Oracle® APEX
Release Notes

Release 22.2

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Oracle APEX Release Notes, Release 22.2

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About These Release Notes

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

- Before You Begin
- New Features
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Before You Begin

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

- Oracle Database Requirements
- Browser Requirements
- About Release Numbering Conventions
- About Checking for the Most Current Release
- About Upgrading to the Latest Oracle APEX Release
- About Determining Your Release Version
- Important Information if Updating from a Release Prior to 22.2
- Important Information if Upgrading from Oracle Database Version 12c CDB

2.1 Oracle Database Requirements

Oracle APEX release 22.2 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*

2.2 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.

2.3 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, 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 22.2 Known Issues page or the Prior Release Archives for earlier releases.

2.4 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

2.5 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*.

2.6 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*

2.7 Important Information if Updating from a Release Prior to 22.2

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

- *Oracle APEX Release Notes* release 22.1

- *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

2.8 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.

3

New Features

Oracle APEX release 22.2 includes a number of new features. These new features are not present in APEX release 22.1 and earlier releases.

- Application Search
- Invoke API Process Type
- New Dynamic Content Region
- Approvals Functionality Updated
- Page Item Session State Data Type - CLOB
- Date Picker
- Support for Template Directives in Classic and Interactive Reports
- Number Page Item Enhancement
- Vector-Based Map Support
- Progressive Web App Enhancements
- Naming Actions of Dynamic Actions
- Landmark Support for Regions
- Debounce and Throttle Dynamic Actions
- Updated Rich Text Editor
- Drawer Modal Dialog Template
- Updated Global Search (Spotlight Search)
- JavaScript API Updates
- PL/SQL API Updates
- JavaScript Library Upgrades

3.1 Application Search

There is new declarative search functionality for APEX:

- Create multiple search configurations by defining searchable data sources, search features, and display templates
- Search tables within the local database or use REST Enabled SQL or external REST data sources
- Leverage Oracle Text for linguistic and fuzzy search capabilities
- Provide search functionality to end users by adding multiple search widgets to a single application
- Configure options for:
  - pagination

    –   search-as-you-type

    –   custom layout

    –   page size limit

    –   show results count

    –   lazy loading

    –   sorting

    –   custom messages for No Query Entered and No Results Found

Once a user types in a search term, the search configuration executes, returning relevant search results.

3.2 Invoke API Process Type

The new Invoke API page-level process type allows you to execute procedures and functions completely declaratively, without having to write PL/SQL code:

- Page Designer automatically presets parameters and maps them to matching page items or interactive grid columns, if available.
- Use **Synchronize Parameters** to refresh parameter definitions.
- Invoke API is fully PL/SQL data type aware (`NUMBER`, `DATE`, `TIMESTAMP`, `BOOLEAN`, `CLOB`, `BLOB`, etc.).
- Supports complex data types like PL/SQL Records.
- Populate parameter values with Static Value, SQL Query, Page Item, Expression, and Function Result.
- Store the output of parameters or functions in Page Item.
- Automatically uses Page Item Format Mask for type conversions.
- Automatically uses Switch and Checkbox item type configuration for `BOOLEAN` conversion.

Restrictions

On Oracle database 12r1, you cannot use Invoke API if there is a `BOOLEAN` parameter.

3.3 New Dynamic Content Region

There is a new native region type: **Dynamic Content**. Dynamic Content regions are similar to PL/SQL Dynamic Content regions with the following differences:

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

PL/SQL Dynamic Content regions are now marked Legacy, but continue to work. Oracle recommends moving existing regions over to the new Dynamic Content region type. The move is done manually, as you must convert the region source code to return a CLOB instead of using the HTP package.

To query existing regions, run:

```
select application_id, page_id, region_name
  from apex_application_page_regions
 where source_type = 'PL/SQL';
```

3.4 Approvals Functionality Updated

New Functionality

The approvals component has new functionality.

Copy Task Definition: Developers can now copy existing task definitions within the same application, or from one application to another. Participants, Actions, and Parameters are copied. Any shared component the task definition uses (like an email template or a REST data source) is copied into the target application if it does not already exist.

Request and Submit Information: Task owners can now request more information before completing a task. This sends the task back to the task initiator, who fills in the missing information before returning it to the owner for approval.

Action Logging: Actions can now be recorded in the task history log. You configure logging in the Task Definition Action Editor. You can choose whether to log successful actions, failed actions, all actions, or no actions. If you define a success message or error message, it is appended to the Messages column of the task history.

Update Due Date: The business administrator can now update the due date of an in-progress task. Changing the due date only affects the current task instance. The due date set in the task definition does not change.

Dynamic Due Dates: Due dates can now be set dynamically basically on a SQL Query, Expression, or Function Body. When the task is created, the due date is calculated based on three attributes:

1. Due On Type, which can be set as `INTERVAL`, `SQL QUERY`, `EXPRESSION`, `FUNCTION BODY`, or `SCHEDULER_EXPRESSION`.

2. Due On Language, which is used when Due On Type is `SQL QUERY`, `EXPRESSION`, or `FUNCTION BODY`. Otherwise, this is `Null`.

3. Due On Interval. When Due On Type is `INTERVAL`, this value is an interval in ISO or SQL format. Otherwise, the system uses the query or expression in this field to evaluate the date.

Advanced Date Configuration: When Due On Type is `SCHEDULER_EXPRESSION`, the expression field should contain a valid `DBMS_SCHEDULER` filtering expression. APEX evaluates the expression at run time using `DBMS_SCHEDULER.EVALUATE_CALENDAR_STRING()`.

If you choose the ISO/SQL interval format, new task definitions created in 22.2 have `INTERVAL` as the Due On Type.

Deadlines and Task Expiration: Tasks can be set to expire or renew after the task due date based on the Expiration Policy. Tasks that are not complete after the task due date may:

• Stay available to approve or reject

• Expire, meaning they can no longer be approved or rejected

• Renew as a new task with a new due date from the same task definition

If you select the Renew Expiration Policy, you can configure the number of times a task automatically renews on expiry. The default value is three, and the maximum value is 99. The business administrator can manually renew an expired task by clicking the Renew button on the Task Details page. This action is useful if the number of times the task was auto-renewed is already reached.

You can configure actions based on two new events:

1. **Before Expire**, for actions that happen before the task due date.

2. **Expire**, for actions that happen after the task due date.

New APIs

There are new APIs in the `apex_approval` package:

- `apex_approval.request_more_information()` - Used by the task's actual owner to get more information from the task initiator.

- `apex_approval.submit_information()` - Used by the task initiator to send more information to the task's actual owner.

- `apex_approval.set_due()` - Used by the task initiator or business administrator to set or update the due date for the task.

- `apex_approval.add_to_history()` - Used in PL/SQL code for the task definition to log custom messages in the task history when the action executes.

- `apex_approval.renew_task()` - Used by the business administrator to renew an expired task.

- `apex_approval.handle_task_deadlines()` - In 22.2, a background job performs this work every hour. Developers can use this API for testing Task Expiration Policies and Before Expire and Expire Task Actions.

