Oracle® APEX
API Reference

Release 22.1
F51980-03
June 2022

Oracle APEX API Reference, Release 22.1

F51980-03

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Preface

Oracle APEX API Reference describes the available Application Programming Interfaces (APIs) when programming in the Oracle APEX environment. To utilize these APIs, such as APEX_JSON, when not developing with APEX, you must install APEX into the database.

Audience

Oracle APEX API Reference is intended for application developers who are building database-centric web applications using Oracle APEX. The guide describes the APIs available when programming in the APEX environment.

To use this guide, you need to have a general understanding of relational database concepts and an understanding of the operating system environment under which you are running APEX.

> **See Also:**
>
> *Oracle APEX App Builder User's Guide*

Documentation Accessibility

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Diversity and Inclusion

Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our products and documentation. We are also mindful of the necessity to maintain compatibility with our customers' existing technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.

Related Documents

For more information, see these Oracle resources:

- *Oracle APEX Release Notes*
- *Oracle APEX Installation Guide*
- *Oracle APEX App Builder User's Guide*
- *Oracle APEX Administration Guide*
- *Oracle APEX SQL Workshop Guide*
- *Oracle APEX End User's Guide*
- *Oracle Database Concepts*
- *Oracle Database Administrator's Guide*
- *Oracle Database SQL Language Reference*
- *SQL*Plus User's Guide and Reference*
- *Oracle Database PL/SQL Language Reference*

Conventions

For a description of PL/SQL subprogram conventions, refer to the *Oracle Database PL/SQL Language Reference*. This document contains the following information:

- Specifying subprogram parameter modes
- Specifying default values for subprogram parameters
- Overloading PL/SQL subprogram Names

The following text conventions are used in this document:

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

1

Changes in Release 22.1 for *Oracle APEX API Reference*

All content in *Oracle APEX API Reference* has been updated to reflect release 22.1 functionality.

New Features and Updates

The following topics have been added or updated for this release:

- APEX_APPLICATION_INSTALL (Updates)
  - `SET_REMOTE_SERVER` Procedure (Updates) - New parameters `p_default_database` and `p_mysql_sql_modes`.
- APEX_AUTHENTICATION (Updates)
  - `LOGIN` (Update) - New parameter `p_set_persistent_auth`.
  - `PERSISTENT_AUTH_ENABLED` Function (New) - Returns whether persistent authentication is enabled at instance level.
  - `REMOVE_CURRENT_PERSISTENT_AUTH` Procedure (New) - Removes all Persistent Authentication entries for a user and ends all related sessions in the current workspace.
  - `REMOVE_PERSISTENT_AUTH` Procedure (New) - Removes all Persistent Authentication entries for a user and ends all related sessions in the current workspace.
- APEX_AUTOMATION (Updates)
  - `ABORT` Procedure (New) - Aborts a currently executing automation.
  - `GET_SCHEDULER_JOB_NAME` Function (New) - Returns the name which is used for the scheduler job when the automation executes.
  - `IS_RUNNING` Function (New) - Determines whether a given automation is currently running.
- APEX_CSS (Updates)
  - `ADD_3RD_PARTY_LIBRARY_FILE` Procedure (Updates) - New attribute `p_attributes`.
  - `ADD_FILE` Procedure (Updates) - New attribute `p_attributes`.
- APEX_DG_DATA_GEN (New) - API package for the new Data Generator feature in SQL Workshop.
- APEX_EXEC (Updates)
  - Constants (Updates):
    - Database Vendor Constants (New)
    - Aggregation Type Constants (New)
    - Aggregation Column Role Constants (New)

    - Aggregation Function Constants (New)
    - Aggregation Columns (New)
    - Collection of Aggregation Columns (New)
    - Aggregation (New)
  - `ENQUOTE_LITERAL` Function (New) - Enquote a string literal and escape contained quotes.
  - `ENQUOTE_NAME` Function (New) - Enquote a database object name and escape contained quotes.
  - `OPEN_QUERY_CONTEXT` Function (Updates) - New parameter `p_aggregation`.
  - `OPEN_QUERY_CONTEXT` Procedure (Updates) - New parameter `p_aggregation`.
  - `OPEN_REST_SOURCE_QUERY` Function (Updates) - New parameter `p_aggregation`.
  - `OPEN_WEB_SOURCE_QUERY` Function (Deprecated) (Updates) - New parameter `p_aggregation`.
- APEX_INSTANCE_ADMIN (Updates)
  - New parameter `SAML_NAMEID_FORMAT`.
- APEX_JAVASCRIPT (Updates)
  - `ADD_3RD_PARTY_LIBRARY_FILE` Procedure (Updates) - New attribute `p_attributes`.
  - `ADD_LIBRARY` Procedure (Updates) - New attributes: `p_is_module`, `p_is_async`, `p_is_defer`, and `p_attributes`.
- APEX_JSON (Updates)
  - `GET_VALUE_KIND` Function (New) - Returns the kind of the value at a path position.
- APEX_MARKDOWN (Updates)
  - TO_HTML Function (Updates) - Function now supports passing content as CLOB. Default behavior of parameter `p_softbreak` changed to `<br />`.
- APEX_PLUGIN_UTIL (Updates)
  - `GET_CURRENT_DATABASE_TYPE` Function (New) - Retrieves the database type for the currently active region.
- APEX_STRING (Updates)
  - New supported data type `apex_t_clob`.
  - `JOIN_CLOBS` Function (New) - Returns the values of the `apex_t_clob` input table `p_table` as a concatenated clob, separated by `p_sep`.
  - `SPLIT_CLOBS` Function (New) - Splits input clobs at the separator and returns a table of clobs.
  - `PUSH` Procedure Signtaure 5 (New) - Appends collection values to the `apex_t_clob` table.
  - `PUSH` Procedure Signtaure 6 (New) - Appends values of a PL/SQL table to the `apex_t_varchar2` table.

- APEX_WEB_SERVICE (Updates)
  - `CLEAR_REQUEST_COOKIES` Procedure (New) - Clears all cookies, so that the next MAKE_REST_REQUEST call executes without sending any cookies.
  - `CLEAR_REQUEST_HEADERS` Procedure (New) - clears the current request headers.

Deprecated and Desupported Features

- APEX_IR
  - `GET_REPORT` Function (Deprecated) - This function is deprecated as of this release and will be removed in a future release. Use `APEX_REGION.OPEN_QUERY_CONTEXT` Function instead.

See Deprecated Features and Desupported Features in *Oracle APEX Release Notes* .

2
APEX_ACL

The APEX_ACL package provides utilities that you can use when programming in the Oracle APEX environment related to application access control shared components. You can use APEX_ACL package to add, remove, or replace user roles. You can also take advantage of INSTEAD OF trigger on APEX_APPL_ACL_USERS view to edit user roles with DML statements (INSERT, UPDATE, and DELETE).

If the package is used outside of an Oracle APEX environment, the security_group_id must be set using either APEX_UTIL.SET_WORKSPACE or APEX_UTIL.SET_SECURITY_GROUP_ID before the call. Use the related APEX views to get more information on application users and roles are APEX_APPL_ACL_ROLES, APEX_APPL_ACL_USERS, and APEX_APPL_ACL_USER_ROLES.

2.1 ADD_USER_ROLE Procedure Signature 1

This procedure assigns a role to a user.

Syntax

```
APEX_ACL.ADD_USER_ROLE (
    p_application_id  IN NUMBER DEFAULT apex_application.g_flow_id,
    p_user_name       IN VARCHAR2,
    p_role_id         IN NUMBER );
```

Parameters

Table 2-1 ADD_USER_ROLE Procedure Signature 1 Parameters

Parameter	Description
p_application_id	The application ID for which you want to assign role to a user. Defaults to the current application.

Table 2-1 (Cont.) ADD_USER_ROLE Procedure Signature 1 Parameters

Parameter	Description
p_user_name	The case insensitive name of the application user to assign the role to.
p_role_id	The ID of the role.

Example

The following example shows how to use ADD_USER_ROLE procedure to assign role ID of 2505704029884282 to the user name called 'SCOTT' in application 255.

```
begin
    APEX_ACL.ADD_USER_ROLE (
        p_application_id => 255,
        p_user_name      => 'SCOTT',
        p_role_id        => 2505704029884282 );
end;
```

2.2 ADD_USER_ROLE Procedure Signature 2

This procedure assigns a role to a user.

Syntax

```
APEX_ACL.ADD_USER_ROLE (
    p_application_id IN NUMBER  DEFAULT apex_application.g_flow_id,
    p_user_name      IN VARCHAR2,
    p_role_static_id IN VARCHAR2 );
```

Parameters

Table 2-2 ADD_USER_ROLE Procedure Signature 2 Parameters

Parameter	Description
p_application_id	The application ID for which you want to assign role to a user. Defaults to the current application.
p_user_name	The case insensitive name of the application user to assign the role to.
p_role_static_id	The case insensitive name of the role static ID.

Example

The following example shows how to use ADD_USER_ROLE procedure to assign role static ID 'ADMINISTRATOR' to the user name called 'SCOTT' in application 255.

```
begin
    APEX_ACL.ADD_USER_ROLE (
        p_application_id => 255,
```

```
        p_user_name      => 'SCOTT',
        p_role_static_id => 'ADMINISTRATOR' );
end;
```

2.3 HAS_USER_ANY_ROLES Function

This function returns `TRUE` when the specified user is assigned to any application role. This function can be used to check if a user is permitted to access an application.

Syntax

```
APEX_ACL.HAS_USER_ANY_ROLES (
    p_application_id IN NUMBER   DEFAULT apex_application.g_flow_id,
    p_user_name      IN VARCHAR2 DEFAULT apex_application.g_user )
    RETURN boolean;
```

Parameters

Table 2-3 HAS_USER_ANY_ROLES Function Parameters

Parameter	Description
`p_application_id`	The application ID for which you want to check if a user is assigned to any application role. Defaults to the current application.
`p_user_name`	The case insensitive name of the application user to check. Defaults to the current logged-in user.

Example

The following example shows how to use `HAS_USER_ANY_ROLES` function to check if the user name `SCOTT` is assigned to any application role in application `255`.

```
DECLARE
    l_has_user_any_roles boolean := false;
BEGIN
    l_has_user_any_roles := APEX_ACL.HAS_USER_ANY_ROLES (
                              p_application_id  => 255,
                              p_user_name       => 'SCOTT' );

    IF NOT l_has_user_any_roles THEN
        raise_application_error(-20001, 'Scott is not assigned to any
application role' );
    END IF;
END;
```

2.4 HAS_USER_ROLE Function

This function returns `TRUE` if, the user is assigned to the specified role.

Syntax

```
APEX_ACL.HAS_USER_ROLE (
    p_application_id IN NUMBER   default apex_application.g_flow_id,
    p_user_name      IN VARCHAR2 default apex_application.g_user,
    p_role_static_id IN VARCHAR2 )
    return boolean;
```

Parameters

Table 2-4 HAS_USER_ROLE Function Parameters

Parameter	Description
p_application_id	The application ID for which you want to check if a user is assigned to the specific role. Defaults to the current application.
p_user_name	The case insensitive name of the application user to check. It defaults to the current logged in user.
p_role_static_id	The case insensitive name of the role static ID.

Example

The following example shows how to use `HAS_USER_ROLE` function to check if the user name called `'SCOTT'` is assigned to role static IDs of `'ADMINISTRATOR'` in application `255`.

```
declare
    l_is_admin boolean := false;
begin
    l_is_admin := APEX_ACL.HAS_USER_ROLE (
                    p_application_id  => 255,
                    p_user_name       => 'SCOTT',
                    p_role_static_id  => 'ADMINISTRATOR' );

    if not l_is_admin then
        raise_application_error(-20001, 'Scott is NOT an
administrator' );
    end if;
end;
```

2.5 IS_ROLE_REMOVED_FROM_USER Function

This function checks if a role is removed from a user. This function returns `TRUE` if a specific role is removed from the list of new role IDs for the user.

Syntax

```
APEX_ACL.IS_ROLE_REMOVED_FROM_USER (
    p_application_id    IN NUMBER       DEFAULT
apex_application.g_flow_id,
    p_user_name         IN VARCHAR2,
```

```
    p_role_static_id    IN VARCHAR2,
    p_role_ids          IN apex_t_number )
    RETURN BOOLEAN;
```

Parameters

Table 2-5 IS_ROLE_REMOVED_FROM_USER Parameters

Parameter	Description
p_application_id	The application ID for which you want to check if specific role removed from the list of roles from a user. It defaults to the current application.
p_user_name	The case insensitive name of the application user to check.
p_role_static_id	The case insensitive name of the role static ID to check if it is removed.
p_role_ids	The array of NUMBER type new role IDs the user is assigned to.

Example

The following example uses the `IS_ROLE_REMOVED_FROM_USER` function to check if role static ID of `ADMINISTRATOR` is removed from the new role IDs of `2505704029884282`, `345029884282` for user name `SCOTT` in application `255`.

```
DECLARE
    is_role_removed boolean := false;
BEGIN
    is_role_removed := apex_acl.is_role_removed_from_user (
                         p_application_id => 255,
                         p_user_name => 'SCOTT',
                         p_role_static_id => 'ADMINISTRATOR',
                         p_role_ids => apex_t_number( 2505704029884282,
345029884282 ) );

    IF NOT is_role_removed THEN
        raise_application_error(-20001, 'ADMINISTRATOR role is not removed
from SCOTT.' );
    END IF;
END;
```

2.6 REMOVE_USER_ROLE Procedure Signature 1

This procedure removes an assigned role from a user.

Syntax

```
APEX_ACL.REMOVE_USER_ROLE (
    p_application_id IN NUMBER   DEFAULT apex_application.g_flow_id,
    p_user_name      IN VARCHAR2,
    p_role_id        IN NUMBER );
```

Parameters

Table 2-6 REMOVE_USER_ROLE Procedure Signature 1 Parameters

Parameter	Description
p_application_id	The application ID from which you want to remove an assigned role from a user. Defaults to the current application.
p_user_name	The case insensitive name of the application user to remove the role from.
p_role_id	The ID of the role.

Example

The following example shows how to use REMOVE_USER_ROLE procedure to remove role ID of 2505704029884282 from the user name called 'SCOTT' in application 255.

```
begin
    APEX_ACL.REMOVE_USER_ROLE (
        p_application_id => 255,
        p_user_name      => 'SCOTT',
        p_role_id        => 2505704029884282 );
end;
```

2.7 REMOVE_USER_ROLE Procedure Signature 2

This procedure removes an assigned role from a user.

Syntax

```
APEX_ACL.REMOVE_USER_ROLE (
        p_application_id IN NUMBER   DEFAULT
apex_application.g_flow_id,
        p_user_name      IN VARCHAR2,
        p_role_static_id IN VARCHAR2 );
end;
```

Parameters

Table 2-7 REMOVE_USER_ROLE Procedure Signature 2 Parameters

Parameter	Description
p_application_id	The application ID from which you want to remove an assigned role from a user. It defaults to the current application.
p_user_name	The case insensitive name of the application user to remove the role from.
p_role_static_id	The case insensitive name of the role static ID.

Example

The following example shows how to use `REMOVE_USER_ROLE` procedure to remove role static ID `'ADMINISTRATOR'` from the user name `'SCOTT'` in application `255`.

```
begin
    APEX_ACL.REMOVE_USER_ROLE (
        p_application_id => 255,
        p_user_name => 'SCOTT',
        p_role_static_id => 'ADMINISTRATOR' );
end;
```

2.8 REPLACE_USER_ROLES Procedure Signature 1

This procedure replaces any existing assigned user roles to new array of roles.

Syntax

```
APEX_ACL.REPLACE_USER_ROLES (
    p_application_id IN NUMBER   DEFAULT apex_application.g_flow_id,
    p_user_name      IN VARCHAR2,
    p_role_ids       IN apex_t_number );
```

Parameters

Table 2-8 REPLACE_USER_ROLES Procedure Signature 1 Parameters

Parameter	Description
`p_application_id`	The application ID for which you want to replace user role. Defaults to the current application.
`p_user_name`	The case insensitive name of the application user to replace the role.
`p_role_ids`	The array of `NUMBER` type role IDs.

Example

The following example shows how to use `REPLACE_USER_ROLES` procedure to replace existing roles to new role IDs of `2505704029884282`, `345029884282` for the user name called `'SCOTT'` in application `255`.

```
begin
    APEX_ACL.REPLACE_USER_ROLES (
        p_application_id => 255,
        p_user_name      => 'SCOTT',
        p_role_ids       => apex_t_number( 2505704029884282,
345029884282 ) );
end;
```

2.9 REPLACE_USER_ROLES Procedure Signature 2

This procedure replaces any existing assigned user roles to new array of roles.

Syntax

```
APEX_ACL.REPLACE_USER_ROLES (
    p_application_id  IN NUMBER   default apex_application.g_flow_id,
    p_user_name       IN VARCHAR2,
    p_role_static_ids IN apex_t_varchar2 );
```

Parameters

Table 2-9 REPLACE_USER_ROLES Procedure Signature 2 Parameters

Parameter	Description
`p_application_id`	The application ID for which you want to replace user role. Defaults to the current application.
`p_user_name`	The case insensitive name of the application user to replace the role.
`p_role_static_ids`	The array of case insensitive `VARCHAR2` type of role static IDs.

Example

The following example shows how to use `REPLACE_USER_ROLES` procedure to replace existing roles to new role static IDs of `'ADMINISTRATOR'` and `'CONTRIBUTOR'` for the user name called `'SCOTT'` in application `255`.

```
begin
    APEX_ACL.REPLACE_USER_ROLES (
        p_application_id  => 255,
        p_user_name       => 'SCOTT',
        p_role_static_ids => apex_t_varchar2( 'ADMINISTRATOR',
'CONTRIBUTOR' ) );
end;
```

2.10 REMOVE_ALL_USER_ROLES Procedure

This procedure removes all assigned roles from a user.

Syntax

```
APEX_ACL.REMOVE_ALL_USER_ROLES (
    p_application_id IN NUMBER   default apex_application.g_flow_id,
    p_user_name      IN VARCHAR2 );
```

Parameters

Table 2-10 REMOVE_ALL_USER_ROLES Procedure Parameters

Parameter	Description
p_application_id	The application ID for which you want to remove all assigned roles from a user. Defaults to the current application.
p_user_name	The case insensitive name of the application user to remove all assigned roles.

Example

The following example shows how to use REMOVE_ALL_USER_ROLES procedure to removes all assigned roles from the user name called 'SCOTT' in application 255.

```
begin
    APEX_ACL.REMOVE_ALL_USER_ROLES (
        p_application_id  => 255,
        p_user_name       => 'SCOTT' );
end;
```

3
APEX_APPLICATION

The APEX_APPLICATION package is a PL/SQL package that implements the Oracle APEX rendering engine. You can use this package to take advantage of many global variables.

3.1 Working with G_Fnn Arrays (Legacy)

> **Important:**
>
> Support for G_Fnn arrays is legacy and will be removed in a future release. Oracle recommends using interactive grids instead.

The APEX_APPLICATION.G_Fnn arrays (where *nn* ranges from 01 to 50) are used with APEX_ITEM functions to enable the dynamic generation of HTML form elements to an APEX page (such as APEX_ITEM.TEXT and APEX_ITEM.SELECT_LIST). On Page Submit, the item values are sent to the server and provided as the APEX_APPLICATION.G_Fnn arrays.

Only use APEX_APPLICATION.G_Fnn in an APEX_ITEM context. For other contexts (such as plain array processing for PL/SQL code) use the APEX_T_VARCHAR2 type and the procedures and functions within the APEX_STRING package.

> **Note:**
>
> When working with APEX_APPLICATION.G_Fnn, the TABLE_TO_STRING and STRING_TO_TABLE functions in APEX_UTIL are deprecated. Use APEX_STRING.TABLE_TO_STRING and APEX_STRING.STRING_TO_TABLE instead.

Referencing G_Fnn Arrays

The following example uses APEX_ITEM to manually create a tabular form on the EMP table. Note that the ename, sal, and comm columns use the APEX_ITEM.TEXT function to generate an HTML text field for each row. Note also that each item in the query is passed a unique p_idx parameter to ensure that each column is stored in its own array.

1. On a new page, add a classic report with a SQL Query such as the following example:

```
SELECT
  empno,
```

```
  APEX_ITEM.HIDDEN(1,empno)||
  APEX_ITEM.TEXT(2,ename) ename,
  APEX_ITEM.TEXT(3,job) job,
  mgr,
  APEX_ITEM.DATE_POPUP(4,rownum,hiredate,'dd-mon-yyyy') hiredate,
  APEX_ITEM.TEXT(5,sal) sal,
  APEX_ITEM.TEXT(6,comm) comm,
  deptno
FROM emp
ORDER BY 1
```

2. Disable "Escape Special Characters" for all report columns (under the Security property in Page Designer).
3. Add a Submit button to the page.
4. Run the application.

Referencing Values Within an On Submit Process

You can reference the values posted by the tabular form using the PL/SQL variable `APEX_APPLICATION.G_F01` to `APEX_APPLICATION.G_F50`. Because this element is an array, you can reference values directly. For example, the following code block collects all employee names as a text block and stores it as the value of the `P3_G_F01_CONTENTS` item:

```
:P3_G_F01_CONTENTS := '';
for i IN 1..APEX_APPLICATION.G_F01.COUNT LOOP
    :P3_G_F01_CONTENTS := :P3_G_F01_CONTENTS
                        || 'element '||I||' has a value of '||
APEX_APPLICATION.G_F02(i) || chr(10);
END LOOP;
```

Note that check boxes displayed using `APEX_ITEM.CHECKBOX` only contain values in the `APEX_APPLICATION` arrays for those rows which are checked. Unlike other items (`TEXT`, `TEXTAREA`, and `DATE_POPUP`) which can contain an entry in the corresponding `APEX_APPLICATION` array for every row submitted, a check box only has an entry in the `APEX_APPLICATION` array if it is selected.

See Also:

- APEX_IG
- APEX_ITEM (Legacy)
- APEX_STRING
- STRING_TO_TABLE Function
- TABLE_TO_STRING Function

3.2 Global Variables

Table 3-1 Global Variables Available in APEX_APPLICATION

Global Variable	Description
G_USER	Specifies the currently logged in user.
G_FLOW_ID	Specifies the ID of the currently running application.
G_FLOW_STEP_ID	Specifies the ID of the currently running page.
G_FLOW_OWNER	Defaults to the application's parsing schema. Use #OWNER# to reference this value in SQL queries and PL/SQL. **Note:** Changing G_FLOW_OWNER at runtime does not change the parsing schema.
G_REQUEST	Specifies the value of the request variable most recently passed to or set within the show or accept modules.
G_BROWSER_LANGUAGE	Refers to the web browser's current language preference.
G_DEBUG	Refers to whether debugging is switched on or off. Valid values for the DEBUG flag are Yes or No. Enabling debug shows details about application processing.
G_HOME_LINK	Refers to the home page of an application. If no page is given and if no alternative page is dictated by the authentication scheme's logic, the Oracle APEX engine redirects to this location.
G_LOGIN_URL	Used to display a link to a login page for users that are not currently logged in.
G_IMAGE_PREFIX	Refers to the virtual path the web server uses to point to the images directory distributed with APEX.
G_FLOW_SCHEMA_OWNER	Refers to the owner of the APEX schema.
G_PRINTER_FRIENDLY	Refers to whether the APEX engine is running in print view mode. This setting can be referenced in conditions to eliminate elements not desired in a printed document from a page.
G_PROXY_SERVER	Refers to the application attribute Proxy Server.
G_SYSDATE	Refers to the current date on the database server. G_SYSDATE uses the DATE datatype.
G_PUBLIC_USER	Refers to the Oracle schema used to connect to the database through the database access descriptor (DAD).
G_GLOBAL_NOTIFICATION	Specifies the application's global notification attribute.
G_X01, ... G_X10	Specifies the values of the X01, ... X10 variables most recently passed to or set within the show or accept modules. You typically use these variables in On-Demand AJAX processes.

3.3 HELP Procedure

This function outputs page and item level help text as formatted HTML. You can also use it to customize how help information is displayed in your application.

Syntax

```
APEX_APPLICATION.HELP (
    p_request             IN VARCHAR2 DEFAULT NULL,
    p_flow_id             IN VARCHAR2 DEFAULT NULL,
    p_flow_step_id        IN VARCHAR2 DEFAULT NULL,
    p_show_item_help      IN VARCHAR2 DEFAULT 'YES',
    p_show_regions        IN VARCHAR2 DEFAULT 'YES',
    p_before_page_html    IN VARCHAR2 DEFAULT '<p>',
    p_after_page_html     IN VARCHAR2 DEFAULT NULL,
    p_before_region_html  IN VARCHAR2 DEFAULT NULL,
    p_after_region_html   IN VARCHAR2 DEFAULT '</td></tr></table></p>',
    p_before_prompt_html  IN VARCHAR2 DEFAULT '<p><b>',
    p_after_prompt_html   IN VARCHAR2 DEFAULT '</b></p>: ',
    p_before_item_html    IN VARCHAR2 DEFAULT NULL,
    p_after_item_html     IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 3-2 describes the parameters available in the HELP procedure.

Table 3-2 HELP Parameters

Parameter	Description
p_request	Not used.
p_flow_id	The application ID that contains the page or item level help you want to output.
p_flow_step_id	The page ID that contains the page or item level help you want to display.
p_show_item_help	Flag to determine if item level help is output. If this parameter is supplied, the value must be either 'YES' or 'NO', if not the default value is 'YES'.
p_show_regions	Flag to determine if region headers are output (for regions containing page items). If this parameter is supplied, the value must be either 'YES' or 'NO', if not the default value is 'YES'.
p_before_page_html	Use this parameter to include HTML between the page level help text and item level help text.
p_after_page_html	Use this parameter to include HTML at the bottom of the output, after all other help.

Table 3-2 (Cont.) HELP Parameters

Parameter	Description
p_before_region_html	Use this parameter to include HTML before every region section. Note this parameter is ignored if p_show_regions is set to 'NO'.
p_after_region_html	Use this parameter to include HTML after every region section. Note this parameter is ignored if p_show_regions is set to 'NO'.
p_before_prompt_html	Use this parameter to include HTML before every item label for item level help. Note this parameter is ignored if p_show_item_help is set to 'NO'.
p_after_prompt_html	Use this parameter to include HTML after every item label for item level help. Note this parameter is ignored if p_show_item_help is set to 'NO'.
p_before_item_html	Use this parameter to include HTML before every item help text for item level help. Note this parameter is ignored if p_show_item_help is set to 'NO'.
p_after_item_html	Use this parameter to include HTML after every item help text for item level help. Note this parameter is ignored if p_show_item_help is set to 'NO'.

Example

The following example shows how to use the APEX_APPLICATION.HELP procedure to customize how help information is displayed.

In this example, the p_flow_step_id parameter is set to :REQUEST, which means that a page ID specified in the REQUEST section of the URL controls which page's help information to display (see note after example for full details on how this can be achieved).

Also, the help display has been customized so that the region sub-header now has a different color (through the p_before_region_html parameter) and also the ':' has been removed that appeared by default after every item prompt (through the p_after_prompt_html parameter).

```
APEX_APPLICATION.HELP(
    p_flow_id => :APP_ID,
    p_flow_step_id => :REQUEST,
    p_before_region_html => '<p><br/><table class="u-info"
width="100%"><tr><td><b>',
    p_after_prompt_html  => '</b></p>  ');
```

To implement this type of call in your application, you can do the following:

1. Create a page that will be your application help page.

2. Create a region of type 'PL/SQL Dynamic Content' and add the `APEX_APPLICATION.HELP` call as PL/SQL Source.
3. Then you can add a 'Navigation Bar' link to this page, ensuring that the REQUEST value set in the link is `&APP_PAGE_ID`.

3.4 STOP_APEX_ENGINE Procedure

This procedure signals the Oracle APEX engine to stop further processing and immediately exit to avoid adding additional HTML code to the HTTP buffer.

> **Note:**
>
> This procedure raises the exception `APEX_APPLICATION.E_STOP_APEX_ENGINE` internally. You must raise that exception again if you use a WHEN OTHERS exception handler.

Syntax

```
APEX_APPLICATION.STOP_APEX_ENGINE
```

Parameters

None.

Example 1

This example tells the browser to redirect to `http://apex.oracle.com/` and immediately stops further processing.

```
owa_util.redirect_url('http://apex.oracle.com');
apex_application.stop_apex_engine;
```

Example 2

This example tells the browser to redirect to `http://apex.oracle.com/` and immediately stops further processing. The code also contains a WHEN OTHERS exception handler which deals with the `APEX_APPLICATION.E_STOP_APEX_ENGINE` used by `APEX_APPLICATION.STOP_APEX_ENGINE`.

```
BEGIN
    ... code which can raise an exception ...
    owa_util.redirect_url('http://apex.oracle.com');
    apex_application.stop_apex_engine;
EXCEPTION
    WHEN apex_application.e_stop_apex_engine THEN
        RAISE; -- raise again the stop APEX engine exception
    WHEN others THEN
        ...; -- code to handle the exception
END;
```

4
APEX_APPLICATION_INSTALL

The `APEX_APPLICATION_INSTALL` package provides many methods to modify application attributes during the Oracle APEX application installation process.

4.1 About the APEX_APPLICATION_INSTALL API

Oracle APEX provides two ways to import an application into an APEX instance:

1. Uploading an application export file by using the web interface of APEX.
2. Execution of the application export file as a SQL script, typically in the command-line utility SQL*Plus.

Using the file upload capability of the web interface of APEX, developers can import an application with a different application ID, different workspace ID and different parsing schema. But when importing an application by using a command-line tool like SQL*Plus, none of these attributes (application ID, workspace ID, parsing schema) can be changed without directly modifying the application export file.

To view the install log, enter the following from the command-line tool, so the server outputs are displayed:

```
set serveroutput on unlimited
```

As more and more APEX customers create applications which are meant to be deployed by using command-line utilities or by using a non-web-based installer, they are faced with this challenge of how to import their application into an arbitrary workspace on any APEX instance.

Another common scenario is in a training class when installing an application into 50 different workspaces that all use the same application export file. Today, customers work around this by adding their own global variables to an application export file and then varying the values of these globals at installation time. However, this manual modification of the application export file (usually done with a post-export sed or awk script) should not be necessary.

Application Express 4.0 and higher includes the APEX_APPLICATION_INSTALL API. This PL/SQL API provides many methods to set application attributes during the APEX application installation process. All export files in Application Express 4.0 and higher contain references to the values set by the APEX_APPLICATION_INSTALL API. However, the methods in this API is only used to override the default application installation behavior.

4.2 Attributes Manipulated by APEX_APPLICATION_INSTALL

The table below lists the attributes that can be set by functions in this API.

Table 4-1 Attributes Manipulated by the APEX_APPLICATION_INSTALL API

Attribute	Description
`Workspace ID`	Workspace ID of the imported application. See GET_WORKSPACE_ID Function, SET_WORKSPACE_ID Procedure.
`Application ID`	Application ID of the imported application. See GENERATE_APPLICATION_ID Procedure, GET_APPLICATION_ID Function, SET_APPLICATION_ID Procedure.
`Offset`	Offset value used during application import. See GENERATE_OFFSET Procedure, GET_OFFSET Function, SET_OFFSET Procedure.
`Schema`	The parsing schema ("`owner`") of the imported application. See GET_SCHEMA Function, SET_SCHEMA Procedure.
`Name`	Application name of the imported application. See GET_APPLICATION_NAME Function, SET_APPLICATION_NAME Procedure.
`Alias`	Application alias of the imported application. See GET_APPLICATION_ALIAS Function, SET_APPLICATION_ALIAS Procedure.
`Image Prefix`	The image prefix of the imported application. See GET_IMAGE_PREFIX Function, SET_IMAGE_PREFIX Procedure.
`Proxy`	The proxy server attributes of the imported application. See GET_PROXY Function, SET_PROXY Procedure.

4.3 Import Data Types

The section describes import data types used by the `APEX_APPLICATION_INSTALL` package.

t_file_type

`t_file_type` data types define the kinds of install files.

```
subtype t_file_type is pls_integer range 1 .. 5;
c_file_type_workspace           constant t_file_type := 1;
c_file_type_app                 constant t_file_type := 2;
c_file_type_websheet            constant t_file_type := 3;
c_file_type_plugin              constant t_file_type := 4;
c_file_type_css                 constant t_file_type := 5;
```

> **Note:**
>
> The constant `c_file_type_websheet` is no longer used in APEX and is obsolete.

t_app_usage

`t_app_usage` data types define the kinds of application usage.

```
subtype t_app_usage is pls_integer range 1..3;
c_app_usage_not_used            constant t_app_usage := 1;
c_app_usage_current_workspace   constant t_app_usage := 2;
c_app_usage_other_workspace     constant t_app_usage := 3;
```

t_file_info

t_file_info data types specify information in a source file that can be used to configure the installation.

```
type t_file_info is record (
     file_type                  t_file_type,
     workspace_id               number,
     version                    varchar2(10),
     app_id                     number,
     app_name                   varchar2(4000),
     app_alias                  varchar2(4000),
     app_owner                  varchar2(4000),
     build_status               varchar2(4000),
     has_install_script         boolean,
     app_id_usage               t_app_usage,
     app_alias_usage            t_app_usage );
```

4.4 Import Script Examples

Using the workspace FRED_DEV on the development instance, you generate an application export of application 645 and save it as file f645.sql. All examples in this section assume you are connected to SQL*Plus.

Import Application without Modification

To import this application back into the FRED_DEV workspace on the same development instance using the same application ID:

@f645.sql

Import Application with Specified Application ID

To import this application back into the FRED_DEV workspace on the same development instance, but using application ID 702:

```
BEGIN
  apex_application_install.set_application_id( 702);
  apex_application_install.generate_offset;
  apex_application_install.set_application_alias( 'F' ||
apex_application_install.get_application_id );
END;
/
```

```
@645.sql
```

Import Application with Generated Application ID

To import this application back into the FRED_DEV workspace on the same development instance, but using an available application ID generated by Oracle APEX :

```
BEGIN
  apex_application_install.generate_application_id;
  apex_application_install.generate_offset;
  apex_application_install.set_application_alias( 'F' ||
apex_application_install.get_application_id );
END;
/

@f645.sql
```

Import Application into Different Workspace using Different Schema

To import this application into the FRED_PROD workspace on the production instance, using schema FREDDY, and the workspace ID of FRED_DEV and FRED_PROD are different:

```
BEGIN
    apex_application_install.set_workspace('FRED_PROD');
    apex_application_install.generate_offset;
    apex_application_install.set_schema( 'FREDDY' );
    apex_application_install.set_application_alias( 'FREDPROD_APP' );
END;
/

@f645.sql
```

Import into Training Instance for Three Different Workspaces

To import this application into the Training instance for 3 different workspaces:

```
BEGIN
    apex_application_install.set_workspace('TRAINING1');
    apex_application_install.generate_application_id;
    apex_application_install.generate_offset;
    apex_application_install.set_schema( 'STUDENT1' );
    apex_application_install.set_application_alias( 'F' ||
apex_application_install.get_application_id );
END;
/

@f645.sql

BEGIN
    apex_application_install.set_workspace('TRAINING2');
    apex_application_install.generate_application_id;
    apex_application_install.generate_offset;
    apex_application_install.set_schema( 'STUDENT2' );
```

```
    apex_application_install.set_application_alias( 'F' ||
apex_application_install.get_application_id );
END;
/

@f645.sql

BEGIN
    apex_application_install.set_workspace('TRAINING3');
    apex_application_install.generate_application_id;
    apex_application_install.generate_offset;
    apex_application_install.set_schema( 'STUDENT3' );
    apex_application_install.set_application_alias( 'F' ||
apex_application_install.get_application_id );
    END;
/

@f645.sql
```

4.5 CLEAR_ALL Procedure

This procedure clears all values currently maintained in the `APEX_APPLICATION_INSTALL` package.

Syntax

```
APEX_APPLICATION_INSTALL.CLEAR_ALL;
```

Parameters

None.

Example

The following example clears all values currently set by the `APEX_APPLICATION_INSTALL` package.

```
begin
    apex_application_install.clear_all;
end;
```

4.6 GENERATE_APPLICATION_ID Procedure

This procedure generates an available application ID on the instance and sets the application ID in APEX_APPLICATION_INSTALL.

Syntax

```
APEX_APPLICATION_INSTALL.GENERATE_APPLICATION_ID;
```

Parameters

None.

> **See Also:**
>
> - GET_APPLICATION_ID Function
> - Import Script Examples
> - SET_APPLICATION_ID Procedure

4.7 GENERATE_OFFSET Procedure

This procedure generates the offset value used during application import. Use the offset value to ensure that the metadata for the Oracle APEX application definition does not collide with other metadata on the instance. For a new application installation, it is usually sufficient to call this procedure to have APEX generate this offset value for you.

Syntax

```
APEX_APPLICATION_INSTALL.GENERATE_OFFSET;
```

Parameters

None.

> **See Also:**
>
> - GET_OFFSET Function
> - Import Script Examples
> - SET_OFFSET Procedure

4.8 GET_APPLICATION_ALIAS Function

This function gets the application alias for the application to be imported. This is only used if the application to be imported has an alias specified. An application alias must be unique within a workspace and it is recommended to be unique within an instance.

Syntax

```
APEX_APPLICATION_INSTALL.GET_APPLICATION_ALIAS
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the value of the application alias value in the `APEX_APPLICATION_INSTALL` package. The application alias cannot be more than 255 characters.

```
declare
    l_alias varchar2(255);
begin
    l_alias := apex_application_install.get_application_alias;
end;
```

> **See Also:**
>
> "SET_APPLICATION_ALIAS Procedure"

4.9 GET_APPLICATION_ID Function

Use this function to get the application ID of the application to be imported. The application ID should either not exist in the instance or, if it does exist, must be in the workspace where the application is being imported to.

Syntax

```
APEX_APPLICATION_INSTALL.GET_APPLICATION_ID
RETURN NUMBER;
```

Parameters

None.

Example

The following example returns the value of the application ID value in the `APEX_APPLICATION_INSTALL` package.

```
declare
    l_id number;
begin
    l_id := apex_application_install.get_application_id;
end;
```

> **See Also:**
>
> - "SET_APPLICATION_ID Procedure"
> - "GENERATE_APPLICATION_ID Procedure"

4.10 GET_APPLICATION_NAME Function

This function gets the application name of the import application.

Syntax

```
APEX_APPLICATION_INSTALL.GET_APPLICATION_NAME
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the value of the application name value in the `APEX_APPLICATION_INSTALL` package.

```
declare
    l_application_name varchar2(255);
begin
    l_application_name := apex_application_install.get_application_name;
end;
```

> **See Also:**
>
> "SET_APPLICATION_NAME Procedure"

4.11 GET_AUTHENTICATION_SCHEME Function

Use this function to retrieve the authentication scheme name that should override the default.

Syntax

```
function GET_AUTHENTICATION_SCHEME(
      return VARCHAR2 );
```

Example

Print the authentication scheme override.

```
select apex_application_install.get_authentication_scheme from
    sys.dual;
```

> **See Also:**
>
> "SET_AUTHENTICATION_SCHEME Procedure"

4.12 GET_AUTO_INSTALL_SUP_OBJ Function

Use this function to get the automatic install of supporting objects setting used during the import of an application. This setting is valid only for command line installs. If the setting is set to TRUE and the application export contains supporting objects, it automatically installs or upgrades the supporting objects when an application imports from the command line.

Syntax

```
APEX_APPLICATION_INSTALL.GET_AUTO_INSTALL_SUP_OBJ
RETURN BOOLEAN;
```

Parameters

None.

Example

The following example returns the value of automatic install of supporting objects setting in the `APEX_APPLICATION_INSTALL` package.

```
declare
    l_auto_install_sup_obj boolean;
begin
    l_auto_install_sup_obj :=
apex_application_install.get_auto_install_sup_obj;
end;
```

4.13 GET_BUILD_STATUS Function

Use this function to retrieve the build status that should override the default.

Syntax

```
FUNCTION GET_BUILD_STATUS (
    RETURN VARCHAR2;
```

Parameters

None.

Example

The following example prints the build status override.

```
select apex_application_install.get_build_status from sys.dual;
```

4.14 GET_IMAGE_PREFIX Function

This function gets the image prefix of the import application. Most Oracle APEX instances use the default image prefix of /i/.

Syntax

```
APEX_APPLICATION_INSTALL.GET_IMAGE_PREFIX
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the value of the application image prefix in the `APEX_APPLICATION_INSTALL` package. The application image prefix cannot be more than 255 characters.

```
DECLARE
    l_image_prefix varchar2(255);
BEGIN
    l_image_prefix := apex_application_install.get_image_prefix;
END;
```

> **See Also:**
>
> SET_IMAGE_PREFIX Procedure

4.15 GET_INFO Function

Use this function to retrieve install information from a source file.

Syntax

```
FUNCTION GET_INFO (
    p_source    IN apex_t_export_files )
    RETURN t_file_info;
```

Parameters

Table 4-2 GET_INFO Parameters

Parameter	Description
p_source	The source code, a table of (name, contents) with a single record for normal APEX applications or multiple records for applications that were split when exporting. Note that passing multiple applications is not supported.

Returns

This function returns information about the application that can be used to configure installation.

Raises

This function may raise the folllowing: `WWV_FLOW_IMP_PARSER.RUN_STMT_ERROR: The source contains invalid statements.`

Example

The following example fetches an application from a remote URL and prints its install information.

```
DECLARE
    l_source apex_t_export_files;
    l_info   apex_application_install.t_file_info;
BEGIN
    l_source := apex_t_export_files (
                    apex_t_export_file (
                        name     => 'f100.sql',
                        contents => apex_web_service.make_rest_request
(
                                            p_url         => 'https://
www.example.com/apps/f100.sql',
                                            p_http_method => 'GET' )));
    l_info   := apex_application_install.get_info (
                    p_source      => l_source );
    sys.dbms_output.put_line (apex_string.format (
         p_message => q'!Type ................. %0
                       !Workspace ............ %1
```

```
                    !Version ..............  %2
                    !App ID ...............  %3
                    !App Name .............  %4
                    !Alias ................  %5
                    !Owner ................  %6
                    !Build Status .........  %7
                    !Has Install Script ...  %8
                    !App ID Usage .........  %9
                    !App Alias Usage ......  %10!',
        p0        => l_info.file_type,
        p1        => l_info.workspace_id,
        p2        => l_info.version,
        p3        => l_info.app_id,
        p4        => l_info.app_name,
        p5        => l_info.app_alias,
        p6        => l_info.app_owner,
        p7        => l_info.build_status,
        p8        => apex_debug.tochar(l_info.has_install_script),
        p9        => l_info.app_id_usage,
        p10       => l_info.app_alias_usage,
        p_prefix  => '!' ));
END;
```

See Also:

- INSTALL Procedure
- GET_APPLICATION Function

4.16 GET_KEEP_SESSIONS Function

This function finds out if sessions and session state will be preserved or deleted on upgrades.

Syntax

```
function GET_KEEP_SESSIONS
    RETURN BOOLEAN
```

Example

The following example shows whether print sessions will be kept or deleted.

```
dbms_output.put_line (
    case when apex_application_install.get_keep_sessions then 'sessions will
be kept'
    else 'sessions will be deleted'
    end );
```

> **See Also:**
>
> "SET_KEEP_SESSIONS Procedure"

4.17 GET_NO_PROXY_DOMAINS Function

Use this function to get the No Proxy Domains attribute of an application to be imported.

Syntax

```
APEX_APPLICATION_INSTALL.GET_PROXY
RETURN VARCHAR2;
```

Parameters

None.

Example

```
declare
    l_no_proxy_domains varchar2(255);
begin
    l_no_proxy_domains :=
apex_application_install.get_no_proxy_domains;
end;
```

> **See Also:**
>
> "SET_PROXY Procedure"

4.18 GET_OFFSET Function

Use function to get the offset value used during the import of an application.

Syntax

```
APEX_APPLICATION_INSTALL.GET_OFFSET
RETURN NUMBER;
```

Parameters

None.

Example

The following example returns the value of the application offset value in the `APEX_APPLICATION_INSTALL` package.

```
declare
    l_offset number;
begin
    l_offset := apex_application_install.get_offset;
end;
```

> **See Also:**
>
> - "SET_OFFSET Procedure"
> - "GENERATE_OFFSET Procedure"

4.19 GET_PROXY Function

Use this function to get the proxy server attribute of an application to be imported.

Syntax

```
APEX_APPLICATION_INSTALL.GET_PROXY
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the value of the proxy server attribute in the `APEX_APPLICATION_INSTALL` package. The proxy server attribute cannot be more than 255 characters.

```
declare
    l_proxy varchar2(255);
begin
    l_proxy := apex_application_install.get_proxy;
end;
```

> **See Also:**
>
> "SET_PROXY Procedure"

4.20 GET_REMOTE_SERVER_BASE_URL Function

Use this function to get the Base URL property to be used for a given remote server during application import.

Syntax

```
APEX_APPLICATION_INSTALL.GET_REMOTE_SERVER_BASE_URL(
    p_static_id IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 4-3 GET_REMOTE_SERVER_BASE_URL Function Parameters

Parameter	Description
p_static_id	Static ID to reference the remote server object.

Example

```
declare
    l_base_url varchar2(255);
begin
    l_base_url :=
apex_application_install.get_remote_server_base_url( 'MY_REMOTE_SERVER'
 );
end;
```

> **See Also:**
>
> "SET_REMOTE_SERVER Procedure"

4.21 GET_REMOTE_SERVER_HTTPS_HOST Function

Use this function to get the HTTPS Host property to be used for a given remote server during application import.

Syntax

```
APEX_APPLICATION_INSTALL.GET_REMOTE_SERVER_HTTPS_HOST(
    p_static_id IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 4-4 GET_REMOTE_SERVER_HTTPS_HOST Parameters

Parameter	Description
p_static_id	Static ID to reference the remote server object.

Example

```
declare
    l_https_host varchar2(255);
begin
    l_https_host :=
apex_application_install.get_remote_server_https_host( 'MY_REMOTE_SERVER' );
end;
```

> **See Also:**
>
> "SET_REMOTE_SERVER Procedure"

4.22 GET_SCHEMA Function

Use this function to get the parsing schema (owner) of the APEX application.

Syntax

```
APEX_APPLICATION_INSTALL.GET_SCHEMA
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the value of the application schema in the `APEX_APPLICATION_INSTALL` package.

```
DECLARE
    l_schema varchar2(30);
BEGIN
    l_schema := apex_application_install.get_schema;
END;
```

> **See Also:**
>
> SET_SCHEMA Procedure

4.23 GET_WORKSPACE_ID Function

Use this function to get the workspace ID for the application to be imported.

Syntax

```
APEX_APPLICATION_INSTALL.GET_WORKSPACE_ID
RETURN NUMBER;
```

Parameters

None.

Example

The following example returns the value of the workspace ID value in the `APEX_APPLICATION_INSTALL` package.

```
declare
    l_workspace_id number;
begin
    l_workspace_id := apex_application_install.get_workspace_id;
end;
```

> **See Also:**
>
> "SET_WORKSPACE_ID Procedure"

4.24 INSTALL Procedure

Use this procedure to install an application. Use the `APEX_APPLICATION_INSTALL_INSTALL.SET%` procedures to configure installation parameters.

Syntax

```
PROCEDURE INSTALL (
    p_source             IN apex_t_export_files    default null,
    p_overwrite_existing IN BOOLEAN                default false );
```

Parameters

Table 4-5 INSTALL Parameters

Parameter	Description
p_source	The source code, a table of (name, contents) with a single record for normal Oracle Applicatino Express applications or multiple records for applications that were split when exporting. Note that passing multiple applications is not supported. If null (the default), import the source that was previously passed to GET_INFO.
p_overwrite_existing	If false (the default), raise an error instead of overwriting an existing application.

Raises

- WWV_FLOW_IMP_PARSER.RUN_STMT_ERROR: The source contains invalid statements.
- SECURITY_GROUP_ID_INVALID: The current workspace conflicts with the install workspace.
- WWV_FLOW_API.FLOW_ID_RESERVED_FOR_OTHER_WORKSPACE: The application ID isused in another workspace.
- WWV_FLOW_API.FLOW_ID_RANGE_RESERVED: The application ID is reserved internal us.
- WWV_FLOW_API.FLOW_ID_OUT_OF_RANGE: The application ID used for installing is not in a valid range.
- APPLICATION_ID_RESERVED: The application ID is in use in the current workspace and p_overwrite_existing was set to false.

Example

Fetch an application from a remote URL, then install it with a new ID and new component ID offsets in workspace EXAMPLE.

```
declare
    l_source apex_t_export_files;
    l_info   apex_application_install.t_file_info;
begin
    l_source := apex_t_export_files (
                    apex_t_export_file (
                         name     => 'f100.sql',
                         contents => apex_web_service.make_rest_request (
                                          p_url         => 'https://
www.example.com/apps/f100.sql',
                                          p_http_method => 'GET' )));

    apex_util.set_workspace('EXAMPLE');
    apex_application_install.generate_application_id;
    apex_application_install.generate_offset;
    apex_application_install.install (
         p_source => l_source );
end;
```

4.25 REMOVE_APPLICATION Procedure

This procedure removes an application from a workspace. Use the `APEX_APPLICATION_INSTALL.SET_%` procedures to configure installation parameters.

Syntax

```
APEX_APPLICATION_INSTALL.REMOVE_APPLICATION(
     p_application_id IN NUMBER);
```

Parameters

Table 4-6 REMOVE_APPLICATION Parameters

Parameter	Description
`p_application_id`	The ID of the application.

Raises

This procedure may raise the following:

- `WWV_FLOW_API.DELETE_APP_IN_DIFFERENT_WORKSPACE`: The application is not in this workspace.
- `WWV_FLOW_API.FLOW_NOT_DELETED`: The application was not deleted.
- `WWV_FLOW.APP_NOT_FOUND_ERR`: The application ID was not found.

Example

The following example demonstrates how to use the `REMOVE_APPLICATION` procedure to remove an application with an ID of 100 from a workspace.

```
begin
    apex_application_install.set_workspace('EXAMPLE');
    apex_application_install.set_keep_sessions(false);
    apex_application_install.remove_application(100);
end;
```

4.26 SET_APPLICATION_ALIAS Procedure

This procedure sets the application alias for the application to be imported. This is only used if the application to be imported has an alias specified. An application alias must be unique within a workspace and it is recommended to be unique within an instance.

Syntax

```
APEX_APPLICATION_INSTALL.SET_APPLICATION_ALIAS(
    p_application_alias IN VARCHAR2);
```

Parameters

Table 4-7 SET_APPLICATION_ALIAS Parameters

Parameter	Description
p_application_alias	The application alias. The application alias is an alphanumeric identifier. It cannot exceed 255 characters, must unique within a workspace and, ideally, is unique within an entire instance.

See Also:

- GET_APPLICATION_ALIAS Function
- Import Script Examples

4.27 SET_APPLICATION_ID Procedure

Use this procedure to set the application ID of the application to be imported. The application ID should either not exist in the instance or, if it does exist, must be in the workspace where the application is being imported to. This number must be a positive integer and must not be from the reserved range of Oracle APEX application IDs.

Syntax

```
APEX_APPLICATION_INSTALL.SET_APPLICATION_ID (
    p_application_id IN NUMBER);
```

Parameters

Table 4-8 SET_APPLICATION_ID Parameters

Parameter	Description
p_application_id	This is the application ID. The application ID must be a positive integer, and cannot be in the reserved range of application IDs (3000 - 8999). It must be less than 3000 or greater than or equal to 9000.

See Also:

- SET_APPLICATION_ID Procedure
- Import Script Examples
- GENERATE_APPLICATION_ID Procedure

4.28 SET_APPLICATION_NAME Procedure

This procedure sets the application name of the import application.

Syntax

```
APEX_APPLICATION_INSTALL.SET_APPLICATION_NAME;(
    p_application_name  IN VARCHAR2);
```

Parameters

Table 4-9 SET_APPLICATION_NAME Parameters

Parameter	Description
p_application_name	This is the application name. The application name cannot be null and cannot be longer than 255 characters.

Example

The following example sets the application name in APEX_APPLICATION_INSTALL to "Executive Dashboard".

```
declare
    l_name varchar2(255) := 'Executive Dashboard';
begin
    apex_application_install.set_application_name( p_application_name
=> l_name );
end;
```

> **See Also:**
>
> "GET_APPLICATION_NAME Function"

4.29 SET_AUTHENTICATION_SCHEME Procedure

Use this procedure to override the active authentication scheme for the applications that are about to be installed.

Syntax

```
APEX_APPLICATION_INSTALL.SET_AUTHENTICATION_SCHEME(
      p_name IN VARCHAR2 );
```

Parameters

Table 4-10 SET_AUTHENTICATION_SCHEME Parameters

Parameter	Description
p_name	The name of the authentication scheme to be activated. This new authentication scheme must exist in the application. If null, the active authentication scheme will remain unchanged.

Example

Activate authentication scheme "SSO-Production" and install application f100.sql, then reset the override for f101.sql to keep its active scheme.

```
begin
  apex_application_install.set_authentication_scheme (
      p_name => 'SSO-Production' );
end;
/
@f100.sql
begin
  apex_application_install.set_authentication_scheme (
      p_name => null );
end;
/
@f101.sql
```

> **See Also:**
>
> "GET_AUTHENTICATION_SCHEME Function"

4.30 SET_AUTO_INSTALL_SUP_OBJ Procedure

This procedure sets the automatic install of supporting objects value used during application import. This setting is valid only for command line installs. If the value is set to TRUE and the application export contains supporting objects, it automatically installs or upgrades the supporting objects when an application imports from the command line.

Syntax

```
APEX_APPLICATION_INSTALL.SET_AUTO_INSTALL_SUP_OBJ(
    p_auto_install_sup_obj IN BOOLEAN);
```

Parameters

Table 4-11 SET_AUTO_INSTALL_SUP_OBJ Parameters

Parameter	Description
p_auto_install_sup_obj	The automatic install of supporting objects Boolean value.

Example

The following example gets the automatic install of supporting objects setting. If it is not set to install automatically, it sets to `true` to override export file settings of automatic install of supporting objects.

```
begin

apex_application_install.set_auto_install_sup_obj( p_auto_install_sup_o
bj => true );
end;
```

4.31 SET_BUILD_STATUS Function

Use this function to override the build status for applications that are about to be installed.

Syntax

```
Function SET_BUILD_STATUS (
    p_build_status IN VARCHAR2 );
```

Parameters

Table 4-12 SET_BUILD_STATUS Parameters

Parameter	Description
p_build_status	New build status to set application to. Values include: • `RUN_AND_BUILD` - Developers and users can both run develop the application. • `RUN_ONLY` - Users can only run the application. Developers cannot edit the application.

Example

The following example sets build status for app 100 to `RUN_ONLY`.

```
begin
  apex_application_install.set_build_status (
      p_build_status => 'RUN_ONLY' );
end;
```

```
/
@f100.sql
```

4.32 SET_IMAGE_PREFIX Procedure

This procedure sets the image prefix of the import application. Most Oracle APEX instances use the default image prefix of /i/.

Syntax

```
APEX_APPLICATION_INSTALL.SET_IMAGE_PREFIX(
    p_image_prefix  IN VARCHAR2);
```

Parameters

Table 4-13 SET_APPLICATION_NAME Parameters

Parameter	Description
p_auto_install_sup_obj	The automatic install of supporting objects Boolean value.

Example

The following example sets the value of the image prefix variable in APEX_APPLICATION_INSTALL.

```
DECLARE
    l_prefix varchar2(255) := '/i/';
BEGIN
    apex_application_install.set_image_prefix( p_image_prefix => l_prefix );
END;
```

> **See Also:**
>
> GET_IMAGE_PREFIX Function

4.33 SET_KEEP_SESSIONS Procedure

This procedure preserves sessions associated with the application on upgrades.

Syntax

```
procedure SET_KEEP_SESSIONS (
    p_keep_sessions IN BOOLEAN );
```

Parameters

Table 4-14 SET_KEEP_SESSIONS Parameters

Parameter	Description
p_keep_sessions	false is the default value.true if sessions should be preserved, false if they should be deleted. KEEP_SESSIONS_ON_UPGRADE controls the default behavior. If it is N (the default), sessions will be deleted. KEEP_SESSIONS_ON_UPGRADE is an instance parameter.

Example

The following example installs application 100 in workspace FRED_PROD and keep session state.

```
SQL> exec apex_application_install.set_workspace(p_workspace =>
'FRED_PROD');
SQL> exec apex_application_install.set_keep_sessions(p_keep_sessions
=> true);
SQL> @f100.sql
```

> **See Also:**
>
> "GET_KEEP_SESSIONS Function"

4.34 SET_OFFSET Procedure

This procedure sets the offset value used during application import. Use the offset value to ensure that the metadata for the Oracle APEX application definition does not collide with other metadata on the instance. For a new application installation, it is usually sufficient to call the generate_offset procedure to have APEX generate this offset value for you.

Syntax

```
APEX_APPLICATION_INSTALL.SET_OFFSET(
    p_offset IN NUMBER);
```

Parameters

Table 4-15 SET_OFFSET Parameters

Parameter	Description
p_offset	The offset value. The offset must be a positive integer. In most cases you do not need to specify the offset, and instead, call APEX_APPLICATION_INSTALL.GENERATE_OFFSET, which generates a large random value and then set it in the APEX_APPLICATION_INSTALL package.

Example

The following example generates a random number from the database and uses this as the offset value in APEX_APPLICATION_INSTALL.

```
DECLARE
    l_offset number;
BEGIN
    l_offset := dbms_random.value(100000000000, 999999999999);
    apex_application_install.set_offset( p_offset => l_offset );
END
```

See Also:

- GET_OFFSET Function
- GENERATE_OFFSET Procedure

4.35 SET_PROXY Procedure

Use this procedure to set the proxy server attributes of an application to be imported.

Syntax

```
APEX_APPLICATION_INSTALL.SET_PROXY (
    p_proxy            IN VARCHAR2,
    p_no_proxy_domains IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 4-16 SET_PROXY Parameters

Parameter	Description
p_proxy	The proxy server. There is no default value. The proxy server cannot be more than 255 characters and should not include any protocol prefix such as http://. A sample value might be: www-proxy.example.com

Table 4-16 (Cont.) SET_PROXY Parameters

Parameter	Description
p_no_proxy_domains	The list of domains for which the proxy server should not be used. There is no default value.

Example

The following example sets the value of the proxy variable in APEX_APPLICATION_INSTALL.

```
declare
    l_proxy varchar2(255) := 'www-proxy.example.com'
begin
    apex_application_install.set_proxy( p_proxy => l_proxy );
end;
```

> **See Also:**
>
> "SET_PROXY Procedure"

4.36 SET_REMOTE_SERVER Procedure

Use this procedure to set the Base URL and the HTTPS Host attributes for remote servers of the imported application. Remote Servers are identified by their Static ID.

Syntax

```
APEX_APPLICATION_INSTALL.SET_REMOTE_SERVER (
    p_static_id        IN VARCHAR2,
    p_base_url         IN VARCHAR2,
    p_https_host       IN VARCHAR2 DEFAULT NULL,
    --
    p_default_database IN VARCHAR2 DEFAULT NULL,
    p_mysql_sql_modes  IN VARCHAR2 DEFAULT NULL,
    --
    p_ords_timezone    IN VARCHAR2 DEFAULT NULL )
```

Parameters

Table 4-17 SET_REMOTE_SERVER Parameters

Parameter	Description
p_static_id	Static ID to reference the remote server object.
p_base_url	New Base URL to use for this remote server object.

Table 4-17 (Cont.) SET_REMOTE_SERVER Parameters

Parameter	Description
p_https_host	New HTTPS Host Property to use for this remote server object. Only relevant when the base URL is https:// and the database version is 12.2 or greater.
p_default_database	Default database to use when connecting. Currently only supported for MySQL databases.
p_mysql_sql_modes	SQL modes to use when connecting to a MySQL database.

Example

```
BEGIN
    apex_application_install.set_remote_server(
        p_static_id => 'MY_REMOTE_SERVER',
        p_base_url => 'http://production.company.com' );
END;
```

> **See Also:**
>
> - GET_REMOTE_SERVER_BASE_URL Function
> - GET_REMOTE_SERVER_HTTPS_HOST Function

4.37 SET_SCHEMA Procedure

Use this function to set the parsing schema (owner) of the Oracle APEX application. The database user of this schema must already exist, and this schema name must already be mapped to the workspace used to import the application.

Syntax

```
APEX_APPLICATION_INSTALL.SET_SCHEMA (
    p_schema  IN VARCHAR2);
```

Parameters

Table 4-18 SET_SCHEMA Parameters

Parameter	Description
p_schema	The schema name.

See Also:

- GET_SCHEMA Function
- Import Script Examples

4.38 SET_WORKSPACE_ID Procedure

Use this function to set the workspace ID for the application to be imported.

Syntax

```
APEX_APPLICATION_INSTALL.SET_WORKSPACE_ID (
    p_workspace_id  IN NUMBER);
```

Parameters

Table 4-19 SET_WORKSPACE_ID Parameters

Parameter	Description
p_workspace_id	The workspace ID.

See Also:

- SET_WORKSPACE_ID Procedure
- Import Script Examples

4.39 SET_WORKSPACE Procedure

This function is used to set the workspace ID for the application to be imported.

Syntax

```
procedure SET_WORKSPACE (
   p_workspace IN VARCHAR2 );
```

Parameters

Table 4-20 SET_WORKSPACE Procedure Parameters

Parameters	Description
p_workspace	The workspace name.

Example

This example shows how to set workspace ID for workspace FRED_PROD.

```
apex_application_install.set_workspace (
    p_workspace => 'FRED_PROD' );
```

> **See Also:**
>
> - "GET_WORKSPACE_ID Function"
> - "SET_WORKSPACE_ID Procedure"

5
APEX_APP_SETTING

The `APEX_APP_SETTING` package provides utilities you can use when programming in the Oracle APEX environment related to application setting shared components. You can use the `APEX_APP_SETTING` package to get and set the value of application settings.

5.1 GET_VALUE Function

This function gets the application setting value in the current application.

Syntax

```
APEX_APP_SETTING.GET_VALUE(
    p_name          IN VARCHAR2
    p_raise_error   IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 5-1 GET_VALUE Function Parameters

Parameters	Description
`p_name`	The case insensitive name of the application setting. An error raises if: • Application Setting name does not exist. • If build option, associated with application setting is disabled.
`p_raise_error`	If set to TRUE, the procedure raises an error if an application setting with a passed name does not exist.

Example

The following example shows how to use the `GET_VALUE` function to retrieve the value of application setting `ACCESS_CONTROL_ENABLED`.

```
declare
    l_value varchar2(4000);
begin
    l_value := APEX_APP_SETTING.GET_VALUE( p_name =>
'ACCESS_CONTROL_ENABLED');
end;
```

5.2 SET_VALUE Procedure

This procedure changes the application setting value in the current application.

Syntax

```
APEX_APP_SETTING.SET_VALUE(
    p_name          IN VARCHAR2,
    p_value         IN VARCHAR2,
    p_raise_error   IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 5-2 SET_VALUE Procedure Parameters

Parameters	Description
`p_name`	The case insensitive name of the application setting. An error raised if: • Application Setting name does not exist. • If build option associated with application setting is disabled.
`p_value`	The value of the application setting. An error raised if: • The value is set to required, but null value passed. • The valid values defined, but the value is not in one of the valid values.
`p_raise_error`	If set to `TRUE`, the procedure raises an error if the build option check failed.

Example

The following example shows how to use the `SET_VALUE` procedure to set the value of application setting `ACCESS_CONTROL_ENABLED`.

```
begin
    APEX_APP_SETTING.SET_VALUE(
        p_name  => 'ACCESS_CONTROL_ENABLED',
        p_value => 'Y' );
end;
```

6
APEX_APPROVAL

The APEX_APPROVAL package provides APIs for the management of approvals and Human Tasks. This package includes functionality to create new Human Tasks for a user to approve as well as operations dealing with the lifecycle management and state handling of Human Tasks. This package is part of the Oracle APEX Workflow functionality.

6.1 ADD_TASK_COMMENT Procedure

This procedure adds a comment to a task. Any potential owner or business administrator of a Task can add comments to a Task. Comments are useful as additional information regarding a Task. For example, a manager may add her notes to a Task she is working on before delegating the Task.

Syntax

```
APEX_APPROVAL.ADD_TASK_COMMENT (
    p_task_id                IN NUMBER,
    p_text                   IN VARCHAR2 );
```

Parameters

Table 6-1 ADD_TASK_COMMENT Parameters

Parameter	Description
p_task_id	The Task ID.
p_text	The comment text.

Example

```
BEGIN
     add_task_comment(
         p_task_id => 1234,
         p_text    => 'Please review and approve');
END;
```

6.2 ADD_TASK_POTENTIAL_OWNER Procedure

This procedure adds a new potential owner to a task. Only a Business Administrator for the task can invoke this procedure. The procedure throws an error if the task is in `Completed` or `Errored` state.

Syntax

```
APEX_APPROVAL.ADD_TASK_POTENTIAL_OWNER (
    p_task_id                IN NUMBER,
    p_potential_owner        IN VARCHAR2,
    p_identity_type          IN t_task_identity_type default
c_task_identity_type_user );
```

Parameters

Table 6-2 ADD_TASK_POTENTIAL_OWNER Parameters

Parameter	Description
p_task_id	The Task ID.
p_potential_owner	The potential owner.

Table 6-2 (Cont.) ADD_TASK_POTENTIAL_OWNER Parameters

Parameter	Description
p_identity_type	The identity type of the potential owner. Default is USER.

> **Note:**
>
> As of this release, the only supported identity type is USER. Additional options will be added in a future release.

Example

The following example adds user STIGER as potential owner for Task ID 1234.

```
BEGIN
     apex_approval.add_task_potential_owner(
         p_task_id         => 1234,
         p_potential_owner => 'STIGER'
     );
END;
```

6.3 APPROVE_TASK Procedure

This procedure approves a Task. Only the potential owner or actual owner of the task can invoke this procedure. This procedure moves the state of the Task to Completed and sets the outcome of the Task to Approved.

This is a convenience procedure and equivalent to calling complete_task with outcome apex_approval.c_task_outcome_approved.

Syntax

```
APEX_APPROVAL.APPROVE_TASK (
    p_task_id                IN NUMBER,
    p_autoclaim              IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 6-3 APPROVE_TASK Parameters

Parameter	Description
p_task_id	The Task ID.

Table 6-3 (Cont.) APPROVE_TASK Parameters

Parameter	Description
p_autoclaim	If Task is in state UNASSIGNED then claims the task implicitly.

State Handling

Pre-State: ASSIGNED|UNASSIGNED (p_autoclaim=true)

Post-State: COMPLETED

Example

```
BEGIN
    apex_approval.approve_task(
        p_task_id => 1234);
END;
```

6.4 CANCEL_TASK Procedure

This procedure cancels the task by setting the task to state CANCELED. Only the initiator of the task can invoke this procedure. Only tasks which are not in COMPLETED or ERRORED state can be CANCELED.

Canceling a task is useful when an approval is no longer required. For example, consider a travel approval for a business trip, and the person requesting the approval suddenly cannot make the trip, and the Task may be canceled.

Syntax

```
APEX_APPROVAL.CANCEL_TASK (
    p_task_id                IN NUMBER );
```

Parameters

Table 6-4 CANCEL_TASK Parameters

Parameter	Description
p_task_id	The Task ID.

State Handling

Pre-State: Any

Post-State: CANCELED

Example

```
BEGIN
    apex_approval.cancel_task(
```

```
        p_task_id => 1234
    );
END;
```

6.5 CLAIM_TASK Procedure

This procedure claims responsibility for a task. A task can be claimed by potential owners of the Task. A Task must be in Unassigned state to claim it. Once the task is claimed by a user, the Task transitions to Assigned state and the actual owner of the task is set to the user who claimed the task.

Syntax

```
APEX_APPROVAL.CLAIM_TASK (
    p_task_id                IN NUMBER );
```

Parameters

Table 6-5 CLAIM_TASK Parameters

Parameter	Description
p_task_id	The Task ID.

State Handling

Pre-State: `UNASSIGNED`. Post-State: `ASSIGNED`.

Example

```
BEGIN
    apex_approval.claim_task(
        p_task_id => 1234);
END;
```

6.6 COMPLETE_TASK Procedure

This procedure completes a task with an outcome. Only the actual owner or a potential owner of the task can invoke this procedure.

Tasks in `Assigned` state might be completed with an outcome. This operation transitions the Task from `Assigned` state to `Completed` state and sets the outcome of the task. Once a Task is in `Completed` state, it is subject for purging and archival.

Syntax

```
APEX_APPROVAL.COMPLETE_TASK (
    p_task_id                IN NUMBER,
    p_outcome                IN t_task_outcome,
    p_autoclaim              IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 6-6 COMPLETE_TASK Parameters

Parameter	Description
p_task_id	The Task ID.
p_outcome	The outcome of the Task.
p_autoclaim	If Task is in state UNASSIGNED then claim the task implicitly.

State Handling

Pre-State: ASSIGNED|UNASSIGNED (p_autoclaim=true)

Post-State: COMPLETED

Example

```
BEGIN
    apex_approval.complete_task(
        p_task_id => 1234,
        p_outcome => apex_approval.c_task_outcome_approved
    );
END;
```

6.7 CREATE_TASK Function

This function creates a new task. A new Task (Instance) is created. Depending on the task definition participant setting, the Task is set to state Unassigned or Assigned.

If the task definition has a single potential owner, the Task is set to Assigned.

If the task has multiple potential owners, the Task is set to Unassigned and can be claimed by any of the potential owners. This procedure throws an exception if no potential owners are found in the corresponding task definition.

Syntax

```
APEX_APPROVAL.CREATE_TASK (
    p_application_id         IN NUMBER            DEFAULT
wwv_flow.g_flow_id,
    p_task_def_static_id     IN VARCHAR2,
    p_subject                IN VARCHAR2          DEFAULT NULL,
    p_parameters             IN t_task_parameters DEFAULT
c_empty_task_parameters,
    p_priority               IN INTEGER           DEFAULT NULL,
    p_initiator              IN VARCHAR2          DEFAULT NULL,
    p_detail_pk              IN VARCHAR2          DEFAULT NULL )
return number; )
```

Parameters

Table 6-7 CREATE_TASK Parameters

Parameter	Description
p_application_id	The application ID that creates the Task.
p_task_def_static_id	The Task Definition static ID.
p_subject	The subject (expression of the Task).
p_parameters	The task parameters.
p_priority	(Optional) A task priority, default is NULL. If no priority is provided, uses the priority set in the corresponding task definition.
p_initiator	(Optional) An initiator information for the task.
p_detail_pk	(Optional) A primary key value for the task details.

Returns

Returns the ID of the newly created task.

Example

The following example creates a requisition item in the system of record in the database and then creates a new Human Task to get the requisition item approved by a user.

```
DECLARE

    l_req_id number;
    l_req_item varchar2(100) := 'Some requisition item requiring approval';
    l_req_amount number := 2499.42;
    l_task_id number;

BEGIN
    insert into requisitions(created_by, creator_emailid, item, item_amount,
item_category)
    values (:emp_uid, :emp_email, l_req_item, l_req_amount, 'Equipment')
    returning id into l_req_id;
    commit;
    l_task_id := apex_approval.create_task(
                 p_application_id => 110,
                 p_task_def_static_id => 'REQAPPROVALS',
                 p_subject => 'Requisition ' || l_req_id || ': ' ||
l_req_item || ' for ' || l_req_amount,
                 p_initiator => :emp_uid,
                 p_parameters => apex_approval.t_task_parameters(
                 1 => apex_approval.t_task_parameter(static_id =>
'REQ_DATE', string_value => sysdate),
                 2 => apex_approval.t_task_parameter(static_id =>
'REQ_AMOUNT', string_value => l_req_amount),
                 3 => apex_approval.t_task_parameter(static_id =>
'REQ_ITEM', string_value => l_req_item),
                 4 => apex_approval.t_task_parameter(static_id => 'REQ_ID',
string_value => l_req_id)),
```

```
                p_detail_pk => l_req_id);
END;
```

6.8 DELEGATE_TASK Procedure

This procedure assigns the task to one potential owner and sets the task state to `Assigned`. Either the current owner of the task (the user to whom the task is currently assigned) or the Business Administrator of the task can perform this operation.

Syntax

```
APEX_APPROVAL.DELEGATE_TASK (
    p_task_id                IN NUMBER,
    p_to_user                IN VARCHAR2 );
```

Parameters

Table 6-8 DELEGATE_TASK Parameters

Parameter	Description
`p_task_id`	The Task ID.
`p_to_user`	A (user) participant.

State Handling

Pre-State: `UNASSIGNED`, `ASSIGNED`

Post-State: `ASSIGNED`

Example

```
BEGIN
    apex_approval.delegate_task(
        p_task_id            => 1234,
        p_to_user            => 'STIGER'
    );
END;
```

6.9 GET_LOV_PRIORITY Function

This function retrieves the list of value data for the task priority.

Syntax

```
APEX_APPROVAL.GET_LOV_PRIORITY
RETURN wwv_flow_t_temp_lov_data pipelined;
```

Returns

A table of `apex_t_temp_lov_data`.

Example

The following example demonstrates

```
select disp,val from table ( apex_approval.get_lov_priority )
```

6.10 GET_LOV_STATE Function

This function gets the list of value data for the task attribute state.

Syntax

```
APEX_APPROVAL.GET_LOV_STATE
RETURN wwv_flow_t_temp_lov_data pipelined;
```

Returns

A table of `apex_t_temp_lov_data`.

Example

```
select disp,val from table ( apex_approval.get_lov_state )
```

6.11 GET_TASK_DELEGATES Function

This function gets the potential new owners of a task. The actual owner is excluded from the list.

This function only returns data in the context of a valid Oracle APEX session. It returns no data in SQL Workshop.

Syntax

```
APEX_APPROVAL.GET_TASK_DELEGATES (
    p_task_id IN NUMBER )
RETURN wwv_flow_t_temp_lov_data pipelined;
```

Parameters

Table 6-9 GET_TASK_DELEGATES Parameters

Parameter	Description
`p_task_id`	The task ID.

Returns

A table of `apex_t_temp_lov_data`.

Example

```
select disp,val from table ( apex_approval.get_task_delegates
( p_task_id => 1234 ) )
```

6.12 GET_TASK_HISTORY Function

This function gets the approval log for a task.

This function only returns data in the context of a valid Oracle APEX session. It returns no data in SQL Workshop.

Syntax

```
APEX_APPROVAL.GET_TASK_HISTORY (
    p_task_id        IN NUMBER )
RETURN wwv_flow_t_approval_log_table pipelined;
```

Parameters

Table 6-10 GET_TASK_HISTORY Parameters

Parameter	Description
p_task_id	The task ID.

Returns

A table of log entries (type `apex_t_approval_log`).

Example

```
select * from table ( apex_approval.get_task_history ( p_task_id =>
1234 ) )
```

6.13 GET_TASK_PARAMETER_VALUE Function

This function gets the value of a Task parameter. This function can be used in SQL or PL/SQL to get the value of a Task parameter for a given task.

Syntax

```
APEX_APPROVAL.GET_TASK_PARAMETER_VALUE (
    p_task_id                IN NUMBER,
    p_param_static_id        IN VARCHAR2,
    p_ignore_not_found       IN BOOLEAN DEFAULT FALSE )
RETURN VARCHAR2;
```

Parameters

Table 6-11 GET_TASK_PARAMETER_VALUE Parameters

Parameter	Description
p_task_id	The Task ID.
p_param_static_id	The static id of the parameter.
p_ignore_not_found	If set to false (default) and no data is found, a no_data_found exception will be raised. If set to true and no data is found, null will be returned.

Returns

The task parameter value for the given static ID or null.

Exception

no_data_found - In the case where p_ignore_not_found is set to false and no data is found (for example, if the parameter of given name does not exist).

Example

```
DECLARE
    l_req_item varchar2(100);
BEGIN
    l_req_item := apex_approval.get_task_parameter_value(
        p_task_id         => 1234,
        p_param_static_id => 'REQ_ITEM'
    );
    dbms_output.put_line('Parameter REQ_ITEM of task 1234 has value ' ||
l_req_item);
END;
```

6.14 GET_TASK_PRIORITIES Function

This function gets the potential new priorities of a task. The actual priority is excluded from the list.

This function only returns data in the context of a valid Oracle APEX session. It returns no data in SQL Workshop.

Syntax

```
APEX_APPROVAL.GET_TASK_PRIORITIES (
    p_task_id IN NUMBER )
RETURN wwv_flow_t_temp_lov_data pipelined;
```

Parameters

Table 6-12 GET_TASK_PRIORITIES Parameters

Parameter	Description
p_task_id	The task ID.

Returns

A table of apex_t_temp_lov_data.

Example

```
select disp,val from table ( apex_approval.get_task_priorities
( p_task_id => 1234 ) )
```

6.15 GET_TASKS Function

This function gets the tasks of a user depending on the given context.

Context can be one of the following:

- MY_TASKS - Returns all tasks where the user calling the function is either the Owner or one of the Potential Owners of the task.
- ADMIN_TASKS - Returns all tasks for which the user calling the function is a Business Administrator.
- INITIATED_BY_ME - Returns all tasks where the user calling the function is the Initiator.
- SINGLE_TASK - Returns the task identified by the P_TASK_ID input parameter.

This function only returns data in the context of a valid Oracle APEX session. It returns no data in SQL Workshop.

Syntax

```
APEX_APPROVAL.GET_TASKS (
    p_context           IN VARCHAR2 DEFAULT
wwv_flow_approval_api.c_context_my_tasks,
    p_user              IN VARCHAR2 DEFAULT wwv_flow_security.g_user,
    p_task_id           IN NUMBER   DEFAULT NULL,
    p_application_id    IN NUMBER   DEFAULT NULL )
RETURN wwv_flow_t_approval_tasks pipelined;
```

Parameters

Table 6-13 GET_TASKS Parameters

Parameter	Description
p_context	The list context. Default is MY_TASKS.

Table 6-13 (Cont.) GET_TASKS Parameters

Parameter	Description
p_user	The user to check for. Default is logged-in user. Requires p_context set to MY_TASKS, ADMIN_TASKS or INITIATED_BY_ME.
p_task_id	Filter for a task ID instead of a user. Default is null. Requires p_context set to SINGLE_TASK.
p_application_id	Filter for an application. Default is null (all applications).

Returns

A table of tasks (type apex_t_approval_tasks).

Example

```
select * from table ( apex_approval.get_tasks ( p_context => 'MY_TASKS' ) )
```

6.16 IS_ALLOWED Function

This function checks whether the given user is permitted to perform a certain operation on a Task.

Syntax

```
APEX_APPROVAL.IS_ALLOWED (
    p_task_id               IN NUMBER,
    p_operation             IN wwv_flow_approval_api.t_task_operation,
    p_user                  IN VARCHAR2 DEFAULT wwv_flow_security.g_user,
    p_new_participant       IN VARCHAR2 DEFAULT NULL )
RETURN BOOLEAN;
```

Parameters

Table 6-14 IS_ALLOWED Parameters

Parameter	Description
p_task_id	The Task ID.
p_operation	The operation to check (see constants c_task_op_###).
p_user	The user to check for. Default is logged in user.
p_new_participant	(Optional) The new assignee in case of Delegate operation.

Returns

TRUE if the user given by p_user is permitted to perform the operation given by p_operation, FALSE otherwise.

Example

```
DECLARE
    l_is_allowed boolean;
BEGIN
    l_is_allowed := apex_approval.is_allowed(
        p_task_id         => 1234,
        p_operation       => apex_approval.c_task_op_delegate
        p_user            => 'STIGER',
        p_new_participant => 'SMOON'
    );
    IF l_is_allowed THEN
        dbms_output.put_line('STIGER is a allowed to delegate the task
to SMOON for task 1234');
    END IF;
END;
```

6.17 IS_BUSINESS_ADMIN Function

This function checks whether the given user is a business administrator for at least one task definition.

Syntax

```
APEX_APPROVAL.IS_BUSINESS_ADMIN (
    p_user              IN VARCHAR2 DEFAULT wwv_flow_security.g_user,
    p_application_id    IN NUMBER   DEFAULT NULL )
RETURN BOOLEAN;
```

Parameters

Table 6-15 IS_BUSINESS_ADMIN Parameters

Parameter	Description
p_user	The user to check for. Default is logged-in user.
p_application_id	The application to check for. Default behavior checks against all applications in the workspace.

Returns

TRUE if the user given by p_user is at least in one task definition configured as participant type BUSINESS_ADMIN, FALSE otherwise.

Example

```
DECLARE
    l_is_business_admin boolean;
BEGIN
    l_is_business_admin := apex_approval.is_business_admin(
        p_user => 'STIGER'
    );
```

```
    IF l_is_business_admin THEN
        dbms_output.put_line('STIGER is a Business Administrator');
    END IF;
END;
```

6.18 IS_OF_PARTICIPANT_TYPE Function

This function checks whether the given user is of a certain participant type for a Task.

Syntax

```
APEX_APPROVAL.IS_OF_PARTICIPANT_TYPE (
    p_task_id               IN NUMBER,
    p_participant_type      IN t_task_participant_type
                               DEFAULT c_task_potential_owner,
    p_user                  IN VARCHAR2
                               DEFAULT wwv_flow_security.g_user)
RETURN BOOLEAN;
```

Parameters

Table 6-16 IS_OF_PARTICIPANT_TYPE Parameters

Parameter	Description
`p_task_id`	The Task ID.
`p_participant_type`	The participant type. Can be set to `POTENTIAL_OWNER` (default) or `BUSINESS_ADMIN`.
`p_user`	The user to check for. Default is logged-in user.

Returns

`TRUE` if the user given by `p_user` is a participant of given participant type for a given task, `FALSE` otherwise.

Example

```
DECLARE
    l_is_potential_owner boolean;
BEGIN
    l_is_potential_owner := apex_approval.is_of_participant_type(
        p_task_id          => 1234,
        p_participant_type => apex_approval.c_task_potential_owner,
        p_user             => 'STIGER'
    );
    IF l_is_potential_owner THEN
        dbms_output.put_line('STIGER is a potential owner for task 1234');
    END IF;
END;
```

6.19 REJECT_TASK Procedure

This procedure rejects the task. Only a potential owner or the actual owner of the task can invoke this procedure.

Moves the state of the Task to `Completed` and sets the outcome of the Task to `Rejected`. This is a convenience procedure and equivalent to calling `complete_task` with outcome `apex_approval.c_task_outcome_rejected`.

Syntax

```
APEX_APPROVAL.REJECT_TASK (
    p_task_id                IN NUMBER,
    p_autoclaim              IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 6-17 REJECT_TASK Parameters

Parameter	Description
`p_task_id`	The Task ID.
`p_autoclaim`	If Task is in state `UNASSIGNED` then claim the task implicitly.

State Handling

Pre-State: `ASSIGNED|UNASSIGNED` (`p_autoclaim=true`)

Post-State: `COMPLETED`

Example

```
BEGIN
    apex_approval.reject_task(
        p_task_id => 1234
    );
END;
```

6.20 RELEASE_TASK Procedure

This procedure releases an `Assigned` task from its current owner and sets the task to `Unassigned` state. Only the current owner of the task can invoke this procedure.

Syntax

```
APEX_APPROVAL.RELEASE_TASK (
    p_task_id                IN NUMBER );
```

Parameters

Table 6-18 RELEASE_TASK Parameters

Parameter	Description
p_task_id	The Task ID.

State Handling

Pre-State: ASSIGNED

Post-State: UNASSIGNED

Example

```
BEGIN
    apex_approval.release_task(
        p_task_id            => 1234
    );
END;
```

6.21 SET_TASK_PRIORITY Procedure

This procedure sets the priority of a task.

This procedure updates the priority of a task. The task can not be COMPLETED or ERRORED. Only a user who is either a Business Administrator for the task or is the initiator of the task can invoke this procedure.

Syntax

```
APEX_APPROVAL.SET_TASK_PRIORITY (
    p_task_id                IN NUMBER,
    p_priority               IN INTEGER );
```

Parameters

Table 6-19 SET_TASK_PRIORITY Parameters

Parameter	Description
p_task_id	The Task ID.
p_priority	The task priority (between 1 and 5, 1 being the highest).

Example

```
BEGIN
    apex_approval.set_task_priority(
        p_task_id  => 1234,
        p_priority => apex_approval.c_task_priority_highest
```

```
    );
END;
```

7
APEX_AUTHENTICATION

The `APEX_AUTHENTICATION` package provides a public API for authentication plug-in.

7.1 Constants

The APEX_AUTHENTICATION package uses the following constants.

```
c_default_username_cookie constant varchar2(30) := 'LOGIN_USERNAME_COOKIE';
```

7.2 CALLBACK Procedure

This procedure is the landing resource for external login pages. Call this procedure directly from the browser.

Syntax

```
APEX_AUTHENTICATION.CALLBACK (
    p_session_id      IN NUMBER,
    p_app_id          IN NUMBER,
    p_page_id         IN NUMBER DEFAULT NULL,
```

```
    p_ajax_identifier IN VARCHAR2,
    p_x01             IN VARCHAR2 DEFAULT NULL,
    p_x02             IN VARCHAR2 DEFAULT NULL,
    p_x03             IN VARCHAR2 DEFAULT NULL,
    p_x04             IN VARCHAR2 DEFAULT NULL,
    p_x05             IN VARCHAR2 DEFAULT NULL,
    p_x06             IN VARCHAR2 DEFAULT NULL,
    p_x07             IN VARCHAR2 DEFAULT NULL,
    p_x08             IN VARCHAR2 DEFAULT NULL,
    p_x09             IN VARCHAR2 DEFAULT NULL,
    p_x10             IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 7-1 CALLBACK Procedure Parameters

Parameters	Description
`p_session_id`	The Oracle APEX session identifier.
`p_app_id`	The database application identifier.
`p_page_id`	(Optional) Page identifier.
`p_ajax_identifier`	The system generated Ajax identifier. See GET_AJAX_IDENTIFIER Function.
`p_x01` through `p_x10`	(Optional) Parameters that the external login passes to the authentication plugin.

Example 1

In this example, a redirect is performed to an external login page and the callback is passed into APEX, which the external login redirects to after successful authentication.

```
DECLARE
    l_callback varchar2(4000) := apex_application.get_callback_url;
BEGIN
    sys.owa_util.redirect_url(
        'https://single-signon.example.com/my_custom_sso.login?
p_on_success='||
        sys.utl_url.escape (
            url => l_callback,
            escape_reserved_chars => true );
    apex_application.stop_apex_engine;
END;
```

Example 2

In this example, an external login page saves user data in a shared table and performs a call back with a handle to the data. In APEX, the callback activates the authentication plugin's ajax code. It can take the value of `x01` and fetch the actual user data from the shared table.

```
---- create or replace package body my_custom_sso as
PROCEDURE LOGIN (
    p_on_success in varchar2 )
    IS
```

```
    l_login_id varchar2(32);
BEGIN
    l_login_id := rawtohex(sys.dbms_crypto.random(32));
    insert into login_data(id, username) values (l_login_id, 'JOE USER');
    sys.owa_util.redirect_url (
    p_on_success||'&p_x01='||l_login_id );
END;
---- end my_custom_sso;
```

See Also:

- GET_CALLBACK_URL Function
- CALLBACK 2 Procedure

7.3 CALLBACK 1 Procedure

This procedure is the landing resource for OAuth2-based authentication schemes. The parameters are defined by the OAuth2 spec. This procedure gets called via redirects, by external authentication providers.

Syntax

```
PROCEDURE CALLBACK (
   state             IN VARCHAR2,
   code              IN VARCHAR2 DEFAULT NULL,
   error             IN VARCHAR2 DEFAULT NULL,
   error_description IN VARCHAR2 DEFAULT NULL,
   error_uri         IN VARCHAR2 DEFAULT NULL,
   error_reason      IN VARCHAR2 DEFAULT NULL,
   error_code        IN VARCHAR2 DEFAULT NULL,
   error_message     IN VARCHAR2 DEFAULT NULL,
   authuser          IN VARCHAR2 DEFAULT NULL,
   session_state     IN VARCHAR2 DEFAULT NULL,
   prompt            IN VARCHAR2 DEFAULT NULL,
   scope             IN VARCHAR2 DEFAULT NULL );
```

7.4 CALLBACK 2 Procedure

This procedure is an alternative to Callback 1 .

Syntax

```
PROCEDURE CALLBACK2 (
   p_session_id      IN NUMBER,
   p_app_id          IN NUMBER,
   p_ajax_identifier IN VARCHAR2,
   p_page_id         IN NUMBER   DEFAULT NULL,
   p_x01             IN VARCHAR2 DEFAULT NULL,
```

```
   p_x02             IN VARCHAR2 DEFAULT NULL,
   p_x03             IN VARCHAR2 DEFAULT NULL,
   p_x04             IN VARCHAR2 DEFAULT NULL,
   p_x05             IN VARCHAR2 DEFAULT NULL,
   p_x06             IN VARCHAR2 DEFAULT NULL,
   p_x07             IN VARCHAR2 DEFAULT NULL,
   p_x08             IN VARCHAR2 DEFAULT NULL,
   p_x09             IN VARCHAR2 DEFAULT NULL,
   p_x10             IN VARCHAR2 DEFAULT NULL );


PROCEDURE CALLBACK2 (
   state             IN VARCHAR2,
   code              IN VARCHAR2 DEFAULT NULL,
   error             IN VARCHAR2 DEFAULT NULL,
   error_description IN VARCHAR2 DEFAULT NULL,
   error_uri         IN VARCHAR2 DEFAULT NULL,
   error_reason      IN VARCHAR2 DEFAULT NULL,
   error_code        IN VARCHAR2 DEFAULT NULL,
   error_message     IN VARCHAR2 DEFAULT NULL,
   authuser          IN VARCHAR2 DEFAULT NULL,
   session_state     IN VARCHAR2 DEFAULT NULL,
   prompt            IN VARCHAR2 DEFAULT NULL,
   scope             IN VARCHAR2 DEFAULT NULL );
```

7.5 GET_CALLBACK_URL Function

This function is a plugin helper function to return a URL that is used as a landing request for external login pages. When the browser sends the request, it triggers the authentication plugin ajax callback, which can be used to log the user in.

Syntax

```
APEX_AUTHENTICATION.GET_CALLBACK_URL (
    p_x01           IN VARCHAR2 DEFAULT NULL,
    p_x02           IN VARCHAR2 DEFAULT NULL,
    p_x03           IN VARCHAR2 DEFAULT NULL,
    p_x04           IN VARCHAR2 DEFAULT NULL,
    p_x05           IN VARCHAR2 DEFAULT NULL,
    p_x06           IN VARCHAR2 DEFAULT NULL,
    p_x07           IN VARCHAR2 DEFAULT NULL,
    p_x08           IN VARCHAR2 DEFAULT NULL,
    p_x09           IN VARCHAR2 DEFAULT NULL,
    p_x10           IN VARCHAR2 DEFAULT NULL,
    p_callback_name IN VARCHAR2 DEFAULT NULL )
    RETURN VARCHAR2;
```

Parameters

Table 7-2 APEX_AUTHENTICATION.GET_CALLBACK _URL Function Parameters

Parameters	Description
`p_x01` through `p_x10`	Optional parameters that the external login passes to the authentication plugin.
`p_callback_name`	Optional public name of the callback, defaults to `apex_authentication.callback`.

Example

> **See Also:**
>
> "CALLBACK Procedure"

7.6 GET_LOGIN_USERNAME_COOKIE Function

This function reads the cookie with the username from the default login page.

Syntax

```
GET_LOGIN_USERNAME_COOKIE (
    p_cookie_name IN VARCHAR2 DEFAULT c_default_username_cookie )
    RETURN VARCHAR2;
```

Parameters

Table 7-3 APEX_AUTHENTICATION.GET_LOGIN_USERNAME_COOKIE Function Parameters

Parameters	Description
`p_cookie_name`	The cookie name which stores the username in the browser.

Example

The example code below could be from a Before Header process. It populates a text item `P101_USERNAME` with the cookie value and a switch `P101_REMEMBER_USERNAME`, based on whether the cookie already has a value.

```
:P101_USERNAME          := apex_authentication.get_login_username_cookie;
:P101_REMEMBER_USERNAME := case when :P101_USERNAME is not null
                           then 'Y'
                           else 'N'
                           end;
```

> **See Also:**
>
> "SEND_LOGIN_USERNAME_COOKIE Procedure"

7.7 IS_AUTHENTICATED Function

This function checks if the user is authenticated in the session and returns TRUE if the user is already logged in or FALSE if the user of the current session is not yet authenticated.

Syntax

```
APEX_AUTHENTICATION.IS_AUTHENTICATED
    RETURN BOOLEAN;
```

Parameters

None.

Example

In this example, `IS_AUTHENTICATED` is used to emit the username if the user has already logged in or a notification if the user has not.

```
if apex_authentication.is_authenticated then
    sys.htp.p(apex_escape.html(:APP_USER)||', you are known to the
system');
else
    sys.htp.p('Please sign in');
end if;
```

> **Note:**
>
> "IS_PUBLIC_USER Function"

7.8 IS_PUBLIC_USER Function

This function checks if the user is not authenticated in the session. A FALSE is returned if the user is already logged on or TRUE if the user of the current session is not yet authenticated.

Syntax

```
APEX_AUTHENTICATION.IS_PUBLIC_USER
    return BOLLEAN;
```

Parameters

None.

Example

In this example, `IS_PUBLIC_USER` is used to show a notification if the user has not already logged in or the username if the user has not.

```
if apex_authentication.is_public_user then
    sys.htp.p('Please sign in');
else
    sys.htp.p(apex_escape.html(:APP_USER)||', you are known to the system');
end if;
```

7.9 LOGIN Procedure

This procedure authenticates the user in the current session.

Login processing has the following steps:

1. Run authentication scheme's pre-authentication procedure.
2. Run authentication scheme's authentication function to check the user credentials (`p_username`, `p_password`), returning `TRUE` on success.
3. If result=true: run post-authentication procedure.
4. If result=true: save username in session table.
5. If result=true: set redirect URL to deep link.
6. If result=false: set redirect URL to current page, with an error message in the `notification_msg` parameter.
7. Log authentication result.
8. Redirect.

Syntax

```
APEX_AUTHENTICATION.LOGIN (
    p_username              IN VARCHAR2,
    p_password              IN VARCHAR2,
    p_uppercase_username    IN BOOLEAN  DEFAULT TRUE
    p_set_persistent_auth   IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 7-4 LOGIN Parameters

Parameters	Description
`p_username`	The user's name.
`p_password`	The user's password.
`p_uppercase_username`	If `TRUE` then `p_username` is converted to uppercase.

Table 7-4 (Cont.) LOGIN Parameters

Parameters	Description
p_set_persistent_auth	If TRUE then persistent authentication cookie is set. Persistent authentication needs to be enabled on instance level.

Example

This example passes user credentials, username and password, to the authentication scheme.

```
apex_authentication.login('JOE USER', 'mysecret');
```

> **See Also:**
>
> POST_LOGIN Procedure

7.10 LOGOUT Procedure

This procedure closes the session and redirects to the application's home page. Call this procedure directly from the browser.

Syntax

```
APEX_AUTHENTICATION.LOGOUT (
    p_session_id    IN NUMBER,
    p_app_id        IN NUMBER,
    p_ws_app_id     IN NUMBER   DEFAULT NULL );
```

Parameters

Table 7-5 LOGOUT Parameters

Parameters	Description
p_session_id	The Oracle APEX session identifier of the session to close.
p_app_id	The database application identifier.
p_ws_app_id	The websheet application identifier.

Example

This example logs the session out.

```
apex_authentication.logout(:SESSION, :APP_ID);
```

7.11 PERSISTENT_AUTH_ENABLED Function

This function returns whether persistent authentication is enabled on instance level.

Syntax

```
APEX_AUTHENTICATION.PERSISTENT_AUTH_ENABLED
    return BOOLEAN;
```

Parameters

None.

Example

The following example uses PERSISTENT_AUTH_ENABLED to show a notification.

```
begin
     if apex_authentication.persistent_auth_enabled then
         sys.htp.p('Persistant Authentication enabled');
     else
         sys.htp.p('Persisten Auhentication disabled');
     end if;
end;
```

7.12 PERSISTENT_COOKIES_ENABLED Function

This function returns whether persistent cookies are enabled on the instance. Instance administrators can control this value with the parameter `WORKSPACE_NAME_USER_COOKIE`.

Syntax

```
FUNCTION PERSISTENT_COOKIES_ENABLED
       RETURN BOOLEAN;
```

RETURNS

- `TRUE`: `WORKSPACE_NAME_USER_COOKIE` is set to `Y` or not set.
- `FALSE`: `WORKSPACE_NAME_USER_COOKIE` is set to `N`.

7.13 POST_LOGIN Procedure

This procedure authenticates the user in the current session. It runs a subset of `APEX_AUTHENTICATION.LOGIN`, without steps 1 and 2. For steps, see LOGIN Procedure. This procedure is useful in authentication schemes where user credentials checking is performed externally to Oracle APEX.

Syntax

```
APEX_AUTHENTICATION.POST_LOGIN (
    p_username              IN VARCHAR2,
    p_password              IN VARCHAR2,
    p_uppercase_username    IN BOOLEAN  DEFAULT TRUE );
```

Parameters

Table 7-6 POST_LOGIN Parameters

Parameters	Description
`p_username`	The user's name.
`p_password`	The user's password.
`p_uppercase_username`	If `TRUE` then `p_username` is converted to uppercase.

Example

This procedure call passes user credentials, username and password, to the authentication scheme to finalize the user's authentication.

```
apex_authentication.post_login('JOE USER', 'mysecret');
```

> **See Also:**
>
> LOGIN Procedure

7.14 REMOVE_CURRENT_PERSISTENT_AUTH Procedure

This procedure removes all Persistent Authentication entries for a user and ends all related sessions in the current workspace.

Syntax

```
APEX_AUTHENTICATION.REMOVE_CURRENT_PERSISTENT_AUTH;
```

Parameters

None.

Example

This example invalidates the user's persistent authentication cookies for the current browser and application.

```
apex_authentication.remove_current_persistent_auth;
```

> **See Also:**
>
> LOGIN Procedure

7.15 REMOVE_PERSISTENT_AUTH Procedure

This procedure removes all Persistent Authentication entries for a user and ends all related sessions in the current workspace.

Syntax

```
APEX_AUTHENTICATION.REMOVE_PERSISTENT_AUTH (
    p_username      IN VARCHAR2 );
```

Parameters

Table 7-7 REMOVE_PERSISTENT_AUTH Parameters

Parameter	Description
p_username	The user's name. If enabled, this procedure only invalidates persistent authentication cookies of this user. If set to NULL, then invalidates all persistent authentication cookies of all users for this workspace.

Example

This example deletes all Persistant Authentication entries for the current user and ends all sessions of this user in the current workspace.

```
apex_authentication.remove_persistent_auth(
           p_username         => :APP_USER );
```

> **See Also:**
>
> LOGIN Procedure

7.16 SAML_METADATA Procedure

This procedure emits the SAML metadata for the given application or for the APEX instance.

Syntax

```
APEX_AUTHENTICATION.SAML_METADATA (
    p_app_id    IN NUMBER   DEFAULT NULL );
```

Parameters

Table 7-8 SAML_METADATA Parameters

Parameter	Description
p_app_id	The ID of the application for which service provider metadata should be generated. If NULL or if the application's SAML authentication is configured to use instance mode, generate metadata using the SAML instance attributes.

Example

The following example downloads SAML metadata for app 101.

```
$ curl https://www.example.com/apex/apex_authentication.saml_metadata?
p_app_id=101
```

x

7.17 SEND_LOGIN_USERNAME_COOKIE Procedure

This procedure sends a cookie with the username.

Syntax

```
SEND_LOGIN_USERNAME_COOKIE (
    p_username    IN VARCHAR2,
    p_cookie_name IN VARCHAR2 DEFAULT c_default_username_cookie,
    p_consent     IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 7-9 APEX_AUTHENTICATION.SEND_LOGIN_USERNAME_COOKIE Procedure Parameters

Parameters	Description
p_username	The user's name.
p_cookie_name	The cookie name which stores p_username in the browser.

Table 7-9 (Cont.) APEX_AUTHENTICATION.SEND_LOGIN_USERNAME_COOKIE Procedure Parameters

Parameters	Description
p_consent	Control if the cookie should actually be sent. If `true`, assume the user gave consent to send the cookie. If `false`, do not send the cookie. If there is no consent and the cookie already exists, the procedure overwrites the existing cookie value with `NULL`. This parameter is ignored and no cookie gets sent if persistent_cookies_enabled returns `false`.

Example

The example code below could be from a page submit process on a login page, which saves the username in a cookie when consent is given. `P101_REMEMBER_USERNAME` could be a switch. On rendering, it could be set to `Y` when the cookie has a value.

```
apex_authentication.send_login_username_cookie (
     p_username => :P101_USERNAME,
     p_consent  => :P101_REMEMBER_USERNAME = 'Y' );
```

> **See Also:**
>
> "GET_LOGIN_USERNAME_COOKIE Function"

8
APEX_AUTHORIZATION

The `APEX_AUTHORIZATION` package contains public utility functions used for controlling and querying access rights to the application.

8.1 ENABLE_DYNAMIC_GROUPS Procedure

This procedure enables groups in the current session. These groups do not have to be created in the Oracle APEX workspace repository, but can be loaded from an LDAP repository or retrieved from a trusted HTTP header. Enabling a group that exists in the workspace repository and has other groups granted to it, also enables the granted groups.

If Real Application Security, available with Oracle Database Release 12*g,* is enabled for the authentication scheme, all dynamic groups are enabled as RAS dynamic or external groups (depending whether the group exists in `dba_xs_dynamic_roles`).

This procedure must be called during or immediately after authentication, for example, in a post-authentication procedure.

Syntax

```
APEX_AUTHORIZATION.ENABLE_DYNAMIC_GROUPS (
    p_group_names IN apex_t_varchar2 );
```

Parameters

Table 8-1 ENABLE_DYNAMIC_GROUPS Parameters

Parameter	Description
`p_group_names`	Table of group names.

Example

This example enables the dynamic groups `SALES` and `HR` from within a post authentication procedure.

```
BEGIN
   apex_authorization.enable_dynamic_groups (
       p_group_names => apex_t_varchar2('SALES', 'HR') );
END;
```

> **See Also:**
>
> View `APEX_WORKSPACE_SESSION_GROUPS` and View `APEX_WORKSPACE_GROUP_GROUPS`

8.2 IS_AUTHORIZED Function

This function determines if the current user passes the authorization with name `p_authorization_name`. For performance reasons, authorization results are cached. Because of this, the function may not always evaluate the authorization when called, but take the result out of the cache.

> **See Also:**
>
> Changing the Evaluation Point Attribute in *Oracle APEX App Builder User's Guide*

Syntax

```
APEX_AUTHORIZATION.IS_AUTHORIZED (
    p_authorization_name IN VARCHAR2 )
    RETURN BOOLEAN;
```

Parameters

Table 8-2 IS_AUTHORIZED Parameters

Parameter	Description
`p_authorization_name`	The name of an authorization scheme in the application.

Returns

Table 8-3 IS_AUTHORIZED Returns

Parameter	Description
`TRUE`	If the authorization is successful.
`FALSE`	If the authorization is not successful.

Example

This example prints the result of the authorization "User Is Admin."

```
BEGIN
    sys.htp.p('User Is Admin: '||
              case apex_authorization.is_authorized (
                      p_authorization_name => 'User Is Admin' )
```

```
                WHEN true THEN 'YES'
                WHEN false THEN 'NO'
                ELSE 'null'
                END);
END;
```

8.3 RESET_CACHE Procedure

This procedure resets the authorization caches for the session and forces a re-evaluation when an authorization is checked next.

Syntax

```
APEX_AUTHORIZATION.RESET_CACHE;
```

Parameters

None.

Example

This examples resets the authorization cache.

```
apex_authorization.reset_cache;
```

9
APEX_AUTOMATION

The `APEX_AUTOMATION` package provides automated functionality to your environment. Automations are a sequential set of actions which are triggered by query results. Use automations to monitor data and then perform the appropriate action, such as auto-approving specific requests and sending email alerts.

9.1 ABORT Procedure

This procedure aborts a currently executing automation.

Syntax

```
APEX_AUTOMATION.ABORT (
    p_application_id    IN NUMBER   DEFAULT {current application id},
    p_static_id         IN VARCHAR2 )
```

Parameters

Table 9-1 ABORT Parameters

Parameter	Description
`p_application_id`	ID of the application which contains the automation.
`p_static_id`	Static ID of the automation to disable.

Example

The following example aborts the currently executing automation `my_emp_table_automation` in application `152`. If the automation is not running, nothing happens.

```
BEGIN
apex_automation.abort(
p_application_id => 152,
p_static_id => 'my_emp_table_automation' );
END;
```

9.2 DISABLE Procedure

This procedure stops the automation from executing automatically.

Syntax

```
APEX_AUTOMATION.DISABLE(
    p_application_id    IN NUMBER   DEFAULT {current application id},
    p_static_id         IN VARCHAR2 );
```

Parameters

Parameter	Description
`p_application_id`	ID of the application which contains the automation.
`p_static_id`	Static ID of the automation to disable.

Examples

This example disables the automation `my_emp_table_automation` in application 152.

```
BEGIN
    apex_automation.disable(
        p_application_id  => 152,
        p_static_id       => 'my_emp_table_automation' );
END;
```

9.3 ENABLE Procedure

This procedure enables the automation for normal execution.

Syntax

```
APEX_AUTOMATION.ENABLE (
    p_application_id    IN NUMBER   DEFAULT {current application id},
    p_static_id         IN VARCHAR2 )
```

Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to disable.

Examples

This example enables the automation `my_emp_table_automation` in application 152.

```
BEGIN
    apex_automation.enable(
        p_application_id  => 152,
        p_static_id       => 'my_emp_table_automation' );
END;
```

9.4 EXECUTE Procedure

This procedure executes an automation.

Syntax

```
APEX_AUTOMATION.EXECUTE (
    p_application_id    IN NUMBER                   DEFAULT {current
application id},
    p_static_id         IN VARCHAR2,
    p_filters           IN apex_exec.t_filters      DEFAULT
apex_exec.c_empty_filters,
    p_order_bys         IN apex_exec.t_order_bys    DEFAULT
apex_exec.c_empty_order_bys )
```

Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to execute.
p_filters	Additional filters to apply to the automation query.
p_order_bys	`ORDER BY` clauses to apply to the automation query.

Examples

This example executes the automation `my_emp_table_automation` and applies a filter to the automation query on the `DEPTNO` column (DEPTNO = 10).

```
DECLARE
    l_filters apex_exec.t_filters;
BEGIN
```

```
    apex_session.create_session( 100, 1, 'ADMIN' );

    apex_exec.add_filter(
        p_filters        => l_filters,
        p_column_name    => 'DEPTNO',
        p_filter_type    => apex_exec.c_filter_eq,
        p_value          => 10 );

    apex_automation.execute(
        p_static_id       => 'my_emp_table_automation',
        p_filters         => l_filters );
END;
```

9.5 EXECUTE for Query Context Procedure

This procedure executes automation actions for a given query context. The columns returned by the query context match those defined in the automation query, especially when columns are referenced as bind variables in the actions code.

Syntax

```
APEX_AUTOMATION.EXECUTE (
    p_application_id    IN NUMBER   DEFAULT {current application id},
    p_static_id         IN VARCHAR2,
    p_query_context     IN apex_exec.t_context )
```

Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to execute.
p_query_context	The context to run the actions for the query.

Examples

This example executes the actions defined in the automation `my_emp_table_automation`, but uses a different query context.

```
DECLARE
    l_context apex_exec.t_context:
BEGIN
    apex_session.create_session( 100, 1, 'ADMIN' );

    l_context := apex_exec.open_query_context(
                    p_location         =>
apex_exec.c_location_local_db,
                    p_sql_query        => 'select * from
emp_copy_table' );

    apex_automation.execute(
        p_static_id       => 'my_emp_table_automation',
```

```
        p_query_context   => l_context );
END;
```

9.6 EXIT Procedure

This procedure exits automation processing, including for remaining rows. Use this procedure in automation action code.

Syntax

```
APEX_AUTOMATION.EXIT (
    p_log_message   IN VARCHAR2 DEFAULT NULL )
```

Parameters

Parameter	Description
`p_log_message`	Message to write to the automation log.

Examples

This example aborts the automation if a salary higher than 10000 is found. The automation uses `select * from emp` as the automation query.

```
BEGIN
    IF :SQL > 10000 THEN
        apex_automation.exit( p_log_message => 'Dubious SAL value found.
Exit automation.' );
    ELSE
        my_logic_package.process_emp(
            p_empno  => :EMPNO,
            p_sal    => :SAL,
            p_depto  => :DEPTNO );
    END IF;
END;
```

9.7 GET_LAST_RUN Function

This function returns the last run of the automation as a `TIMESTAMP WITH TIME ZONE` type. Use this function within automation action code or the automation query.

Syntax

```
APEX_AUTOMATION.GET_LAST_RUN
    RETURN timestamp with time zone;
```

Returns

Return	Description
*	Timestamp of the previous automation run.

Examples

This example automation only selects rows from a table which have the CREATED_AT column after the last run of the automation.

```
select *
  from {table}
 where created_at > apex_automation.get_last_run;
```

9.8 GET_LAST_RUN_TIMESTAMP Function

This function retrieves information about the latest automation run.

Syntax

```
APEX_AUTOMATION.GET_LAST_RUN_TIMESTAMP (
    p_application_id         IN NUMBER   DEFAULT {current application
id},
    p_static_id              IN VARCHAR2 )
    RETURN timestamp with time zone;
```

Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to execute.

Returns

Return	Description
*	Timestamp of the last successful automation run.

Examples

This example retrieves the timestamp of the last successful run of the `my_emp_table_automation`.

```
DECLARE
    l_last_run_ts timestamp with time zone;
BEGIN
    apex_session.create_session( 100, 1, 'ADMIN' );
    l_last_run := apex_automation.get_last_run_timestamp(
                      p_static_id    => 'my_emp_table_automation' );

    dbms_output.put_line( 'The automation''s last run was as of: ' ||
l_last_run );
END;
```

9.9 GET_SCHEDULER_JOB_NAME Function

This procedure returns the name which is used for the scheduler job when the automation executes.

Syntax

```
APEX_AUTOMATION.GET_SCHEDULER_JOB_NAME (
    p_application_id    IN NUMBER   DEFAULT {current application id},
    p_static_id         IN VARCHAR2 )
    RETURN VARCHAR2;
```

Parameters

Table 9-2 GET_SCHEDULER_JOB_NAME Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to disable.

Returns

The name of the the scheduler job which is generated to execute this automation.

Example

The following example returns the name of the scheduler job which executes the automation with the static ID `my_emp_table_automation`.

```
BEGIN
dbms_output.put_line(
apex_automation.get_scheduler_job_name(
p_application_id => 152,
p_static_id => 'my_emp_table_automation' ) );

-- ==> APEX$AUTOMATION_2167837869128719
END;
```

9.10 IS_RUNNING Function

This function determines whether a given automation is currently running.

Syntax

```
APEX_AUTOMATION.IS_RUNNING (
    p_application_id    IN NUMBER   DEFAULT {current application id},
    p_static_id         IN VARCHAR2 )
    RETURN BOOLEAN;
```

Parameters

Table 9-3 IS_RUNNING Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to disable.

Returns

If TRUE, the automation is currently running.

Example

The following example prints out whether the automation is currently running.

```
BEGIN
IF apex_automation.is_running(
p_application_id => 152,
p_static_id => 'my_emp_table_automation' )
THEN
dbms_output.put_line( 'The Automation is currently running.' );
ELSE
dbms_output.put_line( 'The Automation is currently not running.' );
END IF;
END;
```

9.11 LOG_ERROR Procedure

Syntax

```
APEX_AUTOMATION.LOG_ERROR (
    p_message   IN VARCHAR2 )
```

9.12 LOG_INFO Procedure

This procedure logs procedures to be used within automation code.

Syntax

```
APEX_AUTOMATION.LOG_INFO (
    p_message   IN VARCHAR2 )
```

Parameters

Parameter	Description
p_message	Message to write to the automation log.

Examples

This example writes some log information. The automation uses `select * from emp` as the automation query.

```
BEGIN
    IF :SAL > 10000 THEN
        apex_automation.log_info( p_message => 'High Salary found for empno:
' || :EMPNO );
    END IF;
    my_logic_package.process_emp(
        p_empno  => :EMPNO,
        p_sal    => :SAL,
        p_depto  => :DEPTNO );
END;
```

9.13 LOG_WARN Procedure

Syntax

```
APEX_AUTOMATION.LOG_WARN (
    p_message   IN VARCHAR2 )
```

9.14 RESCHEDULE Procedure

This procedure sets the next scheduled execution date of a "polling" automation to now so that the main automation execution job executes the automation as soon as possible. If the automation is currently running, it will not restart.

Syntax

```
APEX_AUTOMATION.RESCHEDULE (
  p_application_id  IN NUMBER                    DEFAULT {current
application id},
  p_static_id       IN VARCHAR2,
  p_next_run_at     IN timestamp with time zone   DEFAULT systimestamp )
```

Parameters

Parameter	Description
p_application_id	ID of the application which contains the automation.
p_static_id	Static ID of the automation to execute.
p_next_run_at	Timestamp of the next automation run.

Examples

This example sets the automation `my_emp_table_automation` to execute in the background right now.

```
BEGIN
  apex_session.create_session( 100, 1, 'ADMIN' );

  apex_automation.reschedule(
    p_static_id  => 'my_emp_table_automation' );
END;
```

9.15 SKIP_CURRENT_ROW Procedure

This procedure skips processing of the current row and continues with next one. Use this procedure in automation action code.

Syntax

```
APEX_AUTOMATION.SKIP_CURRENT_ROW (
    p_log_message   IN VARCHAR2 DEFAULT NULL )
```

Parameters

Parameter	Description
`p_log_message`	Message to write to the automation log.

Examples

This example skips the rest of processing for the current row (PRESIDENT row). The automation uses `select * from emp` as the automation query.

```
BEGIN
    IF :ENAME = 'PRESIDENT' THEN
        apex_automation.skip_current_row( p_log_message => 'PRESIDENT
skipped' );
    ELSE
        my_logic_package.process_emp(
            p_empno  => :EMPNO,
            p_sal    => :SAL,
            p_depto  => :DEPTNO );
    END IF;
END;
```

10
APEX_COLLECTION

Collections enable you to temporarily capture one or more nonscalar values. You can use collections to store rows and columns currently in session state so they can be accessed, manipulated, or processed during a user's specific session. You can think of a collection as a bucket in which you temporarily store and name rows of information.

10.1 About the APEX_COLLECTION API

Every collection contains a named list of data elements (or members) which can have up to 50 character attributes (`VARCHAR2(4000)`), five number attributes, five date attributes, one XML Type attribute, one large binary attribute (`BLOB`), and one large character attribute (`CLOB`). You insert, update, and delete collection information using the PL/SQL API `APEX_COLLECTION`.

The following are examples of when you might use collections:

- When you are creating a data-entry wizard in which multiple rows of information first need to be collected within a logical transaction. You can use collections to

temporarily store the contents of the multiple rows of information, before performing the final step in the wizard when both the physical and logical transactions are completed.

- When your application includes an update page on which a user updates multiple detail rows on one page. The user can make many updates, apply these updates to a collection and then call a final process to apply the changes to the database.
- When you are building a wizard where you are collecting an arbitrary number of attributes. At the end of the wizard, the user then performs a task that takes the information temporarily stored in the collection and applies it to the database.

Beginning in Oracle Database 12*c*, database columns of data type `VARCHAR2` can be defined up to 32,767 bytes. This requires that the database initialization parameter `MAX_STRING_SIZE` has a value of `EXTENDED`. If Oracle APEX was installed in Oracle Database 12*c* and with `MAX_STRING_SIZE=EXTENDED`, then the tables for the APEX collections will be defined to support up 32,767 bytes for the character attributes of a collection. For the methods in the APEX_COLLECTION API, all references to character attributes (`c001` through `c050`) can support up to 32,767 bytes.

10.2 Naming Collections

When you create a collection, you must give it a name that cannot exceed 255 characters. Note that collection names are not case-sensitive and are converted to uppercase.

Once the collection is named, you can access the values in the collection by running a SQL query against the view `APEX_COLLECTIONS`.

> **See Also:**
>
> - "Accessing a Collection"
> - "CREATE_COLLECTION Procedure"
> - "CREATE_OR_TRUNCATE_COLLECTION Procedure"

10.3 Creating a Collection

Every collection contains a named list of data elements (or members) which can have up to 50 character attributes (`VARCHAR2(4000)`), five number attributes, one XML Type attribute, one large binary attribute (`BLOB`), and one large character attribute (`CLOB`). You use the following methods to create a collection:

- `CREATE_COLLECTION`

  This method creates an empty collection with the provided name. An exception is raised if the named collection exists.

- `CREATE_OR_TRUNCATE_COLLECTION`

  If the provided named collection does not exist, this method creates an empty collection with the given name. If the named collection exists, this method truncates it. Truncating a collection empties it, but leaves it in place.

- `CREATE_COLLECTION_FROM_QUERY`

This method creates a collection and then populates it with the results of a specified query. An exception is raised if the named collection exists. This method can be used with a query with up to 50 columns in the `SELECT` clause. These columns in the `SELECT` clause populate the 50 character attributes of the collection (C001 through C050).

- `CREATE_COLLECTION_FOM_QUERY2`

  This method creates a collection and then populates it with the results of a specified query. An exception is raised if the named collection exists. It is identical to the `CREATE_COLLECTION_FROM_QUERY`, however, the first 5 columns of the `SELECT` clause must be numeric. After the numeric columns, there can be up to 50 character columns in the `SELECT` clause.

- `CREATE_COLLECTION_FROM_QUERY_B`

  This method offers significantly faster performance than the `CREATE_COLLECTION_FROM_QUERY` method by performing bulk SQL operations, but has the following limitations:

  – No column value in the select list of the query can be more than 2,000 bytes. If a row is encountered that has a column value of more than 2,000 bytes, an error is raised during execution.

  – The MD5 checksum is not computed for any members in the collection.

- `CREATE_COLLECTION_FROM_QUERYB2`

  This method also creates a collection and then populates it with the results of a specified query. An exception is raised if the named collection exists. It is identical to the `CREATE_COLLECTION_FROM_QUERY_B`, however, the first five columns of the `SELECT` clause must be numeric. After the numeric columns, there can be up to 50 character columns in the `SELECT` clause.

See Also:

- "CREATE_COLLECTION Procedure"
- "CREATE_OR_TRUNCATE_COLLECTION Procedure"
- "CREATE_COLLECTION_FROM_QUERY Procedure"
- "CREATE_COLLECTION_FROM_QUERY2 Procedure"
- "CREATE_COLLECTION_FROM_QUERY_B Procedure"
- "CREATE_COLLECTION_FROM_QUERYB2 Procedure"

10.4 About the Parameter p_generate_md5

Use the `p_generate_md5` flag to specify if the message digest of the data of the collection member should be computed. By default, this flag is set to `NO`. Use this parameter to check the MD5 of the collection member (that is, compare it with another member or see if a member has changed).

> **See Also:**
>
> - "Determining Collection Status"for information about using the `GET_MEMBER_MD5` function
> - "GET_MEMBER_MD5 Function"

10.5 Accessing a Collection

You can access the members of a collection by querying the database view `APEX_COLLECTIONS`. Collection names are always converted to uppercase. When querying the `APEX_COLLECTIONS` view, always specify the collection name in all uppercase. The `APEX_COLLECTIONS` view has the following definition:

```
COLLECTION_NAME   NOT NULL VARCHAR2(255)
SEQ_ID            NOT NULL NUMBER
C001              VARCHAR2(4000)
C002              VARCHAR2(4000)
C003              VARCHAR2(4000)
C004              VARCHAR2(4000)
C005              VARCHAR2(4000)
...
C050              VARCHAR2(4000)
N001              NUMBER
N002              NUMBER
N003              NUMBER
N004              NUMBER
N005              NUMBER
D001              DATE
D002              DATE
D003              DATE
D004              DATE
D005              DATE
CLOB001           CLOB
BLOB001           BLOB
XMLTYPE001        XMLTYPE
MD5_ORIGINAL      VARCHAR2(4000)
```

Use the `APEX_COLLECTIONS` view in an application just as you would use any other table or view in an application, for example:

```
SELECT c001, c002, c003, n001, d001, clob001
   FROM APEX_collections
 WHERE collection_name = 'DEPARTMENTS'
```

10.6 Merging Collections

You can merge members of a collection with values passed in a set of arrays. By using the `p_init_query` argument, you can create a collection from the supplied query.

> **See Also:**
>
> "MERGE_MEMBERS Procedure"

10.7 Truncating a Collection

If you truncate a collection, you remove all members from the specified collection, but the named collection remains in place.

> **See Also:**
>
> "TRUNCATE_COLLECTION Procedure"

10.8 Deleting a Collection

If you delete a collection, you delete the collection and all of its members. Be aware that if you do not delete a collection, it is eventually deleted when the session is purged.

> **See Also:**
>
> "DELETE_COLLECTION Procedure"

10.9 Deleting All Collections for the Current Application

Use the `DELETE_ALL_COLLECTIONS` method to delete all collections defined in the current application.

> **See Also:**
>
> "DELETE_ALL_COLLECTIONS Procedure"

10.10 Deleting All Collections in the Current Session

Use the `DELETE_ALL_COLLECTIONS_SESSION` method to delete all collections defined in the current session.

> **See Also:**
>
> "DELETE_ALL_COLLECTIONS_SESSION Procedure"

10.11 Adding Members to a Collection

When data elements (or members) are added to a collection, they are assigned a unique sequence ID. As you add members to a collection, the sequence ID is change in increments of 1, with the newest members having the largest ID.

You add new members to a collection using the `ADD_MEMBER function`. Calling this function returns the sequence ID of the newly added member.

You can also add new members (or an array of members) to a collection using the `ADD_MEMBERS` procedure. The number of members added is based on the number of elements in the first array.

> **See Also:**
>
> - "ADD_MEMBER Procedure"
> - "ADD_MEMBER Function"
> - "ADD_MEMBERS Procedure"

10.12 About the Parameters p_generate_md5, p_clob001, p_blob001, and p_xmltype001

Use the `p_generate_md5` flag to specify if the message digest of the data of the collection member should be computed. By default, this flag is set to `NO`. Use this parameter to check the MD5 of the collection member (that is, compare it with another member or see if a member has changed).

Use `p_clob001` for collection member attributes which exceed 4,000 characters. Use `p_blob001` for binary collection member attributes. Use `p_xmltype001` to store well-formed XML.

> **See Also:**
>
> "Determining Collection Status" for information about using the function `GET_MEMBER_MD5`

10.13 Updating Collection Members

You can update collection members by calling the `UPDATE_MEMBER` procedure and referencing the desired collection member by its sequence ID. The `UPDATE_MEMBER` procedure replaces an entire collection member, not individual member attributes.

Use the `p_clob001` parameter for collection member attributes which exceed 4,000 characters.

To update a single attribute of a collection member, use the `UPDATE_MEMBER_ATTRIBUTE procedure`.

See Also:

- "UPDATE_MEMBER Procedure"
- "UPDATE_MEMBERS Procedure"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5"

10.14 Deleting Collection Members

You can delete a collection member by calling the `DELETE_MEMBER` procedure and referencing the desired collection member by its sequence ID. Note that this procedure leaves a gap in the sequence IDs in the specified collection.

You can also delete all members from a collection by when an attribute matches a specific value. Note that the `DELETE_MEMBERS` procedure also leaves a gap in the sequence IDs in the specified collection. If the supplied attribute value is null, then all members of the named collection are deleted where the attribute (specified by `p_attr_number`) is null.

See Also:

- "DELETE_MEMBER Procedure"
- "DELETE_MEMBERS Procedure"

10.15 Obtaining a Member Count

Use `COLLECTION_MEMBER_COUNT` to return the total count of all members in a collection. Note that this count does not indicate the highest sequence in the collection.

> **See Also:**
>
> "COLLECTION_MEMBER_COUNT Function"

10.16 Resequencing a Collection

Use `RESEQUENCE_COLLECTION` to resequence a collection to remove any gaps in sequence IDs while maintaining the same element order.

> **See Also:**
>
> "RESEQUENCE_COLLECTION Procedure"

10.17 Verifying Whether a Collection Exists

Use `COLLECTION_EXISTS` to determine if a collection exists.

> **See Also:**
>
> "COLLECTION_EXISTS Function"

10.18 Adjusting a Member Sequence ID

You can adjust the sequence ID of a specific member within a collection by moving the ID up or down. When you adjust a sequence ID, the specified ID is exchanged with another ID. For example, if you were to move the ID 2 up, 2 becomes 3, and 3 would become 2.

Use `MOVE_MEMBER_UP` to adjust a member sequence ID up by one. Alternately, use `MOVE_MEMBER_DOWN` to adjust a member sequence ID down by one.

> **See Also:**
>
> - "MOVE_MEMBER_DOWN Procedure"
> - "MOVE_MEMBER_UP Procedure"

10.19 Sorting Collection Members

Use the `SORT_MEMBERS` method to reorder members of a collection by the column number. This method sorts the collection by a particular column number and also reassigns the sequence IDs for each member to remove gaps.

> **See Also:**
>
> "SORT_MEMBERS Procedure"

10.20 Clearing Collection Session State

Clearing the session state of a collection removes the collection members. A shopping cart is a good example of when you might need to clear collection session state. When a user requests to empty the shopping cart and start again, you must clear the session state for a collection. You can remove session state of a collection by calling the `TRUNCATE_COLLECTION` method or by using `f?p` syntax.

Calling the `TRUNCATE_COLLECTION` method deletes the existing collection and then recreates it, for example:

```
APEX_COLLECTION.TRUNCATE_COLLECTION(
    p_collection_name => collection name);
```

You can also use the sixth `f?p` syntax argument to clear session state, for example:

```
f?p=App:Page:Session::NO:collection name
```

> **See Also:**
>
> "TRUNCATE_COLLECTION Procedure"

10.21 Determining Collection Status

The `p_generate_md5` parameter determines if the MD5 message digests are computed for each member of a collection. The collection status flag is set to `FALSE` immediately

after you create a collection. If any operations are performed on the collection (such as add, update, truncate, and so on), this flag is set to `TRUE`.

You can reset this flag manually by calling `RESET_COLLECTION_CHANGED`.

Once this flag has been reset, you can determine if a collection has changed by calling `COLLECTION_HAS_CHANGED`.

When you add a new member to a collection, an MD5 message digest is computed against all 50 attributes and the CLOB attribute if the `p_generated_md5` parameter is set to `YES`. You can access this value from the `MD5_ORIGINAL` column of the view `APEX_COLLECTION`. You can access the MD5 message digest for the current value of a specified collection member by using the function `GET_MEMBER_MD5`.

See Also:

- "RESET_COLLECTION_CHANGED Procedure"
- "COLLECTION_HAS_CHANGED Function"
- "GET_MEMBER_MD5 Function"

10.22 ADD_MEMBER Procedure

Use this procedure to add a new member to an existing collection. An error is raised if the specified collection does not exist for the current user in the same session for the current Application ID. Gaps are not used when adding a new member, so an existing collection with members of sequence IDs (1,2,5,8) adds the new member with a sequence ID of 9.

Syntax

```
APEX_COLLECTION.ADD_MEMBER (
    p_collection_name IN VARCHAR2,
    p_c001 IN VARCHAR2 DEFAULT NULL,
    ...
    p_c050 IN VARCHAR2 DEFAULT NULL,
    p_n001 IN NUMBER DEFAULT NULL,
    p_n002 IN NUMBER DEFAULT NULL,
    p_n003 IN NUMBER DEFAULT NULL,
    p_n004 IN NUMBER DEFAULT NULL,
    p_n005 IN NUMBER DEFAULT NULL,
    p_d001 IN DATE DEFAULT NULL,
    p_d002 IN DATE DEFAULT NULL,
    p_d003 IN DATE DEFAULT NULL,
    p_d004 IN DATE DEFAULT NULL,
    p_d005 IN DATE DEFAULT NULL,
    p_clob001 IN CLOB DEFAULT EMPTY_CLOB(),
    p_blob001 IN BLOB DEFAULT EMPTY_BLOB(),
    p_xmltype001 IN XMLTYPE DEFAULT NULL,
    p_generate_md5 IN VARCHAR2  DEFAULT 'NO');
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters.

Table 10-1 ADD_MEMBER Procedure Parameters

Parameter	Description
p_collection_name	The name of an existing collection. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case.
p_c001 through p_c050	Attribute value of the member to be added. Maximum length is 4,000 bytes. Any character attribute exceeding 4,000 characters is truncated to 4,000 characters.
p_n001 through p_n005	Attribute value of the numeric attributes to be added.
p_d001 through p_d005	Attribute value of the date attribute.
p_clob001	Use p_clob001 for collection member attributes that exceed 4,000 characters.
p_blob001	Use p_blob001 for binary collection member attributes.
p_xmltype001	Use p_xmltype001 to store well-formed XML.
p_generate_md5	Valid values include YES and NO. YES to specify if the message digest of the data of the collection member should be computed. Use this parameter to compare the MD5 of the collection member with another member or to see if that member has changed.

Example

The following is an example of the ADD_MEMBER procedure.

```
APEX_COLLECTION.ADD_MEMBER(
        p_collection_name => 'GROCERIES'
        p_c001            => 'Grapes',
        p_c002            => 'Imported',
        p_n001            => 125,
        p_d001            => sysdate );
END;
```

> **See Also:**
>
> - "GET_MEMBER_MD5 Function"
> - "ADD_MEMBER Function"
> - "ADD_MEMBERS Procedure"

10.23 ADD_MEMBER Function

Use this function to add a new member to an existing collection. Calling this function returns the sequence ID of the newly added member. An error is raised if the specified collection does not exist for the current user in the same session for the current Application ID. Gaps are not used when adding a new member, so an existing collection with members of sequence IDs (1,2,5,8) adds the new member with a sequence ID of 9.

Syntax

```
APEX_COLLECTION.ADD_MEMBER (
    p_collection_name IN VARCHAR2,
    p_c001 IN VARCHAR2 DEFAULT NULL,
    ...
    p_c050 IN VARCHAR2 DEFAULT NULL,
    p_n001 IN NUMBER DEFAULT NULL,
    p_n002 IN NUMBER DEFAULT NULL,
    p_n003 IN NUMBER DEFAULT NULL,
    p_n004 IN NUMBER DEFAULT NULL,
    p_n005 IN NUMBER DEFAULT NULL,
    p_d001 IN DATE DEFAULT NULL,
    p_d002 IN DATE DEFAULT NULL,
    p_d003 IN DATE DEFAULT NULL,
    p_d004 IN DATE DEFAULT NULL,
    p_d005 IN DATE DEFAULT NULL,
    p_clob001 IN CLOB DEFAULT EMPTY_CLOB(),
    p_blob001 IN BLOB DEFAULT EMPTY_BLOB(),
    p_xmltype001 IN XMLTYPE DEFAULT NULL,
    p_generate_md5 IN VARCHAR2 DEFAULT 'NO')
RETURN NUMBER;
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters.

Table 10-2 ADD_MEMBER Function Parameters

Parameter	Description
p_collection_name	The name of an existing collection. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case.
p_c001 through p_c050	Attribute value of the member to be added. Maximum length is 4,000 bytes. Any character attribute exceeding 4,000 characters is truncated to 4,000 characters.
p_n001 through p_n005	Attribute value of the numeric attributes to be added.
p_d001 through p_d005	Attribute value of the date attribute to be added.
p_clob001	Use p_clob001 for collection member attributes that exceed 4,000 characters.
p_blob001	Use p_blob001 for binary collection member attributes.
p_xmltype001	Use p_xmltype001 to store well-formed XML.
p_generate_md5	Valid values include YES and NO. YES to specify if the message digest of the data of the collection member should be computed. Use this parameter to compare the MD5 of the collection member with another member or to see if that member has changed.

Example

```
DECLARE
    l_seq number;
BEGIN
    l_seq := APEX_COLLECTION.ADD_MEMBER(
                 p_collection_name => 'GROCERIES'
                 p_c001            => 'Grapes',
                 p_c002            => 'Imported',
                 p_n001            => 125,
                 p_d001            => sysdate );
END;
```

See Also:

- "GET_MEMBER_MD5 Function"
- "ADD_MEMBER Procedure"
- "ADD_MEMBERS Procedure"

10.24 ADD_MEMBERS Procedure

Use this procedure to add an array of members to a collection. An error is raised if the specified collection does not exist for the current user in the same session for the current Application ID. Gaps are not used when adding a new member, so an existing

collection with members of sequence IDs (1,2,5,8) adds the new member with a sequence ID of 9. The count of elements in the p_c001 PL/SQL table is used as the total number of items across all PL/SQL tables. For example, if p_c001.count is 2 and p_c002.count is 10, only 2 members are added. If p_c001 is null an application error is raised.

Syntax

```
APEX_COLLECTION.ADD_MEMBERS (
    p_collection_name IN VARCHAR2,
    p_c001 IN APEX_APPLICATION_GLOBAL.VC_ARR2,
    p_c002 IN APEX_APPLICATION_GLOBAL.VC_ARR2 default empty_vc_arr,
    p_c003 IN APEX_APPLICATION_GLOBAL.VC_ARR2 default empty_vc_arr,
    ...
    p_c050 IN APEX_APPLICATION_GLOBAL.VC_ARR2 default empty_vc_arr,
    p_n001 IN APEX_APPLICATION_GLOBAL.N_ARR default empty_n_arr,
    p_n002 IN APEX_APPLICATION_GLOBAL.N_ARR default empty_n_arr,
    p_n003 IN APEX_APPLICATION_GLOBAL.N_ARR default empty_n_arr,
    p_n004 IN APEX_APPLICATION_GLOBAL.N_ARR default empty_n_arr,
    p_n005 IN APEX_APPLICATION_GLOBAL.N_ARR default empty_n_arr,
    p_d001 IN APEX_APPLICATION_GLOBAL.D_ARR default empty_d_arr,
    p_d002 IN APEX_APPLICATION_GLOBAL.D_ARR default empty_d_arr,
    p_d003 IN APEX_APPLICATION_GLOBAL.D_ARR default empty_d_arr,
    p_d004 IN APEX_APPLICATION_GLOBAL.D_ARR default empty_d_arr,
    p_d005 IN APEX_APPLICATION_GLOBAL.D_ARR default empty_d_arr,
    p_generate_md5 IN VARCHAR2 default 'NO');
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-3 ADD_MEMBERS Procedure Parameters

Parameter	Description
p_collection_name	The name of an existing collection. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case.
p_c001 through p_c050	Array of character attribute values to be added.
p_n001 through p_n005	Array of numeric attribute values to be added.
p_d001 through p_d005	Array of date attribute values to be added.
p_generate_md5	Valid values include YES and NO. YES to specify if the message digest of the data of the collection member should be computed. Use this parameter to compare the MD5 of the collection member with another member or to see if that member has changed.

Example

The following example shows how to add two new members to the `EMPLOYEE` table.

```
Begin
    APEX_COLLECTION.ADD_MEMBERS(
        p_collection_name => 'EMPLOYEE',
        p_c001 => l_arr1,
        p_c002 => 1_arr2);
End;
```

> **See Also:**
>
> - "GET_MEMBER_MD5 Function"
> - "ADD_MEMBER Procedure"
> - "ADD_MEMBER Function"

10.25 COLLECTION_EXISTS Function

Use this function to determine if a collection exists. A `TRUE` is returned if the specified collection exists for the current user in the current session for the current Application ID, otherwise `FALSE` is returned.

Syntax

```
APEX_COLLECTION.COLLECTION_EXISTS (
    p_collection_name IN VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 10-4 COLLECTION_EXISTS Function Parameters

Parameter	Description
`p_collection_name`	The name of the collection. Maximum length is 255 bytes. The collection name is not case sensitive and is converted to upper case.

Example

The following example shows how to use the `COLLECTION_EXISTS` function to determine if the collection named `EMPLOYEES` exists.

```
Begin
    l_exists := APEX_COLLECTION.COLLECTION_EXISTS (
```

```
        p_collection_name => 'EMPLOYEES');
End;
```

10.26 COLLECTION_HAS_CHANGED Function

Use this function to determine if a collection has changed since it was created or the collection changed flag was reset.

Syntax

```
APEX_COLLECTION.COLLECTION_HAS_CHANGED (
    p_collection_name IN VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 10-5 COLLECTION_HAS_CHANGED Function Parameters

Parameter	Description
p_collection_name	The name of the collection. An error is returned if this collection does not exist with the specified name of the current user and in the same session.

Example

The following example shows how to use the `COLLECTION_HAS_CHANGED` function to determine if the `EMPLOYEES` collection has changed since it was created or last reset.

```
Begin
    l_exists := APEX_COLLECTION.COLLECTION_HAS_CHANGED (
       p_collection_name => 'EMPLOYEES');
End;
```

10.27 COLLECTION_MEMBER_COUNT Function

Use this function to get the total number of members for the named collection. If gaps exist, the total member count returned is not equal to the highest sequence ID in the collection. If the named collection does not exist for the current user in the current session, an error is raised.

Syntax

```
APEX_COLLECTION.COLLECTION_MEMBER_COUNT (
    p_collection_name IN VARCHAR2)
RETURN NUMBER;
```

Parameters

Table 10-6 COLLECTION_MEMBER_COUNT Function Parameters

Parameter	Description
p_collection_name	The name of the collection.

Example

This example shows how to use the COLLECTION_MEMBER_COUNT function to get the total number of members in the DEPARTMENTS collection.

```
Begin
    l_count :=
APEX_COLLECTION.COLLECTION_MEMBER_COUNT( p_collection_name =>
'DEPARTMENTS');
End;
```

10.28 CREATE_COLLECTION Procedure

Use this procedure to create an empty collection that does not already exist. If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.CREATE_COLLECTION(
    p_collection_name    IN VARCHAR2,
    p_truncate_if_exists IN VARCHAR2 default 'NO');
```

Parameters

Table 10-7 CREATE_COLLECTION Procedure Parameters

Parameter	Description
p_collection_name	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
p_truncate_if_exists	If YES, then members of the collection will first be truncated if the collection exists and no error will be raised. If NO (or not YES), and the collection exists, an error will be raised.

Example

This example shows how to use the CREATE_COLLECTION procedure to create an empty collection named EMPLOYEES.

```
Begin
    APEX_COLLECTION.CREATE_COLLECTION(
```

```
        p_collection_name => 'EMPLOYEES');
End;
```

> **See Also:**
>
> - GET_MEMBER_MD5 Function

10.29 CREATE_OR_TRUNCATE_COLLECTION Procedure

Use this procedure to create a collection. If a collection exists with the same name for the current user in the same session for the current Application ID, all members of the collection are removed. In other words, the named collection is truncated.

Syntax

```
APEX_COLLECTION.CREATE_OR_TRUNCATE_COLLECTION(
    p_collection_name IN VARCHAR2);
```

Parameters

Table 10-8 CREATE_OR_TRUNCATE_COLLECTION Procedure Parameters

Parameter	Description
p_collection_name	The name of the collection. The maximum length is 255 characters. All members of the named collection are removed if the named collection exists for the current user in the current session.

Example

This example shows how to use the `CREATE_OR_TRUNCATE_COLLECTION` procedure to remove all members in an existing collection named `EMPLOYEES`.

```
Begin
    APEX_COLLECTION.CREATE_OR_TRUNCATE_COLLECTION(
        p_collection_name => 'EMPLOYEES');
End;
```

> **See Also:**
>
> - GET_MEMBER_MD5 Function

10.30 CREATE_COLLECTION_FROM_QUERY Procedure

Use this procedure to create a collection from a supplied query. The query is parsed as the application owner. This method can be used with a query with up to 50 columns in the `SELECT` clause. These columns in the `SELECT` clause populates the 50 character attributes of the collection (C001 through C050). If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY (
    p_collection_name    IN VARCHAR2,
    p_query              IN VARCHAR2,
    p_generate_md5       IN VARCHAR2 default 'NO',
    p_truncate_if_exists IN VARCHAR2 default 'NO');
```

Parameters

Table 10-9 CREATE_COLLECTION_FROM_QUERY Procedure Parameters

Parameter	Description
`p_collection_name`	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
`p_query`	Query to execute to populate the members of the collection.
`p_generate_md5`	Valid values include `YES` and `NO`. `YES` to specify if the message digest of the data of the collection member should be computed. Use this parameter to compare the MD5 of the collection member with another member or to see if that member has changed.
`p_truncate_if_exists`	If `YES`, then members of the collection will first be truncated if the collection exists and no error will be raised. If `NO` (or not `YES`), and the collection exists, an error will be raised.

Example

The following example shows how to use the `CREATE_COLLECTION_FROM_QUERY` procedure to create a collection named `AUTO` and populate it with data from the `AUTOS` table. Because `p_generate_md5` is '`YES`', the `MD5` checksum is computed to allow comparisons to determine change status.

```
Begin
    l_query := 'select make, model, year from AUTOS';
    APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY (
        p_collection_name => 'AUTO',
        p_query => l_query,
        p_generate_md5 => 'YES');
End;
```

> **See Also:**
>
> - GET_MEMBER_MD5 Function

10.31 CREATE_COLLECTION_FROM_QUERY2 Procedure

Use this procedure to create a collection from a supplied query. This method is identical to `CREATE_COLLECTION_FROM_QUERY`, however, the first 5 columns of the `SELECT` clause must be numeric and the next 5 must be date. After the numeric and date columns, there can be up to 50 character columns in the `SELECT` clause. The query is parsed as the application owner. If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY2 (
    p_collection_name    IN VARCHAR2,
    p_query              IN VARCHAR2,
    p_generate_md5       IN VARCHAR2 default 'NO',
    p_truncate_if_exists IN VARCHAR2 default 'NO');
```

Parameters

Table 10-10 CREATE_COLLECTION_FROM_QUERY2 Procedure Parameters

Parameter	Description
`p_collection_name`	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
`p_query`	Query to execute to populate the members of the collection.
`p_generate_md5`	Valid values include `YES` and `NO`. `YES` to specify if the message digest of the data of the collection member should be computed. Use this parameter to compare the MD5 of the collection member with another member or to see if that member has changed.
`p_truncate_if_exists`	If `YES`, then members of the collection will first be truncated if the collection exists and no error will be raised. If `NO` (or not `YES`), and the collection exists, an error will be raised.

Example

The following example shows how to use the `CREATE_COLLECTION_FROM_QUERY2` procedure to create a collection named `EMPLOYEE` and populate it with data from the `EMP` table. The first five columns (mgr, sal, comm, deptno, and null) are all numeric. Because p_generate_md5 is '`NO`', the `MD5` checksum is not computed.

```
BEGIN
    APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY2 (
        p_collection_name => 'EMPLOYEE',
        p_query => 'select empno, sal, comm, deptno, null, hiredate, null,
```

```
null, null, null, ename, job, mgr from emp',
        p_generate_md5 => 'NO');
END;
```

> **See Also:**
>
> - GET_MEMBER_MD5 Function

10.32 CREATE_COLLECTION_FROM_QUERY_B Procedure

Use this procedure to create a collection from a supplied query using bulk operations. This method offers significantly faster performance than the `CREATE_COLLECTION_FROM_QUERY` method. The query is parsed as the application owner. If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised.

This procedure uses bulk dynamic SQL to perform the fetch and insert operations into the named collection. Two limitations are imposed by this procedure:

1. The MD5 checksum for the member data is not computed.
2. No column value in query p_query can exceed 2,000 bytes. If a row is encountered that has a column value of more than 2,000 bytes, an error is raised during execution. In Oracle Database 11g Release 2 (11.2.0.1) or later, this column limit is 4,000 bytes.

Syntax

```
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B (
    p_collection_name    IN VARCHAR2,
    p_query              IN VARCHAR2,
    p_names  IN apex_application_global.vc_arr2,
    p_values IN apex_application_global.vc_arr2,
    p_max_row_count      IN NUMBER default null,
    p_truncate_if_exists IN VARCHAR2 default 'NO');
```

Parameters

Table 10-11 CREATE_COLLECTION_FROM_QUERY_B Procedure Parameters

Parameter	Description
`p_collection_name`	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
`p_query`	Query to execute to populate the members of the collection.
`p_names`	Array of bind variable names used in the query statement.

Table 10-11 (Cont.) CREATE_COLLECTION_FROM_QUERY_B Procedure Parameters

Parameter	Description
p_values	Array of bind variable values used in the bind variables in the query statement.
p_max_row_count	Maximum number of rows returned from the query in p_query which should be added to the collection.
p_truncate_if_exists	If YES, then members of the collection will first be truncated if the collection exists and no error will be raised. If NO (or not YES), and the collection exists, an error will be raised.

Example

The following example shows how to use the CREATE_COLLECTION_FROM_QUERY_B procedure to create a collection named EMPLOYEES and populate it with data from the emp table.

```
declare
     l_query varchar2(4000);
 Begin
     l_query := 'select empno, ename, job, sal from emp where deptno = :b1';
     APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B (
         p_collection_name => 'EMPLOYEES',
         p_query => l_query,
         p_names => apex_util.string_to_table('b1'),
         p_values => apex_util.string_to_table('10'));
 End;
```

See Also:

- GET_MEMBER_MD5 Function

10.33 CREATE_COLLECTION_FROM_QUERY_B Procedure (No bind version)

Use this procedure to create a collection from a supplied query using bulk operations. This method offers significantly faster performance than the CREATE_COLLECTION_FROM_QUERY method. The query is parsed as the application owner. If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised.

This procedure uses bulk dynamic SQL to perform the fetch and insert operations into the named collection. Two limitations are imposed by this procedure:

1. The MD5 checksum for the member data is not computed.

2. No column value in query p_query can exceed 2,000 bytes. If a row is encountered that has a column value of more than 2,000 bytes, an error is raised during execution. In Oracle Database 11g Release 2 (11.2.0.1) or later, this column limit is 4,000 bytes.

Syntax

```
 APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B
(
  p_collection_name IN VARCHAR2,
  p_query           IN VARCHAR2,
  p_max_row_count   IN NUMBER DEFAULT NULL);
```

Parameters

Table 10-12 CREATE_COLLECTION_FROM_QUERY_B Procedure (No bind version) Parameters

Parameter	Description
p_collection_name	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
p_query	Query to execute to populate the members of the collection.
p_max_row_count	Maximum number of rows returned from the query in p_query which should be added to the collection.

Example

The following example shows how to use the `CREATE_COLLECTION_FROM_QUERY_B` procedure to create a collection named `EMPLOYEES` and populate it with data from the `emp` table.

```
declare
   l_query varchar2(4000);
Begin
     l_query := 'select empno, ename, job, sal from emp';
     APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B
(
          p_collection_name => 'EMPLOYEES',
          p_query => l_query );
 End;
```

See Also:

- GET_MEMBER_MD5 Function

10.34 CREATE_COLLECTION_FROM_QUERYB2 Procedure

Use this procedure to create a collection from a supplied query using bulk operations. This method offers significantly faster performance than the `CREATE_COLLECTION_FROM_QUERY_2` method. The query is parsed as the application owner. If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised. It is identical to the `CREATE_COLLECTION_FROM_QUERY_B`, however, the first five columns of the `SELECT` clause must be numeric and the next five columns must be date. After the date columns, there can be up to 50 character columns in the `SELECT` clause

This procedure uses bulk dynamic SQL to perform the fetch and insert operations into the named collection. Two limitations are imposed by this procedure:

1. The MD5 checksum for the member data is not computed.
2. No column value in query p_query can exceed 2,000 bytes. If a row is encountered that has a column value of more than 2,000 bytes, an error is raised during execution. In Oracle Database 11g Release 2 (11.2.0.1) or later, this column limit is 4,000 bytes.

Syntax

```
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERYB2 (
    p_collection_name    IN VARCHAR2,
    p_query              IN VARCHAR2,
    p_names IN apex_application_global.vc_arr2,
    p_values IN apex_application_global.vc_arr2,
    p_max_row_count      IN NUMBER default null,
    p_truncate_if_exists IN VARCHAR2 default 'NO');
```

Parameters

Table 10-13 CREATE_COLLECTION_FROM_QUERYB2 Procedure Parameters

Parameter	Description
p_collection_name	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
p_query	Query to execute to populate the members of the collection.
p_names	Array of bind variable names used in the query statement.
p_values	Array of bind variable values used in the bind variables in the query statement.
p_max_row_count	Maximum number of rows returned from the query in p_query which should be added to the collection.
p_truncate_if_exists	If `YES`, then members of the collection will first be truncated if the collection exists and no error will be raised. If `NO` (or not `YES`), and the collection exists, an error will be raised.

Example

The following example shows how to use the `CREATE_COLLECTION_FROM_QUERYB2` procedure to create a collection named `EMPLOYEES` and populate it with data from the `EMP` table. The first five columns (mgr, sal, comm, deptno, and null) are all numeric and the next five are all date.

```
declare
 l_query varchar2(4000);
Begin
 l_query := 'select empno, sal, comm, deptno, null, hiredate, null,
null, null, null, ename, job, mgr from emp where deptno = :b1';
  APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERYB2 (
        p_collection_name => 'EMPLOYEES',
        p_query => l_query,
        p_names => apex_util.string_to_table('b1'),
         p_values => apex_util.string_to_table('10'));
End;
```

See Also:

- GET_MEMBER_MD5 Function

10.35 CREATE_COLLECTION_FROM_QUERYB2 Procedure (No bind version)

Use this procedure to create a collection from a supplied query using bulk operations. This method offers significantly faster performance than the `CREATE_COLLECTION_FROM_QUERY_2` method. The query is parsed as the application owner. If a collection exists with the same name for the current user in the same session for the current Application ID, an application error is raised. It is identical to the `CREATE_COLLECTION_FROM_QUERY_B`, however, the first five columns of the `SELECT` clause must be numeric and the next five columns must be date. After the date columns, there can be up to 50 character columns in the `SELECT` clause

This procedure uses bulk dynamic SQL to perform the fetch and insert operations into the named collection. Two limitations are imposed by this procedure:

1. The MD5 checksum for the member data is not computed.
2. No column value in query p_query can exceed 2,000 bytes. If a row is encountered that has a column value of more than 2,000 bytes, an error is raised during execution. In Oracle Database 11g Release 2 (11.2.0.1) or later, this column limit is 4,000 bytes.

Syntax

```
APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERYB2
(
    p_collection_name IN VARCHAR2,
    p_query           IN VARCHAR2,
    p_max_row_count   IN NUMBER DEFAULT);
```

Parameters

Table 10-14 CREATE_COLLECTION_FROM_QUERYB2 Procedure (No bind version) Parameters

Parameter	Description
p_collection_name	The name of the collection. The maximum length is 255 characters. An error is returned if this collection exists with the specified name of the current user and in the same session.
p_query	Query to execute to populate the members of the collection.
p_max_row_count	Maximum number of rows returned from the query in p_query which should be added to the collection.

Example

The following example shows how to use the CREATE_COLLECTION_FROM_QUERYB2 procedure to create a collection named EMPLOYEES and populate it with data from the EMP table. The first five columns (mgr, sal, comm, deptno, and null) are all numeric and the next five are all date. Because p_generate_md5 is 'NO', the MD5 checksum is not computed.

