

## About These Release Notes

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

- [Before You Begin](#)
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## Before You Begin

Review the following to ensure your readiness for this version of Oracle APEX.

- [Oracle Database Requirements](#)
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# Oracle Database Requirements

Oracle APEX release 22.1 requires an Oracle Database release 12.1.0.2 or later, including Enterprise Edition (EE) and Express Edition (Oracle Database XE).

## Note:

The Data Package installation script type requires Oracle Database 18c or later.

## See Also:

Oracle APEX Installation Requirements in *Oracle APEX Installation Guide*

# Browser Requirements

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

# About Release Numbering Conventions

New releases of Oracle APEX correlate to the calendar year.

In 2018 and starting with release 18.1 and 18.2, Oracle APEX introduced correlating the release number to the calendar year.

In addition, APEX now only offers full releases and no longer provides patch set releases (such as 5.1.1). Eliminating patch set releases reduces downtime when updating existing installations. APEX architecture also enables developers to revert releases if necessary.

Patch set exceptions (PSEs) may still be delivered for major defects. To learn more about PSEs, visit the [Oracle APEX 22.1 Known Issues](#) page or the [Prior Release Archives](#) for earlier releases.

# About Checking for the Most Current Release

Oracle APEX 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 APEX Release

If you already have Oracle APEX installed, Oracle strongly recommends that you regularly upgrade to the latest version available.

To learn more, see [Upgrading from a Previous Oracle APEX Release](#) in the *Oracle APEX Installation Guide*.

## About Determining Your Release Version

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

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



### See Also:

[About Accessing Your Development Environment in Oracle APEX App Builder User's Guide](#)

## Important Information if Updating from a Release Prior to 22.1

If you are updating from a previous release of Oracle APEX, see the Changed Behavior sections in the following documents:

- [Oracle Application Express Release Notes release 21.2](#)
- [Oracle Application Express Release Notes release 21.1](#)
- [Oracle Application Express Release Notes release 20.2](#)
- [Oracle Application Express Release Notes release 20.1](#)
- [Oracle Application Express Release Notes release 19.2](#)
- [Oracle Application Express Release Notes release 19.1](#)
- [Oracle Application Express Release Notes release 18.2](#)
- [Oracle Application Express Release Notes release 18.1](#)
- [Oracle Application Express Release Notes release 5.1](#)

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

## 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.

## New Features

Oracle APEX release 22.1 includes a number of new features. These new features are not present in APEX release 21.2 and earlier releases.

- [Approvals and Unified Task List](#)
- [Create Page Wizard](#)
- [Export Application Metadata in JSON or YAML Format](#)
- [Natural Search on Row Search](#)
- [Region Sort Page Item](#)
- [Markdown and Rich Text Enhancements](#)
- [Customizing the PWA Service Worker](#)
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- [Subscription Support for Lists](#)
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- [Code Editor Enhancements](#)
- [New JavaScript Initialization Code Attribute](#)
- [Plug-In Support for Faceted Search/Smart Filters](#)
- [Email Template Updates](#)
- [JavaScript Library Upgrades](#)
- [JavaScript API Updates](#)

- [PL/SQL API Updates](#)

## Approvals and Unified Task List

Create approval tasks with new processing elements, and easily manage the progress of tasks from a single Unified Task List for easy maintenance.

**Unified Task List** - Use the Unified Task List component page to set up a centralized location for managing tasks.

**Task Details** - Generate a Task Details page to customize the style and design for approval tasks.

**Task Definitions** - Use Task Definitions to configure approval tasks for a particular function, including static or dynamic generation of task owners and task managers.

**Sample Approvals App** - The new Sample Approvals App has everything you need to get started.

### See Also:

- [Managing Approvals](#) in *Oracle APEX App Builder User's Guide*

## Simplified Page Creation

The Create Page wizard is drastically simplified to make it easier than ever before to create pages in your APEX apps. The streamlined wizard applies smart defaults, minimizes user input, improves page navigation, and more.

**Create Pages Faster** - We've reduced the number of steps necessary to create pages, so you can add pages faster and with minimal effort.

**Create Pages Smarter** - The Create Page wizard automatically sets the most appropriate settings for page mode, breadcrumb and navigation. Even the navigation icons are set based on the page type, and Primary Key columns are selected based on Primary Key Constraints.

**Create Smarter Pages** - It's more than just the wizard—the pages you get are smarter too! Shared List of Values (LOVs) are created or re-used for columns that have foreign key constraints, and the column or item types are set appropriately to match!

## Export Application Metadata in JSON or YAML Format

Application Export now has a readable/diffable version in JSON or YAML format.

**Export Readable Format** - Include a human-readable export in JSON or YAML format as part of your application export.

**Export API Updates** - New export type options `READABLE_JSON` and `READABLE_YAML` are now available for the `APEX_EXPORT.GET_APPLICATION_API`, whose `p_type` parameter can now be a comma-delimited list of values to export multiple formats at once.

**SQLcl and APEXExport Support** - `SQLcl` and `APEXExport` (Java) utilities now support the new JSON and YAML export formats.

## Natural Search on Row Search

A new attribute, `Tokenize Row Search`, is added to the Application Definition page. Previously, any component that executed a row search performed an exact match search. Search terms are now applied more generally.

**Tokenize Row Search** - Setting this attribute to `On` treats each word of a search term separately. Records return as matches when the words in the search are contained in any of the columns either together or independently. To search for an exact phrase, use double quotes (") around the search terms. To escape a double quote in a search term, use a double quote ("").

## Region Sort Page Item

The new `Sort Order` item type lets you easily configure sorting options for your regions. This is particularly useful for region types that do not support ordering on their own, such as the `Cards` region.

**Easy Sorting** - Define a collection of `Order By` clauses, internal keys, and display values as part of the item definition. The appropriate `Order By` clause associated with the key is applied.

**Fully Integrated** - Region refresh is built into the system by default. In most cases, the `Sort Order` item is automatically created as part of the `Create Page` wizard.

**Wide Region Support** - Nearly all region types are supported, including `cards`, `classic reports`, `charts`, and `region plug-ins`. Some regions (`map region`, `tree region`, `interactive report`, and `interactive grid`) are exempt from this feature because these regions provide their own sort controls.

## Markdown and Rich Text Enhancements

A more consistent content styling is now available across all components (`classic report`, `interactive report`, `interactive grid`, `display only item`, `markdown editor item`, and `rich text editor item`). The `Markdown Editor` page item now displays as a `Display Only` item in `Read Only` mode to stay consistent with other components.

**Rich Text in the Interactive Grid** - Toggle the `Display Rich Text` attribute to show rich text, even in `read-only` grid mode.

**CKEditor5 v32.0.0** - `CKEditor5 v32.0.0` includes the new `HTML Embed` plugin for embedding raw HTML. The `Full` toolbar of the `Rich Text Editor` now contains an entry that allows you to insert and edit arbitrary HTML snippets.

**apex\_markdown.to\_html** - The `apex_markdown.to_html` API function now supports passing the content as CLOB.

## Customizing the PWA Service Worker

Advanced users can tap into the full power of Progressive Web Apps (PWAs) by adding their own service worker code. Customizing the Service Worker gives users the ability to:

- Implement push notifications
- Enable offline mode
- Perform background synchronization

**PWA in Shared Components** - The Shared Components section now features a new page dedicated to PWA attributes.

**Pick a Service Worker Strategy** - Use the APEX default service worker to benefit from the new resource caching system, or extend the APEX service worker with JavaScript hooks to implement push notifications, web app payments, push app updates in the background, and more.

**Share Your Custom Service Worker** - Using the File URL service worker strategy, you can share your code across multiple applications.

## Persistent Authentication

Persistent Authentication allows users to open an application without having to sign in each time. Once you enable Persistent Authentication on the instance level and check the PWA option in the Application Wizard, the Login page of the generated application automatically contains a **Remember Me** checkbox.

**Secured by Default** - Persistent Authentication is enabled through the Security options in Manage Instance and can be disabled at any moment, so you stay in control of your system.

**Extended API** - Persistent Authentication extends the `apex_authentication.login` API, so it can be implemented in non-PWA applications. Persistent logins can be revoked or invalidated individually or in bulk using the `apex_authentication` APIs.