3.5 Page Item Session State Data Type - CLOB

Prior to this release, Page Items had an implicit session state data type of `VARCHAR2`. This means the value rendered on the screen, submitted, computed, and validated, was a String, capped at either 4k or 32k bytes in length depending on the database configuration. In APEX 22.2, the internal infrastructure of page items and session state is reworked to support different data types. The first additional supported data type is `CLOB`.

Setting the Data Type

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

- Textarea

- Display Only

- Hidden

- Rich Text Editor

- Markdown Editor

For these items, under the new attribute group **Session State**, the Data Type select list is now populated with `VARCHAR2` (default) and `CLOB`. If you set the data type to `CLOB`, it implies:

- The item source and computations can handle evaluating a CLOB value.

- The item can render, submit, and validate a CLOB value.

- The item's bind variable data type used in PL/SQL code is of data type CLOB.

- Due to restrictions of the `V` function, reading an item's value programatically must be done using `apex_session_state.get_clob(<item name>)`.

Interactive Grid Compatibility

The five item types that support the CLOB session state data type can also be used as Interactive Grid columns. Note that there are a number of edge cases where this combination isn't allowed, including setting CLOB for a Primary Key or a Master Detail column. Oracle does not recommend rendering too many large CLOB values on one page as it can cause performance issues for the browser. Oracle does recommend not having multiple CLOB columns and using a Page-type pagination.

APEX_SESSION_STATE

The new `APEX_SESSION_STATE` public package is the central place for handling session state related operations. Refer to APEX_SESSION_STATE in *Oracle APEX API Reference* for more information.

Plug-in Support

Item-type plug-ins can also opt into this new infrastructure. Developers must tick the new **Session State Supports CLOB** Standard Attribute for the item to display the Data Type attribute in Page Designer. Additionally, the render and validation callback code must be adapted to support CLOB values. The following API changes facilitate this:

Package `APEX_PLUGIN`:

```
type t_item is record (
    ...
    data_type               varchar2(32767),              -- DEPRECATED
    source_data_type        apex_exec.t_data_type,        -- NEW
    session_state_data_type apex_session_state.t_data_type, -- NEW
    ...
    );

type t_item_render_param is record (
    ...
    value                   varchar2(32767),              -- LEGACY
    session_state_value     apex_session_state.t_value,   -- NEW
    ...
    );

type t_item_validation_param is record (
    value                   varchar2(32767),              -- LEGACY
    session_state_value     apex_session_state.t_value    -- NEW
    );
```

Package `APEX_PLUGIN_UTIL`:

```
-- NEW: Overloaded version of print_escaped_value
procedure print_escaped_value (
```

```
    p_value in apex_session_state.t_value );

-- NEW: Overloaded version of print_hidden
procedure print_hidden (
    p_item_name  in varchar2,
    p_value      in apex_session_state.t_value,
    p_id_postfix in varchar2 defaultnull,
    p_classes    in varchar2 defaultnull );

-- NEW: Overloaded version of print_display_only
procedure print_display_only (
    p_item             in apex_session_state.t_item,
    p_display_value    in apex_session_state.t_value,
    p_show_line_breaks in boolean,
    p_escape           in booleandefaultnull,
    p_id_postfix       in varchar2 default'_DISPLAY',
    p_show_icon        in booleandefaulttrue );
```

Oracle recommends referencing `t_item_render_param.session_state_value`, as opposed to the now legacy `t_item_render_param.value`, and using the new utilities in `APEX_PLUGIN_UTIL`, which address handling the different data types.

Migration

All existing items are migrated to session state data type `VARCHAR2`. You must switch existing items manually, because none of the existing items are set to CLOB by default. Newly-created items that are part of an Interactive Grid or a Form Region, whether they are created via Page Designer or the Create Page wizard, are set to `CLOB` if their source data type is `CLOB`.

Other Notes and Restrictions

Restrictions on the CLOB data type include:

- This feature applies strictly to page items, not application items. Application items remain `VARCHAR2` only.

- When using Session State Data type CLOB in Interactive Grid columns or Form Region items, the Source Data Type must also be CLOB.

- Session State Data Type CLOB items cannot be referenced via the typical substitution string syntax `(&ITEM_NAME.)` on the server. This causes a runtime error. To display a CLOB item, use the respective page item in Read-Only mode or a Display Only item. You can also render the item programatically in a Dynamic Content region. In the client (for example, in template directives), the typical substitution string syntax for the CLOB data type works.

- Within the Set Value dynamic action, Set Type **PL/SQL Expression** and **PL/SQL Function Body** cannot be used to return a CLOB. A workaround is to use Set Type **SQL Statement** or the **Execute Server-side Code** Dynamic Action by assigning the new value directly to the item and specifying the item in **Items To Return**.

- In the Interactive Grid, CLOB values cannot be downloaded.

3.6 Date Picker

The new Date Picker is built from the ground up for APEX and provides a streamlined user experience that is faster, more accessible, and lighter weight.

Today Button

The Today button allows users to effortlessly select today's date. You can easily enable this button via the Component Settings or from the Item Attributes.

Simple Behavior Control

Use HTML attributes to change the behavior of the date picker on the client side, without needing to use complicated JavaScript calls.

Fast and Accessible

The new Date Picker loads faster, responds quicker to user interaction, and is built to accessibility guidelines.

3.7 Support for Template Directives in Classic and Interactive Reports

APEX now supports Template Directives for columns that have an HTML expression in Classic Reports and Interactive Reports.

3.8 Number Page Item Enhancement

A new attribute, **Virtual Keyboard**, is now available on the Number page item. You can use this attribute to configure the type of virtual keyboard to use on mobile devices when editing a Number page item:

• **Text** - A regular alphanumeric keyboard.

• **Numeric** - A numeric-only keyboard. This option is useful for monetary values, PINs, ZIP codes, CC numbers, and similar entries.

• **Decimal** - A numeric-only keyboard with an added decimal key.

APEX now creates new number fields with a default left alignment instead of a right alignment. You can change the alignment at any time.

3.9 Vector-Based Map Support

APEX now supports Vector-Based Map Tiles in the map region. There are three layers available:

• OpenStreetMap Positron

• OpenStreetMap Dark

• OpenStreetMap Bright

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

3.10 Progressive Web App Enhancements

The Progressive Web App (PWA) feature has new functionality.

PWA Feature Detection

APEX now uses feature detection to automatically determine if PWA is supported by the user's browser or device, and only displays the **Install App** button when PWA is supported. This prevents APEX from pushing for PWA on browsers and devices that choose not to support it.

PWA Screenshots

You can now add screenshots of your app. APEX uses the screenshots when prompting users to install the Progressive Web App. For best results, all screenshots should have the same aspect ratio.

PWA Shortcuts

Once users install a PWA, they can use a PWA shortcut to get to a specific page of the application quickly:

- On touch-enabled devices - long-press on the application icon on the home screen
- On other devices - right-click on the application icon on the task bar

To enable PWA shortcuts on your application, you must also enable Rejoin Sessions.

