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Primary Authors: Terri Jennings, Drue Baker

Contributors: Marco Adelfio, Christina Cho, Hillary Farrell, Michael Hichwa, Christopher Jones, Joel Kallman, Sharon Kennedy, David Peake, Anthony Rayner, Marc Sewtz, Scott Spadafore, Jason Straub, Patrick Wolf

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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
What's New	Describes new features available in this release of Oracle Application Express and documentation updates to this version of the Oracle Application Express Application Builder User's Guide.
Quick Start	Offers a quick introduction to using the Oracle Application Express.
Application Builder Concepts	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.
Managing the Development Process	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.
Using Application Builder	Provides important background information about using Application Builder to build dynamically rendered applications.
Working with Application Pages	Provides important background information about creating and managing pages within an application.

Title	Description
Creating Database Applications	Describes how to use Application Builder to build an application and application components.
Adding Application Components	Describes how to use Application Builder to add pages to an application and add other components (reports, charts, trees or forms), page controls (buttons, items, list of values), and shared components (breadcrumbs, lists, or tabs).
Adding Navigation	Describes how to implement navigation in your application using different types of navigation controls, including navigation bar entries, tabs, breadcrumbs, lists, and trees.
Controlling Page Layout	Describes different ways you can customize your application's page layout by customizing regions, editing item attributes, and incorporating images.
Managing Themes and Templates	Describes different ways you can alter your application's user interface and page layout through themes and templates.
Debugging an Application	Describes approaches to debugging your Application Builder application, including viewing Debug Mode, enabling SQL tracing, viewing page reports, and how to manually remove a control or a component to isolate a problem.
Managing Application Security	Describes how to provide security for an Application Builder application by utilizing cross-site scripting protection, session state protection, authentication, and authorization.
Deploying an Application	Explains how to package an application built within Application Builder.
Advanced Programming Techniques	Provides information about advanced programming techniques including establishing database links, using collections, running background SQL, utilizing Web services, and managing user preferences.
Managing Application Globalization	Explains how to translate an application built-in Application Builder.

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 are running Oracle Application Express.

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

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Related Documents

For more information, see these Oracle resources:

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

For information about Oracle error messages, see *Oracle Database Error Messages*. Oracle error message documentation is available only in HTML. If you have access to the Oracle Database Documentation Library, you can browse the error messages by range. Once you find the specific range, use your browser's "find in page" feature to locate the specific message. When connected to the Internet, you can search for a specific error message using the error message search feature of the Oracle online documentation.

Many books in the documentation set use the sample schemas of the seed database, which is installed by default when you install Oracle. Refer to *Oracle Database Sample Schemas* for information on how these schemas were created and how you can use them yourself.

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://apex.oracle.com/pls/apex/f?p=9830:28:0::NO:RIR:P28_PRODUCT_SUITE,IR_P`

Printed documentation is available for sale in the Oracle Store at

`http://shop.oracle.com/`

To download free release notes, installation documentation, white papers, or other collateral, please visit the Oracle Technology Network (OTN). You must register online before using OTN; registration is free and can be done at

`http://www.oracle.com/technology/membership/`

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

`http://www.oracle.com/technology/documentation/`

Conventions

The following text conventions are used in this document:

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

What's New

This section describes new features available in Oracle Application Express Release 4.0, new documentation and points you to additional information.

Oracle Application Express Release 4.0 New Features

New features in Oracle Application Express, release 4.0 include:

- Websheets

  Websheets enable any user to quickly build and deploy Web-based data entry and reporting applications. With Websheets, the creation of tables, triggers, and sequences is handled automatically. Websheets offer an easy, declarative approach to report and form layout as well as the creation list of values and validations. See "Understanding the Difference Between a Websheet and a Database Application" on page 2-1.

- Team Development

  Team Development is a built-in project management tool that enables you ro manage the software development process by tracking new features, miscellaneous 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 3-1.

- Chart Enhancements

  Release 4.0 includes the integration of AnyChart 5.1 resulting in improved performance, decreased rendering time, and decreased update time. In addition to added support for maps and Gantt charts, this release now features scrolling support, interactive labels, markers in legends, multiple data markers, and content menu localization. See "Creating Maps" on page 7-76 and "Creating Charts" on page 7-82.

- REST Web Services

  REST Web services utilize a simpler architecture than SOAP Web services. Parameters are passed to a REST Web service as part of the URL and VML document is returned. See "Implementing Web Services" on page 14-7

- Improved Application Builder

  Application Builder features a new look and feel. User interface enhancements include improved navigation, redesigned Administration screens, extensive use of interactive reports, and an integrated application search capabilities. See "Using Application Builder" on page 4-1, "About Tree and Component View" on page 5-7,

Oracle Database 2 Day + Oracle Application Express Developer's Guide, and *Oracle Application Express Administration Guide*.

- Enhanced Interactive Reports

  Interactive reports now support icon and detail views, calendar views, inline edit, compound filter expressions, email notification, and a new group by functionality. Additionally, each report features enhanced Save options, can be downloaded to searchable HTML, and offers more granular printing capabilities. See "Customizing Interactive Reports" on page 7-4.

- Dynamic Actions

  Dynamic action provide developers with a way to define client-side behavior declaratively without the need of JavaScript. Using a simple wizard, developers can select a page item, a condition, enter a value, and select an action (for example, Show, Hide, Enable, Show Item Row). See "Implementing Dynamic Actions" on page 14-31.

- Plug-ins

  Plug-ins enable developers to enhance the existing built-in functionality by writing PL/SQL components for item types, regions, and processes. See "Implementing Plug-ins" on page 14-22.

- Oracle Application Express Listener

  Release 4.0 includes a new HTTP Web server. This Web server is Java-based. The Oracle Application Express Listener features file system caching, support for FOP transformations to PDF, offers improved file upload capability, and is certified against Web Logic, Tomcat, and OC4J with Oracle WebLogic Server, OC4J, and Oracle Glassfish Server. See *Oracle Application Express Listener* documentation.

- Application Timestamp Format and Timestamp TZ format

  Release 4.0 includes the ability for a developer to set the time zone for a user during an Application Express session as well as the ability to set the time zone automatically from the client browser. See "Configuring Globalization Attributes" on page 4-20.

- Tree Enhancements

  Release 4.0 includes the support for a new tree component using jsTree, a JavaScript based, cross browser tree component that features theme support, optional keyboard navigation and optional state saving. See "Creating Trees" on page 7-109.

- Theme Enhancements

  Oracle Application Express ships with 20 Themes. Twelve of these themes have been updated to a new look. These themes offer modern style that utilizes a DIV based page structure and run in "standards mode", as defined by the DOCTYPE in each page template.

1

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 Architecture
- Understanding Application Express User Roles
- Logging In to Oracle Application Express
- About the Workspace Home Page
- Using Online Help

> **See Also:** *Oracle Database 2 Day + Oracle 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...** button on the Workspace home page. The Learn 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 Architecture

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

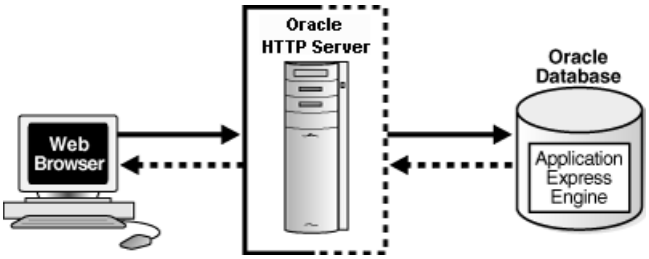
Whether you are running the Oracle Application Express development environment or an application you built using Oracle Application Express, the process is the same. Your browser sends a URL request that is translated into the appropriate Oracle Application Express PL/SQL call. After the database processes 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.

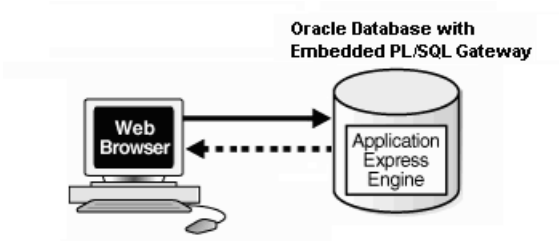
About Oracle Application Express Listener, Oracle HTTP Server (Apache), and the Embedded PL/SQL Gateway

The version of Oracle Database you use determines how the URL is translated:

- Versions prior to Oracle Database 11.1 require Oracle Application Express Listener or Oracle HTTP Server (Apache) with `mod_plsql`. The following graphic illustrates the three-tier architecture .



- With Oracle Database 11.1 or later or Oracle Database 10*g* Express Edition, you can use the embedded PL/SQL gateway. The following graphic illustrates the two-tier architecture using the embedded PL/SQL gateway.



The embedded PL/SQL gateway provides the Oracle database with a Web server and also the necessary infrastructure to create dynamic applications. The embedded PL/SQL gateway runs in the XML DB HTTP server in the Oracle database and includes the core features of `mod_plsql`. Inclusion of the embedded PL/SQL gateway simplifies the architecture and eliminates the middle tier entirely.

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
- validations 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** have no development privileges and are defined to provide access to applications that do not use an external authentication scheme.
- **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
- If you are a developer logging into a previously configured development environment, an administrator must grant you access to a workspace

Topics:

- About Browser Requirements
- Configuring Your Oracle Application Express Environment
- Logging In to Oracle Application Express as a Developer

About Browser Requirements

To 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 3.5 or later version
- Google Chrome 4.0 or later version
- Apple Safari 4.0 or later version

Application Express applications can be developed that support earlier Web browser versions, including Microsoft 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 embedded PL/SQL gateway, go to:

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

        Where:

        `hostname` is the name of the system where Oracle XML DB HTTP Server is installed.

        `port` is the port number assigned to Oracle XML DB HTTP Server. In a default installation, this number is 8080. See "Verifying the Oracle XML DB HTTP Server Port" on page 1-8.

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

      – 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 HTTP Server is installed.

        `port` is the port number assigned to Oracle HTTP Server. In a default installation, this number is 8888. See the Or*acle Application Express Listener* documentation.

        `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 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: See "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 will work. 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.

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

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.

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 **Next** 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 embedded PL/SQL gateway, go to:

     `http://hostname:port/apex`

Where:

- `hostname` is the name of the system where Oracle XML DB HTTP Server is installed.
- `port` is the port number assigned to Oracle XML DB HTTP Server. In a default installation, this number is 8080. See "Verifying the Oracle XML DB HTTP Server Port" on page 1-8.
- `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 `htmldb` or something else. Verify your DAD with your Oracle Application Express administrator.

- 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 HTTP Server is installed.
  - `port` is the port number assigned to Oracle HTTP Server. In a default installation, this number is 8888. See the *Oracle Application Express Listener* documentation.
  - `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 `htmldb` or something else. Verify your DAD with your Oracle Application Express administrator.

- If your setup uses Oracle HTTP Server (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 Oracle XML DB HTTP Server Port To verify the port number where the Oracle XML DB HTTP Server is running:

1. Start SQL*Plus and connect the database where Oracle Application Express is installed as `SYS`:
   - On Windows:

     ```
     SYSTEM_DRIVE:\ sqlplus /nolog
     connect sys as sysdba
     ```

   - On UNIX and Linux:

     ```
     $ sqlplus /nolog
     connect sys as sysdba
     ```

   When prompted, enter the appropriate username and 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 HTTP Server is disabled.

   See Also: *Oracle Database Installation Guide* to learn how to enable the Oracle XML DB HTTP 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. From the Administration list, click **Change Password**.

   The Change Password page appears.
3. 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.
4. 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** icon 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. Note that your user name and workspace name display in the lower left corner of the page.



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

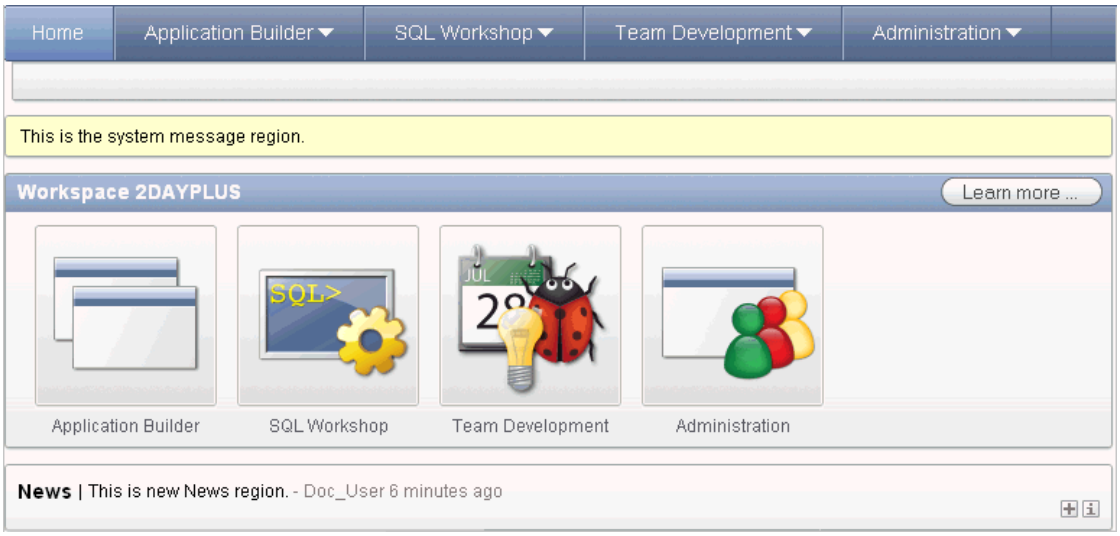
- **Application Builder**. Use Application Builder to assemble an HTML interface (or application) on top of database objects such as tables and procedures. See "Application Builder Concepts" on page 2-1 and "Using Application Builder" on page 4-1.
- **SQL Workshop**. Use the SQL Workshop to access tools 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 3-1.
- **Administration** links to the Workspace Administration page. See "Workspace and Application Administration" in *Oracle Application Express Administration Guide*.

About Learn More

Click the **Learn More** button 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



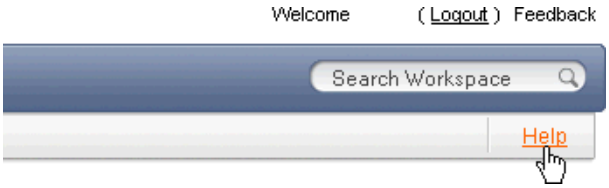
The system message displays at the top of the page. The News region displays in the center of the page. Use these regions to communicate with other users in the workspace. To learn more, see "Defining a System Message" in *Oracle Application Express Administration Guide* and "Managing News Entries" on page 3-19.

About Top Applications, Top Users, and Team Development

The Top Applications, Top Users, and Team Development dashboards display at the bottom on the page. These regions offer real time information about development activities in the workspace.

Your user name and workspace name display in the lower left corner of the page.

About Search Workspace



The Search Workspace field displays in the upper right corner of the 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 Available Updates

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

To disable this feature, click the **Edit** icon. From Check for Available Updates, select No and click **Apply Changes**.

About Language

Displays the default language for this Oracle Application Express instance.

About Set Screen Reader Mode

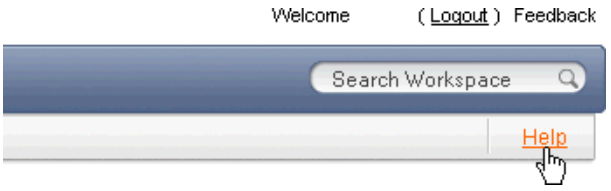
Use the Set Screen Reader Mode flag to identiry if a page optimised for screen readers.. This flag toggles between **Set Screen Reader Mode On** and **Set Screen Reader Mode Off**. To learn more, see "Accessibility in Oracle Application Express" in *Oracle Application Express Installation Guide* and the the accessible mode functions described in *Oracle Application Express API Reference*.

Using Online Help

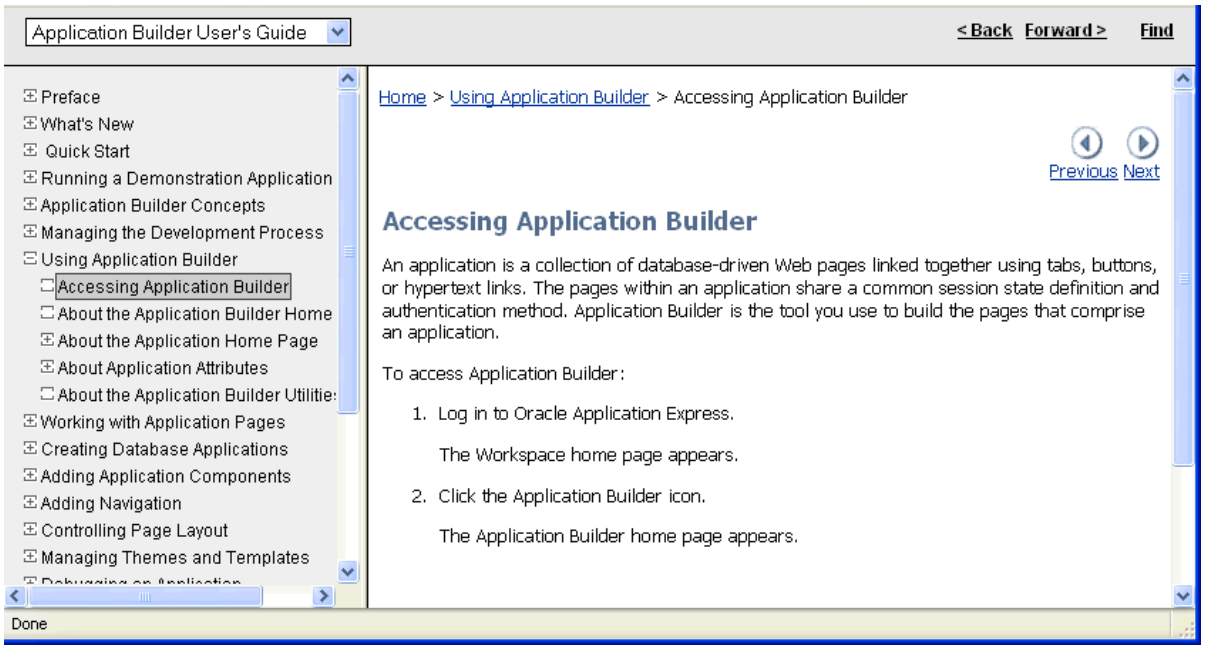
The Application Express user interface features three types of online help: Procedural Online Help, Page-level Help, and Field-Level Help.

About Procedural Online Help

You can access an HTML-based online Help system by clicking the Help link in the upper right corner of the window.



When you click the **Help** link, a help topic appears that describes the current page. To view the table of contents of another help set, select it from the list in the upper left side of the window.



You can browse through help topics by:

- Expanding and collapsing the table of contents. To view a topic, simply select it.
- Clicking the breadcrumb links at the top of each help topic.
- Clicking the **Previous** and **Next** buttons within a topic. Click these buttons to access the previous and next help topic within the structure of the help set.

The top of the window features a gray bar. Click **Back** and **Forward** to return to a previously viewed page. These controls work similarly to the Back and Forward controls in a Web browser.

Click **Find** to perform a keyword search of the entire help system. When the search field appears, enter a case insensitive query in the field provided and click **Find**. To search for an exact phrase, enclose the phrase in double quotation marks.

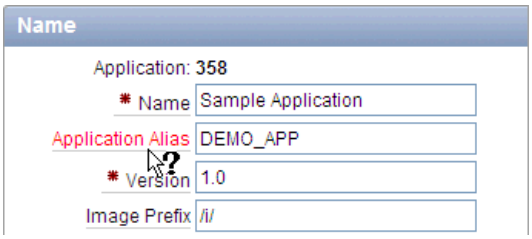
> **Tip:** With Oracle Database 11g, you must enable network services in order use the Find link. See "Enabling Network Services in Oracle Database 11g" on page 12-5

About Page-level Help

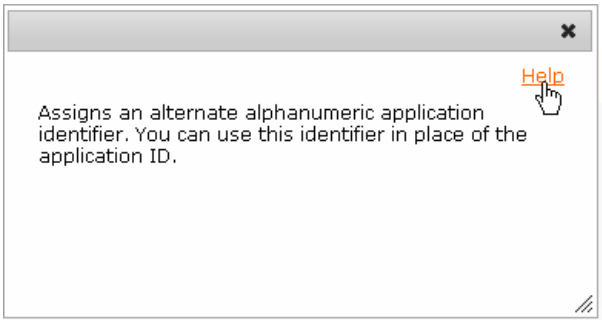
Many pages with in the Application Express user interface include Page-level Help. Page-level Help displays in a text box on the right side of the page and offers a brief description of the page functionality.

About Field-Level Help

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



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



Clicking the Help link in the upper right corner links to relevant content within the full online Help system.

2

Application Builder Concepts

This section 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. Each application is a collection of pages linked together using tabs, buttons, or hypertext links.

Topics:

- Understanding the Difference Between a Websheet and a Database 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 4-1

Understanding the Difference Between a Websheet and a Database Application

An application is HTML interface that exists on top of database objects such as tables and procedures. Each application is a collection of pages linked together using tabs, buttons, or hypertext links. Application Builder enables you to build two different types of applications: a websheet application and a database application.

An database application is a collection of pages that share a common session state and authentication. Developers create database objects using SQL Workshop and then create an application using a wizard. Database application enable developers to manually control all aspects of the development process. You can manually add and customize components (reports, charts, or forms), page controls (buttons, items, list of values), and shared components (breadcrumbs, lists, or tabs).For more information on database applications, click the **Learn more ...** button on the Application Express home page.

A **websheet application** is geared for the business user and requires no prior development experience. Each websheet application is a collection of pages designed for Web-based data entry and reporting. When you create a websheet application, Application Builder automatically handles the creation of tables, triggers, and sequences. Websheets offer an easy, declarative approach to report and form layout as

well as the creation list of values and validations. For more information on websheet applications, click the **Learn more ...** button on the Application Express home page.

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.

You add controls to a page on 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 5-14.
   - **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 5-14.
   - **Shared Components** lists common components that can be used by one or more pages within an application. See "Using Shared Components Icons" on page 5-15.

   See Also: "About the Page Definition" on page 5-1 and "Editing a Page in Component View" on page 5-12

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.

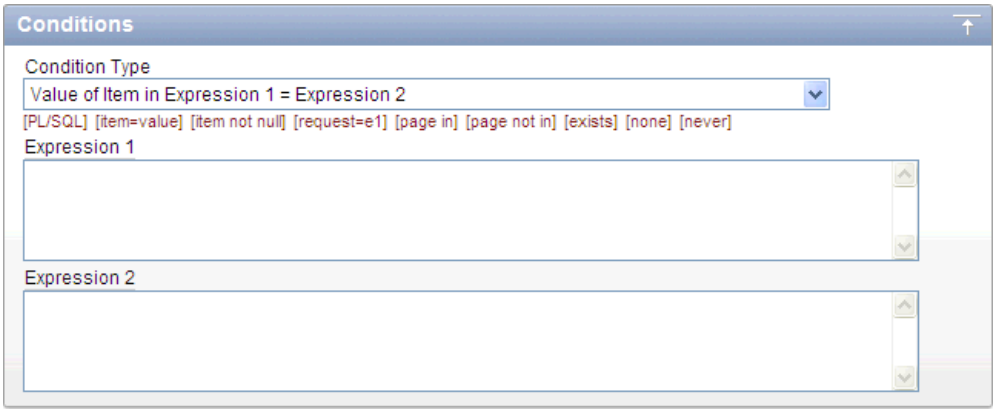
When you request a page using a URL, the engine is running **Show Page**. When you submit a page, the Application Express engine is running **Accept Page** or performing page processing during which it saves the submitted values in the session cache and then performs any computations, validations, or processes.

Understanding Conditional Rendering and Processing

A condition is a small unit of logic that helps you control the display of regions, items, buttons, and tabs as well as 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.



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 B, "Available Conditions" on page B-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 2-14

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 No, 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 a number of 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 12-26 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 extend the security of your application's authentication scheme. 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 12-35

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 may occur in the future. This means that to access form values entered on one page on a subsequent page, some form of session state management needs to occur. Typically, when a user enters values into a form on one page, those values are not accessible on later pages. 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. Also, because sessions persist in the database until purged by an administrator, a user can return to an old session and continue running an application long after first launching it. A user can also run multiple instances of an application simultaneously in different browser sessions.

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 (or anonymity) 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 (where applicable) 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 2-7

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.

Table 2–1 (Cont.) Information Available on the Session State Page

Heading	Description
Page Items	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. The Status column indicates the status of the session state. Available values include: ■ I - Inserted ■ U - Updated ■ R - Reset **See Also**: "Understanding Page-Level Items" on page 6-28s
Application Items	Application items are items that do not reside on a page. Application items are session state variables without the associated user interface properties. **See Also**: "Understanding Application-Level Items" on page 6-48 and "Understanding Substitution Strings" on page 2-15 for information about referencing item values

See Also: "Managing Session State Values" on page 2-11

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. 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
- 22088340776569347 is the session number

See Also: "About Publishing the Database Application URL" on page 13-32

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: ■ Short substitution string: &SESSION. ■ PL/SQL: V('SESSION') ■ Bind variable: :APP_SESSION
Request	Sets the value of REQUEST. Each application button sets the value of REQUEST to the name of the button. This enables accept processing to reference the name of the button when a user clicks it. You can reference REQUEST using the syntax: ■ Substitution string: &REQUEST. ■ PL/SQL: V('REQUEST') ■ Bind variable: :REQUEST
Debug	Displays application processing details. Valid values for the DEBUG flag are YES or NO. Setting this flag to YES displays details about application processing. You can reference the Debug flag using the following syntax: ■ Short substitution string: &DEBUG. ■ PL/SQL: V('DEBUG') ■ Bind variable: :DEBUG **See Also**: "Debugging an Application" on page 11-1

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

Syntax	Description
`ClearCache`	Clears the cache. This sets the value of items to null. To clear cached items on a single page, specify the numeric page number. To clear cached items on multiple pages, use a comma-separated list of page numbers. Clearing a page's cache also resets any stateful processes on the page. Individual or comma-separated values can also include collection names to be reset or the keyword `RP`, which resets region pagination on the requested page. The keyword `APP` clears cache for all pages and all application-level items in the current application and removes sort preferences for the current user. The keyword `SESSION` achieves the same result as the `APP` keyword, but clears items associated with all applications that have been used in the current session. **See Also**: "Clearing Session State" on page 2-12
`itemNames`	Comma-delimited list of item names used to set session state with a URL.
`itemValues`	List of item values used to set session state within a URL. Item values cannot include colons, but can contain commas if enclosed with backslashes. To pass a comma in an item value, enclose the characters with backslashes. For example: `\123,45\`
`PrinterFriendly`	Determines if the page is being rendered in printer friendly mode. If PrinterFriendly is set to Yes, then the page is rendered in printer friendly mode. The value of PrinterFriendly can be used in rendering conditions to remove elements such as regions from the page to optimize printed output. You can reference the printer friendly preference by using the following syntax: `V('PRINTER_FRIENDLY')` When referenced, the Application Express engine will not display tabs or navigation bars, and all items will be displayed as text and not as form elements.

Although it is important to understand how `f?p` syntax works, you rarely have to construct this syntax yourself. Application Builder includes many wizards that automatically create these references for you. The following sections describe specific instances that utilize `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. Another method is to submit the page first. 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 7-95 and "APP_SESSION" on page 2-19

Facilitating Bookmarks by Using Zero as the Session ID

If the pages within an application are public and do not require authentication, you make it easier for 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 will see that all generated links to public pages will contain `0` for the session ID and all branches to public pages will 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.

In order to use zero as the session ID in your application, you have to 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 one of the following patterns:

- `&APP_ID.`
- 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 10 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')"
```

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 6-44

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	`:MY_ITEM`	Use standard bind variable syntax for items whose names are no longer than 30 characters. Use this syntax for references within a SQL query and within PL/SQL.
PL/SQL	`V('MY_ITEM')`	Use PL/SQL syntax to reference an item value using the `V` function. **See Also:** *Oracle Application Express API Reference*
PL/SQL	`NV('MY_NUMERIC_ITEM')`	Use standard PL/SQL syntax referencing the numeric item value using the `NV` function. **See Also:** *Oracle Application Express API Reference*
Static text (exact)	`&MY_ITEM.`	For static text or an exact substitution use the convention `&ITEM_NAME` followed by a period (.), for example: `&MY_ITEM.`

Setting Session State

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

- Form submission. See "Form Submission Example" on page 2-12.
- Bind variable. See "About Bind Variable Syntax" on page 2-14.
- Computation. See "Understanding Application Computations" on page 5-44.
- f?p syntax. See "Using f?p Syntax to Link Pages" on page 2-8

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 will need to 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 9-2 for information about creating regions

Using Bind Variables in PL/SQL Procedures

For region types defined as a PL/SQL Procedure, 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 to achieve a specific type of functionality

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 10-12.

About Built-in Substitution Strings

Application Builder supports a number of built-in substitution strings. You may need to 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:

- APP_ALIAS
- APP_ID
- APP_IMAGES
- APP_PAGE_ID
- APP_SESSION
- APP_UNIQUE_PAGE_ID
- APP_USER
- AUTHENTICATED_URL_PREFIX
- BROWSER_LANGUAGE
- CURRENT_PARENT_TAB_TEXT
- DEBUG
- HOME_LINK
- LOGIN_URL

- IMAGE_PREFIX
- Application Express SCHEMA OWNER
- PRINTER_FRIENDLY
- LOGOUT_URL
- PROXY_SERVER
- PUBLIC_URL_PREFIX
- REQUEST
- SQLERRM
- SYSDATE_YYYYMMDD
- WORKSPACE_IMAGES

See Also:

- "Substitutions" on page 4-13 for information about defining static substitution strings as an application attribute
- "Establishing User Identity Through Authentication" on page 12-26 for information about authentication

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 2–4 describes the supported syntax for referencing APP_ALIAS.

Table 2–4 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_ID

APP_ID identifies the application ID of the currently executing application. Table 2–5 describes the supported syntax for referencing APP_ID.

Table 2–5 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_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 2–6 describes the supported syntax for referencing `APP_IMAGES`.

Table 2–6 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 2-22, "WORKSPACE_IMAGES" on page 2-26, and "Managing Images" on page 9-18

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 need to work generically in multiple applications. Table 2–7 describes the supported syntax for referencing `APP_PAGE_ID`.

Table 2–7 APP_PAGE_ID Syntax

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

The following is an example of a substitution string reference:

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

APP_SESSION

APP_SESSION is one of 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 2–8 describes the supported syntax for referencing APP_SESSION.

Table 2–8 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_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 2–9 describes the supported syntax for referencing APP_UNIQUE_PAGE_ID.

Table 2–9 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 2–10 describes the supported syntax for referencing APP_USER.

Table 2–10 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:

```
htp.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 4-17 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 2–11 describes the supported syntax for referencing AUTHENTICATED_URL_PREFIX.

Table 2–11 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 2–12 describes the supported syntax for referencing BROWSER_LANGUAGE.

Table 2–12 BROWSER_LANGUAGE Syntax

Reference Type	Syntax
Bind variable	`:BROWSER_LANGUAGE`
Direct PL/SQL	`APEX_APPLICATION.G_BROWSER_LANGUAGE`
PL/SQL	`V('BROWSER_LANGUAGE')`
Substitution string	`:BROWSER_LANGUAGE.`
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 2–13 describes the supported syntax for referencing `CURRENT_PARENT_TAB_TEXT`.

Table 2–13 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 2–14 describes the supported syntax for referencing `DEBUG`.

Table 2–14 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 will redirect 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 2–15 describes the supported syntax for referencing HOME_LINK.

Table 2–15 HOME_LINK Syntax

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

> **See Also:** "Authentication" on page 4-17 for information about the Home Link attribute

LOGIN_URL

Use `LOGIN_URL` to display a link to a login page for users that are not currently logged in. Table 2–16 describes the supported syntax for `LOGIN_URL`.

> **See Also:** "Authentication" on page 4-17 and "About the Security Attributes Page" on page 4-16

Table 2–16 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#`

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 2–17 describes the supported syntax for referencing `IMAGE_PREFIX`.

> **See Also:** "APP_IMAGES" on page 2-18,"WORKSPACE_IMAGES" on page 2-26, and "Editing the Application Definition" on page 4-8

Table 2–17 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#`

Application Express SCHEMA OWNER

If you are generating calls to applications from within your PL/SQL code, you may need to 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).

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 2–18 describes the supported syntax for referencing `PRINTER_FRIENDLY`.

Table 2–18 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.`

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 2–19 describes the supported syntax for referencing `LOGOUT_URL`.

Table 2–19 LOGOUT_URL Syntax

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

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 2–20 describes the supported syntax for referencing PUBLIC_URL_PREFIX.

Table 2–20 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. This enables 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 2–21 describes the supported syntax for referencing REQUEST.

Table 2–21 REQUEST Syntax

Reference Type	Syntax
Bind variable	:REQUEST
Direct PL/SQL	APEX_APPLICATION.G_REQUEST
PL/SQL	V('REQUEST')
Substitution string	&REQUEST
	&REQUEST. (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
   htp.p('hello');
END IF;
```

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

See Also:

- *Oracle Database Advanced Application Developer's Guide* for information about developing Web applications with PL/SQL
- *Oracle Database PL/SQL Packages and Types Reference* for information about htp packages

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 2–22 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 2–23 describes the supported syntax for referencing `WORKSPACE_IMAGES`.

Table 2–23 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 2-18 and "IMAGE_PREFIX" on page 2-22

3

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
- 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.

About Workspace

The Workspace region displays at the top of the page and includes the following icons:

- Features. See "Tracking Features" on page 3-2.
- Milestones. See "Tracking Milestones" on page 3-6.
- To Dos. See "Tracking To Dos" on page 3-8.
- Bugs. See "Managing Bugs" on page 3-11.
- Feedback. See "Managing Feedback" on page 3-14.

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 3-19.

About the Team Development Summaries

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

- Features. See "Tracking Features" on page 3-2.
- Milestones. See "Tracking Milestones" on page 3-6.
- To Dos. See "Tracking To Dos" on page 3-8.
- Bugs. See "Managing Bugs" on page 3-11.
- Links. See "Managing Links" on page 3-18.
- Feedback. See "Managing Feedback" on page 3-14.
- Tag Cloud. See "Utilizing the Tag Cloud Summary" on page 3-17.

To edit an item, click the item name. To create a new item, click the **Create** icon The Create icon resembles a plus (+) symbol and displays in the upper right corner of each dashboard.

You can filter the display by assignee, release, or application using the Search bar in the center of the page. To filter the display, configure the select lists and click **Set**. To remove any filters, click the **Reset** button.

About Team Actions

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



The Team Actions list contains the following links:

- Manage Links. See "Managing Links" on page 3-18.
- Manage News. See "Managing News Entries" on page 3-19.
- Team Development Settings. See "Managing Team Development Settings" on page 3-20.
- Release Summary. "Viewing a Release Summary" on page 3-21.
- Utilities. "About Utilities" on page 3-21.

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:

- Accessing the Features Page
- Creating a Feature
- Updating a Feature
- Viewing Feature Reports

Accessing the Features Page

To access the Features page:

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

   The Features Dashboard appears. The Feature 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
   - Contributors
   - Development Priority
   - Applications
   - Feature Desirability
   - Documentation Status
   - Focus Areas
   - Tag Cloud
   - Releases
3. Click the Features tab. See "About the Features Page" on page 3-3.

About the Features Page

The Features page 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:

- **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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **Reports** - Displays a list of saved interactive reports. If available, select an alternate report and click **Go**. See "Saving a Report" on page 7-16.
- **View**. Use this control to toggle between report and details views. To change the view, click the following icons
  - **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 "Using the Actions Menu" on page 7-6.

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, click the item label.

   When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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**.

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**.

Viewing Feature Reports

Use feature reports to view features from different perspectives.

Topics:

- About the Features Dashboard

- About Calendar
- About History
- About Progress Log
- About Focus Areas
- About Owners

About the Features Dashboard

The Feature 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
- Contributors
- Development Priority
- Applications
- Feature Desirability
- Documentation Status
- Focus Areas
- Tag Cloud
- Releases

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.

About History

Displays a report of recently changed features, including the old value and new value as well as who made the update. To view a specific feature, click 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 7-4.

About Progress Log

Displays a report of progress log entries. The progress log shows all the progress entries across all features. 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 7-4.

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**.

Tracking Milestones

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

Topics:

- Accessing the Milestone Page
- Creating a Milestone
- Updating a Milestone
- Viewing Milestone Reports

Accessing the Milestone Page

To access the Milestones page:

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

   The Milestones Dashboard appears. The Milestones Dashboard display an overview of milestones within the workspace. You can filter by release or link to a specific milestone or milestones by owner.
3. Click the **Milestones** tab.

   The Milestones page appears. "About the Milestones Page" on page 3-6.

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 (wild card 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 "Using the Actions Menu" on page 7-6.

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.
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, click the item label.

   When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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**.

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.

   When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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
- About Milestone Details
- About Milestone Details

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.

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.

About Milestone Details

The Milestones Details 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.

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:

- Accessing the To Do's Page
- About the To Dos Page
- Creating a To Do
- Updating a To Do
- Viewing To Do Reports

Accessing the To Do's Page

To access the To Do's page:

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. The page is divided into the following sections:

   - Open To do's
   - Top Categories

- Top Assignees
- Top Status Codes
- Top Contributors
- Top Features
- Top Releases
- Top To do's by Application
- Tag Cloud
- Developer Percent Complete

To view to dos associated with specific owner, click the appropriate section of the pie chart.

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

   The To Do's 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 Do's 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 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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **Reports** - Displays a list of saved interactive reports. If available, select an alternate report and click **Go**. See "Saving a Report" on page 7-16.
- **View**. Use this control to toggle between report and details views. To change the view, click the following icons
  - **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 "Using the Actions Menu" on page 7-6.

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, click the item label.

When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

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**.

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 appears. 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:

- Open To do's
- Top Categories
- Top Assigneees
- Top Status Codes

- Top Contributors
- Top Features
- Top Releases
- Top To do's by Application
- Tag Cloud
- Developer Percent Complete

To view to dos associated with specific owner, click the appropriate section of the pie chart.

About Calendar View

The Calendar page displays to dos 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 to do, click the feature name.

About Progress Log

Displays a report of progress log entries. The progress log shows all the progress entries across all features. 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 7-4.

Managing Bugs

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

Topics:

- Accessing the Bugs Page
- About the Bugs Page
- Creating a Bug
- Editing a Bug
- Viewing Bug Reports

Accessing the Bugs Page

To access the Bugs page:

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. The Dashboard page contains the following regions:

   - Percent Complete
   - Assigned Developer
   - Severity
   - Status

- Targeted Release
- Priority
- Tag Cloud

3. Click the **Bugs** tab.

   The Bug page appears. See "About the Bugs Page" on page 3-12.

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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **Reports** - Displays a list of saved interactive reports. If available, select an alternate report and click **Go**. See "Saving a Report" on page 7-16.
- **View**. Use this control to toggle between report and details views. To change the view, click the following icons
  - **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 "Using the Actions Menu" on page 7-6.

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, click the item label.

   When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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 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**.

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 Complete
- Assigned Developer
- Severity
- Status
- Targeted Release
- Priority
- Tag Cloud

About Calendar

The Calendar page displays 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.

About By Developer

The By Developer page displays bug by developer. To view bugs associated with a specific assignee, click the appropriate section of the pie 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 bar 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:

- Accessing the Feedback Page
- Adding a Feedback Page to an Application
- Reviewing Feedback
- Viewing Feedback Reports

Accessing the Feedback Page

To access the Feedback page:

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

   The Feedback Dashboard appears. The Dashboard page contains the following regions:

   - Percent Closed
   - Summary
   - Top Feedback Filers
   - Top Applications
   - Status
   - Top Pages
   - Tag Cloud
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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **Reports** - Displays a list of saved interactive reports. If available, select an alternate report and click **Go**. See "Saving a Report" on page 7-16.
- **View**. Use this control to toggle between report and details views. To change the view, click the following icons
  - **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 "Using the Actions Menu" on page 7-6.

Adding a Feedback Page to an Application

In order to utilize 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 a entry label.
7. For Application Feedback Setting, select **Yes** to enable this feature for the current application.

Using the Feedback Page

To submit feedback:

1. Run the application for which you wish 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 will be made available to the developers.

4. From Feedback Type, select one of the following: General Comment, Enhancement Request, or Bug.
5. Identify the comment.
6. 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. Create a bug, to do, or feature by selecting one of the following:
   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 bug reports to view bugs from different perspectives.

Topics:

- About the Bugs Dashboard
- About Calendar
- About By Developer

- About By Day

About Feedback Dashboard

The Feedback Dashboard contains the following regions:

- Percent Closed
- Summary
- Top Feedback Filers
- Top Applications
- Status
- Top Pages
- Tag Cloud

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 feedback by application.

About By Filing User

The By Filing User page displays chart of open feedback by filing user.

Utilizing the Tag Cloud Summary

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

To populate this summary, edit the Tags field for each Team Development component (that is, 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.



Topics:

- Managing Links
- Managing News Entries

- Managing Team Development Settings
- Viewing a Release Summary
- About Utilities

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 Tasks 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 (wild card 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 "Using the Actions Menu" on page 7-6.

Adding a Link

To add a link:

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

   The Links page appears.
3. To add a new link:

   a. Click **Create Link**.

      The Links page appears.

   b. Edit the fields provided.

   c. Click **Create**.

Editing or Deleting a Link

To access the links page.

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

2. On the Tasks 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

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 Tasks 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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.
   - **View**. Toggles between Report and Details views. To change the view, click the following icons:
     - **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 "Using the Actions Menu" on page 7-6.

Adding a News Entry

To add a news entry:

1. On the Workspace home page, click the **Team Development** icon.
2. On the Tasks 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 Tasks 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 preferences.

1. On the Workspace home page, click the **Team Development** icon.
2. On the Tasks list, click **Team Development Settings**.

   The Settings page appears.
3. Edit the appropriate attributes.
4. To view help for a specific item on a page, click the item label.

   When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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 Tasks 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 appear.
   b. Fill in the appropriate fields. Mandatory fields are marked with a red asterisk (*).
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 Tasks list, click **Utilities**.
3. Options include:
   - **Push past due Features** - Enables you to take all features that are not yet complete (based upon the selected status and release) and extend their due date by the entered number of days. Note that you can accept the default of all features meeting your filter or select just those you want to update, enabling you to slip your schedule a week
   - **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 Assignee** - 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 to ready for production
   - **Manage Team Development Settings** - See "Managing Team Development Settings" on page 3-20.

4

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
- About Application Attributes

> **See Also:** "Quick Start" on page 1-1, "Application Builder Concepts" on page 2-1, "Creating Database Applications" on page 6-1, "Controlling Page Layout" on page 9-1, and "Adding Navigation" on page 8-1

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.

   The Workspace home page appears.

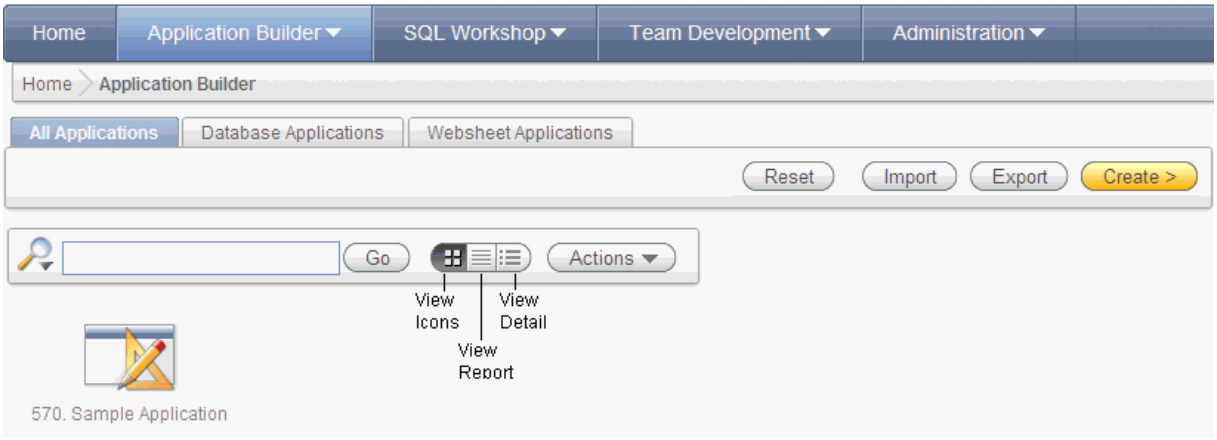
2. Click the Application Builder icon.

   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 a Websheet and a Database Application" 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, and Websheet Applications.



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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View icons**. Use this control to toggle between icon, report, or details views. To change the view, click the following icons:
  - **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 "Using the Actions Menu" on page 7-6.

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 13-23.
- **Export**. Click Export to export an application file. See "Exporting an Application and Related Files" on page 13-12.
- **Create.** Click **Create** to create an application or install a demonstration application. See "About Using the Create Application Wizard" on page 6-2.

About the Tasks List

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



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 Applications Groups" on page 6-26.
- **Workspace Themes**. See "Managing Themes" on page 10-1.
- **Cross Application Reports**. See "Viewing Utilities and Reports" on page 6-50.
- **APEX Views**. See "About Application Express Views" on page 6-54.
- **Demonstration Applications**.

About the Recent List

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 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 4-8



The following large icons appear next:

- **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 2-2.

- **Supporting Objects** links to the Supporting Objects page. See "How to Create a Packaged Application" on page 13-5.
- **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 5-36.
- **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 6-50.
- **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 13-12.

> **Tip:** You can control how these items display by clicking **Customize Display** on the Task list. See"About the Tasks List" on page 4-5

About the Edit Application Properties and Create Page Buttons

The Edit Application Properties and Create Page buttons display 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 4-8. 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 6-9.

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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View icons**. Use this control to toggle between icon, report, and detail view. To change the view, click the following icons:
  - **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.
  - **View Detail** displays detailed information about each application.

- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

About the Tasks List

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



The Tasks list contains the following links:

- **Delete this Application** deletes the current application. See "Deleting an Application" on page 6-7.
- **Copy this Application** creates a copy of the current application. See "Copying an Application" on page 6-7.
- **Customize Display** controls whether the top of the page displays using large icons or small buttons. Options include **Use Icons** (the default) and **Use Buttons**.

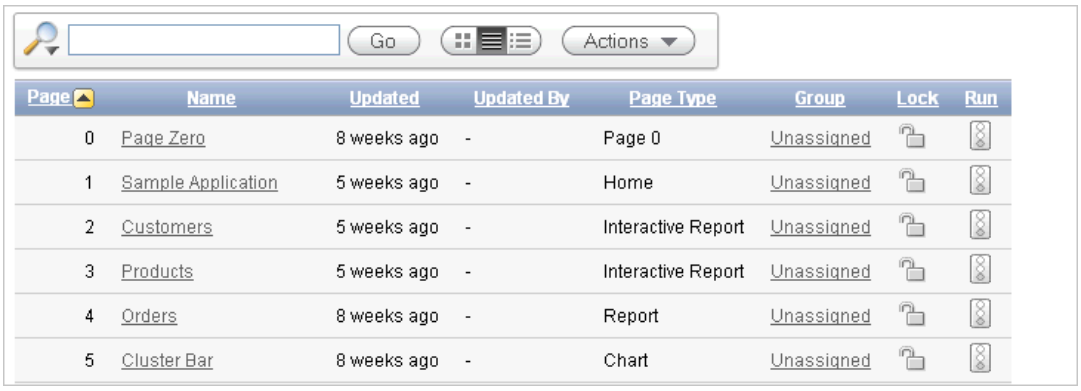
Understanding Page Display Alternatives

You can control how the Application home page appears by selecting the following icons: View Icons, View Report, or View Details.

View Icons (the default) display each page as an icon.

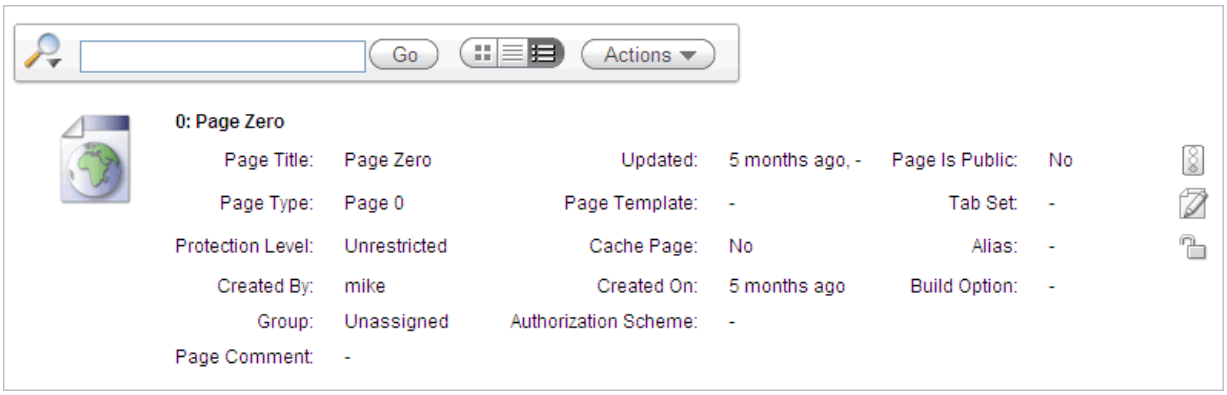


Report mode displays each page as a line in a report. Each line includes the page number, the page name, when the page was last updated and by whom, the page type, any associated group, and lock status. To view a page, click the page ID. Use the Lock icon to prevent conflicts during application development. Click the **Run** icon to run the associated page and render viewable HTML.



See Also: "Locking and Unlocking a Page" on page 6-17 and "Running a Page or Application" on page 6-13

Details 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. Use the **Lock** icon to prevent conflicts during application development.

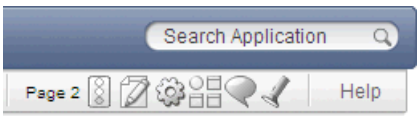


About Recently Edited Pages

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 a number of 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 5-36.

Run Page Icon



The **Run Page** icon resembles a small traffic signal. 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 a Page or Application" on page 6-13.

Edit Page Icon



The **Edit Page** icon resembles a small green 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 5-1.

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 5-36.

Dashboard Icon



The **Dashboard** icon resembles a circle and four small boxes. Click this icon to link to the Application Dashboard page. The Application Dashboard offers a summary of application components and attributes. See "About the Application Dashboard" on page 6-52.

Developer Comment icon



The **Developer Comment** icon is the shape of a green balloon. Click this icon to record comments about an application, a specific page, or a group of pages. See "Adding Developer Comments" on page 6-21.

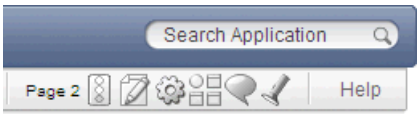
Find Icon



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 7-112.

Searching Page Metadata

The Search Application field displays above the Developer Action bar.



Use this field to perform case sensitive searches for metadata within a page. 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 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

> **See Also:** "How to Create a Packaged Application" on page 13-5 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 page to edit the application name and availability and to define static substitution strings. Additionally, the Edit Application page displays defined build options, the associated theme, template defaults, and component defaults. Required values are marked with a red asterisk (*).

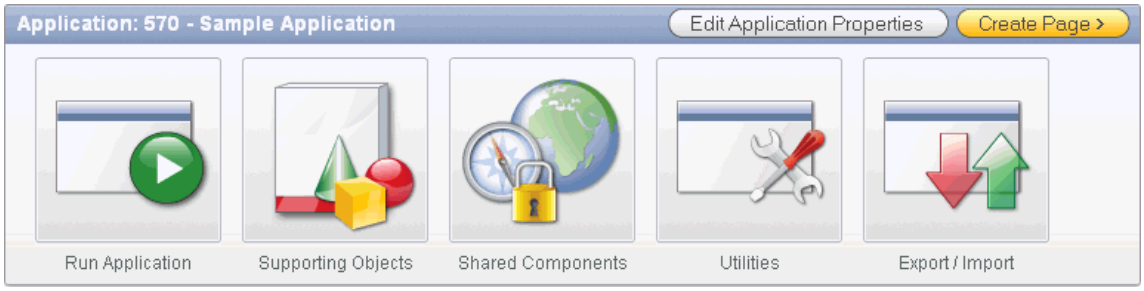
Topics:

- Accessing the Edit Definition Page
- About the Edit Application Page

Accessing the Edit Definition Page

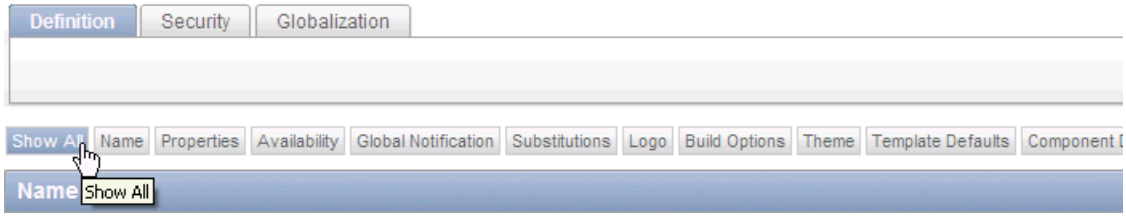
To edit the application definition:

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 page appears.

About Navigation Alternatives The Edit Application page is divided into the following sections: Name, Properties, Availability, 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 Page

The following sections describe the attributes available on the Edit Application page.

Topics:

- Name
- Properties
- Availability
- Global Notification
- Substitutions
- Logo

- Build Options
- Theme
- Template Defaults
- Component Defaults

Name Use Name to define basic characteristics of your application, including the application name, an optional alphanumeric alias, and a version number. Table 4–1 describes all Name attributes.

Table 4–1 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 in place of 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: ▪ `f?p=105:1` ▪ `f?p=myapp:1` **See Also**: "Using f?p Syntax to Link Pages" on page 2-8
Version	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: ▪ `YYYY.MM.DD` ▪ `MM.DD.YYYY` ▪ `DD.MM.YYYY` 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.
Image Prefix	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 `/i/`. 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 `#IMAGE_PREFIX#`. For example, to reference the image `go.gif`, you would use the following syntax: `<img src="#IMAGE_PREFIX#go.gif">` **See Also:** "IMAGE_PREFIX" on page 2-22, "Managing Images" on page 9-18, and "Referencing Images" on page 9-18
Media Type	Enter the Internet Media Type. An Internet Media Type is two-part identifier for file formats on the Internet. A Media Type is composed of at least two parts: a type, a subtype, and one or more optional parameters. This Media Type is used in the Content-Type HTTP header when rendering the page. The page-level Media Type overrides the application-level Media Type. The default value for this attribute is `NULL`. If both the page-level and application-level values for Media Type are `NULL`, the Media Type `text/html` is used.

Table 4–1 (Cont.) Application Definition, Name

Attribute	Description
Proxy Server	Use this field to specify a proxy server. 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. You can reference values entered into this field from PL/SQL using the PL/SQL package variable `APEX_APPLICATION.G_PROXY_SERVER`.
Parsing Schema	Specifies the schema that all SQL and PL/SQL in the application is parsed as. You may use the `#OWNER#` substitution string to reference this value in SQL queries and PL/SQL (for example, in a region or a process).

Properties Use Properties to enable the following attributes: logging, debugging, exact substitutions, application group, feedback, and default error display location. Table 4–2 describes all Name attributes.

Table 4–2 Application Definition, Properties

Attribute	Description
Logging	Determines whether user activity is recorded in the Oracle Application Express activity log. When set to **Yes**, every page view is logged, enabling an administrator to monitor user activity for each application. Disabling logging may be advisable for high volume applications.
Debugging	Controls debug mode for the current application. Available options include: ▪ **Yes** enables the application to run in a debug mode. ▪ **No** disables the application from running in debug mode. 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.

Exact Substitutions	Determines if exact substitutions are supported. Use exact substitutions. Non-exact substitutions is a deprecated feature.
	Exact substitutions use the following sytnax:
	`&ITEM.`
	Non-exact substitutions use the following sytnax:
	`&ITEM`
	See Also: "Understanding Substitution Strings" on page 2-15

Application Group	Displays the application group currently associated with this application. To select another application group, make a selection from the list. To remove an application from an existing group, select Unassigned. **See Also**: "Creating Applications Groups" on page 6-26

Table 4–2 (Cont.) Application Definition, Properties

Attribute	Description
Allow Feedback	Enables support for end user feedback for this application. Select **Yes** or **No**. **See Also**: "Managing Feedback" on page 3-14
Default Error Display Location	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.

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 4–3.

Table 4–3 Application Definition, Availability

Attribute	Description
Status	Specifies whether the application is available or unavailable for use. Options include: ▪ **Available** - Application is available with no restrictions. ▪ **Available with Edit Links** - 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. ▪ **Available to Developers Only** - Application is available to users having developer privileges. ▪ **Restricted Access** - Application is available to developers named in the **Restrict to comma separated user list**. ▪ **Unavailable** - Application cannot be run or edited. The message in **Message for unavailable application** displays when users attempt to access the application. ▪ **Unavailable (Status Shown with PL/SQL)** - Application cannot be run or edited. ▪ **Unavailable (Redirect to URL)** - Application cannot be run. The user is linked to the URL entered in **Message for unavailable application**. **See Also**: "Changing Build Status for Multiple Applications" in *Oracle Application Express Administration Guide*, "Changing Application Build Status Set During Deployment" in *Oracle Application Express Administration Guide*, and "Controlling Access to Applications, Pages, and Page Components" on page 7-118,
Build Status	Identifies the build status of the current application. Options include: ▪ **Run and Build Application** - Developers and users can both run and develop the application. ▪ **Run Application Only** - Users can only run the application. This option is intended for applications in a production instance. **See Also**: "Changing Application Build Status Set During Deployment" in *Oracle Application Express Administration Guide*

Table 4–3 (Cont.) Application Definition, Availability

Attribute	Description
Message for unavailable application	Use this attribute in conjunction with Status. If you set Status to **Unavailable**, **Unavailable (Status Shown with PL/SQL)**, or **Unavailable (Redirect to URL)**, the text you enter in this attribute displays. If you set Status to **Available**, the text you enter in this attribute does not display.
Restrict to comma separated user list (status must equal Restricted Access)	Use this attribute in conjunction with the Status **Restricted Access**. If you set Status to **Restricted Access**, only the users listed in this attribute can run the application. To use this attribute: 1. From the Status list, select **Restricted Access**. 2. Enter a comma-delimited list of users who can run the application in the field provided.

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 will display 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 page and enter a message in the Global Notification attribute.
3. Click **Apply Changes**.

> **See Also:** "Understanding Substitution Strings" on page 2-15 and "Page Templates" on page 10-26

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 2-15

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:

1. 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.
2. In Logo, enter the following:

- For an image, enter the complete image name, including the filename extension. For example:

