page Details, you can change the page name, alias, parent page, or page description.

To edit page details:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Edit menu, select **Edit Page**.
3. One Page Details.
  - Name - Identifies the name of the page. The page name displays in the window title and in the breadcrumb.
  - Alias - A page alias enables you to create links in page sections to other pages. A page alias must be unique within an application. See ["Linking to a Page"](#) on page 5-31.
  - Owner - Identifies the owner of the page.
  - Parent Page - Identifies the parent page. The defined parent page is used to construct breadcrumbs and navigation between pages.
  - Page Description - Descriptive text that describes the page.
4. Click **Apply Changes**.

A success message appears.

**Tip:** You can also edit page details by clicking **Edit Page** on the Control Panel.

## Deleting a Websheet

You delete a Websheet on the Websheet Properties page.

To delete a Websheet application:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select the Websheet application.  
The Websheet Properties page appears.
3. Click **Delete**.

**See Also:** ["Editing Websheet Properties"](#) on page 5-40

## About Adding and Editing Page Sections

This section describes how to add and edit page sections.

### Topics:

- [About Section Types](#)
- [About Editing Sections](#)
- [Deleting Page Sections](#)
- [Editing Section Titles and Display Order](#)

## About Section Types

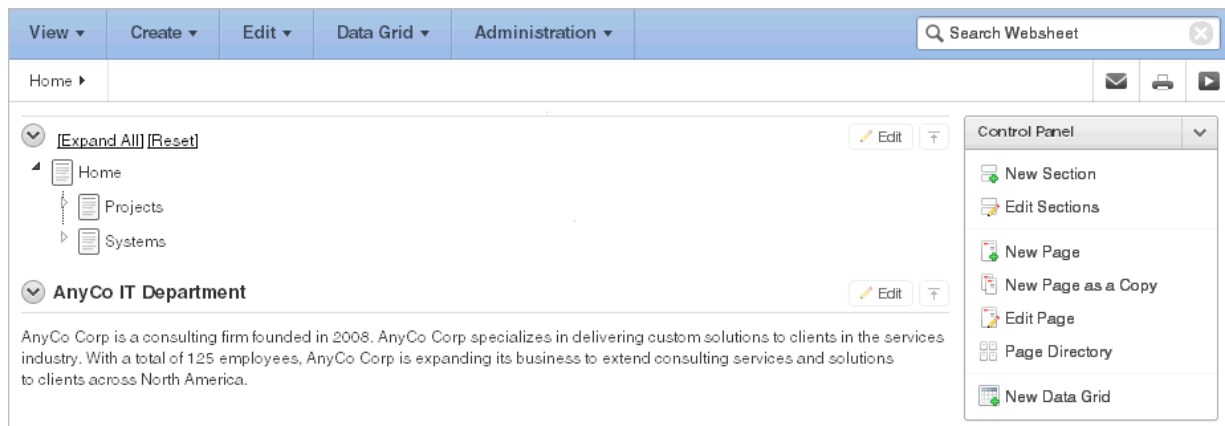
Websheets are organized into pages which consist of containers called **sections**. To each Websheet page, you can add the following section types:

- **Text** - Display entered text, inline images, and inline reports, and links to reports, data grids, other pages, files, external URLs, and so on. You can manage text sections using an intuitive WYSIWIG editor. See ["About Text Sections"](#) on page 12.
- **Navigation** - Add dynamically generated navigation to subordinate pages or page sections. See ["About Navigation Sections"](#) on page 14.
- **Data** - Create inline reports based upon a data grid or report. See ["About Adding Data Grids"](#) on page 15 and ["About Adding Data Reports"](#) on page 25.
- **Chart** - Create inline charts based upon a data grid or report. See ["About Chart Sections"](#) on page 28.
- **PL/SQL** - Select a data grid to generate SQL and SQLVALUE queries to use within your application. See ["About PL/SQL Sections"](#) on page 29.

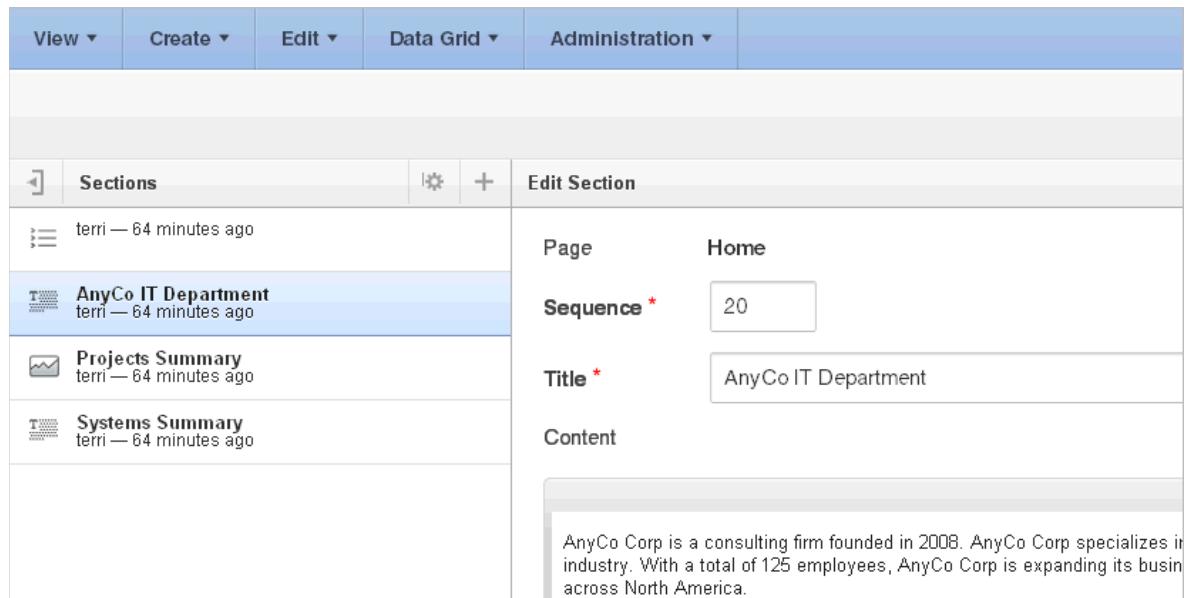
## About Editing Sections

To edit a page section:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. Click the **Edit** icon that displays in the upper right of the section.



The Edit Section page appears.



**Tip:** The left side of the Edit Section page lists all sections on the current page. The current section is highlighted. To go to another section, simply select it.

3. Edit the section and click **Apply Changes**.

## Deleting Page Sections

To delete a page section:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. Click the **Edit** icon that displays in the upper right of the section.  
The Edit Section page appears.
3. Click **Delete**.

## Editing Section Titles and Display Order

You can change the section title or display order on the Edit Sections page.

To edit all sections:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Edit menu, select **Edit Sections**.

The Edit Sections page appears.

Section Title	Type
	Page Navigation
AnyCo IT Department	Text
Projects Summary	Chart
Systems Summary	Text

3. To edit the section title, enter a new title.
4. To change the section order, click the **Up** and **Down** arrows adjacent to the section title.
5. Click **Apply Changes**.

**Tip:** You can also edit sections by clicking **Edit Sections** on the Control Panel.

## About Text Sections

To add text to a Websheet page, you create a text section. You can type directly into a text section, or copy and paste content from a spreadsheet. Copying and pasting from a spreadsheet creates a new section for each spreadsheet row.

### Topics:

- [Adding a Text Section](#)
- [Editing a Text Section](#)

**See Also:** ["Deleting Page Sections"](#) on page 5-11 and ["Understanding Markup Syntax"](#) on page 5-30

## Adding a Text Section

To add a text section:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Create menu, select **New Section**.
3. When prompted for the section type, select **Text** and click **Next**.
4. On Create Text Section select either:

- **Create single text section**
  - **Create multiple text section from Spreadsheet**
5. If you select **Create single text section**:
    - a. Sequence - Enter the section display sequence.
    - b. Title - Enter a section title.
    - c. Content - Enter text. To learn more about formatting text, see ["Editing a Text Section"](#) on page 5-13.
    - d. Click **Create Section**.
  6. If you select **Create multiple text section from Spreadsheet**:
    - a. First Row Contains Column Headings - Select this option if applicable.
    - b. Paste Spreadsheet Data - Paste a two column spreadsheet or other tab delimited data. The first column must contain the section title and the second column must contain the section content.
    - c. Click **Create Section**.

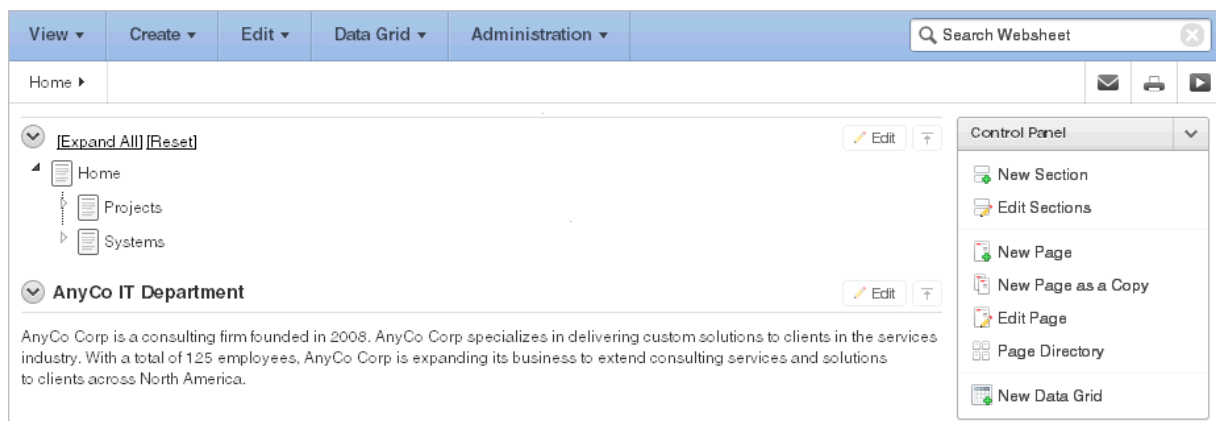
**Tip:** You can also add a new section by selecting **New Section** on the Control Panel.

## Editing a Text Section

You can edit and format text sections using an intuitive WYSIWIG editor.

To edit a text section:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. Click the **Edit** icon that displays in the upper right of the section.

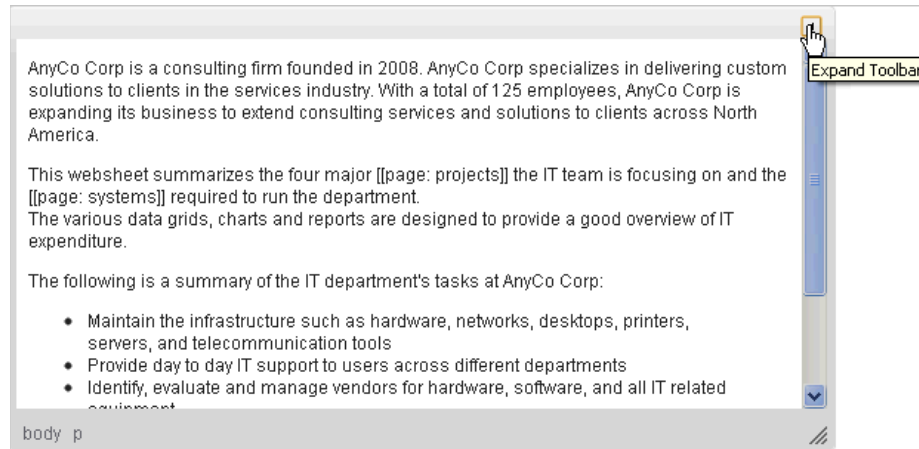


The Edit Section page appears.

3. Edit the text in the field provided.

**Tip:** To learn more about adding or embedding links, see ["Understanding Markup Syntax"](#) on page 5-30.

4. To change the formatting, click the **Expand Toolbar** icon in the upper right corner.



The Toolbar appears. When you pass your cursor over an icon, a descriptive tooltip displays.

5. To hide the toolbar, click the **Collapse Toolbar** icon.



6. To save your changes, click **Apply Changes**.

## About Navigation Sections

By creating a Navigation section, you can add dynamically generated navigation to subordinate pages or page sections.

**See Also:** ["Using Navigation Sections"](#) on page 5-2, ["Deleting Page Sections"](#) on page 5-11, and ["Editing Section Titles and Display Order"](#) on page 5-12

## Adding a Navigation Section

To add a navigation section:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Create menu, select **New Section**.
3. When prompted for the section type, select **Navigation** and click **Next**.
4. For Navigation Type:



- a. Select either:
    - **Page Navigation** - Creates navigation of all pages in the Websheet.
    - **Section Navigation** - Creates navigation for all sections on a page.
  - b. Click **Next**.
5. If you select **Page Navigation**:
  - a. Sequence - Enter the section display sequence.
  - b. Title - Enter a section title.
  - c. Starting Page - Select the starting page from which to display hierarchical navigation.
  - d. Maximum Levels - Select the maximum number of levels (or tree depth) to display.
  - e. Order Siblings By - Select the order of siblings by column. If not defined, the siblings are sorted by the page name.
  - f. Click **Create Section**.
6. If you select **Section Navigation**:
  - a. Sequence - Enter the section display sequence.
  - b. Title - Enter a section title.
  - c. Click **Create Section**.

## About Adding Data Grids

Data grids are sets of data displayed in rows and columns. Data grids store data in a similar way to how spreadsheets store data. Once created, the structure can be modified as needed over time.

### Topics:

- [About Data Grids](#)
- [Creating a Data Grid](#)
- [Copying a Data Grid](#)
- [Viewing and Editing a Data Grid](#)
- [Viewing the Data Grid Change History Log](#)
- [Deleting a Data Grid](#)

**See Also:** ["About Adding and Editing Data Content"](#) on page 5-24 and ["Understanding Markup Syntax"](#) on page 5-30

## About Data Grids

You can define the structure of a data grid using column names, data sources, and basic validations, or you can create a data grid by pasting spreadsheet data. Once created, the structure can be modified as needed.

Users can alter the layout of report data by selecting columns or by applying filters, highlighting, and sorting. Users can also define breaks, aggregations, group bys, computations, and different charts. Additionally, users can create multiple variations of a data grid and save them as named reports, for either public or private viewing.

You can also use the data from a data grid and include it as a chart or report within any page.

**See Also:** ["About Chart Sections"](#) on page 28

## Creating a Data Grid

You can create a data grid by either defining the structure (that is, the column names, data types, and basic validations), or by pasting in spreadsheet data. In addition to the defined columns, the following standard columns are always included within each data grid: owner, created by, created on, updated by, updated on, row order, and annotation (files, notes, links, and tags).

### Topics:

- [Creating a Data Grid from Scratch](#)
- [Creating a Data Grid by Copying and Pasting Spreadsheet Data](#)

### Creating a Data Grid from Scratch

When you create a data grid from scratch you must define the column names, datatypes, and basic values. Once you have created the basic structure, you can then populate it with data.

To create a data grid from scratch:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select **New Data Grid**.

**Tip:** You can also select **New Data Grid** on the Control Panel.

3. When prompted for the section type, select **From Scratch** and click **Next**.

Home ▸
Data ▸
Create Data Grid

Name \*
DOC\_USER 01

Alias

Column Name	Type	Move
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲
	String	▽ ▲

Add Column

4. Specify the following:

- Name - Enter a data grid name.
- Alias - Enter a data grid alias. Use this alias to link to this data grid within other page sections. A data grid alias must be unique within an application.
- Define the data grid structure by specifying the column name and data type. To change the order, click the **Up** and **Down** arrows under Move.  
To add more columns, click **Add Column**.
- Click **Create Data Grid**.

The data grid appears.

5. To add data, click **Add Row**. See ["Editing Data Grid Data"](#) on page 5-19.

### Creating a Data Grid by Copying and Pasting Spreadsheet Data

To create a data grid by copying and pasting spreadsheet data:

- Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
- From the Data Grid menu, select **New Data Grid**.

**Tip:** You can also select **New Data Grid** from the Create menu or the Control Panel.

- When prompted for the section type, select **Copy and Paste** and click **Next**.
- Specify the following:
  - Name - Enter a data grid name.

- b. Alias - Enter a data grid alias. You can use this alias to link to this data grid within page sections. A data grid alias must be unique within an application.
- c. First Row Contains Column Headings - Select this option if applicable.
- d. Paste Spreadsheet Data - Copy and paste the data you want to load from a spreadsheet program.
- e. Click **Upload**.

A data grid appears.

## Copying a Data Grid

To copy a data grid:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select an existing data grid.  
The data grid appears.
3. Click Manage and select **Copy**.
4. Enter a new data grid name and click **Copy**.

## Viewing and Editing a Data Grid

Once you create a data grid, you can view and edit it on the Data page.

### Topics:

- [Accessing the Data Page](#)
- [Editing Data Grid Data](#)
- [Editing Data Grid Columns Manually](#)
- [Editing Data Grid Rows Manually](#)
- [Editing a Single Data Grid Row](#)
- [Editing Data Grid Properties](#)
- [Creating a Bookmark Link to a Data Grid](#)

**Tip:** Data grids display as an interactive report. To learn more about interactive reports and using the Actions menu, see ["Customizing Interactive Reports"](#) on page 9-4 and ["About the Actions Menu"](#) on page 9-6.

### Accessing the Data Page

To access the Data page:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select **View All**.

An interactive report appears displaying all data grids.

**Tip:** If icons display, click the **View Report** icon.

The Report view appears.

Data Grids

Q

Go

Actions

Reset

View Saved Reports

Create Data Grid







Name	Embed Tag	Alias	Status	Updated	Updated By
<a href="#">Projects</a>	[[ datagrid: 6702897 ]]	6702897	PRIVATE	92 minutes ago	te
<a href="#">Planned Purchases</a>	[[ datagrid: 8159460 ]]	8159460	PRIVATE	93 minutes ago	te
<a href="#">Systems Maintenance</a>	[[ datagrid: 8166770 ]]	8166770	PRIVATE	93 minutes ago	te

1 - 3






By default, Report view displays the data grid Name, Embed Tag, Alias, Status, Updated, and Updated By columns. The Embed Tag column displays the syntax used to include a link to the report or data grid from within a section of a page.

### 3. Select a data grid.

The data grid appears.

Home ▶ Data ▶ Projects									
<input type="text"/>			Go	Reports	1. Primary Report ▾	Actions ▾	Manage ▾		
	Project 	Task	Start Date	End Date	Status	Assigned To	Cost	Budget	Files
	Timesheet Application	Determine business rules	15-MAR-2010	15-NOV-2010	Open	Pam King	\$2,500.00	\$4,000.00	
	Timesheet Application	Create prototype and trial testing	20-MAR-2010	30-NOV-2010	Open	James Cassidy	\$6,000.00	\$10,000.00	
	Timesheet Application	Company rollout and training	25-MAR-2010	05-DEC-2010	Open	Pam King	\$1,000.00	\$1,500.00	

**Toggle Check Boxes** When viewing a data grid, you can enable and disable check boxes. From the Manage menu, select **Toggle Check Boxes**. Selecting this option, displays check boxes to the left of each row.

Home ▶ Data ▶ Projects									
<input type="text"/>			Go	Reports	1. Primary Report ▾	Actions ▾	Manage ▾		
<input type="checkbox"/>	Project 	Task	Start Date	End Date	Status	Assigned To	Cost	Budget	Files
<input type="checkbox"/>	 Timesheet Application	Determine business rules	15-MAR-2010	15-NOV-2010	Open	Pam King	\$2,500.00	\$4,000.00	
<input type="checkbox"/>	 Timesheet Application	Create prototype and trial testing	20-MAR-2010	30-NOV-2010	Open	James Cassidy	\$6,000.00	\$10,000.00	
<input type="checkbox"/>	 Timesheet Application	Company rollout and training	25-MAR-2010	05-DEC-2010	Open	Pam King	\$1,000.00	\$1,500.00	

## Editing Data Grid Data

To edit data grid data:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select a data grid.

The data grid appears.

3. To add another row:

- a. Click the **Add Row** button.

A form appears.

- b. Edit the fields provided and click either **Save** or **Save and Add Another**.

### Editing Data Grid Columns Manually

To manually edit data grid columns:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select a data grid.

The data grid appears.

3. From the Manage Menu, select **Columns**.

Reports <span>1. Primary Report</span> <span>Actions</span> <span>Manage</span> <span>Add Row</span>									
Start Date	End Date	Status	Assigned To	Cost					Links Tags
15-MAR-2010	15-NOV-2010	Open	Pam King	\$2,500.00					
20-MAR-2010	30-NOV-2010	Open	James Cassidy	\$6,000.00					
25-MAR-2010	05-DEC-2010	Open	Pam King	\$1,000.00					
07-APR-2010	07-APR-2010	closed	John Watson	\$1,000.00	\$700.00				

The following submenu displays:

- **Add** - Adds a new column. Enables you to define all column properties such as the column name, type, whether a value is required, list of values, default type, and default text.
  - **Column Properties** - Editable properties include sequence, group, required value, label, format, heading, width and height, column type, default text, list of values, and help text.
  - **List of Values** - Enables you to restrict the values a user can enter. You associate a list of values with a column on Column Properties.
  - **Column Groups** - Create a group and add columns to the group. Add / Edit row page displays groups as a subsection under the Data region and lists columns within the group. By using groups, you can control the Add / Edit row page display.
  - **Validation** - Create a column validation and error message.
  - **Delete Columns** - Select columns to be deleted.
4. Select a submenu option and follow the on-screen instructions.

## Editing Data Grid Rows Manually

You can manually edit the rows of a data grid by selecting Rows and on the Manage menu.

To manually edit data grid rows:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select a data grid.  
The data grid appears.
3. From the Manage Menu, select **Rows**.

Start Date	End Date	Status	Assigned To	Cost
15-MAR-2010	15-NOV-2010	Open	Pam King	\$2,500.00
20-MAR-2010	30-NOV-2010	Open	James Cassidy	\$6,000.00
25-MAR-2010	05-DEC-2010	Open	Pam King	\$1,000.00
07-APR-2010	07-APR-2010	closed	John Watson	\$1,000.00

The following options display:

- **Add row** - Adds a new row.
  - **Set Column Values** - Set a predefined value for a column.
  - **Replace** - Search and replace rows.
  - **Fill** - Fill down null column values with column value from above cell.
  - **Delete Rows** - Select rows to be deleted.
4. Select a submenu option and follow the on-screen instructions.

## Editing a Single Data Grid Row

To manually edit a single data grid row:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select a data grid.  
The data grid appears.
3. Locate the row to be edited and click the **Edit Row** icon.

Project	Task	Start Date	End Date	Status	Assigned To	Cost	Budget
Timesheet Application	Determine business rules	15-MAR-2010	15-NOV-2010	Open	Pam King	\$2,500.00	\$4,000.00
Timesheet Application	Create prototype and trial testing	20-MAR-2010	30-NOV-2010	Open	James Cassidy	\$6,000.00	\$10,000.00

The Add/Edit Row page appears.

4. Edit the appropriate rows and click **Apply Changes**.

**Tip:** You can use the Actions region on the Add/Edit Row page to add a new row, add annotations, view a history of changes, edit column properties and group, delete columns, and create a list of values or a validation.

**Adding Annotations to a Single Data Grid Row** To add annotations (that is, files, notes, links, and tags) to a single data grid row:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Data Grid menu, select a data grid.

The data grid appears.

3. Locate the row to be edited and click the **Edit Row** icon.

The Add/Edit Row page appears.

4. On the Actions region, select one of the following:
  - Add File
  - Add Note
  - Add Link
  - Add Tags
5. Follow the on-screen instructions.

**See Also:** ["Managing Annotations"](#) on page 5-34

**Displaying Annotation Columns in a Data Grid Report** To display annotation columns in a data grid report:

1. Add annotations to the data grid report as described in ["Adding Annotations to a Single Data Grid Row"](#) on page 5-22.



2. To include the columns in the data grid report:
  - a. View the data grid report.
  - b. Click the **Actions** menu and then **Select Columns**.
  - c. In the Select Columns region, move the columns (for example, Files, Notes, Links, and Tags) to Display in Report.
  - d. Click **Apply**.
3. To ensure all users can see the columns, developers can save the revised layout as the default report:
  - a. Click the **Actions** menu and select **Save Report**.  
The Save Report Region appears.
  - b. In Save Report:
    - a. **Save - Select As Default Report Settings**.
    - b. **Name** - Enter a name for the report.
    - c. **Description** - Enter an optional description.
    - d. Click **Apply**.

### Editing Data Grid Properties

You can change the name, alias, and description of a data grid on the Data Grid Properties page.

To edit a data grid:

1. Run the Websheet application. See "[Running a Websheet](#)" on page 5-7.
2. From the Data Grid menu, select a data grid.  
The data grid appears.
3. From the Manage menu, click **Properties**.  
The Data Grid Properties page appears.
4. Edit the fields provided and click **Apply**.

### Creating a Bookmark Link to a Data Grid

To bookmark directly to a data grid or a row, use the following syntax:

```
ws?p=100000:DG_<data grid alias>
ws?p=100000:DG_<data grid alias>:<session ID>:ROW_ID:<data grid row ID>
```

The *data grid row ID* is an ID column value of the APEX\$\_WS\_ROWS table.

To get a link to a specific data grid row:

1. Run the data grid.
2. Click the Edit Row icon.
3. Note the URL in the browser.

## Viewing the Data Grid Change History Log

The View Change History log displays a report of data grid changes. This report lists the row, column name, old value, new value, user who authored the change, and how long ago the change occurred.

To view a history of data grid changes:

1. Run the Websheet application. See "[Running a Websheet](#)" on page 5-7.
2. From the Data Grid menu, select a data grid.  
The data grid appears.
3. From the Manage menu, select **History**.

## Deleting a Data Grid

To copy a data grid:

1. Run the Websheet application. See "[Running a Websheet](#)" on page 5-7.
2. From the Data Grid menu, select a data grid.  
The data grid appears.
3. From the Manage menu, select **Delete Data Grid**.
4. Confirm your selection and click **Delete**.

## About Adding and Editing Data Content

This section describes how to add and edit data content.

### Topics:

- [Available Data Sources](#)
- [About Enabling Support for Creating Data Reports](#)
- [Incorporating Data into Websheet Pages](#)

## Available Data Sources

Websheets can include data sources. Once defined, you can incorporate these data sources into Websheet page sections. Websheets can include the following data sources:

- Data Grids - Data grids are highly customizable, editable tabular reports. Data grids enable you to maintain data within the Websheet which is stored within the Oracle database. See "[About Adding Data Grids](#)" on page 5-15.
- Reports - Reports are queries defined against tables or views that exist within your Oracle database. See "[About Adding Data Reports](#)" on page 5-25.

## About Enabling Support for Creating Data Reports

To define a data report, your Websheet developer must enable the **Allow SQL and PL/SQL** attribute on the Websheet Properties page. By default, this attribute is disabled.

**Tip:** Only a Websheet application developer can edit the **Allow SQL and PL/SQL** attribute on the Websheet Properties page. To learn more, see ["Editing Websheet Properties"](#) on page 5-40

## Incorporating Data into Websheet Pages

Data grids and data reports can be incorporated into page sections in the following ways:

- Within a data section. See ["About Adding Data Reports"](#) on page 25.
- Within a chart section. See ["Adding a Chart Section"](#) on page 5-28.
- Linking to a Data Grid. See ["Linking to a Data Grid"](#) on page 5-32.
- Include a single value or tabular results of queries See ["Using SQL and SQLVALUE Syntax"](#) on page 5-32.

## About Adding Data Reports

Data reports are contributor-defined queries on tables or views within the underlying Oracle database.

**Tip:** Before you can add a data report, the Websheet application developer must enable the **Allow SQL and PL/SQL** attribute on the Websheet properties page. By default, this attribute is disabled. To learn more, see ["Editing Websheet Properties"](#) on page 5-40.

### Topics:

- [About Data Reports](#)
- [Creating a Data Report](#)
- [Viewing and Modifying a Data Report](#)
- [Deleting a Data Report](#)

**See Also:** ["About Adding and Editing Data Content"](#) on page 5-24 and ["Understanding Markup Syntax"](#) on page 5-30

## About Data Reports

Data reports, unlike data grids, are query-only and based on existing data from the Oracle database. You can specify the table or view name and retrieve all columns or write an SQL statement to retrieve the required data.

Users can alter the layout of report data by selecting columns or by applying filters, highlighting, and sorting. Users can also define breaks, aggregations, group by, computations, and different charts. Additionally, users can create multiple variations of a data grid and save them as named reports, for either public or private viewing. You can also use the data from a data report and include it as a chart or report within any page.

**See Also:** ["About Data Sections"](#) on page 5-27 and ["About Chart Sections"](#) on page 5-28

## Creating a Data Report

You can create a data report by either simply entering the table or view name, or by providing a SQL query.

To create a data report:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. From the Report menu, select **New Report**.

**Tip:** You can also select **New Report** on the Control Panel.

The Create Report page appears.

3. For Report Source, identify how to develop your source. Options include:
  - a. **Table** - Select **Table** and enter the following:
    - Table or View Name - Select the table name the report is to be based on.
    - Report Name - Enter the name of the report.
    - Report Alias - Enter a report alias. A Report alias is used for linking to the Report within page sections. A Report alias must be unique within an application.
  - b. **SQL Query** - Select SQL Query and enter the following:
    - Report Name - Enter the name of the report.
    - Report Alias - Enter a report alias. A Report alias is used for linking to the Report within page sections. A Report alias must be unique within a Websheet.
    - Query - Enter the SQL query that defines your report.
  - c. Click **Next**.
4. Confirm your selections and click **Create Report**.

## Viewing and Modifying a Data Report

To view or modify a data report:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. From the Report menu, select **View All**.

The Report page appears.

3. Select the report.

The report appears.

4. To edit report attributes:
  - From the Manage menu, click **Edit Attributes**.  
The Report Attributes page appears.
  - Edit the attributes and click **Apply Changes**.
5. To edit the report query:
  - From the Manage menu, click **Edit Query**.  
The Report Query page appears.
  - To save your changes, click **Apply Changes**.

## Deleting a Data Report

To delete a data report:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. From the Report menu, select the report.  
The report appears.
3. From the Manage menu, click **Edit Attributes**.  
The Report Attributes page appears.
4. Click **Delete**.

## About Data Sections

You can create data sections based upon a data grid or report.

### Topics:

- [Adding a Data Section to a Page](#)
- [Editing a Data Section](#)

**See Also:** ["About Adding and Editing Data Content"](#) on page 5-24

## Adding a Data Section to a Page

Once you create a data grid or report, you add it to a page by adding a data section.

**See Also:** ["About Adding Data Grids"](#) on page 5-15 and ["About Adding Data Reports"](#) on page 5-25

To add a data section:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. From the Create menu, select **New Section**.
3. When prompted for the section type, select **Data** and click **Next**.
4. Specify the following:
  - a. Data Section Source - Select either **Data Grid** or **Report**.
  - b. Display Sequence - Enter the section display sequence.
  - c. Data Grid/Report - Select the data grid or report to be used to display the data section.
  - d. Report Settings to Use - For the selected data grid or report, select the report settings to use. This selection enables you to filter the rows and columns you want to display and set the columns to display. If you do not have a saved report with the settings you need, create it now before adding the section.
  - e. Title - Enter the section title.
  - f. Include - Select whether to add the following:
    - Add Row (available if Data Section Source is Data Grid)
    - Edit Row (available if Data Section Source is Data Grid)
    - Search Field

- g. Style - Choose a user interface style.
  - h. Click **Next**.
5. Click **Create Section**.

**See Also:** ["About Adding Data Grids"](#) on page 5-15 and ["About Adding Data Reports"](#) on page 5-25

## Editing a Data Section

Once you have added a data report to a page, you can change the section sequence, title, and user interface style.

To edit a data section:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. Click the **Edit** icon that displays in the upper right of the section.  
The Edit Section page appears.
3. Edit the fields provided. See item Help for more details.
4. To save your changes, click **Apply Changes**.

## About Chart Sections

You can create inline charts based upon a data grid or report.

### Topics:

- [Adding a Chart Section](#)
- [Editing a Chart Section](#)

**See Also:** ["About Adding and Editing Data Content"](#) on page 5-24

## Adding a Chart Section

To add a chart section:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. Create a data grid or report. See ["About Adding Data Grids"](#) on page 15.
3. From the Create menu, select **New Section**.
4. When prompted for the section type, select **Chart** and click **Next**.
5. On Select Chart Type:
  - a. Select one of the following:
    - **Column**
    - **Horizontal Bar**
    - **Pie**
    - **Line**
  - b. Click **Next**.
6. Specify the following:
  - a. Display Sequence - Enter the section display sequence.

- b. Data Grid - Select a data grid.
  - c. Report Settings to Use - For the selected data grid or report, select the report settings to use. This selection enables you to filter the rows and columns you want to display.  
  
If you do not have a saved report with the settings you need, create it now before adding the section.
  - d. Section Title - Enter the section title.
  - e. Click **Next**.
7. Specify the following:
- a. Chart Label - Select the column to be used as the Label.  
  
In Axis Title for Label, enter title to display on the axis associated with the column selected for Label.
  - b. Chart Value - Select the column to be used as the Value. If your function is a COUNT, a Value does not need to be selected.  
  
In Axis Title for Value, enter the title to display on the axis associated with the column selected for Value.
  - c. Function - Select a function to be performed on the column selected for Value.
  - d. Sort - Select the chart sort direction.  
  
Check **Enable 3D** to display the chart in 3D.
  - e. Click **Next**.
8. On the summary page, confirm your selections and click **Create Section**.

## Editing a Chart Section

To edit a chart section:

1. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
2. Click the **Edit** icon that displays in the upper right of the section.  
  
The Edit Section page appears.
3. Edit the fields provided. See item Help for more details.
4. Click **Apply Changes**.

## About PL/SQL Sections

Users with PL/SQL knowledge can use PL/SQL sections to write their own code against the associated schema.

**Tip:** PL/SQL sections are only available if the Websheet application developer has enabled the **Allow SQL and PL/SQL** attribute on the Websheet Properties page. To learn more, see ["Editing Websheet Properties"](#) on page 5-40

### Topics:

- [Adding a PL/SQL Section](#)
- [Editing a PL/SQL Section](#)

**See Also:** ["Deleting Page Sections"](#) on page 5-11

## Adding a PL/SQL Section

To add a PL/SQL Section:

1. Enable SQL and PL/SQL on the Websheet Properties page. See ["Editing Websheet Properties"](#) on page 5-40.
2. Run the Websheet application. See ["Running a Websheet"](#) on page 5-7.
3. From the Create menu, select **New Section**.

**Tip:** You can also select **New Section** on the Control Panel. See ["About the Control Panel"](#) on page 3-26.

4. When prompted for the section type, select **PL/SQL** and click **Next**.
5. Specify the following:
  - a. Sequence - Enter the section display sequence.
  - b. Title - Enter the section title.
  - c. Enter PL/SQL - Enter a PL/SQL anonymous block of code.
  - d. If applicable, select **Do not validate PL/SQL code (parse PL/SQL code at run time only)**. Select this option to create the section even if an errors occurs. Use this option to create the section and then debug it later.

**Tip:** To view an example, click **PL/SQL Example**.

6. Click **Create Section**.

## Editing a PL/SQL Section

To edit a PL/SQL section:

1. Run the Websheet as described in ["Running a Websheet"](#) on page 7.
2. Click the **Edit** icon that displays in the upper right of the section.

The Edit Section page appears.

3. Edit the following:
  - a. Sequence - Enter the section display sequence.
  - b. Title - Enter the section title.
  - c. Enter PL/SQL - Enter a PL/SQL anonymous block of code.
4. To save your changes, click **Apply Changes**.

## Understanding Markup Syntax

This section describes syntax for adding links to Websheet pages, page sections, external URLs, data grids, or for including SQL or SQLVALUE syntax.

**Tip:** A Help button displays in the upper right corner of each Websheet page. The Help page, Markup Syntax, lists all the different syntax options described in this section.



**Topics:**

- [Linking to a Page](#)
- [Linking to a Section](#)
- [Linking to External URLs](#)
- [Linking to a Data Grid](#)
- [Using SQL and SQLVALUE Syntax](#)
- [About Advanced Data Grid Queries Rules](#)

**See Also:** ["Managing Uploaded Files and Images"](#) on page 34

**Linking to a Page**

To include links in page sections to other pages in a Websheet, use the syntax described below. If the page exists, a link displays. If the page does not exist, a link to create the page displays. Note that the use of the `page: identifier` is optional.

**Syntax:**

```
[[ page: <page alias> | <link name> ]]
[[ <page alias> | <link name> ]]
```

**Syntax Example:**

```
[[page: home]]
[[mypage | My Page]]
```

**In Context Example:**

One of the most colorful fish is the [[ clownfish | Clown fish]].

**Linking to a Section**

To include links to a page section, use the syntax below. If the section exists, a link displays. If the section does not exist, a link to create the section displays. Note that if the section is not prefaced by a page, it is assumed the section is on the current page.

**Syntax:**

```
[[ section: <page alias> . <page section> | <link name> ]]
[[ section: <page section> | <link name> ]]
```

**Syntax Example Linking Within the Current Page:**

```
[[section: clownfish | Clown Fish]]
```

**Syntax Example Linking to a Different Page:**

```
[[section: fish.clownfish | Clown Fish]]
```

**In Context Example:**

One of the most colorful fish is the [[ section: clownfish | Clown fish]].  
Visit or fish page to see the [[ section: fish . clownfish | Clown fish]], also known as Nemo.

## Linking to External URLs

To include links to external URLs in page sections, use the syntax below. Note that the use of the `url:` identifier is optional. To have the link open in a new browser window, use the popup prefix.

### Syntax:

```
[[ url: <url> | <link name> ]]  
[ popupurl: <url> | <link name> ]]  
[[ <url> | <link name> ]]
```

### Syntax Example:

```
[[url: http://www.company.com/store | commpanystore]]  
[[popupurl: http://www.company.com/store | commpanystore]]  
[[http://www.searchengine.com | searchengine]]  
[[http://www.searchengine.com ]]
```

### In Context Example:

You can buy Company software on the [[http://www.company.com/store | Company Store]] website.

## Linking to a Data Grid

To include links to data grids within page sections, use the syntax below. You can use these links to view the data grid or to create new data. Note that data grid can be one or two words.

### Syntax:

```
[[ data grid: <datagrid alias> | <link name> ]]  
[[ datagrid: <datagrid alias> | <link name> ]]  
[[ datagrid: <datagrid alias> . <saved report name (may not be private)> | <link name> ]]
```

### Syntax Example:

```
[[ data grid: todo list | To Do List ]]  
[[ data grid: todo list . open todo items | To Do List ]]  
[[ datagrid: todo list | To Do List ]]
```

### In Context Example:

Please review the [[ data grid: todo list | To Do List ]] and ensure your tasks can be accomplished by Friday.

## Using SQL and SQLVALUE Syntax

Using SQL or SQLVALUE syntax, you can include single value and tabular results of queries against data grids or tables and views within sections of a page. The SQLVALUE tag displays the first column of the first row returned by the SQL query, enabling you to embed data within a sentence (for example: There are currently 5 types of cats.). For tabular results, use the SQL tag. SQL tag results display in a searchable report. By default, however, the search option can be disabled using the NOSEARCH syntax.

When working with data grids, there are a few more options (shown under Syntax) and a few more rules. Basic rules when writing a data grid query include:

- Enclose the data grid name or data grid alias with curly brackets. For example:  
`{Cat Facts}`
- Enclose the data grid column names with double quotation marks. For example:  
`"Type of Cat"`

To learn more about advanced rules, see ["About Advanced Data Grid Queries Rules"](#) on page 33.

### Syntax for Queries Against Tables and Views:

```
[[sql: <select statement> ]]
[[sql: <select statement | limit=<maximum rows> nosearch style=<style number>
]]
[[sqlvalue: <select statement> ]]
```

### Syntax for Data Grid Queries:

```
[[sql: <select statement> ]]
[[sql: <select statement | limit=<maximum rows> nosearch style=<style number>
edit_row add_row show_sql ]]
[[sqlvalue: <select statement> ]]
[[sqlvalue: <select statement> | show_sql ]]
```

### In Context SQL Tag Syntax Examples:

```
[[sql: select ename "Employee Name", sal "Salary" from emp order by sal desc |
limit="10" style="2"]].
[[sql: select "Type of Cat",
        "Estimated Population",
        "Largest Threats",
        "Top Speed",
        "Scientific Name",
        "IUCN Status",
        "Weight",
        "Study Date"
from {Cat Facts} | add_row edit_row ]]
```

### In Context SQLVALUE Tag Syntax Examples:

We have `[[sqlvalue: select count(*) from emp]]` employees in our database,  
`[[sqlvalue: select count(*) from emp where deptno=10 ]]` work in department 10.  
 We are currently tracking `[[sqlvalue: select count(*) from {Cat Facts} ]]` types of cats.

## About Advanced Data Grid Queries Rules

Advanced data grid query rules include:

- The query must reference the data grid only once to include an edit or add row link (that is, you cannot join the data grid to itself within the query).
- The first column must be the primary key of the data grid to include an edit row link (that is, the column that uniquely identifies the row of data). If the "edit\_row" option is included and the query has a single select statement, the primary key column is included automatically. If the query contains multiple select statements, you can use the "APXWS\_DATA\_GRID\_PK" substitution (always enclosed with

double quotation marks) as the first column in the `SELECT` statement to include the primary key in order to include an edit row link.

- Report column names are the column name from the data grid, but can be modified using standard SQL column aliasing syntax. For example, the following displays the data from the `Minimum Number` column but the heading displays as `Min`:

```
select "Minimum Number" "Min" from ...
```

- If a column name is longer than 30 characters, you only include the first 30 characters as the name. For example, use:

```
"% of Estimated Lions per Region"
```

Instead of:

```
"% of Estimated Lions per Region"
```

- To display the query that is executed, include the `"show_sql"` option. By including this option, the query displays above the included report. Although this is a good approach for debugging, Oracle does not recommend using `"show_sql"` for a production application.

## Managing Annotations

You can add commentary and additional details to a web page by adding annotations. Annotations can be in the form of uploaded files, notes, links, and tags. Annotations can be added to both pages and data grid records.

### Topics:

- [Managing Uploaded Files and Images](#)
- [Adding Tags](#)
- [Adding Notes](#)
- [Viewing and Deleting Annotations](#)

## Managing Uploaded Files and Images

You can upload files and images to a Websheet page using the Files region. Once uploaded, you can display uploaded images within a page section or embed download links to files.

### Topics:

- [Uploading Files and Images](#)
- [Including a Download Link in a Page Section](#)
- [Displaying an Uploaded Image Inline](#)
- [Editing or Deleting Uploaded Files](#)

### Uploading Files and Images

To upload files and images to a Websheet:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. Under Files on the right side of the page, click the **Add File** icon.



### 3. On the Add File page:

- a. File - Browse to locate the file to upload. Once uploaded, the file is associated with the current page. You can reference an uploaded file in any page using the image or file syntax. See ["Displaying an Uploaded Image Inline"](#) on page 35 or online Help, Markup Syntax.
- b. Alias - A file alias enables you to embed download links or image links within page sections. A file alias must be unique within an application.
- c. Description - Enter descriptive text to describe the file.

### 4. Click Add File.

## Including a Download Link in a Page Section

You can embed a download link within a page section to uploaded files using the following syntax.

### Syntax:

```
[[ file: < file name > | < link name > ]]
[[ file: < file alias > | < link name > ]]
```

### Syntax Examples:

```
[[file: myfile ]]
[[file: myfile.xls ]]
[[file: myfile | My File ]]
```

### File Markup Example:

This `[[file: parts01.xls | spreadsheet ]]` documents our part numbers.

## Displaying an Uploaded Image Inline

After you upload an image, you can display it within any page section of an application by embedding a download link using the following syntax. You can reference an uploaded image using the image name or image alias.

Images defined for the current page are used before images associated with other pages. If image names are ambiguous, the most recently created image displays.


### Syntax:

```
[[ image: < file name > | < properties > ]]
[[ image: < file alias > | < properties > ]]
```

### Syntax Examples:

```
[[image: myimage ]]
[[image: theimagename.jpg ]]
[[image: myimage | width="600" alt="my image" ]]
```

**Example:**

This diagram  illustrates the work flow.

**Editing or Deleting Uploaded Files**

To edit details or delete uploaded files:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. In the Files region, click the **Edit File** icon.  
The Details page appears.
3. To edit file details:
  - a. Edit the fields provided. See item Help for more details.
  - b. To accept your changes, click **Apply Changes**.
4. To delete a file:
  - a. Click **Delete**.
  - b. To accept your changes, click **OK**.

**Adding Tags**

Tags facilitate keyword searching within a Websheet.

**Topics:**

- [Adding Tags](#)
- [Editing Existing Tags](#)

**Adding Tags**

To add tags to a Websheet page:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. Under Tags on the right side of the page, click the **Add Tag** icon.



3. Enter tags in the field provided. Separate multiple tags with a comma.
4. Click **Apply Changes**.

**Editing Existing Tags**

To edit existing tags:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. In the Tags region, click the **Edit Tag** icon.  
The Details page appears.
3. Edit the tags and click **Apply Changes**.

## Adding Notes

Use notes to record user comments.

### Topics:

- [Adding Notes](#)
- [Editing and Deleting Existing Notes](#)

### Adding Notes

To add notes to a Websheet page:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. Under Notes on the right side of the page, click the **Add Note** icon.



3. Enter text in the field provided.
4. Click **Add Note**.

### Editing and Deleting Existing Notes

To edit or delete existing notes:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. In the Notes region, click the **Edit Note** icon.
3. To edit file details:
  - a. Edit the fields provided. See item Help for more details.
  - b. To accept your changes, click **Apply Changes**.
4. To delete a note, click **Delete**.

## Viewing and Deleting Annotations

You can view and delete all Websheet annotations on the Annotations page. Annotations include uploaded files, notes, links, and tags that were either added to a Websheet page or to a specific row in a data grid.

### Topics:

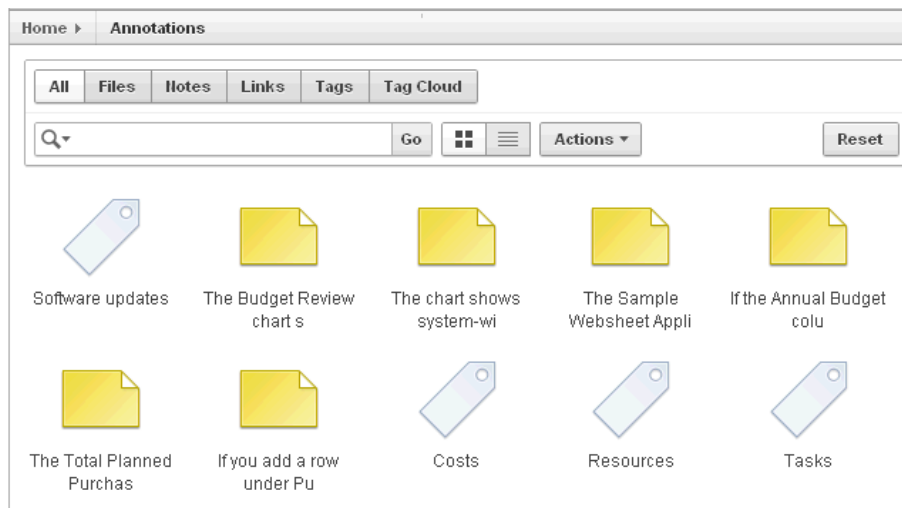
- [Accessing the Annotations Page](#)
- [Deleting Annotations](#)

### Accessing the Annotations Page

To access the Annotations page:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. From the View menu, select **Annotations**.

The Annotations page appears.



3. To view specific type of annotation, click the **Files**, **Notes**, **Links**, **Tags**, or **Tag Cloud** tabs.

### Deleting Annotations

To delete uploaded files, notes, link, or tags:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. From the View menu, select **Annotations**.  
The Annotations page appears.
3. Select an annotation type by clicking the appropriate tab at the top of the page.
4. Click the appropriate tab: **Files**, **Notes**, **Links**, **Tags**, or **Tag Cloud**.
5. Select the annotations to be deleted.
6. If not selected, click the **View Report** icon.

Home ▾

Annotations ▾

Files

All

Files

Notes

Links

Tags

Tag Cloud

Q ▾

Go

Actions ▾

Reset

Delete Checked

<input type="checkbox"/>	File Name	Alias	Attributes	Page	Data Grid	Created ▾	Created By	File Size
	<input type="checkbox"/> <a href="#">Resources.xlsx</a>	Resources.xlsx	-	<a href="#">Home</a>	-	23 hours ago	terri	8KB
	<input checked="" type="checkbox"/> <a href="#">systems.jpg</a>	systems.jpg	-	<a href="#">Systems</a>	-	23 hours ago	terri	134KB
	<input type="checkbox"/> <a href="#">logo.gif</a>	logo.gif	-	<a href="#">Home</a>	-	23 hours ago	terri	116KB
	<input type="checkbox"/> <a href="#">vendors.txt</a>	vendors.txt	-	<a href="#">Planned Purchases Review</a>	-	23 hours ago	terri	164

7. Click **Delete Checked**.



## Managing Websheet Applications

Use the options on the Administration menu to view the Websheet Dashboard, monitor Websheet activity, edit Websheet properties, and control Websheet access.

### Topics:

- [Viewing the Websheet Dashboard](#)
- [Monitoring Websheet Activity](#)
- [Editing Websheet Properties](#)
- [Controlling Websheet Access](#)
- [Changing Your Websheet Password](#)
- [Emailing a Websheet Page](#)
- [Printing a Websheet Page](#)

**See Also:** ["About Publishing the Websheet Application URL"](#) on page 16-32

## Viewing the Websheet Dashboard

The Websheet dashboard displays the details about the current Websheet application including recent changes, top users, and top pages.

To view the Websheet Dashboard:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. From the Administration menu, select **Dashboard**.

The Dashboard appears and is divided into the following sections:

- Application Details
  - Recent Changes
  - Top Users
  - Top Pages
3. To edit the time frame, select a new value from the TimeFrame list.
  4. Click **Reset** to return to the default setting.

## Monitoring Websheet Activity

Use the Monitor Activity page to analyze usage, performance, and popularity of pages and content.

To access the Monitor Activity page:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. From the Administration menu, select **Monitor Activity**.

The Monitor Activity page appears and is divided into the following sections:

- Activity
  - Page Views
  - Top Pages
  - Top Data Grids

- Top Reports
- Top Users
- Annotations
  - Top Files
  - Top Notes
  - Top Tags

Each report displays as an interactive report. To learn more about interactive reports and using the Actions menu, see "[Customizing Interactive Reports](#)" on page 9-4 and "[About the Actions Menu](#)" on page 9-6.

## Editing Websheet Properties

You can access the Websheet Properties page from inside or outside a running Websheet. Use the Websheet Properties page to control general application defaults and behavior. The home page identifies the home page users land on when running the Websheet. The name of the application is displayed within the breadcrumb.

### Topics:

- [Accessing Websheet Properties from a Running Websheet](#)
- [Accessing Websheet Properties from Application Builder](#)
- [About Websheet Properties](#)

### Accessing Websheet Properties from a Running Websheet

To access the Websheet Properties page:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. From the Administration menu, select **Websheet Properties**.

The Websheet Properties appears.

3. To view a section, click the greater than sign (>) to the left of the section title.
4. To learn more about a specific attribute, see item Help and "[About Websheet Properties](#)" on page 5-40.

### Accessing Websheet Properties from Application Builder

To access the Websheet Properties page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Websheet Applications** tab.
3. Click the **View Icons** button.
4. Locate the Websheet and click **Edit**.

The Websheet Properties appears. See "[About Websheet Properties](#)" on page 5-40.

5. To learn more about a specific attribute, see item Help.

### About Websheet Properties

This section describes the attributes on the Websheet Properties page.

**Application** Use the Application section to control general application properties. [Table 5–1](#) describes Application attributes.

**Table 5–1 Application Attributes**

Attribute	Descriptions
Name	Identifies the name of the application. This name displays within the breadcrumb when the application is running.
Status	Identifies the status of the application. Available options include: Available or Unavailable.
Home Page	Select the home page for this Websheet. This is the first page a user sees when running the Websheet.
Application Date Format	Determines the date format to be used in the application.  This date format is used to alter the NLS_DATE_FORMAT 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.
Default Application Language	Identifies the default language of the application. Users are able to change their language preference from within the application. This language list is determined by the translated versions of Application Express which are installed.
Default Application Territory	Identifies the default territory of the application, which controls attributes like date language and numeric characters. Users are able to change their territory preference from within the application.
Show Reset Password	Controls the display of the Reset Password link on the Login page. This link enables users to reset their passwords. This option works only if the application is using Application Express Account authentication.
Websheet Email From Address	Determines the email address to use as the from address in the Websheet. This from email address is used when sending email from a data grid or report email download in the Websheet.

**Details** Use the Details section to edit the application description and login message. [Table 5–2](#) describes Details attributes.

**Table 5–2 Details**

Attribute	Descriptions
Owner	Identifies the user who owns the application.
Description	An optional description that describes the application.
Login Message	Display this message on the login page.

**Logo** Use the Logo section to create a logo for this Websheet application. This logo displays at the top of the Websheet. [Table 5–3](#) describes Logo attributes.

**Table 5–3 Logo**

Attribute	Descriptions
Logo Type	Select the type of logo being used for the application.
Logo	Enter a full text string to use as application logo.

**Style** Use the Style section to override default application style and use a custom CSS.

**Authentication** Use the Authentication section to select an authentication scheme for this Websheet. [Table 5–4](#) describes Authentication attributes.

**Table 5–4 Authentication**

Attribute	Descriptions
Authentication	<p>Select the way users of the application are authenticated. To change the authentication scheme, click <b>Edit Authentication</b>. The following list displays:</p> <ul style="list-style-type: none"> <li>■ <b>Application Express Account</b> - Authenticate using developer account username and password.</li> <li>■ <b>Single Sign-On</b> - Authenticate using Oracle Application Server Single Sign-On. This must be configured for the Application Express instance.</li> <li>■ <b>LDAP</b> - Authenticate using an LDAP directory. Specify additional parameters on this page to configure this.</li> <li>■ <b>Custom</b> - Provide your own code for authentication and session management tasks. See "<a href="#">Controlling Websheet Access</a>" on page 5-43.</li> </ul>
Logout URL	<p>Specify a URL to become this application's Logout URL attribute. This attribute is referenced in logout links as follows:</p> <p>&amp;LOGOUT_URL.</p> <p>If the application uses built-in session verification, you may use "wv_flow_custom_auth_std.ws_logout?p_websheet_app_id=&amp;WS_APP_ID.&amp;p_next_url=ws?p=&amp;WS_APP_ID.:home" to invoke a built-in logout procedure.</p>
Cookie Name	Name for the session cookie, which is required to identify an Application Express session and the session ID in the URL. If no value for the session cookie name is specified, Application Express picks a default value.
Cookie Path	Path attribute for the session cookie.
Cookie Domain	Domain attribute for the session cookie.
Secure	<p>Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Yes</b> - Allow the session management cookie to be sent from the browser only when the protocol is HTTPS.</li> <li>■ <b>No</b> - Allow the session management cookie to be sent from the browser when the protocol is HTTP or HTTPS.</li> </ul>

**Authorization** Use the Authorization section to control who can log in to a Websheet application. [Table 5–5](#) describes Application attributes.

**Table 5–5 Authorization**

Attribute	Descriptions
Access Control List Type	If authentication is Application Express Account, choose whether authorization is determined by the role in the Application Express workspace, or if authorization is determined by the access control list. For all authentication types other than Application Express Account, authorization is always determined by the access control List.

**Table 5–5 (Cont.) Authorization**

Attribute	Descriptions
Allow Public Access	Options include: <ul style="list-style-type: none"> <li>■ <b>Yes</b> - Enable users to run the application in a read-only mode without requiring users to log in.</li> <li>■ <b>No</b> - All users must log in to run the application.</li> </ul>

Click **Access Control Roles** to learn more about roles and their privileges. Click **Edit Access Control List** to link to the Access Control List page. To learn more, see ["Controlling Websheet Access"](#) on page 43.

**SQL and PL/SQL** Use the SQL and PL/SQL section to determine if users can use SQL and PL/SQL in the current Websheet. By default, this capability is disabled. To change the default setting, for Allow SQL and PL/SQL, select **Yes**.

If enabled, users can use SQL in reports and SQL Tags and include PL/SQL in page sections. Click **Add Object** to link to the Suggestion Objects page. Users can write custom reports and use SQL tags on database objects within the schema associated with the current workspace. Identifying a database table or view as a Suggested Object makes it easier to write SQL by exposing the table and view columns in the help page.

**Tip:** instance administrators can control the ability to use SQL and PL/SQL for an entire instance. To learn more, see "Enabling and Disabling SQL Access in Websheets" in *Oracle Application Express Administration Guide*.

## Controlling Websheet Access

This section describes how to control access to a Websheet application.

### Topics:

- [How Websheet Access Works](#)
- [Specifying the Access Control List Type](#)
- [Creating Access Control List Entries](#)

### How Websheet Access Works

An administrator controls who can log in to a Websheet application by specifying one of the following authentication mechanisms:

- Public access (no authentication)
- Oracle Application Express Account
- Single Sign-On Verification
- LDAP Credentials Verification
- Custom

If authentication is defined as **Custom**, an access control list manages the privileges of this application's users.

If authentication is **Oracle Application Express Account**, you must specify whether authorization is determined by the user role defined in the Application Express workspace, or if authorization is determined by the access control list. For all

authentication types other than Oracle Application Express Accounts, authorization is always determined by the access control list.

Once a user logs in to an application, a user's assigned role determines access. User assigned roles include:

- Reader - May view, but not edit content.
- Contributor - May view and edit content.
- Administrator - May view and edit content and edit Websheet Properties and manage the Access Control List.

To learn more about user roles and privileges, click **Help** and then select **Access Control**. See ["About the Help Link"](#) on page 5-3.

### Specifying the Access Control List Type

To use an access control list, you must edit the Websheet Properties and define the Access Control List Type as Custom.

To access the Websheet Properties page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Websheet Applications** tab.
3. Click the **View Icons** button.
4. Locate the Websheet and click **Edit**.

The Websheet Properties appears. See ["About Websheet Properties"](#) on page 5-40.

5. Scroll down to Authorization.
6. From Access Control List Type, select **Custom**.
7. Click **Apply Changes**.

**See Also:** ["Authentication"](#) on page 5-42

### Creating Access Control List Entries

To create access control list entries:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. From the Administration menu, select **Access Control**.
3. Click **Create Entry**.

The Entry Details page appears.

4. On the Entry Details page:
  - a. Username - Enter the username of the user for whom you want to control access.
  - b. Privilege - Identify the user's privileges:
    - Reader - May view, but not edit content.
    - Contributor - May view and edit content.
    - Administrator - May view and edit content and edit Websheet Properties and manage the Access Control List.
5. Click either **Create** or **Create and Create Another**.

## Changing Your Websheet Password

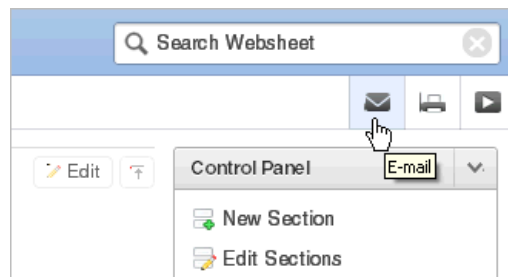
To change your Websheet password:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. From the Administration menu, select **Change My Password**.  
The Change Password page appears.
3. Follow the on-screen instructions and click **Change Password**.

## Emailing a Websheet Page

To email a Websheet page:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. Locate the page you want to email.
3. Click the **Email** icon above the Control Panel.



4. On the Email Page:
  - a. To - Enter the target email address.
  - b. Subject - Enter a description of this email.
  - c. Body - Enter the email content you want to include along with the Websheet page link.
5. Click **Send**.

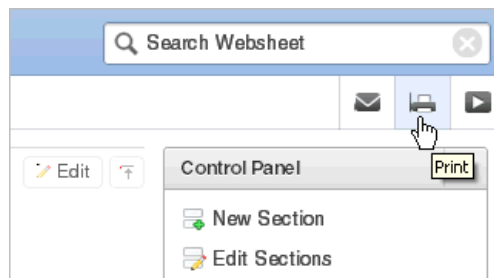
An email link to the currently selected page is automatically included in your email message.

**See Also:** "Configuring Email" in *Oracle Application Express Administration Guide*

## Printing a Websheet Page

To print a Websheet in printer-friendly mode:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. Click the **Print** icon above the Control Panel.



The page displays in printer-friendly mode.

3. Print the page.

## Viewing Websheets

Use the options on the View menu to access presentation mode, view a page directory, access a page history, and view an application directory.

### Topics:

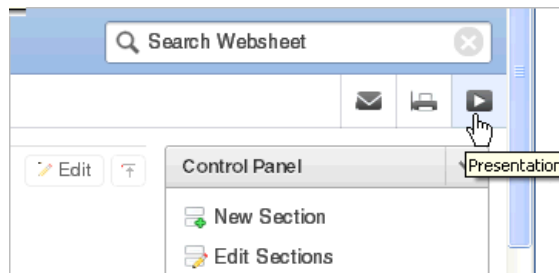
- [About Presentation Mode](#)
- [Viewing the Page Directory](#)
- [Viewing Page History](#)
- [Viewing an Websheet Directory](#)

**See Also:** ["Managing Annotations"](#) on page 5-34 and ["About Publishing the Websheet Application URL"](#) on page 16-32

## About Presentation Mode

Presentation mode enables a single Websheet page to be viewed as a presentation. Each page section displays one at a time as a slide. Users can navigate between sections by using the right and left arrow keys, by using the right and left arrow controls on the top right of the page, or by entering a section number to quickly jump to a specific section.

To view a Websheet in presentation mode, click the **Presentation** icon on the far right side of the page.



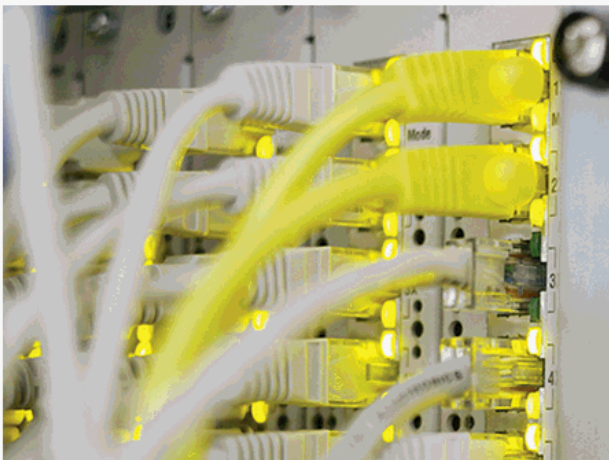
In Presentation mode, each page section displays as a separate page.



Home > Systems

2 / 4

## Systems Overview



The IT team at AnyCo Corp manages all hardware and software. This includes maintaining hardware resources, networks, applying software updates, regular backups etc. The overall cost incurred is computed considering the cost of purchase along with maintenance cost and

Use the navigation bar on the upper right of the page. To exit Presentation mode, click the **Exit** icon or press **ESC**.

## Viewing the Page Directory

Use the Page Directory to view all pages in the current Websheet. Each Websheet can contain any number of pages.

To access the Page Directory:

1. Log in to and run the Websheet. See "[Running a Websheet](#)" on page 5-7.
2. From the View menu, select **Page Directory**.






The Page Directory displays as an interactive report. To learn more about interactive reports and using the Actions menu, see "[Customizing Interactive Reports](#)" on page 9-4 and "[About the Actions Menu](#)" on page 9-6.

By default, the Page Directory displays in icon view.

Home > Page > Page Directory

Page Directory Application Directory

Q Go [Icon] [Icon] Actions

 Home 	 Planned Purchases Review	 Projects	 Systems
--	--	---	--

One page in each Websheet is designated as the home page. The home page is the starting page that displays when you run the Websheet. In Icon view, the home page displays as a page with orange outline of home.

3. To view the page as a report, click the **View Report** icon.

By default, Report view displays the following columns: Name, Doc Type, Created, Created By, Updated On, Updated By, Parent Page, and Grand Parent Page.

4. To create a new page, click **Create Page**.

**Tip:** You specify the Websheet home page on the Websheet Properties page. See ["Editing Websheet Properties"](#) on page 5-40.

## Viewing Page History

Use the Page History to view a log of all changes to the current page.

To view the Page History:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. Select a page.
3. From the View menu, select **Page History**.

The Page History displays as an interactive report.

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 then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each Websheet as a large icon.
  - **View Report** - Displays each Websheet as a line in a report.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
4. To view changes in a Calendar format, click **Calendar**.

## Viewing an Websheet Directory

Use the Websheet Directory to navigate to another Websheet application.

**See Also:** ["Editing Websheet Properties"](#) on page 5-40

To access the Websheet Directory:

1. Log in to and run the Websheet. See ["Running a Websheet"](#) on page 5-7.
2. From the View menu, select **Websheet Directory**.

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 then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each Websheet as a large icon.
  - **View Report** - Displays each Websheet as a line in a report.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
3. To view an Websheet:
- In Icon view, click the appropriate icon.
  - In Report view, click the **Run** icon in the Actions column.



---

## Using Application Builder

This section provides important background information about using Application Builder to build dynamically rendered applications.

### Topics:

- [Accessing Application Builder](#)
- [About the Application Builder Home Page](#)
- [About the Application Home Page](#)

**See Also:** ["Quick Start"](#) on page 1-1, ["Application Builder Concepts"](#) on page 2-1, ["About Database Applications"](#) on page 7-1, ["Controlling Page Layout"](#) on page 12-1, and ["Adding Navigation"](#) on page 11-1

### Accessing Application Builder

An application is a collection of database-driven web pages linked together using tabs, buttons, or hypertext links. The pages within an application share a common session state definition and authentication method. Application Builder is the tool you use to build the pages that comprise an application.

To access Application Builder:

1. Log in to Oracle Application Express. See ["Logging In To Oracle Application Express"](#) on page 1-3.

The Workspace home page appears.

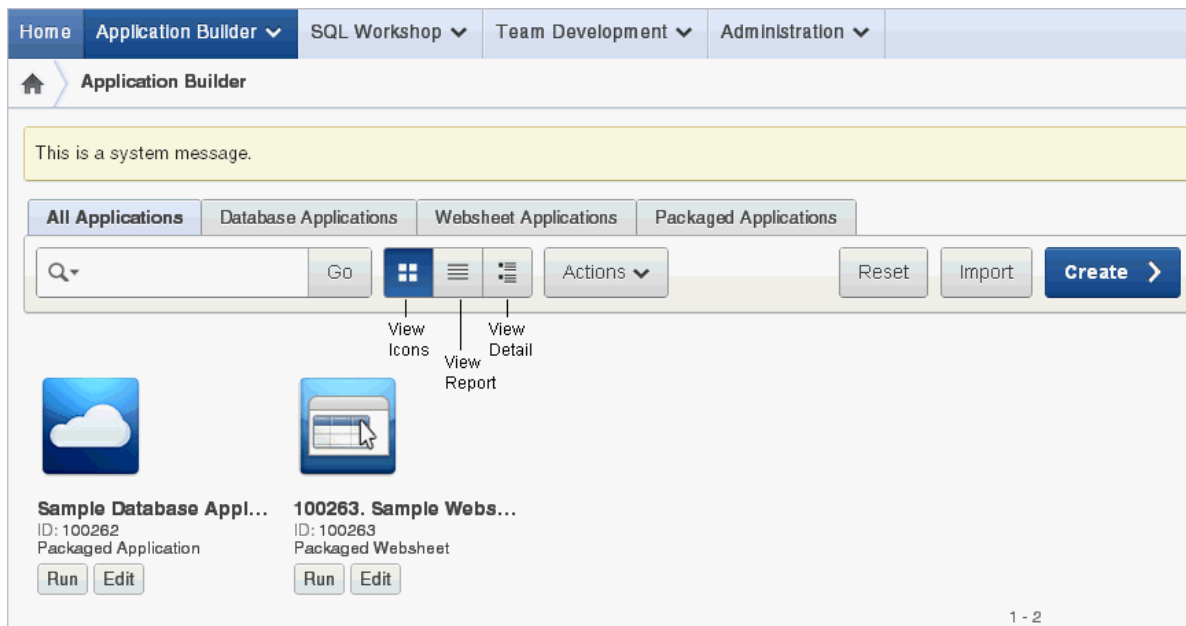
2. Click the Application Builder icon.

The Application Builder home page appears.

### About the Application Builder Home Page

The Application Builder home page displays all installed applications. Applications are divided into two categories: database applications and Websheet applications. To learn more, see ["Understanding the Difference Between Database and Websheet Applications"](#) on page 2-1.

Tabs at the top of the Application Builder home page enable you to choose the type of applications to view. Available tabs include: All Applications, Database Applications, Websheet Applications, and Packaged Application. To learn more about packaged applications, see ["Utilizing Packaged Applications"](#) on page 3-1.



You can customize the appearance of the Application Builder home page using the Search bar at the top of the page. Available controls include:

- **Search icon** - Resembles a magnifying glass. 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 then 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.
- **View Detail** - Displays detailed information about each application.
- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

The following buttons appear to the right of the navigation bar:

- **Reset**. Click **Reset** to return the page to the default display.
- **Import**. Click **Import** to import an exported application file. See ["Importing Export Files"](#) on page 16-23.
- **Create**. Click **Create** to create an application or install a demonstration application. See ["About the Create Application Wizard"](#) on page 2-2.

### About the Tasks List

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

Tasks
<a href="#">Application Builder Defaults</a>
<a href="#">Application Groups</a>
<a href="#">Workspace Themes</a>
<a href="#">Cross Application Reports</a>
<a href="#">Application Express Views</a>
<a href="#">Export</a>

The Tasks list contains the following links:

- **Application Builder Defaults.** See "Leveraging Application Builder Defaults" in *Oracle Application Express Administration Guide*.
- **Application Groups.** See "[Creating Application Groups](#)" on page 7-52.
- **Workspace Themes.** See "[Managing Workspace Themes](#)" on page 13-7
- **Cross Application Reports.** See "[Viewing Application Utilities and Reports](#)" on page 7-77.
- **Application Express Views.** See "[About Application Express Views](#)" on page 7-82.
- **Export.** See "[Exporting an Application and Related Files](#)" on page 16-12.

### About Recent

The Recent list contains links to recently viewed applications.

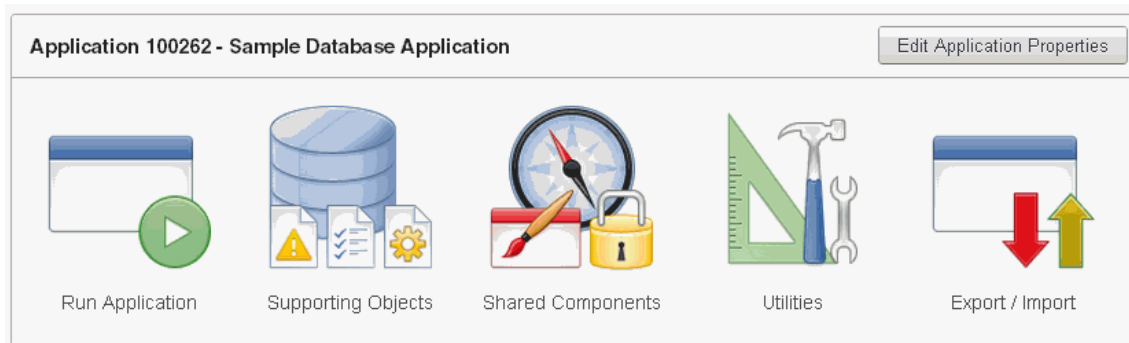
### About Migrations

Links to Oracle Application Express Application Migration Workshop. Use this tool to migrate a Microsoft Access application or convert an Oracle Forms application to an Oracle Application Express application. See *Oracle Application Express Application Migration Guide*.

## About the Application Home Page

To view a specific application, select the application on the Application Builder home page. The Application home page appears. The application ID and the application name display at the top of the page. To link to the application definition, click the **Edit Application Properties** button.

**See Also:** "[Editing the Application Definition](#)" on page 7-14



The following large icons appear next:

- **Run Application** submits the home page in the current application to the Application Express engine to render viewable HTML. See ["How the Application Express Engine Renders and Processes Pages"](#) on page 2-4.
- **Supporting Objects** links to the Supporting Objects page. See ["How to Create a Custom Packaged Application"](#) on page 16-5.
- **Shared Components** links to a list of shared components and user interface controls that can display or be applied on every page within an application. See ["Working with Shared Components"](#) on page 8-49.
- **Utilities** links to the Utilities page. Use this page to monitor developer activity, view dashboards, run Advisor, and view numerous other reports. See ["Using Application Builder Utilities"](#) on page 7-77.
- **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 ["Exporting an Application and Related Files"](#) on page 16-12.

#### About the Edit Application Properties Button

The Edit Application Properties button displays to the right of the application ID and name. Click **Edit Application Properties** to edit the application definition. See ["Editing the Application Definition"](#) on page 7-14.

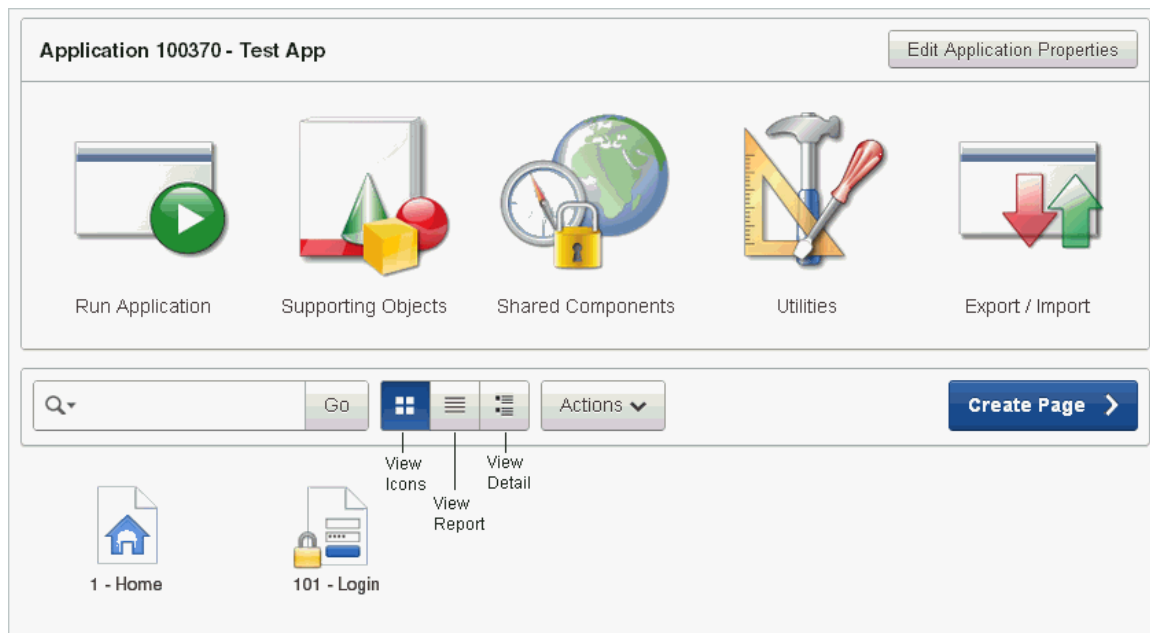
#### About the Create Page Button

Click **Create Page** to launch a wizard that walks you creating a page in an application. See ["Creating a Page from the Application Home Page"](#) on page 7-34.

#### About the Navigation Bar

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





The Application home page navigation bar contains the following controls:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View icons**. Use these icons to toggle between three views:
  - **View Icons** (default) displays each page as a large icon identified by the page name.
  - **View Report** displays each page as a line in a report. Each line includes the page ID, the page name, when the page was last updated, who updated it, the page type, user interface classification, and group.
  - **View Detail** displays detailed information about each page.

**See Also:** ["Understanding Page Display Alternatives"](#) on page 6-6

- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

### About the Tasks List

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

Tasks
<a href="#">Delete this Application</a>
<a href="#">Copy this Application</a>
<a href="#">Hide Icons</a>

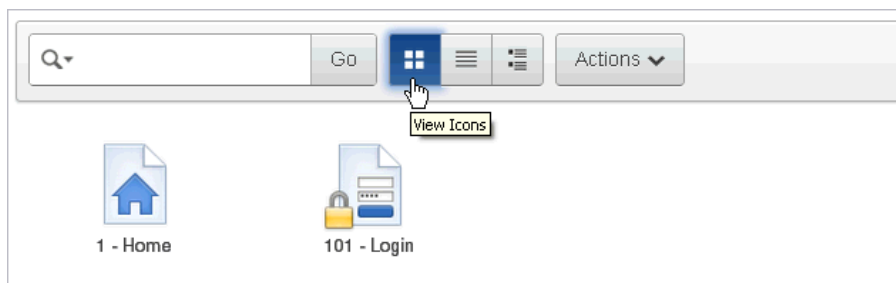
The Tasks list contains the following links:

- **Delete this Application** deletes the current application. See ["Deleting a Database Application"](#) on page 7-11.
- **Copy this Application** creates a copy of the current application. See ["Copying a Database Application"](#) on page 7-7.
- **Hide Icons** hides the icons that display at the top of the Application home page. See ["About the Application Home Page"](#) on page 6-3. This link toggles between **Hide Icons** and **Show Icons** depending upon whether the icons currently display.

### Understanding Page Display Alternatives

You can control how the Application home page appears by selecting the following icons: View Icons, View Report, or View Detail.

**View Icons** (the default) display each page as an icon.



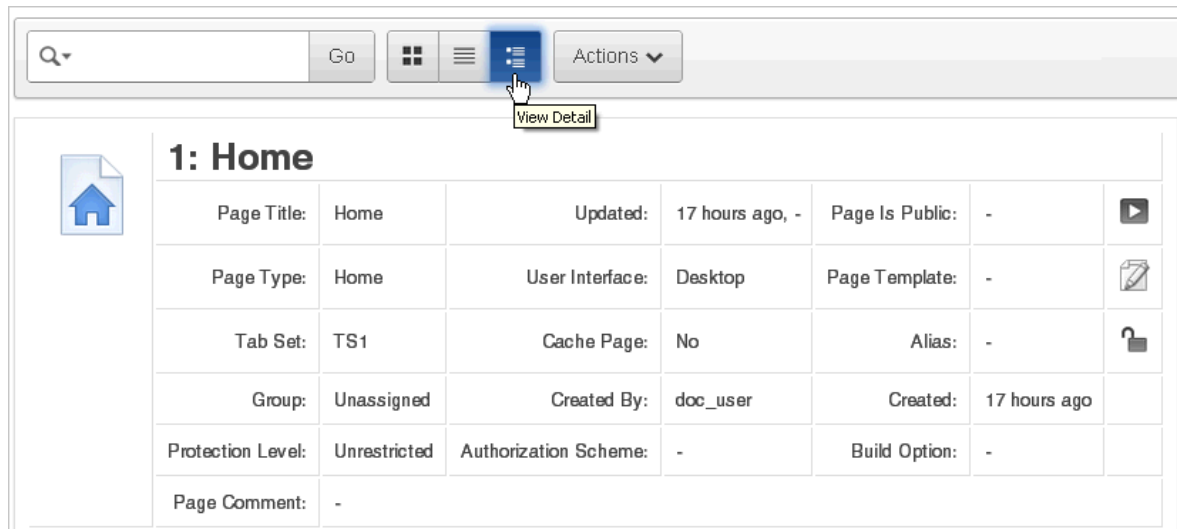
**Report** mode displays each page as a line in a report. Each line includes the page number, the page name, when the page was last updated and by whom, the page type, any associated group, and lock status. To view a page, click the page ID. Click the **Lock** icon to prevent conflicts during application development. Click the **Run** icon to run the associated page and render viewable HTML.

Page	Name	Updated	Updated By	Page Type	User Interface	Group	Lock	Run
1	<a href="#">Home</a>	17 hours ago	-	Home	Desktop	<a href="#">Unassigned</a>		
101	<a href="#">Login</a>	17 hours ago	-	Login	Desktop	<a href="#">Unassigned</a>		

1 - 2

**See Also:** ["Locking and Unlocking a Page"](#) on page 7-43 and ["Running an Application or Page"](#) on page 7-39

**View Detail** displays detailed information about each page in a separate region. Click the **Run** icon to run the associated page and render viewable HTML. Click the **Edit** icon to view the Page Definition. Click the **Lock** icon to prevent conflicts during application development.

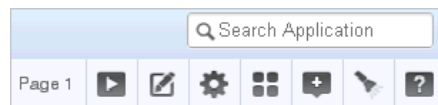


### About Recently Edited Pages

The Recent list contains links to recently edited pages within the current application. To link to specific page, click the page ID and name.

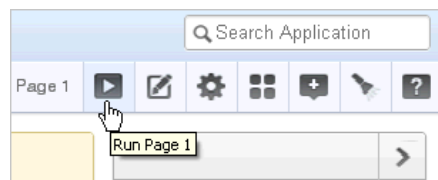
### About the Developer Action Bar

The Developer Action bar displays in the upper right corner below the Search Application field on most pages in Application Builder.



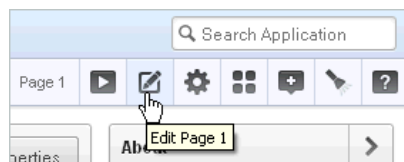
The Developer Action bar contains several icons. The icons that display depend upon the page you are in Application Builder. Note that the Run Page icon, Edit Page icon, Developer Comment icon, and Find icon display on numerous pages in Application Builder, including pages for creating and managing shared components. See ["Working with Shared Components"](#) on page 8-49.

### Run Page Icon



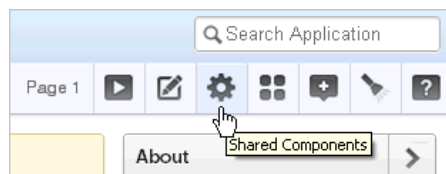
The **Run Page** icon resembles a forward arrow. Click this icon to render viewable HTML of the current page. If no page is selected, clicking this icon runs the first page in the application. When you run a page, the Application Express engine dynamically renders the page based on data stored in the database. See ["Running an Application or Page"](#) on page 7-39.

## Edit Page Icon



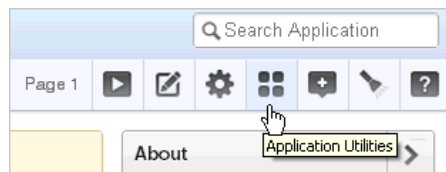
The **Edit Page** icon resembles a small piece of paper and pencil. Click this icon to access the Page Definition of the current page. If no page is selected, clicking this icon displays the Page Definition of the first page in the application. See ["About the Page Definition"](#) on page 8-1.

## Shared Components Icon



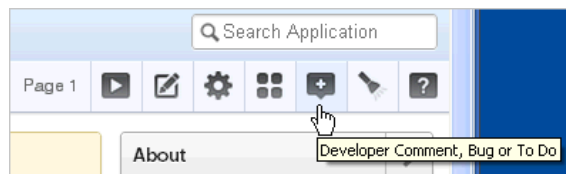
The **Shared Components** icon resembles a small mechanical gear. Click this icon to view a list of shared components and user interface controls that can display or be applied on every page within an application. See ["Working with Shared Components"](#) on page 8-49.

## Application Utilities Icon



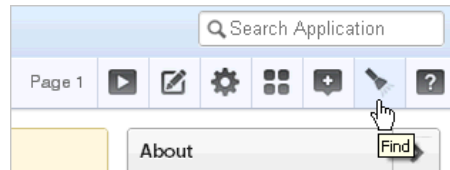
The **Application Utilities** icon resembles four small boxes. Click this icon to link to the Utilities page. The Utilities page summarizes information across the application and provides access to useful tools. See ["Using Application Builder Utilities"](#) on page 7-77.

## Developer Comment, Bug, or To Do icon



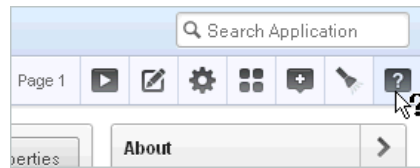
The **Developer Comment, Bug, or To Do** icon resembles a balloon with a plus sign. Click this icon to link to create a developer comment, a bug, or a To Do entry. See ["Adding Developer Comments"](#) on page 7-48, ["Managing Bugs"](#) on page 4-14, and ["Tracking To Dos"](#) on page 4-10.

## Find Icon



The **Find** icon resembles a flashlight. Click this icon to search for items, pages, queries, tables, PL/SQL, images, and cascading style sheets (CSS) within the current application or the schemas associated with the workspace. See ["Using the Find Icon"](#) on page 10-82.

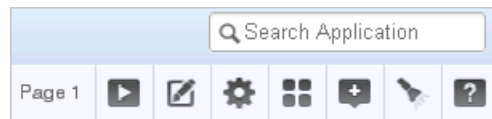
## Help Icon



The **Help** icon resembles a question mark. Clicking the Help icon displays the Documentation and Tutorials page. To view the entire library, click the **Full Library** HTML link, or click a specific HTML or PDF link. See ["About the Oracle Application Express Documentation"](#) on page 1-11.

## Searching Page Metadata

The Search Application field displays above the Developer Action bar.



Use this field to perform case sensitive searches for metadata within an application. This field supports regular expressions.

To quickly view a specific page, enter the application and page number using the format `application:page` or `application-page` and press **ENTER**. Consider the following examples:

```
4000-100
4000:100
```



---

## About Database Applications

This section describes how to use Application Builder to build database applications and application components. It includes instructions for creating an application and adding pages and adding components (reports, charts, or forms), page controls (buttons, items, list of values), and shared components (breadcrumbs, lists, or tabs). For instructions on viewing the packaged and sample applications that ship with Oracle Application Express, see ["Utilizing Packaged Applications"](#) on page 1.

### Topics:

- [About Creating a Database Application](#)
- [About Application Attributes](#)
- [Managing Pages in a Database Application](#)
- [Adding Database Application Comments](#)
- [Adding Developer Comments](#)
- [Creating Application Groups](#)
- [Understanding Page-Level Items](#)
- [Understanding Application-Level Items](#)
- [Viewing Application Utilities and Reports](#)

**See Also:** ["Understanding the Difference Between Database and Worksheet Applications"](#) on page 2-1, ["Using Application Builder"](#) on page 6-1, ["Creating Reports"](#) on page 9-1, ["Controlling Page Layout"](#) on page 12-1, and ["Adding Navigation"](#) on page 11-1

### About Creating a Database Application

By using the Create Application Wizard, you can create a complete application containing multiple pages including reports, interactive reports, forms, tabular forms, and master detail forms. The Create Application Wizard is designed to easily and quickly create basic Oracle Application Express applications. After you create an application using this wizard, you can modify pages and add additional pages using the Create Page Wizard. See ["About Creating Pages in a Database Application"](#) on page 7-34.

You can use the Create Application Wizard to create blank pages, or pages based on SQL queries or existing database tables. Applications based on tables can consist of a simple report, a form and report, or a tabular form. To learn more, see ["Creating Forms"](#) on page 10-1. You can create SQL queries by manually typing SQL, or by using the graphical user interface of Query Builder.

At the workspace level, you have the option of setting defaults that are used for applications built in that workspace. Setting these defaults enables you to exit the wizard without paging through each step. When you exit the wizard, the application you create uses the values you specified as defaults.

**See Also:** "Building Queries with Query Builder" in *Oracle Application Express SQL Workshop Guide* and "Leveraging Application Builder Defaults" in *Oracle Application Express Administration Guide*

**Topics:**

- [Creating a Database Application Based on a Table, Query, or Drill-down Query](#)
- [Creating an Application from a Spreadsheet](#)
- [Copying a Database Application](#)
- [Creating a Database Application from a Template](#)
- [Installing Sample Applications](#)
- [Deleting a Database Application](#)
- [About Application Models and User Interface Defaults](#)

## Creating a Database Application Based on a Table, Query, or Drill-down Query

You can create a database application based on a table, query, or drill-down query by selecting **Database** in the Create Application Wizard. A key decision point when running the Create Application Wizard is choosing a target user interface. Based on the user interface you select, the wizard is optimized to display the appropriate page types, attributes, and themes.

**See Also:** ["Managing Pages in a Database Application"](#) on page 7-34

To create a database application based on a table, query, or drill-down query:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. For Method, select **Database** and click **Next**.
4. For Name:
  - a. Application - Enter a unique integer value to identify the application. Note that Application IDs between 3000 to 9000 are reserved for internal use by Oracle Application Express.
  - b. Name - Enter a name to identify the application.
  - c. Schema - Each application obtains its privileges by parsing all SQL as a specific database schema. Identify the database schema owner.
  - d. Create Options:
    - **Start from scratch** - Enables you to manually add all pages.
    - **Include Home page** - Includes a blank page, which automatically acts as the parent of any new pages added. A list region is also created on the home page, providing navigation to the additional pages.
    - **Use previously created application model** - Reuses an existing application definition. Using an existing application definition enables you to run this wizard without reentering application property values.



Note that you still have to define all other application attributes, or you can choose to copy some attributes by choosing to copy shared components from another application (See "[About Application Models and User Interface Defaults](#)" on page 7-12).

- e. User Interface - Select a user interface for the application. For application primarily designed for desktop use, select **Desktop**.
- f. Click **Next**.

**Tip:** To create an instant application consisting of just a login page and blank page, click **Create Application**.

Next, add pages to your application.

- 5. For Pages, select the type of page you want to add.
  - a. Select the type of page you want to add.

[Table 7-1](#) lists available page types by target user interface (that is, Desktop and jQuery Mobile Smartphone).

**Table 7-1 Available Create Application Wizard Page Types**

Page Type	Description	Desktop	jQuery Mobile Smartphone
Blank	Creates a page with no built-in functionality.	Available	Available
List View	Creates a page that contains the formatted result of a SQL query. You can choose a table to build the List view on, and select a column to be used for the List view display information.	Not applicable	Available
Report	Creates a page that contains the formatted result of a SQL query. You can choose to build a report based on a table you select, or based on a custom SQL SELECT statement or a PL/SQL function returning a SQL SELECT statement that you provide. <b>Note:</b> jQuery Mobile Smartphone only supports classic reports.	Available	Available
List View and Form	Builds a two page List view and form combination. On the first page, users select a row to update from the List View. On the second page, users can update the selected table or view.	Not applicable	Available
Report and Form	Builds a two page report and form combination. On the first page, users select a row to update. On the second page, users can add a record or update or delete an existing record.	Available	Available
Form	Creates a form to update a single row in a database table.	Available	Available
Tabular Form	Creates a form to perform update, insert, and delete operations on multiple rows in a database table.	Available	Not applicable
Master Detail	Builds a two page report and form combination. On the first page, users select a row to update. On the second page, users can update the selected table or view and its associated detail.	Available	Not applicable
Chart	Creates a page with a chart to represent the result of a SQL query.	Available	Available

**Action** displays the currently selected page type. For each selection, the wizard prompts you for different types of information, such as selecting a table name or report implementation. To learn more, see item Help.

**b. Click Add Page.**

The page (or pages) appear at the top of the page. To delete a page, click the **Delete** icon.

**c. Repeat the previous steps until all pages have been added.**

**d. Click Next.**

**Tip:** To exit this wizard early and use Application Builder Defaults, click the **Create Application** button. To configure Application Builder Defaults, see "Leveraging Application Builder Defaults" in *Oracle Application Express Administration Guide*.

**6. For Shared Components, indicate whether to copy shared components from another application. Select **Yes** or **No**. If you select Yes, select where to copy them from and which components to import.**

Shared components are common application elements that can be displayed or applied across multiple pages in an application. To save time or maintain consistency between applications, copy the shared components from an existing application. The types of shared components you can copy include: user interface themes, lists of values, navigation bar entries, authorization schemes and authentication schemes.

**7. For Attributes:**

**a. Authentication Scheme - Determine how establish user identity before accessing an application. Options include:**

- **Application Express** - Uses the user account credentials created and maintained with the Application Express Service Administration application. These are the accounts you use to log in to the Application Express development environment. You can also create accounts in this user account repository for end users of your applications.
- **Database Account** - Requires users logging into your application to enter a database schema name (or user name) and a password in order to authenticate. This account information is managed entirely within the Oracle database.
- **No Authentication** - Also known as Database Account Credentials. This option enables users to access your application using the account credentials stored in the `mod_plsql` DAD definition. In most cases this results in users not having to login when accessing your application. This is the quickest way to create a "public" application.

To learn more, see ["Establishing User Identity Through Authentication"](#) on page 15-25

**b. Tabs - Select whether to include tabs in your application. You can create one level tabs, two level tabs, or no tabs at all. To learn more, see ["Creating Tabs"](#) on page 11-1**

This attribute identifies the language in which an application is developed. This language is the base language from which all translations are made.

**c. Language - Select the primary language for this application.**

This attribute identifies the language in which an application is developed. This language is the base language from which all translations are made.

- d. **User Language Preference Derived From** - Specifies how the engine determines the application language. The application primary language can be static (that is, derived from the web browser language) or determined from a user preference or item. The database language setting determines date display and sorting characteristics. To learn more, see item Help.

You can alter the Language and User Language Preference Derived From attributes later on the Edit Globalization attributes page. See "[Configuring Globalization Attributes](#)" on page 7-26.

- e. **Date Format** - Specifies the date format to be used in the application.

Use this date format to alter the `NLS_DATE_FORMAT` database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle date format mask or an item reference through substitution syntax. If no value is specified, the default date format is derived from the database session at runtime. If supplied, this is also used as the date format for any items resulting from columns of type `DATE`.

- f. **Date Time Format** - Specifies 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.

- g. **Timestamp Format** - Specifies the timestamp format to be used in your application.

Use this timestamp format to alter the `NLS_TIMESTAMP_FORMAT` database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle timestamp format mask or an item reference through substitution syntax. If no value is specified, the default timestamp format is derived from the database session at runtime.

- h. **Timestamp Time Zone Format** - Specifies the timestamp with time zone format to be used in your application.

Use this timestamp with time zone format to alter the `NLS_TIMESTAMP_TZ_FORMAT` database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle timestamp with time zone format mask or an item reference through substitution syntax. If no value is specified, the default timestamp with time zone format is derived from the database session at runtime.

- i. **Click Next.**

8. For User Interface Theme, select a theme and click **Next**.

Themes are collections of templates used to define the layout and style of an entire application. See "[Managing Themes](#)" on page 13-1.

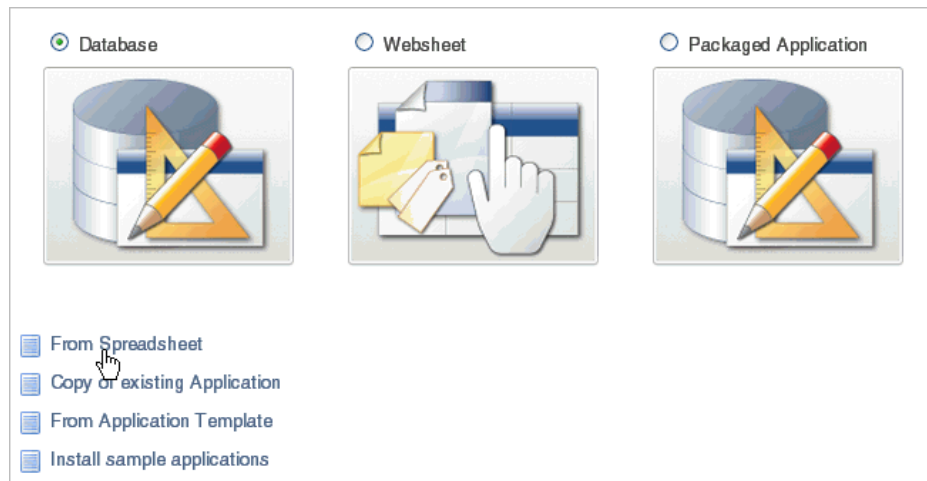
9. Confirm your selections and click **Create Application**.

## Creating an Application from a Spreadsheet

You can create an application based on spreadsheet data by selecting **From Spreadsheet** in the Create Application Wizard.

To create an application from spreadsheet data:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. For Method, select **From Spreadsheet**.



4. For Load Method, specify how spreadsheet data is imported. Select one of the following and click **Next**:
  - a. **Upload file, comma separated (\*.csv) or tab delimited.** Specify the following and click **Next**:
    - Text File - Click **Choose File** to locate the file to be uploaded.
    - Separator - Specify the column separator character. Use \t for tab separators.
    - Optionally Enclosed By - Enter a delimiter character. You can use this character to delimitate 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. You can also use this option to enclose a data value with the specified delimiter character. If applicable, select **First row contains column names**.
    - File Character Set - Choose the character set in which the text file is encoded.
  - b. **Copy and paste.** Copy and paste the tab delimited data you want to import.
5. For Table Properties:
  - a. Schema - Identify the database schema owner.
  - b. Table - Enter a name for the table being created.
  - c. Set Table Properties - Review the table properties. Modify the data types or enter format masks. Specify whether to include a column by selecting **Yes** or **No** from the Upload list.
  - d. Click **Next**.

6. For User Interface Defaults:
  - a. Review the displayed Singular Name and Plural Name.
  - b. (Optional) Under Column User Interface Defaults, review the displayed column labels.
  - c. Click **Next**.
7. For Application Options, specify the following:
  - a. Application Name - Enter an alphanumeric name for this application.
  - b. Create Mode - Options include:
    - **Read Only** does not include insert and update pages.
    - **Read and Write** includes insert and update pages.
  - c. Report Implementation:
    - **Classic** creates a SQL report.
    - **Interactive** creates an interactive report.
  - d. Click **Next**.
8. For User Interface Theme, select a theme and click **Next**.

Themes are collections of templates used to define the layout and style of an entire application. See "[Managing Themes](#)" on page 13-1.
9. Confirm your selections and click **Create Application**.

## Copying a Database Application

You can create a copy of an existing application by running the Create Application Wizard or by selecting the application and then Copy this Application on the Application home page.

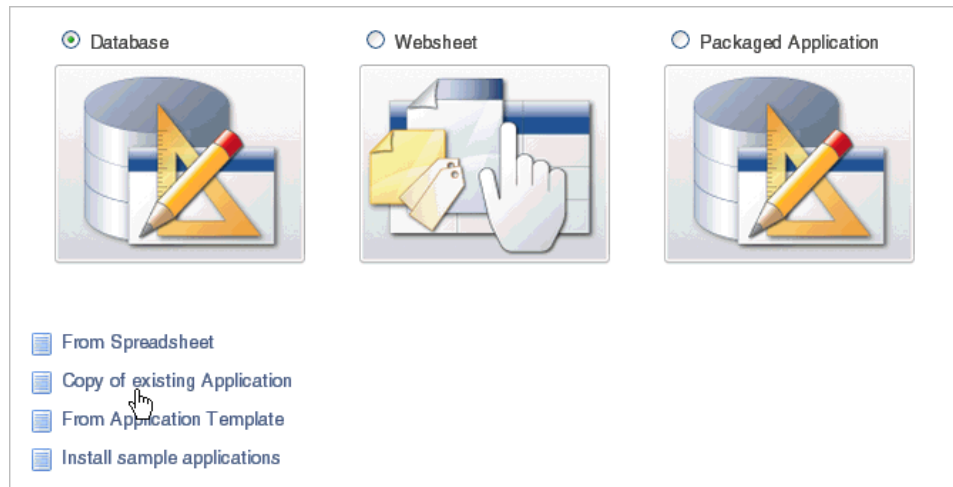
### Topics:

- [Copying a Database Application Using the Create Application Wizard](#)
- [Copying an Application from the Application Home Page](#)

### Copying a Database Application Using the Create Application Wizard

To copy application by running the Create Application Wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. Select **Copy of an existing Application**.



4. For Method, click the **As a copy of an existing application** link.
5. 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 - Enter a unique integer value to identify the application. Note that Application IDs between 3000 to 9000 are reserved for internal use.
  - d. Copy Supporting Object Definitions - Specify whether to include supporting object definitions. Options include:
    - **Yes** - Include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file.
    - **No** - Do not include supporting object definitions.
  - e. Click **Next**.
6. Click **Create Application**.

### Copying an Application from the Application Home Page

To copy a database application from the Application home page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.  
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. Note that 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 - Specify whether to include supporting object definitions. Options include:

- **Yes** - Include database object definitions, image definitions, and seed data SQL statements encapsulated in a single file.
  - **No** - Do not include supporting object definitions.
- d. Click **Next**.
5. Click **Copy Application**.

## Creating a Database Application from a Template

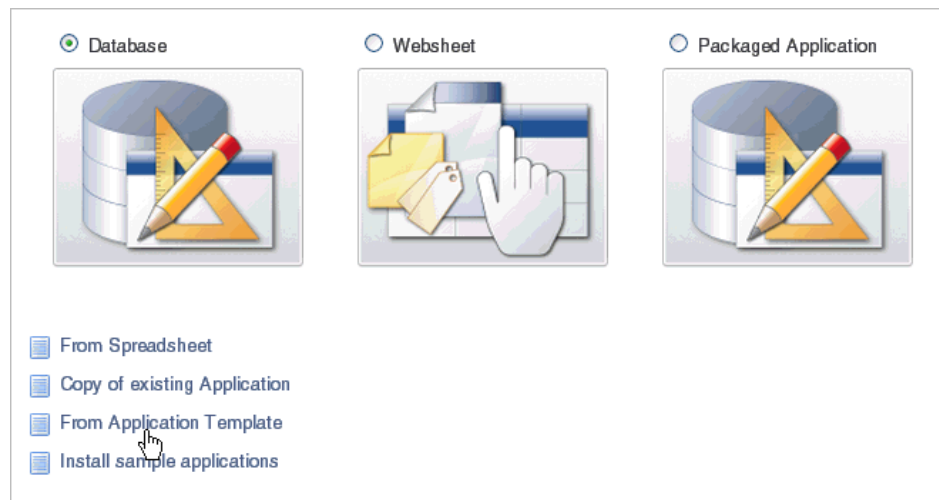
Instance administrators manage the template application repository for an entire Oracle Application Express instance. Developers can create robust applications based on template applications stored in the template application repository.

Only an instance administrator can add or remove an application template from the repository. To create a template application, an instance administrator must first export the application and then add it to the template application repository.

**See Also:** "Managing Template Applications" in *Oracle Application Express Administration Guide*

To create an application based on a template application:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. For Method, select **From Application Template**.



4. For Select Application:
  - a. Application Type - Select the type of template application on which to base your new application. Select either **Database** or **Worksheet**.
  - b. Template Application - Select the name of the template application on which to base your new application.
  - c. Name - Enter a short descriptive name for the application, helping to distinguish the new application in select lists and reports.
  - d. Application - Specify an integer value that identifies the application. The application ID must be unique within your Application Express instance.

Application IDs in the range of 3000 to 9000 are reserved for internal use by Application Express.

- e. Schema - Your application obtains its privileges by parsing all SQL as a specific database schema. Identify the database schema owner. This option only displays if you select Database for Application Type.
  - f. Click **Next**.
5. Confirm your selections and click **Create Application**.

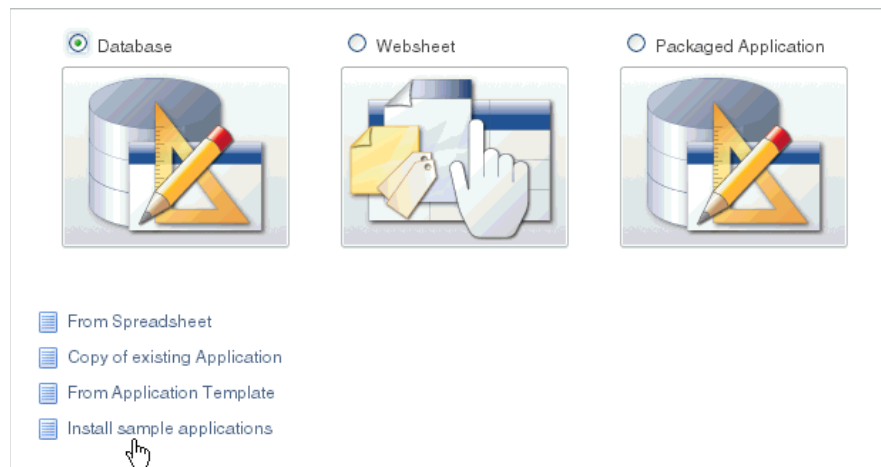
## Installing Sample Applications

Oracle Application Express includes many sample applications. You can install, run, and use sample applications as is, or analyze them to better understand how to use Application Builder to build specific types of functionality.

**See Also:** ["Utilizing Packaged Applications"](#) on page 3-1

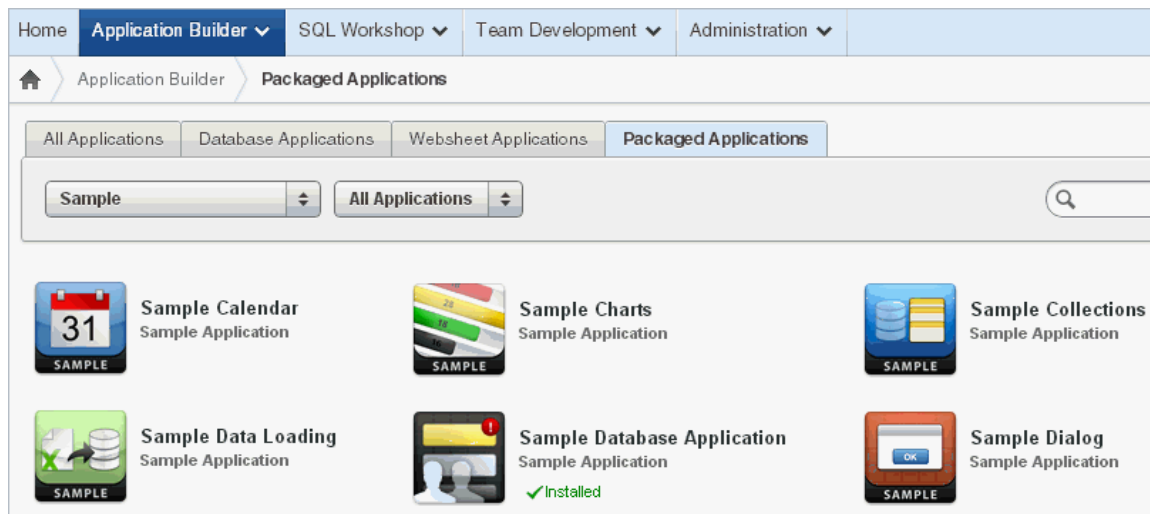
To install sample applications:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. For Method, select **Install Sample applications**.

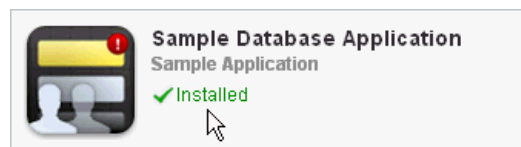


The Packaged Applications page appears.





Note that the application category (for example, Sample Application) displays beneath the application title. You can identify installed applications by the green Installed tag that displays beneath the product category.



4. Locate the application to be installed.
5. Click the application image.  
A summary page appears.
6. Click **Install Application**.
7. Select an Authentication scheme and click **Next**.
8. Click **Install Application** again.  
A success message appears.
9. To run the application, click the **Run Application** icon.
10. Enter the appropriate login credentials:
  - a. Username - Enter your workspace username.
  - b. Password - Enter your workspace password.
  - c. Click **Login**.

## Deleting a Database Application

You can delete an application from within Application Builder, or while editing application attributes. If you delete an application you also delete all defined components (reports, charts, or forms), page controls (buttons, items, list of values), and shared components (breadcrumbs, lists, and tabs, but not user interface defaults).

**See Also:** ["Deinstalling Supporting Objects"](#) on page 16-11

**Topics:**

- [Deleting an Application from the Application Builder Home Page](#)
- [Deleting an Application from the Edit Application Definition Page](#)

**See Also:** ["Deinstalling Supporting Objects"](#) on page 16-11

**Deleting an Application from the Application Builder Home Page**

To delete an application from Application Builder:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. When Application Builder appears, verify the application ID and name at the top of the page.
4. On the Tasks list, click **Delete this Application**.
5. When prompted, click **Permanently Delete Now**.

**Deleting an Application from the Edit Application Definition Page**

To delete an application from the Edit Application Definition page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Edit Application Properties** 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**.

**See Also:** ["Editing the Application Definition"](#) on page 7-14

## About Application Models and User Interface Defaults

The Create Application Wizard is designed with the assumption that the developer may run it multiple times. To facilitate this iterative approach to application development, every time you run the wizard it saves the page definitions to an application model.

Consider the following example. You create an application by running the Create Application Wizard. After viewing the application, you realize it is not quite what you wanted. Instead of altering it, you can run the wizard again and select an application model. By selecting an existing application model when you rerun the wizard, you can quickly improve your application with minimal time and effort.

**See Also:** *"Managing Application Models" in Oracle Application Express Administration Guide*

Another way to increase your productivity when creating an application is to specify user interface defaults. User interface defaults are metadata that enable you to assign default user interface properties to a table, column, or view within a specified schema.

**See Also:** *"Managing User Interface Defaults" in Oracle Application Express SQL Workshop Guide*

## Leveraging Application Models and User Interface Defaults

You can increase your productivity when creating applications by leveraging application models and user interface defaults. Consider the following scenario:

1. Create an application based on tables or views by running the Create Application Wizard.
2. Run the generated application. Note any functional deficiencies.
3. Evaluate whether to create or edit user interface defaults.

For example, you can use user interface defaults to control how form field or report labels display. You can also use user interface defaults to display specific columns or have columns display in an alternate order.

4. Navigate to the Application Builder home page and create an application by clicking **Create**.
5. For Method, select **Database**.
6. For Name:
  - a. Application - Enter a unique integer value to identify the application. Note that Application IDs between 3000 to 9000 are reserved for internal use by Oracle Application Express.
  - b. Name - Enter a name to identify the application.
  - c. Schema - Each application obtains its privileges by parsing all SQL as a specific database schema. Identify the database schema owner.
  - d. For Create Options - Select **Use previously created application model**. This option reuses an existing application definition. Using an existing application definition enables you to run the wizard without reentering application property values.

Note that you still have to define all other application attributes, or you can choose to copy some attributes by choosing to copy shared components from another application (See "[About Application Models and User Interface Defaults](#)" on page 7-12).
  - e. User Interface - Select user interface for the application.
  - f. Click **Next**.

7. Select a design model and developer.

Note the pages you previously created already appear.

8. Add pages, edit pages, or remove pages.
9. Complete the wizard.
10. Repeat steps 2 through 9 until the application meets your functional requirements.

## About Application Attributes

Application attributes apply to an entire application. Once you create an application, the next logical step is to review and possibly update application attributes.

### Topics:

- [Editing the Application Definition](#)
- [Configuring Security Attributes](#)

- [Configuring Globalization Attributes](#)
- [Managing the Application User Interface](#)

**See Also:** ["How to Create a Custom Packaged Application"](#) on page 16-5 for information on using the Supporting Objects utility to create a packaged application

## Editing the Application Definition

You use the attributes on the Edit Application Definition page to edit the application name and availability and to define static substitution strings. Additionally, the Edit Application Definition page displays defined build options, the associated theme, template defaults, and component defaults. Required values are marked with a red asterisk (\*).

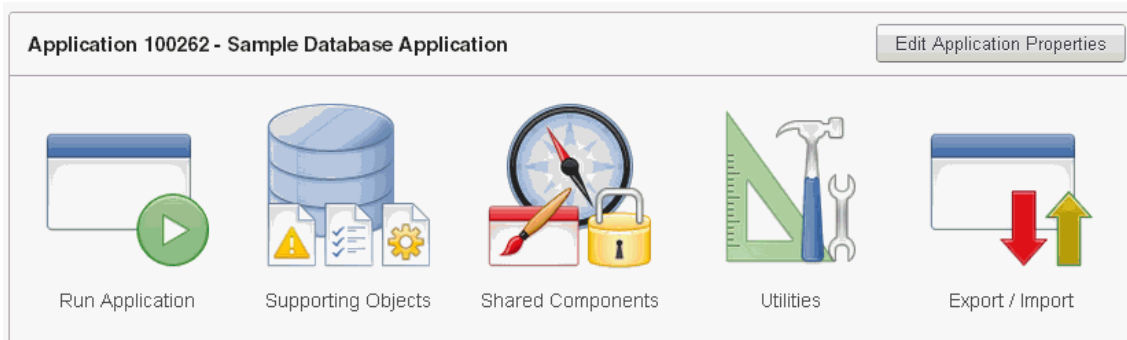
### Topics:

- [Accessing the Edit Definition Page](#)
- [About the Edit Application Definition Page](#)

### Accessing the Edit Definition Page

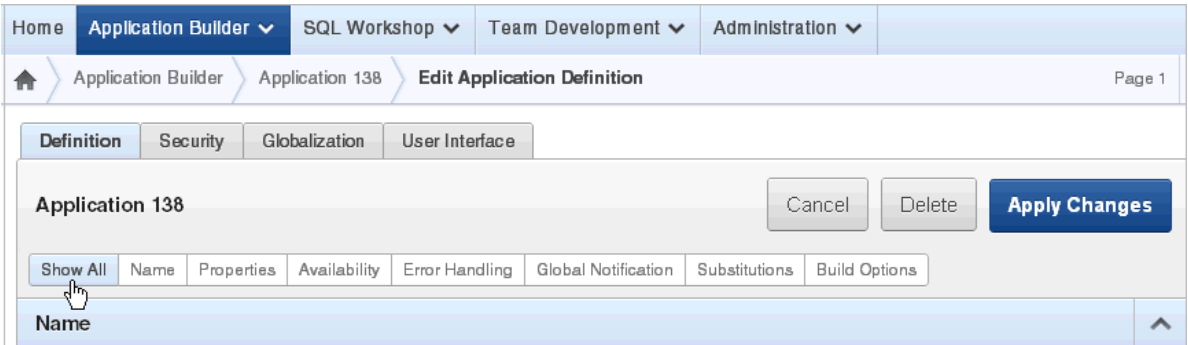
To edit the application definition:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Edit Application Properties** button to the right of the application name.



The Edit Application Definition page appears.

**About Navigation Alternatives** The Edit Application Definition page is divided into the following sections: Name, Properties, Availability, Error Handling, Global Notification, Substitutions, Logo, Build Options, Theme, Template Defaults, and Component Defaults. You can access these sections by 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**.

About the Edit Application Definition Page

The following sections describe the attributes available on the Edit Application Definition page.

Topics:

- [Name](#)
- [Properties](#)
- [Availability](#)
- [Error Handling](#)
- [Global Notification](#)
- [Substitutions](#)
- [Build Options](#)

**Name** Use Name to define basic characteristics of your application, including the application name, an optional alphanumeric alias, and a version number. [Table 7–2](#) describes all Name attributes.

Table 7–2 Application Definition, Name

Attribute	Description
Name	Provides a short descriptive name for the application to distinguish it from other applications in your development environment.
Application Alias	Assigns an alternate alphanumeric application identifier. You can use this identifier for the application ID.  For example, suppose you create an alias of myapp for application 105. Using f?p syntax, you could call application 105 as either: <ul style="list-style-type: none"><li>■ f?p=105:1</li><li>■ f?p=myapp:1</li></ul> See Also: " <a href="#">Using f?p Syntax to Link Pages</a> " on page 2-9

**Table 7–2 (Cont.) Application Definition, Name**

Attribute	Description
Version	<p>Includes the application's version number on a page. You can also automatically tie the version to the date of last modification using the following format masks:</p> <ul style="list-style-type: none"><li>■ YYYY.MM.DD</li><li>■ MM.DD.YYYY</li><li>■ DD.MM.YYYY</li></ul> <p>If your application version uses YYYY.MM.DD, then Application Builder replaces this format mask with the date of last modification of any application attribute.</p>
Application Group	<p>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 Unassigned.</p> <p><b>See Also:</b> <a href="#">"Creating Application Groups"</a> on page 7-52</p>

**Properties** Use Properties to enable the following attributes: logging, debugging, exact substitutions, application group, feedback, and default error display location. [Table 7–3](#) describes all Name attributes.

**Table 7–3 Application Definition, Properties**

Attribute	Description
Logging	<p>Determines whether user activity is recorded in the Oracle Application Express activity log. When set to <b>Yes</b>, every page view is logged, enabling an administrator to monitor user activity for each application.</p> <p>Disabling logging may be advisable for high volume applications.</p> <p>This attribute can only be modified if the Application Activity Logging attribute in Oracle Application Express Administration Services is set to <b>Use Application Setting</b>.</p> <p><b>See Also:</b> "Enabling Application Activity" in Logging in <i>Oracle Application Express Administration Guide</i>.</p>
Debugging	<p>Controls debug mode for the current application. Available options include:</p> <ul style="list-style-type: none"><li>■ <b>Yes</b> - Enables the application to run in a debug mode.</li><li>■ <b>No</b> - Prevents end users from running an application in debug mode.</li></ul> <p>Running an application in debug mode is useful when an application is under development. However, for a production application, it is a good idea to disable debugging and thus prevent users from viewing application logic.</p>
Allow Feedback	<p>Enables support for end user feedback for this application. Select <b>Yes</b> or <b>No</b>.</p> <p>If enable this option, you must create a feedback page and navigation bar icon to call that page. If you later disable feedback, the navigation bar icon is hidden.</p> <p><b>See Also:</b> <a href="#">"Managing Feedback"</a> on page 4-17</p>

**Table 7–3 (Cont.) Application Definition, Properties**

Attribute	Description
Compatibility Mode	<p>This attribute controls the compatibility mode of the Application Express engine. Certain runtime behaviors are changed from release to release. Use this attribute to obtain specific application behavior. To realize new behavior in an application, set the compatibility mode of the application to 4.2.</p> <p>To learn more, see Field-level Help.</p>
Application Email from Address	<p>Determines the email address to use as the from address in the application.</p> <p>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:</p> <p><code>john.doe@abc.com</code>  <code>&amp;MY_APP_EMAIL_FROM.</code></p> <p>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.</p> <p>You can also specify the from address on the Interactive Report Attributes page. See <a href="#">"Accessing Classic Report Attributes"</a> on page 9-51.</p>
Proxy Server	<p>Use this field to specify a proxy server.</p> <p>For example, you 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 Application Builder, you may need to specify a proxy server.</p> <p>You can reference values entered into this field from PL/SQL using the PL/SQL package variable <code>APEX_APPLICATION.G_PROXY_SERVER</code>.</p>

**Availability** Use Availability 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. To learn more, see [Table 7–4](#).

**Table 7–4 Application Definition, Availability**

Attribute	Description
Status	<p>Specifies whether the application is available or unavailable for use. Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Available</b> - Application is available with no restrictions.</li> <li>■ <b>Available with Edit Links</b> - Application is available for use. For developers, the Developer toolbar displays at the bottom of each page. Requires the developer to be logged in to the Application Builder in the same browser session.</li> <li>■ <b>Available to Developers Only</b> - Application is available to users having developer privileges.</li> <li>■ <b>Restricted Access</b> - Application is available to developers named in the <b>Restrict to comma separated user list</b>.</li> <li>■ <b>Unavailable</b> - Application cannot be run or edited. The message in <b>Message for unavailable application</b> displays when users attempt to access the application.</li> <li>■ <b>Unavailable (Status Shown with PL/SQL)</b> - Application cannot be run or edited.</li> <li>■ <b>Unavailable (Redirect to URL)</b> - Application cannot be run. The user is linked to the URL entered in <b>Message for unavailable application</b>.</li> </ul> <p><b>See Also:</b> "Changing Build Status for Multiple Applications" in <i>Oracle Application Express Administration Guide</i>, "Changing Application Build Status Set During Deployment" in <i>Oracle Application Express Administration Guide</i>, and "<a href="#">Controlling Access to Applications, Pages, and Page Components</a>" on page 10-88,</p>
Build Status	<p>Identifies the build status of the current application. Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Run and Build Application</b> - Developers and users can both run and develop the application.</li> <li>■ <b>Run Application Only</b> - Users can only run the application. This option is intended for applications in a production instance.</li> </ul> <p><b>See Also:</b> "Changing Application Build Status Set During Deployment" in <i>Oracle Application Express Administration Guide</i></p>
Message for unavailable application	<p>Use this attribute with Status. If you set Status to <b>Unavailable</b>, <b>Unavailable (Status Shown with PL/SQL)</b>, or <b>Unavailable (Redirect to URL)</b>, the text you enter in this attribute displays. If you set Status to <b>Available</b>, the text you enter in this attribute does not display.</p>
Restrict to comma separated user list (status must equal Restricted Access)	<p>Use this attribute with the Status <b>Restricted Access</b>. If you set Status to <b>Restricted Access</b>, only the users listed in this attribute can run the application. To use this attribute:</p> <ol style="list-style-type: none"> <li>1. From the Status list, select <b>Restricted Access</b>.</li> <li>2. Enter a comma-delimited list of users who can run the application in the field provided.</li> </ol>

**Error Handling** Use the attributes described in [Table 7–5](#) to control or modify how an application logs errors. Error handling functions specified here are overridden by similar page-level attributes. See "[About Page Attributes](#)" on page 8-21.



**Table 7–5 Application Definition, Error Handling**

Attribute	Description
Default Error Display Location	<p>Identifies where the validation error messages display for basic validations performed by Application Express or by plug-ins. Validation error messages can display in a notification area (defined as part of the page template), or within the field label. Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Inline with Field and in Notification</b> - Error messages display in a notification area defined as part of the page template.</li> <li>■ <b>Inline with Field</b> - Error messages display within the field label.</li> <li>■ <b>Inline in Notification</b> - Enter the error text displays in the #NOTIFICATION_MESSAGE# template substitution string when an error occurs on the page.</li> </ul>
Error Handling Function	<p>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:</p> <pre>log_apex_error</pre> <p>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:</p> <pre>#OWNER#.log_apex_error</pre> <p>You must implement error handling functions using the syntax described in the apex_error package.</p> <pre>function &lt;name of function&gt; (     p_error in apex_error.t_error ) return apex_error.t_error_result</pre> <p><b>See Also:</b> apex_error in <i>Oracle Application Express API Reference</i></p> <p><b>Note:</b> Error handling specified at the page-level overwrites any error handling function specified here. See <a href="#">"About Page Attributes"</a> on page 8-21.</p>

**Global Notification** You can use the Global Notification attribute to communicate system status to application users. For example, you can use this attribute to notify users of scheduled downtime, or communicate other messages regarding application availability. If the page templates used in your application contain the #GLOBAL\_NOTIFICATION# substitution string, the text entered here displays in that string's place.

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:** ["Understanding Substitution Strings"](#) on page 2-17 and ["Page Templates"](#) on page 13-27

**Substitutions** Use these fields 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.

**See Also:** ["Understanding Substitution Strings"](#) on page 2-17

**Build Options** Displays existing build options. 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 Application Express engine considers it at runtime. However, if you specify an attribute to be excluded, then the Application Express engine treats it as if it did not exist.

Do not specify a build option unless you plan to exclude that object from specific installations.

**See Also:** ["Using Build Options to Control Configuration"](#) on page 16-33

## Configuring Security Attributes

You can provide security for your application by configuring attributes on the Edit Security Attributes page. The Security Attributes you choose apply to all pages within an application.

### Topics:

- [Accessing the Edit Security Attributes Page](#)
- [About the Security Attributes Page](#)

**See Also:** ["Managing Application Security"](#) on page 15-1

### Accessing the Edit Security Attributes Page

To access the Edit Security Attributes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.

The Shared Components page appears.

4. Under Security, click **Security Attributes**.

The Edit Security Attributes page appears.

**Tip:** you can also access to the Edit Security Attributes by navigating to the Edit Application Definition and then clicking the Security tab. See ["Accessing the Edit Definition Page"](#) on page 7-14.

**About Navigation Alternatives** The Edit Security Attributes page is divided into the following sections: Authentication, Authorization, Database Schema, Session Timeout, Session State Protection, and Database Session. You can access these sections by 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**.

### About the Security Attributes Page

The following sections describe the attributes available on the Edit Security Attributes page.

#### Topics:

- [Authentication](#)
- [Authorization](#)
- [Database Schema](#)
- [Session Timeout](#)
- [Session State Protection](#)
- [Browser Security](#)
- [Database Session](#)

**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 7–6](#) describes the attributes available under Authentication.

**Table 7–6 Authentication Attributes**

Attribute	Descriptions
Public User	<p>Identifies the Oracle schema used to connect to the database through the database access descriptor (DAD). The default value is <code>ANONYMOUS</code> in environments where the database server version is Oracle Database Express Edition and it is <code>APEX_PUBLIC_USER</code> for all other versions of the database server.</p> <p>Once a user has been identified, the Application Express engine keeps track of each user by setting the value of the built-in substitution string <code>APP_USER</code>.</p> <p><b>Note:</b> Previous versions of Oracle Application Express used the built-in substitution string <code>HTMLDB_PUBLIC_USER</code>.</p> <p>When <code>APP_USER</code> equals this value, the Application Express engine considers the current session to be a public user session. The Application Express engine supports the following built-in display conditions:</p> <ul style="list-style-type: none"><li>■ <code>USER_IS_PUBLIC_USER</code></li><li>■ <code>USER_IS_NOT_PUBLIC_USER</code></li></ul> <p>If the current application user (<code>APP_USER</code>) 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.</p> <p>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 <code>APEX_APPLICATION.G_PUBLIC_USER</code>. The Application Express engine also has built in condition types <code>USER_IS_PUBLIC_USER</code> and <code>USER_IS_NOT_PUBLIC</code>.</p> <p><b>See Also:</b> "<a href="#">HOME_LINK</a>" on page 2-26 and "<a href="#">Understanding Conditional Rendering and Processing</a>" on page 2-4</p>
Authentication Scheme	<p>Select from the authentication schemes defined for the application. To create an authentication scheme, click <b>Define Authentication Schemes</b>.</p> <p><b>See Also:</b> "<a href="#">Understanding How Authentication Works</a>" on page 15-26 and "<a href="#">Creating an Authentication Scheme</a>" on page 15-27</p>
Deep Linking	<p>Use this attribute to enable or prevent deep linking to an application. Options include:</p> <ul style="list-style-type: none"><li>■ <b>Enabled</b> - The URL to a specific page ultimately redirects there, possibly after the user has logged in.</li><li>■ <b>Disabled</b> - If the URL does not contain a valid session ID, Application Express starts a new session and redirects to the application's home page.</li></ul> <p>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). By selecting Disable, Application Express starts a new session and redirects to the application's home page.</p> <p><b>See Also:</b> "<a href="#">Security</a>" on page 8-26 to learn more about overriding this behavior at the page-level.</p>

**Authorization** Authorization controls user access to specific controls or components based on user privileges. You can specify an authorization scheme for your application, by making a selection from the **Authorization Scheme** list. For example, if

you only want company employees to be able to log in to an application you could define an authorization scheme that is true if the users email address ends in '@somecompany.com' and then select that authorization scheme for this option. You can assign only one authorization scheme to an entire application. However, you can assign an authorization scheme to individual pages, page controls (such as a region, a button, or an item), or a shared component (such as a menu, a list, or a tab).