New Dynamic Actions

There are new dynamic actions for PWAs:

- Get Current Position - triggers the device to return its current position. Choose between three options:
    1. Returns the GeoJSON as a string to a page item
    2. Returns the latitude and longitude to two different page items
    3. Gets the full Geolocation Position object to use it in a JavaScript function
- Share - shares the current page of the application, a URL, or files with other applications
    – You can share one file or multiple files, either statically defined or from a SQL query

Declarative Meta Tags

You can now define meta tags for your public-facing APEX pages directly from Page Designer. Combine this with the new Share dynamic action to display page previews on social media. Meta tags can also be used to increase a web app's SEO score.

New Public Views

The PWA feature has new public views:

- `APEX_APPL_PWA_SHORTCUTS`
- `APEX_APPL_PWA_SCREENSHOTS`
- `APEX_APPL_PAGE_META_TAGS`

3.11 Naming Actions of Dynamic Actions

You can now name actions of dynamic actions with a custom description for better self-documentation in Page Designer.

3.12 Landmark Support for Regions

Landmarks redefine how screen reader users understand the structure of a web page. Building on previous support in APEX, regions now have full control over how they present as landmarks. Regions either use a template default or override their landmark at page level.

The Developer Toolbar now includes options to **Show Landmarks** and **Show Headings**.

3.13 Debounce and Throttle Dynamic Actions

You can now set the Dynamic Action Execution Type, Time, and Immediate properties to control when actions execute:

- Debounce an action with a delay to execute it once after a specified time delay from the last time an event fires.
- Throttle an action immediately to execute it immediately and then in timed intervals if the event continues to fire.

You can also execute debounced actions immediately, or execute throttled actions with a delay.

3.14 Updated Rich Text Editor

The Rich Text Editor page has two new declarative attributes:

1. **Toolbar Style** lets you choose between **Overflow Menu** and **Multiline**.
   - **Overflow Menu** - The toolbar displays items in one line. Items that exceed the toolbar width overflow into a popup menu.
   - **Multiline** - The toolbar displays items in multiple lines, similar to behavior in CKEditor4.
2. **Allow Custom HTML** enables the General HTML Support and Source Editing CKEditor5 plug-ins. Together, these plug-ins help bridge the gap between CKEditor4 and CKEditor5 by allowing custom HTML that can be edited inline.

> **Note:**
>
> Oracle recommends keeping this attribute disabled as it is intended for advanced usage and compatibility with content produced by CKEditor4.

3.15 Drawer Modal Dialog Template

The latest Universal Theme includes Drawer Dialog Template. This template can be selected if the page mode is Modal Dialog.

A drawer is an overlay window that pulls out from the sides of the screen. A drawer remains active and focused until the user has finished with it and closes it. While a drawer is active, the user is unable to interact with the rest of the page until the drawer is closed.

Create Application Wizard now creates Form pages as Drawer by default. Create Page Wizard defaults the Form Page Mode to Drawer if the application theme contains a Drawer page template.

3.16 Updated Global Search (Spotlight Search)

Global Search (Spotlight Search) is updated. Global Search now supports:

- search by page name and page alias
- in-app search by application alias. In-app search works with a colon (`:`) or dash (`-`) between the application id or alias and the page id, name, or alias

3.17 JavaScript API Updates

New or Changed Functions, Methods, and Events

This release contains new or changed functions, methods, and events:

- New function `apex.util.throttle`
- New parameter `pImmediate` added to `apex.util.debounce`
- New parameter `pIgnoreUnsavedChanges` added to `apex.navigation.redirect`
- New model events `destroy` and `instanceRename`
- Method `model.clearData` now returns Boolean
- New `mapRegion` property `useVectorTileLayers`
- Renamed parameters `pFeatId` to `pFeatureId` and `pFeat` to `pFeature` in some `mapRegion` methods

Other Changes

This release includes other API changes:

- Changes attribute named "JavaScript Initialization Code" to "Initialization JavaScript Function"
- Improves descriptions for:
  - how `apex.locale.toNumber` handles loss of precision
  - `apex.message.showPageSuccess`
  - a number of `apex.pwa` functions
  - a number of `mapRegion` methods

    – `item` **interface**

    – `apex.pwa.isInstallable`

    – `apex.pwa.openInstallDialog`

- Other various minor fixes and improvements to the JavaScript API documentation

3.18 PL/SQL API Updates

APEX_ESCAPE New Functions

`APEX_ESCAPE` has new features:

- `csv` escapes any special characters in a VARCHAR2 or CLOB for output in a CSV file

- `striphtml` removes any HTML tags from a VARCHAR2 or CLOB

- CLOB is fully supported throughout:

    – `html_clob`

    – `html_allowlist_clob`

    – `html_attribute_clob`

    – `is_literal_clob`

    – `json_clob`

APEX_LDAP Support for the Credential Store

The `APEX_LDAP` APIs now support a new `p_credential_static_id` parameter as an alternative to username/password. Use this parameter to avoid hardcoding the credentials in packages or storing them in other insecure ways. Now, you can store the credentials in App Builder, under Workspace Utilities, Web Credentials.

Other Updates

The `APEX_THEME` API has new examples for `disable_user_style` and `enable_user_style`.

3.19 JavaScript Library Upgrades

- CKEditor 5.35.x

- CSSO 5.0.3

- DOMPurify 2.3.8

- Font APEX 2.2.1

- FullCalendar 5.11.2

- JavaScript Extension Toolkit (JET) 12.1.3

- jQuery 3.6.0

- jQuery Migrate 3.4.0

- jQuery UI 1.13.2 (Custom bundle)

- Less JS 4.1.3

- MarkedJS 4.0.17

- prism.js 1.28.0
- MapLibre 2.1.9
- Terser 5.14.1

4

Changed Behavior

Changed behavior in this release includes:

- Improved Text Field with Autocomplete
- Calendar Regions
- Create Modal Page as Drawer
- Dynamic Action Changes in Page Designer
- UI Changes
- Compatibility Mode
- Enabling Network Services in Oracle Database

4.1 Improved Text Field with Autocomplete

The **Text field with Autocomplete**, formerly an Oracle JET implementation, is now a custom HTML component. Applications that use the Text field with Autocomplete item are automatically switched to the new custom HTML component. You can no longer create a Text field with Autocomplete using the previous Oracle JET implementation.

Item Improvements

This change means that Text field with Autocomplete now has:

- support for PD Maximum Values in List when not lazy loading (now called **Fetch on Type**)
- icon support when the **List of Values Type** is `Shared LOV`
- support for cascading LOVs
- support for refreshing dynamic actions when **Fetch on Type** is `False`
- visual improvements, including:
    - a placeholder when fetching from server to indicate APEX is retrieving data
    - no dropdown flash when search is synchronous (**Fetch on Type** is `False`) or when using smart filters

Item Changed Behaviors

This update changes some behaviors for Text field with Autocomplete items:

- The Dynamic Action Event **Update [Text Field with Autocomplete]** (`ojupdate`) is replaced with the **change** event.
    - Existing Dynamic Actions using **Update [Text Field with Autocomplete]** are automatically migrated to the **change** event.

– The new **change** event triggers when the user changes the autocomplete in any way (for example, typing in it). This is an improvement on the `ojupdate` event, which was only triggered when the user selected a suggestion.

- Because the new item implementation is a custom HTML component, using the HTML attribute style on the Custom Attributes page designer property does not style the internal input element. Styling the input element is neither supported nor recommended.

