

Oracle® APEX

Release Notes



Release 24.1
F90748-01
June 2024



Oracle APEX Release Notes, Release 24.1

F90748-01

Copyright © 2003, 2024, Oracle and/or its affiliates.

Primary Author: CM Dietrich

Contributing Authors: John Godfrey, Terri Jennings

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

If this is software, software documentation, data (as defined in the Federal Acquisition Regulation), or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software," "commercial computer software documentation," or "limited rights data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Oracle®, Java, MySQL, and NetSuite are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Contents

1 About These Release Notes

1.1	Before You Begin	1-1
1.1.1	Oracle Database Requirements	1-1
1.1.2	Browser Requirements	1-1
1.1.3	Web Server Requirements	1-2
1.1.4	About Release Numbering Conventions	1-2
1.1.5	About Checking for the Most Current Release	1-2
1.1.6	About Upgrading to the Latest Oracle APEX Release	1-2
1.1.6.1	About Upgrading to the Latest Version of Universal Theme	1-2
1.1.7	About Determining Your Release Version	1-3
1.1.8	Important Information if Updating from a Release Prior to 24.1	1-3

2 New Features

2.1	Generative AI Support	2-2
2.2	Document Generator Service Integration	2-2
2.3	New Select One and Select Many Item Types	2-3
2.4	Template Component Enhancements	2-3
2.5	Component Groups	2-4
2.6	Unlimited Attributes for Regions	2-4
2.7	Workflow Enhancements	2-7
2.8	Human Task Enhancements	2-7
2.9	Application Working Copy Enhancements	2-8
2.10	Accessibility Improvements	2-8
2.11	Built-In Oracle Text Search Functions	2-9
2.12	Multi-Value Item Type JSON and Custom Separator Support	2-9
2.13	Date Picker Support in Faceted Search and Smart Filters	2-9
2.14	Declarative BLOB/CLOB File Download Support	2-9
2.15	Multi-Domain Support for SAML Authentication	2-9
2.16	App and Page Database Object Dependencies API	2-10
2.17	Builder Extensions Enhancements	2-10
2.18	Improved Shared Component Subscriptions	2-10
2.19	App Builder Enhancements	2-11
2.20	Server Side Geocoding	2-11

2.21	Hierarchical JSON Support for REST Sources	2-11
2.22	Improvements to REST Source Infrastructure	2-11
2.23	Support for Database Credentials	2-12
2.24	Readable Export Enhancements	2-12
2.25	Universal Theme Enhancements	2-12
2.26	Dynamic Action Enhancements	2-13
2.27	Translation of Runtime Messages into Ukrainian and Vietnamese	2-13
2.28	Define Maximum Emails Processed	2-13
2.29	Alternative Labels for Interactive Reports	2-14
2.30	Unified Privilege Management	2-14
2.31	Automatic Dismissal of Success Messages	2-14
2.32	PL/SQL API Updates	2-14
2.33	JavaScript API Updates	2-15
2.34	JavaScript Library Upgrades	2-17

3 Changed Behavior

3.1	Workspace URL Updated	3-1
3.2	App Builder UI Changes	3-1
3.3	Interactive Grid Selection Changes	3-2
3.4	Export File Changes	3-2
3.5	PDF Export Changes	3-3
3.6	Changes to Public Dictionary Views	3-3
3.7	Changes to onclick	3-3
3.8	APEX_EXPORT.GET_APPLICATION Changes	3-3
3.9	JET Chart Changes	3-4
3.10	Shared Component Unique Names	3-4
3.11	Compatibility Mode	3-4
3.12	Enabling Network Services in Oracle Database	3-7
3.12.1	When and Why Network Services Must be Enabled	3-7
3.12.2	Granting Connect Privileges	3-8
3.12.3	Troubleshooting an Invalid ACL Error	3-9

4 Ideas App Implementations

5 Deprecated Features

5.1	Deprecated APIs	5-1
5.2	Deprecated Dynamic Action Event	5-1
5.3	Deprecated Plug-In Attribute	5-1

5.4	Number Field Substitutions	5-1
-----	----------------------------	-----

6 Deprecated in Previous Releases

6.1	Quick SQL Deprecated Functionality	6-1
6.2	CKEditor5 Deprecated	6-2
6.3	Deprecated Object Browser Features	6-2
6.4	Preventing Double Escaping of LOV Display Values	6-2
6.5	Display Only Item with Format HTML (Unsafe) Deprecated	6-3
6.6	Deprecated Functions and Procedures	6-3
6.7	Deprecated APEX Item Markup	6-3
6.8	Deprecated jQuery Date Picker	6-4
6.9	Previously Deprecated APIs	6-4
6.10	Deprecated Legacy Web Service References	6-4
6.11	jQuery UI Deprecated	6-4

7 Desupported Features

7.1	Removed JSON Application Export	7-1
-----	---------------------------------	-----

8 Desupported in Previous Releases

8.1	Desupported Utilities	8-2
8.2	Querying Template Component Metadata	8-2
8.3	Desupported Query Builder	8-2
8.4	Desupported User Interfaces Removed	8-2
8.5	Desupported JET Date Picker Item Type Migrated	8-3
8.6	DOM Object Desupported	8-3
8.7	Legacy Bulk Utilities Desupported	8-3
8.8	Desupported Attributes in App Builder	8-4
8.9	Desupported Properties	8-4
8.10	Desupported View Columns	8-4
8.11	FullCalendar 3 Desupported	8-4
8.12	App Builder Defaults Desupported	8-5
8.13	Copying Legacy Themes Desupported	8-5
8.14	CKEditor4 Desupported	8-5
8.15	Desupported Public Package APIs	8-5
8.16	Desupported Page Positions	8-5
8.17	Desupported Region Positions	8-6
8.18	Custom Page Region Templates with Duplicated Positions Desupported	8-6
8.19	Legacy Substitution Strings Desupported	8-6
8.20	Desupported JavaScript Functions	8-7

8.21	Post Calculation for Page Items Desupported	8-7
8.22	Show / Hide All Page Items On Same Line Attributes Desupported	8-7
8.23	apex.server Plug-in and Process Function Async Option Desupported	8-7
8.24	apex.widget.initPageItem Function Desupported	8-7
8.25	Popup LOV Template Desupported	8-7
8.26	Based On - Output of PL/SQL Code attribute Desupported	8-7
8.27	Syntax {COLUMN_NAME}_LABEL in Interactive Grid Icon and Detail Views Desupported	8-8
8.28	Removed Content Delivery Network	8-8
8.29	APEX-Based REST Services Desupported	8-8

9 Fixed Bugs

10 Open Bugs and Known Issues

10.1	Known Issue with ORDS 24.1 and APEX SQL Developer Web	10-1
10.2	Known Issue for Sublists	10-2
10.3	Known Issues for Working Copy Feature	10-2
10.4	Known Issues for Workflow Component	10-2
10.5	Known Issue with Confirm or Alert Dynamic Action Messages When Upgrading	10-2
10.6	Known Issue using 'Source Display' region type plug-in in previously installed Sample Apps	10-3
10.7	Known Issues for jQuery Upgrade	10-4
10.8	Interactive Grid support for REST Enabled SQL	10-4
10.9	Group By Component Type mode prevents Default View	10-4
10.10	Known Issues for Data Generator	10-4

11 Documentation Accessibility

12 Privacy Notice

Index

1

About These Release Notes

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

- [Before You Begin](#)

1.1 Before You Begin

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

- [Oracle Database Requirements](#)
- [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.
- [Web Server Requirements](#)
Oracle APEX requires Oracle REST Data Services (ORDS) 20.x or later. The use of Quick SQL requires Oracle REST Data Services (ORDS) 23.3 or later.
- [About Release Numbering Conventions](#)
New releases of Oracle APEX correlate to the calendar year.
- [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 24.1](#)

1.1.1 Oracle Database Requirements

Oracle APEX release 24.1 requires an Oracle Database release 19c or later. APEX runs on all database editions, including Enterprise Edition (EE), Standard Edition (SE) and Database 23ai Free. APEX can be installed in single-instance database and in Oracle Real Application Clusters (Oracle RAC) database.



See Also:

Oracle APEX Installation Requirements in *Oracle APEX Installation Guide*

1.1.2 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.

1.1.3 Web Server Requirements

Oracle APEX requires Oracle REST Data Services (ORDS) 20.x or later. The use of Quick SQL requires Oracle REST Data Services (ORDS) 23.3 or later.

Oracle REST Data Services (ORDS) is Java-based web server. Oracle REST Data Services features the ability to emit RESTful web services, offers improved file upload capability, and is certified with Oracle WebLogic Server and Apache Tomcat.

Tip:

APEX-based REST Services were desupported in release 22.1. Oracle REST Data Services (ORDS) release 21.4.2 and newer now ship 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](#).

1.1.4 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 24.1 Known Issues](#) page or the [Prior Release Archives](#) for earlier releases.

1.1.5 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>

1.1.6 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 Upgrading to the Latest Version of Universal Theme](#)

1.1.6.1 About Upgrading to the Latest Version of Universal Theme

APEX supports the current and prior APEX version of Universal Theme for each release. For example, APEX 24.1 supports Universal Theme 24.1 and 23.2.

It is highly recommended users refresh Universal Theme within their applications after each APEX release. While refreshing Universal Theme is not mandatory and your application will continue to work, older versions of Universal Theme do not have support for new features or bug fixes introduced in subsequent APEX releases. Therefore, it is important to refresh your theme regularly so your applications are on the latest (or one version prior) release of Universal Theme and remain supported.

Universal Theme moved to CSS variables in APEX 21.1. This means refreshing Universal Theme is easier to customize and manage. For more on refreshing Universal Theme, see Refreshing the Universal Theme in *Oracle APEX App Builder User's Guide* and the [Migration Guides](#) on the Oracle APEX Universal Theme app.

For the Universal Theme [Change Log](#), see the Oracle APEX Universal Theme app.

1.1.7 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*

1.1.8 Important Information if Updating from a Release Prior to 24.1

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 23.2](#)
- [Oracle APEX Release Notes release 23.1](#)
- [Oracle APEX Release Notes release 22.2](#)
- [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

New Features

Oracle APEX release 24.1 includes a number of new features. These new features are not present in APEX release 23.2 and earlier releases.

- [Generative AI Support](#)
- [Document Generator Service Integration](#)
- [New Select One and Select Many Item Types](#)
- [Template Component Enhancements](#)
- [Component Groups](#)
- [Unlimited Attributes for Regions](#)
- [Workflow Enhancements](#)
- [Human Task Enhancements](#)
- [Application Working Copy Enhancements](#)
- [Accessibility Improvements](#)
- [Built-In Oracle Text Search Functions](#)
- [Multi-Value Item Type JSON and Custom Separator Support](#)
- [Date Picker Support in Faceted Search and Smart Filters](#)
- [Declarative BLOB/CLOB File Download Support](#)
- [Multi-Domain Support for SAML Authentication](#)
- [App and Page Database Object Dependencies API](#)
- [Builder Extensions Enhancements](#)
- [Improved Shared Component Subscriptions](#)
- [App Builder Enhancements](#)
- [Server Side Geocoding](#)
- [Hierarchical JSON Support for REST Sources](#)
- [Improvements to REST Source Infrastructure](#)
- [Support for Database Credentials](#)
- [Readable Export Enhancements](#)
- [Universal Theme Enhancements](#)
- [Dynamic Action Enhancements](#)
- [Translation of Runtime Messages into Ukrainian and Vietnamese](#)
- [Define Maximum Emails Processed](#)
- [Alternative Labels for Interactive Reports](#)
- [Unified Privilege Management](#)
- [Automatic Dismissal of Success Messages](#)

- [PL/SQL API Updates](#)
- [JavaScript API Updates](#)
- [JavaScript Library Upgrades](#)

2.1 Generative AI Support

Tip:

For legal terms, see Generative AI Services in *Oracle APEX Licensing Information User Manual*.

