

About These Release Notes

These release notes contain important information not included in the Oracle Application Express documentation.

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Before You Begin

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About Checking for the Most Current Release

Oracle Application Express is released more frequently than the Oracle Database. To view information about or download a more current release, see:

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

About Upgrading to the Latest Oracle Application Express Release

If you already have Oracle Application Express installed, Oracle strongly recommends that you regularly upgrade to the latest version available. To learn more about see "Upgrading from a Previous Oracle Application Express Release" in *Oracle Application Express Installation Guide*.

About Determining Your Release Version

To determine which release of Oracle Application Express you are currently running, do one of the following:

- View the release number on the Workspace home page:
 - Sign in to Oracle Application Express.
The Workspace home page appears. The current release version displays in bottom right corner.
- View the About Application Express page:
 1. Sign in to Oracle Application Express.
The Workspace home page appears.
 2. Click the **Help** menu at the top of the page and select **About**.
The About Application Express page appears.

See Also:

"About Accessing Your Development Environment" in *Oracle Application Express App Builder User's Guide*

Important Information if Updating from a Previous Release

If you are updating from previous release of Oracle Application Express, see the "Changed Behavior" sections in the following documents:

- [Oracle Application Express Release Notes release 5.1](#)
- [Oracle Application Express Release Notes release 5.0](#)
- [Oracle Application Express Release Notes release 4.2](#)
- [Oracle Application Express Release Notes release 4.1](#)

- [Oracle Application Express Release Notes release 4.0](#)

Important Information if Using Oracle Workspace Manager in an Oracle Database

If your database uses Oracle Workspace Manager, you must download the patch for Bug 11061801 from My Oracle Support and apply it to your database prior to attempting the install. To locate this patch, search for **11061801** on the Patches tab.

Important Information if Upgrading from Oracle Database Version 12c CDB

If you are upgrading an Oracle Database 12c Release 1 (12.1) multitenant container database (CDB), you must download the patch for Bug 20618595 from My Oracle Support and apply it to your database. To locate this patch, search for **20618595** on the Patches tab.

Configuration Requirements

When configuring the `mod_plsql` Database Access Descriptor (DAD), you must set the value of the character set portion of `PlsqlNLSLanguage` to `AL32UTF8` regardless of the underlying database character set.

The Database Access Descriptor now contains a parameter for `PlsqlRequestValidationFunction`. The purpose of this parameter is to limit the number of procedures which 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.

Enabling the `PlsqlRequestValidationFunction` for a Database Access Descriptor may cause existing applications which relied upon publicly executable procedures to fail. You may choose to either omit the `PlsqlRequestValidationFunction` from the Database Access Descriptor definition, or follow the recommended approach of extending the supplied validation function.

See Also:

"Restricting Access to Oracle Application Express by Database Access Descriptor (DAD)" in *Oracle Application Express Administration Guide*

New Features

Oracle Application Express release 18.1 includes a number of new features. These new features are not present in Oracle Application Express release 5.1 and earlier releases.

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Oracle JET Chart Types

Oracle Application Express release 18.1 introduces the following JET chart types:

Pyramid

Pyramid charts are useful for visualizing hierarchical, proportional and foundation-based relationships, process steps, organizational layers, or interconnections between topics. The area of a pyramid slice is proportional to its value for the corresponding stage.

Box Plot

Box plot charts (also known as Box and Whisker diagrams) are useful for analyzing the distribution of data, displaying the minimum, quartiles, median, and maximum values of groups of numerical data. Our declarative support requires the selection of a Label and Value column, and our underlying logic automatically handles the calculations for the various elements of the chart as follows:

- **High / Maximum Value** – the highest value of the data set. Optionally, you can also select a High column to set the highest value to a specific value.
- **1st Quartile** – the 25th percentile of data; 25% of the data is below this value.
- **Median / 2nd Quartile** – the middle of the data; 50% of the data is greater than this value.
- **3rd Quartile** – the 75th percentile of data; 25% of the data is above this value.
- **Low / Minimum Value** – the lowest value of the data set. Optionally, you can also select a Low column to set the lowest value to a specific value.

- **Outliers** – values that fall outside of the quartile ranges. The Upper Outliers are more than 3/2 of the 3rd Quartile. The Lower Outliers are less than 3/2 times the 1st Quartile.

Gantt

Gantt charts display project schedules, displaying bars that indicate the start and end date of tasks for a hierarchical data set.

Updated Font APEX

Oracle Application Express release 18.1 uses Font APEX 2. The previous font (Font Awesome 4.2.0) has been removed.

Font APEX 2 contains two sets of icons: Small and Large

- Small Icons are 16x16. Large icons are 32x32.
- There are several new directional and form control icons.
- Some templates (cards, media list, and so on) automatically pick up the correct icon size based on template options.

REST Enabled SQL Support

This release enables developers to create a **REST Enabled SQL** service to execute SQL or PL/SQL defined in Oracle Application Express components on a remote Oracle database.

Key features include:

- Create and maintain references to REST Enabled SQL instances (Oracle REST Data Services) in Shared Components.
- Use a REST Enabled SQL Service and therefore a remote Oracle database as the data source for classic reports, interactive reports, Oracle JET charts or CSS calendar.
- Execute PL/SQL page processes on a remote Oracle database.
- Use the `APEX_EXEC` PL/SQL package to execute SQL Queries or PL/SQL blocks on a remote database, from within your custom PL/SQL code.

Note:

At this time, Application Express Remote Data Sources (REST Enabled SQL) does not support BLOB columns (Download or Display Image format masks).

REST Service Consumption

This release introduces a robust toolset for developers to take full advantage of the new REST support including the following features:

- Create and maintain references to REST services (Web Source Modules) within Shared Components.
- Leverage Oracle REST Data Services features like server-side filtering or pagination to fetch only required data from the REST service.
- Use Simple HTTP for generic REST services, JSON or XML data feeds.
- Have Application Express automatically discover and maintain the Data Profile; no manual SQL or PL/SQL coding is required for JSON or XML parsing.
- Use Web Sources as the data source for Classic Reports, Interactive Reports, Oracle JET Charts or the CSS Calendar.
- Use the `APEX_EXEC` PL/SQL package in order to invoke REST services from within custom PL/SQL code in plug-ins or page processes.

Note:

At this time, this feature contains the following restrictions:

- When using a classic report with a REST service, Application Express does not support pagination schemes displaying the total row count (such as X to Y of Z). Selecting these pagination schemes in Page Designer results in an error message at runtime.
- REST Services does not support the Compute Sum functionality in classic reports. If selected in Page Designer, an error message displays at runtime.
- REST Services does not support BLOB columns (Download and Display Image) in classic reports or interactive reports on a REST Service.

New Create App Wizard

The Create App Wizard is redesigned to generate apps quicker than before with the following updates:

- New and improved user experience for creating applications.
- Simpler wizards for creating pages.
- Add **Features** (common frameworks) to applications such as activity reporting, access control, theme selection, and more.
- Customize user interface options such as Theme Style, application icon, and page icons.

- Leverage existing applications or UI defaults to default labels and form display types.

JavaScript API Documentation

The JavaScript API chapter in the *Oracle Application Express API Reference* is being migrated to its own new reference guide, *Oracle Application Express JavaScript API Reference*.

New widget APIs include (among others):

- `menu`
- `treeView`
- `grid`
- namespaces: `apex.actions` and `apex.model`



See Also:

[Oracle Application Express JavaScript API Reference](#)

Application Express Global Search

This release introduces a powerful search function with the following features:

- Provides quick navigation and unified search experience across Oracle Application Express
- Activate by clicking search button from header, or using the keyboard shortcut **Ctrl + Quote** (users of non-US keyboard layouts should refer to the US keyboard layout to determine the proper key for this shortcut)
- You can navigate to most screens within Application Express App Builder
- Quickly jump across applications and pages
- Also works in Page Designer – can focus on page components

Interactive Report Charts

Interactive Report charts are now powered by the Oracle JET charting library. Chart types supported for this feature include Bar, Line, Line with Area, and Pie. Customers with existing Interactive Report charts are automatically upgraded to the latest version of JET.

Websheet Charts

Websheet charts are now powered by the Oracle JET charting library. Chart types supported for this feature include Bar, Line, Line with Area, and Pie. Customers with existing Websheet charts are automatically upgraded to the latest version of JET.

Oracle JET Chart Sorting

This release introduces a new declarative option to support the sorting of chart data. The new **Sort Order** chart-level attribute can be used to sort charts by value (ascending or descending) or by x-axis label (ascending or descending).

Social Login

This release introduces the new Social Login authentication scheme with the following features:

- Supports Google, Facebook, OpenID Connect, OAuth2
- New authentication scheme attribute **Switch in Session** for schemes that can be set in the current session.