  ```
  /i/oracle.gif
  ```

- For text, enter the full text string. For example:

  ```
  Sample Application
  ```

3. 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 9-18, "Verifying the Prefix for the Virtual Image Directory" on page 9-19, "Customizing Templates" on page 10-12, and "Page Templates" on page 10-26

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 run time. 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 13-33

Theme Displays the current theme applied to the application. Themes are collections of templates that can be used to define the layout and style of an entire application. Each theme provides a complete set of templates that accommodate every user interface pattern that may be needed in an application.

> **See Also:** "Managing Themes" on page 10-1

Template Defaults Lists the default templates for this application. To specify a default template at the application level, you can either:

- Select a new theme. See "Switching the Active Theme" on page 10-5.
- Select a new default page template on the Create/Edit Theme page. See "Changing the Default Templates in a Theme" on page 10-3.

You can also override this default by making a selection from the Page Template list on the Page Attributes page.

Table 4–4 describes template defaults for the current application.

Table 4–4 Application Definition, Template Defaults

Attribute	Description
Default Page Template	Indicates the default page template to display pages. You can override this selection by making a selection from the Page Template list on the Page Attributes page. **See Also:** "Altering Page Attributes" on page 5-20
Print Mode Page Template	Identifies the template to be used when the Application Express engine is in printer friendly mode. When calling the Application Express engine to render a page, you have the option to specify whether the page should be displayed using the Print Mode Page Template specified. If you specify Yes, then the page displays using a printer friendly template. The Application Express engine displays all text within HTML Form Fields as text. The printer friendly template does not need to have the `#FORM_OPEN#` or `#FORM_CLOSE#` substitution string. **See Also:** "Optimizing a Page for Printing" on page 7-125
Error Page Template	Optional. Specifies a page template to use for errors that display on a separate page, as opposed to those that display inline.

See Also: "Changing the Default Templates in a Theme" on page 10-3 and "Customizing Templates" on page 10-12

Component Defaults Displays the default templates used when running wizards. You can override these settings on the attributes page for each control or component. Table 4–5 describes component defaults for the current application.

Table 4–5 Application Definition, Component Defaults

Attribute	Description
Calendar	Default calendar template used when you create a calendar.
Label	Default label template used when you create page items.
Report	Default report template used when you create report.
List	Default template used when you create a list.
Breadcrumb	Default template used when you create a breadcrumb.
Button	Default template used when you create buttons that are template controlled.
Region	Default template used when you create a region.
Chart Region	Default region template used when you create a chart or map.
Form Region	Default region template used when you create a form.
Report Region	Default region template used when you create a report.
Tabular Form Region	Default region template used when you create a tabular form.
Wizard Region	Default region template used when you create a wizard component.
Breadcrumb Region	Default region template used when you create a breadcrumb.
List Region	Default region template used when you create a list.

See Also: "Changing the Default Templates in a Theme" on page 10-3 and "Customizing Templates" on page 10-12

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 12-1

Accessing the Edit Security Attributes Page

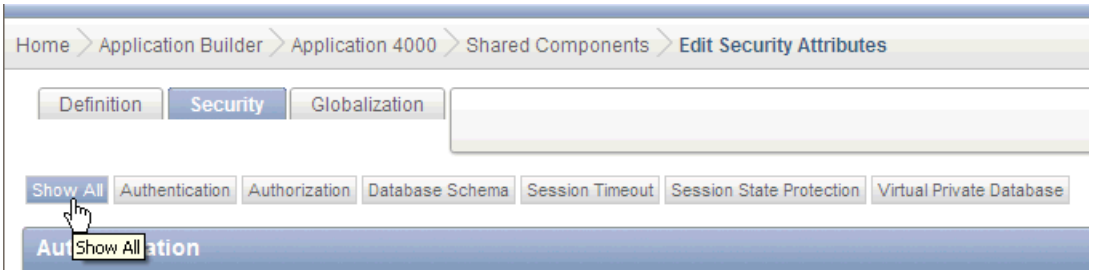
To access the Edit Security Attributes page:

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.

About Navigation Alternatives The Edit Security Attributes page is divided into the following sections: Authentication, Authorization, Database Schema, Session State Protection, and Virtual Private Database. 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
- Virtual Private Database (VPD)

Authentication **Authentication** is the process of establishing users' identities before they can access an application. Although you define multiple authentication schemes for your application, only one scheme can be current at a time. Table 4–6 describes the attributes available under Authentication.

Table 4–6 Authentication Attributes

Attribute	Descriptions
Home Link	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. 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. **See Also:** "HOME_LINK" on page 2-21
Login URL	Replaces the substitution strings `&LOGIN_URL.` in HTML or `#LOGIN_URL#` in templates. **See Also:** "LOGIN_URL" on page 2-22 and "Creating an Authentication Scheme" on page 12-27

Table 4–6 (Cont.) Authentication Attributes

Attribute	Descriptions
Public User	Identifies the Oracle schema used to connect to the database through the database access descriptor (DAD). The default value is `ANONYMOUS` in environments where the database server version is Oracle Database Express Edition and it is `APEX_PUBLIC_USER` for all other versions of the database server. 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`. **Note**: Previous versions of Oracle Application Express used the built-in substitution string `HTMLDB_PUBLIC_USER`. When `APP_USER` 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: ▪ USER_IS_PUBLIC_USER ▪ USER_IS_NOT_PUBLIC_USER If the current application user (`APP_USER`) equals the value of this attribute, then the user is logged on as a public user. Some applications have public (not logged in) and a private (logged in) modes. By determining if the user is the public user, you can conditionally display or hide information. For example, you can show a login button if the user is the public user and a logout link if the user is not a public user. Reference this value using `APEX_APPLICATION.G_PUBLIC_USER`. The Application Express engine also has built in condition types `USER_IS_PUBLIC_USER` and `USER_IS_NOT_PUBLIC`. **See Also:** "HOME_LINK" on page 2-21 and "Understanding Conditional Rendering and Processing" on page 2-3
Authentication Scheme	Click the link to define an authentication scheme. **See Also:** "Understanding How Authentication Works" on page 12-26 and "Creating an Authentication Scheme" on page 12-27

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. You can assign only one authorization 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 a authorization scheme, click **Define Authorization Schemes**.

An authorization scheme is a binary operation that either succeeds (equals true) or fails (equals false). If it succeeds, then the component or control can be viewed. If it fails, then the component or control cannot be viewed or processed. When you attach an authorization scheme to a page and it fails, an error message displays instead of the page. However, when you attach an authorization scheme to a page control (for example, a region, a button, or an item) and it fails, no error page displays. Instead, the control either does not display or is not processed or executed.

> **See Also:** "Providing Security Through Authorization" on page 12-35

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 will be 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 representing how many seconds a session used by this application will exist. Leave the value `NULL` for the session to exist indefinitely. This session duration may be superseded by the operation of the job that runs every eight hours which deletes sessions older than 24 hours.
- **On session timeout direct to this URL** - Enter an optional URL to be redirected to when the Maximum Session Length in Seconds has been exceeded. If implemented in Oracle Application Express, the target page in this URL 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.
- **Maximum Session Idle Time in Seconds** - Enter a positive integer representing how many seconds of inactivity or idle time a session used by this application should permit. The idle time is the time between one page request and the next one. Leave the value `NULL` 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 in Seconds has been exceeded. If implemented in Oracle Application Express, the target page in this URL should be a public page. A common use for this page would be to inform the user of the session is redirected to the application home page. If no URL is supplied, the user is redirected to the application home page.

> **See Also:** "Understanding Session Timeout" on page 12-4 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 12-14

Virtual Private Database (VPD) Use this attribute to enter a PL/SQL block that sets a Virtual Private Database (VPD) context for the current 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));
```

The previous 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 know 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 means of 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 needs to 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;
```

See Also: "Providing Security Through Authorization" on page 12-35 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 15-1

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 Builder home page appears.
3. Click **Shared Components**.

   The Shared Components page appears.
4. Under Globalization, click **Globalization Attributes**.

   The Edit Globalization Attributes page appears.

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 15-4

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.

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.

Application Timestamp Format Determines the timestamp format to be used in the application. Select a timestamp format from the list of values.

This timestamp format is used to alter the NLS_TIMESTAMP_FORMAT database session setting prior to 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.

This date format is used to alter the NLS_TIMESTAMP_TZ_FORMAT database session setting prior to 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.
```

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 will 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 will often appear corrupted when opened by a desktop spreadsheet application. This is because the CSV output 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 will be encoded in Chinese GBK.

See Also: "Adding a Download Link to a Classic Report" on page 7-47

5

Working with Application Pages

This section provides important background information about working with pages within an 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, "Creating Database Applications" on page 6-1, "Controlling Page Layout" on page 9-1, and "Adding Navigation" on page 8-1

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 Page Rendering
- About Page Processing

- About Shared Components
- About Tree and Component View
- Switching Between Tree and Component View
- Editing a Page in Tree View
- Editing a Page in Component View
- 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. This section lists user interface controls and logic that execute when a page is rendered. See "About Page Rendering" on page 5-2.
   - **Page Processing**. Page processing occurs once a page is submitted. Typically a page is submitted when a user clicks a button. See "About Page Processing" on page 5-4.
   - **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 5-5.

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, page rendering computations, and page processes.

The sections that follow describe each subsection under Page Rendering.

Topics:

- Page
- Regions
- Buttons
- Items
- Computations
- 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 5-20

Regions

A region is a 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 9-2 for information about creating and editing regions
> - *Oracle Database Advanced Application Developer's Guide* for information about developing Web applications with PL/SQL
> - *Oracle Database PL/SQL Packages and Types Reference* for information about htp 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 7-95

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 will be, and whether the item will display 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 6-28 and "Understanding Application-Level Items" on page 6-48

Computations

Computations are units of logic used to assign session state to items. You can use computations to assign a value to an identified item when a page is submitted or displayed.

Application-level computations assign a value to an item each time a page is rendered. A page-level computation assigns a value to an identified item when a page is displayed or submitted (rendered and processed).

See Also: "Creating a Page Computation" on page 5-26 and "Understanding Application Computations" on page 5-44

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 5-32 and "Understanding Application Processes" on page 5-41

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 as well as when and how they are affected.

See Also: "Implementing Dynamic Actions" on page 14-31

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, the Application Express engine runs this logic in the order it appears on the Page Definition.

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 5-26

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 5-29 and "About the When Button Pressed Attribute" on page 2-24

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 5-32

Branches

Branches enable you to create logic controls that determine how the user navigates through the application.

> **See Also:** "Working with Branches" on page 5-35 and "About the When Button Pressed Attribute" on page 2-24

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 subsection that may display under Shared Components.

> **See Also:** "Working with Shared Components" on page 5-36

Topics:

- Tabs
- Lists of Values
- Breadcrumbs
- Lists
- Theme
- Templates
- Security
- Navigation Bar

> **See Also:** "About the Page Definition" on page 5-1, "About the Edit All Icon" on page 5-13, and "About the Copy or Create Icons" on page 5-13

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 8-1

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" on page 7-102

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 8-15

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 10-1

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 10-12

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 12-35

Navigation Bar

Use a navigation bar to link users to various pages within an application. Typically a navigation bar is used 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 8-25

About Tree and Component View

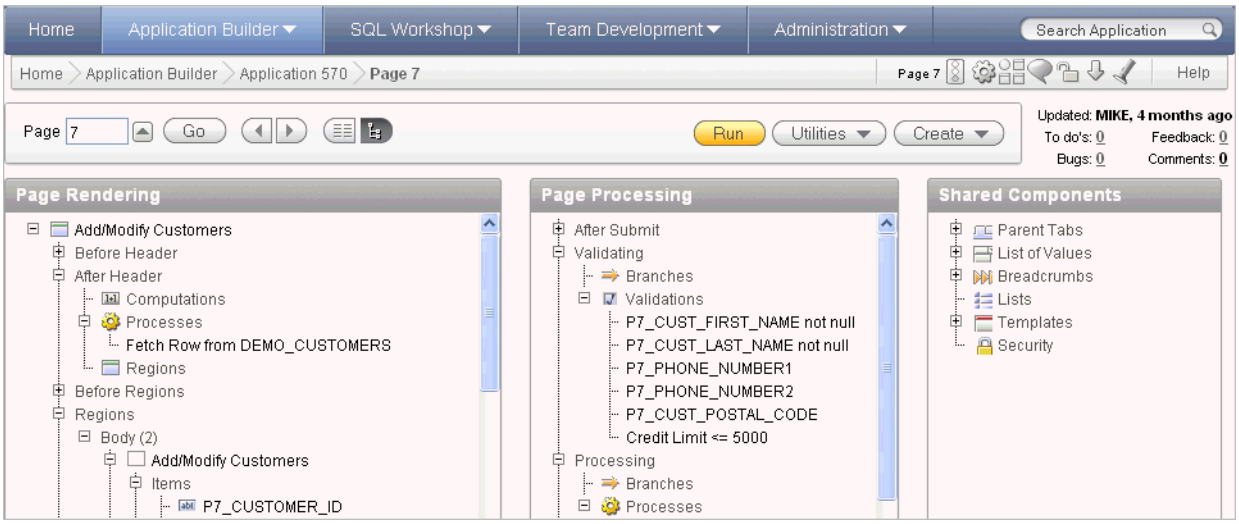
A page is the basic building block of an application. Each page has a page number, a name, and typically some text attributes such as a header, title, and footer. You add content to your page by creating page controls (regions, items, and buttons). Page templates and page region templates control the exact look and feel of each page.

There are two way to view a page:

- Tree view. See "About Tree View" on page 5-7.
- Component view. See "About Component View" on page 5-8.

About 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.



Key features of this view include:

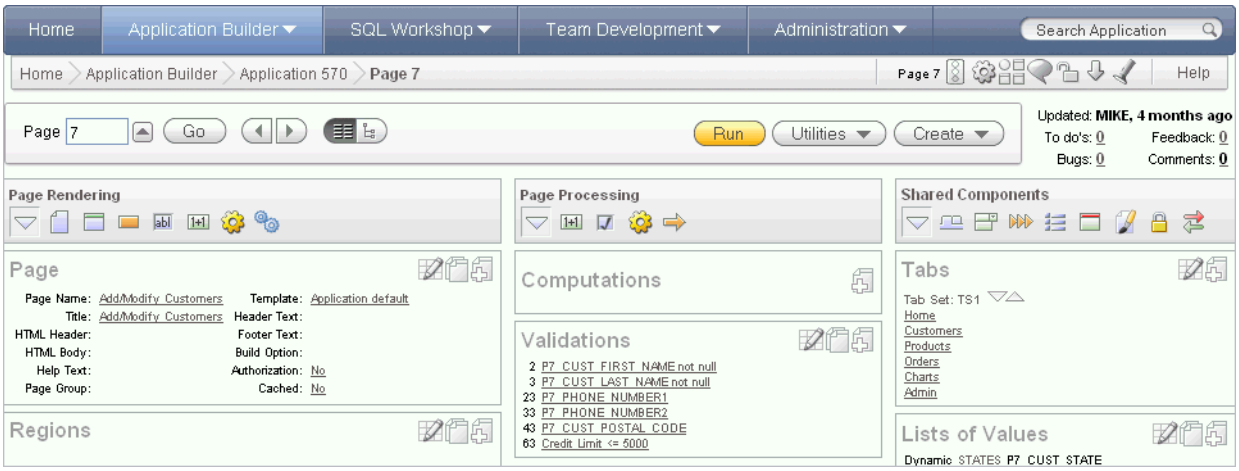
- **Context menus**. Each tree node features a custom context menu. To access a context menu, right-click.
- **Quick access to attributes pages**. To edit attributes, double-click or press **ENTER**. If available, an attribute page appears.
- **Easy reorder of components**. Reorder page items, report 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 5-12
- **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 5-9 and "Switching Between Tree and Component View" on page 5-8.

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 5-12 and "Switching Between Tree and Component View" on page 5-8.

Switching Between Tree and Component View

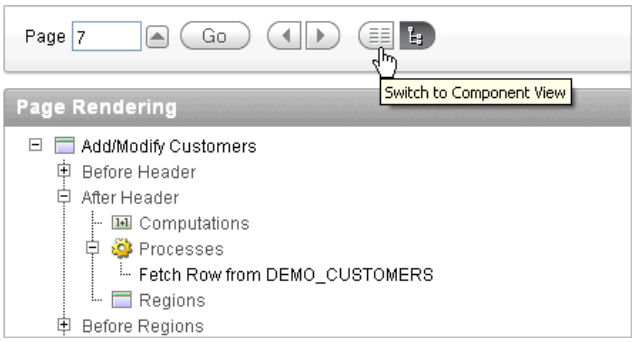
There are two ways to view a page: Tree view and Component view.

To switch between views:

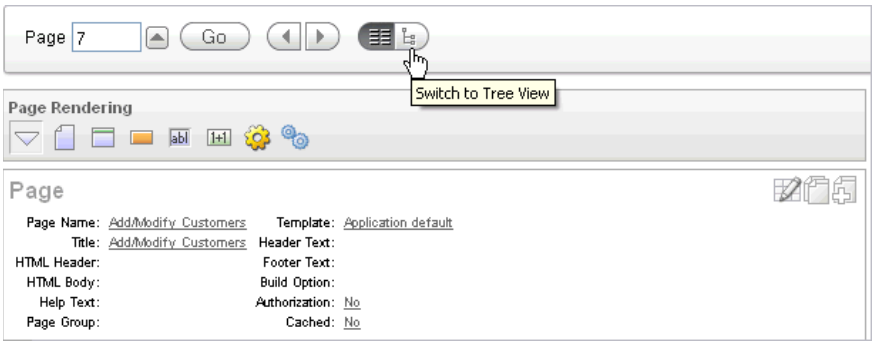
1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.

   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 at the top of the page.



3. To switch back to Tree view, click the **Switch to Tree View** icon.



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.

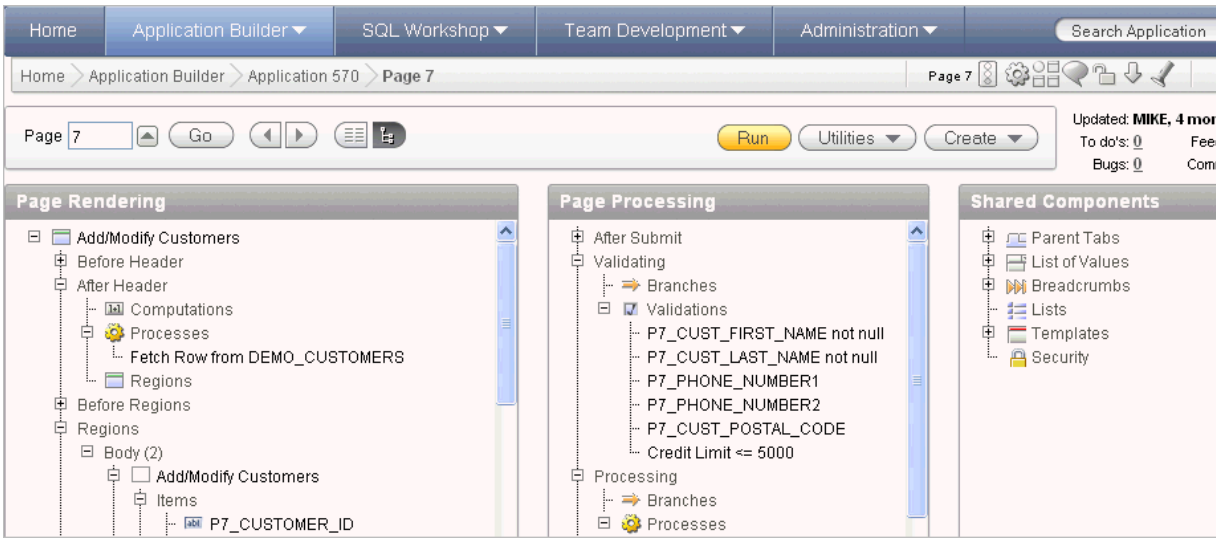
Topics:

- 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 5-8 and "Common Elements of the Page Definition" on page 5-15

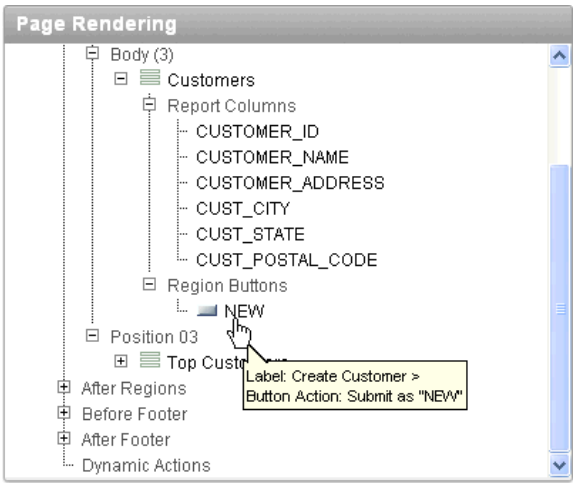
About Tree View

In Tree view, the Page Definition displays each page component as a node in a tree.



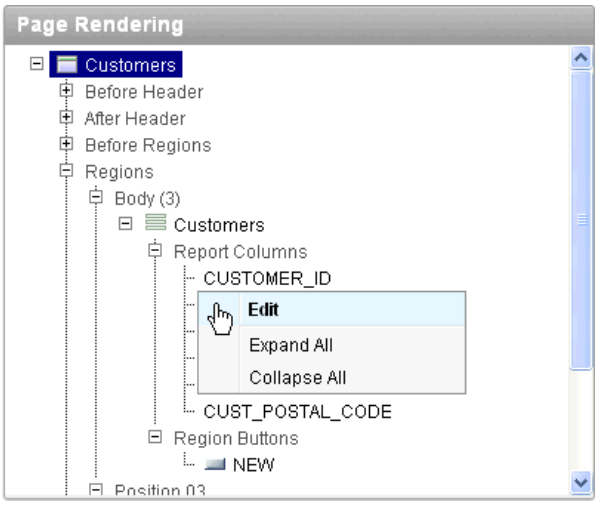
Each tree groups components based on event sequence, or how Application Builder processes them when rendering or processing the page.

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).



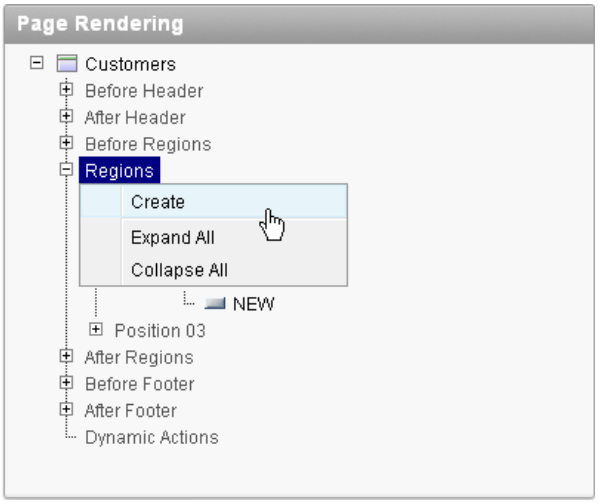
Accessing Attribute Pages To edit a node, you can:

- Right-click and select **Edit**.
- Double-click.
- Select the node and press **ENTER**.

If available, an attributes page appears.

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 the either:
   - **Show Names**
   - **Show Labels**

To learn more about the Utilities button, see "Common Elements of the Page Definition" on page 5-15

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.

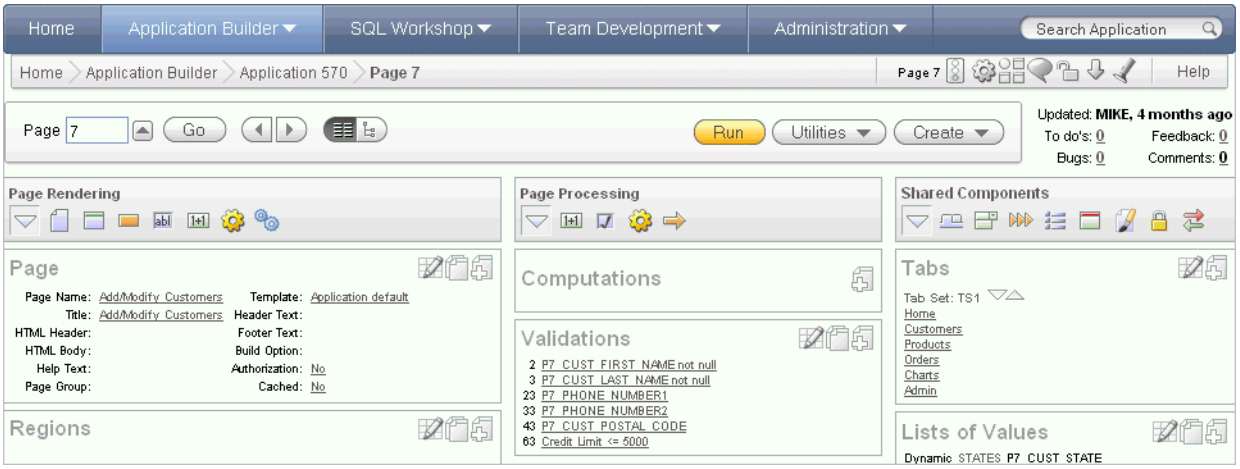
Topics:

- About Component View
- Reordering Page Components
- Using Page Rendering Icons
- Using Page Processing Icons
- Using Shared Components Icons

> **See Also:** "Switching Between Tree and Component View" on page 5-8

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 all controls, components, or logic within a given subsection by clicking the Edit All icon that displays to the right of the subsection title. The Edit All icon resembles a small grid with a pencil on top of it.



Clicking the **Edit All** icon displays pages that enable 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 overlapping a small page. Click the Create icon to create a control or component.



See Also: "About the Edit All Icon" on page 5-13

Reordering Page Components

You can quickly change the order in which regions, buttons, and items display using the Reorder icon on the Page Definition. The Reorder icon displays as a light gray downward arrow and upward arrow.



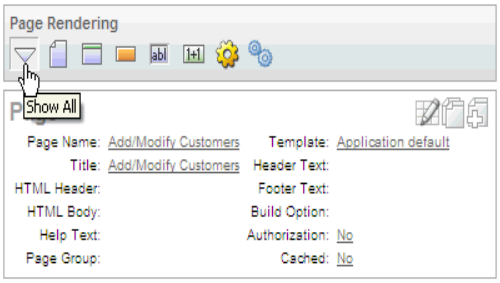
To reorder page components, click the **Reorder** icon. When the Reorder page appears click the up and down arrows and then click **Apply Changes**.

> **See Also:** "Reordering Regions" on page 9-11, "Using the Reorder Buttons Icon in Component View" on page 7-101, "Editing Multiple Items Simultaneously" on page 6-37, and "Using the Drag and Drop Layout Page" on page 6-40

Using Page Rendering Icons

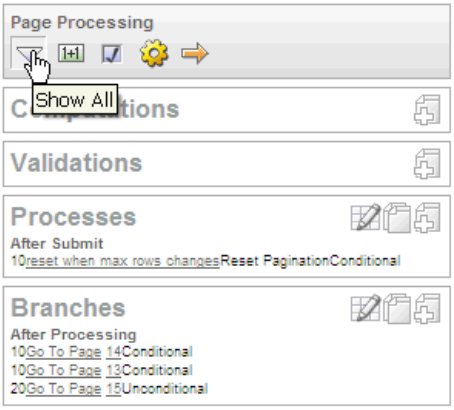
Page rendering is the process of generating a page from the database. See "About Page Rendering" on page 5-2.

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**. The Show All icon resembles an inverted triangle.



Using Page Processing Icons

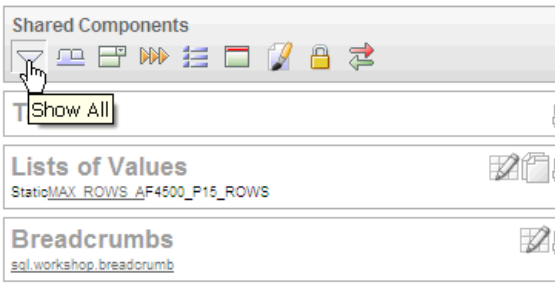
Page processing is the process of submitting a page. A page is typically submitted when a user clicks a button. Use the Page Processing section of the Page Definition to specify application logic such as computations, validations, processes, and branches. In general, the Application Express engine runs this logic in the order it appears on the Page Definition.



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**. The Show All icon resembles an inverted triangle.

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.



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**. The Show All icon resembles an inverted triangle.

See Also: "Working with Shared Components" on page 5-36

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.

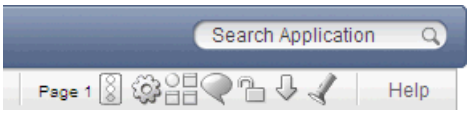
Topics:

- 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 5-2 and "Editing a Page in Component View" on page 5-12

About the Developer Action Bar

The Developer Action bar displays in the upper right corner, beneath the Search Application field.



This Developer Action bar contains the following icons: Run Page, Shared Components, Dashboard, Developer Comment, Page Unlocked/Locked, Export Page, and Find icon.

Run Page Icon The **Run Page** icon resembles a small traffic signal. 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 a Page or Application" on page 6-13.

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 5-36.

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 6-50.

Developer Comment icon The **Developer Comment** icon is the shape of a green balloon. Click this icon to record comments about an application, a specific page, or a group of pages. See "Adding Developer Comments" on page 6-21.

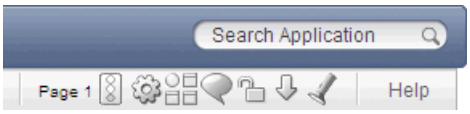
Page Unlocked/Page Locked Icon The **Page Unlocked** and **Page Locked** icon indicates whether a page is available for editing. If a page is unlocked, the icon appears as an open padlock. If the page is locked, the icon appears as a locked padlock. To change the lock status of a page, click this icon. See "Locking and Unlocking a Page" on page 6-17.

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 13-17.

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 7-112.

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 expressions syntax. For a regular search, enter `P1_NAME` to search for all occurences of `P1_NAME` in the application

The following is an advanced regular epxression search and will find all occurenes of P1_NAME or P2_NAME:

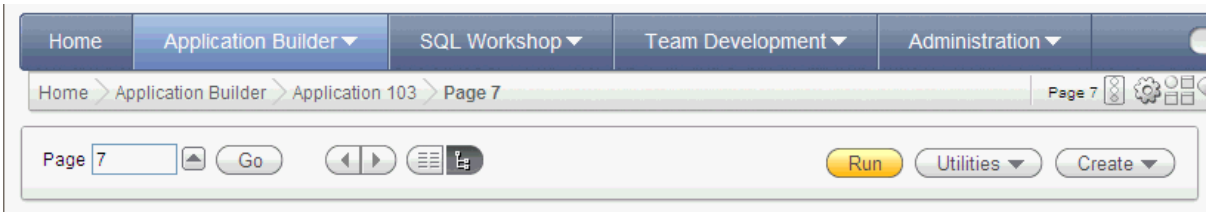
```
regexp:(P1_NAME)|(P2_NAME)
```

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.



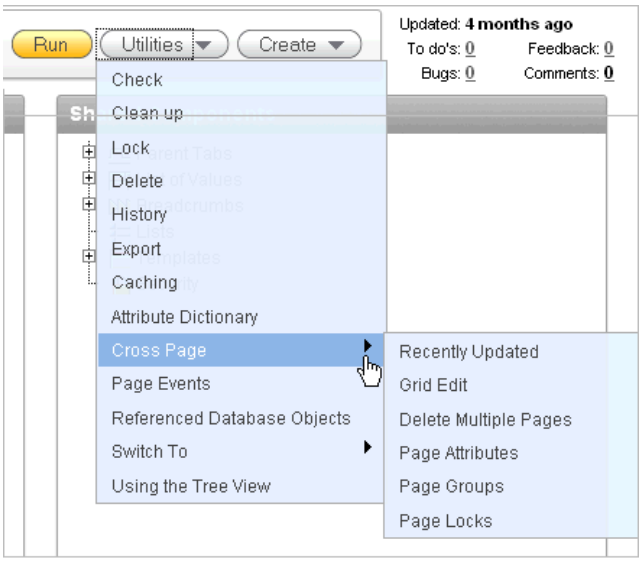
Use the page field to navigate between pages. Enter a page number in the Page field and click **Go**.

The following buttons display on the right side: Run, Utilities, Create

About the Run Button

Click **Run** to dynamically renders the page based on data stored in the database. "Running a Page or Application" on page 6-13.

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 11-1
- **Clean up**. Click this link to change the sequence page components.
- **Lock**. Locks the current page. See "Locking and Unlocking a Page" on page 6-17.
- **Delete**. Deletes the current page. See "Deleting a Page" on page 6-19.
- **History**. Displays a report of changes to the current page.
- **Export**. Links to Export page. See "Exporting an Application" on page 13-13.
- **Caching**. Displays the caching page. See "Managing Cached Regions" on page 9-9.
- **Attribute Dictionary**. Links to Manage Attribute Dictionary page. See "Using the Attribute Dictionary" on page 5-46.
- **Cross Page** contains links to:
  - **Recently Updated Pages**. 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 6-20.
  - **Page Attributes**. Displays a report of attributes, components, controls, and application logic by page.
  - **Page Groups**. See "Grouping Pages" on page 6-14
  - **Page Locks**. See "Locking and Unlocking a Page" on page 6-17.
- **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 "About the Database Object Dependencies Report" on page 6-54.
- **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 5-7 and "Editing a Page in Tree View" on page 5-9.

About the Create Button

Click **Create** to add new page or component to the existing page. See "About Creating Pages" on page 6-9.

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 a Page or Application" on page 6-13

When you run an 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.



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 4-3.
- **Edit Page** accesses the Page Definition for the current running page. See "About the Page Definition" on page 5-1.
- **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 "Creating Database Applications" on page 6-1.
- **Session** links you to session state information for the current page. See "Viewing Session State" on page 2-6.
- **Caching** links to the Caching page. See "Managing Cached Regions" on page 9-9.
- **View Debug** displays the Debug window. See "Accessing Debugging Mode" on page 11-4.
- **Debug** toggles the page between Debug and No Debug mode. See "Accessing Debugging Mode" on page 11-4.

- **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.

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 5-2.
2. To access the Edit Page:
   a. Tree view - Under Page Rendering, double-click the page title at the top of the tree.
   b. 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 and Body Attribute, Header and Footer, Security, Duplicate Submission, Cache, Configuration, On Error Text, Help, 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**.

The topics that follow describe the specific sections of the Page Attributes page.

Name

Use these attributes to define general attributes for the current page such as a page name, an optional alphanumeric alias, and associated page groups. To learn more, see Table 5–1.

Table 5–1 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`
Group	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. To remove a page from a group, select **No Group Assigned** and click **Apply Changes**. **See Also:** "Grouping Pages" on page 6-14

Display Attributes

Use these attributes to define general display attributes for the current page such as the selected page template, standard tab set, title, and cursor focus. To learn more, see Table 5–2.

Table 5–2 Page Attributes: Display Attributes

Attributes	Descriptions
Page Template	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. **See Also:** "Changing the Default Templates in a Theme" on page 10-3
Standard Tab Set	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. **See Also:** "Creating Tabs" on page 8-1
Title	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 `<TITLE></TITLE>`.
Media Type	Enter the Internet Media Type. An Internet Media Type is two-part identifier for file formats on the Internet. A Media Type is composed of at least two parts: a type, a subtype, and one or more optional parameters. This Media Type is used in the Content-Type HTTP header when rendering the page. The page-level Media type overrides the application-level media type. The default value for this attribute is `NULL` If both the page-level and application-level values for Media Type are `NULL`, the Media Type `text/html` is used.

Table 5–2 (Cont.) Page Attributes: Display Attributes

Attributes	Descriptions
Cursor Focus	Specify the cursor focus. Available options include: ▪ Select **First item on page** to have the cursor focus placed in the first field on the page. ▪ Select **Do not focus cursor** if you do not want to include JavaScript. Select this option to prevent conflicts between generated JavaScript and custom JavaScript.

JavaScript

Use these attributes to include JavaScript on the current page. To learn more see Table 5–3.

Table 5–3 JavaScript Attributes

Attribute	Description
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. **Note**: You do not need to include opening or closing script tags. Just include the JavaScript code. Code you enter here replaces the `#JAVASCRIPT_CODE#` substitution string in the page template. 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. Note: You do not need to add any opening or closing script tags, just the JavaScript code. To reference a shortcut, use: `"SHORTCUTNAME"`
Include Standard JavaScript and CSS Edit	Oracle Application Express typically requires specific JavaScript and CSS files. For some applications, such as mobile applications, you may wish to suppress the inclusion of these files in the HTML header. For Include Standard CSS and JavaScript, select **Yes** to suppress the inclusion of cascading style sheet (CSS) and JavaScript files in the HTML header. Because suppressing the display of these files breaks typical applications, enabling this attribute is only recommended for advanced developers.

HTML Header and Body Attributes

Use these attributes to define page header and body header text. To learn more, see Table 5–4.

Table 5–4 HTML Header and Body Attributes

Attribute	Description
HTML Header	Enter text to replace the `#HEAD#` substitution string in the page template header. The values entered here are inserted after the HTML `<HEAD>` tag. Use this page attribute to: ■ Code page specific inline cascading style sheet classes ■ Add additional style sheets for a specific page ■ Code page specific meta tags
Page HTML Body Attribute	Enter text or HTML you want to appear before page template footer.

HTML and Footer Header

Use these attributes to define HTML header and footer text. To learn more, see Table 5–5.

Table 5–5 Header Text and Footer Text

Attribute	Description
HTML Header	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.

Security

Use these attributes to specify an authorization scheme and authentication requirements for the current page. To learn more, see Table 5–6.

Table 5–6 Page Attributes: Security

Attribute	Description
Authorization Scheme	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. 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 will not display and an error message displays. **See Also:** "Providing Security Through Authorization" on page 12-35
Authentication	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. **See Also:** "Establishing User Identity Through Authentication" on page 12-26

Table 5–6 (Cont.) Page Attributes: Security

Attribute	Description
Page Access Protection	**Note**: This attribute only displays if Session State Protection has been enabled for the application. See "Understanding Session State Protection" on page 12-14. Select a Page Access Protection level for the current page: ■ **Unrestricted** - The page may be requested using an 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.
Form Auto Complete	Setting this attribute to **On** has no effect on the page. Setting this value to **Off** generates the following HTML in the FORM tag: `autocomplete="off"`

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.]

Cache

Use these attributes to enable caching for the current page. Enabling page caching can improve application's performance and works well for static pages. To learn more, see Table 5–7.

Table 5–7 Cache Attributes

Attribute	Description
Cache Page	Specify whether to enable page caching by selecting **Yes** or **No**. Page caching can improve performance because the page displays from cache instead of displaying dynamically.
Cache Timeout	Specify the amount of time for which a cached page remains valid.

Table 5–7 (Cont.) Cache Attributes

Attribute	Description
Cache by User	Specify if the page should be cached by user. If **Yes**, the page is cached specifically for each user. If **No**, 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 be cached. If the condition returns true, the page is displayed from 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 9-8

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 run time. 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 13-33

On Error Text

Use this attribute to specify the error text that displays in the `#NOTIFICATION_MESSAGE#` template substitution string in the event an error occurs on the page.

See Also: "Page Templates" on page 10-26

Help

Use this attribute to enter Help text for the current page.

Help text is displayed using a help system that you must develop. To show the Help for a specific page, call the `APEX_APPLICATION.HELP` procedure from a page that you create for displaying Help text. For example, you could use a navigation bar icon similar to:

```
javascript:popupURL('wwv_flow_help.show_help?p_lang=&BROWSER_LANGUAGE.&p_session=&
```

Page-level help supports shortcuts using the following syntax:

```
"SHORTCUT_NAME"
```

See Also: "Creating a Help Page" on page 7-126 and "Using Shortcuts" on page 7-106

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.

See Also: "Understanding Application Computations" on page 5-44

Topics:

- Creating a Page Computation
- Understanding Computation Points and Computation Syntax
- Editing Page Computation Attributes

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 5-2.
2. Access the Create Computation Wizard:
   a. Tree view- Under the appropriate event, locate Computations. Right-click and select **Create**.
   b. Component view - Under Computations, click the **Create** icon.
3. For Item Type, select where the computation will execute and click **Next**. Location options include:
   - Item on Another Page
   - Item on This Page
   - Application Level Item
4. For Item, select the item and computation point at which you would like to perform the computation:
   a. Compute Item - Select the item the computation will update.
   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**.

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 5-2.

2. Create a 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 6-28.

3. Access the Create Computation Wizard:

   a. Tree view- Under the appropriate event, locate Computations. Right-click and select **Create**.

   b. 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 have the option of creating one of 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 5-2.
2. Access the Edit Page Computation page:
   a. Tree view- Under the appropriate event, locate Computations. Right-click on the computation name and select **Edit**.
   b. 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 **item level validations**. Validations that do not apply to any single item are **page level 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 will not occur. Also remember that the validation you enter must be consistent with the validation type you selected.

Topics:

- Creating a Validation
- Defining How Validation Error Messages Display
- Processing Validations Conditionally

See Also: "About the When Button Pressed Attribute" on page 2-24

Creating a Validation

To create a validation:

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 5-2.
2. To access the Create Validation Wizard:
   a. Tree view- Under Page Processing, right-click **Validating** and select **Create Validation**.
   b. Component view - Under Page Processing, locate Validations. Click the **Create** icon.

   The Create Validation Wizard appears.
3. Select a validation level and click **Next**:
   - **Item Level Validations** are specific to a single item.
   - **Tabular Form Validation** are specific to a tabular form.
   - **Page level Validation** do not apply to any single item, but apply to an entire page.
4. If you selected **Item level validation**, select the item to be validated and click **Next**.
5. Select a validation method as described in Table 5–8, click **Next**.

Table 5–8 Validation Methods

Validation Method	Descriptions

SQL	Compares item values to data in the database.
	
	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`.
	
	`SELECT 1 FROM customers`
	`WHERE last_name = :P1_LAST_NAME`

PL/SQL	Useful if you need complex logic to validate entered data.
	
	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:
	
	`BEGIN`
	`  IF :P1_COUNTRY = 'US' AND :P1_PROVINCE IS NULL THEN`
	`    RETURN FALSE;`
	`  ELSE`
	`    RETURN TRUE;`
	`  END IF;`
	`END;`
	
	You could also create the same validation implemented as a PL/SQL Expression as follows:
	
	`NOT (:P1_COUNTRY='US' AND  :P1_PROVINCE IS NULL);`

Item Not Null	Checks if an item's value in session state is null. 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 **Item Not Null**.

Item String Comparison	Compares the value of an item to a specific string.
	
	There are several string comparison validations that compare the value of an item to a literal string. For example, you select the validation type **Item in Expression 1 is contained in Expression 2** to validate a user entry in a field against a list of values you provide.
	
	In Expression 1, enter the name of the item you want to validate without a colon. For example:
	
	`P1_VALUE`
	
	In Expression 2, enter a string of values you want to validate against. For example:
	
	`ABC/DEF/GHI`

Table 5–8 (Cont.) Validation Methods

Validation Method	Descriptions

Regular Expression	Regular expressions provide a method to describe text patterns. Use a Regular Expression validation to perform data validation.
	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:
	`^([[:digit:]]{6},)+$`
	This regular expression would find the following entries valid:
	`123456,654321,`
	`123456,`
	`123456,123456,654321,`
	However, the following would not be valid:
	`123456,12345`
	`12345`

6. For SQL, PL/SQL, and Item String Comparison validations, select the type of validation you want to create and click **Next**.
7. Specify the sequence and validation name and click **Next**.
8. Depending upon the validation method, enter the validation or message text that displays if the validation fails.

   You can use the placeholders `#LABEL#` or `#HEADING#` to get the current page item label or column heading when the error message displays.
9. Click Next.
10. Define conditions that apply to this validation and click **Create**.

See Also: "Validating User Input in Forms" on page 7-68

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 5-2.
2. Go to the Edit Validations page:
   a. Tree view- Under Page Processing, locate Validating and expand the Validations branch. Right-click on the validation name and select **Edit**.
   b. Component view - Under Validations, select the appropriate validation.
3. Scroll down to Error Message.
4. In Error Message, enter your error message text.
5. From Error message display location, select a display location.

This attribute 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 all processing (including validations), you must display the error on an error page.

6. If you select Inline with Field or Inline with Field and in Notification, you must associate an item with the error message. To associate an item with the error message, select the item from the Associated Item list.
7. Click **Apply Changes**.

> **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.

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 5-2.
2. Go the Edit Validations page:
   a. Tree view- Under Page Processing, locate Validating and expand the Validations branch. Right-click on the validation name and select **Edit**.
   b. Component view - Under Validations, select the appropriate validation.
3. Scroll down to Conditions.
4. To have a validation performed when a user clicks a particular button, make a selection from the When Button Pressed list.
5. Make a selection from the Condition Type list.
6. Depending upon the selected Condition Type, enter values in the Expression attributes. The validation will be rendered or processed if the specified condition is met.
7. Click **Apply Changes**.

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.

> **See Also:** "Understanding Application Processes" on page 5-41

Topics:

- Creating a Page Process
- Editing Process Attributes

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 will execute, and select a process category. You can change nearly all of these attributes on the Edit Page Process page.

To create a process:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Create Page Process Wizard:
   a. Tree view- Under the appropriate event, locate Processes. Right-click and select **Create**.
   b. Component view - Under Processes, click the **Create** icon.
3. Select a category as described in Table 5–9:

Table 5–9 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.
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:** "Managing Session State Values" on page 2-11 and "Managing User Preferences" in *Oracle Application Express Administration Guide*
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: ■ Select **Automatic Row Fetch** and **Automatic Row Processing (DML)** to create an automatic data manipulation language (DML) process. ■ Use **Multi Row Update** and **Multi Row Delete** with tabular forms. ■ Use **Add Rows to Tabular Form** with a tabular form.
Web Services	Implements a Web Service as a process on a page. Running the process submits a request to the service provider. **See Also:** "Invoking a Web Service as a Process" on page 14-17

Table 5–9 (Cont.) Process Categories

Process Category	Description
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:** "Creating a Master Detail Form" on page 7-64
Send E-Mail	Provides a declarative interface for the `APEX_MAIL.SEND_MAIL` package. The process type support attachments.
Plug-ins	Plug-ins allow developers to declaratively extend the built-in types available with Application Express. This option is available when a plug-in type process exists in this application. See Also: "Implementing Plug-ins" on page 14-22
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**: "About On Demand Application Processes" on page 5-41

4. Follow the on-screen instructions.

Editing 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 5-2.
2. Access the Edit Page Process page:
   a. Tree view- Under the appropriate event, locate the Processes section. Right-click and select **Edit**.
   b. Component view - Under Processes, click the process name.

   The Edit Page Process page appears.

   See Also: "About the When Button Pressed Attribute" on page 2-24

Changing Processing Points and Source

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 one of the following options under Run Process:

- Once for each page visit
- Once for each session or when reset

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**. In the event a process fails, you can optionally define an error message in the Process Error Message field.

Creating Conditional Processes

You can make a process conditional by selecting a condition type and entering an expression under Conditional Processing.

Additionally, you can also make a selection from the When Button Pressed attribute. When you select a button from this list, the process only executes if a user clicks the selected button.

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 2-24

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 do not need to invoke any 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 8-30

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

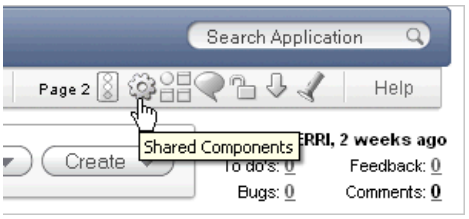
To access the Shared Components page:

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 5-19

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 5-36

Logic

The following section describes 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 6-48.

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 5-41.

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 5-44.

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 14-7.

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 13-33.

Navigation

The following section describes 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 8-1.

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 8-7.

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 8-15.

Trees A tree is a hierarchical navigation mechanism. Trees utilize 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. See "Creating Trees" on page 7-109.

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 8-25.

Security

The following section describes 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 12-26.

Authorization Schemes Authorization restricts user access to specific controls or components based on predefined user privileges. See "Providing Security Through Authorization" on page 12-35.

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 12-14.

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 4-16.

User Interface

The following section describes the links under User Interface.

Themes A theme is a named collection of templates that defines the application user interface. See "Managing Themes" on page 10-1.

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 10-12.

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" on page 7-102.

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 7-106.

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 14-22.

Files

The following section describes 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 10-42.

Images Use the Images link to upload images to your workspace. See "Managing Images" on page 9-18.

Static Files Use the Static Files link to upload static files to your workspace. See "Managing Static Files" on page 9-21.

Globalization

The following section describes 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 15-1 and "Understanding the Translation Process" on page 15-6.

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 15-11.

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 4-20 and "About Translating an Application and Globalization Support" on page 15-1.

Reports

The following section describes 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 7-54.

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 7-56.

About the Application List

The following section describes 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 4-8.

Edit Comments Use Edit Comments to enter comments specific to the currently selected application. See "Adding Application Comments" on page 20.

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 Packaged Application" on page 5.

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.

Topics:

- About On Demand Application Processes
- Application Process Example
- Creating an Application Process
- Viewing the Application Processes History Report

About On Demand Application Processes

A special type of application process is the **On Demand** process. An On Demand application process 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.

See Also: "Creating a Page Process" on page 5-33

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 will display.
- Specifying the process by name locates the first process with the specified (case-preserved) name.

See Also: "Clearing Session State" on page 2-12

Application Process Example

A shopping cart application is a good example of when you might use an application process. For example, suppose you need to display the contents of a user's shopping cart with each page view. To accomplish this, 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: "Displaying Components on Every Page of an Application" on page 9-2

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**.
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 will be evaluated relative to other processes.
   c. Point - Identify the point at which this process executes.
   d. Click **Next**.
5. For Source:
   a. Process Text - Enter the text that is to be the source of your process.
   b. Error Message - Enter the error message that displays if the process raises an error.
   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 will execute 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. You control how the page displays by making a selection from the View list. Available options include:

- **Icons** (the default) displays each process as a large icon. To edit a process, click the appropriate icon.
- **Details** displays each application process as a line in a report. To edit a process, click the name.

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:
   - **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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.
   - **View icons**. Use this control to toggle between Icons, Report, or Details views. To change the view, click one of the following:
     - **View Icons** (default) displays each process as a large icon.
     - **View Report** displays each process as line in a report.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

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.

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 will be 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 will execute 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 13-33.
10. Click **Create**.

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 an 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:
   - **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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.
   - **View icons**. Use this control to toggle between icon and report views. To change the view, select one of the following:
     - **View Icons** (default) displays each computation as a large icon.
     - **View Report** displays each computation as a line in a report.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

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 amongst several columns by using synonyms.

You can the Manage Attribute Dictionary page to update values on the current page with those in the Attribute Dictionary or use 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.

   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.

5. To update the current page or update the Attribute dictionary, select the appropriate hypertext link.

   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*.

6

Creating Database Applications

This section describes how to use Application Builder to build an application and application components. It includes instructions for creating an application and adding pages as well as adding components (reports, charts, or forms), page controls (buttons, items, list of values), and shared components (breadcrumbs, lists, or tabs).

Topics:

- Creating an Application
- Managing Pages in an Application
- Adding Application Comments
- Adding Developer Comments
- Creating Applications Groups
- Understanding Page-Level Items
- Understanding Application-Level Items
- Viewing Utilities and Reports

> **See Also:** "Using Application Builder" on page 4-1, "Controlling Page Layout" on page 9-1, and "Adding Navigation" on page 8-1

Creating an Application

A database application is a collection of pages that share a common session state and authentication. You create a database application in the Application Builder using a wizard. You delete an application from the Application home page.

Topics:

- About Using the Create Application Wizard
- About Creating a Database Application
- About the Create Application from Spreadsheet Wizard
- Copying an Application
- Deleting an Application

> **Tip:** You can reduce the number of steps needed to create an application by configuring Application Builder Defaults. See "Leveraging Application Builder Defaults" in *Oracle Application Express Administration Guide*.

About Using the Create Application Wizard

When you click **Create** on the Application Builder home page, you must choose one of the following options:

- **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 Creating a Database Application" on page 6-2*.
- **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...** button on the Application Express home page.
- **Sample Applications**. Oracle Application Express installs with a number of sample applications. Use these applications to learn more about the different types of functionality you can include in your applications.

About Creating a Database Application

The Create Application wizard enables you to create a fully functional application based on any number of tables. You can use the Create Application Wizard to create blank pages, or pages based on SQL queries or database tables. You can create SQL queries by manually typing SQL, or by using the graphical user interface of Query Builder.

Applications based on tables can consist of a simple report, a form and report, or a tabular form. To learn more, see "Creating Reports" on page 7-1 and "Creating Forms" on page 7-61.

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*
>
> **See Tutorials:** "Building Your Application" in *Oracle Database 2 Day + Oracle Application Express Developer's Guide* and *Oracle Application Express Advanced Tutorials*

Topics:

- Creating an Application From Scratch
- About Application Models and User Interface Defaults
- Leveraging Application Models and User Interface Defaults

Creating an Application From Scratch

You can create an application based on a table, query, or drill-down query by selecting **Create Application** in the Create Application Wizard.