Generative AI

You can now add **Generative AI** to APEX. Generative AI is configured on the APEX instance level, with further configuration available on the APEX workspace level. APEX supports the following providers:

- Open AI
- Cohere
- OCI Generative AI

Once generative AI is enabled for your workspace, include AI in your applications by creating a dynamic action that opens the AI Assistant.

For more information on configuring generative AI, see *Managing Generative AI in APEX in Oracle APEX App Builder User's Guide*.

AI Chat Widget

Use the new **Chat Widget**, comprising a text area and a message area, to provide a chat-like experience with a Generative AI Service. Configure the **System Prompt** to give the AI context to request user input. You can also customize the **Welcome Message** that the AI Assistant displays to users.

Create App Using Generative AI

Create a new APEX Application using natural language from the Generative AI chat prompt. To use this option, configure a generative AI service in Workspace Utilities, and enable the **Used by App Builder** attribute.

AI Code Editor

The **APEX Assistant** is now integrated directly into code editors within the APEX Builder. To use the AI Chat widget in code editors, configure a generative AI service in Workspace Utilities and enable the **Use in App Builder** attribute.

The new AI button is available in the editor toolbar, and allows users to seamlessly access the AI Chat widget from inside any code editor.

2.2 Document Generator Service Integration

The **Document Generator Service** in OCI is now integrated into APEX as a new remote print server type. You can develop your printing templates in Microsoft Word, and the PDF engine combines your template and your app data to render the final output.

With Document Generator, you can:

- configure Document Generator Object Storage Buckets
- use report queries and report layouts to generate documents
- enable document generator report layouts for classic reports and interactive reports
- use the new page process type **Print Report** to use a report query as a data source instead of a report region

To use the Document Generator Service, your APEX instance must run off a database with `DBMS_CLOUD` installed. You configure the Document Generator Function through the OCI Pre-Built Functions page.

 **Tip:**

For more information on configuring report printing, see About Configuring Report Printing in *Oracle APEX Administration Guide*.

For more information on configuring the `DBMS_CLOUD` credential, see Understanding Web Credentials in *Oracle APEX App Builder User's Guide*.

For more information on configuring **Document Generator** as a Remote Print Server, see [Document Generator Function](#) in *Oracle Cloud Infrastructure Documentation*.

2.3 New Select One and Select Many Item Types

The new LOV-based item types, **Select One** and **Select Many**, only allow entries included on the data set, similar to select lists. These item types support:

- custom HTML for choices with Template Directives
- Icons
- Groups
- multi-column search and display

Select Many also supports:

- showing chips as a delimited list when the focus is not on the Select Many item
- JSON session state
- multi-select where the user can select more than one option and the dropdown remains open

2.4 Template Component Enhancements

Slots for Template Components

Previously known as **Display Points**, and then renamed to **Positions**, these placements are now known as **Slots**. APEX has always allowed developers to place regions, items, and buttons inside page positions and region positions. With this release, developers can now place regions, items, and buttons into **Page Slots**, **Region Slots**, or **Template Component Slots**.

You can define slots on the Template Component Edit page. Template component slots allow nesting for multiple components, which is essential for creating advanced template

components using layered UI designs. You can also limit what type of components are allowed in a template component slot, creating strong template guardrails for consistent appearance.

Declarative Selection Support for Template Component Reports

This feature enables selection support for Template Component Reports. Template components now support single and multiple selection as well as standard keyboard shortcuts for focus navigation and selection. A new attribute, **Current Selection Page Item**, puts the values of the selected row(s) into a page item for processing on the server. For multiple selection, use the new **Select All Page Item** attribute to select all items.

Template authors can use the new placeholder `APEX$SELECTOR` to add a checkbox or radio selector to rows.

Template Components without Data Source - Static Values

You can now create a template component without an attached data source. Instead, you provide settings for static values, include item or value substitutions.

Template Component Rendering

The performance for template component rendering is now improved.

New `#APEX$DOM_ID#` Placeholder for Template Component and Template Directive Execution

A new placeholder, `#APEX$DOM_ID#`, is available for every Template Component and Template Directive execution. This placeholder provides a unique random DOM ID, facilitating the seamless usage of dynamic DOM IDs within Template Directives.

Example 2-1 `#APEX$DOM_ID#` Usage

```
<h1 id="#APEX$DOM_ID#_heading">#HEADING#</h1><someelement aria-  
labelledby="#APEX$DOM_ID#_heading">
```

2.5 Component Groups

A **Component Group** is a collection of other shared components. Create a component group to manage a set of shared components that are all related to a specific functionality or requirement within your application. Component groups make it easy to copy, subscribe to, or refresh all components in the group with a single action.

All shared components that support subscription can be added to a component group with the exception of themes and templates, which are currently not supported.

2.6 Unlimited Attributes for Regions

In 23.2, the custom attribute limit for Template Components was lifted. In this release, this is extended to Region Plug-ins. New region plug-ins leverage the new infrastructure out of the box, including the new **Attributes** construct, which is available for `t_plugin` in order to read application-scope attributes. If your region plug-in has columns, `t_region_column` is available as well.

For existing plug-ins to benefit, developers need to make a few changes to their plug-ins.

Updating Existing Plug-Ins

To edit an existing plug-in:

1. Edit the region plug-in and change the **API Interface** attribute to Procedure.

Note:

The **Substitute Attribute Values** switch is now deprecated. When you move to the Procedure interface, this switch disappears. To perform substitutions on the attribute value, use `apex_plugin_util.replace_substitutions`.

2. Change the signature of the render and ajax functions as below:

```

-- old
function render (
    p_plugin          in apex_plugin.t_plugin,
    p_region          in apex_plugin.t_region,
    p_is_printer_friendly in boolean )
    return t_dynamic_action_render_result

-- new
procedure render (
    p_plugin in          apex_plugin.t_plugin,
    p_region in          apex_plugin.t_region,
    p_param in          apex_plugin.t_region_render_param,
    p_result in out nocopy apex_plugin.t_region_render_result )

-- Note that p_is_printer_friendly is now available under
p_param.is_printer_friendly

-- old
function ajax (
    p_region in apex_plugin.t_region,
    p_plugin in apex_plugin.t_plugin )
    return apex_plugin.t_region_ajax_result

-- new
procedure ajax (
    p_plugin in          apex_plugin.t_plugin,
    p_region in          apex_plugin.t_region,
    p_param in          apex_plugin.t_region_ajax_param,
    p_result in out nocopy apex_plugin.t_region_ajax_result )

```

Note:

You no longer need to return a dummy `p_result`, further simplifying your code.

3. Update the reading of your custom attributes as follows:

```

-- old
l_my_attribute varchar2(32767) := p_region.attribute_01;

```

```
-- new
l_my_attribute varchar2(32767) :=
p_region.attributes.get_varchar2( 'attribute_01'
    );
```

 **Note:**

The new `get_varchar2` function takes the **Static ID** of the custom attribute as a parameter.

Upgrading to APEX 24.1

When upgrading to APEX 24.1, custom attributes are migrated to receive the new Static ID. An attribute with sequence 1 gets the ID `attribute_01`, attribute 2 gets ID `attribute_02`, and so on. This should simplify the migration of your code. For new attributes that you create after the move to 24.1, you can use whatever Static ID you wish.

 **Note:**

Oracle recommends keeping the Static ID short, lowercase, and descriptive of its purpose. For example, `css_classes`, `page_item_name`, or `plsql_code`.

Changes to Public Dictionary Views

To accommodate the extra attributes, public views have changed:

- Querying region plug-in attributes is now done by reading the JSON attributes column. Make sure to alias the view in order to leverage the friendlier **JSON dot notation**.

```
select r.attributes.my_static_id
       from apex_application_page_regions r
       where ...
```

- The `attribute_01...25` columns are now obsolete and return null.
- Reading application-scope and region column attributes is now done by reading the JSON attributes column.

```
select s.attributes.my_static_id
       from apex_appl_plugin_settings s
       where ...
```

```
select c.attributes.my_static_id
       from apex_application_page_reg_cols c
       where ...
```


2.7 Workflow Enhancements

Workflow Diagram Region

The **Workflow Diagram** is a new region that displays a visual representation of the selected workflow instance. The region highlights the nodes and links the instance has passed through, giving users a clear understanding of the workflow route. The region is read-only.

Archive Purge Enhancements

Purgeable workflows and tasks are now visible with the following views:

- Workflows:
 - `APEX_PURGEABLE_WORKFLOWS` for workflow instances
 - `APEX_PURGEABLE_WF_ACTIVITIES`, for workflow activity instances
 - `APEX_PURGEABLE_WF_VARIABLES`, for workflow variable values
 - `APEX_PURGEABLE_WF_PARTICIPANT`, for workflow participant values
 - `APEX_PURGEABLE_WF_AUDIT`, for the workflow audit log
- Tasks:
 - `APEX_PURGEABLE_TASKS`, for task instances
 - `APEX_PURGEABLE_TASK_HISTORY`, for operations performed during the lifecycle of a task
 - `APEX_PURGEABLE_TASK_COMMENTS`, for comments on a task instance
 - `APEX_PURGEABLE_TASK_PARAMETERS`, for task parameters and parameter runtime values

In addition to the new views, the `APEX_APPROVAL` and `APEX_WORKFLOW` APIs now contain a `get_next_purge_timestamp` function to retrieve the timestamp of the next purge run.

Termination Function for Asynchronous Activity Plugins

You can now specify a termination function for custom process type plugins used as activities. The termination function executes when the workflow instance is terminated.

New Workflow Dashboards Page

When creating the Workflow Console page, you now have the option to create a Workflow Dashboards page. The workflow dashboards page shows analytics for all workflows in a given report context, including workflows by state, active workflows, faulted workflows, and average completion time of workflows.

Workflow Instance ID Available for Debug Messages

You can now expose the workflow instance ID in debug messages. This allows you to determine which workflow instance corresponds to a particular debug message.

2.8 Human Task Enhancements

Approvals Component: Allow Initiator to Approve or Reject Tasks

The new **Initiator Can Complete** option allows approval task initiators to complete approval tasks. This option is available as a switch in the task definition editor and as a select list with

entries `Yes` and `No` in the Human Task - Create Page process in Page Designer and Workflow Designer. The default behavior for the switch in the task definition editor is `Off`. In the Human Task - Create Page process, the **Initiator Can Complete** select list is unselected by default.

Vacation Rules for Tasks

You can now use a procedure to define vacation rules for tasks, allowing substitution of task participants during runtime. You can add a vacation rule at the task definition level for that specific task definition, or at the application definition level for all task definitions in that application.

APEX evaluates vacation rule procedures when creating a new instance of a task and when the task instance is delegated.

2.9 Application Working Copy Enhancements

APEX 23.2 introduced Application Working Copies. The working copies features set is enhanced with APEX 24.1 to include the following changes:

- a visual indicator in Page Designer shows when a page is changed or locked in another copy of the application
- you are now notified when on the Main application
- the **Compare Page with Main** utility is now available in Page Designer
- a new report indicates which working copy a page is modified or locked in and provides the option to view the diff between the working copy and Main
- the YAML diff editor now shows the last updated date
- the 40-byte limit on the working copy name is now increased

2.10 Accessibility Improvements

New Accessibility Help Text in Page Designer

Accessibility help text is now incorporated into key attributes within Page Designer Help. This provides developers with clear and actionable guidance for creating more accessible APEX apps. The accessibility help text covers crucial accessibility aspects including alt text, color contrast, row headers for reports, labels, descriptions, and other important features.

Including accessibility-focused help text directly in Page Designer simplifies the accessibility process and underscores the importance of these attributes. The provided guidance includes best practices and recommendations, ensuring developers have practical support for crafting inclusive applications. For instance, the help text for **Landmark Label** now includes guidance on defining a good label, including label length and purpose.