Changed Behavior

This section is current as of the writing of this document. To view the most current listing of changed behavior, go to the Known Issues page: <http://www.oracle.com/technetwork/developer-tools/apex/downloads/apex181-known-issues-4478237.html>

Changed behavior in Oracle Application Express release 18.1 includes:

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Browser Requirements

Oracle Application Express requires a JavaScript-enabled browser and supports the current and prior major release of Google Chrome, Mozilla Firefox, Apple Safari, Microsoft Internet Explorer, and Microsoft Edge.

Note:

Microsoft Internet Explorer 11 is the prior major release, with Microsoft Edge being the current Microsoft browser.

Compatibility Mode

The application attribute **Compatibility Mode** controls the compatibility mode of the Application Express runtime engine. Certain runtime behaviors change from release to release. You can use the Compatibility Mode attribute to obtain specific application behavior. This section lists Compatibility Mode changes by release. Note that all mode changes are inclusive in that all changes in older releases are included in newer releases.

Compatibility Mode Changes in Mode 4.1

In Oracle Application Express release 4.1, Automatic DML forms raised an error when rendering the page if the column name of the source of an item was invalid. Prior to Oracle Application Express release 4.1, an invalid column name of the source of an item would not raise an error when rendering the page but it would also not set session state of the item.

Also, in Oracle Application Express release 4.1, there are two new application Security Attributes to control Browser Security: **Cache** and **Embed in Frames**. Enabling the Cache attribute enables the browser to save the contents of your application's pages

in its cache, both in memory and on disk. The Embed in Frames attribute controls if the browser displays your application's pages within a frame. Applications running in a Pre-4.1 Compatibility Mode function as if the Cache is enabled and as if Embed in Frames is set to allowed. Applications running in Compatibility Mode **4.1** or later respect the specific Browser Security attributes.

Also, in Oracle Application Express release 4.1, because of bug 12990445, the following changes were implemented for Automatic Row Processing (DML) process types. The code which performs the INSERT was changed to determine if the columns should be included in the INSERT statement. Note that these are the same checks which occur before an UPDATE. These new checks include:

- Is the source type a DB Column?
- Is the page item contained in the POST request? For example, if the page item is conditional it will not be contained in the POST request if the condition evaluates to FALSE during page rendering.
- Is the page item not of type Display Only where Save State is set to No?

To enable these behaviors, set the Compatibility Mode to **4.1** or later. For behavior that matches earlier releases, set the Compatibility Mode to **Pre-4.1**.

Compatibility Mode Changes in Mode 4.2

In Oracle Application Express release 4.2 due to changes for the new grid layout, when a page is rendered, all regions in a certain display point are evaluated before rendering that display point, to find out if they should be displayed or not (so that the grid layout knows how many columns to render). The regions where the evaluation returned true will be executed and displayed. However, this will not work if a PL/SQL based region sets session state which is then used in a subsequent region condition to determine if the region should be displayed. In that scenario, the condition has already been checked before the display point is rendered. Use computations or PL/SQL processes to set session state before any region is displayed. In previous versions, the condition was evaluated right before each region was displayed.

In Oracle Application Express release 4.2, computations and processes with a processing point Before Region(s) do now fire before any region gets rendered. Computations and processes with a processing point After Region(s) fire after all regions have been rendered. In previous versions, the computations and processes fired just before and after the region display point Page Template Body (1-3).

Oracle Application Express Patch Set 4.2.2 added two new Compatibility Mode changes for Compatibility Mode **4.2**:

- Text areas were changed to always use the Maximum Width attribute to restrict text input.
- Enhanced security for report column links, where the link contains both JavaScript and references to other report column substitutions, for example:

```
javascript:alert( 'Delete #NAME#' );
```

In the previous example, *NAME* is a column name in the report.

Prior to Oracle Application Express release 4.2.1, to protect against possible cross-site scripting vulnerabilities, you would have had to explicitly escape any column values in the report source, so that they could safely be used in JavaScript links. When running in Compatibility Mode **4.2**, Oracle Application Express automatically JavaScript escapes column name substitutions referenced in JavaScript links if the column is defined to escape special characters.

See Also:

To learn more, see [Oracle Application Express Patch Set Notes](#) and search for *Compatibility Mode*.

Compatibility Mode Changes in Mode 5.0

In Oracle Application Express release 5.0, referencing a Static Application File with `#WORKSPACE_IMAGES#` no longer returns the application file. Instead, use `#APP_IMAGES#`.

The API calls

to `wwv_flow_custom_auth_std.logout`, `wwv_flow_custom_auth_std.logout_then_go_to_page`, `wwv_flow_custom_auth_std.logout_then_go_to_url`, and `apex_custom_auth.logout` are desupported and will raise a runtime error instead of logging out from the Oracle Application Express session. Instead, use the `apex_authentication.logout` entry point.

Prior to release 5.0, developers using data upload did not have the option to choose a date format. Instead, a parser checked for the best format to match the user's entry or an end user could enter their own format. Oracle Application Express release 5.0 includes a new item that enables the user to choose an application date format or user entered format. Because applications created before release 5.0 do not have an item, a Compatibility Mode of **5.0** checks if the user has entered some data. If no data has been entered, it picks the application date format.

When a session timeout occurs and no timeout URL is specified, Oracle Application Express raises an error instead of redirecting to the application's home page. If the session setup for an Ajax requests fails, Oracle Application Express also raises an error. For Ajax requests that expect JSON, the response is a JSON string with members that describe the error. For other requests, the error appears on an error page.

Page items based on a database column where the attribute Source Used is set to **Only when current value in session state is null** will raise an error when the page item gets rendered. Using this setting for a database column is very dangerous and can result in accidentally overwriting data when viewing and saving multiple records. Always set the Source Used attribute to **Always, replacing any existing value in session state**.

Compatibility Mode Changes in Mode 5.1 / 18.1

In Oracle Application Express 18.1, buttons where the Execute Validations attribute is set to **Yes** also perform some client-side validations (such as item required checks) and will not submit the page until all issues are fixed. In previous versions this flag was just used to determine if server-side validations should be executed.

 **Tip:**

Please pay attention when changing the Compatibility Mode to 5.1/18.1. Buttons, such as Cancel or Previous, where the Execute Validation flag has incorrectly been set to **Yes** and which use an After Submit branch, never execute validations when the user clicks the button. You can address this issue by using the new client-side validations, or by setting Execute Validations to **No**.

In release 5.1, any Ajax-based Dynamic Actions where the "Wait for Result" attribute is set to `Yes` perform an asynchronous Ajax call. Prior to 5.1, such calls would be made synchronously.

Enabling Network Services in Oracle Database 11g or Later

You must enable network services in Oracle Database 11g or later versions to send outbound mail, use Web services, or use PDF report printing in Oracle Application Express.

When and Why Network Services Must be Enabled

Enabling network services enables support for sending outbound mail in Oracle Application Express, use of Web services in Oracle Application Express, and PDF report printing.

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 2 or later. Therefore, if you are running Oracle Application Express with Oracle Database 11g Release 2 or later, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_180100` 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.

 **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 a 11g or 12c database will already have the parameter set properly, but a database upgraded to 11g or 12c from a prior version may not. For information about changing database initialization parameters, see "Creating and Configuring an Oracle Database" in [Oracle Database Administrator's Guide](#).

Granting Connect Privileges Prior to Oracle Database 12c

Demonstrates how to grant connect privileges to any host for the APEX_180100 database user.

The following example demonstrates how to grant connect privileges to any host for the APEX_180100 database user. This example assumes you connected to the database where Oracle Application Express is installed as SYS specifying the SYSDBA role.

```
DECLARE
    ACL_PATH VARCHAR2(4000);
BEGIN
    -- Look for the ACL currently assigned to '*' and give APEX_180100
    -- the "connect" privilege if APEX_180100 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;

    IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_180100',
        'connect') IS NULL THEN
        DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
            'APEX_180100', 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_180100', TRUE, 'connect');
        DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('power_users.xml', '*');
END;
/
COMMIT;
```

The following example demonstrates how to provide less privileged access to local network resources. This example enables access to servers on the local host only, such as email and report servers.

```
DECLARE
    ACL_PATH VARCHAR2(4000);
BEGIN
    -- Look for the ACL currently assigned to 'localhost' and give APEX_180100
```

```

-- the "connect" privilege if APEX_180100 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;

IF DBMS_NETWORK_ACL_ADMIN.CHECK_PRIVILEGE(ACL_PATH, 'APEX_180100',
'connect') IS NULL THEN
    DBMS_NETWORK_ACL_ADMIN.ADD_PRIVILEGE(ACL_PATH,
'APEX_180100', 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 users to connect to localhost',
'APEX_180100', TRUE, 'connect');
    DBMS_NETWORK_ACL_ADMIN.ASSIGN_ACL('local-access-users.xml', 'localhost');
END;
/
COMMIT;

```

Granting Connect Privileges in Oracle Database 12c or Later

Procedures `CREATE_ACL`, `ASSIGN_ACL`, `ADD_PRIVILEGE` and `CHECK_PRIVILEGE` in `DBMS_NETWORK_ACL_ADMIN` are deprecated in Oracle Database 12c. Oracle recommends to use `APPEND_HOST_ACE`.