- HTML markup may change between releases without prior notice.

- The attribute **Lazy Loading** is now **Fetch on Type**.

- If the List of Values is set to `Static` or `Shared`, only the Return column provides values to the item.

4.2 Calendar Regions

With this release, calendar regions still using the deprecated FullCalendar v3 are automatically migrated to FullCalendar v5. Custom JavaScript customization is commented out. See Calendar Region Upgrade Guide in APEX 21.1 for details.

4.3 Create Modal Page as Drawer

Create Application Wizard now creates Form pages as **Drawer** by default. There is no option to change this unless you add a Wizard Page type.

Create Page Wizard defaults the Form Page Mode to **Drawer** if the application theme contains a Drawer page template. With Drawer page mode, APEX creates the page as Modal Dialog, and uses the Drawer Dialog Template. To override this default behavior, you can select the desired page mode from the Create Page Wizard.

4.4 Dynamic Action Changes in Page Designer

The Execution Options property group in the Page Designer editor is renamed **Execution**. There are three new entries in the Execution group:

- Type
- Time
- Immediate

The Event Scope and Static Container (jQuery Selector) DA properties are moved from Advanced to Execution.

If you upgrade an app that has Dynamic Actions without an Execution Type value, the value is automatically set to `Immediate`. This is the default behavior.

4.5 UI Changes

User interface changes in this release include:

- The browser console only shows the dynamic action debug message if debugging is turned on. In previous releases, the dynamic action debug message was always displayed.

- Tooltips are now always visible on the Page Designer gallery, regardless of a user's personal settings.

4.6 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" (` `).

Compatibility Mode Changes in Mode 21.2 / 22.1 / 22.2

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.

4.7 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.

4.7.1 When and Why Network Services Must be Enabled

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

By default, the ability to interact with network services is disabled in Oracle Database 11g Release 2 or later. Therefore, if you are running Oracle APEX with Oracle Database 11*g*

Release 2 or later, you must use the new `DBMS_NETWORK_ACL_ADMIN` package to grant connect privileges to any host for the `APEX_220200` database user. Failing to grant these privileges results in issues with:

- Sending outbound mail in Oracle APEX.

  Users can call methods from the `APEX_MAIL` package, but issues arise when sending outbound email.

- Consuming web services from APEX.

- Making outbound LDAP calls from APEX.

- PDF report printing with BI Publisher.

> **Note:**
>
> When upgrading APEX on a database 12*c* 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 11*g* or 12*c* database will already have the parameter set properly, but a database upgraded to 11*g* or 12*c* 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*.

4.7.2 Granting Connect Privileges in Oracle Database 12*c* or Later

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

The following example demonstrates how to grant connect privileges to any host for the `APEX_220200` database user. This example assumes you connected to the database where Oracle APEX is installed as `SYS` specifying the `SYSDBA` role.

```
BEGIN
    DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE(
        host => '*',
        ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                           principal_name => 'APEX_220200',
```

```
                                    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_220200',
                           principal_type => xs_acl.ptype_db));
END;
/
```

4.7.3 Troubleshooting an Invalid ACL Error

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

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

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

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

Next, run the following code to fix the ACL:

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

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

  IF (CNT > 0) THEN

    FOR R IN (SELECT PRINCIPAL FROM XDS_ACE
                WHERE ACLID = ACL_ID AND
```

```
                            NOT EXISTS (SELECT NULL FROM ALL_USERS
                                        WHERE USERNAME = PRINCIPAL)) LOOP
        UPDATE XDB.XDB$ACL
           SET OBJECT_VALUE =
                 DELETEXML(OBJECT_VALUE,
                             '/ACL/ACE[PRINCIPAL="'||R.PRINCIPAL||'"]')
         WHERE OBJECT_ID = ACL_ID;
      END LOOP;

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

END;
/

REM commit the changes.

COMMIT;
```

Once the ACL has been fixed, you must run the first script in this section to apply the ACL to the APEX_220200 user.

5

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 5-1   APEX Ideas App

Feature Request Number	Subject	Solution
FR-1649	Extended support for Template Directives	Delivered. See Support for Template Directives in Classic and Interactive Reports.
FR-1854	Switching a theme: current theme should be pre-selected	Delivered.
FR-1869	Refresh region on PL/SQL Dynamic Content	Delivered. See New Dynamic Content Region.
FR-1985	Dynamic Action for Delay or Timer	Delivered. See Dynamic Action Changes in Page Designer.
FR-2087	`APEX_DATA_LOADING` API: make the line number from the preview accessible for the data load	Delivered. See bug 33957428 in Fixed Bugs.
FR-2099	Enhance spotlight to support application alias and page alias	Delivered. See Updated Global Search (Spotlight Search).
FR-2122	Support for CLOB in Text Area	Delivered. See Page Item Session State Data Type - CLOB.
FR-2132	Allow Item/Column (Type: Number Field) to allow only number/decimal input	Delivered. See Number Page Item Enhancement.
FR-2142	Improve the restore subscription for theme and templates, as it can fail without giving any details; better template matching	Delivered.
FR-2162	Page designer doesn't synchronize navigator URL with current selected edit page, fails when pressing F5 jumping to previous page	Delivered. See bug 34033306 in Fixed Bugs.
FR-2377	BLOB to CLOB and CLOB to BLOB APIs	Delivered. See BLOB_TO_CLOB Function and CLOB_TO_BLOB Function.
FR-2381	Add "Name" field for each of the DA true/false actions	Delivered. See Naming Actions of Dynamic Actions.
FR-2392	Show Dynamic Action name in console log	Delivered. See UI Changes.
FR-2454	Improve "Add to Home Screen" dialog when PWA installation fails	Delivered. See Progressive Web App Enhancements.

Table 5-1   (Cont.) APEX Ideas App

Feature Request Number	Subject	Solution
FR-2489	Pass Sample Response to REST Datasource Plugin for Discovery	Delivered. See bug 34155996 in Fixed Bugs.
FR-2536	Increase Varchar2 column limit for `APEX_DATA_PARSER` to 32k	Delivered. See bug 34230448 in Fixed Bugs.
FR-2567	Support "nextStartWith" pagination (aka OCI Object Storage) in REST Data Sources	Delivered. See bug 34297638 in Fixed Bugs.
FR-2701	Improve Region Display Selector to prevent redirects	Delivered. See bug 34371688 in Fixed Bugs.
FR-2704	APEX debug output needs additional format options	Delivered.
FR-2719	Allow declarative positioning of items on region title bar	Delivered.

6

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 Query Builder
- Deprecated APEX Item Markup
- Deprecated User Interfaces Removed
- Deprecated APIs and Parameters
- Deprecated jQuery/JET Date Pickers

6.1 Deprecated Query Builder

SQL Workshop Query Builder is deprecated as of this release. Query Builder is currently supported, but will be removed in a future release.

6.2 Deprecated APEX Item Markup

Future releases of APEX may include fixes and improvements to the accessibility, usability, and functionality of various items that require changing the markup or using custom elements (web components). These changes may create more dynamic behaviors for items, and will be done in a way that minimizes impact to items and forms in existing apps.

The `apex.item` namespace and item interface are the only supported APIs for customizing and programatically working with items. APEX discourages customizations that rely on undocumented item markup or CSS classes, as these may not work as expected in future releases.

Assumptions about the HTML markup used by each of the native APEX items may not hold in the future. Item customization through Advanced attributes (CSS Classes), Custom Attributes, JavaScript code, and CSS rules that assumes particular markup could break.

For example, you could make the text area item character counter bold by adding class `important-text` to the **Advanced: CSS Classes** attribute of a text area and then add a custom CSS rule like:

```
.important-text.apex-item-textarea + .apex-item-textarea-counter {
    font-weight: bold;
}
```

This currently works, but may not in the future because it relies on undocumented class names and the counter element directly following the `textarea` element. It is also not a best practice to add event handlers in Custom Attributes.

Future releases may document new custom element markup, classes, and CSS variables to allow more supportable customization.

6.3 Deprecated User Interfaces Removed

APEX previously defined multiple users interfaces for each application. This is no longer the case. This release cleans up deprecated user interfaces, which impacts many APEX Dictionary Views:

- Obsolete views:

  - `apex_workspace_ui_types`

  - `apex_appl_user_interfaces`

- New view columns:

  - `apex_applications.theme_style_by_user_pref`

  - `apex_applications.built_with_love`

  - `apex_applications.navigation_list`

  - `apex_applications.navigation_list_position`

  - `apex_applications.nav_bar_type`

  - `apex_applications.nav_bar_list`

  - `apex_applications.include_legacy_javascript`

  - `apex_applications.include_jquery_migrate`

- Obsolete view columns:

  - `apex_applications.ui_detection_css_urls`

  - `apex_appl_concatenated_files.user_interface_id`

  - `apex_application_pages.user_interface_id`

  - `apex_application_pages.page_transition`

  - `apex_application_pages.popup_transition`

  - `apex_application_themes.ui_type_id`

  - `apex_application_themes.ui_type_name`

  - `apex_application_themes.default_page_transition`

  - `apex_application_themes.default_popup_transition`

  - `apex_appl_plugins.supported_ui_types`

  - `apex_appl_plugin_std_attrs.supported_ui_types`

  - `apex_appl_plugin_attributes.supported_ui_types`

- Removed Page Designer Properties:

  - Page Transition

  - Popup Transition

  - User Interface

Older applications created when APEX could have two User Interfaces now only use the active user interface. Inactive user interfaces are removed from the metadata.

6.4 Deprecated APIs and Parameters

PL/SQL APIs

Deprecated parameters:

- For `apex_instance_admin.add_web_entry_point`, the parameter `p_methods` is deprecated.

JavaScript APIs

Deprecated JavaScript APIs:

- `apex.pwa.getInstallText`

6.5 Deprecated jQuery/JET Date Pickers

jQuery/JET Date Pickers are now deprecated and cannot be used for new pages or applications. The old jQuery Date Picker JavaScript APIs are not supported.

The JET Date Picker will be removed in a future release. Oracle recommends replacing all old Date Pickers with the new Date Picker.

7

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.

- Previously Deprecated APIs
- Deprecated Utilities
- Deprecated Legacy Web Service References
- jQuery UI Deprecated

7.1 Previously Deprecated APIs

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

7.2 Deprecated Utilities

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

Oracle recommends using SQLcl instead.

7.3 Deprecated Legacy Web Service References

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

7.4 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 1.13.2 that includes only the modules that APEX needs. Oracle no longer ships individual widgets or any jQuery UI CSS files.

8

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 Attributes in App Builder
- Desupported Properties
- Desupported View Columns
- FullCalendar 3 Desupported
- App Builder Defaults Desupported
- Copying Legacy Themes Desupported
- CKEditor4 Desupported
- Desupported Public Package APIs

8.1 Desupported Attributes in App Builder

The following attributes in App Builder are desupported:

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

8.2 Desupported Properties

The following properties in the property editor are desupported:

- Region Image
- Image Tag Attributes

8.3 Desupported View Columns

The following view columns are desupported:

- In apex_applications:
  - app_builder_icon_name
  - favicons
  - pwa_manifest_icon_url

8.4 FullCalendar 3 Desupported

FullCalendar v3 is desupported, including:

- deprecated plug-in attributes
- files and folders specific to v3 or `jquery-fullcalendar`
- v3-specific logic in PL/SQL and JavaScript

The used library version is now FullCalendar 5.11.2. APEX upgrades the library automatically.

8.5 App Builder Defaults Desupported

Developers can no longer define App Builder Defaults from Workspace Utilities, App Builder Defaults. The Create Application Wizard no longer uses the defined attributes.

8.6 Copying Legacy Themes Desupported

The Copy Theme Wizard no longer supports copying legacy themes. This includes Themes 1 - 26, and the jQuery Mobile theme.

8.7 CKEditor4 Desupported

Rich Text Editor items based on CKEditor4, which are marked as deprecated since APEX 20.2, are now desupported and will be automatically converted to CKEditor5. CKEditor4 is removed from APEX completely.

Converted items receive the following configuration:

- **Format**: `HTML`
- **Toolbar**: unchanged
- **Toolbar Style**: `Multiline`
- **Minimum Height**: `180`
- **Maximum Height**: `null`
- **Allow Custom HTML**: `Enabled`

The properties **Toolbar Position** and **Skin** do not have a CKEditor5 equivalent, and are removed. Any code included in the **JavaScript Initialization Code** attribute is automatically commented out.

Oracle recommends manually checking the functioning of each Rich Text Editor item.

> **Note:**
>
> With this update, any code referencing CKEditor4 and the `CKEDITOR` global object no longer works.

8.8 Desupported Public Package APIs

Desupported public package APIs:

- `apex_page.is_desktop_ui` function
- `apex_page.get_ui_type` function

9

Desupported in Previous Releases

The following section lists features which were desupported in a previous release.

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

9.1 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

9.2 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

9.3 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.

9.4 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 9-1   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

9.5 Desupported JavaScript Functions

The following functions are desupported:

Universal Theme JavaScript API function:

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

9.6 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.

9.7 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.

9.8 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.

9.9 apex.widget.initPageItem Function Desupported