The accessibility help text serves as a consistent reminder for developers to prioritize crafting inclusive applications to ensure greater accessibility for all users.

Development Environment Improvements

This release includes multiple accessibility improvements to core functionality in APEX, including:

- improved region landmarks
- improved region headings
- appropriate row header columns for all report regions

- improved page titles

Item Read-Only Handling

A new switch is available when editing the Application Definition: **Accessible Read-Only Items**. When toggled on, APEX renders the elements as `readonly` input or `textarea` elements, rather than legacy SPAN-based elements. These elements are now focusable and more easily discoverable for screen reader users.

This attribute is set to **Off** for backwards compatibility, and to **On** for new applications so new applications get the improved accessibility support out of the box.

2.11 Built-In Oracle Text Search Functions

APEX_SEARCH is now extended with two Oracle Text Query functions, **Search Engine** and **Expert Search**. These functions enable advanced full text search features including fuzzy searching and proximity search. You can access these functions programmatically with APEX_SEARCH.QUERY_SEARCH_ENGINE and APEX_SEARCH.QUERY_EXPERT_SEARCH.

For more information, see Editing a Search Configuration in *Oracle APEX App Builder User's Guide* or APEX_SEARCH in *Oracle APEX API Reference*.

2.12 Multi-Value Item Type JSON and Custom Separator Support

Multi-value item types now support JSON or custom separators for session state value. The Shuttle, Select Many, Select List, Combobox, List Manager, and Popup LOV now support a custom separator character for delimited list string values or a JSON array value. Plug-in developers can add the same functionality to their own multi-value item plug-ins.

2.13 Date Picker Support in Faceted Search and Smart Filters

APEX now has Date Picker support for Input Facets and Manual Range Inputs for Faceted Search and Smart Filters regions. You can also set and use your own format mask for date representation.

2.14 Declarative BLOB/CLOB File Download Support

APEX now supports BLOB and CLOB file downloads. The new **Download** Dynamic Action and new **Download** process type mean you can now download multiple files as a zip archive. This supports CLOB and VARCHAR2 data types as file content. You can also show the file as an attachment, prompting the user to download the file or show the file inline, inside the browser.

2.15 Multi-Domain Support for SAML Authentication

APEX now supports the "AssertionConsumerServiceIndex" attribute in SAML authentications. Administrators can configure SAML callbacks for multiple domains. See **Supported Callback URLs** in the Instance Administration settings under Security, SAML Authentication, or Configuring SAML Sign-In in *Oracle APEX Administration Guide*.

2.16 App and Page Database Object Dependencies API

You can now analyze and report on APEX table references, table dependencies, and table and database object references by page and application using the new API

`APEX_APP_OBJECT_DEPENDENCY`.

2.17 Builder Extensions Enhancements

If your workspace is configured to host extensions, you can now invoke APEX applications from that workspace and use them in other workspaces on the same instance. If read access is granted by the invoking workspace, you can also access the application metadata (views) of the invoking workspace.

Other enhancements include:

- a new Builder Extension Sign-in Authentication Scheme that allows developers to open the extension app from an APEX session without having to sign-in with username/password.
- the option to publish Extension apps using the Extension Menu
- subscription updates so workspaces can subscribe to Extension Menus from Extension Workspaces and invoke the published Extensions
- a new API package, `APEX_EXTENSION.SET_WORKSPACE`, that allows accessing repository data of workspaces that have granted read access to an Extension workspace in Automations or PL/SQL in APEX session context

For more information, see *Managing Links on the Extension Menu* in *Oracle APEX Administration Guide* and *Builder Extension Sign-in* in *Oracle APEX App Builder User's Guide*.

2.18 Improved Shared Component Subscriptions

APEX 23.2 added a few new features to the subscription functionality. These features included read-only behavior for subscribed components, automatic dependency resolution, a subscription status column, and an option for bulk refresh. These new features are now available for the following shared components:

- Lists
- Data Load Definitions
- REST Data Sources
- Authentication Schemes
- Authorization Schemes
- Lists of Values
- Plug-Ins
- Shortcuts
- Search Configurations
- Data Profiles

**Note:**

After upgrading to APEX 24.1, the **Subscription Status** for the subscribed shared components will display as "Could not determine, needs refresh". To change the status to "Up to date", either publish or refresh the shared component.

2.19 App Builder Enhancements

Spotlight Search Enhancements

Spotlight Search is enhanced. Displaying the search results has never been faster thanks to fuzzy search. Results are now neatly organized into categories, making them much easier to find, and APEX now highlights search terms with the matches of your search to improve visibility.

Component Export Across Different Workspace and Applications

Component import now introduces support for importing and exporting components into different workspace or applications. Previously, this was only possible to do from the command line. For more information, see Importing a Component Export in *Oracle APEX App Builder User's Guide*.

2.20 Server Side Geocoding

A new process type, **Server Side Geocoding**, is available on Oracle APEX Autonomous Database instances. This allows users to turn a postal address to a coordinate on the server independently from the UI. **Server Side Geocoding** is supported for Page Processes, Automation Actions, Task Definition Actions, and Workflow Activities.

2.21 Hierarchical JSON Support for REST Sources

This release introduces support for hierarchical REST Source Data Profiles. APEX components can now consume data from REST Sources on every hierarchy level, and are no longer limited to REST APIs that return "flat" JSON responses. Array Columns and Hierarchies are also supported in REST Source Catalog. This feature adds **Array Columns**, which allow the REST Source data profile to represent the hierarchy of the JSON response. APEX components that use REST Sources (including reports, charts, and forms) also specify the Array Column in order to work with data on the requested hierarchy level.

Use the `APEX_EXEC` PL/SQL API to support building DML requests with Array Columns and programmatically fetch hierarchical data from REST Sources.

2.22 Improvements to REST Source Infrastructure

A new **Is Common** attribute is available in the Data Profile column definitions, which allows the Create Page Wizard to focus on the important attributes when creating new pages.

A Detail Interactive Grid built on top of a REST Data Source can use the new **Parent Column** parameter type to use a primary key value of the parent grid as the value for a REST Source parameter.

2.23 Support for Database Credentials

Web credentials can now reference a database credential to store the Client ID and Client Secret. The web credential type must be **Basic Authentication** or **OAuth2 Client Credentials**. This feature is only available on Oracle Database 23ai or Autonomous Database release 19c or later.

The database credential is completely maintained by the database, and APEX does not have access to the stored secrets. For more information, see Using a Database Credential with Web Credentials in *Oracle APEX App Builder User's Guide*.

2.24 Readable Export Enhancements

Application Export has a readable/diffable version in YAML format. With APEX 24.1, this export is extended to include multiple enhancements.

Export Individual Pages in Readable Format

Pages can now be exported in readable YAML format through the **Export Page** option in App Builder, or through sqlcl/command line. You can use this method to compare different versions of a page in a readable format.

Improvements for Better Diff Analysis

Exporting in readable format now defaults **Original IDs** to **YES**. This ensures that the primary key (ID) values of components keep their original value, and don't show up as a diff when comparing different versions.

Application-Level Readable Export

You can configure the application to only allow readable exports by setting the **Readable Format** switch to **On**.

Include Audit Information in Readable Exports

You can now optionally include audit information in export files, including the date the export was made and the name of the user doing the export.

2.25 Universal Theme Enhancements

Improved Content-Security-Policy for Universal Theme

Universal Theme 24.1 includes the following improvements to better support Content-Security-Policy:

- adds `.a-Error-back.js` handler for error page templates
- removes inline event handlers
- adds `#APEX_CSP_NONCE_ATTRIBUTE#` on script tags where necessary
- removes `PopupLOV onload="first_field()"` and uses native autofocus instead
- adds support for `#APEX_CSP_DISPLAY_NONE#` substitution string to use `style=display:none;`
- adds reference to `#APEX_CSP_DISPLAY_NONE#` in eight templates

- adds support for #ONCLICK# substitution string on in button templates
- moves inline JavaScript click event handlers on buttons (**onclick** attribute) to page-level script event registration

 **Caution:**

This change removes the **onclick** attribute from buttons starting in Universal Theme 24.1. For more information, see [Changes to onclick](#).

Redwood Light Enhancements

This release includes minor UI enhancements for Avatars, Badges, Combobox and LOV chips File Drop Train (Wizard), Input focus styles, Interactive Grid and Interactive Report filters and chips, and Page headers.

2.26 Dynamic Action Enhancements

New "Input" Dynamic Actions Event

The browser event **Input** is now available when configuring a Dynamic Action. The event fires every time the value of the form element changes. This is different from the **Change** event, which only fires when the value is committed--for example, by pressing the `Enter` key or selecting a value from a list of options.

The **Input** event is not fired when JavaScript changes an element's value programmatically.

New Quick Pick Options for Dynamic Actions

Execute JavaScript Code and **Execute Server-side Code** are now available from the Quick Pick options.

2.27 Translation of Runtime Messages into Ukrainian and Vietnamese

APEX now supports the translation of runtime messages into Ukrainian and Vietnamese, extending our language support to 34 languages.

APEX supports the following languages: Arabic, Brazilian Portuguese, Croatian, Czech, Danish, Dutch, Finnish, French, French - Canada, German, Greek, Hebrew, Hungarian, Icelandic, Italian, Japanese, Korean, Norwegian, Polish, Portuguese (Portugal) (pt), Romanian, Russian, Serbian - Cyrillic, Serbian - Latin, Simplified Chinese, Slovak, Slovenian, Spanish, Swedish, Thai, Traditional Chinese, Turkish, Ukrainian, and Vietnamese.

For more information, see Installing Translated Versions of APEX in *Oracle APEX Installation Guide*.

2.28 Define Maximum Emails Processed

You can now use the attribute **Maximum Emails Processed per Workspace** in Administration Services to define the number of emails messages processed from the queue per workspace during each invocation of the `ORACLE_APEX_MAIL_QUEUE` scheduler job.

2.29 Alternative Labels for Interactive Reports

Interactive reports now have a new attribute: **Heading, Alternative Label**. Use the alternative label when the heading contains extra formatting, such as HTML tags, that do not display properly. APEX uses the alternative label in dialogs and all column headings.

2.30 Unified Privilege Management

When assigning a schema to a workspace in Administration Services, there is a new switch: **Grant APEX Privileges**. When enabled, APEX grants privileges of `APEX_GRANTS_FOR_NEW_USERS_ROLE` to the schema. An equivalent parameter exists for the procedure `APEX_INSTANCE_ADMIN.ADD_SCHEMA`.

2.31 Automatic Dismissal of Success Messages

You can now set all application success messages to dismiss automatically by turning on the **Auto-Dismiss Success Messages** attribute. The attribute is located in the application's User Interface settings.

You can also control message timing and turn auto-dismiss on or off with the new `apex.message.setDismissPreferences` API.

2.32 PL/SQL API Updates

APEX_AUTOMATION

The new `TERMINATE` function terminates a currently executing automation. This deprecates the existing `ABORT` function.

APEX_EXEC

The new `DESCRIBE_QUERY` function describes columns and data types of a data source (Local, REST Source, or REST Enabled SQL).

APEX_INSTANCE_ADMIN

There are multiple changes in `APEX_INSTANCE_ADMIN`:

- adding new parameters `EXPIRE_FND_USER_ACCOUNTS`, `MAX_LOGIN_FAILURES`, and `ACCOUNT_LIFETIME_DAYS` for use with `SET_WORKSPACE_PARAMETER` and `GET_WORKSPACE_PARAMETER` to control account locking on runtime-only instances.
- adding new `p_grant_apex_privileges` parameter to the `ADD_SCHEMA` procedure when adding a workspace schema.
- adding `CREATE_OR_UPDATE_ADMIN_USER` procedure signature 2 that accepts one parameter, `p_username`. This creates an instance administration user account (for example, a user in the `INTERNAL` workspace). If the account already exists, this procedure unlocks it. This creates or updates the account with a random password, which is not needed when the builder authentication is Database Accounts.