The following example demonstrates how to grant connect privileges to any host for the `APEX_180100` database user. This example assumes you connected to the database where Oracle Application Express is installed as `sys` specifying the `SYSDBA` role.

```

BEGIN
    DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
        host => '*',
        ace => xs$ace_type(privilege_list => xs$name_list('connect'),
            principal_name => 'APEX_180100',
            principal_type => xs_acl.p_type_db));
END;
/

```

The following example demonstrates how to provide less privileged access to local network resources. This example enables access to servers on the local host only, such as email and report servers.

```

BEGIN
    DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
        host => 'localhost',
        ace => xs$ace_type(privilege_list => xs$name_list('connect'),
            principal_name => 'APEX_180100',
            principal_type => xs_acl.p_type_db));
END;
/

```

Troubleshooting an Invalid ACL Error

Learn how to identify a invalid ACL error by running the query.

If you receive an `ORA-44416: Invalid ACL error` after running the previous script, use the following query to identify the invalid ACL:

```
REM Show the dangling references to dropped users in the ACL that is assigned
REM to '*'.

```

```
SELECT ACL, PRINCIPAL
       FROM DBA_NETWORK_ACLS NACL, XDS_ACE ACE
       WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL AND
             NACL.ACLID = ACE.ACLID AND
             NOT EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);

```

Next, run the following code to fix the ACL:

```
DECLARE
  ACL_ID  RAW(16);
  CNT     NUMBER;
BEGIN
  -- Look for the object ID of the ACL currently assigned to '*'
  SELECT ACLID INTO ACL_ID FROM DBA_NETWORK_ACLS
         WHERE HOST = '*' AND LOWER_PORT IS NULL AND UPPER_PORT IS NULL;

  -- If just some users referenced in the ACL are invalid, remove just those
  -- users in the ACL. Otherwise, drop the ACL completely.
  SELECT COUNT(PRINCIPAL) INTO CNT FROM XDS_ACE
         WHERE ACLID = ACL_ID AND
               EXISTS (SELECT NULL FROM ALL_USERS WHERE USERNAME = PRINCIPAL);

  IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
              WHERE ACLID = ACL_ID AND
                    NOT EXISTS (SELECT NULL FROM ALL_USERS
                                WHERE USERNAME = PRINCIPAL)) LOOP

      UPDATE XDB.XDB$ACL
      SET OBJECT_VALUE =
          DELETEXML(OBJECT_VALUE,
                   '/ACL/ACE[PRINCIPAL="' || R.PRINCIPAL || '"]')
      WHERE OBJECT_ID = ACL_ID;
    END LOOP;

  ELSE
    DELETE FROM XDB.XDB$ACL WHERE OBJECT_ID = ACL_ID;
  END IF;

END;
/

REM commit the changes.

COMMIT;

```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the `APEX_180100` user.

APEX_WORKSPACE_ACTIVITY_LOG.THINK_TIME is always NULL

As of this release, the value of `THINK_TIME` in view `APEX_WORKSPACE_ACTIVITY_LOG` is always null.

Previously, the computation of this column negatively impacted the view's performance. It required an additional index, causing more I/O during page processing.

You can compute `THINK_TIME` by using the following example as a guide:

```
select view_date,
       (view_date - lag(view_date) over (
         partition by apex_session_id
         order by view_date )) *60*60*24 think_time,
       application_id,
       page_id,
       apex_session_id,
       apex_user
from apex_workspace_activity_log
where workspace = 'EXAMPLE WORKSPACE'
and view_date > sysdate-1
order by 1, 2 desc
```

Internal engine changes for Classic Reports

Changes to the engine executing classic reports in order to support REST enabled SQL and REST Services includes the following:

- When **Compute Sum** is enabled, the application now computes the sum using the `SUM()` SQL function with a windowing clause.
- When **Generic Columns** and a PL/SQL function returning SQL Query is used, the generated SQL Query must have unique column names (no duplicate column names). Additionally, the column names must be valid SQL identifiers. On Oracle Database 12.2 and higher, column names can be up to 128 characters (for older versions, 30 characters).
- You can only enable **Compute Sum** for numeric report columns. In previous releases, you could create Classic Reports with Compute Sum enabled for `VARCHAR2` columns. These reports now fail with an `ORA-1722` error message in this release. Set Compute Sum to `NO` for non-numeric columns in these Classic Reports.
- Oracle Application Express uses Bulk Row Fetching by default for better performance. For tabular forms, however, custom Javascript code may no longer function properly. To force Single Row fetching, add the comment `/*APEX$SINGLE_ROW_FETCH*/` to your SQL query.
- In the past, classic reports rendered when the result set contained multiple columns with the same name. In Application Express 18.1, the column names of the query result set must be unique, otherwise a "Column Ambiguously Defined"

error occurs. You must change any non-unique report queries present in your current applications.

- Classic reports which select a ROWID column without a column alias may throw ORA-01446 error messages under specific circumstances (cannot select ROWID from, or sample, a view with DISTINCT, GROUP BY, and so on). When a report throws this error message, adjust the SQL query to provide a column alias for the ROWID column.

Changes to Interactive Reports

This release introduces the following changes to the engine executing interactive reports in order to support REST enabled SQL and REST Services:

- Interactive reports with Invalid Computations do not render. Previously, interactive reports could contain invalid computations as long as the computation was hidden by the end user. An invalid computation can occur when end users create computations and developers remove dependent columns afterwards. With this release, such invalid computations display an error message. Since an invalid computation has no value, developers or users should delete them to make the report work again.
- The SQL text generated by an interactive report differs from the text generated in previous versions (however, it is semantically the same). Developers may need to update applications that depend on the exact SQL query text returned by `APEX_IR.GET_REPORT`
- End users cannot use interactive report columns which are set to "Hidden" in Page Designer in filters, highlights, or other report actions. Setting a column to hidden completely hides this column from the end user.

Page Designer Improvements

Property Editor

The following changes have been made to the Property Editor in Page Designer:

- Updated UI to improve usability
- Removed the Show Common, Show All, Collapse All, and Expand All functionality
- Property groups glow when you select a property
- Improved **Go to Group** functionality
- The Two Pane / Three Pane button has been moved to the Utilities, Layout submenu

Sticky Filters

Filter terms can now be pinned to the Property Editor search filter so you can click other components and retain the filter.

Interactive Grid Enhancements

Updates to interactive grid regions in this release include:

- Expose additional events to Dynamic Actions
- A new **Selections** sub-menu (within the Actions menu) with the following new features:
 - Toggle selection mode between **Cell Selection** and **Row Selection**
 - **Copy Down**, **Clear**, and **Fill** actions
 - **Copy to Clipboard** (for row or cell range selections)

Tree Region Enhancements

Updates to the tree region for this release include:

- Oracle Application Express now supports the Advanced: JavaScript Initialization Code attribute. This attribute and the *Oracle Application Express JavaScript API Reference* make customizing the tree region easier (see "[Widget: treeView](#)").
- SQL columns and their use no longer have a fixed association. Now you choose the column to use for functions such as node label, tooltip, and link.
- The Hierarchy attribute provides the option to let the engine automatically compute the hierarchy from the SQL statement.
- Added Default Icon attribute. Allow Icon Type to be empty (without forcing a-Icon).
- Improved Page Designer help text for all attributes.
- Support for Dynamic Action Event Selection Change [Tree].
- Advanced Config option (nodeSelector) to support checkbox selection.
- Tree region now supports the `apex.region` API.
- Copy selection to clipboard.
- For Security reasons, tooltip contents are now escaped.

To use HTML markup in a tooltip:

1. Choose "HTML Expression" as Tooltip and use HTML markup in the Tooltip Value attribute.
2. Reference database columns within Tooltip Value using Substitution syntax (&COLUMN.).

Developer Toolbar Improvements

This release introduces the following updates to the Developer Toolbar:

- An indicator for when there is a JavaScript error on the page.
- New **Page Info** menu which contains the **Show Layout Columns** and **Show Page Timing** features.

Advisor Improvements

Updates to the Oracle Application Express Advisor in this release include:

- New Accessibility checks to check your apps for common accessibility issues
- New Performance check for inclusion of compatibility JavaScript

Item Type Improvements

This release introduces the new **Text with Autocomplete** item type using Oracle JET.