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

9.10 Popup LOV Template Desupported

The Popup LOV template type is desupported.

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

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

9.12 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 Running Application Upgrade in *Oracle APEX App Builder User's Guide*.

9.13 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.`.

9.14 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.

9.15 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*.

10
Fixed Bugs

The following section lists bugs fixed in this release.

Table 10-1   Fixed Bugs in Oracle APEX 22.2

Bug Number	Description
25673217	INTERACTIVE GRID DOES NOT SUPPORT BLOB COLUMNS
30250291	INTERACTIVE GRID: IG_RPT_NAME_UK ERROR WHEN UPDATING REPORT SETTINGS
30450209	SQL WORKSHOP: V$SESSION INSTRUMENTATION FOR SQL SCRIPTS IS INCONSISTENT
31048028	INTERACTIVE GRID: DYNAMIC COLUMN NAME NOT MAINTAINED IN VALIDATION MESSAGE
31193604	PAGE DESIGNER: VALIDATION EDITABLE REGION SHOULD NOT ALLOW SELECTING FORM REGION TYPE
32070574	WARN ON UNSAVED CHANGES BROKEN AFTER MODAL DIALOG PAGE CLOSES
32079384	CLASSIC REPORT CURRENT COLUMN SORT NOT PERCEIVABLE WITH SCREEN READERS
32479148	DYNAMIC ACTION EVENT 'AFTER REFRESH' SHOULD NOT BE DEFAULT FOR REGIONS THAT DON'T SUPPORT IT
32532058	COLLAPSIBLE REGION TEMPLATE NEEDS ACCESSIBILITY IMPROVEMENT
32861547	APEX_DATA_PARSER ERRORS OUT WITH ORA-06502 IF FIRST ROWS CONTAIN UNICODE CONTENT LONGER THAN 128 BYTE
33040542	SHARED LOV PAGE: MISSING VALIDATION TO CHECK MAPPING COLUMNS ARE DEFINED IN 'ADDITIONAL DISPLAY COLUMNS'
33140144	ERROR WHEN CLICKING ON LINK WITH \ESCAPED\ PAYLOAD THAT NAVIGATES FROM DIALOG TO NORMAL PAGE
33184216	UNDO BUTTON IS ENABLED ON THEME ROLLER EVEN THOUGH THERE IS NOTHING TO UNDO
33233910	LIST OF VALUES EDIT PAGE > SWITCHING FROM TABLE TO SQL QUERY CAN RESULT IN CONSTRAINT ERROR
33302244	INTERACTIVE AND CLASSIC REPORT DOWNLOADS TRIGGER "WARN ON UNSAVED CHANGES" MESSAGE
33475574	PAGE DESIGNER PROPERTY EDITOR NUMBER FIELDS DON'T SUPPORT COPY AND PASTE
33522530	APEX SHOULD NOT ALLOW TO USE "FILES" AS THE PAGE ALIAS, AS RUNNING THE PAGE FAILS WITH HTTP-400
33591098	INTERACTIVE REPORT FILTERS NEEDS ACCESSIBILITY IMPROVEMENTS
33655826	GETTING ERRORS WHEN THE SWITCHED THEME DOESN'T HAVE A MAPPED TEMPLATE
33719312	UNIVERSAL THEME FLOATING LABELS ANIMATIONS
33875951	SUCCESS MESSAGES CAN BE ANNOUNCED TWICE BY JAWS

Table 10-1   (Cont.) Fixed Bugs in Oracle APEX 22.2

Bug Number	Description
33957428	DATA LOADING: PROVIDE NEW COLUMN TYPE "LINE NUMBER"
33969953	DATA GENERATOR: DATA SOURCE COLUMNS NOT POPULATED AFTER NEW CUSTOM DATA SOURCE CREATED
33991020	APEX_APPLICATION_LIST_ENTRIES DOES NOT SHOW AUTH SCHEME NAME FOR TRANSLATED ENTRIES
33996486	MLE OBJECT GRANTS REVOKED FROM USER SCHEMA ON APEX UPGRADE OR UNINSTALL
33998885	PWA APPLICATION NAME IS NOT RESOLVING SUBSTITUTIONS AT RUNTIME
34002437	NEW DATA LOADING: TRANSFORMATION RULE "REPLACE" DOES NOT ALLOW TO REPLACE WITH NULL (STRIP OUT)
34003115	PUBLISHING A THEME TO APP SUBSCRIBERS LEADS TO AN INDEX VIOLATION
34005344	ORACLE APEX ADVISOR SHOWS WRONG MESSAGES
34012116	EMAIL TEMPLATE UTILIZATION REPORT INCLUDES INCORRECT ROWS FROM OTHER APPLICATIONS
34012638	IR SUBSCRIPTION SESSION GETS MARKED TO PURGE WHEN SIGN OUT CLICKED FROM AN APP USING SAML AUTH
34012897	APEX GALLERY: WHEN INSTALLATION OF SUPPORTING OBJECTS FAILS THE GALLERY DOES NOT DETECT THAT APP IS INSTALLED
34012954	SESSION OVERRIDES: REORDER GROUPS IN SESSION OVERRIDES FEATURE
34013988	MASTER DETAIL PAGE DOESN'T LOAD THE DETAIL REGION ROWS AFTER REFRESH
34014879	DON'T START AUTOMATIONS AND EMAIL JOBS UNTIL THE FIRST AUTOMATION/EMAIL IS CREATED
34015610	DATA LOADING: ERROR MESSAGE DISPLAYED FOR LOADING OF INVALID JSON FILE SHOULD BE MORE CLEARER
34016829	FILE BROWSE ITEM IN FORM REGION ERRORS OUT AFTER COPYING THE PAGE
34020505	DATA GENERATOR: FORMULA PROPERTY VALUE IS NOT SAVED WHEN DATA SOURCE TYPE IS NOT "FORMULA"
34026101	DATA GENERATOR: MISSING MAX LENGTH ATTRIBUTES FOR PAGE ITEMS
34027348	REST SOURCE SYNC CREATES "JSON DOCUMENT" COLUMN AS VARCHAR INSTEAD OF CLOB IN LOCAL TABLE
34029928	INTERACTIVE REPORT THROWS ORA-936 IF THERE IS NO VISIBLE COLUMN TO RENDER
34032488	PAGE DESIGNER NO LONGER AUTO-FOCUSES RENDERING TAB IN 2 PANE MODE
34032561	THEME ROLLER ISSUE WHEN A LESS FILE IS NOT FOUND
34032804	FOCUS ON SEARCH FIELD OF SMART FILTER, WITH ONLY REQUIRED SEARCH FACET, RESULTS IN MOMENTARY FLASH OF EMPTY DROPDOWN
34033306	PAGE DESIGNER DOES NOT REMEMBER CURRENT PAGE ON REFRESH

Table 10-1   (Cont.) Fixed Bugs in Oracle APEX 22.2

Bug Number	Description
34037405	HELP TEXT FOR RANGE FACETS SHOULD CONTAIN LOV SYNTAX EXAMPLES
34047243	SUPPORT MAX_STRING_SIZE=EXTENDED FOR DATA PROFILES
34064516	DATA GENERATOR: COLUMN COUNT IS WRONG IN THE DATA GENERATOR REPORT
34065533	DATA GENERATOR: COLUMN AND TABLE SEQUENCE VALUES ARE NON EDITABLE
34066159	QUICK SQL IDENTITY PK WITH SAMPLE DATA CAUSES FORM PAGE TO ERROR OUT WITH UNIQUE CONSTRAINT
34070384	ERROR PROCESSING VALIDATION WHEN SWITCHING THEMES AND NO THEMES SELECTED
34077180	INTERACTIVE GRID MASTER DETAIL ADD BUTTON ON DETAIL DISABLED AFTER SAVE NEW MASTER ROW
34086815	INTERACTIVE REPORT AGGREGATE OF COMPUTED COLUMN UNEXPECTEDLY LEFT-ALIGNED
34087189	BUILD OPTION SELECTED TO INCLUDE DURING APP UPGRADE DOES NOT GET INCLUDED
34090790	DATA GENERATOR: REQUIRED TOGGLE BUTTON IS NOT GETTING DISABLED FOR A COLUMN
34093041	USING A TRANSFORMATION IN A REST DATA SOURCE COLUMN CAUSES ORA-00904 ERROR.
34097011	DATA LOAD MERGE FAILS IF DEFINITION CONTAINS PRIMARY KEY COLUMN PROFILE ONLY
34104268	CALLING APEX_REGION.OPEN_QUERY_CONTEXT FOR INTERACT. GRID ON OTHER PAGE LEADS TO WRONG META DATA LOADED
34104741	APEX$USE_NO_GROUPING_SETS "PSEUDO HINT" IS NOT CONTAINED IN PAGE DESIGNER HELP TEXT
34110990	IT IS NOT POSSIBLE TO CREATE A THEME FROM SCRATCH USING THE WIZARD
34115954	DATA LOAD DOES NOT LOAD THE COLUMN IF PROFILE COLUMN NAME CONTAINS HYPHEN
34120638	NUMBER FIELD WITH FORMAT MASK AND NUMBER WITH LARGE NUMBER OF DECIMAL PLACES GIVES ERROR
34131726	CANNOT ADD DATA COLUMN FROM DATA PROFILE COLUMNS GRID
34155212	APEX_AUTOMATION.EXECUTE LACKS P_RUN_IN_BACKGROUND PARAMETER
34155996	PASS SAMPLE RESPONSE TO REST DATASOURCE PLUGIN FOR DISCOVERY
34170409	MULTI_VALUE FACETS: JSON_EXISTS FUNCTION SHOULD USE BIND VARIABLES
34179761	CANNOT SET GALLERY_FILE_URLS PARAMETER USING PL/SQL API WITH NEW LINE
34180759	QUERY BUILDER NOT RETURNING SQL QUERY
34185197	PREVENT PROVISONING OF WORKSPACE NAMES WITH NAMES CONTAINING URLS

Table 10-1   (Cont.) Fixed Bugs in Oracle APEX 22.2