APEX_PLUGIN_UTIL

The new `PRINT_READ_ONLY` API handles the rendering of read-only items. This new API should be used instead of the existing `apex_plug_util.print_display_only`.

2.33 JavaScript API Updates

New Interfaces, Events, Options, and Function

This release contains new interfaces, events, options, and a function:

- New interfaces:
 - `cardsRegion`
 - `templateReportRegion`
- New events in `apex` namespace:
 - `apexcurrentrowchange`
 - `apexselectionchange`
- New item interface methods:
 - `getMultiValueStorage`
 - `getSeparator`
- New options added to `apex.item.create`:
 - `storageType`
 - `separator`
- New function: `apex.message.setDismissPreferences`
- New option added to `apex.message.setThemeHooks`: `successMessageContainerSelector`

Changes and Additions Related to Selection

This release includes changes and additions related to selection in `model` interface and `tableModelViewBase`, `tableModelView`, and `grid` widgets:

- Widget `tableModelView` new options:
 - `accLabelColumn`
 - `allowCopy`
 - `clipboardValue`
 - `entityTitlePlural`
 - `entityTitleSingular`
 - `itemNavigationMode`
 - `itemSelector`
 - `loadIncompleteSelection`
 - `multiple`
 - `selectAll`

- `selectAllId`
 - `selectionStateItem`
 - `updateStatus`
- **Widget `tableModelView` new event:** `currentitemchange`
- **Widget `tableModelView` new methods:**
 - `fetchAllData`
 - `getCurrentItem`
 - `getCurrentItemValue`
 - `getSelectedValues`
 - `selectAll`
 - `setCurrentItem`
 - `setCurrentItemValue`
 - `setSelectedValues`
- **Widget `grid` new options:**
 - `constrainNavigation`
 - `entityTitlePlural`
 - `entityTitleSingular`
 - `loadIncompleteSelection`
 - `selectionStateItem`
 - `updateStatus`
- **Widget `grid` new event:** `currentcellchange`
- **Widget `grid` new methods:**
 - `fetchAllData`
 - `getColumnForCell`
 - `getCurrentCell`
 - `setCurrentCell`
- **Interface `model` new method:**
 - `getSelectionState`

Other Changes

This release includes other JavaScript API changes:

- **Date support added to `facetsRegion`.** The `dataType` property now includes "DATE", "TIMESTAMP", "TIMESTAMP WITH TIME ZONE", "TIMESTAMP WITH LOCAL TIME ZONE" and the new property `formatMask`.
- **Change to `apex.util.toArray`:** `pSeparator` arg can be an object now.

Updated Descriptions, Examples, or Typos Fixed

This release includes various updated descriptions, examples, or typos fixed in these areas:

- apex.message
- apex.page.confirm
- navigation.openInNewWindow
- apex.util.toArray
- apex.locale.toNumber
- apex.util.applyTemplate **loop directive**
- numberFieldItem
- item
- item.getValue
- tableModelViewBase
- tableModelView
- grid
- recordView
- model
- iconList
- \$v
- \$v_CheckValueAgainst
- apex.widget.waitPopup
- treeView
- treeNodeAdapter
- mapRegion

2.34 JavaScript Library Upgrades

- Backbone 1.6
- cropperjs 1.6.1
- DOMPurify 3.1.4
- FullCalendar 6.1.11
- Less.js 4.2.0
- MapLibre 4.0.1
- Marked.js 12.0.1
- Monaco Editor 0.47.0
- Oracle JET 16.0.1
- terser 5.30.3
- TinyMCE 6.8.3
- Turndown 7.1.3

3

Changed Behavior

Some existing behaviour changes in this release.

- [Workspace URL Updated](#)
- [App Builder UI Changes](#)
- [Interactive Grid Selection Changes](#)
- [Export File Changes](#)
- [PDF Export Changes](#)
- [Changes to Public Dictionary Views](#)
- [Changes to onclick](#)
- [APEX_EXPORT.GET_APPLICATION Changes](#)
- [JET Chart Changes](#)
- [Shared Component Unique Names](#)
- [Compatibility Mode](#)
- [Enabling Network Services in Oracle Database](#)
Database administrators must enable network services in Oracle Database to send outbound mail, invoke web services, or use template-based PDF report printing with external print servers in Oracle APEX.

3.1 Workspace URL Updated

The main workspace URL is changed. The readable URL remains `https://apex.oracle.com/pls/apex/r/apex/workspace/home`, but `https://apex.oracle.com/pls/apex/f?p=4500:1000` is no longer available.

If you have bookmarked the non-readable URL for your workspace, update your bookmark.

3.2 App Builder UI Changes

Changes to the application builder user interface for this release include:

- **Resizable Icon Picker** - The Icon Picker in Page Designer now has a resizable marker in the bottom right corner.
- **New Name Attribute for Regions** - Similar to pages, regions now support both **Name** and **Title** attributes.
- **"Copy This Page" Menu Option** - The **Page as Copy** option in Page Designer is renamed to **Copy Page**.
- **New "Show Processing" Attribute** - When you select **Submit Page**, you can now toggle the **Show Process** option to determine whether APEX displays a processing animation during page submission. The processing animation helps prevent users from double-clicking and submitting the page twice.

- **New Template Option to Hide Empty Values** - In Classic Reports, you can now hide empty values using the **Value Attribute Pairs - Column** template or the **Contextual Info** template.
- **Locked Page Improvements** - Locked pages now display the same red icon used in Page Designer.
- **About Oracle APEX** - The **About Oracle APEX** page (**Help** icon, **About**) now includes a section on the **Multilingual Engine**. This section determines if JavaScript in the database can be used for APEX applications, and includes information about the schemas of the current workspace.
- **Font APEX** - Font APEX is now updated to version 2.3, which includes new AI icons.

3.3 Interactive Grid Selection Changes

This release includes changes in Interactive Grid selection:

- The grid view **Select All** user interface and behavior is changed. When using virtual scroll pagination (**Pagination Type** is `Scroll` and **Show Total Count** is `On`) and selecting all rows without fetching all data from the server, the status bar now reports how many records are actually selected, and a **Load All** link is visible. The user can click the **Load All** link to fetch all the data and update the selection. Previously, the status bar reported that all rows were selected even though they were not.
- In the grid view, when using `Space` to select or deselect a row, selection or deselection now happens on `key up` rather than on `key down`.
- When copying rows to the clipboard, the row selection header is not included unless it contains text. All the selected rows are copied, not just the ones rendered to the DOM.
- Scrolling is now smooth when using the keyboard to move up or down rows or page up/down. Previously, when the focused row was beyond the scroll viewport, the scroll offset was adjusted so that the focused element was in the vertical center of the viewport. This caused a jump from edge to center. Now, scrolling by holding down the arrow keys keeps the focused element at the top or bottom edge, resulting in smooth scrolling.
- **Details** view can support selection by using JavaScript API options. If enabled, the **Actions, Selection** menu is enabled.

3.4 Export File Changes

Previously, audit information was only available for applications and pages. Now, audit information is available for applications, pages, application components, themes, plug-ins, team development feedback, and REST source catalogs. Audit information in export files now includes **Created By User**, **Created On Date**, **Changed By User**, and **Changed On Date**. Users performing exports can now select the type of audit information included in export files:

- **None**, to exclude audit information from the export file.

Note:

Excluding audit information from export files can be helpful when checking files into revision control systems like GIT or SVN, as including names and dates can appear as file changes when the code remains the same.

- **Names and Dates**, to include all audit information in the export file.

- **Dates Only**, to include the dates and exclude user details.

 **Note:**

Choosing **Dates Only** is useful when it is undesirable to include usernames of developers in files.

When importing an application from an export file, the **Changed By User** and **Changed On Date** values now reflect the values in the export file, not the values from the user performing the import.

3.5 PDF Export Changes

This change applies to native PDF printing. Previously, APEX truncated text in a PDF table cell if the text would overflow the current page. Now, APEX no longer truncates the text. Instead, a table row could span multiple pages. Developers are now responsible for addressing overflowing text in tables prior to PDF export.

3.6 Changes to Public Dictionary Views

Public dictionary views have changed, and the following columns now return `NULL`:

- In `apex_application_page_regions`, `columns attribute_01...25`
- In `apex_application_page_reg_cols`, `columns attribute_01...25`
- For region plug-ins only, in `apex_appl_plugin_settings`, `columns attribute_01...15`

Use the `JSON attributes` column instead.

3.7 Changes to onclick

 **Caution:**

This change removes the **onclick** attribute from buttons starting in Universal Theme 24.1. If you added custom code to read or manipulate the value of the **onclick** attribute, that custom code no longer works as expected.

A workaround is to put the page URL from a call to `APEX_PAGE.GET_URL` into a hidden page item value. Alternatively, you could create your own custom button template and revert to use the previous `#JAVASCRIPT#` substitution and use that template in places where you have custom code that relies on the **onclick** attribute.

3.8 APEX_EXPORT.GET_APPLICATION Changes

In `APEX_EXPORT.GET_APPLICATION`, behavior of the parameter `p_type` changes. When the parameter `p_type` contains `APPLICATION_SOURCE` and either `CHECKSUM-SH1` or `CHECKSUM-SH256`, APEX now adds an additional line with a comment containing an overall checksum at the end of the application source file or, in case of a split export, the top-level `install.sql` file. For split exports, this can make it easier to detect changes in an application by only looking for a changed `install.sql` file.

The following example `install.sql` file was exported with `p_type => 'APPLICATION_SOURCE,CHECKSUM-SH1'`:

```
prompt --install
@@application/set_environment.sql
@@application/delete_application.sql
...snip...
@@application/deployment/buildoptions.sql
@@application/end_environment.sql
-- Application Checksum SH1:jpcliMUZZDVVB1lMKpyyAfPBDdw=
```

3.9 JET Chart Changes

In the previous release, when the **Marker, Show** setting was set to `Auto`, APEX, by default, did not display markers for **line** and **area** series in a combination chart.

The default behavior is now changed. When **Marker, Show** is set to `Auto`, APEX now displays markers for these series. This change only affects **line** and **area** series defined within a combination chart.

3.10 Shared Component Unique Names

Previously, Application Processes, Authorization Schemes, and Lists could have duplicate names. Later, validations were added to prevent APEX from creating new shared components with duplicate names, but the restriction was not enforced at the database level.

Now, this release adds a new unique constraint to the database tables to enforce unique names. In cases where existing applications contain duplicate names, APEX adjusts the names to ensure they are unique. This modification takes place either during an APEX upgrade or when importing older applications.

3.11 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 to 24.1

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.

3.12 Enabling Network Services in Oracle Database

Database administrators must enable network services in Oracle Database to send outbound mail, invoke web services, or use template-based PDF report printing with external print servers in Oracle APEX.

To learn more, see *Enabling Network Services in Oracle Database* in *Oracle APEX Installation Guide*.

Note:

Enabling network services does not apply to APEX instances running on Oracle Autonomous Database. APEX can communicate with external endpoints over the internet without additional configuration.

- [When and Why Network Services Must be Enabled](#)
Enabling network services enables support for sending outbound mail in Oracle APEX, using REST Services, REST Enabled SQL, or other web services, and using a remote server for report printing.
- [Granting Connect Privileges](#)
- [Troubleshooting an Invalid ACL Error](#)
Learn how to identify any invalid ACL error by running the query.

3.12.1 When and Why Network Services Must be Enabled

Enabling network services enables support for sending outbound mail in Oracle APEX, using REST Services, REST Enabled SQL, or other web services, and using a remote server for report printing.

By default, the ability to interact with network services is disabled in Oracle Database. Therefore, you must use the `DBMS_NETWORK_ACL_ADMIN` package to grant network connect privileges to the database user that owns the APEX schema (`APEX_240100`). 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 REST services and other web services from APEX.