Some additional changes to the implementation of this item type has resulted in the following changed behavior.

Prior to this release, if an Application Express page had only one item on it, and that item was a "Text with autocomplete," pressing the Enter key when focused on the item may have submitted the page. This behavior was not by design in Application Express. Rather, this is a default browser behavior where if a web page contains just one form element, pressing Enter when focused on the item submits the form.

In this release, the updated autocomplete implementation prevents this from happening. If you relied on this behavior in previous releases (such as submitting the page and branching to a page relevant to the selected search item), this no longer works. Implement one of the following solutions instead:

- Add a button next to the autocomplete item that submits the page.
- Use the "update" Dynamic Action event along with a "Submit Page" action to trigger the page submit when a search item is selected.
- Create a Dynamic Action to trigger the submit after the Enter key has been pressed. For example, use the "Key Down" event, define the autocomplete item in the "When > Item(s)", and define a "JavaScript expression" Client-side Condition with the following:

```
this.browserEvent.which === 13
```

Then define a "True Action" that calls the "Submit Page" action type.

Item Type Markup Improvements

This release includes the following improvements in form markup for item types:

- Markup has moved away from tables and changed to <div> elements.
- CSS classes feature a more consistent naming convention.
- Includes additional classes used to style items.

These changes may impact custom themes and therefore could impact your application UI. If you are using a custom theme, you may want to review the markup for items.

If you are using Universal Theme, Oracle recommends refreshing the theme to the latest version to resolve known issues with previous versions of Universal Theme.

 **See Also:**

"Refreshing a Subscribed Theme" in the *Oracle Application Express App Builder User's Guide*

Oracle JET and jQuery Library Updates

Updates to Oracle JET and jQuery library in this release include the following:

- JET 4.2.0
- jQuery 3.1.1
- jQuery UI 1.12.0
- FullCalendar 3.3.1
- jsTree third party library is removed because it is incompatible with new versions. Tree regions will be converted to use the Application Express treeView widget.

If you have made JavaScript or CSS customizations that are specific to jsTree, you may need to re-implement them following removal and automatic conversion to treeView.

To learn more, see the new [JSDoc treeView widget API documentation](#).

 **See Also:**

"[Known Issues for jQuery UI and jQuery Upgrade \(page 37\)](#)"

Text Message Substitutions

Text message substitution updates in this release include:

- For a given text message `MY_MESSAGE`, you can now use `v('APP_TEXT$MY_MESSAGE')` to retrieve the message text.
- Use `APP_TEXT$MY_MESSAGE$XX` to return the translation text for language `XX` (such as DE, FR, and so on).
- Same syntax is supported on the client via the `apex.util.applyTemplate` API.

List View Region

The List View region from the deprecated mobile UI is supported on desktop UI.

This release includes the following updates to the List View Region:

- The desktop UI now supports the List View region from the deprecated mobile UI.
- Refresh works for nested lists.

- Nested lists in the desktop UI do not create jQuery Mobile pages.
- For the desktop UI, some CSS class names have changed so developers may need to update CSS customizations. Additionally, options related to jQuery Mobile theme are not supported.

Column Toggle Report Region

This release includes the following updates to the Column Toggle Report region:

- The desktop UI now supports the Column Toggle Report region from the deprecated mobile UI.
- The Column Toggle Report region now supports refresh and page items to submit.
- The Column Toggle Report region now supports the Messages: When No Data Found attribute (desktop only).
- New Column Button Text attribute to customize the button that opens the column popup.
- New accessible table markup and Use As Row Header attribute.
- For the desktop UI, some CSS class names have changed so developers may need to update CSS customizations. Additionally, options related to jQuery Mobile theme are not supported.

Reflow Report Region

This release includes the following updates to the Reflow Report region:

- The desktop UI now supports the Reflow Report region from the deprecated mobile UI.
- The Reflow Report region now supports refresh and page items to submit.
- The Reflow Report region now supports the Messages: When No Data Found attribute (desktop only).
- Accessible table markup and Use As Row Header attribute.
- For the desktop UI, some CSS class names have changed so developers may need to update CSS customizations. Additionally, options related to jQuery Mobile theme are not supported.

Ajax Error Message on Server and dynamic_actions_core JavaScript Modules Changed

The Oracle Application Express server and dynamic_actions_core JavaScript modules no longer call window.onerror when there is an Ajax error.

Classic Report (based on Function) removed

As of this release, "Classic Report (based on Function)" is no longer available. Use the Classic Report region type instead.

The column `SOURCE_TYPE_PLUGIN_NAME` of the view `APEX_APPLICATION_PAGE_REGIONS` now returns `NATIVE_SQL_REPORT` instead of `NATIVE_FNC_REPORT`.

JET Chart Datetime Formatting

In Oracle Application Express release 5.1, the use of "Z" automatically applied in the format mask for Datetime information rendered on a chart. However, the use of "Z" in the format mask for all Datetime information resulted in some unexpected behavior for customers (such as Datetime information on charts rendered with time zone formatting, when no time zone formatting was expected).

In this release, the format mask setting is now based on the data type of the x-axis LABEL column (regardless if it is DATE, TIMESTAMP, TIMESTAMP with TIME_ZONE, or TIMESTAMP with LOCAL TIME_ZONE). The format mask setting is also based on the data type of the column. For DATE columns, the format mask no longer uses "Z". Customers reviewing chart information now see Datetime rendered with the appropriate time zone information.

New HTTP Headers X-Content-Type-Options and X-XSS-Protection

To improve browser security in the browser, Oracle Application Express sends two new HTTP response headers on each request:

- `X-Content-Type-Options: nosniff`
- `X-XSS-Protection: 1; mode=block`

X-Content-Type-Options - Update your applications and data to send the correct Content-Type. As a workaround, you can set the value to "sniff", but this should only be used in the short term. The "nosniff" value for X-Content-Type-Options prevents MIME-type sniffing in the browser. This can cause regressions if responses return an invalid Content-Type (such as "image/gif" when the file type is PNG).

X-XSS-Protection - prevents some categories of cross-site-scripting attacks.

While you cannot suppress these headers, you can override them by setting different values in the application- or instance-level **HTTP Response Headers** attributes.

JET Chart Sort Order

In order to support REST Enabled SQL Service and Oracle REST Data Services, the SQL optimizer works differently than in previous releases due to changes to the engine executing JET Chart series queries. Things such as orders in your chart may render incorrectly. This can happen due to the following reasons:

- **No ORDER BY clause in the series query** - You should always use an ORDER BY clause to ensure the ordering of results.
- **GROUP BY is used in a series query without an ORDER BY clause** - GROUP BY does not guarantee that the result is ordered. The SQL optimizer decides how grouping is performed. Ensure that every SQL statement has an ORDER BY clause to specify a certain order.

Database Monitor Username and Password Case-Sensitive

As of this release, the database username and password used to access Database Monitor are now case-sensitive.

See Also:

"Monitoring the Database" in the *Oracle Application Express SQL Workshop Guide*

Deprecated Features

Deprecated features are features which Oracle plans to desupport or remove in a future release of Oracle Application Express. If a feature is related to application metadata or an API, existing applications can still use the feature, but Oracle strongly recommends that developers start to modify their applications as described in this section. Use Oracle Application Express Advisor to scan existing applications for deprecated attributes.

- [apex.server Plug-in and Process Function Async Option Deprecated](#) (page 24)
- [apex.widget.initPageItem Function Deprecated](#) (page 24)
- [jQuery Flot and Flot Plug-ins Deprecated](#) (page 24)
- [APEX_ERROR.GET_ARIA_ERROR_ATTRIBUTES Deprecated](#) (page 24)
- [External Processing in Classic Report Deprecated](#) (page 24)
- [APEX_UTIL.STRING_TO_TABLE Function Deprecated](#) (page 25)
- [APEX_UTIL.TABLE_TO_STRING Function Deprecated](#) (page 25)
- [Deprecated JavaScript Functions](#) (page 25)

See Also:

"Running Advisor to Check Application Integrity" in the *Oracle Application Express App Builder User's Guide*

apex.server Plug-in and Process Function Async Option Deprecated

In a future release the `async` option will be ignored and all Ajax requests will be asynchronous.

apex.widget.initPageItem Function Deprecated

The function `apex.widget.initPageItem` is deprecated. Item plug-in creators should use `apex.item.create` instead.

jQuery Flot and Flot Plug-ins Deprecated

The jQuery Flot versions 0.7, 0.8, 0.8.2, and 0.8.3 are not used in Oracle Application Express and will be removed in a future release. Packaged Applications have also been updated to remove Flot Line, Flot Bar, and Flot Pie chart plug-ins. Remove any references in your application code and use our declarative chart solution, based on Oracle JET Data Visualizations.