## Improved Region Images

**New Image Region Template** - The new Image region template in Universal Theme can be used to create image-only regions. Template options like filter, ratio, and scale allow image customization without writing any CSS.

**Image Substitution Strings** - Image substitution strings are available to use in custom region templates for more control over image placement in a region.

Region Image and Image Tag Attributes previously were available in the Property Editor for all regions, regardless of the template and including regions without a

template. Now, Region Image and Image Tag Attributes have been deprecated, and are not available for regions that don't have a template defined.

## Data Generator

Use the Data Generator to quickly prototype data by creating blueprints with tables, columns, and custom data sources.

**Start From Existing Tables** - Create blueprints from existing tables in the user scheme, from scratch, or by importing valid JSON blueprint files.

**Generate Data** - Generate thousands of rows of data and export in CSV, JSON, or SQL insert files. Insert data into existing tables and columns in the schema.

## Application Icons

Application Icons are redesigned. Upload your application icon once, and let APEX propagate it to your application at runtime.

**Upload Your Icon** - In addition to the list of APEX icons, styles, and colors, you can upload a custom icon and use APEX's icon editor to resize or crop your icon.

**Edit Your Icon** - You can edit application icons any time through a new dedicated icon section in Shared Components, User Interface Attributes.

**Integrated in Runtime Developer Toolbar** - Use the Runtime Developer toolbar to edit your icon. Editing the icon from the login page of your application shows a preview of the output in real time.

## Effortless App Gallery Installs

Sample and Starter Apps can once again be installed directly from the Gallery. This feature had been removed in Oracle Application Express 21.1.

**New Gallery Design** - The APEX app gallery is redesigned to display a more user friendly view of all available starter apps and sample apps, along with their app descriptions and the install options.

**Update Available** - If your starter app or sample app is out of date, APEX displays a badge to notify you that an update is available.

### See Also:

- [Installing Apps from the Gallery](#) in *Oracle APEX App Builder User's Guide*
- [Configuring the Gallery](#) in *Oracle APEX Administration Guide*

## Session Overrides

There is a new Developer Toolbar option for Session Overrides that allows you to set APEX session variables at runtime.

**Scoped Session Attributes** - With session overrides, you can quickly test your app running in other languages and other timezones without impacting users.

**Load Additional JavaScript and CSS** - Building JavaScript and CSS locally is easier than ever with file path session overrides. Edit substitution strings like `#APP_FILES#` or `#THEME_FILES#`, allowing APEX to reroute the file path of those files to your preferred location.

## File URL Enhancements

**Extended File URL Syntax** - The JavaScript File URL syntax is extended to support new directives: `[module]`, `[defer]`, and `[async]`. The IE-specific `[if...]` directive is now desupported.

**Comments** - File URLs can be commented out by prefixing the line with two dashes (`--`) or wrapping multiple lines in `/* */`.

**Improved Editing Experience** - The code editor for both JavaScript and CSS File URLs now supports syntax highlighting and autocomplete for URL directives and substitution strings.

## Add Workspace Static Files to Component Export

Export Workspace Static Files using Component Export.

## Subscription Support for Lists

Like many other Shared Components, lists now support the subscription feature.

Create List, Copy List, and Edit List are all simplified.

## REST Sources

**New REST Source Type** - Introduces a new REST Source Type, **REST Enabled SQL Query**. Create REST Sources on top of REST Enabled SQL and use them for REST Catalogs, Synchronization, or abstracting the SQL query from the APEX component.

## Code Editor Enhancements

There is a new editor setting for **Bracket Pair Colorization**.

All uncommon invisible characters in the source code are now highlighted by default.

JavaScript code defined in the JavaScript Function and Global Variable Declaration is available as intellisense in all other JavaScript editors on the page.

 **See Also:**

- [High Performance Bracket Pair Colorization](#)
- [Unicode Highlighting](#)

## New JavaScript Initialization Code Attribute

The JavaScript Initialization Code attribute is added to the Faceted Search, Smart Filters, and Cards regions. This allows advanced customization of the region during initialization.

If you previously used JavaScript to customize options for these regions, review your code to see if it can benefit from being moved into this attribute.

## Plug-In Support for Faceted Search/Smart Filters

Plug-in developers can now make a region plug-in compatible with Faceted Search and Smart Filters. Region plug-ins can then be connected to a Faceted Search or Smart Filters region in Page Designer. At runtime, the region automatically refreshes as the filters change. Data is automatically filtered. Required setup:

1. Enable the plug-in standard attribute **Supports Faceted Search/Smart Filters**, which is conditional on **Region Source supports different Data Sources**.
2. Pass `p_region.filter_region_static_id` to the front-end, and to the **filterRegionId** attribute of the region interface implementation.
  - The filter IDs are automatically appended to `p_region.ajax_items_to_submit`
3. On the front-end, ensure the region interface's **refresh** callback returns a Promise to let the engine know when to lock/unlock the facets. You can return the result of the call to `apex.server.plugin`.

## Email Template Updates

Specific attributes of email templates now support template directives.

 **See Also:**

[Using Template Directives](#) in *Oracle APEX App Builder User's Guide*

## JavaScript Library Upgrades

- Oracle JET 12.0.0
- jQuery 3.6.0

- jQuery UI 1.13.1 (Custom bundle)
- FullCalendar 5.5.1
- Font APEX 2.2.1
- PrismJS 1.26.0
- MarkedJS 4.0.12
- DOMPurify 2.3.1
- CKEditor4 4.18.0
- CKEditor5 32.0.0
- MapLibre 1.15.2 (Maps previously used Mapbox)

## JavaScript API Updates

### Enhancements for Actions

The actions interface is updated:

- Actions can be bound to links (anchor elements). This allows invoking actions from most places that you can enter a URL in APEX including Shared Components list entries and card region actions.
- Action binding syntax for href and data-action attributes can now include action context-id and arguments. This allows binding actions defined by a context, such as an interactive grid region, to UI elements outside the context and passing arguments to actions.
- Added `pArgs` argument to a number of methods and callback functions.
- Added `actions.action` object properties `idArg` and `instanceSelector`. New section Handling Multiple Instances added to `actions` interface description.
- The `treeView` can now invoke actions on node activation. The `menu` and `treeView` widgets are updated to support specifying action context and passing arguments to actions. Both widgets support the href binding syntax. Menus from markup support attribute `data-context-id`.

### New Options, Properties, and Parameters

There are new options, properties, and parameters:

- Added option `iterationCallback` to `apex.util.applyTemplate`.
- Menu widget `menu.item` object has new properties: `actionContextId` and `args`.
- Menu widget `open` and `toggle` methods have new optional `args` parameter.
- New option `actionsContext` added to `treeView` widget.
- Added `onIcon` and `offIcon` properties to `action` object and `menu item` to support toggle menu items and actions.

- Interface method `model.clearData` now has `pNotify` parameter.
- New options for `apex.model.create`: `callServer`, `visibilityFilter`, and `visibilityFilterContext`.
- Added `pCallServer` parameter to `apex.model.save`.
- Added `pTotal`, `pMoreData` parameters to `model.setData`.
- Property `copyValueToClipboard` added to `grid widget columns` option.
- Added `pageErrorsContainerSelector` option to `apex.message.setThemeHooks`.
- Added `filterRegionId` property to the `facetsRegion` interface.
- The `region` interface `refresh` callback can now return a `Promise`.
- `treeView` widget update method has new parameter `pRender`.
- Model method `metadataChanged` has new parameter `pPropertyName` and notification `metaChange` includes the property as well.
- Added `actionsFilter` property to the `facetsRegion` interface `listcontrol` object.

## New Functions and Methods

There are new functions and methods:

- `apex.actions.findContextById`
- `apex.model.multipleFetch`
- `model.setDisabledState`
- `model.setHiddenState`
- `model.isDisabled`
- `model.updateVisibility`
- `apex.locale.getDayNames`
- `apex.locale.getMonthNames`
- `apex.locale.getDSDateFormat`
- `apex.locale.getDLDateFormat`
- `item.hasDisplayValue`
- `treeNodeAdapter.isHidden`

## Other Changes

- Simpler markup for action bindings and menu buttons.
  - Actions no longer need `js-actionButton` class for button bindings or `js-actionSelect` class for select list binding.
  - Menu buttons no longer need `js-menuButton` class.