To create an 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 Application Type, select **Database**.
4. For Method, select **From Scratch**.
5. For Name, enter the following and click **Next**:
   a. Name - Enter a name to identify the application.
   b. Application - Enter a unique integer value to identify the application.
   c. Create Application - Select a creation method:
      – Select **From scratch** to manually add all pages
      – Select **Based on existing application design model** to copy page definitions from a previous application model.

        Note that you will 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 step 7 and "About Application Models and User Interface Defaults" on page 6-5).
   d. **Schema** - Your application will obtain its privileges by parsing all SQL as a specific database schema. Identify the database schema owner.

   Next, add pages to your application.
6. For Pages:
   a. Select the type of page you want to add:
      – **Blank** creates a page with no built-in functionality.
      – **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.
      – **Form** creates a form to update a single row in a database table.
      – **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.
      – **Tabular Form** creates a form to perform update, insert, and delete operations on multiple rows in a database table.
      – **Master Detail** 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.
      – **Chart** creates a page with a flash chart to represent the result of a SQL query.

      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.
   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 utilize Application Builder Defaults, click the **Create** button. To configure Application Builder Defaults, see "Leveraging Application Builder Defaults" in *Oracle Application Express Administration Guide*.

7. For Tabs, determine whether to include tabs in your application and click **Next**.
8. For Shared Components, determine whether to import shared components from another application. Shared components are common elements that can display or be applied on any page within an application.

   To include shared components, select the following:

   a. Copy Shared Components from Another Application - Select **Yes**.

   b. Copy from Application - Select the application from which you want to import shared components.

   c. Select Components to Import - Select the components to import.

   d. Click **Next**.

   Next, select a default authentication scheme. Authentication is the process of establishing a user's identity before they can access an application. See "Establishing User Identity Through Authentication" on page 12-26.
9. For Authentication Scheme, select one of the following:

   - **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.
   - **No Authentication** - Also known as database authentication, this option enables users to access your application using the account credentials stored in the `modplsql` 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.
   - **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.
10. Next, select the following globalization preferences:

    a. 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.

    b. 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.

    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 4-20.

c. 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 via 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.

d. Click **Next**.

11. For User Interface, select a theme and click **Next**.

    Themes are collections of templates that can be used to define the layout and style of an entire application. See "Managing Themes" on page 10-1.

12. Confirm your selections and click **Create**.

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 utilize user interface defaults to display specific columns or have columns display in an alternate order.
4. Navigate to the Application home page and create an application by clicking **Create**.
5. Select **Create Application**.
6. When prompted to enter application details, specify the following:

a. Name - Enter a name to identify the application.

b. Application - Enter a unique integer value to identify the application, or accept the default.

c. Create Application - Select **Based on existing application design model**.

7. Select an application model.

   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 the Create Application from Spreadsheet Wizard

You can create an application based on spreadsheet data by selecting **Create 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 Application Type, select **Database**.

4. Select **From Spreadsheet**.

5. For Load Method, specify how spreadsheet data will be uploaded. 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 **Browse** 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 deliminate 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.

      – 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.

6. For Table Properties, review how your table will display and click **Next**. Specify the table name and column names, or modify the data types. To specify whether to include a column, make a selection from the Upload list.

7. For User Interface Defaults:

   a. Review the displayed Singular Name and enter a Plural Name.

   b. (Optional) Under Column User Interface Defaults, review the displayed column labels.

   c. Click **Next**.

8. For Application Options, specify the following:
   a. Application Name - Enter an alphanumeric name for this application.
   b. Create Mode:
      – **Read and Write** includes insert and update pages.
      – **Read Only** does not include insert and update pages.
   c. Report Implementation:
      – **Classic** creates a SQL report.
      – **Interactive** creates an interactive report.
   d. Click **Next**.
9. For User Interface Theme, select a theme and click **Next**.

   Themes are collections of templates that can be used to define the layout and style of an entire application. See "Managing Themes" on page 10-1.
10. Confirm your selections and click **Create**.

> **See Also:** "Building Queries with Query Builder" in *Oracle Application Express SQL Workshop Guide*
>
> **See Tutorial:** "How to Build an Access Control Page" in *Oracle Application Express Advanced Tutorials*

Copying an Application

To copy an application:

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. On Copy Application:
   a. Enter a new application ID.
   b. Enter a new application name.
   c. Specify whether to copy supporting object definitions.
   d. Click **Next**.
5. Click **Copy Application**.

Deleting an 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 13-11

Topics:

- Deleting an Application from Application Builder

- Deleting an Application from the Edit Application Page

See Also: "Deinstalling Supporting Objects" on page 13-11

Deleting an Application from Application Builder

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 Page

To delete an application from the Edit Application 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 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 4-8

Managing Pages in an 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
- Creating a Page from the Application Home Page
- Creating a Page from the Developer Toolbar
- Copying a Page
- Running a Page or Application
- Grouping Pages
- Locking and Unlocking a Page
- Deleting a Page

See Also: "Viewing Utilities and Reports" on page 6-50

About Creating Pages

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 6-9.
- Click the **Create** link on the Developer toolbar and then select **New Page**. "Creating a Page from the Developer Toolbar" on page 6-10.

> **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.

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 the following table.

Page Type	Description
Blank Page	Creates a blank page.
Multiple Blank Pages	Creates multiple blank pages.
Report	Formatted result of a SQL query. Available options: ■ 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. ■ 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. ■ Report on Web Service Result - Creates a report on a Web Service result. ■ Wizard Report - Creates a report without requiring any SQL knowledge. Select the appropriate schema, table, columns, and result set display. **See Also**: "Creating Reports" on page 7-1 and "Implementing Web Services" on page 14-7
Chart	Enables you to create HTML and Flash graphical charts. **See Also**: "Creating Charts" on page 7-82
Form	Creates a form interface with which users can update a single row or multiple rows within a table. **See Also**: "Creating Forms" on page 7-61
Wizard	Create a wizard.

Page Type	Description
Calendar	Generates a calendar with monthly, weekly, and daily views. **See Also**: "Creating Calendars" on page 7-69
Tree	Creates a a tree to graphically communicate hierarchical or multiple level data. **See Also**: "Creating Trees" on page 7-109
Login Page	Creates a login page. **See Also**: "Building a Login Page" on page 12-33
Access Control	Creates a page containing a access control list, enabling developers to control access to an application, individual pages, or page components. **See Also**: "Controlling Access to Applications, Pages, and Page Components" on page 7-118
Map	Creates a Flash map based on the AnyChart AnyMap Interactive Maps Component. **See Also**: "Creating Maps" on page 7-76
Feedback Page	Adds a feedback page. Feedback is the process of gathering real-time comments, enhancement requests, and bugs from your application users. **See Also**: "Managing Feedback" on page 3-14

5. Follow the on-screen instructions.

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 a Page or Application" on page 6-13

When you run an 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 page.

> **See Also:** "Editing the Application Definition" on page 4-8 for information on the Status list

To create a page from the Developer toolbar:

1. Run the application. See "Running a Page or Application" on page 6-13.
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 6-11.
   - Region on this page
   - Page control on this page

- Shared control

4. Follow the on-screen instructions.

See Also: "About the Developer Toolbar" on page 5-19

About Create Page Types

When you run the Create Page Wizard, you select a page type. Table 6–1 describes available create page options based on the type of page you select.

Table 6–1 Create Page Options

Create Page Options	Available Selections
New Page	Available page types: ■ Blank page ■ Multiple blank pages ■ Report. See "Creating Reports" on page 7-1. ■ Chart. See "Creating Charts" on page 7-82. ■ Form. See "Creating Forms" on page 7-61. ■ Wizard ■ Calendar. See "Creating Calendars" on page 7-69. ■ Tree. See "Creating Trees" on page 7-109. ■ Login Page. See "Building a Login Page" on page 12-33. ■ Access control. See "Controlling Access to Applications, Pages, and Page Components" on page 7-118. ■ Map. See "Creating Maps" on page 7-76. ■ Feedback Page. See "Managing Feedback" on page 3-14.
Region on this page	Regions function as containers for content. Available region types: ■ HTML ■ Multiple HTML ■ Report ■ Form ■ Chart ■ List ■ Breadcrumb ■ PL/SQL Dynamic Content ■ Tree ■ URL ■ Calendar ■ Plug-ins (displays if region type plug-in exists) ■ Help Text ■ Map ■ Region Display Selector **See Also**: "Understanding Regions" on page 9-2 and "About Region Types" on page 9-3

Table 6–1 (Cont.) Create Page Options

Create Page Options	Available Selections
Page control on this page	Page controls: ■ Item. See "Understanding Page-Level Items" on page 6-28 ■ Button. See "Creating Buttons" on page 7-95. ■ Branch. See "Controlling Navigation Using Branches" on page 8-30 ■ Computation. See "Understanding Page Computations" on page 5-26. ■ Process. See "Understanding Page Processes" on page 5-32. ■ Validation. See "Understanding Validations" on page 5-29.
Shared control	Shared component options: ■ Navigation Bar icon. See "Creating a Navigation Bar Entry" on page 8-25. ■ Parent tab. See "Creating Tabs" on page 8-1. ■ Standard tab. See "Creating Tabs" on page 8-1. ■ List of values. See "Creating Lists of Values" on page 7-102. ■ List. See "Creating Lists" on page 8-7. ■ Breadcrumb. See "Creating Breadcrumbs" on page 8-15.

Copying a 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 Rending, 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.

Running a Page or Application

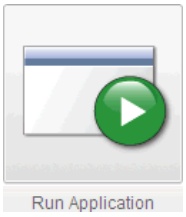
The Application Express engine dynamically renders and processes pages based on data stored in database tables. To view a rendered version of your application, you run or submit it to the Application Express engine. As you create new pages, you can run them individually, or run an entire application. 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 from the Page Definition

About the Run Application and Run Page Icons

The Run Application icon resembles a large traffic light and displays on the Application home page. Clicking the **Run Application** icon runs an entire application.



The Run Page icon resembles a small, light gray traffic light and displays in the upper right corner of many pages within Application Builder. Clicking the **Run Page** icon runs the current page.



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. From the View list, select **Report** and click **Go**.
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 making a selection from the View list on the navigation bar at the top of the page. Selecting **Details** 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, 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. From the View list, select **Report** and click **Go**.
4. From the Pages list, 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 6-17

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 help developers organize 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 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 (wild card 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**. Use this control to toggle between icon and report views. To change the view, click these icons:
     - **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.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.
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. Clicking a page number takes you to the Page Attributes page. Clicking the page Name links to the Page Definition.
7. From the New Group list, select a group to which you want to assign pages and click **Go**.
8. Select the pages to be assigned and click **Assigned Checked**.

Reassigning a Page to a Another Page Group To reassign a page to 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. Click the **Page Assignments** tab.

   The Page Assignments page appears. Clicking a page number takes you to the Page Attributes page. Clicking the page Name links to the Page Definition.
7. Select a page.
8. From New Group, select a group to which you want to assign pages.
9. Select the pages to be reassigned and click **Assigned Checked**.

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 6-16.
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.

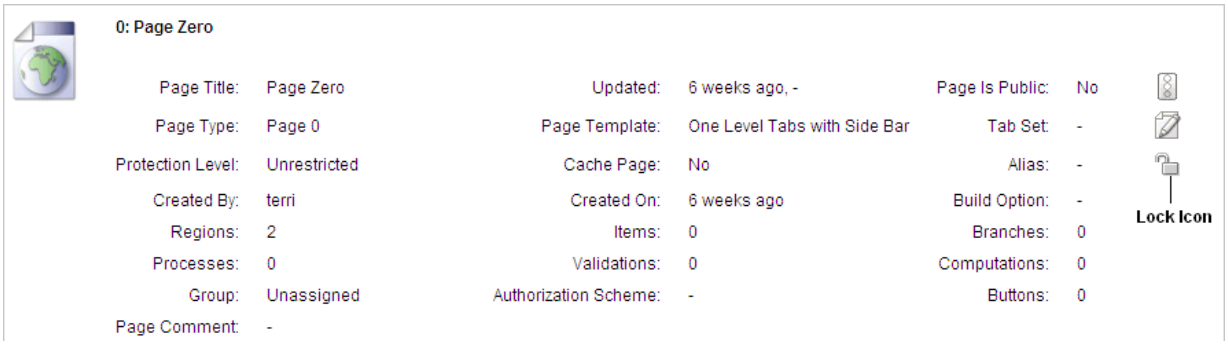
Topics:

- 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 Detail** icon. A detail view appears. The lock icon appears on the right side of the page.



The lock icon also appears on the Action Bar on the Page Definition. See "About the Developer Action Bar" on page 4-6.

Locking a Page

You can lock pages from the Page Locks page, the Pages list, and from a 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 Detail View To lock a page from the Detail view:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the search bar, click the **View Detail** icon.
4. Locate the page you want to lock and 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 5-2.
2. Click the **Lock** icon in the Developer Action bar. See "About the Developer Action Bar" on page 4-6.
3. Select the selected page 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 from the Detail View To unlock a page from the Detail view:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. On the search bar, click the **View Detail** icon.
4. In the Pages list, locate the page you want to unlock and 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 5-2.
2. Click the **Lock** icon in the upper right corner above Shared Components.

   The Page Locks page appears.
3. Select the page you want to unlock and click **Unlock**.

   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

You can delete a page from the Page Definition or while editing page attributes.

Topics:

- Deleting a Page from the Page Definition
- Deleting a Page While Editing Page Attributes
- Deleting Multiple 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 5-2.
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 5-12 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 5-2.
2. To access the Edit Page:
   a. Tree view - Under Page Rendering, double-click the page title at the top of the tree.
   b. 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**.

> **Tip:** To delete a range of pages, click the **Delete Pages by Range** tab. Enter a range of pages and click **Delete Pages**.

Adding Application Comments

You can add comments concerning an entire 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 Application Comments

See Also: "Adding Developer Comments" on page 6-21

Creating and Editing Application Comments

To create an application comment:

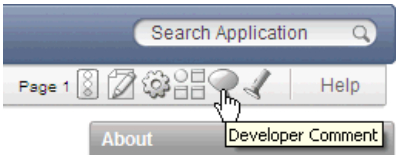
1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. On the Application home page, click **Shared Components**.

   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 icon. The Developer Comment icon resembles a small balloon. 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 Application Comments" on page 6-20

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** icon.

The Create Comment page displays in a separate window.

4. 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.
5. In Comment, enter up to 4000 characters of text.
6. 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** icon.

   The Create Comment page displays in a separate window.
4. Click **View Comments**.

   The View Comments page appears. See "About the Navigation Bar on the View Comments Page" on page 6-22.
5. 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.
6. 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 5-36.

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:

- **Page.** Search for a page number. Enter a page number and click **Go**. To view all pages, leave the field blank and click **Go**.

- **Comment.** Search for comments. Enter a case insensitive query for comment text and click **Go**. To view all comments, leave the field blank and click **Go**.
- **Developer.** Limit the display to a specific developer. Select a developer to display and click **Go**.
- **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** icon.

   The Create Comment page displays in a separate window.
4. Click **View Comments**.
5. Locate the comment to be deleted. See "About the Navigation Bar on the View Comments Page" on page 6-22.
6. Click the **Edit** icon.

   The Edit Comment page appears.
7. 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** icon.

   The Create 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.

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:

- **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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search.
- **Actions menu** - Displays the Actions menu. Use this menu to customize an interactive report. See "Using the Actions Menu" on page 7-6.

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 "Deleting Multiple Developer Comments" on page 6-23.

   The Developer Comments report appears.
2. Locate the comment to be edited.
3. Click the **Edit** icon.

   The Edit Comment 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 6-24.

   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 6-23.

   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.
7. Click **Apply Changes**.

Viewing the Developer Comments Calendar

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 Calendar**.

   The Developer Comments Calendar page appears.

5. Use the Previous, Today and Next buttons to navigate.

Creating Applications 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 Application Groups
- Creating an Application Group
- Assigning an Application to an Application Group
- Removing an Application from an Application Group
- Deleting an Application Group

Viewing Application Groups

The section describes different ways to view 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.

   Use the Navigation bar at the top of the page to search for a page group by name or change the page display. You can change the default display by making a selection from View list. Available options include:

   - **Icons** (the default) displays each group as a large icon. To edit a group, click the appropriate icon.
   - **Details** 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.

Creating an Application Group

To create 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 Application Group page, click **Create**.
4. Enter a name, a description (optional), and click **Create**.

Editing an 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 an 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 4-8.

Removing an 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 4-8.

Deleting an 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 an Application from an Application Group" on page 27.
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 will display 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
- Using the Drag and Drop Layout Page
- Referencing Item Values
- Displaying Conditional or Read-Only Page Items
- Working with Multiple Select List Item

> **See Also:** "Understanding Application-Level Items" on page 6-48, "How Item Attributes Affect Page Layout" on page 9-15, "Understanding Substitution Strings" on page 2-15, and "About the Item Finder" on page 7-112

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 6-48

Viewing Items on the Page Definition

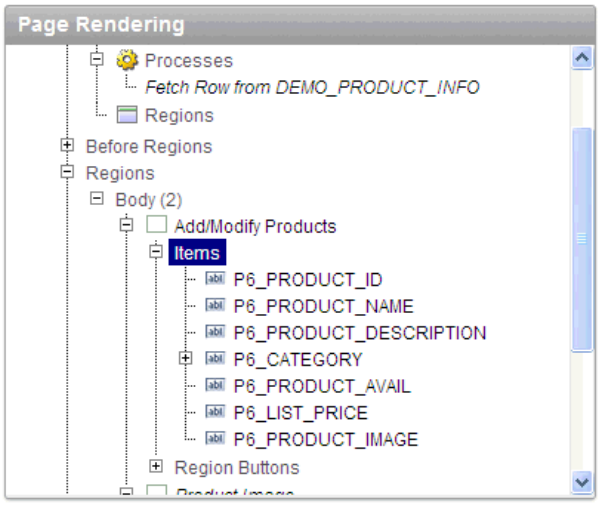
You create and edit page-level items on the Page Definition. In both Component and Tree view, items section appears in the Page Rendering section. See "Switching Between Tree and Component View" on page 5-8.

Topics:

- Viewing Items in Tree View
- Viewing Items in Component View

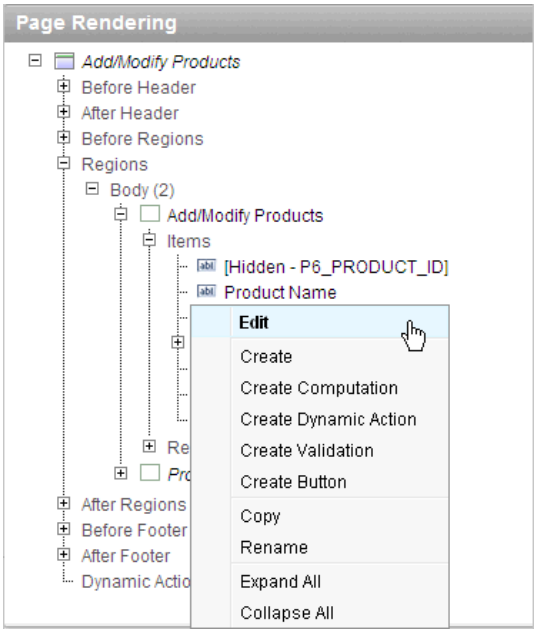
Viewing Items in Tree View

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.

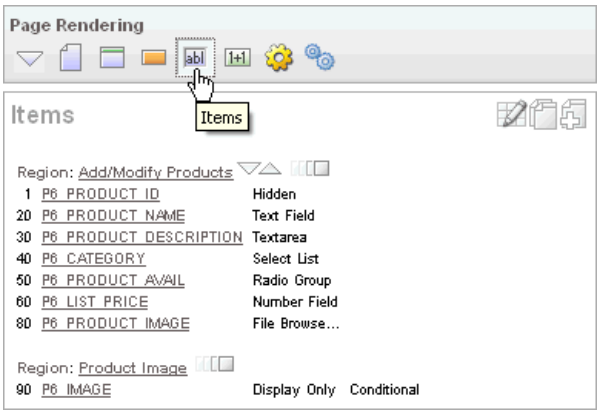
> **Tip:** You can also edit an item by double-clicking the item name or selecting the name and pressing **ENTER**. See "Editing a Page in Tree View" on page 5-9.



To edit multiple items at once, right-click Items and select **Edit All**. The Items page appears. See "Editing Multiple Items Simultaneously" on page 6-37.

You can interactively reorder items within a given region or move them to another region by dragging and dropping them.

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.

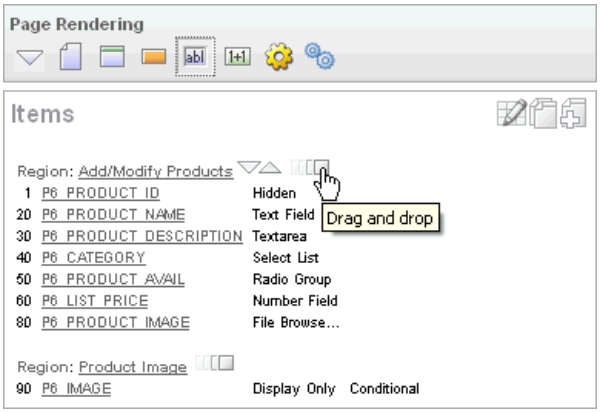
The following icons display next to the section title:

- **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 6-37.
- **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.

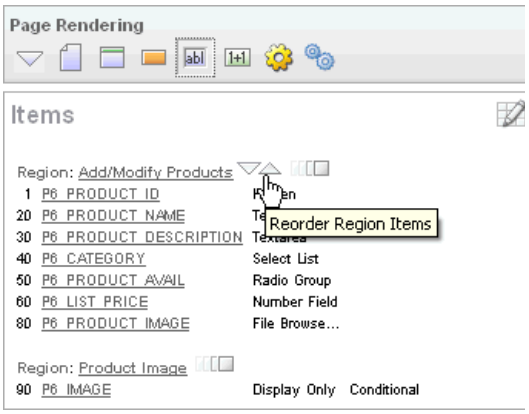
> **See Also:** "Editing Page Item Attributes" on page 6-35 and "Using the Reorder Buttons Icon in Component View" on page 7-101

About the Drag and Drop Icon You can quickly change the appearance of a page by clicking the Drag and drop icon to access the Drag and Drop Layout page. The Drag and drop icon resembles a rectangle and displays to the right of the Reorder Region Items icon.



You can use the Drag and Drop Layout page to interactively reorder items within a given region, change select item attributes, create items, or delete existing items. See "Using the Drag and Drop Layout Page" on page 6-40.

About the Reorder Items Icon You can quickly edit the label and position of items in a region by clicking the **Reorder Region Items** icon on the Page Definition. This icon resembles a light green down or up arrow.



> **See Also:** "Using the Reorder Region Items Icon in Component View" on page 6-43

Creating Page-Level Items

You can create page-level items by running the Create Item Wizard.

Topics:

- Creating a Page-Level Item on the Page Definition
- About Item Naming Conventions
- Creating Multiple Items Using a Tabular Form
- Creating Multiple Items Using Drag and Drop
- Creating a Static List of Values

> **See Also:** "Differences Between Page Items and Application Items" on page 6-28 and "About Item Types" on page A-1

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 5-2.
2. If necessary, create an HTML region. See "Understanding Regions" on page 9-2.
3. To access the Create Item Wizard:
   a. Tree view- Under Page Rending, right-click the region to contain the item and select **Create Page Item**.
   b. 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.

5. Follow the on-screen instructions.
6. To learn more about a specific field, click the field label.

   When help is available, the item label changes to red when you pass your cursor over it, and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

About Item Naming Conventions

When specifying an item name, remember the following rules. Item names must:

- Be unique within an application
- Not have 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
- Cannot contain letters outside the base ASCII character set

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 5-2.
2. If necessary, create an HTML region. See "Understanding Regions" on page 9-2.
3. To access the Create Item Wizard:
   a. Tree view- Under Page Rending, right-click the region to contain the item and select **Create Page Item**.
   b. 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**.

See Also: "About the Drag and Drop Icon" on page 6-30

Creating Multiple Items Using Drag and Drop

To create multiple items using the Drag and Drop Layout page:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. If necessary, create an HTML region. See "Understanding Regions" on page 9-2.
3. To access the Drag and Drop Layout page:

a. Tree view- Under Page Rending, right-click on the region and select **Drag and Drop Layout**.

b. Component view - Under Items, click the **Drag and Drop Layout** icon.

The Drag and Drop Layout page appears.

4. Select an item from the palette on the left side of the page and drag it to the appropriate position on the page.
5. Edit the item attributes at the of the page.
   a. Item Name - Enter an item name. Use this name retrieve the value of the item. Item names longer than 30 characters cannot be referenced using bind variable syntax.
   b. Label - Enter the label for this item. You may include HTML, JavaScript, and shortcuts. You can also use the substitution string `#CURRENT_ITEM_NAME#` to obtain the name of the item associated with this label.
   c. Display Type - Select a display type (if applicable). See "About Item Types" on page A-1.
6. To edit an existing item, select the item and then edit the Item Name and Label fields, or select a new Display Type at the top of the page.
7. Click **Next**.
8. Optionally, edit the each item's Name and Label.
9. Click **Apply Changes**.

See Also: "Using the Drag and Drop Layout Page" on page 6-40

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" on page 7-102

To create a static list of values:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the attributes page for the item:
   a. Tree view- Right-click on the item and select **Edit**.
   b. Component view -Under Items, select the item name.

   The Edit Page Item page appears.
3. Under Name, specify how the item will be 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 is the same as the display value.

6. To learn more, see item Help. To view help for a specific item on a page, click the item label.

   When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

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
```

See Tutorial: "How to Control Form Layout" in *Oracle Application Express Advanced Tutorials*

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
- Creating a Quick Pick Selection
- Editing Multiple Items Simultaneously

- Using the Reorder Region Items Icon in Component View
- Using the Drag and Drop Layout Page

> **See Also:** "Displaying Conditional or Read-Only Page Items" on page 6-45

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 5-2.
2. Access the attributes page for the item:
   a. Tree view- Right-click on the item and select **Edit**.
   b. 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 5-9.

   The Edit Page Item page appears.
3. To learn more about a specific attribute on a page, click the attribute label.

   When help is available, the item label changes to red when you pass your cursor over it, and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
4. Click **Apply Changes**.

> **See Also:** "How Item Attributes Affect Page Layout" on page 9-15 and "Understanding Cross-Site Scripting Protection" on page 12-11

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 Pate 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 6-31.
2. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Access the attributes page for the item:
   a. Tree view- Right-click on the item and select **Edit**.

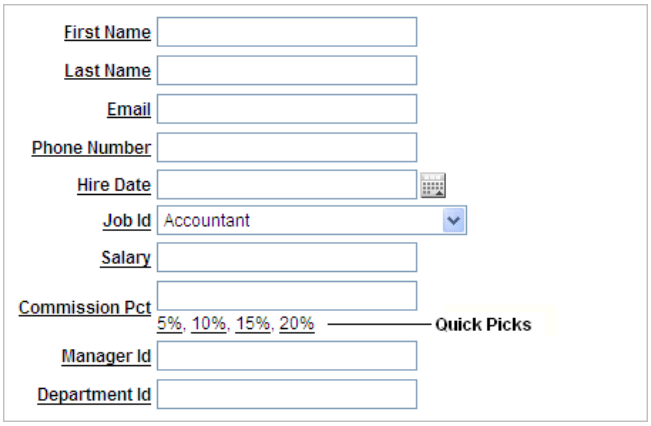
b. Component view -Under Items, select the item name.

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**.

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%.



To create a quick pick:

1. Create the item. See "Creating Page-Level Items" on page 6-31.
2. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Access the attributes page for the item:
   a. Tree view- Right-click on the item and select **Edit**.
   b. 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.

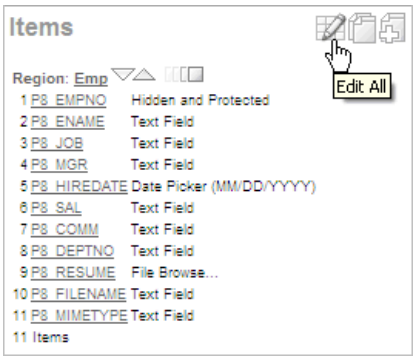
Topics:

- Items
- Reassign Region Items
- Delete Multiple Items
- Viewing Item Utilities
- History

See Also: "How Item Attributes Affect Page Layout" on page 9-15

Items To edit multiple items simultaneously:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Page Items page:
   a. Tree view - Right-click **Items** and select **Edit All**.
   b. 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 Items tab appears.

A Navigation bar displays at the top of the page. 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 6-35

The Page Items page displays items in an editable report. Table 6–2 describes each editable attribute.

Table 6–2 Editable Attributes on Page Items

Attribute	Description
Sequence	Specify the display sequence for this component. The sequence determines the order of evaluation.

Table 6–2 (Cont.) Editable Attributes on Page Items

Attribute	Description
Prompt	Enter the label for this HTML form element. You may include HTML, JavaScript, and shortcuts. You can also use the substitution string #CURRENT_ITEM_NAME# 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 **Yes** to have an item display as the first field in a new row in the table.
New Field	If set to **Yes**, this item will be rendered into it's own HTML table cell which is the default. If set to **No**, the item will be rendered into the same HTML table cell as the previous page item. Note that rendering into the same table cell will look more attached to the previous page item.
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 will be rendered immediately after the page item element.

Reassign Region Items Use the Reassign Region Items page to assign items to a new region.

To Reassign Region Items page:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Page Item page:
   a. Tree view - Right-click on Items and select **Edit All**.
   b. 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**.

      Tip: In Tree view, you can also reassign region items by simply dragging and dropping to a new location.

Delete Multiple Items Use the Delete Multiple Items page to delete multiple items at once.

To delete multiple items:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Page Item page:
   a. Tree view - Right-click on Items and select **Edit All**.
   b. 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 an item:
   a. Select the items.
   b. Click **Remove Items**.

Viewing Item Utilities The Utilities page includes Grid Edit pages and reports Utilities that enable you to edit 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 5-2.
2. Access the Page Item page:
   a. Tree view - Right-click on Items and select **Edit All**.
   b. 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.

Using the Drag and Drop Layout Page

You can use the Drag and Drop Layout page to interactively reorder items within a given region, change select item attributes, create items, or delete existing items.

Topics:

- Accessing the Drag and Drop Layout Page
- About the Drag and Drop Layout Page
- Creating a New Item
- Editing Existing Items
- Deleting Items

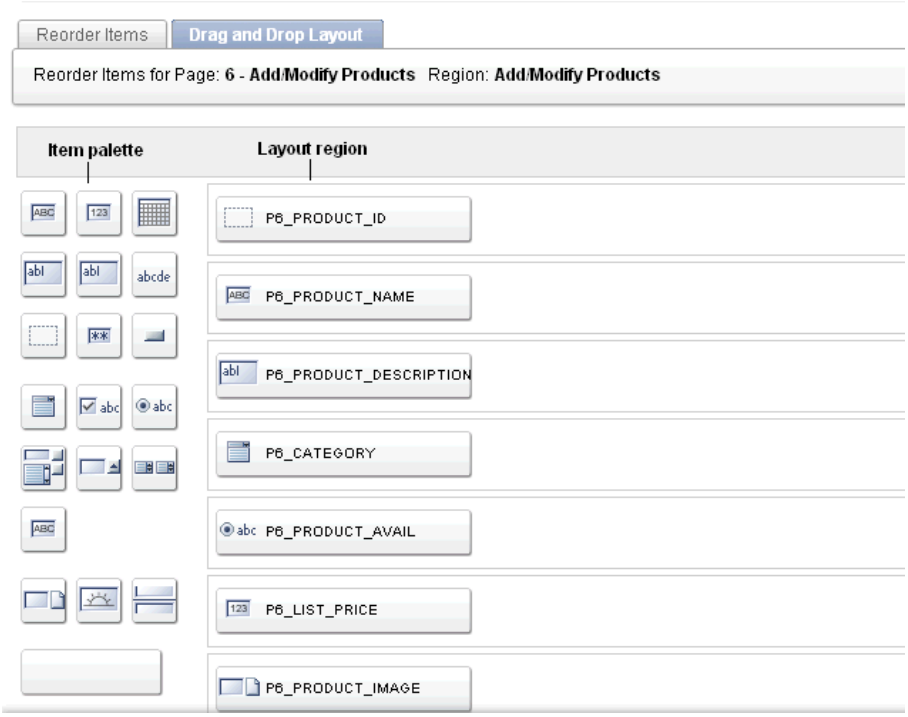
> **See Also:** "Creating Multiple Items Using Drag and Drop" on page 6-32

Accessing the Drag and Drop Layout Page You access the Drag and Drop Layout page by either:

- Tree view- Under Page Rending, right-click on the region and select **Drag and Drop Layout**.
- Component view - Under Items, click the **Drag and Drop Layout** icon.

> **See Also:** "Differences Between Page Items and Application Items" on page 6-28

About the Drag and Drop Layout Page The Drag and Drop Layout page is divided into two sections: Item palette and Layout region.



The **Item palette** displays on the left side of the page. You add items by clicking an item type on the palette and dragging it to the correct position in the Layout region. Note that when you position the cursor over an item type, a tooltip appears.

Use the right side of the page (or **Layout region**) to position items. To move an item vertically, click the **Add Row** button to insert an empty row. Then drag and drop the item into the empty row.

> **See Also:** "Deleting Items" on page 6-43

Creating a New Item To create a new item on the Drag and Drop Layout page:

1. Navigate to the Drag and Drop Layout page. See "Accessing the Drag and Drop Layout Page" on page 6-40.
2. Click an item type in the Item palette on the left side of the page and drag it to the appropriate location in the Layout region.

   Note that when you position the cursor over an item type, a tooltip appears.
3. You can reposition the item:
   - To move an item horizontally, select the item and drag it to the appropriate position on the page.
   - To insert an existing or new item between two existing rows, click the **Add Row** button and drag it between the existing rows. This creates an empty row where you can then move the item.
4. Edit the item attributes at the of the page.
   a. Display Name - Enter an item name. Use this name to retrieve the value of the item. Item names longer than 30 characters cannot be referenced using bind variable syntax.

b. Label - Enter the label for this item. You may include HTML, JavaScript, and shortcuts. You can also use the substitution string `#CURRENT_ITEM_NAME#` to obtain the name of the item associated with this label.

c. Display Type - Select a display type (if applicable). Note that the select list is restricted to options corresponding to the type of item you are creating. See "About Item Types" on page A-1.

5. Click **Next**.
6. Optionally, edit the each item's Name and Label.
7. Click **Apply Changes**.

> **See Also:** "Creating Multiple Items Using Drag and Drop" on page 6-32 and "Editing Page Item Attributes" on page 6-35

About List of Values If you create an item that requires a list of values (LOV), the Drag and Drop Layout Wizard creates a static inline LOV for you. Note you must edit and fix this LOV once you complete the layout process.

> **See Also:** "Creating a Static List of Values" on page 6-33

Editing Existing Items To edit an existing item on the Drag and Drop Layout page:

1. Navigate to the Drag and Drop Layout page. See "Accessing the Drag and Drop Layout Page" on page 6-40.
2. To reposition the item:
   - To move an item horizontally, select the item and drag it to the appropriate position on the page.
   - To insert an existing or new item between two existing rows, click the **Add Row** button and drag it between the existing rows. This creates an empty row where you can then move the item.
3. If required, select an item and edit its attributes at the of the page.

   a. Display Name - Enter an item name. Use this name retrieve the value of the item. Item names longer than 30 characters cannot be referenced using bind variable syntax.

   b. Label - Enter the label for this item. You may include HTML, JavaScript, and shortcuts. You can also use the substitution string `#CURRENT_ITEM_NAME#` to obtain the name of the item associated with this label.

   c. Display Type - Select a display type (if applicable). Note that the select list is restricted to options corresponding to the type of item you are creating. See "About Item Types" on page A-1.

4. Click **Next**.
5. Optionally, edit the each item's Name and Label.
6. Click **Apply Changes**.

> **Note:** To change the region in which an item resides, you must edit the item attributes. See "Editing Page Item Attributes" on page 6-35.

Deleting Items To delete an item, click it and drag it to the Recycle box at the bottom of the page. If you delete an existing item, it appears in the Recycle box and can be retrieved until you click **Apply Changes** on the next page. Note that if you drop a new item you have just created in the Recycle box, it instantly disappears and cannot be retrieved.

Using the Reorder Region Items Icon in Component View

You can quickly edit the label and position of items in a region by clicking the **Reorder Region Items** icon on the Page Definition. This icon resembles a gray down and up arrow.

To use the Reorder Region Items icon:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Under Items, click the **Reorder Region Items** icon.

   The Reorder Region Items page appears with items laid out in tables. You can edit the position of an item by selecting values for New Line, New Field, Column Span, and Label Alignment attributes.
3. To edit an item label, enter a new title in the Label field.
4. To change the position of an item, edit the following attributes:
   - **New Line**. Determines if the item displays on the same line as the previous item, or displays on the next line. Select **Yes** to have an item display as the first field in a new row in the table.
   - **New Field**. Determines if the item displays in the next column or in the same column as the previous item. Select **Yes** to have the label and value for the item display in a new HTML table cell. Use this attribute in combination with the New Line and Span attributes to control layout.
   - **Column Span**. Defines the value to be used for the `COLSPAN` attribute in the table cell. The `COLSPAN` attribute defines the number of columns that it spans across the table.
5. To change label alignment, make a selection from the Label Alignment list.
6. To change the order in which items display, click the up and down arrows in the far right column. Clicking the arrow moves the item one row up or down.

   Note that the order you specify here translates to sequence number in the Sequence attribute on the Edit Page Item page. See "Editing Page Item Attributes" on page 6-35.
7. Click **Apply Changes**.

Tip: You can also use the Drag and Drop Layout feature to reorder items. See "Using the Drag and Drop Layout Page" on page 6-40.

Note: To change the region in which an item resides, you must edit the item attributes. See "Editing Page Item Attributes" on page 6-35.

Referencing Item Values

You can reference item values stored in session state in regions, computations, processes, validation, and branches. Table 6–3 describes the supported syntax for referencing item values.

See Also: "Managing Session State Values" on page 2-11

Table 6–3 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. **See Also:** *Oracle Application Express API Reference*
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. **See Also:** *Oracle Application Express API Reference*
Static Text (exact)	`&MY_ITEM.`	Static text. Exact Substitution. **Note**: 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 2-12, *Oracle Application Express API Reference*, and "Understanding Cross-Site Scripting Protection" on page 12-11

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 or read-only item:

1. Create the item. See "Creating Page-Level Items" on page 6-31.
2. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Access the attributes page for the item:
   a. Tree view- Right-click on the item and select **Edit**.
   b. Component view -Under Items, select the item name.

   The Edit Page Item page appears.
4. To display an item conditionally:
   a. Scroll down to Conditions.
   b. Make a selection from the Condition Type list.
   c. Enter an expression in the fields provided.
5. To make an item read-only:
   a. Scroll down to Read Only Display Settings.
   b. Make a selection from the Read Only Condition Type list.
   c. Enter an expression in the fields provided.
6. 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 6-31.
2. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Access the attributes page for the item:
   a. Tree view- Right-click on the item and select **Edit**.
   b. Component view -Under Items, select the item name.

   The Edit Page Item page appears.
4. To display an item conditionally:

a. Scroll down to Read Only.

b. Make a selection from the Condition Type list.

c. Enter an expression in the fields provided.

5. To make an item read-only:

a. Scroll down to Read Only Display Settings.

b. Make a selection from the Read Only Condition Type list.

c. Enter an expression in the fields provided.

6. 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:

```
bgcolor="#FF0000"
```

7. 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, you would 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 deparment. To made 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. Select the appropriate schema.
   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:

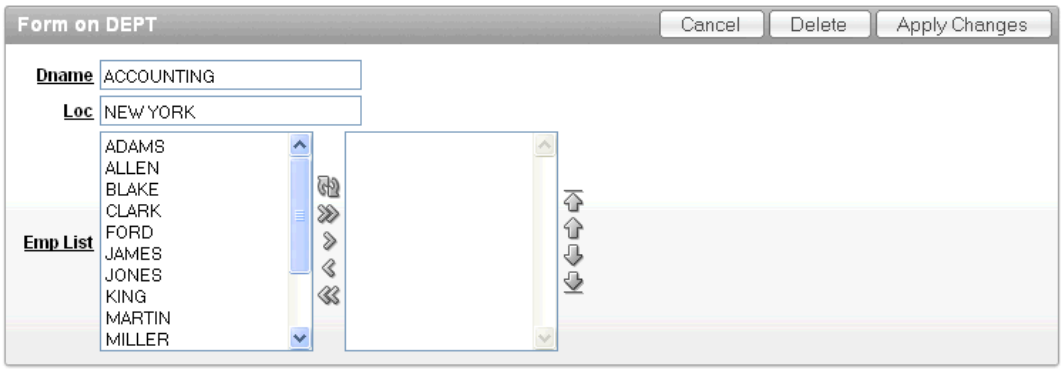
   – Source Type - Select **SQL Query (return color separated value)**

   – 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

> **See Also:** "Differences Between Page Items and Application Items" on page 6-28 and "Referencing Item Values" on page 6-44

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 Builder appears, click **Shared Components**.
5. Under Logic, select **Application Items**.

The Application Items page appears.

6. To create an application item, click **Create**.
7. Follow the on-screen instructions.

About the Application Items Page

Once you create a 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:

- **Search 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 (wild card characters are implied) to search for a page group by name and then click **Go**.
- **Go button** - Executes a search.
- **View**. Use this control to toggle between icon and report views. To change the view, click these icons:
  - **View Icons** (the default) displays each application 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 item name.
- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

Viewing Application Item Usage

You can a listing of where application items are used by clicking **Utilization** 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 Builder appears, click **Shared Components**.
5. Under Logic, select **Application Items**.

   The Application Items page appears.
6. Select an application item.

   The Create/Edit Application Item page appears.
7. To learn more about a specific item on a page, click the item label.

   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

8. Click **Apply Changes**.

> **See Also:** "Understanding Cross-Site Scripting Protection" on page 12-11

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**.

Viewing 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, plugins, 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 Cross Page Utilities
- About Cross Application Reports

> **See Also:** "Creating Custom Activity Reports Using APEX_ACTIVITY_LOG" on page 14-4

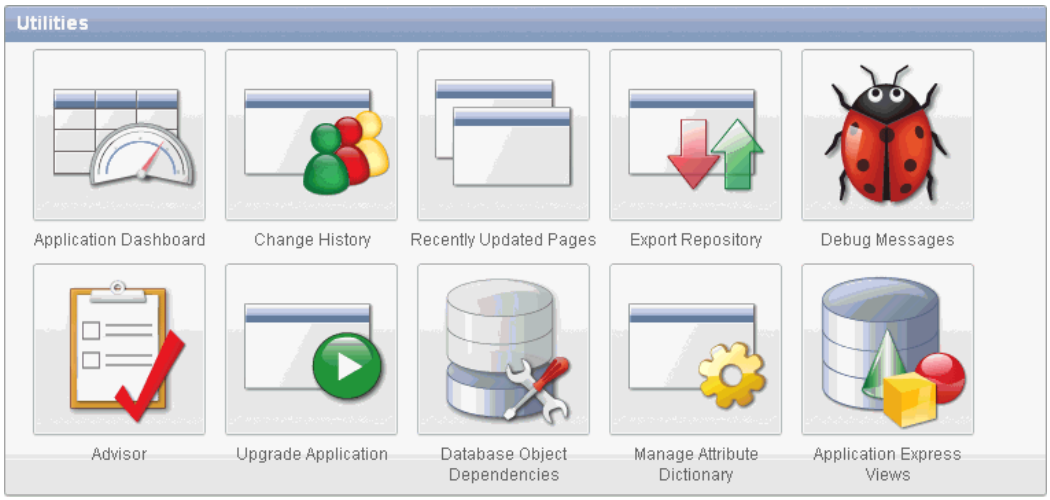
Using Application Builder Utilities

The Application Builder Utilities page includes tools and reports that summarize information across an application.

Topics:

- About the Application Builder Utilities Page
- Accessing Application Builder Utilities
- About the Application Dashboard
- About the Change History Report
- About the Recently Updated Pages Report
- About the Database Object Dependencies Report

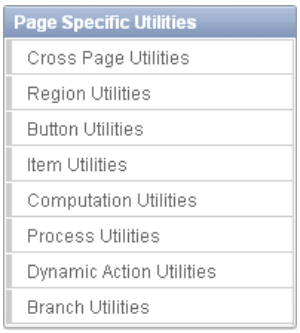
About the Application Builder Utilities Page



The center of Application Builder Utilities contains icons that link to the following tools and reports:

- **Application Dashboard**. See "About the Application Dashboard" on page 6-52.
- **Change History**. See "About the Change History Report" on page 6-53.
- **Recently Updated Pages**. See "About the Recently Updated Pages Report" on page 6-54.
- **Export Repository**. See "Accessing the Export Repository" on page 13-29.
- **Debug Messages**. See "Debugging an Application" on page 11-1.
- **Advisor**. See "Running Advisor to Check Application Integrity" on page 11-1.
- **Upgrade Application**. See *Oracle Application Express Installation Guide*.
- **Database Object Dependencies**. See "About the Database Object Dependencies Report" on page 6-54.
- **Manage Attribute Dictionary** - See "Using the Attribute Dictionary" on page 5-46.
- **Application Express Views** - See "About Application Express Views" on page 6-54.

Page Specific Utilities



The Page Specific Utilities display on the right side of the Utilities page. Available links include:

- Cross Page Utilities. See "About Cross Page Utilities" on page 6-55.

- Region Utilities
- Button Utilities
- Item Utilities
- Computations Utilities
- Process Utilities
- Dynamic Action Utilities
- Branch Utilities

Accessing Application Builder Utilities

To access the Application Builder 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. Click **Utilities**.

   The Utilities page appears and contains the following icons:

   - **Application Dashboard**. See "About the Application Dashboard" on page 6-52.
   - **Change History**. See "About the Change History Report" on page 6-53.
   - **Recently Updated Pages**. See "About the Recently Updated Pages Report" on page 6-54.
   - **Export Repository**. See "Accessing the Export Repository" on page 13-29.
   - **Debug Messages**. See "Debugging an Application" on page 11-1.
   - **Advisor**. See "Running Advisor to Check Application Integrity" on page 11-1.
   - **Upgrade Application**. See *Oracle Application Express Installation Guide*.
   - **Database Object Dependencies**. See "About the Database Object Dependencies Report" on page 6-54.
   - **Manage Attribute Dictionary** - See "Using the Attribute Dictionary" on page 5-46.
   - **Application Express Views** - See "About Application Express Views" on page 6-54.

About the Application Dashboard

The Application Dashboard details application components and attributes.

To view reports specific to an 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 **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 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.

See Also: "Identifying At Risk Password Items" on page 12-10

About 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 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 (wild card characters are implied) to search for a page group by name and then click **Go**.
   - **Go button** - Executes a search.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report. See "Using the Actions Menu" on page 7-6.

About 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 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 (wild card characters are implied) to search for a page group by name and then click **Go**.
   - **Go button** - Executes a search.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report. See "Using the Actions Menu" on page 7-6.

About 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**.

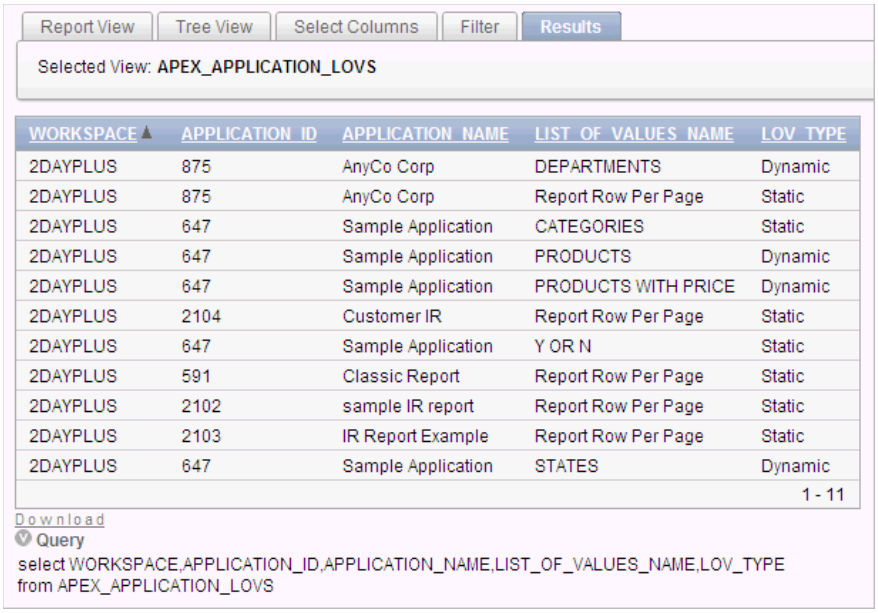
   Tip: Display of the report may take a moment depending on the size and complexity of your application.

   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 can not only see the view, but you can also see the data they contain.

To view the data within a view, select the 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.



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 6-56.
- **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 6-56.
- **Delete Multiple Pages**. See "About Delete Multiple Pages" on page 6-56.
- **Page Attributes**. Displays a report of attributes, components, controls, and application logic by page. See "About the Page Attributes" on page 6-56.
- **Page Groups**. See "About Page Groups" on page 6-56
- **Page Locks**. See "About Page Locks" on page 6-56.

See Also: "Viewing Utilities and Reports" on page 6-50f

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 "Customizing Interactive Reports" on page 7-4.

About Grid Edit of all Pages

Use the Grid Edit 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 6-20.

About the Page Attributes

The Page Attributes report details attributes, components, controls, and application logic for each page in the current application. To link to a specific page, click the page number. To customize the report, use the Search Bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

About Page Groups

Use Page Groups to better organize the pages within an application. See "Grouping Pages" on page 6-14.

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 6-17.

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.

7

Adding Application Components

This section describes how to use Application Builder to add pages to an application and add other components (reports, charts, or forms), page controls (buttons, items, list of values), and shared components (breadcrumbs, lists, or tabs).

Topics:

- Creating Reports
- Creating Forms
- Creating Calendars
- Creating Maps
- Creating Charts
- Creating Buttons
- Creating Lists of Values
- Creating Dependent Select Lists
- Using Shortcuts
- Creating Trees
- Using the Find Icon
- Controlling Access to Applications, Pages, and Page Components
- Incorporating JavaScript into an Application
- Optimizing a Page for Printing
- Creating a Help Page

See Also: "Using Application Builder" on page 4-1, "Controlling Page Layout" on page 9-1, and "Adding Navigation" on page 8-1

Creating Reports

In Oracle Application Express, a report is the formatted result of a SQL query. You can generate reports by selecting and running a built-in query, or by defining a report region based on a SQL query.

Topics:

- Creating a Report Using a Built-in Wizard
- Customizing Interactive Reports

- Editing Interactive Reports as a Developer
- Editing SQL and Wizard Reports
- Printing Report Regions

Creating a Report Using a Built-in Wizard

Application Builder includes a number of 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**. Option 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. End users can customize the report layout and data displayed by selecting options on the Actions menu.
   - **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.
   - **Report on Web Service Result** - Creates a report based on a Web service result. To learn more, see "Implementing Web Services" on page 14-7.
   - **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.

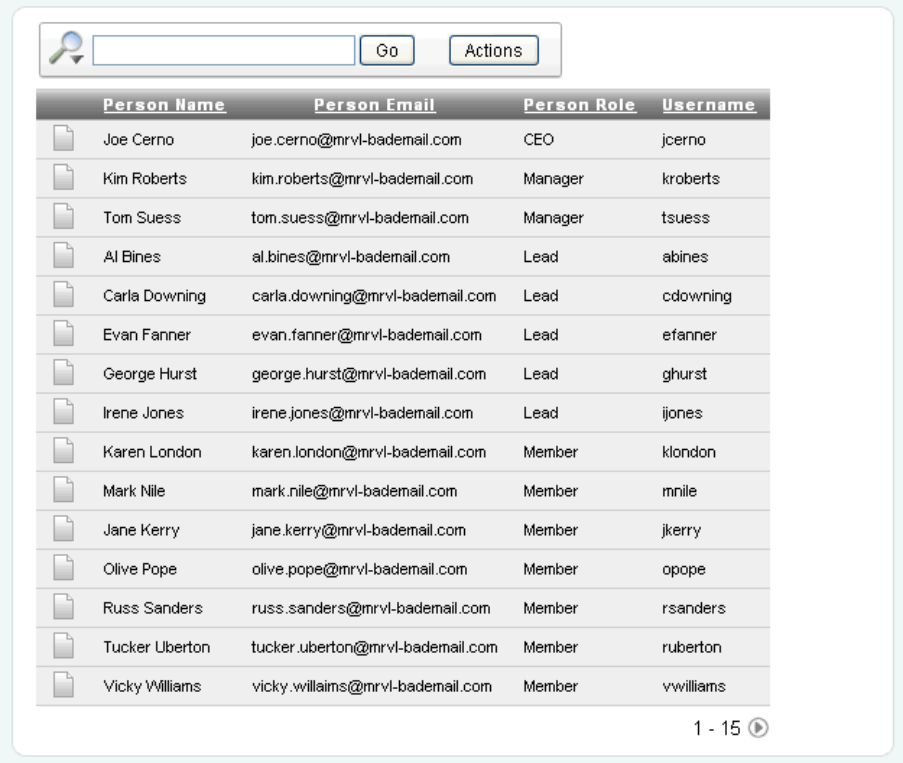
   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

   See Tutorials: "How to Create a Drill Down Report" and "How to Create a Parameterized Report" in *Oracle Application Express Advanced Tutorials*

Understanding the Difference Between Interactive and Classic Reports

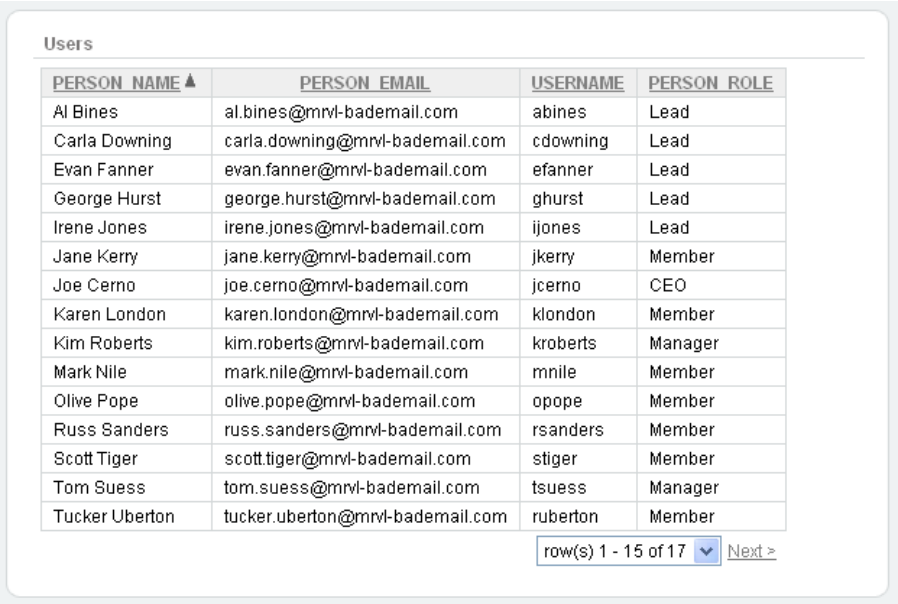
Oracle Application Express includes two main report types, an interactive report and a classic report. The main difference between these two report types is that interactive reports enable the user to customize the appearance of the data through a searching, filtering, sorting, column selection, highlighting, and other data manipulations.

The following is an example of an interactive report.



Notice that the interactive report includes a Search Bar, Column Heading Menu links, and Link Column icons in the first column of each row. For a complete description of these components, see "Customizing Interactive Reports" on page 7-4.

In contrast, a classic report does not include any of these customization features. The following is an example of a classic report built on top of the same data.



Classic reports do not include a Search Bar and the links at the top of each column only support basic sorting.

> **See Also:** "Editing Interactive Reports as a Developer" on page 7-20 and "Editing SQL and Wizard Reports" on page 7-40

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, different charts, group bys, and add their own computations.

Users can also set up a subscription so that an HTML version of the report will be 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 7-20

Topics:

- About the Search Bar
- Using the Select Columns Icon
- Using the Actions Menu
- Selecting Columns to Display
- Adding a Filter
- Specifying Rows Per Page
- Selecting Columns and 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 a Report
- Resetting a Report
- Downloading a Report
- Subscribing to Emailed Reports
- Using the Column Heading Menu

About the Search Bar



A search bar displays at the top of every interactive report and may include the following features:

- 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 (wild card characters are implied) and then click **Go**.
- Go button - Executes a search.
- Reports - Displays alternate default and saved private or public reports.
- View icons - Switches between icon, report and detail view of the default report (if enabled). May also include Chart and Group By View (if defined).
- Actions menu - Clicking the icon displays the Actions menu. Use this menu to customize an interactive report. See "Using the Actions Menu" on page 7-6.

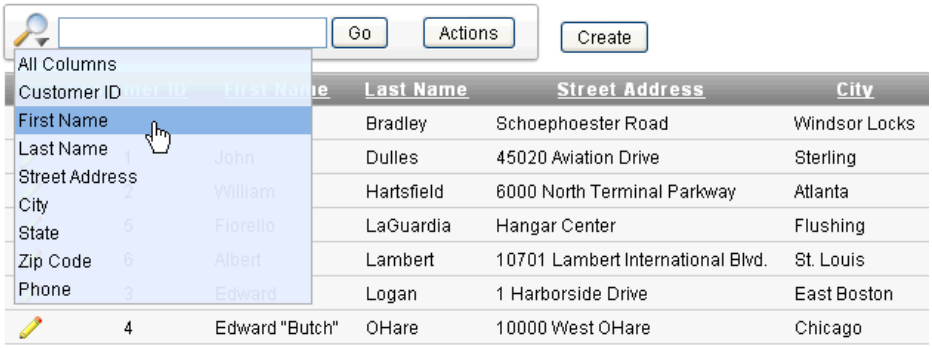
> **See Also:** "Customizing the Interactive Report Search Bar" on page 7-27

Using the Select Columns Icon

A Select Columns 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** icon and select a column.



2. Enter keywords in the Text area and click **Go**.



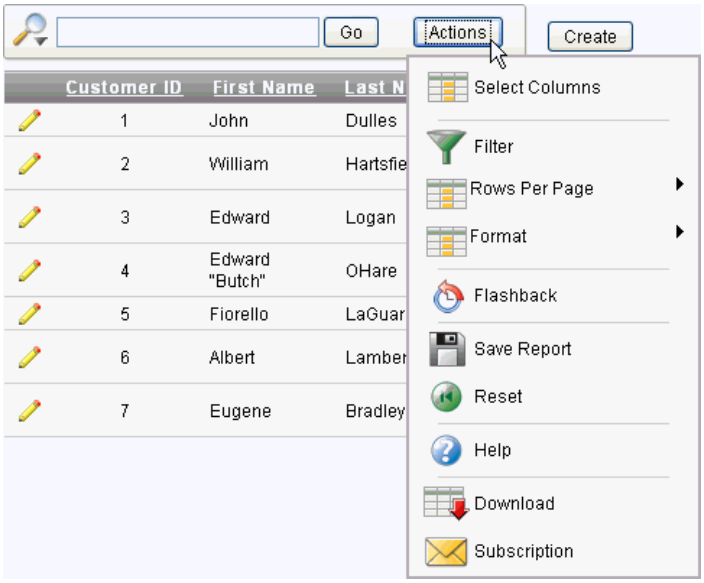
   Notice in this example the filter `Row text contains 'Edward'` displays above the report.

3. To disable the filter, select the **Enable/Disable Filter** check box.
4. To delete the filter, click the **Remove Filter** icon.

> **See Also:** "Selecting Columns to Display" on page 7-7

Using the Actions Menu

The Actions menu appears to the right of the Go button on the Search bar. Use this menu to customize an interactive report.



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 7-7.
- **Filter** focuses the report by adding or modifying the `WHERE` clause on the query. See "Adding a Filter" on page 7-8.
- **Rows Per Page** determines how many rows display in the current report. See "Specifying Rows Per Page" on page 7-10.
- **Format** contains the following submenu:
  - **Sort** - Changes the columns to sort on and determines whether to sort in ascending or descending order. See "Selecting Columns and Sort Order" on page 7-10.
  - **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 7-11.
  - **Highlight** - Defines a filter that highlights the rows that meet the filter criteria. See "Adding Highlighting" on page 7-11.
  - **Compute** - Enables users to add computed columns to a report. See "Computing Columns" on page 7-12.
  - **Aggregate** - Enables users to perform mathematical computations against a column. See "Aggregating a Column" on page 7-14.
  - **Chart** - Displays the report data as a chart. See "Creating a Chart from the Actions Menu" on page 7-15.
  - **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 7-15.

- **Flashback** - Enables you to view the data as it existed at a previous point in time. See "Executing a Flashback Query" on page 7-16.
- **Save Report** - Saves the interactive report. Depending upon their user credentials, users can save four different types of reports. See "Saving a Report" on page 7-16.
- **Reset** - Enables users to reset the report back to the default report settings. See "Resetting a Report" on page 19.
- **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 7-19.
- **Subscription** - Enables users to send themselves an interactive report by email. See "Subscribing to Emailed Reports" on page 7-19

> **See Also:** "Customizing the Interactive Report Search Bar" on page 7-27

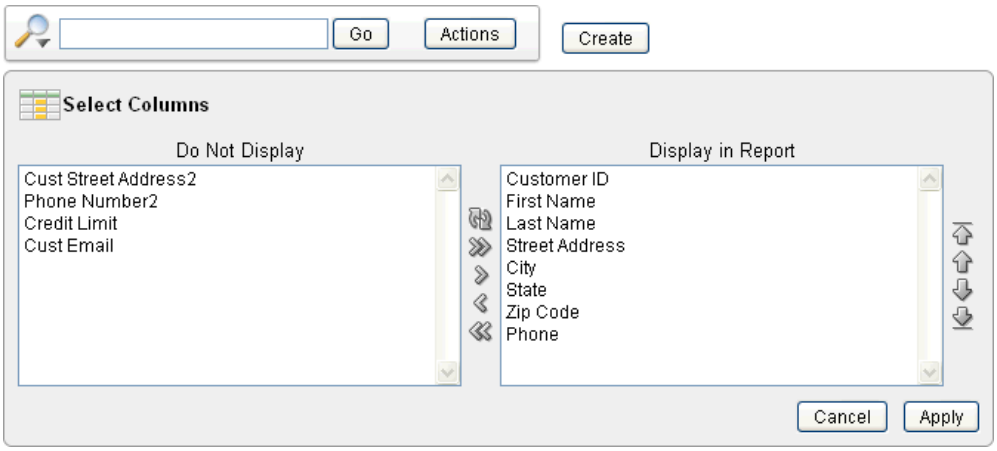
Selecting Columns to Display

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 wish 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.

> **See Also:** "Resetting a Report" on page 7-19

Adding a Filter

You can create a filter on an interactive report by adding or modifying the `WHERE` clause on the query. You can create two types of filters:

- **Column** - Creates a custom column filter. Select a column (it does not need to be one that displays), select a standard Oracle operator (=, !=, not in, `between`), and enter an expression to compare against. Expressions are case sensitive. Use % as a wild card. For example:

  ```
  STATE_NAME like A%
  ```

- **Row** - Creates a custom row filter. This filter creates a complex `WHERE` clauses using column aliases and any Oracle functions or operators. For example:

  ```
  G = 'VA' or G = 'CT'
  ```

  Where `G` is the alias for `CUSTOMER_STATE`.

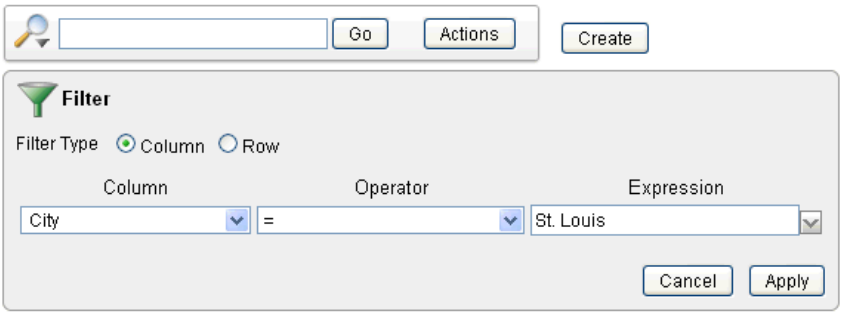
Adding a Column Filter To add a column filter:

1. Click the **Actions** menu and select **Filter**.

   The Filter region appears.

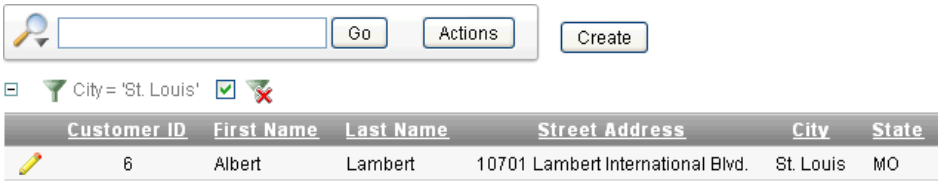
2. For Filter Type, select **Column**.

3. In the Filter region, specify a column, an operator, and expression.



   This filter narrows the display to only customers in the city of St. Louis.

4. Click **Apply**.



   Notice the filter `City = 'St Louis'` has been added to the Report Settings area above the report.

5. To revise the filter:

   a. Click the filter name (in this example, `City = 'St Louis'`).

   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**.

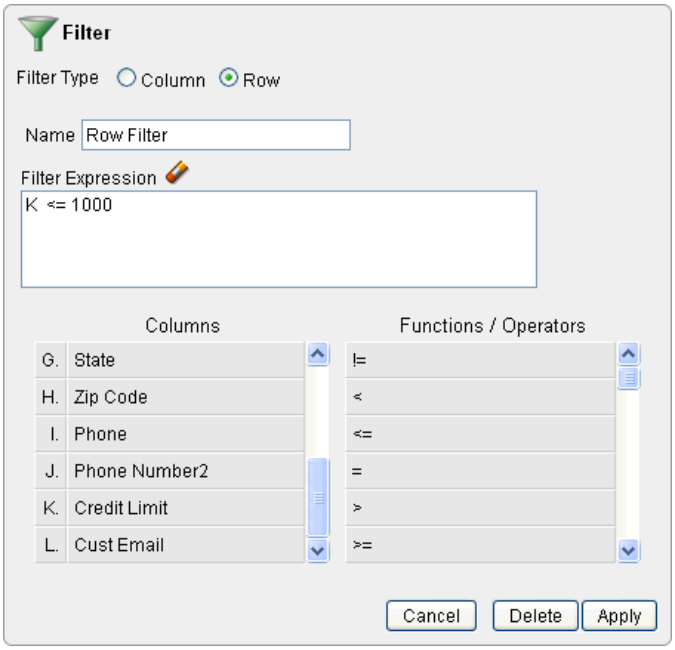
   The Filter region appears.

2. For Filter Type, select **Row**.

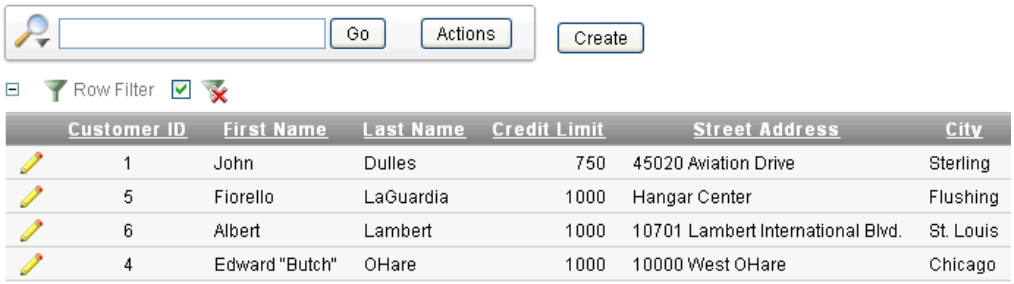
3. In the Filter region:

   a. Enter a Name.

   b. Enter expression. Select a column and function or operator at the bottom of the region.



4. Click **Apply**.



   The filter `K<= 1000` narrows the display to customer having credit limit that is less than or equal to 1000.

5. To revise the filter:

   a. Click **Row Filter**.

   b. Edit your selections and click **Apply**.

6. To disable the filter, select the **Enable/Disable Filter** check box.

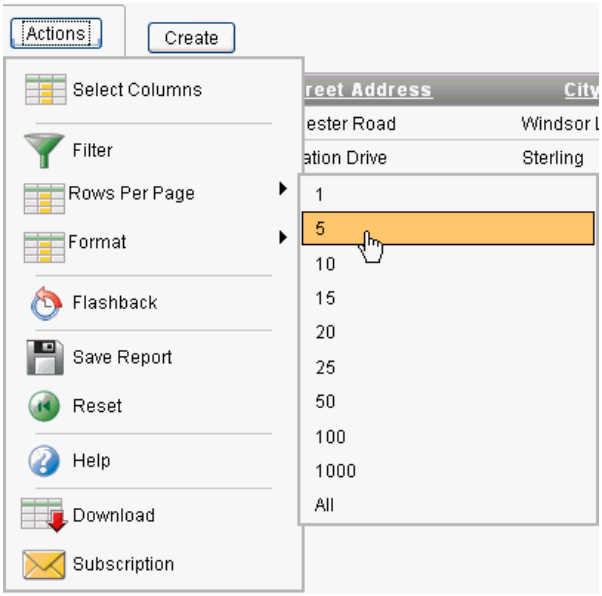
7. To delete the filter, click **Remove Filter**.

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.



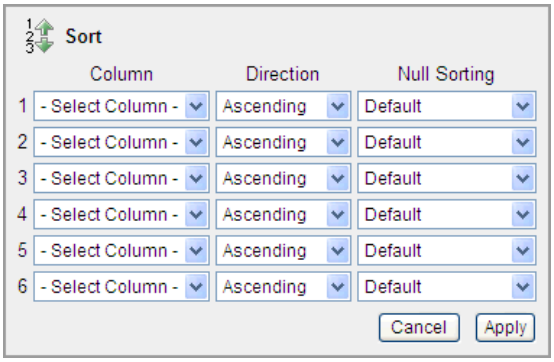
Selecting Columns and Sort Order

You can specify which columns to display and the 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 display 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**).
3. Click **Apply**.

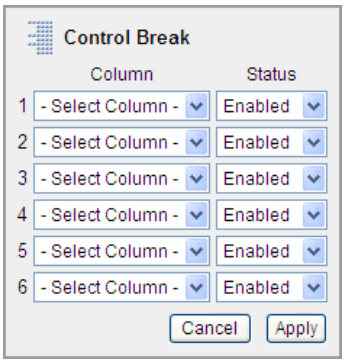
Creating a Control Break

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**)
3. Click **Apply**.

   One or more break groups display in Report Settings area above the report.
4. To expand the break group, click the plus (+) sign.
5. To enable the Control Break filter, select the **Enable/Disable Filter** check box.
6. To delete the filter, click **Remove Filter**.

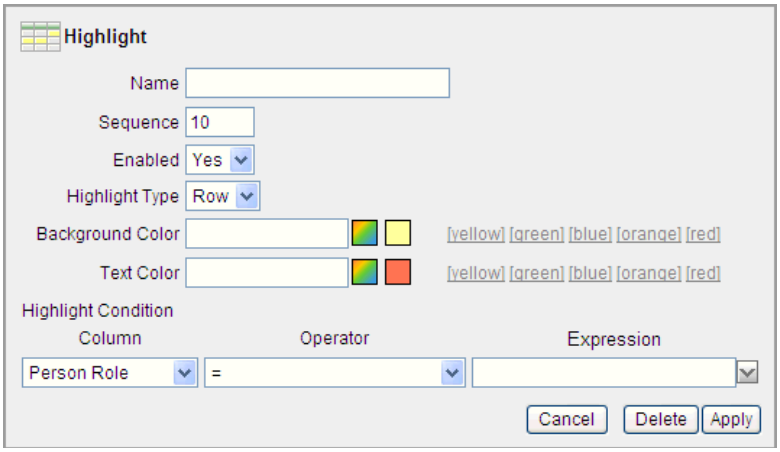
Adding Highlighting

You can customize the display to highlight specific rows in a report by selecting **Highlight** on the Actions, Format submenu.

To add highlighting:

1. Click the **Actions** menu and select **Format** and then **Highlight**.

   The Highlight region appears.



2. Enter the following information:

a. Name - Enter a name that describes this filter.

b. Sequence - Enter numeric value to identify the sequence in which the rules are evaluated.

c. Enabled - Select **Yes**.

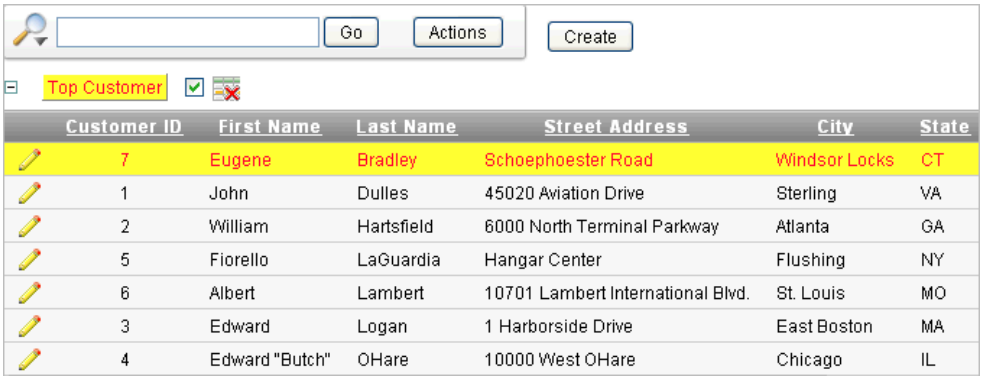
d. Highlight Type - Select **Cell** or **Row**. If Cell is selected, the column referenced in the Highlight Condition is highlighted.

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.

3. Click **Apply**.



Customer ID	First Name	Last Name	Street Address	City	State
7	Eugene	Bradley	Schoephoester Road	Windsor Locks	CT
1	John	Dulles	45020 Aviation Drive	Sterling	VA
2	William	Hartsfield	6000 North Terminal Parkway	Atlanta	GA
5	Fiorello	LaGuardia	Hangar Center	Flushing	NY
6	Albert	Lambert	10701 Lambert International Blvd.	St. Louis	MO
3	Edward	Logan	1 Harborside Drive	East Boston	MA
4	Edward "Butch"	OHare	10000 West OHare	Chicago	IL

Note a new highlight appears in the Report Settings area above the report.

4. To revise the highlight:

a. Click the highlight name (in this example, `Top Customer`).

b. Edit your selections and click **Apply**.

5. To disable the highlight, select the **Enable/Disable Filter** 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. Note that some display as examples and others (such as `TO_DATE`) can also be used).

To create a computation:

1. Click the **Actions** menu and select **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.

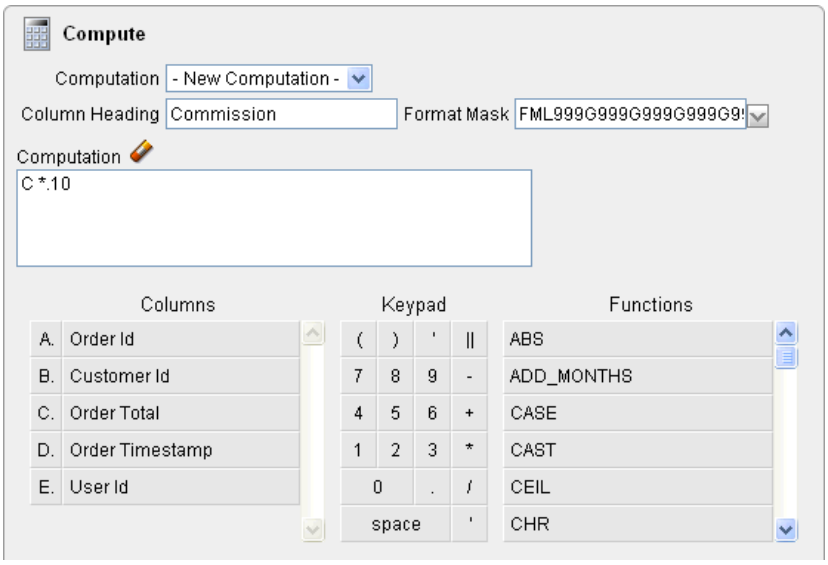
c. Format Mask - Select an Oracle format mask to be applied to the new column. (for example, `S9999`).

Next, create the computation.

d. Create the computation:

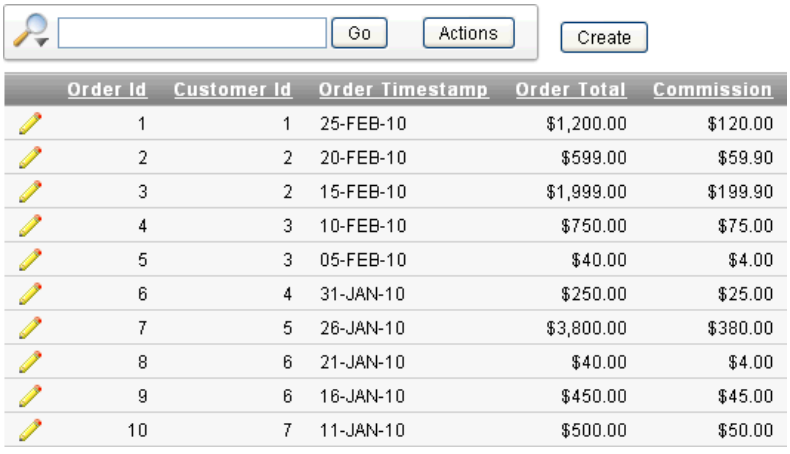
- Columns - Select a column or alias.
- Keypad - Select a shortcut for commonly used keys.
- Functions - Select the appropriate function.

The following example, creates a new Commission column. This column calculates at 10% sales commission using the formula `C*.10` where `C` is the order total.



3. Click **Apply**.

The revised report appears containing a new Commission column.



Order Id	Customer Id	Order Timestamp	Order Total	Commission
1	1	25-FEB-10	$1,200.00	$120.00
2	2	20-FEB-10	$599.00	$59.90
3	2	15-FEB-10	$1,999.00	$199.90
4	3	10-FEB-10	$750.00	$75.00
5	3	05-FEB-10	$40.00	$4.00
6	4	31-JAN-10	$250.00	$25.00
7	5	26-JAN-10	$3,800.00	$380.00
8	6	21-JAN-10	$40.00	$4.00
9	6	16-JAN-10	$450.00	$45.00
10	7	11-JAN-10	$500.00	$50.00

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 a mathematical computation against a column (or aggregate) 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 in which they are defined.

To aggregate columns:

1. Click the **Actions** menu and select **Format** and then **Aggregate**.

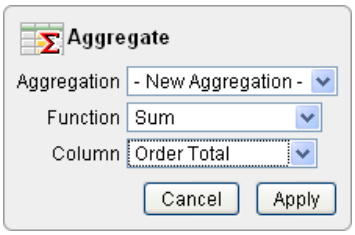
   The Aggregate region appears.

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.

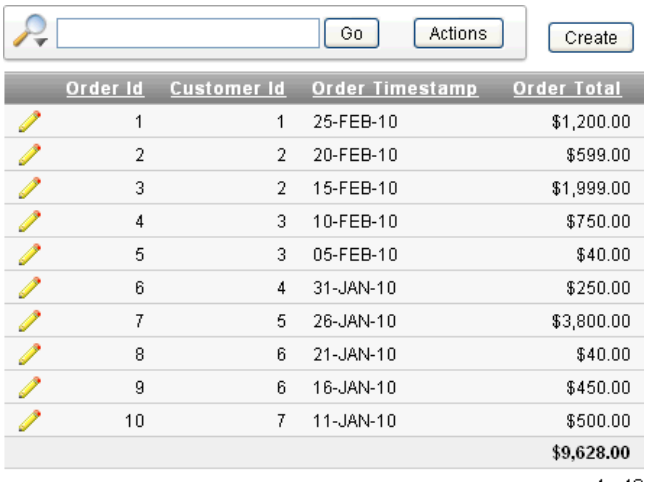
   c. Column - Select a column.



   This example creates a sum or Order Total column.

3. Click **Apply**.

   The computation appears at the bottom of the report.



Order Id	Customer Id	Order Timestamp	Order Total
1	1	25-FEB-10	$1,200.00
2	2	20-FEB-10	$599.00
3	2	15-FEB-10	$1,999.00
4	3	10-FEB-10	$750.00
5	3	05-FEB-10	$40.00
6	4	31-JAN-10	$250.00
7	5	26-JAN-10	$3,800.00
8	6	21-JAN-10	$40.00
9	6	16-JAN-10	$450.00
10	7	11-JAN-10	$500.00
			$9,628.00

   In this example, the aggregate shows the sum of all amounts in the Order Total 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**.

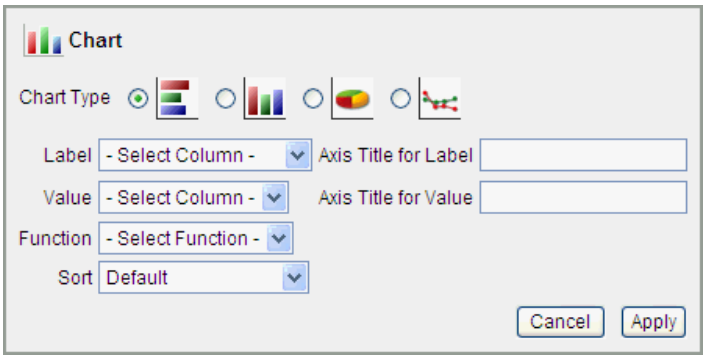
Creating a Chart from the Actions Menu

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 following:

   a. Chart Type - Select the type of chart you wish 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 title to be displayed 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.

      Click **Apply** and a View Chart icon appears in Search bar.

Deleting a Chart To delete a chart:

1. Click the **Actions** menu and select **Format** and then **Chart**.

   The Chart region appears.

2. Click **Delete**.

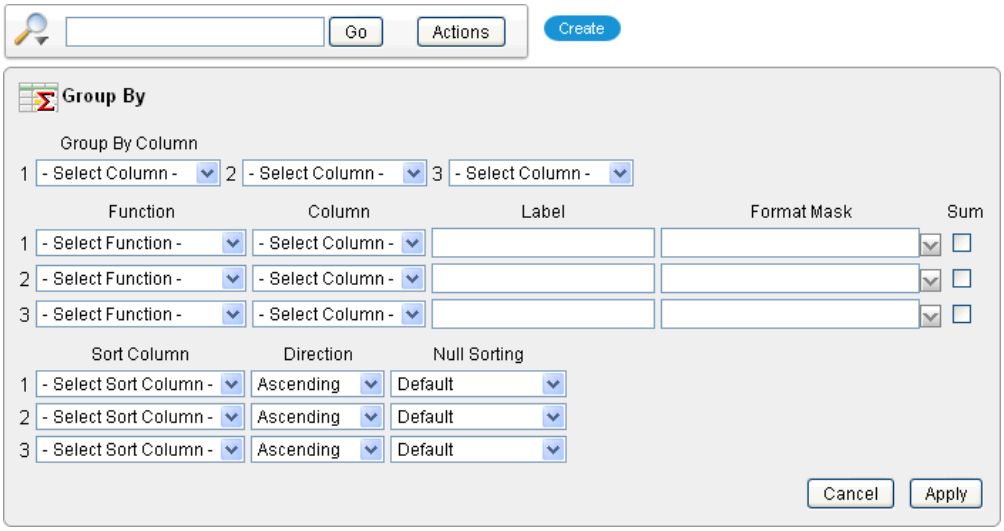
Grouping Columns

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.

To use Group By:

1. Click the **Actions** menu and select **Format** and then **Group By**.

   The Group By region appears.



2. From Group by Column, select the columns to display.
3. To include a computation, select the function, column, label, and format mask.
4. To specify sorting, select a column, sort direction, and preferences for NULL values.

   A Group By icon appears in the Search bar.

Deleting a Group By To delete a group by:

1. Click the **Actions** menu and select **Format** and then **Group By**.

   The Group By region appears.

2. Click **Delete**.

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 will differ 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**.

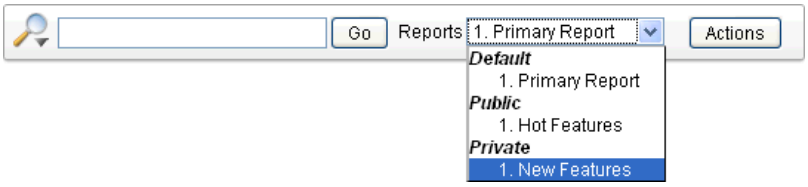
Saving a Report

Both developers and end users can save an interactive reports. However, only a developer can save the report that initially displays, the Primary Default, or create an Alternative Default report.

You can save four types of interactive reports:

- **Primary Default** (Developer Only). The Primary Default is the report that initially displays. Primary Default reports cannot be renamed or deleted.
- **Alternative Report** (Developer Only). Enables developers to create multiple report layouts. Only developers can save, rename, or delete an Alternative Report.
- **Public Report** (End user). Can be saved, renamed, or deleted by the end user who created it. Other users can view and save the layout as another report.
- **Private Report** (End user). Only the end user that created the report can view, save, rename or delete the report.

The following shows the Reports list on the Search bar of an interactive report.



Topics

- Configuration Dependencies
- Saving a Primary or Alternative Interactive Report
- Saving a Public or Private an Interactive Report
- Editing or Deleting Primary, Alternative, Public or Private Reports
- About Exporting Interactive Reports

See Also: "Viewing and Deleting Saved Reports" on page 7-39

Configuration Dependencies The Save Report option on the Actions only displays if you:

- Define an authentication scheme for the current application. See "Establishing User Identity Through Authentication" on page 12-26.
- On the Report Attributes page, scroll down to Search Bar and select **Save Report** or **Save Public Report**. See "Customizing the Interactive Report Search Bar" on page 7-27.

The Reports select list on the Search Bar only displays if you select **Reports Select List** under Search Bar on the Report Attributes page. See "Customizing the Interactive Report Search Bar" on page 7-27.

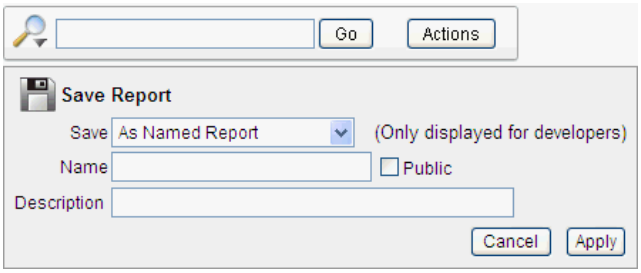
Note that many of these options are selected by default.

Saving a Primary or Alternative Interactive Report Only developers can save a Primary Default interactive report. 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 "Using the Actions Menu" on page 7-6.
3. Click the **Actions** menu and select **Save Report**.

   The Save Report region appears.



4. For Save, select **As Default Report Settings**.
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**.

Saving a Public or Private an 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, you must select **Save Public Report** must be selected under **Include in Actions Menu** on the Report Attributes page. in Include Actions menu list. Developers can also apply authorization scheme to enable or disable Save Public Report. See "Customizing the Interactive Report Search Bar" on page 7-27.

To save a public or private interactive report:

1. Go to the page containing the interactive report you wish to save.
2. Customize the report (for example, hide columns, add filters, and so on). See "Using the Actions Menu" on page 7-6.
3. Click the **Actions** menu and select **Save Report**.

   The Save Report region appears.
4. In Save Report:
   a. **Save** - Select **As Named Report.**
   b. **Public**- Select this check box to make the report viewable to all users. Deselect this check box to make the report private.
   c. **Name** - Enter a name for the report.
   d. **Description** - Enter an optional description.
   e. Click **Apply**.

Editing or Deleting Primary, Alternative, Public or Private Reports To edit or delete a primary, alternative, public or private interactive report:

1. Run the report as a developer.
2. Customize the report (for example, hide columns, add filters, and so on). See "Using the Actions Menu" on page 7-6.
3. To edit the report:

a. Click the alternative report name link.

b. Edit the attributes (for example, enter a new name).

c. Click **Apply**.

4. To delete the report, click the **Delete Report** icon next to the alternative report name link.

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 13-13.

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 back 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). See "Configuring Download Options on the Actions Menu" on page 7-29

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.

To utilize 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 check the Subscription check box on the Interactive Report Attributes page. See "Customizing the Interactive Report Search Bar" on page 7-27

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 address to receive the report.

   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.

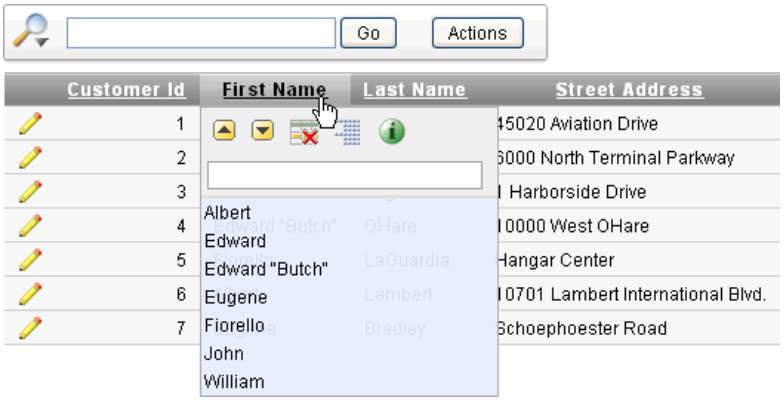
e. Ending - Select a end date and time. Select a day, week, month, or year.

f. Click **Apply**.

Tip: "Managing Interactive Report Subscriptions" in *Oracle Application Express Administration Guide*

Using the Column Heading Menu

Clicking a column heading exposes the Column Heading menu.



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, there will be no Hide Column icon.
- Break Column - Creates a break group on the column. This pulls the column out of the report as a master record.
- Column Information - Displays help text about the column, if available.
- Text Area - Used to enter a case insensitive search criteria (no need for wild cards). 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 will be created as a filter using either the `equal` sign (=) or `contains` depending on the List of Values Column Filter Type. Alternatively, you can click the **Flashlight** icon and enter a value to be created as a filter with the `LIKE` modifier (for example, column `LIKE '%ABC%'`).
- List of Unique Values - Contains the first 500 unique values that meets your filter criteria. If the column is a date, a list of date ranges is displayed instead.

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. 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
- Defining a Column as a List of Values in an Interactive Report
- Enabling Icon View
- Configuring Advanced Attributes for Interactive Reports
- Linking to Interactive Reports
- Linking to Shared Interactive Reports
- Viewing and Deleting Saved Reports
- Viewing Saved Report Activity

> **Tip:** To learn more about using interactive reports as a user, see "Customizing Interactive Reports" on page 7-4

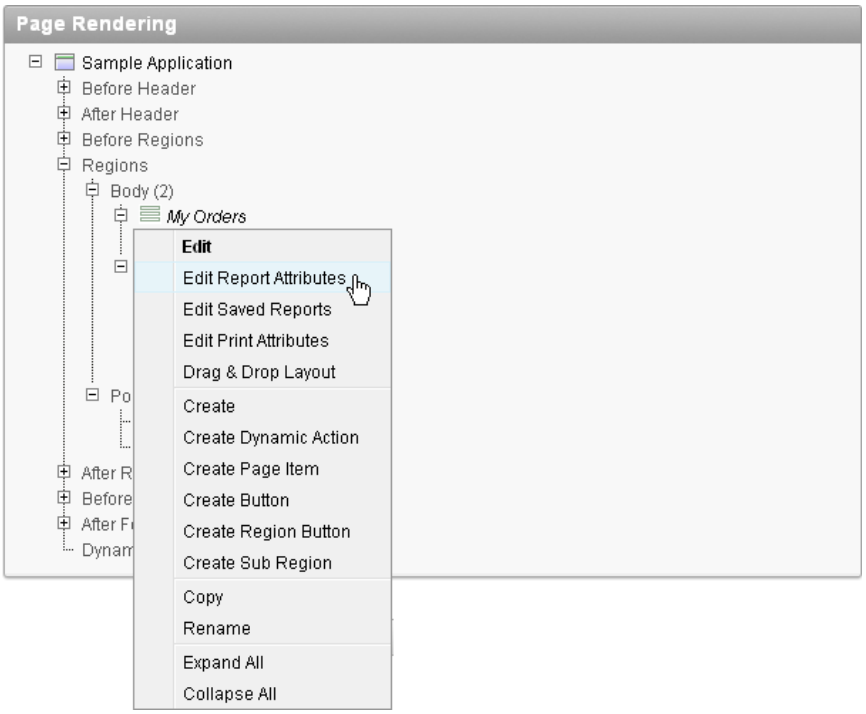
Accessing the Interactive Report Attributes Page

You customize an interactive report by editing attributes on the Interactive Report Attributes page.

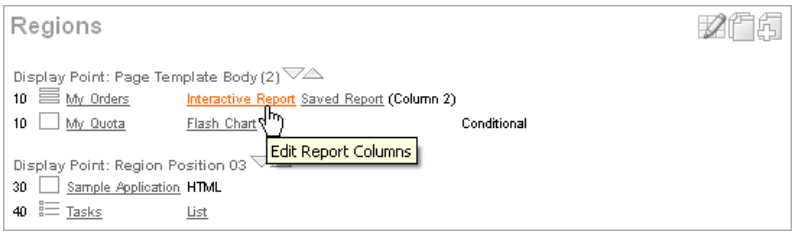
To access the Report Attributes page:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Select the page containing the interactive report you wish to edit.

   The Page Definition appears.
4. To access the Interactive Report Attributes page:
   - Tree view - Right-click on 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 5-8

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 7-23.
   - **Column Groups** attributes enable you to group columns together on the single row view. See "Creating Column Groups" on page 7-25.
   - **Pagination** attributes control report pagination. See "Controlling Interactive Report Pagination" on page 7-25.
   - **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 7-26.
   - **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 7-27.

- **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 7-29.
- **Link Column** attributes enable you to add a link to a column. See "Understanding Link Columns" on page 7-31 and "Creating a Column Link in an Interactive Report" on page 7-33.
- **Icon View** attributes enable you to add a View Icons icon to the Search bar. See "Enabling Icon View" on page 7-35.
- **Detail View** attributes enable you to add a View Details icon to the Search bar. See "Enabling Detail View" on page 7-36.
- **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 7-36.
- **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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

   See Also: "Creating a Column Link in a Classic Report" on page 7-48 and "Defining an Updatable Column in a Classic Report" on page 7-49, and "Defining a Column as a List of Values in a Classic Report" on page 7-50, and "Controlling When Columns Display in a Classic Report" on page 7-51

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.



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.

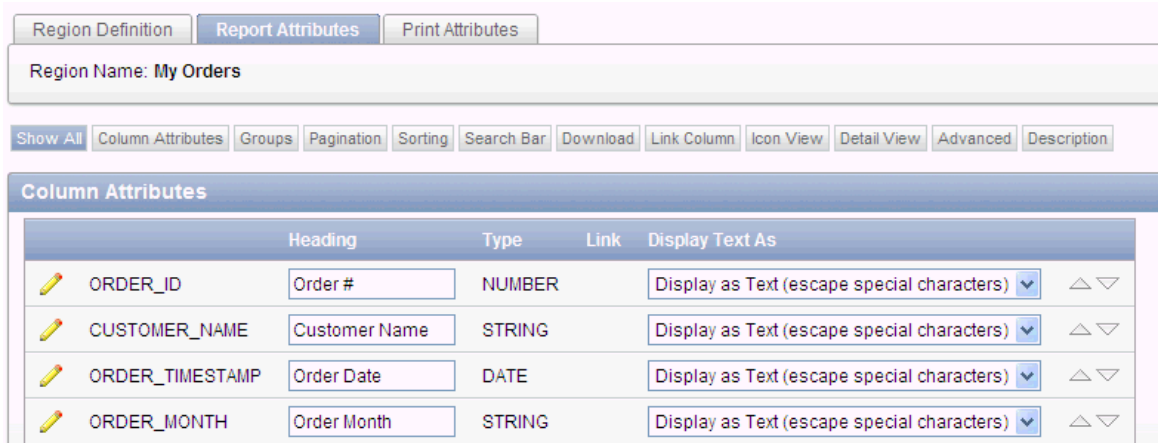
To access Column Attributes:

1. On the Workspace home page, click **Application Builder**.
2. Select the application.
3. Select the page containing the interactive report you wish to edit.

The Page Definition appears.

4. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   The Interactive Report Attributes page appears with the Column Attributes section at the top of the page.



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 7–1 describes common report column edits.

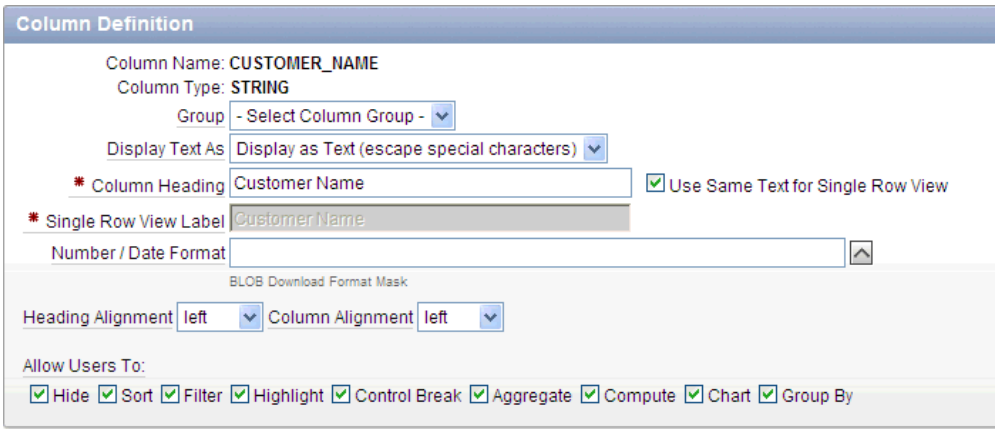
Table 7–1 Common Report Column Edits for Interactive Reports

Description	Developer Action
Alter column display sequence.	Click the up and down arrows to change the column display sequence. Note that 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.

5. 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.

6. 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 together 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 7-21.

   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 7-21.

   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 7–2 describes the available Pagination attributes.

Table 7–2 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. Pagination can be displayed above or below the report (or both) and can be positioned on the left or right. Available pagination options include: ▪ Row Ranges X to Y ▪ Row Ranges X to Y of Z
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)`.
Maximum Row Count	Defines the maximum number of rows to query, for example, rows 1 - 10 or 456. If you set this attribute to 200, the result would appear as follows: `rows 1 - 10 of more than 200 rows` Note that this attribute impacts performance. Counting fewer rows can improve performance and counting thousands of rows can degrade performance.
When more than maximum row data found message	Defines the text message that displays when more than maximum row count are 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 7-21.

   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 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:

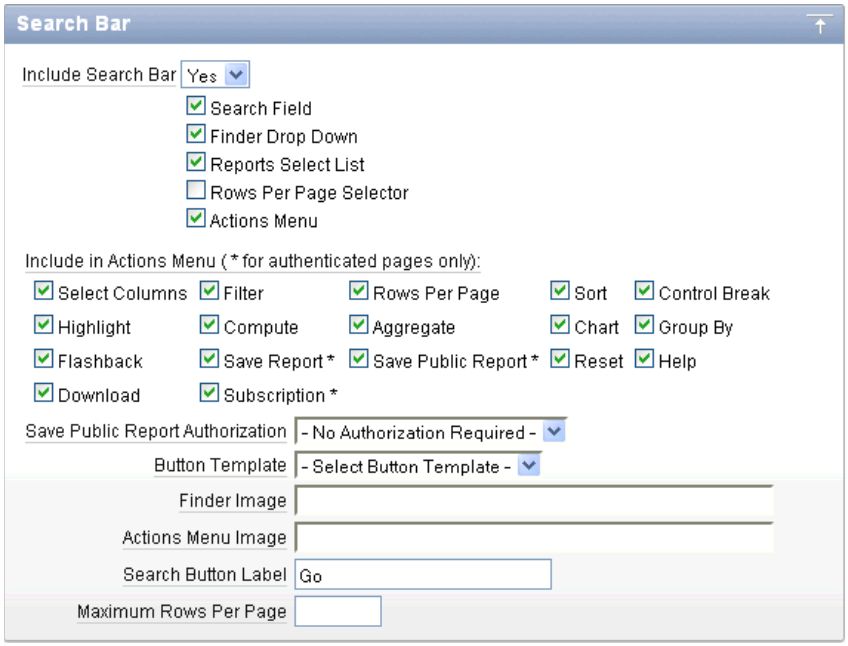
- Customizing the Search Bar
- Removing the Search Bar

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 7-21.

   The Interactive Report Attributes page appears.

2. Scroll down to Search Bar.



Use these attributes to customize how the search bar displays. Table 7–3 describes Search bar attributes:

Table 7–3 Search Bar Attributes

Attribute	Description
Include Search Bar	Select **Yes** or **No**. Selecting **No** removes the following default components: ▪ Search Field - Displays a text field in the search bar in which to enter search criteria. ▪ Finder Drop Down - Enables users to search on a selected column or against all columns. ▪ Reports Select List - Displays report select list if the report has alternative default, shared report or personal report. See "Saving a Report" on page 7-16. ▪ Rows Per Page Selector - Displays a select list to enable users to select the number of rows to display per page. ▪ Actions Menu - Enables the user to customize the report based on selected Actions.
Include in Actions Menu	Select and deselect functions included in the Actions menu. Available options include: ▪ Select Columns - Used to hide, unhide, and order the report columns. ▪ Filter - Used to add filters to the report (for example, STATE = VA). ▪ Rows Per Page - Used to display rows per page menu. ▪ Sort - Used to sort columns. ▪ Control Break - Used to build control breaks on report columns. ▪ Highlight - Used to define conditions that will highlight certain rows. ▪ Compute - Used to add computed columns. ▪ Aggregate - Used to include aggregate calculations on report columns. ▪ Chart - Used to create a Flash chart based off the data in the report. ▪ Group By - Used to create a Group By view based off the data in the report. ▪ Flashback - Used to flashback the report data to some time in the past. ▪ Save Report - Used to save the report settings for future use. Only available for authenticated pages. ▪ Save Public Report * - Used to save Public Report for all users to view. You must select Save Report to enable this option. Only available for unauthenticated pages. ▪ Reset - Used to reset the report to the default settings. ▪ Help - Used to display instructions for using the Interactive report. ▪ Download - Used to download the report in different formats. ▪ Subscription * - Used to schedule a subscription to send the report in email. Only available for unauthenticated pages. **See Also**: "Using the Actions Menu" on page 7-6.

Table 7–3 (Cont.) Search Bar Attributes

Attribute	Description
Save Report Public Authorization	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. In addition to enabling Save Public Report under Actions Menu, you can add additional security by defining an Authorization Scheme to determine who has rights to enable Save Public Report. To enable support for public reports, select an authentication method from this list.
Button Template	Select a template for buttons that display in the search region and in the dialogs.
Finder Image	Specify an image. If no image is defined, the following is used: `/i/htmldb/builder/finder_w_dropdown.gif`
Actions Menu Image	Specify an image. If no image is defined, the default button will be 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**.

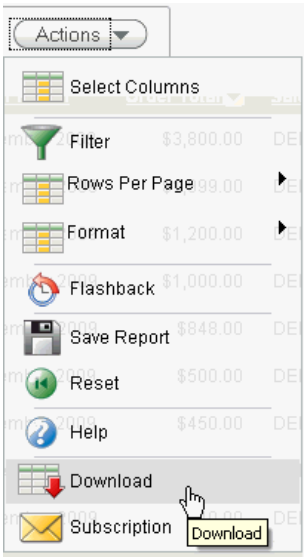
Removing the Search Bar To remove the search bar:

1. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   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. Navigate to the page containing the interactive report.
2. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   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. Select download formats. Options include:
   - **CSV**. See "Enabling CSV Download" on page 7-30.
   - **HTML**.
   - **Email**. See "Enabling Email Download" on page 7-31.
   - **XLS**.
   - **PDF**. See "About Printing Reports to PDF" on page 7-52.
   - **RTF**.

   Tip: The Download option only appears on the Actions menu if a file format is selected.
6. 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 4-21 and "Automatic CSV Encoding" on page 4-22.
2. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

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 delimiter character. This character is used to delineate 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.

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 7-21.

   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**.

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 7-21.

   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**.

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 7-21.

   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 7-37.
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 7-21.

   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 user

   To 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 7-21.

   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 7-21.

   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 7-21.

   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**.

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 7-21.

   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:

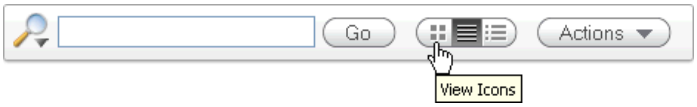
   - **None** - Disable filter on list of values.

- **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**.

Enabling Icon View

Be 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.



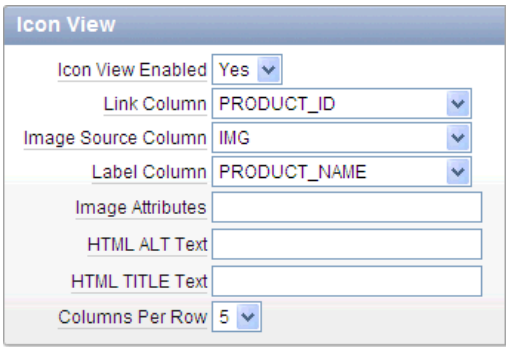
To utilize Icon view, you must identify the columns used to identify the icon, the label, and the target (that is, the link). As a best practice, set these columns to display "Hidden" since they are typically not useful for end users.

To add Icon view to an interactive report:

1. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   The Interactive Report Attributes page appears.

2. Scroll down to Icon View.

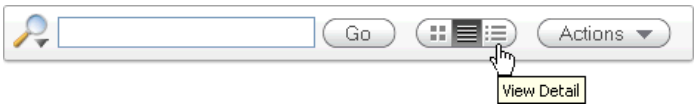


3. For Icon View Enabled, select **Yes**.
4. Specify the following mandatory attributes:
   - Link Column - Select the column that returns the link target of the icon. See item Help for an example.
   - Image Source Column - Identify the column that returns the image source. See item Help for an example.
   - 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**.

Enabling Detail View

Be default, most interactive reports display as a report. You can optionally display details about each column. When configured, a View Details icon displays on the Search bar.



To add Details view to an interactive report:

1. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   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 items to set into session state.

To configure Advanced Attributes:

1. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   The Interactive Report Attributes page appears.
2. Scroll down to Advanced Attributes.

   Table 7–4 describes the available Advanced Attributes.

Table 7–4 Advanced Attributes

Attribute	Description
Region Alias	Enter an alphanumeric alias for this interactive report region. The alias must be unique within the application. You can use an alias to reference an interactive report in an API call. For example, you can write a function to return `INTERACTIVE_REPORT_ID` by querying `ALIAS` column in the `APEX_APPLICATION_PAGE_IR` view). The alias must be unique within the application. Since the `INTERACTIVE_REPORT_ID` value can change when you export or import to different instance, referencing an interactive report region using an alias can be useful.
Report ID Item	This attribute enables you to send a user directly to a saved view of the report. You specify an item whose value stores the report ID of the saved view. Report ID's can be retrieved from the `APEX_APPLICATION_PAGE_IR_RPT` view.
Page Items to Submit	Enter a comma separated list of items to be set into session state when the user clicks the **Go** button on the search bar. Only items on the current page will be set.

3. Click **Apply Changes**.

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 desire 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 will 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:

- `EQ` = Equals (this is the default)
- `NEQ` = Not Equals
- `LT` = Less than
- `LTE` = Less then or equal to
- `GT` = Greater Than
- `GTE` = Greater than or equal to
- `LIKE` = SQL Like operator
- `N` = Null
- `NN` = Not Null

- C = Contains
- NC = Not Contains

Consider the following examples:

```
f?p=...:IR_ENAME:KING
```

The previous example is equivalent to the end user creating a filter on the target page: ENAME = KING. Note that 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
```