```
DECLARE
  l_query varchar2(4000);
BEGIN
 l_query := 'select empno, sal, comm, deptno, null, hiredate, null,
null, null, null, ename, job, mgr from emp where deptno = 10';
  APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERYB2
(
        p_collection_name => 'EMPLOYEES',
        p_query => l_query);
END;
```

See Also:

- GET_MEMBER_MD5 Function

10.36 DELETE_ALL_COLLECTIONS Procedure

Use this procedure to delete all collections that belong to the current user in the current Oracle APEX session for the current Application ID.

Syntax

```
APEX_COLLECTION.DELETE_ALL_COLLECTIONS;
```

Parameters

None.

Example

This example shows how to use the `DELETE_ALL_COLLECTIONS` procedure to remove all collections that belong to the current user in the current session and Application ID.

```
BEGIN
    APEX_COLLECTION.DELETE_ALL_COLLECTIONS;
END;
```

10.37 DELETE_ALL_COLLECTIONS_SESSION Procedure

Use this procedure to delete all collections that belong to the current user in the current Oracle APEX session regardless of the Application ID.

Syntax

```
APEX_COLLECTION.DELETE_ALL_COLLECTIONS_SESSION;
```

Parameters

None.

Example

This example shows how to use the `DELETE_ALL_COLLECTIONS_SESSION` procedure to remove all collections that belong to the current user in the current session regardless of Application ID.

```
BEGIN
    APEX_COLLECTION.DELETE_ALL_COLLECTIONS_SESSION;
END;
```

10.38 DELETE_COLLECTION Procedure

Use this procedure to delete a named collection. All members that belong to the collection are removed and the named collection is dropped. If the named collection

does not exist for the same user in the current session for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.DELETE_COLLECTION (
    p_collection_name IN VARCHAR2);
```

Parameters

Table 10-15 DELETE_COLLECTION Procedure Parameters

Parameter	Description
p_collection_name	The name of the collection to remove all members from and drop. An error is returned if this collection does not exist with the specified name of the current user and in the same session.

Example

This example shows how to use the `DELETE_COLLECTION` procedure to remove the '`EMPLOYEE`' collection.

```
Begin
    APEX_COLLECTION.DELETE_COLLECTION(
        p_collection_name => 'EMPLOYEE');
End;
```

See Also:

- "DELETE_ALL_COLLECTIONS_SESSION Procedure"
- "DELETE_ALL_COLLECTIONS Procedure"
- "DELETE_MEMBER Procedure"
- "DELETE_MEMBERS Procedure"

10.39 DELETE_MEMBER Procedure

Use this procedure to delete a specified member from a given named collection. If the named collection does not exist for the same user in the current session for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.DELETE_MEMBER (
    p_collection_name IN VARCHAR2,
    p_seq IN VARCHAR2);
```

Parameters

Table 10-16 DELETE_MEMBER Parameters

Parameter	Description
p_collection_name	The name of the collection to delete the specified member from. The maximum length is 255 characters. Collection names are not case sensitive and are converted to upper case. An error is returned if this collection does not exist for the current user in the same session.
p_seq	This is the sequence ID of the collection member to be deleted.

Example

This example shows how to use the DELETE_MEMBER procedure to remove the member with a sequence ID of '2' from the collection named EMPLOYEES.

```
Begin
    APEX_COLLECTION.DELETE_MEMBER(
        p_collection_name => 'EMPLOYEES',
        p_seq => '2');
End;
```

See Also:

- "DELETE_ALL_COLLECTIONS_SESSION Procedure"
- "DELETE_ALL_COLLECTIONS Procedure"
- "DELETE_COLLECTION Procedure"
- "DELETE_MEMBERS Procedure"

10.40 DELETE_MEMBERS Procedure

Use this procedure to delete all members from a given named collection where the attribute specified by the attribute number equals the supplied value. If the named collection does not exist for the same user in the current session for the current Application ID, an application error is raised. If the attribute number specified is invalid or outside the range of 1 to 50, an error is raised.

If the supplied attribute value is null, then all members of the named collection are deleted where the attribute, specified by p_attr_number, is null.

Syntax

```
APEX_COLLECTION.DELETE_MEMBERS (
    p_collection_name IN VARCHAR2,
```

```
    p_attr_number     IN VARCHAR2,
    p_attr_value      IN VARCHAR2);
```

Parameters

Table 10-17 DELETE_MEMBERS Parameters

Parameter	Description
p_collection_name	The name of the collection to delete the specified members from. The maximum length is 255 characters. Collection names are not case sensitive and are converted to upper case. An error is returned if this collection does not exist for the current user in the same session.
p_attr_number	Attribute number of the member attribute used to match for the specified attribute value for deletion. Valid values are 1 through 50 and null.
p_attr_value	Attribute value of the member attribute used to match for deletion. Maximum length can be 4,000 bytes. The attribute value is truncated to 4,000 bytes if greater than this amount.

Example

The following example deletes all members of the collection named 'GROCERIES' where the 5th character attribute is equal to 'APPLE'.

```
Begin
    apex_collection.delete_members(
        p_collection_name => 'GROCERIES'
        p_attr_number     => 5,
        p_attr_value      => 'APPLE' );
    Commit;
End;
```

See Also:

- "DELETE_ALL_COLLECTIONS_SESSION Procedure"
- "DELETE_ALL_COLLECTIONS Procedure"
- "DELETE_COLLECTION Procedure"
- "DELETE_MEMBER Procedure"

10.41 GET_MEMBER_MD5 Function

Use this function to compute and return the message digest of the attributes for the member specified by the sequence ID. This computation of message digest is equal to the computation performed natively by collections. Thus, the result of this function could be compared to the MD5_ORIGINAL column of the view apex_collections.

If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised.

Syntax

```
APEX_COLLECTION.GET_MEMBER_MD5 (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER)
RETURN VARCHAR2;
```

Parameters

Table 10-18 GET_MEMBER_MD5 Parameters

Parameter	Description
p_collection_name	The name of the collection to add this array of members to. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
p_seq	Sequence ID of the collection member.

Example

The following example computes the MD5 for the 5th member of the GROCERIES collection.

```
declare
    l_md5 varchar2(4000);
begin
    l_md5 := apex_collection.get_member_md5(
        p_collection_name => 'GROCERIES'
        p_seq             => 10 );
end;
```

> **See Also:**
>
> - "COLLECTION_HAS_CHANGED Function"
> - "RESET_COLLECTION_CHANGED Procedure"
> - "RESET_COLLECTION_CHANGED_ALL Procedure"

10.42 MERGE_MEMBERS Procedure

Use this procedure to merge members of the given named collection with the values passed in the arrays. If the named collection does not exist one is created. If a p_init_query is provided, the collection is created from the supplied SQL query. If the named collection exists, the following occurs:

1. Rows in the collection and not in the arrays are deleted.
2. Rows in the collections and in the arrays are updated.
3. Rows in the arrays and not in the collection are inserted.

The count of elements in the p_c001 PL/SQL table is used as the total number of items across all PL/SQL tables. For example, if p_c001.count is 2 and p_c002.count is 10, only 2 members are merged. If p_c001 is null an application error is raised.

Syntax

```
APEX_COLLECTION.MERGE_MEMBERS (
    p_collection_name IN VARCHAR2,
    p_seq  IN APEX_APPLICATION_GLOBAL.VC_ARR2 DEFAULT empty_vc_arr,
    p_c001 IN APEX_APPLICATION_GLOBAL.VC_ARR2 DEFAULT empty_vc_arr,
    p_c002 IN APEX_APPLICATION_GLOBAL.VC_ARR2 DEFAULT empty_vc_arr,
    p_c003 IN APEX_APPLICATION_GLOBAL.VC_ARR2 DEFAULT empty_vc_arr,
    ...
    p_c050 IN APEX_APPLICATION_GLOBAL.VC_ARR2 DEFAULT empty_vc_arr,
    p_null_index  IN NUMBER DEFAULT 1,
    p_null_value  IN VARCHAR2 DEFAULT null,
    p_init_query  IN VARCHAR2 DEFAULT null);
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-19 MERGE_MEMBERS Procedure Parameters

Parameter	Description
p_collection_name	The name of the collection. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case.
p_c001 through p_c050	Array of attribute values to be merged. Maximum length is 4,000 bytes. Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. The count of the p_c001 array is used across all arrays. If no values are provided then no actions are performed.
p_c0xx	Attribute of NN attributes values to be merged. Maximum length can be 4,000 bytes. The attribute value is truncated to 4,000 bytes if greater than this amount.
p_seq	Identifies the sequence number of the collection to be merged.
p_null_index	That is if the element identified by this value is null, then treat this row as a null row. For example, if p_null_index is 3, then p_c003 is treated as a null row. In other words, tell the merge function to ignore this row. This results in the null rows being removed from the collection. The null index works with the null value. If the value of the p_cXXX argument is equal to the p_null_value then the row is treated as null.

Table 10-19 (Cont.) MERGE_MEMBERS Procedure Parameters

Parameter	Description
p_null_value	Used with the p_null_index argument. Identifies the null value. If used, this value must not be null. A typical value for this argument is "0"
p_init_query	If the collection does not exist, the collection is created using this query.

Example

The following example creates a collection on the table of employees, and then merges the contents of the local arrays with the collection, updating the job of two employees.

```
DECLARE
    l_seq   APEX_APPLICATION_GLOBAL.VC_ARR2;
    l_c001  APEX_APPLICATION_GLOBAL.VC_ARR2;
    l_c002  APEX_APPLICATION_GLOBAL.VC_ARR2;
    l_c003  APEX_APPLICATION_GLOBAL.VC_ARR2;
BEGIN
    l_seq(1)  := 1;
    l_c001(1) := 7369;
    l_c002(1) := 'SMITH';
    l_c003(1) := 'MANAGER';
    l_seq(2)  := 2;
    l_c001(2) := 7499;
    l_c002(2) := 'ALLEN';
    l_c003(2) := 'CLERK';

    APEX_COLLECTION.MERGE_MEMBERS(
        p_collection_name => 'EMPLOYEES',
        p_seq => l_seq,
        p_c001 => l_c001,
        p_c002 => l_c002,
        p_c003 => l_c003,
        p_init_query => 'select empno, ename, job from emp order by
empno');
END;
```

10.43 MOVE_MEMBER_DOWN Procedure

Use this procedure to adjust the sequence ID of a specified member in the given named collection down by one (subtract one), swapping sequence ID with the one it is replacing. For example, 3 becomes 2 and 2 becomes 3.

If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised.

If the member specified by sequence ID p_seq does not exist, an application error is raised. If the member specified by sequence ID p_seq is the lowest sequence in the collection, an application error is NOT returned.

Syntax

```
APEX_COLLECTION.MOVE_MEMBER_DOWN (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER );
```

Parameters

Table 10-20 MOVE_MEMBER_DOWN Parameters

Parameter	Description
p_collection_name	The name of the collection. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case. An error is returned if this collection does not exist with the specified name of the current user in the same session.
p_seq	Identifies the sequence number of the collection member to be moved down by one.

Example

This example shows how to move a member of the EMPLOYEES collection down one position. After executing this example, sequence ID '5' becomes sequence ID '4' and sequence ID '4' becomes sequence ID '5'.

```
BEGIN
    APEX_COLLECTION.MOVE_MEMBER_DOWN(
        p_collection_name => 'EMPLOYEES',
        p_seq => '5' );
END;
```

10.44 MOVE_MEMBER_UP Procedure

Use this procedure to adjust the sequence ID of specified member in the given named collection up by one (add one), swapping sequence ID with the one it is replacing. For example, 2 becomes 3 and 3 becomes 2.

If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised.

If the member specified by sequence ID p_seq does not exist, an application error is raised. If the member specified by sequence ID p_seq is the highest sequence in the collection, an application error is not returned.

Syntax

```
APEX_COLLECTION.MOVE_MEMBER_UP (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER );
```

Parameters

Table 10-21 MOVE_MEMBER_UP Parameters

Parameter	Description
p_collection_name	The name of the collection. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case. An error is returned if this collection does not exist with the specified name of the current user in the same session.
p_seq	Identifies the sequence number of the collection member to be moved up by one.

Example

This example shows how to move a member of the EMPLOYEES collection up one position. After executing this example, sequence ID '5' becomes sequence ID '6' and sequence ID '6' becomes sequence ID '5'.

```
BEGIN
    APEX_COLLECTION.MOVE_MEMBER_UP(
        p_collection_name => 'EMPLOYEES',
        p_seq => '5' );
END;
```

10.45 RESEQUENCE_COLLECTION Procedure

For a named collection, use this procedure to update the seq_id value of each member so that no gaps exist in the sequencing. For example, a collection with the following set of sequence IDs (1,2,3,5,8,9) becomes (1,2,3,4,5,6). If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.RESEQUENCE_COLLECTION (
    p_collection_name   IN VARCHAR2);
```

Parameters

Table 10-22 RESEQUENCE_COLLECTION Parameters

Parameter	Description
p_collection_name	The name of the collection to resequence. An error is returned if this collection does not exist with the specified name of the current user and in the same session.

Example

This example shows how to resequence the `DEPARTMENTS` collection to remove gaps in the sequence IDs.

```
BEGIN
    APEX_COLLECTION.RESEQUENCE_COLLECTION (
        p_collection_name => 'DEPARTMENTS');
END;
```

> **See Also:**
>
> - "MOVE_MEMBER_DOWN Procedure"
> - "MOVE_MEMBER_UP Procedure"

10.46 RESET_COLLECTION_CHANGED Procedure

Use this procedure to reset the collection changed flag (mark as not changed) for a given collection.

If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.RESET_COLLECTION_CHANGED (
    p_collection_name IN VARCHAR2);
```

Parameters

Table 10-23 RESET_COLLECTION_CHANGED Parameters

Parameter	Description
`p_collection_name`	The name of the collection to reset the collection changed flag. An error is returned if this collection does not exist with the specified name of the current user and in the same session.

Example

This example shows how to reset the changed flag for the `DEPARTMENTS` collection.

```
BEGIN
    APEX_COLLECTION.RESET_COLLECTION_CHANGED (
        p_collection_name => 'DEPARTMENTS');
END;
```

> **See Also:**
>
> RESET_COLLECTION_CHANGED_ALL Procedure

10.47 RESET_COLLECTION_CHANGED_ALL Procedure

Use this procedure to reset the collection changed flag (mark as not changed) for all collections in the user's current session.

Syntax

```
APEX_COLLECTION.RESET_COLLECTION_CHANGED_ALL;
```

Parameters

None.

Example

This example shows how to reset the changed flag for all collections in the user's current session.

```
BEGIN
    APEX_COLLECTION.RESET_COLLECTION_CHANGED_ALL;
END;
```

> **See Also:**
>
> RESET_COLLECTION_CHANGED Procedure

10.48 SORT_MEMBERS Procedure

Use this procedure to reorder the members of a given collection by the column number specified by `p_sort_on_column_number`. This sorts the collection by a particular column/attribute in the collection and reassigns the sequence IDs of each number such that no gaps exist. If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.SORT_MEMBERS (
    p_collection_name       IN VARCHAR2,
    p_sort_on_column_number IN NUMBER);
```

Parameters

Table 10-24 SORT_MEMBERS Parameters

Parameter	Description
p_collection_name	The name of the collection to sort. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
p_sort_on_column_number	The column number used to sort the collection. The domain of possible values is 1 to 50.

Example

In this example, column 2 of the DEPARTMENTS collection is the department location. The collection is reorder according to the department location.

```
BEGIN
    APEX_COLLECTION.SORT_MEMBERS (
        p_collection_name => 'DEPARTMENTS',
        p_sort_on_column_number => '2';
END;
```

10.49 TRUNCATE_COLLECTION Procedure

Use this procedure to remove all members from a named collection.

If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised.

Syntax

```
APEX_COLLECTION.TRUNCATE_COLLECTION (
    p_collection_name   IN VARCHAR2);
```

Parameters

Table 10-25 TRUNCATE_COLLECTION Parameters

Parameter	Description
p_collection_name	The name of the collection to truncate. An error is returned if this collection does not exist with the specified name of the current user and in the same session.

Example

This example shows how to remove all members from the DEPARTMENTS collection.

```
BEGIN
    APEX_COLLECTION.TRUNCATE_COLLECTION(
```

```
        p_collection_name => 'DEPARTMENTS');
END;
```

> **See Also:**
>
> CREATE_OR_TRUNCATE_COLLECTION Procedure

10.50 UPDATE_MEMBER Procedure

Use this procedure to update the specified member in the given named collection.

If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised.

> **Note:**
>
> Using this procedure sets the columns identified and nullifies any columns not identified. To update specific columns, without affecting the values of other columns, use "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1."

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER (
    p_collection_name   IN VARCHAR2,
    p_seq               IN VARCHAR2 DEFAULT NULL,
    p_c001              IN VARCHAR2 DEFAULT NULL,
    p_c002              IN VARCHAR2 DEFAULT NULL,
    p_c003              IN VARCHAR2 DEFAULT NULL,
    …
    p_c050              IN VARCHAR  DEFAULT NULL,
    p_n001              IN NUMBER   DEFAULT NULL,
    p_n002              IN NUMBER   DEFAULT NULL,
    p_n003              IN NUMBER   DEFAULT NULL,
    p_n004              IN NUMBER   DEFAULT NULL,
    p_n005              IN NUMBER   DEFAULT NULL,
    p_d001              IN DATE     DEFAULT NULL,
    p_d002              IN DATE     DEFAULT NULL,
    p_d003              IN DATE     DEFAULT NULL,
    p_d004              IN DATE     DEFAULT NULL,
    p_d005              IN DATE     DEFAULT NULL,
    p_clob001           IN CLOB     DEFAULT empty_clob(),
    p_blob001           IN BLOB     DEFAULT empty-blob(),
    p_xmltype001        IN XMLTYPE  DEFAULT NULL );
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-26 UPDATE_MEMBER Parameters

Parameter	Description
p_collection_name	The name of the collection to update. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case.
p_c001 through p_c050	Attribute value of the member to be added. Maximum length is 4,000 bytes. Any character attribute exceeding 4,000 characters is truncated to 4,000 characters.
p_n001 through p_n005	Attribute value of the numeric attributes to be added or updated.
p_d001 through p_d005	Attribute value of the date attributes to be added or updated.
p_clob001	Use p_clob001 for collection member attributes that exceed 4,000 characters.
p_blob001	Use p_blob001 for binary collection member attributes.
p_xmltype001	Use p_xmltype001 to store well-formed XML.

Example

Update the second member of the collection named 'Departments', updating the first member attribute to 'Engineering' and the second member attribute to 'Sales'.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER (
        p_collection_name => 'Departments',
        p_seq => '2',
        p_c001 => 'Engineering',
        p_c002 => 'Sales');
END;
```

> **See Also:**
>
> - UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1
> - UPDATE_MEMBERS Procedure

10.51 UPDATE_MEMBERS Procedure

Use this procedure to update the array of members for the given named collection. If a collection does not exist with the specified name for the current user in the same session and for the current Application ID, an application error is raised. The count of elements in the p_seq PL/SQL table is used as the total number of items across all PL/SQL tables. That is, if p_seq.count = 2 and p_c001.count = 10, only 2 members are updaapex_application_globalted. If p_seq is null, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBERS (
    p_collection_name IN VARCHAR2,
    p_seq  IN apex_application_global.VC_ARR2 DEFAULT empty_vc_arr,
    p_c001 IN apex_application_global.VC_ARR2 DEFAULT empty_vc_arr,
    p_c002 IN apex_application_global.VC_ARR2 DEFAULT empty_vc_arr,
    p_c003 IN apex_application_global.VC_ARR2 DEFAULT empty_vc_arr,
    ...
    p_c050 IN apex_application_global.VC_ARR2 DEFAULT empty_vc_arr,
    p_n001 IN apex_application_global.N_ARR DEFAULT empty_n_arr,
    p_n002 IN apex_application_global.N_ARR DEFAULT empty_n_arr,
    p_n003 IN apex_application_global.N_ARR DEFAULT empty_n_arr,
    p_n004 IN apex_application_global.N_ARR DEFAULT empty_n_arr,
    p_n005 IN apex_application_global.N_ARR DEFAULT empty_n_arr,
    p_d001 IN apex_application_global.D_ARR DEFAULT empty_d_arr,
    p_d002 IN apex_application_global.D_ARR DEFAULT empty_d_arr,
    p_d003 IN apex_application_global.D_ARR DEFAULT empty_d_arr,
    p_d004 IN apex_application_global.D_ARR DEFAULT empty_d_arr,
    p_d005 IN apex_application_global.D_ARR DEFAULT empty_d_arr)
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-27 UPDATE_MEMBERS Parameters

Parameter	Description
p_collection_name	The name of the collection to update. Maximum length is 255 bytes. Collection names are not case sensitive and are converted to upper case.
p_seq	Array of member sequence IDs to be updated. The count of the p_seq array is used across all arrays.
p_c001 through p_c050	Array of attribute values to be updated.

Table 10-27 (Cont.) UPDATE_MEMBERS Parameters

Parameter	Description
`p_n001 through p_n005`	Attribute value of numeric
`p_d001` through `p_d005`	Array of date attribute values to be updated.

Example

```
DECLARE
    l_seq   apex_application_global.vc_arr2;
    l_carr  apex_application_global.vc_arr2;
    l_narr  apex_application_global.n_arr;
    l_darr  apex_application_global.d_arr;
BEGIN
    l_seq(1)  := 10;
    l_seq(2)  := 15;
    l_carr(1) := 'Apples';
    l_carr(2) := 'Grapes';
    l_narr(1) := 100;
    l_narr(2) := 150;
    l_darr(1) := sysdate;
    l_darr(2) := sysdate;

    APEX_COLLECTION.UPDATE_MEMBERS (
        p_collection_name => 'Groceries',
        p_seq  => l_seq,
        p_c001 => l_carr,
        p_n001 => l_narr,
        p_d001 => l_darr);
END;
```

> **See Also:**
>
> "UPDATE_MEMBER Procedure"

10.52 UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1

Update the specified member attribute in the given named collection. If a collection does not exist with the specified name for the current user in the same session for the current Application ID, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised. If the attribute number specified is invalid or outside the range 1-50, an error is raised. Any attribute value exceeding 4,000 bytes are truncated to 4,000 bytes.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER,
    p_attr_number     IN NUMBER,
    p_attr_value      IN VARCHAR2);
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-28 UPDATE_MEMBER_ATTRIBUTE Signature 1 Parameters

Parameter	Description
`p_collection_name`	The name of the collection. Maximum length can be 255 bytes. Collection_names are case-insensitive, as the collection name is converted to upper case. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
`p_seq`	Sequence ID of the collection member to be updated.
`p_attr_number`	Attribute number of the member attribute to be updated. Valid values are 1 through 50. Any number outside of this range is ignored.
`p_attr_value`	Attribute value of the member attribute to be updated.

Example

Update the second member of the collection named `'Departments'`, updating the first member attribute to `'Engineering'` and the second member attribute to `'Sales'`.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
        p_collection_name => 'Departments',
        p_seq => 2,
        p_attr_number => 1,
        p_attr_value => 'Engineering');
END;
```

> **See Also:**
>
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 6"

10.53 UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2

Update the specified CLOB member attribute in the given named collection.

If a collection does not exist with the specified name for the current user in the same session for the current Application ID, an application error is raised.

If the member specified by sequence ID p_seq does not exist, an application error is raised.

If the attribute number specified is invalid or outside the valid range (currently only 1 for CLOB), an error is raised.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER,
    p_clob_number     IN NUMBER,
    p_clob_value      IN CLOB );
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-29 UPDATE_MEMBER_ATTRIBUTE Signature 2 Parameters

Parameter	Description
p_collection_name	The name of the collection. Maximum length can be 255 bytes. Collection_names are case-insensitive, as the collection name is converted to upper case. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
p_seq	Sequence ID of the collection member to be updated.

Table 10-29 (Cont.) UPDATE_MEMBER_ATTRIBUTE Signature 2 Parameters

Parameter	Description
p_clob_number	Attribute number of the CLOB member attribute to be updated. Valid value is 1. Any number outside of this range is ignored.
p_clob_value	Attribute value of the CLOB member attribute to be updated.

Example

The following example sets the first and only CLOB attribute of collection sequence number 2 in the collection named `'Departments'` to a value of `'Engineering'`.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
        p_collection_name => 'Departments',
        p_seq => 2,
        p_clob_number => 1,
        p_clob_value => 'Engineering');
END;
```

See Also:

- UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1
- UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3
- UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4
- UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5
- UPDATE_MEMBER_ATTRIBUTE Procedure Signature 6

10.54 UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3

Update the specified BLOB member attribute in the given named collection. If a collection does not exist with the specified name for the current user in the same session for the current Application ID, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised. If the attribute number specified is invalid or outside the valid range (currently only 1 for BLOB), an error is raised.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER,
```

```
    p_blob_number     IN NUMBER,
    p_blob_value      IN BLOB);
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-30 UPDATE_MEMBER_ATTRIBUTE Signature 3 Parameters

Parameter	Description
`p_collection_name`	The name of the collection. Maximum length can be 255 bytes. Collection_names are case-insensitive, as the collection name is converted to upper case. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
`p_seq`	Sequence ID of the collection member to be updated.
`p_blob_number`	Attribute number of the BLOB member attribute to be updated. Valid value is 1. Any number outside of this range is ignored.
`p_blob_value`	Attribute value of the BLOB member attribute to be updated.

Example

The following example sets the first and only BLOB attribute of collection sequence number 2 in the collection named `'Departments'` to a value of the BLOB variable `l_blob_content`.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
        p_collection_name => 'Departments',
        p_seq => 2,
        p_blob_number => 1,
        p_blob_value => l_blob_content);
END;
```

> **See Also:**
>
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 6"

10.55 UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4

Update the specified XMLTYPE member attribute in the given named collection. If a collection does not exist with the specified name for the current user in the same session for the current Application ID, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised. If the attribute number specified is invalid or outside the valid range (currently only 1 for XMLTYPE), an error is raised.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER,
    p_xmltype_number  IN NUMBER,
    p_xmltype_value   IN BLOB);
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-31 UPDATE_MEMBER_ATTRIBUTE Signature 4 Parameters

Parameter	Description
p_collection_name	The name of the collection. Maximum length can be 255 bytes. Collection_names are case-insensitive, as the collection name is converted to upper case. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
p_seq	Sequence ID of the collection member to be updated.
p_xmltype_number	Attribute number of the XMLTYPE member attribute to be updated. Valid value is 1. Any number outside of this range is ignored.
p_xmltype_value	Attribute value of the XMLTYPE member attribute to be updated.

Example

The following example sets the first and only XML attribute of collection sequence number 2 in the collection named `'Departments'` to a value of the XMLType variable `l_xmltype_content`.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
        p_collection_name => 'Departments',
        p_seq => 2,
        p_xmltype_number => 1,
        p_xmltype_value => l_xmltype_content);
END;
```

> **See Also:**
>
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 6"

10.56 UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5

Update the specified NUMBER member attribute in the given named collection. If a collection does not exist with the specified name for the current user in the same session for the current Application ID, an application error is raised. If the member specified by sequence ID p_seq does not exist, an application error is raised. If the attribute number specified is invalid or outside the valid range (currently only 1 through 5 for NUMBER), an error is raised.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER,
    p_attr_number     IN NUMBER,
    p_number_value    IN NUMBER);
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-32 UPDATE_MEMBER_ATTRIBUTE Signature 5 Parameters

Parameter	Description
`p_collection_name`	The name of the collection. Maximum length can be 255 bytes. Collection_names are case-insensitive, as the collection name is converted to upper case. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
`p_seq`	Sequence ID of the collection member to be updated.
`p_attr_number`	Attribute number of the NUMBER member attribute to be updated. Valid value is 1 through 5. Any number outside of this range is ignored.
`p_number_value`	Attribute value of the NUMBER member attribute to be updated.

Example

The following example sets the first numeric attribute of collection sequence number 2 in the collection named `'Departments'` to a value of 3000.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
        p_collection_name => 'Departments',
        p_seq => 2,
        p_attr_number => 1,
        p_number_value => 3000);
END;
```

> **See Also:**
>
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4"
> - "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 6"

10.57 UPDATE_MEMBER_ATTRIBUTE Procedure Signature 6

Update the specified DATE member attribute in the given named collection. If a collection does not exist with the specified name for the current user in the same session for the current Application ID, an application error is raised. If the member specified by sequence ID `p_seq` does not exist, an application error is raised. If the attribute number specified is invalid or outside the valid range (currently only 1 through 5 for DATE), an error is raised.

Syntax

```
APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
    p_collection_name IN VARCHAR2,
    p_seq             IN NUMBER,
    p_attr_number     IN NUMBER,
    p_date_value      IN DATE);
```

Parameters

> **Note:**
>
> Any character attribute exceeding 4,000 characters is truncated to 4,000 characters. Also, the number of members added is based on the number of elements in the first array.

Table 10-33 UPDATE_MEMBER_ATTRIBUTE Signature 6 Parameters

Parameter	Description
`p_collection_name`	The name of the collection. Maximum length can be 255 bytes. Collection_names are case-insensitive, as the collection name is converted to upper case. An error is returned if this collection does not exist with the specified name of the current user and in the same session.
`p_seq`	Sequence ID of the collection member to be updated.
`p_attr_number`	Attribute number of the DATE member attribute to be updated. Valid value is 1 through 5. Any number outside of this range is ignored.
`p_date_value`	Attribute value of the DATE member attribute to be updated.

Example

Update the first date attribute of the second collection member in collection named `'Departments'`, and set it to the value of `sysdate`.

```
BEGIN
    APEX_COLLECTION.UPDATE_MEMBER_ATTRIBUTE (
        p_collection_name => 'Departments',
        p_seq => 2,
        p_attr_number => 1,
```

```
        p_date_value => sysdate );
END;
```

See Also:

- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 1"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 2"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 3"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 4"
- "UPDATE_MEMBER_ATTRIBUTE Procedure Signature 5"

11
APEX_CREDENTIAL

You can use the `APEX_CREDENTIAL` package to change stored credentials either persistently or for the current APEX session only.

11.1 CLEAR_TOKENS Procedure

This procedure clears all acquired tokens for a given credential. Applies only to `OAuth2` based flows, where the `Client ID` and `Client Secret` are used to obtain an Access Token with a certain expiry time. This call clears the obtained tokens.

Syntax

```
PROCEDURE CLEAR_TOKENS( p_credential_static_id IN VARCHAR2);
```

Parameters

Table 11-1 CLEAR_TOKENS Procedure Parameters

Parameters	Description
`p_credential_static_id`	The credential static ID.

Example

The following example clears all obtained tokens for the credential `OAuth Login`.

```
BEGIN
    apex_credential.clear_tokens(
    p_credential_static_id => 'OAuth Login' );
END;
```

11.2 CREATE_CREDENTIAL Procedure

This procedure creates a credential definition.

Syntax

```
PROCEDURE CREATE_CREDENTIAL (
    p_credential_name       IN VARCHAR2,
    p_credential_static_id  IN VARCHAR2,
    p_authentication_type   IN VARCHAR2,
    p_scope                 IN VARCHAR2         DEFAULT NULL,
    p_allowed_urls          IN apex_t_varchar2  DEFAULT NULL,
    p_prompt_on_install     IN BOOLEAN          DEFAULT FALSE,
    p_credential_comment    IN VARCHAR2         DEFAULT NULL );
```

Parameters

Table 11-2 CREATE_CREDENTIAL Parameters

Parameter	Description
p_credential_name	The credential name.
p_credential_static_id	The credential static ID.
p_authentication_type	The authentication type. Supported types: • apex_credential.C_TYPE_BASIC • apex_credential.C_TYPE_OAUTH_CLIENT_CRED • apex_credential.C_TYPE_JWT • apex_credential.C_TYPE_OCI • apex_credential.C_TYPE_HTTP_HEADER • apex_credential.C_TYPE_HTTP_QUERY_STRING
p_scope	(Optional) OAuth 2.0 scope.
p_allowed_urls	(Optional) List of URLs (as APEX_T_VARCHAR2) that these credentials can access.
p_prompt_on_install	(Optional) Choose whether prompts for this credential should be displayed when the application is being imported on another Oracle APEX instance.
p_credential_comment	(Optional) Credential comment.

Example

The following example creates a credential definition "OAuth Login."

```
BEGIN
   -- first set the workspace
   apex_util.set_workspace(p_workspace => 'MY_WORKSPACE');

   apex_credential.create_credential (
       p_credential_name => 'OAuth Login',
       p_credential_static_id => 'OAUTH_LOGIN',
       p_authentication_type =>
apex_credential.C_TYPE_OAUTH_CLIENT_CRED,
```

```
      p_scope => 'email',
      p_allowed_urls => apex_t_varchar2( 'https://tokenserver.mycompany.com/
oauth2/token', 'https://www.oracle.com' ),
      p_prompt_on_install => false,
      p_credential_comment => 'Credential for OAuth Login' );

  -- should be followed by set_persistent_credentials
  apex_credential.set_persistent_credentials (
      p_credential_static_id => 'OAUTH_LOGIN',
      p_client_id => 'dnkjq237o8832ndj98098-..',
      p_client_secret => '1278672tjksaGSDA789312..' );
END;
```

11.3 DROP_CREDENTIAL Procedure

This procedure drops a credential definition.

Syntax

```
PROCEDURE DROP_CREDENTIAL (
    p_credential_static_id  IN VARCHAR2 );
```

Parameters

Table 11-3 DROP_CREDENTIAL Parameters

Parameter	Description
p_credential_static_id	The credential static ID.

Example

The following example drops the credential definition "OAuth Login."

```
BEGIN
   -- first set the workspace
   apex_util.set_workspace(p_workspace => 'MY_WORKSPACE');

   apex_credential.drop_credential (
       p_credential_static_id => 'OAUTH_LOGIN );
END;
```

11.4 SET_ALLOWED_URLS Procedure

This procedure sets a list of URLs that can be used for this credential.

Syntax

```
PROCEDURE SET_ALLOWED_URLS(
    p_credential_static_id  IN VARCHAR2,
```

```
    p_allowed_urls          IN apex_t_varchar2,
    p_client_secret         IN VARCHAR2 );
```

Parameters

Parameter	Description
p_credential_static_id	The credential static ID.
p_allowed_urls	List of URLs (as APEX_T_VARCHAR2) that these credentials can access.
p_client_secret	Client Secret. If allowed URLs are changed, this must be provided again.

Usage Notes

If an HTTP request target URL for these credentials matches one of these URLs, credential usage is allowed. If not, an error raises.

URLs are matched on a starts-with basis. For example, if p_allowed_urls is passed in as:

```
apex_t_varchar2('https://www.oracle.com','https://apex.oracle.com/
ords/'),
```

… then the credential can be used for HTTP requests to:

- https://www.oracle.com/
- https://www.oracle.com/myrest/service
- https://apex.oracle.com/ords/secret/workspace

However, the credential is **not allowed** for requests to:

- https://web.oracle.com
- https://apex.oracle.com/apex/workspace
- http://www.oracle.com/

The Client Secret needs to be provided again if the allowed URLs change. If the client secret is provided as NULL, it will be cleared.

Examples

This example sets allowed URLs for the credential OAuth Login.

```
BEGIN
  apex_credential.set_allowed_urls (
    p_credential_static_id  'OAuth Login',
    p_allowed_urls          apex_t_varchar2(
                              'https://tokenserver.mycompany.com/
oauth2/token',
                              'https://www.oracle.com' ),
    p_client_secret       '1278672tjksaGSDA789312..' );
END;
```

11.5 SET_PERSISTENT_CREDENTIALS Procedure Signature 1

This procedure sets `Client ID` and `Client Secret` for a given credential. Typically used for the `OAuth2` Client Credentials flow. The new credentials are stored persistently and are valid for all current and future sessions. Stored access, refresh or ID tokens for that credential, will be deleted.

Syntax

```
PROCEDURE SET_PERSISTENT_CREDENTIALS(
    p_credential_static_id  IN VARCHAR2,
    p_client_id             IN VARCHAR2,
    p_client_secret         IN VARCHAR2,
    p_namespace             IN VARCHAR2 DEFAULT NULL,
    p_fingerprint           IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 11-4 SET_PERSISTENT_CREDENTIALS Procedure Signature 1 Parameters

Parameters	Description
`p_credential_static_id`	The credential static ID.
`p_client_id`	The OAuth2 Client ID.
`p_client_secret`	The OAuth2 Client Secret
`p_namespace`	Optional namespace (for OCI)
`p_fingerprint`	Optional fingerprint (for OCI)

Example

The following example sets credential `OAuth Login`.

```
BEGIN
    apex_credential.set_persistent_credentials (
    p_credential_static_id  => 'OAuth Login',
    p_client_id             => 'dnkjq237o8832ndj98098-..',
    p_client_secret         => '1278672tjksaGSDA789312..' );
END;
```

11.6 SET_PERSISTENT_CREDENTIALS Procedure Signature 2

This procedure sets username and password for a given credential. This is typically be used by a security person after application import, and allows to separate responsibilities between a person importing the application and another person storing the credentials.

Syntax

```
PROCEDURE SET_PERSISTENT_CREDENTIALS(
    p_credential_static_id  IN VARCHAR2,
    p_username              IN VARCHAR2,
    p_password              IN VARCHAR2 );
```

Parameters

Table 11-5 SET_PERSISTENT_CREDENTIALS Procedure Signature 2 Parameters

Parameters	Description
p_credential_static_id	The credential static ID.
p_username	The credential username.
p_password	The credential password.

Example

The following example sets credential `Login`.

```
begin
    apex_credential.set_persistent_credentials (
    p_credential_static_id => 'Login',
    p_username             => 'scott',
    p_password             => 'tiger );
end;
```

11.7 SET_PERSISTENT_TOKEN Procedure

This procedure uses an autonomous transaction in order to store the token in the database table.

`SET_PERSISTENT_TOKEN` stores a token into a credential store which is obtained with manual or custom PL/SQL code. The credential store saves this token in encrypted form for subsequent use by Oracle APEX components. The token is stored for the lifetime of the APEX session. Other sessions cannot use this token. When tokens are obtained with custom PL/SQL code, Client ID, and Client Secret are not stored in that credential store – it contains the tokens set by this procedure only.

Syntax

```
PROCEDURE SET_PERSISTENT_TOKEN(
    p_credential_static_id IN VARCHAR2,
    p_token_type           IN t_token_type,
    p_token_value          IN VARCHAR2,
    p_token_expires        IN DATE );
```

Parameters

Table 11-6 SET_PERSISTENT_TOKEN Procedure Parameters

Parameters	Description
p_credential_static_id	The credential static ID.
p_token_type	The token type: APEX_CREDENTIAL.C_TOKEN_ACCESS, APEX_CREDENTIAL.C_TOKEN_REFRESH or APEX_CREDENTIAL.C_TOKEN_ID.
p_token_value	The value of the token.
p_token_expiry	The expiry date of the token

Example

The following example stores OAuth2 access token with value sdakjjkhw7632178jh12hs876e38.. and expiry date of 2017-10-31 into credential OAuth Login.

```
begin
     apex_credential.set_persistent_token (
     p_credential_static_id => 'OAuth Login',
     p_token_type           => apex_credential.C_TOKEN_ACCESS,
     p_token_value          => 'sdakjjkhw7632178jh12hs876e38..',
     p_token_expiry         => to_date('2017-10-31', 'YYYY-MM-DD') );
end;
```

11.8 SET_SESSION_CREDENTIALS Procedure

This procedure is a generic overload to set session credentials.

Syntax

```
PROCEDURE SET_SESSION_CREDENTIALS(
    p_credential_static_id IN VARCHAR2,
    p_key                  IN VARCHAR2,
    p_value                IN VARCHAR2 );
```

Parameters

Parameter	Description
p_credential_static_id	The credential static ID.
p_key	Credential key (name of the HTTP Header or Query String Parameter).
p_value	Credential secret value.

Example

The following example sets the credential `API Key`.

```
begin
apex_credential.set_session_credentials (
    p_credential_static_id    'my_API_key',
    p_key                     'api_key',
    p_value                   'lsjkgjw4908902ru9fj879q367891hdaw' );
end;
```

11.9 SET_SESSION_CREDENTIALS Procedure Signature 1

This procedure sets username and password for a given credential for the current session. Typically used for `BASIC` authentication when the credentials to be used are to be provided by the end user.

Syntax

```
PROCEDURE SET_SESSION_CREDENTIALS(
    p_credential_static_id  IN VARCHAR2,
    p_username              IN VARCHAR2,
    p_password              IN VARCHAR2 );
```

Parameters

Table 11-7 SET_SESSION_CREDENTIALS Procedure Signature1 Parameters

Parameters	Description
`p_credential_static_id`	The credential static ID.
`p_username`	The credential username.
`p_password`	The credential password.

Example

The following example sets credential `Login`.

```
begin
    apex_credential.set_session_credentials (
        p_credential_static_id => 'Login',
        p_username             => 'scott',
        p_password             => 'tiger );
end;
```

11.10 SET_SESSION_CREDENTIALS Procedure Signature 2

This procedure sets `Client ID` and `Client Secret` for a given credential for the current session. Typically used for the `OAuth2` Client Credentials flow.

Syntax

```
PROCEDURE SET_SESSION_CREDENTIALS(
    p_credential_static_id  IN VARCHAR2,
    p_client_id             IN VARCHAR2,
    p_client_secret         IN VARCHAR2,
    p_namespace             IN VARCHAR2 DEFAULT NULL,
    p_fingerprint           IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 11-8 SET_SESSION_CREDENTIALS Procedure Signature2 Parameters

Parameters	Description
`p_credential_static_id`	The credential static ID.
`p_client_id`	The OAuth2 Client ID.
`p_client_secret`	The OAuth2 Client Secret.
`p_namespace`	Optional namespace (used for OCI)
`p_fingerprint`	Optional fingerprint (used for OCI)

Example

The following example sets credential `OAuth Login`.

```
begin
    apex_credential.set_session_credentials (
        p_credential_static_id => 'OAuth Login',
        p_client_id => 'dnkjq237o8832ndj98098-..',
        p_client_secret => '1278672tjksaGSDA789312..' );
end;
```

11.11 SET_SESSION_TOKEN Procedure

This procedure uses an autonomous transaction in order to store the token in the database table.

Stores a token into a credential store which is obtained with manual or custom PL/SQL code. The credential store saves this token in encrypted form for subsequent use by APEX components. The token is stored for the lifetime of the APEX session. Other sessions cannot use this token. When tokens are obtained with custom PL/SQL code, Client ID, and Client Secret are not stored in that credential store – it contains the tokens set by this procedure only.

Syntax

```
PROCEDURE SET_SESSION_TOKEN(
    p_credential_static_id  IN VARCHAR2,
    p_token_type            IN t_token_type,
    p_token_value           IN VARCHAR2,
    p_token_expires         IN DATE );
```

Parameters

Table 11-9 SET_SESSION_TOKEN Procedure Parameters

Parameters	Description
p_credential_static_id	The credential static ID.
p_token_type	The token type: APEX_CREDENTIAL.C_TOKEN_ACCESS, APEX_CREDENTIAL.C_TOKEN_REFRESH or APEX_CREDENTIAL.C_TOKEN_ID.
p_token_value	The value of the token.
p_token_expires	The expiry date of the token

Example

The following example stores OAuth2 access token with value sdakjjkhw7632178jh12hs876e38.. and expiry date of 2017-10-31 into credential OAuth Login.

```
begin
     apex_credential.set_session_token (
     p_credential_static_id => 'OAuth Login',
     p_token_type           => apex_credential.C_TOKEN_ACCESS,
     p_token_value          => 'sdakjjkhw7632178jh12hs876e38..',
     p_token_expires         => to_date('2017-10-31', 'YYYY-MM-DD') );
end;
```

12
APEX_CSS

The `APEX_CSS` package provides utility functions for adding CSS styles to HTTP output. This package is usually used for plug-in development.

12.1 ADD Procedure

This procedure adds a CSS style snippet that is included inline in the HTML output. Use this procedure to add new CSS style declarations.

Syntax

```
APEX_CSS.ADD (
    p_css   IN  VARCHAR2,
    p_key   IN  VARCHAR2  DEFAULT NULL);
```

Parameters

Table 12-1 ADD Parameters

Parameter	Description
`p_css`	The CSS style snippet. For example, `#test {color:#fff}`
`p_key`	Identifier for the style snippet. If specified and a style snippet with the same name has already been added the new style snippet will be ignored.

Example

Adds an inline CSS definition for the class autocomplete into the HTML page. The key `autocomplete_widget` prevents the definition from being included another time if the `apex_css.add` is called another time.

```
apex_css.add (
    p_css => '.autocomplete { color:#ffffff }',
    p_key => 'autocomplete_widget' );
```

12.2 ADD_3RD_PARTY_LIBRARY_FILE Procedure

This procedure adds the link tag to load a third-party CSS file and also takes into account the specified CDN (content delivery network) for the application.

Supported libraries include:

- jQuery
- jQueryMobile
- jQueryUI

If a library has already been added, it is not added a second time.

Syntax

```
APEX_CSS.ADD_3RD_PARTY_LIBRARY_FILE (
    p_library       IN    VARCHAR2,
    p_file_name     IN    VARCHAR2 DEFAULT NULL,
    p_directory     IN    VARCHAR2 DEFAULT NULL,
    p_version       IN    VARCHAR2 DEFAULT NULL,
    p_media_query   IN    VARCHAR2 DEFAULT NULL,
    p_attributes    IN    VARCHAR2 DEFAULT NULL );
```

Parameters

Table 12-2 ADD_3RD_PARTY_LIBRARY_FILE Parameters

Parameters	Description
`p_library`	Use one of the `c_library_*` constants.
`p_file_name`	Specifies the file name excluding version, `.min`, and `.css`.
`p_directory`	(Optional) Directory where the file `p_file_name` is located.
`p_version`	(Optional) If no value is provided, then uses the same version shipped with APEX.
`p_media_query`	(Optional) Value that is set as media query.
`p_attributes`	Extra attributes to add to the link tag.

> **Note:**
>
> Callers are responsible for escaping this parameter.

Example

The following example loads the Cascading Style Sheet file of the Accordion component of the jQuery UI.

```
apex_css.add_3rd_party_library_file (
    p_library   => apex_css.c_library_jquery_ui,
    p_file_name => 'jquery.ui.accordion' )
```

12.3 ADD_FILE Procedure

This procedure adds the link tag to load a CSS library. If a library has already been added, it will not be added a second time.

Syntax

```
APEX_CSS.ADD_FILE (
    p_name           IN    VARCHAR2,
    p_directory      IN    VARCHAR2 DEFAULT apex.g_image_prefix||'css/',
    p_version        IN    VARCHAR2 DEFAULT NULL,
    p_skip_extension IN    BOOLEAN  DEFAULT FALSE,
    p_media_query    IN    VARCHAR2 DEFAULT NULL,
    -- p_ie_condition is desupported and has no effect
    p_ie_condition   IN    VARCHAR2 DEFAULT NULL,
    p_attributes     IN    VARCHAR2 DEFAULT NULL );
```

Parameters

Table 12-3 ADD_FILE Parameters

Parameter	Description
`p_name`	Name of the CSS file.
`p_directory`	Begin of the URL where the CSS file should be read from. If you use this function for a plug-in, set this parameter to `p_plugin.file_prefix`
`p_version`	Identifier of the version of the CSS file. The version will be added to the CSS filename. In most cases you should use the default of `NULL` as the value.
`p_skip_extension`	The function automatically adds `.css` to the CSS filename. If set to `TRUE`, the function ignores this addition.
`p_media_query`	Value set as media query.
`p_ie_condition`	(Desupported) Condition used as Internet Explorer condition.
`p_attributes`	Extra attributes to add to the link tag.

> **Note:**
>
> Callers are responsible for escaping this parameter.

Example

Adds the CSS file`jquery.autocomplete.css` in the directory specified by `p_plugin.image_prefix` to the HTML output of the page and makes sure that it will only be included once if `apex_css.add_file` is called multiple times with that name.

```
apex_css.add_file (
    p_name => 'jquery.autocomplete',
    p_directory => p_plugin.file_prefix );
```

13
APEX_CUSTOM_AUTH

You can use the `APEX_CUSTOM_AUTH` package to perform various operations related to authentication and session management.

13.1 APPLICATION_PAGE_ITEM_EXISTS Function

This function checks for the existence of page-level item within the current page of an application. This function requires the parameter `p_item_name`. This function returns a Boolean value (TRUE or FALSE).

Syntax

```
APEX_CUSTOM_AUTH.APPLICATION_PAGE_ITEM_EXISTS(
    p_item_name   IN    VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 13-1 APPLICATION_PAGE_ITEM_EXISTS Parameters

Parameter	Description
p_item_name	The name of the page-level item.

Example

The following example checks for the existence of a page-level item, ITEM_NAME, within the current page of the application.

```
DECLARE
    L_VAL BOOLEAN;
BEGIN
   L_VAL := APEX_CUSTOM_AUTH.APPLICATION_PAGE_ITEM_EXISTS(:ITEM_NAME);
    IF L_VAL THEN
        htp.p('Item Exists');
    ELSE
        htp.p('Does not Exist');
    END IF;
END;
```

13.2 CURRENT_PAGE_IS_PUBLIC Function

This function checks whether the current page's authentication attribute is set to **Page Is Public** and returns a Boolean value (TRUE or FALSE)

Syntax

```
APEX_CUSTOM_AUTH.CURRENT_PAGE_IS_PUBLIC
RETURN BOOLEAN;
```

Example

The following example checks whether the current page in an application is public.

```
DECLARE
    L_VAL BOOLEAN;
BEGIN
    L_VAL := APEX_CUSTOM_AUTH.CURRENT_PAGE_IS_PUBLIC;
    IF L_VAL THEN
        htp.p('Page is Public');
    ELSE
        htp.p('Page is not Public');
    END IF;
END;
```

> **See Also:**
>
> "Editing Page Attributes" in *Oracle APEX App Builder User's Guide*.

13.3 DEFINE_USER_SESSION Procedure

This procedure combines the `SET_USER` and `SET_SESSION_ID` procedures to create one call.

Syntax

```
APEX_CUSTOM_AUTH.DEFINE_USER_SESSION(
    p_user         IN    VARCHAR2,
    p_session_id   IN    NUMBER);
```

Parameters

Table 13-2 DEFINE_USER_SESSION Parameters

Parameter	Description
`p_user`	Login name of the user.
`p_session_id`	The session ID.

Example

In the following example, a new session ID is generated and registered along with the current application user.

```
APEX_CUSTOM_AUTH.DEFINE_USER_SESSION (
    :APP_USER,
    APEX_CUSTOM_AUTH.GET_NEXT_SESSION_ID);
```

> **See Also:**
>
> - "SET_USER Procedure"
> - "SET_SESSION_ID Procedure"

13.4 GET_COOKIE_PROPS Procedure

This procedure obtains the properties of the session cookie used in the current authentication scheme for the specified application. These properties can be viewed directly in the App Builder by viewing the authentication scheme cookie attributes.

Syntax

```
APEX_CUSTOM_AUTH.GET_COOKIE_PROPS(
    p_app_id                        IN  NUMBER,
    p_cookie_name                   OUT VARCHAR2,
    p_cookie_path                   OUT VARCHAR2,
    p_cookie_domain                 OUT VARCHAR2
    p_secure                                OUT BOOLEAN);
```

Parameters

Table 13-3 GET_COOKIE_PROPS Parameters

Parameter	Description
p_app_id	An application ID in the current workspace.
p_cookie_name	The cookie name.
p_cookie_path	The cookie path.
p_cookie_domain	The cookie domain.
p_secure	Flag to set secure property of cookie.

Example

The following example retrieves the session cookie values used by the authentication scheme of the current application.

```
DECLARE
    l_cookie_name   varchar2(256);
    l_cookie_path   varchar2(256);
    l_cookie_domain varchar2(256);
    l_secure        boolean;
BEGIN
    APEX_CUSTOM_AUTH.GET_COOKIE_PROPS(
        p_app_id => 2918,
        p_cookie_name => l_cookie_name,
        p_cookie_path => l_cookie_path,
        p_cookie_domain => l_cookie_domain,
        p_secure => l_secure);
END;
```

13.5 GET_LDAP_PROPS Procedure

This procedure obtains the LDAP attributes of the current authentication scheme for the current application. These properties can be viewed directly in App Builder by viewing the authentication scheme attributes.

Syntax

```
APEX_CUSTOM_AUTH.GET_LDAP_PROPS(
    p_ldap_host                 OUT VARCHAR2,
```

```
    p_ldap_port                OUT INTEGER,
    p_use_ssl                  OUT VARCHAR2,
    p_use_exact_dn             OUT VARCHAR2,
    p_search_filter            OUT VARCHAR2,
    p_ldap_dn                  OUT VARCHAR2,
    p_ldap_edit_function       OUT VARCHAR2);
```

Parameters

Table 13-4 GET_LDAP_PROPS Parameters

Parameter	Description
p_ldap_host	LDAP host name.
p_ldap_port	LDAP port number.
p_use_ssl	Whether SSL is used.
p_use_exact_dn	Whether exact distinguished names are used.
p_search_filter	The search filter used if exact DN is not used.
p_ldap_dn	LDAP DN string.
p_ldap_edit_function	LDAP edit function name.

Example

The following example retrieves the LDAP attributes associated with the current application.

```
DECLARE
    l_ldap_host          VARCHAR2(256);
    l_ldap_port          INTEGER;
    l_use_ssl            VARCHAR2(1);
    l_use_exact_dn       VARCHAR2(1);
    l_search_filter      VARCHAR2(256);
    l_ldap_dn            VARCHAR2(256);
    l_ldap_edit_function VARCHAR2(256);
BEGIN
APEX_CUSTOM_AUTH.GET_LDAP_PROPS (
    p_ldap_host       => l_ldap_host,
    p_ldap_port       => l_ldap_port,
    p_use_ssl         => l_use_ssl,
    p_use_exact_dn    => l_use_exact_dn,
    p_search_filter   => l_search_filter,
    p_ldap_dn         => l_ldap_dn,
    p_ldap_edit_function => l_ldap_edit_function);
END;
```

13.6 GET_NEXT_SESSION_ID Function

This function generates the next session ID from the Oracle APEX sequence generator. This function returns a number.

Syntax

```
APEX_CUSTOM_AUTH.GET_NEXT_SESSION_ID
RETURN NUMBER;
```

Example

The following example generates the next session ID and stores it into a variable.

```
DECLARE
    val number;
BEGIN
    val := apex_custom_auth.get_next_session_id;
END;
```

13.7 GET_SECURITY_GROUP_ID Function

This function returns a number with the value of the security group ID that identifies the workspace of the current user.

Syntax

```
APEX_CUSTOM_AUTH.GET_SECURITY_GROUP_ID
RETURN NUMBER;
```

Example

The following example retrieves the Security Group ID for the current user.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_CUSTOM_AUTH.GET_SECURITY_GROUP_ID;
END;
```

13.8 GET_SESSION_ID Function

This function returns `APEX_APPLICATION.G_INSTANCE` global variable. `GET_SESSION_ID` returns a number.

Syntax

```
APEX_CUSTOM_AUTH.GET_SESSION_ID
RETURN NUMBER;
```

Example

The following example retrieves the session ID for the current user.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_CUSTOM_AUTH.GET_SESSION_ID;
END;
```

13.9 GET_SESSION_ID_FROM_COOKIE Function

This function returns the Oracle APEX session ID located by the session cookie in a page request in the current browser session.

Syntax

```
APEX_CUSTOM_AUTH.GET_SESSION_ID_FROM_COOKIE
RETURN NUMBER;
```

Example

The following example retrieves the session ID from the current session cookie.

```
DECLARE
    val number;
BEGIN
    val := apex_custom_auth.get_session_id_from_cookie;
END;
```

13.10 GET_USER Function

This function returns the `APEX_APPLICATION.G_USER` global variable (`VARCHAR2`).

Syntax

```
APEX_CUSTOM_AUTH.GET_USER
RETURN VARCHAR2;
```

Examples

The following example retrieves the username associated with the current session.

```
DECLARE
    VAL VARCHAR2(256);
BEGIN
    VAL := APEX_CUSTOM_AUTH.GET_USER;
END;
```

13.11 GET_USERNAME Function

This function returns user name registered with the current Oracle APEX session in the internal sessions table. This user name is usually the same as the authenticated user running the current page.

Syntax

```
APEX_CUSTOM_AUTH.GET_USERNAME
RETURN VARCHAR2;
```

Example

The following example retrieves the username registered with the current application session.

```
DECLARE
    val varchar2(256);
BEGIN
    val := apex_custom_auth.get_username;
END;
```

13.12 IS_SESSION_VALID Function

This function is a Boolean result obtained from executing the current application's authentication scheme to determine if a valid session exists. This function returns the Boolean result of the authentication scheme's page sentry.

Syntax

```
APEX_CUSTOM_AUTH.IS_SESSION_VALID
RETURN BOOLEAN;
```

Example

The following example verifies whether the current session is valid.

```
DECLARE
    L_VAL BOOLEAN;
BEGIN
    L_VAL := APEX_CUSTOM_AUTH.IS_SESSION_VALID;
    IF L_VAL THEN
        htp.p('Valid');
    ELSE
        htp.p('Invalid');
    END IF;
END;
```

13.13 LDAP_DNPREP Function

This function replaces any occurrences of a period character (.) with an underscore character (_) in the passed in `p_username` value and then returns that newly massaged username value.

Syntax

```
APEX_CUSTOM_AUTH.LDAP_DNPREP (
    p_username IN VARCHAR2)
    RETURN VARCHAR2
IS
BEGIN
    RETURN replace(p_username,'.','_');
END ldap_dnprep;
```

Parameters

Table 13-5 LDAP_DNPREP Parameters

Parameter	Description
`p_username`	Username value of an end user.

Example

The following example demonstrates how to return a username formatted for LDAP authentication.

```
return apex_custom_auth.ldap_dnprep(p_username =>
      :USERNAME);
```

13.14 LOGIN Procedure

Also referred to as the Login API, this procedure performs authentication and session registration.

Syntax

```
APEX_CUSTOM_AUTH.LOGIN (
    p_uname         IN  VARCHAR2  DEFAULT NULL,
    p_password      IN  VARCHAR2  DEFAULT NULL,
    p_session_id    IN  VARCHAR2  DEFAULT NULL,
    p_app_page      IN  VARCHAR2  DEFAULT NULL,
    p_entry_point   IN  VARCHAR2  DEFAULT NULL,
    p_preserve_case IN  BOOLEAN   DEFAULT FALSE )
```

> **Note:**
>
> Do not use bind variable notations for `p_session_id` argument.

Parameter

Table 13-6 LOGIN Parameters

Parameter	Description
`p_uname`	Login name of the user.
`p_password`	Clear text user password.
`p_session_id`	Current Oracle APEX session ID. Do not use bind variable notations for `p_session_id` argument.
`p_app_page`	Current application ID. After login page separated by a colon (:).
`p_entry_point`	Internal use only.
`p_preserve_case`	If `TRUE`, do not include `p_uname` in uppercase during session registration.

Example

The following example performs the user authentication and session registration.

```
BEGIN
    APEX_CUSTOM_AUTH.LOGIN (
        p_uname       => 'FRANK',
        p_password    => 'secret99',
        p_session_id  => V('APP_SESSION'),
        p_app_page    => :APP_ID||':1');
END;
```

13.15 LOGOUT Procedure [DEPRECATED]

> **Note:**
>
> This procedure is deprecated. Use `APEX_AUTHENTICATION.LOGOUT` instead.

This procedure causes a logout from the current session by unsetting the session cookie and redirecting to a new location.

Syntax

```
APEX_CUSTOM_AUTH.LOGOUT(
    p_this_app              IN VARCHAR2 DEFAULT NULL,
    p_next_app_page_sess    IN VARCHAR2 DEFAULT NULL,
    p_next_url              IN VARCHAR2 DEFAULT NULL);
```

Parameter

Table 13-7 LOGOUT Parameters

Parameter	Description
p_this_app	Current application ID.
p_next_app_page_sess	Application and page number to redirect to. Separate multiple pages using a colon (:) and optionally followed by a colon (:) and the session ID (if control over the session ID is desired).
p_next_url	URL to redirect to (use this instead of p_next_app_page_sess).

Example

The following example causes a logout from the current session and redirects to page 99 of application 1000.

```
BEGIN
    APEX_CUSTOM_AUTH.LOGOUT (
        p_this_app            => '1000',
        p_next_app_page_sess  => '1000:99');
END;
```

13.16 POST_LOGIN Procedure

This procedure performs session registration, assuming the authentication step has been completed. It can be called only from within an Oracle APEX application page context.

Syntax

```
APEX_CUSTOM_AUTH.POST_LOGIN (
    p_uname         IN VARCHAR2 DEFAULT NULL,
    p_session_id    IN VARCHAR2 DEFAULT NULL,
    p_app_page      IN VARCHAR2 DEFAULT NULL,
    p_preserve_case IN BOOLEAN  DEFAULT FALSE )
```

Parameter

Table 13-8 POST_LOGIN Parameters

Parameter	Description
p_uname	Login name of user.
p_session_id	Current APEX session ID.
p_app_page	Current application ID and after login page separated by a colon (:).
p_preserve_case	If TRUE, do not include p_uname in uppercase during session registration.

Example

The following example performs the session registration following a successful authentication.

```
BEGIN
    APEX_CUSTOM_AUTH.POST_LOGIN (
        p_uname       => 'FRANK',
        p_session_id  => V('APP_SESSION'),
        p_app_page    => :APP_ID||':1');
END;
```

13.17 SESSION_ID_EXISTS Function

This function returns a Boolean result based on the global package variable containing the current Oracle APEX session ID. Returns TRUE if the result is a positive number; returns FALSE if the result is a negative number.

Syntax

```
APEX_CUSTOM_AUTH.SESSION_ID_EXISTS
RETURN BOOLEAN;
```

Example

The following example checks whether the current session ID is valid and exists.

```
DECLARE
    l_val BOOLEAN;
BEGIN
    L_VAL := APEX_CUSTOM_AUTH.SESSION_ID_EXISTS;
    IF l_val THEN
        htp.p('Exists');
    ELSE
        htp.p('Does not exist');
    END IF;
END;
```

13.18 SET_SESSION_ID Procedure

This procedure sets `APEX_APPLICATION.G_INSTANCE` global variable. This procedure requires the parameter `P_SESSION_ID` (`NUMBER`) which specifies a session ID.

Syntax

```
APEX_CUSTOM_AUTH.SET_SESSION_ID(
    p_session_id    IN    NUMBER);
```

Parameters

Table 13-9 SET_SESSION_ID Parameters

Parameter	Description
p_session_id	The session ID to be registered.

Example

In the following example, the session ID value registered is retrieved from the browser cookie.

```
APEX_CUSTOM_AUTH.SET_SESSION_ID(APEX_CUSTOM_AUTH.GET_SESSION_ID_FROM_COOKIE);
```

13.19 SET_SESSION_ID_TO_NEXT_VALUE Procedure

This procedure combines the operation of `GET_NEXT_SESSION_ID` and `SET_SESSION_ID` in one call.

Syntax

```
APEX_CUSTOM_AUTH.SET_SESSION_ID_TO_NEXT_VALUE;
```

Example

In the following example, if the current session is not valid, a new session ID is generated and registered.

```
IF NOT APEX_CUSTOM_AUTH.SESSION_ID_EXISTS THEN
    APEX_CUSTOM_AUTH.SET_SESSION_ID_TO_NEXT_VALUE;
END IF;
```

13.20 SET_USER Procedure

This procedure sets the `APEX_APPLICATION.G_USER` global variable. `SET_USER` requires the parameter `P_USER` (`VARCHAR2`) which defines a user ID.

Syntax

```
APEX_CUSTOM_AUTH.SET_USER(
    p_user    IN    VARCHAR2);
```

Parameters

Table 13-10 SET_USER Parameters

Parameter	Description
p_user	The user ID to be registered.

Example

In the following example, if the current application user is **NOBODY**, then **JOHN.DOE** is registered as the application user.

```
IF V('APP_USER') = 'NOBODY' THEN
    APEX_CUSTOM_AUTH.SET_USER('JOHN.DOE');
END IF;
```

14
APEX_DATA_LOADING

The APEX_DATA_LOADING package provides the ability to load data by calling an application data loading definition. This can be used in place of native data loading.

14.1 Data Types

The APEX_DATA_LOADING package uses the following data types.

```
type t_data_load_result is record(
    processed_rows    PLS_INTEGER,
    error_rows        PLS_INTEGER );
```

14.2 GET_FILE_PROFILE Function

This function returns the file profile (determined by the data loading definition) in JSON format.

Syntax

```
APEX_DATA_LOADING.GET_FILE_PROFILE (
    p_application_id    IN NUMBER   DEFAULT apex_application.g_flow_id,
    p_static_id         IN VARCHAR2 )
    RETURN CLOB;
```

Parameters

Table 14-1 GET_FILE_PROFILE Parameters

Parameter	Description
p_application_id	ID of the application which contains the data load definition.
p_static_id	Static ID of the data loading definition to execute.

Example

This example parses and fetches the first 10 columns using a file uploaded from P1_FILE File Browse item and the file profile computed from the data load defintion.

```
select p.line_number,
    p.col001, p.col002, p.col003, p.col004, p.col005, p.col006,
p.col007, p.col008, p.col009, p.col010
    from apex_application_temp_files f,
             table( apex_data_parser.parse(
                  p_content       =>  f.blob_content,
                  p_file_name     =>  f.filename,
                  p_file_profile  =>
apex_data_loading.get_file_profile( p_static_id =>
        'my-load-definition'),
                  p_max_rows      =>  100 ) )
    p where f.name = :P1_FILE
```

14.3 LOAD_DATA Function Signature 1

This function loads file data and returns loading status information containing processed rows and error rows.

Syntax

```
APEX_DATA_LOADING.LOAD_DATA (
    p_application_id   IN NUMBER      DEFAULT
apex_application.g_flow_id,
    p_static_id        IN VARCHAR2,
    p_data_to_load     IN BLOB,
    p_xlsx_sheet_name  IN VARCHAR2    DEFAULT NULL )
    RETURN t_data_load_result;
```

Parameters

Table 14-2 LOAD_DATA Parameters

Parameter	Description
p_application_id	ID of the application which contains the data load definition.
p_static_id	Static ID of the data loading definition to execute.
p_data_to_load	BLOB file to be loaded.
p_xlsx_sheet_name	For XLSX files, the worksheet to extract.

Example

This example fetches a file (uploaded with the `PX_FILEBROWSE_ITEM`) from the APEX_APPLICATION_TEMP_FILES table and executes the `my-load-definition` data loading definition.

```
DECLARE
    l_file blob;
    l_load_result apex_data_loading.t_data_load_result;
BEGIN
    apex_session.create_session( 100, 1, 'ADMIN' );
    SELECT blob_content
      INTO l_file
      FROM apex_application_temp_files
    WHERE name = :PX_FILEBROWSE_ITEM;
    l_load_result := apex_data_loading.load_data (
                       p_static_id    => 'my-load-definition',
                       p_data_to_load => l_file );
    dbms_output.put_line( 'Processed ' || l_load_result.processed_rows || '
rows.');
END;
```

14.4 LOAD_DATA Function Signature 2

This function loads CLOB data and returns loading status information containing processed rows and error rows.

Syntax

```
APEX_DATA_LOADING.LOAD_DATA (
    p_application_id   IN NUMBER      DEFAULT apex_application.g_flow_id,
    p_static_id        IN VARCHAR2,
    p_data_to_load     IN CLOB,
    p_xlsx_sheet_name  IN VARCHAR2    DEFAULT NULL )
    RETURN t_data_load_result;
```

Parameters

Table 14-3 LOAD_DATA Parameters

Parameter	Description
p_application_id	ID of the application which contains the data load definition.
p_static_id	Static ID of the data loading definition to execute.
p_data_to_load	CLOB data to be loaded.
p_xlsx_sheet_name	For XLSX files, the worksheet to extract.

Example

This example gets data (copy and pasted into the `PX_DATA` textarea) and executes the `my-load-definition` data loading definition.

```
DECLARE
    l_load_result apex_data_loading.t_data_load_result;
BEGIN
    apex_session.create_session( 100, 1, 'ADMIN' );

    l_load_result := apex_data_loading.load_data (
                         p_static_id    => 'my-load-definition',
                         p_data_to_load => :PX_DATA );
    dbms_output.put_line( 'Processed ' || l_load_result.processed_rows
|| ' rows.');
END;
```

15
APEX_DATA_EXPORT

The APEX_DATA_EXPORT package contains the implementation to export data from Oracle APEX. Supported filetypes include: PDF, XLSX, HTML, CSV, XML and JSON.

Use the `EXPORT` function to pass a query context from the `APEX_EXEC` package and return the `t_export` type, which includes the contents in a LOB.

15.1 Global Constants

The APEX_DATA_EXPORT package uses the following constants.

Export Format Constants

Constants used in the `EXPORT` function. The `c_format_pxml` and `c_format_pjson` formats are optimized for printing.

```
c_format_csv                    constant t_format               := 'CSV';
c_format_html                   constant t_format               := 'HTML';
c_format_pdf                    constant t_format               := 'PDF';
c_format_xlsx                   constant t_format               := 'XLSX';
c_format_xml                    constant t_format               := 'XML';
c_format_pxml                   constant t_format               := 'PXML';
c_format_json                   constant t_format               := 'JSON';
c_format_pjson                  constant t_format               := 'PJSON';
```

Alignment Constants

Constants used in the `ADD_COLUMN`, `ADD_COLUMN_GROUP`, and `GET_PRINT_CONFIG` methods.

```
c_align_start                   constant t_alignment            := 'LEFT';
c_align_center                  constant t_alignment            := 'CENTER';
c_align_end                     constant t_alignment            := 'RIGHT';
```

Content Disposition Constants

Constants used in the `DOWNLOAD` procedure.

```
c_attachment                    constant t_content_disposition  :=
'attachment';
c_inline                        constant t_content_disposition  :=
'inline';
```

Size Unit Constants

Constants used in the `GET_PRINT_CONFIG` function.

```
c_unit_inches                   constant t_unit                 :=
'INCHES';
c_unit_millimeters              constant t_unit                 :=
'MILLIMETERS';
c_unit_centimeters              constant t_unit                 :=
'CENTIMETERS';
c_unit_points                   constant t_unit                 :=
'POINTS';
```

Predefined Size Constants

Constants used in the `GET_PRINT_CONFIG` function.

```
c_size_letter                   constant t_size                 :=
'LETTER';
c_size_legal                    constant t_size                 :=
'LEGAL';
c_size_tabloid                  constant t_size                 :=
'TABLOID';
c_size_A4                       constant t_size                 :=
'A4';
c_size_A3                       constant t_size                 :=
'A3';
c_size_custom                   constant t_size                 :=
'CUSTOM';
```

Column Width Unit Constants

Constants used in the `GET_PRINT_CONFIG` function.

```
c_width_unit_percentage         constant t_width_unit           :=
'PERCENTAGE';
c_width_unit_points             constant t_width_unit           :=
'POINTS';
c_width_unit_pixels             constant t_width_unit           :=
'PIXELS';
```

Page Orientation Constants

Constants used in the `GET_PRINT_CONFIG` function.

```
c_orientation_portrait          constant t_orientation          :=
'VERTICAL';
c_orientation_landscape         constant t_orientation          :=
'HORIZONTAL';
```

Font Family Constants

Constants used in the `GET_PRINT_CONFIG` function.

```
c_font_family_helvetica         constant t_font_family          :=
'Helvetica';
c_font_family_times             constant t_font_family          := 'Times';
c_font_family_courier           constant t_font_family          := 'Courier';
```

Font Weight Constants

Constants used in the `GET_PRINT_CONFIG` function.

```
c_font_weight_normal            constant t_font_weight          := 'normal';
c_font_weight_bold              constant t_font_weight          := 'bold';
```

15.2 Data Types

The APEX_DATA_EXPORT package uses the following data types.

Generic

```
subtype t_alignment             is varchar2(255);
subtype t_label                 is varchar2(255);
subtype t_color                 is varchar2(4000);
subtype t_format                is varchar2(20);
subtype t_content_disposition   is varchar2(30);
subtype t_unit                  is varchar2(4000);
subtype t_size                  is varchar2(4000);
subtype t_width_unit            is varchar2(255);
subtype t_orientation           is varchar2(4000);
subtype t_font_family           is varchar2(4000);
subtype t_font_weight           is varchar2(4000);
```

Resulting Object of an Export

```
type t_export is record (
    file_name               varchar2(32767),
    format                  t_format,
    mime_type               varchar2(32767),
    as_clob                 boolean,
```

```
    content_blob            blob,
    content_clob            clob );
```

Column Groups

```
type t_column_group is record (
    name                    varchar2(255),
    alignment               t_alignment,
    parent_group_idx        pls_integer );

type t_column_groups        is table of t_column_group  index by
pls_integer;
```

Columns

```
type t_column is record (
    name                    apex_exec.t_column_name,
    heading                 varchar2(255),
    format_mask             varchar2(4000),
    heading_alignment       t_alignment,
    value_alignment         t_alignment,
    width                   number,
    is_column_break         boolean,
    is_frozen               boolean,
    column_group_idx        pls_integer );

type t_columns              is table of t_column        index by
pls_integer;
```

Highlights

```
type t_highlight is record (
    id                      number,
    name                    varchar2(4000),
    value_column            apex_exec.t_column_name,
    display_column          apex_exec.t_column_name,
    text_color              t_color,
    background_color        t_color );

type t_highlights           is table of t_highlight     index by
pls_integer;
```

Aggregates

```
type t_aggregate is record (
    label                   t_label,
    format_mask             varchar2(4000),
    display_column          apex_exec.t_column_name,
    value_column            apex_exec.t_column_name,
    overall_label           t_label,
    overall_value_column    apex_exec.t_column_name );
```

```
type t_aggregates          is table of t_aggregate     index by pls_integer;
```

Print Config

```
type t_print_config is record (
    units                       t_unit,
    paper_size                  t_size,
    width_units                 t_width_unit,
    width                       number,
    height                      number,
    orientation                 t_orientation,
    page_header                 varchar2(4000),
    page_header_font_color      t_color,
    page_header_font_family     t_font_family,
    page_header_font_weight     t_font_weight,
    page_header_font_size       varchar2(4000),
    page_header_alignment       t_alignment,
    page_footer                 varchar2(4000),
    page_footer_font_color      t_color,
    page_footer_font_family     t_font_family,
    page_footer_font_weight     t_font_weight,
    page_footer_font_size       varchar2(4000),
    page_footer_alignment       t_alignment,
    header_bg_color             t_color,
    header_font_color           t_color,
    header_font_family          t_font_family,
    header_font_weight          t_font_weight,
    header_font_size            varchar2(4000),
    body_bg_color               t_color,
    body_font_color             t_color,
    body_font_family            t_font_family,
    body_font_weight            t_font_weight,
    body_font_size              varchar2(4000),
    border_width                number,
    border_color                t_color );
```

15.3 ADD_AGGREGATE Procedure

This procedure adds an aggregate to the aggregate collection. Aggregate collections can be passed to the `EXPORT` calls in order to add an aggregate row. This procedure can be used in combination with control breaks or standalone for overall aggregates.

If an empty aggregate collection (or no aggregate collection) is passed, no aggregate rows render in the export.

This procedure requires an aggregate column. Value is the current aggregate total (for control breaks) or the overall total.

Syntax

```
PROCEDURE ADD_AGGREGATE(
  p_aggregates            IN OUT NOCOPY t_aggregates,
  p_label                 IN            t_label,
  p_format_mask           IN            VARCHAR2                  DEFAULT
```

```
NULL,
  p_display_column        IN            apex_exec.t_column_name,
  p_value_column          IN            apex_exec.t_column_name,
  p_overall_label         IN            t_label
DEFAULT NULL,
  p_overall_value_column  IN            apex_exec.t_column_name
DEFAULT NULL );
```

Parameters

Parameter	Description
p_aggregates	Aggregate collection.
p_label	Aggregate label.
p_format_mask	Format mask to apply on the aggegate value.
p_display_column	Name of the column where to display the aggregate.
p_value_column	Name of the column which contains the value of the aggregate.
p_overall_label	Overall label.
p_overall_value_column	Name of the column which contains the value of the overall aggregate.

Examples

```
DECLARE
  l_aggregates  apex_data_export.t_aggregates;
  l_columns     apex_data_export.t_columns;
  l_context     apex_exec.t_context;
  l_export      apex_data_export.t_export;
BEGIN
  apex_data_export.add_aggregate(
    p_aggregates              => l_aggregates,
    p_label                   => 'Sum',
    p_format_mask             => 'FML999G999G999G999G990D00',
    p_display_column          => 'SAL',
    p_value_column            => 'AGGREGATE1',
    p_overall_label           => 'Total sum',
    p_overall_value_column    => 'OVERALL1' );

  apex_data_export.add_column( p_columns => l_columns, p_name =>
'DEPTNO', p_is_column_break => true );
  apex_data_export.add_column( p_columns => l_columns, p_name =>
'EMPNO');
  apex_data_export.add_column( p_columns => l_columns, p_name =>
'ENAME');
  apex_data_export.add_column( p_columns => l_columns, p_name =>
'SAL');

  l_context := apex_exec.open_query_context(
    p_location    => apex_exec.c_location_local_db,
    p_sql_query   => 'select deptno,
                             empno,
```

```
                              ename,
                              sal,
                              sum( sal)  over ( partition by deptno ) as
AGGREGATE1,
                              sum( sal)  over ( ) as OVERALL1
                         FROM emp
                         order by deptno' );

l_export := apex_data_export.export (
              p_context      => l_context,
              p_format       => apex_data_export.c_format_pdf,
              p_columns      => l_columns,
              p_aggregates   => l_aggregates );

  apex_exec.close( l_context );

  apex_data_export.download( p_export => l_export );

EXCEPTION
  WHEN others THEN
      apex_exec.close( l_context );
      raise;
END;
```

15.4 ADD_COLUMN Procedure

This procedure adds a column to the column collection. Column collections can be passed to the `EXPORT` calls in order to return only a subset of the columns in the export. If an empty column collection (or no column collection) passes, all columns defined in the Query Context are added to the export.

Syntax

```
PROCEDURE ADD_COLUMN (
  p_columns             IN OUT NOCOPY t_columns,
  p_name                IN            apex_exec.t_column_name,
  p_heading             IN            VARCHAR2                  DEFAULT NULL,
  p_format_mask         IN            VARCHAR2                  DEFAULT NULL,
  p_heading_alignment   IN            t_alignment               DEFAULT NULL,
  p_value_alignment     IN            t_alignment               DEFAULT NULL,
  p_width               IN            NUMBER                    DEFAULT NULL,
  p_is_column_break     IN            BOOLEAN                   DEFAULT
FALSE,
  p_is_frozen           IN            BOOLEAN                   DEFAULT
FALSE,
  p_column_group_idx    IN            PLS_INTEGER               DEFAULT
NULL );
```

Parameters

Parameter	Description
p_columns	Column collection.
p_name	Column name.
p_heading	Column heading text.
p_format_mask	Format mask to apply. Useful for XLSX exports where native datatypes are used.
p_heading_alignment	Column heading alignment. Valid values are: LEFT, CENTER, RIGHT.
p_value_alignment	Column value alignment. Valid values are: LEFT, CENTER, RIGHT.
p_width	PDF only. The column width. By default the units are as percentage. The units can be modified by updating the width_units of the print config.
p_is_column_break	Whether to use this column for control breaks
p_is_frozen	XLSX only. Whether the column is frozen.
p_column_group_idx	The index of a column group. If used, this column will part of the column group.

Examples

```
DECLARE
    l_context               apex_exec.t_context;

    l_export                apex_data_export.t_export;
    l_columns               apex_data_export.t_columns;

BEGIN
    l_context := apex_exec.open_query_context(
        p_location    => apex_exec.c_location_local_db,
        p_sql_query   => 'select * from emp' );

    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'ENAME',
        p_heading             => 'Name' );

    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'JOB',
        p_heading             => 'Job' );

    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'SAL',
        p_heading             => 'Salary',
        p_format_mask         => 'FML999G999G999G999G990D00' );

    l_export := apex_data_export.export (
        p_context               => l_context,
```

```
        p_format               => apex_data_export.c_format_html,
        p_columns              => l_columns,
        p_file_name            => 'employees' );

    apex_exec.close( l_context );

    apex_data_export.download( p_export => l_export );

EXCEPTION
    WHEN others THEN
        apex_exec.close( l_context );
        raise;
END;
```

15.5 ADD_COLUMN_GROUP Procedure

This procedure adds a column group to the column group collection. Column group collections can be passed to the `EXPORT` calls in order to group columns using an extra header row. If an empty column group collection (or no column group collection) passes, no column groups are added to the export. You can create multiple column group levels.

Syntax

```
PROCEDURE ADD_COLUMN_GROUP (
    p_column_groups     IN OUT NOCOPY   t_column_groups,
    p_idx               OUT             PLS_INTEGER,
    p_name              IN              VARCHAR2,
    p_alignment         IN              t_alignment         DEFAULT
c_align_center,
    p_parent_group_idx  IN              PLS_INTEGER         DEFAULT NULL );
```

Parameters

Parameter	Description
`p_column_groups`	Column group collection.
`p_idx`	The generated index in the columns collection.
`p_name`	Column group name.
`p_alignment`	Column group alignment. Valid values are: `LEFT`, `CENTER` (default), `RIGHT`.
`p_parent_group_idx`	The index of a parent column group.

Examples

```
DECLARE
    l_context               apex_exec.t_context;

    l_export                apex_data_export.t_export;
    l_column_groups         apex_data_export.t_column_groups;
    l_columns               apex_data_export.t_columns;

    -- Column group indexes
```

```
    l_identity_idx          pls_integer;
    l_compensation_idx      pls_integer;
BEGIN

    l_context := apex_exec.open_query_context(
        p_location    => apex_exec.c_location_local_db,
        p_sql_query   => 'select * from emp' );

    -- Define column groups
    apex_data_export.add_column_group(
        p_column_groups   => l_column_groups,
        p_idx             => l_identity_idx,
        p_name            => 'Identity' );

    apex_data_export.add_column_group(
        p_column_groups   => l_column_groups,
        p_idx             => l_compensation_idx,
        p_name            => 'Compensation' );

    -- Define columns
    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'ENAME',
        p_heading             => 'Name',
        p_column_group_idx    => l_identity_idx );

    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'JOB',
        p_heading             => 'Job',
        p_column_group_idx    => l_identity_idx );

    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'SAL',
        p_heading             => 'Salary',
        p_column_group_idx    => l_compensation_idx );

    apex_data_export.add_column(
        p_columns             => l_columns,
        p_name                => 'COMM',
        p_heading             => 'Commission',
        p_column_group_idx    => l_compensation_idx );

    l_export := apex_data_export.export (
        p_context               => l_context,
        p_format                => apex_data_export.c_format_html,
        p_columns               => l_columns,
        p_column_groups         => l_column_groups,
        p_file_name             => 'employees' );

    apex_exec.close( l_context );

    apex_data_export.download( p_export => l_export );
```

```
EXCEPTION
    when others THEN
        apex_exec.close( l_context );
        raise;
END;
```

15.6 ADD_HIGHLIGHT Procedure

This procedure adds a highlight to the highlight collection. Highlight collections can be passed to the `EXPORT` calls in order to highlight a row or a column in a row. If no highlight collection (or an empty highlight collection) is passed, no highlights render in the export.

This procedure requires a highlight column. The value is the ID when highlights should be applied, else `NULL`.

Syntax

```
PROCEDURE ADD_HIGHLIGHT (
  p_highlights        IN OUT NOCOPY t_highlights,
  p_id                IN            pls_integer,
  p_value_column      IN            apex_exec.t_column_name,
  p_display_column    IN            apex_exec.t_column_name DEFAULT NULL,
  p_text_color        IN            t_color                 DEFAULT NULL,
  p_background_color  IN            t_color                 DEFAULT NULL );
```

Parameters

Parameter	Description
p_highlights	Highlight collection.
p_id	ID of the highlight.
p_value_column	Name of the column where to check for the highlight ID.
p_display_column	Name of the column where to display the highlight. Leave empty for row highlights.
p_text_color	Hex color code of the text (#FF0000).
p_background_color	Hex color code of the background (#FF0000).

Examples

```
DECLARE
    l_highlights     apex_data_export.t_highlights;
    l_context        apex_exec.t_context;
    l_export         apex_data_export.t_export;
BEGIN
    apex_data_export.add_highlight(
        p_highlights          => l_highlights,
        p_id                  => 1,
        p_value_column        => 'HIGHLIGHT1',
        p_display_column      => 'SAL',
        p_text_color          => '#FF0000' );
```

```
    l_context := apex_exec.open_query_context(
        p_location    => apex_exec.c_location_local_db,
        p_sql_query   => 'select empno,
                                 ename,
                                 sal,
                                 case when sal >= 3000 then 1 end as
HIGHLIGHT1
                            from emp' );

    l_export := apex_data_export.export (
                         p_context      => l_context,
                         p_format       =>
apex_data_export.c_format_pdf,
                         p_highlights   => l_highlights );

    apex_exec.close( l_context );

    apex_data_export.download( p_export => l_export );

EXCEPTION
    when others THEN
        apex_exec.close( l_context );
        raise;
END;
```

15.7 DOWNLOAD Procedure

This procedure downloads the data export by calling `APEX_APPLICATION.STOP_APEX_ENGINE`.

Syntax

```
PROCEDURE DOWNLOAD (
    p_export                IN OUT NOCOPY t_export,
    p_content_disposition   IN t_content_disposition    DEFAULT
c_attachment,
    p_stop_apex_engine      IN BOOLEAN                  DEFAULT TRUE );
```

Parameters

Parameter	Description
`p_export`	The result object of an export.
`p_content_disposition`	Specifies whether to download the print document or display inline ("attachment" or "inline").
`p_stop_apex_engine`	Whether to call `APEX_APPLICATION.STOP_APEX_ENGINE`.

Examples

```
DECLARE
    l_context apex_exec.t_context;
```

```
    l_export  apex_data_export.t_export;
BEGIN
    l_context := apex_exec.open_query_context(
        p_location    => apex_exec.c_location_local_db,
        p_sql_query   => 'select * from emp' );

    l_export := apex_data_export.export (
        p_context   => l_context,
        p_format    => apex_data_export.c_format_csv,
        p_file_name => 'employees' );

    apex_exec.close( l_context );

    apex_data_export.download( p_export => l_export );

EXCEPTION
    when others THEN
        apex_exec.close( l_context );
        raise;
END;
```

15.8 EXPORT Function

This function exports the query context in the specified format.

Syntax

```
FUNCTION EXPORT (
  p_context                IN apex_exec.t_context,
  p_format                 IN t_format,
  p_as_clob                IN BOOLEAN          DEFAULT false,
  p_columns                IN t_columns        DEFAULT c_empty_columns,
  p_column_groups          IN t_column_groups  DEFAULT
c_empty_column_groups,
  p_aggregates             IN t_aggregates     DEFAULT c_empty_aggregates,
  p_highlights             IN t_highlights     DEFAULT c_empty_highlights,
  --
  p_file_name              IN VARCHAR2         DEFAULT NULL,
  p_print_config           IN t_print_config   DEFAULT c_empty_print_config,
  p_page_header            IN VARCHAR2         DEFAULT NULL,
  p_page_footer            IN VARCHAR2         DEFAULT NULL,
  p_supplemental_text      IN VARCHAR2         DEFAULT NULL,
  --
  p_csv_enclosed_by        IN VARCHAR2         DEFAULT NULL,
  p_csv_separator          IN VARCHAR2         DEFAULT NULL,
  --
  p_pdf_accessible         IN BOOLEAN          DEFAULT NULL,
  --
  p_xml_include_declaration IN BOOLEAN         DEFAULT false )
  RETURN t_export
```

Parameters

Parameter	Description
p_context	Context object from the EXEC infrastructure.
p_format	Export format. Valid values are: XLSX, PDF, HTML, CSV, XML and JSON.
p_as_clob	Exports as a CLOB instead of BLOB (default FALSE).
p_columns	Collection of column attributes beginning with column breaks, then in the order of display.
p_column_groups	Collection of column group attributes in the order of levels and display.
p_aggregates	Collection of report aggregates.
p_highlights	Collection of report highlights.
p_file_name	Defines the filename of the export.
p_print_config	Used for EXCEL and PDF to set the print attributes.
p_page_header	Text to appear in the header section of the document. Overrides the page header from p_print_config.
p_page_footer	Text to appear in the footer section of the document. Overrides the page footer from p_print_config.
p_supplemental_text	Text at the top of all download formats.
p_csv_enclosed_by	Used for CSV to enclose the output.
p_csv_separator	Used for CSV to separate the column values.
p_pdf_accessible	Used for PDF to create an accessible PDF.
p_xml_include_declaration	Used for XML to generate the XML declaration as the first line.

Returns

This function returns: the export file as object which includes the contents, MIME type, and file name.

Examples

```
DECLARE
    l_context apex_exec.t_context;
    l_export  apex_data_export.t_export;
BEGIN
    l_context := apex_exec.open_query_context(
        p_location    => apex_exec.c_location_local_db,
        p_sql_query   => 'select * from emp' );

    l_export := apex_data_export.export (
                        p_context   => l_context,
                        p_format    => apex_data_export.c_format_pdf );

    apex_exec.close( l_context );
```

```
    apex_data_export.download( p_export => l_export );

EXCEPTION
    when others THEN
        apex_exec.close( l_context );
        raise;
END;
```

15.9 GET_PRINT_CONFIG Procedure

This function prepares the print config to style the data export.

- The colors are specified using hexadecimal (hex) notation, RGB color codes, or HTML color names.
- The alignment options include: Left, Center, Right
- The font family options include: Helvetica, Times, Courier
- The font weight options include: Normal, Bold

Syntax

```
FUNCTION GET_PRINT_CONFIG(
    p_units                     IN t_unit         DEFAULT c_unit_inches,
    p_paper_size                IN t_size         DEFAULT c_size_letter,
    p_width_units               IN t_width_unit   DEFAULT
c_width_unit_percentage,
    p_width                     IN NUMBER         DEFAULT 11,
    p_height                    IN NUMBER         DEFAULT 8.5,
    p_orientation               IN t_orientation  DEFAULT
c_orientation_landscape,
    --
    p_page_header               IN VARCHAR2       DEFAULT NULL,
    p_page_header_font_color    IN t_color        DEFAULT '#000000',
    p_page_header_font_family   IN t_font_family  DEFAULT
c_font_family_helvetica,
    p_page_header_font_weight   IN t_font_weight  DEFAULT
c_font_weight_normal,
    p_page_header_font_size     IN NUMBER         DEFAULT 12,
    p_page_header_alignment     IN t_alignment    DEFAULT c_align_center,
    --
    p_page_footer               IN VARCHAR2       DEFAULT NULL,
    p_page_footer_font_color    IN t_color        DEFAULT '#000000',
    p_page_footer_font_family   IN t_font_family  DEFAULT
c_font_family_helvetica,
    p_page_footer_font_weight   IN t_font_weight  DEFAULT
c_font_weight_normal,
    p_page_footer_font_size     IN NUMBER         DEFAULT 12,
    p_page_footer_alignment     IN t_alignment    DEFAULT c_align_center,
    --
    p_header_bg_color           IN t_color        DEFAULT '#EEEEEE',
    p_header_font_color         IN t_color        DEFAULT '#000000',
    p_header_font_family        IN t_font_family  DEFAULT
c_font_family_helvetica,
```

```
    p_header_font_weight          IN t_font_weight  DEFAULT
c_font_weight_bold,
    p_header_font_size            IN NUMBER         DEFAULT 10,
    --
    p_body_bg_color               IN t_color        DEFAULT '#FFFFFF',
    p_body_font_color             IN t_color        DEFAULT '#000000',
    p_body_font_family            IN t_font_family  DEFAULT
c_font_family_helvetica,
    p_body_font_weight            IN t_font_weight  DEFAULT
c_font_weight_normal,
    p_body_font_size              IN NUMBER         DEFAULT 10,
    --
    p_border_width                IN NUMBER         DEFAULT .5,
    p_border_color                IN t_color        DEFAULT
'#666666' ) return t_print_config;
```

Parameters

Parameter	Description
p_units	Select the units used to specify page width and height. Valid values are: Inches, Millimeters, Centimeters, Points
p_paper_size	PDF only. Select the report page size. To type in your own page width and height, select Custom. Available options include: Letter, Legal, Tabloid, A4, A3, Custom
p_width_units	PDF only. Select the units used to specify column widths. Valid values are: Percentage, Points, Pixels
p_width	PDF only. The width of the page.
p_height	PDF only. The height of the page.
p_orientation	The orientation for the page. PDF only. Available options include: Vertical (Portrait), Horizontal (Landscape)
p_page_header	Text to appear in the header section of the document.
p_page_header_font_color	The page header font color.
p_page_header_font_family	The page header font family.
p_page_header_font_weight	The page header font weight.
p_page_header_font_size	The page header font size.
p_page_header_alignment	The page header text aligment.
p_page_footer	Text to appear in the footer section of the document.
p_page_footer_font_color	The page footer font color.
p_page_footer_font_family	The page footer font family.
p_page_footer_font_weight	The page footer font weight.
p_page_footer_font_size	The page footer font size.
p_page_footer_alignment	The page footer text aligment.

Parameter	Description
p_header_bg_color	The table header background color.
p_header_font_color	The table header font color.
p_header_font_family	The table header font family.
p_header_font_weight	The table header font weight.
p_header_font_size	The table header font size.
p_body_bg_color	The table body background color.
p_body_font_color	The table body font color.
p_body_font_family	The table body font family.
p_body_font_weight	The table body font weight.
p_body_font_size	The table body font size.
p_border_width	The width of the borders.
p_border_color	The color of the borders.

Returns

The print config to style the data export.

Examples

```
DECLARE
    l_context         apex_exec.t_context;
    l_print_config    apex_data_export.t_print_config;
    l_export          apex_data_export.t_export;
BEGIN
    l_context := apex_exec.open_query_context(
        p_location    => apex_exec.c_location_local_db,
        p_sql_query   => 'select * from emp' );

    l_print_config := apex_data_export.get_print_config(
        p_orientation     => apex_data_export.c_orientation_portrait,
        p_border_width    => 2 );

    l_export := apex_data_export.export (
        p_context         => l_context,
        p_print_config    => l_print_config,
        p_format          => apex_data_export.c_format_pdf );

    apex_exec.close( l_context );

    apex_data_export.download( p_export => l_export );

EXCEPTION
    when others THEN
        apex_exec.close( l_context );
        raise;
END;
```

16
APEX_DATA_INSTALL

This package contains the API for data migration in Oracle APEX.

16.1 LOAD_SUPPORTING_OBJECT_DATA Procedure

This procedure loads the supporting object data and installs the data in the specified application using the internal package. It makes use of the static files generated through the CREATE_DATA_MIGRATION procedure to carry out the installation

Syntax

```
APEX_DATA_INSTALL.LOAD_SUPPORTING_OBJECT_DATA (
    p_table_name            IN  VARCHAR2,
    p_delete_after_install  IN  BOOLEAN,
    p_app_id                IN  NUMBER  DEFAULT NULL);
```

Parameters

Table 16-1 LOAD_SUPPORTING_OBJECT_DATA Parameters

Parameter	Description
`p_table_name`	Name of the table where the data will be deposited.
`p_delete_after_install`	Indicates if files are removed after installing supporting objects. Default `TRUE`.
`p_app_id`	APEX application ID of the application that contains the static files associated with a data migration export. This can be used from SQL workshop outside the context of installing supporting objects, enabling a developer to reinstall migrated data without reinstalling all supporting objects.

Example

The following example demonstrates

```
DECLARE
    l_table_name    varchar2(400);
BEGIN
   wwv_data_migration_int.load_supporting_object_data(
       p_table_name           => l_table_name,
       p_delete_after_install  => true);
END;
```

17
APEX_DATA_PARSER

This package contains the implementation for the file parser in APEX. `APEX_DATA_PARSER` supports XML, JSON, CSV and XLSX files. The most important function in this package is the PARSE function, which is implemented as a table function returning rows of the `APEX_T_PARSER_ROW` type. The parser supports up to 300 columns.

17.1 Global Constants

The APEX_DATA_PARSER package uses the following constants.

```
subtype t_file_type is pls_integer range 1..4;
c_file_type_xlsx             constant t_file_type      := 1;
c_file_type_csv              constant t_file_type      := 2;
c_file_type_xml              constant t_file_type      := 3;
c_file_type_json             constant t_file_type      := 4;
```

17.2 Data Types

The APEX_DATA_PARSER package uses the following data types.

Generic

```
type t_file_profile is record(
    file_type          t_file_type,
    file_charset       varchar2(128),
    row_selector       varchar2(32767),
    is_single_row      boolean,
    first_row_headings boolean,
    xlsx_worksheet     varchar2(128),
    xml_namespaces     varchar2(4000),
    csv_delimiter      varchar2(4),
```

```
    csv_enclosed       varchar2(4),
    null_if            varchar2(20),
    parsed_rows        number,
    file_columns       t_file_columns );

The t_file_columns type is defined as table of t_file_column type

type t_file_column is record(
    col_seq       pls_integer,
    name          varchar2(128),
    data_type     apex_exec_api.t_data_type,
    data_type_len pls_integer,
    selector      varchar2(32767),
    decimal_char  varchar2(1),
    group_char    varchar2(1),
    format_mask   varchar2(128) );
```

17.3 ASSERT_FILE_TYPE Function

This function checks if the file name is valid file type and returns boolean.

Syntax

```
FUNCTION ASSERT_FILE_TYPE(
    p_file_name IN VARCHAR2,
    p_file_type IN t_file_type ) RETURN BOOLEAN;
```

Parameters

Table 17-1 ASSERT_FILE_TYPE Parameters

Parameter	Description
p_file_name	File name to get the file type.
p_file_type	File type as t_file_type.

Returns

Returns boolean.

Example

The following example checks if the passed-in file name is the CSV file type.

```
DECLARE
    is_valid_file_type boolean;
BEGIN
    is_valid_file_type := apex_data_parser.assert_file_type(
        p_file_name => 'test.csv',
        p_file_type => apex_data_parser.c_file_type_csv );
END;
```

17.4 DISCOVER Function

This is a function to discover the column profile of a file. This function calls `parse()` and then returns the generated file profile. This function is a shortcut which can be used instead of first calling `parse()` and then `get_file_profile()`.

Syntax

```
APEX_DATA_PARSER.DISCOVER (
    p_content             IN BLOB,
    p_file_name           IN VARCHAR2,
    p_decimal_char        IN VARCHAR2 DEFAULT NULL,
    p_xlsx_sheet_name     IN VARCHAR2 DEFAULT NULL,
    p_row_selector        IN VARCHAR2 DEFAULT NULL,
    p_csv_row_delimiter   IN VARCHAR2 DEFAULT LF,
    p_csv_col_delimiter   IN VARCHAR2 DEFAULT NULL,
    p_csv_enclosed        IN VARCHAR2 DEFAULT '"',
    p_file_charset        IN VARCHAR2 DEFAULT 'AL32UTF8',
    p_max_rows            IN NUMBER   DEFAULT 200 )
RETURN CLOB;
```

Parameter

Table 17-2 DISCOVER Parameters

Parameter	Description
`p_content`	The file content to be parsed as a BLOB.
`p_file_name`	The name of the file used to derive the file type.
`p_decimal_char`	Use this decimal character when trying to detect `NUMBER` data types. If not specified, the procedure will auto-detect the decimal character.
`p_xlsx_sheet_name`	For XLSX workbooks. The name of the worksheet to parse. If omitted, the function uses the first worksheet found.
`p_row_selector`	Whether to detect data types (`NUMBER, DATE, TIMESTAMP`) during parsing. If set to `Y`, the function will compute the file profile and also add data type information to it. If set to `'N'`, no data types will be detected and all columns will be `VARCHAR2`. Default is `Y`.
`p_decimal_char`	Use this decimal character when trying to detect `NUMBER` data types. If not specified,the procedure will auto-detect the decimal character.
`p_xlsx_sheet_name`	For XLSX workbooks. The name of the worksheet to parse. If omitted, the function uses the first worksheet found.

Table 17-2 (Cont.) DISCOVER Parameters

Parameter	Description
p_row_selector	For JSON and XML files. Pointer to the array / list of rows within the JSON or XML file. If omitted, the function will: • For **XML** files: Use /*/* (first tag under the root tag) as the row selector. • For **JSON** files: Look for a JSON array and use the first array found.
p_csv_row_delimiter	Override the default row delimiter for CSV parsing.
p_csv_row_delimiter	Override the default row delimiter for CSV parsing.
p_csv_col_delimiter	Use a specific CSV column delimiter. If omitted, the function detects the column delimiter based on the first row contents.
p_csv_enclosed	Override the default enclosure character for CSV parsing.
p_file_charset	File encoding, if not UTF-8 (AL32UTF8).
p_max_rows	Stop discovery after P_MAX_ROWS rows have been processed.

Returns

Returns a CLOB containing the file profile in JSON format.

Example

```
select apex_data_parser.discover(
           p_content => {BLOB containing XLSX file},
           p_file_name=>'large.xlsx' ) as profile_json
from dual;


PROFILE_JSON
------------------------------------------------------------
{
    "file-encoding" : "AL32UTF8",
    "single-row" : false,
    "file-type" : 1,
    "parsed-rows" : 2189,
    "columns" : [
       {
          "name" : "C0",
          "format-mask" : "",
          "selector" : "",
          "data-type" : 2
       },
       {
          "selector" : "",
          "format-mask" : "",
          "data-type" : 1,
          "name" : "FIRST_NAME"
       },
       {
          "name" : "LAST_NAME",
          "format-mask" : "",
```

```
            "selector" : "",
            "data-type" : 1
        },

        :

        {
            "name" : "DATE_",
            "format-mask" : "DD\"/\"MM\"/\"YYYY",
            "data-type" : 3,
            "selector" : ""
        },
        {
            "format-mask" : "",
            "selector" : "",
            "data-type" : 2,
            "name" : "ID"
        }
    ],
    "row-selector" : "",
    "headings-in-first-row" : true,
    "xslx-worksheet" : "sheet1.xml",
    "csv-delimiter" : ""
}
```

17.5 GET_COLUMNS Function

This function returns the columns of a parser profile as a table in order to be consumed by APEX components.

Syntax

```
FUNCTION GET_COLUMNS(
    p_profile             IN CLOB ) RETURN APEX_T_PARSER_COLUMNS;
```

Parameter

Table 17-3 GET_COLUMNS Function Parameters

Parameter	Description
P_FILE_PROFILE	File profile to be used for parsing. The file profile might have been computed in a previous PARSE() or DISCOVER() invocation.

Returns

Returns Profile column information as rows of APEX_T_PARSER_COLUMNS.

Example

This example uses `DISCOVER()` to compute a file profile and then `GET_COLUMS()` to return the list of columns among with their data types.

```
select *
      from table(
                  apex_data_parser.get_columns(
                      apex_data_parser.discover(
                          p_content => {BLOB containing XLSX file},
                          p_file_name=>'large.xlsx' )));

     COLUMN_POSITION COLUMN_NAME   DATA_TYPE   FORMAT_MASK
     --------------- ------------- ----------- ------------------
                   1 C0            NUMBER
                   2 FIRST_NAME    VARCHAR2
                   3 LAST_NAME     VARCHAR2
                   4 GENDER        VARCHAR2
                   5 COUNTRY       VARCHAR2
                   6 AGE           NUMBER
                   7 DATE_         DATE        DD"/"MM"/"YYYY
                   8 ID            NUMBER
```

17.6 GET_FILE_PROFILE Function

This function returns the current file profile in JSON format. A file profile is generated when the `parse()` table function runs and no file profile is passed in. The file profile contains metadata about the parsed files such as the CSV delimiter, the XLSX worksheet name, and the columns found during parsing and their data types.

The typical call sequence is as follows:

1. Invoke `PARSE` - Use this table function to parse the files and get rows and columns in order to display a data preview. While the function runs, it computes the file parser profile which can be used in subsequent calls in order to further process the data.
2. Invoke `GET_FILE_PROFILE` - Retrieve file profile information in JSON format.
3. Process the data.

Syntax

```
FUNCTION GET_FILE_PROFILE RETURN CLOB;
```

Parameter

None.

Returns

Returns file profile of the last `PARSE()` invocation in JSON format.

Example

```
select line_number, col001,col002,col003,col004,col005,col006,col007,col008
   from table(
              apex_data_parser.parse(
                  p_content         => {BLOB containing XLSX file},
                  p_file_name       => 'test.xlsx',
                  p_xlsx_sheet_name => 'sheet1.xml') ) ;

LINE_NUMBER COL001   COL002       COL003       COL004   COL005
COL006   COL007       COL008
----------- -------- ------------ ------------ -------- ---------------
-------- ------------ ---------
          1 0        First Name   Last Name    Gender   Country
Age      Date          Id
          2 1        Dulce        Abril        Female   United States
32       15/10/2017    1562
          3 2        Mara         Hashimoto    Female   Great Britain
25       16/08/2016    1582
          4 3        Philip       Gent         Male     France
36       21/05/2015    2587
          5 4        Kathleen     Hanner       Female   United States
25       15/10/2017    3549
          6 5        Nereida      Magwood      Female   United States
58       16/08/2016    2468
          7 6        Gaston       Brumm        Male     United States
24       21/05/2015    2554
          8 7        Etta         Hurn         Female   Great Britain
56       15/10/2017    3598
          9 8        Earlean      Melgar       Female   United States
27       16/08/2016    2456
          10 9       Vincenza     Weiland      Female   United States
40       21/05/2015    6548
           : :        :            :            :        :               :
    :            :

select apex_data_parser.get_file_profile from dual;

{
    "file-type" : 1,
    "csv-delimiter" : "",
    "xslx-worksheet" : "sheet1.xml",
    "headings-in-first-row" : true,
    "file-encoding" : "AL32UTF8",
    "single-row" : false,
    "parsed-rows" : 2378,
    "columns" : [
       {
          "format-mask" : "",
          "name" : "C0",
          "data-type" : 2,
          "selector" : ""
       },
       {
```

```
            "name" : "FIRST_NAME",
            "data-type" : 1,
            "selector" : "",
            "format-mask" : ""
         },
         {
            "selector" : "",
            "data-type" : 1,
            "name" : "LAST_NAME",
            "format-mask" : ""
         },
         {
            "format-mask" : "",
            "data-type" : 1,
            "name" : "GENDER",
            "selector" : ""
         },
         {
            "name" : "COUNTRY",
            "data-type" : 1,
            "selector" : "",
            "format-mask" : ""
         },
         {
            "data-type" : 2,
            "name" : "AGE",
            "selector" : "",
            "format-mask" : ""
         },
         {
            "format-mask" : "DD\"/\"MM\"/\"YYYY",
            "selector" : "",
            "data-type" : 3,
            "name" : "DATE_"
         },
         {
            "name" : "ID",
            "data-type" : 2,
            "selector" : "",
            "format-mask" : ""
         }
      ],
      "row-selector" : ""
}
```

17.7 GET_FILE_TYPE Function

This function returns a file type, based on a file name extension.

Syntax

```
FUNCTION GET_FILE_TYPE(
    p_file_name IN VARCHAR2 ) RETURN t_file_type;
```

Parameter

Table 17-4 GET_FILE_TYPE Parameters

Parameter	Description
p_file_name	File name to get the file type.

Returns

Returns the file type as `t_file_type`.

Example

```
declare
   l_file_type apex_data_parser.t_file_type;
begin
    l_file_type := apex_data_parser.get_file_type( 'test.xlsx' );
end;
```

17.8 GET_XLSX_WORKSHEETS Function

This function returns information on worksheets within an XLSX workbook as a list of `apex_t_parser_worksheet` instances.

Syntax

```
FUNCTION GET_XLSX_WORKSHEETS(
    p_content    IN BLOB ) RETURN apex_t_parser_worksheets;
```

Parameter

Table 17-5 GET_XLSX_WORKSHEETS Parameters

Parameter	Description
p_content	XLSX worksheet as a BLOB

Returns

Returns table with worksheet information.

Example

```
select * from table(
    apex_data_parser.get_xlsx_worksheets(
        p_content =>{BLOB containing XLSX file}


SHEET_SEQUENCE SHEET_DISPLAY_NAME   SHEET_FILE_NAME
SHEET_PATH
1              Sheet1               sheet1.xml        worksheets/
sheet1.xml
```

17.9 JSON_TO_PROFILE Function

This function converts a file profile in JSON format to an instance of the `t_file_profile` record type.

Syntax

```
FUNCTION JSON_TO_PROFILE( p_json inclob ) RETURN t_file_profile;
```

Parameter

Table 17-6 JSON_TO_PROFILE Parameters

Parameter	Description
`p_json`	The data profile in JSON format.

Returns

Returns the the file profile in JSON format.

Example

```
declare
    l_profile t_file_profile;
begin
    l_profile := apex_data_parser.json_to_profile( '{"file-type", "csv-
delimiter" : "", ... }' );

end;
```

17.10 PARSE Function

This function enables you to parse XML, XLSX, CSV, or JSON files and returns a generic table of the following structure:

```
LINE_NUMBER COL001 COL002 COL003 COL004 ... COL300
```

Values are generally returned in VARCHAR2 format. A returned table row can have a maximum of 300 columns. The maximum length for a VARCHAR2 table column is 4000 bytes; there is no line length maximum. 20 out of the 300 supported columns can be handled as a CLOB.

File parsing happens on-the-fly as this function is invoked. Data does not write to a collection nor to a temporary table.

About Parsing File Profiles

If the p_file_profile parameter is not passed, the function computes a file profile with column information during parsing.

If p_detect_data_types is passed as Y (default), the function also detects column data types during parsing. Retrieve the computed file profile using GET_FILE_PROFILE after the function finishes:

1. Invoke PARSE - Use this table function to parse the files and get rows and columns in order to display a data preview.
2. Invoke GET_FILE_PROFILE - Retrieve file profile information in JSON format.
3. Process the data - Generate a SQL query based on the data profile to perform custom processing.

> **Note:**
>
> XLSX parsing occurs in phases:
>
> 1. First, APEX_ZIP extracts individual XML files from the XLSX archive.
> 2. Then, the XMLTABLE SQL function parses the actual XLSX.

About CLOB Support

Starting with APEX release 19.2, this package supports string values larger than 4,000 bytes. 20 out of the 300 supported columns can be handled as a CLOB. The level of CLOB support depends upon the file type being parsed.

CSV and XLSX

- CLOB values are supported up to 32K.
- CLOB columns can be detected during discovery.
- When the data profile is discovered, values below 4000 bytes are normally returned as COLNNN. CLOB values are returned in the CLOBNN column and the first 1000 characters are returned as COLNNN. If a data profile is passed in and that has CLOB column defined, all values are returned in the CLOBNN column only.

XML

- CLOB values with more than 32K are supported.
- CLOB columns can be detected during discovery.
- When the data profile is discovered, values below 4000 bytes are normally returned as COLNNN. CLOB values are returned in the CLOBNN column and the first 1000 characters are returned as COLNNN. If a data profile is passed in and that has CLOB column defined, all values are returned in the CLOBNN column only.

JSON

- `CLOB` values with more than 32K are supported.
- `CLOB` columns are **not** detected during discovery; `CLOB` support is only active if a file profile containing `CLOB` column is passed in as the `p_file_profile` parameter.
- Since `JSON_TABLE` does not support CLOBs on 12c databases, the parser uses XMLTYPE-based processing if a file profile with CLOB columns is passed in. Processing will be significantly slower.

About Large CSV Files

If the BLOB passed to `APEX_DATA_PARSER.PARSE` is less than 50 MB, Oracle APEX copies the BLOB to an *internal, cached* temporary LOB. Thus all CSV parsing is done in memory. For larger BLOBs, APEX does CSV parsing on the original BLOB locator. If it is selected from a table, CSV parsing can happen on disk but might be significantly slower. Note that a performance degradation may occur when parsed CSV files grow beyond 50 MB.

However, developers can also use the `DBMS_LOB.CREATETEMPORARY` (passing `CACHE => TRUE`) and `DBMS_LOB.COPY` procedures in order to explicitly create a cached temporary LOB, even for a larger file. Instead of the original BLOB, the cached temporary LOB can be passed to `APEX_DATA_PARSER.PARSE`. This approach also enables in-memory parsing for files larger than 50 MB.

> **See Also:**
>
> CREATETEMPORARY Procedures and COPY Procedures in *Oracle Database PL/SQL Packages and Types Reference*.

Syntax

```
FUNCTION PARSE(
    p_content                     IN BLOB,
    p_file_name                   IN VARCHAR2     DEFAULT NULL,
    p_file_type                   IN t_file_type  DEFAULT NULL,
    p_file_profile                IN CLOB         DEFAULT NULL,
    p_detect_data_types           IN VARCHAR2     DEFAULT 'Y',
    p_decimal_char                IN VARCHAR2     DEFAULT NULL,
    p_xlsx_sheet_name             IN VARCHAR2     DEFAULT NULL,
    p_row_selector                IN VARCHAR2     DEFAULT NULL,
    p_csv_row_delimiter           IN VARCHAR2     DEFAULT LF,
    p_csv_col_delimiter           IN VARCHAR2     DEFAULT NULL,
    p_csv_enclosed                IN VARCHAR2     DEFAULT '"',
    p_skip_rows                   IN PLS_INTEGER  DEFAULT 0,
    p_add_headers_row             IN VARCHAR2     DEFAULT 'N',
    p_file_charset                IN VARCHAR2     DEFAULT 'AL32UTF8',
    p_max_rows                    IN NUMBER       DEFAULT NULL,
    p_return_rows                 IN NUMBER       DEFAULT NULL,
    p_store_profile_to_collection IN VARCHAR2     DEFAULT NULL
    p_fix_excel_precision         IN VARCHAR2     DEFAULT 'N'  )
    RETURN apex_t_parser_table pipelined;
```

Parameters

Table 17-7 PARSE Function Parameters

Parameter	Description
p_content	The file content to be parsed as a BLOB.
p_file_name	The name of the file; only used to derive the file type. Either P_FILE_NAME, P_FILE_TYPE or P_FILE_PROFILE must be passed in.
p_file_type	The type of the file to be parsed. Use this to explicitly pass the file type in. Either P_FILE_NAME, P_FILE_TYPE or P_FILE_PROFILE must be passed in.
p_file_profile	File profile to be used for parsing. The file profile might have been computed in a previous PARSE() invocation. If passed in again, the function will skip some profile detection logic and use the passed in profile - in order to improve performance.
p_detect_data_types	Whether to detect data types (NUMBER, DATE, TIMESTAMP) during parsing. If set to 'Y', the function will compute the file profile and also add data type information to it. If set to 'N', no data types will be detected and all columns will be VARCHAR2. Default is 'Y'.
p_decimal_char	Use this decimal character when trying to detect NUMBER data types. If not specified,the procedure will auto-detect the decimal character.
p_xlsx_sheet_name	For XLSX workbooks. The name of the worksheet to parse. If omitted, the function uses the first worksheet found.
p_row_selector	For JSON and XML files. Pointer to the array / list of rows within the JSON or XML file. If omitted, the function will: • For XML files: Use "/*/*" (first tag under the root tag) as the row selector. • For JSON files: Look for a JSON array and use the first array found.
p_csv_row_delimiter	Override the default row delimiter for CSV parsing. Limited to one character and defaults to Linefeed (LF). Note that the Linefeed row delimiter also handles "Carriage Return/Linefeed" (CRLF).
p_csv_col_delimiter	Use a specific CSV column delimiter. If omitted, the function will detect the column delimiter based on the first row contents.
p_csv_enclosed	Override the default enclosure character for CSV parsing.
p_skip_rows	Skip the first N rows when parsing.
p_add_headers_row	For XML, JSON: Emit the column headers (tag, attr names) as the first row.
p_file_charset	File encoding, if not UTF-8 (AL32UTF8).
p_max_rows	Stop parsing after P_MAX_ROWS have been returned.
p_return_rows	Amount of rows to return. This is useful when the parser shall to parse more rows (for data type detection), than it is supposed to return. When the specified amount of rows have been emitted, the function will continue parsing (and refining the detected data types) until P_MAX_ROWS has been reached, or until the ROWNUM < x clause of the SQL query kicks in and stops execution.
p_store_profile_to_collection	Store the File profile which has been computed during parse into a collection. The collection will be cleared, if it exists. Only be used for computed profiles.

Table 17-7 (Cont.) PARSE Function Parameters

Parameter	Description
p_fix_excel_precision	Whether to round numbers in XLSX files to 15 significant digits. This is useful for XLSX files generated by Microsoft Excel. Excel stores numeric values as floating point numbers with a maximum of 15 significant digits. For calculation results, this can lead to rounding issues, which are fixed using this parameter. See also: https://docs.microsoft.com/en-us/office/troubleshoot/excel/floating-point-arithmetic-inaccurate-result

Returns

Returns rows of the `APEX_T_PARSER_ROW` type.

```
LINE_NUMBER COL001 COL002 COL003 COL004 ... COL300
```

Example

```
select line_number,
col001,col002,col003,col004,col005,col006,col007,col008
   from table(
              apex_data_parser.parse(
                  p_content         => {BLOB containing XLSX
spreadsheet},
                  p_file_name       => 'test.xlsx',
                  p_xlsx_sheet_name => 'sheet1.xml') ) ;

LINE_NUMBER COL001   COL002       COL003       COL004
COL005          COL006   COL007       COL008
----------- -------- ------------ ------------ --------
--------------- -------- ------------ --------
          1 0        First Name   Last Name    Gender
Country         Age      Date         Id
          2 1        Dulce        Abril        Female   United
States   32       15/10/2017   1562
          3 2        Mara         Hashimoto    Female   Great
Britain   25       16/08/2016   1582
          4 3        Philip       Gent         Male
France          36       21/05/2015   2587
          5 4        Kathleen     Hanner       Female   United
States   25       15/10/2017   3549
          6 5        Nereida      Magwood      Female   United
States   58       16/08/2016   2468
          7 6        Gaston       Brumm        Male     United
States   24       21/05/2015   2554
          8 7        Etta         Hurn         Female   Great
Britain   56       15/10/2017   3598
          9 8        Earlean      Melgar       Female   United
States   27       16/08/2016   2456
         10 9        Vincenza     Weiland      Female   United
States   40       21/05/2015   6548
          : :        :            :            :        :
```

```
 :        :            :

select line_number, col001,col002,col003,col004,col005,col006,col007,col008
   from table(
              apex_data_parser.parse(
                  p_content         => {BLOB containing JSON file},
                  p_file_name       => 'test.json') ) ;

LINE_NUMBER COL001    COL002   COL003
COL004          COL005
----------- --------- ------------------------------------------------
--------------- --------------
           1 Feature   1.5      41km E of Cape Yakataga, Alaska
1536513727239   1536514117117
           2 Feature   0.21     11km ENE of Aguanga, CA
1536513299520   1536513521231
           3 Feature   1.84     5km SSW of Pahala, Hawaii
1536513262940   1536513459610
           4 Feature   2.55     9km W of Volcano, Hawaii
1536513100890   1536513446680
           5 Feature   1.3      62km ESE of Cape Yakataga, Alaska
1536512917361   1536513322236
           6 Feature   1.79     7km SW of Tiptonville, Tennessee
1536512379690   1536512668010
           7 Feature   1.9      126km NNW of Arctic Village, Alaska
1536512346186   1536512846567
           8 Feature   1.4      105km NW of Arctic Village, Alaska
1536512140162   1536512846334
```

18
APEX_DEBUG

The `APEX_DEBUG` package provides utility functions for managing the debug message log. Specifically, this package provides the necessary APIs to instrument and debug PL/SQL code contained within your Oracle APEX application as well as PL/SQL code in database stored procedures and functions. Instrumenting your PL/SQL code makes it much easier to track down bugs and isolate unexpected behavior more quickly.

The package also provides the means to enable and disable debugging at different debug levels and utility procedures to clean up the message log.

You can view the message log either as described in the Accessing Debugging Mode section of the *Oracle APEX App Builder User's Guide* or by querying the `APEX_DEBUG_MESSAGES` view.

For further information, see the individual API descriptions.

> **Note:**
>
> In APEX release 4.2, the APEX_DEBUG_MESSAGE package was renamed to APEX_DEBUG. The APEX_DEBUG_MESSAGE package name is still supported to provide backward compatibility. As a best practice, however, use the new APEX_DEBUG package for new applications unless you plan to run them in an earlier version of APEX.

- REMOVE_DEBUG_BY_AGE Procedure
- REMOVE_DEBUG_BY_APP Procedure
- REMOVE_DEBUG_BY_VIEW Procedure
- REMOVE_SESSION_MESSAGES Procedure
- TOCHAR Function
- TRACE Procedure
- WARN Procedure

> **See Also:**
>
> Accessing Debugging Mode in *Oracle APEX App Builder User's Guide*

18.1 Constants

The APEX_DEBUG package uses the following constants.

```
subtype t_log_level is pls_integer;
c_log_level_error constant t_log_level := 1;
    -- critical error
c_log_level_warn constant t_log_level := 2;
    -- less critical error
c_log_level_info constant t_log_level := 4;
    -- default level if debugging is enabled
    -- (for example, used by apex_application.debug)
c_log_level_app_enter constant t_log_level := 5;
    -- application: messages when procedures/functions are entered
c_log_level_app_trace constant t_log_level := 6;
    -- application: other messages within procedures/functions
c_log_level_engine_enter constant t_log_level := 8;
    -- APEX engine: messages when procedures/functions are entered
c_log_level_engine_trace constant t_log_level := 9;
    -- APEX engine: other messages within procedures/functions
```

18.2 DISABLE Procedure

This procedure turns off debug messaging.

Syntax

```
APEX_DEBUG.DISABLE;
```

Parameters

None.

Example

This example shows how you can turn off debug messaging.

```
BEGIN
    APEX_DEBUG.DISABLE();
END;
```

> **See Also:**
>
> "ENABLE Procedure"

18.3 DISABLE_DBMS_OUTPUT Procedure

This procedure stops writing all debug logs also via `dbms_output`.

Syntax

```
DISABLE_DBMS_OUTPUT;
```

Parameters

None.

Example

See `enable_dbms_output`.

> **See Also:**
>
> - "ENABLE_DBMS_OUTPUT Procedure"
> - "ENABLE Procedure"
> - "DISABLE Procedure"

18.4 ENABLE Procedure

This procedure turns on debug messaging. You can specify, by level of importance, the types of debug messages that are monitored.

> **Note:**
>
> You only need to call `ENABLE` procedure once per page view or page accept.

Syntax

```
APEX_DEBUG.ENABLE (
    p_level    IN  T_LOG_LEVEL DEFAULT C_LOG_LEVEL_INFO );
```

Parameters

Table 18-1 ENABLE Procedure Parameters

Parameter	Description
`p_level`	Level or levels of messages to log. Must be an integer from 1 to 9, where level 1 is the most important messages and level 4 (the default) is the least important. Setting to a specific level logs messages both at that level and below that level. For example, setting `p_level` to 2 logs any message at level 1 and 2.

Example

This examples shows how to enable logging of messages for levels 1, 2 and 4. Messages at higher levels are not logged.

```
BEGIN
    APEX_DEBUG.ENABLE(
        apex_debug.c_log_level_info);
END;
```

18.5 ENTER Procedure

This procedure logs messages at level `c_log_level_app_enter`. Use `APEX_DEBUG.ENTER()` to log the routine name and it's arguments at the beginning of a procedure or function.

Syntax

```
APEX_DEBUG.ENTER (
p_routine_name     IN VARCHAR2,
p_name01           IN VARCHAR2    DEFAULT NULL,
p_value01          IN VARCHAR2    DEFAULT NULL,
p_name02           IN VARCHAR2    DEFAULT NULL,
p_value02          IN VARCHAR2    DEFAULT NULL,
p_name03           IN VARCHAR2    DEFAULT NULL,
p_value03          IN VARCHAR2    DEFAULT NULL,
p_name04           IN VARCHAR2    DEFAULT NULL,
p_value04          IN VARCHAR2    DEFAULT NULL,
p_name05           IN VARCHAR2    DEFAULT NULL,
```

```
p_value05          IN VARCHAR2    DEFAULT NULL,
p_name06           IN VARCHAR2    DEFAULT NULL,
p_value06          IN VARCHAR2    DEFAULT NULL,
p_name07           IN VARCHAR2    DEFAULT NULL,
p_value07          IN VARCHAR2    DEFAULT NULL,
p_name08           IN VARCHAR2    DEFAULT NULL,
p_value08          IN VARCHAR2    DEFAULT NULL,
p_name09           IN VARCHAR2    DEFAULT NULL,
p_value09          IN VARCHAR2    DEFAULT NULL,
p_name10           IN VARCHAR2    DEFAULT NULL,
p_value10          IN VARCHAR2    DEFAULT NULL,
p_value_max_length IN PLS_INTEGER DEFAULT 1000 );
```

Parameters

Table 18-2 APEX_DEBUG.ENTER Procedure Parameters

Parameter	Description
`p_routine_name`	The name of the procedure or function.
`p_namexx`/`p_valuexx`	The procedure or function parameter name and value.
`p_value_max_length`	The `p_valuexx` values is truncated to this length.

Example

This example shows how to use APEX_ENTER to add a debug message at the beginning of a procedure.

```
procedure foo (
    p_widget_id in number,
    p_additional_data in varchar2,
    p_emp_rec in emp%rowtype )
is
begin
    apex_debug.enter('foo',
        'p_widget_id' , p_widget_id,
        'p_additional_data', p_additional_data,
        'p_emp_rec.id' , p_emp_rec.id );
....do something....
end foo;
```

See Also:

- "MESSAGE Procedure"
- "ERROR Procedure"
- "WARN Procedure"
- "TRACE Procedure"
- "INFO Procedure"

18.6 ENABLE_DBMS_OUTPUT Procedure

This procedure writes all debug logs via `dbms_output`. If debug is disabled, this call also enables it with log level `c_log_level_warn`. You have to set a debug level higher than `c_log_level_warn` for finer grained debug output. The output `95` starts with a configurable prefix, followed by the log level, `"|"` and the actual debug message.

Syntax

```
ENABLE_DBMS_OUTPUT (
    p_prefix    IN VARCHAR2    DEFAULT '# APEX|' );
```

Parameters

Table 18-3 ENABLE_DBMS_OUTPUT Procedure Parameters

Parameter	Description
`p_prefix`	Prefix for lines that go to `dbms_output`, default `'# APEX|'`.

Example

This sqlplus code writes the debug messages for 4, 5, 7, and 8 via `dbms_output`.

```
set serveroutput on size unlimited
begin
 apex_debug.error('1');
 apex_debug.warn('2');
 apex_debug.enable_dbms_output(p_prefix=>'Debug-');
 apex_debug.error('4');
 apex_debug.warn('5');
 apex_debug.info('6');
 apex_debug.enable(p_level=>apex_debug.c_log_level_info);
 apex_debug.info('7');
 apex_debug.enable_dbms_output;
 apex_debug.info('8');
 apex_debug.disable_dbms_output;
 apex_debug.info('9');
end;
```

```
 /
Output:
  Debug-ERR|4
  Debug-WRN|5
  Debug-INF|7
  # APEX|INF|8
```

See Also:

- "DISABLE_DBMS_OUTPUT Procedure"
- "ENABLE Procedure"
- "DISABLE Procedure"

18.7 ERROR Procedure

This procedure logs messages at level `c_log_level_error`. This procedure always logs, even if debug mode is turned off.

Syntax

```
APEX_DEBUG.ERROR (
    p_message IN VARCHAR2,
    p0  IN VARCHAR2     DEFAULT NULL,
    p1  IN VARCHAR2     DEFAULT NULL,
    p2  IN VARCHAR2     DEFAULT NULL,
    p3  IN VARCHAR2     DEFAULT NULL,
    p4  IN VARCHAR2     DEFAULT NULL,
    p5  IN VARCHAR2     DEFAULT NULL,
    p6  IN VARCHAR2     DEFAULT NULL,
    p7  IN VARCHAR2     DEFAULT NULL,
    p8  IN VARCHAR2     DEFAULT NULL,
    p9  IN VARCHAR2     DEFAULT NULL,
    p_max_length IN PLS_INTEGER DEFAULT 1000 );
```

Parameters

Table 18-4 APEX_DEBUG.ERROR Procedure Parameters

Parameter	Description
`p_message`	The debug message. Occurrences of '%s' are replaced by `p0` to `p19`, as in `utl_lms.format_message` and C's sprintf. Occurrences of '% %' represent the special character '%'. Occurrences of '%<n>' are replaced by p<n>.
`p0` through `p9`	Substitution strings for '%s' placeholders.
`p_max_length`	The `p<n>` values are truncated to this length.

Example

This example shows how to use `APEX_ERROR` to log a critical error in the debug log.

```
apex_debug.error('Critical error %s', sqlerrm);
```

> **See Also:**
>
> - "MESSAGE Procedure"
> - "ERROR Procedure"
> - "WARN Procedure"
> - "TRACE Procedure"
> - "INFO Procedure"

18.8 GET_LAST_MESSAGE_ID Function

This function returns the identifier for the last debug message that was generated in this session. The value is null until the first debug message has been generated.

Syntax

```
APEX_DEBUG.GET_LAST_MESSAGE_ID (
  RETURN NUMBER );
```

Example

The following example prints the message identifiers before and after emitting debug output.

```
BEGIN
    sys.dbms_output.put_line('Page View ID='||
apex_debug.get_last_message_id);
    apex_debug.message('Hello', p_force => true);
    sys.dbms_output.put_line('Page View ID='||
apex_debug.get_last_message_id);
END;
```

18.9 GET_PAGE_VIEW_ID Function

This function returns the current page view identifier, which is a unique ID for each browser request or standalone database session. The value is null until the first debug message has been generated.

Syntax

```
APEX_DEBUG.GET_PAGE_VIEW_ID (
  RETURN NUMBER );
```

Example

The following example prints the page view identifiers before and after emitting debug output.

```
BEGIN
    sys.dbms_output.put_line('Page View ID='||apex_debug.get_page_view_id);
    apex_debug.message('Hello', p_force => true);
    sys.dbms_output.put_line('Page View ID='||apex_debug.get_page_view_id);
END;
```

18.10 INFO Procedure

This procedure logs messages at level `c_log_level_info`.

Syntax

```
APEX_DEBUG.INFO (
    p_message IN VARCHAR2,
    p0  IN VARCHAR2  DEFAULT NULL,
    p1  IN VARCHAR2  DEFAULT NULL,
    p2  IN VARCHAR2  DEFAULT NULL,
    p3  IN VARCHAR2  DEFAULT NULL,
    p4  IN VARCHAR2  DEFAULT NULL,
    p5  IN VARCHAR2  DEFAULT NULL,
    p6  IN VARCHAR2  DEFAULT NULL,
    p7  IN VARCHAR2  DEFAULT NULL,
    p8  IN VARCHAR2  DEFAULT NULL,
    p9  IN VARCHAR2  DEFAULT NULL,
    p_max_length IN PLS_INTEGER DEFAULT 1000 );
```

Parameters

Table 18-5 APEX_DEBUG.INFO Procedure Parameters

Parameter	Description
`p_message`	The debug message. Occurrences of '%s' are replaced by `p0` to `p19`, as in `utl_lms.format_message` and C's sprintf. Occurrences of '% %' represent the special character '%'. Occurrences of '%<n>' are replaced by p<n>.
`p0` through `p9`	Substitution strings for '%s' placeholders.
`p_max_length`	The `p<n>` values are truncated to this length.

Example

This example shows how to use `APEX_DEBUG.INFO` to log information in the debug log.

```
apex_debug.info('Important: %s', 'fnord');
```

> **See Also:**
>
> - "MESSAGE Procedure"
> - "ERROR Procedure"
> - "WARN Procedure"
> - "TRACE Procedure"
> - "ENTER Procedure"

18.11 LOG_DBMS_OUTPUT Procedure

This procedure writes the contents of `dbms_output.get_lines` to the debug log. Messages of legacy applications which use `dbms_output` are copied into the debug log. In order to write to the debug log, `dbms_output.enable` must be performed

Syntax

```
APEX_DEBUG.LOG_DBMS_OUTPUT;
```

Parameters

None.

Example

This example shows how to log the contents of the `DBMS_OUTPUT` buffer in the debug log.

```
sys.dbms_output.enable;
sys.dbms_output.put_line('some data');
sys.dbms_output.put_line('other data');
apex_debug.log_dbms_output;
```

> **See Also:**
>
> - "MESSAGE Procedure"
> - "ERROR Procedure"
> - "WARN Procedure"
> - "TRACE Procedure"
> - "INFO Procedure"

18.12 LOG_LONG_MESSAGE Procedure

This procedure emits debug messages from PL/SQL components of Oracle APEX, or PL/SQL procedures and functions.

This procedure is the same as LOG_MESSAGE, except it allows logging of much longer messages, which are subsequently split into 4,000 character chunks in the debugging output (because a single debug message is constrained to 4,000 characters).

> **Note:**
>
> As a best practice, Oracle recommends using shorter message APIs when possible (ERROR, WARN, and so on), and reserving LOG_LONG_MESSAGE for scenarios that require longer messages.

Syntax

```
APEX_DEBUG.LOG_LONG_MESSAGE (
    p_message   IN VARCHAR2     DEFAULT NULL,
    p_enabled   IN BOOLEAN      DEFAULT FALSE,
    p_level     IN t_log_level  DEFAULT c_log_level_app_trace )
```

Parameters

Table 18-6 APEX_DEBUG.LOG_LONG_MESSAGE Procedure Parameters

Parameter	Description
p_message	Log long message with maximum size of 32767 bytes.
p_enabled	Set to TRUE to always log messages, irrespective of whether debugging is enabled. Set to FALSE to only log messages if debugging is enabled.
p_level	Identifies the level of the long log message. See Constants.

Example

This example shows how to enable debug message logging for 1 and 2 level messages and display a level 1 message that could contain anything up to 32767 characters. Note, the

`p_enabled` parameter need not be specified, as debugging has been explicitly enabled and the default of FALSE for this parameter respects this enabling.

```
DECLARE
    l_msg VARCHAR2(32767) := 'Debug outputs anything up to varchar2
limit';
BEGIN
    APEX_DEBUG.ENABLE (p_level => 2);

    APEX_DEBUG.LOG_LONG_MESSAGE(
        p_message => l_msg,
        p_level => 1 );
END;
```

See Also:

- ENTER Procedure
- ERROR Procedure
- INFO Procedure
- MESSAGE Procedure
- TRACE Procedure
- WARN Procedure

18.13 LOG_MESSAGE Procedure [Deprecated]

This procedure logs a debug message.

Note:

Instead of this procedure, use "ERROR Procedure," "WARN Procedure," "MESSAGE Procedure," "INFO Procedure," "ENTER Procedure," or "TRACE Procedure."

Syntax

```
APEX_DEBUG.LOG_MESSAGE (
    p_message    IN  VARCHAR2 DEFAULT NULL,
    p_enabled    IN  BOOLEAN DEFAULT FALSE,
    p_level IN T_LOG_LEVEL DEFAULT C_LOG_LEVEL_APP_TRACE );
```

Parameters

Table 18-7 APEX_DEBUG.LOG_MESSAGE Procedure Parameters

Parameter	Description
p_message	The debug message with a maximum length of 1000 bytes.
p_enabled	Messages are logged when logging is enabled, setting a value of TRUE enables logging.
p_level	Identifies the level of the log message where 1 is most important and 9 is least important. This is an integer value.

Example

This example shows how to enable debug message logging for 1 and 2 level messages and display a level 1 message showing a variable value. Note, the p_enabled parameter need not be specified, as debugging has been explicitly enabled and the default of FALSE for this parameter respects this enabling.

```
DECLARE
    l_value varchar2(100) := 'test value';
BEGIN
    APEX_DEBUG.ENABLE (p_level => 2);

APEX_DEBUG.LOG_MESSAGE(
    p_message => 'l_value = ' || l_value,
    p_level => 1 );

END;
```

See Also:

- "MESSAGE Procedure"
- "ERROR Procedure"
- "WARN Procedure"
- "TRACE Procedure"
- "INFO Procedure"

18.14 LOG_PAGE_SESSION_STATE Procedure

This procedure logs the session's item values.

Syntax

```
APEX_DEBUG.LOG_PAGE_SESSION_STATE (
    p_page_id    IN  NUMBER DEFAULT NULL,
```

```
    p_enabled    IN  BOOLEAN DEFAULT FALSE,
    p_level IN T_LOG_LEVEL DEFAULT C_LOG_LEVEL_APP_TRACE );
```

Parameters

Table 18-8 APEX_DEBUG.LOG_SESSION_STATE Procedure Parameters

Parameter	Description
p_page_id	Identifies a page within the current applicaton and workspace context.
p_enabled	Messages are logged when logging is enabled, setting a value of TRUE enables logging.
p_level	Identifies the level of the log message where 1 is most important, 9 is least important. Must be an integer value.

Example

This example shows how to enable debug message logging for 1 and 2 level messages and display a level 1 message containing all the session state for the application's current page. Note, the `p_enabled` parameter need not be specified, as debugging has been explicitly enabled and the default of FALSE for this parameter respects this enabling. Also note the `p_page_id` has not been specified, as this example just shows session state information for the application's current page.

```
BEGIN
    APEX_DEBUG.ENABLE (p_level => 2);

    APEX_DEBUG.LOG_PAGE_SESSION_STATE (p_level => 1);

END;
```

18.15 MESSAGE Procedure

This procedure logs a formatted debug message, general version.

Syntax

```
APEX_DEBUG.MESSAGE (
    p_message IN VARCHAR2,
    p0  IN VARCHAR2  DEFAULT NULL,
    p1  IN VARCHAR2  DEFAULT NULL,
    p2  IN VARCHAR2  DEFAULT NULL,
    p3  IN VARCHAR2  DEFAULT NULL,
    p4  IN VARCHAR2  DEFAULT NULL,
    p5  IN VARCHAR2  DEFAULT NULL,
    p6  IN VARCHAR2  DEFAULT NULL,
    p7  IN VARCHAR2  DEFAULT NULL,
    p8  IN VARCHAR2  DEFAULT NULL,
    p9  IN VARCHAR2  DEFAULT NULL,
    p10 IN VARCHAR2  DEFAULT NULL,
    p11 IN VARCHAR2  DEFAULT NULL,
    p12 IN VARCHAR2  DEFAULT NULL,
```

```
    p13 IN VARCHAR2  DEFAULT NULL,
    p14 IN VARCHAR2  DEFAULT NULL,
    p15 IN VARCHAR2  DEFAULT NULL,
    p16 IN VARCHAR2  DEFAULT NULL,
    p17 IN VARCHAR2  DEFAULT NULL,
    p18 IN VARCHAR2  DEFAULT NULL,
    p19 IN VARCHAR2  DEFAULT NULL,
    p_max_length   IN PLS_INTEGER    DEFAULT 1000,
    p_level        IN T_LOG_LEVEL    DEFAULT C_LOG_LEVEL_INFO,
    p_force        IN BOOLEAN        DEFAULT FALSE );
```

Parameters

Table 18-9 APEX_DEBUG.MESSAGE Procedure Parameters

Parameter	Description
`p_message`	The debug message. Occurrences of '%s' is replaced by `p0` to `p19`, as in `utl_lms.format_message` and C's sprintf. Occurrences of '%%' represent the special character '%'. Occurrences of '%<n>' are replaced by `p<n>`.
`p0` through `p19`	Substitution strings for '%s' placeholders.
`p_max_length`	The `p<n>` values is truncated to this length.
`p_level`	The log level for the message, default is `c_log_level_info`. See "Constants."
`p_force`	If TRUE, this generates a debug message even if the page is not rendered in debug mode or `p_level` is greater than the configured debug messaging (using the URL or using the enable procedure).

Example

This example shows how to use the `APEX_DEBUG.MESSAGE` procedure to add text to the debug log.

```
apex_debug.message('the value of %s + %s equals %s', 3, 5, 'eight');
```

See Also:

- "ERROR Procedure"
- "WARN Procedure"
- "TRACE Procedure"
- "INFO Procedure"
- "ENTER Procedure"

18.16 REMOVE_DEBUG_BY_AGE Procedure

Use this procedure to delete from the debug message log all data older than the specified number of days.

Syntax

```
APEX_DEBUG.REMOVE_DEBUG_BY_AGE (
    p_application_id    IN NUMBER,
    p_older_than_days   IN NUMBER);
```

Parameters

Table 18-10 APEX_DEBUG.REMOVE_DEBUG_BY_AGE Procedure Parameters

Parameter	Description
p_application_id	The application ID of the application.
p_older_than_days	The number of days data can exist in the debug message log before it is deleted.

Example

This example demonstrates removing debug messages relating to the current application, that are older than 3 days old.

```
BEGIN
    APEX_DEBUG.REMOVE_DEBUG_BY_AGE (
        p_application_id  => TO_NUMBER(:APP_ID),
        p_older_than_days => 3 );
END;
```

18.17 REMOVE_DEBUG_BY_APP Procedure

Use this procedure to delete from the debug message log all data belonging to a specified application.

Syntax

```
APEX_DEBUG.REMOVE_DEBUG_BY_APP (
    p_application_id IN NUMBER);
```

Parameters

Table 18-11 APEX_DEBUG.REMOVE_DEBUG_BY_APP Procedure Parameters

Parameter	Description
p_application_id	The application ID of the application.

Example

This example demonstrates removing all debug messages logged for the current application.

```
BEGIN
    APEX_DEBUG.REMOVE_DEBUG_BY_APP(
        p_application_id => TO_NUMBER(:APP_ID) );
END;
```

18.18 REMOVE_DEBUG_BY_VIEW Procedure

Use this procedure to delete all data for a specified view from the message log.

Syntax

```
APEX_DEBUG.REMOVE_DEBUG_BY_VIEW (
    p_application_id   IN NUMBER,
    p_view_id          IN NUMBER);
```

Parameters

Table 18-12 APEX_DEBUG.REMOVE_DEBUG_BY_VIEW Procedure Parameters

Parameter	Description
p_application_id	The application ID of the application.
p_view_id	The view ID of the view.

Example

This example demonstrates the removal of debug messages within the 'View Identifier' of 12345, belonging to the current application.

```
BEGIN
    APEX_DEBUG.REMOVE_DEBUG_BY_VIEW (
        p_application_id => TO_NUMBER(:APP_ID),
        p_view_id        => 12345 );
END;
```

18.19 REMOVE_SESSION_MESSAGES Procedure

This procedure deletes from the debug message log all data for a given session in your workspace defaults to your current session.

Syntax

```
APEX_DEBUG.REMOVE_SESSION_MESSAGES (
    p_session    IN NUMBER  DEFAULT NULL);
```

Parameters

Table 18-13 APEX_DEBUG.REMOVE_SESSION_MESSAGES Procedure Parameters

Parameter	Description
p_session	The session ID. Defaults to your current session.

Example

This example demonstrates the removal of all debug messages logged within the current session. Note: As no value is passed for the p_session parameter, the procedure defaults to the current session.

```
BEGIN
    APEX_DEBUG.REMOVE_SESSION_MESSAGES();
END;
```

18.20 TOCHAR Function

This procedure converts a BOOLEAN to a VARCHAR2.

Syntax

```
APEX_DEBUG.TOCHAR (
    p_value    IN BOOLEAN )
    RETURN VARCHAR2;
```

Parameters

Table 18-14 APEX_DEBUG.TOCHAR Function Parameters

Parameter	Description
p_value	A BOOLEAN 0or 1 that is converted to FALSE or TRUE respectively.

Example

This example shows how to use the APEX_DEBUG.TOCHAR function to convert boolean values to varchar2, so they can be passed to the other debug procedures.

```
declare
    l_state boolean;
begin
    ....
    apex_debug.info('Value of l_state is %s',
apex_debug.tochar(l_state));
    ....
end;
```

18.21 TRACE Procedure

This procedure logs messages at level `c_log_level_app_trace`.

Syntax

```
APEX_DEBUG.TRACE (
    p_message IN VARCHAR2,
    p0 IN VARCHAR2  DEFAULT NULL,
    p1 IN VARCHAR2  DEFAULT NULL,
    p2 IN VARCHAR2  DEFAULT NULL,
    p3 IN VARCHAR2  DEFAULT NULL,
    p4 IN VARCHAR2  DEFAULT NULL,
    p5 IN VARCHAR2  DEFAULT NULL,
    p6 IN VARCHAR2  DEFAULT NULL,
    p7 IN VARCHAR2  DEFAULT NULL,
    p8 IN VARCHAR2  DEFAULT NULL,
    p9 IN VARCHAR2  DEFAULT NULL,
    p_max_length IN PLS_INTEGER DEFAULT 1000 );
```

Parameters

Table 18-15 APEX_DEBUG.TRACE Procedure Parameters

Parameter	Description
`p_message`	The debug message. Occurrences of '%s' are replaced by `p0` to `p19`, as in `utl_lms.format_message` and C's sprintf. Occurrences of '% %' represent the special character '%'. Occurrences of '%<n>' are replaced by p<n>.
`p0` through `p9`	Substitution strings for '%s' placeholders.
`p_max_length`	The `p<n>` values are truncated to this length.

Example

This example shows how to use `APEX_DEBUG.TRACE` to log low-level debug information in the debug log.

```
apex_debug.trace('Low-level information: %s+%s=%s', 1, 2, 3);
```

See Also:

- "MESSAGE Procedure"
- "ERROR Procedure"
- "WARN Procedure"
- "ENTER Procedure"
- "INFO Procedure"

18.22 WARN Procedure

This procedure logs messages at level `c_log_level_warn`.

Syntax

```
APEX_DEBUG.WARN (
    p_message IN VARCHAR2,
    p0 IN VARCHAR2  DEFAULT NULL,
    p1 IN VARCHAR2  DEFAULT NULL,
    p2 IN VARCHAR2  DEFAULT NULL,
    p3 IN VARCHAR2  DEFAULT NULL,
    p4 IN VARCHAR2  DEFAULT NULL,
    p5 IN VARCHAR2  DEFAULT NULL,
    p6 IN VARCHAR2  DEFAULT NULL,
    p7 IN VARCHAR2  DEFAULT NULL,
    p8 IN VARCHAR2  DEFAULT NULL,
    p9 IN VARCHAR2  DEFAULT NULL,
    p_max_length IN PLS_INTEGER DEFAULT 1000 );
```

Parameters

Table 18-16 APEX_DEBUG.WARN Procedure Parameters

Parameter	Description
`p_message`	The debug message. Occurrences of '%s' are replaced by `p0` to `p19`, as in `utl_lms.format_message` and C's sprintf. Occurrences of '%%' represent the special character '%'. Occurrences of '%<n>' are replaced by p<n>.
`p0` through `p9`	Substitution strings for '%s' placeholders.
`p_max_length`	The `p<n>` values are truncated to this length.

Example

This example shows how to use `APEX_DEBUG.WARN` to log highly important data in the debug log.

```
apex_debug.warn('Soft constraint %s violated: %s', 4711, sqlerrm);
```

See Also:

- "MESSAGE Procedure"
- "ERROR Procedure"
- "ENTER Procedure"
- "TRACE Procedure"
- "INFO Procedure"

19

APEX_DG_DATA_GEN

This package contains the implementation for data generation in Oracle APEX.

19.1 ADD_BLUEPRINT Procedure

This procedure creates a blueprint which is a collection of tables with corresponding columns and data generation attributes.

Syntax

```
APEX_DG_DATA_GEN.ADD_BLUEPRINT (
    p_name                  IN VARCHAR2,
    p_display_name          IN VARCHAR2 DEFAULT NULL,
    p_description           IN VARCHAR2 DEFAULT NULL,
    p_lang                  IN VARCHAR2 DEFAULT 'en',
    p_default_schema        IN VARCHAR2 DEFAULT NULL,
    p_blueprint_id          OUT NUMBER )
```

Parameters

Table 19-1 ADD_BLUEPRINT Parameters

Parameter	Description
p_name	Identifier for the blueprint, combination of name and language is unique. Name is automatically upper cased and special characters removed.
p_display_name	Friendly display name.
p_description	Description of the blueprint.
p_lang	Blueprint language determines values from built-in data sources. If the built-in data source has 0 records in this language, en is used.
p_default_schema	The default schema name for the blueprint.
p_blueprint_id	ID of the added blueprint (OUT).

Example

```
DECLARE
  l_blueprint_id number;
BEGIN
    apex_dg_data_gen.add_blueprint(
                p_name           => 'Cars',
                p_display_name   => 'My Cars Blueprint',
                p_description    => 'A blueprint to generate car
data',
                p_blueprint_id   => l_blueprint_id);
END;
```

19.2 ADD_BLUEPRINT_FROM_FILE Procedure

This procedure imports a JSON blueprint from a workspace or application file. The file should be JSON, containing a correct blueprint definition.

Syntax

```
APEX_DG_DATA_GEN.ADD_BLUEPRINT_FROM_FILE (
    p_filename          IN VARCHAR2,                -- name of workspace or
application file
    p_application_id    IN NUMBER   DEFAULT NULL,   -- Application ID of an
Application File, or null if a workspace file
    p_override_name     IN VARCHAR2 DEFAULT NULL,   -- Name of blueprint,
overrides the name provided in the file
    p_replace           IN BOOLEAN  DEFAULT FALSE,  -- return error if
blueprint exist and p_replace=FALSE
    p_blueprint_id      OUT NUMBER )
```

Parameters

Table 19-2 ADD_BLUEPRINT_FROM_FILE Parameters

Parameter	Description
p_filename	Name of the file (apex_application_files.filename).
p_application_id	ID of the application, or null for workspace files.
p_override_name	Name of blueprint, this will override the name provided in the file.
p_replace	Return error if blueprint exists and p_replace = FALSE. Will replace the blueprint (or p_override_name if provided).
p_blueprint_id	ID of the imported blueprint (OUT).

Example

```
DECLARE
   l_blueprint number;
BEGIN
   apex_dg_data_gen.add_blueprint_from_file
     (p_filename              => 'app/example.json',
      p_application_id        => 145,
      p_override_name         => 'My Application Blueprint',
      p_replace               => false,
      p_blueprint_id          => l_blueprint
     );
END;

DECLARE
   l_blueprint number;
BEGIN
   apex_dg_data_gen.add_blueprint_from_file
     (p_filename              => 'workspace/example.json',
      p_override_name         => 'My Workspace Blueprint',
      p_replace               => false,
      p_blueprint_id          => l_blueprint
     );
END;
```

19.3 ADD_BLUEPRINT_FROM_TABLES Procedure

This procedure creates a blueprint and adds the tables specified based on the data dictionary.

For all the table names specified by the user, the Data Generator retrieves each table from the current schema, plus its definition, column names, data types, and attributes as they come from the DB data dictionary.