To create an authorization scheme, click **Define Authorization Schemes**.

Use **Run on Public Pages** to control whether the application-level authorization scheme is checked on public pages (that is, pages that do not require authorization). Options include:

- **Yes** - If you select Yes and the page is public, the application authorization is checked.
- **No** - If you select No and the page is public, the application authorization is ignored.

Application-level authorization is never evaluated on the login page (independent of Run on Public Pages), because authorizations typically are dependent on the username.

**See Also:** ["Attaching an Authorization Scheme to an Application"](#)  
on page 15-39

**Database Schema** Use **Parsing Schema** to specify the database scheme for the current application. Once defined, all SQL and PL/SQL commands issued by the application are performed with the rights and privileges of the defined database schema.

**Session Timeout** Use the following attributes to reduce exposure to abandoned computers with an open web browser by application:

- **Maximum Session Length in Seconds** - Enter a positive integer to control how many seconds a session exists and should be used by this application. Leave the value null to revert the value to the instance level setting. Enter 0 to have the session exist indefinitely. The session duration may be superseded by the operation of the job that runs every eight hours which deletes sessions older than 12 hours.
- **On session timeout direct to this 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 Application Express, 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 no URL is supplied, the user is redirected to the application home page.

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.

- **Maximum Session Idle Time in Seconds** - Enter a positive integer to control the seconds of inactivity or idle time for sessions used by this application. The idle time is the time between one page request and the next one. Leave the value null

to revert the value to the instance level setting. Set to 0 to prevent session idle time checks from being performed.

- **On session idle time timeout direct to this 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 Application Express, should be a public page. A common use for this page would be to inform the user of the session timeout and to present a login link or other options. If no URL is supplied, the user is redirected to the application home page.

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.

**See Also:** ["Understanding Session Timeout"](#) on page 15-4 and ["Configuring Session Timeout"](#) in *Oracle Application Express Administration Guide*

**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.

To enable or disable Session State Protection for your application, make a selection from the Session State Protection list. Setting Session State Protection to **Enabled** turns on session state protection controls defined at the page and item level.

**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 **Expire Bookmarks** button. Clicking this button causes any bookmarked URLs that contain previously generated checksums to fail when they are subsequently used to access the application.

To configure Session State Protection, click **Manage Session State Protection**.

**See Also:** ["Understanding Session State Protection"](#) on page 15-13

**Browser Security** 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, Application Express 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`.

Use **Embed in Frames** to control 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.

**Tip:** Both of these features require modern browsers that support the HTTP header response variable `X-Frame-Options`.

Use **HTML Escaping Mode** to define how Oracle Application Express escapes special characters. Options include:

- Basic: Escape `&`, `"`, `<` and `>`
- Extended: Escape `&`, `"`, `<`, `>`, `'`, `/` and non-ASCII characters if the database character set is not AL32UTF8

**Database Session** Attributes available under Database Session include:

- **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. Consider the following example:

```
dbms_session.set_context('CTX_USER_QRY', 'USERPRIV', my_package.my_function(:APP_USER));
```

This example sets the value of `USERPRIV` in the context named `CTX_USER_QRY` to the value returned by the function `my_function` in package `my_package`. The function is passed the current value of `APP_USER` as an input argument. Presumably, the named context would be used in a VPD policy (created within the application's parsing schema) to effect the generation of predicates appropriate to the authenticated user.

Virtual Private Database, also known as Fine-Grained Access Control or FGAC, is an Oracle database feature that provides an application programming interface (API) that enables developers to assign security policies to database tables and views. Using PL/SQL, developers can create security policies with stored procedures and bind the procedures to a table or view by a call to an RDBMS package. Such policies are based on the content of application data stored within the database, or based on context variables provided by Oracle database. In this way, VPD permits access security mechanisms to be removed from applications, and to be situated closer to particular schemas.

The code entered in this section need not pertain to VPD/FGAC and may not be related to security at all. Any code that must be executed at the earliest point in a page request can be placed here. For example, to set the database session time zone for every page request:

```
BEGIN
  EXECUTE IMMEDIATE 'alter session set time_zone = ''Australia/Sydney'' ';
END;
```

- **Cleanup PL/SQL Code**

Use this attribute to enter a PL/SQL block that runs at the end of page processing. For example, you can use this attribute to free or clean up resources such as VPD contexts or database links.

Example 1:

```
dbms_session.clear_context('CTX_USER_QRY');
```

This call resets the application context named CTX\_USER\_QRY before the database session is given back to the session pool, to ensure that no information is leaked when it gets reused.

Example 2:

```
dbms_session.close_database_link('SALES');
```

This call closes the database link SALES, which may have been opened in the **Initialization PL/SQL Code** or implicitly, just by querying data through the link. This frees resources and prevents resource leakage when the database session is reused.

**See Also:** ["Providing Security Through Authorization"](#) on page 15-37 and *Oracle Label Security Administrator's Guide*

## Configuring Globalization Attributes

In Application 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.

### Topics:

- [Accessing the Globalization Attributes Page](#)
- [About the Edit Globalization Attributes Page](#)

**See Also:** ["Managing Application Globalization"](#) on page 18-1



## Accessing the Globalization Attributes Page

To access the Edit Globalization Attributes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.  
The Application home page appears.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Globalization, click **Globalization Attributes**.  
The Edit Globalization Attributes page appears.

**Tip:** you can also access to the Edit Globalization Attributes page by navigating to the Edit Application Definition and then clicking the Globalization tab. See ["Accessing the Edit Definition Page"](#) on page 7-14.

## About the Edit Globalization Attributes Page

The following sections describe the attributes available on the Edit Globalization Attributes page.

**See Also:** ["Specifying the Primary Language for an Application"](#) on page 18-4

**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.

**Application Language Derived From** Determines how Application Builder 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. The database language setting also determines how the date is displayed and how certain information is sorted.

This option enables you to disable browser derived language support. You also have the option of having the application language derived from an application preference. To learn more, see Field-level Help.

**Application Date Format** Determines the date format to be used in the application.

Use this date format to alter the NLS\_DATE\_FORMAT 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.
```

**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.
```

**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.
```

**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 `NLS_TIMESTAMP_TZ_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 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.
```

**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 `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
```

**Character Value Comparison Behavior** Determines the collation behavior of SQL operations, for example, `LIKE`, `MIN/MAX`.

Use this value to alter the `NLS_COMP` database session parameter for the execution of SQL queries in classic report and interactive report regions. 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).

**Automatic Time Zone** Controls the setting of the database session time zone. When set to **Yes**, the client time zone is derived from the client's web browser and set for the duration of the Application Express 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`.

**See Also:** *Oracle Application Express API Reference*

**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 **No**. If Automatic CSV Encoding is set to **Yes**, 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 Application Builder is determined by the character set of the database access descriptor (DAD) used to access Oracle Application Express. For example, if the character set of the database access descriptor is AL32UTF8, all pages in all applications in the Oracle Application Express 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.

## Managing the Application User Interface

Use the attributes on the User Interface page to specify user interface options for an application.

### Topics:

- [Accessing the User Interface Page](#)
- [About the User Interface Page](#)
- [Creating a New User Interface](#)

### Accessing the User Interface Page

To access the User Interface page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.  
The Application home page appears.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under User Interface, click **User Interface Attributes**.  
The User Interface page appears.

**Tip:** you can also access to the User Interface page by navigating to the Edit Application Definition and then clicking the User Interface tab. See ["Accessing the Edit Definition Page"](#) on page 7-14.

## About the User Interface Page

The following sections describe the attributes available on the User Interface page.

### Topics:

- [General Properties](#)
- [Logo](#)
- [JavaScript](#)
- [User Interface Detection](#)
- [User Interfaces](#)

**General Properties** Use General Properties to define basic characteristics of the application user interface. [Table 7-7](#) describes all General Properties attributes.

**Table 7-7 User Interface, General Properties**

Attribute	Description
Image Prefix	<p>Determines the virtual path the web server uses to point to the images directory distributed with Application Builder. During installation, the virtual path is configured as <code>/i/</code>.</p> <p>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 <code>#IMAGE_PREFIX#</code>. For example, to reference the image <code>go.gif</code>, you would use the following syntax:</p> <pre>&lt;img src="#IMAGE_PREFIX#go.gif"&gt;</pre> <p><b>See Also:</b> <a href="#">"IMAGE_PREFIX"</a> on page 2-27, <a href="#">"Managing Images"</a> on page 12-17, and <a href="#">"Referencing Images"</a> on page 12-18</p>
Content Delivery Network	<p>Specify the Content Delivery Network used to load the 3rd party libraries jQuery and jQuery Mobile.</p> <p>Using a Content Delivery Network can reduce the loading time of your application if the user has visited other websites which also use the same content delivery network to load the jQuery files. It is very likely that those file calls are still in the browser cache and do not have to be downloaded again. Especially on mobile devices with limited browser caches, this can improve performance because it is not so likely that the files are purged from the cache.</p>

**Table 7–7 (Cont.) User Interface, General Properties**

Attribute	Description
Media Type	<p>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.</p> <p>The page-level Media Type overrides the application-level Media Type. The default value for this attribute is <code>NULL</code>. If both the page-level and application-level values for Media Type are <code>NULL</code>, the Media Type <code>text/html</code> is used.</p>

**Logo** Use Logo attributes to define an application logo. An application logo can be text-based or image-based. To use this feature, your page template must include the `#LOGO#` substitution string.

To define an application logo:

- For Logo Type, select one of the following:
  - Select **Image** to use an image for the application logo.
  - Select **Text** to use text for the application logo.
- In Logo, enter the following:
  - For an image, enter the complete image name, including the file name extension. For example:
 

```
/i/oracle.gif
```
  - For text, enter the full text string. For example:
 

```
Sample Application
```
- In Logo Attributes, enter the appropriate attributes for the logo or make a selection from the list.

Image example:

```
width="100" height="20" alt="Company Logo"
```

Text example:

```
style="font-family:Arial; color:#000000; font-size:18; white-space:nowrap; font-weight:bold;"
```

**See Also:** ["Managing Images"](#) on page 12-17, ["Verifying the Prefix for the Virtual Image Directory"](#) on page 12-18, ["Customizing Templates"](#) on page 13-11, and ["Page Templates"](#) on page 13-27

**JavaScript** Use the attributes described in [Table 7–8](#) to control or modify how an application handles JavaScript.

**Table 7–8 User Interface, JavaScript**

Attribute	Description
File URLs	<p>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 in your file URL for a regular page view and an empty string if the page is viewed in debug mode.</p> <p>JavaScript file URLs you enter here replaces the #APPLICATION_JAVASCRIPT# substitution string in the page template.</p> <p><b>Note:</b> You do not need to include opening or closing script tags. Just write the URL.</p> <p>Examples:</p> <ul style="list-style-type: none"><li>■ Standard file reference: <code>/myjs/main.js</code></li><li>■ Standard file reference which loads the minified file main.min.js for regular page views and main.js in Debug mode: <code>/myjs/main#MIN#.js</code></li><li>■ Conditional file for Internet Explorer <code>[if IE]/myjs/ie.js</code></li></ul>
Include Legacy JavaScript	<p>Specifies if the legacy JavaScript functions are included on every page in the application. If you are confident your application does not contain any references to the legacy functions, set this to <b>No</b> to reduce the overall size of the JavaScript files loaded.</p>

**User Interface Detection** Enter Cascading Style Sheet ( CSS) file URLs for stylesheets that should load when Oracle Application Express displays the available user interfaces, when automatic detection fails. 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 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# to include the application's version in the file URL. If you do not enter any URLs, Oracle Application Express uses a default stylesheet.

Examples:

- Standard file reference:  
`/mycss/main.css`
- Standard file reference which loads the minified file main.min.css for regular page views and main.css in debug mode:  
`/mycss/main#MIN#.css`
- Conditional media query:  
`[media="only screen and (max-device-width: 480px)"]/mycss/smartphone.css`
- Conditional file for Internet Explorer:  
`[if IE]/mycss/ie.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 loads the new file and ignores any previously cached files:

```
/mycss/main.css?version=#APP_VERSION#
```

You do not need to include opening or closing script tags. Just write the URL.

**User Interfaces** Displays user interfaces defined for the current application. To edit an existing user interface, click the user interface name. To add a new user interface, click **Add New User Interface**.

**See Also:** ["Managing Themes"](#) on page 13-1

### Creating a New User Interface

To add a new user interface:

1. Navigate to the User Interface page. See [Accessing the User Interface Page](#).
2. Scroll down to User Interfaces and click **Add New User Interface**.
3. For User Interface:
  - a. User Interface - Displays the current user interface.
  - b. Type - Select a user interface type. You can only select interfaces not currently associated with the application.
  - c. Display Name - Specify a display name for the user interface.
  - d. Sequence - Specify the user interface sequence.
  - e. Auto Detect - Select whether the user interface should be automatically detected.
  - f. Home URL - Specifies a URL or procedure that should be run when you run the application.

For example, Home Link could contain the relative URL used to locate the application home page. For example, `f?p=6000:600` would specify application 6000 with a home page number of 600. In this example, the value you enter in Home Link replaces the `#HOME_LINK#` substitution string in application templates. See ["HOME\\_LINK"](#) on page 2-26.

You can also use this attribute to name a procedure. For example, you could create a procedure such as `personal_calendar` which renders an HTML page to serve as the application home.

**Note:** Do not use the Home Link attribute to determine the page that displays after authentication. The page that displays after authentication is determined by other components within the application's authentication scheme.

- g. Login URL - Specify the URL for the page that is to be used as the login page for the current user interface. This replaces the substitution strings `&LOGIN_URL.` in HTML or `#LOGIN_URL#` in templates. See ["LOGIN\\_URL"](#) on page 2-27 and ["Creating an Authentication Scheme"](#) on page 15-27.
  - h. Click **Next**.
4. For Identify Theme:

- a. Theme Type - Select a theme type. Standard themes are supplied with Application Express. Custom themes are those created for the workspace or Oracle Application Express instance. Legacy themes are older themes supplied with Application Express.
  - b. Theme - Select a theme. A theme identifies a collection of templates which define the look and feel of the application.
  - c. Click **Next**.
5. Confirm your selections and click **Create**.

## Managing Pages in a Database Application

A page is the basic building block of an application. When you build an application in Application Builder, you create pages that contain user interface elements, such as tabs, lists, buttons, items, and regions.

### Topics:

- [About Creating Pages in a Database Application](#)
- [Creating a Page from the Application Home Page](#)
- [Creating a Page from the Developer Toolbar](#)
- [Copying a Database Application Page](#)
- [Running an Application or Page](#)
- [Grouping Pages](#)
- [Locking and Unlocking a Page](#)
- [Deleting a Page](#)

**See Also:** ["Viewing Application Utilities and Reports"](#) on page 7-77  
and ["Working with Database Application Pages"](#) on page 8-1

## About Creating Pages in a Database Application

You add a page or add a component to an existing page by running the Create Page Wizard. You can access this wizard by:

- Clicking **Create Page** on the Application home page. See ["Creating a Page from the Application Home Page"](#) on page 7-34.
- Click the **Create** link on the Developer toolbar and then select **New Page**. ["Creating a Page from the Developer Toolbar"](#) on page 7-36.
- Click the **Create** button on the Page Definition and select **New page**. See ["About the Page Definition"](#) on page 8-1.

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**Note:** You can also use the Create Page Wizard to add a component (that is, a report, chart, form, wizard, a calendar, or tree) to an existing page. When prompted, specify an existing page number.

---

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## Creating a Page from the Application Home Page

To create a page from the Application home page:

1. On the Workspace home page, click **Application Builder**.



2. Select an application.  
The Application home page appears.
3. Click the **Create Page** button.
4. Select the type of page you want to create as described in [Table 7–9, "Available Create Page Wizard Page Types"](#).

**Table 7–9 Available Create Page Wizard Page Types**

Page Type	Description	Desktop	jQuery Mobile Smartphone
Blank Page	Creates a page with no built-in functionality.	Available	Available
Multiple Blank Pages	Creates multiple blank pages.	Available	Available
Report	<p>Formatted result of a SQL query. Available options:</p> <ul style="list-style-type: none"> <li>■ Classic Report - Creates a report based on a custom SQL SELECT statement or a PL/SQL function returning a SQL SELECT statement that you provide.</li> <li>■ List View - Creates a page that contains the formatted result of a SQL query. You can choose a table to build the List view on, and select a column to be used for the List view display information.</li> </ul> <p><b>Note:</b> Desktop applications do not support list view.</p> <ul style="list-style-type: none"> <li>■ Interactive Report - Creates an interactive report based on a custom SQL SELECT statement you provide. Users can alter the layout of report data by selecting specific columns, applying filters, highlighting, and sorting. They can also define breaks, aggregations, different charts, and their own computations.</li> </ul> <p><b>Note:</b> jQuery Mobile Smartphone does not support interactive reports.</p> <ul style="list-style-type: none"> <li>■ Report on Web Service Result - Creates a report on a Web Service result.</li> </ul> <p><b>See Also:</b> <a href="#">"Implementing Web Services"</a> on page 17-7</p> <ul style="list-style-type: none"> <li>■ Wizard Report - Creates a report without requiring any SQL knowledge. Select the appropriate schema, table, columns, and result set display.</li> </ul>	Available	Available
Form	<p>Creates a form interface with which users can update a single row or multiple rows within a table.</p> <p><b>See Also:</b> <a href="#">"Creating Forms"</a> on page 10-1</p>	Available	Available
Plug-ins	<p>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 Application Express.</p> <p><b>See Also:</b> <a href="#">"Importing a Plug-in from the Plug-in Page"</a> on page 17-34</p>	Available	Available
Chart	<p>Enables you to create HTML5 and Flash graphical charts.</p> <p><b>See Also:</b> <a href="#">"Creating Charts"</a> on page 10-46</p>	Available	No applicable.

**Table 7–9 (Cont.) Available Create Page Wizard Page Types**

Page Type	Description	Desktop	jQuery Mobile Smartphone
Map	Creates a Flash map based on the AnyChart AnyMap Interactive Maps Component. <b>See Also:</b> <a href="#">"Creating Maps"</a> on page 10-40	Available	Not applicable.
Tree	Creates a tree to graphically communicate hierarchical or multiple level data. <b>See Also:</b> <a href="#">"Creating Trees"</a> on page 10-78	Available	Not applicable.
Calendar	Generates a calendar with monthly, weekly, and daily views. <b>See Also:</b> <a href="#">"Creating Calendars"</a> on page 10-20	Available	Available
Wizard	Create a wizard.	Available	Available
Data Loading	Creates a new data loading wizard allowing the end user to manage the loading of data into a table to all schemas for which the user has privileges <b>See Also:</b> <a href="#">"Creating Applications with Data Loading Capability"</a> on page 17-52	Available	Not available.
Feedback Page	Adds a feedback page. Feedback is the process of gathering real-time comments, enhancement requests, and bugs from your application users. <b>See Also:</b> <a href="#">"Managing Feedback"</a> on page 4-17	Available	Available
Login Page	Creates a login page. <b>See Also:</b> <a href="#">"About Building a Login Page"</a> on page 15-30	Available	Available
Access Control	Creates a page containing an access control list, enabling developers to control access to an application, individual pages, or page components. <b>See Also:</b> <a href="#">"Controlling Access to Applications, Pages, and Page Components"</a> on page 10-88	Available	Available

- Follow the on-screen instructions.

**See Also:** ["Creating a Page from the Developer Toolbar"](#) on page 7-36 and ["Running an Application or Page"](#) on page 7-39

## Creating a Page from the Developer Toolbar

To view a rendered version of your application, you run or submit it to the Application Express engine by clicking the Run or Run Application icon.

**See Also:** ["Running an Application or Page"](#) on page 7-39

When you run a desktop application, the Developer toolbar appears at the bottom of the page. The Developer toolbar offers a quick way to edit the current page, create a page, region, or page control, view session state, or turn edit links on and off. You can control whether the Developer toolbar displays by changing the Status attribute on the Edit Application Definition page. To learn more about changing the Status attribute, see ["Editing the Application Definition"](#) on page 7-14.

**See Also:** ["Running an Application or Page"](#) on page 7-39 and ["About the Developer Toolbar"](#) on page 19

To create a page from the Developer toolbar:

1. Run the application. See ["Running an Application or Page"](#) on page 7-39.
2. On the Developer toolbar, click **Create**.  
The New Component Wizard appears.
3. Select the type of component you want to create and click **Next**. Available options include:
  - New Page. See ["About Create Page Types"](#) on page 7-37.
  - Region on this page
  - Page control on this page
  - Shared control
4. Follow the on-screen instructions.

**See Also:** ["Creating a Page from the Application Home Page"](#) on page 7-34, ["Running an Application or Page"](#) on page 7-39, and ["About the Developer Toolbar"](#) on page 8-19

About Create Page Types

When you run the Create Page Wizard from the Developer Toolbar, you select a page type. [Table 7-10](#) describes available create page options based on the type of page you select.

Table 7-10 Create Page Options

Create Page Options	Available Desktop Selections
New Page	Available page types: <ul style="list-style-type: none"><li>■ Blank page</li><li>■ Multiple blank pages</li><li>■ Report. See <a href="#">"Creating Reports"</a> on page 9-1.</li><li>■ Form. See <a href="#">"Creating Forms"</a> on page 10-1.</li><li>■ Plug-in. See <a href="#">"Implementing Plug-ins"</a> on page 17-25.</li><li>■ Chart. See <a href="#">"Creating Charts"</a> on page 10-46.</li><li>■ Map. See <a href="#">"Creating Maps"</a> on page 10-40.</li><li>■ Tree. See <a href="#">"Creating Trees"</a> on page 10-78.</li><li>■ Calendar. See <a href="#">"Creating Calendars"</a> on page 10-20.</li><li>■ Wizard</li><li>■ Data Loading. See <a href="#">"Creating Applications with Data Loading Capability"</a> on page 17-52.</li><li>■ Feedback Page. See <a href="#">"Managing Feedback"</a> on page 4-17.</li><li>■ Login Page. See <a href="#">"About Building a Login Page"</a> on page 15-30.</li><li>■ Access Control. See <a href="#">"Controlling Access to Applications, Pages, and Page Components"</a> on page 10-88.</li></ul>

**Table 7–10 (Cont.) Create Page Options**

Create Page Options	Available Desktop Selections
Region on this page	<p>Regions function as containers for content. Available region types:</p> <ul style="list-style-type: none"> <li>■ HTML</li> <li>■ Multiple HTML</li> <li>■ Report</li> <li>■ Form</li> <li>■ Plug-ins (displays if region type plug-in exists)</li> <li>■ Chart</li> <li>■ Map</li> <li>■ Tree</li> <li>■ Calendar</li> <li>■ List</li> <li>■ Breadcrumb</li> <li>■ PL/SQL Dynamic Content</li> <li>■ URL</li> <li>■ Region Display Selector</li> <li>■ Help Text</li> </ul> <p><b>See Also:</b> <a href="#">"Understanding Regions"</a> on page 12-3 and <a href="#">"About Region Types"</a> on page 12-4</p>
Page control on this page	<p>Page controls:</p> <ul style="list-style-type: none"> <li>■ Item. See <a href="#">"Understanding Page-Level Items"</a> on page 7-55</li> <li>■ Button. See <a href="#">"Creating Buttons"</a> on page 10-63.</li> <li>■ Branch. See <a href="#">"Controlling Navigation Using Branches"</a> on page 11-32</li> <li>■ Computation. See <a href="#">"Understanding Page Computations"</a> on page 8-29.</li> <li>■ Process. See <a href="#">"Understanding Page Processes"</a> on page 8-43.</li> <li>■ Validation. See <a href="#">"Understanding Validations"</a> on page 8-32.</li> </ul>
Shared control	<p>Shared component options:</p> <ul style="list-style-type: none"> <li>■ Navigation Bar icon. See <a href="#">"Creating a Navigation Bar Entry"</a> on page 11-27.</li> <li>■ Parent tab. See <a href="#">"Creating Tabs"</a> on page 11-1.</li> <li>■ Standard tab. See <a href="#">"Creating Tabs"</a> on page 11-1.</li> <li>■ List of values. See <a href="#">"Creating Lists of Values at the Application Level"</a> on page 10-71.</li> <li>■ List. See <a href="#">"Creating Lists"</a> on page 11-7.</li> <li>■ Breadcrumb. See <a href="#">"Creating Breadcrumbs"</a> on page 11-20.</li> </ul>

## Copying a Database 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. Navigate to the application you want to copy to:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. Select a page.

The Page Definition appears.
2. In Tree view:
  - a. Under Page Rendering, select the page name.
  - b. Right-click and select copy.
3. In Component view:
  - a. Under Page, click the Copy icon.
  - b. For Copy Page Option, select one of the following:
    - **Page in this application**
    - **Page in another application**
4. Follow the on-screen instructions.

### **Desktop Pages That Cannot Be Copied to a Mobile User Interface**

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. However, the following Desktop pages cannot be copied to a Mobile user interface:

- Interactive report
- Flash map
- Flash chart
- jsTree region.

Attempting to copy these Desktop pages to a Mobile page results in an error.

## **Running an Application or Page**

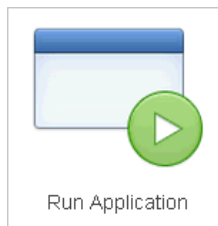
The Application Express engine dynamically renders and processes pages based on data stored in database tables. To view a rendered version of your application, you run or submit it to the Application Express engine. As you create new pages, you can run them individually, or run an entire application. You can run an application by clicking the Run Application icon.

### **Topics:**

- [About the Run Application and Run Page Icons](#)
- [Running an Application from the Application Builder Home Page](#)
- [Running an Application from the Application Home Page](#)
- [Running a Page on the Application Home Page](#)
- [Running a Page from the Page Definition](#)

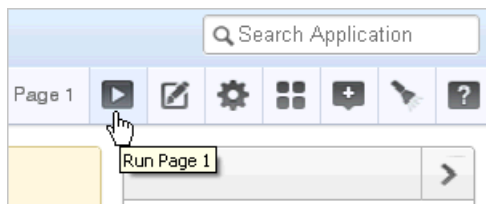
### About the Run Application and Run Page Icons

The Run Application icon displays on the Application home page and resembles of an application window with a run (or play) button. Clicking the **Run Application** icon runs an entire application.



The Run Page icon resembles a small, gray play button and displays in the upper right corner of many pages within Application Builder. Clicking the **Run Page** icon runs the current page.

**Tip:** When running mobile applications and locked packaged applications, the Developer toolbar does not display. As a best practice, right-click on the icon and select **Open Link in New Tab** so that you can easily access the Application Builder.



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

To run an entire application from the Application Builder home page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **View Report** icon.
3. Locate the application in the Applications list.
4. Click the **Run** icon in the far right column.

### Running an Application from the Application Home Page

To run an entire application from the Application home page:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select on application.
3. Click the **Run Application** icon at the top of the page.

### Running a Page on the Application Home Page

You can control how the Application home page displays by selecting the View icons on the navigation bar at the top of the page. 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 icon.

To run a page from the Pages list:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **View Report** icon.
4. Locate the page you want to run and click the **Run** icon in the far right column.

**See Also:** ["Locking and Unlocking a Page"](#) on page 7-43

### Running a Page from the Page Definition

To run a specific page from the Page Definition:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Select a page.

The Page Definition appears.

4. Click the **Run** button at the top of the page.

## Grouping Pages

You can make the pages within your application easier to access by organizing them into page groups. To use page groups, you create a group and then assign pages to the group.

Page groups do not have any function other than to aid developers in organizing their application pages.

### Topics:

- [Viewing Page Groups](#)
- [Creating a Page Group](#)
- [Editing a Page Group Definition](#)
- [Assigning a Page to a Page Group](#)
- [Viewing Pages by Page Group](#)
- [Deleting a Page Group](#)

### Viewing Page Groups

The section describes different ways to view page groups.

To access the Page Groups page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click the **Utilities** icon.
4. From Page Specific Utilities, click **Cross Page Utilities**.
5. 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 then 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. See ["About the Actions Menu"](#) on page 9-6.
6. To view the pages associated with a group, click **Pages by Page Group**.

### Creating a Page Group

To create a page group:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click the **Utilities** icon.
4. From Page Specific Utilities, click **Cross Page Utilities**.
5. Click **Page Groups**.
6. On the Page Groups page, click **Create**.
7. Enter a name, a description (optional), and click **Create**.

### Editing a Page Group Definition

When you create page group you specify a name and description.

To edit the Page Group definition:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click the **Utilities** icon.
4. From Page Specific Utilities, click **Cross Page Utilities**.
5. Click **Page Groups**.
6. Select a page group.
7. On the Page Group page, edit the name or description and click **Apply Changes**.
8. To move to the next Page Group definition, click the **Previous** (<) and **Next** (>) buttons and repeat the previous step.

### Assigning a Page to a Page Group

To assign pages to a group:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click the **Utilities** icon.



4. From Page Specific Utilities, click **Cross Page Utilities**.
5. Click **Page Groups**.
6. Click the **Page Assignments** tab.  
The Page Assignments page appears.
7. Click the page number.  
The Page Attributes page appears.
8. Locate the Name region and select a group from the Group list.
9. Click **Apply Changes**.

### Viewing Pages by Page Group

To view pages by page group:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click the **Utilities** icon.
4. From Page Specific Utilities, click **Cross Page Utilities**.
5. Click **Page Groups**.
6. Click the **Pages by Page Group** tab.  
The Pages by Page Group page appears. Clicking a page number takes you to the Page Attributes page. Clicking the page Name links to the Page Definition.
7. To create a new group, click **Create** and follow the on-screen instructions.

### Deleting a Page Group

To remove a page group:

1. Remove all pages from the group to be deleted. See "[Viewing Pages by Page Group](#)" on page 7-43.
2. Access the Page Group page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select the application.
  - c. Click the **Utilities** icon.
  - d. From Page Specific Utilities, click **Cross Page Utilities**.
  - e. Click **Page Groups**.
  - f. Select a page group.
3. Click **Delete**.  
A confirmation page appears.
4. Confirm your request.

## Locking and Unlocking a Page

You can prevent conflicts during application development by locking pages in your application. By locking a page, you prevent other developers from editing it.








**Topics:**

- [Determining If a Page Is Locked](#)
- [Locking a Page](#)
- [Unlocking Pages](#)

**Determining 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 Definition.

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.

Page 	Name	Updated	Updated By	Page Type	User Interface	Group	Lock	Run
1	<a href="#">Home</a>	3 minutes ago	teri	Home	Desktop	<a href="#">Unassigned</a>		
101	<a href="#">Login</a>	2 weeks ago	-	Login	Desktop	<a href="#">Unassigned</a>	  	

1 - 2

The lock icon also appears on the Developer Action Bar on the Page Definition. See ["About the Developer Action Bar"](#) on page 6-7.

**Locking a Page**

You can lock pages from Application home page (click View Report or View Detail), from the Page Locks page, the Pages list, and from the Page Definition.

**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 **Application 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)**.

**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 **Application 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)**.

**Locking a Page from the Page Definition** To lock a page from the Page Definition:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Click the **Lock** icon in the Developer Action bar. See "[About the Developer Action Bar](#)" on page 6-7.
3. Select the page to lock and click **Lock Checked**.
4. Enter a comment in the Comment field.
5. Click **Lock Page(s)**.

**Tip:** You can also lock a page on the Page Definition, by clicking the **Utilities** button and then **Lock**.

### Unlocking Pages

Only the developer who locked a page can unlock it. However, a developer with administrative privileges can unlock pages locked by other developers.

**Unlocking Pages from the Page Locks Page** To unlock a page from the Page Locks page:

1. On the Workspace home page, click the **Application 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.
7. Click **Unlock Checked**.

**Unlocking Pages from the Application Home Page** To unlock a page from the Application Home Page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the search bar, click the **View Report** or **View Detail** icon.
4. Click the **Lock** icon.  
The Edit Lock Comment page appears.
5. Click **Unlock**.

**Unlocking Pages from the Page Definition** To unlock pages from the Page Definition:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Click the **Lock** icon in the Developer Action bar. See "[About the Developer Action Bar](#)" on page 6-7.
3. Select the page you want to unlock and click **Unlock Checked**.

**Tip:** You can also unlock a page on the Page Definition, by clicking the **Utilities** button and then **Unlock**.

**Unlocking Pages As a Workspace Administrator** To unlock pages as a Workspace Administrator:

1. On the Workspace home page, click the **Application 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)**.

## Deleting a Page

Deleting a page deletes the corresponding tabs, breadcrumbs, and list entries. You can only delete pages that are locked or unlocked by you. See ["Locking and Unlocking a Page"](#) on page 7-43.

### Topics:

- [Deleting a Page from the Page Definition](#)
- [Deleting a Page While Editing Page Attributes](#)
- [Deleting Multiple Pages](#)
- [Deleting a Range of Pages](#)

### Deleting a Page from the Page Definition

To delete a page from the Page Definition:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Verify the page number.
3. Click the **Utilities** button and then click **Delete**.
4. Click **Permanently Delete Page**.

**See Also:** ["Editing a Page in Component View"](#) on page 8-8 for information about editing page attributes

### Deleting a Page While Editing Page Attributes

To delete a page while editing page attributes:

1. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. To access the Edit Page:
  - Tree view - Under Page Rendering, double-click the page title at the top of the tree.
  - Component view - Under Page, click the **Edit All** icon.

The Page Attributes page appears. Required values are marked with a red asterisk (\*).

3. Verify the page number and page name.
4. Click **Delete**.
5. Follow the on-screen instructions.

### Deleting Multiple Pages

To delete multiple pages:

1. On the Workspace home page, click the **Application 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**.

### Deleting a Range of Pages

To delete a range of pages:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. 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**.

## Adding Database Application Comments

You can add comments concerning an entire database application on the Application Comments page. You could add a description of the application or track the developers involved in working on the application.

### Topics:

- [Creating and Editing Database Application Comments](#)

**See Also:** ["Adding Developer Comments"](#) on page 7-48

## Creating and Editing Database Application Comments

To create an application comment:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. On the Application home page, click **Shared Components**.

The Shared Components page appears.

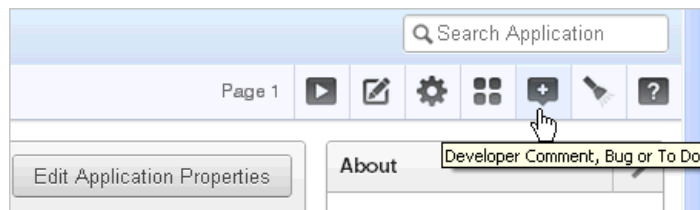
5. Under Application, click **Edit Comments**.

The Application Comments page appears.

6. Enter comments in the Comments field and click **Apply Changes**.

## Adding Developer Comments

You can add developer comments to an application, a page, or a group of pages using the Developer Comment, Bug, or To Do icon. This icon resembles a small balloon with a plus symbol. This icon displays on the Developer Action bar.



You can use developer comments to communicate application changes, report issues, or record developer suggestions.

### Topics:

- [Adding Developer Comments to an Application or Page](#)
- [Viewing and Editing Developer Comments](#)
- [Deleting Developer Comments](#)
- [About the Developer Comments Report](#)
- [Viewing the Developer Comments Calendar](#)

**See Also:** ["Adding Database Application Comments"](#) on page 7-47

## Adding Developer Comments to an Application or Page

The Developer Comment icon displays on any page in Application Builder that is related to a specific application or application page. You can 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 **Application Builder** icon.
2. Select an application.
3. Click the **Developer Comment, Bug, or To Do** icon.
4. Click the **Comment** icon.

The Create Comment page displays in a separate window.

5. In Relevant Page(s), specify the pages to which the comment applies. To enter a comment that:
  - Applies to a specific page, enter the page number.
  - Applies to multiple pages, enter a comma-delimited list of pages. For example:

1, 2, 3

- Does not apply to a page or group of pages, leave this field blank.
- 6. In Comment, enter up to 4000 characters of text.
- 7. Click **Create** or **Create and Create Another**.

## Viewing and Editing Developer Comments

To edit a developer comment:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Developer Comment, Bug, or To Do** icon.
4. Click the **Comment** icon.

The Create Comment page displays in a separate window.

5. Click **View Comments**.

The View Comments page appears. See ["About the Navigation Bar on the View Comments Page"](#) on page 7-49.

6. To edit a comment, click the **Edit** icon.

The Edit Comment page appears.

- a. In Relevant Page(s), specify the pages to which the comment applies. To enter a comment that:
  - Applies to a specific page, enter the page number.
  - Applies to multiple pages, enter a comma-delimited list of pages. For example:  
1, 2, 3
  - Does not apply to a page or group of pages, leave this field blank.
- b. In Comment, enter up to 4000 characters of text.
7. 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** on the Tasks list. See ["Accessing the Shared Components Page"](#) on page 8-50.

### About the Navigation Bar on the View Comments Page

A navigation bar appears at the top of the View Comments page and contains the following controls:

- **Select Columns to Search.** Select a column and click **Go**. To search all, leave the search field blank and click **Go**.
- **Select Report.** Enter case insensitive query and click **Go**. To view all pages, leave the field blank and click **Go**.
- **Actions** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
- **Display.** Determines how comments display. To increase or decrease the number of comments that appear, make a selection from the Display list and click **Go**.

## Deleting Developer Comments

You can delete developer comments on the Edit Comment page or on the Manage Comments page.

### Topics:

- [Deleting a Specific Developer Comment](#)
- [Deleting Multiple Developer Comments](#)

### Deleting a Specific Developer Comment

To delete a developer comment:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Developer Comment, Bug, or To Do** icon.
4. Click the **Comment** icon.

The Create Comment page displays in a separate window.

5. Click **View Comments**.
6. Locate the comment to be deleted. See ["About the Navigation Bar on the View Comments Page"](#) on page 7-49.
7. Click the **Edit** icon.

The Edit Comment page appears.

8. Click **Delete**.

### Deleting Multiple Developer Comments

To delete multiple developer comments:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Developer Comment, Bug, or To Do** icon.
4. Click the **Comment** icon.

The Create Comment page displays in a separate window.

5. Click **Manage Comments**.
6. 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.

## About the Developer Comments Report

You can also view, edit, and manage developer comments from the Developer Comments report.



**Topics:**

- [Accessing the Developer Comments Report](#)
- [Editing or Deleting Comments from the Developer Comments Report](#)
- [Deleting a Comment from the Developer Comments Report](#)
- [Deleting Multiple Comments from the Developer Comments Report](#)

**Accessing the Developer Comments Report**

To access the Developer Comments report:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**
4. Under Tasks, click **Developer Comments**.

The Developer Comments report appears.

A navigation bar appears at the top of the page and contains the following controls:

- **Select columns to search** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Use the Actions menu to customize the report view. See "[About the Actions Menu](#)" on page 9-6.

**Editing or Deleting Comments from the Developer Comments Report**

To edit a comment from the Developer Comments report:

1. Navigate to the Developer Comments report. See "[Accessing the Developer Comments Report](#)" on page 7-51.

The Developer Comments report appears.

2. Locate the comment to be edited.
3. Click the **Edit** icon.

The Edit Comments page displays in a separate window.

- a. In Relevant Page(s), specify the pages to which the comment applies. To enter a comment that:
    - Applies to a specific page, enter the page number.
    - Applies to multiple pages, enter a comma-delimited list of pages, for example:  
1, 2, 3
    - Does not apply to a page or group of pages, leave this field blank.
  - b. In Comment, enter up to 4000 characters of text.
4. Click **Apply Changes**.

### Deleting a Comment from the Developer Comments Report

To delete a comment from the Developer Comments report:

1. Navigate to the Developer Comments report. See "[Accessing the Developer Comments Report](#)" on page 7-51.

The Developer Comments report appears.

2. Locate the comment to be deleted.
3. Click the **Edit** icon.

The Edit Comment page displays in a separate window.

4. Click **Delete**.

### Deleting Multiple Comments from the Developer Comments Report

To delete multiple comments from the Developer Comments report:

1. Navigate to the Developer Comments report. See "[Deleting Multiple Developer Comments](#)" on page 7-50.

The Developer Comments report appears.

2. Locate the comment to be deleted.
3. Click the **Edit** icon.

The Edit Comment page displays in a separate window.

4. Click **Manage Comments**.
5. Select one of the following actions:
  - **Delete all comments**
  - **Delete comments created by a developer**
  - **Delete comments by date**
6. Follow the on-screen instructions.

## Viewing the Developer Comments Calendar

To access the Developer Comments Calendar:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**
4. Under Tasks, click **Developer Comments Calendar**.

The Developer Comments Calendar page appears.

5. Use the Previous, Today and Next buttons to navigate.

## Creating Application Groups

You can organize your applications by assigning them to application groups. To use application groups, create a group by clicking the **Create** button and then assign applications to it.

**Topics:**

- [Viewing Database Application Groups](#)
- [Creating a Database Application Group](#)
- [Assigning a Database Application to an Application Group](#)
- [Removing a Database Application from an Application Group](#)
- [Deleting an Database Application Group](#)

**See Also:** ["About Cross Page Utilities"](#) on page 7-84

## Viewing Database Application Groups

The section describes different ways to view database application groups.

### Accessing the Application Group Page

To access the Application Group page:

1. On the Workspace home page, click the **Application Builder** icon.
2. On the Tasks List on the right side of the page, click **Application Groups**.

The Application Group 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 group by name and then 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. To edit a group, click the name.
3. To view the applications associated with a group, you click the group name.

---

---

**Note:** The Tasks list only appears if groups currently exist.

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## Creating a Database Application Group

To create a database application group:

1. On the Workspace home page, click the **Application Builder** icon
2. On the Tasks List on the right side of the page, click **Application Groups**.
3. On the Application Group page, click **Create**.
4. Enter a name, a description (optional), and click **Create**.

### Editing a Database Application Group Definition

When you create page group you specify a name and description.

To edit an application group definition:

1. On the Workspace home page, click the **Application Builder** icon

2. On the Tasks List on the right side of the page, click **Application Groups**.  
Application Group page appears.
3. Select an application group.
4. On the Application Group page, edit the name or description and click **Apply Changes**.

## Assigning a Database Application to an Application Group

To assign applications to a group:

1. On the Workspace home page, click the **Application Builder** icon.
2. On the Tasks List on the right side of the page, click **Application Groups**.
3. On the Tasks list, click **Manage Unassigned**.  
The Manage Application Group Assignments page appears.
4. From the New Group list, select a group.
5. Select the applications to be assigned and click **Assigned Checked**.

**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"](#) on page 7-14.

## Removing a Database Application from an Application Group

To remove an application from an application group:

1. On the Workspace home page, click the **Application Builder** icon.
2. On the Tasks List on the right side of the page, click **Application Groups**.
3. On the Tasks list, click **Manage Unassigned**.  
The Manage Application Group Assignments page appears.
4. From the New Group list, select **Unassign**.
5. 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"](#) on page 7-14.

## Deleting an Database Application Group

To remove an application group:

1. On the Workspace home page, click the **Application Builder** icon.
2. On the Tasks List on the right side of the page, click **Application Groups**.
3. Assign all applications in the group to Unassign. See ["Removing a Database Application from an Application Group"](#) on page 54.
4. Return to the Application Groups page.
5. Select the application group to be deleted.

6. On the Application Group page, click **Delete**.  
A confirmation page appears.
7. Confirm your request.

## Understanding Page-Level Items

An item is part of an HTML form. An item can be a text field, text area, password, select list, check box, and so on. Item attributes affect the display of items on a page. For example, these attributes can impact where a label displays, how large an item is, and if the item displays next to or below the previous item.

### Topics:

- [Differences Between Page Items and Application Items](#)
- [Viewing Items on the Page Definition](#)
- [Creating Page-Level Items](#)
- [Editing Page-Level Items](#)
- [Referencing Item Values](#)
- [Displaying Conditional or Read-Only Page Items](#)
- [Working with Multiple Select List Item](#)

**See Also:** ["Understanding Application-Level Items"](#) on page 7-74, ["How Item Attributes Affect Page Layout"](#) on page 12-14, ["About the Item Finder"](#) on page 10-83, and ["About Page Specific Utilities"](#) on page 7-83

## Differences Between Page Items and Application Items

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-level items include a check box, date picker, display as text, file browse field, popup list of values, select list, or a text area. **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.

**See Also:** ["Understanding Application-Level Items"](#) on page 7-74

## Viewing Items on the Page Definition

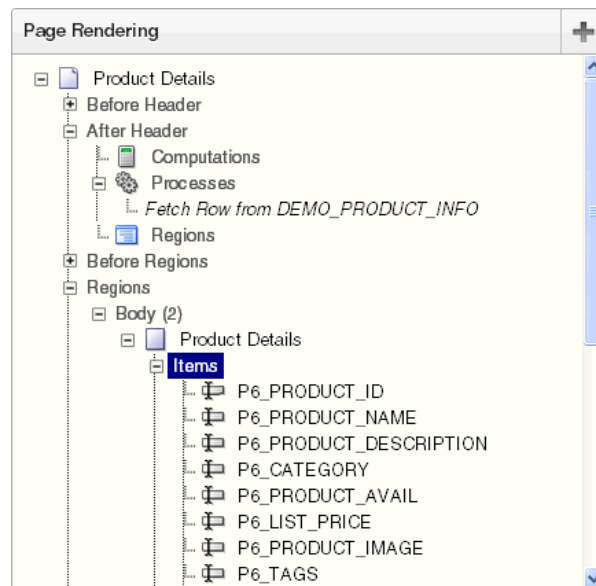
You create and edit page-level items on the Page Definition. In both Component and Tree view, items section appears in the Page Rendering section. See ["Switching Between Tree and Component View"](#) on page 8-3.

### Topics:

- [Viewing Items in Tree View](#)
- [Viewing Items in Component View](#)

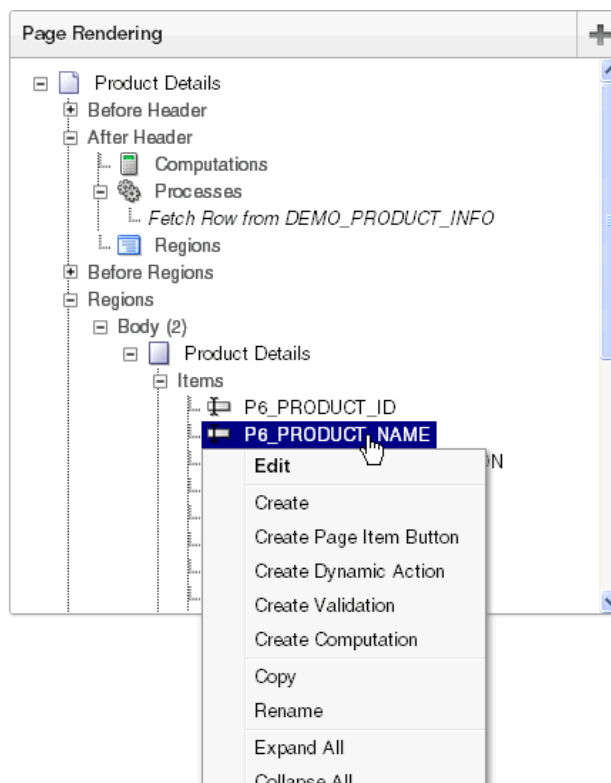
### Viewing Items in Tree View

In Tree view, items display within a tree under the region which contains them.



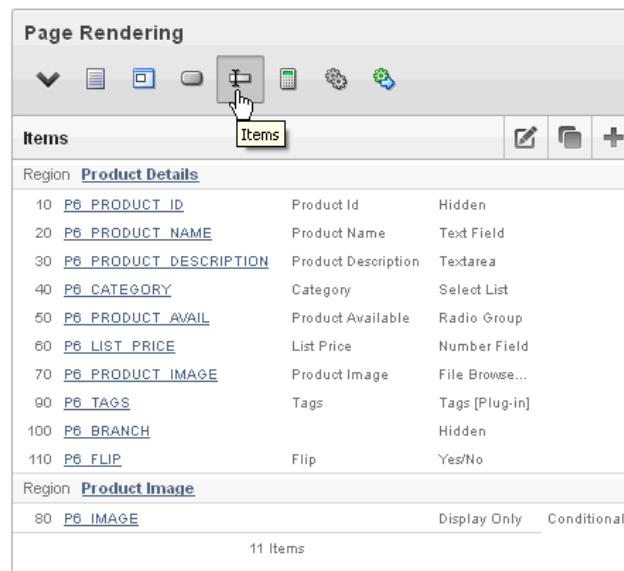
To edit or add an item, right-click to display a context menu. Then, make a selection from the context menu.

**Tip:** You can also edit an item by double-clicking the item name or selecting the name and pressing **ENTER**. See ["Editing a Page in Tree View"](#) on page 8-5.



To edit multiple items at once, right-click **Items** and select **Edit All**. The Items page appears. See ["Editing Multiple Items Simultaneously"](#) on page 7-66.

## Viewing Items in Component View



In Component view, items display under the Items. You can temporarily hide all other subsections by clicking the **Items** icon. To restore the view, click **Show All**. The Show All icon resembles an inverted triangle.

The following icons display next to the section title:

- **Edit All.** The Edit All icon resembles a small grid with a pencil on top of it. Use this icon to edit all items at once. See ["Editing Multiple Items Simultaneously"](#) on page 7-66.
- **Copy.** The Copy icon resembles two small overlapping pages. Use this icon to make a copy of an existing item.
- **Create.** The Create icon resembles a plus (+) sign overlapping a small page. Click this icon to create an item.

Items are organized by region. To edit an item, click the item name.

**See Also:** ["Editing Page Item Attributes"](#) on page 7-62

## Creating Page-Level Items

You can create page-level items by running the Create Item Wizard.

### Topics:

- [About Item Naming Conventions](#)
- [Creating a Page-Level Item on the Page Definition](#)
- [Creating a Static List of Values](#)
- [Creating a Cascading List of Values](#)
- [Creating Multiple Items Using a Tabular Form](#)

**See Also:** ["Differences Between Page Items and Application Items"](#) on page 7-55 and ["About Item Types"](#) on page A-1

## About 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 ["About Bind Variable Syntax"](#) on page 2-16.
- 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`).

## Creating a Page-Level Item on the Page Definition

You create a page-level item by running the Create Item Wizard from the Page Definition.

To create a page-level item:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. If necessary, create an HTML region. See ["Understanding Regions"](#) on page 12-3.
3. To access the Create Item Wizard:
  - Tree view - Under Page Rendering, right-click the region to contain the item and select **Create Page Item**.
  - Component view - Under Items, click the **Create** icon.

The Create Item Wizard appears.

4. Select an item type. See ["About Item Types"](#) on page A-1.

When creating a Popup LOV, Color Picker, or Text Field with Calculator Popup, select **Popup LOV** and then the specific popup list of values type.

5. For Display Position and Name:
  - a. Item Name - Enter a name used to retrieve the value of the item. See ["About Item Naming Conventions"](#) on page 7-58.
  - b. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - c. Region - Select a region to contain this item.
  - d. Click **Next**.
6. Follow the on-screen instructions.
7. To learn more about a specific field, click the field label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.



## Creating a Static List of Values

One way to create a static list of values is to edit an item's List of Values definition. Note that this type of list of values is not reusable. As a best practice, create a list of values as a shared component whenever possible.

**See Also:** ["Creating Lists of Values at the Application Level"](#) on page 10-71

To create a static list of values:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.

The Edit Page Item page appears.

3. Under Name, specify how the item is rendered. From Display As, select Select List.
4. Scroll down to List of Values.
5. Under List of Values, create a static list of values:
  - a. From Named LOV, select **Select Named LOV**.
  - b. In List of values definition, enter a definition using the following syntax:

```
STATIC[2]:Display Value[;Return Value],Display Value[;Return Value]
```

Where:

- The first keyword may be `STATIC` or `STATIC2`.  
`STATIC` results in the values being sorted alphabetically by display value.  
`STATIC2` results in the values being displayed in the order they are entered in the list.
- A semicolon separates the display value from the return value in each entry.
- `Return Value` is optional. If a `Return Value` is not included, the return value equals the display value.

6. To view help for a specific item on a page, click the item label. See ["About Field-Level Help"](#) on page 1-13.
7. Click **Apply Changes**.

The examples that follow demonstrate syntax for three different static LOVs.

**Example 1: Four Values Displayed in Alphabetical Order** In this example, the list of values has four values (Cow, Dog, Cat, and Lion) that display in alphabetical order. The return value of each entry equals the display value.

```
STATIC:Cow,Dog,Cat,Lion
```

**Example 2: Ten Values Displayed in the Order Listed** In this example, the list of values has ten values that display in the order listed in the definition. The return value of each entry equals the display value.

```
STATIC2:10,15,20,25,50,100,200,500,1000,10000
```

**Example 3: A List of Values with Having Both a Return and Display Value** In this example, the list of values has two values: Yes and No (the display value Yes and its return value Y, and the display value No and its return value N).

```
STATIC:Yes;Y,No;N
```

### Creating a Cascading List of Values

By creating a cascading list of values (LOV), one item on a page determines the list of values for another item. Application Builder includes cascading LOV support for the following item types: Select List, Shuttle, Checkbox, Radio Group, Popup LOV, and List Manager. To learn more about item types, see [Appendix A, "About Item Types"](#) on page A-1.

You create a cascading 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 a cascading list of values:

1. Create the first item and name it P1\_DEPTNO:
  - a. Create a select list item. See ["Creating a Page-Level Item on the Page Definition"](#) on page 7-58.
  - b. For Item Type, select **Select List**.
  - c. For Display Position and Name:
    - Item Name - Enter:  
P1\_DEPTNO
    - Accept the remaining defaults and click **Next**.
  - d. For Item Attributes:
    - Label - Enter Department
    - Accept the remaining defaults and click **Next**.
  - e. For Settings, accept the defaults and click **Next**.
  - f. For List of Values:
    - Display Null Value - Accept the default, **Yes**.
    - Null Display Value - Enter - Select Department -  
- Select Department -
    - In List of values definition, enter:  

```
SELECT dname as d,
       deptno as r
FROM dept
ORDER BY dname
```
    - Click **Next**.

- g. Accept the remaining defaults.
  - h. Click **Create Item**.
2. Create the second item named P1\_EMPNO:
- a. Create a second item. See ["Creating a Page-Level Item on the Page Definition"](#) on page 7-58.
  - b. For Item Type, select **Select List**.
  - c. For Display Position and Name:
    - Item Name - Enter:  
P1\_EMPNO
    - Accept the remaining defaults and click **Next**.
  - d. For Item Attributes:
    - Label - Enter Employee.
    - Accept the remaining defaults and click **Next**.
  - e. For Settings, accept the defaults and click **Next**.
  - f. For List of Values:
    - Display Null Value - Accept the default, **Yes**.
    - Null Display Value - Enter - Select Department -  
- Select Employee -
    - From Cascading LOV Parent Item(s) - Select **P1\_DEPTNO**.
    - In List of values definition, enter:
 

```
SELECT ename as d,
       empno as r
FROM emp
WHERE deptno = :P1_DEPTNO
ORDER BY ename
```
    - Click **Next**.
  - g. Accept the remaining defaults.
  - h. Click **Create Item**.

Two select lists appear. Making a selection in the Department select list, determines which individuals display in the Employees select list.

The screenshot shows a form titled "Cascading LOV Example". It contains two dropdown menus. The first dropdown, labeled "Department", has "RESEARCH" selected. The second dropdown, labeled "Employee", is open and shows a list of employee names: ADAMS, FORD, JONES, SCOTT, and SMITH. The first two options in the "Employee" dropdown are "- Select Employee -".

**See Also:** ["Editing Page-Level Items"](#) on page 7-62

## Creating Multiple Items Using a Tabular Form

To create multiple items simultaneously:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. If necessary, create an HTML region. See ["Understanding Regions"](#) on page 12-3.
3. To access the Create Item Wizard:
  - Tree view - Under Page Rendering, right-click the region to contain the item and select **Create Page Item**.
  - Component view - Under Items, click the **Create** icon.The Create Item Wizard appears.
4. Click the **Create multiple items using tabular form** link at the bottom of the page.
5. On the Create Multiple Items page, specify the following:
  - a. Create Item(s) in Region - Select the region to contain the items.
  - b. Item Template - Select an item template.
  - c. For each item, enter the Sequence, Name, Label, Type and specify whether the item should be cached.
6. Click **Create Multiple Items**.

## Editing Page-Level Items

You can edit page-level items by editing page item attributes or using the Edit All or Reorder Items icons.

### Topics:

- [Editing Page Item Attributes](#)
- [Defining Default Values](#)
- [Configuring Page Item Security](#)
- [Creating a Quick Pick Selection](#)
- [Editing Multiple Items Simultaneously](#)

**See Also:** ["Displaying Conditional or Read-Only Page Items"](#) on page 7-71 and ["Available Item Types"](#) on page A-1

### Editing Page Item Attributes

Once you create a page item, you can edit it on the Edit Page Item page.

To edit page item attributes:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.

**Tip:** You can also edit an item by double-clicking the item name or selecting the name and pressing **ENTER**. See ["Editing a Page in Tree View"](#) on page 8-5.

The Edit Page Item page appears.

3. To learn more about a specific attribute on a page, click the attribute label. See ["About Field-Level Help"](#) on page 1-13.
4. Click **Apply Changes**.

**See Also:** ["How Item Attributes Affect Page Layout"](#) on page 12-14 and ["Understanding Cross-Site Scripting Protection"](#) on page 15-10

**About Navigation Alternatives** The Edit Page Item page is divided into sections. The sections that display depend upon the Display As attribute.

You can access these sections by 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**.

### Defining Default Values

You define default values for an item using the attributes under Default on the Edit Page Item page. 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. Create the item. See ["Creating Page-Level Items"](#) on page 7-57.
2. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
3. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.

The Edit Page Item page appears.

4. Scroll down to Default.
5. In Default Value, enter a value.
6. From Default Value Type, select one of the following:
  - **Static Text with Session State Substitutions**
  - **PL/SQL Function Body**
  - **PL/SQL Expression**
7. Click **Apply Changes**.

### Configuring Page Item Security

You can configure security for an item in Security region on the Edit Page Item page.

To configure page item security:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.

2. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view -Under Items, select the item name.

The Edit Page Item page appears.

3. Scroll down to Security.
4. Configure the attributes described in [Table 7–11](#).

**Table 7–11 Edit Page Item, Security**

Attribute	Description
Authorization Scheme	<p>Select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed.</p> <p><b>See Also:</b> <a href="#">"Providing Security Through Authorization"</a> on page 15-37</p>
Session State Protection	<p>Select a Session State Protection level. Options include:</p> <ul style="list-style-type: none"> <li>■ Unrestricted - The item may be set by passing the item in a URL or in a form. No checksum is required in the URL.</li> <li>■ Restricted: May not be set from browser - The item may not be altered using the URL or POSTDATA. Select this option to restrict the way that the item value can be set to internal processes, computations, and so on. This attribute only applies to items that cannot be used as data entry items and is always observed, even if Session State Protection is disabled.</li> </ul> <p>Use this attribute for application items or for page items having the following Display As types: Display Only (Save State=No), Text Field (Disabled, does not save state), and Stop and Start Grid Layout (Displays label only).</p> <p>If Session State Protection is enabled, these additional attributes may be applied to items:</p> <ul style="list-style-type: none"> <li>■ Checksum Required: Application Level - The item may be set by passing the item in a URL if a checksum is also provided that is specific to the workspace and application.</li> <li>■ Checksum Required: User Level - The item may be set by passing the item in a URL if a checksum is also provided that is specific to the workspace, application, and user.</li> <li>■ Checksum Required: Session Level - The item may be set by passing the item in a URL if a checksum is also provided that is specific to the current session.</li> </ul> <p><b>See Also:</b> <a href="#">"Understanding Session State Protection"</a> on page 15-13</p>
Store value encrypted in session state	<p>Session state that is sensitive can be encrypted when stored in Application Express session state management tables. To maintain session state encrypted for this item, set the value to <b>Yes</b>.</p> <p>Values up to 4000 bytes in length can be encrypted. Attempts to encrypt values longer than 4000 bytes produce an error message.</p>

**Table 7-11 (Cont.) Edit Page Item, Security**

Attribute	Description
Escape Special Characters	<p>This attribute only displays with some item types. Select <b>Yes</b> to prevent Cross-Site Scripting (XSS) attacks. Select <b>No</b> if you want that HTML tags which are stored in the page item or in the entries of a list of value are actually rendered.</p> <p><b>See Also:</b> "<a href="#">Understanding Cross-Site Scripting Protection</a>" on page 15-10</p>
Restricted Characters	<p>Use this attribute to restrict the characters that can be saved in session state. Oracle Application Express displays an error message if a user tries to save data which does not conform to the selected character restriction. Available options include:</p> <ul style="list-style-type: none"> <li>■ <b>All Characters Allowed</b> No restriction applies.</li> <li>■ <b>Whitelist for a-Z, 0-9 and space</b> Only allow characters a-z, A-Z, 0-9, and space.</li> <li>■ <b>Blacklist HTML command characters (&lt;&gt;").</b> Do not allow reserved HTML characters</li> <li>■ <b>Blacklist &amp;&lt;&gt;"/,;* =% and --:</b> Do not allow &amp;, &lt;, &gt;, ", /, ;, ", *,  , =, % and "--" (PL/SQL comment).</li> <li>■ <b>Blacklist &amp;&lt;&gt;"/,;* =% or -- and new line</b> Do not allow &amp;, &lt;, &gt;, ", /, ;, ", *,  , =, %, "--", and new line characters</li> </ul> <p><b>See Also:</b> "<a href="#">Understanding Cross-Site Scripting Protection</a>" on page 15-10</p>

### Creating a Quick Pick Selection

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%.

The screenshot shows a form with the following fields:

- First Name
- Last Name
- Email
- Phone Number
- Hire Date
- Job Id (dropdown menu showing 'Accountant')
- Salary
- Commission Pct (highlighted with a yellow background and labeled 'Quick Picks' with a list of values: 5%, 10%, 15%, 20%)
- Manager Id
- Department Id

To create a quick pick:

1. Create the item. See "[Creating Page-Level Items](#)" on page 7-57.
2. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.

3. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.The Edit Page Item page appears.
4. Scroll down to Quick Picks.
5. From Show Quick Picks, select **Yes**.
6. Define the Label and Value for each quick pick:
  - a. Under Label, enter the label to display for each selection.
  - b. Under Value, enter the corresponding value.
7. In Link Attributes, enter additional attributes for the quick picks.
8. Click **Apply Changes**.

### Editing Multiple Items Simultaneously

Item attributes control how items display on a page. You can use the Page Items page to edit the sequence, field label, template, region, and overall position for all items on a page. The sections that follow describe how to edit items using these pages.

#### Topics:

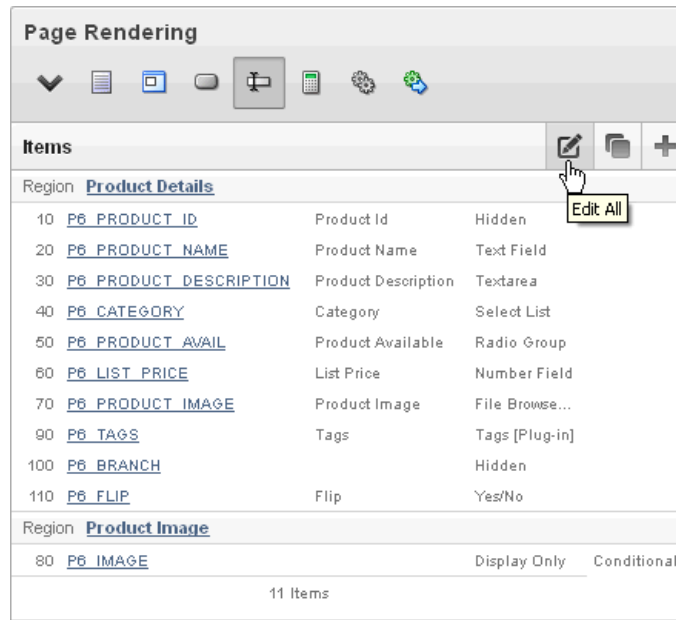
- [Items](#)
- [Reassign Region Items](#)
- [Delete Multiple Items](#)
- [Viewing Item Utilities](#)
- [History](#)

**See Also:** ["How Item Attributes Affect Page Layout"](#) on page 12-14

**Items** To edit multiple items simultaneously:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Page Items page:
  - Tree view - Right-click **Items** and select **Edit All**.
  - Component view - Under Items, click the **Edit All** icon. The Edit All icon resembles a small page with a pencil on top of it.





The Items tab appears.

A Navigation bar displays at the top of the page. Use the Item Name field to search for a specific item. Use the Page field to navigate to another page. To limit the display to just items in a specific region, make a selection from Regions list.

**See Also:** ["Editing Page Item Attributes"](#) on page 7-62

The Page Items page displays items in an editable report. [Table 7-12](#) describes each editable attribute.

**Table 7-12 Editable Attributes on Page Items**

Attribute	Description
Sequence	Specify the display sequence for this component. The sequence determines the order of evaluation.
Prompt	Enter the label for this HTML form element. You may include HTML, JavaScript, and shortcuts. You can also use the substitution string <code>#CURRENT_ITEM_NAME#</code> to obtain the name of the item associated with this label.
Field Template	Determines the label template. Label templates enable you to define the user interface attributes in a central place and share that definition among many labels.
Region	Defines the region in which the item displays. All items must be in a region.
New Line	Determines whether this item displays on the same line as the previous item or whether it displays on the next line. Items are laid out in an HTML table. Select <b>Yes</b> to have an item display as the first field in a new row in the table.
New Field	<p>If set to <b>Yes</b>, this item is rendered into its own HTML table cell which is the default. If set to <b>No</b>, the item is rendered into the same HTML table cell as the previous page item.</p> <p>Note that rendering into the same table cell looks more attached to the previous page item.</p>

**Table 7–12 (Cont.) Editable Attributes on Page Items**

Attribute	Description
Width	Specifies the length (in characters) of the form element that displays for this item.
Height	Specifies the height (in lines) for text areas and multi select lists.
Column Span	Items are laid out in HTML tables. This property defines the value to be used for the COLSPAN attribute in the table cell.
Row Span	Items are laid out in HTML tables. The attribute determines the value to be used for the ROWSPAN attribute in the table cell that the item displays in.
Post Element	Text or HTML code is rendered immediately after the page item element.

**Reassign Region Items** Use the Reassign Region Items page to assign items to a new region.

To assign items to a new region on the Reassign Region Items page:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Page Item page:
  - Tree view - Right-click **Items** and select **Edit All**.
  - Component view - Under **Items**, click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.

The Page Item page appears.

3. Click **Reassign Region Items**.

The Reassign Region Items page appears.

Use the Navigation bar at the top of the page to narrow or broaden the display. Available options include:

- **Page** - Select or enter a new number and click **Go**.
  - **Show Region(s)** - Select a region to display and click **Go**.
4. To reassign an item to another region:
    - a. Select the items to reassign.
    - b. From **Assign to Region**, select a new region.
    - c. Click **Reassign**.

**Delete Multiple Items** Use the Delete Multiple Items page to simultaneously delete multiple items.

To delete multiple items:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Page Item page:
  - Tree view - Right-click **Items** and select **Edit All**.
  - Component view - Under **Items**, click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.

The Page Item page appears.

**3. Click **Delete Multiple Items**.**

The Delete Multiple Items page appears.

Use the Navigation bar at the top of the page to narrow or broaden the display. Use the Page field to navigate to a new page. Select or enter a new number and click **Go**.

**4. To delete items:**

- a.** Select the items.
- b.** Click **Remove Items**.

**Viewing Item Utilities** The Utilities page includes Grid Edit pages and reports that enable you to edit items on multiple pages within a selected application.

To access the Utilities page:

- 1.** Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
- 2.** Access the Page Item page:
  - Tree view - Right-click Items and select **Edit All**.
  - Component view - Under Items, click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.

The Page Item page appears.

**3. Select one of the following reports:**

- Grid Edit of all Item Labels
- Grid Edit of all Item Help Text
- Item Help Subscriptions
- All Page Items
- Conditional Items

**History** Use the History page to view a summary of recent edits to page-level items.

## Referencing Item Values

You can reference item values stored in session state in regions, computations, processes, validation, and branches. [Table 7-13](#) describes the supported syntax for referencing item values.

**See Also:** "[Managing Session State Values](#)" on page 2-13

**Table 7–13 Syntax for Referencing Item Values**

Type	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' )	PL/SQL syntax referencing the item value using the 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.  <b>See Also:</b> <i>Oracle Application Express API Reference</i>
PL/SQL	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.  <b>See Also:</b> <i>Oracle Application Express API Reference</i>
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-level items, use the Source Attribute to set the item value.  
  
From the Page Definition, 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"](#) on page 2-14, *Oracle Application Express API Reference*, and ["Understanding Cross-Site Scripting Protection"](#) on page 15-10

## Displaying Conditional or Read-Only Page Items

You can choose to have an item display conditionally or as read-only by editing attributes on the Edit Pages Item page.

### Topics:

- [Displaying Conditional Page Items](#)
- [Displaying Read Only Page Items](#)

### Displaying Conditional Page Items

To display a conditional item:

1. Create the item. See "[Creating Page-Level Items](#)" on page 7-57.
2. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
3. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.
 The Edit Page Item page appears.
4. Scroll down to Conditions.
5. Make a selection from the Condition Type list.
6. Enter an expression in the fields provided.
7. Click **Apply Changes**.

### Displaying Read Only Page Items

To display a read-only item:

1. Create the item. See "[Creating Page-Level Items](#)" on page 7-57.
2. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
3. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.
 The Edit Page Item page appears.
4. Scroll down to Read Only. Under Read Only:
  - a. Make a selection from Read Only Condition Type.
 

Depending on the item type, a read-only item may be rendered as plain text or as nonenterable field. Not selecting a condition causes the item to render normally.

**Tip:** Setting Condition Type to **Never** always renders the item as an enterable field. This setting overwrites any read-only condition setting defined at the region or page-level.
  - b. Enter an expression in the fields provided.

- c. In Read Only Element Table Cell(s) Attributes, enter attributes to be included in the HTML table cell tag, `<td>`, that contains the item when displayed in read only mode. For example:

```
bghcolor="#FF0000"
```

**Tip:** Read Only Element Table Cell(s) Attributes only be displays if the application uses HTML tables to layout regions and page items.

5. Click **Apply Changes**.

## Working with 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\_UTIL.STRING\_TO\_TABLE function
- Creating a shuttle

### Topics:

- [Using APEX\\_UTIL.STRING\\_TO\\_TABLE to Convert Selected Values](#)
- [Creating a Shuttle Item Type](#)

### Using 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 APEX\_UTIL.STRING\_TO\_TABLE function. The following example demonstrates how to insert the selected departments into an audit table containing the date of the query.

```
DECLARE
    l_selected APEX_APPLICATION_GLOBAL.VC_ARR2;
BEGIN
    --
    -- Convert the colon separated string of values into
    -- a PL/SQL array

    l_selected := APEX_UTIL.STRING_TO_TABLE(:P1_DEPTNO);
```

```
--
-- Loop over array to insert department numbers and sysdate
--

FOR i IN 1..l_selected.count
LOOP
    INSERT INTO report_audit_table (report_date, selected_department)
        VALUES (sysdate, l_selected(i));
END LOOP;
END;
```

**See Also:** "STRING\_TO\_TABLE Function" in *Oracle Application Express API Reference*

### Creating a Shuttle Item Type

Suppose you have a form on the DEPT table that shows which employees are assigned to a given department. To make assigning employees to a department easier, you can create a shuttle item that lists employees alphabetically.

To create a shuttle item:

1. Create a new Form page on DEPT using Form on a Table with Report:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Create Page**.
  - d. For Page Type, select **Form**.
  - e. Under Forms, select **Form on a Table with Report**.
  - f. For Report Page, accept the defaults and click **Next**.
  - g. For Table/View Name, select **DEPT**.
  - h. Accept the remaining defaults and follow the on-screen instructions. To learn more about a specific field, click the item label.
2. Create a shuttle named P2\_EMP\_LIST and the form page.
  - a. Go the Page Definition for the form page.
  - b. Right-click the region containing the form and select **Create Page Item**.
  - c. For Item Type, select **Shuttle**.
  - d. For Item Name, enter P2\_EMP\_LIST and click **Next**.

**Tip:** In this example, "P2" in the item name P2\_EMP\_LIST indicates the item resides on page 2.

- e. For Item Attributes, accept the defaults and click **Next**.
- f. For Setting, accept the defaults and click **Next**.
- g. For List of Values:
  - List of Values Query - Enter:
 

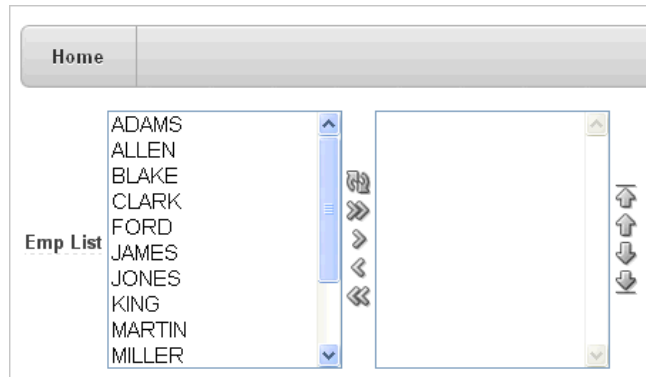
```
SELECT ename, empno FROM emp ORDER BY 1
```
  - Click **Next**.

h. For Source:

- Source Type - Select **SQL Query (return color separated value)**
- Item Source Value - Enter:  

```
SELECT empno FROM emp WHERE deptno = :P2_DEPTNO ORDER BY ename
```
- Click **Create Item**.

i. Run the page by clicking the Run Page icon.



## Understanding Application-Level Items

Application-level items do not display, but are used as global variables to the application. You can use an application item as a global variable.

### Topics:

- [Creating an Application-level Item](#)
- [Viewing Application Item Usage](#)
- [Editing Application-level Item Attributes](#)
- [Creating an Application-level Item that Functions as a Global Variable](#)

**See Also:** ["Differences Between Page Items and Application Items"](#) on page 7-55 and ["Referencing Item Values"](#) on page 7-69

## Creating an Application-level Item

To create an application-level item:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. When Application home page appears, click **Shared Components**.
5. Under Logic, select **Application Items**.  
The Application Items page appears.
6. To create an application item, click **Create**.  
The Create/Edit page appears.
7. For Name:



- a. Name - Enter a name for the application-level item.
- b. Scope - Options include:
  - Global - Select this option if the application shares session state with other applications in the same workspace. To learn more, see ["Creating an Application-level Item that Functions as a Global Variable"](#) on page 7-77.
  - Application - Select this option if the application does share session state with another application.
8. For Security, Session State 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.  
**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.
9. For Build Option, Select a build option for this component. Build options are predefined settings that determine whether components within an application are enabled.
10. In Comments, enter any notes regarding this item.
11. Click **Create Application Item**.

## About the Application Items Page

Once you create an application item, it appears on the Application Items page. You can customize the appearance of 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 items by name and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Icons** - Displays each item as a large icon. To edit an item, click the appropriate icon.
- **View Report** - Displays each item as a line in a report. To edit an item, click the name.
- **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## 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-level Item Attributes

Once you create an application-level item, you can edit it on the Create/Edit Application Item page.

To edit application-level item attributes:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. When Application home page appears, click **Shared Components**.
5. Under Logic, select **Application Items**.

The Application Items page appears. See ["About the Application Items Page"](#) on page 76

6. Select an application item.

The Create/Edit page appears.

7. To learn more about a specific item on a page, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

8. Click **Apply Changes**.

**See Also:** ["Understanding Cross-Site Scripting Protection"](#) on page 15-10

## About Navigation Alternatives

The Create/Edit Application Item page is divided into the following sections: Name, Security, Configuration, and Comments.

You can access these sections by 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**.

## Creating an Application-level Item that Functions as a Global Variable

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 multi-tenant application

You can create a global variable by creating an application-level item with the same name across all applications and setting the scope to Global.

To create an application-level item that functions as a global variable:

1. Create an application-level 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**.

To learn more, see "[Creating an Application-level Item](#)" on page 7-74.

## Viewing Application Utilities and Reports

Oracle Application Express includes a comprehensive number of reports that enable you to view of your application from various perspectives. You can use these reports to view statistics and access reports of page and application components, templates, plug-ins, and conditions. For example, you can view details about buttons used on all pages within your application. Additionally, many reports are updatable so you can standardize components, such as item and region labels, without navigating to a specific page.

### Topics:

- [Using Application Builder Utilities](#)
- [About Page Specific Utilities](#)
- [About Cross Page Utilities](#)
- [About Cross Application Reports](#)

**See Also:** "[Creating Custom Activity Reports Using APEX\\_ACTIVITY\\_LOG](#)" on page 17-4

## Using Application Builder Utilities

The Application Builder Utilities page includes tools and reports that summarize information across an application.

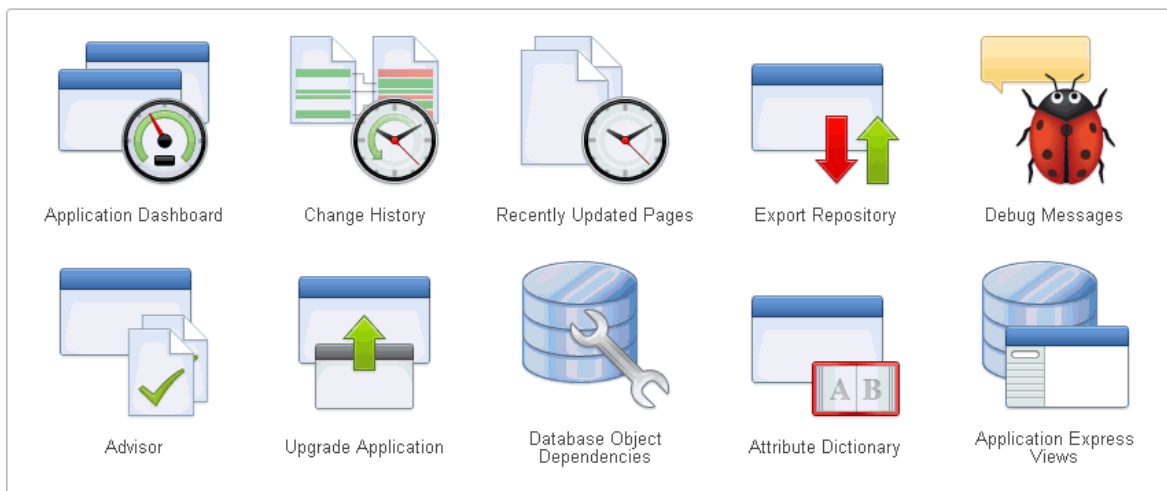
**Topics:**

- [About the Application Builder Utilities Page](#)
- [Viewing the Application Dashboard](#)
- [Viewing the Change History Report](#)
- [Viewing the Recently Updated Pages Report](#)
- [Upgrading an Existing Application](#)
- [Using the Database Object Dependencies Report](#)
- [About Application Express Views](#)

**About the Application Builder Utilities Page**

To access Application Builder Utilities page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click the **Utilities** icon.



The Application Builder Utilities page features icons that link to the following tools and reports:

- **Application Dashboard.** See "[Viewing the Application Dashboard](#)" on page 7-79.
- **Change History.** See "[Viewing the Change History Report](#)" on page 7-80.
- **Recently Updated Pages.** See "[Viewing the Recently Updated Pages Report](#)" on page 7-80.
- **Export Repository.** See "[Accessing the Export Repository](#)" on page 16-30.
- **Debug Messages.** See "[Debugging an Application](#)" on page 14-1.
- **Advisor.** See "[Running Advisor to Check Application Integrity](#)" on page 14-1.
- **Upgrade Application.** See "[Upgrading an Existing Application](#)" on page 7-80
- **Database Object Dependencies.** See "[Using the Database Object Dependencies Report](#)" on page 7-81.

- **Manage Attribute Dictionary** - See ["Using the Attribute Dictionary"](#) on page 8-62.
- **Application Express Views** - See ["About Application Express Views"](#) on page 7-82.

### Page Specific Utilities

Page Specific Utilities
<a href="#">Cross Page Utilities</a>
<a href="#">Region Utilities</a>
<a href="#">Button Utilities</a>
<a href="#">Item Utilities</a>
<a href="#">Computation Utilities</a>
<a href="#">Validation Utilities</a>
<a href="#">Process Utilities</a>
<a href="#">Dynamic Action Utilities</a>
<a href="#">Branch Utilities</a>

The Page Specific Utilities display on the right side of the Utilities page. Use these utilities to view component reports across pages in an application and by component type (for example, region, button, item, validation, process, dynamic action, or branch). To learn more, see ["About Page Specific Utilities"](#) on page 7-83 and ["About Cross Page Utilities"](#) on page 7-84.

### Viewing the Application Dashboard

The Application Dashboard details application components and attributes.

To the Application Dashboard:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.  
The Application home page appears.
4. Click **Utilities**.
5. 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.
6. To view a specific report, click the number to the right of the component type or template.

**See Also:** ["Identifying At Risk Password Items"](#) on page 15-9

### 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:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.  
The Application home page appears.
4. Click **Utilities**.
5. Click the **Change History**.

A Search bar displays at the top of the page. See ["Using the Search Bar"](#) on page 9-5.

### Viewing the Recently Updated Pages Report

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 **Application Builder** icon.
3. Select an application.  
The Application home page appears.
4. Click **Utilities**.
5. Click **Recently Updated Pages**.

A Search bar displays at the top of the page. See ["Using the Search Bar"](#) on page 9-5.

### Upgrading an Existing Application

Use the Upgrade Application icon on the Utilities page to upgrade an existing application to include new components available in the current release. This feature upgrades the following components:

- Update Text Field items to Number Field items when there is an IS NUMERIC validation.
- Update the Value Required item attribute to **Yes** when there is a NOT NULL validation.
- Upgrade Date Picker (Classic) to the new Date Picker.
- Remove %null% in LOV Null Return Value of page items.
- Upgrade FCKeditor 2 to CKEditor 3.
- Upgrade SVG Charts to HTML5 Charts.
- Upgrade Flash Charts to Flash 6 Charts.
- Upgrade Flash Charts to HTML5 Charts.
- For interactive reports:
  - Enable Group By for interactive reports.
  - Enable Save Public Report for interactive reports.
  - Enable Subscription for interactive reports.
  - Enable Rows Per Page Selector for interactive reports.
- Numeric, Required, and Date Picker Item updates based upon conditional validations.

A wizard displays all relevant validations per page and enables you to select the ones you want to replace with item settings. Then, select buttons that should not execute validations (such as Cancel). Lastly, you can select any validations that should always execute (for example, checking privileges before deletion).

To upgrade an existing application:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.  
The Application home page appears.
4. Click **Utilities**.
5. Click **Upgrade Application**.
6. Follow the on-screen instructions.

### Using the Database Object Dependencies Report

The Database Object Dependencies report identifies database objects referenced by the current application. Review this report to determine what objects to move when deploying an application.

To view the Database Object Dependencies report:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.  
The Application home page appears.
4. Click **Utilities**.

5. Click **Database Object Dependencies**.

The Database Object Dependencies page appears.

6. Click **Compute Dependencies**.

**Tip:** Display of the report may take a moment depending on the size and complexity of your application.

The Database Object Dependencies report appears.

### About Application Express Views

Application Express Views are data dictionary views that expose the metadata for applications. In Application Express Views, you cannot only see the view, but you can also see the data they contain.

To access the Application Express Views page:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.

The Application home page appears.

4. Click **Utilities**.
5. Click **Application Express Views**.

The Application Express Views 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 view by name and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Icons** - Displays each view as a large icon. To access a view, click the appropriate icon.
- **View Report** - Displays each view as a line in a report. To access a view, click the name.
- **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

6. Select a view

To view the data within a view, select columns from the Select Column tab and click the **Results** button.

On the Results tab, expand the Query region to view the query that was executed. You can copy this query for reuse with SQL Commands or SQL Developer.



Report View	Tree View	Select Columns	Filter	Results
Selected View: <b>APEX_APPLICATION_LOVS</b>				
WORKSPACE ▼	WORKSPACE_DISPLAY_NAME	APPLICATION_ID	APPLICATION_NAME	LIST_OF_VALUES_NAME
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	CATEGORIES
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	DATA_LOAD_OPTION
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	FIRST_ROW_OPTION
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	NEW_OR_EXISTING_CUSTOMER
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	Y_OR_N
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	PRODUCTS_WITH_PRICE
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	ROWS
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	STATES
2DAYPLUS	2DAYPLUS	100429	Sample Database Application	PRODUCTS
				1 - 9
<a href="#">Download</a>				
<b>Query</b> select WORKSPACE,WORKSPACE_DISPLAY_NAME,APPLICATION_ID,APPLICATION_NAME,LIST_OF_VALUES_NAME from APEX_APPLICATION_LOVS				

## About Page Specific Utilities

The Page Specific Utilities display on the right side of the Utilities page. Use these utilities to view component reports across pages in an application and by component type (for example, region, button, item, computation, validation, process, dynamic action, or branch).

Page Specific Utilities
<a href="#">Cross Page Utilities</a>
<a href="#">Region Utilities</a>
<a href="#">Button Utilities</a>
<a href="#">Item Utilities</a>
<a href="#">Computation Utilities</a>
<a href="#">Validation Utilities</a>
<a href="#">Process Utilities</a>
<a href="#">Dynamic Action Utilities</a>
<a href="#">Branch Utilities</a>

To access Page Specific Utilities page:

1. Log in to Oracle Application Express.

The Workspace home page appears.

2. Click the Application Builder icon.  
The Application 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. See ["About Cross Page Utilities"](#) on page 7-84.
  - Region Utilities
  - Button Utilities
  - Item Utilities
  - Computations Utilities
  - Process Utilities
  - Dynamic Action Utilities
  - Branch Utilities

## About Cross Page Utilities

The Cross Page Utilities page provides access to the following tools and reports:

- **Recently Updated Pages.** Displays a report of recently updated pages in the current application. See ["About Recently Updated Pages"](#) on page 7-84.
- **Grid Edit of all Pages.** Edit multiple page attributes across multiple pages in a grid format. See ["About Grid Edit of all Pages"](#) on page 7-85.
- **Delete Multiple Pages.** See ["About Delete Multiple Pages"](#) on page 7-85.
- **Page Attributes.** Displays a report of attributes, components, controls, and application logic by page. See ["About the Page Attributes"](#) on page 7-85.
- **Page Groups.** See ["About Page Groups"](#) on page 7-85.
- **Page Locks.** See ["About Page Locks"](#) on page 7-85.

**See Also:** ["Viewing Application Utilities and Reports"](#) on page 7-77

## Accessing Cross Page Utilities

To access the Page Utilities page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Utilities**.
4. From Page Specific Utilities, click **Cross Page Utilities**.

## About Recently Updated Pages

The Recent Pages report displays a report of recently accessed pages within the current application. To link to a page, click the page number. To customize the report, use the search bar at the top of the page. See ["Using the Search Bar"](#) on page 9-5.

### About Grid Edit of all Pages

Use the Grid Edit of all Pages 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**.

### About Delete Multiple Pages

Use Delete Multiple Pages to delete multiple pages at once. See "[Deleting Multiple Pages](#)" on page 7-47.

### About the Page Attributes

The Page Attributes report details attributes, components, controls, and application logic for each page in the current application. To customize the report, use the search bar at the top of the page. See "[Using the Search Bar](#)" on page 9-5.

To link to a specific page, click the page number.

### About Page Groups

Use Page Groups to better organize the pages within an application. See "[Grouping Pages](#)" on page 7-41.

### About Page Locks

Use Page Locks to prevent conflicts during application development. By locking a page, you prevent other developers from editing it. See "[Locking and Unlocking a Page](#)" on page 7-43.

## About Cross Application Reports

Use the links on the Cross Application Reports page to view and edit information across multiple applications in the current workspace. You access cross application reports from Application Builder home page.

To access cross application reports:

1. Log in to Oracle Application Express.  
The Workspace home page appears.
2. Click the Application Builder icon.  
The Application Builder home page appears.
3. From Tasks, click **Cross Application Reports**.  
The Cross Application Reports page is divided into the following sections:
  - Application Attributes
  - Application Comparison Reports
  - Security
  - User Interface
4. Select a report to review.



---

# Working with Database Application Pages

This section provides important information about working with pages within a database application.

**Topics:**

- [About the Page Definition](#)
- [Altering Page Attributes](#)
- [Understanding Page Computations](#)
- [Understanding Validations](#)
- [Understanding Page Processes](#)
- [Working with Branches](#)
- [Working with Shared Components](#)
- [Understanding Application Processes](#)
- [Understanding Application Computations](#)
- [Using the Attribute Dictionary](#)

**See Also:** ["Quick Start"](#) on page 1-1, ["Application Builder Concepts"](#) on page 2-1, ["About Database Applications"](#) on page 7-1, ["Controlling Page Layout"](#) on page 12-1, and ["Adding Navigation"](#) on page 11-1

## About the Page Definition

A Page Definition is the basic building block of a page. You use the Page Definition to view, create, and edit the controls and application logic that define a page. Each page can have buttons and fields (called items), which are grouped into containers called regions. Pages can also have 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, create, and edit the controls that define a page by accessing the Page Definition.

**Topics:**

- [Accessing the Page Definition](#)
- [About Tree and Component View](#)
- [Editing a Page in Tree View](#)

- [Editing a Page in Component View](#)
- [About Page Rendering](#)
- [About Page Processing](#)
- [About Shared Components](#)
- [Common Elements of the Page Definition](#)

## Accessing the Page Definition

You can view, create, and edit the controls that define a page through the Page Definition.

To access the Page Definition for an existing page:

1. On the Workspace home page, click the **Application Builder** icon.

The Application Builder home page appears.

2. Select an application.

The Application home page appears.

3. Select a page.

The Page Definition appears and is divided into the following sections:

- **Page Rendering.** Page rendering is the process of generating a page from the database. Use the Page Rendering section to modify controls that impact the rendering of a page, including page attributes, regions, buttons, items, page rendering computations, and page processes. See "[About Page Rendering](#)" on page 8-12.
- **Page Processing.** Page processing is the process of submitting a page. A page is typically submitted when a user clicks a button. Use the Page Processing section of the Page Definition to specify application logic such as computations, validations, processes, and branches. In general, the Application Express engine runs this logic in the order it appears on the Page Definition. See "[About Page Processing](#)" on page 8-13.
- **Shared Components.** The Shared Components section lists common components that can be used by one or more pages within an application. See "[About Shared Components](#)" on page 8-14.

## About Tree and Component View

A page is the basic building block of an application. Each page has a page number, a name, and typically some text attributes such as a header, title, and footer. You add content to your page by creating page controls (regions, items, and buttons). Page templates and page region templates control the exact look and feel of each page. There are two ways to view a page: Tree view and Component view.

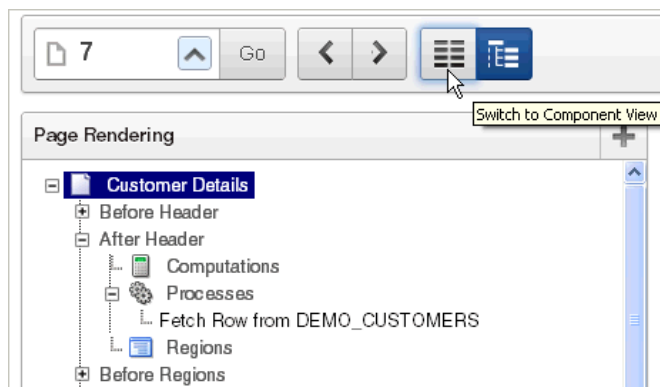
### Topics:

- [Switching Between Tree and Component View](#)
- [About Tree View](#)
- [About Component View](#)

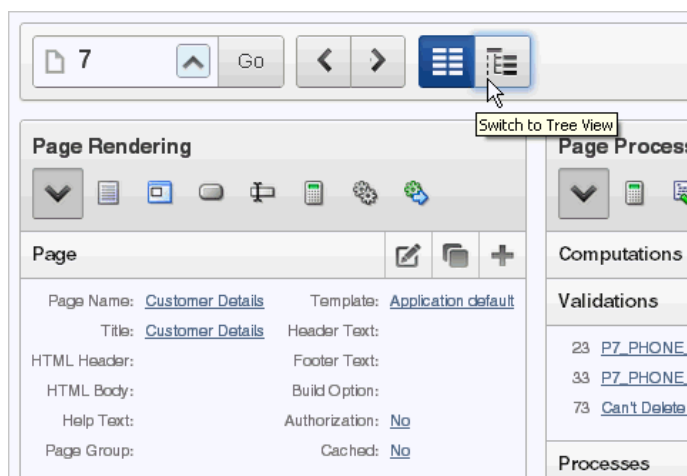
## Switching Between Tree and Component View

To switch between Tree view and Component view:

1. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.  
The Page Definition appears. By default, each page displays components as nodes in a tree.
2. To switch to Component view, click the **Switch to Component View** icon to the right of the navigation bar.

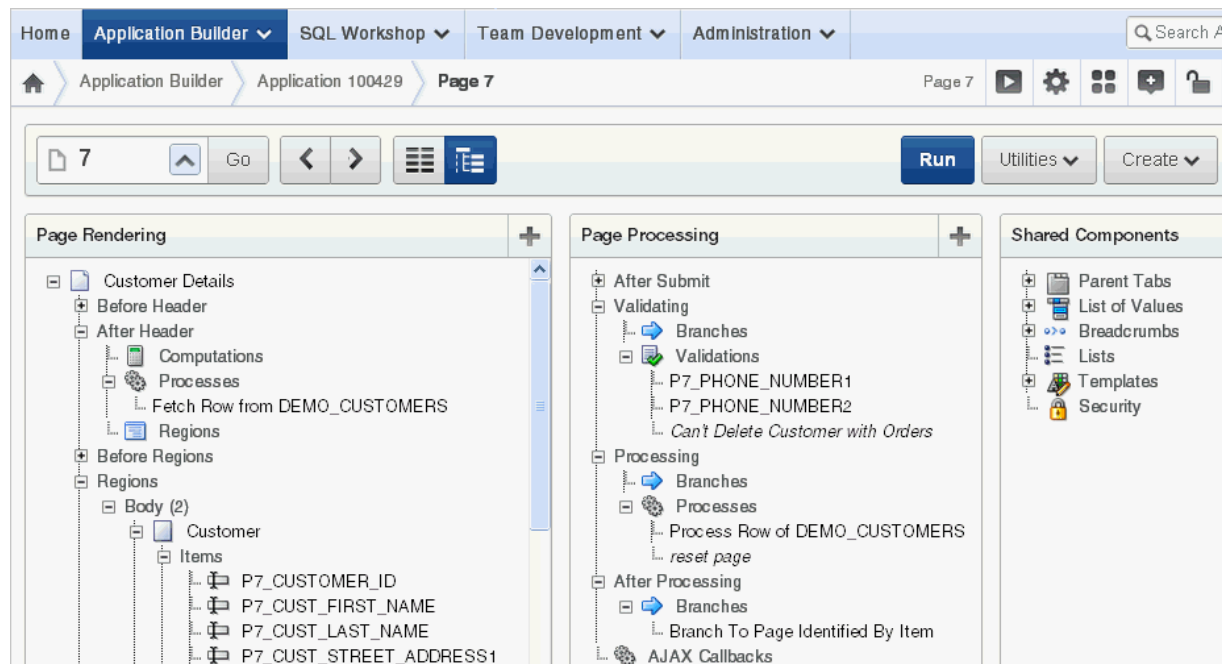


3. To switch back to Tree view, click the **Switch to Tree View** icon.



## About Tree View

**Tree view** displays regions, page items, and application logic as nodes in a tree. Each tree groups components based on event sequence or how Oracle Application Express processes them when rendering or processing a page. This organization enables you to better understand when a component is processed.



Key features of this view include:

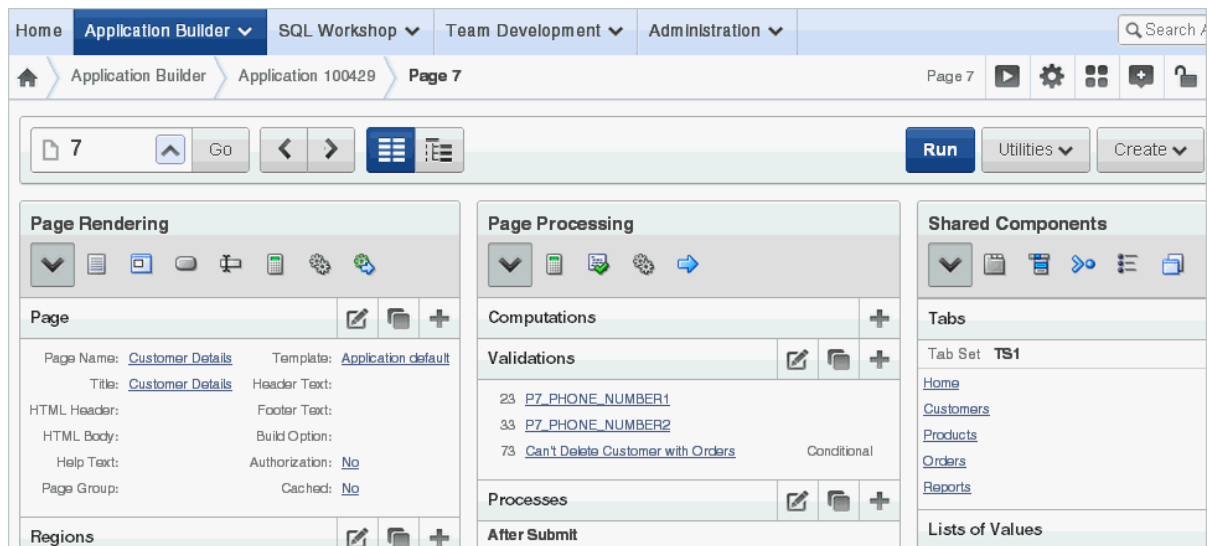
- **Context menus.** Each tree node features a custom context menu. To access a context menu, right-click.
- **Quick access to attributes pages.** To edit attributes, double-click or press **ENTER**. If available, an attribute page appears.
- **Easy reorder of components.** Reorder page items, report columns, processes, validations, branches, or computations by dragging and dropping to another display, processing point, or region.
- **Tooltips.** Each tree node features a tooltip which displays basic information about the component, including item type, condition, authorization, and so on.
- **View component names or labels.** Choose to view the components on a page using the component name or the label that displays when you run the page. (for example, an item named P7\_CUST\_FIRST\_NAME, but with the label *First Name*). See ["Switching Between Names or Labels"](#) on page 8-8
- **Identification of conditions, authorizations, and build options.** If a component has a condition, authorization, or build option, then the tree node label displays in *italic*.
- **Direct access to default wizards.** Each context menu includes actions that link to default wizards. For example, selecting **Create Validation** for an item displays the Create Validation Wizard.

To learn more, see, ["Editing a Page in Tree View"](#) on page 8-5 and ["Switching Between Tree and Component View"](#) on page 8-3.

## About Component View

**Component view** groups user interface elements and application logic by component type.





To edit a component, drill down on the component name or click the icons. To learn more, see ["Editing a Page in Component View"](#) on page 8-8 and ["Switching Between Tree and Component View"](#) on page 8-3.

## Editing a Page in Tree View

In **Tree view** displays regions, page items, and application logic as nodes in a tree. Each tree groups components based on event sequence or how Oracle Application Express processes them when rendering a page. This organization enables you to better understand when a component is processed.

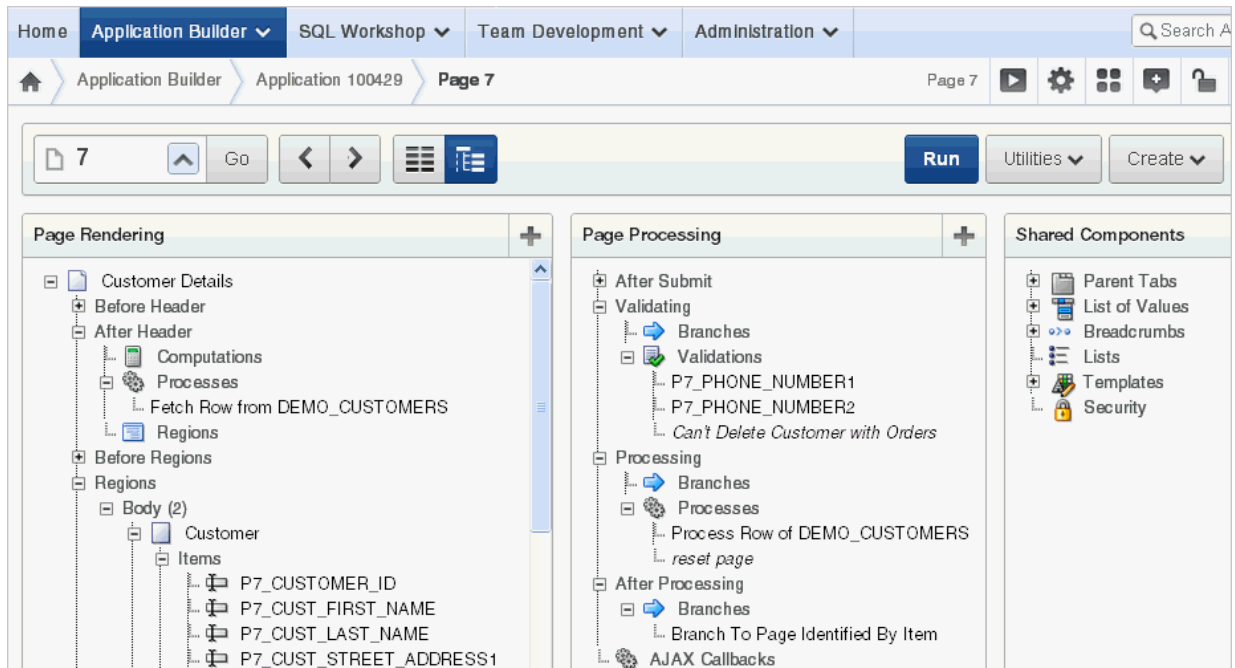
### Topics:

- [About Tree View](#)
- [Accessing Context Menus](#)
- [Creating New Components](#)
- [Reordering Page Components](#)
- [Switching Between Names or Labels](#)

**See Also:** ["Switching Between Tree and Component View"](#) on page 8-3 and ["Common Elements of the Page Definition"](#) on page 8-16

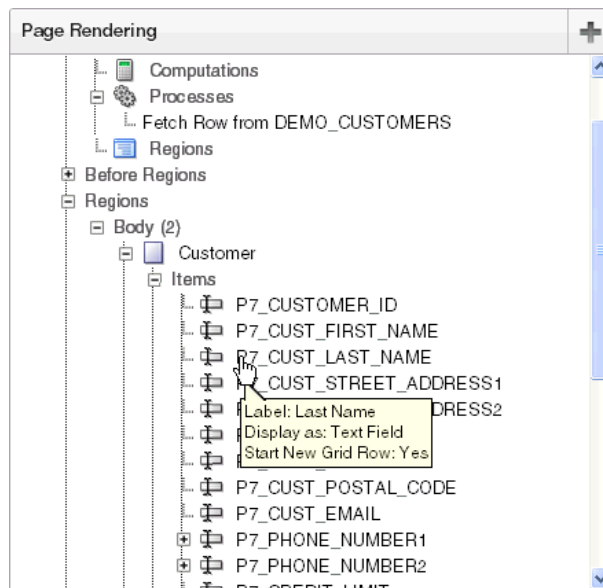
### About Tree View

In Tree view, the Page Definition displays each page component as a node in a tree.



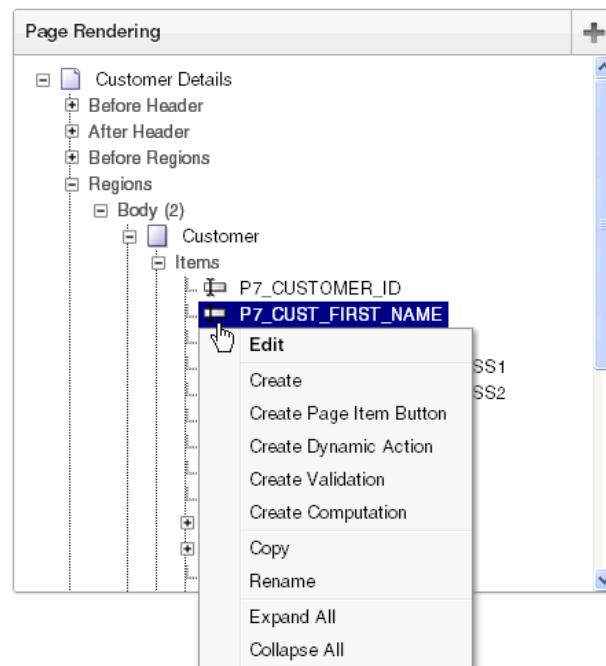
Each tree groups components based on event sequence, or how Application Builder processes them when rendering or processing the page.

Moving your cursor over a component displays a tooltip. Tooltips display basic information about the component, including item type, condition, authorization, and so on.



### Accessing Context Menus

To edit or add a component, right-click to display a context menu. The context menu changes, based on the component type. The following example includes the options Edit, Expand All, and Collapse All. However other options may also display depending upon the component type (for example, Copy, Edit All, and Delete).



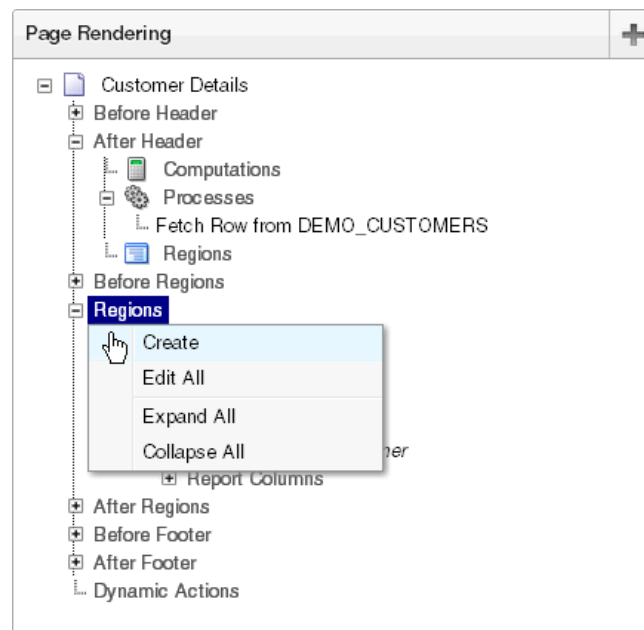
### Accessing Attribute Pages

To edit a node, you can:

- Right-click the node and select **Edit All** or **Edit**.
- Double-click the node.
- Select the node and press **ENTER**.

### Creating New Components

You can create controls or components by right-clicking and selecting **Create**.



A wizard appears. Follow the online instructions

## Reordering Page Components

You can quickly change the order in which page items, regions, report columns, computations, processes, validations, branches, and dynamic actions display by dragging and dropping to another display, processing point, or region.

## Switching Between Names or Labels

You choose to view the components on a page using the component name or the label that displays when you run the page. (for example, an item named `P7_CUST_FIRST_NAME`, but with the label `First Name`).

To change the view:

1. Click the **Utilities** button.
2. Select **Switch To** and then one of the following:
  - **Show Names**
  - **Show Labels**

To learn more about the Utilities button, see "[Common Elements of the Page Definition](#)" on page 8-16

## Editing a Page in Component View

A page is the basic building block of an application. Each page has a page number, a name, and typically some text attributes such as a header, title, and footer. You add content to your page by creating page controls (regions, items, and buttons). Page templates and page region templates control the exact look and feel of each page.

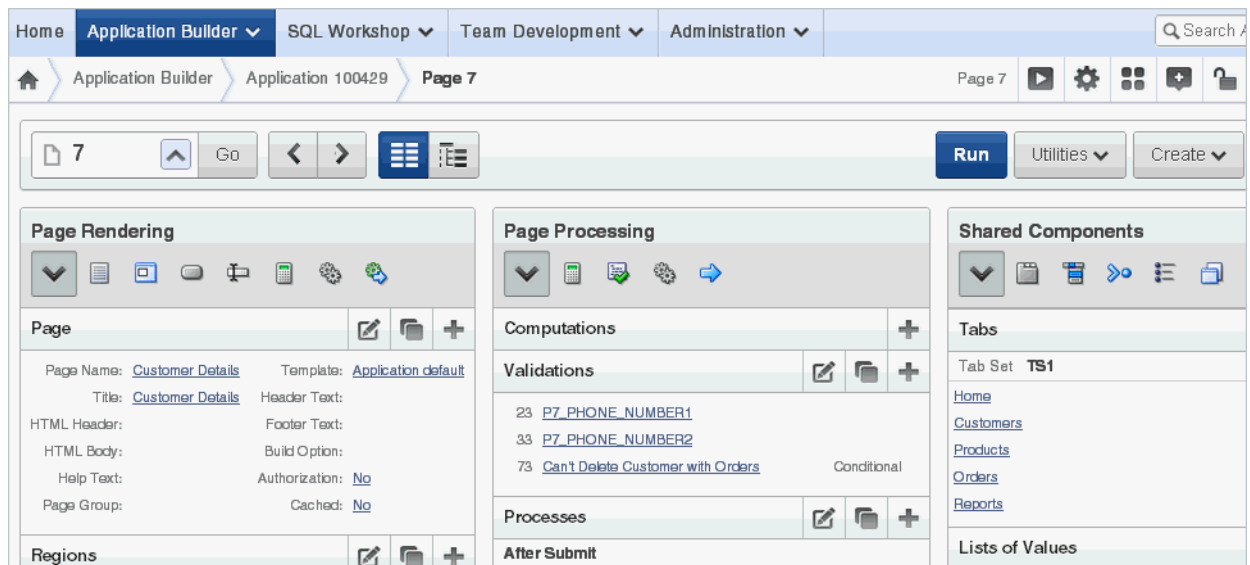
### Topics:

- [About Component View](#)
- [Using Page Rendering Icons](#)
- [Using Page Processing Icons](#)
- [Using Shared Components Icons](#)

**See Also:** "[Switching Between Tree and Component View](#)" on page 8-3

## About Component View

Each Page Definition is divided into three sections: Page Rendering, Page Processing, and Shared Components. Each of these sections is broken into subsections with headings that identify the type of control, component, or application logic.



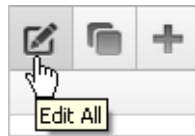
To edit a component, drill down on the component name or click the icon described in the following sections.

### Topics:

- [About the Edit All Icon](#)
- [About the Copy or Create Icons](#)

### About the Edit All Icon

You can edit the controls, components, or logic within a given subsection by clicking the Edit icon that displays to the right of the subsection title. The Edit All icon resembles a piece of paper with a pencil on top of it.



Clicking the **Edit All** icon enables you to edit or delete multiple controls, components, or application logic simultaneously or view a history of recent changes.

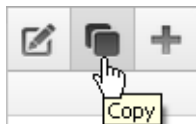
For example, selecting the **Edit All** icon under Regions displays a summary report of all currently defined regions on the current page. You can use this summary view to:

- Edit the multiple attributes at once by making selections from the available fields and select lists.
- Link to a definition page by clicking the **Edit** icon.

You can access similar summary views on other pages by selecting a different page from the **Page** pop up list. To save your edits to any summary view, click **Apply Changes**.

You can also view the attributes of a specific control or component by selecting its name on the Page Definition. For example, suppose your Page Definition contains a region named *Customers*. Clicking the region name **Customers** would display a region definition page for that region.

**About the Copy or Create Icons** You can copy or create controls or components by clicking the Copy and Create icons. The Copy icon resembles two small overlapping pages. Click the Copy icon to make a copy of an existing control or component.



The Create icon resembles a plus (+) sign. Click the Create icon to create a control or component.

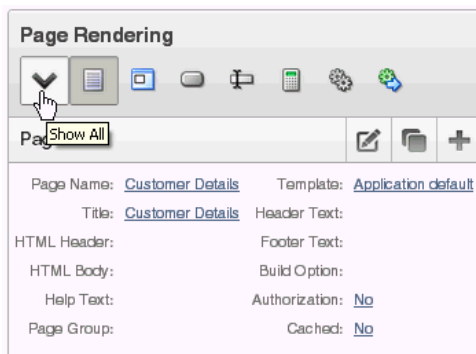


**See Also:** ["About the Edit All Icon"](#) on page 8-9

## Using Page Rendering Icons

Page rendering is the process of generating a page from the database. See ["About Page Rendering"](#) on page 8-12.

In Component view, you can navigate to a specific subsection by clicking the icons beneath the heading. When you select one of these icons, the subsection appears and all other subsections are temporarily hidden. To restore the view, click **Show All**.



## Using Page Processing Icons

Page processing is the process of submitting a page. A page is typically submitted when a user clicks a button. Use the Page Processing section of the Page Definition to specify application logic such as computations, validations, processes, and branches. In general, the Application Express engine runs this logic in the order it appears on the Page Definition.

Page Processing		
<a href="#">Show All</a>		+
<b>Validations</b>		
23	<a href="#">P7_PHONE_NUMBER1</a>	
33	<a href="#">P7_PHONE_NUMBER2</a>	
73	<a href="#">Can't Delete Customer with Orders</a>	Conditional
<b>Processes</b>		
<b>After Submit</b>		
10	<a href="#">Process Row of DEMO_CUSTOMERS</a>	Automatic Row Processing (DML) Unconditional
20	<a href="#">reset page</a>	Clear Cache for all Items on Pages (PageID,PageID,PageID) Never
<b>Branches</b>		
<b>After Processing</b>		
20	<a href="#">Branch To Page Identified By Item</a>	

You can quickly navigate to a specific subsection by clicking the icons beneath the heading. When you select one of these icons, the subsection appears and all other subsections are temporarily hidden. To restore the view, click **Show All**.

### Using Shared Components Icons

The Shared Components section of the Page Definition contains common elements that can display or be applied on any page within an application.

Shared Components		
<a href="#">Show All</a>		+
<b>Tab Set TS1</b>		
<a href="#">Home</a> <a href="#">Customers</a> <a href="#">Products</a> <a href="#">Orders</a> <a href="#">Reports</a>		
<b>Lists of Values</b>		
Dynamic	<a href="#">STATES</a>	P7_CUST_STATE
<b>Breadcrumbs</b>		
<a href="#">Main Menu:</a> (No corresponding region)		

You can quickly navigate to a specific subsection by clicking the icons beneath the heading. When you select one of these icons, the subsection appears and all other subsections are temporarily hidden. To restore the view, click **Show All**.

**See Also:** ["Working with Shared Components"](#) on page 8-49

## About Page Rendering

Page rendering is the process of generating a page from the database. Use the Page Rendering section to modify controls that impact the rendering of a page, including page attributes, regions, buttons, items, and page processes.

The sections that follow describe each subsection under Page Rendering.

### Topics:

- [Page](#)
- [Regions](#)
- [Buttons](#)
- [Items](#)
- [Processes](#)
- [Dynamic Actions](#)

### Page

Page attributes control specific characteristics of a page such as the page name, display attributes such as the page title and the associated page template, header text, and the selected authorization scheme to name just a few. You access page attributes from the Page Definition.

**See Also:** ["Altering Page Attributes"](#) on page 8-20

### Regions

A region is an area on a page that serves as a container for content. Each page can have any number of regions. The content of a region is determined by the region source. For example, a region may contain a report based on a SQL query you define, or it may contain static HTML.

You control the appearance of a region through a specific region template. You can use regions to group page controls (such as items or buttons). You can also create simple regions that do not generate additional HTML, or create elaborate regions that frame content within HTML tables or images.

### See Also:

- ["Understanding Regions"](#) on page 12-3 for information about creating and editing regions
- *Oracle Database Development Guide* for information about developing web applications with PL/SQL
- *Oracle Database PL/SQL Packages and Types Reference* for information about http packages

### Buttons

As you design your application, you can use buttons to direct users to a specific page or URL, or to enable users to submit a page. When you submit a page, the Application Express engine posts or processes information. A button can be implemented as an HTML button, an image, or by using a template. Buttons can be placed in predefined region template positions or among items in a form.



**See Also:** ["Creating Buttons"](#) on page 10-63

## Items

Items are HTML form elements such as text fields, select lists, and check boxes with an associated session state. Item attributes affect the display and behavior of items on a page. For example, these attributes can impact where a label displays, how large an item is, and whether the item displays next to or below the previous item.

There are two categories of items: page items and application items. **Page-level items** are placed on a page and have associated user interface properties, such as Display As, Label, and Label Template. **Application-level items** are not associated with a page and therefore have no user interface properties. An application item can be used as a global variable.

**See Also:** ["Understanding Page-Level Items"](#) on page 7-55 and ["Understanding Application-Level Items"](#) on page 7-74

## Processes

Processes are logic controls used to execute data manipulation language (DML) or PL/SQL. For example, you can use a process to populate session state at the time a page is rendered, to execute some type of logic (for example, using PL/SQL), or to make a call to the rendering engine. Typically a process performs an action. A process may be hand coded PL/SQL, or the invocation of a predefined process.

**See Also:** ["Understanding Page Processes"](#) on page 8-43 and ["Understanding Application Processes"](#) on page 8-55

## Dynamic Actions

Dynamic actions provide a way to define complex client-side behavior declaratively without the need for JavaScript. You can specify an action that is performed based on a defined set of conditions. You can also specify which elements are affected by the action and when and how they are affected.

**See Also:** ["Implementing Dynamic Actions"](#) on page 17-35

## About Page Processing

Page processing is the process of submitting a page. A page is typically submitted when a user clicks a button. Use the Page Processing section of the Page Definition to specify application logic such as computations, validations, processes, and branches. In general, when viewing the Page Definition in Tree View, the Application Express engine runs this logic in the order it appears.

The sections that follow describe each subsection under Page Processing.

### Topics:

- [Computations](#)
- [Validations](#)
- [Processes](#)
- [Branches](#)

## Computations

Computations are units of logic used to assign session state to items and are executed at the time the page is processed.

**See Also:** ["Understanding Page Computations"](#) on page 8-29

## Validations

Validations enable you to create logic controls to verify whether user input is valid. For example, a validation can check whether a date entered into a target completion date field is in the future.

**See Also:** ["Understanding Validations"](#) on page 8-32 and ["About the When Button Pressed Attribute"](#) on page 2-29

## Processes

Processes are logic controls used to execute data manipulation language (DML) or PL/SQL. Processes are executed after the page is submitted.

**See Also:** ["Understanding Page Processes"](#) on page 8-43

## Branches

Branches enable you to create logic controls that determine how the user navigates through the application.

**See Also:** ["Working with Branches"](#) on page 8-48 and ["About the When Button Pressed Attribute"](#) on page 2-29

## About Shared Components

The Shared Components section of the Page Definition contains common elements that can display or be applied on any page within an application. Note Shared Components only display on the Page Definition after you add them.

The sections that follow describe subsections that may display under Shared Components on the Page Definition.

**See Also:** ["Working with Shared Components"](#) on page 8-49

### Topics:

- [Tabs](#)
- [Lists of Values](#)
- [Breadcrumbs](#)
- [Lists](#)
- [Theme](#)
- [Templates](#)
- [Security](#)
- [Navigation Bar](#)

**See Also:** ["About the Page Definition"](#) on page 8-1, ["About the Edit All Icon"](#) on page 8-9, and ["About the Copy or Create Icons"](#) on page 8-10

## Tabs

Tabs are an effective way to navigate between pages of an application. Application Builder includes two types of tabs: standard tabs and parent tabs.

An application having only one level of tabs uses a standard tab set. A standard tab set is associated with a specific page. You can use standard tabs to link users to other pages within your application. A parent tab set functions as a container to hold a group of standard tabs. Parent tabs give users another level of navigation and context (or sense of place) within the application.

**See Also:** ["Creating Tabs"](#) on page 11-1

## Lists of Values

A list of values (LOV) is a static or dynamic definition used to display a specific type of page item, such as a radio group, check box, popup list, or select list. LOVs can be static (that is, based on a set of predefined display and return values) or dynamic (based on SQL queries that select values from tables). Once created, an LOV can then be referenced by one or more page items.

You define LOVs at the application level by running the LOV Wizard and adding them to the List of Values repository.

**See Also:** ["Creating Lists of Values at the Application Level"](#) on page 10-71

## Breadcrumbs

A breadcrumb is a hierarchical list of links that is rendered using a template. For example, you can display breadcrumbs as a list of links or as a breadcrumb path.

**See Also:** ["Creating Breadcrumbs"](#) on page 11-20

## Lists

A list is a collection of links that is rendered using a template. For each list entry, you specify display text, a target URL, and other attributes that control when and how the list entry displays. You control the display of the list and the appearance of all list entries by linking the list to a template.

**See Also:** ["Creating Lists"](#) on page 7

## Theme

A theme is a named collection of templates that defines the application user interface. Each theme contains templates for every type of application component and page control, including individual pages, regions, reports, lists, labels, menus, buttons, and list of values.

**See Also:** ["Managing Themes"](#) on page 13-1

## Templates

Templates control the look and feel of the pages in your application. As you create your application, you specify templates for pages, regions, reports, lists, labels, menus, buttons, and popup lists of values. Groups of templates are organized into named collections called themes.

**See Also:** ["Customizing Templates"](#) on page 13-11

## Security

You can provide security for your application by specifying an authorization scheme. Authorization is a broad term for controlling access to resources based on user privileges.

**See Also:** ["Providing Security Through Authorization"](#) on page 15-37

## Navigation Bar

Use a navigation bar to link users to various pages within an application. You can use a navigation bar to enable users to log in, log out, or link to Help text. The location of a navigation bar depends upon the associated page template. A navigation bar icon enables you to display a link from an image or text. When you create a navigation bar icon you can specify an image name, text, display sequence, and target location (a URL or page).

**See Also:** ["Creating a Navigation Bar Entry"](#) on page 11-27

## Common Elements of the Page Definition

A Page Definition is the basic building block of a page. You use the Page Definition to view, create, and edit the controls and application logic that define a page. The sections that follow describe common UI elements of the Page Definition.

### Topics:

- [About the Developer Action Bar](#)
- [Searching for Page Metadata](#)
- [About the Navigation Bar](#)
- [About the Developer Toolbar](#)

**See Also:** ["Accessing the Page Definition"](#) on page 8-2 and ["Editing a Page in Component View"](#) on page 8-8

## About the Developer Action Bar

The Developer Action bar displays in the upper right corner, beneath the Search Application field.



The Developer Action bar contains the following icons: Run Page, Shared Components, Application Utilities, Developer Comment, Bug, or To Do, Page Unlocked/Locked, Export Page, Find icon and Help.

**Run Page Icon** The **Run Page** icon Run Page icon resembles a small, gray play button. Click this icon to render viewable HTML of the current page. If no page is selected, clicking this icon runs the first page in the application. When you run a page, the Application Express engine dynamically renders the page based on data stored in the database. See ["Running an Application or Page"](#) on page 7-39.

**Shared Components Icon** The **Shared Components** icon resembles a small mechanical gear. Click this icon to view a list of shared components and user interface controls

that can display or be applied on every page within an application. See ["Working with Shared Components"](#) on page 8-49.

**Application Utilities** The **Application Utilities** icon resembles a circle and four small boxes. Click this icon to link to the Utilities page. See ["Using Application Builder Utilities"](#) on page 7-77.

**Developer Comment, Bug, or To Do icon** The **Developer Comment, Bug, or To Do** icon is the shape of a gray balloon. Click this icon to create a developer comment, bug, or To Do about an application, a specific page, or a group of pages. See ["Adding Developer Comments"](#) on page 7-48, ["Managing Bugs"](#) on page 4-14, and ["Tracking To Dos"](#) on page 4-10.

**Page Unlocked/Page Locked icon** The **Page Unlocked** and **Page Locked** icon indicates whether a page is available for editing. If a page is unlocked, the icon appears as an open padlock. If the page is locked, the icon appears as a locked padlock. To change the lock status of a page, click this icon. See ["Locking and Unlocking a Page"](#) on page 7-43.

**Export Page icon** The **Export Page** icon resembles a downward arrow. Click this icon to export the current page. See ["Exporting a Page in an Application"](#) on page 16-17.

**Find icon** The **Find** icon resembles a flashlight. Click this icon to search for items, pages, queries, tables, PL/SQL, images, and cascading style sheets (CSS) within the current application or the schemas associated with the workspace. See ["Using the Find Icon"](#) on page 10-82.

**Help** Click the **Help** link to view online help for this page. See ["About the Oracle Application Express Documentation"](#) on page 1-11.

## Searching for Page Metadata

The Search Application field displays above the Developer Action bar.



Use this field to search for metadata within an application. By default, this field is case insensitive and supports regular expression syntax. For a regular search, enter P1\_NAME to search for all occurrences of P1\_NAME in the application

The following is an advanced regular expression search and finds all occurrence of P1\_NAME or P2\_NAME:

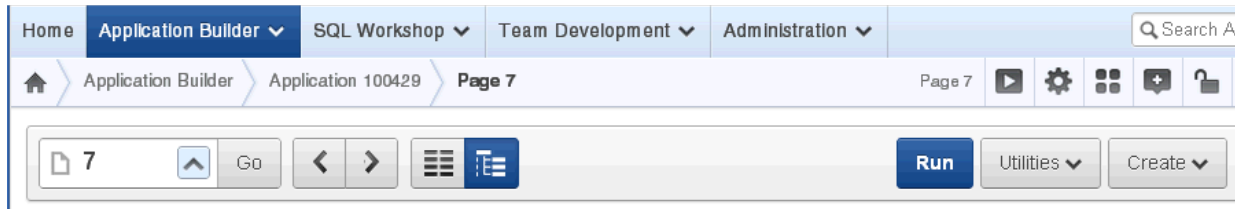
```
regex: (P1_NAME) | (P2_NAME)
```

The Search Application field also supports a shortcut to quickly view a specific page. Simply enter the application and page number using the format *page*, *application:page* or *application-page* and press **ENTER**. Consider the following examples:

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

## About the Navigation Bar

A navigation bar displays at the top of the page beneath the breadcrumb menu. Use this bar to navigate between pages within an application.



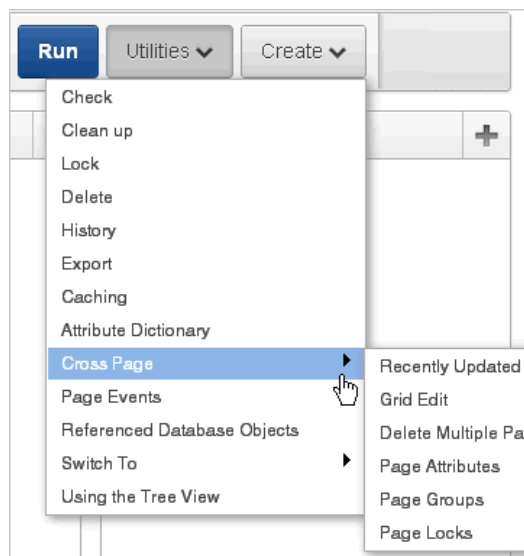
Use the Page field to navigate between pages. Enter a page number in the Page field and click **Go**.

The following buttons display on the right side: Run, Utilities, Create.

## About the Run Button

Click **Run** to dynamically render the page based on data stored in the database. ["Running an Application or Page"](#) on page 7-39.

## About the Utilities Button



**Tip:** Some Utilities menu options only display in Tree view.

Click the Utilities button to view the following menu:

- **Check.** Links to Advisor. Use this tool to verify the integrity and quality of your Oracle Application Express application. See ["Running Advisor to Check Application Integrity"](#) on page 14-1
- **Clean up.** Click this link to change the sequence page components.
- **Lock.** Locks the current page. See ["Locking and Unlocking a Page"](#) on page 7-43.
- **Delete.** Deletes the current page. See ["Deleting a Page"](#) on page 7-46.
- **History.** Displays a report of changes to the current page.
- **Export.** Links to Export page. See ["Exporting an Application"](#) on page 16-14.

- **Caching.** Displays the caching page. See ["Managing Cached Regions"](#) on page 12-10.
- **Attribute Dictionary.** Links to Manage Attribute Dictionary page. See ["Using the Attribute Dictionary"](#) on page 8-62.
- **Cross Page** contains links to:
  - **Recently Updated.** Displays a report of recently updated pages in the current application.
  - **Grid Edit.** Displays a report for editing multiple page attributes across multiple pages in a grid format.
  - **Delete Multiple Pages.** See ["Deleting Multiple Pages"](#) on page 7-47.
  - **Page Attributes.** Displays a report of attributes, components, controls, and application logic by page.
  - **Page Groups.** See ["Grouping Pages"](#) on page 7-41
  - **Page Locks.** See ["Locking and Unlocking a Page"](#) on page 7-43.
- **Page Events.** Details all currently defined page controls and processes in the order in which the Application Express engine renders the page, invokes logic, and runs processes.
- **Referenced Database Objects.** Identifies database objects referenced by the current application. See ["Using the Database Object Dependencies Report"](#) on page 7-81.
- **Switch to** (Tree view only). Choose whether to view the components on a page using the component name or the label that displays when you run the page. (for example, an item named `P7_CUST_FIRST_NAME` but with the label `First Name`). Select either **Show Names** or **Show Labels**.
- **Using the Tree View.** Displays an explanation about using Tree view. See ["About Tree and Component View"](#) on page 8-2 and ["Editing a Page in Tree View"](#) on page 8-5.

### About the Create Button

Click **Create** to add new page or component to the existing page. Available options include:

- New page. See ["About Creating Pages in a Database Application"](#) on page 7-34.
- Region in this page. See ["Understanding Regions"](#) on page 12-3
- Shared Component. See ["Working with Shared Components"](#) on page 8-49.
- New page as a copy. ["Copying a Database Application Page"](#) on page 7-38.
- Bug. See ["Managing Bugs"](#) on page 4-14.
- To Do. ["Tracking To Dos"](#) on page 4-10.
- Comment. see ["Adding Developer Comments"](#) on page 7-48.

### About the Developer Toolbar

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

**See Also:** ["Running an Application or Page"](#) on page 7-39

When you run a desktop application from within the development environment, the Developer toolbar appears at the bottom of the page. The Developer toolbar offers a quick way to edit the current page, create a page, region, or page control, view session state, or toggle in and out of Debugging mode. You can control whether the Developer toolbar displays by changing the Status attribute on the Edit Definition page.



**Note:** The Developer toolbar does not display on locked packaged applications pages or on jQuery Mobile Smartphone pages.

The Developer toolbar consists of the following links:

- **Home** links you to the Workspace home page. See "[About the Workspace Home Page](#)" on page 1-9.
- **Application** links you to the Application home page. See "[About the Application Home Page](#)" on page 6-3.
- **Edit Page** accesses the Page Definition for the current running page. See "[About the Page Definition](#)" on page 8-1.
- **Create** links to a wizard for creating a page, region, page control (item, button, branch, computation, process, or validation), or a shared control (navigation bar icon, tab, list of values, list, or breadcrumb). See "[About Database Applications](#)" on page 7-1.
- **Session** links you to session state information for the current page. See "[Viewing Session State](#)" on page 2-7.
- **Caching** links to the Caching page. See "[Managing Cached Regions](#)" on page 12-10.
- **View Debug** displays the Debug window. See "[Accessing Debugging Mode](#)" on page 14-4.
- **Debug** toggles the page between Debug and No Debug mode. See "[Accessing Debugging Mode](#)" on page 14-4.
- **Show Edit Links** toggles between **Show Edit Links** and **Hide Edit Links**. Clicking **Show Edit Links** displays a small orange icon next to each editable object on the page. Each icon is orange and contains a triangle with two rules beneath it. Clicking the link displays another window in which to edit the object.
- **Show Grid** displays how regions and page items are positioned on a page if a grid layout is used.

## Altering Page Attributes

Page attributes control specific characteristics of a page such as the page name, display attributes such as the page title and the associated page template, header text, and the selected authorization scheme. You access page attributes from the Page Definition.

### Topics:

- [Accessing Page Attributes](#)
- [About Page Attributes](#)



## Accessing Page Attributes

To edit page attributes:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. To access the Edit Page:
  - Tree view - Under Page Rendering, double-click the page title at the top of the tree.
  - Component view- Under Page, click the **Edit All** icon.

The Page Attributes page appears. Required values are marked with a red asterisk (\*).

## About Page Attributes

The Page Attribute page is divided into the following sections: Name, Display Attributes, JavaScript, HTML Header, Header and Footer, Read Only, Security, Duplicate Submission, Server Cache, Configuration, Error Handling, Help, and Comments.

The screenshot shows the 'Page Attributes' page for page 8 of 31. At the top, there are 'Cancel' and 'Delete' buttons. Below them is a navigation bar with tabs: 'Show All', 'Name', 'Display Attributes', 'JavaScript', 'CSS', 'HTML Header', 'Header and Footer', 'Read Only', 'Security', 'Duplicate Submission', 'Server Cache', and 'Comments'. The 'Show All' tab is selected, and a mouse cursor is pointing at it. The 'Name' section is active, showing 'Page: 7'. Below this, there is a text input field for 'Name' with the value 'Customer Details', a text input field for 'Page Alias', and a dropdown menu for 'Group' with the value '- No Group Assigned -'.

You can access these sections by scrolling down the page, or by clicking a navigation buttons 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**.

The topics that follow describe the specific sections of the Page Attributes page.

### Name

[Table 8-1](#) describes general attributes for the current page such as a page name, an optional alphanumeric alias, and associated page groups.

**Table 8-1 Page Attributes: Name**

Attributes	Descriptions
Name	Identifies the name of the current page for application developers. This name is used in numerous pages and reports, along with the page number and page title.
Page Alias	Enter an alphanumeric alias for this page. This alias must be unique within the current application.  For example, if you were working on page 1 of application 100, you could create an alias called home. You could then access this page from other pages using the following f?p syntax:  f?p=100:home

**Table 8–1 (Cont.) Page Attributes: Name**

Attributes	Descriptions
Group	<p>Identify the page group you would like to associate with this page. Page groups do not affect functionality, but help developers manage the pages within an application.</p> <p>To remove a page from a group, select <b>No Group Assigned</b> and click <b>Apply Changes</b>.</p> <p><b>See Also:</b> "Grouping Pages" on page 7-41</p>

## Display Attributes

[Table 8–2](#) describes general display attributes for the current page such as the selected page template, standard tab set, title, and cursor focus.

**Table 8–2 Page Attributes: Display Attributes**

Attributes	Descriptions
Page Template	<p>Select a page template to control the appearance of this page. Making a selection here overrides the default page template defined within the current theme.</p> <p><b>See Also:</b> "Editing a Theme" on page 13-2</p>
Standard Tab Set	<p>Select a standard tab set to be used for this page. A standard tab set is associated with a specific page and page number. You can use standard tabs to link users to a specific page.</p> <p><b>See Also:</b> "Creating Tabs" on page 11-1</p>
Title	<p>Enter a title to display in the title bar of the browser window. The Application Express engine uses the title you specify here in place of the #TITLE# substitution string used in the page template. This title is inserted between the HTML tag &lt;TITLE&gt;&lt;/TITLE&gt;.</p>
Cursor Focus	<p>Specify the cursor focus. Available options include:</p> <ul style="list-style-type: none"> <li>■ Select <b>First item on page</b> to have the cursor focus placed in the first field on the page.</li> <li>■ Select <b>Do not focus cursor</b> if you do not want to include JavaScript. Select this option to prevent conflicts between generated JavaScript and custom JavaScript.</li> </ul>
Media Type	<p>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.</p> <p>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 <code>text/html</code> is used.</p>

## JavaScript

[Table 8–3](#) describes attributes that enable you to include JavaScript on the current page.

**Table 8–3    JavaScript Attributes**

Attribute	Description
File URLs	<p>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 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# to include the application's version in the file URL.</p> <p>JavaScript file URLs you enter here replaces the #PAGE_JAVASCRIPT# substitution string in the page template.</p> <p><b>Note:</b> Do not include opening or closing script tags. Just write the URL.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>■ Standard file reference: /myjs/main.js</li> <li>■ Standard file reference which loads the minified file main.min.js for regular page views and main.js in Debug mode: /myjs/main#MIN#.js</li> <li>■ Conditional file for Internet Explorer [if IE]/myjs/ie.js</li> <li>■ 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. /myjs/main.js?version=#APP_VERSION#</li> </ul>
Function and Global Variable Declaration	<p>Enter JavaScript code (for example, functions or global variable declarations) for code to be used on this page. If the code is used on multiple pages, consider putting it into an external JavaScript file to avoid duplication.</p> <p>Code you enter here replaces the #PAGE_JAVASCRIPT# substitution string in the page template.</p> <p><b>Note:</b> Do not to include opening or closing script tags. Just include the JavaScript code.</p> <p>To reference a shortcut, use: "SHORTCUTNAME"</p>
Execute when Page Loads	<p>Enter JavaScript code to execute when the page loads. The code is executed after the JavaScript code generated by Oracle Application Express.</p> <p>Code you enter here replaces the #GENERATED_JAVASCRIPT# substitution string in the page template.</p> <p><b>Note:</b> Do not to add any opening or closing script tags, just the JavaScript code.</p>

## CSS

Table 8–4 describes attributes that enable you to include Cascading Style Sheet (CSS) files on the current page.

**Table 8–4 CSS Attributes**

Attribute	Description
File URLs	<p>Enter Cascading Style Sheet file URLs 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 in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You can also use the substitution string #APP_VERSION# to include the application's version in the file URL.</p> <p>File URLs you enter here replace the #PAGE_CSS# substitution string in the page template.</p> <p><b>Note:</b> Do not include opening or closing link tags. Just include the file URL.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>Standard file reference:  <code>/myjs/main.js</code></li> <li>Standard file reference which loads the minified file main.min.css for regular page views and main.css in debug mode:  <code>/mycss/main#MIN#.css</code></li> <li>Conditional media query:  <code>[media="only screen and (max-device-width: 480px) "]/mycss/smartphone.css</code></li> <li>Conditional file for Internet Explorer:  <code>[if IE]/myjs/ie.js</code></li> <li>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 loads the new file and ignores any previously cached files:  <code>/mycss/main.css?version=#APP_VERSION#</code></li> </ul> <p><b>Note:</b> Do not include opening or closing script tags. Just write the URL. To learn more, see item Help.</p>

**Table 8–4 (Cont.) CSS Attributes**

Attribute	Description
Inline	<p>Enter Cascading Style Sheet code to be used on this page. If the code is used on multiple pages, consider putting it into an external file to avoid duplication and to leverage browser caching of static files.</p> <p>Code you enter here replaces the #PAGE_CSS# substitution string in the page template.</p> <p><b>Note:</b> Do not include opening or closing style tags. Just include the cascading style sheet code.</p> <p>For example to set the CSS class <code>display_only</code> to bold:</p> <pre>.display_only {   font-weight:bold; }</pre>

## HTML Header

[Table 8–5](#) describes attributes for defining the page header and page HTML body text.

**Table 8–5 HTML Header Attributes**

Attribute	Description
HTML Header	<p>Enter text to replace the #HEAD# substitution string in the page template header. The values entered here are inserted after the HTML &lt;HEAD&gt; tag. Use this page attribute to:</p> <ul style="list-style-type: none"> <li>■ Code page specific inline cascading style sheet classes</li> <li>■ Add additional style sheets for a specific page</li> <li>■ Code page specific meta tags</li> </ul>
Page HTML Body Attribute	<p>Enter text to be substituted in for your page template's #ONLOAD# substitution string. To use this feature, your page template must include the #ONLOAD# substitution string.</p>

## Header and Footer

[Table 8–6](#) describes attributes for defining the header and footer text.

**Table 8–6 Header Text and Footer Text**

Attribute	Description
Header Text	Enter any text or HTML to appear immediately following the page header and before the body content.
Footer Text	Enter text or HTML to appear before the page template footer.

## Read Only

For Read Only Condition Type, select a condition type from the list that must be met in order for this page to render page items as a read-only. Depending on the item type, a read-only item is rendered as plain text or as a not enterable field. Not selecting a condition will cause the item to render normally.

A Read Only condition defined at the page-level is evaluated after the processes with a processing point of On Load - After Header have executed. This evaluation order enables a developer to reference a page item set by the Fetch process (or by any other

process) and use that in the read only condition to make the page read only based on the data displayed.

**Tip:** If you want some page items (for example a search field) or all page items of a specific region to always render as enterable page items independent of how this condition evaluates, then set the Read Only condition of those regions or page items to **Never**.

## Security

[Table 8–7](#) describes attributes for defining authorization scheme and authentication requirements for the current page.

**Table 8–7 Page Attributes: Security**

Attribute	Description
Authorization Scheme	<p>Select an authorization scheme to be applied to the page. Authorization schemes are defined at the application-level and can be applied to many elements within the application.</p> <p>An authorization scheme is evaluated either once for each application session (at session creation), or once for each page view. If the selected authorization scheme evaluates to true, then the page displays and is subject to other defined conditions. If it evaluates to false, then the page does display and an error message displays.</p> <p><b>See Also:</b> <a href="#">"Providing Security Through Authorization"</a> on page 15-37</p>
Authentication	<p>Specifies whether this page has been defined as public or requires authentication. If a page is identified as public, the page can be viewed before authentication. This attribute only applies to applications requiring authentication. The application's page sentry function can access this page attribute to identify pages that do not require prior authentication to view. The implementation of the authentication scheme's page sentry function determines if this attribute has any effect.</p> <p><b>See Also:</b> <a href="#">"Establishing User Identity Through Authentication"</a> on page 15-25</p>
Deep Linking	<p>Use this attribute to enable or prevent deep linking to an application page. Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Enabled</b> - The URL to a specific page ultimately redirects there, possibly after the user has logged in.</li> <li>■ <b>Disabled</b> - If the URL does not contain a valid session ID, Application Express starts a new session and redirects to the application's home page.</li> <li>■ <b>Application Default</b> - The application-level setting is used.</li> </ul> <p><b>See Also:</b> <a href="#">"Authentication"</a> on page 7-21</p>

**Table 8–7 (Cont.) Page Attributes: Security**

Attribute	Description
Page Access Protection	<p><b>Note:</b> This attribute only displays if Session State Protection has been enabled for the application. See <a href="#">"Understanding Session State Protection"</a> on page 15-13.</p> <p>Select a Page Access Protection level for the current page:</p> <ul style="list-style-type: none"> <li>■ <b>Unrestricted</b> - The page may be requested using an URL with or without session state arguments (Request, Clear Cache, Name/Values).</li> <li>■ <b>Arguments Must Have Checksum</b> - 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.</li> <li>■ <b>No Arguments Allowed</b> - A URL may be used to request the page but no Request, Clear Cache, or Name/Value arguments are allowed.</li> <li>■ <b>No URL Access</b> - 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.</li> </ul>
Form Auto Complete	<p>Setting this attribute to <b>On</b> has no effect on the page. Setting this value to <b>Off</b> generates the following HTML in the FORM tag:</p> <pre>autocomplete="off"</pre>
Browser Cache	<p><b>Note:</b> This feature requires a modern browser that support the HTTP header response variable <code>cache-control</code>.</p> <p>Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Application Default</b> - The value at runtime is taken from the application's Browser Cache attribute.</li> <li>■ <b>Enabled</b> - The browser saves the content of application's pages in its cache, both in memory and on disk. If a user presses the browser's back button, the page typically loads from the cache, not from the server.</li> <li>■ <b>Disabled</b> - The browser does not save page content and requests content from the server. Oracle Application Express sends the HTTP header <code>cache-control: no-store</code> which instructs the browser to not cache the page content in memory and on disk. Disabling Browser Cache also prevents subtle back button issues with pages that use partial page refreshes (for example, pages with interactive reports).</li> </ul> <p>From a security perspective and as a best practice, Oracle recommends the browser cache should be disabled. This prevents the browser from storing sensitive data and ensures the browser always request pages if the URL changes. Otherwise, it may even be possible to go back in the browser history after a logout and see cached content of the former session.</p>

### Duplicate Submission

Use the **Allow duplicate page submissions** list to specify whether users may process a page multiple times in a row. Set this attribute to **No** to prevent duplicate page submissions from being processed multiple times.

Examples of duplicate page submissions include:

- A user clicks the Submit button multiple times.

- You create a branch of type Branch to Page, and the user clicks the browser reload button.

In **On duplicate page submissions go to this URL**, enter a URL. Use this field if you set **Allow duplicate page submissions** to **No**. If you select **No** and a user attempts to submit the same page twice, Oracle Application Express displays an error message and a link to the URL you specify.]

## Server Cache

[Table 8–8](#) describes attributes to enable caching for the current page.

**Table 8–8 Cache Attributes**

Attribute	Description
Cache Page	Specify whether to enable page caching by selecting <b>Yes</b> or <b>No</b> . Page caching can improve performance because the page displays from the cache instead of displaying dynamically.
Cache Timeout	Specify the amount of time for which a cached page remains valid.
Cache by User	Specify if the page should be cached by user. If <b>Yes</b> , the page is cached specifically for each user. If <b>No</b> , the same cached page is used for all users.
Cache Page Condition	Specify a condition. If the condition returns false, the page is rendered dynamically and is not to be cached. If the condition returns true, the page is displayed from the cache.
Expression 1	Displays conditionally based on the selected Cache Page Condition. Enter values in this attribute based on the specific condition type selected.
Expression 2	Displays conditionally based on the selected Cache Page Condition. Enter values in this attribute based on the specific condition type selected.

**See Also:** "Managing Cached Regions and Pages" in *Oracle Application Express Administration Guide* and "[Utilizing Region Caching](#)" on page 12-9

## Configuration

Select a build option for this page. You can use build options to enable or disable functionality. Most application attributes have a build option attribute. Do not specify a build option for the current page unless you plan to exclude the page in certain configurations.

Build options have two possible values: **INCLUDE** and **EXCLUDE**. If you specify an attribute as being included, then the Application Express engine considers it part of the application definition at runtime. Conversely, if you specify an attribute as being excluded, then the Application Express engine treats it as if it did not exist.

**See Also:** "[Using Build Options to Control Configuration](#)" on page 16-33

## Error Handling

[Table 8–9](#) describes attributes used to control or modify how an application logs errors.



In-line Error Notification Text, enter the error text that displays in the #NOTIFICATION\_MESSAGE# template substitution string in the event an error occurs on the page.

**Table 8–9 Page Attributes, Error Handling**

Attribute	Description
In-line Error Notification Text	Enter the error text that displays in the #NOTIFICATION_MESSAGE# template substitution string in the event an error occurs on the page.
Error Handling Function	<p>Enter the name of a PL/SQL error function to modify the existing error message and display location or log the error if one occurs. This function can reference a package function or standalone function in the database. For example:</p> <pre>log_apex_error</pre> <p>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:</p> <pre>#OWNER#.log_apex_error</pre> <p>You must implement error handling functions using the syntax described in the apex_error package.</p> <pre>function &lt;name of function&gt; (     p_error in apex_error.t_error ) return apex_error.t_error_result</pre> <p><b>See Also:</b> apex_error in <i>Oracle Application Express API Reference</i></p> <p><b>Note:</b> Error handling specified at the page-level overwrites any error handling function specified at the application-level. See <a href="#">"Editing the Application Definition"</a> on page 7-14.</p>

**See Also:** ["Page Templates"](#) on page 13-27

## Help

Use this attribute to enter Help text for the current page. Help text is displayed using a help system that you must develop.

**See Also:** ["Creating a Help Page"](#) on page 10-100 and ["Using Shortcuts"](#) on page 10-75

## Comments

Use this attribute to record comments about the current page. These comments never display when the application is running.

# Understanding Page Computations

Use page computations to assign a value to an identified item when a page is submitted or displayed. 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.

**Tip:** To learn more about execution behavior in the case of a validation error, see ["What Happens When a Validation Fails?"](#) on page 8-42

**Topics:**

- [Creating a Page Computation](#)
- [Understanding Computation Points and Computation Syntax](#)
- [Editing Page Computation Attributes](#)

**See Also:** ["Understanding Application Computations"](#) on page 8-59 and ["About Cross Page Utilities"](#) on page 7-84

## Creating a Page Computation

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.

To create a page computation:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Computation Wizard:
  - Tree view - Under the appropriate page rendering event (such as Before Header, After Header and so on), locate Computations. Right-click and select **Create**.
  - Component view - Under Computations, click the **Create** icon.
3. For Item Type, select where the computation executes and click **Next**. Location options include:
  - Item on This Page
  - Item on Another Page
  - Application Level Item
4. For Item, select the item and computation point:
  - a. Compute Item - Select the item the computation updates.
  - b. Sequence - Select the order of evaluation.
  - c. Computation Point - Select the point at which the computation executes. The computation point **On New Instance** executes the computation when a new session (or instance) is generated.
  - d. Computation Type - Select the method of computation you want to create.
  - e. Click **Next**.
5. In Computation, enter a computation that corresponds to the selected computation type and click **Next**.
6. On Condition, you can choose to make the computation conditional. To make a computation conditional, make a selection from the Condition Type list and enter text in the expression fields.
7. Click **Create Computation**.

## Understanding Computation Points and Computation Syntax

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 Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Create an item named P10\_PHONE\_NUMBER to store the combined values of P10\_AREA\_CODE, P10\_PREFIX, and P10\_LINE\_NUMBER. See ["Differences Between Page Items and Application Items"](#) on page 7-55.
3. Access the Create Computation Wizard:
  - Tree view - Under the appropriate event, locate Computations. Right-click and select **Create**.
  - Component view - Under Computations, click the **Create** icon.
4. For Item Location, select **Item on this Page** and click **Next**.
5. For Computation, select **P10\_PHONE\_NUMBER**.
6. For Sequence, select the order of evaluation.
7. For Computation, you can create the following computation types:
  - a. Static Assignment:
    - For Computation Type, select **Static Assignment** and click **Next**.
    - Enter the following computation:
 