Note that 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
```

Editiing 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 Defintion 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**s 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 specfic saved report
6. Click **Apply Changes**.

Viewing and Deleting Saved Reports

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.

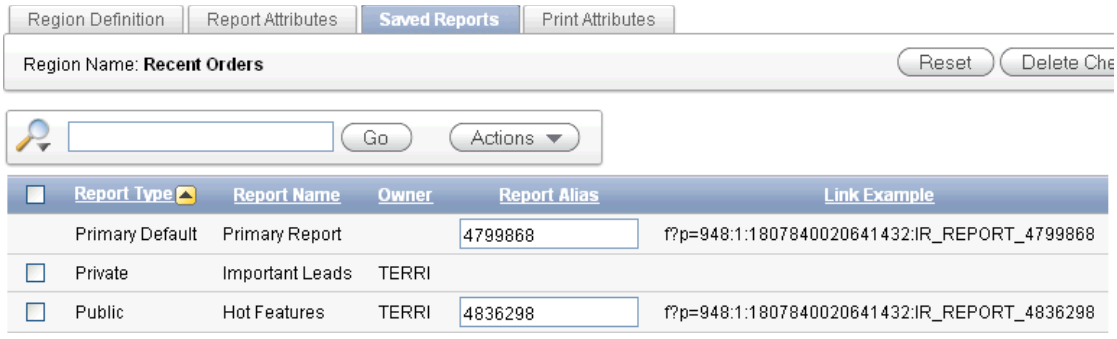
End users can also save reports and classify them as being either **public** or **private**. **Public** reports can be viewed by all users. **Private** reports can only be viewed by the user who saved the report. To learn more see, "Saving a Report" on page 7-16.

To view a listing of Saved Reports:

1. Access the Interactive Report Attributes page. See "Accessing the Interactive Report Attributes Page" on page 7-21.

   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.



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 7-21.

   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 SQL and Wizard Reports

Developers can control report layout, pagination, column sorting, error messages, export links, and column break of SQL and 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 7-20.

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

> **See Tutorials:** *Oracle Application Express Advanced Tutorials*

Accessing Classic Report Attributes

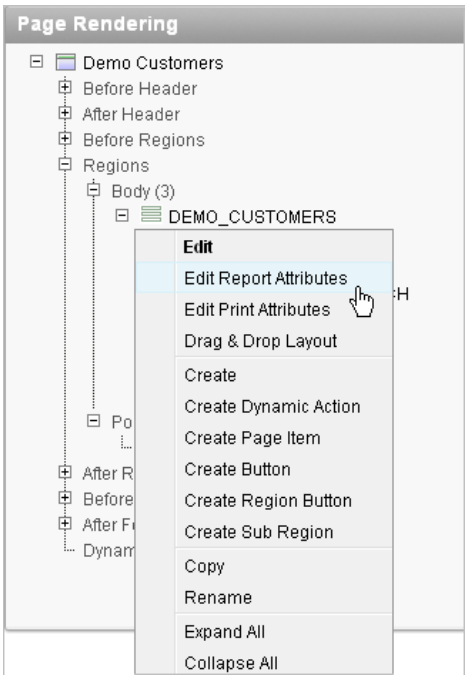
You can access the classic Report Attributes page by clicking the **Report** link next to the report region you want to edit on the Page Definition. You can also navigate to the Report Attributes page by clicking the region name and then selecting the Report Attributes tab.

To access the Report Attributes page:

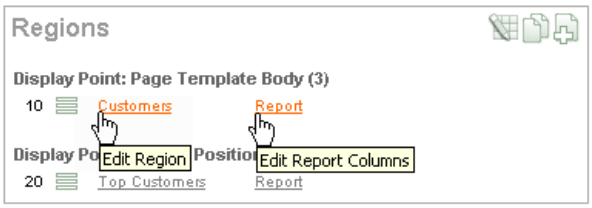
1. On the Workspace home page, click the **Application Builder** icon.

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 7-42.
   - **Layout and Pagination** attributes control report pagination. See "Controlling Classic Report Pagination" on page 7-44.
   - **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 7-46.
   - **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 7-47 and "Exporting a Classic Report as an XML File or a CSV File" on page 7-47.

- **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 7-51.
- **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.

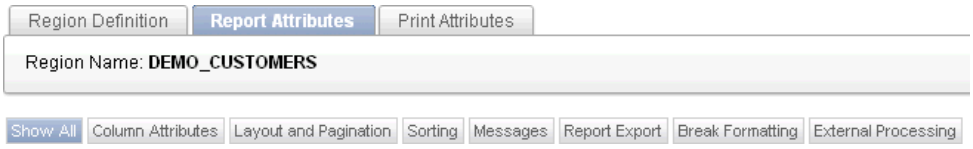
   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

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

> **See Also:** "Creating a Column Link in a Classic Report" on page 7-48 and "Defining an Updatable Column in a Classic Report" on page 7-49, and "Defining a Column as a List of Values in a Classic Report" on page 7-50, and "Controlling When Columns Display in a Classic Report" on page 7-51

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.

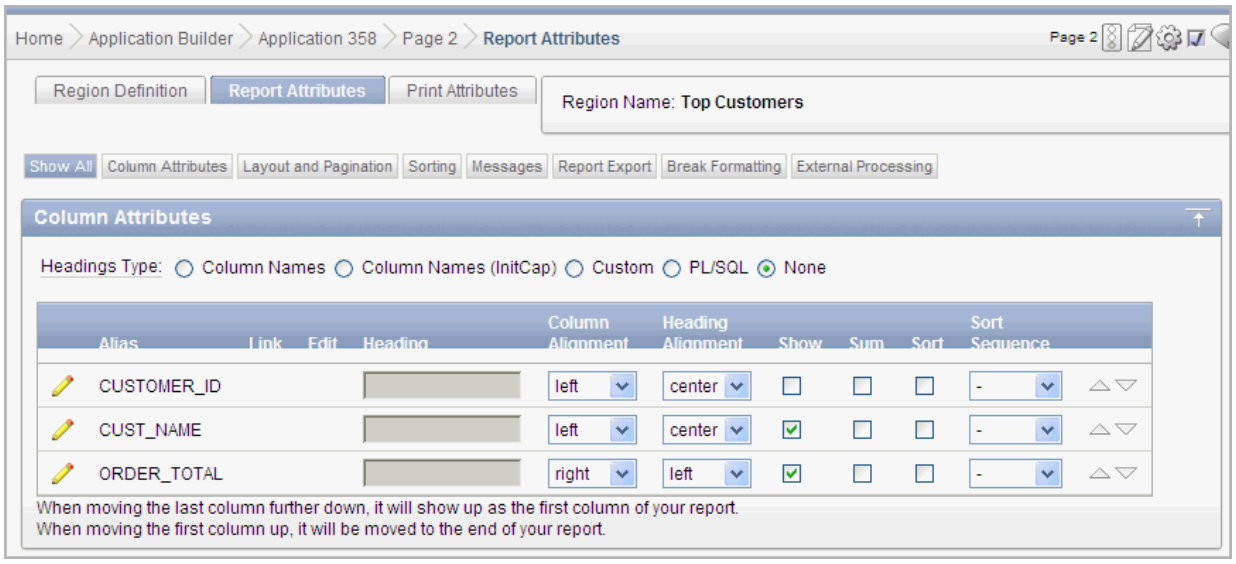
To access the Column Attributes:

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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   The Report Attributes page appears with the Column Attributes section at the top of the page.



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 7–5 describes common report column edits.

Table 7–5 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 **Show** to indicate a column should display.
Enable a unique sort sequence.	Click **Sort** and select a sequence number from **Sort Sequence**. 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 **Sum** to enable the sum of a column.

You can further refine the attributes of a specific column on the Column Attributes page.

5. 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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

See Also: "Creating a Column Link in a Classic Report" on page 7-48 and "Defining an Updatable Column in a Classic Report" on page 7-49, and "Defining a Column as a List of Values in a Classic Report" on page 7-50, and "Controlling When Columns Display in a Classic Report" on page 7-51

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 Built-in Wizard" on page 7-2.
2. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Access the Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 7–6 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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

Table 7–6 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 a number of default templates, or pick a custom build template.
Report Attributes Substitution	Enter a value to be in place of the `#REPORT_ATTRIBUTES#` substitution string. The `#REPORT_ATTRIBUTES#` substitution string is only replaced in the before rows attribute of the report template.

Table 7–6 (Cont.) Layout and Pagination Attributes

Attribute	Description
Show Null Values as	Enter the text you want to display for null columns. The default value is `(null)`.
Pagination Scheme	Specifies a pagination scheme for this report. Pagination provides the user with information about the number of rows and the current position within the result set. Pagination also defines the style of links or buttons used to navigate to the next or previous page. For more information, see the Help information for this attribute.
Enable Partial Page Refresh	If enabled, this attribute refreshed the report region when paginating forward and backward in your result set.
Display Position	Defines where pagination occurs. If you choose to display pagination above a report, the selected report template needs to support that type of display.
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	Defines the maximum number of rows to query, for example, rows 1 - 10 of 456. If you set this attribute to 200, the result would appear as follows: `rows 1 - 10 of more than 200 rows` Note that this attribute impacts performance. Counting fewer rows can improve performance and counting thousands of rows can degrade performance.
Strip HTML	Specify whether to remove HTML tags from the original column values for HTML expressions, column links and report data exported as CSV files. 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.
Sort Nulls	For reports with column heading sorting, specify if you want null valued columns to sort first or last. **See Also**: "Enabling Column Sorting in a Classic Report" on page 7-46

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 Built-in Wizard" on page 7-2.

   Next, select the appropriate Layout and Pagination attributes.

2. Access the Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 5-2.

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 Built-in Wizard" on page 7-2.

   Next, select the appropriate Layout and Pagination attributes.

2. Access the Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 5-2.

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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

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:** Note that 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 7-44.

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 4-22

Enabling the CSV Output Option in a Classic Report

To use the enable the CSV output option:

1. Access the Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 the Link Label field, enter link text. This text will display in your report and enable 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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 7-37.

   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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 Attributes.
4. 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.
5. 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 is used to compare 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 is used to compare 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 is used to compare references to columns across applications against User Interface Defaults. This reference is manually maintained after being initialized by a wizard, whenever possible.

6. 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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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. See "Creating Lists of Values" on page 7-102.

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**.

> **See Tutorials:** "How to Create a Tabular Form" in *Oracle Application Express Advanced Tutorials*

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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   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 12-35, "Understanding Conditional Rendering and Processing" on page 2-3, and Appendix B, "Available Conditions" on page B-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 Interactive Report Attributes page. See "Accessing Classic Report Attributes" on page 7-40.

   The Report Attributes page appears.

2. Scroll down to Break Formatting.
3. Make a selection from the Breaks list.

Printing Report Regions

You can configure a classic report region to print by exporting it to a number of 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 are running Oracle Application Express with Oracle Database 11*g* Release 1 (11.1), you must enable network services in order to use report printing. See "Enabling Network Services in Oracle Database 11g" on page 12-5

> **See Also:** "How to Create a Master Detail PDF Report" in *Oracle Application Express Advanced Tutorials*

About Printing Reports to PDF

When printing to a PDF, the report data is transformed using an externally defined report server. When the application end user clicks a print link, a request is sent to the Application Express engine. The Application Express engine then generates the report data in XML format and report template in XSL-FO or RTF format. The external reporting engine then transforms the data and the template into a PDF which displays to the end user using the conversion servlet that ships with BI Publisher 10.1.3.2 (formerly known as Oracle XML Publisher). Fortunately, this architectural complexity is transparent to both end users and developers. End users just click a print link, and developers just declaratively set regions to support PDF printing. Output to other formats operates in the same manner using the necessary conversion servlet.

About Report Printing Configuration Options

Your report server can be Oracle BI Publisher, OC4J with Apache FOP, or another standard XSL-FO processing engine. Oracle BI Publisher provides a higher level of functionality and facilitates "high fidelity" output requirements including master-detail reports, charts, and so on. To accommodate the difference in functionality, Oracle Application Express provides two report printing configuration options:

- **Standard Support**. Enables you to print report regions and report queries using either the built-in templates (provided with a standard XSL-FO processing engine), or other XSL-FO compatible formats you provide. This setting does not support RTF.

  Standard Support provides declarative formatting of report regions and report queries with basic control over page attributes, including page orientation, page size, column heading formats, page header, and page footer.

- **Advanced Support**. Requires a valid license of Oracle BI Publisher (also known as Oracle XML Publisher). This setting, provides you with all the capabilities of the Standard configuration plus the ability to define RTF-based report layouts developed using the BI Publisher Word Template Builder.

  To learn more about installing and configuring Oracle BI Publisher, see *PDF Printing in Application Express 3.1*. Go to:

  `http://www.oracle.com/technology/products/database/application_express/html/configure_printing.html`

  > **Note:** To use the full functionality of report printing, your Oracle Application Express service administrator must enable it for your site. 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 7-58.
- **Create a Report Query**. You can print a report by defining a report query as a Shared Component. See "About Report Queries" on page 7-54.

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 7-56.

Tip: You can also have the output format specified by an item that determines the output format at runtime. Select the item that will hold the format value. Valid values are PDF, RTF (to open the document in Microsoft Word), XLS (to open the document in Microsot 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 7-53

To create a report query:

1. Navigate to the Shared Components page. See "Accessing the Shared Components Page" on page 5-36.
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. This can be used 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 will default 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 will 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 5-36.
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 5-36.
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 a number of 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.

  A number of 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 5-36.
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 time 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 5-36.
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 5-36.
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 7-53 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 7-40.
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 needs to 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.

8. Click **Apply Changes**.

Configuring Interactive Report Region Print Attributes

Unlike classic reports, the Interactive Report Print Attributes can only utilize 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 needs to be based on Report Settings.

   b. Content Disposition - 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**.

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 a number of 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

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 7–7.

Table 7–7 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.

Table 7–7 (Cont.) Form Page Types

Form Page Type	Description
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. **Note:** 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. **See Also:** "Creating a Master Detail Form" on page 7-64
Tabular Form	Creates a form in which users can update multiple rows in a database. **See Also:** "Creating a Tabular Form" on page 7-62
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.
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. **See Also:** "Creating a Form on a Web Service" on page 14-15
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. **See Also**: "Creating an Input Form and Report on a Web Service" on page 14-14

6. Follow the on-screen instructions. To learn more about a specific field, click the item label.

   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

Creating a Tabular Form

A tabular form enables users to update multiple rows in a table. The Tabular Form Wizard creates a form to perform update, insert, and delete operations on multiple rows in a database table.

To create a tabular form:

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 Tabular Form Wizard appears.

6. For Table/View Owner:
   a. Specify the table or view owner on which you want to base your tabular form.
   b. Select the operations to be performed on the table (for example, **Update, Insert and Delete**).
   c. Click **Next**.
7. For Table/View Name, select a table and click **Next**.
8. For Displayed Columns:
   a. Select the columns (updatable and nonupdatable) to include in the form.

      Note that you can modify the column order or your SQL query after you create the page.
   b. Click **Next**.
9. For Primary Key, select the Primary Key column and a secondary Primary Key column (if applicable) and click **Next**.
10. For Primary Key Source, select a source type for the primary key column and click **Next**. Valid options include:
    - **Existing trigger** - Select this option if a trigger is defined for the table. 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 if you want to provide a PL/SQL function to generate returning key value.
    - **Existing sequence** - Select this option if you want to pick the sequence from a list of sequences available in the selected schema.
11. On Updatable Columns, select which columns should be updatable and click **Next**.
12. On Page and Region Attributes:
    a. Specify page and region information.
    b. Select a region template.
    c. Select a report template.
    d. Click **Next**.
13. On Tab, specify a tab implementation for this page and click **Next**.
14. On Button Labels, enter the display text to appear for each button and click **Next**.
15. On Branching, specify the pages to branch to after the user clicks the Submit and Cancel buttons and click **Next**.
16. Click **Finish**.

    A success message is displayed. Choose either **Run Page** or **Edit Page**.

Note: Any modification of the select list of a SQL statement of a tabular form after it has been generated is not recommended. If you do modify the query, make sure the values of the updateable columns are not altered after being queried from the database by the Application Express engine.

See Also: "Managing User Interface Defaults" in *Oracle Application Express SQL Workshop Guide*

See Tutorial: "How to Create a Tabular Form" in *Oracle Application Express Advanced Tutorials*

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.

To create a master detail form:

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 Master Table:
   a. Select the table or view owner.
   b. Select a table or view name.

      The columns in that object appear under Available Columns.
   c. Select the columns to display in the form and then click the arrow keys to move them to Displayed Columns.
   d. Click **Next**.
7. On Detail Table:
   a. Specify whether to show only related tables by selecting **Yes** or **No**.
   b. Select the table or view owner.
   c. Select a table or view name.

      The columns in that object appear under Available Columns.
   d. Select the columns to display in the form and then click the arrow keys to move them to Displayed Columns.
   e. Click **Next**.
8. On Primary Key:
   a. Primary Key(s) of Master Table - Select the primary key (or keys) of the master table. You can select maximum of two primary keys for master table.
   b. Primary Key(s) of Detail Table - Select the primary key (or keys) of the detail table. You can select maximum of two primary keys for detail table.
   c. Click **Next**.
9. On Master Detail Link, define the relationship between the master and detail tables and click **Next**.

10. On Primary Key Source, select the primary key column for the master table and click **Next**. Then select the primary key column for the detail table and click **Next**. Options include:
    - **Existing trigger** - Select this option if a trigger is defined to populate the primary key, or if the user will be expected to enter the primary key value manually. Detail tables do not support user entered primary key values.
    - **Custom PL/SQL function** - Select this option if you want to provide a PL/SQL function to populate the primary key.
    - **Existing sequence** - Select this option if an existing sequence will be used to generate the primary key.
11. On 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.
12. 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.
13. On Page Attributes, review and edit the master page and detail page information and then click **Next**.
14. On Tab, specify whether to include a tab set and click **Next**.
15. 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 and HTML region:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Create an HTML region:
    a. Under Regions, click the **Create** icon.
    b. Select the region type **HTML**.
    c. Follow the on-screen instructions.
3. Start adding items to the page:
    - Under Items, click the **Create** icon.
    - Follow the on-screen instructions.

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 need to:

- 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 5-2
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 5-2.
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.
- Associate the validation with a specific item.

Creating a Validation

To create a validation:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Create Validation Wizard:
   - Tree view - Under Page Processing, right-click Valdidating and click **Create Validation**.
   - Component view - Under Processes, click the **Create** icon.

   The Create Validations Wizard appear

3. For Level, select the validation level:
   - **Item Level Validation**
   - **Tabular Form Validation**
   - **Page Level Validation**
4. Follow the on-screen instructions.

> **Note:** Validations cannot contain more than 3,950 characters.

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 5-2.
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, and daily views. Once you specify the table on which the calendar is based, you can create drill-down links to information stored in specific columns. Note that Oracle Application Express supports the creation of only one calendar per page.

Topics:

- About Creating Calendars
- Creating a New Calendar
- Editing a Calendar Title
- Editing Calendar Attributes
- Converting an Easy Calendar to a SQL Calendar

- Upgrading a Calendar Created in a Previous Releases

About Creating Calendars

Application Builder supports two calendar types:

- **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.
- **SQL Calendar** creates a calendar based on a SQL query you provide. The SQL SELECT statement you provide must include at least two columns: a date column and display column.

See Also: "Calendar Display" on page 7-72

Supported Calendar Substitution Strings

Application Builder supports a number of 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" on page 10-1

Creating a New Calendar

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 includes daily, weekly, and monthly views.
- The **date column** determines which days on the calendar will contain entries.
- The **display column** defines a specific row that will display a calendar date.

Topics:

- Adding a Calendar to an Existing Page
- Adding a Calendar to a New Page

> **Tip:** In Oracle Application Express release 3.1, the Create Calendar Wizard includes a new Display Type option. **Standard** submits the page along with the associated request. **Partial Page Refresh** only refreshes the Calendar region. Once the calendar is created, the display type cannot be changed. To change the display type, you must delete the calendar and then recreate it.

Adding a Calendar to an Existing Page

Oracle Application Express supports the creation of one calendar per page.

To add a calendar to an existing page:

1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
2. 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.

3. Select **Calendar** and click **Next**.
4. Select the type of calendar you want to create and click **Next**:
   - **Easy Calendar** creates a calendar based on the date column and display column you specify.
   - **SQL Calendar** creates a calendar based on a SQL query you provide.
5. Follow the on-screen instructions.

Adding a Calendar to a New Page

To create a calendar on a new page:

1. Navigate to the Workspace home page.
2. Click the **Application Builder** icon.
3. Select an application.
4. Click **Create Page**.
5. Select **Calendar** and click **Next**.
6. Select the type of calendar you want to create and click **Next**:
   - **Easy Calendar** creates a calendar based on the date column and display column you specify.
   - **SQL Calendar** creates a calendar based on a SQL query you provide.
7. Follow the on-screen instructions.

See Also: "Editing Calendar Attributes" on page 7-71

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 5-2.
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**.

Editing Calendar Attributes

Once you create a calendar, you can alter the display by editing attributes on the Calendar Attributes page.

Note that 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 5-2.
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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark.
5. Click **Apply Changes**.

> **See Also:** "About the Calendar Attributes Page" on page 7-72 and "About Field-Level Help" on page 1-12

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 7–8 describes Calendar Display attributes.

Table 7–8 Calendar Display Attributes

Attribute	Description
Calendar Template	Determines what template is used when the Application Express engine renders a calendar.
Date Column	Defines the column from the table or query containing the dates to be placed on the calendar.
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

Table 7–8 (Cont.) Calendar Display Attributes

Attribute	Description
Calendar Type Item	Specifies the item which holds the calendar type.
Display Type	Defines the display type. Options include: ■ **Column** ■ **Custom** ■ **No Display Value** If the Display Type is **Column**, use the Display Column attribute to select the column to display in the day cell of the monthly calendar. If the Display Type is **Custom**, in Column Format enter a custom column format using HTML expressions and supported substitution strings.
Display Column	Defines a specific row that displays on a calendar date.

Column Format	Enter HTML expressions to be shown in this column. Use `#COLUMN#` syntax to show column values in HTML. For example:
	`#EMPLOYEE_NAME#`
	This following example demonstrates how to display images in a column.
	`<img src="#IMAGE_NAME#">`

See Also: "Supported Calendar Substitution Strings" on page 7-70

Display Attributes Use Display Attributes to define the dates that are included in the calendar. Table 7–9 describes Display attributes.

Table 7–9 Display Attributes

Attribute	Description
Begin at Start of Interval	Determines when the calendar should start. Selecting this option creates a calendar that spans an entire interval (such as a month). For example: ■ If **Begin at Start of Interval** is selected, the date is June 15th, and the display is monthly, the resulting calendar spans from June 1st to June 30th. ■ If **Begin at Start of Interval** is not selected, the date is June 15th, and the display is monthly, the resulting calendar spans from June 15th to June 30th.
Item Containing Start Date Item Containing End Date	These attributes define which items hold the calendar start date and end date. You can use these attributes to create calendars that span multiple months at a time. Note that the format of the date of either item must be `YYYYMMDD`: ■ **Item Containing Start Date** points to an item that holds the start date of the calendar. ■ **Item Containing End Date** points to an item that holds the end date of the calendar.
Start of Week for Monthly Calendar	Determines the day on which the calendar starts for the monthly view.

Table 7–9 (Cont.) Display Attributes

Attribute	Description
Start Day for Weekly Calendar	Determines the day on which the calendar starts for the weekly view.
End Day for Weekly Calendar	Determines the day on which the calendar ends for the weekly view.
	Time Format determines if the time displays in a 12-hour or 24-hour format.
	Start Time and **End Time** determine the start and end times to display in the weekly and daily calendar views.
Time Format	Determines if the time displays in a 12-hour or 24-hour format.
Start Time	Determines the start times to display in the weekly and daily calendar views.
End Time	Determines the end times to display in the weekly and daily calendar views.

Column Link Use Column link to create a link on the column in the calendar.

To create a column link to another page:

1. Navigate to the appropriate Calendar Attributes page.
2. Scroll down to Column 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, specify the request to be used.
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: the Set these items attribute and the With these values attribute.
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**.

See Also: "Supported Calendar Substitution Strings" on page 7-70

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, enter the appropriate address.
5. Click **Apply Changes**.

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.
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, specify the request to be used.
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, enter the appropriate address.
5. 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 10-9.
  b. Recreate the theme. See "Creating a Theme" on page 10-4.
  c. Apply the new theme to your application. See "Switching the Active Theme" on page 10-5.

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 Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Under Regions, click **Calendar** next to the region name.

   The Calendar Attributes page appears.
3. 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. 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 5-2.
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 wish to use (for example, **Denmark**).
6. For Display Attributes:
   a. Specify the following:
      – Title
      – Region Template
      – Parent Region
      – Display Point
      – Sequence
      – Column
   b. 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 1-12.
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 7-79.
      – 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 on of the page.

In order 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 7-79.

9. Click **Create Region**.

Adding Flash Maps to a New Page

To create an 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 **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 wish 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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
   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 1-12.
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 7-79.
       - 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 on of the page.

       In order 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 7-79.

c. Click **Next**.

11. Click **Finish**.

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 that you wish to associate data with. The Region ID or Region Name of the map should be used as the label.
- *value* is the numeric column that defines the data to be associated with a point on the map.

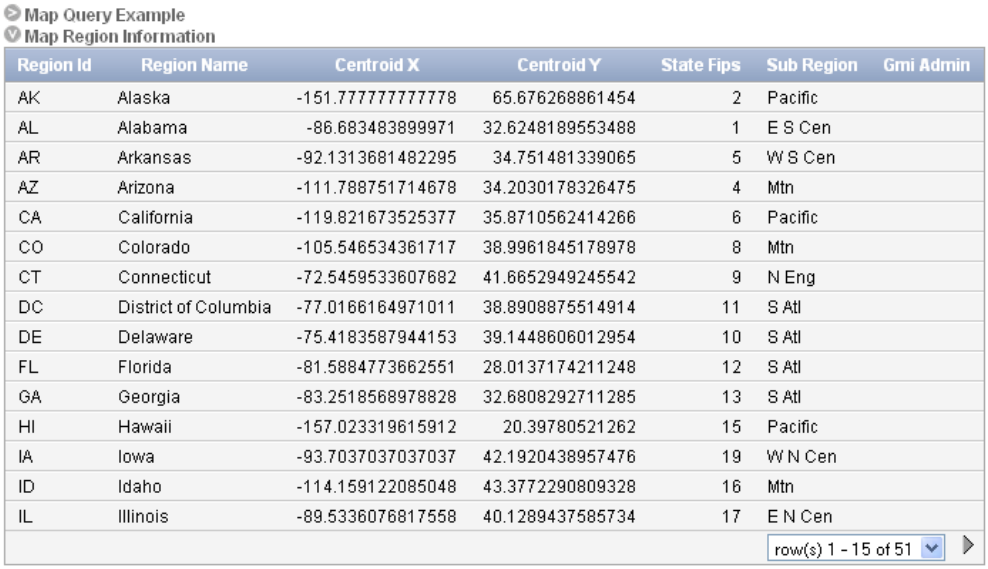
Consider the following example when creating a new page:

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 Region Information region at the bottom of the page.



Map Query Example
Map Region Information

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	
DE	Delaware	-75.4183587944153	39.1448606012954	10	S Atl	
FL	Florida	-81.5884773662551	28.0137174211248	12	S Atl	
GA	Georgia	-83.2518568978828	32.6808292711285	13	S Atl	
HI	Hawaii	-157.023319615912	20.39780521262	15	Pacific	
IA	Iowa	-93.7037037037037	42.1920438957476	19	W N Cen	
ID	Idaho	-114.159122085048	43.3772290809328	16	Mtn	
IL	Illinois	-89.5336076817558	40.1289437585734	17	E N Cen	

row(s) 1 - 15 of 51

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 7-82.
        – 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 5-2.

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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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 5-2.
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**.

   Note that when 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 7-76 and "About Flash Map Support" on page 7-76.
2. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
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 HTML and Flash charts, and supports the editing of SVG charts. Oracle Application Express supports only those three types of graphical charts.

Topics:

- About Creating SQL Queries for Charts
- Creating an HTML Chart
- Creating a Flash Chart
- About SVG Charts
- Editing Chart Attributes
- Enabling Asynchronous Updates

> **See Tutorial:** "How to Create a Stacked Bar Chart" in *Oracle Application Express Advanced Tutorials*

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

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 only)

For column charts and line Flash 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 Flash chart, use the following syntax:

```
SELECT link, label, series_1_value [, series_2_value [, ...]]
FROM   ...
```

Range Chart Syntax (Flash only)

Range charts require two values for each bar. To create a range chart, create a Flash chart and provide a SQL query using the following syntax:

```
SELECT link, label, low_value, high_value
FROM   ...
```

Scatter Chart Syntax (Flash only)

Scatter charts require an *x* value and *y* value for each point. To create a range chart, create a Flash chart and provide a SQL query using the following syntax:

```
SELECT link, label, x_value, y_value
FROM   ...
```

Candlestick Chart Syntax (Flash only)

Candlestick charts require open, low, high, and close values for each candlestick. To create a candlestick chart, create a Flash chart and provide a SQL query using the following syntax:

```
SELECT link, label, open, low, high, close
FROM   ...
```

Gantt Chart Syntax

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 one of 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   ...
```

Creating an HTML Chart

How you create a chart depends upon whether you are adding the chart to an existing page, or adding a chart on a page. This chart type creates a bar chart showing one data series with each data point represented by a bar.

Topics:

- Adding an HTML Chart to an Existing Page
- Adding an HTML Chart to a New Page

Adding an HTML 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 5-2.
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 Region, select **HTML Chart** and click **Next**.
5. For Display Attributes:
   a. Specify the following:
      – Title

- Region Template
- Parent Region
- Display Point
- Sequence
- Column

To learn more, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

b. Click **Next**.

6. 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 7-82.
- 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.

7. Click **Create Region**.

Adding an HTML Chart to a New Page

To create an HTML 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 Region, select **HTML Chart** and click **Next**.
6. For Page Attributes:

a. Specify the following:

- Title
- Region Template
- Parent Region
- Display Point
- Sequence
- Column

To learn more, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

b. Click **Next**.

7. Specify whether to include tabs and click **Next**.
8. For Chart Definition:

a. Specify a query by either:

- Entering a SQL query in the field provided. See "About Creating SQL Queries for Charts" on page 7-82.
- 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**.

9. Click **Finish**.

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 a Flash 3 Chart to Flash 5
- Upgrading all Flash 3 Charts to Flash 5

About Flash Charts

Flash chart support in Oracle Application Express is based on the Anychart Flash Chart Component. Anychart is a flexible Macromedia Flash-based solution that enables developers to create animated, compact, interactive flash charts. Flash charts are rendered by a browser and require Flash player 9 or later.

`http://www.anychart.com`

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 5-2.

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. Select **Flash Chart** and click **Next**.

5. For Chart Type:

a. Select a chart style (for example, **Column**) and click **Next**.

b. Select a specific chart type (for example, **3D Column**) and click **Next**.

6. For Display Attributes

a. Specify the following:

- Title

- Region Template
- Parent Region
- Display Point
- Sequence
- Column

To learn more, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

b. Click **Next**.

7. For Display Attributes, select the appropriate attributes and click **Next**.

To learn more about a specific attribute, click the item label.

8. 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 7-82.
- 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.

9. 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. Select **Flash Chart** and click Next.

6. For Chart Type:

a. Select a chart style (for example, **Column**) and click **Next**.

b. Select a specific chart type(for example, 3D Column) and click **Next**.

7. For Display 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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

b. Click **Next**.

8. Specify whether to include tabs and click **Next**.
9. For Display Attributes, select the appropriate attributes and click **Next**.

   To learn more about a specific attribute, click the item label.
10. 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 7-82.
       – 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**.
11. Click **Finish**.

Upgrading all Flash 3 Charts to Flash 5

To upgrade all Flash 3 charts in an application to Flash 5:

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 5

To upgrade a Flash 3 charts Flash 5:

1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
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 Flash Chart**.
4. Click **Upgrade**.

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 Flash
- 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 Flash

Topics:

- About SVG Chart Upgrade Restrictions
- Upgrading a SVG Chart to Flash
- Upgrading all SVG Charts in a Application to Flash

You can automatically upgrade single or multiple SVG charts to Flash.

About SVG Chart Upgrade Restrictions Note that SVG charts can be upgraded with the following restrictions:

- Only number formats defined in axis format strings will be migrated. Date and time formats will be ignored.
- Number format elements containing the following will be migrated:

  ```
  0,9,D,G,, (comma),. (period),$,C,L,FM
  ```

- The label for each series in the Flash chart will be derived from each series' column alias. This differs from SVG charts, where the label for each series was derived from the Series Name attribute.
- Flash Dial charts display actual values instead of percentages.
- In SVG charts, only the labels for the first series are used for the x-axis. In Flash charts, this has been enhanced so that all data appears, even if the data's label does not occur in the first series.

Upgrading a SVG Chart to Flash To upgrade a SVG chart to Flash:

1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
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 Flash Chart**.
4. Click **Upgrade**.

Upgrading all SVG Charts in a Application to Flash To upgrade all SVG Charts to Flash 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 Flash Chart 5, 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 7–10 describes all supported CSS classes. Note that certain classes only apply to specific chart types.

Table 7–10 Available SVG Chart CSS Classes

Class	Description
`text`	Defines the appearance of text that displays in a chart.
`tspan`	Defines the appearance of text that displays in a chart. `tspan` should match the definition of `text`.

Table 7–10 (Cont.) Available SVG Chart CSS Classes

Class	Description
`text.title`	Overrides the default chart text. Use this class for title text.
`text.moredatafound`	Defines the appearance of more datafound text.
`rect.legend`	Creates the rectangular box that holds the chart legend. To remove the legend border, change `rect.legend` to the following: `rect.legend{fill:#CCCC99;stroke:none;}`
`text.legend`	Defines the text that appears in the chart legend.
`#background`	Creates the entire background for the SVG plug-in. For a solid white background with no border, change `#background` to the following: `#background{fill:#FFFFFF;stroke:#FFFFFF;stroke-width:2;}`
`rect.chartholderbackground`	Not applicable to pie and dial charts. Creates the background of the rectangle that holds the chart data. For a clear background, change `rect.chartholderbackground` to the following: `rect.chartholderbackground(display:none;)`
`#timestamp`	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 `#timestamp` as follows in the Custom CSS, Inline attribute. `"#timestamp{display:none;}"` **See Also:** "Enabling Asynchronous Updates" on page 7-94
`text.tic`	Dial charts only. Defines the numbers on a dial chart.
`line.tic`	Dial charts only. Defines the graduation mark that displays directly beneath the number on a dial chart.
`#dial`	Dial charts only. Defines the value that displays on the dial chart.
`#dial.alert`	Dial charts only. Defines a value (called an alert value) that renders in a dial chart using a different display.
`#dialbackground`	Dial charts only. Creates the background of a dial chart.
`#dialcenter`	Dial charts only. Creates the center of the dial on a dial chart.
`#dialbackground-border`	Dial charts only. Works with `#dialbackground` to create specific graphic effect.
`#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

Table 7–10 (Cont.) Available SVG Chart CSS Classes

Class	Description
`#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 10-43.
2. Navigate to the Page Definition containing the chart. See "Accessing the Page Definition" on page 5-2.
3. Under Regions, click **Chart** next to the region name.

   The Chart Attributes page appears.
4. Scroll down to the CSS section.
5. From Use Custom CSS, select **Yes**.
6. 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:

      ```
      /**/
      ```

7. 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 7-88.
2. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Under Regions, click **Chart** next to the region name.

   The Chart Attributes page appears.
4. Scroll down to CSS.
5. From Use Custom CSS, select **Yes**.
6. 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 Chart Attributes page. See "Editing Chart Attributes" on page 7-93.
2. Scroll down to CSS.
3. From Use Custom CSS, select **Yes**.
4. 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;}
```

Editing Chart Attributes

Once you have created a chart, you can alter its display by editing chart attributes on the Chart Attributes page.

To access the Chart Attributes page:

1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
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 **Chart Attributes**.
4. Edit the appropriate attributes.
5. To learn more about a specific item on a page, click the item label.

   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
6. 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**.

Using Custom XML with Flash 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:
   a. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
   b. Under Regions, click the chart type, **Flash Chart**.

      The Chart Attributes page appears.
2. Scroll down to Chart XML.
3. From Use Custom XML, select **Yes**.

   Note that when 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 and Flash charts can monitor information by enabling the Asynchronous Update attribute on the Chart attributes page. Enabling this attribute updates the chart to reflect changes in the underlying data within a specified time interval.

To enable asynchronous updates:

1. Edit an existing SVG or Flash chart. See "About SVG Charts" on page 7-88.
2. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
3. Under Regions, click **Chart** next to the region name.

   The Chart Attributes page appears.
4. Scroll down to Refresh.
5. From Asynchronous Update, select **Yes**.

6. 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 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 two different types of actions. A button can submit a page and then redirect to a URL. Alternately, a button can branch to a URL without submitting the page, such as for a Cancel button.

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 2-10

Creating a Button Using a Wizard

You create a button by running the Create Button Wizard from the Page Definition. Each button resides in a region. A region is an area on a page that serves as a container for content. How you create a button depends upon whether the Page Defintion is in tree or component view. To learn more, see "About Tree and Component View" on page 5-7.

Topics:

- Creating a Button in Component View
- Creating a Button in Tree View

Creating a Button in Component View

To create a button in Component view:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.

2. If necessary, create region. See "Understanding Regions" on page 9-2.
3. Under Buttons, click the **Create** icon.
4. Select a region to contain 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. If you select **Create a button in a region position**:
   a. For Button Attributes:
      – Button Name - Enter a name for this button. Note that the button name becomes the page request value.
      – Label - Enter a label to be displayed for the button.
      – Button Style - Select **HTML Button**, **Image**, or **Template Based Button**

        If the button is an image, you will need to supply an image name. If the button is template controlled, you will need select a template name.
      – 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. If you wish to no longer use a button template, change the button template to the `NULL`.
      – 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 will need to include the `#BUTTON_ATTRIBUTES#` substitution string. You can use this to control tab stops. For example:

        ```
        tabindex="3"
        ```

      – Click **Next**.
   b. For Display Properties, select a position, sequence, and alignment and click **Next**.
   c. For Action When Clicked:
      – Action - Select the action to be performed when button is clicked.
      – Execute Validations - Select **Yes** or **No**. See item Help for more details.
7. If you select **Create a button displayed among this region's items**:
   a. Button Name - Enter a button name.
   b. Sequence - Enter the sequence for this button. The sequence determines the order of evaluation amongst the other items in this region.
   c. Show - Select **Beginning on New Line** or **Beginning on New Field**. See item Help for more details.

d. Label - Enter a label for this button. This will become the HTML alt tag if the button is an image.

e. Request - Enter a `Request` value to be associated with this button. When the button is pressed the page will be submitted and the page request will be set to this value.

f. Execute Validations - Select **Yes** or **No**. See item Help for more details.

g. Button Style - Specify the button style.

h. Image Name - Enter a optional button image name. The button image should be just the image file name, no prefix. The image prefix will be prepended to the image name. This application currently has an image prefix of "`/i/`".

i. Image Attributes - Enter button image attributes if you have entered a button image name. The button image attributes are not required however identifying the height and width will allow browsers to paint the page faster. For example:

```
width=16 height=14
```

8. Click **Create Button**.

See Also: "Understanding the Relationship Between Button Names and REQUEST" on page 7-101

Creating a Button in Tree View

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 directly to the right of a form field).
- **Create Button** displays a button within or between button items (for example, to place a button after a page item.

See Also: "Understanding the Relationship Between Button Names and REQUEST" on page 7-101

Creating a Region Button To create a region button in Tree view:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. If necessary, create region. See "Understanding Regions" on page 9-2.
3. Right-click the region to contain the button and select **Create Region Button**.
4. For Button Attributes, specify the following:

   a. Button Name - Enter a name for this button. Note that the button name becomes the page request value.

   b. Label - Enter a label to be displayed for the button.

   c. Button Style - Select **HTML Button**, **Image**, or **Template Based Button**

   If the button is an image, you will need to supply an image name. If the button is template controlled, you will need select a template name.

   d. 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 will need to include the `#BUTTON_ATTRIBUTES#` substitution string. You can use this to control tab stops. For example:

```
tabindex="3"
```

e. Click **Next**.

5. For Display Properties, specify the following:
   a. Position - Identifies the button position.
   b. Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
   c. Button Style - Select **HTML Button**, **Image**, or **Template Based Button**

      If the button is an image, you will need to supply an image name. If the button is template controlled, you will need select a template name.
   d. Alignment - Choose the button alignment.
   e. Click **Next**.
6. For Action When Clicked, specify the following:
   a. Action - Select action to be performed when button is clicked.
   b. Execute Validations - Select **Yes** or **No**. See item Help for more details.
   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 processed.
8. Click **Create Button**.

Creating a Button Among Region Items To create a button that displays within or between button items:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. If necessary, create a region. See "Understanding Regions" on page 9-2.
3. Click the region to contain the button, right-click and select **Create Button**.
4. For the button attributes, specify the following:
   a. Button Name - Enter a button name.
   b. Sequence - Enter the sequence for this button. The sequence determines the order of evaluation amongst the other items in this region.
   c. Show - Select **Beginning on New Line** or **Beginning on New Field**. See item Help for more details.
   d. Label - Enter a label for this button. This will become the HTML alt tag if the button is an image.
   e. Request - Enter a `Request` value to be associated with this button. When the button is pressed the page will be submitted and the page request will be set to this value.
   f. Execute Validations - Select **Yes** or **No**. See item Help for more details.
   g. Button Style - Specify the button style.

h. Image Name - Enter a optional button image name. The button image should be just the image file name, no prefix. The image prefix will be prepended to the image name. This application currently has an image prefix of "`/i/`".

i. Image Attributes - Enter button image attributes if you have entered a button image name. The button image attributes are not required however identifying the height and width will allow browsers to paint the page faster. For example:

```
width=16 height=14
```

5. Click **Create Button**.

Creating Multiple Buttons in Component View

In Component view, you can create multiple 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 5-2.
2. If necessary, create an HTML region. See "Understanding Regions" on page 9-2.
3. In Component view, locate the Buttons section and click the **Create** icon.

   The Create Button wizard appears.**Create** icon.
4. From the Tasks list, click **Create Multiple Buttons**.

   The Create Multiple Button Wizard appears.
5. From Place Buttons in Region, select the region to contain the buttons.
6. From Template, select a template.
7. In HTML Attributes, specify HTML attributes for these buttons. This text will be 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 a Once
- Using the Reorder Buttons Icon in Component View

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 5-2.
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. To learn more about a specific item on a page, click the item label.

   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
4. Click **Apply Changes**.

Editing Multiple Buttons a 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 5-2.
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.

Deleting Multiple Buttons To delete multiple buttons at once:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
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. T
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.

Using the Reorder Buttons Icon in Component View

In Component view, you can quickly edit a button label or change a button position within a region on the Reorder Buttons page. The Reorder Region Buttons icon resembles a light gray downward arrow and upward arrow and displays next to the region name.

To edit buttons using the Reorder Region Buttons icon:

1. Navigate to the appropriate Page Definition in Component view. See "Switching Between Tree and Component View" on page 5-2.
2. Under Buttons, click the **Reorder Region Buttons** icon.

   The Reorder Buttons page appears. Use this page to edit the button label, select a region position, or change the button order.
3. To edit the button label, enter a name in the Label field.
4. To change the region position, make a selection from the Position list.
5. To change the order in which buttons display, click the up and down arrows in the far right column.

   Note that you can also control the order in which buttons display by editing the Sequence attribute. See "Editing Button Attributes" on page 7-99.
6. Click **Apply Changes**.

Note: To change the region where a button resides, you must edit the button attributes. See "Editing Button Attributes" on page 7-99.

Understanding the Relationship Between Button Names and REQUEST

The name you give a button determines the value of the built-in attribute `REQUEST`. 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* will fail. For example:

```
<input type="BUTTON" value="Finish" onClick="javascript:doSubmit('Finish');">
```

Note that 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 will only be considered if a user clicks the button.

See Also: "Controlling Navigation Using Branches" on page 8-30

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 7-95.
2. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
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 2-14

Creating Lists of Values

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 a number of 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 6-33 and "Working with Shared Components" on page 5-36

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**.

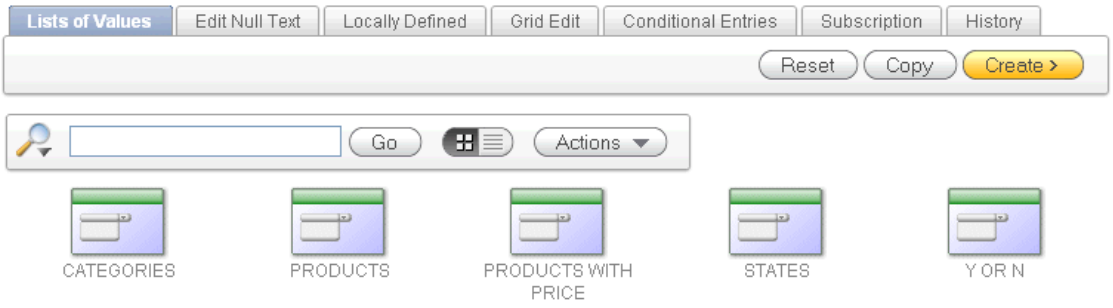
   The Lists of Values page appears.
5. To create a LOV, click **Create**.
6. Follow the on-screen instructions.

   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.

   See Also: "Defining a Column as a List of Values in a Classic Report" on page 7-50

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:

- **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 (wild card characters are implied) and then click **Go**.
- **View icons**. Use this control to toggle between icon and report views. To change the view, click the following icons:
  - **View Icons** (default) displays each lists of value as a large icon.
  - **View Report** displays each lists of value as a line in a report.
- **Go button** - Executes a search.

- **Actions menu** - Displays the Actions menu. Use this menu to customize an interactive report. See "Using the Actions Menu" on page 7-6.

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 List of Values page appears.
6. To learn more about a specific item on a page, click the item label.

   When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
7. Click **Apply Changes**.

About Navigation Alternatives

The Edit List of Values page is divided into the following sections: Name, Subscription, Source, 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**.

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 appropriate display values 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 a number of 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 utilized 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.

Creating Dependent Select Lists

You can use a select list to determine the range of values of another select list on the same page. You can achieve this functionality by having a driving select list submit values to a subsequent select list. You incorporate these values in the subsequent select list as a bind variable in the WHERE clause of its query.

To have one LOV drive another LOV:

- Create a basic form.
- Define two lists of values. Note that the driving LOV must submit the page after a value is chosen.
- Define a branch that branches back to the current page.

Consider the following example. The first LOV enables the user to pick a state:

```
SELECT state_name d, state_id v
FROM states
```

The second LOV selects the county name and county ID based on the state selected in the first LOV:

```
SELECT county_name d, county_id v
  FROM counties
WHERE state_id = :P1_STATE_ID
```

See Also: "Creating Forms" on page 7-61, "Creating Lists of Values" on page 7-61, and "Controlling Navigation Using Branches" on page 8-30

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 run time. Note that since this shortcut does not have a shortcut body, the name of the shortcut must match the corresponding message name. At run time, 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 run time.

> **See Also:** "About Translating an Application and Globalization Support" on page 15-1

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"
```

Note that 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 9-2.
- Region Header and Footer Text attribute. See "Specifying a Region Header and Footer" on page 9-7.
- Item Label attributes and Default Value attribute.
- Region Templates attributes. See "Customizing Templates" on page 10-12.

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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.
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 a number of 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 utilize 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

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 Templatee, select a tree template and click **Next**.

8. For Table/View Owner, select the table or view owner on which to base the tree and click **Next**.

9. For Table/View Name, select the table or view and click **Next**.

10. 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 th 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**.

11. For Where and Order by, specify the following:

    a. Where Clause - Enter an optional `WHERE` clause.

    b. Order Sibliings By - Select the columns by which siblings are ordered.

    c. Click **Next**.

12. For Tree Attributes, specify the following:

    a. Include following buttons - Select the buttons to include.

    b. 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 in the next step.

       – Nothing

c. Existing Application Item - Can be used to hold the selected node value. If you select an application item, this item can be used to save the tree state, by holding the last selected node of the tree.

d. 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.

e. Click **Next**.

13. For Link, select a page the leaf node links to.

    Note that this option only appears if you want make the leaf node text a link.

14. 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 5-2.
2. Access the Tree Attributes page:
   - Tree view - Right-click on 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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

4. Click **Apply Changes**.

Using the Find Icon

You can search for items, pages, queries, tables, PL/SQL code, images, or cascading style sheets by clicking the Find icon on numerous pages within Application Builder.

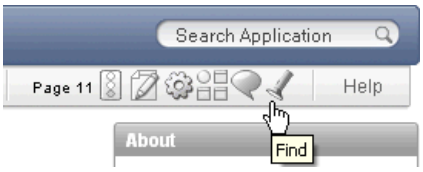
Topics:

- About the Find Icon
- About the Item Finder
- Using the Page Finder
- Using the Queries Finder
- Using the Table Finder
- Using the PL/SQL Finder
- Using the Images Finder

See Also: "Debugging an Application" on page 11-1

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 4-3

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.

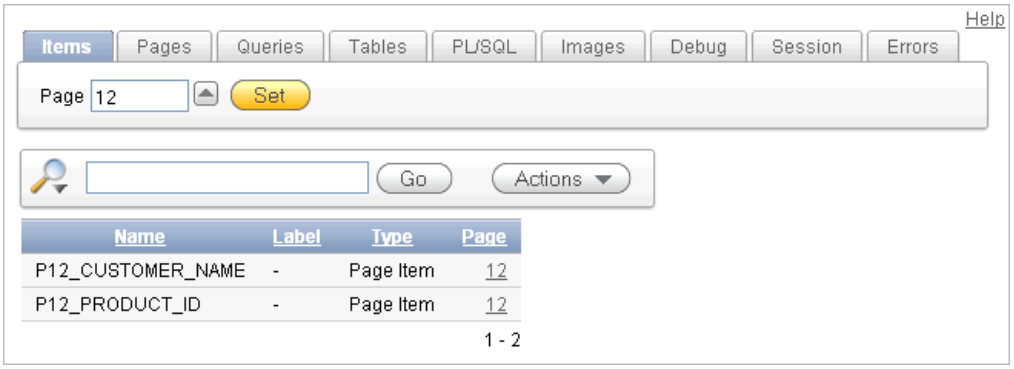
See Also: "Understanding Page-Level Items" on page 6-28

To search for an item using the Item Finder:

1. Click the **Find** icon.

The Item 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 (wild card 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 "Using the Actions Menu" on page 7-6.



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 6-28 and "Editing Multiple Items Simultaneously" on page 6-37.

Using the Page Finder

A page (or Page Definition) is the basic building block of an application. You can use the Page Finder to search for pages within the current application or within the schema associated with the workspace.

To search for a page:

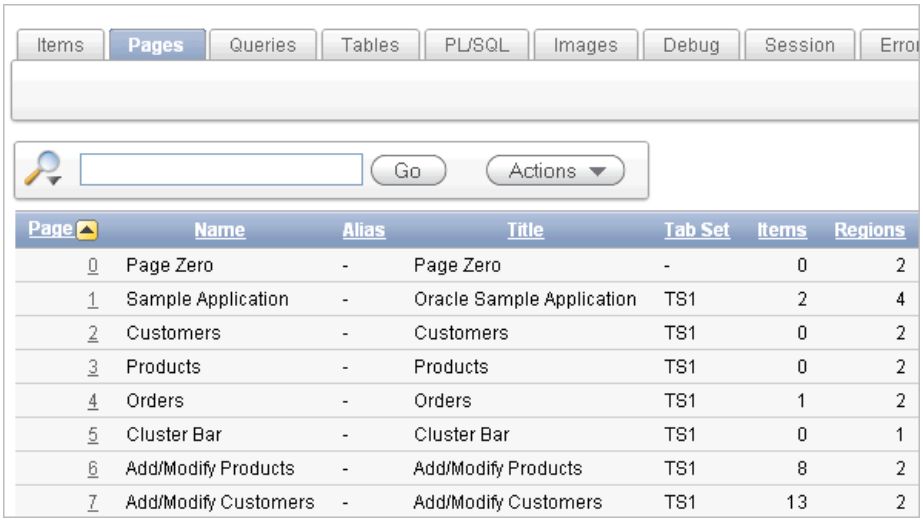
1. Click the **Find** icon.
2. Click the **Pages** tab.

   The Page 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 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 (wild card 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 "Using the Actions Menu" on page 7-6.



Page	Name	Alias	Title	Tab Set	Items	Regions
0	Page Zero	-	Page Zero	-	0	2
1	Sample Application	-	Oracle Sample Application	TS1	2	4
2	Customers	-	Customers	TS1	0	2
3	Products	-	Products	TS1	0	2
4	Orders	-	Orders	TS1	1	2
5	Cluster Bar	-	Cluster Bar	TS1	0	1
6	Add/Modify Products	-	Add/Modify Products	TS1	8	2
7	Add/Modify Customers	-	Add/Modify Customers	TS1	13	2

3. To link to the Items page, click the page number.

See Also: "About the Page Definition" on page 5-1 and "Editing a Page in Component View" on page 5-12

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.

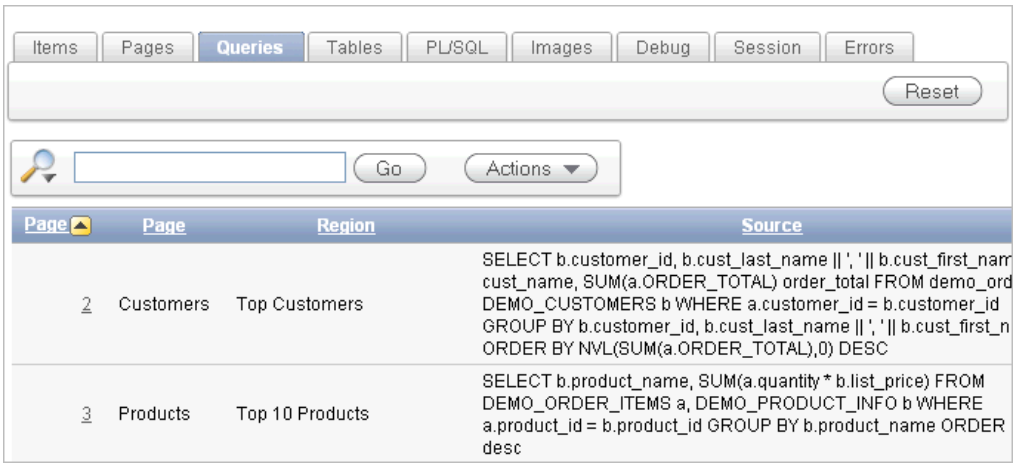
To search for a query using the Queries Finder:

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 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 (wild card 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 "Using the Actions Menu" on page 7-6.



3. To link to the Items page, click the page number.

See Also: "About the Page Definition" on page 5-1 and "Editing a Page in Component View" on page 5-12

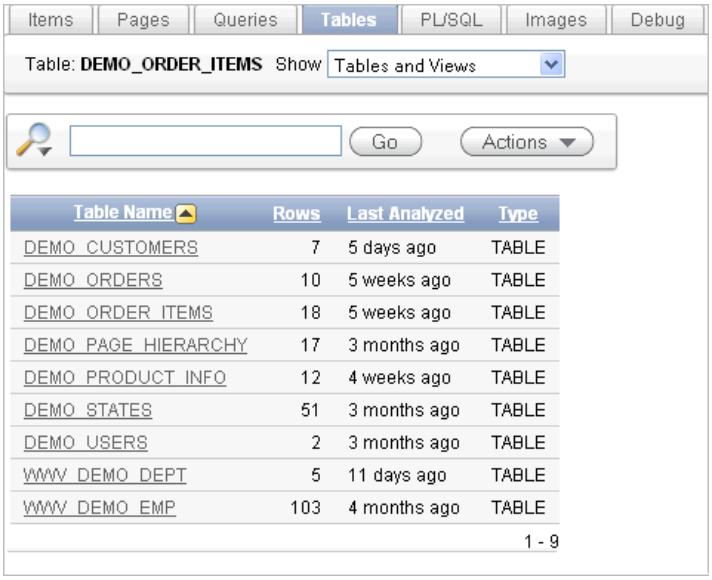
Using the Table Finder

You can use the Table 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 Table Finder appears.



A search bar displaying the selected tab appears 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 (wild card 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 "Using the Actions Menu" on page 7-6.

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:

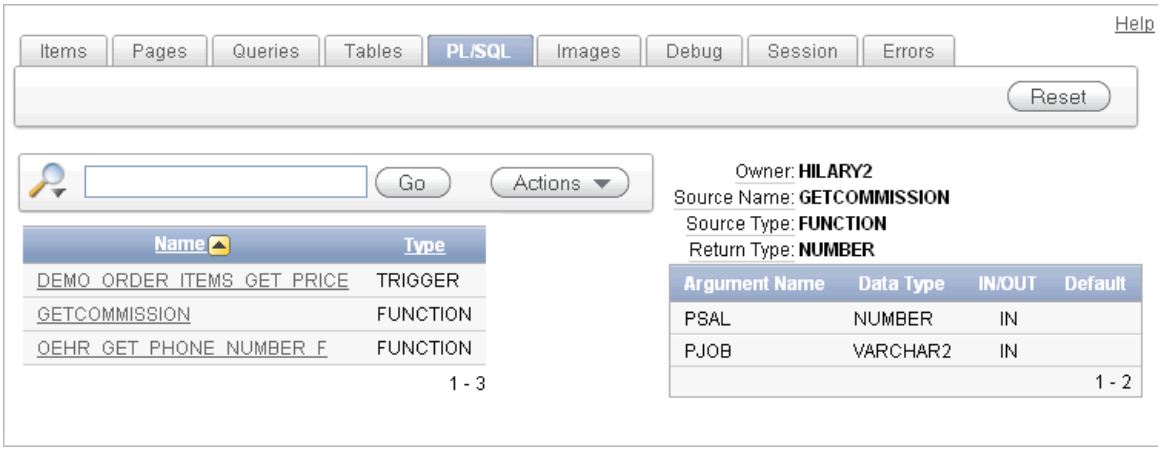
1. Click the **Find** icon.
2. Click the **PL/SQL** tab.

   The PL/SQL Finder appears.

   A search bar displays at the top of the page and contains the following controls:

   - **Select Columns 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 (wild card 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 "Using the Actions Menu" on page 7-6.

3. To view additional details, select the procedure, function, or package name.



The procedure, package, or function name appears and additional information including the owner, source name, source type, return type, argument names, data types, and IN/OUT parameters.

> **See Also:** "Managing Database Objects with Object Browser" in *Oracle Application Express SQL Workshop Guide*

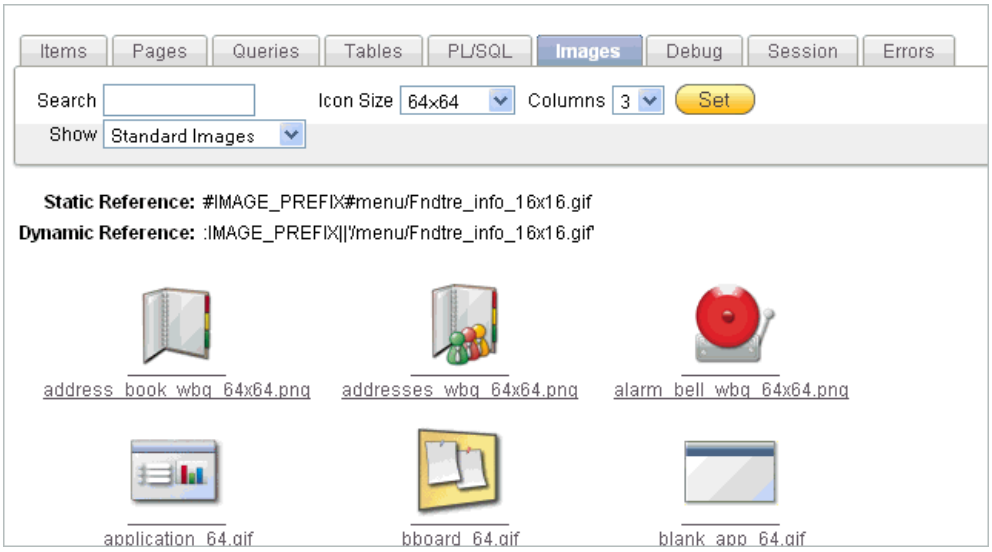
Using the Images Finder

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 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 (wild card 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 "Using the Actions Menu" on page 7-6.