Syntax

```
APEX_DG_DATA_GEN.ADD_BLUEPRINT_FROM_TABLES (
    p_name              IN VARCHAR2,
    p_tables            IN wwv_flow_t_varchar2,
    p_preserve_case     IN VARCHAR2 DEFAULT 'N',
    p_exclude_columns   IN wwv_flow_t_varchar2 DEFAULT
c_empty_t_varchar2,
    p_description       IN VARCHAR2 DEFAULT NULL,
    p_lang              IN VARCHAR2 DEFAULT 'en',
    p_default_schema    IN VARCHAR2 DEFAULT NULL,
    p_blueprint_id      OUT NUMBER );
```

Parameters

Table 19-3 ADD_BLUEPRINT_FROM_TABLES Parameters

Parameter	Description
p_name	Name of blueprint, combination of name and language are unique. Name is automatically upper cased.
p_tables	List of tables and the number of records. The format is: apex_t_varchar2('<Table name>:[Rows]',...) For example: apex_t_varchar2('PRODUCTS:10','CUSTOMERS:50', 'SALES:1000') The ordering of tables should be: master tables before child tables (for FK relationships).
p_preserve_case	Defaults to N which forces table name to uppercase. If Y, preserves table case.
p_exclude_columns	String array (apex_t_varchar2) of column names to exclude from the auto column generation. The exclude columns parameter applies to all tables in the p_tables parameter.
p_description	Description of blueprint.
p_lang	Blueprint language determines values from built-in data sources. If the built-in data source has 0 records in this language, en is used.
p_default_schema	The default schema name for the blueprint.

Table 19-3 (Cont.) ADD_BLUEPRINT_FROM_TABLES Parameters

Parameter	Description
p_blueprint_id	ID of the added blueprint (OUT).

Example

```
DECLARE
  l_blueprint_id number;
BEGIN
    apex_dg_data_gen.add_blueprint_from_tables(
                p_name            => 'Product Sales',
                p_tables          =>
apex_t_varchar2('PRODUCTS:10','CUSTOMERS:50','SALES:1000'),
                p_exclude_columns =>
apex_t_varchar2('CREATED_BY','CREATED_DATE'),
                p_description     => 'A blueprint to generate product sales
data',
                p_lang            => 'en',
                p_blueprint_id    => l_blueprint_id
                );
END;
```

19.4 ADD_COLUMN Procedure

This procedure adds a column to the blueprint table.

Syntax

```
APEX_DG_DATA_GEN.ADD_COLUMN (
    p_blueprint             IN VARCHAR2,
    p_sequence              IN PLS_INTEGER,
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_preserve_case         IN VARCHAR2 DEFAULT 'N',
    p_display_name          IN VARCHAR2 DEFAULT NULL,
    p_max_length            IN NUMBER   DEFAULT 4000,
    p_multi_value           IN VARCHAR2 DEFAULT 'N',
    p_mv_format             IN VARCHAR2 DEFAULT 'JSON',
    p_mv_unique             IN VARCHAR2 DEFAULT 'Y',
    p_mv_delimiter          IN VARCHAR2 DEFAULT ':',
    p_mv_min_entries        IN INTEGER  DEFAULT 1,
    p_mv_max_entries        IN INTEGER  DEFAULT 2,
    p_mv_partition_by       IN VARCHAR2 DEFAULT NULL,
    p_lang                  IN VARCHAR2 DEFAULT 'en',
    p_data_source_type      IN VARCHAR2,
    p_data_source           IN VARCHAR2 DEFAULT NULL,
    p_ds_preserve_case      IN VARCHAR2 DEFAULT 'N',
    p_min_numeric_value     IN NUMBER   DEFAULT 1,
    p_max_numeric_value     IN NUMBER   DEFAULT 10,
    p_numeric_precision     IN NUMBER   DEFAULT 0,
```

```
p_min_date_value        IN DATE     DEFAULT NULL,
p_max_date_value        IN DATE     DEFAULT NULL,
p_format_mask           IN VARCHAR2 DEFAULT c_json_date_format,
p_sequence_start_with   IN NUMBER   DEFAULT 1,
p_sequence_increment    IN NUMBER   DEFAULT 1,
p_formula               IN VARCHAR2 DEFAULT NULL,
p_formula_lang          IN VARCHAR2 DEFAULT 'PLSQL',
p_custom_attributes     IN VARCHAR2 DEFAULT NULL,
p_percent_blank         IN NUMBER   DEFAULT 0,
p_column_id             OUT NUMBER )
```

Parameters

Table 19-4 ADD_COLUMN Parameters

Parameter	Description
p_blueprint	Identifier for the blueprint.
p_sequence	1 for first column, 2 for second, and so on.
p_table_name	Table name as known to the blueprint. Checks exact case first, then checks upper case.
p_column_name	Name of the column.
p_preserve_case	Defaults to N which forces column name to uppercase. If Y, preserves casing of parameter.
p_display_name	A friendly name for a given table.
p_max_length	When generating data (such as Latin text) substring to this.
p_multi_value	Y or N (currently available for BUILTIN table data and INLINE data). BUILTIN table data will be distinct. INLINE data will be distinct if all values appear once (red,1;blue,1;green,1). Otherwise, permits duplicates (red,3;blue,4;green,8). The number indicates the approximated frequency of each value on the generate data.
p_mv_format	DELIMITED (based upon p_mv_delimiter) or JSON (such as {"p_column_name" : ["sympton1","sympton2"]}).
p_mv_unique	If Y, values do not repeat within the multi-value column. If N, indicates values may repeat.
p_mv_delimiter	Delimiter for a DELIMITED.
p_mv_min_entries	Minimum values in a multi value list.
p_mv_max_entries	Maximum values in a multi value list.
p_mv_partition_by	This value must match a column in the same built-in data source. For example, if p_data_source is "car.model", this value may be "make" because "car.make" is valid.
p_lang	Language code (for example en, de, es).

Table 19-4 (Cont.) ADD_COLUMN Parameters

Parameter	Description
p_data_source_type	• BLUEPRINT • BUILTIN • DATA_SOURCE • FORMULA (requires p_data_source to be NULL) • INLINE • SEQUENCE
p_data_source	Can be set to one of the following options: • DATA_SOURCE: DATA_SOURCE_NAME.COLUMN_NAME (column name's case follows p_ds_preserve_case and defaults to upper case). • BUILTIN: see built-in list, must match a built-in exactly. • BLUEPRINT: references table data already generated (table must have lower sequence). For example, Dept.Deptno where add_table with p_table_name = Dept and add_column with Deptno exist. **Note:** This is case-sensitive. Tables created with p_preserve_case = N are automatically uppercased. May require DEPT.DEPTNO instead of dept.deptno). • INLINE: PART_TIME,3;FULL_TIME,7 **Note:** Inline format is VALUE,FREQUENCY, separated by a semi-colon. The frequency of the value is an approximation and Oracle best practice is to use the smallest numeric values that provide the desired distribution. • SEQUENCE: uses p_sequence_ parameters. • FORMULA: p_data_source must be NULL. Uses p_formula as a PL/SQL formula and {column_name} as substitutions from this table. For example, p_formula => {first_name}||'.'||{last_name}||'.insum.ca'
p_ds_preserve_case	If p_data_source_type in ('DATA_SOURCE'. 'BLUEPRINT') and p_ds_preserve_case = N, then the data source is upper cased to match an upper case table_name.column_name
p_min_numeric_value	A positive integer number used as the minimum value (inclusive) to be used in BUILTIN data sources that return NUMBER values.
p_max_numeric_value	A positive integer number used as the maximum value (inclusive) to be used in BUILTIN data sources that return NUMBER values.
p_numeric_precision	0 = no decimal values -1 = round to ten positive integer = number of decimal places
p_min_date_value	A DATE used as the minimum value (inclusive) to be used in BUILTIN data sources that return DATE type values.

Table 19-4 (Cont.) ADD_COLUMN Parameters

Parameter	Description
p_max_date_value	A DATE used as the maximum value (inclusive) to be used in BUILTIN data sources that return DATE type values.
p_format_mask	Format mask when datatype is a date.
p_sequence_start_with	Only used when p_data_source_type = SEQUENCE.
p_sequence_increment	Only used when p_data_source_type = SEQUENCE.
p_formula	Enables referencing columns in this row, PL/SQL expressions that can reference columns defined in this blueprint row. For example: {FIRST_NAME}||'.'||{LAST_NAME}||'.insum.ca' Substitutions are case sensitive and must match {column_name} exactly. If p_preserve_case was set to N, {COLUMN_NAME} must be upper case. Can be used on any DATA_SOURCE_TYPE. Formulas are applied last, after p_percent_blank. If p_percent_blank = 100 but FORMULAR is sysdate, the column value will be sysdate.
p_formula_lang	Formulas can be used as a combination of PL/SQL functions performed on this or other columns using {column_name} notation. String/Char, Date/Time, Numeric/Math functions are supported.
p_custom_attributes	For future expansion.
p_percent_blank	0 to 100. This is applied prior to all formulas. If this column is referenced in a formula, the formula contains a blank when appropriate. **Note:** A formula on this column may cause the column to **not** be blank.
p_column_id	ID of the added column (OUT).

Example

```
DECLARE
   l_column_id number;
BEGIN
   apex_dg_data_gen.add_column(
                p_blueprint              => 'Cars',
                p_sequence               => 1,
                p_table_name             => 'MY_CARS',
                p_column_name            => 'make',
                p_data_source_type       => 'BUILTIN',
                p_data_source            => 'car.make',
```

```
                p_column_id               => l_column_id);
END;
```

19.5 ADD_DATA_SOURCE Procedure

This procedure creates a data source which identifies a table or query from which you can source data values.

Syntax

```
APEX_DG_DATA_GEN.ADD_DATA_SOURCE (
    p_blueprint             IN VARCHAR2,
    p_name                  IN VARCHAR2,
    p_data_source_type      IN VARCHAR2,
    p_table                 IN VARCHAR2 DEFAULT NULL,
    p_preserve_case         IN VARCHAR2 DEFAULT 'N',
    p_sql_query             IN VARCHAR2 DEFAULT NULL,
    p_where_clause          IN VARCHAR2 DEFAULT NULL,
    p_inline_data           IN CLOB     DEFAULT NULL,
    p_order_by_column       IN VARCHAR2 DEFAULT NULL,
    p_data_source_id        OUT NUMBER )
```

Parameters

Table 19-5 ADD_DATA_SOURCE Parameters

Parameter	Description
p_blueprint	Identifies the blueprint.
p_name	Name of a data source. Name is upper cased and must be 26 characters or less.
p_data_source_type	TABLE or SQL_QUERY.
p_table	For source type = TABLE. Typically this will match p_name.
p_preserve_case	Defaults to N which forces p_table_name to uppercase, if Y preserves casing of p_table.
p_sql_query	For p_data_source_type = SQL_QUERY.
p_where_clause	For p_data_source_type = TABLE, this adds the where clause. Do **not** include "where" keyword (for example, deptno <= 20).
p_inline_data	For p_data_source_type = JSON_DATA.
p_order_by_column	Not used.
p_data_source	The ID of the added data source (OUT).

Example

```
DECLARE
  l_data_source_id number;
BEGIN
    apex_dg_data_gen.add_data_source(
                p_blueprint           => 'Cars',
```

```
                p_name                => 'apex_dg_builtin_cars',
                p_data_source_type    => 'TABLE',
                p_table               => 'apex_dg_builtin_cars',
                p_data_source_id      => l_data_source_id  );
END;
```

19.6 ADD_TABLE Procedure

This procedure adds a destination table for the generated data.

Syntax

```
APEX_DG_DATA_GEN.ADD_TABLE (
    p_blueprint             IN VARCHAR2,
    p_sequence              IN PLS_INTEGER,
    p_table_name            IN VARCHAR2,
    p_preserve_case         IN VARCHAR2             DEFAULT 'N',
    p_display_name          IN VARCHAR2             DEFAULT NULL,
    p_singular_name         IN VARCHAR2             DEFAULT NULL,
    p_plural_name           IN VARCHAR2             DEFAULT NULL,
    p_rows                  IN NUMBER               DEFAULT 0,
    p_max_rows              IN NUMBER               DEFAULT NULL,
    p_use_existing_table    IN VARCHAR2             DEFAULT 'N',
    p_exclude_columns       IN wwv_flow_t_varchar2  DEFAULT
c_empty_t_varchar2,
    p_table_id              OUT NUMBER )
```

Parameters

Table 19-6 ADD_TABLE Parameters

Parameter	Description
p_blueprint	Identifier for the blueprint.
p_sequence	1 for first table, 2 for second, and so forth.
p_table_name	Name of table that can exist or not exist.
p_preserve_case	Defaults to N, which forces table name to uppercase. If Y, perserves casing of parameter.
p_display_name	Friendly display name.
p_singular_name	Singluar friendly name.
p_plural_name	Plural friendly name.
p_rows	Number of rows to generate for this table.
p_max_rows	If null, then p_rows determines the number of rows, otherwise random rows between p_rows and p_max_rows are used when generating output.

Table 19-6 (Cont.) ADD_TABLE Parameters

Parameter	Description
p_use_existing_table	If Y, uses the data dictionary to auto generate columns. The automatic blueprint column creation supports the following data source mapping rules: • Foreign key data generation (populates the column with keys from the master table). • Inline data generation based on CHECK constraints (simple IN constructs are supported). • Mapping based on existing built-in tables (based on the table and column name). • Mapping based on the column name, data type, and length. • If the column is nullable, 5% of the values will be NULL.
p_exclude_columns	String array (apex_t_varchar2) of column names to exclude from the automatic column generation.
p_table_id	ID of the added table (OUT).

Example

```
DECLARE
   l_table_id number;
BEGIN
   apex_dg_data_gen.add_table(
               p_blueprint              => 'Cars',
               p_sequence               => 1,
               p_table_name             => 'my_cars',
               p_rows                   => '50',
               p_table_id               => l_table_id);

   apex_dg_data_gen.add_table(
               p_blueprint              => 'Cars',
               p_sequence               => 1,
               p_table_name             => 'my_cars',
               p_rows                   => '50',
               p_use_existing_table     => 'Y',
               p_table_id               => l_table_id
   );

   apex_dg_data_gen.add_table(
               p_blueprint              => 'Cars',
               p_sequence               => 1,
               p_table_name             => 'my_cars',
               p_rows                   => '50',
               p_use_existing_table     => 'Y',
               p_exclude_columns        =>
apex_t_varchar2('CREATED_BY','CREATED_DATE'),
               p_table_id               => l_table_id
   );
END;
```

19.7 EXPORT_BLUEPRINT Function

This function exports a blueprint in JSON format.

Syntax

```
APEX_DG_DATA_GEN.EXPORT_BLUEPRINT (
    p_name                  IN VARCHAR2,
    p_pretty                IN VARCHAR2 DEFAULT 'Y' )
RETURN CLOB;
```

Parameters

Table 19-7 EXPORT_BLUEPRINT Parameters

Parameter	Description
`p_name`	Name of blueprint to export.
`p_pretty`	`Y` to return pretty results, all other values do not.

Returns

Returns the blueprint as a JSON document in a CLOB.

Example

```
DECLARE
    l_json clob;
BEGIN
    l_json := apex_dg_data_gen.export_blueprint(
                p_name => 'Cars');
END;
```

19.8 GENERATE_DATA Procedure Signature 1

This procedure creates rows of data based on the blueprint tables and their columns customizations.

This procedure inserts data into tables in the schema when the `p_format` is set to `INSERT INTO` or `FAST INSERT INTO`. The outputs do not contain data (all are set to NULL).

This procedure also generates data in a file. For that file, the three outputs contain the following data:

- `p_output` (BLOB) with the data output. Contents can be inside a JSON, CSV, ZIP, or SQL file.
- `p_file_ext` and `p_mime_type` (VARCHAR2) indicates the file extension and its MIME type.

These three output parameters send the file to the user's browser so it can be handled client-side.

In both scenarios, `p_errors` may have a NULL value or a CLOB with a JSON output that contains any errors.

Syntax

```
APEX_DG_DATA_GEN.GENERATE_DATA (
    p_blueprint             IN          VARCHAR2,
    p_format                IN          VARCHAR2,
    p_blueprint_table       IN          VARCHAR2 DEFAULT NULL,
    p_row_scaling           IN          NUMBER DEFAULT 100,
    p_stop_after_errors     IN          NUMBER DEFAULT c_max_error_count,
    p_output                OUT NOCOPY  BLOB,
    p_file_ext              OUT NOCOPY  VARCHAR2,
    p_mime_type             OUT NOCOPY  VARCHAR2,
    p_errors                OUT NOCOPY  CLOB )
```

Parameters

Table 19-8 GENERATE_DATA Parameters

Parameter	Description
`p_blueprint`	Name of the blueprint.
`p_format`	Can be set to one of the following options: `SQL INSERT` outputs a SQL script. `CSV` outputs a single CSV for one table or a ZIP of CSVs for multiple tables. `JSON` outputs JSON file. `INSERT INTO` generates the SQL INSERT script and runs the insert statements in the current schema. `FAST INSERT INTO` generates the data and does a single `INSERT ... into [table] SELECT ... from [temporary table]`.
`p_blueprint_table`	Null for all tables. If not null, generates data only for designated table. If not null, must be table name of a table within the blueprint. This value is case sensitive.
`p_row_scaling`	Scales the number of rows defined into the blueprint by this percentage value.
`p_stop_after_errors`	How many errors can happen before the process is stopped. This is only applicable for `INSERT INTO`.
`p_output`	The blob to hold the output. Null for `INSERT INTO` and `FAST INSERT INTO`.
`p_file_ext`	The file extension of the output. Null for `INSERT INTO` and `FAST INSERT INTO`.
`p_mime_type`	The MIME type of the output. Null for `INSERT INTO` and `FAST INSERT INTO`.
`p_errors`	JSON output of any errors. `NULL` upon success.

Example

```
DECLARE
    l_output    blob;
```

```
    l_file_ext  varchar2(255);
    l_mime_type varchar2(255);
    l_errors    clob;
BEGIN
    apex_dg_output.generate_data
        (p_blueprint          => 'Cars',
         p_blueprint_table    => 'my_cars',
         p_stop_after_errors  => 100,
         p_output             => l_output
         p_file_ext           => l_file_ext,
         p_mime_type          => l_mime_type,
         p_errors             => l_errors
        );
END;
```

19.9 GENERATE_DATA Procedure Signature 2

This procedure creates rows of data based on the blueprint tables and their columns customizations.

This procedure inserts data into user-specified tables in the schema when the `p_format` is set to `INSERT INTO` or `FAST INSERT INTO`. The outputs do not contain data (all are set to NULL).

This procedure also generates data in a file. For that file, the three outputs contain the following data:

- `p_output` (BLOB) with the data output. Contents can be inside a JSON, CSV, ZIP, or SQL file.
- `p_file_ext` and `p_mime_type` (VARCHAR2) indicates the actual file extension and its MIME type.

These three output parameters send the file to the user's browser so it can be handled client-side.

In both scenarios, `p_errors` may have a NULL value or a CLOB with a JSON output that contains any errors.

Syntax

```
APEX_DG_DATA_GEN.GENERATE_DATA (
    p_blueprint             IN         VARCHAR2,
    p_format                IN         VARCHAR2,
    p_blueprint_table       IN         VARCHAR2 DEFAULT NULL,
    p_row_scaling           IN         NUMBER DEFAULT 100,
    p_stop_after_errors     IN         NUMBER DEFAULT
c_max_error_count,
    p_output                OUT NOCOPY CLOB,
    p_file_ext              OUT NOCOPY VARCHAR2,
    p_mime_type             OUT NOCOPY VARCHAR2,
    p_errors                OUT NOCOPY CLOB )
```

Parameters

Table 19-9 GENERATE_DATA Parameters

Parameter	Description
p_blueprint	Name of the blueprint.
p_format	Can be set to one of the following options: SQL INSERT outputs a SQL script. CSV outputs a single CSV for one table or a ZIP of CSVs for multiple tables. JSON outputs JSON file. INSERT INTO generates the SQL INSERT script and runs the insert statements in the current schema. FAST INSERT INTO generates the data and does a single INSERT ... into [table] SELECT ... from [temporary table].
p_blueprint_table	Null for all tables. If not null, will generate data only for designated table. If not null, must be table name of a table within the blueprint. Note: this value is case sensitive.
p_row_scaling	Will scale the number of rows defined into the blueprint by this percentage value.
p_stop_after_errors	How many errors can happen before the process is stopped. This is only applicable for INSERT INTO
p_output	The clob to hold the output. Null for INSERT INTO and FAST INSERT INTO.
p_file_ext	The file extension of the output. Null for INSERT INTO and FAST INSERT INTO.
p_mime_type	The MIME type of the output. Null for INSERT INTO and FAST INSERT INTO.
p_errors	JSON output of any errors. NULL upon success.

Example

```
DECLARE
    l_output    clob;
    l_file_ext  varchar2(255);
    l_mime_type varchar2(255);
    l_errors    clob;
BEGIN
    apex_dg_output.generate_data
        (p_blueprint          => 'Cars',
         p_blueprint_table    => 'my_cars',
         p_stop_after_errors  => 100,
         p_output             => l_output
         p_file_ext           => l_file_ext,
         p_mime_type          => l_mime_type,
         p_errors             => l_errors
        );
END;
```

19.10 GENERATE_DATA_INTO_COLLECTION Procedure

This procedure generates the data of the specified blueprint and stores the results in an APEX collection named `APEX$DG$[BLUEPRINT_NAME]`.

Syntax

```
APEX_DG_DATA_GEN.GENERATE_DATA_INTO_COLLECTION (
    p_blueprint            IN         VARCHAR2,
    p_format               IN         VARCHAR2,
    p_blueprint_table      IN         VARCHAR2 DEFAULT NULL,
    p_row_scaling          IN         NUMBER DEFAULT 100,
    p_stop_after_errors    IN         NUMBER DEFAULT c_max_error_count,
    p_errors               OUT NOCOPY CLOB )
```

Parameters

Table 19-10 GENERATE_DATA_INTO_COLLECTION Parameters

Parameter	Description
`p_blueprint`	Name of the blueprint.
`p_format`	`SQL INSERT` outputs a sql script. `CSV` outputs a single CSV for one table or a ZIP of CSVs for multiple tables. `JSON` outputs JSON file. `INSERT INTO` generates the SQL INSERT script and runs the insert statements in the current schema. `FAST INSERT INTO` generates the data and does a single `INSERT ... into [table] SELECT ... from [temporary table]`
`p_blueprint_table`	This value is case sensitive. Null for all tables. If not null, generates data only for designated table. If not null, must be table name of a table within the blueprint.
`p_row_scaling`	Scales the number of rows defined into the blueprint by this percentage value.
`p_stop_after_errors`	Defines the number of errors that can happen before the process is stopped. Only applies to `INSERT INTO`.
`p_errors`	JSON output of any errors. NULL upon success.

Output is stored in the collection. Additionally, a new row within the same collection contains the error message if there is none.

Output	Description
`CLOB001`	The clob to hold the output. Null for INSERT INTO and FAST INSERT INTO.
`BLOB001`	The blob to hold the output. Null for INSERT INTO and FAST INSERT INTO.
`C006`	The file extension of the output. Null for INSERT INTO and FAST INSERT INTO.

Output	Description
C007	The mime type of the output. Null for INSERT INTO and FAST INSERT INTO.
C001	'ERROR'
CLOB001	JSON output of any errors. NULL upon success.

Example

```
DECLARE
    l_errors    clob;
BEGIN
    apex_dg_output.generate_data_into_collection
        (p_blueprint          => 'Cars',
         p_blueprint_table    => 'my_cars',
         p_stop_after_errors  => 100,
         p_errors             => l_errors
        );
END;
```

19.11 GET_BLUEPRINT_ID Function

This function returns the blueprint ID from the name.

Syntax

```
APEX_DG_DATA_GEN.GET_BLUEPRINT_ID (
    p_name  IN VARCHAR2 )
    RETURN NUMBER;
```

Parameters

Table 19-11 GET_BLUEPRINT_ID Parameters

Parameter	Description
p_name	The blueprint identifier.

Returns

ID of the blueprint.

Example

The following example demonstrates

```
DECLARE
  l_blueprint_id apex_dg_blueprints.id%TYPE;
BEGIN
  l_blueprint_id := apex_dg_data_gen.get_blueprint_id(p_name => 'MY
```

```
BLUEPRINT');
END;
```

19.12 GET_BP_TABLE_ID Function

This function returns the `table_id` for a given blueprint ID and table name (case-sensitive). If not found, it searches with UPPERCASE `p_table_name` automatically.

Syntax

```
APEX_DG_DATA_GEN.GET_BP_TABLE_ID (
    p_bp_id         IN NUMBER,
    p_table_name    IN VARCHAR2 )
    RETURN NUMBER;
```

Parameters

Table 19-12 GET_BP_TABLE_ID Parameters

Parameter	Description
p_bp_id	The blueprint ID.
p_table_name	The name of the table.

Returns

The table ID.

Example

```
DECLARE
 v_table_id number;
BEGIN
 l_table_id := apex_dg_data_gen.get_bp_table_id
     (p_bp_id         => 12345,
      p_table_name    => 'DEPT'
     );
END;
```

19.13 GET_EXAMPLE Function

This function generates example data for the friendly name of built-in data. The function returns a (user-specified) number of examples, showing the data to expect when using this friendly name.

Syntax

```
APEX_DG_DATA_GEN.GET_EXAMPLE (
    p_friendly_name     IN  VARCHAR2,
    p_lang              IN  VARCHAR2 DEFAULT 'en',
```

```
    p_rows              IN  NUMBER DEFAULT 5 )
    RETURN wwv_flow_t_varchar2;
```

Parameters

Table 19-13 GET_EXAMPLE Parameters

Parameter	Description
p_friendly_name	The friendly name.
p_lang	(Optional) The language.
p_rows	Number of rows (examples) to return.

Example

The following example returns five rows from the domain of values for the built-in with the friendly name `animal.family`.

```
select *
from apex_dg_data_gen.get_example( p_friendly_name => 'animal.family');
```

19.14 GET_WEIGHTED_INLINE_DATA Function

This function returns a list of generated inline rows from a semi colon (;) delimited list of values. For each value add a comma to define weight (such as `F,45;M,30`).

Syntax

```
APEX_DG_DATA_GEN.GET_WEIGHTED_INLINE_DATA (
    p_data  IN VARCHAR2 )
    RETURN wwv_flow_t_varchar2
```

Parameters

Table 19-14 GET_WEIGHTED_INLINE_DATA Parameters

Parameter	Description
p_data	The list of values.

Example

The following example returns two rows: F and M.

```
select *
from apex_dg_data_gen.get_weighted_inline_data( p_data => 'F;M');
```

19.15 IMPORT_BLUEPRINT Procedure

This procedure imports a JSON blueprint.

Syntax

```
APEX_DG_DATA_GEN.IMPORT_BLUEPRINT (
    p_clob              IN CLOB,
    p_override_name     IN VARCHAR2 DEFAULT NULL,
    p_replace           IN BOOLEAN  DEFAULT FALSE,
    p_blueprint_id      OUT NUMBER )
```

Parameters

Table 19-15 IMPORT_BLUEPRINT Parameters

Parameter	Description
p_clob	Blueprint in JSON format.
p_override_name	Name of blueprint. This overrides the name provided in p_clob.
p_replace	Return error if blueprint exists and p_replace is FALSE. Replaces the blueprint (or p_override_name if provided).
p_blueprint_id	ID of the imported blueprint (OUT).

Example

```
DECLARE
   l_json clob;
   l_blueprint_id number;
BEGIN
   l_json := apex_dg_data_gen.export_blueprint(
                p_name => 'Cars');

   apex_dg_data_gen.import_blueprint(
                p_clob => l_json,
                p_replace => TRUE,
                p_blueprint_id => l_blueprint_id);
END;
```

19.16 PREVIEW_BLUEPRINT Procedure

This procedure creates preview data for a blueprint and stores this in APEX collections. This procedure can only be used with an active APEX session.

Syntax

```
APEX_DG_DATA_GEN.PREVIEW_BLUEPRINT (
  parameter_1 IN NUMBER,
  parameter_2 IN VARCHAR2,
  parameter_3 IN NUMBER )
```

Parameters

Table 19-16 PREVIEW_BLUEPRINT Parameters

Parameter	Description
p_blueprint	Name of the blueprint.
p_table_name	If null, all tables. If not null, the specified table.
p_number_of_rows	Number of rows to generate (maximum of 50).
p_data_collection	Name of the APEX collection for data.
p_header_collection	Name of the APEX collection for headers.

Example

```
BEGIN
    apex_dg_output.preview_blueprint
        (p_blueprint          => 'Cars',
         p_table_name         => 'my_cars',
         p_data_collection    => 'CARS_DATA',
         p_header_collection  => 'CARS_HEADERS'
        );
END;
```

19.17 REMOVE_BLUEPRINT Procedure

This procedure removes metadata associated with a blueprint.

Syntax

```
APEX_DG_DATA_GEN.REMOVE_BLUEPRINT (
    p_name                   IN VARCHAR2 )
```

Parameters

Table 19-17 REMOVE_BLUEPRINT Parameters

Parameter	Description
p_name	Name of blueprint to be removed.

Example

```
BEGIN
    apex_dg_data_gen.remove_blueprint(
                p_name           => 'Cars');
END;
```

19.18 REMOVE_COLUMN Procedure

This procedure removes a column from the blueprint table.

Syntax

```
APEX_DG_DATA_GEN.REMOVE_COLUMN (
    p_blueprint             IN VARCHAR2,
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2 )
```

Parameters

Table 19-18 REMOVE_COLUMN Parameters

Parameter	Description
p_blueprint	Identifier for the blueprint.
p_table_name	Name of table within blueprint.
p_column_name	Name of column within table.

Example

```
BEGIN
   apex_dg_data_gen.remove_column(
               p_blueprint              => 'Cars',
               p_table_name             => 'MY_CARS',
               p_column_name            => 'MAKE');
END;
```

19.19 REMOVE_DATA_SOURCE Procedure

This procedure removes metadata associated with the data source for the given blueprint.

Syntax

```
APEX_DG_DATA_GEN.REMOVE_DATA_SOURCE (
    p_blueprint             IN VARCHAR2,
    p_name                  IN VARCHAR2 )
```

Parameters

Table 19-19 REMOVE_DATA_SOURCE Parameters

Parameter	Description
p_blueprint	Identifies the blueprint.
p_name	Data source to be removed from blueprint.

Example

```
BEGIN
   apex_dg_data_gen.remove_data_source(
               p_blueprint           => 'Cars',
               p_name                => 'apex_dg_builtin_cars');
END;
```

19.20 REMOVE_TABLE Procedure

This procedure removes a table for the specified blueprint.

Syntax

```
APEX_DG_DATA_GEN.REMOVE_TABLE (
    p_blueprint             IN VARCHAR2,
    p_table_name            IN VARCHAR2 )
```

Parameters

Table 19-20 REMOVE_TABLE Parameters

Parameter	Description
p_blueprint	Identifier for the blueprint.
p_table_name	Table name to be removed from blueprint.

Example

```
BEGIN
   apex_dg_data_gen.remove_table(
               p_blueprint               => 'Cars',
               p_table_name              => 'MY_CARS');
END;
```

19.21 RESEQUENCE_BLUEPRINT Procedure

This procedure resequences all tables and columns within tables with gaps of `p_offset`, retaining their current order.

Syntax

```
APEX_DG_DATA_GEN.RESEQUENCE_BLUEPRINT (
    p_blueprint IN VARCHAR2,
    p_offset    IN NUMBER   DEFAULT c_default_seq_offset )
```

Parameters

Table 19-21 RESEQUENCE_BLUEPRINT Parameters

Parameter	Description
p_blueprint	Identifier for the blueprint.
p_offset	The offset between gaps, such as 10, 100, or 1000.

Example

```
BEGIN
  apex_dg_data_gen.resequence_blueprint(
              p_blueprint          => 'Cars',
              p_offset             => 100);
END;
```

19.22 STOP_DATA_GENERATION Procedure

This procedure stops the current data generation process. This only works within an Oracle APEX session.

This procedure relies on an APEX Collection which tracks progress and reacts to stop instructions. The collection is named: APEXDG[*BLUEPRINT_NAME*] and contains the following attributes:

```
d001 => current_timestamp of the process step
c001 => Blueprint name
c002 => Requested output format
c003 => Table name being generated
c004 => Name of the process step,
c005 => Description of the process step
n001 => Numeric identifier of the process step
```

Syntax

```
APEX_DG_DATA_GEN.STOP_DATA_GENERATION (
    p_blueprint         IN VARCHAR2 )
```

Parameters

Table 19-22 STOP_DATA_GENERATION Parameters

Parameter	Description
p_blueprint	Name of the blueprint.

Example

```
BEGIN
    apex_dg_output.stop_data_generation
```

```
        (p_blueprint          => 'CARS',
        );
END;
```

19.23 UPDATE_BLUEPRINT Procedure

This procedure updates the attributes of an existing blueprint.

Syntax

```
APEX_DG_DATA_GEN.UPDATE_BLUEPRINT (
    p_name                  IN VARCHAR2,
    p_new_name              IN VARCHAR2 DEFAULT NULL,
    p_display_name          IN VARCHAR2 DEFAULT NULL,
    p_description           IN VARCHAR2 DEFAULT NULL,
    p_lang                  IN VARCHAR2 DEFAULT 'en',
    p_default_schema        IN VARCHAR2 DEFAULT NULL )
```

Parameters

Table 19-23 UPDATE_BLUEPRINT Parameters

Parameter	Description
p_name	Name of blueprint to update.
p_new_name	The new name (rename). The name is upper cased and special characters removed.
p_display_name	Friendly display name.
p_description	Description of the blueprint.
p_lang	Blueprint language determines values from built-in data sources. If the built-in data source has 0 records in this language, en is used.

Example

```
BEGIN
    apex_dg_data_gen.update_blueprint(
                p_name           => 'Cars',
                p_display_name   => 'My Cars',
                p_description    => 'An updated blueprint to generate car
data');
END;
```

19.24 UPDATE_COLUMN Procedure

This procedure updates an existing column in a blueprint table.

Syntax

```
APEX_DG_DATA_GEN.UPDATE_COLUMN (
    p_blueprint             IN VARCHAR2,
```

```
p_table_name            IN VARCHAR2,
p_column_name           IN VARCHAR2,
p_new_column_name       IN VARCHAR2     DEFAULT NULL,
p_sequence              IN PLS_INTEGER,
p_preserve_case         IN VARCHAR2     DEFAULT 'N',
p_display_name          IN VARCHAR2     DEFAULT NULL,
p_max_length            IN NUMBER       DEFAULT 4000,
p_multi_value           IN VARCHAR2     DEFAULT 'N',
p_mv_format             IN VARCHAR2     DEFAULT 'JSON',
p_mv_unique             IN VARCHAR2     DEFAULT 'Y',
p_mv_delimiter          IN VARCHAR2     DEFAULT ':',
p_mv_min_entries        IN INTEGER      DEFAULT 1,
p_mv_max_entries        IN INTEGER      DEFAULT 2,
p_mv_partition_by       IN VARCHAR2     DEFAULT NULL,
p_lang                  IN VARCHAR2     DEFAULT 'en',
p_data_source_type      IN VARCHAR2,
p_data_source           IN VARCHAR2     DEFAULT NULL,
p_ds_preserve_case      IN VARCHAR2     DEFAULT 'N',
p_min_numeric_value     IN NUMBER       DEFAULT 1,
p_max_numeric_value     IN NUMBER       DEFAULT 10,
p_numeric_precision     IN NUMBER       DEFAULT 0,
p_min_date_value        IN DATE         DEFAULT NULL,
p_max_date_value        IN DATE         DEFAULT NULL,
p_format_mask           IN VARCHAR2     DEFAULT c_json_date_format,
p_sequence_start_with   IN NUMBER       DEFAULT 1,
p_sequence_increment    IN NUMBER       DEFAULT 1,
p_formula               IN VARCHAR2     DEFAULT NULL,
p_formula_lang          IN VARCHAR2     DEFAULT 'PLSQL',
p_custom_attributes     IN VARCHAR2     DEFAULT NULL,
p_percent_blank         IN NUMBER       DEFAULT 0 )
```

Parameters

Table 19-24 UPDATE_COLUMN Parameters

Parameter	Description
p_blueprint	Identifier for the blueprint.
p_table_name	Table name as known to the blueprint. Checks exact case first, then checks upper case.
p_column_name	Name of the column.
p_new_column_name	New name of column (rename).
p_sequence	1 for first column, 2 for second, and so on.
p_preserve_case	Defaults to N which forces column name to uppercase. If Y, preserves casing of parameter.
p_display_name	A friendly name for a given table.
p_max_length	When generating data (such as Latin text) substring to this.

Table 19-24 (Cont.) UPDATE_COLUMN Parameters

Parameter	Description
p_multi_value	Y or N (currently available for BUILTIN table data and INLINE data). BUILTIN table data will be distinct. INLINE data will be distinct if all values appear once (red,1;blue,1;green,1). Otherwise, permits duplicates (red,3;blue,4;green,8). The number indicates the approximated frequency of each value on the generate data.
p_mv_format	DELIMITED (based upon p_mv_delimiter) or JSON (such as {"p_column_name" : ["sympton1","sympton2"]}).
p_mv_unique	If Y, values do not repeat within the multi-value column. If N, indicates values may repeat.
p_mv_delimiter	Delimiter for a DELIMITED.
p_mv_min_entries	Minimum values in a multi value list.
p_mv_max_entries	Maximum values in a multi value list.
p_mv_partition_by	This value must match a column in the same built-in data source. For example, if p_data_source is "car.model", this value may be "make" because "car.make" is valid.
p_lang	Language code (for example en, de, es).
p_data_source_type	• BLUEPRINT • BUILTIN • DATA_SOURCE • FORMULA (requires p_data_source to be null) • INLINE • SEQUENCE

Table 19-24 (Cont.) UPDATE_COLUMN Parameters

Parameter	Description
p_data_source	When p_data_source_type = DATA_SOURCE then DATA_SOURCE_NAME.COLUMN_NAME (column name'ss case follows p_ds_preserve_case and defaults to upper case). Can be set to one of the following options: • BUILTIN: see built-in list, must match a built-in exactly. • BLUEPRINT: references table data already generated (table must have lower sequence). For example, Dept.Deptno where add_table with p_table_name = Dept and add_column with Deptno exist. **Note:** This is case-sensitive. Tables created with p_preserve_case = N are automatically uppercased. May require DEPT.DEPTNO instead of dept.deptno). • INLINE: PART_TIME,3;FULL_TIME,7 **Note:** Inline format is VALUE,FREQUENCY, separated by a semi-colon. The frequency of the value is an approximation and Oracle best practice is to use the smallest numeric values that provide the desired distribution. • SEQUENCE: uses p_sequence_ parameters. • FORMULA: p_data_source must be null. Uses p_formula as a PL/SQL formula and {column_name} as substitutions from this table. For example, p_formula => {first_name}||'.'||{last_name}||'.insum.ca'
p_ds_preserve_case	If p_data_source_type in ('DATA_SOURCE'. 'BLUEPRINT') and p_ds_preserve_case = N, then the data source is upper cased to match an upper case table_name.column_name
p_min_numeric_value	A positive integer number used as the minimum value (inclusive) to be used in BUILTIN data sources that return NUMBER values.
p_max_numeric_value	A positive integer number used as the maximum value (inclusive) to be used in BUILTIN data sources that return NUMBER values.
p_numeric_precision	0 = no decimal values -1 = round to ten positive integer = number of decimal places
p_min_date_value	A DATE used as the minimum value (inclusive) to be used in BUILTIN data sources that return DATE type values.
p_max_date_value	A DATE used as the maximum value (inclusive) to be used in BUILTIN data sources that return DATE type values.

Table 19-24 (Cont.) UPDATE_COLUMN Parameters

Parameter	Description
p_format_mask	Format mask when datatype is a date.
p_sequence_start_with	Only used when p_data_source_type = SEQUENCE.
p_sequence_increment	Only used when p_data_source_type = SEQUENCE.
p_formula	Enables referencing columns in this row, PL/SQL expressions that can reference columns defined in this blueprint row. For example: {FIRST_NAME}||'.'||{LAST_NAME}||'.insum.ca' Substitutions are case sensitive and must match {column_name} exactly. If p_preserve_case was set to N, {COLUMN_NAME} must be upper case. Can be used on any DATA_SOURCE_TYPE. Formulas are applied last, after p_percent_blank. If p_percent_blank = 100 but FORMULAR is sysdate, the column value will be sysdate.
p_formula_lang	Formulas can be used as a combination of PL/SQL functions performed on this or other columns using {column_name} notation. String/Char, Date/Time, Numeric/Math functions are supported.
p_custom_attributes	For future expansion.
p_percent_blank	0 to 100. This is applied prior to all formulas. If this column is referenced in a formula, the formula contains a blank when appropriate.

> **Note:**
>
> A formula on this column may cause the column to **not** be blank.

Example

```
BEGIN
  apex_dg_data_gen.update_column(
               p_blueprint               => 'Cars',
               p_sequence                => 1,
               p_table_name              => 'MY_CARS',
               p_column_name             => 'make',
               p_data_source_type        => 'BUILTIN',
               p_data_source             => 'car.make');
END;
```

19.25 UPDATE_DATA_SOURCE Procedure

This procedure updates an existing data source which identifies a table or query from which you can source data values.

Syntax

```
APEX_DG_DATA_GEN.UPDATE_DATA_SOURCE (
    p_blueprint             IN VARCHAR2,
    p_name                  IN VARCHAR2,
    p_new_name              IN VARCHAR2 DEFAULT NULL,
    p_data_source_type      IN VARCHAR2,
    p_table                 IN VARCHAR2 DEFAULT NULL,
    p_preserve_case         IN VARCHAR2 DEFAULT 'N',
    p_sql_query             IN VARCHAR2 DEFAULT NULL,
    p_where_clause          IN VARCHAR2 DEFAULT NULL,
    p_inline_data           IN CLOB     DEFAULT NULL,
    p_order_by_column       IN VARCHAR2 DEFAULT NULL )
```

Parameters

Table 19-25 UPDATE_DATA_SOURCE Parameters

Parameter	Description
p_blueprint	Identifies the blueprint.
p_name	Name of a data source. Name is upper cased and must be 26 characters or less.
p_new_name	New name of a data source (rename). Name is upper cased and must be 26 characters or less.
p_data_source_type	TABLE, SQL_QUERY.
p_table	For source type = TABLE. Typically this matches p_name.
p_preserve_case	Defaults to N which forces p_table_name to uppercase. If Y, perserves casing of p_table.
p_sql_query	For p_data_source_type = SQL_QUERY.
p_where_clause	For p_data_source_type = TABLE, this adds the where clause. Do not include "where" keyword (for example deptno <= 20).
p_inline_data	Used for p_data_source_type = JSON_DATA.
p_order_by_column	Not used.

Example

```
BEGIN
    apex_dg_data_gen.update_data_source(
                p_blueprint           => 'Cars',
                p_name                => 'apex_dg_builtin_cars',
                p_data_source_type    => 'TABLE',
```

```
                p_table              => 'apex_dg_builtin_cars');
END;
```

19.26 UPDATE_TABLE Procedure

This procedure updates the attributes for a blueprint table. The logical key is `p_blueprint` and `p_table_name`.

Syntax

```
APEX_DG_DATA_GEN.UPDATE_TABLE (
    p_blueprint         IN VARCHAR2,
    p_table_name        IN VARCHAR2,
    p_new_table_name    IN VARCHAR2     DEFAULT NULL,
    p_sequence          IN PLS_INTEGER,
    p_preserve_case     IN VARCHAR2     DEFAULT 'N',
    p_display_name      IN VARCHAR2     DEFAULT NULL,
    p_singular_name     IN VARCHAR2     DEFAULT NULL,
    p_plural_name       IN VARCHAR2     DEFAULT NULL,
    p_rows              IN NUMBER       DEFAULT 0,
    p_max_rows          IN VARCHAR2     DEFAULT NULL )
```

Parameters

Table 19-26 UPDATE_TABLE Parameters

Parameter	Description
`p_blueprint`	Identifier for the blueprint.
`p_table_name`	Name of table that can exist or not exist.
`p_new_table_name`	New table name (rename).
`p_sequence`	1 for first table, 2 for second, and so forth.
`p_preserve_case`	Defaults to `N` which forces `p_new_table_name` to uppercase. If `Y`, preserves casing of `p_new_table_name`.
`p_display_name`	Friendly display name.
`p_singular_name`	Singluar friendly name.
`p_plural_name`	Plural friendly name.
`p_rows`	Number of rows to generate for this table.
`p_max_rows`	If NULL, then `p_rows` determines the number of rows, otherwise random rows between `p_rows` and `p_max_rows` are used when generating output.

Example

```
BEGIN
    apex_dg_data_gen.update_table(
                p_blueprint             => 'Cars',
                p_table_name            => 'MY_CARS',
                p_sequence              => 20,
                p_new_table_name        => 'MY_NEW_CARS',
                p_display_name          => 'My great cars 2',
```

```
                p_singular_name           => 'My car',
                p_plural_name             => 'My Cars',
                p_rows                    => '50',
    );
END;

BEGIN
   apex_dg_data_gen.update_table(
                p_blueprint               => 'Cars',
                p_table_name              => 'my_cars',
                p_sequence                => 10,
                p_rows                    => '50',
                p_use_existing_table      => 'Y',
    );
END;
```

19.27 VALIDATE_BLUEPRINT Procedure

This procedure validates the blueprint by checking the validity of the generated SQL.

Syntax

```
APEX_DG_DATA_GEN.VALIDATE_BLUEPRINT (
    p_blueprint          IN     VARCHAR2,
    p_format             IN     VARCHAR2,
    p_errors             OUT    CLOB )
```

Parameters

Table 19-27 VALIDATE_BLUEPRINT Parameters

Parameter	Description
`p_blueprint`	Name of the blueprint.
`p_format`	`CSV`, `SQL INSERT`, `JSON`, `PRETTY JSON`, `INSERT INTO`, or `FAST INSERT INTO`.
`p_errors`	Clob holds error output.

Example

```
DECLARE
   l_errors    clob;
BEGIN
   apex_dg_output.validate_blueprint
       (p_blueprint          => 'Cars',
        p_format             => 'JSON',
        p_errors             => l_errors
       );
END;
```

19.28 VALIDATE_INSTANCE_SETTING Procedure

This procedure validates appropriate instance settings (table, column, generation level).

Syntax

```
APEX_DG_DATA_GEN.VALIDATE_INSTANCE_SETTING (
    p_json      IN          CLOB,
    p_valid     OUT NOCOPY  VARCHAR2,
    p_message   OUT NOCOPY  CLOB )
```

Parameters

Table 19-28 VALIDATE_INSTANCE_SETTING Parameters

Parameter	Description
p_json	JSON Document.
p_valid	Out parameter to identify whether settings are valid.
p_result	Out parameter with a detailed message.

Example

```
DECLARE
    l_is_valid varchar2(30);
    l_message clob;
BEGIN
   apex_dg_data_gen.validate_instance_setting(
                p_json              => '<json_doc>',
                p_valid             => l_is_valid,
                p_message           => l_message);
END;
```

20
APEX_ERROR

The APEX_ERROR package provides the interface declarations and some utility functions for an error handling function and includes procedures and functions to raise errors in an APEX application.

20.1 Constants and Attributes Used for Result Types

The following constants are used for the API parameter `p_display_location` and the attribute `display_location` in the `t_error` and `t_error_result` types.

```
c_inline_with_field           constant varchar2(40):='INLINE_WITH_FIELD';
c_inline_with_field_and_notif  constant
varchar2(40):='INLINE_WITH_FIELD_AND_NOTIFICATION';
c_inline_in_notification      constant
varchar2(40):='INLINE_IN_NOTIFICATION';
c_on_error_page               constant varchar2(40):='ON_ERROR_PAGE';
```

The following constants are used for the API parameter `associated_type` in the `t_error` type.

```
c_ass_type_page_item          constant varchar2(30):='PAGE_ITEM';
c_ass_type_region             constant varchar2(30):='REGION';
c_ass_type_region_column      constant varchar2(30):='REGION_COLUMN';
```

The following record structure is passed into an error handling callout function and contains all the relevant information about the error.

```
type t_error is record (
    message                 varchar2(32767),
        /* Error message which will be displayed */
    additional_info         varchar2(32767),
        /* Only used for display_location ON_ERROR_PAGE to display
additional error information */
    display_location        varchar2(40),
        /* Use constants "used for display_location" below */
    association_type        varchar2(40),
        /* Use constants "used for asociation_type" below */
    page_item_name          varchar2(255),
        /* Associated page item name */
    region_id               number,
        /* Associated tabular form region id of the primary
application */
    column_alias            varchar2(255),
        /* Associated tabular form column alias */
    row_num                 pls_integer,
        /* Associated tabular form row */
    apex_error_code         varchar2(255),
        /* Contains the system message code if it's an error raised by
APEX */
    is_internal_error       boolean,
        /* Set to TRUE if it's a critical error raised by the APEX
engine, like an invalid SQL/PLSQL statements,
        ... Internal Errors are always displayed on the Error Page */
    is_common_runtime_error boolean,
        /* TRUE for internal authorization, session and session state
errors that normally should not be masked
        by an error handler */
    ora_sqlcode             number,
        /* SQLCODE on exception stack which triggered the error, NULL
if the error was not raised by an ORA error */
    ora_sqlerrm             varchar2(32767),
        /* SQLERRM which triggered the error, NULL if the error was
not raised by an ORA error */
    error_backtrace         varchar2(32767),
        /* Output of sys.dbms_utility.format_error_backtrace or
sys.dbms_utility.format_call_stack */
    error_statement         varchar2(32767),
        /* Statement that was parsed when the error occurred - only
suitable when parsing caused the error */
    component               apex_application.t_component,
        /* Component which has been processed when the error occurred
*/
);
```

The following record structure must be returned by an error handling callout function.

```
type t_error_result is record (
    message             varchar2(32767),  /* Error message which will
```

```
be displayed */
    additional_info     varchar2(32767),  /* Only used for display_location
ON_ERROR_PAGE
                                          to display additional error
information */
    display_location    varchar2(40),     /* Use constants "used for
display_location" below */
    page_item_name      varchar2(255),    /* Associated page item name */
    column_alias        varchar2(255)     /* Associated tabular form column
alias */
);
```

20.2 Example of an Error Handling Function

The following is an example of an error handling function.

```
create or replace function apex_error_handling_example (
    p_error in apex_error.t_error )
    return apex_error.t_error_result
is
    l_result          apex_error.t_error_result;
    l_reference_id    number;
    l_constraint_name varchar2(255);
begin
    l_result := apex_error.init_error_result (
                    p_error => p_error );

    -- If it's an internal error raised by APEX, like an invalid statement or
    -- code which can't be executed, the error text might contain security
sensitive
    -- information. To avoid this security problem we can rewrite the error
to
    -- a generic error message and log the original error message for further
    -- investigation by the help desk.
    if p_error.is_internal_error then
        -- mask all errors that are not common runtime errors (Access Denied
        -- errors raised by application / page authorization and all errors
        -- regarding session and session state)
        if not p_error.is_common_runtime_error then
            -- log error for example with an autonomous transaction and
return
            -- l_reference_id as reference#
            -- l_reference_id := log_error (
            --                       p_error => p_error );
            --

            -- Change the message to the generic error message which doesn't
expose
            -- any sensitive information.
            l_result.message         := 'An unexpected internal application
error has occurred. '||
                                        'Please get in contact with XXX and
provide '||
                                        'reference# '||
```

```
to_char(l_reference_id, '999G999G999G990')||
                                          ' for further investigation.';
            l_result.additional_info := null;
        end if;
    else
        -- Always show the error as inline error
        -- Note: If you have created manual tabular forms (using the
package
        --       apex_item/htmldb_item in the SQL statement) you
should still
        --       use "On error page" on that pages to avoid loosing
entered data
        l_result.display_location := case
                                       when l_result.display_location
= apex_error.c_on_error_page then apex_error.c_inline_in_notification
                                       else l_result.display_location
                                     end;

        --
        -- Note: If you want to have friendlier ORA error messages,
you can also define
        --       a text message with the name pattern APEX.ERROR.ORA-
number
        --       There is no need to implement custom code for that.
        --

        -- If it's a constraint violation like
        --
        --   -) ORA-00001: unique constraint violated
        --   -) ORA-02091: transaction rolled back (-> can hide a
deferred constraint)
        --   -) ORA-02290: check constraint violated
        --   -) ORA-02291: integrity constraint violated - parent key
not found
        --   -) ORA-02292: integrity constraint violated - child
record found
        --
        -- we try to get a friendly error message from our constraint
lookup configuration.
        -- If we don't find the constraint in our lookup table we
fallback to
        -- the original ORA error message.
        if p_error.ora_sqlcode in (-1, -2091, -2290, -2291, -2292) then
            l_constraint_name := apex_error.extract_constraint_name (
                                     p_error => p_error );

            begin
                select message
                  into l_result.message
                  from constraint_lookup
                 where constraint_name = l_constraint_name;
            exception when no_data_found then null; -- not every
constraint has to be in our lookup table
            end;
        end if;
```

```
        -- If an ORA error has been raised, for example a
raise_application_error(-20xxx, '...')
        -- in a table trigger or in a PL/SQL package called by a process and
we
        -- haven't found the error in our lookup table, then we just want to
see
        -- the actual error text and not the full error stack with all the
ORA error numbers.
        if p_error.ora_sqlcode is not null and l_result.message =
p_error.message then
            l_result.message := apex_error.get_first_ora_error_text (
                                    p_error => p_error );
        end if;

        -- If no associated page item/tabular form column has been set, we
can use
        -- apex_error.auto_set_associated_item to automatically guess the
affected
        -- error field by examine the ORA error for constraint names or
column names.
        if l_result.page_item_name is null and l_result.column_alias is null
then
            apex_error.auto_set_associated_item (
                p_error        => p_error,
                p_error_result => l_result );
        end if;
    end if;

    return l_result;
end apex_error_handling_example;
```

20.3 ADD_ERROR Procedure Signature 1

This procedure adds an error message to the error stack that is used to display an error on an error page or inline in a notification. It can be called in a validation or process to add one or more errors to the error stack.

> **Note:**
>
> This procedure must be called before the Oracle APEX application has performed the last validation or process. Otherwise, the error is ignored if it does not have a display location of `apex_error.c_on_error_page`.

Syntax

```
APEX_ERROR.ADD_ERROR (
    p_message          IN VARCHAR2,
    p_additional_info  IN VARCHAR2 DEFAULT NULL,
    p_display_location IN VARCHAR2 );
```

Parameters

Table 20-1 ADD_ERROR Parameters

Parameters	Description
`p_message`	Displayed error message.
`p_additional_info`	Additional error information needed if the error is displayed on the error page.
`p_display_location`	Specifies where the error message is displayed. Use the constant `apex_error.c_inline_in_notification` or `apex_error.c_on_error_page`. See Constants and Attributes Used for Result Types.

Example

This example illustrates how to add a custom error message to the error stack. The error message is displayed inline in a notification. This example can be used in a validation or process.

```
apex_error.add_error (
    p_message          => 'This custom account is not active!',
    p_display_location => apex_error.c_inline_in_notification );
```

20.4 ADD_ERROR Procedure Signature 2

This procedure adds an error message to the error stack that is used to display an error for a page item inline in a notification. It can be called in a validation or process to add one or more errors to the error stack.

> **Note:**
>
> This procedure must be called before the APEX application has performed the last validation or process. Otherwise, the error is ignored if it does not have a display location of `apex_error.c_on_error_page`.

Syntax

```
APEX_ERROR.ADD_ERROR (
    p_message          IN VARCHAR2,
    p_additional_info  IN VARCHAR2 DEFAULT NULL,
    p_display_location IN VARCHAR2,
    p_page_item_name   IN VARCHAR2);
```

Parameters

Table 20-2 ADD_ERROR Parameters

Parameters	Description
p_message	Displayed error message.
p_additional_info	Additional error information needed if the error is displayed on the error page.
p_display_location	Specifies where the error message is displayed. Use the constant apex_error.c_inline_with_field or apex_error.c_inline_with_field_and_notif. See Constants and Attributes Used for Result Types.
p_page_item_name	Name of the page item on the current page that is highlighted if apex_error.c_inline_with_field or apex_error.c_inline_with_field_and_notif are used as the display location.

Example

This example illustrates how to add a custom error message to the error stack. The P5_CUSTOMER_ID item is highlighted on the page. The error message is displayed inline in a notification. This example can be used in a validation or process.

```
apex_error.add_error (
    p_message          => 'Invalid Customer ID!',
    p_display_location =>  apex_error.c_inline_with_field_and_notif,
    p_page_item_name   => 'P5_CUSTOMER_ID');
```

20.5 ADD_ERROR Procedure Signature 3

This procedure adds an error message to the error stack that is used to display text as defined by a shared component. This error message can be displayed to all display locations. It can be called in a validation or process to add one or more errors to the error stack.

> **Note:**
>
> This procedure must be called before the Oracle APEX application has performed the last validation or process. Otherwise, the error is ignored if it does not have a display location of apex_error.c_on_error_page.

Syntax

```
APEX_ERROR.ADD_ERROR (
    p_error_code          IN VARCHAR2,
    p0                    IN VARCHAR2 DEFAULT NULL,
    p1                    IN VARCHAR2 DEFAULT NULL,
    p2                    IN VARCHAR2 DEFAULT NULL,
    p3                    IN VARCHAR2 DEFAULT NULL,
    p4                    IN VARCHAR2 DEFAULT NULL,
```

```
    p5                    IN VARCHAR2 DEFAULT NULL,
    p6                    IN VARCHAR2 DEFAULT NULL,
    p7                    IN VARCHAR2 DEFAULT NULL,
    p8                    IN VARCHAR2 DEFAULT NULL,
    p9                    IN VARCHAR2 DEFAULT NULL,
    p_escape_placeholders IN BOOLEAN  DEFAULT TRUE,
    p_additional_info     IN VARCHAR2 DEFAULT NULL,
    p_display_location    IN VARCHAR2,
    p_page_item_name      IN VARCHAR2 );
```

Parameters

Table 20-3 ADD_ERROR Parameters

Parameters	Description
`p_error_code`	Name of shared component text message.
`p_additional_info`	Additional error information needed if the error is displayed on the error page.
`p0` through `p9`	Values for %0 through %9 placeholders defined in the text message.
`p_escape_placeholders`	If set to `TRUE`, the values provided in `p0` through `p9` are escaped with `sys.htf.escape_sc` before replacing the placeholder in the text message. If set to `FALSE`, values are not escaped.
`p_display_location`	Specifies where the error message is displayed. Use the constants defined for `p_display_location`. See Constants and Attributes Used for Result Types.
`p_page_item_name`	Name of the page item on the current page that is highlighted if `apex_error.c_inline_with_field` or `apex_error.c_inline_with_field_and_notif` are used as the display location.

Example

This example illustrates how to add a custom error message, where the text is stored in a text message, to the error stack. The P5_CUSTOMER_ID item is highlighted on the page. The error message is displayed inline in a notification. This example can be used in a validation or process.

```
apex_error.add_error (
    p_error_code       => 'INVALID_CUSTOMER_ID',
    p0                 => l_customer_id,
    p_display_location => apex_error.c_inline_with_field_and_notif,
    p_page_item_name   => 'P5_CUSTOMER_ID' );
```

20.6 ADD_ERROR Procedure Signature 4

This procedure adds an error message to the error stack that is used to display an error for a tabular form inline in a notification. It can be called in a validation or process to add one or more errors to the error stack.

> **Note:**
>
> This procedure must be called before the Oracle APEX application has performed the last validation or process. Otherwise, the error is ignored if it does not have a display location of `apex_error.c_on_error_page`.

Syntax

```
APEX_ERROR.ADD_ERROR (
    p_message          IN VARCHAR2,
    p_additional_info  IN VARCHAR2 DEFAULT NULL,
    p_display_location IN VARCHAR2,
    p_region_id        IN NUMBER,
    p_column_alias     IN VARCHAR2 DEFAULT NULL,
    p_row_num          IN NUMBER );
```

Parameters

Table 20-4 ADD_ERROR Parameters

Parameters	Description
`p_message`	Displayed error message.
`p_additional_info`	Additional error information needed if the error is displayed on the error page.
`p_display_location`	Specifies where the error message is displayed. Use the constant `apex_error.c_inline_with_field` or `apex_error.c_inline_with_field_and_notif`. See Constants and Attributes Used for Result Types.
`p_region_id`	The ID of a tabular form region on the current page. The ID can be read from the view `APEX_APPLICATION_PAGE_REGIONS`.
`p_column_alias`	Name of a tabular form column alias defined for p_region_id that is highlighted if `apex_error.c_inline_with_field` or `apex_error.c_inline_with_field_and_notif` are used as a display location.
`p_row_num`	Number of the tabular form row where the error occurred.

Example

This example illustrates how to add a custom error message for a tabular form, where the column `CUSTOMER_ID` is highlighted, to the error stack. The error message is displayed inline in a notification. This example can be used in a validation or process.

```
apex_error.add_error (
    p_message          => 'Invalid Customer ID!',
    p_display_location => apex_error.c_inline_with_field_and_notif,
    p_region_id        => l_region_id,
    p_column_alias     => 'CUSTOMER_ID',
    p_row_num          => l_row_num );
```

20.7 ADD_ERROR Procedure Signature 5

This procedure adds an error message to the error stack of a tabular form that is used to display text as defined by a shared component. This error message can be displayed to all display locations. It can be called in a validation or process to add one or more errors to the error stack.

> **Note:**
>
> This procedure must be called before the Oracle APEX application has performed the last validation or process. Otherwise, the error is ignored if it does not have a display location of `apex_error.c_on_error_page`.

Syntax

```
APEX_ERROR.ADD_ERROR (
    p_error_code           IN VARCHAR2,
    p0                     IN VARCHAR2 DEFAULT NULL,
    p1                     IN VARCHAR2 DEFAULT NULL,
    p2                     IN VARCHAR2 DEFAULT NULL,
    p3                     IN VARCHAR2 DEFAULT NULL,
    p4                     IN VARCHAR2 DEFAULT NULL,
    p5                     IN VARCHAR2 DEFAULT NULL,
    p6                     IN VARCHAR2 DEFAULT NULL,
    p7                     IN VARCHAR2 DEFAULT NULL,
    p8                     IN VARCHAR2 DEFAULT NULL,
    p9                     IN VARCHAR2 DEFAULT NULL,
    p_escape_placeholders IN BOOLEAN  DEFAULT TRUE,
    p_additional_info      IN VARCHAR2 DEFAULT NULL,
    p_display_location     IN VARCHAR2,
    p_region_id            IN NUMBER,
    p_column_alias         IN VARCHAR2 DEFAULT NULL,
    p_row_num              IN NUMBER );
```

Parameters

Table 20-5 ADD_ERROR Parameters

Parameters	Description
`p_error_code`	Name of shared component text message.
`p0` through `p9`	Values for %0 through %9 placeholders defined in the text message.
`p_escape_placeholders`	If set to `TRUE`, the values provided in `p0` through `p9` are escaped with `sys.htf.escape_sc` before replacing the placeholder in the text message. If set to `FALSE`, values are not escaped.
`p_additional_info`	Additional error information needed if the error is displayed on the error page.

Table 20-5 (Cont.) ADD_ERROR Parameters

Parameters	Description
p_display_location	Specifies where the error message is displayed. Use the constants defined for p_display_location. See Constants and Attributes Used for Result Types.
p_region_id	The ID of the tabular form region on the current page. The ID can be read from the view APEX_APPLICATION_PAGE_REGIONS.
p_column_alias	The name of the tabular form column alias defined for p_region_id that is highlighted if apex_error.c_inline_with_field or apex_error.c_inline_with_field_and_notif are used as a display location.
p_row_num	Number of the tabular form row where the error occurred.

Example

This example illustrates how to add a custom error message, where the text is stored in a text message, to the error stack. The CUSTOMER_ID column on the tabular form is highlighted. The error message is displayed inline in a notification. This example can be used in a validation or process.

```
apex_error.add_error (
    p_error_code       => 'INVALID_CUSTOMER_ID',
    p0                 => l_customer_id,
    p_display_location => apex_error.c_inline_with_field_and_notif,
    p_region_id        => l_region_id,
    p_column_alias     => 'CUSTOMER_ID',
    p_row_num          => l_row_num );
```

20.8 AUTO_SET_ASSOCIATED_ITEM Procedure

This procedure automatically sets the associated page item or tabular form column based on a constraint contained in p_error.ora_sqlerrm.This procedure performs the following:

- Identifies the constraint by searching for the schema.constraint pattern.
- Only supports constraints of type P, U, R and C.
- For constraints of type C (check constraints), the procedure parses the expression to identify those columns that are used in the constraints expression.
- Using those columns, the procedure gets the first visible page item or tabular form column that is based on that column and set it as associated p_error_result.page_item_name or p_error_result.column_alias.
- If a page item or tabular form column was found, p_error_result.display_location is set to apex_error.c_inline_with_field_and_notif.

Syntax

```
APEX_ERROR.AUTO_SET_ASSOCIATED_ITEM (
    p_error_result IN OUT nocopy t_error_result,
    p_error        IN            t_error );
```

Parameters

Table 20-6 AUTO_SET_ASSOCIATED_ITEM Procedure Parameters

Parameters	Description
`p_error_result`	The result variable of your error handling function.
`p_error`	The `p_error` parameter of your error handling function.

Example

See an example of how to use this procedure in "Example of an Error Handling Function."

20.9 EXTRACT_CONSTRAINT_NAME Function

This function extracts a constraint name contained in `p_error.ora_sqlerrm`. The constraint must match the pattern `schema.constraint`.

Syntax

```
APEX_ERROR.EXTRACT_CONSTRAINT_NAME (
    p_error          IN t_error,
    p_include_schema IN BOOLEAN DEFAULT FALSE )
    RETURN VARCHAR2;
```

Parameters

Table 20-7 EXTRACT_CONSTRAINT_NAME Function Parameters

Parameters	Description
`p_error`	The `p_error` parameter of your error handling function.
`p_include_schema`	If set to `TRUE`, the result is prefixed with the schema name. For example, `HR.DEMO_PRODUCT_INFO_PK`. If set to `FALSE`, only the constraint name is returned.

Example

See an example of how to use this procedure in "Example of an Error Handling Function."

20.10 GET_FIRST_ORA_ERROR_TEXT Function

This function returns the first ORA error message text stored in `p_error.ora_sqlerrm`. If `p_error_ora_sqlerrm` does not contain a value, `NULL` is returned.

Syntax

```
APEX_ERROR.GET_FIRST_ORA_ERROR_TEXT (
    p_error            IN t_error,
    p_include_error_no IN BOOLEAN DEFAULT FALSE )
    RETURN VARCHAR2;
```

Parameters

Table 20-8 GET_FIRST_ORA_TEXT Function Parameters

Parameters	Description
`p_error`	The `p_error` parameter of your error handling function.
`p_include_error_no`	If set to `TRUE`, ORA-xxxx is included in the returned error message. If set to `FALSE`, only the error message text is returned.

Example

See an example of how to use this procedure in "Example of an Error Handling Function."

20.11 HAVE_ERRORS_OCCURRED Function

This function returns `TRUE` if (inline) errors have occurred and `FALSE` if no error has occurred.

Syntax

```
APEX_ERROR.HAVE_ERRORS_OCCURRED
RETURN BOOLEAN;
```

Example

This example only executes the statements of the `IF` statement if no error has been raised.

```
IF NOT apex_error.have_errors_occurred THEN
    ...
END IF;
```

20.12 INIT_ERROR_RESULT Function

This function returns the t_error_result type initialized with the values stored in `p_error`.

> **Note:**
>
> This function must be used to ensure initialization is compatible with future changes to `t_error_result`.

Syntax

```
APEX_ERROR.INIT_ERROR_RESULT (
    p_error  IN t_error)
    RETURN   t_error_result;
```

Parameters

Table 20-9 INT_ERROR_RESULT Function Parameters

Parameters	Description
`p_error`	The `p_error` parameter of your error handling function.

Example

See an example of how to use this function in "Example of an Error Handling Function."

21
APEX_ESCAPE

The `APEX_ESCAPE` package provides functions for escaping special characters in strings to ensure that the data is suitable for further processing.

21.1 Constants

The APEX_ESCAPE package uses the following constants.

```
c_ldap_dn_reserved_chars constant varchar2(8) := '"+,;<=>\';
c_ldap_search_reserved_chars constant varchar2(5) := '*()\/';
c_html_allowlist_tags constant varchar2(255) := '<h1>,</h1>,<h2>,</
h2>,<h3>,</h3>,<h4>,</h4>,<p>,</p>,<b>,</b>,<strong>,</strong>,<i>,</
i>,<ul>,</ul>,<ol>,</ol>,<li>,</li>,<br />,<hr/>';
```

21.2 HTML Function

This function escapes characters which can change the context in an html environment. It is an extended version of the well-known `sys.htf.escape_sc`.

The function's result depends on the escaping mode that is defined by using `apex_escape.set_html_escaping_mode`. By default, the escaping mode is `Extended`, but it can be overridden by manually calling `set_html_escaping_mode` or by setting the application security attribute `HTML Escaping Mode` to `Basic`. If the mode is `Basic`, the function behaves like `sys.htf.escape_sc`. Otherwise, the rules below apply.

The following table, Table 21-1, depicts ascii characters that the function transforms and their escaped values:

Table 21-1 Escaped Values for Transformed ASCII Characters

Raw ASCI Characters	Returned Escaped Characters
&	&amp;
"	&quot;
<	&lt;
>	&gt;
'	&#x27;
/	&#x2F;

Syntax

```
APEX_ESCAPE.HTML (
    p_string IN VARCHAR2 )
    return VARCHAR2;
```

Parameters

Table 21-2 HTML Function Parameters

Parameter	Description
p_string	The string text that is escaped

Example

This example tests escaping in basic (B) and extended (E) mode.

```
DECLARE
procedure eq(p_str1 in varchar2,p_str2 in varchar2)
    is
    BEGIN
        IF p_str1||'.' <> p_str2||'.' THEN
            raise_application_error(-20001,p_str1||' <> '||p_str2);
    END IF;
END eq;
BEGIN
    apex_escape.set_html_escaping_mode('B');
    eq(apex_escape.html('hello &"<>''/'), 'hello
&amp;&quot;&lt;&gt;''/');
    apex_escape.set_html_escaping_mode('E');
    eq(apex_escape.html('hello &"<>''/'), 'hello
    &amp;&quot;&lt;&gt;&#x27;&#x2F;');
END;
```

> **See Also:**
>
> - SET_HTML_ESCAPING_MODE Procedure

21.3 HTML_ALLOWLIST Function

The `HTML_ALLOWLIST` function performs HTML escape on all characters in the input text except the specified allowlist tags. This function can be useful if the input text contains simple html markup but a developer wants to ensure that an attacker cannot use malicious tags for cross-site scripting.

Syntax

```
APEX_ESCAPE.HTML_ALLOWLIST (
    p_html           IN VARCHAR2,
    p_allowlist_tags IN VARCHAR2 DEFAULT c_html_allowlist_tags )
    return VARCHAR2;
```

Parameters

Table 21-3 HTML_ALLOWLIST Function Parameters

Parameter	Description
`p_html`	The text string that is filtered.
`p_allowlist_tags`	The comma separated list of tags that stays in `p_html`.

Example

This example shows how to use `HTML_ALLOWLIST` to remove unwanted html markup from a string, while preserving allowlisted tags.

```
BEGIN
     sys.htp.p(apex_escape.html_allowlist(
         '<h1>Hello<script>alert("XSS");</script></h1>'));
END;
```

> **See Also:**
>
> - SET_HTML_ESCAPING_MODE Procedure

21.4 HTML_ATTRIBUTE Function

Use this function to escape the values of HTML entity attributes. It hex escapes everything that is not alphanumeric or in one of the following characters:

- ,
- .
- -
- _

Syntax

```
APEX_ESCAPE.HTML_ATTRIBUTE (
    p_string IN VARCHAR2 )
    return VARCHAR2;
```

Parameters

Table 21-4 HTML_ATTRIBUTE Function Parameters

Parameter	Description
p_string	The text string that is escaped.

Example

This example generates a HTML list of of titles and text bodies. HTML entity attributes are escaped with `HTML_ATTRIBUTE`, whereas normal text is escaped with `HTML` and `HTML_TRUNC`.

```
BEGIN
    htp.p('<ul>');
    for l_data in ( select title, cls, body
        from my_topics )
    LOOP
    sys.htp.p('<li><span class="'||
        apex_escape.html_attribute(l_data.cls)||'">'||
        apex_escape.html(l_data.title)||'</span>');
    sys.htp.p(apex_escape.html_trunc(l_data.body));
    sys.htp.p('</li>');
    END LOOP;
    htp.p('</ul>');
END;
```

See Also:

- SET_HTML_ESCAPING_MODE Procedure

21.5 HTML_TRUNC Function

The `HTML_TRUNC` function escapes html and limits the returned string to `p_length` bytes. This function returns the first `p_length` bytes of an input clob and escapes

them. You can use this function if the input clob is too large to fit in a VARCHAR2 variable and it is sufficient to only display the first part of it.

Syntax

```
APEX_ESCAPE.HTML_TRUNC (
    p_string IN CLOB,
    p_length IN NUMBER DEFAULT 4000 )
    return VARCHAR2;
```

Parameters

Table 21-5 HTML_TRUNC Function Parameters

Parameter	Description
p_string	The text string that is escaped.
p_length	The number of bytes from p_string that are escaped.

Example

This example generates a html list of of titles and text bodies. HTML entity attributes are escaped with HTML_ATTRIBUTE, whereas normal text is escaped with HTML and HTML_TRUNC.

```
BEGIN
    htp.p('<ul>');
    for l_data in ( select title, cls, body
        from my_topics )
    LOOP
    sys.htp.p('<li><span class="'||
        apex_escape.html_attribute(l_data.cls)||'">'||
        apex_escape.html(l_data.title)||'</span>');
    sys.htp.p(apex_escape.html_trunc(l_data.body));
    sys.htp.p('</li>');
    END LOOP;
    htp.p('</ul>');
END;
```

See Also:

- SET_HTML_ESCAPING_MODE Procedure

21.6 JS_LITERAL Function

The JS_LITERAL function escapes and optionally enquotes a javascript string. This function replaces non-immune characters with \xHH or \uHHHH equivalents. The result can be injected into javascript code, within <script> tags or inline ("javascript:xxx"). Immune characters include a through z, A through Z, 0 through 9, commas ",", periods "." and underscores "_" if

the output should not be enclosed in quotes when the parameter `p_quote` is null. If `p_quote` has a value, printable `ASCII 7` characters except for & < > " ' ` / \ % are not escaped.

Syntax

```
APEX_ESCAPE.JS_LITERAL (
    p_string IN VARCHAR2,
    p_quote  IN VARCHAR2 DEFAULT '''' )
    return VARCHAR2;
```

Parameters

Table 21-6 JS_LITERAL Function Parameters

Parameter	Description
`p_string`	The text string that is escaped.
`p_quote`	If not null, this string is placed on the left and right of the result. The quotation character must be a single or a double quotation mark.

Example

It describes how to use `JS_LITERAL` to escape special characters in the `l_string` variable.

```
declare
    l_string varchar2(4000) := 'O''Brien';
begin
    sys.htp.p('<script>'||
        'alert('||apex_escape.js_literal(l_string)||');'||'</
script>');
end;
```

21.7 JSON Function

This function returns `p_string` with all special characters escaped.

Syntax

```
APEX_ESCAPE.JSON (
    p_string  IN VARCHAR2 )
RETURN VARCHAR2;
```

Parameters

Table 21-7 JSON Function Parameters

Parameter	Description
`p_string`	The string to be escaped.

Returns/Raised Errors

Table 21-8 JSON Function Returns

Return	Description
VARCHAR2	The escaped string.

Example

The following example prints this: `{ "name": "O\u0027Brien"}`

```
declare
    l_string varchar2(4000) := 'O''Brien';
begin
    sys.htp.p('{ "name": "'||apex_escape.json(l_string)||'"}');
end;
```

21.8 LDAP_DN Function

The `LDAP_DN` function escapes reserved characters in an LDAP distinguished name, according to RFC 4514. The RFC describes "+,;<=>\ as reserved characters (see `p_reserved_chars`). These are escaped by a backslash, for example, " becomes \". Non-printable characters, ASCII 0 - 31, and ones with a code > 127 (see `p_escape_non_ascii`) are escaped as `\xx`, where `xx` is the hexadecimal character code. The space character at the beginning or end of the string and a # at the beginning is also escaped with a backslash.

Syntax

```
APEX_ESCAPE.LDAP_DN (
    p_string            IN VARCHAR2,
    p_reserved_chars    IN VARCHAR2 DEFAULT c_ldap_dn_reserved_chars,
    p_escaped_non_ascii IN BOOLEAN  DEFAULT TRUE )
RETURN VARCHAR2;
```

Parameters

Table 21-9 LDAP_DN Parameters

Parameter	Description
p_string	The text string that is escaped.
p_reserved_chars	A list of characters that when found in `p_string` is escaped with a backslash.
p_escaped_non_ascii	If `TRUE`, characters above ASCII 127 in `p_string` are escaped with a backslash. This is supported by RFCs 4514 and 2253, but may cause errors with older LDAP servers and Microsoft AD.

Example

This example escapes characters in `l_name` and places the result in `l_escaped`.

```
DECLARE
    l_name varchar2(4000) := 'Joe+User';
    l_escaped varchar2(4000);
BEGIN
    l_escaped := apex_escape.ldap_dn(l_name);
    htp.p(l_name||' becomes '||l_escaped);
END;
```

> **Note:**
>
> LDAP_SEARCH_FILTER Function

21.9 LDAP_SEARCH_FILTER Function

The `LDAP_SEARCH_FILTER` function escapes reserved characters in an LDAP search filter, according to RFC 4515. The RFC describes *()\/ as reserved characters (see `p_reserved_chars`). These, non-printable characters (ASCII 0 - 31) and ones with a code > 127 (see `p_escape_non_ascii`) are escaped as `\xx`, where `xx` is the hexadecimal character code.

Syntax

```
APEX_ESCAPE.LDAP_SEARCH_FILTER (
    p_string              IN VARCHAR2,
    p_reserved_chars      IN VARCHAR2 DEFAULT
c_ldap_search_reserved_chars,
    p_escape_non_ascii    IN BOOLEAN  DEFAULT TRUE )
RETURN VARCHAR2;
```

Parameters

Table 21-10 LDAP_SEARCH_FILTER Parameters

Parameter	Description
`p_string`	The text string that is escaped.
`p_reserved_chars`	A list of characters that when found in `p_string` is escaped with `\xx` where `xx` is the character's ASCII hexadecimal code.
`p_escape_non_ascii`	If TRUE, characters above ascii 127 in `p_string` are escaped with `\xx` where `xx` is the character's ASCII hexadecimal code. This is supported by RFCs 4514, but may cause errors with older LDAP servers and Microsoft AD.

Example

This example escapes the text in `l_name` and places the result in `l_escaped`.

```
DECLARE
l_name varchar2(4000) := 'Joe*User';
l_escaped varchar2(4000);
BEGIN
    l_escaped := apex_escape.ldap_search_filter(l_name);
    htp.p(l_name||' becomes '||l_escaped);
END;
```

> **Note:**
>
> LDAP_DN Function

21.10 NOOP Function

Return `p_string` unchanged. Use this function to silence automatic injection detection tests, similar to `dbms_assert.noop` for SQL injection.

Syntax

```
APEX_ESCAPE.NOOP (
    p_string IN VARCHAR2)
    return VARCHAR2 deterministic;
```

Parameters

Table 21-11 APEX_ESCAPE.NOOP Function Parameters

Parameter	Description
`p_string`	The input text string.

Example

This example shows how to use `NOOP` to show the developer's intention to explicitly not escape text.

```
begin
    sys.htp.p(apex_escape.noop('Cats & Dogs'));
end;
```

21.11 REGEXP Function

This function escapes characters that can change the context in a regular expression. It should be used to secure user input. The following list depicts ascii characters that the function escapes with a backslash (\):

\.^$*+-?()[]{|

Syntax

```
APEX_ESCAPE.REGEXP (
    p_string IN VARCHAR2);
```

Parameters

Table 21-12 APEX_ESCAPE.REGEXP Function Parameters

Parameter	Description
p_string	Text to escape.

Example

The following example ensures the special character "-" in Mary-Ann will be escaped and ignored by the regular expression engine.

```
declare
    l_subscribers varchar2(4000) := 'Christina,Hilary,Mary-Ann,Joel';
    l_name varchar2(4000) := 'Mary-Ann';
begin
    if regexp_instr(l_subscribers,'(^|,)'||
apex_escape.regexp(l_name)||'($|,)')>0
    then
        sys.htp.p('found');
    else
        sys.htp.p('not found')
    endif;
end
```

21.12 SET_HTML_ESCAPING_MODE Procedure

The `SET_HTML_ESCAPING_MODE` procedure configures HTML escaping mode for `apex_escape.html`.

Syntax

```
APEX_ESCAPE.SET_HTML_ESCAPING_MODE (
    p_mode IN VARCHAR2);
```

Parameters

Table 21-13 APEX_ESCAPE.SET_HTML_ESCAPING_MODE Procedure Parameters

Parameter	Description
p_mode	If equal to B, then do basic escaping, like sys.htf.escape_sc. If equal to E, then do extended escaping.

Example

This example tests escaping in basic (B) and extended (E) mode.

```
DECLARE
procedure eq(p_str1 in varchar2,p_str2 in varchar2)
    is
    BEGIN
        IF p_str1||'.' <> p_str2||'.' THEN
            raise_application_error(-20001,p_str1||' <> '||p_str2);
    END IF;
END eq;
BEGIN
    apex_escape.set_html_escaping_mode('B');
    eq(apex_escape.html('hello &"<>''/'), 'hello &amp;&quot;&lt;&gt;''/');
    apex_escape.set_html_escaping_mode('E');
    eq(apex_escape.html('hello &"<>''/'), 'hello
    &amp;&quot;&lt;&gt;&#x27;&#x2F;');
END;
```

See Also:

- HTML Function
- HTML_ALLOWLIST Function
- HTML_ATTRIBUTE Function
- HTML_TRUNC Function

22
APEX_EXEC

The `APEX_EXEC` package encapsulates data processing and querying capabilities and provides an abstraction from the data source to APEX components and plug-ins. `APEX_EXEC` contains procedures and functions to execute queries or procedural calls on local and remote data sources as well as REST Data Sources. It can be used for plug-in development and procedural PL/SQL processing in applications or within packages and procedures.

All `APEX_EXEC` procedures require an existing APEX session to function. In a pure SQL or PL/SQL context, use the `APEX_SESSION` package to initialize a new session.

> **Note:**
>
> Always add an exception handler to your procedure or function to ensure that `APEX_EXEC.CLOSE` is always called to release server resources such as database cursors and temporary lobs.

22.1 Call Sequences for APEX_EXEC

All `APEX_EXEC` procedures require an existing APEX session to function. In a pure SQL or PL/SQL context, use the `APEX_SESSION` package to initialize a new session.

> **See Also:**
>
> APEX_SESSION

22.1.1 Querying a Data Source with APEX_EXEC

1. Prepare columns to be selected from the data source:
   a. Create a variable of the `APEX_EXEC.T_COLUMNS` type.
   b. Add columns with the `APEX_EXEC.ADD_COLUMNS`.
2. (Optional) Prepare bind variables:
   a. Create a variable of `APEX_EXEC.T_PARAMETERS` type.
   b. Add bind values with `APEX_EXEC.ADD_PARAMETER`.
3. (Optional) Prepare filters:
   a. Create a variable of the type `APEX_EXEC.T_FILTERS`.
   b. Add bind values with `APEX_EXEC.ADD_FILTER`.
4. Execute the data source query in one of the following ways:
   - For **REST Data Sources**, use `APEX_EXEC.OPEN_REST_SOURCE_QUERY`.
   - For **REST Enabled SQL**, use `APEX_EXEC.OPEN_REMOTE_SQL_QUERY`.
   - Alternatively, use `APEX_EXEC.OPEN_QUERY_CONTEXT` to pass in the location as a parameter.
5. Get the result set meta data:
   a. `APEX_EXEC.GET_COLUMN_COUNT` returns the number of result columns.
   b. `APEX_EXEC.GET_COLUMN` returns information about a specific column.
6. Process the result set:
   a. `APEX_EXEC.NEXT_ROW` advances the result cursor by one row.
   b. `APEX_EXEC.GET_NNNN` functions retrieve individual column values.
7. Close all resources with `APEX_EXEC.CLOSE`.
8. Add an exception handler and close those resources. For example:

```
EXCEPTION
    WHEN others THEN
         apex_debug.log_exception;
         apex_exec.close( l_context );
    RAISE;
```

> **See Also:**
>
> For code examples of a complete query to a Data Source, review the example sections in the following APIs:
>
> - OPEN_QUERY_CONTEXT Function Signature 2
> - OPEN_REMOTE_SQL_QUERY Function
> - OPEN_REST_SOURCE_QUERY Function

22.1.2 Executing a DML on a Data Source with APEX_EXEC

1. Define the Data Manipulation Language (DML) columns:
   a. Create a variable of the `APEX_EXEC.T_COLUMNS` type.
   b. Add columns with `APEX_EXEC.ADD_COLUMNS`.
2. (Optional) Prepare bind variables:
   a. Create a variable of the `APEX_EXEC.T_PARAMETERS` type.
   b. Add bind values with `APEX_EXEC.ADD_PARAMETER`.
3. Prepare the DML Context in one of the following ways:
   - For **REST Data Sources**, use `OPEN_REST_SOURCE_DML_CONTEXT`.
   - For **REST Enabled SQL**, use `OPEN_REMOTE_DML_CONTEXT`.
   - For **local database**, use `OPEN_LOCAL_DML_CONTEXT`.
4. Add row values for the DML to perform:
   a. Use `APEX_EXEC.ADD_DML_ROW` to add a new row.
   b. Use `APEX_EXEC.SET_VALUE` to provide individual column values.
5. Execute the DML with `APEX_EXEC.EXECUTE_DML`.
6. Close all resources with `APEX_EXEC.CLOSE`.
7. Add an exception handler and close those resources. For example:

```
EXCEPTION
    WHEN others THEN
        apex_exec.close( l_context );
        RAISE;
```

> **See Also:**
>
> For code examples of a complete DML query, review the example sections in the following APIs:
>
> - OPEN_LOCAL_DML_CONTEXT Function
> - OPEN_REMOTE_DML_CONTEXT Function
> - OPEN_REST_SOURCE_DML_CONTEXT Function

22.1.3 Executing a Remote Procedure or REST API with APEX_EXEC

1. (Optional) Prepare bind variables:
   a. Create a variable of `APEX_EXEC.T_PARAMETERS` type.
   b. Add bind values with `APEX_EXEC.ADD_PARAMETER`.
2. Execute the local or remote procedure or REST API in one of the following ways:
   - For **REST Data Sources**, use `APEX_EXEC.EXECUTE_REST_SOURCE`.
   - For **REST Enabled SQL**, use `APEX_EXEC.EXECUTE_REMOTE_PLSQL`.
   - For **local database**, use `APEX_EXEC.EXECUTE_PLSQL`.

   The `P_PARAMETERS` array which is used to pass bind variables is an `IN OUT` parameter, so `OUT` parameters are passed back.
3. (Optional) Retrieve the `OUT` parameters. Walk through the variable of the `APEX_EXEC.T_PARAMETERS` type and use `GET_PARAMETER_VALUE` to retrieve the `OUT` parameter value.

> **See Also:**
>
> For code examples of a complete remote procedure or REST API query, review the example sections in the following APIs:
>
> - EXECUTE_PLSQL Procedure
> - EXECUTE_REMOTE_PLSQL Procedure
> - EXECUTE_REST_SOURCE Procedure

22.2 Global Constants

The APEX_EXEC package uses the following constants.

```
subtype t_location     is varchar2(12);

c_location_local_db       constant t_location  := 'LOCAL';
c_location_remote_db      constant t_location  := 'REMOTE';
c_location_web_source     constant t_location  := 'WEB_SOURCE';
```

```
c_lov_shared              constant t_lov_type  := 1;
c_lov_sql_query           constant t_lov_type  := 2;
c_lov_static              constant t_lov_type  := 3;

subtype t_query_type is varchar2(23);

c_query_type_table           constant t_query_type := 'TABLE';
c_query_type_sql_query       constant t_query_type := 'SQL';
c_query_type_func_return_sql constant t_query_type :=
'FUNC_BODY_RETURNING_SQL';

subtype t_dml_operation is pls_integer range 1..3;

c_dml_operation_insert constant t_dml_operation := 1;
c_dml_operation_update constant t_dml_operation := 2;
c_dml_operation_delete constant t_dml_operation := 3;

subtype t_target_type is varchar2(13);
c_target_type_region_source constant t_target_type := 'REGION_SOURCE';
c_target_type_table         constant t_target_type := 'TABLE';
c_target_type_sql_query     constant t_target_type := 'SQL';
c_target_type_plsql         constant t_target_type := 'PLSQL_CODE';

subtype t_post_processing is pls_integer range 1..3;
c_postprocess_where_orderby    constant t_post_processing := 1;
c_postprocess_sql              constant t_post_processing := 2;
c_postprocess_plsql_return_sql constant t_post_processing := 3;
```

Data Type Constants

Data type constants to be used in the `ADD_FILTER` or `ADD_COLUMN` procedures.

```
subtype t_data_type is pls_integer range 1..15;

c_data_type_varchar2      constant t_data_type := 1;
c_data_type_number        constant t_data_type := 2;
c_data_type_date          constant t_data_type := 3;
c_data_type_timestamp     constant t_data_type := 4;
c_data_type_timestamp_tz  constant t_data_type := 5;
c_data_type_timestamp_ltz constant t_data_type := 6;
c_data_type_interval_y2m  constant t_data_type := 7;
c_data_type_interval_d2s  constant t_data_type := 8;
c_data_type_blob          constant t_data_type := 9;
c_data_type_bfile         constant t_data_type := 10;
c_data_type_clob          constant t_data_type := 11;
c_data_type_rowid         constant t_data_type := 12;
c_data_type_user_defined  constant t_data_type := 13;
c_data_type_binary_number constant t_data_type := 14;
c_data_type_sdo_geometry  constant t_data_type := 15;
--
-- Data Type constant for columns of the "JSON" data type (Database
21c or higher) ONLY.
-- Has currently the same functionality as CLOB columns, but might be
```

```
extended in the future.
c_data_type_json constant t_data_type := 11;
```

Filter Type Constants

Filter type constants to be used in the `ADD_FILTER` procedures.

```
c_filter_eq              constant t_filter_type := 1;
c_filter_not_eq          constant t_filter_type := 2;
c_filter_gt              constant t_filter_type := 3;
c_filter_gte             constant t_filter_type := 4;
c_filter_lt              constant t_filter_type := 5;
c_filter_lte             constant t_filter_type := 6;
c_filter_null            constant t_filter_type := 7;
c_filter_not_null        constant t_filter_type := 8;
c_filter_starts_with     constant t_filter_type := 9;
c_filter_not_starts_with constant t_filter_type := 10;
c_filter_ends_with       constant t_filter_type := 11;
c_filter_not_ends_with   constant t_filter_type := 12;
c_filter_contains        constant t_filter_type := 13;
c_filter_not_contains    constant t_filter_type := 14;
c_filter_in              constant t_filter_type := 15;
c_filter_not_in          constant t_filter_type := 16;
c_filter_between         constant t_filter_type := 17;
c_filter_not_between     constant t_filter_type := 18;
c_filter_regexp          constant t_filter_type := 19;
-- date filters: days/months/...
c_filter_last            constant t_filter_type := 20;
c_filter_not_last        constant t_filter_type := 21;
c_filter_next            constant t_filter_type := 22;
c_filter_not_next        constant t_filter_type := 23;

-- interactive reports
c_filter_like            constant t_filter_type := 24;
c_filter_not_like        constant t_filter_type := 25;
c_filter_search          constant t_filter_type := 26;
c_filter_sql_expression  constant t_filter_type := 27;
c_filter_between_lbe     constant t_filter_type := 29;
c_filter_between_ube     constant t_filter_type := 30;

-- Oracle TEXT CONTAINS filter
c_filter_oracletext      constant t_filter_type := 28;

-- Spatial filter
c_filter_sdo_filter      constant t_filter_type := 31;
c_filter_sdo_anyinteract constant t_filter_type := 32;

c_filter_expr_sep       constant varchar2(1) := '~';
c_filter_expr_value_sep constant varchar2(1) := chr(1);

-- interval types for date filters (last, not last, next, not next)
c_filter_int_type_year   constant t_filter_interval_type := 'Y';
c_filter_int_type_month  constant t_filter_interval_type := 'M';
c_filter_int_type_week   constant t_filter_interval_type := 'W';
c_filter_int_type_day    constant t_filter_interval_type := 'D';
```

```
c_filter_int_type_hour   constant t_filter_interval_type := 'H';
c_filter_int_type_minute constant t_filter_interval_type := 'MI';
```

Order By Constants

Order by constants to be used in the `ADD_FILTER` procedures.

```
c_order_asc           constant t_order_direction := 1;
c_order_desc          constant t_order_direction := 2;

c_order_nulls_first   constant t_order_nulls := 1;
c_order_nulls_last    constant t_order_nulls := 2;
```

Empty Constants

Constants for empty filter, order by, columns or parameter arrays.

```
c_empty_columns         t_columns;
c_empty_filters         t_filters;
c_empty_order_bys       t_order_bys;
c_empty_parameters      t_parameters;
```

Database Vendor Constants

```
subtype t_database_type is pls_integer range 1..2;
c_database_oracle constant t_database_type := 1;
c_database_mysql  constant t_database_type := 2;
```

Aggregation Type Constants

```
subtype t_aggregation_type is pls_integer range 1..3;

c_aggregation_none constant     t_aggregation_type := 1;
c_aggregation_group_by constant t_aggregation_type := 2;
c_aggregation_distinct constant t_aggregation_type := 3;
```

Aggregation Column Role Constants

```
subtype t_column_role is pls_integer range 1..2;

c_column_role_aggregate constant t_column_role := 1;
c_column_role_group_by  constant t_column_role := 2;
```

Aggregation Function Constants

```
subtype t_aggregate_function is pls_integer range 1..11;

c_aggregate_sum             constant t_aggregate_function := 1;
c_aggregate_avg             constant t_aggregate_function := 2;
c_aggregate_median          constant t_aggregate_function := 3;
c_aggregate_cnt             constant t_aggregate_function := 4;
c_aggregate_distinct_cnt    constant t_aggregate_function := 5;
```

```
c_aggregate_approx_dist_cnt  constant t_aggregate_function := 6;
c_aggregate_min              constant t_aggregate_function := 7;
c_aggregate_max              constant t_aggregate_function := 8;
c_aggregate_ratio_report_sum constant t_aggregate_function := 9;
c_aggregate_ratio_report_cnt constant t_aggregate_function := 10;
c_aggregate_listagg          constant t_aggregate_function := 11;
```

Aggregation Columns

```
type t_aggregation_column is record(
    attributes         t_column,
    aggr_role          t_column_role,
    aggr_function      t_aggregate_function,
    total_column_name  t_column_name,
    total_function     t_aggregate_function );
```

Collection of Aggregation Columns

```
type t_aggregation_columns is table of t_aggregation_column index by
pls_integer;
```

Aggregation

```
type t_aggregation is record(
    aggregation_type        t_aggregation_type,
    column_info             t_aggregation_columns,
    order_bys               t_order_bys,
    order_by_expr           varchar2(32767),
    row_count_column        t_column_name );

c_empty_aggregation t_aggregation;
```

22.3 Data Types

The APEX_EXEC package uses the following data types.

Generic

```
subtype t_column_name is varchar2(32767);

type t_value is record (
    varchar2_value      varchar2(32767),
    number_value        number,
    binary_number_value binary_double,
    date_value          date,
    timestamp_value     timestamp,
    timestamp_tz_value  timestamp with time zone,
    timestamp_ltz_value timestamp with local time zone,
    interval_y2m_value  yminterval_unconstrained,
    interval_d2s_value  dsinterval_unconstrained,
    blob_value          blob,
    bfile_value         bfile,
```

```
    clob_value          clob,
    sdo_geometry_value  mdsys.sdo_geometry,
    anydata_value       sys.anydata );

type t_values is table of t_value index by pls_integer;
```

> **Note:**
>
> `sdo_geometry_value` is **only** available when SDO_GEOMETRY is installed in the database.

Bind variables

```
type t_parameter is record (
    name      t_column_name,
    data_type t_data_type,
    value     t_value );

type t_parameters is table of t_parameter index by pls_integer;
```

Filters

```
subtype t_filter_type          is pls_integer range 1..27;
subtype t_filter_interval_type is varchar2(2);

type t_filter is record (
    column_name       t_column_name,
    data_type         t_data_type,
    filter_type       t_filter_type,
    filter_values     t_values,
    sql_expression    varchar2(32767),
    search_columns    t_columns,
    null_result       boolean default false,
    is_case_sensitive boolean default true );

type t_filters is table of t_filter index by pls_integer;
```

Order Bys

```
subtype t_order_direction is pls_integer range 1..2;
subtype t_order_nulls     is pls_integer range 1..2;

type t_order_by is record (
    column_name   t_column_name,
    direction     t_order_direction,
    order_nulls   t_order_nulls );

type t_order_bys is table of t_order_by index by pls_integer;
```

Columns

```
type t_column is record (
    name                t_column_name,
    sql_expression      varchar2(4000),
    --
    data_type           t_data_type,
    data_type_length    pls_integer,
    format_mask         varchar2(4000),
    --
    is_required         boolean default false,
    is_primary_key      boolean default false,
    is_query_only       boolean default false,
    is_checksum         boolean default false,
    is_returning        boolean default false );

type t_columns is table of t_column index by pls_integer;
```

Context Handle

```
subtype t_context is pls_integer;
```

Data Source Capabilities

> **Note:**
>
> The data source capabilities `filter_*` and `orderby_*` are deprecated and will be removed in a future release.

```
type t_source_capabilities is record(
    location               t_location,
    --
    pagination             boolean default false,
    --
    allow_fetch_all_rows   boolean default false,
    --
    filtering              boolean default false,
    order_by               boolean default false,
    group_by               boolean default false,
    --
    -- the following filter_* attributes are deprecated, do not use.
    --
    filter_eq              boolean default false,
    filter_not_eq          boolean default false,
    filter_gt              boolean default false,
    filter_gte             boolean default false,
    filter_lt              boolean default false,
    filter_lte             boolean default false,
    filter_null            boolean default false,
    filter_not_null        boolean default false,
```

```
    filter_contains        boolean default false,
    filter_not_contains    boolean default false,
    filter_like            boolean default false,
    filter_not_like        boolean default false,
    filter_starts_with     boolean default false,
    filter_not_starts_with boolean default false,
    filter_between         boolean default false,
    filter_not_between     boolean default false,
    filter_in              boolean default false,
    filter_not_in          boolean default false,
    filter_regexp          boolean default false,
    filter_last            boolean default false,
    filter_not_last        boolean default false,
    filter_next            boolean default false,
    filter_not_next        boolean default false,
    --
    -- the following orderby_* attributes are deprecated, do not use.
    --
    orderby_asc            boolean default false,
    orderby_desc           boolean default false,
    orderby_nulls          boolean default false );
```

22.4 ADD_COLUMN Procedure

This procedure adds a column to the columns collection.

Columns collections can be passed to the `OPEN_*_CONTEXT` calls in order to request only a subset of columns. This is particularly useful for web sources without a SQL statement. If no or an empty column array is passed, all columns defined in the web source are fetched.

Syntax

```
procedure add_column(
    p_columns         IN OUT NOCOPY t_columns,
    p_column_name     IN            VARCHAR2,
    p_data_type       IN            t_data_type DEFAULT NULL,
    p_sql_expression  IN            VARCHAR2    DEFAULT NULL,
    p_format_mask     IN            VARCHAR2    DEFAULT NULL,
    p_is_primary_key  IN            BOOLEAN     DEFAULT FALSE,
    p_is_query_only   IN            BOOLEAN     DEFAULT FALSE,
    p_is_returning    IN            BOOLEAN     DEFAULT FALSE,
    p_is_checksum     IN            BOOLEAN     DEFAULT FALSE );
```

Parameters

Table 22-1 ADD_COLUMN Procedure Parameters

Parameter	Description
`p_columns`	Columns array.
`p_column_name`	Column name.
`p_data_type`	Column data type.

Table 22-1 (Cont.) ADD_COLUMN Procedure Parameters

Parameter	Description
p_sql_expression	SQL expression used to derive a column from other columns.
p_format_mask	Format mask to use for this column.
p_is_primary_key	Whether this is a primary key column (default FALSE).
p_is_query_only	Query only columns are not written in a DML context (default FALSE).
p_is_returning	Whether to retrieve the RETURNING column after DML has been executed (default FALSE).
p_is_checksum	Whether this is a checksum (row version) column (default FALSE).

Example

```
DECLARE
    l_columns     apex_exec.t_columns;
    l_context     apex_exec.t_context;
BEGIN
    apex_exec.add_column(
        p_columns     => l_columns,
        p_column_name => 'ENAME' );

    apex_exec.add_column(
        p_columns     => l_columns,
        p_column_name => 'SAL' );

    l_context := apex_exec.open_web_source_query(
        p_module_static_id => '{web source module static ID}',
        p_columns          => l_columns
        p_max_rows         => 1000 );

        while apex_exec.next_row( l_context ) LOOP
           -- process rows here ...
        END LOOP;

    apex_exec.close( l_context );
EXCEPTION
    when others then
         apex_exec.close( l_context );
         raise;
END;
```

22.5 ADD_DML_ROW Procedure

This procedure adds one row to the DML context. This is called after the `open_dml_context` and before the `execute_dml` procedures. This procedure can be called multiple times to process multiple rows. All columns of the new row are initialized with `NULL`.

Use `set_value`, `set_null` and `set_row_version_checksum` to populate the new row with values and the checksum for lost-update detection.

Syntax

```
PROCEDURE ADD_DML_ROW(
    p_context               IN t_context,
    p_operation             IN t_dml_operation );
```

Parameters

Table 22-2 ADD_DML_ROW Parameters

Parameter	Description
`p_context`	Context object obtained with one of the OPEN_ functions
`p_operation`	DML operation to be executed on this row. Possible values: • `c_dml_operation_insert` • `c_dml_operation_update` • `c_dml_operation_delete`

Example

See"OPEN_REMOTE_DML_CONTEXT Function ","OPEN_WEB_SOURCE_DML_CONTEXT Function (Deprecated)","OPEN_LOCAL_DML_CONTEXT Function "

22.6 ADD_FILTER Procedure

This procedure adds a filter to the filter collection.

Syntax

Signature 1

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name );
```

Signature 2

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_value             IN            apex_t_varchar2,
    p_null_result       IN            BOOLEAN  DEFAULT FALSE,
    p_is_case_sensitive IN            BOOLEAN  DEFAULT TRUE );
```

Signature 3

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_from_value        IN            VARCHAR2,
    p_to_value          IN            VARCHAR2,
    p_null_result       IN            BOOLEAN DEFAULT FALSE,
    p_is_case_sensitive IN            BOOLEAN DEFAULT TRUE );
```

Signature 4

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_values            IN            apex_t_varchar2,
    p_null_result       IN            BOOLEAN DEFAULT FALSE,
    p_is_case_sensitive IN            BOOLEAN DEFAULT TRUE );
```

Signature 5

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_value             IN            number,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 6

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_from_value        IN            NUMBER,
    p_to_value          IN            NUMBER,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 7

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_values            IN            apex_t_number,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 8

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_value             IN            DATE,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 9

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_from_value        IN            DATE,
    p_to_value          IN            DATE,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 10

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_value             IN            TIMESTAMP,
    p_null_result       in            BOOLEAN DEFAULT FALSE );
```

Signature 11

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_from_value        IN            TIMESTAMP,
    p_to_value          IN            TIMESTAMP,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 12

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_value             IN            TIMESTAMP WITH TIME ZONE,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 13

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
```

```
    p_column_name       IN            t_column_name,
    p_from_value        IN            TIMESTAMP WITH TIME ZONE,
    p_to_value          IN            TIMESTAMP WITH TIME ZONE,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 14

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_value             IN            TIMESTAMP WITH LOCAL TIME ZONE,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 15

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_from_value        IN            TIMESTAMP WITH LOCAL TIME ZONE,
    p_to_value          IN            TIMESTAMP WITH LOCAL TIME ZONE,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 16

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            t_column_name,
    p_interval          IN            PLS_INTEGER,
    p_interval_type     IN            t_filter_interval_type,
    p_null_result       IN            BOOLEAN DEFAULT FALSE );
```

Signature 17

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_search_columns    IN            t_columns,
    p_is_case_sensitive IN            BOOLEAN DEFAULT FALSE,
    p_value             IN            VARCHAR2 );
```

Signature 18

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_sql_expression    IN            VARCHAR2 );
```

Signature 19

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

```
PROCEDURE ADD_FILTER (
    p_filters           IN OUT NOCOPY t_filters,
    p_filter_type       IN            t_filter_type,
    p_column_name       IN            VARCHAR2,
    p_value             IN            mdsys.sdo_geometry );
```

Parameters

Table 22-3 ADD_FILTER Procedure Parameters

Parameter	Description
p_filters	Filters array.
p_filter_type	Type of filter - use one of the t_filter_type constants.
p_column_name	Column to apply this filter on.
p_value	Value for filters requiring one value (for example, equals or greater than).
p_values	Value array for IN or NOT IN filters.
p_from_value	Lower value for filters requiring a range (for example, between).
p_to_value	Upper value for filters requiring a range (for example, between).
p_interval	Interval for date filters (for example, last X months).
p_interval_type	Interval type for date filters (months, dates).
p_sql_expression	Generic SQL expression to use as filter.
p_null_result	Result to return when the actual column value is NULL.
p_is_case_sensitive	Whether this filter should work case-sensitive or not.
p_search_columns	List of columns to apply the row search filter on.

Example

```
DECLARE
    l_filters     apex_exec.t_filters;
    l_context     apex_exec.t_context;
BEGIN
    apex_exec.add_filter(
        p_filters     => l_filters,
        p_filter_type => apex_exec.c_filter_eq,
        p_column_name => 'ENAME',
        p_value       => 'KING' );

   apex_exec.add_filter(
       p_filters     => l_filters,
```

```
        p_filter_type => apex_exec.c_filter_gt,
        p_column_name => 'SAL',
        p_value       => 2000 );

    l_context := apex_exec.open_web_source_query(
        p_module_static_id => '{web source module static ID}',
        p_filters          => l_filters
        p_max_rows         => 1000 );

        while apex_exec.next_row( l_context ) loop
            -- process rows here ...
        END loop;

  apex_exec.close( l_context );
EXCEPTION
     WHEN others THEN
        apex_exec.close( l_context );
        raise;
END;
```

22.7 ADD_ORDER_BY Procedure

This procedure adds an order by expression to the order bys collection.

Syntax

```
PROCEDURE ADD_ORDER_BY (
    p_order_bys         IN OUT NOCOPY t_order_bys,
    p_position          IN            PLS_INTEGER,
    p_direction         IN            t_order_direction default c_order_asc,
    p_order_nulls       IN            t_order_nulls     DEFAULT NULL );

procedure add_order_by (
    p_order_bys         IN OUT nocopy t_order_bys,
    p_column_name       IN            t_column_name,
    p_direction         IN            t_order_direction default c_order_asc,
    p_order_nulls       IN            t_order_nulls     DEFAULT NULL );
```

Parameters

Table 22-4 ADD_ORDER_BY Procedure Parameters

Parameter	Description
p_order_bys	Order by collection.
p_position	References a column of the provided data source by position.
p_column_name	References a column name or alias of the provided data source.
p_direction	Defines if the column should be sorted ascending or descending. Valid values are c_order_asc and c_order_desc.

Table 22-4 (Cont.) ADD_ORDER_BY Procedure Parameters

Parameter	Description
p_order_nulls	Defines if NULL data will sort to the bottom or top. Valid values are NULL, c_order_nulls_first and c_order_nulls_last. Use NULL for automatic handling based on the sort direction.

Example

```
declare
    l_order_bys   apex_exec.t_order_bys;
    l_context     apex_exec.t_context;
begin
    apex_exec.add_order_by(
        p_order_bys     => l_order_bys,
        p_column_name   => 'ENAME',
        p_direction     => apex_exec.c_order_asc );

   l_context := apex_exec.open_web_source_query(
       p_module_static_id => '{web source module static ID}',
       p_order_bys        => l_order_bys,
       p_max_rows         => 1000 );

       while apex_exec.next_row( l_context ) loop
          -- process rows here ...
       end loop;

   apex_exec.close( l_context );
exception
    when others then
        apex_exec.close( l_context );
raise;
end;
```

22.8 ADD_PARAMETER Procedure

This procedure adds a SQL parameter to the parameter collection. To use SQL parameters, prepare the array first, then use it in the execution call.

Syntax

Signature 1

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN           t_column_name,
    p_value      IN           VARCHAR2 );
```

Signature 2

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            NUMBER );
```

Signature 3

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            DATE );
```

Signature 4

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            TIMESTAMP );
```

Signature 5

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            TIMESTAMP WITH TIME ZONE );
```

Signature 6

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       in            t_column_name,
    p_value      IN            TIMESTAMP WITH LOCAL TIME ZONE );
```

Signature 7

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       in            t_column_name,
    p_value      in            INTERVAL YEAR TO MONTH );
```

Signature 8

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       in            t_column_name,
    p_value      in            INTERVAL DAY TO SECOND );
```

Signature 9

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            BLOB );
```

Signature 10

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            bfile );
```

Signature 11

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            CLOB );
```

Signature 12

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            SYS.ANYDATA );
```

Signature 13

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_data_type  IN            t_data_type,
    p_value      IN            t_value );
```

Signature 14

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

```
PROCEDURE ADD_PARAMETER (
    p_parameters IN OUT NOCOPY t_parameters,
    p_name       IN            t_column_name,
    p_value      IN            mdsys.sdo_geometry );
```

Parameters

Table 22-5 ADD_PARAMETER Procedure Parameters

Parameter	Description
p_parameters	SQL parameter array.
p_name	Parameter name.
p_value	Parameter value.

Example

```
declare
    l_parameters     apex_exec.t_parameters;
begin
    apex_exec.add_parameter( l_parameters, 'ENAME',    'SCOTT' );
    apex_exec.add_parameter( l_parameters, 'SAL',      2000 );
    apex_exec.add_parameter( l_parameters, 'HIREDATE', sysdate );

    apex_exec.execute_remote_plsql(
        p_server_static_id => '{static ID of the REST Enabled SQL Service}',
        p_auto_bind_items  => false,
        p_plsql_code       => q'#begin insert into emp values
(:ENAME, :SAL, :HIREDATE ); end;#',
        p_sql_parameters   => l_parameters );
end;
```

22.9 CLEAR_DML_ROWS Procedure

This procedure clears all DML rows which have been added with `add_dml_rows`.

Syntax

```
PROCEDURE CLEAR_DML_ROWS(
    p_context               IN t_context );
```

Parameters

Table 22-6 CLEAR_DML_ROWS Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions

22.10 CLOSE Procedure

This procedure closes the query context and releases resources.

> **Note:**
>
> Ensure to always call this procedure after work has finished or an exception occurs.

Syntax

```
PROCEDURE CLOSE(
    p_context IN t_context );
```

Parameters

Table 22-7 CLOSE Procedure Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.

22.11 COPY_DATA Procedure

This procedure fetches all rows from the source context and writes to the target context. Useful to copy data between different data sources (for example, local to remote, remote to web source etc).

Syntax

```
PROCEDURE COPY_DATA(
    p_from_context          IN OUT NOCOPY t_context,
    p_to_context            IN OUT NOCOPY t_context,
    p_operation_column_name IN            VARCHAR2 DEFAULT NULL);
```

Parameters

Table 22-8 COPY_DATA Procedure Parameters

Parameter	Description
p_from_context	Query context to fetch rows from.
p_to_context	DML context to write rows to.
p_operation_column_name	Column in the query context to indicate the DML operation to execute on the target context. Possible values are: • "I": insert the row on the target (DML) context • "U": update the row on the target (DML) context • "D": delete the row on the target (DML) context

Example

```
declare
    l_columns        apex_exec.t_columns;
```

```
    l_dml_context    apex_exec.t_context;
    l_query_context  apex_exec.t_context;
begin
    -- I. Define DML columns
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'EMPNO',
        p_data_type      => apex_exec.c_data_type_number,
        p_is_primary_key => true );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'ENAME',
        p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'JOB',
        p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'HIREDATE',
        p_data_type      => apex_exec.c_data_type_date );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'MGR',
        p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'SAL',
        p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'COMM',
        p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'DEPTNO',
        p_data_type      => apex_exec.c_data_type_number );

    -- II. Open the Query Context object
    l_query_context := apex_exec.open_remote_sql_query(
        p_server_static_id  => 'DevOps_Remote_SQL',
        p_sql_query         => 'select * from emp',
        p_columns           => l_columns );

    -- III. Open the DML context object
    l_dml_context := apex_exec.open_remote_dml_context(
        p_server_static_id      => '{remote server static id}',
        p_columns               => l_columns,
        p_query_type            => apex_exec.c_query_type_sql_query,
        p_sql_query             => 'select * from emp' );

    -- IV. Copy rows
    apex_exec.copy_data(
        p_from_context => l_query_context,
        p_to_context   => l_dml_context );
```

```
    -- V. Close contexts and free resources
    apex_exec.close( l_dml_context );
    apex_exec.close( l_query_context );
exception
    when others the
         apex_exec.close( l_dml_context );
         apex_exec.close( l_query_context );
         raise;

end;
```

22.12 EXECUTE_DML Procedure

This procedure executes the DML context . This procedure is called after:

- After the context has been opened (`open_dml_context`) .
- One or many DML rows have been added with `add_dml_row`.
- Column values have been set with `set_values`, `set_null` or `set_value`.

Syntax

```
PROCEDURE EXECUTE_DML(
    p_context               IN t_context,
    p_continue_on_error     IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 22-9 EXECUTE_DML Procedure Parameters

Parameter	Description
`p_context`	Context object obtained with one of the OPEN_ functions.
`p_continue_on_error`	Whether to continue executing DML for the remaining rows after an error occurred (defaults to false).

Example

See "SET_ROW_VERSION_CHECKSUM Procedure ", "OPEN_WEB_SOURCE_DML_CONTEXT Function (Deprecated)","OPEN_LOCAL_DML_CONTEXT Function ", and "OPEN_REMOTE_DML_CONTEXT Function "

22.13 EXECUTE_PLSQL Procedure

This procedure executes PL/SQL code based on the current process or plug-in location settings.

Syntax

```
PROCEDURE EXECUTE_PLSQL (
    p_plsql_code      IN     VARCHAR2,
    p_auto_bind_items IN     BOOLEAN      DEFAULT TRUE,
    p_sql_parameters  IN OUT t_parameters );
```

Parameters

Table 22-10 EXECUTE_PLSQL Procedure Parameters

Parameter	Description
p_plsql_code	PL/SQL code to be executed. Based on the settings of the current process or process-type plug-in, the code is executed locally or remote.
p_auto_bind_items	Whether to automatically bind page item values for IN **and** OUT direction. If the PL/SQL code references bind variables which are not page items, this must be set to `false`. Default: `true`.
p_sql_parameters	Additional bind variables, if needed. Note that `EXECUTE_PLSQL` binds all `p_sql_parameters` as VARCHAR2. Bind variables such as `NUMBER` and `DATE` are implicitly converted to VARCHAR2.

Examples

Example 1

Executes a PL/SQL block with arbitrary bind variables, so any bind can be used to pass values and to get values back.

```
declare
    l_sql_parameters apex_exec.t_parameters;
    l_out_value      varchar2(32767);
begin
    apex_exec.add_parameter( l_sql_parameters, 'MY_BIND_IN_VAR',  '{some
value}' );
    apex_exec.add_parameter( l_sql_parameters, 'MY_BIND_OUT_VAR',
''             );

    apex_exec.execute_plsql(
        p_plsql_code      => q'#begin :MY_BIND_OUT_VAR :=
some_plsql( p_parameter => :MY_BIND_IN_VAR ); end;#',
        p_auto_bind_items => false,
        p_sql_parameters  => l_sql_parameters );

    l_out_value := apex_exec.get_parameter_varchar2(
        p_parameters => l_sql_parameters,
        p_name       => 'MY_BIND_OUT_VAR');

    -- further processing of l_out_value
end;
```

Example 2

Executes a PL/SQL block.

```
begin
    apex_exec.execute_plsql(
        p_plsql_code => q'#begin :P10_NEW_SAL :=
salary_pkg.raise_sal( p_empno => :P10_EMPNO ); end;#' );
end;
```

22.14 EXECUTE_REMOTE_PLSQL Procedure

This procedure executes PL/SQL code on a REST Enabled SQL instance.

Syntax

```
PROCEDURE EXECUTE_REMOTE_PLSQL(
    p_server_static_id     IN     VARCHAR2,
    p_plsql_code           IN     VARCHAR2,
    p_auto_bind_items      IN     BOOLEAN      DEFAULT TRUE,
    p_sql_parameters       IN OUT t_parameters );
```

Parameters

Table 22-11 EXECUTE_REMOTE_PLSQL Procedure Parameters

Parameter	Description
p_server_static_id	Static ID of the ORDS REST Enabled SQL Instance.
p_plsql_code	PL/SQL code to be executed.
p_auto_bind_items	Whether to automatically bind page item values for IN *and* OUT direction. If the PL/SQL code references bind variables which are not page items, this must be set to FALSE. Default: TRUE
p_sql_parameters	Additional bind variables; if needed.

Examples

Example 1

Executes a PL/SQL block on a remote database.

```
begin
    apex_exec.execute_remote_plsql(
        p_server_static_id => '{Static ID of the REST Enabled SQL
Service}',
        p_plsql_code  => q'#begin :P10_NEW_SAL :=
salary_pkg.raise_sal( p_empno => :P10_EMPNO ); end;#' );
end;
```

Example 2

Works with arbitrary bind variables, so any bind can be used to pass values to the REST Enabled SQL service and to get values back.

```
 declare
        l_sql_parameters apex_exec.t_parameters;
        l_out_value      varchar2(32767);
    begin
        apex_exec.add_parameter( l_sql_parameters, 'MY_BIND_IN_VAR',  '{some
value}' );
        apex_exec.add_parameter( l_sql_parameters, 'MY_BIND_OUT_VAR',
''             );

        apex_exec.execute_remote_plsql(
            p_server_static_id     => '{Static ID of the REST Enabled SQL
Service}',
            p_plsql_code           => q'#begin :MY_BIND_OUT_VAR :=
some_remote_plsql( p_parameter => :MY_BIND_IN_VAR ); end;#',
            p_auto_bind_items => false,
            p_sql_parameters  => l_sql_parameters );

        l_out_value := apex_exec.get_parameter_varchar2(
            p_parameters  => l_sql_parameters,
            p_name        => 'MY_BIND_OUT_VAR');

        -- further processing of l_out_value
end;
```

22.15 EXECUTE_REST_SOURCE Procedure

This procedure executes a REST Source operation based on module name, operation, and URL pattern (if required). Use the `t_parameters` array to pass in values for declared REST Data Source parameters. REST Source invocation is based on metadata defined in Shared Components.

Syntax

```
PROCEDURE EXECUTE_REST_SOURCE (
    p_static_id     IN VARCHAR2,
    p_operation     IN VARCHAR2,
    p_url_pattern   IN VARCHAR2     DEFAULT NULL,
    p_parameters    IN OUT t_parameters );
```

Parameters

Table 22-12 EXECUTE_REST_SOURCE Procedure Parameters

Parameter	Description
p_static_id	Static ID of the REST Data Source.
p_operation	Name of the operation (for example, POST, GET, DELETE).

Table 22-12 (Cont.) EXECUTE_REST_SOURCE Procedure Parameters

Parameter	Description
p_url_pattern	If multiple operations with the same name exist, specify the URL pattern, as defined in Shared Components, to identify the REST Source operation.
p_parameters	Parameter values to pass to the external REST Data Source. Note that HTTP Headers, URL Patterns and other parameters being passed to a REST Data Source are typically strings. Oracle recommends to explicitly pass all values to VARCHAR2 before adding to the T_PARAMETERS array.
t_parameters	Array with OUT parameter values, received from the REST Data Source.

Returns

Table 22-13 EXECUTE_REST_SOURCE Procedure Returns

Return	Description
p_parameters	Array with OUT parameter values, received from the REST Data Source.

Example

This example assumes a REST service being created on the EMP table using ORDS and the "Auto-REST" feature (ORDS.ENABLE_OBJECT). Then a REST Data Source for this REST service is being created in Shared Components as "ORDS EMP".

The POST operation has the following "Request Body Template" defined:

```
{"empno": "#EMPNO#", "ename": "#ENAME#", "job": "#JOB#", "sal": #SAL#}
```

Parameters are defined as follows:

Name	Direction	Type	Default Value
EMPNO	IN	Request Body	n/a
ENAME	IN	Request Body	n/a
SAL	IN	Request Body	n/a
JOB	IN	Request Body	n/a
RESPONSE	OUT	Request Body	n/a
Content-Type	IN	HTTP Header	application/json

PL/SQL code to invoke that REST Source operation looks as follows:

```
DECLARE
    l_params apex_exec.t_parameters;
BEGIN
    apex_exec.add_parameter( l_params, 'ENAME', :P2_ENAME );
```

```
    apex_exec.add_parameter( l_params, 'EMPNO', :P2_EMPNO );
    apex_exec.add_parameter( l_params, 'SAL',   :P2_SAL   );
    apex_exec.add_parameter( l_params, 'JOB',   :P2_JOB   );

    apex_exec.execute_rest_source(
        p_static_id       => 'ORDS_EMP',
        p_operation       => 'POST',
        p_parameters      => l_params );

    :P2_RESPONSE := apex_exec.get_parameter_clob(l_params,'RESPONSE');
END;
```

22.16 EXECUTE_WEB_SOURCE Procedure (Deprecated)

> **Note:**
>
> This procedure is deprecated and will be removed in a future release. Use `execute_rest_source` instead.

This procedure executes a web source operation based on module name, operation and URL pattern (if required). Use the `t_parameters` array to pass in values for declared web source parameters. Web Source invocation is done based on metadata defined in Shared Components.

Syntax

```
PROCEDURE EXECUTE_WEB_SOURCE (
    p_module_static_id IN VARCHAR2,
    p_operation        IN VARCHAR2,
    p_url_pattern      IN VARCHAR2         DEFAULT NULL,
    p_parameters       IN OUT t_parameters );
```

Parameters

Table 22-14 EXECUTE_WEB_SOURCE Procedure Parameters

Parameter	Description
`p_module_static_id`	Static ID of the web source module.
`p_operation`	Name of the operation (for example, POST, GET, DELETE).
`p_url_pattern`	If multiple operations with the same name exist, specify the URL pattern, as defined in Shared Components, to identify the web source operation.
`p_parameters`	Parameter values to pass to the external web source. Note that HTTP Headers, URL Patterns and other parameters being passed to a Web Source Module are typically strings. Oracle recommends to explicitly pass all values to `VARCHAR2` before adding to the `T_PARAMETERS` array.
Returns	n/a

Table 22-14 (Cont.) EXECUTE_WEB_SOURCE Procedure Parameters

Parameter	Description
p_parameters	Array with OUT parameter values, received from the web source module.

Example

This example assumes a REST service being created on the EMP table using ORDS and the "Auto-REST" feature (ORDS.ENABLE_OBJECT). Then a Web Source Module for this REST service is being created in Shared Components as "ORDS EMP".

The POST operation has the following "Request Body Template" defined:

```
{"empno": "#EMPNO#", "ename": "#ENAME#", "job": "#JOB#", "sal": #SAL#}
```

Parameters are defined as follows:

Name	Direction	Type	Default Value
EMPNO	IN	Request Body	n/a
ENAME	IN	Request Body	n/a
SAL	IN	Request Body	n/a
JOB	IN	Request Body	n/a
RESPONSE	OUT	Request Body	n/a
Content-Type	IN	HTTP Header	application/json

PL/SQL code to invoke that web source operation looks as follows:

```
declare
    l_params apex_exec.t_parameters;
begin
    apex_exec.add_parameter( l_params, 'ENAME', :P2_ENAME );
    apex_exec.add_parameter( l_params, 'EMPNO', :P2_EMPNO );
    apex_exec.add_parameter( l_params, 'SAL',   :P2_SAL   );
    apex_exec.add_parameter( l_params, 'JOB',   :P2_JOB   );

    apex_exec.execute_web_source(
        p_module_static_id => 'ORDS_EMP',
        p_operation        => 'POST',
        p_parameters       => l_params );

    :P2_RESPONSE := apex_exec.get_parameter_clob(l_params,'RESPONSE');
end;
```

22.17 GET Functions

This function retrieves column values for different data types.

Syntax

```
FUNCTION GET_VARCHAR2 (
    p_context     IN t_context,
    p_column_idx  IN PLS_INTEGER ) RETURN VARCHAR2;

FUNCTION GET_VARCHAR2 (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN VARCHAR2;
```

Signature 1

```
FUNCTION GET_NUMBER (
    p_context     IN t_context,
    p_column_idx  IN PLS_INTEGER ) RETURN NUMBER;

FUNCTION GET_NUMBER (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN NUMBER;
```

Signature 2

```
FUNCTION GET_DATE (
    p_context     IN t_context,
    p_column_idx  IN PLS_INTEGER ) RETURN DATE;

FUNCTION GET_DATE (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN DATE;
```

Signature 3

```
FUNCTION GET_TIMESTAMP (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN TIMESTAMP;

FUNCTION GET_TIMESTAMP (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN TIMESTAMP;
```

Signature 4

```
FUNCTION GET_TIMESTAMP_TZ (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN TIMESTAMP WITH TIME ZONE;

FUNCTION GET_TIMESTAMP_TZ (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN TIMESTAMP WITH TIME ZONE;
```

Signature 5

```
FUNCTION GET_TIMESTAMP_LTZ (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN TIMESTAMP WITH LOCAL TIME
ZONE;

FUNCTION GET_TIMESTAMP_LTZ (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN TIMESTAMP WITH LOCAL TIME ZONE;
```

Signature 6

```
FUNCTION GET_CLOB (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN CLOB;

FUNCTION GET_CLOB (
    p_context    IN t_context,
    p_column_name IN VARCHAR2 ) RETURN CLOB;
```

Signature 7

```
FUNCTION GET_BLOB (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN BLOB;

FUNCTION GET_BLOB (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN BLOB;
```

Signature 8

```
FUNCTION GET_INTERVALD2S (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN DSINTERVAL_UNCONSTRAINED;

FUNCTION GET_INTERVALD2S (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN DSINTERVAL_UNCONSTRAINED;
```

Signature 9

```
FUNCTION GET_INTERVALY2M (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN YMINTERVAL_UNCONSTRAINED;

FUNCTION GET_INTERVALY2M (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN YMINTERVAL_UNCONSTRAINED;
```

Signature 10

```
FUNCTION GET_ANYDATA (
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN SYS.ANYDATA;

FUNCTION GET_ANYDATA (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN SYS.ANYDATA;
```

Signature 11

```
FUNCTION GET_SDO_GEOMETRY (
    p_context     IN t_context,
    p_column_name IN VARCHAR2 ) RETURN MDSYS.SDO_GEOMETRY;
```

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

Parameters

Table 22-15 GET Functions Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.
p_column_idx	Column index.
p_column_name	Column name.

Returns

The column value as specific data type.

22.18 GET_COLUMN Function

This function returns detailed information about a result set column.

Syntax

```
FUNCTION GET_COLUMN(
    p_context    IN t_context,
    p_column_idx IN PLS_INTEGER ) RETURN t_column;
```

Parameters

Table 22-16 GET_COLUMN Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_functions.
p_column_idx	Index of the column to retrieve information for.

Returns

t_column object with column metadata.

22.19 GET_COLUMN_COUNT Function

This function returns the result column count for the current execution context.

Syntax

```
FUNCTION GET_COLUMN_COUNT (
    p_context IN t_context ) RETURN PLS_INTEGER;
```

Parameters

Table 22-17 GET_COLUMN_COUNT Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.

Returns

Returns the result columns count.

22.20 GET_COLUMN_POSITION Function

This function returns the array index for a given column alias. In order to do this lookup operation only once, Oracle recommends you to use GET_COLUMN_POSITION function before entering the NEXT_ROW loop. This saves on computing resources.

Syntax

```
FUNCTION GET_COLUMN_POSITION (
    p_context           IN t_context,
    p_column_name       IN VARCHAR2,
    p_attribute_label   IN VARCHAR2  DEFAULT NULL,
    p_is_required       IN BOOLEAN   DEFAULT FALSE,
    p_data_type         IN VARCHAR2  DEFAULT c_data_type_varchar2 )
    RETURN PLS_INTEGER;
```

Parameters

Table 22-18 GET_COLUMN_POSITION Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.
p_attribute_label	Attribute label to format error messages.
p_column_name	Column name.
p_is_required	Indicates whether this is a required column.
p_data_type	Indicates the requested data type.

Returns

The position of the column in the query result set. Throws an exception when p_is_required or p_data_type prerequisites are not met.

22.21 GET_DATA_TYPE Function

This function converts the t_data_type constant into the VARCHAR2 representation, or the data type VARCHAR2 representation to the t_data_type constant.

Syntax

Signature 1

```
FUNCTION GET_DATA_TYPE (
    p_datatype_num      IN apex_exec.t_data_type )
    RETURN VARCHAR2;
```

Signature 2

```
FUNCTION GET_DATA_TYPE (
    p_datatype_num      IN VARCHAR2 )
    RETURN apex_exec.t_data_type;
```

Parameters

Table 22-19 GET_DATA_TYPE Function Parameters

Parameter	Description
p_datatype_num	Data type constant of apex_exec.t_data_type.
p_datatype	VARCHAR2 representation of the data type, as used by SQL.

Returns

Signature 1

VARCHAR2 representation of the data type, as used by SQL

Signature 2

Data type constant of `apex_exec.t_data_type`.

22.22 GET_DML_STATUS_CODE Function

This function returns the SQL status code of the last context execution, for the current row. For local or remote SQL contexts, the ORA error code will be returned in case of an error, `NULL` in case of success.

For REST Data Source contexts, the function returns the HTTP status code.

Syntax

```
FUNCTION GET_DML_STATUS_CODE (
    p_context               IN t_context )
    RETURN NUMBER;
```

Parameters

Table 22-20 GET_DML_STATUS_CODE Function Parameters

Parameter	Description
`p_context`	Context object obtained with one of the `OPEN_` functions.

Returns

The DML status code of the current row.

22.23 GET_DML_STATUS_MESSAGE Function

This function returns the SQL status message of the last context execution, for the current row. For local or remote SQL contexts, the ORA error message will be returned in case of an error; `NULL` in case of success.

For REST Data Source contexts, the function returns the HTTP reason phrase.

Syntax

```
FUNCTION GET_DML_STATUS_MESSAGE(
    p_context       IN t_context )
    RETURN VARCHAR2;
```

Parameters

Table 22-21 GET_DML_STATUS_MESSAGE Function Parameters

Parameter	Description
`p_context`	Context object obtained with one of the `OPEN_` functions.

Returns

The DML status message of the current row.

22.24 GET_PARAMETER Functions

These functions returns a SQL parameter value. Typically used to retrieve values for `OUT` binds of an executed SQL or PL/SQL statement.

Syntax

```
FUNCTION GET_PARAMETER_VARCHAR2 (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN VARCHAR2;

FUNCTION GET_PARAMETER_NUMBER (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN NUMBER;

FUNCTION GET_PARAMETER_DATE (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN DATE;

FUNCTION GET_PARAMETER_TIMESTAMP (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN TIMESTAMP;

FUNCTION GET_PARAMETER_TIMESTAMP_TZ (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN TIMESTAMP WITH TIME ZONE;

FUNCTION GET_PARAMETER_TIMESTAMP_LTZ (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN TIMESTAMP WITH LOCAL TIME ZONE;

FUNCTION GET_PARAMETER_CLOB (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN CLOB;

FUNCTION GET_PARAMETER_INTERVAL_D2S (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN INTERVAL DAY TO SECOND;

FUNCTION GET_PARAMETER_INTERVAL_Y2M (
    p_parameters      IN t_parameters,
    p_name            IN VARCHAR2 ) RETURN INTERVAL YEAR TO MONTH;
```

Parameters

Table 22-22 GET_PARAMETER Function Parameters

Parameter	Description
p_parameters	SQL parameter array.
p_name	Parameter name.

Returns

Parameter value.

22.25 GET_ROW_VERSION_CHECKSUM Function

This function returns the row version checksum for the current row. This is either a specific column (when designated as "checksum column") or a calculated checksum from all column values.

Syntax

```
FUNCTION GET_ROW_VERSION_CHECKSUM(
   p_context     IN t_context ) RETURN VARCHAR2;
```

Parameters

Table 22-23 GET_ROW_VERSION_CHECKSUM Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_functions.

Returns

The row version checksum.

22.26 GET_TOTAL_ROW_COUNT Function

This function returns the total row count of the query result.

Syntax

```
FUNCTION GET_TOTAL_ROW_COUNT (
    p_context       IN t_context )
    RETURN PLS_INTEGER;
```

Parameters

Table 22-24 GET_TOTAL_ROW_COUNT Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.

Returns

The total row count; NULL if unknown.

22.27 HAS_ERROR Function

This function returns TRUE when DML execution led to an error and FALSE when not.

Syntax

```
APEX_EXEC.HAS_ERROR(
    p_context                IN t_context)
    return boolean;
```

Parameters

Table 22-25 APEX_EXEC.HAS_ERROR Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.

Returns

true, if an error occurred, false otherwise.

22.28 HAS_MORE_ROWS Function

This function returns whether the data source has more data after fetching p_max_rows. This function only returns a value after the NEXT_ROW loop has finished. Only then we can know that there is more data to fetch than we actually requested.

Syntax

```
APEX_EXEC.HAS_MORE_ROWS (
    p_context IN t_context )
    return boolean;
```

Parameters

Table 22-26 APEX_EXEC.HAS_MORE_ROWS Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.

Returns

TRUE, if there is more data, FALSE otherwise. NULL if no more data detection was requested.

Examples

The following example executes a query, fetches a maximum of 10 rows, and prints the result set. If there are more rows, then a message "has more rows" displays. This example code can be used within an Execute PL/SQL region.

```
DECLARE
    l_context      apex_exec.t_context;

BEGIN
    l_context := apex_exec.open_query_context(
        p_location          => apex_exec.c_location_local_db,
        p_max_rows          => 10,
        p_sql_query         => 'select * from emp' );

    while apex_exec.next_row( l_context ) loop
        htp.p( 'EMPNO: ' || apex_exec.get_number  ( l_context,
'EMPNO' ) );
        htp.p( 'ENAME: ' || apex_exec.get_varchar2( l_context,
'ENAME' ) );
        htp.p( '<br>' );
    END loop;
    IF apex_exec.has_more_rows( l_context ) THEN
        htp.p( 'there are more rows ...' );
    END IF;

    apex_exec.close( l_context );
    return;
EXCEPTION
    when others then
        apex_exec.close( l_context );
        raise;
END;
```

22.29 IS_REMOTE_SQL_AUTH_VALID Function

This function checks whether the current authentication credentials are correct for the given REST Enabled SQL instance.

Syntax

```
function IS_REMOTE_SQL_AUTH_VALID (
    p_server_static_id  IN    VARCHAR2 )
    RETURN BOOLEAN;
```

Parameters

Table 22-27 IS_REMOTE_SQL_AUTH_VALID Function Parameters

Parameter	Description
p_server_static_id	Static ID of the REST enabled SQL instance.

Returns

Returns `true`, when credentials are correct, `false` otherwise.

Example

The following example requires a REST enabled SQL instance created as `My Remote SQL`. It uses credentials stored as `SCOTT_Credentials`.

```
begin
    apex_credentials.set_session_credentials(
        p_application_id    => {application-id},
        p_credential_name   => 'SCOTT_Credentials',
        p_username          => 'SCOTT',
        p_password          => '****' );
    if apex_exec.check_rest_enabled_sql_auth(
        p_server_static_id  => 'My_Remote_SQL' )
    then
        sys.dbms_output.put_line( 'credentials are correct!');
    else
        sys.dbms_output.put_line( 'credentials are NOT correct!');
    end if;
end;
```

22.30 NEXT_ROW Function

This function advances the cursor of an open query or DML context, after execution, by one row.

Syntax

```
FUNCTION NEXT_ROW(
    p_context IN t_context ) RETURN BOOLEAN;
```

Parameters

Table 22-28 NEXT_ROW Function Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.

Returns

Returns false when the end of the response has been reached, true otherwise.

22.31 OPEN_LOCAL_DML_CONTEXT Function

This function opens a DML context based for a local database.

Syntax

```
FUNCTION OPEN_LOCAL_DML_CONTEXT (
    p_columns               IN t_columns               DEFAULT
c_empty_columns,
    p_query_type            IN t_query_type,
    --
    p_table_owner           IN VARCHAR2                DEFAULT NULL,
    p_table_name            IN VARCHAR2                DEFAULT NULL,
    p_where_clause          IN VARCHAR2                DEFAULT NULL,
    --
    p_sql_query             IN VARCHAR2                DEFAULT NULL,
    p_plsql_function_body   IN VARCHAR2                DEFAULT NULL,
    --
    p_with_check_option     IN BOOLEAN                 DEFAULT TRUE,
    p_optimizer_hint        IN VARCHAR2                DEFAULT NULL,
    --
    p_dml_table_owner       IN VARCHAR2                DEFAULT NULL,
    p_dml_table_name        IN VARCHAR2                DEFAULT NULL,
    p_dml_plsql_code        IN VARCHAR2                DEFAULT NULL,
    --
    p_lost_update_detection IN t_lost_update_detection DEFAULT NULL,
    p_lock_rows             IN t_lock_rows             DEFAULT NULL,
    p_lock_plsql_code       IN VARCHAR2                DEFAULT NULL,
    --
    p_sql_parameters        IN t_parameters            DEFAULT
c_empty_parameters ) RETURN t_context;
```

Parameters

Table 22-29 OPEN_LOCAL_DML_CONTEXT Function Parameters

Parameter	Description
p_columns	DML columns to pass to the data source.

Table 22-29 (Cont.) OPEN_LOCAL_DML_CONTEXT Function Parameters

Parameter	Description
p_query_type	DML columns to pass to the data source. Indicates the type of the data source: possible values are: • c_query_type_table: Use a plain Table as the data source. • c_query_type_sql_query: Use a SQL query as the data source. • c_query_type_func_return_sql: Use the SQL query returned by the PL/SQL function.
p_table_owner	For query type TABLE: Table owner
p_table_name	For query type TABLE: Table name
p_where_clause	For query type TABLE: where clause
p_sql_query	For query type SQL QUERY: the query
p_plsql_function_body	For query type PLSQL: the PL/SQL function which returns the SQL query
p_with_check_option	Specify whether to the "WITH CHECK OPTION" should be added to the data source. If set to "true" (default), INSERTED or UPDATED rows cannot violate the where clause.
p_optimizer_hint	Optimizer hints to be added to the DML clause
p_dml_table_owner	When set, DML statements will be executed against this table
p_dml_table_name	When set, DML statements will be executed against this table
p_dml_plsql_code	Custom PL/SQL code to be executed instead of DML statements
p_lost_update_detection	lost-update detection type. Possible values are: • c_lost_update_implicit: APEX calculates a checksum from the row values • c_lost_update_explicit: One of the p_columns has the "is_checksum" attribute set • c_lost_update_none: No lost update detection
p_lock_rows	Specify whether to lock the rows for the (short) time frame between the lost update detection and the actual DML statement. Possible values are: • c_lock_rows_automatic: use a SELECT .. FOR UPDATE • c_lock_rows_plsql: use custom PL/SQL code to lock the rows • c_lock_rows_none: do not lock rows
p_dml_plsql_code	Custom PL/SQL code to be used to lock the rows
p_sql_parameters	Bind variables to be used

Example

The following inserts one row into the EMP table on a REST Enabled SQL Service.

```
declare
    l_columns        apex_exec.t_columns;
```

```
    l_context        apex_exec.t_context;
begin
    -- I. Define DML columns
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'EMPNO',
       p_data_type      => apex_exec.c_data_type_number,
       p_is_primary_key => true );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'ENAME',
       p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'JOB',
       p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'HIREDATE',
       p_data_type      => apex_exec.c_data_type_date );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'MGR',
       p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'SAL',
       p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'COMM',
       p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'DEPTNO',
       p_data_type      => apex_exec.c_data_type_number );

    -- II. Open the context object
    l_context := apex_exec.open_local_dml_context(
       p_columns              => l_columns,
       p_query_type           => apex_exec.c_query_type_sql_query,
       p_sql_query            => 'select * from emp where deptno =
10',
       p_lost_update_detection => apex_exec.c_lost_update_none );

    -- III. Provide DML data

    apex_exec.add_dml_row(
       p_context   => l_context,
       p_operation => apex_exec.c_dml_operation_insert );

    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 1,
       p_value           => 4711 );
```

```
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 2,
       p_value           => 'DOE' );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 3,
       p_value           => 'DEVELOPR' );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 4,
       p_value           => sysdate );
    apex_exec.set_value(
       p_column_position => 6,
       p_value           => 1000 );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 8,
       p_value           => 10 );

    -- IV: Execute the DML statement

    apex_exec.execute_dml(
       p_context           => l_context,
       p_continue_on_error => false);

     apex_exec.close( l_context );
exception
    when others then
        apex_exec.close( l_context );
        raise;

end;
```

Returns

The context object representing the DML handle.

22.32 OPEN_QUERY_CONTEXT Function Signature 1

This function opens a query context for a local database, remote database, or Web Source Module.

Syntax

```
FUNCTION OPEN_QUERY_CONTEXT (
  p_location               IN apex_exec_api.t_location,
  --
  p_table_owner            IN VARCHAR2                DEFAULT NULL,
  p_table_name             IN VARCHAR2                DEFAULT NULL,
  p_where_clause           IN VARCHAR2                DEFAULT NULL,
  p_order_by_clause        IN VARCHAR2                DEFAULT NULL,
  p_include_rowid_column   IN BOOLEAN                 DEFAULT FALSE,
  --
```

```
  p_sql_query              IN VARCHAR2              DEFAULT NULL,
  p_plsql_function_body    IN VARCHAR2              DEFAULT NULL,
  p_optimizer_hint         IN VARCHAR2              DEFAULT NULL,
  --
  p_server_static_id       IN VARCHAR2              DEFAULT NULL,
  --
  p_module_static_id       IN VARCHAR2              DEFAULT NULL,
  p_web_src_parameters     IN t_parameters          DEFAULT
c_empty_parameters,
  p_external_filter_expr   IN VARCHAR2              DEFAULT NULL,
  p_external_order_by_expr IN VARCHAR2              DEFAULT NULL,
  --
  p_sql_parameters         IN t_parameters          DEFAULT
c_empty_parameters,
  p_auto_bind_items        IN BOOLEAN               DEFAULT TRUE,
  --
  p_columns                IN t_columns             DEFAULT
c_empty_columns,
  --
  p_filters                IN t_filters             DEFAULT
c_empty_filters,
  p_order_bys              IN t_order_bys           DEFAULT
c_empty_order_bys,
  p_aggregation            IN t_aggregation         DEFAULT
c_empty_aggregation,
  --
  p_first_row              IN PLS_INTEGER           DEFAULT NULL,
  p_max_rows               IN PLS_INTEGER           DEFAULT NULL,
  --
  p_total_row_count        IN BOOLEAN               DEFAULT FALSE,
  p_total_row_count_limit  IN NUMBER                DEFAULT NULL )
  RETURN t_context;
```

Parameters

Table 22-30 OPEN_QUERY_CONTEXT Function Parameters

Parameter	Description
p_location	Location to open the query context for. Can be local database, remote database, or Web Source Module. Use the C_LOCATION_LOCAL_DB, C_LOCATION_REMOTE_DB or C_LOCATION_WEB_SOURCE constants.
p_module_static_id	Static ID of the Web Source Module, when C_LOCATION_WEB_SOURCE has been used for p_location.
p_server_static_id	Static ID of the Remote Server, when C_LOCATION_REMOTE_DB has been used for p_location.
p_table_owner	Table owner when query type TABLE is used.
p_table_name	Table name when query type TABLE is used.
p_where_clause	Where clause to append when query type TABLE is used.
p_order_by_clause	Order by clause to append when query type TABLE is used.
p_include_rowid_column	Add the ROWID column to the SELECT list when query type TABLE is used. Defaults to FALSE.

Table 22-30 (Cont.) OPEN_QUERY_CONTEXT Function Parameters

Parameter	Description
p_sql_query	SQL Query to execute when query type `SQL Query` is used.
p_plsql_function_body	PL/SQL function body returning SQL query.
p_optimizer_hint	Optimizer hint to be applied to the most outer SQL query generated by APEX.
p_external_filter_expr	External filter expression to be passed to a Web Source Module.
p_external_order_by_expr	External order by expression to be passed to a Web Source Module.
p_web_src_parameters	Parameters to be passed to a Web Source Module.
p_auto_bind_items	Whether to auto-bind APEX items (page and application items).
p_sql_parameters	Additional bind variables to be used for the SQL query.
p_filters	Filters to be passed to the query context.
p_order_bys	Order by expressions to be passed to the query context.
p_aggregation	Aggregation (`GROUP BY`, `DISTINCT`) to apply on top of the query.
p_columns	Columns to be selected.
p_first_row	First row to be fetched from the result set.
p_max_rows	Maximum amount of rows to be fetched.
p_total_row_count	Whether to determine the total row count.
p_total_row_count_limit	Upper boundary for total row count computation.

Returns

The context object representing a cursor for the query.

Example

The following example executes a query and prints out the result set. This example code can be used within a `Execute PL/SQL` region.

```
DECLARE
    l_context apex_exec.t_context;
    --
    l_idx_empno    pls_integer;
    l_idx_ename    pls_integer;
    l_idx_job      pls_integer;
    l_idx_hiredate pls_integer;
    l_idx_mgr      pls_integer;
    l_idx_sal      pls_integer;
    l_idx_comm     pls_integer;
    l_idx_deptno   pls_integer;
    --
BEGIN
    l_context := apex_exec.open_query_context(
        p_location          => apex_exec.c_location_local_db,
        p_sql_query         => 'select * from emp' );
    --
```

```
    l_idx_empno    := apex_exec.get_column_position( l_context,
'EMPNO');
    l_idx_ename    := apex_exec.get_column_position( l_context,
'ENAME');
    l_idx_job      := apex_exec.get_column_position( l_context,
'JOB');
    l_idx_hiredate := apex_exec.get_column_position( l_context,
'HIREDATE');
    l_idx_mgr      := apex_exec.get_column_position( l_context,
'MGR');
    l_idx_sal      := apex_exec.get_column_position( l_context,
'SAL');
    l_idx_comm     := apex_exec.get_column_position( l_context,
'COMM');
    l_idx_deptno   := apex_exec.get_column_position( l_context,
'DEPTNO');
    --
    WHILE apex_exec.next_row( l_context ) LOOP
    --
        htp.p( 'EMPNO: ' || apex_exec.get_number  ( l_context,
l_idx_empno    ) );
        htp.p( 'ENAME: ' || apex_exec.get_varchar2( l_context,
l_idx_ename    ) );
        htp.p( 'MGR:   ' || apex_exec.get_number  ( l_context,
l_idx_mgr      ) );
    --
    END LOOP;
    --
    apex_exec.close( l_context );
    RETURN;
EXCEPTION
    WHEN others THEN
        apex_exec.close( l_context );
        RAISE;
END;
```

22.33 OPEN_QUERY_CONTEXT Function Signature 2

This procedure enables plug-in developers to open a query context based on the current region source. All data source information that the query retrieves is from the plug-in region metadata.

Syntax

```
FUNCTION OPEN_QUERY_CONTEXT (
    p_columns               IN t_columns        DEFAULT
c_empty_columns,
    --
    p_filters               IN t_filters        DEFAULT
c_empty_filters,
    p_order_bys             IN t_order_bys      DEFAULT
c_empty_order_bys,
    p_aggregation           IN t_aggregation    DEFAULT
c_empty_aggregation,
```

```
    --
    p_first_row             IN PLS_INTEGER      DEFAULT NULL,
    p_max_rows              IN PLS_INTEGER      DEFAULT NULL,
    --
    p_total_row_count       IN BOOLEAN          DEFAULT FALSE,
    p_total_row_count_limit IN NUMBER           DEFAULT NULL,
    --
    p_sql_parameters        IN t_parameters     DEFAULT c_empty_parameters )
    RETURN t_context;
```

Parameters

Table 22-31 OPEN_QUERY_CONTEXT Function Parameters

Parameter	Description
p_columns	Columns to be selected.
p_filters	Filters to be passed to the query context.
p_order_bys	Order by expressions to be passed to the query context.
p_aggregation	Aggregation (GROUP BY, DISTINCT) to apply on top of the query.
p_first_row	First row to be fetched from the result set.
p_max_rows	Maximum amount of rows to be fetched.
p_total_row_count	Whether to determine the total row count.
p_total_row_count_limit	Upper boundary for total row count computation.
p_sql_parameters	Additional bind variables to be used for the SQL query.

22.34 OPEN_REMOTE_DML_CONTEXT Function

This function opens a DML context based for a remote database.