APEX_ERROR.GET_ARIA_ERROR_ATTRIBUTES Deprecated

`APEX_ERROR.GET_ARIA_ERROR_ATTRIBUTES` is deprecated and will no longer be available in the next major release of Oracle Application Express. Developers should replace this functionality with `apex_plugin_util.get_element_attributes`, which provides better support with native functionality.

External Processing in Classic Report Deprecated

The External Processing functionality of Classic Report has been deprecated and will be removed in a future release.

To use the External Processing function in the interim, your application must include the **Deprecated or Desupported JavaScript** file. To include this file, select the application and edit the User Interface Details. For Include Deprecated or Desupported JavaScript Functions, select **Pre 18.x**.

See Also:

- "Editing User Interface Details" in the *Oracle Application Express App Builder User's Guide*
- "JavaScript" in the *Oracle Application Express App Builder User's Guide*

APEX_UTIL.STRING_TO_TABLE Function Deprecated

Since Oracle Application Express 5.1, `APEX_UTIL.STRING_TO_TABLE` is deprecated. Use `APEX_STRING.STRING_TO_TABLE` instead.

APEX_UTIL.TABLE_TO_STRING Function Deprecated

Since Oracle Application Express 5.1, `APEX_UTIL.TABLE_TO_STRING` is deprecated. Use `APEX_STRING.TABLE_TO_STRING` instead.

Deprecated JavaScript Functions

The following functions are deprecated as of this release:

- `$d_Find`
- `$d_LOV_from_JSON`
- `$dom_JoinNodeLists`
- `$dom_Replace`
- `$f_Enter`
- `$f_First_field`
- `$s_Split`
- `$tr_RowMoveFollow`
- `$u_ArrayToString`
- `$u_js_temp_drop`
- `$u_SubString`
- `$x_Check_For_Compound`
- `$x_object`
- `$x_Show_Hide`
- `addLoadEvent`
- `ajax_Loading`
- `base_disableItem`
- `confirmDelete2`
- `dhtml_ShuttleObject`
- `doMultiple`
- `findPosX`
- `findPosY`
- `flowSelectAll`
- `getScrollXY`

- `hideShow`
- `html_GetTarget`
- `html_ReturnToTextSelection`
- `html_RowDown`
- `html_RowUp`
- `html_StringReplace`
- `htmlldb_ch`
- `htmlldb_ch_message`
- `htmlldb_doUpdate`
- `htmlldb_goSubmit`
- `htmlldb_item_change`
- `ie_RowFixFinish`
- `ie_RowFixStart`
- `json_SetItems`
- `lc_SetChange`
- `selectString`
- `setCaretToBegin`
- `setCaretToEnd`
- `setCaretToPos`
- `setSelectionRange`
- `setValue2`
- `widget.util.disableIcon`
- `wiget.util.enableIcon`

Desupported Features

Desupported features are no longer available. If a desupported feature has to do with application metadata or APIs, then existing applications may not work as they did previously. Oracle recommends modifying the application to replace the feature.

- [Removed Packaged Applications](#) (page 27)
- [Removal of Outdated Third Party Libraries Versions](#) (page 27)
- [Desupported Condition Types](#) (page 27)
- [Application Builder Component View Desupported](#) (page 31)
- [APEX_UTIL.SET_CURRENT_THEME_STYLE Desupported](#) (page 32)
- [Conditional File Loading for Microsoft Internet Explorer Desupported](#) (page 32)
- [Themes 1 thru 26, Theme 50, and Theme 51 Desupported](#) (page 32)

- [jQuery Autocomplete and jsTree Plug-ins are Desupported](#) (page 32)
- [Old jQuery Versions Desupported](#) (page 33)
- [Legacy Chart Components Desupported](#) (page 33)
- [Desupport of Mobile Theme - 51 and the jQuery Mobile User Interface](#) (page 33)
- [Desupport of APEXExportSplitter](#) (page 33)
- [Removal of Text with Autocomplete attributes](#) (page 34)
- [Desupported JavaScript Functions](#) (page 34)

Removed Packaged Applications

The following packaged applications have been removed in this release of Oracle Application Express:

- Packaged Applications:
 - Quick SQL
 - REST Client Assistant
 - Community Requests
 - Expertise Tracker
 - Feedback

Note:

Quick SQL is currently available at quicksql.oracle.com

Removal of Outdated Third Party Libraries Versions

The following outdated third party library version have been removed:

- jsTree 0.9.9
- twitter-bootstrap all versions
- bgiframe 2.1.1
- respond-js 1.1.0
- jquery-quicksand 1.2.2
- selectivizr 1.0.2

Desupported Condition Types

The following condition types of the following attributes are no longer supported in Oracle Application Express release 18.1.

For each desupported condition type, follow the proceeding Oracle recommended action to correct your application.

Attribute — Conditions

- **For Condition Types:**

- CGI_ENV: DAD_NAME `#!/= Value`
- CGI_ENV: HTTP_POST `#!/= Value`
- CGI_ENV: SERVER_NAME `#!/= Value`

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- Client Browser is Microsoft Internet Explorer 7.0 or higher
- Client Browser is Mozilla, Netscape 6.x/7x or higher
- Client Browser is Other browsers (or older version)
- Client Browser is XHTML / CSS capable browser

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('HTTP_USER_AGENT')` instead.
- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- SQL Reports
- Current Page `#!/= Page Submitted (posted)`
- Text `#!/= Value`
- Text is/ is NOT contained in Value/Item

Recommended Action:

- Use PL/SQL Expression or PL/SQL Function returning Boolean condition types.

- **For Condition Type:**

- Always

Recommended Action:

- By having no condition specified the same result will be achieved.

Attribute — Read Only Conditions

- **For Condition Types:**

- CGI_ENV: DAD_NAME `#!/= Value`
- CGI_ENV: HTTP_POST `#!/= Value`
- CGI ENV: SERVER_NAME `#!/= Value`

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- Client Browser is Microsoft Internet Explorer 7.0 or higher
- Client Browser is Mozilla, Netscape 6.x/7x or higher
- Client Browser is Other browsers (or older version)
- Client Browser is XHTML / CSS capable browser

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('HTTP_USER_AGENT')` instead.
- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- SQL Reports
- Current Page `#!/= Page Submitted (posted)`
- Text `#!/= Value`
- Text is/ is NOT contained in Value/Item

Recommended Action:

- Use PL/SQL Expression or PL/SQL Function returning Boolean condition types.

Attribute — Server Cache Conditions

- **For Condition Types:**

- CGI_ENV: DAD_NAME `#!/= Value`
- CGI_ENV: HTTP_POST `#!/= Value`
- CGI ENV: SERVER_NAME `#!/= Value`

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- Client Browser is Microsoft Internet Explorer 7.0 or higher
- Client Browser is Mozilla, Netscape 6.x/7x or higher

- Client Browser is Other browsers (or older version)
- Client Browser is XHTML / CSS capable browser

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('HTTP_USER_AGENT')` instead.
- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- SQL Reports
- Current Page \neq Page Submitted (posted)
- Text \neq Value
- Text is/ is NOT contained in Value/Item

Recommended Action:

- Use PL/SQL Expression or PL/SQL Function returning Boolean condition types.

- **For Condition Type:**

- Always

Recommended Action:

- By having no condition specified the same result will be achieved.

Attribute — Link Conditions

- **For Condition Types:**

- `CGI_ENV: DAD_NAME \neq Value`
- `CGI_ENV: HTTP_POST \neq Value`
- `CGI_ENV: SERVER_NAME \neq Value`

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.

- **For Condition Types:**

- Client Browser is Microsoft Internet Explorer 7.0 or higher
- Client Browser is Mozilla, Netscape 6.x/7x or higher
- Client Browser is Other browsers (or older version)
- Client Browser is XHTML / CSS capable browser

Recommended Action:

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('HTTP_USER_AGENT')` instead.

- Use a PL/SQL expression, such as `SYS.OWA_UTIL.GET_CGI_ENV('XYZ')` API instead.
- **For Condition Types:**
 - SQL Reports
 - Current Page `≠` Page Submitted (posted)
 - Text `≠` Value
 - Text is/ is NOT contained in Value/Item

Recommended Action:

 - Use PL/SQL Expression or PL/SQL Function returning Boolean condition types.
- **For Condition Type:**
 - Always

Recommended Action:

 - By having no condition specified the same result will be achieved.

Application Builder Component View Desupported

Legacy Component View has been desupported and removed.

To assist developers with the transition to Page Designer, Page Designer includes a Component View tab. Similar in appearance to Legacy Component View, the Page Designer Component View tab presents user interface elements and application logic by component type; however, when you click a component, the Property Editor highlights the corresponding attribute in the right pane and enables you to edit the component attributes.