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 needs to 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*
>
> **See Tutorial:** "How to Build an Access Control Page" in *Oracle Application Express Advanced Tutorials*

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 12-38

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 **Finish**.

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 5-2.
2. Click the **Create** button next to the navigation bar 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 a Page or Application" on page 6-13.
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 7-119.

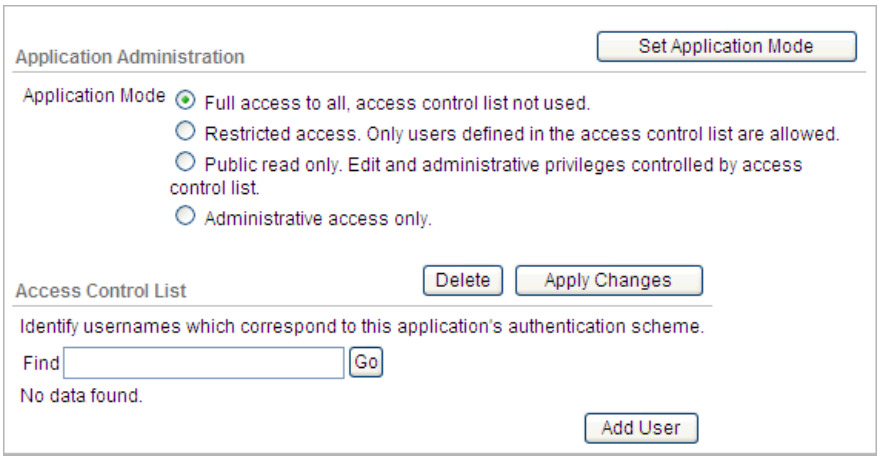
   The wizard creates a page named Access Control Administration.
2. Run the Access Control Administration page. See "Running a Page or Application" on page 6-13.
3. Select an Application Mode. Options include:
   - **Full access to all, access control list not used**.

     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**.



Note that the user interface of your page is dependent upon the theme you selected for your application. See "Managing Themes" on page 10-1.

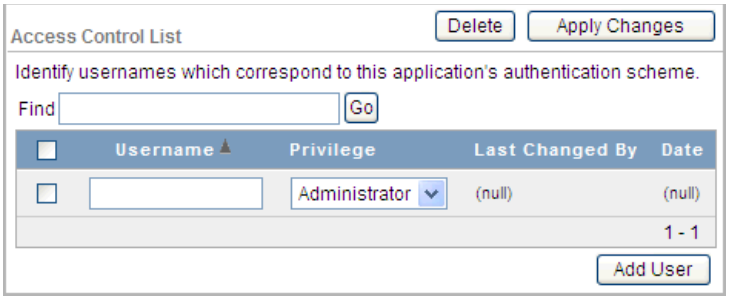
Next, add users to the Access Control List.

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 12-37

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 would need to 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 Functions
- Calling JavaScript from a Button
- Calling JavaScript Using a Dynamic Action

See Also: "Understanding Validations" on page 5-29

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 will be `P1_FIRST_NAME`.

You can get and set item attributes and values using the JavaScript function `$v('P1_FIRST_NAME')`. Consider the following example:

```
  function firstName(){
  alert('First Name is ' +$v('P1_FIRST_NAME'));
  }
 // or a more generic version would be
function displayValue(pId){
  alert('The Value is ' + $v(pId));
  }

  // Then add the following to the "Form Element Attributes" Attribute of the
item:
  onchange="displayValue('P1_FIRST_NAME');"
```

Incorporating JavaScript Functions

You can include JavaScript functions by incorporating JavaScript

- Editing the JavaScript attribute of the page
- Calling the .js file from the HTML Header attribute of the page
- Calling the .js file from the page template

> **See Also:** "Text with JavaScript Escaped Single Quotes" on page 7-107 for information about referencing a shortcut inside of a JavaScript literal string

Topics:

- Incorporating JavaScript Utilizing the JavaScript Attribute
- Calling the JavaScript File from the HTML Header Attribute
- Calling the JavaScript File from the Page Template

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 5-2.
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 Expresss.

   For example, adding the following would test a function accessible from anywhere on the current page.

   ```
   function test(){
     window.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 5-2.
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 10-26

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.

Note that when you create the button, you would need to select **Action Redirect to URL without submitting page**. 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 7-95

Calling JavaScript Using a Dynamic Action

You can also execute JavaScript code by creating a dynamic action of type Execute JavaScript Code. To learn more, see "Implementing Dynamic Actions" on page 14-31.

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 "Changing the Default Templates in a Theme" on page 10-3.

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: "Changing the Default Templates in a Theme" on page 10-3, "Creating a Theme" on page 10-4, and "Printing Report Regions" on page 52

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: "Changing the Default Templates in a Theme" on page 10-3

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 2-8

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 an Application" on page 6-8.
2. Navigate to the Page Definition of your Help page. See "Accessing the Page Definition" on page 5-2.
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 5-2.
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 5-2.
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 **Page Components**.
5. Under Items, click **Item Help Text**.

   A report displays at the bottom of the page.
6. In Bulk Item Help Report, you can:
   - Update existing Help topics. Edit the Help text that appears and click **Apply Changes**.
   - Link to the Page 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 the previous topic.
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. In Help Contains, enter keywords.
2. Click **Go**.

Searching for an Item Label To search for an item label:

1. In Help Contains, enter keywords.
2. Click **Go**.

See Also: "Viewing Utilities and Reports" on page 6-50

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 5-2.
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 7-127.
   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**.

8

Adding Navigation

When you build an application, you can include different types of navigation controls, such as navigation bar entries, tabs, breadcrumbs, lists, 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 application.

Topics:

- Creating Tabs
- Creating Lists
- Creating Breadcrumbs
- About Trees Created as Shared Components
- Creating a Navigation Bar Entry
- Controlling Navigation Using Branches

See Also: "Working with Shared Components" on page 5-36

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. If you want 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 8-7.

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: "Creating an Application" on page 6-1

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 a number of 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.

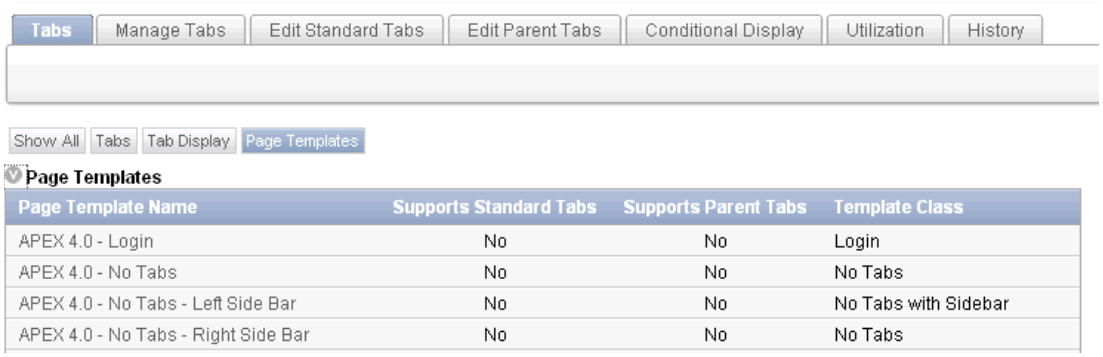
About Template Support

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. Click **Page Templates**.
6. If needed, expand the Page Templates region.



See Also:

- "Template Defaults" on page 4-14 for information about setting a default page template at the application level
- "Page Templates" on page 10-26

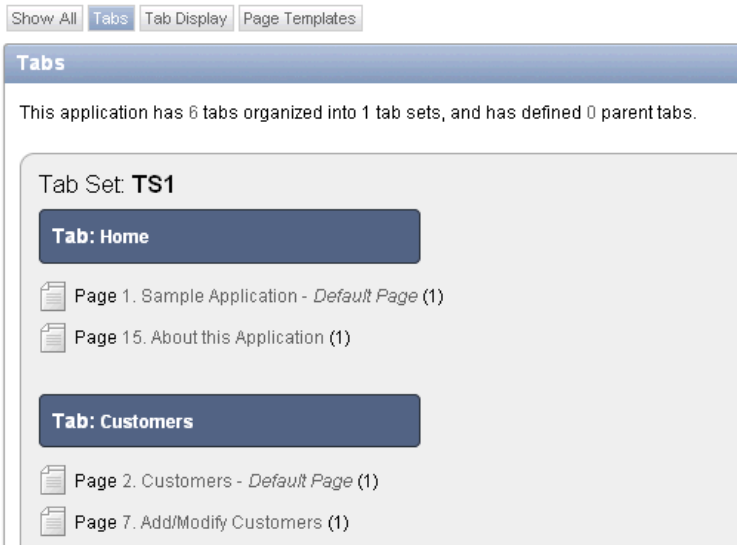
About the Tabs Page

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 5-2.

Tab Display

Tab Display provides additional information about how the current tabs or tab set are configured to display.

Page Templates

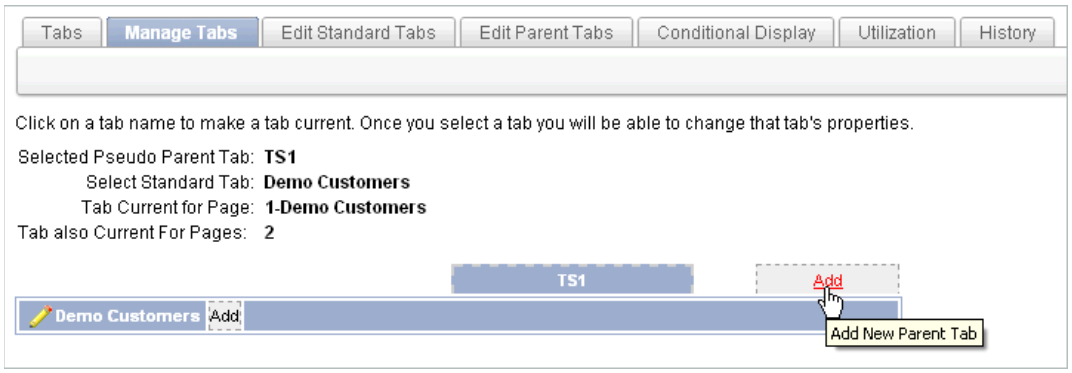
Page Templates displays a report of page templates associated with the current application. See "About Template Support" on page 8-2.

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. If you want to display two levels of tabs define both Parent tabs and Standard tabs. See "About Tabs" on page 8-2.

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.

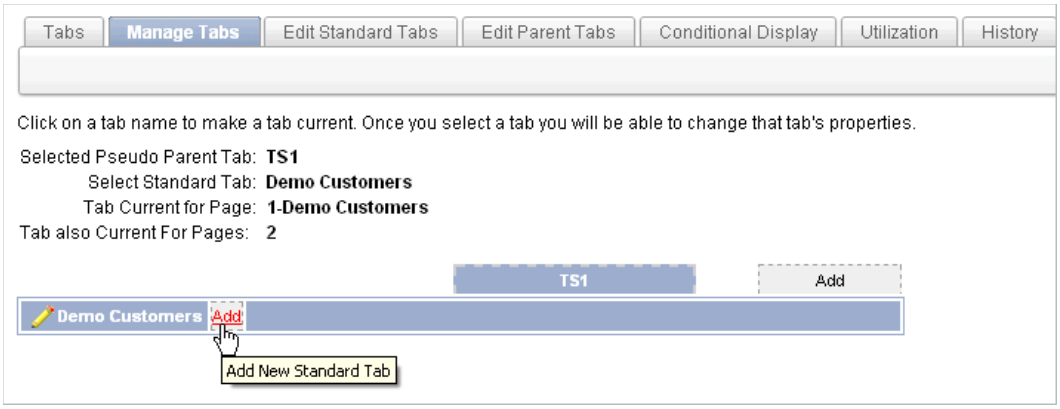


This illustration shows the Add New Parent Tab link on the Manage Tabs page. Additional information about this illustration can be found in the surrounding text.

****

Parent tabs can control the display of standard tab sets. Clicking a parent tab will display 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. 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**

You can change the appearance each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

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.

Standard Tab 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.



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 8-12 and "Conditional Entries" on page 8-15.

You further control a list looks like using template attributes. For information about altering list display, see "Creating a New Template" on page 10-14 and "List Templates" on page 10-24.

Topics:

- How To Create a List
- Editing List Attributes
- Reparenting List Entries
- Managing Orphaned List Entries
- Resequencing List Entries
- Accessing List Reports

How To Create a List

To create a list you:

1. Create the list by running the Create List Wizard.
2. Add list entries by either creating them from scratch or by coping entries from an existing list. If you copy a list and it contains list items or entries, the list entries are also copied.
3. Add the list to a page by creating a List region.

How you perform these steps is a personal preference. You can perform all three when you run the Create List Wizard. Alternatively, you can perform these steps one at a time.

Topics:

- Creating a List from Scratch
- Adding List Entries and Sublists
- Copying List Entries Between Lists
- Copying a List Between Applications
- Adding a List to a Page by Creating a Region

Creating a 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 Builder home page, click **Shared Components**.
   d. Under Navigation, click **Lists**.
   e. Click **Create**.
2. For Define List:
   a. Name - Enter a numeric or alphanumeric name for the list.
   b. List Template - Select a list template to control the appearance of your list.

      To view currently used list templates, view the List Template Utilization region.
   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**.
3. 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**.
4. For Confirm, specify the following:
   a. Create List Regions - Select whether or not 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. 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 5-2, "Editing a Page in Tree View" on page 5-9, and "Editing a Page in Component View" on page 5-12

Adding List Entries and Sublists

Once your list is created, you must add entries to it. You can add list entries from scratch, copy a list entry from within a list, or copy 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 10-12 and "List Templates" on page 10-24

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 Entries by List 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 will contain 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 allows for the title image attribute to be automatically set based on the value of the list label text. For example:

      ```
      title="#LIST_LABEL#"
      ```

   e. List Entry Label - Enter the label text for this link.
5. Specify a target location.

   If the target location is a URL, specify the following:

   – Target Type - Select **URL**.
   – 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.

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.

You can also select **Printer Friendly**. Selecting this option displays the target page using the application's Printer Friendly template. Printer friendly templates optimize a page for printing. "Changing the Default Templates in a Theme" on page 10-3 and "Optimizing a Page for Printing" on page 7-125.

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 1-12.

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 - 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 1-12.

7. For 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, you can 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, 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 List Entries Between Lists

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 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**.

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. Select one of the following:
    - List in this application
    - List in another application
5. Follow the online instructions. To learn more, see item Help. See "About Field-Level Help" on page 1-12.

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 10-14 and "List Templates" on page 10-24 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 5-2.
2. On the Page Definition, add a list region:
   a. Tree view- Under Page Rendering, right-click **Regions** and select **Create**.
   b. 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, specify the following and click **Next**:
   - Title - Enter a title for the region. This title will display if the region template you choose displays the region title.
   - Region Template - Choose a template to control the look of the region.
   - Parent Region - Defines the parent region to which the new region belongs.
   - Display Point - Identify a display point for this region. There are two types of display points:
     – **Page body positions** are displayed where indicated by the `#BODY#` substitution string in the page template.
     – **Page template positions** are controlled by page template substitution strings (`#REGION_POSITION_01#..#REGION_POSITION_08#`). Page template region positions enable exact placement of a region within a template.
   - Sequence - Specify the sequence for this component. The sequence determines the order of evaluation.
   - Column - Indicate the column where this region is to be displayed. A page can have multiple regions, which can be displayed in different columns. Note that this attribute only applies to regions that are displayed in a Page Template Body position.
5. For Source, select the list you want to add.
6. Click **Create List 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 each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

2. Select a list.

The Entries by List page appears.

3. Select the appropriate list name.

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**.

4. Edit the appropriate attributes.

5. To learn more about a specific item on a page, click the item label.

When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

6. Click **Apply Changes**.

Reparenting 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 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 **Reparent Checked Entries**.

Resequencing List Entries

You can resequence list entries in increments of 10 on the Clean Up List Entries 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**.

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 each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

   To learn more, see the sections that follow.

Unused

Click **Unused** on the Lists page to identify lists that are not used in the current application.

Conditional Entries

Click **Conditional Entries** on the Lists page to view conditional lists.

Utilization

Click **List Utilization** on the Lists page to access the Lists 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, click List Template Utilization. Then click the name to view or edit the list template.

History

Click **History** on the Lists page 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 10-4 and "Breadcrumb Templates" on page 10-19

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

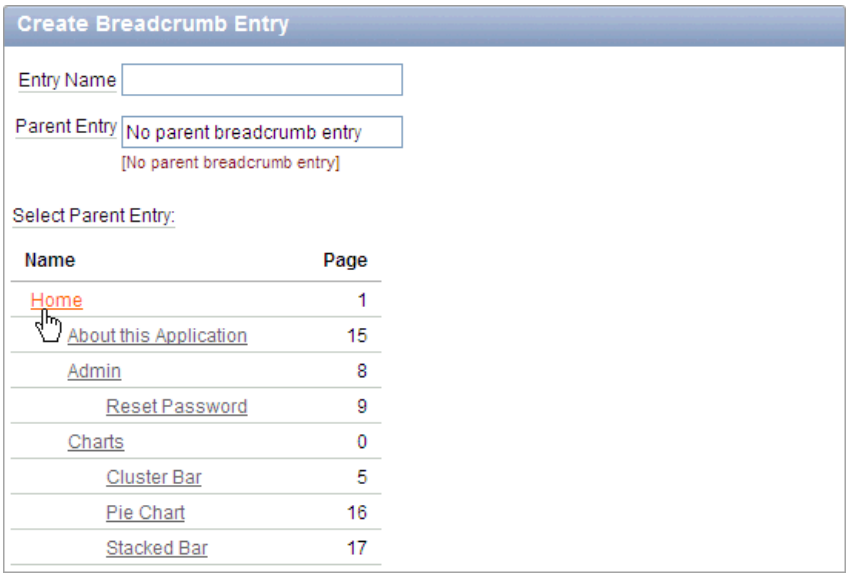
To create a breadcrumb while creating a page:

1. Run the Create Page Wizard to add a new page. See "Managing Pages in an Application" on page 6-8.

   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 yo select a breadcrumb, the Create Breadcrumb Entry form appears.



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 need to 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 8-17 and "Creating Breadcrumbs from a Page Definition" on page 8-18.
2. Add entries to the breadcrumb. See "Adding Breadcrumb Entries" on page 8-18.
3. Add the breadcrumb to a page by creating a region. See "Adding a Breadcrumb Region" on page 8-19.

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 Builder 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 8-18.

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 5-2.
2. Access the Create Breadcrumb Wizard:
   a. Tree view- Under Shared Components, right-click **Breadcrumbs** and click **Create**.
   b. Component view - Under Shared Components, click the **Create** icon.

      The Breadcrumb page appears.
   c. Click **Calendar Attributes**.
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 8-18.

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 Builder 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 will display.
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 your specified.

  You can specify static values or substitution syntax (for example, `&APP_ITEM_NAME.`). Note that item values passed to `f?p=` in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, `\1234,56\`).

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. When you are finished defining menu attributes, click **Create** at the top of the page.

Repeat these procedures for each breadcrumb entry you need to 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 10-14 and "Breadcrumb Templates" on page 10-19 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 5-2.

   a. Tree view- Under Page Rendering, right-click **Regions** and click **Create**.

   b. Component view - Under Page Rendering, click the **Create** icon.

   The Create Region Wizard appears. Note that 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.

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. Parent Region - Defines the parent region to which the new region belongs to.

f. 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 Builder 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 on a page, see item Help. See "About Field-Level Help" on page 1-12.

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 8-23

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 Builder 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 Builder 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 Builder 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 each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

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.

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 Chared 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 plugin. To learn more, see "Creating Trees" on page 7-109.

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 Componet:

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 Builder home page, click **Shared Components**.

e. Under Navigation, click **Trees**.

The Trees page appears.

You can change the appearance each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

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 1-12.

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 Builder home page, click **Shared Components**.

e. Under Navigation, click **Trees**.

2. Click the appropriate tab:

- **Utilization**
- **History**

You can change the appearance each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

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.

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.

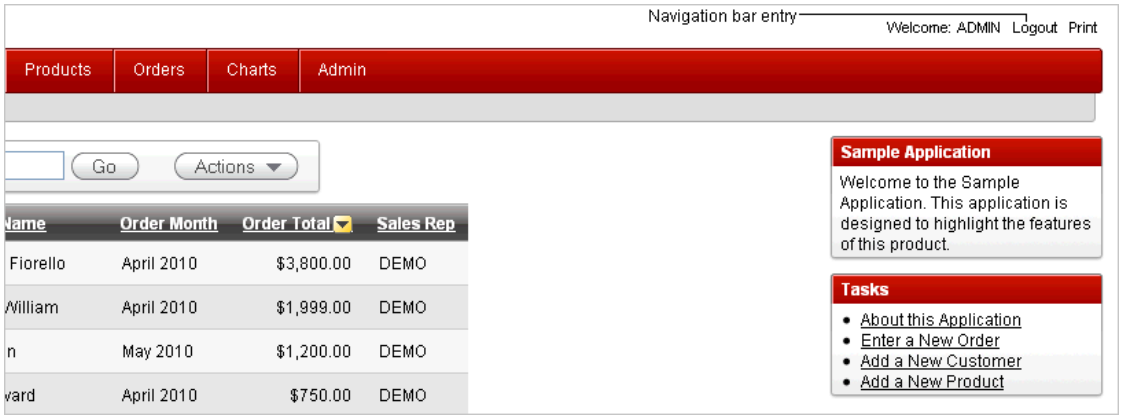
Topics:

- 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 10-12

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: "Supported Page Template Substitution Strings" on page 10-27

How to Create a Navigation Bar Entry

Before adding a navigation bar, you must create entries for the navigation bar. To do so, access the Navigation Bar page from either the Page Definition or from the Shared Components page. You can create a navigation bar entry from scratch or by copying an existing entry.

See Also: "Understanding Application Computations" on page 5-44

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 Builder home page, click **Shared Components**.
   e. Under Navigation, click **Navigation Bar Entries**.
2. Under Navigation Bar, click the **Create** icon.

   The Create Navigation Bar Entry Wizard appears. Note that 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 **Navigation to URL**. To learn more about Feedback, see "Creating a Navigation Bar Entry for Feedback" on page 8-27.
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 1-12.
   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. "Changing the Default Templates in a Theme" on page 10-3 and "Optimizing a Page for Printing" on page 7-125.
- 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 your specified.

  You can specify static values or substitution syntax (for example, `&APP_ITEM_NAME.`). Note that item values passed to `f?p=` in the URL cannot contain a colon. Additionally, item values cannot contain commas unless you enclose the entire value in backslashes (for example, `\1234,56\`).

d. Click **Next**.

7. To set a condition for displaying the navigation bar entry, select a condition type.
8. Click **Create**.

Tip: In order for a navigation bar to appear, your page template must include the `#NAVIGATION_BAR#` substitution string. See"Supported Page Template Substitution Strings" on page 10-27.

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 3-14.

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 Builder home page, click **Shared Components**.
   e. Under Navigation, click **Navigation Bar Entries**.
2. Under Navigation Bar, click the **Create** icon.

The Create Navigation Bar Entry Wizard appears. Note that 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"Supported Page Template Substitution Strings" on page 10-27.

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 Builder home page, click **Shared Components**.
   e. Under Navigation, click **Navigation Bar Entries**.
2. Under Navigation Bar, click the **Create** icon.

   The Create Navigation Bar Entry Wizard appears. Note that 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 **As a Copy of an Existing Navigation Bar**.
4. For Copy From Application, select and 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 Builder home page, click **Shared Components**.

e. Under Navigation, click **Navigation Bar Entries**.

The Navigation Bar Entries page appears.

You can change the appearance each page by using the Search bar at the top of the page. See "Customizing Interactive Reports" on page 7-4.

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 1-12.

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 Builder 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.

Note: The Subscription and History buttons only appear after you create a navigation bar.

---

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 Builder 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.

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 5-2.
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. Note that 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 Point and Type, select a branch point:
   - 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.

4. Select a branch type and click **Next**.
5. 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, specify the following:
      – 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 the following:
      – Target is a - 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 1-12.
      – 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. Select **save state before branching** to clear cache and save session state before performing the redirect. See "About Saving State Before Branching" on page 8-32.
   e. Click **Next**.
6. Follow the on-screen instructions.

See Also: "About the When Button Pressed Attribute" on page 2-24

Creating a Branch on a Page with a Component that Submits

If you have a page with a component that submits, such as a Go button or select list with submit, note that you must create a branch that links back to that page. For example, suppose you have a page with a select list and a submit button. For processing to occur properly, you need to create a branch on the page that links back to the page.

About Saving State Before Branching

Consider selecting the **save state before branching** check box if your branch is redirecting to a URL or returning a URL and passes clear cache directives or item names and item values in the resulting `f?p` URL. By default, this information is passed after the branch is taken, displaying any passed information in the URL.

Selecting **save state before branching** sets potentially sensitive information in session state before the branch redirect. This option improves application security by making URLs less susceptible to tampering and by exposing fewer item names, values, and indications of program logic.

Note that when you select **save state before branching**, the redirected URL no longer include clear cache or item name and item values. You can still view this information, by running your application in Debug mode. See "Accessing Debugging Mode" on page 11-4.

9

Controlling Page Layout

This section describes different ways you can customize your application's page layout by customizing regions, editing item attributes, and incorporating images.

Topics:

- Understanding Page Layout in Oracle Application Express
- Displaying Components on Every Page of an Application
- Understanding Regions
- Creating a Multiple Column Layout
- 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 8-1 and "Using the Drag and Drop Layout Page" on page 6-40

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 run time.

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 breadcumb, 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 9-3

Displaying Components on Every Page of an Application

Page zero of your application functions as a master page. The Application Express engine renders all components you add to page zero 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 an Application" on page 6-8, "Understanding Conditional Rendering and Processing" on page 2-3 and "Available Conditions" on page B-1

Topics:

- Creating a Page Zero
- Navigating to Page Zero

Creating a Page Zero

To create a page zero:

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. For Select a page type, select **Page Zero**.

   Note that the Page Zero option only appears if the application does not have a page zero.
5. Click **Finish**.

Navigating to Page Zero

To navigate to page zero:

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 **0-0**.

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 will be 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

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 5-2.
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 9-3.
4. Follow the on-screen instructions.

> **See Also:** "Creating Regions in Multiple Columns" on page 14 and "Creating a Region Display Selector" on page 9-12

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 9–1 describes the available region types.

Table 9–1 Region Types

Region Type	Description
HTML	When you select HTML, the wizard prompts you to select one of the following: ■ **HTML** - Functions as containers for items and contains the HTML you provide. Any HTML you type may contain substitution strings. ■ **HTML Text (escape special characters)** - Same as HTML region, but the Application Express engine escapes special characters before they are rendered. ■ **HTML Text (with shortcuts)** - Same as HTML region, but with support for shortcuts. **See Also:** "Using Shortcuts" on page 7-106
Multiple HTML	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.
Report	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. **See Also**: "Creating Reports" on page 7-1
Form	Form regions are used to contain a form. **See Also**: "Creating Forms" on page 7-61
Chart	Chart regions contain line, bar, or pie charts based on SQL queries. **See Also**: "Creating Charts" on page 7-82
List	List regions contain a shared collection of links called list. **See Also**: "Creating Lists" on page 8-7
Breadcrumb	Breadcrumb regions contain a hierarchical list of links called a breadcrumb. **See Also**: "Creating Breadcrumbs" on page 8-15
PL/SQL Dynamic Content	Regions based on PL/SQL enable you to render any HTML or text using the PL/SQL Web Toolkit.
Tree	Trees are a hierarchical navigational control based on a SQL query executed at run time. It enables the user to expand and collapse nodes. **See Also**: "About Trees Created as Shared Components" on page 8-23
URL	URL based regions obtain their content by calling a Web server using a predefined URL. **See Also**: "Incorporating Content from Other Web Sites" on page 9-17
Calendar	Calendar regions are used to contain a calendar. **See Also**: "Creating Calendars" on page 7-69
Plug-ins	Plug-ins allow developers to declaratively extend the built-in types available with Application Express. **See Also**: "Implementing Plug-ins" on page 14-22
Help Text	Help Text regions enable you to provide page-level help. **See Also**: "Creating a Help Page" on page 7-126

Table 9–1 (Cont.) Region Types

Region Type	Description
Map	Map regions contain declaratively defined Flash maps. **See Also**: "Creating Maps" on page 7-76
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. **See Also**: "Creating a Region Display Selector" on page 9-12

See Also:

- *Oracle Database Advanced Application Developer's Guide* for information about developing Web applications with PL/SQL
- ***Oracle Database PL/SQL Packages and Types Reference*** for information about htp 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 Region Header and FooterSpecifying a Static Region ID
- Adding a Region Image
- Editing Multiple Regions at Once
- Reordering Regions

Editing Region Attributes

To edit region attributes:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
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. Edit the appropriate attributes.
4. To learn more about a specific item on a page, click the item label.

When Help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

5. Click **Apply Changes**.

See Also: "How Region Attributes Affect Page Layout" on page 9-6, "Controlling Region Positioning" on page 9-7, and "Specifying a Region Header and Footer" on page 9-7

About Navigation Alternatives The Region Definition page is divided into the following 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. Table 9–2 describes region attributes that affect the layout of a page.

Table 9–2 Region Attributes Affecting Page Layout

Attribute	Description
User Interface, Template	Determines the look of the region. Select from the region templates defined in the application. To view template attributes, click the template name on the Page Definition. **See Also:** "Customizing Templates" on page 10-12 and "Region Templates" on page 10-33
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 to.
User Interface, Display Point	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. 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.
User Interface, Column	Determines the column where the region displays. If two regions are in the same display point, you can place them next to one another by setting the second region to display in column 2. Many regions can display in each column and the display order of the regions within the region display point and column is controlled by the region display sequence number.
Attributes, Region Display Selector	Identifies this region to be included in Region display selectors. Region display selector's will only display regions that have been identified using this attribute.
Attributes, Region Image	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. **See Also**: "Adding a Region Image" on page 9-10
Attributes, Image Tag Attributes	Used in conjunction with the Region Image attributes. Enter attributes to be included in the image html. For example, use this attribute for height and width. **See Also**: "Adding a Region Image" on page 9-10

Table 9–2 (Cont.) Region Attributes Affecting Page Layout

Attribute	Description
Attributes, Region HTML table cell attributes	Defines additional attributes to be used in the HTML table cells when regions display in multiple columns. The attributes control the cells in the table used to lay out a region in multiple columns.
Header and Footer	Specifies HTML text to be displayed at the top of the region (just before the `#BODY#` content).
Conditions	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). **See Also:** "Understanding Conditional Rendering and Processing" on page 2-3 and "Optimizing a Page for Printing" on page 7-125
Customization	Enables end-user customization. To utilize this feature, you must include the `#CUSTOMIZE#` substitution string in the Header, Body, or Footer section of the page template. **See Also:** "Enabling Users to Customize a Page" on page 9-8

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 will be 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 9-3

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 5-2.
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**
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 10-12

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. See "Editing Interactive Reports as a Developer" on page 7-20.

When you enable region caching, the Application Express engine renders a region from a cached (or stored) respository 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:** "Cache" on page 5-24 and "Managing Cached Regions" on page 9-9

Enabling Region Caching To enable region caching:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
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 be 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 9-8.

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 5-2.
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 "Customizing Interactive Reports" on page 7-44.
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 a 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, in order 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 5-2.
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 5-2.
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. Note that you cannot the table tag used to display this image.
   - 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 a number of 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 9-5.

To edit multiple attributes across all regions:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
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 and click
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 5-2.
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. Update the appropriate attributes and click
4. Click **Apply Changes**.

> **See Also:** "Editing Regions" on page 9-5 and "Reordering Regions" on page 9-11

Reordering Regions

You can quickly change the order that regions display, edit a region title, or change a region template on the Drag and Drop Layout page.

To access the Drag and Drop Layout page:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Edit Region page:

- Component view - Under Regions, click the **Reorder Regions** icon. The Reorder Regions icon resembles a light green downward arrow and upward arrow.
- Tree view - Right-click the region and select **Drag and Drop Layout**.

The Reorder Regions page appears. Use this page to edit the region title or select a template.

3. In Region, enter a title.
4. From Template, select a template.
5. To change the order in which regions display, click the up and down arrows in the far right column.
6. Click **Apply Changes**.

See Also: "Creating Multiple Items Using Drag and Drop" on page 6-32

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 5-2.
   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 5-2.
   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 5-2.
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 select **Drag and Drop Layout**.

   The Reorder Regions page appears. Use this page to edit the region title or select a template.
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.
   c. Copy Buttons - Select **Yes** or **No** to determine whether to copy buttons within this region.
   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 5-2.
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 5-2.
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**.

Creating a Multiple Column Layout

A region is an area on a page that uses a specific template to format HTML content. You use regions to group page controls. To create a multiple column layout, you create two regions that display in adjacent cells of the same table.

You can create a multiple column layout by:

- Manually creating the two adjacent regions
- Defining a page template that contains a multiple column table
- Defining a page template that contains multiple `DIV` areas
- Defining a page template multiple with floating `DIV` based regions. For example, using `DIV` based region templates, you can control which regions display next to each other and which break to the next line using the region attributes

Topics:

- Creating Regions in Multiple Columns
- Creating a Multiple Column Page Template

Creating Regions in Multiple Columns

You create regions using the Create Region Wizard. To create a two-column page, you create two regions. Oracle Application Express replaces the `#BOX_BODY#` substitution string within a two-column table and displays the regions in two separate cells.

To create a two-column page by creating regions:

1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Create the first region:
   a. Under Regions, click **Create**.

      The Create Region Wizard appears.
   b. Select a region type.
   c. From the Column field, select **1**.

d. Follow the on-screen instructions.

3. Create the second region:

a. Under Regions, click **Create**.

The Create Region Wizard appears.

b. Select a region type.

c. From the Column field, select **2**.

d. Follow the on-screen instructions.

Creating a Multiple Column Page Template

Page templates define the appearance of individual pages, including the placement of page controls and components. Each page template is divided into three sections: Header, Body, and Footer. The most basic template must include the substitution string `#BOX_BODY#` in the Body attribute. When the page is rendered, the Application Express engine replaces `#BOX_BODY#` with HTML to display the regions on that page.

You can create a multiple column page by defining a page template that contains a multiple column table. You then explicitly place regions within specific table cells.

The following example demonstrates how to create a two-column page and specify a region position using the `#REGION_POSITION_XX#` substitution string in each column. You would enter the code in the Body section of the page-level template as shown in the following example.:

```
<body #ONLOAD#>
  #FORM_OPEN#
  <table style="width:100%">
    <tr>
      <td style="width:50%;padding:5px;">#REGION_POSITION_01#</td>
      <td style="width:50%; border-left:2px #bbbbbb dashed; padding:5px;">#REGION_
POSITION_02#</td>
    </tr>
  <br />
  #BOX_BODY#
  #FORM_CLOSE#
</body>
```

The following is an alternative DIV-based example:

```
<body #ONLOAD#>
  #FORM_OPEN#
  <div style="width:100%">
    <div style="float:left;width:50%;">#REGION_POSITION_01#</div>
    <div style="float:left;width:50%;">#REGION_POSITION_02#</div>
  </div>
  #BOX_BODY#
  #FORM_CLOSE#
</body>
```

Once you create this page-level template, the newly defined positions would be available as Display Point options when you run the Create Region Wizard.

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 will be, if the item will display next to or below the previous item.

> **See Also:** "Understanding Page-Level Items" on page 6-28 and "Using the Drag and Drop Layout Page" on page 6-40

To edit item attributes:

1. Navigate to the Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Under Items, click the item name.

   The Edit Page Item page appears.

Table 9–3 describes how item attributes affect the layout of a page.

Table 9–3 Item Attributes Effecting Page Layout

Heading	Attribute	Description
Displayed	Sequence	Determines the order that items are rendered within a region.
Displayed	Region	Defines the region where the item displays. All items must be in a region.
Displayed	Begin On New Line	Determines if this item displays on the same line or on the next line as the previous item.
Displayed	...Field	Determines if this item displays in the next column or in the same column as the previous item.
Displayed	ColSpan	Items are laid out in HTML tables. Defines the value to be used for the COLSPAN attribute of the table cell containing an item.
Displayed	RowSpan	Items are laid out in HTML tables. Defines the value to be used for the ROWSPAN attribute in the table cell where the item displays.
Label	Label	Defines the label for this item. You can include HTML, JavaScript, and shortcuts. You can also use the substitution string `#CURRENT_ITEM_NAME#` to obtain the name of the item associated with this label.
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.
Label	Template	Specifies the label template. Use label templates to apply a consistent appearance to labels in your application.
Label	HTML Table Cell Attributes	Defines additional attributes for the cell containing this item's label (for example, `nowrap="nowrap"`).
Element	Pre Element Texts	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: ▪ `#CURRENT_FORM_ELEMENT#` obtains the name of the HTML form element with which this post element text is associated. ▪ `#CURRENT_ITEM_NAME#` obtains the name of the item with which this post element text is associated.
Element	Post Element Texts	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: ▪ `#CURRENT_FORM_ELEMENT#` obtains the name of the HTML form element with which this post element text is associated. ▪ `#CURRENT_ITEM_NAME#` obtains the name of the item with which this post element text is associated.

Table 9–3 (Cont.) Item Attributes Effecting Page Layout

Heading	Attribute	Description
List of Values	Columns	Applies to radio groups and check boxes. Defines the number of columns to use to display the values defined in the List of Values. By default, all values display in one column.
Conditions	Condition Type and Expressions	Defines conditions and appropriate expressions that determine if an item displays. **See Also:** "Understanding Conditional Rendering and Processing" on page 2-3
Read Only Display Settings	Read Only Condition Type	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. Reduces the need to code duplicate interfaces for different users.

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 4-8.

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 7-117.

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. Under Application, select **Definition**.
5. When the Edit Application Definition page appears, 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:

```
<img src="#IMAGE_PREFIX#go.gif">
```

> **See Also:** "About Built-in Substitution Strings" on page 2-16, "IMAGE_PREFIX" on page 2-22, "APP_IMAGES" on page 2-18, and "WORKSPACE_IMAGES" on page 2-26

Referencing Images Using a Fully Qualified URL

Alternatively, you can also reference an image using a fully qualified URL. For example:

```
<img
src="http://g-images.amazon.com/images/G/01/associates/navbar2000/logo-no-border(1
).gif">
```

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 9-20 and "Uploading Images" on page 9-18

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. Use the following controls to filter the view:

   a. Image - Enter text to search for an image name or notes describing the image. Select whether to search for **All Images**, **Workspace Images**, or **Application Images**.

   b. View - Select one of the following:

      – **Icons** (the default) displays each image as a large icon.

      – **Details** displays each image as a line in a report.

   c. Display - Determines the number of images that display.

   d. Click **Go**.

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. Use the following to filter the view:

   a. Image - Enter text to search for an image name or notes describing the image. Select whether to search for **All Images**, **Workspace Images**, or **Application Images**.

   b. View - Select one of the following:

      – **Icons** (the default) displays each image as a large icon.

      – **Details** displays each image as a line in a report.

   c. Click **Go**.

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. To upload a file, click **Create**.
6. 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. Use the following controls to filter the view:
   a. Static File - Enter text to search for a file name or notes describing the file.
   b. Application - Narrow or broaden the view by selecting one of the following:
      - All Static Files
      - **No Associated Application**
      - A specific application
   c. View - Select one of the following:
      - **Icons** (the default) displays each file as a large icon.
      - **Details** displays each file as a line in a report.

d. Display - Determines the number of files to display.

e. Click **Go**.

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. From View, select **Details** and click **Go**.

   Details displays each file as a line in a report.
6. Select the **Download** icon next to the appropriate file.

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. Use the following controls to filter the view:

   a. Static File - Enter text to search for a file name or notes describing the file.

   b. Application - Narrow or broaden the view by selecting one of the following:

      – All Static Files

      – **No Associated Application**

      – A specific application

   c. View - Select one of the following:

      – **Icons** (the default) displays each file as a large icon.

      – **Details** displays each file as a line in a report.

   d. Display - Determines the number of files to display.

   e. Click **Go**.

6. Select a file.
7. Click **Delete**.

Rendering HTML Using Custom PL/SQL

If you need to 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 Advanced Application Developer's Guide* for information about developing Web applications with PL/SQL
- *Oracle Database PL/SQL Packages and Types Reference* for information about htp 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:

```
htp.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;
   htp.p('The maximum salary is: '||TO_CHAR(l_max_sal,'999,999.00'));
END;
```

10

Managing Themes and Templates

This section describes different ways you can alter your 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" on page 8-1 and "Using the Drag and Drop Layout Page" on page 6-40

Managing Themes

Themes are collections of templates that can be used 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 (breadcrumb, button, calendar, label, list, page, popup list of values, region, and report) and then by template classes, identifying the purpose of the each template within that 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 10-7.
- 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 Themes for an Oracle Application Express Instance" in *Oracle Application Express Administration Guide*.

Topics:

- Accessing the Themes Page
- Changing the Default Templates in a Theme
- Creating a Theme
- Switching the 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 10-12

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 "Changing the Default Templates in a Theme" on page 10-3.

Topics:

- Accessing the Themes Page from Shared Components
- Accessing the Themes Page from a Page Definition
- About the Themes Page

Accessing the Themes Page from Shared Components

To access the Themes page from Shared Components:

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. Click the **View Report** icon.

   A report appears. A check mark in the Is Current column indicates which theme is selected.
6. Click the theme name.

   The Create/Edit Theme page appears.

Accessing the Themes Page from a Page Definition

To access the Themes 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. Under Shared Components, locate the Theme section.

5. Click a theme name.

   The Create/Edit Theme page appears.

Changing the Default Templates in a Theme

A standard theme contains templates for every type of application component and region type. You can change the selected default templates for a theme on the Create/Edit Theme page.

You can override the default templates in a theme by selecting another template when you create components or regions, or by changing the template on the component or region attributes page.

To review or change the default templates in a theme:

1. Navigate to the Themes 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 **Themes**.

      The Themes page appears.
2. To edit a theme:
   a. Click the **View Report** icon.
   b. 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 10–1 describes the default templates available under Component Defaults.

Table 10–1 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. **See Also:** "Display Attributes" on page 5-21 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.

Table 10–1 (Cont.) Component Default Templates

Attribute	Description
Printer Friendly Page	Identifies the template to be used when the Application Express engine is in printer friendly mode. **See Also:** "Optimizing a Page for Printing" on page 7-125
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.

5. To change a default template for a region, scroll down to Region Defaults. Make a selection from the appropriate list.

   Table 10–2 describes the default templates available under the Regions Defaults.

Table 10–2 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.
Reports	Default region template used when you create a report.
Tabular Forms	Default region template used when you create a tabular form.
Wizards	Default region template used when you create a wizard component.

6. Under Calendar Icon Details, specify an Icon Name and Icon Attributes to be used when displaying Date Picker items.
7. Click **Apply Changes.**

Creating a Theme

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:
   a. On the Workspace home page, click **Application Builder**.
   b. Select an application.
   c. Click **Shared Components**.
   d. Under User Interface, select **Themes**.

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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

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:

- **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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View icons**. Use this control to toggle between icon and report views. To change the view, click these icons:
  - **View Icons** (default) displays each theme as a large icon.
  - **View Report** displays each theme as a line in a report.
- **Actions menu** - Displays the Actions menu. Use this menu to customize report view. See "Using the Actions Menu" on page 7-6.

Switching the 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.

You can only switch to a theme if that 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 10-4.

> **Tip:** Note that if multiple templates for the same class exist, a warning may display when you switch themes. To remove this warning, you must correct the template.

To apply a theme to an application:

1. Navigate to the Themes 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 **Themes**.

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 10-4.

3. From Switch to Theme, select the new theme and 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.
5. Click **Next** to continue.
6. Click **Switch Theme**.

Updating an Older Application with a New Theme

Oracle Application Express ships with 20 themes. A number of these themes have been updated and include a new more modern style.

If you import or upgrade and application from a previous Oracle Application Express release, the appearance of the application will not change. In order to obtain the newer theme, you must:

1. Switch to another theme. See "Switching the Active Theme" on page 10-5.
2. Re-create the theme you want to use from the repository. "Creating a Theme" on page 10-4.
3. Switch to that new theme. "Switching the Active Theme" on page 10-5

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:
   a. On the Workspace home page, click the **Application Builder** icon.
   b. Select an application.
   c. Click **Shared Components**.
   d. Under User Interface, select **Themes**.
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 will be lost. To keep template modifications, you must export the theme. See "Exporting Themes" on page 13-19.

To delete a theme:

1. Navigate to the Themes 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 **Themes**.

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
- Deleting a Workspace Theme
- Modifying a Workspace Theme
- About Exporting a Workspace Theme

> **See Also:** "Managing Themes for an Oracle Application Express Instance" 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:

a. On the Workspace home page, click the **Application Builder** icon.

b. Select an application.

c. Click **Shared Components**.

d. Under User Interface, select **Themes**.

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**.

Deleting a Workspace Theme

To delete a workspace theme:

1. Navigate to the Themes 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 **Themes**.

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 need to create an application using the theme, modify it, and then manually add it to the workspace theme repository. a theme in the same way you export any related application files.

To modify a workspace theme:

1. Create an application using the theme you want to modify. "Creating an Application" on page 6-1.
2. Modify the theme. See "Changing the Default Templates in a Theme" on page 10-3.
3. Delete the existing workspace theme. See "Deleting a Workspace Theme" on page 10-8.
4. Add the modified theme to the workspace theme repository. See "Adding a Theme to the Theme Repository" on page 10-7.

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. "Creating an Application" on page 6-1.
2. Export the application. See "Exporting an Application" on page 13-13.
3. Import the exported file into the target Oracle Application Express instance. See "Importing an Application, Page or Component Export" on page 13-23.

4. Install the exported file from the Export Repository. See "Installing Export Files" on page 13-29.

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. "Creating an Application" on page 6-1.
2. Export the theme using the Export Theme utility. See "Exporting Themes" on page 13-19.
3. Import the exported file into the target Oracle Application Express instance. See "Importing Export Files" on page 13-23.
4. Install the exported file from the Export Repository. See "Installing Export Files" on page 13-29.

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:
   a. On the Workspace home page, click the **Application Builder** icon.
   b. Select an application.
   c. Click **Shared Components**.
   d. Under User Interface, select **Themes**.
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**.
   d. Confirm your changes and click **Change Theme ID**.

Viewing Theme Reports

Application Builder includes a number of 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:
   a. On the Workspace home page, click the **Application Builder** icon.
   b. Select an application.
   c. Click **Shared Components**.
   d. Under User Interface, select **Themes**.
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:
   a. On the Workspace home page, click the **Application Builder** icon.
   b. Select an application.
   c. Click **Shared Components**.
   d. Under User Interface, select **Themes**.
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:

a. On the Workspace home page, click the **Application Builder** icon.

b. Select an application.

c. Click **Shared Components**.

d. Under User Interface, select **Themes**.

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:

a. On the Workspace home page, click the **Application Builder** icon.

b. Select an application.

c. Click **Shared Components**.

d. Under User Interface, select **Themes**.

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:
   a. On the Workspace home page, click the **Application Builder** icon.
   b. Select an application.
   c. Click **Shared Components**.
   d. Under User Interface, select **Themes**.
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 2-15

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 need to 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 10-1

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 in order to preserve backwards compatibility for imported applications using older versions of a theme.

See Also: "Using Custom Cascading Style Sheets" on page 10-42

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:
   a. On the Workspace home page, click the **Application Builder** icon.

b. Select an application.

c. Click **Shared Components**.

d. Under User Interface, select **Themes**.

The Themes page appears.

2. Click the **View Report** icon.
3. In the Themes list, select the theme name.

The Create/Edit Theme page appears.

4. Scroll down to Component Defaults. Make a selection from the Page list.
5. Click **Apply Changes** at the top of the page.

See Also: "Changing the Default Templates in a Theme" on page 10-3

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 Edit Page:

a. Tree view - Under Page Rendering, double-click the page title at the top of the tree.

b. Component view- Under Page, click the **Edit All** 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 a type of 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:
   - **Utilization** displays template utilization in the current application for all template types (page, report, region, label and list).
   - **Subscription** displays subscribed templates in your application.
   - **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 10-10, "Breadcrumb Templates" on page 10-19, "Button Templates" on page 10-21, "Calendar Templates" on page 10-22, "Label Templates", on page 10-23, "List Templates" on page 10-24, "Page Templates" on page 10-26, "Popup LOV Templates" on page 10-32, "Region Templates" on page 10-33, and "Report Templates" on page 10-35

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 a type of 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.

Note that 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.

   Note that 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. From Replace from Application, select an application and 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 utilizes 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**.

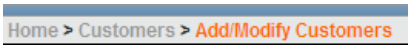
Breadcrumb Templates

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 10-12 and "Managing Themes" on page 10-1

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 user interface 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 8-15

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. Note that 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**.

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 10–3 describes available breadcrumb Entry attributes.

Table 10–3 Breadcrumb Entry Control attributes

Attribute	Description
Before First	Defines text that displays before the first breadcrumb entry.
Current Page Breadcrumb Entry	Defines the look of a breadcrumb entry that corresponds to the current page. This attribute supports the following substitution strings: ■ `#NAME#` specifies the short name of the breadcrumb entry. ■ `#LINK#` specifies the anchor target of the breadcrumb entry. ■ `#LONG_NAME#` specifies the long name of the breadcrumb entry.

Table 10–3 (Cont.) Breadcrumb Entry Control attributes

Attribute	Description
Non Current Page Breadcrumb Entry	Defines the look of a breadcrumb entry that does not correspond to the current page. This attribute supports the following substitution strings: ▪ `#NAME#` specifies the short name of the breadcrumb entry ▪ `#LINK#` specifies the anchor target of the breadcrumb entry ▪ `#LONG_NAME#` specifies the long name of the breadcrumb entry For example: `<li><a href="#LINK#">#NAME#</a>`
After Last	Defines text that displays after the last breadcrumb entry.
Between Level	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: `main X cars X porsche X 911`
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, display the hypertext link for the breadcrumb entry, add the following text to the HTML anchor tag in the position of the *X*:

`<A HREF="..." X>`

Substitution Strings Lists substitution string used in the current template. Substitution strings are used within subtemplates to reference component values.

Comments Use this attribute to record comments about this component.

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 10-12 and "Managing Themes" on page 10-1

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. Note that 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 Template**.

Definition Use Template to define the button template that displays. 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:

- `#LABEL#` is replaced with a button label.
- `#LINK#` is replaced with a URL. The URL then calls a `#doSubmit#` or a redirect JavaScript that submits the page (that is, setting the request value), or simply redirects it to the supplied URL.
- `#BUTTON_ATTRIBUTES#` is replaced with the button attributes property from the button definition.

Note that all substitution string must be in uppercase.

Substitution Strings Lists substitution string used in this template. Substitution strings are used within subtemplates to reference component values.

Comments Use this attribute to record comments about this component.

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#`. 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 (#).

> **See Also:** "Creating Calendars" on page 7-69, "Customizing Templates" on page 10-12, and "Managing Themes" on page 10-1

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. Note that 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 Template**.

Comments Use this attribute to record comments about this component.

Monthly Calendar, Weekly Calendar, and Daily Calendar

Use the Monthly Calendar, Weekly Calendar, and Daily 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 item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

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 10-12 and "Managing Themes" on page 10-1

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. Note that 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 Template**.

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#

For example:

```
<label for="#CURRENT_ITEM_NAME#">
<a href="javascript:popupFieldHelp('#CURRENT_ITEM_ID#',
  '&APP_SESSION.','&CLOSE.')" >
```

The label will be automatically display 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 will automatically display before the HTML in this region, any open HTML tags in the Before Label region should be closed here. For example:

```
</a></label>
```

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#
```

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. This attribute supports the following substitution strings:

- #CURRENT_FORM_ELEMENT#
- #CURRENT_FORM_ID#
- #CURRENT_ITEM_NAME#

The following example would append a space and a closing bracket to the displayed item label with the error.

```
 ]</font>
```

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.

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 8-7, "Customizing Templates" on page 10-12, and "Managing Themes" on page 10-1

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 8-7

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. Note that 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 Template**.

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 will be 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 will be used.
- **Between List Elements.** Enter HTML that displays between list elements. This attribute will be ignored if no HTML is specified.

Before Sub List Entry Enter HTML that displays before any sublist elements.

Sub List 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 will be 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 will be used.
- **Between Sub List Items.** Enter HTML that displays between list elements. This attribute will be 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 a number of 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 run time. 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 10-12 and "Managing Themes" on page 10-1

Topics:

- Supported Page Template Substitution Strings
- Page Template Attributes

Supported Page Template Substitution Strings

Table 10–4 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 Stings section of the Edit Page Template page. See "Page Template Attributes" on page 10-29.

Table 10–4 Page Template Substitution Strings

Substitution String	Description
`#APP_VERSION#`	Can be used in the Header or Footer sections of the page template. You define the value of `#APP_VERSION#` in the Version attribute on the Edit Application page **See Also:** "Name" on page 4-10
`#BOX_BODY#`	Identifies where the Body displays. If the Body is null, then `#BOX_BODY#` will be used instead.
`#CUSTOMIZE#`	Can be used in the Header, Body, or Footer sections of the page template. The Customization section of the Region Definition enables you to turn on end-user customization. To utilize this feature, you must also include the `#CUSTOMIZE#` substitution string in the page template. If at least one region supports end-user customization, a link called **Customize** appears wherever the `#CUSTOMIZE#` substitution string appears in the page template. When users click this link, a window displays enabling them to turn on and off regions on the page. **See Also:** "Editing Regions" on page 9-5
`#FORM_CLOSE#`	If a `#FORM_OPEN#` is included, then you must include a `#FORM_CLOSE#` in the header, body, or footer template. `#FORM_OPEN#` must appear before the `#BOX_BODY#` and `#FORM_CLOSE#` must appear after the `#BOX_BODY#` substitution string.
`#FORM_OPEN#`	Specifies where the HTML open form tag `<form>` is placed. You must include this substitution string in order to submit a form. You do not need to code your own form open; the Application Express engine does it for you.
`#GLOBAL_NOTIFICATION#`	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. **See Also:** "Global Notification" on page 4-13 for information about the Global Notification attribute

Table 10–4 (Cont.) Page Template Substitution Strings

Substitution String	Description
#HEAD#	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).
#LOGO#	Identifies an application logo. In the Logo section of the Edit Application page, you can identify an image and image attributes for an application logo. To utilize this feature, you must also include the #LOGO# substitution string in the Header or Body page template. **See Also:** "Logo" on page 4-13
#NAVIGATION_BAR#	Defines the existence of navigation bar entries. A navigation bar will appear on every page in your application that uses a template that includes this substitution string.You can expand this substitution string using the Navigation bar subtemplate. **See Also:** "Subtemplate" on page 10-30 for information about the Navigation Bar subtemplate
#NOTIFICATION_MESSAGE#	Enables developers to communicate messages to the user. Defines where a summary of inline error messages is displayed. Inline error messages can be displayed next to a field, inline in the notification area, or both.
#ONLOAD#	Can be used in the Header and Footer section of the page template and should be placed inside the <body> html tag. For example: <body #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.
#PARENT_TAB_CELLS#	Identifies the display of parent tabs. Parent tabs require standard tabs. If your application only has one level of tabs, you do not need this substitution string. **See Also:** "Standard Tab Attributes" on page 10-30 for information about defining Parent Tab Attributes
#REGION_POSITION_NN#	Identifies the exact placement of regions within a page. If no region is specified (for example, #REGION_POSITION_01#), then #REGION_POSITION_01# will be replaced with nothing.
#SUCCESS_MESSAGE#	Defines where in the 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.
#TAB_CELLS#	Identifies the display of standard tabs. **See Also:** "Standard Tab Attributes" on page 10-30
#TITLE#	Defines the page title. Typically included within HTML title tags.