Syntax

```
function open_remote_dml_context (
    p_server_static_id      IN VARCHAR2,
    --
    p_columns               IN t_columns              DEFAULT
c_empty_columns,
    p_query_type            IN t_query_type,
    --
    p_table_owner           IN VARCHAR2               DEFAULT NULL,
    p_table_name            IN VARCHAR2               DEFAULT NULL,
    p_where_clause          IN VARCHAR2               DEFAULT NULL,
    --
    p_sql_query             IN VARCHAR2               DEFAULT NULL,
    p_plsql_function_body   IN VARCHAR2               DEFAULT NULL,
    --
    p_with_check_option     IN BOOLEAN                DEFAULT TRUE,
    p_optimizer_hint        IN VARCHAR2               DEFAULT NULL,
    --
    p_dml_table_owner       IN VARCHAR2               DEFAULT NULL,
    p_dml_table_name        IN VARCHAR2               DEFAULT NULL,
    p_dml_plsql_code        IN VARCHAR2               DEFAULT NULL,
```

```
    --
    p_lost_update_detection IN t_lost_update_detection DEFAULT NULL,
    p_lock_rows             IN t_lock_rows             DEFAULT NULL,
    p_lock_plsql_code       IN VARCHAR2                DEFAULT NULL,
    --
    p_sql_parameters        IN t_parameters            DEFAULT
c_empty_parameters )
    RETURN t_context;
```

Parameters

Table 22-32 OPEN_REMOTE_DML_CONTEXT Function Parameters

Parameter	Description
p_server_static_id	Static ID of the ORDS REST Enabled SQL Instance.
p_columns	DML columns to pass to the Data Source.
p_query_type	DML columns to pass to the Data Source. Indicates the type of the Data Source. Possible values are: • c_query_type_table: Use a plain Table as the data source. • c_query_type_sql_query: Use a SQL query as the data source. • c_query_type_func_return_sql: Use the SQL query returned by the PL/SQL function.
p_table_owner	For query type TABLE: Table owner.
p_table_name	For query type TABLE: Table name.
p_where_clause	For query type TABLE: where clause.
p_sql_query	For query type SQL QUERY: the query.
p_plsql_function_body	For query type PLSQL: the PL/SQL function which returns the SQL query.
p_with_check_option	Specify whether to the "WITH CHECK OPTION" should be added to the data source. If set to "TRUE" (default), INSERTED or UPDATED rows cannot violate the where clause.
p_optimizer_hint	Optimizer hints to be added to the DML clause.
p_dml_table_owner	When set, DML statements will be executed against this table.
p_dml_table_name	When set, DML statements will be executed against this table.
p_dml_plsql_code	Custom PL/SQL code to be executed instead of DML statements.
p_lost_update_detection	Lost-update detection type. Possible values are: • c_lost_update_implicit: APEX calculates a checksum from the row values • c_lost_update_explicit: One of the p_columns has the "is_checksum" attribute set • c_lost_update_none: No lost update detection

Table 22-32 (Cont.) OPEN_REMOTE_DML_CONTEXT Function Parameters

Parameter	Description
p_lock_rows	Specify whether to lock the rows for the (short) time frame between the lost update detection and the actual DML statement. Possible values are: • c_lock_rows_automatic: use a SELECT .. FOR UPDATE • c_lock_rows_plsql: use custom PL/SQL code to lock the rows • c_lock_rows_none: do not lock rows
p_dml_plsql_code	Custom PL/SQL code to be used to lock the rows.
p_sql_parameters	Bind variables to be used.

Returns

The context object representing the DML handle.

Example

The following inserts one row into the EMP table on a REST Enabled SQL Service.

```
DECLARE
    l_columns        apex_exec.t_columns;
    l_context        apex_exec.t_context;
BEGIN
    -- I. Define DML columns
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'EMPNO',
       p_data_type      => apex_exec.c_data_type_number,
       p_is_primary_key => true );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'ENAME',
       p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'JOB',
       p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'HIREDATE',
       p_data_type      => apex_exec.c_data_type_date );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'MGR',
       p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'SAL',
       p_data_type      => apex_exec.c_data_type_number );
```

```
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'COMM',
       p_data_type      => apex_exec.c_data_type_number );
    apex_exec.add_column(
       p_columns        => l_columns,
       p_column_name    => 'DEPTNO',
       p_data_type      => apex_exec.c_data_type_number );

    -- II. Open the context object
    l_context := apex_exec.open_remote_dml_context(
       p_server_static_id      => '{remote server static id}',
       p_columns               => l_columns,
       p_query_type            => apex_exec.c_query_type_sql_query,
       p_sql_query             => 'select * from emp where deptno =
10',
       p_lost_update_detection => apex_exec.c_lost_update_none );

    -- III. Provide DML data

    apex_exec.add_dml_row(
       p_context   => l_context,
       p_operation => apex_exec.c_dml_operation_insert );

    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 1,
       p_value           => 4711 );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 2,
       p_value           => 'DOE' );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 3,
       p_value           => 'DEVELOPR' );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 4,
       p_value           => sysdate );
    apex_exec.set_value(
       p_column_position => 6,
       p_value           => 1000 );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 8,
       p_value           => 10 );

    -- IV: Execute the DML statement

    apex_exec.execute_dml(
       p_context           => l_context,
       p_continue_on_error => false);
       apex_exec.close( l_context );
EXCEPTION
```

```
    when others then
        apex_exec.close( l_context );
        raise;
END;
```

22.35 OPEN_REMOTE_SQL_QUERY Function

This function opens a query context and executes the provided SQL query on the ORDS REST Enabled SQL instance.

Syntax

```
FUNCTION OPEN_REMOTE_SQL_QUERY(
    p_server_static_id      IN VARCHAR2,
    p_sql_query             IN VARCHAR2,
    p_sql_parameters        IN t_parameters DEFAULT c_empty_parameters,
    p_auto_bind_items       IN BOOLEAN      DEFAULT TRUE,
    --
    p_first_row             IN PLS_INTEGER  DEFAULT NULL,
    p_max_rows              IN PLS_INTEGER  DEFAULT NULL,
    --
    p_total_row_count       IN BOOLEAN      DEFAULT FALSE,
    p_total_row_count_limit IN PLS_INTEGER  DEFAULT NULL )
    RETURN t_context;
```

Parameters

Table 22-33 OPEN_REMOTE_SQL_QUERY Function Parameters

Parameter	Description
p_server_static_id	Static ID of the ORDS REST Enabled SQL Instance.
p_sql_query	SQL Query to execute.
p_sql_parameters	Bind variables to pass to the remote server.
p_auto_bind_items	Whether to auto-bind all page items.
p_first_row	First row to be fetched from the result set.
p_max_rows	Maximum amount of rows to be fetched.
p_total_row_count	Whether to determine the total row count.
p_total_row_count_limit	Upper boundary for total row count computation.

Returns

The context object representing a cursor for the web source query.

Example

The following example assumes a REST enabled ORDS instance to be configured in Shared Components with the static ID "My_Remote_SQL_Instance". Based on that, the example

executes the query on the remote server and prints out the result set. This example code could be used Within a plug-in or within a "Execute PL/SQL" region.

```
declare
    l_context apex_exec.t_context;

    l_idx_empno    pls_integer;
    l_idx_ename    pls_integer;
    l_idx_job      pls_integer;
    l_idx_hiredate pls_integer;
    l_idx_mgr      pls_integer;
    l_idx_sal      pls_integer;
    l_idx_comm     pls_integer;
    l_idx_deptno   pls_integer;

begin
    l_context := apex_exec.open_remote_sql_query(
         p_server_static_id   => 'My_Remote_SQL_Instance',
         p_sql_query          => 'select * from emp' );

    l_idx_empno    := apex_exec.get_column_position( l_context,
'EMPNO');
    l_idx_ename    := apex_exec.get_column_position( l_context,
'ENAME');
    l_idx_job      := apex_exec.get_column_position( l_context,
'JOB');
    l_idx_hiredate := apex_exec.get_column_position( l_context,
'HIREDATE');
    l_idx_mgr      := apex_exec.get_column_position( l_context,
'MGR');
    l_idx_sal      := apex_exec.get_column_position( l_context,
'SAL');
    l_idx_comm     := apex_exec.get_column_position( l_context,
'COMM');
    l_idx_deptno   := apex_exec.get_column_position( l_context,
'DEPTNO');

    while apex_exec.next_row( l_context ) loop

          htp.p( 'EMPNO: ' || apex_exec.get_number  ( l_context,
l_idx_empno    ) );
          htp.p( 'ENAME: ' || apex_exec.get_varchar2( l_context,
l_idx_ename    ) );
          htp.p( 'MGR:   ' || apex_exec.get_number  ( l_context,
l_idx_mgr      ) );

    end loop;

    apex_exec.close( l_context );
    return;
exception
    when others then
         apex_debug.log_exception;
         apex_exec.close( l_context );
```

```
    raise;
end;
```

22.36 OPEN_REST_SOURCE_DML_CONTEXT Function

This function opens a DML context based for a REST Data Source.

Syntax

```
FUNCTION OPEN_REST_SOURCE_DML_CONTEXT (
    p_static_id             IN VARCHAR2,
    p_parameters            IN t_parameters            DEFAULT
c_empty_parameters,
    --
    p_columns               IN t_columns               DEFAULT
c_empty_columns,
    p_lost_update_detection IN t_lost_update_detection DEFAULT NULL )
    RETURN t_context;
```

Parameters

Table 22-34 OPEN_REST_SOURCE_DML_CONTEXT Function Parameters

Parameter	Description
p_static_id	Static ID of the REST Data Source to use. This REST Data Source must have operations for at least one of the Insert Rows, Update Rows or Delete rows database actions.
p_parameters	REST Data Source parameter values to pass to the DML context.
p_columns	DML columns to pass to the data source.
p_lost_update_detection	Lost-update detection type. Possible values are: • c_lost_update_implicit: APEX calculates a checksum from the row values. • c_lost_update_explicit: One of the p_columns has the is_checksum attribute set. • c_lost_update_none: No lost update detection.

Returns

The context object representing the DML handle.

Example

The following inserts one row into the EMP REST Data Source.

```
DECLARE
    l_columns        apex_exec.t_columns;
    l_context        apex_exec.t_context;
BEGIN
    -- I. Define DML columns
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'EMPNO',
```

```
    p_data_type      => apex_exec.c_data_type_number,
    p_is_primary_key => true );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'ENAME',
    p_data_type      => apex_exec.c_data_type_varchar2 );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'JOB',
    p_data_type      => apex_exec.c_data_type_varchar2 );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'HIREDATE',
    p_data_type      => apex_exec.c_data_type_date );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'MGR',
    p_data_type      => apex_exec.c_data_type_number );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'SAL',
    p_data_type      => apex_exec.c_data_type_number );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'COMM',
    p_data_type      => apex_exec.c_data_type_number );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'DEPTNO',
    p_data_type      => apex_exec.c_data_type_number );

-- II. Open the context object
l_context := apex_exec.open_web_source_dml_context(
    p_server_static_id      => '{module static id}',
    p_columns               => l_columns,
    p_lost_update_detection => apex_exec.c_lost_update_none );

-- III. Provide DML data

apex_exec.add_dml_row(
   p_context   => l_context,
   p_operation => apex_exec.c_dml_operation_insert );

apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 1,
   p_value           => 4711 );
apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 2,
   p_value           => 'DOE' );
apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 3,
   p_value           => 'DEVELOPR' );
```

```
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 4,
       p_value           => sysdate );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 6,
       p_value           => 1000 );
    apex_exec.set_value(
       p_context         => l_context,
       p_column_position => 8,
       p_value           => 10 );

    -- IV: Execute the DML statement

    apex_exec.execute_dml(
       p_context           => l_context,
       p_continue_on_error => false);

    apex_exec.close( l_context );
EXCEPTION
    WHEN others THEN
         apex_exec.close( l_context );
         raise;

END;
```

22.37 OPEN_REST_SOURCE_QUERY Function

This function opens a REST Source query context. Based on the provided REST Source static ID, the operation matched to the `FETCH_COLLECTION` database operation will be selected.

Syntax

```
FUNCTION OPEN_REST_SOURCE_QUERY (
    p_static_id              IN VARCHAR2,
    p_parameters             IN t_parameters     DEFAULT c_empty_parameters,
    --
    p_filters                IN t_filters        DEFAULT c_empty_filters,
    p_order_bys              IN t_order_bys      DEFAULT c_empty_order_bys,
    p_aggregation            IN t_aggregation    DEFAULT c_empty_aggregation,
    p_columns                IN t_columns        DEFAULT c_empty_columns,
    --
    p_first_row              IN PLS_INTEGER      DEFAULT NULL,
    p_max_rows               IN PLS_INTEGER      DEFAULT NULL,
    --
    p_external_filter_expr   IN VARCHAR2         DEFAULT NULL,
    p_external_order_by_expr IN VARCHAR2         DEFAULT NULL,
    p_total_row_count        IN BOOLEAN          DEFAULT FALSE )
    RETURN t_context;
```

Parameters

Table 22-35 OPEN_REST_SOURCE_QUERY Parameters

Parameter	Description
p_static_id	Static ID of the REST Data Source to invoke.
p_parameters	Parameter values to be passed to the data source.
p_filters	Filters to be passed to the data source.
p_order_bys	Order by expressions to be passed to the data source.
p_aggregation	Aggregation (GROUP BY, DISTINCT) to apply on top of the query.
p_columns	Columns to be selected from the data source.
p_first_row	First row to be fetched from the data source.
p_max_rows	Maximum amount of rows to be fetched from the data source.
p_external_filter_expr	Filter expression to be passed 1:1 to the external web service. Depends on the actual web service being used.
p_external_order_by_expr	Order by expression to be passed 1:1 to the external web service. Depends on the actual web service being used.
p_total_row_count	Whether to determine the total row count (only supported when the attribute "allow fetch all rows" equals Yes).

Returns

The context object representing a cursor for the REST Data Source query

Example

The following example assumes a REST Data Source with the static ID USGS to be created in Shared Components, based on the URL endpoint https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_day.geojson. The example invokes the REST service and prints out the result set. This example code could be used within a plug-in or within a Execute PL/SQL region.

```
declare
    l_context apex_exec.t_context;
    l_filters apex_exec.t_filters;
    l_columns apex_exec.t_columns;

    l_row     pls_integer := 1;

    l_magidx  pls_integer;
    l_titidx  pls_integer;
    l_plcidx  pls_integer;
    l_timidx  pls_integer;
    l_ididx   pls_integer;
begin
    l_context := apex_exec.open_rest_source_query(
        p_module_static_id => 'USGS',
        p_max_rows         => 1000 );

    l_titidx := apex_exec.get_column_position( l_context, 'TITLE' );
```

```
    l_magidx := apex_exec.get_column_position( l_context, 'MAG' );
    l_plcidx := apex_exec.get_column_position( l_context, 'PLACE' );
    l_timidx := apex_exec.get_column_position( l_context, 'TIME' );
    l_ididx  := apex_exec.get_column_position( l_context, 'ID' );

    while apex_exec.next_row( l_context ) loop

        htp.p( 'ID:    ' || apex_exec.get_varchar2( l_context, l_ididx  ) );
        htp.p( 'MAG:   ' || apex_exec.get_varchar2( l_context, l_magidx ) );
        htp.p( 'PLACE: ' || apex_exec.get_varchar2( l_context, l_plcidx ) );
        htp.p( 'TITLE: ' || apex_exec.get_varchar2( l_context, l_tititdx ) );
        htp.p( 'TIME:  ' || apex_exec.get_varchar2( l_context, l_timidx ) );
     end loop;

     apex_exec.close( l_context );
exception
     when others then
         apex_exec.close( l_context );
     raise;
end;
```

22.38 OPEN_WEB_SOURCE_DML_CONTEXT Function (Deprecated)

> **Note:**
>
> This function is deprecated and will be removed in a future release. Use `open_rest_source_dml_context` instead. See OPEN_REST_SOURCE_DML_CONTEXT Function.
>
> Additionally, the parameter `p_module_static_id` is deprecated. Use `p_static_id` instead.

This function opens a DML context based for a web source module.

Syntax

```
FUNCTION OPEN_WEB_SOURCE_DML_CONTEXT (
    p_module_static_id      IN VARCHAR2,
    p_parameters            IN t_parameters            DEFAULT
c_empty_parameters,
    --
    p_columns               IN t_columns               DEFAULT
c_empty_columns,
    p_lost_update_detection IN t_lost_update_detection DEFAULT NULL )
    RETURN t_context;
```

Parameters

Table 22-36 OPEN_WEB_SOURCE_DML_CONTEXT Function Parameters

Parameter	Description
p_module_static_id (deprecated)	Static ID of the web source module to use. This web source module must have operations for at least one of the Insert Rows, Update Rows or Delete rows database actions. This parameter is deprecated. Use p_static_id instead.
p_parameters	Web source parameter values to pass to the DML context.
p_columns	DML columns to pass to the data source
p_lost_update_detection	Lost-update detection type. Possible values are: • c_lost_update_implicit: APEX calculates a checksum from the row values • c_lost_update_explicit: One of the p_columns has the "is_checksum" attribute set • c_lost_update_none: No lost update detection

Returns

The context object representing the DML handle.

Example

The following inserts one row into the EMP web source module.

```
DECLARE
    l_columns        apex_exec.t_columns;
    l_context        apex_exec.t_context;
BEGIN
    -- I. Define DML columns
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'EMPNO',
        p_data_type      => apex_exec.c_data_type_number,
        p_is_primary_key => true );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'ENAME',
        p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'JOB',
        p_data_type      => apex_exec.c_data_type_varchar2 );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'HIREDATE',
        p_data_type      => apex_exec.c_data_type_date );
    apex_exec.add_column(
        p_columns        => l_columns,
        p_column_name    => 'MGR',
        p_data_type      => apex_exec.c_data_type_number );
```

```
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'SAL',
    p_data_type      => apex_exec.c_data_type_number );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'COMM',
    p_data_type      => apex_exec.c_data_type_number );
apex_exec.add_column(
    p_columns        => l_columns,
    p_column_name    => 'DEPTNO',
    p_data_type      => apex_exec.c_data_type_number );

-- II. Open the context object
l_context := apex_exec.open_web_source_dml_context(
    p_server_static_id      => '{module static id}',
    p_columns               => l_columns,
    p_lost_update_detection => apex_exec.c_lost_update_none );

-- III. Provide DML data

apex_exec.add_dml_row(
   p_context   => l_context,
   p_operation => apex_exec.c_dml_operation_insert );

apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 1,
   p_value           => 4711 );
apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 2,
   p_value           => 'DOE' );
apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 3,
   p_value           => 'DEVELOPR' );
apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 4,
   p_value           => sysdate );
apex_exec.set_value(
   p_column_position => 6,
   p_value           => 1000 );
apex_exec.set_value(
   p_context         => l_context,
   p_column_position => 8,
   p_value           => 10 );

-- IV: Execute the DML statement

apex_exec.execute_dml(
   p_context           => l_context,
   p_continue_on_error => false);
```

```
    apex_exec.close( l_context );
EXCEPTION
    when others then
         apex_exec.close( l_context );
         raise;

END;
```

22.39 OPEN_WEB_SOURCE_QUERY Function (Deprecated)

> **Note:**
>
> This function is deprecated and will be removed in a future release. Use `open_rest_source_query` instead. See OPEN_REST_SOURCE_QUERY Function.

This function opens a Web Source query context. Based on the provided web source static ID, the operation matched to the `FETCH_COLLECTION` database operation will be selected.

Syntax

```
FUNCTION OPEN_WEB_SOURCE_QUERY (
    p_module_static_id       IN VARCHAR2,
    p_parameters             IN t_parameters     DEFAULT
c_empty_parameters,
    --
    p_filters                IN t_filters        DEFAULT
c_empty_filters,
    p_order_bys              IN t_order_bys      DEFAULT
c_empty_order_bys,
    p_aggregation            IN t_aggregation    DEFAULT
c_empty_aggregation,
    p_columns                IN t_columns        DEFAULT
c_empty_columns,
    --
    p_first_row              IN PLS_INTEGER      DEFAULT NULL,
    p_max_rows               IN PLS_INTEGER      DEFAULT NULL,
    --
    p_external_filter_expr   IN VARCHAR2         DEFAULT NULL,
    p_external_order_by_expr IN VARCHAR2         DEFAULT NULL,
    p_total_row_count        IN BOOLEAN          DEFAULT FALSE )
    RETURN t_context;
```

Parameters

Table 22-37 OPEN_WEB_SOURCE_QUERY Parameters

Parameter	Description
p_module_static_id	Static ID of the web source module to invoke.
p_parameters	Parameter values to be passed to the web source.
p_filters	Filters to be passed to the web source.
p_order_bys	Order by expressions to be passed to the web source.
p_aggregation	Aggregation (GROUP BY, DISTINCT) to apply on top of the query.
p_columns	Columns to be selected from the web source.
p_first_row	First row to be fetched from the web source.
p_max_rows	Maximum amount of rows to be fetched from the web source.
p_external_filter_expr	Filter expression to be passed 1:1 to the external web service. Depends on the actual web service being used.
p_external_order_by_expr	Order by expression to be passed 1:1 to the external web service. Depends on the actual web service being used.
p_total_row_count	Whether to determine the total row count (only supported when the attribute "allow fetch all rows" equals Yes).

Returns

The context object representing a "cursor" for the web source query.

Example

The following example assumes a Web Source module with the static ID "USGS" to be created in Shared Components, based on the URL endpoint https://earthquake.usgs.gov/earthquakes/feed/v1.0/summary/all_day.geojson. The example invokes the REST service and prints out the result set. This example code could be used within a plug-in or within a "Execute PL/SQL" region.

```
DECLARE
    l_context apex_exec.t_context;
    l_filters apex_exec.t_filters;
    l_columns apex_exec.t_columns;

    l_row     pls_integer := 1;

    l_magidx  pls_integer;
    l_titidx  pls_integer;
    l_plcidx  pls_integer;
    l_timidx  pls_integer;
    l_ididx   pls_integer;
BEGIN
    l_context := apex_exec.open_web_source_query(
        p_module_static_id => 'USGS',
        p_max_rows         => 1000 );

    l_titidx := apex_exec.get_column_position( l_context, 'TITLE' );
    l_magidx := apex_exec.get_column_position( l_context, 'MAG' );
```

```
    l_plcidx := apex_exec.get_column_position( l_context, 'PLACE' );
    l_timidx := apex_exec.get_column_position( l_context, 'TIME' );
    l_ididx  := apex_exec.get_column_position( l_context, 'ID' );

    while apex_exec.next_row( l_context ) LOOP

        htp.p( 'ID:    ' || apex_exec.get_varchar2( l_context,
l_ididx  ) );
        htp.p( 'MAG:   ' || apex_exec.get_varchar2( l_context,
l_magidx ) );
        htp.p( 'PLACE: ' || apex_exec.get_varchar2( l_context,
l_plcidx ) );
        htp.p( 'TITLE: ' || apex_exec.get_varchar2( l_context,
l_titidx ) );
        htp.p( 'TIME:  ' || apex_exec.get_varchar2( l_context,
l_timidx ) );
     END LOOP;

     apex_exec.close( l_context );
EXCEPTION
     when others then
         apex_exec.close( l_context );
         raise;
END;
```

22.40 PURGE_REST_SOURCE_CACHE Procedure

This procedure purges the local cache for a REST Data Source. The REST Data Source must exist in the current application and be identified by a static ID. If caching is disabled or no cache entries exist, nothing happens.

Syntax

```
PROCEDURE PURGE_REST_SOURCE_CACHE(
    p_static_id            IN VARCHAR2,
    p_current_session_only IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 22-38 PURGE_REST_SOURCE_CACHE Procedure Parameters

Parameter	Description
`p_static_id`	Static ID of the REST Data Source to invoke.
`p_current_session_only`	Specify `true` to only purge entries that were saved for the current session. Defaults to `false`.

Example

Purge cache for the REST Data Source with static ID `USGS`.

```
begin
    apex_exec.purge_rest_source_cache(
        p_static_id => 'USGS' );
end;
```

22.41 PURGE_WEB_SOURCE_CACHE Procedure (Deprecated)

> **Note:**
>
> This procedure is deprecated and will be removed in a future release. Use `purge_rest_source_cache` instead.

This procedure purges the local cache for a Web Source module. The web source module must exist in the current application and identified by its static ID. If caching is disabled or no cache entries exist, nothing happens.

Syntax

```
PROCEDURE PURGE_WEB_SOURCE_CACHE(
    p_module_static_id     IN VARCHAR2,
    p_current_session_only IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 22-39 PURGE_WEB_SOURCE_CACHE Procedure Parameters

Parameter	Description
`p_module_static_id`	Static ID of the web source module to invoke.
`p_current_session_only`	Specify `true` to only purge entries that were saved for the current session. Defaults to `false`.

Example

Purge cache for the Web Source Module with static ID "USGS".

```
begin
    apex_exec.purge_web_source_cache(
        p_module_static_id => 'USGS' );
end;
```

22.42 SET_CURRENT_ROW Procedure

This procedure sets the current row pointer of a DML context to the given row number. Subsequent `SET_VALUE` invocations affect the row with this row number.

Syntax

```
APEX_EXEC.SET_CURRENT_ROW (
    p_context IN t_context,
    p_row_idx IN PLS_INTEGER );
```

Parameters

Table 22-40 APEX_EXEC.SET_CURRENT_ROW Parameters

Parameter	Description
`p_context`	Context object obtained with one of the `OPEN_` functions.
`p_row_idx`	Row number to set the "current row" pointer to.

22.43 SET_NULL Procedure

This procedure sets procedures to set a DML column value to NULL. Useful when the row is initialized from a query context with `set_values` and the new value of one of the columns should be `NULL`.

Syntax

Signature 1

```
PROCEDURE SET_NULL(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER );
```

Signature 2

```
PROCEDURE SET_NULL(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2 );
```

Parameters

Table 22-41 SET_NULL Procedure Parameters

Parameter	Description
`p_context`	Context object obtained with one of the `OPEN_` functions.
`p_column_position`	Position of the column to set the value for within the DML context.

Table 22-41 (Cont.) SET_NULL Procedure Parameters

Parameter	Description
p_column_name	Name of the column to set the value.

Examples

Example 1

```
apex_exec.set_null(
     p_context         => l_dml_context,
     p_column_position => 6 );
```

Example 2

```
apex_exec.set_null(
     p_context         => l_dml_context,
     p_column_name     => 'SAL' );
```

22.44 SET_ROW_VERSION_CHECKSUM Procedure

This procedure sets the row version checksum to use for lost update detection for the current DML row. This is called after `add_dml_row`.

Syntax

```
PROCEDURE SET_ROW_VERSION_CHECKSUM(
    p_context               IN t_context,
    p_checksum              IN VARCHAR2 );
```

Parameters

Table 22-42 SET_ROW_VERSION_CHECKSUM Procedure Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.
p_checksum	checksum to use for lost-update detection of this row.

Example

The following example opens a query context on the EMP table and retrieves all values and the row version checksum for the row with `EMPNO=7839`. Then a DML context is opened to update the `SAL` column while using the row version checksum for lost update detection.

```
declare
    l_columns        apex_exec.t_columns;
    l_dml_context    apex_exec.t_context;
    l_query_context  apex_exec.t_context;
```

```
begin
     -- I. Define DML columns
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'EMPNO',
         p_data_type      => apex_exec.c_data_type_number,
         p_is_primary_key => true );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'ENAME',
         p_data_type      => apex_exec.c_data_type_varchar2 );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'JOB',
         p_data_type      => apex_exec.c_data_type_varchar2 );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'HIREDATE',
         p_data_type      => apex_exec.c_data_type_date );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'MGR',
         p_data_type      => apex_exec.c_data_type_number );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'SAL',
         p_data_type      => apex_exec.c_data_type_number );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'COMM',
         p_data_type      => apex_exec.c_data_type_number );
     apex_exec.add_column(
         p_columns        => l_columns,
         p_column_name    => 'DEPTNO',
         p_data_type      => apex_exec.c_data_type_number );

    -- II. Open the Query Context object
    l_query_context := apex_exec.open_remote_sql_query(
        p_server_static_id  => 'DevOps_Remote_SQL',
        p_sql_query         => 'select * from emp where empno = 7839',
        p_columns           => l_columns );

     -- III. Open the DML context object
     l_dml_context := apex_exec.open_remote_dml_context(
         p_server_static_id      => '{remote server static id}',
         p_columns               => l_columns,
         p_query_type            => apex_exec.c_query_type_sql_query,
         p_sql_query             => 'select * from emp where deptno =
10',
         p_lost_update_detection => apex_exec.c_lost_update_implicit );

     if apex_exec.next_row( p_context => l_query_context ) then
         apex_exec.add_dml_row(
             p_context   => l_dml_context,
             p_operation => apex_exec.c_dml_operation_update);
```

```
      apex_exec.set_row_version_checksum(
         p_context   => l_dml_context,
         p_checksum  => apex_exec.get_row_version_checksum( p_context =>
l_query_context );

      apex_exec.set_values(
         p_context         => l_dml_context,
         p_cource_context  => l_query_context );

      apex_exec.set_value(
         p_column_name => 'SAL',
         p_value       => 8000 );
     else
         raise_application_error( -20000, 'EMPNO #4711 is not present!');
     end if;

     apex_exec.execute_dml(
         p_context           => l_dml_context,
         p_continue_on_error => false);

     apex_exec.close( l_dml_context );
     apex_exec.close( l_query_context );
exception
      when others then
           apex_exec.close( l_dml_context );
           apex_exec.close( l_query_context );
           raise;

end;
```

22.45 SET_VALUE Procedure

This procedure sets DML column values for different data types. To be called after `add_dml_row` for each column value to be set. Each procedure is called either with the column name or with the column position.

Syntax

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN VARCHAR2 );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN VARCHAR2 );
```

Signature 1

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
```

```
    p_column_position       IN PLS_INTEGER,
    p_value                 IN NUMBER );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN NUMBER );
```

Signature 2

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN DATE );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN DATE );
```

Signature 3

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN TIMESTAMP );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN TIMESTAMP );
```

Signature 4

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN TIMESTAMP WITH TIME ZONE);

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN TIMESTAMP WITH TIME ZONE);
```

Signature 5

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN TIMESTAMP WITH LOCAL TIME ZONE);

procedure set_value(
```

```
    p_context               in t_context,
    p_column_name           in varchar2,
    p_value                 in timestamp with local time zone);
```

Signature 6

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN DSINTERVAL_UNCONSTRAINED );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN DSINTERVAL_UNCONSTRAINED );
```

Signature 7

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN YMINTERVAL_UNCONSTRAINED );

PROCEDURE SET_VALUE(
    p_context               in t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN YMINTERVAL_UNCONSTRAINED );
```

Signature 8

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN CLOB );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN CLOB );
```

Signature 9

```
PROCEDURE SET_VALUE(
   p_context               IN t_context,
   p_column_position       IN PLS_INTEGER,
   p_value                 IN BLOB );

PROCEDURE SET_VALUE(
   p_context               IN t_context,
   p_column_name           IN VARCHAR2,
   p_value                 IN BLOB );
```

Signature 10

```
PROCEDURE SET_VALUE(
   p_context               IN t_context,
   p_column_position       IN PLS_INTEGER,
   p_value                 IN SYS.ANYDATA );

PROCEDURE SET_VALUE(
   p_context               IN t_context,
   p_column_name           IN VARCHAR2,
   p_value                 IN SYS.ANYDATA );
```

Signature 11

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

```
PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_position       IN PLS_INTEGER,
    p_value                 IN mdsys.sdo_geometry );

PROCEDURE SET_VALUE(
    p_context               IN t_context,
    p_column_name           IN VARCHAR2,
    p_value                 IN mdsys.sdo_geometry );
```

Parameters

Table 22-43 SET_VALUE Procedure Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.
p_column_position	Position of the column to set the value for within the DML context.
p_column_name	Name of the column to set the value for.
p_value	Value to set.

Example

```
apex_exec.set_value(
    p_context         => l_dml_context,
    p_column_name     => 'SAL',
    p_value           => 9500 );

apex_exec.set_value(
    p_context         => l_dml_context,
```

```
    p_column_position => 6,
    p_value           => 9500 );

apex_exec.set_value(
    p_context         => l_dml_context,
    p_column_position => 'HIREDATE',
    p_value           => trunc( sysdate ) );
```

22.46 SET_VALUES Procedure

This procedure sets all column values in the DML context with corresponding column values from the source (query) context. Useful for querying a row, changing only single columns and writing the row back.

Syntax

```
PROCEDURE SET_VALUES(
   p_context               IN t_context,
   p_source_context        IN t_context );
```

Parameters

Table 22-44 SET_VALUE Procedure Parameters

Parameter	Description
p_context	Context object obtained with one of the OPEN_ functions.
p_source_context	Query context object to get column values from.

Example

See "SET_ROW_VERSION_CHECKSUM Procedure "

23
APEX_EXPORT

The APEX_EXPORT package provides APIs to export the definitions of applications, files, feedback, and workspaces to text files. `APEX_EXPORT` uses utility types `APEX_T_EXPORT_FILE` and `APEX_T_EXPORT_FILES`. The `APEX_T_EXPORT_FILE` is a tuple of (name, contents) where name is the file name and contents is a clob containing the export object's definition. `APEX_T_EXPORT_FILES` is a table of `APEX_T_EXPORT_FILE`.

23.1 GET_APPLICATION Function

This function exports the given application and optionally splits the application definition into multiple files. The optional `p_with_% parameters` can be used to include additional information in the export.

Syntax

```
FUNCTION GET_APPLICATION (
    p_application_id            IN NUMBER,
    p_type                      IN t_export_type      DEFAULT
c_type_application_source,
    p_split                     IN BOOLEAN            DEFAULT FALSE,
    p_with_date                 IN BOOLEAN            DEFAULT FALSE,
    p_with_ir_public_reports    IN BOOLEAN            DEFAULT FALSE,
    p_with_ir_private_reports   IN BOOLEAN            DEFAULT FALSE,
    p_with_ir_notifications     IN BOOLEAN            DEFAULT FALSE,
    p_with_translations         IN BOOLEAN            DEFAULT FALSE,
    p_with_pkg_app_mapping      IN BOOLEAN            DEFAULT FALSE,
    p_with_original_ids         IN BOOLEAN            DEFAULT FALSE,
    p_with_no_subscriptions     IN BOOLEAN            DEFAULT FALSE,
    p_with_comments             IN BOOLEAN            DEFAULT FALSE,
    p_with_supporting_objects   IN VARCHAR2           DEFAULT NULL,
    p_with_acl_assignments      IN BOOLEAN            DEFAULT FALSE,
    p_components                IN apex_t_varchar2  DEFAULT NULL )
    RETURN apex_t_export_files;
```

Parameters

Table 23-1 GET_APPLICATION Parameters

Parameters	Description
p_application_id	The application ID.
p_split	If true, split the definition into discrete elements that can be stored in separate files. If false, the result is a single file.
p_type	Comma-delimited list of export types to perform: • APPLICATION_SOURCE: export an APEX application using other parameters passed. • EMBEDDED_CODE: Export code such as SQL, PL/SQL and Javascript. APEX ignores all other options when EMBEDDED_CODE is selected. • CHECKSUM-SH1: Export a SHA1 checksum that is independent of IDs and can be compared across instances and workspaces. • CHECKSUM-SH1: Export a SHA-256 checksum that is independent of IDs and can be compared across instances and workspaces. • READABLE_JSON: Export a readable version of the application meta-data in JSON format. • READABLE_YAML: Export a readable version of the application meta-data in YAML format.
p_with_date	If true, include export date and time in the result.
p_with_public_reports	If true, include public reports that a user saved.
p_with_private_reports	If true, include private reports that a user saved.
p_with_notifications	If true, include report notifications.
p_with_translations	If true, include application translation mappings and all text from the translation repository.
p_with_pkg_app_mapping	If true, export installed packaged applications with references to the packaged application definition. If false, export them as normal applications.
p_with_original_ids	If true, export with the IDs as they were when the application was imported.
p_with_no_subscriptions	If false, components contain subscription references.
p_with_comments	If true, include developer comments.
p_with_supporting_objects	If Y, export supporting objects. If I, automatically install on import. If N, do not export supporting objects. If null, the application's include in export deployment value is used.
p_with_acl_assignments	If true, export ACL user role assignments.
p_components	If not null, export only given components (array elements should be of form *type*:*name*, for example,PAGE:42 or MESSAGE:12345). See view APEX_APPL_EXPORT_COMPS for components that can be exported.

Returns

A table of `apex_t_export_file`. Unless the caller passes `p_split=>true` to the function, the result is a single file.

Example

This sqlplus code fragment spools the definition of application `100` into file `f100.sql`.

```
variable name varchar2(255)
variable contents clob
declare
   l_files apex_t_export_files;
begin
   l_files := apex_export.get_application(p_application_id => 100);
   :name := l_files(1).name;
   :contents := l_files(1).contents;
end;
/
set feed off echo off head off flush off termout off trimspool on
set long 100000000 longchunksize 32767
col name new_val name
select :name name from sys.dual;
spool &name.
print contents
spool off
```

23.2 GET_WORKSPACE _FILES Function

This function exports the given workspace's static files.

Syntax

```
FUNCTION GET_WORKSPACE_FILES (
    p_workspace_id     IN NUMBER,
    p_with_date        IN BOOLEAN  DEFAULT FALSE )
    RETURN apex_t_export_files;
```

Parameters

Table 23-2 GET_WORKSPACE_FILES Function Parameters

Parameters	Description
`p_workspace_id`	The workspace ID.
`p_with_date`	If `true`, include export date and time in the result.

RETURNS

A table of `apex_t_export_file`. The result is a single file, splitting into multiple files will be implemented in a future release.

Example

Export the workspace files of the workspace with id 12345678.

```
declare
    l_file apex_t_export_files;
begin
    l_file := apex_export.get_workspace_files(p_workspace_id =>
12345678);
end;
```

23.3 GET_FEEDBACK Function

This function exports user feedback to the development environment or developer feedback to the deployment environment.

Syntax

```
FUNCTION GET_FEEDBACK (
   p_workspace_id      IN NUMBER,
   p_with_date         IN BOOLEAN  DEFAULT FALSE,
   p_since             IN DATE     DEFAULT NULL,
   p_deployment_system IN VARCHAR2 DEFAULT NULL )
   RETURN apex_t_export_files;
```

Parameters

Table 23-3 GET_FEEDBACK Function Parameters

Parameters	Description
`p_workspace_id`	The workspace id.
`p_with_date`	If `true`, include export date and time in the result.
`p_since`	If set, only export feedback that has been gathered since the given date.
`p_deployment_system`	If null, export user feedback. If not null, export developer feedback for the given deployment system.

RETURNS

A table of `apex_t_export_file`.

Examples

Example 1

Export feedback to development environment.

```
declare
     l_file apex_t_export_files;
begin
```

```
    l_file := apex_export.get_feedback(p_workspace_id => 12345678);
end;
```

Example 2

Export developer feedback in workspace 12345678 since 8-MAR-2010 to deployment environment EA2.

```
declare
    l_file apex_t_export_files;
begin
    l_file := apex_export.get_feedback (
                  p_workspace_id => 12345678,
                  p_since => date'2010-03-08',
                  p_deployment_system => 'EA2' );
end;
```

23.4 GET_WORKSPACE Function

This function exports the given workspace's definition and users. The optional `p_with_%` parameters (which all default to `FALSE`) can be used to include additional information in the export.

Syntax

```
FUNCTION GET_WORKSPACE (
    p_workspace_id          IN NUMBER,
    p_with_date             IN BOOLEAN  DEFAULT FALSE,
    p_with_team_development IN BOOLEAN  DEFAULT FALSE,
    p_with_misc             IN BOOLEAN  DEFAULT FALSE )
    RETURN apex_t_export_files;
```

Parameters

Table 23-4 GET_WORKSPACE Function Parameters

Parameters	Description
`p_workspace_id`	The workspace ID.
`p_with_date`	If `true`, include export date and time in the result.
`p_with_team_development`	If `true`, include team development data.
`p_with_misc`	If `true`, include data from SQL Workshop, mail logs, and so on, in the export.

Returns

A table of `apex_t_export_file`.

Examples

The following example exports the definition of workspace #12345678.

```
DECLARE
    l_file apex_t_export_files;
BEGIN
    l_files := apex_export.get_workspace(p_workspace_id => 12345678);
END;
```

23.5 UNZIP Function

This function extracts and decompresses all the files from a zip archive.

This function is intended for use with the routines in the `APEX_APPLICATION_INSTALL` package and assumes that all of the files in the ZIP archive are in a text format, such as SQL scripts (which must have a `.sql` extension) or simple `README` files.

All text content in the ZIP file must be encoded as UTF-8.

Syntax

```
APEX_EXPORT.UNZIP (
    p_source_zip    IN BLOB )
    RETURN apex_t_export_file;
```

Parameters

Table 23-5 UNZIP Parameters

Parameter	Description
`p_source_zip`	A BLOB containing the zip archive.

Returns

This function returns a table of `apex_t_export_file` containing the name and contents (converted to text format) of each file from the ZIP archive.

Example

The following example fetches an application archive from a remote URL, extracts the files within it, and prints the type and name of the contained application.

```
DECLARE
   l_zip blob;
   l_info apex_application_install.t_file_info;
BEGIN
   l_zip := apex_web_service.make_rest_request_b (
               p_url => 'https://www.example.com/apps/f100.zip',
               p_http_method => 'GET' );
   l_info := apex_application_install.get_info (
                  p_source => apex_export.unzip (
```

```
                    p_source_zip => l_zip ) );

   sys.dbms_output.put_line (
       apex_string.format (
           p_message => q'~
                        !Type ................. %0
                        !App Name ............. %1
                        !~',
           p0 => l_info.file_type,
           p1 => l_info.app_name,
           p_prefix => '!' ));
END;
```

23.6 ZIP Function

This function compresses a list of files (usually obtained from one of the `APEX_EXPORT` routines) into a single BLOB containing a `.zip` archive. All text content in the resultant `.zip` file is encoded as UTF-8.

All file names within the archive must be unique to prevent the accidental overwriting of files in the application export (an exception raises otherwise).

Additional files (`p_extra_files`) may also be added to the resultant archive, such as a simple `README.txt` file or licensing information.

Syntax

```
APEX_EXPORT.ZIP (
    p_source_files  apex_t_export_files,
    p_extra_files   apex_t_export_files DEFAULT apex_t_export_files() )
    RETURN BLOB;
```

Parameters

Table 23-6 ZIP Parameters

Parameter	Description
`p_source_files`	A table of files. For example, from `apex_export.get_application`.
`p_extra_files`	Optional additional files to add to the resultant `.zip` archive.

Returns

This function returns a BLOB containing the compressed application files and any extra files, in ZIP format.

Example

```
DECLARE
  l_source_files apex_t_export_files;
  l_extra_files apex_t_export_files;
```

```
  l_zip blob;
BEGIN
  l_source_files := apex_export.get_application(
    p_application_id => 100,
    p_split => true );

  l_extra_files := apex_t_export_files(
    apex_t_export_file(
      name => 'README.md',
      contents => 'An example exported application.' ),
    apex_t_export_file(
      name => 'LICENSE.txt',
      contents => 'The Universal Permissive License (UPL), Version
1.0' ) );

  l_zip := apex_export.zip(
    p_source_files => l_source_files,
    p_extra_files => l_extra_files );

    sys.dbms_output.put_line(
      'Compressed application export to zip of size; '
      || sys.dbms_lob.getLength( l_zip ) );
END;
```

24
APEX_INSTANCE_ADMIN

The `APEX_INSTANCE_ADMIN` package provides utilities for managing an Oracle APEX runtime environment.

Use the `APEX_INSTANCE_ADMIN` package to get and set email settings, Oracle Wallet settings, report printing settings, and to manage schema to workspace mappings.

`APEX_INSTANCE_ADMIN` can be executed by the `SYS` or `SYSTEM` database users and any database user granted the role `APEX_ADMINISTRATOR_ROLE`.

24.1 Available Parameter Values

The following table lists all the available parameter values you can set within the `APEX_INSTANCE_ADMIN` package, including parameters for email, wallet, and reporting printing.

You can query `APEX_INSTANCE_PARAMETERS` dictionary view to determine the current values of these parameters unless the parameter contains a password.

Table 24-1 Available Parameters

Parameter Name	Description
ACCOUNT_LIFETIME_DAYS	The maximum number of days an end-user account password may be used before the account is expired.
ALLOW_DB_MONITOR	If set to `Y`, the default, database monitoring is enabled. If set to `N`, it is disabled.
ALLOW_HASH_FUNCTIONS	Comma-separated list of supported hash algorithms (default is `SH256,SH384,SH512`). SH1 is also supported by default in Oracle Database 11g.
ALLOW_HOSTNAMES	If set, users can only navigate to an application if the URL's hostname part contains this value. Instance administrators can configure more specific values at workspace level.
ALLOW_PUBLIC_FILE_UPLOAD	If set to `Y`, enables file uploads without user authentication. If set to `N`, the default, they are disabled.
ALLOW_RAS	This parameter is only supported if running Oracle Database 12*c*. If set to `Y`, enable Real Application Security support for applications. If set to `N` (the default), Real Application Security cannot be used.
ALLOW_REST	If set to `Y`, the default, enables exposing report regions as RESTful services. If set to `N`, disabled.
APEX_BUILDER_AUTHENTICATION	Controls the authentication scheme for Oracle APEX Administration Services and the development environment. Valid parameter values include: • `APEX` - Oracle APEX workspace accounts authentication (default) • `DB` - Database accounts authentication • `HEADER` - HTTP header variable based authentication • `SSO` - Oracle Application Server Single Sign-On authentication (OracleAS PL/SQL SSO SDK) • `LDAP` - LDAP authentication • `SAML` - SAML Sign-In authentication • `SOCIAL` - Social Sign-In authentication

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
APEX_REST_PATH_PREFIX	Controls the URI path prefix used to access built-in RESTful Services exposed by APEX. For example, built-in RESTful Service for referencing static application files using #APP_IMAGES# token. If the default prefix (r) conflicts with RESTful Services defined by users, adjust this preference to avoid the conflict.
APPLICATION_ACTIVITY_LOGGING	Controls instance wide setting of application activity log ([A]lways, [N]ever, [U]se application settings).
APPLICATION_ID_MAX	The largest possible ID for a websheet or database application.
APPLICATION_ID_MIN	The smallest possible ID for a websheet or database application.
AUTOEXTEND_TABLESPACES	If set to Y, the default, provisioned tablespaces is autoextended up to a maximum size. If set to N tablespaces are not autoextended.
BIGFILE_TABLESPACES_ENABLED	If set to Y, the tablespaces provisioned through APEX are created as bigfile tablespaces. If set to N, the tablespaces are created as smallfile tablespaces.
CHECKSUM_HASH_FUNCTION	Defines the algorithm that is used to create one way hashes for URL checksums.Valid values are MD5 (deprecated), SH1 (SHA-1), SH256 (SHA-2, 256 bit), SH384 (SHA-2, 384 bit), SH512 (SHA-2, 512 bit) and n. The SHA-2 algorithms are only available on Oracle Database 12*g* and later. A null value evaluates to the most secure algorithm available and is the default.
CHECK_FOR_UPDATES	If set to N, the check for APEX and Oracle REST Data Services product updates is disabled for the entire instance, regardless of preferences specified by individual developers. The default is Y.
CLONE_SESSION_ENABLED	If set to Y, the default, users can create multiple sessions in the browser.
CONTENT_CACHE_MAX_FILE_SIZE	The individual file entry size limit for the content cache, per workspace.
CONTENT_CACHE_SIZE_TARGET	The target size for the content cache, per workspace.
DB_SIGNATURE	Set to the database host/service name on install. If it differs, for example, on cloned databases, sending emails will fail. A value of null (the default) disables any checks.
DEBUG_MESSAGE_PAGE_VIEW_LIMIT	Maximum number of debug messages for a single page view. Default is 50000.
DELETE_UPLOADED_FILES_AFTER_DAYS	Uploaded files like application export files, websheet export files, spreadsheet data load files are automatically deleted after this number of days. Default is 14.
DISABLE_ADMIN_LOGIN	If set to Y, administration services are disabled. If set to N, the default, they are not disabled.
DISABLE_WORKSPACE_LOGIN	If set to Y, the workspace login is disabled. If set to N, the default, the login is not disabled.
DISABLE_WS_PROV	If set to Y, the workspace creation is disabled for requests sent out by using e-mail notification. If set to N, the default, they are not disabled.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
EMAIL_IMAGES_URL	Specifies the full URL to the images directory of APEX instance, including the trailing slash after the images directory. For example: http://your_server/i/ This setting is used for APEX system-generated emails.
EMAIL_INSTANCE_URL	Specifies the URL to APEX instance, including the trailing slash after the Database Access Descriptor. For example: http://your_server/pls/apex/ This setting used for APEX system-generated emails.
ENABLE_LEGACY_WEB_ENTRY_POINTS	If set to Y (default is N), procedures used in older APEX versions can be called in the URL (such as HTMLDB_UTIL.%).
ENABLE_TRANSACTIONAL_SQL	If set to Y, transactional SQL commands are enabled on this instance. If set to N, the default, they are not enabled.
ENCRYPTED_TABLESPACES_ENABLED	If set to Y, the tablespaces provisioned through APEX are created as encrypted tablespaces. If set to N, the tablespaces are not encyrpted.
ENV_BANNER_ENABLE	Default N. If set to N, the default, the banner does not display. If set to Y, the environment banner displays in the APEX development environment to visually flag the environment.
ENV_BANNER_LABEL	Defines the label for the environment banner.
ENV_BANNER_COLOR	Defines the color class name for the environment banner color. Use accent-1, accent-2, accent-3, (and so on). Maximum of 16 color classes.
ENV_BANNER_POS	Defines the display position for the environment banner. Options: LEFT or TOP.
EXPIRE_FND_USER_ACCOUNTS	If set to Y, expiration of APEX accounts is enabled. If set to N, they are not enabled.
HEADER_AUTH_CALLBACK	Callback procedure name for HTTP header based authentication, defaults to apex_authentication.callback.
HTTP_ERROR_STATUS_ON_ERROR_PAGE_ENABLED	Used in conjunction with the APEX_INSTANCE_ADMIN.SET_PARAMETER procedure. If set to N, the default, APEX presents an error page to the end user for all unhanded errors. If set to Y, returns an HTTP 400 status to the end user's client browser when the APEX engine encounters an unhandled error.
HTTP_RESPONSE_HEADERS	List of http response headers, separated by newline (chr(10)). APEX writes these headers on each request, before rendering the page. The substitution string #CDN# within the headers is replaced with the content delivery networks that are known to APEX.
HTTP_STS_MAX_AGE	REQUIRE_HTTPS must be set to A for this parameter to be relevant. APEX emits a Strict-Transport-Security header, with max-age=<value>, on HTTPS requests if HTTP_STS_MAX_AGE has a value greater than 0. If the request protocol is HTTP, instead of processing the request, APEX redirects to a HTTPS URL.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
IGNORED_FRIENDLY_URL_PARAMETERS	Comma-separated list of parameter names which are ignored when parsing friendly URLs. Default: utm_campaign,utm_source,utm_medium,utm_term,utm_content
INBOUND_PROXIES	Comma-separated list of IP addresses for proxy servers through which requests come in.
INSTANCE_PROXY	The proxy server for all outbound HTTP(s) traffic. If INSTANCE_PROXY is set, it overrides any application specific proxy server definition.
INSTANCE_NO_PROXY_DOMAINS	Comma-separated list of domain names for which the instance proxy is not to be used.
INSTANCE_TABLESPACE	If specified, the tablespace to use for the database user for all new workspaces.
KEEP_SESSIONS_ON_UPGRADE	This flag affects application upgrades. If set to N, the default, delete sessions associated with the application. If set to Y, leave sessions unaffected.
LOGIN_THROTTLE_DELAY	The flag which determines the time increase in seconds after failed logins.
LOGIN_THROTTLE_METHODS	The methods to count failed logins. Colon-separated list of USERNAME_IP, USERNAME, IP.
LOGIN_MESSAGE	The text to be displayed on the login page. This text can include HTML.
MAX_APPLICATION_BACKUPS	The maximum number of backups kept for each application. Default is 25. Maxium is 30. Zero (0) disables automated backups.
MAX_DATA_EXPORT_IMAGES	The maximum number of unique images to be included in a data export / report download.
MAX_LOGIN_FAILURES	Maximum login failures permitted.
MAX_SESSION_IDLE_SEC	The number of seconds an internal application may be idle.
MAX_SESSION_IDLE_SEC	The number of seconds an internal application may be idle.
MAX_SESSION_LENGTH_SEC	The number of seconds an internal application session may exist.
MAX_WEBSERVICE_REQUESTS	The maximum number of outbound web service requests permitted for each workspace in a rolling 24-hour period. Default is 1000.
PASSWORD_ALPHA_CHARACTERS	The alphabetic characters used for password complexity rules. Default list of alphabetic characters include the following: abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
PASSWORD_HASH_FUNCTION	Defines the algorithm that is used to create one way hashes for workspace user passwords. Valid values are MD5 (deprecated), SH1 (SHA-1), SH256 (SHA-2, 256 bit), SH384 (SHA-2, 384 bit), SH512 (SHA-2, 512 bit) and null. The SHA-2 algorithms are only available on Oracle Database Release 12*g* and later. A null value evaluates to the most secure algorithm available and is the default.
PASSWORD_HASH_ITERATIONS	Defines the number of iterations for the PASSWORD_HASH_FUNCTION (default 10000).
PASSWORD_HISTORY_DAYS	Defines the number of days a previously used password cannot be used again as a new password by the same user.
PASSWORD_PUNCTUATION_CHARACTERS	The punctuation characters used for password complexity rules. Default list of punctuation characters include the following: !"#$%&()``*+,-/:;<=>?_
PASSWORD_NOT_LIKE_USERNAME	If Y (the default is N), prevent workspace administrator, developer, and end user account passwords from containing the username.
PASSWORD_NOT_LIKE_WORDS	Enter words, separated by colons, that workspace administrator, developer, and end user account passwords must not contain. These words may not appear in the password in any combination of upper- or lowercase.
PASSWORD_NOT_LIKE_WS_NAME	Set to Y to prevent workspace administrator, developer, and end user account passwords from ontaining the workspace name.
PASSWORD_ONE_ALPHA	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one alphabetic character as specified in PASSWORD_ALPHA_CHARACTERS.
PASSWORD_ONE_LOWER_CASE	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one lowercase alphabetic character.
PASSWORD_ONE_NUMERIC	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one Arabic numeric character (0-9).
PASSWORD_ONE_PUNCTUATION	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one punctuation character as specified in PASSWORD_PUNCTUATION_CHARACTERS.
PASSWORD_ONE_UPPER_CASE	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one uppercase alphabetic character.
PATH_PREFIX	The unique URI path prefix used to access RESTful Services in a workspace. The default path prefix value is the name of the workspace.
PLSQL_EDITING	If set to Y, the default, the SQL Workshop Object Browser is enabled to permit users to edit and compile PL/SQL. If set to N, users are not permitted.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
PRINT_BIB_LICENSED	Specify either standard support or advanced support. Advanced support requires an Oracle BI Publisher license. Valid values include: • STANDARD - requires Apache FOP. • ADVANCED - requires Oracle BI Publisher. • APEX_LISTENER - requires Oracle Rest Data Services (ORDS, formerly APEX Listener). • AOP - requires APEX Office Print. • NONE - native APEX printing.
PRINT_SVR_HOST	Specifies the host address of the print server converting engine, for example, localhost. Enter the appropriate host address if the print server is installed at another location.
PRINT_SVR_PORT	Defines the port of the print server engine, for example 8888. Value must be a positive integer.
PRINT_SVR_PROTOCOL	Valid values include: • http • https
PRINT_SVR_SCRIPT	Defines the script that is the print server engine, for example: /xmlpserver/convert
QOS_MAX_SESSION_KILL_TIMEOUT	Number of seconds that an active old session can live, when QOS_MAX_SESSION_REQUESTS has been reached. The oldest database session with LAST_CALL_ET greater than QOS_MAX_SESSION_KILL_TIMEOUT is killed.
QOS_MAX_SESSION_REQUESTS	Number of permitted concurrent requests to one session associated with this workspace.
QOS_MAX_WORKSPACE_REQUESTS	Number of permitted concurrent requests to sessions in this workspace.
REQ_NEW_SCHEMA	If set to Y, the option for new schema for new workspace requests is enabled. If set to N, the default, the option is disabled.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
REQUIRE_HTTPS	If set to A, enforces HTTPS for the entire APEX instance. If I, enforces HTTPS within the APEX development and administration applications. If N, permits all applications to be used when the protocol is either HTTP or HTTPS. **Note:** Note developers can also enforce HTTPS at the application level, by setting the Secure attribute of an application scheme's cookie.
REQUIRE_VERIFICATION_CODE	If set to Y, the Verification Code is displayed and is required for someone to request a new workspace. If set to N, the default, the Verification Code is not required.
RESTRICT_RESPONSE_HEADERS	If Y or null (default), show HTTP 500 when a page contains unsupported HTTP response headers. These include status codes 301, 308 and 410, and cache headers for POST requests.
RESTFUL_SERVICES_ENABLED	If set to Y, the default, RESTful services development is enabled. If set to N, RESTful services are not enabled.
RESTRICT_IP_RANGE	To restrict access to the APEX development environment and Administration Services to a specific range of IP addresses, enter a comma-delimited list of IP addresses. If necessary, you can use an asterisk (*) as a wildcard, but do not include additional numeric values after wildcard characters. For example, 138.*.41.2 is not a valid value.
RM_CONSUMER_GROUP	If set, this is the resource manager consumer group to be used for all page events. A more specific group can be configured at workspace level.
SAML_APEX_CERTIFICATE	SAML authentication: The primary certificate of the APEX side.
SAML_APEX_CERTIFICATE2	(Optional) SAML authentication: The alternative certificate of the APEX side.
SAML_APEX_PRIVATE_KEY	SAML authentication: The private key of the APEX side.
SAML_APEX_PRIVATE_KEY2	(Optional) SAML authentication: The alternative private key of the APEX side.
SAML_ENABLED	SAML authentication: Y if workspace applications should be able to use SAML authentication.
SAML_IP_ISSUER	SAML authentication: Issuer attribute from the identity provider's metadata.
SAML_IP_SIGNING_CERTIFICATE	SAML authentication: The certificate from the identity provider's metadata.
SAML_IP_SIGNING_CERTIFICATE2	(Optional) SAML authentication: An alternative certificate from the identity provider's metadata.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
SAML_NAMEID_FORMAT	SAML authentication: The NameID format that APEX expects. Defaults to urn:oasis:names:tc:SAML:2.0:nameid-format:persistent when null.
SAML_SIGN_IN_URL	SAML authentication: The identity provider's sign in URL.
SAML_SIGN_OUT_URL	(Optional) SAML authentication: The identity provider's sign out URL.
SAML_SP_ISSUER	SAML authentication: The "issuer" attribute that APEX sends (defaults to the callback URL).
SAML_USERNAME_ATTRIBUTE	SAML authentication: Responses can contain additional attributes about the user. If set, APEX uses that attribute's value as the username (defaults to the assertion subject's NameID attribute).
SERVICE_ADMIN_PASSWORD_MIN_LENGTH	A positive integer or 0 which specifies the minimum character length for passwords for instance administrators, workspace administrators, developers, and end user APEX accounts, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_NEW_DIFFERS_BY	A positive integer or 0 which specifies the number of differences required between old and new passwords. The passwords are compared character by character, and each difference that occurs in any position counts toward the required minimum difference. This setting applies to accounts for instance administrators, workspace administrators, developers, and end user APEX accounts, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_ONE_ALPHA	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one alphabetic character as specified in PASSWORD_ALPHA_CHARACTERS, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_ONE_NUMERIC	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one Arabic numeric character (0-9), when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_ONE_PUNCTUATION	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one punctuation character as specified in PASSWORD_PUNCTUATION_CHARACTERS, the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_ONE_UPPER_CASE	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one uppercase alphabetic character, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
SERVICE_ADMIN_PASSWORD_ONE_LOWER_CASE	Set to Y to require that workspace administrator, developer, and end user account passwords contain at least one lowercase alphabetic character, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_NOT_LIKE_USERNAME	If Y, prevent workspace administrator, developer, and end user account passwords from containing the username, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_NOT_LIKE_WS_NAME	Set to Y to prevent workspace administrator, developer, and end user account passwords from containing the workspace name, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD).
SERVICE_ADMIN_PASSWORD_NOT_LIKE_WORDS	Enter words, separated by colons, that workspace administrator, developer, and end user account passwords must not contain, when the strong password rules are enabled (see STRONG_SITE_ADMIN_PASSWORD). These words may not appear in the password in any combination of upper- or lowercase.
SERVICE_REQUEST_FLOW	Determines default provisioning mode. Default is MANUAL.
SERVICE_REQUESTS_ENABLED	If set to Y, the default, workspace service requests for schemas, storage, and termination is enabled. If set to N, these requests are disabled.
SESSION_TIMEOUT_WARNING_SEC	The number of seconds before session timeout that a warning displays for internal applications.
SMTP_FROM	Defines the "From" address for administrative tasks that generate email, such as approving a provision request or resetting a password. Enter a valid email address, for example: admin@example.com
SMTP_HOST_ADDRESS	Defines the server address of the SMTP server. If you are using another server as an SMTP relay, change this parameter to that server's address. Default setting: localhost
SMTP_HOST_PORT	Defines the port the SMTP server listens to for mail requests. Default setting: 25
SMTP_PASSWORD	Defines the password APEX takes to authenticate itself against the SMTP server, with the parameter SMTP_USERNAME.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
SMTP_TLS_MODE	Defines whether APEX opens an encrypted connection to the SMTP server. Encryption is only supported on database versions 11.2.0.2 and later. On earlier database versions, the connection is not encrypted. If set to N, the connection is unencrypted (default). If set to Y, the connection is encrypted before data is sent. If STARTTLS, APEX sends the SMTP commands EHLO <SMTP_HOST_ADDRESS> and STARTTLS before encrypting the connection.
SMTP_USERNAME	Defines the username APEX takes to authenticate itself against the SMTP server (default is null). Starting with database version 11.2.0.2, APEX uses UTL_MAIL's AUTH procedure for authentication. This procedure negotiates an authentication mode with the SMTP server. With earlier database versions, the authentication mode is always AUTH LOGIN. If SMTP_USERNAME is null, no authentication is used.
SOCIAL_AUTH_CALLBACK	Callback procedure name for Social Sign-In, defaults to apex_authentication.callback.
SQL_SCRIPT_MAX_OUTPUT_SIZE	Sets the maximum size for an individual script result. Default is 200000.
SSO_LOGOUT_URL	Defines the URL APEX redirects to in order to trigger a logout from the Single Sign-On server. APEX automatically appends ?p_done_url=...login url... Example: https://login.mycompany.com/pls/orasso/orasso.wwsso_app_admin.ls_logout
STRONG_SITE_ADMIN_PASSWORD	If set to Y, the default, the apex_admin password must conform to the default set of strong complexity rules. If set to N, the password is not required to follow the strong complexity rules.
SYSTEM_DEBUG_LEVEL	Defines a default debug level for all incoming requests (null, 1-9) The SQL Plus script utilities/debug/d0.sql can be used to switch between NULL (disabled) and level 9.
SYSTEM_HELP_URL	Location of the help and documentation accessed from the Help link within the development environment. Default is http://apex.oracle.com/doc41
SYSTEM_MESSAGE	The text to be displayed on the development environment home page. This text can include HTML.
TRACE_HEADER_NAME	This parameter contains a HTTP request header name and defaults to ECID-CONTEXT. The name must be in upper case. APEX writes the HTTP header value to the activity log's ECID column.
TRACING_ENABLED	If set to Y (the default), an application with Debug enabled can also generate server side db trace files using &p_trace=YES on the URL. If set to N, the request to create a trace file is ignored.

Table 24-1 (Cont.) Available Parameters

Parameter Name	Description
USERNAME_VALIDATION	The regular expression used to validate a username if the Builder authentication scheme is not APEX. Default is as follows: ^[[:alnum:]._%-]+@[[:alnum:].-]+\.[[:alpha:]]{2,4}$
WALLET_PATH	The path to the wallet on the file system, for example: file:/home/<*username*>/wallets
WALLET_PWD	The password associated with the wallet. Use an empty/null value for auto-login wallets.
WEBSERVICE_LOGGING	Controls instance wide setting of web service activity log. A, N, or U (Always, Never, Use workspace settings).
WORKSPACE_EMAIL_MAXIMUM	Sets the maximum number of emails that can be sent by using APEX_MAIL per workspace in a 24-hour period. Default is 1000.
WORKSPACE_MAX_FILE_BYTES	The maximum number of bytes for uploaded files for a workspace. A setting at the workspace-level overrides the instance-level setting.
WORKSPACE_MAX_OUTPUT_SIZE	The maximum space allocated for script results. Default is 2000000
WORKSPACE_NAME_USER_COOKIE	If set to Y or null (the default), APEX sends persistent cookies for workspace name and username during login, as well as for language selection. If N, the cookies are not sent.
WORKSPACE_PROVISION_DEMO_OBJECTS	If set to Y, the default, demonstration applications and database objects are created in new workspaces. If set to N, they are not created in the current workspace.
WORKSPACE_TEAM_DEV_FILES_YN	If set to Y, the default, new workspaces enable file uploads into Team Development. If set to N, new workspaces disable file uploads into Team Development, disabling the ability to upload feature, bug, and feedback attachments.
WORKSPACE_TEAM_DEV_FS_LIMIT	The maximum per upload file size of a Team Development file (feature, bug, and feedback attachments). Default value is 15728640 (15 MB). All possible options are listed below: 5 MB - 5242880 | 10 MB - 10485760 | 15 MB - 15728640 | 20 MB - 20971520 | 25 MB - 26214400

See Also:

- Configuring Email in a Runtime Environment in the *Oracle APEX Administration Guide*
- Configuring Wallet Information in the *Oracle APEX Administration Guide*
- Configuring Report Printing for an Instance in the *Oracle APEX Administration Guide*
- Workspace and Application Administration in the *Oracle APEX Administration Guide*

24.2 ADD_SCHEMA Procedure

The `ADD_SCHEMA` procedure adds a schema to a workspace to schema mapping.

Syntax

```
APEX_INSTANCE_ADMIN.ADD_SCHEMA(
    p_workspace    IN VARCHAR2,
    p_schema       IN VARCHAR2);
```

Parameters

Table 24-2 ADD_SCHEMA Parameters

Parameter	Description
`p_workspace`	The name of the workspace to which the schema mapping is added.
`p_schema`	The schema to add to the schema to workspace mapping.

Example

The following example demonstrates how to use the `ADD_SCHEMA` procedure to map a schema mapped to a workspace.

```
BEGIN
    APEX_INSTANCE_ADMIN.ADD_SCHEMA('MY_WORKSPACE','FRANK');
END;
```

24.3 ADD_WEB_ENTRY_POINT Procedure

Purpose

Add a public procedure to the white list of objects that can be called via the URL.

The parsing schema (such as `APEX_PUBLIC_USER`) must have privileges to execute the procedure. You must enable `EXECUTE` to `PUBLIC` or the parsing schema.

Syntax

```
PROCEDURE ADD_WEB_ENTRY_POINT (
    p_name    IN VARCHAR2,
    p_methods IN VARCHAR2 DEFAULT 'GET' );
```

Parameters

Parameter	Description
p_name	The procedure name, prefixed by package name and schema, unless a public synonym exists.
p_methods	The comma-separated HTTP request methods (such sa GET, POST). Default GET.

Examples

This example enables myschema.mypkg.proc to be called via GET and POST requests, such as https://www.example.com/apex/myschema.mypkg.proc

```
BEGIN
    apex_instance_admin.add_web_entry_point (
        p_name    => 'MYSCHEMA.MYPKG.PROC',
        p_methods => 'GET,POST' );
    commit;
END;
```

24.4 ADD_WORKSPACE Procedure

The ADD_WORKSPACE procedure adds a workspace to an Oracle APEX Instance.

Syntax

```
APEX_INSTANCE_ADMIN.ADD_WORKSPACE(
    p_workspace_id        IN NUMBER DEFAULT NULL,
    p_workspace           IN VARCHAR2,
    p_source_identifier   IN VARCHAR2 DEFAULT NULL,
    p_primary_schema      IN VARCHAR2,
    p_additional_schemas  IN VARCHAR2,
    p_rm_consumer_group   IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 24-3 ADD_WORKSPACE Parameters

Parameter	Description
p_workspace_id	The ID to uniquely identify the workspace in an APEX instance. This may be left null and a new unique ID is assigned.
p_workspace	The name of the workspace to be added.

Table 24-3 (Cont.) ADD_WORKSPACE Parameters

Parameter	Description
p_source_identifier	A short identifier for the workspace used when synchronizing feedback between different instances.
p_primary_schema	The primary database schema to associate with the new workspace.
p_additional_schemas	A colon delimited list of additional schemas to associate with this workspace.
p_rm_consumer_group	Resource Manager consumer group which is used when executing applications of this workspace.

Example

The following example demonstrates how to use the ADD_WORKSPACE procedure to add a new workspace named MY_WORKSPACE using the primary schema, SCOTT, along with additional schema mappings for HR and OE.

```
BEGIN
    APEX_INSTANCE_ADMIN.ADD_WORKSPACE (
        p_workspace_id       => 8675309,
        p_workspace          => 'MY_WORKSPACE',
        p_primary_schema     => 'SCOTT',
        p_additional_schemas => 'HR:OE' );
END;
```

24.5 CREATE_SCHEMA_EXCEPTION Procedure

This procedure creates an exception which allows assignment of a restricted schema to a specific workspace.

Syntax

```
APEX_INSTANCE_ADMIN.CREATE_SCHEMA_EXCEPTION (
    p_schema    IN VARCHAR2,
    p_workspace IN VARCHAR2 );
```

Parameter

Table 24-4 CREATE_SCHEMA_EXCPETION Parameters

Parameter	Description
p_schema	The schema.
p_workspace	The workspace.

Example

This example allows the assignment of restricted schema `HR` to workspace `HR_WORKSPACE`.

```
begin
    apex_instance_admin.create_schema_exception (
        p_schema    => 'HR',
        p_workspace => 'HR_WORKSPACE' );
    commit;
end;
```

> **See Also:**
>
> - "RESTRICT_SCHEMA Procedure"
> - "UNRESTRICT_SCHEMA Procedure"
> - "REMOVE_SCHEMA_EXCEPTION Procedure"
> - "REMOVE_SCHEMA_EXCEPTIONS Procedure"
> - "REMOVE_WORKSPACE_EXCEPTIONS Procedure"

24.6 DB_SIGNATURE Function

The `DB_SIGNATURE` function computes the current database signature value.

Syntax

```
FUNCTION DB_SIGNATURE
    RETURN VARCHAR2;
```

Example

The following example prints the database signature.

```
begin
     apex_instance_admin.set_parameter (
         p_parameter => 'DB_SIGNATURE',
         p_value     => apex_instance_admin.db_signature );
end;
```

> **See Also:**
>
> "IS_DB_SIGNATURE_VALID Function", "Available Parameter Values"

24.7 FREE_WORKSPACE_APP_IDS Procedure

This procedure removes the reservation of application IDs for a given workspace ID. Use this procedure to undo a reservation, when the reservation is not necessary anymore because it happened by mistake or the workspace no longer exists. To reserve application IDs for a given workspace, see "RESERVE_WORKSPACE_APP_IDS Procedure."

Syntax

```
APEX_INSTANCE_ADMIN.FREE_WORKSPACE_APP_IDS (
    p_workspace_id IN NUMBER );
```

Parameters

Table 24-5 FREE_WORKSPACE_APP_IDS Parameters

Parameter	Description
p_workspace_id	The unique ID of the workspace.

Example

This example illustrates how to undo the reservation of application IDS that belong to a workspace with an ID of 1234567890.

```
begin
    apex_instance_admin.free_workspace_app_ids(1234567890);
end;
```

24.8 GET_PARAMETER Function

This function retrieves the value of a parameter used in administering a runtime environment.

Syntax

```
APEX_INSTANCE_ADMIN.GET_PARAMETER(
    p_parameter     IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 24-6 GET_PARAMETER Parameters

Parameter	Description
p_parameter	The instance parameter to be retrieved. See Available Parameter Values.

Example

The following example demonstrates how to use the GET_PARAMETER function to retrieve the SMTP_HOST_ADDRESS parameter currently defined for an APEX instance.

```
DECLARE
    L_VAL VARCHAR2(4000);
BEGIN
    L_VAL :=APEX_INSTANCE_ADMIN.GET_PARAMETER('SMTP_HOST_ADDRESS');
    DBMS_OUTPUT.PUT_LINE('The SMTP Host Setting Is: '||L_VAL);
END;
```

24.9 GET_SCHEMAS Function

The GET_SCHEMAS function retrieves a comma-delimited list of schemas that are mapped to a given workspace.

Syntax

```
APEX_INSTANCE_ADMIN.GET_SCHEMAS(
    p_workspace     IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 24-7 GET_SCHEMAS Parameters

Parameter	Description
p_workspace	The name of the workspace from which to retrieve the schema list.

Example

The following example demonstrates how to use the GET_SCHEMA function to retrieve the underlying schemas mapped to a workspace.

```
DECLARE
    L_VAL VARCHAR2(4000);
BEGIN
    L_VAL :=APEX_INSTANCE_ADMIN.GET_SCHEMAS('MY_WORKSPACE');
    DBMS_OUTPUT.PUT_LINE('The schemas for my workspace: '||L_VAL);
END;
```

24.10 GET_WORKSPACE_PARAMETER

The GET_WORKSPACE_PARAMETER procedure gets the workspace parameter.

Syntax

```
GET_WORKSPACE_PARAMETER(
    p_workspace     IN VARCHAR2,
    p_parameter     IN VARCHAR2,
```

Parameters

Table 24-8 GET_WORKSPACE_PARAMETER Parameters

Parameter	Description
p_workspace	The name of the workspace to which you are getting the workspace parameter.
p_parameter	The parameter name that overrides the instance parameter value of the same name for this workspace. Parameter names include: • ALLOW_HOSTNAMES • MAX_SESSION_IDLE_SEC • MAX_SESSION_LENGTH_SEC • QOS_MAX_WORKSPACE_REQUESTS • QOS_MAX_SESSION_REQUESTS • QOS_MAX_SESSION_KILL_TIMEOUT • RM_CONSUMER_GROUP • WORKSPACE_EMAIL_MAXIMUM • WORKSPACE_MAX_FILE_BYTES

Example

The following example prints the value of ALLOW_HOSTNAMES for the HR workspace.

```
BEGIN
    DBMS_OUTPUT.PUT_LINE (
APEX_INSTANCE_ADMIN.GET_WORKSPACE_PARAMETER (
            p_workspace => 'HR',
            p_parameter => 'ALLOW_HOSTNAMES' ));
END;
```

24.11 IS_DB_SIGNATURE_VALID Function

The IS_DB_SIGNATURE_VALID function returns whether the instance parameter DB_SIGNATURE matches the value of the function db_signature. If the instance parameter is not set (the default), also return true.

Syntax

```
FUNCTION IS_DB_SIGNATURE_VALID
    RETURN BOOLEAN;
```

Example

The following example prints the signature is valid.

```
begin
    sys.dbms_output.put_line (
        case when apex_instance_admin.is_db_signature_valid
        then 'signature is valid, features are enabled'
        else 'signature differs (cloned db), features are disabled'
        end );
end;
```

> **See Also:**
>
> "DB_SIGNATURE Function", "Available Parameter Values"

24.12 REMOVE_APPLICATION Procedure

The REMOVE_APPLICATION procedure removes the application specified from the Oracle APEX instance.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_APPLICATION (
    p_application_id IN NUMBER);
```

Parameters

Table 24-9 REMOVE_APPLICATION Parameters

Parameter	Description
p_application_id	The ID of the application.

Example

The following example demonstrates how to use the `REMOVE_APPLICATION` procedure to remove an application with an ID of 100 from an APEX instance.

```
BEGIN
    APEX_INSTANCE_ADMIN.REMOVE_APPLICATION(100);
END;
```

24.13 REMOVE_SAVED_REPORT Procedure

The `REMOVE_SAVED_REPORT` procedure removes a specific user's saved interactive report settings for a particular application.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_SAVED_REPORT(
    p_application_id     IN NUMBER,
    p_report_id          IN NUMBER);
```

Parameters

Table 24-10 REMOVE_SAVED_REPORT Parameters

Parameter	Description
p_application_id	The ID of the application for which to remove user saved interactive report information.
p_report_id	The ID of the saved user interactive report to be removed.

Example

The following example demonstrates how to use the REMOVE_SAVED_REPORT procedure to remove user saved interactive report with the ID 123 for the application with an ID of 100.

```
BEGIN
    APEX_INSTANCE_ADMIN.REMOVE_SAVED_REPORT(100,123);
END;
```

24.14 REMOVE_SAVED_REPORTS Procedure

The REMOVE_SAVED_REPORTS procedure removes all user saved interactive report settings for a particular application or for the entire instance.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_SAVED_REPORTS(
    p_application_id     IN NUMBER DEFAULT NULL);
```

Parameters

Table 24-11 REMOVE_SAVED_REPORTS Parameters

Parameter	Description
p_application_id	The ID of the application for which to remove user saved interactive report information. If this parameter is left null, all user saved interactive reports for the entire instance is removed.

Example

The following example demonstrates how to use the `REMOVE_SAVED_REPORTS` procedure to remove user saved interactive report information for the application with an ID of 100.

```
BEGIN
    APEX_INSTANCE_ADMIN.REMOVE_SAVED_REPORTS(100);
END;
```

24.15 REMOVE_SCHEMA Procedure

This `REMOVE_SCHEMA` procedure removes a workspace to schema mapping.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_SCHEMA(
    p_workspace     IN VARCHAR2,
    p_schema        IN VARCHAR2);
```

Parameters

Table 24-12 REMOVE_SCHEMA Parameters

Parameter	Description
`p_workspace`	The name of the workspace from which the schema mapping is removed.
`p_schema`	The schema to remove from the schema to workspace mapping.

Example

The following example demonstrates how to use the `REMOVE_SCHEMA` procedure to remove the schema named `Frank` from the `MY_WORKSPACE` workspace to schema mapping.

```
BEGIN
    APEX_INSTANCE_ADMIN.REMOVE_SCHEMA('MY_WORKSPACE','FRANK');
END;
```

24.16 REMOVE_SCHEMA_EXCEPTION Procedure

This procedure removes an exception that allows the assignment of a restricted schema to a given workspace.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_SCHEMA_EXCEPTION (
    p_schema    IN VARCHAR2,
    p_workspace IN VARCHAR2 );
```

Parameter

Table 24-13 REMOVE_SCHEMA_EXCEPTION Parameters

Parameter	Description
p_schema	The schema.
p_workspace	The workspace.

Example

This example removes the exception that allows the assignment of schema HR to workspace HR_WORKSPACE.

```
begin
    apex_instance_admin.remove_schema_exception (
        p_schema    => 'HR',
        p_workspace => 'HR_WORKSPACE' );
    commit;
end;
```

See Also:

- "CREATE_SCHEMA_EXCEPTION Procedure"
- "RESTRICT_SCHEMA Procedure"
- "UNRESTRICT_SCHEMA Procedure"
- "REMOVE_SCHEMA_EXCEPTIONS Procedure"
- "REMOVE_WORKSPACE_EXCEPTIONS Procedure"

24.17 REMOVE_SCHEMA_EXCEPTIONS Procedure

This procedure removes all exceptions that allow the assignment of a given schema to workspaces.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_SCHEMA_EXCEPTIONS (
      p_schema in varchar2 );
```

Parameter

Table 24-14 REMOVE_SCHEMA_EXCEPTIONS Parameter

Parameter	Description
p_schema	The schema.

Example

This example removes all exceptions that allow the assignment of the HR schema to workspaces.

```
begin
    apex_instance_admin.remove_schema_exceptions (
            p_schema => 'HR' );
    commit;
end;
```

> **See Also:**
>
> - "CREATE_SCHEMA_EXCEPTION Procedure"
> - "RESTRICT_SCHEMA Procedure"
> - "UNRESTRICT_SCHEMA Procedure"
> - "REMOVE_SCHEMA_EXCEPTION Procedure"
> - "REMOVE_WORKSPACE_EXCEPTIONS Procedure"

24.18 REMOVE_SUBSCRIPTION Procedure

The REMOVE_SUBSCRIPTION procedure removes a specific interactive report subscription.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_SUBSCRIPTION(
    p_subscription_id     IN NUMBER);
```

Parameters

Table 24-15 REMOVE_SUBSCRIPTION Procedure Parameters

Parameter	Description
p_subscription_id	The ID of the interactive report subscription to be removed.

Example

The following example demonstrates how to use the `REMOVE_SUBSCRIPTION` procedure to remove interactive report subscription with the ID 12345. Use of `APEX_APPLICATION_PAGE_IR_SUB` view can help identifying the subscription ID to remove.

```
BEGIN
    APEX_INSTANCE_ADMIN.REMOVE_SUBSCRIPTION (
        p_subscription_id => 12345);
END;
```

24.19 REMOVE_WEB_ENTRY_POINT Procedure

The `REMOVE_WEB_ENTRY_POINT` procedure removes a public procedure from the white list of objects that can be called via the URL.

Syntax

```
REMOVE_WEB_ENTRY_POINT (
    p_name   IN VARCHAR2 );
```

Parameters

Parameter	Description
`p_name`	The procedure name, prefixed by package name and schema, unless a public synonym exists.

Examples

Prevent `myschema.mypkg.proc` from being called via POST requests.

```
BEGIN
APEX_INSTANCE_ADMIN.REMOVE_WEB_ENTRY_POINT (
        p_name   'MYSCHEMA.MYPKG.PROC' );
    commit;
END;
```

24.20 REMOVE_WORKSPACE Procedure

This procedure removes a workspace from an Oracle APEX instance.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_WORKSPACE(
    p_workspace         IN VARCHAR2,
    p_drop_users        IN VARCHAR2 DEFAULT 'N',
    p_drop_tablespaces  IN VARCHAR2 DEFAULT 'N' );
```

Parameters

Table 24-16 REMOVE_WORKSPACE Parameters

Parameter	Description
p_workspace	The name of the workspace to be removed.
p_drop_users	Y to drop the database user associated with the workspace. The default is N.
p_drop_tablespaces	Y to drop the tablespace associated with the database user associated with the workspace. The default is N.

Example

The following example demonstrates how to use the REMOVE_WORKSPACE procedure to remove an existing workspace named MY_WORKSPACE, along with the associated database users and tablespace.

```
BEGIN
    APEX_INSTANCE_ADMIN.REMOVE_WORKSPACE('MY_WORKSPACE','Y','Y');
END;
```

24.21 REMOVE_WORKSPACE_EXCEPTIONS Procedure

This procedure removes all exceptions that allow the assignment of restricted schemas to given workspace.

Syntax

```
APEX_INSTANCE_ADMIN.REMOVE_WORKSPACE_EXCEPTIONS (      p_workspace IN
VARCHAR2 );
```

Parameter

Table 24-17 REMOVE_WORKSPACE_EXCEPTIONS Parameter

Parameter	Description
p_workspace	The workspace.

Example

This example removes all exceptions that allow the assignment of restricted schemas to HR_WORKSPACE.

```
begin    apex_instance_admin.remove_schema_exceptions
(            p_workspace => 'HR_WORKSPACE' );    commit;end;
```

See Also:

- "CREATE_SCHEMA_EXCEPTION Procedure"
- "RESTRICT_SCHEMA Procedure"
- "UNRESTRICT_SCHEMA Procedure"
- "REMOVE_SCHEMA_EXCEPTION Procedure"
- "REMOVE_SCHEMA_EXCEPTIONS Procedure"

24.22 RESERVE_WORKSPACE_APP_IDS Procedure

This procedure permanently reserves the IDs of websheet and database applications in a given workspace. Even if the workspace and its applications get removed, developers can not create other applications with one of these IDs.

Syntax

```
APEX_INSTANCE_ADMIN.RESERVE_WORKSPACE_APP_IDS (
    p_workspace_id IN NUMBER );
```

Parameters

Table 24-18 RESERVE_WORKSPACE_APP_IDS Parameters

Parameter	Description
p_workspace_id	The unique ID of the workspace.

Example

This example demonstrates setting up two separate Oracle APEX instances where the application IDs are limited to within a specific range. At a later point, a workspace and all of its applications are moved from instance 1 to instance 2. For the workspace that is moved, the developer reserves all of its application IDs to ensure that no applications with the same IDs are created on instance 1.

1. After setting up APEX instance 1, ensure that application IDs are between 100000 and 199999.

```
begin
    apex_instance_admin.set_parameter('APPLICATION_ID_MIN', 100000);
    apex_instance_admin.set_parameter('APPLICATION_ID_MAX', 199999);
end;
```

2. After setting up APEX instance 2, ensure that application IDs are between 200000 and 299999.

```
begin
    apex_instance_admin.set_parameter('APPLICATION_ID_MIN', 200000);
```

```
    apex_instance_admin.set_parameter('APPLICATION_ID_MAX', 299999);
end;
```

3. Later, the operations team decides that workspace `MY_WORKSPACE` with ID `1234567890` should be moved from instance 1 to instance 2. The required steps are:
   a. Export the workspace, applications and data on instance 1 (not shown here).
   b. Ensure that no other application on instance 1 can reuse application IDs of this workspace.

```
begin
    apex_instance_admin.reserve_workspace_app_ids(1234567890);
end;
```

   c. Drop workspace, accompanying data and users on instance 1.

```
begin
    apex_instance_admin.remove_workspace('MY_WORKSPACE');
end;
```

   d. Import the workspace, applications and data on instance 2 (not shown here).

> **See Also:**
>
> To undo a reservation, see FREE_WORKSPACE_APP_IDS Procedure.

24.23 RESTRICT_SCHEMA Procedure

This procedure revokes the privilege to assign a schema to workspaces.

Syntax

```
APEX_INSTANCE_ADMIN.RESTRICT_SCHEMA (
    p_schema IN VARCHAR2 );
```

Parameter

Table 24-19 RESTRICT_SCHEMA Parameters

Parameter	Description
p_schema	The schema.

Example

This example revokes the privilege to assign schema HR to workspaces.

```
begin
    apex_instance_admin.restrict_schema(p_schema => 'HR');
```

```
    commit;
end;
```

> **See Also:**
>
> - "CREATE_SCHEMA_EXCEPTION Procedure"
> - "UNRESTRICT_SCHEMA Procedure"
> - "REMOVE_SCHEMA_EXCEPTION Procedure"
> - "REMOVE_SCHEMA_EXCEPTIONS Procedure"
> - "REMOVE_WORKSPACE_EXCEPTIONS Procedure"

24.24 SET_LOG_SWITCH_INTERVAL Procedure

Set the log switch interval for each of the logs maintained by Oracle APEX.

Syntax

```
APEX_INSTANCE_ADMIN.SET_LOG_SWITCH_INTERVAL(
    p_log_name              IN VARCHAR2,
    p_log_switch_after_days IN NUMBER );
```

Parameters

Table 24-20 SET_LOG_SWITCH_INTERVAL Parameters

Parameters	Description
p_log_name	Specifies the name of the log. Valid values include ACCESS, ACTIVITY, AUTOMATION, CLICKTHRU, DEBUG, WEBSERVICE, and WEBSOURCESYNC.
p_log_switch_after_days	This interval must be a positive integer between 1 and 180.

Example

This example sets the log switch interval for the ACTIVITY log to 30 days.

```
BEGIN
    apex_instance_admin.set_log_switch_interval( p_log_name => 'ACTIVITY',
p_log_switch_after_days => 30 );
    COMMIT;
END;
```

24.25 SET_WORKSPACE_PARAMETER

The SET_WORKSPACE_PARAMETER procedure sets the designated workspace parameter.

Syntax

```
SET_WORKSPACE_PARAMETER(
    p_workspace     IN VARCHAR2,
    p_parameter     IN VARCHAR2,
    p_value         IN VARCHAR2 );
```

Parameters

Table 24-21 SET_WORKSPACE_PARAMETER Parameters

Parameter	Description
p_workspace	The name of the workspace to which you are setting the workspace parameter.
p_parameter	The parameter name which overrides the instance parameter value of the same for this workspace. Parameter names include: • ALLOW_HOSTNAMES • CONTENT_CACHE_SIZE_TARGET • CONTENT_CACHE_MAX_FILE_SIZE • MAX_SESSION_IDLE_SEC • MAX_SESSION_LENGTH_SEC • MAX_WEBSERVICE_REQUESTS • PATH_PREFIX • QOS_MAX_WORKSPACE_REQUESTS • QOS_MAX_SESSION_REQUESTS • QOS_MAX_SESSION_KILL_TIMEOUT • RM_CONSUMER_GROUP • SESSION_TIMEOUT_WARNING_SEC • WEBSERVICE_LOGGING • WORKSPACE_EMAIL_MAXIMUM • WORKSPACE_MAX_FILE_BYTES
p_value	The parameter value.

Example

The following example demonstrates how to use the `set_workspace_parameter` procedure to restrict URLs for accessing applications in the HR workspace that have hr.example.com in the hostname or domain name.

```
BEGIN
    apex_instance_admin.set_workspace_parameter (
            p_workspace => 'HR',
            p_parameter => 'ALLOW_HOSTNAMES' );
            p_value     => 'hr.example.com' );
    COMMIT
END;
```

24.26 SET_PARAMETER Procedure

This procedure sets a parameter used in administering a runtime environment. You must issue a commit for the parameter change to take affect.

Syntax

```
APEX_INSTANCE_ADMIN.SET_PARAMETER(
    p_parameter     IN VARCHAR2,
    p_value         IN VARCHAR2 DEFAULT 'N');
```

Parameters

Table 24-22 SET_PARAMETER Parameters

Parameter	Description
p_parameter	The instance parameter to be set.
p_value	The value of the parameter. See Available Parameter Values.

Example

The following example demonstrates how to use the SET_PARAMETER procedure to set the SMTP_HOST_ADDRESS parameter for an Oracle APEX instance.

```
BEGIN
    APEX_INSTANCE_ADMIN.SET_PARAMETER('SMTP_HOST_ADDRESS',
'mail.example.com');
    COMMIT;
END;
```

24.27 SET_WORKSPACE_CONSUMER_GROUP Procedure

The SET_WORKSPACE_CONSUMER_GROUP procedure sets a Resource Manager Consumer Group to a workspace.

Syntax

```
SET_WORKSPACE_CONSUMER_GROUP(
    p_workspace IN VARCHAR2,
    p_rm_consumer_group IN VARCHAR2 );
```

Parameters

Table 24-23 SET_WORKSPACE_CONSUMER_GROUP Parameters

Parameters	Description
p_workspace	This is the name of the workspace for which the resource consumer group is to be set.
p_rm_consumer_group	The parameter `P_RM_CONSUMER_GROUP` is the Oracle Database Resource Manager Consumer Group name. The consumer group does not have to exist at the time this procedure is invoked. But if the Resource Manager Consumer Group is set for a workspace and the consumer group does not exist, then an error will be raised when anyone attempts to login to this workspace or execute any application in the workspace. If the value of `P_RM_CONSUMER_GROUP` is null, then the Resource Manager consumer group associated with the specified workspace is cleared.

Example

The following example sets the workspace to the Resource Manager consumer group "CUSTOM_GROUP1":

```
begin
        apex_instance_admin.set_workspace_consumer_group(
        p_workspace => 'MY_WORKSPACE',
        p_rm_consumer_group => 'CUSTOM_GROUP1' );
    commit;
end;
/
```

24.28 TRUNCATE_LOG Procedure

The TRUNCATE_LOG procedure truncates the log entries specified by the input parameter.

Syntax

```
APEX_INSTANCE_ADMIN.TRUNCATE_LOG (
    p_log     IN VARCHAR2 )
```

Parameters

Table 24-24 TRUNCATE_LOG Parameters

Parameter	Description
p_log	This parameter can have one of the following values: • ACTIVITY - removes all entries that record page access. • CLICKS - removes all entries that record clicks tracked to external sites. • DEBUG - removes all entries captured during debug sessions. • FILE - removes all entries that record automatic file purge activity. • LOCK_INSTALL_SCRIPT - removes all entries that record developer locking of supporting objects script. • LOCK_PAGE - removes all entries that record developer locking of pages. • MAIL - removes all entries that record mail sent. • PURGE - removes all entries that record automatic workspace purge activity. • SCRIPT - removes all entries that record results of SQL scripts executed in SQL Workshop. • SQL - removes all entries that record the history of commands executed in SQL Workshop SQL Commands • USER_ACCESS - removes all entries that record user login. • WORKSPACE_HIST - removes all entries that record daily workspace summary.

Example

The following example demonstrates how to use the TRUNCATE_LOG procedure to remove all log entries that record access to APEX application pages.

```
BEGIN
  APEX_INSTANCE_ADMIN.TRUNCATE_LOG('ACTIVITY');
END;
```

24.29 UNRESTRICT_SCHEMA Procedure

This procedure re-grants the privilege to assign a schema to workspaces, if it has been revoked before.

Syntax

```
APEX_INSTANCE_ADMIN.UNRESTRICT_SCHEMA (
    p_schema IN VARCHAR2 );
```

Parameter

Table 24-25 RESTRICT_SCHEMA Parameters

Parameter	Description
p_schema	The schema.

Example

This example re-grants the privilege to assign schema HR to workspaces.

```
begin
    apex_instance_admin.unrestrict_schema(p_schema => 'HR');
    commit;
end;
```

> **See Also:**
>
> - "CREATE_SCHEMA_EXCEPTION Procedure"
> - "RESTRICT_SCHEMA Procedure"
> - "REMOVE_SCHEMA_EXCEPTION Procedure"
> - "REMOVE_SCHEMA_EXCEPTIONS Procedure,"
> - "REMOVE_WORKSPACE_EXCEPTIONS Procedure"

24.30 VALIDATE_EMAIL_CONFIG Procedure

This procedure attempts to establish a connection with the email server configured in an Oracle APEX instance. An error is returned if the connection is unsuccessful. This can indicate incorrect SMTP instance parameters, missing Network ACL, missing SSL certificate in Oracle Wallet, or a problem on the email server side. Correct the instance configuration and re-execute this procedure to confirm.

This procedure exits if the connection successfully establishes.

Syntax

```
APEX_INSTANCE_ADMIN.VALIDATE_EMAIL_CONFIG
```

Parameters

None.

Example

```
BEGIN
    APEX_INSTANCE_ADMIN.VALIDATE_EMAIL_CONFIG;
END;
```

See Also:

- APEX_MAIL
- Configuring Email in *Oracle APEX Administration Guide*

25
APEX_IG

The `APEX_IG` package provides utilities you can use when programming in the Oracle APEX environment related to interactive grids. You can use the `APEX_IG` package to add filters, reset or clear report settings, delete saved reports and change report owners.

25.1 ADD_FILTER Procedure Signature 1

This procedure creates a filter on an interactive grid using a report ID.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive grid reloads the page with download format in the `REQUEST` value. Any interactive grid settings changes (such as add filter or reset report) are done in an Ajax request. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IG.ADD_FILTER (
    p_page_id           IN NUMBER,
    p_region_id         IN NUMBER,
    p_filter_value      IN VARCHAR2,
    p_column_name       IN VARCHAR2 DEFAULT NULL,
    p_operator_abbr     IN VARCHAR2 DEFAULT NULL,
    p_is_case_sensitive IN BOOLEAN  DEFAULT FALSE,
    p_report_id         IN NUMBER   DEFAULT NULL );
```

Parameters

Table 25-1 ADD_FILTER Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive grid.
p_region_id	The interactive grid region (ID).
p_filter_value	The filter value. This value is not used for operator N and NN.
p_column_name	Name of the report SQL column, or column alias, to be filtered.
p_operator_abbr	Filter type. Valid values are as follows: EQ = Equals NEQ = Not Equals LT = Less than LTE = Less than or equal to GT = Greater Than GTE = Greater than or equal to N = Null NN = Not Null C = Contains NC = Not Contains IN = SQL In Operator NIN = SQL Not In Operator
p_is_case_sensitive	Case sensitivity of the row search filter. This value is not used for a column filter, where p_report_column is set. Valid values are as follows: • TRUE • FALSE (This is the default value.)
p_report_id	The saved report ID within the current application page. If p_report_id is NULL, it adds the filter to the last viewed report settings.

Example 1

The following example shows how to use the ADD_FILTER procedure to filter the interactive grid with report ID of 901029800374639010 in page 1, region 3335704029884222 of the current application with DEPTNO equals 30

```
BEGIN
    APEX_IG.ADD_FILTER(
        p_page_id           => 1,
        p_region_id         => 3335704029884222,
        p_filter_value      => '30',
        p_column_name       => 'DEPTNO',
        p_operator_abbr     => 'EQ',
        p_report_id         => 901029800374639010);
END;
```

Example 2

The following example shows how to use the `ADD_FILTER` procedure to filter the interactive grid with report ID of `901029800374639010` in page 1, region `3335704029884222` of the current application with rows containing the case-sensitive word `Salary`.

```
BEGIN
    APEX_IG.ADD_FILTER(
        p_page_id           => 1,
        p_region_id         => 3335704029884222,
        p_filter_value      => 'Salary',
        p_is_case_sensitive => true,
        p_report_id         => 901029800374639010);
END;
```

25.2 ADD_FILTER Procedure Signature 2

This procedure creates a filter on an interactive grid using a report name.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive grid reloads the page with download format in the `REQUEST` value. Any interactive grid settings changes (such as add filter or reset report) are done in an Ajax request. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IG.ADD_FILTER (
    p_page_id           IN NUMBER,
    p_region_id         IN NUMBER,
    p_filter_value      IN VARCHAR2,
    p_column_name       IN VARCHAR2 DEFAULT NULL,
    p_operator_abbr     IN VARCHAR2 DEFAULT NULL,
    p_is_case_sensitive IN BOOLEAN  DEFAULT FALSE,
    p_report_name       IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 25-2 ADD_FILTER Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive grid.
`p_region_id`	The interactive grid region (ID).
`p_filter_value`	This is the filter value. This value is not used for `N` and `NN`.

Table 25-2 (Cont.) ADD_FILTER Parameters

Parameter	Description
p_column_name	Name of the report SQL column, or column alias, to be filtered.
p_operator_abbr	Filter type. Valid values are as follows: EQ = Equals NEQ = Not Equals LT = Less than LTE = Less than or equal to GT = Greater Than GTE = Greater than or equal to N = Null NN = Not Null C = Contains NC = Not Contains IN = SQL In Operator NIN = SQL Not In Operator
p_is_case_sensitive	Case sensitivity of the row search filter. This value is not used for a column filter, where p_report_column is set. Valid values are as follows: • TRUE • FALSE (This is the default value.)
p_report_name	The saved report name within the current application page. If p_report_name is NULL, it adds the filter to the last viewed report settings.

Example 1

The following example shows how to use the ADD_FILTER procedure to filter the interactive grid with report name of Statistics in page 1, region 3335704029884222 of the current application with DEPTNO equals 30.

```
BEGIN
    APEX_IG.ADD_FILTER(
        p_page_id           => 1,
        p_region_id         => 3335704029884222,
        p_filter_value      => '30',
        p_column_name       => 'DEPTNO',
        p_operator_abbr     => 'EQ',
        p_report_name       => 'Statistics');
END;
```

Example 2

The following example shows how to use the `ADD_FILTER` procedure to filter the interactive grid with report name of `Statistics` in page 1, region `3335704029884222` of the current application with rows containing the case-sensitive word `Salary`.

```
BEGIN
    APEX_IG.ADD_FILTER(
        p_page_id           => 1,
        p_region_id         => 3335704029884222,
        p_filter_value      => 'Salary',
        p_is_case_sensitive => true,
        p_report_name       => 'Statistics');
END;
```

25.3 CHANGE_REPORT_OWNER Procedure

This procedure changes the owner of a saved interactive grid report using a report ID. This procedure cannot change the owner of default interactive grid report.

Syntax

```
APEX_IG.CHANGE_REPORT_OWNER (
    p_application_id IN NUMBER DEFAULT apex_application.g_flow_id,
    p_report_id      IN NUMBER,
    p_old_owner      IN VARCHAR2,
    p_new_owner      IN VARCHAR2);
```

Parameters

Table 25-3 CHANGE_REPORT_OWNER Procedure

Parameters	Description
`p_application_id`	The application ID containing the interactive grid. If `p_application_id` is NULL, it defaults to the application ID in `apex_application.g_flow_id`.
`p_report_id`	The saved report ID within the current application page.
`p_old_owner`	The previous owner name to change from (case sensitive). The owner needs to a valid login user accessing the report.
`p_new_owner`	The new owner name to change to (case sensitive). The owner must be a valid login user accessing the report.

Example

This example shows how to use `CHANGE_REPORT_OWNER` procedure to change the old owner name of JOHN to the new owner name of JOHN.DOE for a saved report. The saved report has a report ID of `1235704029884282` and resides in the application with ID `100`.

```
BEGIN
    APEX_IG.CHANGE_REPORT_OWNER (
        P_application_id => 100,
```

```
        p_report_id      => 1235704029884282,
        p_old_owner      => 'JOHN',
        p_new_owner      => 'JOHN.DOE');
END;
END;
```

25.4 CLEAR_REPORT Procedure Signature 1

This procedure clears report filter settings to the developer defined default settings using the report ID.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive grid reloads the page with download format in the REQUEST value. Any interactive grid settings changes (such as add filter or reset report) are done in an Ajax request. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IG.CLEAR_REPORT (
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER,
    p_report_id IN NUMBER DEFAULT NULL );
```

Parameters

Table 25-4 CLEAR_REPORT Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive grid.
`p_region_id`	The interactive grid region ID.
`p_report_id`	The saved report ID within the current application page. If `p_report_id` is NULL, it clears the last viewed report settings.

Example

The following example shows how to use the `CLEAR_REPORT` procedure signature 1 to reset interactive grid filter settings with report ID of `901029800374639010` in page 1, region `3335704029884222` of the current application.

```
BEGIN
    APEX_IG.CLEAR_REPORT(
        p_page_id      => 1,
        p_region_id    => 3335704029884222,
```

```
        p_report_id    => 901029800374639010);
END;
```

25.5 CLEAR_REPORT Procedure Signature 2

This procedure clears filter report settings to the developer defined default settings using the report name.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive grid reloads the page with download format in the REQUEST value. Any interactive grid settings changes (such as add filter or reset report) are done in an Ajax request. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IG.CLEAR_REPORT(
    p_page_id     IN NUMBER,
    p_region_id   IN NUMBER,
    p_report_name IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 25-5 CLEAR_REPORT Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive grid.
`p_region_id`	The interactive grid region (ID).
`p_report_name`	The saved report name within the current application page. If `p_report_name` is NULL, it resets the last viewed report settings.

Example

The following example shows how to use the `CLEAR_REPORT` procedure signature 2 to reset interactive grid filter settings with report name of `Statistics` in page 1, region `3335704029884222` of the current application.

```
BEGIN
    APEX_IG.CLEAR_REPORT(
        p_page_id      => 1,
        p_region_id    => 3335704029884222,
        p_report_name  => 'Statistics');
END;
```

25.6 DELETE_REPORT Procedure

This procedure deletes a saved interactive grid report. It deletes a specific saved report in the current logged in workspace and application.

Syntax

```
APEX_IG.DELETE_REPORT(
    p_application_id IN NUMBER DEFAULT apex_application.g_flow_id,
    p_report_id      IN NUMBER);
```

Parameters

Table 25-6 DELETE_REPORT Parameters

Parameter	Description
p_application_id	The application ID containing the interactive grid. If p_application_id is NULL, it defaults to the application ID in apex_application.g_flow_id.
p_report_id	Report ID to delete within the current Oracle APEX application.

Example

The following example shows how to use the DELETE_REPORT procedure to delete the saved interactive grid report with ID of 901029800374639010 in application ID 100.

```
BEGIN
    APEX_IG.DELETE_REPORT (
        P_application_id => 100,
        p_report_id      => 901029800374639010);
END;
```

25.7 GET_LAST_VIEWED_REPORT_ID Function

This function returns the last viewed base report ID of the specified page and region.

Syntax

```
APEX_IG.GET_LAST_VIEWED_REPORT_ID (
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER );
```

Parameters

Table 25-7 GET_LAST_VIEWED_REPORT_ID Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive grid.
p_region_id	The interactive grid region ID.

Example

The following example shows how to use the GET_LAST_VIEWED_REPORT_ID function to retrieve the last viewed report ID in page 1, region 3335704029884222 of the current application.

```
DECLARE
    l_report_id number;
BEGIN
    l_report_id := APEX_IG.GET_LAST_VIEWED_REPORT_ID (
        p_page_id   => 1,
        p_region_id => 3335704029884222);
END;
```

25.8 RESET_REPORT Procedure Signature 1

This procedure resets report settings to the developer defined default settings using the report ID.

Syntax

```
APEX_IG.RESET_REPORT (
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER,
    p_report_id IN NUMBER DEFAULT NULL );
```

Parameters

Table 25-8 RESET_REPORT Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive grid.
p_region_id	The interactive grid region ID.
p_report_name	The saved report name within the current application page. If p_report_name is NULL, it resets the last viewed report settings.

Example

The following example shows how to use the `RESET_REPORT` procedure signature 1 to reset interactive grid settings with report ID of `901029800374639010` in page 1, region `3335704029884222` of the current application.

```
BEGIN
    APEX_IG.RESET_REPORT(
        p_page_id      => 1,
        p_region_id    => 3335704029884222,
        p_report_id    => 901029800374639010);
END;
```

25.9 RESET_REPORT Procedure Signature 2

This procedure resets report settings to the developer defined default settings using the report name.

Syntax

```
APEX_IG.RESET_REPORT(
    p_page_id     IN NUMBER,
    p_region_id   IN NUMBER,
    p_report_name IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 25-9 RESET_REPORT Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive grid.
`p_region_id`	The interactive grid region ID.
`p_report_name`	The saved report name within the current application page. If `p_report_name` is NULL, it resets the last viewed report settings.

Example

The following example shows how to use the `RESET_REPORT` procedure signature 2 to reset interactive grid settings with report name of `Statistics` in page 1, region `3335704029884222` of the current application.

```
BEGIN
    APEX_IG.RESET_REPORT(
        p_page_id      => 1,
        p_region_id    => 3335704029884222,
        p_report_name  => 'Statistics' );
END;
```

26
APEX_IR

The `APEX_IR` package provides utilities you can use when programming in the Oracle APEX environment related to interactive reports. You can use the `APEX_IR` package to get an interactive report runtime query based on local and remote data source, add filters, reset or clear report settings, delete saved reports and manage subscriptions.

26.1 ADD_FILTER Procedure Signature 1

This procedure creates a filter on an interactive report using a report ID.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive report reloads the page with download format in the REQUEST value. Any interactive report settings changes (such as add filter or reset report) are done in partial page refresh. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IR.ADD_FILTER (
    p_page_id       IN NUMBER,
```

```
    p_region_id     IN NUMBER,
    p_report_column IN VARCHAR2,
    p_filter_value  IN VARCHAR2,
    p_operator_abbr IN VARCHAR2 DEFAULT NULL,
    p_report_id     IN NUMBER DEFAULT NULL );
```

Parameters

Table 26-1 ADD_FILTER Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.
p_region_id	The interactive report region (ID).
p_report_column	Name of the report SQL column, or column alias, to be filtered.
p_filter_value	The filter value. This value is not used for N and NN. Enter multiple valuables in a comma-separated list. Enclose multiple filter values separated by commas in blackslash characters (\). For example, if the p_operator_abbr is type IN or NIN, and you wish to filter for the values CLOSED and OPEN, then set p_filter_value to \CLOSED,OPEN\.
p_operator_abbr	Filter type. Valid values are as follows: EQ = Equals NEQ = Not Equals LT = Less than LTE = Less then or equal to GT = Greater Than GTE = Greater than or equal to LIKE = SQL Like operator NLIKE = Not Like N = Null NN = Not Null C = Contains NC = Not Contains IN = SQL In Operator NIN = SQL Not In Operator
p_report_id	The saved report ID within the current application page. If p_report_id is NULL, it adds the filter to the last viewed report settings.

Example

The following example shows how to use the ADD_FILTER procedure to filter the interactive report with report ID of 880629800374638220 in page 1, region 2505704029884282 of the current application with DEPTNO equals 30.

```
BEGIN
    APEX_IR.ADD_FILTER(
        p_page_id       => 1,
        p_region_id     => 2505704029884282,
        p_report_column => 'DEPTNO',
```

```
        p_filter_value  => '30',
        p_operator_abbr => 'EQ',
        p_report_id     => 880629800374638220);
END;
```

26.2 ADD_FILTER Procedure Signature 2

This procedure creates a filter on an interactive report using a report alias.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive report reloads the page with download format in the REQUEST value. Any interactive report settings changes (such as add filter or reset report) are done in partial page refresh. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IR.ADD_FILTER (
    p_page_id       IN NUMBER,
    p_region_id     IN NUMBER,
    p_report_column IN VARCHAR2,
    p_filter_value  IN VARCHAR2,
    p_operator_abbr IN VARCHAR2 DEFAULT NULL,
    p_report_alias  IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 26-2 ADD_FILTER Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive report.
`p_region_id`	The interactive report region (ID).
`p_report_column`	Name of the report SQL column, or column alias, to be filtered.
`p_filter_value`	This is the filter value. This value is not used for `N` and `NN`.

Table 26-2 (Cont.) ADD_FILTER Parameters

Parameter	Description
p_operator_abbr	Filter type. Valid values are as follows: EQ = Equals NEQ = Not Equals LT = Less than LTE = Less then or equal to GT = Greater Than GTE = Greater than or equal to LIKE = SQL Like operator NLIKE = Not Like N = Null NN = Not Null C = Contains NC = Not Contains IN = SQL In Operator NIN = SQL Not In Operator
p_report_alias	The saved report alias within the current application page. If p_report_alias is NULL, it adds filter to the last viewed report settings.

Example

The following example shows how to use the ADD_FILTER procedure to filter an interactive report with a report alias of CATEGORY_REPORT in page 1, region 2505704029884282 of the current application with DEPTNO equals 30.

```
BEGIN
    APEX_IR.ADD_FILTER(
        p_page_id       => 1,
        p_region_id     => 2505704029884282,
        p_report_column => 'DEPTNO',
        p_filter_value  => '30',
        p_operator_abbr => 'EQ',
        p_report_alias  => 'CATEGORY_REPORT');
END;
```

26.3 CHANGE_SUBSCRIPTION_EMAIL Procedure

This procedure changes interactive report subscriptions email address. When an email is sent out, the subscription sends message to the defined email address.

Syntax

```
APEX_IR.CHANGE_SUBSCRIPTION_EMAIL (
    p_subscription_id    IN NUMBER,
    p_email_address      IN VARCHAR2);
```

Parameters

Table 26-3 CHANGE_SUBSCRIPTION_EMAIL Parameters

Parameter	Description
p_subscription_id	Subscription ID to change the email address within the current workspace.
p_email_address	The new email address to change to. The email address needs to be a valid email syntax and cannot be set to null.

Example

The following example shows how to use CHANGE_SUBSCRIPTION_EMAIL procedure to change the email address to some.user@somecompany.com for the interactive report subscription 956136850459718525.

```
BEGIN
    APEX_IR.CHANGE_SUBSCRIPTION_EMAIL (
        p_subscription_id => 956136850459718525,
        p_email_address => 'some.user@somecompany.com');
END;
```

26.4 CHANGE_REPORT_OWNER Procedure

This procedure changes the owner of a saved interactive report using a report ID. This procedure cannot change the owner of default interactive reports.

Syntax

```
APEX_IR.CHANGE_REPORT_OWNER (
    p_report_id    IN NUMBER,
    p_old_owner    IN VARCHAR2,
    p_new_owner    IN VARCHAR2);
```

Parameters

Table 26-4 CHANGE_REPORT_OWNER Procedure

Parameters	Description
p_report_id	The saved report ID within the current application page.
p_old_owner	The previous owner name to change from (case sensitive). The owner needs to a valid login user accessing the report.
p_new_owner	The new owner name to change to (case sensitive). The owner must be a valid login user accessing the report.

Example

This example shows how to use `CHANGE_REPORT_OWNER` procedure to change the old owner name of *JOHN* to the new owner name of *JOHN.DOE* for a saved report. The saved report has a report ID of 1235704029884282.

```
BEGIN
    APEX_IR.CHANGE_REPORT_OWNER (
        p_report_id    => 1235704029884282,
        p_old_owner    => 'JOHN',
        p_new_owner    => 'JOHN.DOE');
END;
```

26.5 CHANGE_SUBSCRIPTION_EMAIL Procedure

This procedure changes interactive report subscriptions email address. When an email is sent out, the subscription sends message to the defined email address.

Syntax

```
APEX_IR.CHANGE_SUBSCRIPTION_EMAIL (
    p_subscription_id    IN NUMBER,
    p_email_address      IN VARCHAR2);
```

Parameters

Table 26-5 CHANGE_SUBSCRIPTION_EMAIL Parameters

Parameter	Description
`p_subscription_id`	Subscription ID to change the email address within the current workspace.
`p_email_address`	The new email address to change to. The email address needs to be a valid email syntax and cannot be set to null.

Example

The following example shows how to use `CHANGE_SUBSCRIPTION_EMAIL` procedure to change the email address to `some.user@somecompany.com` for the interactive report subscription 956136850459718525.

```
BEGIN
    APEX_IR.CHANGE_SUBSCRIPTION_EMAIL (
        p_subscription_id => 956136850459718525,
        p_email_address => 'some.user@somecompany.com');
END;
```

26.6 CHANGE_SUBSCRIPTION_LANG Procedure

This procedure changes the interactive report subscription language.

Syntax

```
APEX_IR.CHANGE_SUBSCRIPTION_LANG(
    p_subscription_id IN NUMBER,
    p_language        IN VARCHAR2);
```

Parameters

Table 26-6 CHANGE_SUBSCRIPTION_LANG Procedure Parameters

Parameter	Description
p_subscription_id	Subscription ID to change the language within the current workspace.
p_language	This is an IANA language code. Some examples include: en, de, de-at, zh-cn, and pt-br.

Example

The following example shows how to use the CHANGE_SUBSCRIPTION_LANG procedure to change the subscription with the ID of 567890123 to German in the current workspace.

```
BEGIN
    APEX_IR.CHANGE_SUBSCRIPTION_LANG(
        p_subscription_id => 567890123,
        p_language        => 'de');
END;
```

26.7 CLEAR_REPORT Procedure Signature 1

This procedure clears report settings using the report ID.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive report reloads the page with download format in the REQUEST value. Any interactive report settings changes (such as add filter or reset report) are done in partial page refresh. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IR.CLEAR_REPORT (
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER,
    p_report_id IN NUMBER DEFAULT NULL );
```

Parameters

Table 26-7 CLEAR_REPORT Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.
p_region_id	The interactive report region (ID).
p_report_id	The saved report ID within the current application page. If p_report_id is NULL, it clears the last viewed report settings.

Example

The following example shows how to use the CLEAR_REPORT procedure to clear interactive report settings with a report ID of 880629800374638220 in page 1, region 2505704029884282 of the current application.

```
BEGIN
    APEX_IR.CLEAR_REPORT(
        p_page_id      => 1,
        p_region_id    => 2505704029884282,
        p_report_id    => 880629800374638220);
END;
```

26.8 CLEAR_REPORT Procedure Signature 2

This procedure clears report settings using report alias.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive report reloads the page with download format in the REQUEST value. Any interactive report settings changes (such as add filter or reset report) are done in partial page refresh. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IR.CLEAR_REPORT(
    p_page_id      IN NUMBER,
    p_region_id    IN NUMBER,
    p_report_alias IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 26-8 CLEAR_REPORT Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.
p_region_id	The interactive report region (ID).
p_report_alias	The saved report alias within the current application page. If p_report_alias is NULL, it clears the last viewed report settings.

Example

The following example shows how to use the CLEAR_REPORT procedure to clear interactive report settings with report alias of CATEGORY_REPORT in page 1, region 2505704029884282 of the current application.

```
BEGIN
    APEX_IR.CLEAR_REPORT(
        p_page_id      => 1,
        p_region_id    => 2505704029884282,
        p_report_alias => 'CATEGORY_REPORT');
END;
```

26.9 DELETE_REPORT Procedure

This procedure deletes saved interactive reports. The deleted saved report is removed from the current logged-in workspace and application.

Syntax

```
APEX_IR.DELETE_REPORT(
    p_report_id IN NUMBER);
```

Parameters

Table 26-9 DELETE_REPORT Parameters

Parameter	Description
p_report_id	Report ID to delete within the current Oracle APEX application.

Example

The following example shows how to use the DELETE_REPORT procedure to delete the saved interactive report with ID of 880629800374638220 in the current application.

```
BEGIN
    APEX_IR.DELETE_REPORT (
```

```
        p_report_id => 880629800374638220);
END;
```

26.10 DELETE_SUBSCRIPTION Procedure

This procedure deletes interactive report subscriptions.

Syntax

```
APEX_IR.DELETE_SUBSCRIPTION(
    p_subscription_id IN NUMBER);
```

Parameters

Table 26-10 DELETE_SUBSCRIPTION Procedure Parameters

Parameter	Description
p_subscription_id	Subscription ID to delete within the current workspace.

Example

The following example shows how to use the `DELETE_SUBSCRIPTION` procedure to delete the subscription with ID of 567890123 in the current workspace.

```
BEGIN
    APEX_IR.DELETE_SUBSCRIPTION(
        p_subscription_id => 567890123);
END;
```

26.11 GET_LAST_VIEWED_REPORT_ID Function

This function returns the last viewed base report ID of the specified page and region.

Syntax

```
APEX_IR.GET_LAST_VIEWED_REPORT_ID (
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER );
```

Parameters

Table 26-11 GET_LAST_VIEWED_REPORT_ID Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.
p_region_id	The interactive report region ID.

Example

The following example shows how to use the `GET_LAST_VIEWED_REPORT_ID` function to retrieve the last viewed report ID in page 1, region `2505704029884282` of the current application.

```
DECLARE
    l_report_id number;
BEGIN
    l_report_id := APEX_IR.GET_LAST_VIEWED_REPORT_ID (
        p_page_id   => 1,
        p_region_id => 2505704029884282);
END;
```

26.12 GET_REPORT Function (Deprecated)

> **Note:**
>
> This function is deprecated and will be removed in a future release.
>
> Use OPEN_QUERY_CONTEXT Function in APEX_REGION instead.

This function returns an interactive report runtime query.

Syntax

```
APEX_IR.GET_REPORT(
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER,
    p_report_id IN NUMBER   DEFAULT NULL,
    p_view      IN VARCHAR2 DEFAULT C_VIEW_REPORT );
```

Parameters

Table 26-12 GET_REPORT Function Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive report.
`p_region_id`	The interactive report region ID.
`p_report_id`	The saved report ID within the current application page. If `p_report_id` is NULL, retrieves last viewed report query.
`p_view`	The view type available for the report. The values can be `APEX_IR.C_VIEW_REPORT`, `APEX_IR.C_VIEW_GROUPBY`, or `APEX_IR.C_VIEW_PIVOT`. If `p_view` is NULL, retrieves the view currently used by the report. If the `p_view` passed does not exist for the current report, an error raises.

Example 1

The following example shows how to use the `GET_REPORT` function to retrieve the runtime report query with bind variable information with report ID of 880629800374638220 in page 1, region 2505704029884282 of the current application.

```
DECLARE
   l_report apex_ir.t_report;
   l_query varchar2(32767);
BEGIN
    l_report := APEX_IR.GET_REPORT (
                    p_page_id => 1,
                    p_region_id => 2505704029884282,
                    p_report_id => 880629800374638220);
    l_query := l_report.sql_query;
    sys.htp.p('Statement = '||l_report.sql_query);
    for i in 1..l_report.binds.count
    loop
        sys.htp.p(i||'. '||l_report.binds(i).name||' = '||
l_report.binds(i).value);
    end loop;
END;
```

Example 2

The following example shows how to use the `GET_REPORT` function to retrieve Group By view query defined in the current report page with region 2505704029884282.

```
DECLARE
   l_report APEX_IR.T_REPORT;
BEGIN
   l_report := APEX_IR.GET_REPORT (
                   p_page_id        => :APP_PAGE_ID,
                   p_region_id      => 2505704029884282,
                   p_view           => APEX_IR.C_VIEW_GROUPBY );
   sys.htp.p( 'Statement = '||l_report.sql_query );
END;
```

> **See Also:**
>
> OPEN_QUERY_CONTEXT Function

26.13 RESET_REPORT Procedure Signature 1

This procedure resets report settings to the developer defined default settings using the report ID.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive report reloads the page with download format in the REQUEST value. Any interactive report settings changes (such as add filter or reset report) are done in partial page refresh. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IR.RESET_REPORT (
    p_page_id   IN NUMBER,
    p_region_id IN NUMBER,
    p_report_id IN NUMBER DEFAULT NULL );
```

Parameters

Table 26-13 RESET_REPORT Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive report.
`p_region_id`	The interactive report region ID.
`p_report_id`	The saved report ID within the current application page. If `p_report_id` is NULL, it resets the last viewed report settings.

Example

The following example shows how to use the `RESET_REPORT` procedure signature 1 to reset interactive report settings with report ID of `880629800374638220` in page 1, region `2505704029884282` of the current application.

```
BEGIN
    APEX_IR.RESET_REPORT(
        p_page_id      => 1,
        p_region_id    => 2505704029884282,
        p_report_id    => 880629800374638220);
END;
```

26.14 RESET_REPORT Procedure Signature 2

This procedure resets report settings using the report alias.

> **Note:**
>
> The use of this procedure in a page rendering process causes report download issues (CSV, HTML, Email, and so on). When a user downloads the report, the interactive report reloads the page with download format in the REQUEST value. Any interactive report settings changes (such as add filter or reset report) are done in partial page refresh. Thus, the download data may not match the report data user is seeing. For this reason, Oracle recommends only using this procedure in a page submit process.

Syntax

```
APEX_IR.RESET_REPORT(
    p_page_id      IN NUMBER,
    p_region_id    IN NUMBER,
    p_report_alias IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 26-14 RESET_REPORT Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.
p_region_id	The interactive report region ID.
p_report_alias	The saved report alias within the current application page. If p_report_alias is NULL, it resets the last viewed report settings.

Example

The following example shows how to use the RESET_REPORT procedure to reset interactive report settings with a report alias of CATEGORY_REPORT in page 1, region 2505704029884282 of the current application.

```
BEGIN
    APEX_IR.RESET_REPORT(
        p_page_id      => 1,
        p_region_id    => 2505704029884282,
        p_report_alias => 'CATEGORY_REPORT');
END;
```

27
APEX_ITEM (Legacy)

This API is designated as legacy.

You can use the `APEX_ITEM` package to create form elements dynamically based on a SQL query instead of creating individual items page by page.

27.1 CHECKBOX2 Function

This function creates check boxes.

Syntax

```
APEX_ITEM.CHECKBOX2(
    p_idx                       IN    NUMBER,
    p_value                     IN    VARCHAR2 DEFAULT NULL,
```

```
    p_attributes                IN    VARCHAR2 DEFAULT NULL,
    p_checked_values            IN    VARCHAR2 DEFAULT NULL,
    p_checked_values_delimiter  IN    VARCHAR2 DEFAULT ':',
    p_item_id                   IN    VARCHAR2 DEFAULT NULL,
    p_item_label                IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-1 CHECKBOX2 Parameters

Parameter	Description
p_idx	Number that determines which APEX_APPLICATION global variable is used. Valid range of values is 1 to 50. For example 1 creates F01 and 2 creates F02
p_value	Value of a check box, hidden field, or input form item
p_attributes	Controls the size of the text field
p_checked_values	Values to be checked by default
p_checked_values_delimiter	Delimits the values in the previous parameter, p_checked_values
p_item_id	HTML attribute ID for the <input> tag
p_item_label	Invisible label created for the item

Examples of Default Check Box Behavior

The following example demonstrates how to create a selected check box for each employee in the emp table.

```
SELECT APEX_ITEM.CHECKBOX2(1,empno,'CHECKED') "Select",
    ename, job
FROM   emp
ORDER BY 1
```

The following example demonstrates how to have all check boxes for employees display without being selected.

```
SELECT APEX_ITEM.CHECKBOX2(1,empno) "Select",
    ename, job
FROM   emp
ORDER BY 1
```

The following example demonstrates how to select the check boxes for employees who work in department 10.

```
SELECT APEX_ITEM.CHECKBOX2(1,empno,DECODE(deptno,10,'CHECKED',NULL))
"Select",
    ename, job
FROM   emp
ORDER BY 1
```

The next example demonstrates how to select the check boxes for employees who work in department 10 or department 20.

```
SELECT APEX_ITEM.CHECKBOX2(1,deptno,NULL,'10:20',':') "Select",
    ename, job
FROM   emp
ORDER BY 1
```

Creating an On-Submit Process

If you are using check boxes in your application, you might need to create an On Submit process to perform a specific type of action on the selected rows. For example, you could have a Delete button that uses the following logic:

```
SELECT APEX_ITEM.CHECKBOX2(1,empno) "Select",
    ename, job
FROM   emp
ORDER  by 1
```

Consider the following sample on-submit process:

```
FOR I in 1..APEX_APPLICATION.G_F01.COUNT LOOP
    DELETE FROM emp WHERE empno = to_number(APEX_APPLICATION.G_F01(i));
END LOOP;
```

The following example demonstrates how to create unselected checkboxes for each employee in the emp table, with a unique ID. This is useful for referencing records from within JavaScript code:

```
SELECT APEX_ITEM.CHECKBOX2(1,empno,NULL,NULL,NULL,'f01_#ROWNUM#') "Select",
    ename, job
FROM   emp
ORDER BY 1
```

27.2 DATE_POPUP Function

Use this function with forms that include date fields. The `DATE_POPUP` function dynamically generates a date field that has a popup calendar button.

Syntax

```
APEX_ITEM.DATE_POPUP(
    p_idx                          IN    NUMBER,
    p_row                          IN    NUMBER,
    p_value                        IN    VARCHAR2 DEFAULT NULL,
    p_date_format                  IN    DATE DEFAULT 'DD-MON-YYYY',
    p_size                         IN    NUMBER DEFAULT 20,
    p_maxlength                    IN    NUMBER DEFAULT 2000,
    p_attributes                   IN    VARCHAR2 DEFAULT NULL,
    p_item_id                      IN    VARCHAR2 DEFAULT NULL,
```

```
    p_item_label                IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-2 DATE_POPUP Parameters

Parameter	Description
p_idx	Number that determines which APEX_APPLICATION global variable is used.Valid range of values is 1 to 50. For example, 1 creates F01 and 2 creates F02
p_row	This parameter is deprecated. Anything specified for this value is ignored
p_value	Value of a field item
p_date_format	Valid database date format
p_size	Controls HTML tag attributes (such as disabled)
p_maxlength	Determines the maximum number of enterable characters. Becomes the maxlength attribute of the <input> HTML tag
p_attributes	Extra HTML parameters you want to add
p_item_id	HTML attribute ID for the <input> tag
p_item_label	Invisible label created for the item

Example

The following example demonstrates how to use APEX_ITEM.DATE_POPUP to create popup calendar buttons for the hiredate column.

```
SELECT
    empno,
    APEX_ITEM.HIDDEN(1,empno)||
    APEX_ITEM.TEXT(2,ename) ename,
    APEX_ITEM.TEXT(3,job) job,
    mgr,
    APEX_ITEM.DATE_POPUP(4,rownum,hiredate,'dd-mon-yyyy') hd,
    APEX_ITEM.TEXT(5,sal) sal,
    APEX_ITEM.TEXT(6,comm) comm,
    deptno
FROM emp
ORDER BY 1
```

See Also:

Oracle Database SQL Language Reference for information about the TO_CHAR or TO_DATE functions

27.3 DATE_POPUP2 Function

Use this function with forms that include date fields. The DATE_POPUP2 function dynamically generates a date field that has a jQuery based popup calendar with button.

Syntax

```
APEX_ITEM.DATE_POPUP2(
    p_idx                   in number,
    p_value                 in date     default null,
    p_date_format           in varchar2 default null,
    p_size                  in number   default 20,
    p_maxLength             in number   default 2000,
    p_attributes            in varchar2 default null,
    p_item_id               in varchar2 default null,
    p_item_label            in varchar2 default null,
    p_default_value         in varchar2 default null,
    p_max_value             in varchar2 default null,
    p_min_value             in varchar2 default null,
    p_show_on               in varchar2 default 'button',
    p_number_of_months      in varchar2 default null,
    p_navigation_list_for   in varchar2 default 'NONE',
    p_year_range            in varchar2 default null,
    p_validation_date       in varchar2 default null)
    RETURN VARCHAR2;
```

Parameters

Table 27-3 DATE_POPUP2 Parameters

Parameter	Description
p_idx	Number that determines which APEX_APPLICATION global variable is used.Valid range of values is 1 to 50. For example, 1 creates F01 and 2 creates F02.
p_value	Value of a field item
p_date_format	Valid database date format
p_size	Controls HTML tag attributes (such as disabled)
p_maxlength	Determines the maximum number of enterable characters. Becomes the maxlength attribute of the <input> HTML tag
p_attributes	Extra HTML parameters you want to add
p_item_id	HTML attribute ID for the <input> tag
p_item_label	Invisible label created for the item
p_default_value	The default date which should be selected in DatePicker calendar popup
p_max_value	The Maximum date that can be selected from the datepicker
p_min_value	The Minimum date that can be selected from the datepicker.

Table 27-3 (Cont.) DATE_POPUP2 Parameters

Parameter	Description
p_show_on	Determines when the datepicker displays, on button click or on focus of the item or both.
p_number_of_months	Determines number of months displayed. Value should be in array formats follows: [row,column]
p_navigation_list_for	Determines if a select list is displayed for Changing Month, Year or Both. Possible values include: MONTH,YEAR,MONTH_AND_YEAR and default is null.
p_year_range	The range of years displayed in the year selection list.
p_validation_date	Used to store the Date value for the which date validation failed

See Also:

Oracle Database SQL Language Reference for information about the `TO_CHAR` or `TO_DATE` functions

27.4 DISPLAY_AND_SAVE Function

Use this function to display an item as text, but save its value to session state.

Syntax

```
APEX_ITEM.DISPLAY_AND_SAVE(
    p_idx         IN    NUMBER,
    p_value       IN    VARCHAR2 DEFAULT NULL,
    p_item_id     IN    VARCHAR2 DEFAULT NULL,
    p_item_label  IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-4 DISPLAY_AND_SAVE Parameters

Parameter	Description
`p_idx`	Number that determines which `APEX_APPLICATION` global variable is used.Valid range of values is 1 to 50. For example, 1 creates `F01` and 2 creates `F02`
`p_value`	Current value
`p_item_id`	HTML attribute ID for the `<span>` tag
`p_item_label`	Invisible label created for the item

Example

The following example demonstrates how to use the `APEX_ITEM.DISPLAY_AND_SAVE` function.

```
SELECT APEX_ITEM.DISPLAY_AND_SAVE(10,empno) c FROM emp
```

27.5 HIDDEN Function

This function dynamically generates hidden form items.

Syntax

```
APEX_ITEM.HIDDEN(
    p_idx         IN    NUMBER,
    p_value       IN    VARCHAR2 DEFAULT
    p_attributes  IN    VARCHAR2 DEFAULT NULL,
    p_item_id     IN    VARCHAR2 DEFAULT NULL,
    p_item_label  IN    VARCHAR2 DEFAULT NULL
) RETURN VARCHAR2;
```

Parameters

Table 27-5 HIDDEN Parameters

Parameter	Description
`p_idx`	Number to identify the item you want to generate. The number determines which `G_FXX` global is populated **See Also:** " APEX_APPLICATION"
`p_value`	Value of the hidden input form item
`p_attributes`	Extra HTML parameters you want to add
`p_item_id`	HTML attribute ID for the `<input>` tag
`p_item_label`	Invisible label created for the item

Example

Typically, the primary key of a table is stored as a hidden column and used for subsequent update processing, for example:

```
SELECT
    empno,
    APEX_ITEM.HIDDEN(1,empno)||
    APEX_ITEM.TEXT(2,ename) ename,
    APEX_ITEM.TEXT(3,job) job,
    mgr,
    APEX_ITEM.DATE_POPUP(4,rownum,hiredate,'dd-mon-yyyy') hiredate,
    APEX_ITEM.TEXT(5,sal) sal,
    APEX_ITEM.TEXT(6,comm) comm,
    deptno
```

```
FROM emp
ORDER BY 1
```

The previous query could use the following page process to process the results:

```
BEGIN
    FOR i IN 1..APEX_APPLICATION.G_F01.COUNT LOOP
        UPDATE emp
            SET
                ename=APEX_APPLICATION.G_F02(i),
                job=APEX_APPLICATION.G_F03(i),
                    hiredate=to_date(APEX_APPLICATION.G_F04(i),'dd-mon-
yyyy'),
                    sal=APEX_APPLICATION.G_F05(i),
                    comm=APEX_APPLICATION.G_F06(i)
        WHERE empno=to_number(APEX_APPLICATION.G_F01(i));
    END LOOP;
END;
```

Note that the `G_F01` column (which corresponds to the hidden `EMPNO`) is used as the key to update each row.

27.6 MD5_CHECKSUM Function

Use this function for lost update detection. Lost update detection ensures data integrity in applications where data can be accessed concurrently.

This function produces hidden form fields with a name attribute equal to `fcs` and as value a MD5 checksum based on up to 50 inputs. APEX_ITEM.MD5_CHECKSUM also produces an MD5 checksum using Oracle Database DBMS_CRYPTO:

```
DBMS_CRYPTO.HASH(
    SRC => UTL_RAW.CAST_TO_RAW('my_string'),
    TYP => DBMS_CRYPTO.HASH_MD5 );
```

An MD5 checksum provides data integrity through hashing and sequencing to ensure that data is not altered or stolen as it is transmitted over a network.

Syntax

```
APEX_ITEM.MD5_CHECKSUM(
    p_value01   IN    VARCHAR2 DEFAULT NULL,
    p_value02   IN    VARCHAR2 DEFAULT NULL,
    p_value03   IN    VARCHAR2 DEFAULT NULL,
    ...
    p_value50   IN    VARCHAR2 DEFAULT NULL,
    p_col_sep   IN    VARCHAR2 DEFAULT '|',
    p_item_id   IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-6 MD5_CHECKSUM Parameters

Parameter	Description
p_value01 ... p_value50	Fifty available inputs. If no parameters are supplied, defaults to NULL.
p_col_sep	String used to separate p_value inputs. Defaults to | (pipe symbol).
p_item_id	ID of the HTML form item.

Example

This function generates hidden form elements with the name fcs. The values can subsequently be accessed by using the APEX_APPLICATION.G_FCS array.

```
SELECT APEX_ITEM.MD5_CHECKSUM(ename,job,sal) md5_cks,
       ename, job, sal
FROM emp
```

27.7 MD5_HIDDEN Function

Use this function for lost update detection. Lost update detection ensures data integrity in applications where data can be accessed concurrently.

This function produces a hidden form field with a MD5 checksum as value which is based on up to 50 inputs. APEX_ITEM.MD5_HIDDEN also produces an MD5 checksum using Oracle database DBMS_CRYPTO:

```
UTL_RAW.CAST_TO_RAW(DBMS_CRYPTO.MD5())
```

An MD5 checksum provides data integrity through hashing and sequencing to ensure that data is not altered or stolen as it is transmitted over a network

Syntax

```
APEX_ITEM.MD5_HIDDEN(
    p_idx       IN    NUMBER,
    p_value01   IN    VARCHAR2 DEFAULT NULL,
    p_value02   IN    VARCHAR2 DEFAULT NULL,
    p_value03   IN    VARCHAR2 DEFAULT NULL,
    ...
    p_value50   IN    VARCHAR2 DEFAULT NULL,
    p_col_sep   IN    VARCHAR2 DEFAULT '|',
    p_item_id   IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-7 MD5_HIDDEN Parameters

Parameter	Description
p_idx	Indicates the form element to be generated. For example, 1 equals F01 and 2 equals F02. Typically the p_idx parameter is constant for a given column
p_value01 ... p_value50	Fifty available inputs. Parameters not supplied default to NULL
p_col_sep	String used to separate p_value inputs. Defaults to the pipe symbol (|)
p_item_id	ID of the HTML form item

Example

The p_idx parameter specifies the FXX form element to be generated. In the following example, 7 generates F07. Also note that an HTML hidden form element is generated.

```
SELECT APEX_ITEM.MD5_HIDDEN(7,ename,job,sal)md5_h, ename, job, sal
FROM emp
```

27.8 POPUP_FROM_LOV Function

This function generates an HTML popup select list from an application shared list of values (LOV). Like other available functions in the APEX_ITEM package, POPUP_FROM_LOV function is designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.POPUP_FROM_LOV (
    p_idx              IN    NUMBER,
    p_value            IN    VARCHAR2 DEFAULT NULL,
    p_lov_name         IN    VARCHAR2,
    p_width            IN    VARCHAR2 DEFAULT NULL,
    p_max_length       IN    VARCHAR2 DEFAULT NULL,
    p_form_index       IN    VARCHAR2 DEFAULT '0',
    p_escape_html      IN    VARCHAR2 DEFAULT NULL,
    p_max_elements     IN    VARCHAR2 DEFAULT NULL,
    p_attributes       IN    VARCHAR2 DEFAULT NULL,
    p_ok_to_query      IN    VARCHAR2 DEFAULT 'YES',
    p_item_id          IN    VARCHAR2 DEFAULT NULL,
    p_item_label       IN    VARCHAR2 DEFAULT NULL )
    RETURN VARCHAR2;
```

Parameters

Table 27-8 POPUP_FROM_LOV Parameters

Parameter	Description
p_idx	Form element name. For example, 1 equals F01 and 2 equals F02. Typically, p_idx is a constant for a given column.
p_value	Form element current value. This value should be one of the values in the p_lov_name parameter.
p_lov_name	Named LOV used for this popup.
p_width	Width of the text box.
p_max_length	Maximum number of characters that can be entered in the text box.
p_form_index	HTML form on the page in which an item is contained. Defaults to 0 (rarely used). Only use this parameter when it is necessary to embed a custom form in your page template (such as a search field that posts to a different website). If this form comes before the #FORM_OPEN# substitution string, then its index is zero and the form opened automatically by Oracle APEX must be referenced as form 1. This functionality supports the JavaScript used in the popup LOV that passes a value back to a form element.
p_escape_html	Replacements for special characters that require an escaped equivalent: • < for < • > for > • & for & Range of values is YES and NO. If YES, special characters are escaped. This parameter is useful if you know your query returns illegal HTML.
p_max_elements	Limit on the number of rows that can be returned by your query. Limits the performance impact of user searches. By entering a value in this parameter, you force the user to search for a narrower set of results.
p_attributes	Additional HTML attributes to use for the form item.
p_ok_to_query	Range of values is YES and NO. If YES, a popup returns first set of rows for the LOV. If NO, a search is initiated to return rows.
p_item_id	ID attribute of the form element.
p_item_label	Invisible label created for the item.

Example

The following example demonstrates a sample query the generates a popup from an LOV named DEPT_LOV.

```
SELECT APEX_ITEM.POPUP_FROM_LOV (1,deptno,'DEPT_LOV') dt
FROM emp
```

27.9 POPUP_FROM_QUERY Function

This function generates an HTML popup select list from a query. Like other available functions in the APEX_ITEM package, the POPUP_FROM_QUERY function is designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.POPUP_FROM_QUERY (
    p_idx               IN    NUMBER,
    p_value             IN    VARCHAR2 DEFAULT NULL,
    p_lov_query         IN    VARCHAR2,
    p_width             IN    VARCHAR2 DEFAULT NULL,
    p_max_length        IN    VARCHAR2 DEFAULT NULL,
    p_form_index        IN    VARCHAR2 DEFAULT '0',
    p_escape_html       IN    VARCHAR2 DEFAULT NULL,
    p_max_elements      IN    VARCHAR2 DEFAULT NULL,
    p_attributes        IN    VARCHAR2 DEFAULT NULL,
    p_ok_to_query       IN    VARCHAR2 DEFAULT 'YES',
    p_item_id           IN    VARCHAR2 DEFAULT NULL,
    p_item_label        IN    VARCHAR2 DEFAULT NULL )
    RETURN VARCHAR2;
```

Parameters

Table 27-9 POPUP_FROM_QUERY Parameters

Parameter	Description
p_idx	Form element name. For example, 1 equals F01 and 2 equals F02. Typically, p_idx is a constant for a given column.
p_value	Form element current value. This value should be one of the values in the p_lov_query parameter.
p_lov_query	SQL query that is expected to select two columns (a display column and a return column). For example: SELECT dname, deptno FROM dept
p_width	Width of the text box.
p_max_length	Maximum number of characters that can be entered in the text box.
p_form_index	HTML form on the page in which an item is contained. Defaults to 0 and rarely used. Only use this parameter when it is necessary to embed a custom form in your page template (such as a search field that posts to a different website). If this form comes before the #FORM_OPEN# substitution string, then its index is zero and the form opened automatically by Oracle APEX must be referenced as form 1. This functionality supports the JavaScript used in the popup LOV that passes a value back to a form element.
p_escape_html	Replacements for special characters that require an escaped equivalent. • < for < • > for > • & for & Range of values is YES and NO. If YES, special characters are escaped. This parameter is useful if you know your query returns invalid HTML.

Table 27-9 (Cont.) POPUP_FROM_QUERY Parameters

Parameter	Description
p_max_elements	Limit on the number of rows that can be returned by your query. Limits the performance impact of user searches. By entering a value in this parameter, you force the user to search for a narrower set of results.
p_attributes	Additional HTML attributes to use for the form item.
p_ok_to_query	Range of values is YES and NO. If YES, a popup returns the first set of rows for the LOV. If NO, a search is initiated to return rows.
p_item_id	ID attribute of the form element.
p_item_label	Invisible label created for the item.

Example

The following example demonstrates a sample query the generates a popup select list from the emp table.

```
SELECT APEX_ITEM.POPUP_FROM_QUERY (1,deptno,'SELECT dname, deptno FROM
dept') dt
FROM emp
```

27.10 POPUPKEY_FROM_LOV Function

This function generates a popup key select list from a shared list of values (LOV). Similar to other available functions in the APEX_ITEM package, the POPUPKEY_FROM_LOV function is designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.POPUPKEY_FROM_LOV (
    p_idx              IN    NUMBER,
    p_value            IN    VARCHAR2 DEFAULT NULL,
    p_lov_name         IN    VARCHAR2,
    p_width            IN    VARCHAR2 DEFAULT NULL,
    p_max_length       IN    VARCHAR2 DEFAULT NULL,
    p_form_index       IN    VARCHAR2 DEFAULT '0',
    p_escape_html      IN    VARCHAR2 DEFAULT NULL,
    p_max_elements     IN    VARCHAR2 DEFAULT NULL,
    p_attributes       IN    VARCHAR2 DEFAULT NULL,
    p_ok_to_query      IN    VARCHAR2 DEFAULT 'YES',
    p_item_id          IN    VARCHAR2 DEFAULT NULL,
    p_item_label       IN    VARCHAR2 DEFAULT NULL )
    RETURN VARCHAR2;
```

Although the text field associated with the popup displays in the first column in the LOV query, the actual value is specified in the second column in the query.

Parameters

Table 27-10 POPUPKEY_FROM_LOV Parameters

Parameter	Description

p_idx	Identifies a form element name. For example, 1 equals F01 and 2 equals F02. Typically, p_idx is a constant for a given column
	Because of the behavior of POPUPKEY_FROM_QUERY, the next index value should be p_idx + 1. For example:
	`SELECT APEX_ITEM.POPUPKEY_FROM_LOV (1,deptno,'DEPT') dt,`
	`APEX_ITEM.HIDDEN(3,empno) eno`

p_value	Indicates the current value. This value should be one of the values in the P_LOV_NAME parameter.
p_lov_name	Identifies a named LOV used for this popup.
p_width	Width of the text box.
p_max_length	Maximum number of characters that can be entered in the text box.
p_form_index	HTML form on the page in which an item is contained. Defaults to 0 and rarely used. Only use this parameter when it is necessary to embed a custom form in your page template (such as a search field that posts to a different website). If this form comes before the #FORM_OPEN# substitution string, then its index is zero and the form opened automatically by APEX must be referenced as form 1. This functionality supports the JavaScript used in the popup LOV that passes a value back to a form element.
p_escape_html	Replacements for special characters that require an escaped equivalent. • <lt; for < • > for > • & for & This parameter is useful if you know your query returns invalid HTML.
p_max_elements	Limit on the number of rows that can be returned by your query. Limits the performance impact of user searches. By entering a value in this parameter, you force the user to search for a narrower set of results.
p_attributes	Additional HTML attributes to use for the form item.
p_ok_to_query	Range of values is YES and NO. If YES, a popup returns the first set of rows for the LOV. If NO, a search is initiated to return rows.
p_item_id	HTML attribute ID for the <input> tag.
p_item_label	Invisible label created for the item.

Example

The following example demonstrates how to generate a popup key select list from a shared list of values (LOV).

```
SELECT APEX_ITEM.POPUPKEY_FROM_LOV (1,deptno,'DEPT') dt
FROM emp
```

27.11 POPUPKEY_FROM_QUERY Function

This function generates a popup key select list from a SQL query. Similar to other available functions in the `APEX_ITEM` package, the `POPUPKEY_FROM_QUERY` function is designed to generate forms with `F01` to `F50` form array elements.

Syntax

```
APEX_ITEM.POPUPKEY_FROM_QUERY (
    p_idx              IN    NUMBER,
    p_value            IN    VARCHAR2 DEFAULT NULL,
    p_lov_query        IN    VARCHAR2,
    p_width            IN    VARCHAR2 DEFAULT NULL,
    p_max_length       IN    VARCHAR2 DEFAULT NULL,
    p_form_index       IN    VARCHAR2 DEFAULT '0',
    p_escape_html      IN    VARCHAR2 DEFAULT NULL,
    p_max_elements     IN    VARCHAR2 DEFAULT NULL,
    p_attributes       IN    VARCHAR2 DEFAULT NULL,
    p_ok_to_query      IN    VARCHAR2 DEFAULT 'YES',
    p_item_id          IN    VARCHAR2 DEFAULT NULL,
    p_item_label       IN    VARCHAR2 DEFAULT NULL )
    RETURN VARCHAR2;
```

Parameters

Table 27-11 POPUPKEY_FROM_QUERY Parameters

Parameter	Description
`p_idx`	Form element name. For example, `1` equals `F01` and `2` equals `F02`. Typically, `p_idx` is a constant for a given column. Because of the behavior of `POPUPKEY_FROM_QUERY`, the next index value should be `p_idx + 1`. For example: `SELECT APEX_ITEM.POPUPKEY_FROM_QUERY (1,deptno,'SELECT dname, deptno FROM dept') dt, APEX_ITEM.HIDDEN(3,empno) eno`
`p_value`	Form element current value. This value should be one of the values in the `P_LOV_QUERY` parameter.
`p_lov_query`	LOV query used for this popup.
`p_width`	Width of the text box.
`p_max_length`	Maximum number of characters that can be entered in the text box.
`p_form_index`	HTML form on the page in which an item is contained. Defaults to 0 and rarely used. Only use this parameter when it is necessary to embed a custom form in your page template (such as a search field that posts to a different website). If this form comes before the `#FORM_OPEN#` substitution string, then its index is zero and the form opened automatically by Oracle APEX must be referenced as form 1. This functionality supports the JavaScript used in the popup LOV that passes a value back to a form element.

Table 27-11 (Cont.) POPUPKEY_FROM_QUERY Parameters

Parameter	Description
p_escape_html	Replacements for special characters that require an escaped equivalent. • <lt; for < • <gt; for > • <amp; for & This parameter is useful if you know your query returns illegal HTML.
p_max_elements	Limit on the number of rows that can be returned by your query. Limits the performance impact of user searches. By entering a value in this parameter, you force the user to search for a narrower set of results.
p_attributes	Additional HTML attributes to use for the form item.
p_ok_to_query	Range of values is YES and NO. If YES, a popup returns first set of rows for the LOV. If NO, a search is initiated to return rows.
p_item_id	ID attribute of the form element.
p_item_label	Invisible label created for the item.

Example

The following example demonstrates how to generate a popup select list from a SQL query.

```
SELECT APEX_ITEM.POPUPKEY_FROM_QUERY (1,deptno,'SELECT dname, deptno
FROM dept') dt
FROM emp
```

27.12 RADIOGROUP Function

This function generates a radio group from a SQL query.

Syntax

```
APEX_ITEM.RADIOGROUP(
    p_idx              IN    NUMBER,
    p_value            IN    VARCHAR2 DEFAULT NULL,
    p_selected_value   IN    VARCHAR2 DEFAULT NULL,
    p_display          IN    VARCHAR2 DEFAULT NULL,
    p_attributes       IN    VARCHAR2 DEFAULT NULL,
    p_onblur           IN    VARCHAR2 DEFAULT NULL,
    p_onchange         IN    VARCHAR2 DEFAULT NULL,
    p_onfocus          IN    VARCHAR2 DEFAULT NULL,
    p_item_id          IN    VARCHAR2 DEFAULT NULL,
    p_item_label       IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-12 RADIOGROUP Parameters

Parameter	Description
p_idx	Number that determines which APEX_APPLICATION global variable is used. Valid range of values is 1 to 50.For example 1 creates F01 and 2 creates F02.
p_value	Value of the radio group.
p_selected_value	Value that should be selected.
p_display	Text to display next to the radio option.
p_attributes	Extra HTML parameters you want to add.
p_onblur	JavaScript to execute in the onBlur event.
p_onchange	JavaScript to execute in the onChange event.
p_onfocus	JavaScript to execute in the onFocus event.
p_item_id	HTML attribute ID for the <input> tag
p_item_label	Invisible label created for the item

Example

The following example demonstrates how to select department 20 from the emp table as a default in a radio group.

```
SELECT APEX_ITEM.RADIOGROUP (1,deptno,'20',dname) dt
FROM   dept
ORDER  BY 1
```

27.13 SELECT_LIST Function

This function dynamically generates a static select list. Similar to other functions available in the APEX_ITEM package, these select list functions are designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.SELECT_LIST(
    p_idx           IN   NUMBER,
    p_value         IN   VARCHAR2 DEFAULT NULL,
    p_list_values   IN   VARCHAR2 DEFAULT NULL,
    p_attributes    IN   VARCHAR2 DEFAULT NULL,
    p_show_null     IN   VARCHAR2 DEFAULT 'NO',
    p_null_value    IN   VARCHAR2 DEFAULT '%NULL%',
    p_null_text     IN   VARCHAR2 DEFAULT '%',
    p_item_id       IN   VARCHAR2 DEFAULT NULL,
    p_item_label    IN   VARCHAR2 DEFAULT NULL,
    p_show_extra    IN   VARCHAR2 DEFAULT 'YES')
    RETURN VARCHAR2;
```

Parameters

Table 27-13 SELECT_LIST Parameters

Parameter	Description
p_idx	Form element name. For example, 1 equals F01 and 2 equals F02. Typically the P_IDX parameter is constant for a given column.
p_value	Current value. This value should be a value in the P_LIST_VALUES parameter.
p_list_values	List of static values separated by commas. Displays values and returns values that are separated by semicolons. Note that this is only available in the SELECT_LIST function.
p_attributes	Extra HTML parameters you want to add.
p_show_null	Extra select option to enable the NULL selection. Range of values is YES and NO.
p_null_value	Value to be returned when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_null_text	Value to be displayed when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_item_id	HTML attribute ID for the <input> tag.
p_item_label	Invisible label created for the item.
p_show_extra	Shows the current value even if the value of p_value is not located in the select list.

Example

The following example demonstrates a static select list that displays Yes, returns Y, defaults to Y, and generates a F01 form item.

```
SELECT APEX_ITEM.SELECT_LIST(1,'Y','Yes;Y,No;N')yn
FROM emp
```

The following example demonstrates the use of APEX_ITEM.SELECT_LIST to generate a static select list where:

- A form array element F03 is generated (p_idx parameter).
- The initial value for each element is equal to the value for deptno for the row from emp (p_value parameter).
- The select list contains 4 options (p_list_values parameter).
- The text within the select list displays in red (p_attributes parameter).
- A null option is displayed (p_show_null) and this option displays -Select- as the text (p_null_text parameter).
- An HTML ID attribute is generated for each row, where #ROWNUM# is substituted for the current row rownum (p_item_id parameter). (So an ID of 'f03_4' is generated for row 4.)
- A HTML label element is generated for each row (p_item_label parameter).

- The current value for `deptno` is displayed, even if it is not contained with the list of values passed in the `p_list_values` parameter (`p_show_extra` parameter).