As of Oracle Application Express release 5.1, Legacy Component View is disabled by default. To enable Component View, edit your user preferences and select **Yes** for Enable Legacy Component view. Once the Legacy Component View has been enabled, navigate back to Page Designer, click the **Component View** tab, and then click **Legacy Component View [Deprecated]**. Please note that some components, such as Interactive Grids and Oracle JET based Charts, can not be maintained using the Legacy Component View.

Tip:

To assist developers with the transition to Page Designer, Page Designer includes a Component View tab. Similar in appearance to Legacy Component View, the Page Designer Component View tab presents user interface elements and application logic by component type; however, when you click a component, the Property Editor highlights the corresponding attribute in the right pane and enables you to edit the component attributes.

APEX_UTIL.SET_CURRENT_THEME_STYLE Desupported

`APEX_UTIL.SET_CURRENT_THEME_STYLE` is desupported and is no longer available in the next major release of Oracle Application Express. Developers should replace this functionality with `APEX_THEME.SET_CURRENT_STYLE`.

Conditional File Loading for Microsoft Internet Explorer Desupported

Support for conditional file loading for Microsoft Internet Explorer in JavaScript File URLs and CSS File URLs attributes using `[if IE]/mycss/ie.js` is desupported.

Themes 1 thru 26, Theme 50, and Theme 51 Desupported

Themes 1 thru 26, Theme 50, and Theme 51 are desupported and considered legacy. The Universal Theme - 42 (Universal Theme) is now the standard theme in Oracle Application Express.

To learn more about transitioning to Universal Theme, navigate to <http://apex.oracle.com/ut> and click **Migration Guide**.

jQuery Autocomplete and jsTree Plug-ins are Desupported

The jQuery `jsTree` plug-in optionally used by the APEX Tree region and the jQuery `autocomplete` plug-in used by the Text Field with Autocomplete item are desupported and do not work in this release of Oracle Application Express.

All tree regions have been migrated to use the APEX Tree implementation.

Customizations for the `jsTree` implementation must be reimplemented using the `treeView` API. Note that the automatic upgrade of a `jsTree` region to an APEX Tree region does **not** automatically convert an image reference to a CSS Class. The APEX Tree region does not support defining an image reference. Instead, APEX Tree regions accept a CSS class to represent an image.

If you are using the Text Field with autocomplete there is nothing you need to do. In this release, we have a replacement implementation based on JET `ojQueryInputSearch` widget that is fully backward compatible (for all declarative features). However, Oracle recommends that you do not use the jQuery `autocomplete` plug-in directly in your app due to incompatibility.

See Also:

- "treeView" in the [Oracle Application Express JavaScript API Reference](#)
- [Known Issues for jQuery UI and jQuery Upgrade](#) (page 37)

Old jQuery Versions Desupported

The jQuery versions 1.4.2, 1.6.2 and 1.7.1 are not used in Oracle Application Express and have been removed in this release. Remove any references in your application code and use the most current jQuery version which ships with Oracle Application Express.

Legacy Chart Components Desupported

Some legacy chart components are no longer supported (such as HTML Charts and SVG Charts) following the removal of Component View in Oracle Application Express 18.1.

Because these legacy charts are not supported in Page Designer, app developers may be left with regions that they cannot edit. Customers with existing HTML and SVG charts are automatically upgraded to the latest version of JET charts, in the following ways:

- When you upgrade to Oracle Application Express 18.1
- When you import an older app to Oracle Application Express 18.1

Desupport of Mobile Theme - 51 and the jQuery Mobile User Interface

The jQuery Mobile user interface and Mobile Theme - 51 are desupported. The last stable version of the jQuery Mobile open source library was released on 10/31/2014 and only provides support for jQuery versions 1.8 - 1.11 and 2.1, which no longer receive patches. Oracle Application Express release 18.1 ships with jQuery 3.2. All new application development targeted at mobile devices must be done using the responsive Universal Theme. jQuery Mobile will no longer be supported in future releases.

To learn more about migrating existing applications to the Universal Theme, go to the *Universal Theme* application at <https://apex.oracle.com/ut> and select **Migration Guide**.

Desupport of APEXExportSplitter

The APEXExport program for exporting workspaces, applications, and related files is no longer supported. Use the `-split` parameter instead without the program.

 **Note:**

In Oracle Application Express release 5.1, APEXExport included a `-split` parameter to split exported applications into multiple files.

Removal of Text with Autocomplete attributes

The following attributes of the **Text with Autocomplete** item type have been removed:

- **Automatic Fill** - This attribute has been removed due to a potentially confusing user experience. The new implementation now uses a more standard approach (the item's value only updates when selected from the option list, not during navigation of the list).
- **Select First** - This attribute has been removed due to a potentially confusing user experience. The new implementation uses a more standard approach (selection occurs in response to direct user input by using the arrow keys to select from the option list).
- **Highlight** - Prior to this release, it was possible to enable or disable highlighting of the search term as it appeared in the results list. This is no longer configurable. Instead, the text is always highlighted in the results.

Desupported JavaScript Functions

Oracle has an ongoing commitment to try to reduce the overall size of JavaScript that Oracle Application Express loads when rendering a page. We are gradually moving JavaScript functions that are no longer served on every page to legacy JavaScript files (located in `/i/libraries/apex/legacy*.js`).

Including legacy JavaScript functions is optional. To include them, use the Include Legacy JavaScript property on the User Interface Attributes page under the application's Shared Components.

When including legacy JavaScript functions, Application Express migrates any existing applications automatically for backward compatibility. To exclude this legacy file, do the following:

1. Review the functions listed in the legacy file or files (`legacy_18.js` and `legacy_pre18.js`).
2. Search your application and associated JavaScript files for any references to those files.

If you exclude all references to these functions, you can disable inclusion of the entire `legacy*.js` file (this also reduces the size of the library slightly).

Oracle recommends that you avoid using any of the functions in `legacy.js` to reduce your dependency on this legacy JavaScript for both new and existing application development.

Deprecated Functions in this Release

As of this release, the following functions are desupported and moved to `legacy_18.js`.

Ajax-related Functions

Replace with functions from `apex.server` namespace

- `htmldb_Get`
- `htmldb_Get_sync`
- `htmldb_Get_getUrl`
- `htmldb_Get_escape`
- `htmldb_Get_addParam`
- `htmldb_Get_addItem`
- `htmldb_Get_trimPartialPage`
- `htmldb_get_WriteResult`
- `$a_PostClob`
- `$a_GetClob`
- `ob_PPR_TAB`
- `htmldb_ExternalPost`
- `apex.ajax`

Menu-related Functions

Replace with `menu` widget.

- `item_menu`
- `dhtml_CloseAllSubMenus`
- `dhtml_CloseAllSubMenusL`
- `app_AppMenuMultiClose`
- `dhtml_DocMenuCheck`
- `dhtml_ButtonDropDown`
- `dhtml_KeyAction`
- `dhtml_MenuOpen`
- `dhtml_DocMenuSingleCheck`
- `dhtml_SingeMenuOpen`
- `dhtml_FixLeft`
- `htmldb_IE_Select_Item_Fix`
- `app_AppMenuMultiOpenBottom`
- `app_AppMenuMultiOpenBottom2`

- `app_AppMenuMultiOpenBottom3`

Tooltip-related Functions

Replace with jQuery UI tooltip.

- `toolTip_init`
- `toolTip_disable`
- `toolTip_enable`
- `toolTip_follow`

Pop-up field help

Replace with `apex.theme.popupFieldHelp`

- `apex.theme.popupFieldHelpClassic`

Open Bugs and Known Issues

This section describes bugs and known issues for Oracle Application Express release 18.1.

Tip:

This section is current as of the writing of this document. To view the most current listing of changed behavior, go to the **Known Issues** page:

<http://www.oracle.com/technetwork/developer-tools/apex/downloads/apex181-known-issues-4478237.html>

- [Removal of AnyChart Flash Components from Images Folder](#) (page 36)
- [Known Issues for jQuery UI and jQuery Upgrade](#) (page 37)
- [Known Issues for RESTful Services and Oracle REST Data Services \(ORDS\)](#) (page 38)
- [Accessibility Issues](#) (page 41)

Removal of AnyChart Flash Components from Images Folder

In a previous release, the AnyChart and AnyGantt flash `.swf` files were removed from the `/images` folder. This results in AnyChart map chart and gantt charts no longer rendering. No error message displays, instead the region will be blank.