Bug Number	Description
34189472	COMBOBOX - SEARCH TERM IS NOT SUBMITTED ON FIELD CLICKED
34190686	DUPLICATED COLUMN EXPORTING TO EXCEL FROM APEX APPLICATION
34191555	QUICK SQL: CREATE VIEW WHERE CLAUSE DOESN'T ALWAYS RESPECT MANUAL PK
34194772	JET CHART: PIE CHART 'DISPLAY AS' ATTRIBUTE SHOULD PROVIDE 'LABEL - PERCENTAGE' OPTION
34201197	MAX_WEBSERVICE_REQUESTS RESET TO DEFAULT UPON UPGRADE
34208220	REGRESSION: "ORDER BY" PROPERTY ON FORM REGION NO LONGER DISPLAYS
34213875	OPEN_QUERY_CONTEXT() IGNORES APPLIED REGION FILTERS IF USED FROM DIFFERENT PAGE
34224098	PAGE DESIGNER PAGE SEARCH DOES NOT PERSIST WHEN MOVING ACROSS PAGES
34230448	APEX_DATA_PARSER DOES NOT SUPPORT MAX_STRING_SIZE=EXTENDED
34231006	SAML AUTH: ERROR IN WWV_FLOW_ASN1 PACKAGE WHEN PARSING CERTIFICATE WITH SPACES
34245972	DOWNLOAD IR TO EXCEL FAIL WHEN APPLICATION LANGUAGE SET TO HEBREW AND NUMERIC FO
34248854	NEW SERVICE SIGNUP WIZARD DOES NOT RESPECT SSO USERNAME
34256371	DATA GENERATOR: COLUMN NOT SAVED ON BLUEPRINT DATA SOURCE TYPE
34257937	SAML AUTH: ERROR REGISTERING CERTIFICATE WITHOUT VERSION IDENTIFIER
34259635	JQUERYUI DIALOG CLOSE BUTTON'S FOCUS STYLE IS TOO WIDE IN FIREFOX
34261389	DATA GENERATOR: CUSTOM DATA SOURCES DO NOT LOAD TABLES OR EXECUTE QUERIES
34264934	ASSOC ARRAY SHAPE NOT CONSISTENT W/ SESSION PARAMETERS USING APEX_PAGE.GET_URL() W/ LINGUISTIC BINARY_AI NLS
34272782	APPROVAL COMPONENT - ACCESSIBILITY - UNIFIED TASK LIST IS USING MIDDOT CHARACTER WITHOUT PROVIDING A SEPARATOR ROLE
34297638	SUPPORT "OBJECT STORE" PAGINATION STYLE "NEXTSTARTWITH" IN "OCI" REST SOURCE TYPE
34300897	GENERATE REQUEST BODY TEMPLATE CAN USE INCORRECT PROPERTY NAMES
34307623	CREATE SAMPLE DATASETS DOES NOT WORK IF SCHEMA NAME HAS SPECIAL CHARACTERS LIKE / OR &
34318575	INTERACTIVE GRID SETTINGS NEED ACCESSIBILITY IMPROVEMENTS
34322254	PAGE DESIGNER DOES NOT USE COMBINED JAVASCRIPT FILE

Table 10-1 (Cont.) Fixed Bugs in Oracle APEX 22.2

Bug Number	Description
34323267	COPY AUTOMATION RAISES ORA-54013: INSERT OPERATION DISALLOWED ION VIRTUAL COLUMN
34333105	DIALOG PAGE > NOT-CHAINED > 2ND PAGE LOSES KEYBOARD FOCUS IN FIREFOX
34333480	APEX.DATE FORMAT & PARSE FUNCTION LOG TOO MUCH INFORMATION TO BROWSER CONSOLE
34334231	PAGE DESIGNER DOES NOT DETECT IDENTITY COLUMNS FOR A TABLE DATA SOURCE
34346694	EDIT AUTOMATION: PRIMARY KEY COLUMN ATTRIBUTE ALWAYS CLEARS WHENEVER DATA SOURCE SETTINGS ARE CHANGED
34348144	DML PROCESSING RAISES "CHARACTER STRING BUFFER TOO SMALL" ERROR WHEN GENERATING CHECKSUM QUERY FOR VERY LARGE SOURCE QUERY
34358291	NAVIGATION MENU FLICKERS WHEN EXPANDED BY DEFAULT OR IN ICON COLLAPSE MODE
34368236	REST SOURCE PLUG-IN DISCOVERY FUNCTION CAN ONLY SET EMPTY PLUG-IN ATTRIBUTE VALUES
34371634	APEX_DATA_PARSER: P_STORE_PROFILE_TO_COLLECTION IS IGNORED WHEN REPORT STOPS FETCHING EARLY
34371688	REGION DISPLAY SELECTOR CAUSES REGIONS TO FLICKER ON PAGE LOAD UNTIL JS INITIALIZES
34379915	EMAIL TEMPLATES ARE NOT COPIED WHEN REFERENCING AUTOMATION OR PAGE PROCESS IS COPIED TO OTHER APP
34401404	USING FACETED SEARCH WITH MAP COMPONENT RAISES RUNTIME ERROR WHEN NO QUERY AT REGION LEVEL
34418790	INTERACTIVE GRID SELECTION AFTER SAVE INCORRECT IN SOME CASES
34425530	APPLICATION "4000" PAGE "1207" NOT FOUND WHEN CREATING A THEME FROM THE REPOSITORY
34429821	COPY SHARED COMPONENT CODE: IMPROVE COPY REST SOURCE PARAMETERS LOGIC
34447119	GETTING ERRORS WHEN TEMPLATE NAME ALREADY EXISTS FOR THE THEME
34457484	CREATING REST SOURCES FROM REST CATALOG GENERATES INVALID WEB CREDENTIAL
34460675	NON-ENGLISH BUILDER SESSION THROWS ORA-2047 FOR PAGES USING DBLINK WHEN RENDERING DEVELOPER TOOLBAR
34470960	PAGE DESIGNER TREE NODE LOSES SERVER SIDE CONDITION STYLING WHEN MOVED
34471057	EMBEDDED CODE UTILITY FAILS W/ ORA-6502 FOR REPORT QUERY OVER 1000 CHARS
34475959	PAGE LOAD API APEX.PWA.CLEANUP IS INVASIVE TO CUSTOM SERVICE WORKERS
34485827	MASTER DETAIL INTERACTIVE GRID - LAZY LOAD - RESET REGION NOT WORKING
34510738	INTERACTIVE GRID MASTER DETAIL DOES NOT REFRESH DETAIL WHEN MASTER REPORT CHANGES

Table 10-1   (Cont.) Fixed Bugs in Oracle APEX 22.2

Bug Number	Description
34518378	COPY PAGE DOESN'T COPY HUMAN TASK PROCESSES PARAMETERS
34529179	APEX COMPONENTS (CARD REGION, INTERACTIVE REPORT, DISPLAY IMAGE ITEM) DO NOT LAZY LOAD IMAGES LEADING TO PERFORMANCE ISSUES
34533953	PAGE DESIGNER: COLUMN QUICK PICK IN HTML EXPRESSIONS SHOULD APPEND AND NOT REPLACE
34534485	APPLICATION EXPORT FAILS WHEN USING SWITZERLAND NLS TERRITORY SETTING
34538449	SERVICE WORKER ITEM-LEVEL HELP TEXT TOO LONG
34542636	ROW HIGHLIGHTS MISSING IN INTERACTIVE REPORT DOWNLOADS WHEN COLUMN IS EXCLUDED
34549822	UNABLE TO REFRESH THEME FROM SHARED COMPONENT PAGE
34554254	EDIT LOV ON REST SOURCE: ENABLING POST PROCESSING POPULATES QUERY, BUT COLUMN SELECT LISTS ARE EMPTY
34560184	APEX UPGRADE RUNS INTO DBA_REGISTRY FK ERROR (SYS.REGISTRY_PROGRESS_FK)
34560360	PWA MANIFEST UNABLE TO LOAD DUE TO CORS 401 UNAUTHORIZED RESOURCES
34569916	INTERACTIVE REPORT CHART ON PAGINATED REST SOURCE DOES NOT CORRECTLY FETCH ALL ROWS
34570863	JET CHARTS DO NOT RESPECT EXTERNAL FILTER AND ORDER BY FOR REST SOURCES
34571670	CARDS REGION ONLY SUPPORTS ONE FULL CARD ACTION
34575387	PAGE DESIGNER: JS ERROR WHEN OPENING CONDITION ITEM LOV IN PROPERTY EDITOR FOR CARDS ACTIONS
34594066	XLSX EXPORT: ERROR WHEN TABLE NAME STARTS WITH A NUMBER
34594885	REST SOURCE DISCOVERY DOES NOT PASS "SCOPE" ARGUMENT WHEN USING EXISTING WEB CREDENTIAL
34597724	XLSX EXPORT: ERROR WHEN DUPLICATE COLUMN HEADINGS ARE USED
34633052	TEST REST ENABLED SQL THROWS ERRORS IN CHINESE ENVIRONMENTS

11

Open Bugs and Known Issues

This section describes bugs and known issues for Oracle APEX release 22.2.

> 💡 **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-222-known-issues.html

- Known Issue with Confirm or Alert Dynamic Action Messages When Upgrading
- Known Issue using 'Source Display' region type plug-in in previously installed Sample Apps
- Known Issues for jQuery Upgrade
- Interactive Grid support for REST Enabled SQL
- Group By Component Type mode prevents Default View
- Known Issues for Data Generator
- Known Issue Using Readable Export Format

11.1 Known Issue with Confirm or Alert Dynamic Action Messages When Upgrading

Issue

When upgrading from APEX 21.2 or earlier, the text in existing Confirm or Alert dynamic action messages may be truncated if it is too long, leading to data loss. This is due to APEX HTML-escaping messages, which may increase their size past the 4000-byte limit.

Resolution

Prior to upgrading, run a query to check whether any messages are affected:

```
select *
    from apex_application_page_da_acts
where action_name in ('Alert', 'Confirm')
    and ( lengthb( attribute_01 )
        + ( 4 * nvl( regexp_count( attribute_01, '&|"|<|>' ), 0 ) )
        ) > 4000;
```

If the query does not return any rows, proceed with the upgrade.

If the query does return rows, convert the affected rows into application text messages and reference them with substitution syntax before proceeding with the upgrade.

11.2 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**.

11.3 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/

11.4 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.

11.5 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.

11.6 Known Issues for Data Generator

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.

11.7 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.

12
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.

13

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

- Spatial Map Region - Session storage keys used on the map component:

  - `ORA_WWV_apex.spatialMap.application id.page.region id.zoomState` - Stores the current zoom level on the map

  - `ORA_WWV_apex.spatialMap.application id.page.region id.lngState` - Stores the current longitude on map

  - `ORA_WWV_apex.spatialMap.application id.page.region id.latState` - Stores the current latitude on map

  - `ORA_WWV_apex.spatialMap.application id.page.region id.bearingState` - Stores the current tilt in degrees on the map

  - `ORA_WWV_apex.spatialMap.application id.page.region id.pitchState` - Stores current direction user is facing measured clockwise as an angle on the map

- `ORA_WWV_apex.facets.application id.page.region id.clientSideFiltering` - Stores the facets where the user has enabled or disabled on client-side filtering.

- `ORA_WWV_apex.facets.application id.page.region id.hiddenFacets` - Stores the facets where the user has set Visibility to `Off`.

- `ORA_WWV_apex.facets.application id.page.region id.chartConfig` - Stores the configuration for the facet charts.

- `ORA_WWV_apex.facets.application id.page.region id.openCharts` - Stores the facet charts that have been opened.

- `ORA_WWV_apex.facets.application id.page.region id.facetCollapsedState` - Stores the facet-collapsible state.

- `ORA_WWV_apex.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.

- `ORA_WWV_apex.builder.pageDesigner.`*`application id`*`.(`*`current tab id`*`)` - This stores the current tab in each of the tab sets of Page Designer.

- `ORA_WWV_apex.core.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.

- `ORA_WWV_apex.apexTabs.`*`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.

- `ORA_WWV_apex.toggleCore.*.`*`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.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*.