```
SELECT  empno "Employee #",
    ename "Name",
    APEX_ITEM.SELECT_LIST(
        p_idx           =>   3,
        p_value         =>   deptno,
        p_list_values   =>
'ACCOUNTING;10,RESEARCH;20,SALES;30,OPERATIONS;40',
        p_attributes    =>   'style="color:red;"',
        p_show_null     =>   'YES',
        p_null_value    =>   NULL,
        p_null_text     =>   '-Select-',
        p_item_id       =>   'f03_#ROWNUM#',
        p_item_label    =>   'Label for f03_#ROWNUM#',
        p_show_extra    =>   'YES') "Department"
  FROM  emp;
```

27.14 SELECT_LIST_FROM_LOV Function

This function dynamically generates select lists from a shared list of values (LOV). Similar to other functions available in the `APEX_ITEM` package, these select list functions are designed to generate forms with `F01` to `F50` form array elements. This function is the same as `SELECT_LIST_FROM_LOV`, but its return value is `VARCHAR2`. Use this function in SQL queries where you need to handle a column value longer than 4000 characters.

Syntax

```
APEX_ITEM.SELECT_LIST_FROM_LOV(
    p_idx           IN   NUMBER,
    p_value         IN   VARCHAR2 DEFAULT NULL,
    p_lov           IN   VARCHAR2,
    p_attributes    IN   VARCHAR2 DEFAULT NULL,
    p_show_null     IN   VARCHAR2 DEFAULT 'YES',
    p_null_value    IN   VARCHAR2 DEFAULT '%NULL%',
    p_null_text     IN   VARCHAR2 DEFAULT '%',
    p_item_id       IN   VARCHAR2 DEFAULT NULL,
    p_item_label    IN   VARCHAR2 DEFAULT NULL,
    p_show_extra    IN   VARCHAR2 DEFAULT 'YES')
    RETURN VARCHAR2;
```

Parameters

Table 27-14 SELECT_LIST_FROM_LOV Parameters

Parameter	Description
`p_idx`	Form element name. For example, `1` equals `F01` and `2` equals `F02`. Typically, the `p_idx` parameter is constant for a given column.
`p_value`	Current value. This value should be a value in the `p_lov` parameter.

Table 27-14 (Cont.) SELECT_LIST_FROM_LOV Parameters

Parameter	Description
p_lov	Text name of an application list of values. This list of values must be defined in your application. This parameter is used only by the select_list_from_lov function.
p_attributes	Extra HTML parameters you want to add.
p_show_null	Extra select option to enable the NULL selection. Range of values is YES and NO.
p_null_value	Value to be returned when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_null_text	Value to be displayed when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_item_id	HTML attribute ID for the <select> tag.
p_item_label	Invisible label created for the item.
p_show_extra	Shows the current value even if the value of p_value is not located in the select list.

Example

The following example demonstrates a select list based on an LOV defined in the application.

```
SELECT APEX_ITEM.SELECT_LIST_FROM_LOV(2,job,'JOB_FLOW_LOV')job
FROM emp
```

27.15 SELECT_LIST_FROM_LOV_XL Function

This function dynamically generates very large select lists (greater than 32K) from a shared list of values (LOV). Similar to other functions available in the APEX_ITEM package, these select list functions are designed to generate forms with F01 to F50 form array elements. This function is the same as SELECT_LIST_FROM_LOV, but its return value is CLOB. Returned values will be limited to 32k.

Syntax

```
APEX_ITEM.SELECT_LIST_FROM_LOV_XL(
    p_idx           IN   NUMBER,
    p_value         IN   VARCHAR2 DEFAULT NULL,
    p_lov           IN   VARCHAR2,
    p_attributes    IN   VARCHAR2 DEFAULT NULL,
    p_show_null     IN   VARCHAR2 DEFAULT 'YES',
    p_null_value    IN   VARCHAR2 DEFAULT '%NULL%',
    p_null_text     IN   VARCHAR2 DEFAULT '%',
    p_item_id       IN   VARCHAR2 DEFAULT NULL,
    p_item_label    IN   VARCHAR2 DEFAULT NULL,
    p_show_extra    IN   VARCHAR2 DEFAULT 'YES')
    RETURN CLOB;
```

Parameters

Table 27-15 SELECT_LIST_FROM_LOV_XL Parameters

Parameter	Description
p_idx	Form element name. For example, 1 equals F01 and 2 equals F02. Typically, the p_idx parameter is constant for a given column.
p_value	Current value. This value should be a value in the p_lov parameter.
p_lov	Text name of a list of values. This list of values must be defined in your application. This parameter is used only by the select_list_from_lov function.
p_attributes	Extra HTML parameters you want to add.
p_show_null	Extra select option to enable the NULL selection. Range of values is YES and NO.
p_null_value	Value to be returned when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_null_text	Value to be displayed when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_item_id	HTML attribute ID for the <select> tag.
p_item_label	Invisible label created for the item.
p_show_extra	Shows the current value even if the value of p_value is not located in the select list.

Example

The following example demonstrates how to create a select list based on an LOV defined in the application.

```
SELECT APEX_ITEM.SELECT_LIST_FROM_LOV_XL(2,job,'JOB_FLOW_LOV')job
FROM emp
```

27.16 SELECT_LIST_FROM_QUERY Function

This function dynamically generates a select list from a query. Similar to other functions available in the APEX_ITEM package, these select list functions are designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.SELECT_LIST_FROM_QUERY(
    p_idx           IN    NUMBER,
    p_value         IN    VARCHAR2 DEFAULT NULL,
    p_query         IN    VARCHAR2,
    p_attributes    IN    VARCHAR2 DEFAULT NULL,
    p_show_null     IN    VARCHAR2 DEFAULT 'YES',
    p_null_value    IN    VARCHAR2 DEFAULT '%NULL%',
    p_null_text     IN    VARCHAR2 DEFAULT '%',
    p_item_id       IN    VARCHAR2 DEFAULT NULL,
    p_item_label    IN    VARCHAR2 DEFAULT NULL,
```

```
    p_show_extra    IN    VARCHAR2 DEFAULT 'YES')
    RETURN VARCHAR2;
```

Parameters

Table 27-16 SELECT_LIST_FROM_QUERY Parameters

Parameter	Description
p_idx	Form element name. For example, 1 equals F01 and 2 equals F02. Typically, the p_idx parameter is constant for a given column.
p_value	Current value. This value should be a value in the p_query parameter.
p_query	SQL query that is expected to select two columns, a display column, and a return column. For example: `SELECT dname, deptno FROM dept` Note that this is used only by the SELECT_LIST_FROM_QUERY function. Also note, if only one column is specified in the select clause of this query, the value for this column is used for both display and return purposes.
p_attributes	Extra HTML parameters you want to add.
p_show_null	Extra select option to enable the NULL selection. Range of values is YES and NO.
p_null_value	Value to be returned when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_null_text	Value to be displayed when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_item_id	HTML attribute ID for the <select> tag.
p_item_label	Invisible label created for the item.
p_show_extra	Show the current value even if the value of p_value is not located in the select list.

Example

The following example demonstrates a select list based on a SQL query.

```
SELECT APEX_ITEM.SELECT_LIST_FROM_QUERY(3,job,'SELECT DISTINCT job
FROM emp')job
FROM emp
```

27.17 SELECT_LIST_FROM_QUERY_XL Function

This function is the same as SELECT_LIST_FROM_QUERY, but its return value is a CLOB. This allows its use in SQL queries where you need to handle a column value longer than 4000 characters. Returned values will be limited to 32K. Similar to other functions available in the APEX_ITEM package, these select list functions are designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.SELECT_LIST_FROM_QUERY_XL(
    p_idx           IN    NUMBER,
    p_value         IN    VARCHAR2 DEFAULT NULL,
    p_query         IN    VARCHAR2,
    p_attributes    IN    VARCHAR2 DEFAULT NULL,
    p_show_null     IN    VARCHAR2 DEFAULT 'YES',
    p_null_value    IN    VARCHAR2 DEFAULT '%NULL%',
    p_null_text     IN    VARCHAR2 DEFAULT '%',
    p_item_id       IN    VARCHAR2 DEFAULT NULL,
    p_item_label    IN    VARCHAR2 DEFAULT NULL,
    p_show_extra    IN    VARCHAR2 DEFAULT 'YES')
    RETURN CLOB;
```

Parameters

Table 27-17 SELECT_LIST_FROM_QUERY_XL Parameters

Parameter	Description
p_idx	Form element name. For example, 1 equals F01 and 2 equals F02. Typically the p_idx parameter is constant for a given column.
p_value	Current value. This value should be a value in the p_query parameter.
p_query	SQL query that is expected to select two columns, a display column, and a return column. For example: `SELECT dname, deptno FROM dept` Note that this is used only by the SELECT_LIST_FROM_QUERY_XL function. Also note, if only one column is specified in the select clause of this query, the value for this column is used for both display and return purposes.
p_attributes	Extra HTML parameters you want to add.
p_show_null	Extra select option to enable the NULL selection. Range of values is YES and NO.
p_null_value	Value to be returned when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_null_text	Value to be displayed when a user selects the NULL option. Only relevant when p_show_null equals YES.
p_item_id	HTML attribute ID for the <select> tag.
p_item_label	Invisible label created for the item.
p_show_extra	Show the current value even if the value of p_value is not located in the select list.

Example

The following example demonstrates a select list based on a SQL query.

```
SELECT APEX_ITEM.SELECT_LIST_FROM_QUERY_XL(3,job,'SELECT DISTINCT job
FROM emp')job
FROM emp
```

27.18 SWITCH Function

This function dynamically generates flip toggle item. If On/Off value and label are not passed, it renders Yes/No toggle. Similar to other functions available in the `APEX_ITEM` package, switch function is designed to generate forms with F01 to F50 form array elements.

Syntax

```
APEX_ITEM.SWITCH(
     p_idx IN NUMBER,
     p_value IN VARCHAR2,
     p_on_value IN VARCHAR2 DEFAULT 'Y',
     p_on_label IN VARCHAR2 DEFAULT 'Yes',
     p_off_value IN VARCHAR2 DEFAULT 'N',
     p_off_label IN VARCHAR2 DEFAULT 'No',
     p_item_id IN VARCHAR2 DEFAULT NULL,
     p_item_label IN VARCHAR2,
     p_attributes IN VARCHAR2 DEFAULT NULL)
     RETURN VARCHAR2;
```

Parameters

Table 27-18 SWITCH Parameters

Parameter	Description
`p_idx`	Form element name. For example, 1 equals F01 and 2 equals F02. Typically the `P_IDX` parameter is constant for a given column.
`p_value`	Form element current value.
`p_on_value`	The value of the item if the user picks **On** option.
`p_on_label`	The display text for the **On** option.
`p_off_value`	The value of the item if the user picks **Off** option.
`p_off_label`	The display text for the **Off** option.
`p_item_id`	HTML attribute ID for the <input> tag. Try concatenating some string with rownum to make it unique.
`p_item_label`	Invisible label created for the item.
`p_attributes`	Additional HTML attributes to use for the form item.

Example

The following example demonstrates the use of `APEX_ITEM.SWITCH` to generate a Yes/No flip toggle item where:

- A form array element F01 will be generated (`p_idx` parameter).
- The initial value for each element will be equal to N (`p_value` parameter).
- A HTML ID attribute will be generated for each row with the current rownum to uniquely identify. (`p_item_id` parameter). An ID of `'IS_MANAGER_2'` is generated for row 2.)
- A HTML label element will be generated for each row (`p_item_label` parameter).

```
SELECT
  ename "Name",
  APEX_ITEM.SWITCH (
       p_idx => 1,
       p_value => 'N',
   p_item_id => 'IS_MANAGER_'||rownum,
       p_item_label => apex_escape.html(ename)||': Is Manager' )
"Is Manager"
FROM emp;
```

27.19 TEXT Function

This function generates text fields (or text input form items) from a SQL query.

Syntax

```
APEX_ITEM.TEXT(
    p_idx         IN    NUMBER,
    p_value       IN    VARCHAR2 DEFAULT NULL,
    p_size        IN    NUMBER DEFAULT NULL,
    p_maxlength   IN    NUMBER DEFAULT NULL,
    p_attributes  IN    VARCHAR2 DEFAULT NULL,
    p_item_id     IN    VARCHAR2 DEFAULT NULL,
    p_item_label  IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-19 TEXT Parameters

Parameter	Description
`p_idx`	Number to identify the item you want to generate. The number determines which `G_FXX` global is populated. See also APEX_APPLICATION.
`p_value`	Value of a text field item.
`p_size`	Controls HTML tag attributes (such as disabled).
`p_maxlength`	Maximum number of characters that can be entered in the text box.

Table 27-19 (Cont.) TEXT Parameters

Parameter	Description
p_attributes	Extra HTML parameters you want to add.
p_item_id	HTML attribute ID for the <input> tag.
p_item_label	Invisible label created for the item.

Example

The following sample query demonstrates how to generate one update field for each row. Note that the ename, sal, and comm columns use the APEX_ITEM.TEXT function to generate an HTML text field for each row. Note also that each item in the query is passed a unique p_idx parameter to ensure that each column is stored in its own array.

```
SELECT
  empno,
  APEX_ITEM.HIDDEN(1,empno)||
  APEX_ITEM.TEXT(2,ename) ename,
  APEX_ITEM.TEXT(3,job) job,
  mgr,
  APEX_ITEM.DATE_POPUP(4,rownum,hiredate,'dd-mon-yyyy') hiredate,
  APEX_ITEM.TEXT(5,sal) sal,
  APEX_ITEM.TEXT(6,comm) comm,
  deptno
FROM emp
ORDER BY 1
```

27.20 TEXTAREA Function

This function creates text areas.

Syntax

```
APEX_ITEM.TEXTAREA(
    p_idx          IN    NUMBER,
    p_value        IN    VARCHAR2 DEFAULT NULL,
    p_rows         IN    NUMBER DEFAULT 40,
    p_cols         IN    NUMBER DEFAULT 4,
    p_attributes   IN    VARCHAR2 DEFAULT NULL,
    p_item_id      IN    VARCHAR2 DEFAULT NULL,
    p_item_label   IN    VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 27-20 TEXTAREA Parameters

Parameter	Description
p_idx	Number to identify the item you want to generate. The number determines which G_FXX global is populated. **See Also:** " APEX_APPLICATION"
p_value	Value of the text area item.
p_rows	Height of the text area (HTML rows attribute)
p_cols	Width of the text area (HTML column attribute).
p_attributes	Extra HTML parameters you want to add.
p_item_id	HTML attribute ID for the <textarea> tag.
p_item_label	Invisible label created for the item.

Example

The following example demonstrates how to create a text area based on a SQL query.

```
SELECT APEX_ITEM.TEXTAREA(3,ename,5,80) a
FROM emp
```

27.21 TEXT_FROM_LOV Function

Use this function to display an item as text, deriving the display value of the named LOV.

Syntax

```
APEX_ITEM.TEXT_FROM_LOV (
    p_value       IN    VARCHAR2 DEFAULT NULL,
    p_lov         IN    VARCHAR2,
    p_null_text   IN    VARCHAR2 DEFAULT '%')
    RETURN VARCHAR2;
```

Parameters

Table 27-21 TEXT_FROM_LOV Parameters

Parameter	Description
p_value	Value of a field item. Note that if p_value is not located in the list of values, p_null_text is value displayed.
p_lov	Text name of a shared list of values. This list of values must be defined in your application.
p_null_text	Value displayed when the value of the field item is NULL.

Example

The following example demonstrates how to derive the display value from a named LOV (`EMPNO_ENAME_LOV`).

```
SELECT APEX_ITEM.TEXT_FROM_LOV(empno,'EMPNO_ENAME_LOV') c FROM emp
```

27.22 TEXT_FROM_LOV_QUERY Function

Use this function to display an item as text, deriving the display value from a list of values query.

Syntax

```
APEX_ITEM.TEXT_FROM_LOV_QUERY (
    p_value       IN    VARCHAR2 DEFAULT NULL,
    p_query       IN    VARCHAR2,
    p_null_text   IN    VARCHAR2 DEFAULT '%')
    RETURN VARCHAR2;
```

Parameters

Table 27-22 TEXT_FROM_LOV_QUERY Parameters

Parameter	Description
`p_value`	Value of a field item.
`p_query`	SQL query that is expected to select two columns, a display column and a return column. For example: `SELECT dname, deptno FROM dept` Note if only one column is specified in the select clause of this query, the value for this column is used for both display and return purposes.
`p_null_text`	Value to be displayed when the value of the field item is NULL or a corresponding entry is not located for the value `p_value` in the list of values query.

Example

The following example demonstrates how to derive the display value from a query.

```
SELECT APEX_ITEM.TEXT_FROM_LOV_QUERY(empno,'SELECT ename, empno FROM
emp') c from emp
```

28
APEX_JAVASCRIPT

The `APEX_JAVASCRIPT` package provides utility functions for adding dynamic JavaScript code to HTTP output. This package is usually used for plug-in development.

28.1 ADD_3RD_PARTY_LIBRARY_FILE Procedure

This procedure adds the script tag to load a third-party JavaScript library file and also takes into account the specified CDN (content delivery network) for the application.

Supported libraries include:

- jQuery
- jQueryMobile
- jQueryUI

Syntax

```
APEX_JAVASCRIPT.ADD_3RD_PARTY_LIBRARY_FILE (
    p_library    IN VARCHAR2,
    p_file_name  IN VARCHAR2 DEFAULT NULL,
    p_directory  IN VARCHAR2 DEFAULT NULL,
```

```
    p_version    IN VARCHAR2 DEFAULT NULL,
    p_attributes IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 28-1 ADD_3RD_PARTY_LIBRARY_FILE Parameters

Parameters	Description
`p_library`	Use one of the `c_library_*` constants.
`p_file_name`	Specifies the file name excluding version, `.min`, and `.css`.
`p_directory`	(Optional) Directory where the file `p_file_name` is located.
`p_version`	(Optional) If no value is provided, then uses the same version shipped with APEX.
`p_attributes`	Extra attributes to add to the script tag. **Note:** Callers are responsible for escaping this parameter.

Example

This example loads the JavaScript file of the Draggable feature of jQuery UI.

```
apex_javascript.add_3rd_party_library_file (
     p_library   => apex_javascript.c_library_jquery_ui,
     p_file_name => 'jquery.ui.draggable' )
```

28.2 ADD_ATTRIBUTE Function Signature 1

This function returns the attribute and the attribute's escaped text surrounded by double quotation marks.

Note:

This function does not escape HTML tags. It only prevents HTML tags from breaking the JavaScript object attribute assignment. To prevent XSS (cross site scripting) attacks, you must also call `SYS.HTF.ESCAPE_SC` to prevent embedded JavaScript code from being executed when you inject the string into the HTML page.

Syntax

```
APEX_JAVASCRIPT.ADD_ATTRIBUTE (
    p_name       IN VARCHAR2,
    p_value      IN VARCHAR2,
    p_omit_null  IN BOOLEAN:=TRUE,
    p_add_comma  IN BOOLEAN:=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-2 ADD_ATTRIBUTE Signature 1 Parameters

Parameter	Description
p_name	Name of the JavaScript object attribute.
p_value	Text to be assigned to the JavaScript object attribute.
p_omit_null	If set to TRUE and p_value is empty, returns NULL.
p_add_comma	If set to TRUE, a trailing comma is added when a value is returned.

Example

Adds a call to the addEmployee JavaScript function and passes in a JavaScript object with different attribute values. The output of this call looks like:

```
addEmployee(
  {"FirstName":"John",
   "LastName":"Doe",
   "Salary":2531.29,
   "Birthday":new Date(1970,1,15,0,0,0),
   "isSalesman":true
  });
```

As the last attribute you should use the parameter combination FALSE (p_omit_null), FALSE (p_add_comma) so that the last attribute is always generated. This avoids that you have to check for the other parameters if a trailing comma should be added or not.

```
apex_javascript.add_onload_code (
    'addEmployee('||
        '{'||
        apex_javascript.add_attribute('FirstName',
sys.htf.escape_sc(l_first_name))||
        apex_javascript.add_attribute('LastName',
sys.htf.escape_sc(l_last_name))||
        apex_javascript.add_attribute('Salary',     l_salary)||
        apex_javascript.add_attribute('Birthday',   l_birthday)||
        apex_javascript.add_attribute('isSalesman', l_is_salesman, false,
false)||
        '});' );
```

28.3 ADD_ATTRIBUTE Function Signature 2

This function returns the attribute and the attribute's number.

Syntax

```
APEX_JAVASCRIPT.ADD_ATTRIBUTE (
    p_name       IN VARCHAR2,
    p_value      IN NUMBER,
    p_omit_null  IN BOOLEAN:=TRUE,
    p_add_comma  IN BOOLEAN:=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-3 ADD_ATTRIBUTE Signature 2 Parameters

Parameter	Description
`p_name`	Name of the JavaScript object attribute.
`p_value`	Number which should be assigned to the JavaScript object attribute.
`p_omit_null`	If set to TRUE and `p_value` is empty, returns NULL.
`p_add_comma`	If set to TRUE, a trailing comma is added when a value is returned.

Example

See example for ADD_ATTRIBUTE Function Signature 1.

28.4 ADD_ATTRIBUTE Function Signature 3

This function returns the attribute and a JavaScript boolean of TRUE, FALSE, or NULL.

Syntax

```
APEX_JAVASCRIPT.ADD_ATTRIBUTE (
    p_name       IN VARCHAR2,
    p_value      IN BOLLEAN,
    p_omit_null  IN BOOLEAN:=TRUE,
    p_add_comma  IN BOOLEAN:=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-4 ADD_ATTRIBUTE Signature 3 Parameters

Parameter	Description
p_name	Name of the JavaScript object attribute.
p_value	Boolean assigned to the JavaScript object attribute.
p_omit_null	If p_omit_null is TRUE and p_value is NULL the function returns NULL.
p_add_comma	If set to TRUE a trailing comma is added when a value is returned.

Example

See example for ADD_ATTRIBUTE Function Signature 1

28.5 ADD_ATTRIBUTE Function Signature 4

This function returns the attribute and the attribute's date. If p_value is null the value null is returned.

Syntax

```
APEX_JAVASCRIPT.ADD_ATTRIBUTE (
    p_name       IN VARCHAR2,
    p_value      IN DATE,
    p_omit_null  IN BOOLEAN:=TRUE,
    p_add_comma  IN BOOLEAN:=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-5 ADD_ATTRIBUTE SIgnature 4 Parameters

Parameter	Description
p_name	Name of the JavaScript object attribute.
p_value	Date assigned to the JavaScript object attribute.
p_omit_null	If p_omit_null is TRUE and p_value is NULL the function returns NULL.
p_add_comma	If set to TRUE a trailing comma is added when a value is returned.

Example

See example for ADD_ATTRIBUTE Function Signature 1

28.6 ADD_INLINE_CODE Procedure

This procedure adds a code snippet that is included inline into the HTML output. For example, you can use this procedure to add new functions or global variable declarations.

> **Note:**
>
> If you want to execute code you should use ADD_ONLOAD_CODE Procedure.

Syntax

```
APEX_JAVASCRIPT.ADD_INLINE_CODE (
    p_code       IN VARCHAR2,
    p_key        IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 28-6 ADD_INLINE_CODE Parameters

Parameter	Description
p_code	JavaScript code snippet. For example: `$s('P1_TEST',123);`
p_key	Identifier for the code snippet. If specified and a code snippet with the same name has already been added, the new code snippet is ignored. If `p_key` is NULL the snippet is always added.

Example

The following example includes the JavaScript function `initMySuperWidget` in the HTML output. If the plug-in is used multiple times on the page and the `add_inline_code` is called multiple times, it is added once to the HTML output because all calls have the same value for `p_key`.

```
apex_javascript.add_inline_code (
    p_code => 'function initMySuperWidget(){'||chr(10)||
              '  // do something'||chr(10)||
              '};',
    p_key  => 'my_super_widget_function' );
```

28.7 ADD_JET Procedure

This procedure adds the script tag to load the Oracle JET library.

Syntax

```
PACKAGE.PROCEDURE/FUNCTION (
  procedure add_jet );
```

Example

The following example demonstrates how to only load the Oracle JET library if the widget isn't rendered as a native browser input field.

```
if l_display_as <> 'NATIVE' then
    apex_javascript.add_jet;
end if;
```

28.8 ADD_LIBRARY Procedure

This procedure adds the script tag to load a JavaScript library. If a library has been added, it is not added a second time.

Syntax

```
APEX_JAVASCRIPT.ADD_LIBRARY (
    p_name                    IN VARCHAR2,
    p_directory               IN VARCHAR2,
    p_version                 IN VARCHAR2 DEFAULT NULL,
    p_check_to_add_minified   IN BOOLEAN  DEFAULT FALSE,
    p_skip_extension          IN BOOLEAN  DEFAULT FALSE,
    p_ie_condition            IN VARCHAR2 DEFAULT NULL,
    p_requirejs_module        IN VARCHAR2 DEFAULT NULL,
    p_requirejs_js_expression IN VARCHAR2 DEFAULT NULL,
    p_requirejs_required      IN BOOLEAN  DEFAULT FALSE,
    p_is_module               IN BOOLEAN  DEFAULT FALSE,
    p_is_async                IN BOOLEAN  DEFAULT FALSE,
    p_is_defer                IN BOOLEAN  DEFAULT FALSE,
    p_attributes              IN VARCHAR2 DEFAILT NULL,
    p_key                     IN VARCHAR2 DEFAULT NULL )
```

Parameters

Table 28-7 ADD_LIBRARY Parameters

Parameter	Description
p_name	Name of the JavaScript file. Must not use .js when specifying.
p_directory	Directory where JavaScript library is loaded. Must have a trailing slash.
p_version	Version identifier.
p_check_to_add_minified	If TRUE, the procedure tests if it is appropriate to add .min extension and add it if appropriate. This is added if an application is not running in DEBUG mode, and omitted when in DEBUG mode.
p_skip_extension	If TRUE, the extension .js is NOT added.
p_ie_condition	Condition which is used as Internet Explorer condition.
p_requirejs_module	Module name which is used to expose the library to RequireJS.
p_requirejs_js_expression	JavaScript expression which is used to expose the library to the RequireJS module.
p_requirejs_required	This has to be true if the library uses RequireJS in its code to loading other JavaScript files.

Table 28-7 (Cont.) ADD_LIBRARY Parameters

Parameter	Description
p_key	Name used to indicate if the library has already been loaded. If not specified, defaults to p_directory||p_name||p_version.
p_key	Name used to indicate if the library has already been loaded. If not specified, defaults to p_directory||p_name||p_version.
p_key	Name used to indicate if the library has already been loaded. If not specified, defaults to p_directory||p_name||p_version.
p_is_module	If true, adds type="module" to the script tag.
p_is_async	If true, adds attribute async to the script tag.
p_is_defer	If true adds attribute defer to the script tag. defer cannot be used in combination with async. defer should not be used in combination with type="module" as module scripts defer by default.
p_attributes	Extra attributes to add to the script tag. **Note:** Callers are responsible for escaping this parameter.
p_key	Name used to indicate if the library has already been loaded. If not specified, defaults to p_directory||p_name||p_version.

Example

The following example includes the JavaScript library file named hammer-2.0.4.min.js (if the application has not been started from the Builder), or hammer-2.0.4.js (if the application has been started from the Builder or is running in DEBUG mode), from the directory specified by p_plugin.file_prefix. Since p_skip_extension is not specified, this defaults to .js. Also, since p_key is not specified, the key defaults to p_plugin.file_prefix||hammer-2.0.4. Hammer is a JavaScript library which exposes itself to RequireJS using hammerjs as module name.

```
apex_javascript.add_library (
    p_name                    => 'hammer-2.0.4#MIN#',
    p_directory               => p_plugin.file_prefix,
    p_requirejs_module        => 'hammerjs',
    p_requirejs_js_expression => 'Hammer' );
```

28.9 ADD_REQUIREJS Procedure

This procedure adds the script tag to load the RequireJS library.

Syntax

```
procedure add_requirejs;
```

28.10 ADD_REQUIREJS_DEFINE Procedure

This procedure adds a RequireJS define after RequireJS has been loaded to let it know about the existence of a library.

Syntax

```
APEX_JAVASCRIPT.add_requirejs_define (
          p_module        in varchar2,
          p_js_expression in varchar2 );
```

Parameters

Table 28-8 ADD_REQUIREJS_DEFINE Parameters

Parameter	Description
p_module	
p_js_expression	

Example

```
apex_javascript.add_requirejs_define (
    p_module        => 'hammerjs',
    p_js_expression => 'Hammer' );
```

28.11 ADD_ONLOAD_CODE Procedure

This procedure adds a JavaScript code snippet to the HTML output which the onload event executes. If an entry with the same key exists, it is ignored. If `p_key` is NULL the snippet is always added.

Syntax

```
APEX_JAVASCRIPT.ADD_ONLOAD_CODE (
    p_code           IN VARCHAR2,
    p_key            IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 28-9 ADD_ONLOAD_CODE Parameters

Parameter	Description
p_code	JavaScript code snippet to execute during the onload event.

Table 28-9 (Cont.) ADD_ONLOAD_CODE Parameters

Parameter	Description
p_key	Any name to identify the specified code snippet. If specified, the code snippet is added if there has been no other call with the same p_key. If p_key is NULL the code snippet is always added.

Example

Adds the JavaScript call initMySuperWidget() to the onload buffer. If the plug-in is used multiple times on the page and the add_onload_code is called multiple times, it is added once to the HTML output because all calls have the same value for p_key

```
apex_javascript.add_onload_code (
    p_code => 'initMySuperWidget();',
    p_key  => 'my_super_widget' );
```

28.12 ADD_VALUE Function Signature 1

This function returns the escaped text surrounded by double quotation marks. For example, this string could be returned "That\'s a test".

> **Note:**
>
> This function does not escape HTML tags. It only prevents HTML tags from breaking the JavaScript object attribute assignment. To prevent XSS (cross site scripting) attacks, you must also call SYS.HTF.ESCAPE_SC to prevent embedded JavaScript code from being executed when you inject the string into the HTML page.

Syntax

```
APEX_JAVASCRIPT.ADD_VALUE (
    p_value          IN VARCHAR2,
    p_add_comma      IN BOOLEAN :=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-10 ADD_VALUE Signature 1 Parameters

Parameter	Description
p_value	Text to be escaped and wrapped by double quotation marks.
p_add_comma	If p_add_comma is TRUE a trailing comma is added.

Example

This example adds some JavaScript code to the onload buffer. The value of `p_item.attribute_01` is first escaped with `htf.escape_sc` to prevent XSS attacks and then assigned to the JavaScript variable `lTest` by calling `apex_javascript.add_value`. `Add_value` takes care of properly escaping the value and wrapping it with double quotation marks. Because commas are not wanted, `p_add_comma` is set to FALSE.

```
apex_javascript.add_onload_code (
    'var lTest = '||
apex_javascript.add_value(sys.htf.escape_sc(p_item.attribute_01),
FALSE)||';'||chr(10)||
    'showMessage(lTest);' );
```

28.13 ADD_VALUE Function Signature 2

This function returns `p_value` as JavaScript number, if `p_value` is NULL the value null is returned.

Syntax

```
APEX_JAVASCRIPT.ADD_VALUE (
    p_value          IN NUMBER,
    p_add_comma      IN BOOLEAN :=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-11 ADD_VALUE Signature 2 Parameters

Parameter	Description
`p_value`	Number which should be returned as JavaScript number.
`p_add_comma`	If `p_add_comma` is TRUE a trailing comma is added. Default is TRUE.

Example

See example for ADD_VALUE Function Signature 1 .

28.14 ADD_VALUE Function Signature 3

This function returns `p_value` as JavaScript boolean. If `p_value` is NULL the value null is returned.

Syntax

```
APEX_JAVASCRIPT.ADD_VALUE (
    p_value          IN BOOLEAN,
    p_add_comma      IN BOOLEAN :=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-12 ADD_VALUE Signature 3 Parameters

Parameter	Description
p_value	Boolean which should be returned as JavaScript boolean.
p_add_comma	If p_add_comma is TRUE a trailing comma is added. Default is TRUE.

Example

See example for ADD_VALUE Function Signature 1 .

28.15 ADD_VALUE Function Signature 4

This function returns p_value as JavaScript date object, if p_value is NULL the value null is returned.

Syntax

```
APEX_JAVASCRIPT.ADD_VALUE (
    p_value          IN NUMBER,
    p_add_comma      IN BOOLEAN :=TRUE)
RETURN VARCHAR2;
```

Parameters

Table 28-13 ADD_VALUE Signature 4 Parameters

Parameter	Description
p_value	Date which should be returned as JavaScript date object.
p_add_comma	If p_add_comma is TRUE a trailing comma is added. Default is TRUE.

Example

See example for ADD_VALUE Function Signature 1 .

28.16 Escape Function

This function escapes text to be used in JavaScript. This function uses APEX_ESCAPE.JS_LITERAL to escape characters and provide a reference to that other API.

> **Note:**
>
> This function prevents HTML tags from breaking the JavaScript object attribute assignment and also escapes the HTML tags '<' and '>'. It does not escape other HTML tags, therefore to be sure to prevent XSS (cross site scripting) attacks, you must also call `SYS.HTF.ESCAPE_SC` to prevent embedded JavaScript code from being executed when you inject the string into the HTML page.

Syntax

```
APEX_JAVASCRIPT.ESCAPE (
    p_text  IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 28-14 ESCAPE Parameters

Parameter	Description
p_text	Text to be escaped.

Example

Adds some JavaScript code to the onload buffer. The value of p_item.attribute_01 is first escaped with htf.escape_sc to prevent XSS attacks and then escaped with apex_javascript.escape to prevent that special characters like a quotation mark break the JavaScript code.

```
apex_javascript.add_onload_code (
    'var lTest = "'||
apex_javascript.escape(sys.htf.escape_sc(p_item.attribute_01))||'";'||
chr(10)||
    'showMessage(lTest);' );
```

29
APEX_JSON

This package includes utilities that parse and generate JSON.

29.1 Package Overview and Examples

To read from a string that contains JSON data, first use `parse()` to convert the string to an internal format. Then use the `get_%` routines (for example, `get_varchar2()`, `get_number()`, ...) to access the data and `find_paths_like()` to search.

Alternatively, use `to_xmltype()` to convert a JSON string to an xmltype.

This package also contains procedures to generate JSON-formatted output. Use the overloaded `open_%()`, `close_%()` and `write()` procedures for writing.

Example 1

This example parses a JSON string and prints the value of member variable `"a"`.

```
DECLARE
    s varchar2(32767) := '{ "a": 1, "b": ["hello", "world"]}';
BEGIN
    apex_json.parse(s);
    sys.dbms_output.put_line('a is '||apex_json.get_varchar2(p_path => 'a'));
END;
```

Example 2

This example converts a JSON string to XML and uses `XMLTABLE` to query member values.

```
select col1, col2
from xmltable (
        '/json/row'
        passing apex_json.to_xmltype('[{"col1": 1, "col2": "hello"},'||
                '{"col1": 2, "col2": "world"}]')
        columns
           col1 number path '/row/col1',
           col2 varchar2(5) path '/row/col2' );
```

Example 3

This example writes a nested JSON object to the HTP buffer.

```
BEGIN
    apex_json.open_object;        -- {
    apex_json.write('a', 1);    --   "a":1
    apex_json.open_array('b');  --  ,"b":[
    apex_json.open_object;    --    {
    apex_json.write('c',2); --      "c":2
    apex_json.close_object;   --    }
    apex_json.write('hello'); --   ,"hello"
    apex_json.write('world'); --   ,"world"
    apex_json.close_all;          --  ]
                          -- }
END;
```

29.2 Constants and Data Types

Parser Interface

The following are constants used for the parser interface:

```
subtype t_kind is binary_integer range 1 .. 8;
c_null     constant t_kind := 1;
c_true     constant t_kind := 2;
c_false    constant t_kind := 3;
c_number   constant t_kind := 4;
```

```
c_varchar2 constant t_kind := 5;
c_object   constant t_kind := 6;
c_array    constant t_kind := 7;
c_clob     constant t_kind := 8;
```

Storage for JSON Data

JSON data is stored in an index by varchar2 table. The JSON values are stored as records. The discriminator "kind" determines whether the value is null, true, false, a number, a varchar2, a clob, an object or an array. It depends on "kind" which record fields are used and how. If not explicitly mentioned below, the other record fields' values are undefined:

* c_null: -

* c_true: -

* c_false: -

* c_number: number_value contains the number value

* c_varchar2: varchar2_value contains the varchar2 value

* c_clob: clob_value contains the clob

* c_object: object_members contains the names of the object's members

* c_array: number_value contains the array length

```
type t_value is record (
   kind           t_kind,
   number_value   number,
   varchar2_value varchar2(32767),
   clob_value clob,
   object_members apex_t_varchar2 );
type t_values is table of t_value index by varchar2(32767);
```

Default Format for Dates

```
c_date_iso8601 constant varchar2(30) := 'yyyy-mm-dd"T"hh24:mi:ss"Z"';
```

Default JSON Values Table

```
g_values t_values;
```

Errors Thrown for PARSE()

```
e_parse_error     exception;
pragma exception_init(e_parse_error, -20987);
```

29.3 CLOSE_ALL Procedure

This procedure closes all objects and arrays up to the outermost nesting level.

Syntax

```
APEX_JSON.CLOSE_ALL;
```

Parameters

None.

Example

See "Package Overview and Examples".

29.4 CLOSE_ARRAY Procedure

This procedure writes a close bracket symbol as follows:

```
]
```

Syntax

```
APEX_JSON.CLOSE_ARRAY ();
```

Parameters

None.

Example

See "Package Overview and Examples".

29.5 CLOSE_OBJECT Procedure

This procedure writes a close curly bracket symbol as follows:

```
}
```

Syntax

```
APEX_JSON.CLOSE_OBJECT ();
```

Parameters

None.

Example

See "Package Overview and Examples".

29.6 DOES_EXIST Function

This function determines whether the given path points to an existing value.

Syntax

```
APEX_JSON.DOES_EXIST (
   p_path             IN VARCHAR2,
   p0                 IN VARCHAR2 DEFAULT NULL,
   p1                 IN VARCHAR2 DEFAULT NULL,
   p2                 IN VARCHAR2 DEFAULT NULL,
   p3                 IN VARCHAR2 DEFAULT NULL,
   p4                 IN VARCHAR2 DEFAULT NULL,
   p_values           IN t_values DEFAULT g_values )
RETURN BOOLEAN;
```

Parameters

Table 29-1 DOES_EXIST Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns

Table 29-2 DOES_EXIST Function Returns

Return	Description
`TRUE`	Given path points to an existing value.
`FALSE`	Given path does not point to an existing value

Example

This example parses a JSON string and prints whether it contains values under a path.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "items": [ 1, 2, { "foo": true } ] }');
    if apex_json.does_exist(p_path => 'items[%d].foo', p0 => 3,
p_values =>
j) then
        dbms_output.put_line('found items[3].foo');
    end if;
END;
```

29.7 FIND_PATHS_LIKE Function

This function returns paths into `p_values` that match a given pattern.

Syntax

```
APEX_JSON.FIND_PATHS_LIKE (
    p_return_path      IN VARCHAR2,
    p_subpath          IN VARCHAR2 DEFAULT NULL,
    p_value            IN VARCHAR2 DEFAULT NULL,
    p_values           IN t_values DEFAULT g_values )
RETURN apex_t_varchar2;
```

Parameters

Table 29-3 FIND_PATHS_LIKE Function Parameters

Parameter	Description
`p_return_path`	Search pattern for the return path..
`p_subpath`	Search pattern under `p_return_path` (optional).
`p_value`	Search pattern for value (optional).
`p_values`	Parsed JSON members. The default is `g_values`.

Returns/Raised Errors

Table 29-4 FIND_PATHS_LIKE Function Returns and Raised Errors

Return	Description
`apex_t_varchar2`	Table of paths that match the pattern.
`VALUE_ERROR`	Raises this error if `p_values(p_path)` is not an array or object.

Example

This example parses a JSON string, finds paths that match a pattern, and prints the values under the paths.

```
DECLARE
    j            apex_json.t_values;
    l_paths apex_t_varchar2;
BEGIN
    apex_json.parse(j, '{ "items": [ { "name": "Amulet of Yendor",
"magical": true }, '||
                                       { "name": "Slippers",  "magical":
"rather not" } ]}');
    l_paths := apex_json.find_paths_like (
        p_values         => j,
        p_return_path => 'items[%]',
        p_subpath       => '.magical',
        p_value           => 'true' );
    dbms_output.put_line('Magical items:');
    for i in 1 .. l_paths.count loop
        dbms_output.put_line(apex_json.get_varchar2(p_values => j, p_path =>
l_paths(i)||'.name'));
```

```
    end loop;
END;
```

29.8 FLUSH Procedure

This procedure flushes pending changes. Note that close procedures automatically flush.

Syntax

```
APEX_JSON.FLUSH
```

Parameters

None.

Example

This example writes incomplete JSON.

```
BEGIN
  apex_json.open_object;
  apex_json.write('attr', 'value');
  apex_json.flush;
  sys.htp.p('the "}" is missing');
END;
```

29.9 FREE_OUTPUT Procedure

Frees output resources. Call this procedure after process if you are using `INITIALIZE_CLOB_OUTPUT` to write to a temporary `CLOB`.

Syntax

```
free_output;
```

Example

This example configures `APEX_JSON` for `CLOB` output, generate `JSON`, print the `CLOB` with `DBMS_OUTPUT`, and finally free the `CLOB`.

```
BEGIN
  apex_json.initialize_clob_output;

  apex_json.open_object;
  apex_json.write('hello', 'world');
  apex_json.close_object;

  dbms_output.put_line(apex_json.get_clob_output);
```

```
apex_json.free_output;
END;
```

29.10 GET_BOOLEAN Function

This function returns a boolean number value.

Syntax

```
APEX_JSON.GET_BOOLEAN (
    p_path              IN VARCHAR2,
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL,
    p_default           IN BOOLEAN  DEFAULT NULL,
    p_values            IN t_values DEFAULT g_values )
RETURN BOOLEAN;
```

Parameters

Table 29-5 GET_BOOLEAN Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_default`	The default value if the member does not exist.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns

Table 29-6 GET_BOOLEAN Function Returns

Return	Description
`TRUE`	Value at the given path position.
`FALSE`	Value at the given path position.
`NULL`	Value at the given path position.
`VALUE_ERROR`	Raises this error if `p_values(p_path)` is not boolean.

Example

This example parses a JSON string and prints the boolean value at a position.

```
DECLARE
    j apex_json.t_values;
BEGIN
```

```
    apex_json.parse(j, '{ "items": [ 1, 2, { "foo": true } ] }');
    if apex_json.get_boolean(p_path=>'items[%d].foo',
p0=>3,p_values=>j) then
        dbms_output.put_line('items[3].foo is true');
END IF;
END;
```

29.11 GET_CLOB Function

This function returns clob member value. This function auto-converts `varchar2`, boolean, and number values.

Syntax

```
GET_CLOB (
    p_path    IN VARCHAR2,
    p0        IN VARCHAR2 DEFAULT NULL,
    p1        IN VARCHAR2 DEFAULT NULL,
    p2        IN VARCHAR2 DEFAULT NULL,
    p3        IN VARCHAR2 DEFAULT NULL,
    p4        IN VARCHAR2 DEFAULT NULL,
    p_default IN CLOB DEFAULT NULL,
    p_values  in t_values DEFAULT g_values )
RETURN CLOB
```

Parameters

Table 29-7 GET_CLOB Function Parameters

Parameter	Description
`p_values`	Parsed JSON members. defaults to `g_values`.
`p_path`	Index into `p_values`.
`p[0-4]`	Each `%N` in `p_path` will be replaced by `pN` and every `i-th %s` or `%d` will be replaced by the `p[i-1]`.
`p_default`	Default value if the member does not exist.

Returns/Raised Errors

Table 29-8 GET_CLOB Function Returns and Raised Errors

Return/Raised Errors	Description
`a clob`	Value at the given path position.
`VALUE_ERROR`	If `p_values(p_path)` is an array or an object.

Example

Parse a JSON string and print the value at a position.

```
DECLARE
    j apex_json.t_values;
```

```
BEGIN
    apex_json.parse(j, '{ "items": [ 1, 2, { "foo": 42 } ] }');
    dbms_output.put_line(apex_json.get_clob (
    p_values => j,
    p_path => 'items[%d].foo',
    p0 => 3));
END;
```

29.12 GET_CLOB_OUTPUT Function

Returns the temporary `CLOB` that you created with `INITIALIZE_CLOB_OUTPUT`.

Syntax

```
APEX_JSON.GET_CLOB_OUTPUT (
    p_free  IN BOOLEAN  DEFAULT FALSE )
    RETURN CLOB;
```

Parameters

Table 29-9 GET_CLOB_OUTPUT Parameters

Parameter	Description
`p_free`	If `true`, frees output resources. Defaults to false.

Example 1

This example configures `APEX_JSON` for `CLOB` output, generates `JSON`, prints the `CLOB` with `DBMS_OUTPUT`, and finally frees the `CLOB`.

```
BEGIN
  apex_json.initialize_clob_output;

  apex_json.open_object;
  apex_json.write('hello', 'world');
  apex_json.close_object;

  dbms_output.put_line(apex_json.get_clob_output);

 apex_json.free_output;
END;
```

Example 2

This example configures `APEX_JSON` for CLOB output, generates JSON, and prints and frees the CLOB with `DBMS_OUTPUT` and `GET_CLOB_OUTPUT`.

```
BEGIN
  apex_json.initialize_clob_output;

  apex_json.open_object;
```

```
  apex_json.write('hello', 'world');
  apex_json.close_object;

  dbms_output.put_line(apex_json.get_clob_output( p_free => true ) );
END;
```

29.13 GET_COUNT Function

This function returns the number of array elements or object members.

Syntax

```
APEX_JSON.GET_COUNT (
    p_path              IN VARCHAR2,
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL,
    p_values            IN t_values DEFAULT g_values )
RETURN NUMBER;
```

Parameters

Table 29-10 GET_COUNT Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns/Raised Errors

Table 29-11 GET_COUNT Function Returns and Raised Errors

Return	Description
`NUMBER`	The number of array elements or object members or null if the array or object could not be found
`VALUE_ERROR`	Raises this error if `p_values(p_path)` is not an array or object.

Example

This example parses a JSON string and prints the number of members at positions.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "foo": 3, "bar": [1, 2, 3, 4] }');
```

```
dbms_output.put_line(apex_json.get_count(p_path=>'.',p_values=>j)); -- 2
(foo and bar)
    dbms_output.put_line(apex_json.get_count(p_path=>'bar',p_values=>j)); --
4
END;
```

29.14 GET_DATE Function

This function returns a date member value.

Syntax

```
APEX_JSON.GET_DATE (
    p_path             IN VARCHAR2,
    p0                 IN VARCHAR2 DEFAULT NULL,
    p1                 IN VARCHAR2 DEFAULT NULL,
    p2                 IN VARCHAR2 DEFAULT NULL,
    p3                 IN VARCHAR2 DEFAULT NULL,
    p4                 IN VARCHAR2 DEFAULT NULL,
    p_default          IN DATE     DEFAULT NULL,
    p_format           IN VARCHAR2 DEFAULT c_date_iso8601,
    p_values           IN t_values DEFAULT g_values )
RETURN DATE;
```

Parameters

Table 29-12 GET_DATE Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_default`	The default value if the member does not exist.
`p_format`	The date format mask.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns/Raised Errors

Table 29-13 GET_DATE Function Returns and Raised Errors

Return	Description
`DATE`	.Returns the date.
`VALUE_ERROR`	Raises this error if `p_values(p_path)` is not a date.

Example

This example parses a JSON string and prints the value at a position.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "items": [ 1, 2, { "foo":
"2014-04-29T10:08:00Z" }] }');

dbms_output.put_line(to_char(apex_json.get_date(p_path=>'items[%d].foo'
,p0=>3, p_values=>j), 'DD-Mon-YYYY'));
END;
```

29.15 GET_MEMBERS Function

This function returns the table of `OBJECT_MEMBERS` names for an object.

Syntax

```
APEX_JSON.GET_MEMBERS (
    p_path              IN VARCHAR2,
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL,
    p_values            IN t_values DEFAULT g_values )
RETURN APEX_T_VARCHAR2;
```

Parameters

Table 29-14 GET_MEMBERS Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns/Raised Errors

Table 29-15 GET_MEMBERS Function Returns and Raised Errors

Return	Description
`OBJECT_MEMBERS`	The `OBJECT_MEMBERS` of the object or null if the object could not be found.
`VALUE_ERROR`	Raises this error if `p_values(p_path)` is not an array or object.

Example

This example parses a JSON string and prints members at positions.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "foo": 3, "bar": [1, 2, 3, 4] }');
    dbms_output.put_line(apex_json.get_members(p_path=>'.',p_values=>j)(1));
-- foo
    dbms_output.put_line(apex_json.get_members(p_path=>'.',p_values=>j)(2));
-- bar
END;
```

29.16 GET_NUMBER Function

This function returns a numeric number value.

Syntax

```
APEX_JSON.GET_NUMBER (
    p_path              IN VARCHAR2,
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL,
    p_default           IN BOOLEAN  DEFAULT NULL,
    p_values            IN t_values DEFAULT g_values )
RETURN NUMBER;
```

Parameters

Table 29-16 GET_NUMBER Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_default`	The default value if the member does not exist.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns and Raised Errors

Table 29-17 GET_NUMBER Function Returns and Raised Errors

Return	Description
`NUMBER`	The value at the given path position.
`VALUE_ERROR`	Raises this error if `p_values(p_path)` is not a number.

Example

This example parses a JSON string and prints the value at a position.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "items": [ 1, 2, { "foo": 42 } ] }');

dbms_output.put_line(apex_json.get_number(p_path=>'items[%d].foo',p0=>
3,p_values=>j));
END;
```

29.17 GET_SDO_GEOMETRY Function

This function returns SDO_GEOMETRY member value from a GeoJSON member. This function supports only two-dimensional geometry objects.

> **Note:**
>
> This function is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

Syntax

```
APEX_JSON.GET_SDO_GEOMETRY FUNCTION (
    p_path              IN VARCHAR2,
    p0                  IN VARCHAR2  DEFAULT NULL,
    p1                  IN VARCHAR2  DEFAULT NULL,
    p2                  IN VARCHAR2  DEFAULT NULL,
    p3                  IN VARCHAR2  DEFAULT NULL,
    p4                  IN VARCHAR2  DEFAULT NULL,
    p_srid              IN NUMBER    DEFAULT 4326,
    p_values            IN t_values  DEFAULT g_values )
    RETURN mdsys.sdo_geometry;
```

Parameters

Table 29-18 GET_SDO_GEOMETRY Parameters

Parameter	Description
`p_values`	Parsed JSON members. Defaults to `g_values`.
`p_path`	Index into `p_values`.
`p[0-4]`	Each `%N` in `p_path` is replaced by `pN` and every `i-th %s` or `%d` is replaced by the `p[i-1]`.
`p_default`	Default value if the member does not exist.
`p_srid`	Coordinate system (SRID) to return the SDO_GEOMETRY in.

Returns

Table 29-19 GET_SDO_GEOMETRY Returns

Return	Description
a geometry	Value at the given path position.

Raises

Table 29-20 GET_SDO_GEOMETRY Raises

Raise	Description
VALUE_ERROR	If `p_values(p_path)` is not a GeoJSON object.

Example

The following example parses a JSON string and prints the value at a position.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "items": [ 1, 2, { "geom":
{"type":"Point","coordinates":[-122.7783356,38.8198318,1.85 ] } } ] }');
    dbms_output.put_line(to_char(apex_json.get_sdo_geometry (
                                    p_values => j,
                                    p_path   => 'items[%d].geom',
                                    p0       => 3) ) );
END;
```

29.18 GET_T_NUMBER Function

This function returns the numeric attributes of an array.

Syntax

```
FUNCTION GET_T_NUMBER (
         p_path             IN VARCHAR2,
         p0                 IN VARCHAR2 DEFAULT NULL,
         p1                 IN VARCHAR2 DEFAULT NULL,
         p2                 IN VARCHAR2 DEFAULT NULL,
         p3                 IN VARCHAR2 DEFAULT NULL,
         p4                 IN VARCHAR2 DEFAULT NULL,
         p_values           IN T_VALUES DEFAULT G_VALUES )
         return apex_t_number;
```

Parameters

Table 29-21 GET_T_NUMBER Parameters

Parameter	Description
p_path	Index into p_values.
p[0-4]	Each %N in p_path is replaced by pN and every i-th %s or %d is replaced by the p[i-1].
p_values	Parsed JSON members. The default is p_values.

Returns

Array member values if the referenced t_value is an array. An array with just the referenced value if it's type can be converted to a number.

Table 29-22 GET_T_NUMBER Function Raised Errors

Return	Description
VALUE_ERROR	On conversion errors.

Example

This example parses a JSON string and prints the value at position 1.

```
declare
     j          apex_json.t_values;
     l_elements apex_t_number;
 begin
     apex_json.parse(j, '{ "foo": [111, 222], "bar": 333 }');
     l_elements := apex_json.get_t_number (
                      p_values => j,
                      p_path   => 'foo' );
     for i in 1 .. l_elements.count loop
         sys.dbms_output.put_line(i||':'||l_elements(i));
     end loop;
     l_elements := apex_json.get_t_number (
                      p_values => j,
                      p_path   => 'bar' );
     for i in 1 .. l_elements.count loop
         sys.dbms_output.put_line(i||':'||l_elements(i));
     end loop;
 end;

Output:
  1:111
  2:222
  1:333
```

29.19 GET_T_VARCHAR2 Function

This function returns the varchar2 attributes of an array.

Syntax

```
FUNCTION GET_T_VARCHAR2 (
    p_path             IN VARCHAR2,
    p0                 IN VARCHAR2 default null,
    p1                 IN VARCHAR2 default null,
    p2                 IN VARCHAR2 default null,
    p3                 IN VARCHAR2 default null,
    p4                 IN VARCHAR2 default null,
    p_values           IN T_VALUES default g_values )
    RETURN apex_t_varchar2;
```

Parameters

Table 29-23 GET_T_VARCHAR2 Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns

Array member values if the referenced `t_value` is an array. An array with just the referenced value if it's type can be converted to a varchar2.

Raises

Table 29-24 GET_T_VARCHAR2 Function Raised Errors

Return	Description
`VALUE_ERROR`	On conversion errors.

Example

This example parses a JSON and prints the value at position 1.

```
declare
    j          apex_json.t_values;
    l_elements apex_t_varchar2;
begin
    apex_json.parse(j, '{ "foo": ["one", "two"], "bar": "three" }');
    l_elements := apex_json.get_t_varchar2 (
                      p_values => j,
                      p_path   => 'foo' );
```

```
    for i in 1 .. l_elements.count loop
        sys.dbms_output.put_line(i||':'||l_elements(i));
    end loop;
    l_elements := apex_json.get_t_varchar2 (
                    p_values => j,
                    p_path   => 'bar' );
    for i in 1 .. l_elements.count loop
        sys.dbms_output.put_line(i||':'||l_elements(i));
    end loop;
end;

Output:
  1:one
  2:two
  1:three
```

29.20 GET_VALUE Function

This function returns the t_value.

Syntax

```
APEX_JSON.GET_VALUE (
    p_path              IN VARCHAR2,
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL,
    p_values            IN t_values DEFAULT g_values )
RETURN t_value;
```

Parameters

Table 29-25 GET_VALUE Function Parameters

Parameter	Description
`p_path`	Index into `p_values`.
`p[0-4]`	Each %N in `p_path` is replaced by `pN` and every i-th %s or %d is replaced by the `p[i-1]`.
`p_values`	Parsed JSON members. The default is `g_values`.

Returns/Raised Errors

Table 29-26 GET_VALUE Function Returns and Raised Errors

Return	Description
`t_value`	The `t_value` at the given path position. The record attributes are null if no data is found.

Table 29-26 (Cont.) GET_VALUE Function Returns and Raised Errors

Return	Description
VALUE_ERROR	Raises this error if p_values(p_path) is not an array or object.

Example

This example parses a JSON string and prints attributes of values at positions.

```
DECLARE
    j apex_json.t_values;
    v apex_json.t_value;
BEGIN
    apex_json.parse(j, '{ "foo": 3, "bar": [1, 2, 3, 4] }');
    v := apex_json.get_value(p_path=>'bar[%d]',p0=> 2,p_values=>j); --
returns the t_value for bar[2]
    dbms_output.put_line(v.number_value); -- 2
    v := apex_json.get_value(p_path=>'does.not.exist',p_values=>j);
    dbms_output.put_line(case when v.kind is null then 'not found!' end);
END;
```

29.21 GET_VALUE_KIND Function

This function returns the kind of the value at a path position.

Syntax

```
APEX_JSON.GET_VALUE_KIND (
    p_path             IN VARCHAR2,
    p0                 IN VARCHAR2 DEFAULT NULL,
    p1                 IN VARCHAR2 DEFAULT NULL,
    p2                 IN VARCHAR2 DEFAULT NULL,
    p3                 IN VARCHAR2 DEFAULT NULL,
    p4                 IN VARCHAR2 DEFAULT NULL,
    p_values           IN t_values DEFAULT g_values )
    RETURN t_kind;
```

Parameters

Table 29-27 GET_VALUE_KIND Parameters

Parameter	Description
p_values	Parsed JSON members. Defaults to g_values.
p_path	Index into p_values.
p[0-4]	Each %N in p_path is replaced by pN and every i-th %s or %d is replaced by the p[i-1].

Table 29-28 Returns

Return	Description
t_kind	The t_kind of the value at the given path position. Returns NULL if no data is found.

Example

The following example demonstrates

```
DECLARE
    j apex_json.t_values;
    k apex_json.t_kind;

    PROCEDURE print_kind( p_kind in apex_json.t_kind ) IS
    BEGIN
        dbms_output.put_line(
            CASE p_kind
                WHEN apex_json.c_null      THEN 'NULL'
                WHEN apex_json.c_true      THEN 'true'
                WHEN apex_json.c_false     THEN 'false'
                WHEN apex_json.c_number    THEN 'NUMBER'
                WHEN apex_json.c_varchar2  THEN 'VARCHAR2'
                WHEN apex_json.c_object    THEN 'OBJECT'
                WHEN apex_json.c_array     THEN 'ARRAY'
                WHEN apex_json.c_clob      THEN 'CLOB' end );
    END print_kind;
BEGIN
    apex_json.parse(j, '{ "foo": 3, "bar": [1, 2, 3, 4] }');
    k := apex_json.get_value_kind (
             p_values => j,
             p_path   => 'bar[%d]',
             p0       => 2); -- returns the t_value for bar[2]
    print_kind(k);      -- 'NUMBER'
    k := apex_json.get_value_kind (
             p_values => j,
             p_path   => 'bar');
    print_kind(k);      -- 'ARRAY'
END;
```

29.22 GET_VARCHAR2 Function

This function returns a varchar2 member value. This function converts boolean and number values to varchar2 values.

Syntax

```
APEX_JSON.GET_VARCHAR2 (
    p_path             IN VARCHAR2,
    p0                 IN VARCHAR2 DEFAULT NULL,
    p1                 IN VARCHAR2 DEFAULT NULL,
    p2                 IN VARCHAR2 DEFAULT NULL,
```

```
    p3                IN VARCHAR2 DEFAULT NULL,
    p4                IN VARCHAR2 DEFAULT NULL,
    p_default         IN BOOLEAN  DEFAULT NULL,
    p_values          IN t_values DEFAULT g_values )
RETURN VARCHAR2;
```

Parameters

Table 29-29 GET_VARCHAR2 Function Parameters

Parameter	Description
p_path	Index into p_values.
p[0-4]	Each %N in p_path is replaced by pN and every i-th %s or %d is replaced by the p[i-1].
p_default	The default value if the member does not exist.
p_values	Parsed JSON members. The default is g_values.

Returns/Raised Errors

Table 29-30 GET_VARCHAR2 Function Returns and Raised Errors

Return	Description
VARCHAR2	This is the value at the given path position.
VALUE_ERROR	Raises this error if p_values(p_path) is not an array or object.

Example

This example parses a JSON string and prints the value at a position.

```
DECLARE
    j apex_json.t_values;
BEGIN
    apex_json.parse(j, '{ "items": [ 1, 2, { "foo": 42 } ] }');
    dbms_output.put_line(apex_json.get_varchar2(p_path=>'items[%d].foo',p0=>
3,p_values=>j));
END;
```

29.23 INITIALIZE_CLOB_OUTPUT Procedure

This procedure initializes the output interface to write to a temporary CLOB. The default is to write to SYS.HTP. If using CLOB output, call FREE_OUTPUT() at the end to free the CLOB.

Syntax

```
APEX_JSON.INITIALIZE_CLOB_OUTPUT (
    p_dur         IN PLS_INTEGER DEFAULT sys.dbms_lob.call,
    p_cache       IN BOOLEAN     DEFAULT TRUE,
```

```
    p_indent      IN PLS_INTEGER DEFAULT NULL,
    p_preserve    IN BOOLEAN     DEFAULT FALSE )
```

Parameters

Table 29-31 INITIALIZE_CLOB_OUTPUT Procedure Parameters

Parameter	Description
p_dur	Duration of the temporary CLOB. this can be DBMS_LOB.SESSION or DBMS_LOB.CALL (the default).
p_cache	Specifies if the lob should be read into buffer cache or not.
p_indent	Indent level. Defaults to 2 if debug is turned on, 0 otherwise.
p_preserve	Whether to preserve the currently active output object. After calling FREE_OUTPUT, subsequent write calls will be executed on the preserved output. Defaults to FALSE. If HTP output has already been initialized and a CLOB needs to be created, use p_preserve => true. After FREE_OUTPUT, subsequent output will be directed to the original HTP output again. If p_preserve is true, you **must** call FREE_OUTPUT after JSON processing.

Example

This example configures APEX_JSON for CLOB output, generates JSON, prints the CLOB with DBMS_OUTPUT, and finally frees the CLOB.

```
BEGIN
  apex_json.initialize_clob_output( p_preserve => true );

  apex_json.open_object;
  apex_json.write('hello', 'world');
  apex_json.close_object;

  dbms_output.put_line(apex_json.get_clob_output);

  apex_json.free_output;
END;
```

29.24 INITIALIZE_OUTPUT Procedure

This procedure initializes the output interface. You only have to call this procedure if you want to modify the parameters below. Initially, output is already configured with the defaults mentioned in the parameter table.

Syntax

```
APEX_JSON.INITIALIZE_OUTPUT (
    p_http_header     IN BOOLEAN     DEFAULT TRUE,
    p_http_cache      IN BOOLEAN     DEFAULT FALSE,
```

```
    p_http_cache_etag IN VARCHAR2    DEFAULT NULL,
    p_indent          IN PLS_INTEGER DEFAULT NULL );
```

Parameters

Table 29-32 INITIALIZE_OUTPUT Procedure Parameters

Parameter	Description
p_http_header	If TRUE (the default), write an application/JSON mime type header.
p_http_cache	This parameter is only relevant if p_write_header is TRUE. If TRUE, writes Cache-Control: max-age=315360000. If FALSE (the default), writes Cache-Control: no-cache. Otherwise, does not write Cache-Control.
http_cache_etag	If not null, writes an etag header. This parameter is only used if P_HTTP_CACHE is true.
p_indent	Indent level. Defaults to 2, if debug is turned on, otherwise defaults to 0.

Example

This example configures APEX_JSON to not emit default headers, because they are written directly.

```
BEGIN
  apex_json.initialize_output (
      p_http_header => false );

  sys.owa_util.mime_header('application/json', false);
  sys.owa_util.status_line(429, 'Too Many Requests');
  sys.owa_util.http_header_close;
  --
  apex_json.open_object;
  apex_json.write('maxRequestsPerSecond', 10);
  apex_json.close_object;
END;
```

29.25 OPEN_ARRAY Procedure

This procedure writes an open bracket symbol as follows:

```
[
```

Syntax

```
APEX_JSON.OPEN_ARRAY (
    p_name     IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 29-33 OPEN_ARRAY Procedure Parameters

Parameter	Description
p_name	If not null, write an object attribute name and colon before the opening bracket.

Example

This example performs a `write { "array":[ 1 ,[ ] ] }`.

```
BEGIN
  apex_json.open_object; -- {
  apex_json.open_array('array'); -- "array": [
  apex_json.write(1); -- 1
  apex_json.open_array; -- , [
  apex_json.close_array; -- ]
  apex_json.close_array; -- ]
  apex_json.close_object; -- }
END;
```

29.26 OPEN_OBJECT Procedure

This procedure writes an open curly bracket symbol as follows:

```
{
```

Syntax

```
APEX_JSON.OPEN_OBJECT (
    p_name     IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 29-34 OPEN_OBJECT Procedure Parameters

Parameter	Description
p_name	If not null, write an object attribute name and colon before the opening brace.

Example

This example performs a `write { "obj": { "obj-attr": "value" }}`.

```
BEGIN
  apex_json.open_object; -- {
  apex_json.open_object('obj'); -- "obj": {
  apex_json.write('obj-attr', 'value'); -- "obj-attr": "value"
```

```
  apex_json.close_all; -- }}
END;
```

29.27 PARSE Procedure Signature 1

This procedure parses a JSON-formatted `VARCHAR2` or `CLOB` and puts the members into `p_values`.

Syntax

```
APEX_JSON.PARSE (
    p_values   IN OUT NOCOPY   t_values,
    p_source   IN VARCHAR2,
    p_strict   IN BOOLEAN      DEFAULT TRUE );

APEX_JSON.PARSE (
    p_values   IN OUT NOCOPY   t_values,
    p_source   IN CLOB,
    p_strict   IN BOOLEAN      DEFAULT TRUE );
```

Parameters

Table 29-35 PARSE Parameters

Parameter	Description
`p_values`	An index by `VARCHAR2` result array which contains the JSON members and values. The default is `g_values`.
`p_source`	The JSON source (`VARCHAR2` or `CLOB`)
`p_strict`	If `TRUE` (default), enforce strict JSON rules

Example

This example parses JSON and prints member values.

```
DECLARE
    l_values apex_json.t_values;
BEGIN
    apex_json.parse (
        p_values => l_values,
        p_source => '{ "type": "circle", "coord": [10, 20] }' );
    sys.htp.p('Point at '||
        apex_json.get_number (
            p_values => l_values,
            p_path   => 'coord[1]')||
        ','||
        apex_json.get_number (
            p_values => l_values,
            p_path   => 'coord[2]'));
END;
```

29.28 PARSE Procedure Signature 2

This procedure parses a JSON-formatted `varchar2` or `clob` and puts the members into the package global `g_values`. This simplified API works similar to the `parse()` procedure for signature 1, but saves the developer from declaring a local variable for parsed JSON data and passing it to each JSON API call.

Syntax

```
APEX_JSON.PARSE (
    p_source    IN VARCHAR2,
    p_strict    IN BOOLEAN  DEFAULT TRUE );

APEX_JSON.PARSE (
    p_source    IN CLOB,
    p_strict    IN BOOLEAN  DEFAULT TRUE );
```

Parameters

Table 29-36 PARSE Parameters

Parameter	Description
`p_source`	The JSON source (`VARCHAR2` or `CLOB`).
`p_strict`	If `TRUE` (default), enforce strict JSON rules.

Example

This example parses JSON and prints member values.

```
apex_json.parse('{ "type": "circle", "coord": [10, 20] }');
sys.htp.p('Point at '||
    apex_json.get_number(p_path=>'coord[1]')||
    ','||
    apex_json.get_number(p_path=>'coord[2]'));
```

29.29 STRINGIFY Function Signature 1

This function converts a string to an escaped JSON value.

Syntax

```
APEX_JSON.STRINGIFY (
    p_value  IN VARCHAR2 )
RETURN VARCHAR2;
```

Parameters

Table 29-37 STRINGIFY Function Parameters

Parameter	Description
p_value	The string to be converted.

Returns

Table 29-38 STRINGIFY Function Returns

Return	Description
VARCHAR2	The converted and escaped JSON value.

Example

This example is a query that returns a JSON varchar2 value.

```
select apex_json.stringify('line 1'||chr(10)||'line 2') from dual;
```

29.30 STRINGIFY Function Signature 2

This function converts a number to an escaped JSON value.

Syntax

```
APEX_JSON.STRINGIFY (
    p_value  IN NUMBER )
RETURN VARCHAR2;
```

Parameters

Table 29-39 STRINGIFY Function Parameters

Parameter	Description
p_value	The number to be converted.

Returns

Table 29-40 STRINGIFY Function Returns

Return	Description
VARCHAR2	The converted and escaped JSON value.

Example

This example is a query that returns a JSON number value.

```
select apex_json.stringify(-1/10) from dual
```

29.31 STRINGIFY Function Signature 3

This function converts a date to an escaped JSON value.

Syntax

```
APEX_JSON.STRINGIFY (
    p_value  IN DATE,
    p_format IN VARCHAR2 DEFAULT c_date_iso8601 )
RETURN VARCHAR2;
```

Parameters

Table 29-41 STRINGIFY Function Parameters

Parameter	Description
p_value	The date value to be converted.

Returns

Table 29-42 STRINGIFY Function Returns

Return	Description
VARCHAR2	The converted and escaped JSON value.

Example

This example is a query that returns a JSON `varchar2` value that is suitable to be converted to dates.

```
select apex_json.stringify(sysdate) from dual
```

29.32 STRINGIFY Function Signature 4

This function converts a boolean value to an escaped JSON value.

Syntax

```
APEX_JSON.STRINGIFY (
    p_value  IN BOOLEAN )
RETURN VARCHAR2;
```

Parameters

Table 29-43 STRINGIFY Function Parameters

Parameter	Description
p_value	The boolean value to be converted.

Returns

Table 29-44 STRINGIFY Function Returns

Return	Description
VARCHAR2	The converted and escaped JSON value.

Example

This example demonstrates printing JSON boolean values.

```
BEGIN
  sys.htp.p(apex_json.stringify(true));
  sys.htp.p(apex_json.stringify(false));
END;
```

29.33 STRINGIFY Function Signature 5

This function converts p_value to a GeoJSON value.

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

Syntax

```
APEX_JSON.STRINGIFY (
    p_value IN mdsys.sdo_geometry )
    RETURN CLOB;
```

Parameters

Table 29-45 STRINGIFY Parameters

Parameter	Description
p_value	The date value to be converted.

Returns

Table 29-46 STRINGIFY Returns

Return	Description
VARCHAR2	The GeoJSON value.

Example

The following example prints GeoJSON values.

```
BEGIN
  sys.htp.p(apex_json.stringify(
                mdsys.sdo_geometry( 2001, 4326, sdo_point_type( 10,
50, null ), null, null ) ) );
END;
```

29.34 TO_MEMBER_NAME Function

This function converts the given string to a JSON member name, usable for accessing values via the `get_%` functions. Unless member names are simple identifiers (`A-Z,0-9, "_"`), they need to be quoted.

Syntax

```
FUNCTION TO_MEMBER_NAME (
   p_string IN VARCHAR2 )
   RETURN VARCHAR2
```

Parameters

Table 29-47 TO_MEMBER_NAME Function Parameters

Parameter	Description
p_string	The raw member name.

Returns

A valid member name for `get_%` functions.

Example

Print various converted strings.

```
begin
    sys.dbms_output.put_line('Unquoted: '||
apex_json.to_member_name('member_name'));
    sys.dbms_output.put_line('Quoted:   '||
apex_json.to_member_name('Hello"World'));
end;
```

```
Output:

    Unquoted: member_name
    Quoted:   "Hello\"World"
```

29.35 TO_XMLTYPE Function

This procedure parses a JSON-formatted `varchar2` or `CLOB` and converts it to an xmltype.

Syntax

```
APEX_JSON.TO_XMLTYPE (
    p_source   IN VARCHAR2,
    p_strict   IN BOOLEAN DEFAULT TRUE )
RETURN sys.xmltype;

APEX_JSON.TO_XMLTYPE (
    p_source   IN CLOB,
    p_strict   IN BOOLEAN DEFAULT TRUE )
RETURN sys.xmltype;
```

Parameters

Table 29-48 TO_XMLTYPE Function Parameters

Parameter	Description
`p_source`	The JSON source (`VARCHAR2` or `CLOB`)
`p_strict`	If TRUE (default), enforce strict JSON rules

Returns

Table 29-49 TO_XMLTYPE Function Returns

Return	Description
`sys.xmltype`	An `xmltype` representation of the JSON data.

Example

This example parses JSON and prints the XML representation.

```
DECLARE
    l_xml xmltype;
BEGIN
    l_xml := apex_json.to_xmltype('{ "items": [ 1, 2, { "foo": true } ] }');
    dbms_output.put_line(l_xml.getstringval);
END;
```

29.36 TO_XMLTYPE_SQL Function

This function parses a JSON-formatted `varchar2` or `CLOB` and converts it to an xmltype. This function overload has the `p_strict` parameter as `VARCHAR2` in order to allow invoking from within a SQL query and having JSON parsing in LAX mode.

Syntax

```
function to_xmltype_sql (
    p_source   IN VARCHAR2,
    p_strict   IN BOOLEAN DEFAULT 'Y' )
RETURN sys.xmltype;

function to_xmltype_sql (
    p_source   IN CLOB,
    p_strict   IN BOOLEAN DEFAULT 'Y' )
RETURN sys.xmltype;
```

Parameters

Table 29-50 TO_XMLTYPE_SQL Function Parameters

Parameter	Description
`p_source`	The JSON source (`VARCHAR2` or `CLOB`)
`p_strict`	If Y (default), enforce strict JSON rules

Returns

An xmltype representation of the json data

Example

This example SQL query converts JSON to `XMLTYPE` and uses the `XMLTABLE SQL` function to extract data. The `p_strict` argument is set to `N` , so the JSON can successfully be parsed in lax mode, although the items attribute is not enquoted.

```
select
    attr_1
from
    xmltable(
    '/json/items/row'
    passing apex_json.to_xmltype_sql( '{ items: [ 1, 2, { "foo":
true } ] }', p_strict => 'N' )
    columns
    attr_1 varchar2(20) path 'foo/text()'
 );
```

29.37 WRITE Procedure Signature 1

This procedure writes an array attribute of type `VARCHAR2`.

Syntax

```
APEX_JSON.WRITE (
    p_value    IN VARCHAR2 );
```

Parameters

Table 29-51 WRITE Procedure Parameters

Parameter	Description
p_value	The value to be written.

Example

This example writes an array containing 1, "two", "long text", false, the current date and a JSON representation of an xml document.

```
DECLARE
  l_clob clob := 'long text';
  l_xml sys.xmltype := sys.xmltype('<obj><foo>1</foo><bar>2</bar></obj>');
BEGIN
  apex_json.open_array; -- [
  apex_json.write(1); -- 1
  apex_json.write('two'); -- , "two"
  apex_json.write(l_clob); -- , "long text"
  apex_json.write(false); -- , false
  apex_json.write(sysdate); -- , "2014-05-05T05:36:08Z"
  apex_json.write(localtimestamp); -- , "2014-05-05T05:36:08.5434Z"
  apex_json.write(current_timestamp); -- , "2014-05-05T05:36:08.5434+02:00"
  apex_json.write(l_xml); -- , { "foo": 1, "bar": 2 }
  apex_json.close_array; -- ]
END;
```

29.38 WRITE Procedure Signature 2

This procedure writes an array attribute. of type `clob`.

Syntax

```
APEX_JSON.WRITE (
    p_value    IN CLOB );
```

Parameters

Table 29-52 WRITE Procedure Parameters

Parameter	Description
p_value	The value to be written.

Example

See "WRITE Procedure Signature 1".

29.39 WRITE Procedure Signature 3

This procedure writes an array attribute of type `NUMBER`.

Syntax

```
APEX_JSON.WRITE (
    p_value    IN NUMBER );
```

Parameters

Table 29-53 WRITE Procedure Parameters

Parameter	Description
`p_value`	The value to be written.

Example

See "WRITE Procedure Signature 1".

29.40 WRITE Procedure Signature 4

This procedure writes an array attribute. of type date

Syntax

```
APEX_JSON.WRITE (
    p_value    IN DATE,
    p_format   IN VARCHAR2 DEFAULT c_date_iso8601 );
```

Parameters

Table 29-54 WRITE Procedure Parameters

Parameter	Description
`p_value`	The value to be written.
`p_format`	The date format mask (default `c_date_iso8601`).

Example

See "WRITE Procedure Signature 1".

29.41 WRITE Procedure Signature 5

This procedure writes an array attribute of type `boolean`.

Syntax

```
APEX_JSON.WRITE (
    p_value    IN BOOLEAN );
```

Parameters

Table 29-55 WRITE Procedure Parameters

Parameter	Description
`p_value`	The value to be written.

Example

See "WRITE Procedure Signature 1".

29.42 WRITE Procedure Signature 6

This procedure writes an array attribute of type `sys.xmltype`. The procedure uses a XSL transformation to generate JSON. To determine the JSON type of values, it uses the following rules:

- If the value is empty, it generates a `NULL` value.
- If upper(value) is `TRUE`, it generates a boolean true value.
- If upper(value) is `FALSE`, it generates a boolean false value.
- If the `XPath` number function returns `TRUE`, it emits the value as is. Otherwise, it enquotes the value (that is, treats it as a JSON string).

Syntax

```
APEX_JSON.WRITE (
    p_value    IN sys.xmltype );
```

Parameters

Table 29-56 WRITE Procedure Parameters

Parameter	Description
`p_value`	The value to be written.

Example

See "WRITE Procedure Signature 1".

29.43 WRITE Procedure Signature 7

This procedure writes an array with all rows that the cursor returns. Each row is a separate object. If the query contains object type, collection, or cursor columns, the procedure uses `write(xmltype)` to generate JSON. Otherwise, it uses `DBMS_SQL` to fetch rows and the `write()` procedures for the appropriate column data types for output. If the column type is `varchar2` and the uppercase value is `'TRUE'` or `'FALSE'`, it generates boolean values.

Syntax

```
APEX_JSON.WRITE (
    p_cursor      IN OUT NOCOPY sys_refcursor );
```

Parameters

Table 29-57 WRITE Procedure Parameters

Parameter	Description
p_cursor	The cursor.

Example 1

This example writes an array containing JSON objects for departments 10 and 20.

```
DECLARE
    c sys_refcursor;
BEGIN
    open c for select deptno, dname, loc from dept where deptno in
(10, 20);
    apex_json.write(c);
END;
```

This is the output:

```
[ { "DEPTNO":10 ,"DNAME":"ACCOUNTING" ,"LOC":"NEW YORK" }
, { "DEPTNO":20 ,"DNAME":"RESEARCH" ,"LOC":"DALLAS" } ]
```

29.44 WRITE Procedure Signature 8

This procedure writes array attribute of type SDO_GEOMETRY.

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

Syntax

```
APEX_JSON.WRITE (
    p_value       IN mdsys.sdo_geometry );
```

Parameters

Table 29-58 WRITE Parameters

Parameter	Description
p_value	The value to be written.

29.45 WRITE Procedure Signature 9

This procedure writes an object attribute of type VARCHAR2.

Syntax

```
APEX_JSON.WRITE (
    p_name        IN VARCHAR2,
    p_value       IN VARCHAR2,
    p_write_null  IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-59 WRITE Procedure Parameters

Parameter	Description
p_name	The attribute name.
p_value	The attribute value to be written.
p_write_null	If TRUE, write NULL values. If FALSE (the default), do not write NULLs.

Example

This example writes an object with named member attributes of various types. The comments to the right of the statements show the output that they generate.

```
DECLARE
  l_clob clob := 'long text';
  l_xml sys.xmltype := sys.xmltype('<obj><foo>1</foo><bar>2</bar></obj>');
BEGIN
  apex_json.open_object; -- {
  apex_json.write('a1', 1); -- "a1": 1
  apex_json.write('a2', 'two'); -- ,"a2": "two"
  apex_json.write('a3', l_clob); -- ,"a3": "long text"
  apex_json.write('a4', false); -- ,"a4": false
  apex_json.write('a5', sysdate); -- ,"a5": "2014-05-05T05:36:08Z"
  apex_json.write('a6', l_xml); -- ,"a6": { "foo": 1, "bar": 2 }
```

```
  apex_json.close_object; -- }
END;
```

29.46 WRITE Procedure Signature 10

This procedure writes an object attribute of type `CLOB`.

Syntax

```
APEX_JSON.WRITE (
    p_name          IN VARCHAR2,
    p_value         IN CLOB,
    p_write_null    IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-60 WRITE Procedure Parameters

Parameter	Description
`p_name`	The attribute name.
`p_value`	The attribute value to be written.
`p_write_null`	If `TRUE`, write `NULL` values. If `FALSE` (the default), do not write `NULL`s.

Example

See example for WRITE Procedure Signature 9.

29.47 WRITE Procedure Signature 11

This procedure writes an object attribute of type `NUMBER`.

Syntax

```
APEX_JSON.WRITE (
    p_name          IN VARCHAR2,
    p_value         IN NUMBER,
    p_write_null    IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-61 WRITE Procedure Parameters

Parameter	Description
`p_name`	The attribute name.
`p_value`	The attribute value to be written.
`p_write_null`	If true, write `NULL` values. If false (the default), do not write `NULL`s.

Example

See example for WRITE Procedure Signature 9.

29.48 WRITE Procedure Signature 12

This procedure writes an object attribute of type `date`.

Syntax

```
APEX_JSON.WRITE (
    p_name          IN VARCHAR2,
    p_value         IN DATE,
    p_format        IN VARCHAR2 DEFAULT c_date_iso8691,
    p_write_null    IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-62 WRITE Procedure Parameters

Parameter	Description
`p_name`	The attribute name.
`p_value`	The attribute value to be written.
`p_format`	The date format mask (default `apex_json.c_date_iso8601`.
`p_write_null`	If true, write `NULL` values. If false (the default), do not write `NULL`.

Example

See example for WRITE Procedure Signature 9.

29.49 WRITE Procedure Signature 13

This procedure writes an object attribute of type `boolean`.

Syntax

```
APEX_JSON.WRITE (
    p_name          IN VARCHAR2,
    p_value         IN BOOLEAN,
    p_write_null    IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-63 WRITE Procedure Parameters

Parameter	Description
`p_name`	The attribute name.
`p_value`	The attribute value to be written.

Table 29-63 (Cont.) WRITE Procedure Parameters

Parameter	Description
p_write_null	If true, write NULL values. If false (the default), do not write NULL.

Example

See example for WRITE Procedure Signature 9.

29.50 WRITE Procedure Signature 14

This procedure writes an attribute where the value is an array that contains all rows that the cursor returns. Each row is a separate object.

If the query contains object type, collection, or cursor columns, the procedure uses write(p_name,<xmltype>). See "WRITE Procedure Signature 15". Otherwise, it uses DBMS_SQL to fetch rows and the write() procedures for the appropriate column data types for output. If the column type is varchar2 and the uppercase value is 'TRUE' or 'FALSE', it generates boolean values.

Syntax

```
APEX_JSON.WRITE (
    p_name        IN VARCHAR2,
    p_cursor      IN OUT NOCOPY sys_refcursor );
```

Parameters

Table 29-64 WRITE Procedure Parameters

Parameter	Description
p_name	The attribute name.
p_cursor	The cursor.

Example

This example writes an array containing JSON objects for departments 10 and 20, as an object member attribute.

```
DECLARE
  c sys_refcursor;
BEGIN
  open c for select deptno,
                    dname,
                    cursor(select empno,
                                  ename
                             from emp e
                            where e.deptno=d.deptno) emps
               from dept d;
  apex_json.open_object;
  apex_json. write('departments', c);
```

```
  apex_json.close_object;
END;

{ "departments":[
      {"DEPTNO":10,
       "DNAME":"ACCOUNTING",
       "EMPS":[{"EMPNO":7839,"ENAME":"KING"}]},
      ...
     ,{"DEPTNO":40,"DNAME":"OPERATIONS","EMPS":null}] }
```

29.51 WRITE Procedure Signature 15

This procedure writes an array attribute of type `sys.xmltype`. The procedure uses a XSL transformation to generate JSON. To determine the JSON type of values, it uses the following rules:

- If the value is empty, it generates a `NULL` value.
- If upper(value) is `TRUE`, it generates a boolean true value.
- If upper(value) is `FALSE`, it generates a boolean false value.
- If the `XPath` number function returns true, it emits the value as is. Otherwise, it enquotes the value (that is, treats it as a JSON string).

Syntax

```
APEX_JSON.WRITE (
    p_name         IN VARCHAR2,
    p_value        IN sys.xmltype,
    p_write_null   IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-65 WRITE Procedure Parameters

Parameter	Description
`p_name`	The attribute name.
`p_value`	The value to be written. The XML is converted to JSON
`p_write_null`	If true, write `NULL` values. If false (the default), do not write `NULL`s.

Example

See example for WRITE Procedure Signature 14.

29.52 WRITE Procedure Signature 16

This procedure writes parts of a parsed `APEX_JSON.t_values` table.

Syntax

```
APEX_JSON.WRITE (
    p_values           IN t_values,
```

```
    p_path              IN VARCHAR2 DEFAULT '.',
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 29-66 WRITE Procedure Parameters

Parameter	Description
`p_values`	The parsed JSON members.
`p_path`	The index into `p_values`.
`p[0-4]`	Each `%N` in `p_path` will be replaced by `pN` and every `i-th %s` or `%d` is replaced by `p[i-1]`.

Example

This example parses a JSON string and writes parts of it.

```
DECLARE
  j apex_json.t_values;
BEGIN
  apex_json.parse(j, '{ "foo": 3, "bar": { "x": 1, "y": 2 }}');
  apex_json.write(j,'bar');
END;
```

29.53 WRITE Procedure Signature 17

This procedure writes parts of a parsed `APEX_JSON.t_values` table as an object member attribute.

Syntax

```
APEX_JSON.WRITE (
    p_name              IN VARCHAR2,
    p_values            IN t_values,
    p_path              IN VARCHAR2 DEFAULT '.',
    p0                  IN VARCHAR2 DEFAULT NULL,
    p1                  IN VARCHAR2 DEFAULT NULL,
    p2                  IN VARCHAR2 DEFAULT NULL,
    p3                  IN VARCHAR2 DEFAULT NULL,
    p4                  IN VARCHAR2 DEFAULT NULL,
    p_write_null        IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-67 WRITE Procedure Parameters

Parameter	Description
p_name	The attribute name.
p_values	The parsed JSON members.
p_path	The index into p_values.
p[0-4]	Each %N in p_path will be replaced by pN and every i-th %s or %d is replaced by p[i-1].
p_write_null	If true, write NULL values. If false (the default), do not write NULLs.

Example

This example parses a JSON string and writes parts of it as an object member.

```
DECLARE
  j apex_json.t_values;
BEGIN
  apex_json.parse(j, '{ "foo": 3, "bar": { "x": 1, "y": 2 }}');
  apex_json.open_object; -- {
  apex_json.write('parsed-bar',j,'bar');-- "parsed-bar":{ "x":1 ,"y":2 }
  apex_json.close_object; -- }
END;
```

29.54 WRITE Procedure Signature 18

This procedure writes an array attribute of type VARCHAR2.

Syntax

```
APEX_JSON.WRITE (
      p_name        IN VARCHAR2,
      p_values      IN APEX_T_VARCHAR2,
      p_write_null  IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-68 WRITE Procedure Parameters

Parameter	Description
p_name	The attribute name.
p_values	The VARCHAR2 array values to be written.
p_write_null	If true, write an empty array. If false (the default), do not -- write an empty array.

Example

This example writes an array containing a, b, c.

```
DECLARE
 l_values apex_t_varchar2 := apex_t_varchar2( 'a', 'b', 'c' );
BEGIN
  apex_json.open_object;                -- {
  apex_json.write('array', l_values );  --   "array": [ "a", "b", "c" ]
  apex_json.close_object;               -- }
END;
```

29.55 WRITE Procedure Signature 19

This procedure writes an array attribute of type `NUMBER` .

Syntax

```
APEX_JSON.WRITE (
   p_name        IN VARCHAR2,
   p_values      IN APEX_T_NUMBER,
   p_write_null  IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-69 WRITE Procedure Parameters

Parameter	Description
`p_name`	The attribute name.
`p_values`	The `NUMBER` array values to be written.
`p_write_null`	If true, write an empty array. If false (the default), do not -- write an empty array.

Example

This example writes an array containing 1, 2, 3.

```
DECLARE
  l_values apex_t_number := apex_t_number( 1, 2, 3 );
BEGIN
  apex_json.open_object;                -- {
  apex_json.write('array', l_values );  --   "array": [ 1, 2, 3 ]
  apex_json.close_object;               -- }
END;
```

29.56 WRITE Procedure Signature 20

This procedure writes a BLOB object attribute. The value will be Base64-encoded.

Syntax

```
APEX_JSON.WRITE (
   p_name         IN VARCHAR2
   p_value        IN BLOB,
   p_write_null   IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-70 WRITE Procedure Parameters

Parameter	Description
p_name	The attribute name.
p_values	The attribute value to be written.
p_write_null	If TRUE, write an empty array. If FALSE (the default), do not write an empty array.

Example

This example writes a JSON object with the a1, a2, a3, and a4 attributes. a3 is a BLOB, encoded in Base64 format.

```
DECLARE
  l_blob blob := to_blob( hextoraw('000102030405060708090a');
BEGIN
  apex_json.open_object; -- {
  apex_json.write('a1', 1); -- "a1": 1
  apex_json.write('a2', 'two'); -- ,"a2": "two"
  apex_json.write('a3', l_blob); -- ,"a3": "AAECAwQFBgcICQo="
  apex_json.write('a4', false); -- ,"a4": false
  apex_json.close_object; -- }
END;
```

29.57 WRITE Procedure Signature 21

This procedure writes an object attribute.

> **Note:**
>
> This signature is **only** available if SDO_GEOMETRY (Oracle Locator) is installed in the database.

Syntax

```
APEX_JSON.WRITE (
    p_name         IN VARCHAR2,
    p_value        IN mdsys.sdo_geometry,
    p_write_null   IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 29-71 WRITE Parameters

Parameter	Description
p_name	The attribute name.
p_value	The attribute value to be written.
p_write_null	If TRUE, write null values. If FALSE (the default), do not write nulls.

Example

The following example writes a JSON object with the a1, a2, a3, and a4 attributes. a3 is an SDO_GEOMETRY, encoded as GeoJSON.

```
DECLARE
  l_sdo_geometry mdsys.sdo_geometry := sdo_geometry( 2001, 4326,
sdo_point_type( 10, 50, null ), null, null );
BEGIN
  apex_json.open_object; -- {
  apex_json.write('a1', 1); -- "a1": 1
  apex_json.write('a2', 'two'); -- ,"a2": "two"
  apex_json.write('a3', l_sdo_geometry); -- ,"a3": { "type": "Point",
"coordinates": [ 10, 50 ] }
  apex_json.write('a4', false); -- ,"a4": false
  apex_json.close_object; -- }
END;
```

29.58 WRITE_CONTEXT Procedure

This procedure writes an array with all rows that the context handle returns. Each row is a separate object.

If the query contains object type, collection or cursor columns, an error is raised. If the column is VARCHAR2 and the uppercase value is 'TRUE' or 'FALSE', boolean values are generated.

Syntax

```
PROCEDURE WRITE_CONTEXT (
   p_name        IN VARCHAR2
   p_context     IN apex_exec.t_context,
   p_write_null  IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 29-72 WRITE_CONTEXT Procedure Parameters

Parameter	Description
p_name	The attribute name.

Table 29-72 (Cont.) WRITE_CONTEXT Procedure Parameters

Parameter	Description
p_context	The context handle from an APEX_EXEC.OPEN_QUERY_CONTEXT call.
p_write_null	Whether to write (true) or omit (false) null values.

Example

This example opens an APEX_EXEC quey context selecting the DEPT table and passes it to APEX_JSON.

```
DECLARE
    l_context apex_exec.t_context;
begin
    l_context := apex_exec.open_query_context(
                    p_location   => apex_exec.c_location_local_db,
                    p_sql_query  => q'#select * from dept#' );

   apex_json.open_object;
   apex_json.write_context( p_name => 'departments', p_context => l_context);
   apex_json.close_object;
 end;

{ "departments":[
     { "DEPTNO":10 ,"DNAME":"ACCOUNTING" ,"LOC":"NEW YORK" }
    ,{ "DEPTNO":20 ,"DNAME":"RESEARCH" ,"LOC":"DALLAS" }
    ,{ "DEPTNO":30 ,"DNAME":"SALES" ,"LOC":"CHICAGO" }
    ,{ "DEPTNO":40 ,"DNAME":"OPERATIONS" ,"LOC":"BOSTON" } ] }
```

30
APEX_JWT

This package provides APIs to work with JSON Web Tokens (JWT). JWTs can be used to pass a number of signed claims between client and server. Token values are URL-safe strings that consist of 3 parts, separated by `'.'`. The header part identifies the algorithm used for the signature part. The payload part contains the claims to make.

For more details on JWT, see RFC 7519.

> **Note:**
>
> APEX_JWT APIs only support HS256 symmetric encryption algorithm for claim signatures. Asymmetric encryption algorithms such as RS256 are not supported.

30.1 T_TOKEN

A `t_token` record contains the decoded parts of a JSON Web Token.

Syntax

```
TYPE t_token IS RECORD (
     header VARCHAR2(32767),
     payload VARCHAR2(32767),
     signature VARCHAR2(32767) );
```

Parameters

Table 30-1 T_TOKEN Parameters

Parameter	Description
`header`	The Javascript Object Signing and Encryption (JOSE) header contains cryptographic parameters.
`payload`	The claims which the token asserts.
`signature`	The signature of header and payload.

30.2 ENCODE Function

This function encodes and optionally encrypts payload.

Syntax

```
FUNCTION ENCODE (
     p_iss           IN VARCHAR2                 DEFAULT NULL,
     p_sub           IN VARCHAR2                 DEFAULT NULL,
     p_aud           IN VARCHAR2                 DEFAULT NULL,
     p_nbf_ts        IN TIMESTAMP WITH TIME ZONE DEFAULT NULL,
     p_iat_ts        IN TIMESTAMP WITH TIME ZONE DEFAULT SYSTIMESTAMP,
     p_exp_sec       IN PLS_INTEGER              DEFAULT NULL,
     p_jti           IN VARCHAR2                 DEFAULT NULL,
     p_other_claims  IN VARCHAR2                 DEFAULT NULL,
     p_signature_key IN RAW                      DEFAULT NULL )
     RETURN VARCHAR2
```

Parameters

Table 30-2 ENCODE Function Parameters

Parameter	Description
p_iss	Optional "iss" (Issuer) claim.
p_sub	Optional "sub" (Subject) claim.
p_aud	Optional "aud" (Audience) claim.
p_nbf_ts	Optional "nbf" (Not Before) claim.
p_iat_ts	Optional "iat" (Issued At) claim (default systimestamp).
p_exp_sec	Optional "exp" (Expiration Time) claim, in seconds. The start time is taken from "nbf", "iat" or current time.
p_jti	Optional "jti" (JWT ID) Claim.
p_other_claims	Optional raw JSON with additional claims.
p_signature_key	Optional MAC key for the signature. If not null, a 'HS256' signature is added. This requires Oracle Database 12c or higher. Other signature algorithms are not supported.

Returns

A VARCHAR2, the encoded token value.

Example

This example creates and prints a JWT value for Example User, intended to be used by Example JWT Recipient. The token is valid for 5 minutes.

```
DECLARE
    l_jwt_value varchar2(32767);
BEGIN
    l_jwt_value := apex_jwt.encode (
                       p_iss => 'Example Issuer',
```

```
                        p_sub => 'Example User',
                        p_aud => 'Example JWT Recipient',
                        p_exp_sec => 60*5,
                        p_other_claims => '"name1": '||
apex_json.stringify('value1')||
                                                ',"name2": '||
apex_json.stringify('value2'),
                        p_signature_key => ... encryption key ... );
    sys.dbms_output.put_line(l_jwt_value);
END;
```

30.3 DECODE Function

This function decodes a raw token value.

Syntax

```
FUNCTION DECODE (
    p_value         IN VARCHAR2,
    p_signature_key IN RAW      DEFAULT NULL )
RETURN t_token;
```

Parameters

Table 30-3 DECODE Function Parameters

Parameter	Description
`p_value`	A raw token value contains 3 base64-encoded parts, which are separated by `'.'`. The parts are header, payload and signature.
`p_signature_key`	If not null, validate `p_value`'s signature using this key and the algorithm specified in header. The algorithms `'HS256'` and 'none' are supported, but `'HS256'` requires 12c or higher.

Returns

A `t_token`.

Raises

`VALUE_ERROR`: The input value is invalid.

`WWV_FLOW_CRYPTO.UNSUPPORTED_FUNCTION`: The token is signed using an unsupported function.

Example

This example decodes an encoded token and print it's contents.

```
declare
    l_token apex_jwt.t_token;
    l_keys apex_t_varchar2;
begin
    l_token := apex_jwt.decode (
```

```
                    p_value =>
'eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJsb2dnZWRJbkFzIjoiYWRtaW4iLCJpY
XQiOjE0MjI3Nzk2Mzh9.gzSraSYS8EXBxLN_oWnFSRgCzcmJmMjLiuyu5CSpyHI' );
    sys.dbms_output.put_line('--- Header ---');
    apex_json.parse(l_token.header);
    l_keys := apex_json.get_members('.');
    for i in 1 .. l_keys.count loop
        sys.dbms_output.put_line(l_keys(i)||'='||
apex_json.get_varchar2(l_keys(i)));
    end loop;
    sys.dbms_output.put_line('--- Payload ---');
    apex_json.parse(l_token.payload);
    l_keys := apex_json.get_members('.');
    for i in 1 .. l_keys.count loop
        sys.dbms_output.put_line(l_keys(i)||'='||
apex_json.get_varchar2(l_keys(i)));
    end loop;
end;
```

Output:

```
--- Header ---
alg=HS256
typ=JWT
--- Payload ---
loggedInAs=admin
iat=1422779638
```

30.4 VALIDATE Procedure

This procedure validates the given token.

Syntax

```
PROCEDURE VALIDATE (
     p_token          IN t_token,
     p_iss            IN VARCHAR2    DEFAULT NULL,
     p_aud            IN VARCHAR2    DEFAULT NULL,
     p_leeway_seconds IN PLS_INTEGER DEFAULT 0 );
```

Parameters

Table 30-4 VALIDATE Procedure Parameters

Parameter	Description
p_token	The JWT.
p_iss	If not null, verify that the "iss" claim equals p_iss.
p_aud	If not null, verify that the single "aud" value equals p_aud. If "aud" is an array, verify that the "azp" (Authorized Party) claim equals p_aud. This is an OpenID extension.

Table 30-4 (Cont.) VALIDATE Procedure Parameters

Parameter	Description
p_leeway_seconds	Fudge factor (in seconds) for comparing "exp" (Expiration Time), "nbf" (Not Before) and "iat" (Issued At) claims.

Raises

APEX.ERROR.INTERNAL: Validation failed, check debug log for details.

Example

Verify that l_value is a valid OpenID ID token.

```
declare
     l_value varchar2(4000) := 'eyJ0 ... NiJ9.eyJ1c ...
I6IjIifX0.DeWt4Qu ... ZXso';
     l_oauth2_client_id varchar2(30) := '...';
     l_token apex_jwt.t_token;
begin
     l_token := apex_jwt.decode (
                    p_value => l_value );
     apex_jwt.validate (
         p_token => l_token,
         p_aud => l_oauth2_client_id );
end;
```

31
APEX_LANG

You can use `APEX_LANG` API to translate messages.

31.1 CREATE_LANGUAGE_MAPPING Procedure

Use this procedure to create the language mapping for the translation of an application. Translated applications are published as new applications, but are not directly editable in the App Builder.

> **Note:**
>
> This procedure is available in Oracle APEX release 4.2.3 and later.

Syntax

```
APEX_LANG.CREATE_LANGUAGE_MAPPING (
  p_application_id IN NUMBER,
  p_language IN VARCHAR2,
  p_translation_application_id IN NUMBER )
```

Parameters

Table 31-1 CREATE_LANGUAGE_MAPPING Parameters

Parameter	Description
p_application_id	The ID of the application for which you want to create the language mapping. This is the ID of the primary language application.
p_language	The IANA language code for the mapping. Examples include en-us, fr-ca, ja, he.
p_translation_application_id	Unique integer value for the ID of the underlying translated application. This number cannot end in 0.

Example

The following example demonstrates the creation of the language mapping for an existing APEX application.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary
    -- if you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;

    -- Now, actually create the language mapping
    apex_lang.create_language_mapping(
        p_application_id => 63969,
        p_language => 'ja',
        p_translation_application_id => 778899 );
    commit;
    --
    -- Print what we just created to confirm
    --
    for c1 in (select *
                 from apex_application_trans_map
                where primary_application_id = 63969) loop
        dbms_output.put_line( 'translated_application_id: ' ||
c1.translated_application_id );
        dbms_output.put_line( 'translated_app_language: ' ||
c1.translated_app_language );
    end loop;
end;
/
```

31.2 CREATE_MESSAGE Procedure

Use this procedure to create a translatable text message for the specified application.

Syntax

```
APEX_LANG.CREATE_MESSAGE (
    p_application_id      IN NUMBER,
    p_name                IN VARCHAR2,
    p_language            IN VARCHAR2,
    p_message_text        IN VARCHAR2,
    p_used_in_javascript  IN BOOLEAN  DEFAULT FALSE )
```

Parameters

Table 31-2 CREATE_MESSAGE Procedure Parameters

Parameter	Description
p_application_id	The ID of the application for which you wish to create the translatable text message. This is the ID of the primary language application.
p_name	The name of the translatable text message.
p_language	The IANA language code for the mapping. Examples include en-us, fr-ca, ja, or he.
p_message	The text of the translatable text message.
p_used_in_javascript	Specify if the message needs to be used directly by JavaScript code (use the apex.lang JavaScript API).

Example

The following example demonstrates the creation of a translatable text message.

```
BEGIN
    --
    -- If running from SQL*Plus or SQLcl, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary if
    -- you're running within the context of the App Builder or an APEX
    -- application.
    --
    for c1 in (select workspace_id
                from apex_workspaces
                where workspace = 'HR_DEV') loop
            apex_util.set_security_group_id( c1.workspace_id );
            exit;
        end loop;
    apex_lang.create_message(
        p_application_id => 63969,
        p_name => 'TOTAL_COST',
        p_language => 'ja',
        p_message_text => 'The total cost is: %0',
```

```
        p_used_in_javascript => true );
    commit;
END;
/
```

31.3 DELETE_LANGUAGE_MAPPING Procedure

Use this procedure to delete the language mapping for the translation of an application. This procedure deletes all translated strings in the translation repository for the specified language and mapping. Translated applications are published as new applications, but are not directly editable in the App Builder.

> **Note:**
>
> This procedure is available in Oracle APEX release 4.2.3 and later.

Syntax

```
APEX_LANG.DELETE_LANGUAGE_MAPPING (
    p_application_id    IN NUMBER,
    p_language          IN VARCHAR2 )
```

Parameters

Table 31-3 DELETE_LANGUAGE_MAPPING Parameters

Parameter	Description
p_application_id	The ID of the application for which you want to delete the language mapping. This is the ID of the primary language application.
p_language	The IANA language code for the existing mapping. Examples include en-us, fr-ca, ja, he.

Example

The following example demonstrates the deletion of the language mapping for an existing APEX application and existing translation mapping.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary
    -- if you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
```

```
     end loop;
    -- Now, delete the language mapping
    apex_lang.delete_language_mapping(
        p_application_id => 63969,
        p_language => 'ja' );
    commit;
    --
    -- Print what we just updated to confirm
    --
    for c1 in (select count(*) thecount
                 from apex_application_trans_map
                where primary_application_id = 63969) loop
        dbms_output.put_line( 'Translation mappings found: ' ||
c1.thecount );
    end loop;
end;
/
```

31.4 DELETE_MESSAGE Procedure

Use this procedure to delete a translatable text message in the specified application.

Syntax

```
APEX_LANG.DELETE_MESSAGE (
    p_id    IN NUMBER )
```

Parameters

Table 31-4 DELETE_MESSAGE Parameters

Parameter	Description
p_id	The ID of the text message.

Example

The following example demonstrates the deletion of an existing translatable text message.

```
begin
    --
    -- If running from SQL*Plus or SQLcl, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary if
    -- you're running within the context of the App Builder or an APEX
    -- application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces
                where workspace = 'HR_DEV') loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;
```

```
    -- Locate the ID of the specific message and delete it
    for c1 in (select translation_entry_id
                from apex_application_translations
               where application_id = 63969
                and translatable_message = 'TOTAL_COST'
                and language_code = 'ja') loop
        apex_lang.delete_message(
            p_id => c1.translation_entry_id );
        commit;
        exit;
    end loop;
end;
/
```

31.5 EMIT_LANGUAGE_SELECTOR_LIST Procedure

This procedure determines which languages the current application is translated into and prints language selector. You can use this procedure from a PL/SQL region to include language selector.

Syntax

```
APEX_LANG.EMIT_LANGUAGE_SELECTOR_LIST;
```

Example

The following example shows how to use the `EMIT_LANGUAGE_SELECTOR_LIST` procedure to display language selector.

```
begin
APEX_LANG.EMIT_LANGUAGE_SELECTOR_LIST;
end;
```

31.6 LANG Function

Use this function to return a translated text string for translations defined in dynamic translations.

Syntax

```
APEX_LANG.LANG (
    p_primary_text_string IN VARCHAR2 DEFAULT NULL,
    p0 IN VARCHAR2 DEFAULT NULL,
    p1 IN VARCHAR2 DEFAULT NULL,
    p2 IN VARCHAR2 DEFAULT NULL,
    ...
    p9 IN VARCHAR2 DEFAULT NULL,
    p_primary_language IN VARCHAR2 DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 31-5 LANG Parameters

Parameter	Description
`p_primary_text_string`	Text string of the primary language. This is the value of the Translate From Text in the dynamic translation.
`p0` through `p9`	Dynamic substitution value: p0 corresponds to %0 in the translation string; p1 corresponds to %1 in the translation string; p2 corresponds to %2 in the translation string, and so on.
`p_primary_language`	Language code for the message to be retrieved. If not specified, Oracle APEX uses the current language for the user as defined in the Application Language Derived From attribute. See also Specifying the Primary Language for an Application in *Oracle APEX App Builder User's Guide*.

Example

In a table that defines all primary colors, you can define a dynamic message for each color and then apply the LANG function to the defined values in a query. For example:

```
SELECT APEX_LANG.LANG(color)
FROM my_colors
```

In an application in German where `RED` (English) is a value for the color column in the `my_colors` table, and you defined the German word for red, the previous example returns `ROT`.

31.7 MESSAGE Function

Use this function to translate text strings (or messages) generated from PL/SQL stored procedures, functions, triggers, packaged procedures, and functions.

Syntax

```
APEX_LANG.MESSAGE (
    p_name            IN VARCHAR2 DEFAULT NULL,
    p0                IN VARCHAR2 DEFAULT NULL,
    p1                IN VARCHAR2 DEFAULT NULL,
    p2                IN VARCHAR2 DEFAULT NULL,
    ...
    p9                IN VARCHAR2 DEFAULT NULL,
    p_lang            IN VARCHAR2 DEFAULT NULL,
    p_application_id  IN NUMBER   DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 31-6 MESSAGE Parameters

Parameter	Description
p_name	Name of the message as defined in Text Messages under Shared Components of your application in Oracle APEX.
p0 through p9	Dynamic substitution value: p0 corresponds to %0 in the translation string; p1 corresponds to %1 in the translation string; p2 corresponds to %2 in the translation string, and so on.
p_lang	Language code for the message to be retrieved. If not specified, APEX uses the current language for the user as defined in the Application Language Derived From attribute. See also Specifying the Primary Language for an Application in *Oracle APEX App Builder User's Guide*.
p_application_id	Used to specify the application ID within the current workspace that owns the translated message you wish to return. Useful when coding packages that might be called outside of the scope of APEX such as packages called from a database job.

Example

The following example assumes you have defined a message called GREETING_MSG in your application in English as Good morning %0 and in German as Guten Tag %1. The following example demonstrates how to invoke this message from PL/SQL:

```
BEGIN
--
-- Print the greeting
--
HTP.P(APEX_LANG.MESSAGE('GREETING_MSG', V('APP_USER')));
END;
```

How the p_lang attribute is defined depends on how the APEX engine derives the Application Primary Language. For example, if you are running the application in German and the previous call is made to the APEX_LANG.MESSAGE API, the APEX engine first looks for a message called GREETING_MSG with a LANG_CODE of de. If it does not find anything, then it is reverted to the Application Primary Language attribute. If it still does not find anything, the APEX engine looks for a message by this name with a language code of en.

> **See Also:**
>
> Specifying the Primary Language for an Application in *Oracle APEX App Builder User's Guide*

31.8 PUBLISH_APPLICATION Procedure

Use this procedure to publish the translated version of an application. This procedure creates an underlying, hidden replica of the primary application and merges the strings from the translation repository in this new application. Perform a seed and publish process each time you want to update the translated version of your application and synchronize it with the primary application.

This application is not visible in the App Builder. It can be published and exported, but not directly edited.

> **Note:**
>
> This procedure is available in Oracle APEX release 4.2.3 and later.

Syntax

```
APEX_LANG.PUBLISH_APPLICATION (
  p_application_id IN NUMBER,
  p_language IN VARCHAR2 )
```

Parameters

Table 31-7 PUBLISH_APPLICATION Parameters

Parameter	Description
`p_application_id`	The ID of the application for which you want to publish and create the translated version. This is the ID of the primary language application.
`p_language`	The IANA language code for the existing translation mapping. Examples include `en-us`, `fr-ca`, `ja`, `he`.

Example

The following example demonstrates the publish process for an APEX application and language.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary
    -- if you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;
```

```
    -- Now, publish the translated version of the application
    apex_lang.publish_application(
        p_application_id => 63969,
        p_language => 'ja' );
    commit;
end;
/
```

31.9 SEED_TRANSLATIONS Procedure

This procedure seeds the translation repository for the specified application and language. This procedure populates the translation repository with all of the new, updated, and removed translatable strings from your application. Perform a seed and publish process each time you want to update the translated version of your application and synchronize it with the primary application.

Syntax

```
APEX_LANG.SEED_TRANSLATIONS (
    p_application_id    IN NUMBER,
    p_language          IN VARCHAR2 )
```

Parameters

Table 31-8 SEED_TRANSLATIONS Parameters

Parameter	Description
p_application_id	The ID of the application for which you want to update the translation repository. This is the ID of the primary language application.
p_language	The IANA language code for the existing translation mapping. Examples include en-us, fr-ca, ja, he.

Example

The following example demonstrates the seeding process of the translation repository for an Oracle APEX application and language.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema. The
    -- call to apex_util.set_security_group_id is not necessary if
    -- you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;
    -- Now, seed the translation repository
    apex_lang.seed_translations(
```

```
        p_application_id => 63969,
        p_language => 'ja' );
    commit;
    -- Print out the total number of potentially translatable strings
    --
    for c1 in (select count(*) thecount
                 from apex_application_trans_repos
                where application_id = 63969) loop
        dbms_output.put_line( 'Potentially translatable strings found: ' ||
c1.thecount );
    end loop;
end;
/
```

31.10 UPDATE_LANGUAGE_MAPPING Procedure

Use this procedure to update the language mapping for the translation of an application. Translated applications are published as new applications, but are not directly editable in the App Builder.

> **Note:**
>
> This procedure is available in Oracle APEX release 4.2.3 and later.

Syntax

```
APEX_LANG.UPDATE_LANGUAGE_MAPPING (
    p_application_id            IN NUMBER,
    p_language                  IN VARCHAR2,
    p_new_trans_application_id  IN NUMBER )
```

Parameters

Table 31-9 UPDATE_LANGUAGE_MAPPING Parameters

Parameters	Description
p_application_id	The ID of the application for which you want to update the language mapping. This is the ID of the primary language application.
p_language	The IANA language code for the existing mapping. Examples include en-us, fr-ca, ja, he. The language of the mapping cannot be updated with this procedure, only the new translation application ID.
p_new_trans_application_id	New unique integer value for the ID of the underlying translated application. This number cannot end in 0.

Example

The following example demonstrates the update of the language mapping for an existing APEX application and existing translation mapping.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary
    -- if you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;
    -- Now, update the language mapping
    apex_lang.update_language_mapping(
        p_application_id => 63969,
        p_language => 'ja',
        p_new_trans_application_id => 881188 );
    commit;
    --
    -- Print what we just updated to confirm
    --
    for c1 in (select *
                 from apex_application_trans_map
                where primary_application_id = 63969) loop
        dbms_output.put_line( 'translated_application_id: ' ||
c1.translated_application_id );
        dbms_output.put_line( 'translated_app_language: ' ||
c1.translated_app_language );
    end loop;
end;
/
```

31.11 UPDATE_MESSAGE Procedure

Use this procedure to update a translatable text message for the specified application.

Syntax

```
APEX_LANG.UPDATE_MESSAGE (
  p_id             IN NUMBER,
  p_message_text   IN VARCHAR2 )
```

Parameters

Table 31-10 UPDATE_MESSAGE Parameters

Parameter	Description
p_id	The ID of the text message.
p_message_text	The new text for the translatable text message.

Example

The following example demonstrates an update of an existing translatable text message.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema.
    -- The call to apex_util.set_security_group_id is not necessary
    -- if you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;
    -- Locate the ID of the specific message and update it with the new text
    for c1 in (select translation_entry_id
                 from apex_application_translations
                where application_id = 63969
                  and translatable_message = 'TOTAL_COST'
                  and language_code = 'ja') loop
        apex_lang.update_message(
            p_id => c1.translation_entry_id,
            p_message_text => 'The total cost is: %0');
        commit;
        exit;
    end loop;
end;
/
```

31.12 UPDATE_TRANSLATED_STRING Procedure

Use this procedure to update a translated string in the seeded translation repository.

> **Note:**
>
> This procedure is available in Oracle APEX release 4.2.3 and later.

Syntax

```
APEX_LANG.UPDATE_TRANSLATED_STRING (
    p_id        IN NUMBER,
    p_language  IN VARCHAR2
    p_string    IN VARCHAR2 )
```

Parameters

Table 31-11 UPDATE_TRANSLATED_STRING Parameters

Parameter	Description
p_id	The ID of the string in the translation repository.
p_language	The IANA language code for the existing translation mapping. Examples include en-us, fr-ca, ja, he. The language of the mapping cannot be updated with this procedure, only the new translation application ID.
p_string	The new value for the string in the translation repository.

Example

The following example demonstrates an update of an existing string in the translation repository.

```
begin
    --
    -- If running from SQL*Plus, we need to set the environment
    -- for the Oracle APEX workspace associated with this schema. The
    -- call to apex_util.set_security_group_id is not necessary if
    -- you're running within the context of the App Builder
    -- or an APEX application.
    --
    for c1 in (select workspace_id
                 from apex_workspaces) loop
        apex_util.set_security_group_id( c1.workspace_id );
        exit;
    end loop;
    -- Locate all strings in the repository for the specified
application
    -- which are 'Search' and change to 'Find'
    for c1 in (select id
                 from apex_application_trans_repos
                where application_id = 63969
                  and dbms_lob.compare(from_string,
to_nclob('Search')) = 0
                  and language_code = 'ja') loop
        apex_lang.update_translated_string(
            p_id => c1.id,
            p_language => 'ja',
            p_string => 'Find');
        commit;
        exit;
```

```
    end loop;
end;
/
```

32
APEX_LDAP

You can use `APEX_LDAP` to perform various operations related to Lightweight Directory Access Protocol (LDAP) authentication.

32.1 AUTHENTICATE Function

The `AUTHENTICATE` function returns a boolean TRUE if the user name and password can be used to perform a `SIMPLE_BIND_S`, call using the provided search base, host, and port.

Syntax

```
APEX_LDAP.AUTHENTICATE(
    p_username     IN VARCHAR2 DEFAULT NULL,
    p_password     IN VARCHAR2 DEFAULT NULL,
    p_search_base  IN VARCHAR2,
    p_host         IN VARCHAR2,
    p_port         IN VARCHAR2 DEFAULT 389,
    p_use_ssl      IN VARCHAR2 DEFAULT 'N')
RETURN BOOLEAN;
```

Parameters

Table 32-1 AUTHENTICATE Parameters

Parameter	Description
`p_username`	Login name of the user.
`p_password`	Password for `p_username`.
`p_search_base`	LDAP search base, for example, `dc=users,dc=my,dc=org`.
`p_host`	LDAP server host name.
`p_port`	LDAP server port number.
`p_use_ssl`	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL (default).

Example

The following example demostrates how to use the `APEX_LDAP.AUTHENTICATE` function to verify user credentials against an LDAP Server.

```
IF APEX_LDAP.AUTHENTICATE(
    p_username =>'firstname.lastname',
    p_password =>'abcdef',
    p_search_base => 'cn=user,l=amer,dc=my_company,dc=com',
    p_host => 'our_ldap_sever.my_company.com',
    p_port => 389) THEN
    dbms_output.put_line('authenticated');
ELSE
    dbms_output.put_line('authentication failed');
END IF;
```

32.2 GET_ALL_USER_ATTRIBUTES Procedure

The `GET_ALL_USER_ATTRIBUTES` procedure returns two OUT arrays of `user_attribute` names and values for the user name designated by `p_username` (with password if required) using the provided auth base, host, and port.

Syntax

```
APEX_LDAP.GET_ALL_USER_ATTRIBUTES(
    p_username          IN VARCHAR2 DEFAULT NULL,
    p_pass              IN VARCHAR2 DEFAULT NULL,
    p_auth_base         IN VARCHAR2 DEFAULT NULL,
    p_host              IN VARCHAR2,
    p_port              IN VARCHAR2 DEFAULT 389,
    p_use_ssl           IN VARCHAR2 DEFAULT 'N',
    p_attributes        OUT apex_application_global.vc_arr2,
    p_attribute_values  OUT apex_application_global.vc_arr2);
```

Parameters

Table 32-2 GET_ALL_USER_ATTRIBUTES Parameters

Parameter	Description
`p_username`	Login name of the user.
`p_pass`	Password for `p_username`.
`p_auth_base`	LDAP search base, for example, `dc=users,dc=my,dc=org`.
`p_host`	LDAP server host name.
`p_port`	LDAP server port number.
`p_use_ssl`	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL (default).
`p_attributes`	An array of attribute names returned.

Table 32-2 (Cont.) GET_ALL_USER_ATTRIBUTES Parameters

Parameter	Description
p_attribute_values	An array of values returned for each corresponding attribute name returned in p_attributes.

Example

The following example demonstrates how to use the APEX_LDAP.GET_ALL_USER_ATTRIBUTES procedure to retrieve all attribute value's associated to a user.

```
DECLARE
    L_ATTRIBUTES       apex_application_global.vc_arr2;
    L_ATTRIBUTE_VALUES apex_application_global.vc_arr2;
BEGIN
    APEX_LDAP.GET_ALL_USER_ATTRIBUTES(
        p_username         => 'firstname.lastname',
        p_pass             => 'abcdef',
        p_auth_base        => 'cn=user,l=amer,dc=my_company,dc=com',
        p_host             => 'our_ldap_sever.my_company.com',
        p_port             => '389',
        p_attributes       => L_ATTRIBUTES,
        p_attribute_values => L_ATTRIBUTE_VALUES);

     FOR i IN L_ATTRIBUTES.FIRST..L_ATTRIBUTES.LAST LOOP
         htp.p('attribute name: '||L_ATTRIBUTES(i));
         htp.p('attribute value: '||L_ATTRIBUTE_VALUES(i));
     END LOOP;
END;
```

32.3 GET_USER_ATTRIBUTES Procedure

The GET_USER_ATTRIBUTES procedure returns an OUT array of user_attribute values for the user name designated by p_username (with password if required) corresponding to the attribute names passed in p_attributes using the provided auth base, host, and port.

Syntax

```
APEX_LDAP.GET_USER_ATTRIBUTES(
    p_username          IN VARCHAR2 DEFAULT NULL,
    p_pass              IN VARCHAR2 DEFAULT NULL,
    p_auth_base         IN VARCHAR2,
    p_host              IN VARCHAR2,
    p_port              IN VARCHAR2 DEFAULT 389,
    p_use_ssl           IN VARCHAR2 DEFAULT 'N',
    p_attributes        IN  apex_application_global.vc_arr2,
    p_attribute_values  OUT apex_application_global.vc_arr2);
```

Parameters

Table 32-3 GET_USER_ATTRIBUTES Parameters

Parameter	Description
p_username	Login name of the user.
p_pass	Password for p_username.
p_auth_base	LDAP search base, for example, dc=users,dc=my,dc=org.
p_host	LDAP server host name.
p_port	LDAP server port number.
p_use_ssl	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL (default).
p_attributes	An array of attribute names for which values are to be returned.
p_attribute_values	An array of values returned for each corresponding attribute name in p_attributes.

Example

The following example demonstrates how to use the APEX_LDAP.GET_USER_ATTRIBUTES procedure to retrieve a specific attribute value associated to a user.

```
DECLARE
    L_ATTRIBUTES apex_application_global.vc_arr2;
    L_ATTRIBUTE_VALUES apex_application_global.vc_arr2;
BEGIN
    L_ATTRIBUTES(1) := 'xxxxxxxxxx'; /* name of the employee number
attribute */
    APEX_LDAP.GET_USER_ATTRIBUTES(
        p_username => 'firstname.lastname',
        p_pass => NULL,
        p_auth_base => 'cn=user,l=amer,dc=my_company,dc=com',
        p_host => 'our_ldap_sever.my_company.com',
        p_port => '389',
        p_attributes => L_ATTRIBUTES,
        p_attribute_values => L_ATTRIBUTE_VALUES);
END;
```

32.4 IS_MEMBER Function

The IS_MEMBER function returns a boolean TRUE if the user named by p_username (with password if required) is a member of the group specified by the p_group and p_group_base parameters using the provided auth base, host, and port.

Syntax

```
APEX_LDAP.IS_MEMBER(
    p_username     IN VARCHAR2,
    p_pass         IN VARCHAR2 DEFAULT NULL,
```

```
    p_auth_base    IN VARCHAR2,
    p_host         IN VARCHAR2,
    p_port         IN VARCHAR2 DEFAULT 389,
    p_use_ssl      IN VARCHAR2 DEFAULT 'N',
    p_group        IN VARCHAR2,
    p_group_base   IN VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 32-4 IS_MEMBER Parameters

Parameter	Description
p_username	Login name of the user.
p_pass	Password for p_username.
p_auth_base	LDAP search base, for example, dc=users,dc=my,dc=org.
p_host	LDAP server host name.
p_port	LDAP server port number.
p_use_ssl	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL.
p_group	Name of the group to be search for membership.
p_group_base	The base from which the search should be started.

Example

The following example demonstrates how to use the APEX_LDAP.IS_MEMBER function to verify whether a user is a member of a group against an LDAP server.

```
DECLARE
    L_VAL boolean;
BEGIN
    L_VAL := APEX_LDAP.IS_MEMBER(
        p_username =>'firstname.lastname',
        p_pass =>'abcdef',
        p_auth_base => 'cn=user,l=amer,dc=my_company,dc=com',
        p_host => 'our_ldap_sever.my_company.com',
        p_port => 389,
        p_group => 'group_name',
        p_group_base => 'group_base');
    IF L_VAL THEN
        htp.p('Is a member.');
    ELSE
        htp.p('Not a member.');
    END IF;
END;
```

32.5 MEMBER_OF Function

The `MEMBER_OF` function returns an array of groups the user name designated by `p_username` (with password if required) belongs to, using the provided auth base, host, and port.

Syntax

```
APEX_LDAP.MEMBER_OF(
    p_username     IN VARCHAR2 DEFAULT NULL,
    p_pass         IN VARCHAR2 DEFAULT NULL,
    p_auth_base    IN VARCHAR2,
    p_host         IN VARCHAR2,
    p_port         IN VARCHAR2 DEFAULT 389,
    p_use_ssl      IN VARCHAR2 DEFAULT 'N')
RETURN apex_application_global.vc_arr2;
```

Parameters

Table 32-5 MEMBER_OF Parameters

Parameter	Description
`p_username`	Login name of the user.
`p_pass`	Password for `p_username`.
`p_auth_base`	LDAP search base, for example, `dc=users,dc=my,dc=org`.
`p_host`	LDAP server host name.
`p_port`	LDAP server port number.
`p_use_ssl`	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL (default).

Example

The following example demonstrates how to use the `APEX_LDAP.MEMBER_OF` function to retrieve all the groups designated by the specified username.

```
DECLARE
    L_MEMBERSHIP       apex_application_global.vc_arr2;
BEGIN
    L_MEMBERSHIP := APEX_LDAP.MEMBER_OF(
        p_username         => 'firstname.lastname',
        p_pass             => 'abcdef',
        p_auth_base        => 'cn=user,l=amer,dc=my_company,dc=com',
        p_host             => 'our_ldap_sever.my_company.com',
        p_port             => '389');
    FOR i IN L_MEMBERSHIP.FIRST..L_MEMBERSHIP.LAST LOOP
        htp.p('Member of: '||L_MEMBERSHIP(i));
    END LOOP;
END;
```

32.6 MEMBER_OF2 Function

The MEMBER_OF2 function returns a VARCHAR2 colon delimited list of groups the user name designated by p_username (with password if required) belongs to, using the provided auth base, host, and port.

Syntax

```
APEX_LDAP.MEMBER_OF2(
    p_username     IN VARCHAR2 DEFAULT NULL,
    p_pass         IN VARCHAR2 DEFAULT NULL,
    p_auth_base    IN VARCHAR2,
    p_host         IN VARCHAR2,
    p_port         IN VARCHAR2 DEFAULT 389,
    p_use_ssl      IN VARCHAR2 DEFAULT 'N')
RETURN VARCHAR2;
```

Parameters

Table 32-6 MEMBER_OF2 Parameters

Parameter	Description
p_username	Login name of the user.
p_pass	Password for p_username.
p_auth_base	LDAP search base, for example, dc=users,dc=my,dc=org.
p_host	LDAP server host name.
p_port	LDAP server port number.
p_use_ssl	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL (default).

Example

The following example demonstrates how to use the APEX_LDAP.MEMBER_OF2 function to retreive all the groups designated by the specified username.

```
DECLARE
    L_VAL varchar2(4000);
BEGIN
    L_VAL := APEX_LDAP.MEMBER_OF2(
        p_username => 'firstname.lastname',
        p_pass => 'abcdef',
        p_auth_base => 'cn=user,l=amer,dc=my_company,dc=com',
        p_host => 'our_ldap_sever.my_company.com',
        p_port => 389);
    htp.p('Is Member of:'||L_VAL);
END;
```

32.7 SEARCH Function

The `SEARCH` function searches the LDAP repository. The result is an object table of (dn, name, val) that can be used in table queries.

Syntax

```
function search (
           p_username          IN VARCHAR2 DEFAULT NULL,
           p_pass              IN VARCHAR2 DEFAULT NULL,
           p_auth_base         IN VARCHAR2 DEFAULT NULL,
           p_host              IN VARCHAR2,
           p_port              IN NUMBER DEFAULT 389,
           p_use_ssl           IN VARCHAR2 DEFAULT 'N',
           p_search_base       IN VARCHAR2,
           p_search_filter     IN VARCHAR2,
           p_scope             IN BINARY_INTEGER DEFAULT
SYS.DBMS_LDAP.SCOPE_SUBTREE,
           p_timeout_sec       IN BINARY_INTEGER DEFAULT 3,
           p_attribute_names   IN VARCHAR2 )
           RETURN APEX_T_LDAP_ATTRIBUTES PIPELINED;
```

Parameters

Table 32-7 Search Parameters

Parameter	Descriptions
`p_username`	Login name of the user (can be `NULL` for anonymous binds).
`p_pass`	The password for `p_username` (can be `NULL` for anonymous binds)
`p_auth_base`	The authentication base dn for `p_username` (for example, `dc=users,dc=my,dc=org`). Can be `NULL` for anonymous binds.
`p_host`	The LDAP server host name.
`p_port`	The LDAP server port number.
`p_use_ssl`	Set to 'Y' to use SSL in bind to LDAP server. Set to 'A' to use SSL with one way authentication (requires LDAP server certificate configured in an Oracle wallet). Set to 'N' to not use SSL (default).
`p_search_base`	dn base for the search.
`p_search_filter`	LDAP search filter expression.
`p_scope`	Search scope (default descends into subtrees).
`p_timeout_sec`	Timeout for the search (default is 3 seconds)
`p_attribute_names`	Comma separated list of return attribute names

Example 1

```
SELECT val group_dns
  FROM table(apex_ldap.search (
```

```
          p_host            => 'ldap.example.com',
          p_search_base     => 'dc=example,dc=com',
          p_search_filter   => 'uid='||
apex_escape.ldap_search_filter(:APP_USER),
          p_attribute_names => 'memberof' ));
```

Example 2

```
SELECT dn, mail, dispname, phone
  from ( select dn, name, val
           from table(apex_ldap.search (
                         p_host            => 'ldap.example.com',
                         p_search_base     => 'dc=example,dc=com',
                         p_search_filter   => '&(objectClass=person)
(ou=Test)',
                         p_attribute_names =>
'mail,displayname,telephonenumber' )))
  pivot (min(val) for name in ( 'mail'            mail,
                                'displayname'     dispname,
                                'telephonenumber' phone ))
```

33
APEX_MAIL

You can use the APEX_MAIL package to send an email from an Oracle APEX application. This package is built on top of the Oracle-supplied UTL_SMTP package. Because of this dependence, the UTL_SMTP package must be installed and functioning to use APEX_MAIL.

APEX_MAIL contains three notable procedures:

- Use APEX_MAIL.SEND to send an outbound email message from your application.
- Use APEX_MAIL.PUSH_QUEUE to deliver mail messages stored in APEX_MAIL_QUEUE.
- Use APEX_MAIL.ADD_ATTACHMENT to send an outbound email message from your application as an attachment.

APEX installs the database job ORACLE_APEX_MAIL_QUEUE, which periodically sends all mail messages stored in the active mail queue.

Note:

The APEX_MAIL package may be used from outside the context of an APEX application (such as from SQL*Plus or from a Database Scheduler job) as long as the database user making the call is mapped to an APEX workspace. If the database user is mapped to multiple workspaces, you must first call APEX_UTIL.SET_WORKSPACE or APEX_UTIL.SET_SECURITY_GROUP_ID as in the following examples. The APEX_MAIL package cannot be used by database users that are not mapped to any workspace unless they have been granted the role APEX_ADMINISTRATOR_ROLE.

```
- Example 1
apex_util.set_workspace(p_workspace => 'MY_WORKSPACE');

-- Example 2
FOR c1 in (
   select workspace_id
     from apex_applications
    where application_id = 100 )
LOOP
   apex_util.set_security_group_id(p_security_group_id =>
c1.workspace_id);
END LOOP;
```

- GET_IMAGES_URL Function
- GET_INSTANCE_URL Function
- PREPARE_TEMPLATE Procedure
- PUSH_QUEUE Procedure
- SEND Function Signature 1
- SEND Function Signature 2
- SEND Procedure Signature 1
- SEND Procedure Signature 2

> **See Also:**
>
> - Sending Email from an Application in *Oracle APEX App Builder User's Guide*
> - *Oracle Database PL/SQL Packages and Types Reference* for more information about the UTL_SMTP package

33.1 Configuring Oracle APEX to Send Email

Before you can send email from an App Builder application, you must:

1. Log in to APEX Administration Services and configure the email settings on the Instance Settings page. See Configuring Email in *Oracle APEX Administration Guide*.
2. Enable network services that are disabled by default in Oracle Database 11*g* release 2 (11.2) and newer. See Enabling Network Service in Oracle Database 11*g* in Enabling Network Services in Oracle Database 11g or Later in *Oracle APEX App Builder User's Guide*.

> **Tip:**
>
> You can configure APEX to automatically email users their login credentials when a new workspace request has been approved. To learn more, see Selecting a Provisioning Mode in *Oracle APEX Administration Guide*.

33.2 ADD_ATTACHMENT Procedure Signature 1

This procedure adds an attachment of type BLOB to an outbound email message. To add multiple attachments to a single email, `APEX_MAIL.ADD_ATTACHMENT` can be called repeatedly for a single email message.

Syntax

```
APEX_MAIL.ADD_ATTACHMENT (
    p_mail_id           IN NUMBER,
    p_attachment        IN BLOB,
    p_filename          IN VARCHAR2,
    p_mime_type         IN VARCHAR2
    p_content_id        IN VARCHAR2    DEFAULT NULL );
```

Parameters

Table 33-1 ADD_ATTACHMENT Parameters

Parameter	Description
p_mail_id	The numeric ID associated with the email. This is the numeric identifier returned from the call to APEX_MAIL.SEND to compose the email body.
p_attachment	A BLOB variable containing the binary content to be attached to the email message.
p_filename	The filename associated with the email attachment.
p_mime_type	A valid MIME type (or Internet media type) to associate with the email attachment.
p_content_id	An optional identifier for the attachment. If non-null, then the file attaches inline. That attachment may then be referenced in the HTML of the email body by using the cid. Note: Be aware that automatic displaying of inlined images may not be supported by all e-mail clients.

Example 1

The following example demonstrates how to access files stored in APEX_APPLICATION_FILES and add them to an outbound email message.

```
DECLARE
    l_id NUMBER;
BEGIN
    l_id := APEX_MAIL.SEND(
        p_to        => 'fred@flintstone.com',
        p_from      => 'barney@rubble.com',
        p_subj      => 'APEX_MAIL with attachment',
        p_body      => 'Please review the attachment.',
        p_body_html => '<b>Please</b> review the attachment');
    FOR c1 IN (SELECT filename, blob_content, mime_type
        FROM APEX_APPLICATION_FILES
        WHERE ID IN (123,456)) LOOP

        APEX_MAIL.ADD_ATTACHMENT(
            p_mail_id    => l_id,
            p_attachment => c1.blob_content,
            p_filename   => c1.filename,
            p_mime_type  => c1.mime_type);
```

```
        END LOOP;
    COMMIT;
END;
/
```

Example 2

This example shows how to attach a file inline, by using a content identifier, and how to refer to that attachment in the HTML of the email.

```
DECLARE
  l_id number;
  l_body clob;
  l_body_html clob;
  l_content_id varchar2(100) := 'my-inline-image';
  l_filename varchar2(100);
  l_mime_type varchar2(100);
  l_image blob;
BEGIN
  l_body := 'To view the content of this message, please use an HTML
enabled mail client.' || utl_tcp.crlf;

  l_body_html := '<html><body>' || utl_tcp.crlf ||
                 '<p>Here is the image you requested.</p>' ||
utl_tcp.crlf ||
                 '<p><img src="cid:' || l_content_id || '"
alt="Requested Image"></p>' || utl_tcp.crlf ||
                 '<p>Thanks,<br />' || utl_tcp.crlf ||
                 'The EveryCorp Dev Team<br />' || utl_tcp.crlf ||
                 '</body></html>';
  l_id := apex_mail.send (
    p_to => 'some_user@somewhere.com', -- change to your email address
    p_from => 'some_sender@somewhere.com', -- change to a real senders
email address
    p_body => l_body,
    p_body_html => l_body_html,
    p_subj => 'Requested Image' );

  select filename, mime_type, blob_content
    into l_filename, l_mime_type, l_image
    from apex_application_files
   where id = 123;

  apex_mail.add_attachment(
    p_mail_id => l_id,
    p_attachment => l_image,
    p_filename => l_filename,
    p_mime_type => l_mime_type,
    p_content_id => l_content_id );

  COMMIT;
END;
```

33.3 ADD_ATTACHMENT Procedure Signature 2

This procedure adds an attachment of type CLOB to an outbound email message. To add multiple attachments to a single email, `APEX_MAIL.ADD_ATTACHMENT` can be called repeatedly for a single email message.

Syntax

```
APEX_MAIL.ADD_ATTACHMENT(
    p_mail_id                   IN    NUMBER,
    p_attachment                IN    CLOB,
    p_filename                  IN    VARCHAR2,
    p_mime_type                 IN    VARCHAR2);
```

Parameters

Table 33-2 ADD_ATTACHMENT Parameters

Parameter	Description
`p_mail_id`	The numeric ID associated with the email. This is the numeric identifier returned from the call to `APEX_MAIL.SEND` to compose the email body.
`p_attachment`	A `CLOB` variable containing the text content to be attached to the email message.
`p_filename`	The filename associated with the email attachment.
`p_mime_type`	A valid MIME type (or Internet media type) to associate with the email attachment.

Examples

The following example demonstrates how to attached a CLOB-based attachment to an outbound email message.

```
DECLARE
    l_id NUMBER;
    l_clob CLOB := 'Value1,Value2,Value3,42';
BEGIN
    l_id := APEX_MAIL.SEND(
        p_to => 'fred@flintstone.com',
        p_from => 'barney@rubble.com',
        p_subj => 'APEX_MAIL with a text attachment',
        p_body => 'Please review the attachment.',
        p_body_html => '<b>Please</b> review the attachment');

    APEX_MAIL.ADD_ATTACHMENT(
        p_mail_id => l_id,
        p_attachment => l_clob,
        p_filename => 'data.csv',
        p_mime_type => 'text/csv');
```

```
    COMMIT;
END;
/
```

33.4 GET_IMAGES_URL Function

This function gets the image prefixed URL if the email includes Oracle APEX instance images.

Syntax

```
APEX_MAIL.GET_IMAGES_URL return VARCHAR2;
```

Parameters

None.

Example

The following example sends an Order Confirmation email which includes the Oracle Logo image.

```
declare
    l_body      clob;
    l_body_html clob;
begin
    l_body := 'To view the content of this message, please use an HTML
enabled mail client.' || utl_tcp.crlf;

    l_body_html := '<html><body>' || utl_tcp.crlf ||
                   '<p>Please confirm your order on the <a href="' ||
                   apex_mail.get_instance_url || 'f?p=100:10">Order
Confirmation</a> page.</p>' || utl_tcp.crlf ||
                   '<p>Sincerely,<br />' || utl_tcp.crlf ||
                   'The EveryCorp Dev Team<br />' || utl_tcp.crlf ||
                   '<img src="' || apex_mail.get_images_url ||
'oracle.gif" alt="Oracle Logo"></p>' || utl_tcp.crlf ||
                   '</body></html>';
    apex_mail.send (
        p_to        => 'some_user@somewhere.com',   -- change to your
email address
        p_from      => 'some_sender@somewhere.com', -- change to a
real senders email address
        p_body      => l_body,
        p_body_html => l_body_html,
        p_subj      => 'Order Confirmation' );
end;
```

33.5 GET_INSTANCE_URL Function

This function gets the instance URL if an email includes a link to an Oracle APEX instance

> **Note:**
>
> This function requires that the instance setting `APEX Instance URL` for emails is set.

Syntax

```
APEX_MAIL.GET_INSTANCE_URL return VARCHAR2;
```

Parameters

None.

Example

The following example sends an Order Confirmation email which includes an absolute URL to page 10 of application 100.

```
declare
    l_body      clob;
    l_body_html clob;
begin
    l_body := 'To view the content of this message, please use an HTML
enabled mail client.' || utl_tcp.crlf;

    l_body_html := '<html><body>' || utl_tcp.crlf ||
                   '<p>Please confirm your order on the <a href="' ||
                   apex_mail.get_instance_url || 'f?p=100:10">Order
Confirmation</a> page.</p>' || utl_tcp.crlf ||
                   '</body></html>';
    apex_mail.send (
        p_to        => 'some_user@somewhere.com',   -- change to your email
address
        p_from      => 'some_sender@somewhere.com', -- change to a real
senders email address
        p_body      => l_body,
        p_body_html => l_body_html,
        p_subj      => 'Order Confirmation' );
end;
```

33.6 PREPARE_TEMPLATE Procedure

Procedure to return a formatted mail based on an e-mail template where the placeholders specified as JSON string are substituted.

Syntax

```
PROCEDURE PREPARE_TEMPLATE (
    p_static_id         IN  VARCHAR2,
    p_placeholders      IN  CLOB,
    p_application_id    IN  NUMBER   DEFAULT,
    p_subject           OUT VARCHAR2,
    p_html              OUT CLOB,
```

```
    p_text              OUT CLOB,
    p_language_override IN  VARCHAR2 DEFAULT NULL );
```

Parameters

Table 33-3 PREPARE_TEMPLATE Parameters

Parameters	Description
p_static_id	The identifier which was specified when the template was created in the Oracle APEX Builder.
p_placeholders	A JSON formatted string containing name/value pairs specifying values for the placeholders to be replaced in the email template.
p_application_id	Application ID where the email template is defined. Defaults to the current application (if called from within an application).
p_subject	The subject line generated from the template, after any placeholders and substitutions have been made.
p_html	The HTML code for the email, after placeholders have been replaced.
p_text	The plain text of the email, with substitutions made.
p_language_override	Language of a translated template to use. Use a language code like "en", "fr" or "de-at" here. An application translation for this language must exist, otherwise the argument is ignored.

Example

```
declare
  l_subject varchar2( 4000 );
  l_html    clob;
  l_text    clob;
begin
  apex_mail.prepare_template (
  p_static_id    => 'ORDER',
  p_placeholders => '{ "ORDER_NUMBER": 5321, "ORDER_DATE": "01-
Feb-2018", "ORDER_TOTAL": "$12,000" }',
  p_subject      => l_subject,
  p_html         => l_html,
  p_text         => l_text );
end;
```

33.7 PUSH_QUEUE Procedure

This procedure manually delivers queued mail messages stored in the `APEX_MAIL_QUEUE` dictionary view to the SMTP gateway.

Oracle APEX logs successfully submitted messages in the `APEX_MAIL_LOG` dictionary view with the timestamp reflecting your server's local time.

Syntax

```
APEX_MAIL.PUSH_QUEUE (
    p_smtp_hostname     IN VARCHAR2 DEFAULT NULL,
    p_smtp_portno       IN NUMBER   DEFAULT NULL );
```

Parameters

Table 33-4 PUSH_QUEUE Parameters

Parameters	Description
p_smtp_hostname	SMTP gateway host name
p_smtp_portno	SMTP gateway port number

Note that these parameter values are provided for backward compatibility, but their respective values are ignored. The SMTP gateway hostname and SMTP gateway port number are exclusively derived from values entered on the Instance Settings page in Administration Services or set using APEX_INSTANCE_ADMIN API.

Example

The following example demonstrates the use of the APEX_MAIL.PUSH_QUEUE procedure using a shell script. This example only applies to UNIX/LINUX installations.

```
SQLPLUS / <<EOF
APEX_MAIL.PUSH_QUEUE;
DISCONNECT
EXIT
EOF
```

See Also:

- Configuring Email in *Oracle APEX Administration Guide*
- Sending an Email from an Application in *Oracle APEX App Builder User's Guide*

33.8 SEND Function Signature 1

This function sends an outbound email message from an application. Although you can use this function to pass in either a VARCHAR2 or a CLOB to p_body and p_body_html, the data types must be the same. In other words, you cannot pass a CLOB to P_BODY and a VARCHAR2 to p_body_html.

This function returns a NUMBER. The NUMBER returned is the unique numeric identifier associated with the mail message.

When using APEX_MAIL.SEND, remember the following:

- **No single line may exceed 1000 characters.** The SMTP/MIME specification dictates that no single line shall exceed 1000 characters. To comply with this restriction, you must add a carriage return or line feed characters to break up your `p_body` or `p_body_html` parameters into chunks of 1000 characters or less. Failing to do so results in erroneous email messages, including partial messages or messages with extraneous exclamation points.
- **Plain text and HTML email content.** Passing a value to `p_body`, but not `p_body_html` results in a plain text message. Passing a value to `p_body` and `p_body_html` yields a multi-part message that includes both plain text and HTML content. The settings and capabilities of the recipient's email client determine what displays. Although most modern email clients can read an HTML formatted email, remember that some users disable this functionality to address security issues.
- **Avoid images.** When referencing images in `p_body_html` using the `<img />` tag, remember that the images must be accessible to the recipient's email client in order for them to see the image.

  For example, suppose you reference an image on your network called `hello.gif` as follows:

  ```
  <img src="http://someserver.com/hello.gif" alt="Hello" />
  ```

  In this example, the image is not attached to the email, but is referenced by the email. For the recipient to see it, they must be able to access the image using a web browser. If the image is inside a firewall and the recipient is outside of the firewall, the image is not displayed.

  Alternatively, you may specify the `p_content_id` parameter when calling `APEX_MAIL.ADD_ATTACHMENT` which creates an inline attachment that can be referenced as follows:

  ```
  <img src="cid:hello_content_id" alt="Hello" />
  ```

  Note that this may greatly increase the size of the resultant emails and that clients may not always automatically display inline images.

  For these reasons, avoid using images. If you must include images, be sure to include the `ALT` attribute to provide a textual description in the event the image is not accessible nor displayed.

Syntax

```
APEX_MAIL.SEND (
    p_to                IN    VARCHAR2,
    p_from              IN    VARCHAR2,
    p_body              IN  [ VARCHAR2 | CLOB ],
    p_body_html         IN  [ VARCHAR2 | CLOB ] DEFAULT NULL,
    p_subj              IN    VARCHAR2 DEFAULT NULL,
    p_cc                IN    VARCHAR2 DEFAULT NULL,
    p_bcc               IN    VARCHAR2 DEFAULT NULL,
    p_replyto           IN    VARCHAR2 )
RETURN NUMBER;
```

Parameters

Table 33-5 SEND Parameters

Parameter	Description
p_to	Valid email address to which the email is sent (required). For multiple email addresses, use a comma-separated list
p_from	Email address from which the email is sent (required). This email address must be a valid address. Otherwise, the message is not sent
p_body	Body of the email in plain text, not HTML (required). If a value is passed to p_body_html, then this is the only text the recipient sees. If a value is not passed to p_body_html, then this text only displays for email clients that do not support HTML or have HTML disabled. A carriage return or line feed (CRLF) must be included every 1000 characters.
p_body_html	Body of the email in HTML format. This must be a full HTML document including the <html> and <body> tags. A single line cannot exceed 1000 characters without a carriage return or line feed (CRLF)
p_subj	Subject of the email
p_cc	Valid email addresses to which the email is copied. For multiple email addresses, use a comma-separated list
p_bcc	Valid email addresses to which the email is blind copied. For multiple email addresses, use a comma-separated list
p_replyto	Address of the Reply-To mail header. You can use this parameter as follows: • If you omit the p_replyto parameter, the Reply-To mail header is set to the value specified in the p_from parameter • If you include the p_replyto parameter, but provide a NULL value, the Reply-To mail header is set to NULL. This results in the suppression of automatic email replies • If you include p_replyto parameter, but provide a non-null value (for example, a valid email address), you send these messages, but the automatic replies go to the value specified (for example, the email address)

Examples

The following example demonstrates how to use APEX_MAIL.SEND to send a plain text email message from an application and return the unique message ID.

```
-- Example One: Plain Text only message
DECLARE
    l_body      CLOB;
    l_id NUMBER;
BEGIN
    l_body := 'Thank you for your interest in the APEX_MAIL
package.'||utl_tcp.crlf||utl_tcp.crlf;
```

```
    l_body := l_body ||'  Sincerely,'||utl_tcp.crlf;
    l_body := l_body ||'  The EveryCorp Dev Team'||utl_tcp.crlf;
    l_id   := apex_mail.send(
        p_to       => 'some_user@somewhere.com',   -- change to your
email address
        p_from     => 'some_sender@somewhere.com', -- change to a real
senders email address
        p_body     => l_body,
        p_subj     => 'APEX_MAIL Package - Plain Text message');
END;
/
```

The following example demonstrates how to use `APEX_MAIL.SEND` to send an HTML email message from an application. Remember, you must include a carriage return or line feed (CRLF) every 1000 characters. The example that follows uses `utl_tcp.crlf`.

```
-- Example Two: Plain Text / HTML message
DECLARE
    l_body      CLOB;
    l_body_html CLOB;
    l_id NUMBER;
BEGIN
    l_body := 'To view the content of this message, please use an HTML
enabled mail client.'||utl_tcp.crlf;

    l_body_html := '<html>
        <head>
            <style type="text/css">
                body{font-family: Arial, Helvetica, sans-serif;
                    font-size:10pt;
                    margin:30px;
                    background-color:#ffffff;}

                span.sig{font-style:italic;
                    font-weight:bold;
                    color:#811919;}
             </style>
         </head>
         <body>'||utl_tcp.crlf;
    l_body_html := l_body_html ||'<p>Thank you for your interest in
the <strong>APEX_MAIL</strong> package.</p>'||utl_tcp.crlf;
    l_body_html := l_body_html ||'  Sincerely,<br />'||utl_tcp.crlf;
    l_body_html := l_body_html ||'  <span class="sig">The EveryCorp
Dev Team</span><br />'||utl_tcp.crlf;
    l_body_html := l_body_html ||'</body></html>';
    l_id        := apex_mail.send(
        p_to        => 'some_user@somewhere.com',   -- change to your
email address
        p_from      => 'some_sender@somewhere.com', -- change to a
real senders email address
        p_body      => l_body,
        p_body_html => l_body_html,
        p_subj      => 'APEX_MAIL Package - HTML formatted message');
```

```
END;
/
```

33.9 SEND Function Signature 2

This function returns a mail ID after adding the mail to the mail queue of APEX. The mail ID can be used in a call to `add_attachment` to add attachments to an existing mail.

The mail is based on an email template where the placeholder values specified as JSON string are substituted.

Syntax

```
FUNCTION SEND (
    p_template_static_id    IN VARCHAR2,
    p_placeholders          IN CLOB,
    p_to                    IN VARCHAR2,
    p_cc                    IN VARCHAR2 DEFAULT NULL,
    p_bcc                   IN VARCHAR2 DEFAULT NULL,
    p_from                  IN VARCHAR2 DEFAULT NULL,
    p_replyto               IN VARCHAR2 DEFAULT NULL,
    p_application_id        IN NUMBER   DEFAULT apex_application.g_flow_id,
    p_language_override     IN VARCHAR2 DEFAULT NULL );
    RETURN NUMBER;
```

Parameters

Table 33-6 SEND Function Parameters

Parameter	Description
`p_template_static_id`	Static identifier string, used to identify the shared component email template.
`p_placeholders`	JSON string representing the placeholder names along with the values, to be substituted.
`p_to`	Valid email address to which the email is sent (required). For multiple email addresses, use a comma-separated list.
`p_cc`	Valid email addresses to which the email is copied. For multiple email addresses, use a comma-separated list.
`p_bcc`	Valid email addresses to which the email is blind copied. For multiple email addresses, use a comma-separated list.
`p_from`	Email address from which the email is sent (required). This email address must be a valid address. Otherwise, the message is not sent.