See Also:

"Switching from AnyChart to JET Chart" in the *Oracle Application Express App Builder User's Guide*

Known Issues for jQuery UI and jQuery Upgrade

jQuery 3.1.1 breaks compatibility with earlier 2.x versions. For applications that still rely on removed 2.x functionality, you can use the jQuery Migrate plug-in (to include this plug-in, set the Desktop User Interface Details attribute **Include jQuery Migrate to Yes**).

If your application relies on removed 1.x jQuery APIs, that functionality no longer works as of Oracle Application Express release 18.1. You must update the JavaScript to only use jQuery 3.1 APIs. See the jQuery migration guides to learn more:

- To migrate from 1.x to 2.x see <http://jquery.com/upgrade-guide/1.9/>
- To migrate from 2.x to 3.x see <https://jquery.com/upgrade-guide/3.0/>

jQuery UI 1.12.x has changed the folder structure and files that make up the library compared to version 1.10.4. If you have direct references to any of the old file filenames, you must update them to the new name. For example, if you previously referenced the tabs widget with `#JQUERYUI_DIRECTORY#ui/#MIN_DIRECTORY#jquery.ui.tabs#MIN#.js`, you must change it to `#JQUERYUI_DIRECTORY#ui/widgets/#MIN_DIRECTORY#tabs#MIN#.js`.

The Oracle Application Express specific bundle `jquery-ui-apex[.min].js` that loads by default for Application Express desktop UI pages (either as `jquery-ui-apex.js` or as part of `desktop[_all].min.js`) includes all the core files, the drop effect, and the following widgets:

- button
- checkboxradio
- controlgroup
- datepicker
- dialog
- draggable
- droppable
- resizable
- selectable
- sortable
- tooltip

This is essentially the same set as in 1.10.4 with the addition of sortable. If you have a separate reference to sortable, you can remove it.

The `jquery-ui-apex[.min].css` file loads by default and includes all the jQuery UI CSS files. If you had references to individual jQuery UI css files, you can remove them.



See Also:

[JET v4.2.0 Release Notes](#)

Known Issues for RESTful Services and Oracle REST Data Services (ORDS)

Customers using Oracle Application Express 18.1 and Oracle REST Data Services 18.1 may encounter the following issues when developing and deploying RESTful Services.

- [Issue when Migrating Application Express RESTful Services with a Null URI to ORDS](#) (page 39)
- [Issue when Workspace Name Differs From First Provisioned Schema Name](#) (page 38)

Issue when Workspace Name Differs From First Provisioned Schema Name

Issue

This issue affects all releases of Oracle REST Data Services **except** 17.4.1 and 18.2 or later and all releases of Application Express (ORDS services can be created by SQL Developer or an API). This issue exists for services created in the First Apportioned Schema of a workspace when the workspace name and schema name are different.

Due to an error in the way older releases of Oracle REST Data Services retrieve information about the Application Express environment, Oracle REST Data Services cannot serve ORDS Based RESTful Services if a given workspace name does not match the first provisioned schema name. This error was corrected in Oracle REST Data Services 17.4.1 but regressed in Oracle REST Data Services 18.1.

The following examples describe the issue:

- A user has existing APEX Based RESTful Services and migrates them to Oracle REST Data Services, then modifies the ORDS Based RESTful Services definition. If the user calls the services and expects the new logic to perform, instead the older APEX Based RESTful Services are still called. If the user then goes to the APEX Based RESTful Services page, deletes the original service, and runs the service expecting to call the ORDS service, the user instead gets a 404 error.
- If a user creates new ORDS Based RESTful Services in the first provisioned schema but does not have corresponding APEX Based RESTful Services, a 404 error results when the user calls the services.

There is no supported resolution at this time.

Issue when Migrating Application Express RESTful Services with a Null URI to ORDS

Issue

Prior to 5.1, the Application Express RESTful Services interface enabled users to create RESTful service modules with a null URI Prefix (users could also create multiple modules with null URI Prefixes). The URI templates in all modules had to be unique in order to share the null URI Prefix across the services.

Example Module Definitions with Null URI Prefixes

Consider the following definitions:

Module 1

```
Name:           MyMod1
URI Prefix:     NULL

URI Templates:  /Template1
                /Template2
```

Module 2

```
Name:           MyMod2
URI Prefix:     NULL

URI Templates:  /Template3
                /Template4
```

In effect, these definitions create a single virtual service with four templates with *null* for the URI Prefix. These can be called in the following ways:

```
http://server.com/ords/mySchema/Template1
http://server.com/ords/mySchema/Template2
http://server.com/ords/mySchema/Template3
http://server.com/ords/mySchema/Template4
```

Where:

`http://server.com`
The **server URL**.

`ords`
The **ORDS alias**.

`mySchema`
The **Path Prefix**.

null

The **null Module URI Prefix**. Does not appear in the call, but is processed by the services.

Template1

The **URI Template**.

While the ability to create null URI Prefixes was disabled in Application Express 5.1, legacy services that were defined in prior releases were migrated and functioned as long as they were not deleted. However, when migrating these services to Oracle REST Data Services, the ORDS Based data model does not accept multiple modules with duplicate URI Prefixes (including null prefixes).

The logic to migrate APEX Based Rest Services to Oracle REST Data Services in Application Express 18.1 is a simple pass-through to an Oracle REST Data Services procedure (introduced in Oracle REST Data Services 17.4.1). However, the logic of that procedure fails to process multiple modules with a null base path. Users in this situation who try to migrate to Oracle REST Data Services encounter a "Duplicate Value" and throw an `ORA-0001` error (Oracle bug 27916570).

Resolution

Logic has been added to the migration procedure to merge all modules that have null URI Prefixes. The rules are as follows:

Oracle REST Data Services 18.2

All affected modules collapse into a single ORDS Based module named `merged.apex.rest.services`

If **any** of the APEX Based modules being merged are published, the new merged module publishes.

If **none** of the APEX Based modules being merged are published, the new merged module does not publish.

All **roles** associated with APEX Based modules being merged are assigned to the new merged module.

The **pagination size** of the merged module is set to the largest pagination size in the modules being merged.

For APEX Based modules with null URI Prefixes that also have duplicate URI templates, the following occurs:

- The **most recently updated** template maintains the duplicate URI.
- All other templates are given the prefix `dup001_*`
- The comment for the template contains: 1) the original module name that it migrated from, and 2) the original Template URI.

Oracle Application Express 18.1

If you have **one module or none** with a null URI Prefix, the services migrate successfully regardless of your release of Oracle REST Data Services (the migration is only available in Oracle REST Data Services 17.4.1 or later).

If you have **two or more modules** with a null URI Prefix, one of the following occurs:

- If you have Oracle REST Data Services 18.2 or later, the modules migrate using the rules above.

- If your Oracle REST Data Services release is older than 18.2, a warning message displays and you cannot migrate your services to Oracle REST Data Services until you upgrade to 18.2 or later.

Accessibility Issues

This section describes accessibility bugs and known issues for Oracle Application Express.

- [Inconsistent "Required" Attributes Emitted for Page Items](#) (page 41)
- [Interactive Grid Single Row View Keyboard Issues with Links and Buttons](#) (page 42)
- [Interactive Grid Cell Buttons and Links Cannot Activate in Edit Mode](#) (page 42)
- [Interactive Grid Contains Additional Hidden Tab Stops After the Grid](#) (page 43)
- [Page Designer, Property Editor, Display Group Headings Should Be Buttons](#) (page 43)
- [Single Value / Item Check Boxes Render Unnecessary Fieldset and Legend Tags](#) (page 43)
- [Duplicate Labels When Two or More Regions Display Maximize Buttons](#) (page 44)
- [Icons Not Visible When Running Windows High Contrast Mode](#) (page 44)
- [Calendar Region List View Accessibility Should Be Improved](#) (page 44)

Inconsistent "Required" Attributes Emitted for Page Items

Issue

Some configurations of required attributes produce inconsistent emissions by screen readers, and may confuse users of assistive technology.

When specifying required page items in Oracle Application Express, developers can choose different configuration steps and options depending on the specifics of the validation:

1. Developers must use the relevant label template (such as "Required") to show the required icon next to the label. Choosing this label template also means the label appends hidden text that is read by a screen reader, stating "(Value Required)."
2. To validate the input, there are two main methods:
 - The most common method is to set the Value Required item attribute, which validates the input, and also emits "aria-required="true" required="" in the form item attributes.
 - The less common method is to use a `not null` page validation, which you may need to do if, for example, the validation needs to be done conditionally based on some other context (such as a page item storing `TOTAL_SALES` information is only required if `JOB = SALES`).

In this case, where a separate validation is used, the item does not contain the required attributes on the item emitted.

This can lead to inconsistencies in what is emitted, and possibly confuse a user of Assistive Technology.

This issue is tracked with Oracle bug 23761182.