- Document that the template loop directive works with models and add new APEX\$META substitution.
- Added example to `grid widget columns` option showing how `defaultGridColumnOptions` can be used from an Interactive Grid column.
- Interface `model` describes content of ajax messages.
- Removed the `apex.date.DEFAULT_DATE_FORMAT` property. To format/parse directly, use `apex.locale.getDateFormat`.
- Now `apex.date.format` and `apex.date.parse` support more format masks.
- Improved descriptions for:
  - `tableModelView` and `grid pageChange` event
  - `tableModelView` and `grid getPageInfo` method
  - `grid sortIndex` and `controlBreakIndex` column properties
  - `apex.util.showSpinner`
  - `apex.actions.add`
  - `model.setOption`
  - `apex.message.showError`
- A new APEX action (`apex.actions`) named `a-pwa-install` is added to trigger the opening of the Progressive Web App (PWA) install dialog. This new action automatically invokes the `openInstallDialog` function of the `apex.pwa` namespace. To use this new action, you can add custom buttons to your application and add attribute `data-action="a-pwa-install"`, or use `href="#action$a-pwa-install"` for links or list entries.
- Other various minor fixes and improvements.

## PL/SQL API Updates

The `APEX_WEB_SERVICE` API now includes the `CLEAR_REQUEST_HEADERS` and `CLEAR_REQUEST_COOKIES` procedures, providing an easy programmatic way to clear request headers and cookies.

The `APEX_STRING` API now includes additional methods for arrays of CLOBs (`apex_t_clob`): `PUSH` procedure, `SPLIT_CLOBS` function, and `JOIN_CLOBS` function.

## Changed Behavior

Changed behavior in this release includes:

- [Faceted Search Enhancements](#)
- [Removed Text Messages](#)
- [Interactive Reports Character Limit Change](#)
- [URL Format Changed for Friendly URL and Static File Support](#)

- [UI Changes](#)
- [Compatibility Mode](#)
- [Enabling Network Services in Oracle Database](#)

## Faceted Search Enhancements

Faceted search updates include:

- The Show Chart button on the facet is now on the facet context menu.
- Search Term Highlighting is added for client-side filtering.

Page Designer changes for Faceted search regions include:

- The attribute Show Chart moves from List Entries to Actions Menu.
- The attribute Show Chart Initially moves from List Entries to Advanced.
- Client-side Filtering is renamed to Display Filter Initially due to the introduction of Filter on the Actions Menu. The filter is disabled by default, but users can enable it if the Action Menu Filter option is set to On.

## Removed Text Messages

The internal text message `APEX.WAIT_UNTIL_PAGE_LOADED` is removed because it is no longer needed. If you previously translated this message, the translation can be removed.

## Interactive Reports Character Limit Change

Because of accessibility improvements, interactive report headings have changed. If an interactive report has a large number of columns displayed, users may get a character limit error at runtime. Although these errors with interactive report regions existed previously, accessibility improvements made in this release have resulted in more markup. The number of columns displayed when this error occurs is slightly fewer than in previous releases.

If users receive a runtime error, Oracle recommends reducing the overall number of columns referenced in the region source.

## Create Page Wizard

The following Page type options are removed from the wizard:

- List View
- List View with Form
- Column Toggle Report
- Reflow Report

These components can still be created using Page Designer.

Other changes include:

- Page type Form on a Local Procedure is moved to legacy section
- Tabs are not displayed in Create Page Wizard, but you can still create pages in apps that use tab-based navigation.
  - After you create the page, use the Tabs section in Shared Components to map new pages with tabs.
  - Note: Universal Theme does not support tabs.
- Plug-ins with deprecated source types are not available for selection in the Create Plug-in Page wizard.
  - In these cases, create a blank page and use Page Designer to add the plug-in region to the page.

## URL Format Changed for Friendly URL and Static File Support

Prior to this release, Friendly URL and Static file support in APEX relied on the definition and use of APEX-based REST Services. With APEX 22.1, APEX-based REST Services are desupported.

The Oracle REST Data Services (ORDS) `r` servlet now handles the processing of Friendly URLs and Static Files. This changes the URL format from `/path_prefix/r/app_alias/` to `/r/path_prefix/app_alias/`. The `path_prefix` defaults to the workspace name, but can be changed via the ORDS Based REST Services schema alias.

For more information, see [APEX-Based REST Services Desupported](#).

## UI Changes

User interface changes in this release include:

- The Shared Components layout now has a badge that indicates how many of each component (Application Items, Computations, etc) exist for each application. If no items of a particular type exist, the badge does not display.
- The Shared Components layout has been restructured:
  - Automations moves to a new section called Workflows and Automations.
  - Web Credentials moves from Security to Workspace Objects.
  - Email Templates moves from Other Components to User Interface.
  - Progressive Web App displays under User Interface.
  - Report Queries and Report Layouts move to Files and Reports.
  - REST Synchronization displays under Data Sources.
  - Task Definitions display under Workflows and Automations.

- The APEX header displays a **Search Field** style UI for the search button that triggers the spotlight search.
- The App Builder homepage now sorts by Name.
- The following new popup LOVs display under Instance Tasks on the Administration Services home page:
  - Jump to app
  - Jump to user
- The Browse by Facets page is updated to improve usability.
- Define Environment Banner moved from Instance Settings to the top of the Messages region.

## Compatibility Mode

The application attribute **Compatibility Mode** controls the compatibility mode of the APEX 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.

To fix this, Oracle recommends that you remove the manual JavaScript escaping from your report source and use of the native escaping.

## 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 / 18.2

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 5.1/18.1/18.2. 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.

## Compatibility Mode Changes in Mode 19.1

In Oracle Application Express 19.1, the Rich Text editor now enforces validation of the `Max Length` item attribute. When the length of the HTML markup exceeds the `Max Length` value, the system produces an error message.

## Compatibility Mode Changes in Mode 19.2 / 20.1 / 20.2 / 21.1

In Oracle Application Express 19.2, Classic Reports render empty column values as an empty cell instead of using a "non-breaking white-space" (`&nbsp;`).

## Compatibility Mode Changes in Mode 21.2 / 22.1

Prior to Oracle Application Express 21.2, all processes of the current processing point have been executed regardless of the added errors.

In Oracle Application Express 21.2, calling `APEX_ERROR.ADD_ERROR` in a process stops further processes from executing and immediately displays the inline errors.

## Enabling Network Services in Oracle Database

You must enable network services in Oracle Database to send outbound mail, use Web services, or use template-based PDF report printing with BI Publisher in Oracle APEX.

### When and Why Network Services Must be Enabled

Enabling network services enables support for sending outbound mail in Oracle APEX, use of Web services in APEX, and PDF report printing with BI Publisher.

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 2 or later. Therefore, if you are running Oracle APEX with Oracle Database 11g Release 2 or later, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_220100` database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle APEX.  
Users can call methods from the `APEX_MAIL` package, but issues arise when sending outbound email.
- Consuming web services from APEX.
- Making outbound LDAP calls from APEX.
- PDF report printing with BI Publisher.

 **Note:**

When upgrading APEX on a database 12c or newer, based on the configuration of the old APEX version the upgrade automatically configures Network Services.

 **Tip:**

To run the examples described in this section, the compatible initialization parameter of the database must be set to at least 11.1.0.0.0. By default an 11g or 12c database will already have the parameter set properly, but a database upgraded to 11g or 12c from a prior version may not. For information about changing database initialization parameters, see *Specifying the Database Compatibility Level in Oracle Multitenant Administrator's Guide*.

 **See Also:**

About Report Printing in *Oracle APEX App Builder User's Guide*.

## 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_220100` database user. This example assumes you connected to the database where Oracle APEX 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_220100',
                      principal_type => xs_acl.ptype_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_220100',
                          principal_type => xs_acl.ptype_db));
END;
/

```

## Troubleshooting an Invalid ACL Error

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

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

```

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

```

```

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

```

Next, run the following code to fix the ACL:

```

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

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

  IF (CNT > 0) THEN

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

```

```

        SET OBJECT_VALUE =
            DELETXML(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\_220100 user.

## Ideas App Implementations

APEX thrives because of community engagement and feedback. The [APEX Ideas](#) app makes it easier for you to contribute directly to the product direction of APEX.