See Also: ""Understanding Substitution Strings" on page 2-15and "Managing Pages in an Application" on page 6-8

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. Note that 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 Template**.

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 will display or execute immediately after this section in the template that is rendered. For example:

```
<html>
 <head>
   <title>#TITLE#</title>
   #HEAD#
 </head>
```

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. See item Help for information about supported substitution strings.

At a minimum, you must include the `#BOX_BODY#` substitution string. It is recommended that you also include the `#FORM_OPEN#` and `#FORM_CLOSE#` substitution strings. For example:

```
<body #ONLOAD#>
   #FORM_OPEN#
   #BOX_BODY#
   #FORM_CLOSE#
</body>
```

Footer is the third section in the page template that displays after the Body.

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.

Subtemplate Use Subtemplate to specify how a component should display. Available subtemplates include:

- **Success Message.** Expands the `#SUCCESS_MESSAGE#` substitution string. You can define a success message either programmatically or as an attribute of a process. If a success message exists and if the page template includes the `#SUCCESS_MESSAGE#` substitution string, then this subtemplate is used to render the message.
- **Navigation Bar.** Controls the display of navigation bar entries. Enter HTML or text to be substituted when the `#NAVIGATION_BAR#` substitution string is referenced in the template header, body, or footer. Use the `#BAR_BODY#` substitution string to identify where each navigation bar icon should display. In the following example, `#BAR_BODY#` substitution string will generate the appropriate HTML table cells:

  ```
  <table class="navBar"><tr>#BAR_BODY#</tr></table>
  ```

- **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 following substitution strings to create the navigation bar entry subtemplate.

  Use the following substitution strings to compose 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 will be 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. Use the substitution string `#MESSAGE#` to indicate where the body of the message will appear in the Notification Message.

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. For example:

  ```
  <td>#TAB_LABEL#</td>
  ```

- **Non Current Standard Tab.** Enter HTML or text that will be substituted for the unselected standard tabs. Use the `#TAB_TEXT#` substitution string to position a tab's label and link within the template. For example:

  ```
  <td><a href="#TAB_LINK#">#TAB_LABEL#</a></td>
  ```

See Also: "Creating Tabs" on page 8-1

Parent Tab Attributes You must populate this attribute if your application includes two levels of tabs. Enter HTML or text that will 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. See item Help for information about supported substitution strings.

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. Use the `#TAB_TEXT#` substitution string to position a tab's label and link within the template. For example:

  ```
  <td><a href="#TAB_LINK#">#TAB_LABEL#</a></td>
  ```

  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 that will be substituted for the unselected parent tabs. Use the `#TAB_TEXT#` substitution string to position a tab's label and link within the template. For example:

  ```
  <td><a href="#TAB_LINK#">#TAB_LABEL#</a></td>
  ```

  This attribute is part of the Parent Tab subtemplate and expands the `#PARENT_TAB_CELLS#` substitution string.

See Also: "Creating Tabs" on page 8-1

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.

Multi Column Region Table Attribute If the Application Express engine displays regions in multiple columns in the same region position, then Oracle Application Express will

render an HTML table. This attribute enables you to control the attributes of the `<table>` tag.

Error Page Template Control Use this attribute only when a page template is designated as an error template. Use the `#MESSAGE#` substitution string to place the error message and the `#BACK_LINK#` substitution string to display a link back to the previous page. Use the `#OK#` and `#RETURN_TO_APPLICATION#` substitution strings to return translated text strings. For example:

```
#MESSAGE#

<br>

<a href="#BACK_LINK#">back</a>
```

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.

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" on page 7-102, "Customizing Templates" on page 10-12, and "Managing Themes" on page 10-1

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. Note that 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 Template**.

Icon Use **Popup Icon** to specify 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. Use **Popup Icon Attr** to define image attributes, such as height and width, for the Popup Icon.

Use **Popup Color Picker Icon** to specify 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/htmldb/icons/palette.gif image`.

Use **Popup Color Picker Icon Attr** to specify 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 10–5 describes available Search Field attributes.

Table 10–5 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 `HTML INPUT TYPE = TEXT` widget using this width.
Filter Max Width	Displays the `HTML INPUT TYPE = TEXT` widget using this maximum width.
Filter Text Attribute	Displays the `HTML INPUT TYPE = TEXT` widget using these attributes. This will be 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. See item Help for more information.

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. See item Help for more information.

Pagination Defines how row count results display. See item Help for more information.

Result Set Use these attributes to define text or HTML to display before and after a result set. See item Help for more information.

Page Attributes Use these attributes to define popup pages. For more information, see item Help. See item Help for more information.

Region Templates

Region templates control the appearance and placement of region attributes. Region templates frequently use HTML tables to arrange content.

Region templates apply style elements to regions. Region templates display substitution strings. The only required substitution string, `#BODY#`, identifies where the source of the region should be placed. All other substitution strings are optional. You can use these substitution strings to indicate the existence and placement of a page control, such as a button, within the region.

> **See Also:** "Understanding Regions" on page 9-2, "Customizing Templates" on page 10-12, and "Managing Themes" on page 10-1

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. Note that 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#`
- `#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 will 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 2-15

Form Table Attributes Page items display within regions. Items are rendered as HTML form elements in an HTML table. With this template property, you can define attributes that will be placed in the <table> tag. For example:

```
class="instructiontext"
```

Sub Regions Sub Region **Header Templates** together with Sub Region **Header Entry Templates** provide the possibility to generate a list of region titles of all the sub regions of the current region. #ENTRIES# is the only required substitution string. It identifies where the sub region header entries should be placed. All other substitution strings are optional.

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: "Creating Reports" on page 7-1, "Customizing Templates" on page 10-12, and "Managing Themes" on page 10-1

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 run time 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. Note that 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 Template**.

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 is to 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.

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 10–6.

Table 10–6 Column Template Substitution Strings

Substitution String	Description
#ALIGNMENT#	Determines the column alignment. Specified by the user.
#COLCOUNT#	Defines the count of the number of columns.
#COLNUM#	Defines the current column number.
#COLUMN_HEADER#	Defines the column header.
#COLUMN_VALUE#	Replaced with the value of the column.
#ROWNUM#	Specifies the current row number.

Consider the following example:

```
<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
```

Note that 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 run time with the number of columns defined in the report.

Row Highlighting Use **Background color for checked row** to control the background color of a report row when the row selector is checked. Use **Background color for current row** to control 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 10–9 describes these templates.

Table 10–7 Pagination Subtemplate Attributes

Pagination Subtemplate Attribute	Description
Pagination Template	Applies to the entire pagination subtemplate. For example: `<span class="instructiontext">#TEXT#</span>` You can use the substitution string `#TEXT#` to specify where you want the pagination subtemplate to display. Use the other Pagination Subtemplate attributes to modify individual items.
Next Page Template	Enter HTML to modify how the Next Page portion of the pagination subtemplate appears. For example: `<a href="#LINK#">next</a>`
Previous Page Template	Enter HTML to modify how the Previous Page portion of the pagination subtemplate appears. For example: `<a href="#LINK#">previous</a>`
Next Set Template	Enter HTML to modify how the Next Set portion of the pagination subtemplate appears. For example: `<a href="#LINK#">next set</a>`
Previous Set Template	Enter HTML to modify how the Previous Set portion of the pagination subtemplate appears. For example: `<a href="#LINK#">previous set</a>`

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. Note that 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 10–8.

Table 10–8 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
```

Note that 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 run time 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 10–9 describes these templates.

Table 10–9 Pagination Subtemplate Attributes

Pagination Subtemplate Attribute	Description
Pagination Template	Applies to the entire pagination subtemplate. For example: `<span class="instructiontext">#TEXT#</span>` You can use the substitution string `#TEXT#` to specify where you want the pagination subtemplate to display. Use the other Pagination Subtemplate attributes to modify individual items.

Table 10–9 (Cont.) Pagination Subtemplate Attributes

Pagination Subtemplate Attribute	Description
Next Page Template	Enter HTML to modify how the Next Page portion of the pagination subtemplate appears. For example: `<a href="#LINK#">next</a>`
Previous Page Template	Enter HTML to modify how the Previous Page portion of the pagination subtemplate appears. For example: `<a href="#LINK#">previous</a>`
Next Set Template	Enter HTML to modify how the Next Set portion of the pagination subtemplate appears. For example: `<a href="#LINK#">next set</a>`
Previous Set Template	Enter HTML to modify how the Previous Set portion of the pagination subtemplate appears. For example: `<a href="#LINK#">previous set</a>`

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 9-2

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 10-43.
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.

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 (wild card characters are implied) and then click **Go**.
- **Go button** - Executes a search or applies a filter.
- **View icons**. Use this control to toggle between icon, report, or details views. To change the view, click these icons:
  - **View Icons** (default) 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 "Using the Actions Menu" on page 7-6.

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 10-43, "Creating a New Template" on page 10-14, "Managing Templates" on page 10-15, "Page Templates" on page 10-26, "APP_IMAGES" on page 2-18, and "WORKSPACE_IMAGES" on page 2-26

11

Debugging an Application

This section describes approaches to debugging an application including 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: "Application Builder Concepts" on page 2-1 and "Using Application Builder" on page 4-1

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 utilize 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 2-14.
- 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 2-15.

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 quailty assurance.

Running Advisor on an Entire Application

To run Advisor on an entire application:

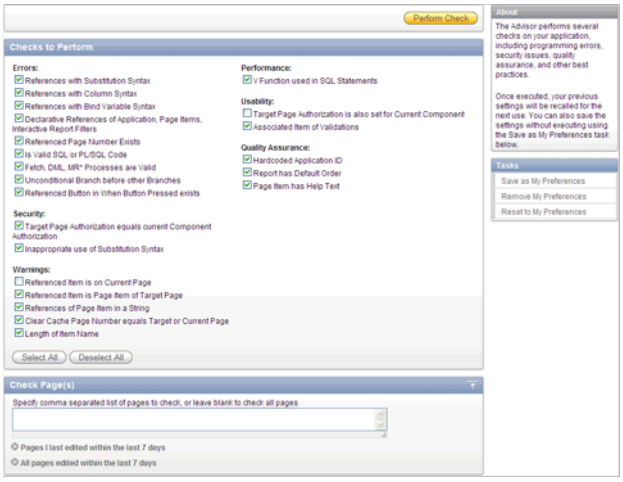
1. Navigate to the appropriate application:
   a. On the Workspace home page, click the **Application Builder** icon.

      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.



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 5-19, "Viewing Session State" on page 2-6, "Managing Session State Values" on page 2-11, 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. The debug mode for the current page and sessions is enabled and disabled by clicking the Debug and No Debug links in the Developer Toolbar. Debug reports are viewed by clicking the **View Debug** link in the Developer Toolbar.



See Also: "About the Developer Toolbar" on page 5-19

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`. For example:

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

See Also: "Using f?p Syntax to Link Pages" on page 2-8

Enabling and Disabling Debugging Mode

You enable and disable debug mode by clicking **Debug** and **No Debug** on the Developer Toolbar. By default, Debugging mode is disabled.

To enable or disable Debug mode:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an 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**.

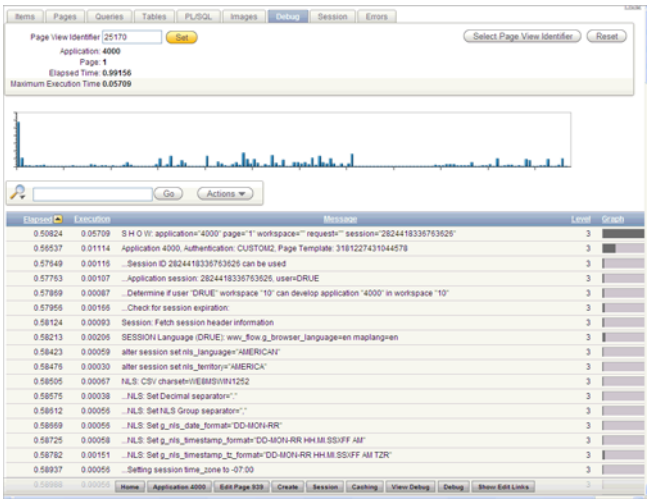
Viewing Debug Reports

To view a debug report:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.
3. In the Developer Toolbar, click **View Debug**.

   The list of Debug reports displays.
4. To view the Debug report for a particular session, click the View Identifier to the left of the session you want to view.

   The session's Debug report appears.



5. To view steps that took the longest, hover over that step on the graph above the report.

   The step details display.

6. To go to that step in the report, click on 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:** "Using Application Tracing Tools" in *Oracle Database Performance 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 a number of page and application reports.

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.
   - **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.
   - **Templates** contains links to reports of templates used within the current application.
   - **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 5-2.
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 5-2, "Editing a Page in Component View" on page 5-12, "Understanding Conditional Rendering and Processing" on page 2-3, and "Running a Page or Application" on page 6-13

12

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 4-1

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 11g
- Enabling Indexing of Online Help in Oracle Database 11gR2 and Higher

Security Considerations When Using the Embedded PL/SQL Gateway

The embedded PL/SQL gateway runs in the database as part of the XML DB HTTP Protocol Listener. The XML DB HTTP Protocol 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, it is not recommended to use 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 `wwv_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" 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 on the Manage Service 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 Password Policies," and "Enabling 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
     ```

2. Execute the following statement:

   ```
   ALTER SESSION SET CURRENT_SCHEMA = APEX_040000;
   ```

3. Execute the following statement:

```
BEGIN
APEX_INSTANCE_ADMIN.SET_PARAMETER('PASSWORD_HISTORY_DAYS',365);
COMMIT;
END;
/
```

This will restrict 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 4.0.

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 4-19. 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 11*g*

By default, the ability to interact with network services is disabled in Oracle Database 11*g* release 1 (11.1). Therefore, if you are running Oracle Application Express with Oracle Database 11*g* release 1 (11.1), you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_040000` 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.
- Searching for content in online Help (that is, using the Find link).

Topics:

- Granting Connect Privileges to a Host
- Granting Connect Privileges to a Local Host
- 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 an 11*g* database will have the parameter set properly, but a database upgraded to 11*g* 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 to a Host

The following example demonstrates how to grant connect privileges to a host for the `APEX_040000` database user.

```
DECLARE
  ACL_PATH  VARCHAR2(4000);
  ACL_ID    RAW(16);
BEGIN
  -- Look for the ACL currently assigned to '*' and give APEX_040000
  -- the "connect" privilege if APEX_040000 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, make sure 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_040000'
```

```
  -- 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_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', 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_040000', TRUE, 'connect');
  DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('power_users.xml','*');
END;
/
COMMIT;
```

Granting Connect Privileges to a Local Host

The following example is a less privileged demonstration of how to access resources on a local host. This example would enable indexing of 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_040000
  -- the "connect" privilege if APEX_040000 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, make sure 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_040000'
  -- 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_040000',
     'connect') IS NULL THEN
      DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
     'APEX_040000', 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_040000', 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_040000 user. See "Granting Connect Privileges to a Host" on page 12-5.

Enabling Indexing of Online Help in Oracle Database 11gR2 and Higher

The ability to search Oracle Application Express online Help is accomplished through Oracle Text and a URL datastore. There is a change in the default behavior and permissions to use an Oracle Text URL datastore in database 11gR2 and higher.

If users attempt to search Oracle Application Express online Help in Oracle database 11gR2 and encounter the following error, then the permission to use an Oracle Text URL datastore has not been granted to database user APEX_040000.

```
ORA-29855: error occurred in the execution of ODCIINDEXCREATE routine
ORA-20000: Oracle Text error:
DRG-10758: index owner does not have the privilege to use file or URL datastore
```

To enable the indexing of online Help in Oracle Application Express, the permission to use an Oracle Text URL datastore must be granted to the APEX_040000 database user. This is accomplished by assigning this specific privilege to a database role and then granting this role to the APEX_040000 database user.

To determine if the ability to use an Oracle Text URL datastore is already granted to a database role:

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. Run the following command:

   ```
   SELECT par_value FROM ctxsys.ctx_parameters WHERE par_name = 'FILE_ACCESS_
   ROLE';
   ```

   This returns either NULL or the database role which is granted the ability to use an Oracle Text URL datastore.

3. If no value is returned by step 2, then create a new database role as shown in the following example:

   ```
   CREATE ROLE APEX_URL_DATASTORE_ROLE;
   ```

4. Grant this role to the database user APEX_040000 with the following statement:

   ```
   GRANT APEX_URL_DATASTORE_ROLE to APEX_040000;
   ```

If step 2 returned a value, use this database role name instead of the example *APEX_URL_DATASTORE_ROLE*.

5. Lastly, if step 2 did not return a value, then use the Oracle Text API to grant permission to the newly created database role with the following statement:

```
EXEC ctxsys.ctx_adm.set_parameter('file_access_role', 'APEX_URL_DATASTORE_
ROLE');
```

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
- About Using Zero as a Session ID
- 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 items of type password, 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.

Available password item type attributes include:

- **Value Required** - If set to Yes and the page item is visible, Application Express will automatically perform 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 12-13.

See Also: "About Item Types" on page A-1

Identifying At Risk Password Items

At risk password items are those that either:

- Do not use one of the password item types 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 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. To learn more about this attribute, see Table 5–8, " Validation Methods".

About Using Zero as a Session ID

When users access Oracle Application Express application pages, numerous links containing session IDs become visible in the Web browser's location window. If the application is publicly accessible and the user communicates one of these links to another application user, for example by using email or a messaging service, the recipient can use the link and immediately begin sharing the original user's session. This can have a negative effect on both users as they use the application and lead to unpredictable, hard to reproduce screen behavior. To prevent this, Oracle recommends the use of the Zero Session ID feature for all applications where users are not required to provide login authentication. To learn more, see "Facilitating Bookmarks by Using Zero as the Session ID" on page 2-10.

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

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 6-28

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 `htp.p` or other methods should be explicitly escaped by the code where it is appropriate to do so. For example, suppose a PL/SQL dynamic content region on a page uses the following:

```
htp.p(v('SOME_ITEM'));
```

If the value of the item fetched from session state could contain unintended tags or scripts, you might want to use the following in the region:

```
htp.p(htf.escape_sc(v('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 need to 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 one of the safe types described in "About Safe Item Display Types" on page 12-12.

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 in order to support the intended behavior of each display type.

Some item types have the flag Escape special characters in the Security region where the developer can specify if the value should be escaped or not. The default is set to Yes. If you want to display HTML code you should set this flag to No.

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 checksums 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 will not change existing security attribute settings, but those attributes will be ignored at run time.

About the Expire Bookmarks Button Enabling Session State Protection affects whether bookmarked links to the current application will work. Consider the following rules:

1. Bookmarked links created after Session State Protection is enabled will work if the bookmarked link contains a checksum.
2. Bookmarked links created before Session State Protection is enabled will not work if the bookmarked link contains a checksum.
3. Bookmarks that do not contain checksums or contain unnecessary checksums will not be 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 will not change existing security attribute settings, but those attributes will be ignored at run time.

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 will then be 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 12-14.

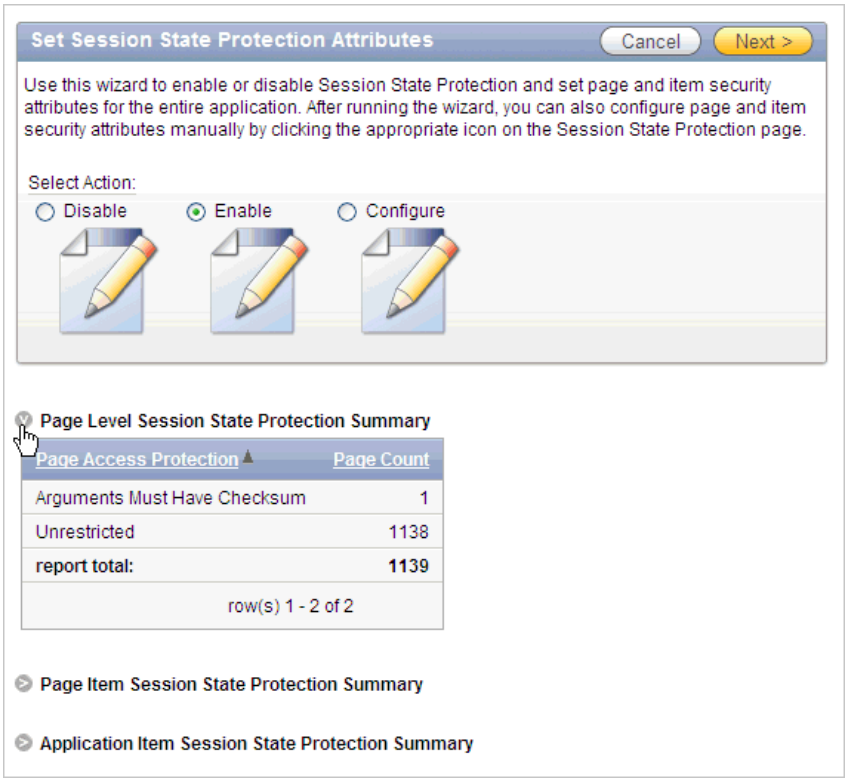
Reviewing Existing Session State Protection Settings You can review a summary of Session State Protection settings for pages, items, and application items on the first page of the Session State Protection wizard.

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



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**.

   The Session State Protection wizard appears.
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.
   - **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 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.

- **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.

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.
   - **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: 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. 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.
   - **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 (wild card 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 "Using the Actions Menu" on page 7-6.
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.
   - **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.

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.
   - **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. 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. 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 (wild card 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 "Using the Actions Menu" on page 7-6.
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.
   - **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.
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.
   - **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. 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. 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 (wild card 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 "Using the Actions Menu" on page 7-6.
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.
   - **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. A user-level checksum or a session-level checksum will also suffice (see next bullets). Use this option when you want to allow the item to be set only by URLs having checksums that were generated by any user running the same application in the current workspace but in a different session.
- **Checksum Required: User Level** - The item's session state may be set by passing the item name/value in a URL if a checksum specific to the workspace, application, and user is provided. A session-level checksum will also suffice (see next bullet). Use this option when you want to allow the item to be set only by URLs having checksums that were generated by the same named user, running the same application in the current workspace but in a different session.
- **Checksum Required: Session Level** - The item's session state may be set by passing the item name/value in a URL if a checksum specific to the current session is provided. Use this option when you want to allow this item to be set only by URLs having checksums that were generated in the current session.

6. 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 14-40 or use the methods described in Oracle Application Express How To Documents for file upload on OTN at:

`http://www.oracle.com/technology/products/database/application_express/howtos/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 6-28 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 identify 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 a number of 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
- Using Preconfigured Authentication Schemes
- About Creating an Authentication Scheme from Scratch
- Managing Existing Authentication Schemes
- Viewing the Authentication Scheme Associated with an Application
- Changing the Authentication Scheme Associated with an Application
- Viewing Authentication Scheme Utilization Report

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 needs to track each user individually, you need to 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:

- From PL/SQL:

  ```
  V('APP_USER')
  ```

- As a bind variable from either PL/SQL or SQL:

  ```
  :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 2-20 and "Configuring Security Attributes" on page 4-16

Determining Whether to Include Authentication

As you create your application, you need to 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 10*g*iAS, Oracle Internet Directory, or other external services. See "Using Preconfigured Authentication Schemes" on page 12-28 and "Changing the Authentication Scheme Associated with an Application" on page 12-35.
- **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 12-36.

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:
   - **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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.

- **View icons**. Use this control to toggle between Icons and Report views. To change the view, click these icons:
  - **View Icons** (default) displays each scheme as a large icon.
  - **View Report** displays information in a report. To view the events in a flow chart, click the **Show** icon under the Flow Chart column.
- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

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 preconfigured scheme**. See "Managing Existing Authentication Schemes" on page 12-34.
   - **As a copy of an existing scheme**
   - **From scratch**
8. Follow the on-screen instructions.

See Also: "Using Preconfigured Authentication Schemes" on page 12-28 and "About Creating an Authentication Scheme from Scratch" on page 12-32

Using Preconfigured Authentication Schemes

When you select a preconfigured authentication scheme, Oracle Application Express creates an authentication scheme for your application that follows a standard behavior for authentication and session management.

Topics:

- Open Door Credentials
- Oracle Application Express Account Credentials
- Database Account Credentials
- LDAP Credentials Verification
- DAD Credentials Verification
- Single Sign-On Server Verification

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**.
7. From Gallery, select **Show Login Page and Use Open Door Credentials.**
8. Specify a login page and click **Next**.
9. Enter a name and click **Create Scheme**.

Oracle Application Express Account Credentials

Oracle Application Express Account Credentials are internal user accounts (also known as "cookie 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 Account Credentials 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 need to get a group of users up and running on a new application quickly.

Setting Up Application Express Account Credentials To set up Application Express 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**.
7. From Gallery, select **Show Login Page and Use Application Express Account Credentials.**
8. Specify a login page and click **Next**.
9. Enter a name and click **Create Scheme**.

Database Account Credentials

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**.
7. From Gallery, select **Show Login Page and Use Database Account Credentials.**
8. Specify a login page and click **Next**.
9. Enter a name and click **Create Scheme**.

LDAP Credentials 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, whether or not 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 Credentials Verification To set up LDAP 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**.
7. From Gallery, select **Show Login Page and Use LDAP Directory Credentials**.
8. Specify a login page and click **Next**.
9. Specify the following and click **Next**.
   a. LDAP Host
   b. LDAP Port
   c. Use SSL
   d. Use Exact DN
   e. LDAP Distinguished Name (DN) String
   f. (Optional) Search Filer

g. (Optional) LDAP Username Edit Function

To view help for a specific item, click the item label. When help is available, the item label changes to red when you pass your cursor over it and the cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

10. Enter a name and click **Create Scheme**.

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 Administrator's Guide*.

DAD Credentials Verification

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 need to 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**.

7. From Gallery, select **No Authentication (using DAD)**.
8. Enter a name and click **Create Scheme**.

Single Sign-On Server Verification

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. To accomplish this, you must register your application (or register the Application Express engine) as the partner application. To do so, follow 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**.
7. From Gallery, select one of the following:
   - **Oracle Application Server Single Sign-On (Application Express engine as Partner App)** 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 Server Single Sign-On (My application as Partner App)** delegates authentication to the SSO server. Requires that you register an application with SSO as a partner application.
8. Enter a name and click **Create Scheme**.

About Creating an Authentication Scheme from Scratch

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 delegate all aspects of user authentication to external services such as Oracle 10*g*AS Single Sign-On.
- 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).

> **See Also:** "APEX_CUSTOM_AUTH" in *Oracle Application Express API Reference*

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.

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 will be 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.

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:
   - **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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.
   - **View icons**. Use this control to toggle between icon and report views. To change the view, click these icons:
     - **View Icons** (default) displays each scheme as a large icon.
     - **View Report** displays information in a report. To view the events in a flow chart, click the **Show** icon under the Flow Chart column.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.
6. To edit a specific authentication scheme, select it.

   The Authentication Scheme page appears.
7. 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 link to the Authentication Scheme pages, select the scheme name.

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 **Change Current** tab at the top of the page.
3. From Available Authentication Schemes, select a new authentication scheme and click **Next**.
4. Click **Make Current**.

Viewing Authentication Scheme Utilization Report

The Authentication Schemes report lists authentication scheme utilization for all applications in the current workspace.

To view the Authentication Schemes report:

1. On the Workspace home page, click the **Application Builder** icon.
2. Select an application.

   The Application home page appears.
3. Click **Cross Application Reports**.
4. Select **Authentication Schemes**.

   A report appears displaying each application ID, name, authentication scheme name, status, and description.

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 12-37

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:
   - **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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.
   - **View icons**. Use this control to toggle between icon and report views. To change the view, click these icons:
     - **View Icons** (default) displays each scheme as a large icon.
     - **View Report** displays information in a report. To view the events in a flow chart, click the **Show** icon under the Flow Chart column.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

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, 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.

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. Under Page Rendering, locate the section with the title of Page.



5. Click **Edit page attributes** icon.
6. 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**
   - **Utilization**

Subscription

Use the Authorization Scheme Subscription report to view details about authorization schemes subscription.

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**

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Deploying an Application

This section describes how to package an 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 Development Instance
- How to Create a 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 14-1 and "Managing Application Express Users" in *Oracle Application Express Administration Guide*

About the Oracle Application Express Application Development Life Cycle

When developing applications using Application Builder, you need to 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 a number of 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. One of the primary problems 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 protoypes 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 Development Instance" on page 4.
2. Move the supporting objects. Review the Database Object Dependencies report to determine what objects to move. See "About the Database Object Dependencies Report" on page 6-54 and "How to Create a Packaged Application" on page 13-5.

Topics:

- Deployment Options to Consider
- Deciding Whether to Copy a Workspace
- Deciding Whether to Copy a Database
- About the Application ID

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.

During the deployment process, you must decide whether you want to use the existing application ID, the existing workspace, the existing database, the existing Oracle HTTP Server, or create new ones. Deployment options to consider include:

1. **Create Application Express End Users.** The simplest way to deploy an application is to create Application Express end users and then send the URL and login information to users. This approach works well for applications with a small and tolerant user population. See "About Publishing the Database Application URL" on page 13-32 and "Managing Application Express Users" in *Oracle Application Express Administration Guide*.
2. **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.
3. **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.
4. **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 will need to have the database objects required by your application. See "About the Database Object Dependencies Report" on page 6-54.
5. **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 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 the application subscribes to other Oracle Application Express objects within the workspace.
- 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 4-10 for information about defining an application alias and "About Built-in Substitution Strings" on page 2-16 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 or Oracle HTTP Server and mod_plsql. 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 "Choosing a HTTP Server" in the appropriate installation guide for your operating environment. See "Related Documents" on page -xix.

How to Move an Application to Another Development 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 "About the Database Object Dependencies Report" on page 6-54.
2. Package an application definition with its supporting objects to create a packaged application. See "How to Create a Packaged Application" on page 13-5.
3. Import the exported files into the target Oracle Application Express instance. See "Importing Export Files" on page 13-23.

   Note that if the target instance is a different schema, you also need to export and import any required database objects.
4. Install the exported files from Export Repository. See "Installing Export Files" on page 13-29.

You can import an application into your workspace regardless of the workspace in which it was developed. See "Deployment Options to Consider" on page 13-3.

> **Tip:** You can also move the application definition and all supporting objects manually. See "Exporting an Application and Related Files" on page 13-12.

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:** "About the Database Object Dependencies Report" on page 6-54 and "How to Create a Packaged Application" on page 13-5

If the target schema is different from the schema used in the development environment, you need to 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:** "Loading and Unloading Data from the Database" in *Oracle Application Express SQL Workshop Guide*

How to Create a Packaged Application

You can greatly simplify the steps needed to deploy an application by creating a packaged application on the Supporting Objects page.

> **See Also:** "How to Move an Application to Another Development Instance" on page 13-4 and "Exporting an Application and Related Files" on page 13-12

Topics:

- How a Packaged Application Simplifies Deployment
- Creating a Packaged Application
- Adding Installation Scripts for an Image, Cascading Style Sheet, or Static File
- Adding an Access Control List to a Packaged Application
- Installing Supporting Objects
- Deleting Supporting Objects Scripts, Messages, and Installation Options
- Upgrading a Packaged Application
- Deinstalling Supporting Objects
- Viewing an Install Summary

How a Packaged Application Simplifies Deployment

From a user'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 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 a number of advantages:

- Ensures that the supporting objects are created in the correct order.
- Provides users with 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 13-9.
- 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 13-11.
- Enables users and developers with an easy way to upgrade a previously released packaged application. See "Upgrading a Packaged Application" on page 13-10.

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 Packaged Application

To create a 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 packaged application on the Supporting Objects page.

To access the Supporting Objects Page application:

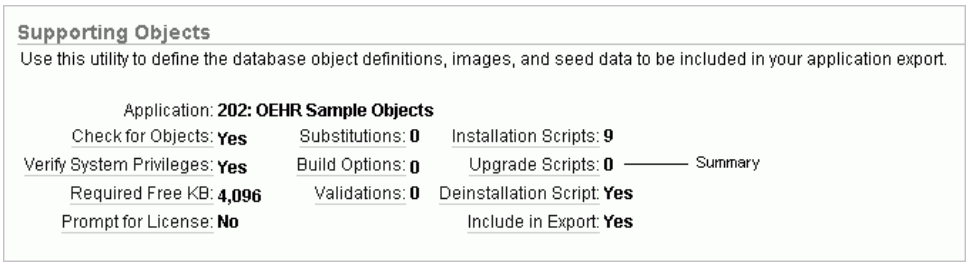
1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.

   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.



The rest of the page is divided into four 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 4-13.

  When packaging an application, you can include prompts for substitution strings which users can specify when they install the 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 13-33 and "Exporting Build Options or Build Option Status" on page 13-35.

  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 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**. Allows 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>`.

  Note that when these messages display, only a limited set of HTML tags are recognized in order to prevent a cross site-scripting (XSS) attack. See "Understanding Cross-Site Scripting Protection" on page 12-11.

Upgrade Use the links under Installation 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 Packaged Application" on page 13-10.
- **Upgrade Message**. Allows 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>`.

Note that when these messages display, only a limited set of HTML tags are recognized in order to prevent a cross site-scripting (XSS) attack. See "Understanding Cross-Site Scripting Protection" on page 12-11.

Deinstallation Use the links under Installation to define the following types of information:

- Deinstallation. 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>`.

  Note that when these messages display, only a limited set of HTML tags are recognized in order to prevent a cross site-scripting (XSS) attack. See "Understanding Cross-Site Scripting Protection" on page 12-11.

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 already exist), which removes the selected files when the application's supporting objects are deinstalled.

> **See Also:** "Using Custom Cascading Style Sheets" on page 10-42, "Managing Images" on page 9-18, and "Managing Static Files" on page 9-21

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 packaged application and click **Create Script**.

Adding an Access Control List to a 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 packaged application:

1. Create an access control list. See "Controlling Access to Applications, Pages, and Page Components" on page 7-118.
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 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 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 Packaged Application

You can define scripts to upgrade a previously published application on the Upgrade page.

Topics:

- Defining an Upgrade Script
- Upgrading a 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 need to be upgraded.
5. In Query to Detect Existing Supporting Objects, enter a query in the field provided that returns at least one row if the supporting objects exist.

   This query determines whether the user who installs the 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 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 packaged application.

To upgrade a packaged application:

1. Import a new version of application to be upgraded (if applicable). See "Importing an Application, Page or Component Export" on page 13-23.
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 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 Packaged Application" on page 13-6.

To deinstall a 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. 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:

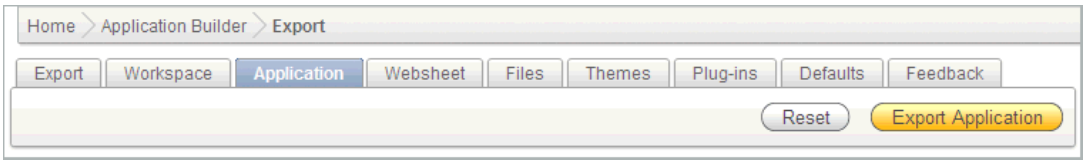
1. On the Workspace home page, click the **Application Builder** icon.
2. Select the application.
3. Click **Supporting Objects**.

   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 and import application definitions and all associated files using the Export, Workspace, Application, Websheet, Files, Themes, Plug-ins, Defaults and Feedback tabs located at the top of the Export page.



It is not necessary to export a 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 Development Instance" on page 13-4.

> **Tip:** You can simplify the steps needed to deploy an application by creating a packaged application. See "How to Create a Packaged Application" on page 13-5.

Topics:

- Where Images, CSS, and Script Files Are Stored
- Exporting an Application
- Exporting Application Components
- Exporting a Websheet
- Exporting a Page in an Application
- Exporting a Websheet
- Exporting Cascading Style Sheets
- Exporting Images
- Exporting Static Files
- Exporting Script Files
- Exporting Themes
- Exporting Plug-ins
- Exporting User Interface Defaults
- Exporting Feedback

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:

- Where Images, CSS, and Script Files Are Stored When Using Oracle HTTP Server
- Where Images, CSS, and Script Files Are Stored When Using the Embedded PL/SQL Gateway

Where Images, CSS, and Script Files Are Stored When Using Oracle HTTP Server

In an Oracle HTTP Server or Oracle Application Server 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/`:

- Oracle9*i* HTTP Server Release 2—see the `httpd.conf` file.
- Oracle HTTP Server distributed with Oracle Database 11*g*—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*

Where Images, CSS, and Script Files Are Stored 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 13-15

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**.
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 will be 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 13-33. 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 Packaged Application" on page 13-5.
- Export Public Interactive Reports. See "Saving a Report" on page 7-16.
- Export Private Interactive Reports. See "Saving a Report" on page 7-16.
- Export Interactive Report Subscriptions. See "Subscribing to Emailed Reports" on page 7-19.
- Export Developer Comments. See "Adding Developer Comments" on page 6-21.

To learn more about a specific attribute, click the item label. When Help is available, the item label changes to red when you pass your cursor over it and the

cursor changes to an arrow and question mark. See "About Field-Level Help" on page 1-12.

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 11-5

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 13-13, "Exporting a Page in an Application" on page 13-17, "Importing an Application, Page or Component Export" on page 13-23, and "Exporting Build Options or Build Option Status" on page 13-35

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 5-36 and "Exporting Build Options or Build Option Status" on page 13-35.
   - **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.
   - **Application Attributes** displays application attributes. Press **CTRL** or **SHIFT** to select multiple attributes. See "About the Edit Application Page" on page 4-9.
   - **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 13-35.
3. Click **Add to Export**.
4. Click **Next**.

5. On Components to Export:
   a. From File Format, select how rows in the export file will be 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**.
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 will be 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

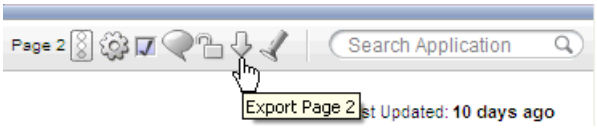
You can also export a specific page within an application by clicking the Export page icon on the Page Definition. When exporting a page, remember that exported pages

can only be imported sucessfully if they have the same application ID and workspace ID.

> **See Also:** "Exporting Application Components" on page 13-15, "Exporting an Application" on page 13-13, and "Importing an Application, Page or Component Export" on page 13-23

To export a page in an application:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
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 will be 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.

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**.
2. On the Export page, click **CSS**.
3. On the Export Cascading Style Sheets page, select the following:
   a. Stylesheets - Select the cascading style sheets to export.
   b. File Format - Select how rows in the export file will be 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 13-26 and "Using Custom Cascading Style Sheets" on page 10-42

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**.
2. On the Export page, click **Images**.
3. On the Export Images page, select the following:
   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 will be 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 13-27, "Managing Images" on page 9-18, and "Using the Images Finder" on page 7-117

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**.
2. On the Export page, click **Files**.
3. On Export Static Files page, select the following:
   a. Static Files - Select the files to export.
   b. File Format - Select how rows in the export file will be 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

Note that 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 13-28and "Managing Themes" on page 10-1

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**.
2. Click the **Themes** tab at the top of the page.
3. On the Export Application Theme page, select the following:
   a. Export Theme - Select the theme to export.
   b. File Format - Select how rows in the export file will be 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 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**.

   The Export page appears.
6. On the Export Theme page, select the following:
   a. Export Theme - Select the theme to export.
   b. File Format - Select how rows in the export file will be 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 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**.
2. Click the **Plug-ins** tab at the top of the page.
3. On the Export Plug-in page, select the following:
   a. Export Plug-in - Select the plug-in to export.
   b. File Format - Select how rows in the export file will be 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 Plug-in**.

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*

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 13-28 and See "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**.
2. On the Export page, click **User Interface Defaults**.
3. On the Export User Interface Defaults - Table Dictionary page, select the following:
   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 will be 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. For Schema, select the schema that owns the table associated with the Attribute Dictionary.
6. 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** link.
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 isdentified 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**.
2. On the Export page, click the **Feedback** tab.
3. For Export Feedback:
   - 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.

Importing Export Files

Once you export an application and any related files, you need to import them into the target Oracle Application Express instance before you can install them. As a general rule, always import the application first and then the related files. See "How to Move an Application to Another Development Instance" on page 13-4.

> **Tip:** You can simplify the steps needed to deploy an application by creating a packaged application. See "How to Create a Packaged Application" on page 13-5.

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, specify the following:
   a. Import file - Click **Browse** and 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 an imported file, click **Next**.

   The Install Application wizard appears.
4. In the Install Application wizard, specify the following:
   a. Parsing Schema - Select a schema.

This is the schema against which all of the application's SQL and PL/SQL will be 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 packaged application (that is, one for which you have defined Supporting Objects), the installer prompts you to install the packaged installation scripts. Follow the on-screen instructions.

   See Also: "How to Create a Packaged Application" on page 13-5

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 machine, 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 machine then a new application group is created. The new application group will use 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 will be generated.

Importing a Websheet

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, specify the following:
   a. Import file - Click **Browse** and navigate to the file.
   b. File Type - Select **Websheet Application 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 an imported file, click **Next**.

   The Install Application wizard appears.
4. In the Install Application wizard, specify the following:
   a. Parsing Schema - Select a schema.

      This is the schema against which all of the application's SQL and PL/SQL will be 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 packaged application (that is, one for which you have defined Supporting Objects), the installer prompts you to install the packaged installation scripts. Follow the on-screen instructions.

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, specify the following:
   a. Import file - Click **Browse** and 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 already 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, select the following:
   a. Import file - Click **Browse** and 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 10-42 and "Exporting Cascading Style Sheets" on page 13-18

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, select the following:
   a. Import file - Click **Browse** and 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 9-18, "Using the Images Finder" on page 7-117, and "Exporting Images" on page 13-18

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, select the following:
   a. Import file - Click **Browse** and 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 13-19

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 - Click **Browse** and 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 10-1 and "Exporting Themes" on page 13-18

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, select the following:
   a. Import file - Click **Browse** and 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 13-21

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 packaged application. See "How to Create a Packaged Application" on page 13-5.

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. Under General Utilities, 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:
   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 Tasks list, click **Manage Export Repository**.

The Export Repository appears.

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 will be 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" *Oracle Application Express Administration Guide*.

c. Install As Application - Select one of the following:

– **Reuse Application ID from Export File**

– **Auto Assign New Application ID**

– **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 Packaged Application

If you are installing a packaged application, the installer prompts you to install the packaged installation scripts. Follow the on-screen instructions.

See Also: "How to Create a Packaged Application" on page 13-5

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.

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 Tasks list, click **Manage Export Repository**.

The Export Repository appears.

2. Select the file to be installed and click **Install** in the Action column.
3. Follow the on-screen instructions and click the **Install** button.

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.
   a. On the Workspace home page, click the **Application Builder** icon.
   b. Select an application.
   c. On the Tasks list, click **Manage Export Repository**.

   The Export Repository appears.
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 will be 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 will be overwritten.

Topics:

- Verifying If Source and Target Workspace IDs Are Identical
- Using SQL*Plus to Install Export Files

Verifying If Source and Target Workspace IDs Are Identical

You can verify that the source and target workspaces are identical by running a query in SQL Command Processor.

To verify that the source and target workspaces are identical:

1. Log in to the source workspace.
2. Click the **SQL Workshop** icon on the Workspace home page.
3. Click **SQL Commands**.
4. Enter the following in the SQL editor pane and click **Run**:

   ```
   SELECT &WORKSPACE_ID. FROM DUAL
   ```

5. Note the workspace ID.
6. Log in to the target workspace.
7. Repeat steps 2 through 5 to verify the workspace IDs match.

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 names 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 positioning the mouse over the **Run** icon on the Application home page. The URL displays in the status bar at the bottom of the page.

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.

See Also: "Accessing the Edit Security Attributes Page" on page 4-16

About Publishing the Websheet Application URL

Once you have installed your Websheet application, you can publish your production URL.

You can determine the URL to your Websheet application by clicking a 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
```

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 Edit 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.

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 run time. 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: See "Changing Application Build Status Set During Deployment" in *Oracle Application Express Administration Guide*.

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 Builder 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 run time. 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 Builder 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:
   - **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 (wild card characters are implied) and then click **Go**.
   - **Go button** - Executes a search or applies a filter.
   - **View icons**. Use this control to toggle between icon and report views. To change the view, click these icons:
     - **View Icons** (default) displays each navigation bar entry as a large icon.
     - **View Report** displays each navigation bar entry as a line in a report.
   - **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.
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 5-20

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.

To accomplish this, you associate 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 Packaged Application" on page 13-5 and "Exporting Application Components" on page 13-15

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 will be 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. Select an application.
   d. On the Application Builder home page, click **Shared Components**.
   e. 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**.

14

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
- About Screen Reader Mode

> **See Also:** *Oracle Application Express API Reference* and "Deploying an Application" on page 13-1

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` will be 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 needs to 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 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 in order 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. All Application Programming Interface packages for Application Express are described in the Oracle Application Express API Reference.

> **See Also:** "APEX_MAIL" in *Oracle Application Express API Reference* and "Managing Mail" 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`. All Application Programming Interface packages for Application Express are described in the 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 run-time 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 14–1 describes the columns in the APEX_ACTIVITY_LOG view.

Table 14–1 Columns in APEX_ACTIVITY_LOG

Column	Type	Description
time_stamp	DATE	Date and time that activity was logged at the end of the page view.
component_type	VARCHAR2(255)	Reserved for future use.
component_name	VARCHAR2(255)	Reserved for future use.
component_attribute	VARCHAR2(4000)	Title of page.
information	VARCHAR2(4000)	Reserved for future use.
elap	NUMBER	Elapsed time of page view in seconds.
num_rows	NUMBER	Number of rows processed on page.
userid	VARCHAR2(255)	User ID performing page view.
ip_address	VARCHAR2(4000)	IP address of client.
ir_report_id	NUMBER	Interactive report ID
ir_search	VARCHAR2	Interactive report search criteria entered by users.
user_agent	VARCHAR2(4000)	Web browser user agent of client.
flow_id	NUMBER	Application ID.
step_id	NUMBER	Page number.
session_id	NUMBER	Oracle Application Express session identifier.
sqlerrm	VARCHAR2(4000)	SQL Error message.
sqlerrm_component_type	VARCHAR2(255)	Reserved for future use.
sqlerrm_component_name	VARCHAR2(255)	Reserved for future use.

To conserve space in the activity log, only the first log entry of each unique session will contain 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 of this, logging information is only as current as the oldest available entry in the logs. If you want 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 4-10 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 14–2 describes the functions available in the APEX_PLSQL_JOB package.

Table 14–2 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.

All Application Programming Interface packages for Application Express are described in the 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 will be assigned to this process as it is submitted to APEX_PLSQL_JOB. By specifying this reserved item inside your process code, it will be 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 will not be 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 update will 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 are running Oracle Application Express with Oracle Database 11*g* Release 1 (11.1), you must enable network services in order to use Web services. See "Enabling Network Services in Oracle Database 11g" on page 12-5

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 utilize 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.
2. Select an application.

   Application Builder 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.
2. Select an application.

   Application home page appears.
3. Click **Shared Components**.
4. Under Application, click **Edit Definition**.
5. Under Name, enter the proxy server in the Proxy Server field.
6. 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 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 14-8.
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 14-8.
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. Click **Finish**.

The Web service reference is added to the Web Service References Repository.

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 14-8.
2. Click **Create**.
3. Select **Manual** and click **Next**.

   The Create/Edit Web Service page appears.
4. In Name, enter a name to identify the reference.
5. Under Service Description:

a. URL - Enter the URL endpoint of the Web service.

b. Action - Enter the action of the Web service (optional).

c. Proxy - Enter a proxy if you want 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. For SOAP Envelope, enter the SOAP envelope for this request.

> **Note:** You can reference items from session state in the SOAP envelope by using `#ITEM_NAME#` syntax.

7. For Store Response in Collection, enter the name of a collection to store the response (optional).

8. Click **Create**.

The Web service reference is added to the Web Service References Repository.

Creating 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 14-8.

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 if you want to override the application proxy for this service (optional).

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. HTTP Headers - Enter the names of the HTTP headers to send with the request.

g. Click **Next**.

5. For REST Input parameters, specify the following:

a. Name - Enter the name of the input parameter expected by the method.

b. Type - Select the input type.

c. Click **Add Parameter**.

d. Repeat steps a though c for each expected input.

e. Click **Next**.

6. For REST Output parameters, specify the following:
   a. Output Format - Select **XML** or **Text** 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.
   c. Response Namespace (XML only) - Enter the namespace corresponding to the Response XPath.
   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. Type - Select the output type.
   h. Click **Add Parameter**.
   i. Repeat steps f though h for each returned output parameter.
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. On the Workspace home page, click **Application Builder**.
2. Select an application.

   Application Builder appears.
3. Click **Shared Components**.

   The Shared Components page appears.
4. Under Logic, click **Web Service References**.

   The Web Service Reference page appears.

   Use the Navigation bar at the top of the page to search for Web service references or change the page display. Available options include:

   - Web Service Reference - Enter a case insensitive query and click **Go**. To view all Web service references, leave the field blank and click **Go**.
   - View - Select a display mode and click **Go**. Available options include:
     - **Icons** (the default) displays each Web service reference as a large icon. To edit a Web service reference, click the appropriate icon.
     - **Report** displays each Web service reference as a line in a report.
5. Select **Report** from the View list and click **Go**.
6. In report view you can:

- Edit a reference by clicking the reference name.
- Test a reference by clicking the **Run** 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 14-8.
2. From View, select **Report**.
3. Click the **Run** icon adjacent to the Web Service reference name.

   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.

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 14-8.
2. From View, select **Report**.
3. Click the **Run** icon adjacent to the Web Service reference name.

   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.

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 14-8.

2. From View, select **Report**.
3. Click the **Run** icon adjacent to the Web Service reference name.

   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.

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 14-9 and Creating a RESTful Web Service Reference on page 14-11.
2. After the Web service reference has been added, select **Create Form and Report on Web Service**.
3. For Choose Service and Operation:
   a. Web Service Reference - Select the Web service reference.
   b. Operation - Select the method to be executed. For REST style Web references, select **doREST**.
4. For Page and Region Attributes, review the displayed attributes. If the page you specify does not exist, the wizard creates the page for you.
5. For Input Items:
   a. Identify which items to add to the form. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
   b. If necessary, edit the item label.
6. 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.
7. For Window Service Results:
   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 Result Parameters to Display, select the parameters to be included in the report.

9. Click **Finish**.

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 14-9, "Creating a Web Service Reference Manually" on page 14-10, and "Creating a RESTful Web Service Reference" on page 14-11.

2. Create a new page. See "Managing Pages in an Application" on page 6-8.

   In the Create Page Wizard:

   a. Select **Form**.

   b. Select **Form and Report on Web Service**.

3. For Choose Service and Operation:

   a. Web Service Reference - Select the Web service reference.

   b. Operation - Select the method to be executed. For RESTful style Web references, doREST will be selected automatically. The Operation option will not appear for Manual style Web references.

4. For Page and Region Attributes, review the page and region attributes. If the page you specify does not exist, the wizard creates the page for you.

5. For Input Items:

   a. Identify which items to add to the form. To include an item, select **Yes** in the Create column. Otherwise, select **No**.

   b. If necessary, edit the item label.

6. 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.

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 14-9, Creating a RESTful Web Service Reference on page 14-11, and Creating a Web Service Reference Manually on page 14-10.
2. After the Web service references has been added, select **Create Form on Web Service**.
3. For Choose Service and Operation:
   a. Web Service Reference - Select the Web service reference.
   b. Operation - Select the method to be executed. For RESTful style Web references, doREST will be selected automatically. The Operation option will not appear for Manual style Web references.
4. For Identify Page and Region Attributes, review the page and region attributes. If the page you specify does not exist, the wizard creates the page for you.
5. For Items for Input Parameters:
   a. Identify which items to add. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
   b. If necessary, edit the item label.
6. For Items for Output Parameters (this step is bypassed for Manual style Web references):
   a. Identify which items need to be added. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
   b. If necessary, edit the item label.
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. Click **Finish**.

Creating a Form by Adding a New Page

If you have an existing Web service reference, you can create form 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 14-9, Creating a RESTful Web Service Reference on page 14-11, and Creating a Web Service Reference Manually on page 14-10.
2. Create a new page. See "Managing Pages in an Application" on page 6-8.

   In the Create Page Wizard:
   a. Select **Form**.
   b. Select **Form on Web Service**.
3. For Web Service Reference and Operation, select the Web service reference and operation (that is, the method to be executed). For RESTful style Web references, doREST will be selected automatically. The Operation option does not appear for Manual style Web references.

4. For Identify Page and Region Attributes, review the page and region attributes. If the page you specify does not exist, the wizard creates the page for you.
5. For Items for Input Parameters:
   a. Identify which items need to be added. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
   b. 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.
6. For Items for Output Parameters (this step is bypassed for Manual style Web references):
   a. Identify which items need to be added. To include an item, select **Yes** in the Create column. Otherwise, select **No**.
   b. If necessary, edit the item label.
7. Click **Finish**.

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 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 14-9, "Creating a Web Service Reference Manually" on page 14-10, or "Creating a RESTful Web Service Reference" on page 14-11.
2. Create a page. See "Managing Pages in an Application" on page 6-8.

   In the Create Page Wizard:
   a. Select **Blank Page**.
   b. When prompted to use tabs, select **No**.
3. Navigate to the Page Definition. See "Altering Page Attributes" on page 5-20.
4. Under Page Rendering or Page Processing, locate the Processes section and click **Create**.

   The Create Page Processes Wizard appears.
5. For Process Type, select **Web Services** and click **Next**.
6. For Process Attributes, specify the following:
   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.
   d. Click **Next**.
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:

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:

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 5-12.
2. Under Regions, click the **Create** icon.

   The Create Region Wizard appears.
3. For the region type, select **Report**.
4. For the report implementation, select **Report on collection containing Web service result**.

5. On Identify Region Attributes, enter a region title and optionally edit the region attributes.
6. Choose whether the Web reference was created manually, from a WSDL, or is RESTful style.
7. If the Web service reference was created from a WSDL:
   a. For Web Service Reference and Operation, select a Web service reference and an operation (that is, the method to be executed).
   b. 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.
   c. For Result Parameters:
      – 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 14-17.
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. 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.

   Application Builder appears.
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 after you have created a Web service reference.

Exposing a Report Region as a RESTful Web Service

RESTful Web services, that are callable with a URL and return either JSON or XML, can be exposed in report regions. In order to expose a report region as a RESTful Web service, the following steps must be performed:

1. The instance administrator must enable the REST provider feature in instance settings. To enable RESTful access to an 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.
3. The page that contains the report must not require authentication.

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 regions, you must make the page public so no authentication is required and enable the report for RESTful access.

To make a page public:

1. On the Workspace home page, click the Application Builder.
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**.
2. Select an application.

   Application Builder 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**.
7. Click **Apply Changes**.

Accessing a RESTful Enabled Report Region from a Web Service Client

Once you enabled 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 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 prior to running the report based on the language passed in. For example: de
`output`	`xml`	Yes	This determines whether XML or JSON will be 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 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 14-29

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 allow developers to declaratively extend the built-in types available with Application Express and to enable developers to share and reuse them.

Application Express supports a set group of item, region, dynamic action and process types. Plug-ins offer a means of augmenting these built-in types by declaratively creating and using new types in your application. Because plug-ins are designed for reuse, developers can export and import them to other workspaces and also share them with the Application Express Plug-in community by using the Plug-in Repository.

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

1. Create or import a plug-in in to your application workspace.
2. Edit or create an 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 Learning Library at the following location, click the **All Content** tab and enter search criteria for Application Express (APEX) Product OBEs:

```
http://apex.oracle.com/pls/apex/f?p=9830:1:0::NO
```

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** icon.
   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 area** - Enter case insensitive search criteria (wild card characters are implied) and then click **Go**.