Table 33-6 (Cont.) SEND Function Parameters

Parameter	Description
p_replyto	Address of the Reply-To mail header. You can use this parameter as follows: • If you omit the p_replyto parameter, the Reply-To mail header is set to the value specified in the p_from parameter. • If you include the p_replyto parameter, but provide a NULL value, the Reply-To mail header is set to NULL. This results in the suppression of automatic email replies. • If you include p_replyto parameter, but provide a non-null value (for example, a valid email address), you send these messages, but the automatic replies go to the value specified (for example, the email address).
p_application_id	Application ID where the email template is defined. Defaults to the current application (if called from within an application).
p_language_override	Language of a translated template to use. Use a language code like "en", "fr" or "de-at" here. An application translation for this language must exist, otherwise the argument is ignored.

Note:

When calling the SEND function from outside the context of an APEX application (such as from a Database Scheduler job), you must specify the p_application_id parameter.

Examples

```
DECLARE
    l_mail_id number;
BEGIN
    l_mail_id := apex_mail.send (
        p_template_static_id => 'ORDER',
        p_placeholders       => '{ "ORDER_NUMBER": 5321, "ORDER_DATE":
"01-Feb-2018", "ORDER_TOTAL": "$12,000" }',
        p_to                 => 'some_user@somewhere.com' );

    apex_mail.add_attachment (
        p_mail_id    => l_mail_id,
        p_attachment => ... );
END;
```

33.10 SEND Procedure Signature 1

This procedure sends an outbound email message from an application. Although you can use this procedure to pass in either a `VARCHAR2` or a `CLOB` to `p_body` and `p_body_html`, the data types must be the same. In other words, you cannot pass a `CLOB` to `P_BODY` and a `VARCHAR2` to `p_body_html`.

When using `APEX_MAIL.SEND`, remember the following:

- **No single line may exceed 1000 characters.** The SMTP/MIME specification dictates that no single line shall exceed 1000 characters. To comply with this restriction, you must add a carriage return or line feed characters to break up your `p_body` or `p_body_html` parameters into chunks of 1000 characters or less. Failing to do so results in erroneous email messages, including partial messages or messages with extraneous exclamation points.
- **Plain text and HTML email content.** Passing a value to `p_body`, but not `p_body_html` results in a plain text message. Passing a value to `p_body` and `p_body_html` yields a multi-part message that includes both plain text and HTML content. The settings and capabilities of the recipient's email client determine what displays. Although most modern email clients can read an HTML formatted email, remember that some users disable this functionality to address security issues.
- **Avoid images.** When referencing images in `p_body_html` using the `<img />` tag, remember that the images must be accessible to the recipient's email client in order for them to see the image.

  For example, suppose you reference an image on your network called `hello.gif` as follows:

  ```
  <img src="http://someserver.com/hello.gif" alt="Hello" />
  ```

  In this example, the image is not attached to the email, but is referenced by the email. For the recipient to see it, they must be able to access the image using a web browser. If the image is inside a firewall and the recipient is outside of the firewall, the image is not displayed.

  Alternatively, you may specify the `p_content_id` parameter when calling `APEX_MAIL.ADD_ATTACHMENT` which creates an inline attachment that can be referenced as follows:

  ```
  <img src="cid:hello_content_id" alt="Hello" />
  ```

  Note that this may greatly increase the size of the resultant emails and that clients may not always automatically display inline images.

  For these reasons, avoid using images. If you must include images, be sure to include the `ALT` attribute to provide a textual description in the event the image is not accessible nor displayed.

Syntax

```
APEX_MAIL.SEND(
    p_to                IN    VARCHAR2,
```

```
p_from              IN    VARCHAR2,
p_body              IN  [ VARCHAR2 | CLOB ],
p_body_html         IN  [ VARCHAR2 | CLOB ] DEFAULT NULL,
p_subj              IN    VARCHAR2 DEFAULT NULL,
p_cc                IN    VARCHAR2 DEFAULT NULL,
p_bcc               IN    VARCHAR2 DEFAULT NULL,
p_replyto           IN    VARCHAR2);
```

Parameters

Table 33-7 SEND Parameters

Parameter	Description
p_to	Valid email address to which the email is sent (required). For multiple email addresses, use a comma-separated list
p_from	Email address from which the email is sent (required). This email address must be a valid address. Otherwise, the message is not sent
p_body	Body of the email in plain text, not HTML (required). If a value is passed to p_body_html, then this is the only text the recipient sees. If a value is not passed to p_body_html, then this text only displays for email clients that do not support HTML or have HTML disabled. A carriage return or line feed (CRLF) must be included every 1000 characters.
p_body_html	Body of the email in HTML format. This must be a full HTML document including the <html> and <body> tags. A single line cannot exceed 1000 characters without a carriage return or line feed (CRLF)
p_subj	Subject of the email
p_cc	Valid email addresses to which the email is copied. For multiple email addresses, use a comma-separated list
p_bcc	Valid email addresses to which the email is blind copied. For multiple email addresses, use a comma-separated list
p_replyto	Address of the Reply-To mail header. You can use this parameter as follows: • If you omit the p_replyto parameter, the Reply-To mail header is set to the value specified in the p_from parameter • If you include the p_replyto parameter, but provide a NULL value, the Reply-To mail header is set to NULL. This results in the suppression of automatic email replies • If you include p_replyto parameter, but provide a non-null value (for example, a valid email address), you send these messages, but the automatic replies go to the value specified (for example, the email address)

Examples

The following example demonstrates how to use `APEX_MAIL.SEND` to send a plain text email message from an application.

```
-- Example One: Plain Text only message
DECLARE
    l_body      CLOB;
BEGIN
    l_body := 'Thank you for your interest in the APEX_MAIL
package.'||utl_tcp.crlf||utl_tcp.crlf;
    l_body := l_body ||'  Sincerely,'||utl_tcp.crlf;
    l_body := l_body ||'  The EveryCorp Dev Team'||utl_tcp.crlf;
    apex_mail.send(
        p_to       => 'some_user@somewhere.com',   -- change to your email
address
        p_from     => 'some_sender@somewhere.com', -- change to a real
senders email address
        p_body     => l_body,
        p_subj     => 'APEX_MAIL Package - Plain Text message');
END;
/
```

The following example demonstrates how to use `APEX_MAIL.SEND` to send an HTML email message from an application. Remember, you must include a carriage return or line feed (CRLF) every 1000 characters. The example that follows uses `utl_tcp.crlf`.

```
-- Example Two: Plain Text / HTML message
DECLARE
    l_body      CLOB;
    l_body_html CLOB;
BEGIN
    l_body := 'To view the content of this message, please use an HTML
enabled mail client.'||utl_tcp.crlf;

    l_body_html := '<html>
        <head>
            <style type="text/css">
                body{font-family: Arial, Helvetica, sans-serif;
                    font-size:10pt;
                    margin:30px;
                    background-color:#ffffff;}

                span.sig{font-style:italic;
                    font-weight:bold;
                    color:#811919;}
             </style>
         </head>
         <body>'||utl_tcp.crlf;
    l_body_html := l_body_html ||'<p>Thank you for your interest in the
<strong>APEX_MAIL</strong> package.</p>'||utl_tcp.crlf;
    l_body_html := l_body_html ||'  Sincerely,<br />'||utl_tcp.crlf;
    l_body_html := l_body_html ||'  <span class="sig">The EveryCorp Dev
```

```
Team</span><br />'||utl_tcp.crlf;
    l_body_html := l_body_html ||'</body></html>';
    apex_mail.send(
    p_to   => 'some_user@somewhere.com',   -- change to your email
address
    p_from => 'some_sender@somewhere.com', -- change to a real senders
email address
    p_body      => l_body,
    p_body_html => l_body_html,
    p_subj      => 'APEX_MAIL Package - HTML formatted message');
END;
/
```

33.11 SEND Procedure Signature 2

This procedure adds a mail to the mail queue of Oracle APEX. The mail is based on an email template where the placeholder values specified as JSON string are substituted.

Syntax

```
APEX_MAIL.SEND (
    p_template_static_id IN VARCHAR2,
    p_placeholders       IN CLOB,
    p_to                 IN VARCHAR2,
    p_cc                 IN VARCHAR2 DEFAULT NULL,
    p_bcc                IN VARCHAR2 DEFAULT NULL,
    p_from               IN VARCHAR2 DEFAULT NULL,
    p_replyto            IN VARCHAR2 DEFAULT NULL,
    p_application_id     IN NUMBER   DEFAULT
apex_application.g_flow_id );
```

Parameters

Table 33-8 SEND Parameters

Parameter	Description
p_template_static_id	Static identifier string, used to identify the shared component email template.
p_placeholders	JSON string representing the placeholder names along with the values, to be substituted.
p_to	(Required) Valid email address to which the email is sent. For multiple email addresses, use a comma-separated list.
p_cc	Valid email addresses to which the email is copied. For multiple email addresses, use a comma-separated list.
p_bcc	Valid email addresses to which the email is blind copied. For multiple email addresses, use a comma-separated list.
p_from	(Required) Email address from which the email is sent. This email address must be a valid address. Otherwise, the message is not sent.

Table 33-8 (Cont.) SEND Parameters

Parameter	Description
p_replyto	Address of the Reply-To mail header. You can use this parameter as follows: • If you omit the p_replyto parameter, the Reply-To mail header is set to the value specified in the p_from parameter • If you include the p_replyto parameter, but provide a NULL value, the Reply-To mail header is set to NULL. This disables automatic email replies. • If you include p_replyto parameter, but provide a non-null value (for example, a valid email address), you send these messages, but the automatic replies go to the value specified (for example, the email address)
p_application_id	Application ID where the email template is defined. Defaults to the current application (if called from within an application).

Note:

When calling the SEND procedure from outside the context of an APEX application (such as from a Database Scheduler job), you must specify the p_application_id parameter.

Examples

```
begin
    apex_mail.send (
        p_template_static_id => 'ORDER',
        p_placeholders       => '{ "ORDER_NUMBER": 5321, "ORDER_DATE": "01-
Feb-2018", "ORDER_TOTAL": "$12,000" }',
        p_to                 => 'some_user@somewhere.com' );
end;
```

34
APEX_MARKDOWN

This package offers a way to convert Markdown to HTML directly in the database.

This parser is compliant with the CommonMark Spec version 0.29.

34.1 Constants

The following constants are used by this package.

```
c_embedded_html_escape   constant t_embedded_html_mode := 'ESCAPE';
-- escapes HTML
c_embedded_html_preserve constant t_embedded_html_mode := 'PRESERVE';
-- leaves HTML content as-is
```

34.2 TO_HTML Function

This function converts a Markdown string into HTML.

Syntax

```
APEX_MARKDOWN.TO_HTML (
    p_markdown              IN CLOB,
    p_embedded_html_mode    IN t_embedded_html_mode DEFAULT
c_embedded_html_escape,
    p_softbreak             IN VARCHAR2             DEFAULT '<br />',
    p_extra_link_attributes IN apex_t_varchar2      DEFAULT
apex_t_varchar2() )
    RETURN CLOB;
```

Parameters

Table 34-1 TO_HTML Parameters

Parameter	Description
p_markdown	The Markdown text content to be converted to HTML.
p_embedded_html_mode	Specify what should happen with embedded HTML. By default it is escaped. Set this option to C_EMBEDDED_HTML_PRESERVE for it to be preserved. Note that this option has security implications and should only ever be used on trusted input.

Table 34-1 (Cont.) TO_HTML Parameters

Parameter	Description
`p_softbreak`	Specify a raw string to be used for a softbreak, such as `apex_application.LF`. If none is specified, uses ` `.
`p_extra_link_attributes`	A plist of additional HTML attributes for anchor elements. For example, to open all links in new tabs, set this parameter to `apex_t_varchar2('target', '_blank')`

Example

```
DECLARE
  l_markdown varchar2(100) := '## APEX_MARKDOWN' || chr(10) || '-
Includes the `to_html` **function**';
BEGIN
  dbms_output.put_line(apex_markdown.to_html(l_markdown));
END;
```

35
APEX_PAGE

The `APEX_PAGE` package is the public API for handling pages.

35.1 Global Constants

The APEX_PAGE package uses the following constants.

```
c_ui_type_desktop        constant varchar2(10) := 'DESKTOP';
c_ui_type_jqm_smartphone constant varchar2(15) := 'JQM_SMARTPHONE';
```

35.2 IS_DESKTOP_UI Function

This function returns TRUE if the current page has been designed for desktop browsers.

Syntax

```
FUNCTION IS_DESKTOP_UI
RETURN BOOLEAN;
```

35.3 IS_JQM_SMARTPHONE_UI Function [DEPRECATED]

This function returns TRUE if the current page has been designed for smartphone devices using jQuery Mobile.

Syntax

```
FUNCTION IS_JQM_SMARTPHONE_UI
RETURN BOOLEAN;
```

35.4 IS_JQM_TABLET_UI Function [DEPRECATED]

This function returns TRUE if the current page has been designed for tablet devices using jQuery Mobile.

Syntax

```
FUNCTION IS_JQM_TABLET_UI
RETURN BOOLEAN;
```

35.5 GET_UI_TYPE Function

This function returns the user interface (UI) type for which the current page has been designed.

Syntax

```
FUNCTION GET_UI_TYPE
RETURN VARCHAR2;
```

35.6 IS_READ_ONLY Function

This function returns TRUE if the current page is rendered read-only and FALSE if it is not.

Syntax

```
FUNCTION IS_READ_ONLY
RETURN BOOLEAN;
```

35.7 GET_PAGE_MODE Function

This function returns the page mode for a given page.

Syntax

```
FUNCTION GET_PAGE_MODE (
    p_application_id IN NUMBER,
    p_page_id        IN NUMBER)
    RETURN VARCHAR2;
```

Parameters

Table 35-1 GET_PAGE_MODE Parameters

Parameter	Description
p_application_id	ID of the application.

Table 35-1 (Cont.) GET_PAGE_MODE Parameters

Parameter	Description
p_page_id	ID of the page.

35.8 PURGE_CACHE Procedure

This procedure purges the cache of the specified application, page, and region for the specified user. If the user is not specified, the procedure purges all cached versions of the page.

Syntax

```
APEX_PAGE.PURGE_CACHE (
    p_application_id       IN NUMBER DEFAULT apex.g_flow_id,
    p_page_id              IN NUMBER DEFAULT apex.g_flow_step_id,
    p_user_name            IN VARCHAR2 DEFAULT NULL,
    p_current_session_only IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 35-2 PURGE_CACHE Parameters

Parameter	Description
p_application_id	ID of the application. Defaults to the current application.
p_page_id	ID of the page. Defaults to the current page. If you pass NULL, Oracle APEX purges the cache on all pages of the application.
p_user_name	Specify a user name if you only want to purge entries that were saved for the given user.
p_current_session_only	Specify TRUE if you only want to purge entries that where saved for the current session. Defaults to FALSE.

Example

This example purges session specific cache on the current page.

```
BEGIN
     APEX_PAGE.PURGE_CACHE (
         p_current_session_only => true );
END;
```

35.9 GET_URL Function

This function returns an APEX navigation. It is sometimes clearer to read a function call than a concatenated URL. See the example below for a comparison.

If the specified application is located in a different workspace, the URL does not contain a checksum.

Syntax

```
FUNCTION GET_URL (
    p_application        IN VARCHAR2 DEFAULT NULL,
    p_page               IN VARCHAR2 DEFAULT NULL,
    p_session            IN NUMBER   DEFAULT APEX.G_INSTANCE,
    p_request            IN VARCHAR2 DEFAULT NULL,
    p_debug              IN VARCHAR2 DEFAULT NULL,
    p_clear_cache        IN VARCHAR2 DEFAULT NULL,
    p_items              IN VARCHAR2 DEFAULT NULL,
    p_values             IN VARCHAR2 DEFAULT NULL,
    p_printer_friendly   IN VARCHAR2 DEFAULT NULL,
    p_trace              IN VARCHAR2 DEFAULT NULL,
    p_triggering_element IN VARCHAR2 DEFAULT 'this',
    p_plain_url          IN BOOLEAN DEFAULT FALSE )
    RETURN VARCHAR2;
```

Parameters

Table 35-3 GET_URL Parameters

Parameter	Description
p_application	The application ID or alias. Defaults to the current application.
p_page	Page ID or alias. Defaults to the current page.
p_session	Session ID. Defaults to the current session ID.
p_request	URL request parameter.
p_debug	URL debug parameter. Defaults to the current debug mode.
p_clear_cache	URL clear cache parameter.
p_items	Comma-delimited list of item names to set session state.
p_values	Comma-delimited list of item values to set session state.
p_printer_friendly	URL printer friendly parameter. Defaults to the current request's printer friendly mode.
p_trace	SQL trace parameter.
p_triggering_element	A jQuery selector (for example, `#my_button`, where `my_button` is the static ID for a button element), to identify which element to use to trigger the dialog. This is required for Modal Dialog support.
p_plain_url	If the page you are calling `APEX_PAGE.GET_URL` from is a modal dialog, specify `p_plain_url` to omit the unnecessary JavaScript code in the generated link. By default, if this function is called from a modal dialog, JavaScript code to close the modal dialog is included in the generated URL.

Example

This query uses `APEX_PAGE.GET_URL` and its alternative `APEX_UTIL.PREPARE_URL` to produce two identical URLs.

```
SELECT APEX_PAGE.GET_URL (
            p_page   => 1,
            p_items  => 'P1_X,P1_Y',
            p_values => 'somevalue,othervalue' ) f_url_1,
         APEX_UTIL.PREPARE_URL('f?
p=&APP_ID.:1:&APP_SESSION.::::P1_X,P1_Y:somevalue,othervalue')
     FROM DUAL
```

36
APEX_PLUGIN

The `APEX_PLUGIN` package provides the interface declarations and some utility functions to work with plug-ins.

36.1 Data Types

This section describes the data types used by the `APEX_PLUGIN` package.

- t_region_column
- t_region_columns
- t_region
- t_region_ajax_result
- t_region_render_result

36.1.1 c_inline_with_field

Use the constant `c_inline_with_field` for `display_location` in the page item validation function result type `t_page_item_validation_result`.

```
c_inline_with_field         constant varchar2(40) :=
'INLINE_WITH_FIELD';
```

36.1.2 c_inline_with_field_and_notif

Use the constant `c_inline_with_field_and_notif` for `display_location` in the page item validation function result type `t_page_item_validation_result`.

```
c_inline_with_field_and_notif   constant varchar2(40) :=
'INLINE_WITH_FIELD_AND_NOTIFICATION';
```

36.1.3 c_inline_in_notification

Use the following constant for `display_location` in the page item validation function result type `t_page_item_validation_result`.

```
c_inline_in_notification        constant varchar2(40) :=
'INLINE_IN_NOTIFICATION';
```

36.1.4 c_on_error_page

Use the constant `c_on_error_page` for `display_location` in the page item validation function result type `t_page_item_validation_result`.

```
c_on_error_page                 constant varchar2(40) :=
'ON_ERROR_PAGE';
```

36.1.5 t_authentication

```
type t_authentication is record (
    id                  number,
    name                varchar2(255),
```

```
    invalid_session_url  varchar2(4000),
    logout_url           varchar2(4000),
    plsql_code           clob,
    attribute_01         varchar2(32767),
    attribute_02         varchar2(32767),
    attribute_03         varchar2(32767),
    attribute_04         varchar2(32767),
    attribute_05         varchar2(32767),
    attribute_06         varchar2(32767),
    attribute_07         varchar2(32767),
    attribute_08         varchar2(32767),
    attribute_09         varchar2(32767),
    attribute_10         varchar2(32767),
    attribute_11         varchar2(32767),
    attribute_12         varchar2(32767),
    attribute_13         varchar2(32767),
    attribute_14         varchar2(32767),
    attribute_15         varchar2(32767),
    --
    session_id           number,
    username             varchar2(255) );
```

36.1.6 t_authentication_ajax_result

```
type t_authentication_ajax_result is record (
    dummy                boolean );
```

36.1.7 t_authentication_auth_result

```
type t_authentication_auth_result is record (
    is_authenticated     boolean,
    redirect_url         varchar2(4000),
    log_code             number,
    log_text             varchar2(4000),
    display_text         varchar2(4000) );
```

36.1.8 t_authentication_inval_result

```
type t_authentication_inval_result is record (
    redirect_url         varchar2(4000) );
```

36.1.9 t_authentication_logout_result

```
type t_authentication_logout_result is record (
    redirect_url         varchar2(4000) );
```

36.1.10 t_authentication_sentry_result

```
type t_authentication_sentry_result is record (
    is_valid            boolean );
```

36.1.11 t_authorization

The following type is passed to all authorization plug-in functions and contains information about the current authorization.

```
type t_authorization is record (
    id                  number,
    name                varchar2(255),
    username            varchar2(255),
    caching             varchar2(20),
    component           apex.t_component,
    attribute_01        varchar2(32767),
    attribute_02        varchar2(32767),
    attribute_03        varchar2(32767),
    attribute_04        varchar2(32767),
    attribute_05        varchar2(32767),
    attribute_06        varchar2(32767),
    attribute_07        varchar2(32767),
    attribute_08        varchar2(32767),
    attribute_09        varchar2(32767),
    attribute_10        varchar2(32767),
    attribute_11        varchar2(32767),
    attribute_12        varchar2(32767),
    attribute_13        varchar2(32767),
    attribute_14        varchar2(32767),
    attribute_15        varchar2(32767),
```

36.1.12 t_authorization_exec_result

The `t_authorization_exec_result` data type has been added to the `APEX_PLUGIN` package.

```
type t_authorization_exec_result is record (
    is_authorized       boolean
    );
```

36.1.13 t_dynamic_action

The `t_dynamic_action` type is passed into all dynamic action plug-in functions and contains information about the current dynamic action.

```
type t_dynamic_action is record (
    id          number,
```

```
    action       varchar2(50),
    attribute_01 varchar2(32767),
    attribute_02 varchar2(32767),
    attribute_03 varchar2(32767),
    attribute_04 varchar2(32767),
    attribute_05 varchar2(32767),
    attribute_06 varchar2(32767),
    attribute_07 varchar2(32767),
    attribute_08 varchar2(32767),
    attribute_09 varchar2(32767),
    attribute_10 varchar2(32767),
    attribute_11 varchar2(32767),
    attribute_12 varchar2(32767),
    attribute_13 varchar2(32767),
    attribute_14 varchar2(32767),
    attribute_15 varchar2(32767) );
```

36.1.14 t_dynamic_action_ajax_result

The `t_dynamic_action_ajax_result` type is used as the result type for the Ajax function of a dynamic action type plug-in.

```
type t_dynamic_action_ajax_result is record (
    dummy boolean /* not used yet */
    );
```

36.1.15 t_dynamic_action_render_result

The `t_dynamic_action_render_result` type is used as the result type for the rendering function of a dynamic action plug-in.

```
type t_dynamic_action_render_result is record (
    javascript_function varchar2(32767),
    ajax_identifier     varchar2(255),
    attribute_01        varchar2(32767),
    attribute_02        varchar2(32767),
    attribute_03        varchar2(32767),
    attribute_04        varchar2(32767),
    attribute_05        varchar2(32767),
    attribute_06        varchar2(32767),
    attribute_07        varchar2(32767),
    attribute_08        varchar2(32767),
    attribute_09        varchar2(32767),
    attribute_10        varchar2(32767),
    attribute_11        varchar2(32767),
    attribute_12        varchar2(32767),
    attribute_13        varchar2(32767),
    attribute_14        varchar2(32767),
    attribute_15        varchar2(32767) );
```

36.1.16 t_item

The `t_item` type is passed into all item type plug-in functions and contains information about the current page item.

```
type t_item is record (
    id number,
    name varchar2(4000),
    session_state_name varchar2(4000),
    component_type_id number,
    region_id number,
    form_region_id number,
    data_type varchar2(30),
    label varchar2(4000),
    plain_label varchar2(4000),
    label_id varchar2(4000), /* label id is set if "Standard Form
Element" = no and label template uses #LABEL_ID# substitution */
    placeholder varchar2(4000),
    format_mask varchar2(4000),
    is_required boolean,
    lov_definition varchar2(4000),
    shared_lov_id number,
    lov_display_extra boolean,
    lov_display_null boolean,
    lov_null_text varchar2(4000),
    lov_null_value varchar2(4000),
    lov_cascade_parent_items varchar2(4000),
    lov_return_column varchar2(128),
    lov_display_column varchar2(128),
    lov_icon_column varchar2(128),
    lov_group_column varchar2(128),
    lov_group_sort_direction varchar2(16),
    lov_default_sort_column varchar2(128),
    lov_default_sort_direction varchar2(16),
    lov_oracle_text_column varchar2(128),
    lov_columns t_lov_columns,
    lov_is_legacy boolean,
    ajax_items_to_submit varchar2(4000),
    ajax_optimize_refresh boolean,
    element_width number,
    element_max_length number,
    element_height number,
    element_css_classes varchar2(4000),
    element_attributes varchar2(4000),
    element_option_attributes varchar2(4000),
    icon_css_classes varchar2(4000),
    escape_output boolean,
    ignore_change boolean default true,
    attribute_01 varchar2(32767),
    attribute_02 varchar2(32767),
    attribute_03 varchar2(32767),
    attribute_04 varchar2(32767),
    attribute_05 varchar2(32767),
```

```
    attribute_06 varchar2(32767),
    attribute_07 varchar2(32767),
    attribute_08 varchar2(32767),
    attribute_09 varchar2(32767),
    attribute_10 varchar2(32767),
    attribute_11 varchar2(32767),
    attribute_12 varchar2(32767),
    attribute_13 varchar2(32767),
    attribute_14 varchar2(32767),
    attribute_15 varchar2(32767),
    init_javascript_code varchar2(32767),
    inline_help_text varchar2(4000)
);
```

36.1.17 t_item_ajax_result

The `t_item_ajax_result` type is used as the result type for the Ajax function of an item type plug-in.

```
type t_item_ajax_result is record (
    dummy boolean /* not used yet */
    );
```

36.1.18 t_item_meta_data_result

The `t_item_meta_data_result` type is used as the result type for the meta data function of an item type plug-in.

Syntax

```
TYPE T_ITEM_META_DATA_RESULT IS RECORD (
    is_multi_value         BOOLEAN DEFAULT FALSE,
    display_lov_definition VARCHAR2(32767),
    return_display_value   BOOLEAN DEFAULT TRUE,
    escape_output          BOOLEAN DEFAULT TRUE );
```

36.1.19 t_item_render_result

The `t_item_render_result` type is used as the result type for the rendering function of an item type plug-in.

```
type t_item_render_result is record (
    is_navigable           boolean default false,
    navigable_dom_id       varchar2(255),         /* should only be set if
navigable element is not equal to item name */
    item_rendered          boolean default true   /* should be set to false
if the render procedure didn't render anything,
                                                     this could be the case
for a read only item in IG */
    );
```

36.1.20 t_item_validation_result

The `t_item_validation_result` type is used as the result type for the validation function of an item type plug-in.

```
type t_item_validation_result is record (
    message          varchar2(32767),
    display_location varchar2(40),    /* if not set the application
default is used */
    page_item_name   varchar2(255) ); /* if not set the validated page
item name is used */
```

36.1.21 t_plugin

The `t_plugin` type is passed into all plug-in functions and contains information about the current plug-in.

```
type t_plugin is record (
    name         varchar2(45),
    file_prefix  varchar2(4000),
    attribute_01 varchar2(32767),
    attribute_02 varchar2(32767),
    attribute_03 varchar2(32767),
    attribute_04 varchar2(32767),
    attribute_05 varchar2(32767),
    attribute_06 varchar2(32767),
    attribute_07 varchar2(32767),
    attribute_08 varchar2(32767),
    attribute_09 varchar2(32767),
    attribute_10 varchar2(32767),
    attribute_11 varchar2(32767),
    attribute_12 varchar2(32767),
    attribute_13 varchar2(32767),
    attribute_14 varchar2(32767),
    attribute_15 varchar2(32767) );
```

36.1.22 t_process

The `t_process` type is passed into all process type plug-in functions and contains information about the current process.

```
type t_process is record ( id number, name varchar2(255), success_message
varchar2(32767), attribute_01 varchar2(32767), attribute_02
varchar2(32767), attribute_03 varchar2(32767), attribute_04
varchar2(32767), attribute_05 varchar2(32767), attribute_06
varchar2(32767), attribute_07 varchar2(32767), attribute_08
varchar2(32767), attribute_09 varchar2(32767), attribute_10
varchar2(32767), attribute_11 varchar2(32767), attribute_12
varchar2(32767), attribute_13 varchar2(32767), attribute_14
varchar2(32767), attribute_15 varchar2(32767) );
```

36.1.23 t_process_exec_result

The `t_process_exec_result` type is used as the result type for the execution function of a process type plug-in.

```
type t_process_exec_result is record (
    success_message varchar2(32767)
    execution_skipped boolean default false /* set to TRUE if process
execution has been skipped by plug-in because of additional condition checks
*/
    );
```

36.1.24 t_region_column

The `t_region_column` type is passed into all region type plug-in functions and contains information about the current region.

```
type  t_region_column is record (
    id                    number,
    name                  t_region_column_name,
    is_displayed          boolean,
    heading               apex_region_columns.heading%type,
    heading_alignment     apex_region_columns.heading_alignment%type,
    value_alignment       apex_region_columns.value_alignment%type,
    value_css_classes     apex_region_columns.value_css_classes%type,
    value_attributes      apex_region_columns.value_attributes%type,
    format_mask           apex_region_columns.format_mask%type,
    escape_output         boolean,
    attribute_01          varchar2(32767),
    attribute_02          varchar2(32767),
    attribute_03          varchar2(32767),
    attribute_04          varchar2(32767),
    attribute_05          varchar2(32767),
    attribute_06          varchar2(32767),
    attribute_07          varchar2(32767),
    attribute_08          varchar2(32767),
    attribute_09          varchar2(32767),
    attribute_10          varchar2(32767),
    attribute_11          varchar2(32767),
    attribute_12          varchar2(32767),
    attribute_13          varchar2(32767),
    attribute_14          varchar2(32767),
    attribute_15          varchar2(32767),
    attribute_16          varchar2(32767),
    attribute_17          varchar2(32767),
    attribute_18          varchar2(32767),
    attribute_19          varchar2(32767),
    attribute_20          varchar2(32767),
    attribute_21          varchar2(32767),
    attribute_22          varchar2(32767),
    attribute_23          varchar2(32767),
```

```
    attribute_24         varchar2(32767),
    attribute_25         varchar2(32767);
```

36.1.25 t_region_columns

```
type t_region_columns is table of t_region_column index by
       pls_integer;
```

36.1.26 t_region

The `t_region` type is passed into all region type plug-in functions and contains information about the current region.

```
type t_region is record (
    id                          number,
    static_id                   varchar2(255),
    name                        varchar2(4000),
    type                        varchar2(255),
    source                      varchar2(32767),
    ajax_items_to_submit        varchar2(32767),
    fetched_rows                pls_integer,
    escape_output               boolean,
    error_message               varchar2(32767), /* obsolete */
    no_data_found_message       varchar2(32767),
    attribute_01                varchar2(32767),
    attribute_02                varchar2(32767),
    attribute_03                varchar2(32767),
    attribute_04                varchar2(32767),
    attribute_05                varchar2(32767),
    attribute_06                varchar2(32767),
    attribute_07                varchar2(32767),
    attribute_08                varchar2(32767),
    attribute_09                varchar2(32767),
    attribute_10                varchar2(32767),
    attribute_11                varchar2(32767),
    attribute_12                varchar2(32767),
    attribute_13                varchar2(32767),
    attribute_14                varchar2(32767),
    attribute_15                varchar2(32767),
    attribute_16                varchar2(32767),
    attribute_17                varchar2(32767),
    attribute_18                varchar2(32767),
    attribute_19                varchar2(32767),
    attribute_20                varchar2(32767),
    attribute_21                varchar2(32767),
    attribute_22                varchar2(32767),
    attribute_23                varchar2(32767),
    attribute_24                varchar2(32767),
    attribute_25                varchar2(32767),
    filter_region_id            number,
    filter_region_static_id     varchar2(255),
    region_columns              t_region_columns,
```

```
    init_javascript_code        varchar2(32767),
    );
```

36.1.27 t_region_ajax_result

The `t_region_ajax_result` type is used as result type for the Ajax function of a region type plug-in.

```
type t_region_ajax_result is record (
    dummy boolean /* not used yet */
    );
```

36.1.28 t_region_render_result

The `t_region_render_result` type is used as the result type for the rendering function of a region type plug-in.

```
type t_region_render_result is record (
    navigable_dom_id varchar2(255) /* can be used to put focus to an input
field (that is, search field) the region renders as part of the plug-in
output */
    );
```

36.2 Global Constants

Data Format Constants

The following data format constants are used with REST Data Sources in APEX_PLUGIN:

```
subtype t_data_format           is pls_integer range 1..2;

c_format_xml                constant t_data_format := 1;
c_format_json               constant t_data_format := 2;
```

Database Operation Constants

The following constants are used with REST Data Sources in APEX_PLUGIN:

```
subtype t_db_operation          is pls_integer range 1..6;

c_db_operation_fetch_rows   constant t_db_operation          := 1;
c_db_operation_insert       constant t_db_operation          := 2;
c_db_operation_update       constant t_db_operation          := 3;
c_db_operation_delete       constant t_db_operation          := 4;
c_db_operation_fetch_row    constant t_db_operation          := 5;
c_db_operation_execute      constant t_db_operation          := 6;
```

REST Data Source Parameter Constants

The following constants are used with REST Data Sources in APEX_PLUGIN:

```
subtype t_web_source_param_type is pls_integer range 1..5;

c_web_src_param_header      constant t_web_source_param_type := 1;
c_web_src_param_query       constant t_web_source_param_type := 2;
c_web_src_param_url_pattern constant t_web_source_param_type := 3;
c_web_src_param_body        constant t_web_source_param_type := 4;
c_web_src_param_cookie      constant t_web_source_param_type := 5;

subtype t_web_source_param_dir is pls_integer range 1..3;


c_direction_in              constant t_web_source_param_dir  := 1;
c_direction_out             constant t_web_source_param_dir  := 2;
c_direction_in_out          constant t_web_source_param_dir  := 3;
```

REST Data Source DML Row Status Constants

The following constants are used with REST Data Sources in APEX_PLUGIN:

```
subtype t_web_source_row_check_result is pls_integer range 1..5;

c_row_ok                    constant t_web_source_row_check_result :=
1;
c_row_version_changed       constant t_web_source_row_check_result :=
2;
c_row_data_not_changed      constant t_web_source_row_check_result :=
3;
c_row_refetch_error         constant t_web_source_row_check_result :=
4;
c_row_dml_not_allowed       constant t_web_source_row_check_result :=
5;
```

36.3 GET_AJAX_IDENTIFIER Function

This function returns the Ajax identifier used to call the Ajax callback function defined for the plug-in.

> **Note:**
>
> This function only works in the context of a plug-in rendering function call and only if the plug-in has defined an Ajax function callback in the plug-in definition.

Syntax

```
APEX_PLUGIN.GET_AJAX_IDENTIFIER
RETURN VARCHAR2;
```

Parameters

None.

Example

This is an example of a dynamic action plug-in rendering function that supports an Ajax callback.

```
FUNCTION RENDER_SET_VALUE (
    p_dynamic_action in apex_plugin.t_dynamic_action )
    return apex_plugin.t_dynamic_action_render_result
IS
    l_result                apex_plugin.t_dynamic_action_render_result;
BEGIN
    l_result.javascript_function := 'com_oracle_apex_set_value';
    l_result.ajax_identifier     := apex_plugin.get_ajax_identifier;
    return l_result;
END;
```

36.4 GET_INPUT_NAME_FOR_PAGE_ITEM Function

Use this function when you want to render an HTML input element in the rendering function of an item type plug-in. For the HTML input element, for example, `<input type="text" id="P1_TEST" name="xxx">`, you have to provide a value for the `name` attribute so that Oracle APEX can map the submitted value to the actual page item in session state. This function returns the mapping `name` for your page item. If the HTML input element has multiple values, such as a select list with `multiple="multiple"`, then set `p_is_multi_value` to `TRUE`.

> **Note:**
>
> This function is only useful when called in the rendering function of an item type plug-in.

Syntax

```
APEX_PLUGIN.GET_INPUT_NAME_FOR_PAGE_ITEM (
    p_is_multi_value    IN BOOLEAN )
RETURN VARCHAR2;
```

Parameters

Table 36-1 GET_INPUT_NAME_FOR_PAGE_ITEM Parameters

Parameter	Description
p_is_multi_value	Set to TRUE if the HTML input element has multiple values. If not, set to FALSE. HTML input elements with multiple values can be checkboxes and multi select lists.

Example

The following example outputs the necessary HTML code to render a text field where the value gets stored in session state when the page is submitted.

```
sys.htp.prn (
    '<input type="text" id="'||p_item.name||'" '||
    'name="'||apex_plugin.get_input_name_for_page_item(false)||'" '||
    'value="'||sys.htf.escape_sc(p_value)||'" '||
    'size="'||p_item.element_width||'" '||
    'maxlength="'||p_item.element_max_length||'" '||
    coalesce(p_item.element_attributes, 'class="text_field"')||' />' );
```

37
APEX_PLUGIN_UTIL

The `APEX_PLUGIN_UTIL` package provides utility functions that solve common problems when writing a plug-in.

37.1 BUILD_REQUEST_BODY Procedure

This procedure builds a request body for a REST Data Source DML request. If a request body template is set, then `#COLUMN#` placeholders will be replaced by the DML context column values. In this case, the request body can be any data format.

If no request body template is set, the function builds a JSON with the following structure:

```
{
   "{column1-name}": "{column1-value}",
   "{column2-name}": "{column2-value}",
   :
}
```

Syntax

```
APEX_PLUGIN_UTIL.BUILD_REQUEST_BODY (
    p_request_format    IN    apex_plugin.t_data_format,
    p_profile_columns   IN    apex_plugin.t_web_source_columns,
    p_values_context    IN    apex_exec.t_context,
    p_build_when_empty  IN    BOOLEAN,
    --
    p_request_body      IN OUT NOCOPY CLOB );
```

Parameters

Table 37-1 BUILD_REQUEST_BODY Parameters

Parameter	Description
p_request_format	Request format (JSON or XML).

Table 37-1 (Cont.) BUILD_REQUEST_BODY Parameters

Parameter	Description
p_profile_columns	Column meta data (names, data types).
p_values_context	apex_exec context object containing DML values.
p_build_when_empty	If p_request_body is empty, whether to build a new request body.
p_request_body	Request body template to perform replacements on.

Returns

Table 37-2 BUILD_REQUEST_BODY Returns

Parameter	Description
p_request_body	Request body (substitutions replaced or built from scratch).

Example

The following example uses BUILD_REQUEST_BODY within a plug-in DML procedure.

```
apex_plugin_util.build_request_body (
    p_plugin     IN            apex_plugin.t_plugin,
    p_web_source IN            apex_plugin.t_web_source,
    p_params     IN            apex_plugin.t_web_source_dml_params,
    p_result     IN OUT NOCOPY apex_plugin.t_web_source_dml_result )
IS
    l_web_source_operation apex_plugin.t_web_source_operation;
    l_request_body         clob;
BEGIN

    l_web_source_operation := apex_plugin_util.get_web_source_operation(
        p_web_source   => p_web_source,
        p_db_operation => apex_plugin.c_db_operation_insert,
        p_perform_init => true );

    apex_plugin_util.build_request_body(
        p_request_format       => apex_plugin.c_format_json,
        p_profile_columns      => p_web_source.profile_columns,
        p_values_context       => p_params.insert_values_context,
        p_build_when_empty     => true,
        p_request_body         => l_request_body );

    -- continue with APEX_PLUGIN_UTIL.MAKE_REST_REQUEST

END plugin_dml;
```

37.2 CLEAR_COMPONENT_VALUES Procedure

This procedure clears the component specific `Session State` set by `apex_plugin_util.set_component_values`.

Syntax

```
PROCEDURE CLEAR_COMPONENT_VALUES;
```

Example

See `apex_plugin_util.set_component_values`

> **See Also:**
>
> SET_COMPONENT_VALUES Procedure

37.3 CURRENT_ROW_CHANGED Function

This function determines whether the current row changed between the two contexts. In order to compare the next row within the value context, use `APEX_EXEC.NEXT_ROW` for both contexts.

Syntax

```
API_PLUGIN_UTIL.CURRENT_ROW_CHANGED(
    p_old_row_context       IN apex_exec.t_context,
    p_new_row_context       IN apex_exec.t_context )
RETURN BOOLEAN;
```

Parameters

Table 37-3 CURRENT_ROW_CHANGED Parameters

Parameter	Description
`p_old_row_context`	Values context containing values before the change.
`p_new_row_context`	Values context containing values after the change.

Returns

Table 37-4 CURRENT_ROW_CHANGED Returns

Parameter	Description
*	Whether there is a difference between the rows.

Example

The following example performs a "refetch" operation within the Plug-In DML function for a given row to be updated and check whether the row would actually be changed with the DML operation. If not, we could suppress the HTTP request.

```
procedure plugin_dml(
    p_plugin     in            apex_plugin.t_plugin,
    p_web_source in            apex_plugin.t_web_source,
    p_params     in            apex_plugin.t_web_source_dml_params,
    p_result     in out nocopy apex_plugin.t_web_source_dml_result )
IS
    l_web_source_operation apex_plugin.t_web_source_operation;
    l_request_body         clob;
    l_response             clob;

    l_refetch_context      apex_exec.t_context;
    l_checksum             varchar2(32767);
    l_refetched_checksum   varchar2(32767);

BEGIN
    p_result.update_values_context := p_params.update_values_context;

    --
    -- this code performs a "refetch" operation for a row, in order to
perform
    -- lost update detection. This happens before the actual DML.
    --
    IF
p_web_source.operations.exists( apex_plugin.c_db_operation_fetch_row ) THEN

        l_web_source_operation := apex_plugin_util.get_web_source_operation(
            p_web_source       => p_web_source,
            p_db_operation     => apex_plugin.c_db_operation_fetch_row,
            p_preserve_headers => false,
            p_perform_init     => true );

        -- add some logic to add primary key values to the URL or as HTTP
headers here
        -- PK values can be obtained from "p_params.update_values_context"

        apex_plugin_util.make_rest_request(
            p_web_source_operation => l_web_source_operation,
            p_request_body         => l_request_body,
            p_response             => l_response,
            p_response_parameters  => p_result.out_parameters );

        l_refetch_context := apex_plugin_util.parse_refetch_response(
            p_web_source_operation => l_web_source_operation,
            p_web_source           => p_web_source,
            p_response             => l_response,
            p_values_context       => p_params.update_values_context );

        IF apex_plugin_util.current_row_changed(
```

```
            p_old_row_context   => l_refetch_context,
            p_new_row_context   => p_params.update_values_context )
        THEN
            -- perform actual DML here
            --
        ELSE
            apex_exec.set_row_status(
                p_context  => p_result.update_values_context,
                p_sqlcode  => 0,
                p_sqlerrm  => 'SKIPPED' );
        END IF;
    END IF;
END plugin_dml;
```

37.4 DB_OPERATION_ALLOWED Function

This function checks whether a database operation is allowed (contained in the allowed operations) and either raises an APEX error or returns an error message.

Syntax

```
APEX_PLUGIN_UTIL.DB_OPERATION_ALLOWED (
    p_allowed_operations   IN VARCHAR2,
    p_operation            IN apex_plugin.t_db_operation,
    p_raise_error          IN BOOLEAN DEFAULT TRUE )
RETURN VARCHAR2;
```

Parameters

Table 37-5 DB_OPERATION_ALLOWED Parameters

Parameter	Description
`p_allowed_operations`	Allowed operations (U, UD, D).
`p_operation`	Operation to check for.
`p_raise_error`	Whether to raise an error if the operation is not allowed (default `TRUE`).

Returns

`NULL` if the operation is allowed.

If not allowed, an error message and `p_raise_error` is FALSE.

Example

The following example asserts (using `allowed_operations_column`) that the current operation is allowed within the Plug-In code. See above examples for illustration of the Plug-In DML procedure.

```
apex_plugin_util.db_operation_allowed (
DECLARE
    l_error_message varchar2(32767);
```

```
BEGIN
    l_error_message := apex_plugin_util.db_operation_allowed(
                         p_allowed_operations => apex_exec.get_varchar2(
                                                   p_context     =>
l_refetch_context,
                                                   p_column_name =>
p_params.allowed_operations_column ),
                         p_operation          =>
apex_plugin.c_db_operation_update,
                         p_raise_error        => false );
END;
```

37.5 DEBUG_DYNAMIC _ACTION Procedure

This procedure writes the data of the dynamic action meta data to the debug output if debugging is enabled.

Syntax

```
APEX_PLUGIN_UTIL.DEBUG_DYNAMIC_ACTION (
    p_plugin         IN apex_plugin.t_plugin,
    p_dynamic_action IN apex_plugin.t_dynamic_action);
```

Parameters

Table 37-6 DEBUG_DYNAMIC_ACTION Parameters

Parameter	Description
`p_plugin`	This is the `p_plugin` parameter of your plug-in function.
`p_dynamic_action`	This is the `p_dynamic_action` parameter of your plug-in function.

Example

This example shows how to collect helpful debug information during the plug-in development cycle to see what values are actually passed into the rendered function or Ajax callback function of the plug-in.

```
apex_plugin_util.debug_dynamic_action (
    p_plugin         => p_plugin,
    p_dynamic_action => p_dynamic_action );
```

37.6 DEBUG_PAGE_ITEM Procedure Signature 1

This procedure writes the data of the page item meta data to the debug output if debugging is enabled.

Syntax

```
APEX_PLUGIN_UTIL.DEBUG_PAGE_ITEM (
    p_plugin    IN apex_plugin.t_plugin,
    p_page_item IN apex_plugin.t_page_item);
```

Parameters

Table 37-7 DEBUG_PAGE_ITEM Parameters

Parameter	Description
p_plugin	This is the p_plugin parameter of your plug-in function.
p_page_item	This is the p_page_item parameter of your plug-in function.

Example

This example shows how to collect helpful debug information during the plug-in development cycle to see what values are actually passed into the renderer, Ajax callback or validation function.

```
apex_plugin_util.debug_page_item (
    p_plugin    => p_plugin,
    p_page_item => p_page_item );
```

37.7 DEBUG_PAGE_ITEM Procedure Signature 2

This procedure writes the data of the page item meta data to the debug output if debugging is enabled.

Syntax

```
APEX_PLUGIN_UTIL.DEBUG_PAGE_ITEM (
    p_plugin              IN apex_plugin.t_plugin,
    p_page_item           IN apex_plugin.t_page_item,
    p_value               IN VARCHAR2,
    p_is_readonly         IN BOOLEAN,
    p_is_printer_friendly IN BOOLEAN);
```

Parameters

Table 37-8 DEBUG_PAGE_ITEM Parameters

Parameter	Description
p_plugin	This is the p_plugin parameter of your plug-in function.
p_page_item	This is the p_page_item parameter of your plug-in function.
p_value	This is the p_value parameter of your plug-in function.
p_is_readonly	This is the p_is_readonly parameter of your plug-in function.

Table 37-8 (Cont.) DEBUG_PAGE_ITEM Parameters

Parameter	Description
p_is_printer_friendly	This is the p_is_printer_friendly parameter of your plug-in function.

Example

This example shows how to collect helpful debug information during the plug-in development cycle to see what values are actually passed into the renderer, Ajax callback or validation function.

```
apex_plugin_util.debug_page_item (
    p_plugin         => p_plugin,
    p_page_item      => p_page_item,
    p_value          => p_value,
    p_is_readonly    => p_is_readonly,
    p_is_printer_friendly => p_is_printer_friendly);
```

37.8 DEBUG_PROCESS Procedure

This procedure writes the data of the process meta data to the debug output if debugging is enabled.

Syntax

```
APEX_PLUGIN_UTIL.DEBUG_PROCESS (
    p_plugin         IN apex_plugin.t_plugin,
    p_process        IN apex_plugin.t_process);
```

Parameters

Table 37-9 DEBUG_PROCESS Parameters

Parameter	Description
p_plugin	This is the p_plugin parameter of your plug-in function.
p_process	This is the p_process parameter of your plug-in function.

Example

This example shows how to collect helpful debug information during the plug-in development cycle to see what values are actually passed into the execution function of the plug-in.

```
apex_plugin_util.debug_process (
    p_plugin         => p_plugin,
    p_process        => p_process);
```

37.9 DEBUG_REGION Procedure Signature 1

This procedure writes the data of the region meta data to the debug output if debugging is enabled.

Syntax

```
APEX_PLUGIN_UTIL.DEBUG_REGION (
    p_plugin              IN apex_plugin.t_plugin,
    p_region              IN apex_plugin.t_region);
```

Parameters

Table 37-10 DEBUG_REGION Signature 1 Parameters

Parameter	Description
`p_plugin`	This is the `p_plugin` parameter of your plug-in function.
`p_region`	This is the `p_region` parameter of your plug-in function.

Example

This example shows how to collect helpful debug information during the plug-in development cycle to see what values are actually passed into the render function or Ajax callback function of the plug-in.

```
apex_plugin_util.debug_process (
    p_plugin         => p_plugin,
    p_region        => p_region);
```

37.10 DEBUG_REGION Procedure Signature 2

This procedure writes the data of the region meta data to the debug output if debugging is enabled. This is the advanced version of the debugging procedure which is used for the rendering function of a region plug-in.

Syntax

```
APEX_PLUGIN_UTIL.DEBUG_REGION (
    p_plugin              IN apex_plugin.t_plugin,
    p_region              IN apex_plugin.t_region,
    p_is_printer_friendly IN BOOLEAN);
```

Parameters

Table 37-11 describes the parameters available in the `DEBUG_REGION` procedure.

Table 37-11 DEBUG_REGION Signature 2 Parameters

Parameter	Description
p_plugin	This is the p_plugin parameter of your plug-in function
p_region	This is the p_region parameter of your plug-in function
p_is_printer_friendly	This is the p_is_printer_friendly parameter of your plug-in function

Example

This example shows how to collect helpful debug information during the plug-in development cycle to see what values are actually passed into the render function or Ajax callback function of the plug-in.

```
apex_plugin_util.debug_region (
    p_plugin              => p_plugin,
    p_region              => p_region,
    p_is_printer_friendly => p_is_printer_friendly);
```

37.11 ESCAPE Function

This function is used if you have checked the standard attribute "Has Escape Output Attribute" option for your item type plug-in which allows a developer to decide if the output should be escaped or not.

Syntax

```
APEX_PLUGIN_UTIL.ESCAPE (
    p_value  IN VARCHAR2,
    p_escape IN BOOLEAN)
RETURN VARCHAR2;
```

Parameters

Table 37-12 ESCAPE Parameters

Parameter	Description
p_value	This is the value you want to escape depending on the p_escape parameter.
p_escape	If set to TRUE, the return value is escaped. If set to FALSE, the value is not escaped.

Example

This example outputs all values of the array `l_display_value_list` as a HTML list and escapes the value of the array depending on the setting the developer as picked when using the plug-in.

```
for i in 1 .. l_display_value_list.count
loop
    sys.htp.prn (
        '<li>'||
        apex_plugin_util.escape (
            p_value  => l_display_value_list(i),
            p_escape => p_item.escape_output )||
        '</li>' );
end loop;
```

37.12 EXECUTE_PLSQL_CODE Procedure

This procedure executes a PL/SQL code block and performs binding of bind variables in the provided PL/SQL code. This procedure is usually used for plug-in attributes of type PL/SQL Code.

Syntax

```
APEX_PLUGIN_UTIL.EXECUTE_PLSQL_CODE (
    p_plsql_code  IN VARCHAR2);
```

Parameters

Table 37-13 EXECUTE_PLSQL_CODE Parameters

Parameter	Description
`p_plsql_code`	PL/SQL code to be executed.

Example

Text which should be escaped and then printed to the HTTP buffer.

```
declare
    l_plsql_code VARCHAR(32767) := p_process.attribute_01;
begin
    apex_plugin_util.execute_plsql_code (
        p_plsql_code => l_plsql_code );
end;
```

37.13 GET_ATTRIBUTE_AS_NUMBER Function

This function returns the value of a plug-in attribute as a number, taking into account NLS decimal separator effective for the current database session. Use this function in

plug-in PL/SQL source for custom attributes of type NUMBER instead of the built-in to_number function.

Syntax

```
APEX_PLUGIN_UTIL.GET_ATTRIBUTE_AS_NUMBER (
    p_value IN VARCHAR2 ),
    p_attribute_label IN VARCHAR2 )
    return NUMBER;
```

Parameters

Table 37-14 GET_ATTRIBUTE_AS_NUMBER Function Parameters

Parameter	Description
p_attribute_label	The label of the custom plug-in attribute.
p_value	The value of a custom attribute of type NUMBER.

Example

```
declare
    l_value number;
begin
    -- The following may fail for languages that don't use dot as the NLS
decimal separator
    l_value := to_number( p_region.attribute_04 );

    -- The following will work correctly regardless of the effective NLS
decimal separator
    l_value :=
apex_plugin_util.get_attribute_as_number( p_region.attribute_04, 'Minimum
Amount' );
end;
/
```

37.14 GET_CURRENT_DATABASE_TYPE Function

This function retrieves the database type for the currently active region. If Plug-In developers generate SQL in their code, this information helps to generate correct SQL for the corresponding database type.

Syntax

```
APEX_PLUGIN_UTIL.GET_CURRENT_DATABASE_TYPE (
    p_remote_server_id  IN NUMBER   DEFAULT NULL )
    RETURN apex_exec.t_database_type;
```

Parameters

Table 37-15 GET_CURRENT_DATABASE_TYPE Parameters

Parameter	Description
p_remote_server_id	The internal ID of the REST Enabled SQL reference.

Returns

This function returns the database vendor for the data source of the currently executed region.

Example

The following example demonstrates

```
DECLARE
    l_database_type apex_exec.t_database_type;
BEGIN
    l_database_type := apex_plugin_util.get_current_database_type;
    IF l_database_type = apex_exec.c_database_mysql THEN
        -- MySQL specific code goes here
    ELSE
        -- normal code goes here
    END IF;
END;
```

37.15 GET_DATA Function Signature 1

Executes the specified SQL query restricted by the provided search string (optional) and returns the values for each column. All column values are returned as a string, independent of their data types. The search column is identified by providing a column number in the `p_search_column_no` parameter. This function takes into account character value comparison globalization attributes defined for the application.

Syntax

```
APEX_PLUGIN_UTIL.GET_DATA (
    p_sql_statement    IN VARCHAR2,
    p_min_columns      IN NUMBER,
    p_max_columns      IN NUMBER,
    p_component_name   IN VARCHAR2,
    p_search_type      IN VARCHAR2 DEFAULT 2,
    p_search_column_no IN VARCHAR2 DEFAULT 2,
    p_search_string    IN VARCHAR2 DEFAULT NULL,
    p_first_row        IN NUMBER DEFAULT NULL,
    p_max_rows         IN NUMBER DEFAULT NULL)
RETURN t_column_value_list;
```

Parameters

Table 37-16 GET_DATA Function Signature 1Parameters

Parameters	Description
p_sql_statement	SQL statement used for the lookup.
p_min_columns	Minimum number of return columns.
p_max_columns	Maximum number of return columns.
p_component_name	In case an error is returned, this is the name of the page item or report column used to display the error message.
p_search_type	Must be one of the c_search_* constants. They are as follows: c_search_contains_case, c_search_contains_ignore, c_search_exact_case, c_search_exact_ignore
p_search_column_no	Number of the column used to restrict the SQL statement. Must be within the p_min_columns though p_max_columns range.
p_search_string	Value used to restrict the query.
p_first_row	Start query at the specified row. All rows before the specified row are skipped.
p_max_rows	Maximum number of return rows allowed.

Return

Table 37-17 GET_DATA Function Signature 1 Return

Return	Description
t_column_value_list	Table of apex_application_global.vc_arr2 indexed by column number.

Example

The following example shows a simple item type plug-in rendering function which executes the LOV defined for the page item and does a case sensitive LIKE filtering with the current value of the page item. The result is then generated as a HTML list.

```
function render_list (
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
is
    l_column_value_list   apex_plugin_util.t_column_value_list;
begin
    l_column_value_list :=
        apex_plugin_util.get_data (
            p_sql_statement    => p_item.lov_definition,
            p_min_columns      => 2,
            p_max_columns      => 2,
```

```
            p_component_name   => p_item.name,
            p_search_type      =>
apex_plugin_util.c_search_contains_case,
            p_search_column_no => 1,
            p_search_string    => p_value );

    sys.htp.p('<ul>');
    for i in 1 .. l_column_value_list(1).count
    loop
        sys.htp.p(
            '<li>'||
            sys.htf.escape_sc(l_column_value_list(1)(i))|| -- display
column
            '-'||
            sys.htf.escape_sc(l_column_value_list(2)(i))|| -- return
column
            '</li>');
    end loop;
    sys.htp.p('</ul>');
end render_list;
```

37.16 GET_DATA Function Signature 2

Executes the specified SQL query restricted by the provided search string (optional) and returns the values for each column. All column values are returned as a string, independent of their data types. The search column is identified by providing a column name in the `p_search_column_name` parameter. This function takes into account character value comparison globalization attributes defined for the application.

Syntax

```
APEX_PLUGIN_UTIL.GET_DATA (
    p_sql_statement      IN VARCHAR2,
    p_min_columns        IN NUMBER,
    p_max_columns        IN NUMBER,
    p_component_name     IN VARCHAR2,
    p_search_type        IN VARCHAR2 DEFAULT NULL,
    p_search_column_name IN VARCHAR2 DEFAULT NULL,
    p_search_string      IN VARCHAR2 DEFAULT NULL,
    p_first_row          IN NUMBER DEFAULT NULL,
    p_max_rows           IN NUMBER DEFAULT NULL)
RETURN t_column_value_list;
```

Parameters

Table 37-18 GET_DATA Function Signature 2 Parameters

Parameters	Description
`p_sql_statement`	SQL statement used for the lookup.
`p_min_columns`	Minimum number of return columns.
`p_max_columns`	Maximum number of return columns.

Table 37-18 (Cont.) GET_DATA Function Signature 2 Parameters

Parameters	Description
p_component_name	In case an error is returned, this is the name of the page item or report column used to display the error message.
p_search_type	Must be one of the c_search_* constants. They are as follows: c_search_contains_case, c_search_contains_ignore, c_search_exact_case, c_search_exact_ignore
p_search_column_name	This is the column name used to restrict the SQL statement.
p_search_string	Value used to restrict the query.
p_first_row	Start query at the specified row. All rows before the specified row are skipped.
p_max_rows	Maximum number of return rows allowed.

Return

Table 37-19 GET_TABLE Function Signature 2

Parameter	Description
t_column_value_list	Table of apex_application_global.vc_arr2 indexed by column number.

Example

The following example shows a simple item type plug-in rendering function which executes the LOV defined for the page item and does a case sensitive LIKE filtering with the current value of the page item. The result is then generated as a HTML list.

```
function render_list (
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
is
    l_column_value_list   apex_plugin_util.t_column_value_list;
begin
    l_column_value_list :=
        apex_plugin_util.get_data (
            p_sql_statement    => p_item.lov_definition,
            p_min_columns      => 2,
            p_max_columns      => 2,
            p_component_name   => p_item.name,
            p_search_type      => apex_plugin_util.c_search_contains_case,
            p_search_column_name => 'ENAME',
            p_search_string    => p_value );

    sys.htp.p('<ul>');
    for i in 1 .. l_column_value_list(1).count
    loop
```

```
        sys.htp.p(
            '<li>'||
            sys.htf.escape_sc(l_column_value_list(1)(i))|| -- display
column
            '-'||
            sys.htf.escape_sc(l_column_value_list(2)(i))|| -- return
column
            '</li>');
    end loop;
    sys.htp.p('</ul>');
end render_list;
```

37.17 GET_DATA2 Function Signature 1

This function executes the specified SQL query (optionally restricted by the provided search string) and returns the values for each column. All column values are returned along with their original data types. The search column is identified by providing a column number in the `p_search_column_no` parameter. This function takes into account character value comparison globalization attributes defines for the application.

Syntax

```
APEX_PLUGIN_UTIL.GET_DATA2 (
    p_sql_statement     IN VARCHAR2,
    p_min_columns       IN NUMBER,
    p_max_columns       IN NUMBER,
    p_data_type_list    IN wwv_global.vc_arr2   DEFAULT
c_empty_data_type_list,
    p_component_name    IN VARCHAR2,
    p_search_type       IN VARCHAR2 DEFAULT 2,
    p_search_column_no  IN VARCHAR2 DEFAULT 2,
    p_search_string     IN VARCHAR2 DEFAULT NULL,
    p_first_row         IN NUMBER   DEFAULT NULL,
    p_max_rows          IN NUMBER   DEFAULT NULL)
RETURN t_column_value_list2;
```

Parameters

Table 37-20 GET_DATA2 Parameters

Parameter	Description
`p_sql_statement`	SQL statement used for the lookup.
`p_min_columns`	Minimum number of return columns.
`p_max_columns`	Maximum number of return columns.
`p_data_type_list`	If provided, checks to make sure the data type for each column matches the specified data type in the array. Use the constants `c_data_type_*` for available data types.
`p_component_name`	In case an error is returned, this is the name of the page item or report column used to display the error message.

Table 37-20 (Cont.) GET_DATA2 Parameters

Parameter	Description
p_search_type	Must be one of the following c_search_* constants: • c_search_contains_case • c_search_contains_ignore • c_search_exact_case • c_search_exact_ignore
p_search_column_no	Number of the column used to restrict the SQL statement. Must be within the p_min_columns though p_max_columns range.
p_search_string	Value used to restrict the query.
p_first_row	Start query at the specified row. All rows before the specified row are skipped.
p_max_rows	Maximum number of return rows allowed.

Return

Table 37-21 GET_DATA2 Return

Return	Description
t_column_value_list2	Table of t_column_values indexed by column number.

Example 1

In the following example, a simple item type plug-in rendering function executes the LOV defined for the page item and performs a case sensitive LIKE filtering with the current value of the page item. The result then generates as an HTML list. Here, the first column of the LOV SQL statement is checked if it is VARCHAR2 and the second is NUMBER.

```
function render_list (
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
IS
    l_data_type_list    apex_application_global.vc_arr2;
    l_column_value_list apex_plugin_util.t_column_value_list2;
BEGIN
    -- The first LOV column has to be a string and the second a number
    l_data_type_list(1) := apex_plugin_util.c_data_type_varchar2;
    l_data_type_list(2) := apex_plugin_util.c_data_type_number;
    --
    l_column_value_list :=
        apex_plugin_util.get_data2 (
            p_sql_statement    => p_item.lov_definition,
            p_min_columns      => 2,
            p_max_columns      => 2,
            p_data_type_list   => l_data_type_list,
            p_component_name   => p_item.name,
            p_search_type      => apex_plugin_util.c_search_contains_case,
```

```
            p_search_column_no => 1,
            p_search_string    => p_value );
    --
    sys.htp.p('<ul>');
    FOR i in 1 .. l_column_value_list.count
    LOOP
        sys.htp.p(
            '<li>'||

sys.htf.escape_sc(l_column_value_list(1).value_list(i).varchar2_value)|
| -- display column
            '-'||

sys.htf.escape_sc(l_column_value_list(2).value_list(i).number_value)||
-- return column
            '</li>');
    END LOOP;
    sys.htp.p('</ul>');
END render_list;
```

Example 2

In the following example, a simple region type plug-in rendering function executes the SQL query defined for the region. The result generates as an HTML list. This example demonstrates the advanced handling of object type columns like `SDO_GEOMETRY`.

```
function render (
    p_region in apex_plugin.t_region,
    p_plugin in apex_plugin.t_plugin,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_region_render_result
IS
    l_column_value_list apex_plugin_util.t_column_value_list2;
    l_geometry sdo_geometry;
    l_value varchar2(32767);
    l_dummy pls_integer;
BEGIN
    l_column_value_list :=
        apex_plugin_util.get_data2 (
            p_sql_statement => p_region.source,
            p_min_columns => 1,
            p_max_columns => null,
            p_component_name => p_region.name );
   --
   sys.htp.p('<ul>');
   FOR row in 1 .. l_column_value_list(1).value_list.count LOOP

       sys.htp.p('<li>');

       FOR col in 1 .. l_column_value_list.count LOOP
            IF l_column_value_list(col).data_type = 'SDO_GEOMETRY' THEN

               -- Object Type columns are always returned using
ANYDATA and we have to
               -- use GETOBJECT to transform them back into the
```

```
original object type
               l_dummy :=
l_column_value_list(col).value_list(row).anydata_value.getobject(
l_geometry );
               l_value := '( type=' || l_geometry.sdo_gtype || ' srid=' ||
l_geometry.sdo_srid ||
                          case when l_geometry.sdo_point is not null THEN
                               ',x=' || l_geometry.sdo_point.x ||
                               ',y=' || l_geometry.sdo_point.y ||
                               ',z=' || l_geometry.sdo_point.z
                          END ||
                          ' )';
               ELSE
                          l_value := apex_plugin_util.get_value_as_varchar2(
                                  p_data_type =>
l_column_value_list(col).data_type,
                                  p_value =>
l_column_value_list(col).value_list(row) );
               END IF;

               sys.htp.p( case when col > 1 then ' - ' END || l_value );
          END LOOP;

          sys.htp.p('<li>');
      END LOOP;
      sys.htp.p('<ul>');

      RETURN null;
END;
```

37.18 GET_DATA2 Function Signature 2

Executes the specified SQL query restricted by the provided search string (optional) and returns the values for each column. All column values are returned along with their original data types. The search column is identified by providing a column number in the `p_search_column_no` parameter. This function takes into account character value comparison globalization attributes defines for the application.

Syntax

```
APEX_PLUGIN_UTIL.GET_DATA2 (
    p_sql_statement      IN VARCHAR2,
    p_min_columns        IN NUMBER,
    p_max_columns        IN NUMBER,
    p_data_type_list     IN WWV_GLOBAL.VC_ARR2 DEFAULT
C_EMPTY_DATA_TYPE_LIST,
    p_component_name     IN VARCHAR2,
    p_search_type        IN VARCHAR2 DEFAULT 2,
    p_search_column_name IN VARCHAR2 DEFAULT 2,
    p_search_string      IN VARCHAR2 DEFAULT NULL,
    p_first_row          IN NUMBER DEFAULT NULL,
    p_max_rows           IN NUMBER DEFAULT NULL)
RETURN t_column_value_list2;
```

Parameters

Table 37-22 GET_DATA2 Function Signature 2

Parameter	Description
p_sql_statement	SQL statement used for the lookup.
p_min_columns	Minimum number of return columns.
p_max_columns	Maximum number of return columns.
p_data_type_list	If provided, checks to make sure the data type for each column matches the specified data type in the array. Use the constants c_data_type_* for available data types.
p_component_name	In case an error is returned, this is the name of the page item or report column used to display the error message.
p_search_type	Must be one of the c_search_* constants. They are as follows: c_search_contains_case, c_search_contains_ignore, c_search_exact_case, c_search_exact_ignore
p_search_column_name	The column name used to restrict the SQL statement.
p_search_string	Value used to restrict the query.
p_first_row	Start query at the specified row. All rows before the specified row are skipped.
p_max_rows	Maximum number of return rows allowed.

Return

Table 37-23 GET_DATA2 Function Signature 2 Return

Parameter	Description
t_column_value_list2	Table of t_column_values indexed by column number.

Example

The following example is a simple item type plug-in rendering function which executes the LOV defined for the page item and does a case sensitive LIKE filtering with the current value of the page item. The result is then generated as a HTML list. This time, the first column of the LOV SQL statement is checked if it is of type VARCHAR2 and the second is of type number.

```
function render_list (
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
is
    l_data_type_list    apex_application_global.vc_arr2;
    l_column_value_list apex_plugin_util.t_column_value_list2;
begin
    -- The first LOV column has to be a string and the second a number
    l_data_type_list(1) := apex_plugin_util.c_data_type_varchar2;
```

```
    l_data_type_list(2) := apex_plugin_util.c_data_type_number;
    --
    l_column_value_list :=
        apex_plugin_util.get_data2 (
            p_sql_statement    => p_item.lov_definition,
            p_min_columns      => 2,
            p_max_columns      => 2,
            p_data_type_list   => l_data_type_list,
            p_component_name   => p_item.name,
            p_search_type      => apex_plugin_util.c_search_contains_case,
            p_search_column_name => 'ENAME',
            p_search_string    => p_value );
    --
    sys.htp.p('<ul>');
    for i in 1 .. l_column_value_list.count(1)
    loop
        sys.htp.p(
            '<li>'||

sys.htf.escape_sc(l_column_value_list(1).value_list(i).varchar2_value)|| --
display column
            '-'||

sys.htf.escape_sc(l_column_value_list(2).value_list(i).number_value)|| --
return column
            '</li>');
    end loop;
    sys.htp.p('</ul>');
end render_list;
```

37.19 GET_DISPLAY_DATA Function Signature 1

This function gets the display lookup value for the value specified in `p_search_string`.

Syntax

```
APEX_PLUGIN_UTIL.GET_DISPLAY_DATA (
    p_sql_statement    IN VARCHAR2,
    p_min_columns      IN NUMBER,
    p_max_columns      IN NUMBER,
    p_component_name   IN VARCHAR2,
    p_display_column_no IN BINARY_INTEGER DEFAULT 1,
    p_search_column_no  IN BINARY_INTEGER DEFAULT 2,
    p_search_string    IN VARCHAR2 DEFAULT NULL,
    p_display_extra    IN BOOLEAN DEFAULT TRUE)
RETURN VARCHAR2;
```

Parameters

Table 37-24 GET_DISPLAY_DATA Signature 1 Parameters

Parameter	Description
p_sql_statement	SQL statement used for the lookup.
p_min_columns	Minimum number of return columns.
p_max_columns	Maximum number of return columns.
p_component_name	In case an error is returned, this is the name of the page item or report column used to display the error message.
p_display_column_no	Number of the column returned from the SQL statement. Must be within the p_min_columns though p_max_columns range
p_search_column_no	Number of the column used to restrict the SQL statement. Must be within the p_min_columns though p_max_columns range.
p_search_string	Value used to restrict the query.
p_display_extra	If set to TRUE, and a value is not found, the search value is added to the result instead.

Return

Table 37-25 GET_DISPLAY_DATA Signature 1 Return

Return	Description
VARCHAR2	Value of the first record of the column specified by p_display_column_no. If no record was found it contains the value of p_search_string if the parameter p_display_extra is set to TRUE. Otherwise NULL is returned.

Example

The following example does a lookup with the value provided in p_value and returns the display column of the LOV query.

```
function render_value (
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
is
begin
    sys.htp.p(sys.htf.escape_sc(
        apex_plugin_util.get_display_data (
            p_sql_statement     => p_item.lov_definition,
            p_min_columns       => 2,
            p_max_columns       => 2,
            p_component_name    => p_item.name,
            p_display_column_no => 1,
            p_search_column_no  => 2,
```

```
            p_search_string     => p_value )));
end render_value;
```

37.20 GET_DISPLAY_DATA Function Signature 2

This function looks up all the values provided in the `p_search_value_list` instead of just a single value lookup.

Syntax

```
APEX_PLUGIN_UTIL.GET_DISPLAY_DATA (
    p_sql_statement    IN VARCHAR2,
    p_min_columns      IN NUMBER,
    p_max_columns      IN NUMBER,
    p_component_name   IN VARCHAR2,
    p_display_column_no IN BINARY_INTEGER DEFAULT 1,
    p_search_column_no  IN BINARY_INTEGER DEFAULT 2,
    p_search_value_list IN ww_flow_global.vc_arr2,
    p_display_extra     IN BOOLEAN DEFAULT TRUE)
RETURN apex_application_global.vc_arr2;
```

Parameters

Table 37-26 GET_DISPLAY_DATA Signature 2 Parameters

Parameter	Description
`p_sql_statement`	SQL statement used for the lookup.
`p_min_columns`	Minimum number of return columns.
`p_max_columns`	Maximum number of return columns.
`p_component_name`	In case an error is returned, this is the name of the page item or report column used to display the error message.
`p_display_column_no`	Number of the column returned from the SQL statement. Must be within the `p_min_columns` though `p_max_columns` range.
`p_search_column_no`	Number of the column used to restrict the SQL statement. Must be within the `p_min_columns` though `p_max_columns` range.
`p_search_value_list`	Array of values to look up.
`p_display_extra`	If set to `TRUE`, and a value is not found, the search value is added to the result instead.

Return

Table 37-27 GET_DISPLAY_DATA Signature 2 Return

Return	Description
`apex_application_global.vc_arr2`	List of VARCHAR2 indexed by pls_integer. For each entry in `p_search_value_list` the resulting array contains the value of the first record of the column specified by `p_display_column_no` in the same order as in `p_search_value_list`. If no record is found it contains the value of `p_search_string` if the parameter `p_display_extra` is set to TRUE. Otherwise the value is skipped.

Example

Looks up the values 7863, 7911 and 7988 and generates a HTML list with the value of the corresponding display column in the LOV query.

```
function render_list (
    p_plugin              in apex_plugin.t_plugin,
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
is
    l_search_list apex_application_global.vc_arr2;
    l_result_list apex_application_global.vc_arr2;
begin
    l_search_list(1) := '7863';
    l_search_list(2) := '7911';
    l_search_list(3) := '7988';
    --
    l_result_list :=
        apex_plugin_util.get_display_data (
            p_sql_statement     => p_item.lov_definition,
            p_min_columns       => 2,
            p_max_columns       => 2,
            p_component_name    => p_item.name,
            p_search_column_no  => 1,
            p_search_value_list => l_search_list );
    --
    sys.htp.p('<ul>');
    for i in 1 .. l_result_list.count
    loop
        sys.htp.p(
            '<li>'||
            sys.htf.escape_sc(l_result_list(i))||
            '</li>');
    end loop;
    sys.htp.p('</ul>');
end render_list;
```

37.21 GET_ELEMENT_ATTRIBUTES Function

This function returns some of the standard attributes of an HTML element (for example, id, name, required, placeholder, aria-error-attributes, class) which is used if a HTML input/select/textarea/... tag is generated to get a consistent set of attributes.

Syntax

```
APEX_PLUGIN_UTIL.GET_ELEMENT_ATTRIBUTES (
    p_item IN apex_plugin.t_page_item,
    p_name IN VARCHAR2 DEFAULT NULL,
    p_default_class IN VARCHAR2 DEFAULT NULL,
    p_add_id IN BOOLEAN DEFAULT TRUE,
    p_add_labelledby IN BOOLEAN DEFAULT TRUE
    p_aria_describedby_id IN VARCHAR2 DEFAULT NULL )
    RETURN VARCHAR2;
```

Parameters

Table 37-28 GET_ELEMENT_ATTRIBUTES Function Parameters

Parameters	Description
p_item	This is the p_item parameter of your plug-in function.
p_name	This is the value which has been return by apex_plugin.get_input_name_or_page_item
p_default_class	Default CSS class which which should be contained in the result string.
p_add_id	If set to TRUE then the id attribute is also contained in the result string.
p_add_labelled_by	Returns some of the general attributes of an HTML element (for example, the ID, name, required, placeholder, aria-error-attributes, class) which should be used if an HTML input, select, or textarea tag is generated to get a consistent set of attributes.Set to FALSE if you render a HTML input element like input, select, or textarea which does not require specifying the aria-labelledby attribute because the label's `for` attribute works for those HTML input elements. Set it to TRUE for all 'non-standard form element widgets (that is, those using div, span, and so on.) which do allow focus to make them accessible to screen readers. **Note:** Inclusion of aria-labelled by is also dependent on the item plug-in having Standard Form Element set to No and that there is a `#LABEL_ID#` substitution defined in the item's corresponding label template.
p_aria_describedby_id	Pass additional IDs here that you would like `get_element_attributes` to include in the value it renders for the `'aria-describedby'` attribute on the form element. This can be useful if you would like to convey additional information to users of Assistive Technology, when they are focused on the form field.

Example

This example emits an INPUT tag of type text which uses `apex_plugin_util.get_element_attributes` to automatically include the most common attributes.

```
sys.htp.prn (
        '<input type="text" ' ||
        apex_plugin_util.get_element_attributes(p_item, l_name,
'text_field') ||
        'value="'||l_escaped_value||'" '||
        'size="'||p_item.element_width||'" '||
        'maxlength="'||p_item.element_max_length||'" '||
        ' />');
```

37.22 GET_PLSQL_EXPRESSION_RESULT Function

This function executes a PL/SQL expression and returns a result. This function also performs the binding of any bind variables in the provided PL/SQL expression. This function is usually used for plug-in attributes of type PL/SQL expression.

Syntax

```
APEX_PLUGIN_UTIL.GET_PLSQL_EXPRESSION_RESULT (
    p_plsql_expression  IN VARCHAR2 )
RETURN VARCHAR2;
```

Parameters

Table 37-29 GET_PLSQL_EXPRESSION_RESULT Parameters

Parameter	Description
`p_plsql_expression_result`	A PL/SQL expression that returns a string.

Return

Table 37-30 GET_PLSQL_EXPRESSION_RESULT Returns

Return	Description
`VARCHAR2`	String result value returned by the PL/SQL Expression.

Example

This example executes and returns the result of the PL/SQL expression which is specified in `attribute_03` of an item type plug-in attribute of type `PL/SQL Expression`.

```
l_result := apex_plugin_util.get_plsql_expression_result (
    p_plsql_expression => p_item.attribute_03 );
```

37.23 GET_PLSQL_EXPR_RESULT_BOOLEAN Function

This function executes a PL/SQL expression and returns a Boolean result. This function also performs the binding of any bind variables in the provided PL/SQL expression. This function is usually used for plug-in attributes of type PL/SQL expression.

Syntax

```
APEX_PLUGIN_UTIL.GET_PLSQL_EXPR_RESULT_BOOLEAN (
    p_plsql_expression  IN BOOLEAN )
RETURN VARCHAR2;
```

Parameters

Table 37-31 GET_PLSQL_EXPR_RESULT_BOOLEAN Parameters

Parameter	Description
p_plsql_expression_result	A PL/SQL expression that returns a string.

Return

Table 37-32 GET_PLSQL_EXPR_RESULT_BOOLEAN Returns

Return	Description
BOOLEAN	String result value returned by the PL/SQL expression.

Example

This example executes and returns the result of the PL/SQL expression which is specified in `attribute_03` of an item type plug-in attribute of type `PL/SQL Expression`.

```
l_result := apex_plugin_util.get_plsql_expr_result_boolean (
    p_plsql_expression => p_item.attribute_03 );
```

37.24 GET_PLSQL_FUNCTION_RESULT Function

This function executes a PL/SQL function block and returns the result. This function also performs binding of bind variables in the provided PL/SQL function body. This function is usually used for plug-in attributes of type PL/SQL function body.

Syntax

```
APEX_PLUGIN_UTIL.GET_PLSQL_FUNCTION_RESULT (
    p_plsql_function    IN VARCHAR2 )
RETURN VARCHAR2;
```

Parameters

Table 37-33 GET_PLSQL_FUNCTION_RESULT Parameters

Parameter	Description
p_plsql_function	A PL/SQL function block that returns a result of type string.

Return

Table 37-34 GET_PLSQL_FUNCTION_RESULT Return

Return	Description
VARCHAR2	String result value returned by the PL/SQL function block.

Example

The following example executes and returns the result of the PL/SQL function body that is specified in `attribute_03` of an item type plug-in attribute of type `PL/SQL Function Body`.

```
l_result := apex_plugin_util.get_plsql_function_result (
    p_plsql_function => p_item.attribute_03 );
```

37.25 GET_PLSQL_FUNC_RESULT_BOOLEAN Function

This function executes a PL/SQL function block and returns the Boolean result. This function also performs binding of bind variables in the provided PL/SQL function body. This function is usually used for plug-in attributes of type PL/SQL function body.

Syntax

```
APEX_PLUGIN_UTIL.GET_PLSQL_FUNCTION_RESULT (
    p_plsql_function    IN BOOLEAN )
RETURN VARCHAR2;
```

Parameters

Table 37-35 GET_PLSQL_FUNC_RESULT_BOOLEAN Parameters

Parameter	Description
p_plsql_function	A PL/SQL function block that returns a result of type string.

Return

Table 37-36 GET_PLSQL_FUNC_RESULT_BOOLEAN Return

Return	Description
BOOLEAN	String result value returned by the PL/SQL function block.

Example

The following example executes and returns the Boolean result of the PL/SQL function body that is specified in `attribute_03` of an item type plug-in attribute of type `PL/SQL Function Body`.

```
l_result := apex_plugin_util.get_plsql_func_result_boolean (
    p_plsql_function => p_item.attribute_03 );
```

37.26 GET_POSITION_IN_LIST Function

This function returns the position in the list where p_value is stored. If it is not found, null is returned.

Syntax

```
APEX_PLUGIN_UTIL.GET_POSITION_IN_LIST(
    p_list IN apex_application_global.vc_arr2,
    p_value IN VARCHAR2)
RETURN NUMBER;
```

Parameters

Table 37-37 GET_POSITION_IN_LIST Parameters

Parameter	Description
p_list	Array of type `apex_application_global.vc_arr2` that contains entries of type VARCHAR2.
p_value	Value located in the `p_list` array.

Return

Table 37-38 GET_POSITION_IN_LIST Return

Return	Description
NUMBER	Returns the position of `p_value` in the array `p_list`. If it is not found `NULL` is returned.

Example

The following example searchs for "New York" in the provided list and returns `2` into `l_position`.

```
declare
    l_list     apex_application_global.vc_arr2;
    l_position number;
begin
    l_list(1) := 'Rome';
    l_list(2) := 'New York';
    l_list(3) := 'Vienna';

    l_position := apex_plugin_util.get_position_in_list (
                      p_list  => l_list,
                      p_value => 'New York' );
end;
```

37.27 GET_SEARCH_STRING Function

Based on the provided value in `p_search_type` the passed in value of `p_search_string` is returned unchanged or is converted to uppercase. Use this function with the `p_search_string` parameter of `get_data` and `get_data2`.

Syntax

```
APEX_PLUGIN_UTIL.GET_SEARCH_STRING(
    p_search_type IN VARCHAR2,
    p_search_string IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 37-39 GET_SEARCH_STRING Parameters

Parameter	Description
`p_search_type`	Type of search when used with `get_data` and `get_data2`. Use one of the `c_search_*` constants.
`p_search_string`	Search string used for the search with `get_data` and `get_data2`.

Return

Table 37-40 GET_SEARCH_STRING Return

Return	Description
`VARCHAR2`	Returns `p_search_string` unchanged or in uppercase if `p_search_type` is of type `c_search_contains_ignore` or `c_search_exact_ignore`.

Example

This example uses a call to `get_data` or `get_data2` to make sure the search string is using the correct case.

```
l_column_value_list :=
    apex_plugin_util.get_data (
        p_sql_statement    => p_item.lov_definition,
        p_min_columns      => 2,
        p_max_columns      => 2,
        p_component_name   => p_item.name,
        p_search_type      => apex_plugin_util.c_search_contains_ignore,
        p_search_column_no => 1,
        p_search_string    => apex_plugin_util.get_search_string (
            p_search_type   => apex_plugin_util.c_search_contains_ignore,
            p_search_string => p_value ) );
```

37.28 GET_VALUE_AS_VARCHAR2 Function

This function can be used if you use `GET_DATA2` to read the column values along with their original data types. It will convert and return the passed in `p_value` as `VARCHAR2`.

Syntax

```
function get_value_as_varchar2 (
   p_data_type IN VARCHAR2,
   p_value IN T_VALUE,
   p_format_mask IN VARCHAR2 DEFAULT NULL )
   RETURN VARCHAR2;
```

Parameters

Table 37-41 GET_VALUE_AS_VARCHAR2 Function Parameters

Parameter	Description
`p_data_type`	The data type of the value stored in `p_value`.
`p_value`	The value of type `t_value` which contains the value to be converted and returned as `VARCHAR2`.
`p_format_mask`	The format mask used to convert the value into a `VARCHAR2`.

Example

The following example emits all values stored in the data type aware `l_column_value_list` array as `VARCHAR2`.

```
declare
  l_column_value_list apex_plugin_util.t_column_value_list2;
begin
    -- Populate l_column_value_list by calling apex_plugin_util.get_data2
```

```
    ...
    -- Emit returned data
    sys.htp.p( '<table>' );
    for l_row in 1 .. l_column_value_list( 1 ).value_list.count
    loop
        sys.htp.p( '<tr>' );
        for l_column in 1 .. l_column_value_list.count loop
            sys.htp.p (
                '<td>' ||
                apex_plugin_util.get_value_as_varchar2 (
                    p_data_type =>
l_column_value_list( l_column ).data_type,
                    p_value =>
l_column_value_list( l_column ).value_list( l_row )
                    ) ||
                '</td>' );
        end loop;
        sys.htp.p( '</tr>' );
    end loop;
    sys.htp.p( '</table>' );
end;
```

37.29 GET_WEB_SOURCE_OPERATION Function

This function gets a REST Data Source operation. The REST Data Source operation object contains all meta data for the HTTP request which needs to be done to implement the given database operation (such as INSERT, UPDATE, DELETE).

Syntax

```
APEX_PLUGIN_UTIL.GET_WEB_SOURCE_OPERATION (
    p_web_source       in apex_plugin.t_web_source,
    p_db_operation     in apex_plugin.t_db_operation   DEFAULT NULL,
    p_perform_init     in BOOLEAN                      DEFAULT FALSE,
    p_preserve_headers in BOOLEAN                      DEFAULT FALSE )
RETURN apex_plugin.t_web_source_operation;
```

Parameters

Table 37-42 GET_WEB_SOURCE_OPERATION Parameters

Parameter	Description
p_web_source	REST Data Source plug-in meta data.
p_db_operation	Database operation to look up the Web Source operation (such as `UPDATE -> PUT`, `INSERT -> POST`).
p_db_operation	Whether to inialize the HTTP request environment (HTTP request headers, cookies, request body placeholder replacements). If passed as false, the Plug-In developer is responsible for setting up the environment themselves.

Table 37-42 (Cont.) GET_WEB_SOURCE_OPERATION Parameters

Parameter	Description
p_preserve_headers	Whether to preserve HTTP request headers in apex_web_service.g_request_headers.

Returns

Table 37-43 GET_WEB_SOURCE_OPERATION Returns

Parameter	Description
*	Plug-In meta data for the web source operation.

Example

The following example uses `get_web_source_operation` as part of a Plug-In "fetch" procedure in order to get meta data about the REST Data Source operation.

```
apex_plugin_util.get_web_source_operation (
    p_plugin     in            apex_plugin.t_plugin,
    p_web_source in            apex_plugin.t_web_source,
    p_params     in            apex_plugin.t_web_source_fetch_params,
    p_result     in out nocopy apex_plugin.t_web_source_fetch_result )
IS
    l_web_source_operation apex_plugin.t_web_source_operation;
BEGIN

    l_web_source_operation := apex_plugin_util.get_web_source_operation(
        p_web_source   => p_web_source,
        p_db_operation => apex_plugin.c_db_operation_fetch_rows,
        p_perform_init => true );

    p_result.responses.extend( 1 );

    apex_plugin_util.make_rest_request(
        p_web_source_operation => l_web_source_operation,
        --
        p_response             => p_result.responses( 1 ),
        p_response_parameters  => p_result.out_parameters );

END plugin_fetch;
```

37.30 IS_EQUAL Function

This function returns `TRUE` if both values are equal and `FALSE` if not. If both values are `NULL`, `TRUE` is returned.

Syntax

```
APEX_PLUGIN_UTIL.IS_EQUAL (
    p_value1 IN VARCHAR2
    p_value2 IN VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 37-44 IS_EQUAL Parameters

Parameter	Description
p_value1	First value to compare.
p_value2	Second value to compare.

Return

Table 37-45 IS_EQUAL Return

Return	Description
BOOLEAN	Returns TRUE if both values are equal or both values are NULL, otherwise it returns FALSE.

Example

In the following example, if the value in the database is different from what is entered, the code in the if statement is executed.

```
if NOT apex_plugin_util.is_equal(l_database_value, l_current_value)
then
    -- value has changed, do something
    null;
end if;
```

37.31 IS_COMPONENT_USED Function

This function returns TRUE if the passed build option, authorization, and condition are valid to display, process, or use this component.

Syntax

```
APEX_PLUGIN_UTIL.IS_COMPONENT_USED (
    p_build_option_id           IN NUMBER   DEFAULT NULL,
    p_authorization_scheme_id   IN VARCHAR2,
    p_condition_type            IN VARCHAR2,
    p_condition_expression1     IN VARCHAR2,
    p_condition_expression2     IN VARCHAR2,
    p_component                 IN VARCHAR2 DEFAULT NULL )
    RETURN BOOLEAN;
```

37.32 MAKE_REST_REQUEST Procedure Signature 1

This procedure performs the actual REST request (HTTP). Unlike a direct invocation of `APEX_WEB_SERVICE.MAKE_REST_REQUEST`, this procedure respects all REST Data Source parameters.

Syntax

```
APEX_PLUGIN_UTIL.MAKE_REST_REQUEST (
    p_web_source_operation IN            apex_plugin.t_web_source_operation,
    p_request_body         IN            CLOB    DEFAULT NULL,
    p_bypass_cache         IN            BOOLEAN DEFAULT FALSE,
    --
    p_time_budget          IN OUT NOCOPY NUMBER,
    --
    p_response             IN OUT NOCOPY CLOB,
    p_response_parameters  IN OUT NOCOPY
apex_plugin.t_web_source_parameters );
```

Parameters

Table 37-46 APEX_PLUGIN_UTIL.MAKE_REST_REQUEST Parameters

Parameter	Description
`p_web_source_operation`	Plug-In meta data for the REST Data Source operation.
`p_bypass_cache`	If "true" then the cache is not used.
`p_time_budget`	If "all rows" are fetched (multiple HTTP requests), then the process stops when the time budget is exhausted and an error raises.

Returns

Table 37-47 APEX_PLUGIN_UTIL.MAKE_REST_REQUEST Returns

Parameter	Description
`p_time_budget`	Time budget left after request has been made.
`p_response`	Received response of the HTTP invocation.
`p_response_parameters`	Received response headers and cookies, based on REST Data Source meta data.

Example

The following example demonstrates a simplified Plug-In "fetch" procedure doing HTTP requests with `APEX_PLUGIN_UTIL.MAKE_REST_REQUEST`.

```
apex_plugin_util.make_rest_request (
    p_plugin     in            apex_plugin.t_plugin,
    p_web_source in            apex_plugin.t_web_source,
    p_params     in            apex_plugin.t_web_source_fetch_params,
    p_result     in out nocopy apex_plugin.t_web_source_fetch_result )
```

```
IS
    l_web_source_operation apex_plugin.t_web_source_operation;
    l_time_budget          pls_integer := 60;
    l_page_to_fetch        pls_integer := 1;
    l_continue_fetching    boolean;
BEGIN

    l_web_source_operation :=
apex_plugin_util.get_web_source_operation(
        p_web_source   => p_web_source,
        p_db_operation => apex_plugin.c_db_operation_fetch_rows,
        p_perform_init => true );

    --
    -- loop to execute HTTP request as long as we receive a response
header named "moreRows"
    -- with the value of "true". A time budget of (initially 60)
seconds is passed as
    -- IN OUT parameter to MAKE_REST_REQUEST; once that budget is
exhausted, an error will
    -- be raised.
    --
    while l_continue_fetching loop
        p_result.responses.extend( 1 );
        l_page_to_fetch := l_page_to_fetch + 1;

        apex_plugin_util.make_rest_request(
            p_web_source_operation => l_web_source_operation,
            p_bypass_cache         => false,
            p_time_budget          => l_time_budget,
            --
            p_response             =>
p_result.responses( l_page_to_fetch ),
            p_response_parameters  => p_result.out_parameters );

        l_continue_fetching := false;
        for h in 1 .. apex_web_service.g_headers.count loop
            IF apex_web_service.g_headers( h ).name = 'moreRows' and
               apex_web_service.g_headers( h ).value = 'true'
            THEN
                l_continue_fetching := true;
                exit;
            END IF;
        END LOOP;
    END LOOP;
END plugin_fetch;
```

37.33 MAKE_REST_REQUEST Procedure Signature 2

This procedure performs the actual REST request (HTTP). It uses `apex_web_service`. All parameters for `apex_web_service.make_rest_request` are derived from the REST Data Source meta data passed in as `p_web_source_operation`.

Syntax

```
APEX_PLUGIN_UTIL.MAKE_REST_REQUEST (
    p_web_source_operation IN            apex_plugin.t_web_source_operation,
    --
    p_request_body         IN            CLOB DEFAULT NULL,
    --
    p_response             IN OUT NOCOPY CLOB,
    p_response_parameters  IN OUT NOCOPY
apex_plugin.t_web_source_parameters );
```

Parameters

Table 37-48 MAKE_REST_REQUEST Parameters

Parameter	Description
p_web_source_operation	Plug-in meta data for the REST Data Source operation.
p_bypass_cache	If TRUE, then the cache is not used.
p_request_body	Override request body to use.

Returns

Table 37-49 MAKE_REST_REQUEST Returns

Parameter	Description
p_response	Received response of the HTTP invocation.
p_response_parameters	Received response headers and cookies, based on REST Data Source meta data.

Example

The following example demonstrates a simplified Plug-In "fetch" procedure doing a HTTP request with APEX_PLUGIN_UTIL.MAKE_REST_REQUEST.

```
apex_plugin_util.make_rest_request (
    p_plugin     in            apex_plugin.t_plugin,
    p_web_source in            apex_plugin.t_web_source,
    p_params     in            apex_plugin.t_web_source_fetch_params,
    p_result     in out nocopy apex_plugin.t_web_source_fetch_result )
is
    l_web_source_operation apex_plugin.t_web_source_operation;
BEGIN

    l_web_source_operation := apex_plugin_util.get_web_source_operation(
        p_web_source   => p_web_source,
        p_db_operation => apex_plugin.c_db_operation_fetch_rows,
        p_perform_init => true );

    p_result.responses.extend( 1 );

    apex_plugin_util.make_rest_request(
```

```
        p_web_source_operation => l_web_source_operation,
        --
        p_response             => p_result.responses( 1 ),
        p_response_parameters  => p_result.out_parameters );

END plugin_fetch;
```

37.34 PAGE_ITEM_NAMES_TO_JQUERY Function

This function returns a jQuery selector based on a comma delimited string of page item names. For example, you could use this function for a plug-in attribute called "Page Items to Submit" where the JavaScript code has to read the values of the specified page items.

Syntax

```
APEX_PLUGIN_UTIL.PAGE_ITEM_NAMES_TO_JQUERY (
    p_page_item_names IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 37-50 PAGE_ITEM_NAMES_TO_JQUERY Parameters

Parameter	Description
`p_page_item_names`	Comma delimited list of page item names.

Return

Table 37-51 PAGE_ITEM_NAMES_TO_JQUERY Return

Return	Description
`VARCHAR2`	Transforms the page items specified in `p_page_item_names` into a jQuery selector.

Example

The following example shows the code to construct the initialization call for a JavaScript function called `myOwnWidget`. This function gets an object with several attributes where one attribute is `pageItemsToSubmit` which is expected to be a jQuery selector.

```
apex_javascript.add_onload_code (
    p_code => 'myOwnWidget('||
                  '"#'||p_item.name||'",'||
                  '{'||
                  apex_javascript.add_attribute('ajaxIdentifier',
apex_plugin.get_ajax_identifier)||
                  apex_javascript.add_attribute('dependingOnSelector',
apex_plugin_util.page_item_names_to_jquery(p_item.lov_cascade_parent_it
ems))||
```

```
                  apex_javascript.add_attribute('optimizeRefresh',
p_item.ajax_optimize_refresh)||
                  apex_javascript.add_attribute('pageItemsToSubmit',
apex_plugin_util.page_item_names_to_jquery(p_item.ajax_items_to_submit))||
                  apex_javascript.add_attribute('nullValue',
p_item.lov_null_value, false, false)||
                  '});' );
```

37.35 PARSE_REFETCH_RESPONSE Function

This function parses the response from a "DML row refetch." A "row refetch" is used for lost update detection in order to verify that nobody else changed the row. To use this function, the REST Data Source must have a "Fetch Single Row" database operation defined.

Syntax

```
APEX_PLUGIN_UTIL.PARSE_REFETCH_RESPONSE (
    p_web_source_operation IN apex_plugin.t_web_source_operation,
    p_web_source           IN apex_plugin.t_web_source,
    p_values_context       IN apex_exec.t_context,
    --
    p_response             IN CLOB )
RETURN apex_exec.t_context;
```

Parameters

Table 37-52 PARSE_REFETCH_RESPONSE Parameters

Parameter	Description
p_web_source_operation	REST Data Source operation (Plug-In) meta data.
p_web_source	REST Data Source (Plug-In) meta data.
p_response	REST response to parse.
p_values_context	Values context, needed for DML column definitions.

Returns

Table 37-53 PARSE_REFETCH_RESPONSE Returns

Parameter	Description
*	APEX_EXEC "Values" context object for the plug-in developer to retrieve the checksum or column values.

Example

The following example demonstrates how to perform a "refetch" operation within the Plug-In DML function for a given row to be updated and compare checksums in order to detect lost updates.

```
apex_plugin_util.parse_refetch_response (
  p_plugin     in            apex_plugin.t_plugin,
```

```
  p_web_source in            apex_plugin.t_web_source,
  p_params     in            apex_plugin.t_web_source_dml_params,
  p_result     in out nocopy apex_plugin.t_web_source_dml_result )
IS
  l_web_source_operation apex_plugin.t_web_source_operation;
  l_request_body         clob;
  l_response             clob;

  l_refetch_context      apex_exec.t_context;
  l_checksum             varchar2(32767);
  l_refetched_checksum   varchar2(32767);

BEGIN
  p_result.update_values_context := p_params.update_values_context;

  --
  -- this code performs a "refetch" operation for a row, in order to
perform
  -- lost update detection. This happens before the actual DML.
  --
  IF
p_web_source.operations.exists( apex_plugin.c_db_operation_fetch_row )
THEN

    l_web_source_operation :=
apex_plugin_util.get_web_source_operation(
      p_web_source       => p_web_source,
      p_db_operation     => apex_plugin.c_db_operation_fetch_row,
      p_preserve_headers => false,
      p_perform_init     => true );

    -- add some logic to add primary key values to the URL or as HTTP
headers here
    -- PK values can be obtained from "p_params.update_values_context"

    apex_plugin_util.make_rest_request(
      p_web_source_operation => l_web_source_operation,
      p_request_body         => l_request_body,
      p_response             => l_response,
      p_response_parameters  => p_result.out_parameters );

    l_refetch_context := apex_plugin_util.parse_refetch_response(
      p_web_source_operation => l_web_source_operation,
      p_web_source           => p_web_source,
      p_response             => l_response,
      p_values_context       => p_params.update_values_context );

    IF apex_exec.next_row( p_context => l_refetch_context ) THEN

      l_checksum           :=
apex_exec.get_row_version_checksum( p_context =>
p_params.update_values_context );
      l_refetched_checksum :=
apex_exec.get_row_version_checksum( p_context => l_refetch_context );
```

```
      IF l_checksum != l_refetched_checksum THEN
        apex_exec.set_row_status(
          p_context  => p_result.update_values_context,
          p_sqlcode  => -20987,
          p_sqlerrm  => 'APEX.DATA_HAS_CHANGED' );
      END IF;
    END IF;
  END IF;

  -- continue with DML logic here ...

END plugin_dml;
```

37.36 PRINT_DISPLAY_ONLY Procedure

This procedure outputs a SPAN tag for a display only field.

Syntax

```
APEX_PLUGIN_UTIL.PRINT_DISPLAY_ONLY (
    p_item_name        IN VARCHAR2,
    p_display_value    IN VARCHAR2,
    p_show_line_breaks IN BOOLEAN,
    p_attributes       IN VARCHAR2,
    p_id_postfix       IN VARCHAR2 DEFAULT '_DISPLAY');
```

Parameters

Table 37-54 PRINT_DISPLAY_ONLY Parameter

Parameter	Description
p_item_name	Name of the page item. This parameter should be called with p_item.name.
p_display_value	Text to be displayed.
p_show_line_breaks	If set to TRUE line breaks in p_display_value are changed to so that the browser renders them as line breaks.
p_attributes	Additional attributes added to the SPAN tag.
p_id_postfix	Postfix which is getting added to the value in p_item_name to get the ID for the SPAN tag. Default is _DISPLAY.

Example

The following code could be used in an item type plug-in to render a display only page item.

```
apex_plugin_util.print_display_only (
    p_item_name        => p_item.name,
    p_display_value    => p_value,
    p_show_line_breaks => false,
    p_escape           => true,
    p_attributes       => p_item.element_attributes );
```

37.37 PRINT_ESCAPED_VALUE Procedure

This procedure outputs the value in an escaped form and chunks big strings into smaller outputs.

Syntax

```
APEX_PLUGIN_UTIL.PRINT_ESCAPED_VALUE (
    p_value   IN VARCHAR2);
```

Parameters

Table 37-55 PRINT_ESCAPED_VALUE Parameter

Parameter	Description
p_value	Text which should be escaped and then printed to the HTTP buffer.

Example

Prints a hidden field with the current value of the page item.

```
sys.htp.prn('<input type="hidden" name="'||l_name||'" id="'||
p_item_name||'" value="');
print_escaped_value(p_value);
sys.htp.prn('">');
```

37.38 PRINT_HIDDEN_IF_READONLY Procedure

This procedure outputs a hidden field to store the page item value if the page item is rendered as readonly and is not printer friendly. If this procedure is called in an item type plug-in, the parameters of the plug-in interface should directly be passed in.

Syntax

```
APEX_PLUGIN_UTIL.PRINT_HIDDEN_IF_READ_ONLY (
    p_item_name   IN VARCHAR2,
    p_value       IN VARCHAR2,
    p_is_readonly IN BOOLEAN,
    p_is_printer_friendly IN BOOLEAN,
    p_id_postfix  IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 37-56 PRINT_HIDDEN_IF_READONLY Parameters

Parameter	Description
p_item_name	Name of the page item. For this parameter the p_item.name should be passed in.
p_value	Current value of the page item. For this parameter p_value should be passed in.
p_is_readonly	Is the item rendered readonly. For this parameter p_is_readonly should be passed in.
p_is_printer_friendly	Is the item rendered in printer friendly mode. For this parameter p_is_printer_friendly should be passed in.
p_id_postfix	Used to generate the ID attribute of the hidden field. It is build based on p_item_name and the value in p_id_postfix.

Example

Writes a hidden field with the current value to the HTTP output if p_is_readonly is TRUE and p_printer_friendly is FALSE.

```
apex_plugin_util.print_hidden_if_readonly (
    p_item_name           => p_item.name,
    p_value               => p_value,
    p_is_readonly         => p_is_readonly,
    p_is_printer_friendly => p_is_printer_friendly );
```

37.39 PRINT_JSON_HTTP_HEADER Procedure

This procedure outputs a standard HTTP header for a JSON output.

Syntax

```
APEX_PLUGIN_UTIL.PRINT_JSON_HTTP_HEADER;
```

Parameters

None.

Example

This example shows how to use this procedure in the Ajax callback function of a plugin. This code outputs a JSON structure in the following format: `[{"d":"Display 1","r":"Return 1"},{"d":"Display 2","r":"Return 2"}]`

```
-- Write header for the JSON stream.
apex_plugin_util.print_json_http_header;
-- initialize the JSON structure
sys.htp.p('[');
-- loop through the value array
```

```
for i in 1 .. l_values.count
loop
    -- add array entry
    sys.htp.p (
        case when i > 1 then ',' end||
        '{'||
        apex_javascript.add_attribute('d',
sys.htf.escape_sc(l_values(i).display_value), false, true)||
        apex_javascript.add_attribute('r',
sys.htf.escape_sc(l_values(i).return_value), false, false)||
        '}' );
end loop;
-- close the JSON structure
sys.htp.p(']');
```

37.40 PRINT_LOV_AS_JSON Procedure

This procedure outputs a JSON response based on the result of a two column LOV in the format:

```
[{"d:"display","r":"return"},{"d":....,"r":....},....]
```

> **Note:**
>
> The HTTP header is initialized with MIME type "application/json" as well.

Syntax

```
APEX_PLUGIN_UTIL.PRINT_LOV_AS_JSON (
    p_sql_statement         IN VARCHAR2,
    p_component_name        IN VARCHAR2,
    p_escape                IN BOOLEAN,
    p_replace_substitutions IN BOOLEAN DEFAULT FALSE);
```

Parameters

Table 37-57 PRINT_LOV_AS_JSON Parameters

Parameter	Description
`p_sql_statement`	A SQL statement which returns two columns from the SELECT.
`p_component_name`	The name of the page item or report column that is used in case an error is displayed.
`p_escape`	If set to `TRUE` the value of the display column is escaped, otherwise it is output as is.
`p_replace_substitutions`	If set to TRUE, `apex_plugin_util.replace_substitutions` is called for the value of the display column, otherwise, it is output as is.

Example

This example shows how to use the procedure in an Ajax callback function of an item type plug-in. The following call writes the LOV result as a JSON array to the HTTP output.

```
apex_plugin_util.print_lov_as_json (
    p_sql_statement  => p_item.lov_definition,
    p_component_name => p_item.name,
    p_escape         => true );
```

37.41 PRINT_OPTION Procedure

This procedure outputs an OPTION tag.

Syntax

```
APEX_PLUGIN_UTIL.PRINT_OPTION (
    p_display_value       IN VARCHAR2,
    p_return_value        IN VARCHAR2,
    p_is_selected         IN BOOLEAN,
    p_attributes          IN VARCHAR2,
    p_escape              IN BOOLEAN DEFAULT TRUE);
```

Parameters

Table 37-58 PRINT_OPTION Parameters

Parameter	Description
p_display_value	Text which is displayed by the option.
p_return_value	Value which is set when the option is picked.
p_is_selected	Set to TRUE if the selected attribute should be set for this option.
p_attributes	Additional HTML attributes which should be set for the OPTION tag.
p_escape	Set to TRUE if special characters in p_display_value should be escaped.

Example

The following example could be used in an item type plug-in to create a SELECT list. Use apex_plugin_util.is_equal to find out which list entry should be marked as current.

```
sys.htp.p('<select id="'||p_item.name||'" size="'||
nvl(p_item.element_height, 5)||'" '||coalesce(p_item.element_attributes,
'class="new_select_list"')||'>');
-- loop through the result and add list entries
for i in 1 .. l_values.count
loop
    apex_plugin_util.print_option (
        p_display_value => l_values(i).display_value,
```

```
        p_return_value  => l_values(i).return_value,
        p_is_selected   =>
apex_plugin_util.is_equal(l_values(i).return_value, p_value),
        p_attributes    => p_item.element_option_attributes,
        p_escape        => true );
end loop;
sys.htp.p('</select>');
```

37.42 PROCESS_DML_RESPONSE Procedure

This procedure parses the DML request response and load return values to the values context object.

Syntax

```
APEX_PLUGIN_UTIL.PROCESS_DML_RESPONSE (
    p_web_source_operation IN apex_plugin.t_web_source_operation,
    p_web_source           IN apex_plugin.t_web_source,
    --
    p_response             IN CLOB,
    p_status_code          IN pls_integer,
    p_error_message        IN VARCHAR2,
    --
    p_values_context       IN apex_exec.t_context );
```

Parameters

Table 37-59 PROCESS_DML_RESPONSE Parameters

Parameter	Description
p_web_source_operation	REST Data Source operation (Plug-In) meta data.
p_web_source	REST Data Source (Plug-In) meta data.
p_response	REST response to parse.
p_status_code	HTTP status code to use.
p_error_message	Error message to use.
p_values_context	Values context to store the return values in.

Example

The following example uses PROCESS_DML_RESPONSE within a plug-in DML procedure.

```
apex_plugin_util.process_dml_response (
    p_plugin     in            apex_plugin.t_plugin,
    p_web_source in            apex_plugin.t_web_source,
    p_params     in            apex_plugin.t_web_source_dml_params,
    p_result     in out nocopy apex_plugin.t_web_source_dml_result )
IS
    l_web_source_operation apex_plugin.t_web_source_operation;
    l_request_body         clob;
```

```
    l_response             clob;
    l_return_values_ctx    apex_exec.t_context :=
p_params.insert_values_context;
BEGIN
    l_web_source_operation := apex_plugin_util.get_web_source_operation(
        p_web_source   => p_web_source,
        p_db_operation => apex_plugin.c_db_operation_insert,
        p_perform_init => true );
    apex_plugin_util.build_request_body(
        p_request_format       => apex_plugin.c_format_json,
        p_profile_columns      => p_web_source.profile_columns,
        p_values_context       => p_params.insert_values_context,
        p_build_when_empty     => true,
        p_request_body         => l_request_body );
    -- continue with APEX_PLUGIN_UTIL.MAKE_REST_REQUEST
    apex_plugin_util.process_dml_response(
        p_web_source_operation => l_web_source_operation,
        p_web_source           => p_web_source,
        --
        p_response             => l_response,
        --
        p_status_code          => apex_web_service.g_status_code,
        p_error_message        => apex_web_service.g_reason_phrase,
        --
        p_values_context       => l_return_values_ctx );
END plugin_dml;
```

37.43 REPLACE_SUBSTITUTIONS Function

This function replaces any `&ITEM.` substitution references with their actual value. If `p_escape` is set to `TRUE`, any special characters contained in the value of the referenced item are escaped to prevent Cross-site scripting (XSS) attacks.

Syntax

```
APEX_PLUGIN_UTIL.REPLACE_SUBSTITUTIONS (
    p_value    IN VARCHAR2,
    p_escape   IN BOOLEAN DEFAULT TRUE )
    RETURN VARCHAR2;
```

Parameters

Table 37-60 REPLACE_SUBSTITUTION Parameters

Parameter	Description
`p_value`	This value is a string which can contain several `&ITEM.` references which are replaced by their actual page item values.
`p_escape`	If set to `TRUE` any special characters contained in the value of the referenced item are escaped to prevent Cross-site scripting (XSS) attacks. If set to `FALSE`, the referenced items are not escaped.

Example

The following example replaces any substitution syntax references in the region plug-in `attribute 05` with their actual values. Any special characters in the values are escaped.

```
l_advanced_formatting  := apex_plugin_util.replace_substitutions (
                              p_value => p_region.attribute_05,
                              p_escape => true );
```

37.44 SET_COMPONENT_VALUES Procedure

This procedure extends `Session State` to include the column values of a specific row number. By doing so, columns can be referenced using `substitution syntax` or the `V` function in the same way as you can reference page or application items.

> **Note:**
>
> Always call `apex_plugin_util.clear_component_values` after you are done processing the current row!

Syntax

```
PROCEDURE SET_COMPONENT_VALUES (
    p_column_value_list IN t_column_list,
    p_row_num           IN PLS_INTEGER );
```

Parameters

Table 37-61 SET_COMPONENT_VALUES Parameters

Parameter	Description
`p_column_value_list`	Table of `t_column_values_returned` by the call to `apex_plugin_util.get_data2`.
`p_row_num`	Row number in `p_column_value_list` for which the column values should be set in `Session State`.

Example

This example is the skeleton of a simple item type plug-in rendering function which renders a link list based on a provided SQL query. Instead of a fixed SQL query format where the first column contains the link and the second contains the link label, it allows a developer using this plug-in to enter any SQL statement and then use substitution syntax to reference the values of the executed SQL query.

```
function render_link_list (
    p_item                in apex_plugin.t_page_item,
    p_value               in varchar2,
```

```
    p_is_readonly         in boolean,
    p_is_printer_friendly in boolean )
    return apex_plugin.t_page_item_render_result
is
  -- The link target plug-in attribute 01 would allow that a developer can
enter a link which references columns
  -- of the provided SQL query using subsitution syntax.
  -- For example: f?p=&APP_ID.:1:&APP_SESSION.::&DEBUG.::P1_EMPNO:&EMPNO.
  -- where &EMPNO. references the column EMPNO in the SQL query.
  c_link_target    constant varchar2(4000) := p_item.attribute_01;
  -- The link label column plug-in attribute 02 would allows a developer to
reference a column of the SQL query
  -- which should be used as the text for the link.
  c_link_label_column constant varchar2(128) := p_item.attribute_02;
  --
  l_column_value_list apex_plugin_util.t_column_value_list2;
begin
    l_column_value_list :=
        apex_plugin_util.get_data2 (
            p_sql_statement =>
            ... );
    --
    sys.htp.p('<ul>');
    for i in 1 .. l_column_value_list.count(1)
    loop
        -- Set all column values of the current row
        apex_plugin_util.set_component_values (
            p_column_value_list => l_column_value_list,
            p_row_num           => i );
        --
        sys.htp.p(
            '<li><a href="' ||

apex_escape.html_attribute( apex_util.prepare_url( c_link_target )) || '">'
||
            apex_escape.html( v( c_link_label_column )) ||
       '</a></li>');

        --
        apex_plugin_util.clear_component_values;
    end loop;
    sys.htp.p('<ul>');
end;
```

38
APEX_REGION

The `APEX_REGION` package is the public API for handling regions.

38.1 CLEAR Procedure

This procedure clears region settings (that is, CR and IR pagination, IR report settings).

For interactive report regions, this procedure clears the following settings: control break, aggregate, flashback, chart, number of rows to display, filter, highlight, computation, and group by. However, it does not clear the following: display column list, sorting, report preference (such as view mode, display nulls in detail view, expand/collapse of report settings).

Syntax

```
APEX_REGION.CLEAR (
    p_application_id  IN NUMBER  DEFAULT apex_application.g_flow_id,
    p_page_id         IN NUMBER,
    p_region_id       IN NUMBER,
    p_component_id    IN NUMBER  DEFAULT NULL );
```

Parameters

Table 38-1 CLEAR Parameters

Parameter	Description
`p_application_id`	`ID` of the application where the region is on.
`p_page_id`	`ID` of the page where the region is on.
`p_region_id`	`ID` of a specific region.
`p_component_id`	Region component `ID` to use. For interactive reports, this is the saved report `ID` within the current application page.

Example

This example clears the given saved report on application 100, page 1.

```
 BEGIN
     APEX_REGION.CLEAR (
         p_applicatoin_id => 100,
         p_page_id        => 1,
         p_region_id      => 2505704029884282,
         p_component_id   => 880629800374638220);
END;
```

38.2 EXPORT_DATA Function

This function exports current region data.

> **Note:**
>
> The `APEX_REGION.EXPORT_DATA` function only supports native regions at this time.

Syntax

```
FUNCTION EXPORT_DATA(
    p_format                    IN apex_data_export.t_format,
    --
    p_page_id                   IN NUMBER,
    p_region_id                 IN NUMBER,
    p_component_id              IN
NUMBER                                  DEFAULT NULL,
    p_view_mode                 IN
VARCHAR2                                DEFAULT NULL,
    --
    p_additional_filters        IN
apex_exec.t_filters                     DEFAULT
apex_exec.c_empty_filters,
    --
    p_max_rows                  IN
NUMBER                                  DEFAULT NULL,
    p_parent_column_values      IN
apex_exec.t_parameters                  DEFAULT
apex_exec.c_empty_parameters,
    --
    p_as_clob                   IN
BOOLEAN                                 DEFAULT FALSE,
    --
    p_file_name                 IN
VARCHAR2                                DEFAULT NULL,
    p_page_size                 IN
apex_data_export.t_size                 DEFAULT
apex_data_export.c_size_letter,
```

```
    p_orientation               IN apex_data_export.t_orientation
DEFAULT apex_data_export.c_orientation_portrait,
    p_data_only                 IN BOOLEAN
DEFAULT FALSE,
    --
    p_pdf_accessible            IN BOOLEAN
DEFAULT FALSE,
    --
    p_xml_include_declaration   IN BOOLEAN
DEFAULT TRUE )
    return apex_data_export.t_export;
```

Parameters

Parameter	Description
p_format	Export format. Use constants apex_data_export.c_format_*
p_page_id	ID of the page where the region is on.
p_region_id	Open the query context for this specific region ID.
p_component_id	Region component ID to use. For Interactive Reports and Interactive Grids, this is the saved report ID within the current application page. For JET charts, use the chart series ID.
p_view_mode	The view type available for the report. The values can be: • APEX_IR.C_VIEW_REPORT • APEX_IR.C_VIEW_GROUPBY • APEX_IR.C_VIEW_PIVOT If p_view is null, it gets the view currently used by the report. If p_view passed which doesn't exist for the current report, an error raises.
p_additional_filters	Additional filters to apply to the context.
p_max_rows	Maximum amount of rows to get. Default unlimited.
p_parent_column_values	For the detail grid in an Interactive Grid Master-Detail relationship. Use this parameter to pass in values for the master-detail parent column(s).
p_as_clob	Returns the export contents as a CLOB. Does not work with binary export formats such as PDF and XLSX. Default to false.
p_file_name	Defines the filename of the export.
p_page_size	Page size of the report. Use constants apex_data_export.c_size_*
p_orientation	Orientation of the report page. Use constants apex_data_export.c_orientation_*
p_data_only	Whether to include column groups, control breaks, aggregates, and highlights.
p_pdf_accessible	Whether to include accessibility tags in the PDF. Defaults to false.

Parameter	Description
p_xml_include_declaration	Whether to include the XML declaration. Defaults to true.

Returns

The export file contents, mime_type, and optionally the report layout.

Examples

Get the export result for a given saved interactive report on page 3 and download as HTML.

```
DECLARE
    l_export       apex_data_export.t_export;
    l_region_id    number;
BEGIN

   SELECT region_id into l_region_id
     FROM apex_application_page_regions
    WHERE application_id = 100
      and page_id = 3
      and static_id = 'classic_report';

    l_export := apex_region.export_data (
         p_format       => apex_data_export.c_format_html,
         p_page_id      => 3,
         p_region_id    => l_region_id );

    apex_data_export.download( l_export );
END;
```

38.3 IS_READ_ONLY Function

This function returns TRUE if the current region is rendered read-only and FALSE if region is not rendered read-only. If the function is called from a context where no region is currently processed, it returns NULL. For example, you can use this function in conditions of a region or its underlying items and buttons.

Syntax

```
FUNCTION IS_READ_ONLY
RETURN BOOLEAN;
```

Parameters

None.

Example

This examples purges the session for a specific region cache for the whole application.

```
RETURN APEX_REGION.IS_READ_ONLY;
```

38.4 OPEN_QUERY_CONTEXT Function

This function returns an APEX_EXEC query context returning current region data.

This function runs within an autonomous transaction.

Only native regions are supported at this time.

Syntax

```
FUNCTION APEX_REGION.OPEN_QUERY_CONTEXT (
  p_page_id                IN NUMBER,
  p_region_id              IN NUMBER,
  p_component_id           IN NUMBER    DEFAULT NULL,
  p_view_mode              IN VARCHAR2  DEFAULT NULL,
  --
  p_additional_filters     IN apex_exec.t_filters DEFAULT
apex_exec.c_empty_filters,
  p_outer_sql              IN VARCHAR2  DEFAULT NULL,
  --
  p_first_row              IN NUMBER    DEFAULT NULL,
  p_max_rows               IN NUMBER    DEFAULT NULL,
  p_total_row_count        IN BOOLEAN   DEFAULT FALSE,
  p_total_row_count_limit  IN NUMBER    DEFAULT NULL,
  --
  p_parent_column_values IN apex_exec.t_parameters DEFAULT
apex_exec.c_empty_parameters )
  RETURN apex_exec.t_context;
```

Parameters

Table 38-2 OPEN_QUERY_CONTEXT Parameters

Parameter	Description
p_page_id	ID of the page where the region is on.
p_region_id	ID of a specific region to open the query context for.
p_component_id	Region component ID to use. For interactive reports and interactive grids this is the saved report ID within the current application page. For JET charts, use the chart series ID.
p_view_mode	The view type available for the report. The values can be APEX_IR.C_VIEW_REPORT, APEX_IR.C_VIEW_GROUPBY, or APEX_IR.C_VIEW_PIVOT. If p_view is null, it gets the view currently used by the report. If the p_view passed does not exist for the current report, an error is raised.

Table 38-2 (Cont.) OPEN_QUERY_CONTEXT Parameters

Parameter	Description
p_additional_filters	Additional filters to apply to the context.
p_outer_sql	Outer SQL query to wrap around the region SQL query. Use #APEX$SOURCE_DATA# to reference the region source (apex_exec.c_data_source_table_name constant). If this parameter is specified, then the P_COLUMNS parameter has no effect. This parameter overrides CHART, GROUP BY or PIVOT views for interactive reports.
p_first_row	Row index to start fetching at. Defaults to 1.
p_max_rows	Maximum amount of rows to get. Default unlimited.
p_total_row_count	Determines whether to retrieve the total row count. Defaults to false.
p_total_row_count_limit	Upper limit of rows to process the query on. This applies to interactive report aggregations or ordering. Default is no limit.
p_parent_column_values	For the detail grid in an Interactive Grid Master-Detail relationship. Use this parameter to pass in values for the master-detail parent column(s).

Example

The following example demonstrates how to get the query context for a given saved interactive report on page 1 and print the data out as JSON.

```
DECLARE
       l_context apex_exec.t_context;
BEGIN
       l_context := apex_region.open_query_context (
              p_page_id => 1,
              p_region_id => 2505704029884282,
              p_component_id => 880629800374638220 );

       apex_json.open_object;
       apex_json.write_context( 'data', l_context );
       apex_json.close_object;
END;
```

38.5 PURGE_CACHE Procedure

This procedure purges the region cache of the specified application, page, and region.

Syntax

```
APEX_REGION.PURGE_CACHE (
    p_application_id       IN NUMBER DEFAULT apex.g_flow_id,
    p_page_id              IN NUMBER DEFAULT NULL,
    p_region_id            IN NUMBER DEFAULT NULL,
    p_current_session_only IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 38-3 PURGE_CACHE Parameters

Parameter	Description
p_application_id	ID of the application where the region caches should be purged. Defaults to the current application.
p_page_id	ID of the page where the region caches should be purged. If no value is specified (default), all regions of the application are purged.
p_region_id	ID of a specific region on a page. If no value is specified, all regions of the specified page are purged.
p_current_session_only	Specify true if you only want to purge entries that where saved for the current session. Defaults to FALSE.

Example

This example purges session specific region cache for the whole application.

```
BEGIN
     APEX_REGION.PURGE_CACHE (
         p_current_session_only => true );
END;
```

38.6 RESET Procedure

This procedure resets region settings (such as CR and IR pagination, CR sort, IR and IG report settings). Only report regions are supported at this time.

Syntax

```
APEX_REGION.RESET (
    p_application_id  IN NUMBER  DEFAULT apex_application.g_flow_id,
    p_page_id         IN NUMBER,
    p_region_id       IN NUMBER,
    p_component_id    IN NUMBER  DEFAULT null );
```

Parameters

Table 38-4 CLEAR Parameters

Parameter	Description
p_application_id	ID of the application where the region is on.
p_page_id	ID of the page where the region is on.
p_region_id	ID of a specific region.
p_component_id	Region component ID to use. For interactive reports and interactive grids, this is the saved report ID within the current application page.

Example

This example resets the given saved report on application 100, page 1.

```
 BEGIN
     APEX_REGION.RESET  (
         p_applicatoin_id => 100,
         p_page_id        => 1,
         p_region_id      => 2505704029884282,
         p_component_id   => 880629800374638220);
END;
```

39
APEX_REST_SOURCE_SYNC

The `APEX_REST_SOURCE_SYNC` package enables you to synchonize data between tables by merging rows instantly or at scheduled intervals.

39.1 DISABLE Procedure

This procedure disables automatic synchronization.

Syntax

```
APEX_REST_SOURCE_SYNC.DISABLE (
  p_application_id    IN NUMBER   DEFAULT {current application id},
  p_module_static_id  IN VARCHAR2 )
```

Parameters

Table 39-1 DISABLE Parameters

Parameter	Description
`p_application_id`	(Optional) The application ID.
`p_module_static_id`	Static ID to identify the REST Data Source.

Example

The following example disables synchronization for the `rest_movie` REST Data Source in application 152.

```
BEGIN
apex_rest_source_sync.disable(
    p_application_id => 152,
    p_module_static_id => 'rest_movie' );
END;
```

39.2 DYNAMIC_SYNCHRONIZE_DATA Procedure

This procedure executes a dynamic data synchronization to the local table based on the provided parameters. The predefined synchronization steps are not executed.

Syntax

```
APEX_REST_SOURCE_SYNC.DYNAMIC_SYNCHRONIZE_DATA (
    p_module_static_id          IN VARCHAR2,
    --
    p_sync_static_id            IN VARCHAR2,
    p_sync_external_filter_expr IN VARCHAR2               DEFAULT NULL,
    p_sync_parameters           IN apex_exec.t_parameters DEFAULT
apex_exec.c_empty_parameters,
    --
    p_application_id            IN NUMBER                 DEFAULT
apex_application.g_flow_id );
```

Parameters

Table 39-2 DYNAMIC_SYNCHRONIZE_DATA Parameters

Parameter	Description
p_module_static_id	Static ID to identify the REST Data Source.
p_sync_static_id	Static ID for this dynamic synchronization.
p_sync_external_filter_expr	External filter expression to use for this synchronization.
p_sync_parameters	REST Data Source parameters to use for this synchronization.
p_application_id	ID of the application containing the REST Data Source.

Example

The following example performs a dynamic data synchronization with `Oracle APEX` as the REST Data Source's `query` parameter.

```
DECLARE
    l_parameters apex_exec.t_parameters;
BEGIN
    apex_exec.add_parameter(
        p_parameters      => l_parameters,
        p_name            => 'query',
        p_value           => 'Oracle APEX' );

    apex_session.create_session(
        p_app_id          => 100,
        p_app_page_id     => 1,
        p_username        => '...' );

    apex_rest_source_sync.dynamic_synchronize_data(
        p_module_static_id      => 'rest_movie',
```

```
        p_sync_static_id        => 'Sync_Oracle_APEX',
        p_sync_parameters       => l_parameters );
END;
```

39.3 ENABLE Procedure

This procedure enables synchronization for the REST Data Source.

Syntax

```
APEX_REST_SOURCE_SYNC.ENABLE (
  p_application_id    IN NUMBER    DEFAULT {current application id},
  p_module_static_id  IN VARCHAR2 )
```

Parameters

Table 39-3 ENABLE Parameters

Parameter	Description
p_application_id	(Optional) The application ID.
p_module_static_id	Static ID to identify the REST Data Source.

Example

The following example enables synchronization for the `rest_movie` REST Data Source in application 152.

```
BEGIN
    apex_rest_source_sync.enable(
    p_application_id => 152,
    p_module_static_id => 'rest_movie' );
END;
```

39.4 GET_LAST_SYNC_TIMESTAMP Function

This function returns the timestamp of the last successful sync operation.

Syntax

```
APEX_REST_SOURCE_SYNC.GET_LAST_SYNC_TIMESTAMP (
    p_module_static_id  IN VARCHAR2,
    p_application_id    IN NUMBER   DEFAULT {current application id} )
    RETURN timestamp with local time zone;
```

Parameters

Table 39-4 GET_LAST_SYNC_TIMESTAMP Parameters

Parameter	Description
p_module_static_id	Static ID to identify the REST Data Source.
p_application_id	ID of the application containing the REST Data Source.

Returns

This function returns the timestamp of the last successful sync operation.

Example

The following example returns the last synchronization timestamp of the "rest_movie" REST Data Source.

```
DECLARE
    l_last_sync_time timestamp with local time zone;
BEGIN
    apex_session.create_session(
        p_app_id          => 100,
        p_app_page_id     => 1,
        p_username        => '...' );

    l_last_sync_time := apex_rest_source_sync.get_last_sync_timestamp(
                            p_module_static_id      => 'rest_movie' );
END;
```

39.5 GET_SYNC_TABLE_DEFINITION_SQL Function

This function generates SQL to synchronize the local table definition with the data profile.

Syntax

```
APEX_REST_SOURCE_SYNC.GET_SYNC_TABLE_DEFINITION_SQL (
    p_module_static_id      IN VARCHAR2,
    p_application_id        IN NUMBER   DEFAULT {current application
id},
    p_include_drop_columns  IN BOOLEAN  DEFAULT FALSE )
    RETURN VARCHAR2;
```

Parameters

Table 39-5 APEX_REST_SOURCE_SYNC.GET_SYNC_TABLE_DEFINITION_SQL Parameters

Parameter	Description
p_module_static_id	Static ID to identify the REST Data Source.

Table 39-5 (Cont.) APEX_REST_SOURCE_SYNC.GET_SYNC_TABLE_DEFINITION_SQL Parameters

Parameter	Description
p_application_id	(Optional) The application ID.
p_include_drop_columns	If TRUE, generate ALTER TABLE DROP COLUMN statements for columns which do not exist in the data profile any more.

Example

The following example generates the SQL statements (ALTER TABLE) to bring the table in sync with the data profile after the REST Data Source named "rest_movie" has changed.

```
DECLARE
    l_sql varchar2(32767);
BEGIN
    apex_session.create_session(
        p_app_id          => 100,
        p_app_page_id     => 1,
        p_username        => '...' );
    l_sql := apex_rest_source_sync.get_sync_table_definition_sql(
        p_module_static_id      => 'rest_movie',
        p_include_drop_columns  => true );
END;
```

39.6 RESCHEDULE Procedure

This procedure sets the next scheduled execution timestamp of the synchronization.

Syntax

```
APEX_REST_SOURCE_SYNC.RESCHEDULE (
    p_application_id    IN NUMBER   DEFAULT wwv_flow.g_flow_id,
    p_module_static_id  IN VARCHAR2,
    p_next_run_at       IN timestamp with time zone default systimestamp );
```

Parameters

Table 39-6 RESCHEDULE Parameters

Parameter	Description
p_application_id	(Optional): The application ID.
p_module_static_id	Static ID to identify the REST Data Source.
p_next_run_at	Timestamp to execute the next synchronization.

Example

The following example synchronizes the REST Data Source named "rest_movie" immediately.

```
BEGIN
    apex_session.create_session(
          p_app_id          => 100,
          p_app_page_id     => 1,
          p_username        => '...' );

    apex_rest_source_sync.reschedule(
        p_static_id       => 'rest_movie' );
END;
```

39.7 SYNCHRONIZE_DATA Procedure

This procedure executes the configured data synchronization to the local table. The SYNCHRONIZE_DATA procedure requires an APEX session context.

Syntax

```
APEX_REST_SOURCE_SYNC.SYNCHRONIZE_DATA (
    p_module_static_id      IN VARCHAR2,
    p_run_in_background     IN BOOLEAN  DEFAULT FALSE,
    p_application_id        IN NUMBER   DEFAULT {current application
id} );
```

Parameters

Table 39-7 SYNCHRONIZE_DATA Parameters

Parameter	Description
p_module_static_id	Static ID to identify the REST Data Source.
p_application_id	(Optional) The application ID.
p_run_in_background	If TRUE, synchronization will run in the background, as a one-time DBMS_SCHEDULER job.
p_application_id	ID of the application containing the REST Data Source.

Example

The following example performs data synchronization immediately, independent of the next scheduled time.

```
BEGIN
    apex_session.create_session(
        p_app_id          => 100,
        p_app_page_id     => 1,
        p_username        => '...' );

    apex_rest_source_sync.synchronize_data(
```

```
        p_module_static_id      => 'rest_movie',
        p_run_in_background     => true );
END;
```

39.8 SYNCHRONIZE_TABLE_DEFINITION Procedure

This procedure synchronizes the local table definition with the data profile.

If the table does not exist, a `CREATE TABLE` statement executes. Table columns are created for visible data profile columns.

If the table already exists, a series of `ALTER TABLE` statements execute in order to align the table with the data profile.

Syntax

```
APEX_REST_SOURCE_SYNC.SYNCHRONIZE_TABLE_DEFINITION (
    p_module_static_id      IN VARCHAR2,
    p_application_id        IN NUMBER   DEFAULT {current application id},
    p_drop_unused_columns   IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 39-8 SYNCHRONIZE_TABLE_DEFINITION Procedure Parameters

Parameter	Description
`p_module_static_id`	Static ID to identify the REST Data Source.
`p_application_id`	(Optional) The application ID.
`p_drop_unused_columns`	If `TRUE`, the procedure also drops columns which do not exist in the data profile any more.

Example

The following example demonstrates bringing the local synchronization table in sync with the data profile after the REST Data Source named "rest_movie" has changed.

```
BEGIN
    apex_session.create_session(
        p_app_id          => 100,
        p_app_page_id     => 1,
        p_username        => '...' );
    apex_rest_source_sync.synchronize_table_definition(
        p_module_static_id     => 'rest_movie',
        p_drop_unused_columns  => true );
END;
```

40
APEX_SESSION

The APEX_SESSION package enables you to configure Oracle APEX sessions.

40.1 ATTACH Procedure

This procedure sets the environment and runs the Initialization PL/SQL Code based on the given application and current session.

Syntax

```
APEX_SESSION.ATTACH (
    p_app_id        IN  NUMBER,
    p_page_id       IN  NUMBER,
    p_session_id    IN  NUMBER );
```

Parameters

Table 40-1 ATTACH Parameters

Parameters	Description
p_app_id	The application ID.
p_page_id	The application page.
p_session_id	The session ID.

Raises

- WWV_FLOW.APP_NOT_FOUND_ERR: Application does not exist or caller has no access to the workspace.
- APEX.SESSION.EXPIRED: Your session has ended.
- SECURITY_GROUP_ID_INVALID: Security Group ID (your workspace identity) is invalid.

Example

Attach to session `12345678` for application `100` page `1`, then print the app ID and session ID.

```
begin
    apex_session.attach (
        p_app_id     => 100,
        p_page_id    => 1,
        p_session_id => 12345678 );
    sys.dbms_output.put_line (
        'App is '||v('APP_ID')||', session is '||v('APP_SESSION'));
end;
```

See Also:

- CREATE_SESSION Procedure
- DELETE_SESSION Procedure
- DETACH Procedure

40.2 CREATE_SESSION Procedure

This procedure creates a new session for the given application, set environment and run the application's Initialization PL/SQL Code.

Syntax

```
PROCEDURE CREATE_SESSION (
   p_app_id                    IN NUMBER,
   p_page_id                   IN NUMBER,
   p_username                  IN VARCHAR2,
   p_call_post_authentication IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 40-2 CREATE_SESSION Procedure Parameters

Parameters	Description
p_app_id	The application id.
p_page_id	The application page.
p_username	The session user.
p_call_post_authentication	If true, call post-authentication procedure. The default is false.

Raises

`WWV_FLOW.APP_NOT_FOUND_ERR`: The application does not exist or the caller has no access to the workspace.

Example

> **Note:**
>
> The `CREATE_SESSION` procedure is not supported in the SQL Commands and SQL Scripts tools within SQL Workshop.

This example creates a session for EXAMPLE USER in application 100 page 1, then print the app id and session id.

```
begin
    apex_session.create_session (
    p_app_id   => 100,
    p_page_id  => 1,
    p_username => 'EXAMPLE USER' );
    sys.dbms_output.put_line (
   'App is '||v('APP_ID')||', session is '||v('APP_SESSION'));
 end;
```

> **See Also:**
>
> - "DELETE_SESSION Procedure"
> - "ATTACH Procedure"
> - "DETACH Procedure"

40.3 DETACH Procedure

This procedure detaches from the current session, resets the environment and runs the application's Cleanup PL/SQL Code. This procedure does nothing if no session is attached.

Syntax

```
PROCEDURE DETACH;
```

Example

Detach from the current session..

```
begin
    apex_session.detach;
end;
```

> **See Also:**
>
> - "CREATE_SESSION Procedure"
> - "DELETE_SESSION Procedure"
> - "ATTACH Procedure"

40.4 DELETE_SESSION Procedure

This procedure deletes the session with the given ID. If the session is currently attached, call the application's Cleanup PL/SQL Code and reset the environment.

Syntax

```
APEX_SESSION.DELETE_SESSION (
    p_session_id    IN  NUMBER  DEFAULT apex_application.g_instance );
```

Parameters

Table 40-3 DELETE SESSION Parameters

Parameters	Description
`p_session_id`	The session ID.

Raises

- `APEX.SESSION.EXPIRED`: Your session has ended.
- `SECURITY_GROUP_ID_INVALID`: Security Group ID (your workspace identity) is invalid.

Example

The following example deletes session `12345678`.

```
BEGIN
    apex_session.delete_session (
    p_session_id => 12345678 );
END;
```

See Also:

- CREATE_SESSION Procedure
- ATTACH Procedure
- DETACH Procedure

40.5 SET_DEBUG Procedure

This procedure sets debug level for all future requests in a session.

Syntax

```
PROCEDURE SET_DEBUG (
   p_session_id IN NUMBER DEFAULT apex.g_instance,
   p_level IN apex_debug_api.t_log_level );
```

Parameters

Table 40-4 SET_DEBUG Procedure Parameters

Parameters	Description
p_session_id	The session id. **Note** : The session must belong to the current workspace or the caller must be able to set the session's workspace.
p_level	The debug level. NULL disables debug, 1-9 sets a debug level.

Example 1

This example shows how to set debug for session 1234 to INFO level.

```
apex_session.set_debug (
    p_session_id => 1234,
         p_level => apex_debug.c_log_level_info );
commit;
```

Example 2

This example shows how to disable debug in session 1234.

```
apex_session.set_debug (
    p_session_id => 1234,
         p_level => null );
commit;
```

> **See Also:**
>
> - "ENABLE Procedure"
> - "DISABLE Procedure"

40.6 SET_TENANT_ID Procedure

This procedure is used to associate a session with a tenant ID which can be used for building multitenant Oracle APEX applications. Once set, the value of the current tenant can be retrieved using the built-in `APP_TENANT_ID`.

Syntax

```
APEX_SESSION.SET_TENANT_ID (
    p_tenant_id );
```

Parameters

Table 40-5 SET_TENANT_ID Parameters

Parameter	Description
p_tenant_id	The tenant ID to associate with a session

Raises

`PE.DISPLAY_GROUP.SESSION_NOT_VALID`: The session doesn't exist.

`WWV_FLOW_SESSION_API.TENANT_ID_EXISTS`: The tenant ID has already been set.

Example

```
begin
    apex_session.set_tenant_id (
        p_tenant_id => 'ABC');

end;
```

40.7 SET_TRACE Procedure

This procedure sets trace mode in all future requests of a session.

Syntax

```
PROCEDURE SET_TRACE (
   p_session_id IN NUMBER DEFAULT apex.g_instance,
   p_mode IN VARCHAR2 );
```

Parameters

Table 40-6 SET_TRACE Procedure Parameters

Parameters	Description
p_session_id	The session id. **Note** : The session must belong to the current workspace or the caller must be able to set the session's workspace.
p_level	The trace mode. NULL disables trace, SQL enables SQL trace.

Example 1

This example shows how to enable trace in requests for session 1234.

```
apex_session.set_trace (
    p_session_id => 1234,
          p_mode => 'SQL' );
commit;
```

Example 2

This example shows how to disable trace in requests for session 1234.

```
apex_session.set_trace (
    p_session_id => 1234,
          p_mode => null );
commit;
```

41
APEX_SPATIAL

This package enables you to use Oracle Locator and the Spatial Option within Oracle APEX.

In an APEX context, the logon user of the database session is typically `APEX_PUBLIC_USER` or `ANONYMOUS`. Spatial developers can not directly use DML on `USER_SDO_GEOM_METADATA` within such a session in SQL Commands within SQL Workshop, for example. The Spatial view's trigger performs DML as the logon user, but it must run as the application owner or workspace user.

With the `APEX_SPATIAL` API, developers can use the procedures and functions below to insert, update, and delete rows of `USER_SDO_GEOM_METADATA` as the current APEX user. The package also provides a few utilities that simplify the use of Spatial in APEX.

If the SDO_GEOMETRY data type is unavailable in the database, then SPATIAL_IS_AVAILABLE is the only function within this package, and it returns `FALSE`. All other functions are only available if SDO_GEOMETRY is available in the database, and SPATIAL_IS_AVAILABLE returns `TRUE`.

41.1 Data Types

The APEX_SPATIAL package uses the following data types.

t_srid

```
subtype t_srid is number;
```

c_no_reference_system

```
c_no_reference_system constant t_srid := null;
```

c_wgs_84

```
c_wgs_84  constant t_srid := 4326; -- World Geodetic System, EPSG:4326
```

41.2 CHANGE_GEOM_METADATA Procedure

This procedure modifies a spatial metadata record.

Syntax

```
APEX_SPATIAL.CHANGE_GEOM_METADATA (
    p_table_name        IN VARCHAR2,
    p_column_name       IN VARCHAR2,
    p_new_table_name    IN VARCHAR2 DEFAULT NULL,
    p_new_column_name   IN VARCHAR2 DEFAULT NULL,
    p_diminfo           IN mdsys.sdo_dim_array,
    p_srid              IN t_srid );
```

Parameters

Table 41-1 CHANGE_GEOM_METADATA Parameters

Parameter	Description
p_table_name	Name of the feature table.
p_column_name	Name of the column of type mdsys.sdo_geometry.
p_new_table_name	New name of a feature table (or null, to keep the current value).
p_new_column_name	New name of the column of type mdsys.sdo_geometry (or null, to keep the current value.
p_diminfo	SDO_DIM_ELEMENT array, ordered by dimension, with one entry for each dimension.
p_srid	SRID value for the coordinate system for all geometries in the column.

Example

The code below modifies the dimensions of column CITIES.SHAPE.

```
begin
    for l_meta in ( select *
                      from user_sdo_geom_metadata
                     where table_name  = 'CITIES'
                       and column_name = 'SHAPE' )
    loop
        apex_spatial.change_geom_metadata (
            p_table_name  => l_meta.table_name,
            p_column_name => l_meta.column_name,
            p_diminfo     => SDO_DIM_ARRAY (
                               SDO_DIM_ELEMENT('X', -180, 180, 0.1),
                                      SDO_DIM_ELEMENT('Y',  -90,  90,
0.1) ),
        p_srid        => l_meta.srid );
```

```
    end loop;
end;
```

41.3 CIRCLE_POLYGON Function

This function creates a polygon that approximates a circle at (`p_lon`, `p_lat`) with radius of `p_radius`. See `mdsys.sdo_util.circle_polygon` for details.

Syntax

```
APEX_SPATIAL.CIRCLE_POLYGON (
    p_lon         IN NUMBER,
    p_lat         IN NUMBER,
    p_radius      IN NUMBER,
    p_arc_tolerance  IN NUMBER DEFAULT 20,
    p_srid         IN t_srid DEFAULT c_wgs_84 )
RETURN mdsys.sdo_geometry;
```

Parameters

Table 41-2 CIRCLE_POLYGON Parameters

Parameter	Description
p_lon	Longitude position of the lower left point.
p_lat	Latitude position of the lower left point.
`p_radius`	Radius of the circle in meters.
`p_arc_tolerance`	Arc tolerance (default 20).
p_srid	Reference system (default c_wgs_84).

Returns

Table 41-3 CIRCLE_POLYGON Function Returns

Return	Description
`mdsys.sdo_geometry`	The geometry for the polygon that approximates the circle.

Example

This example is a query that returns a polygon that approximates a circle at (0, 0) with radius 1.

```
select apex_spatial.circle_polygon(0, 0, 1) from dual
```

41.4 DELETE_GEOM_METADATA Procedure

This procedure deletes a spatial metadata record.

Syntax

```
APEX_SPATIAL.DELETE_GEOM_METADATA (
    p_table_name        IN VARCHAR2,
    p_column_name       IN VARCHAR2,
    p_drop_index        IN BOOLEAN DEFAULT FALSE );
```

Parameters

Table 41-4 DELETE_GEOM_METADATA Parameters

Parameter	Description
p_table_name	Name of the feature table.
p_column_name	Name of the column of type mdsys.sdo_geometry.
p_drop_index	If TRUE (default is FALSE), drop the spatial index on the column.

Example

This example deletes metadata on column CITIES.SHAPE and drops the spatial index on this column.

```
begin
    apex_spatial.delete_geom_metadata (
        p_table_name  => 'CITIES',
        p_column_name => 'SHAPE',
        p_drop_index  => true );
end;
```

41.5 INSERT_GEOM_METADATA Procedure

This procedure inserts a spatial metadata record and optionally creates a spatial index.

Syntax

```
APEX_SPATIAL.INSERT_GEOM_METADATA (
    p_table_name        IN VARCHAR2,
    p_column_name       IN VARCHAR2,
    p_diminfo           in mdsys.sdo_dim_array,
    p_srid              in t_srid,
    p_create_index_name IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 41-5 INSERT_GEOM_METADATA Parameters

Parameter	Description
p_table_name	The name of the feature table.

Table 41-5 (Cont.) INSERT_GEOM_METADATA Parameters

Parameter	Description
p_column_name	The name of the column of type mdsys.sdo_geometry.
p_diminfo	The SDO_DIM_ELEMENT array, ordered by dimension, with one entry for each dimension.
p_srid	The SRID value for the coordinate system for all geometries in the column.
p_create_index_name	If not null, a spatial index on the column is created with this name. Only simple column names are supported, function based indexes or indexes on object attributes cause an error. For more complex requirements, leave this parameter null (the default) and manually create the index.

Example

This example creates table CITIES, spatial metadata and an index on column CITIES.SHAPE.

```
create table cities (
    city_id   number primary key,
    city_name varchar2(30),
    shape     mdsys.sdo_geometry )
/
begin
    apex_spatial.insert_geom_metadata (
        p_table_name   => 'CITIES',
        p_column_name  => 'SHAPE',
        p_diminfo     => SDO_DIM_ARRAY (
            SDO_DIM_ELEMENT('X', -180, 180, 1),
            SDO_DIM_ELEMENT('Y',  -90,  90, 1) ),
        p_srid        => apex_spatial.c_wgs_84 );
end;
/
   create index cities_idx_shape on cities(shape) indextype is
mdsys.spatial_index
/
```

41.6 INSERT_GEOM_METADATA_LONLAT Procedure

This procedure inserts a spatial metadata record that is suitable for longitude/latitude and optionally creates a spatial index.

Syntax

```
APEX_SPATIAL.INSERT_GEOM_METADATA_LONLAT (
    p_table_name        IN VARCHAR2,
    p_column_name       IN VARCHAR2,
    p_tolerance         IN NUMBER DEFAULT 1,
    p_create_index_name IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 41-6 INSERT_GEOM_METADATA_LONLAT Parameters

Parameter	Description
p_table_name	Name of the feature table.
p_column_name	Name of the column of type mdsys.sdo_geometry.
p_tolerance	Tolerance value in each dimension, in meters (default 1).
p_create_index_name	if not null, a spatial index on the column is created with this name. Only simple column names are supported, function based indexes or indexes on object attributes cause an error. For more complex requirements, leave this parameter null (the default) and manually create the index.

Example

The code below creates table CITIES and spatial metadata for the column CITIES.SHAPE. By passing CITIES_IDX_SHAPE to p_create_index_name, the API call automatically creates an index on the spatial column.

```
create table cities (
    city_id   number primary key,
    city_name varchar2(30),
    shape     mdsys.sdo_geometry )
/
begin
    apex_spatial.insert_geom_metadata_lonlat (
        p_table_name        => 'CITIES',
        p_column_name       => 'SHAPE',
        p_create_index_name => 'CITIES_IDX_SHAPE' );
end;
/
```

41.7 POINT Function

This function creates a point at (p_lon, p_lat).

Syntax

```
APEX_SPATIAL.POINT (
    p_lon        IN NUMBER,
    p_lat        IN NUMBER,
    p_srid       IN t_srid DEFAULT c_wgs_84 )
RETURN mdsys.sdo_geometry;
```

Parameters

Table 41-7 POINT parameters

Parameter	Description
p_lon	Longitude position.
p_lat	Latitude position.
p_srid	Reference system (default c_wgs_84).

Returns

Table 41-8 POINT Function Returns

Return	Description
mdsys.sdo_geometry	The geometry for the point.

Example

This example is a query that returns a point at (10, 50).

```
select apex_spatial.point(10, 50) from dual;
```

This example is equivalent to:

```
select mdsys.sdo_geometry(2001, 4326, sdo_point_type(10, 50, null), null,
null) from dual;
```

41.8 RECTANGLE Function

This function creates a rectangle from point at (p_lon1, p_lat1) to (p_lon2, p_lat2).

Syntax

```
APEX_SPATIAL.RECTANGLE (
    p_lon1        IN NUMBER,
    p_lat1        IN NUMBER,
    p_lon2        IN NUMBER,
    p_lat2        IN NUMBER,
    p_srid        IN t_srid DEFAULT c_wgs_84 )
RETURN mdsys.sdo_geometry;
```

Parameters

Table 41-9 RECTANGLE Parameters

Parameter	Description
p_lon1	Longitude position of the lower left point.

Table 41-9 (Cont.) RECTANGLE Parameters

Parameter	Description
p_lat1	Latitude position of the lower left point.
p_lon2	Longitude position of the upper right point.
p_lat2	Latitude position of the upper right point.
p_srid	Reference system (default c_wgs_84).

Returns

Table 41-10 RECTANGLE Function Returns

Return	Description
mdsys.sdo_geometry	The geometry for the rectangle (p_lon1, p_lon2, p_lon2, p_lat2).

Example

This example is a query that returns a rectangle from (10, 50) to (11, 51).

```
select apex_spatial.rectangle(10, 50, 11, 51) from dual
```

This example is equivalent to:

```
select mdsys.sdo_geometry(
    2003, 4326, null,
    sdo_elem_info_array(1, 1003, 1),
    sdo_ordinate_array(10, 50, 11, 50, 11, 51, 10, 51, 10, 50))
from dual;
```

41.9 SPATIAL_IS_AVAILABLE Function

This function returns whether spatial is available in the database.

Syntax

```
APEX_SPATIAL.SPATIAL_IS_AVAILABLE (
  spatial_is_available )
RETURN BOOLEAN;
```

Returns

Table 41-11 APEX_SPATIAL.SPATIAL_IS_AVAILABLE Returns

Parameter	Description
*	True when spatial (SDO_GEOMETRY) is available in the database. Otherwise, false.

42
APEX_STRING

The APEX_STRING package provides utilities for the following data types:

- `apex_t_clob`
- `apex_t_number`
- `apex_t_varchar2`
- `clob`
- `varchar2`

Unless otherwise noted, the APIs expect arrays to be continuous (that is, without holes that `coll.delete(n)` operations generate).

42.1 FORMAT Function

This function returns a formatted string with substitutions applied.

Returns `p_message` after replacing each `<n>`th occurrence of `%s` with `p<n>` and each occurrence of `%<n>` with `p<n>`. If `p_max_length` is not null, `substr(p<n>,1,p_arg_max_length)` is used instead of `p<n>`.

Use `%%` in `p_message` to emit a single % character. Use %n to emit a newline.