```
(&P10_AREA_CODE.) &P10_PREFIX.-&P10_LINE_NUMBER.
```
    - Click **Next**.
  - b. PL/SQL Function Body:
    - For Computation Type, select **PL/SQL Function Body** and click **Next**.
    - Enter the following 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;
```
    - Click **Next**.
  - c. SQL Query (return colon separated value):
    - For Computation Type, select **SQL Query (return colon separated value)** and click **Next**.

- Enter the following computation:

```
SELECT '(' || :P10_AREA_CODE || ')' || :P10_PREFIX || '-' || :P10_LINE_NUMBER  
FROM DUAL
```

- Click **Next**.

d. PLSQL Expression:

- For Computation Type, select **PLSQL Expression** and click **Next**.
- Enter the following computation:

```
'(' || :P10_AREA_CODE || ')' || :P10_PREFIX || '-' || :P10_LINE_NUMBER
```

- Click **Next**.

8. Click **Create**.

## Editing Page Computation Attributes

Once you create a computation, you can edit it on the Edit Page Computation page.

To edit a page computation:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Page Computation page:
  - Tree view - Under the appropriate event, locate Computations. Right-click the computation name and select **Edit**.
  - Component view - Under Computations, select the computation name.The Edit Page Computation page appears.
3. Edit the appropriate attributes.
4. Click **Apply Changes**.

### Editing the Computation Point and Source

You control when a computation executes under the Computation Point attributes by specifying a sequence and a computation point. The computation point **On New Instance** executes the computation when a new session (or instance) is generated.

Under Source, enter an expression or query to compute an item's value. In the event a computation fails, you can optionally define an error message in the Computation Error Message field.

### Creating Conditional Computations

You can make a computation conditional by making a selection from the Condition Type list and entering text in the expression fields.

## Understanding 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.

**Topics:**

- [Creating Item and Page Validations](#)
- [Determining When Validations Execute](#)
- [Defining How Validation Error Messages Display](#)
- [Processing Validations Conditionally](#)
- [What Happens When a Validation Fails?](#)

**See Also:** ["About the When Button Pressed Attribute"](#) on page 2-29

## Creating Item and Page Validations

You create a validation by running the Create Validation Wizard. This wizard changes slightly depending upon what you are validating. Validations are either specific to a given field (either a single page item or tabular form column validation) or, they are not field specific (either a page or tabular form row validation).

**Topics:**

- [Creating a Validation for a Page Item](#)
- [Creating a Validation for an Entire Page](#)
- [Creating a Validation for a Tabular Form Column](#)
- [Creating a Validation for a Tabular Form Row](#)

**See Also:** ["Validating User Input in Forms"](#) on page 10-19, ["About Execute Validations"](#) on page 10-69, and ["About Item Types"](#) on page A-1

### Creating a Validation for a Page Item

To create a validation for a page item page item:

---

---

**Note:** Text entered for validations may not exceed 3,950 characters.

---

---

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Validation Wizard:
  - Tree view - Under Page Processing, right-click **Validating** and select **Create Validation**.
  - Component view - Under Page Processing, locate Validations. Click the **Create** icon.

The Create Validation Wizard appears.

3. For Validation Level, select **Page Item** and click **Next**.
4. For Item/Column, select the item to be validated and click **Next**.

5. For Sequence and Name:
  - a. Sequence - Enter the sequence number for this item.
  - b. Validation Name - Enter a name for the validation.
  - c. Error Display Location - Select the display location of the validation error message. Validation error messages can display on an error page or inline with the submitted page. Inline validations can display in the *notification* area (defined as part of the page template) or within the field label.
  - d. Click **Next**.
6. For Validation Type, select a method as described in [Table 8–10](#) and click **Next**.

**Table 8–10 Page Item Validation Methods**

Validation Method	Descriptions
Not Null	<p>Checks if an item's value in session state is null.</p> <p>For example, you could validate that the user enters a value in a field by creating an item validation and then selecting the validation method <b>Item Not Null</b>.</p>
String Comparison	<p>Compares the value of an item to a specific string. When prompted select a validation type.</p> <p>There are several string comparison validations that compare the value of an item to a literal string. For example, you select the validation type <b>Item in Expression 1 is contained in Expression 2</b> to validate a user entry in a field against a list of values you provide.</p> <p>In Expression 1, enter the name of the item you want to validate without a colon. For example:</p> <p>P1_VALUE</p> <p>In Expression 2, enter a string of values you want to validate against. For example:</p> <p>ABC/DEF/GHI</p>
Regular Expression	<p>Regular expressions provide a method to describe text patterns. Use a Regular Expression validation to perform data validation. When prompted, enter a regular expression.</p> <p>For example, you could use the following regular expression validation to verify that a string of entered data always consists of groups of six numbers separated by commas and followed by a comma:</p> <p><code>^([[:digit:]]{6},)+\$</code></p> <p>This regular expression would find the following entries valid:</p> <p>123456,654321, 123456, 123456,123456,654321,</p> <p>However, the following would not be valid:</p> <p>123456,12345 12345</p>

**Table 8–10 (Cont.) Page Item Validation Methods**

Validation Method	Descriptions
SQL	<p>Compares to values in the database. Select a validation type:</p> <ul style="list-style-type: none"> <li>■ <b>Exists</b></li> <li>■ <b>NOT Exists</b></li> <li>■ <b>SQL Expression</b></li> </ul> <p>For example, you can use a SQL validation to verify whether a last name typed into a field exists in the database. In the following Exists SQL validation, the field is named P1_LAST_NAME and the table is named customers.</p> <pre>SELECT 1 FROM customers WHERE last_name = :P1_LAST_NAME</pre> <p>To learn more, see the syntax examples at the bottom of the page.</p>
PL/SQL	<p>Useful if you need complex logic. Select a validation type:</p> <ul style="list-style-type: none"> <li>■ <b>PL/SQL Expression</b></li> <li>■ <b>PL/SQL Error</b></li> <li>■ <b>Function Returning Boolean</b></li> <li>■ <b>Function Returning Error Text</b></li> </ul> <p>For example, suppose you need to create a validation for an address form that requires the user to enter a province if the address is not in the United States. You could create the validation as a Function Returning Boolean, using the following PL/SQL:</p> <pre>BEGIN   IF :P1_COUNTRY = 'US' AND :P1_PROVINCE IS NULL THEN     RETURN FALSE;   ELSE     RETURN TRUE;   END IF; END;</pre> <p>You could also create the same validation implemented as a PL/SQL Expression as follows:</p> <pre>NOT (:P1_COUNTRY='US' AND :P1_PROVINCE IS NULL);</pre> <p>To learn more, see the syntax examples at the bottom of the page.</p>

**7. For Validation:**

- a. Error Message** - Depending upon the validation method, enter the validation or message text that displays if the validation fails.

You can use #LABEL# as placeholder for the label of the associated page item.

- b. Always Execute** - Determines if validations execute when a page is submitted. Use this attribute with the Execute Validations attribute for buttons or certain page items that submit a page. Option include:
- **Yes** - The validation always executes independent of validation settings for buttons or items on a page. Note that defined conditions still apply.
  - **No** - The validation only executes if the button or item used to submit the page has the **Execute Validations** attributes set to **Yes**.

To learn more, see ["Determining When Validations Execute"](#) on page 8-40.

- c. Click Next.**

8. Define conditions that apply to this validation and click **Create**.

### Creating a Validation for an Entire Page

To create a validation for an entire page:

---

**Note:** Text entered for validations may not exceed 3,950 characters.

---

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. To access the Create Validation Wizard:
  - Tree view - Under Page Processing, right-click **Validating** and select **Create Validation**.
  - Component view - Under Page Processing, locate Validations. Click the **Create** icon.

The Create Validation Wizard appears.

3. For Validation Level, select **Page** and click **Next**:
4. For Sequence and Name:
  - a. Sequence - Enter the sequence number for this item.
  - b. Validation Name - Enter a name for the validation.
  - c. Error Display Location - Select the display location of the validation error message. Validation error messages can display on an error page or inline with the submitted page. Inline validations can display in the *notification* area (defined as part of the page template) or within the field label.
  - d. Click **Next**.
5. For Validation Type, select a method as described in [Table 8–11](#) and click **Next**.

**Table 8–11** Page Validation Methods

Validation Method	Descriptions
SQL	Compares to values in the database. Select a validation type: <ul style="list-style-type: none"><li>■ Exists</li><li>■ NOT Exists</li><li>■ SQL Expression</li></ul> To learn more, see the syntax examples at the bottom of the page.
PL/SQL	Useful if you need complex logic. Select a validation type: <ul style="list-style-type: none"><li>■ PL/SQL Expression</li><li>■ PL/SQL Error</li><li>■ Function Returning Boolean</li><li>■ Function Returning Error Text</li></ul> To learn more, see the syntax examples at the bottom of the page.

6. For Validation:
  - a. Validation Code - Enter the code corresponding to the validation type selected.



- b. Error Message - Depending upon the validation method, enter the validation or message text that displays if the validation fails.

You can use #LABEL# as placeholder for the label of the associated page item.

- c. Always Execute - Determines if validations execute when a page is submitted. Use this attribute with the Execute Validations attribute for buttons or certain page items that submit a page. Option include:
  - **Yes** - The validation always executes independent of validation settings for buttons or items on a page. Note that defined conditions still apply.
  - **No** - The validation only executes if the button or item used to submit the page has the **Execute Validations** attributes set to **Yes**.

To learn more, see "[Determining When Validations Execute](#)" on page 8-40.

- d. Click **Next**.

7. Define conditions that apply to this validation and click **Create**.

### Creating a Validation for a Tabular Form Column

To create a validation for a tabular form column:

---

**Note:** Text entered for validations may not exceed 3,950 characters.

---

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. To access the Create Validation Wizard:
  - Tree view - Under Page Processing, right-click **Validating** and select **Create Validation**.
  - Component view - Under Page Processing, locate Validations. Click the **Create** icon.

The Create Validation Wizard appears.

3. For Validation Level:
  - a. Tabular Form - Select the associated tabular form region for this validation.
  - b. Identify the validation level - Select **Column**.
  - c. Select the column to be validated.
4. For Item/Column:
  - a. Select the column to be validated.
  - b. Click **Next**.
5. For Sequence and Name:
  - a. Sequence - Enter the sequence number for this item.
  - b. Validation Name - Enter a name for the validation.
  - c. Error Display Location - Select the display location of the validation error message. Validation error messages can display on an error page or inline with the submitted page. Inline validations can display in the *notification* area (defined as part of the page template) or within the field label.
  - d. Click **Next**.

6. For Validation Type, select a method as described in [Table 8–12](#). Follow the on-screen instructions and click **Next**.

**Table 8–12 Validation Methods for Tabular Form Column**

Validation Method	Descriptions
Not Null	Checks if the item's value in session state is null.
String Comparison	Compares the value of an item to a specific string. When prompted select a validation type.
Regular Expression	Regular expressions provide a method to describe text patterns. Use a Regular Expression validation to perform data validation. When prompted, enter a regular expression.
SQL	Compares to values in the database. Select a validation type: <ul style="list-style-type: none"> <li>■ Exists</li> <li>■ NOT Exists</li> <li>■ SQL Expression</li> </ul> To learn more, see the syntax examples at the bottom of the page.
PL/SQL	Useful if you need complex logic. Select a validation type: <ul style="list-style-type: none"> <li>■ PL/SQL Expression</li> <li>■ PL/SQL Error</li> <li>■ Function Returning Boolean</li> <li>■ Function Returning Error Text</li> </ul> To learn more, see the syntax examples at the bottom of the page.

7. For Validation:
- Error Message - Depending upon the validation method, enter the validation or message text that displays if the validation fails.  
You can use #COLUMN\_HEADER# as placeholder for the column header of the associated tabular form column.
  - Always Execute - Determines if validations execute when a page is submitted. Use this attribute with the Execute Validations attribute for buttons or certain page items that submit a page. Option include:
    - **Yes** - The validation always executes independent of validation settings for buttons or items on a page. Note that defined conditions still apply.
    - **No** - The validation only executes if the button or item used to submit the page has the **Execute Validations** attributes set to **Yes**.
To learn more, see "[Determining When Validations Execute](#)" on page 8-40.
  - Click **Next**.
8. Define conditions that apply to this validation and click **Create**.

### Creating a Validation for a Tabular Form Row

To create a validation for a tabular form row:

---

**Note:** Text entered for validations may not exceed 3,950 characters.

---

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Validation Wizard:
  - Tree view - Under Page Processing, right-click **Validating** and select **Create Validation**.
  - Component view - Under Page Processing, locate Validations. Click the **Create** icon.

The Create Validation Wizard appears.
3. For Validation Level:
  - a. Tabular Form - Select the associated tabular form region for this Validation.
  - b. Identify the validation level - Select **Tabular Form Row**.
  - c. Click **Next**.
4. For Sequence and Name specify the following and click **Next**.
  - Sequence - Enter the sequence number for this item.
  - Validation Name - Enter a name for the validation.
  - Error Display Location - Select the display location of the validation error message. Validation error messages can display on an error page or inline with the submitted page. Inline validations can display in the *notification* area (defined as part of the page template) or within the field label.
5. For Validation Type, select a method as described in [Table 8-13](#).

**Table 8-13 Validation Methods for Tabular Form Row**

Validation Method	Descriptions
SQL	<p>Compares to values in the database. Select a validation type:</p> <ul style="list-style-type: none"> <li>■ Exists</li> <li>■ NOT Exists</li> <li>■ SQL Expression</li> </ul> <p>To learn more, see the syntax examples at the bottom of the page.</p>
PL/SQL	<p>Useful if you need complex logic. Select a validation type:</p> <ul style="list-style-type: none"> <li>■ PL/SQL Expression</li> <li>■ PL/SQL Error</li> <li>■ Function Returning Boolean</li> <li>■ Function Returning Error Text</li> </ul> <p>To learn more, see the syntax examples at the bottom of the page.</p>

6. For Validation:
  - a. Validation Code - Enter the code corresponding to the validation type selected.
  - b. Error Message - Depending upon the validation method, enter the validation or message text that displays if the validation fails.

You can use #COLUMN\_HEADER# as placeholder for the column header of the associated tabular form column.

- c. Always Execute - Determines if validations execute when a page is submitted. Use this attribute with the Execute Validations attribute for buttons or certain page items that submit a page. Option include:
    - **Yes** - The validation always executes independent of validation settings for buttons or items on a page. Note that defined conditions still apply.
    - **No** - The validation only executes if the button or item used to submit the page has the **Execute Validations** attributes set to **Yes**.To learn more, see "[Determining When Validations Execute](#)" on page 8-40.
  - d. Click **Next**.
7. Define conditions that apply to this validation and click **Create**.

## Determining When Validations Execute

When creating a validation, the **Always Execute** attribute determines if validations execute when a page is submitted. Use this attribute with the Execute Validations attribute for buttons or certain page items that submit a page. This attribute has two options:

- **Yes** - The validation always executes independent of validation settings for buttons or items on a page.

For example, select **Yes** 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.
- **No** - The validation only executes if the button or item used to submit the page has the **Execute Validations** attributes set to **Yes**.

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 example, 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 **No**
  - For the Create and Apply Changes buttons, set Execute Validations to **Yes**.
  - For the Delete button, set Execute Validations to **No** to avoid unnecessary validations

## Defining How Validation Error Messages Display

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.

To define how a validation error message displays:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Go to the Edit Validations page:
  - Tree view - Under Page Processing, locate Validating and expand the Validations branch. Right-click the validation name and select **Edit**.
  - Component view - Under Validations, select the appropriate validation.
3. Scroll down to Error Message.

4. In Error Message, enter the error message text. See item Help, for more details.

Validation error messages can display on an error page or inline within the existing page.

5. From Error message display, select one of the following:
  - **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.

If you select **Inline with Field** or **Inline with Field and in Notification**, you must associate an item with the error message. From the Associated Item list, select an item.

**Tip:** If you select **Inline with Field** or **Inline with Field and in Notification**, be aware that the Application Express engine does not execute computations or processes during the re-rendering of the page when the validation error messages appear.

6. Click **Apply Changes**.

**See Also:** ["Page Templates"](#) on page 13-27

### About the Go to Error Link

If you define an associated item, Oracle Application Express 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 Oracle Application Express. 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. To learn more, see ["Translating Messages Used Internally by Oracle Application Express"](#) on page 18-14.

## Processing Validations Conditionally

You can control when and if a validation is performed under Conditions.

To create a condition for an existing validation:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Go the Edit Validations page:
  - Tree view - Under Page Processing, locate Validating and expand the Validations branch. Right-click the validation name and select **Edit**.
  - Component view - Under Validations, select the appropriate validation.
3. Scroll down to Conditions.

4. Under Condition, specify the following:
  - a. When Button Pressed - Select a page button. If a user clicks the button you select, the validation is performed (that is, depending upon to other defined conditions). This validation is performed if the page is submitted by a means other than the clicking the specified button.

If no button is pressed, other conditions are evaluated before performing the validation.
  - b. Execution Scope - Applicable only to tabular forms. Specify the execution scope:
    - **For Created and Modified Rows** - The validation executes only for created and modified rows in your tabular form.
    - **All Submitted Rows** - The validation executes for every submitted row.
  - c. Condition Type - Select a condition type.
    - Expression Attributes - Depending upon the selected Condition Type, enter values in the Expression attributes.
    - Execute Condition - Applicable only to tabular forms. Select either:
      - For Each Row** - Select this option if you refer to tabular form columns in your condition. This option causes the condition to evaluate each row of the tabular form.
      - Once** - Select this option if you do not refer to tabular form specific values.

The validation is rendered or processed if the specified condition is met.
5. Click **Apply Changes**.

## What Happens When a Validation Fails?

If a page is submitted and some of the validations fail, Oracle Application Express redisplay the existing page with all inline validation errors. While displaying inline errors, Oracle Application Express 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 them 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.
```

## Understanding 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 Application Express 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.

**Tip:** To learn more about execution behavior in the case of a validation error, see ["What Happens When a Validation Fails?"](#) on page 8-42

### Topics:

- [About Creating a Page Process](#)
- [Editing Page Process Attributes](#)
- [Controlling When a Page Process Executes](#)
- [Creating Page Process Success and Error Messages](#)
- [Making a Page Process Conditional](#)

**See Also:** ["Understanding Application Processes"](#) on page 8-55 and ["About Cross Page Utilities"](#) on page 7-84

## About Creating a Page Process

You create a process by running the Create Process Wizard. During the wizard, you define a process name, specify a sequence and the point at which the process executes, and select a process category. You can change nearly all of these attributes on the Edit Page Process page.

### Topics:

- [Creating a Page Process](#)
- [Creating a Tabular Form Page Process](#)

### Creating a Page Process

To create a page process:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Page Process Wizard:
  - Tree view - Under the appropriate page rendering event (such as Before Header, After Header and so on), locate Processes. Right-click and select **Create**.
  - Component view - Under Processes, click the **Create** icon.
3. For Process Type, select the category of the process you want to create as described in [Table 8-14](#).

**Table 8–14 Page Process Categories**

Process Category	Description
PL/SQL	Runs the PL/SQL you provide. Use this process type to execute a block of PL/SQL entered directly into the process or to simply call an existing API.
Reset Pagination	In Report regions, resets pagination back to the first result set. The Application Express engine keeps track of where the user is within a given result set. This process category returns the user to the beginning result set. In other words, this category resets the counters associated with the report region to return the first part of the result set the next time the result set displays.
Plug-ins	Plug-ins allow developers to declaratively extend the built-in types available with Application Express. This option is only available when a plug-in type process exists in this application.  See Also: <a href="#">"Implementing Plug-ins"</a> on page 17-25
Session State	Sets the values of existing session state items to null. Select this process type to clear the cache for applications, sessions, or items and to clear existing user preferences.  See Also: <a href="#">"Managing Session State Values"</a> on page 2-13 and <a href="#">"Managing User Preferences"</a> in <i>Oracle Application Express Administration Guide</i>
Data Manipulation	Data Manipulation process types are frequently used by wizards to support data manipulation language (DML) actions. Application Builder supports the following declarative data manipulation processes: <ul style="list-style-type: none"> <li>■ Select <b>Automatic Row Fetch</b> and <b>Automatic Row Processing (DML)</b> to create an automatic data manipulation language (DML) process.</li> <li>■ Use <b>Multi Row Update</b> and <b>Multi Row Delete</b> with tabular forms.</li> <li>■ Use <b>Add Rows to Tabular Form</b> with a tabular form.</li> </ul>
Web Services	Implements a Web Service as a process on a page. Running the process submits a request to the service provider.  See Also: <a href="#">"Invoking a Web Service as a Process"</a> on page 17-19
Form Pagination	Implements pagination through the detail records associated with a master detail form. Most often used in master detail forms (such as in the Master Detail Wizard), this process checks the master table to determine which set of detail records you are in and determines what the next detail record should be.  See Also: <a href="#">"Creating a Master Detail Form"</a> on page 10-10
Send E-Mail	Provides a declarative interface for the APEX_MAIL . SEND_MAIL package. The process type support attachments.
Close popup window	Applies to processes running within a popup window. Upon execution, this process type closes the current popup window.
Run On Demand Process	Creates an application-level process that can only be executed when called from a specific page. When you create this process type at the page-level, you are creating reference to an existing application-level process.  See Also: <a href="#">"About On Demand Application Processes"</a> on page 8-55

4. Follow the on-screen instructions.



## Creating a Tabular Form Page Process

To create a tabular form page process:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Page Process Wizard:
  - Tree view - Under the appropriate page rendering event (such as Before Header, After Header and so on), locate Processes. Right-click and select **Create**.
  - Component view - Under Processes, click the **Create** icon.
3. For Process Type:
  - Tabular Form - Select the associated tabular form region.
  - Select the category of the process you want to create as described in [Table 8-15](#):

**Table 8-15 Tabular Form Process Categories**

Process Category	Description
PL/SQL	Runs the PL/SQL you provide. Use this process type to execute a block of PL/SQL entered directly into the process or to simply call an existing API.
Plug-ins	Plug-ins allow developers to declaratively extend the built-in types available with Application Express. This option is only available when a plug-in type process exists in this application. See Also: <a href="#">"Implementing Plug-ins"</a> on page 17-25
Data Manipulation	Data Manipulation process types are frequently used by wizards to support data manipulation language (DML) actions. Application Builder supports the following declarative data manipulation processes: <ul style="list-style-type: none"> <li>■ Select <b>Automatic Row Fetch</b> and <b>Automatic Row Processing (DML)</b> to create an automatic data manipulation language (DML) process.</li> <li>■ Use <b>Multi Row Update</b> and <b>Multi Row Delete</b> with tabular forms.</li> <li>■ Use <b>Add Rows to Tabular Form</b> with a tabular form.</li> </ul>
Web Services	Implements a Web service as a process on a page. Running the process submits a request to the service provider. See Also: <a href="#">"Invoking a Web Service as a Process"</a> on page 17-19
Send E-Mail	Provides a declarative interface for the APEX_MAIL.SEND_MAIL package. The process type support attachments.

4. Follow the on-screen instructions.

## Editing Page Process Attributes

Once you create a process, you can control when the process executes and what the process does by editing attributes on the Edit Page Process page.

To edit an existing page process:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.

2. Access the Edit Page Process page:
  - Tree view - Under the appropriate page rendering event (such as Before Header, After Header and so on), locate the Processes section. Right-click and select **Edit**.
  - Component view - Under Processes, click the process name.The Edit Page Process page appears.
3. Edit the appropriate attributes. For more information, see item Help and the sections that follow.
4. Click **Apply Changes**.

## Controlling When a Page Process Executes

You control when a process executes by specifying a sequence number and a process point under Process Point. You can prevent a process from running during subsequent visits to a page by selecting the options under Run Process.

To change the processing point or source:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
  2. Access the Edit Page Process page:
    - Tree view - Under the appropriate page rendering event (such as Before Header, After Header and so on), locate the Processes section. Right-click and select **Edit**.
    - Component view - Under Processes, click the process name.The Edit Page Process page appears.
- You control when a process executes by specifying a sequence number and a process point under Process Point.
3. Locate the section, Process Point.
  4. In Sequence, enter a number. The sequence determines the order of evaluation.
  5. From Process Point, select the point at which the process executes.
  6. You can prevent a process from running during subsequent visits to a page by selecting the following options under Run Process:
    - Once for each page visit
    - Once for each session or when reset
  7. Enter the appropriate code for PL/SQL process types.

For PL/SQL anonymous block processes, enter the appropriate code under **Process**.

For Clear Cache processes, enter the appropriate code under **Source**.
  8. Optionally define an error message. See ["Creating Page Process Success and Error Messages"](#) on page 8-47.
  9. Click **Apply Changes**.

## Creating Page Process Success and Error Messages

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. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Page Process page:
  - Tree view - Under the appropriate page rendering event (such as `Before Header`, `After Header` and so on), locate the Processes section. Right-click and select **Edit**.
  - Component view - Under Processes, click the process name.

The Edit Page Process page appears.

3. Scroll down to Messages.
4. In Process Success Message, enter a message that displays when the process runs successfully.
5. In Process Error Message, enter the message that displays when an unhandled exception is raised. See item Help for more details of supported substitution strings for both success and error messages.
6. For processes with a processing point of `On Submit - Before Computation and Validations` or `On Submit - After Computations and Validations`, you can specify where the error message displays.

From Error message display location, select one of the following:

- **Inline in Notification** - Error displays inline with the existing page in the "notification" area (defined as part of the page template). This is the default setting for new processes.
- **On Error Page** - Error displays on a separate error page.

If the page 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.

7. Click **Apply Changes**.

**See Also:** ["Page Templates"](#) on page 13-27

## Making a Page Process Conditional

To create a conditional page process:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Page Process page:

- Tree view - Under the appropriate page rendering event (such as Before Header, After Header and so on), locate the Processes section. Right-click and select **Edit**.
- Component view - Under Processes, click the process name.

The Edit Page Process page appears.

3. Scroll down to Conditions.
4. Under Condition, specify the following:
  - a. When Button Pressed - Select a page button. If a user clicks the button you select, the validation is performed (that is, depending upon to other defined conditions). This validation is performed if the page is submitted by a means other than the clicking the specified button.

If no button is pressed, other conditions are evaluated before performing the validation.
  - b. Execution Scope - Applicable only to tabular forms. Specify the execution scope:
    - **For Created and Modified Rows** - The validation executes only for created and modified rows in your tabular form.
    - **All Submitted Rows** - The validation executes for every submitted row.
  - c. Condition Type - Select a condition type.
    - Expression Attributes - Depending upon the selected Condition Type, enter values in the Expression attributes.
    - Execute Condition - Applicable only to tabular forms. Select either:
      - For Each Row** - Select this option if you refer to tabular form columns in your condition. This option causes the condition to evaluate each row of the tabular form.
      - Once** - Select this option if you do not refer to tabular form specific values.

The validation is rendered or processed if the specified condition is met.
5. Click **Apply Changes**.

## Working with 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.

You create a branch by running the Create Page Branch Wizard and specifying Branch Point and Branch Type. The Branch Type defines the type of branch you are creating. For more information about Branch Types, see online Help.

### Topics:

- [Defining a Branch Point and Action](#)
- [Branching Conditionally](#)

**See Also:** ["About the When Button Pressed Attribute"](#) on page 2-29

## Defining a Branch Point and Action

When you click a standard tab in an application, the Application Express engine sets session state, executes computations, and then links you to the target page. It does not run any processes or explicitly defined branches. In cases where the page is submitted without clicking a tab, the Application Express engine explicitly defines branches to direct users to a subsequent page.

You can control when a branch executes by making a selection from the Branch Point list. Available options include:

- **On Submit: Before Computation** - Branching occurs before computations, validations, or processing. Use this option for buttons that should not invoke processing (for example, a Cancel button).
- **On Submit: Before Validation** - Branching occurs after computations, but before validations or processing. If a validation fails, page processing stops, a rollback is issued, and the page displays the error. Because of this default behavior, you do not need to create branches to accommodate validations. However, you may want to branch based on the result of a computation (for example, to a previous branch point).
- **On Submit: Before Processing** - Branching occurs after computations and validations, but before processing. Use this option to branch based on a validated session state, but before performing any page processing.
- **On Submit: After Processing** - Branching occurs after computations, validations, and processing. This option branches to a URL or page after performing computations, validations, and processing. When using this option, remember to sequence your branches if you have multiple branches for a given branch point.
- **On Load: Before Header** - Branching occurs before a page is rendered. This option displays another page instead of the current page or redirects the user to another URL or procedure.

Depending upon the Branch Type you select, you can specify the following additional information in the Action attributes:

- The page number of the page to which you want to branch
- PL/SQL procedure which ultimately renders a branch target page
- A URL address

## Branching Conditionally

Like other controls, branches can be made conditional. To create a conditional branch, make a selection from the Condition Type list, and enter text in the expression fields to implement the condition type you choose.

**See Also:** ["Controlling Navigation Using Branches"](#) on page 11-32

## Working with Shared Components

Shared components are common elements that can display or be applied on any page within an application. You can use the tools and wizards on the Shared Components page either at the application-level or on specific pages.

### Topics:

- [Accessing the Shared Components Page](#)

- [About the Shared Components Page](#)
- [About Exporting Shared Components](#)

## Accessing the Shared Components Page

To access the Shared Components page:

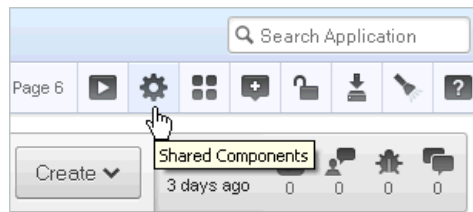
1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. On the Application home page, click **Shared Components**.

The Shared Components page appears.

5. To create a shared component, select the appropriate link.

## Using the Shared Components Icon

You can also access the Shared Components page by clicking the Shared Components icon on the Developer Action bar. The Shared Components icon resembles a small mechanical gear and displays beneath the Search Application field on most pages in Application Builder.



**See Also:** ["About the Developer Toolbar"](#) on page 8-19

## About the Shared Components Page

The following sections describe each link on the Shared Components page.

**See Also:** ["Accessing the Shared Components Page"](#) on page 8-50

### Logic

The following sections describe the links under Logic.

**Application Items** Application-level items do not display, but are used as global variables to the application. Commonly, you set the value of a page-level item using an application or page computations. See ["Understanding Application-Level Items"](#) on page 7-74.

**Application Processes** Use application processes to run PL/SQL logic:

- At specific points for each page in an application
- As defined by the conditions under which the process is set to execute
- Upon the creation of a new session

Note that **On Demand** processes execute only when called from a page-level On Demand process or when called using AJAX from the browser. See ["Understanding Application Processes"](#) on page 8-55.

**Application Computations** Use application-level computations to assign values to application and page-level 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 ["Understanding Application Computations"](#) on page 8-59.

**Web Service References** Web service references in Application Builder are typically based on the Simple Object Access Protocol (SOAP) or Representational State Transfer (REST) architectures. You can create a reference to a Web service and then incorporate it into an application to process data submitted by a form, or to render output in the form or report. See ["Implementing Web Services"](#) on page 17-7.

**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 ["Using Build Options to Control Configuration"](#) on page 16-33.

**Data Loading** 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. See ["Importing a Plug-in from the Plug-in Page"](#) on page 17-34.

## Navigation

The following sections describe the links under Navigation.

**Tabs** 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 ["Creating Tabs"](#) on page 11-1.

**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 ["Creating Lists"](#) on page 11-7.

**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 ["Creating Breadcrumbs"](#) on page 11-20.

**Navigation Bar Entries** Navigation bar entries 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. Navigation bar entries can display as a link from an image or text. A navigation bar entry can be an image, an image with text beneath it, or text. See ["Creating a Navigation Bar Entry"](#) on page 11-27.

## Security

The following sections describe the links under Security.

**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 ["Establishing User Identity Through Authentication"](#) on page 15-25.



**Authorization Schemes** Authorization restricts user access to specific controls or components based on predefined user privileges. See ["Providing Security Through Authorization"](#) on page 15-37.

**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 ["Understanding Session State Protection"](#) on page 15-13.

**Security Attributes** Use the Edit Security Attributes page to configure general security attributes for all pages within an application. See ["Configuring Security Attributes"](#) on page 7-20.

## User Interface

The following sections describe the links under User Interface.

**User Interface Attributes** Use User Interface page to specify user interface options for an application. See ["Managing the Application User Interface"](#) on page 7-29.

**Themes** A theme is a named collection of templates that defines the application user interface. See ["Managing Themes"](#) on page 13-1.

**Templates** Templates control the look and feel of specific constructs within your application, such as pages, regions, items, and menus. See ["Customizing Templates"](#) on page 13-11.

**Lists 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, check box, or radio group. See ["Creating Lists of Values at the Application Level"](#) on page 10-71.

**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 ["Using Shortcuts"](#) on page 10-75.

**Plug-ins** Application 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 ["Implementing Plug-ins"](#) on page 17-25.

**Component Settings** Use Component Settings to set application-level values for built-in Oracle Application Express components and installed plug-ins. See ["Managing Component Settings"](#) on page 17-56.

**User Interface Attributes** Use User Interface Attributes to edit the user interface definition associated with an application. See ["Managing the Application User Interface"](#) on page 7-29

## Files

The following sections describe the links under Files.

**Cascading Style Sheets** Application Builder includes themes that contain templates that reference their own cascading style sheets (CSS). Use the Cascading Style Sheets link to



upload cascading style sheets to your workspace. See ["Using Custom Cascading Style Sheets"](#) on page 13-46.

**Images** Use the Images link to upload images to your workspace. See ["Managing Images"](#) on page 12-17.

**Static Files** Use the Static Files link to upload static files to your workspace. See ["Managing Static Files"](#) on page 12-20.

## Globalization

The following sections describe the links under Globalization.

**Translate Application** You can develop applications in Oracle Application Express that can run concurrently in different languages. A single Oracle database and Oracle Application Express instance can support an application in multiple languages. Translating an application involves multiple steps. See ["About Translating an Application and Globalization Support"](#) on page 18-1 and ["Understanding the Translation Process"](#) on page 18-6.

**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 ["Translating Messages"](#) on page 18-12.

**Globalization Attributes** You can 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. See ["Configuring Globalization Attributes"](#) on page 7-26 and ["About Translating an Application and Globalization Support"](#) on page 18-1.

## Reports

The following sections describe the links under Reports.

**Report Queries** Use the Report Queries link to view a report of stored queries within the current application. See ["About Report Queries"](#) on page 9-65.

**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. See ["About Report Layouts"](#) on page 9-68.

## About the Application List

The following sections describe the links under the Application region on the right side of the page.

**Edit Definition** Links to the Edit Application Definition page. Use this page to edit attributes that determine the application name, application availability, and static substitution strings. You can also use this page to define other attributes such as build options or an application logo and view associated templates and component defaults. See ["Editing the Application Definition"](#) on page 7-14.

**Edit Comments** Use Edit Comments to enter comments specific to the currently selected application. See ["Adding Database Application Comments"](#) on page 47.

## About the Tasks List

The following describes the links under the Tasks list:

- **Export Application Components** link to the Component Export page appears. 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 "[Exporting Application Components](#)" on page 15.
- **Manage Supporting Objects** links to the Supporting Objects page. Use this page to create a packaged application. See "[How to Create a Custom Packaged Application](#)" on page 5.
- **Developer Comments** links to Developer Comments page. See "[Adding Developer Comments](#)" on page 7-48.
- **Developer Comments Calendar** links to Developer Comments Calendar page. See "[Viewing the Developer Comments Calendar](#)" on page 7-52.

## About Exporting Shared Components

You can export shared components and page components on the Component Export page. You can also use this wizard to back up a component before editing it or to create an export that functions as a patch to another Oracle Application Express instance.

### Topics:

- [Exporting Shared Components from the Export Page](#)
- [Exporting Shared Components from the Shared Components Page](#)

### Exporting Shared Components from the Export Page

To export shared components from the Shared Components page:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Export/Import**.
  - d. On the Export/Import page, click **Export** and click **Next**.
2. On the Tasks list, click **Component Export**.

The Component Export page appears. See "[Exporting Application Components](#)" on page 15.

### Exporting Shared Components from the Shared Components Page

To export shared components from the Shared Components page:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. On the Application home page, click **Shared Components**.  
The Shared Components page appears.
5. On the Tasks list, click **Export Application Components**.

The Component Export page appears. See ["Exporting Application Components"](#) on page 15.

## Understanding Application Processes

Application processes are blocks of PL/SQL logic that are set to run at specific points using processes 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 page 8-42

### Topics:

- [About On Demand Application Processes](#)
- [Application Process Example](#)
- [Creating an Application Process](#)
- [Editing Application Process Attributes](#)
- [Creating Application Process Error Messages](#)
- [Viewing the Application Processes History Report](#)

**See Also:** ["Understanding Page Processes"](#) on page 8-43

## About On Demand Application Processes

An **On Demand** process is special type of application process which has a Process Point of **On Demand** and executes when called from a page-level On Demand process or from an AJAX call from the browser. On Demand processes are useful when you have PL/SQL logic that you would like to run from different execution points across multiple pages.

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**. This prohibits the processes being invoked from users in authenticated sessions.

**See Also:** ["About Creating a Page Process"](#) on page 8-43

### Running 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 Application Express 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 Application Builder as a developer, an error messages displays.
- Specifying the process by name locates the first process with the specified (case-preserved) name.

**See Also:** ["Clearing Session State"](#) on page 2-14

## 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 `TOTAL_CART_ITEMS` and `TOTAL_PURCHASE_PRICE`.

**See Also:** ["Creating a Global Page to Display Components on Every Page"](#) on page 12-2

Instead of writing a process for each page to set the values of `TOTAL_CART_ITEMS` and `TOTAL_PURCHASE_PRICE`, you could write an application process of type **On Load: Before Header** to compute these values. Then, the Application Express 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 `TOTAL_CART_ITEMS` and `TOTAL_PURCHASE_PRICE`.

## Creating an Application Process

To create an application process:

1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **Application Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.

2. Under Logic, select **Application Processes**.  
The Application Processes page appears.
3. Click **Create**.

4. For Identification:
  - a. 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. Process Text - Enter the text that is to be the source of your process. Processor of type PL/SQL is wrapped with a `Begin` and `End`;
  - b. Error Message - Enter the error message that displays if the process raises an error. See ["Creating Application Process Error Messages"](#) on page 8-58.
  - c. Click **Next**.
6. For Conditionality:
  - a. Condition Type - Select a condition type that must be met in order for this process to execute.
  - b. Expression 1 and Expression 2 - Use these attributes to conditionally control whether the process executes. Enter values in this attribute based on the specific condition type you select. The process executes if the specified condition is met.
  - c. Click **Create Process**.

### About the Application Process Page

Once you create an application process, it appears on the Application Processes page. 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 process by name and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Icons** - Displays each process as a large icon. To edit a process, click the appropriate icon.
- **View Report** - Displays each process as a line in a report. To edit a process, click the name.
- **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Editing Application Process Attributes

To edit an existing page process:

1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **Application Builder**.

- b. Select an application.
  - c. On the Application home page, click **Shared Components**.  
The Shared Components page appears.
2. Under Logic, select **Application Processes**.  
The Application Processes page appears.
3. Click the process name.
4. Edit the appropriate attributes. For more information, see item Help
5. Click **Apply Changes**.

## Creating Application Process Error Messages

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 **Application Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.

The Shared Components page appears.
2. Under Logic, select **Application Processes**.

The Application Processes page appears.
3. Click the process name.
4. Scroll down to Source.
5. In Process Error Message, enter the message that displays when an unhandled exception is raised. See item Help for more details and supported substitution strings for both success and error messages.
6. For processes with a processing point of On Submit - Before Computation and Validations or On Submit - After Computations and Validations, you can specify where the error message displays.

From Error message display location, 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). This is the default setting for new processes.
- **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.

7. Click **Apply Changes**.

## Viewing the Application Processes History Report

After you create an application process, you can access the Application Processes History reports. This report displays a history of recently changed application processes by date.

To access application processes reports:

1. Navigate to the Workspace home page.
2. Click **Application Builder**.
3. Select an application.
4. On the Application home page, click **Shared Components**.
5. Under Logic, select **Application Processes**.
6. Select the History tab at the top of the page.
7. 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 then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Understanding 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. Like page-level computation, application computations can be based on static values, item values, PL/SQL, or SQL.

**Tip:** To learn more about execution behavior in the case of a validation error, see ["What Happens When a Validation Fails?"](#) on page 8-42

### Topics:

- [About Application Computations](#)
- [Creating an Application Computation](#)
- [Accessing the Application Computation History Report](#)

## About Application Computations

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.

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;
```

### About Application Computations that Execute On New Instance

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**. This type of computation only runs when a user first accesses your application. This type of computation is useful when you need to only retrieve information once within a user's session (for example, to retrieve a user's job title).

## Creating an Application Computation

To create an application computation:

1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click **Application Builder**.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.The Shared Components page appears.
2. Under Logic, select **Application Computations**.
3. Click **Create**.
4. Under Item:
  - a. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - b. Computation Item - Select the item this computation affects.
5. For 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.
6. Under Computation:
  - a. Computation Type - Select the manner in which this computation is performed.
  - b. Computation - Enter the computation logic that corresponds to the computation type.
  - c. Computation Error Message - Enter the error message that displays if the computation fails.
7. For Authorization Scheme (optional), select an authorization scheme which must evaluate to True in order for this computation to execute.



8. Under Conditions (optional):
  - a. Condition Type - Select a condition type that must be met in order for this computation to execute.
  - b. Expression 1 and Expression 2 - Use these attributes to conditionally control whether the computation executes. Enter values in this attribute based on the specific condition type you select. The computation executes if the specified condition is met.
9. For Build Option (optional), select a build option for this component. See ["Using Build Options to Control Configuration"](#) on page 16-33.
10. Click **Create Computation**.

### About the Application Computations Page

Once you create an application computation, it appears on the Application Computations page. You control how the page displays by making a selection from the View list. Available options include:

- **Icons** (the default) displays each computation as a large icon. To edit a computation, click the appropriate icon.
- **Details** displays each application process as a line in a report. To edit a computation process, click the name.

## Accessing the Application Computation History Report

Once you create an application computation, you can view the Application Computation History report.

To access the Application Computation History report:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. When Application Builder appears, click **Shared Components**.
5. Under Logic, select **Application Computations**.
6. Select the **History** tab at the top of the page.

This Application Computation History report displays a history of recently changed application computations by date.

7. 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 then **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each computation as a large icon. To edit a computation, click the appropriate icon.
  - **View Report** - Displays each computation as a line in a report. To edit a computation, click the name.

- **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Using the Attribute Dictionary

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

You can 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.

To access the Manage Attribute Dictionary page:

1. On the Workspace home page, click the **Application Builder** icon.

The Application Builder home page appears.

2. Select an application.

3. Select a page.

The Page Definition appears.

4. Click the **Utilities** button and then 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.

**Tip:** To go to the Attribute Dictionary in SQL Workshop, click **Access Attribute Dictionary** on the Tasks list. To learn more, see "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*.

---

## Creating Reports

In Oracle Application Express, a report is the formatted result of a SQL query. You can generate reports in a database application by selecting and running a built-in query, or by defining a report region based on a SQL query.

### Topics:

- [Understanding the Difference Between Interactive and Classic Reports](#)
- [Creating a Report Using a Wizard](#)
- [Customizing Interactive Reports](#)
- [Editing Interactive Reports as a Developer](#)
- [Editing Classic Reports](#)
- [Printing Report Regions](#)

**See Also:** ["Creating Forms"](#) on page 10-1 and ["Adding Database Application Components and Controls"](#) on page 1

## Understanding the Difference Between Interactive and Classic Reports

When creating a database application, you can include two types of reports: an interactive report or a classic report. The main difference between these two report types is that interactive reports enable the user to customize the appearance of the data through searching, filtering, sorting, column selection, highlighting, and other data manipulations.

### About Interactive Reports

The following is an example of an interactive report.

<div> <input type="text"/> <input type="button" value="Go"/> <input type="button" value="Actions"/> <input type="button" value="Create"/> </div>								
	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	APEX Environment Configuration	Identify server requirements	27-MAY-12	28-MAY-12	Closed	John Watson	100	200
	APEX Environment Configuration	Determine Web listener configuration(s)	28-MAY-12	28-MAY-12	Closed	James Cassidy	100	100
	APEX Environment Configuration	Specify security authentication scheme(s)	29-MAY-12	31-MAY-12	Closed	John Watson	200	300
	APEX Environment Configuration	Select servers for Development, Test, Production	29-MAY-12	03-JUN-12	Closed	James Cassidy	200	600

Interactive reports enable end users to create highly customized reports. 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. Each interactive report includes a search bar, Actions menu, Column Heading menu, and Edit icons in the first column of each row. For a complete description of these components, see ["Customizing Interactive Reports"](#) on page 9-4.

When using an interactive report you can:

- Include one interactive report per page
- Display 100 columns using report columns. You can edit additional columns using Tree view or paginating through Report Column Attributes.
- 1,000,000 rows per column heading filter (if no custom LOV is specified in the column attributes)
- Include 999 rows per column heading filter (if no custom LOV is specified in the column attributes)

### About Classic Reports

In contrast, a classic report does not support the ability to create a highly customized report. The following is an example of a classic report built on top of the same data.

<div> <div>  Search </div> <div> Display 15 </div> <div> Go </div> <div> Reset </div> </div>							
Report 1							
PROJECT	TASK NAME	START DATE	END DATE	STATUS	ASSIGNED TO	COST	BUDGET
APEX Environment Configuration	Identify server requirements	27-MAY-12	28-MAY-12	Closed	John Watson	100	200
APEX Environment Configuration	Determine Web listener configuration(s)	28-MAY-12	28-MAY-12	Closed	James Cassidy	100	100
APEX Environment Configuration	Specify security authentication scheme(s)	29-MAY-12	31-MAY-12	Closed	John Watson	200	300
APEX Environment Configuration	Select servers for Development, Test, Production	29-MAY-12	03-JUN-12	Closed	James Cassidy	200	600
APEX Environment Configuration	Configure Workspace provisioning	05-JUN-12	05-JUN-12	Closed	John Watson	200	100
APEX Environment Configuration	Create pilot workspace	05-JUN-12	05-JUN-12	Closed	John Watson	100	100

Classic reports support general keyword search capability, the ability to specify the number of rows that display, and basic column sorting.

When using a classic report, you can view 100 columns using report columns. You can edit additional columns using Tree view or paginating through Report Column attributes.

**See Also:** ["Editing Classic Reports"](#) on page 9-50

## Creating a Report Using a Wizard

Application Builder includes many built-in wizards for generating reports.

To create a report using a wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click **Create Page** and click **Next**.
4. Select **Report** and click **Next**.
5. Select a report type and click **Next**. Options include:
  - **Interactive Report** - Creates an interactive report based on a custom SQL `SELECT` statement you provide. For assistance in writing the SQL query, click the **Query Builder** button. Interactive Reports are only supported on Desktop pages and you may only define one interactive report per page. End users can customize the report layout and data displayed by selecting options on the Actions menu. See ["Customizing Interactive Reports"](#) on page 9-4 and ["Editing Interactive Reports as a Developer"](#) on page 9-27.
  - **Classic Report** - Creates a report based on a custom SQL `SELECT` statement or a PL/SQL function returning a SQL `SELECT` statement that you provide. For assistance in writing the SQL query, click the **Query Builder** button. See ["Editing Classic Reports"](#) on page 9-50.

- **Report on Web Service Result** - Creates a report based on a Web service result. See ["Implementing Web Services"](#) on page 17-7.
  - **Wizard Report** - Creates a classic report without requiring any SQL knowledge. Select the appropriate schema, table, columns, and result set display.
6. Follow the on-screen instructions. To learn more about a specific field, click the item label.

When Help is available, the cursor changes to an arrow and question mark. See ["About Field-Level Help"](#) on page 1-13.

## Customizing Interactive Reports

Interactive reports enable end users to customize reports. Users can alter the layout of report 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.

Users can also set up a subscription so that an HTML version of the report is emailed to them a designated interval. Users can create multiple variations of a report and save them as named reports, for either public or private viewing.

An interactive report can be customized in three ways: the Search bar, Actions menu and Column Heading menu.

**Tip:** To learn more about controlling what options display in an interactive report, see ["Editing Interactive Reports as a Developer"](#) on page 9-27

### Topics:

- [Using the Search Bar](#)
- [Using the Select Columns to Search Icon](#)
- [Using the Column Heading Menu](#)
- [About the Actions Menu](#)
- [Selecting Columns to Display](#)
- [Adding a Filter](#)
- [Specifying Rows Per Page](#)
- [Selecting Column Sort Order](#)
- [Creating a Control Break](#)
- [Adding Highlighting](#)
- [Computing Columns](#)
- [Aggregating a Column](#)
- [Creating a Chart from the Actions Menu](#)
- [Grouping Columns](#)
- [Executing a Flashback Query](#)
- [Saving an Interactive Report](#)
- [Resetting a Report](#)

- [Downloading a Report](#)
- [Subscribing to Emailed Reports](#)

## Using the Search Bar

A search bar displays at the top of every interactive report and may include the following features:

- **Select columns to Search icon** - Resembles a magnifying glass. Click this icon to narrow your search to specific columns. To search all columns, select **All Columns**. See ["Using the Select Columns to Search Icon"](#) on page 9-5.
- **Text area** - Enter case insensitive search criteria (wildcard characters are implied) and then click **Go**.
- **Go button** - Executes a search.
- **Reports** - Displays alternate default and saved private, or public reports. See ["Saving an Interactive Report"](#) on page 9-21.
- **View icons** - Switches between an icon, report and detail view 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"](#) on page 9-6.

**See Also:** ["Customizing the Interactive Report Search Bar"](#) on page 9-33

## Using the Select Columns to Search Icon

The Select columns to search icon displays to the left of the search bar. Clicking this icon displays a listing of all columns in the current report.

To search specific columns:

1. Click the **Select columns to search** icon and select a column.

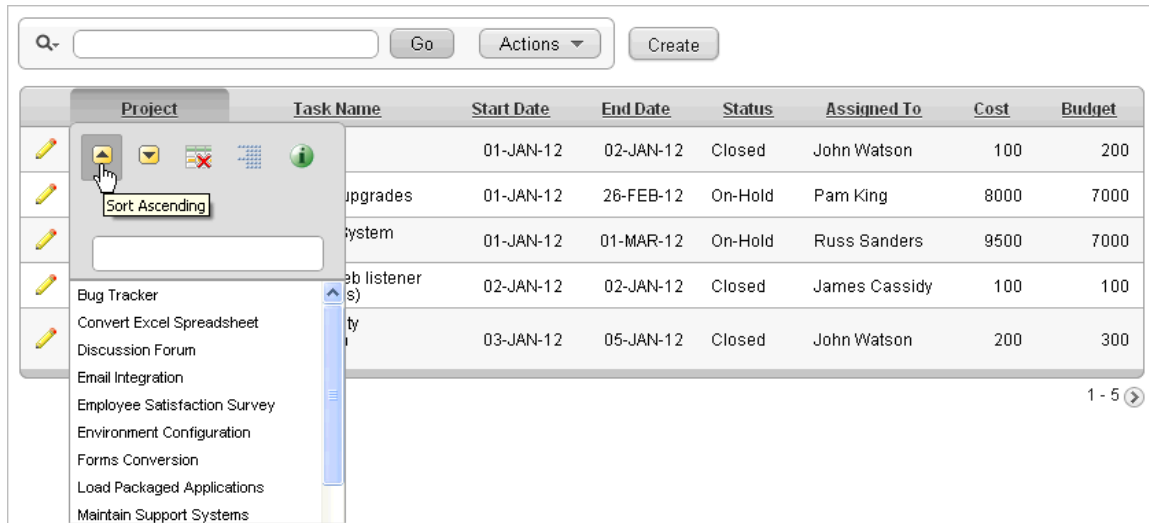
	Start Date	End Date	Status	Assigned To	Cost	Budget
Project	27-MAY-12	28-MAY-12	Closed	John Watson	100	200
Task Name	27-MAY-12	22-JUL-12	On-Hold	Pam King	8,000	7,000
Start Date	27-MAY-12	26-JUL-12	On-Hold	Russ Sanders	9,500	7,000
End Date	28-MAY-12	28-MAY-12	Closed	James Cassidy	100	100
Status						
Assigned To						
Cost						
Budget						
Available Budget						

2. Enter keywords in the text area and click **Go**.
3. To disable the filter, select the **Enable/Disable** check box.
4. To delete the filter, click the **Remove Filter** icon.

**See Also:** ["Selecting Columns to Display"](#) on page 9-8

## Using the Column Heading Menu

Clicking a column heading in an interactive report exposes the Column Heading menu. Positioning the cursor over each icon displays a tooltip that describes its function.



Column Heading menu options include:

- Sort Ascending icon - Sorts the report by the column in ascending order.
- Sort Descending icon - Sorts the report by the column in descending order.
- Hide Column - Hides the column. Not all columns can be hidden. If a column cannot be hidden, no Hide Column icon displays.
- Control Break - Creates a break group on the column. This pulls the column out of the report as a master record. See ["Creating a Control Break"](#) on page 9-12.
- Column Information - Displays help text about the column, if available.
- Text Area - Used to enter a case insensitive search criteria. Entering a value reduces the list of values at the bottom of the menu. You can then select a value from the bottom. The selected value is created as a filter using either the equal sign (=) or contains depending on the List of Values Column Filter Type.
- List of Unique Values - Contains the first 500 unique values that meet your filter criteria. If the column is a date, a list of date ranges is displayed instead.

## About the Actions Menu

You can customize an interactive report by selecting options on the Actions menu.



**Tip:** Not all options described in this section are available on every Actions menu. Developers can customize what options appear. To learn more, see ["Customizing the Interactive Report Search Bar"](#) on page 9-33.

The Actions menu appears to the right of the Go button on the Search bar. Use this menu to customize an interactive report.

The screenshot shows the Oracle APEX Interactive Report interface. At the top, there is a search bar with a magnifying glass icon, a 'Go' button, and a dropdown menu showing 'Reports 1. Primary Report'. To the right of the dropdown is the 'Actions' menu, which is currently open, displaying a list of options: 'Select Columns', 'Filter', 'Rows Per Page', 'Format', 'Flashback', 'Save Report', 'Reset', 'Help', 'Download', and 'Subscription'. Below the search bar is a table with the following columns: 'Project', 'Task Name', 'Start Date', 'End Date', 'Status', 'Assigned To', and 'Comments'. The table contains four rows of data, each with a yellow pencil icon in the 'Project' column.

	Project	Task Name	Start Date	End Date	Status	Assigned To	Comments
	APEX Environment Configuration	Identify server requirements	27-MAY-12	28-MAY-12	Closed	John Watson	
	Maintain Support Systems	HR software upgrades	27-MAY-12	22-JUL-12	On-Hold	Pam King	8
	Maintain Support Systems	Apply Billing System updates	27-MAY-12	26-JUL-12	On-Hold	Russ Sanders	9
	APEX Environment Configuration	Determine Web listener configuration(s)	28-MAY-12	28-MAY-12	Closed	James Cassidy	

The Actions menu contains the following options:

- **Select Columns** specifies which columns to display and in what order. See ["Selecting Columns to Display"](#) on page 9-8.
- **Filter** focuses the report by adding or modifying the WHERE clause on the query. See ["Adding a Filter"](#) on page 9-9.
- **Rows Per Page** determines how many rows display in the current report. See ["Specifying Rows Per Page"](#) on page 9-11.
- **Format** contains the following submenu:
  - **Sort** - Changes the columns to sort on and determines whether to sort in ascending or descending order. See ["Selecting Column Sort Order"](#) on page 9-11.
  - **Control Break** - Creates a break group on one or several columns. This pulls the columns out of the interactive report and displays them as a master record. See ["Creating a Control Break"](#) on page 9-12.
  - **Highlight** - Defines a filter that highlights the rows that meet the filter criteria. See ["Adding Highlighting"](#) on page 9-13.
  - **Compute** - Enables users to add computed columns to a report. See ["Computing Columns"](#) on page 9-14.
  - **Aggregate** - Enables users to perform mathematical computations against a column. See ["Aggregating a Column"](#) on page 9-16.
  - **Chart** - Displays the report data as a chart. See ["Creating a Chart from the Actions Menu"](#) on page 9-17.

- **Group By** - Enables users to group the result set by one or more columns and perform mathematical computations against columns. See ["Grouping Columns"](#) on page 9-19.
- **Flashback** - Enables you to view the data as it existed at a previous point in time. See ["Executing a Flashback Query"](#) on page 9-21.
- **Save Report** - Saves the interactive report. Depending upon their user credentials, users can save different types of reports. See ["Saving an Interactive Report"](#) on page 9-21.
- **Reset** - Resets the report back to the default report settings. See ["Resetting a Report"](#) on page 26.
- **Help** - Provides descriptions of how to customize interactive reports.
- **Download** - Enables users to download a report. Available download formats depend upon your installation and report definition. See ["Downloading a Report"](#) on page 9-26.
- **Subscription** - Enables users to send themselves an interactive report by email. See ["Subscribing to Emailed Reports"](#) on page 9-26

**See Also:** ["Customizing the Interactive Report Search Bar"](#) on page 9-33

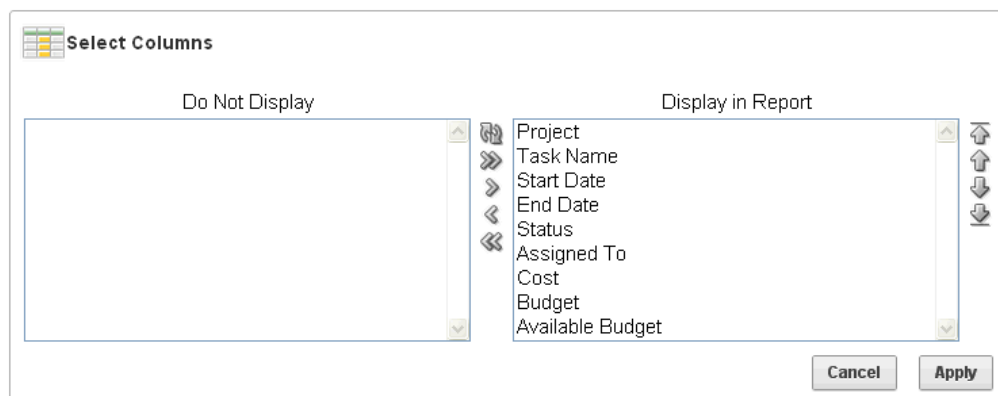
## Selecting Columns to Display

To customize a report to include specific columns, select **Select Columns** on the Actions menu.

To use the Select Columns option:

1. Click the **Actions** menu and select **Select Columns**.

The Select Columns region appears.



2. Select the columns you want to move. Click the center arrows to move a column from the Display in Report box to the Do Not Display box. To select multiple columns at once, press and hold the **CTRL** key.
3. To change the order of the columns, click the **Top**, **Up**, **Down**, and **Bottom** arrows on the right.
4. Click **Apply**.

A revised report appears.



Notice the filter `Project = 'Discussion Forum'` has been added to the Report Settings area above the report.

5. To revise the filter:
  - a. Click the filter name (in this example, `Project = 'Discussion Forum'`).
  - b. Edit your selections and click **Apply**.
6. To disable the filter, select the **Enable/Disable Filter** check box.
7. To delete the filter, click **Remove Filter**.

### Adding a Row Filter

To add a row filter:

1. Click the **Actions** menu and select **Filter**.  
The Filter region appears.
2. For Filter Type, select **Row**.
3. In the Filter region:
  - a. Name - Enter a name that describes this filter.
  - b. Filter Expression - Enter an expression. Select a column and function or operator at the bottom of the region.

4. Click **Apply**.

<u>Cost over \$5000</u>							
	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost
	Maintain Support Systems	HR software upgrades	31-MAY-12	26-JUL-12	On-Hold	Pam King	8,000
	Maintain Support Systems	Apply Billing System updates	31-MAY-12	30-JUL-12	On-Hold	Russ Sanders	9,500
	Email Integration	Complete plan	07-JUN-12	13-JUL-12	Closed	Mark Nile	3,000

The Row Filter narrows the display to projects with a cost of \$5000 or more.

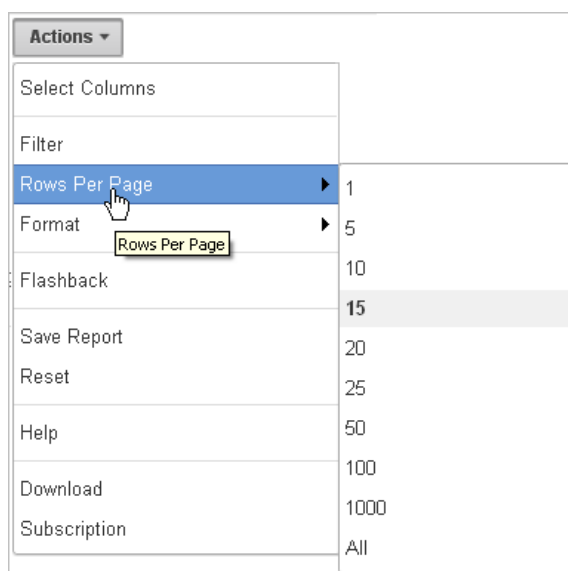
5. To revise the filter:
  - a. Click the Row Filter, **Cost over \$1000**.
  - b. Edit your selections and click **Apply**.
6. To disable the filter, select the **Enable/Disable Filter** check box.
7. To delete the filter, click **Remove Filter**.

## Specifying Rows Per Page

You can specify the number of rows that display on a page by selecting **Rows Per Page** on the Actions menu.

To specify the number of rows that display:

1. Click the **Actions** menu and select **Rows Per Page**.
2. From the submenu, select a number.

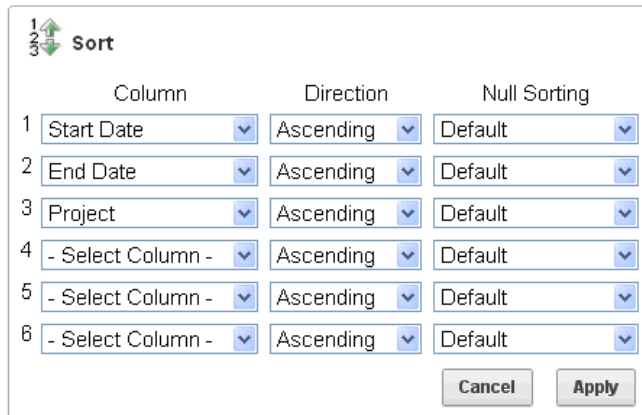


## Selecting Column Sort Order

You can specify which column sort order (ascending or descending) by selecting **Sort** on the Format submenu. You can also specify how to handle NULL values. Using the default setting always displays NULL values last or always displays them first.

To sort by column:

1. Click the **Actions** menu and select **Format** and then **Sort**.  
The Sort region appears.
2. Select a column, the sort direction (**Ascending** or **Descending**), and Null Sorting behavior (**Default**, **Nulls Always Last**, or **Nulls Always First**).



**Sort**

	Column	Direction	Null Sorting
1	Start Date	Ascending	Default
2	End Date	Ascending	Default
3	Project	Ascending	Default
4	- Select Column -	Ascending	Default
5	- Select Column -	Ascending	Default
6	- Select Column -	Ascending	Default

Cancel Apply

3. Click **Apply**.

## Creating a Control Break

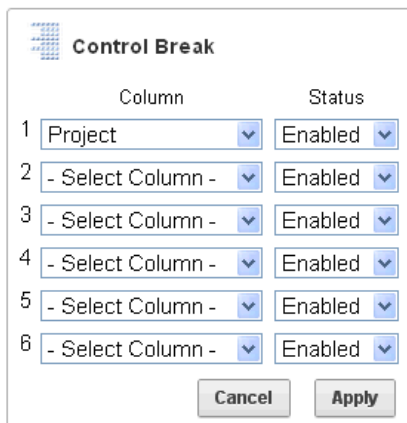
You can create a break group of one or several columns by selecting **Control Break** from the Actions, Format submenu. Creating a break group pulls the columns out of the interactive report and displays them as a master record.

To create a break group:

1. Click the **Actions** menu and select **Format** and then **Control Break**.

The Control Break region appears.

2. Select a column and then a status (**Enable** or **Disable**)



**Control Break**

	Column	Status
1	Project	Enabled
2	- Select Column -	Enabled
3	- Select Column -	Enabled
4	- Select Column -	Enabled
5	- Select Column -	Enabled
6	- Select Column -	Enabled

Cancel Apply

3. Click **Apply**.

A revised report displays.

Project <input checked="" type="checkbox"/> <input type="checkbox"/>							
<b>Project : Train Developers in APEX</b>							
	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	Publish development standards	23-JUN-12	29-AUG-12	On-Hold	John Watson	1,000	2,000
	Publish links to self-study courses	26-JUN-12	26-JUN-12	Closed	John Watson	100	100
	Create training workspace	26-JUN-12	03-JUL-12	Closed	James Cassidy	500	700
						1,600	2,800
<b>Project : Software Projects Tracking</b>							
	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	Conduct project kickoff meeting	30-JUN-12	30-JUN-12	Closed	Pam King	100	100

Note the defined break group, Project, displays in the Report Settings area above the report.

- To disable the Control Break filter, deselect the **Enable/Disable Filter** check box. To enable the filter, select the **Enable/Disable Filter** check box again.
- To delete the filter, click **Remove Breaks**.

## Adding Highlighting

You can customize the display to highlight specific rows in a report by selecting **Highlight** on the Actions, Format submenu.

To add highlighting:

- Click the **Actions** menu and select **Format** and then **Highlight**.

The Highlight region appears.

**Highlight**

Name

Sequence

Enabled ☒ Yes

Highlight Type

Background Color  [yellow] [green] [blue] [orange] [red]

Text Color  [yellow] [green] [blue] [orange] [red]

Highlight Condition

Column  Operator

- Edit the following information:
  - Name - Enter a name that describes this filter.
  - Sequence - Enter a numeric value to identify the sequence in which highlighting rules are evaluated.
  - Enabled - Select **Yes**.

- d. Highlight Type - Select **Cell** or **Row**.
- e. Background Color - Select a new color for the background of the highlighted area.
- f. Text Color - Select a new color for the text in the highlighted area.
- g. Highlight Condition - Select a column, an operator, and expression.

**Highlight**

Name: On-Hold Projects

Sequence: 10

Enabled: Yes

Highlight Type: Row

Background Color:  [yellow] [green] [blue] [orange] [red]

Text Color: #FF7755  [yellow] [green] [blue] [orange] [red]

Highlight Condition

Column: Status Operator: = Expression: On-Hold

Cancel Apply

3. Click **Apply**.

<div> <div>On-Hold Projects</div> <div> <input checked="" type="checkbox"/> <input type="checkbox"/> </div> </div>					
Project	Task Name	Start Date	End Date	Status	
Train Developers in APEX	Publish development standards	23-JUN-12	29-AUG-12	On-Hold	
Train Developers in APEX	Publish links to self-study courses	26-JUN-12	26-JUN-12	Closed	
Train Developers in APEX	Create training workspace	26-JUN-12	03-JUL-12	Closed	
Software Projects Tracking	Conduct project kickoff meeting	30-JUN-12	30-JUN-12	Closed	

Note the highlight On-Hold Projects appears in the Report Settings area above the report.

4. To revise the highlight, click the highlight name and make the following edits:
  - a. Background Color - Select **yellow**.
  - b. Text Color - Select **green**.
  - c. Click **Apply**.
5. To disable the highlight, select the **Enable/Disable** check box.
6. To delete the highlight, click **Remove Highlight**.

## Computing Columns

You can add computations to columns by selecting **Compute** from the Actions, Format submenu. These computations can be mathematical computations (for example,  $NBR\_HOURS/24$ ) or standard Oracle functions applied to existing columns.

To create a computation:



1. Click the **Actions** menu and select **Format** and then **Compute**.

The Compute region appears.

2. In the Compute region:

- a. Computation - Select **New Computation**.
- b. Column Heading - Enter the name of the new column to be created.
- c. Format Mask - Select an Oracle format mask to be applied to the new column.  
(for example, \$5,234.10).

Next, create the computation.

- d. Create the computation:
  - Columns - Select a column or alias.
  - Keypad - Select a shortcut for commonly used keys.
  - Functions - Select the appropriate function.

In the following example, a new column compares the actual cost to the budgeted amount, using the formula  $H - I$ , where H is the cost and I is the budgeted amount.

**Compute**

Computation - New Computation -

Column Heading Cost Analysis Format Mask FML999G999G999G999G990D

Computation Expression H - I





Columns	Keypad	Function
D. Start Date	( ) '	SIGN
E. End Date	7 8 9 -	SIN
F. Status	4 5 6 +	SQRT
G. Assigned To	1 2 3 *	SUBSTR
H. Cost	0 . /	SYSDATE
I. Budget	space ,	SYSTIMESTAMP
K. Available Budget		THEN

Create a computation using column aliases.  
Examples:  
1. (B+C)\*100  
2. INITCAP(B)||', '||INITCAP(C)  
3. CASE WHEN A = 10 THEN B + C ELSE B END

Cancel Apply

3. Click **Apply**.

The revised report appears.

	Project 	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget	Cost Analysis
	Train Developers in APEX	Publish development standards	23-JUN-12	29-AUG-12	On-Hold	John Watson	1,000	2,000	-\$1,000.00
	Train Developers in APEX	Publish links to self-study courses	26-JUN-12	26-JUN-12	Closed	John Watson	100	100	\$0.00
	Train Developers in APEX	Create training workspace	26-JUN-12	03-JUL-12	Closed	James Cassidy	500	700	-\$200.00

## Deleting a Computation

To delete a computation:

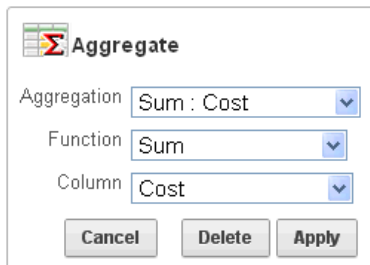
1. Click the **Actions** menu and select **Format** and then **Compute**.  
The Compute region appears.
2. From Computation, select computation name.
3. Click **Delete**.

## Aggregating a Column

You can define an aggregation against a column by selecting **Aggregate** from the Actions, Format menu. Aggregates are displayed after each control break and at the end of the report within the column for which they are defined.

To aggregate columns:

1. Click the **Actions** menu and select **Format** and then **Aggregate**.  
The Aggregate region appears.
2. In the Aggregate region:
  - a. Aggregation - Select **New Aggregation**.
  - b. Function - Select one of the following: Sum; Average, Count, Count Distinct, Minimum, Maximum, or Median.
  - c. Column - Select a column.



This example creates a sum of the Cost column.

3. Click **Apply**.

The computation appears at the bottom of the report.

	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	APEX Environment Configuration	Create pilot workspace	05-JUN-12	05-JUN-12	Closed	John Watson	100	100
	APEX Environment Configuration	Configure Workspace provisioning	05-JUN-12	05-JUN-12	Closed	John Watson	200	100
	APEX Environment Configuration	Run installation	06-JUN-12	06-JUN-12	Closed	James Cassidy	100	100
							56,150	

In this example, the aggregate shows the sum of all amounts in the Cost column.

## Removing an Aggregate

To remove aggregate columns:

1. Click the **Actions** menu and select **Format** and then **Aggregate**.  
The Aggregate region appears.
2. From Aggregation, select a previously defined aggregation.
3. Click **Delete**.

## Creating a Chart from the Actions Menu

To create a chart, select Chart on the Actions, Format menu. You can create one chart for each interactive report. Once defined, you can switch between the chart and report views using links on the Search bar.

To create a chart:

1. Click the **Actions** menu and select **Format** and then **Chart**.  
The Chart region appears.
2. In the Chart region, specify the appropriate options.

**Chart**

Chart Type

Label 
 Axis Title for Label

Value 
 Axis Title for Value

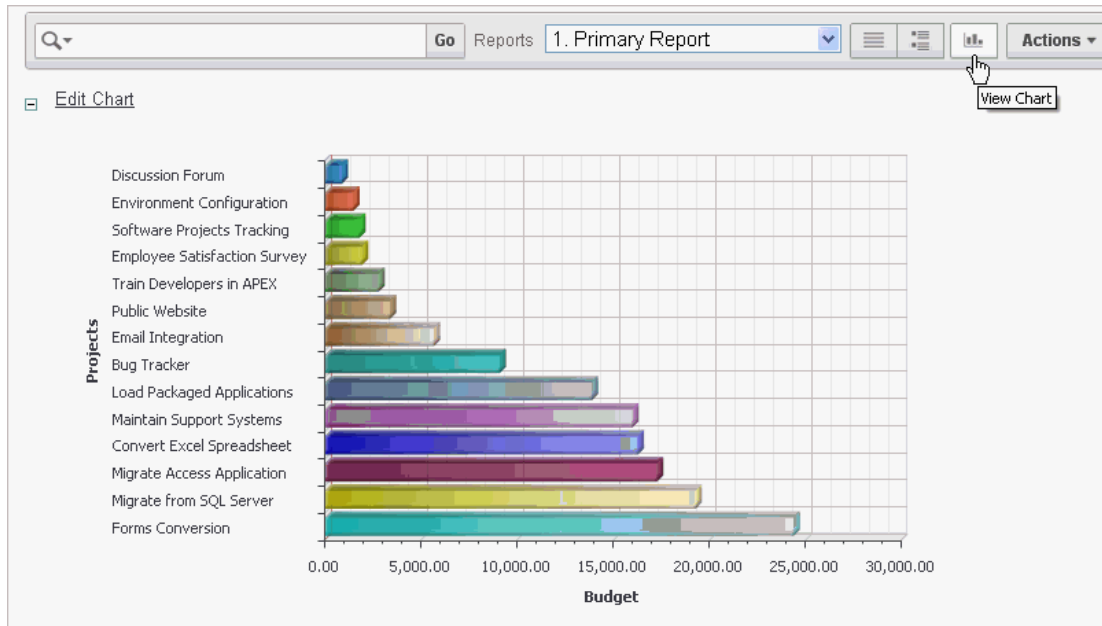
Function

Sort

The following attributes are for bar charts:

- a. Chart Type - Select the type of chart you want to create (horizontal bar, vertical bar, pie, or line.).
- b. Label - Select the column to be used as the label.
- c. Axis for Title for Label - Enter the title to display on the axis associated with the column selected for Label (not available for pie chart).

- d. **Value** - Select the column to be used as the Value. If your function is a COUNT, a Value does not need to be selected.
  - e. **Axis Title for Value** - Enter the title to display on the axis associated with the column selected for Value (not available for pie chart).
  - f. **Function** - (Optional) Select a function to be performed on the column selected for Value.
  - g. **Sort** - Select a sorting method.
3. Click **Apply**.
- The chart appears.



Note the Search bar now contains two icons: View Report and View Chart.

4. Click these icons to toggle between chart and report views.

### Editing a Chart

To edit a chart:

1. While viewing a report:
  - a. Click the **Actions** menu and select **Format** and then **Chart**.  
The Chart region appears.
  - b. Edit your selections and click **Apply**.
2. While viewing the chart:
  - a. Click **Edit Chart**.
  - b. Edit your selections and click **Apply**.

### Deleting a Chart

To delete a chart:

1. While viewing a report:

- a. Click the **Actions** menu and select **Format** and then **Chart**.  
The Chart region appears.
  - b. Edit your selections and click **Apply**.
2. While view the chart:
  - a. Click **Edit Chart**.
  - b. Edit your selections and click **Apply**.

## Grouping Columns

Group By enables users to group the result set by one or more columns and perform mathematical computations against the columns. Once users define the group by, they can switch between the group by and report views using the View Icon on the Search bar.

### Topics:

- [Creating a Group By](#)
- [Editing a Group By](#)
- [Deleting a Group By](#)
- [Selecting a Group By Sort Order](#)

### Creating a Group By

To create a Group By:

1. Click the **Actions** menu and select **Format** and then **Group By**.  
The Group By region appears.

**Group By**

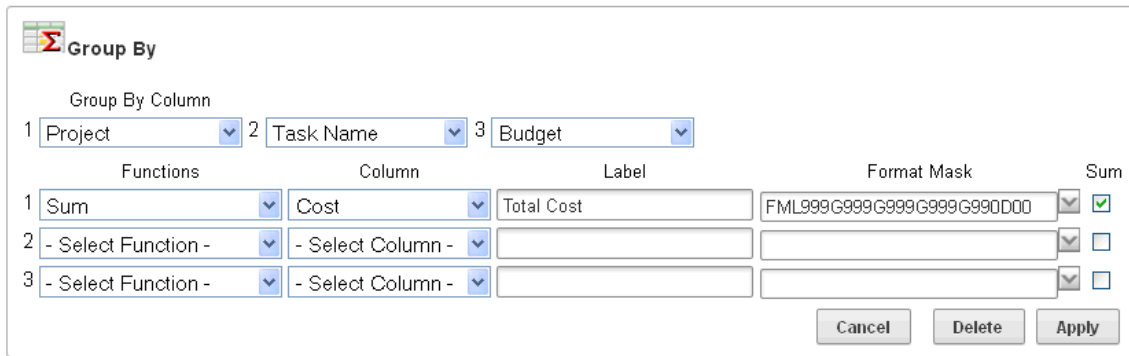
Group By Column

1 - Select Column - 2 - Select Column - 3 - Select Column -

	Functions	Column	Label	Format Mask	Sum
1	- Select Function -	- Select Column -			<input type="checkbox"/>
2	- Select Function -	- Select Column -			<input type="checkbox"/>
3	- Select Function -	- Select Column -			<input type="checkbox"/>

Cancel Apply

2. From Group by Column, select up to three columns to display.
3. To include a computation, select the function, column, label, and format mask.



**Group By**

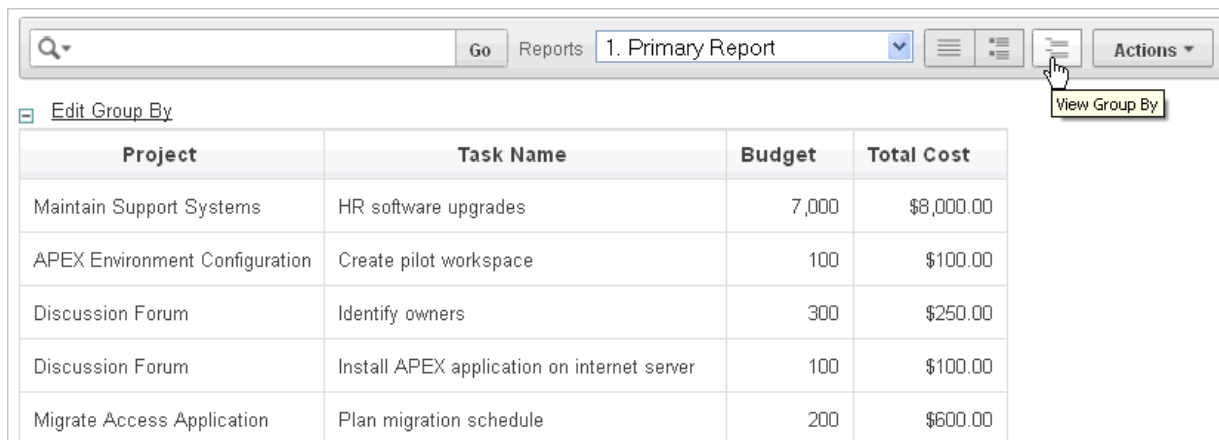
Group By Column

1 Project 2 Task Name 3 Budget

	Functions	Column	Label	Format Mask	Sum
1	Sum	Cost	Total Cost	FML999G999G999G999G999D000	<input checked="" type="checkbox"/>
2	- Select Function -	- Select Column -			<input type="checkbox"/>
3	- Select Function -	- Select Column -			<input type="checkbox"/>

Cancel Delete Apply

#### 4. Click **Apply**.



Search bar: Go Reports 1. Primary Report

Actions

Edit Group By

Project	Task Name	Budget	Total Cost
Maintain Support Systems	HR software upgrades	7,000	\$8,000.00
APEX Environment Configuration	Create pilot workspace	100	\$100.00
Discussion Forum	Identify owners	300	\$250.00
Discussion Forum	Install APEX application on internet server	100	\$100.00
Migrate Access Application	Plan migration schedule	200	\$600.00

View Group By

A Group By icon appears below the Search bar. The resulting report displays the Project, Task Name, and Budget columns. Additionally, a new column, Total Cost, displays on the right side.

### Editing a Group By

To edit a group by:

1. Click **Edit Group By**.

The Group By region appears.

2. Edit the attributes.
3. Click **Apply**.

### Deleting a Group By

To delete a group by:

1. Click **Edit Group By**.

The Group By region appears.

2. Click **Delete**.

### Selecting a Group By Sort Order

You can specify group by column sort order (ascending or descending) by either clicking on the group by column heading or selecting Group By Sort on the Format

submenu. You can also specify how to handle NULL values. Using the default setting always displays NULL values last or always displays them first.

To sort a group by column:

1. Access a Group By view. See ["Creating a Group By"](#) on page 9-19.
2. Click the **Actions** menu and select **Format** and then **Group By Sort**.

**Tip:** The Group By Sort menu is only visible when you are viewing Group By view.

The Group By Sort region appears.

	Column	Direction	Null Sorting
1	- Select Column -	Ascending	Default
2	- Select Column -	Ascending	Default
3	- Select Column -	Ascending	Default
4	- Select Column -	Ascending	Default
5	- Select Column -	Ascending	Default
6	- Select Column -	Ascending	Default

Cancel Apply

3. Select a column, the sort direction (Ascending or Descending), and Null Sorting behavior (Default, Nulls Always Last, or Nulls Always First).
4. Click **Apply**.

## Executing a Flashback Query

You can execute a flashback query by selecting Flashback from the Actions menu. A flashback query enables 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 differs for each database.

To execute a flashback query:

1. Click the **Actions** menu and select **Flashback**.
2. In the Flashback region, enter the number of minutes.
3. Click **Apply**.

## Saving an Interactive Report

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.

### Topics:

- [Save Options by User Type](#)
- [Configuration Dependencies](#)
- [Saving a Public or Private Interactive Report](#)
- [Saving a Default Interactive Report](#)

- [Renaming a Public or Private Interactive Report](#)
- [Deleting a Public or Private Interactive Report](#)

**See Also:** ["Managing Saved Reports as a Developer"](#) on page 9-49

## Save Options by User Type

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 shows the Reports list on the Search bar of an interactive report.

<input type="text"/> <input type="button" value="Go"/>		Reports <div>           1. Primary Report           <div>             Default             1. Primary Report             Private             1. Control Break           </div> </div>		<input type="button" value="Actions"/>		<input type="button" value="Reset R"/>	
	Project	Task Name	Star	Status	Assigned To	Cost	Budg
	APEX Environment Configuration	Identify server requirements	27-MAY-12	28-MAY-12	Closed	John Watson	100
	Maintain Support Systems	HR software upgrades	27-MAY-12	22-JUL-12	On-Hold	Pam King	8,000

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. Control.** This is a Private report. Only the user who creates a private report can view, save, rename, or delete it.

**See Also:** ["Managing Saved Reports as a Developer"](#) on page 9-49

## Configuration Dependencies

The Save Report option on the Actions only displays if the application developer:

- Defines an authentication scheme for the current application. See ["Establishing User Identity Through Authentication"](#) on page 15-25.
- Selects **Save Report** or **Save Public Report** under Search Bar on the Report. See ["Customizing the Interactive Report Search Bar"](#) on page 9-33.



Also note that the Reports select list on the Search Bar only displays if the application developer selects **Reports Select List** under Search Bar on the Report Attributes page. See ["Customizing the Interactive Report Search Bar"](#) on page 9-33.

Note that many of these options are selected by default.

### Saving a Public or Private Interactive Report

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.

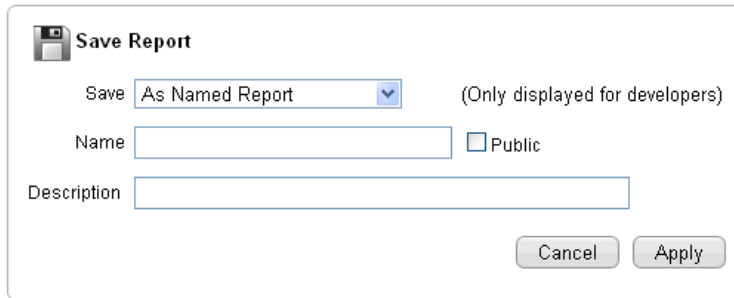
**Tip:** To save a public report, the developer must select **Save Public Report** must be selected under **Include in Actions Menu** on the Report Attributes page. Developers can also apply authorization scheme to enable or disable Save Public Report. See ["Customizing the Interactive Report Search Bar"](#) on page 9-33.

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). See ["About the Actions Menu"](#) on page 9-6.
3. Click the **Actions** menu and select **Save Report**.  
The Save Report region appears.
4. For end users, the following Save Report Region appears.

In Save Report:

- Name** - Enter a name for the report.
  - Public**- Select this check box to make the report viewable to all users. Deselect this check box to make the report private.
  - Description** - Enter an optional description.
  - Click **Apply**.
5. For developers, the following Save Report Region appears.



**Save Report**

Save As Named Report (Only displayed for developers)

Name  ☐ Public

Description

In Save Report:

- a. **Save** - Select **As Named Report**.
- b. **Name** - Enter a name for the report.
- c. **Public**- Select this check box to make the report viewable to all users. Deselect this check box to make the report private.
- d. **Description** - Enter an optional description.
- e. Click **Apply**.

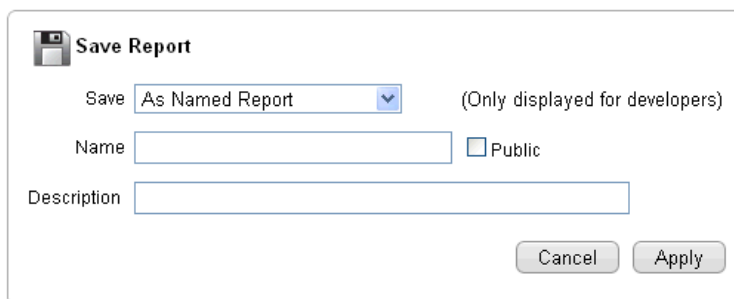
### Saving a Default Interactive Report

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:

1. Run the report as a developer.
2. Customize the report (for example, hide columns, add filters, and so on). See ["About the Actions Menu"](#) on page 9-6.
3. Click the **Actions** menu and select **Save Report**.

The Save Report region appears.



**Save Report**

Save As Named Report (Only displayed for developers)

Name  ☐ Public

Description

4. For Save, select **As Default Report Settings**.

Another region appears.

The current report settings will be used as the default for all users.

Default Report Type ☒ Primary ☐ Alternative

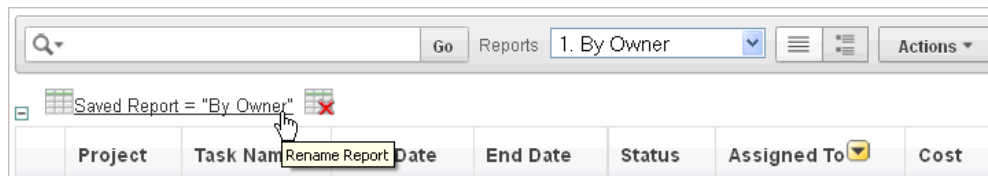
Cancel Apply

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**.

### Renaming a Public or Private Interactive Report

To rename a public or private interactive report:

1. Run the report as a developer.
2. Select public or private interactive report to rename.
3. Click the **Rename Report** link.

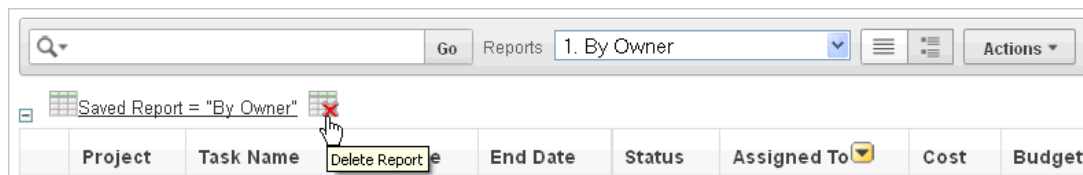


4. Edit the attributes (for example, enter a new name).
5. Click **Apply**.

### Deleting a Public or Private Interactive Report

To delete a public or private interactive report:

1. Run the report as a developer.
2. Click the **Delete Report** icon next to the report name link.



3. Click **Apply**.

### About Exporting Interactive Reports

When you export an application, the Primary Default, Alternative Default, public reports are included by default. You can also choose to include personal reports during the export process by selecting **Yes** for Private Interactive Reports. See ["Exporting an Application"](#) on page 16-14.

## Resetting a Report

You can reset a report back to the default settings by selecting **Reset** from the Actions menu. Resetting a report removes any customizations you have made.

To reset a report:

1. Click the **Actions** menu and select **Reset**.
2. Click **Apply**.

## Downloading a Report

You can download an interactive report by selecting **Download** from the Actions menu. Available download formats depend upon your installation and report definition. Supported formats include comma-delimited file (CSV) format, HTML, Email, Microsoft Excel (XLS) format, Adobe Portable Document Format (PDF), and Microsoft Word Rich Text Format (RTF).

**Tip:** The ability to download an interactive report is configurable by your application developer. To learn more about configuring download options, see ["Configuring Download Options on the Actions Menu"](#) on page 9-36.

To download a report:

1. Click the **Actions** menu and select **Download**.
2. Select a report download format and follow the provided instructions.

## Subscribing to Emailed Reports

End users can receive updated versions of a report by subscribing to it. To subscribe to a report, click **Subscription** on the Actions menu. Emails sent from an interactive report contain a system generated email signature that cannot be overwritten that identifies who originated the email.

To utilize a subscription:

- An Oracle Application Express administrator must configure email at the Instance level. See "Configuring Mail" in *Oracle Application Express Administration Guide*.
- The application developer must enable the Subscription check box on the Interactive Report Attributes page. See ["Customizing the Interactive Report Search Bar"](#) on page 9-33

To receive updated report results by email:

1. Click the **Actions** menu and select **Subscription**.

The Add Subscription region appears.

2. Under Add Subscription:
  - a. Email Address - Enter the email addresses to receive the report. To include multiple email addresses, separate each email address with a comma.
  - b. Subject - Enter text to display in the email subject line.
  - c. Frequency - Select the interval at which the report is sent.
  - d. Starting From - Select a start date and time.
  - e. Ending - Select an end date and time. Select a day, week, month, or year.

- f. Click **Apply**.

**Note:** Emails sent from a subscription include a system generated email signature indicating who created the subscription. This signature cannot be removed.

**Tip:** "Managing Interactive Report Subscriptions" in *Oracle Application Express Administration Guide*

## Editing Interactive Reports as a Developer

By default, an interactive report includes a Search Bar which contains a search icon, text area, Go button, and Actions menu. As described in "[Customizing Interactive Reports](#)" on page 9-4, users can use these controls to alter the layout of report data by selecting columns, applying filters, highlighting, and sorting. This section describes how developers can customize an interactive report by editing report attributes.

### Topics:

- [Accessing the Interactive Report Attributes Page](#)
- [Editing Interactive Report Column Attributes](#)
- [Creating Column Groups](#)
- [Controlling Interactive Report Pagination](#)
- [Managing Interactive Report Column Sorting](#)
- [Customizing the Interactive Report Search Bar](#)
- [Configuring Download Options on the Actions Menu](#)
- [Understanding Link Columns](#)
- [Creating a Column Link in an Interactive Report](#)
- [Displaying Interactive Reports Conditionally](#)
- [Defining a Column as a List of Values in an Interactive Report](#)
- [Formatting Columns in an Interactive Values Report](#)
- [Enabling Icon View](#)
- [Enabling Detail View](#)
- [Configuring Advanced Attributes for Interactive Reports](#)
- [Linking to Interactive Reports](#)
- [Linking to Shared Interactive Reports](#)
- [Managing Saved Reports as a Developer](#)
- [Viewing Saved Report Activity](#)

**Tip:** To learn more about using interactive reports as a user, see "[Customizing Interactive Reports](#)" on page 9-4

**See Also:** "APEX\_IR" in *Oracle Application Express API Reference*

## Accessing the Interactive Report Attributes Page

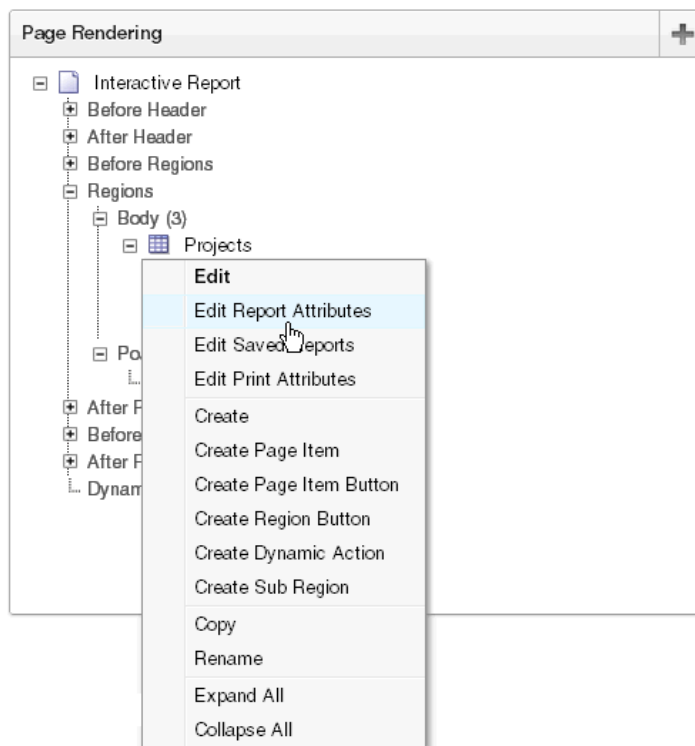
You customize an interactive report by editing attributes on the Interactive Report Attributes page.

To access the Report Attributes page:

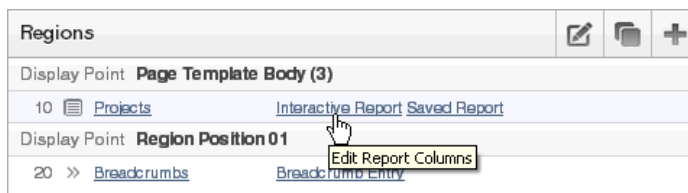
1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Select the page containing the interactive report you want to edit.

The Page Definition appears.

4. To access the Interactive Report Attributes page:
  - Tree view - Right-click the Region name and select **Edit Report Attributes**.



- Component view - Under Regions, click the **Interactive Report** link next to the name of the report region you want to edit.



**See Also:** ["Switching Between Tree and Component View"](#) on page 8-3

5. The Report Attributes page appears and is divided into the following sections:

- **Column Attributes** control the report layout. See ["Editing Interactive Report Column Attributes"](#) on page 9-30.
  - **Column Groups** attributes enable you to group columns on the single row view. See ["Creating Column Groups"](#) on page 9-31.
  - **Pagination** attributes control report pagination. See ["Controlling Interactive Report Pagination"](#) on page 9-32.
  - **Sorting** attributes enable you to define images and image attributes for images that display in report headings to sort values. See ["Managing Interactive Report Column Sorting"](#) on page 9-33.
  - **Search Bar** contain attributes that enable you to define the search bar within an interactive report. See ["Customizing the Interactive Report Search Bar"](#) on page 9-33.
  - **Download** enables you to add a download option to the Actions menu and export the report as CSV, HTML, Email, XLS, PDF, or RTF file. See ["Configuring Download Options on the Actions Menu"](#) on page 9-36.
  - **Link Column** attributes enable you to add a link to a column. See ["Understanding Link Columns"](#) on page 9-38 and ["Creating a Column Link in an Interactive Report"](#) on page 9-40.
  - **Advanced Attributes** enable you to define the Interactive Report region alias, specify an item whose value stores the saved report id, and define items to set into session state. See ["Configuring Advanced Attributes for Interactive Reports"](#) on page 9-45.
  - **Icon View** attributes enable you to add a View Icons icon to the Search bar. See ["Enabling Icon View"](#) on page 9-43.
  - **Detail View** attributes enable you to add a View Details icon to the Search bar. See ["Enabling Detail View"](#) on page 9-45.
  - **Description** lists a textual description of the current report.
6. To learn more about a specific attribute, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

**See Also:** ["Creating a Column Link in a Classic Report"](#) on page 9-59 and ["Defining an Updatable Column in a Classic Report"](#) on page 9-60, and ["Defining a Column as a List of Values in a Classic Report"](#) on page 9-61, and ["Controlling When Columns Display in a Classic Report"](#) on page 9-62

## About Navigation Alternatives

The Report Attribute page is divided into these sections: Column Attributes, Groups, Pagination, Sorting, Search Bar, Download, Link Column, Icon View, Detail View, Advanced, and Description.

You can access these sections by scrolling down the page, or by clicking a navigation button at the top of the page.

Region Definition

Report Attributes

Saved Reports

Print Attributes

Region Name: Projects

Cancel

Apply Ch

Show All

Column Attributes

Column Groups

Pagination

Sorting

Search Bar

Download

Link Column

Advanced Attributes

Icon View

Detail View

Description

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**.

Editing Interactive Report Column Attributes

You can use the Column Attributes section of the Report Attributes page to precisely control the report layout. For example, you can use these attributes to alter column heading text, change column positioning, or hide a column.

To access Column Attributes:

- 1. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 9-28.

The Interactive Report Attributes page appears with the Column Attributes section at the top of the page.

Region Definition

Report Attributes

Saved Reports

Print Attributes

Region Name: Projects

Cancel

Apply Changes

Show All

Column Attributes

Column Groups

Pagination

Sorting

Search Bar

Download

Link Column

Advanced Attributes

Icon View

Column Attributes

^

To change the column display order run the report as a developer. Click Select Columns from the Actions Menu and move the displayed columns using the arrows. Then select Save Report from the Action Menu and save **As Default Report Settings**.

		Heading	Type	Link	Display Text As
	ID	<input type="text" value="Id"/>	NUMBER		<input type="text" value="Hidden"/>
	PROJECT	<input type="text" value="Project"/>	STRING		<input type="text" value="Display as Text (escape special characters)"/>
	TASK_NAME	<input type="text" value="Task Name"/>	STRING		<input type="text" value="Display as Text (escape special characters)"/>

Use the Column Attributes section to control report column appearance and functionality.

**Heading** displays the heading text to be included in the report. **Type** indicates the type of query column. The **Link** column indicates if a link column is currently defined.

Table 9-1 describes common report column edits.



**Table 9–1 Common Report Column Edits for Interactive Reports**

Description	Developer Action
Alter column display sequence.	Click the up and down arrows to change the column display sequence.  This display sequence is only used in the Single Row View if enabled. It does not affect report column display. The report column display can be changed when you run the report and save.
Change column group assignment.	If Column Groups are defined, individual columns can be assigned under Column Group.
Change column heading text.	Under Heading, enter different heading text.
Change how columns display.	Select an option from Display Text As.

You can further refine the attributes of a specific column on the Column Attributes page.

2. To access the Column Attributes page, click the **Edit** icon next to the appropriate column Alias.

The Column Definition appears.

Use the check boxes under Allow Users To to control how users manipulate the report. Options include: Hide, Sort, Filter, Highlight, Control Break, Aggregate, Compute, Chart, and Group By.

3. Under Column Definition, Allow Users To, select the appropriate check boxes.  
To learn more about a specific attribute, click the item label.

## Creating Column Groups

Use column groups to group columns on a single row view.

To create a column group:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Column Groups.
3. Click **Add Group**.
4. Under Column Group:
  - a. Sequence - Enter the display sequence for this column group. This attribute determines the order in which the column groups display in the detail view.
  - b. Group Name - Enter a column group name. This name displays in the region header in detailed view.
  - c. Description - Enter an optional description for the column group. This description never displays to the end user.
5. Click **Create**.

## Controlling Interactive Report Pagination

You control how pagination displays by making selections from Pagination attributes on the Interactive Report Attributes page.

To access the Pagination section of the Report Attributes page:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Pagination.

You use the Pagination attributes to select a pagination style, determine where pagination occurs, specify the maximum number of rows to query, and messages to display when more than the maximum number of rows are returned or if no rows are returned.

[Table 9–2](#) describes the available Pagination attributes.