- Making outbound LDAP calls from APEX.
- Using a remote print server for report printing.

The granted network connect privileges apply to the entire APEX instance and enable all applications in all workspaces to perform outbound network calls. You do *not* need to grant network connect privileges to individual workspace schemas unless applications also use native database PL/SQL API such as `UTL_HTTP` and `UTL_SMTP`.

 **Note:**

When upgrading APEX, the upgrade automatically configures Network Services based on the configuration of the previous APEX version.

 **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, the parameter is set properly, but a database upgraded from a version prior to 11g may require an update. 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*.

3.12.2 Granting Connect Privileges

The following example demonstrates how to grant connect privileges to any host for the the database user that owns the APEX schema (`APEX_240100`). 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_APPLICATION.g_flow_schema_owner,
                      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 only to servers running on the same database host (`localhost`), such as email and report printing servers.

```
BEGIN
  DBMS_NETWORK_ACL_ADMIN.APPEND_HOST_ACE (
```

```

        host => 'localhost',
        ace => xs$ace_type(privilege_list => xs$name_list('connect'),
                          principal_name =>
APEX_APPLICATION.g_flow_schema_owner,
                          principal_type => xs_acl.ptype_db));
END;
/

```

3.12.3 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;

```

```
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_240100` user.

4

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.

Feature Request Number	Subject	Solution
FR-27	Separate Name and Title Attributes for Regions	Delivered. See App Builder UI Changes .
FR-1588	Make Universal Theme Version More Visible in App Builder	Delivered.
FR-1765	Single and Multi-Row Selection for Reports	Delivered. See Multi-Value Item Type JSON and Custom Separator Support .
FR-1865/FR-3288	Date Field Type in Faceted Search	Delivered. See Date Picker Support in Faceted Search and Smart Filters .
FR-1965/FR-2958	Automatic Fade Out of Success Messages	Delivered. See Automatic Dismissal of Success Messages .
FR-1967	Declarative CLOB and BLOB Downloads Everywhere	Delivered. See Declarative BLOB/CLOB File Download Support .
FR-1984 / FR-2168	Enable Multiple Value Selection Select List	Delivered. See New Select One and Select Many Item Types .
FR-2027	Enable Menu and List of Values Subscriptions Between Applications	Delivered. See Improved Shared Component Subscriptions .
FR-2030	Show a Spinner that Prevents Screen Input when Submitting Page	Delivered. See App Builder UI Changes .
FR-3623	Declarative Support for Display-Only (and Read-Only) Field Alignment	Delivered. See Accessibility Improvements .
FR-2043	Renamed "Page as Copy" to be more intuitive in Page Designer	Delivered. See App Builder UI Changes .
FR-2105/FR-3057/FR-3399	Add Heading HTML Column Attribute to Interactive Report	Delivered. See Alternative Labels for Interactive Reports .
FR-2106/FR-2843	Option to Disable Button After Clicking to Submit	Delivered. See App Builder UI Changes .
FR-2183	Spotlight Enhancements	Delivered. See App Builder Enhancements .
FR-2207	Easy Way to Clear Select List/ Popup LOV	Delivered. See New Select One and Select Many Item Types .
FR-2226	Bigger/Resizable/Responsive Icon Picker Modal Dialog in Page Designer	Delivered. See App Builder UI Changes .
FR-2275	Smart Filters for Date Columns	Delivered. See Date Picker Support in Faceted Search and Smart Filters .

Feature Request Number	Subject	Solution
FR-2296	Add Workspace Name to Notification Email	Delivered.
FR-2403	Option to Hide Null Values When Using Report Template "Value Attribute Pairs - Column"	Delivered. See App Builder UI Changes .
FR-2632	Red Lock Icon in Application Pages Report	Delivered. See App Builder UI Changes .
FR-2713	Opacity Utility Classes	Delivered. See Reference, Color and Status Modifiers in Oracle APEX Universal Theme .
FR-2819	Export individual page as readable YAML	Delivered. See Readable Export Enhancements .
FR-2998	Report to Show Out-of-Sync (Stale) Component Subscriptions	Delivered. See Improved Shared Component Subscriptions .
FR-3044	Add Execute JS and PL/SQL (Serverside Code) to Quickpick for DA Actions	Delivered. See Dynamic Action Enhancements .
FR-3142	Custom Templates for Select Lists	Delivered. See New Select One and Select Many Item Types .
FR-3319/FR-3215	Add Capability to Connect an AI Assistant in All Code Editors	Delivered. See Generative AI Support .
FR-3352	Freeze Column Titles in SQL Commands	Delivered.
FR-3424	Workspace-Level Option to Disable Generative AI Capability	Delivered. See Generative AI Support .
FR-3537	Enable Approval Initiator to Claim Tasks	Delivered. See Human Task Enhancements .
FR-3559/FR-3567/FR-3661	Create a Word or PDF Document/Develop Formatted PDF Report	Delivered. See Document Generator Service Integration .
FR-3560	Workflow Task Assignment/Delegation Based on Vacation Rules	Delivered. See Human Task Enhancements .
FR-3639	Increase SAML RSA Key Bit Length from 2048 to 4096	Delivered.
FR-3647	New Font APEX Icons	Delivered. See App Builder UI Changes .
FR-3784	Allow <code>apex_instance_admin.set_parameter('WALLET_PATH', 'system:')</code> to work in Oracle Database 23ai or higher	Delivered. See 35878406 in Fixed Bugs .

5

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 Dynamic Action Event](#)
- [Deprecated Plug-In Attribute](#)
- [Number Field Substitutions](#)

5.1 Deprecated APIs

The `APEX_APPROVAL` package is deprecated. Use `APEX_HUMAN_TASK` instead.

The PL/SQL APIs `apex_javascript.add_3rd_party_library_file` and `apex_css.add_3rd_party_library_file` are deprecated and will be removed in a future APEX release.

The `URL_ENCODE` function in `APEX_UTIL` is now deprecated. Instead, use the built-in database function `UTL_URL.ESCAPE`.

The `apex_plugin_util.print_display_only` API is deprecated. Instead, use `apex_plugin_util.print_read_only`.

The `ABORT` function in `APEX_AUTOMATION` is now deprecated. Instead, use `TERMINATE` to terminate a currently executing automation.

Oracle recommends not relying on APEX's 3rd party dependencies as they may change without notice. Instead, bundle your own dependencies or include them via a CDN.

5.2 Deprecated Dynamic Action Event

The APEX Dynamic Action event "Page Unload" is deprecated because the underlying browser event `unload` is deprecated. For more information, see [Window: unload event](#).

5.3 Deprecated Plug-In Attribute

When editing a region plug-in, the **Substitute Attribute Values** switch is now deprecated. When you move to the Procedure interface, this switch disappears. To perform substitutions on the attribute value, use `apex_plugin_util.replace_substitutions`.

5.4 Number Field Substitutions

Dynamic substitutions for Min/Max Value attributes for the Number field page item, including `&P1_MIN.`, are deprecated. This will be fixed in a future release by allowing developers to declaratively pick an item to use for Min/Max Value attributes.

6

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.

- [Quick SQL Deprecated Functionality](#)
- [CKEditor5 Deprecated](#)
- [Deprecated Object Browser Features](#)
- [Preventing Double Escaping of LOV Display Values](#)
- [Display Only Item with Format HTML \(Unsafe\) Deprecated](#)
- [Deprecated Functions and Procedures](#)
- [Deprecated APEX Item Markup](#)
- [Deprecated jQuery Date Picker](#)
- [Previously Deprecated APIs](#)
- [Deprecated Legacy Web Service References](#)
- [jQuery UI Deprecated](#)

6.1 Quick SQL Deprecated Functionality

Deprecated Settings

As of APEX 23.2, the following Quick SQL settings are deprecated:

- `#language:"DE"`: No longer generates sample data into different languages (German, Korean, Japanese, Spanish).
- `#tags:true`: No longer generates tag framework objects (table, trigger, sync procedure).
- `#ondelete:"cascade"`: No longer supports system-wide `ondelete` settings. Handle these settings through the new `/cascade` column directive.
- `#longVC:true`: No longer supports artificially shortening or increasing `VARCHAR2` size.
- `#tenantID:true`: No longer supported.

Deprecated Directives

As of APEX 23.2, the following Quick SQL directives are deprecated:

- `/select`: No longer generates a SQL `SELECT` statement after generating data for each table.

6.2 CKEditor5 Deprecated

As of APEX 23.1, CKEditor5 is deprecated. Existing items based on the CKEditor5 library continue to work. However, these items will be automatically converted to TinyMCE in the next release. Any custom code using CKEditor5 APIs must be re-worked.

6.3 Deprecated Object Browser Features

As of APEX 23.1, some functionality in Object Browser is deprecated:

- The Model tab for tables is removed.
- The Create Materialized View Wizard is removed. Create materialized views by using a `CREATE MATERIALIZED VIEW` statement in SQL Commands or SQL Scripts. You can still view materialized views in Object Browser.

6.4 Preventing Double Escaping of LOV Display Values

As of APEX 23.1, APEX prevents double escaping of LOV display values.

By default, APEX automatically HTML-escapes Lists of Values (LOV) display values as necessary. To ensure backward compatibility with legacy apps, APEX checks whether the LOV query already includes a utility function to escape the display value. If it does, APEX avoids double-escaping the value when displaying it in a Select List, Popup LOV, Shuttle, Display Only item, or similar components.

Oracle recommends removing redundant inline escaping calls from your LOVs. In a future version of APEX, this prevention mechanism may be removed, which could cause some display values to appear double-escaped.

To identify whether any of your LOVs are impacted, run the following queries:

```
select *
  from apex_application_lovs
 where lov_type = 'Dynamic'
    and ( upper(list_of_values_query) like '%HTF.ESCAPE_SC%'
        or upper(list_of_values_query) like '%APEX_ESCAPE.HTML%'
        or upper(list_of_values_query) like '%WWV_FLOW_ESCAPE.HTML%' );
```

```
select *
  from apex_application_page_items
 where lov_named_lov is null
    and ( upper(lov_definition) like '%HTF.ESCAPE_SC%'
        or upper(lov_definition) like '%APEX_ESCAPE.HTML%'
        or upper(lov_definition) like '%WWV_FLOW_ESCAPE.HTML%' );
```

If the queries returns no rows, then no action is required. Otherwise, check the LOV definition and/or page items, remove any manual escaping, and test your applications to ensure that the values still appear as intended.

6.5 Display Only Item with Format HTML (Unsafe) Deprecated

As of APEX 23.1, Format HTML sanitizes the HTML content on the client before displaying it. This simplifies the display of user-provided HTML, including the content of HTML-based rich text editors.

To maintain backward compatibility with existing applications, all current Display Only page items using the Format HTML option will be migrated to HTML (Unsafe) to preserve their current behavior. However, going forward, this option is deprecated, and displaying "unsafe" HTML, such as script tags or `javascript:` expressions, `onclick` attributes, and others, is no longer possible, as this content is stripped away.

Although it is not recommended to display unsafe HTML content, you can still choose to display it.

6.6 Deprecated Functions and Procedures

As part of moving existing APIs from `APEX_UTIL` to `APEX_APPLICATION_ADMIN`, some comments changed. As of APEX 23.1, the following functions and procedures are deprecated:

- `set_build_option_status`
- `get_build_option_status` (two times, overloaded)
- `set_application_status`
- `get_application_status`
- `set_global_notification`
- `get_global_notification`
- `set_app_build_status`

6.7 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.

As of APEX 22.2, the `apex.item` namespace and item interface are the only supported APIs for customizing and programmatically 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.

6.8 Deprecated jQuery Date Picker

As of APEX 22.2, jQuery Date Picker is now deprecated and cannot be used for new pages or applications. The old jQuery Date Picker JavaScript APIs are not supported.