**Table APEX Ideas App**

Feature Request Number	Subject	Solution
<a href="#">FR-1704 / FR-1817</a>	Allow easier editing of the application's icon (not the logo) / Change App Icon Later as Easily as During Create Time	Delivered. See <a href="#">Application Icons</a> .
<a href="#">FR-1929</a>	Page designer: Don't reset items or buttons position to default region position when moving them between regions or rearranging within same region	Delivered.
<a href="#">FR-2048</a>	The Test icon for REST Data Sources is confusing	The Test icon is updated with a new icon.
<a href="#">FR-2057 / FR-2373</a>	Allow easy installation of CKEditor plugins / Support "Paste" of Image in CKEditor (without URL or uploading the image)	Delivered. See <a href="#">Markdown and Rich Text Enhancements</a> .
<a href="#">FR-2165</a>	Add Icon to the navigation menu entry when creating a new page.	Delivered. See <a href="#">Simplified Page Creation</a> .

**Table (Cont.) APEX Ideas App**

Feature Request Number	Subject	Solution
<a href="#">FR-2172</a>	Unify Application Wizard and Page Wizard	The Create Page wizard has been updated, and there are more changes to come.
<a href="#">FR-2225</a>	Expandable PWA Serviceworker	Delivered. See <a href="#">Customizing the PWA Service Worker</a> .

## Deprecated Features

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

- [Deprecated APIs](#)
- [Deprecated JavaScript APIs](#)
- [Deprecated Attributes in App Builder](#)
- [Deprecated Utilities](#)
- [Deprecated Legacy Web Service References](#)
- [Deprecated Properties](#)
- [Deprecated View Columns](#)
- [CKEditor4 Deprecation](#)

## Deprecated APIs

The `APEX_IR.GET_REPORT` API is deprecated. Instead, use `APEX_REGION.OPEN_QUERY_CONTEXT` to get interactive report data.

## Deprecated JavaScript APIs

The `tableModelView` widget options `useIconList` and `iconListOptions` are deprecated.

## Deprecated Attributes in App Builder

The following attributes are marked as deprecated in App Builder:

- In Edit Application Definition:
  - Progressive Web App - Icon URL
  - Application Icon - Icon File Name

- In Edit User Interface:
  - Favicon

## Deprecated Utilities

The `APEXExport` utility is deprecated, and will be removed in a future release.

Oracle recommends using `SQLcl` instead.

## Deprecated Legacy Web Service References

SOAP style Web Service references and legacy support for REST style Web Services references are deprecated.

## Deprecated Properties

The following properties are deprecated in the property editor:

- Region Image
- Image Tag Attributes

## Deprecated View Columns

The following view columns are marked as deprecated:

- In `apex_applications`:
  - `app_builder_icon_name`
  - `favicons`
  - `pwa_manifest_icon_url`

## CKEditor4 Deprecation

Rich Text Editor items based on CKEditor4 are deprecated, and will be migrated to CKEditor5 automatically in the next APEX release.

In the next APEX release, any custom code written against the CKEditor4 library will stop working, as CKEditor4 and CKEditor5 are not API-compatible. Any code included in the **JavaScript Initialization Code** attribute will be automatically commented out and ignored. To try and preserve any custom HTML content produced with CKEditor4, all migrated items will have the "General HTML Support" CKEditor5 plug-in enabled.

Oracle recommends developers manually switch to CKEditor5 now. You can also consider a 3rd party replacement of CKEditor4, or wait for the automatic migration to CKEditor5 in the next APEX release.

## Deprecated in Previous Releases

The following section lists features which were deprecated in a previous release but have not been fully removed or desupported from Oracle APEX.

Oracle strongly recommends that developers start to modify their applications as described in this section. Use APEX Advisor to scan existing applications for deprecated attributes.

- [jQuery UI Deprecated](#)

## jQuery UI Deprecated

jQuery UI is deprecated. Oracle recommends that customers update third-party APEX plug-ins and custom JavaScript code to remove any jQuery UI references. Native APEX components that use jQuery UI will continue to function, but support will be removed in a future release.

Oracle ships a custom bundle of JQuery UI 1.13.1 that includes only the modules that APEX needs. Oracle no longer ships individual widgets or any jQuery UI CSS files.

## 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.

- [Desupported Page Positions](#)
- [Desupported Region Positions](#)
- [Custom Page Region Templates with Duplicated Positions Desupported](#)
- [Legacy Substitution Strings Desupported](#)
- [Desupported JavaScript Functions](#)
- [Post Calculation for Page Items Desupported](#)
- [Show / Hide All Page Items On Same Line Attributes Desupported](#)
- [apex.server Plug-in and Process Function Async Option Desupported](#)
- [apex.widget.initPageItem Function Desupported](#)
- [Popup LOV Template Desupported](#)
- [Based On - Output of PL/SQL Code attribute Desupported](#)
- [Date Picker \(jQuery\) Desupported](#)
- [Syntax {COLUMN\\_NAME}\\_LABEL in Interactive Grid Icon and Detail Views Desupported](#)
- [Removed Content Delivery Network](#)
- [APEX-Based REST Services Desupported](#)

## Desupported Page Positions

The following page positions are desupported and display as **Legacy** in Page Designer:

- Body 1
- Body 2
- Body 3
- After Header
- Before Footer

## Desupported Region Positions

The following region positions used for button positioning are desupported and display as **Legacy** in Page Designer:

- Top of Region
- Bottom of Region
- Above Region
- Below Region

## Custom Page Region Templates with Duplicated Positions Desupported

Custom page template and custom region templates with duplicated positions are desupported. For example, a region template referencing position #CHANGE# twice is not recommended because that duplicate position causes duplicate DOM IDs.

## Legacy Substitution Strings Desupported

As of this release, the following `apex.env` substitution strings are desupported:

- APP\_IMAGES
- IMAGE\_PREFIX
- THEME\_DB\_IMAGES
- THEME\_IMAGES
- WORKSPACE\_IMAGES

While the legacy substitutions still function, Oracle recommends developers update their environments to use updated substitutions (listed below).

**Table Updated apex.env Substitutions**

Legacy	New
IMAGE_PREFIX	APEX_FILES
WORKSPACE_IMAGES	WORKSPACE_FILES
APP_IMAGES	APP_FILES
THEME_IMAGES	THEME_FILES
THEME_DB_IMAGES	THEME_DB_FILES

## Desupported JavaScript Functions

The following functions are desupported:

Universal Theme JavaScript API function:

- `apex.theme42.util.mq` (use `apex.theme.mq` instead)

## Post Calculation for Page Items Desupported

The **Post Calculation** functionality of page items is desupported.

This functionality remains for existing page items where it has been used, but you can no longer set it for new page items nor add it to existing page items where it has not been used in the past.

## Show / Hide All Page Items On Same Line Attributes Desupported

In Dynamic Actions, the Show and Hide actions have attributes **Show all page items on same line** and **Hide all page items on same line**, respectively. These attributes were designed for forms with a table-based layout. Because Universal Theme no longer uses table-based layout, these attributes are desupported.

This functionality remains for existing Dynamic Actions where it was set to `Yes`, but developers cannot select it for new Dynamic Actions.

## apex.server Plug-in and Process Function Async Option Desupported

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

## apex.widget.initPageItem Function Desupported

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

## Popup LOV Template Desupported

The Popup LOV template type is desupported.

## Based On - Output of PL/SQL Code attribute Desupported

The selection **Output of PL/SQL Code** of the attribute **Based On** is now desupported.

## Date Picker (jQuery) Desupported

The old Date Picker item type **Date Picker (jQuery)** is desupported and should no longer be used.

Existing apps will not automatically switch to using the new date picker to preserve possible customizations that would no longer work. You can switch all the date pickers in your app to use the new date pickers by using Upgrade Application in the Utilities section of your application in App Builder.

See Upgrading an Application to Include New Components in the *Oracle APEX App Builder User's Guide*.

## Syntax {COLUMN\_NAME}\_LABEL in Interactive Grid Icon and Detail Views Desupported

The `&{COLUMN_NAME}_LABEL.` syntax, which is used to reference the column label in Interactive Grid Detail and Icon views, is desupported.