**Table 9–2** *Pagination Attributes*

Attribute	Description
Pagination Type	Select a pagination type. Pagination provides the user with information about the number of rows and the current position within the result set. You can display pagination above or below the report (or both) and position it on the left or right. Available pagination options include: <ul style="list-style-type: none"><li>■ Row Ranges X to Y</li><li>■ Row Ranges X to Y of Z</li></ul>
Pagination Display Position	Defines where pagination occurs. Pagination can be display on the left side, right side, at the bottom, or above the report.
Show Null Values as	Enter the text you want to display for null columns. The default value is (null).

**Table 9–2 (Cont.) Pagination Attributes**

Attribute	Description
Maximum Row Count	<p>Defines the maximum number of rows to query, for example, rows 1 - 10 or 456.</p> <p>If you set this attribute to 200, the result would appear as follows:</p> <p>rows 1 - 10 of more than 200 rows</p> <p>This attribute impacts performance. Counting fewer rows can improve performance and counting thousands of rows can degrade performance.</p>
When more than maximum row data found message	Defines the text message that displays when more than the maximum row count is returned.
When No Data Found Message	Defines the text message that displays when the query does not return any rows.

## Managing Interactive Report Column Sorting

You manage column sorting on the Interactive Report Attributes page.

To manage column sorting:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

2. Under Column Attributes, click the **Edit** icon for the column for which you want to enable sorting.
  3. Under Column Definition, select **Sort** and click **Apply Changes**.
- The Interactive Report Attributes page appears.
4. Scroll down to Sorting.
  5. Specify ascending and descending image attributes and click **Apply Changes**.

## Customizing the Interactive Report Search Bar

A search bar displays at the top of every interactive report and includes a Select columns to search icon, Text area, Go button, and Actions menu.



You can remove or customize the search bar by selecting and deselecting options in the Search Bar section of the Interactive Reports Attributes page.

### Topics:

- [Customizing the Search Bar](#)
- [Removing the Search Bar](#)

**See Also:** "[Enabling Icon View](#)" on page 9-43 and "[Enabling Detail View](#)" on page 9-45

## Customizing the Search Bar

To customize the search bar:

1. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Search Bar.

Use these attributes to customize how the search bar displays. [Table 9–3](#) describes Search bar attributes:

**Table 9–3 Search Bar Attributes**

Attribute	Description
Include Search Bar	<p>Select <b>Yes</b> or <b>No</b>. Selecting <b>No</b> removes the following default components:</p> <ul style="list-style-type: none"> <li>■ Search Field - Displays a text field in the search bar in which to enter search criteria.</li> <li>■ Finder Drop Down - Enables users to search on a selected column or against all columns.</li> <li>■ Reports Select List - Displays report select list if the report has alternative default, shared report or personal report. See <a href="#">"Saving an Interactive Report"</a> on page 9-21.</li> <li>■ Rows Per Page Selector - Displays a select list to enable users to select the number of rows to display per page.</li> <li>■ Actions Menu - Enables the user to customize the report based on selected Actions.</li> </ul>

**Table 9–3 (Cont.) Search Bar Attributes**

Attribute	Description
Include in Actions Menu	<p>Select and deselect functions to be included in the Actions menu. Available options include:</p> <ul style="list-style-type: none"> <li>■ Select Columns - Used to hide, unhide, and order the report columns.</li> <li>■ Filter - Used to add filters to the report (for example, STATE = VA).</li> <li>■ Rows Per Page - Used to display rows per page menu.</li> <li>■ Sort - Used to sort columns.</li> <li>■ Control Break - Used to build control breaks on report columns.</li> <li>■ Highlight - Used to define conditions that highlights certain rows.</li> <li>■ Compute - Used to add computed columns.</li> <li>■ Aggregate - Used to include aggregate calculations on report columns.</li> <li>■ Chart - Used to create a Flash chart based off the data in the report.</li> <li>■ Group By - Used to create a Group By view based off the data in the report.</li> <li>■ Flashback - Used to flashback the report data to some time in the past.</li> <li>■ Save Report - Used to save the report settings for future use. Only available for authenticated pages.</li> <li>■ Save Public Report * - Used to save a public report for all users to view. You must select Save Report to enable this option. Only available for unauthenticated pages.</li> <li>■ Reset - Used to reset the report to the default settings.</li> <li>■ Help - Used to display instructions for using the Interactive report.</li> <li>■ Download - Used to download the report in different formats.</li> </ul> <p><b>Note:</b> Disabling the Download functionality only prevents the Download menu from displaying on the Actions menu. To fully prevent users from downloading data, deselect all check boxes in the Download Formats section.</p> <ul style="list-style-type: none"> <li>■ Subscription * - Used to schedule a subscription to send the report in email. Only available for unauthenticated pages.</li> </ul> <p><b>See Also:</b> <a href="#">"About the Actions Menu"</a> on page 9-6.</p>
Save Report Public Authorization	<p>Users can save reports and classify them as being either public or private. Public reports can be viewed by all users. Private reports can only be viewed by the user who saved the report.</p> <p>In addition to enabling Save Public Report on the Actions Menu, you can add additional security by defining an Authorization Scheme to determine who has rights to enable Save Public Report.</p> <p>To enable support for public reports, select an authentication method from this list.</p>
Button Template	Select a template for buttons that display in the search region and in the dialogs.

**Table 9–3 (Cont.) Search Bar Attributes**

Attribute	Description
Finder Image	Specify an image. If no image is defined, the following is used: <code>/i/html/db/builder/finder_w_dropdown.gif</code>
Actions Menu Image	Specify an image. If no image is defined, the default button is used.
Search Button Label	Specify the text to use as search button label.
Maximum Rows Per Page	Enter the maximum number to display in the Rows Per Page Selector.

### 3. Click **Apply Changes**.

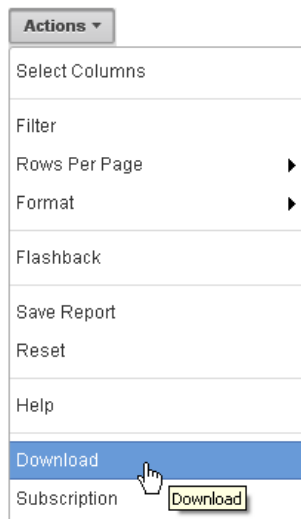
## Removing the Search Bar

To remove the search bar:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Scroll down to Search Bar.
3. From Include Search Bar, select **No**.
4. Click **Apply Changes**.

## Configuring Download Options on the Actions Menu

You can add a Download option to the Actions menu to enable users to download an interactive report as a comma-delimited file (CSV) format, HTML, Microsoft Excel (XLS) format, Adobe Portable Document Format (PDF), Microsoft Word Rich Text Format (RTF), or as HTML attached to an email.



## Enabling Download Formats

To configure download formats:

1. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Search Bar.
  - a. For Include Search Bar, select **Yes** and then select **Actions Menu**.
  - b. Under Include in Actions menu, select **Download**.

**Tip:** Disabling the Download functionality only prevents the Download menu from displaying on the Actions menu. To fully prevent users from downloading data, deselect all check boxes in the Download Formats section.

3. Scroll down to Download.
4. Select download formats. Options include:
  - **CSV**. See ["Enabling CSV Download"](#) on page 9-37.
  - **HTML**.
  - **Email**. See ["Enabling Email Download"](#) on page 9-38.
  - **XLS**.
  - **PDF**. See ["About Printing Reports to PDF"](#) on page 9-63.
  - **RTF**.

**Tip:** The Download option only appears on the Actions menu if a file format is selected. If a report server has not been defined within Instance Administration then certain options do not display. To learn more, see *"Configuring Report Printing" Oracle Application Express Administration Guide*.

5. Click **Apply Changes**.

### Enabling CSV Download

To enable the Enable CSV download:

1. Enable the CSV output option on the Edit Globalization Attributes page. See ["Accessing the Globalization Attributes Page"](#) on page 7-27 and ["Automatic CSV Encoding"](#) on page 7-29.
2. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.  
The Interactive Report Attributes page appears.
3. Scroll down to Search Bar.
  - a. For Include Search Bar, select **Yes** and then select **Actions Menu**.
  - b. Under Include in Actions menu, select **Download**.
4. Scroll down to Download.
5. From Download Formats, select **CSV**.

**Tip:** The Download option only appears on the Actions menu if a file format is selected.

6. In the CSV Separator, define the column separator. If no value is entered, a comma or semicolon is used depending on your current NLS settings.
7. In the CSV Enclosed By, enter a delimiter character. This character delineates the starting and ending boundary of a data value. Default delimiter is double quotation marks (" ").
8. In 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.
9. Click **Apply Changes**.

### Enabling Email Download

You can configure the Download option to send static HTML report to specific email addresses.

**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 email download:

1. An Oracle Application Express administrator must configure email at the Instance level. See "Configuring Mail" in *Oracle Application Express Administration Guide*
2. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

3. Scroll down to Search Bar.
  - a. For Include Search Bar, select **Yes** and then select **Actions Menu**.
  - b. Under Include in Actions menu, select **Download**.
4. Scroll down to Download.
5. From Download Formats, select **Email**.

**Tip:** The Download option only appears on the Actions menu if a file format is selected.

6. Click **Apply Changes**.

**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](#)" on page 9-46

### Understanding Link Columns

A Link Column displays on the left side of an interactive report. It can link to a single row view, a custom target, or be excluded from the report. Note that 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

To link to a single row view:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Scroll down to Link Column.
3. For Link Column, select **Link to Single Row View**.
4. From Single Row View, select the appropriate options:
  - **Allow Exclude Null Values** - Excludes columns with null values.
  - **Allow Displayed Columns** - Displays only the columns shown in the report.
5. For Uniquely Identify Rows by, select **ROWID** or **Unique Column**.  
If you select, **Unique Column**, specify the column in the Unique Column field.
6. For Link Icon, select an icon.
7. For Link Attributes (Optional), specify additional column link attributes to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
8. Click **Apply Changes**.

**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 make the report accessible. To override this behavior, include meaningful ALT text.

## Linking to a Specific Page

To link to a specific page:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Scroll down to Link Column.
3. For Link Column, select **Link to Custom Target**.
4. For Link Icon, select an icon.
5. For Link Attributes (Optional), specify additional column link attributes to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
6. For Target, select **Page in this Application**.
7. For Page, select the target page number. To reset the pagination for this page, select **Reset Pagination**.
8. For Request, specify the request to be used.
9. For Clear Cache, specify the pages (that is, the page numbers) on which to clear cache. You can specify multiple pages by listing the page numbers in a comma-delimited list. See "[Linking to Interactive Reports](#)" on page 9-47.
10. For Name and Value, specify session state for a specific item.
11. Click **Apply Changes**.

## Linking to a URL

To link to a URL:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Scroll down to Link Column.
3. For Link Column, select **Link to Custom Target**.
4. For Link Icon, select an icon.
5. For Link Attributes (Optional), specify additional column link attributes that to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
6. From Target, select **URL**.
7. In URL, enter the appropriate address.
8. For Checksum - Select one of the following:
  - Use default
  - Application Level - Link reusable by any user
  - User Level - Link reusable by current userTo learn more about each option, see item Help.
9. Click **Apply Changes**.

## Excluding a Link Column

To exclude a column link:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Scroll down to Link Column.
3. For Link Column, select **Exclude Link Column**.
4. Click **Apply Changes**.

## Creating a Column Link in an Interactive Report

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. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Under Column Attributes, locate the column to contain the link.
3. Click the **Edit** icon next to the column name.  
The Column Attributes page appears.
4. Scroll down to Column Link.
5. To create a column link to another page:

- a. From Target, select **Page in this Application**.
- b. (Optional) In Link Attributes, specify additional column link attributes to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
- c. In Link Text, enter the text to be displayed as a link, specify an image tag, or pick from the list of default images.
- d. In Page, specify the target page number. To reset the pagination for this page, select **Reset Pagination**.
- e. In Request, specify the request to be used.
- f. In Clear Cache, specify the pages (that is, the page numbers) on which to clear cache. You can specify multiple pages by listing the page numbers in a comma-delimited list.
- g. Use the Name and Value fields to specify session state for a specific item.
- h. For Checksum - Select one of the following:
  - Use default
  - Application Level - Link reusable by any user
  - User Level - Link reusable by current user
 To learn more about each option, see item Help.

**6. Click **Apply Changes**.**

To create a column link to a URL:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.  
The Interactive Report Attributes page appears.
2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.  
The Column Attributes page appears.
3. Scroll down to Column Link.
4. Under Column Link, specify the following:
  - a. From Target, select **URL**.
  - b. In Link Text, enter the text to be displayed as a link and select a substitution string.
  - c. (Optional) In Link Attributes, specify additional column link attributes to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
  - d. In URL, enter the appropriate address.
5. Click **Apply Changes**.

## Displaying Interactive Reports Conditionally

You can choose to have interactive reports display conditionally by editing region attributes on the Edit Region page.

To display an interactive report conditionally:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.

2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.

The Edit Region page appears.

3. Scroll down to Conditions.
4. From the Condition Type list, make a selection.
5. Enter an expression in the fields provided.
6. Click **Apply Changes**.

**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 in the interactive report function incorrectly.

## Defining a Column as a List of Values in an Interactive Report

In interactive reports you can use a list of values to improve the speed of built-in filter tools.

To define a report column as a list of values:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.

The Column Attributes page appears.

3. Scroll down to List of Values.
4. From Column Filter List of Values, specify how to create a list of values as a filter on the report column list. Available options include:
  - **None** - Disable filter on list of values.
  - **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 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.
5. Click **Apply Changes**.

## Formatting Columns in an Interactive Values Report

You can use HTML expressions in interactive reports to further the customize column display.

To define column formatting:

1. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.
3. Scroll down to Column Formatting.
4. Specify HTML expressions to be shown for the column. Use substitution strings for column names to show column values in HTML. Consider the following examples:

Example 1:

```
<span style="background-color: yellow; color: red;">#EMPLOYEE_STATUS</span>
```

Example 2:

```
<span class="#COLUMN_CLASS#">#EMPLOYEE_STATUS#
```

In the previous example, the #COLUMN\_CLASS# and #EMPLOYEE\_STATUS# substitutions in this example are columns selected in the report SQL query.

Example 3:

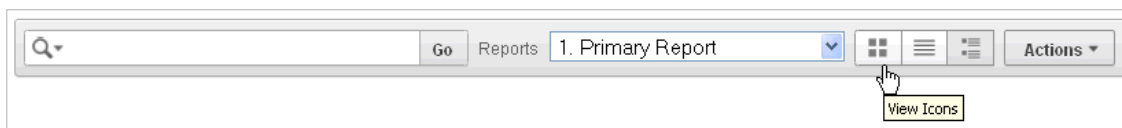
```

```

5. Click **Apply Changes**.

## Enabling Icon View

By default, most interactive reports display as a report. You can optionally display columns as icons. When configured, 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.

### Topics:

- [Adding Icon View to an Interactive Report](#)
- [Adding a Custom Icon View Link](#)

### Adding Icon View to an Interactive Report

To add Icon view to an interactive report:

1. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Icon View.

3. For Icon View Enabled, select **Yes**.
4. Specify the following mandatory attributes:
  - Link Column - Select the column that returns the link target of the icon. See item Help for an example.
  - Image Source Column - Identify the column that returns the image source. See item Help for an example.
  - Label Column - Select the column that returns the image label. See item Help for an example.
5. For Columns Per Row, identify the number of icons to be displayed per row. A value of 5 would display 5 icons per row.
6. Click **Apply Changes**.

### Adding a Custom Icon View Link

To add a custom Icon View link:

1. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Icon View.
3. For Use Custom Icon Link, select **Yes**.
4. For Columns Per Row, identify the number of icons to be displayed per row.  
A value of 5 would display 5 icons per row.

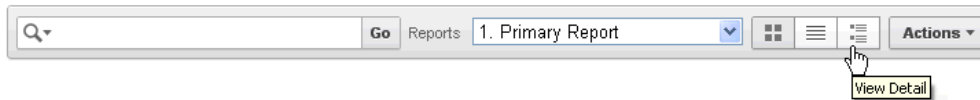
5. In Custom Link, enter the column link for the Icon view. Use substitution strings for column names, for example:

```
<a href="#ICON_LINK#"><br />#PRODUCT_NAME#</a>
```

6. Click **Apply Changes**.

## Enabling Detail View

By 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. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Detail View.
3. For Detail View Enabled, select **Yes**.
4. Specify the following attributes:

- Before Rows - Enter the HTML to be displayed before report rows. For example:

```
<TABLE>
```

- For Each Row (Use #COLUMN\_ALIAS# substitutions) - Use substitution strings for column names and column labels. For example:

```
<tr><td align="right">#ENAME_LABEL#</td><td>#ENAME#</td></tr>
<tr><td align="right">#JOB_LABEL#</td><td>#JOB#</td></tr>
```

- After Rows - Enter the HTML to be displayed after report rows. For example:

```
</TABLE>
```

5. Click **Apply Changes**.

## Configuring Advanced Attributes for Interactive Reports

Use the Advanced Attributes section to define the Interactive Report 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.

To configure Advanced Attributes:

1. Access the Interactive Report Attributes page. See ["Accessing the Interactive Report Attributes Page"](#) on page 9-28.

The Interactive Report Attributes page appears.

2. Scroll down to Advanced Attributes.

[Table 9–4](#) describes the available Advanced Attributes.

**Table 9–4 Advanced Attributes**

Attribute	Description
Region Alias	<p>Enter an alphanumeric alias for this interactive report region. The alias must be unique within the application.</p> <p>You can use an alias to reference an interactive report in an API call. For example, you can write a function to return <code>INTERACTIVE_REPORT_ID</code> by querying <code>ALIAS</code> column in the <code>APEX_APPLICATION_PAGE_IR</code> view). The alias must be unique within the application. Since the <code>INTERACTIVE_REPORT_ID</code> value can change when you export or import to different instance, referencing an interactive report region using an alias can be useful.</p>
Report ID Item	<p>Enables you to send a user to a saved view of a report rather than the default, or working view. You specify an item whose value stores the report id of the saved view. Report ID's can be retrieved from the <code>APEX_APPLICATION_PAGE_IR_RPT</code> view.</p>
Email From Address	<p>Enter a valid email address to use as the from address when sending email from an email download or a subscription. The value can be a literal string containing a valid email or an application substitution defined at the application-level using substitution syntax or the <code>&amp;APP_EMAIL.</code> substitution which returns the Application Email From Address defined at the application-level. Examples:</p> <pre>john.doe@abc.com &amp;MY_APP_EMAIL_FROM. &amp;APP_EMAIL.</pre> <p>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.</p> <p><b>Tip:</b> The email from address comes from the following in the order of precedence:</p> <p>Email From Address at report level &gt; Application Email From Address at application level &gt; Default Email From Address at instance level.</p> <p>If all of them are null, the email from address is the same as email to address.</p> <p><b>See Also:</b> <a href="#">"About the Edit Application Definition Page"</a> on page 7-15.</p>

### 3. Click **Apply Changes**.

## About Emailing from an Interactive Report

You can define the from address for emails sent from an interactive report in two ways:

- At the application-level on the Edit Application Definition page in the Application Email from Address attribute. See ["About the Edit Application Definition Page"](#) on page 7-15.
- At the interactive report-level on the Interactive Report Attributes page in the Email from Address attribute. See ["Configuring Advanced Attributes for Interactive Reports"](#) on page 9-45



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.
```

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.

**See Also:** ["Enabling Email Download"](#) on page 9-38 and [Understanding Substitution Strings](#)

## Linking to Interactive Reports

Unlike classic reports which typically use page items as report parameters, the data in an interactive report is driven by declarative filters. However, the developer may want to set these report parameters by modifying interactive report settings for an end user. These settings only affect the end user's working report and do not affect any saved report settings.

To reset an interactive report in a link, use the string "RIR" in the Clear-Cache section of a URL. 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.

To create a Row text contains filter on an interactive report, use the string `IR_ROWFILTER` in the Item Names section of the URL. Adding this string passes the filter value in the corresponding location in the Item Values section of the URL.

To create a filter on an interactive report in a link, use the string `IR<operator>_<target column alias>` in the Item Names section of the URL, and pass the filter value in the corresponding location in the Item Values section of the URL.

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 backslash, \)
- IN = In (escape the comma separated values with backslash, \)

- `ROWFILTER = Row Text Contains` (this searches all columns displayed in the report with type `STRING` or `NUMBER`)

Consider the following example:

```
f?p=...:IR_ENAME:KING
```

The previous example is equivalent to the end user creating a filter on the target page: `ENAME = KING`. When an operator is not provided, `EQ` is used because it is the default.

```
f?p=...:IRGT_SAL:3000
```

The previous example is equivalent to the end user creating a filter on the target page: `SAL > 3000`.

## Linking to Shared Interactive Reports

You can link to saved primary default, alternative default and public reports using `IR_REPORT_[report_alias]` in the request value of the URL.

### Link Examples to a Primary Report

The following examples demonstrate how to link to a primary report (`report_alias=12345`):

This example links to a primary report:

```
f?p=100:1:&APP_SESSION.:IR_REPORT_12345
```

This example links, resets, and clears primary report settings:

```
f?p=100:1:&APP_SESSION.:IR_REPORT_12345::RIR,CIR:
```

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_REPORT_12345::RIR,CIR:IR_ENAME:KING
```

### Link Examples to Saved Reports

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.:IR_REPORT_1234
```

This example links, resets, and clears settings for saved report 12345:

```
f?p=100:1:&SESSION.:IR_REPORT_12345::RIR,CIR:
```

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.:IR_REPORT_12345::RIR,CIR::RIR,CIR:IR_ENAME:KING
```

If you reset, clear, or create filter using URL without the `IR_REPORT_[report_alias]` request value, it resets, clears, and creates filter on the primary report. For example, this link goes to the primary report:

```
f?p=100:1:&SESSION.:::RIR,CIR:IR_ENAME:KING
```

## Editing the Saved Report Alias

Developers can edit the report alias or view link examples by going to Saved Reports page.

To access the Saved Reports page.

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Go to the Page Definition containing the saved interactive report.  
The Page Definition appears.
4. To access the Saved Reports page:
  - Tree view - Right-click the Region name and select **Edit Saved Reports**.
  - Component view - Under Regions, click the **Saved Report** link.  
The Saved Reports page appears.
5. In Report Alias, you can either:
  - Enter a new alias for the saved report
  - Copy and paste the link example to link to a specific saved report
6. Click **Apply Changes**.

## Managing Saved Reports as a Developer

Each interactive report can have multiple default reports. A report categorized as **Primary Default** displays initially and cannot be renamed nor deleted. A report saved as **Alternative Default** can be selected from Reports list on the Search bar.

End users can also save reports and classify them as being either **public** or **private**. **Public** reports can be viewed by all users. **Private** reports can only be viewed by the user who saved the report.

**See Also:** ["Saving an Interactive Report"](#) on page 9-21

### Topics:

- [Editing or Renaming an Alternative Default Interactive Report](#)
- [Viewing or Deleting Saved Reports](#)

### Editing or Renaming an Alternative Default Interactive Report

To rename an alternative default interactive report:

1. Run the report as a developer.
2. Select the report to be edited.
3. Click the Saved Report link.  
A new region appears.
4. Edit the attributes (for example, enter a new name or change the default report type).
5. Click **Apply**.

**See Also:** ["Saving a Default Interactive Report"](#) on page 9-24

## Viewing or Deleting Saved Reports

To view a listing of Saved Reports:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

2. Click the **Saved Reports** tab.

A report displays all saved reports by report type, report name, owner, and report alias.

Region Definition | Report Attributes | **Saved Reports** | Print Attributes

Region Name: **Projects** [Reset] [Delete Checked] [Apply Changes]

Q- [Go] [Actions ▼]

<input type="checkbox"/>	Report Type ▼	Report Name	Owner	Report Alias	Link Example
<input type="checkbox"/>	Private	By Owner			
	Primary Default	Primary Report		19091460	f?p=100446:1:&APP_SESSION.:fR_REPORT_19091460
<input type="checkbox"/>	Alternative Default	Budget Review		19092255	f?p=100446:1:&APP_SESSION.:fR_REPORT_19092255

3. To delete a report, select it and click **Delete Checked**.

## Viewing Saved Report Activity

Developers can view saved report activity by clicking the **View Saved Report Activity** link under Tasks on the Edit Report Attributes page. This link only displays if saved reports other than the primary default report exist. You can use this page to determine which reports are being used and which ones are not.

To view saved report activity:

1. Access the Interactive Report Attributes page. See "[Accessing the Interactive Report Attributes Page](#)" on page 9-28.

The Interactive Report Attributes page appears.

2. On the Tasks list, click **View Saved Report Activity**.

**Tip:** You can also view saved report activity from the Workspace Administration page. On the Workspace home page, click **Administration** and then **Monitory Activity**. Under Page Views, click **by Interactive Report**.

## Editing Classic Reports

Developers can control report layout, pagination, column sorting, error messages, export links, and column break of Classic reports using the Report Attributes page.

**Tip:** With the addition of interactive reports in Oracle Application Express release 3.1, all previous report types are referred to as classic reports. See ["Editing Interactive Reports as a Developer"](#) on page 9-27.

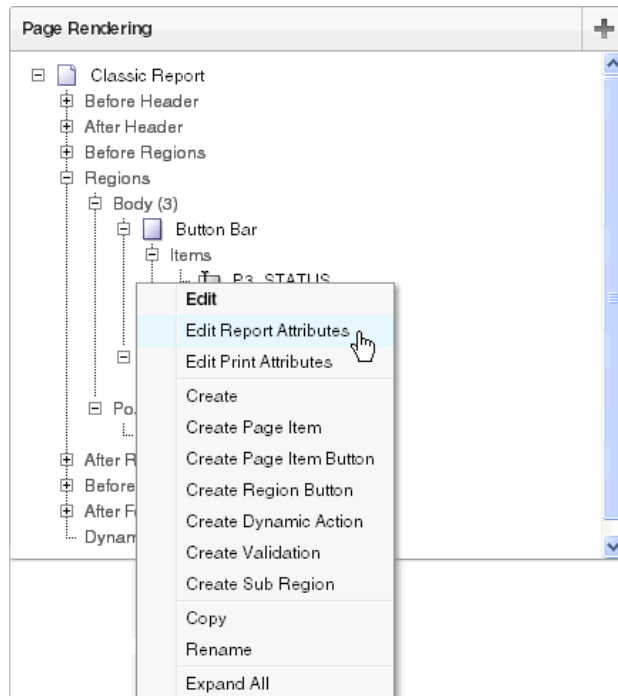
**Topics:**

- [Accessing Classic Report Attributes](#)
- [Altering Classic Report Layout Using Column Attributes](#)
- [Controlling Classic Report Pagination](#)
- [Enabling Column Sorting in a Classic Report](#)
- [Adding a Download Link to a Classic Report](#)
- [Enabling the CSV Output Option in a Classic Report](#)
- [Exporting a Classic Report as an XML File or a CSV File](#)
- [Creating a Column Link in a Classic Report](#)
- [Defining an Updatable Column in a Classic Report](#)
- [Defining a Column as a List of Values in a Classic Report](#)
- [Controlling When Columns Display in a Classic Report](#)
- [Controlling Column Breaks in a Classic Report](#)
- [Synchronizing Classic Report Column Order with Region Source](#)

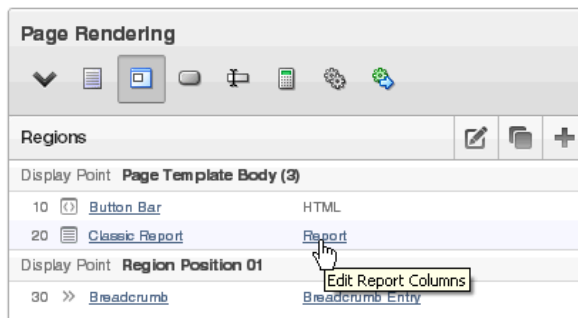
## Accessing Classic Report Attributes

To access the Report Attributes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Select a page.  
The Page Definition appears.
4. To access the Report Attributes page:
  - Tree view - Right-click the region name and select **Edit Report Attributes**.



- Component view - Click the Report link next to the report region you want to edit.



The Report Attributes page appears and is divided into the following sections:

- **Column Attributes** control the report layout. See ["Altering Classic Report Layout Using Column Attributes"](#) on page 9-53.
- **Layout and Pagination** attributes control report pagination. See ["Controlling Classic Report Pagination"](#) on page 9-55.
- **Sorting** attributes enable you to define images and image attributes for images that display in report headings to sort values. See ["Enabling Column Sorting in a Classic Report"](#) on page 9-57.
- **Messages** contain attributes that enable you to define messages that display if no data is found or more data is found than can be displayed.
- **Report Export** attributes enable you to add download link to a report or export a report as either an XML file or CSV file. See ["Adding a Download Link to a Classic Report"](#) on page 9-58 and ["Exporting a Classic Report as an XML File or a CSV File"](#) on page 9-58.

- **Break Formatting** attributes enable you to control if a specific column repeats and how column breaks appear when printed. See ["Controlling Column Breaks in a Classic Report"](#) on page 9-62.
  - **External Processing** attributes enable you to specify a URL for post processing and a link label.
5. To learn more about a specific attribute, click the item label.  
When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.
  6. To save your changes, click **Apply Changes**.

**See Also:** ["Creating a Column Link in a Classic Report"](#) on page 9-59 and ["Defining an Updatable Column in a Classic Report"](#) on page 9-60, and ["Defining a Column as a List of Values in a Classic Report"](#) on page 9-61, and ["Controlling When Columns Display in a Classic Report"](#) on page 9-62

### About Navigation Alternatives

The Report Attribute page is divided into these sections: Column Attributes, Layout and Pagination, Sorting, Messages, Report Export, Break Formatting, and External Processing.

You can access these sections by 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**.

## Altering Classic Report Layout Using Column Attributes

You can use the Column Attributes section of the Report Attributes page 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 access the Column Attributes:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Select a page.

The Page Definition appears.

4. Access the Classic Report Attributes page. See ["Accessing Classic Report Attributes"](#) on page 9-51.

The Report Attributes page appears with the Column Attributes section at the top of the page.

Application Builder Application 100446 Page 3 Report Attributes Page 3

Region Definition Report Attributes Print Attributes

Region Name: Classic Report Cancel Apply Changes

Show All Column Attributes Layout and Pagination Sorting Messages Report Export Break Formatting External Processing

Column Attributes

Headings Type: ☐ Column Names ☐ Column Names (InitCap) ☒ Custom ☐ PL/SQL ☐ None

Alias	Link	Edit	Heading	Column Width	Column Alignment	Heading Alignment	Show	Sum	Sort	Sort Sequence
ID			ID		left	center	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
PROJECT			Project		left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1
TASK_NAME	<input checked="" type="checkbox"/>		Task		left	left	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2
START_DATE			Start Date		left	center	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-

Use the Column Attributes section to control report column appearance and functionality.

**Heading Type** identifies how the heading is generated for the report. The **Link** column indicates if a column link is currently defined. The **Edit** column indicates whether a column is currently updatable.

Table 9–5 describes common report column edits.

**Table 9–5 Common Report Column Edits for Classic Reports**

Description	Developer Action
Alter column display sequence.	Click the up and down arrows to change the column display sequence.
Alter heading alignment.	Under Column Alignment, select a column alignment.
Change column heading text.	Under Heading, enter different heading text.
Control which columns display.	Click <b>Show</b> to indicate a column should display.
Enable a unique sort sequence.	Click <b>Sort</b> and select a sequence number from <b>Sort 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.	Click <b>Sum</b> to enable the sum of a column.

You can further refine the attributes of a specific column on the Column Attributes page.

- To access the Column Attributes page, click the **Edit** icon next to the appropriate column Alias.

To learn more about a specific attribute, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.



**See Also:** ["Creating a Column Link in a Classic Report"](#) on page 9-59 and ["Defining an Updatable Column in a Classic Report"](#) on page 9-60, and ["Defining a Column as a List of Values in a Classic Report"](#) on page 9-61, and ["Controlling When Columns Display in a Classic Report"](#) on page 9-62

## Controlling Classic Report Pagination

You control report pagination by:

- Including a pagination substitution string in the report template
- Making selections from the Layout and Pagination section on the Report Attributes page

You control how pagination displays by making selections from the Layout and Pagination attributes on the Report Attributes page.

### Topics:

- [Accessing and Understanding Layout and Pagination Attributes](#)
- [Including Pagination After the Rows in a Classic Report](#)
- [Including Pagination Before the Rows in a Classic Report](#)

### Accessing and Understanding Layout and Pagination Attributes

To access the Layout and Pagination section of the Report Attributes page:

1. Create a report. See ["Creating a Report Using a Wizard"](#) on page 9-3.
2. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
3. Access the Classic Report Attributes page. See ["Accessing Classic Report Attributes"](#) on page 9-51.

The Report Attributes page appears.

4. Scroll down to Layout and Pagination.

You use the Layout and Pagination attributes to select a pagination style, determine where pagination occurs, and specify the number of rows that display on each page. [Table 9-6](#) describes the most commonly used Layout and Pagination attributes.

To learn more about a specific attribute, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

**Table 9-6** *Layout and Pagination Attributes*

Attribute	Description
Report Template	Specifies a template to be applied to this report. Report templates provide control over the results of a row from your SQL query. You can choose from many default templates, or pick a custom build template.
Report Attributes Substitution	Enter a value to replace the #REPORT_ATTRIBUTES# substitution string. The #REPORT_ATTRIBUTES# substitution string is only replaced in the before rows attribute of the report template.
Show Null Values as	Enter the text you want to display for null columns. The default value is (null).

**Table 9–6 (Cont.) Layout and Pagination Attributes**

Attribute	Description
Pagination Scheme	<p>Specifies a pagination scheme for this report.</p> <p>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 used to navigate to the next or previous page.</p> <p>For more information, see the Help information for this attribute.</p>
Enable Partial Page Refresh	If enabled, this attribute refreshed the report region when paginating forward and backward in your result set.
Display Position	<p>Defines where pagination occurs.</p> <p>If you choose to display pagination above a report, the selected report template must support that type of display.</p>
Number of Rows	Defines the maximum number of rows to display on each page.
Number of Rows (Item)	Defines the number of rows displayed by default per page for SQL queries (obtained dynamically from an item). Identify the item in this attribute.
Maximum Row Count	<p>Defines the maximum number of rows to query, for example, rows 1 - 10 of 456.</p> <p>If you set this attribute to 200, the result would appear as follows:</p> <p>rows 1 - 10 of more than 200 rows</p> <p>This attribute impacts performance. Counting fewer rows can improve performance and counting thousands of rows can degrade performance.</p>
Strip HTML	<p>Specify whether to remove HTML tags from the original column values for HTML expressions, column links and report data exported as CSV files.</p> <p>If you select values from the database that contain HTML tags, then those tags can cause conflicts with the HTML generated for your columns links or HTML expressions. When this option is enabled, only the actual data portion of your column value is used.</p>
Sort Nulls	<p>For reports with column heading sorting, specify if you want null valued columns to sort first or last.</p> <p><b>See Also:</b> <a href="#">"Enabling Column Sorting in a Classic Report"</a> on page 9-57</p>

### Including Pagination After the Rows in a Classic Report

To include pagination after the rows in a report:

1. Create a report. See ["Creating a Report Using a Wizard"](#) on page 9-3.  
Next, select the appropriate Layout and Pagination attributes.
2. Access the Classic Report Attributes page. See ["Accessing Classic Report Attributes"](#) on page 9-51.  
The Report Attributes page appears.
3. Under Layout and Pagination, select the following:
  - a. Report Template - Select a report template (optional).

- b. Pagination Scheme - Select a pagination scheme.
  - c. Display Position - Select a display position.
  - d. Number of Rows - Specify how many rows display on each page.
  - e. Click **Apply Changes**.
4. Edit the report template:
    - a. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
    - b. Under Templates, select the report template name.
    - c. Include the #PAGINATION# substitution string in the After Rows attribute.
    - d. Click **Apply Changes**.
  5. Run the page.

### Including Pagination Before the Rows in a Classic Report

To include pagination before the rows in a report:

1. Create a report. See "[Creating a Report Using a Wizard](#)" on page 9-3.  
Next, select the appropriate Layout and Pagination attributes.
2. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.  
The Report Attributes page appears.
3. Under Layout and Pagination:
  - a. Report Template - Select a report template (optional).
  - b. Pagination Scheme - Select a pagination scheme.
  - c. Display Position - Select a position that contains the word top.
  - d. Number of Rows - Specify how many rows display on each page.
  - e. Click **Apply Changes**.
4. Edit the report template.
  - a. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
  - b. Under Templates, select the report template name.
  - c. Include the #TOP\_PAGINATION# substitution string in the Before Rows attribute.
  - d. Click **Apply Changes**.
5. Run the page.

### Enabling Column Sorting in a Classic Report

You enable column sorting on the Report Attributes page.

To enable column sorting:

1. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.  
The Report Attributes page appears.

2. Under Column Attributes, select the **Sort** check box next to the columns to be sorted.
3. From Sort Sequence, select a sequence number.  
Sort Sequence is optional. However, if there are one or more sort enabled columns, then at least one column needs a defined Sort Sequence.
4. Scroll down to Sorting.
5. Specify ascending and descending image attributes or click **set defaults**.
6. Click **Apply Changes**.

**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 "[Accessing and Understanding Layout and Pagination Attributes](#)" on page 9-55.

## Adding a Download Link to a Classic Report

You can create a link within a report that enables users to export the report as a comma-delimited file (.csv) file. To add a CSV link to a report you must enable the CSV output option. When using the CSV output option, the report template is not important. You can include a CSV link with any report template that has the CSV export substitution string defined.

**See Also:** "[Automatic CSV Encoding](#)" on page 7-29

## Enabling the CSV Output Option in a Classic Report

To use the enable the CSV output option:

1. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. Scroll down to Report Export.
3. From Enable CSV output, select **Yes**.
4. (Optional) In the Separator and Enclosed By fields, define the separator and delimiter.

The default Enclosed By by characters are a double quotation marks (" "). The default delimiter is either a comma or a semicolon depending upon your current NLS settings.

5. In Link Label, enter link text. This text displays in your report and enables users to invoke a download.
6. (Optional) To specify a default export file name, enter a name in the Filename field.

By default, the Application Express engine creates an export file name by taking the region name and adding the appropriate file name extension (.csv or .xml).

7. Click **Apply Changes**.

## Exporting a Classic Report as an XML File or a CSV File

You can export a report as an XML file by selecting a report template.

To export a report as a file:

1. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. Scroll down to Layout and Pagination.
3. From the Report Template list, select **export: XML** or **export: CSV**.

Selecting **export: XML** prevents the Application Express engine from rendering the page and dumps the content to an XML file.

4. Click **Apply Changes**.

## Creating a Column Link in a Classic Report

Use the 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. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. Under Column Attributes, locate the column to contain the link.
3. Click the **Edit** icon next to the column name.

The Column Attributes page appears.

4. Scroll down to Column Link.
5. To create a column link to another page:
  - a. From Target, select **Page in this Application**.
  - b. (Optional) In Link Attributes, specify additional column link attributes to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
  - c. In Link Text, enter the text to be displayed as a link, specify an image tag, or pick from the list of default images.
  - d. In Page, specify the target page number. To reset the pagination for this page, select **Reset Pagination**.
  - e. In Request, specify the request to be used.
  - f. In Clear Cache, specify the pages (that is, the page numbers) on which to clear cache. You can specify multiple pages by listing the page numbers in a comma-delimited list. See "[Linking to Interactive Reports](#)" on page 9-47.
  - g. Use the Name and Value fields to specify session state for a specific item.
6. Click **Apply Changes**.

To create a column link to a URL:

1. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.

The Column Attributes page appears.

3. Scroll down to Column Link.
4. Under Column Link, specify the following:
  - a. From Target, select **URL**.
  - b. In Link Text, enter the text to be displayed as a link and select a substitution string.
  - c. (Optional) In Link Attributes, specify additional column link attributes to be included in the `<a href= >` tag (for example, a link target, classes, or styles).
  - d. In URL, enter the appropriate address.
5. Click **Apply Changes**.

## Defining an Updatable Column in a Classic Report

You can make a column updatable by editing Tabular Form Element attributes on the Column Attributes page. Note that the Application Express 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. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.

The Column Attributes page appears.

3. Under Column Attributes, specify the following:
  - a. Display As - Select a type of updatable column.

Use this option to make a column updatable. Updates can only be performed if a multirow update is defined, or a PL/SQL process is implemented to process updated data.
  - b. Number/Date Format - Make a selection if you selected the Display As type of **Date Picker**.
  - c. Element Width - Specify the width of the form item.
  - d. Number of Rows - Specify the height of a form item (applicable to text areas).
  - e. Element Attributes - Define a style or standard form element attribute.
  - f. Element Option Attributes - Specify form element attributes for items in a radio group or check box.
4. Tabular Form Attributes, specify the following:
  - a. Default Type - Identify the default type.
  - b. Default - Identify the default source.

- c. Reference Table Owner - Identify the owner of the referenced table. This attribute compares references to columns across applications against User Interface Defaults. This reference is manually maintained after being initialized by a wizard, whenever possible.
  - d. Reference Table Name - Specify the table or view that this column references. This attribute compares references to columns across applications against User Interface Defaults. This reference is manually maintained after being initialized by a wizard, whenever possible.
  - e. Reference Column Name - Specify the column name that this report column references. This attribute compares references to columns across applications against User Interface Defaults. This reference is manually maintained after being initialized by a wizard, whenever possible.
5. Click **Apply Changes**.

## Defining a Column as a List of Values in a Classic Report

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. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.

The Column Attributes page appears. Next, specify how the column is rendered (radio group, LOV, select list, and so on).

3. Under Column Attributes, make a selection from the Display As list.
4. Scroll down to List of Values.
5. From Named LOV, make a selection from the List of Values repository.
6. To include a null value in a list of values:
  - a. In Display Null - Select **Yes**.
  - b. Null display value - Enter the display value for the NULL option here.
  - c. Null return value - Enter the NULL value to be used for this item's list of values. If you do not specify a value, the default is %null%.

A column can also have a value that does not display in its list of values.

7. To define a value that does not display in the list of values:
  - a. From Display Extra Value, select **Yes**.

The extra value is used if the actual column value is not part of the LOV. In that situation, the actual value is shown. If you do not display extra values, you may end up with the wrong value and unintentionally update your data incorrectly.

- b. In Null Value, specify the value that displays.
  - c. If you have not selected a Named LOV, enter the query used to display a select list in the LOV Query field.
8. If you have not selected a Named LOV, enter the query used to display a select list in List of values definition.
  9. Click **Apply Changes**.

## Controlling When Columns Display in a Classic Report

You can use the Authorization and Condition attributes to control when a column displays.

Authorization enables you 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.

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 and Condition attributes:

1. Access the Classic Report Attributes page. See ["Accessing Classic Report Attributes"](#) on page 9-51.

The Report Attributes page appears.

2. Access the Column Attributes page by clicking the **Edit** icon next to the appropriate column.

The Column Attributes page appears.

3. Under Authorization, make a selection from the Authorization Scheme list.
4. Under Conditions, make a selection from the Condition Type list, and depending upon your selection, enter an expression or value in the appropriate Expression fields.

If the authorization is successful and the condition type display evaluates to true, the column displays.

**See Also:** ["Providing Security Through Authorization"](#) on page 15-37, ["Understanding Conditional Rendering and Processing"](#) on page 2-4, and [Appendix C, "Available Conditions"](#) on page C-1

## Controlling Column Breaks in a Classic Report

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 the department number only appears once.

To create this type of column break:

1. Access the Classic Report Attributes page. See ["Accessing Classic Report Attributes"](#) on page 9-51.

The Report Attributes page appears.



2. Scroll down to Break Formatting.
3. Make a selection from the Breaks list.

## Synchronizing Classic Report Column Order with Region Source

To synchronize a classic report's column order with the column order defined in the region source query:

1. Access the Classic Report Attributes page. See "[Accessing Classic Report Attributes](#)" on page 9-51.

The Report Attributes page appears.

2. From Tasks, select **Synchronize Column Order with Region Source**.
3. Click Synchronize.

## Printing Report Regions

You can configure a classic report region to print by exporting it to several different formats. Oracle BI Publisher supports Adobe Portable Document Format (PDF), Microsoft Word Rich Text Format (RTF), or Microsoft Excel format (XLS), or Extensible Markup Language (XML). The supplied OC4J with Apache FOP alternative only supports PDF and XML. If you choose to use other third-party rendering engines, other output formats can also be configured.

By taking advantage of region report printing, your application users can view and print reports that have a predefined orientation, page size, column headings, and page header and footer. Interactive reports also have the ability to export to PDF, RTF, Microsoft Excel and Comma Separated Values (CSV). Note that for interactive reports, it is not possible to define a custom report layout.

### Topics:

- [About Printing Reports to PDF](#)
- [About Report Printing Configuration Options](#)
- [About Classic Report Printing Methods](#)
- [About Report Queries](#)
- [About Report Layouts](#)
- [Configuring Classic Report Region Print Attributes](#)
- [Configuring Interactive Report Region Print Attributes](#)

**Tip:** If you run Oracle Application Express with Oracle Database 11g Release 1 (11.1) or higher, you must enable network services to use report printing. See "[Enabling Network Services in Oracle Database 12c](#)" on page 15-5

## About Printing Reports to PDF

To print a report to PDF, the data must be transformed using a report server defined at the instance-level. From an end user's perspective, they simply click a print link. However, from developer's perspective, you must then declaratively create regions to support PDF printing.

## About Report Printing Configuration Options

Oracle Application Express provides three report printing configuration options:

- **Oracle Application Express Listener** - Select this option if you are using the Oracle Application Express Listener 2.0 or higher. This option enables you to use the basic printing functionality, which includes creating report queries and printing report regions using the default templates provided in Application Express and using your own customized XSL-FO templates.

**Note:** The Oracle Application Express Listener option does not require an external print server; instead the report data and stylesheet 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 Application Express Listener-based configuration.

- **External (Apache FOP)** - Select this option if you are using Apache FOP on an external J2EE server. This option enables you to use the basic printing functionality, which includes creating report queries and printing report regions using the default templates provided in Application Express and using your own customized XSL-FO templates.
- **Oracle BI Publisher** - This option requires a valid license of Oracle BI Publisher (also known as Oracle XML Publisher). This option enables you to take report query results and convert them from XML to RTF format using Oracle BI Publisher. Select this option to upload your own customized RTF or XSL-FO templates for printing reports within Application Express.

**See Also:** *PDF Printing in Application Express* to learn more about installing and configuring Oracle BI Publisher. Go to:

<http://www.oracle.com/technetwork/developer-tools/apex/application-express/configure-printing-093060.html>

To use the full functionality of report printing, your Oracle Application Express service administrator must enable it for your instance. To learn more, see "Configuring Report Printing" in *Oracle Application Express Administration Guide*.

## About Classic Report Printing Methods

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 Region Print Attributes](#)" on page 9-70.
- **Create a Report Query.** You can print a report by defining a report query as a Shared Component. See "[About Report Queries](#)" on page 9-65.

Both report regions and report queries can be downloaded in the following formats:

- PDF - Adobe Portable Document Format.
- RTF - Microsoft Word Rich Text Format.
- XLS - Microsoft Excel format. Note that this 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. To learn more, see ["About Report Layouts"](#) on page 9-68.

**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 HTM (to download the document as an HTML file).

## 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.

### Topics:

- [Creating a Report Query](#)
- [Editing Report Queries](#)
- [Copying Report Queries](#)

### Creating a Report Query

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.

**See Also:** ["About Report Printing Configuration Options"](#) on page 9-64

To create a report query:

1. Navigate to the Shared Components page. See ["Accessing the Shared Components Page"](#) on page 8-50.
2. Under Reports, click **Report Queries**.
3. Click **Create**.
4. For Query, specify the following information:

- 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 check box to reference session state values, such as the values of page items in the XML structure of your report.
  - f. Click **Next**.
5. For SQL Query, enter a SQL statement directly or click **Query Builder** to build a SQL statement by clicking and pointing.

To reference applications and page items in the SQL statement, reference them as 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.
6. For Download Definition, specify the following:
  - a. Data Source for Report Layout - Use this option to download a report definition export file. Select **XML Data** or **XML Schema** and then 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. For Upload Report Layout, specify the following:
  - a. Report Layout Source - Specify how the report layout is derived. If you choose the report based file layout then the layout name and report layout file must be provided.
  - b. Layout Name - Enter a layout name (optional). The default is the report query name.

- c. Report Layout File - Click **Browse** and select a Rich Text Format (RTF).
  - d. Click **Next**.
8. For Confirm:
- 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 - To integrate this report with your application, use the displayed URL as the target for a button, list item, link, or other navigational component. End users can click a button, for example, to start the printing process.
  - 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.
  - g. Click **Finish**.

The Report Query is created and saved to Shared Components.

## Editing Report Queries

To edit a report query:

1. Navigate to the Shared Components page. See "[Accessing the Shared Components Page](#)" on page 8-50.
2. Under Reports, click **Report Queries**.
3. On the Report Queries page, you can use the Navigation bar at the top of the page to search for a query by name or change the page display. For example, you can change the default display by making a selection from View list. Available options include:
  - **Icons** (the default) displays each query as a large icon. To edit a query, click the appropriate icon.
  - **Details** displays each query as a line in a report. To edit a query, click the name.
4. Select the appropriate report query. On the Edit Report Query page, edit the information.
5. Click **Apply Changes**.

## Copying Report Queries

To copy a report query:

1. Navigate to the Shared Components page. See "[Accessing the Shared Components Page](#)" on page 8-50.
2. Under Reports, click **Report Queries**.
3. On the Report Queries page, click **Copy**.
4. 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.

## 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 Application Express.
- 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 Oracle Application Express service administrator must select the Advanced setting for your site. See "Configuring Report Printing" in *Oracle Application Express Administration Guide*.

### Topics:

- [About Report Layout Options](#)
- [Creating a Report Layout](#)
- [Editing Report Layouts](#)
- [Copying Report Layouts](#)

## 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.

**See Also:** "Configuring Report Printing" in *Oracle Application Express Administration Guide*.

## Creating a Report Layout

To create a report layout:

1. Navigate to the Shared Components page. See "[Accessing the Shared Components Page](#)" on page 8-50.
2. Under 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) - This layout is pre-populated with a default template, which you can edit to fit your needs.
- Named Columns (RTF) - This layout is uploaded as an RTF file.
- Named Columns (XSL-FO) - This layout is uploaded as an XSL-FO file.

### 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.  
  
To see a list of valid substitution strings and other information, click the item label, **Report Layout**. This opens a separate Help window.
  - 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. 8.b)Report Layout File - Upload the file containing the report layout.

## Editing Report Layouts

You can edit a generic column report layout directly in Application Express. 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. See "[Accessing the Shared Components Page](#)" on page 8-50.
2. Under 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 then 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.

## Copying Report Layouts

You can copy a report layout to edit and save.

To copy a report layout:

1. Navigate to the Shared Components page. See ["Accessing the Shared Components Page"](#) on page 8-50.
2. Under Reports, click **Report Layouts**.
3. On the Report Layouts page, click **Copy**.
4. On the Copy Report Layout page, select the layout you want to copy, enter a name for the copy, and click **Copy**.

The copy appears in the layout list.

## Configuring Classic Report Region Print Attributes

One approach to printing a report region is to configure Print Attributes. Once configured, these attributes only apply only to current region and cannot be used outside the context of the region.

If the printing feature is set up for your instance, you can configure a report region to print in various formats.

**See Also:** ["About Classic Report Printing Methods"](#) on page 9-64 and ["Configuring Report Printing"](#) in *Oracle Application Express Administration Guide*

To configure a classic report region for printing:

1. In your application, select the page containing the classic report region you want to print.

The Page Definition appears.

2. Access the Report Attributes page. See ["Accessing Classic Report Attributes"](#) on page 9-51.
3. Click the **Print Attributes** tab.
4. Under Printing, specify the appropriate information:
  - a. Enable Report Printing - Select **Yes**.
  - b. Link Label - Enter the text for the link that starts the printing process.
  - c. Response Header - Specify whether the response header generated by Oracle Application Express is based on your **Report Settings** or the **Print Server**. The response header is the information the server sends back to the web browser in response to receiving an HTTP request. It contains the date, size and type of file that the server is sending back to the client and also data about the server itself. To specify content disposition (using the attribute View File As) and file name, the response header must be based on Report Settings.
  - 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. (Optional) File Name - Enter a name for the downloaded file. If you leave this blank, the region name is used as the file name.
  - f. Output Format - Select an output option.



- g. Item - Only enabled, if you select the Output Format **Derived from Item**. If enabled, select the application or page item that holds format value.
  - h. Report Layout - Select **Default Report Layout** to use the built-in generic report layout, or an available report layout you or your administrator created. See item Help for a listing of the supported substitution strings available when building custom XSL-FO report layouts.
  - i. Print Server Overwrite - Specify an alternate print server. A print server is typically configured centrally for all workspaces in Oracle Application Express Administration Services. See "Configuring Report Printing" in *Oracle Application Express Administration Guide*.  
  
Configuring an alternative print server at the report level makes debugging and diagnosis of potential printing problems easier and supports the use of specific custom built end points to perform custom XSLT transformations.
  - j. Print URL - Report regions can be printed using the standard print link or using a page button. To use a button, remove the Link Label, create a button on your page, and use the URL shown in this attribute as the button target.
5. In the remaining sections, define page size, paper orientation, page headers and footers, fonts, text color, and background color.
  6. Under Report Columns, specify the width for each column.  
  
The default is to make each column the same width. The Total Width is a display only field that shows the sum of all column width values. When changing the width for an individual column the Total Width is automatically recalculated. If Column Width Units is set to **Percentage**, rather than **Points**, then the total column width must be less than or equal to 100.  
  
Use the **Reset Column Width** button to reset the Column Width Units to **Percentage** and change all column widths back to their default value. The **Recalculate** button maintains the current ratios between column widths but reduce all column widths such that the Total Width is less than or equal to 100%.
  7. Click **Apply Changes**.

## Configuring Interactive Report Region Print Attributes

Unlike classic reports, the Interactive Report Print Attributes can only use the default XSL-FO layout and is initiated from the Report Attributes, Download section rather than directly from this screen. Once configured, these attributes only apply only to the current region and cannot be used outside the context of the region.

If the printing feature is set up for your instance, you can configure a report region to print in various formats

To configure a interactive report region for printing:

1. In your application, select the page containing the interactive report region you want to print.  
  
The Page Definition appears.
2. Under Regions, click **Interactive Report** next to the region you want to print.
3. Click the **Print Attributes** tab.
4. Under Printing, specify the appropriate information:
  - a. Response Header - Specify whether the response header generated by Oracle Application Express is based on your Report Settings or the Print Server. The

response header is the information the server sends back to the web browser in response to receiving an HTTP request. It contains the date, size and type of file that the server is sending back to the client and also data about the server itself. To specify content disposition (using the attribute View File As) and file name, the response header must be based on Report Settings.

- b. 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.
- c. Print Server Overwrite - Specify an alternate print server. A print server is typically configured centrally for all workspaces in Oracle Application Express Administration Services. See "Configuring Report Printing" in *Oracle Application Express Administration Guide*.

Configuring an alternative print server at the report level allows for easier debugging and diagnosis of potential printing problems and supports the use of specific custom built end points to perform custom XSLT transformations.

- 5. In the remaining sections, define page size, paper orientation, page headers and footers, fonts, text color, and background color.
- 6. Click **Apply Changes**.

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## Adding Database Application Components and Controls

This section describes how to use Application Builder to create database application components (such as forms, calendars, maps, and charts) and page controls (such as buttons, list of values, shortcuts, and trees). To learn more about creating interactive and classic reports, see ["Creating Reports"](#) on page 9-1.

### Topics:

- [Creating Forms](#)
- [Creating Calendars](#)
- [Creating Maps](#)
- [Creating Charts](#)
- [Creating Buttons](#)
- [Creating Lists of Values at the Application Level](#)
- [Using Shortcuts](#)
- [Creating Trees](#)
- [Using the Find Icon](#)
- [Controlling Access to Applications, Pages, and Page Components](#)
- [Incorporating JavaScript into an Application](#)
- [About jQuery and jQuery UI Support](#)
- [Optimizing a Page for Printing](#)
- [Creating a Help Page](#)

**See Also:** ["Controlling Page Layout"](#) on page 12-1 and ["Adding Navigation"](#) on page 11-1

### Creating Forms

You can include a variety of different types of forms in your applications. You can include forms that enable users to update just a single row in a table or multiple rows at once. Application Builder includes several wizards you can use to create forms automatically, or you can create forms manually.

### Topics:

- [Creating a Form Using a Wizard](#)

- [Creating a Tabular Form](#)
- [Creating a Master Detail Form](#)
- [Creating a Form Manually](#)
- [Validating User Input in Forms](#)

**See Also:** ["Creating Reports"](#) on page 9-1

## Creating a Form Using a Wizard

The easiest way to create a form is to use a wizard. For example, the Form on Table or View Wizard creates one item for each column in a table. It also includes the necessary buttons and processes required to insert, update, and delete rows from the table using a primary key. Each region has a defined name and display position; all other attributes are items, buttons, processes, and branches.

To create a form using a wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Create Page**.
4. Select **Form** and click **Next**.
5. Under Forms, select a type of form page as described in [Table 10–1](#).

**Table 10–1** *Form Page Types*

Form Page Type	Description
Form on a Procedure	Builds a form based on stored procedure arguments. Use this approach when you have implemented logic or data manipulation language (DML) in a stored procedure or package.
Form on a Table or View	Creates a form that enables users to update a single row in a database table.
Form on a Table with Report	Creates two pages. One page displays a report. Each row provides a link to the second page to enable users to update each record.  <b>Note:</b> This wizard does not support tables having more than 127 columns. Selecting more than 127 columns generates an error.
Master Detail Form	Creates a form that displays a master row and multiple detail rows within a single HTML form. With this form, users can query, insert, update, and delete values from two tables or views.  <b>See Also:</b> <a href="#">"Creating a Master Detail Form"</a> on page 10-10
Tabular Form	Creates a form in which users can update multiple rows in a database.  <b>See Also:</b> <a href="#">"Creating a Tabular Form"</a> on page 10-3
Form on a SQL Query	Creates a form based on the columns returned by a SQL query such as an EQUIJOIN.
Summary Page	Creates a read-only version of a form. Typically used to provide a confirmation page at the end of a wizard.

**Table 10–1 (Cont.) Form Page Types**

Form Page Type	Description
Form on Web Service	Creates a page with items based on a Web service definition. This wizard creates a user input form, a process to call the Web service, and a submit button.  <b>See Also:</b> <a href="#">"Creating a Form on a Web Service"</a> on page 17-17
Form and Report on Web Service	Creates a page with items based on a Web service definition. This wizard creates a user input form, a process to call the Web service, a submit button, and displays the results returned in a report.  <b>See Also:</b> <a href="#">"Creating an Input Form and Report on a Web Service"</a> on page 17-15

6. Follow the on-screen instructions. To learn more about a specific field, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

## Creating a Tabular Form

A tabular form enables users to update multiple rows in a table at once from a single page. If created using a wizard, a tabular forms enables you to perform update, insert, and delete operations on multiple rows in a database table. This form includes a built-in multiple row update process that performs optimistic locking behind the scenes to maintain the data integrity.

### Topics:

- [About Tabular Forms](#)
- [How Tabular Forms Work](#)
- [Creating a Tabular Form Using the Create Application Wizard](#)
- [Creating a Tabular Form Using the Create Page Wizard](#)
- [Synchronizing Tabular Form Column Order with Region Source](#)

### About Tabular Forms

There are two primary methods for creating tabular forms:

- Create Application Wizard
- Create Page Wizard

Tabular forms created using these wizards include automatic DML processes. These wizards create a form that performs update, insert, and delete operations on multiple rows in a database table. Alternatively, you can build a tabular form manually either by creating a updatable report region or standard report region with updatable columns with custom PL/SQL page processes to process the tabular form data.

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**Note:** Any modification of the select list of a SQL statement of a tabular form after it has been generated using a wizard is not recommended. If you do modify the query, make sure the values of the updatable columns are not altered after being queried from the database by the Application Express engine.

---

**Running a 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).

<input type="checkbox"/>	Id	Row Version Number	Project	Task Name	Budget	End Date
<input type="checkbox"/>	26341192367117	2	APEX Environmen	Identify server req.	200	01-JUN-12
<input type="checkbox"/>	26341192367117	2	Maintain Support:	HR software upgrd	7000	26-JUL-12
<input type="checkbox"/>	26341192367117	2	Maintain Support:	Apply Billing Syste	7000	30-JUL-12
<input type="checkbox"/>	26341192367118	2	APEX Environmen	Determine Web lis	100	01-JUN-12
<input type="checkbox"/>	26341192367118	2	APEX Environmen	Specify security au	300	04-JUN-12
<input type="checkbox"/>	26341192367118	2	APEX Environmen	Select servers for I	600	07-JUN-12
<input type="checkbox"/>	26341192367118	2	Email Integration	Complete plan	1500	13-JUL-12

By default, date columns are created using the Date Picker item type. If user interface defaults are defined, other columns can be automatically created as select lists based on lists of values, or numeric fields and large text areas.

**See Also:** "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*

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 check box 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.

### How 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 form, 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 NULL 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, include 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 another process in the time between the tabular form was rendered and the time the data was submitted.

Wizard generated tabular forms also automatically create validations for some columns. Validations are created for columns that are set to NOT NULL in the underlying table and columns of type NUMBER, DATE or TIMESTAMP. 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.

### Creating a Tabular Form Using the Create Application Wizard

The Create Application Wizard is designed to quickly create a basic Oracle Application Express application consisting of multiple pages and components. For that reason, this wizard uses general best practices to generate the application and does not include several advanced options included in the Create Page Wizard.

**Tip:** When creating a tabular form, Oracle recommends using a generic column template and avoiding column report templates. See ["Report Templates"](#) on page 13-39.

To create a tabular form using the Create Application Wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Click the **Create** button.
3. For Method, select **Database** and click **Next**.
4. For Name:
  - a. Application - Enter a unique integer value to identify the application. Application IDs between 3000 to 9000 are reserved for internal use by Oracle Application Express.
  - b. Name - Enter a name to identify the application.
  - c. Schema - Each application obtains its privileges by parsing all SQL as a specific database schema. Identify the database schema owner.
  - d. Create Options:
    - **Start from scratch** - Enables you to manually add all pages.
    - **Include Home page** - Includes a blank page, which automatically acts as the parent of any new pages added. A list region is also created on the home page, providing navigation to the additional pages.
    - **Use previously created application model** - Reuses an existing application definition. Using an existing application definition enables you to run this wizard without reentering application property values.

Note that you still have to define all other application attributes, or you can choose to copy some attributes by choosing to copy shared components from another application.

- e. User Interface - Select a user interface for the application. For application primarily designed for desktop use, select **Desktop**.
  - f. Click **Next**.
5. Under Add Page:
- a. Select Page Type - Select **Tabular Form**.
  - b. Subordinate to Page - If applicable, select a subordinate page. To learn more, see item Help.
  - c. Table Name - Select a table.
  - d. Click **Add Page**.

The new page appears at the top of the page.

- e. Click **Next**.
6. For Shared Components, indicate whether to copy shared components from another application. Select **Yes** or **No**. If you select Yes, select where to copy them from and which components to import.

Shared components are common application elements that can be displayed or applied across multiple pages in an application. To save time or maintain consistency between applications, copy the shared components from an existing application. The types of shared components you can copy include: user interface themes, lists of values, navigation bar entries, authorization schemes and authentication schemes.

7. For Attributes:
- a. Authentication Scheme - Determine how establish user identity before accessing an application. Options include:
    - **Application Express** - Uses the user account credentials created and maintained with the Application Express Service Administration application. These are the accounts you use to log in to the Application Express development environment. You can also create accounts in this user account repository for end users of your applications.
    - **Database Account** - Requires users logging into your application to enter a database schema name (or user name) and a password in order to authenticate. This account information is managed entirely within the Oracle database.
    - **No Authentication** - Also known as Database Account Credentials. This option enables users to access your application using the account credentials stored in the `mod_plsql` DAD definition. In most cases this results in users not having to login when accessing your application. This is the quickest way to create a “public” application.

To learn more, see ["Establishing User Identity Through Authentication"](#) on page 15-25

- b. Tabs - Select whether to include tabs in your application. You can create one level tabs, two level tabs, or no tabs at all. To learn more, see ["Creating Tabs"](#) on page 11-1



This attribute identifies the language in which an application is developed. This language is the base language from which all translations are made.

- c. Language - Select the primary language for this application.

This attribute identifies the language in which an application is developed. This language is the base language from which all translations are made.

- d. User Language Preference Derived From - Specifies how the engine determines the application language. The application primary language can be static (that is, derived from the web browser language) or determined from a user preference or item. The database language setting determines date display and sorting characteristics. To learn more, see item Help.

You can alter the Language and User Language Preference Derived From attributes later on the Edit Globalization attributes page. See "[Configuring Globalization Attributes](#)" on page 7-26.

- e. Date Format - Specifies the date format to be used in the application.

This date format is used to alter the NLS\_DATE\_FORMAT database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle date format mask or an item reference through substitution syntax. If no value is specified, the default date format is derived from the database session at runtime. If supplied, this is also used as the date format for any items resulting from columns of type DATE.

- f. Date Time Format - Specifies 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.

- g. Timestamp Format - Specifies the timestamp format to be used in your application.

This timestamp format is used to alter the NLS\_TIMESTAMP\_FORMAT database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle timestamp format mask or an item reference through substitution syntax. If no value is specified, the default timestamp format is derived from the database session at runtime.

- h. Timestamp Time Zone Format - Specifies the timestamp with time zone format to be used in your application.

This timestamp with time zone format is used to alter the NLS\_TIMESTAMP\_TZ\_FORMAT database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle timestamp with time zone format mask or an item reference through substitution syntax. If no value is specified, the default timestamp with time zone format is derived from the database session at runtime.

- i. Click **Next**.

8. For User Interface Theme, select a theme and click **Next**.

Themes are collections of templates that you can use to define the layout and style of an entire application. See ["Managing Themes"](#) on page 13-1.

9. Confirm your selections and click **Create**.

**See Also:** "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*

### Creating a Tabular Form Using the Create Page Wizard

Use the Create Page Wizard to add a tabular form to an existing application. Once you provide a table name on which to build the tabular form, the wizard reads the table columns from the database data dictionary.

Tabular forms perform insert, update and delete operations on table rows. Unlike with the Create Application Wizard, when you create a tabular form using the Create page Wizard you determine how rows are identified. You can either specify a primary key defined on the table, or a ROWID pseudo column, which uniquely identifies a row in a table. If you choose to select a primary key, you can choose between three different primary key source types: trigger, PL/SQL function, and sequence.

**Tip:** When creating a tabular form, Oracle recommends using a generic column template and avoiding column report templates. See ["Report Templates"](#) on page 13-39.

To create a tabular form using the Create Page Wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Create Page**.
4. Select **Form** and click **Next**.
5. Select **Tabular Form** and click **Next**.

The Create Tabular Form Wizard appears.

6. For Table and Columns, specify the following:
  - a. Table/View Owner - Select the table or view owner on which to base the tabular form.
  - b. Table/View Name - Select the table or view which contains the columns to be included in the tabular form region.
  - c. Select Columns - Select one or more columns to be included in the tabular form. In the pages that follow you define which columns should be updatable.
  - d. Allowed Operations - Select the operations to be performed on the table (for example, **Update, Insert and Delete**).
  - e. User Interface Defaults - Select whether to use user interface defaults. See item Help for more information and "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*.
  - f. Click **Next**.

Next, define a primary key. Tabular forms perform insert, update and delete operations on table rows in the database. You identify the rows by using either a primary key defined on the table, or the ROWID pseudo column, which uniquely identifies a row in a table.

7. For Primary Key, select one of the following:
  - **Managed by Database (ROWID)** - The tabular form uses the ROWID pseudo column to identify rows to update and delete.
  - **Select Primary Key Column(s)** - The tabular form uses the source table's primary key column(s).
8. If you select **Managed by Database (ROWID)**, click **Next** to continue.
9. If you select **Select Primary Key Column(s)**:
  - a. Primary Key Column 1 - Select the first column of the primary key.
  - b. Primary Key Column 2 - If you have a compound primary key, specify the second primary key column in this attribute. This attribute is optional.
  - c. Click **Next**.
  - d. For Source Type, select the method by which the primary key is populated:
    - **Existing trigger** - Select this option if a before-insert trigger populates the primary key. You can also select this option if you plan on specifying the primary key column source later after completing the form.
    - **Custom PL/SQL function** - Select this option to provide a PL/SQL function to generate returning key value.
    - **Existing sequence** - Select this option to pick the sequence from a list of sequences available in the selected schema.
  - e. Click **Next**.
10. For Updatable Columns:
  - a. Updatable Columns - Select the updatable columns to include in the form.  
You can modify the column order or your SQL query after you create the page.
  - b. Click **Next**.
11. For Page and Region Attributes:
  - a. Page - Select a page to contain the new updatable report, or enter a new page number.
  - b. Page Name - If you are creating a new page, enter a name.
  - c. Region Title - Enter a name for the region in which the updatable report appears.
  - d. Region Template - Select a region template for the updatable report region.
  - e. Report Template - Select a report template.
  - f. Breadcrumb - Select whether you want to use a breadcrumb navigation control on your page, and which breadcrumb navigation control you want to use.
  - g. Click **Next**.
12. For Tab Options, select an option that describes how tabs display on the page and click **Next**.
13. For Buttons and Branching:
  - a. Cancel Button Label - Enter text to display on the Cancel button.
  - b. Branch to Page - Specify the page number to branch to when the user clicks Cancel.

- c. Submit Button Label - Enter text to display on the Submit button.
  - d. Branch to Page - Specify the page number to branch to when the user clicks Submit.
  - e. Delete Button Label - Enter text to display on the Delete button.
  - f. Add Row Button Label - Enter text to display on the Add Row button label.
  - g. Click Next.
14. Click **Create**.

A success message appears.

### Synchronizing Tabular Form Column Order with Region Source

To synchronize a classic report's column order with the column order defined in the region source query:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Select a page containing the tabular form.  
The Page Definition appears.
4. To access the Report Attributes page:
  - Tree view - Right-click Tabular Form region and select **Edit Report Attributes**.
  - Component view - Click the **Report** link next to the Tabular Form region.
5. From Tasks, select **Synchronize Column Order with Region Source**.
6. Click **Synchronize**.

## Creating a Master Detail Form

A master detail form reflects a one-to-many relationship between two tables in a database. Typically, a master detail form displays a master row and multiple detail rows within a single HTML form. With this form, users can insert, update, and delete values from two tables or views.

### Topics:

- [About Master Detail Forms](#)
- [Creating a Master Details Form Using the Create Application Wizard](#)
- [Create a Master Detail Form Using the Create Page Wizard](#)

### About Master Detail Forms

When running a master detail form, data is rendered as a report using various form elements (including text fields, text areas, date pickers, select lists, radio groups, and so on). By default, date columns are created using the Date Picker item type. If user interface defaults are defined, other columns can be automatically created as select lists based on lists of values, or numeric fields and large text areas.

**Order #47**

Customer Info Edward Logan  
1 Harborside Drive  
East Boston, MA 02128

Order Date 20-AUG-2012 02:40PM

Order Total \$1,250.00


Sales Rep DPEAKE

Tags

23 of 25

---

**Items for Order #47**

<input type="checkbox"/>	Product Name	Quantity	Unit Price	Subtotal	Product Image
<input type="checkbox"/>	Bag [\$125]	10	\$125.00	\$1,250.00	
				<b>\$1,250.00</b>	

1 - 1

On the Master Detail, the master record displays as a standard form and the detail records display in a tabular form at the bottom of the page. Click **Add Item to Order** to add a new row.

**See Also:** "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*

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 NOT NULL in the underlying table and columns of type NUMBER, DATE or TIMESTAMP. 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.

**Tip:** You can control the appearance of a specific column by editing column attributes.

### Creating a Master Details Form Using the Create Application Wizard

The Create Application Wizard is designed to quickly create a basic Oracle Application Express application consisting of multiple pages and components. This 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 **Application Builder** icon.
2. Click the **Create** button.

3. For Method, select **Database** and click **Next**.
4. For Name:
  - a. Application - Enter a unique integer value to identify the application. Application IDs between 3000 to 9000 are reserved for internal use by Oracle Application Express.
  - b. Name - Enter a name to identify the application.
  - c. Schema - Each application obtains its privileges by parsing all SQL as a specific database schema. Identify the database schema owner.
  - d. Create Options:
    - **Start from scratch** - Enables you to manually add all pages.
    - **Include Home page** - Includes a blank page, which automatically acts as the parent of any new pages added. A list region is also created on the home page, providing navigation to the additional pages.
    - **Use previously created application model** - Reuses an existing application definition. Using an existing application definition enables you to run this wizard without reentering application property values.  
  
Note that you still have to define all other application attributes, or you can choose to copy some attributes by choosing to copy shared components from another application.
  - e. User Interface - Select a user interface for the application. For application primarily designed for desktop use, select **Desktop**.
  - f. Click **Next**.  
  
**Tip:** To create an instant application consisting of just a login page and blank page, click the **Create Application** button.

Next, add pages to your application.

5. For Pages:
  - a. Select Page Type - Select **Master Detail**.
  - b. Subordinate to Page - If applicable, select a subordinate page. To learn more, see item Help.
  - c. Master Table Name - Select the table or view to be used as your master table. This table is used to create a report page and a master form on the master detail page.
  - d. Detail Table Name - Select the table or view to be used as your detail table.  
  
Only tables and views that are associated to your selected Master Table using a foreign key are displayed.
  - e. Click **Add Page**.  
  
The new pages appear at the top of the page.
  - f. Click **Next**.
6. For Shared Components, indicate whether to copy shared components from another application. Select **Yes** or **No**. If you select Yes, select where to copy them from and which components to import.

Shared components are common application elements that can be displayed or applied across multiple pages in an application. To save time or maintain consistency between applications, copy the shared components from an existing application. The types of shared components you can copy include: user interface themes, lists of values, navigation bar entries, authorization schemes and authentication schemes.

7. For Attributes:

- a. Authentication Scheme - Determine how establish user identity before accessing an application. Options include:
  - **Application Express** - Uses the user account credentials created and maintained with the Oracle Application Express Service Administration application. These are the accounts you use to log in to the Application Express development environment. You can also create accounts in this user account repository for end users of your applications.
  - **Database Account** - Requires users logging into your application to enter a database schema name (or user name) and a password in order to authenticate. This account information is managed entirely within the Oracle database.
  - **No Authentication** - Also known as Database Account Credentials. This option enables users to access your application using the account credentials stored in the `mod_plsql` DAD definition. In most cases this results in users not having to login when accessing your application. This is the quickest way to create a “public” application.

To learn more, see ["Establishing User Identity Through Authentication"](#) on page 15-25

- b. Tabs - Select whether to include tabs in your application. You can create one level tabs, two level tabs, or no tabs at all. To learn more, see ["Creating Tabs"](#) on page 11-1

This attribute identifies the language in which an application is developed. This language is the base language from which all translations are made.

- c. Language - Select the primary language for this application.

This attribute identifies the language in which an application is developed. This language is the base language from which all translations are made.

- d. User Language Preference Derived From - Specifies how the engine determines the application language. The application primary language can be static (that is, derived from the web browser language) or determined from a user preference or item. The database language setting determines date display and sorting characteristics. To learn more, see item Help.

You can alter the Language and User Language Preference Derived From attributes later on the Edit Globalization attributes page. See ["Configuring Globalization Attributes"](#) on page 7-26.

- e. Date Format - Specifies the date format to be used in the application.

This date format is used to alter the `NLS_DATE_FORMAT` database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle date format mask or an item reference through substitution syntax. If no value is specified, the default date format is derived from the database session at runtime. If supplied, this is

also used as the date format for any items resulting from columns of type DATE.

- f. **Date Time Format** - Specifies 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.

- g. **Timestamp Format** - Specifies the timestamp format to be used in your application.

This timestamp format is used to alter the `NLS_TIMESTAMP_FORMAT` database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle timestamp format mask or an item reference through substitution syntax. If no value is specified, the default timestamp format is derived from the database session at runtime.

- h. **Timestamp Time Zone Format** - Specifies the timestamp with time zone format to be used in your application.

This timestamp with time zone format is used to alter the `NLS_TIMESTAMP_TZ_FORMAT` database session setting before showing or submitting any page within the application. This value can be a literal string containing a valid Oracle timestamp with time zone format mask or an item reference through substitution syntax. If no value is specified, the default timestamp with time zone format is derived from the database session at runtime.

- i. **Click Next.**

- 8. For User Interface Theme, select a theme and click **Next**.

Themes are collections of templates that you can use to define the layout and style of an entire application. See "[Managing Themes](#)" on page 13-1.

- 9. Confirm your selections and click **Create Application**.

### Create a Master Detail Form Using the Create Page Wizard

The Create Page Wizard provides support for creating a master detail from two tables that do not have foreign key relationship defined in the database. Although Oracle recommends the use of foreign keys and properly defined relationships in the underlying database, developers do not always have the ability to modify their database model.

When created using a wizard, the master form on a master detail form page includes buttons that enable the user to move forward and backward within the master result set. While running the wizard, you choose which columns determine the navigation order. You also have the option to choose whether to create a two-page or three-page master detail form, with the detail records shown in a report with single-record editing on a separate page.

To create a master detail form using the Create Page Wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.



3. Click **Create Page**.

4. Select **Form** and click **Next**.

5. Select **Master Detail Form** and click **Next**.

The Master Detail Wizard appears.

6. On Define Master Table:

a. Table/View Owner - Select the schema that owns the master table.

b. Table/View Name - Select the table or view which contains the columns to be included in the master page.

The columns in that object display.

c. Click **Next**.

7. On Define Detail Table:

a. Show Only Related Tables - Specify whether to restrict the list of detail tables to only those tables related to the master table. Select **Yes** or **No**.

b. Table/View Owner - Select the table or view owner. The default selected owner for the table or view is the same owner as for your application. If the owner of your application has select privileges on tables or views in other schemas, you may select another schema.

c. Table/View Name - Select the table or view which contains the columns to be included in the detail page.

The columns in that object appear.

d. Select columns for detail page - Select the columns to display in your detail page. You may add columns later.

e. Click **Next**.

Next, define a primary key. Forms perform insert, update and delete operations on table rows in the database. You identify the rows by using either a primary key defined on the table, or the ROWID pseudo column, which uniquely identifies a row in a table.

8. For Define Primary Key, select one for each table:

■ **Managed by Database (ROWID)** - Use the ROWID pseudo column to identify rows to update and delete.

■ **Select Primary Key Column(s)** - Use the source table's primary key column(s).

9. If you select **Managed by Database (ROWID)**:

a. Click **Next**.

b. For Master Options, define the relationship between the Master and Detail tables. You may type in the column names (fully qualified with table names), or choose them from the list. Click **Next**.

c. Click **Next**.

10. If you select **Select Primary Key Column(s)**:

a. On Define Primary Key, select the following for each table:

– Primary Key Column 1 - Select the first column of the primary key.

– Primary Key Column 2 - If you have a compound primary key, specify the second primary key column in this attribute. This attribute is optional

- Click **Next**.
  - b. For Primary Key Source, select the method by which the primary key is populated and click **Next**.
    - **Existing trigger** - Select this option if a before-insert trigger populates the primary key. You can also select this option if you plan on specifying the primary key column source later after completing the form.
    - **Custom PL/SQL function** - Select this option to provide a PL/SQL function to generate returning key value.
    - **Existing sequence** - Select this option to pick the sequence from a list of sequences available in the selected schema.
  - c. For Master Options, specify whether to include master row navigation and click **Next**.

If you include master row navigation, define navigation order columns. If a navigation order column is not defined, the master update form navigates by the primary key column.
  - d. Click **Next**.
11. On Layout, specify how to build the master detail and click **Next**. Options include:
- **Edit detail as tabular form on same page** creates a two page master detail. Edit detail on separate page creates a three page master detail.
  - **Edit detail on separate page** creates a three page master detail.
12. On Page Attributes:
- a. Page Attributes - Review and edit the master page and detail page information.
  - b. Breadcrumb - Specify whether to create a breadcrumb. To create breadcrumbs entries:
    - Entry Name (Master Report) - Specify the name of the breadcrumb entry for the master report page.
    - Entry Name (Master Detail Page) - Specify the name of the breadcrumb entry for the master detail page.
    - Select Parent Entry - Select a parent entry for this breadcrumb entry.
    - Parent Entry - This item displays if you have chosen a parent entry.
  - c. Click **Next**.
13. On Tab Options, specify whether to include a tab set and click **Next**.
14. Click **Create**.

## Creating a Form Manually

You can also create a form manually by performing the following steps:

- Create an HTML region (to serve as a container for your page items)
- Create items to display in the region
- Create processes and branches

To create a form manually by creating an HTML region:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Create an HTML region. See ["Creating a Region"](#) on page 12-3.
3. Start adding items to the page. ["Creating Page-Level Items"](#) on page 7-57.

## Processing a Form

Once you create a form, the next step is to process the data a user types by inserting into or updating the underlying database tables or views. There are three ways to process a form:

- [Creating an Automatic Row \(DML\) Processing Process](#)
- [Creating a Process that Contains One or More Insert Statements](#)
- [Using a PL/SQL API to Process Form Values](#)

## Creating an Automatic Row (DML) Processing Process

One common way to implement a form is to manually create an Automatic Row Processing (DML) process. This approach offers three advantages. First, you are not required to provide any SQL coding. Second, Oracle Application Express performs DML processing for you. Third, this process automatically performs lost update detection. Lost update detection ensures data integrity in applications where data can be accessed concurrently.

To implement this approach you must:

- Add items, define the Item Source Type as Database Column, and specify a case-sensitive column name.
- Select the option **Always overrides the cache value**.

To create an Automatic Row Processing (DML) process:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2
2. Access the Create Page Process Wizard:
  - Tree view - Under the appropriate location, right-click and click **Create Process**.
  - Component view - Under Processes, click the **Create** icon.
3. Under Processes, click the **Create** icon.
4. Select the process **Data Manipulation**.
5. Select the process category **Automatic Row Processing (DML)**.
6. Specify the following process attributes:
  - a. In the Name field, enter a name to identify the process.
  - b. In the Sequence field, specify a sequence number.
  - c. From the Point list, select the appropriate processing point. In most instances, select **Onload - After Header**.
  - d. From the Type list, select **Automated Row Processing (DML)**.
7. Follow the on-screen instructions.

## Creating a Process that Contains One or More Insert Statements

In this approach to form handling, you create one or more processes to handle insert, update, and delete actions. Instead of having the Application Express engine handling everything transparently, you are in complete control.

For example, suppose you have a form with three items:

- P1\_ID - A hidden item to store the primary key of the currently displayed row in a table.
- P1\_FIRST\_NAME - A text field for user input.
- P1\_LAST\_NAME - A text field for user input.

Assume also there are three buttons labeled Insert, Update, and Delete. Also assume you have a table T that contains the columns `id`, `first_name`, and `last_name`. The table has a trigger that automatically populates the `ID` column when there is no value supplied.

To process the insertion of a new row, you create a conditional process of type PL/SQL that executes when the user clicks the Insert button. For example:

```
BEGIN
  INSERT INTO T ( first_name, last_name )
    VALUES ( :P1_FIRST_NAME, :P1_LAST_NAME );
END;
```

To process the updating of a row, you create another conditional process of type PL/SQL. For example:

```
BEGIN
  UPDATE T
    SET first_name = :P1_FIRST_NAME,
        last_name = :P1_LAST_NAME
  WHERE ID = :P1_ID;
END;
```

To process the deletion of a row, you create a conditional process that executes when the user clicks the Delete button. For example:

```
BEGIN
  DELETE FROM T
  WHERE ID = :P1_ID;
END;
```

## Using a PL/SQL API to Process Form Values

For certain types of applications, it is appropriate to centralize all access to tables in a single or a few PL/SQL packages. If you created a package to handle DML operations, you can call procedures and functions within this package from an After Submit PL/SQL process to process insert, updates, and delete requests.

## Populating Forms

Oracle Application Express populates a form either on load or when the Application Express engine renders the page. You can populate a form in the following ways:

- Create a process and define the type as Automated Row Fetch.
- Populate the form manually by referencing a hidden session state item.

To create an Automated Row Fetch process:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Page Process Wizard:
  - Tree view - Under the appropriate location, right-click and click **Create Process**.
  - Component view - Under Processes, click the **Create** icon.
3. Select the process type **Data Manipulation**.
4. Select the process category **Automatic Row Fetch**.
5. Specify the following process attributes:
  - a. In the Name field, enter a name to identify the process.
  - b. In the Sequence field, specify a sequence number.
  - c. From the Point list, select the appropriate processing point.
  - d. From the Type list, select **Automated Row Fetch**.
6. Follow the on-screen instructions.

You can also populate a form manually by referencing a hidden session state item. For example, the following code in an Oracle Application Express process of type PL/SQL would set the values of `ename` and `sal`. The example also demonstrates how to manually populate a form by referencing a hidden session state item named `P2_ID`.

```
FOR C1 in (SELECT ename, sal
FROM emp WHERE ID=:P2_ID)
LOOP
    :P2_ENAME := C1.ename;
    :P2_SAL := C1.sal;
END LOOP;
```

In this example:

- `C1` is an implicit cursor.
- The value of `P2_ID` has been set.
- The process point for this process would be set to execute (or fire) on or before **Onload - Before Regions**.

## Validating User Input in Forms

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:

- Create a validation and specify error message text. To learn more, see ["Creating Item and Page Validations"](#) on page 8-33.
- Associate the validation with a specific item.

### Topics:

- [Associating a Validation with a Specific Item](#)
- [About Error Message](#)

### Associating a Validation with a Specific Item

To associate an item with a validation and specify error message text:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Navigate to the Edit Page Validations page:
  - Tree view - Right-click the validation name and click **Edit**.
  - Component view - Under Validations, select the validation item you want to associate.

The attributes page for the validation appears.

3. Scroll down to Error Message:
  - Error message display location - Verify the display location.
  - Associated Item - Select the item you want to associate with this validation.
4. Click **Apply Changes**.

### About Error Message

**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.

## Creating Calendars

Application Builder includes a built-in wizard for generating 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.

**Note:** Oracle Application Express supports the creation of only one calendar per page.

### Topics:

- [About Creating Calendars](#)
- [Viewing a Sample Calendar](#)
- [Creating an Easy Calendar](#)
- [Creating a SQL Calendar](#)
- [Editing Calendar Attributes](#)
- [Editing an Existing Calendar to Include Add and Edit Functionality](#)
- [Enabling the Dragging and Dropping of Data In an Existing Calendar](#)
- [Editing a Calendar Title](#)
- [Upgrading a Calendar Created in a Previous Releases](#)
- [Converting an Easy Calendar to a SQL Calendar](#)

## About Creating Calendars

Application Builder supports two calendar types:

- **Easy Calendar** creates a calendar based on the schema, table, and columns you specify. The wizard prompts you to select a date column and display column. See ["Creating an Easy Calendar"](#) on page 10-22.
- **SQL Calendar** creates a calendar based on a SQL query you provide. This SQL `SELECT` statement must include at least two columns: a date column and display column. See ["Creating a SQL Calendar"](#) on page 10-27.

How you create a calendar depends on if you are adding a calendar to an existing page or adding a calendar on a new page. When creating calendars, remember:

- You can only create one calendar for each page. The calendar may 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.

**See Also:** ["Calendar Display"](#) on page 10-33 and

### About Adding Drag and Drop Capability

If you choose to enable drag and drop capability in an Easy Calendar, the calendar generation process automatically creates a On Demand process to implement this functionality for you. However, when you create a SQL Calendar on a new page, the Enable Drag and Drop option does not appear. To enable this functionality, create a SQL Calendar page and then edit the page to enable drag and drop. To learn more, see ["Enabling the Dragging and Dropping of Data In an Existing Calendar"](#) on page 10-38.

### Supported Calendar Substitution Strings

Application 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.

**See Also:** ["Managing Themes and Templates"](#) on page 13-1

## Viewing a Sample Calendar

The following is a sample calendar of IT projects.

<div> Monthly Weekly Daily List &lt; Today &gt; </div>						
August 2012						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31				
		Frank OHare [\$1,060.00]				
William Hartsfield [\$730.00]			Eugene Bradley [\$870.00]	Edward Logan [\$800.00]		John Dulles [\$415.00] Albert Lambert [\$790.00] Davey Jones [\$520.00]

This calendar includes the following buttons:

- Monthly - Displays a monthly view of all projects.
- Weekly - Displays projects by week.
- Daily - Displays projects by day.
- List - Displays a list of all projects.
- Previous - Navigates to the previous view.
- Today - Displays the current day.
- Next - Navigates to the next view.

In the previous example, you can move a calendar entry to another date by dragging and dropping it.

## Creating an Easy Calendar

An Easy Calendar creates a calendar based on schema, table, and columns you specify. The wizard prompts you to select a date column and display column.

### Topics:

- [Adding an Easy Calendar to an Existing Page](#)
- [Adding an Easy Calendar to a New Page](#)

### Adding an Easy Calendar to an Existing Page

To add an Easy Calendar to an existing page:

1. Create a Calendar region:
  - a. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
  - b. On the Page Definition, create a new Calendar region:
    - Tree view- Under Page Rendering, right-click **Regions** and select **Create**.



- Component view - Under Region, click the **Create** icon.  
The Create Region Wizard appears.
- c. Select **Calendar** and click **Next**.
- 2. For Implementation, select **Easy Calendar** and click **Next**.
- 3. For Region Attributes:
  - a. Title - Enter a title for the region. This title displays if the region template you select displays the region title.
  - b. Region Template - Choose a template to control the appearance of the region.
  - c. Parent Region - Defines the parent region to which the new region belongs.
  - d. Display Point - Identify a display point for this region. Two types of display points exist: **page template positions** and **page body positions**. To learn more, see online Help.
  - e. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - f. Click **Next**.
- 4. For Source:
  - a. Owner - Select the database schema that owns the table from which you are creating a calendar.
  - b. Table/View Name - Specify the table to be used in the calendar.
  - c. Click **Next**.
- 5. For Calendar Attributes:
  - a. Date Column - Specify the column used as the date to place an entry on the calendar.
  - b. Display Column - Specify the column to be displayed on the calendar.
  - c. Date Format - Specify how you want to represent dates on your calendar. Options include:
    - **Date Only** - Results display in a monthly and list calendar.
    - **Date and Time** - Results display in a monthly, weekly, daily, and list calendar.
  - d. Primary Key Column - Select the name of the first column that uniquely identifies a row in the table, or select ROWID. ROWID is a built in globally unique identifier for the row. For example:  
EMPNO
  - e. Enable Drag and Drop - Identify whether to enable the drag and drop of calendar data to other dates and times on the calendar.
  - f. Click **Next**.

Next, define Link Details for calendar entries. The Link Target determines where users are redirected to if they select a calendar entry. The selected Link Target determines what attributes display.
- 6. For Link Details:

- a. **Link Target** - Identify whether a calendar entry should have a link target. When a calendar entry is selected, the user is redirected to the link target. Options include:
    - Create a new edit page
    - Page in this application
    - URL
    - Exclude Link Target
  - b. **Allowed Operations** - Determines which data manipulation language (DML) operations are allowed. To enable drag and drop on the calendar data, you must select Update. Options include:
    - Insert
    - Update
    - Delete
  - c. **Page Number** - Enter a unique page number for the page being created.
  - d. **Page Name** - Enter a title for the page being created.
  - e. **Region Template** - Select a region template for the new calendar region.
  - f. **Region Name** - Enter a name for the region to contain the calendar.
  - g. **Select Columns(s)** - Select the columns to be included in the form. To ensure expected behavior, include the Date and Primary Key columns to the form.
  - h. **Open Link In** - Specify the location where the URL or page should open.
  - i. Click **Next**.
7. For Process Options:
- a. **Cancel Button Label** - Enter the label for the Cancel button.
  - b. **Show Create Button** - Indicate whether users should have insert capability using the form.
  - c. **Create Button Label** - Enter the label for the Create button.
  - d. **Show Save Button** - Indicate whether users should have update capability using the form.
  - e. **Save Button Label** - Enter the label for the Save button.
  - f. **Show Delete Button** - Indicate whether users should have delete capability using the form.
  - g. **Delete Button Label** - Enter the label for the Delete button.
  - h. Select **Next**.
8. Confirm your selections and click **Create**.

### Adding an Easy Calendar to a New Page

To create an Easy Calendar on a new page:

1. Create a Calendar page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.

- c. Select an application.
- d. Click **Create Page**.

The Create Page Wizard appears.

2. Select **Calendar** and click **Next**.
3. Select **Easy Calendar** and click **Next**.
4. For Page Attributes:
  - a. Page Number - If you identify a new page number, the wizard creates a new page. If you identify an existing page number, the wizard adds the component to that page.
  - b. Page Name - Enter a title for the page to be created.
  - c. Region Template - Select a region template for the new calendar region. The template controls the appearance of the region.
  - d. Region Name - Enter a name for the region to contain the calendar.
  - e. Display Type - Determines the behavior of the calendar. Options include:
    - **Standard** - Submits the page along with the associated request.
    - **Partial Page Refresh** - Only refreshes the Calendar region

**Tip:** Once the calendar is created, the display type cannot be changed. To change the display type, you must delete the calendar and then re-create it.
  - f. Breadcrumb - Select whether to use a breadcrumb navigation control on your page, and which breadcrumb navigation control you want to use.
  - g. Click **Next**.
5. On Tab Options, specify a tab implementation and click **Next**.
6. For Source:
  - a. Owner - Select the database schema that owns the table from which you are creating a calendar.
  - b. Table/View Name - Specify the table to be used in the calendar.
  - c. Click **Next**.
7. For Calendar Attributes:
  - a. Date Column - Specify which column is used as the date to place an entry on the calendar.
  - b. Display Column - Specify the column to be displayed on the calendar.
  - c. Date Format - Specify how you want to represent dates on your calendar. Options include:
    - **Date Only** - Results display in a monthly and list calendar.
    - **Date and Time** - Results display in a monthly, weekly, daily, and list calendar.
  - d. Primary Key Column - Select the name of the first column that uniquely identifies a row in the table, or select ROWID.

ROWID is a built in globally unique identifier for the row. This column is used for adding or editing and for drag and drop through the calendar. For example:

EMPNO

- e. Custom Date Range - Identify whether to include custom start and end dates. Use this option to enable more than one month to be represented on a monthly calendar.
- f. Enable Drag and Drop - Select **Yes** or **No**. Enables drag and drop of calendar data to other dates and times on the calendar.

**Tip:** If you select **Yes** for Enable Drag and Drop, the wizard automatically creates an On Demand process.

- g. Click **Next**.

Next, define Link Details for calendar entries. The Link Target determines where users are redirected to if they select a calendar entry. The selected Link Target determines what attributes display.

8. For Link Details:

- a. Link Target - Identify whether a calendar entry should have a link target. When a calendar entry is selected, the user is redirected to the link target. Options include:
  - Create a new edit page
  - Page in this application
  - URL
  - Exclude Link Target
- b. **Allowed Operations** - Determines which data manipulation language (DML) operations are allowed. To enable drag and drop on the calendar data, you must select Update. Options include:
  - Insert
  - Update
  - Delete
- c. Page Number - Enter a unique page number for the page being created.
- d. Page Name - Enter a title for the page being created.
- e. Region Name - Enter a name for the region to contain the calendar.
- f. Region Template - Select a region template for the new calendar region.
- g. Region Name - Enter a name for the region to contain the calendar.
- h. Select Columns(s) - Select the columns to be included in the form. To ensure expected behavior, include the Date and Primary Key columns to the form
- i. Click **Next**.

9. For Process Options:

- a. Cancel Button Label - Enter the label for the Cancel button.
- b. Show Create Button - Indicate whether users should have insert capability using the form.

- c. Create Button Label - Enter the label for the Create button.
  - d. Show Save Button - Indicate whether users should have update capability using the form.
  - e. Save Button Label - Enter the label for the Save button.
  - f. Show Delete Button - Indicate whether users should have delete capability using the form.
  - g. Delete Button Label - Enter the label for the Delete button.
  - h. Select **Next**.
10. Confirm your selections and click **Create**.

**See Also:** ["Editing Calendar Attributes"](#) on page 10-32

## Creating a SQL Calendar

A SQL Calendar creates a calendar based on a SQL query you provide. When creating a SQL Calendar, you must select the date and display columns. Also since you are using a SQL source, you must explicitly specify the primary key.

### Topics:

- [Adding a SQL Calendar to an Existing Page](#)
- [Adding a SQL Calendar to a New Page](#)

**Tip:** When creating a SQL Calendar, you must manually create an On Demand page process to enable drag and drop functionality. See ["Enabling the Dragging and Dropping of Data In an Existing Calendar"](#) on page 10-38.

### Adding a SQL Calendar to an Existing Page

To add a SQL Calendar to an existing page:

1. Create a Calendar region:
  - a. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
  - b. On the Page Definition, create a new Calendar region:
    - Tree view- Under Page Rendering, right-click **Regions** and select **Create**.
    - Component view - Under Region, click the **Create** icon.
 The Create Region Wizard appears.
  - c. Select **Calendar** and click **Next**.
2. For Implementation, select **SQL Calendar** and click **Next**.
3. For Region Attributes:
  - a. Title - Enter a title for the region. This title displays if the region template you select displays the region title.
  - b. Region Template - Choose a template to control the appearance of the region.
  - c. Parent Region - Defines the parent region to which the new region belongs.

- d. Display Point - Identify a display point for this region. Two types of display points exist: page template positions and page body positions. To learn more, see online Help.
      - e. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
      - f. Click **Next**.
4. For Source:
  - a. Enter SQL Query - Enter the select statement to be used by the calendar.

Use the syntax:

```
SELECT id, name, date
FROM ...
```

Remember the following:

    - You include at least two columns, one of which must be a DATE column.
    - The first column should identify the primary key column to be used for managing data manipulation language (DML) operation.
    - Review the examples at the bottom of the page.
  - b. Click **Next**.
5. For Calendar Attributes:
  - a. Date Column - Specify the column used as the date to place an entry on the calendar.
  - b. Display Column - Specify the column to be displayed on the calendar.
  - c. Date Format - Specify how you want to represent dates on your calendar. Options include:
    - **Date Only** - Results display in a monthly and list calendar.
    - **Date and Time** - Results display in a monthly, weekly, daily, and list calendar.
  - d. Primary Key Column - Select the name of the first column that uniquely identifies a row in the table, or select ROWID. ROWID is a built in globally unique identifier for the row. For example:

```
EMPNO
```
  - e. Custom Date Range - Identify whether to include custom start and end dates. Use this option to enable more than one month to be represented on a monthly calendar.
  - f. Enable Drag and Drop - Select **Yes** or **No**. Enables drag and drop of calendar data to other dates and times on the calendar.

**Tip:** When creating a SQL Calendar, you must manually create an On Demand page process to enable drag and drop functionality. See ["Enabling the Dragging and Dropping of Data In an Existing Calendar"](#) on page 10-38
  - g. Click **Next**.

Next, define Link Details for calendar entries. The Link Target determines where users are redirected to if they select a calendar entry. The selected Link Target determines what attributes display.

6. For Link Details:

- a. **Link Target** - Identify whether a calendar entry should have a link target. When a calendar entry is selected, the user is redirected to the link target. Options include:
  - Create a new edit page
  - Page in this application
  - URL
  - Exclude Link Target
- b. **Allowed Operations** - Determines which data manipulation language (DML) operations are allowed. To enable drag and drop on the calendar data, you must select Update. Options include:
  - Insert
  - Update
  - Delete
- c. **Page Number** - Enter a unique page number for the page being created.
- d. **Page Name** - Enter a title for the page being created.
- e. **Region Template** - Select a region template for the new calendar region.
- f. **Region Name** - Enter a name for the region to contain the calendar.
- g. **Owner** - Identifies the schema that owns the table.
- h. **Table/View Name** - Select the database object (table or view) on which this calendar is based.
- i. **Date Column** - Specify which column is used as the date to place an entry on the calendar.
- j. **Primary Key Type** - Options include:
  - **Managed by Database (ROWID)** - The form uses the ROWID pseudo column to identify rows to update and delete.
  - **Select Primary Key Column(s)** - Uses the source table's primary key column(s).
- k. **Select Columns** - Select the column(s) to be included in the form. You must include date and primary key columns to the form for expected functionality.
- l. **From Open Link in**, select the location where the URL or page should open.
- m. Click **Next**.

7. For Process Options:

- a. **Cancel Button Label** - Enter the label for the Cancel button.
- b. **Show Create Button** - Indicate whether users should have insert capability using the form.
- c. **Create Button Label** - Enter the label for the Create button.

- d. Show Save Button - Indicate whether users should have update capability using the form.
  - e. Save Button Label - Enter the label for the Save button.
  - f. Show Delete Button - Indicate whether users should have delete capability using the form.
  - g. Delete Button Label - Enter the label for the Delete button.
  - h. Select **Next**.
8. Confirm your selections and click **Create**.

### Adding a SQL Calendar to a New Page

To create an Easy Calendar on a new page:

1. Create a Calendar page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. Click **Create Page**.
  - e. Select **Calendar** and click **Next**.
2. For Page, select **SQL Calendar** and click **Next**.
3. For Page Attributes:
  - a. Page Number - If you identify a new page number, the wizard creates a new page. If you identify an existing page number, the wizard adds the component to that page.
  - b. Page Name - Enter a title for the page being created.
  - c. Region Template - Select a region template for the new calendar region.
  - d. Region Name - Enter a name for the region to contain the calendar.
  - e. Display Type - Determines the behavior of the calendar. Options include
    - **Standard** - Submits the page along with the associated request.
    - **Partial Page Refresh** - Only refreshes the Calendar region

**Tip:** Once the calendar is created, the display type cannot be changed. To change the display type, you must delete the calendar and then re-create it.

  - f. Breadcrumb - Select whether you want to use a breadcrumb navigation control on your page, and which breadcrumb navigation control you want to use.
  - g. Click **Next**.
4. On Tab Options, specify a tab implementation and click **Next**.
5. For Source:
  - a. Enter SQL Query - Enter the select statement to be used by the calendar.

Use the syntax:

```
SELECT id, name, date  
FROM ...
```



Remember the following:

- You include at least two columns, one of which must be a `DATE` column.
- The first column should identify the primary key column to be used for managing data manipulation language (DML) operation.
- Review the examples at the bottom of the page.

**b. Click Next.**

**6. For Calendar Attributes:**

- a. Date Column** - Specify which column is used as the date to place an entry on to the calendar.
- b. Display Column** - Specify the column to be displayed on the calendar.
- c. Date Format** - Specify how you want to represent dates on your calendar. Options include:
  - **Date Only** - Results display in a monthly and list calendar.
  - **Date and Time** - Results display in a monthly, weekly, daily, and list calendar.
- d. Primary Key Column** - Select the name of the first column that uniquely identifies a row in the table, or select `ROWID`. `ROWID` is a built in globally unique identifier for the row.
- e. Custom Date Range** - Identify whether to include custom start and end dates. Use this option to enable more than one month to be represented on a monthly calendar.
- f. Enable Drag and Drop** - Identify whether to enable the drag and drop of calendar data to other dates and times on the calendar.
- g. Click Next.**

Next, define Link Details for calendar entries. The Link Target determines where users are redirected to if they select a calendar entry. The selected Link Target determines what attributes display.

**7. For Link Details:**

- a. Link Target** - Identify whether a calendar entry should have a link target. When a calendar entry is selected, the user is redirected to the link target. Options include:
  - Create a new edit page
  - Page in this application
  - URL
  - Exclude Link Target
- b. Allowed Operations** - Determines which data manipulation language (DML) operations are allowed. To enable drag and drop on the calendar data, you must select Update. Options include:
  - Insert
  - Update
  - Delete

- c. Page Number - Enter a unique page number for the page being created.
  - d. Page Name - Enter a title for the page being created.
  - e. Region Template - Select a region template for the new calendar region.
  - f. Region Name - Enter a name for the region to contain the calendar.
  - g. Owner - Identifies the schema that owns the table.
  - h. Table/View Name - Select the database object (table or view) on which this calendar is based.
  - i. Date Column - Specify which column is used as the date to place an entry on the calendar.
  - j. Primary Key Type - Options include:
    - **Managed by Database (ROWID)** - The form uses the ROWID pseudo column to identify rows to update and delete.
    - **Select Primary Key Column(s)** - Uses the source table's primary key column(s).
  - k. Select Columns - Select the column(s) to be included in the form. You must include date and primary key columns to the form for expected functionality.
  - l. From Open Link in, select the location where the URL or page should open.
  - m. Click **Next**.
8. For Process Options:
- a. Cancel Button Label - Enter the label for the Cancel button.
  - b. Show Create Button - Indicate whether users should have insert capability using the form.
  - c. Create Button Label - Enter the label for the Create button.
  - d. Show Save Button - Indicate whether users should have update capability using the form.
  - e. Save Button Label - Enter the label for the Save button.
  - f. Show Delete Button - Indicate whether users should have delete capability using the form.
  - g. Delete Button Label - Enter the label for the Delete button.
  - h. Select **Next**.
9. Confirm your selections and click **Create**.

**See Also:** ["Editing Calendar Attributes"](#) on page 10-32

## Editing Calendar Attributes

Once you create a calendar, you can alter the display by editing attributes on the Calendar Attributes page.

To disable a view of a calendar, you must delete the Monthly, Weekly, or Daily buttons on the calendar page.

### Topics:

- [Accessing the Calendar Attributes Page](#)

- [About the Calendar Attributes Page](#)

### Accessing the Calendar Attributes Page

To access the Calendar Attributes page:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Calendar Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.
3. Click **Calendar Attributes**.
4. Edit the appropriate attributes. To learn more about a specific item on a page, click the item label.
 

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item.
5. Click **Apply Changes**.

**See Also:** "[About the Calendar Attributes Page](#)" on page 10-33 and "[About Field-Level Help](#)" on page 1-13

**About Navigation Alternatives** The Calendar Attribute page is divided into sections.

You can access these sections by 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**.

### About the Calendar Attributes Page

The topics that follow describe specific sections of the Calendar Attributes page. You can use these attribute to specify general calendar formatting, define the dates included in the calendar, or create a link on the column or a day in the calendar.

**Calendar Display** Use Calendar Display to specify a calendar template, date columns, and general calendar formatting. [Table 10-2](#) describes Calendar Display attributes.

**Table 10-2** *Calendar Display Attributes*

Attribute	Description
Calendar Template	Determines what template is used when the Application Express engine renders a calendar.
Easy SQL Table Owner	Indicates the database owner of the table on which the calendar is based.
Easy SQL Table	Indicates the database table on which the calendar is based.
Date Column	Defines the column from the table or query containing the dates to be placed on the calendar.
Date Format	Specifies how you want to represent dates on your calendar. Options include: <ul style="list-style-type: none"> <li>■ Date Only</li> <li>■ Date and Time</li> </ul>

**Table 10–2 (Cont.) Calendar Display Attributes**

Attribute	Description
Date Item	Defines the item which holds the date on which the calendar is based
End Date Item	Specifies the item which holds the end date on which the calendar of type Custom is based.
Calendar Type Column	Specifies the item which holds the calendar type.
Display Type	<p>Defines the display type. Options include:</p> <ul style="list-style-type: none"> <li>■ <b>Column</b></li> <li>■ <b>Custom</b></li> <li>■ <b>No Display Value</b></li> </ul> <p>If the Display Type is <b>Column</b>, use the Display Column attribute to select the column to display in the day cell of the monthly calendar.</p> <p>If the Display Type is <b>Custom</b>, in Column Format enter a custom column format using HTML expressions and supported substitution strings.</p>
Display Column	When the Display Type is set to <b>Column</b> , select the column to display in the day cell of the monthly calendar. To display more than one column, change the display type.
Primary Key Column	The primary key column value which is passed when editing data through Calendar. This value is passed to the target page only if the Column link item value has #PRIMARY_KEY_VALUE#.
Column Format	<p>Enter HTML expressions to be shown in this column. Use #COLUMN# syntax to show column values in HTML. For example:</p> <pre>#EMPLOYEE_NAME#</pre> <p>This following example demonstrates how to display images in a column.</p> <pre>&lt;img src="#IMAGE_NAME#"&gt;</pre>

**See Also:** ["Supported Calendar Substitution Strings"](#) on page 10-21

**Display Attributes** Use Display Attributes to define the dates that are included in the calendar. [Table 10–3](#) describes Display attributes.

**Table 10–3 Display Attributes**

Attribute	Description
Begin at Start of Interval	<p>Determines when the calendar should start. Selecting this option creates a calendar that spans an entire interval (such as a month). For example:</p> <ul style="list-style-type: none"> <li>■ If you select <b>Begin at Start of Interval</b>, the date is June 15th, and the display is monthly, the resulting calendar spans from June 1st to June 30th.</li> <li>■ If you do not select <b>Begin at Start of Interval</b>, the date is June 15th, and the display is monthly, the resulting calendar spans from June 15th to June 30th.</li> </ul>

**Table 10-3 (Cont.) Display Attributes**

Attribute	Description
Start of Week for Monthly Calendar	Determines the day of the week on which the calendar starts for the monthly view.
Start Day for Weekly Calendar	Select the start day for a weekly calendar.
End Day for Weekly Calendar	Select the end day for a weekly calendar.
Time Format	Select the time format. Determines if the time displays in a 12 hour or 24 hour format.
Start Time	Enter the start time from which the weekly and daily Calendar should display.
End Time	Enter the end time until which the weekly and daily Calendar should display.
Data Background Color	Specify a background color for this data displayed in the calendar.
Data Text Color	Specify a text color for data displayed on the calendar.
Custom View Days	Enter total number of days to be displayed in the custom calendar.

**Column Link** Use Column link to create a link on the entries displayed on the calendar.

To set session state with these values:

1. Navigate to the appropriate Calendar Attributes page. See "[Accessing the Calendar Attributes Page](#)" on page 10-33.
2. Scroll down to Column Link.
3. From Target is a, select **Page in this Application**.
4. From Open Link in, select the location where the URL or page should open. Options include:
  - **Same Window**
  - **Popup Window**
5. In Page, specify the target page number. To reset the pagination for this page, select **reset pagination for this page**.
6. In Request, enter text for the built-in application item called REQUEST. This is also the item that is set with the name of a button that was clicked.
7. In Clear Cache, specify the pages (that is, the page numbers) on which to clear cache. Specify multiple pages by listing the page numbers in a comma-delimited list.  
  
You can set session state (that is, give a listed item a value) using the next two attributes: the Set these items attribute and the With these values attribute.
8. To set session state with these values:
  - a. Set these items - Enter a comma-delimited list of item names for which you would like to set session state.
  - b. 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\`).

9. Click **Apply Changes**.

**See Also:** ["Supported Calendar Substitution Strings"](#) on page 10-21

To create a column link to a URL:

1. Navigate to the appropriate Calendar Attributes page.
2. Scroll down to Column Link.
3. From Target is a, select **URL**.
4. In URL Target, enter the appropriate address.

You can use a column link to a URL to:

- Link to a URL defined by your query, for example:

`#URL#`

Where URL is a column alias from your query that defines the proper URL.

- Pass values from your query to the page you want to call, for example:

`f?p=&FLOW_ID.:3:&SESSION.::&DEBUG.:3:P3_EVENT_ID,P3_PREV_PAGE:#EVENT_ID#,1`

Where `EVENT_ID` is the alias of a column from your query.

5. Click **Apply Changes**.

**See Also:** ["Editing an Existing Calendar to Include Add and Edit Functionality"](#) on page 10-37

**Day Link** Use Day link to create a link on a day in the calendar. This attribute creates a link on an actual number (or day) on the calendar.

To create a day link to another page:

1. Navigate to the appropriate Calendar Attributes page. See ["Accessing the Calendar Attributes Page"](#) on page 10-33.
2. Scroll down to Day Link.
3. From Target is a, select **Page in this Application**.
4. In Page, specify the target page number.

To reset the pagination for this page, select **reset pagination for this page**.

5. In Request, enter text for the built-in application item called REQUEST. This is also the item that is set with the name of a button that was clicked.
6. In Clear Cache, specify the pages (that is, the page numbers) on which to clear cache. Specify multiple pages by listing the page numbers in a comma-delimited list.

You can set session state (that is, give a listed item a value) using the next two attributes: Set these items and With these values.

7. To set session state:

- a. Set these items - Enter a comma-delimited list of item names for which you would like to set session state.
- b. 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\).

**8. Click Apply Changes.**

To create a day link to a URL:

1. Navigate to the appropriate Calendar Attributes page.
2. Scroll down to Day Link.
3. From Target is a, select URL.
4. In URL Target, enter the appropriate address.
5. Click Apply Changes.

## Editing an Existing Calendar to Include Add and Edit Functionality

To edit an existing calendar to include add and edit functionality:

1. Navigate to the appropriate Calendar Attributes page. See ["Accessing the Calendar Attributes Page"](#) on page 10-33.
2. Scroll down to Column Link. Under Column Link:
  - a. Target is a - Select **Page in this Application**.
  - b. Open Link in - Select the location where the URL or page should open. Options include:
    - Same Window
    - Popup Window
  - c. Page - Specify the form page number.
  - d. Set these items - Select the primary key and date column from the target form page.

**Tip:** The selected date column must have a format mask of RRRRMMDDHH24MISS since the calendar passes the date in the that format.

If you do not want to change the format mask of date item, you must create a hidden item (this hidden item should be selected as Date Item which accepts the date value) in the form page with the above format mask.

- e. With these values - Enter the substitution strings #PRIMARY\_KEY\_VALUE# for primary key value and #DATE\_VALUE#, for example:
 

```
#PRIMARY_KEY_VALUE#, #DATE_VALUE#
```
3. Scroll up to Calendar Display.

From Primary Key Column, select the value to be passed when editing calendar data. This value is substituted for the #PRIMARY\_KEY\_VALUE# specified in the previous step.

**4. Click Apply Changes.**

### About the Date Column Format Mask

Because the calendar passes the date in specific format, the selected date column must have a format mask of RRRRMMDDHH24MISS. If you do not want to change the format mask of date item, you must create a hidden item (this hidden item should be selected as Date Item which accepts the date value) in the form page with the above format mask. The default value of the date column should be changed to:

```
return to_char(to_date(<hidden item created>,'RRRRMMDDHH24MISS'),<Date item format mask>);
```

Consider the following example:

```
return to_char(to_date(:P130_HIREDATE_TMP,'RRRRMMDDHH24MISS'),:APP_DATE_TIME_FORMAT);
```

The source type for default should be PL/SQL Function returning value.

## Enabling the Dragging and Dropping of Data In an Existing Calendar

If you choose to enable drag and drop capability in an Easy Calendar, the calendar generation process automatically creates a On Demand process to implement this functionality. When creating an Easy Calendar on a new page, the process is created automatically. When creating an Easy Calendar on an existing page, the wizard prompts you to create the new page process. To learn more, see "[Creating an Easy Calendar](#)" on page 10-22. These are the only wizards that automatically facilitate the creation of this On Demand process.

In contrast, when you create a SQL Calendar on a new page, the Enable Drag and Drop option does not appear. To enable this functionality, you must create the On Demand process, create a SQL Calendar page, and then edit the page to enable drag and drop. As a best practice, Oracle recommends creating this process before creating the calendar.

To enable support for dragging and dropping of calendar data:

1. Create an On Demand application process. See "[Understanding Page Processes](#)" on page 8-43.

This page process should execute when the calendar data is dragged and dropped. It should have code similar to the following example:

```
declare
    l_date_value          varchar2(32767) := apex_application.g_x01;
    l_primary_key_value   varchar2(32767) := apex_application.g_x02;
begin
    update EMP set HIREDATE = to_date(l_date_value,'YYYYMMDD HH24MISS')
    where ROWID = l_primary_key_value;
end;
```

2. Navigate to the Calendar Attributes page. See "[Accessing the Calendar Attributes Page](#)" on page 10-33.
3. Scroll down to Drag and Drop.
4. From Process, select the custom page process you created in step 1.



5. Click **Apply Changes**.

## Editing a Calendar Title

The title that appears at the top of calendar corresponds to the region title.

To alter the region title:

1. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Region Definition:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.

3. Under Identification, edit the Title attribute.
4. Click **Apply Changes**.

## Upgrading a Calendar Created in a Previous Releases

By default, calendars you create in Oracle Application Express 3.0 include daily, weekly, and monthly views. To update calendars created in a previous release to include these views, you can either:

- Create a calendar:
  - a. Create a calendar page and integrate the SQL query from your previous calendar.
  - b. Replace the previous calendar page with the new one in your application.
- Upgrade the theme:
  - a. Change the identification number of the existing theme. See ["Changing a Theme Identification Number"](#) on page 13-8.
  - b. Re-create the theme. See ["Creating a Theme"](#) on page 13-4.
  - c. Apply the new theme to your application. See ["Switching an Active Theme"](#) on page 13-5.

## Converting an Easy Calendar to a SQL Calendar

Creating an Easy Calendar is the simplest way to create a calendar. However, if you find the resulting calendar does not meet your needs, you can quickly convert it to a SQL Calendar.

To convert an Easy Calendar to a SQL Calendar:

1. Navigate to the appropriate Calendar Attributes page. See ["Accessing the Calendar Attributes Page"](#) on page 10-33.
2. On the Tasks list, click **Convert to SQL Based calendar**.

Converting an Easy Calendar to a SQL Calendar adds a Region Source section to the Region Definition. The Region Source contains the original SQL query that creates the calendar. By accessing the Region Source, you can edit the query to meet your needs.

## Creating Maps

Application Builder includes built-in wizards for generating Flash maps on pages with a Desktop user interface. How you create a flash map depends upon whether you are adding the map to an existing page, or adding a map on a new page.

### Topics:

- [About Flash Map Support](#)
- [Adding a Flash Map to an Existing Page](#)
- [Adding Flash Maps to a New Page](#)
- [About Creating SQL Queries for Maps](#)
- [Editing Flash Map Attributes](#)
- [Using Custom XML with Flash Maps](#)
- [Enabling Asynchronous Updates](#)

## About Flash Map Support

Flash map support in Oracle Application Express is based on the AnyChart AnyMap Interactive Maps Component. AnyMap is a flexible Macromedia Flash-based solution that enables developers to visualize geographical related data. Flash maps are rendered by a browser and require Flash Player 9 or later. For more information about AnyChart, go to

<http://www.anychart.com>

AnyChart stores map data in files with a \*.amap extension, and supports 300 map files for the United States of America, Europe, Asia, Europe, Africa, Oceania, North America, and South America. To render a desired map, you select the map source in the wizard (for example, Germany) and the map XML automatically references the desired map source .amap file, germany.amap. To browse through the available maps, see "Map Reference" in *AnyChart User's Guide*:

<http://anychart.com/products/anychart/docs/users-guide/>

## Adding a Flash Map to an Existing Page

To add a flash map to an existing page.

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. On the Page Definition, create a new region:
  - Tree view- Under Page Rendering, right-click **Regions** and select **Create**.
  - Component view - Under Region, click the **Create** icon.The Create Region Wizard appears.
3. Select **Map** and click **Next**.
4. For Map Type, select a map type (for example, **Europe**), and click **Next**.
5. For Map Source, a Tree lists the map source files for the selected Map Type. Click the Map Source you want to use (for example, **Denmark**).
6. For Display Attributes, specify the following:
  - a. Title

- b. Region Template
  - c. Parent Region
  - d. Display Point
  - e. Sequence
 

To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.
  - f. Click **Next**.
7. For Display Attributes, select the appropriate map attributes and click **Next**.
- To learn more about a specific attribute, click the item label. See ["About Field-Level Help"](#) on page 1-13.
8. For Source:
- a. Specify a query by either:
    - Entering a SQL query in the field provided. See ["About Creating SQL Queries for Maps"](#) on page 10-42.
    - Clicking the **Build Query** button. When the Build Chart Query Wizard appears, follow the on-screen instructions.
  - b. Specify relevant attributes. To view map reference information associated with your selected Map Source, expand the **Map Region Information** region at the bottom of the page.
 

To associate data with geographical locations, you must incorporate information from the Region Name or Region ID columns into the Map query. See ["About Creating SQL Queries for Maps"](#) on page 10-42.
9. For Conditional Display:
- a. Condition Type - Select a condition type from the list that must be met in order for this component to be rendered processed. See ["Understanding Conditional Rendering and Processing"](#) on page 2-4
  - b. Authorization Scheme - Optionally select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed. See ["Providing Security Through Authorization"](#) on page 15-37.
  - c. Click **Create Region**.

## Adding Flash Maps to a New Page

To create a flash map chart on a new page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Create Page**.
4. Select **Map** and click **Next**.
5. For Map Type, select a map type (for example, **Europe**), and click **Next**.
6. For Map Source, a Tree lists the map source files for the selected Map Type. Click the Map Source you want to use (for example, **Denmark**).
7. For Page Attributes:

- a. Specify the following:
  - Page Number
  - Page Name
  - Region Template
  - Region Name
  - Breadcrumb

To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.
- b. Click **Next**.
8. Specify whether to include tabs and click **Next**.
9. For Map Attributes, select the appropriate attributes and click **Next**.

To learn more about a specific attribute, click the item label. See ["About Field-Level Help"](#) on page 1-13.
10. For Query:
  - a. Specify a query by either:
    - Entering a SQL query in the field provided. See ["About Creating SQL Queries for Maps"](#) on page 10-42.
    - Clicking the **Build Query** button. When the Build Chart Query Wizard appears, follow the on-screen instructions.
  - b. Specify relevant attributes. To view map reference information associated with your selected Map Source, expand the **Map Reference Information** region at the bottom of the page.

To associate data with geographical locations, you must incorporate information from the Region Name or Region ID columns into the Map query. See ["About Creating SQL Queries for Maps"](#) on page 10-42.
  - c. Click **Next**.
11. Click **Create**.

## About Creating SQL Queries for Maps

You define a map in Application Builder using a wizard. For most chart wizards, you select a map type, map source, and provide a SQL query using the following syntax:

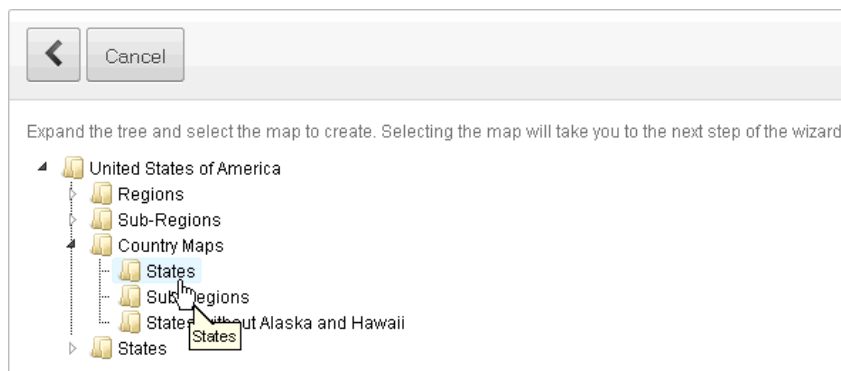
```
SELECT link, label, value
FROM ...
```

Where:

- *link* is a URL.
- *label* is the text that identifies the point on the map with which you want to associate data. The Region ID or Region Name of the map will be used as the label.
- *value* is the numeric column that defines the data to be associated with a point on the map.

Consider the following example when creating a new page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Create Page**.
4. Select **Map** and click **Next**.
5. For Map Type, select **United States of America** and click **Next**.
6. For Map Source, expand Country Maps and select **States**.



7. For Page Attributes specify the appropriate attributes and click **Next**.
8. Specify whether to include tabs and click **Next**.
9. For Map Attributes, select the appropriate attributes and click **Next**.  
The Query page appears.
10. Expand and review the **Map Reference Information** region at the bottom of the page.

<div> <div>Map Query Example</div> <div> <div>Map Reference Information</div> <table> <tr> <th>Region Id</th><th>Region Name</th><th>Centroid X</th><th>Centroid Y</th><th>State Fips</th><th>Sub Region</th><th>Gmi Admin</th></tr> <tr> <td>AK</td><td>Alaska</td><td>-151.777777777778</td><td>65.676268861454</td><td>2</td><td>Pacific</td><td></td></tr> <tr> <td>AL</td><td>Alabama</td><td>-86.683483899971</td><td>32.6248189553488</td><td>1</td><td>E S Cen</td><td></td></tr> <tr> <td>AR</td><td>Arkansas</td><td>-92.1313681482295</td><td>34.751481339065</td><td>5</td><td>W S Cen</td><td></td></tr> <tr> <td>AZ</td><td>Arizona</td><td>-111.788751714678</td><td>34.2030178326475</td><td>4</td><td>Mtn</td><td></td></tr> <tr> <td>CA</td><td>California</td><td>-119.821673525377</td><td>35.8710562414266</td><td>6</td><td>Pacific</td><td></td></tr> <tr> <td>CO</td><td>Colorado</td><td>-105.546534361717</td><td>38.9961845178978</td><td>8</td><td>Mtn</td><td></td></tr> <tr> <td>CT</td><td>Connecticut</td><td>-72.5459533607682</td><td>41.6652949245542</td><td>9</td><td>N Eng</td><td></td></tr> <tr> <td>DC</td><td>District of Columbia</td><td>-77.0166164971011</td><td>38.8908875514914</td><td>11</td><td>S Atl</td><td></td></tr> </table> </div> </div>							Region Id	Region Name	Centroid X	Centroid Y	State Fips	Sub Region	Gmi Admin	AK	Alaska	-151.777777777778	65.676268861454	2	Pacific		AL	Alabama	-86.683483899971	32.6248189553488	1	E S Cen		AR	Arkansas	-92.1313681482295	34.751481339065	5	W S Cen		AZ	Arizona	-111.788751714678	34.2030178326475	4	Mtn		CA	California	-119.821673525377	35.8710562414266	6	Pacific		CO	Colorado	-105.546534361717	38.9961845178978	8	Mtn		CT	Connecticut	-72.5459533607682	41.6652949245542	9	N Eng		DC	District of Columbia	-77.0166164971011	38.8908875514914	11	S Atl	
Region Id	Region Name	Centroid X	Centroid Y	State Fips	Sub Region	Gmi Admin																																																															
AK	Alaska	-151.777777777778	65.676268861454	2	Pacific																																																																
AL	Alabama	-86.683483899971	32.6248189553488	1	E S Cen																																																																
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AZ	Arizona	-111.788751714678	34.2030178326475	4	Mtn																																																																
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DC	District of Columbia	-77.0166164971011	38.8908875514914	11	S Atl																																																																

11. For Query,
  - a. Specify a query by either:
    - Entering a SQL query in the field provided. See ["About Creating SQL Queries for Maps"](#) on page 10-46.
    - Clicking the **Build Query** button. When the Build Chart Query Wizard appears, follow the on-screen instructions.