Oracle recommends replacing all old Date Pickers with the new Date Picker.

6.9 Previously Deprecated APIs

As of APEX 22.1, the `APEX_IR.GET_REPORT` API is deprecated. Instead, use `APEX_REGION.OPEN_QUERY_CONTEXT` to get interactive report data.

6.10 Deprecated Legacy Web Service References

As of APEX 22.1, SOAP style Web Service references and legacy support for REST style Web Services references are deprecated.

6.11 jQuery UI Deprecated

As of APEX 20.1, 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.

7

Desupported Features

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

- [Removed JSON Application Export](#)

7.1 Removed JSON Application Export

The JSON application export option is removed. The **Export Readable Format** option is now a switch. If off, the application exports in SQL form. If on, the export file contains a human-readable YAML version of the application metadata.

8

Desupported in Previous Releases

The following section lists features that 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 Utilities](#)
- [Querying Template Component Metadata](#)
- [Desupported Query Builder](#)
- [Desupported User Interfaces Removed](#)
- [Desupported JET Date Picker Item Type Migrated](#)
- [DOM Object Desupported](#)
- [Legacy Bulk Utilities Desupported](#)
- [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](#)
- [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](#)
- [Syntax {COLUMN_NAME}_LABEL in Interactive Grid Icon and Detail Views Desupported](#)
- [Removed Content Delivery Network](#)
- [APEX-Based REST Services Desupported](#)

8.1 Desupported Utilities

As of APEX 23.2, the `APEXExport` utility is desupported and is no longer included with Oracle APEX. Oracle recommends using SQLcl to perform export operations.

8.2 Querying Template Component Metadata

As of APEX 23.2, for template components only, the `ATTRIBUTE_01...ATTRIBUTE_25` columns of `APEX_APPLICATION_PAGE_REGIONS` and `APEX_APPLICATION_PAGE_IR_COL` public views now return null.

Instead, use the new `ATTRIBUTES` column that stores a JSON object of all attribute values. Use the attribute's Static ID as the object key. Note that a table alias is always needed when using the JSON dot notation. For example:

```
select r.attributes.COLOR
       from apex_application_page_regions r
      where r.application_id = 100
             and r.page_id   = 1
             and r.static_id  = 'user_badge';
```

8.3 Desupported Query Builder

As of APEX 23.1, SQL Workshop Query Builder is now desupported, and will be removed in a future release.

8.4 Desupported User Interfaces Removed

APEX previously defined multiple users interfaces for each application. As of APEX 23.1, this is no longer the case. Desupported user interfaces are cleaned up, 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.

8.5 Desupported JET Date Picker Item Type Migrated

As of APEX 23.1, the Date Picker (JET) item type is now removed. Existing page items and interactive grid columns are automatically migrated to the new Date Picker item type introduced in APEX 22.2.

This impacts any JavaScript customizations made for the JET Date Picker component.

8.6 DOM Object Desupported

As of APEX 23.1, the DOM Object Dynamic Action selector type is desupported. Any page that uses this type for an action now throws an exception in the browser console, and the action does not execute.

Use the JavaScript Expression type instead of DOM Object.

8.7 Legacy Bulk Utilities Desupported

As of APEX 23.1, the **Grid Edit** tools are now desupported. This includes grid edit tools available in:

- Cross Page Utilities
- Region Utilities
- Button Utilities
- Item Utilities

- Computation Utilities
- Validation Utilities
- Process Utilities
- Dynamic Action Utilities
- Branch Utilities

You can edit items individually through Page Designer, or view them in bulk through the appropriate Utility area.

8.8 Desupported Attributes in App Builder

As of APEX 22.2, 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

8.9 Desupported Properties

As of APEX 22.2, the following properties in the property editor are desupported:

- Region Image
- Image Tag Attributes

8.10 Desupported View Columns

As of APEX 22.2, the following view columns are desupported:

- In apex_applications:
 - app_builder_icon_name
 - favicons
 - pwa_manifest_icon_url

8.11 FullCalendar 3 Desupported

As of APEX 22.2, 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 6.1.8. APEX upgrades the library automatically.

8.12 App Builder Defaults Desupported

As of APEX 22.2, developers can no longer define App Builder Defaults from Workspace Utilities, App Builder Defaults. The Create Application Wizard no longer uses the defined attributes.

8.13 Copying Legacy Themes Desupported

As of APEX 22.2, the Copy Theme Wizard no longer supports copying legacy themes. This includes Themes 1 - 26, and the jQuery Mobile theme.

8.14 CKEditor4 Desupported

As of APEX 22.2, 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.

8.15 Desupported Public Package APIs

As of APEX 22.2, the following public package APIs are desupported:

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

8.16 Desupported Page Positions

As of APEX 22.1, the following page positions are desupported and display as **Legacy** in Page Designer:

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

8.17 Desupported Region Positions

As of APEX 22.1, 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

8.18 Custom Page Region Templates with Duplicated Positions Desupported

As of APEX 22.1, 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.

8.19 Legacy Substitution Strings Desupported

As of APEX 22.1, 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).

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

8.20 Desupported JavaScript Functions

As of APEX 22.1, the following functions are desupported:

Universal Theme JavaScript API function:

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

8.21 Post Calculation for Page Items Desupported

As of APEX 22.1, 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.

8.22 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, as of APEX 22.1, 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.

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

As of APEX 22.1, the `apex.server` plug-in and process function async option are desupported. In a future release, the async option will be ignored and all Ajax requests will be asynchronous.

8.24 apex.widget.initPageItem Function Desupported

As of APEX 22.1, the function `apex.widget.initPageItem` is desupported. Item plug-in creators should use `apex.item.create` instead.

8.25 Popup LOV Template Desupported

As of APEX 22.1, the Popup LOV template type is desupported.

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

As of APEX 22.1, the selection **Output of PL/SQL Code** of the attribute **Based On** is now desupported.

8.27 Syntax {COLUMN_NAME}_LABEL in Interactive Grid Icon and Detail Views Desupported

As of APEX 22.1, 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..`

8.28 Removed Content Delivery Network

As of APEX 22.1, 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](#).

8.29 APEX-Based REST Services Desupported

As of APEX 22.1, APEX-based REST Services are desupported. 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 and newer now ship 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*.

9

Fixed Bugs

The following section lists bugs fixed in this release.

Bug Number	Description
20693603	PAGE DESIGNER SPLITTER CONTROL BUTTONS HAVE ACCESSIBILITY PROBLEMS
28070162	INTERACTIVE GRID ADD AGGREGATE DOESN'T ADD ROW HEADER UNTIL REFRESH PAGE
30666675	APEX DIALOGS DO NOT MAKE NON-DIALOG CONTENT INERT TO SCREEN READERS
32815429	PAGE DESIGNER: REGION COLUMNS NOT RESET WHEN REST SOURCE POST PROCESSING CHANGED BACK TO "NONE"
33351947	REPORT COLUMNS OF TYPE 'DISPLAY IMAGE' HAVE LIMITED SUPPORT FOR DEFINING ALT TEXT
33651195	PAGE DESIGNER > SUCCESS / ERROR MESSAGES NOT ANNOUNCED TO JAWS
33825065	MISPLACED ACTIONS MENU IN INTERACTIVE GRID/INTERACTIVE REPORT WHEN SCROLLING DOWN
34052197	DATA GENERATOR: GETTING ORA-00001 UNIQUE CONSTRAINT IF USER CLICKS PREVIEW FIRST AND THEN SAVE OPTION
34139461	SAML AUTH: STORING CERTIFICATE FOR 4096 RSA RAISES ORA-06502
34147034	SWITCH ITEM IS EXPOSED AS CHECKBOX TO SCREEN READER.
34413163	INTERACTIVE GRID - COLUMN SORT BUTTONS NOT EXPOSED TO JAWS IN VIRTUAL PC MODE
34469087	INTERACTIVE GRID: CHECKBOX COLUMN TYPE MISSING LABEL
34510276	NON-EDITABLE TEXTAREA ITEMS COULD BE EASILY MISSED BY SCREEN READER USERS
34518962	READ ONLY SELECT LISTS COULD BE EASILY MISSED BY SCREEN READER USERS
34525007	NON-EDITABLE NUMBER FIELD ITEMS COULD BE EASILY MISSED BY SCREEN READER USERS
34550043	NON-EDITABLE POPUP LOVS COULD BE EASILY MISSED BY SCREEN READER USERS
34552301	READ ONLY SWITCH ITEMS COULD BE EASILY MISSED BY SCREEN READER USERS
34556933	NON-EDITABLE TEXT FIELD WITH AUTOCOMPLETE ITEMS COULD BE EASILY MISSED BY SCREEN READER USERS
34668111	INTERACTIVE GRID - EDITABLE - ITEMS THAT USE POPUP PATTERN HAVE UNLABELED CLOSE BUTTON
34849051	NLS: SORTING ON THE DAY COLUMN IS NOT SORTING IN NLS_SORT ORDER INSTEAD SORTING ALPHABETICALLY
34927506	SINGLE LINE COMMENT AT END OF PL/SQL EXPRESSION LEADS TO COMPILATION ERROR AT RUNTIME
35121962	DATA GENERATOR: FORMULA REFERENCING EARLIER FORMULA COLUMN BY NAME GETS NULL UNEXPECTEDLY

Bug Number	Description
35145331	CUSTOMER EXPECTS INTERACTIVE GRID SELECT ALL TO SELECT ALL ROWS IN RESULT SET EVEN WHEN NOT ALL LOADED ON CLIENT
35207751	MULTI-SELECT ITEMS ARE INCONSISTENT ON THE TYPES OF LOV QUERIES ACCEPTED
35209140	PAGE DESIGNER: COLUMN QUICK PICK FOR TEXT ATTRIBUTES IS NOT ALWAYS DISPLAYED/REFRESHED
35260566	APEX SAML SSO DOES NOT REDIRECT TO THE NODE WHERE SSO IS INITIATED FOR MULTI-NODE INSTANCES
35306603	APPROVAL COMPONENT: APEX\$TASK_ID NOT SET IN TASK ACTIONS SOURCE
35331325	CREATE PAGE WIZARD FOR TEMPLATE COMPONENTS SHOULD USE COLUMN AGNOSTIC ORDER BY
35398580	FILE BROWSE PAGE ITEM DOES NOT ALLOW UPLOAD OF FILES WITH NAMES CONTAINING CERTAIN CHARACTERS
35399556	NLS: CHANGING APPLICATION PRIMARY LANGUAGE TO SPANISH (BOLIVIA) CHANGES NLS_TERRITORY TO ARGENTINA INSTEAD OF BOLIVIA
35430679	AUTOREST ENABLE OBJECT LIST NOT ALPHABETIZED: HARD TO FIND NAMES IF LIST IS LONG
35432238	COPYING PAGE COPIES WRONG ITEM REFERENCES TO THE CODE
35533094	DATA GENERATOR: TABLE MAX ROWS INPUT VALIDATION AND INTERNAL ERROR HANDLING NOT WORKING CORRECTLY
35533515	DATA GENERATOR: BLUEPRINT EXPORT CUTS OFF AT 32767 CHARACTERS
35547622	ERROR WHILE UNINSTALLING APEX APPLICATION FROM APPLICATION CONTAINER
35574366	CLASSIC REPORT THEME TEMPLATE OPTION "PAGINATION DISPLAY: HIDE WHEN ALL ROWS DISPLAYED" IS ONLY RESPECTED ON PAGE LOAD WITH ROWS FOUND
35585554	KEY PAIR CREDENTIALS PROMPT ON INSTALL IS NOT PROMPTED WHEN SET TO YES
35597423	DATA GENERATOR: BLUEPRINTS ARE NOT MIGRATED WHEN UPGRADING APEX
35600280	MISSING "LANG" ATTRIBUTE IN SHARED COMPONENT TEXT MESSAGES PAGES IN APP BUILDER
35613209	DATA GENERATOR: CREATING A TABLE WITH A 'COUNTY' COLUMN RAISES AN ERROR
35650075	INACCESSIBLE WIZARD PROGRESS BAR IN THE REQUEST A WORKSPACE WIZARD
35653871	NEW COMBOBOX USES LEGACY READ ONLY SUPPORT
35658076	INTERACTIVE GRID UI BUGS ON RIGHT-TO-LEFT APP ON EDIT MODE
35663560	INTERACTIVE GRID PAGINATION FOOTER CAN GET CORRUPTED ON COLUMN SORT
35666365	QUERY ONLY INTERACTIVE GRID COLUMNS SHOULD STILL EXPOSE DEFAULT VALUE ATTRIBUTES
35720507	NLS: CHANGING THE APPLICATION PRIMARY LANGUAGE TO KONKANI OF AN APEX APP CHANGES NLS_LANGUAGE AND NLS_TERRITORY TO KOREAN AND KOREA WHICH IS AMBIGUOUS
35744013	LINK TARGET VALUE OF INTERACTIVE REPORT IS NOT DISPLAYED ON PAGE DESIGNER
35746824	OBJECT BROWSER SHOULD NOT ALLOW EDITING VIRTUAL COLUMN