Instead, use `&{COLUMN_NAME}%LABEL..`

## Removed Content Delivery Network

The attribute `Content Delivery Network` that could be found under User Interface Attributes, Javascript with options `None`, `Google`, `Microsoft`, and `jQuery`, has been removed. Enabling this option was only relevant for pulling in a few of the JavaScript libraries that APEX needs.

If you were using this option, it's recommended to instead use the more modern, Oracle-provided CDN approach. For further information, see [Announcing Oracle APEX Static Resources on Content Delivery Network](#).

# APEX-Based REST Services Desupported

APEX-based REST Services are desupported in this release. Prior to release 18.1, definitions of RESTful services created within Oracle APEX were stored within the metadata tables of the core APEX schema, and referred to as APEX-based REST Services. With release 18.1, we introduced support for Oracle REST Data Services (ORDS) -based REST Services, where definitions are stored in the ORDS repository. ORDS-based REST Services continue to be supported for definitions of RESTful Services in Oracle APEX.

The instance parameter `APEX_REST_PATH-PREFIX` is desupported.

## Note:

Oracle REST Data Services (ORDS) release 21.4.2 now ships with migration scripts that enable you to upgrade any remaining APEX-based REST Services to ORDS-based Services. To learn more, see [Migration of Oracle APEX Restful Service Modules](#) in *Oracle REST Data Services Release Notes*.

## Fixed Bugs

The following section lists bugs fixed in this release.

**Table Fixed Bugs in Oracle APEX 22.1**

Bug Number	Description
14198644	UI: CLASSIC AND INTERACTIVE REPORT REGIONS PROVIDE NO WAY OF DEFINING A "ROW HEADER" FOR THE REPORT
16599622	APPLICATION SEARCH SHOWS A HIT IN "DB SESSION INIT CODE" TWICE
20351490	GRID LAYOUT IN PAGE DESIGNER DOESN'T USE GRID SETTINGS FOR SUB REGIONS
20446375	ACCESSIBILITY: GRID LAYOUT ARROW KEY NAVIGATION ISSUES
20687795	INTERACTIVE REPORTS: LINK COLUMN ISSUES (DUPLICATE IDS, IMPROPER ALIGNMENT)
20916048	ER: NOT ABLE TO RETRIEVE APPLICATION LEVEL COMMENTS VIA THE APEX_APPLICATION VIEWS
21651010	POPUP LOV DOES NOT DISPLAY DEFAULT VALUE WHEN CASCADING PARENT CHANGES
22964626	INTERACTIVE REPORT - QUICK CONSECUTIVE CLICKS ON VARIOUS CONTROLS BREAKS REPORT
26044907	COPY PAGE WIZARD: JAVASCRIPT ERROR ON LIST OF VALUES & AUTHORIZATION SCHEME STEPS
26878709	UI: FOCUS NOT SET WHEN A VALIDATION ERROR OCCURS

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
27809850	ORA-20001 WHEN USING 'METHODS ON TABLES' OPTION ON TABLE WITH MULTI-COLUMN PRIMARY KEY
28611896	INTERACTIVE GRID SINGLE ROW VIEW PREVIOUS BUTTON NOT DISABLED ON FIRST RECORD
28740275	DOWNLOAD INTERACTIVE GRID TO HTML THROWS ORA-01403 NO DATA FOUND ERROR
28859580	'VALUE REQUIRED' VALIDATION NOT GETTING FIRED FOR TEXT WITH AUTOCOMPLETE ITEM
29924673	INTERACTIVE REPORT SUBSCRIPTION DATA PICKER DOESN'T SHOW TIME FIELDS AND TODAY BUTTON
30492531	COPY FACETED SEARCH REGION TO OTHER PAGE FAILS WITH SERVER ERROR
30928800	DESKTOP NAVIGATION BAR LIST - ATTRIBUTES NEVER GET RENDERED
30982003	INTERACTIVE GRID COLUMN > ERROR WITH POPUP LOV WHEN 'MULTIPLE VALUES=ON' AND 'MANUAL ENTRY=OFF'
31081916	INTERACTIVE GRID REPORT: LAST COLUMN IS NOT DISPLAYED FULLY IF USER DOESN'T CLICK EXPAND/ COLLAPSE NAVIGATION
31355918	PAGE DESIGNER > TREES > FOCUS LEAVES TREE AFTER DELETE
31485327	QUICK SQL DOES NOT RESPECT "PREFIX PK WITH TABLE NAME" ATTRIBUTE WITH PLSQL API OPTION
31776193	SESSION STATE: APP_REGION_ID AND APP_REGION_STATIC_ID ARE NULL IN REGION AUTHORIZATION CODE
31799257	INTERACTIVE GRID FAILS AFTER SECOND LEVEL (MASTER DETAIL)
31972027	SPOTLIGHT SEARCH > SCREEN READER OUTPUT SOMETIMES DUPLICATED AND CONFUSING
32075821	SORTING OF CLASSIC REPORT COLUMN MOVES FOCUS TO THE TOP OF THE REGION
32080813	ACCESSIBILITY ISSUE OF SORTING INTERACTIVE REPORT COLUMN
32095473	INTERACTIVE REPORTS ACCESSIBILITY NEEDS IMPROVEMENTS WITH LANDMARKS
32200011	APEX_STRING.SPLIT(CLOB): VALUE_ERROR WHEN CHUNKS ARE 32767 BYTES
32360759	CREATE PAGE WIZARD NEEDS ACCESSIBILITY IMPROVEMENTS
32459595	DATA EXPORTS: POOR PERFORMANCE FOR HUGE DATASETS
32716610	QUICK SQL DOES NOT GENERATE TRIGGER ON AUDIT COLUMNS IF COLPREFIX DIRECTIVE USED FOR A TABLE
32799078	DATE PICKER: INLINE MODE MISSING LABEL

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
32850886	INTERACTIVE REPORT: HIGHLIGHT & FILTER DIALOGS FAIL TO LOAD FIRST TIME, WHEN IMAGES ARE FROM CDN
32918337	APEX LOGIN PAGE: SINGLE CHECKBOX SHOULD BE USED FOR 'REMEMBER USERNAME...'
32955521	FORM REGION OR INTERACTIVE GRID DML PROCESS IGNORES PL/SQL CODE FOR REGIONS ON REST SOURCES
32982558	JAWS READS BUTTONS MENUS INCORRECTLY
33056326	TEMPLATE TOP NAVIGATION MENU FIRST LOAD IS NOT CORRECT
33073996	APEX_DATA_EXPORT: ORA-06502 ERROR THROWN WHEN EXPORTING BIG CLOB VALUES TO CSV
33092986	NO WARNING MESSAGE ON UPLOADING A FILE WITH THE SAME NAME AS EXISTING FILE IN STATIC APPLICATION FILES
33134056	APPLICATION FILES SEARCH RESULTS LINK IS BROKEN
33170907	GENERAL PERFORMANCE AND UI ISSUES RENDERING INTERACTIVE REPORT
33253878	THEME ROLLER FREEZES WHEN LESS THROWS AN ERROR ON INVALID .LESS FILE
33276048	ADD VALIDATION FOR "ERROR HANDLING FUNCTION"
33279332	CLASSIC REPORT WITH COMPUTE SUM/CONTROL BREAK: SUM IS NOT DISPLAYED IF THE LAST ROW OF A GROUP IS ALSO THE LAST ROW OF A PAGE
33295054	CREATE FORM ON PROCEDURE WIZARD ALSO OFFERS FUNCTIONS TO SELECT
33309337	FACETED SEARCH FACET TYPE INPUT FIELD VALUE IS DOUBLE ESCAPED
33320648	BUTTON MISPLACED ON CHANGE END-USER PASSWORD (4155:50)
33322866	GET_BLOCK ERROR WHEN COPYING APPLICATION WITH VERY LONG APP ALIAS
33323239	THEME ROLLER OPTION TO DISABLE CONTRAST CHECKER FOR DOUBLE COLOR PICKER NO LONGER FOUND
33328249	OCI REST SERVICES: PRIVATE KEY SHOULD ALLOW NEWLINES AND ----BEGIN PRIVATE KEY-----
33332102	CONSOLE ERROR (EXCEPTION) WHEN CHANGING REGION TYPE FROM IR TO CLASSIC REPORT
33332404	QUICK SQL: IF /UNIQUE /UPPER DIRECTIVES USED TOGETHER, THE COLUMN DOES NOT CREATE
33333924	APEX_UTIL.HOST_URL(IMGPRE) WORKS INCORRECTLY WHEN USING CDN
33334771	TEST REST SOURCE RESULTS: HEADINGS AND DATA NOT ALIGNED WHEN PROFILE CONTAINS DERIVED COLUMNS
33351056	ERROR WHEN TRY TO IMPORT APP WITH LEGACY ANYCHART AND TRANSLATION