- b. When you create your query, you must incorporate the region name information. The following example includes information for Florida and Alaska:

```
SELECT null link, region label, value Populations
FROM (
  SELECT 'Florida' region, 18328340 value FROM dual
  UNION ALL
  SELECT 'Alaska' region, 686293 value FROM dual)
```

**Note:** If you are referencing geographical information stored in a database table, the information must correspond with the Region information associated with the map source. For more information, see *AnyChart User's Guide*:

<http://anychart.com/products/anymap/docs/>

- c. Click **Next**.

12. Click **Finish**.

## Editing Flash Map Attributes

Once you create a map, you can alter its display by editing map attributes on the Map Attributes page.

To access the Map Attributes page:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.

3. Click **Map Attributes**.
4. Edit the appropriate attributes.

To learn more about a specific item on a page, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.

5. Click **Apply Changes**.

### About Navigation Alternatives

The Map Attributes page is divided into sections. You can access these sections by 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**.

## Using Custom XML with Flash Maps

There are additional map settings that cannot be controlled using the standard attributes on the Map Attributes page. To further control the look and feel of a chart, you can use custom XML.

To use custom XML:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Map Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.

3. Click **Map Attributes**.
4. Scroll down to Map XML.
5. From Use Custom XML, select **Yes**.

If you select to use custom XML, regions with attributes that no longer appear are hidden. To display these regions again, select **No** for Use Custom XML.

6. Edit the XML.
7. Click **Apply Changes**.

**Tip:** For more information on supported XML format for maps, see the Online Map XML Reference at:

<http://www.anychart.com/>

## Enabling Asynchronous Updates

You can create Flash maps that monitor information by enabling the Asynchronous Update attribute on the Map Attributes page. Enabling this attribute updates the map to reflect changes in the underlying data within a specified time interval.

To enable asynchronous updates:

1. Create a Flash map. See "[About Flash Map Support](#)" on page 10-40 and "[About Flash Map Support](#)" on page 10-40.
2. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
3. Access the Map Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.
4. Click **Map Attributes**.
5. Scroll down to Refresh.
6. From Asynchronous Update, select **Yes**.
7. In Update Interval (Seconds), enter the interval in seconds between map updates. For optimal performance, select an interval that is greater than 2 seconds.
8. Click **Apply Changes**.

## Creating Charts

Application Builder includes built-in wizards for generating Flash and HTML5 charts, and supports the editing of SVG and HTML charts. Oracle Application Express supports only these four types of graphical charts.

### Topics:

- [About Creating SQL Queries for Charts](#)
- [About Creating a HTML5 Charts](#)
- [About Creating a Flash Chart](#)
- [About SVG Charts](#)
- [About HTML Charts](#)
- [Editing Chart Attributes](#)
- [About Saving Flash Charts](#)
- [Enabling Asynchronous Updates](#)

## About Creating SQL Queries for Charts

You define a chart in Application Builder using a wizard. For most chart wizards, you select a chart type and provide a SQL query using the following syntax:

```
SELECT link, label, value
FROM   ...
```

Where:

- *link* is a URL.
- *label* is the text that displays in the bar.
- *value* is the numeric column that defines the bar size.

For example:

```
SELECT null, last_name, salary
FROM   employees
WHERE  DEPARTMENT_ID = :P101_DEPARTMENT_ID
```

### Dial Chart Syntax (Flash and HTML5)

To create a dial chart, select a dial chart type and provide a SQL query using the following syntax:

```
SELECT value , maximum_value [ ,low_value [ ,high_value] ]
FROM   ...
```

Where:

- *value* is the starting point on the dial.
- *maximum\_value* is the possible highest point on the dial.
- *low\_value* and *high\_value* are the historical low and high values.

For example:

```
SELECT dbms_random.value(500, 1200), 1300, dbms_random.value(100, 200)
FROM   DUAL
```



**Multiple Series Syntax (Flash and HTML5)**

For column charts and line charts, you can define multiple series in one SQL query. The series names for these chart types are derived from the corresponding column aliases in the query. To define a multiple series chart, use the following syntax:

```
SELECT link, label, series_1_value [, series_2_value [, ...]]
FROM ...
```

**Range Chart Syntax (Flash and HTML5)**

Range charts require two values for each bar. To create a range chart, create a chart and provide a SQL query using the following syntax:

```
SELECT link, label, low_value, high_value
FROM ...
```

**Scatter Chart Syntax (Flash and HTML5)**

Scatter charts require an  $x$  value and  $y$  value for each point. To create a range chart, create a chart and provide a SQL query using the following syntax:

```
SELECT link, label, x_value, y_value
FROM ...
```

**Candlestick Chart Syntax (Flash and HTML5)**

Candlestick charts require open, low, high, and close values for each candlestick. To create a candlestick chart, create a chart and provide a SQL query using the following syntax:

```
SELECT link, label, open, low, high, close
FROM ...
```

**Gantt Chart Syntax (Flash Only)**

Project Gantt charts require a task name, task id, parent task id, actual start date, actual\_end\_date, and progress value for each task. Two optional values for planned start date and planned end date can also be used. To create a Project Gantt chart, create a Flash chart and provide a SQL query using the following syntax:

```
SELECT link, task_name, task_id, parent_task_id, actual_start_date, actual_end_date, progress
FROM ...
```

Resource Gantt charts require a resource id, resource name, parent resource id, actual start date, and actual end date value for each task. To create a Resource Gantt chart, create a Flash chart and provide a SQL query using the following syntax:

```
SELECT link, resource_id, resource_name, resource_parent_id, actual_start_date, actual_end_date
FROM ...
```

## About Creating a HTML5 Charts

HTML5 chart support in Oracle Application Express is based on the AnyChart HTML5 Chart Component.

### Topics:

- [About HTML5 Charts](#)
- [Adding an HTML5 Chart to an Existing Page](#)
- [Adding an HTML5 Chart to a New Page](#)
- [Switching an HTML5 Chart to a Flash Chart](#)

### About HTML5 Charts

HTML5 chart support in Oracle Application Express is based on the AnyChart HTML5 Chart Component. AnyChart is a flexible Flash and JavaScript (HTML5) based solution that enables developers to create animated and compact interactive charts. HTML5 charts use a JavaScript chart engine, rendering the chart in SVG format. Flash cannot be rendered on most of the modern mobile devices, however you can now take advantage of our new HTML5 charting solution to incorporate charts in your mobile applications. HTML5 charts are compatible with popular browsers for the following mobile platforms:

- Android: Versions 3.1, 3.2, 4.0, 4.0.3, and 4.1
- iOS (iPhone, iPad, iPod Touch): Safari 3.2 and higher is required

To learn more see:

<http://www.anychart.com>

### Adding an HTML5 Chart to an Existing Page

To add an HTML chart to an existing page:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. On the Page Definition, create a new region:
  - Tree view- Under Page Rendering, right-click **Regions** and select **Create**.
  - Component view - Under Region, click the **Create** icon.The Create Region Wizard appears.
3. Select **Chart** and click **Next**.
4. For Chart Type:
  - a. Chart Rendering - Select **HTML5 Chart**.
  - b. Chart Type - Specify a chart type. Depending upon the chart type, you may be prompted to make one or two selections.
  - c. Click **Next**.
5. For Display Attributes:
  - a. Specify the following:
    - Title
    - Region Template
    - Parent Region

- Display Point
- Sequence

To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

- b. Click **Next**.
6. For Chart Attributes, specify the appropriate attributes and click **Next**.  
To learn more about a specific attribute, click the item label.
7. For Source:
  - a. Specify a query by either:
    - Entering a SQL query in the field provided. See ["About Creating SQL Queries for Charts"](#) on page 10-46.
    - Clicking the **Build Query** button. When the Build Chart Query Wizard appears, follow the on-screen instructions.
  - b. Specify relevant chart attributes. To learn more, click the item label.
8. For Conditional Display:
  - a. Condition Type - Select a condition type from the list that must be met in order for this component to be rendered processed. See ["Understanding Conditional Rendering and Processing"](#) on page 2-4
  - b. Authorization Scheme - Optionally select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed. See ["Providing Security Through Authorization"](#) on page 15-37.
  - c. Click **Create Region**.

### Adding an HTML5 Chart to a New Page

To create an HTML5 chart on a new page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Create Page**.
4. Select **Chart** and click **Next**.
5. For Chart Type:
  - a. Chart Rendering - Select **HTML5 Chart**.
  - b. Chart Type - Specify a chart type. Depending upon the chart type, you may be prompted to make one or two selections.
  - c. Click **Next**.
6. For Page and Region Attributes:
  - a. Specify the following:
    - Page Number
    - Page Name
    - Region Template
    - Region Name

- To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

For Tab Options, specify whether to include tabs and click **Next**.

To learn more about an attribute, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

**a.** Specify a query by either:

- b.** Specify relevant chart attributes. To learn more, click the item label.

**10. Click Create.**

Once you create an HTML5 chart, you can switch its rendering to Flash by editing chart attributes on the Chart Attributes page.

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.

- Tree view- Under Page Rendering, double-click the region name.

- The Region Definition appears.

**3. For Chart Type:**

- b.** Chart Type - Specify a chart type. Note that 3D chart types are only supported for Flash charts, so you may want to change the chart type to use one of the 3D options.

To learn more about an attribute, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

**10-50** Oracle Application Express Application Builder User's Guide

## About Creating a Flash Chart

Flash chart support in Oracle Application Express is based on the AnyChart Flash Chart Component.

### Topics:

- [About Flash Charts](#)
- [Adding a Flash Chart to an Existing Page](#)
- [Adding a Flash Chart to a New Page](#)
- [Upgrading All Flash Charts to Flash 6](#)
- [Upgrading All Flash Charts to HTML5](#)
- [Upgrading a Flash 3 Chart to Flash 6](#)
- [Upgrading a Flash 3 Chart to HTML5](#)
- [Switching a Flash Chart to an HTML5 Chart](#)

### About Flash Charts

Flash chart support in Oracle Application Express is based on the AnyChart Flash Chart Component. AnyChart is a flexible Flash and JavaScript-based solution that enables developers to create animated, compact, interactive charts. Flash charts are rendered by a browser and require Flash player 9 or later. With AnyChart 6.0, Flash charts are rendered using the FLASH\_PREFERRED rendering type. If Flash Player is not available on the device displaying the chart (for example, pages displayed on an iPhone), AnyChart automatically switches to the HTML5 chart engine and displays an SVG-based chart.

### Adding a Flash Chart to an Existing Page

To add a flash chart to an existing page:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. On the Page Definition, create a new region:
  - Tree view- Under Page Rendering, right-click **Regions** and select **Create**.
  - Component view - Under Region, click the **Create** icon.

The Create Region Wizard appears.
3. Select **Chart** and click **Next**.
4. For Chart Type:
  - a. Chart Rendering - Select **Flash Chart**.
  - b. Chart Type - Specify a chart type. Depending upon the chart type, you may be prompted to make one or two selections.
  - c. Click **Next**.
5. For Display Attributes
  - a. Specify the following:
    - Title
    - Region Template
    - Parent Region

- Display Point
- Sequence

To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

- b.** Click **Next**.
- 6.** For Chart Attributes, select the appropriate attributes and click **Next**.  
To learn more about a specific attribute, click the item label.
- 7.** For Source:
  - a.** Specify a query by either:
    - Entering a SQL query in the field provided. See ["About Creating SQL Queries for Charts"](#) on page 10-46.
    - Clicking the **Build Query** button. When the Build Chart Query Wizard appears, follow the on-screen instructions.
  - b.** Specify relevant chart attributes. To learn more, click the item label.
  - c.** Click **Next**.
- 8.** For Conditional Display:
  - a.** Condition Type - Select a condition type from the list that must be met in order for this component to be rendered processed. See ["Understanding Conditional Rendering and Processing"](#) on page 2-4
  - b.** Authorization Scheme - Optionally select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed. See ["Providing Security Through Authorization"](#) on page 15-37.
  - c.** Click **Create Region**.

### Adding a Flash Chart to a New Page

To create a flash chart on a new page:

- 1.** On the Workspace home page, click the **Application Builder** icon.
- 2.** Select an application.
- 3.** Click **Create Page**.
- 4.** Select **Chart** and click **Next**.
- 5.** For Chart Type:
  - a.** Chart Rendering - Select **Flash Chart**.
  - b.** Chart Type - Specify a chart type. Depending upon the chart type, you may be prompted to make one or two selections.
  - c.** Click **Next**.
- 6.** For Page and Region Attributes:
  - a.** Specify the following:
    - Page Number
    - Page Name
    - Region Template

- Region Name
- Breadcrumb

To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

- b. Click **Next**.
7. Specify whether to include tabs and click **Next**.
8. For Chart Attributes, select the appropriate attributes and click **Next**.  
To learn more, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.
9. For Query:
  - a. Specify a query by either:
    - Entering a SQL query in the field provided. See ["About Creating SQL Queries for Charts"](#) on page 10-46.
    - Clicking the **Build Query** button. When the Build Chart Query Wizard appears, follow the on-screen instructions.
  - b. Specify the remaining attributes. To learn more, click the item label.
  - c. Click **Next**.
10. Click **Create**.

### Upgrading All Flash Charts to Flash 6

To upgrade all Flash charts in an application to Flash 6:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Click **Utilities** and then click **Upgrade Application**.  
The Upgrade Application Summary report appears.
4. For **Upgrade Flash Charts to Flash Chart 5**, click the number of candidate objects.
5. Select the objects to upgrade and click **Upgrade**.

### Upgrading All Flash Charts to HTML5

To upgrade all Flash charts in an application to HTML5 charts:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Click **Utilities** and then click **Upgrade Application**.  
The Upgrade Application Summary report appears.

4. For **Upgrade Flash Charts to Flash Chart 5**, click the number of candidate objects.
5. Select the objects to upgrade and click **Upgrade**.

### Upgrading a Flash 3 Chart to Flash 6

To upgrade a Flash 3 charts Flash 6:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.  
The Region Definition appears.
3. From the Tasks list, click **Upgrade to Flash 6 Chart**.
4. Click **Upgrade**.

### Upgrading a Flash 3 Chart to HTML5

To upgrade a Flash 3 charts HTML5:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.  
The Region Definition appears.
3. From the Tasks list, click **Upgrade to HTML5 Chart**.
4. Click **Upgrade**.

### Switching a Flash Chart to an HTML5 Chart

Once you create a Flash chart, you can switch its rendering to HTML5 by editing chart attributes on the Chart Attributes page.

To switch an Flash chart to an HTML5 Chart:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.  
The Region Definition appears.
  - Click **Chart Attributes**
3. For Chart Type:
  - a. Chart Rendering - Select **HTML5 Chart**.
  - b. Chart Type - Specify a chart type. Note that 3D chart types are only supported for Flash charts, so you may want to change the chart type to use one of the 2D options.

To learn more about an attribute, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.



4. Click **Apply Changes**.

## About SVG Charts

Previous releases of Oracle Application Express supported the creation of SVG charts. Although existing SVG charts are still supported, Oracle Application Express no longer supports the creation of new SVG charts.

### Topics:

- [About Upgrading SVG Charts to HTML5](#)
- [Understanding SVG Chart Cascading Style Sheet Classes](#)
- [Referencing a Custom SVG Chart Cascading Style Sheet](#)
- [Specifying Custom CSS Styles Inline for SVG Charts](#)
- [Displaying SVG Charts in Other Languages](#)

## About Upgrading SVG Charts to HTML5

This section describes restrictions that apply when upgrading SVG charts to HTML5 and also describes the instructions for upgrading.

### Topics:

- [About SVG Chart Upgrade Restrictions](#)
- [Upgrading an SVG Chart to HTML5](#)
- [Upgrading all SVG Charts in an Application to HTML5](#)

You can automatically upgrade single or multiple SVG charts to HTML5.

**About SVG Chart Upgrade Restrictions** SVG charts can be upgraded with the following restrictions:

- Only number formats defined in axis format strings are migrated. Date and time formats are ignored.
- Number format elements containing the following are migrated:  
0,9,D,G,, (comma),. (period),\$C,L,FM
- The label for each series in the HTML5 chart is derived from each series' column alias. This differs from SVG charts, where the label for each series is derived from the Series Name attribute.
- In SVG charts, only the labels for the first series are used for the x-axis. In HTML5 charts, this has been enhanced so that all data appears, even if the data's label does not occur in the first series.

**Upgrading an SVG Chart to HTML5** To upgrade an SVG chart to HTML5:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.
 The Region Definition appears.
3. From the Tasks list, click **Upgrade to New HTML5 Chart**.

#### 4. Click **Upgrade**.

**Upgrading all SVG Charts in an Application to HTML5** To upgrade all SVG Charts to HTML5 charts:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Click **Utilities** and then click **Upgrade Application**.  
The Upgrade Application Summary report appears.
4. For Upgrade SVG Charts to HTML5 Charts, click the number of candidate objects.
5. Select the objects to upgrade and click **Upgrade**.

### Understanding SVG Chart Cascading Style Sheet Classes

When you create a SVG chart, Oracle Application Express renders it based on cascading style sheet (CSS) classes associated with the current theme. You can change the appearance of a chart by referencing another CSS or by overriding individual classes in the CSS section of the Edit Attributes page

The following sample contains the CSS classes for the dial chart in *Sample Application*. This example contains all the available CSS classes. Class names appear in boldface.

```
text{font-family:Verdana, Geneva, Arial, Helvetica, sans-serif;fill:#000000;}
tspan{font-family:Verdana, Geneva, Arial, Helvetica, sans-serif;fill:#000000;}
text.title{font-weight:bold;font-size:14;fill:#000000;}
text.moredatafound{font-size:12;}
rect.legend{fill:#EEEEEE;stroke:#000000;stroke-width:1;}
text.legend{font-size:10;}
#background{fill:#FFFFFF;stroke:none;}
rect.chartholderbackground{fill:#ffffff;stroke:#000000;stroke-width:1;}
#timestamp{text-anchor:start;font-size:9;}
text.tic{stroke:none;fill:#000000;font-size:12}
line.tic{stroke:#000000;stroke-width:1px;fill:none;}
#dial{stroke:#336699;stroke-width:2px;fill:#336699;fill-opacity:.5;}
#dial.alert{fill:#FF0000;fill-opacity:.5;}
#dialbackground{stroke:#000000;stroke-width:none;fill:none;filter:url(#MyFilter);}
#dialcenter{stroke:none;fill:#111111;filter:url(#MyFilter);}
#dialbackground-border{stroke:#DDDDDD;stroke-width:2px;fill:none;filter:url
(#MyFilter);}#low{stroke-width:3;stroke:#336699;}
#high{stroke-width:3;stroke:#FF0000;}
#XAxisTitle{letter-spacing:2;kerning:auto;font-size:14;fill:#000000;text-anchor:mi
ddle;}
#YAxisTitle{letter-spacing:2;kerning:auto;font-size:14;fill:#000000;text-anchor:mi
ddle;writing-mode:tb;}
.XAxisValue{font-size:8;fill:#000000;}
.YAxisValue{font-size:8;fill:#000000;text-anchor:end;}
.nodatafound{stroke:#000000;stroke-width:1;font-size:12;}
.AxisLine{stroke:#000000;stroke-width:2;fill:#FFFFFF;}
.GridLine{stroke:#000000;stroke-width:0.3;stroke-dasharray:2,4;fill:none;}
g.dataholder rect{stroke:#000000;stroke-width:0.5;}
.legenditem rect{stroke:#000000;stroke-width:0.5;}
```

Table 10–4 describes all supported CSS classes. Note that certain classes only apply to specific chart types.

**Table 10–4 Available SVG Chart CSS Classes**

Class	Description
<code>text</code>	Defines the appearance of text that displays in a chart.
<code>tspan</code>	Defines the appearance of text that displays in a chart. <code>tspan</code> should match the definition of <code>text</code> .
<code>text.title</code>	Overrides the default chart text. Use this class for title text.
<code>text.moredatafound</code>	Defines the appearance of more datafound text.
<code>rect.legend</code>	Creates the rectangular box that holds the chart legend.  To remove the legend border, change <code>rect.legend</code> to the following: <code>rect.legend{fill:#CCCC99;stroke:none;}</code>
<code>text.legend</code>	Defines the text that appears in the chart legend.
<code>#background</code>	Creates the entire background for the SVG plug-in.  For a solid white background with no border, change <code>#background</code> to the following: <code>#background{fill:#FFFFFF;stroke:#FFFFFF;stroke-width:2;}</code>
<code>rect.chartholderbackground</code>	Not applicable to pie and dial charts. Creates the background of the rectangle that holds the chart data.  For a clear background, change <code>rect.chartholderbackground</code> to the following: <code>rect.chartholderbackground(display:none;)</code>
<code>#timestamp</code>	Only applicable if the Asynchronous Update chart attribute is set to Yes. Controls the appearance of the update timestamp test.  To disable the display of the timestamp, use defines <code>#timestamp</code> as follows in the Custom CSS, Inline attribute. <code>"#timestamp{display:none;}"</code> <b>See Also:</b> <a href="#">"Enabling Asynchronous Updates"</a> on page 10-62
<code>text.tic</code>	Dial charts only. Defines the numbers on a dial chart.
<code>line.tic</code>	Dial charts only. Defines the graduation mark that displays directly beneath the number on a dial chart.
<code>#dial</code>	Dial charts only. Defines the value that displays on the dial chart.
<code>#dial.alert</code>	Dial charts only. Defines a value (called an alert value) that renders in a dial chart using a different display.
<code>#dialbackground</code>	Dial charts only. Creates the background of a dial chart.
<code>#dialcenter</code>	Dial charts only. Creates the center of the dial on a dial chart.
<code>#dialbackground-border</code>	Dial charts only. Works with <code>#dialbackground</code> to create specific graphic effect.

**Table 10–4 (Cont.) Available SVG Chart CSS Classes**

Class	Description
#low	Dial charts only. Defines the historical low watermark of the data being displayed on a chart.
#high	Dial charts only. Defines the historical high watermark of the data being displayed on a chart.
#XAxisTitle	Defines the title that appears on the x-axis
#YAxisTitle	Defines the title that appears on the y-axis.
.XAxisValue	Defines the value that appears on the x-axis.
.YAxisValue	Defines the value that appears on the y-axis.
.AxisLabel	Similar to the axis value.
.nodatafound	Defines the text element that displays if no information is available.
.AxisLine	Indicates zero on charts that have negative values.
.GridLine	Creates the horizontal and vertical lines on the chart.
g.dataholder rect	Applies a blanket style to all data that displays in the chart.
.legenditem rect	Applies a blanket style to all rectangular items in the legend.

### Referencing a Custom SVG Chart Cascading Style Sheet

You can reference a custom cascading style sheet for a chart using the CSS section of the Chart Attributes page. When you reference an external CSS, you can reference it entirely or simply override specific styles.

To reference a custom chart CSS:

1. Upload the CSS to Application Builder. See ["Uploading Cascading Style Sheets"](#) on page 13-47.
2. Navigate to the Page Definition containing the chart. See ["Accessing the Page Definition"](#) on page 8-2.
3. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.
4. Click the **Chart Attributes** tab.
5. On the Chart Attributes page, scroll down to the CSS section.
6. From Use Custom CSS, select **Yes**.
7. To reference an external CSS exclusively:
  - a. In Custom CSS, Link, enter a link to a custom CSS. For example:  
`#IMAGE_PREFIX#themes/theme_4/svg.css`
  - b. Specify that the CSS should be used exclusively. In Custom CSS, Inline enter the following:

`/**/`

8. To reference a custom CSS and override specific styles:
  - a. In Custom CSS, Link, enter a link to a custom style sheet. For example:  
`#IMAGE_PREFIX#themes/theme_4/svg.css`
  - b. In Custom CSS, Inline, enter the custom CSS styles you want to override.

### Specifying Custom CSS Styles Inline for SVG Charts

You can override specific styles within the default CSS, using the Custom CSS, Inline attribute on the Chart Attributes page.

To override specific styles within the default CSS:

1. Create a chart. See ["About SVG Charts"](#) on page 10-55.
2. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
3. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.
4. Click the **Chart Attributes** tab.
5. Scroll down to CSS.
6. From Use Custom CSS, select **Yes**.
7. In Custom CSS, Inline, enter the custom CSS styles you want to override.

### Displaying SVG Charts in Other Languages

To display an SVG chart in another language, you edit the `text` and `tspan` classes to reflect the correct language.

To display an SVG chart in another language:

1. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.
3. Click the **Chart Attributes** tab.
4. Scroll down to CSS.
5. From Use Custom CSS, select **Yes**.
6. In Custom CSS, Inline, edit the `text` and `tspan` classes to reflect the correct language. The following example demonstrates how to change a chart to Korean:

```
text{font-family:Batang;fill:#000000;}
tspan{font-family:Batang;fill:#000000;}
```

## About HTML Charts

Previous releases of Oracle Application Express supported the creation of HTML charts. Although existing HTML charts are still supported, Oracle Application Express no longer supports the creation of new HTML charts with the Create wizards. A new HTML chart region type plug-in is available for download from OTN. This plug-in enables users to create HTML chart regions in their applications

To learn more, see:

<http://www.oracle.com/technetwork/developer-tools/apex/application-express/apex-plug-ins-182042.html#region>

### Topics:

- [Upgrading an HTML Chart to HTML5](#)
- [Upgrading All HTML Charts to HTML5](#)

### Upgrading an HTML Chart to HTML5

To upgrade an HTML chart to HTML5:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
4. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.  
The Region Definition appears.
  - Click **Chart Attributes**
5. From the Tasks list, click **Upgrade to HTML5 Chart**.
6. Click **Upgrade**.

### Upgrading All HTML Charts to HTML5

To upgrade all HTML charts to HTML5:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Click **Utilities** and then click **Upgrade Application**.  
The Upgrade Application Summary report appears.
4. For Upgrade HTML Charts to HTML5 Charts, click the number of candidate objects.
5. Select the objects to upgrade and click **Upgrade**.

## Editing Chart Attributes

Once you have created a chart, you can alter its display by editing chart attributes on the Chart Attributes page.

**See Also:** ["About Saving Flash Charts"](#) on page 10-61

To access the Chart Attributes page:

1. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Chart Attributes page:
  - Tree view- Under Page Rendering, double-click the region name.
  - Component view - Under Region, select the region name.

The Region Definition appears.

- Click **Chart Attributes**
3. Edit the appropriate attributes.
  4. To learn more about a specific item on a page, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

5. Click **Apply Changes**.

**Tip:** Removing the chart title of an SVG chart (that is, the Chart Title attribute) may negatively impact the location and display of the chart legend.

### About Navigation Alternatives

The Chart Attributes page is divided into sections. You can access these sections by 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**.

## About Saving Flash Charts

To support the saving of an image, AnyChart requires the use of a server-side script that resides on <http://www.anychart.com>. When you attempt to save an image, the data is sent to the server in Base64 encoding. It is then decoded on the server and the decoded response is returned.

If you want to support the saving of charts locally, you must host the decoding script on your local server. The Flash chart would also require you use of the AnyChart JavaScript function `getPNG`. By default, the chart region uses embedded HTML tags and does not use any AnyChart JavaScript calls. To make use of the AnyChart JavaScript call, you must modify the region source of your Flash charts.

**See Also:** "Saving chart as image or vector file" in *AnyChart User's Guide* for more information on adding support to save Flash charts locally.

## Using Custom XML with Flash and HTML5 Charts

There are additional chart settings that cannot be controlled using the standard attributes on the Chart attributes page. To further control the look and feel of a chart, you can use custom XML.

To use custom XML:

1. Navigate to the Chart Attributes page. See "[Editing Chart Attributes](#)" on page 10-61.
2. Scroll down to Chart XML.
3. From Use Custom XML, select **Yes**.

If you select to use custom XML, regions with attributes that no longer apply are hidden. To display these regions again, select **No** for Use Custom XML.

4. Edit the XML.
5. Click **Apply Changes**.

**Tip:** For more information on supported XML format for charts, see the Online XML Reference at:

<http://www.anychart.com>

## Enabling Asynchronous Updates

SVG, Flash, and HTML5 charts can monitor information by enabling the Asynchronous Update attribute on the Chart attributes page or using a dynamic action with the Refresh action.

### Topics:

- [Editing the Asynchronous Update Attribute](#)
- [Creating a Refresh Dynamic Action](#)

### Editing the Asynchronous Update Attribute

Enabling the Asynchronous Update attribute updates the chart to reflect changes in the underlying data within a specified time interval.

To enable asynchronous updates:

1. Navigate to the Chart Attributes page. See "[Editing Chart Attributes](#)" on page 10-61.  
The Chart Attributes page appears.
2. Scroll down to Refresh.
3. From Asynchronous Update, select **Yes**.
4. In Update Interval (Seconds), enter the interval in seconds between chart updates.  
For optimal performance, select an interval that is greater than 2 seconds.

When Asynchronous Update is enabled for an SVG chart, a timestamp displays on the chart indicating the last update.

To disable the Asynchronous Update timestamp:

1. Navigate to the Chart Attributes page.
2. Locate the CSS section.



3. From Use Custom CSS, select **Yes**.
4. In Custom CSS, Inline edit `#timestamp` as follows:

```
#timestamp{display:none;}
```

### Creating a Refresh Dynamic Action

To create a Refresh dynamic action:

1. Navigate to the Page Definition containing the chart. See "[Accessing the Page Definition](#)" on page 8-2.
2. Locate the Dynamic Action section and click **Create**.
3. For Identification:
  - a. Name - Enter a name of the dynamic action.
  - b. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - c. Click **Next**.
4. For When:
  - a. Event - Specify the event to trigger the firing of the dynamic action.
  - b. Click **Next**.
5. For True Action:
  - a. Action - Select **Refresh**.
  - b. Click **Next**.
6. For Affected Elements:
  - a. Selection Type - Select **Region**.
  - b. Region - Select the region containing the chart.
  - c. Click **Next**.
7. Click **Create Dynamic Action**.

## Creating Buttons

As you design your application, 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).

Buttons can perform four different types of actions. A button can submit a page (for example to save changes to a form page), redirect to either a different page or a custom URL, or do nothing (for example if the button's behavior is defined in a Dynamic Action).

### Topics:

- [Creating a Button Using a Wizard](#)
- [Creating Multiple Buttons in Component View](#)
- [Editing Buttons](#)
- [Understanding the Relationship Between Button Names and REQUEST](#)
- [About Branching with Buttons](#)

- [Displaying Buttons Conditionally](#)

**See Also:** ["Calling a Page from a Button URL"](#) on page 2-11 and ["About Page Specific Utilities"](#) on page 7-83

## Creating a Button Using a Wizard

You create a button by running the Create Button Wizard from the Page Definition. How you create a button depends upon whether you are viewing the Page Definition in tree or component view. To learn more, see ["About Tree and Component View"](#) on page 8-2.

### Topics:

- [Creating a Button in Component View](#)
- [Creating a Button in Tree View](#)

### Creating a Button in Component View

Component view groups user interface elements and application logic by component type. To create a button in Component view, under buttons and click the **Create** icon.

To create a region button in Component view:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. If necessary, create a region. See ["Understanding Regions"](#) on page 12-3.
3. Under Buttons, click the **Create** icon.
4. Select a region for the button and click **Next**.
5. Select a position for the button and click **Next**:
  - **Create a button in a region position** - Select this option to place the button in a region position. A region position is a position defined by a region template.
  - **Create a button displayed among this region's items** - Select this option to display the button within or between page items (for example, to add a button directly to the right of a form field).
6. For Button Attributes:
  - a. **Button Name** - Enter a name for this button. For buttons with an action of **Submit Page**, the button name becomes the page request value. For example, if you name the button `FLOW_RESET_BUTTON`, then the button has purpose of resetting the current page without doing a submit).
  - b. **Label** - Enter a label to be displayed for the button.
  - c. **Button Style** - Available options:
    - **HTML Button**
    - **Template Based Button**
    - **Image**

If the button is an image, you must supply an image name. If the button is template controlled, you must select a template name.
  - d. **Button Template** - Define which template controls the display of the button. Button templates are defined on the templates page. You must have at least one button template defined to use button templates.

- e. Button Type - Use this attribute to select either the **Normal** or **Hot** template of the button template.

If you select **Hot**, the button is rendered using the template stored in the Hot Template attribute of a button template. If no value is defined, the regular button template is used.

- f. Button Attributes - Text entered is added to the HTML element definition. The following example sets the class of a text button:

```
class="myclass"
```

For buttons based on templates, your template must include the #BUTTON\_ATTRIBUTES# substitution string. You can use this to control tab stops. For example:

```
tabindex="3"
```

- g. Click **Next**.

The options that display for Display Properties depend upon the selected region position.

#### 7. For Display Properties:

- If the button position is **Create a button in a region position**:
  - Sequence - Enter the sequence for this component. The sequence determines the order of evaluation.
  - Position - Select a position for this button.
  - Alignment - Select **Right** or **Left**.
  - Click **Next**.
- If the button position is **Create a button displayed among this region's items**:
  - Sequence - Enter the sequence for this component. The sequence determines the order of evaluation.
  - Click **Next**.

#### 8. For Action When Clicked:

- a. Action - Select a behavior when the button is clicked:
  - **Submit Page** - Submits 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 properties for resetting pagination, setting the request value, clearing cache, and setting item values, on the target page.
  - **Redirect to URL** - Redirect to a target URL.
  - **Defined by Dynamic Action** - Does nothing. The button's behavior is defined by a Dynamic Action.
  - **Download Printable Report Query** - This creates a Submit Page button and also a corresponding branch. When the button is clicked, the output is downloaded from the Report Query.

Note that this action is only available if you have a report query defined in your application's Shared Components.

- b. **Execute Validations** - Execute Validations controls the execution of validations when a page is submitted. For example, this is useful for a Delete button where you do not want to annoy the user with irrelevant validation error messages when they are deleting a record.

Options include:

- **Yes** - If the page is submitted and this attribute is set to **Yes**, all validations defined for the page and all built-in validations execute (for example to check for a required value or to determine if the value is a valid number or date).
- **No** - If set to **No**, none of the defined validations or the built-in validations execute.

To have a specific validation always execute independent of this setting, set the validation attribute, Always Execute, to **Yes**. To learn more, see ["Determining When Validations Execute"](#) on page 8-40.

- c. **Click Next**.
9. For Conditional Display, select a condition type from the list that must be met in order for this component to be rendered.
  10. Click **Create Button**.

**See Also:** ["Understanding the Relationship Between Button Names and REQUEST"](#) on page 10-70

### Creating a Button in Tree View

Tree view displays regions, page items, and application logic as nodes in a tree. To create a button in Tree view, you select a region and then one of two options:

- **Create Region Button** displays a button in a region position. For example, to add a button in a region position, as defined by the region template.
- **Create Page Item Button** displays a button within or between button items. For example, use this option to place a button after a page item.

**See Also:** ["Understanding the Relationship Between Button Names and REQUEST"](#) on page 10-70

To create a region button in Tree view:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. If necessary, create region. See ["Understanding Regions"](#) on page 12-3.
3. Right-click the region to contain the button and select one of the following:
  - **Create Region Button** - Displays a button in a region position. For example, to add a button in a region position, as defined by the region template.
  - **Create Page Item Button** - Displays a button within or between button items (for example, to place a button after a page item).
4. For Button Attributes:
  - a. **Button Name** - Enter a name for this button. For buttons with an action of **Submit Page**, the button name becomes the page request value. For example, if you name the button `FLOW_RESET_BUTTON`, then the button has the purpose of resetting the current page without doing a submit.

- b. Label - Enter a label to be displayed for the button.
- c. Button Style - Available options:

- **HTML Button**
- **Template Based Button**
- **Image**

If the button is an image, you must supply an image name. If the button is template controlled, you must select a template name.

- d. Button Template - Define which template controls the display of the button. Button templates are defined on the templates page. You must have at least one button template defined to use button templates.
- e. Button Type - Use this attribute to select either the **Normal** or **Hot** template of the button template.

If you select **Hot**, the button is rendered using the template stored in the Hot Template attribute of a button template. If no value is defined, the regular button template is used.

- f. Button Attributes - Text entered is added to the HTML element definition. The following example sets the class of a text button:

```
class="myclass"
```

For buttons based on templates, your template must include the #BUTTON\_ATTRIBUTES# substitution string. You can use this to control tab stops. For example:

```
tabindex="3"
```

- g. Click **Next**.

The options that display for Display Properties depend upon the selected region position.

## 5. For Display Properties:

- For Create Region Button:
  - Sequence - Enter the sequence for this component. The sequence determines the order of evaluation.
  - Position - Select a position for this button.
  - Alignment - Select **Right** or **Left**.
  - Click **Next**.
- For Create Page Item Button:
  - Sequence - Enter the sequence for this component. The sequence determines the order of evaluation.
  - Click **Next**.

## 6. For Action When Clicked:

- a. Action - Select a behavior when the button is clicked:
  - **Submit Page** - Submits 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 properties for resetting pagination, setting the request value, clearing cache, and setting item values, on the target page.
- **Redirect to URL** - Redirect to a target URL.
- **Defined by Dynamic Action** - Does nothing. The button's behavior is defined by a Dynamic Action.
- **Download Printable Report Query** - This creates a Submit Page button and also a corresponding branch. When the button is clicked, the output is downloaded from the Report Query.

Note that this action is only available if you have a report query defined in your application's Shared Components.

- b. **Execute Validations** - Execute Validations controls the execution of validations when a page is submitted. For example, this is useful for a Delete button where you do not want to annoy the user with irrelevant validation error messages when they are deleting a record.

Options include:

- **Yes** - If the page is submitted and this attribute is set to **Yes**, all validations defined for the page and all built-in validations execute (for example to check for a required value or to determine if the value is a valid number or date).
- **No** - If set to **No**, none of the defined validations or the built-in validations execute.

To have a specific validation always execute independent of this setting, set the validation attribute, Always Execute, to **Yes**. To learn more, see ["Determining When Validations Execute"](#) on page 8-40.

- c. **Click Next**.

7. For Conditional Display, select a condition type from the list that must be met in order for this component to be rendered.
8. Click **Create Button**.

## Creating Multiple Buttons in Component View

In Component view, you can create multiple Submit Page buttons within the same region at once using the Create Multiple Buttons Wizard.

To create multiple buttons at once:

1. Navigate to the appropriate Page Definition in Component view. See ["Switching Between Tree and Component View"](#) on page 8-2.
2. If necessary, create an HTML region. See ["Understanding Regions"](#) on page 12-3.
3. In Component view, locate the Buttons section and click the **Create** icon.  
The Create Button wizard appears.
4. Click the **Create Multiple Buttons** link.  
The Create Multiple Button Wizard appears.
5. From Region, select the region to contain the buttons.

6. From Template, select a template. If no template is selected, buttons of style HTML are created.
7. In HTML Attributes, specify HTML attributes for these buttons. This text is added to the HTML element definition. For example, you could set the class of a text button as follows:  
`class="myclass"`
8. To quickly populate the remaining fields, make a selection from the Quick Button list on the right side of the page.
9. Click **Create Buttons**.

## Editing Buttons

When you want to edit a button, you start from the Buttons section on the Page Definition. You can edit the attributes of a button, edit multiple buttons at once, or change a button position within a region.

### Topics:

- [Editing Button Attributes](#)
- [Editing Multiple Buttons at Once](#)

### Editing Button Attributes

You can edit button attributes on the Edit Pages Buttons page.

To edit attributes for an existing button:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Edit Page Buttons page:
  - Tree view- Under Page Rendering, double-click the button name.
  - Component view - Under Button, select the button name.

The Edit Page Buttons page appears.
3. Edit the button attributes.

To learn more about a specific item on a page, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.

4. Click **Apply Changes**.

**About Execute Validations** Execute Validations controls the execution of validations when a page is submitted. For example, this is useful for a Delete button where you do not want to annoy the user with irrelevant validation error messages when they are deleting a record.

Options include:

- **Yes** - If the page is submitted and this attribute is set to **Yes**, all validations defined for the page and all built-in validations execute (for example to check for a required value or to determine if the value is a valid number or date).
- **No** - If set to **No**, none of the defined validations or the built-in validations execute.

To have a specific validation always execute independent of this setting, set the validation attribute, Always Execute, to **Yes**. To learn more, see "[Determining When Validations Execute](#)" on page 8-40.

### Editing Multiple Buttons at Once

Use the Buttons page to delete multiple buttons or view a history of recent changes.

To edit multiple buttons at once:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Edit Page Buttons page:
  - Tree view- Under Page Rendering, right-click the button name and select **Edit All**.
  - Component view - Click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.

The Buttons page appears. The Buttons page contains a table listing the buttons in the region.

3. Edit the attributes and click **Apply Changes**.

**Deleting Multiple Buttons** To delete multiple buttons at once:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Edit Page Buttons page:
  - Tree view- Under Page Rendering, right-click the button name and select **Edit All**.
  - Component view - Click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.

The Buttons page appears.

3. Click **Delete Multiple Buttons**.

The Delete Multiple Buttons page appears.

4. Select the buttons to delete and click **Remove Buttons**.

**History** Use the History page to view a summary of recent edits to buttons.

## Understanding 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 submits. 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.

## 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 Application Express 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 Application 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"](#) on page 11-32

## Displaying Buttons Conditionally

You can choose to have a button display conditionally by editing attributes on the Edit Pages Button page.

To have a button display conditionally:

1. Create the button. See ["Creating a Button Using a Wizard"](#) on page 10-64.
2. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
3. Access the Edit Page Buttons page:
  - Tree view- Under Page Rendering, locate the button and double-click the button name.
  - Component view - Under Buttons, click the button name.
4. Scroll down to Conditions.
5. Make a selection from the Condition Type list.
6. Enter an expression in the fields provided.
7. Click **Apply Changes**.

**See Also:** ["About Bind Variable Syntax"](#) on page 2-16

## Creating Lists of Values at the Application Level

A list of values (LOV) is a static or dynamic set of values used to display a specific type of page item, such as popup lists of values, a select list, a check box, a radio group, or multiple select lists.

Creating a LOV as a shared component has several advantages:

- It can be added to any page within an application.
- All LOV definitions are stored in one location, making them easy to locate and update.

**Topics:**

- [Creating a Named LOV at the Application Level](#)
- [About Static LOVs](#)
- [Editing an Existing LOV](#)
- [Referencing Session State Within an LOV](#)
- [Accessing LOV Reports](#)

**See Also:** ["Creating a Static List of Values"](#) on page 7-59, ["Creating a Cascading List of Values"](#) on page 7-60, and ["Working with Shared Components"](#) on page 8-49

## Creating a Named LOV at the Application Level

You define named (or shared) LOVs at the application level by running the Create LOV Wizard and adding them to the List of Values repository. All LOVs can be defined as static or dynamic. Static lists are based on predefined pairs of display values and return values. Dynamic lists are based on a SQL query you write that selects values from a table.

To create a named LOV:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

The Application home page appears.

3. Click the **Shared Components** icon.
4. Under User Interface, select **Lists of Values**.

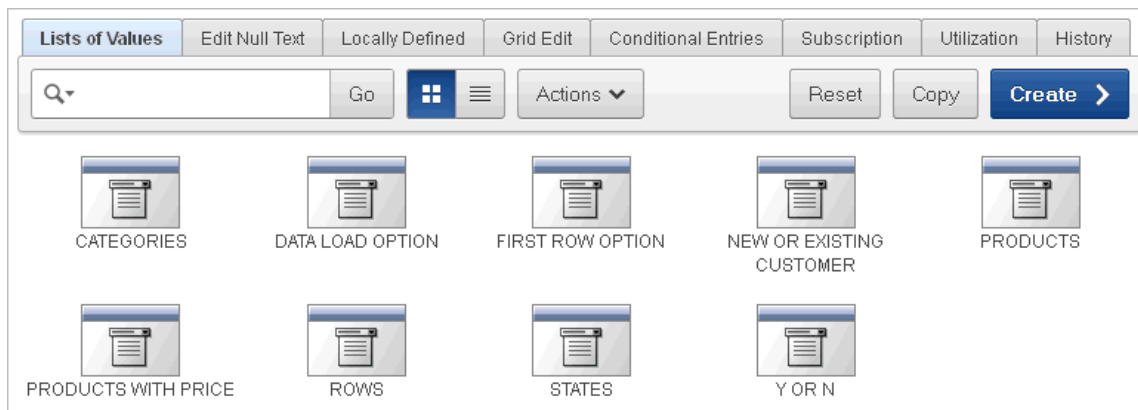
The Lists of Values page appears.

5. To create a LOV, click **Create**.
6. Follow the on-screen instructions.

New named LOVs are added to the List of Values repository. Note to add the LOV to a page you must edit the appropriate item or column and select the named LOV.

### About the List of Values Page

Once you create an LOV, it appears on the List of Values page.



A navigation bar appears at the top of the page and contains the following controls:

- **Select columns to search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Icons** - Displays each LOV as a large icon. To edit a group, click the appropriate icon.
- **View Report** - Displays each LOV as a line in a report. To edit a group, click the name.
- **Actions menu** - Displays the Actions menu. Use this menu to customize an interactive report. See "[About the Actions Menu](#)" on page 9-6.

## About Static LOVs

Static LOVs are based on a static list of display values and return values you specify when you run the Create LOV Wizard. To create a static LOV, run the Create LOV Wizard and select the LOV type **Static**. Oracle Application Express stores the display values, return values, and sort sequence you specify in the List of Values repository. Once you add a static LOV to the repository, you can create an item and display it as a check box, radio group, select list, or popup list based on this definition.

## Editing an Existing LOV

To edit an existing LOV, select the LOV on the Lists of Values page.

To edit an LOV:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.
4. Under User Interface, select **Lists of Values**.
5. Select an LOV.

The Edit page appears.

6. To learn more about a specific item on a page, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.

7. Click **Apply Changes**.

### About Navigation Alternatives

The Edit List of Values page is divided into the following sections: Name, Subscription, and Source.

You can access these sections by 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**.

### Bulk Edit of Static LOVs

You can edit the display values of all static LOVs by clicking the Grid Edit button on the Edit List of Values page.

To perform a bulk edit of static LOVs:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.
4. Under User Interface, select **Lists of Values**.  
By default, LOVs display as icons.
5. Click the **Grid Edit** tab.
6. Edit the display text and click **Apply Changes**.

### Referencing Session State Within an LOV

You can reference session state by using bind variables. Keep in mind that referencing session state makes an LOV a bit less reusable, but is still a recommended development practice. In the following example, this LOV only works if the item called *my\_deptno* contains a valid department number.

```
SELECT ename, empno FROM emp WHERE deptno = :P1_DEPTNO
```

### Accessing LOV Reports

Application Builder includes many reports designed to help you better manage LOVs.

To access LOV reports:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. When Application Builder appears, click **Shared Components**.
4. Under User Interface, select **Lists of Values**.
5. Select one of the following tabs at the top of the page:
  - **Edit Null Text**
  - **Locally Defined**
  - **Grid Edit**
  - **Conditional Entries**
  - **Subscription**
  - **Utilization**
  - **History**
6. Follow the on-screen instructions.

#### Edit Null Text

Click **Edit Null Text** to edit null text for all LOVs in your application.

### Locally Defined

Click **Locally Defined** to view all LOVs that are defined locally with the definition of an item. LOVs 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

Click **Grid Edit** to edit the display values of all static LOVs.

### Conditional Entries

Click **Conditional Entries** to view LOVs that display conditionally.

### Subscription

Click **Subscription** to display the List of Values Subscription page. This page displays all subscribed LOVs in your application.

### Utilization

Click **Utilization** to view a report of where LOVs are used in your application.

### History

Click **History** to display the List of Values History page. This page displays a history of recently changed LOVs by date.

## Using Shortcuts

By using shortcuts you can avoid repetitive coding of HTML or PL/SQL functions. You can use a shortcut to define a page control such as a button, HTML text, a PL/SQL procedure, or HTML. Once defined, you can invoke a shortcut using specific syntax unique to the location in which the shortcut is used. Shortcuts can be referenced many times, thus reducing code redundancy.

### Topics:

- [About Shortcut Types](#)
- [Defining Shortcuts](#)
- [Editing Existing Shortcuts](#)
- [Accessing Shortcut Reports](#)

## About Shortcut Types

When you create a shortcut, you must specify the type of shortcut you want to create. Oracle Application Express supports the following shortcut types:

- 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.

**See Also:** ["About Translating an Application and Globalization Support"](#) on page 18-1

## Defining Shortcuts

Before you can incorporate a shortcut in your application, you must define it and add it to the Shortcuts repository. You reference shortcuts using the following syntax:

```
"MY_SHORTCUT"
```

The shortcut name must be capitalized and enclosed in quotation marks.

To define a shortcut:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. When Application Builder appears, click **Shared Components**.
4. Under User Interface, select **Shortcuts**.
5. Click **Create**.
6. Select one of the following creation methods:
  - **From Scratch**
  - **As a Copy of an Existing Shortcut**
7. Follow the on-screen instructions.

New shortcuts are added to the Shortcut repository and are available for use within the following locations:

- The Region Source attribute of regions defined as HTML Text (with shortcuts). See ["Understanding Regions"](#) on page 12-3.
- Region Header and Footer Text attribute. See ["Specifying a Region Header and Footer"](#) on page 12-8.
- Item Label attributes and Default Value attribute.
- Region Templates attributes. See ["Customizing Templates"](#) on page 13-11.

## About the Shortcuts Page

Once you create a shortcut, it appears on the Shortcuts page. You control how the page displays by making a selection from the View list. Available options include:

- **Icons** (the default) displays each shortcut as a large icon. To edit a shortcut, click the appropriate icon.
- **Details** displays each shortcut as a line in a report. To edit a shortcut, click the name.

## 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:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.
4. Under User Interface, select **Shortcuts**.
5. Select a shortcut.

The Edit Shortcut page appears.

6. To learn more about a specific item on a page, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.

7. Click **Apply Changes**.

## About Navigation Alternatives

The Edit Shortcut page is divided into the following sections: Name, Subscription, Source, Configuration, and Comments.

You can access these sections by 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**.

## Accessing Shortcut Reports

Application Builder includes several reports designed to help you better manage shortcuts.

To access shortcut reports:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. When Application Builder appears, click **Shared Components**.
4. Under User Interface, select **Shortcuts**.
5. Click one of the following tabs:
  - **Subscription**
  - **History**

---

---

**Note:** The Subscription and History tabs only appear after you create a shortcut.

---

---

### Subscribed Shortcuts

Click **Subscription** to display the Subscribed Shortcuts page. This page displays all subscribed shortcuts in your application.

### Shortcut History

Click **History** to display the Shortcut History page. This page displays a history of recently changed shortcuts by date.

## Creating Trees

Application Builder includes a built-in wizard for generating a tree. Trees use jsTree, a JavaScript-based, cross browser tree component that features theme support, optional keyboard navigation, and optional state saving. You can create a Tree from a query that specifies a hierarchical relationship by identifying an ID and parent ID column in a table or view. The tree query utilizes a `START WITH . . . CONNECT BY` clause to generate the hierarchical query.

### Topics:

- [Creating a Tree](#)
- [Editing a Tree as a Developer](#)
- [About Trees Created as Shared Components](#)

**Tip:** The creation of jsTree regions is only possible on pages using a Desktop user interface.

## Creating a Tree

To create a tree using a wizard:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Create Page** and click **Next**.
4. For Page Type, select **Tree**.
5. For Page Attributes, specify the following:
  - a. Page Number - Specify the page on which the tree should be created.
  - b. Page Name - If the tree will be created on a new page, enter the page name.
  - c. Region Template - Select a region template for the tree region.
  - d. Region Name - Enter a name for the region to contain the tree.
  - e. Breadcrumb - Select whether you want to use a breadcrumb navigation control on your page, and which breadcrumb navigation control you want to use. If you select Breadcrumb, enter the following:
    - Entry Name - Enter a name for the breadcrumb entry.
    - Select Parent Entry - Select a parent entry.



- f. Click **Next**.
6. For Tab, specify whether the page should have tabs and click **Next**.
7. For Tree Templates, select a tree template and click **Next**.
8. For Table/View Owner and Name, select the table or view owner and name on which to base the tree and click **Next**.
9. For Query, select the columns to include in the tree:
  - a. ID - Select the column to use as the ID.
  - b. Parent ID - Select the column to use as the parent ID.
  - c. Node Text - Select the text to appear on the tree nodes.
  - d. Start With - Select the column to be used to specify the root of the hierarchical tree query.
  - 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**.
10. For Where and Order by, specify the following:
  - a. Where Clause - Enter an optional WHERE clause.
  - b. Order Siblings By - Select the columns by which siblings are ordered.
  - c. Click **Next**.
11. For Tree Attributes, specify the following:
  - a. Include Buttons - Select the buttons to include.
  - b. Selected Node Page Item - Can be used to hold the selected node value. If you select an application item, you can use this item to save the tree state, by holding the last selected node of the tree.
  - c. Tooltip - Displays a tooltip when the mouse hovers over a leaf node. Options include:
    - Static Assignment - Specifies a static value to be used as the tooltip text. Substitution strings can be used in the static text, to incorporate information from the SQL query in the tooltip text. The following substitution strings can be used:
      - #VALUE# - refers to the value of ID column.
      - #TITLE# - refers to the value of Node Text column
      - #LINK# - refers to the value of Link option
    - Database Column - Select the column to use as the tooltip text.
  - d. Link Option:
    - Existing Application Item - Makes the leaf node text a link. If you select this option, you must specify a page to link to and an existing application item to link leaf node text.

This option only appears if you select the Existing Application Item link option.

- Nothing

e. Click **Next**.

12. Confirm your selections and click **Finish**.

## Editing a Tree as a Developer

By default, a tree does not have focus and node links are activated with a single click action. This section describes how developers can customize a tree by editing tree attributes.

### Accessing the Tree Attributes Page

Developers can customize a tree by editing attributes on the Tree Attributes page.

To access the Tree Attributes page:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Tree Attributes page:
  - Tree view - Right-click the Region name and select **Edit Tree**.
  - Component View - Under Regions, click the Tree link next to the name of the tree region you want to edit.

The Tree Attributes page appears and is divided into the following sections:

- Display Settings enable you control a tree's appearance and functionality. Use these settings to define a tree template, tooltip, a page item to hold the last selected node value for saving tree state, determine whether the tree has focus on page load, and what action activates node links on a tree.
- Query enables you to edit the SQL query underlying the tree. The query must be in the following format:

```
SELECT status, level, name, icon, id, tooltip, link
FROM ...
WHERE ...
START WITH...
CONNECT BY PRIOR id = pid

ORDER SIBLINGS BY ...
```

3. To learn more about a specific attribute, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

4. Click **Apply Changes**.

## About Trees Created as Shared Components

Previous releases of Oracle Application Express supported the creation of trees as Shared Components. Although existing trees are still supported, Oracle Application Express no longer supports the creation of trees as Shared Components.

Oracle Application Express now supports the generation of a jsTree tree region. jsTree is a JavaScript based, cross browser tree component. It is packaged as a jQuery plug-in. To learn more, see ["Creating Trees"](#) on page 10-78.

#### Topics:

- [Editing an Existing Tree](#)
- [Accessing Existing Tree Reports](#)

### Editing an Existing Tree

Once you create a tree as a Shared Component, you can edit it on the Trees page.

To edit a tree created as a Shared Component:

1. Navigate to the Trees page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Trees**.

The Trees page appears.

You can change the appearance of the page by using the Search bar at the top of the page. See ["Customizing Interactive Reports"](#) on page 9-4.

2. Select a tree.
 

The Edit Tree page appears.
3. Edit the appropriate attributes.
4. To learn more about a specific item on a page, click the item label. See ["About Field-Level Help"](#) on page 1-13.
5. Click **Apply Changes**.

**About Navigation Alternatives** The Edit Tree page is divided into the following sections: Name, Query, Before and After, Static Node Templates, Dynamic Templates, Node Text Templates, and Link Templates.

You can access these sections by 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**.

### Accessing Existing Tree Reports

You can view the Trees Utilization and Tree History reports by clicking the appropriate tab at the top of the Trees page.

To view tree reports:

1. Navigate to the Trees page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.

- d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Trees**.
2. Click the appropriate tab:
- **Utilization**
  - **History**

You can change the appearance of the page by using the Search bar at the top of the page. See "[Customizing Interactive Reports](#)" on page 9-4.

To learn more, see the sections that follow.

---

**Note:** The Utilization and History buttons only appear after you have created a tree.

---

**Tree Utilization** Click **Utilization** on the Trees page to access the Tree Utilization report. This report displays all trees included in the current application. To edit a tree, select the tree name.

**Tree History** Click **History** on the Trees page to view changes to trees by developer and date.

## Using the Find Icon

You can search for items, pages, queries, tables, PL/SQL code, or images by clicking the Find icon on numerous pages within Application Builder.

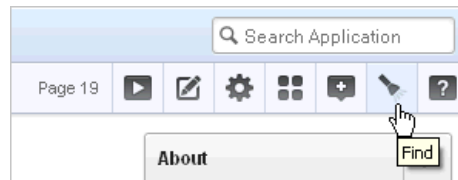
### Topics:

- [About the Find Icon](#)
- [About the Item Finder](#)
- [Using the Pages Finder](#)
- [Using the Queries Finder](#)
- [Using the Tables Finder](#)
- [Using the PL/SQL Finder](#)
- [Using the Images Finder](#)

**See Also:** "[Debugging an Application](#)" on page 14-1

## About the Find Icon

The Find icon resembles a flashlight and often displays to the right of the Run Page and Edit Page icons as shown in the following illustration. The Find icon displays on many pages in Application Builder, including the Application home page, the Page Definition, application attribute pages, and numerous pages for creating and managing shared components.



**See Also:** ["About the Application Home Page"](#) on page 6-3

## About the Item Finder

In Application Builder, an item can be a text field, text area, password, select list, check box, 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.

**See Also:** ["Understanding Page-Level Items"](#) on page 7-55

To search for an item using the Item Finder:

1. Click the **Find** icon.

The Items Finder appears. A search bar displays at the top of the page and contains the following controls:

- **Select Columns 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 then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See ["About the Actions Menu"](#) on page 9-6.

Name	Label	Type	Page
P1_SEARCH	-	Page Item	1

1 - 1

2. To restrict the report to display just items on a specific page, click the appropriate page number in the far right column.

Note the page number you select appears in the Page field at the top of the page. To expand the view to all pages, delete the page number in the Page field and click **Go**.

3. To edit a specific item, navigate to the appropriate item. See ["Understanding Page-Level Items"](#) on page 7-55 and ["Editing Multiple Items Simultaneously"](#) on page 7-66.

## Using the Pages Finder

A page (or Page Definition) 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 report appears, displaying the page number, page name, page alias, title, tab set, and counts of the number of items and regions on the page.

A search bar displays at the top of the page and contains the following controls:

- **Select columns to search 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 then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See ["About the Actions Menu"](#) on page 9-6.

Items	Pages	Queries	Tables	PL/SQL	Images	Debug	Session	Errors
<div> <input type="text"/> <input type="button" value="Reset"/> </div>								
<div> <input type="text"/> <input type="button" value="Go"/> <input type="button" value="Actions"/> </div>								
Page	Name	Alias	Title	Tab Set	Items	Regions		
<a href="#">0</a>	Page Zero	-	Page Zero	-	0	2		
<a href="#">1</a>	Sample Database Application	-	Sample Database Application	TS1	1	8		
<a href="#">2</a>	Customers	-	Customers	TS1	0	1		
<a href="#">3</a>	Products	-	Products	TS1	0	2		
<a href="#">4</a>	Orders	-	Orders	TS1	0	1		

3. To link to the Items page, click the page number.

**See Also:** ["About the Page Definition"](#) on page 8-1 and ["Editing a Page in Component View"](#) on page 8-8

## Using the Queries 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 Query Finder report appears, displaying the page number, page name, the region containing the query, and the query source.

A search bar displays at the top of the page and contains the following controls:

- **Select columns to search 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 then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See ["About the Actions Menu"](#) on page 9-6.

Items

Pages

Queries

Tables

PL/SQL

Images

Debug

Session

Errors

Page	Page	Region	Source
1	Sample Database Application	Top Products	Select p.product_name  ' - '  SUM(oi.quantity)  ' x '  to_char(p.list_price,'L999G99')  " product, SUM(oi.quantity * oi.unit_price) sales, p.product_id from demo_order_items oi , demo_product_info p where oi.product_id = p.product_id group by p.Product_id, p.product_name, p.list_price order by 2 desc
1	Sample Database Application	Top Customers	SELECT b.cust_last_name    ' , '    b.cust_first_name    ' - '    count(a.order_id)   " Order(s)' customer_name , SUM(a.ORDER_TOTAL) order_total, b.customer_id id FROM demo_orders a, DEMO_CUSTOMERS b WHERE a.customer_id = b.customer_id GROUP BY b.customer_id, b.cust_last_name    ' , '    b.cust_first_name ORDER BY NVL(SUM(a.ORDER_TOTAL),0) DESC
3	Products	Top 5 Products	SELECT b.product_name, SUM(a.quantity * b.list_price) FROM DEMO_ORDER_ITEMS a, DEMO_PRODUCT_INFO b WHERE a.product_id = b.product_id GROUP BY b.product_name ORDER BY 2 desc

3. To link to the Items page, click the page number.

**See Also:** ["About the Page Definition"](#) on page 8-1 and ["Editing a Page in Component View"](#) on page 8-8

## Using the Tables 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.

Items	Pages	Queries	<b>Tables</b>	PL/SQL	Images	Debug	Session	Errors
Show <span>Tables and Views</span>				Reset				
<input type="text"/> <input type="button" value="Go"/> <input type="button" value="Actions"/>								
Table Name	Rows	Last Analyzed	Type					
<a href="#">APEX\$ ACL</a>	6	12 days ago	TABLE					
<a href="#">APEX\$ WS_FILES</a>	21	12 days ago	TABLE					
<a href="#">APEX\$ WS_HISTORY</a>	0	2 months ago	TABLE					
<a href="#">APEX\$ WS_LINKS</a>	3	12 days ago	TABLE					
<a href="#">APEX\$ WS_NOTES</a>	24	12 days ago	TABLE					
<a href="#">APEX\$ WS_ROWS</a>	66	12 days ago	TABLE					
<a href="#">APEX\$ WS_TAGS</a>	54	12 days ago	TABLE					

A search bar displaying the selected tab appears at the top of the page and contains the following controls:

- **Select columns to search 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 then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See "[About the Actions Menu](#)" on page 9-6.

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.

**See Also:** "Managing Tables" in *Oracle Application Express SQL Workshop Guide*

## Using the PL/SQL Finder

You can use the PL/SQL 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 and contains the following controls:



- **Select columns to search 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 then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See ["About the Actions Menu"](#) on page 9-6.

3. To view additional details, select the procedure, function, or package name.

The screenshot shows the Oracle SQL Developer interface with the **PL/SQL** tab selected. The search bar contains the text **SAMPLE\_PKG** and the **Go** button is highlighted. The search results table on the left shows the following data:

Name	Type
<a href="#">UPDATE_ORDER_TOTAL</a>	TRIGGER
<a href="#">SAMPLE_PKG</a>	PACKAGE
<a href="#">SAMPLE_PKG</a>	PACKAGE BODY
<a href="#">IT_SAMPLE_DATA</a>	PACKAGE BODY
<a href="#">IT_SAMPLE_DATA</a>	PACKAGE
<a href="#">INSERT_DEMO_PROD</a>	TRIGGER

The right pane displays details for the selected package **SAMPLE\_PKG**. The table shows the following data:

ID	Name	Object Type	Return Type
1	<a href="#">DEMO_ERROR_HANDLING</a>	FUNCTION	PLUSQL RECORD
2	<a href="#">DEMO_TAGS_CLEANER</a>	FUNCTION	VARCHAR2
3	<a href="#">DEMO_TAG_SYNC</a>	PROCEDURE	-

row(s) 1 - 3 of 3

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 Application Express SQL Workshop Guide*

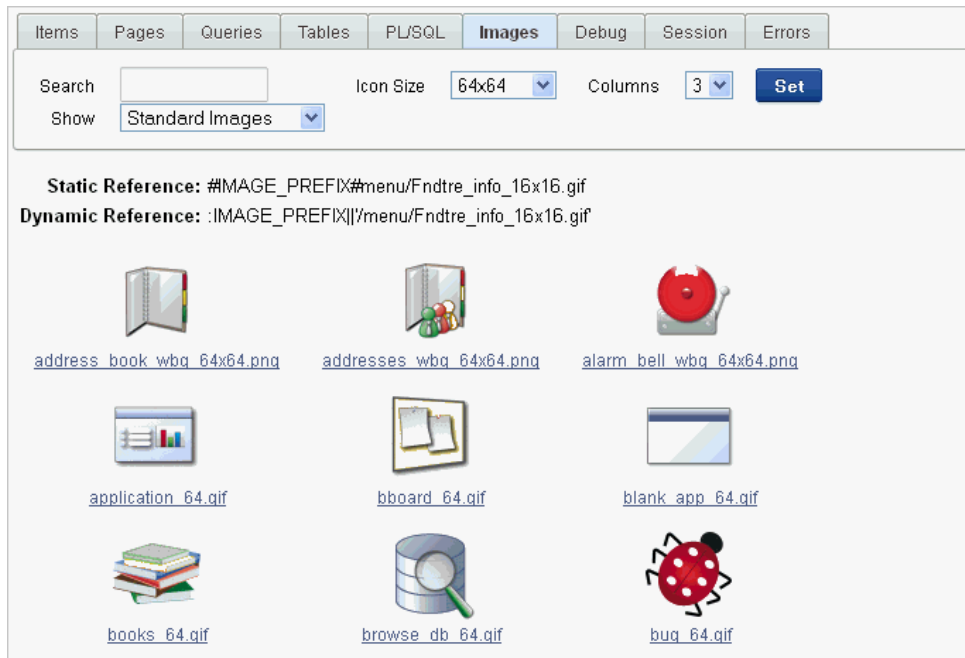
## Using the Images Finder

You can use the Images Finder to identify images available to the current application.

To view available images:

1. Click the **Find** icon.
2. Click the **Images** tab.

The Images Finder appears.



A search bar displays at the top of the page and contains the following controls:

- **Select columns to search 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 then click **Go**.
  - **Go button** - Executes a search.
  - **Actions menu** - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See "[About the Actions Menu](#)" on page 9-6.
3. From Show, select the type of images to view. Options include:
- Standard Images
  - Workspace Images
  - Application Images

**See Also:** "Managing Database Objects with Object Browser" in *Oracle Application Express SQL Workshop Guide*

## Controlling Access to Applications, Pages, and Page Components

You can control access to an application, individual pages, or page components by creating an access control list. To create an access control page, the application schema must have CREATE TABLE, CREATE TRIGGER, CREATE SEQUENCE privileges.

### Topics:

- [How the Access Control List Works](#)
- [Creating an Access Control List](#)
- [Selecting an Application Mode and Adding Users](#)
- [Controlling Access for Pages and Page Components](#)

**See Also:** "Building Queries with Query Builder" in *Oracle Application Express SQL Workshop Guide*

## How the Access Control List Works

You create an access control list by running the Access Control Wizard. The Access Control Wizard creates a page named **Access Control Administration**. This page contains a list of application modes and an Access Control List. Once you create the Access Control Administration page, you:

1. Run the Access Control Administration page.
2. Select one of the following application modes:
  - Full access to all, access control list not used.
  - Restricted access. Only users defined in the access control list are allowed.
  - Public read only. Edit and administrative privileges controlled by access control list.
  - Administrative access only.
3. Add users to the Access Control List.

In addition to creating the Access Control Administration page, the Access Control Wizard also creates:

- two tables within the application's default schema to manage the access control
- the authorization schemes that correspond to the application mode list options
- the privileges available in the Access Control List

You can control access to a specific page or page component by selecting one of these authorization schemes on the page or component attributes pages. Once you create an Access Control, you can customize the page, tables and values to suit the specific needs of your application.

**See Also:** ["Attaching an Authorization Scheme to an Application"](#) on page 15-39

## Creating an Access Control List

You create an access control list by creating a page. You can create a page on the Application home page, while viewing a Page Definition, or by clicking **Create** on the Developer toolbar.

### Topics:

- [Creating an Access Control from the Application Home Page](#)
- [Creating an Access Control from the Page Definition](#)
- [Creating an Access Control List from the Developer Toolbar](#)

### Creating an Access Control from the Application Home Page

To create an access control list from the Application home page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

The Application home page appears.

3. Click **Create Page**.
4. For page type, select **Access Control** and click **Next**.  
The Access Control Wizard appears.
5. Specify a page number and click **Next**.
6. Select a tab option and click **Next**.
7. Review the confirmation page and click **Create**.

### Creating an Access Control from the Page Definition

To create an access control list from the Page Definition:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Click the **Create** button at the top of the page.
3. Click **New page** and select **New Page**.
4. For page type, select **Access Control** and click **Next**.  
The Access Control Wizard appears.
5. Specify a page number and click **Next**.
6. Select a tab option and click **Next**.
7. Review the confirmation page and click **Finish**.

### Creating an Access Control List from the Developer Toolbar

To create an access control list from the Developer toolbar:

1. Run the application. See ["Running an Application or Page"](#) on page 7-39.
2. On the Developer toolbar, click **Create**.  
The New Component Wizard appears.
3. Select **New page** and click **Next**.
4. For page type, select **Access Control** and click **Next**.  
The Access Control Wizard appears.
5. Specify a page number and click **Next**.
6. Select a tab option and click **Next**.
7. Review the confirmation page and click **Finish**.

## Selecting an Application Mode and Adding Users

You can control access to an application by running the Access Control Administration page, selecting an application mode, and then adding users to the Access Control list.

### Topics:

- [Selecting an Application Mode](#)
- [Adding Users to the Access Control List and Selecting Privileges](#)
- [Removing Users from the Access Control List](#)

## Selecting an Application Mode

To select an application mode:

1. Create an access control list. See ["Creating an Access Control List"](#) on page 10-89.  
The wizard creates a page named Access Control Administration.
2. Run the Access Control Administration page. See ["Running an Application or Page"](#) on page 7-39.
3. Select an Application Mode. Options include:
  - **Full access to all, access control list not used.**  
Select this option to enable all users access to an application.
  - **Restricted access. Only users defined in the access control list are allowed.**  
Select this option to restrict access to users on the Access Control List. Only users on the Access Control List can view pages and components associated with an authorization scheme.
  - **Public read only. Edit and administrative privileges controlled by access control list.**  
Provides public access to pages and components associated with the access control - view authorization scheme.
  - **Administrative access only.**  
Only users with Administrator privileges can access pages or components associated with an authorization scheme.
4. Click **Set Application Mode**.

The screenshot shows a web application interface with two main sections. The top section, titled "Application Administration", contains a "Set Application Mode" button and a list of four application modes, each with a radio button. The first mode, "Full access to all, access control list not used", is selected. The bottom section, titled "Access Control List", contains a "Delete" button, an "Apply Changes" button, and a text input field for finding usernames. Below the input field is a table with columns for Username, Privilege, Last Changed By, and Date. The table is currently empty, displaying "No data found." and an "Add User" button.

**Application Administration**

Set Application Mode

**Application Mode**

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

**Access Control List**

Delete Apply Changes

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

Find  Go

<input type="checkbox"/>	Username ▼	Privilege	Last Changed By	Date
No data found.				

Add User

The user interface of your page depends on the theme you selected for your application. See ["Managing Themes"](#) on page 13-1.

Next, add users to the Access Control List.

## Adding Users to the Access Control List and Selecting Privileges

To add users to the Access Control List:

1. Under Access Control List, click **Add User**.

A new row appears.

2. Enter a user in the Username field.
3. Associate a privilege with the user. Available options include:
  - **Administrator**
  - **Edit**
  - **View**
4. Click **Apply Changes**.
5. Repeat steps 1 to 5 for all users.

## Removing Users from the Access Control List

To remove users from the Access Control List:

1. Select the user to be removed by selecting the check box to the left of the user name.
2. Click **Delete**.

## Controlling Access for Pages and Page Components

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 selecting one of the following authorization schemes on the page or component attributes pages:

- **access control administrator.** Only users with Administrator privileges can view the page or component.
- **access control - edit.** Users with both Edit and Administrator privileges can view the page or component. Users with View privileges cannot view the page or component.
- **access control - view.** Users with Administrator, Edit, or View privileges can view the page or component.
- **Not access control administrator.** Users with Administrator privileges cannot view the page or component.

- **Not access control - edit.** Users with both Edit and Administrator privileges cannot view the page or component. Users with View privileges can view the page or component.
- **Not access control - view.** Users with Administrator, Edit, or View privileges cannot view the page or component.

**See Also:** ["Attaching an Authorization Scheme to an Application, Page, or Components"](#) on page 15-39

## Incorporating JavaScript into an Application

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. Oracle Application Express includes multiple built-in interfaces especially designed for adding JavaScript.

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 Application Express validations instead of JavaScript.

### Topics:

- [Referencing Items Using JavaScript](#)
- [Incorporating JavaScript Utilizing the JavaScript Attribute](#)
- [Calling the JavaScript File from the HTML Header Attribute](#)
- [Calling the JavaScript File from the Page Template](#)
- [Calling JavaScript from a Button](#)
- [Calling JavaScript Using a Dynamic Action](#)

**See Also:** ["Text with JavaScript Escaped Single Quotes"](#) on page 10-76 for information about referencing a shortcut inside of a JavaScript literal string, ["Understanding Validations"](#) on page 8-32, and ["Using JavaScript Code in a Plug-In"](#) on page 10-99

## 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 Application Express 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.

**See Also:** "APEX\_JAVASCRIPT" in *Oracle Application Express API Reference*

## Incorporating JavaScript Utilizing the JavaScript Attribute

You can include JavaScript into your application by adding it to the JavaScript attribute of the page. This 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 the .js file.

In the following example, adding the code would make the `test` function accessible from anywhere on the current page.

To add JavaScript code to the JavaScript attribute:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. To access the Edit Page:
  - Tree view - Under Page Rendering, double-click the page title at the top of the tree.
  - Component view- Under Page, click the **Edit** icon.
3. Scroll down to JavaScript.
4. Enter code into the following:
  - **Function and Global Variable Declaration** - Enter JavaScript code (for example, functions or global variable declarations) for code to be used on this page. If the code is used on multiple pages, consider putting it into an external JavaScript file to avoid duplication.

Code you enter here replaces the `#JAVASCRIPT_CODE#` substitution string in the page template.
  - **Execute When Page Loads** - Enter JavaScript code to execute when the page loads. The code is executed after the JavaScript code generated by Oracle Application Express.

For example, adding the following would test a function accessible from anywhere on the current page.

```
function test(){
    alert('This is a test.');
```

```
}
```

5. Apply Changes.

## Calling the JavaScript File from the HTML Header Attribute

To call a .js file from the HTML Header attribute:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. To access the Edit Page:
  - Tree view - Under Page Rendering, double-click the page title at the top of the tree.
  - Component view- Under Page, click the **Edit** icon.
3. Scroll down to HTML Header and Body Attribute.



4. In HTML Header, call the JavaScript file using the following syntax:

```
<script src="/my_images/custom.js" type="text/javascript"></script>
```

5. Apply Changes.

## Calling the JavaScript File from the Page Template

In Oracle Application Express, you can reference a .js file in the page template. This approach 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.

The following demonstrates how to include a .js file in the header section of a page template. Note the line `script src=` that appears in bold.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
  <title>#TITLE#</title>
  #HEAD#
  <script src="/my_images/custom.js" type="text/javascript"></script>
</head>
<body #ONLOAD#>#FORM_OPEN#
```

**See Also:** ["Page Templates"](#) on page 13-27

## Calling JavaScript from a Button

Calling JavaScript from a button is a great way to confirm a request. Oracle Application Express uses this technique for the delete operation of most objects. For example, when you delete a button, a JavaScript message appears asking you to confirm your request. Consider the following example:

```
function deleteConfirm(msg)
{
var confDel = msg;
if(confDel ==null)
  confDel= confirm("Would you like to perform this delete action?");
else
  confDel= confirm(msg);

if (confDel== true)
  doSubmit('Delete');
}
```

This example creates a function to confirm a delete action and then calls that function from a button. Note that the function optionally submits the page and sets the value of the internal variable :REQUEST to Delete, thus performing the deletion using a process that conditionally executes based on the value of the request.

When you create the button, you must select **Redirect to URL**. Then, you would specify a URL target such as the following:

```
javascript:confirmDelete('Would you like to perform this delete action?');
```

**See Also:** ["Creating a Button Using a Wizard"](#) on page 10-64

Oracle recommends using dynamic actions as the preferred way of executing JavaScript code. Consider the following example:

1. Create a button with action of **Defined by Dynamic Action**. See ["Creating a Button Using a Wizard"](#) on page 10-64.
2. Create a dynamic action and using the action type **Execute JavaScript Code** to execute the previous code, for example:

```
if (confirm("Would you like to perform this delete action?")) {  
    apex.submit('Delete');  
}
```

This example uses JavaScript, but you could also easily implement this example without having to use JavaScript. Instead, you can use the declarative actions **Confirm** and **Submit Page** which are also translatable. To learn more, see ["Implementing Dynamic Actions"](#) on page 17-35.

## Calling JavaScript Using a Dynamic Action

You can also execute JavaScript code by creating a dynamic action. JavaScript code can be executed with the types **Execute JavaScript** and **Set Value**. You can also use JavaScript code for the condition of a dynamic action by setting the condition type to **JavaScript Expression**. To learn more, see ["Implementing Dynamic Actions"](#) on page 17-35.

## About jQuery and jQuery UI Support

Oracle Application Express includes the jQuery 1.7.1, jQuery UI 1.8.22, and jQuery Mobile - 1.1.1 RC1 JavaScript libraries. This section discusses the features available in jQuery UI and best practices when referencing jQuery libraries in your JavaScript code.

### Topics:

- [About Available jQuery UI Features](#)
- [Referencing the jQuery Library in Your JavaScript Code](#)

## About Available jQuery UI Features

Oracle Application Express only loads the components of jQuery UI that are required for base Oracle Application Express functionality. Oracle Application Express does not include the entire jQuery UI library since doing so would significantly add to download and processing time for each page load. Oracle Application Express includes these components by default:

- jQuery UI Core - Required for all interactions and widgets.
- Query UI Widget - The widget factory that is the base for all widgets.
- jQuery UI Mouse - The mouse widget is a base class for all interactions and widgets with heavy mouse interaction.
- jQuery UI Position - A utility plug-in for positioning elements relative to other elements.
- jQuery UI Draggable - Makes any element on the page draggable.
- jQuery UI Resizable - Makes any element on the page resizable.
- jQuery UI Dialog - Opens existing mark up in a draggable and resizable dialog.

- jQuery UI Datepicker - A datepicker that can be toggled from a input or displayed inline.
- jQuery UI Effects - Extends the internal jQuery effects, includes morphing, easing, and is required by all other effects.
- jQuery UI Effects Drop - A drop out effect by moving the element in one direction and hiding it at the same time.

For more information about jQuery UI and these specific components, see the jQuery UI site:

<http://jqueryui.com/>

### Accessing Other jQuery UI Components

Oracle Application Express does not include the entire jQuery UI library. You can easily activate other components of jQuery UI by just including the relevant files. For example, to include the Tabs jQuery UI Widget in your application, you would include the following in your Page Template, Header within the `<head>...</head>` tags as shown in the following example:

```
<link href="#IMAGE_
PREFIX#libraries/jquery-ui/1.8.22/themes/base/minified/jquery.ui.tabs.min.css"
rel="stylesheet" type="text/css" />
<script src="#IMAGE_
PREFIX#libraries/jquery-ui/1.8.22/ui/minified/jquery.ui.tabs.min.js"
type="text/javascript"></script>
```

**Tip:** You do not need to include the Dependencies for Tabs of UI Core and UI Widget since these are included by default with Oracle Application Express, as shown in the previous list of default components.

## Referencing the jQuery Library in Your JavaScript Code

Determining when to use the `$`, `jQuery`, and `apex.jQuery` references to the jQuery library in your own JavaScript code depends on where you use it.

Newer versions of Oracle Application Express may include updated versions of the jQuery libraries. When new versions of jQuery are released, they sometimes introduce changes that could break existing functionality. These issues are documented in the Change Log for a particular version's Release Notes. To minimize your risk when upgrading to a newer version of Oracle Application Express, Oracle recommends the best practices described in the sections that follow.

### Topics:

- [Managing JavaScript Code in Your Application](#)
- [Using JavaScript Code in a Plug-In](#)

### Managing JavaScript Code in Your Application

If you want to use jQuery in your own JavaScript code in an application, Oracle recommends you use `jQuery` or the shortcut `$` for the following reasons:

1. If you upgrade Oracle Application Express, there is the potential that the newer jQuery version may break your existing code.

To avoid intensive testing and rewriting of your application to the new jQuery version, you can include the old jQuery version that was shipped with Oracle Application Express release 4.1 in your Page Template, Header within the `<head>...</head>` tags after the `#HEAD#` substitution string. Consider the following example:

```
...
#HEAD#
...
<script src="#IMAGE_PREFIX#libraries/jquery/1.6.2/jquery-1.6.2.min.js"
type="text/javascript"></script>
...
```

In this example, the references to the jQuery library '\$' and 'jQuery' point to jQuery version 1.6.2 (the version included in Oracle Application Express release 4.1) and not the newer version 1.7.1 included with Oracle Application Express release 4.2

**Tip:** Oracle Application Express release 4.2 includes jQuery version 1.6.2 so you do not need to add this to your web server.

Note that no additional code changes necessary. This approach minimizes the risk of breaking custom jQuery code when upgrading to a newer version of Application Express.

**2. If jQuery plug-in you use requires a different version of jQuery and you want to use that version in other code in your application.**

In this case, you can include version of jQuery library (the newer or older) into your page template as described in the previous step (that is, after the `#HEAD#` substitution string). The variables `$` and `jQuery` point to the appropriate jQuery version.

**3. If a jQuery plug-in you use requires a different version of jQuery and you do not want to use that version in other code in an application.**

For example, suppose a jQuery plug-in requires jQuery 1.6.2, but you want to use jQuery 1.7.1 which included with Oracle Application Express. Include jQuery version 1.6.2 into your Page Template, Header, within the `<head>...</head>` tags, before the `#HEAD#` substitution string.

In this case, you also need a JavaScript snippet to define a new variable to store the plug-in specific jQuery version (for example, `jQuery_1_6_2`) and then assign it. Consider the following example:

```
...
<script src="#IMAGE_PREFIX#libraries/jquery/1.6.2/jquery-1.6.2.min.js"
type="text/javascript"></script>
<script type="text/javascript">
    var jQuery_1_6_2 = jQuery;
</script>
...
#HEAD#
...
```

You must also modify the initialization code of the jQuery plug-in to use the `jQuery_1_6_2` variable, for example:

```
(function($) {
    ... plugin code ...
})(jQuery_1_6_2);
```

For more information about jQuery plug-in initialization, see ["Using JavaScript Code in a Plug-In"](#) on page 10-99.

**Tip:** In all of these scenarios, use the variables `$` and `jQuery` in your application to specify the version you require. Note that the variable `apex.jQuery` still points to the version that ships with Oracle Application Express to support built-in functionality, which depends on that jQuery version.

### Using JavaScript Code in a Plug-In

If you want to use jQuery in an Oracle Application Express plug-in, Oracle recommends using the `apex.jQuery` reference to the jQuery library. This reference should even include a modification of the initialization code of the included jQuery plug-in to use the `apex.jQuery` reference.

If you look at the JavaScript code of a jQuery plug-in, notice that most have the following code structure:

```
(function($) {
    ... plugin code ...
})(jQuery);
```

This structure declares an anonymous JavaScript function with a parameter `$`, which is immediately called and passed the parameter value of the current jQuery variable. The use of `$` as the jQuery shortcut is implemented in a safe manner without having to rely on the fact that `$` is still used to reference the main jQuery library.

Oracle recommends copying the jQuery plug-in file and prefixing it with *apex* (for example, `apex.jQuery.maskedinput-1.2.2.js`). This makes it obvious to Oracle Application Express that the file has been modified. Then, change the reference from `jQuery` to `apex.jQuery` in the initialization code as shown in the following example.

```
(function($) {
    ... plugin code ...
})(apex.jQuery);
```

**Other Reasons to Use this Approach** As a plug-in developer, you want to minimize your testing effort and create an environment where you have full control. Assume you are not following the recommendations described in the previous section. What happens if your plug-in is using a different version of jQuery?

This may result in strange plug-in behavior. Furthermore, it may be difficult to reproduce that behavior because you will not know if your plug-in is actually referencing a different version of jQuery. Using the `apex.jQuery` namespace reduces your risk and also the risk to your users. This approach enables you to test your plug-ins with the Oracle Application Express versions you want to support.

## 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. See ["Editing a Theme"](#) on page 13-2.

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.

**See Also:** ["Editing a Theme"](#) on page 13-2, ["Creating a Theme"](#) on page 13-4, and

**Topics:**

- [Selecting a Printer Friendly Template for an Application](#)
- [Using f?p Syntax to Toggle to Printer Friendly Mode](#)

## 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 **Application Builder**.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under User Interface, select **Themes**.

The Themes page appears.

2. Change to a report view by clicking the View Report icon.
3. In the Themes list, click the theme name.

The Create/Edit Theme page appears.
4. Scroll down to Component Defaults and locate the Printer Friendly Page list.
5. Make a selection from the Printer Friendly Page list.
6. Click **Apply Changes**.

**See Also:** ["Editing a Theme"](#) on page 13-2

## 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.

**See Also:** ["Using f?p Syntax to Link Pages"](#) on page 2-9

## Creating a Help Page

Application Builder includes built-in attributes to create Help for your application. Creating Help for your application involves the following steps:

1. Create a dedicated Help page and Help region.
2. Define page Help text.
3. Define item Help text.

4. Create a navigation bar icon to link to your Help page.

Help created in Application 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 item Help topics specific to the page they are viewing.

#### Topics:

- [Creating a Help Page and Region](#)
- [Defining Help Text](#)
- [Creating a Help Navigation Bar Entry](#)

## Creating a Help Page and Region

The first step in creating Help for your application is to create a dedicated page and Help Text region.

To create a Help Text region:

1. Create a page for your Help. See "[Managing Pages in a Database Application](#)" on page 7-34.
2. Navigate to the Page Definition of your Help page. See "[Accessing the Page Definition](#)" on page 8-2.
3. Under Regions, the **Create** icon.
4. When prompted to select a region type, select **Help Text**.
5. Follow the on-screen instructions.

## Defining Help Text

You define Help text for a page or single item by editing attributes. Ideally, you would define these attributes as you create your application. For simplicity, however, the following procedures describe how to define this text after the fact.

#### Topics:

- [Defining Help for a Page](#)
- [Defining Help Text for an Item](#)
- [Editing Multiple Item Help Topics Simultaneously](#)

### Defining Help for a Page

To define page Help text:

1. Navigate to the Page Definition for the page for which you want to add page Help. See "[Accessing the Page Definition](#)" on page 8-2.
2. Under Page, click the **Edit page attributes** icon to view the existing page attributes.
3. Scroll down to **Help**.
4. Enter your Help text in the field provided.
5. Click **Apply Changes**.

Repeat the previous procedure for each page requiring page Help text.

## Defining Help Text for an Item

To define item Help text for an item:

1. Navigate to the Page Definition for the page for which you want to add item Help. See ["Accessing the Page Definition"](#) on page 8-2.
2. Under Items, click the name of the item you want to edit.
3. Scroll down to **Help Text**.
4. Enter your Help text in the field provided.
5. Click **Apply Change**.

Repeat the previous procedure for each item requiring Help text.

## Editing Multiple Item Help Topics Simultaneously

If you are including item Help in your application, you can edit multiple item Help topics at once using the Bulk Edit Item Help report.

**Accessing the Bulk Edit Item Help Report** To view the Bulk Edit Item Help report:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Tasks list, click **Application Reports**.
4. Click the **Utilities** icon.
5. From Page Specific Utilities, select **Item Utilities**.
6. Click **Grid Edit of All Item Help Text**.
7. 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 Definition containing the item by clicking the page number.
  - Link to the Page Item by clicking the item name.

**Seeding Item Help Topics** If your application does not yet contain item Help, you can perform a mass update of default Help text.

To seed item Help topics:

1. Access the Bulk Edit Item Help report as described in ["Accessing the Bulk Edit Item Help Report"](#) on page 10-102.
2. Click **Seed Item Help Text**.
3. In Default Help Text, enter the default text to appear in all Help topics.
4. Click **Apply Changes**.

**Searching for Existing Item Help Topics** You can search for existing Help text, or for an item label.

To search for existing item Help topic:

1. Access the Bulk Edit Item Help report as described in ["Accessing the Bulk Edit Item Help Report"](#) on page 10-102.
2. In Help Contains, enter keywords.



3. Click **Go**.

**Searching for an Item Label** To search for an item label:

1. Access the Bulk Edit Item Help report as described in "[Accessing the Bulk Edit Item Help Report](#)" on page 10-102.
2. In Help Contains, enter keywords.
3. Click **Go**.

**See Also:** "[Viewing Application Utilities and Reports](#)" on page 7-77

## 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 Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Under Navigation Bar, click the **Create** icon.
3. For Attributes:
  - a. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - b. Alt Tag Text - Enter ALT text for navigation icons that are images. If you do not specify an image name, then this text displays.
  - c. Icon Image Name - Enter the name of the image that displays.
  - d. Image Height - Enter the height of the image.
  - e. Image Width - Enter the width of the image.
  - f. Text - Enter additional text to display with the image. You can include text or use icons with no text. This attribute is optional and can be translated.
  - g. Click **Next**.

Next, specify the target location.

4. 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 a Help Page and Region](#)" on page 10-101.
  - c. Request - Enter the following:

`&APP_PAGE_ID.`

By specifying substitution string `&APP_PAGE_ID` as the Request, you are instructing the Application Express engine to display Help text for the current page when the user clicks this icon.

- d. Click **Next**.
5. Click **Create**.



---

## Adding Navigation

When you build a database application, you can include different types of navigation controls, such as navigation bar entries, tabs, lists, breadcrumbs, and trees. This section describes how to implement navigation in your application.

Navigation controls such as navigation bar entries, tabs, breadcrumbs, and lists are shared components. Shared components enable you to create a specific type of navigation control at the application level on the Shared Components page. Once created, you can add them to any page within your database application.

### Topics:

- [Creating Tabs](#)
- [Creating Lists](#)
- [Creating Breadcrumbs](#)
- [Creating a Navigation Bar Entry](#)
- [Controlling Navigation Using Branches](#)

**See Also:** ["Working with Shared Components"](#) on page 8-49

## Creating Tabs

Tabs are an effective way to navigate users between pages of an application. You can create a tabbed application look by using parent tabs, standard tabs, and lists.

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 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. See ["Creating Lists"](#) on page 11-7.

### Topics:

- [About Tabs](#)
- [About the Tabs Page](#)
- [Creating a Tab](#)
- [Editing Tabs](#)
- [Accessing Tab Reports](#)

---

**Note:** When running the Create Application Wizard, you have the option of creating an application with tabs. The following procedures assume you have created an application that does *not* have any tabs.

---

**See Also:** ["About Creating a Database Application"](#) on page 7-1

## About Tabs

A standard tab can have a one-to-one relationship with a page, or a standard tab can be the current tab for many pages. Application 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 set 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. 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.

### About Template Support


Before you can create parent and standard tabs, you must 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. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.
4. Under Navigation, click **Tabs**.

The Tabs page appears.

5. Locate **Page Templates** at the bottom of the page. If needed, expand the Page Templates region.

 <b>Page Templates</b>			
Page Template Name	Supports Standard Tabs	Supports Parent Tabs	Template Class
<a href="#">Login</a>	No	No	Login
<a href="#">No Tabs - Left Sidebar</a>	No	No	No Tabs with Sidebar
<a href="#">No Tabs - Left and Right Sidebar</a>	No	No	No Tabs with Sidebar
<a href="#">No Tabs - No Sidebar</a>	No	No	No Tabs
<a href="#">No Tabs - Right Sidebar</a>	No	No	No Tabs
<a href="#">One Level Tabs - Content Frame</a>	Yes	No	One Level Tabs
<a href="#">One Level Tabs - Left Sidebar</a>	Yes	No	One Level Tabs with Sidebar
<a href="#">One Level Tabs - Left and Right Sidebar</a>	Yes	No	One Level Tabs with Sidebar

**See Also:**

- ["Managing Themes"](#) on page 13-1 for information about setting a default page template at the application level
- ["Page Templates"](#) on page 13-27

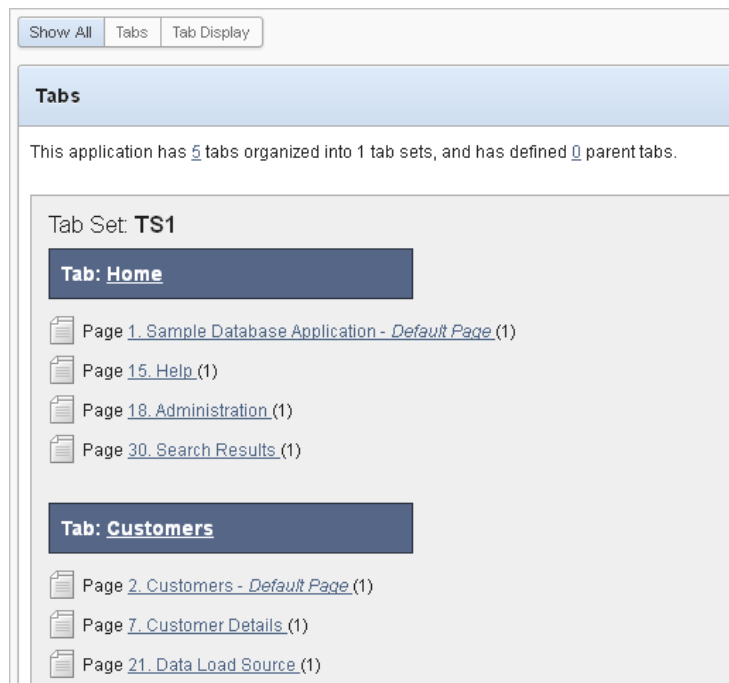
**About the Tabs Page**

The Tabs page describes the tabs defined in your application.

To access the Tabs page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.
4. Under Navigation, click **Tabs**.

The Tabs page appears.



The sections that follow describe the Tab Display and Page Templates section of the Tabs page.

**Tip:** You can also access the Tabs page under Shared Components on the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.

### Tab Display

Tab Display provides additional information about how the current tabs or tab set are configured to display.

### Page Templates

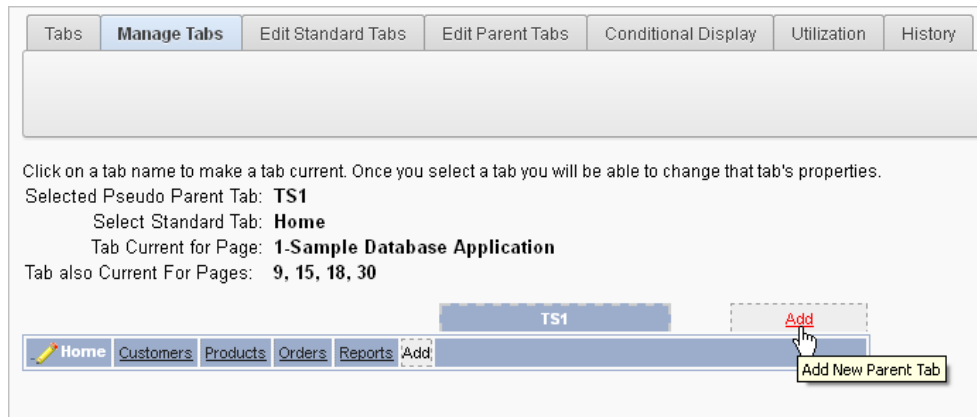
Page Templates displays a report of page templates associated with the current application. See "[About Template Support](#)" on page 11-2.

## Creating a Tab

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 define both Parent tabs and Standard tabs. See "[About Tabs](#)" on page 11-2.

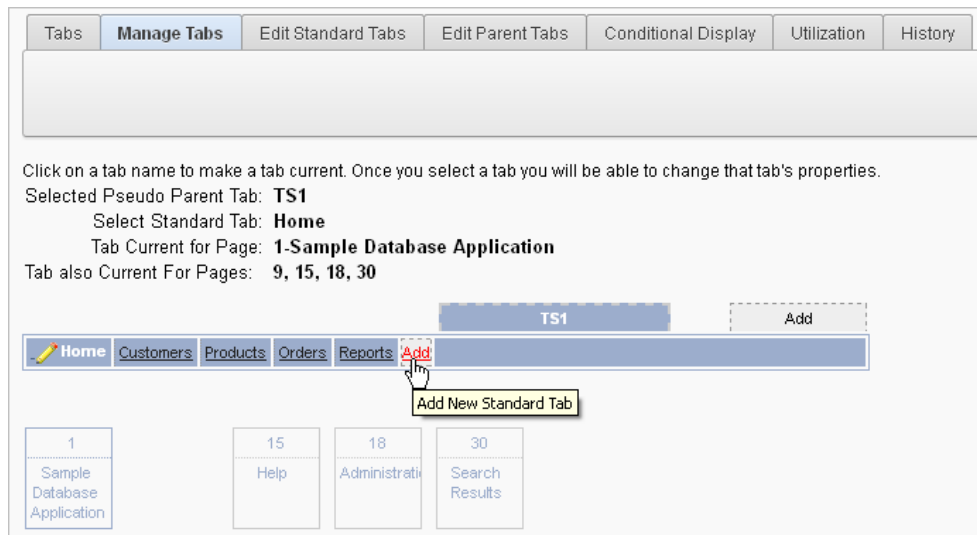
To create a tab:

1. Access the Tabs page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation, click **Tabs**.
2. Click **Manage Tabs**.
3. To add a Parent tab, click the **Add** button in the upper row.



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.

## Editing Tabs

You can edit multiple tabs simultaneously. Also, for standard tabs, you can update tab properties, such as their labels and order sequence, by using the Standard Tab Tasks list.

### Editing Multiple Tabs Simultaneously

You can edit multiple tabs simultaneously.

To edit multiple tabs simultaneously:

1. Navigate to the Tabs page:
  - a. On the Workspace home page, click the **Application 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**.

### Using 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 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:

1. Navigate to the Tabs page:
  - a. On the Workspace home page, click the **Application 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:
  - **Rename Standard Tab Set**
  - **Resequence Display Order**
  - **Associate Page(s) with Selected Standard Tab**
  - **Create New Standard Tab**
  - **Create New Standard Tab Set**

## Accessing Tab Reports

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 **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Tabs**.The Tabs page appears.



2. Click the appropriate tab:

- **Conditional Display**
- **Utilization**
- **History**

To learn more, see the sections that follow.

### 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.

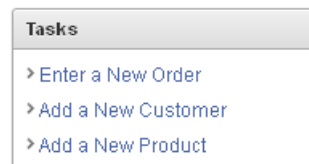
### Standard and Parent Tab History

History report displays a history of changes to tab attributes for the current application.

## Creating Lists

A **list** is a shared collection of links. 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.

You can define a list by creating **static** or **dynamic** definition. The definition displays a specific type of page item, such as progress bars, sidebar, or a bullet navigation list. The following illustration is an example of a static list using the template Vertical Unordered List with Bullets.



You can further control how a list displays using template attributes. For information about altering a list display, see "[Creating a New Template](#)" on page 13-13 and "[List Templates](#)" on page 13-25.

### Topics:

- [About List Types](#)
- [About Static Lists](#)
- [About Dynamic Lists](#)
- [Copying a List](#)
- [Adding a List to a Page by Creating a Region](#)
- [Editing List Attributes](#)
- [Accessing List Reports](#)

## About List Types

Oracle Application Express supports two types of lists: **static** and **dynamic**.

### Static Lists

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. See ["About Static Lists"](#) on page 11-8.

### Dynamic Lists

Dynamic lists are 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 such as jQuery Mobile. See ["About Dynamic Lists"](#) on page 11-13 and ["Understanding Dynamic List Syntax"](#) on page 11-14.

## About Static Lists

To create a static list:

1. Create the list by running the Create List Wizard.
2. Specify whether to create the list from scratch or by copying an existing list.  
You can add list entries by either creating them from scratch or by copying entries from an existing list. If you copy an entire list, you also copy all of its list entries.
3. If creating a list from scratch, you are prompted to select a list type. Select **Static**.  
Each list element has a display condition, which enables you to control when it displays. You can define a list element to be either *current* or *non-current* for a specific page. See ["Editing List Attributes"](#) on page 11-18 and ["Conditional Entries"](#) on page 11-19.
4. Add the list to a page by creating a List region.

How you perform these steps is a personal preference. You can perform all three when you run the Create List Wizard. Alternatively, you can perform these steps one at a time.

### Topics:

- [Creating a Static List from Scratch](#)
- [Adding Entries and Sublists to a Static List](#)
- [Copying Static List Entries Between Lists](#)
- [Reparenting Static List Entries](#)
- [Managing Orphaned Static List Entries](#)
- [Resequencing Static List Entries](#)

### Creating a Static List from Scratch

To create a list:

1. Access the Create/Edit Lists Wizard:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.

- c. On the Application home page, click **Shared Components**.
  - d. Under Navigation, click **Lists**.
  - e. Click **Create**.
2. For Source, select **From Scratch** and click **Next**.
3. For Name and Type:
  - a. Name - Enter a numeric or alphanumeric name for the list.
  - b. Type - Select **Static**.
  - c. Build Option - If applicable, select a build option for this component. Build options are predefined settings that determine whether components within an application are enabled.
  - d. Click **Next**.
4. For Define List Entries, specify the following:
  - a. List Entry Label - Enter a numeric or alphanumeric name for the list.
  - b. Target Page ID or custom URL - Select a target page or enter a custom URL.
  - c. Click **Next**.
5. For Confirm, specify the following:
  - 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**.

**Tip:** You can also create a list under Shared Components on the Page Definition. To learn more, see ["Accessing the Page Definition"](#) on page 8-2, ["Editing a Page in Tree View"](#) on page 8-5, and ["Editing a Page in Component View"](#) on page 8-8

### 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 creating a list from scratch, 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. To determine which list templates support hierarchical lists, look for templates having the naming convention "with Sublist."
- Select a Parent List Item when you create each list entry.

**See Also:** ["Customizing Templates"](#) on page 13-11 and ["List Templates"](#) on page 13-25

**Adding Entries or Sublists from Scratch** To add an entry or sublist from scratch:

1. Navigate to the Lists page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation, select **Lists**.The Lists page appears.
2. Select a list.

The List Details page appears.
3. Click **Create List Entry**.
4. 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.
  - b. Sequence - Indicate the order in which list the list entry appears. The sequence determines the order of evaluation.
  - c. Image - Identify the file name for the image used to display this list entry. List templates control this attribute.
  - 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.yahoo.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. See ["Editing a Theme"](#) on page 13-2 and ["Optimizing a Page for Printing"](#) on page 10-99.

- 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 - Specify the page numbers on which to clear cache. To learn more, see item Help. See ["About Field-Level Help"](#) on page 1-13.

- 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\`).

## 6. 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 item Help. See ["About Field-Level Help"](#) on page 1-13.

## 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, such as [www.google.com](http://www.google.com), you can count clicks. For more information, see "COUNT\_CLICK Procedure" in *Oracle Application Express API Reference*.

11. To specify additional attributes, use the User Defined Attributes section. For example, the following adds a tabindex and accesskey.

```
tabindex="15" accesskey="D"
```

12. When you are finished defining list attributes, click **Create** or **Create and Create Another**.

### Copying Static List Entries Between Lists

You can 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 **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.
2. Select the list to copy.
3. On the Tasks list, click **Copy List Entries from one List to Another**.
4. From Copy List Entries, select the list to copy to and click **Next**.
5. Click **Copy List Entries**.

### Reparenting Static List Entries

Use the Reparent List Entries page to manage list entry hierarchy.

To reparent list entries:

1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.
2. Select the list.
3. From the Tasks list, click **Reparent List Entries within this List**.
4. Use Start With to restrict your view to a subset of hierarchy. Make a selection and click **Go**.
5. From Reparent To, select a new parent.
6. Select the entries to move.
7. Click **Reparent Checked Entries**.

## Managing Orphaned Static List Entries

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 **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.

2. Select the list.
3. From the Tasks list, click **Manage Orphaned List Entries**.
4. Select the entries to remove.
5. Click **Clear Parent Entries**.

## Resequencing Static List Entries

You can resequence list entries in increments of 10 on the Clean Up page.

To clean up list entries:

1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.

2. Select the list.
3. From the Tasks list, click **Clean Up List Entries**.
4. Click **Clean Up**.

## About Dynamic Lists

A dynamic list enables you to dynamically create styled list items that support mobile frameworks such as jQuery Mobile. Dynamic lists are based on a SQL query or a PL/SQL function returning a SQL query.

To create a dynamic static list:

1. Create the list by running the Create List Wizard.
2. Specify whether to create the list from scratch or by copying an existing list.
3. If creating a list from scratch, you are prompted to select a list type. Select **Dynamic**.

4. Enter a SQL query or a PL/SQL function returning a SQL query.
5. Add the list to a page by creating a List region. See ["Adding a List to a Page by Creating a Region"](#) on page 11-17.

**Topics:**

- [Understanding Dynamic List Syntax](#)
- [Creating a Dynamic List from Scratch](#)

**Understanding Dynamic List Syntax**

You create a dynamic list using a SQL query or a function returning a SQL Query.

Syntax for a SQL query:

```
SELECT level, labelValue label,
       [targetValue]          target,
       [is_current]           is_current_list_entry,
       [imageValue]           image,
       [imageAttributeValue]  image_attribute,
       [imageAltValue]        image_alt_attribute,
       [attribute1]           attribute1,
       [attribute2]           attribute2,
       [attribute3]           attribute3,
       [attribute4]           attribute4,
       [attribute5]           attribute5,
       [attribute6]           attribute6,
       [attribute7]           attribute7,
       [attribute8]           attribute8,
       [attribute9]           attribute9,
       [attribute10]          attribute10
FROM ...
WHERE ...
ORDER BY ...
```

Syntax for a function returning a SQL query:

```
RETURN
'SELECT level, labelValue label, '||
'      [targetValue]          target, '||
'      [is_current]           is_current_list_entry, '||
'      [imageValue]           image, '||
'      [imageAttributeValue] image_attribute, '||
'      [imageAltValue]        image_alt_attribute, '||
'      [attribute1]           attribute1, '||
'      [attribute2]           attribute2, '||
'      [attribute3]           attribute3, '||
'      [attribute4]           attribute4, '||
'      [attribute5]           attribute5, '||
'      [attribute6]           attribute6, '||
'      [attribute7]           attribute7, '||
'      [attribute8]           attribute8, '||
'      [attribute9]           attribute9, '||
'      [attribute10]          attribute10 '||
'FROM ... '||
'WHERE ... '||
'ORDER BY ...';
```

Where:

- *level* and *labelvalue* are required.



- *level* - For hierarchical lists, the *level* parameter should be supplied. For non-hierarchical lists, this parameter can be set to `NULL`.
- *labelvalue* - Text to appear as list entry.
- *targetvalue* - Target URL to branch to when list entry is selected.
- *is\_current* - Controls the behavior of the list entry. Values include:
  - `NULL` - Currency of target is based upon Target URL.
  - `'YES'` - List entry is always current.
  - `'NO'` - List entry is not current.
- *imagevalue* - The name of image to be display on the list entry
- *imageattributevalue* - Attributes of the image, such as the width or height
- *imagealtvalue* - Value for Image ALT tag, required for accessibility purposes in templates where the user must click the image.
- *attribute1* to *10*: These attributes tie in with the existing ten User Attributes exposed on the Static List Entry page.

## Creating a Dynamic List from Scratch

To create a dynamic list:

1. Access the Create/Edit Lists Wizard:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Navigation, click **Lists**.
  - e. Click **Create**.
2. Click **From Scratch** and click **Next**.
3. For Name and Type:
  - a. Name - Enter a numeric or alphanumeric name for the list.
  - b. Type - Select **Dynamic**.
  - c. Build Option - If applicable, select a build option for this component. Build options are predefined settings that determine whether components within an application are enabled.
  - d. Click **Next**.
4. 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. See ["Understanding Dynamic List Syntax"](#) on page 11-14.
  - c. Click **Next**.
5. For Confirm, specify the following:
  - 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. List Template - If creating a new region, select a list template.
- e. Click **Create**.

**Tip:** You can also create a list under Shared Components on the Page Definition. To learn more, see ["Accessing the Page Definition"](#) on page 8-2, ["Editing a Page in Tree View"](#) on page 8-5, and ["Editing a Page in Component View"](#) on page 8-8

## Copying a List

You can copy a list from another application or from a list in the existing application.

### Topics:

- [Copying a List from the Current Application](#)
- [Copying a List Between Applications](#)

### Copying a List from the Current Application

You can copy 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 **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.The Lists page appears.
2. Select the list to copy.
3. On the Tasks list, click **Copy List**.
4. On Copy List, select **List in this application** and click **Next**.
5. For Identify List:
  - a. Copy List - Select the list to be copied.
  - b. New List Name - Enter a new name for the copied list.
  - c. Click **Copy**.

### Copying a List Between Applications

You can copy a list from the current application or from another application.

To copy a list:

1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.

- c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.
2. Select the list to copy.
3. On the Tasks list, click **Copy List**.
4. On Copy List, select **List in another application** and click **Next**.
5. For Identify List:
  - a. Copy From Application - Select the application from which you want to copy a list.
  - b. Copy List - Select the list you are copying.
  - c. New List Name - Enter a name for the new list.
  - d. Click **Copy**.

## Adding a List to a Page by Creating a Region

Once you create a list and list entries, the next step is to add it to a page by creating a region and specifying the region type as List.

**See Also:** ["Creating a New Template"](#) on page 13-13 and ["List Templates"](#) on page 13-25 for information about altering list display

To add a list to a page:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. On the Page Definition, add a list region:
  - Tree view - Under Page Rendering, right-click **Regions** and select **Create**.
  - Component view - Under Region, click the **Create** icon.

The Create Region Wizard appears.
3. For Region, select **List** as the region type and click **Next**.
4. For Display Attributes:
  - a. Title - Enter a title for the region. This title displays if the region template you choose displays the region title.
  - b. Region Template - Choose a template to control the look of the region.
  - c. Parent Region - Defines the parent region to which the new region belongs.
  - d. Display Point - Identify a display point for this region.
  - e. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - f. Click **Next**.
5. For Source:
  - a. List - Select the list you want to add.
  - b. List Template - Choose a template to control the look of the list.

- c. Click **Next**.
6. For Conditional Display:
  - a. Condition Type - Select a condition type from the list that must be met in order for this component to be rendered processed. See "[Understanding Conditional Rendering and Processing](#)" on page 2-4
  - b. Authorization Scheme - Optionally select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed. See "[Providing Security Through Authorization](#)" on page 15-37.
  - c. Click **Create Region**.

Repeat these procedures for each page where you would like to add a list.

## Editing List Attributes

Once you create a list, you can edit it on the Lists page.

To edit a list:

1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.

You can change the appearance of the page by using the Search bar at the top of the page. See "[Customizing Interactive Reports](#)" on page 9-4.
2. Select a list.

The List Details page appears.
3. To change the list name, template, or build options, click the **Edit List** button.
4. For a dynamic list:
  - a. Edit the appropriate attributes. To learn more about an attribute, click the item label. See "[About Field-Level Help](#)" on page 1-13.
  - b. Click **Apply Changes**.
5. For a static list:
  - a. To edit the list sequence, link text, target, or current status for all list entries, click **Grid Edit**.
  - b. Click the **Edit** icon adjacent to the appropriate list entry.

The Create/Edit page that appears is divided into sections. You can access these sections by 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**.
  - c. Edit the appropriate attributes. To learn more about an attribute, click the item label. See "[About Field-Level Help](#)" on page 1-13.

- d. Click **Apply Changes**.

## Accessing List Reports

You can view the Unused, Conditional Entries, 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:

1. Navigate to the Lists page.
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Lists**.

The Lists page appears.

2. Click the appropriate tab:

- **Unused**
- **Conditional Entries**
- **Utilization**
- **History**

You can change the appearance of the page by using the Search bar at the top of the page. See "[Customizing Interactive Reports](#)" on page 9-4.

To learn more, see the sections that follow.

### 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.

### Utilization

Click the **List Utilization** tab to access the Utilization report. This report displays all lists included in the current application. From the report:

- To edit list entries, select the list name.
- To view the pages on which the list appears, click the number in the Pages column.
- To view the template used with the list, expand **List Template Utilization**. Then click the name to view or edit the list template.

### History

Click the **History** tab to view changes to list definitions and list entries by developer and date.

## Creating 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.

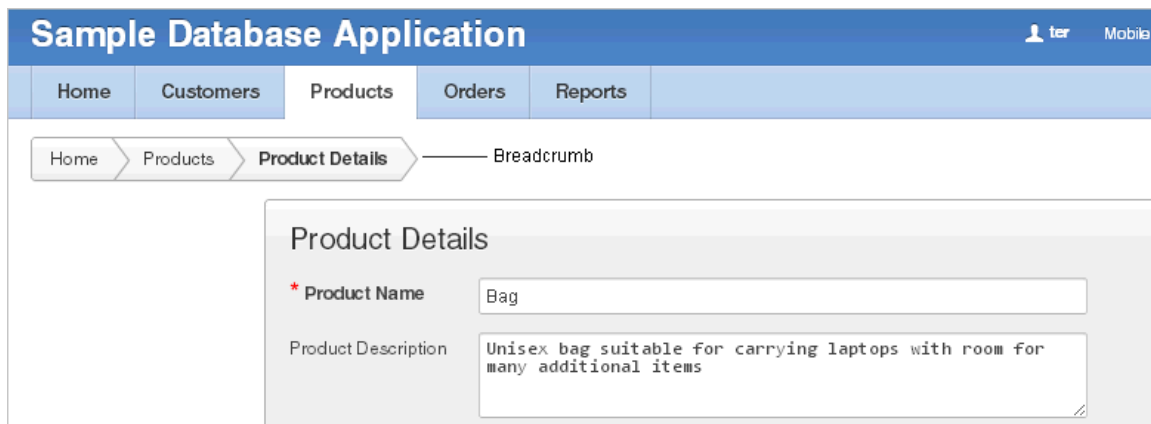
### Topics:

- [About Breadcrumbs](#)
- [How to Create Breadcrumbs](#)
- [Editing Breadcrumbs](#)
- [Reparenting Breadcrumb Entries](#)
- [Deleting Unused Breadcrumb Entries](#)
- [Accessing Breadcrumb Reports](#)

**See Also:** ["Creating a Theme"](#) on page 13-4 and ["Breadcrumb Templates"](#) on page 13-18

## About Breadcrumbs

A breadcrumb trail indicates where the user is within the application from a hierarchical perspective. In addition, users can click a specific breadcrumb link to instantly view the page. You use breadcrumbs as a second level of navigation at the top of each page, complementing other user interface elements such as tabs and lists.



## How to Create Breadcrumbs

You can create breadcrumbs while creating a page, or manually by running the Create Breadcrumb Wizard.

### Topics:

- [Creating a Breadcrumb While Creating a Page](#)
- [Creating a Breadcrumb Manually](#)

### Creating a Breadcrumb While Creating a Page

To create a breadcrumb while creating a page:

1. Run the Create Page Wizard to add a new page. See ["Managing Pages in a Database Application"](#) on page 7-34.

During the wizard, a Breadcrumb option appears. The actual page on which this list displays depends upon the type of page you are creating.

2. From the Breadcrumb list, select a breadcrumb or select **-do not add breadcrumb region to page -**.

If you select a breadcrumb, the Create Breadcrumb Entry form appears.

**Create Breadcrumb Entry**

Entry Name

Parent Entry   
[No parent breadcrumb entry]

[Select Parent Entry:](#)

Name	Page
<a href="#">Home</a>	1
<a href="#">Administration</a>	18
<a href="#">Customers</a>	2
<a href="#">Customer Data Loading</a>	21
<a href="#">Customer Data Loading</a>	22

3. In Entry Name, enter a name for the breadcrumb.
4. For Parent Entry:
  - To specify a parent, select a parent page from the Select Parent Entry list.
  - If this breadcrumb does not have a parent, select **No parent breadcrumb entry**.
5. Follow the on-screen instructions.

### Creating a Breadcrumb Manually

To create breadcrumbs manually, you must add a breadcrumb to each page in your application as follows:

1. Create the breadcrumb by running the Create/Edit Breadcrumb Wizard from either the Shared Components page or the Page Definition. See "[Creating Breadcrumbs from the Shared Components Page](#)" on page 11-21 and "[Creating Breadcrumbs from a Page Definition](#)" on page 11-22.
2. Add entries to the breadcrumb. See "[Adding Breadcrumb Entries](#)" on page 11-22.
3. Add the breadcrumb to a page by creating a region. See "[Adding a Breadcrumb Region](#)" on page 11-23.

**Creating Breadcrumbs from the Shared Components Page** To create breadcrumbs from the Shared Components page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.
4. Under Navigation, click **Breadcrumbs**.

The Breadcrumbs page appears.

5. Click **Create Breadcrumb**.

6. Enter a name and click **Create**.
7. Add breadcrumb entries. See ["Adding Breadcrumb Entries"](#) on page 11-22.

**Creating Breadcrumbs from a Page Definition** To create breadcrumbs from a Page Definition:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Breadcrumb Wizard:
  - Tree view - Under Shared Components, right-click **Breadcrumbs** and click **Create**.
  - Component view - Under Shared Components, click the **Create** icon.

The Breadcrumb page appears.
3. Under Shared Components, scroll down to **Breadcrumbs** and click the **Create** icon.
4. For Create, select **Breadcrumb** and click **Next**.
5. Enter a name and click **Create**.
6. Add breadcrumb entries. See ["Adding Breadcrumb Entries"](#) on page 11-22.

**Adding Breadcrumb Entries** To add a breadcrumb entry:

1. Navigate to the Breadcrumbs page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Breadcrumbs**.

The Breadcrumbs page appears.
2. Select a breadcrumb to add entries to.
3. Click **Create Breadcrumb Entry**.
4. Under Breadcrumb, specify the page where this breadcrumb entry displays.
5. Under Entry:
  - a. Sequence - Indicate the order in which breadcrumb entries appear. The sequence determines the order of evaluation.
  - 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. Short Name - Specify the short name of this entry (referenced in the breadcrumb template).
  - d. Long Name - Specify the long name of this entry (referenced in the breadcrumb template).
6. Under Target, specify the target location:
  - a. Target is a - Select **Page in this Application**.
  - b. Page - Specify the target page number.



You can also select **reset pagination for this page**. Selecting this option causes the page to return to the first set of data meeting a user's new query.

- c. Request - Specify the request to be used.
- d. Clear Cache - Specify the page numbers on which to clear cache.
- 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 you 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\`).

- 7. To make the breadcrumb conditional:
  - a. Make a selection from the Condition Type list.
  - b. Enter an expression in the fields provided.
- 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, you can select a build option for this component.

Build options are predefined settings that determine whether components within an application are enabled.
- 10. Click **Create Breadcrumb Entry**.

Repeat these procedures for each breadcrumb entry you create.

**Adding a Breadcrumb Region** A region is an area on a page that serves as a container for content. Once you create a breadcrumb and a breadcrumb template, the next step is to create a region. Once you create a breadcrumb region, you can add a breadcrumb to a page.

**See Also:** ["Creating a New Template"](#) on page 13-13 and ["Breadcrumb Templates"](#) on page 13-18 for information about changing menu display

To create a breadcrumb region:

- 1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
  - Tree view - Under Page Rendering, right-click **Regions** and click **Create**.
  - Component view - Under Page Rendering, click the **Create** icon.

The Create Region Wizard appears.
- 2. For the region type, select **Breadcrumb** and click **Next**.
- 3. For Breadcrumb Container Region:
  - a. Region Title - Enter a title for this region.
  - b. Region Template - Select a region template.

- c. Display Point - Select a Display Point.  
Regions are organized by position (or Display Point). To determine the appropriate region position, click the flashlight icon. A graphical representation appears.
  - d. Sequence - Enter a number for the sequence. The sequence determines the order of evaluation.
  - e. Click **Next**.
4. For Breadcrumb:
  - a. Breadcrumb - Select the breadcrumb to be associated with this region.
  - b. Breadcrumb Template - Select a template.
  - c. Click **Next**.
5. Review the breadcrumb region information and click **Next**.
6. Click **Finish**.

Repeat these procedures for each page where you would like to add breadcrumb navigation.

**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 Application Express 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.

## Editing Breadcrumbs

Once you create a breadcrumb, you can edit it on the Breadcrumbs page.

To edit a breadcrumb:

1. Navigate to the Breadcrumbs page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, select **Breadcrumbs**.

The Breadcrumbs page appears.

2. Select a breadcrumb.
3. Select a breadcrumb entry.

The Create/Edit page appears.

**Tip:** By default, the Breadcrumb Entries page displays in a hierarchical list. You can toggle between a hierarchical view or a tabular view by selecting either **Tabular View** or **Hierarchical View** on the Tasks list.

4. Edit the appropriate attributes.

To learn more about a specific item, see item Help. See "[About Field-Level Help](#)" on page 1-13.

5. (Optional) In the Breadcrumb Entry list on the right side of the page, you can select the **Synchronize Breadcrumb With Page Name and Title** option.

Selecting this option makes changing the name of a page and breadcrumb a one-step process. The information you provide for breadcrumb names is used to update the referenced page name and title.

6. Click **Apply Changes**.

**See Also:** "[Grid Edit](#)" on page 11-27

### About Navigation Alternatives

The Create/Edit page is divided into the following sections: Breadcrumb, Entry, Target, Conditions, Authorization and Configuration.

You can access these sections by 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**.

## Reparenting Breadcrumb Entries

You can select a new parent for selected breadcrumb entries on the Reparent Entries page.

To reparent breadcrumb entries:

1. Navigate to the Breadcrumbs page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, select **Breadcrumbs**.

The Breadcrumbs page appears.

2. Select a breadcrumb.

The Entries page appears.

3. From the Tasks list, click **Reparent Entries within this Breadcrumb**.

The Reparent Entries page appears.

4. Use the navigation bar to edit or filter the view:

- Breadcrumb - Identify the breadcrumb you want to edit and click **Go**.
- Start With - Make a selection to restrict your view to a subset of the breadcrumb hierarchy and click **Go**.

5. From Reparent to, select the new parent.
6. Select the breadcrumbs entries you want to move and click **Reparent Checked Entries**.

## Deleting Unused Breadcrumb Entries

To delete unused breadcrumb entries:

1. Navigate to the Breadcrumbs page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, select **Breadcrumbs**.The Breadcrumbs page appears.
2. Select a breadcrumb.  
The Breadcrumb Entries page appears.
3. From the Tasks list, click **Delete Unused Breadcrumb Entries**.  
The Delete page appears.
4. Select the entries to remove and click **Delete Checked**.

## Accessing Breadcrumb Reports

You can view the Breadcrumb Hierarchy, Grid Edit Breadcrumb, Breadcrumb Exceptions, Breadcrumb Utilization and Breadcrumb History reports by clicking the appropriate tab at the top of the Breadcrumbs page.

---

---

**Note:** These reports only appear after you create a breadcrumb.

---

---

To view Breadcrumb reports:

1. Navigate to the Breadcrumbs page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, select **Breadcrumbs**.The Breadcrumbs page appears.
2. Click the appropriate tab:
  - **Hierarchy**
  - **Grid Edit**
  - **Exceptions**
  - **Utilization**

- **History**

You can change the appearance of the page by using the Search bar at the top of the page. See "[Customizing Interactive Reports](#)" on page 9-4.

To learn more, see the sections that follow.

### **Hierarchy**

Click **Hierarchy** to view breadcrumbs by page and hierarchy. Click the page number to link to a page.

### **Grid Edit**

Click **Grid Edit** to edit all breadcrumb names at once. Click the page number to link to a page.

### **Exceptions**

Click **Exceptions** to view the Exceptions page.

### **Utilization Report**

Click **Utilization** to access the Breadcrumb Utilization report. This report lists breadcrumbs by page. Click the page number to go to a specific page.

### **History Report**

Click **History** to view the Breadcrumb History report. This report lists recent changes to breadcrumbs.

## **Creating a Navigation Bar Entry**

Navigation bar entries offer an easy way to move users between pages in an application. For example, a navigation entry enables you to display a link from an image or text. The associated page template determines the location of a navigation bar.

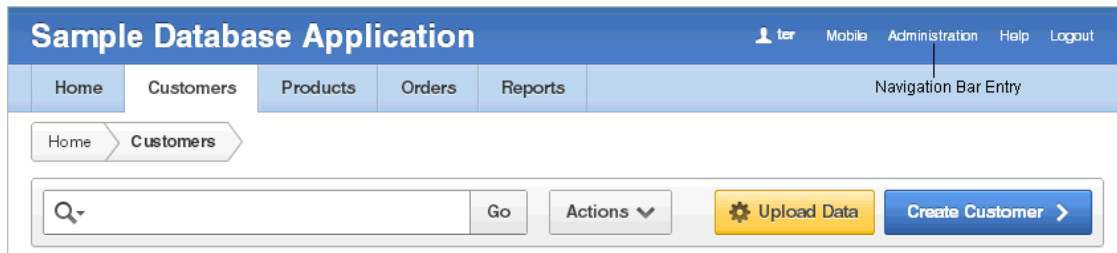
### **Topics:**

- [About Navigation Bars](#)
- [How to Create a Navigation Bar Entry](#)
- [Editing a Navigation Bar Entry](#)
- [Editing Multiple Navigation Bar Entries Simultaneously](#)
- [Accessing Navigation Bar Entry Reports](#)

**See Also:** "[Customizing Templates](#)" on page 13-11

## **About Navigation Bars**

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 Application Express engine automatically includes any defined navigation bars when it renders the page.

**See Also:** ["About Supported Page Template Substitution Strings"](#) on page 13-27

## How to Create a 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.

**See Also:** ["Understanding Application Computations"](#) on page 8-59

### Topics:

- [Creating a Navigation Bar Entry from Scratch](#)
- [Creating a Navigation Bar Entry for Feedback](#)
- [Copying a Navigation Bar Entry](#)

### Creating a 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 **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **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**. To learn more about Feedback, see ["Creating a Navigation Bar Entry for Feedback"](#) on page 11-30.
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 item Help. See ["About Field-Level Help"](#) on page 1-13.
  - 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. 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.  
  
Select **reset pagination for this page** to make the page return to the first set of data meeting a user's new query.  
  
Select **Printer Friendly** to display the target page using the application's Printer Friendly template. Printer friendly templates optimize a page for printing. ["Editing a Theme"](#) on page 13-2 and ["Optimizing a Page for Printing"](#) on page 10-99.
    - Request - Specify the request to be used.
    - Clear Cache - Specify the page numbers on which to clear cache.
  - c. 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 you 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 ["About Supported Page Template Substitution Strings"](#) on page 13-27.

## Creating a 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. See ["Managing Feedback"](#) on page 4-17.

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 **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Navigation Bar Entries**.

2. 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**.
4. For Type, select **Feedback**.
5. For Feedback, specify the following:
  - a. Feedback Page - Select your feedback page.
  - b. Entry Label - Enter the label of the new navigation bar entry.
  - c. 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. See ["About Supported Page Template Substitution Strings"](#) on page 13-27.

## Copying a Navigation Bar Entry

To copy a navigation bar entry:

1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Navigation Bar Entries**.
2. 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**.



5. For New Names, enter the name on the new entry, and select whether to copy and subscribe.
6. Click **Copy Navigation Bar Entries**.

## Editing a Navigation Bar Entry

Once you create a navigation bar entry, you can edit it on the Navigation Bar Entries page.

To edit a navigation bar entry:

1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Navigation Bar Entries**.

The Navigation Bar Entries page appears.

You can change the appearance of the page by using the Search bar at the top of the page. See "[Customizing Interactive Reports](#)" on page 9-4.

2. Select a navigation bar entry.

The Edit page appears.

The Edit page is divided into the following sections: Entry Display, Entry Image, Feedback Entry, Target, Conditions, Authorization, Configuration, Subscription, and Comments.

You can access these sections by 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**.

3. Edit the appropriate attributes.
4. To learn more about a specific item on a page, see item Help. See "[About Field-Level Help](#)" on page 1-13.
5. Click **Apply Changes**.

## Editing Multiple Navigation Bar Entries Simultaneously

To edit multiple navigation bar entries simultaneously:

1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Navigation Bar Entries**.
2. Click **Grid Edit** at the top of the page.
3. Edit the appropriate attributes and click **Apply Changes**.

## Accessing Navigation Bar Entry Reports

You can view the Navigation Bar Entry Subscription and Navigation Bar Entry History reports by clicking the appropriate tab at the top of the Navigation Bar Entries page.

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**Note:** The Subscription and History buttons only appear after you create a navigation bar.

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1. Navigate to the Navigation Bar Entries page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. Select an application.
  - d. On the Application home page, click **Shared Components**.
  - e. Under Navigation, click **Navigation Bar Entries**.
2. Click the appropriate tab:
  - **Subscription**
  - **History**

### Navigation Bar Entry Subscription Report

Click **Subscription** to access the Subscribed NavBars report. This report displays subscribed navigation bar entries in your application.

### Navigation Bar Entry History

Click **History** to view the Navigation Bar History report. This report lists recent changes to navigation bars.

## Controlling Navigation Using Branches

A branch is an instruction to link to a specific page, procedure, or URL after a given page is submitted. For example, you can branch from page 1 to page 2 after page 1 is submitted.

### Topics:

- [Creating a Branch](#)

**See Also:** ["About Cross Page Utilities"](#) on page 7-84

## Creating a Branch

You create a branch by running the Create Branch Wizard and specifying the branch point and branch type.

To create a branch:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Under Branches access the Create Branch Wizard:
  - Tree view - Under Page Processing, right-click and select **Create Branch**.
  - Component view - Under Branches, click the **Create** icon.

The Create Branch Wizard appears.

3. For Branch Attributes:
  - a. Name - Specify the name of the branch for easy identification by developers.
  - b. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
  - c. Branch Point options:
    - On Submit: Before Computation - Occurs before computations, validations, or processing. Use this option for a Cancel button.
    - On Submit: Before Validation - Occurs after computations, but before validations or processing. Typically not used. If a validation fails, page processing stops, a rollback is issued, and the page displays the error. Because of this default behavior, you do not need to create branches to accommodate validations. However, you might want to branch based on the result of a computation (for example, to the previous branch point).
    - On Submit: Before Processing - Occurs after computations and validations, but before processing. Use this option to branch based on a validated session state, but before performing any page processing.
    - On Submit: After Processing - Occurs after computations, validations, and processing. This option branches to a URL or page after performing computations, validations, and processing. When using this option, remember to sequence your branches if you have multiple branches for a given branch point.
    - On Load: Before Header - Occurs before a page is rendered. This option displays another page, instead of the current page, or redirects the user to another URL or procedure.
  - d. Select a branch type.
  - e. Click **Next**.
4. For Target, specify the target location. The information that appears on the page depends on the branch type you selected:
  - a. If the target location is a URL:
    - Branch Target - Select **URL**.
    - URL Target - Enter a URL. For example:  
`http://www.yahoo.com`
  - b. If the target location is a page:
    - Branch Target - Select **Page in this Application**.
    - Page - Specify the target page number.  
  
 Select **reset pagination for this page** to have the page return to the first set of data meeting a user's query.  
  
 Select **include process success message** to display a message when a user submits a page and a branch is taken to another page. If you do not select this option, the message does not display because it is part of submitting the page, not displaying the next one.

- Request - Enter text to assign to the built-in application item called REQUEST. To learn more, see item Help. See ["About Field-Level Help"](#) on page 1-13.
  - Clear Cache - Specify the page numbers on which to clear cache. Separate multiple entries with a comma.
  - c. 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 Set these items.

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.
5. Follow the on-screen instructions.

**See Also:** ["About the When Button Pressed Attribute"](#) on page 2-29

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## Controlling Page Layout

This section describes different ways you can customize your database application's page layout by customizing regions, editing item attributes, and incorporating images.

### Topics:

- [Understanding Page Layout in Oracle Application Express](#)
- [Creating a Global Page to Display Components on Every Page](#)
- [Understanding Regions](#)
- [How Item Attributes Affect Page Layout](#)
- [Incorporating Content from Other Web Sites](#)
- [Managing Images](#)
- [Managing Static Files](#)
- [Rendering HTML Using Custom PL/SQL](#)

**See Also:** ["Adding Navigation"](#) on page 11-1 and ["Managing the Application User Interface"](#) on page 7-29

## Understanding Page Layout in Oracle Application Express

The Application Express 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:** ["Creating a Region"](#) on page 12-3

## Creating a Global Page to Display Components on Every Page

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

**See Also:** ["Managing Pages in a Database Application"](#) on page 7-34, ["Understanding Conditional Rendering and Processing"](#) on page 2-4 and ["Available Conditions"](#) on page C-1

### Topics:

- [Creating a Global Page](#)
- [Navigating to the Global Page](#)

## Creating a Global Page

To create a Global page:

1. On the Workspace home page, click **Application Builder**.
2. Select an application.  
The Application home page appears.
3. Click the **Create Page** button.
4. On Create Page:

- a. User Interface - Select a user interface for the page.
- b. For Select a page type, select **Global Page**.

Note that the Global Page option only appears if the application does not have a Global page for the specified user interface.

5. For Page Number, enter an integer value that identifies a page within the application.
6. Click **Finish**.

**See Also:** ["Managing the Application User Interface"](#) on page 7-29

## Navigating to the Global Page

To navigate to the Global page:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Select **Global Page**.

## Understanding Regions

A region is a 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.

### Topics:

- [Creating a Region](#)
- [About Region Types](#)
- [Editing Regions](#)
- [Creating a Region Display Selector](#)
- [Copying a Region](#)
- [Deleting Regions](#)

**See Also:** ["About Page Specific Utilities"](#) on page 7-83

## Creating a Region

You create regions by running the Create Region Wizard.

To create a region:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Create Region Wizard:
  - Component view - Under Regions, click the **Create** icon.
  - Tree view - Right-click the Regions and select **Create**.The Create Region Wizard appears.
3. Select a region type. See ["About Region Types"](#) on page 12-4.
4. Specify Display Attributes:
  - Component view - Under Regions, click the **Create** icon.
  - Tree view - Right-click the Regions and select **Create**.The Create Region Wizard appears.
5. Follow the on-screen instructions.

**See Also:** ["Creating a Region Display Selector"](#) on page 12-12

## About Creating Subregions

Subregions enable you to create a parent/child relationship between two regions. A subregion displays inside of a parent region. You can specify a Parent Region when you initially create the region, or when editing region attributes. See ["Creating a Region"](#) on page 12-3 and ["Editing Regions"](#) on page 12-5.

You can use this feature in a variety of ways. One use case would be to use subregions to group information. For example, suppose you have a region with a border. You can use this feature to display two classic reports (or subregions) within it. You can also use subregions to display regions as tabs or as an accordion. You control how parent and subregions display by editing the Sub Region attributes of the region template. To learn more, see ["Region Templates"](#) on page 13-37.

## About Region Types

When you create a region, you select a region type. The Application Express engine interprets a region differently based on the type you select. [Table 12-1](#) describes the available region types.

**Table 12-1** *Region Types*

Region Type	Description
HTML	<p>When you select HTML, the wizard prompts you to select one of the following:</p> <ul style="list-style-type: none"> <li>■ <b>HTML</b> - Functions as containers for items and contains the HTML you provide. Any HTML you type may contain substitution strings.</li> <li>■ <b>HTML Text (escape special characters)</b> - Same as HTML region, but the Application Express engine escapes special characters before they are rendered.</li> <li>■ <b>HTML Text (with shortcuts)</b> - Same as HTML region, but with support for shortcuts.</li> </ul> <p>See Also: <a href="#">"Using Shortcuts"</a> on page 10-75</p>
Multiple HTML	<p>Use this option to create multiple HTML regions at once. In the fields provided, specify the Sequence, Title, Display Point, Report Template, and Column for each region.</p>
Report	<p>Report regions can be defined by a SQL query you write, or by using a wizard to guide you through the steps needed to write a query.</p> <p>When you select Report, the wizard prompts you to select one of the following:</p> <ul style="list-style-type: none"> <li>■ <b>Classic Report</b> - Creates a report based on a custom SQL <code>SELECT</code> statement or a PL/SQL function returning a SQL <code>SELECT</code> statement that you provide.</li> <li>■ <b>List View</b> - Creates a report optimized to display data and provide easy navigation on Smartphones.</li> <li>■ <b>Web Service Result</b> - Creates a report based on a Web service result</li> <li>■ <b>Wizard Report</b> - Creates a classic report without requiring any SQL knowledge.</li> </ul> <p>See Also: <a href="#">"Creating Reports"</a> on page 9-1</p>
Form	<p>Form regions contain a form.</p> <p>See Also: <a href="#">"Creating Forms"</a> on page 10-1</p>



**Table 12–1 (Cont.) Region Types**

Region Type	Description
Plug-ins	Plug-ins allow developers to declaratively extend the built-in types available with Application Express. <b>See Also:</b> <a href="#">"Implementing Plug-ins"</a> on page 17-25
Chart	Chart regions contain line, bar, or pie charts based on SQL queries. <b>See Also:</b> <a href="#">"Creating Charts"</a> on page 10-46
Map	Map regions contain declaratively defined Flash maps. <b>See Also:</b> <a href="#">"Creating Maps"</a> on page 10-40
Tree	Trees are a hierarchical navigational control based on a SQL query executed at runtime. <b>See Also:</b> <a href="#">"Creating Trees"</a> on page 10-78
Calendar	Calendar regions contain a calendar. <b>See Also:</b> <a href="#">"Creating Calendars"</a> on page 10-20
List	List regions contain a shared collection of links called list. <b>See Also:</b> <a href="#">"Creating Lists"</a> on page 11-7
Breadcrumb	Breadcrumb regions contain a hierarchical list of links called a breadcrumb. <b>See Also:</b> <a href="#">"Creating Breadcrumbs"</a> on page 11-20
PL/SQL Dynamic Content	Regions based on PL/SQL enable you to render any HTML or text using the PL/SQL Web Toolkit.
URL	URL based regions obtain their content by calling a web server using a predefined URL. <b>See Also:</b> <a href="#">"Incorporating Content from Other Web Sites"</a> on page 12-16
Region Display Selector	Region Display Selector region enables the display of show hide controls for each region on a page for which region display selection has been enabled. <b>See Also:</b> <a href="#">"Creating a Region Display Selector"</a> on page 12-12
Help Text	Help Text regions enable you to provide page-level help. <b>See Also:</b> <a href="#">"Creating a Help Page"</a> on page 10-100

**See Also:**

- *Oracle Database Development Guide* for information about developing web applications with PL/SQL
- *Oracle Database PL/SQL Packages and Types Reference* for information about http packages

## Editing Regions

A region is an area of a page that serves as a container for content. You can alter the appearance of a page by editing region attributes.

**Topics:**

- [Editing Region Attributes](#)

- [How Region Attributes Affect Page Layout](#)
- [Specifying a Region Header and Footer](#)
- [Enabling Users to Customize a Page](#)
- [Utilizing Region Caching](#)
- [Specifying a Static Region ID](#)
- [Adding a Region Image](#)
- [Editing Multiple Regions at Once](#)

### Editing Region Attributes

To edit region attributes:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.

The Edit Region page appears.

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**Note:** For further information regarding regions that are plug-in type regions, see ["Importing a Plug-in from the Plug-in Page"](#) on page 17-34.

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3. Edit the appropriate attributes.
4. To learn more about a specific item on a page, click the item label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.
5. Click **Apply Changes**.

**See Also:** ["How Region Attributes Affect Page Layout"](#) on page 12-6, ["Controlling Region Positioning"](#) on page 12-8, and ["Specifying a Region Header and Footer"](#) on page 12-8

**About Navigation Alternatives** The Region Definition page is divided into sections. You can access these sections by 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**.

### How Region Attributes Affect Page Layout

Region attributes control the appearance of a page. ["Region Attributes Affecting Page Layout"](#) on page 12-7 describes region attributes that affect the layout of a page.

**Table 12–2 Region Attributes Affecting Page Layout**

Attribute	Description
User Interface, Sequence	Specifies the display order of the regions within the page.
User Interface, Parent Regions	Defines the parent region to which the current region belongs.
User Interface, Display Point	<p>Identifies where the region displays within the page. Regions are rendered in order of sequence number within a Display Point. Click the View icon to see the page layout and select a position.</p> <p>The possible display points for a region are determined by the page-level template (which is a page attribute). If no page-level template is selected, the default page-level template, defined in the Application Definition, is used.</p>
User Interface, Template	<p>Determines the look of the region. To view template attributes, click the template name on the Page Definition.</p> <p><b>See Also:</b> <a href="#">"Customizing Templates"</a> on page 13-11 and <a href="#">"Region Templates"</a> on page 13-37</p>
User Interface, Item Display Position	Determines if page items are displayed above or below the main region content.
Grid Layout, Start New Grid	Determines whether this region displays in a new grid or in the same grid as the previous region.
Grid Layout, Start New Row	Determines whether this region displays on the same row as the previous region or whether it displays on the next row.
Grid Layout, Column	Determines if the region displays in a specific grid column. Select <b>Automatic</b> to automatically determine the next available grid column where the region gets displayed.
Grid Layout, Column Span	Determines how many grid columns should be occupied by the region. Select <b>Automatic</b> to balance the available grid columns within all regions in the same grid row.
Grid Layout, Column Attributes	Enter additional attributes which are set for the grid column. This value replaces the #ATTRIBUTES# substitution placeholder in the grid layout column template.
Attributes, Region CSS Classes	Enter additional CSS classes as space delimited list which are substituted if the region template contains the substitution string #REGION_CSS_CLASSES#.
Attributes, Region	Region templates that contain the substitution string #REGION_ATTRIBUTES# are substituted with this value.
Attributes, Region Display Selector	Use the region display selector to identify the region to display in a region display selector region type. Region display selectors enable you to hide other regions on the page and just show a specific region. Region display selectors only display regions that have been identified using this attribute.
Attributes, Region Image	<p>If populated, the identified image displays in the upper left of the region. There is no control over the table tag used to display this image.</p> <p><b>See Also:</b> <a href="#">"Adding a Region Image"</a> on page 12-11</p>
Attributes, Image Tag Attributes	<p>Used with the Region Image attributes. Enter attributes to be included in the image html. For example, use this attribute for height and width.</p> <p><b>Note:</b> If no ALT is defined in the image tag attributes, Oracle Application Express defaults to rendering the image as a decorative image (for example with an empty ALT tag).</p> <p><b>See Also:</b> <a href="#">"Adding a Region Image"</a> on page 12-11</p>
Header and Footer	Specifies HTML text to be displayed at the top of the region (just before the #BODY# content).

**Table 12–2 (Cont.) Region Attributes Affecting Page Layout**

Attribute	Description
Conditions	<p>Defines conditions and appropriate expressions that determine if the region displays. Conditions can reference session state, the currently logged in user, or environment preferences (such as whether a page is in Print View mode).</p> <p><b>See Also:</b> <a href="#">"Understanding Conditional Rendering and Processing"</a> on page 2-4 and <a href="#">"Optimizing a Page for Printing"</a> on page 10-99</p>
Read Only, Read Only Condition Type	<p>Select a condition type from the list that must be met in order for this region to render page items as a read-only. Not selecting a condition causes the page items to render normally.</p> <p><b>Note:</b> Set the condition type to <b>Never</b> to always render the items of this region as enterable fields. This overwrites any read-only condition defined at the page-level.</p>
Customization	<p>Enables end-user customization. To use this feature, you must include the #CUSTOMIZE# substitution string in the Header, Body, or Footer section of the page template.</p> <p><b>See Also:</b> <a href="#">"Enabling Users to Customize a Page"</a> on page 12-9</p>

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

In addition to Display Point, you can specify the column in which the region is placed. When you place regions in multiple columns, Oracle Application Express automatically renders the necessary HTML to produce a multiple column layout.

### Specifying a Region Header and Footer

In addition to the body content of a region (which can be a report, a chart, or HTML with form elements), you can specify additional HTML to be placed above and below a region or in its header and footer.

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.

For classic report regions, the region footer supports the following substitution strings:

- #ROWS\_FETCHED# shows the number of rows fetched by the Oracle Application Express 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.
- #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

```

**See Also:** ["About Region Types"](#) on page 12-4

## Enabling Users to Customize a Page

You can use the Customization attribute to control whether display attributes in a region can be customized by users.

To enable end-user customization:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.

The Edit Region page appears.

3. Scroll down to Customization and select one of the following:
  - **Customizable and Not Shown By Default**
  - **Customizable and Shown By Default**
  - **Not Customizable By End Users**
4. In Customized Option Name, enter the label that represents this region on the page to the user.
5. Include the #CUSTOMIZE# substitution string in the Header, Body, or Footer section of the page template.

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 link called Customize appears wherever you include the #CUSTOMIZE# substitution string in the page template. When users click this link, a window appears, enabling them to turn on and off regions on the page.

**See Also:** ["Customizing Templates"](#) on page 13-11

## Utilizing Region Caching

Enabling region caching is an effective way improve the performance of static regions such as regions containing lists that do not use conditions or regions containing static HTML.

**Tip:** Region caching is not available for interactive report regions.

When you enable region caching, the Application Express 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 Application Express 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 Application Express 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.

**See Also:** ["Server Cache"](#) on page 8-28 and ["Managing Cached Regions"](#) on page 12-10

**Enabling Region Caching** To enable region caching:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.The Edit Region page appears.
3. Scroll down to Caching.
4. For Caching, select one of the following:
  - **Cached** - Caches the region independent of the user.
  - **Cached by User** - Caches the region specific to a given user.
  - **Not Cached** - Disables this feature.
5. If you select **Cached** or **Cached by User**, specify the following:
  - a. Timeout Cache After - Identify how long the cached region remains valid.
  - b. Cache Condition Type - Select a condition type from the list. If the condition returns false, the region is rendered dynamically and is not cached. If the condition returns true, the region is cached.
  - c. Expression 1 and Expression 2 - Enter values based on the specific condition type selected.
6. Click **Apply Changes**.

**Managing Cached Regions** One way to improve an application's performance is to take advantage region caching. Developers can configure region caching by setting the Cache attribute on the Edit Region pages. See ["Utilizing Region Caching"](#) on page 12-9.

You can manage cached regions on the Cached Regions page.

To access the Cached Regions page:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Select an application.
3. Click the **Utilities** button and select **Caching**.
4. Under Cached Regions, click **Manage**.  
The Cached Regions page appears.
5. You can customize the appearance the page using the Search bar at the top of the page. See 4.
6. Select the regions you want to purge and click one of the following:
  - **Purge Expired**
  - **Purge Checked**
7. To purge all cached regions, click **Purge All**.

**See Also:** "Managing Cached Regions" in *Oracle Application Express Administration Guide*

## Specifying a Static Region ID

Specifying a static region ID is useful when creating custom JavaScript or cascading stylesheets. 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. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.

The Edit Region page appears.
3. Scroll down to Attributes.
4. For Static ID, enter value to identify this region. You can reference this value using the substitution string #REGION\_STATIC\_ID#.
5. Click **Apply Changes**.

## Adding a Region Image

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. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.

The Edit Region page appears.
3. Scroll down to Attributes.
4. Under Attributes, specify the following:
  - Region Image - Specify an image to display in the upper left of the region.
  - Image Tag Attributes - Enter attributes to be included in the image html. Use these attributes to specify height and width.
5. Click **Apply Changes**.

## Editing Multiple Regions at Once

Application Builder includes several ways to edit multiple regions at once.

### Topics:

- [Editing Multiple Attributes Across All Regions](#)

- [Accessing Region Utilities](#)

**Editing Multiple Attributes Across All Regions** Using the Regions page you can update multiple region attributes across all regions on a page, including sequence (the order), column, region name, and display point.

**See Also:** To learn more about region attributes, go to the Edit Region page. See ["Editing Regions"](#) on page 12-5.

To edit multiple attributes across all regions:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Regions page:
  - Component view - Click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.
  - Tree view - Right-click **Regions** and select **Edit All**.Regions page appears.
3. Update the appropriate attributes.
4. Click **Apply Changes**.

**Accessing Region Utilities** Use the Utilities page to access Grid Edit pages and reports across all pages within a selected application.

To access the Region Utilities page:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Regions page:
  - Component view - Click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.
  - Tree view - Right-click **Regions** and select **Edit All**.Regions page appears.
3. Click **Utilities**.
4. Select a utility and follow the on-screen instructions.

**See Also:** ["Editing Regions"](#) on page 12-5

## Creating a Region Display Selector

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

To create a Region Display Selector:

1. Create the page and regions to be included in the Region Page Selector.
2. For each region to be included in the selector, edit Region Display Selector attribute:
  - a. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
  - b. Access the Edit Region page:



- Component view - Under Regions, select the region name.
- Tree view - Right-click the region name and select **Edit**.

The Edit Region page appears.

- c. Under Attributes, change Region Display Selector to **Yes**.
  - d. Click **Apply Changes**.
3. Create a region of type Region Display Selector:
    1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
    2. Access the Create Region Wizard:
      - Component view - Under Regions, click the **Create** icon.
      - Tree view - Right-click the Regions and select **Create**.The Create Region Wizard appears.
    3. Select a region type Region Display Selector.
    4. Click **Create**.

## Copying a Region

---

---

**Note:** You cannot copy a Tree region since this type of region encompasses more than one region.

---

---

To copy a region:

1. Navigate to the Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, click the **Copy** icon. The Copy icon resembles two small overlapping pages.
  - Tree view - Right-click the region and click the **Copy** icon.The Copy Region Wizard appears.
3. If you are using Component view, select the region you want to copy. Otherwise, proceed to the next step.
4. For To Page:
  - a. To Page - Select the page to which you want to copy the region.
  - b. Copy Region Items - Select **Yes** or **No** to determine whether to copy items within this region. Depending upon the region, this option may not appear.
  - c. Copy Buttons - Select **Yes** or **No** to determine whether to copy buttons within this region. Depending upon the region, this option may not appear.
  - d. Click **Next**.
5. Click **Copy Region**.

## Deleting Regions

To delete a region:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Region page:
  - Component view - Under Regions, select the region name.
  - Tree view - Right-click the region name and select **Edit**.The Edit Region page appears.
3. Click **Delete**.

### Deleting Multiple Regions at Once

To delete multiple regions at once:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the Edit Regions page:
  - Component view - Click the **Edit All** icon. The Edit All icon resembles a small grid with a pencil on top of it.
  - Tree view - Right-click **Regions** and select **Edit All**.Regions page appears.
3. Click the **Delete Multiple Regions** tab.
4. Specify the following:
  - a. Cascade to Delete Button - Select **Yes** to delete corresponding region buttons.
  - b. Cascade to Delete Items - Select **Yes** to delete corresponding region items.
  - c. Delete associated list and list Entries - Select **Yes** to delete corresponding lists. This option only displays when the region to be deleted is the only region which references the list.
  - d. Cascade to Delete Dynamic Actions - Select **Yes** to delete corresponding region items.
5. Select the lists to be deleted.
6. Click **Apply Changes**.

## How Item Attributes Affect Page Layout

An item is part of an HTML form and can be a text field, text area, password, select list, check box, and so on. You can alter the appearance of a page by changing the item attributes. For example, these attributes can effect where a label displays, how large an item is, and if the item displays next to or below the previous item.

**See Also:** ["Understanding Page-Level Items"](#) on page 7-55

To edit item attributes:

1. Navigate to the Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Access the attributes page for the item:
  - Tree view - Right-click the item and select **Edit**.
  - Component view - Under Items, select the item name.

**Tip:** You can also edit an item by double-clicking the item name or selecting the name and pressing **ENTER**. See ["Editing a Page in Tree View"](#) on page 8-5.

The Edit Page Item page appears.

3. Under Items, click the item name.

The Edit Page Item page appears.

[Table 12-3](#) describes how item attributes affect the layout of a page.

**Table 12-3** *Item Attributes Effecting Page Layout*

Heading	Attribute	Description
User Interface	Sequence	Specifies the display sequence for this component. The sequence determines the order of evaluation.
User Interface	Region	Defines the region where the item displays. All items must be in a region.
User Interface	Template	Indicates the item template. Item templates enable you to define the user interface attributes in a central place and share that definition among many page items.
Grid Layout	Start New Grid	Determines whether this page item displays in a new grid or in the same grid as the previous page item.
Grid Layout	Start New Row	Determines whether this page item displays on the same row as the previous page item or button, or whether it displays on the next row.
Grid Layout	Column	Determines if the page item should be displayed in a specific grid column. Use <b>Automatic</b> to automatically determine the next available grid column where the page item gets displayed.
Grid Layout	ColSpan	Determines how many grid columns should be occupied by the page item. Use <b>Automatic</b> to balance the available grid columns within all page items and buttons in the same grid row.
Grid Layout	RowSpan	If items are laid out in HTML tables, this attribute determines the value used for the ROWSPAN attribute in the table cell in which the page item displays.
Grid Layout	Column Attributes	Enter additional attributes which are set for the grid column. This value replaces the #ATTRIBUTES# substitution placeholder in the grid layout column template.
Label	Label	Identifies the field label for the page item. The label displays on the page only if the item displays. Depending on the label alignment, the label displays in its own HTML table cell for some displays or in the same cell for others. Item labels can include shortcuts using "SHORTCUT_NAME" syntax.
Label	Horizontal/Vertical Alignment	Controls the placement and the horizontal and vertical alignment of the label. Labels can be displayed above, below, or to the left of the item. When the label is displayed next to a form element, it occupies its own HTML table cell. By changing the alignment here, you control the label's position within that table cell.
Label	HTML Table Cell Attributes	Enter any additional attributes to be used in the HTML table cell that contains this label.

**Table 12–3 (Cont.) Item Attributes Effecting Page Layout**

Heading	Attribute	Description
Element	Pre Element Texts	<p>Specifies additional attributes for the HTML table cell used to display each individual option in a radio group or set of check boxes. Can include HTML, JavaScript, and shortcuts. You can reference the following substitution strings:</p> <ul style="list-style-type: none"> <li>■ <code>#CURRENT_FORM_ELEMENT#</code> obtains the name of the HTML form element with which this post element text is associated.</li> <li>■ <code>#CURRENT_ITEM_NAME#</code> obtains the name of the item with which this post element text is associated.</li> </ul>
Element	Post Element Texts	<p>Specifies additional attributes for the HTML table cell used to display each individual option in a radio group or set of check boxes. Can include HTML, JavaScript, and shortcuts. You can reference the following substitution strings:</p> <ul style="list-style-type: none"> <li>■ <code>#CURRENT_FORM_ELEMENT#</code> obtains the name of the HTML form element with which this post element text is associated.</li> <li>■ <code>#CURRENT_ITEM_NAME#</code> obtains the name of the item with which this post element text is associated.</li> </ul>
Conditions	Condition Type and Expressions	<p>Defines conditions and appropriate expressions that determine if an item displays.</p> <p><b>See Also:</b> <a href="#">"Understanding Conditional Rendering and Processing"</a> on page 2-4</p>
Read Only Display Settings	Read Only Condition Type	<p>Defines conditions and expressions that determine if the item displays as read-only. Use this attribute to display certain items to a set of users as updatable, while displaying that same set of items to others users as nonupdatable. Using this attribute reduces the need to code duplicate interfaces for different users.</p> <p>Depending on the item type, a read-only item renders as plain text or as not enterable field. Not selecting a condition causes the item to render normally.</p> <p><b>Note:</b> Set the condition type to <b>Never</b> to always render the item as enterable field. This overwrites any read-only condition defined at the region or page-level</p>

## Incorporating Content from Other Web Sites

Typically, pages in an application are based on data stored in an Oracle database. To incorporate content from other servers, you can create a region based on a URL to display content. For example, suppose you wanted to reference the current Oracle stock price. You could create a region of type URL based on a URL such as the following:

```
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)

Note that 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 Application Express uses the Oracle `utl_http.request_pieces` function to obtain the HTML generated from the given URL. See ["Editing the Application Definition"](#) on page 7-14.

### 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 Application Express Administration Guide*

## Managing Images

You can reference images within your application by uploading them to the Images Repository. When you upload an image, you can specify whether it is available to all applications or a specific application.

### Topics:

- [Uploading Images](#)
- [Referencing Images](#)
- [Editing Image Attributes](#)
- [Deleting an Image](#)

**Tip:** You can use the Images Finder to identify images available to the current application. See ["Using the Images Finder"](#) on page 10-87.

## Uploading Images

You upload images to your workspace using the Image Repository.

To upload images to your workspace:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Files, select **Images**.  
The Images page appears.
5. To upload an image, click **Create**.
6. On the Create Image page, specify the following:
  - a. Application - Select **No Application Associated** to make the image available to all applications within the workspace, or select a specific application ID.
  - b. Upload New Image - Click **Browse** to identify a file to upload.
  - c. Note - Enter details that describe the image.
7. Click **Upload**.

## Referencing Images

You can reference images in your application by referencing the substitution string `#IMAGE_PREFIX#` or including a fully qualified URL to the image.

### Topics:

- [Verifying the Prefix for the Virtual Image Directory](#)
- [Referencing an Image Using #IMAGE\\_PREFIX#](#)
- [Referencing Images Using a Fully Qualified URL](#)

### Verifying the Prefix for the Virtual Image Directory

When you install Application Builder, the installer creates a virtual directory for images. This virtual directory points to the actual path on the file system that contains uploaded images. By default, you reference this virtual directory using the prefix:

`/i/`

When you first create an application, you must verify this prefix on the Edit Definition page.

To verify the Image Prefix for an application:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.
4. From the Application region, select **Edit Definition**.
5. Click the **User Interface** tab.
6. Locate the Image Prefix field.

By default, this attribute is defined as `/i/`. Contact your administrator for information about the name of this virtual directory for your installation.

### Referencing an Image Using #IMAGE\_PREFIX#

When you embed an image in static text (for example, in page headers, region headers, or footers), you can reference the image using the substitution string `#IMAGE_PREFIX#`. For example, to reference the image `go.gif`, you would use the following syntax:

```

```

**See Also:** ["About Built-in Substitution Strings"](#) on page 2-18, ["IMAGE\\_PREFIX"](#) on page 2-27, ["APP\\_IMAGES"](#) on page 2-21, and ["WORKSPACE\\_IMAGES"](#) on page 2-31

### Referencing Images Using a Fully Qualified URL

Alternatively, you can also reference an image using a fully qualified URL. For example:

```

```

## Editing Image Attributes

When you edit image attributes, you can add notes that describe an image or change the associated application. However, you cannot change the actual image. To change an image, delete it and then upload it again.

**See Also:** ["Deleting an Image"](#) on page 12-19 and ["Uploading Images"](#) on page 12-17

To edit images attributes:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Files, select **Images**.  
The Images page appears.
5. 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 name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each image as a large icon. To edit an image, click the appropriate icon.
  - **View Report** - Displays each image as a line in a report. To edit a image, click the name.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. Select an image.  
The Edit Image Attributes page appears.
7. From Application, specify the image availability.  
Select **No Application Associated** to make the image available to all applications within the workspace, or select a specific application ID.
8. In Notes, enter details that describe the image.
9. Click **Apply Changes**.

## Deleting an Image

To delete an image:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Files, select **Images**.

The Images page appears.

5. 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 name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each image as a large icon. To edit an image, click the appropriate icon.
  - **View Report** - Displays each image as a line in a report. To edit a image, click the name.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. Select an image.
7. Click **Delete**.

## Managing Static Files

You can upload static files to your workspace using the Static File Repository.

### Topics:

- [Uploading Static Files](#)
- [Editing an Uploaded File](#)
- [Downloading an Uploaded File](#)
- [Deleting an Uploaded File](#)

## Uploading Static Files

To upload static files:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.

The Shared Components page appears.

4. Under Files, select **Static Files**.

The Static Files page appears.

5. 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 name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each file as a large icon. To edit a file, click the appropriate icon.



- **View Report** - Displays each file as a line in a report. To edit a file, click the name.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. To upload a file, click **Create**.
  7. Follow the on-screen instructions.

## Editing an Uploaded File

You can edit static files smaller than 30,000 bytes by selecting the file name. Otherwise, you must edit the file offline and upload it again.

To edit a static file smaller than 30,000 bytes:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Files, select **Static Files**.  
The Static Files page appears.
5. 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 name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each file as a large icon. To edit a file, click the appropriate icon.
  - **View Report** - Displays each file as a line in a report. To edit a file, click the name.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. Select a file.
7. If the file is smaller than 30,000 bytes, edit the file.
8. In Notes, edit or enter notes describing the file.
9. Click **Apply Changes**.

## Downloading an Uploaded File

To download an uploaded file:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.

4. Under Files, select **Static Files**.  
The Static Files Repository appears.
5. Click **View Report**.  
A report appears.
6. Select the **Download** icon next to the appropriate file.

**See Also:** ["Uploading Static Files"](#) on page 12-20, ["Editing an Uploaded File"](#) on page 12-21, and ["Deleting an Uploaded File"](#) on page 12-22

## Deleting an Uploaded File

To delete an uploaded static file:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Files, select **Static Files**.  
The Static Files Repository appears.
5. 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 name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each file as a large icon. To edit a file, click the appropriate icon.
  - **View Report** - Displays each file as a line in a report. To edit a file, click the name.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. Select a file.
7. Click **Delete**.

## Rendering HTML Using Custom PL/SQL

If you must generate specific HTML content not handled by Oracle Application Express 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.

**See Also:**

- *Oracle Database Development Guide* for information about developing web applications with PL/SQL
- *Oracle Database PL/SQL Packages and Types Reference* for information about http packages

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:

```
http.p(TO_CHAR(SYSDATE, 'Day Month DD, YYYY'));
```

This next example accesses tables:

```
DECLARE
    l_max_sal NUMBER;
BEGIN
    SELECT max(sal) INTO l_max_sal FROM emp;
    http.p('The maximum salary is: ' || TO_CHAR(l_max_sal, '999,999.00'));
END;
```



---

## Managing Themes and Templates

This section describes different ways you can alter your database application's user interface and page layout through themes and templates.

### Topics:

- [Managing Themes](#)
- [Customizing Templates](#)
- [Using Custom Cascading Style Sheets](#)

**See Also:** ["Adding Navigation"](#)

## Managing Themes

**Themes** are collections of templates that you can use to define the layout and style of an entire application. The idea behind a theme is to provide a complete set of templates that accommodate every UI pattern that may be needed in an application. Templates are organized first by type and then by template class. Template types include breadcrumb, button, calendar, label, list, page, popup list of values, region, and report. The template class identifies the purpose of the each template within a given type. Each template type provides a group of standard classes and eight custom classes. These classifications enable Oracle Application Express to map templates among themes, making it easy to quickly change the entire look and feel of an application.

Oracle Application Express ships with an extensive theme repository. You can add themes to the theme repository as follows:

- Workspace administrators can create Workspace themes. Workspace themes are available to all developers within the workspace. See ["Managing Workspace Themes"](#) on page 13-7.
- Instance administrators can create public themes. Public themes are added using Application Express Administration Services. Once added, these themes are available to all workspaces and developers. See ["Managing Public Themes"](#) in *Oracle Application Express Administration Guide*.

### Topics:

- [Accessing the Themes Page](#)
- [Editing a Theme](#)
- [Creating a Theme](#)
- [Switching an Active Theme](#)

- [Copying a Theme](#)
- [Deleting a Theme](#)
- [Managing Workspace Themes](#)
- [About Exporting and Importing Themes](#)
- [Changing a Theme Identification Number](#)
- [Viewing Theme Reports](#)

**See Also:** ["Customizing Templates"](#) on page 13-11

## Accessing the Themes Page

You manage themes on the Themes page. You can access the Themes page from the Shared Components page or from the Page Definition.

**Tip:** You can change the selected default templates for a theme on the Create/Edit Theme page. See ["Editing a Theme"](#) on page 13-2.

To access the Themes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.
4. Under User Interface, select **Themes**.

The Themes page appears. A check mark in the Is Current column indicates which theme is selected.

5. Click the theme name.

The Create/Edit Theme page appears.

**See Also:** ["About the Themes Page"](#) on page 13-4

## Editing a Theme

A standard theme contains templates for every type of application component and region type. When you edit a theme you can change theme name, edit the default templates for components and regions, alter the page transition, change the icon that displays for Date Picker items, and specify if custom images are supported. The sections that follow describe each section Theme Create/Edit page.

To review or edit a theme:

1. Navigate to the Themes page. See ["Accessing the Themes Page"](#) on page 13-2.
2. Click the theme name.

The Create/Edit Theme page appears

The Create/Edit Theme page is divided into sections. You can access these sections by 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**.

Note the application ID and the Theme Identification Number display at the top of the page.

3. To change the theme name, enter a name in the Name field.
4. To change a default template for a component, scroll down to Component Defaults. Make a selection from the appropriate list.

[Table 13–1](#) describes the default templates available under Component Defaults.

**Table 13–1 Component Default Templates**

Attribute	Description
Page	Identifies the default template for displaying pages. If a developer does not explicitly choose a template, then the Application Express engine uses the template specified here. <b>See Also:</b> <a href="#">"Display Attributes"</a> on page 8-22 for information about overriding the page template on the Page Attributes page
Error Page	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 want to use a template designed to display errors.
Printer Friendly Page	Identifies the template to be used when the Application Express engine is in printer friendly mode. <b>See Also:</b> <a href="#">"Optimizing a Page for Printing"</a> on page 10-99
Breadcrumb	Identifies the default breadcrumb template used when you create a breadcrumb.
Button	Identifies the default button template used when you create a button.
Calendar	Specifies the default calendar template used when you create a calendar.
Label	Identifies the default label template used when you create a 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.
Report	Identifies the default region template used when you create a report.
Header Toolbar	Identifies the default template used for the header toolbar.
Footer Toolbar	Identifies the default template used for the footer toolbar.

5. To change a default template for a region, scroll down to Region Defaults. Make a selection from the appropriate list.

[Table 13–2](#) describes the default templates available under the Regions Defaults.

**Table 13–2 Region Defaults**

Attribute	Description
Breadcrumbs	Default region template used when you create a breadcrumb.
Charts	Default chart template used when you create a chart.
Forms	Default form template used when you create a form.
Lists	Default region template used when you create a list.
Interactive Reports	Default region template used when you create an interactive report.
Reports	Default region template used when you create a report.
Tabular Forms	Default region template used when you create a tabular form.

**Table 13-2 (Cont.) Region Defaults**

Attribute	Description
Wizards	Default region template used when you create a new wizard component.
Interactive Reports	Default region template used when you create an interactive report.

6. For Calendar Icon Details:
  - a. Icon Name - Specify the name and location of image to be used when items of type Date Picker are displayed, for example:  
`/i/new_cal.bmp`
  - b. Icon Name - Identify the image attributes for the Calendar Icon, for example:  
`width="16" height="16" alt="Display Calendar"`
7. For Custom Image, specify whether to use the default theme image or enable support for a custom theme image. Select **Yes** or **No**.
8. Click **Apply Changes**.

## Creating a Theme

Once you create a theme, it displays on the Themes page. You can create a theme from scratch or select an existing theme from the repository.

To create a theme:

1. Navigate to the Themes page. See ["Accessing the Themes Page"](#) on page 13-2.
2. Click **Create**.
3. Select a creation method:
  - **From the Repository** - View and select a theme from the repository.
  - **From Scratch** - Create a theme from scratch.
  - **From Export** - Create a theme to import from the export repository.
4. Follow the on-screen instructions.
5. To learn more about a specific field, click the field label.

When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

**See Also:** ["Editing a Theme"](#) on page 13-2

### About the Themes Page

Once you create a theme, it appears on the Themes page. You can change the appearance of the page by 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 by name and then click **Go**.



- **Go button** - Executes a search or applies a filter.
- **View Icons** - Displays each theme as a large icon. To edit a theme, click the icon.
- **View Report** - Displays each theme as a line in a report. To edit a theme, click the name.
- **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Switching an Active Theme

When you switch to a theme, all components with assigned templates are assigned to a corresponding template in the theme. Application 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 ["Creating a Theme"](#) on page 13-4.
- 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.

To switch an active theme:

1. Navigate to the Themes page. See ["Accessing the Themes Page"](#) on page 13-2.
2. Click **Switch Theme**.

The Switch Theme page appears.

**Tip:** If you do not have at least two themes installed, click **Create Theme**. You can create a theme from scratch or simply select an existing theme from the repository. See ["Creating a Theme"](#) on page 13-4.

3. For Identify Theme:
  - a. **Currently Active Theme** - Select the current theme for the application.
  - b. **Switch to Theme** - Select the new theme for the application.
  - c. Click **Next**.
4. Review the Status column to identify problematic mappings:
  - **Check** indicates the mapping was successful.
  - **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.

- **Error** indicates that Application Builder was unable to map the class among the themes. Ensure that a class is identified for the templates in both themes.

**Note:** 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**.

### Updating an Older Application with a New Theme

Oracle Application Express ships with a variety of themes. Many of these themes have been updated and include a new more modern style.

If you import or upgrade an application from a previous Oracle Application Express release, the appearance of the application does not change. To obtain the newer theme, you must:

1. Switch to another theme. See ["Switching an Active Theme"](#) on page 13-5.
2. Re-create the theme you want to use from the repository. ["Creating a Theme"](#) on page 13-4.
3. Switch to that new theme. ["Switching an Active Theme"](#) on page 13-5

## Copying a Theme

Each theme is identified by a numeric identification number (ID). When you copy a theme, you specify a theme ID. Copying a theme is useful when experimenting with editing a theme or to export a theme with a different ID.

To copy a theme:

1. Navigate to the Themes page. See ["Accessing the Themes Page"](#) on page 13-2.
2. On the Tasks list, click **Copy Theme**.
3. On Copy Theme:
  - a. Copy From Theme - Select the theme you want to copy.
  - b. Copy to this Theme Identification Number - Enter a new ID for the theme.
  - c. Click **Next**.
4. Click **Copy Theme**.

## Deleting a Theme

You can only delete inactive themes. When you delete a theme, Application 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"](#) on page 16-20.

To delete a theme:

1. Navigate to the Themes page. See ["Accessing the Themes Page"](#) on page 13-2.

2. On the Tasks list, click **Delete Theme**.
3. From Remove Theme, select the theme you want to delete and click **Next**.
4. Click **Delete Theme**.

## Managing Workspace Themes

Workspace administrators manage the theme repository for a workspace. Workspace administrators can add a theme to the repository, making it available to all developers within a workspace, or delete it.

### Topics:

- [Adding a Theme to the Theme Repository](#)
- [Modifying a Workspace Theme](#)
- [Deleting a Workspace Theme](#)
- [Modifying a Workspace Theme](#)
- [About Exporting a Workspace Theme](#)

**See Also:** "Managing Public Themes" in Oracle Application Express Administration Guide

### Adding a Theme to the Theme Repository

To add a theme to the Theme repository:

1. Navigate to the Themes page. See "[Accessing the Themes Page](#)" on page 13-2.
2. From the Tasks List, click **Manage Workspace Themes**.
3. Select **Create** and click **Next**.
4. For Application Theme to Copy, select the desired theme and click **Next**.
5. For Identify Name, enter a theme number, name, and optional description and then click **Next**.
6. Click **Create Workspace Theme**.

### Viewing an Existing Workspace Theme

To view an existing workspace theme:

1. Navigate to the Themes page. See "[Accessing the Themes Page](#)" on page 13-2.
2. From the Tasks List, click **Manage Workspace Themes**.
3. Click **View Existing** and click **Next**.

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](#)" on page 13-8.

### Deleting a Workspace Theme

To delete a workspace theme:

1. Navigate to the Themes page. See "[Accessing the Themes Page](#)" on page 13-2.

2. From the Tasks List, click **Manage Workspace Themes**.
3. Click **Delete** and click **Next**.
4. Select the workspace theme to be deleted and click **Delete Theme**.

### Modifying a Workspace Theme

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:

1. Create an application using the theme you want to modify. ["About Creating a Database Application"](#) on page 7-1.
2. Modify the theme. See ["Editing a Theme"](#) on page 13-2.
3. Delete the existing workspace theme. See ["Deleting a Workspace Theme"](#) on page 13-7.
4. Add the modified theme to the workspace theme repository. See ["Adding a Theme to the Theme Repository"](#) on page 13-7.

### About Exporting a Workspace Theme

You 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. ["About Creating a Database Application"](#) on page 7-1.
2. Export the application. See ["Exporting an Application"](#) on page 16-14.
3. Import the exported file into the target Oracle Application Express instance. See ["Importing an Application, Page or Component Export"](#) on page 16-24.
4. Install the exported file from the Export Repository. See ["Installing Export Files"](#) on page 16-29.

## About Exporting and Importing Themes

You 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. ["About Creating a Database Application"](#) on page 7-1.
2. Export the theme using the Export Theme utility. See ["Exporting Themes"](#) on page 16-20.
3. Import the exported file into the target Oracle Application Express instance. See ["Importing Export Files"](#) on page 16-23.
4. Install the exported file from the Export Repository. See ["Installing Export Files"](#) on page 16-29.

## Changing a Theme Identification Number

Each theme has an identification number (ID). You can use the Change Theme ID utility to change a theme ID to another identification number. 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. See "[Accessing the Themes Page](#)" on page 13-2.
2. On the Tasks list, click **Change Identification Number**.
3. For Theme Number:
  - a. Identify Theme - Select a theme.
  - b. Change to this Theme Identification Number - Specify an identification number.
  - c. Click **Next**.
4. Confirm your changes and click **Change Theme ID**.

## Viewing Theme Reports

Application Builder includes several reports designed to help you manage themes and templates.

### Topics:

- [Viewing All Templates in a Theme](#)
- [Viewing Theme Template Counts](#)
- [Viewing File References](#)
- [Viewing Class References](#)
- [Viewing Template Substitution Strings](#)

### Viewing All Templates in a Theme

To view all templates that comprise a theme:

1. Navigate to the Themes page. See "[Accessing the Themes Page](#)" on page 13-2.
2. Click **Reports**.
3. On the Theme Reports page:
  - a. From Report, select **Application Templates**.
  - b. From Theme, select a theme.
  - c. Click **Go**.

A list of templates appears with the template type, template name, the associated theme, and template class.

4. To edit a template, select the template name.

### Viewing Theme Template Counts

The Theme Template Count report lists which template classes currently have templates created for them.

To view the Theme Template Count report:

1. Navigate to the Themes page. See "[Accessing the Themes Page](#)" on page 13-2.
2. Click **Reports**.

3. On the Theme Reports page:
  - a. From Report, select **Theme Template Counts**.
  - b. From Theme, select a theme.
  - c. Click **Go**.
4. If you are using custom classifications, select **Show Custom** and click **Go**.

### 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. See "[Accessing the Themes Page](#)" on page 13-2.
2. On the Themes page, click **Reports**.
3. On the Theme Reports page:
  - a. From Report, select **File References**.
  - b. From Theme, select a theme.
  - c. Click **Go**.
4. On the File References page:
  - a. From Show, select the type of component to include in the report. If you do not make a selection, no results are returned.
  - b. From 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 to link to a Page Definition.
    - **Without context** displays only the file name and the image (if applicable).
  - c. From File Extensions, select the type of extensions for which to search.
  - d. Click **Go**.
5. To download a comma-delimited file (.csv) version of this report, click **Download** at the bottom of the page.

### Viewing Class References

Accessing 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:

1. Navigate to the Themes page. See "[Accessing the Themes Page](#)" on page 13-2.
2. Click **Reports**.
3. On the Theme Reports page:
  - a. From Report, select **Class References**.
  - b. From Theme, select a theme.
  - c. Click **Go**.
4. On the Class References page:

- a. From Show, select the components to check for a class reference. If you do not make a selection, no results are returned.
  - b. From 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.

### 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. See "[Accessing the Themes Page](#)" on page 13-2.
2. Click **Reports**.
3. On the Theme Reports page:
  - a. From the Report list, select **Template Substitution Strings**.
  - b. From the Theme list, select which themes to include in the report.
  - c. Click **Go**.
4. To link to a template definition, select the component name.

**See Also:** "[Understanding Substitution Strings](#)" on page 2-17

## Customizing Templates

The Application Express engine creates the user interface of an application based on a named collection of templates called a theme. Templates control the look and feel of the components in your 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.

### Topics:

- [About Cascading Style Sheets](#)
- [Selecting a Default Page Template](#)
- [Creating a New Template](#)
- [Viewing Template Reports](#)
- [Managing Templates](#)
- [Breadcrumb Templates](#)
- [Button Templates](#)
- [Calendar Templates](#)
- [Label Templates](#)

- [List Templates](#)
- [Page Templates](#)
- [Popup LOV Templates](#)
- [Region Templates](#)
- [Report Templates](#)

**See Also:** ["Managing Themes"](#) on page 13-1

## 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. Oracle Application Express 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 Oracle Application Express version number. Theme specific CSS files include the Oracle Application Express version number to preserve backward compatibility for imported applications using older versions of a theme.

**See Also:** ["Using Custom Cascading Style Sheets"](#) on page 13-46

## Selecting a Default Page Template

You can specify a default page template in two ways:

- Select a default page template within a specific theme.
- Select a specific page template on a page-by-page basis.

By default, the Application Express engine uses the Page template specified on the Themes page.

### Topics:

- [Selecting a Page-level Template Within a Theme](#)
- [Selecting a Page-level Template for a Specific Page](#)

### Selecting a Page-level Template Within a Theme

To specify a default page template within a theme:

1. Navigate to the Themes page. See ["Accessing the Themes Page"](#) on page 13-2.
2. Select a theme name.

The Create/Edit Theme page appears.



3. Scroll down to Component Defaults. Make a selection from the Page list.
4. Click **Apply Changes** at the top of the page.

**See Also:** ["Editing a Theme"](#) on page 13-2

### Selecting a Page-level Template for a Specific Page

To specify a page-level template for a specific page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Select a page.  
The Page Definition appears.
4. To access the Page Definition Edit Page:
  - Tree view - Under Page Rendering, double-click the page title at the top of the tree.
  - Component view- Under Page, click the **Edit** icon.  
The Page Attributes page appears.
5. Locate the section Display Attributes.
6. Make a selection from the Page Template list.
7. Click **Apply Changes**.

## Creating a New Template

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.

To create a custom template:

1. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under User Interface, select **Templates**.
2. Click **Create**.
3. Select the type of template you want to create and click **Next**.
4. Select a creation method:
  - **From Scratch**
  - **As a Copy of an Existing Template**
5. Follow the on-screen instructions.

**Tip:** Make sure you associate your template with the correct theme.

## Viewing Template Reports

Application Builder includes reports describing template utilization, subscription, published templates and edit history.

To view template reports for the current application:

1. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under User Interface, select **Templates**.
2. You can narrow the display by making a selection from the following lists and clicking **Go**.
  - Template Name - Enter a case insensitive query.
  - Theme - View only templates in a specific theme.
  - Referenced - Select a type of template to display. Options include:
    - All Templates
    - Templates Referenced
    - Templates Not Referenced
  - Type - Select a template type.
  - Since - Restrict the report to a specific time frame. Select the amount of time to include in your report.
  - Subscribed - Specify whether to view All Templates, Subscribed Templates, or Not Subscribed Templates.
3. To view template reports, click the following tabs:
  - **Subscription** displays subscribed templates in your application.
  - **Utilization** displays template utilization in the current application for all template types (page, report, region, label and list).
  - **History** details recent changes to templates by developers and the last update date.

## Managing Templates

You can view all available templates on the Templates page. Alternatively, you can access a template associated with a specific page on the Page Definition.

### Topics:

- [Viewing Templates on the Templates Page](#)
- [Viewing Templates Associated with a Specific Page](#)
- [Replacing Templates](#)
- [Replacing All Templates within an Application](#)
- [Viewing Region Position Utilization by Page Template](#)
- [Unsubscribing to Templates](#)

- [Publishing Templates](#)

**See Also:** ["Viewing All Templates in a Theme"](#) on page 13-9

## Viewing Templates on the Templates Page

To view existing templates:

1. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under User Interface, select **Templates**.

The Templates page appears.
2. You can narrow the display by making a selections from the following lists and clicking **Go**.
  - Template Name - Enter a case insensitive query.
  - Theme - View only templates in a specific theme.
  - Referenced - Select a type of template to display.
  - Type - Select a template type.
  - Since - Restrict the report to a specific time frame. Select the amount of time to include in your report.
  - Subscribed - Specify whether to view All Templates, Subscribed Templates, or Not Subscribed Templates.
3. To see a preview of a template, click the **Run** icon in the Preview column.  
Note that not all template types have the preview capability.
4. To view or edit a template definition, click the template name.  
The template definition appears.  
  
Each template definition is divided into sections. You can access these sections by manually scrolling, 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**.
5. Edit the appropriate attributes.  
  
If you edit a template, you can make changes in one window and run your application in another by selecting the **Return to Page** check box on the right side of the template definition page. Selecting this check box keeps the page you are editing current after you click Apply Changes.
6. Click **Apply Changes**.

## Viewing Templates Associated with a Specific Page

To view templates associated with a specific page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Select a page.

The Page Definition appears. Templates associated with the current page display under the Templates heading in the far right column.

4. To view or edit a template definition, click the template name.

The Template Definition appears.

Each template definition is divided into sections. You can access these sections by manually scrolling, 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**.

5. Edit the appropriate attributes.

If you edit a template, you can make changes in one window and run your application in another by selecting the **Return to Page** check box on the right side of the template definition page. Selecting this check box keeps the page you are editing current after you click Apply Changes.

6. Click **Apply Changes**.

## Replacing Templates

You can update the template associated with a component using the Replace Templates Wizard.

To replace the template associated with a component:

1. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application 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 **Replace Templates**.
3. From Template Type, select a template and click **Next**.
4. For Replace Templates, select the following:
  - a. Change From - Select the template you want to change.
  - b. Change To - Select the template you want to change to.
  - c. Click **Next**.
5. Click **Finish**.

## Replacing All Templates within an Application

To replace all templates within an application with templates from another application:

1. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application 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 **Replace templates in this application with templates from another application**.
3. For Replace Templates:
  - a. Replace from Application - Select an application.
  - b. User Interface - Select the type of user interface for which this application has been developed.
  - c. Click **Next**.
4. 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.
5. Click **Replace Templates**.

### Viewing 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. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application 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 **View page template region position utilization**.

The Region Display Point Utilization report appears.

### Unsubscribing to Templates

A subscribed template is a template that has its definition maintained in another template, 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 **Application 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.

3. To unsubscribe to a specific template type within the current theme, select the template type and click **Unsubscribe**.

## Publishing Templates

Use the Publish Templates page to view templates that are subscribed to by other templates in your workspace.

To publish master template content to subscribing templates:

1. Navigate to the Templates page.
  - a. On the Workspace home page, click the **Application 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**.

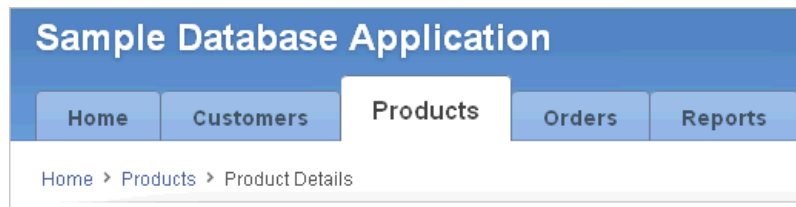
## Breadcrumb Templates

A breadcrumb template controls the display of breadcrumb entries. You select a breadcrumb template when you create a region.

**See also:** ["Customizing Templates"](#) on page 13-11 and ["Managing Themes"](#) on page 13-1

### About Breadcrumb Style Navigation

Breadcrumbs usually indicate where the current page is relative to other pages in the application. In addition, users can click a specific page to instantly view it. For example, the Oracle Application Express Sample Database Application includes breadcrumb paths at the top of each page.



#### See Also:

- Online help for information about using specific sections of the Edit Breadcrumb Template page
- ["Creating Breadcrumbs"](#) on page 11-20

### Breadcrumb Template Attributes

This section describes specific sections of the Edit Breadcrumb Template page. 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** **Name** identifies the name of the template. Use the **Translatable** check box 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. Application Builder accomplishes this template mapping through the assignment of a template class.

**Subscription** Use Subscription to apply an existing template to the current application.

Use **Reference Master Breadcrumb Template From** to select an existing template in this application 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**.

**Template Type** Select one of the following template styles:

- **Child Breadcrumb Entries** displays all breadcrumb entries that are children of the current page parent breadcrumb (that is, peers of the current breadcrumb).
- **Current Breadcrumb** displays all breadcrumb entries in sequence with a common parent.
- **Parent Breadcrumb Entries** displays all breadcrumb entries for the current pages parent breadcrumb (that is, one level up from the current breadcrumb entry).
- **Parent to Leaf (breadcrumb style)** displays the current page breadcrumb entry, its parent to the left, and so on, until the root node is reached.

**Definition** [Table 13–3](#) describes available breadcrumb Entry attributes.

**Table 13–3** *Breadcrumb Entry Control attributes*

Attribute	Description
Before First	Defines text that displays before the first breadcrumb entry.
Current Page Breadcrumb Entry	<p>Defines the look of a breadcrumb entry that corresponds to the current page. This attribute supports the following substitution strings:</p> <ul style="list-style-type: none"> <li>■ <code>#NAME#</code> specifies the short name of the breadcrumb entry.</li> <li>■ <code>#LINK#</code> specifies the anchor target of the breadcrumb entry.</li> <li>■ <code>#LONG_NAME#</code> specifies the long name of the breadcrumb entry.</li> </ul> <p>For example:</p> <pre>&lt;li&gt;&lt;a href="#LINK#"&gt;#NAME#&lt;/a&gt;</pre>

**Table 13–3 (Cont.) Breadcrumb Entry Control attributes**

Attribute	Description
Non Current Page Breadcrumb Entry	<p>Defines the look of a breadcrumb entry that does not correspond to the current page. This attribute supports the following substitution strings:</p> <ul style="list-style-type: none"> <li>■ <code>#NAME#</code> specifies the short name of the breadcrumb entry</li> <li>■ <code>#LINK#</code> specifies the anchor target of the breadcrumb entry</li> <li>■ <code>#LONG_NAME#</code> specifies the long name of the breadcrumb entry</li> </ul> <p>For example:</p> <pre>&amp;lt;li&amp;gt;&amp;lt;a href="#LINK#"&amp;gt;#NAME#&amp;lt;/a&amp;gt;</pre>
After Last	Defines text that displays after the last breadcrumb entry.
Between Level	<p>Defines text that displays between levels of breadcrumb entries. For example, if a breadcrumb has three levels this text would display at the "X" in the example that follows:</p> <pre>main X cars X porsche X 911</pre>
Maximum Levels	Specifies the number of levels that appear when displaying breadcrumbs in a breadcrumb style.

**Link Attributes** Use **Breadcrumb Link Attributes** to specify hypertext link attributes for a breadcrumb entry. For example, to display the hypertext link for the breadcrumb entry, add the following text to the HTML anchor tag in the position of the `X`:

```
&lt;A HREF="..." X&gt;
```

**Comments** Use this attribute to record comments about this component.

**Substitution Strings** Lists substitution string used in the current template. Substitution strings are used within subtemplates to reference component values.

## Button Templates

Button templates enable developers to customize the look and feel of a button. To build a button, you can use multiple images or HTML tags. Using button templates is optional.

**See also:** ["Customizing Templates"](#) on page 13-11 and ["Managing Themes"](#) on page 13-1

### Button Template Attributes

This section describes specific sections of the Edit Button Template page. 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** **Template Name** identifies the name of the template. Use the **Translatable** check box 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. Application Builder accomplishes this template mapping through the assignment of a template class.

**Subscription** Use Subscription to apply an existing template to the current application.

Use **Reference Master 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**.

**Definition Normal Template** defines the button template that displays if the button type is **Normal**. You can include standard application substitutions. 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.

Button templates support the following substitution strings:

- The `#LABEL#` substitution string is replaced with a button label.
- The `#LINK#` substitution string is replaced with generated JavaScript code to control the button's behavior. Depending on the button's action, this code could either a call to `apex.submit` to submit the page, a redirect to a page, a redirect to some other URL supplied, execution of some custom JavaScript, or `void(0)` to do nothing (when the behavior is be defined separately with Dynamic Actions). Since the `#LINK#` prefixes the generated JavaScript code with 'javascript:', use it in an `HREF` attribute.
- The `#JAVASCRIPT#` substitution string is replaced with generated JavaScript code to control the button's behavior. Depending on a button's action, this code could be either a call to `apex.submit` to submit the page, a redirect to a page, a redirect to some other URL supplied, execution of some custom JavaScript or `void(0)` to do nothing (when the behavior may be defined separately with Dynamic Actions).

**Tip:** Since `#JAVASCRIPT#` does not prefix the generated JavaScript code with 'javascript:', use it in an `onclick` attribute.

- The `#BUTTON_ID#` substitution string is replaced with the ID for the button. This is either the button's Static ID, if defined, or an internally generated ID in the format. For example:  

```
'B' || [Internal Button ID]
```
- The `#BUTTON_CSS_CLASSES#` substitution string is replaced with the button CSS classes property from the button definition.
- The `#BUTTON_ATTRIBUTES#` substitution string is replaced with the button attributes property from the button definition.

**Tip:** All substitution string must be in uppercase.

**Comments** Use this attribute to record comments about this component.

**Substitution Strings** Lists substitution string used in this template. Substitution strings are used within subtemplates to reference component values.

## Calendar Templates

Calendar templates control the appearance and placement of a calendar. Calendar templates frequently use HTML tables to arrange dates. You place calendar attributes using substitution strings such as #DD# and #MONTH#.

**See Also:** ["Creating Calendars"](#) on page 10-20, ["Customizing Templates"](#) on page 13-11, and ["Managing Themes"](#) on page 13-1

### About Supported 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 (#).

### Calendar Template Attributes

This section describes specific sections of the Edit Calendar Template page. 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**.

#### Calendar Definition

**Name** **Name** identifies the name of the template. Use the **Translatable** check box 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. Application Builder accomplishes this template mapping through the assignment of a template class.

**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**.

**Comments** Use this attribute to record comments about this component.

#### Monthly Calendar, Weekly Calendar, Daily 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.

To learn more about a specific attribute, click the attribute label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

## Label Templates

Label templates are designed to centrally manage HTML markup of page item labels. Each 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 enable you to define a before-and-after text string that gets prepended and appended to the item.

**See Also:** ["Customizing Templates"](#) on page 13-11 and ["Managing Themes"](#) on page 13-1

### Label Template Attributes

This section describes specific sections of the Edit Label Template page. 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** **Template Name** identifies the name of the template. Use the **Translatable** check box 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. Application Builder accomplishes this template mapping through the assignment of a template class.

**Subscription** Use **Template 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. When you select an existing template, you become a subscriber to that template.

To load a copy of a master template, click **Refresh**.

**Definition** In **Before Label**, enter HTML to display before the item label. Before Label supports the following substitution strings:

- #CURRENT\_FORM\_ELEMENT#
- #CURRENT\_ITEM\_ID#
- #CURRENT\_ITEM\_NAME#
- #CURRENT\_ITEM\_HELP\_TEXT#

For example:

```
<label for="#CURRENT_ITEM_NAME#">
<a href="javascript:popupFieldHelp('#CURRENT_ITEM_ID#',
  '&APP_SESSION.', '&CLOSE.')" >
```

In this example the label automatically displays after the HTML in this region. Therefore, if you open an `<a>` tag, you should close it in the After Label region.

In **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. For example:

```
</a></label>
```

**In Before Label**, enter HTML to display before the item label. This attribute supports the following substitution strings:

- #CURRENT\_FORM\_ELEMENT#
- #CURRENT\_ITEM\_ID#
- #CURRENT\_ITEM\_NAME#
- #CURRENT\_ITEM\_HELP\_TEXT#

**Error Display In On Error Before Label**, enter HTML to precede the item label when an application displays an inline validation error message for the item. For example:

```
<font class="fieldtitleleft">#ERROR_MESSAGE#
```

This attribute supports the following substitution strings:

- #CURRENT\_FORM\_ELEMENT#
- #CURRENT\_ITEM\_ID#
- #CURRENT\_ITEM\_NAME#
- #CURRENT\_ITEM\_HELP\_TEXT#

**In 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. For example:

```
&nbsp;]</font>
```

This attribute supports the following substitution strings:

- #CURRENT\_FORM\_ELEMENT#
- #CURRENT\_ITEM\_ID#
- #CURRENT\_ITEM\_NAME#
- #CURRENT\_ITEM\_HELP\_TEXT#

**Field Container In 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.

This attribute supports the following substitution strings:

- #CURRENT\_FORM\_ELEMENT#
- #CURRENT\_ITEM\_ID#
- #CURRENT\_ITEM\_NAME#
- #CURRENT\_ITEM\_HELP\_TEXT#
- #CURRENT\_ITEM\_CONTAINER\_ID#

In order for page items rendered on pages that do not use a table grid to be reliably hidden and shown with the Oracle Application Express JavaScript APIs, you should ensure the HTML container element defined in this attribute also has an `id="#CURRENT_ITEM_CONTAINER_ID#"` defined. If this is not done, you may find some elements of the item are not successfully hidden and shown.

**Substitution Strings** Lists substitution string usage for this template. Substitution strings are used within subtemplates to reference component values.

**Comments** Use this attribute to record comments about this object.

### Using #CURRENT\_ITEM\_HELP\_TEXT# to Create Item Help

You can use the #CURRENT\_ITEM\_HELP\_TEXT# substitution string to create inline page item Help text when a page is rendered. For example, you can use this substitution string to create page item 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's 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 independent if the user actually hovers over the label of a page item to display the help text.

### Example Label Template

Before Label:

```
<label for="#CURRENT_ITEM_NAME#" class="optional"><span>
class="helpText">#CURRENT_ITEM_HELP_TEXT#</span>
```

After Label:

```
</label>
```

## List Templates

A list is a shared collection of links. You control the appearance of a list through list templates. Using template attributes, you can also define a list element to be either current or non current for a specific page.

**See Also:** ["Creating Lists"](#) on page 11-7, ["Customizing Templates"](#) on page 13-11, and ["Managing Themes"](#) on page 13-1

### About Hierarchical Lists

Oracle Application Express 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."
- Select a Parent List Entry when you create each list entry.

**See Also:**

- Online Help for information about using specific sections of the Edit List Template page
- ["Creating Lists"](#) on page 11-7

### List Template Attributes

This section describes specific sections of the Edit List Template page. 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** **Name** identifies the name of the template. Use the **Translatable** check box 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. Application Builder accomplishes this template mapping through the assignment of a template class.

**Subscription** Use Subscription to apply an existing template to the current application.

Use **Reference Master List 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**.

**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.

**Template Definition** Defines current and noncurrent list templates. Supported substitution strings include #LINK#, #TEXT#, #TEXT\_ESC\_SC#, #IMAGE\_PREFIX#, #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.

**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.

**Before Sublist Entry** Enter HTML that displays before any sublist elements.

**Sublist Entry** Defines current and noncurrent list templates. Supported substitution strings include #LINK#, #TEXT#, #IMAGE\_PREFIX#, #IMAGE#, #IMAGE\_ATTR#, #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.

**After Sub List Entry** Enter HTML that displays after displaying sublist elements.

**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.

**Substitution Strings** Lists substitution string usage for this template. Substitution strings are used within subtemplates to reference component values.

**Comments** Use this attribute to record comments about this object.

## Page Templates

Page templates define the appearance of a page. Each 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 Application Express 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.

**See Also:** ["Customizing Templates"](#) on page 13-11 and ["Managing Themes"](#) on page 13-1

### Topics:

- [About Supported Page Template Substitution Strings](#)
- [Page Template Attributes](#)

### About Supported Page Template Substitution Strings

[Table 13-4](#) describes the available page template substitution strings. Note that all template substitution strings must be in uppercase letters and begin and end with a number sign (#).

To view a report of substitution strings supported by a given template, look at the Substitution Strings section of the Edit Page Template page. See ["Page Template Attributes"](#) on page 13-30.

**Table 13–4 Page Template Substitution Strings**

Substitution String	From	Description
#APEX_JAVASCRIPT#	Header Template	JavaScript files and code used by Oracle Application Express.
#APP_CSS#	Header Template	CSS files used by Oracle Application Express.
#BOX_BODY#	Body	Where the Body displays. If the Body is null, then #BOX_BODY# is used instead.
#CUSTOMIZE#	Footer Template	Customize link.
#FORM_CLOSE#	Footer template	Where the HTML close form tag <form> is placed.
#FORM_OPEN#	Header Template	Where the HTML open form tag <form> is placed. You must include this substitution string to submit a form.
#GENERATED_CSS#	Header Template	Cascading style sheet files created by components.
#GENERATED_JAVASCRIPT#	Header Template	JavaScript code created by components as needed.
#GLOBAL_NOTIFICATION#	Body	Displays the Global Notification attribute. Global notifications are intended to communicate system status, such as pending system downtime. You can also use APEX_APPLICATION.G_GLOBAL_NOTIFICATION to set this value programmatically. <b>See Also:</b> <a href="#">"Global Notification"</a> on page 7-19
#HEAD#	Header Template	Used after the <head> open tag but before the </head> close tag. You can optionally define the contents of #HEAD# for each page (for example, to reference additional style sheets or JavaScript libraries).
#HIGH_CONTRAST_TOGGLE#	All	High Contrast toggle.
#LOGO#	Body	Application image or log. In the Logo section of the Edit Application Definition page, you can identify an image and image attributes for an application logo. To use this feature, you must also include the #LOGO# substitution string in the Header or Body page template. <b>See Also:</b> <a href="#">"Logo"</a> on page 7-31
#NAVIGATION_BAR#	Body	Navigation bar. <b>See Also:</b> <a href="#">"Subtemplate"</a> on page 13-33 for information about the Navigation Bar subtemplate
#NOTIFICATION_MESSAGE#	Body	Defines where a summary of inline error messages displays. Inline error messages can display next to a field, inline in the notification area, or both.
#ONLOAD#	Header Template	Page onload. Use this string as a substitute in a JavaScript call to be executed when a page is loaded by the web browser. The JavaScript to be called can vary for each page.
#PAGE_CSS#	Header Template	Cascading style sheet files and inline style defined on the page-level.



**Table 13–4 (Cont.) Page Template Substitution Strings**

Substitution String	From	Description
#PAGE_JAVASCRIPT#	Header Template	JavaScript files and code defined on the page-level.
#PAGE_STATIC_ID#	All	Page Static ID (for example 'P100')
#PAGE_TRANSITION#	Page	Default page transition used to navigate to other pages in a jQuery Mobile application. You must use this new placeholders in a DIV of type role="page". For example:  <pre>&lt;div id="#PAGE_STATIC_ID#" data-role="page" data-apex-page-transition="#PAGE_TRANSITION#" data-apex-popup-transition="#POPUP_TRANSITION#" data-url="#REQUESTED_URL#"&gt;</pre>
#PARENT_TAB_CELLS#	All	Display of parent tabs.  <b>See Also:</b> <a href="#">"Parent Tab Attributes"</a> on page 13-34
#POPUP_TRANSITION#	Page	Default page transition used to open a dialog in a jQuery Mobile application. You must use this new placeholders in a DIV of type role="page". For example:  <pre>&lt;div id="#PAGE_STATIC_ID#" data-role="page" data-apex-page-transition="#PAGE_TRANSITION#" data-apex-popup-transition="#POPUP_TRANSITION#" data-url="#REQUESTED_URL#"&gt;</pre>
#REGION_POSITION_01#	Body	Region Position 1.
#REGION_POSITION_02#	Body	Region Position 2.
#REGION_POSITION_03#	Body	Region Position 3.
#REGION_POSITION_04#	Body	Region Position 4.
#REGION_POSITION_05#	Footer Template	Region Position 5.
#REGION_POSITION_06#	All	Region Position 6.
#REGION_POSITION_07#	Body	Region Position 7.
#REGION_POSITION_08#	Body	Region Position 8.
#REQUESTED_URL#	All	Page URL which was requested by the browser
#SCREEN_READER_TOGGLE#	All	Screen Reader toggle.
#SUCCESS_MESSAGE#	Body	Success message. Defines where page success and error messages appear. If the page process runs without raising errors, then this text displays.  You can customize the display of the success message for each template by adding HTML to be displayed before and after the success message.
#SWITCH_UI_TO_DESKTOP#	All	Hyperlink for home page of desktop user interface.
#SWITCH_UI_TO_JQM_SMARTPHONE#	All	Hyperlink for home page of smart phone user interface.
#TAB_CELLS#	Body	Display of standard tabs.  <b>See Also:</b> <a href="#">"Standard Tab Attributes"</a> on page 13-33

**Table 13–4 (Cont.) Page Template Substitution Strings**

Substitution String	From	Description
#TEMPLATE_CSS#	Header Template	Cascading style sheet files and inline style defined on page template-level.
#THEME_CSS#	Header Template	Cascading style sheet files selected for the theme.
#TITLE#	Header Template	Defines the page title. Typically included within HTML title tags.

**See Also:** ["Understanding Substitution Strings"](#) on page 2-17 and ["Managing Pages in a Database Application"](#) on page 7-34

### Page Template Attributes

This section describes specific sections of the Edit Page Template page. 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** **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. Application Builder accomplishes this template mapping through the assignment of a template class.

Use the **Translatable** check box to indicate if this template contains text strings that require translation.

**Subscription** Use Subscription to apply an existing template to the current application.

Use Reference Master Page 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 new copy of a master template, select **Refresh**.

**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 (#). See item Help for information about supported substitution strings.

**Header** is the first section of the page template. Enter HTML that defines the <Head> section of the HTML document. Regions that display or processes and computations that execute AFTER HEADER display or execute immediately after this section in the template that is rendered. For example:

```
<html>
<head>
  <title>#TITLE#</title>
  #APEX_CSS#
  #TEMPLATE_CSS#
  #THEME_CSS#
  #PAGE_CSS#
  #HEAD#
</head>
```

Oracle recommends you include at least #TITLE# and #HEAD# in this template section. See item Help for a specific list of supported substitution strings.

**Body** is the second section in the page template and is rendered after the header section but before the footer section. Enter HTML that defines the <Body> section of the HTML document. At a minimum, you must include the #BOX\_BODY#, #FORM\_OPEN# and #FORM\_CLOSE# substitution strings in this section of the template. For example:

```
<body #ONLOAD#>
  #FORM_OPEN#
  #BOX_BODY#
  #FORM_CLOSE#
  #GENERATED_CSS#
  #APEX_JAVASCRIPT#
  #TEMPLATE_JAVASCRIPT#
  #APPLICATION_JAVASCRIPT#
  #PAGE_JAVASCRIPT#
  #GENERATED_JAVASCRIPT#
</body>
```

See item Help for information about supported substitution strings.

**Footer** is the third section in the page template that displays after the Body. See item Help for information about supported substitution strings

**JavaScript** Available attributes include:

- **File URLs.** Enter JavaScript file URLs for code to be loaded on this page. Each URL must 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 in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You can also use the substitution string #APP\_VERSION# 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.

Examples:

- Standard file reference:

```
/myjs/main.js
```

- Standard file reference which loads the minified file main.min.js for regular page views and main.js in Debug mode:

```
/myjs/main#MIN#.js
```

- Conditional file for Internet Explorer

```
[if IE]/myjs/ie.js
```

- 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.

```
/myjs/main.js?version=#APP_VERSION#
```

- **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 Application Express. Code you enter here replaces the #GENERATED\_JAVASCRIPT# substitution string in the page template.

Do not include opening or closing script tags, just include the JavaScript code.

**Cascading Style Sheet** Available attributes include:

- **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 in your file URL for a regular page view and an empty string if the page is viewed in debug mode. You can also use the substitution string #APP\_VERSION# to include the application's version in the file URL. File URLs you enter here replace the #TEMPLATE\_CSS# substitution string in the template.

Do not include opening or closing script tags, just include the file URL.

Examples:

- Standard file reference:

```
/mycss/main.css
```

- Standard file reference which loads the minified file main.min.css for regular page views and main.css in debug mode.

```
/mycss/main#MIN#.css
```

- Conditional media query

```
[media="only screen and (max-device-width: 480px)"]/mycss/smartphone.css
```

- Conditional file for Internet Explorer

```
[if IE]/mycss/ie.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#
```

- **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 to avoid duplication and to leverage browser caching of static files.

Do not include opening or closing style tags, just include the cascading style sheet code. This example sets the CSS class display\_only to bold:

```
.display_only {
    font-weight:bold;
}
```

**Subtemplate** Enter the HTML for subtemplates below. Subtemplates are placed inside the body of the page template using substitution strings. Available subtemplates include:

- **Success Message.** Enter HTML to replace the string #SUCCESS\_MESSAGE# in the template body, header, or footer. For example:

```
<b>#SUCCESS_MESSAGE#</b>
```

- **Navigation Bar.** Enter HTML or text to replace the string #NAVIGATION\_BAR# in the template header, body, or footer. Use the substitution string #BAR\_BODY# to indicate where in the Navigation Bar the entries should appear. For example:

```
<table class="navBar"><tr>#BAR_BODY#</tr></table>
```

The #BAR\_BODY# substitution string generates the appropriate HTML table cells.

- **Navigation Bar Entry.** Enter HTML or text to be substituted into the navigation bar #BAR\_BODY# substitution string for each navigation bar entry. Use the these substitution strings to create the navigation bar entry subtemplate.

- #LINK# - entry link
- #TEXT# - entry sub text
- #IMAGE# - entry image

Note that the HTML image ALT, HEIGHT, and WIDTH arguments are included with the HTML IMG tag when supplied with the navigation bar entry.

- #EDIT# - Inline edit link editing capability
- #WIDTH# - Image width
- #HEIGHT# - Image height
- #COLSPAN# - HTML COLSPAN value
- #ALT# - Image alternative text

- **Notification.** Enter HTML or text to be substituted when the #NOTIFICATION\_MESSAGE# substitution string is referenced in the template header, body, or footer. The Notification subtemplate supports these substitution strings:

- #MESSAGE#
- #NOTIFICATION\_MESSAGE\_HEADER#

Use the substitution string #MESSAGE# to indicate where the body of the message should appear in the Notification Message. For example:

```
<table><tr><td>#MESSAGE#</td></tr></table>
```

**Standard Tab Attributes** You must populate this attribute if your application includes standard tabs. Standard tabs can be placed in the header, body, or footer sections of the page template using the #TAB\_CELLS# substitution string. The page template Header/Body/Footer defines the HTML table and rows. This subtemplate defines

how these tabs display by defining the specific cell. See item Help for information about supported substitution strings.

Available attributes include:

- **Current Tab.** Enter HTML or text to be substituted for the currently selected standard tab. Whether a tab is current is determined by standard tab attributes. Include the #TAB\_TEXT# substitution string to show the displayed name of the tab. For example:

```
<td>#TAB_LABEL#</td>
```

See item Help for information about supported substitution strings.

- **Non Current Standard Tab.** Enter HTML or text to be substituted for the unselected standard tabs. Include the #TAB\_TEXT# substitution string to show the displayed name of the tab. For example:

```
<td><a href="#TAB_LINK#">#TAB_LABEL#</a></td>
```

See item Help for information about supported substitution strings.

**See Also:** ["Creating Tabs"](#) on page 11-1

**Parent Tab Attributes** You must populate this attribute if your application includes two levels of tabs. Enter HTML or text that to be substituted for the selected parent tabs. Parent tabs can be placed in the header, body, or footer section of the page template using the #PARENT\_TAB\_CELLS# substitution string. Parent tabs only display with standard tabs.

Available attributes include:

- **Current Parent Tab.** Enter HTML or text to be substituted for the selected parent tabs. Whether a tab is current is determined by the page that displays and the standard tab set that the page uses. Include the #TAB\_TEXT# substitution string to show the displayed name of the tab. For example:

```
<td><a href="#TAB_LINK#">#TAB_LABEL#</a></td>
```

See item Help for information about supported substitution strings.

This attribute is part of the Parent Tab subtemplate and expands the #PARENT\_TAB\_CELLS# substitution string.

- **Non Current Parent Tab.** Enter HTML or text to be substituted for the unselected parent tabs. Include the #TAB\_TEXT# substitution string to show the displayed name of the tab. For example:

```
<td><a href="#TAB_LINK#">#TAB_LABEL#</a></td>
```

See item Help for information about supported substitution strings.

This attribute is part of the Parent Tab subtemplate and expands the #PARENT\_TAB\_CELLS# substitution string.

**See Also:** ["Creating Tabs"](#) on page 11-1

**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. For example:

```
<td>#TAB_TEXT#</td>
```

- **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.

**Grid Layout** Available attributes include:

- **Type.** Select a grid 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.
- **Region Table Attributes.** This attribute enables you to control the attributes of the <table> tag. If the Application Express engine displays regions in multiple columns in the same region position, then Oracle Application Express renders an HTML table.

**Display Points** **Breadcrumb Display Point** applies to generated components that use breadcrumbs. It defines where the breadcrumbs are placed on the page. **Sidebar Display Point** applies to generated components that use Sidebars. It defines where sidebars are placed on the page.

**Error Page Template Control** Use this attribute when a page template is designated as an error template. Supported substitution strings include:

- #MESSAGE# and #ADDITIONAL\_INFO# - Places the error message.
- #TECHNICAL\_INFO# - Displays detailed internal error information which is visible to developers.
- #BACK\_LINK# - Displays a link back to the previous page.
- #OK# and #RETURN\_TO\_APPLICATION# - Returns to translated text strings.

**Substitution Strings** Lists substitution string usage for this template. Substitution strings are used within subtemplates to reference component values. See ["About Supported Page Template Substitution Strings"](#) on page 13-27

**Comments** Use this attribute to record comments about this component.

## Popup LOV Templates

Popup LOV templates control how popup lists display for all items defined as POPUP. You can only specify one popup LOV template for each theme.

**See Also:** ["Creating Lists of Values at the Application Level"](#) on page 10-71, ["Customizing Templates"](#) on page 13-11, and ["Managing Themes"](#) on page 13-1

## Popup List of Values Template Attributes

This section describes specific sections of the Edit Popup List of Values Template page. You can access the sections of the page either by 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**.

**Application 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. Application Builder accomplishes this template mapping through the assignment of a template class. Use the **Translatable** check box to indicate if this template contains text strings that require translation.

**Subscription** Use Subscription to apply an existing template to the current application. Reference Master Popup List of Values 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 new copy of a master template, click **Refresh**.

**Icon** Available attributes include:

- **Popup Icon.** Specifies an icon to display to the right of a form field for items of type POPUP. By default, the Application Express engine uses a list.gif image.
- **Popup Icon Attr.** Defines image attributes, such as height and width, for the Popup Icon.
- **Popup Color Picker Icon.** Defines an icon to display to the right of a form field for items of type Popup Color Picker. By default, the Application Express engine uses /i/htmllob/icons/palette.gif image.
- **Popup Color Picker Icon Attr.** Defines image attributes, such as height and width, used to display the Popup Color Picker Icon.

**Search Field** Use these attributes to specify how a Search field displays. [Table 13–5](#) describes available Search Field attributes.

**Table 13–5 Search Field Attributes**

Attribute	Description
Before Field Text	Defines text to display before the popup list of values search field displays.
Filter Width	Displays the <code>HTML INPUT TYPE = TEXT</code> widget using this width.
Filter Max Width	Displays the <code>HTML INPUT TYPE = TEXT</code> widget using this maximum width.
Filter Text Attribute	Displays the <code>HTML INPUT TYPE = TEXT</code> widget using these attributes. This is included within the HTML input tag.
After Field Text	Displays this text after displaying the search field, the search button, and the close button.

**Buttons** Use these attributes to define the button name and attributes for the Find, Close, Next, and Previous buttons. For more information, see item Help.



**Window** Popup lists of values are executed using JavaScript. Use these attribute to control the values of `scrollbars=`, `resizable=`, `width=`, and `height=`. For information about default values, see item Help. For more information, see item Help.

**Pagination** Defines how row count results display. For more information, see item Help.

**Result Set** Use these attributes to define text or HTML to display before and after a result set. For more information, see item Help.

**Page Attributes** Use these attributes to define popup pages. For more information, see item Help.

## Region Templates

Region templates control the appearance and placement of region attributes. You place region attributes using substitution strings such as `#BODY#` and `#EDIT#`. Template substitution strings must be in upper case and begin and end with a pound sign (`#`).

**See Also:** ["Understanding Regions"](#) on page 12-3, ["Customizing Templates"](#) on page 13-11, and ["Managing Themes"](#) on page 13-1

### Region Template Attributes

This section describes specific sections of the Edit Region Template page. You can access the sections of the page either by 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** **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. Application Builder accomplishes this template mapping through the assignment of a template class. Use the **Translatable** check box to indicate that the template contains text strings that require translation.

**Subscription** Use Reference Master Region Template From to select an existing template in this application or another template in your workspace schema. By selecting an existing template, you become a subscriber to that template.

To load a new copy of a master template, click **Refresh Template**.

**Definition** 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. It identifies where the source of the region should be placed. All other substitution strings are optional. The following are valid substitution strings:

- `#TITLE#`
- `#PAGE_TITLE#`
- `#EXPAND#`
- `#CHANGE#`
- `#BODY#`

- #SUB\_REGION\_HEADERS#
- #SUB\_REGIONS#
- #FORM\_OPEN#
- #FORM\_CLOSE#
- #REGION\_ID#
- #REGION\_STATIC\_ID#
- #REGION\_ATTRIBUTES#

When you create a button in a region position, the positions you define appear in a select list. Use the following substitution strings to define positions for the placement of buttons in a region:

- #EDIT#
- #CLOSE#
- #CREATE#
- #CREATE2#
- #EXPAND#
- #HELP#
- #DELETE#
- #COPY#
- #NEXT#
- #PREVIOUS#

**See Also:** ["Understanding Substitution Strings"](#) on page 2-17

**Grid Layout** Page items display within regions. Each item is part of an HTML table if the grid type in the page template is set to **Table**. You can set the attributes of this table using this attribute. For example:

```
class="instructiontext"
```

**Sub Regions** Use **Header Templates** and **Header Entry Templates** to generate a list of region titles of all the subregions of the current region. For either template, #ENTRIES# is the only required substitution string.

Other valid substitution strings include:

- #ENTRIES#
- #REGION\_ID#
- #REGION\_STATIC\_ID#

Use #SUB\_REGION\_HEADERS# in the region template to place the output of this template.

Use **Template** to wrap a subregion with additional HTML code. #SUB\_REGION# is the only required substitution string. It identifies where the source of the subregion should be placed. All other substitution strings are optional.

See item Help for more information and a list of supported substitution strings.

**Comments** Use this attribute to record comments about this component.

**Substitution Strings** Lists substitution string usage for this template. Substitution strings are used within subtemplates to reference component values.

## 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*.

**See Also:** , ["Customizing Templates"](#) on page 13-11, and ["Managing Themes"](#) on page 13-1

### Topics:

- [About Generic Column Templates and Named Column Templates](#)
- [Report Column Template Attributes for Generic Column Templates](#)
- [Report Column Template Attributes for Named Column Templates](#)
- [About Using JavaScript in Column Templates](#)

### About Generic Column Templates and Named Column Templates

Oracle Application Express includes two types of report templates:

- Generic column templates
- Named column templates

**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:

```
<td class="tabledata" align="#ALIGN#">#COLUMN_VALUE#</td>
```

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
```

**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:

```
<tr><td>#ENAME#</td><td>#SAL#</td></tr>
```

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:

```
<tr><td>#ENAME#</td><td>#SAL#</td></tr>
```

```
<tr><td>#1#</td><td>#2#</td></tr>
```

### Report Column Template Attributes for Generic Column Templates

This section describes specific sections of the Edit Report Template page for Generic 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**.

**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. Application Builder accomplishes this template mapping through the assignment of a template class. Use the **Translatable** check box to indicate the template contains text strings that require translation.

**Template Subscription** Use Reference Master Report 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 new copy of a master template, click **Refresh**.

**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:

```
<table>
```

You can identify column headers using the syntax #1#, #2#, #3#. For example:

```
<th>#1#</th><th>#2#</th><th>#3#</th>
```

You can include pagination above a report by including the substitution string #TOP\_PAGINATION#. This substitution string generates HTML that starts with an opening <tr> tag and ends with a closing </tr> tag. For example, to include an open table tag and the #TOP\_PAGINATION# substitution string, you would enter the following:

```
<table>#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.

**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:

```
<th >Item Help Text</th>
```

If you do not want any column headings, enter the following:

```
OMIT
```

If you do use this attribute, Application Express engine applies the default column heading template.

Use **After Column Heading** to display text after report headings.

**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.

**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 13–6](#).

**Table 13–6** *Column Template Substitution Strings*

Substitution String	Description
<code>#ALIGNMENT#</code>	Determines the column alignment. Specified by the user.
<code>#COLCOUNT#</code>	Defines the count of the number of columns.
<code>#COLNUM#</code>	Defines the current column number.
<code>#COLUMN_HEADER#</code>	Defines the column header.
<code>#COLUMN_VALUE#</code>	Replaced with the value of the column.
<code>#ROWNUM#</code>	Specifies the current row number.

Consider the following example:

```
<td> #ALIGNMENT#>#COLUMN_VALUE#</td>
```

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
```

**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:

```
</tr>
```

**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:

```
</table>
```

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.

**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.

**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 13–9](#) describes these templates.

**Table 13–7** *Pagination Subtemplate Attributes*

Pagination Subtemplate Attribute	Description
Pagination Template	<p>Applies to the entire pagination subtemplate. For example:</p> <pre>&lt;span class="instructiontext"&gt;#TEXT#&lt;/span&gt;</pre> <p>Use the substitution string #TEXT# to specify where you want the pagination subtemplate to display.</p> <p>Use the other Pagination Subtemplate attributes to modify individual items.</p>
Next Page Template	<p>Enter HTML to modify how the Next Page portion of the pagination subtemplate appears. For example:</p> <pre>&lt;a href="#LINK#"&gt;next&lt;/a&gt;</pre>
Previous Page Template	<p>Enter HTML to modify how the Previous Page portion of the pagination subtemplate appears. For example:</p> <pre>&lt;a href="#LINK#"&gt;previous&lt;/a&gt;</pre>
Next Set Template	<p>Enter HTML to modify how the Next Set portion of the pagination subtemplate appears. For example:</p> <pre>&lt;a href="#LINK#"&gt;next set&lt;/a&gt;</pre>
Previous Set Template	<p>Enter HTML to modify how the Previous Set portion of the pagination subtemplate appears. For example:</p> <pre>&lt;a href="#LINK#"&gt;previous set&lt;/a&gt;</pre>

**Comments** Use this attribute to record comments about this component.

### Report Column Template Attributes for Named Column Templates

This section 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** **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** check box 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. Application Builder accomplishes this template mapping through the assignment of a template class.

**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**.

**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 13–8](#).

**Table 13–8 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
```

**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 OMIT.

For example:

```
<th #ALIGNMENT#>#COLUMN_HEADER#</th>
```



**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:

```
<table>
```

You can identify column headers using the syntax #1#, #2#, #3#. For example:

```
<th>#1#</th><th>#2#</th><th>#3#</th>
```

You can include pagination above a report by including the substitution string #TOP\_PAGINATION#. This substitution string generates HTML that starts with an opening <tr> tag and ends with a closing </tr> tag. For example, to include an open table tag and #TOP\_PAGINATION# substitution string, you would enter the following:

```
<table>#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:

```
</table>
```

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.

**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 13–9](#) describes these templates.

**Table 13–9** *Pagination Subtemplate Attributes*

Pagination Subtemplate Attribute	Description
Pagination Template	<p>Applies to the entire pagination subtemplate. For example:</p> <pre>&lt;span class="instructiontext"&gt;#TEXT#&lt;/span&gt;</pre> <p>Use the substitution string #TEXT# to specify where you want the pagination subtemplate to display.</p> <p>Use the other Pagination Subtemplate attributes to modify individual items.</p>
Next Page Template	<p>Enter HTML to modify how the Next Page portion of the pagination subtemplate appears. For example:</p> <pre>&lt;a href="#LINK#"&gt;next&lt;/a&gt;</pre>

**Table 13–9 (Cont.) Pagination Subtemplate Attributes**

Pagination Subtemplate Attribute	Description
Previous Page Template	Enter HTML to modify how the Previous Page portion of the pagination subtemplate appears. For example: <code>&lt;a href="#LINK#"&gt;previous&lt;/a&gt;</code>
Next Set Template	Enter HTML to modify how the Next Set portion of the pagination subtemplate appears. For example: <code>&lt;a href="#LINK#"&gt;next set&lt;/a&gt;</code>
Previous Set Template	Enter HTML to modify how the Previous Set portion of the pagination subtemplate appears. For example: <code>&lt;a href="#LINK#"&gt;previous set&lt;/a&gt;</code>

**Comments** Use this attribute to record comments about this component.

### 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 `GROUP_DESC` query column is not null:

```
<script language="javascript">
IF ( "#GROUP_DESC#" != "" )
document.writeln( "<TR>";
<TD BGCOLOR=#336699>;</TD>
</TR>
</TR>
<TD>#GROUP_DESC#</TD>
</TR>" );
</TR>" );
```

#### See Also:

- Online Help for information about using specific sections of the Edit Report Template page
- ["Understanding Regions"](#) on page 12-3

## Using Custom 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. Oracle Application Express 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.

#### Topics:

- [Uploading Cascading Style Sheets](#)
- [Referencing an Uploaded Cascading Style Sheet in the Page Template](#)

## Uploading Cascading Style Sheets

You upload cascading style sheets to your workspace using the Cascading Style Sheet Repository. Uploaded cascading style sheets (CSS) are available to any application created in your workspace. The cascading style sheets are written to the file system, so you can reference them in your HTML source code.

To upload cascading style sheets:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Files, select **Cascading Style Sheets**.  
The Cascading Style Sheet page appears.
5. Click the **View Report** icon. See "[About the Cascading Style Sheets Page](#)" on page 13-47.  
A report appears.
6. To upload a CSS, click **Create** and follow the on-screen instructions.
7. To edit an existing CSS, select the CSS name.
8. To download an existing CSS, click the **Download** icon.

**See Also:** "[Referencing an Uploaded Cascading Style Sheet in the Page Template](#)" on page 13-47

### About the Cascading Style Sheets Page

Once you upload a CSS to the CSS Repository, you control how the page displays by making a selections from the search bar. Available controls include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Icons** - Displays each cascading style sheet as a large icon.
- **View Report** - Displays each cascading style sheet as a line in a report.
- **Actions menu** - Displays the Actions menu. Use this menu to customize report view. See "[About the Actions Menu](#)" on page 9-6.

## Referencing an Uploaded Cascading Style Sheet in the Page Template

You can reference an uploaded cascading style sheet within the Header section of the page template. You 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:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

3. Click **Shared Components**.
4. Under User Interface, select **Themes**.  
The Themes page appears.
5. On the Tasks list, click **View Templates**.
6. Select the name of the page template you want to edit.
7. 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_IMAGES#`. For example:

```
<html>
<head>
  <title>#TITLE#</title>
  #HEAD#
  <link rel="stylesheet" href="#APP_IMAGES#sample2.css" type="text/css">
</head>
...
```

To reference an uploaded file that is associated with a specific workspace, you would use the substitution string `#WORKSPACE_IMAGES#`. For example:

```
<html>
<head>
  <title>#TITLE#</title>
  #HEAD#
  <link rel="stylesheet" href="#WORKSPACE_IMAGES#sample3.css"
type="text/css">
</head>
...
```

**See Also:** ["Uploading Cascading Style Sheets"](#) on page 13-47, ["Creating a New Template"](#) on page 13-13, ["Managing Templates"](#) on page 13-14, ["Page Templates"](#) on page 13-27, ["APP\\_IMAGES"](#) on page 2-21, and ["WORKSPACE\\_IMAGES"](#) on page 2-31

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## Debugging an Application

This section describes approaches to debugging an application including running Oracle Application Express Advisor (Advisor), viewing Debug Mode, enabling SQL tracing, and viewing page reports. It also describes how to manually remove a control or a component to isolate a problem.

### Topics:

- [About Tuning Performance](#)
- [Running Advisor to Check Application Integrity](#)
- [Reviewing Session State](#)
- [Accessing Debugging Mode](#)
- [Enabling SQL Tracing and Using TKPROF](#)
- [Monitoring Application and Page Resource Use](#)
- [Viewing Page Reports](#)
- [Debugging Problematic SQL Queries](#)
- [Removing Controls and Components to Isolate a Problem](#)

**See Also:** "APEX\_DEBUG" in *Oracle Application Express API Reference*

### About Tuning Performance

For applications having a large number of concurrent users, maintaining optimal performance is critical. To optimize your application's performance, remember to use the following features:

- 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. See ["About Bind Variable Syntax"](#) on page 2-16.
- Include a #TIMING# substitution string in the region footer so that you can view the timing of each region. See ["Understanding Substitution Strings"](#) on page 2-17.

### Running Advisor to Check Application Integrity

The Oracle Application Express Advisor (Advisor) enables you to check the integrity and quality of your Oracle Application Express application. Advisor functions like a

compiler or LINT and flags suspicious behavior or errors. Running Advisor checks the integrity of your application based on the underlying metadata.

**Topics:**

- [About Oracle Application Express Advisor](#)
- [Running Advisor on an Entire Application](#)
- [Running Advisor on a Single Page](#)

## About Oracle Application Express Advisor

Before deploying your application, you can use the Oracle Application Express Advisor to perform various sanity checks on your application. The Advisor checks for errors, security issues, performance bottlenecks, usability and quality assurance.

## Running 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 **Application Builder** icon.  
The Application Builder home page appears.
  - b. Select the application.  
The Application home page appears.
2. Click **Utilities**.
3. Click **Advisor**.  
The Advisor page appears.

**Checks to Perform**

**Errors:**

- ☒ References with Substitution Syntax
- ☒ References with Column Syntax
- ☒ References with Bind Variable Syntax
- ☒ Declarative References of Application Items, Page Items, Columns or Interactive Report Filters
- ☒ Referenced Page Number Exists
- ☒ Is Valid SQL or PL/SQL Code
- ☒ Fetch, DML, MR\* Processes are Valid
- ☒ Unconditional Branch before other Branches
- ☒ Referenced Button in When Button Pressed exists
- ☒ Button is not compatible with Dynamic Actions

**Security:**

- ☒ Target Page Authorization equals current Component Authorization
- ☒ Inappropriate use of Substitution Syntax

**Warnings:**

- ☐ Referenced Item is on Current Page
- ☒ Referenced Item is Page Item of Target Page
- ☒ References of Page Item in a String
- ☒ Clear Cache Page Number equals Target or Current Page
- ☒ Length of Item or Tabular Form Column Name
- ☒ Inconsistent references between Dynamic Actions and Buttons
- ☒ Protected items in AJAX calls

**Performance:**

- ☒ V Function used in SQL Statements

**Usability:**

- ☐ Target Page Authorization is also set for Current Component
- ☒ Associated Item or Column of Validations

**Quality Assurance:**

- ☒ Hardcoded Application ID
- ☒ Report has Default Order
- ☒ Page Item has Help Text

4. Under Checks to Perform, review the selected checks. Enable and disable check boxes as appropriate.
5. Click **Perform Check** at the top of the page.  
A Results page appears. Current Advisor settings are used next time the check is performed.
6. To remove any Advisor changes you have made, under Tasks select **Remove My Preferences**.
7. To run Advisor again, click **Perform Check**.

## Running Advisor on a Single Page

To run Advisor on a single page:

1. Navigate to the appropriate application:
  - a. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
  - b. Select the application.  
The Application home page appears.
  - c. Select the page.  
The Page Definition page appears.

2. Click **Utilities**.

The list of utility options displays.

3. Click **Check**.

The Results page appears. Result reports are generated using the last Advisor settings.

4. To change settings, click **Change Settings**.

The Advisor page appears.

5. Under Checks to Perform, review the selected checks. Enable and disable check boxes as appropriate.

6. To run the check again, click **Perform Check** at the top of the page.

A Results page appears. Current Advisor settings are used next time the check is performed.

7. To filter results, enable and disable check boxes under Filter Results and click **Apply Filter**.

8. To re-run the Advisor and see if reported problems are fixed, click **Check Again**.

## Reviewing Session State

Many applications are based on data contained within application controls. For example, buttons can display conditionally based on a value stored in session state. You can view current session state for your application by clicking the **Session** link on the Developer Toolbar.

**See Also:** ["About the Developer Toolbar"](#) on page 8-19, ["Viewing Session State"](#) on page 2-7, ["Managing Session State Values"](#) on page 2-13, and ["Managing Session State and User Preferences"](#) in *Oracle Application Express Administration Guide*

## Accessing Debugging Mode

The Debug mode is a built in mechanism used to track down unexpected application behavior. You enable and disable debug mode for the current page and session by clicking the **Debug** and **No Debug** links in the Developer Toolbar. To view Debug reports, click the **View Debug** link in the Developer Toolbar.



If an application runs in debug mode, Oracle Application Express writes information about how it processes each page request to a log table. You can control the logging level of detail, add debug calls in your own code, and analyze the written log information.

When debug is enabled, Oracle Application Express also uses its non-minified JavaScript files to better isolate where possible issues may be coming from with client-side-code.

**See Also:** ["About the Developer Toolbar"](#) on page 8-19 and ["APEX\\_DEBUG"](#) in *Oracle Application Express API Reference*



**Topics:**

- [Enabling and Disabling Debugging](#)
- [Running an Application in Debugging Mode](#)
- [Using f?p Syntax to Access Debugging Mode](#)
- [Viewing Debug Reports](#)

**Enabling and Disabling Debugging**

You can configure whether end users can run the application in debug mode by using the Debugging attribute on the Edit Application Definition page. A developer who is logged into the application's workspace can always run the application in debug mode.

To enable or disable debugging:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Edit Application Properties** button to the right of the application name.  
The Edit Application page appears.
4. Scroll down to Properties.
5. For Debugging:
  - **Yes.** Enables the application debug mode using the browser at runtime.
  - **No.** Disables the application debug mode using the browser at runtime.

**See Also:** ["About Application Attributes"](#) on page 7-13

**Running an Application in Debugging Mode**

You run and disable debug mode at runtime by clicking **Debug** and **No Debug** on the Developer Toolbar. By default, Debugging mode is disabled, unless you are logged into the application's workspace as a developer. See ["Enabling and Disabling Debugging"](#) on page 14-5.

To enable or disable Debug mode:

1. On the Workspace home page, click the **Application Builder** icon.
2. Run the application.
3. On the Developer Toolbar, click **Debug**.  
The debugging mode is enabled. Debug data is captured in the background.
4. To disable debug mode, on the Developer Toolbar, click **No Debug**.

**Using f?p Syntax to Access Debugging Mode**

You can also use f?p syntax to run an application in Debugging mode. Simply call the page and set the Debug argument to YES or LEVEL*n*, where *n* is between 1 (least detailed) and 9 (most detailed). For example:

```
f?p=100:1:&APP_SESSION.::YES
```

**See Also:** ["Using f?p Syntax to Link Pages"](#) on page 2-9

## Viewing Debug Reports

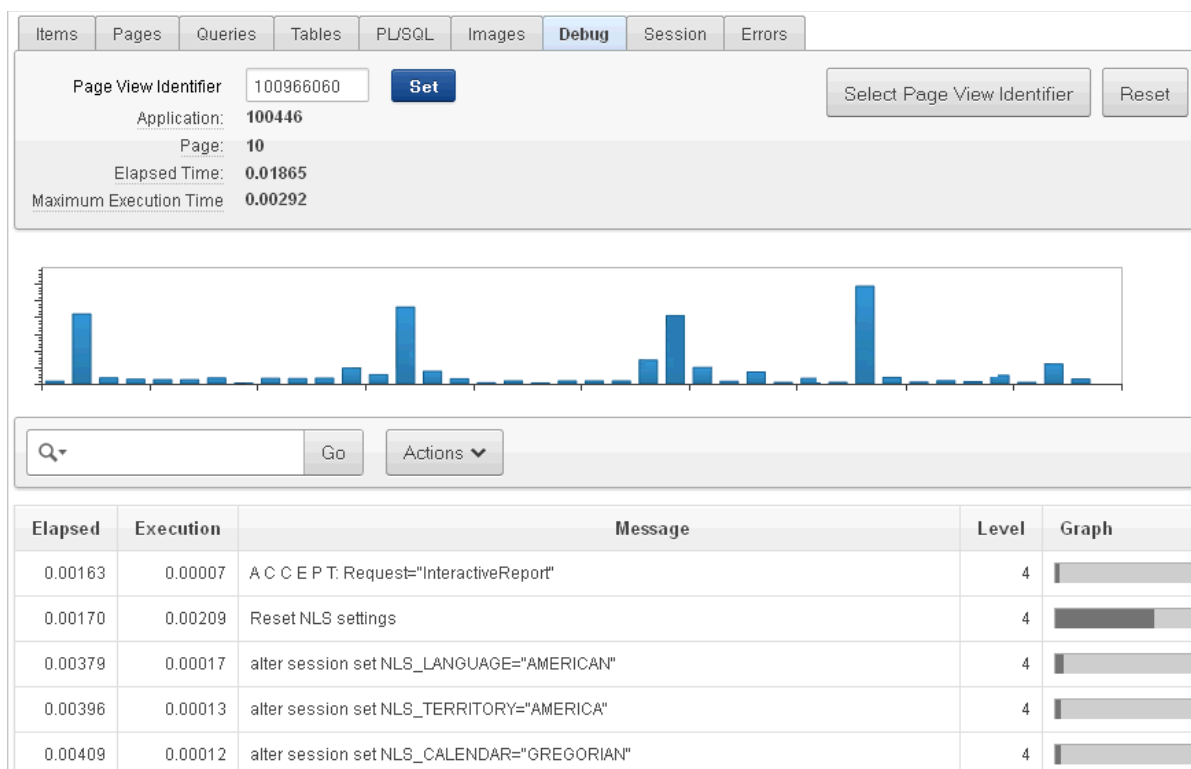
To view a debug reports:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the desired application.  
You can view debug reports when the application is running or in development mode.
3. To view a debug reports in development mode:
  - Click the **Find** icon and then the **Debug** tab. See ["Using the Find Icon"](#) on page 10-82.
  - On the Application home page, click **Utilities**, and then **Debug Messages**.
4. To view debug reports when the application is running, click **View Debug** on the Developer Toolbar.

A list of Debug reports displays.

5. Click the View Identifier to the left of the session you want to view.

The following illustration shows debug reports viewed in the Item Finder.



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.

---

**Note:** 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.

---

## Enabling SQL Tracing and Using TKPROF

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 Application Express creates a temporary file you can then analyze using the TKPROF utility.

You enable SQL tracing in Oracle Application Express 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.

**See Also:** "Understanding SQL Trace and TKPROF" in *Oracle Database SQL Tuning Guide* for information about using the TKPROF program

## Monitoring Application and Page Resource Use

Oracle Application Express facilitates the monitoring of resources used by applications and pages by calling the package `DBMS_APPLICATION_INFO`. Whenever the Application Express engine renders or processes a page, the module is set to APEX and includes the application ID and page number. Once set, you can query the `V$SESSION` and `V$SQLAREA` views to monitor transactions.

## Viewing Page Reports

When isolating an issue within a page, it is important to clearly understand the functions it is performing. To accomplish this goal, Application Builder includes several page and application reports.

**See Also:** "APEX\_DEBUG" in *Oracle Application Express API Reference*

### Viewing the Application Dashboard Report

The Application Dashboard provides a comprehensive view of your application from various perspectives. You can use this dashboard to view statistics and access reports of security settings, page and application components and templates.

To view the Application Dashboard:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.

The Application home page appears.

4. Click **Utilities**.
5. Click **Application Dashboard**.

The Application Dashboard appears. The first two regions on the left, Application Overview, and Pages by Types, list detailed information and statistics about the current application. The remaining regions are divided into the following sections:

- **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 pages by type.
  - **Application Components** contains links to reports of application-level controls and logic, including lists of values, tabs, lists, application items, application processes, and application computations.
  - **Page Components** contains links to reports of page-level controls and logic, including items, buttons, processes, regions, branches, validations, and dynamic actions.
6. To view a specific report, click the number to the right of the component type or template.

## 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 determine what the problem is.

## 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 by selecting the Condition attribute Never.

To remove a control or component using conditional attributes:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Select the name of the control or component you want to disable.

The appropriate attributes page appears.

3. Scroll down to Condition Type and select **Never** from the Condition Type list.
4. Click **Apply Changes** and return to the Page Definition.
5. Try running the page again.
6. Continue to remove controls or components until the page runs correctly.

**See Also:** ["Accessing the Page Definition"](#) on page 8-2, ["Editing a Page in Component View"](#) on page 8-8, ["Understanding Conditional Rendering and Processing"](#) on page 2-4, and ["Running an Application or Page"](#) on page 7-39



---

## Managing Application Security

This section describes how to implement security best practices for Oracle Application Express. Administrators are primarily responsible for ensuring the security of the Oracle Application Express installation, while developers are responsible for building secure applications.

### Topics:

- [Understanding Administrator Security Best Practices](#)
- [Understanding Developer Security Best Practices](#)
- [Securing File Uploads](#)
- [Establishing User Identity Through Authentication](#)
- [Providing Security Through Authorization](#)

**See Also:** ["Application Builder Concepts"](#) on page 2-1 and ["Using Application Builder"](#) on page 6-1

### Understanding Administrator Security Best Practices

This section describes security best practices for Oracle Application Express administrators.

### Topics:

- [Security Considerations When Using the Embedded PL/SQL Gateway](#)
- [About Configuring Oracle HTTP Server with mod\\_plsql for Oracle Application Express](#)
- [Utilizing Secure Sockets Layer \(SSL\)](#)
- [Integrating with Oracle BI Publisher](#)
- [About Setting Password Complexity Rules](#)
- [Advantages of the Oracle Application Express Runtime Environment](#)
- [Understanding Session Timeout](#)
- [Enabling Network Services in Oracle Database 12c](#)

### Security Considerations When Using the Embedded PL/SQL Gateway

The embedded PL/SQL gateway runs in the database as part of the Oracle XML DB HTTP listener. The Oracle XML DB HTTP listener and embedded PL/SQL gateway

provides the equivalent core features of Oracle HTTP Server and `mod_plsql`. Because the HTTP Listener runs in the same database where Oracle Application Express is installed, it is not possible to separate the HTTP listener from the database. For this reason, Oracle does not recommend the embedded PL/SQL gateway for applications that run on the Internet. Additionally, the embedded PL/SQL gateway does not provide the same flexibility of configuration and detailed logging as Oracle HTTP Server with `mod_plsql`.

## About Configuring Oracle HTTP Server with `mod_plsql` for Oracle Application Express

Oracle HTTP Server uses the `mod_plsql` plug-in to communicate with the Oracle Application Express engine within the Oracle database. `mod_plsql` functions act as a communication broker between the web server and the Oracle Application Express engine in the Oracle database.

Each `mod_plsql` request is associated with a set of configuration values used to access the database called a Database Access Descriptor (DAD). `mod_plsql` provides a DAD parameter called `PlsqlRequestValidationFunction` which enables you to allow or disallow further processing of a requested procedure. You can utilize this parameter to implement tighter security for your PL/SQL application by blocking package and procedure calls which should not be allowed to run from the DAD. Oracle recommends a DAD configuration for Oracle Application Express which utilizes the `PlsqlRequestValidationFunction` directive with a value of `www_flow_epg_include_modules.authorize`.

The purpose of the `PlsqlRequestValidationFunction` parameter is to control which procedures can be invoked through `mod_plsql`. By default, the only procedures permitted are the public entry points of Oracle Application Express. This can be extended using the validation functions shipped with Oracle Application Express. To learn more, see "Restricting Access to Oracle Application Express by Database Access Descriptor (DAD)" in *Oracle Application Express Administration Guide*.

## Utilizing Secure Sockets Layer (SSL)

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 Oracle Application Express applications using SSL (HTTPS protocol) to prevent any sensitive data from being sent over an unencrypted (cleartext) communication channel.

You can configure both your Oracle Application Express instance and all related applications to require HTTPS by setting the Require HTTPS attribute to **Yes** on the Security Settings page in Oracle Application Express Administration Services.

Setting the Require HTTPS attribute to **Yes** and logging out prevents anyone from logging in to Oracle Application Express Administration Services and from logging into an Oracle Application Express workspace as a developer or administrator unless the protocol in use is HTTPS.

**See Also:** "Requiring HTTPS" in *Oracle Application Express Administration Guide*

## Integrating with Oracle BI Publisher

Oracle recommends that you employ Secure Sockets Layer (SSL) when integrating Oracle Application Express 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.

**See Also:** "Configuring Wallet Information" and "Configuring Report Printing" in *Oracle Application Express Administration Guide*

## About Setting Password Complexity Rules

Workspace administrators and developers can create user accounts for the purpose of logging in to the Oracle Application Express development environment and for end-user authentication to applications developed within their workspaces. The Oracle Application Express administrator can create password complexity rules, or a policy, for the passwords of these accounts. These rules apply to all accounts in the installation, across all workspaces.

The following are example password complexity policies:

All passwords must:

- Contain at least one upper-case character
- Contain at least one numeric digit
- Must be at least six characters long

Note that many other variations are possible. Oracle recommends administrators establish a password complexity policy for each Oracle Application Express instance. To learn more, see "Enabling Login Controls for All Workspaces," "About Strong Password Policies," and "Enabling Account Login Controls for a Workspace" in *Oracle Application Express Administration Guide*.

## 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 Oracle Application Express 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_040200;
```

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 Application Express.

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;
/
```

**Tip:** Developers can also use the `APEX_UTIL.STRONG_PASSWORD_CHECK` procedure and the `APEX_UTIL.STRONG_PASSWORD_VALIDATION` function described in *Oracle Application Express API Reference*.

## Advantages of the Oracle Application Express Runtime Environment

An Oracle Application Express runtime environment enables you to run production applications, but it does not provide a web interface for administration or direct development of these applications

Oracle recommends that you run any sensitive production Oracle Application Express applications with a runtime installation of Oracle Application Express. A runtime installation does not expose the web-based application development environment, thus preventing the use of Application Builder, SQL Workshop, and related utilities on a production installation. Additionally, a runtime environment only includes the Oracle Application Express database objects and privileges necessary to run applications, making it a more hardened environment.

**See Also:** "Managing a Runtime Environment" in *Oracle Application Express Administration Guide*

## Understanding Session Timeout

By configuring Session Timeout attributes, you can 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
- Session Timeout URL
- Maximum Session Idle Time in Seconds

- Idle Timeout URL

To learn more about configuring these attributes at an application-level, see "[Session Timeout](#)" on page 7-23. To learn more about configuring these attributes for an entire Oracle Application Express instance, see "Configuring Session Timeout" in *Oracle Application Express Administration Guide*.

## Enabling Network Services in Oracle Database 12c

By default, the ability to interact with network services is disabled in Oracle Database 12c. Therefore, if you are running Oracle Application Express with Oracle Database 12c, you must use the new DBMS\_NETWORK\_ACL\_ADMIN package to grant connect privileges to any host for the APEX\_040200 database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle Application Express.  
Users can call methods from the APEX\_MAIL package, but issues arise when sending outbound email.
- Using Web services in Oracle Application Express.
- PDF/report printing.

### Topics:

- [Granting Connect Privileges](#)
- [Troubleshooting an Invalid ACL Error](#)

**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 Oracle Database 12c will already has the parameter set properly, but a database upgraded to Oracle Database 12c from a prior version may not. See "Creating and Configuring an Oracle Database" in *Oracle Database Administrator's Guide* for information about changing database initialization parameters.

### Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the APEX\_040200 database user. This example assumes you connected to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role.

```
DECLARE
    ACL_PATH  VARCHAR2(4000);
    ACL_ID    RAW(16);
BEGIN
    -- Look for the ACL currently assigned to '*' and give APEX_040200
    -- the "connect" privilege if APEX_040200 does not have the privilege yet.

    SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
    WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

    -- Before checking the privilege, ensure that the ACL is valid
    -- (for example, does not contain stale references to dropped users).
    -- If it does, the following exception will be raised:
    --
    -- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040200'
    -- ORA-06512: at "XDB.DBMS_XDBZ", line ...
    --
```

```
SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
FROM XDB.XDB$ACL A, PATH_VIEW P
WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
      EQUALS_PATH(P.RES, ACL_PATH) = 1;

DBMS_XDBZ.ValidateACL(ACL_ID);
IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
    'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_040200', TRUE, 'connect');
END IF;

EXCEPTION
-- When no ACL has been assigned to '*'.
WHEN NO_DATA_FOUND THEN
    DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('power_users.xml',
    'ACL that lets power users to connect to everywhere',
    'APEX_040200', TRUE, 'connect');
    DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('power_users.xml','*');
END;
/
COMMIT;
```

The following example demonstrates how to provide less privileged access to local network resources. This example would enable indexing the Oracle Application Express Online Help and could possibly enable email and PDF printing if those servers were also on the local host.

```
DECLARE
    ACL_PATH  VARCHAR2(4000);
    ACL_ID    RAW(16);
BEGIN
-- Look for the ACL currently assigned to 'localhost' and give APEX_040200
-- the "connect" privilege if APEX_040200 does not have the privilege yet.
SELECT ACL INTO ACL_PATH FROM DBA_NETWORK_ACLS
WHERE HOST = 'localhost' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

-- Before checking the privilege, ensure that the ACL is valid
-- (for example, does not contain stale references to dropped users).
-- If it does, the following exception will be raised:
--
-- ORA-44416: Invalid ACL: Unresolved principal 'APEX_040200'
-- ORA-06512: at "XDB.DBMS_XDBZ", line ...
--

SELECT SYS_OP_R2O(extractValue(P.RES, '/Resource/XMLRef')) INTO ACL_ID
FROM XDB.XDB$ACL A, PATH_VIEW P
WHERE extractValue(P.RES, '/Resource/XMLRef') = REF(A) AND
      EQUALS_PATH(P.RES, ACL_PATH) = 1;

DBMS_XDBZ.ValidateACL(ACL_ID);
IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_040200',
    'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
    'APEX_040200', TRUE, 'connect');
END IF;

EXCEPTION
-- When no ACL has been assigned to 'localhost'.
WHEN NO_DATA_FOUND THEN
```

```

DBMS_NETWORK_ACL_ADMIN.CREATE_ACL('local-access-users.xml',
  'ACL that lets power users to connect to everywhere',
  'APEX_040200', TRUE, 'connect');
DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml','localhost');
END;
/
COMMIT;

```

## Troubleshooting an Invalid ACL Error

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\_040200 user. See ["Granting Connect Privileges"](#) on page 15-5.

## Understanding Developer Security Best Practices

This section describes security best practices for Oracle Application Express developers.

### Topics:

- [Understanding Items of Type Password](#)
- [Identifying At Risk Password Items](#)
- [Understanding Cross-Site Scripting Protection](#)
- [About Session State and Security](#)
- [Understanding Session State Protection](#)

## Understanding 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. This prevents the password from being saved in the database in the session state tables.

Configurable password item type attributes include:

- **Value Required** - If set to Yes and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. If set to No, no validation a NULL value is accepted.
- **Submit when Enter pressed** - If set to Yes, when the user presses the ENTER key in the field the page is submitted.
- **Does not save state** - If set to Yes, the password is not saved into session state. For security reasons you should always set this attribute to Yes. If you set it to No, consider to set the attribute Store value encrypted in session state to Yes.
- **Authorization Scheme** - Optionally select an authorization scheme which must evaluate to TRUE in order for this component to be rendered or otherwise processed.
- **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.
- **Store value encrypted in session state** - Session state that is sensitive can be encrypted when stored in Application Express session state management tables. To maintain session state encrypted for this item set the value to Yes. To learn more, see ["About Session State and Security"](#) on page 15-12.

**See Also:** ["About Item Types"](#) on page A-1 and ["Editing Page-Level Items"](#) on page 7-62

## Identifying At Risk Password Items

At risk password items are those that either:

- Do not use a password item type that does not save session state
- Store the value in session state un-encrypted

Use the Security Profiles and Password Items reports to help identify at risk password items.

### Topics:

- [Viewing the Security Profiles Report](#)
- [Viewing the Password Items Report](#)

### Viewing the Security Profiles Report

To view the Security Profiles Report:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.  
The Application Builder home page appears.
3. On the Tasks list, click **Cross Application Reports**.
4. Under Security, 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

### Viewing the Password Items Report

To identify at risk password items:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.  
The Application Builder home page appears.
3. On the Tasks list, click **Cross Application Reports**.

4. Under Security, 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.

## Understanding Cross-Site Scripting Protection

Cross site-scripting (also referred to as XSS) is a security breach that takes advantage of dynamically generated web pages. In a 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 Application Express 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 Application Express engine escapes characters in certain cases.

### Topics:

- [Protecting HTML Regions and Other Static Areas](#)
- [Protecting Dynamic Output](#)
- [Protecting Report Regions](#)
- [Protecting Form Items](#)
- [Restricting Characters Entered on an Item](#)

### Protecting HTML Regions and Other Static Areas

In HTML regions and other static display areas, you can reference session state using 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.

**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.

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.

**See Also:** ["Understanding Page-Level Items"](#) on page 7-55

**About the Rules Used to Determine Whether to Escape Values** The Application Express 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 Oracle Application Express f?p URL syntax, the Application Express engine escapes special characters when saving the value into session state. This has two intended results:

1. If the value contained no special characters, the value passed in is saved into session state exactly as it was provided.
2. If the value contained 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.

**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 Application Express 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 Application Express engine as part of a page submission.

## Protecting Dynamic Output

Items fetched from session state and rendered using `http.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:

```
http.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:

```
http.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 described in ["About Safe Item Display Types"](#) on page 15-10.

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.

## Protecting Report Regions

The Application Express 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.

## 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 attribute `Escape special characters in the Security region`. Use this attribute to specify if the value should be escaped or not. The default is set to Yes. To display HTML code, set this attribute to No.

## Restricting Characters Entered on an Item

You can limit cross site-scripting and other injection attacks by restricting the characters users can enter on an item. To accomplish this, use the `Restricted Characters` attribute in the Security region of the Edit Page Item page.