Bug Number	Description
35755307	BLANK LINES IN PL/SQL PRUNED OUT DURING SUPPORTING OBJECTS INSTALLATION
35774433	PAGE DESIGNER - TREES ARE NOT LABELLED
35774515	RESET PAGINATION DOES NOT WORK FOR INTERACTIVE REPORT
35778660	FACETED SEARCH FACETS INPUT FIELD TOGGING MENU IS MOVING ON MOBILE DEVICE
35786694	INTERNAL APPS, INLINE ERROR NOTIFICATIONS HAVE 2 ACCESSIBLE HEADINGS
35799991	COMPONENT EXPORT FOR A REST SOURCE SHOULD INCLUDE REFERENCED CREDENTIALS AND REMOTE SERVERS
35815182	WORKFLOW DESIGNER: MISSING KEYBOARD SHORTCUT TO OPEN LINK INSERT ELEMENT MENU
35824455	INTERACTIVE GRID, NAVIGATION MODE, JAWS READS EACH COLUMN NUMBER TWICE
35825780	OBJECT BROWSER LENGTH SEMANTICS OPTION IS ENABLED FOR NCHAR/NVARHCAR2 DATATYPE, WHEREAS NLS LENGTH SEMANTICS IS ALWAYS CHAR FOR NCHAR/NVARCHAR2
35850965	APEX_JSON.WRITE_CONTEXT DOES NOT SUPPORT MULTI VALUE COLUMN TYPES
35855880	SUBSTITUTION IGNORED FOR BEFORE/AFTER ROWS TEMPLATE OF IR DETAIL VIEW
35856550	REGRESSION: BUILDER PAGES NOT REMEMBERING RDS TAB SELECTION
35860819	BACKGROUND PROCESSING: FILES ARE NOT MOVED OR COPIED TO THE WORK SESSION WHEN MULTIPLE FILES WERE UPLOADED
35875870	ERROR THROWN WHEN NOT USING 'USER CAN CHOOSE OPERATOR' ON 'NUMBER' DATA TYPE IN FACETED SEARCH WHEN SESSION STATE IS NOT EMPTY
35878406	ON DB 23AI APEX SHOULD NOT CALL UTL_HTTP.SET_WALLET WHEN NO WALLET IS CONFIGURED
35883952	WITH RAS ENABLED APEX THE RAS SESSION HAS NOT BEEN STARTED YET IN AN AFTER AUTHENTICATION PROCESS
35903855	APEX_APPROVAL.SET_TASK_DUE IN TASK ACTIONS DELETES TASK HISTORY
35906077	INTERACTIVE REPORT, FILTER DIALOG, POPUP LIST OF VALUES BUTTON MAKES NOTHING FOR SCREEN READER USERS
35907917	APEX MAINTENANCE JOB FAILURE
35908884	503 SERVICE UNAVAILABLE AFTER DOWNGRADING APEX (FROM 23.1 TO 20.1)
35912546	DATA EXPORT: IMAGES WITH .JPG EXTENSION NOT INCLUDED IN EXCEL EXPORT
35913541	MISSING WORKFLOW ID IN APEX_TASKS VIEW
35918638	502 BAD GATEWAY WHILE TRYING TO CALL REST USING APEX_WEB_SERVICE.MAKE_REST_REQUEST FOR SPECIFIC "DEEPL" ENDPOINT
35928179	DATA EXPORT: IMAGE WRONGLY INCLUDED IF PRIMARY KEY VALUE IS NULL
35932468	PAGE DESIGNER: DIALOGS DO NOT CLOSE WHEN A NEW PAGE IS LOADED
35938332	LOGIN PAGE, MISSING ARIA-CURRENT ON THE LANGUAGE SELECTOR

Bug Number	Description
35939935	SOCIAL AUTH: EXTEND SOCIAL_AUTH_CALLBACK INSTANCE PARAMETER TO SUPPORT FULL URLS
35943558	SPACE USAGE JUMP UP ON TABLESPACE AEPX_REL232
35945952	DEADLOCK DETECTED WHEN INSERTING FORM PAGE WITH FILE UPLOAD ITEM
35950003	APEX 23.1 USER PREFERENCE DARK/LIGHT MODE ARE NOT SAVED
35952016	VERSION ADDITIONAL DATA COLUMNS EVALUATE TO NULL IN ACTIVITY ADDITIONAL DATA QUERY
35959832	ERROR ON INSTALLING MORE THAN ONE APP AT ONCE WHEN BACKGROUND APP INSTALLATION IS DISABLED
35960248	APEX_JSON.WRITE IS IGNORING P_WRITE_NULL WHEN PARSING APEX_JSON.T_VALUES
35960654	SPURIOUS FALSE POSITIVE ERROR "PAGE ITEM DOES NOT EXIST" USING INVOKEAPI
35963468	INTERACTIVE REPORT: SUBSTITUTE #COLUMN_NAME# STRINGS FOR ICON AND COLOR ATTRIBUTES OF TEMPLATE COMPONENT COLUMNS
35963879	INCORRECT ARIA ROLE IN THE CREATE PAGE WIZARD
35964183	ORACLE_APEX_DAILY_METRICS JOB TAKES MORE LONGER TO COMPLETE
35967742	#SQLERRM# SUBSTITUTION IS NOT WORKING FOR THE ERROR MESSAGE ATTRIBUTE FOR ACTIONS UNDER TASK DEFINITIONS
35969748	APP BUILDER, CREATE APP WIZARD HAS UNLABELED BUTTON IN INLINE ERROR NOTIFICATION
35973589	INTERACTIVE REPORT, COLUMN ACTION DIALOG, SORTED ORDER IS NOT PERCEIVABLE BY SCREEN READER USERS
35977506	REQUIRED FIELD INDICATOR FOR UNIVERSAL THEME MISSING ON RADIO BUTTONS
35996877	SAML AUTH: XML CANONICALIZATION SHOULD NORMALIZE LINE ENDINGS TO 0X0A (INVALID /RESPONSE/SIGNATURE)
35998892	WHEN FETCH_ALL_ROWS IS TRIGGERED, ADFBC PLUGIN CAN RETURN LIMIT= PARAM TWICE
36002315	QR CODE ITEM SHOULD NOT ADD A QUIET ZONE
36006069	CUSTOMIZE REGION DOES NOT SUPPORT SUBSTITUTIONS FOR REGION TITLES
36019244	UNABLE TO INSTALL JAPANESE TRANSLATION WHEN DATABASE CHARACTER SET IS NOT AL32UTF8
36038201	CALENDAR REGION DOESN'T RESPECT THE ORDER BY CLAUSE ENTERED IN THE SQL QUERY
36046140	REST SOURCES: VALUES OF STATIC PARAMETERS ARE NOT PASSED TO REST SOURCE DML CALLBACK
36047581	IMAGE SIZE INCREASED AFTER CROPPING USING NEW APEX 23.2 IMAGE UPLOAD PAGE ITEM
36048666	COMMUNITY-REPORTED MINOR ERRORS IN APEX SEEDDED TRANSLATION HTML
36048750	WORKING COPY FEATURE DOES NOT PREVENT MERGING TO MAIN WHEN A PAGE TO MERGE IS LOCKED IN MAIN
36053478	WORKING COPY DIFF IS INCORRECTLY SHOWING DIFFERENCES FOR URLS WHICH HAVE PRINT_REPORT=XXXXX IN THE REQUEST
36060790	APPROVALS COMPONENT: PURGED TASKS FILE DOES NOT CONTAIN THE DETAIL_PK AND COMMENTS VALUES

Bug Number	Description
36072534	COMBOBOX ONE ITEM TRIGGERS INPUT EVENT ON ENTER PASSING ITEM_SELECT INFORMATION
36072603	COMBOBOX ONE ITEM DON'T TRIGGER INPUT EVENT ON X ICON CLICK
36072632	COMBOBOX TAKES FOCUS BACK TO THE ITEM WHEN DROPDOWN OPENED
36080109	PAGE DESIGNER CACHING ISSUE WHEN USING MAP REGION WITH A REST DATA SOURCE
36099986	WWV_FLOW_APPL_EXPORT_COMPS VIEW GENERATE ORA-00600 [QCTCTE1]
36104636	COPY PAGE TO OTHER APP: FOR SEARCH REGION THE REFERENCED SEARCH CONFIG IS NOT COPIED
36105015	SAML AUTH: XML PARSING ERROR, NAMESPACE PREFIX "DS" IS NOT DECLARED
36109623	REMOTE DEPLOYMENT ERRORS OUT IF REST ENABLED SQL URL ENDS WITH A SLASH
36147888	ERROR WHEN IMPORTING A NEW VERSION OF A TEMPLATE COMPONENT PLUG-IN WITH AN ACTION POSITION
36155245	IR DIALOGS ARE NOT USING THE APEX.DIALOG.CLOSE STRING FOR THE CLOSETEXT ATTRIBUTE OF THE DIALOG
36155493	NUMBER FIELD ITEM: MIN/MAX MUST BE A NUMBER BUT THE PAGE DESIGNER DOCUMENTATION SHOWS AN EXAMPLE WITH SUBSTITUTION SYNTAX
36174231	INTERACTIVE REPORT REGION ATTRIBUTE LINK ICON IS CHANGED TO DEFAULT ICON
36176666	REST DATA SOURCE PARAMETERS IN REGION LOST ON MERGING CHANGE TO REST DATA SOURCE FROM WORKING COPY
36178116	DATA GENERATOR: TABLE NAMES ALLOW EMPTY SPACES ON SAVE BUT FAIL ON GENERATE DATA
36181728	CREATE WORKING COPY GETS ROLES BUT LOSES ROLE USER ASSIGNMENTS OF MAIN APP
36183306	COMBOBOX MANY ITEM DOESNT TRIGGERS INPUT EVENT WHEN ITEM DESELECTED
36199515	CHARTS: NO SUPPORT FOR !HTML, !JS, ... SUBSTITUTION MODIFIERS IN LINK TARGET
36199977	APPLICATION DATA LOADING FAILS IF CSV OR XLSX COLUMN HEADING IS LARGER THEN 255 BYTE
36201064	DEVELOPER TOOLBAR'S REDIRECT TO PAGE THROWS AN ERROR IF WORKFLOW DESIGNER IS OPEN
36207748	CREATE WORKING COPY UNEXPECTEDLY CHANGES BUTTON ALIGNMENT CAUSING DIFFS
36212703	ADB: APEX JOBS MAY STOP WORKING AFTER UPGRADE
36220745	MULTIPLE REGIONS DISAPPEAR IN PAGE CREATED USING "PAGE AS COPY"
36229358	SAML AUTH: XML CANONICALIZATION SHOULD NORMALIZE ENTITY ENCODINGS ( TO )
36240425	REGRESSION: DOWNLOAD COL ORDER WRONG IN CLASSIC REPORT W/ GENERIC COLS & FUNC RET SQL
36250686	SAML AUTH: XML CANONICALIZATION FOR ASSERTION CONTAINS SUPERFLUOUS XMLNS FROM ROOT NODE