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
33365137	IN CREATING APP, ADD FACETED SEARCH PAGE ERROR IF REPORT AND INCLUDE FORM CHECKED THEN CHANGE TO CARDS
33368455	FACETED SEARCH PROBLEM WITH LOV GROUPS ACCESSIBILITY
33372893	USABILITY ISSUES ON REST SOURCE EDIT PAGES
33374461	UNDEFINED VALIDATION MESSAGE FOR FILE BROWSE ITEM
33379680	CREATE REST DATA SOURCE WIZARD THROWS "CONSTRAINT WWW_REMOTE_SRVR_WS_NAME_UK VIOLATED" ERROR
33383558	APEX_AUTOMATION.EXECUTE THROWS ORA-1400 WHEN CALLED FOR AUTOMATION IN OTHER APP
33385976	IR SUBSCRIPTION DOES NOT SEND IF CLONED SESSION_ID GETS PURGED FROM ADMIN UI
33395058	INCONSISTENT ESCAPING OF SUBSTITUTIONS IN "BODY HTML" ATTRIBUTE OF SEND EMAIL PROCESS
33402686	CREATING SUPPORTING OBJECT DEINSTALLATION SCRIPT SHOWS DATA PACKAGE AS SCRIPT TYPE OPTION
33406594	MISSING VALIDATION FOR "INITIALIZATION PL/SQL CODE" AND "CLEANUP PL/SQL CODE" IN SECURITY ATTRIBUTES
33425910	SMART FILTER - SUGGESTION CHIPS NOT KEYBOARD FOCUSABLE AFTER BEING HIDDEN AND RESHOWN
33427373	SMART FILTER / FACETED SEARCH - ROW COUNT INFORMATION MISSING LANDMARK
33429642	INTERACTIVE GRID CASCADING LOV BASED ON REST DATA SOURCE DOES NOT WORK
33432026	CHECKSUM REPORT PAGE FAILS WITH ORA-06502 ERROR IN APP BUILDER WHEN RUN IN GERMAN
33433123	IMPROVE USABILITY OF THE CREATE REST ENABLED SQL REFERENCE WIZARD
33438771	REST SOURCE DATA PROFILES DO NOT SUPPORT JSON_TABLE FILTER PREDICATES IN ROW SELECTOR
33443995	FACETED SEARCH & SMART FILTERS HIDE SELECTED FILTER OPTIONS
33446201	PAGECHANGE EVENT DOES NOT FIRE FOR GRID, ICON, DETAIL VIEWS OF INTERACTIVE GRID OR CARDS WHEN NO DATA
33448482	CLIENT SIDE VALIDATION BUG WHEN USING LIST MANAGER WHERE VALUE IS REQUIRED
33455581	COPY DETAIL REGION OF A MASTER DETAIL RELATIONSHIP TO OTHER PAGE FAILS WITH SERVER ERROR
33458143	SQL WORKSHOP > METHODS ON TABLES: THROWS ORA-20001 ERROR WHEN TABLE HAS NO PRIMARY KEYS

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
33459871	SQL WORKSHOP > OBJECT BROWSER: GO TO LINE FUNCTION NO WORKING AS EXPECTED
33460759	REQUEST VERIFICATION CODE NOT DISPLAYED
33464495	FACETED SEARCH: FILTER LABEL IS NOT CORRECT IF USER SELECTS MORE THAN 1 FACET WITH BATCH FACET CHANGES ENABLED
33465426	REGRESSION - DUPLICATE COMPONENT EVENTS UNDER DYNAMIC ACTIONS
33465560	REPORT ON "SIMPLE HTTP" REST SOURCE: WHEN FILTER IS APPLIED; ONLY THE FIRST PAGE CAN BE FETCHED
33470329	CARDS REGION - CSS CLASSES SHOULD BE HIDDEN WHEN ADVANCED FORMATTING ENABLED
33472923	APEX DEBUG LOG SHOWS CURSOR LEAK (FALSE POSITIVE)
33480818	APEX_AUTHORIZATION.IS_AUTHORIZED GENERATES "ORA-14551: CANNOT PERFORM A DML OPERATION INSIDE A QUERY" ERRORS
33488629	ACCESS CONTROL FEATURE GENERATES ADMIN LIST ITEM DESCRIPTION SWITCHED
33491785	INTERACTIVE GRID - DUPLICATE REPORT SETTINGS WHEN SET VIA JAVASCRIPT API
33513196	FACETED SEARCH - SMART FILTERS FOCUS DOESN'T STAY ON SELECTED RADIO OPTION
33513248	FACETED SEARCH & SMART FILTERS - COUNTS ON RADIO GROUP CONTROL ARE WRONG
33517429	CONSISTENTLY APPLY 'VALUE REQUIRED' CLIENT SIDE VALIDATION TO PAGE ITEMS
33522680	PAGE EXPORT FILE NAMES DO NOT REFLECT THE PAGE NUMBER
33526942	PDF EXPORT: ORA-06502 ERROR OCCURS WHEN DATA CONTAINS JAPANESE HALF-WIDTH KATAKANA CHARACTERS.
33536827	QUICK SQL: OPTIONALLY GENERATE AND POPULATE PRIMARY KEY WITH NON-NUMERIC DATA TYPE, AND SUPPORT COMPOSITE PRIMARY KEY
33540117	APEX_MAIL: AVOID DEFAULTING P_FROM TO P_TO WHEN USING EMAIL TEMPLATES
33541186	UPDATE OF IDLE TIMEOUT CAUSES UNNECESSARY IO FOR AJAX CALLS
33550297	TEXT MESSAGE DELETE_MSG NOT TRANSLATED INTO NEW RUNTIME ONLY LANGUAGES
33552783	LIST OF WORKSPACES ON SSO PAGE NEEDS ACCESSIBILITY IMPROVEMENTS
33561839	SQL WORKSHOP DATA LOADING: ERROR WHEN LOADING AN XML FILE WITH THE FIRST COLUMN OF THE CLOB TYPE

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
33566820	INTERACTIVE GRID AUTO ADD RECORD DOESN'T WORK IN DETAIL GRIDS
33575824	LEGACY TABULAR FORM ON MODAL PAGE WITH "PPR" DISABLED GENERATES BAD PAGINATION LINKS
33576236	ARIA-SORT MISSING IN IR COLUMN HEADERS
33583148	APEX_AUTOMATION NEEDS APIS TO DETERMINE WHETHER A JOB IS RUNNING AND TO ABORT A RUNNING JOB
33592031	FIRST TAB OF SELECTOR IS MISSING ARIA-SELECTED IN APP BUILDER
33594225	JAVASCRIPT ERRORS WHEN TRYING TO ENABLE/DISABLE DEBUG ON MODAL DIALOG PAGES
33599941	APEX_STRING.NEXT_CHUNK FAILS WHEN READING BEYOND 2GB
33600780	REGRESSION: #ROWNUM# SUBSTITUTION IN CLASSIC REPORT DOES NOT WORK ANY MORE
33604789	REST SOURCE DISCOVERY FAILS WHEN JSON RESPONSE IS SENT WITH MIME TYPE "TEXT/PLAIN"
33607881	REST SOURCE DISCOVERY: NO DATA PREVIEW SHOWN WHEN DATA PROFILE CONTAINS CLOB OR JSON COLUMN WITH MORE THAN 4000 BYTE
33611602	REST SOURCE DISCOVERY FOR JSON RESPONSE CONTAINING "ARRAY OF ARRAYS" IS POOR
33612797	FOR INTERACTIVE GRIDS, FILTER VALUES DISAPPEAR WHEN ONE FILTER IS A "BETWEEN/NOT BETWEEN" FILTER
33621185	MANUAL INPUT FOR RANGE FACET THROWS ERROR WHEN DECIMAL COMMA IS USED
33629462	SMART FILTER OR FACETED SEARCH W/ BIND VAR SHOWS NO CHOICES IN CHECKBOX GROUP
33635081	APEX_DATA_PARSER THROWS ORA-1403 FOR XLSX FILE WITH EMPTY COLUMNS AND WHEN GET_PROFILE_PROFILE IS CALLED WITHIN THE PARSE LOOP
33639622	APEX.STORAGE.SETCOOKIE USES FULL PATH OF FRIENDLY URLS CAUSING COOKIES NOT TO BE PASSED IN WWV_FLOW SUBMITS AND AJAX CALLS
33643243	APEX 21.2 UPGRADE FAILS WHEN APEX IS INSTALLED IN CDB\$ROOT
33655749	WEB CREDENTIALS UTILIZATION PAGE: SOCIAL SIGN IN USAGE IS NOT LISTED ON 4000:1622
33670212	THE CLOSE BUTTON OF JQUERYUI DIALOGS IS MISSING ARIA-LABEL ATTRIBUTE
33670264	SAML AUTH ERROR ON AZURE: ORA-30625 ERROR: METHOD DISPATCH ON NULL SELF ARGUMENT IS DISALLOWED