Use the `Restricted Characters` to restrict the characters that can be saved in session state. Available options include:

- **All Characters Allowed**  
No restriction applies.
- **Whitelist for a-Z, 0-9 and space**  
Only allow characters a-z, A-Z, 0-9, and space.
- **Blacklist HTML command characters (<>").**  
Do not allow reserved HTML characters
- **Blacklist &<>"/;,\*|=% and --:**  
Do not allow &, <, >, ", /, ;, ", \*, |, =, %, and "--" (PL/SQL comment).
- **Blacklist &<>"/;,\*|=% or -- and new line**  
Do not allow &, <, >, ", /, ;, ", \*, |, =, %, "--", and new line characters

If you select a restriction, Oracle Application Express displays an error message if a user tries to save data which does not conform to the selected character restriction.

**See Also:** ["Configuring Page Item Security"](#) on page 7-63

## About Session State and Security

Oracle Application Express 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 Oracle Application Express 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 Oracle Application Express application user significantly lessens memory and database resource requirements.

Developers can query the session state stored by Oracle Application Express applications using the Application Builder and built-in monitoring pages. Developers

and administrators can access session state for any application in the workspace to which they are authenticated.

A few best practices for developers 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 Oracle Application Express session state tables in encrypted form. To use this feature, set the page item's Store value encrypted in session state attribute to **Yes**. Encrypted stored values are automatically decrypted when read.

**Note:** The objective of encrypted session state is to persist session state such that the unencrypted values cannot be read by other Oracle Application Express developers or database administrators who might have access to the Oracle Application Express 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.

## Understanding 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.

Enabling Session State Protection is a two-step process. First, you enable the feature. Second, you set page and item security attributes.

### Topics:

- [How Session State Protection Works](#)
- [Enabling Session State Protection](#)
- [Configuring Session State Protection](#)

### How Session State Protection Works

When enabled, Session State Protection uses the Page Access Protection attributes and the Session State Protection item 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 in generated `f?p=` URLs.

### Enabling Session State Protection

You can enable session state protection from either the Edit Security Attributes page or the Session State Protection page.

Enabling Session State Protection is a two-step process. First, you enable the feature. 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.

**Topics:**

- [Enabling Session State Protection from Edit Security Attributes](#)
- [Enabling Session State Protection from Session State Protection](#)

**Enabling Session State Protection from Edit Security Attributes** To enable Session State Protection from the Edit Security Attributes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click the **Shared Components** icon.
4. Under Security, click **Security Attributes**.
5. Scroll down to Session State Protection and select **Enabled** from the Session State Protection list.
6. To configure session Session State Protection, click **Manage Session State Protection**.

The Session State Projection page appears.

7. To enable, disable, or configure Session State Protection using a wizard, click **Set Protection**.
8. Otherwise, navigate to the appropriate page or item attributes page and configure the Security attributes.

**Tip:** To disable Session State Protection, perform the same steps again, but select **Disabled** instead of **Enabled**. Disabling Session State Protection does not change existing security attribute settings, but those attributes are ignored at runtime.

**About the Expire Bookmarks Button** Enabling Session State Protection affects whether bookmarked links to the current application work. Consider the following rules:

1. Bookmarked links created after Session State Protection is enabled work if the bookmarked link contains a checksum.
2. Bookmarked links created before Session State Protection is enabled do not work if the bookmarked link contains a checksum.
3. Bookmarks that do not contain checksums or contain unnecessary checksums are not affected by Session State Protection.

During page rendering, the Application Express engine uses a hidden application attribute (a checksum salt) during computation and to verify checksums included in `f?p` URLs. When you enable Session State Protection, the Application Express engine includes checksums. You can reset the checksum salt attribute by clicking **Expire Bookmarks** on the Edit Security Attributes page. Note that if you click **Expire Bookmarks**, bookmarked URLs used to access your application that contain previously generated checksums will fail.

**Enabling Session State Protection from Session State Protection** To enable Session State Protection:

1. Navigate to the Shared Components page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Security, select **Session State Protection**.

The Session State Protection page appears. Note the current Session State Protection status (Enabled or Disabled) displays at the top of the page.
2. Click the **Set Protection** button.
 

The Session State Protection wizard appears.
3. Under Select Action, select **Enable** and click **Next**.
 

Next, determine whether to set security attributes for pages and items.
4. Select **Enable** and click **Next**.
5. Click **Enable Session State Protection**.

**Tip:** To disable Session State Protection, perform the same steps, but select **Disable** instead of **Enable**. Disabling Session State Protection does not change existing security attribute settings, but those attributes are ignored at runtime.

### 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.

#### Topics:

- [Reviewing Existing Session State Protection Settings](#)
- [Configuring Session State Protection Using a Wizard](#)
- [Configuring Session State Protection for Pages](#)
- [Configuring Session State Protection for Page Items](#)
- [Configuring Session State Protection for Application Items](#)

**Tip:** Before you can configure security attributes, you must first enable Session State Protection. See "[Enabling Session State Protection](#)" on page 15-13.

**Reviewing Existing Session State Protection Settings** You can 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:

1. Navigate to the Session State Protection page:
  - a. On the Workspace home page, click the **Application 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 the following reports at the bottom of the page:
  - Page Level Session State Protection Summary
  - Page Item Session State Protection Summary
  - Application Item Session State Protection


Use this wizard to enable or disable Session State Protection and set page and item security attributes for the entire application. You can also manually configure page and item security attributes by clicking the appropriate icon on the Session State Protection page.

Select Action:

☒ Disable
 ☐ Enable
 ☐ Configure

> Page Level Session State Protection Summary


[Page Item Session State Protection Summary](#)

Page ▲	Item Session State Protection	Item Count
1	Unrestricted	1
6	Unrestricted	10
7	Unrestricted	14

**Configuring 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 **Application 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. Under Select Action, select **Configure** and click **Next**.
4. For Page Access Protection, select one of the following:
  - **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. For Application Item Protection, select one of the following:
- **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).
  - **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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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 also 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.
  - **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 applicable only to items that cannot be used as data entry items and is always observed even if Session State Protection is disabled.  
 Use this attribute for application items or for page items with any of these Display As types:
    - Display as Text (escape special characters, does not save state)
    - 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 HTML Table (Displays label only)

6. For Page Data Entry Item Protection, select one of the following:

- **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).
- **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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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.

7. For Page Display-Only Item Protection, select one of the following:

- **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.  
**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).
- **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. You can also use a user-level checksum or a session-level checksum (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: 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.
- **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. You can also use a session-level checksum. 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.

- **Restricted: May not be set from browser** - The item may not be altered using 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 as Text (escape special characters, does not save state)
- 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 HTML Table (Displays label only)

8. Click **Next**.

9. Click **Finish**.

**Configuring Session State Protection for Pages** To configure Session State Protection for Pages:

1. Navigate to the Session State Protection page:

- a. On the Workspace home page, click the **Application 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 the **Page** icon.

3. You can customize the appearance the page using the Search bar at the top of the page. Available controls include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View Chart**. Use this control to view information as a chart.
- **Actions menu** - Displays the Actions menu. Use this menu to customize this interactive report. See "[About the Actions Menu](#)" on page 9-6.

4. Select a page number.

The Set Page and Item Protection page appears. The following information displays at the top of the page:

- Application ID and name
- Session State Protection status (Enabled or Disabled)
- Page Number

- Page name
5. For Page Access Protection, select one of the following:
- **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.
6. For Item Types, select **Data Entry Items** or **Display-only Items**.
- Data Entry items are items that can be altered using forms and include hidden items. Display-Only items are rendered only and are not submitted with the form.
7. If you select **Data Entry Items**, select a session state protection level for each item:
- **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).
  - **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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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.
8. If you select **Display-only Item**, select a session state protection level for each item:
- **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.  
**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 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 as Text (escape special characters, does not save state)
  - 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 HTML Table (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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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.

## 9. Click **Apply Changes**.

**Configuring Session State Protection for Page Items** To configure Session State Protection for items:

1. Navigate to the Session State Protection page:
  - a. On the Workspace home page, click the **Application 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 the **Page Item** icon.
3. You can customize the appearance the page using the Search bar at the top of the page. Available controls include:

- **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "[About the Actions Menu](#)" on page 9-6.
4. Select a page number.
- The Edit Session State Protection for Page and Items page appears. The following information displays at the top of the page:
- Application ID and name
  - Session State Protection status (Enabled or Disabled)
  - page Number
  - Page name
5. For Page Access Protection, select a session state protection level for each item:
- **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.
6. For Item Types, select **Data Entry Items** or **Display-only Items**.
- Data Entry items are items that can be altered using forms and include hidden items. Display-Only items are rendered only and are not submitted with the form.
7. If you select **Data Entry Items**, select a session state protection level for each item:
- **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).
  - **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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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.
8. If you select **Display-only Item**, select a session state protection level for each item:
- **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.  
  
**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 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 as Text (escape special characters, does not save state)
    - 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 HTML Table (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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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.
9. Click **Apply Changes**.

**Configuring Session State Protection for Application Items** To configure Session State Protection for application items:

1. Navigate to the Session State Protection page:
  - a. On the Workspace home page, click the **Application 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 the **Application Item** icon.
3. You can customize the appearance the page using the Search bar at the top of the page. Available controls include:
  - **Search icon** - Resembles a magnifying glass. 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 then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
4. Select an application item.
5. Under Security, select one of the following from the Session State Protection list:
  - **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 as Text (escape special characters, does not save state)
    - 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 HTML Table (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. You can also use a user-level checksum or a session-level checksum (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. You can also use a session-level checksum (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. Click **Apply Changes**.

## Securing File Uploads

Oracle Application Express 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 `APEX_APPLICATION_FILES` 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 either use the methods described in "[About BLOB Support in Forms and Reports](#)" on page 17-46 or use the methods described in Oracle Application Express How To Documents for file upload on OTN at:

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

Either of these methods results in the uploaded files being stored in schema tables and not the public table.

**See Also:** "[Differences Between Page Items and Application Items](#)" on page 7-55 and "[About Item Types](#)" on page A-1 to learn more about creating a File Browse page-level item

## Establishing User Identity Through Authentication

Authentication is the process of establishing each user's identity before they can access your application. Authentication may require a user identify a user name and password or could involve the use of digital certificates or a secure key.

When you create an authentication scheme, you have the option of choosing from several preconfigured authentication schemes, copying an authentication scheme from an existing application, or creating your own custom authentication scheme.

### Topics:

- [Understanding How Authentication Works](#)
- [Determining Whether to Include Authentication](#)
- [Creating an Authentication Scheme](#)
- [Creating a Preconfigured Authentication Schemes](#)

- [Managing Existing Authentication Schemes](#)
- [Viewing the Authentication Scheme Associated with an Application](#)
- [Changing the Authentication Scheme Associated with an Application](#)
- [Viewing Authentication Scheme Reports](#)

## Understanding 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 Application Express 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 Application Express engine sets the value of `APP_USER` to identify the user. The Application Express 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')
```

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.

**See Also:** ["APP\\_USER"](#) on page 2-24 and ["Configuring Security Attributes"](#) on page 7-20

## Determining Whether to Include Authentication

As you create your application, you must determine whether to include authentication. You can:

- **Choose to not require authentication.** Oracle Application Express 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. See ["Creating a Preconfigured Authentication Schemes"](#) on page 15-27 and ["Changing the Authentication Scheme Associated with an Application"](#) on page 15-36.

- **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 Application Express engine executes before processing each page request. This function's Boolean return value determines whether the Application Express engine processes the page normally or displays a failure page. See ["Creating an Authorization Scheme"](#) on page 15-37.

## Creating an Authentication Scheme

To create an authentication scheme:

1. On the Workspace home page, click the **Application 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. 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 items by name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each scheme as a large icon. To edit a scheme, click the appropriate icon.
  - **View Report** - Displays each scheme as a line in a report. To edit a scheme, click the Edit icon.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. To create a new authentication scheme, click **Create**.
7. Specify how the scheme should be created by selecting one of the following:
  - **Based on a pre-configured scheme from the gallery.** See ["Creating a Preconfigured Authentication Schemes"](#) on page 15-27 and ["Custom Authentication"](#) on page 15-29.
  - **As a copy of an existing authentication scheme.**
8. Follow the on-screen instructions.

## Creating a 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. Note that if you create a new authentication scheme, it automatically becomes the current authentication scheme for the selected

application. This section describes all preconfigured authentication schemes that ship with Oracle Application Express.

**Topics:**

- [Application Express Accounts](#)
- [Custom Authentication](#)
- [Database Accounts](#)
- [HTTP Header Variable](#)
- [LDAP Directory Verification](#)
- [No Authentication \(using DAD\)](#)
- [Open Door Credentials](#)
- [Oracle Application Server Single Sign-On Server](#)

**Tip:** Authentication schemes support plug-ins. To learn more, see ["Implementing Plug-ins"](#) on page 17-25.

### Application Express Accounts

Application Express Accounts are user accounts that are created within and managed in the Oracle Application Express user repository. When you use this method, your application is authenticated against these accounts.

**See Also:** "Managing Application Express Users" in *Oracle Application Express Administration Guide*

Application Express 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

This is an especially good approach when you must get a group of users up and running on a new application quickly.

**Setting Up Application Express Accounts** To set up Application Express Accounts:

1. On the Workspace home page, click the **Application 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 **Application Express Accounts**.
  - c. Click **Create**.

## Custom Authentication

Creating an authentication scheme from scratch gives you complete control over your authentication interface. This 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 Application Express page processing.
- You want to integrate your application with non-Oracle Application Express 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. To learn more, see ["Implementing Plug-ins"](#) on page 17-25.

### Topics:

- [Creating a Custom Authentication Scheme](#)
- [About Session Management Security](#)
- [About Building a Login Page](#)

**Creating a Custom Authentication Scheme** To create a custom authentication scheme:

1. On the Workspace home page, click the **Application 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 **Custom**.
8. Fill in the appropriate fields.
9. To learn more about a specific field, see item Help.  
When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.
10. Click **Create**.

**About Session Management Security** When running custom authentication, Oracle Application Express 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.

Oracle Application Express 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 Application Express engine redirects back the same page using an appropriate session ID.

**About Building a Login Page** When you create an application in Oracle Application Express, 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 Oracle Application Express 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 **Application Builder** icon.
2. Select an application.
3. Click **Create Page**.
4. Select **Login Page**.
5. Specify Login page attributes and click **Create**.

**About Deep Linking** Deep linking refers to the ability to link to an Oracle Application Express 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 login page. After credentials verification, the Application Express engine automatically displays the page that was referenced in the original link. Deep linking is supported for applications that use authentication schemes.

## Database Accounts

Database Account Credentials utilizes database schema accounts. This authentication scheme requires that a database user (schema) exist in the local database. When using this method, the user name and password of the database account is used to authenticate the user.

Database Account Credentials is a good choice if having one database account for each named user of your application is feasible and account maintenance using database tools meets your needs

**Setting Up Database Account Credentials** To set up Database Account Credentials:

1. On the Workspace home page, click the **Application 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 **Database Accounts**.
  - c. Click **Create**.

### HTTP Header Variable

HTTP Header Variable supports the use of header variables to identify a user and to create an Application Express user session. Use this 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 Oracle Application Express using a HTTP header variable such as "REMOTE\_USER" (which is the default).

**Setting Up HTTP Header Variable** To set up HTTP Header Variable:

1. On the Workspace home page, click the **Application 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 **HTTP Header Variable**.
8. Fill in the appropriate fields.
9. To learn more about a specific field, see item Help.  
When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.
10. Click **Create**.

### 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.

Application 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 `SIMPLE_BIND_S` 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.

**Setting Up LDAP Directory Verification** To set up LDAP Directory:

1. On the Workspace home page, click the **Application 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 **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 Application Express 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 Application Express 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.
9. To learn more about a specific field, see item Help.  
When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.
10. Click **Create**.

---

**Note:** If you choose SSL with Authentication as the SSL mode, a wallet must be set up using the Oracle Application Express instance settings. Additionally, the root certification from the LDAP server must be imported into that wallet as a trusted certificate. See "Configuring Wallet Information" in *Oracle Application Express Administration Guide* and "Using Oracle Wallet Manager" in *Oracle Database Advanced Security Guide*.

---

### No Authentication (using DAD)

Database Access Descriptor (DAD) database authentication 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.

**Setting Up DAD Credentials Verification** To set up DAD Credentials Verification:

1. On the Workspace home page, click the **Application 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 (using DAD)**.
8. Click **Create**.

### Open Door Credentials

Open Door Credentials enables anyone to access your application using a built-in login page that captures a user name. This authentication method is useful during application development.

**Setting Up Open Door Credentials** To set up Open Door Credentials:

1. On the Workspace home page, click the **Application 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 **Open Door Credentials**.
8. Click **Create**.

### Oracle Application Server Single Sign-On Server

Oracle Application Server Single Sign-On verification 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.

Oracle Application Express applications can operate as partner applications with Oracle Application Server's Single Sign-On (SSO) infrastructure. You must register your application (or register the Application Express 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 Application Express engine redirects to the Single Sign-On login page. After the user is authentication by SSO, the SSO components redirect back to your application, passing the user identity and other information to the Application Express 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.



**Setting Up Oracle Application Server Single Sign-On** To set up Oracle Application Server Single Sign-On:

1. On the Workspace home page, click the **Application 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. Fill in the appropriate fields.
9. To learn more about a specific field, see item Help.  
When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.
10. Click **Create**.

## Managing Existing Authentication Schemes

Once created, available authentication schemes display in the Authentication Schemes Repository.

To navigate to the Authentication Schemes Repository:

1. On the Workspace home page, click the **Application 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. 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 items by name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each scheme as a large icon. To edit a scheme, click the appropriate icon.
  - **View Report** - Displays each scheme as a line in a report. To edit a scheme, click the Edit icon.
  - **Actions menu** - Use the Actions menu to customize the report view. See "[About the Actions Menu](#)" on page 9-6.

6. To edit a specific authentication scheme as a report, click the Edit icon to the left of the authentication scheme name.  
The Authentication Scheme page appears.
7. To learn more about a specific field, see item Help.  
When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See "[About Field-Level Help](#)" on page 1-13.
8. Edit the appropriate attributes and click **Apply Changes**.

## Viewing the Authentication Scheme Associated with an Application

To view the current authentication scheme for an application:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.
4. Under Security, click **Security Attributes**.
5. Locate the Authentication section. The current authentication scheme displays next to **Authentication Scheme**.
6. To edit the Authentication Scheme, **Define Authentication Schemes**.

## Changing 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 **Application 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. Click the **Edit** icon adjacent to the authentication scheme you want to activate.  
The Create/Edit page appears.
3. Click **Make Current Scheme**.

**See Also:** "[Creating a Preconfigured Authentication Schemes](#)" on page 15-27

## Viewing Authentication Scheme Reports

To view authentication scheme reports:

1. On the Workspace home page, click the **Application 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 the appropriate tab at the top of the page:
  - **Subscription**
  - **History**

### **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.

## **Providing Security Through Authorization**

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.

### **Topics:**

- [How Authorization Schemes Work](#)
- [Creating an Authorization Scheme](#)
- [Attaching an Authorization Scheme to an Application, Page, or Components](#)
- [Viewing Authorization Reports](#)

## **How Authorization Schemes Work**

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. 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 Application Express 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.

## **Creating an Authorization Scheme**

Before you can attach an authorization scheme to an application or an application component or control, you must first create it.

To create an authorization scheme:

1. On the Workspace home page, click the **Application 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. Follow the on-screen instructions.

**See Also:** ["Attaching an Authorization Scheme to an Application, Page, or Components"](#) on page 15-39

### Editing Attributes of an Existing Authorization Scheme

To edit attributes of an existing authorization scheme:

1. On the Workspace home page, click the **Application 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.
5. 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 items by name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each scheme as a large icon. To edit a scheme, click the appropriate icon.
  - **View Report** - Displays each scheme as a line in a report. To edit a scheme, click the Edit icon.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

### About the Evaluation Point Attribute

You can specify when your authorization scheme is validated in the Evaluation Point attribute. You can choose to have your authorization scheme validated once for each session or once for each page view.

Keep in mind, if you specify that an authorization scheme should be evaluated once for each session and the authorization scheme passes, then the underlying code, test, or query will not be executed again for the duration of the application session. If your

authorization scheme consists of a test whose results might change if evaluated at different times during the session, then you should specify that the evaluation point be once for each page view.

### About Resetting Authorization Scheme State

If an authorization scheme is validated once for each session, Oracle Application Express caches the validation results in each user's session cache. You can reset a session's authorization scheme state by calling the `APEX_UTIL.RESET_AUTHORIZATIONS` API.

Calling this procedure nulls out any previously cached authorization scheme results for the current session. Be aware that this procedure takes no arguments and is part of the publicly executable `APEX_UTIL` package.

**See Also:** "RESET\_AUTHORIZATIONS Procedure" in *Oracle Application Express API Reference*

## Attaching an Authorization Scheme to an Application, Page, or Components

Once you have created an authorization scheme you can attach it to an entire application, page, control, or component.

### Topics:

- [Attaching an Authorization Scheme to an Application](#)
- [Attaching an Authorization Scheme to a Page](#)
- [Attaching an Authorization Scheme to a Control or Component](#)

### Attaching an Authorization Scheme to an Application

To attach an authorization scheme to an application:

1. On the Workspace home page, click the **Application Builder** icon.
2. 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 Yes or No 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](#)" on page 7-22.
7. To define a new authorization scheme, click **Define Authorization Schemes**.

### Attaching an Authorization Scheme to a Page

To attach an authorization scheme to a page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Select a page.
4. To access the Edit Page:

- Tree view - Under Page Rendering, double-click the page title at the top of the tree.
  - Component view- Under Page, click the page name.
5. Scroll down to Security and make a selection from the Authorization Scheme list.

### Attaching 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 **Application Builder** icon.
2. Select an application.
3. Select a page.
4. Click the name of the component or control to which you want to apply the authorization scheme.
5. Scroll down to Security and make a selection from the Authorization Scheme list.

## Viewing Authorization Reports

You can use 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 **Application 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 the appropriate tab at the top of the page:

- **Subscription**
- **by Component**
- **Utilization**
- **History**

### 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 History report to view recent modifications made to Authorization Schemes in this application.





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## Deploying an Application

This section describes how to deploy and package a database application built within Application Builder.

### Topics:

- [About the Oracle Application Express Application Development Life Cycle](#)
- [Understanding the Packaging Process](#)
- [How to Move an Application to Another Instance](#)
- [How to Create a Custom Packaged Application](#)
- [Exporting an Application and Related Files](#)
- [Importing Export Files](#)
- [Installing Export Files](#)
- [About Publishing the Database Application URL](#)
- [About Publishing the Websheet Application URL](#)
- [Using Build Options to Control Configuration](#)

**See Also:** "Advanced Programming Techniques" on page 17-1 and "Managing Application Express Users" in *Oracle Application Express Administration Guide*

**Tip:** To review a tutorial that demonstrates deployment options, go to the Oracle Online Learning Library at <http://apex.oracle.com/pls/apex/f?p=44785:1> and search for "Advanced Deployment of Your Application: Part 3".

### About the Oracle Application Express Application Development Life Cycle

When developing applications using Application Builder, you must find a balance between two dramatically different development methodologies:

- Iterative, rapid application development
- Planned, linear style development

The first approach offers so much flexibility that you run the risk of never completing your project. In contrast, the second approach can yield applications that do not meet the needs of end users even if they meet the stated requirements on paper.

## 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 SDLC models that work well for developing applications in Oracle Application Express.

The **SDLC waterfall** is probably the best known model. In this methodology, the development process is broken down into the following stages:

1. Project Planning
2. Requirements Definition
3. Design
4. Development
5. Integration and Testing
6. Installation and Acceptance
7. 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.

The Oracle Application Express development environment enables developers to take a more iterative approach to development. Unlike many other development environments, creating prototypes is easy. With Oracle Application Express, 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

Other methodologies that work well with Oracle Application Express include:

- **Spiral** - This approach 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.
- **Rapid application development (RAD) life cycle** - This approach has a heavy emphasis on creating a prototype that closely resembles the final product. The prototype is an essential part of the requirements phase. One disadvantage of this model is that the emphasis on creating the prototype can cause scope creep; developers can lose sight of their initial goals in the attempt to create the perfect application.

## Understanding the Packaging Process

To move an application from one Oracle Application Express instance to another, you must move both the metadata and supporting objects used by the application as follows:

1. Move the application definition and all associated files. See ["How to Move an Application to Another Instance"](#) on page 4.
2. Move the supporting objects. Review the Database Object Dependencies report to determine what objects to move. See ["Using the Database Object Dependencies"](#)

[Report](#)" on page 7-81 and ["How to Create a Custom Packaged Application"](#) on page 16-5.

**Topics:**

- [Deployment Options to Consider](#)
- [Deciding Whether to Copy a Workspace](#)
- [Deciding Whether to Copy a Database](#)
- [About the Application ID](#)
- [Deciding to Install a New HTTP Server](#)

## Deployment Options to Consider

When you develop an application in Application Builder, 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:

1. **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. See ["Using the Database Object Dependencies Report"](#) on page 7-81.
4. **Use a different database with all its variations.** Export and then import the application into a different Oracle Application Express instance and install it using a different workspace, schema, and database.

## Deciding Whether to Copy a 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 Oracle Application Express authentication. Copying the workspace automatically migrates all the required user data.

## Deciding Whether to Copy a 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"](#) on page 7-15 for information about defining an application alias and ["About Built-in Substitution Strings"](#) on page 2-18 for information about using `APP_ID` and `APP_ALIAS`

## Deciding to Install a New HTTP Server

In order to run, Oracle Application Express must have access to either the embedded PL/SQL gateway, Oracle HTTP Server and `mod_plsql`, or Oracle Application Express Listener. Installing a new HTTP server is another way to separate a development version and production version of an application. To learn more about HTTP server configuration options, see "About Choosing a HTTP Server" in *Oracle Application Express Installation Guide*.

## How to Move an Application to Another Instance

Whether you want to move an application to another workspace or just make a copy of it, deploying involves the following steps:

1. Move the supporting database objects (if appropriate). Review the Database Object Dependencies report to determine what objects to move. See ["Using the Database Object Dependencies Report"](#) on page 7-81.
2. Package the application definition with its supporting objects to create a custom packaged application. See ["How to Create a Custom Packaged Application"](#) on page 16-5.
3. Export the custom packaged application. See ["Exporting an Application and Related Files"](#) on page 16-12.
4. Import the exported files into the target Oracle Application Express instance. See ["Importing Export Files"](#) on page 16-23.

You can import an application into your workspace regardless of the workspace in which it was developed. See ["Deployment Options to Consider"](#) on page 16-3.

**Tip:** You can also move the application definition and all supporting objects manually. See ["Exporting an Application and Related Files"](#) on page 16-12.

## About Managing Database Objects

Before you export an application and the appropriate related files, you must determine if you also need to migrate the database objects referenced by the application. If you are unsure of which database objects to move, review the Database Object Dependencies report.

**See Also:** ["Using the Database Object Dependencies Report"](#) on page 7-81 and ["How to Create a Custom Packaged Application"](#) on page 16-5

If the target schema is different from the schema used in the development environment, you must migrate the database objects referenced by the application. In many cases, this process can be as simple as using Oracle database export and import utilities to copy the application schema from the development environment to target instance. The following are two common scenarios where this approach does *not* work:

- When the object development schema refers to tablespaces to which the target instance schema does not have access
- When the development instance schema has sample data that you do not want to migrate to the target instance schema

If a database administrator or an Oracle Application Express administrator is the person responsible for exporting Oracle Application Express applications, be sure to clearly communicate if he or she:

- Should include all data when exporting your application
- Should not include data from specific tables you identify

**Tip:** "Using the Data Workshop to Manage Data" in *Oracle Application Express SQL Workshop Guide*

## How to Create a Custom Packaged Application

You can greatly simplify the steps needed to deploy an application by creating a custom packaged application on the Supporting Objects page.

**See Also:** ["How to Move an Application to Another Instance"](#) on page 16-4 and ["Exporting an Application and Related Files"](#) on page 16-12

### Topics:

- [How Creating a Custom Packaged Application Simplifies Deployment](#)
- [Creating a Custom Packaged Application](#)
- [Adding Installation Scripts for an Image, Cascading Style Sheet, or Static File](#)
- [Adding an Access Control List to a Custom Packaged Application](#)
- [Installing Supporting Objects](#)
- [Deleting Supporting Objects Scripts, Messages, and Installation Options](#)
- [Upgrading a Custom Packaged Application](#)
- [Deinstalling Supporting Objects](#)
- [Viewing an Install Summary](#)

## How Creating a Custom Packaged Application Simplifies Deployment

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 packaged 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, this feature has many 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. See ["Installing Supporting Objects"](#) on page 16-9.
- Enables users and developers with a convenient method for removing the application definition, supporting files, and all database objects. See ["Deinstalling Supporting Objects"](#) on page 16-11.
- Provides users and developers with an easy way to upgrade a previously released custom packaged application. See ["Upgrading a Custom Packaged Application"](#) on page 16-10.

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.

## Creating a Custom Packaged Application

To create a custom packaged 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.

### Topics:

- [Accessing the Supporting Objects Page](#)
- [About the Supporting Objects Page](#)

### Accessing the Supporting Objects Page

You create a custom packaged application on the Supporting Objects page.

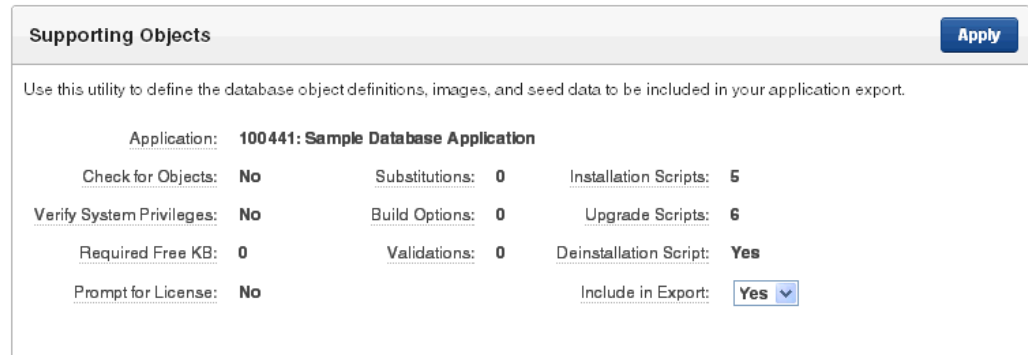
To access the Supporting Objects Page application:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.  
The Application home page appears.
3. Click the **Supporting Objects** icon.  
The Supporting Objects page appears.

## 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, Substitutions, Build Options, Validations, Installation Scripts, Upgrade Scripts, Deinstallation Script, and Include in Export.

To specify whether to include supporting objects with an application export, select **Yes** or **No** from the **Include in Export** list and click **Apply**.



**Supporting Objects** Apply

Use this utility to define the database object definitions, images, and seed data to be included in your application export.

Application: **100441: Sample Database Application**

Check for Objects:	<b>No</b>	Substitutions:	<b>0</b>	Installation Scripts:	<b>5</b>
Verify System Privileges:	<b>No</b>	Build Options:	<b>0</b>	Upgrade Scripts:	<b>6</b>
Required Free KB:	<b>0</b>	Validations:	<b>0</b>	Deinstallation Script:	<b>Yes</b>
Prompt for License:	<b>No</b>	Include in Export:	<b>Yes</b> ▼		

The rest of the page is divided into three categories.

**Installation** Use the links under Installation to define the following types of information:

- **Prerequisites.** Defines built-in checks required before installing the application, including 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. See ["Substitutions"](#) on page 7-20.

When packaging an application, you can include prompts for substitution strings which users can specify when they install the custom packaged application.

- **Build Options.** Lists build options defined for this application. You can use build options to conditionally display specific functionality within an application. See ["Using Build Options to Control Configuration"](#) on page 16-33 and ["Exporting Build Options or Build Option Status"](#) on page 16-35.

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 packaged 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.
- **Messages.** Enables you to define messages that display when the user installs or deinstalls the application. Supported HTML tags include `<b>`, `<i>`, `<u>`, `<p>`, `<br>`, `<hr>`, `<ul>`, `<ol>`, `<li>`, and `<pre>`.



When these messages display, only a limited set of HTML tags are recognized to prevent a cross site-scripting (XSS) attack. See ["Understanding Cross-Site Scripting Protection"](#) on page 15-10.

**Upgrade** 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. See ["Upgrading a Custom Packaged Application"](#) on page 16-10.
- **Upgrade Message.** Enables you to define messages that display when the user upgrades the application. Supported HTML tags include `<b>`, `<i>`, `<u>`, `<p>`, `<br>`, `<hr>`, `<ul>`, `<ol>`, `<li>`, and `<pre>`.

When these messages display, only a limited set of HTML tags are recognized to prevent a cross site-scripting (XSS) attack. See ["Understanding Cross-Site Scripting Protection"](#) on page 15-10.

**Deinstallation** 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.
- **Deinstallation Message.** Allows you to define messages that display when the user deinstalls the application. Supported HTML tags include `<b>`, `<i>`, `<u>`, `<p>`, `<br>`, `<hr>`, `<ul>`, `<ol>`, `<li>`, and `<pre>`.

When these messages display, only a limited set of HTML tags are recognized to prevent a cross site-scripting (XSS) attack. See ["Understanding Cross-Site Scripting Protection"](#) on page 15-10.

## Adding Installation Scripts for an Image, Cascading Style Sheet, or Static File

You can create installation scripts for images, cascading style sheets, and static files you have previously uploaded for your application or workspace on the Installation Scripts page. Oracle Application Express uses the name of the file you select as the name for each new script. It also adds corresponding API calls to the end of the deinstallation script (or creates one if one does not exist), which removes the selected files when the application's supporting objects are deinstalled.

**See Also:** ["Using Custom Cascading Style Sheets"](#) on page 13-46, ["Managing Images"](#) on page 12-17, and ["Managing Static Files"](#) on page 12-20

To create installation scripts for an image, cascading style sheet, or static file:

1. Navigate to the Supporting Objects page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select the application.  
The Application home page appears.
  - c. Click **Supporting Objects**.  
The Supporting Objects page appears.
2. Under Installation, click **Installation Scripts**.



The Installation Scripts page appears.

3. Click **Create**.
4. Follow the on-screen instructions.
5. At the bottom of the page, click **Create Script to Install Files**.  
A list of available cascading style sheets, images, and static files appears.
6. Select the files to include with your custom packaged application and click **Create Script**.

## Adding an Access Control List to a Custom Packaged Application

You can control access to an application, individual pages, or page components by creating an access control list.

To add an access control list of a custom packaged application:

1. Create an access control list. See "[Controlling Access to Applications, Pages, and Page Components](#)" on page 10-88.
2. Navigate to the Supporting Objects page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select the application.  
The Application home page appears.
  - c. Click **Supporting Objects**.  
The Supporting Objects page appears.
3. Under Installation, click **Installation Scripts**.  
The Installation Scripts page appears.
4. Click **Create**.
5. At the bottom of the page, click **Create Scripts for Access Control Tables**.  
If Access Control tables are defined, the Create Script page displays the tables to be included.
6. Click **Create Script**.

## Installing 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 packaged application (or supporting objects) after they import and install the application definition.

To install supporting objects:

1. On the Workspace home page, click the **Application 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, 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, click **Yes** and click **Next**.
8. Follow the on-screen instructions.

## 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 packaged 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 **Application Builder** icon.
2. Select an application.
3. Click **Supporting Objects**.  
The Supporting Objects page appears.
4. On the Tasks list on the right side of the page, click **Remove Supporting Object Installation**.
5. Follow the on-screen instructions.

## Upgrading a Custom Packaged Application

You can define scripts to upgrade a previously published application on the Upgrade page.

### Topics:

- [Defining an Upgrade Script](#)
- [Upgrading a Custom Packaged Application](#)

### Defining an Upgrade Script

You can use the Upgrade page to define scripts 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 **Application Builder** icon.
2. Select an application.
3. Click **Supporting Objects**.  
The Supporting Objects page appears.
4. Under Upgrade, click **Upgrade Scripts**.

Use the Detect Existing Supporting Objects section to determine if the appropriate objects are installed or must be upgraded.

5. 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 packaged application is prompted to run the installation scripts or the upgrade scripts.

6. 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.

7. Follow the on-screen instructions.

### Upgrading a Custom Packaged 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 packaged application.

To upgrade a custom packaged application:

1. Import a new version of application to be upgraded (if applicable). See ["Importing an Application, Page or Component Export"](#) on page 16-24.
2. On the Workspace home page, click the **Application Builder** icon.
3. Select the application.
4. Click **Supporting Objects**.  
The Supporting Objects page appears.
5. From the Tasks list, click **Upgrade Supporting Objects**.
6. Follow the on-screen instructions.

### Deinstalling Supporting Objects

Once you create or install a custom packaged 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.

**See Also:** ["Creating a Custom Packaged Application"](#) on page 16-6.

To deinstall a custom packaged application:

1. On the Workspace home page, click the **Application 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.
6. Follow the on-screen instructions.

## Viewing an Install Summary

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 Application Express session.

To view the Install Summary:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click **Supporting Objects**.

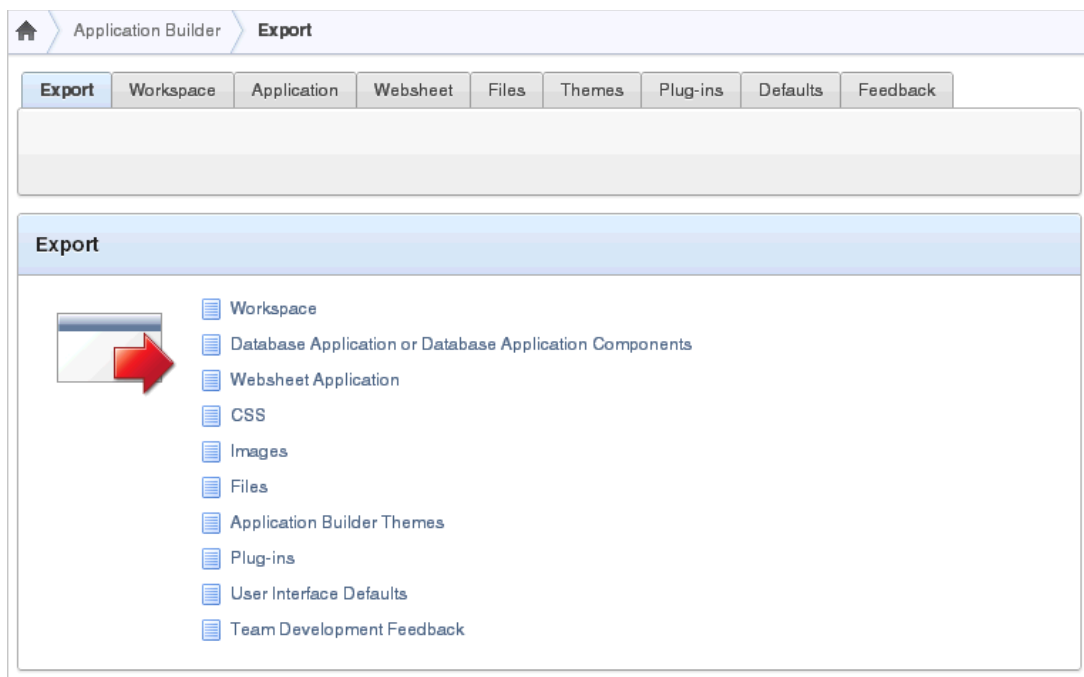
The Supporting Objects page appears.

4. On the Tasks list on the right side of the page, click **View Install Summary**.

A Summary page appears.

## Exporting an Application and Related Files

You export application definitions and all associated files using the Export, Workspace, Application, Worksheet, Files, Themes, Plug-ins, Defaults, and Feedback tabs located at the top of the Export page.



It is not necessary to export an entire workspace unless you want to migrate workspace users or replicate shared component subscriptions in the target instance.

Once you export an application and any related files, you must import them into the target Oracle Application Express instance and then install them. As a general rule, always import the application first and then the related files. See ["How to Move an Application to Another Instance"](#) on page 16-4.

**Tip:** You can simplify the steps needed to deploy an application by creating a custom packaged application. See ["How to Create a Custom Packaged Application"](#) on page 16-5.

#### Topics:

- [Where Images, CSS, and Script Files Are Stored](#)
- [Exporting an Application](#)
- [Exporting Application Components](#)
- [Exporting a Workspace](#)
- [Exporting a Page in an Application](#)
- [Exporting a Worksheet](#)
- [Exporting Cascading Style Sheets](#)
- [Exporting Images](#)
- [Exporting Static Files](#)
- [Exporting Themes](#)
- [Exporting Plug-ins](#)
- [Exporting Script Files](#)
- [Exporting User Interface Defaults](#)
- [Exporting Feedback](#)
- [Exporting Script Files](#)

## Where Images, CSS, and Script Files Are Stored

In order to run, Oracle Application Express must have access to either Oracle HTTP Server and mod\_plsql or the embedded PL/SQL gateway. Where images, CSS, and script files are stored depends upon the HTTP server you choose.

#### Topics:

- [Finding Images, CSS, and Script Files When Using Oracle HTTP Server or Oracle Application Express Listener](#)
- [Finding Images, CSS, and Script Files When Using the Embedded PL/SQL Gateway](#)

### Finding Images, CSS, and Script Files When Using Oracle HTTP Server or Oracle Application Express Listener

In an Oracle HTTP Server, Oracle Application Server, or Oracle Application Express Listener configuration, images are stored on the file system in the location referenced by the alias `/i/`. To locate the images directory on the file system, review the following files and search for the text alias `/i/`:

- Oracle HTTP Server distributed with Oracle Database 11g—see the `dads.conf` file.

- Oracle Application Server 10g—see the `marvel.conf` file.

Specific examples for locating the text alias `/i/` can be found in *Oracle Application Express Installation Guide*.

### Finding Images, CSS, and Script Files When Using the Embedded PL/SQL Gateway

When running Oracle Application Express with the embedded PL/SQL gateway, images are stored directly in the database within the Oracle XML DB repository. You can access images by using the WebDAV feature of Oracle XML DB or by using FTP. To learn more, see "Using Protocols to Access the Repository" in *Oracle XML DB Developer's Guide*.

## Exporting an Application

When you export an application, Oracle Application Express generates a text file containing PL/SQL API calls.

**See Also:** ["Exporting Application Components"](#) on page 16-15

To export an application:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. On the Export page, click the **Application** tab.
3. Under Choose Application, select the application to export.
4. Under Export Application, specify the following:
  - a. File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - b. Owner Override - Optionally select another owner. By default, the application is owned by the owner identified in the application attribute owner.
  - c. Build Status Override - Select one of the following:
    - **Run Application Only** - Developers can only run an application
    - **Run and Build Application** - Developers can both run and edit 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 cannot set the argument `p_trace` to Yes. See ["Using Build Options to Control Configuration"](#) on page 16-33. Also, the only way to change this setting after you import the application, is to log in to Oracle Application Express Administration Services. See "Changing Application Build Status Set During Deployment" in *Oracle Application Express Administration Guide*.

- d. Debugging - Select one of the following:
  - **Yes** exports the application with debugging enabled.
  - **No** exports the application with debugging disabled.
- e. As of - Enables you to go back in time and export a previous version of your application. For example, you can use this option to export a version of your application that contain an object that is currently deleted. Specify the number of minutes in the field provided.

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.

5. Under Export Preferences, select **Yes** or **No** to include or exclude the following:
  - Export Supporting Object Definitions. See ["How to Create a Custom Packaged Application"](#) on page 16-5.
  - Export Public Interactive Reports. See ["Saving an Interactive Report"](#) on page 9-21.
  - Export Private Interactive Reports. See ["Saving an Interactive Report"](#) on page 9-21.
  - Export Interactive Report Subscriptions. See ["Saving an Interactive Report"](#) on page 9-21.
  - Export Developer Comments. See ["Adding Developer Comments"](#) on page 7-48.
  - Export Translations

To learn more about a specific attribute, click the item label. When help is available, the cursor changes to an arrow and question mark when you pass the cursor over an item. See ["About Field-Level Help"](#) on page 1-13.

6. Click **Export Application**.

In addition to exporting the actual application file, you may also need to export other related files such as cascading style sheets, images, and script files.

**See Also:** ["Enabling SQL Tracing and Using TKPROF"](#) on page 14-7

## Exporting Application Components

You can export shared components or components of a page on the Component Export page. You can use this wizard to:

- Export shared components or page components to another application or workspace
- Back up a component before editing it
- Create an export to function as a patch to another Oracle Application Express instance

**See Also:** ["Exporting an Application"](#) on page 16-14, ["Exporting a Page in an Application"](#) on page 16-17, ["Importing an Application, Page or Component Export"](#) on page 16-24, and ["Exporting Build Options or Build Option Status"](#) on page 16-35

To export shared components or page components:

1. Navigate to the Component Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. From the Tasks list, click **Export Application Components**.The Component Export page appears.
2. Click the following 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. See ["Working with Shared Components"](#) on page 8-49 and ["Exporting Build Options or Build Option Status"](#) on page 16-35.
  - **Components by Page** lists components of the selected page. Navigate to a specific page by making a selection from the Page. Click **Check All** to select all components.
  - **Build Option Status** displays available build options. Use this page to turn build options on and off. See ["Exporting Build Options or Build Option Status"](#) on page 16-35.
3. Click **Add to Export**.
4. Click **Next**.
5. On Components to Export:
  - a. From File Format, select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - b. Use the **As of** field to export a page as it was previously defined. Specify the number of minutes in the field provided.

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. Click **Export Components**.



## Exporting a Workspace

You can make an application available to other users by exporting a workspace. When you export a workspace, Oracle Application Express creates an ASCII text SQL script of users, any defined user groups and Team Development data.

To export a workspace:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. On the Export page, click the **Workspace** tab.
3. Under Export Workspace:
  - Include Team Development - Select **Yes** to include Team Development data such as Features, Milestones, To Do, Bugs, Feedback, Links and News. Otherwise, select **No**.
  - File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
4. Click **Export Workspace**.

**See Also:** "Managing Application Express Users" in *Oracle Application Express Administration Guide*

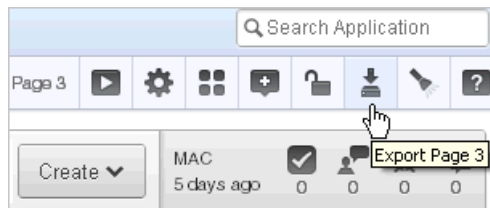
## Exporting a Page in an Application

You can also export a specific page within an application by clicking the Export page icon on the Page Definition. When exporting a page, remember that exported pages can only be imported successfully if they have the same application ID and workspace ID.

**See Also:** ["Exporting Application Components"](#) on page 16-15, ["Exporting an Application"](#) on page 16-14, and ["Importing an Application, Page or Component Export"](#) on page 16-24

To export a page in an application:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. On the Page Definition, click the **Export Page** icon in the upper right corner.



The Export Page Wizard appears.

3. From Page, select the page to export.

4. From File Format, select how rows in the export file are formatted:
  - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
  - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
5. Use the **As of** field to export a page as it was previously defined. Specify the number of minutes in the field provided.

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.

6. Click **Export Page**.

## Exporting a Websheet

Use the Export Websheet utility to make a Websheet application available to other users.

**See Also:** ["About Websheet Applications"](#) on page 5-1

To export a Websheet application:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export**.
2. On the Export page, click the **Websheet** tab.
3. For Websheet Application, select the Websheet to export and click **Set Application**.
4. Follow on screen instructions.

## Exporting Cascading Style Sheets

Use the Export Cascading Style Sheets utility to export uploaded cascading style sheets. Note that you can use this utility to export only uploaded cascading style sheets.

To export related cascading style sheets:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. On the Export page, click **CSS**.
3. On the Export Cascading Style Sheets page:
  - a. Stylesheets - Select the cascading style sheets to export.
  - b. File Format - Select how rows in the export file are formatted:

- Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
- Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
- c. Click **Export Style Sheets**.

**See Also:** ["Importing Cascading Style Sheets"](#) on page 16-26 and ["Using Custom Cascading Style Sheets"](#) on page 13-46

## Exporting Images

Use the Export Images utility to export uploaded images. When you export images using this utility, the images are converted to a text document. Note that you can use this utility to export only uploaded images.

To export upload images:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. On the Export page, click **Images**.
3. On the Export Images page:
  - a. Export Images in Application - Select an application from which to export images.  
  
Be aware that selecting **Workspace Images** only exports those images in your repository that are not associated with a specific application. If all of your images are associated with specific applications, then the workspace image export file will be empty.
  - b. File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
4. Click **Export Images**.

**See Also:** ["Importing Images"](#) on page 16-27, ["Managing Images"](#) on page 12-17, and ["Using the Images Finder"](#) on page 10-87

## Exporting Static Files

Use the Export Static Files utility to export static files you have imported. Note that you can use this utility to export only uploaded static files.

To export related static files:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** from the Tasks list.
2. On the Export page, click **Files**.
3. On Export Static Files page:

- a. Static Files - Select the files to export.
- b. File Format - Select how rows in the export file are formatted:
  - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
  - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
- c. Click **Export File(s)**.

### About Importing into Another Oracle Application Express Instance

You cannot use the web interface described in this section to import exported static files into another Oracle Application Express instance. To import exported static files into another Oracle Application Express instance, use SQL\*Plus while connected to the database. Note that you must export from and to a workspace having the same name and workspace ID.

## Exporting Themes

Use the Export Theme utility to export themes from one Oracle Application Express development instance to a file.

**See Also:** ["Importing Themes"](#) on page 16-28 and ["Managing Themes"](#) on page 13-1

### Exporting a Theme from the Export Page

To export an application theme from the Export page:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. Click the **Themes** tab at the top of the page.
3. On the Themes page:
  - a. Application - Select an application.
  - b. Export Theme - Select the theme to export.
  - c. File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - d. Click **Export Theme**.

### Exporting a Theme from the Themes Page

To export an application theme from the Themes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.

4. Under User Interface, select **Themes**.  
The Themes page appears.
5. On the Tasks list, click **Export Theme**.
6. On the Themes page:
  - a. Application - Select an application.
  - b. Export Theme - Select the theme to export.
  - c. File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - d. Click **Export Theme**.

## Exporting Plug-ins

Use the Export Plug-in utility to export plug-ins from one Oracle Application Express development instance to a file.

To export a Plug-in from the Export page:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. Click **Plug-ins**.
3. On the Plug-ins page:
  - a. Application - Select an application
  - b. Plug-in - Select the plug-in to export.
  - c. File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - d. Click **Export Plug-in**.

## Exporting User Interface Defaults

Exporting User Interface Defaults is useful when you plan to develop on a target system. User Interface Defaults are divided into two categories, the Table Dictionary, and the Attribute Dictionary.

- 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 SQL Command 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 Application Express instance.

**See Also:** ["Importing User Interface Defaults"](#) on page 16-28 and "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*.

### Exporting User Interface Defaults from the Export Page

To export User Interface Defaults from the Export page:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. On the Export page, click **User Interface Defaults**.
3. On the Export User Interface Defaults - Table Dictionary page:
  - a. Schema - Select the schema that owns the table associated with the User Interface Defaults.
  - b. File Format - Select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - c. Click **Export**.
4. To export Attribute Dictionary, click **Attribute Dictionary** tab.
5. Click **Export**.

### Exporting 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**.

The User Interface Defaults page appears.
4. Select the dictionary you want to export:
  - **Manage Table Dictionary** - Select this button to export specific tables and columns within a selected schema.
  - **Manage Attribute Dictionary** - Select this button to export a set of column attributes used to create forms and reports.
5. Under Tasks, click **Export**.
6. On the Table Dictionary page, select the file format:
  - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.

- Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
7. Click **Export**.

## Exporting Feedback

Use the Export Feedback utility to synchronize feedback from a production or test system to the development system. The development system is identified by using the workspace setting Feedback Synchronization Source Identifier which is set on the Edit Workspace Information page. If exporting from a development system, the export process has an additional attribute called Deployment System where you specify to which deployment system, production or test, you want to synchronize the updated feedback to.

To export Feedback:

1. Navigate to the Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Export** on the Tasks list.
2. On the Export page, click the **Feedback** tab.
3. For Export Feedback:
  - Deployment System - Select the name of the deployment systems for which you want to export the feedback entries.
  - Changes Since - select the date of the oldest feedback to export. All feedback from this selected date until the current date is exported.
  - File Format - select the format of the export file.
4. Click **Export**.
5. Follow on screen instructions.

## Exporting Script Files

You can transfer selected scripts from your current Script Repository to a Script Repository in a different Workspace by using the Export and Import tasks.

To export script files:

1. On the Workspace home page, click the **SQL Workshop** icon.
2. Click **SQL Scripts**.
3. On the Tasks list, click **Export**.
4. Select the appropriate script files and click **Add to Export**.
5. Review the file name and click **Export All**.

Select the Remove check box to remove the script.

**See Also:** "Using SQL Scripts" in *Oracle Application Express SQL Workshop Guide*

## Importing Export Files

Once you export an application and any related files, you must import them into the target Oracle Application Express instance before you can install them. 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. See ["How to Move an Application to Another Instance"](#) on page 16-4.

**Tip:** You can simplify the steps needed to deploy an application by creating a custom packaged application. See ["How to Create a Custom Packaged Application"](#) on page 16-5.

**Topics:**

- [Importing an Application, Page or Component Export](#)
- [Importing a Websheet](#)
- [Importing Plug-ins](#)
- [Importing Cascading Style Sheets](#)
- [Importing Images](#)
- [Importing Static Files](#)
- [Importing Themes](#)
- [Importing User Interface Defaults](#)
- [Importing Feedback](#)

## Importing an Application, Page or Component Export

To import an Application, Page or Component Export into a target Oracle Application Express instance:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. For Specify File:
  - a. Import file - Navigate to the file.
  - b. File Type - Select **Application, Page, or Component Export**.
  - c. Verify that File Character Set is correct.
  - d. Click **Next**.

Once you import a file, you have the option to install it.

3. To install the file, click **Next**.

The Install Application wizard appears.
4. For the Install wizard:
  - a. Parsing Schema - Select a schema.

This is the schema against which all of the application's SQL and PL/SQL are parsed.
  - b. Build Status - Select one of the following:
    - **Run Application Only** - Users can only run an application.
    - **Run and Build Application** - Users can run an application and developers can both run and edit 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**, the only way to change this setting after you import the application is to log in to Oracle Application Express Administration Services. See "Changing Application Build Status Set During Deployment" in *Oracle Application Express Administration Guide*.

c. Install As Application - Select one of the following:

- **Auto Assign New Application ID**
- **Reuse Application ID From Export File**
- **Change Application ID**

Use these options to avoid application ID conflicts. These options come in handy when you have two versions of the same application in the same instance. For example, you might be migrating an application to a production instance and still need to maintain the development version.

d. Click **Install**.

If you are installing a custom packaged application (that is, one for which you have defined Supporting Objects), the installer prompts you to install the custom packaged installation scripts. Follow the on-screen instructions.

**See Also:** ["How to Create a Custom Packaged Application"](#) on page 16-5

### About Importing Application Groups

Application groups are exported with an application, application exports include an 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 Application Express instance. If the group ID is being used, then a new ID is generated.

## Importing a Worksheet

**See Also:** ["About Worksheet Applications"](#) on page 5-1

To import a Worksheet into a target Oracle Application Express instance:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. For Specify File:

- a. Import file - Navigate to the file.
- b. File Type - Select **Worksheet Application Export**.
- c. Click **Next**.

Once you import a file, you have the option to install it.

3. To install an imported file, click **Next**.

The Install Application wizard appears.

4. For the Install Application wizard:

- a. Install As Application - Select one of the following:
  - **Auto Assign New Application ID**
  - **Reuse Application ID From Export File**
  - **Change Application ID**

Use these options to avoid application ID conflicts. These options come in handy when you have two versions of the same application in the same instance. For example, you might be migrating an application to a production instance and still need to maintain the development version.

- b. Click **Install**.

## Importing Plug-ins

To import an exported plug-in file:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. For Specify File:
  - a. Import file - Navigate to the file.
  - b. File Type - Select **Plug-in**.
  - c. Verify that File Character Set is correct.
  - d. Click **Next**.

Once you import a file, you have the option to install it.

3. To install an imported file, click **Next**.
4. Click **Install Plug-in**.

---

---

**Note:** If the plug-in with the same name exists, a dialog displays requesting permission to write over the existing plug-in.

---

---

## Importing Cascading Style Sheets

After you import an application into the target Oracle Application Express instance, you must import all related files.

To import a CSS Export file:

1. Navigate to the Import page:

- a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. For Specify File:
  - a. Import file - Navigate to the file.
  - b. File Type - Select **CSS 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.
3. To install an imported file, click **Next**.
4. Click **Install CSS**.

**See Also:** ["Using Custom Cascading Style Sheets"](#) on page 13-46 and ["Exporting Cascading Style Sheets"](#) on page 16-18

## Importing Images

After you import an application into the target Oracle Application Express instance, you must import all related files.

To import an Image Export file:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. On Import Definition:
  - a. Import file - Navigate to the file.
  - b. File Type - Select **Image 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.
3. To install an imported file, click **Next**.
4. Click **Install Image**.

**See Also:** ["Managing Images"](#) on page 12-17, ["Using the Images Finder"](#) on page 10-87, and ["Exporting Images"](#) on page 16-19

## Importing Static Files

After you import an application into the target Oracle Application Express instance, you must import all related files.

To import a static file:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. For Specify File:

- a. Import file - Navigate to the file.
- b. File Type - Select **File 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.

3. To install an imported file, click **Next**.
4. Click **Install Static Files**.

**See Also:** ["Exporting Static Files"](#) on page 16-19

## Importing Themes

After you import an application into the target Oracle Application Express instance, you must import all related files.

To import a Theme Export file:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. On Import Definition, select the following:
  - a. Import file - 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.

3. To install an imported file, click **Next**.
4. Click **Install Theme**.

**See Also:** ["Managing Themes"](#) on page 13-1 and ["Exporting Themes"](#) on page 16-19

## Importing User Interface Defaults

User Interface Defaults enables you to assign default user interface properties to a table, column, or view within a specified schema.

After you import an application into the target Oracle Application Express instance, you must import all related files.

To import User Interface Defaults:

1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
2. Select an application.
3. On Import Definition:
  - a. Import file - 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.

- 4. To install an imported file, click **Next**.
- 5. Click **Install User Interface Defaults**.

**See Also:** "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide* and ["Exporting User Interface Defaults"](#) on page 16-21

## Importing Feedback

To import Feedback:

- 1. Navigate to the Import page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. On the Application Builder home page, click **Import**.
- 2. Select **Feedback**.
- 3. For File Character Set, verify that File Character Set is correct and click **Next**.  
Once you import a file, you have the option to install it.
- 4. To install an imported file, click **Next**.
- 5. Click **Install Feedback**.

## Installing Export Files

After you import an application and any related files into the target Oracle Application Express instance, the files are stored in the Export Repository. Next, you must install them.

You can install export files in the following ways:

- After you import the export file, click the **Install** button and follow the on-screen instructions.
- Import the export files into Application Builder and then install the files from the Export Repository.
- Install the export files from SQL\*Plus.

**Tip:** You can simplify the steps needed to deploy an application by creating a custom packaged application. See ["How to Create a Custom Packaged Application"](#) on page 16-5.

### Topics:

- [Accessing the Export Repository](#)
- [Installing an Application Export from the Export Repository](#)
- [Installing Other Files from the Export Repository](#)
- [Deleting Files from the Export Repository](#)
- [Installing Export Files from SQL\\*Plus](#)

## Accessing the Export Repository

When you import an application and any related files into a target Oracle Application Express instance, the files are stored in the Export Repository. You can use the Export Repository to manage archived application exports, imports, and other files.

To access the Export Repository:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Utilities**.
4. Click **Export Repository**.

The Export Repository appears.

## Installing an Application Export from the Export Repository

After you import an application export into an Oracle Application Express instance, you must install it before it can become active or available in Application Builder.

To install an application export from the Export Repository:

1. Navigate to the Export Repository. See "[Accessing the Export Repository](#)" on page 16-30.
2. Select an application export and click **Install** in the Action column.
3. Specify the following:
  - a. Parsing Schema - Select a schema.

This is the schema against which all of the application's SQL and PL/SQL are parsed.
  - b. Build Status - Select one of the following:
    - **Run Application Only**
    - **Run and Build Application**

Select **Run Application Only** to run the application in the target instance and make it inaccessible to developers.

**Tip:** If you select **Run Application Only**, the only way to change this setting after you import the application is to log in to Oracle Application Express Administration Services. See "Changing Application Build Status Set During Deployment" in *Oracle Application Express Administration Guide*.
  - c. Install As Application - Select one of the following:
    - **Auto Assign New Application ID**
    - **Reuse Application ID from Export File**
    - **Change Application ID**

Use these options to avoid application ID conflicts. Use these options when you must have two versions of the same application in the same instance. For example, you might be migrating an application to a production instance and still need to maintain the development version.
  - d. Click **Install**.

## About Installing a Custom Packaged Application

If you are installing a custom packaged application, the installer prompts you to install the custom packaged installation scripts. Follow the on-screen instructions.

**See Also:** ["How to Create a Custom Packaged Application"](#) on page 16-5

## Installing Other Files from the Export Repository

After you import files into an Oracle Application Express instance, you must install them before they can become active or available in Application Builder.

To install files stored in the Export Repository:

1. Navigate to the Export Repository. See ["Accessing the Export Repository"](#) on page 16-30.
2. Select the file to be installed and click **Install** in the Action column.
3. Follow the on-screen instructions.

## Deleting Files from the Export Repository

You can delete a file from the Export Repository.

To delete a file from the Export Repository:

1. Navigate to the Export Repository. See ["Accessing the Export Repository"](#) on page 16-30.
2. Select the file to be deleted and click **Delete Checked**.

## Installing Export Files from SQL\*Plus

You can also install export files from SQL\*Plus.

The following restrictions apply for export files:

- The export file must originate from the same user database account as the one into which you are installing.
- If the export file is a database application, the application ID is overwritten. Therefore, the target workspace must own the ID of the application being installed.
- If the export file contains Supporting Object scripts, the scripts are not run when the application is installed. You can either log in to the Application Builder to install Supporting Objects, or copy the installation scripts to a standalone SQL\*Plus script and run them from there.
- If the export file is a Websheet application, the target workspace must have Websheet Database objects set-up.
- If the export file is a Websheet application, the export file must be installed using the Websheet schema in the target workspace.
- If the export file is a Websheet application, the application ID is overwritten.

### Topics:

- [Using SQL\\*Plus to Install Export Files](#)

## Using SQL\*Plus to Install Export Files

To install Oracle Application Express export files from SQL\*Plus:

1. Log in to SQL\*Plus.
2. Run the export file.

For example, if your export file is named f144.sql by default, you would type @f144 at the command prompt.

## About Publishing the Database Application URL

Once you have deployed your application, loaded data, and created users, you can publish your production URL. You can determine the URL to 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 icon 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 Application Express Login API. Consider the following example:

```
http://apex.somewhere.com/pls/apex/f?p=11563:1:3397731373043366363
```

Where:

- apex.somewhere.com is the URL of the server.
- pls is the indicator to use the mod\_plsql cartridge.
- apex is the database access descriptor (DAD) name. The DAD describes how Oracle HTTP Server connects to the database server so that it can fulfill an HTTP request. The default value is apex.
- f?p= is a prefix used by Oracle Application Express.
- 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 application, you would use the URL:

```
http://apex.somewhere.com/pls/apex/f?p=11563:1
```

When users log in, they receive unique session numbers. Do not include the session number as part of the URL.

**See Also:** ["Accessing the Edit Definition Page"](#) on page 7-14

## About Publishing the Websheet Application URL

Once you complete your Websheet application, you can publish your production URL. You can determine the URL to your Websheet application by either:

- Selecting the Websheet 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.

Consider the following example:

```
http://apex.somewhere.com/pls/apex/ws?p=123:home
```

Where:

- `apex.somewhere.com` is the URL of the server.
- `pls` is the indicator to use the `mod_plsql` cartridge.
- `apex` is the database access descriptor (DAD) name. The DAD describes how Oracle HTTP Server connects to the database server so that it can fulfill an HTTP request. The default value is `apex`.
- `ws?p=` is a prefix used by Oracle Application Express to link to a Websheet application.
- `123` is the Websheet application being called.
- `home` is the home page alias defined as Home Page on the Application Properties page.

To run this example application, you would use the URL:

```
http://apex.somewhere.com/pls/apex/ws?p=123:home
```

When users log in, they receive unique session numbers. Do not include the session number as part of the URL.

## Using Build Options to Control Configuration

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 Application Express engine considers it part of the application definition at runtime. Conversely, if you specify an attribute as being excluded, then the Application Express engine treats it as if it did not exist.

### Topics:

- [Creating Build Options](#)
- [Managing Build Options](#)
- [Exporting Build Options or Build Option Status](#)
- [Viewing the Build Option Utilization Report](#)

**See Also:** "Changing Build Status for Multiple Applications" in *Oracle Application Express Administration Guide* and discussions of the `GET_BUILD_OPTION_STATUS` and `SET_BUILD_OPTION_STATUS` procedures in "APEX\_UTIL" in *Oracle Application Express API Reference*

## Creating Build Options

You create a build option for an application on the Build Options page.

To create a build option:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

3. On the Application home page, click **Shared Components**.
4. Under Logic, click **Build Options**.
5. To create a new build option, click **Create**.
6. Follow the on-screen instructions.

## Managing Build Options

Build options have two possible values: `INCLUDE` and `EXCLUDE`. If you specify an attribute as being included, then the Application Express engine considers it part of the application definition at runtime. Conversely, if you specify an attribute as being excluded, then the Application Express engine treats it as if it did not exist.

To include or exclude a build option:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.
4. Under Logic, click **Build Options**.

The Build Options page appears.

5. You can change the appearance of the page by 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 build options by name and then click **Go**.
  - **Go button** - Executes a search or applies a filter.
  - **View Icons** - Displays each build option as a large icon. To edit a build option, click the appropriate icon.
  - **View Report** - Displays each build option as a line in a report. To edit a build option, click Name.
  - **Actions menu** - Use the Actions menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.
6. Select a build option name.

The Create/Edit Build Option page appears.

7. For Status, select either **INCLUDE** or **EXCLUDE**.

### Selecting a Build Option

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 attributes page. Most attributes pages contain a Configuration section where you can select defined build options.

**See Also:** ["Altering Page Attributes"](#) on page 8-20

## Exporting Build Options or Build Option Status

You can export build options or build option status on the Component Export page. Exporting build option status is an effective way to toggle build options on or off within another environment. 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 **EXCLUDE**. After deployment, you can enable the hidden feature by changing the status of the build option to **INCLUDE** and then exporting the Build Option Status.

Once you apply the Build Options Status to the production instance, the new feature appears.

**See Also:** ["How to Create a Custom Packaged Application"](#) on page 16-5 and ["Exporting Application Components"](#) on page 16-15

To export build options or build option status:

1. Navigate to the Component Export page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. From the Tasks list, click **Export Application Components**.

The Component Export page appears.
2. Select the build options to export:
  - a. Click the **Components** tab and select the build options to export.
  - b. Click **Add to Export**.
3. Select **Build Option Status** to be exported:
  - a. Click the **Build Options Status** tab and select the build options to export.
  - b. Click **Add to Export**.
4. Click **Next**.
5. On Components to Export:
  - a. From File Format, select how rows in the export file are formatted:
    - Choose **UNIX** to have the resulting file contain rows delimited by line feeds.
    - Choose **DOS** to have the resulting file contain rows delimited by carriage returns and line feeds.
  - b. Use the **As of** field to export a page as it was previously defined. Specify the number of minutes in the field provided.

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. Click **Export Components**.

## Viewing the Build Option Utilization Report

Once you create a build option, a Utilization tab appears on the Build Options page. This report details build option utilization in the current application.

---

**Note:** The Utilization tab only appears on the Build Options page after you create a build option.

---

To view the Build Option Utilization report:

1. Navigate to the Build Options page:
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder** icon.
  - c. On the Application home page, click **Shared Components**.
  - d. Under Application, click **Build Options**.

The Build Options page appears.

2. On the Build Options page, click **Utilization**.

The Build Option Utilization report appears.

3. Select a build option and click **Go**.

---

## Advanced Programming Techniques

This section provides information about advanced programming techniques including working with automatic data manipulation language, establishing database links, using collections, running background SQL, utilizing Web services, and managing user preferences.

### Topics:

- [About DML Locking](#)
- [Accessing Data with Database Links](#)
- [Sending Email from an Application](#)
- [Using Collections](#)
- [Creating Custom Activity Reports Using APEX\\_ACTIVITY\\_LOG](#)
- [Running Background PL/SQL](#)
- [Implementing Web Services](#)
- [Implementing Plug-ins](#)
- [Implementing Dynamic Actions](#)
- [About BLOB Support in Forms and Reports](#)
- [Using Screen Reader Mode in Your Database Applications](#)
- [Using High Contrast Mode in Your Database Applications](#)
- [Creating Applications with Data Loading Capability](#)
- [Managing Component Settings](#)

**See Also:** *Oracle Application Express API Reference* and "[Deploying an Application](#)" on page 16-1

### About DML Locking

When automatic data manipulation language (DML) is used in Oracle Application Express to update or delete rows of a table, a transaction is initiated to first lock the row, verify if it has changed since it was displayed on the page, and then finally issue the actual UPDATE or DELETE statement for the row.

In some environments where locking of rows is prevalent, you may want to control the DML operation and determine if the DML operation:

- waits indefinitely

- fails immediately
- waits for a specified period of time

#### About APEX\_DML\_LOCK\_WAIT\_TIME

You can set the value of an application substitution string, an application item, or a page item to APEX\_DML\_LOCK\_WAIT\_TIME to control the DML operation. The following values are supported:

- If null (the default), results in the same behavior as previous versions of Oracle Application Express, that is, wait indefinitely.
- If 0, fail immediately if the row is locked by another database session.
- If > 0 and the row is locked, wait for the specified number of seconds.

When set in an application, the value for APEX\_DML\_LOCK\_WAIT\_TIME applies to all UPDATE and DELETE DML operations using Automatic DML in the entire application. To control a specific Automatic DML process, update the value of APEX\_DML\_LOCK\_WAIT\_TIME before the Automatic DML process and reset it after the Automatic DML process. Note that this does not affect updates and deletes using tabular forms.

#### About FSP\_DML\_LOCK\_ROW

You can also set the value of an application substitution string, an application item, or a page item to FSP\_DML\_LOCK\_ROW to control the DML operation. The following values are supported:

- If the value is set to FALSE, then no SELECT FOR UPDATE is issued.
- If the value is anything other than FALSE, the default behavior of SELECT FOR UPDATE is performed when issuing an UPDATE or DELETE DML operation using Automatic DML.

## Accessing Data with Database Links

Because the Workspace home page runs in an Oracle database, you have access to all distributed Oracle database capabilities. Typically, you perform distributed database operations using database links.

A database link is a schema object in one database that enables you to access objects on another database. Once you have created the database link you can access the remote objects by appending @dblink to the table or view name where dblink is the Database Link Name you specify in the Create Database Object Wizard.

---

**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*.

---

To create a database link:

1. 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.

To view an existing a database link:

1. 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.

**See Also:** "Managing Database Objects with Object Browser" in *Oracle Application Express SQL Workshop Guide* and "Database Links" in *Oracle Database Administrator's Guide*

## Sending Email from an Application

You can use the `APEX_MAIL` package to send an email from an Oracle Application Express application. This 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:** *Oracle Database PL/SQL Packages and Types Reference* for more information about the `UTL_SMTP` package

`APEX_MAIL` contains three procedures. Use `APEX_MAIL.SEND` to send an outbound email message from your application. Use `APEX_MAIL.PUSH_QUEUE` to deliver mail messages stored in `APEX_MAIL_QUEUE`. Use `APEX_MAIL.ADD_ATTACHMENT` to send an outbound email message from your application as an attachment. For complete descriptions of all Application Programming Interface packages for Oracle Application Express, see *Oracle Application Express API Reference*.

**See Also:** "APEX\_MAIL" in *Oracle Application Express API Reference* and "Configuring Email" in *Oracle Application Express Administration Guide*

## Using Collections

Collections enable you to temporarily capture one or more nonscalar values. You can use collections to store rows and columns currently in session state so they can be accessed, manipulated, or processed during a user's specific session. You can 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`. For complete descriptions of all Application Programming Interface packages for Oracle Application Express, see *Oracle Application Express API Reference*.

**See Also:** "APEX\_COLLECTION" in *Oracle Application Express API Reference*

## Creating Custom Activity Reports Using APEX\_ACTIVITY\_LOG

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 to 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 17–1](#) describes the columns in the `APEX_ACTIVITY_LOG` view.

**Table 17–1 Columns in APEX\_ACTIVITY\_LOG**

Column	Type	Description
<code>time_stamp</code>	DATE	Date and time that activity was logged at the end of the page view.
<code>component_type</code>	VARCHAR2(255)	Reserved for future use.
<code>component_name</code>	VARCHAR2(255)	Reserved for future use.
<code>component_attribute</code>	VARCHAR2(4000)	Title of page.
<code>information</code>	VARCHAR2(4000)	Reserved for future use.
<code>elap</code>	NUMBER	Elapsed time of page view in seconds.
<code>num_rows</code>	NUMBER	Number of rows processed on page.
<code>userid</code>	VARCHAR2(255)	User ID performing page view.
<code>ip_address</code>	VARCHAR2(4000)	IP address of client.
<code>ir_report_id</code>	NUMBER	Interactive report ID
<code>ir_search</code>	VARCHAR2	Interactive report search criteria entered by users.
<code>user_agent</code>	VARCHAR2(4000)	web browser user agent of client.
<code>flow_id</code>	NUMBER	Application ID.
<code>step_id</code>	NUMBER	Page number.
<code>session_id</code>	NUMBER	Oracle Application Express session identifier.
<code>sqlerrm</code>	VARCHAR2(4000)	SQL Error message.
<code>sqlerrm_component_type</code>	VARCHAR2(255)	Reserved for future use.
<code>sqlerrm_component_name</code>	VARCHAR2(255)	Reserved for future use.

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.

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 logging of activity in an Oracle Application Express 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.

**See Also:** ["Name"](#) on page 7-15 for information on enabling logging on the Edit Definition page

## Running Background PL/SQL

You can use the APEX\_PLSQL\_JOB package to run PL/SQL code in the background of your application. This is an effective approach for managing long running operations that do not need to complete for a user to continue working with your application.

APEX\_PLSQL\_JOB is a wrapper package around DBMS\_JOB functionality offered in the Oracle database. Note that the APEX\_PLSQL\_JOB package only exposes that functionality which is necessary to run PL/SQL in the background.

[Table 17-2](#) describes the functions available in the APEX\_PLSQL\_JOB package.

**Table 17-2 APEX\_PLSQL\_JOB Package: Available Functions**

Function or Procedure	Description
SUBMIT_PROCESS	Use this procedure to submit background PL/SQL. This procedure returns a unique job number. Because you can use this job number as a reference point for other procedures and functions in this package, it may be useful to store it in your own schema.
UPDATE_JOB_STATUS	Call this procedure to update the status of the currently running job. This procedure is most effective when called from the submitted PL/SQL.
TIME_ELAPSED	Use this function to determine how much time has elapsed since the job was submitted.
JOBS_ARE_ENABLED	Call this function to determine whether the database is currently in a mode that supports submitting jobs to the APEX_PLSQL_JOB package.
PURGE_PROCESS	Call this procedure to clean up submitted jobs. Submitted jobs stay in the APEX_PLSQL_JOBS view until either Oracle Application Express cleans out those records, or you call PURGE_PROCESS to manually remove them.

You can view all jobs submitted to the APEX\_PLSQL\_JOB package using the APEX\_PLSQL\_JOB view.

For complete descriptions of all Application Programming Interface packages for Oracle Application Express, see *Oracle Application Express API Reference*.

**See Also:** ["APEX\\_PLSQL\\_JOB"](#) in *Oracle Application Express API Reference*

## About System Status Updates

Submitted jobs can contain any of the following system status settings:

- **SUBMITTED** indicates the job has been submitted, but has not yet started. The DBMS\_JOB does not guarantee immediate starting of jobs.
- **IN PROGRESS** indicates that the DBMS\_JOB has started the process.
- **COMPLETED** indicates the job has finished.
- **BROKEN (sqlcode) sqlerrm** indicates there was a problem in your job that resulted in an error. The SQL code and SQL error message for the error should be included in the system status. Review this information to determine what went wrong.

## Using a Process to Implement Background PL/SQL

The following example runs a PL/SQL job in the background for testing and explanation:

```
001 BEGIN
002   FOR i IN 1 .. 100 LOOP
003     INSERT INTO emp(a,b) VALUES (:APP_JOB,i);
004     IF MOD(i,10) = 0 THEN
005       APEX_PLSQL_JOB.UPDATE_JOB_STATUS(
006         P_JOB      => :APP_JOB,
007         P_STATUS   => i || 'rows inserted');
008     END IF;
009     APEX_UTIL.PAUSE(2);
010   END LOOP;
011 END;
```

In this example, note that:

- Lines 002 to 010 run a loop that inserts 100 records into the emp table.
- APP\_JOB is referenced as a bind variable inside the VALUES clause of the INSERT, and specified as the P\_JOB parameter value in the call to UPDATE\_JOB\_STATUS.
- APP\_JOB represents the job number which is assigned to this process as it is submitted to APEX\_PLSQL\_JOB. By specifying this reserved item inside your process code, it is replaced for you at execution time with the actual job number.
- Note that this example calls to UPDATE\_JOB\_STATUS every ten records, INSIDE the block of code. Normally, Oracle transaction rules dictate updates made inside code blocks are not seen until the entire transaction is committed. The APEX\_PLSQL\_JOB.UPDATE\_JOB\_STATUS procedure, however, has been implemented in such a way that the updates happen regardless of whether the job succeeds or fails. This last point is important for two reasons:
  1. Even if your status shows "100 rows inserted", it does not mean the entire operation was successful. If an error occurred at the time the block of code tried to commit, the user\_status column of APEX\_PLSQL\_JOBS would not be affected because status updates are committed separately.
  2. Updates are performed autonomously. You can view the job status before the job has completed. This gives you the ability to display status text about ongoing operations in the background as they are happening.

## Implementing Web Services

Web services enable applications to interact with one another over the web in a platform-neutral, language independent environment. 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 Application 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 Application Express with Oracle Database 11g Release 1 (11.1), you must enable network services to use Web services. See ["Enabling Network Services in Oracle Database 12c"](#) on page 15-5

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.

### Topics:

- [Understanding Web Service References](#)
- [Working with SSL Enabled Web Services](#)
- [Creating a Web Service Reference Based on a WSDL](#)
- [Creating a Web Service Reference Manually](#)
- [Creating a RESTful Web Service Reference](#)
- [Using the Web Service Reference Repository](#)
- [Testing a Web Service Reference Created from a WSDL](#)
- [Testing a Web Service Reference Created Manually](#)
- [Testing a REST Web Service Reference](#)
- [Creating an Input Form and Report on a Web Service](#)
- [Creating a Form on a Web Service](#)
- [Invoking a Web Service as a Process](#)
- [Editing a Web Service Process](#)

- [Viewing a Web Service Reference History](#)
- [Exposing a Report Region as a RESTful Web Service](#)

---

**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/>

---

## Understanding Web Service References

To use Web services in Oracle Application Express, 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.

When you create a Web service reference based on a WSDL, the wizard 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

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

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

### 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. On the Workspace home page, click the **Application Builder** icon.

The Application Builder home page appears.

2. Select an application.  
The Application home page appears.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Logic, click **Web Service References**.  
The Web Service References page appears.

### Specifying an Application Proxy Server Address

If your environment requires a proxy server to access the Internet, you must specify a proxy server address on the Application Attributes page before you can create a Web service reference.

To specify a proxy address for an application:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
Application home page appears.
3. Click **Edit Application Properties**.
4. Under Properties, enter the proxy server in the Proxy Server field.
5. Click **Apply Changes**.

## Working with SSL Enabled 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 Oracle Application Express 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 Application Express Administration Guide*

## Creating a Web Service Reference Based on a WSDL

When you create a Web service reference based on a WSDL, you must decide how to locate the WSDL. You can locate a WSDL in two ways:

- By searching a Universal Description, Discovery and Integration (UDDI) registry
- By entering the URL to the WSDL document

A UDDI registry is a directory where businesses register their Web services.

### Topics:

- [Creating a Web Service Reference by Searching a UDDI Registry](#)
- [Creating a Web Service Reference by Specifying a WSDL Document](#)

### Creating a Web Service Reference by Searching a UDDI Registry

To create a Web service by searching a UDDI registry:

1. Navigate to the Web Service References page. See "[Accessing the Web Service References Page](#)" on page 17-8.
2. Click **Create**.
3. Select **Based on WSDL** and click **Next**.
4. When prompted to search a UDDI registry to find a WSDL, click **Yes** then **Next**.
5. For UDDI Location, enter a URL endpoint to a UDDI registry and click **Next**.
6. For Search, specify the following:
  - a. Search Type - Specify whether to search for a business name or a service name. You cannot search for both.
  - b. Name - Enter the business name or service name to search for. Use the percent (%) symbol as a wildcard character.
  - c. Optionally indicate if the search should be case-sensitive or an exact match.
  - d. Click **Search**.
  - e. When the search results appear, make a selection and click **Next**.

A summary page appears describing the selected Web service.

7. Review your selection and click **Next** to continue.

The URL to the WSDL document displays in the WSDL Location field.

8. Click **Finish**.

The Web service reference is added to the Web Service References Repository.

### 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. See "[Accessing the Web Service References Page](#)" on page 17-8.
2. Click **Create**.
3. Select **Based on WSDL** and click **Next**.
4. When 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. See "[Creating a Form After Creating a Reference](#)" on page 17-17.
- Create Form & Report on Web Service - Select to create a Form and Report for this Web Service Reference. See "[Creating a Form and Report After Creating a Reference](#)" on page 17-15.

## Creating a Web Service Reference Manually

To create a Web service reference manually:

**1. Navigate to the Web Service References page.** See "[Accessing the Web Service References Page](#)" on page 17-8.

**2. Click **Create**.**

**3. Select **Manual** and click **Next**.**

The Create/Edit Web Service page appears.

**4. Under Web Service, for Name, enter a name to identify the reference.**

**5. Under Service Description, make these changes:**

- a. 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.
- b. 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.
- c. Proxy** - Enter a proxy to override the application proxy for this service.
- d. SOAP Version** - Select **1.1** or **1.2**.
- e. Basic Authentication** - Choose whether the Web service requires authentication. Select **Yes** or **No**.

**6. Under SOAP Envelope, for SOAP Envelope, enter the SOAP envelope to be used for the SOAP request to the Web service.**

---

**Note:** You can reference items from session state in the SOAP envelope by using #ITEM\_NAME# syntax.

---

**7. Under SOAP Response, for Store Response in Collection, enter the name of a collection to store the response (optional).** The response is stored in the CLOB001 column.

**8. Click **Create**.**

The Web service reference is added to the Web Service References Repository.

## Creating a RESTful Web Service Reference

To use a RESTful Web service from your application, you must create a RESTful Web service reference.

To create a RESTful Web service reference:

1. Navigate to the Web Service References page. See "[Accessing the Web Service References Page](#)" on page 17-8.
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. See "Creating a Proxy Server for an Instance" in Oracle Application Express Administration Guide.
  - 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 through c for each expected input.
  - e. Click **Next**.
6. For REST Output parameters, specify the following:
  - a. 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 CLOB001 column of a collection you specify.
- h. **Type** - Select the output type.
- i. Click **Add Parameter**.
- j. Repeat steps f through 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.

## Using the 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. See "[Accessing the Web Service References Page](#)" on page 17-8.

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 then 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. See "[About the Actions Menu](#)" on page 9-6.
2. 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.

## 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. See "[Accessing the Web Service References Page](#)" on page 17-8.
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.

## 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. See "[Accessing the Web Service References Page](#)" on page 17-8.
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.

## 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. See "[Accessing the Web Service References Page](#)" on page 17-8.

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.

## Creating an Input Form and Report on a Web Service

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.

### Creating a Form and Report After Creating a Reference

To create a form and report after creating a Web service reference:

1. Create the Web service reference. See ["Creating a Web Service Reference Based on a WSDL"](#) on page 17-9 and [Creating a RESTful Web Service Reference](#) on page 17-12.
2. After the Web service reference has been added, select **Create Form & Report on Web Service**.
3. For Choose Service and Operation, make these selections and click **Next**:
  - a. Web Service Reference - Select the Web service reference.
  - b. Operation - Select the method to be executed. For REST style Web references, select **doREST**.
  - c. User Interface - Select Desktop to create a form and report for a desktop. Select jQuery Mobile Smartphone to create a form and report for a mobile phone. The jQuery Mobile Smartphone option is only available if the user interface options for the application properties have jQuery Mobile Smartphone selected. See ["Managing the Application User Interface"](#) on page 7-29.
4. For Page and Region Attributes, review the displayed attributes and click **Next**.

---

**Note:** If the page you specify does not exist, the wizard creates the page for you.

---

5. 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.
- 6. If applicable, specify the Item Names and Item Labels for basic authentication and click **Next**.

---

**Note:** This step only appears if basic authentication was specified for this Web service reference when it was created.

---

- 7. For Window Service Results, make these selections and click **Next**:
  - a. Temporary Result Set Name - Enter a name for the collection that stores the Web service result.
  - b. Result Tree to Report On (Not displayed for REST style Web service references) - Select the portion of the resulting XML document that contains the information you want to include in the report.
- 8. For Report Parameters, select the parameters to be included in the report and click **Next**.
- 9. For Tab Options, select whether the page should have tabs and how they should be created, then click **Next**.
- 10. Review confirmation page and click **Create**.

### 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. See ["Creating a Web Service Reference Based on a WSDL"](#) on page 17-9, ["Creating a Web Service Reference Manually"](#) on page 17-11, and ["Creating a RESTful Web Service Reference"](#) on page 17-12.
- 2. Create a new page. See ["Managing Pages in a Database Application"](#) on page 7-34.

In the Create Page Wizard:

- a. For User Interface, select Desktop to create a form and report for a desktop. Select jQuery Mobile Smartphone to create a form and report for a mobile phone. The jQuery Mobile Smartphone option is only available if the user interface options for the application properties have jQuery Mobile Smartphone selected. See ["Managing the Application User Interface"](#) on page 7-29.
  - b. Select **Form** and click **Next**.
  - c. Select **Form and Report on Web Service** and click **Next**.
- 3. For Choose Service and Operation, make the following selections and click **Next**:
  - 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.
- 4. For Page and Region Attributes, review the page and region attributes and click **Next**.

---

**Note:** If the page you specify does not exist, the wizard creates the page for you.

---

5. For Input Items, make the following 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.
6. 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.

---

7. Follow the on-screen instructions.
8. Click **Finish**.

## Creating a Form on a Web Service

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 from the Page Definition.

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.

### Creating a Form After Creating a Reference

To create a form after creating a Web service reference:

1. Create the Web service reference. See ["Creating a Web Service Reference Based on a WSDL"](#) on page 17-9, [Creating a RESTful Web Service Reference](#) on page 17-12, and [Creating a Web Service Reference Manually](#) on page 17-11.
2. After the Web service reference has been added, select **Create Form on Web Service**.
3. For Choose Service and Operation, Make the following selections then click **Next**:
  - 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. User Interface - Select Desktop to create a form and report for a desktop. Select jQuery Mobile Smartphone to create a form and report for a mobile phone. The jQuery Mobile Smartphone option is only available if the user interface options for the application properties have jQuery Mobile Smartphone selected. See ["Managing the Application User Interface"](#) on page 7-29.
4. For Page and Region Attributes, review the page and region attributes and click **Next**.

---

**Note:** If the page you specify does not exist, the wizard creates the page for you.

---

5. 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.
6. If applicable, specify the Item Names and Item Labels for basic authentication and click **Next**.

---

**Note:** This step only appears if basic authentication was specified for this Web service reference when it was created.

---

7. 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.
8. 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.
9. For Tab Options, select whether the page should have tabs and how they should be created, then click **Next**.
10. Review confirmation page and click **Create**.

### 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. See ["Creating a Web Service Reference Based on a WSDL"](#) on page 17-9, [Creating a RESTful Web Service Reference](#) on page 17-12, and [Creating a Web Service Reference Manually](#) on page 17-11.
2. Create a new page. See ["Managing Pages in a Database Application"](#) on page 7-34.

In the Create Page Wizard:

- a. For User Interface, select Desktop to create a form and report for a desktop. Select jQuery Mobile Smartphone to create a form and report for a mobile phone. The jQuery Mobile Smartphone option is only available if the user interface options for the application properties have jQuery Mobile Smartphone selected. See ["Managing the Application User Interface"](#) on page 7-29
- b. Select **Form** and click **Next**.
- c. Select **Form on Web Service** and click **Next**.

3. For Choose Service and Operation, Make the following selections then click **Next**:
  - 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.
4. For Page and Region Attributes, review the page and region attributes and click **Next**.

---

**Note:** If the page you specify does not exist, the wizard creates the page for you.

---

5. 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.
6. If applicable, specify the Item Names and Item Labels for basic authentication and click **Next**.

---

**Note:** This step only appears if basic authentication was specified for this Web service reference when it was created.

---

7. 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.
8. 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.
9. For Tab Options, select whether the page should have tabs and how they should be created, then click **Next**.
10. Review confirmation page and click **Create**.

## Invoking a 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.

To invoke a Web service as a process:

1. Create a Web Service Reference. See ["Creating a Web Service Reference Based on a WSDL"](#) on page 17-9, ["Creating a Web Service Reference Manually"](#) on page 17-11, or ["Creating a RESTful Web Service Reference"](#) on page 17-12.

2. Create a page. See ["Managing Pages in a Database Application"](#) on page 7-34.  
In the Create Page Wizard:
  - a. Select **Blank Page**.
  - b. When prompted to use tabs, select **No**.
3. Click **Edit Page**. See ["Altering Page Attributes"](#) on page 8-20.
4. Under Page Rendering or Page Processing, locate the Processes section, right click and select **Create Process**.  
The Create Page Process wizard appears.
5. For Process Type, select **Web Services** and click **Next**.
6. For Process Attributes, specify the following and click **Next**:
  - a. Name - Enter the process name.
  - b. Sequence - Enter the sequence for this component. This specifies the order of evaluation.
  - c. Point - Select the processing point.
7. For Process, specify the following:
  - a. Web Service Reference - Select the Web service reference for this process.  
If the Web reference was created from a WSDL or is RESTful style, the Operation selection appears.
  - b. Operation (WSDL or RESTful style Web service references only) - Select the Web service operation this process executes.  
The Web Service Input Parameters and Web Service Output Parameters appear.
  - c. Under Web Service Input Parameters, specify inputs to the Web service process:
    - Source - Select the source type.
    - Value - Select the source value.
  - d. Under Web Service Output Parameters, specify where the results are stored:  
To store the results in a collection:
    - Store Result in - Select **Collection**.
    - Value - Enter a name for the collection.  
To store the results in items on the page:
    - Store Result in - Select **Items**.
    - Value - Enter the appropriate item value.
  - e. Click **Next**.
8. For Messages, make the following entries and click **Next**:
  - a. Success Message - Enter the message that displays on the next page when the process runs successfully.
  - b. Failure Message - Enter the message that displays when an unhandled exception is raised. After any error processing stops, a rollback is issued and an error message displays.



9. For Process Conditions, make the following selections and click **Next**:
  - a. When Button Pressed - Select that button that causes the process to run.
  - b. Condition Type - Select a condition type that must be met in order for this component to be processed. If the condition type requires expressions for comparison, the Expression 1 and possibly Expression 2 fields display. Enter expressions into these fields as required.
10. Click **Create Process**.

### Displaying Web Service Results in a Report

To create a report in which to display Web Service request results:

1. Navigate to the Page Definition. See ["Editing a Page in Component View"](#) on page 8-8.
2. In component view, for Regions, click the **Create** icon.  
The Create Region Wizard appears.
3. For the region type, select **Report** and click **Next**.
4. For Region, select **Web Service Result** and click **Next**.
5. For Display Attributes, enter a region title and optionally edit the region attributes and click **Next**.
6. Choose whether the Web reference was created manually, from a WSDL, or is RESTful style and click **Next**.
7. If the Web service reference was created from a WSDL:
  - a. For Web Service Reference, select the Web service reference to execute.
  - b. For Operation, select the method to be executed.
  - c. For Result Tree to Report On, select the portion of the resulting XML document that contains the information you want to include in the report.
  - d. For Report Parameters and Options:
    - In Temporary Result Set Name, enter a name for the collection that stores the Web service result.
    - Select and deselect the appropriate parameters.
8. If the Web service reference was created manually:
  - a. Select the Web service reference.
  - b. Choose the SOAP style.
  - c. Choose the message format.
  - d. Enter the XPath expression to the node to report on.
  - e. Enter the namespace for the SOAP response envelope and click **Next**.
  - f. Enter the name of the collection where the response message is stored.
  - g. Enter the names of the parameters that you want to be included in the report.
9. If the Web service reference is REST style:
  - a. Select the Web service reference.
  - b. Enter the name of the collection where the response message is stored.

- c. Choose the report template and the number of rows to display per page.
  - d. Select the parameters to be included in the report.
10. Click **Create SQL Report**.

## 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. See ["Invoking a Web Service as a Process"](#) on page 17-19.
2. Navigate to the Page Definition containing the Web service process.
3. Select the process name.  
The Edit Page Process page appears.
4. To map an input parameter to a static value:
  - a. Scroll down to Web Service Input Parameters.
  - b. Enter a value in the Value field, adjacent to the appropriate parameter name.
5. To map an output parameter to a collection:
  - a. Scroll down to Web Service Output Parameters.
  - b. For Store Response In, select **Collection**.
  - c. For Value, enter the name of a collection to store the response. The response is stored in the CLOB001 or XMLTYPE001 based on the expected response.
6. To map an output parameter to an item:
  - a. Scroll down to Web Service Output Parameters.
  - b. For Store Response In, select **Items**.
  - c. Enter an item name in the Value field, adjacent to the appropriate parameter name.
7. Click **Apply Changes**.

## Viewing a Web Service Reference History

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. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.  
The Shared Components page appears.
4. Under Logic, click **Web Service References**.
5. Click **History**.

---

**Note:** The History button only appears on the Web Service Reference page if at least one reference exists.

---

## Exposing a Report Region as a RESTful Web Service

To expose a report region as a RESTful Web service, perform the following steps:

1. The instance administrator must enable the REST provider feature in instance settings. To enable RESTful access to an Oracle Application Express instance, see "Enabling RESTful Access" in the *Oracle Application Express Administration Guide*.
2. A developer must enable RESTful access to a report region. See ["Enabling RESTful Access to a Report Region"](#) on page 17-23.
3. The page that contains the report must not require authentication.

**See Also:** "Using RESTful Services" in *Oracle Application Express SQL Workshop Guide*

### Topics:

- [Enabling RESTful Access to a Report Region](#)
- [Accessing a RESTful Enabled Report Region from a Web Service Client](#)

### Enabling RESTful Access to a Report Region

To enable RESTful access to a report region, you must make the page public so no authentication is required and enable the report for RESTful access. To enable RESTful access to an Oracle Application Express instance, see "Enabling RESTful Access" in the *Oracle Application Express Administration Guide*.

To make a page public:

1. On the Workspace home page, click **Application Builder**.  
The Application Builder home page appears.
2. Select an application.
3. Select the page that contains the report you want to enable.  
The Page Definition appears.
4. Under Page, click the edit icon.
5. Under Security, select **Page is Public** from the Authentication list.
6. Click **Apply Changes**.

To enable a report region for RESTful access:

1. On the Workspace home page, click **Application Builder**.  
The Application Builder home page appears.
2. Select an application.  
The Page Definition appears.
3. Select the page that contains the report you want to enable.  
The Page Definition appears.
4. Under Regions, click the name of the region that contains the report you want to enable.

5. Under Attributes, enter a value for Static ID field. This value is used to access the report RESTfully.
6. From the Enable RESTful Access List, select **Yes**.

---

**Note:** The Enable RESTful Access List option only displays if RESTful access to this Oracle Application Express instance has been enabled, see "Enabling RESTful Access" in the *Oracle Application Express Administration Guide*.

---

7. Click **Apply Changes**.

### Accessing a RESTful Enabled Report Region from a Web Service Client

Once you enable a report for RESTful access, you need to know the endpoint URL and parameters to pass to the RESTful Web service. The endpoint URL is similar to the URL used to access this instance of Oracle Application Express followed by the resource `apex_rest.getReport`. For example:

```
http://apex.oracle.com/apex/apex_rest.getReport
```

**Tip:** If your client uses the POST method, you must also set the HTTP Header, `Content-Type`, to the value `application/x-www-form-urlencoded`.

Name	Default	Required	Description
app	N/A	Yes	The numeric ID or alias of the application that contains the RESTful enabled report.
page	N/A	Yes	The numeric ID or alias of the page that contains the RESTful enabled report.
reportid	N/A	Yes	The Static ID attribute of the RESTful enabled report.
parmvalues	null	No	Values for the report parameters can be sent in a comma separated list. For example: CLERK,10
lang	en	No	Sets the NLS environment variables before running the report based on the language passed in. For example: de
output	xml	Yes	This determines whether XML or JSON are returned to the client. Domain of possible values are: xml, json

The `apex_rest` service also has an operation to allow discoverability of RESTful enabled reports, given an application ID or alias. The response is an XML document with a description of all reports that can be accessed by RESTful Web services. This service is invoked with a URL similar to the following:

```
http://apex.oracle.com/apex/apex_rest.getServiceDescription?app=691
```

In the URL above, 691 is the numeric ID of an application. The document returned is similar to the following:

```
<?xml version="1.0"?>
<urn:getServiceDescriptionResponse xmlns:urn="urn:oasis:names:tc:wsrp:v1:types">
  <urn:requiresRegistration>false</urn:requiresRegistration>
  <urn:offeredPortlets>
    <urn:PortletDescription>
      <urn:portletHandle>employees</urn:portletHandle>
      <urn:markupTypes>
        <urn:mimeType>application/xml</urn:mimeType>
        <urn:mimeType>application/json</urn:mimeType>
      </urn:markupTypes>
      <urn:groupID>1</urn:groupID>
      <urn:description/>
      <urn:title>EMP</urn:title>
      <urn:keywords>
        <urn:value>P1_JOB</urn:value>
        <urn:value>P1_DEPTNO</urn:value>
      </urn:keywords>
    </urn:PortletDescription>
  </urn:offeredPortlets>
</urn:getServiceDescriptionResponse>
```

The `portletHandle` maps to the Static ID of the report region or the `reportid` parameter in the REST request. The `groupID` maps to the page id or the `page` parameter in the REST request. Finally, any parameters used by the SQL report are listed as children of the `keywords` node.

## Implementing Plug-ins

This section describes how to add plug-ins to your application, and how to manage reuse and sharing. Plug-in examples are available on the Oracle Application Express Plug-in Repository on the Oracle Technology Network, and are included in the *Sample Database Application*.

**See Also:** ["Viewing the Plug-in Repository"](#) on page 17-34 and ["About Sample Database Application"](#) on page 3-6

### Topics:

- [About Plug-ins](#)
- [Accessing Plug-ins](#)
- [Editing a Plug-in](#)
- [Creating a Plug-in](#)
- [Adding Custom Attributes to a Plug-in](#)
- [Uploading Files to Associate with a Plug-in](#)
- [Adding Events to a Plug-in](#)
- [Deleting a Plug-in](#)
- [Viewing the Plug-in Repository](#)
- [Importing a Plug-in from the Plug-in Page](#)
- [Exporting a Plug-in from the Plug-in Page](#)

- [Resetting the Plug-in Interactive Report](#)
- [View Plug-in Utilization](#)
- [View Plug-in History](#)

## About Plug-ins

Plug-ins enable developers to declaratively extend, share, and reuse the built-in types available with Oracle Application Express.

Oracle Application Express 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 Application Express 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 in to 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.

For Plug-in implementation examples, go to the Oracle Plug-in Repository at:

<http://apex.oracle.com/plugins>

For additional Plug-in implementation examples, go to the Oracle Learning Library at the following location, click the link at the bottom of the page to access the library, then enter search criteria for Oracle Application Express (APEX) Product OBEs:

<http://www.oracle.com/technetwork/tutorials/index.html>

## Accessing Plug-ins

To access the plug-ins:

1. Navigate to the Plug-ins page.
  - a. Navigate to the Workspace home page.
  - b. Click the **Application Builder**.
  - c. Select an application.
  - d. Click **Shared Components**.
  - e. Under User Interface, select **Plug-ins**.

The Plug-ins page displays with the Plug-ins tab selected by default. All available plug-ins appear.
2. You can customize the appearance of the page using the Search bar at the top of the page. Available controls include:
  - **Search icon** - Resembles a magnifying glass. Click this icon to narrow your search to only specific columns. To search all columns, select **All Columns**.
  - **Text field** - Enter case insensitive search criteria (wildcard characters are implied) and then click **Go**.
  - **Go button** - Executes a search or applies a filter.

- **View Icons** - (the default) Displays each plug-in as a large icon. To edit a plug-in, click the appropriate icon.
- **View Report** - Displays each plug-in as a line in a report.
- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See ["About the Actions Menu"](#) on page 9-6.

## Editing a Plug-in

To edit a plug-in:

1. Navigate to the Plug-ins page. See ["Accessing Plug-ins"](#) on page 26.
2. Click the plug-in you want to edit or view.

The Plug-in Create/Edit page appears.

3. Make modifications.

To learn more about each option, see item Help, ["Creating a Plug-in"](#) on page 17-27, ["Adding Custom Attributes to a Plug-in"](#) on page 17-31, ["Uploading Files to Associate with a Plug-in"](#) on page 17-32 and ["Adding Events to a Plug-in"](#) on page 17-33

4. Click **Apply Changes**.

## Creating a Plug-in

**Tip:** During the following steps, see item help to learn more about a specific field.

To create a plug-in:

1. Navigate to the Plug-ins page. See ["Accessing Plug-ins"](#) on page 26.
2. Click **Create**.

The Plug-in Create/Edit page appears.

3. Under Name:

- a. Name (Required) - Enter name of the plug-in.
- b. Internal Name (Required) - Enter the internal name of the plug-in. This name must be unique within the current application.

---

**Tip:** To insure the internal name is a globally unique name worldwide, it is recommended that your organization domain name be used as a prefix to internal plug-in names. For example, a domain name of `mycompany.com` prefixed to a plug-in named `Slider`, would result in an internal name of `COM.MYCOMPANY.SLIDER`.

---

- c. Type (Required) - Select the type of component that can use this plug-in. Settings under Callbacks and Standard Attributes differ depending on the plug-in type selected. Refer to the following sections for details.
  - d. Category (Required when Type is Dynamic Action) - Select the category the plug-in is displayed under on the UI.
4. Under Subscription:

- Reference Master Plug-in From - To base this plug-in on another plug-in in this workspace, select the plug-in from the pop up list. Otherwise, leave the field blank to make this the master copy of this plug-in.
5. 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.
    - b. Do not validate PL/SQL code (parse PL/SQL code at runtime only) - Check this option to parse the PL/SQL code at runtime only. Otherwise, the code is parsed when the plug-in is created.
  6. Under Callbacks:
    - a. Render Function Name (only available for Region, Item, and Dynamic Action type plug-ins) - Enter the name of the PL/SQL function called to render the plug-in.
    - b. AJAX Function Name (only available for Authentication, Region, Item and Dynamic Action type plug-ins) - Enter the name of the PL/SQL function used by the plug-in to load additional data with an AJAX call.
    - c. Validation Function Name (only available for Item type plug-ins) - Enter the name of the PL/SQL function the plug-in can use to perform basic validations on the submitted data.
    - d. Execution Function Name (only available for Authorization and Process type plug-ins) - Enter the name of the PL/SQL function called to execute the plug-in.
    - e. Session Sentry Function Name (only available for Authentication type plug-ins) - Enter the name of the PL/SQL function the plug-in uses to perform the session sentry verification.
    - f. Invalid Session Function Name (only available for Authentication type plug-ins) - Enter the name of the PL/SQL function the plug-in calls if an invalid session is detected. For example, use this function to call a Single Sign-On sever.
    - g. Authentication Function Name (only available for Authentication type plug-ins) - Enter the name of the PL/SQL function the plug-in uses to perform the verification of the entered user credentials.
    - h. Post Logout Function Name (only available for Authentication type plug-ins) - Enter the name of the PL/SQL function the plug-in calls after Application Express has terminated the current session. Use this function to logout from other systems like a Single Sign-On sever.

---

**Note:** 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. See item help for further details and examples.

---

7. Under User Interfaces, select the display devices the Application Builder must support for this plug-in:
  - Supported for:
    - Desktop - Select this option if the plug-in is displayed on a Desktop.



- jQuery Mobile Smartphone - Select this option if the plug-in is displayed on a mobile smartphone.
8. Under Standard Attributes (not available for Authorization Scheme and Process type plug-ins):

For Authentication Scheme type plug-ins, specify the following attribute:

- Has Session not valid Attribute - If selected, the Stop Execution on Error field is available for the action.

For Dynamic Action type plug-ins, identify the attributes that apply to this plug-in:

- a. For Item(s) - The dynamic action supports selection of items as the affected elements.
- b. For Button - The dynamic action supports selection of buttons as the affected elements.
- c. For Region - The dynamic action supports selection of a region as the affected elements.
- d. For DOM Object - The dynamic action supports selection of DOM Objects as the affected elements.
- e. For jQuery Selector - The dynamic action supports specifying a jQuery selector as the affected elements.
- f. For Triggering Element - The dynamic action supports selection of the triggering element as the affected elements.
- g. For Event Source - The dynamic action supports selection of your event source as the affected elements.
- h. Affected Element Required - The dynamic action requires an affected element to be specified.
- i. Check "Fire on page load" - Defines the default value for the action's Fire on Page Load field.
- j. Has Stop Execution on Error Attribute - The Stop Execution on Error field is available for the action.
- k. Has Wait For Result Attribute - The Wait For Result field is available for the action.

For Item type plug-ins, identify the attributes that apply to this plug-in:

- a. Is Visible Widget - The widget is visible.
- b. Session State Changeable - The value for an item can be changed in session state. The Is Visible Widget attribute must be checked.
- c. Has Read Only Attribute - The user can specify a Read Only condition for the item. The Is Visible Widget attribute must be checked for this attribute to be enabled.
- d. Has Escape Special Characters Attribute - The item has the Escape special characters field in the Security section when the item is edited. The Is Visible Widget attribute must be checked.
- e. Has Quick Pick Attributes - The item has quick pick attributes. The Is Visible Widget attribute must be checked.

- f. Has Source Attributes - The item has source related attributes such as Source Used, Source Type and Format Mask.
- g. Format Mask Date Only - For items that handle date information, the Format Mask field popup restricts the date selections by displaying date values to select from. The Has Source Attributes must be checked.
- h. Format Mask Number Only - For items that handle numeric information, the Format Mask field popup restricts the numeric selections by displaying numeric values to select from.
- i. Has Element Attributes - The item has element attributes such as Horizontal/Vertical Alignment, HTML Form Element Attributes, and Pre/Post Element Text.
- j. Has Width Attributes - The item width can be controlled.
- k. Has Height Attribute - The item height can be controlled.
- l. Has Element Option Attribute - The item allows specification of additional option attributes when rendering multi-selection elements such as radio groups of check boxes.
- m. Has Placeholder Attribute - The item supports the specification of placeholder text, which gets displayed in the element.
- n. Has Encrypt Session State Attribute - When editing the item, the Store value encrypted in session state displays under the Security region.
- o. Has List of Values - The item has an associated list of values. The Is Visible Widget attribute must be checked.
- p. List of Values Required - For items that handle lists of values, a list of values must be defined. The Has List of Values attribute must be checked.
- q. Has LOV Display Null Attributes - The item is associated with a list of values that is allowed to include null values. The Has List of Values attribute must be checked.
- r. Has Cascading LOV Attributes - The item has cascading LOV related attributes. The Has List of Values attribute must be checked.

For Region type plug-ins, check the following to enable options as described here:

- a. Region Source is SQL Statement - The region source is a SQL Statement. When checked, a minimum and a maximum number of columns the query can return can be specified and SQL Examples display to help the user.
- b. Region Source is Plain Text - The region source is plain text.
- c. Region Source Required - If region source is a SQL Statement, this attribute makes this a required value.
- d. Has 'Page Items to Submit' Attribute - If region source is a SQL Statement, this attribute enables you to specify those page items which should be set in session state when executing an AJAX call for that region.
- e. Has 'Number of Fetched Rows' Attribute - The region has the Number of Fetched Rows fields in the Advanced section when the region is edited.
- f. Has 'No Data Found Message' Attribute - The region has the No Data Found Message field in the Advanced section when the region is edited.
- g. Has "Escape Special Characters" Attribute - The region has the Escape special characters field in the Security section when the region is edited.

9. For 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.
10. For Help Text, enter help text used by the user to understand how the plug-in works.
11. For Comments, enter comments and notes that never display when the application is running.  
To learn more about each option, see item Help.

12. Click **Create**.

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. See ["Adding Custom Attributes to a Plug-in"](#) on page 17-31, ["Uploading Files to Associate with a Plug-in"](#) on page 17-32, and ["Adding Events to a Plug-in"](#) on page 17-33.

## Adding Custom Attributes to a Plug-in

A plug-in attribute is used to prompt the developer for additional data in the Application Builder when the plug-in is used.

**Tip:** During the following steps, see item help to learn more about a specific field.

To add custom attributes to the plug-in:

1. Navigate to the Plug-ins page. See [Accessing Plug-ins](#) on page 17-26.
2. Click the plug-in you want to modify.  
The Plug-in Create/Edit page appears.
3. Under Custom Attributes, enable or disable substitution of attribute values.
  - **Substitute Attribute Values** - Custom attribute values specified by the developer might contain items referenced with substitution syntax, for example &P1\_DNAME.  
If set to **Yes**, Application Express automatically replaces substitution syntax with their actual values.  
If set to **No**, 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. See item help for further details.
4. Under Custom Attributes click **Add Attribute**.  
The Edit Attribute page appears.
5. Under name:
  - a. **Scope** - Select **Application** if the attribute is only defined once for the application. Select **Component** if the attribute is defined each time the plug-in is referenced in a component.

- b. Attribute - Enter the sequence that correlates with the ATTRIBUTE\_XX columns and to the PL/SQL types defined in the APEX\_PLUGIN package.
        - c. Display Sequence - Enter the display sequence for this plug-in attribute in the Application Builder.
        - d. Label - Enter the label that displays for this attribute in the Application Builder.
6. For Settings:
  - a. Type - Select the attribute type.
  - b. Required - Select **Yes** if this attribute must be specified. Otherwise, select **No**.
  - c. Translatable - Select **Yes** if this attribute is included in the translation file, otherwise, select **No**.
  - d. Display Width - Enter the length in characters displayed for this attribute in the Application Builder.
  - e. Maximum Width - Enter the maximum number of characters users are allowed to enter for this attribute in the Application Builder.
7. Under Default Value, specify a value to be used for this plug-in attribute when a new component is created that uses this plug-in. Use Y and N for attributes of type Yes/No.
8. Under Condition:
  - a. Depending on - Select the attribute on which the current attribute depends.
  - b. Condition Type (only displays if dependent attribute) - Select the type of condition that must be met in order for this attribute to render.
  - c. Expression (only displays if needed for condition type)- Enter expression that must meet the selected condition type. See item help for details.
9. For Help Text, specify the help text that is displayed as context sensitive help for the attribute in the Application Builder.
10. Under Comments, enter comments or notes that are never displayed when the application is running.
11. Click **Create** to create the attribute and go back to the Edit page, or click **Create and Create Another** to create the attribute and continue to create another attribute.

---

**Note:** If you click **Create** or **Create and Create Another** and the **Return To Page** check box on the right panel under Plug-ins is checked, this same Edit Attribute page displays.

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## Uploading Files to Associate with a Plug-in

Upload image, CSS, and JavaScript files you want to associate with your plug-in. Use #PLUGIN\_PREFIX# in uploaded CSS and JavaScript files to reference another uploaded file. See the Plug-in Files region on the right of the Upload New File page for more details.

For example, in a CSS file the reference might be:

```
.sidebar{
background-image:url (#PLUGIN_PREFIX#flowers.png);
}
```

To upload a file:

1. Navigate to the Plug-ins page. See "[Accessing Plug-ins](#)" on page 17-26.
2. Click the plug-in you want to upload to.  
The Plug-in Create/Edit page appears.
3. Click **Files**.  
The Files options display.
4. For File Prefix - Use the default, #PLUGIN\_PREFIX#, to reference files that are stored with your plug-in definition in the database. This prefix determines the virtual path the Web server uses to point to the files of the plug-in. For improved performance, you can also store your plug-in files on your Web server and use #IMAGE\_PREFIX# or any valid URL to reference them.
5. Click **Upload New File**.  
The Upload New File page appears.
6. For File, browse to and select the file you want to upload.
7. Click **Upload**.  
The Create/Edit page appears. The name of the uploaded file appears under Files.
8. Click **Apply Changes**.

## Adding Events to a Plug-in

Adding events to an item, region, or dynamic action type plug-in, enables them to be exposed to dynamic actions. For example, a Slider plug-in that exposes events such as Start Slide, Sliding, and Stop Slide, allows the creation of dynamic actions that can react when these events occur.

To add events to a plug-in:

1. Navigate to the Plug-ins page. See "[Accessing Plug-ins](#)" on page 17-26.
2. Click the plug-in you want to edit.  
The Plug-in Create/Edit page appears.
3. Scroll down to Events and click **Add Event**.  
A new row displays under Events.
4. Under Events, specify the following:
  - 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.
5. Click **Add Event**.
6. Repeat steps 3 through 4 to add another event.
7. Click **Apply Changes**.

## Deleting a Plug-in

You can delete a plug-in if it is not in use. If it is in use, the Delete button does not display.

To delete a plug-in:

1. Navigate to the Plug-ins page. See ["Accessing Plug-ins"](#) on page 17-26.
2. Click the plug-in you want to delete.  
The Plug-in Create/Edit page appears.
3. Click **Delete**.
4. To confirm, click **OK**.

## Viewing the Plug-in Repository

The purpose of the Plug-in Repository is to provide a central location where developers can share and download plug-ins. The repository is located on the Oracle Technology Network.

To view the Plug-in repository:

1. Navigate to the Plug-ins page. See ["Accessing Plug-ins"](#) on page 17-26.
2. Click **View Plug-in Repository**.

The Oracle Application Express Plug-in Repository displays.

## Importing a Plug-in from the Plug-in Page

Use this option to import an exported plug-in to your application. Importing a plug-in can be done from the Plug-ins page under Shared Components, as described here, or from the Application Builder home page. See ["Importing Plug-ins"](#) on page 16-26.

To import a plug-in:

1. Navigate to the Plug-ins page. See ["Accessing Plug-ins"](#) on page 17-26.
2. Click **Import**.  
The import Plug-in page appears.
3. For Specify File, make the following selections and click **Next**:
  - Import file - Enter or browse to the name of the import file.
  - File Type - Select **Plug-in**.
  - File Character Set - Select the import file character set encoding.
4. For File Import Confirmation, click **Next**.
5. For Install, click **Install Plug-in**.

## Exporting a Plug-in from the Plug-in Page

Use this option to export a plug-in definition to a file. This file can be imported into any APEX application. Exporting a plug-in can be done from the Plug-ins page under Shared Components, as described here, or from the workspace home page. See ["Exporting Plug-ins"](#) on page 16-21.

1. Navigate to the Plug-ins page. See ["Accessing Plug-ins"](#) on page 17-26.
2. Under Tasks, click **Export Plug-in**.  
The Export Plug-in page appears.
3. For Application, select the application to export the plug-in from.

4. Click **Set Application**.
5. For Export Plug-in:
  - Plug-in - Select plug-in.
  - File Format - Select file format of the plug-in export.
6. Click **Export Plug-in**.
7. Select **Save File**, and click **OK**.

Downloads complete message appears.

## Resetting the Plug-in Interactive Report

You can reset the plug-in interactive report to clear all current filters applied to the report.

To reset the interactive report:

1. Navigate to the Plug-ins page. See "[Accessing Plug-ins](#)" on page 17-26.
2. Click **Reset**.

**See Also:**

## View Plug-in Utilization

The Plug-in Utilization page displays which pages, components, and regions use each plug-in.

To view plug-in utilization:

1. Navigate to the Plug-ins page. See "[Accessing Plug-ins](#)" on page 17-26.
2. Click **Utilization**.

The Utilization page appears.

## View 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 plug-in history:

1. Navigate to the Plug-ins page. See "[Accessing Plug-ins](#)" on page 17-26.
2. Click **History**.

The History page appears.

## Implementing Dynamic Actions

This section provides an overview of dynamic actions and explains how to create and modify them.

**Topics:**

- [Understanding Dynamic Actions](#)
- [Creating a Dynamic Action](#)
- [Editing Dynamic Actions](#)

- [Adding Additional True Actions](#)
- [Defining the Frequency and Scope](#)
- [Debugging Dynamic Actions](#)

**See Also:** ["About Page Specific Utilities"](#) on page 7-83

## Understanding 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. See ["Debugging Dynamic Actions"](#) on page 17-46 for information on how to debug problems.

The process of implementing a dynamic action involves the following:

1. Edit or create an item, button, region, DOM object, or jQuery selector on a page. 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.

For Dynamic Action implementation examples, go to the Learning Library at the following location, click the **All Content** tab and enter search criteria for Application Express (APEX) Product OBEs:

<http://www.oracle.com/technetwork/tutorials/index.html>

## 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.

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.
2. Under Page Rendering, scroll down to Dynamic Actions and click the Create icon. The Dynamic Action wizard appears.
3. For Identification, enter the following and click **Next**.
  - Name - Enter the name of the dynamic action.
  - Sequence - Enter the sequence of this component. The sequence determines the order of execution.
4. For When, specify when the action is performed and click **Next**. Available options include:
  - a. Event - Dynamic actions can be defined to fire based on events that happen on the page. There are four different categories of events that can be utilized, Browser events, Framework events, Component events and Custom events.



Here are the details of all the supported events, including the internal JavaScript event name in brackets.

### Browser Events

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**Note:** 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.

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- Change (`change`) - Fires when a control loses the input focus and its value has been modified since gaining focus. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Click (`click`) - Fires when the pointing device button is clicked over the triggering element. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Double Click (`dblclick`) - Fires when the pointing device button is double clicked over the triggering element. Supported User Interface Types: Desktop.
- Get Focus (`focusing`) - Fires when the triggering element receives focus by either a pointing device or by tabbing into the element. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- 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. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- 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. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- 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. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Lose Focus (`focusout`) - Fires when the triggering element loses focus either by the pointing device or by tabbing out of the element. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Mouse Button Press (`mousedown`) - Fires when the pointing device button is pressed over the triggering element. Supported User Interface Types: Desktop.
- Mouse Button Release (`mouseup`) - Fires when the pointing device button is released over the triggering element. Supported User Interface Types: Desktop.
- Mouse Enter (`mouseenter`) - Fires once when the pointing device is moved into the triggering element. Supported User Interface Types: Desktop.

- Mouse Leave (`mouseleave`) - Fires once when the pointing device is moved away from the triggering element. Supported User Interface Types: Desktop.
- Mouse Move (`mousemove`) - Fires when the pointing device is moved while it is over the triggering element. Supported User Interface Types: Desktop.
- Orientation Change (`orientationchange`) - Fires when a device's orientation changes (by turning it horizontally or vertically). The 'this.browserEvent' JavaScript object contains an 'orientation' property that will equal either 'portrait' or 'landscape'. Supported User Interface Type: 'jQuery Mobile Smartphone'.
- Page Load (Desktop User Interface uses `ready`, jQuery Mobile Smartphone User Interface uses `pageinit`) – Fires when the page loads. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Page Unload (`unload`) - Fires when a page is unloaded. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Resize (`resize`) - Fires when the browser window is resized. Supported User Interface Types: Desktop.
- Resource Load (`load`) - When the triggering element is the window element (using a DOM Object 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, it fires when the target element and all of its content has finished loading. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Scroll (`scroll`) - Fires when a scrollable triggering element is scrolled. This could be the browser window (using a DOM Object 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). Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Scroll Start (`scrollstart`) - Fires when a scroll begins. Supported User Interface Type: jQuery Mobile Smartphone.
- Scroll Stop (`scrollstop`) - Fires when a scroll ends. Supported User Interface Type: jQuery Mobile Smartphone.
- Select (`select`) - Fires when a user selects some text in a text field. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Swipe (`swipe`) - Fires when a horizontal drag of 30px or more (and less than 75px vertically) occurs, within a 1 second duration. Supported User Interface Type: jQuery Mobile Smartphone.
- Swipe Left (`swipeleft`) - Fires when a swipe event occurs moving in the left direction. Supported User. Interface Type: jQuery Mobile Smartphone.
- Swipe Right (`swiperight`) - Fires when a swipe event occurs moving in the right direction. Supported User Interface Type: jQuery Mobile Smartphone.
- Tap (`tap`) - Fires after a quick touch event. Supported User Interface Type: jQuery Mobile Smartphone.

- Tap and Hold (`taphold`) - Fires after a held touch event (held for close to 1 second). Supported User Interface Type: jQuery Mobile Smartphone.
- Touch Cancel (`vmousecancel`) - Normalized event for handling touch or mousecancel events. Supported User Interface Type: jQuery Mobile Smartphone.
- Touch End (`vmouseup`) - Normalized event for handling touchend or mouseup events. Supported User Interface Type: jQuery Mobile Smartphone.
- Touch Move (`vmousemove`) - Normalized event for handling touchmove or mousemove events. Supported User Interface Type: jQuery Mobile Smartphone.
- Touch Start (`vmousedown`) - Normalized event for handling touchstart or mousedown events. Supported User Interface Type: jQuery Mobile Smartphone.
- Virtual Click (`vclick`) - Normalized event for handling touchend or mouse click events. On touch devices, this event is dispatched after Touch End. Supported User Interface Type: jQuery Mobile Smartphone.

#### 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. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- Before Page Submit (`apexbeforepagesubmit`) - Fires before a page being submitted. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.
- 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. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.

#### 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 Oracle Application Express, or from plug-in components you have installed into your application.

- Events triggered by native components:  
Change Order [Shuttle] (`shuttlechangeorder`) – Fires when the order of a value in the right hand select list is changed (either using Move Top, Move Up, Move Down, or Move Bottom). There are currently no other events triggered by native components in Oracle Application Express. Supported User Interface Types: Desktop and jQuery Mobile Smartphone.

- 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 plug-ins, 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. Supported User Interface Types: Determined by the plug-in's User Interfaces > Supported for settings.

- Custom Event:

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.

- b. Selection Type - Select the type of page element that triggers the dynamic action. A corresponding name field displays to specify the name of the page element.

---

**Note:** Only available if the event selected supports definition of a page element. Selecting any of the following events hides this field: Page Load, Page Unload, Resize, Before Page Submit, Orientation Change. All other event types show this field.

---

- c. Item(s), Button, Region, DOM Object, or jQuery Selector - Specify the name of the page element as follows:

- Item(s) - Enter or select one or more page item names that trigger the dynamic action. For multiple items, separate page items with a comma.
- Button - Select the button that triggers the dynamic action. If the button is a Template button, the button selected must use a button template that includes an ID attribute set to #BUTTON\_ID#. The dynamic action framework relies on this ID value to reference the button.
- Region - Select the region name that triggers the dynamic action. The region selected must use a region template that includes a container element with an ID attribute set to #REGION\_STATIC\_ID#. The dynamic action framework relies on this ID value to reference the region.

The region can fire the event itself, for example, Before Refresh or After Refresh events, or can be a container to catch events that fire on items or other elements in the region. Only the following subset of events support this: Change (change), Click (click), Double Click (dblclick), Get Focus (focus), Key Down (keydown), Key Press, Key Release (keyup), Lose Focus (blur), Mouse Button Press (mousedown), Mouse Button Release (mouseup), Mouse Move (mousemove).

- DOM Object - Enter either a Document Object Model (DOM) object constant (for example, document or window), or the ID of a DOM object that triggers the dynamic action.
  - jQuery Selector - Enter the jQuery selector syntax to return one or more page elements that trigger the dynamic action.
- d. Condition - To provide a condition, make a selection from the Condition list. Depending on the condition type, you may be required to enter a Value to test the condition against. If no condition is specified, only True Actions fire. If a

condition is specified, the True Action fires when the condition is met, the False Action fires when it is not.

5. Specify the action that is performed when the previously specified event occurs and conditions are satisfied and then click **Next**.
  - For True Actions - Depending on the selected action, additional options display. Use these options to specify additional settings and values required to perform the action.

#### Component

- Clear - Clears the affected elements.
- Disable - Disables the affected elements. By disabling the affected elements, the page item will be non-editable and will not retain the item's value when the page is submitted.
- Enable - Enables the affected elements.
- Hide - Hides the affected elements. Also has the option to Hide all page items on the same line.
- Refresh - Triggers a refresh of the affected elements. Note that not all elements support a refresh, you can use it for interactive reports, classic reports, charts, list view and all item types with cascading LOV support. Plug-ins might support this action as well.
- Set Focus - Sets the focus to the affected elements. This defaults to the first of the affected elements if there are multiple. This can be especially useful when used with the Show and Enable actions to take the user straight to the appropriate item.
- Set Value - Sets the value of the affected elements. This supports the following Set Types: Static Assignment, JavaScript Expression, SQL Statement, PL/SQL Expression, PL/SQL Function Body. SQL Statement Set Type supports setting between 1 and 100 page item values, by selecting between 1 and 100 columns in the query. All other Set Types only support setting 1 page item. See the Execute PL/SQL Code action for an alternative way to set multiple values on the page.
- Show - Shows the affected elements. Also has the option to Show all the page items on the same line.

#### Execute

- Execute JavaScript Code - Enables you to define or call custom, page specific JavaScript code to use within the dynamic action framework. If you are defining JavaScript code that is specific to just one page, you can also make use of the new page level attribute Function and Global Variable Declaration to define this. Functions and variables defined here can subsequently be referenced from this action.
- Execute PL/SQL Code - Executes some PL/SQL code on the server. If an error occurs during execution, the user is alerted. To specify page items that are set on the page when the call to the server returns, based on their values in session state, define **Page Items to Return**. When the **Page Items to Return** option is used, and you want to prevent subsequent Change based dynamic actions from firing for the Page Items to Return, set **Suppress Change Event** to Yes.

#### Notification

- Alert - Displays an Alert.
- Confirm - Displays a confirmation dialog. If the user chooses Cancel then the proceeding actions are not executed and the current event is canceled.

#### Style

- Add Class - Adds 1 or more CSS classes to the affected elements.
- Remove Class - Removes one, more or all classes from the affected elements.
- Set Style - Sets any style, CSS, property to the affected elements.

#### Miscellaneous

- Cancel Event - Cancels subsequent dynamic actions or events from firing, based on certain conditions. This could be useful in the following situations:

If you have multiple dynamic actions on a page that are based on the same event (such as Click) and they refer to the same element on the page, you can use the Cancel Event action to prevent subsequent dynamic actions from firing, conditionally based on its When Condition.

If a dynamic action has many true actions, you can use Cancel Event to halt subsequent actions from being processed. Currently this has limited value as it is not possible to define a dynamic action's actions to fire conditionally, so this would just always prevent subsequent actions being processed, which could be useful in debugging.

Used to cancel page submission, when used with the Before Page Submit event of dynamic actions. For example, suppose you define a dynamic action that fires on the Before Page Submit even. For the Condition, you define JavaScript Expression and in the Value enter an expression such as `$v('P2_ENAME') == 'DO NOT SUBMIT'`. Then, if you define a True Action that uses the Cancel Event action, the page is not submitted when the ENAME field is equal to DO NOT SUBMIT.

- Submit Page - Submits the page. Also, has the option to disable the current page during page submission and display a processing style GIF.

#### Plug-ins

- my\_plugin\_action[Plug-in] - Depending on your application configuration, you may also have additional plug-in dynamic actions available here. These are displayed as my\_plugin\_action [Plug-in]. Plug-in dynamic actions are installed within the application's shared components. The plug-in developer must assign an appropriate category for the action (Component, Execute and so forth).
- Fire On Page Load - Select this option to also trigger this action when the page loads. This may or may not be checked by default, depending on the type of Action selected.
  - Generate Opposite False Action - Select this option to also generate the opposite false action. Actions treated as opposite are Show / Hide, Enable / Disable and Add Class / Remove Class. This option only displays if one of the above actions are selected, and a When Condition has been specified.
6. For Affected Elements (available only for actions that support affected elements), specify the elements affected by this dynamic action and how they are affected then click **Next**.

The final step in creating the dynamic action is different depending on whether the action you have selected supports selection of affected elements. Some actions, such as Submit Page, do not require affected elements to be selected. Other actions, such as Show, do. If the action selected does not support the selection of affected elements, the last page will be a Confirm page where you can review details of the dynamic action. If the action selected does support selection of affected elements, options on this page include:

- Selection Type - Select the type of page element that is affected by the dynamic action. Depending on the selected type, additional options display. Use these options to specify additional settings and values required to specify how the element is affected.
- Item(s), Button, Region, DOM Object, or jQuery Selector - Specify the name of the page element as follows:
  - Item(s) - Select the item name that is affected by the dynamic action.
  - Button - Select the button that is affected by the dynamic action. If the button is a Template button, the button selected must use a button template that includes an ID attribute set to #BUTTON\_ID#. The dynamic action framework relies on this ID value to reference the button.
  - Region - Enter or select the region name that is affected by the dynamic action. The region selected must use a region template that includes a container element with an ID attribute set to #REGION\_STATIC\_ID#. The dynamic action framework relies on this ID value to reference the region.
  - DOM Object - Enter either a Document Object Model (DOM) object constant (for example, document or window), or the ID of a DOM object that is affected by the dynamic action.
  - jQuery Selector - Enter the jQuery selector syntax to return one or more page elements that is affected by the dynamic action.
  - Triggering Element - Provides access to the page element defined in the 'When' of the dynamic action.
  - Event Source - Provides access to the page element where the event originated, which could be different from the Triggering Element in some cases. For example, if the When element is some container element (such as a region) that has been defined to handle events raised by its sub-elements (such as page items in that region), you can use the Event Source to easily act upon the sub-element that triggered the event.

#### 7. Click Create Dynamic Action.

## 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.

**See Also:** ["Creating a Dynamic Action"](#) on page 17-36, ["Adding Additional True Actions"](#) on page 17-44, ["Defining the Frequency and Scope"](#) on page 17-45

To edit a dynamic action:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.

2. Under Page Rendering, scroll down to Dynamic Actions and click the dynamic action you want to modify.

The Edit Dynamic Action page appears.

3. Make changes and click Apply.

## Adding Additional True Actions

Dynamic actions contain a condition that can be specified to control when True actions fire. For example, consider an application that displays employee information to managers. If the employee is exempt, their salary displays, otherwise their hourly wage displays.

The Dynamic Action creation wizard allows only one true action to be specified. To add more than one action you must use the create wizard to create the dynamic action and then edit the action to add additional true actions.

To add an action:

1. Navigate to the appropriate Page Definition. See ["Accessing the Page Definition"](#) on page 8-2.

2. Under Page Rendering, scroll down to Dynamic Actions and click the dynamic action you want to modify.

The Edit Dynamic Action page appears.

3. To add an action that executes when the conditions are met or when no condition is specified, scroll down to True Actions and click **Add True Action**.

The Create/Edit Action page appears.

4. Under Identification:

- a. Sequence - Enter the sequence for this component. This indicates the execution order.

- b. Action - Select the action that triggers when the condition is true.

5. Under Execution Options:

- a. Fire on Page Load - Select if you want the action to also trigger when the page loads.

- b. Stop Execution on Error - Specify whether any proceeding actions should be executed, if an error occurs while executing the current action. Only available when the selected Action has been defined to expose this attribute, for example Execute PL/SQL Code.

- c. Wait for Result - Specify whether any proceeding actions should wait for the result of the current action (if they are dependent on the result), or whether they can just execute without waiting. Only available when the selected Action has been defined to expose this attribute, for example Execute PL/SQL Code.

6. For Affected Elements (only available if the selected action supports definition of affected elements):

---

---

**Note:** Some or all of these fields may not be available to select, depending on the type of action selected. For example the Disable action does not support selecting a Region as the affected element.

---

---



- a. Selection Type - Select the type of page element that is affected by the dynamic action. A corresponding name field displays to specify the name of the page element.
- b. Item(s), Button, Region, DOM Object, or jQuery Selector - Specify the name of the page element as follows:
  - Item(s) - Enter or select the item name that is affected by the dynamic action.
  - Button - Select the button that is affected by the dynamic action. If the button is a Template button, the button selected must use a button template that includes an ID attribute set to #BUTTON\_ID#. The dynamic action framework relies on this ID value to reference the button
  - Region - Enter or select the region name that is affected by the dynamic action. The region selected must use a region template that includes a container element with an ID attribute set to #REGION\_STATIC\_ID#. The dynamic action framework relies on this ID value to reference the region.
  - DOM Object - Enter either the Document Object Model (DOM) object or the ID of a DOM object that is affected by the dynamic action.
  - jQuery Selector - Enter the jQuery selector syntax to return one or more page elements that is affected by the dynamic action.
7. For Comments, enter developer comments or notes. These comments never display when the application is running.
8. Click **Create**.

The Edit Dynamic Action page displays with the added action listed under True Actions.

## Defining the Frequency and 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 scope:

1. Navigate to the appropriate Page Definition. See "[Accessing the Page Definition](#)" on page 8-2.
2. Under Page Rendering, scroll down to Dynamic Actions and click the dynamic action you want to modify.

The Edit Dynamic Action page appears.

3. Scroll down to Advanced and for Event Scope make one of the following selections:
  - a. Static (default) - Binds the event handler to the triggering elements for the lifetime of the current page, but will no longer be bound if the triggering elements are updated by Partial Page Refresh (PPR).
  - b. Dynamic - Binds the event handler to the triggering elements for the lifetime of the current page, including any elements that are updated by Partial Page Refresh (PPR). Specifying Dynamic causes an additional field Static Container (jQuery Selector) to be displayed. Specifying a Static Container can help improve the performance of the way events are handled with a Dynamic Event Scope. This should be an element on the page that itself does not get

re-created, but contains the triggering elements that are re-created using Partial Page Refresh (PPR). This element reference must be defined as a jQuery selector.

For example if you have a dynamic action that does something to the rows of an interactive report region (which is re-created by PPR), this would need an Event Scope of Dynamic, in order for the dynamic action to still work after the report has been refreshed. And here, the Static Container value could be set to a jQuery selector selecting the region's Static ID value, for example: '#my\_region'.

- c. Once - Binds the event handler to the triggering elements for a once only event.
4. Click **Apply Changes**.

## Debugging Dynamic Actions

Debugging dynamic actions in Oracle Application Express 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, Oracle Application Express 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 a dynamic action fires, the name of the dynamic action and also the Action JavaScript Object, which contains all the information needed by the client to execute the action (for example, event name, when details, action, affected elements and so on).

To debug a dynamic action:

1. Ensure the application containing the dynamic action has Debugging enabled. See ["Accessing Debugging Mode"](#) on page 14-4.
2. Run the page containing the dynamic action.
3. Open the browser's JavaScript console.
4. From the Developer toolbar, click **Debug**.

The page refreshes. If you have any dynamic actions that are set to fire on page load, you see the following text output to the console:

```
Dynamic Action Fired: [Dynamic action name] ({JavaScript  
Object containing all Dynamic Action information})
```

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.

## About BLOB Support in Forms and Reports

Oracle Application Express 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 Oracle Application Express applications to manage files including images, documents, videos, and so on.

**Topics:**

- [About BLOB in Forms](#)
- [About BLOB Support in Reports](#)
- [Working With BLOBs Procedurally](#)

## About BLOB in Forms

If you create a Form (either using the Create Application Wizard, create page of type Form - or Report and Form, or create region of type Form) or add an item to an existing form, any item whose source is a database column of type BLOB results in an item of type File Browse. When the form is called for `INSERT`, the file selected by the user is loaded into the BLOB 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.

### 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.

**See Also:** File Browse in [Appendix A, "About Item Types"](#), item level help for the File Browse settings

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. Do not use it in new applications.

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.

### Displaying the BLOB

If the BLOB you are working with is an image, you can display it in the form as well. You can use the Display Image item type to handle this declaratively, see [Appendix A, "About Item Types"](#) for details. See ["Working With BLOBs Procedurally"](#) on page 17-50 to handle procedurally.

### Removing the Image Reference

Because there is no set to 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;
```

## About BLOB Support in Reports

Oracle Application Express 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, basic support is included. Additional information should be added after generation to make the download capability more user friendly.