Bug Number	Description
36253419	INTERACTIVE REPORT EDIT CONTROL BREAK DISPLAYS THE LAST CONTROL BROKEN COLUMN SELECTED MULTIPLE TIMES
36256303	WORKFLOW: FAULTED ACTIVITY CONTINUES TO SHOW ERROR MESSAGE AFTER COMPLETING SUCCESSFULLY ON RETRY
36259208	PAGE DESIGNER: DEPENDENT PROPERTY RE-APPEARS AT DIFFERENT POSITION WHEN BASE PROPERTY CHANGES
36272045	APPROVALS COMPONENT THROWS ORA-12899 WHEN LOG LEVEL IS SET TO TRACE AND THERE ARE TOO MANY PARTICIPANTS DEFINED
36286809	SAMPLE INTERACTIVE GRIDS APP: CONSOLE ERROR IS SEEN UPON SWITCHING FROM DETAIL VIEW TO ICON VIEW
36286891	SAMPLE INTERACTIVE GRIDS APP: COLUMN NAME GETS HIDDEN IF USER SELECTS MAXIMIZE IN 'FULL PAGE WITH MAXIMIZE'
36290103	APPROVAL COMPONENTS: UPDATE COMMENT THROWS ERROR IF TASK COMMENT LENGTH EXCEEDS 1980 BYTES
36292052	DATE PICKER: MONTH SELECTION SKIPS FEBRUARY WHEN MAX DATE IS SET TO MIDDLE OF FEBRUARY
36306455	MAP LAYER INITIALLY CONDITIONED OUT WITH "ONCE" CONDITION DOES NOT GET VISIBLE ON MAP REFRESH BY DYNAMIC ACTION
36313000	INTERACTIVE REPORT RAISES ORA-00935 FOR GROUP BY USING "PERCENT OF TOTAL SUM" WITH "SUM" ENABLED
36315116	PAGE DESIGNER: EDITOR POPUP STAYS OPEN AFTER QUICK EDIT REDIRECT
36316807	REMOVE "SERVER CACHE" PAGE DESIGNER ATTRIBUTES FOR REGIONS WHICH DON'T SUPPORT IT ANYWAY
36322432	APEX_DATA_EXPORT: DOWNLOAD FUNCTION HAS ISSUE WITH FILE NAME ENDING FOR SOME FILES
36333297	APEX_EXEC.PURGE_REST_SOURCE_CACHE DOES NOT WORK IF CACHE WAS POPULATED IN TRANSLATED APP
36343179	INCORRECT PARAMETERS ARE POPULATED WHEN SWITCHING REST SOURCE IN EXISTING INVOKE API PROCESS
36357084	COMPONENT EXPORT SHOULD ALWAYS EXPORT SPECIFIED CREDENTIALS OR REMOTE SERVERS EVEN WHEN NOT PART OF THE APP
36367339	DATA EXPORT: XLSX ISSUE WITH LONG TABLE HEADER
36368370	CONFIGURATION PROCEDURE RAISES ORA-06531 WHEN P_CONF.SUBSTITUTIONS IS NOT SET
36380982	REMOTE FILE SERVER IS ALWAYS STORED WHEN APPLICATION ATTRIBUTES PAGE IS SAVED
36385783	ORA-6502 BINDING CLOB-VALUED BIND VARIABLE IN CLASSIC REPORT QUERY
36392362	POPUP LOV: HASDISPLAYVALUE RETURN INCOSISTENT STATE WHEN ITEM IS SET BY JAVASCRIPT ON PAGE LOAD
36392729	PATCHING A LIST USING COMPONENT IMPORT DELETES REFERENCED SEARCH CONFIGURATIONS
36403627	APEX WEB SERVICE: POST REQUEST AGAINST OCI OBJECTSTORE RAISE AUTHORIZATION ERROR
36404734	APP GALLERY: INSTALLATION FAILS WHEN INSTALLING MULTIPLE APPS IN SEQUENCE
36404857	APEX_WORKFLOW.CONTINUE_ACTIVITY PARAMETERS DON'T UPDATE WORKFLOW VARIABLES

Bug Number	Description
36409786	ORA-6564: "OBJECT APEX_ADMIN DOES NOT EXIST" IN APEX_DEBUG_MESSAGES WHEN ORDS IS CONFIGURED IN RUNTIME-ONLY INSTANCE
36415267	APEX_UTIL.EDIT_USER DUPLICATES ROW IN WWW_FLOW_DEVELOPERS TABLE WHEN USER NAME IS CHANGED
36437024	HTML CODE %5C USED IN APEX URL (I.E SEARCH)
36440298	APEX_WORKSPACE_APEX_USERS VIEW DOES NOT EXPOSE WWW_FLOW_FND_USER.LAST_LOGIN COLUMN
36445098	ORA-6502 ERROR EXPORTING APP W/ LEGACY TAB WHEN READABLE YAML INCLUDED
36445345	MAP REGION DOES NOT SHOW MULTIPOINT GEOMETRIES (SDO_GEOMETRY.SDO_GTYPE=1005)
36445388	WORKSPACE UTILITIES: "REST SOURCE CATALOGS" OPTION IS NOT SHOWN WHEN "APP BACKUP LIMIT" WAS SET TO ZERO
36454980	GETTING ORA-06504 UPON CLICKING 'MY REQUESTS' OPTION IN SAMPLE APPROVALS APP
36455535	INTERACTIVE GRID, EDIT MODE, UNLABELED RADIO GROUP SHOWS LABEL IN PLACE OF THE FIRST OPTION FOR SCREEN READER USERS
36475766	REMOVE GET_VERSION_IDENTIFIER FUNCTIONS THAT RETURN SVN VERSION INFO
36482733	INTERACTIVE GRID, ENTERING AND LEAVING EDIT MODE IS NOT PERCEIVABLE BY SCREEN READER USERS
36493214	APEX_DATA_PARSER NEEDS SWITCH TO TURN OFF BACKSLASH ESCAPING FOR QUOTE CHARACTER
36498332	COPY AUTOMATION ALSO COPIES LAST RUN DATE
36505851	NEW NAVIGATION MENU LIST ENTRY IGNORED DURING MERGE IF IT HAS A PARENT MENU ITEM
36521675	PARTIAL TEMPLATES OF TEMPLATE COMPONENT PLUG-INS ARE ALWAYS INCLUDED IN XLIFF FILE
36529472	COPY SMART FILTERS PAGE IS BROKEN WHEN SMART FILTERS REGION IS CHILD OF ANOTHER REGION
36533627	CREATE TEXT MESSAGE SHOULD DEFAULT TO PRIMARY APPLICATION LANGUAGE
36575296	TEMPLATE COMPONENT PLUG-INS: STATIC FILES ARE NEVER LOADED WHEN PAGE IS RENDERED WITH NO DATA
36578089	PROVIDE ABILITY TO FIX STUCK REST SYNCHRONIZATION JOB
36580151	AUTOMATIONS AND REST SOURCE SYNC LOGS "JOB ALREADY RUNNING" FAILURE WITH SECURITY GROUP ID OF ZERO
36626153	INTERACTIVE GRID URL FILTERS ARE NOT RESPECTED THE FIRST TIME WHEN SESSION STATE COMMITS IS "END OF REQUEST"
36626574	SELECT MANY ITEM SIZE TOO SMALL WHEN NO FLOATING TEMPLATE
36642650	UPG: 19PT-> 23AI: APEX OBJECTS INVALID POST UPGRADE AND RUNNING UTLRP.SQL

10

Open Bugs and Known Issues

This section describes bugs and known issues for Oracle APEX release 24.1.

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-241-known-issues/>

Alternatively, you can view the Accessibility Conformance Report (ACR). The ACR includes details of all known issues with APEX. A single release of APEX uses multiple component ACRs for specific areas of the product (for example, "Development Environment", "Components", "Documentation", etc.) Please go to [Accessibility ACRs | Oracle's Accessibility Program](#) to find the ACRs for Oracle APEX.

- [Known Issue with ORDS 24.1 and APEX SQL Developer Web](#)
- [Known Issue for Sublists](#)
- [Known Issues for Working Copy Feature](#)
- [Known Issues for Workflow Component](#)
- [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](#)

10.1 Known Issue with ORDS 24.1 and APEX SQL Developer Web

When on an upgraded APEX 24.1 instance using ORDS version 24.1.0, if you click the link from APEX App Builder to SQL Developer Web, an error message ("Method Not Allowed") appears.

This bug is fixed in ORDS version 24.1.2.

10.2 Known Issue for Sublists

Currently, sublist entries are not included in list search results when the list search configuration is defined on the list referencing the sublist. This will be fixed in a future release.

10.3 Known Issues for Working Copy Feature

The known issues for the working copy feature are:

- **Server Error** message - If you are running APEX on database version 19c and using the new working copy feature, when you choose the actions **Merge into Main** or **Refresh from Main** or **Compare Changes**, you may get a "Server Error" message that is caused by an underlying ORA-00600 error message. For example:

```
ORA-00600: internal error code, arguments: [qjsnplsDecDomRefCnt:noValP],  
[], [], [], [], [], [], [], [], [], [], []
```

The fix for this error is to upgrade to 19.16 or higher.

- **ORA-00001** error during merge - The Working Copy feature raises an ORA-00001 unique constraint error when attempting to merge changes for component names that are not unique. It is important to coordinate the naming of shared components across working copies and the main application to avoid this error occurring.

10.4 Known Issues for Workflow Component

The known issues for the Workflow Component are:

- The workflow title can only use workflow parameters as substitution strings, but not any additional data source columns
- When using Workflow Designer in a Safari browser, arrows become straight lines in the Workflow Diagram Builder and the type text disappears under the Additional Data Property for workflow version.
- Terminating a Workflow does not auto-cancel the human task(s) created while executing the workflow.
- When deleting a workflow using the `Delete` key on the keyboard, there is no warning message. Deleting a workflow by right-clicking the workflow and selecting **Delete** provides a warning message and a prompt for user confirmation.

10.5 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.

10.6 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**.

10.7 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/>

10.8 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.

10.9 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.

10.10 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

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 customer access to and use of Oracle support services will be pursuant to the terms and conditions specified in their Oracle order for the applicable services.

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

- Object Browser - Session storage keys used for the Object Browser:
 - `ORA_WWV_apex.objectBrowser.openTabs` - Stores a JSON structure with information about the currently open object.
 - `ORA_WWV_apex.objectBrowser.viewState` - Stores view state for the current view of the current open object.
 - `ORA_WWV_apex.objectBrowser.lastSchema` - Stores an opaque number related to the last used schema.
 - `ORA_WWV_apex.objectBrowser.treeExpansionState` - Stores a list of expanded tree nodes.
 - `ORA_WWV_apex.objectBrowser.treeSelection` - Stores the selected tree node.
 - `ORA_WWV_apex.objectBrowser.objectFilter` - Stores the current filter.
- 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*.

Index

B

browser
 requirement, [1-1](#)

I

installation
 enabling network services, [3-7](#)

N

network services
 enabling, [3-7](#)
 granting connect privileges, Oracle Database
 12c, [3-8](#)
 invalid ACL error, [3-9](#)

O

Oracle APEX
 browser requirement, [1-1](#)

R

release numbering
 convention, [1-2](#)
requirements
 browser, [1-1](#)

W

Web browser
 requirements, [1-1](#)
web server
 Oracle REST Data Services, [1-2](#)
 requirements, [1-2](#)