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
33670685	CARDS REGION DYNAMIC ACTION REFRESH DOES NOT PICK UP THE UPDATED BLOB IMAGE
33675082	FACETED SEARCH & SMART FILTERS - CLIENT SIDE FILTERING DOESN'T KEEP FILTERED STATE
33684163	FACETED SEARCH - SHOW MORE & SHOW LESS UNEXPECTED BEHAVIOUR WITH SELECTED OPTIONS
33704062	DATA UNLOAD EXPORTS TIMESTAMP COLUMN WITH ILLEGAL FORMAT (CONTAINING TWO DOTS)
33706269	FOCUS SHIFTED TO THE TOP OF PAGE DESIGNER PAGE AFTER USE OF LINK DIALOG
33730447	FACETED SEARCH - FACET CLIENTSIDE FILTER TAKES COUNTS STRING IN CONSIDERATION
33730538	FACETED SEARCH - MAXIMUM ENTRIES DISPLAYED IGNORED FOR FACET TYPE RANGE
33730607	CUSTOMER ORDERS SAMPLE DATASET DOES NOT INCLUDE PRODUCT IMAGES
33764892	TEMP USAGE WHEN USING DOWNLOAD TO EXCEL FUNCTIONALITY FOR IR OR IG
33766580	SUBSTITUTION STRING VALUES WITH COLONS ARE TRUNCATED WHEN IMPORTED VIA SUPPORTING OBJECTS
33772442	AUTOMATIONS: SCHEDULE STATUS IS DISPLAYED AS 'ACTIVE' AFTER IMPORT OF APPLICATION
33773791	RENDERING TREE MENU BUTTON IS NOT CLEAR TO USE - COLLAPSE/EXPAND OPTION GONE WITHOUT NOTICE
33805386	RICH TEXT EDITOR RAISES FALSE VALUE HAS CHANGED WARNINGS
33807165	JET CHART: DATA CURSOR USE ON AREA OR STOCK CHART THROWS CONSOLE ERROR ERROR: <CIRCLE> ATTRIBUTE R: EXPECTED LENGTH, "NAN".
33811049	ADD COPYRIGHT ATTRIBUTE TO MINIMAP JS WIDGET
33813973	APEX_DATA_LOADING.LOAD_DATA DOES NOT CORRECTLY USE P_XLSX_SHEET_NAME ARGUMENT
33824959	DOWNLOAD INTERACTIVE GRID THROWS ORA-01403 ERROR: NO DATA FOUND FOR AJAX_DISPATCH_REQUEST.
33839009	REST ENABLED SQL ERROR MESSAGES ARE OVER ESCAPED WHEN DISPLAYED IN CODE EDITOR
33840080	ORA-01403 ERROR CAN BE THROWN FOR REPORTS BASED ON REST ENABLED SQL WHEN ROWS PER PAGE IS MORE THAN 500
33840353	CHAINED MODAL DIALOGS DOES NOT UPDATE AN ACCESSIBLE FRAME NAME
33844521	DEVELOPER TOOLBAR MISSING LANDMARK
33845275	SAML AUTH: AUTHNREQUEST SHOULD CONTAIN DESTINATION

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

<b>Bug Number</b>	<b>Description</b>
33848956	INTERACTIVE GRID CHART VIEWS RETURNS 'NO DATA FOUND' ERROR WHEN LABEL COLUMN HAS 'ENABLE COLUMN TO SORT' SWITCHED OFF
33851074	UNLABELED ICON IN LABELS ON APEX BUILDER LOGIN PAGES
33856336	INTERACTIVE GRID: CHART CAN THROW ORA-979 OR ORA-918 ERROR
33860635	SAML AUTH: ORA-01706 WHEN RESPONSE IS ENCRYPTED AND TOO LARGE
33864790	REGION BASED ON REST DATA SOURCE OF TYPE "ORDS" RAISES ORA-20999 WHEN EXTERNAL ORDER BY IS USED
33865318	SAML AUTH: /RESPONSE/SIGNATURE ERROR WHEN XML DIGEST VALUE CONTAINS NEWLINES
33870782	DON'T RUN APEX SCHEDULER JOBS IF CUSTOMER NEVER USED APEX
33872144	DIALOG CLOSED OR CANCELED EVENT PAYLOAD RETURNS PAGE ID OF PARENT PAGE
33881889	PWA "INSTALL APP" NAVIGATION BAR ENTRY NON-FUNCTIONAL IF PARENTED TO &APP_USER. ENTRY
33890899	NAVIGATION BAR TARGET ATTRIBUTE IS NOT BEING CONSIDERED
33910143	APEX APP:PAGE INFO IN ACTIVE SESSION HISTORY
33915329	GEOCODED ADDRESS ITEM: RESULT DIALOG IS NOT IN FOCUS ON MODAL PAGES
33915426	GEOCODED ADDRESS ITEM: MAKE EITHER CITY OR POSTAL CODE REQUIRED
33916511	FILE BROWSE ITEM: ALLOW COPY & PASTE OF FILES FROM CLIPBOARD
33920006	APEX_STRING_UTIL.FIND_TAGS THROWS ERROR WHEN USING MULTIBYTE CHARACTER AS P_PREFIX
33920381	INTERACTIVE REPORT SUBSCRIPTION (FORMAT, DATA ONLY, PDF SETTINGS) GETS LOST UPON APP IMPORT
33929938	SQL WORKSHOP EXPLAIN PLAN SHOWS SQL ERROR ALTHOUGH STATEMENT EXECUTES FINE
33935613	MISSING ACCESSIBLE NAME FOR ALL ICONS IN ICON PICKER LIST
33936730	MULTIPLE SUCCESS MESSAGES CONCATENATED WITHOUT SPACE BETWEEN.
33953362	POPUP LOV WITH MULTIPLE VALUES: SET VALUE DYNAMIC ACTION DOES NOT ALLOW SETTING MORE THAN 1 VALUE
33957343	CREATE DATA LOAD WIZARD SHOULD CREATE BETTER DATA PROFILE WHEN "FIRST LINE CONTAINS HEADERS" IS TURNED OFF
33964860	STACKED DIALOG CLOSE EVENTS LEADS TO JAVASCRIPT ERROR WHEN FIRED IN SEQUENCE

**Table (Cont.) Fixed Bugs in Oracle APEX 22.1**

Bug Number	Description
33964904	INTERACTIVE GRID HIDDEN TAB STOPS AFTER REGION DUE TO EDIT FLOATING ITEMS
33975988	REST SOURCE EDIT PAGE: "TEST" ICON IS MISLEADING
33976207	MORE DEBUG WARNINGS WHEN AUTHENTICATION FAILS
33976471	FACETED SEARCH & SMART FILTERS - COUNTS ON RADIO GROUP FOR RANGE CONTROL AND SELECT LIST WRONG
33983165	APEX_INSTANCE_ADMIN.TRUNCATE_LOG API SHOULD SUPPORT DEBUG LOGS
33991058	DOWNLOAD INTERACTIVE GRID THROWS ORA-01403 ERROR WHEN COLUMN HIGHLIGHT CONDITION IS BASED ON EXCLUDED COLUMN
33997618	ISSUE WHILE UPGRADING TO APEX 21.2 FOR ANYCHART REGIONS CONTAINING VERY LENGTHY SOURCE
34022038	SAMPLE MAPS: "LOAD DATA FROM GITHUB USES WRONG URLS"

## Open Bugs and Known Issues

This section describes bugs and known issues for Oracle APEX release 22.1.