- **Go button** - Executes a search or applies a filter.
- **View icons**. Use this control to toggle between icon and report views. To change the view, select one of the following:
  - **View Icons** (default) displays each computation as a large icon.
  - **View Report** displays each computation as a line in a report.
- **Actions menu** - Displays the Actions menu. Use this menu to customize the report view. See "Using the Actions Menu" on page 7-6.

Editing a Plug-in

To edit a plug-in:

1. Navigate to the Plug-ins page. See Accessing Plug-ins on page 14-23.
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 14-24, "Adding Custom Attributes to a Plug-in" on page 14-27, "Uploading Files to Associate with a Plug-in" on page 14-28 and "Adding Events to a Plug-in" on page 14-29
4. Click **Apply Changes**.

Creating a Plug-in

To create a plug-in:

1. Navigate to the Plug-ins page. See Accessing Plug-ins on page 14-23.
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 will be different depending on the plug-in type selected. Refer to following sections for details.
4. Under Subscription:
   - Reference Master Plug-in From - If you want 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. For Settings:
   - 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.
6. 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 if you want to parse the PL/SQL code at runtime only. Otherwise, the code will be parsed when the plug-in is created.
7. 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 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. Execute Function Name (only available for Process type plug-ins) - Enter the name of the PL/SQL function called to execute the plug-in.

   Note: All Callback function names can reference a function of the anonymous PL/SQL code block, a function within a package or a stand alone function in the database. See item help for further details and examples.

8. Under Standard Attributes (not available for Process type plug-ins):

   For Dynamic Action type plug-ins, the following descriptions apply when the option is checked:

   a. For Item(s) - The dynamic action supports selection of items as the affected elements.
   b. For Region - The dynamic action supports selection of a region as the affected elements.
   c. For DOM Object - The dynamic action supports selection of DOM Objects as the affected elements.
   d. For jQuery Selector - The dynamic action supports specifying a jQuery selector as the affected elements.
   e. For Triggering Element - The dynamic action supports selection of the triggering element as the affected elements.
   f. For Event Source - The dynamic action supports selection of your event source as the affected elements.

g. Affected Element Required - The dynamic action requires an affected element to be specified.

h. Check "Fire on page load" - Defines the default value for the action's Fire on Page Load field.

i. Has Stop Execution on Error Attribute - The Stop Execution on Error field is available for the action.

For Item type plug-ins, check the following to enable options as described here:

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 Output 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 Encrypt Session State Attribute - When editing the item, the Store value encrypted in session state displays under the Security region.

n. Has List of Values - The item has an associated list of values. The Is Visible Widget attribute must be checked.

o. 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.

p. 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.

q. 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.

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 will never be displayed 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 14-27, "Uploading Files to Associate with a Plug-in" on page 14-28, and "Adding Events to a Plug-in" on page 14-29.

Adding Custom Attributes to a Plug-in

A plug-in attribute is used to prompt the developer for additional data in the Builder when the plug-in is used.

To add custom attributes to the plug-in:

1. Navigate to the Plug-ins page. See Accessing Plug-ins on page 14-23.

2. Click the plug-in you want to modify.

   The Plug-in Create/Edit page appears.

3. Scroll down to Custom Attributes and click **Add Attribute**.

   The Edit Attribute page appears.

4. 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 ATTRBUTE_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 Express Builder.

   d. Label - Enter the label that displays for this attribute in the Application Express Builder.

5. 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 Express Builder.

e. Maximum Width - Enter the maximum number of characters users are allowed to enter for this attribute in the Application Express Builder.

6. 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`.

7. Under Condition:

a. Depending on - Select the attribute the current attribute depends on

b. Condition Type (only displays if dependant 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.

8. For Help Text, specify the help text that is displayed as context sensitive help for the attribute in the Application Express Builder.

9. Under Comments, enter comments or notes that are never displayed when the application is running.

10. 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** checkbox on the right panel under Plug-ins is checked, this same Edit Attribute page displays.

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 14-23.

2. Click the plug-in you want to upload to.

   The Plug-in Create/Edit page appears.

3. Scroll down to Files and click **Upload New File**.

   The Upload New File page appears.

4. For File, browse to and select the file you want to upload.
5. Click **Upload**.

   The Create/Edit page appears. The name of the uploaded file appears under Files.
6. Click **Apply Changes**.

Adding Events to a Plug-in

Adding events to an item, region or dynamic action type plug-in, allows 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 14-23.
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 should show up 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 **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 14-23.
2. Click the plug-in you want to delete.

   The Plug-in Create/Edit page appears.
3. Click **Delete**.
4. Click **OK** to confirm.

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 14-23.
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 13-26.

To import a plug-in:

1. Navigate to the Plug-ins page. See Accessing Plug-ins on page 14-23.
2. Click **Import**.

   The import Plug-in page appears.
3. For Specify File:
   - Import file - Select the name of the import file.
   - File Type - Select **Plug-in**.
   - File Character Set - Select the import file character set encoding.
4. Click **Next**.
5. For File Import Confirmation, click **Next**.
6. 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 Application Builder Home page. See "Exporting Plug-ins" on page 13-20.

1. Navigate to the Plug-ins page. See Accessing Plug-ins on page 14-23.
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 export plug-in.
6. Click **Export Plug-in**.
7. Select **Save File**, and click **OK**.

   Downloads complete message appears.

Resetting the Plug-in Interactive Report

To reset the interactive report:

1. Navigate to the Plug-ins page. See Accessing Plug-ins on page 14-23.
2. Click **Reset**.

See Also: "Customizing Interactive Reports" on page 7-4

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 14-23.
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 14-23.
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 or False Actions
- Defining the Frequency and Scope
- Debugging Dynamic Actions

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 can 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 will be. This is because the dynamic action framework emits additional code to the client for each dynamic action defined, which then also needs to be downloaded and executed by the framework in the client. Please see "Debugging Dynamic Actions" on page 14-40 for information on how to debug problems.

The process of implementing a dynamic action involves the following:

1. Edit or create an item on a page. This item 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://apex.oracle.com/pls/apex/f?p=9830:1:0::NO`

Creating a Dynamic Action

Creating a Dynamic Action involves specifying when the action will happen (with optional conditions), what action or actions are performed, and what elements are affected by the action.

To create a dynamic action:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Create Dynamic Action Wizard:
   a. Tree view- Under Page Rendering, locate Dynamic Actions. Right-click and select **Create**. You can also invoke the wizard by right-clicking on a specific page item or region that you want to be the trigger for the dynamic action. This makes definition faster because certain When values will be pre-filled
   b. Component view - Under Page Rendering, scroll down to Dynamic Actions and click the **Create** icon.
3. For Implementation, select one of the following dynamic action types and click **Next**.
   - Standard - Select this option to create simple actions that show, hide, enable and disable page elements when a page item's value changes.
   - Advanced - Select this option to create complex actions such as setting a value, adding a class and using a dynamic action plug-in. This option also allows the selection of different events that will trigger the dynamic action.
4. 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 evaluation.
5. For When, specify when the action is performed and click **Next**. Options on this page include:
   a. Event - Dynamic actions can be defined to fire based on events that happen on the page. There are three different categories of events that can be utilized, Browser events, Framework events and Component events. Here are the details of all the supported events, including the internal JavaScript event name in brackets:

      Browser Events

      – Change (change) - Fires when a control loses the input focus and its value has been modified since gaining focus. This is the default setting.
      – Click (click) - Fires when the pointing device button is clicked over the triggering element.

- Double Click (dblclick) - Fires when the pointing device button is double clicked over the triggering element.
- Get Focus (focusin) - Fires when the triggering element receives focus either via a pointing device or by tabbing into the element.
- Key Down (keydown) - Fires when a key on the keyboard is pressed. Use this event when you want to capture special keystrokes such as arrow keys, after a key has been pressed.
- Key Press (keypress) - Fires when a key on the keyboard is pressed resulting in text being entered. Use this event when you want to capture actual text entry.
- Key Release (keyup) - Fires when a key on the keyboard is released. Use this event when you want to capture special keystrokes such as arrow keys, after a key has been released.
- Lose Focus (focusout) - Fires when the triggering element loses focus either via the pointing device or by tabbing out of the element.
- Mouse Button Press (mousedown) - Fires when the pointing device button is pressed over the triggering element.
- Mouse Button Release (mouseup) - Fires when the pointing device button is released over the triggering element.
- Mouse Enter (mouseenter) - Fires once when the pointing device is moved into the triggering element.
- Mouse Leave (mouseleave) - Fires once when the pointing device is moved away from the triggering element.
- Mouse Move (mousemove) - Fires when the pointing device is moved while it is over the triggering element.
- Page Load (ready) – Fires when the page loads.
- Page Unload (unload) - Fires when a page is unloaded.
- Resize (resize) - Fires when the browser window is resized.
- 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.
- 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).
- Select (select) - Fires when a user selects some text in a text field.

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, for example Interactive Reports, Classic Reports, and all item types with cascading LOV support. Plug-ins might support this event as well.

- Before Page Submit (apexbeforepagesubmit) – Fires prior to a page being submitted.
- Before Refresh (apexbeforerefresh) – Fires before the triggering element has been refreshed. The event is only valid for triggering elements that perform 'Partial Page Refresh' and fire this event, for example Interactive Reports, Classic Reports, and all item types with cascading LOV support. Plug-ins might support this event as well.

Component Events

These events will only be available when there is a component (either an item, region or dynamic action) available to your application that triggers a custom event. These events will appear in the following format Event name [Component Name], for example the Change Order event triggered by the Shuttle native item type will appear as Change Order [Shuttle]. In Application Express, these events are triggered from either native components shipped with 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 Application Express.

- 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, please refer to help text on the plug-in configuration page, by navigating to Shared Components > Plug-ins > [plugin name] > Help Text, where the plug-in author may have included documentation.

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 will hide this field: Page Load, Page Unload, Resize, Before Page Submit. All other event types show this field.

---

c. Item(s), 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, please separate page items with a comma.
- 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, such as in the case of 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 the Document Object Model (DOM) object 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 conditionalize the trigger, make a selection from the Condition Type list and enter text in the Value field. Based on whether this condition is met, it is possible to define both True (when it is met) and False (when it is not) actions. If No Condition is specified, only True actions will fire. For further information, see the item level help.

6. Specify the action that is performed when the previously specified event occurs and conditions are satisfied, then click **Next**.

- For True/False Actions (Standard), specify the True Action:
  - Show - The item displays when the event is true or No Condition is specified.
  - Hide - The item does not display when the event is true or No Condition is specified.
  - Enable - The item is enabled when the event is true or No Condition is specified.
  - Disable - The affected elements are disabled when the event is true or No Condition is specified.
  - Create Opposite False Action - For the selected true action above, create an opposite action to occur when the event is false. The Standard branch of the wizard allows selection of either Show, Hide, Enable or Disable actions for the True Action and provides the facility to create the logical opposite of this. For example, if Show' is selected for the True Action, checking the Create Opposite False Action checkbox would also create a Hide false action.

  Note: Create Opposite False Action only available if a Condition has been specified.

- For True Actions (Advanced only) - The Advanced branch of the wizard allows selection of all actions and allows selection of different True and False Actions. For both the True Action and False Action pages you specify. 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.
  - 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 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 will default to the first of the affected elements if there are multiple. This can be especially useful when used in conjunction 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.
- Show - Shows the affected elements. Also has the option to Show all the page items on the same line.

Execute

- Execute JavaScript Code - Allows 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 will be alerted.

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.
- Confirm - Displays a confirmation dialog. If the user chooses Cancel then the proceeding actions are not executed and the current event is canceled.

Miscellaneaous

- 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, the Cancel Event action can be used to prevent subsequent dynamic actions from firing, conditionally based on it's When Condition.

  If a dynamic action has many true or false actions, Cancel Event can be used 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 in conjunction with the Before Page Submit event of dynamic actions. For example, if you define a dynamic action that fires on the Before Page Submit even, and for the Condition define JavaScript Expression, and in the Value' some expression such as $v('P2_ENAME') == 'DO NOT SUBMIT'. Then, if you define a True Action that uses the Cancel Event action, the page will not be submitted when the ENAME field is equal to DO NOT SUBMIT.

– Submit Page - Submits the page.

Plug-ins

– my_plugin_action[Plug-in] - Depending on your application configuration, you may also have additional plug-in dynamic actions available here. These will be displayed as 'my_plugin_action [Plug-in]'. Plug-in dynamic actions are installed within the application's shared components. The plug-in developer will have assigned an appropriate category for the action (Component, Execute and so forth).

- Fire On Page Load (Advanced only) - 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.

7. 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 required affected elements to be selected. Other actions, such as Show, do. If the action selected does not support selection of affected elements, the last page will just 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), 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.
     – 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 in order 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.

8. Click **Create**.

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 or false actions.

> **See Also:** "Creating a Dynamic Action" on page 14-32, "Adding Additional True or False Actions" on page 14-38, "Defining the Frequency and Scope" on page 14-39

To edit a dynamic action:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Edit Dynamic Action page:
   a. Tree view- Under Page Rendering, locate Dynamic Actions. Right-click and select **Edit**. You can also go straight to editing a dynamic action's true or false actions by expanding the tree node for the dynamic action, then right-clicking and selecting Edit for the specific action you want to edit.
   b. Component view - Under Page Rendering, scroll down to Dynamic Actions and click the dynamic action you want to edit.

   The Edit Dynamic Action page appears.

Adding Additional True or False Actions

Dynamic actions contain a condition that can be specified to control when True and False 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 and one false action to be specified. If you want 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 or false actions.

To add an action:

1. Navigate to the appropriate Page Definition. See "Accessing the Page Definition" on page 5-2.
2. Access the Edit Dynamic Action page:
   a. Tree view- Under Page Rendering, locate Dynamic Actions. Right-click and select **Edit**. You can also right-click directly on the True or False nodes right under the dynamic action node in the tree. Select Create here and this will take you directly to the page to create the additional true or false action. This is a simpler means of creation and eliminates the next step.
   b. Component view - Under Page Rendering, scroll down to Dynamic Actions and click the dynamic action you want to edit.

   The Edit Dynamic Action page appears.
3. If you want 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**.

   Otherwise, scroll down to False Actions and click **Add False Action**.

   The Create/Edit Action page appears.

4. Under Identification:
   a. Sequence - Enter the sequence for this component. This indicates the evaluation order.
   b. Action - Select the action that triggers when the condition is true or false.
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.
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), 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.
      – 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 in order 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 or False 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 5-2.
2. Access the Edit Dynamic Action page:
   a. Tree view- Under Page Rendering, locate Dynamic Actions. Right-click and select **Edit**.
   b. Component view - Under Page Rendering, scroll down to Dynamic Actions and click the dynamic action you want to edit.

   The Edit Dynamic Action page appears.
3. Scroll down to Advanced and for Event Scope make one of the following selections:
   a. bind - 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. live - 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).
   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 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. In order to debug dynamic actions, we output debug information to the browser's JavaScript console, if your browser supports it (for example Firefox with Firebug installed will show the debug information in it's Console pane). The debug information will tell you when a dynamic action fires, the name of the dynamic action and also specifically which action has fired.

To debug a dynamic action:

1. Ensure the application containing the dynamic action has Debugging enabled. See "Accessing Debugging Mode" on page 11-4.
2. Run the page containing the dynamic action.
3. Open the browser's JavaScript console.
4. From the developer toolbar, click **Debug**.
5. The page refreshes and if you have any dynamic actions that are set to fire on page load, you will see the following text output to the console: "Dynamic Action Fired: [Dynamic action name] ([specific action fired])".
6. Leaving Debug mode switched on (as the debug information is only output when running in Debug mode), you can then 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 will show 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 will result in an item of type File Browse. When the form is called for INSERT, the file selected by the user will be 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 will provide 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 will reference a BLOB in your own database table.
- Table WWV_FLOW_FILES - Advanced option if you prefer to reference a BLOB stored in the WWV_FLOW_FILES table.

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. If you want 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 14-44 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 will be 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 then other format masks in that you are required to specify at least three parameters, for example:

```
DOWNLOAD:EMP:RESUME:EMPNO
```

The parameters of the DOWNLOAD format are described in the following table:

Position	Attribute	Required	Description
1	DOWNLOAD	Yes	Identifies the DOWNLOAD report format mask.

Position	Attribute	Required	Description
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.
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 inline or attachment. All other values ignored. If a MIME type is provided and the file is a type that can be displayed, the file will be displayed. If MIME type is not provided, or the file cannot be displayed inline, the user will be prompted to download.
11	Download Text	No	String used for the download link. If nothing provided, Download is used. Note that this will support substitutions (useful for translated applications).

Consider the following example:

```
DOWNLOAD:EMP:RESUME:EMPNO::RESUME_MIMETYPE:RESUME_FILENAME:RESUME_LAST_
UPDATE::attachment:Resume
```

If you have a report column with a format mask that begins with DOWNLOAD:, you will see a link below the format 'BLOB Download Format Mask'. This popup assists in entering all the parameters necessary for the DOWNLOAD format.

Displaying the BLOB

If the BLOB you are working with is an image, you can display it in the report as well. To do this, you use the new report format mask of 'IMAGE'. Regardless of the MIME type, the report will always attempt to display the BLOB. If the BLOB cannot be rendered, a broken image will be displayed.

The parameters of the IMAGE format mask are described in the following table:

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.

Position	Attribute	Required	Description
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.
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
```

If you have a report column with a format mask that begins with 'IMAGE:', you will see a link below the format 'BLOB Download Format Mask'. This popup assists in entering all the parameters necessary for the IMAGE format.

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). Please 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*

About Screen Reader Mode

Sessions in APEX can now be identified as optimized for screen readers, both in the 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.

Although this mode improves usability of 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, please refer to the release notes.

Topics:

- What Screen Reader Mode Does
- Enabling Screen Reader Mode
- Provisioning Screen Reader Mode
- Extending Screen Reader Mode

What Screen Reader Mode Does

Enabling Screen reader mode currently does the following, by default:

- Application Express Flash charts are not currently accessible to screen readers, therefore when running in screen reader mode the user will get a report representation of the information conveyed in the chart. A separate report will be 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:
  - Summary Text - In Websheets, the section title is used as the summary text.
  - Summary Text - In Application Builder, a combination of the chart title and chart series title are used.
  - Column Headers - In Websheets, the Data Grid report labels are used to identify the columns in the report.
  - Column Headers - In Application Builder, the column name/alias in the chart series query is used to identify the columns in the report.

  Note: Only Flash chart 5 supports this. For users wishing to view their Flash 3 chart data in Screen Reader mode, they must first upgrade their Flash chart 3 charts to Flash chart 5, using the Upgrade Application. Once the Flash 3 charts have been upgraded, and the user is running in Screen Reader mode, a report on the Flash Chart chart series query is displayed.

  See Also: "Upgrading all Flash 3 Charts to Flash 5" on page 7-88, "Upgrading a Flash 3 Chart to Flash 5" on page 7-88.

- Radio and checkbox page items are rendered within a `FIELDSET` HTML tag. `FIELDSET` elements require a text description that is used as context for any elements within it, for example the individual radio inputs. This is done using the `LEGEND` HTML tag. When running in screen reader mode, this tag is generated and is given the value of the page item's `Label`.
- Interactive report regions heavily rely on partial page refresh during user interaction to specify a filter, search, sort and so on. In order for a screen reader user to be notified that the page has been partially refreshed, define Interactive Report Regions as WAI-ARIA Live regions, when running in screen reader mode. This means the user is notified when the partial page refresh is complete. This uses a `polite` setting, meaning that the screen reader announces the update only when they are not doing anything else on the page. You must be using both a screen reader and browser that supports WAI-ARIA Live Regions. Application Express is only tested with the most recent JAWS screen reader (11.0.1430), which supports Live Regions. The current list of browsers that support this include:
  - Firefox 3.0 and later

  - IE 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. But as these dialogs have many problems when used with screen readers, therefore the classic popup page is used to display item help text when running in screen reader mode.
- In the Application Builder of the Application Express development environment, 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.

Enabling Screen Reader Mode

Please refer to "Accessibility in Oracle Application Express" in *Oracle Application Express Installation Guide* for details on how to enable this mode in our development environment and websheet runtime environment.

Provisioning Screen Reader Mode

There are three ways you can provision this mode to user's of your own database applications.

1. Page template `#SCREEN_READER_TOGGLE#` substitution string - Add this substitution string to your page template and 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. There are also APIs that can be used to control this mode. You may want to use the APIs if you only want to render the toggle in one place and don't want to do this at page template level or if you want more control over the actual displayed link text. Please see the *Oracle Application Express API Reference* for more details on these APIs.

3. Using `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 Screen Reader Mode Does section above, you can control your own page components, such as conditionally displaying a region when running in screen reader mode. Please see the *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`.

15

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 15-6

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 15-4

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 15-3 and "Translating Data That Supports List of Values" on page 15-26

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 run time. Note that the name of the shortcut must match the corresponding message name. At run time, 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 run time. 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 7-106

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 15-11

About Dynamic Translation Text Strings

Dynamic translations are used for database data that needs to be translated at run time. 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 15-26

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 "Editing a Page in Component View" on page 5-12.
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 will be included in the generated translation file.

> **See Also:** "Customizing Templates" on page 10-12 and "Substitutions" on page 4-13

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, click **Edit Application 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. Available options are described in Table 15–1.

Table 15–1 Application Language Derived From Options

Option	Description
No NLS (Application not translated)	Select this option if the application will not be translated.
Use 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. **See Also:** "SET_PREFERENCE Procedure" in *Oracle Application Express API Reference*
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 15–1 (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 via 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 4-8, "Configuring Globalization Attributes" on page 4-20, and "About Supported Globalization Codes" on page 15-27

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 users'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. Under Items, select the item name.

   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 needs to 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 Export Text to a Translation File
- Step 3: Translate the XLIFF File
- Step 4: Upload and Apply a Translated XLIFF Document and Publish the Application
- Manually Editing a Translation

See Also: "Translating Messages" on page 15-11 and "Translating Data That Supports List of Values" on page 15-26

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 Application page appears.
2. Click **Map your primary language application to a translated application**.

   The Application Mappings page appears.
3. Click **Create**.
4. On the Translation Application Mapping page:
   - Translation Application - Enter a numeric application ID to identify the target application. The translated application ID must be an integer and cannot end in zero.
   - Translation Application Language Code - Select the language into which you are translating.
   - Image Directory - Enter the directory where the images currently reside.

     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.

     Note that this language specific image directory is typically not needed for most translated applications.

5. Click **Create**.

Step 2: Seed and Export Text 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
- Exporting Text to a Translation 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 Application page appears.
2. On the Translate Application page, select **Seed translatable text to translation repository**.
3. From Language Mapping, select the appropriate primary and target application ID map and click **Next**.
4. Click **Seed Translatable Text**.

   The XLIFF Export page appears.

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`

Exporting Text to a Translation File

After you have seeded translatable text, a status box displays at the top of the XLIFF Export page indicating the total number of attributes that may require translation, including the number of:

- Existing updated attributes that may require translation
- New attributes that may require translation

- Purged attributes that no longer require translation

You can use this information to determine if you must export translatable text for an entire application or just a specific page.

The XLIFF Export page is divided into two sections. Use the upper section of the page 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.

Exporting Translatable Text for an Entire Application To export translatable text for an entire application:

1. Seed the translatable text. See "Seeding Translatable Text" on page 15-7.
2. Click **Download translatable text from repository to translation file (XLIFF FILE)**:
   a. From Application, select the appropriate primary and target application ID map.
   b. Specify whether to include XLIFF target elements.
   c. Under Export, specify what translation text is included in your XLIFF file.
   d. Click **Export XLIFF**.
3. Follow the on-screen instructions.

Exporting Translatable Text for a Specific Page To export translatable text for a specific page:

1. Seed the translatable text as described in "Seeding Translatable Text" on page 15-7.
2. Click **Download translatable text from repository to translation file (XLIFF FILE)**:
   a. From Download XLIFF file for Application Page, select the appropriate primary and target application ID map.
   b. Specify whether to include XLIFF target elements.
   c. Under Export, specify what translation text is included in your XLIFF file.
   d. Click **Export XLIFF**.
3. 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.

About Export Use the options under **Export** to specify what translation text is included in your XLIFF file. Select **All translatable elements** to include all translation text for an application. In contrast, select **Only those elements requiring translation** to include only new elements that have not yet been translated. **Only those elements requiring translation** produces an XLIFF file containing new or modified translation units. Also, if translation units were intentionally not previously translated (that is, the source of the translation element equals the target of the translation element), those translation units will also be included in the file

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 will be 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 and Publish the Application

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 and Publishing an Application
- 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 Application page appears.
2. Click **Application XLIFF translation file to translation repository**.
3. Click **Upload XLIFF**.
4. On the XLIFF Upload page:
   a. Specify a title.
   b. Enter a description.
   c. Click **Browse** and locate the file to be uploaded.
   d. Click **Upload XLIFF File**.

   The uploaded document appears in the XLIFF Files repository.

Applying an Uploaded XLIFF Document and Publishing an Application

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 in order to run an application in an alternative language, you must run it with globalization settings that will 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 15-4

To apply a translated XLIFF document and publish the 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 **Apply XLIFF Translation file to translation repository**.
3. In the XLIFF Files repository, click the XLIFF document title for the XLIFF document you wish to apply.
4. From Apply to, select the appropriate primary and target application ID map.
5. Click **Apply XLIFF Translation File**.
6. Click **Publish Application**.

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 Application page appears.
2. On the Translate Application page, select **Apply your translation file and publish**.
3. In the XLIFF Files repository, select the check box to the left of the document title.
4. Click **Delete Checked**.

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 make sure that you have correctly configured the application Globalization attributes.

> **See Also:** "Specifying the Primary Language for an Application" on page 15-4

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 15-6.
2. Seed the translatable text. See "Seeding Translatable Text" on page 15-7.
3. Navigate to the Translatable Text 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**.
4. From the Translation Utilities list, click **Manually Edit Translation Repository**.

   The Translatable Text page appears.

   Use the Navigation bar at the top of the page to change the report display. Available options include:

   - Language Mappings - Select a language mapping and click **Go**.
   - Page - Enter a page number and click **Go**.
   - Translate - Enter a case insensitive query and click **Go**.
   - Display - Select the number of rows to display and click **Go**.
5. To edit translatable text, click the Edit icon.

   The Translatable Text field appears.
6. Edit the appropriate text and 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**.
3. On Identify Text Message, specify the following:
   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**.

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 15–2 describes the parameters available in the APEX_LANG.MESSAGE API.

Table 15–2 APEX_LANG.MESSAGE Parameters

Parameter	Description
p_name	Name of the message as defined in Oracle Application Express.
p0 ... p9	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.
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. **See Also:** "Specifying the Primary Language for an Application" on page 15-4

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 are running 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 will revert 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 15-4 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.

To translate 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 the Translate Messages page, click **Create**.
3. On Identify Text Message, specify the following:
   a. Name - Enter the name of each message that needs to be translated. See Table 15–3.
   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. 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**.

Table 15–3 lists the internal messages that require translation.

Table 15–3 Internal Messages Requiring Translation

Message Name	English Text
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_VALUE_LESS_MIN_DATE	#LABEL# is less than specified minimum date %0.
APEX.DATEPICKER_VALUE_NOT_IN_YEAR_RANGE	#LABEL# is not within valid year range of %0 and %1.
APEX.DATEPICKER_VALUE_NOT_BETWEEN_MIN_MAX	#LABEL# is not between the valid range of %0 and %1.
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.FILE_BROWSE.DOWNLOAD_LINK_TEXT	Download.
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_NOT_BETWEEN_MIN_MAX	#LABEL# is not between the valid range of %0 and %1.
APEX.NUMBER_FIELD.VALUE_GREATER_MAX_VALUE	#LABEL# is greater than specified maximum %0.
APEX.NUMBER_FIELD.VALUE_LESS_MIN_VALUE	#LABEL# is less than specified minimum %0.
APEX.PAGE_ITEM_IS_REQUIRED	#LABEL# must have some value.
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

Table 15–3 (Cont.) Internal Messages Requiring Translation

Message Name	English Text
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_HOURS_AGO	%0 hours ago
SINCE_MINUTES_AGO	%0 minutes ago
SINCE_MONTHS_AGO	%0 months ago
SINCE_SECONDS_AGO	%0 seconds ago
SINCE_WEEKS_AGO	%0 weeks ago
SINCE_YEARS_AGO	%0 years ago
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.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

Table 15–4 lists the internal messages that require translation.

Table 15–4 Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_3D	3D
APEXIR_ACTIONS_MENU	Actions Menu
APEXIR_ADD	Add
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

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_AGG_MODE	Mode
APEXIR_AGG_SUM	Sum
APEXIR_ALL	All
APEXIR_ALL_COLUMNS	All Columns
APEXIR_AND	and
APEXIR_APPLY	Apply
APEXIR_ASCENDING	Ascending
APEXIR_AS_OF	As of %0
APEXIR_BETWEEN	between
APEXIR_BGCOLOR	Background Color
APEXIR_BLUE	blue
APEXIR_BOTTOM	Bottom
APEXIR_CALENDAR	Calendar
APEXIR_CANCEL	Cancel
APEXIR_CATEGORY	Category
APEXIR_CELL	Cell
APEXIR_CHART	Chart
APEXIR_CHART_INITIALIZING	Initializing...
APEXIR_CHART_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

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_COMPARISON_NOT_IN	not in
APEXIR_COMPARISON_NOT_LIKE	not like
APEXIR_COMPARISON_REGEXP_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_DATA_AS_OF	Report data as of %0 minutes ago.
APEXIR_DATE	Date
APEXIR_DEFAULT	Default
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_CHART	Edit Chart Settings
APEXIR_EDIT_CHART2	Edit Chart
APEXIR_EDIT_FILTER	Edit Filter
APEXIR_EDIT_HIGHLIGHT	Edit Highlight

Table 15–4 (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_FILTERS	Filters
APEXIR_FINDER_ALT	Select columns to search
APEXIR_FLASHBACK	Flashback
APEXIR_FLASHBACK_DESCRIPTION	A flashback query enables you to view the data as it existed at a previous point in time.
APEXIR_FLASHBACK_ERROR_MSG	Unable to perform flashback request
APEXIR_FORMAT_MASK	Format Mask
APEXIR_FUNCTION	Function
APEXIR_FUNCTIONS	Functions
APEXIR_GO	Go
APEXIR_GREEN	green
APEXIR_HCOLUMN	Horizontal Column
APEXIR_HELP	Help
APEXIR_HELP_01	An Interactive Report displays a predetermined set of columns. The report may be further customized with an initial filter clause, a default sort order, control breaks, highlighting, computations, aggregates and a chart. Each Interactive Report can then be further customized and the results can be viewed, or downloaded, and the report definition can be stored for later use. <p/> An Interactive Report can be customized in three ways: the search bar, actions menu and column heading menu.
APEXIR_HELP_ACTIONS_MENU	The actions menu is used to customize the display of your Interactive Report.

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_AGGREGATE	Aggregates are mathematical computations performed against a column. Aggregates are displayed after each control break and at the end of the report within the column they are defined. <p/> - Aggregation allows you to select a previously defined aggregation to edit. - Function is the function to be performed (e.g. SUM, MIN). - Column is used to select the column to apply the mathematical function to. Only numeric columns will be displayed.
APEXIR_HELP_AGGREGATE	Aggregates are mathematical computations performed against a column. Aggregates are displayed after each control break and at the end of the report within the column they are defined.<p/> <p/> - Aggregation allows you to select a previously defined aggregation to edit. - Function is the function to be performed (e.g. SUM, MIN). - Column is used to select the column to apply the mathematical function to. Only numeric columns will be displayed.
APEXIR_HELP_CHART	You can include one chart per Interactive Report. Once defined, you can switch between the chart and report views using links below the search bar. <p/> - Chart Type identifies the chart type to include. Select from horizontal bar, vertical bar, pie or line. - Label allows you to select the column to be used as the label. - Axis Title for Label is the title that will display on the axis associated with the column selected for Label. This is not available for pie chart. - Value 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. - Axis Title for Value is the title that will display on the axis associated with the column selected for Value. This is not available for pie chart. - Function is an optional function to be performed on the column selected for Value.

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_COLUMN_HEADING_MENU	Clicking on any column heading exposes a column heading menu. <p/> - 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. - Break Column creates a break group on the column. This pulls the column out of the report as a master record. - Column Information displays help text about the column, if available. - Text Area is used to enter case insensitive search criteria (no need for wild cards). Entering a value will reduce the list of values at the bottom of the menu. You can then select a value from the bottom and the selected value will be created as a filter using '=' (e.g. column = 'ABC'). Alternatively, you can click the flashlight icon and the entered value will be created as a filter with the 'LIKE' modifier (e.g. column LIKE '%ABC%'). - List of Unique Values 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').
APEXIR_HELP_COMPUTE	Computations allow you to add computed columns to your report. These can be mathematical computations (e.g. NBR_HOURS/24) or standard Oracle functions applied to existing columns (some have been displayed for example, others, like TO_DATE, can also be used). <p/> - Computation allows you to select a previously defined computation to edit. - Column Heading is the column heading for the new column. - Format Mask is an Oracle format mask to be applied against the column (e.g. S9999). - Format Mask is an Oracle format mask to be applied against the column (e.g. S9999). - Computation is the computation to be performed. Within the computation, columns are referenced using the aliases displayed. <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/> An example computation to display Total Compensation is: <p/> <pre>CASE WHEN A = 'SALES' THEN B + C ELSE B END</pre> (where A is ORGANIZATION, B is SALARY and C is COMMISSION)

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
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.
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 wild card (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	Highlighting allows you to define a filter. The rows that meet the filter are highlighted using the characteristics associated with the filter. <p/> - Name is used only for display. - Sequence identifies the sequence in which the rules will be evaluated. - Enabled identifies if the rule is enabled or disabled. - Highlight Type identifies whether the Row or Cell should be highlighted. If Cell is selected, the column referenced in the Highlight Condition is highlighted. - Background Color is the new color for the background of the highlighted area. - Text Color is the new color for the text in the highlighted area. - Highlight Condition defines your filter condition.

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_HELP_REPORT_SETTINGS	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/> For each report setting, you can: - Edit by clicking the name. - Disable/Enable by unchecking or checking the Enable/Disable check box. This is used to temporarily turn off and on the setting. - Remove by click the Remove icon. This permanently removes the setting. <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.
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	At the top of each report page is a search region. The region provides the following features: <p/> - Select columns icon allows you to identify which column to search (or all). - Text area allows for case insensitive search criteria (no need for wild cards). - Rows selects the number of records to display per page. [Go] button executes the search. - Actions Menu icon displays the actions menu (discussed next). <p/> Please note that all features may not be available for each report.
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 **.
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

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
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_KEYPAD	Keypad
APEXIR_LABEL	Label
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_ROW_CNT	This query returns more then %0 rows, please filter your data to ensure complete results.
APEXIR_MIN_AGO	%0 minutes ago
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	>
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

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_NEXT_YEAR	Next Year
APEXIR_NO	No
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_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_PIE	Pie
APEXIR_PREVIOUS	<
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_REPORT_SETTINGS	Report Settings
APEXIR_REPORT_VIEW	< Report View
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_ROW_TEXT_CONTAINS	Row text contains

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
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 will be used as the default for all users.
APEXIR_SAVE_REPORT	Save Report
APEXIR_SEARCH_BAR	Search Bar
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_VALUE	Select Value
APEXIR_SEQUENCE	Sequence
APEXIR_SORT	Sort
APEXIR_SORT_ASCENDING	Sort Ascending
APEXIR_SORT_DESCENDING	Sort Descending
APEXIR_SPACE_AS_IN_ONE_EMPTY_STRING	space
APEXIR_STATUS	Status
APEXIR_TEXT_COLOR	Text Color
APEXIR_TIME_DAYS	days
APEXIR_TIME_HOURS	hours
APEXIR_TIME_MINS	minutes
APEXIR_TIME_MONTHS	months
APEXIR_TIME_WEEKS	weeks
APEXIR_TIME_YEARS	years
APEXIR_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

Table 15–4 (Cont.) Interactive Report Messages Requiring Translation

Message Name	English Text
APEXIR_VALUE_REQUIRED	Value Required
APEXIR_VCOLUMN	Vertical Column
APEXIR_VIEW_CHART	View Chart
APEXIR_VIEW_REPORT	View Report
APEXIR_WORKING_REPORT	Working Report
APEXIR_YELLOW	yellow
APEXIR_YES	Yes

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 15–5 describes the parameters available in the APEX_LANG.LANG API.

Table 15–5 APEX_LANG.LANG Parameters

Parameter	Description
p_primary_string	Text string of the primary language. This will be the value of the Translate From Text in the dynamic translation.
p0 ... p9	Dynamic substitution value: p0 corresponds to 0% in the in the translation string; p1 corresponds to 1% in the translation string; p2 corresponds to 2% in the translation string, and so on.
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. **See Also:** "Specifying the Primary Language for an Application" on page 15-4

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 15-4

NLS_LANGUAGE and NLS_TERRITORY determine the default presentation of numbers, dates, and currencies.

Table 15–6 describes the globalization codes in Oracle Application Express.

Table 15–6 Oracle Application Express Globalization Codes

Language Name	Language Code	NLS_LANGUAGE	NLS_TERRITORY
Afrikaans	af	ENGLISH	SOUTH AFRICA
Arabic	ar	ARABIC	UNITED ARAB EMIRATES
Arabic (Algeria)	ar-dz	ARABIC	ALGERIA
Arabic (Bahrain)	ar-bh	ARABIC	BAHRAIN
Arabic (Egypt)	ar-eg	EGYPTIAN	EGYPT
Arabic (Iraq)	ar-iq	ARABIC	IRAQ
Arabic (Jordan)	ar-jo	ARABIC	JORDAN
Arabic (Kuwait)	ar-kw	ARABIC	KUWAIT
Arabic (Lebanon	ar-lb	ARABIC	LEBANNON
Arabic (Libya)	ar-ly	ARABIC	LIBYA
Arabic (Morocco)	ar-ma	ARABIC	MOROCCO
Arabic (Oman)	ar-om	ARABIC	OMAN
Arabic (Qatar)	ar-qa	ARABIC	QATAR
Arabic (Saudi Arabia)	ar-sa	ARABIC	SAUDI ARABIA
Arabic (Syria)	ar-sy	ARABIC	SYRIA
Arabic (Tunisia)	ar-tn	ARABIC	TUNISIA
Arabic (U.A.E.)	ar-ae	ARABIC	UNITED ARAB EMIRATES
Arabic (YEMEN)	ar-ye	ARABIC	YEMEN
Assamese	as	ASSAMESE	INDIA
Basque	eu	FRENCH	FRANCE
Belarusian	be	RUSSIAN	RUSSIA
Bengali	bn	BANGLA	BANGLADESH
Bulgarian	bg	BULGARIAN	BULGARIA
Catalan	ca	CATALAN	CATALONIA
Chinese	zh	SIMPLIFIED CHINESE	CHINA
Chinese (China)	zh-cn	SIMPLIFIED CHINESE	CHINA
Chinese (Hong Kong SAR)	zh-hk	TRADITIONAL CHINESE	HONG KONG
Chinese (Macau SAR)	zh-mo	TRADITIONAL CHINESE	HONG KONG
Chinese (Singapore)	zh-sg	SIMPLIFIED CHINESE	SINGAPORE
Chinese (Taiwan)	zh-tw	TRADITIONAL CHINESE	TAIWAN
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 15–6 (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 (Luxemgourg)	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 15–6 (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 15–6 (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 (Peurto Rico)	es-pr	LATIN AMERICAN SPANISH	PEURTO 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

A

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" describes available item types.

Note that you can control how page item work by editing page item attributes. To learn more, see "Editing Page-Level Items" on page 6-34 and see the descriptions of Summary attributues in Table A–1, " Available Item Types".

Table A–1 Available Item Types

Item Type	Description

Check Box	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.
	
	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.
	
	`SELECT NULL display_text, 'YES' return_value FROM DUAL;`
	
	This example includes the additional text *Click to select*.
	
	`SELECT 'Click to select' display_text, 'YES' return_value FROM DUAL;`
	
	See Also: "APEX_UTIL" in *Oracle Application Express API Reference* for information about breaking up returned values
	
	Item attribute Settings:
	
	■ **Value Required** - If select **Yes** 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.
	
	■ **Number of Checkbox Columns** - Defines the number of layout columns to use to display the values defined in the List of Values.

Color Picker	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. Item attribute Settings: ■ **Value Required** - If select **Yes** 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.
Date Picker	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). Item attribute Settings: ■ **Value Required**- If select **Yes** and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. ■ **Format Mask** - 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. ■ **Highlighted Date** - Enter a date, which should be highlighted in the Date picker. See item Help for more details. ■ **Minimum Date** - Enter a minimum selectable date. ■ **Maximum Date** - Enter the maximum selectable date. ■ **Show** - Determines when the date picker displays. ■ **Show other Months** - Display dates in other months (non-selectable) at the start or end of the current month. ■ **Navigation List** - Change the month, year or both using a select list.
Date Picker (Classic)	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). If the format you need is not included in the Display As list, select **Date Picker (use application format mask)** or **Date Picker (use item format mask)**. The latter uses the value from the Format Mask field in the Source section of the Edit Page Item page.

Table A–1 (Cont.) Available Item Types

Item Type	Description
Display Image	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: Item attribute Settings: ■ **Based On** - Determines where the item is retrieved from. To learn more, see item Help. ■ **Alternative Text Column** - If specified, the returned text is used as an alternative text for the image. ■ **Filename Column** - If specified, the returned filename is used by the browser in the Save As dialog when the user tries to saves the image. ■ **BLOB Last Updated Column** - 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`.
Display Only	Displays the item as display only text. Item attribute Settings: ■ **Save Session State** - Stores the current value in session state when the page gets submitted. ■ **Based On** - Specifies what gets displayed in the field. To learn more, see item Help. ■ **Show Line Breaks** - Select Yes to convert line breaks in the display value to a HTML line break and display them in HTML output.
File Browse	Displays a text field with a Browse... button. The Browse button enables the user to locate a file on a local file system and upload it. Oracle Application Express provides a table for these files to be uploaded to and an API to retrieve the files. **See Also:** "Securing File Uploads" on page 12-25 Item attribute Settings: ■ **Value Required**- If select **Yes** and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. ■ **Storage Type** - Identify where the uploaded file is stored. ■ **MIME Type Column** - Specify the name of the column where the `MIME` type of the uploaded file should be stored. ■ **Filename Column** - Specify the name of the column where the filename of the uploaded file should be stored. ■ **Character Set Column** - Specify the name of the column where the character set of the uploaded file should be stored. ■ **BLOB Last Updated Column** - Specify the name of the column to update with the current time stamp when a file is uploaded. ■ **Display Download Link** - Select **Yes** to display the download link next to the Browse button. ■ **Download Link Text** - Text used for the download link. ■ **Content Disposition** - Determines if the downloaded content is displayed inline within the Browser window or if a Open dialog displays.
Hidden	Create a hidden page item. Item attribute Setting: ■ **Value is Protected** - Select Yes to prevent hidden values from being manipulated when a page is posted.

Table A–1 (Cont.) Available Item Types

Item Type	Description
List Manager	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. Item attribute Settings: ■ **Value Required**- If select **Yes** and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. ■ **Fetch** - Specifies if data is displayed when the Popup LOV is opened by a user.
Number Field	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 will automatically checks if the entered value is a number. No extra validations are required. Item attribute Settings: ■ **Value Required**- If select **Yes** and the page item is visible, Oracle Application Express automatically performs a NOT NULL validation when the page is submitted. ■ **Format Mask** - 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. ■ **Minimum Value** - Enter a minimum enterable value. ■ **Maximum Value** - Enter the maximum enterable value. ■ **Number Alignment** - Select the value alignment within the field.
Password	Renders as an HTML password form element. Item attribute Settings: ■ **Value Required** - If select **Yes** 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. ■ **Submit when Enter Pressed** - Select **Yes** to submit the page when **ENTER** is pressed. This saves the password in a database table when the page is submitted. Select **No** to not save the password in a database table. Only select **Yes** when the password is needed in session state for use by other pages during the session. ■ **Does not save state** - Select **Yes** 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 **Yes**. If you must reference and retrieve the value of a password in your application then you set the **Store value encrypted in session state** attribute to **Yes**. To learn more, see "About Session State and Security" on page 12-13.

Table A–1 (Cont.) Available Item Types

Item Type	Description

Popup List of Values	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.
	
	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.
	
	Popup LOVs must be based on a query that selects two columns with different column aliases. For example:
	
	`SELECT ename name, empno id`
	`FROM emp`
	
	If one of the columns is an expression, remember to use an alias. For example:
	
	`SELECT ename||' '||job display_value, empno FROM emp`
	
	Item attribute Settings:
	
	■ **Value Required**- If select **Yes** 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.
	
	■ **Input Field** - Specifies what the input field of the Popup LOV shows and how it will behave.
	
	■ **Fetch** - Specifies if data is displayed when the Popup LOV is opened by an user.

Radio Group	Renders as an HTML radio group form element, based on a list of values. The following example displays employee names (`ename`), but returns employee numbers (`empno`): `SELECT ename, empno FROM emp` Item attribute Settings: ■ **Value Required**- If select **Yes** 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. ■ **Number of Radio Columns** - Defines the number of columns to use to display the values defined in the List of Values. ■ **Page Action when Value Changed** - Option includes: None (Default); Submit Page; or Redirect and Set Value. Choose **Submit Page** to have the page submitted when the radio button is selected.
Rich Text Editor	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. Additional available Text Area Display As options include: Item attribute Settings: ■ **Value Required**- If select **Yes** 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. ■ **Editor** - Select an editor. ■ **Toolbar** - Select a toolbar style. ■ **Toolbar Expanded** - Determines if the toolbar must start expanded when the Rich Text Editor is loaded. ■ **Skin** - Skin used for the appearance of the Rich Text Editor.

Table A–1 (Cont.) Available Item Types

Item Type	Description
Select List	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 `<select>`. 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. 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. `SELECT ename display_text, empno return_value FROM emp` Item attribute Settings: ■ **Value Required**- If select **Yes** 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. ■ **Page Action when Value Changed** - Options include: None, Submit Page, Redirect and Set Value, Redirect to Page (based on selected value), or Redirect to URL (based on selected value). ■ **Allow Multi Selection** - 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.
Shuttle	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: ■ Move all - Moves all items in the source list to the destination list. ■ Move selected - Moves only selected items (Ctrl + Shift items) to destination list. ■ Remove selected - Moves only selected items (Ctrl + Shift items) to the source list. ■ Remove all - Moves all items on destination list back to the source list. ■ Refresh - Resets the source and destination lists. The right destination list includes the sort controls Move to top, Move up, Move down, and Move to bottom. Item attribute Settings: ■ **Value Required**- If select **Yes** 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. ■ **Show Controls** - Specifies which controls are visible for the Shuttle. Options include: None, Moving Only, Ordering Only, or All. **Note**: In order to create this item type, you must define a list of values. See "Creating Lists of Values" on page 7-102 , "Creating Lists of Values" on page 7-102, and "Working with Multiple Select List Item" on page 6-46.
Stop and Start HTML Layout Table	Forces the close of an HTML table using the `</table>` tag and starts a HTML table. You can use this item type to reset the column width in the middle of the region. Note that a Stop and Start Table item only displays its label. You can prevent the label from displaying at all by setting it to null. To do this, you simply remove the default label.

Table A–1 (Cont.) Available Item Types

Item Type	Description
Text Field with Calculator Popup	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. Configurable item attribute: ■ **Value Required** - If select **Yes** 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. ■ **Input Field** - Specifies what the input field of the Popup LOV shows and how it will behave. ■ **Fetch** - Specifies if data is displayed when the Popup LOV is opened by an user.
Text Field with Auto Complete	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: `SELECT ename FROM emp` Configurable item attribute: ■ **Value Required** - If select **Yes** 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. ■ **Search** - Defines how the search with the entered value should be performed. **Contains & Ignore Case** prevents the use of an existing index on the column. ■ **Lazy Loading** - If select **Yes**, the matching values are read from the database each time the user types a character. If select **No**, all values are read only once when the page is rendered. ■ **Maximum Values in List** - Specify the number of items in the select box to avoid performance problems by returning to many rows. ■ **Automatic Fill** - Select **Yes** to fill the text field while still selecting a value, replaceing the value if something is typed, or somethiing else is selected. ■ **Select First** - Select **Yes** and the first autocomplete value will be automatically selected when the user presses **TAB** or **RETURN**. ■ **Highlight Search** - Select **Yes** and the entered value is highlighted in the select box of matching entries.
Text Field	Displays as an HTML text field containing a maximum of 30,000 bytes of text. You control the maximum length and display width by editing the Height and Width item attribute. Configurable item attribute: ■ **Value Required** - If select **Yes** 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. ■ **Submit when Enter Pressed** - Select **Yes** to submit the page when **ENTER** is pressed. This saves the password in a database table when the page is submitted. Select **No** to not save the password in a database table. Only select **Yes** when when the password is needed in session state for use by other pages during the session. ■ **Disabled** - If **Yes**, text field is rendered disabled and can't be changed by the user.

B

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 2-3

Conditions in Application Builder

Table B–1 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 B–1 describes the conditions available in Application Builder.

Table B–1 Available Conditions

Condition	Description
Always	Always returns true. Used primarily for the read-only conditions of a page item
Current Language = Expression	Verifies the language setting in which the client browser is currently running. Evaluates to true if the current language matches the value entered in Expression 1.
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 is contained within Expression 1	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. 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: `en-us,en-gb`
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.

Table B–1 (Cont.) Available Conditions

Condition	Description
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)	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: `1,2,3,4`
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 `f?p` syntax to specify printer friendly mode.
Current page is not in Printer Friendly mode	Hides page controls or components when printer friendly mode is selected. Use `f?p` syntax to specify printer friendly mode. **See Also:** "Using f?p Syntax to Link Pages" on page 2-8 for information about `f?p` syntax
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)	This condition 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 emp where deptno = :P101_DEPTNO` This example references item `P101_DEPTNO` as a bind variable. You can use bind variables a 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. **See Also:** "About Bind Variable Syntax" on page 2-14 for information about bind variables
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.
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	A PL/SQL expression is any expression in valid PL/SQL syntax that evaluates to true or false. For example: `nvl(:MY_FLOW_ITEM,'NO') = 'YES'` If the value of `MY_FLOW_ITEM` is YES then the condition evaluates as true. Otherwise it evaluates as false.

PLSQL Function Body returning a Boolean	The body of a PL/SQL function that returns true or false. For example:
	`BEGIN`
	`IF :P1_DAY = 'MONDAY' THEN`
	`  RETURN TRUE;`
	`ELSE`
	`  RETURN FALSE;`
	`END IF;`
	`END;`

Table B–1 (Cont.) Available Conditions

Condition	Description
Request != Expression 1	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 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. 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. This condition evaluates as true if REQUEST does not equal the value entered in Expression 1. **See Also:** "Understanding URL Syntax" on page 2-7, "REQUEST" on page 2-24, and "Understanding the Relationship Between Button Names and REQUEST" on page 7-101
Request = Expression 1	This condition is the opposite of `Request != Expression 1`. 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: `V('REQUEST')` **See Also:** "Understanding URL Syntax" on page 2-7, "REQUEST" on page 2-24, and "Understanding the Relationship Between Button Names and REQUEST" on page 7-101
Request is contained within Expression 1	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. Use this condition to specify a 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. **See Also:** "REQUEST" on page 2-24, and "Understanding the Relationship Between Button Names and REQUEST" on page 7-101
Request is not contained within Expression 1	This condition is the opposite of `Request is contained within Expression 1`. Evaluates to true if the value of the REQUEST is not contained within Expression 1. **See Also:** "REQUEST" on page 2-24, and "Understanding the Relationship Between Button Names and REQUEST" on page 7-101
SQL Expression	SQL Expressions are evaluated as a WHERE clause in a SQL statement. For example suppose your expression is `:MY_ITEM = 'ABC'`. The Application Express engine processes the following: `select 1 from dual where :MY_ITEM = 'ABC'` This condition evaluates to true if a row is returned.
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.
Text in Expression 1 != Expression 2 (includes .&ITEM substitutions)	Use this expression to compare two expressions containing strings. Either expression may contain references to session state using &MY_ITEM syntax. **See Also:** "Understanding Substitution Strings" on page 2-15 for information about &MY_ITEM syntax

Table B–1 (Cont.) Available Conditions

Condition	Description
Text in Expression 1 = Expression 2 (includes .&ITEM substitutions)	This condition is the opposite of `Text in Expression 1 != Expression 2` (includes `.&ITEM` substitutions). Compares two expressions containing strings. Either expression may contain references to session state using the `.&ITEM.` syntax. To check if the item `F100_P2_DAY_DATE` equals "Wednesday", select this condition enter the following in Expression 1 and Expression 2: ■ Expression 1: `F100_P2_DAY_DATE` ■ Expression 2: `Wednesday` **See Also:** "Understanding Substitution Strings" on page 2-15 for information about `&MY_ITEM` syntax
User is authenticated (not public)	Verifies whether the current user was authenticated using one of the built-in authentication schemes or a custom authentication scheme. **See Also:** "Establishing User Identity Through Authentication" on page 12-26 for information about authentication
User is the public user (user has not authenticated)	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. 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. **See Also:** "Authentication" on page 4-17 for information about Public User
Value of Item in Expression 1 != zero	Verifies if the value of the item in Expression 1 does not equal zero.
Value of item in Expression 1 = Expression 2	Compares the value of an item with a specific string. Comparisons using this condition are case-sensitive. 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: ■ Expression 1: `F100_P2_WORD` ■ Expression 2: `the quick brown fox`
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	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.
Value of Item in Expression 1 is NOT contained within colon-delimited list in Expression 2	Evaluates to true when the value specified in Expression 1 contains a string that lists elements delimited by colons. 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: ■ Expression 1: `P1_TODAY` ■ Expression 2: `Monday: Tuesday:Wednesday`
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 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.

Table B–1 (Cont.) Available Conditions

Condition	Description
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.
When cgi_env DAD_NAME != Expression 1	This condition is the opposite of `When cgi_env DAD_NAME = Expression 1`. 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.
When cgi_env DAD_NAME = Expression 1	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.
When cgi_env HTTP_HOST != Expression 1	This condition is the opposite of `When cgi_env HTTP_HOST = Expression 1`. Checks for the value of the common gateway interface (CGI) environment variable `HTTP_HOST` that is the value returned by `owa_util.get_cgi_env ('HTTP_HOST')`. Evaluate to true, when this value is not equal to the string in Expression 1.
When cgi_env HTTP_HOST = Expression 1	Checks for the value of the common gateway interface (CGI) environment variable `HTTP_HOST` that is the value returned by `owa_util.get_cgi_env ('HTTP_HOST')`. Evaluate to true, when this value is equal to the string in Expression 1.
When cgi_env SERVER_NAME != Expression 1	This condition is the opposite of `When cgi_env SERVER_NAME = Expression 1`. This condition checks for the value of the common gateway interface (CGI) environment variable `SERVER_NAME`, that is the value returned by `owa_util.get_cgi_env ('SERVER_NAME')`. Evaluate to true, when this value is not equal to the string in Expression 1.
When cgi_env SERVER_NAME = Expression 1	This condition checks for the value of the common gateway interface (CGI) environment variable `SERVER_NAME`, that is the value returned by `owa_util.get_cgi_env ('SERVER_NAME')`. Evaluate to true, when this value is equal to the string in Expression 1.

C

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 4.0, 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_040000).

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_040000):

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_HELP

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_040000):

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_040000):

APEX

APEX_ADMIN

DEVELOPMENT_SERVICE_HOME

DEVELOPMENT_SERVICE_HOME_LOGIN

DEVELOPMENT_SERVICE_SIGNUP

F

HTMLDB

HTMLDB_ADMIN

HTMLDB_LOGIN

P

WS

WWV_FLOW_INIT_HTP_BUFFER

Z

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_040000):

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_040000):

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_040000):

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_040000):

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
```

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