Workaround

Instead of using the Value Required item attribute, create simple `not null` style validations on the items and set the Value Required attributes to `no`. Then, as long as developers have defined the appropriate label template for required items, this provides a consistent experience across all required items: the required information is conveyed in the label, and not in the item attributes.

Interactive Grid Single Row View Keyboard Issues with Links and Buttons

Issue

In the Single Row View of an interactive grid, fields that are links or fields with custom markup that contain one or more buttons or links have the following issues:

- Users cannot activate a column of type link or a column with a link defined with the keyboard in navigation mode.
- A column that contains buttons or links has extra tab stops in edit or navigation mode.

This issue is tracked with Oracle bug 25245829.

Workaround

Use grid view, where links and buttons can be activated.

Interactive Grid Cell Buttons and Links Cannot Activate in Edit Mode

Issue

In an interactive grid, in grid view, users cannot press the space bar or Enter key to activate buttons or links that are contained in cells when the grid is in Edit Mode.

This issue is tracked with Oracle bug 25245887.

Workaround

Press the ESC key to exit Edit Mode and switch back to Navigation Mode, where the buttons and links can be activated as usual.

Interactive Grid Contains Additional Hidden Tab Stops After the Grid

Issue

Interactive grid has additional hidden tab stops when users tab past the grid section.

This issue is tracked with Oracle bug 25245934.

Workaround

After tabbing past the grid section, press the Tab key multiple times until you reach the next visibly focusable element on the page.

Page Designer, Property Editor, Display Group Headings Should Be Buttons

Issue

Currently in the Property Editor, the display groups are marked up as `<div>` elements that are focusable with the keyboard. When focused, users can navigate between display groups with the Up and Down arrow keys, which aids keyboard support of the Property Editor. However, when the `<div>` is focused, JAWS announces the display group title twice, and JAWS does not initially announced the ARIA expanded state when the display group first gets focus (however, it is announced upon expand or collapse).

This issue is tracked with Oracle bug 20693220.

Workaround

Users should be aware that the state is not announced upon first focus, and can either force announcement by pressing Enter and making the group expand or collapse, or alternatively by pressing Tab to go to the next focusable element, which will either be the first field in the group (if expanded), or the next display group (if collapsed).

Single Value / Item Check Boxes Render Unnecessary Fieldset and Legend Tags

Issue

Rendering a native check box item renders a `FIELDSET` tag that acts as a container for the group of check boxes and a `LEGEND` tag which gives the `FIELDSET` an accessible title.

This works well for check boxes that have more than one check box in the group, but when the check box only has one check box, it is incorrect to render the `FIELDSET` and `LEGEND`.

This issue is tracked with Oracle bug 18188460.

Duplicate Labels When Two or More Regions Display Maximize Buttons

Issue

The Maximize functionality built into native region types renders a button within the region allowing the user to maximize the region content to fill the page. If two or more of these regions with maximize functionality enabled appear on the same page, they have duplicate labels for the buttons.

This issue is tracked with Oracle bug 27685217.

There is no supported workaround.

Icons Not Visible When Running Windows High Contrast Mode

Issue

When running Windows High Contrast mode, many icons and icon buttons are unavailable when using Windows High Contrast mode.

There is no supported workaround.

This issue is tracked with Oracle bug 27781674.

Calendar Region List View Accessibility Should Be Improved

Issue

For this release, the List View of the Calendar region type in 18.1 now uses the native list view of the FullCalendar widget. Prior to 18.1 and prior to FullCalendar supporting this, Application Express had a custom implementation of the list view. The FullCalendar list view uses poorly structure HTML, which negatively affects accessibility.

There is no supported workaround.

This issue is tracked with Oracle bug 27941145.

Documentation Additions

This section lists additions to Oracle Application Express documentation.

- [Oracle Application Express JavaScript API Reference Prototype](#) (page 45)

Oracle Application Express JavaScript API Reference Prototype

This release introduces a prototype of the [Oracle Application Express JavaScript API Reference](#) to the Oracle Help Center. As an introductory publication, it is likely some JavaScript APIs were excluded in this initial version.

In the future, this reference will contain all JavaScript APIs. In the interim, please see "JavaScript APIs" in the [Oracle Application Express API Reference](#).

Documentation Accessibility

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

Access to Oracle Support

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

Privacy Notice

This privacy notice describes what to expect when Oracle Application Express directly collects information about users of applications that you create or install. Note that all Application Express internal applications (such as Application Builder) are written in Application Express, so the same facts apply to developers and administrators who are using these applications. Oracle is not responsible for information collection of applications that were developed by customers.

Event Logging

Application Express provides extensive logging of user triggered events. For example, developers and administrators can use this data to find security and performance issues. The log data includes the user's IP address and application username plus event specific information. Below is a brief list of event log types.

- **Activity Log** - Page views and Ajax requests. Can be disabled by developers and instance administrators.
- **Login Access Log** - Successful and failed login attempts.
- **Debug Log** - Application-specific instrumentation, such as internal variable values. Disabled by default, the debug log can be enabled by end users and developers.

- **Click Count Log** - Clicks on external links within applications.
- **Web Service Activity Log** - Requests to external web services from inside the database.
- **Developer Activity Log** - Changes to application components.
- **SQL Workshop Log** - History of SQL statements in the development environment's SQL Workshop.

Cookies and Related Technologies

Application Express does not use any third-party cookies, but it does use functional cookies (no tracking) and the browser's SessionStorage and LocalStorage for maintaining the login session and for personalization. This is essential for application security, performance, and ease of use. Below are details about the cookie and storage names that Application Express uses and their intended use.

Session Cookies

- `ORA_WWV_USER_instance id` - Security cookie for internal applications, like Application Builder.
- `ORA_WWV_APP_application id`, `ORA_WWV_APP_workspace cookie id`, `custom name` - Security cookie for applications. Developers can choose custom cookie names in an application's authentication scheme.
- `ORA_WWV_RAC_INSTANCE` - Session cookie for the Real Application Cluster (RAC) node instance number, for node pinning on the web server. Only sent when multiple RAC nodes are detected.

Persistent Cookies

- `ORA_WWV_REMEMBER_LANG` - The user's selected application language.
- `ORA_WWV_REMEMBER_UN` - (Optional) Workspace and username of the previous login to the development environment login page. See check box "Remember workspace and username" on the development environment login page for details.
- `LOGIN_USERNAME_COOKIE` - (Optional) Username of the previous login to developed applications. See check box "Remember username" on login pages of new applications for details. To make this cookie optional on login pages of existing applications, add a "Remember username" checkbox to the page. The API documentation for `APEX_AUTHENTICATION.GET_LOGIN_USERNAME_COOKIE` and `APEX_AUTHENTICATION.SEND_LOGIN_USERNAME_COOKIE` has examples for the PL/SQL process code to set the check box value and to only send the cookie when the check box is checked.

Session Storage

- `ORA_WWV_apex.builder.devToolbar.grid` - This stores the current setting of the Development Toolbar's Show Layout Columns option.

- `ORA_WWV_apex.builder.themeRoller.application id.*` - This stores settings of the Development Toolbar's Theme Roller popup.
- `.4000.4500.*` - This stores the current tab in each of the tab sets of Page Designer.
- `APEX.userHasTouched` - This is used to remember if the user has interacted with the application using touch (a touchstart event has been seen). It is used by some components to customize the user experience when using touch devices.
- `.application id.page.*.activeTab` - This remembers the last tab selected for Region Display Selector regions or regions using the Tabs Container template that have enabled the option to save the current tab
- `ORA_WWV_apex.Calendar.application id.page.region id.lastview` - This remembers the last viewed calendar period.
- `.application id.page.*.preferenceForExpanded` - This remembers the expanded state for collapsible regions.
- `ORA_WWV_apex.MED_*.splitterPosition` - This stores the splitter bar position for various Interactive Grid settings dialogs.

Local Storage

- `ORA_WWV_apex.builder.devToolbar.options` - This stores the Developer Toolbar user preference settings: Auto Hide, Show Icons Only, and Display Position.
- `ORA_WWV_apex.builder.pageDesigner.useComponentView` - This stores the users preference for the Page Designer's Component View tab.
- `ORA_WWV_apex.builder.pageDesigner.model.componentIds` - This stores a pool of not yet used IDs for new components in Page Designer.

Check for Updates

When developers log in to the Application Express development environment, they get a notification when a new version is available. To get this version information, Application Express sends a request to an oracle.com server on a bi-weekly basis. It passes anonymized, statistical information about the development server (such as database version and Application Express component usage) that the Application Express product development team uses to make decisions about the products' future. This check is enabled by default, but can be disabled by instance administrators. To learn more, review the `CHECK_FOR_UPDATES` parameter in "APEX_INSTANCE_ADMIN" in the *Oracle Application Express API Reference*.

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