### 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:

<https://www.oracle.com/tools/downloads/apex-downloads/apex-221-known-issues.html>

- [Known Issue using 'Source Display' region type plug-in in previously installed Sample Apps](#)
- [Known Issue for Item and Region Plug-in Visibility During Initialization](#)
- [Known Issue with New Version Date Picker in Universal Theme 1.5 and Earlier](#)
- [Known Issue using Code Editor in Safari 13](#)
- [Known Issues for jQuery Upgrade](#)
- [Interactive Grid support for REST Enabled SQL](#)
- [Group By Component Type mode prevents Default View](#)
- [Known Issues for RESTful Services and Oracle REST Data Services \(ORDS\)](#)
- [Known Issues for Data Generator](#)

# Known Issue using 'Source Display' region type plug-in in previously installed Sample Apps

## Issue

The Source Display region type plug-in that is used in a Sample App installed in a previous release of APEX no longer works. This issue is due to the removal of views associated with AnyChart charts and AnyMap map charts.

## Resolution

1. Open the application to edit it.
2. Navigate to **Shared Components**, under Other Components select **Plug-ins**, and **Source Display**.
3. Update the PL/SQL Code to **remove** the following lines of code (lines 35 - 48):

```
union all
select reg.source_type, fs.series_seq, fs.series_name,
fs.series_query source
from apex_application_page_regions reg,
     apex_application_page_flash5_s fs
where reg.application_id = :APP_ID
     and reg.page_id = :APP_PAGE_ID
     and reg.static_id = d_region_static_id
     and fs.application_id = reg.application_id
     and fs.page_id = reg.page_id
     and fs.region_id = reg.region_id
     and reg.source_type in (
        'Flash Chart',
        'Map'
    )
)
```

4. Click **Apply Changes**.

## Known Issue for Item and Region Plug-in Visibility During Initialization

Developers should avoid reliance upon the current behavior of the Region Display Selector and Tabs Container template (tabs), where all the tab contents are visible briefly during page load.

This behavior will change in a future release.

## Known Issue with New Version Date Picker in Universal Theme 1.5 and Earlier

### Issue

There are display issues with the new date picker when used in combination with Universal Theme version 1.5 (shipped with Application Express 20.1) and older.

### Resolution

If your app is using Universal Theme 1.5 or earlier, first refresh your Universal Theme to the latest version before using or migrating to the new date pickers.

## Known Issue using Code Editor in Safari 13

### Issue

There is a known issue with using the Code Editor in the APEX development environment in Safari 13 where the editor is unusable. This affects all places where you can enter code, including SQL Commands.

### Resolution

Upgrade to Safari 14 or use a different supported browser.

## Known Issues for jQuery Upgrade

jQuery 3.x breaks compatibility with earlier 2.x versions. For applications that still rely on removed 2.x functionality, you can use the jQuery Migrate plug-in (to include this plug-in, set the Desktop User Interface Details attribute **Include jQuery Migrate to Yes**).

If your application relies on removed 1.x jQuery APIs, that functionality no longer works as of Application Express release 18.1. You must update the JavaScript to only use jQuery 3.5 or later APIs. See the jQuery migration guides to learn more:

- To migrate from 1.x to 2.x see <http://jquery.com/upgrade-guide/1.9/>
- To migrate from 2.x to 3.5.x see <https://jquery.com/upgrade-guide/3.5/>

## Interactive Grid support for REST Enabled SQL

### Issue

Oracle REST Data Services (ORDS) REST Enabled SQL has a limit of 1000 bind variables in a REST Enabled SQL request. As a result, when Interactive Grid DML

sends more than 1000 column values, the following error displays: "Internal ORDS OUT Bind limits exceeded."

## Solution

Reduce the amount of DML rows.

## Group By Component Type mode prevents Default View

### Issue

Due to the removal of "Sort by Processing Order" and "Group by Component Type" from Page Designer, developers may be stuck in "Group by Component Type" mode without a way to switch back to the default view ("Sort by Processing Order").

### Resolution

1. In Page Designer, open Developer Console in the browser, and run the following command:

```
pageDesigner.saveBoolPref( "GROUP_BY_COMPONENT_TYPE", true );
```

2. Refresh the page.

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

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

- [Issue when Migrating APEX RESTful Services with a Null URI to ORDS](#)
- [Issue when Workspace Name Differs From First Provisioned Schema Name](#)
- [Issue when Using SQL Developer or SQL Scripts to Enable ORDS on an Application Express 18.1 or later Schema](#)

### 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 APEX (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 APEX 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 APEX RESTful Services with a Null URI to ORDS

### Issue

Prior to Application Express 5.1, the APEX 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 RESTful 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 added to the migration procedure merges 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.

## Issue when Using SQL Developer or SQL Scripts to Enable ORDS on an Application Express 18.1 or later Schema

### Issue

This issue affects systems running ORDS 17.4 or earlier and Oracle Application Express 18.1 or later.

This issue only affects schemas that are assigned to an APEX workspace.

The issue occurs when you use SQL Developer or SQL Scripts (however, not RESTful Services in SQL Workshop) to enable ORDS for a schema, when that schema is also assigned to an APEX Workspace.

RESTful Services ensures that the `ORDS_SCHEMA_ALIAS` and the `APEX_PATH_PREFIX` synchronize. However, when ORDS enables a schema using another method, the `APEX_PATH_PREFIX` does not sync. When these two items are out of sync, ORDS returns a 404 error when attempting to access ORDS services defined within the schema.

### Resolution

To sync the `APEX_PATH_PREFIX` with the `ORDS_URI_PREFIX`:

1. In APEX, click **SQL Workshop** then **RESTful Services**.
2. Click the **Configure** button to launch the ORDS Schema Attributes modal dialog.
3. For Schema Alias, select the alias.
4. Click the **Save Schema Attributes** button.

This sets the same value for both the `ORDS_SCHEMA_ALIAS` and the `APEX_PATH_PREFIX`.

## Known Issues for Data Generator

There is a known issue with the user interface for the data generator where the Column and Data Source count in the Blueprints page (4100) is wrong. This will be fixed in a future release.

There are known issues with the API for the data generator:

- API does not accept Percent Blank value of 100.
- Some built-ins that return a number data type ignore values set for minimum value, maximum value, and value precision.
- Preview ignores columns when all their values are null.
- When generating data and using row scaling other than 1x, sometimes an extra row is added.

These issues will be fixed in a future release.

## Known Issue Using Readable Export Format

The Readable Export Format in JSON and YAML does not include attribute values for plug-ins, themes, and templates.

This will be resolved in a future release of APEX.

## Documentation Accessibility

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

## Access to Oracle Support

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

## Privacy Notice

This privacy notice describes what to expect when Oracle APEX directly collects information about users of applications that you create or install. Note that all APEX internal applications (such as Application Builder) are written in APEX, 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

APEX 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

APEX 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 APEX 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

- `facets.application id.page.region id.clientSideFiltering` - Stores the facets where the user has enabled or disabled on client-side filtering.
- `facets.application id.page.region id.hiddenFacets` - Stores the facets where the user has set Visibility to Off.
- `facets.application id.page.region id.chartConfig` - Stores the configuration for the facet charts.
- `facets.application id.page.region id.openCharts` - Stores the facet charts that have been opened.
- `facets.application id.page.region id.facetCollapsedState` - Stores the facet-collapsible state.
- `PopupLov_*.application id.page.state` - This stores the popup dialog size, column widths, sort column, and direction of popup LOV items.
- `ORA_WWV_apex.builder.devToolbar.grid` - This stores the current setting of the Development Toolbar's Show Layout Columns option.
- `ORA_WWV_apex.builder.utr.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 APEX development environment, they get a notification when a new version is available. To get this version information, APEX 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 APEX component usage) that the APEX 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 *Oracle APEX API Reference*.

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### Oracle APEX Release Notes, Release 22.1

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