### Providing a Download Link

To facilitate the inclusion of a download link in a report, the report includes the selection of the length of the BLOB (for example, `dbms_lob.getlength(RESUME)`). If the length is 0, the BLOB is NULL and no download link is displayed. In the same way you specify a format mask for a date or number you can format a download link. The DOWNLOAD format is more complex however than other format masks in that you are required to specify at least three parameters, for example:

```
DOWNLOAD:EMP:RESUME:EMPNO
```

The following table describes the parameters of the DOWNLOAD format:

Position	Attribute	Required	Description
1	DOWNLOAD	Yes	Identifies the DOWNLOAD report format mask.
2	Table Name	Yes	Case sensitive name of table containing target column of type BLOB.
3	Column containing BLOB	Yes	Case sensitive name of column of type BLOB.
4	Primary Key Column 1	Yes	Case sensitive name of primary key column 1.
5	Primary Key Column 2	No	Case sensitive name of primary key column 2.
6	MIME type Column	No	Case sensitive column name used to store the MIME type.

Position	Attribute	Required	Description
7	Filename Column	No	Case sensitive column name used to store the filename of the BLOB. If NULL, the column name is used as the default when a user downloads the file.
8	Last Update Column	No	Case sensitive column name used to store the last update date of the BLOB. If used, the HTTP header of the file download indicates the date of last modification and web browsers will be able to cache the BLOB. If not specified, the browser may not be able to cache files.
9	Character Set Column	No	Case sensitive column name used to store the character set of the BLOB. Most relevant for Asian languages which may need to maintain the character set encoding.
10	Content Disposition	No	Specify <code>inline</code> or <code>attachment</code> . All other values are ignored. If a MIME type is provided and the file is a type that can be displayed, the file is displayed. If MIME type is not provided, or the file cannot be displayed inline, the user is prompted to download.
11	Download Text	No	String used for the download link. If nothing is provided, <code>Download</code> is used. Note that this supports substitutions (useful for translated applications).

Consider the following example:

```
DOWNLOAD:EMP:RESUME:EMPNO::RESUME_MIMETYPE:RESUME_FILENAME:RESUME_LAST_
UPDATE::attachment:Resume
```

To be able to enter these parameters and create the format as described above. You have to select **Blob Format** for Number/Date format item. Once selected, the Blob Column attributes region displays and you can fill in all parameters as described above.

### Displaying the BLOB

If the BLOB you are working with is an image, you can display it in the report using the new report format mask of 'IMAGE'. Regardless of the MIME type, the report always attempts to display the BLOB. If the BLOB cannot be rendered, a broken image is displayed.

The following table describes the parameters of the IMAGE format mask:

Position	Attribute	Required	Description
1	IMAGE	Yes	Identifies the IMAGE report format mask.
2	Table Name	Yes	Case sensitive name of table containing target column of type BLOB.
3	Column containing BLOB	Yes	Case sensitive name of column of type BLOB.
4	Primary Key Column 1	Yes	Case sensitive name of primary key column 1.
5	Primary Key Column 2	No	Case sensitive name of primary key column 2.
6	MIME type Column	No	Case sensitive column name used to store the MIME type.

Position	Attribute	Required	Description
7	Filename Column	No	Not used for IMAGE format but left in so that the format can easily be changed between IMAGE and DOWNLOAD.
8	Last Update Column	No	Case sensitive column name used to store the last update date of the BLOB. If used, the HTTP header of the file download indicates the date of last modification and web browsers will be able to cache the BLOB. If not specified, the browser may not be able to cache files.
9	Character Set Column	No	Not used for IMAGE format but left in so that the format can easily be changed between IMAGE and DOWNLOAD.
10	Content Disposition	No	Not used for IMAGE format but left in so that the format can easily be changed between IMAGE and DOWNLOAD.
11	Alt Text	No	String used for the alt tag associated with the image.

Consider the following example:

```
IMAGE:EMP:RESUME:EMPNO::RESUME_MIMETYPE:RESUME_FILENAME:RESUME_LAST_
UPDATE::attachment:Resume
```

To be able to enter these parameters and create the format as described above. You have to select Blob Format for Number/Date format item. Once selected, a new region, Blob Column attributes, displays and you can fill in all parameters as described above.

## Working With BLOBs Procedurally

As an alternative to using the built-in methods of providing a download link, you can use the `APEX_UTIL.GET_BLOB_FILE_SRC` function. One advantage of this approach, 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 Application Express 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.

**See Also:** "GET\_BLOB\_FILE\_SRC Function" in the *Oracle Application Express API Reference*

## Using Screen Reader Mode in Your Database Applications

Sessions in Oracle Application Express can now be identified as optimized for screen readers, in the Oracle Application Express development environment, Websheet runtime, and also within your own database applications. By default sessions are not flagged as running in screen reader mode. This section describes how you can provide users of your own database applications access to this mode and also how you can extend it.

Although this mode improves usability of Oracle Application Express with a screen reader, there may still be some areas where outstanding issues remain. For a full list of outstanding issues with workarounds where possible, refer to "[Accessibility in Oracle Application Express](#)" on page E-1 and *Oracle Application Express Release Notes*.

### Topics:

- [Provisioning Screen Reader Mode](#)
- [Extending Screen Reader Mode](#)

**See Also:** ["About Screen Reader Mode"](#) on page E-1

## Provisioning Screen Reader Mode

You can provision screen reader mode for use with your own database application in three ways:

1. Use the page template `#SCREEN_READER_TOGGLE#` substitution string.

Add the `#SCREEN_READER_TOGGLE#` substitution string to your page template and Oracle Application Express displays a link to the current page to turn on or off (toggle) the mode. So if you are in standard mode, this procedure generates a link to turn it on.

2. Use APIs to control screen reader mode.

You may want to use the APIs if you only want to render the toggle in one place and not at the page template level, or if you want more control over the actual displayed link text. To learn more, see `"APEX_UTIL"` in *Oracle Application Express API Reference*.

3. Use the `f?p` syntax `REQUEST` attribute to enable and disable screen reader mode.

The general syntax for `f?p` is:

```
f?p=application:page:session:request:...
```

If the request is exactly `SET_SESSION_SCREEN_READER_ON` or `SET_SESSION_SCREEN_READER_OFF` then the session is put into or out of Screen Reader mode. For example:

```
<a href="f?p=100:1:&SESSION.:SET_SESSION_SCREEN_READER_ON">Set Screen Reader On</a>
```

## Extending Screen Reader Mode

In addition to what this mode does by default as detailed in ["What Does Screen Reader Mode Do?"](#) on page E-1, you can control your own page components. For example, you can conditionally display region when running in Screen Reader mode. See `"APEX_UTIL"` in *Oracle Application Express API Reference* for details of the relevant database functions, `APEX_UTIL.IS_SCREEN_READER_SESSION` and `APEX_UTIL.IS_SCREEN_READER_SESSION_YN`.

## Using High Contrast Mode in Your Database Applications

You can identify sessions as optimized for high contrast in the Oracle Application Express development environment, Websheet runtime, and also within your own database applications. This section describes how you can provide users of your own database applications access to this mode and also how you can extend it.

### Topics:

- [Provisioning High Contrast Mode](#)
- [Extending High Contrast Mode](#)

**See Also:** ["About High Contrast Mode"](#) on page E-3

## Provisioning High Contrast Mode

You can provision high contrast mode for user's of your own database applications in three ways:

- Use the page template #HIGH\_CONTRAST\_TOGGLE# substitution string.  
Add the #HIGH\_CONTRAST\_TOGGLE# substitution string to your page template and Oracle Application Express displays a link to the current page to turn on or off (or toggle) the mode. In other words, if you are in standard mode, this procedure generates a link to turn it on.
- Use APIs to control high contrast mode.  
Use the APEX\_UTIL APIs to control this mode. You may want to use the APIs if you only want to render the toggle in one place and not at the page template level, or if you want more control over the actual displayed link text. To learn more, see "APEX\_UTIL" in *Oracle Application Express API Reference*.
- Use the f?p syntax REQUEST attribute to enable and disable high contrast mode.

The general syntax for the f?p syntax REQUEST attribute is:

```
f?p=application:page:session:request:...
```

If the request is exactly SET\_SESSION\_HIGH\_CONTRAST\_ON or SET\_SESSION\_HIGH\_CONTRAST\_OFF then the session is put into or out of high contrast mode. For example:

```
<a href="f?p=100:1:&SESSION.:SET_SESSION_HIGH_CONTRAST_ON">Set High Contrast On</a>
```

## Extending High Contrast Mode

In addition to what this mode does by default as described in ["What Does High Contrast Mode Do?"](#) on page E-4, you can also control your own components. For example, you could conditionally include a high contrast specific CSS file, when running in high contrast mode.

To learn more, see "APEX\_UTIL" in *Oracle Application Express API Reference* details of the following functions: APEX\_UTIL.IS\_HIGH\_CONTRAST\_SESSION and APEX\_UTIL.IS\_HIGH\_CONTRAST\_SESSION\_YN.

## Creating Applications with Data Loading Capability

Applications with data loading capability enable end users to dynamically import data into a table within any schema to which the user has access. To import data, end users run a Data Load Wizard that uploads data from a file or copies and pastes data entered by the end user directly into the wizard.

The application developer creates the Data Load Wizard by creating a Data Load type page with the Create Page Wizard. The creation process allows developers to specify the upload table and its unique columns, table lookups and data transformation rules. See ["Creating a Data Load Wizard"](#) on page 17-53

The Create Page Wizard creates a Data Load Table that defines the Data Load Wizard. The developer edits the Data Load Wizard's definitions, such as table lookups and data transformation rules, by finding and clicking on the corresponding Data Load Table under the application's Shared Components. See ["Editing the Data Load Wizard"](#) on page 17-55.



To learn about using the Data Load wizard, see "About Uploading Data" in *Oracle Application Express End User Guide*.

**Topics:**

- [Creating a Data Load Wizard](#)
- [Editing the Data Load Wizard](#)

## Creating a Data Load Wizard

The Create Page Wizard is used by the developer to create a Data Load Wizard that is several pages. The Data Load Wizard can be defined to include:

- **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, define data transformation rules. If the import file includes column data with both upper and lowercase and the upload table requires all uppercase, define a data transformation rule to insert only uppercase into that column during data upload.
- **Table lookups** - If data exists in the import file that must be mapped to data that can be found 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** - End users may have issues with correctly identifying the columns to upload based on the table's column names. Therefore, you can define aliases for each column. These are displayed to the end user while uploading the spreadsheet data. If a list of values is created, the aliases is automatically picked up by the application during data column mapping. Otherwise, the application uses the table column names. Once created, the list of values can also be edited and a column can be removed from the list.
- **Manage Concurrency** - By default the last user to submit data, updates the record. This option gives the developer the ability to choose a column to track the record versions. This is particularly important when dealing with a table that is regularly updated by different users. Every time the user tries to upload data, the data loading feature uses this column to track the version of the record. If while uploading the value of this column is found to have changed, the record is flagged and not directly updated, instead letting the end user know before he or she makes any further action.

To create a Data Load Wizard:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Click **Create Page**.
4. Select **Data Loading** and click **Next**.
5. For Data Load Table, specify the following then click **Next**:

- Data Load Definition Name - Enter the name of this data load definition.
  - Owner - Select the owner of the data loading table.
  - Table Name - Select the table to use for data loading, also referred to as the upload table.
  - Unique Column 1 - Select the column name to use as the primary unique key column during the data load process. At least one unique key column is required.
  - Case Sensitive - If the selected column for Unique Column 1 is case sensitive, select **Yes**. Otherwise, select **No**.
  - Unique Column 2 - If the unique key definition of the data load table is a compound key consisting of 2 or more columns, select the column name to use as the second unique key column during the data load process.
  - Case Sensitive - If the selected column for Unique Column 2 is case sensitive, select **Yes**. Otherwise, select **No**.
  - Unique Column 3 - If the unique key definition of the data load table is a compound key consisting of 3 or more columns, select the column name to use as the third unique key column during the data load process.
  - Case Sensitive - If the selected column for Unique Column 3 is case sensitive, select **Yes**. Otherwise, select **No**.
6. For Transformation Rules (optional), specify the following then click **Add**.
- Sequence - Specify the sequence for the transformation rule. The sequence determines the order of execution.
  - Rule Name - Enter a name for this transformation rule.
  - Select Columns - Select the name of the column that requires transformation and move to the right.
  - Type - Select the type of transformation rule you want to perform.
7. Repeat the previous step for each transformation rule you want to add, then click **Next**.
8. For Table Lookups (optional), specify the following then click **Add**.
- Column Name - Select the column in the import file you want to replace with the associated value.
  - Owner - Select the owner of the lookup table.
  - Table Name - Select the name of the lookup table. This is the table containing the associated value to be used in place of the value from the import file.
  - Return Column - Select the name of the column returned by the table lookup. This value is inserted into the load column specified, and is generally the key value of the parent in a foreign key relationship. For example: DEPTNO.
  - Upload Column - Select the name of the column end users upload instead of the return column. This is the column that contains the display value from the lookup table. For example: DNAME.
  - Upload Column 2 - Select the name of the second column to be uploaded to uniquely identify the return column if necessary. It may be possible that Department IDs are different from SALES departments in NEW YORK and SAN FRANCISCO. To retrieve the value, you would need to pass second column which is LOCATION in this case.

- Upload Column 3 - Select the name of the third column to be uploaded to uniquely identify the return column if necessary.
- 9. Repeat the previous step for each Table Lookup you want to add, then click **Next**.  
The Page Attributes page appears providing a short description of each page of the Data Load Wizard being created.
- 10. For Pages Attributes, you can optionally change the default page names, page numbers and region names for each page of the data load wizard that is being created, then click **Next**.
- 11. For Tab Options, select the tab type for the wizard pages, and click **Next**.
- 12. For **Breadcrumb**, select the type of breadcrumb to be used by the data load wizard pages and click **Next**.
- 13. For Buttons and Branching, specify the branching for the buttons on the data load wizard pages and click **Next**.
- 14. Review the Confirm page and click **Create**.
- 15. Click **Edit Page** to modify the Data Load Wizard definitions, otherwise click **Run Page**, to test the Data Load Wizard.

## Editing the Data Load Wizard

The Add/Edit Data Load Table page enables you to modify the upload table column and unique key definitions, the Table Lookups and Transformation Rules. Table Lookups and Transformation Rules can be modified, added and removed.

To edit a Data Load Wizard:

1. On the Workspace home page, click the **Application Builder** icon.  
The Application Builder home page appears.
2. Select an application.  
The Application home page appears.
3. Click **Shared Components**.
4. Under Logic, click **Data Loading**.
5. Click the Data Load Definition you want to edit.  
The Data Load Table Details page appears.
6. Make changes to the following data load table details:
  - Data Load Table - Edit the data load table name and add, remove or edit unique columns.
  - Transformation Rules - Add, remove or edit transformation rules.
  - Table Lookups - Add, remove or edit table lookups.
  - Column Name Aliases - Edit the List of Values for Data Loading column aliases.
  - Manage Concurrency - Edit the column which is used as the concurrency management column by the data loading feature.
  - Comments - Edit comments for this data load table.
7. Click **Apply Changes**.

## Managing Component Settings

Use the Component Settings page to set application-level values for built-in Oracle Application Express components and installed plug-ins.

### Topics:

- [Editing Component Settings](#)
- [Viewing the Component Settings History Report](#)

## Editing Component Settings

To edit component settings:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

The Application home page appears.

3. Click **Shared Components**.

The Shared Components page appears.

4. Under User Interface, click **Component Settings**.

The Component Settings page displays as an interactive report. To customize the report, use the Search bar at the top of the page. To learn more, see "[Customizing Interactive Reports](#)" on page 9-4.

5. Edit the settings and click **Apply Changes**.

## Viewing the Component Settings History Report

You can view a report of modifications made to Oracle Application Express components and installed plug-ins on the Component Settings History page.

To view the Component Settings History report:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

The Application home page appears.

3. Click **Shared Components**.

The Shared Components page appears.

4. Under User Interface, click **Component Settings**.

5. 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. To learn more, see "[Customizing Interactive Reports](#)" on page 9-4.

---

## Managing Application Globalization

This section describes how to translate an application built in Application Builder.

### Topics:

- [About Translating an Application and Globalization Support](#)
- [Specifying the Primary Language for an Application](#)
- [Understanding the Translation Process](#)
- [Translating Messages](#)
- [Translating Data That Supports List of Values](#)
- [About Supported Globalization Codes](#)

**See Also:** "Viewing Installed Translations" in *Oracle Application Express Administration Guide*

### About Translating an Application and Globalization Support

You can develop applications in Application Builder that can run concurrently in different languages. A single Oracle database instance and Oracle Application Express can support multiple database sessions customized to support different languages.

In general, translating an application built in Application Builder involves the following steps:

- Map the primary and target application IDs
- Seed and export the text to a file for translation
- Translate the text in the file
- Apply the translated file
- Publish the translated file

**See Also:** "[Understanding the Translation Process](#)" on page 18-6

### Topics:

- [About Language Identification](#)
- [Rules for Translating Applications Built in Application Builder](#)
- [How Translated Applications Are Rendered](#)
- [About Translatable Components](#)

## About Language Identification

After you create an application, you specify a language preference on the Edit Globalization Attributes page. Then you select a primary application language and determine how the Application Express engine determines the application language. You can specify to have the application language based on the user's browser language preference, an application preference, or an item preference.

**See Also:** ["Specifying the Primary Language for an Application"](#) on page 18-4

## Rules for Translating Applications Built in Application Builder

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`.

## How Translated Applications Are Rendered

After Oracle Application Express determines the language for an application, the Application Express engine alters the database language for a specific page request. It then looks for a translated application in the appropriate language. If the Application Express 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. Oracle Application Express dynamically collects page attributes from either a base language application definition or an alternative application definition.

**See Also:** ["About Dynamic Translation Text Strings"](#) on page 18-3 and ["Translating Data That Supports List of Values"](#) on page 18-31

## About Translatable Components

When you build an application in Application Builder, you define a large number of declarative attributes such as field labels, region headings, page header text, and so on. Using the steps described in this section, you can make all the application definition attributes within your application translatable.

### About Shortcuts that Support Translatable Messages

Application 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.

**See Also:** ["Using Shortcuts"](#) on page 10-75

### About Messages

If your application includes PL/SQL regions or PL/SQL processes, you may 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 Oracle Application Express is translated.

**See Also:** ["Translating Messages"](#) on page 18-12

### 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.

**See Also:** ["Translating Data That Supports List of Values"](#) on page 18-31

### About Translating Region Titles

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. Navigate to the Page Definition. See ["About the Page Definition"](#) on page 8-1.
2. On the Page Definition, select the region title.  
The Edit Region page appears.
3. Select the **exclude title from translation** check box.

### About Translating Templates

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 check box on the Edit Page Template page.

To identify a template as translatable:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the Application home page, click **Shared Components**.
4. Under User Interface, select **Templates**.

The Templates page appears.

5. Locate the template you want to edit and select the template name.
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:** ["Customizing Templates"](#) on page 13-11 and ["Substitutions"](#) on page 7-20

## Specifying the Primary Language for an Application

Globalization attributes specify how the Application Express engine determines the primary language of an application.

To edit globalization attributes:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Click **Shared Components**.
4. Under Globalization, select **Globalization Attributes**.
5. From **Application Primary Language**, select the language in which the application is being developed.
6. From **Application Language Derived From**, specify how the Application Express engine determines (or derives) the application language. [Table 18–1](#) describes available options:

**Table 18–1 Application Language Derived From Options**

Option	Description
No NLS (Application not translated)	Select this option if the application will not be translated.
Application Primary Language	Determines the application's primary language based on the Application Primary Language attribute. (See step 5.)
Browser (use browser language preference)	Determines the application's primary language based on the user's browser language preference.
Application Preference (use FSP_LANGUAGE_PREFERENCE)	Determines the application's primary language based on a value defined using the APEX_UTIL.SET_PREFERENCE API. Select this option to maintain the selected language preference across multiple logins.  <b>See Also:</b> "SET_PREFERENCE Procedure" in <i>Oracle Application Express API Reference</i>
Item Preference (use item containing preference)	Determines the application's primary language based on an application-level item called FSP_LANGUAGE_PREFERENCE. Using this option requires Oracle Application Express to determine the appropriate language preference every time the user logs in.



**Table 18–1 (Cont.) Application Language Derived From Options**

Option	Description
Session	Determines the translated application language from the session setting. The Application Express session language can be set through either the APEX_UTIL.SET_SESSION_LANG procedure or by using the p_lang parameter of the "f" procedure in the URL

7. Configure other options as appropriate. To learn more about an attribute, click the item label.
8. Click **Apply Changes**.

**See Also:** ["Editing the Application Definition"](#) on page 7-14, ["Configuring Security Attributes"](#) on page 7-20, and ["About Supported Globalization Codes"](#) on page 18-32

## Using Format Masks for Items

The Application Express 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 Application Express 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

The following procedure describes how to edit item attributes for items having the source type of Database Column.

To edit item attributes:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. Select a page.  
The Page Definition appears.
4. Select an item.  
The Edit Page Item page appears.
5. Under Name, make a selection from the Display As list.
6. Under source, select or enter a format mask.

## 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. The same character set has to be configured in the corresponding database access descriptor (DAD) in mod\_plsql. UTF8 and AL32UTF8 are the character sets you can use to support almost all languages around the world.

## Understanding the Translation Process

To translate an application developed in Application 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.

### Topics:

- [Step 1: Map the Target Language](#)
- [Step 2: Seed and Download to a Translation File](#)
- [Step 3: Translate the XLIFF File](#)
- [Step 4: Upload and Apply a Translated XLIFF Document](#)
- [Step 5: Publish the Application](#)
- [Manually Editing a Translation](#)

**See Also:** ["Translating Messages"](#) on page 18-12 and ["Translating Data That Supports List of Values"](#) on page 18-31

### Step 1: Map the Target 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:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.The Translate page appears.
2. Click **Map your primary language application to a translated application**.  
The Mappings page appears.
3. Click **Create**.
4. On the Translation Application Mapping page:
  - Translation Application - Enter a unique integer value that identifies an application. The application ID must be unique on your instance of Oracle Application Express.
  - 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.

This attribute determines the virtual path for translated images. For example, if your primary language application had an image prefix of `/i/`, you could define additional virtual directories for other languages, such as `/i/de/` for German or `/i/es/` for Spanish.
5. Click **Create**.

**See Also:** ["Step 2: Seed and Download to a Translation File"](#) on page 18-7

## Step 2: Seed and Download to a Translation File

The second step is to seed the translation table and then export the translation text to a translation file.

### Topics:

- [Seeding Translatable Text](#)
- [Downloading an XLIFF File](#)

### 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:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.

The Translate page appears.

2. Select **Seed translatable text to translation repository**.
3. Select the appropriate target application.
4. Click **Seed**.

When completed, the following message displays:

Successfully seeded translatable text.

### Downloading an XLIFF File

Once the translation mappings are established the translatable text within the application is seeded into a translation repository. This repository can then be exported to an XML Localization Interchange File Format (XLIFF) file for translation.

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.

---

**Note:** XML Localization Interchange File Format (XLIFF) is an XML-based format for exchanging localization data. For information about the XLIFF or to view the XLIFF specification, see:

<http://www.xliff.org>

---

**Downloading a XLIFF file for an Application** To download an XLIFF file for an complete application:

1. Seed the translatable text. See ["Seeding Translatable Text"](#) on page 18-7.
2. On the Translate page, click **Download XLIFF translation files from translation repository**.
3. 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**.
4. Follow the on-screen instructions.

**Downloading an XLIFF File for an Application Page** To download an XLIFF file for a specific page:

1. Seed the translatable text as described in ["Seeding Translatable Text"](#) on page 18-7.
2. On the Translate page, click **Download XLIFF translation files from translation repository**.
3. 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**.
4. Follow the on-screen instructions.

**About Including XLIFF Target Elements** When Oracle Application Express 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.

## 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. Oracle Application Express 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. Oracle Application Express supports incremental translation so that application development can be done in parallel with

the translation. An XLIFF file can be translated and uploaded to Oracle Application Express even when only part of the XLIFF file is translated. For strings that have no translation in the corresponding translated application, Oracle Application Express uses the corresponding ones in the primary language.

**See Also:** For more information about the XLIFF, or to view the XLIFF specification, see:

<http://www.xliff.org>

## 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.

### Topics:

- [Uploading a Translated XLIFF Document](#)
- [Applying an Uploaded XLIFF Document](#)
- [Deleting an Uploaded XLIFF Document](#)

### Uploading 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 **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.

The Translate page appears.
2. Click **Upload and apply XLIFF translation file to translation repository**.  
The XLIFF Translation Files page appears.
3. Click **Upload Files**.
4. On the XLIFF Upload page:
  - a. Enter a description.
  - b. Locate the file to be uploaded.
  - c. Click **Upload**.

The uploaded document appears on the XLIFF Translation Files page.

### 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 Application Express 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.

**See Also:** ["Specifying the Primary Language for an Application"](#)  
on page 18-4

To apply a translated XLIFF document:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.

The Translate Application page appears.

2. Click **Upload and apply XLIFF translation file to translation repository**.

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 ["Step 5: Publish the Application"](#) on page 18-11.

### Deleting 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 **Application Builder** icon.
    - b. Select an application.
    - c. Click **Shared Components**.
    - d. Under Globalization, click **Translate Application**.
- The Translate page appears.
2. Click **Upload and apply XLIFF translation file to translation repository**.
- The XLIFF Translation Files page appears.
3. In the XLIFF Files repository, select the check box to the left of the Filename column.
  4. Click **Delete Checked**.

**See Also:** ["Specifying the Primary Language for an Application"](#)  
on page 18-4

## 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.

**See Also:** ["Specifying the Primary Language for an Application"](#) on page 18-4

To publish an application:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.

The Translate Application 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 Application Builder home page. Instead, use the Application Navigate list on the left side of the page.

Note that in order for a translated application to appear in Application Builder, you must ensure that you have correctly configured the application Globalization attributes.

## 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:

1. Map the target language. See ["Step 1: Map the Target Language"](#) on page 18-6.
2. Seed the translatable text. See ["Seeding Translatable Text"](#) on page 18-7.
3. Navigate to the Translatable Text:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.
4. Under Translation Utilities, click **Manually Edit 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 learn more, see ["Customizing Interactive Reports"](#) on page 9-4.
7. To edit translatable text:
  - a. Click the **Edit** icon.  
The Translatable Text page appears.
  - b. In Translate to Text, enter the appropriate text.
  - c. Click **Apply Changes**
8. To access a Grid Edit page:
  - a. Click **Grid Edit**.  
The Translatable Text - Grid Edit page appears.
  - b. In Translate To, enter the appropriate text.
  - c. Click **Apply Changes**

## Translating Messages

You may need to translate messages if your application:

- Includes PL/SQL regions or PL/SQL processes or calls PL/SQL package, procedures, 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 Oracle Application Express is translated. If it does, you may need to translate messages used in reports.

### Topics:

- [Translating Messages Used in PL/SQL Procedures](#)
- [Translating Messages Used Internally by Oracle Application Express](#)

## 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 `APEX_LANG.MESSAGE` API to translate the messages from PL/SQL stored procedures, functions, triggers, or packaged procedures and functions.

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 **Application 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:



- a. Name - Enter a name to identify the message.
- b. Language - Select the language for which the message would be used.
- c. 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**.

### About the APEX\_LANG.MESSAGE API

Use the APEX\_LANG.MESSAGE API to translate text strings (or messages) generated from PL/SQL stored procedures, functions, triggers, packaged procedures, and functions.

#### Syntax

```
APEX_LANG.MESSAGE (
    p_name      IN   VARCHAR2 DEFAULT NULL,
    p0          IN   VARCHAR2 DEFAULT NULL,
    p1          IN   VARCHAR2 DEFAULT NULL,
    p2          IN   VARCHAR2 DEFAULT NULL,
    ...
    p9          IN   VARCHAR2 DEFAULT NULL,
    p_lang      IN   VARCHAR2 DEFAULT NULL)
RETURN VARCHAR2;
```

#### Parameters

[Table 18–2](#) describes the parameters available in the APEX\_LANG.MESSAGE API.

**Table 18–2 APEX\_LANG.MESSAGE Parameters**

Parameter	Description
p_name	Name of the message as defined in Oracle Application Express.
p0	Dynamic substitution value: p0 corresponds to 0% in the message; p1 corresponds to 1% in the message; p2 corresponds to 2% in the message, and so on.
...	
p9	
p_lang	Language code for the message to be retrieved. If not specified, Oracle Application Express uses the current language for the user as defined in the Application Language Derived From attribute.
<b>See Also:</b> <a href="#">"Specifying the Primary Language for an Application"</a> on page 18-4	

#### Example

The following example assumes you have defined a message called GREETING\_MSG in your application in English as Good morning%0 and in German as Guten Tag%1. The following example demonstrates how you could invoke this message from PL/SQL:

```
BEGIN
```

```
--  
-- Print the greeting  
--  
APEX_LANG.MESSAGE('GREETING_MSG', V('APP_USER'));  
END;
```

How the `p_lang` attribute is defined depends on how the Application Express engine derives the Application Primary Language. For example, if you run the application in German and the previous call is made to the `APEX_LANG.MESSAGE` API, the Application Express engine first looks for a message called `GREETING_MSG` with a `LANG_CODE` of `de`. If it does not find anything, then it reverts to the Application Primary Language attribute. If it still does not find anything, the Application Express engine looks for a message by this name with a language code of `en-us`.

**See Also:** ["Specifying the Primary Language for an Application"](#) on page 18-4 for information about the Application Primary Language attribute and `APEX_LANG` in the *Oracle Application Express API Reference*

## Translating Messages Used Internally by Oracle Application Express

Oracle Application Express is translated into German, Spanish, French, Italian, Japanese, Korean, Brazilian Portuguese, Simplified Chinese, and Traditional Chinese. If your application uses a language that is not among the ten languages into which Oracle Application Express is translated, you must translate messages displayed by the Application Express reporting engine.

For example, if you develop a Russian application and want to include report messages, such as pagination, in Russian, you must translate the strings used in messages displayed in reports.

### Topics:

- [Creating Text Messages](#)
- [Editing Text Messages](#)
- [About Internal Messages Requiring Translation](#)
- [About Interactive Report Messages Requiring Translation](#)

### Creating Text Messages

To create a translation message:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application 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. See ["About Internal Messages Requiring Translation"](#) on page 18-15 and ["About Interactive Report Messages Requiring Translation"](#) on page 18-17.
  - b. Language - Select the language for which the message will be used.

- c. **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**.

### Editing Text Messages

To edit text messages:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application 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 **Add Text Message** at the bottom of the page.

### About Internal Messages Requiring Translation

Table 18–3 lists the internal messages that require translation.

**Table 18–3 Internal Messages Requiring Translation**

Message Name	English Text
APEX.AUTHENTICATION.LOGIN_THROTTLE.COUNTER	Please wait <span id="apex_login_throttle_sec">%0</span> seconds to login again.
APEX.AUTHENTICATION.LOGIN_THROTTLE.ERROR	The login attempt has been blocked.
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

**Table 18–3 (Cont.) Internal Messages Requiring Translation**

Message Name	English Text
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_MIN_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.FILE_BROWSE.DOWNLOAD_LINK_TEXT	Download
APEX.GO_TO_ERROR	Go to error
APEX.ITEM_TYPE.SLIDER.VALUE_NOT_BETWEEN_MIN_MAX	#LABEL# is not between the valid range of %0 and %1.
APEX.ITEM_TYPE.SLIDER.VALUE_NOT_MULTIPLE_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.NUMBER_FIELD.VALUE_GREATER_MAX_VALUE	#LABEL# is greater than specified maximum %0.
APEX.NUMBER_FIELD.VALUE_INVALID	#LABEL# must be Numeric.
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_ITEM_IS_REQUIRED	#LABEL# must have some value.
APEX.POPUP_LOV.ICON_TEXT	Popup List of Values: %0.
APEX.REGION.JQM_LIST_VIEW.SEARCH	Search
APEX.REGION.JQM_LIST_VIEW.LOAD_MORE	Load more
FLOW.SINGLE_VALIDATION_ERROR	1 error has occurred.
FLOW.VALIDATION_ERROR	%0 errors have occurred.
INVALID_CREDENTIALS	Invalid Login Credentials .
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
REPORT_TOTAL	report total
RESET	reset pagination
SINCE_DAYS_AGO	%0 days ago
SINCE_DAYS_FROM_NOW	%0 days from now

**Table 18–3 (Cont.) Internal Messages Requiring Translation**

Message Name	English Text
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
WWV_FLOW_UTILITIES.CAL	Calendar
WWV_FLOW_UTILITIES.CLOSE	Close
WWV_FLOW_UTILITIES.OK	Ok
WWV_RENDER_REPORT3.FOUND_BUT_NOT_DISPLAYED	Minimum row requested: %0, rows found but not displayed: %1
WWV_RENDER_REPORT3.SORT_BY_THIS_COLUMN	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

### About Interactive Report Messages Requiring Translation

Table 18–4 lists the interactive report messages that require translation.

**Table 18–4 Interactive Report Messages Requiring Translation**

Message Name	English Text
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_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

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_SUBSCRIPTION	Subscription
4150_COLUMN_NUMBER	Column %0
APEXIR_3D	3D
APEXIR_ACTIONS	Actions
APEXIR_ACTIONS_MENU	Actions Menu
APEXIR_ADD	Add
APEXIR_ADD_SUBSCRIPTION	Add Subscription
APEXIR_AGGREGATE	Aggregate
APEXIR_AGGREGATE_DESCRIPTION	Aggregates are displayed after each control break and at the end of the report.
APEXIR_AGGREGATION	Aggregation
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_ALL	All
APEXIR_ALL_COLUMNS	All Columns
APEXIR_ALTERNATIVE	Alternative
APEXIR_ALTERNATIVE_DEFAULT_NAME	Alternative Default: %0
APEXIR_AND	and
APEXIR_APPLY	Apply
APEXIR_ASCENDING	Ascending
APEXIR_AS_OF	As of %0
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...

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_CHART_TYPE	Chart Type
APEXIR_CHOOSE_DOWNLOAD_FORMAT	Choose report download format
APEXIR_CLEAR	clear
APEXIR_COLUMN	Column
APEXIR_COLUMNS	Columns
APEXIR_COLUMN_HEADING	Column Heading
APEXIR_COLUMN_HEADING_MENU	Column Heading Menu
APEXIR_COLUMN_INFO	Column Information
APEXIR_COMPARISON_CONTAINS	contains
APEXIR_COMPARISON_DOESNOT_CONTAIN	does not contain
APEXIR_COMPARISON_IN	in
APEXIR_COMPARISON_ISNOT_IN_LAST	is not in the last
APEXIR_COMPARISON_ISNOT_IN_NEXT	is not in the next
APEXIR_COMPARISON_IS_IN_LAST	is in the last
APEXIR_COMPARISON_IS_IN_NEXT	is in the next
APEXIR_COMPARISON_IS_NOT_NULL	is not null
APEXIR_COMPARISON_IS_NULL	is null
APEXIR_COMPARISON_LIKE	like
APEXIR_COMPARISON_NOT_IN	not in
APEXIR_COMPARISON_NOT_LIKE	not like
APEXIR_COMPARISON_REGEX_LIKE	matches regular expression
APEXIR_COMPUTATION	Computation
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_BREAKS	Control Breaks
APEXIR_COUNT_DISTINCT	Count Distinct
APEXIR_COUNT_DISTINCT_X	Count Distinct
APEXIR_COUNT_X	Count %0
APEXIR_DAILY	Daily
APEXIR_DATA_AS_OF	Report data as of %0 minutes ago.
APEXIR_DATE	Date
APEXIR_DAY	Day
APEXIR_DEFAULT	Default

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
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_REPORT	Delete Report
APEXIR_DESCENDING	Descending
APEXIR_DESCRIPTION	Description
APEXIR_DETAIL_VIEW	Single Row View
APEXIR_DIRECTION	Direction
APEXIR_DISABLE	Disable
APEXIR_DISABLED	Disabled
APEXIR_DISPLAY	Display
APEXIR_DISPLAYED	Displayed
APEXIR_DISPLAYED_COLUMNS	Displayed Columns
APEXIR_DISPLAY_IN_REPORT	Display in Report
APEXIR_DOWN	Down
APEXIR_DOWNLOAD	Download
APEXIR_DO_NOT_AGGREGATE	- Do not aggregate -
APEXIR_DO_NOT_DISPLAY	Do Not Display
APEXIR_EDIT_ALTERNATIVE_DEFAULT	Edit Alternative Default
APEXIR_EDIT_CHART	Edit Chart Settings
APEXIR_EDIT_CHART2	Edit Chart
APEXIR_EDIT_FILTER	Edit Filter
APEXIR_EDIT_GROUP_BY	Edit Group By
APEXIR_EDIT_HIGHLIGHT	Edit Highlight
APEXIR_EMAIL	Email
APEXIR_EMAIL_ADDRESS	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_SEE_ATTACHED	See attached.
APEXIR_EMAIL_SUBJECT	Subject
APEXIR_EMAIL_TO	To



**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_ENABLE	Enable
APEXIR_ENABLED	Enabled
APEXIR_ENABLE_DISABLE_ALT	Enable/Disable
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_FILTERS	Filters
APEXIR_FILTER_TYPE	Filter Type
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 Mask
APEXIR_FORMAT_MASK	Format
APEXIR_FUNCTION	Function
APEXIR_FUNCTIONS_OPERATORS	Functions / Operators
APEXIR_FUNCTIONS	Functions
APEXIR_GO	Go
APEXIR_GROUP_BY	Group By
APEXIR_GROUP_BY_COLUMN	Group By Column
APEXIR_GREEN	green
APEXIR_HCOLUMN	Horizontal Column
APEXIR_HELP	Help
APEXIR_HELP_01	<p>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.</p> <p>&lt;p/&gt;</p> <p>An Interactive Report can be customized in three ways: the search bar, actions menu and column heading menu.</p>

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_HELP_ACTIONS_MENU	The actions menu is used to customize the display of your Interactive Report.
APEXIR_HELP_AGGREGATE	<p>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.</p> <p>&lt;p/&gt;</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Aggregation&lt;/b&gt; allows you to select a previously defined aggregation to edit.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Function&lt;/b&gt; is the function to be performed (e.g. SUM, MIN).&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Column&lt;/b&gt; is used to select the column to apply the mathematical function to. Only numeric columns will be displayed.&lt;/li&gt;&lt;/ul&gt; </li></ul>
APEXIR_HELP_CHART	<p>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.</p> <p>&lt;p/&gt;</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Chart Type&lt;/b&gt; identifies the chart type to include. Select from horizontal bar, vertical bar, pie or line.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Label&lt;/b&gt; allows you to select the column to be used as the label.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Axis Title for Label&lt;/b&gt; is the title that will display on the axis associated with the column selected for Label. This is not available for pie chart.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Value&lt;/b&gt; 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.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Axis Title for Value&lt;/b&gt; is the title that will display on the axis associated with the column selected for Value. This is not available for pie chart.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Function&lt;/b&gt; is an optional function to be performed on the column selected for Value.&lt;/li&gt;&lt;/ul&gt; </li></ul>

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_HELP_COLUMN_HEADING_MENU	<p>Clicking on any column heading exposes a column heading menu.</p> <p>&lt;p/&gt;</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Sort Ascending icon&lt;/b&gt; sorts the report by the column in ascending order.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Sort Descending icon&lt;/b&gt; sorts the report by the column in descending order.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Hide Column&lt;/b&gt; hides the column.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Break Column&lt;/b&gt; creates a break group on the column. This pulls the column out of the report as a master record.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Column Information&lt;/b&gt; displays help text about the column, if available.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Text Area&lt;/b&gt; 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%').</li> <li>&lt;li&gt;&lt;b&gt;List of Unique Values&lt;/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').&lt;/li&gt;&lt;/ul&gt;</li> </ul>

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_HELP_COMPUTE	<p>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).</p> <p>&lt;p/&gt;</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Computation&lt;/b&gt; allows you to select a previously defined computation to edit.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Column Heading&lt;/b&gt; is the column heading for the new column.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Format Mask&lt;/b&gt; is an Oracle format mask to be applied against the column (e.g. S9999).&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Format Mask&lt;/b&gt; is an Oracle format mask to be applied against the column (e.g. S9999).&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Computation&lt;/b&gt; is the computation to be performed. Within the computation, columns are referenced using the aliases displayed.&lt;/li&gt;</li> </ul> <p>&lt;/ul&gt;</p> <p>&lt;p/&gt;</p> <p>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.</p> <p>&lt;p/&gt;</p> <p>An example computation to display Total Compensation is:</p> <p>&lt;p/&gt;</p> <pre>&lt;pre&gt;CASE WHEN A = 'SALES' THEN B + C ELSE B END&lt;/pre&gt;</pre> <p>(where A is ORGANIZATION, B is SALARY and C is COMMISSION)</p>
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 18–4 (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_HIGHLIGHT	<p>Highlighting allows you to define a filter. The rows that meet the filter are highlighted using the characteristics associated with the filter.</p> <p>&lt;p/&gt;</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Name&lt;/b&gt; is used only for display.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Sequence&lt;/b&gt; identifies the sequence in which the rules will be evaluated.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Enabled&lt;/b&gt; identifies if the rule is enabled or disabled.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Highlight Type&lt;/b&gt; identifies whether the Row or Cell should be highlighted. If Cell is selected, the column referenced in the Highlight Condition is highlighted.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Background Color&lt;/b&gt; is the new color for the background of the highlighted area.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Text Color&lt;/b&gt; is the new color for the text in the highlighted area.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Highlight Condition&lt;/b&gt; defines your filter condition.&lt;/li&gt;&lt;/ul&gt;</li> </ul>
APEXIR_HELP_REPORT_SETTINGS	<p>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.</p> <p>&lt;p/&gt;</p> <p>For each report setting, you can:</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Edit&lt;/b&gt; by clicking the name.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Disable/Enable&lt;/b&gt; by unchecking or checking the Enable/Disable check box. This is used to temporarily turn off and on the setting.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Remove&lt;/b&gt; by click the Remove icon. This permanently removes the setting.&lt;/li&gt;&lt;/ul&gt;</li> </ul> <p>&lt;p/&gt;</p> <p>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.</p>

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_HELP_RESET	Resets the report back to the default settings, removing any customizations that you have made.
APEXIR_HELP_SAVE_REPORT	Saves the customized report for future use. You provide a name and an optional description.
APEXIR_HELP_SEARCH_BAR	<p>At the top of each report page is a search region. The region provides the following features:</p> <p>&lt;p/&gt;</p> <ul style="list-style-type: none"> <li>&lt;li&gt;&lt;b&gt;Select columns icon&lt;/b&gt; allows you to identify which column to search (or all).&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Text area&lt;/b&gt; allows for case insensitive search criteria (no need for wild cards).&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Rows&lt;/b&gt; selects the number of records to display per page.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;[Go] button&lt;/b&gt; executes the search.&lt;/li&gt;</li> <li>&lt;li&gt;&lt;b&gt;Actions Menu icon&lt;/b&gt; displays the actions menu (discussed next).&lt;/li&gt;&lt;/ul&gt;</li> </ul> <p>&lt;p/&gt;</p> <p>Please note that all features may not be available for each report.</p>
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_HIDE_COLUMN	Hide Column
APEXIR_HIGHLIGHT	Highlight
APEXIR_HIGHLIGHTS	Highlights
APEXIR_HIGHLIGHT_CONDITION	Highlight Condition
APEXIR_HIGHLIGHT_TYPE	Highlight Type
APEXIR_HIGHLIGHT_WHEN	Highlight When
APEXIR_INTERACTIVE_REPORT_HELP	Interactive Report Help
APEXIR_INVALID	Invalid
APEXIR_INVALID_COMPUTATION	Invalid computation expression. %0
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

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_LABEL_AXIS_TITLE	Axis Title for Label
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.
APEXIR_MAX_X	Maximum %0
APEXIR_MAX_ROW_CNT	This query returns more then %0 rows, please filter your data to ensure complete results.
APEXIR_MEDIAN_X	Median %0
APEXIR_MIN_AGO	%0 minutes ago
APEXIR_MIN_X	Minimum %0
APEXIR_MONTH	Month
APEXIR_MONTHLY	Monthly
APEXIR_MORE_DATA	More Data
APEXIR_MOVE	Move
APEXIR_MOVE_ALL	Move All
APEXIR_NAME	Name
APEXIR_NEW_AGGREGATION	New Aggregation
APEXIR_NEW_CATEGORY	- New Category -
APEXIR_NEW_COMPUTATION	New Computation
APEXIR_NEXT	&gt;
APEXIR_NEXT_DAY	Next Day
APEXIR_NEXT_HOUR	Next Hour
APEXIR_NEXT_MONTH	Next Month
APEXIR_NEXT_WEEK	Next Week
APEXIR_NEXT_X_DAYS	Next %0 Days
APEXIR_NEXT_X_HOURS	Next %0 Hours
APEXIR_NEXT_X_YEARS	Next %0 Years
APEXIR_NEXT_YEAR	Next Year
APEXIR_NO	No

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_NO_END_DATE	- No End Date -
APEXIR_NONE	- None -
APEXIR_NO_AGGREGATION_DEFINED	No aggregation defined.
APEXIR_NO_COLUMN_INFO	No column information available.
APEXIR_NO_COMPUTATION_DEFINED	No computation defined.
APEXIR_NULLS_ALWAYS_FIRST	Nulls Always First
APEXIR_NULLS_ALWAYS_LAST	Nulls Always Last
APEXIR_NULL_SORTING	Null Sorting
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_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_PREVIOUS	&lt;
APEXIR_PRIMARY	Primary
APEXIR_PRIMARY_REPORT	Primary Report
APEXIR_PRIVATE	Private
APEXIR_PUBLIC	Public
APEXIR_RED	red
APEXIR_REMOVE	Remove
APEXIR_REMOVE_AGGREGATE	Remove Aggregate
APEXIR_REMOVE_ALL	Remove All
APEXIR_REMOVE_CONTROL_BREAK	Remove Control Break
APEXIR_REMOVE_FILTER	Remove Filter
APEXIR_REMOVE_FLASHBACK	Remove Flashback
APEXIR_REMOVE_HIGHLIGHT	Remove Highlight
APEXIR_RENAME_REPORT	Rename Report
APEXIR_REPORT	Report
APEXIR_REPORTS	Reports
APEXIR_REPORT_DOES_NOT_EXIST	Report does not exist.
APEXIR_REPORT_SETTINGS	Report Settings
APEXIR_REPORT_VIEW	&lt; Report View



**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_RESET	Reset
APEXIR_RESET_CONFIRM	Restore report to the default settings.
APEXIR_ROW	Row
APEXIR_ROWS	Rows
APEXIR_ROW_OF	Row %0 of %1
APEXIR_ROW_ORDER	Row Order
APEXIR_ROWS_PER_PAGE	Rows Per Page
APEXIR_ROW_TEXT_CONTAINS	Row text contains
APEXIR_SAVE	Save
APEXIR_SAVED_REPORT	Saved Report
APEXIR_SAVED_REPORT_MSG	Saved Report = "%0"
APEXIR_SAVE_AS_DEFAULT	Save as Default
APEXIR_SAVE_DEFAULT_CONFIRM	The current report settings are used as the default for all users.
APEXIR_SAVE_REPORT	Save Report
APEXIR_SEARCH	Search
APEXIR_SEARCH_BAR	Search Bar
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_SORT_COLUMN	- Select Sort Column -
APEXIR_SELECT_VALUE	Select Value
APEXIR_SEQUENCE	Sequence
APEXIR_SORT	Sort
APEXIR_SORT_ASCENDING	Sort Ascending
APEXIR_SORT_COLUMN	Sort Column
APEXIR_SORT_DESCENDING	Sort Descending
APEXIR_SPACE_AS_IN_ONE_EMPTY_STRING	space
APEXIR_STATUS	Status
APEXIR_SUBSCRIPTION_ENDING	Ending
APEXIR_SUBSCRIPTION_STARTING_FROM	Starting From
APEXIR_SUM_X	Sum %0
APEXIR_TEXT_COLOR	Text Color
APEXIR_TIME_DAYS	days

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
APEXIR_TIME_HOURS	hours
APEXIR_TIME_MINS	minutes
APEXIR_TIME_MONTHS	months
APEXIR_TIME_WEEKS	weeks
APEXIR_TIME_YEARS	years
APEXIR_TOP	Top
APEXIR_UNAUTHORIZED	Unauthorized
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_REPORT	View Report
APEXIR_WEEK	Week
APEXIR_WEEKLY	Weekly
APEXIR_WORKING_REPORT	Working Report
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

**Table 18–4 (Cont.) Interactive Report Messages Requiring Translation**

Message Name	English Text
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

## 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.

To define a dynamic translation:

1. Navigate to the Translate Application page:
  - a. On the Workspace home page, click the **Application Builder** icon.
  - b. Select an application.
  - c. Click **Shared Components**.
  - d. Under Globalization, click **Translate Application**.
2. On the Translate Application page, select **Optionally identify any data that needs to be dynamically translated to support SQL based lists of values**.
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 - Enter the translated text.
4. Click **Create**.

### APEX\_LANG.LANG API

#### Syntax

```
APEX_LANG.LANG (
    p_primary_text_string    IN    VARCHAR2 DEFAULT NULL,
```

```
p0                IN    VARCHAR2 DEFAULT NULL,  
p1                IN    VARCHAR2 DEFAULT NULL,  
p2                IN    VARCHAR2 DEFAULT NULL,  
...  
p9                IN    VARCHAR2 DEFAULT NULL,  
p_primary_language IN    VARCHAR2 DEFAULT NULL)  
RETURN VARCHAR2;
```

Parameters

Table 18–5 describes the parameters available in the APEX\_LANG.LANG API.

Table 18–5 APEX\_LANG.LANG Parameters

Parameter	Description
p_primary_string	Text string of the primary language. This is the value of the Translate From Text in the dynamic translation.
p0	Dynamic substitution value: p0 corresponds to 0% in the translation string; p1 corresponds to 1% in the translation string; p2 corresponds to 2% in the translation string, and so on.
...	
p9	
p_primary_language	Language code for the message to be retrieved. If not specified, Oracle Application Express uses the current language for the user as defined in the Application Language Derived From attribute.  <b>See Also:</b> "Specifying the Primary Language for an Application" on page 18-4

Example

Suppose you have a table that defines all primary colors. You could define a dynamic message for each color and then apply the LANG function to the defined values in a query. For example:

```
SELECT APEX_LANG.LANG(color)  
FROM my_colors
```

If you were running the application in German, RED was a value for the color column in the my\_colors table, and you defined the German word for red, the previous example would return ROT.

**See Also:** APEX\_LANG in the *Oracle Application Express API Reference*

About 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.

**See Also:** "Specifying the Primary Language for an Application" on page 18-4

NLS\_LANGUAGE and NLS\_TERRITORY determine the default presentation of numbers, dates, and currencies.

Table 18–6 describes the globalization codes in Oracle Application Express.

**Table 18–6 Oracle Application Express Globalization Codes**

<b>Language Name</b>	<b>Language Code</b>	<b>NLS_LANGUAGE</b>	<b>NLS_TERRITORY</b>
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
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

**Table 18–6 (Cont.) Oracle Application Express Globalization Codes**

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
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 (Luxembourg)	de-lu	GERMAN	LUXEMBOURG
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

**Table 18–6 (Cont.) Oracle Application Express Globalization Codes**

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
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
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 (Columbia)	ec-co	LATIN AMERICAN SPANISH	COLUMBIA
Spanish (Costa Rica)	es-cr	LATIN AMERICAN SPANISH	COSTA RICA
Spanish (Dominican Republic)	es-do	LATIN AMERICAN SPANISH	PUERTO RICO

**Table 18–6 (Cont.) Oracle Application Express Globalization Codes**

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
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



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## About Item Types

When you create an item, you specify an item type. Once you create an item, these types appear on the Display As list on the Edit Page Item page. [Table A-1, "Available Item Types"](#) on page A-2 describes available item types.

**See Also:** ["Understanding Page-Level Items"](#) on page 7-55

### Controlling Item Functionality by Editing Item Attributes

You can control how a page item works by editing the page item's attributes. Each item type in [Table A-1, "Available Item Types"](#) lists important attributes that control item functionality. To learn more about editing attributes, see ["Editing Page-Level Items"](#) on page 7-62

## Available Item Types

When you create an item, you specify an item type. Once you create an item, these types appear on the Display As list on the Edit Page Item page. This section describes available item types and important item attributes that control item behavior.

**Table A–1 Available Item Types**

Item Type	Description
Check Box	<p>Displayed using a list of values. A list of values is required for items displayed as check boxes. The value corresponding to a checked box is returned in a single colon-delimited string.</p> <p>The following example demonstrates how to create a single check box that returns YES. This example would display both a check box and a field label.</p> <pre>SELECT NULL display_text, 'YES' return_value FROM DUAL;</pre> <p>This example includes the additional text <i>Click to select</i>.</p> <pre>SELECT 'Click to select' display_text, 'YES' return_value FROM DUAL;</pre> <p><b>See Also:</b> "APEX_UTIL" in <i>Oracle Application Express API Reference</i> for information about breaking up returned values</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Number of Checkbox Columns</b> - Defines the number of layout columns to use to display the values defined in the List of Values.</li> </ul> <p><b>See Also:</b> "<a href="#">Creating a Cascading List of Values</a>" on page 7-60</p>
Color Picker	<p>Renders as a text field with an icon. When the user clicks the icon, a popup window appears. When the user makes a selection from the palette, the HTML value for the color selected (for example, #000000 for black) is returned.</p> <p><b>Note:</b> When creating a new item of this type, first select <b>PopUp List of Values</b> and then <b>Color Picker</b>.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> </ul>
Date Picker	<p>Displays a text field with a Calendar icon next to it. When clicked, this icon displays a small calendar where the user can select a date and a time (optional).</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b>- If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted.</li> <li>▪ <b>Format Mask</b> - Identify the date format mask used by the item type. You can use substitution syntax to reference a dynamic format mask from an application or page item.</li> <li>▪ <b>Highlighted Date</b> - Enter a date, which should be highlighted in the Date picker. See item Help for more details.</li> <li>▪ <b>Minimum Date</b> - Enter a minimum selectable date.</li> <li>▪ <b>Maximum Date</b> - Enter the maximum selectable date.</li> <li>▪ <b>Show</b> - Determines when the date picker displays.</li> <li>▪ <b>Show other Months</b> - Display dates in other months (non-selectable) at the start or end of the current month.</li> <li>▪ <b>Navigation List</b> - Change the month, year or both using a select list.</li> </ul>

**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Date Picker (Classic)	<p>Displays a text field with a Calendar icon next to it. When clicked, this icon displays a small calendar where the user can select a date and a time (optional).</p> <p>If the format you need is not included in the Display As list, select <b>Date Picker (use application format mask)</b> or <b>Date Picker (use item format mask)</b>. The latter uses the value from the Format Mask field in the Source section of the Edit Page Item page.</p>
Display Image	<p>Enables the display of images stored in an image URL stored in another page item or in a BLOB column. To alter where the image is stored, edit the item and configure the Based on attribute. Options include:</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>■ <b>Based On</b> - Determines where the item is retrieved from. To learn more, see item Help.</li> <li>■ <b>Alternative Text Column</b> - If specified, the returned text is used as an alternative text for the image.</li> <li>■ <b>Filename Column</b> - If specified, the returned file name is used by the browser in the Save As dialog when the user tries to save the image.</li> <li>■ <b>BLOB Last Updated Column</b> - If specified, the column is used for browser caching. It identifies if the image changed since the last browser request. If not entered, no caching is done. Note: This attribute is case sensitive and the column must be of type DATE.</li> </ul>
Display Only	<p>Displays the item as display only text.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>■ <b>Save Session State</b> - Stores the current value in session state when the page gets submitted.</li> <li>■ <b>Based On</b> - Specifies what gets displayed in the field. Options include: <ul style="list-style-type: none"> <li><b>Page Item Value</b> - The current value of the page item displays.</li> <li><b>Display Value of List of Values</b> - The current value of the page item maps to a different display value using a list of values.</li> <li><b>Output of PL/SQL Code</b> - The specified PL/SQL code takes care of emitting the necessary output for the page item.</li> </ul> </li> <li>■ <b>Show Line Breaks</b> - Select Yes to convert line breaks in the display value to an HTML line break and display them in HTML output.</li> </ul>

**Table A-1 (Cont.) Available Item Types**

Item Type	Description
File Browse	<p>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.</p> <p><b>See Also:</b> <a href="#">"Securing File Uploads"</a> on page 15-25</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted.</li> <li>▪ <b>Storage Type</b> - Identify where the uploaded file is stored.</li> <li>▪ <b>MIME Type Column</b> - Specify the name of the column where the MIME type of the uploaded file should be stored.</li> <li>▪ <b>Filename Column</b> - Specify the name of the column where the file name of the uploaded file should be stored.</li> <li>▪ <b>Character Set Column</b> - Specify the name of the column where the character set of the uploaded file should be stored.</li> <li>▪ <b>BLOB Last Updated Column</b> - Specify the name of the column to update with the current time stamp when a file is uploaded.</li> <li>▪ <b>Display Download Link</b> - Select <b>Yes</b> to display the download link next to the Browse button.</li> <li>▪ <b>Download Link Text</b> - Text used for the download link.</li> <li>▪ <b>Content Disposition</b> - Determines if the downloaded content is displayed inline within the Browser window or if a Open dialog displays.</li> </ul>
Hidden	<p>Creates a hidden page item.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value is Protected</b> - Select Yes to prevent hidden values from being manipulated when a page is posted.</li> </ul>
List Manager	<p>Based on a list of values. This item enables you to manage a list of items by selecting and adding to a list. The list of values display as a popup.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted.</li> <li>▪ <b>Fetch</b> - Specifies if data is displayed when the Popup LOV is opened by a user.</li> </ul> <p><b>See Also:</b> <a href="#">"Creating a Cascading List of Values"</a> on page 7-60</p>
Number Field	<p>Displays a number field. You can configure number range checks for values entered by configuring the Minimum Value and Maximum Value attributes. This item type automatically checks if the entered value is a number. No extra validations are required.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted.</li> <li>▪ <b>Format Mask</b> - Identify the number format mask used by the item type. You can use substitution syntax to reference a dynamic format mask from an application or page item.</li> <li>▪ <b>Minimum Value</b> - Enter a minimum enterable value.</li> <li>▪ <b>Maximum Value</b> - Enter the maximum enterable value.</li> <li>▪ <b>Number Alignment</b> - Select the value alignment within the field.</li> </ul>

**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Password	<p>Renders as an HTML password form element.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>■ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>■ <b>Submit when Enter Pressed</b> - Select <b>Yes</b> to submit the page when <b>ENTER</b> is pressed. This saves the password in a database table when the page is submitted. Select <b>No</b> to not save the password in a database table.  Only select <b>Yes</b> when the password is needed in session state for use by other pages during the session.</li> <li>■ <b>Does not save state</b> - Select <b>Yes</b> to suppress text entered into the field and not save the value in session state.  For security reasons you should always set this attribute to <b>Yes</b>.</li> </ul> <p>If you must reference and retrieve the value of a password in your application then you set the <b>Store value encrypted in session state</b> attribute to <b>Yes</b>. To learn more, see <a href="#">"About Session State and Security"</a> on page 15-12.</p>
Popup List of Values (LOV)	<p>Renders as a text field with an icon. When the user clicks the icon, a popup window appears with a list of values represented as a series of links. When the user makes a selection from the list, the selected value is placed in the text field.</p> <p>You control popup lists of values through templates. You can only specify one popup list of values (LOV) template for each application. A popup LOV is a good choice for lists of values that are too large to return on a single page.</p> <p>Popup LOVs must be based on a query that selects two columns with different column aliases. For example:</p> <pre>SELECT ename name, empno id       FROM emp</pre> <p>If one of the columns is an expression, remember to use an alias. For example:</p> <pre>SELECT ename  ' '  job display_value, empno FROM emp</pre> <p><b>Note:</b> When creating a new item of this type, first select <b>Popup List of Values</b> and then <b>Text Field with Calculator Popup</b>.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>■ <b>Value Required</b>- If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>■ <b>Input Field</b> - Specifies what the input field of the Popup LOV shows and how it behaves.</li> <li>■ <b>Fetch</b> - Specifies if data is displayed when the Popup LOV is opened by an user.  <b>Note:</b> Input Field and Fetch are not available for Text Field with Calculator Popup.</li> <li>■ <b>Allow Multi Selection</b> - Allows for multiple, comma separated values to be selected.</li> </ul> <p><b>See Also:</b> <a href="#">"Creating a Cascading List of Values"</a> on page 7-60</p>

**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Radio Group	<p>Renders as an HTML radio group form element, based on a list of values.</p> <p>The following example displays employee names (ename), but returns employee numbers (empno):</p> <pre>SELECT ename, empno FROM emp</pre> <p>Settings and other attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Number of Radio Columns</b> - Defines the number of columns to use to display the values defined in the List of Values.</li> <li>▪ <b>Page Action when Value Changed</b> - Option includes: None (Default); Submit Page; or Redirect and Set Value. Choose <b>Submit Page</b> to have the page submitted when the radio button is selected.</li> <li>▪ <b>Execute Validations</b> - Displays if Page Action when Value Changed is set to <b>Submit Page</b>. Controls the execution of validations when a page is submitted. Set this attribute to <b>No</b> to prevent the execution of validations and associated error messages. Set this attribute to <b>Yes</b> 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, <b>Always Execute</b>. To learn more, see "<a href="#">Creating Item and Page Validations</a>" on page 8-33.</li> </ul> <p><b>See Also:</b> "<a href="#">Creating a Cascading List of Values</a>" on page 7-60</p>
Rich Text Editor	<p>Renders as an HTML text area. There is no maximum length for an item displayed as a text area. You control the height and width by editing the Height and Width item attribute.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Editor</b> - Select an editor.</li> <li>▪ <b>Toolbar</b> - Select a toolbar style.</li> <li>▪ <b>Toolbar Expanded</b> - Determines if the toolbar must start expanded when the Rich Text Editor is loaded.</li> <li>▪ <b>Skin</b> - Skin used for the appearance of the Rich Text Editor.</li> </ul>

**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Select List	<p>Displays using a list of values. A list of values is required for items displayed as a select list. Select lists are rendered using the HTML form element <code>&lt;select&gt;</code>. The values in a select list are determined using a named list of values or a list of values defined at the item level. You can specify the NULL display value and NULL return value.</p> <p>The following example would return employee names (ename) and employee numbers (empno) from the emp table. Note that column aliases are not required and are included in this example for clarity.</p> <pre>SELECT ename display_text, empno return_value FROM emp</pre> <p>Settings and other attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Page Action when Value Changed</b> - Options include: None, Submit Page, Redirect and Set Value, Redirect to Page (based on selected value), or Redirect to URL (based on selected value).</li> <li>▪ <b>Allow Multi Selection</b> - Enables to select multiple values in the Select List. Use the Height attribute to define how many entries of the Select List should be visible at once.</li> <li>▪ <b>Execute Validations</b> - Displays if Page Action when Value Changed is set to <b>Submit Page</b>. Controls the execution of validations when a page is submitted. Set this attribute to <b>No</b> to prevent the execution of validations and associated error messages. Set this attribute to <b>Yes</b> 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, <b>Always Execute</b>. To learn more, see <a href="#">"Creating Item and Page Validations"</a> on page 8-33.</li> </ul> <p><b>See Also:</b> <a href="#">"Creating a Cascading List of Values"</a> on page 7-60</p>
Shuttle	<p>Renders as a multiple select list that includes two boxes containing lists. The left list displays a source list of values. Users use the shuttle control icons and buttons to select list items and move them from the left (source) list to the right (destination) list. Each shuttle has five controls:</p> <ul style="list-style-type: none"> <li>▪ Move all - Moves all items in the source list to the destination list.</li> <li>▪ Move selected - Moves only selected items (Ctrl + Shift items) to destination list.</li> <li>▪ Remove selected - Moves only selected items (Ctrl + Shift items) to the source list.</li> <li>▪ Remove all - Moves all items on destination list back to the source list.</li> <li>▪ Refresh - Resets the source and destination lists.</li> </ul> <p>The right destination list includes the sort controls Move to top, Move up, Move down, and Move to bottom.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required-</b> If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Show Controls</b> - Specifies which controls are visible for the Shuttle. Options include: None, Moving Only, Ordering Only, or All.</li> </ul> <p><b>Note:</b> To create this item type, you must define a list of values. See <a href="#">"Creating Lists of Values at the Application Level"</a> on page 10-71, <a href="#">"Working with Multiple Select List Item"</a> on page 7-72, and <a href="#">"Creating a Cascading List of Values"</a> on page 7-60</p>

**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Slider	<p>Renders slider item type for jQuery Mobile applications. This item type enables users to use slide handler to set a value.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Minimum Value</b> - Enter the minimum enterable value. The value can be a static value or the name of the page item which holds the value (for example, &amp;ITEM_NAME.).</li> <li>▪ <b>Maximum Value</b> - Enter the maximum enterable value. The value can be a static value or the name of the page item which holds the value (for example, &amp;ITEM_NAME.).</li> <li>▪ <b>Step Increment</b> - Enter a value to force the slider to snap to a specific increment. By default, the step is 1. The value can be a static value or the name of the page item (for example, &amp;ITEM_NAME.).</li> <li>▪ <b>Highlight Selected</b> - If set to <b>Yes</b>, the slider highlights the track up to the current slider handle position.</li> </ul>
Text Field with Calculator Popup	<p>Renders as a text field with an icon. When clicked, the icon displays a small window containing a calculator. Calculations are placed back in the text field.</p> <p><b>Note:</b> When creating a new item of this type, first select <b>Popup List of Values</b> and then <b>Text Field with Calculator Popup</b>.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Allow Multi Selection</b> - Allows for multiple, comma separated values to be selected.</li> </ul>



**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Text Field with autocomplete	<p>Displays a list of possible values when the user starts typing in the field. The values are based on the defined LOV SQL statement. The following example displays employee names (ename) and stores them in the field:</p> <pre>SELECT ename FROM emp ORDER BY 1</pre> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li> <li>▪ <b>Search</b> - Defines how the search with the entered value should be performed. <b>Contains &amp; Ignore Case</b> prevents the use of an existing index on the column if <b>Lazy Loading</b> is set to <b>Yes</b>.</li> <li>▪ <b>Lazy Loading</b> - If select <b>Yes</b>, the matching values are read from the database each time the user types a character. Select <b>Yes</b> if the LOV SQL statement returns many records. Otherwise all values are included if the page is rendered, independent of whether or not the autocomplete is used. If select <b>No</b>, all values are read only once when the page is rendered.</li> <li>▪ <b>Maximum Values in List</b> - Specify the number of items in the select box to avoid performance problems by returning to many rows.</li> <li>▪ <b>Automatic Fill</b> - Select <b>Yes</b> to fill the text field while still selecting a value, replacing the value if something is typed, or something else is selected.</li> <li>▪ <b>Select First</b> - Select <b>Yes</b> and the first autocomplete value is automatically selected when the user presses <b>TAB</b> or <b>RETURN</b>.</li> <li>▪ <b>Highlight Search</b> - Select <b>Yes</b> and the entered value is highlighted in the select box of matching entries.</li> </ul>
Text Area	<p>Renders as an HTML text area. There is no maximum length for an item displayed as a text area. You control the height and width by editing the Height, Width, and Maximum Width attributes.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"> <li>▪ <b>Value Required</b>- If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. By defining a message called <code>APEX.PAGE_ITEM_IS_REQUIRED</code> in Shared Components, Text Messages, the predefined error text can be replaced by an application specific error text. The display location of the message is defined by the application level setting Default error display location.</li> <li>▪ <b>Resizable</b> - Select <b>Yes</b> to enable the user resize the Text Area with a mouse.</li> <li>▪ <b>Auto-Height</b> - Select <b>Yes</b> to scale the text area to the amount of data. This option varies the height based on the amount of text.</li> <li>▪ <b>Character Counter</b> - Select <b>Yes</b> to include a counter that displays the number of characters entered in the field.</li> </ul>

**Table A–1 (Cont.) Available Item Types**

Item Type	Description
Yes/No	<p>Displays Flip Toggle Switch in jQuery Mobile user interfaces and as a select list in non-mobile environments.</p> <p>Settings attributes:</p> <ul style="list-style-type: none"><li>■ <b>Value Required</b> - If select <b>Yes</b> and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. See item Help for more details.</li><li>■ <b>Settings</b> - Options include: <b>Use Component Settings</b> or <b>Custom</b>.</li></ul> <p>If Settings is set to <b>Custom</b>, the following attributes display:</p> <ul style="list-style-type: none"><li>■ <b>Yes Value</b> - Specifies the value stored in the page item if the user picks the <b>Yes</b> option.</li><li>■ <b>Yes Label</b> - Specifies the text displayed as the <b>Yes</b> option.</li><li>■ <b>No Value</b> - Specifies the value stored in the page item if the user picks the <b>No</b> option. This attribute can also be left blank if you want to store NULL when the <b>No</b> value is selected.</li><li>■ <b>No Label</b> - Specifies the text displayed as the <b>No</b> option.</li></ul>

# Oracle Application Express Limits

This appendix list limits associated with Oracle Application Express development environment and application components.

## Topics:

- [Development Environment Limits](#)
- [Component Limits](#)

## Development Environment Limits

The Oracle Application Express development environment has no limits as to the number of workspaces or number of users that can exist in a given workspace.

## Component Limits

[Table B-1, "Component Limits"](#) describes limits associated with Oracle Application Express components, such as interactive reports, classic reports, forms, and tabular forms.

**Table B-1 Component Limits**

Component	Limits
Interactive reports	<p>One interactive report per page.</p> <p>100 columns can be seen using report columns. You can edit additional columns using Tree view or paginating through Report Column Attributes.</p> <p>1,000,000 rows per column heading filter (if no custom LOV is specified in the column attributes).</p> <p>You can edit additional columns using Tree view or paginating through Report Column Attributes.</p> <p><b>See Also:</b> <a href="#">"Creating Reports"</a> on page 9-1</p>
Classic reports	<p>100 columns can be seen using report columns. You can edit additional columns using Tree view or paginating through Report Column Attributes.</p> <p><b>See Also:</b> <a href="#">"Creating Reports"</a> on page 9-1</p>
Forms	<p>200 enterable items per page.</p> <p>32767 bytes for a text area or rich text editor item.</p> <p>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.</p> <p><b>See Also:</b> <a href="#">"Creating Forms"</a> on page 10-1</p>

**Table B–1 (Cont.) Component Limits**

<b>Component</b>	<b>Limits</b>
Tabular Forms	<p>One wizard-generated tabular form per page (using built-in DML).</p> <p>50 editable tabular form columns (<code>apex_application.g_f01</code>-<code>apex_application.g_f50</code>), generated with <code>apex_item</code> or the built-in tabular form display types.</p> <p><b>See Also:</b> <a href="#">"Creating a Tabular Form"</a> on page 10-3</p>
Item names	<p>Item names should not exceed 30 characters. Items longer than 30 characters cannot be referenced using bind variable syntax.</p> <p><b>See Also:</b> <a href="#">"About Bind Variable Syntax"</a> on page 2-16 and <a href="#">"About Item Naming Conventions"</a> on page 58</p>
Validations	<p>Text entered for validations may not exceed 3,950 characters.</p> <p><b>See Also:</b> <a href="#">"Understanding Validations"</a> on page 8-32</p>
Data loading	<p>When loading data, the maximum number of columns is 45.</p> <p><b>See Also:</b> <a href="#">"Creating Applications with Data Loading Capability"</a> on page 17-52</p>

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## Available Conditions

A condition is a small unit of logic that helps you 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.

**See Also:** ["Understanding Conditional Rendering and Processing"](#) on page 2-4

### Conditions in Application Builder

[Table C-1, "Available Conditions"](#) describes many Application Builder conditions. To view a complete listing of all available conditions for a given control or component, click the **View** icon to the right of the Condition Type list. Shortcuts to common selections appear directly beneath the Type list. If your condition requires an expression, type it in the appropriate field.

**Table C-1 Available Conditions**

Condition	Description
Always	Always returns true. Used primarily for the read-only conditions of a page item.
Client Browser: Microsoft Internet Explorer 5.5, 6.0 or higher	Evaluates to true when the client browser is one of the following: Microsoft Internet Explorer 5.5, 6.0, or higher. Setting this condition on an item hides the item for all for client browsers other than Microsoft Internet Explorer 5.5, 6.0, or higher.
Client Browser: Mozilla, Netscape 6.x/7x or higher	Evaluates to true when the client browser is one of the following: Mozilla, Netscape 6.x, 7x, or higher. Setting this condition on a component hides it for all client browsers other than Mozilla, Netscape 6.x, 7x, or higher.
Client Browser: Other browsers (or older version)	Evaluates to true when the client browser is one of the following: Other browsers (or older versions).
Client Browser: XHTML / CSS capable browser (NS 6.x,7x, Mozilla, IE 5.5, 6.0 or higher)	Evaluates to true when the client browser is one of the following: Netscape 6.x, 7x, Mozilla, or Microsoft Internet Explorer 5.5, 6.0, or higher). Setting this condition on an item hides the item for all for client browsers other than Netscape 6.x, 7x, Mozilla, or Microsoft Internet Explorer 5.5, 6.0 or higher).
Current Language != Expression 1	Verifies the language setting in which the client browser is not currently running. Checks that the current language is not the one entered in Expression 1
Current Language = Expression	Verifies the language setting in which the client browser is currently running. Checks that the current language is not the one entered in Expression 1.

**Table C-1 (Cont.) Available Conditions**

Condition	Description
Current Language is contained within Expression 1	<p>Determines whether the browser current language is contained within a string. Evaluates to true if the current language matches the string entered in Expression 1.</p> <p>For example, to check if the current language is either en-US or en-GB, choose this condition and enter the following string in Expression 1:</p> <p>en-us, en-gb</p>
Current Language is not contained within Expression 1	Verifies the application's current language is not contained within a specified string. Evaluates to true if the current language is not contained within the string entered in Expression 1.
Current page != Expression 1	Evaluates to true if the current page does not equal the page you specify in Expression 1.
Current Page != Page Submitted (this page was not the page posted)	Determines if the specified page was not posted. Evaluates to true if the current page does not match the value entered in Expression 1.
Current page = Expression 1	Evaluates to true if the current page equals the page you specify in Expression 1.
Current Page = Page Submitted (this page was posted)	Verifies whether the specified page was posted. Evaluates to true if the current page matches the value entered in Expression 1.
Current Page is contained within Expression 1 (comma-delimited list of pages)	<p>Verifies if the current page is part of the list of pages you specify in Expression 1. To check if the current page is in either page 1, 2, 3 or 4, select this condition type and enter the following string in Expression 1:</p> <p>1, 2, 3, 4</p>
Current page is in Printer Friendly mode	Only displays certain page control or components when the user has selected printer friendly mode. If the current page is in printer friendly mode, then the condition evaluates to true. Use <code>f?p</code> syntax to specify printer friendly mode.
Current page is not in Printer Friendly mode	<p>Hides page controls or components when printer friendly mode is selected. Use <code>f?p</code> syntax to specify printer friendly mode.</p> <p><b>See Also:</b> <a href="#">"Using f?p Syntax to Link Pages"</a> on page 2-9 for information about <code>f?p</code> syntax</p>
Current Page not in Expression 1 (comma-delimited list of pages)	Verifies if the current page is not part of the comma-separated list of pages specified in Expression 1.
Exists (SQL query returns at least one row)	<p>This condition is expressed as a SQL query. If the query returns at least one row then the condition evaluates as true. For example:</p> <pre>select 1 from emp where deptno = :P101_DEPTNO</pre> <p>This example references item P101_DEPTNO as a bind variable. You can use bind variables within an application processes and SQL query regions to reference item session state. If one or more employees are in the department identified by the value of P101_DEPTNO then the condition evaluates as true.</p> <p><b>See Also:</b> <a href="#">"About Bind Variable Syntax"</a> on page 2-16 for information about bind variables</p>
Inline Validation Errors Displayed	This condition type hides page controls or components when inline validation errors are displayed on the page.
Never	This condition type is hard wired to always fail. It is useful in temporarily preventing controls or components (such as regions, buttons, or items) from being rendered on a page, or to prevent processes, computations and validations from running.
No Inline Validation Errors Displayed	This condition type hides page controls or components when no inline validation errors are displayed on the page.
NOT Exists (SQL query returns no rows)	This condition is expressed as a SQL query. If the query does not return any rows, it evaluates as true.
PLSQL Expression	<p>A PL/SQL expression is any expression in valid PL/SQL syntax that evaluates to true or false. For example:</p> <pre>nv1 (:MY_FLOW_ITEM, 'NO') = 'YES'</pre> <p>If the value of MY_FLOW_ITEM is YES then the condition evaluates as true. Otherwise it evaluates as false.</p>

**Table C–1 (Cont.) Available Conditions**

Condition	Description
PLSQL Function Body returning a Boolean	<p>The body of a PL/SQL function that returns true or false. For example:</p> <pre> BEGIN IF :P1_DAY = 'MONDAY' THEN     RETURN TRUE; ELSE     RETURN FALSE; END IF; END;</pre>
Request != Expression 1	<p>REQUEST is an internal attribute that tracks how a page is submitted. By default, when a page is submitted, the value of the application attribute REQUEST is set according to the name of the object that caused the page to be submitted. For a regular button, REQUEST is set as the name of the button (such as CANCEL or SAVE) not the label of the button. You can also set request using f?p syntax.</p> <p>For example, the event could be when a user clicks a button or selects a tab menu. Depending upon the event, you can perform different operations by referencing the value of the REQUEST application attribute.</p> <p>This condition evaluates as true if REQUEST does not equal the value entered in Expression 1.</p> <p><b>See Also:</b> <a href="#">"Understanding URL Syntax"</a> on page 2-8, <a href="#">"REQUEST"</a> on page 2-28, and <a href="#">"Understanding the Relationship Between Button Names and REQUEST"</a> on page 10-70</p>
Request = Expression 1	<p>This condition is the opposite of <code>Request != Expression 1</code>.</p> <p>This condition evaluates as true if REQUEST equals the value entered in Expression 1. From PL/SQL you can also reference the application attribute using the following syntax:</p> <pre>V('REQUEST')</pre> <p><b>See Also:</b> <a href="#">"Understanding URL Syntax"</a> on page 2-8, <a href="#">"REQUEST"</a> on page 2-28, and <a href="#">"Understanding the Relationship Between Button Names and REQUEST"</a> on page 10-70</p>
Request is contained within Expression 1	<p>REQUEST is an internal application attribute that tracks of how a page is submitted. By default, when a page is submitted, the value of REQUEST is set according to the event that caused the page to be submitted. For example, the event could be when a user clicks a button or selects a tab. Depending upon the event, you can perform different operations by referencing the value of the REQUEST application attribute.</p> <p>Use this condition to specify a comma delimited list of allowed requests (such as SAVE or UPDATE) in Expression 1. The condition evaluates to true if the value of REQUEST is contained in the list.</p> <p><b>See Also:</b> <a href="#">"REQUEST"</a> on page 2-28, and <a href="#">"Understanding the Relationship Between Button Names and REQUEST"</a> on page 10-70</p>
Request is not contained within Expression 1	<p>This condition is the opposite of <code>Request is contained within Expression 1</code>. Evaluates to true if the value of the REQUEST is not contained within Expression 1.</p> <p><b>See Also:</b> <a href="#">"REQUEST"</a> on page 2-28, and <a href="#">"Understanding the Relationship Between Button Names and REQUEST"</a> on page 10-70</p>
SQL Expression	<p>SQL Expressions are evaluated as a WHERE clause in a SQL statement. For example suppose your expression is <code>:MY_ITEM = 'ABC'</code>.</p> <p>The Application Express engine processes the following:</p> <pre>select 1 from dual where :MY_ITEM = 'ABC'</pre> <p>This condition evaluates to true if a row is returned.</p>
SQL Reports (OK to show the back button)	Use this condition for reports having pagination. It automatically determines when it is appropriate to include a button that pages back in the result set.
SQL Reports (OK to show the forward button)	Use this condition for reports having pagination. It automatically determines when it is appropriate to include a button that pages forward in the result set.

**Table C–1 (Cont.) Available Conditions**

Condition	Description
Text in Expression 1 != Expression 2 (includes &ITEM. substitutions)	<p>Use this expression to compare two expressions containing strings. Either expression may contain references to session state using &amp;MY_ITEM. syntax.</p> <p><b>See Also:</b> <a href="#">"Understanding Substitution Strings"</a> on page 2-17 for information about &amp;MY_ITEM. syntax</p>
Text in Expression 1 = Expression 2 (includes &ITEM. substitutions)	<p>This condition is the opposite of <code>Text in Expression 1 != Expression 2</code> (includes &amp;ITEM. substitutions). Compares two expressions containing strings. Either expression may contain references to session state using the &amp;ITEM. syntax.</p> <p>To check if the item F100_P2_DAY_DATE equals "Wednesday", select this condition enter the following in Expression 1 and Expression 2:</p> <ul style="list-style-type: none"> <li>Expression 1: F100_P2_DAY_DATE</li> <li>Expression 2: Wednesday</li> </ul> <p><b>See Also:</b> <a href="#">"Understanding Substitution Strings"</a> on page 2-17 for information about &amp;MY_ITEM. syntax</p>
Text in Expression 1 Is Contained in Value of Item in Expression 2	<p>This condition compares the string contained in Expression 1 with the value of an item referenced in Expression 2. Expression 1 may contain references to session state using the &amp;ITEM. syntax.</p> <p>To check if the item F100_P2_DAY_DATE contains the text Wed, select this condition and enter the following in Expression 1 and Expression :</p> <ul style="list-style-type: none"> <li>Expression 1: Wed</li> <li>Expression 2: F100_P2_DAY_DATE</li> </ul> <p><b>See Also:</b> <a href="#">"Understanding Substitution Strings"</a> on page 2-17 for information about &amp;MY_ITEM. syntax</p>
Text in Expression 1 Is Contained within the Text in Expression 2	<p>This condition compares two expressions containing strings. Either expression may contain references to session state using the &amp;ITEM. syntax.</p> <p><b>See Also:</b> <a href="#">"Understanding Substitution Strings"</a> on page 2-17 for information about &amp;MY_ITEM. syntax</p>
Text in Expression 1 Is NOT Contained within the Text in Expression 2	<p>This condition is the opposite of <code>Text in Expression 1 Is Contained within the Text in Expression 2</code>. Either expression may contain references to session state using the &amp;ITEM. syntax.</p> <p><b>See Also:</b> <a href="#">"Understanding Substitution Strings"</a> on page 2-17 for information about &amp;MY_ITEM. syntax</p>
User is authenticated (not public)	<p>Verifies whether the current user was authenticated using one of the built-in authentication schemes or a custom authentication scheme.</p> <p><b>See Also:</b> <a href="#">"Establishing User Identity Through Authentication"</a> on page 15-25 for information about authentication</p>
User is the public user (user has not authenticated)	<p>The public user is defined as an application attribute. To set the public user for a specific application, navigate to the Application Builder home page and click the edit link corresponding to your application.</p> <p>A public user is a user used for multiple users. Sometimes applications have pages that are public and thus require authentication and log in. This condition returns true if the user is the public user (that is, the user is authenticated as themselves or some other user not equal to the public user identified in the application attribute Public User.</p> <p><b>See Also:</b> <a href="#">"Authentication"</a> on page 7-21 for information about Public User</p>
Value of Item in Expression 1 != Expression 2	<p>This condition is the opposite of <code>Value of item in Expression 1 = Expression 2</code>. It compares the value of an item with a specific string. Comparisons using this condition are case-sensitive.</p> <p>For example, to verify whether the value of an item F100_ID is not equal to the value 10, enter the following in the Expression 1 and Expression 2 fields:</p> <ul style="list-style-type: none"> <li>Expression 1: F100_ID</li> <li>Expression 2: 10</li> </ul>



**Table C–1 (Cont.) Available Conditions**

Condition	Description
Value of item in Expression 1 = Expression 2	<p>Compares the value of an item with a specific string. Comparisons using this condition are case-sensitive.</p> <p>For example, to verify whether the value of an item F100_P2_WORD is contained within the string "the quick brown fox", enter the following in the Expression 1 and Expression 2 fields:</p> <ul style="list-style-type: none"> <li>Expression 1: F100_P2_WORD</li> <li>Expression 2: the quick brown fox</li> </ul>
Value of Item in Expression 1 = zero	Verifies if the value of the item in Expression 1 does equal zero.
Value of item in Expression 1 contains no spaces	Evaluate to true if the value of the item specified in Expression 1 contains no spaces.
Value of Item in Expression 1 is alphanumeric	Evaluates to true when the string in Expression 1 contains only alphanumeric characters.
Value of Item in Expression 1 is contained within colon-delimited list in Expression 2	<p>Use this condition type to check whether a certain string is contained within the value of a session state item. Verifies whether the string specified in Expression 1 is contained in the value of the item specified in Expression 2.</p>
Value of Item in Expression 1 is NOT contained within colon-delimited list in Expression 2	<p>Evaluates to true when the value specified in Expression 1 contains a string that lists elements delimited by colons.</p> <p>To check if the item P1_TODAY is either "Monday", "Tuesday", or "Wednesday", select this condition and enter the following in Expression 1 and Expression 2:</p> <ul style="list-style-type: none"> <li>Expression 1: P1_TODAY</li> <li>Expression 2: Monday: Tuesday:Wednesday</li> </ul>
Value of Item in Expression 1 is NOT NULL	In Expression 1, enter the name (uppercase) of the application or page item. Evaluates as true, if the current cache value of the item is not null and has a value. If not, the condition evaluates as false.
Value of Item in Expression 1 Is NOT null and the Item Is NOT Zero	<p>Use this condition to check whether the value in Expression 1 is not NULL and does not equal zero.</p> <p>For example, to verify whether the value of an item F100_ID is not null and is not equal to zero, enter the following in the Expression 1:</p> <ul style="list-style-type: none"> <li>Expression 1: F100_ID</li> </ul>
Value of Item in Expression 1 Is Not Numeric	<p>Use this condition to verify that the value in Expression 1 is not numeric.</p> <p>For example, to verify whether the value of an item F100_USER_NAME is not numeric, enter the following in the Expression 1:</p> <ul style="list-style-type: none"> <li>Expression 1: F100_USER_NAME</li> </ul>
Value of Item in Expression 1 is NULL	Evaluates as true if the item in Expression 1 has no value.
Value of Item in Expression 1 is NULL or zero	Evaluates as true if the item in Expression is either NULL or zero.
Value of item in Expression 1 is numeric	Evaluates to true if the value of the Item in Expression 1 is numeric.
Value of user preference in Expression 1 != Expression 2	This condition is the opposite of Value of user preference in Expression 1 = Expression 2. Evaluates to true if the name of the user preference specified in Expression 1 is not equal to the string in Expression 2.
Value of user preference in Expression 1 = Expression 2	Verifies the value of a user preferences. Evaluates to true if the name of the user preference specified in Expression 1 is equal to the string in Expression 2.
When any item in comma-delimited list of items has changed	Evaluates to true when the value of any nonnull session state item in the list of items specified in Expression 1 has changed.
When any item in comma-delimited list of pages has changed	Evaluates to true when the value of any nonnull session state item in the list of pages specified in Expression 1 has changed.
When any item in current application has changed	This condition passes when the value of any nonnull session state item in the current application has changed.
When any item in current page has changed	Evaluate to true when the value of any nonnull session state item in the current page has changed.
When any item in current session has changed	Evaluates to true when the value of any nonnull session state item in the current session has changed.

**Table C–1 (Cont.) Available Conditions**

Condition	Description
When <code>cgi_env DAD_NAME</code> != Expression 1	<p>This condition is the opposite of When <code>cgi_env DAD_NAME</code> = Expression 1.</p> <p>Checks for the data access descriptor (DAD) that is being used in the URL to call the current page in the application and compares it to Expression 1. Evaluate to true, when the DAD is not the same as Expression 1.</p>
When <code>cgi_env DAD_NAME</code> = Expression 1	<p>Checks for the data access descriptor (DAD) that is being used in the URL to call the current page in the application and compares it to Expression 1. Evaluate to true, when the DAD is the same as Expression 1.</p>
When <code>cgi_env HTTP_HOST</code> != Expression 1	<p>This condition is the opposite of When <code>cgi_env HTTP_HOST</code> = Expression 1.</p> <p>Checks for the value of the common gateway interface (CGI) environment variable <code>HTTP_HOST</code> that is the value returned by <code>owa_util.get_cgi_env ( 'HTTP_HOST' )</code>. Evaluate to true, when this value is not equal to the string in Expression 1.</p>
When <code>cgi_env HTTP_HOST</code> = Expression 1	<p>Checks for the value of the common gateway interface (CGI) environment variable <code>HTTP_HOST</code> that is the value returned by <code>owa_util.get_cgi_env ( 'HTTP_HOST' )</code>. Evaluate to true, when this value is equal to the string in Expression 1.</p>
When <code>cgi_env SERVER_NAME</code> != Expression 1	<p>This condition is the opposite of When <code>cgi_env SERVER_NAME</code> = Expression 1.</p> <p>This condition checks for the value of the common gateway interface (CGI) environment variable <code>SERVER_NAME</code>, that is the value returned by <code>owa_util.get_cgi_env ( 'SERVER_NAME' )</code>. Evaluate to true, when this value is not equal to the string in Expression 1.</p>
When <code>cgi_env SERVER_NAME</code> = Expression 1	<p>This condition checks for the value of the common gateway interface (CGI) environment variable <code>SERVER_NAME</code>, that is the value returned by <code>owa_util.get_cgi_env ( 'SERVER_NAME' )</code>. Evaluate to true, when this value is equal to the string in Expression 1.</p>

---

## About Granted Privileges

This section describes grant privileges.

### Topics:

- [About Granting Privileges to Database Users](#)
- [About Privileges Granted to PUBLIC](#)

### About Granting Privileges to Database Users

In Oracle Application Express release 4.2, no privileges are granted to database users when creating a workspace on an existing schema. Unless direct grants exist, database users in Oracle Application Express 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 SYNONYM to [database username]
grant CREATE TABLE to [database username]
grant CREATE TRIGGER to [database username]
grant CREATE TYPE to [database username]
grant CREATE VIEW to [database username]
```

## 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 Oracle Application Express product schema, (for example, APEX\_040200).

### Topics:

- [Packages](#)
- [Procedures](#)
- [Functions](#)
- [Tables](#)
- [Views](#)
- [Sequences](#)
- [Types](#)

## Packages

Public synonyms exist and execute privilege is granted to PUBLIC for the following packages owned by the Oracle Application Express product schema, (for example, APEX\_040200):

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\_AUDIT  
WWV\_FLOW\_CSS\_API  
WWV\_FLOW\_APPLICATION\_INSTALL  
WWV\_FLOW\_AUDIT  
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 Oracle Application Express product schema, (for example, APEX\_040200):

WWV\_CALCULATOR  
WWV\_FLOW\_FLASH\_CHART  
WWV\_FLOW\_GENERATE\_DDL

WWV\_FLOW\_IMAGE\_GENERATOR  
WWV\_FLOW\_TREE\_GLOBAL\_VARS

## Procedures

Public synonyms exist and execute privilege is granted to PUBLIC for the following procedures owned by the Oracle Application Express product schema, (for example, APEX\_040200):

APEX  
APEX\_ADMIN  
DEVELOPMENT\_SERVICE\_HOME  
DEVELOPMENT\_SERVICE\_HOME\_LOGIN  
DEVELOPMENT\_SERVICE\_SIGNUP  
F  
HTMLDB  
HTMLDB\_ADMIN  
HTMLDB\_LOGIN  
P  
WS  
WWV\_FLOW\_INIT\_HTTP\_BUFFER  
Z

## Functions

Public synonyms exist and execute privilege is granted to PUBLIC for the following functions owned by the Oracle Application Express product schema, (for example, APEX\_040200):

NV  
V  
WWV\_FLOW\_HOT\_HTTP\_LINKS

Execute privilege is granted to PUBLIC for the following function owned by the Oracle Application Express product schema, (for example, APEX\_040200):

WWV\_POPUP\_FILTER

## Tables

Public synonyms exist and select privilege is granted to PUBLIC for the following tables owned by the Oracle Application Express product schema, (for example, APEX\_040200):

WWV\_FLOW\_DUAL100  
WWV\_FLOW\_TEMP\_TABLE  
WWV\_FLOW\_LOV\_TEMP

## Views

Public synonyms exist and select privilege is granted to PUBLIC for the following views owned by the Oracle Application Express product schema, (for example, APEX\_040200):

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\_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\_FLASH\_CH  
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\_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\_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\_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\_MIGRATION\_ACC\_FORMS  
APEX\_MIGRATION\_ACC\_PROJECTS  
APEX\_MIGRATION\_ACC\_QUERIES  
APEX\_MIGRATION\_ACC\_RPTS  
APEX\_MIGRATION\_ACC\_TABLES  
APEX\_MIGRATION\_PROJECTS  
APEX\_MIGRATION\_REV\_FORMS  
APEX\_MIGRATION\_REV\_QUERIES  
APEX\_MIGRATION\_REV\_RPTS  
APEX\_MIGRATION\_REV\_TABLES  
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

## Sequences

The following sequences have public synonyms and select privilege granted to public:

WWV\_FLOW\_SESSION\_SEQ  
WWV\_SEQ

## Types

The following types have execute granted to public but no synonyms:

WWV\_FLOW\_TREE\_ENTRY

WWV\_FLOW\_TREE\_SUBS



---

# Accessibility in Oracle Application Express

This section attempts to provide information for users who are accessing Oracle Application Express utilizing only a keyboard or Freedom Scientific's screen reader JAWS.

**Topics:**

- [About Screen Reader Mode](#)
- [About High Contrast Mode](#)
- [Accessing Interactive Reports Using JAWS](#)
- [Accessing Form Pages Using JAWS](#)
- [Accessing Components Using a Keyboard](#)

For additional information about the accessibility of Oracle products, see:

<http://www.oracle.com/accessibility>

**Note:** JAWS release 13.0 with all default settings was used in writing this section. All instructions in this section are based on using a full size keyboard. Note that instructions may vary if using a laptop keyboard.

## About Screen Reader Mode

Sessions can be defined as optimized for use with screen readers. This includes both when using the Application Express development environment and also for use in your own applications.

**Topics:**

- [What Does Screen Reader Mode Do?](#)
- [Enabling Screen Reader Mode](#)

**See Also:** ["Using Screen Reader Mode in Your Database Applications"](#) on page 17-50

## What Does Screen Reader Mode Do?

Enabling Screen Reader mode currently does the following, by default:

- Oracle Application Express Flash charts are not currently accessible to screen readers, therefore when running in screen reader mode the user gets a report representation of the information conveyed in the chart. A separate report is

generated for each series of a multiple-series chart. When running in screen reader mode, these data tables contain descriptive text, in the following format:

- Database Applications:
  - \* Summary Text - A combination of the chart title and chart series title are used.
  - \* Column Headers - The column name/alias in the chart series query identifies the columns in the report.
- Worksheet Applications:
  - \* Summary Text - The section title is used as the summary text.
  - \* Column Headers - The Data Grid report labels identify the columns in the report.
- You must be using both a screen reader and browser that supports WAI-ARIA Live Regions. Oracle Application Express is only tested with the most recent JAWS screen reader (13.0), which supports Live Regions. The current list of browsers that support this include:
  - Mozilla Firefox 3.0 and later
  - Microsoft Internet Explorer version 8
- Interactive report regions in Report View or Group By View use data tables to convey information. Data tables require a text description that describes what information the table contains to a screen reader user. When running in screen reader mode, these data tables now contain detailed summary text, in the following format:
  - Region - The name of the region defined by the developer.
  - Report - The name of the current Saved Report within the Interactive Report. Default to Primary Default if no saved report is defined.
  - View - The current view of the report (Either Report or Group By).
  - Displayed Rows Start - The starting row of the currently displayed set of rows.
  - Displayed Rows End - The ending row of the currently displayed set of rows.
  - Total Rows - The total number of rows returned by the report.
- Interactive report regions provide the ability to add Aggregates to your report data. One of the available aggregates is to Sum a column's values. When running in screen reader mode, the text Sum: is displayed as a prefix to the summed value. In standard mode only the summed value is displayed. All other aggregates display an aggregate type prefix by default, regardless of mode.
- Item level Help text is provided differently in screen reader mode. In standard mode, a dialog is displayed on your page displaying the Help text for a specific item. Since these dialogs have many problems when used with screen readers, a the classic popup page displays item help text when running in screen reader mode.
- In Application Builder the Page Definition page used to manage page information contains 2 different views, Component View and Tree View. The tree used in Tree View is not accessible using a screen reader and therefore, when running this page in screen reader mode the default is Component View.
- The Tree region component in Application Express, available for database applications is not accessible with a screen reader. For this reason, when running

in screen reader mode, the user gets an unordered hierarchical list, as a representation of the information conveyed in the tree.

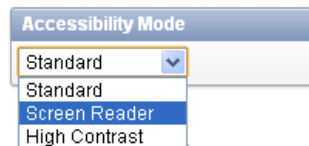
- Screen reader mode has greatly improved the process for the user of dealing with raised validation errors. Consider the following example. A form page is submitted and a validation has failed resulting in displayed errors. If the page item has an associated error, then additional markup is added to that page item so that the screen reader informs the user that the item contains an invalid entry, when moving through the form fields. Additionally, the user is informed of the corresponding error message, when moving through the form fields.

**Tip:** You must be using both a screen reader and browser that supports WAI-ARIA, to benefit from these improvements.

- The home page of a Websheet application displays breadcrumbs that indicate the current page, parent pages, and the home page. On parent page breadcrumb entries, if the user hovers over the entry, a tooltip displays that shows all the sibling pages for that page. In Screen Reader mode, this information is displayed as a hierarchical page list instead. This can easily be identified by screen reader users as it is directly under the <h2> level heading, Hierarchical Page List with Child Pages.

## Enabling Screen Reader Mode

You can enable screen reader mode in the Oracle Application Express development environment by selecting **Screen Reader** from Accessibility Mode list on the Workspace home page and on the Oracle Application Express Administration Services page.



You can enable screen reader mode in the Websheet application by clicking the **Screen Reader** link located in the lower right side of the Websheet home page.

If you intend on using the Oracle Application Express development environment with a screen reader, ensure that you have this option enabled.

## About High Contrast Mode

You can identify sessions as optimized for high contrast in the Oracle Application Express development environment, Websheet runtime, and also within your own database applications. By default, sessions are not flagged as running in high contrast mode.

### Topics:

- [What Does High Contrast Mode Do?](#)
- [Enabling High Contrast Mode](#)

**See Also:** ["Using High Contrast Mode in Your Database Applications"](#) on page 17-51

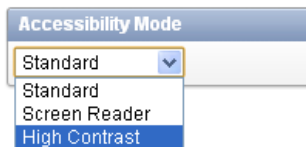
## What Does High Contrast Mode Do?

Enabling high contrast mode results in the following behavior:

- Oracle Application Express Development environment.  
The controls in interactive report region's search bar display without icons, and all controls, including the icons are shown as clear text using a button-like look. There are also numerous reports throughout Application Express that share the same report template, which have contrast issues in the column headers. If high contrast mode is enabled, for those reports, the gradient background is removed and a darker, solid-color background displays instead.
- Application Express Websheet runtime.  
Websheet application replace CSS-based image links with text links. These text links are only created for images where the source image is transparent and the CSS background property is used in its place.
- Custom Database Applications.  
Nothing is done natively from the framework. It is up to each developer to provision the mode and make changes where required.

## Enabling High Contrast Mode

You enable high contrast mode in the Oracle Application Express development environment by selecting **High Contrast** from Accessibility Mode list on the Workspace home page and on the Oracle Application Express Administration Services page.



You can enable high contrast mode in a running Websheet application by clicking the **High Contrast** link located in the lower right side of the Websheet home page.

If you intend on using the Oracle Application Express development environment in Windows High Contrast mode, ensure that you have this option enabled.

## Accessing Interactive Reports Using JAWS

This section describes how to access interactive reports using JAWS.

### Topics:

- [Accessing the Actions Menu](#)

**See Also:** ["Accessing Interactive Report Regions"](#) on page E-11

## Accessing the Actions Menu

Interactive report regions contain an Actions menu which is the main entry point to much of the functionality offered by these regions.

To access the Actions menu with JAWS:

1. Press **INSERT + F5** to load the Select a Form Field dialog box.



2. Press **A** repeatedly to reach the Actions Button field.

3. Press **ENTER** to navigate to the Actions button.

4. Press **ENTER** to open the Actions menu.

You must now switch off the JAWS virtual PC cursor. The Actions menu is fully keyboard accessible.

5. Press **INSERT + Z** to switch off the JAWS virtual PC cursor.

JAWS announces, "Use Virtual PC Cursor Off."

6. Press **UP** and **DOWN** to move up and down the current level of menu and **LEFT** and **RIGHT** to navigate in and out of sub-menus. The menu consists of:

- Select Columns
- Filter
- Rows Per Page (Contains a submenu to select the number of rows the report displays)
- Format (Contains a submenu to specify Sort, Control Break, Highlight, Compute, Aggregate, Chart, Group By).
- Save Report
- Reset
- Help
- Download
- Subscription

7. Once you have chosen the specific action you want to perform, press **ENTER** to load the relevant dialog.

For example, assume you select **Filter**. The Filter dialog loads. When it is updated, JAWS announces the name of the current page followed by the first form field in the dialog which has focus.

8. Refresh the virtual cursor now, by pressing **INSERT + ESC**.

JAWS announces, "Screen Updated."

9. To switch the JAWS virtual PC cursor back on, press **INSERT + Z**.

JAWS announces, "Use Virtual PC Cursor On."

Next, define your filter attributes. This dialog contains slightly different form fields depending on your filter type and subsequent selections. The default fields for defining a Column filter are a Column select list, Operator select list, and Expression input.

10. To hear these fields, just press the JAWS shortcut key **F** and **SHIFT + F** a few times to move around these field items. Then, select or enter your filter details into the form fields.

Next, apply the filter. The dialog ends with a Cancel and Apply button, which can be navigated to using the JAWS shortcut key **B**.

11. Press **B** until you hear, "Apply" and then press **ENTER**.

The page refreshes and JAWS announces when the content has refreshed by starting to read the current report settings.

12. To go straight to the report information, press the JAWS shortcut key **T** to go to the data table containing the information with the applied filter.

Other dialogs for other functionality can be added in a similar fashion.

## Accessing Form Pages Using JAWS

Many of the pages in Oracle Application Express are form pages designed for maintaining application metadata. This section describes how you can gain an understanding of the structure of these pages and interact with them using a screen reader such as JAWS.

### Topics:

- [Understanding the Structure of Pages](#)
- [Using the Tasks Links on a Page](#)
- [Accessing Help Text](#)
- [Dealing with Validation Errors](#)

## Understanding the Structure of Pages

Many form pages are logically broken up into different regions. For example, the Edit Page Item page has the following regions containing form fields for maintaining information about the page item:

- Name
- Displayed
- Label
- Settings
- List of Values (depending on item type)
- Element
- Source
- Default
- Quick Picks (depending on item type)
- Conditions
- Read Only
- Security
- Configuration
- Help Text
- Comments

Oracle Application Express uses Heading (**Hn**) tags throughout its development interface to help define the structure of a page. For example, the Edit Page Item page has the following Headings defined:

- Level 1 (H1)\*
  - Application Express
- Level 2 (H2)\*

- Name
- Displayed
- Label
- Settings
- Element
- Source
- Default
- Conditions
- Read Only
- Security
- Configuration
- Help Text
- Comments
- Level 3 (H3)\*
  - Page Items
  - Tasks

The previous list represents of how headings are used in the Oracle Application Express development environment. Note the following:

- Level 1 headings (H1) provides a link to the relevant root page depending on the context of where you are in the development environment (for example when editing an application this takes you to the home page for the application in the Application Builder).
- Level 2 headings (H2) contain sections integral to the primary function of the current page.
- Level 3 headings (H3) that contain sections that are related to the function of the current page.

To gain an overview of all the headings on the current page, press **INSERT+F6** to list the current page's headings.

You can also use other JAWS keystrokes to navigate through the page headings. For example, to navigate around level 2 headings:

1. Press **INSERT+ALT+CTRL+2** to go to the first heading on the page at level 2.  
On the Edit Page Item page, JAWS announces, "Name heading level 2."
2. Press **2** to go to the next heading at level 2.  
On the Edit Page Item page, JAWS announces, "Displayed heading level 2."
3. Press **SHIFT+2** to go to the previous heading at level 2.  
On the Edit Page Item page, JAWS announces, "Name heading level 2."

## Using the Tasks Links on a Page

Many pages in Oracle Application Express contain a Tasks region on the right-hand side of the page. For example, the Edit Page Item page has a Tasks region on the right side containing a list of links relevant to the current item type. This region has a level 3

Heading (H3) defined on the section title Tasks (as this is a section that is related to the primary function of the current page).

To navigate to the Tasks region using JAWS:

1. Press **INSERT+ALT+CTRL+3** to go to the first heading on the page at level 3.  
JAWS announces, "Page Items heading level 3" on the Edit Page Item page. This contains general help information about page items.
2. Press **3** to go to the next heading at level 3.  
On the Edit Page Item page, JAWS announces, "Tasks heading level 3." This contains a list of links to related tasks.
3. Press **L** once to navigate to the list.  
JAWS announces, "List of *x* items" (where *x* depends on the type of page item currently being edited).
4. Press **I** to navigate through the list items and press **ENTER** to activate a link.

## Accessing Help Text

This section describes how to use JAWS to access Item-level help in Oracle Application Express.

### Topics:

- [Accessing Item Help](#)

### Accessing Item Help

Most items within the user interface have field-level Help available by activating or clicking on the field label. If Help text is available, the adjacent label is implemented as a link, the link text matches the current form item's label text. Activating this link loads a separate window containing the help text.

To access this field-level Help for an item using JAWS:

1. Press **CTRL+HOME** to go to the top of the page.  
JAWS announces the page name.
2. Press **INSERT+F7** load the Links List dialog box.
3. Press the first letter of the link text you want to locate, repeatedly.  
If there is no link text matching the label of the form item you want to get help for, then there is no help available for that item
4. If the appropriate link is found, press **ENTER** to activate the link.  
A separate window containing the Help text appears
5. Press the JAWS navigation quick key **N** to go to the help text.
6. Once you are finished reading the help text, press **ALT+F4** to close the Help window and return to page.

## Dealing with Validation Errors

Oracle Application Express provides many in-built features that help a JAWS user deal validation errors on form pages.

**Topics:**

- [Understanding the an Error Has Occurred](#)
- [Reviewing the Error](#)
- [Navigating to the Relevant Fields to Fix the Errors](#)
- [About WAI-ARIA Support](#)

**Understanding the an Error Has Occurred**

If a validation has failed on a form page when using Screen Reader mode, the page title is prefixed with the following:

`x errors have occurred - [page title]`

When a page loads, JAWS announces the page title. This means a JAWS user immediately knows a validation has failed.

**Tip:** This behavior is also available by default for custom database applications that provision Screen Reader mode. See ["About Screen Reader Mode"](#) on page E-1.

**Reviewing the Error**

To navigate to the section of the page where the error messages display, locate the H2 (Heading Level 2) tag with the text `Notification Message` included at the top of this section. This heading is hidden visually, but is available to screen reader users.

**Adding a Validation Notification to Your Database Applications** You can easily add this functionality to your own database applications. To accomplish this, add the substitution string `#NOTIFICATION_MESSAGE_HEADING#` in the Page Template, Subtemplate, Notification section of a page template. This placeholder substitutes the contents of the built-in system message `APEX.NOTIFICATION_MESSAGE_HEADING` to the text `Notification Message`.

To customize this displayed text, define a text message with that name `APEX.NOTIFICATION_MESSAGE_HEADING` in your own application, along with the text you want to use.

For example, you could add the following to the Notification section of your page template:

```
<h2 class="hideMeButHearMe">#NOTIFICATION_MESSAGE_HEADING#</h2>
```

In this example, the use of the `hideMeButHearMe` CSS class hides content visually, but is available to screen reader users.

**Navigating to the Relevant Fields to Fix the Errors**

For validations that are associated with a particular page item, Oracle Application Express renders a **Go to error** link in the Notification section next to the corresponding error message. When a user clicks (or activates) the **Go to error** link, the focus shifts to the associated item. This enables all users (not just screen reader users) to go straight to the page item related to the error.

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 Oracle Application Express. 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. To learn more, see ["Translating Messages Used Internally by Oracle Application Express"](#) on page 18-14.

### About WAI-ARIA Support

When running in Screen Reader mode, Oracle Application Express includes some Web Accessibility Initiative - Accessible Rich Internet Applications (WAI-ARIA) markup to invalid page items. This enhancement improves the screen reader user experience for screen reader and browser combinations that support WAI-ARIA.

When an error occurs relating to a specific page item, that page item is given the following additional attributes:

- `aria-invalid="true"`  
This means a screen reader announces "Invalid Entry" when the screen reader user is focused on the page item.
- `aria-describedby=" [page_item_name]_error"`  
This attribute value matches up with the item's associated error messages so when the screen reader user focuses on the page item, the screen reader announces the actual error.

Before this enhancement, if a screen reader user navigated to a page item that had an error, the screen reader might announce, "Job, Edit, Type of Text." Now the screen reader would announce, "Job Edit, Invalid Entry, Job must have some value, Type of Text."

**Tip:** If you are a plug-in item developer and want to provide the same WAI-ARIA support in your own plug-in, please see the `APEX.ERROR.GET_ARIA_ERROR_ATTRIBUTES` function in *Oracle Application Express API Reference*.

## Accessing Components Using a Keyboard

This section describes how to access components in Oracle Application Express using a keyboard.

### Topics:

- [Using New Date Pickers](#)
- [Accessing Interactive Report Regions](#)

**Tip:** If using Oracle Application Express using only a keyboard, you should enable Screen Reader Mode since tree regions are not keyboard accessible. When running in screen reader mode, a hierarchical unordered list displays instead and can be easily navigated with keyboard-only using **TAB**, **SHIFT + TAB** and **ENTER** keys to activate a specific list item. To learn more, see ["About Screen Reader Mode"](#) on page E-1.

### Using New Date Pickers

There are many keyboard shortcuts for the Date Picker.

To open a Date Picker:

1. Tab to the relevant input field.

2. Press **CTRL+HOME** to open the Date Picker.
3. Once the Date Picker is open, you have the following navigation options:
  - By month:
    - Press **PAGE UP** to go to the previous month.
    - Press **PAGE DOWN** to go to the next month.
    - Press **CTRL +HOME** to go to the current month.
  - By week:
    - Press **CTRL+UP** to go to the previous week.
    - Press **CTRL+DOWN** to go to the next week.
  - By day:
    - Press **CTRL+LEFT** to go to the previous day.
    - Press **CTRL+RIGHT** to go to the next day.

Once you are finished with the Date Picker:

1. Press **ENTER** to accept the selected date.
2. Press **ESCAPE** to close the date picker without selection.
3. Press **CTRL+END** to close the date picker and erase the date.

## Accessing Interactive Report Regions

This section describes how to access common features within Interactive Report regions.

### Topics:

- [Searching Data in an Interactive Report](#)
- [Using the Actions Menu](#)
- [Managing Bulk Updates](#)
- [Utilizing Drill Down Links](#)
- [Editing Existing Filters](#)
- [Loading Saved Reports](#)

### Searching Data in an Interactive Report

If a search bar displays above an interactive report then the Include Search Bar attribute has been enabled in Report Attributes. This attribute is enabled by default when a new interactive report is created.

#### See Also:

To execute a search:

1. Press **TAB** until the search field has focus.
2. Type your search keywords into the search field.
3. Press **ENTER** to invoke the search.
4. To refine your search to a specific column:

- a. Press **TAB** to access the magnifying glass icon to the left of the search field.
  - b. Press **ENTER** to activate the pull down menu and display a list of all available columns to search.
  - c. Press the **DOWN** or **UP** arrow keys on your keyboard to navigate through the list of **columns**.
  - d. Press **ENTER** to select the column you want to search on. This sets the context of the subsequent search as specific to the column selected.
5. Repeat steps 1 and 2 to execute your column specific search.

### Using the Actions Menu

By default, new interactive reports include both a search bar and Actions menu. Both of these features are controlled by the developer by enabling the Include Search Bar and Actions menu attributes on the Report Attributes page. Depending upon how the developer creates the report, the Action menu can contain different options.

To learn more, see "[About the Actions Menu](#)" on page 9-6.

To access the Actions menu using a keyboard:

1. Press **TAB** until the Actions menu has focus.
2. Press **ENTER** to open the menu.
3. Once the menu is open, you have the following navigation options:
  - Press the **DOWN** arrow key to go down the menu.
  - Press the **UP** arrow key to go up the menu.
  - Press the **RIGHT** arrow key to open a submenu (indicated by a right arrow) and move focus to the first item in the submenu.
  - Press the **LEFT** arrow key to close a submenu and move focus back to the appropriate item in the parent menu.
4. To exit the Action menu:
  - Press **ENTER** to load the action specific dialog. Focus is set to the first focusable element within the dialog box.
  - Press **ESC** to close the menu without selection.

### Managing Bulk Updates

Some interactive reports in Oracle Application Express contain form items for applying bulk updates to components. All form items within the report and buttons to apply the changes are keyboard accessible. Also some pages feature a check box in the first row to perform bulk processing and corresponding **Select All** and **Deselect All** links below the report. All of these items are keyboard accessible.

### Utilizing Drill Down Links

Some interactive reports in Oracle Application Express contain at least one link to edit or view a specific sub-components. These are all standard links and are therefore keyboard accessible.

### Editing Existing Filters

When an existing search filter is applied to an interactive report, a search filter displays below the Search bar.



You can access the search filter using the keyboard to:

- Edit the search filter.

Press **TAB** to navigate to the search filter and then press **ENTER** to open the Filter dialog box. Focus is automatically set to first focusable element in the dialog box.

- Disable or enable the search filter.

Press **TAB** to navigate to the check box to the right of the filter and **SPACEBAR** to disable or enable the filter.

- Delete the search filter.

Press **TAB** to navigate to the search filter and then **ENTER** to open the Filter dialog box. Press **TAB** or **SHIFT+TAB** to navigate to the Delete button and then press **ENTER**.

### Loading Saved Reports

If an Interactive Report includes a Search bar, Actions menu, and support for saved reports, then these options have been enabled by the developer on the Report Attributes page. To learn more, see ["Editing Interactive Reports as a Developer"](#) on page 9-27.

To load a saved report:

1. Press **TAB** until the Reports select list has focus. Note that the Reports select list only displays if there are saved reports.
2. Press the **UP** and **DOWN** keys to select the specific saved report you want to view.
3. Press **ENTER** to view the saved report.



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