Syntax

```
APEX_STRING.FORMAT (
     p_message    IN VARCHAR2,
     p0           IN VARCHAR2     DEFAULT NULL,
     p1           IN VARCHAR2     DEFAULT NULL,
     p2           IN VARCHAR2     DEFAULT NULL,
     p3           IN VARCHAR2     DEFAULT NULL,
     p4           IN VARCHAR2     DEFAULT NULL,
     p5           IN VARCHAR2     DEFAULT NULL,
     p6           IN VARCHAR2     DEFAULT NULL,
     p7           IN VARCHAR2     DEFAULT NULL,
     p8           IN VARCHAR2     DEFAULT NULL,
     p9           IN VARCHAR2     DEFAULT NULL,
     p10          IN VARCHAR2     DEFAULT NULL,
     p11          IN VARCHAR2     DEFAULT NULL,
     p12          IN VARCHAR2     DEFAULT NULL,
     p13          IN VARCHAR2     DEFAULT NULL,
     p14          IN VARCHAR2     DEFAULT NULL,
     p15          IN VARCHAR2     DEFAULT NULL,
     p16          IN VARCHAR2     DEFAULT NULL,
     p17          IN VARCHAR2     DEFAULT NULL,
     p18          IN VARCHAR2     DEFAULT NULL,
     p19          IN VARCHAR2     DEFAULT NULL,
     p_max_length IN PLS_INTEGER  DEFAULT 1000,
     p_prefix     IN VARCHAR2     DEFAULT NULL )
     return VARCHAR2
```

Parameters

Table 42-1 FORMAT Function Parameters

Parameters	Description
`p_message`	Message string with substitution placeholders.

Table 42-1 (Cont.) FORMAT Function Parameters

Parameters	Description
p0-p19	Substitution parameters.
p_max_length	If not null (default is 1000), cap each p<n> at p_max_length characters.
p_prefix	If set, remove leading white space and the given prefix from each line. This parameter can be used to simplify the formatting of indented multi-line text.

Example

```
APEX_STRING.FORMAT('%s+%s=%s', 1, 2, 'three')
-> 1+2=three

APEX_STRING.FORMAT('%1+%2=%0', 'three', 1, 2)
-> 1+2=three


APEX_STRING.FORMAT (
    q'!BEGIN
      !    IF NOT VALID THEN
      !        apex_debug.info('validation failed');
      !    END IF;
      !END;!',
    p_prefix => '!' )
 -> BEGIN
        IF NOT VALID THEN
            apex_debug.info('validation failed');
        END IF;
    END;
```

42.2 GET_INITIALS Function

Get N letter initials from the first N words.

Syntax

```
GET_INITIALS (
   p_str IN VARCHAR2,
   p_cnt IN NUMBER DEFAULT 2 )
   RETURN VARCHAR2
```

Parameters

Table 42-2 GET_INITIALS Function Parameters

Parameters	Description
p_string	The input string.
p_cnt	The N letter initials to get from the first N words. The default is 2.

Example

Get initials from "John Doe".

```
begin
  sys.dbms_output.put_line(apex_string.get_initials('John Doe'));
end;
-> JD

begin
  sys.dbms_output.put_line(apex_string.get_initials(p_str => 'Andres
Homero Lozano Garza', p_cnt => 3));
end;
-> AHL
```

42.3 GET_SEARCHABLE_PHRASES Function

This function returns distinct phrases of 1-3 consecutive lower case words in the input strings. Stopwords in the given language are ignored and split phrases.

> **Note:**
>
> This is a PL/SQL only implementation of a very small subset of what Oracle Text provides. Consider using Oracle Text instead, if the features and performance of this function are not sufficient.

Syntax

```
FUNCTION GET_SEARCHABLE_PHRASES (
    p_strings   IN   apex_t_varchar2,
    p_max_words IN   PLS_INTEGER DEFAULT 3,
    p_language  IN   apex_t_varchar2    DEFAULT 'en' )
    RETURN apex_t_varchar2;
```

Parameters

Table 42-3 GET_SEARCHABLE_PHRASES Function Parameters

Parameters	Description
p_string	The input string.
p_max_words	The maximum number of words in a phrase. The default is 3.
p_language	The language identifier for stopwords, defaults to "en". Supported values are "cn","de","en","es","fr","it","ja","ko","pt-br".

Example

Prints keywords in the given input string.

```
BEGIN
    sys.dbms_output.put_line (
        apex_string.join (
            apex_string.get_searchable_phrases (
                p_strings => apex_t_varchar2 (
                                'Oracle APEX 19.1 is great.',
                                'Low code as it should be!' )),
            ':' ));

END;
-> oracle:oracle apex:oracle apex 19.1:apex:apex 19.1:19.1:great:low:low
code:code
```

42.4 GREP Function Signature 1

Returns the values of the input table that match a regular expression.

Syntax

```
GREP (
   p_table         IN apex_t_varchar2,
   p_pattern       IN VARCHAR2,
   p_modifier      IN VARCHAR2    DEFAULT NULL,
   p_subexpression IN VARCHAR2    DEFAULT '0',
   p_limit         IN PLS_INTEGER DEFAULT NULL )
   RETURN apex_t_varchar2;
```

Parameters

Table 42-4 GREP Function Signature 1 Parameters

Parameters	Description
p_table	The input table.
p_pattern	The regular expression.
p_modifier	The regular expression modifier.
p_subexpression	The subexpression which should be returned. If null, return the complete table value. If 0 (the default), return the matched expression. If > 0, return the subexpression value. You can also pass a comma separated list of numbers, to get multiple subexpressions in the result.
p_limit	Limitation for the number of elements in the return table. If null (the default), there is no limit.

Example

Collect and print basenames of sql files in input collection.

```
declare
    l_sqlfiles apex_t_varchar2;
begin
    l_sqlfiles := apex_string.grep (
                        p_table => apex_t_varchar2('a.html','b.sql',
'C.SQL'),
                        p_pattern => '(\w+)\.sql',
                        p_modifier => 'i',
                        p_subexpression => '1' );
    sys.dbms_output.put_line(apex_string.join(l_sqlfiles, ':'));
end;
-> b:C
```

42.5 GREP Function Signature 2

Returns the values of the input `varchar2` that match a regular expression.

Syntax

```
GREP (
   p_str           IN VARCHAR2,
   p_pattern       IN VARCHAR2,
   p_modifier      IN VARCHAR2    DEFAULT NULL,
   p_subexpression IN VARCHAR2    DEFAULT '0',
   p_limit         IN PLS_INTEGER DEFAULT NULL )
   RETURN apex_t_varchar2;
```

Parameters

Table 42-5 GREP Function Signature 2 Parameters

Parameters	Description
p_str	The input varchar2.
p_pattern	The regular expression.
p_modifier	The regular expression modifier.
p_subexpression	The subexpression which should be returned. If null, return the complete table value. If 0 (the default), return the matched expression. If > 0, return the subexpression value. You can also pass a comma separated list of numbers, to get multiple subexpressions in the result.
p_limit	Limitation for the number of elements in the return table. If null (the default), there is no limit.

Example

Collect and print key=value definitions.

```
declare
    l_plist apex_t_varchar2;
begin
    l_plist := apex_string.grep (
                    p_str => 'define k1=v1'||chr(10)||
                             'define k2 = v2',
                    p_pattern => 'define\s+(\w+)\s*=\s*([^'||chr(10)||']*)',
                    p_modifier => 'i',
                    p_subexpression => '1,2' );
    sys.dbms_output.put_line(apex_string.join(l_plist, ':'));
end;
-> k1:v1:k2:v2
```

42.6 GREP Function Signature 3

Returns the values of the input clob that match a regular expression.

Syntax

```
GREP (
   p_str           IN CLOB,
   p_pattern       IN VARCHAR2,
   p_modifier      IN VARCHAR2    DEFAULT NULL,
   p_subexpression IN VARCHAR2    DEFAULT '0',
   p_limit         IN PLS_INTEGER DEFAULT NULL )
   RETURN apex_t_varchar2;
```

Parameters

Table 42-6 GREP Function Signature 3 Parameters

Parameters	Description
p_str	The input clob.
p_pattern	The regular expression.
p_modifier	The regular expression modifier.
p_subexpression	The subexpression which should be returned. If null, return the complete table value. If 0 (the default), return the matched expression. If > 0, return the subexpression value. You can also pass a comma separated list of numbers, to get multiple subexpressions in the result.
p_limit	Limitation for the number of elements in the return table. If null (the default), there is no limit.

Example

Collect and print key=value definitions.

```
declare
    l_plist apex_t_varchar2;
begin
    l_plist := apex_string.grep (
                    p_str => to_clob('define k1=v1'||chr(10)||
                             'define k2 = v2',
                    p_pattern => 'define\s+(\w+)\s*=\s*([^'||
chr(10)||']*)',
                    p_modifier => 'i',
                    p_subexpression => '1,2' );
    sys.dbms_output.put_line(apex_string.join(l_plist, ':'));
end;
-> k1:v1:k2:v2
```

42.7 JOIN_CLOB Function

Returns the values of the apex_t_varchar2 input table p_table as a concatenated clob, separated by p_sep.

Syntax

```
JOIN_CLOB (
    p_table IN apex_t_varchar2,
    p_sep   IN VARCHAR2    DEFAULT apex_application.LF,
    p_dur   IN PLS_INTEGER DEFAULT sys.dbms_lob.call )
    RETURN CLOB
```

Parameters

Table 42-7 JOIN_CLOB Function Parameters

Parameters	Description
p_table	The input table.
p_sep	The separator, default is line feed.
p_dur	The duration of the clob, default sys.dbms_lob.call

Example

Concatenate numbers, separated by *':'*.

```
apex_string.join_clob(apex_t_varchar2('1','2','3'),':')
-> 1:2:3
```

42.8 JOIN_CLOBS Function

This function returns the values of the apex_t_clob input table p_table as a concatenated clob, separated by p_sep.

Syntax

```
APEX_STRING.JOIN_CLOBS (
  p_table IN apex_t_clob,
  p_sep   IN VARCHAR2     DEFAULT apex_application.LF,
  p_dur   IN PLS_INTEGER  DEFAULT sys.dbms_lob.call )
RETURN CLOB;
```

Parameters

Table 42-8 APEX_STRING.JOIN_CLOBS Parameters

Parameter	Description
p_table	The input table.
p_sep	The separator, default is line feed.
p_dur	The duration of the clob, default sys.dbms_lob.call

Example

The following example concatenates numbers, separated by ':'.

```
apex_string.join_clobs(apex_t_clob('1','2','3'),':')
-> 1:2:3
```

42.9 JOIN Function Signature 1

Returns the values of the `apex_t_varchar2` input table `p_table` as a concatenated `varchar2`, separated by `p_sep`.

Syntax

```
JOIN (
   p_table IN apex_t_varchar2,
   p_sep IN VARCHAR2 DEFAULT apex_application.LF)
   RETURN VARCHAR2
```

Parameters

Table 42-9 JOIN Function Signature 1 Parameters

Parameters	Description
`p_table`	The input table.
`p_sep`	The separator, default is line feed.

Example

Concatenate numbers, separated by *':'*.

```
apex_string.join(apex_t_varchar2('a','b','c'),':')
-> a:b:c
```

42.10 JOIN Function Signature 2

Returns the values of the `apex_t_number` input table `p_table` as a concatenated `varchar2`, separated by `p_sep`.

Syntax

```
JOIN (
   p_table IN apex_t_number,
   p_sep IN VARCHAR2 DEFAULT apex_application.LF )
   RETURN VARCHAR2
```

Parameters

Table 42-10 JOIN Function Signature 2 Parameters

Parameters	Description
`p_table`	The input table.
`p_sep`	The separator, default is line feed.

Example

Concatenate numbers, separated by ':'.

```
apex_string.join(apex_t_number(1,2,3),':')
-> 1:2:3
```

42.11 NEXT_CHUNK Function

This function reads a fixed-length string from a clob. This is just a small wrapper around `DBMS_LOB.READ`, however it prevents common errors when incrementing the offset and picking the maximum chunk size.

Syntax

```
FUNCTION NEXT_CHUNK (
    p_str    IN            CLOB,
    p_chunk  OUT           NOCOPY VARCHAR2,
    p_offset IN OUT NOCOPY PLS_INTEGER,
    p_amount IN            PLS_INTEGER DEFAULT 8191 )
    RETURN BOOLEAN;
```

Parameters

Table 42-11 NEXT_CHUNK Function Parameters

Parameters	Description
`p_str`	The input clob.
`p_chunk`	The chunk value (in/out).
`p_offset`	The position in `p_str`, where the next chunk should be read from (in/out).
`p_amount`	The amount of characters that should be read (default 8191).

Returns

`True` if another chunk could be read. `False` if reading past the end of `p_str`.

Example

Print chunks of 25 bytes of the input clob.

```
declare
    l_input  clob := 'The quick brown fox jumps over the lazy dog';
    l_offset pls_integer;
    l_chunk  varchar2(20);
begin
    while apex_string.next_chunk (
              p_str    => l_input,
              p_chunk  => l_chunk,
```

```
                p_offset => l_offset,
                p_amount => 20 )
    loop
       sys.dbms_output.put_line(l_chunk);
    end loop;
end;

Output:
  The quick brown fox
  jumps over the lazy
  dog
```

42.12 PLIST_DELETE Procedure

This procedure removes the property list key from the table.

Syntax

```
PLIST_DELETE (
     p_table IN OUT NOCOPY apex_t_varchar2,
     p_key   IN VARCHAR2 );
```

Parameters

Table 42-12 PLIST_DELETE Procedure Parameters

Parameters	Description
p_table	The input table.
p_key	The input key.

Raised Errors

Table 42-13 PLIST_DELETE Procedure Raised Errors

Parameters	Description
NO_DATA_FOUND	Given key does not exist in table.

Example

Remove value of property"key2".

```
declare
      l_plist apex_t_varchar2 :=
apex_t_varchar2('key1','foo','key2','bar');
 begin
      apex_string.plist_delete(l_plist,'key2');
      sys.dbms_output.put_line(apex_string.join(l_plist,':'));
 end;
 -> key1:foo
```

42.13 PLIST_GET Function

This function gets the property list value for a key.

Syntax

```
PLIST_GET (
     p_table IN apex_t_varchar2,
     p_key IN VARCHAR2 )
     RETURN VARCHAR2
```

Parameters

Table 42-14 PLIST_GET Function Parameters

Parameters	Description
p_table	The input table.
p_key	The input key.

Raised Errors

Table 42-15 PLIST_GET Function Raised Errors

Parameters	Description
NO_DATA_FOUND	Given key does not exist in table.

Example

Get value of property "key2".

```
declare
    l_plist apex_t_varchar2 := apex_t_varchar2('key1','foo','key2','bar');
begin
    sys.dbms_output.put_line(apex_string.plist_get(l_plist,'key2'));
end;
-> bar
```

42.14 PLIST_PUSH Procedure

This procedure appends key/value to the property list, without looking for duplicates.

Syntax

```
PROCEDURE PLIST_PUSH (
    p_table IN OUT nocopy apex_t_varchar2,
    p_key   IN VARCHAR2,
    p_value IN VARCHAR2 );
```

Parameters

Table 42-16 PLIST_PUSH Procedure Parameters

Parameters	Description
p_table	The input table.
p_key	The input key.
p_value	The input value.

Example

The following example demonstrates how to append key2/bar.

```
declare
    l_plist apex_t_varchar2 := apex_t_varchar2('key1','foo');
begin
    apex_string.plist_push(l_plist,'key2','bar');
    sys.dbms_output.put_line(apex_string.plist_get(l_plist,'key2'));
end;
 -> bar
```

42.15 PLIST_PUT Function

This function inserts or updates property list value for a key.

Syntax

```
PLIST_PUT (
     p_table IN OUT NOCOPY apex_t_varchar2,
     p_key   IN VARCHAR2,
     p_value IN VARCHAR2 );
```

Parameters

Table 42-17 PLIST_PUT Function Parameters

Parameters	Description
p_table	The input table.
p_key	The input key.
p_value	The input value.

Example

Set property value to `"key2"`.

```
declare
    l_plist apex_t_varchar2 := apex_t_varchar2('key1','foo');
```

```
begin
    apex_string.plist_put(l_plist,'key2','bar');
    sys.dbms_output.put_line(apex_string.plist_get(l_plist,'key2'));
end;
-> bar
```

42.16 PUSH Procedure Signature 1

This procedure appends value to `apex_t_varchar2` table.

Syntax

```
PUSH (
   p_table IN OUT NOCOPY apex_t_varchar2,
   p_value IN VARCHAR2 );
```

Parameters

Table 42-18 PUSH Procedure Signature 1 Parameters

Parameter	Description
`p_table`	Defines the table.
`p_value`	Specifies the value to be added.

Example

The following example demonstrates how to append 2 values, then prints the table.

```
DECLARE
    l_table apex_t_varchar2;
BEGIN
    apex_string.push(l_table, 'a');
    apex_string.push(l_table, 'b');
    sys.dbms_output.put_line(apex_string.join(l_table, ':'));
END;
-> a:b
```

42.17 PUSH Procedure Signature 2

This procedure appends a value to `apex_t_number` table.

Syntax

```
PUSH (
   p_table IN OUT NOCOPY apex_t_number,
   p_value IN NUMBER );
```

Parameters

Table 42-19 PUSH Procedure Signature 2 Parameters

Parameter	Description
p_table	Defines the table.
p_value	Specifies the value to be added.

Example

The following example demonstrates how to append two values, then prints the table.

```
DECLARE
   l_table apex_t_number;
BEGIN
   apex_string.push(l_table, 1);
   apex_string.push(l_table, 2);
   sys.dbms_output.put_line(apex_string.join(l_table, ':'));
END;
-> 1:2
```

42.18 PUSH Procedure Signature 3

This procedure appends collection values to `apex_t_varchar2` table.

Syntax

```
PUSH (
   p_table  IN OUT NOCOPY apex_t_varchar2,
   p_values IN            apex_t_varchar2 );
```

Parameters

Table 42-20 PUSH Procedure Signature 3 Parameters

Parameter	Description
p_table	Defines the table.
p_values	Specifies the values that should be added to p_table.

Example

The following example demonstrates how to append a single value and multiple values, then prints the table.

```
DECLARE
   l_table apex_t_varchar2;
BEGIN
   apex_string.push(l_table, 'a');
   apex_string.push(l_table, apex_t_varchar2('1','2','3'));
```

```
   sys.dbms_output.put_line(apex_string.join(l_table, ':'));
END;
-> a:1:2:3
```

42.19 PUSH Procedure Signature 4

This procedure appends values of a PL/SQL table to `apex_t_varchar2` table.

Syntax

```
PROCEDURE PUSH (
    p_table  IN OUT NOCOPY apex_t_varchar2,
    p_values IN            apex_application_global.vc_arr2 );
```

Parameters

Table 42-21 PUSH Procedure Signature 4 Parameters

Parameter	Description
`p_table`	Defines the table.
`p_values`	Specifies the values that should be added to `p_table`.

Example

The following example demonstrates how to append the values of a PL/SQL table, then prints the table.

```
DECLARE
    l_table  apex_t_varchar2;
    l_values apex_application_global.vc_arr2;
BEGIN
    l_values(1) := 'a';
    l_values(2) := 'b';
    apex_string.push(l_table, l_values);
    sys.dbms_output.put_line(apex_string.join(l_table, ':'));
END;
-> a:b
```

42.20 PUSH Procedure Signature 5

This procedure appends collection values to the `apex_t_clob` table.

Syntax

```
APEX_STRING.PUSH (
  p_table  IN OUT NOCOPY apex_t_clob,
  p_values IN            apex_t_clob )
```

Parameters

Table 42-22 PUSH Parameters

Parameter	Description
p_table	The table.
p_values	Values to be added to p_table.

Example

The following example appends single value and multiple values then prints the table.

```
DECLARE
   l_table apex_t_clob;
BEGIN
   apex_string.push(l_table, 'a');
   apex_string.push(l_table, apex_t_clob('1','2','3'));
   sys.dbms_output.put_line(apex_string.join_clobs(l_table, ':'));
END;
-> a:1:2:3
```

42.21 PUSH Procedure Signature 6

This procedure appends values of a PL/SQL table to the apex_t_varchar2 table.

Syntax

```
APEX_STRING.PUSH (
  p_table  IN OUT NOCOPY apex_t_varchar2,
  p_values IN            apex_application_global.vc_arr2 )
```

Parameters

Table 42-23 PUSH Parameters

Parameter	Description
p_table	The table.
p_values	Values to add to p_table.

Example

The following example appends then prints the table.

```
DECLARE
   l_table  apex_t_varchar2;
   l_values apex_application_global.vc_arr2;
BEGIN
   l_values(1) := 'a';
   l_values(2) := 'b';
   apex_string.push(l_table, l_values);
```

```
   sys.dbms_output.put_line(apex_string.join(l_table, ':'));
END;
-> a:b
```

42.22 SHUFFLE Function

Returns the input table values, re-ordered.

Syntax

```
SHUFFLE (
      p_table IN apex_t_varchar2 )
      RETURN apex_t_varchar2;
```

Parameters

Table 42-24 SHUFFLE Function Parameters

Parameters	Description
p_table	The input table.

Example

Shuffle and print `l_table`.

```
declare
    l_table apex_t_varchar2 := apex_string.split('1234567890',null);
begin

sys.dbms_output.put_line(apex_string.join(apex_string.shuffle(l_table),':'));
end;
-> a permutation of 1:2:3:4:5:6:7:8:9:0
```

42.23 SHUFFLE Procedure

This procedure randomly re-orders the values of the input table.

Syntax

```
SHUFFLE (
      p_table  IN OUT NOCOPY apex_t_varchar2 );
```

Parameters

Table 42-25 SHUFFLE Procedure Parameters

Parameters	Description
p_table	The input table, which will be modified by the procedure.

Example

Shuffle and print `l_table`.

```
declare
    l_table apex_t_varchar2 := apex_string.split('1234567890',null);
begin
    apex_string.shuffle(l_table);
    sys.dbms_output.put_line(apex_string.join(l_table,':'));
end;
-> a permutation of 1:2:3:4:5:6:7:8:9:0
```

42.24 SPLIT Function Signature 1

Use this function to split input string at separator.

Syntax

```
SPLIT (
    p_str   IN VARCHAR2,
    p_sep   IN VARCHAR2 DEFAULT apex_application.LF,
    p_limit IN PLS_INTEGER DEFAULT NULL )
    RETURN apex_t_varchar2;
```

Parameters

Table 42-26 SPLIT Function Signature 1 Parameters

Parameters	Description
`p_str`	The input string.
`p_sep`	The separator. Splits at line feed by default. If null, split after each character. If a single character, split at this character. If more than 1 character, split at regular expression (max 512 characters).
`p_limit`	Maximum number of splits, ignored if null. If smaller than the total possible number of splits, the last table element contains the rest.

Examples

```
apex_string.split(1||chr(10)||2||chr(10)||3)
-> apex_t_varchar2('1','2','3')

apex_string.split('1:2:3',':')
-> apex_t_varchar2('1','2','3')

apex_string.split('123',null)
-> apex_t_varchar2('1','2','3')

apex_string.split('1:2:3:4',':',2)
-> apex_t_varchar2('1','2:3:4')
```

```
apex_string.split('key1=val1, key2=val2','\s*[=,]\s*')
-> apex_t_varchar2('key1','val1','key2','val2')
```

42.25 SPLIT Function Signature 2

Use this function to split input clob at separator.

Syntax

```
SPLIT (
    p_str IN CLOB,
    p_sep IN VARCHAR2 DEFAULT apex_application.LF )
    RETURN apex_t_varchar2;
```

Parameters

Table 42-27 SPLIT Function Signature 2 Parameters

Parameters	Description
p_str	The input clob.
p_sep	The separator. Splits at line feed by default. If null, split after each character. If a single character, split at this character. If more than 1 character, split at regular expression (max 512 characters).

Example

```
apex_string.split('1:2:3',':')
-> apex_t_varchar2('1','2','3')
```

42.26 SPLIT_CLOBS Function

This function splits input clobs at the separator and returns a table of clobs.

Syntax

```
APEX_STRING.SPLIT_CLOBS (
  p_str   IN CLOB,
  p_sep   IN VARCHAR2    DEFAULT apex_application.LF,
  p_limit IN PLS_INTEGER DEFAULT NULL )
RETURN apex_t_clob;
```

Parameters

Table 42-28 XX Parameters

Parameter	Description
p_str	The input clob.

Table 42-28 (Cont.) XX Parameters

Parameter	Description
p_sep	The separator. Splits at line feed by default. If null, split after each character. If a single character, split at this character. If more than 1 character, split at regular expression (max 512 characters).
p_limit	Maximum number of splits. Ignored if null. If smaller than the total possible number of splits, the last table element contains the rest.

Example

```
apex_string.split_clobs('1:2:3',':')
-> apex_t_clob('1','2','3')
```

42.27 SPLIT_NUMBERS Function

Use this function to split input at separator, values must all be numbers.

Syntax

```
SPLIT_NUMBERS (
     p_str IN VARCHAR2,
     p_sep IN VARCHAR2 DEFAULT apex_application.LF )
     RETURN apex_t_number;
```

Parameters

Table 42-29 SPLIT_NUMBERS Function Parameters

Parameters	Description
p_str	The input varchar2.
p_sep	The separator. Splits at line feed by default. If null, split after each character. If a single character, split at this character. If more than 1 character, split at regular expression (max 512 characters).

Example

```
apex_string.split_numbers('1:2:3',':')
-> apex_t_number(1,2,3)
```

42.28 STRING_TO_TABLE Function

This function returns the split input at separator, returning a `vc_arr2`.

Syntax

```
FUNCTION STRING_TO_TABLE (
    p_str   IN VARCHAR2,
    p_sep   IN VARCHAR2 DEFAULT ':' )
    RETURN apex_application_global.vc_arr2;
```

Parameters

Table 42-30 STRING_TO_TABLE Parameters

Parameters	Description
p_str	The input varchar2.
p_sep	The separator, no regexp or split at char. Defaults to ':'.

Example

```
DECLARE
    l_result apex_application_global.vc_arr2;
BEGIN
    l_result := apex_string.string_to_table('1:2:3',':');
    sys.dbms_output.put_line(apex_string.table_to_string(l_result,'-'));
END;
-> 1-2-3
```

42.29 TABLE_TO_STRING Function

This function returns the values of the apex_application_global.vc_arr2 input table p_table as a concatenated varchar2, separated by p_sep.

Syntax

```
FUNCTION TABLE_TO_STRING (
    p_table IN apex_application_global.vc_arr2,
    p_sep   IN VARCHAR2             DEFAULT ':' )
    RETURN VARCHAR2;
```

Parameters

Table 42-31 TABLE_TO_STRING Function Parameters

Parameters	Description
p_table	The input table, assumes no holes and index starts at 1.
p_sep	The separator, default is ':'.

Example

Concatenate numbers, separated by `':'`.

```
declare
    l_table apex_application_global.vc_arr2;
begin
    l_table(1) := 'a';
    l_table(2) := 'b';
    l_table(3) := 'c';
    sys.dbms_output.put_line(apex_string.table_to_string(l_table));
end;
-> a:b:c
```

43
APEX_STRING_UTIL

The `APEX_STRING_UTIL` package provides additional string related utilities.

43.1 DIFF Function

This function computes the difference between tables of lines. The implementation uses the default version of the longest common subexpression algorithm, without any optimizations. The DIFF function is not intended for very large inputs. The output is similar to the unified `diff` format.

Syntax

```
APEX_STRING_UTIL.FUNCTION DIFF (
    p_left    IN apex_t_varchar2,
    p_right   IN apex_t_varchar2,
    p_context IN PLS_INTEGER DEFAULT 3 )
    RETURN apex_t_varchar2;
```

Parameters

Table 43-1 DIFF Function Parameters

Parameter	Description
`p_left`	The lines in the "left" table.

Table 43-1 (Cont.) DIFF Function Parameters

Parameter	Description
p_right	The lines in the "right" table.
p_context	The number of same lines after each diff to also return (default 3).

Returns

A table of varchar2, where the first character denotes the type of diff:

- @ - Line numbers on left and right hand side.
- " " (space) - Context, left and right hand side are equal.
- - - Line is in left hand side, but not in right hand side.
- + - Line is in right hand side, but not in left hand side.

Example

This example computes the diff between the given tables.

```
select apex_string_util.diff (
           p_left  => apex_t_varchar2('how','now','brown','cow'),
           p_right =>
apex_t_varchar2('what','now','brown','cow',1,2,3) )
  from sys.dual;

-> apex_t_varchar2 (
       '@@ 1,0 @@',
       '-how',
       '@@ 1,1 @@',
       '+what',
       ' now',
       ' brown',
       ' cow',
       '@@ 4,5 @@',
       '+1',
       '+2',
       '+3' )
```

43.2 FIND_EMAIL_ADDRESSES Function

This function finds all email addresses in the given input string.

Syntax

```
FUNCTION FIND_EMAIL_ADDRESSES (
    p_string IN VARCHAR2 )
    RETURN apex_t_varchar2;
```

Parameters

Table 43-2 FIND_EMAIL_ADDRESSES Function Parameters

Parameter	Description
p_string	The input string.

Returns

This function returns an array of email addresses without duplicates.

Example

```
declare
    l_string  varchar2(32767) := 'b@c.it hello this hello.world@example.com
is text b@c.it includes the '||
                                 'michael.h@example.com email address and
x.y.z@m.io';
    l_results apex_t_varchar2;
begin
    l_results := apex_string_util.find_email_addresses(l_string);
end;
/
-> apex_t_varchar2 (
       'b@c.it',
       'hello.world@example.com',
       'michael.h@example.com',
       'x.y.z@m.io' )
```

43.3 FIND_EMAIL_FROM Function

This function Finds first occurrance of "From: " and the first email after the "From:".

Syntax

```
FUNCTION FIND_EMAIL_FROM (
    p_string in VARCHAR2 )
    RETURN VARCHAR2;
```

Parameters

Table 43-3 FIND_EMAIL_FROM Function Parameters

Parameter	Description
p_string	The input string.

Returns

This function returns the from address.

Example

```
declare
    l_string  varchar2(32767) := 'From: Marc Sample
<marc.sample@example.com>'||chr(10)||
                                 'Subject: Status Meeting'||chr(10)||
                                 'Date';
    l_result varchar2(4000);
begin
    l_result := apex_string_util.find_email_from(l_string);
    dbms_output.put_line('from = "'||l_result||'"');
end;
/
declare
    l_string  varchar2(32767) := 'Elmar J. Fud <elmar.fud@example.com>
wrote:';
    l_result varchar2(4000);
begin
    l_result := apex_string_util.find_email_from(l_string);
    dbms_output.put_line('from = "'||l_result||'"');
end;
/
-> from = "marc.sample@example.com"
```

43.4 FIND_EMAIL_SUBJECT Function

This function finds the subject text in a given email string.

Syntax

```
FUNCTION FIND_EMAIL_SUBJECT (
    p_string IN VARCHAR2 )
    RETURN VARCHAR2;
```

Parameters

Table 43-4 FIND_EMAIL_SUBJECT Function Parameters

Parameter	Description
p_string	The input string.

Returns

This function returns the subject line.

Example

```
declare
    l_string  varchar2(32767) := 'From: Marc Sample
<marc.sample@example.com>'||chr(10)||
                                 'Subject: Status Meeting'||chr(10)||
```

```
                                    'Date';
    l_result varchar2(4000);
begin
    l_result := apex_string_util.find_email_subject(l_string);
    dbms_output.put_line('Subject = "'||l_result||'"');
end;
/
-> Subject = "Status meeting"
```

43.5 FIND_IDENTIFIERS Function

Given an identifiers prefix, this function finds the identifiers including consecutive numbers following. The search is case insensitive and also ignores white space and special characters.

Syntax

```
FUNCTION FIND_IDENTIFIERS (
    p_string IN VARCHAR2,
    p_prefix IN VARCHAR2 )
    RETURN apex_t_varchar2;
```

Parameters

Parameter	Description
p_string	The input string.
p_prefix	The identifer prefix.

Returns

Returns an array of identifers present in a string.

Example

```
DECLARE
    l_string  varchar2(32767) :=
    'ORA-02291: integrity constraint (A.B.C) violated - parent key not found
'||
    'SR # 3-17627996921 bug: 23423 feature 100022 and feature: 1000001
rptno=28487031 sr# 1111111,  '||
    ' i have filed bug 27911887.';
    l_results apex_t_varchar2;
BEGIN
    l_results := apex_string_util.find_identifiers(l_string,'ORA-');
    l_results := apex_string_util.find_identifiers(l_string,'sr ');
    l_results := apex_string_util.find_identifiers(l_string,'feature ');
    l_results := apex_string_util.find_identifiers(l_string,'bug ');
    l_results := apex_string_util.find_identifiers(l_string,'rptno=');
END;
/
-> apex_t_varchar2('ORA-02291')
-> apex_t_varchar2('SR 3-17627996921','SR 1111111')
```

```
-> apex_t_varchar2('FEATURE 100022','FEATURE 1000001')
-> apex_t_varchar2('BUG 23423','BUG 27911887')
-> apex_t_varchar2('RPTNO=28487031')
```

43.6 FIND_LINKS Function

This function finds `https` and `http` hypertext links within text. The case of URL is preserved and the protocol is returned in lower case.

Syntax

```
FUNCTION FIND_LINKS (
    p_string     IN VARCHAR2,
    p_https_only IN BOOLEAN  DEFAULT FALSE )
RETURN apex_t_varchar2;
```

Parameters

Parameter	Description
`p_string`	The input string.
`p_https_only`	If true (the default is false), only returns `https://` links.

Returns

This function returns an array of links.

Example

```
DECLARE
    l_string  varchar2(32767) := 'http://oracle.com i foo.com like
https://carbuzz.com '||
                                 'and <a href="https://dpreview.com">
and http://google.com';
    l_results apex_t_varchar2;
BEGIN
    l_results := apex_string_util.find_links(l_string,false);
END;
/
-> apex_t_string (
       'https://carbuzz.com',
       'https://dpreview.com',
       'http://oracle.com',
       'http://google.com' )
```

43.7 FIND_PHRASES Function

This function finds the occurrences of `p_string` in `p_phrase` return in an array. The search is case insensitive and also ignores white space and special characters.

Syntax

```
FUNCTION FIND_PHRASES (
    p_phrases IN apex_t_varchar2,
    p_string  IN VARCHAR2 )
    RETURN apex_t_varchar2;
```

Parameters

Table 43-5 FIND_PHRASES Function Parameters

Parameter	Description
p_phrases	A table of phrases.
p_string	The input string.

Returns

This function returns an array of phrases that were found, without duplicates.

Example

```
DECLARE
    l_phrases apex_t_varchar2 := apex_t_varchar2();
    l_arr     apex_t_varchar2 := apex_t_varchar2();
    l_string varchar2(4000) := 'how now brown cow';
BEGIN
    apex_string.push(l_phrases,'brown');
    apex_string.push(l_phrases,'cow');
    apex_string.push(l_phrases,'brown cow');
    l_arr := apex_string_util.find_phrases(l_phrases,l_string);
END;
    /
    apex_t_varchar2('brown','cow','brown cow')
```

43.8 FIND_TAGS Function

This function finds all strings prefixed with a tag identifier. The search is case insensitive and also ignores white space and special characters.

Syntax

```
FUNCTION FIND_TAGS (
    p_string          IN VARCHAR2,
    p_prefix          IN VARCHAR2 DEFAULT '#',
    p_exclude_numeric IN BOOLEAN  DEFAULT TRUE )
RETURN apex_t_varchar2;
```

Parameters

Parameter	Description
p_string	The input string.
p_prefix	The tag prefix (default '#').
p_exclude_numeric	If true (the default), excludes values that only consist of the tag identifier and digits.

Returns

This function returns the found tags in upper case.

Example

```
DECLARE
    l_tags   apex_t_varchar2;
    l_string varchar2(4000) := 'how now #orclapex @mike brown #cow';
BEGIN
    l_tags := apex_string_util.find_tags(l_string,'#');
    l_tags := apex_string_util.find_tags(l_string,'@');
END;
/
-> apex_t_varchar2('#ORCLAPEX','#COW')
-> apex_t_varchar2('@MIKE')
```

43.9 GET_DOMAIN Function

This function extracts a domain from a link or email.

Syntax

```
FUNCTION GET_DOMAIN (
    p_string IN VARCHAR2 )
    RETURN VARCHAR2;
```

Parameters

Table 43-6 GET_DOMAIN Function Parameters

Parameter	Description
p_string	The input string.

Returns

This function returns a domain from a url or email.

Example

```
select apex_string_util.get_domain('https://apex.oracle.com/en/platform/low-
code/') from dual
-> apex.oracle.com
```

43.10 GET_FILE_EXTENSION Function

This function returns a file name's extension.

Syntax

```
FUNCTION GET_FILE_EXTENSION (
    p_filename      IN VARCHAR2 )
    RETURN VARCHAR2;
```

Parameters

Table 43-7 GET_FILE_EXTENSION Function Parameters

Parameter	Description
p_filename	The filename.

Returns

This function returns the file name's extension in lower case.

Example

The following example shows how to use the `GET_FILE_EXTENSION` function.

```
select apex_string_util.get_file_extension('foo.pPtx') from dual
-> pptx
select apex_string_util.get_file_extension('PLEASE.READ.ME.TXT') from dual
-> txt
```

43.11 GET_SLUG Function

Use this function to convert the input string to a "-" separated string, with special characters removed.

Syntax

```
FUNCTION GET_SLUG (
    p_string                IN VARCHAR2,
    p_hash_length           IN PLS_INTEGER DEFAULT 0 )
RETURN VARCHAR2;
```

Parameters

Table 43-8 GET_SLUG Function Parameters

Parameter	Description
p_string	The input string.
p_hash_length	If > 0 (the default is 0), append a hash of the current timestamp to make the result unique.

Example

```
select apex_string_util.get_slug('hey now, brown cow! 1') from dual;
-> hey-now-brown-cow-1
--
select apex_string_util.get_slug('hey now, brown cow! 1',4) from dual;
-> hey-now-brown-cow-1-3486
```

43.12 PHRASE_EXISTS Function

This function returns whether the given phrase is in p_string. The search is case insensitive and also ignores white space and special characters.

Syntax

```
FUNCTION PHRASE_EXISTS (
    p_phrase   IN VARCHAR2,
    p_string   IN VARCHAR2 )
RETURN BOOLEAN;
```

Parameters

Table 43-9 PHRASE_EXISTS Function Parameters

Parameter	Description
p_phrase	The given phrase.
p_string	The input string.

Returns

This function returns TRUE if the phrase was found. Otherwise, this function returns FALSE.

Example

The following example shows how to use the FIND_PHRASE function.

```
DECLARE
              l_phrase varchar2(4000) := 'sqldeveloper';
              l_string varchar2(4000) := 'how now brown cow
```

```
sqldeveloper? sql developer.';
          BEGIN
              IF apex_string_util.phrase_exists(l_phrase,l_string) then
                  dbms_output.put_line('found');
              ELSE
                  dbms_output.put_line('NOT found');
              END IF;
          END;
          /
          -> found
```

43.13 REPLACE_WHITESPACE Function

This function can be used to tokenize the input. It replaces white space and special characters with the given whitespace character. It also lower-cases the input. If `p_original_find` contains '.' or '#', these characters are also replaced by white space.

Syntax

```
FUNCTION REPLACE_WHITESPACE (
    p_string               IN VARCHAR,
    p_original_find        IN VARCHAR2 DEFAULT NULL,
    p_whitespace_character IN VARCHAR2 DEFAULT '|')
    RETURN VARCHAR2;
```

Parameters

Table 43-10 REPLACE_WHITESPACE Function Parameters

Parameter	Description
`p_string`	The input string.
`p_original_find`	A set of characters that were already found in a preceding search operation.
`p_whitespace_character`	The separator character.

Returns

This function returns the input string in lower case with all special characters replaced.

Example

```
select apex_string_util.replace_whitespace('foo: Bar...Baz') from dual
-> |foo|bar|baz|
select apex_string_util.replace_whitespace('foo: Bar...Baz',null,'*') from
dual
-> *foo*bar*baz*
select apex_string_util.replace_whitespace('foo: Bar...Baz','.','*') from
dual
-> *foo*bar...baz*
```

43.14 TO_DISPLAY_FILESIZE Function

This function returns a friendly file size, given a size in bytes (for example, 5.1MB or 6GB).

Syntax

```
FUNCTION TO_DISPLAY_FILESIZE (
    p_size_in_bytes IN NUMBER )
    RETURN VARCHAR2;
```

Parameters

Table 43-11 TO_DISPLAY_FILESIZE Function Parameters

Parameter	Description
p_string	The input string.

Returns

Returns the file size with a unit.

Example

```
select apex_string_util.to_display_filesize(1312312312) from dual;
-> 1.2GB
```

44
APEX_THEME

The APEX_THEME package contains utility functions for working with themes and theme styles.

44.1 CLEAR_ALL_USERS_STYLE Procedure

This procedure clears all theme style user preferences for an application and theme.

Syntax

```
PROCEDURE CLEAR_ALL_USERS_STYLE(
    p_application_id  IN NUMBER           DEFAULT {current application id},
    p_theme_number    IN NUMBER           DEFAULT {current theme id}
);
```

Parameters

Table 44-1 CLEAR_ALL_USERS_STYLE Procedure

Parameter	Description
p_application_id	The application to clear all user theme style preferences for.
p_theme_number	The theme number to clear all theme style user preferences for.

Example

The following example clears the all theme style user preferences for theme 42 in application 100.

```
apex_theme.clear_all_users_style(
p_application_id => 100,
```

```
p_theme_number => 42
);
```

44.2 CLEAR_USER_STYLE Procedure

This procedure clears the theme style user preference for user and application.

Syntax

```
PROCEDURE CLEAR_USER_STYLE(
    p_application_id IN NUMBER          DEFAULT  {current application
id},
    p_user           IN VARCHAR2        DEFAULT {current user},
    p_theme_number   IN  NUMBER         DEFAULT {current theme number}
);
```

Parameters

Table 44-2 CLEAR_USER_STYLE Procedure

Parameter	Description
p_theme_number	The theme number to clear the theme style user preference.

Example

The following example clears the theme style user preference for the `ADMIN` user in application `100` and theme `42`.

```
apex_theme.clear_user_style(
    p_application_id => 100,
    p_user           => 'ADMIN',
    p_theme_number   => 42
);
```

44.3 DISABLE_USER_STYLE Procedure

This procedure disables theme style selection by end users. End users will not be able to customize the theme style on their own. Note that this only affects the *Customization* link for end users. `APEX_THEME` API calls are independent.

Syntax

```
PROCEDURE DISABLE_USER_STYLE(
    p_application_id  IN NUMBER           DEFAULT {current application
id},
    p_theme_number    IN NUMBER           DEFAULT {current theme
number}
);
```

Parameters

Table 44-3 DISABLE_USER_STYLE Procedure

Parameter	Description
p_application_id	The Application ID.
p_theme_number	Number of User Interface's *Current Theme*.

The following example disable end user theme style selection for the `Desktop` user interface of application `100`.

```
declare
  l_theme_id apex_themes.theme_number%type;
begin
select theme_number into l_theme_id
  from apex_appl_user_interfaces
where application_id = 100
  and display_name   = 'Desktop';

apex_theme.disable_user_style(
  p_application_id => 100,
  p_theme_number   => l_theme_id
);
end;
```

44.4 ENABLE_USER_STYLE Procedure

This procedure enables theme style selection by end users. When enabled and there is at least one theme style marked as `Public`, end users will see a Customize link which allows to choose the theme style. End user theme style selection is enabled or disabled at the User Interface level. When providing a theme number, the theme must be the *Current Theme* for a user interface. Note that this only affects the *Customization* link for end users. `APEX_THEME` API calls are independent.

Syntax

```
PROCEDURE ENABLE_USER_STYLE(
    p_application_id  IN NUMBER           DEFAULT {current application id},
    p_theme_number    IN NUMBER           DEFAULT {current theme number}
);
```

Parameters

Table 44-4 ENABLE_USER_STYLE Procedure

Parameter	Description
p_application_id	The Application ID.
p_theme_number	Number of User Interface's *Current Theme*.

The following example enable end user theme style selection for the `Desktop` user interface of application `100`.

```
declare
  l_theme_id apex_themes.theme_number%type;
begin
 select theme_number into l_theme_id
 from apex_appl_user_interfaces
 where application_id = 100
 and display_name   = 'Desktop';

 apex_theme.enable_user_style(
  p_application_id => 100,
  p_theme_number   => l_theme_id
);
end;
```

44.5 GET_USER_STYLE Function

This function returns the theme style user preference for the user and application. If no user preference is present, it returns NULL.

Syntax

```
FUNCTION GET_USER_STYLE (
  p_application_id  IN NUMBER   DEFAULT {current application id},
  p_user            IN VARCHAR2 DEFAULT {current user},
  p_theme_number    IN NUMBER   DEFAULT {current theme number} )
RETURN NUMBER;
```

Parameters

Table 44-5 GET_USER_STYLE Function

Parameter	Description
`p_application_id`	The application to set the user style preference.
`p_user`	The user name to the user style preference.
`p_theme_number`	The theme number to set the session style.
`RETURN`	The theme style ID which is set as a user preference.

Example

The query returns the theme style user preference for the `ADMIN` user in application `100` and theme `42`.

```
select apex_theme.get_user_style( 100, 'ADMIN', 42 ) from dual;
```

44.6 SET_CURRENT_STYLE Procedure

This procedure sets current theme style for the current application.

Syntax

```
APEX_THEME.SET_CURRENT_STYLE (
    p_theme_number  IN NUMBER,
    p_id            IN VARCHAR2 );
```

Parameters

Table 44-6 SET_CURRENT_STYLE Procedure

Parameter	Description
p_theme_number	The theme number for which to set the default style.
p_style_id	The ID of the new default theme style.

Example

The following example gets available theme styles from **APEX Dictionary View** for the DESKTOP user interface.

```
select s.theme_style_id, t.theme_number
  from apex_application_theme_styles s,
apex_application_themes t
          where s.application_id = t.application_id
            and s.theme_number = t.theme_number
            and s.application_id = :app_id
            and t.ui_type_name = 'DESKTOP'
            and s.is_current = 'Yes'
```

The following example sets the current theme style to one of values returned by the above query.

```
apex_theme.set_current_style (
     p_theme_number => {query.theme_number},
     p_id => {query.theme_style_id}
);
```

> **See Also:**
>
> SET_CURRENT_THEME_STYLE Procedure [DEPRECATED]

44.7 SET_SESSION_STYLE Procedure

This procedure sets the theme style dynamically for the current session. This is typically called after successful authentication.

Syntax

```
APEX_THEME.SET_SESSION_STYLE (
    p_theme_number  IN NUMBER   DEFAULT {current theme number},
    p_name          IN VARCHAR2 );
```

Parameters

Table 44-7 SET_SESSION_STYLE Procedure

Parameter	Description
p_theme_number	The theme number to set the session style for. Default is the current theme of the application.
p_name	The name of the theme style to be used in the session.

Example

The following example gets the current theme number from **APEX Dictionary View** for the `DESKTOP` user interface.

```
select t.theme_number
  from apex_application_themes t
 where t.application_id = :app_id
   and t.ui_type_name = 'DESKTOP'
```

The following example sets the session theme style for the current theme to `Vita`.

```
apex_theme.set_session_style (
     p_theme_number => {query.theme_number},
     p_name => 'Vita'
);
```

44.8 SET_SESSION_STYLE_CSS Procedure

This procedure sets the theme style CSS URLs dynamically for the current session. Theme style CSS URLs directly pass in; a persistent style definition is optional. This is typically called after successful authentication.

Syntax

```
APEX_THEME.SET_SESSION_STYLE_CSS (
    p_theme_number  IN NUMBER   DEFAULT {current theme number},
    p_css_file_urls IN VARCHAR2 );
```

Parameters

Table 44-8 SET_SESSION_STYLE_CSS Procedure

Parameter	Description
p_theme_number	The theme number to set the session style.
p_css_urls	The URLs to CSS files with style directives.

Example

The following example gets available theme styles from **Oracle APEX Dictionary View** for the DESKTOP user interface.

```
select s.theme_style_id, t.theme_number
  from apex_application_theme_styles s,
apex_application_themes t
          where s.application_id = t.application_id
            and s.theme_number = t.theme_number
            and s.application_id = :app_id
            and t.ui_type_name = 'DESKTOP'
            and s.is_current = 'Yes'
```

The following example sets the current theme style to one of values returned by the above query.

```
apex_theme.set_session_style_css(
    p_theme_number => {query.theme_number},
    p_css_urls => {URLs to theme style CSS files}
);
```

44.9 SET_USER_STYLE Procedure

This procedure sets a theme style user preference for the current user and application. Theme Style User Preferences are automatically picked up and precede any style set with SET_SESSION_STYLE.

Syntax

```
APEX_THEME.SET_USER_STYLE (
    p_application_id  IN NUMBER          DEFAULT {current application id},
    p_user            IN VARCHAR2        DEFAULT {current user},
    p_theme_number    IN NUMBER          DEFAULT {current theme number},
    p_id              IN NUMBER );
```

Parameters

Table 44-9 SET_USER_STYLE Procedure

Parameter	Description
p_application_id	The application to set the user style preference.
p_user	The user name to the user style preference.
p_theme_number	The theme number to set the user style preference.
p_id	The ID of the theme style to set as a user preference.

Example

The following example gets available theme styles from **Oracle APEX Dictionary View** for the `DESKTOP` user interface.

```
select s.theme_style_id, t.theme_number
  from apex_application_theme_styles s,
apex_application_themes t
          where s.application_id = t.application_id
            and s.theme_number = t.theme_number
            and s.application_id = :app_id
            and t.ui_type_name = 'DESKTOP'
            and s.is_current = 'Yes'
```

The following example sets the current theme style IDs as user preference for `ADMIN` in application ID `100`.

```
apex_theme.set_user_style (
     p_application_id => 100,
     p_user           => 'ADMIN',
     p_theme_number   => {query.theme_number},
     p_id             => {query.theme_style_id}
);
```

45
APEX_UI_DEFAULT_UPDATE

The `APEX_UI_DEFAULT_UPDATE` package provides procedures to access user interface defaults from within SQL Developer or SQL*Plus.

You can use this package to set the user interface defaults associated with a table within a schema. The package must be called from within the schema that owns the table you are updating.

User interface defaults enable you to assign default user interface properties to a table, column, or view within a specified schema. When you create a form or report using a wizard, the wizard uses this information to create default values for region and item properties. Utilizing user interface defaults can save valuable development time and has the added benefit of providing consistency across multiple pages in an application.

- UPD_TABLE Procedure

> **See Also:**
>
> Managing User Interface Defaults in *Oracle APEX SQL Workshop Guide*

45.1 ADD_AD_COLUMN Procedure

Adds a User Interface Default Attribute Dictionary entry with the provided definition. Up to three synonyms can be provided during the creation. Additional synonyms can be added post-creation using apex_ui_default_update.add_ad_synonym. Synonyms share the column definition of their base column.

Syntax

```
APEX_UI_DEFAULT_UPDATE.ADD_AD_COLUMN (
    p_column_name           IN  VARCHAR2,
    p_label                 IN  VARCHAR2  DEFAULT NULL,
    p_help_text             IN  VARCHAR2  DEFAULT NULL,
    p_format_mask           IN  VARCHAR2  DEFAULT NULL,
    p_default_value         IN  VARCHAR2  DEFAULT NULL,
    p_form_format_mask      IN  VARCHAR2  DEFAULT NULL,
    p_form_display_width    IN  VARCHAR2  DEFAULT NULL,
    p_form_display_height   IN  VARCHAR2  DEFAULT NULL,
    p_form_data_type        IN  VARCHAR2  DEFAULT NULL,
    p_report_format_mask    IN  VARCHAR2  DEFAULT NULL,
    p_report_col_alignment  IN  VARCHAR2  DEFAULT NULL,
    p_syn_name1             IN  VARCHAR2  DEFAULT NULL,
    p_syn_name2             IN  VARCHAR2  DEFAULT NULL,
    p_syn_name3             IN  VARCHAR2  DEFAULT NULL);
```

Parameters

Table 45-1 ADD_AD_COLUMN Parameters

Parameter	Description
p_column_name	Name of column to be created.
p_label	Used for item label and report column heading.
p_help_text	Used for help text for items and interactive report columns
p_format_mask	Used as the format mask for items and report columns. Can be overwritten by report for form specific format masks.
p_default_value	Used as the default value for items.
p_form_format_mask	If provided, used as the format mask for items, overriding any value for the general format mask.
p_form_display_width	Used as the width of any items using this Attribute Definition.

Table 45-1 (Cont.) ADD_AD_COLUMN Parameters

Parameter	Description
p_form_display_height	Used as the height of any items using this Attribute Definition (only used by item types such as text areas and shuttles).
p_form_data_type	Used as the data type for items (results in an automatic validation). Valid values are VARCHAR, NUMBER and DATE.
p_report_format_mask	If provided, used as the format mask for report columns, overriding any value for the general format mask.
p_report_col_alignment	Used as the alignment for report column data (for example, number are usually right justified). Valid values are LEFT, CENTER, and RIGHT.
p_syn_name1	Name of synonym to be created along with this column. For more than 3, use APEX_UI_DEFAULT_UPDATE.ADD_AD_SYNONYM.
p_syn_name2	Name of second synonym to be created along with this column. For more than 3, use APEX_UI_DEFAULT_UPDATE.ADD_AD_SYNONYM.
p_syn_name3	Name of third synonym to be created along with this column. For more than 3, use APEX_UI_DEFAULT_UPDATE.ADD_AD_SYNONYM.

Example

The following example creates a new attribute to the UI Defaults Attribute Dictionary within the workspace associated with the current schema. It also creates a synonym for that attribute.

```
BEGIN
    apex_ui_default_update.add_ad_column (
       p_column_name          => 'CREATED_BY',
       p_label                => 'Created By',
       p_help_text            => 'User that created the record.',
       p_form_display_width   => 30,
       p_form_data_type       => 'VARCHAR',
       p_report_col_alignment => 'LEFT',
       p_syn_name1            => 'CREATED_BY_USER' );
END;
```

45.2 ADD_AD_SYNONYM Procedure

If the column name is found within the User Interface Default Attribute Dictionary, the synonym provided is created and associated with that column. Synonyms share the column definition of their base column.

Syntax

```
APEX_UI_DEFAULT_UPDATE.ADD_AD_SYNONYM (
    p_column_name           IN VARCHAR2,
    p_syn_name              IN VARCHAR2);
```

Parameters

Table 45-2 ADD_AD_SYNONYM Parameters

Parameter	Description
p_column_name	Name of column with the Attribute Dictionary that the synonym is being created for.
p_syn_name	Name of synonym to be created.

Example

The following example add the synonym CREATED_BY_USER to the CREATED_BY attribute of the UI Defaults Attribute Dictionary within the workspace associated with the current schema.

```
BEGIN
    apex_ui_default_update.add_ad_synonym (
       p_column_name => 'CREATED_BY',
       p_syn_name    => 'CREATED_BY_USER' );
END;
```

45.3 DEL_AD_COLUMN Procedure

If the column name is found within the User Interface Default Attribute Dictionary, the column, along with any associated synonyms, is deleted.

Syntax

```
APEX_UI_DEFAULT_UPDATE.DEL_AD_COLUMN (
    p_column_name           IN VARCHAR2);
```

Parameters

Table 45-3 DEL_AD_COLUMN Parameters

Parameter	Description
p_column_name	Name of column to be deleted

Example

The following example deletes the attribute CREATED_BY from the UI Defaults Attribute Dictionary within the workspace associated with the current schema.

```
BEGIN
    apex_ui_default_update.del_ad_column (
       p_column_name => 'CREATED_BY' );
END;
```

45.4 DEL_AD_SYNONYM Procedure

If the synonym name is found within the User Interface Default Attribute Dictionary, the synonym name is deleted.

Syntax

```
APEX_UI_DEFAULT_UPDATE.DEL_AD_SYNONYM (
    p_syn_name           IN VARCHAR2);
```

Parameters

Table 45-4 DEL_AD_SYNONYM Parameters

Parameter	Description
p_syn_name	Name of synonym to be deleted

Example

The following example deletes the synonym CREATED_BY_USER from the UI Defaults Attribute Dictionary within the workspace associated with the current schema.

```
BEGIN
    apex_ui_default_update.del_ad_synonym (
       p_syn_name    => 'CREATED_BY_USER' );
END;
```

45.5 DEL_COLUMN Procedure

If the provided table and column exists within the user's schema's table based User Interface Defaults, the UI Defaults for it are deleted.

Syntax

```
APEX_UI_DEFAULT_UPDATE.DEL_COLUMN (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2);
```

Parameters

Table 45-5 DEL_COLUMN Parameters

Parameter	Description
p_table_name	Name of table whose column's UI Defaults are to be deleted.
p_column_name	Name of columns whose UI Defaults are to be deleted.

Example

The following example deletes the column CREATED_BY from the EMP table definition within the UI Defaults Table Dictionary within the current schema.

```
BEGIN
    apex_ui_default_update.del_column (
       p_table_name  => 'EMP',
       p_column_name => 'CREATED_BY' );
END;
```

45.6 DEL_GROUP Procedure

If the provided table and group exists within the user's schema's table based User Interface Defaults, the UI Defaults for it are deleted and any column within the table that references that group has the group_id set to null.

Syntax

```
APEX_UI_DEFAULT_UPDATE.DEL_GROUP (
    p_table_name            IN VARCHAR2,
    p_group_name            IN VARCHAR2);
```

Parameters

Table 45-6 DEL_GROUP Parameters

Parameter	Description
p_table_name	Name of table whose group UI Defaults are to be deleted
p_group_name	Name of group whose UI Defaults are to be deleted

Example

The following example deletes the group AUDIT_INFO from the EMP table definition within the UI Defaults Table Dictionary within the current schema.

```
BEGIN
    apex_ui_default_update.del_group (
       p_table_name => 'EMP',
```

```
       p_group_name => 'AUDIT_INFO' );
END;
```

45.7 DEL_TABLE Procedure

If the provided table exists within the user's schema's table based User Interface Defaults, the UI Defaults for it is deleted. This includes the deletion of any groups defined for the table and all the columns associated with the table.

Syntax

```
APEX_UI_DEFAULT_UPDATE.DEL_TABLE (
    p_table_name            IN VARCHAR2);
```

Parameters

Table 45-7 DEL_TABLE Parameters

Parameter	Description
p_table_name	Table name

Example

The following example removes the UI Defaults for the EMP table that are associated with the current schema.

```
begin
    apex_ui_default_update.del_table (
       p_table_name => 'EMP' );
end;
/
```

45.8 SYNCH_TABLE Procedure

If the Table Based User Interface Defaults for the table do not already exist within the user's schema, they are defaulted. If they do exist, they are synchronized, meaning, the columns in the table is matched against the column in the UI Defaults Table Definitions. Additions and deletions are used to make them match.

Syntax

```
APEX_UI_DEFAULT_UPDATE.SYNCH_TABLE (
    p_table_name            IN VARCHAR2);
```

Parameters

Table 45-8 SYNCH_TABLE Parameters

Parameter	Description
p_table_name	Table name

Example

The following example synchronizes the UI Defaults for the EMP table that are associated with the current schema.

```
BEGIN
    apex_ui_default_update.synch_table (
       p_table_name => 'EMP' );
END;
```

45.9 UPD_AD_COLUMN Procedure

If the column name is found within the User Interface Default Attribute Dictionary, the column entry is updated using the provided parameters. If 'null%' is passed in, the value of the associated parameter is set to null.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_AD_COLUMN (
    p_column_name           IN  VARCHAR2,
    p_new_column_name       IN  VARCHAR2  DEFAULT NULL,
    p_label                 IN  VARCHAR2  DEFAULT NULL,
    p_help_text             IN  VARCHAR2  DEFAULT NULL,
    p_format_mask           IN  VARCHAR2  DEFAULT NULL,
    p_default_value         IN  VARCHAR2  DEFAULT NULL,
    p_form_format_mask      IN  VARCHAR2  DEFAULT NULL,
    p_form_display_width    IN  VARCHAR2  DEFAULT NULL,
    p_form_display_height   IN  VARCHAR2  DEFAULT NULL,
    p_form_data_type        IN  VARCHAR2  DEFAULT NULL,
    p_report_format_mask    IN  VARCHAR2  DEFAULT NULL,
    p_report_col_alignment  IN  VARCHAR2  DEFAULT NULL);
```

Parameters

Table 45-9 UPD_AD_COLUMN Parameters

Parameter	Description
p_column_name	Name of column to be updated
p_new_column_name	New name for column, if column is being renamed
p_label	Used for item label and report column heading
p_help_text	Used for help text for items and interactive report columns

Table 45-9 (Cont.) UPD_AD_COLUMN Parameters

Parameter	Description
p_format_mask	Used as the format mask for items and report columns. Can be overwritten by report for form specific format masks.
p_default_value	Used as the default value for items.
p_form_format_mask	If provided, used as the format mask for items, overriding any value for the general format mask.
p_form_display_width	Used as the width of any items using this Attribute Definition.
p_form_display_height	Used as the height of any items using this Attribute Definition (only used by item types such as text areas and shuttles).
p_form_data_type	Used as the data type for items (results in an automatic validation). Valid values are VARCHAR, NUMBER and DATE.
p_report_format_mask	If provided, used as the format mask for report columns, overriding any value for the general format mask.
p_report_col_alignment	Used as the alignment for report column data (for example, number are usually right justified). Valid values are LEFT, CENTER, and RIGHT.

Note:

If p_label through p_report_col_alignment are set to 'null%', the value is nullified. If no value is passed in, that column is not updated.

Example

The following example updates the CREATED_BY column in the UI Defaults Attribute Dictionary within the workspace associated with the current schema, setting the form_format_mask to null.

```
BEGIN
    apex_ui_default_update.upd_ad_column (
       p_column_name      => 'CREATED_BY',
       p_form_format_mask => 'null%');
END;
```

45.10 UPD_AD_SYNONYM Procedure

If the synonym name is found within the User Interface Default Attribute Dictionary, the synonym name is updated.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_AD_SYNONYM (
    p_syn_name           IN VARCHAR2,
    p_new_syn_name       IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-10 UPD_AD_SYNONYM Parameters

Parameter	Description
p_syn_name	Name of synonym to be updated
p_new_syn_name	New name for synonym

Example

The following example updates the CREATED_BY_USER synonym in the UI Defaults Attribute Dictionary within the workspace associated with the current schema.

```
BEGIN
    apex_ui_default_update.upd_ad_synonym (
       p_syn_name     => 'CREATED_BY_USER',
       p_new_syn_name => 'USER_CREATED_BY');
END;
```

45.11 UPD_COLUMN Procedure

If the provided table and column exists within the user's schema's table based User Interface Defaults, the provided parameters are updated. If 'null%' is passed in, the value of the associated parameter is set to null.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_COLUMN (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_group_id              IN VARCHAR2  DEFAULT NULL,
    p_label                 IN VARCHAR2  DEFAULT NULL,
    p_help_text             IN VARCHAR2  DEFAULT NULL,
    p_display_in_form       IN VARCHAR2  DEFAULT NULL,
    p_display_seq_form      IN VARCHAR2  DEFAULT NULL,
    p_mask_form             IN VARCHAR2  DEFAULT NULL,
    p_default_value         IN VARCHAR2  DEFAULT NULL,
    p_required              IN VARCHAR2  DEFAULT NULL,
    p_display_width         IN VARCHAR2  DEFAULT NULL,
    p_max_width             IN VARCHAR2  DEFAULT NULL,
    p_height                IN VARCHAR2  DEFAULT NULL,
    p_display_in_report     IN VARCHAR2  DEFAULT NULL,
    p_display_seq_report    IN VARCHAR2  DEFAULT NULL,
```

```
    p_mask_report           IN VARCHAR2  DEFAULT NULL,
    p_alignment             IN VARCHAR2  DEFAULT NULL);
```

Parameters

Table 45-11 UPD_COLUMN Parameters

Parameter	Description
p_table_name	Name of table whose column's UI Defaults are being updated
p_column_name	Name of column whose UI Defaults are being updated
p_group_id	id of group to be associated with the column
p_label	When creating a form against this table or view, this is used as the label for the item if this column is included. When creating a report or tabular form, this is used as the column heading if this column is included.
p_help_text	When creating a form against this table or view, this becomes the help text for the resulting item.
p_display_in_form	When creating a form against this table or view, this determines whether this column is displayed in the resulting form page. Valid values are Y and N.
p_display_seq_form	When creating a form against this table or view, this determines the sequence in which the columns is displayed in the resulting form page.
p_mask_form	When creating a form against this table or view, this specifies the mask that is applied to the item, such as 999-99-9999. This is not used for character based items.
p_default_value	When creating a form against this table or view, this specifies the default value for the item resulting from this column.
p_required	When creating a form against this table or view, this specifies to generate a validation in which the resulting item must be NOT NULL. Valid values are Y and N.
p_display_width	When creating a form against this table or view, this specifies the display width of the item resulting from this column.
p_max_width	When creating a form against this table or view, this specifies the maximum string length that a user is allowed to enter in the item resulting from this column.
p_height	When creating a form against this table or view, this specifies the display height of the item resulting from this column.
p_display_in_report	When creating a report against this table or view, this determines whether this column is displayed in the resulting report. Valid values are Y and N.
p_display_seq_report	When creating a report against this table or view, this determines the sequence in which the columns are displayed in the resulting report.
p_mask_report	When creating a report against this table or view, this specifies the mask that is applied against the data, such as 999-99-9999. This is not used for character based items.
p_alignment	When creating a report against this table or view, this determines the alignment for the resulting report column. Valid values are L for Left, C for Center, and R for Right.

> **Note:**
>
> If `p_group_id` through `p_alignment` are set to 'null%', the value is nullified. If no value is passed in, that column is not updated.

Example

The following example updates the column `DEPT_NO` within the `EMP` table definition within the UI Defaults Table Dictionary within the current schema, setting the `group_id` to null.

```
BEGIN
    apex_ui_default_update.upd_column (
       p_table_name    => 'EMP',
       p_column_name   => 'DEPT_NO',
       p_group_id      => 'null%' );
END;
```

45.12 UPD_DISPLAY_IN_FORM Procedure

The `UPD_DISPLAY_IN_FORM` procedure sets the display in form user interface defaults. This user interface default is used by wizards when you select to create a form based upon the table. It controls whether the column is included by default or not.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_DISPLAY_IN_FORM (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_display_in_form       IN VARCHAR2);
```

Parameters

Table 45-12 UPD_DISPLAY_IN_FORM Parameters

Parameter	Description
`p_table_name`	Table name
`p_column_name`	Column name
`p_display_in_form`	Determines whether to display in the form by default, valid values are `Y` and `N`

Example

In the following example, when creating a Form against the DEPT table, the display option on the DEPTNO column defaults to 'No'.

```
APEX_UI_DEFAULT_UPDATE.UPD_DISPLAY_IN_FORM(
    p_table_name => 'DEPT',
```

```
    p_column_name => 'DEPTNO',
    p_display_in_form => 'N');
```

45.13 UPD_DISPLAY_IN_REPORT Procedure

The `UPD_DISPLAY_IN_REPORT` procedure sets the display in report user interface default. This user interface default is used by wizards when you select to create a report based upon the table and controls whether the column is included by default or not.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_DISPLAY_IN_REPORT (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_display_in_report     IN VARCHAR2);
```

Parameters

Table 45-13 UPD_DISPLAY_IN_REPORT Parameters

Parameter	Description
`p_table_name`	Table name
`p_column_name`	Column name
`p_display_in_report`	Determines whether to display in the report by default, valid values are `Y` and `N`

Example

In the following example, when creating a Report against the DEPT table, the display option on the DEPTNO column defaults to 'No'.

```
APEX_UI_DEFAULT_UPDATE.UPD_DISPLAY_IN_REPORT(
    p_table_name => 'DEPT',
    p_column_name => 'DEPTNO',
    p_display_in_report => 'N');
```

45.14 UPD_FORM_REGION_TITLE Procedure

The `UPD_FORM_REGION_TITLE` procedure updates the Form Region Title user interface default. User interface defaults are used in wizards when you create a form based upon the specified table.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_FORM_REGION_TITLE (
    p_table_name            IN VARCHAR2,
    p_form_region_title     IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-14 UPDATE_FORM_REGION_TITLE Parameters

Parameter	Description
p_table_name	Table name
p_form_region_title	Desired form region title

Example

This example demonstrates how to set the Forms Region Title user interface default on the DEPT table.

```
APEX_UI_DEFAULT_UPDATE.UPD_FORM_REGION_TITLE (
    p_table_name         => 'DEPT',
    p_form_region_title  => 'Deptartment Details');
```

45.15 UPD_GROUP Procedure

If the provided table and group exist within the user's schema's table based User Interface Defaults, the group name, description and display sequence of the group are updated. If 'null%' is passed in for p_description or p_display_sequence, the value is set to null.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_GROUP (
    p_table_name            IN VARCHAR2,
    p_group_name            IN VARCHAR2,
    p_new_group_name        IN VARCHAR2 DEFAULT NULL,
    p_description           IN VARCHAR2 DEFAULT NULL,
    p_display_sequence      IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-15 UPD_GROUP Parameters

Parameter	Description
p_table_name	Name of table whose group is being updated
p_group_name	Group being updated
p_new_group_name	New name for group, if group is being renamed
p_description	Description of group
p_display_sequence	Display sequence of group.

> **Note:**
>
> If `p_description` or `p_display_sequence` are set to 'null%', the value is nullified. If no value is passed in, that column is not updated.

Example

The following example updates the description of the group `AUDIT_INFO` within the `EMP` table definition within the UI Defaults Table Dictionary within the current schema.

```
BEGIN
    apex_ui_default_update.upd_group (
       p_table_name  => 'EMP',
       p_group_name  => 'AUDIT_INFO',
       p_description => 'Audit columns' );
END;
```

45.16 UPD_ITEM_DISPLAY_HEIGHT Procedure

The `UPD_ITEM_DISPLAY_HEIGHT` procedure sets the item display height user interface default. This user interface default is used by wizards when you select to create a form based upon the table and include the specified column. Display height controls if the item is a text box or a text area.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_DISPLAY_HEIGHT (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_display_height        IN NUMBER);
```

Parameters

Table 45-16 UPD_ITEM_DISPLAY_HEIGHT Parameters

Parameter	Description
`p_table_name`	Table name
`p_column_name`	Column name
`p_display_height`	Display height of any items created based upon this column

Example

The following example sets a default item height of 3 when creating an item on the DNAME column against the DEPT table.

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_DISPLAY_HEIGHT(
   p_table_name => 'DEPT',
```

```
    p_column_name => 'DNAME',
    p_display_height => 3);
```

45.17 UPD_ITEM_DISPLAY_WIDTH Procedure

The `UPD_ITEM_DISPLAY_WIDTH` procedure sets the item display width user interface default. This user interface default is used by wizards when you select to create a form based upon the table and include the specified column.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_DISPLAY_WIDTH (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_display_width         IN NUMBER);
```

Parameters

Table 45-17 UPD_ITEM_DISPLAY_WIDTH Parameters

Parameter	Description
`p_table_name`	Table name
`p_column_name`	Column name
`p_display_width`	Display width of any items created based upon this column

Example

The following example sets a default item width of 5 when creating an item on the DEPTNO column against the DEPT table.

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_DISPLAY_WIDTH(
   p_table_name => 'DEPT',
   p_column_name => 'DEPTNO',
   p_display_width => 5);
```

45.18 UPD_ITEM_FORMAT_MASK Procedure

The `UPD_ITEM_FORMAT_MASK` procedure sets the item format mask user interface default. This user interface default is used by wizards when you select to create a form based upon the table and include the specified column. Item format mask is typically used to format numbers and dates.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_FORMAT_MASK (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_format_mask           IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-18 UPD_ITEM_FORMAT_MASK Parameters

Parameter	Description
p_table_name	Table name
p_column_name	Column name
p_format_mask	Format mask to be associated with the column

Example

In the following example, when creating a Form against the EMP table, the default item format mask on the HIREDATE column is set to 'DD-MON-YYYY'.

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_FORMAT_MASK(
    p_table_name => 'EMP',
    p_column_name => 'HIREDATE',
    p_format_mask=> 'DD-MON-YYYY');
```

45.19 UPD_ITEM_HELP Procedure

The UPD_ITEM_HELP procedure updates the help text for the specified table and column. This user interface default is used when you create a form based upon the table and select to include the specified column.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_HELP (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_help_text             IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-19 UPD_ITEM_HELP Parameters

Parameter	Description
p_table_name	Table name
p_column_name	Column name
p_help_text	Desired help text

Example

This example demonstrates how to set the User Interface Item Help Text default for the DEPTNO column in the DEPT table.

```
APEX_UI_DEFAULT_UPDATE.UPD_ITEM_HELP(
   p_table_name => 'DEPT',
```

```
    p_column_name => 'DEPTNO',
    p_help_text => 'The number assigned to the department.');
```

45.20 UPD_LABEL Procedure

The `UPD_LABEL` procedure sets the label used for items. This user interface default is used when you create a form or report based on the specified table and include a specific column.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_LABEL (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_label                 IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-20 UPD__LABEL Parameters

Parameter	Description
`p_table_name`	Table name
`p_column_name`	Column name
`p_label`	Desired item label

Example

This example demonstrates how to set the User Interface Item Label default for the DEPTNO column in the DEPT table.

```
APEX_UI_DEFAULT_UPDATE.UPD_LABEL(
   p_table_name => 'DEPT',
   p_column_name => 'DEPTNO',
   p_label => 'Department Number');
```

45.21 UPD_REPORT_ALIGNMENT Procedure

The UPD_REPORT_ALIGNMENT procedure sets the report alignment user interface default. This user interface default is used by wizards when you select to create a report based upon the table and include the specified column and determines if the report column should be left, center, or right justified.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_REPORT_ALIGNMENT (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_report_alignment      IN VARCHAR2);
```

Parameters

Table 45-21 UPD_REPORT_ALIGNMENT Parameters

Parameter	Description
p_table_name	Table name.
p_column_name	Column name.
p_report_alignment	Defines the alignment of the column in a report. Valid values are L (left), C (center) and R (right).

Example

In the following example, when creating a Report against the DEPT table, the default column alignment on the DEPTNO column is set to Right justified.

```
APEX_UI_DEFAULT_UPDATE.UPD_REPORT_ALIGNMENT(
    p_table_name => 'DEPT',
    p_column_name => 'DEPTNO',
    p_report_alignment => 'R');
```

45.22 UPD_REPORT_FORMAT_MASK Procedure

The `UPD_REPORT_FORMAT_MASK` procedure sets the report format mask user interface default. This user interface default is used by wizards when you select to create a report based upon the table and include the specified column. Report format mask is typically used to format numbers and dates.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_REPORT_FORMAT_MASK (
    p_table_name            IN VARCHAR2,
    p_column_name           IN VARCHAR2,
    p_format_mask           IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-22 UPD_REPORT_FORMAT_MASK Parameters

Parameter	Description
p_table_name	Table name
p_column_name	Column name
p_format_mask	Format mask to be associated with the column whenever it is included in a report

Example

In the following example, when creating a Report against the EMP table, the default format mask on the HIREDATE column is set to 'DD-MON-YYYY'.

```
APEX_UI_DEFAULT_UPDATE.UPD_REPORT_FORMAT_MASK(
    p_table_name => 'EMP',
    p_column_name => 'HIREDATE',
    p_format_mask=> 'DD-MON-YYYY');
```

45.23 UPD_REPORT_REGION_TITLE Procedure

The `UPD_REPORT_REGION_TITLE` procedure sets the Report Region Title. User interface defaults are used in wizards when a report is created on a table.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_REPORT_REGION_TITLE (
    p_table_name            IN VARCHAR2,
    p_report_region_title   IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-23 UPD_REPORT_REGION_TITLE Parameters

Parameter	Description
`p_table_name`	Table name
`p_report_region_title`	Desired report region title

Example

This example demonstrates how to set the Reports Region Title user interface default on the DEPT table.

```
APEX_UI_DEFAULT_UPDATE.UPD_REPORT_REGION_TITLE (
    p_table_name            => 'DEPT',
    p_report_region_title   => 'Departments');
```

45.24 UPD_TABLE Procedure

If the provided table exists within the user's schema's table based User Interface Defaults, the form region title and report region title are updated to match those provided. If 'null%' is passed in for p_form_region_title or p_report_region_title, the value is set to null.

Syntax

```
APEX_UI_DEFAULT_UPDATE.UPD_TABLE (
    p_table_name            IN VARCHAR2,
```

```
    p_form_region_title     IN VARCHAR2 DEFAULT NULL,
    p_report_region_title   IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 45-24 UPD_TABLE Parameters

Parameter	Description
p_table_name	Name of table being updated.
p_form_region_title	Region title used for forms.
p_report_region_title	Region title used for reports and tabular forms.

> **Note:**
>
> if 'null%' is passed in for p_form_region_title or p_report_region_title, the value is set to null. If no value is passed in, that column is not updated.

Example

The following example updates the EMP table definition within the UI Defaults Table Dictionary within the current schema.

```
begin
    apex_ui_default_update.upd_table (
       p_table_name          => 'EMP',
       p_form_region_title   => 'Employee Details',
       p_report_region_title => 'Employees' );
end;
/
```

46
APEX_UTIL

The APEX_UTIL package provides utilities you can use when programming in the Oracle APEX environment. You can use the APEX_UTIL package to get and set session state, to get files, to check authorizations for users, to reset different states for users, to get and purge cache information, and to get and set preferences for users.

46.1 CACHE_GET_DATE_OF_PAGE_CACHE Function

This function returns the date and time a specified application page was cached either for the user issuing the call, or for all users if the page was not set to be cached by user.

Syntax

```
APEX_UTIL.CACHE_GET_DATE_OF_PAGE_CACHE (
    p_application  IN NUMBER,
    p_page         IN NUMBER)
RETURN DATE;
```

Parameters

Table 46-1 CACHE_GET_DATE_OF_PAGE_CACHE Parameters

Parameter	Description
p_application	The identification number (ID) of the application.
p_page	The page number (ID).

Example

The following example demonstrates how to use the CACHE_GET_DATE_OF_PAGE_CACHE function to retrieve the cache date and time for page 9 of the currently executing application. If page 9 has been cached, the cache date and time is output using the HTP package. The page could have been cached either by the user issuing the call, or for all users if the page was not to be cached by the user.

```
DECLARE
    l_cache_date DATE DEFAULT NULL;
BEGIN
    l_cache_date := APEX_UTIL.CACHE_GET_DATE_OF_PAGE_CACHE(
                        p_application => :APP_ID,
                        p_page => 9);
    IF l_cache_date IS NOT NULL THEN
        HTP.P('Cached on ' || TO_CHAR(l_cache_date, 'DD-MON-YY HH24:MI:SS'));
```

```
    END IF;
END;
```

46.2 CACHE_GET_DATE_OF_REGION_CACHE Function

This function returns the date and time a specified region was cached either for the user issuing the call, or for all users if the page was not set to be cached by user.

Syntax

```
APEX_UTIL.CACHE_GET_DATE_OF_REGION_CACHE (
    p_application  IN NUMBER,
    p_page         IN NUMBER,
    p_region_name  IN VARCHAR2)
RETURN DATE;
```

Parameters

Table 46-2 CACHE_GET_DATE_OF_REGION_CACHE Parameters

Parameter	Description
p_application	The identification number (ID) of the application .
p_page	The page number (ID).
p_region_name	The region name.

Example

The following example demonstrates how to use the CACHE_GET_DATE_OF_REGION_CACHE function to retrieve the cache date and time for the region named Cached Region on page 13 of the currently executing application. If the region has been cached, the cache date and time is output using the HTP package. The region could have been cached either by the user issuing the call, or for all users if the page was not to be cached by user.

```
DECLARE
    l_cache_date DATE DEFAULT NULL;
BEGIN
    l_cache_date := APEX_UTIL.CACHE_GET_DATE_OF_REGION_CACHE(
        p_application => :APP_ID,
        p_page => 13,
        p_region_name => 'Cached Region');
    IF l_cache_date IS NOT NULL THEN
        HTP.P('Cached on ' || TO_CHAR(l_cache_date, 'DD-MON-YY
HH24:MI:SS'));
    END IF;
END;
```

46.3 CACHE_PURGE_BY_APPLICATION Procedure

This procedure purges all cached pages and regions for a given application.

Syntax

```
APEX_UTIL.CACHE_PURGE_BY_APPLICATION (
    p_application  IN NUMBER);
```

Parameters

Table 46-3 CACHE_PURGE_BY_APPLICATION Parameters

Parameter	Description
p_application	The identification number (ID) of the application.

Example

The following example demonstrates how to use the CACHE_PURGE_BY_APPLICATION procedure to purge all the cached pages and regions for the application currently executing.

```
BEGIN
    APEX_UTIL.CACHE_PURGE_BY_APPLICATION(p_application => :APP_ID);
END;
```

46.4 CACHE_PURGE_BY_PAGE Procedure

This procedure purges the cache for a given application and page. If the page itself is not cached but contains one or more cached regions, then the cache for these is also purged.

Syntax

```
APEX_UTIL.CACHE_PURGE_BY_PAGE (
    p_application  IN NUMBER,
    p_page         IN NUMBER,
    p_user_name    IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 46-4 CACHE_PURGE_BY_PAGE Parameters

Parameter	Description
p_application	The identification number (ID) of the application.
p_page	The page number (ID).
p_user_name	The user associated with cached pages and regions.

Example

The following example demonstrates how to use the `CACHE_PURGE_BY_PAGE` procedure to purge the cache for page 9 of the application currently executing. Additionally, if the `p_user_name` parameter is supplied, this procedure would be further restricted by a specific users cache (only relevant if the cache is set to be by user).

```
BEGIN
    APEX_UTIL.CACHE_PURGE_BY_PAGE(
        p_application => :APP_ID,
        p_page => 9);
END;
```

46.5 CACHE_PURGE_STALE Procedure

This procedure deletes all cached pages and regions for a specified application that have passed the defined active time period. When you cache a page or region, you specify an active time period (or Cache Timeout). Once that period has passed, the cache is no longer used, thus removing those unusable pages or regions from the cache.

Syntax

```
APEX_UTIL.CACHE_PURGE_STALE (
    p_application  IN NUMBER);
```

Parameters

Table 46-5 CACHE_PURGE_STALE Parameters

Parameter	Description
`p_application`	The identification number (ID) of the application.

Example

The following example demonstrates how to use the CACHE_PURGE_STALE procedure to purge all the stale pages and regions in the application currently executing.

```
BEGIN
    APEX_UTIL.CACHE_PURGE_STALE(p_application => :APP_ID);
END;
```

46.6 CHANGE_CURRENT_USER_PW Procedure

This procedure changes the password of the currently authenticated user, assuming Oracle APEX user accounts are in use.

Syntax

```
APEX_UTIL.CHANGE_CURRENT_USER_PW (
    p_new_password  IN VARCHAR2 );
```

Parameters

Table 46-6 CHANGE_CURRENT_USER_PW Parameters

Parameter	Description
p_new_password	The new password value in clear text.

Example

The following example demonstrates how to use the `CHANGE_CURRENT_USER_PW` procedure to change the password for the user who is currently authenticated, assuming APEX accounts are in use.

```
BEGIN
    APEX_UTIL.CHANGE_CURRENT_USER_PW ('secret99');
END;
```

> **See Also:**
>
> RESET_PW Procedure

46.7 CHANGE_PASSWORD_ON_FIRST_USE Function

This function enables a developer to check whether this property is enabled or disabled for an end user account.

This function returns TRUE if the account password must be changed upon first use (after successful authentication) after the password is initially set and after it is changed on the Administration Service, Edit User page. This function returns FALSE if the account does not have this property.

This function may be run in a page request context by any authenticated user.

Syntax

```
APEX_UTIL.CHANGE_PASSWORD_ON_FIRST_USE (
    p_user_name     IN VARCHAR2 )
RETURN BOOLEAN;
```

Parameters

Table 46-7 CHANGE_PASSWORD_ON_FIRST_USE Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example demonstrates how to use the CHANGE_PASSWORD_ON_FIRST_USE function. Use this function to check if the password of an APEX user account (workspace administrator, developer, or end user) in the current workspace must be changed by the user the first time it is used.

```
BEGIN
    FOR c1 IN (SELECT user_name FROM apex_users) LOOP
        IF APEX_UTIL.CHANGE_PASSWORD_ON_FIRST_USE(p_user_name =>
c1.user_name) THEN
            htp.p('User:'||c1.user_name||' requires password to be
changed the first time it is used.');
        END IF;
    END LOOP;
END;
```

> **See Also:**
>
> PASSWORD_FIRST_USE_OCCURRED Function

46.8 CLOSE_OPEN_DB_LINKS Procedure

This procedure closes all open database links for the current database session.

It is rare for this procedure to be called programatically in an application. The primary purpose of this procedure is for the middleware technology in an Oracle APEX environment (such as Oracle REST Data Service or ORDS, mod_plsql) to be configured such that it closes all of the open database links in a session, either before a request is made to the APEX engine, or after a request to the APEX engine is completed but before the database session is returned to the pool.

Syntax

```
APEX_UTIL.CLOSE_OPEN_DB_LINKS
```

Parameters

None.

Example

In this example, the configuration of Oracle REST Data Services (ORDS) closes any open database links both before the request is made to the APEX engine and after the request is complete.

```
<entry key="procedure.postProcess">apex_util.close_open_db_links</entry>
<entry key="procedure.preProcess">apex_util.close_open_db_links</entry>
```

When using Oracle HTTP Server and `mod_plsql`, this configuration looks like this:

```
PlsqlBeforeProcedure    apex_util.close_open_db_links
PlsqlAfterProcedure        apex_util.close_open_db_links
```

46.9 CLEAR_APP_CACHE Procedure

This procedure removes session state for a given application for the current session.

Syntax

```
APEX_UTIL.CLEAR_APP_CACHE (
    p_app_id    IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 46-8 CLEAR_APP_CACHE Parameters

Parameter	Description
`p_app_id`	The ID of the application for which session state is cleared for current session.

Example

The following example demonstrates how to use the CLEAR_APP_CACHE procedure to clear all the current sessions state for the application with an ID of 100.

```
BEGIN
    APEX_UTIL.CLEAR_APP_CACHE('100');
END;
```

46.10 CLEAR_PAGE_CACHE Procedure

This procedure removes session state for a given page for the current session. If `p_page_id` is not specified, then the current page will be cleared.

Syntax

```
APEX_UTIL.CLEAR_PAGE_CACHE (
    p_page_id IN NUMBER DEFAULT NULL);
```

Parameters

Table 46-9 CLEAR_PAGE_CACHE Parameters

Parameter	Description
p_page_id	The ID of the page in the current application for which session state is cleared for current session.

Example

The following example demonstrates how to use the CLEAR_PAGE_CACHE procedure to clear the current session state for the page with an ID of 10.

```
BEGIN
    APEX_UTIL.CLEAR_PAGE_CACHE(10);
END;
```

46.11 CLEAR_USER_CACHE Procedure

This procedure removes session state and application system preferences for the current user's session. Run this procedure if you reuse session IDs and want to run applications without the benefit of existing session state.

Syntax

```
APEX_UTIL.CLEAR_USER_CACHE;
```

Parameters

None.

Example

The following example demonstrates how to use the CLEAR_USER_CACHE procedure to clear all session state and application system preferences for the current user's session.

```
BEGIN
    APEX_UTIL.CLEAR_USER_CACHE;
END;
```

46.12 COUNT_CLICK Procedure

This procedure counts clicks from an application built in App Builder to an external site. You can also use the shorthand version, procedure Z, in place of APEX_UTIL.COUNT_CLICK.

Syntax

```
APEX_UTIL.COUNT_CLICK (
    p_url             IN VARCHAR2,
    p_cat             IN VARCHAR2,
    p_id              IN VARCHAR2 DEFAULT NULL,
    p_user            IN VARCHAR2 DEFAULT NULL,
    p_company         IN VARCHAR2 DEFAULT NULL,
    p_workspace       IN VARCHAR2 DEFAULT NULL,
    p_referrer_policy IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 46-10 COUNT_CLICK Parameters

Parameter	Description
p_url	The URL to which to redirect
p_cat	A category to classify the click
p_id	Secondary ID to associate with the click (optional)
p_user	The application user ID (optional)
p_workspace	The workspace associated with the application (optional)
p_referrer_policy	The referrer-policy HTTP response header.

Example

The following example demonstrates how to use the COUNT_CLICK procedure to log how many user's click on the `http://yahoo.com` link specified. Note that once this information is logged, you can view it by using the APEX_WORKSPACE_CLICKS view and in the reports on this view available to workspace and site administrators.

```
DECLARE
    l_url VARCHAR2(255);
    l_cat VARCHAR2(30);
    l_workspace_id VARCHAR2(30);
BEGIN
    l_url := 'http://yahoo.com';
    l_cat := 'yahoo';
    l_workspace_id :=
TO_CHAR(APEX_UTIL.FIND_SECURITY_GROUP_ID('MY_WORKSPACE'));

    HTP.P('<a href=APEX_UTIL.COUNT_CLICK?p_url=' || l_url || '&p_cat=' ||
l_cat || '&p_workspace=' || l_workspace_id || '>Click</a>');
END;
```

> **See Also:**
>
> - FIND_SECURITY_GROUP_ID Function
> - Deleting Click Counting Log Entries in *Oracle APEX Administration Guide*
> - Managing Authorized URLs in *Oracle APEX Administration Guide*

46.13 CREATE_USER Procedure

This procedure creates a new account record in the Oracle APEX user accounts table.

Use this procedure to programmatically create user accounts for applications that utilize the APEX Accounts authentication scheme. To execute this procedure within the context of an APEX application, the current user must be an APEX workspace administrator and the application must permit modification of the workspace repository.

When creating workspace developer or workspace administrator users, you must also ensure that the user can authenticate to the development environment authentication scheme. The CREATE_USER procedure only creates the APEX repository user. For example, if using DB accounts authentication, you must also run `CREATE USER nnn IDENTIFIED BY yyy`.

Syntax

```
APEX_UTIL.CREATE_USER (
    p_user_id                      IN NUMBER   DEFAULT NULL,
    p_user_name                    IN VARCHAR2,
    p_first_name                   IN VARCHAR2 DEFAULT NULL,
    p_last_name                    IN VARCHAR2 DEFAULT NULL,
    p_description                  IN VARCHAR2 DEFAULT NULL,
    p_email_address                IN VARCHAR2 DEFAULT NULL,
    p_web_password                 IN VARCHAR2,
    p_web_password_format          IN VARCHAR2 DEFAULT 'CLEAR_TEXT',
    p_group_ids                    IN VARCHAR2 DEFAULT NULL,
    p_developer_privs              IN VARCHAR2 DEFAULT NULL,
    p_default_schema               IN VARCHAR2 DEFAULT NULL,
    p_allow_access_to_schemas      IN VARCHAR2 DEFAULT NULL,
    p_account_expiry               IN DATE     DEFAULT TRUNC(SYSDATE),
    p_account_locked               IN VARCHAR2 DEFAULT 'N',
    p_failed_access_attempts       IN NUMBER   DEFAULT 0,
    p_change_password_on_first_use IN VARCHAR2 DEFAULT 'Y',
    p_first_password_use_occurred  IN VARCHAR2 DEFAULT 'N',
    p_attribute_01                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_02                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_03                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_04                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_05                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_06                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_07                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_08                 IN VARCHAR2 DEFAULT NULL,
    p_attribute_09                 IN VARCHAR2 DEFAULT NULL,
```

```
    p_attribute_10                 IN VARCHAR2 DEFAULT NULL,
    p_allow_app_building_yn        IN VARCHAR2 DEFAULT NULL,
    p_allow_sql_workshop_yn        IN VARCHAR2 DEFAULT NULL,
    p_allow_websheet_dev_yn        IN VARCHAR2 DEFAULT NULL,
    p_allow_team_development_yn    IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 46-11 CREATE_USER Parameters

Parameter	Description
p_user_id	Numeric primary key of user account.
p_user_name	Alphanumeric name used for login.
p_first_name	Informational.
p_last_name	Informational.
p_description	Informational.
p_email_address	Email address.
p_web_password	Clear text password.
p_web_password_format	If the value your passing for the p_web_password parameter is in clear text format then use CLEAR_TEXT, otherwise use HEX_ENCODED_DIGEST_V2.
p_group_ids	Colon separated list of numeric group IDs.

Table 46-11 (Cont.) CREATE_USER Parameters

Parameter	Description
p_developer_privs	Colon separated list of developer privileges. If p_developer_privs is not null, the user is given access to Team Development. If p_developer_privs contains ADMIN, the user is given App Builder and SQL Workshop access. If p_developer_privs does not contain ADMIN but contains EDIT, the user is given App Builder access. If p_developer_privs does not contain ADMIN but contains SQL, the user is given SQL Workshop access. The following are acceptable values for this parameter: NULL - To create an end user (a user who can only authenticate to developed applications). CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - To create a user with developer privileges with access to App Builder and SQL Workshop. ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - To create a user with full workspace administrator and developer privileges with access to App Builder, SQL Workshop and Team Development.
p_default_schema	A database schema assigned to the user's workspace, used by default for browsing.
p_allow_access_to_schemas	Colon-separated list of schemas assigned to the user's workspace to which the user is restricted (leave NULL for all).
p_account_expiry	The date the password was last updated, which defaults to today's date on creation.
p_account_locked	Y or N indicating if account is locked or unlocked.
p_failed_access_attempts	Number of consecutive login failures that have occurred, defaults to 0 on creation.

Note:

Currently this parameter is named inconsistently between the CREATE_USER, EDIT_USER, and FETCH_USER APIs, although they all relate to the DEVELOPER_ROLE field stored in the named user account record. CREATE_USER uses p_developer_privs; EDIT_USER uses p_developer_roles; and FETCH_USER uses p_developer_role.

Table 46-11 (Cont.) CREATE_USER Parameters

Parameter	Description
p_change_password_on_first_use	Y or N to indicate whether password must be changed on first use, defaults to Y on creation.
p_first_password_use_occurred	Y or N to indicate whether login has occurred since password change, defaults to N on creation.
p_attribute_01 ... p_attribute_10	Arbitrary text accessible with an API.
p_allow_app_building_yn	Y or N to indicate whether access to App Builder is enabled.
p_allow_sql_workshop_yn	Y or N to indicate whether access to SQL Workshop is enabled..
p_allow_websheet_dev_yn	Y or N to indicate whether access to Websheet development is enabled.
p_allow_team_development_yn	Y or N to indicate whether access to Team Development is enabled.

Example 1

The following example creates an End User called NEWUSER1 with a password of secret99. End Users can only authenticate to developed applications.

```
BEGIN
    APEX_UTIL.CREATE_USER(
        p_user_name    => 'NEWUSER1',
        p_web_password => 'secret99');
END;
```

Example 2

The following example creates a Workspace Administrator called NEWUSER2 where the user NEWUSER2:

- has full workspace administration and developer privilege (p_developer_privs parameter set to ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL)
- has access to 2 schemas, both their browsing default MY_SCHEMA (p_default_schema parameter set to MY_SCHEMA) and also MY_SCHEMA2 (p_allow_access_to_schemas parameter set to MY_SCHEMA2)
- does not have to change their password when they first login (p_change_password_on_first_use parameter set to N)
- and has their phone number stored in the first additional attribute (p_attribute_01 parameter set to 123 456 7890).

```
BEGIN
    APEX_UTIL.CREATE_USER(
        p_user_name                    => 'NEWUSER2',
        p_first_name                   => 'FRANK',
        p_last_name                    => 'SMITH',
        p_description                  => 'Description...',
        p_email_address                => 'frank@smith.com',
```

```
        p_web_password                  => 'password',
        p_developer_privs               =>
'ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL',
        p_default_schema                => 'MY_SCHEMA',
        p_allow_access_to_schemas       => 'MY_SCHEMA2',
        p_change_password_on_first_use  => 'N',
        p_attribute_01                  => '123 456 7890');
END;
```

See Also:

- FETCH_USER Procedure Signature 3
- EDIT_USER Procedure
- GET_GROUP_ID Function

46.14 CREATE_USER_GROUP Procedure

This procedure creates a user group when you are using Oracle APEX authentication.

To execute this procedure within the context of an APEX application, the current user must be an APEX workspace administrator and the application must permit modification of the workspace repository.

Syntax

```
APEX_UTIL.CREATE_USER_GROUP (
    p_id                    IN NUMBER   DEFAULT NULL,
    p_group_name            IN VARCHAR2,
    p_security_group_id     IN NUMBER   DEFAULT NULL,
    p_group_desc            IN VARCHAR2 DEFAULT NULL );
```

Parameter

Table 46-12 CREATE_USER_GROUP Parameters

Parameter	Description
p_id	Primary key of group.
p_group_name	Name of group.
p_security_group_id	Workspace ID.
p_group_desc	Descriptive text.

Example

The following example demonstrates how to use the CREATE_USER_GROUP procedure to create a new group called Managers with a description of text. Pass NULL for the p_id

parameter to enable the database trigger to assign the new primary key value. Pass NULL for the `p_security_group_id` parameter to default to the current workspace ID.

```
BEGIN
    APEX_UTIL.CREATE_USER_GROUP (
        p_id                => null,         -- trigger assigns PK
        p_group_name        => 'Managers',
        p_security_group_id => null,         -- defaults to current
workspace ID
        p_group_desc        => 'text');
END;
```

46.15 CURRENT_USER_IN_GROUP Function

This function returns a Boolean result based on whether the current user is a member of the specified workspace group. You can use the group name or group ID to identify the group.

Syntax

```
APEX_UTIL.CURRENT_USER_IN_GROUP (
    p_group_name  IN VARCHAR2 )
RETURN BOOLEAN;

APEX_UTIL.CURRENT_USER_IN_GROUP (
    p_group_id    IN NUMBER )
RETURN BOOLEAN;
```

Parameters

Table 46-13 CURRENT_USER_IN_GROUP Parameters

Parameter	Description
`p_group_name`	Identifies the name of an existing group in the workspace.
`p_group_id`	Identifies the numeric ID of an existing group in the workspace.

Example

The following example demonstrates how to use the `CURRENT_USER_IN_GROUP` function to check if the user currently authenticated belongs to the group `Managers`.

```
DECLARE
    VAL BOOLEAN;
BEGIN
    VAL := APEX_UTIL.CURRENT_USER_IN_GROUP(p_group_name=>'Managers');
END;
```

46.16 CUSTOM_CALENDAR Procedure

Use this procedure to change the existing calendar view to Custom Calendar.

Syntax

```
APEX_UTIL.CUSTOM_CALENDAR(
    p_date_type_field IN VARCHAR2);
```

Parameters

Table 46-14 CUSTOM_CALENDAR Parameters

Parameter	Description
p_date_type_field	Identifies the item name used to define the type of calendar to be displayed.

Example 1

The following example defines a custom calendar based on the hidden calendar type field. Assuming the Calendar is created in Page 9, the following example hides the column called `P9_CALENDAR_TYPE`.

```
APEX_UTIL.CUSTOM_CALENDAR(
    'P9_CALENDAR_TYPE');
```

46.17 DELETE_USER_GROUP Procedure Signature 1

This procedure deletes a user group by providing the primary key of the group when you are using Oracle APEX authentication. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.DELETE_USER_GROUP (
    p_group_id  IN NUMBER );
```

Parameter

Table 46-15 DELETE_USER_GROUP Parameters

Parameter	Description
p_group_id	Primary key of group.

Example

The following example removes the user group called `Managers` by providing the user group's primary key.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.GET_GROUP_ID (
```

```
        p_group_name => 'Managers');
    APEX_UTIL.DELETE_USER_GROUP (
        p_group_id => VAL);
END;
```

46.18 DELETE_USER_GROUP Procedure Signature 2

This procedure deletes a user group by providing the name of the group when you are using Oracle APEX authentication. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.DELETE_USER_GROUP (
    p_group_name    IN VARCHAR2 );
```

Parameter

Table 46-16 DELETE_USER_GROUP Parameters

Parameter	Description
p_group_name	Name of group.

Example

The following example removes the user group `Managers` by providing the name of the user group.

```
BEGIN
    APEX_UTIL.DELETE_USER_GROUP (
        p_group_name => 'Managers');
END;
```

46.19 DOWNLOAD_PRINT_DOCUMENT Procedure Signature 1

This procedure initiates the download of a print document using XML based report data (as a BLOB) and RTF or XSL-FO based report layout.

Syntax

```
APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
    p_file_name           IN VARCHAR,
    p_content_disposition IN VARCHAR,
    p_report_data         IN BLOB,
    p_report_layout       IN CLOB,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default null);
```

Parameters

Table 46-17 DOWNLOAD_PRINT_DOCUMENT Parameters

Parameter	Description
p_file_name	Defines the filename of the print document.
p_content_disposition	Specifies whether to download the print document or display inline ("attachment", "inline").
p_report_data	XML based report data.
p_report_layout	Report layout in XSL-FO or RTF format.
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

> **See Also:**
>
> "Printing Report Regions" in *Oracle APEX App Builder User's Guide*.

46.20 DOWNLOAD_PRINT_DOCUMENT Procedure Signature 2

This procedure initiates the download of a print document using pre-defined report query and RTF and XSL-FO based report layout.

Syntax

```
APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
    p_file_name           IN VARCHAR,
    p_content_disposition IN VARCHAR,
    p_application_id      IN NUMBER,
    p_report_query_name   IN VARCHAR2,
    p_report_layout       IN CLOB,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default null);
```

Parameters

Table 46-18 DOWNLOAD_PRINT_DOCUMENT Parameters

Parameter	Description
p_file_name	Defines the filename of the print document.

Table 46-18 (Cont.) DOWNLOAD_PRINT_DOCUMENT Parameters

Parameter	Description
p_content_disposition	Specifies whether to download the print document or display inline ("attachment", "inline").
p_application_id	Defines the application ID of the report query.
p_report_query_name	Name of the report query (stored under application's Shared Components).
p_report_layout	Report layout in XSL-FO or RTF format.
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

Example for Signature 2

The following example shows how to use the `DOWNLOAD_PRINT_DOCUMENT` using Signature 2 (Pre-defined report query and RTF or XSL-FO based report layout.). In this example, the data for the report is taken from a Report Query called '`ReportQueryAndXSL`' stored in the current application's Shared Components > Report Queries. The report layout is taken from a value stored in a page item (`P1_XSL`).

```
BEGIN
    APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
        p_file_name           => 'mydocument',
        p_content_disposition => 'attachment',
        p_application_id      => :APP_ID,
        p_report_query_name   => 'ReportQueryAndXSL',
        p_report_layout       => :P1_XSL,
        p_report_layout_type  => 'xsl-fo',
        p_document_format     => 'pdf');
END;
```

> **See Also:**
>
> "Printing Report Regions" in *Oracle APEX App Builder User's Guide*.

46.21 DOWNLOAD_PRINT_DOCUMENT Procedure Signature 3

This procedure initiates the download of a print document using pre-defined report query and pre-defined report layout.

Syntax

```
APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
    p_file_name           IN VARCHAR,
    p_content_disposition IN VARCHAR,
    p_application_id      IN NUMBER,
    p_report_query_name   IN VARCHAR2,
    p_report_layout_name  IN VARCHAR2,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default null);
```

Parameters

Table 46-19 DOWNLOAD_PRINT_DOCUMENT Parameters

Parameter	Description
p_file_name	Defines the filename of the print document.
p_content_disposition	Specifies whether to download the print document or display inline ("attachment", "inline").
p_application_id	Defines the application ID of the report query.
p_report_query_name	Name of the report query (stored under application's Shared Components).
p_report_layout_name	Name of the report layout (stored under application's Shared Components).
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

Example for Signature 3

The following example shows how to use the `DOWNLOAD_PRINT_DOCUMENT` using Signature 3 (Pre-defined report query and pre-defined report layout). In this example, the data for the report is taken from a Report Query called '`ReportQuery`' stored in the current application's Shared Components > Report Queries. The report layout is taken from a Report Layout called '`ReportLayout`' stored in the current application's Shared Components > Report Layouts. Note that if you want to provision dynamic layouts, instead of specifying '`ReportLayout`' for the `p_report_layout_name` parameter, you could reference a page item that allowed the user to select one of multiple saved Report Layouts. This example also provides a way for the user to specify how they want to receive the document (as an attachment or inline), through passing the value of `P1_CONTENT_DISP` to the `p_content_disposition` parameter. `P1_CONTENT_DISP` is a page item of type '`Select List`' with the following List of Values Definition:

```
STATIC2:In Browser;inline,Save / Open in separate Window;attachment

BEGIN
    APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
```

```
        p_file_name           => 'myreport123',
        p_content_disposition => :P1_CONTENT_DISP,
        p_application_id      => :APP_ID,
        p_report_query_name   => 'ReportQuery',
        p_report_layout_name  => 'ReportLayout',
        p_report_layout_type  => 'rtf',
        p_document_format     => 'pdf');
END;
```

> **See Also:**
>
> "Printing Report Regions" in *Oracle APEX App Builder User's Guide*.

46.22 DOWNLOAD_PRINT_DOCUMENT Procedure Signature 4

This procedure initiates the download of a print document using XML based report data (as a CLOB) and RTF or XSL-FO based report layout.

Syntax

```
APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
    p_file_name           IN VARCHAR,
    p_content_disposition IN VARCHAR,
    p_report_data         IN CLOB,
    p_report_layout       IN CLOB,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default null);
```

Parameters

Table 46-20 DOWNLOAD_PRINT_DOCUMENT Parameters

Parameter	Description
p_file_name	Defines the filename of the print document.
p_content_disposition	Specifies whether to download the print document or display inline ("attachment", "inline").
p_report_data	XML based report data, must be encoded in UTF-8.
p_report_layout	Report layout in XSL-FO or RTF format.
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

Example for Signature 4

The following example shows how to use the DOWNLOAD_PRINT_DOCUMENT using Signature 4 (XML based report data (as a CLOB) and RTF or XSL-FO based report layout). In this example both the report data (XML) and report layout (XSL-FO) are taken from values stored in page items.

```
BEGIN
    APEX_UTIL.DOWNLOAD_PRINT_DOCUMENT (
        p_file_name           => 'mydocument',
        p_content_disposition => 'attachment',
        p_report_data         => :P1_XML,
        p_report_layout       => :P1_XSL,
        p_report_layout_type  => 'xsl-fo',
        p_document_format     => 'pdf');
END;
```

> **See Also:**
>
> "Printing Report Regions" in *Oracle APEX App Builder User's Guide*.

46.23 EDIT_USER Procedure

This procedure enables a user account record to be altered. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.EDIT_USER (
    p_user_id                      IN                  NUMBER,
    p_user_name                    IN                  VARCHAR2,
    p_first_name                   IN                  VARCHAR2
DEFAULT NULL,
    p_last_name                    IN                  VARCHAR2
DEFAULT NULL,
    p_web_password                 IN                  VARCHAR2
DEFAULT NULL,
    p_new_password                 IN                  VARCHAR2
DEFAULT NULL,
    p_email_address                IN                  VARCHAR2
DEFAULT NULL,
    p_start_date                   IN                  VARCHAR2
DEFAULT NULL,
    p_end_date                     IN                  VARCHAR2
DEFAULT NULL,
    p_employee_id                  IN                  VARCHAR2
DEFAULT NULL,
    p_allow_access_to_schemas      IN                  VARCHAR2
DEFAULT NULL,
```

```
    p_person_type                  IN                  VARCHAR2    DEFAULT
NULL,
    p_default_schema               IN                  VARCHAR2    DEFAULT
NULL,
    p_group_ids                    IN                  VARCHAR2    DEFAULT
NULL,
    p_developer_roles              IN                  VARCHAR2    DEFAULT
NULL,
    p_description                  IN                  VARCHAR2    DEFAULT
NULL,
    p_account_expiry               IN                  DATE        DEFAULT
NULL,
    p_account_locked               IN                  VARCHAR2    DEFAULT
'N',
    p_failed_access_attempts       IN                  NUMBER      DEFAULT
0,
    p_change_password_on_first_use IN                  VARCHAR2    DEFAULT
'Y',
    p_first_password_use_occurred  IN                  VARCHAR2    DEFAULT
'N');
```

Parameters

Table 46-21 EDIT_USER Parameters

Parameter	Description
p_user_id	Numeric primary key of the user account.
p_user_name	Alphanumeric name used for login. **See Also**: "SET_USERNAME Procedure"
p_first_name	Informational. **See Also**: "SET_FIRST_NAME Procedure"
p_last_name	Informational. **See Also**: "SET_LAST_NAME Procedure"
p_web_password	Clear text password. If using this procedure to update the password for the user, values for both p_web_password and p_new_password must not be null and must be identical.
p_new_password	Clear text new password. If using this procedure to update the password for the user, values for both p_web_password and p_new_password must not be null and must be identical.
p_email_address	Informational. **See Also**: "SET_EMAIL Procedure"
p_start_date	Unused.
p_end_date	Unused.
p_employee_id	Unused.
p_allow_access_to_schemas	A list of schemas assigned to the user's workspace to which the user is restricted.
p_person_type	Unused.

Table 46-21 (Cont.) EDIT_USER Parameters

Parameter	Description
p_default_schema	A database schema assigned to the user's workspace, used by default for browsing.
p_group_ids	Colon-separated list of numeric group IDs.
p_developer_roles	Colon-separated list of developer privileges. The following are acceptable values for this parameter: · **null** - To update the user to be an end user (a user who can only authenticate to developed applications). · **CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL** - To update the user to have developer privilege. · **ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL** - To update the user to have full workspace administrator and developer privilege. **Note**: Currently this parameter is named inconsistently between the CREATE_USER, EDIT_USER and FETCH_USER APIs, although they all relate to the DEVELOPER_ROLE field stored in the named user account record. CREATE_USER uses p_developer_privs, EDIT_USER uses p_developer_roles and FETCH_USER uses p_developer_role. **See Also**: "GET_USER_ROLES Function"
p_description	Informational.
p_account_expiry	Date password was last updated. **See Also**: "EXPIRE_END_USER_ACCOUNT Procedure", "EXPIRE_WORKSPACE_ACCOUNT Procedure", "UNEXPIRE_END_USER_ACCOUNT Procedure", "UNEXPIRE_WORKSPACE_ACCOUNT Procedure"
p_account_locked	'Y' or 'N' indicating if account is locked or unlocked. **See Also**: "LOCK_ACCOUNT Procedure", "UNLOCK_ACCOUNT Procedure"
p_failed_access_attempts	Number of consecutive login failures that have occurred.
p_change_password_on_first_use	'Y' or 'N' to indicate whether password must be changed on first use. **See Also**: "CHANGE_PASSWORD_ON_FIRST_USE Function"
p_first_password_use_occurred	'Y' or 'N' to indicate whether login has occurred since password change. **See Also**: "PASSWORD_FIRST_USE_OCCURRED Function"

Example

The following example shows how to use the EDIT_USER procedure to update a user account. This example shows how you can use the EDIT_USER procedure to change the user 'FRANK' from a user with just developer privilege to a user with workspace administrator and developer privilege. Firstly, the FETCH_USER procedure is called to assign account details for the user 'FRANK' to local variables. These variables are then used in the call to EDIT_USER to preserve the details of the account, with the

exception of the value for the `p_developer_roles` parameter, which is set to `'ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL'`.

```
DECLARE
    l_user_id                       NUMBER;
    l_workspace                     VARCHAR2(255);
    l_user_name                     VARCHAR2(100);
    l_first_name                    VARCHAR2(255);
    l_last_name                     VARCHAR2(255);
    l_web_password                  VARCHAR2(255);
    l_email_address                 VARCHAR2(240);
    l_start_date                    DATE;
    l_end_date                      DATE;
    l_employee_id                   NUMBER(15,0);
    l_allow_access_to_schemas       VARCHAR2(4000);
    l_person_type                   VARCHAR2(1);
    l_default_schema                VARCHAR2(30);
    l_groups                        VARCHAR2(1000);
    l_developer_role                VARCHAR2(60);
    l_description                   VARCHAR2(240);
    l_account_expiry                DATE;
    l_account_locked                VARCHAR2(1);
    l_failed_access_attempts        NUMBER;
    l_change_password_on_first_use  VARCHAR2(1);
    l_first_password_use_occurred   VARCHAR2(1);
BEGIN
    l_user_id := APEX_UTIL.GET_USER_ID('FRANK');

APEX_UTIL.FETCH_USER(
    p_user_id                       => l_user_id,
    p_workspace                     => l_workspace,
    p_user_name                     => l_user_name,
    p_first_name                    => l_first_name,
    p_last_name                     => l_last_name,
    p_web_password                  => l_web_password,
    p_email_address                 => l_email_address,
    p_start_date                    => l_start_date,
    p_end_date                      => l_end_date,
    p_employee_id                   => l_employee_id,
    p_allow_access_to_schemas       => l_allow_access_to_schemas,
    p_person_type                   => l_person_type,
    p_default_schema                => l_default_schema,
    p_groups                        => l_groups,
    p_developer_role                => l_developer_role,
    p_description                   => l_description,
    p_account_expiry                => l_account_expiry,
    p_account_locked                => l_account_locked,
    p_failed_access_attempts        => l_failed_access_attempts,
    p_change_password_on_first_use  => l_change_password_on_first_use,
    p_first_password_use_occurred   => l_first_password_use_occurred);
APEX_UTIL.EDIT_USER (
    p_user_id                       => l_user_id,
    p_user_name                     => l_user_name,
    p_first_name                    => l_first_name,
    p_last_name                     => l_last_name,
```

```
    p_web_password                  => l_web_password,
    p_new_password                  => l_web_password,
    p_email_address                 => l_email_address,
    p_start_date                    => l_start_date,
    p_end_date                      => l_end_date,
    p_employee_id                   => l_employee_id,
    p_allow_access_to_schemas       => l_allow_access_to_schemas,
    p_person_type                   => l_person_type,
    p_default_schema                => l_default_schema,
    p_group_ids                     => l_groups,
    p_developer_roles               =>
'ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL',
    p_description                   => l_description,
    p_account_expiry                => l_account_expiry,
    p_account_locked                => l_account_locked,
    p_failed_access_attempts        => l_failed_access_attempts,
    p_change_password_on_first_use  => l_change_password_on_first_use,
    p_first_password_use_occurred   => l_first_password_use_occurred);
END;
```

> **See Also:**
>
> "FETCH_USER Procedure Signature 3"

46.24 END_USER_ACCOUNT_DAYS_LEFT Function

This function returns the number of days remaining before an end user account password expires. This function may be run in a page request context by any authenticated user.

Syntax

```
APEX_UTIL.END_USER_ACCOUNT_DAYS_LEFT (
    p_user_name     IN VARCHAR2 );
RETURN NUMBER
```

Parameters

Table 46-22 END_USER_ACCOUNT_DAYS_LEFT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example determines the number of days remaining before an APEX end user account in the current workspace expires.

```
DECLARE
    l_days_left NUMBER;
BEGIN
    FOR c1 IN (SELECT user_name from apex_users) LOOP
        l_days_left := APEX_UTIL.END_USER_ACCOUNT_DAYS_LEFT(p_user_name =>
c1.user_name);
        htp.p('End User Account:'||c1.user_name||' expires in '||
l_days_left||' days.');
    END LOOP;
END;
```

See Also:

- EXPIRE_END_USER_ACCOUNT Procedure
- UNEXPIRE_END_USER_ACCOUNT Procedure

46.25 EXPIRE_END_USER_ACCOUNT Procedure

This procedure expires the login account for use as a workspace end user. Must be run by an authenticated workspace administrator in a page request context.

Syntax

```
APEX_UTIL.EXPIRE_END_USER_ACCOUNT (
    p_user_name     IN VARCHAR2 );
```

Parameters

Table 46-23 EXPIRE_END_USER_ACCOUNT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example expires an Oracle APEX account (workspace administrator, developer, or end user) in the current workspace. This action specifically expires the account for its use by end users to authenticate to developed applications, but it may also expire the account for its use by developers or administrators to log into a workspace.

Note that this procedure must be run by a user having administration privileges in the current workspace.

```
BEGIN
    FOR c1 IN (select user_name from apex_users) LOOP
        APEX_UTIL.EXPIRE_END_USER_ACCOUNT(p_user_name => c1.user_name);
        htp.p('End User Account:'||c1.user_name||' is now expired.');
    END LOOP;
END;
```

> **See Also:**
>
> UNEXPIRE_END_USER_ACCOUNT Procedure

46.26 EXPIRE_WORKSPACE_ACCOUNT Procedure

This procedure expires developer or workspace administrator login accounts. Must be run by an authenticated workspace administrator in a page request context.

Syntax

```
APEX_UTIL.EXPIRE_WORKSPACE_ACCOUNT (
    p_user_name IN VARCHAR2 );
```

Parameters

Table 46-24 EXPIRE_WORKSPACE_ACCOUNT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example shows how to use the `EXPIRE_WORKSPACE_ACCOUNT` procedure. Use this procedure to expire an Oracle APEX account (workspace administrator, developer, or end user) in the current workspace. This action specifically expires the account for its use by developers or administrators to log in to a workspace, but it may also expire the account for its use by end users to authenticate to developed applications.

```
BEGIN
    FOR c1 IN (SELECT user_name FROM apex_users) LOOP
        APEX_UTIL.EXPIRE_WORKSPACE_ACCOUNT(p_user_name =>
c1.user_name);
        htp.p('Workspace Account:'||c1.user_name||' is now
expired.');
    END LOOP;
END;
```

> **See Also:**
>
> UNEXPIRE_WORKSPACE_ACCOUNT Procedure

46.27 EXPORT_USERS Procedure

This procedure produces an export file of the current workspace definition, workspace users, and workspace groups when called from a page. To execute this procedure, the current user must have administrative privilege in the workspace.

Syntax

```
APEX_UTIL.EXPORT_USERS (
    p_export_format     IN VARCHAR2 DEFAULT 'UNIX' );
```

Parameters

Table 46-25 EXPORT_USERS Parameters

Parameter	Description
p_export_format	Indicates how rows in the export file are formatted. Specify UNIX to have the resulting file contain rows delimited by line feeds. Specify DOS to have the resulting file contain rows delimited by carriage returns and line feeds.

Example

The following example calls this procedure from a page to produce an export file containing the current workspace definition, list of workspace users, and list of workspace groups. The file is formatted with rows delimited by line feeds.

```
BEGIN
    APEX_UTIL.EXPORT_USERS;
END;
```

46.28 FEEDBACK_ENABLED Function

This function returns a boolean value to check if application Allow Feedback is enabled.

Syntax

```
APEX_UTIL.FEEDBACK_ENABLED
    RETURN boolean;
```

Parameters

None.

Example

The following example demonstrates how to use the FEEDBACK_ENABLED function. If Allow Feeedback is enabled, TRUE is returned otherwise FALSE is returned.

```
BEGIN
    RETURN apex_util.feedback_enabled;
END;
```

46.29 FETCH_APP_ITEM Function

This function fetches session state for the current or specified application in the current or specified session.

Syntax

```
APEX_UTIL.FETCH_APP_ITEM(
    p_item    IN VARCHAR2,
    p_app     IN NUMBER DEFAULT NULL,
    p_session IN NUMBER DEFAULT NULL)
RETURN VARCHAR2;
```

Parameters

Table 46-26 FETCH_APP_ITEM Parameters

Parameter	Description
p_item	The name of an application-level item (not a page item) whose current value is to be fetched.
p_app	The ID of the application that owns the item (leave null for the current application).
p_session	The session ID from which to obtain the value (leave null for the current session).

Example

The following example shows how to use the `FETCH_APP_ITEM` function to obtain the value of the application item '`F300_NAME`' in application 300. As no value is passed for `p_session`, this defaults to the current session state value.

```
DECLARE
    VAL VARCHAR2(30);
BEGIN
    VAL := APEX_UTIL.FETCH_APP_ITEM(
        p_item => 'F300_NAME',
        p_app => 300);
END;
```

46.30 FETCH_USER Procedure Signature 1

This procedure fetches a user account record. To execute this procedure, the current user must have administrative privileges in the workspace. Three overloaded versions of this procedure exist, each with a distinct set of allowed parameters or signatures.

Syntax for Signature 1

```
APEX_UTIL.FETCH_USER (
    p_user_id                      IN                  NUMBER,
    p_workspace                    OUT                 VARCHAR2,
    p_user_name                    OUT                 VARCHAR2,
    p_first_name                   OUT                 VARCHAR2,
    p_last_name                    OUT                 VARCHAR2,
    p_web_password                 OUT                 VARCHAR2,
    p_email_address                OUT                 VARCHAR2,
    p_start_date                   OUT                 VARCHAR2,
    p_end_date                     OUT                 VARCHAR2,
    p_employee_id                  OUT                 VARCHAR2,
    p_allow_access_to_schemas      OUT                 VARCHAR2,
    p_person_type                  OUT                 VARCHAR2,
    p_default_schema               OUT                 VARCHAR2,
    p_groups                       OUT                 VARCHAR2,
    p_developer_role               OUT                 VARCHAR2,
    p_description                  OUT                 VARCHAR2 );
```

Parameters for Signature 1

Table 46-27 Fetch_User Parameters Signature 1

Parameter	Description
p_user_id	Numeric primary key of the user account.
p_workspace	The name of the workspace.
p_user_name	Alphanumeric name used for login. **See Also**: "GET_USERNAME Function"
p_first_name	Informational. **See Also**: "GET_FIRST_NAME Function"
p_last_name	Informational. **See Also**: "GET_LAST_NAME Function"
p_web_password	Obfuscated account password.
p_email_address	Email address. **See Also**: "GET_EMAIL Function"
p_start_date	Unused.
p_end_date	Unused.
p_employee_id	Unused.
p_allow_access_to_schemas	A list of schemas assigned to the user's workspace to which user is restricted.

Table 46-27 (Cont.) Fetch_User Parameters Signature 1

Parameter	Description
p_person_type	Unused.
p_default_schema	A database schema assigned to the user's workspace, used by default for browsing. **See Also**: "GET_DEFAULT_SCHEMA Function"
p_groups	List of groups of which user is a member. **See Also**: "GET_GROUPS_USER_BELONGS_TO Function" and "CURRENT_USER_IN_GROUP Function"
p_developer_role	Colon-separated list of developer roles. The following are acceptable values for this parameter: null - Indicates an end user (a user who can only authenticate to developed applications). CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - Indicates a user with developer privilege. ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - Indicates a user with full workspace administrator and developer privilege. Note: Currently this parameter is named inconsistently between the CREATE_USER, EDIT_USER and FETCH_USER APIs, although they all relate to the DEVELOPER_ROLE field stored in the named user account record. CREATE_USER uses p_developer_privs, EDIT_USER uses p_developer_roles and FETCH_USER uses p_developer_role. **See Also**: "GET_USER_ROLES Function"
p_description	Informational.

Example for Signature 1

The following example shows how to use the FETCH_USER procedure with Signature 1. This procedure is passed the ID of the currently authenticated user for the only IN parameter p_user_id. The code then stores all the other OUT parameter values in local variables.

```
DECLARE
    l_workspace                 VARCHAR2(255);
    l_user_name                 VARCHAR2(100);
    l_first_name                VARCHAR2(255);
    l_last_name                 VARCHAR2(255);
    l_web_password              VARCHAR2(255);
    l_email_address             VARCHAR2(240);
    l_start_date                DATE;
    l_end_date                  DATE;
    l_employee_id               NUMBER(15,0);
    l_allow_access_to_schemas   VARCHAR2(4000);
    l_person_type               VARCHAR2(1);
    l_default_schema            VARCHAR2(30);
    l_groups                    VARCHAR2(1000);
    l_developer_role            VARCHAR2(60);
    l_description               VARCHAR2(240);
BEGIN
```

```
    APEX_UTIL.FETCH_USER(
        p_user_id                  => APEX_UTIL.GET_CURRENT_USER_ID,
        p_workspace                => l_workspace,
        p_user_name                => l_user_name,
        p_first_name               => l_first_name,
        p_last_name                => l_last_name,
        p_web_password             => l_web_password,
        p_email_address            => l_email_address,
        p_start_date               => l_start_date,
        p_end_date                 => l_end_date,
        p_employee_id              => l_employee_id,
        p_allow_access_to_schemas  => l_allow_access_to_schemas,
        p_person_type              => l_person_type,
        p_default_schema           => l_default_schema,
        p_groups                   => l_groups,
        p_developer_role           => l_developer_role,
        p_description              => l_description);
END;
```

See Also:

- "EDIT_USER Procedure"
- "GET_CURRENT_USER_ID Function"

46.31 FETCH_USER Procedure Signature 2

This procedure fetches a user account record. To execute this procedure, the current user must have administrative privileges in the workspace. Three overloaded versions of this procedure exist, each with a distinct set of allowed parameters or signatures.

Syntax for Signature 2

```
APEX_UTIL.FETCH_USER (
    p_user_id                  IN                 NUMBER,
    p_user_name                OUT                VARCHAR2,
    p_first_name               OUT                VARCHAR2,
    p_last_name                OUT                VARCHAR2,
    p_email_address            OUT                VARCHAR2,
    p_groups                   OUT                VARCHAR2,
    p_developer_role           OUT                VARCHAR2,
    p_description              OUT                VARCHAR2 );
```

Parameters for Signature 2

Table 46-28 Fetch_User Parameters Signature 2

Parameter	Description
p_user_id	Numeric primary key of the user account
p_user_name	Alphanumeric name used for login. **See Also**: "GET_USERNAME Function"
p_first_name	Informational. **See Also:** "GET_FIRST_NAME Function"
p_last_name	Informational. **See Also:** "GET_LAST_NAME Function"
p_email_address	Email address. **See Also**: "GET_EMAIL Function"
p_groups	List of groups of which user is a member. **See Also:** "GET_GROUPS_USER_BELONGS_TO Function" and "CURRENT_USER_IN_GROUP Function"
p_developer_role	Colon-separated list of developer roles. The following are acceptable values for this parameter: null - Indicates an end user (a user who can only authenticate to developed applications). CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - Indicates a user with developer privilege. ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - Indicates a user with full workspace administrator and developer privilege. Note: Currently this parameter is named inconsistently between the CREATE_USER, EDIT_USER and FETCH_USER APIs, although they all relate to the DEVELOPER_ROLE field stored in the named user account record. CREATE_USER uses p_developer_privs, EDIT_USER uses p_developer_roles and FETCH_USER uses p_developer_role. **See Also**: "GET_USER_ROLES Function"
p_description	Informational

Example for Signature 2

The following example shows how to use the FETCH_USER procedure with Signature 2. This procedure is passed the ID of the currently authenticated user for the only IN parameter p_user_id. The code then stores all the other OUT parameter values in local variables.

```
DECLARE
    l_user_name         VARCHAR2(100);
    l_first_name        VARCHAR2(255);
    l_last_name         VARCHAR2(255);
    l_email_address     VARCHAR2(240);
    l_groups            VARCHAR2(1000);
    l_developer_role    VARCHAR2(60);
```

```
    l_description       VARCHAR2(240);
BEGIN
    APEX_UTIL.FETCH_USER(
        p_user_id           => APEX_UTIL.GET_CURRENT_USER_ID,
        p_user_name         => l_user_name,
        p_first_name        => l_first_name,
        p_last_name         => l_last_name,
        p_email_address     => l_email_address,
        p_groups            => l_groups,
        p_developer_role    => l_developer_role,
        p_description       => l_description);
END;
```

See Also:

- "EDIT_USER Procedure"
- "GET_CURRENT_USER_ID Function"

46.32 FETCH_USER Procedure Signature 3

This procedure fetches a user account record. To execute this procedure, the current user must have administrative privileges in the workspace. Three overloaded versions of this procedure exist, each with a distinct set of allowed parameters or signatures.

Syntax for Signature 3

```
APEX_UTIL.FETCH_USER (
    p_user_id                           IN                  NUMBER,
    p_workspace                         OUT                 VARCHAR2,
    p_user_name                         OUT                 VARCHAR2,
    p_first_name                        OUT                 VARCHAR2,
    p_last_name                         OUT                 VARCHAR2,
    p_web_password                      OUT                 VARCHAR2,
    p_email_address                     OUT                 VARCHAR2,
    p_start_date                        OUT                 VARCHAR2,
    p_end_date                          OUT                 VARCHAR2,
    p_employee_id                       OUT                 VARCHAR2,
    p_allow_access_to_schemas           OUT                 VARCHAR2,
    p_person_type                       OUT                 VARCHAR2,
    p_default_schema                    OUT                 VARCHAR2,
    p_groups                            OUT                 VARCHAR2,
    p_developer_role                    OUT                 VARCHAR2,
    p_description                       OUT                 VARCHAR2,
    p_account_expiry                    OUT                 DATE,
    p_account_locked                    OUT                 VARCHAR2,
    p_failed_access_attempts            OUT                 NUMBER,
    p_change_password_on_first_use      OUT                 VARCHAR2,
    p_first_password_use_occurred       OUT                 VARCHAR2 );
```

Parameters for Signature 3

Table 46-29 Fetch_User Parameters Signature 3

Parameter	Description
p_user_id	Numeric primary key of the user account.
p_workspace	The name of the workspace.
p_user_name	Alphanumeric name used for login. **See Also**: "GET_USERNAME Function"
p_first_name	Informational. **See Also**: "GET_FIRST_NAME Function"
p_last_name	Informational. **See Also**: "GET_LAST_NAME Function"
p_web_password	Obfuscated account password.
p_email_address	Email address. **See Also**: "GET_EMAIL Function"
p_start_date	Unused.
p_end_date	Unused.
p_employee_id	Unused.
p_allow_access_to_schemas	A list of schemas assigned to the user's workspace to which user is restricted.
p_person_type	Unused.
p_default_schema	A database schema assigned to the user's workspace, used by default for browsing. **See Also**: "GET_DEFAULT_SCHEMA Function"
p_groups	List of groups of which user is a member. **See Also**: "GET_GROUPS_USER_BELONGS_TO Function" and "CURRENT_USER_IN_GROUP Function"
p_developer_role	Colon-separated list of developer roles. The following are acceptable values for this parameter: null - Indicates an end user (a user who can only authenticate to developed applications). CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - Indicates a user with developer privilege. ADMIN:CREATE:DATA_LOADER:EDIT:HELP:MONITOR:SQL - Indicates a user with full workspace administrator and developer privilege. Note: Currently this parameter is named inconsistently between the CREATE_USER, EDIT_USER and FETCH_USER APIs, although they all relate to the DEVELOPER_ROLE field stored in the named user account record. CREATE_USER uses p_developer_privs, EDIT_USER uses p_developer_roles and FETCH_USER uses p_developer_role. **See Also**: "GET_USER_ROLES Function"

Table 46-29 (Cont.) Fetch_User Parameters Signature 3

Parameter	Description
p_description	Informational.
p_account_expiry	Date account password was last reset. **See Also**: "END_USER_ACCOUNT_DAYS_LEFT Function" and "WORKSPACE_ACCOUNT_DAYS_LEFT Function"
p_account_locked	Locked/Unlocked indicator Y or N. **See Also**: "GET_ACCOUNT_LOCKED_STATUS Function"
p_failed_access_attempts	Counter for consecutive login failures.
p_change_password_on_first_use	Setting to force password change on first use Y or N.
p_first_password_use_occurred	Indicates whether login with password occurred Y or N.

Example for Signature 3

The following example shows how to use the FETCH_USER procedure with Signature 3. This procedure is passed the ID of the currently authenticated user for the only IN parameter p_user_id. The code then stores all the other OUT parameter values in local variables.

```
DECLARE
    l_workspace                    VARCHAR2(255);
    l_user_name                    VARCHAR2(100);
    l_first_name                   VARCHAR2(255);
    l_last_name                    VARCHAR2(255);
    l_web_password                 VARCHAR2(255);
    l_email_address                VARCHAR2(240);
    l_start_date                   DATE;
    l_end_date                     DATE;
    l_employee_id                  NUMBER(15,0);
    l_allow_access_to_schemas      VARCHAR2(4000);
    l_person_type                  VARCHAR2(1);
    l_default_schema               VARCHAR2(30);
    l_groups                       VARCHAR2(1000);
    l_developer_role               VARCHAR2(60);
    l_description                  VARCHAR2(240);
    l_account_expiry               DATE;
    l_account_locked               VARCHAR2(1);
    l_failed_access_attempts       NUMBER;
    l_change_password_on_first_use VARCHAR2(1);
    l_first_password_use_occurred  VARCHAR2(1);
BEGIN
    APEX_UTIL.FETCH_USER(
        p_user_id                      => APEX_UTIL.GET_CURRENT_USER_ID,
        p_workspace                    => l_workspace,
        p_user_name                    => l_user_name,
        p_first_name                   => l_first_name,
        p_last_name                    => l_last_name,
        p_web_password                 => l_web_password,
```

```
        p_email_address                => l_email_address,
        p_start_date                   => l_start_date,
        p_end_date                     => l_end_date,
        p_employee_id                  => l_employee_id,
        p_allow_access_to_schemas      => l_allow_access_to_schemas,
        p_person_type                  => l_person_type,
        p_default_schema               => l_default_schema,
        p_groups                       => l_groups,
        p_developer_role               => l_developer_role,
        p_description                  => l_description,
        p_account_expiry               => l_account_expiry,
        p_account_locked               => l_account_locked,
        p_failed_access_attempts       => l_failed_access_attempts,
        p_change_password_on_first_use  =>
l_change_password_on_first_use,
        p_first_password_use_occurred   =>
l_first_password_use_occurred);
END;
```

See Also:

- "EDIT_USER Procedure"
- "GET_CURRENT_USER_ID Function"

46.33 FIND_SECURITY_GROUP_ID Function

This function returns the numeric security group ID of the named workspace.

Syntax

```
APEX_UTIL.FIND_SECURITY_GROUP_ID(
    p_workspace    IN VARCHAR2)
RETURN NUMBER;
```

Parameters

Table 46-30 FIND_SECURITY_GROUP_ID Parameters

Parameter	Description
p_workspace	The name of the workspace.

Example

The following example demonstrates how to use the `FIND_SECURITY_GROUP_ID` function to return the security group ID for the workspace called 'DEMOS'.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.FIND_SECURITY_GROUP_ID (p_workspace=>'DEMOS');
END;
```

46.34 FIND_WORKSPACE Function

This function returns the workspace name associated with a security group ID.

Syntax

```
APEX_UTIL.FIND_WORKSPACE(
    p_security_group_id    IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-31 FIND_WORKSPACE Parameters

Parameter	Description
`p_security_group_id`	The security group ID of a workspace.

Example

The following example demonstrates how to use the `FIND_WORKSPACE` function to return the workspace name for the workspace with a security group ID of 20.

```
DECLARE
    VAL VARCHAR2(255);
BEGIN
    VAL := APEX_UTIL.FIND_WORKSPACE (p_security_group_id =>'20');
END;
```

46.35 GET_ACCOUNT_LOCKED_STATUS Function

This function returns `TRUE` if the account is locked and `FALSE` if the account is unlocked. Must be run by an authenticated workspace administrator in a page request context.

Syntax

```
APEX_UTIL.GET_ACCOUNT_LOCKED_STATUS (
    p_user_name     IN VARCHAR2 )
    RETURN BOOLEAN;
```

Parameters

Table 46-32 GET_ACCOUNT_LOCKED_STATUS Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example checks if an Oracle APEX user account (workspace administrator, developer, or end user) in the current workspace is locked.

```
BEGIN
    FOR c1 IN (SELECT user_name FROM apex_users) loop
        IF APEX_UTIL.GET_ACCOUNT_LOCKED_STATUS(p_user_name =>
c1.user_name) THEN
            HTP.P('User Account:'||c1.user_name||' is locked.');
        END IF;
    END LOOP;
END;
```

> **See Also:**
>
> - LOCK_ACCOUNT Procedure
> - UNLOCK_ACCOUNT Procedure

46.36 GET_APPLICATION_STATUS Function

This function returns the current status of the application. Status values include AVAILABLE, AVAILABLE_W_EDIT_LINK, DEVELOPERS_ONLY, RESTRICTED_ACCESS, UNAVAILABLE, UNAVAILABLE_PLSQL, and UNAVAILABLE_URL.

Syntax

```
APEX_UTIL.GET_APPLICATION_STATUS(
    p_application_id IN NUMBER) RETURN VARCHAR2;
```

Parameters

Table 46-33 GET_APPLICATION_STATUS Parameters

Parameter	Description
p_application_id	The Application ID.

Example

```
declare
    l_status varchar2(100);
begin
    l_status := apex_util.get_application_status(
                    p_application_id => 117 );
    dbms_output.put_line( 'The current application status is: ' ||
l_status );
end;
```

> **See Also:**
>
> "Availability" in *Oracle APEX App Builder User's Guide*

46.37 GET_ATTRIBUTE Function

This function returns the value of one of the attribute values (1 through 10) of a named user in the Oracle APEX accounts table. These are only accessible by using the APIs.

Syntax

```
APEX_UTIL.GET_ATTRIBUTE (
    p_username                IN VARCHAR2,
    p_attribute_number        IN NUMBER )
RETURN VARCHAR2;
```

Parameters

Table 46-34 GET_ATTRIBUTE Parameters

Parameter	Description
p_username	User name in the account.
p_attribute_number	Number of attributes in the user record (1 through 10).

Example

The following example returns the value for the 1st attribute for the user FRANK.

```
DECLARE
    VAL VARCHAR2(4000);
BEGIN
    VAL := APEX_UTIL.GET_ATTRIBUTE (
        p_username => 'FRANK',
        p_attribute_number => 1);
END;
```

> **See Also:**
>
> SET_ATTRIBUTE Procedure

46.38 GET_AUTHENTICATION_RESULT Function

Use this function to retrieve the authentication result of the current session. Any authenticated user can call this function in a page request context.

Syntax

```
APEX_UTIL.GET_AUTHENTICATION_RESULT
RETURN NUMBER;
```

Parameters

None.

Example

The following example demonstrates how to use the post-authentication process of an application's authentication scheme to retrieve the authentication result code set during authentication.

```
APEX_UTIL.SET_SESSION_STATE('MY_AUTH_STATUS',
    'Authentication result:'||APEX_UTIL.GET_AUTHENTICATION_RESULT);
```

> **See Also:**
>
> - "SET_AUTHENTICATION_RESULT Procedure"
> - "SET_CUSTOM_AUTH_STATUS Procedure"

46.39 GET_BLOB_FILE_SRC Function

As an alternative to using the built-in methods of providing a download link, you can use the `APEX_UTIL.GET_BLOB_FILE_SRC` function. One advantage of this approach is more specific formatting of the display of the image (with height and width tags). This function must be called from a valid Oracle APEX session and also requires that the parameters that describe the BLOB are listed as the format of a valid item within the application. That item is then referenced by the function.

If the URL returned by this function is passed to `APEX_UTIL.PREPARE_URL`, the `p_plain_url` argument must be set to `TRUE` to ensure that no modal dialog code is added when the referenced page item is on a modal page.

Syntax

```
APEX_UTIL.GET_BLOB_FILE_SRC (
    p_item_name           IN VARCHAR2 DEFAULT NULL,
    p_v1                  IN VARCHAR2 DEFAULT NULL,
    p_v2                  IN VARCHAR2 DEFAULT NULL,
    p_content_disposition IN VARCHAR2 DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 46-35 GET_BLOB_FILE_SRC Parameters

Parameter	Description
p_item_name	Name of valid application page item with type FILE that contains the source type of DB column.
p_v1	Value of primary key column 1.
p_v2	Value of primary key column 2.
p_content_disposition	Specify INLINE or ATTACHMENT, all other values ignored.

Example

As a PL/SQL Function Body:

```
RETURN '<img src="'||
APEX_UTIL.GET_BLOB_FILE_SRC('P2_ATTACHMENT',:P2_EMPNO)||'" />';
```

As a Region Source of type SQL:

```
SELECT ID, NAME,CASE WHEN NVL(dbms_lob.getlength(document),0) = 0
    THEN NULL
    ELSE CASE WHEN attach_mimetype like 'image%'
    THEN '<img src="'||apex_util.get_blob_file_src('P4_DOCUMENT',id)||'" />'
    ELSE
    '<a href="'||
apex_util.get_blob_file_src('P4_DOCUMENT',id)||'">Download</a>'
    end
    END new_img
    FROM TEST_WITH_BLOB
```

The previous example displays the BLOB within the report if it can be displayed, and provides a download link if it cannot be displayed.

> **See Also:**
>
> Understanding BLOB Support in Forms and Reports in *Oracle APEX App Builder User's Guide*

46.40 GET_BUILD_OPTION_STATUS Function Signature 1

Use this function to get the build option status of a specified application by providing the ID of the application build option.

Syntax

```
APEX_UTIL.GET_BUILD_OPTION_STATUS(
    p_application_id  IN NUMBER
    p_id              IN NUMBER;
```

Parameters

Table 46-36 GET_BUILD_OPTION_STATUS Function Signature 1 Paremeters

Parameters	Description
p_application_id	The ID of the application that owns the build option under shared components.
p_id	The ID of the build option in the application.

Example

The following code retrieves the current status of the specified build option that is identified by ID.

```
DECLARE
    l_status VARCHAR2(255);
BEGIN
    l_status := APEX_UTIL.GET_BUILD_OPTION_STATUS(
                    P_APPLICATION_ID => 101,
                    P_ID => 245935500311121039);
END;
/
```

46.41 GET_BUILD_OPTION_STATUS Function Signature 2

Use this function to get the build option status of a specified application by providing the name of the application build option.

Syntax

```
APEX_UTIL.GET_BUILD_OPTION_STATUS(
    p_application_id     IN NUMBER
    p_build_option_name IN VARCHAR2);
```

Parameters

Table 46-37 GET_BUILD_OPTION_STATUS Function Signature 2 Parameters

Parameters	Description
p_application_id	The ID of the application that owns the build option under shared components.
p_build_option_name	The name of the build option in the application.

Example

The following code retrieves the current status of the specified build option that is identified by name.

```
DECLARE
    l_status VARCHAR2(255);
BEGIN
    l_status := APEX_UTIL.GET_BUILD_OPTION_STATUS(
                    P_APPLICATION_ID => 101,
                    P_BUILD_OPTION_NAME => 'EXCLUDE_FROM_PRODUCTION');
END;
/
```

46.42 GET_CURRENT_USER_ID Function

This function returns the numeric user ID of the current user.

Syntax

```
APEX_UTIL.GET_CURRENT_USER_ID
RETURN NUMBER;
```

Parameters

None.

Example

This following example shows how to use the `GET_CURRENT_USER_ID` function. It returns the numeric user ID of the current user into a local variable.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.GET_CURRENT_USER_ID;
END;
```

46.43 GET_DEFAULT_SCHEMA Function

This function returns the default schema name associated with the current user.

Syntax

```
APEX_UTIL.GET_DEFAULT_SCHEMA
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example shows how to use the `GET_DEFAULT_SCHEMA` function. It returns the default schema name associated with the current user into a local variable.

```
DECLARE
    VAL VARCHAR2(30);
BEGIN
    VAL := APEX_UTIL.GET_DEFAULT_SCHEMA;
END;
```

46.44 GET_EDITION Function

This function returns the edition for the current page view.

Syntax

```
APEX_UTIL.GET_EDITION
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example shows how to use the `GET_EDITION` function. It returns the edition name for the current page view into a local variable.

```
DECLARE
    VAL VARCHAR2(30);
BEGIN
    VAL := APEX_UTIL.GET_EDITION;
END;
```

46.45 GET_EMAIL Function

This function returns the email address associated with the named user.

Syntax

```
APEX_UTIL.GET_EMAIL(
   p_username IN VARCHAR2);
RETURN VARCHAR2;
```

Parameters

Table 46-38 GET_EMAIL Parameters

Parameter	Description
p_username	The user name in the account.

Example

The following example shows how to use the `GET_EMAIL` function to return the email address of the user 'FRANK'.

```
DECLARE
    VAL VARCHAR2(240);
BEGIN
    VAL := APEX_UTIL.GET_EMAIL(p_username => 'FRANK');
END;
```

> **See Also:**
>
> "SET_EMAIL Procedure"

46.46 GET_FEEDBACK_FOLLOW_UP Function

Use this function to retrieve any remaining follow up associated with a specific feedback.

Syntax

```
APEX_UTIL.GET_FEEDBACK_FOLLOW_UP (
    p_feedback_id    IN NUMBER,
    p_row            IN NUMBER DEFAULT 1,
    p_template       IN VARCHAR2 DEFAULT '<br />#CREATED_ON# (#CREATED_BY#)
#FOLLOW_UP#')
RETURN VARCHAR2;
```

Parameters

Table 46-39 GET_FEEDBACK_FOLLOW_UP Parameters

Parameter	Description
p_feedback_id	The unique identifier of the feedback item.
p_row	Identifies which follow-up to retrieve and is ordered by created_on_desc.
p_template	The template to use to return the follow up. Given the in the default template, the function can be used in a loop to return all the follow up to a feedback.

Example

The following example displays all the remaining follow-up for feedback with the ID of 123.

```
declare
   l_feedback_count  number;
begin
   select count(*)
     into l_feedback_count
     from apex_team_feedback_followup
    where feedback_id = 123;

   for i in 1..l_feedback_count loop
      htp.p(apex_util.get_feedback_follow_up (
                p_feedback_id => 123,
                p_row         => i,
                p_template    => '<br />#FOLLOW_UP# was created on
#CREATED_ON# by #CREATED_BY#') );
   end loop;
end;
/
```

46.47 GET_FILE Procedure

This procedure downloads files from the Oracle APEX file repository. If you invoke this procedure during page processing, ensure that no page branch is invoked under the same condition to avoid interference with the file retrieval. This means that branches with any of the following conditions should **NOT** be set to fire:

- Branches with a When Button Pressed attribute equal to the button that invokes the procedure.
- Branches with conditional logic defined that would succeed during page processing when the procedure is being invoked.
- As unconditional.

Syntax

```
APEX_UTIL.GET_FILE (
    p_file_id    IN VARCHAR2,
    p_inline     IN VARCHAR2 DEFAULT 'NO' );
```

Parameters

Table 46-40 GET_FILE Parameters

Parameter	Description

p_file_id	ID in APEX_APPLICATION_FILES of the file to be downloaded. APEX_APPLICATION_FILES is a view on all files uploaded to your workspace. The following example demonstrates how to use APEX_APPLICATION_FILES:
	
	DECLARE
	l_file_id NUMBER;
	BEGIN
	SELECT id
	INTO l_file_id
	FROM APEX_APPLICATION_FILES
	WHERE filename = 'myxml';
	--
	APEX_UTIL.GET_FILE(
	p_file_id => l_file_id,
	p_inline => 'YES');
	END;

p_inline	Valid values include YES and NO. YES to display inline in a browser. NO to download as attachment.

Example

The following example returns the file identified by the ID 8675309. This is displayed inline in the browser.

```
BEGIN
    APEX_UTIL.GET_FILE(
        p_file_id   => '8675309',
        p_inline    => 'YES');
END;
```

> **See Also:**
>
> GET_FILE_ID Function

46.48 GET_FILE_ID Function

This function obtains the primary key of a file in the Oracle APEX file repository.

Syntax

```
APEX_UTIL.GET_FILE_ID (
    p_name    IN VARCHAR2 )
RETURN NUMBER;
```

Parameters

Table 46-41 GET_FILE_ID Parameters

Parameter	Description
p_name	The NAME in APEX_APPLICATION_FILES of the file to be downloaded. APEX_APPLICATION_FILES is a view on all files uploaded to your workspace.

Example

The following example retrieves the database ID of the file with a filename of F125.sql.

```
DECLARE
    l_name VARCHAR2(255);
    l_file_id NUMBER;
BEGIN
    SELECT name
        INTO l_name
        FROM APEX_APPLICATION_FILES
        WHERE filename = 'F125.sql';
        --
        l_file_id := APEX_UTIL.GET_FILE_ID(p_name => l_name);
END;
```

46.49 GET_FIRST_NAME Function

This function returns the FIRST_NAME field stored in the named user account record.

Syntax

```
APEX_UTIL.GET_FIRST_NAME
    p_username IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-42 GET_FIRST_NAME Parameters

Parameter	Description
p_username	Identifies the user name in the account.

Example

The following example shows how to use the GET_FIRST_NAME function to return the FIRST_NAME of the user 'FRANK'.

```
DECLARE
    VAL VARCHAR2(255);
BEGIN
    VAL := APEX_UTIL.GET_FIRST_NAME(p_username => 'FRANK');
END;
```

> **See Also:**
>
> "SET_FIRST_NAME Procedure"

46.50 GET_GROUPS_USER_BELONGS_TO Function

This function returns a comma then a space separated list of group names to which the named user is a member.

Syntax

```
APEX_UTIL.GET_GROUPS_USER_BELONGS_TO(
   p_username IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-43 GET_GROUPS_USER_BELONGS_TO Parameters

Parameter	Description
p_username	Identifies the user name in the account.

Example

The following example shows how to use the `GET_GROUPS_USER_BELONGS_TO` to return the list of groups to which the user 'FRANK' is a member.

```
DECLARE
    VAL VARCHAR2(32765);
BEGIN
    VAL := APEX_UTIL.GET_GROUPS_USER_BELONGS_TO(p_username => 'FRANK');
END;
```

> **See Also:**
>
> "EDIT_USER Procedure"

46.51 GET_GROUP_ID Function

This function returns the numeric ID of a named group in the workspace.

Syntax

```
APEX_UTIL.GET_GROUP_ID(
    p_group_name IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-44 GET_GROUP_ID Parameters

Parameter	Description
`p_group_name`	Identifies the user name in the account.

Example

The following example shows how to use the `GET_GROUP_ID` function to return the ID for the group named 'Managers'.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.GET_GROUP_ID(p_group_name => 'Managers');
END;
```

46.52 GET_GROUP_NAME Function

This function returns the name of a group identified by a numeric ID.

Syntax

```
APEX_UTIL.GET_GROUP_NAME(
    p_group_id IN NUMBER)
RETURN VARCHAR2;
```

Parameters

Table 46-45 GET_GROUP_NAME Parameters

Parameter	Description
p_group_id	Identifies a numeric ID of a group in the workspace.

Example

The following example shows how to use the `GET_GROUP_NAME` function to return the name of the group with the ID 8922003.

```
DECLARE
    VAL VARCHAR2(255);
BEGIN
    VAL := APEX_UTIL.GET_GROUP_NAME(p_group_id => 8922003);
END;
```

46.53 GET_HASH Function

This function computes a hash value for all given values. Use this function to implement lost update detection for data records.

Syntax

```
APEX_UTIL.GET_HASH (
    p_values in apex_t_varchar2,
    p_salted in boolean default true )
    RETURN VARCHAR2;
```

Parameters

Table 46-46 GET_HASH Parameters

Parameter	Description
p_values	The input values.
p_salted	If true (the default), salt hash with internal session information.

Example

```
declare
       l_hash varchar2(4000);
```

```
   begin
       select apex_util.get_hash(apex_t_varchar2 (
                  empno, sal, comm ))
         into l_hash
         from emp
        where empno = :P1_EMPNO;

       if :P1_HASH <> l_hash then
           raise_application_error(-20001, 'Somebody already updated
SAL/COMM');
       end if;

       update emp
          set sal = :P1_SAL,
              comm = :P1_COMM
        where empno = :P1_EMPNO;
   exception when no_data_found then
       raise_application_error(-20001, 'Employee not found');
   end;
```

46.54 GET_HIGH_CONTRAST_MODE_TOGGLE Function

This function returns a link to the current page that enables you to turn on or off, toggle, the mode. For example, if you are in standard mode, this function displays a link that when clicked switches high contrast mode on.

Syntax

```
APEX_UTIL.GET_HIGH_CONTRAST_MODE_TOGGLE (
    p_on_message  IN VARCHAR2 DEFAULT NULL,
    p_off_message IN VARCHAR2 DEFAULT NULL)
    RETURN VARCHAR2;
```

Parameters

Table 46-47 GET_HIGH_CONTRAST_MODE_TOGGLE Prameters

Parameter	Description
p_on_message	Optional text used for the link to switch to high contrast mode, when you are in standard mode. If this parameter is not passed, the default 'Set High Contrast Mode On' text is returned in the link.
p_off_message	Optional text used for the link to switch to standard mode, when you are in high contrast mode. If this parameter is not passed, the default 'Set High Contrast Mode Off' text is returned in the link.

Example

When running in standard mode, this function returns a link with the text 'Set High Contrast Mode On'. When the link is clicked the current page is refreshed and high contrast mode is switched on. When running in high contrast mode, a link 'Set High

Contrast Mode Off' is returned. When the link is clicked the current page is refreshed and switched back to standard mode.

```
BEGIN
    htp.p(apex_util.get_high_contrast_mode_toggle);
END;
```

> **Note:**
>
> There are also 2 translatable system messages that can be overridden at application level to change the default link text that is returned for this toggle. They include:
>
> - `APEX.SET_HIGH_CONTRAST_MODE_OFF` - Default text = Set High Contrast Mode Off
> - `APEX.SET_HIGH_CONTRAST_MODE_ON` - Default text = Set High Contrast Mode On

> **See Also:**
>
> "SHOW_HIGH_CONTRAST_MODE_TOGGLE Procedure"

46.55 GET_LAST_NAME Function

This function returns the `LAST_NAME` field stored in the named user account record.

Syntax

```
APEX_UTIL.GET_LAST_NAME(
    p_username IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-48 GET_LAST_NAME Parameters

Parameter	Description
`p_username`	The user name in the user account record.

Example

The following example shows how to use the function to return the `LAST_NAME` for the user 'FRANK'.

```
DECLARE
    VAL VARCHAR2(255);
```

```
BEGIN
    VAL := APEX_UTIL.GET_LAST_NAME(p_username => 'FRANK');
END;
```

> **See Also:**
>
> "SET_LAST_NAME Procedure"

46.56 GET_NUMERIC_SESSION_STATE Function

This function returns a numeric value for a numeric item. You can use this function in Oracle APEX applications wherever you can use PL/SQL or SQL. You can also use the shorthand function `NV` in place of `APEX_UTIL.GET_NUMERIC_SESSION_STATE`.

Syntax

```
APEX_UTIL.GET_NUMERIC_SESSION_STATE (
    p_item     IN VARCHAR2 )
RETURN NUMBER;
```

Parameters

Table 46-49 GET_NUMERIC_SESSION_STATE Parameters

Parameter	Description
`p_item`	The case insensitive name of the item for which you want to have the session state fetched.

Example

The following example shows how to use the function to return the numeric value stored in session state for the item `my_item`.

```
DECLARE
    l_item_value    NUMBER;
BEGIN
    l_item_value := APEX_UTIL.GET_NUMERIC_SESSION_STATE('my_item');
END;
```

> **See Also:**
>
> - GET_SESSION_STATE Function
> - SET_SESSION_STATE Procedure

46.57 GET_PREFERENCE Function

This function retrieves the value of a previously saved preference for a given user.

Syntax

```
APEX_UTIL.GET_PREFERENCE (
    p_preference  IN    VARCHAR2 DEFAULT NULL,
    p_user        IN    VARCHAR2 DEFAULT V('USER'))
RETURN VARCHAR2;
```

Parameters

Table 46-50 GET_PREFERENCE Parameters

Parameter	Description
p_preference	Name of the preference to retrieve the value.
p_user	User for whom the preference is being retrieved.

Example

The following example shows how to use the GET_PREFERENCE function to return the value for the currently authenticated user's preference named default_view.

```
DECLARE
    l_default_view    VARCHAR2(255);
BEGIN
    l_default_view := APEX_UTIL.GET_PREFERENCE(
        p_preference => 'default_view',
        p_user       => :APP_USER);
END;
```

> **See Also:**
>
> - "SET_PREFERENCE Procedure"
> - "REMOVE_PREFERENCE Procedure"
> - "Managing User Preferences" in *Oracle APEX Administration Guide*

46.58 GET_GLOBAL_NOTIFICATION Function

This function gets the global notification message which is the message displayed in page #GLOBAL_NOTIFICATION# substitution string.

Syntax

```
APEX_UTIL.GET_GLOBAL_NOTIFICATION(
   p_application_id IN NUMBER) RETURN VARCHAR2;
```

Parameters

Table 46-51 GET_GLOBAL_NOTIFICATION Parameters

Parameter	Description
p_application_id	The Application ID.

Example

```
declare
    l_global_notification varchar2(100);

begin
    l_global_notification := apex_util.get_global_notification(
                                p_application_id => 117 );
    dbms_output.put_line( 'The current global notification is: ' ||
l_global_notification );
end;
```

> **See Also:**
>
> "Availability" in *Oracle APEX App Builder User's Guide*

46.59 GET_PRINT_DOCUMENT Function Signature 1

This function returns a document as BLOB using XML based report data and RTF or XSL-FO based report layout.

Syntax

```
APEX_UTIL.GET_PRINT_DOCUMENT (
    p_report_data          IN BLOB,
    p_report_layout        IN CLOB,
    p_report_layout_type   IN VARCHAR2 default 'xsl-fo',
    p_document_format      IN VARCHAR2 default 'pdf',
    p_print_server         IN VARCHAR2 default NULL)
RETURN BLOB;
```

Parameters

Table 46-52 GET_PRINT_DOCUMENT Signature 1 Parameters

Parameter	Description
p_report_data	XML based report data.
p_report_layout	Report layout in XSL-FO or RTF format.
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

For a GET_PRINT_DOCUMENT example see "GET_PRINT_DOCUMENT Function Signature 4".

46.60 GET_PRINT_DOCUMENT Function Signature 2

This function returns a document as BLOB using pre-defined report query and pre-defined report layout.

Syntax

```
APEX_UTIL.GET_PRINT_DOCUMENT (
    p_application_id      IN NUMBER,
    p_report_query_name   IN VARCHAR2,
    p_report_layout_name  IN VARCHAR2 default null,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default null)
RETURN BLOB;
```

Parameters

Table 46-53 GET_PRINT_DOCUMENT Signature 2 Parameters

Parameter	Description
p_application_id	Defines the application ID of the report query.
p_report_query_name	Name of the report query (stored under application's shared components).
p_report_layout_name	Name of the report layout (stored under application's Shared Components).
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

For a GET_PRINT_DOCUMENT example see "GET_PRINT_DOCUMENT Function Signature 4".

46.61 GET_PRINT_DOCUMENT Function Signature 3

This function returns a document as BLOB using a pre-defined report query and RTF or XSL-FO based report layout.

Syntax

```
APEX_UTIL.GET_PRINT_DOCUMENT (
    p_application_id      IN NUMBER,
    p_report_query_name   IN VARCHAR2,
    p_report_layout       IN CLOB,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default null)
RETURN BLOB;
```

Parameters

Table 46-54 GET_PRINT_DOCUMENT Signature 3 Parameters

Parameter	Description
p_application_id	Defines the application ID of the report query.
p_report_query_name	Name of the report query (stored under application's shared components).
p_report_layout	Defines the report layout in XSL-FO or RTF format.
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

For a GET_PRINT_DOCUMENT example see "GET_PRINT_DOCUMENT Function Signature 4".

46.62 GET_PRINT_DOCUMENT Function Signature 4

This function returns a document as BLOB using XML based report data and RTF or XSL-FO based report layout.

Syntax

```
APEX_UTIL.GET_PRINT_DOCUMENT (
    p_report_data         IN CLOB,
    p_report_layout       IN CLOB,
    p_report_layout_type  IN VARCHAR2 default 'xsl-fo',
    p_document_format     IN VARCHAR2 default 'pdf',
    p_print_server        IN VARCHAR2 default NULL)
RETURN BLOB;
```

Parameters

Table 46-55 GET_PRINT_DOCUMENT Signature 4 Parameters

Parameter	Description
p_report_data	XML based report data, must be encoded in UTF-8.
p_report_layout	Report layout in XSL-FO or RTF format.
p_report_layout_type	Defines the report layout type, that is "xsl-fo" or "rtf".
p_document_format	Defines the document format, that is "pdf", "rtf", "xls", "htm", or "xml".
p_print_server	URL of the print server. If not specified, the print server is derived from preferences.

Example for Signature 4

The following example shows how to use the GET_PRINT_DOCUMENT using Signature 4 (Document returns as a BLOB using XML based report data and RTF or XSL-FO based report layout). In this example, GET_PRINT_DOCUMENT is used with APEX_MAIL.SEND and APEX_MAIL.ADD_ATTACHMENT to send an email with an attachment of the file returned by GET_PRINT_DOCUMENT. Both the report data and layout are taken from values stored in page items (P1_XML and P1_XSL).

```
DECLARE
    l_id number;
    l_document BLOB;
BEGIN
    l_document := APEX_UTIL.GET_PRINT_DOCUMENT (
        p_report_data         => :P1_XML,
        p_report_layout       => :P1_XSL,
        p_report_layout_type  => 'xsl-fo',
        p_document_format     => 'pdf');

   l_id := APEX_MAIL.SEND(
       p_to        => :P35_MAIL_TO,
       p_from      => 'noreplies@oracle.com',
       p_subj      => 'sending PDF by using print API',
       p_body      => 'Please review the attachment.',
       p_body_html => 'Please review the attachment');

   APEX_MAIL.ADD_ATTACHMENT (
       p_mail_id    => l_id,
       p_attachment => l_document,
       p_filename   => 'mydocument.pdf',
       p_mime_type  => 'application/pdf');
END;
```

46.63 GET_SCREEN_READER_MODE_TOGGLE Function

This function returns a link to the current page to turn on or off, toggle, the mode. For example, if you are in standard mode, this function displays a link that when clicked switches screen reader mode on.

Syntax

```
APEX_UTIL.GET_SCREEN_READER_MODE_TOGGLE (
    p_on_message  IN VARCHAR2 DEFAULT NULL,
    p_off_message IN VARCHAR2 DEFAULT NULL)
RETURN VARCHAR2;
```

Parameters

Table 46-56 GET_SCREEN_READER_MODE_TOGGLE Parameters

Parameter	Description
p_on_message	Optional text used for the link to switch to screen reader mode, when you are in standard mode. If this parameter is not passed, the default 'Set Screen Reader Mode On' text is returned in the link.
p_off_message	Optional text used for the link to switch to standard mode, when you are in screen reader mode. If this parameter is not passed, the default 'Set Screen Reader Mode Off' text is returned in the link.

Example

When running in standard mode, this function returns a link with the text 'Set Screen Reader Mode On'. When the link is clicked the current page is refreshed and screen reader mode is switched on. When running in screen reader mode, a link 'Set Screen Reader Mode Off' is returned. When the link is clicked the current page is refreshed and switched back to standard mode.

```
BEGIN
    htp.p(apex_util.get_screen_reader_mode_toggle);
END;
```

> **See Also:**
>
> "SHOW_SCREEN_READER_MODE_TOGGLE Procedure"

46.64 GET_SESSION_LANG Function

This function returns the language setting for the current user in the current Oracle APEX session.

Syntax

```
APEX_UTIL.GET_SESSION_LANG
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the session language for the current user in the current APEX session into a local variable.

```
DECLARE
    VAL VARCHAR2(5);
BEGIN
    VAL := APEX_UTIL.GET_SESSION_LANG;
END;
```

46.65 GET_SESSION_STATE Function

This function returns the value for an item. You can use this function in your Oracle APEX applications wherever you can use PL/SQL or SQL. You can also use the shorthand function `V` in place of `APEX_UTIL.GET_SESSION_STATE`.

Syntax

```
APEX_UTIL.GET_SESSION_STATE (
    p_item  IN VARCHAR2 )
RETURN VARCHAR2;
```

Parameters

Table 46-57 GET_SESSION_STATE Parameters

Parameter	Description
`p_item`	The case insensitive name of the item for which you want to have the session state fetched.

Example

The following example returns the value stored in session state for the item `my_item`.

```
DECLARE
    l_item_value  VARCHAR2(255);
BEGIN
    l_item_value := APEX_UTIL.GET_SESSION_STATE('my_item');
END;
```

> **See Also:**
>
> - GET_NUMERIC_SESSION_STATE Function
> - SET_SESSION_STATE Procedure

46.66 GET_SESSION_TERRITORY Function

This function returns the territory setting for the current user in the current Oracle APEX session.

Syntax

```
APEX_UTIL.GET_SESSION_TERRITORY
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the session territory setting for the current user in the current APEX session into a local variable.

```
DECLARE
    VAL VARCHAR2(30);
BEGIN
    VAL := APEX_UTIL.GET_SESSION_TERRITORY;
END;
```

46.67 GET_SESSION_TIME_ZONE Function

This function returns the time zone for the current user in the current Oracle APEX session. This value is null if the time zone is not explicitly set by using `APEX_UTIL.SET_SESSION_TIME_ZONE` or if an application's automatic time zone attribute is enabled.

Syntax

```
APEX_UTIL.GET_SESSION_TIME_ZONE
RETURN VARCHAR2;
```

Parameters

None.

Example

The following example returns the session time zone for the current user in the current APEX session into a local variable.

```
BEGIN
    VAL := APEX_UTIL.GET_SESSION_TIME_ZONE;
END;
```

46.68 GET_SINCE Function

This function returns the relative date in words (for example, 2 days from now, 30 minutes ago). It also accepts a second optional `p_short` parameter and returns "in 2d" or "30m" and so forth. This function is equivalent to using the format masks `SINCE` and `SINCE_SHORT` available within Oracle APEX and is useful within SQL queries or PL/SQL routines.

Syntax

```
APEX_UTIL.GET_SINCE (
   p_date  DATE )
   p_short IN [ BOOLEAN DEFAULT FALSE | VARCHAR2 DEFAULT 'N' ] )
RETURN VARCHAR2;
```

Parameters

Table 46-58 GET_SINCE Parameters

Parameter	Description
`p_date`	The date you want formatted.
`p_short`	Boolean or Y/N to indicate whether to return a short version of relative date.

Example

```
select application_id, application_name,apex_util.get_since(last_updated_on)
last_update
  from apex_applications
 order by application_id
```

Syntax

```
APEX_UTIL.GET_SINCE (
   p_value in [ timestamp | timestamp with time zone | timestamp with local
time zone ],
   p_short in [ boolean default false | varchar2 default 'N' ] )
RETURN VARCHAR2;
```

Parameters

Parameter	Description
p_value	The TIMESTAMP, TIMESTAMP WITH TIME ZONE, TIMESTAMP WITH LOCAL TIME ZONE you want to format.
p_short	Boolean or Y/N to indicate whether to return a short version of relative date.

Examples

This example returns the LAST_UPDATE column with the normal formatting.

```
select application_id, application_name,
apex_util.get_since( last_updated_on ) last_update
  from apex_applications
 order by application_id;
```

This example returns the LAST_UPDATE column with the short formatting.

```
select application_id, application_name,
apex_util.get_since( last_updated_on, p_short => 'Y' ) last_update
  from apex_applications
 order by application_id
```

46.69 GET_SUPPORTING_OBJECT_SCRIPT Function

This function gets supporting object scripts defined in an application.

> **Note:**
>
> The workspace ID must be set before the call.

Syntax

```
APEX_UTIL.GET_SUPPORTING_OBJECT_SCRIPT (
    p_application_id  IN NUMBER,
    p_script_type     IN VARCHAR2 ) RETURN CLOB;
```

Parameters

Table 46-59 GET_SUPPORTING_OBJECT_SCRIPT Function

Parameter	Description
p_application_id	The application ID to get supporting objects from.

Table 46-59 (Cont.) GET_SUPPORTING_OBJECT_SCRIPT Function

Parameter	Description
p_script_type	The supporting objects script type. Valid values are apex_util.c_install_script, apex_util.c_upgrade_script, apex_util.c_deinstall_script.

Example

The following example shows how to set workspace ID for workspace FRED, then get supporting objects from application ID 100.

```
declare
    l_install_script   clob;
    l_upgrade_script   clob;
    l_deinstall_script clob;
begin
    apex_util.set_workspace( p_workspace => 'FRED');

    l_install_script :=
apex_util.get_supporting_object_script( p_application_id => 100,
 p_script_type => apex_util.c_install_script );
    l_upgrade_script :=
apex_util.get_supporting_object_script( p_application_id => 100,
 p_script_type => apex_util.c_upgrade_script );
    l_deinstall_script :=
apex_util.get_supporting_object_script( p_application_id => 100,
 p_script_type => apex_util.c_deinstall_script );
end;
```

46.70 GET_SUPPORTING_OBJECT_SCRIPT Procedure

This procedure gets supporting object scripts and outputs to sys.dbms_output buffer or download as a file.

> **Note:**
>
> The workspace ID must be set before the call.

Syntax

```
APEX_UTIL.GET_SUPPORTING_OBJECT_SCRIPT(
    p_application_id  IN NUMBER,
    p_script_type     IN VARCHAR2,
    p_output_type     IN VARCHAR2 DEFAULT c_output_as_dbms_output );
```

Parameters

Table 46-60 GET_SUPPORTING_OBJECT_SCRIPT Procedure

Parameter	Description
p_application_id	The application ID to get supporting objects from.
p_script_type	The supporting objects script type. Valid values are apex_util.c_install_script, apex_util.c_upgrade_script, apex_util.c_deinstall_script.
p_output_type	The script can be output to sys.dbms_output buffer or download as a file. Valid values are apex_util.c_output_as_dbms_output, apex_util.c_output_as_file. The default is c_output_as_dbms_output.

Examples

The following example shows how to set workspace ID for workspace FRED, then get install script from application ID 100 and output to the command-line buffer.

```
set serveroutput on;
begin
    apex_util.set_workspace( p_workspace => 'FRED');
    apex_util.get_supporting_object_script(
        p_application_id => 100,
        p_script_type    => apex_util.c_install_script );
end;
```

The following example shows how to download upgrade script file from application ID 100 in the browser. Useful if the script needs to be downloaded using an application process.

```
begin
    apex_util.set_workspace( p_workspace => 'FRED');
    apex_util.get_supporting_object_script(
        p_application_id => 100,
        p_script_type    => apex_util.c_upgrade_script,
        p_output_type    => apex_util.c_output_as_file );
end;
```

46.71 GET_USER_ID Function

This function returns the numeric ID of a named user in the workspace.

Syntax

```
APEX_UTIL.GET_USER_ID(
    p_username    IN VARCHAR2)
RETURN NUMBER;
```

Parameters

Table 46-61 GET_USER_ID Parameters

Parameter	Description
p_username	Identifies the name of a user in the workspace.

Example

The following example shows how to use the GET_USER_ID function to return the ID for the user named 'FRANK'.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.GET_USER_ID(p_username => 'FRANK');
END;
```

46.72 GET_USER_ROLES Function

This function returns the DEVELOPER_ROLE field stored in the named user account record. Please note that currently this parameter is named inconsistently between the CREATE_USER, EDIT_USER and FETCH_USER APIs, although they all relate to the DEVELOPER_ROLE field. CREATE_USER uses p_developer_privs, EDIT_USER uses p_developer_roles and FETCH_USER uses p_developer_role.

Syntax

```
APEX_UTIL.GET_USER_ROLES(
   p_username IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-62 GET_USER_ROLES Parameters

Parameter	Description
p_username	Identifies a user name in the account.

Example

The following example shows how to use the `GET_USER_ROLES` function to return colon separated list of roles stored in the `DEVELOPER_ROLE` field for the user 'FRANK'.

```
DECLARE
    VAL VARCHAR2(4000);
BEGIN
    VAL := APEX_UTIL.GET_USER_ROLES(p_username=>'FRANK');
END;
```

46.73 GET_USERNAME Function

This function returns the user name of a user account identified by a numeric ID.

Syntax

```
APEX_UTIL.GET_USERNAME(
    p_userid IN NUMBER)
RETURN VARCHAR2;
```

Parameters

Table 46-63 GET_USERNAME Parameters

Parameter	Description
`p_userid`	Identifies the numeric ID of a user account in the workspace.

Example

The following example uses `GET_USERNAME` to return the user name for the user with an ID of `228922003`.

```
DECLARE
    val varchar2(100);
BEGIN
    val := apex_util.get_username(p_userid => 228922003);
END;
```

> **See Also:**
>
> "SET_USERNAME Procedure"

46.74 HOST_URL Function

This function returns the URL to the Oracle APEX instance, depending on the option passed.

Syntax

```
APEX_UTIL.HOST_URL (
    p_option    IN VARCHAR2 DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 46-64 HOST_URL Parameters

Parameter	Description
p_option	Specifies the parts of the URL to include. Possible values for p_option include: • NULL - Return URL up to port number. For example: http://myserver.com:7778 • SCRIPT - Return URL to include script name. For example: For example (Friendly URL enabled): https://myserver.com:7778/pls/apex/{workspace}/r/{application} For example (Friendly URL disabled) https://myserver.com:7778/pls/apex/ • APEX_PATH - Return URL to include the APEX path. For example: https://myserver.com:7778/pls/apex/ • IMGPRE - Return URL to include image prefix. For example: https://myserver.com:7778/i/

Example

The following example returns the URL to the current APEX instance including the script name.

```
declare
    l_host_url      varchar2(4000);
    l_url           varchar2(4000);
    l_application   varchar2(30) := 'f?p=100:1';
    l_email_body    varchar2(32000);
begin
```

```
    l_host_url := apex_util.host_url('SCRIPT');
    l_url := l_host_url||l_application;
    l_email_body := 'The URL to the application is: '||l_url;
end;
```

46.75 HTML_PCT_GRAPH_MASK Function

Use this function to scale a graph. This function can also be used by classic and interactive reports with format mask of GRAPH. This generates a `<div>` tag with inline styles.

Syntax

```
APEX_UTIL.HTML_PCT_GRAPH_MASK (
    p_number         IN NUMBER    DEFAULT NULL,
    p_size           IN NUMBER    DEFAULT 100,
    p_background     IN VARCHAR2  DEFAULT NULL,
    p_bar_background IN VARCHAR2  DEFAULT NULL,
    p_format         IN VARCHAR2  DEFAULT NULL)
RETURN VARCHAR2;
```

Parameters

Table 46-65 HTML_PCT_GRAPH_MASK Parameters

Parameter	Description
p_number	Number between 0 and 100.
p_size	Width of graph in pixels.
p_background	Six character hexadecimal background color of chart bar (not bar color).
p_bar_background	Six character hexadecimal background color of chart bar (bar color).
p_format	If this parameter is supplied, p_size, p_background and p_bar_background are ignored. This parameter uses the following format: PCT_GRAPH:<BACKGROUND>:<FOREGROUND>:<CHART_WIDTH> position 1: PCT_GRAPH format mask indicator position 2: Background color in hexadecimal, 6 characters (optional) position 3: Foreground "bar" color in hexadecimal, 6 characters (optional) position 4: Chart width in pixels. Numeric and defaults to 100. p_number is automatically scaled so that 50 is half of chart_width (optional).

Example

The following is an SQL example.

```
select apex_util.html_pct_graph_mask(33) from dual
```

The following is a report numeric column format mask example.

```
PCT_GRAPH:777777:111111:200
```

46.76 INCREMENT_CALENDAR Procedure

Use this procedure to navigate to the next set of days in the calendar. Depending on what the calendar view is, this procedure navigates to the next month, week or day. If it is a Custom Calendar the total number of days between the start date and end date are navigated.

Syntax

```
APEX_UTIL.INCREMENT_CALENDAR;
```

Parameter

None.

Example

In this example, if you create a button called NEXT in the Calendar page and create a process that fires when the create button is clicked the following code navigates the calendar.

```
APEX_UTIL.INCREMENT_CALENDAR
```

46.77 IR_CLEAR Procedure [DEPRECATED]

> **Note:**
>
> The use of this procedure is not recommended. This procedure has been replaced by the procedure in APEX_IR.

This procedure clears report settings. Only use this procedure in a page submit process.

Syntax

```
APEX_UTIL.IR_CLEAR (
    p_page_id       IN NUMBER,
    p_report_alias  IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 46-66 IR_CLEAR Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.

Table 46-66 (Cont.) IR_CLEAR Parameters

Parameter	Description
p_report_alias	Identifies the saved report alias within the current application page. To clear a Primary report, set p_report_alias to PRIMARY or leave as NULL. To clear a saved report, p_report_alias must be the name of the saved report. For example, to clear report 1234, set p_report_alias to 1234.

Example

The following example clears interactive report settings with alias of 8101021 in page 1 of the current application.

```
BEGIN
    APEX_UTIL.IR_CLEAR(
        p_page_id      => 1,
        p_report_alias => '8101021'
        );
END;
```

46.78 IR_DELETE_REPORT Procedure [DEPRECATED]

> **Note:**
>
> Use of this procedure is not recommended. This procedure has been replaced by the procedure in APEX_IR.

This procedure deletes saved interactive reports. It deletes all saved reports except the Primary Default report.

Syntax

```
APEX_UTIL.IR_DELETE_REPORT (
    p_report_id     IN NUMBER );
```

Parameters

Table 46-67 IR_DELETE_REPORT Parameters

Parameter	Description
p_report_id	Report ID to delete within the current Oracle APEX application.

Example

The following example shows how to use the `IR_DELETE_REPORT` procedure to delete the saved Interactive report with ID of '880629800374638220' in the current application.

```
BEGIN
    APEX_UTIL.IR_DELETE_REPORT(
        p_report_id => '880629800374638220');
END;
```

46.79 IR_DELETE_SUBSCRIPTION Procedure [DEPRECATED]

> **Note:**
>
> The use of this procedure is not recommended. This procedure has been replaced by the procedure in APEX_IR.

This procedure deletes Interactive subscriptions.

Syntax

```
APEX_UTIL.IR_DELETE_SUBSCRIPTION(
    p_subscription_id IN NUMBER);
```

Parameters

Table 46-68 IR_DELETE_SUBSCRIPTION Parameters

Parameter	Description
`p_subscription_id`	Subscription ID to delete within the current workspace.

Example

The following example shows how to use the IR_DELETE_SUBSCRIPTION procedure to delete the subscription with ID of ' 880629800374638220 ' in the current workspace.

```
BEGIN
    APEX_UTIL.IR_DELETE_SUBSCRIPTION(
        p_subscription_id => '880629800374638220');
END;
```

46.80 IR_FILTER Procedure [DEPRECATED]

> **Note:**
>
> This procedure is not recommended. This procedure has been replaced by the procedure in APEX_IR.

This procedure creates a filter on an interactive report. Only use this procedure in a page submit process.

Syntax

```
APEX_UTIL.IR_FILTER (
    p_page_id       IN NUMBER,
    p_report_column IN VARCHAR2,
    p_operator_abbr IN VARCHAR2 DEFAULT NULL,
    p_filter_value  IN VARCHAR2,
    p_report_alias  IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 46-69 IR_FILTER Parameters

Parameter	Description
`p_page_id`	Page of the current Oracle APEX application that contains an interactive report.
`p_report_column`	Name of the report SQL column, or column alias, to be filtered.
`p_operator_abbr`	Filter type. Valid values are as follows: • `EQ` = Equals • `NEQ` = Not Equals • `LT` = Less than • `LTE` = Less then or equal to • `GT` = Greater Than • `GTE` = Greater than or equal to • `LIKE` = SQL Like operator • `N` = Null • `NN` = Not Null • `C` = Contains • `NC` = Not Contains • `IN` = SQL In Operator • `NIN` = SQL Not In Operator
`p_filter_value`	Filter value. This value is not used for `N` and `NN`.

Table 46-69 (Cont.) IR_FILTER Parameters

Parameter	Description
p_report_alias	Identifies the saved report alias within the current application page. To create a filter on a Primary report, p_report_alias must be PRIMARY or leave as NULL. To create a filter on a saved report, p_report_alias must be the name of the saved report. For example, to create a filter on report 1234, p_report_alias must be 1234.

Example

The following example shows how to use the IR_FILTER procedure to filter interactive report with alias of 8101021 in page 1 of the current application with DEPTNO equals 30.

```
BEGIN
    APEX_UTIL.IR_FILTER (
        p_page_id        => 1,
        p_report_column  => 'DEPTNO',
        p_operator_abbr  => 'EQ',
        p_filter_value   => '30'
        p_report_alias   => '8101021'
        );
END;
```

46.81 IR_RESET Procedure [DEPRECATED]

> **Note:**
>
> The use of this procedure is not recommended. This procedure has been replaced by the procedure in APEX_IR.

This procedure resets report settings back to the default report settings. Resetting a report removes any customizations you have made.

> **Note:**
>
> This procedure should be used only in a page submit process.

Syntax

```
APEX_UTIL.IR_RESET(
    p_page_id IN NUMBER,
    p_report_alias IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 46-70 IR_RESET Parameters

Parameter	Description
p_page_id	Page of the current Oracle APEX application that contains an interactive report.
p_report_alias	Identifies the saved report alias within the current application page. To reset a Primary report, p_report_alias must be 'PRIMARY' or leave as NULL. To reset a saved report, p_report_alias must be the name of the saved report. For example, to reset report '1234', p_report_alias must be '1234'.

Example

The following example shows how to use the IR_RESET procedure to reset Interactive report settings with alias of '8101021' in page 1 of the current application.

```
BEGIN
    APEX_UTIL.IR_RESET(
        p_page_id      => 1,
        p_report_alias => '8101021'
        );
END;
```

46.82 IS_HIGH_CONTRAST_SESSION Function

This function returns a boolean TRUE if the session is in high contrast mode and returns a boolean FALSE if not in high contrast mode.

Syntax

```
APEX_UTIL.IS_HIGH_CONTRAST_SESSION
RETURN BOOLEAN;
```

Parameters

None.

Example

In this example, if the current session is running in high contrast mode, a high contrast specific CSS file 'my_app_hc.css' is added to the HTML output of the page.

```
BEGIN
    IF apex_util.is_high_contrast_session THEN
        apex_css.add_file (
            p_name => 'my_app_hc');
    END IF;
END;
```

46.83 IS_HIGH_CONTRAST_SESSION_YN Function

This function returns `Y` if the session is in high contrast mode and `N` if not in high contrast mode.

Syntax

```
APEX_UTIL.IS_HIGH_CONTRAST_SESSION_YN
RETURN VARCHAR2;
```

Parameters

None.

Example

In this example, if the current session is running in high contrast mode, a high contrast specific CSS file, `my_app_hc.css`, is added to the HTML output of the page.

```
BEGIN
    IF apex_util.is_high_contrast_session_yn = 'Y' THEN
        apex_css.add_file (
            p_name => 'my_app_hc');
    END IF;
END;
```

46.84 IS_LOGIN_PASSWORD_VALID Function

This function returns a Boolean result based on the validity of the password for a named user account in the current workspace. This function returns TRUE if the password matches and it returns FALSE if the password does not match.

Syntax

```
APEX_UTIL.IS_LOGIN_PASSWORD_VALID(
    p_username IN VARCHAR2 DEFAULT NULL,
    p_password IN VARCHAR2 DEFAULT NULL)
RETURN BOOLEAN;
```

Parameters

Table 46-71 IS_LOGIN_PASSWORD_VALID Parameters

Parameter	Description
`p_username`	User name in account.
`p_password`	Password to be compared with password stored in the account.

Returns

- `true`: The user credentials are valid.

- `false`: The user credentials are invalid.
- `null`: Credentials checking was delayed because of too many wrong combinations.

Example

The following example shows how to use the `IS_LOGIN_PASSWORD_VALID` function to check if the user 'FRANK' has the password 'tiger'. `TRUE` is returned if this is a valid password for 'FRANK', `FALSE` is returned if not.

```
DECLARE
    VAL BOOLEAN;
BEGIN
    VAL := APEX_UTIL.IS_LOGIN_PASSWORD_VALID (
        p_username=>'FRANK',
        p_password=>'tiger');
END;
```

46.85 IS_SCREEN_READER_SESSION Function

This function returns a boolean TRUE if the session is in screen reader mode and returns a boolean FALSE if not in screen reader mode.

Syntax

```
APEX_UTIL.IS_SCREEN_READER_SESSION
RETURN BOOLEAN;
```

Parameters

None

Example

```
BEGIN
    IF apex_util.is_screen_reader_session then
        htp.p('Screen Reader Mode');
    END IF;
END;
```

46.86 IS_SCREEN_READER_SESSION_YN Function

This function returns 'Y' if the session is in screen reader mode and 'N' if not in screen reader mode.

Syntax

```
APEX_UTIL.IS_SCREEN_READER_SESSION_YN
RETURN VARCHAR2;
```

Parameters

None

Example

```
BEGIN
    IF apex_util.is_screen_reader_session_yn = 'Y' then
        htp.p('Screen Reader Mode');
    END IF;
END;
```

46.87 IS_USERNAME_UNIQUE Function

This function returns a Boolean result based on whether the named user account is unique in the workspace.

Syntax

```
APEX_UTIL.IS_USERNAME_UNIQUE(
    p_username IN VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 46-72 IS_USERNAME_UNIQUE Parameters

Parameter	Description
p_username	Identifies the user name to be tested.

Example

The following example shows how to use the `IS_USERNAME_UNIQUE` function. If the user 'FRANK' already exists in the current workspace, `FALSE` is returned, otherwise `TRUE` is returned.

```
DECLARE
    VAL BOOLEAN;
BEGIN
    VAL := APEX_UTIL.IS_USERNAME_UNIQUE(
        p_username=>'FRANK');
END;
```

46.88 KEYVAL_NUM Function

This function gets the value of the package variable (`apex_utilities.g_val_num`) set by `APEX_UTIL.SAVEKEY_NUM`.

Syntax

```
APEX_UTIL.KEYVAL_NUM
RETURN NUMBER;
```

Parameters

None

Example

The following example shows how to use the `KEYVAL_NUM` function to return the current value of the package variable `apex_utilities.g_val_num`.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.KEYVAL_NUM;
END;
```

> **See Also:**
>
> "SAVEKEY_NUM Function"

46.89 KEYVAL_VC2 Function

This function gets the value of the package variable (`apex_utilities.g_val_vc2`) set by `APEX_UTIL.SAVEKEY_VC2`.

Syntax

```
APEX_UTIL.KEYVAL_VC2;
```

Parameters

None.

Example

The following example shows how to use the `KEYVAL_VC2` function to return the current value of the package variable `apex_utilities.g_val_vc2`.

```
DECLARE
    VAL VARCHAR2(4000);
BEGIN
    VAL := APEX_UTIL.KEYVAL_VC2;
END;
```

> **See Also:**
>
> "SAVEKEY_VC2 Function"

46.90 LOCK_ACCOUNT Procedure

This procedure sets a user account status to locked. Must be run by an authenticated workspace administrator in the context of a page request.

Syntax

```
APEX_UTIL.LOCK_ACCOUNT (
     p_user_name IN VARCHAR2 );
```

Parameters

Table 46-73 LOCK_ACCOUNT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example locks an Oracle APEX account (workspace administrator, developer, or end user) in the current workspace. This action locks the account for use by administrators, developers, and end users.

```
BEGIN
    FOR c1 IN (SELECT user_name from apex_users) LOOP
        APEX_UTIL.LOCK_ACCOUNT(p_user_name => c1.user_name);
        htp.p('End User Account:'||c1.user_name||' is now locked.');
    END LOOP;
END;
```

> **See Also:**
>
> - UNLOCK_ACCOUNT Procedure
> - GET_ACCOUNT_LOCKED_STATUS Function

46.91 PASSWORD_FIRST_USE_OCCURRED Function

This function returns TRUE if the account's password has changed since the account was created, an Oracle APEX administrator performs a password reset operation that results in a

new password being emailed to the account holder, or a user has initiated password reset operation.

This function returns `FALSE` if the account's password has not been changed since either of the events just described.

This function may be run in a page request context by any authenticated user.

Syntax

```
APEX_UTIL.PASSWORD_FIRST_USE_OCCURRED (
    p_user_name     IN VARCHAR2 )
RETURN BOOLEAN;
```

Parameters

Table 46-74 PASSWORD_FIRST_USE_OCCURRED Parameters

Parameter	Description
`p_user_name`	The user name of the user account.

Example

The following example to check if the password for an APEX user account (workspace administrator, developer, or end user) in the current workspace has been changed by the user the first time the user logged in after the password was initially set during account creation, or was changed by one of the password reset operations described above. This is meaningful only with accounts for which the `CHANGE_PASSWORD_ON_FIRST_USE` attribute is set to **Yes**.

```
BEGIN
    FOR c1 IN (SELECT user_name from apex_users) LOOP
        IF APEX_UTIL.PASSWORD_FIRST_USE_OCCURRED(p_user_name =>
c1.user_name) THEN
            htp.p('User:'||c1.user_name||' has logged in and updated
the password.');
        END IF;
    END LOOP;
END;
```

> **See Also:**
>
> CHANGE_PASSWORD_ON_FIRST_USE Function

46.92 PREPARE_URL Function

> **Note:**
>
> Oracle recommends using `APEX_PAGE.GET_URL` instead of `PREPARE_URL` for improved readability.
>
> See GET_URL Function.

The PREPARE_URL function serves two purposes:

1. To return an APEX navigation URL with the Session State Protection checksum argument (&cs=) if one is required. For security, the URL will not contain a checksum if the specified application is located in a different workspace.
2. To return an APEX navigation URL with the session ID component replaced with zero (0) if the zero session ID feature is in use and other criteria are met.

> **Note:**
>
> The `PREPARE_URL` function returns the APEX navigation URL with `&cs=<large hex value>` appended. If you use this returned value (such as in JavaScript), you may need to escape the ampersand in the URL to conform with syntax rules of the particular context.

Syntax

```
APEX_UTIL.PREPARE_URL (
    p_url                    IN VARCHAR2,
    p_url_charset            IN VARCHAR2 default null,
    p_checksum_type          IN VARCHAR2 default null,
    p_triggering_element     IN VARCHAR2 default 'this'
    p_plain_url              IN BOOLEAN  default false
RETURN VARCHAR2;
```

Parameters

Table 46-75 PREPARE_URL Parameters

Parameter	Description
p_url	An APEX navigation URL with all substitutions resolved.
p_url_charset	The character set name (for example, UTF-8) to use when escaping special characters contained within argument values.

Table 46-75 (Cont.) PREPARE_URL Parameters

Parameter	Description
p_checksum_type	Null or any of the following values: • PUBLIC_BOOKMARK or 1 - Use this when generating links to be used by any user. For example, use this value when generating an email which includes links to an application. • PRIVATE_BOOKMARK or 2 - Use this when generating a link to be used outside of the current session. This option can only be used by the same currently authenticated user. • SESSION or 3 - Use this when generating links to an application. This option can only be used within the current session.
p_triggering_element	A jQuery selector (for example, #my_button , where my_button is the static ID for a button element), to identify which element to use to trigger the dialog. This is required for Modal Dialog support.
p_plain_url	If the page you are calling APEX_UTIL.PREPARE_URL from is a modal dialog, specify p_plain_url to omit the unnecessary JavaScript code in the generated link. By default, if this function is called from a modal dialog, JavaScript code to close the modal dialog is included in the generated URL.

Example 1

The following example shows how to use the PREPARE_URL function to return a URL with a valid 'SESSION' level checksum argument. This URL sets the value of P1_ITEM page item to xyz.

```
DECLARE
    l_url varchar2(2000);
    l_app number := v('APP_ID');
    l_session number := v('APP_SESSION');
BEGIN
    l_url := APEX_UTIL.PREPARE_URL(
        p_url => 'f?p=' || l_app || ':1:'||
l_session||'::NO::P1_ITEM:xyz',
        p_checksum_type => 'SESSION');
END;
```

Example 2

The following example shows how to use the PREPARE_URL function to return a URL with a zero session ID. In a PL/SQL Dynamic Content region that generates f?p URLs (anchors), call PREPARE_URL to ensure that the session ID is set to zero when the zero session ID feature is in use, when the user is a public user (not authenticated), and when the target page is a public page in the current application:

```
htp.p(APEX_UTIL.PREPARE_URL(p_url => 'f?p=' || :APP_ID ||
':10:'|| :APP_SESSION
||'::NO::P10_ITEM:ABC');
```

When using `PREPARE_URL` for this purpose, the `p_url_charset` and `p_checksum_type` arguments can be omitted. However, it is permissible to use them when both the Session State Protection and Zero Session ID features are applicable.

> **See Also:**
>
> About Enabling Support for Bookmarks in *Oracle APEX App Builder User's Guide*.

46.93 PRN Procedure

This procedure prints a given CLOB to the HTP buffer.

Syntax

```
APEX_UTIL.PRN (
    p_clob   IN CLOB,
    p_escape IN BOOLEAN DEFAULT TRUE );
```

Parameters

Table 46-76 APEX_UTIL.PRN Parameters

Parameter	Description
p_clob	The CLOB.
p_escape	If `TRUE` (default), escape special characters, using apex_escape.html.

Example

The following example prints l_clob and escape special characters.

```
DECLARE
    l_clob clob := '<script>alert(1)</script>';
BEGIN
    apex_util.prn (
        p_clob   => l_clob,
        p_escape => true );
END;
```

46.94 PUBLIC_CHECK_AUTHORIZATION Function [DEPRECATED]

> **Note:**
>
> Use the "IS_AUTHORIZED Function" instead of this deprecated function.

Given the name of a authorization scheme, this function determines if the current user passes the security check.

Syntax

```
APEX_UTIL.PUBLIC_CHECK_AUTHORIZATION (
    p_security_scheme    IN    VARCHAR2)
RETURN BOOLEAN;
```

Parameters

Table 46-77 PUBLIC_CHECK_AUTHORIZATION Parameters

Parameter	Description
p_security_name	The name of the authorization scheme that determines if the user passes the security check.

Example

The following example shows how to use the `PUBLIC_CHECK_AUTHORIZATION` function to check if the current user passes the check defined in the `my_auth_scheme` authorization scheme.

```
DECLARE
    l_check_security  BOOLEAN;
BEGIN
    l_check_security :=
APEX_UTIL.PUBLIC_CHECK_AUTHORIZATION('my_auth_scheme');
END;
```

46.95 PURGE_REGIONS_BY_APP Procedure

Deletes all cached regions for an application.

Syntax

```
APEX_UTIL.PURGE_REGIONS_BY_APP (
    p_application IN NUMBER);
```

Parameters

Table 46-78 PURGE_REGIONS_BY_APP Parameters

Parameter	Description
p_application	The identification number (ID) of the application.

Example

The following example show how to use APEX_UTIL.PURGE_REGIONS_BY_APP to delete all cached regions for application #123.

```
BEGIN
    APEX_UTIL.PURGE_REGIONS_BY_APP(p_application=>123);
END;
```

46.96 PURGE_REGIONS_BY_NAME Procedure

Deletes all cached values for a region identified by the application ID, page number and region name.

Syntax

```
APEX_UTIL.PURGE_REGIONS_BY_NAME (
     p_application IN NUMBER,
     p_page        IN NUMBER,
     p_region_name IN VARCHAR2);
```

Parameters

Table 46-79 PURGE_REGIONS_BY_NAME Parameters

Parameter	Description
p_application	The identification number (ID) of the application.
p_page	The number of the page containing the region to be deleted.
p_region_name	The region name to be deleted.

Example

The following example shows how to use the PURGE_REGIONS_BY_NAME procedure to delete all the cached values for the region 'my_cached_region' on page 1 of the current application.

```
BEGIN
    APEX_UTIL.PURGE_REGIONS_BY_NAME(
        p_application => :APP_ID,
        p_page => 1,
        p_region_name => 'my_cached_region');
END;
```

46.97 PURGE_REGIONS_BY_PAGE Procedure

Deletes all cached regions by application and page.

Syntax

```
APEX_UTIL.PURGE_REGIONS_BY_PAGE (
     p_application IN NUMBER,
     p_page        IN NUMBER);
```

Parameters

Table 46-80 PURGE_REGIONS_BY_PAGE Parameters

Parameter	Description
p_application	The identification number (ID) of the application.
p_page	The identification number of page containing the region.

Example

The following example shows how to use the PURGE_REGIONS_BY_PAGE procedure to delete all the cached values for regions on page 1 of the current application.

```
BEGIN
    APEX_UTIL.PURGE_REGIONS_BY_PAGE(
        p_application => :APP_ID,
        p_page => 1);
END;
```

46.98 REDIRECT_URL Procedure

This procedure calls owa_util.redirect_url to tell the browser to redirect to a new URL. Afterwards, it automatically calls apex_application.stop_apex_engine to abort further processing of the Oracle APEX application.

Syntax

```
APEX_UTIL.REDIRECT_URL (
    p_url               IN VARCHAR2,
    p_reset_htp_buffer  IN BOOLEAN  DEFAULT TRUE );
```

Parameters

Table 46-81 REDIRECT_URL Parameters

Parameter	Description
p_url	The URL the browser requests.

Table 46-81 (Cont.) REDIRECT_URL Parameters

Parameter	Description
p_reset_htp_buffer	Set to TRUE to reset the HTP buffer to make sure the browser understands the redirect to the new URL and is not confused by data that is already written to the HTP buffer. Set to FALSE if the application has its own cookie to use in the response.

Example

The following example tells the browser to redirect to http://www.oracle.com and immediately stops further processing.

```
apex_util.redirect_url (
    p_url => 'http://www.oracle.com/' );
```

46.99 REMOVE_PREFERENCE Procedure

This procedure removes the preference for the supplied user.

Syntax

```
APEX_UTIL.REMOVE_PREFERENCE(
    p_preference    IN    VARCHAR2 DEFAULT NULL,
    p_user          IN    VARCHAR2 DEFAULT V('USER'));
```

Parameters

Table 46-82 REMOVE_PREFERENCE Parameters

Parameter	Description
p_preference	Name of the preference to remove.
p_user	User for whom the preference is defined.

Example

The following example shows how to use the REMOVE_PREFERENCE procedure to remove the preference default_view for the currently authenticated user.

```
BEGIN
    APEX_UTIL.REMOVE_PREFERENCE(
        p_preference => 'default_view',
        p_user       => :APP_USER);
END;
```

See Also:

- "GET_PREFERENCE Function"
- "SET_PREFERENCE Procedure"
- "Managing User Preferences" in *Oracle APEX Administration Guide*

46.100 REMOVE_SORT_PREFERENCES Procedure

This procedure removes the user's column heading sorting preference value.

Syntax

```
APEX_UTIL.REMOVE_SORT_PREFERENCES (
    p_user  IN   VARCHAR2 DEFAULT V('USER'));
```

Parameters

Table 46-83 REMOVE_SORT_PREFERENCES Parameters

Parameter	Description
p_user	Identifies the user for whom sorting preferences are removed.

Example

The following example shows how to use the `REMOVE_SORT_PREFERENCES` procedure to remove the currently authenticated user's column heading sorting preferences.

```
BEGIN
    APEX_UTIL.REMOVE_SORT_PREFERENCES(:APP_USER);
END;
```

46.101 REMOVE_USER Procedure

This procedure removes the user account identified by the primary key or a user name. To execute this procedure, the current user must have administrative privilege in the workspace.

Syntax

```
APEX_UTIL.REMOVE_USER(
    p_user_id   IN NUMBER,
    p_user_name IN VARCHAR2);
```

Parameters

Table 46-84 REMOVE_USER Parameters

Parameter	Description
p_user_id	The numeric primary key of the user account record.
p_user_name	The user name of the user account.

Example

The following examples show how to use the REMOVE_USER procedure to remove a user account. Firstly, by the primary key (using the p_user_id parameter) and secondly by user name (using the p_user_name parameter).

```
BEGIN
    APEX_UTIL.REMOVE_USER(p_user_id=> 99997);
END;

BEGIN
    APEX_UTIL.REMOVE_USER(p_user_name => 'FRANK');
END;
```

46.102 REMOVE_USER Procedure Signature 2

This procedure removes the user account identified by the user name. To execute this procedure, the current user must have administrative privilege in the workspace.

Syntax

```
APEX_UTIL.REMOVE_USER (
    p_user_name IN VARCHAR2);
```

Parameters

Table 46-85 REMOVE_USER Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following examples show how to use the REMOVE_USER procedure to remove a user account by user name using the p_user_name parameter.

```
BEGIN
   FOR i in 1..10 LOOP
      wwv_flow_fnd_user_api.remove_fnd_user(
         p_user_name => 'USER_'||i);
   END LOOP;
```

```
   COMMIT;
END;
```

46.103 RESET_AUTHORIZATIONS Procedure [DEPRECATED]

> **Note:**
>
> Use the RESET_CACHE Procedure instead of this deprecated procedure.

To increase performance, Oracle APEX caches the results of authorization schemes after they have been evaluated. You can use this procedure to undo caching, requiring each authorization scheme be revalidated when it is next encountered during page show or accept processing. You can use this procedure if you want users to have the ability to change their responsibilities (their authorization profile) within your application.

Syntax

```
APEX_UTIL.RESET_AUTHORIZATIONS;
```

Parameters

None.

Example

The following example shows how to use the `RESET_AUTHORIZATIONS` procedure to clear the authorization scheme cache.

```
BEGIN
    APEX_UTIL.RESET_AUTHORIZATIONS;
END;
```

46.104 RESET_PASSWORD Procedure

This procedure changes the password of `p_user_name` in the current workspace to `p_new_password`. If `p_change_password_on_first_use` is TRUE, then the user has to change the password on the next login.

Syntax

```
APEX_UTIL.RESET_PASSWORD (
    p_user_name                     IN VARCHAR2 DEFAULT
                                        www_flow_security.g_user,
    p_old_password                  IN VARCHAR2 DEFAULT NULL,
    p_new_password                  IN VARCHAR2,
    p_change_password_on_first_use  IN BOOLEAN DEFAULT TRUE );
```

Parameters

Table 46-86 RESET_PASSWORD Parameters

Parameter	Description
p_user_name	The user whose password should be changed. The default is the currently logged in Oracle APEX user name.
p_old_password	The current password of the user. The call succeeds if the given value matches the current password or it is NULL and the owner of the calling PL/SQL code has APEX_ADMINISTRATOR_ROLE. If the value is not the user's password, an error occurs.
p_new_password	The new password.
p_change_password_on_first_use	If TRUE (default), the user must change the password on the next login.

Error Returns

Table 46-87 RESET_PASSWORD Errors

Error	Description
INVALID_CREDENTIALS	Occurs if p_user_name does not match p_old_password.
APEX.AUTHENTICATION.LOGIN_THROTTLE.COUNTER	Indicates authentication prevented by login throttle.
internal error	Occurs if p_old_password is NULL and caller does not have APEX_ADMINISTRATOR_ROLE.
internal error	Indicates caller is not a valid workspace schema.

Example

This example demonstrates changes the password of the currently logged-in user to a new password.

```
apex_util.reset_password (
    p_old_password => :P111_OLD_PASSWORD,
    p_new_password => :P111_NEW_PASSWORD );
```

46.105 RESET_PW Procedure

This procedure resets the password for a named user and emails it in a message to the email address located for the named account in the current workspace. To execute this procedure, the current user must have administrative privilege in the workspace.

Syntax

```
APEX_UTIL.RESET_PW(
    p_user IN VARCHAR2,
    p_msg  IN VARCHAR2);
```

Parameters

Table 46-88 RESET_PW Parameters

Parameter	Description
p_user	The user name of the user account.
p_msg	Message text to be mailed to a user.

Example

The following example shows how to use the RESET_PW procedure to reset the password for the user 'FRANK'.

```
BEGIN
    APEX_UTIL.RESET_PW(
        p_user => 'FRANK',
        p_msg => 'Contact help desk at 555-1212 with questions');
END;
```

> **See Also:**
>
> "CHANGE_CURRENT_USER_PW Procedure"

46.106 SAVEKEY_NUM Function

This function sets a package variable (apex_utilities.g_val_num) so that it can be retrieved using the function KEYVAL_NUM.

Syntax

```
APEX_UTIL.SAVEKEY_NUM(
    p_val IN NUMBER)
RETURN NUMBER;
```

Parameters

Table 46-89 SAVEKEY_NUM Parameters

Parameter	Description
p_val	The numeric value to be saved.

Example

The following example shows how to use the `SAVEKEY_NUM` function to set the `apex_utilities.g_val_num` package variable to the value of `10`.

```
DECLARE
    VAL NUMBER;
BEGIN
    VAL := APEX_UTIL.SAVEKEY_NUM(p_val => 10);
END;
```

> **See Also:**
>
> "KEYVAL_NUM Function"

46.107 SAVEKEY_VC2 Function

This function sets a package variable (`apex_utilities.g_val_vc2`) so that it can be retrieved using the function `KEYVAL_VC2`.

Syntax

```
APEX_UTIL.SAVEKEY_VC2(
    p_val IN VARCHAR2)
RETURN VARCHAR2;
```

Parameters

Table 46-90 SAVEKEY_VC2 Parameters

Parameter	Description
`p_val`	The is the VARCHAR2 value to be saved.

Example

The following example shows how to use the `SAVEKEY_VC2` function to set the `apex_utilities.g_val_vc2` package variable to the value of 'XXX'.

```
DECLARE
    VAL VARCHAR2(4000);
BEGIN
    VAL := APEX_UTIL.SAVEKEY_VC2(p_val => 'XXX');
END;
```

> **See Also:**
>
> "KEYVAL_VC2 Function"

46.108 SET_APP_BUILD_STATUS Procedure

This procedure sets the build status of the specified application.

Syntax

```
APEX_UTIL.SET_APP_BUILD_STATUS( p_application_id IN NUMBER,
                                p_build_status in VARCHAR2 );
```

Parameters

Table 46-91 SET_APP_BUILD_STATUS Parameters

Parameter	Description
p_application_id	The ID of the application.
p_build_status	The new build status of the application. Values include: • RUN_ONLY - The application can be run but cannot be edited by developers. • RUN_AND_BUILD - The application can be run and can also be edited by developers.

Example

```
begin
    apex_util.set_app_build_status(
        p_application_id => 170,
        p_build_status   => 'RUN_ONLY' );
    commit;
end;
```

46.109 SET_APPLICATION_STATUS Procedure

This procedure changes the status of the application.

Syntax

```
APEX_UTIL.SET_APPLICATION_STATUS(
   p_application_id IN NUMBER,
   p_application_status IN VARCHAR2,
   p_unavailable_value IN VARCHAR2,
   p_restricted_user_list IN VARCHAR2);
```

Parameters

Table 46-92 SET_APPLICATION_STATUS Parameters

Parameter	Description
p_application_id	The Application ID.
p_application_status	New application status . Values include: • AVAILABLE - Application is available with no restrictions. • AVAILABLE_W_EDIT_LINK - Application is available with no restrictions. Developer Toolbar shown to developers . • DEVELOPERS_ONLY - Application only available to developers. • RESTRICTED_ACCESS - Application only available to users in p_restricted_user_list. • UNAVAILABLE - Application unavailable. Message shown in p_unavailable_value. • UNAVAILABLE_PLSQL - Application unavailable. Message shown from PL/SQL block in p_unavailable_value. • UNAVAILABLE_URL - Application unavailable. Redirected to URL provided in p_unavailable_value.
p_unavailable_value	Value used when application is unavailable. This value has different semantics dependent upon value for p_application_status.
p_restricted_user_list	Comma separated list of users permitted to access application, when p_application_status = RESTRICTED_ACCESS.

Examples

```
begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'AVAILABLE' );
end;

begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'AVAILABLE_W_EDIT_LINK' );
end;

begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'DEVELOPERS_ONLY' );
end;

begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'RESTRICTED_ACCESS',
```

```
    p_restricted_user_list => 'xxx.xxx@abc.com' );
end;

begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'UNAVAILABLE',
    p_unavailable_value => 'Application not available, sorry' );
end;

begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'UNAVAILABLE_PLSQL',
    p_unavailable_value => 'sys.htp.p(''Application unavailable,
sorry'');' );
end;

begin
apex_util.set_application_status(
    p_application_id => 117,
    p_application_status => 'UNAVAILABLE_URL',
    p_unavailable_value => 'http://www.xyz.com' );
end;
```

See Also:

"Availability" in *Oracle APEX App Builder User's Guide*

46.110 SET_ATTRIBUTE Procedure

This procedure sets the value of one of the attribute values (1 through 10) of a user in the Oracle APEX accounts table.

Syntax

```
APEX_UTIL.SET_ATTRIBUTE (
    p_userid           IN NUMBER,
    p_attribute_number IN NUMBER,
    p_attribute_value  IN VARCHAR2 );
```

Parameters

Table 46-93 SET_ATTRIBUTE Parameters

Parameter	Description
p_userid	The numeric ID of the user account.
p_attribute_number	Attribute number in the user record (1 through 10).

Table 46-93 (Cont.) SET_ATTRIBUTE Parameters

Parameter	Description
p_attribute_value	Value of the attribute located by p_attribute_number to be set in the user record.

Example

The following example sets the number 1 attribute for user FRANK with the value foo.

```
DECLARE
    VAL VARCHAR2(4000);
BEGIN
    APEX_UTIL.SET_ATTRIBUTE (
        p_userid => apex_util.get_user_id(p_username => 'FRANK'),
        p_attribute_number => 1,
        p_attribute_value => 'foo');
END;
```

> **See Also:**
>
> GET_ATTRIBUTE Function

46.111 SET_AUTHENTICATION_RESULT Procedure

This procedure can be called from an application's custom authentication function (that is, credentials verification function). The status passed to this procedure is logged in the Login Access Log.

Syntax

```
APEX_UTIL.SET_AUTHENTICATION_RESULT(
    p_code IN NUMBER);
```

Parameters

Table 46-94 SET_AUTHENTICATION_RESULT Parameters

Parameter	Description
p_code	Any numeric value the developer chooses. After this value is set in the session using this procedure, it can be retrieved using the APEX_UTIL.GET_AUTHENTICATION_RESULT function.

Example

One way to use this procedure is to include it in the application authentication scheme. This example demonstrates how text and numeric status values can be registered for logging. In

this example, no credentials verification is performed, it just demonstrates how text and numeric status values can be registered for logging.Note that the status set using this procedure is visible in the `apex_user_access_log` view and in the reports on this view available to workspace and site administrators.

```
CREATE OR REPLACE FUNCTION MY_AUTH(
    p_username IN VARCHAR2,
    p_password IN VARCHAR2)
RETURN BOOLEAN
IS
BEGIN
    APEX_UTIL.SET_CUSTOM_AUTH_STATUS(p_status=>'User:'||p_username||'
is back.');
    IF UPPER(p_username) = 'GOOD' THEN
        APEX_UTIL.SET_AUTHENTICATION_RESULT(24567);
        RETURN TRUE;
    ELSE
        APEX_UTIL.SET_AUTHENTICATION_RESULT(-666);
        RETURN FALSE;
    END IF;
END;
```

See Also:

- "Monitoring Activity within a Workspace" in *Oracle APEX Administration Guide*
- "GET_AUTHENTICATION_RESULT Function"
- "SET_CUSTOM_AUTH_STATUS Procedure"

46.112 SET_BUILD_OPTION_STATUS Procedure

Use this procedure to change the build option status of a specified application.

Note:

The build option status will be overwritten when the application is upgraded to a new version. To keep the status set via the API, it is necessary to set the build option attribute **On Upgrade Keep Status** to **Yes**.

Syntax

```
APEX_UTIL.SET_BUILD_OPTION_STATUS(p_application_id IN NUMBER,
                                  p_id IN NUMBER,
                                  p_build_status IN VARCHAR2);
```

Parameters

Table 46-95 SET_BUILD_OPTION_STATUS Parameters

Parameter	Description
p_application_id	The ID of the application that owns the build option under shared components.
p_id	The ID of the build option in the application.
p_build_status	The new status of the build option. Possible values are INCLUDE, EXCLUDE both upper case.

Example

The following example demonstrates how to use the SET_BUILD_OPTION_STATUS procedure to change the current status of build option.

```
BEGIN
APEX_UTIL.SET_BUILD_OPTION_STATUS(
    P_APPLICATION_ID => 101,
    P_ID => 245935500311121039, P_BUILD_STATUS=>'INCLUDE');

END;
```

46.113 SET_CURRENT_THEME_STYLE Procedure [DEPRECATED]

This procedure sets the user interface theme style for an application. For example, if there are more than one theme styles available for the current theme, you can use this procedure to change the application theme style.

Syntax

```
APEX_UTIL.SET_CURRENT_THEME_STYLE(
    p_theme_number IN NUMBER,
    p_theme_style_id IN NUMBER
    );
```

Parameters

Table 46-96 SET_CURRENT_THEME_STYLE Parameters

Parameter	Description
p_theme_number	The current theme number of the application. This can be retrieved from APEX_APPLICATION_THEMES view.
p_theme_style_id	The numeric ID of theme style. You can get available theme styles for an application from APEX_APPLICATION_THEME_STYLES view.

Example

The following example shows how to use the `SET_CURRENT_THEME_STYLE` procedure to set the current application desktop theme style to `Blue`.

```
DECLARE
    l_current_theme_number number;
    l_theme_style_id       number;

BEGIN
    select theme_number
    into l_current_theme_number
    from apex_application_themes
    where application_id = :app_id
    and ui_type_name   = 'DESKTOP'
    and is_current = 'Yes';

    select s.theme_style_id
    into l_new_theme_style_id
    from apex_application_theme_styles s, apex_application_themes t
    where s.application_id = t.application_id
    and s.theme_number = t.theme_number
    and s.application_id = :app_id
    and t.ui_type_name   = 'DESKTOP'
    and t.is_current = 'Yes'
    and s.name = 'Blue';

    if l_current_theme_number is not null and
    l_new_theme_style_id is not null then
        APEX_UTIL.SET_CURRENT_THEME_STYLE(
            p_theme_number   => l_current_theme_number,
            p_theme_style_id => l_new_theme_style_id
            );

    end if;

END;
```

> **See Also:**
>
> "SET_CURRENT_STYLE Procedure"

46.114 SET_CUSTOM_AUTH_STATUS Procedure

This procedure can be called from an application's custom authentication function (that is, credentials verification function). The status passed to this procedure is logged in the Login Access Log.

Syntax

```
APEX_UTIL.SET_CUSTOM_AUTH_STATUS(
    p_status  IN VARCHAR2);
```

Parameters

Table 46-97 SET_CUSTOM_AUTH_STATUS Parameters

Parameter	Description
p_status	Any text the developer chooses to denote the result of the authentication attempt (up to 4000 characters).

Example

One way to use the `SET_CUSTOM_AUTH_STATUS` procedure is to include it in the application authentication scheme. This example demonstrates how text and numeric status values can be registered for logging. Note that no credentials verification is performed. The status set using this procedure is visible in the `apex_user_access_log` view and in the reports on this view available to workspace and site administrators.

```
CREATE OR REPLACE FUNCTION MY_AUTH(
    p_username IN VARCHAR2,
    p_password IN VARCHAR2)
RETURN BOOLEAN
IS
BEGIN
    APEX_UTIL.SET_CUSTOM_AUTH_STATUS(p_status=>'User:'||p_username||' is
back.');
    IF UPPER(p_username) = 'GOOD' THEN
        APEX_UTIL.SET_AUTHENTICATION_RESULT(24567);
        RETURN TRUE;
    ELSE
        APEX_UTIL.SET_AUTHENTICATION_RESULT(-666);
        RETURN FALSE;
    END IF;
END;
```

See Also:

- "Monitoring Activity within a Workspace" in *Oracle APEX Administration Guide*
- "SET_AUTHENTICATION_RESULT Procedure"
- "GET_AUTHENTICATION_RESULT Function"

46.115 SET_EDITION Procedure

This procedure sets the name of the edition to be used in all application SQL parsed in the current page view or page submission.

Syntax

```
APEX_UTIL.SET_EDITION(
    p_edition IN VARCHAR2);
```

Parameters

Table 46-98 SET_EDITION Parameters

Parameter	Description
p_edition	Edition name.

Example

The following example shows how to use the SET_EDITION procedure. It sets the edition name for the database session of the current page view.

```
BEGIN
    APEX_UTIL.SET_EDITION( P_EDITION => 'Edition1' );
END;
```

> **Note:**
>
> Support for Edition-Based Redefinition is only available in database version 11.2.0.1 or higher.

46.116 SET_EMAIL Procedure

This procedure updates a user account with a new email address. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.SET_EMAIL(
    p_userid IN NUMBER,
    p_email  IN VARCHAR2);
```

Parameters

Table 46-99 SET_EMAIL Parameters

Parameter	Description
p_userid	The numeric ID of the user account.
p_email	The email address to be saved in user account.

Example

The following example shows how to use the SET_EMAIL procedure to set the value of EMAIL to 'frank.scott@somewhere.com' for the user 'FRANK'.

```
BEGIN
    APEX_UTIL.SET_EMAIL(
        p_userid  => APEX_UTIL.GET_USER_ID('FRANK'),
        p_email   => 'frank.scott@somewhere.com');
END;
```

See Also:

- "GET_EMAIL Function"
- "GET_USER_ID Function"

46.117 SET_FIRST_NAME Procedure

This procedure updates a user account with a new FIRST_NAME value. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.SET_FIRST_NAME(
    p_userid      IN NUMBER,
    p_first_name  IN VARCHAR2);
```

Parameters

Table 46-100 SET_FIRST_NAME Parameters

Parameter	Description
p_userid	The numeric ID of the user account.
p_first_name	FIRST_NAME value to be saved in user account.

Example

The following example shows how to use the `SET_FIRST_NAME` procedure to set the value of `FIRST_NAME` to 'FRANK' for the user 'FRANK'.

```
BEGIN
    APEX_UTIL.SET_FIRST_NAME(
        p_userid       => APEX_UTIL.GET_USER_ID('FRANK'),
        p_first_name   => 'FRANK');
END;
```

See Also:

- "GET_FIRST_NAME Function"
- "GET_USER_ID Function"

46.118 SET_GLOBAL_NOTIFICATION Procedure

This procedure is used to set the global notification message which is the message displayed in page `#GLOBAL_NOTIFICATION#` substitution string.

Syntax

```
APEX_UTIL.SET_GLOBAL_NOTIFICATION(
   p_application_id IN NUMBER,
   p_global_notification_message IN VARCHAR2);
```

Parameters

Table 46-101 SET_GLOBAL_NOTIFICATION Parameters

Parameter	Description
`p_application_id`	The Application ID.
`p_global_notification_message`	Text string to be used for the global notification message.

Example

```
begin
    apex_util.set_global_notification(
        p_application_id              => 117,
        p_global_notification_message => 'This application will be
upgraded this weekend at 2100 UTC' );
end;
```

> **See Also:**
>
> "Availability" in *Oracle APEX App Builder User's Guide*

46.119 SET_GROUP_GROUP_GRANTS Procedure

This procedure modifies the group grants for a given group.

Syntax

```
APEX_UTIL.SET_GROUP_GROUP_GRANTS (
    p_group_name IN VARCHAR2,
    p_granted_group_names IN apex_t_varchar2 );
```

Parameters

Table 46-102 SET_GROUP_GROUP_GRANTS Procedure Parameters

Parameter	Description
`p_group_name`	The target group name.
`p_granted_group_names`	The names of groups to grant to `p_group_name`.

Example

This example creates three groups (`ACCTS_PAY`, `ACCTS_REC`, `MANAGER`) and then grants `ACCTS_PAY` and `ACCTS_REC` to `MANAGER`.

```
apex_util.create_user_group (
    p_group_name => 'ACCTS_PAY' );
apex_util.create_user_group (
    p_group_name => 'ACCTS_REC' );
apex_util.create_user_group (
    p_group_name => 'MANAGER' );
apex_util.set_group_group_grants (
    p_group_name => 'MANAGER',
    p_granted_group_names => apex_t_varchar2('ACCTS_PAY', 'ACCTS_REC') );
```

46.120 SET_GROUP_USER_GRANTS Procedure

This procedure modifies the group grants for a given user.

Syntax

```
APEX_UTIL.SET_GROUP_USER_GRANTS (
    p_user_name IN VARCHAR2,
    p_granted_group_names IN apex_t_varchar2 );
```

Parameters

Table 46-103 SET_GROUP_USER_GRANTS Procedure Parameters

Parameter	Description
p_user_name	The target user name.
p_granted_group_names	The names of groups to grant to p_user_name.

Example

This example creates a user group (MANAGER) and a user (Example User) and then grants MANAGER to Example User.

```
apex_util.create_user_group (
    p_group_name => 'MANAGER' );
apex_util.create_user (
    p_user_name => 'Example User',
    p_web_password => 1_random_password );
-- grant MANAGER to Example User
apex_util.set_group_user_grants (
    p_user_name => 'Example User',
    p_granted_group_names => apex_t_varchar2('MANAGER') );
```

46.121 SET_LAST_NAME Procedure

This procedure updates a user account with a new LAST_NAME value. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.SET_LAST_NAME(
    p_userid      IN NUMBER,
    p_last_name   IN VARCHAR2);
```

Parameters

Table 46-104 SET_LAST_NAME Parameters

Parameter	Description
p_userid	The numeric ID of the user account.
p_last_name	LAST_NAME value to be saved in the user account.

Example

The following example shows how to use the SET_LAST_NAME procedure to set the value of LAST_NAME to 'SMITH' for the user 'FRANK'.

```
BEGIN
    APEX_UTIL.SET_LAST_NAME(
```

```
        p_userid       => APEX_UTIL.GET_USER_ID('FRANK'),
        p_last_name    => 'SMITH');
END;
```

> **See Also:**
>
> - "GET_LAST_NAME Function"
> - "GET_USER_ID Function"

46.122 SET_PARSING_SCHEMA_FOR _REQUEST Procedure

This procedure changes the parsing user for the current page view to another workspace schema. You can call this procedure only from within the application's Initialization PL/SQL Code.

Syntax

```
PROCEDURE SET_PARSING_SCHEMA_FOR_REQUEST (
    p_schema IN VARCHAR2 );
```

Parameters

Table 46-105 SET_PARSING_SCHEMA_FOR _REQUEST Parameters

Parameter	Description
p_schema	The new parsing schema.

Raises

PROGRAM_ERROR when not called from Initialization PL/SQL Code.
WWV_FLOW.NO_PRIV_ON_SCHEMA if p_schema is not a valid workspace schema.

Example

On pages 1-100, change the parsing schema to :G_PARSING_SCHEMA.

```
if :APP_PAGE_ID between 1 and 100 then
    apex_util.set_parsing_schema_for_request (
       p_schema => :G_PARSING_SCHEMA );
end if;
```

46.123 SET_PREFERENCE Procedure

This procedure sets a preference that persists beyond the user's current session.

Syntax

```
APEX_UTIL.SET_PREFERENCE (
    p_preference    IN    VARCHAR2 DEFAULT NULL,
    p_value         IN    VARCHAR2 DEFAULT NULL,
    p_user          IN    VARCHAR2 DEFAULT NULL);
```

Parameters

Table 46-106 SET_PREFERENCE Parameters

Parameter	Description
p_preference	Name of the preference (case-sensitive).
p_value	Value of the preference.
p_user	User for whom the preference is being set.

Example

The following example shows how to use the SET_PREFERENCE procedure to set a preference called 'default_view' to the value 'WEEKLY' that persists beyond session for the currently authenticated user.

```
BEGIN
    APEX_UTIL.SET_PREFERENCE(
        p_preference => 'default_view',
        p_value      => 'WEEKLY',
        p_user       => :APP_USER);
END;
```

> **See Also:**
>
> - "GET_PREFERENCE Function"
> - "REMOVE_PREFERENCE Procedure"

46.124 SET_SECURITY_GROUP_ID Procedure

Use this procedure with apex_util.find_security_group_id to ease the use of the mail package in batch mode. This procedure is especially useful when a schema is associated with more than one workspace. For example, you might want to create a procedure that is run by a nightly job to email all outstanding tasks.

Syntax

```
APEX_UTIL.SET_SECURITY_GROUP_ID (
    p_security_group_id  IN NUMBER);
```

Parameters

Table 46-107 SET_SECURITY_GROUP_ID Parameters

Parameter	Description
p_security_group_id	This is the security group id of the workspace you are working in.

Example

The following example sends an alert to each user that has had a task assigned within the last day.

```
create or replace procedure new_tasks
is
    l_workspace_id      number;
    l_subject           varchar2(2000);
    l_body              clob;
    l_body_html         clob;
begin
    l_workspace_id := apex_util.find_security_group_id (p_workspace =>
'PROJECTS');
    apex_util.set_security_group_id (p_security_group_id => l_workspace_id);

    l_body := ' ';
    l_subject := 'You have new tasks';
    for c1 in (select distinct(p.email_address) email_address, p.user_id
                 from teamsp_user_profile p, teamsp_tasks t
                where p.user_id = t.assigned_to_user_id
                  and t.created_on > sysdate - 1
                  and p.email_address is not null ) loop
        l_body_html := '<p />The following tasks have been added.';
        for c2 in (select task_name, due_date
                     from teamsp_tasks
                    where assigned_to_user_id = c1.user_id
                      and created_on > sysdate - 1 ) loop
            l_body_html := l_body_html || '<p />Task: '||c2.task_name||',
due '||c2.due_date;
        end loop;
apex_mail.send (
            p_to        => c1.email_address,
            p_from      => c1.email_address,
            p_body      => l_body,
            p_body_html => l_body_html,
            p_subj      => l_subject );
    end loop;
end;
```

46.125 SET_SESSION_HIGH_CONTRAST_OFF Procedure

This procedure switches off high contrast mode for the current session.

Syntax

```
APEX_UTIL.SET_SESSION_HIGH_CONTRAST_OFF;
```

Parameters

None.

Example

In this example, high contrast mode is switched off for the current session.

```
BEGIN
    apex_util.set_session_high_contrast_off;
END;
```

46.126 SET_SESSION_HIGH_CONTRAST_ON Procedure

This procedure switches on high contrast mode for the current session.

Syntax

```
APEX_UTIL.SET_SESSION_HIGH_CONTRAST_ON;
```

Parameters

None.

Example

In this example, the current session is put into high contrast mode.

```
BEGIN
    apex_util.set_session_high_contrast_on;
END;
```

46.127 SET_SESSION_LANG Procedure

This procedure sets the language for the current user in the current Oracle APEX session. The language must be a valid IANA language name.

Syntax

```
APEX_UTIL.SET_SESSION_LANG (
    p_lang IN VARCHAR2 );
```

Parameters

Table 46-108 SET_SESSION_LANG Parameters

Parameter	Description
p_lang	This is an IANA language code. Examples include en, de, de-at, zh-cn, and pt-br.

Example

The following example sets the language for the current user for the duration of the APEX session.

```
BEGIN
    APEX_UTIL.SET_SESSION_LANG( P_LANG => 'en');
END;
```

46.128 SET_SESSION_LIFETIME_SECONDS Procedure

This procedure sets the current session's Maximum Session Length in Seconds value, overriding the corresponding application attribute. This enables developers to dynamically shorten or lengthen the session life based on criteria determined after the user authenticates.

Syntax

```
APEX_UTIL.SET_SESSION_LIFETIME_SECONDS (
    p_seconds   IN NUMBER,
    p_scope     IN VARCHAR2 DEFAULT 'session' );
```

Parameters

Table 46-109 SET_SESSION_LIFETIME_SECONDS Parameters

Parameter	Description
p_seconds	A positive integer indicating the number of seconds that the session used by the application can exist.
p_scope	This parameter is obsolete. The procedure always sets the lifetime for the whole session.

Example 1

The following example sets the current application's Maximum Session Length in Seconds attribute to 7200 seconds (two hours).

By setting the p_scope input parameter to use the default value of SESSION, the following example would actually apply to all applications using the current session. This would be the

most common use case when multiple APEX applications use a common authentication scheme and are designed to operate as a suite in a common session.

```
BEGIN
   APEX_UTIL.SET_SESSION_LIFETIME_SECONDS(p_seconds => 7200);
END;
```

Example 2

The following example sets the current application's Maximum Session Length in Seconds attribute to 3600 seconds (one hour).

```
BEGIN
    APEX_UTIL.SET_SESSION_LIFETIME_SECONDS(p_seconds => 3600);
END;
```

46.129 SET_SESSION_MAX_IDLE_SECONDS Procedure

Sets the current application's Maximum Session Idle Time in Seconds value for the current session, overriding the corresponding application attribute. This allows developers to dynamically shorten or lengthen the maximum idle time allowed between page requests based on criteria determined after the user authenticates.

Syntax

```
APEX_UTIL.SET_SESSION_MAX_IDLE_SECONDS (
    p_seconds  IN    NUMEBER,
    p_scope    IN    VARCHAR2 DEFAULT 'SESSION');
```

Parameters

Table 46-110 SET_SESSION_MAX_IDLE_SECONDS Parameters

Parameter	Description
p_seconds	A positive integer indicating the number of seconds allowed between page requests.
p_scope	This parameter is obsolete. The procedure always sets the lifetime for the whole session

Example 1

The following example shows how to use the `SET_SESSION_MAX_IDLE_SECONDS` procedure to set the current application's Maximum Session Idle Time in Seconds attribute to 1200 seconds (twenty minutes). The following example applies to all applications using the current session.

```
BEGIN
   APEX_UTIL.SET_SESSION_MAX_IDLE_SECONDS(p_seconds => 1200);
END;
```

Example 2

The following example shows how to use the `SET_SESSION_MAX_IDLE_SECONDS` procedure to set the current application's Maximum Session Idle Time in Seconds attribute to 600 seconds (ten minutes). This example applies to all applications using the current session.

```
BEGIN
    APEX_UTIL.SET_SESSION_MAX_IDLE_SECONDS(p_seconds => 600);
END;
```

46.130 SET_SESSION_SCREEN_READER_OFF Procedure

This procedure switches off screen reader mode for the current session.

Syntax

```
APEX_UTIL.SET_SESSION_SCREEN_READER_OFF;
```

Parameters

None

Example

In this example, the current session is put into standard mode.

```
BEGIN
    apex_util.set_session_screen_reader_off;
END;
```

46.131 SET_SESSION_SCREEN_READER_ON Procedure

This procedure puts the current session into screen reader mode.

Syntax

```
APEX_UTIL.SET_SESSION_SCREEN_READER_ON;
```

Parameters

None

Example

In this example, the current session is put into screen reader mode.

```
BEGIN
    apex_util.set_session_screen_reader_on;
END;
```

46.132 SET_SESSION_STATE Procedure

This procedure sets session state for a current Oracle APEX session.

Syntax

```
APEX_UTIL.SET_SESSION_STATE (
    p_name      IN    VARCHAR2 DEFAULT NULL,
    p_value     IN    VARCHAR2 DEFAULT NULL
    p_commit    IN    BOOLEAN  DEFAULT TRUE);
```

Parameters

Table 46-111 SET_SESSION_STATE Parameters

Parameter	Description
`p_name`	Name of the application-level or page-level item for which you are setting sessions state.
`p_value`	Value of session state to set.
`p_commit`	If true (the default), commit after modifying session state. If false or if the existing value in session state equals `p_value`, no commit is issued.

Example

The following example shows how to use the `SET_SESSION_STATE` procedure to set the value of the item `my_item` to `myvalue` in the current session.

```
BEGIN
    APEX_UTIL.SET_SESSION_STATE('my_item','myvalue');
END;
```

See Also:

- GET_NUMERIC_SESSION_STATE Function
- GET_SESSION_STATE Function
- Understanding Session State Management in *Oracle APEX App Builder User's Guide*

46.133 SET_SESSION_TERRITORY Procedure

This procedure sets the territory to be used for the current user in the current Oracle APEX session. The territory name must be a valid Oracle territory.

Syntax

```
APEX_UTIL.SET_SESSION_TERRITORY (
    p_territory IN VARCHAR2 );
```

Parameters

Table 46-112 SET_SESSION_TERRITORY Parameters

Parameter	Description
p_territory	A valid Oracle territory name. Examples include: AMERICA, UNITED KINGDOM, ISRAEL, AUSTRIA, and UNITED ARAB EMIRATES.

Example

The following example shows how to use the SET_SESSION_TERRITORY procedure. It sets the territory for the current user for the duration of the APEX session.

```
BEGIN
    APEX_UTIL.SET_SESSION_TERRITORY( P_TERRITORY => 'UNITED KINGDOM');
END;
```

46.134 SET_SESSION_TIME_ZONE Procedure

This procedure sets the time zone to be used for the current user in the current Oracle APEX session.

Syntax

```
APEX_UTIL.SET_SESSION_TIME_ZONE (
    p_time_zone IN VARCHAR2 );
```

Parameters

Table 46-113 SET_SESSION_TIME_ZONE Parameters

Parameter	Description
p_timezone	A time zone value in the form of hours and minutes. Examples include: +09:00, 04:00, -05:00.

Example

The following example shows how to use the SET_SESSION_TIME_ZONE procedure. It sets the time zone for the current user for the duration of the APEX session.

```
BEGIN
    APEX_UTIL.SET_SESSION_TIME_ZONE( P_TIME_ZONE => '-05:00');
END;
```

46.135 SET_USERNAME Procedure

This procedure updates a user account with a new `USER_NAME` value. To execute this procedure, the current user must have administrative privileges in the workspace.

Syntax

```
APEX_UTIL.SET_USERNAME(
    p_userid   IN NUMBER,
    p_username IN VARCHAR2);
```

Parameters

Table 46-114 SET_USERNAME Parameters

Parameter	Description
`p_userid`	The numeric ID of the user account.
`p_username`	`USER_NAME` value to be saved in the user account.

Example

The following example shows how to use the `SET_USERNAME` procedure to set the value of `USERNAME` to 'USER-XRAY' for the user 'FRANK'.

```
BEGIN
    APEX_UTIL.SET_USERNAME(
        p_userid     => APEX_UTIL.GET_USER_ID('FRANK'),
        P_username   => 'USER-XRAY');
END;
```

> **See Also:**
>
> - "GET_USERNAME Function"
> - "GET_USER_ID Function"

46.136 SET_WORKSPACE Procedure

This procedure sets the current workspace.

Syntax

```
PROCEDURE SET_WORKSPACE (
    p_workspace IN VARCHAR2 );
```

Parameters

Table 46-115 SET_WORKSPACE Procedure Parameters

Parameters	Description
p_workspace	The workspace's short name.

Example

This example shows how to set the workspace MY_WORKSPACE.

```
apex_util.set_workspace (
    p_workspace => 'MY_WORKSPACE' );
```

46.137 SHOW_HIGH_CONTRAST_MODE_TOGGLE Procedure

This procedure displays a link to the current page to turn on or off, toggle, the mode. For example, if you are in standard mode, this function displays a link that when clicked switches the high contrast mode on.

Syntax

```
APEX_UTIL.SHOW_HIGH_CONTRAST_MODE_TOGGLE (
    p_on_message  IN VARCHAR2 DEFAULT NULL,
    p_off_message IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 46-116 SHOW_HIGH_CONTRAST_MODE_TOGGLE Parameters

Parameters	Description
p_on_message	Optional text used for the link to switch to high contrast mode, when you are in standard mode. If this parameter is not passed, the default 'Set High Contrast Mode On' text is displayed.
p_off_message	Optional text used for the link to switch to standard mode, when you are in high contrast mode. If this parameter is not passed, the default 'Set High Contrast Mode Off' text is displayed.

Example

When running in standard mode, this procedure displays a link, Set High Contrast Mode On, that when clicked refreshes the current page and switches on high contrast mode. When

running in high contrast mode, a link, Set High Contrast Mode Off, is displayed, that refreshes the current page and switches back to standard mode when clicked.

```
BEGIN
    apex_util.show_high_contrast_mode_toggle;
END;
```

> **Note:**
>
> There are also 2 translatable system messages that can be overridden at application level to change the default link text that is returned for this toggle. They include:
>
> - `APEX.SET_HIGH_CONTRAST_MODE_OFF` - Default text = Set High Contrast Mode Off
> - `APEX.SET_HIGH_CONTRAST_MODE_ON` - Default text = Set High Contrast Mode On

> **See Also:**
>
> "GET_HIGH_CONTRAST_MODE_TOGGLE Function"

46.138 SHOW_SCREEN_READER_MODE_TOGGLE Procedure

This procedure displays a link to the current page to turn on or off, toggle, the mode. For example, if you are in standard mode, this function displays a link that when clicked switches the screen reader mode on.

Syntax

```
APEX_UTIL.SHOW_SCREEN_READER_MODE_TOGGLE (
    p_on_message  IN VARCHAR2 DEFAULT NULL,
    p_off_message IN VARCHAR2 DEFAULT NULL)
```

Parameters

Table 46-117 SHOW_SCREEN_READER_MODE_TOGGLE Parameters

Parameter	Description
`p_on_message`	Optional text used for the link to switch to screen reader mode, when you are in standard mode. If this parameter is not passed, the default 'Set Screen Reader Mode On' text is displayed.

Table 46-117 (Cont.) SHOW_SCREEN_READER_MODE_TOGGLE Parameters

Parameter	Description
p_off_message	Optional text used for the link to switch to standard mode, when you are in screen reader mode. If this parameter is not passed, the default 'Set Screen Reader Mode Off' text is displayed.

Example

When running in standard mode, this procedure displays a link 'Set Screen Reader Mode On', that when clicked refreshes the current page and switches on screen reader mode. When running in screen reader mode, a link 'Set Screen Reader Mode Off' is displayed, that when clicked refreshes the current page and switches back to standard mode.

```
BEGIN
    apex_util.show_screen_reader_mode_toggle;
END;
```

46.139 STRING_TO_TABLE Function (Deprecated)

> **Note:**
>
> This function is deprecated. Oracle recommends `APEX_STRING.STRING_TO_TABLE` instead.
>
> See STRING_TO_TABLE Function .

Given a string, this function returns a PL/SQL array of type `APEX_APPLICATION_GLOBAL.VC_ARR2`. This array is a `VARCHAR2(32767)` table.

Syntax

```
APEX_UTIL.STRING_TO_TABLE (
    p_string       IN VARCHAR2,
    p_separator    IN VARCHAR2 DEFAULT ':')
    RETURN APEX_APPLICATION_GLOBAL.VC_ARR2;
```

Parameters

Table 46-118 STRING_TO_TABLE Parameters

Parameter	Description
p_string	String to be converted into a PL/SQL table of type `APEX_APPLICATION_GLOBAL.VC_ARR2`.
p_separator	String separator. The default is a colon.

Example

The following example demonstrates how the function is passed the string `One:Two:Three` in the `p_string` parameter and returns a PL/SQL array of type `APEX_APPLICATION_GLOBAL.VC_ARR2` containing three elements: the element at position `1` contains the value `One`, position `2` contains the value `Two`, and position 3 contains the value `Three`. This is then output using the HTP.P function call.

```
DECLARE
    l_vc_arr2    APEX_APPLICATION_GLOBAL.VC_ARR2;
BEGIN
    l_vc_arr2 := APEX_UTIL.STRING_TO_TABLE('One:Two:Three');
    FOR z IN 1..l_vc_arr2.count LOOP
        htp.p(l_vc_arr2(z));
    END LOOP;
END;
```

See Also:

- STRING_TO_TABLE Function
- TABLE_TO_STRING Function (Deprecated)
- SPLIT Function Signature 1
- SPLIT Function Signature 2
- SPLIT_NUMBERS Function

46.140 STRONG_PASSWORD_CHECK Procedure

This procedure returns Boolean `OUT` values based on whether a proposed password meets the password strength requirements as defined by the Oracle APEX site administrator.

Syntax

```
APEX_UTIL.STRONG_PASSWORD_CHECK (
    p_username                     IN  VARCHAR2,
    p_password                     IN  VARCHAR2,
    p_old_password                 IN  VARCHAR2,
    p_workspace_name               IN  VARCHAR2,
    p_use_strong_rules             IN  BOOLEAN,
    p_min_length_err               OUT BOOLEAN,
    p_new_differs_by_err           OUT BOOLEAN,
    p_one_alpha_err                OUT BOOLEAN,
    p_one_numeric_err              OUT BOOLEAN,
    p_one_punctuation_err          OUT BOOLEAN,
    p_one_upper_err                OUT BOOLEAN,
    p_one_lower_err                OUT BOOLEAN,
```

```
    p_not_like_username_err       OUT BOOLEAN,
    p_not_like_workspace_name_err OUT BOOLEAN,
    p_not_like_words_err          OUT BOOLEAN,
    p_not_reusable_err            OUT BOOLEAN );
```

Parameters

Table 46-119 STRONG_PASSWORD_CHECK Parameters

Parameter	Description
p_username	Username that identifies the account in the current workspace.
p_password	Password to be checked against password strength rules.
p_old_password	Current password for the account. Used only to enforce "new password must differ from old" rule.
p_workspace_name	Current workspace name, used only to enforce "password must not contain workspace name" rule.
p_use_strong_rules	Passes FALSE when calling this API.
p_min_length_err	Result returns TRUE or FALSE depending upon whether the password meets minimum length requirement.
p_new_differs_by_err	Result returns TRUE or FALSE depending upon whether the password meets "new password must differ from old" requirements.
p_one_alpha_err	Result returns TRUE or FALSE depending upon whether the password meets requirement to contain at least one alphabetic character.
p_one_numeric_err	Result returns TRUE or FALSE depending upon whether the password meets requirements to contain at least one numeric character.
p_one_punctuation_err	Result returns TRUE or FALSE depending upon whether the password meets requirements to contain at least one punctuation character.
p_one_upper_err	Result returns TRUE or FALSE depending upon whether the password meets requirements to contain at least one upper-case character.
p_one_lower_err	Result returns TRUE or FALSE depending upon whether the password meets requirements to contain at least one lower-case character.
p_not_like_username_err	Result returns TRUE or FALSE depending upon whether the password meets requirements that it not contain the username.
p_not_like_workspace_name_err	Result returns TRUE or FALSE whether upon whether the password meets requirements that it not contain the workspace name.
p_not_like_words_err	Result returns TRUE or FALSE whether the password meets requirements that it not contain specified simple words.
p_not_reusable_err	Result returns TRUE or FALSE whether the password can be reused based on password history rules.

Example

The following example checks the new password foo for the user SOMEBODY meets all the password strength requirements defined by the APEX site administrator. If any of the checks fail (the associated OUT parameter returns TRUE), then the example outputs a relevant message. For example, if the APEX site administrator defined that passwords must have at least one numeric character and the password foo is checked, then the p_one_numeric_err

OUT parameter returns TRUE and the message "Password must contain at least one numeric character" displays.

```
DECLARE
    l_username                    varchar2(30);
    l_password                    varchar2(30);
    l_old_password                varchar2(30);
    l_workspace_name              varchar2(30);
    l_min_length_err              boolean;
    l_new_differs_by_err          boolean;
    l_one_alpha_err               boolean;
    l_one_numeric_err             boolean;
    l_one_punctuation_err         boolean;
    l_one_upper_err               boolean;
    l_one_lower_err               boolean;
    l_not_like_username_err       boolean;
    l_not_like_workspace_name_err boolean;
    l_not_like_words_err          boolean;
    l_not_reusable_err            boolean;
    l_password_history_days       pls_integer;
BEGIN
    l_username := 'SOMEBODY';
    l_password := 'foo';
    l_old_password := 'foo';
    l_workspace_name := 'XYX_WS';
    l_password_history_days :=
        apex_instance_admin.get_parameter ('PASSWORD_HISTORY_DAYS');

    APEX_UTIL.STRONG_PASSWORD_CHECK(
        p_username                    => l_username,
        p_password                    => l_password,
        p_old_password                => l_old_password,
        p_workspace_name              => l_workspace_name,
        p_use_strong_rules            => false,
        p_min_length_err              => l_min_length_err,
        p_new_differs_by_err          => l_new_differs_by_err,
        p_one_alpha_err               => l_one_alpha_err,
        p_one_numeric_err             => l_one_numeric_err,
        p_one_punctuation_err         => l_one_punctuation_err,
        p_one_upper_err               => l_one_upper_err,
        p_one_lower_err               => l_one_lower_err,
        p_not_like_username_err       => l_not_like_username_err,
        p_not_like_workspace_name_err => l_not_like_workspace_name_err,
        p_not_like_words_err          => l_not_like_words_err,
        p_not_reusable_err            => l_not_reusable_err);

    IF l_min_length_err THEN
        htp.p('Password is too short');
    END IF;

    IF l_new_differs_by_err THEN
        htp.p('Password is too similar to the old password');
    END IF;

    IF l_one_alpha_err THEN
```

```
        htp.p('Password must contain at least one alphabetic character');
    END IF;

    IF l_one_numeric_err THEN
        htp.p('Password  must contain at least one numeric character');
    END IF;

    IF l_one_punctuation_err THEN
        htp.p('Password  must contain at least one punctuation character');
    END IF;

    IF l_one_upper_err THEN
        htp.p('Password must contain at least one upper-case character');
    END IF;

    IF l_one_lower_err THEN
        htp.p('Password must contain at least one lower-case character');
    END IF;

    IF l_not_like_username_err THEN
        htp.p('Password may not contain the username');
    END IF;

    IF l_not_like_workspace_name_err THEN
        htp.p('Password may not contain the workspace name');
    END IF;

    IF l_not_like_words_err THEN
        htp.p('Password contains one or more prohibited common words');
    END IF;

    IF l_not_reusable_err THEN
        htp.p('Password cannot be used because it has been used for the
            account within the last '||l_password_history_days||' days.');
    END IF;
END;
```

> **See Also:**
>
> Creating Strong Password Policies in *Oracle APEX Administration Guide*

46.141 STRONG_PASSWORD_VALIDATION Function

This function returns formatted HTML in a VARCHAR2 result based on whether a proposed password meets the password strength requirements as defined by the Oracle APEX site administrator.

Syntax

```
APEX_UTIL.STRONG_PASSWORD_VALIDATION (
    p_username                    IN  VARCHAR2,
```

```
    p_password                     IN  VARCHAR2,
    p_old_password                 IN  VARCHAR2 DEFAULT NULL,
    p_workspace_name               IN  VARCHAR2 )
RETURN VARCHAR2;
```

Parameters

Table 46-120 STRONG_PASSWORD_VALIDATION Parameters

Parameter	Description
p_username	Username that identifies the account in the current workspace.
p_password	Password to be checked against password strength rules.
p_old_password	Current password for the account. Used only to enforce "new password must differ from old" rule.
p_workspace_name	Current workspace name, used only to enforce "password must not contain workspace name" rule.

Example

The following example checks the new password `foo` for the user `SOMEBODY` meets all the password strength requirements defined by the APEX site administrator. If any of the checks fail, then the example outputs formatted HTML showing details of where the new password fails to meet requirements.

```
DECLARE
      l_username                   varchar2(30);
      l_password                   varchar2(30);
      l_old_password               varchar2(30);
      l_workspace_name             varchar2(30);
BEGIN
    l_username := 'SOMEBODY';
    l_password := 'foo';
    l_old_password := 'foo';
    l_workspace_name := 'XYX_WS';

    HTP.P(APEX_UTIL.STRONG_PASSWORD_VALIDATION(
        p_username                   => l_username,
        p_password                   => l_password,
        p_old_password               => l_old_password,
        p_workspace_name             => l_workspace_name));
END;
```

46.142 SUBMIT_FEEDBACK Procedure

This procedure enables you to write a procedure to submit feedback, rather than using the feedback page generated by Create Page Wizard.

Syntax

```
APEX_UTIL.SUBMIT_FEEDBACK (
    p_comment          IN VARCHAR2 DEFAULT NULL,
    p_type             IN NUMBER   DEFAULT '1',
```

```
p_application_id   IN VARCHAR2 DEFAULT NULL,
p_page_id          IN VARCHAR2 DEFAULT NULL,
p_email            IN VARCHAR2 DEFAULT NULL,
p_screen_width     IN VARCHAR2 DEFAULT NULL,
p_screen_height    IN VARCHAR2 DEFAULT NULL,
p_attribute_01     IN VARCHAR2 DEFAULT NULL,
p_attribute_02     IN VARCHAR2 DEFAULT NULL,
p_attribute_03     IN VARCHAR2 DEFAULT NULL,
p_attribute_04     IN VARCHAR2 DEFAULT NULL,
p_attribute_05     IN VARCHAR2 DEFAULT NULL,
p_attribute_06     IN VARCHAR2 DEFAULT NULL,
p_attribute_07     IN VARCHAR2 DEFAULT NULL,
p_attribute_08     IN VARCHAR2 DEFAULT NULL,
p_label_01         IN VARCHAR2 DEFAULT NULL,
p_label_02         IN VARCHAR2 DEFAULT NULL,
p_label_03         IN VARCHAR2 DEFAULT NULL,
p_label_04         IN VARCHAR2 DEFAULT NULL,
p_label_05         IN VARCHAR2 DEFAULT NULL,
p_label_06         IN VARCHAR2 DEFAULT NULL,
p_label_07         IN VARCHAR2 DEFAULT NULL,
p_label_08         IN VARCHAR2 DEFAULT NULL,
p_rating           IN NUMBER   DEFAULT NULL,
p_attachment_name  IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 46-121 SUBMIT_FEEDBACK Parameters

Parameter	Description
p_comment	Comment to be submitted.
p_type	Type of feedback (1 is General Comment, 2 is Enhancement Request, 3 is Bug).
p_application_id	ID of application related to the feedback.
p_page_id	ID of page related to the feedback.
p_email	Email of the user providing the feedback.
p_screen_width	Width of screen at time feedback was provided.
p_screen_height	Height of screen at time feedback was provided.
p_attribute_01	Custom attribute for collecting feedback.
p_attribute_02	Custom attribute for collecting feedback.
p_attribute_03	Custom attribute for collecting feedback.
p_attribute_04	Custom attribute for collecting feedback.
p_attribute_05	Custom attribute for collecting feedback.
p_attribute_06	Custom attribute for collecting feedback.
p_attribute_07	Custom attribute for collecting feedback.
p_attribute_08	Custom attribute for collecting feedback.
p_label_01	Label for corresponding custom attribute.
p_label_02	Label for corresponding custom attribute.
p_label_03	Label for corresponding custom attribute.
p_label_04	Label for corresponding custom attribute.

Table 46-121 (Cont.) SUBMIT_FEEDBACK Parameters

Parameter	Description
p_label_05	Label for corresponding custom attribute.
p_label_06	Label for corresponding custom attribute.
p_label_07	Label for corresponding custom attribute.
p_label_08	Label for corresponding custom attribute.
p_rating	User experience (3 is Good, 2 is Neutral, 1 is Bad).
p_attachment_name	Bind variable reference to the feedback form's "File Browse" page item.

Example

The following example submits a bad user experience because of a bug on page 22 within application 283.

```
BEGIN
    apex_util.submit_feedback (
       p_comment => 'This page does not render properly for me',
       p_type => 3,
       p_rating => 1,
       p_application_id => 283,
       p_page_id => 22,
       p_email => 'user@xyz.corp',
       p_attribute_01 => 'Charting',
       p_label_01 => 'Component' );
END;
/
```

46.143 SUBMIT_FEEDBACK_FOLLOWUP Procedure

This procedure enables you to submit follow up to a feedback.

Syntax

```
APEX_UTIL.SUBMIT_FEEDBACK_FOLLOWUP (
    p_feedback_id      IN NUMBER,
    p_follow_up        IN VARCHAR2 DEFAULT NULL,
    p_email            IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 46-122 SUBMIT_FEEDBACK_FOLLOWUP Parameters

Parameter	Description
p_feedback_followup	ID of feedback that this is a follow up to.
p_follow_up	Text of follow up.
p_email	Email of user providing the follow up.

Example

The following example submits follow up to a previously filed feedback.

```
begin
   apex_util.submit_feedback_followup (
       p_feedback_id    => 12345,
       p_follow_up      => 'I tried this on another instance and it does not
work there either',
       p_email          => 'user@xyz.corp' );
end;
/
```

46.144 TABLE_TO_STRING Function (Deprecated)

> **Note:**
>
> This function is deprecated. Oracle recommends using the `JOIN` and `JOIN_CLOB` functions instead.

Given a a PL/SQL table of type `APEX_APPLICATION_GLOBAL.VC_ARR2`, this function returns a delimited string separated by the supplied separator, or by the default separator, a colon (:).

Syntax

```
APEX_UTIL.TABLE_TO_STRING (
    p_table     IN      apex_application_global.vc_arr2,
    p_string    IN      VARCHAR2 DEFAULT ':' )
RETURN VARCHAR2;
```

Parameters

Table 46-123 TABLE_TO_STRING Parameters

Parameter	Description
`p_string`	String separator. Default separator is a colon (:).
`p_table`	PL/SQL table that is to be converted into a delimited string.

Example

The following example returns a comma delimited string of contact names that are associated with the provided `cust_id`.

```
create or replace function get_contacts (
    p_cust_id  in  number )
    return varchar2
is
    l_vc_arr2   apex_application_global.vc_arr2;
```

```
    l_contacts  varchar2(32000);

BEGIN

    select contact_name
        bulk collect
        into l_vc_arr2
        from contacts
    where cust_id = p_cust_id
        order by contact_name;

    l_contacts :=  apex_util.table_to_string (
                       p_table => l_vc_arr2,
                       p_string => ', ');

   return l_contacts;

END get_contacts;
```

See Also:

- STRING_TO_TABLE Function (Deprecated)
- JOIN Function Signature 1
- JOIN Function Signature 2
- JOIN_CLOB Function

46.145 UNEXPIRE_END_USER_ACCOUNT Procedure

This procedure makes expired end users accounts and the associated passwords usable, enabling an end user to log into developed applications.

Syntax

```
APEX_UTIL.UNEXPIRE_END_USER_ACCOUNT (
    p_user_name IN VARCHAR2 );
```

Parameters

Table 46-124 UNEXPIRE_END_USER_ACCOUNT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example renews (unexpires) an APEX end user account in the current workspace. This action specifically renews the account for use by end users to

authenticate to developed applications and may also renew the account for use by developers or administrators to log into a workspace.

This procedure must be run by a user having administration privileges in the current workspace.

```
BEGIN
    FOR c1 IN (SELECT user_name from apex_users) LOOP
        APEX_UTIL.UNEXPIRE_END_USER_ACCOUNT(p_user_name => c1.user_name);
        htp.p('End User Account:'||c1.user_name||' is now valid.');
    END LOOP;
END;
```

See Also:

- Table 46-23
- END_USER_ACCOUNT_DAYS_LEFT Function

46.146 UNEXPIRE_WORKSPACE_ACCOUNT Procedure

This procedure unexpires developer and workspace administrator accounts and the associated passwords, enabling the developer or administrator to log into a workspace.

Syntax

```
APEX_UTIL.UNEXPIRE_WORKSPACE_ACCOUNT (
    p_user_name IN VARCHAR2 );
```

Parameters

Table 46-125 UNEXPIRE_WORKSPACE_ACCOUNT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example shows how to use the UNEXPIRE_WORKSPACE_ACCOUNT procedure. Use this procedure to renew (unexpire) an APEX workspace administrator account in the current workspace. This action specifically renews the account for use by developers or administrators to log into a workspace and may also renew the account for its use by end users to authenticate to developed applications.

This procedure must be run by a user having administration privileges in the current workspace.

```
BEGIN
    FOR c1 IN (select user_name from apex_users) loop
```

```
        APEX_UTIL.UNEXPIRE_WORKSPACE_ACCOUNT(p_user_name =>
c1.user_name);
        htp.p('Workspace Account:'||c1.user_name||' is now valid.');
    END LOOP;
END;
```

See Also:

- EXPIRE_WORKSPACE_ACCOUNT Procedure
- WORKSPACE_ACCOUNT_DAYS_LEFT Function

46.147 UNLOCK_ACCOUNT Procedure

This procedure sets a user account status to unlocked. Must be run by an authenticated workspace administrator in a page request context.

Syntax

```
APEX_UTIL.UNLOCK_ACCOUNT (
    p_user_name IN VARCHAR2 );
```

Parameters

Table 46-126 UNLOCK_ACCOUNT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example shows how to use the `UNLOCK_ACCOUNT` procedure. Use this procedure to unlock an Oracle APEX account in the current workspace. This action unlocks the account for use by administrators, developers, and end users.This procedure must be run by a user who has administration privileges in the current workspace

```
BEGIN
    FOR c1 IN (SELECT user_name from apex_users) LOOP
        APEX_UTIL.UNLOCK_ACCOUNT(p_user_name => c1.user_name);
        htp.p('End User Account:'||c1.user_name||' is now
unlocked.');
    END LOOP;
END;
```

> **See Also:**
>
> - LOCK_ACCOUNT Procedure
> - GET_ACCOUNT_LOCKED_STATUS Function

46.148 URL_ENCODE Function

The following special characters are encoded as follows:

Special Characters	After Encoding
%	%25
+	%2B
space	+
.	%2E
*	%2A
?	%3F
\	%5C
/	%2F
>	%3E
<	%3C
}	%7B
{	%7D
~	%7E
[	%5B
]	%5D
'	%60
;	%3B
?	%3F
@	%40
&	%26
#	%23
|	%7C
^	%5E
:	%3A
=	%3D
$	%24

Syntax

```
APEX_UTIL.URL_ENCODE (
    p_url   IN    VARCHAR2)
    RETURN VARCHAR2;
```

Parameters

Table 46-127 URL_ENCODE Parameters

Parameter	Description
p_url	The string to be encoded.

Example

The following example shows how to use the URL_ENCODE function.

```
DECLARE
    l_url  VARCHAR2(255);
BEGIN
    l_url := APEX_UTIL.URL_ENCODE('http://www.myurl.com?id=1&cat=foo');
END;
```

In this example, the following URL:

```
http://www.myurl.com?id=1&cat=foo
```

Would be returned as:

```
http%3A%2F%2Fwww%2Emyurl%2Ecom%3Fid%3D1%26cat%3Dfoo
```

46.149 WORKSPACE_ACCOUNT_DAYS_LEFT Function

This function returns the number of days remaining before the developer or workspace administrator account password expires. Any authenticated user can run this function in a page request context .

Syntax

```
APEX_UTIL.WORKSPACE_ACCOUNT_DAYS_LEFT (
    p_user_name IN VARCHAR2 )
RETURN NUMBER;
```

Parameters

Table 46-128 WORKSPACE_ACCOUNT_DAYS_LEFT Parameters

Parameter	Description
p_user_name	The user name of the user account.

Example

The following example finds the number of days remaining before an Oracle APEX administrator or developer account in the current workspace expires.

```
DECLARE
    l_days_left NUMBER;
BEGIN
    FOR c1 IN (SELECT user_name from apex_users) LOOP
        l_days_left := APEX_UTIL.WORKSPACE_ACCOUNT_DAYS_LEFT(p_user_name =>
c1.user_name);
        htp.p('Workspace Account:'||c1.user_name||' expires in '||
l_days_left||' days.');
    END LOOP;
END;
```

See Also:

- EXPIRE_WORKSPACE_ACCOUNT Procedure
- UNEXPIRE_WORKSPACE_ACCOUNT Procedure

47

APEX_WEB_SERVICE

The APEX_WEB_SERVICE API enables you to integrate other systems with APEX by enabling you to interact with Web Services anywhere you can use PL/SQL in your application.

The API contains procedures and functions to call both SOAP and RESTful style Web Services. Functions parse the responses from Web Services and encode/decode into SOAP-friendly base64 encoding.

This API also contains package globals for managing cookies and HTTP headers when calling Web Services whether from the API or by using standard processes of type Web Service. Cookies and HTTP headers can be set before invoking a call to a Web Service by populating the globals and the cookies and HTTP headers returned from the Web Service response can be read from other globals.

47.1 About the APEX_WEB_SERVICE API

Use the `APEX_WEB_SERVICE API` to invoke a Web service and examine the response anywhere you can use PL/SQL in Oracle APEX.

The following are examples of when you might use the `APEX_WEB_SERVICE API`:

- When you want to invoke a Web service by using an On Demand Process using Ajax.
- When you want to invoke a Web service as part of an Authentication Scheme.
- When you want to invoke a Web service as part of a validation.
- When you need to pass a large binary parameter to a Web service that is base64 encoded.

47.1.1 Invoking a SOAP-style Web Service

There is a procedure and a function to invoke a SOAP-style Web service.

The procedure stores the response in the collection specified by the parameter `p_collection_name`.

The function returns the results as an `XMLTYPE`.

To retrieve a specific value from the response, you use either the `PARSE_RESPONSE` function if the result is stored in a collection or the `PARSE_XML` function if the response is returned as an `XMLTYPE`.

To pass a binary parameter to the Web service as `base64` encoded character data, use the function `BLOB2CLOBBASE64`. Conversely, to transform a response that contains a binary parameter that is `base64` encoded use the function `CLOBBASE642BLOB`.

Example

The following is an example of using the `BLOB2CLOBBASE64` function to encode a parameter, the `MAKE_REQUEST` procedure to call a Web service, and the `PARSE_RESPONSE` function to extract a specific value from the response.

```
DECLARE
 l_filename varchar2(255);
 l_BLOB BLOB;
 l_CLOB CLOB;
 l_envelope CLOB;
 l_response_msg varchar2(32767);
BEGIN
  IF :P1_FILE IS NOT NULL THEN
     SELECT filename, BLOB_CONTENT
       INTO l_filename, l_BLOB
```

```
       FROM APEX_APPLICATION_FILES
       WHERE name = :P1_FILE;

    l_CLOB := apex_web_service.blob2clobbase64(l_BLOB);

    l_envelope := q'!<?xml version='1.0' encoding='UTF-8'?>!';
    l_envelope := l_envelope|| '<soapenv:Envelope xmlns:soapenv="http://
schemas.xmlsoap.org/soap/envelope/" xmlns:chec="http://www.stellent.com/
CheckIn/">
  <soapenv:Header/>
  <soapenv:Body>
    <chec:CheckInUniversal>
        <chec:dDocName>'||l_filename||'</chec:dDocName>
        <chec:dDocTitle>'||l_filename||'</chec:dDocTitle>
        <chec:dDocType>Document</chec:dDocType>
        <chec:dDocAuthor>GM</chec:dDocAuthor>
        <chec:dSecurityGroup>Public</chec:dSecurityGroup>
        <chec:dDocAccount></chec:dDocAccount>
        <chec:CustomDocMetaData>
            <chec:property>
              <chec:name></chec:name>
              <chec:value></chec:value>
            </chec:property>
        </chec:CustomDocMetaData>
        <chec:primaryFile>
           <chec:fileName>'||l_filename'||</chec:fileName>
           <chec:fileContent>'||l_CLOB||'</chec:fileContent>
        </chec:primaryFile>
        <chec:alternateFile>
           <chec:fileName></chec:fileName>
           <chec:fileContent></chec:fileContent>
        </chec:alternateFile>
        <chec:extraProps>
           <chec:property>
              <chec:name></chec:name>
              <chec:value></chec:value>
           </chec:property>
        </chec:extraProps>
     </chec:CheckInUniversal>
  </soapenv:Body>
</soapenv:Envelope>';

apex_web_service.make_request(
   p_url               => 'http://192.0.2.1/idc/idcplg',
   p_action            => 'http://192.0.2.1/CheckIn/',
   p_collection_name   => 'STELLENT_CHECKIN',
   p_envelope          => l_envelope,
   p_username          => 'sysadmin',
   p_password          => 'password' );

 l_response_msg := apex_web_service.parse_response(
    p_collection_name=>'STELLENT_CHECKIN',
p_xpath=>'//idc:CheckInUniversalResponse/idc:CheckInUniversalResult/
idc:StatusInfo/idc:statusMessage/text()',
    p_ns=>'xmlns:idc="http://www.stellent.com/CheckIn/"');
```

```
  :P1_RES_MSG := l_response_msg;

  END IF;
END;
```

47.1.2 Invoking a RESTful-style Web Service

RESTful-style Web services use a simpler architecture than SOAP. Often the input to a RESTful-style Web service is a collection of name/value pairs. The response can be an XML document or simply text such as a comma-separated response or JSON.

Example

The following is an example of MAKE_REST_REQUEST in an application process that is callable by Ajax.

```
DECLARE
  l_clob clob;
  l_buffer         varchar2(32767);
  l_amount         number;
  l_offset         number;
BEGIN

  l_clob := apex_web_service.make_rest_request(
              p_url => 'http://us.music.yahooapis.com/ video/v1/list/
published/popular',
              p_http_method => 'GET',
              p_parm_name => apex_util.string_to_table('appid:format'),
              p_parm_value =>
apex_util.string_to_table(apex_application.g_x01||':'||
apex_application.g_x02));

    l_amount := 32000;
    l_offset := 1;
    BEGIN
        LOOP
            dbms_lob.read( l_clob, l_amount, l_offset, l_buffer );
            htp.p(l_buffer);
            l_offset := l_offset + l_amount;
            l_amount := 32000;
        END LOOP;
    EXCEPTION
        WHEN no_data_found THEN
            NULL;
    END;

END;
```

47.1.3 Setting Cookies and HTTP Headers

Set cookies and HTTP headers that should be sent along with a Web Service request by populating the globals `g_request_cookies` and `g_request_headers` before the process that invokes the Web Service.

The following example populates the globals to send cookies and HTTP headers with a request.

```
FOR c1 IN (select seq_id, c001, c002, c003, c004, c005, c006, c007
            FROM apex_collections
            WHERE collection_name = 'P31_RESP_COOKIES' ) LOOP
  apex_web_service.g_request_cookies(c1.seq_id).name := c1.c001;
  apex_web_service.g_request_cookies(c1.seq_id).value := c1.c002;
  apex_web_service.g_request_cookies(c1.seq_id).domain := c1.c003;
  apex_web_service.g_request_cookies(c1.seq_id).expire := c1.c004;
  apex_web_service.g_request_cookies(c1.seq_id).path := c1.c005;
  IF c1.c006 = 'Y' THEN
    apex_web_service.g_request_cookies(c1.seq_id).secure := TRUE;
  ELSE
    apex_web_service.g_request_cookies(c1.seq_id).secure := FALSE;
  END IF;
  apex_web_service.g_request_cookies(c1.seq_id).version := c1.c007;
END LOOP;

FOR c1 IN (select seq_id, c001, c002
            FROM apex_collections
            WHERE collection_name = 'P31_RESP_HEADERS' ) LOOP
  apex_web_service.g_request_headers(c1.seq_id).name := c1.c001;
  apex_web_service.g_request_headers(c1.seq_id).value := c1.c002;
END LOOP;
```

47.1.4 Retrieving Cookies and HTTP Headers

When you invoke a Web service using any of the supported methods in Oracle APEX, the `g_response_cookies` and `g_headers` globals are populated if the Web service response included any cookies or HTTP headers. You can interrogate these globals and store the information in collections.

When you invoke a Web service using any of the supported methods in APEX, the `g_status_code` global is populated with the numeric HTTP status code of the response (for example, 200 or 404). The `g_response_cookies` and `g_headers` globals are populated if the Web service response included any cookies or HTTP headers.

The following are examples of interrogating the `APEX_WEB_SERVICE` globals to store cookie and HTTP header responses in collections.

```
DECLARE
  i number;
  secure varchar2(1);
BEGIN
  apex_collection.create_or_truncate_collection('P31_RESP_COOKIES');
  FOR i in 1.. apex_web_service.g_response_cookies.count LOOP
```

```
    IF (apex_web_service.g_response_cookies(i).secure) THEN
      secure := 'Y';
    ELSE
      secure := 'N';
    END IF;
    apex_collection.add_member(p_collection_name => 'P31_RESP_COOKIES',
      p_c001 => apex_web_service.g_response_cookies(i).name,
      p_c002 => apex_web_service.g_response_cookies(i).value,
      p_c003 => apex_web_service.g_response_cookies(i).domain,
      p_c004 => apex_web_service.g_response_cookies(i).expire,
      p_c005 => apex_web_service.g_response_cookies(i).path,
      p_c006 => secure,
      p_c007 => apex_web_service.g_response_cookies(i).version );
  END LOOP;
END;

DECLARE
  i number;
BEGIN
apex_collection.create_or_truncate_collection('P31_RESP_HEADERS');

FOR i in 1.. apex_web_service.g_headers.count LOOP
  apex_collection.add_member(p_collection_name => 'P31_RESP_HEADERS',
    p_c001 => apex_web_service.g_headers(i).name,
    p_c002 => apex_web_service.g_headers(i).value,
    p_c003 => apex_web_service.g_status_code);
END LOOP;
END;
```

47.2 About Web Credentials and APEX_WEB_SERVICE

You can use the `MAKE_REQUEST` and `MAKE_REST_REQUEST` procedures to enable Web Credentials in order to authenticate against the remote Web Service.

Web Credentials can be used with the `APEX_WEB_SERVICE` package from outside the context of an Oracle APEX application (such as from SQL*Plus or from a Database Scheduler job) as long as the database user making the call is mapped to an APEX workspace.

If the database user is mapped to multiple workspaces, you must first call `APEX_UTIL.SET_WORKSPACE` or `APEX_UTIL.SET_SECURITY_GROUP_ID` as in the following examples.

If the database user is mapped to multiple workspaces, you must first call `APEX_UTIL.SET_WORKSPACE` or `APEX_UTIL.SET_SECURITY_GROUP_ID` as in the following examples. The `APEX_WEB_SERVICE` package cannot be used by database users that are not mapped to any workspace unless they have been granted the role `APEX_ADMINISTRATOR_ROLE`.

Examples

Example 1

```
apex_util.set_workspace(p_workspace => 'MY_WORKSPACE');
```

Example 2

```
FOR c1 in (
   select workspace_id
     from apex_applications
    where application_id = 100 )
LOOP
   apex_util.set_security_group_id(p_security_group_id => c1.workspace_id);
END LOOP;
```

> **See Also:**
>
> Managing Web Credentials in *Oracle APEX App Builder User's Guide*.

47.3 APPEND_TO_MULTIPART Procedure Signature 1

This procedure adds a BLOB to a multipart/form request body.

Syntax

```
APEX_WEB_SERVICE.APPEND_TO_MULTIPART (
    p_multipart     IN OUT NOCOPY t_multipart_parts,
    p_name          IN            VARCHAR2,
    p_filename      IN            VARCHAR2 DEFAULT NULL,
    p_content_type  IN            VARCHAR2 DEFAULT 'application/octet-
stream',
    p_body_blob     IN            BLOB );
```

Parameters

Table 47-1 APPEND_TO_MULTIPART Parameters

Parameter	Description
p_multipart	The table type for the multipart/request body, t_multipart_parts.
p_name	The name of the multipart data.
p_filename	The filename of the multipart data if it exists.
p_content_type	The content type of the multipart data.
p_body_blob	The content to add in BLOB.

Example

```
DECLARE
    l_multipart    apex_web_service.t_multipart_parts;
BEGIN
    apex_web_service.append (
        p_multipart    => l_multipart,
        p_name         => 'param1',
        p_content_type => 'application/octet-stream',
```

```
        p_body_body    => (select blob from table where id = 1) );
END;
```

47.4 APPEND_TO_MULTIPART Procedure Signature 2

This procedure adds a CLOB to a multipart/form request body.

Syntax

```
APEX_WEB_SERVICE.APPEND_TO_MULTIPART (
    p_multipart     IN OUT NOCOPY t_multipart_parts,
    p_name          IN            VARCHAR2,
    p_filename      IN            VARCHAR2 DEFAULT NULL,
    p_content_type  IN            VARCHAR2 DEFAULT 'application/octet-
stream',
    p_body          IN            CLOB );
```

Parameters

Table 47-2 APPEND_TO_MULTIPART Parameters

Parameter	Description
p_multipart	The table type for the multipart/request body, t_multipart_parts.
p_name	The name of the multipart data.
p_filename	The filename of the multipart data if it exists.
p_content_type	The content type of the multipart data.
p_body	The content to add in CLOB.

Example

```
DECLARE
    l_multipart    apex_web_service.t_multipart_parts;
BEGIN
    apex_web_service.append (
        p_multipart    => l_multipart,
        p_name         => 'param1',
        p_content_type => 'application/json',
        p_body         => '{"hello":"world"}' );
END;
```

47.5 BLOB2CLOBBASE64 Function

This function converts a `BLOB` datatype into a `CLOB` that is `base64`-encoded. This is often used when sending a binary as an input to a Web service.

Syntax

```
APEX_WEB_SERVICE.BLOB2CLOBBASE64 (
    p_blob IN BLOB)
RETURN CLOB;
```

Parameters

Table 47-3 BLOB2CLOBBASE64 Parameters

Parameter	Description
p_blob	The BLOB to convert into base64 encoded CLOB.

Example

The following example gets a file that was uploaded from the `apex_application_files` view and converts the `BLOB` into a `CLOB` that is `base64`-encoded.

```
DECLARE
    l_clob    CLOB;
    l_blob    BLOB;
BEGIN
    SELECT BLOB_CONTENT
      INTO l_BLOB
      FROM APEX_APPLICATION_FILES
      WHERE name = :P1_FILE;

    l_CLOB := apex_web_service.blob2clobbase64(l_BLOB);
END;
```

47.6 CLEAR_REQUEST_COOKIES Procedure

This procedure clears all cookies, so that the next MAKE_REST_REQUEST call executes without sending any cookies. This procedure clears the cookie globals in APEX_WEB_SERVICE and in UTL_HTTP.

Parameters

None.

Example

```
declare
begin
  apex_web_service.clear_request_cookies;
end;
```

47.7 CLEAR_REQUEST_HEADERS Procedure

This procedure clears the current request headers.

Parameters

None.

Example

```
declare
begin
  apex_web_service.clear_request_headers;
end;
```

47.8 CLOBBASE642BLOB Function

This function converts a `CLOB` datatype that is `base64`-encoded into a `BLOB`. This is often used when receiving output from a Web service that contains a binary parameter.

Syntax

```
APEX_WEB_SERVICE.CLOBBASE642BLOB (
    p_clob IN CLOB)
RETURN BLOB;
```

Parameters

Table 47-4 CLOBBASE642BLOB Parameters

Parameter	Description
`p_clob`	The `base64`-encoded `CLOB` to convert into a `BLOB`.

Example

The following example retrieves a `base64`-encoded node from an XML document as a `CLOB` and converts it into a `BLOB`.

```
DECLARE
    l_base64 CLOB;
    l_blob   BLOB;
    l_xml    XMLTYPE;
BEGIN
    l_base64 := apex_web_service.parse_xml_clob(l_xml, ' //
runReportReturn/reportBytes/text()');
        l_blob := apex_web_service.clobbase642blob(l_base64);
END;
```

47.9 GENERATE_REQUEST_BODY Function

This function generates the multipart/form-data request body from the data in the `t_multiparts` array.

Syntax

```
APEX_WEB_SERVICE.GENERATE_REQUEST_BODY(
    p_multipart      IN t_multipart_parts,
    p_to_charset     IN VARCHAR2 DEFAULT wwv_flow_lang.get_db_charset )
    RETURN BLOB;
```

Parameters

Parameter	Description
p_multipart	The table type for the multipart/request body, t_multipart_parts.
p_to_charset	The target character set for the parts that are CLOBs. This parameter defaults to the current character set of the database.

Examples

This example stores the multipart/form request in a local BLOB variable.

```
DECLARE
    l_multipart    apex_web_service.t_multipart_parts;
    l_request_blob blob;
BEGIN
     l_request_blob := apex_web_service.generate_request_body (
                           p_multipart    => l_multipart );
END;
```

47.10 MAKE_REQUEST Function

This function invokes a SOAP-style Web service with the supplied SOAP envelope returning the results in an XMLTYPE.

Syntax

```
APEX_WEB_SERVICE.MAKE_REQUEST (
    p_url                  IN VARCHAR2,
    p_action               IN VARCHAR2 DEFAULT NULL,
    p_version              IN VARCHAR2 DEFAULT '1.1',
    p_envelope             IN CLOB,
    p_username             IN VARCHAR2 DEFAULT NULL,
    p_password             IN VARCHAR2 DEFAULT NULL,
    p_scheme               IN VARCHAR2 DEFAULT 'Basic',
    p_proxy_override       IN VARCHAR2 DEFAULT NULL,
    p_transfer_timeout     IN NUMBER   DEFAULT 180,
    p_wallet_path          IN VARCHAR2 DEFAULT NULL,
    p_wallet_pwd           IN VARCHAR2 DEFAULT NULL,
    p_https_host           IN VARCHAR2 DEFAULT NULL,
    p_credential_static_id IN VARCHAR2 DEFAULT NULL,
    p_token_url            IN VARCHAR2 DEFAULT NULL )
RETURN XMLTYPE;
```

Parameters

Table 47-5 MAKE_REQUEST Parameters

Parameter	Description
p_url	The URL endpoint of the Web service.
p_action	The SOAP Action corresponding to the operation to be invoked.
p_version	The SOAP version (1.1 or 1.2). The default is 1.1.
p_envelope	The SOAP envelope to post to the service.
p_username	The username if basic authentication is required for this service.
p_password	The password if basic authentication is required for this service
p_scheme	The authentication scheme. Basic (default), AWS, Digest, or OAUTH_CLIENT_CRED if supported by your database release.
p_proxy_override	The proxy to use for the request. The proxy supplied overrides the proxy defined in the application attributes.
p_transfer_timeout	The amount of time in seconds to wait for a response.
p_wallet_path	The file system path to a wallet if the URL endpoint is HTTPS. For example, file:/usr/home/oracle/WALLETS The wallet path provided overrides the wallet defined in the instance settings.
p_wallet_pwd	The password to access the wallet.
p_https_host	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.
p_credential_static_id	The name of a Web Credential to be used (configured in Shared Components).
p_token_url	The URL to retrieve the token for token-based authentication flows (such as OAuth2).

Example

The following example uses the make_request function to invoke a SOAP style Web service that returns movie listings. The result is stored in an XMLTYPE.

```
DECLARE
    l_envelope  CLOB;
    l_xml       XMLTYPE;
BEGIN
        l_envelope := ' <?xml version="1.0" encoding="UTF-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:tns="http://www.ignyte.com/whatsshowing"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
    <soap:Body>
        <tns:GetTheatersAndMovies>
            <tns:zipCode>43221</tns:zipCode>
            <tns:radius>5</tns:radius>
        </tns:GetTheatersAndMovies>
    </soap:Body>
</soap:Envelope>';

l_xml := apex_web_service.make_request(
    p_url => ' http://www.ignyte.com/webservices/
```

```
ignyte.whatsshowing.webservice/moviefunctions.asmx',
   p_action => ' http://www.ignyte.com/whatsshowing/GetTheatersAndMovies',
   p_envelope => l_envelope
);
END
```

47.11 MAKE_REQUEST Procedure

This procedure invokes a SOAP-style Web service with the supplied SOAP envelope and stores the results in a collection.

Syntax

```
APEX_WEB_SERVICE.MAKE_REQUEST (
    p_url               IN VARCHAR2,
    p_action            IN VARCHAR2 DEFAULT NULL,
    p_version           IN VARCHAR2 DEFAULT '1.1',
    p_collection_name   IN VARCHAR2 DEFAULT NULL,
    p_envelope          IN CLOB,
    p_username          IN VARCHAR2 DEFAULT NULL,
    p_password          IN VARCHAR2 DEFAULT NULL,
    p_scheme            IN VARCHAR2 DEFAULT 'Basic',
    p_proxy_override    IN VARCHAR2 DEFAULT NULL,
    p_transfer_timeout  IN NUMBER   DEFAULT 180,
    p_wallet_path       IN VARCHAR2 DEFAULT NULL,
    p_wallet_pwd        IN VARCHAR2 DEFAULT NULL,
    p_https_host        IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 47-6 MAKE_REQUEST Procedure Parameters

Parameter	Description
p_url	The URL endpoint of the Web service.
p_action	The SOAP Action corresponding to the operation to be invoked.
p_version	The SOAP version (1.1 or 1.2). The default is 1.1.
p_collection_name	The name of the collection to store the response.
p_envelope	The SOAP envelope to post to the service.
p_username	The username if basic authentication is required for this service.
p_password	The password if basic authentication is required for this service
p_scheme	The authentication scheme. Basic (default), AWS, or Digest if supported by your database release.
p_proxy_override	The proxy to use for the request. The proxy supplied overrides the proxy defined in the application attributes.
p_transfer_timeout	The amount of time in seconds to wait for a response.
p_wallet_path	The file system path to a wallet if the URL endpoint is HTTPS. For example, `file:/usr/home/oracle/WALLETS` The wallet path provided overrides the wallet defined in the instance settings.
p_wallet_pwd	The password to access the wallet.

Table 47-6 (Cont.) MAKE_REQUEST Procedure Parameters

Parameter	Description
p_https_host	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.

Example

The following example uses the `make_request` procedure to retrieve a list of movies from a SOAP style Web service. The response is stored in an Oracle APEX collection named `MOVIE_LISTINGS`.

```
DECLARE
        l_envelope CLOB;
BEGIN
     l_envelope := '<?xml version="1.0" encoding="UTF-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:tns="http://www.ignyte.com/whatsshowing"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
   <soap:Body>
      <tns:GetTheatersAndMovies>
         <tns:zipCode>43221</tns:zipCode>
         <tns:radius>5</tns:radius>
      </tns:GetTheatersAndMovies>
   </soap:Body>
</soap:Envelope>';

apex_web_service.make_request(
   p_url               => ' http://www.ignyte.com/webservices/
ignyte.whatsshowing.webservice/moviefunctions.asmx',
   p_action            => ' http://www.ignyte.com/whatsshowing/
GetTheatersAndMovies',
   p_collection_name   => 'MOVIE_LISTINGS',
   p_envelope          => l_envelope
);

END;
```

47.12 MAKE_REST_REQUEST Function

Use this function to invoke a RESTful style Web service supplying either name value pairs, a character based payload or a binary payload and returning the response in a CLOB.

Syntax

```
APEX_WEB_SERVICE.MAKE_REST_REQUEST (
    p_url                   IN  VARCHAR2,
    p_http_method           IN  VARCHAR2,
    p_username              IN  VARCHAR2 DEFAULT NULL,
    p_password              IN  VARCHAR2 DEFAULT NULL,
    p_scheme                IN  VARCHAR2 DEFAULT 'Basic',
```

```
    p_proxy_override        IN  VARCHAR2 DEFAULT NULL,
    p_transfer_timeout      IN  NUMBER   DEFAULT 180,
    p_body                  IN  CLOB     DEFAULT EMPTY_CLOB(),
    p_body_blob             IN  BLOB     DEFAULT EMPTY_BLOB(),
    p_parm_name             IN  apex_application_global.vc_arr2
                                    DEFAULT empty_vc_arr,
    p_parm_value            IN  apex_application_global.vc_arr2
                                    DEFAULT empty_vc_arr,
    p_wallet_path           IN  VARCHAR2 DEFAULT NULL,
    p_wallet_pwd            IN  VARCHAR2 DEFAULT NULL,
    p_https_host            IN  VARCHAR2 DEFAULT NULL,
    p_credential_static_id  IN  VARCHAR2 DEFAULT NULL,
    p_token_url             IN  VARCHAR2 DEFAULT NULL )
RETURN CLOB;
```

Parameters

Table 47-7 MAKE_REST_REQUEST Function Parameters

Parameter	Description
p_url	The HTTP method to use: GET, HEAD, POST, PUT, DELETE, or PATCH.
p_http_method	The HTTP method to use, PUT, POST, GET, HEAD, or DELETE.
p_username	The username if basic authentication is required for this service.
p_password	The password if basic authentication is required for this service
p_scheme	The authentication scheme, Basic (default) or AWS or Digest or OAUTH_CLIENT_CRED if supported by your database release.
p_proxy_override	The proxy to use for the request. The proxy supplied overrides the proxy defined in the application attributes.
p_transfer_timeout	The amount of time in seconds to wait for a response.
p_body	The HTTP payload to be sent as CLOB.
p_body_blob	The HTTP payload to be sent as binary BLOB. For example, posting a file.
p_parm_name	The name of the parameters to be used in name/value pairs.
p_parm_value	The value of the parameters to be used in name/value pairs.
p_wallet_path	The file system path to a wallet if the URL endpoint is https. For example, file:/usr/home/oracle/WALLETS. The wallet path provided overrides the wallet defined in the instance settings.
p_wallet_pwd	The password to access the wallet.
p_https_host	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.
p_credential_static_id	The name of a Web Credential (configured in Shared Components) to be used.
p_token_url	For token-based authentication flows (like OAuth2): The URL where to get the token from.

Example

The following example calls a RESTful-style web service using the `make_rest_request` function passing the parameters to the service as name/value pairs. The response from the service is stored in a locally declared CLOB.

```
DECLARE
    l_clob     CLOB;
BEGIN

    l_clob := apex_web_service.make_rest_request(
        p_url => 'http://us.music.yahewapis.com/video/v1/list/
published/popular',
        p_http_method => 'GET',
        p_parm_name => apex_string.string_to_table('appid:format'),
        p_parm_value => apex_string.string_to_table('xyz:xml'));

END;
```

47.13 MAKE_REST_REQUEST_B Function

This function invokes a RESTful style Web service supplying either name value pairs, a character based payload, or a binary payload, and returns the response in a BLOB.

Syntax

```
APEX_WEB_SERVICE.MAKE_REST_REQUEST_B (
    p_url                    IN  VARCHAR2,
    p_http_method            IN  VARCHAR2,
    p_username               IN  VARCHAR2 DEFAULT NULL,
    p_password               IN  VARCHAR2 DEFAULT NULL,
    p_scheme                 IN  VARCHAR2 DEFAULT 'Basic',
    p_proxy_override         IN  VARCHAR2 DEFAULT NULL,
    p_transfer_timeout       IN  NUMBER   DEFAULT 180,
    p_body                   IN  CLOB     DEFAULT EMPTY_CLOB(),
    p_body_blob              IN  BLOB     DEFAULT EMPTY_BLOB(),
    p_parm_name              IN  apex_application_global.vc_arr2
                                     DEFAULT empty_vc_arr,
    p_parm_value             IN  apex_application_global.vc_arr2
                                     DEFAULT empty_vc_arr,
    p_wallet_path            IN  VARCHAR2 DEFAULT NULL,
    p_wallet_pwd             IN  VARCHAR2 DEFAULT NULL,
    p_https_host             IN  VARCHAR2 DEFAULT NULL,
    p_credential_static_id   IN  VARCHAR2 DEFAULT NULL,
    p_token_url              IN  VARCHAR2 DEFAULT NULL )
RETURN BLOB;
```

Parameters

Table 47-8 MAKE_REST_REQUEST_B Function Parameters

Parameter	Description
p_url	The URL endpoint of the Web service.
p_http_method	The HTTP method to use, PUT, POST, GET, HEAD, or DELETE.
p_username	The username if basic authentication is required for this service.
p_password	The password if basic authentication is required for this service
p_scheme	The authentication scheme, Basic (default) or AWS or Digest or OAUTH_CLIENT_CREDif supported by your database release.
p_proxy_override	The proxy to use for the request. The proxy supplied overrides the proxy defined in the application attributes.
p_transfer_timeout	The amount of time in seconds to wait for a response.
p_body	The HTTP payload to be sent as CLOB.
p_body_blob	The HTTP payload to be sent as binary BLOB. For example, posting a file.
p_parm_name	The name of the parameters to be used in name/value pairs.
p_parm_value	The value of the parameters to be used in name/value pairs.
p_wallet_path	The file system path to a wallet if the URL endpoint is https. For example, file:/usr/home/oracle/WALLETS. The wallet path provided overrides the wallet defined in the instance settings.
p_wallet_pwd	The password to access the wallet.
p_https_host	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.
p_credential_static_id	The name of a Web Credential (configured in Shared Components) to be used.
p_token_url	For token-based authentication flows (like OAuth2): The URL where to get the token from.

Example

The following example calls a RESTful style Web service using the `make_rest_request` function passing the parameters to the service as name/value pairs. The response from the service is stored in a locally declared BLOB.

```
DECLARE
    l_blob     BLOB;
BEGIN

    l_blob := apex_web_service.make_rest_request_b(
        p_url => 'http://us.music.yahooapis.com/ video/v1/list/published/
popular',
        p_http_method => 'GET',
        p_parm_name => apex_string.string_to_table('appid:format'),
        p_parm_value => apex_string.string_to_table('xyz:xml'));

END;
```

47.14 OAUTH_AUTHENTICATE_CREDENTIAL Procedure

This procedure performs OAuth authentication and requests an OAuth access token. The token and its expiration date are stored in the global variable `g_oauth_token`.

```
type oauth_token is record(
     token      varchar2(255),
     expires    date );
```

> **Note:**
>
> Currently only the Client Credentials flow is supported.

Syntax

```
APEX_WEB_SERVICE.OAUTH_AUTHENTICATE_CREDENTIAL(
    p_token_url               IN VARCHAR2,
    p_credential_static_id    IN VARCHAR2,
    p_proxy_override          IN VARCHAR2 DEFAULT NULL,
    p_transfer_timeout        IN NUMBER   DEFAULT 180,
    p_wallet_path             IN VARCHAR2
    p_wallet_pwd              IN VARCHAR2
    p_https_host              IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 47-9 OAUTH_AUTHENTICATE_CREDENTIAL

Parameter	Description
`p_token_url`	The url endpoint of the OAuth token service.
`p_credential_static_id`	The name of the Web Credentials to be used. Web Credentials are configured in Shared Components.
`p_proxy_override`	The proxy to use for the request.
`p_transfer_timeout`	The amount of time in seconds to wait for a response.
`p_wallet_path`	The filesystem path to a wallet if request is HTTPS. For example, `file:/usr/home/oracle/WALLETS`
`p_wallet_pwd`	The password to access the wallet.
`p_https_host`	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.

Example

```
BEGIN
    apex_web_service.oauth_authenticate_credential(
        p_token_url => '[URL to ORDS OAuth troken service: http(s)://
{host}:{port}/ords/.../oauth/token]',
```

```
        p_credential_static_id => '[web-credential]');
END;
```

47.15 OAUTH_AUTHENTICATE Procedure Signature 1

This procedure performs OAuth authentication and requests an OAuth access token. The token and its expiration date are stored in the global variable `g_oauth_token`.

```
type oauth_token is record(
     token      varchar2(255),
     expires    date );
```

> **Note:**
>
> Currently only the Client Credentials flow is supported.

Syntax

```
APEX_WEB_SERVICE.OAUTH_AUTHENTICATE(
    p_token_url         IN VARCHAR2,
    p_client_id         IN VARCHAR2,
    p_client_secret     IN VARCHAR2,
    p_flow_type         IN VARCHAR2 DEFAULT OAUTH_CLIENT_CRED,
    p_proxy_override    IN VARCHAR2 DEFAULT NULL,
    p_transfer_timeout  IN NUMBER   DEFAULT 180,
    p_wallet_path       IN VARCHAR2 DEFAULT NULL,
    p_wallet_pwd        IN VARCHAR2 DEFAULT NULL,
    p_https_host        IN VARCHAR2 DEFAULT NULL,
    p_scope             IN VARCHAR2 DEFAULT NULL );
```

Parameters

Table 47-10 OAUTH_AUTHENTICATE Procedure Parameters

Parameter	Description
`p_token_url`	The URL endpoint of the OAuth token service.
`p_client_id`	OAuth Client ID to use for authentication.
`p_client_secret`	OAuth Client Secret to use for authentication.
`p_flow_type`	OAuth flow type. Only `OAUTH_CLIENT_CRED` is supported at this time.
`p_proxy_override`	The proxy to use for the request.
`p_transfer_timeout`	The amount of time in seconds to wait for a response.
`p_wallet_path`	The filesystem path to a wallet if request is HTTPS. For example, `file:/usr/home/oracle/WALLETS`
`p_wallet_pwd`	The password to access the wallet.
`p_https_host`	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.

Table 47-10 (Cont.) OAUTH_AUTHENTICATE Procedure Parameters

Parameter	Description
p_scope	The OAuth scope to identify groups of attributes that will be requested from the OAuth provider. For example, profile,email

Example

```
BEGIN
    apex_web_service.oauth_authenticate(
        p_token_url     => '[URL to ORDS OAuth troken service:
http(s)://{host}:{port}/ords/.../oauth/token]',
        p_client_id     => '[client-id]',
        p_client_secret => '[client-secret]');
END;
```

47.16 OAUTH_AUTHENTICATE Procedure Signature 2 (Deprecated)

> **Note:**
>
> OAUTH_AUTHENTICATE Procedure Signature 2 has been deprecated because p_wallet_path and p_wallet_pwd do not have a default value. Oracle recommends using OAUTH_AUTHENTICATE_CREDENTIAL instead.

This procedure performs OAUTH autentication and requests an OAuth access token. The token and its expiry date are stored in the global variable g_oauth_token.

```
type oauth_token is record(
     token      varchar2(255),
     expires    date );
```

> **Note:**
>
> Currently only the Client Credentials flow is supported.

Syntax

```
APEX_WEB_SERVICE.OAUTH_AUTHENTICATE(
    p_token_url              IN VARCHAR2,
    p_credential_static_id   IN VARCHAR2,
    p_proxy_override         IN VARCHAR2 DEFAULT NULL,
    p_transfer_timeout       IN NUMBER   DEFAULT 180,
    p_wallet_path            IN VARCHAR2
```

```
    p_wallet_pwd            IN VARCHAR2
    p_https_host            IN VARCHAR2 DEFAULT NULL);
```

Parameters

Table 47-11 OAUTH_AUTHENTICATE Procedure Signature 2

Parameter	Description
p_token_url	The url endpoint of the OAuth token service.
p_credential_static_id	The name of the Web Credentials to be used. Web Credentials are configured in Shared Components.
p_proxy_override	The proxy to use for the request.
p_transfer_timeout	The amount of time in seconds to wait for a response.
p_wallet_path	The filesystem path to a wallet if request is https. For example, file:/usr/home/oracle/WALLETS.
p_wallet_pwd	The password to access the wallet.
p_https_host	The host name to be matched against the common name (CN) of the remote server's certificate for an HTTPS request.

Example

```
BEGIN
    apex_web_service.oauth_authenticate(
        p_token_url => '[URL to ORDS OAuth troken service: http(s)://{host}:
{port}/ords/.../oauth/token]',
        p_credential_static_id => '[web-credential]');
END;
```

47.17 OAUTH_GET_LAST_TOKEN Function

This function returns the OAuth access token received in the last OAUTH_AUTHENTICATE call. Returns NULL when the token is already expired or OAUTH_AUTHENTICATE has not been called.

Returns

The OAuth access token from the last OAUTH_AUTHENTICATE call; NULL when the token is expired.

Syntax

```
FUNCTION OAUTH_GET_LAST_TOKEN RETURN VARCHAR2;
```

Example

```
select apex_web_service.oauth_get_last_token from dual;
```

47.18 OAUTH_SET_TOKEN Procedure

This procedure sets the OAuth access token to be used in subsequent `MAKE_REST_REQUEST` calls. This procedure can be used to set a token which was obtained by different means than with `OAUTH_AUTHENTICATE` (such as custom code).

Syntax

```
PROCEDURE OAUTH_SET_TOKEN(
    p_token   IN VARCHAR2,
    p_expires IN DATE DEFAULT NULL );
```

Parameters

Table 47-12 OAUTH_SET_TOKEN Procedure Parameters

Parameter	Description
`p_token`	The OAuth access token to be used by `MAKE_REST_REQUEST` calls.
`p_expires`	(Optional) The token expiry date. If NULL, no expiration date is set.

Example

```
BEGIN
    apex_web_service.oauth_set_token(
        p_token =>   '{oauth access token}'
    );
END;
```

47.19 PARSE_RESPONSE Function

This function parses the response from a Web service that is stored in a collection and returns the result as a VARCHAR2 type.

Syntax

```
APEX_WEB_SERVICE.PARSE_RESPONSE (
    p_collection_name   IN VARCHAR2,
    p_xpath             IN VARCHAR2,
    p_ns                IN VARCHAR2 DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 47-13 PARSE_RESPONSE Function Parameters

Parameter	Description
p_collection_name	The name of the collection where the Web service response is stored.
p_xpath	The XPath expression to the desired node.
p_ns	The namespace to the desired node.

Example

The following example parses a response stored in a collection called `STELLENT_CHECKIN` and stores the value in a locally declared `VARCHAR2` variable.

```
declare
    l_response_msg  VARCHAR2(4000);
BEGIN
    l_response_msg := apex_web_service.parse_response(
        p_collection_name=>'STELLENT_CHECKIN',
        p_xpath =>
'//idc:CheckInUniversalResponse/idc:CheckInUniversalResult/idc:StatusInfo/
idc:statusMessage/text()',
        p_ns=>'xmlns:idc="http://www.stellent.com/CheckIn/"');
END;
```

47.20 PARSE_RESPONSE_CLOB Function

This function parses the response from a Web service that is stored in a collection and returns the result as a CLOB type.

Syntax

```
APEX_WEB_SERVICE.PARSE_RESPONSE_CLOB (
    p_collection_name   IN VARCHAR2,
    p_xpath             IN VARCHAR2,
    p_ns                IN VARCHAR2 DEFAULT NULL )
RETURN CLOB;
```

Parameters

Table 47-14 PARSE_RESPONSE _CLOB Function Parameters

Parameter	Description
p_collection_name	The name of the collection where the Web service response is stored.
p_xpath	The XPath expression to the desired node.
p_ns	The namespace to the desired node.

Example

The following example parses a response stored in a collection called `STELLENT_CHECKIN` and stores the value in a locally declared CLOB variable.

```
DECLARE
    l_response_msg  CLOB;
BEGIN
    l_response_msg := apex_web_service.parse_response_clob(
        p_collection_name=>'STELLENT_CHECKIN',
        p_xpath=>
'//idc:CheckInUniversalResponse/idc:CheckInUniversalResult/
idc:StatusInfo/idc:statusMessage/text()',
        p_ns=>'xmlns:idc="http://www.stellent.com/CheckIn/"');
END;
```

47.21 PARSE_XML Function

This function parses the response from a Web service returned as an XMLTYPE and returns the value requested as a VARCHAR2.

Syntax

```
APEX_WEB_SERVICE.PARSE_XML (
    p_xml                IN XMLTYPE,
    p_xpath              IN VARCHAR2,
    p_ns                 IN VARCHAR2 DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 47-15 PARSE_XML Function Parameters

Parameter	Description
`p_xml`	The XML document as an XMLTYPE to parse.
`p_xpath`	The XPath expression to the desired node.
`p_ns`	The namespace to the desired node.

Example

The following example uses the `make_request` function to call a Web service and store the results in a local XMLTYPE variable. The `parse_xml` function is then used to pull out a specific node of the XML document stored in the `XMLTYPE` and stores it in a locally declared VARCHAR2 variable.

```
DECLARE
    l_envelope CLOB;
    l_xml XMLTYPE;
    l_movie VARCHAR2(4000);
BEGIN
    l_envelope := ' <?xml version="1.0" encoding="UTF-8"?>
```

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:tns="http://www.ignyte.com/whatsshowing"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
   <soap:Body>
      <tns:GetTheatersAndMovies>
         <tns:zipCode>43221</tns:zipCode>
         <tns:radius>5</tns:radius>
      </tns:GetTheatersAndMovies>
   </soap:Body>
</soap:Envelope>';

   l_xml := apex_web_service.make_request(
     p_url => ' http://www.ignyte.com/webservices/
ignyte.whatsshowing.webservice/moviefunctions.asmx',
     p_action => ' http://www.ignyte.com/whatsshowing/GetTheatersAndMovies',
     p_envelope => l_envelope );

   l_movie := apex_web_service.parse_xml(
     p_xml => l_xml,
     p_xpath => ' //GetTheatersAndMoviesResponse/GetTheatersAndMoviesResult/
Theater/Movies/Movie/Name[1]',
     p_ns => ' xmlns="http://www.ignyte.com/whatsshowing"' );

END;
```

47.22 PARSE_XML_CLOB Function

This function parses the response from a Web service returned as an XMLTYPE and returns the value requested as a CLOB.

Syntax

```
APEX_WEB_SERVICE.PARSE_XML_CLOB (
    p_xml                IN XMLTYPE,
    p_xpath              IN VARCHAR2,
    p_ns                 IN VARCHAR2 DEFAULT NULL )
RETURN VARCHAR2;
```

Parameters

Table 47-16 PARSE_XML_CLOB Function Parameters

Parameter	Description
p_xml	The XML document as an XMLTYPE to parse.
p_xpath	The XPath expression to the desired node.
p_ns	The namespace to the desired node.

Example

The following example uses the `make_request` function to call a Web service and store the results in a local `XMLTYPE` variable. The `parse_xml` function is then used to pull out a specific

node of the XML document stored in the XMLTYPE and stores it in a locally declared VARCHAR2 variable.

```
DECLARE
    l_envelope CLOB;
    l_xml XMLTYPE;
    l_movie CLOB;
BEGIN
    l_envelope := ' <?xml version="1.0" encoding="UTF-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:tns="http://www.ignyte.com/whatsshowing"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
   <soap:Body>
      <tns:GetTheatersAndMovies>
         <tns:zipCode>43221</tns:zipCode>
         <tns:radius>5</tns:radius>
      </tns:GetTheatersAndMovies>
   </soap:Body>
</soap:Envelope>';

   l_xml := apex_web_service.make_request(
     p_url => ' http://www.ignyte.com/webservices/
ignyte.whatsshowing.webservice/moviefunctions.asmx',
     p_action => ' http://www.ignyte.com/whatsshowing/
GetTheatersAndMovies',
     p_envelope => l_envelope );

   l_movie := apex_web_service.parse_xml_clob(
     p_xml => l_xml,
     p_xpath => ' //GetTheatersAndMoviesResponse/
GetTheatersAndMoviesResult/Theater/Movies/Movie/Name[1]',
     p_ns => ' xmlns="http://www.ignyte.com/whatsshowing"' );

END;
```

47.23 SET_REQUEST_HEADERS Procedure

This procedure sets HTTP request headers (g_request_headers) for subsequent MAKE_REQUEST or MAKE_REST_REQUEST calls.

Syntax

```
APEX_WEB_SERVICE.SET_REQUEST_HEADERS (
    p_name_01            IN VARCHAR2,
    p_value_01           IN VARCHAR2,
    p_name_02            IN VARCHAR2 DEFAULT NULL,
    p_value_02           IN VARCHAR2 DEFAULT NULL,
    p_name_03            IN VARCHAR2 DEFAULT NULL,
    p_value_03           IN VARCHAR2 DEFAULT NULL,
    p_name_04            IN VARCHAR2 DEFAULT NULL,
    p_value_04           IN VARCHAR2 DEFAULT NULL,
    p_name_05            IN VARCHAR2 DEFAULT NULL,
    p_value_05           IN VARCHAR2 DEFAULT NULL,
```

```
    p_reset              IN BOOLEAN  DEFAULT TRUE,
    p_skip_if_exists     IN BOOLEAN  DEFAULT FALSE );
```

Parameters

Table 47-17 SET_REQUEST_HEADERS Parameters

Parameter	Description
p_name_01	Name of the 1st parameter to set.
p_value_01	Value of the 1st parameter to set.
p_name_02	Name of the 2nd parameter to set.
p_value_02	Value of the 2nd parameter to set.
p_name_03	Name of the 3rd parameter to set.
p_value_03	Value of the 3rd parameter to set.
p_name_04	Name of the 4th parameter to set.
p_value_04	Value of the 4th parameter to set.
p_name_05	Name of the 5th parameter to set.
p_value_05	Value of the 5th parameter to set.
p_reset	Whether to clear the request header array before.
p_skip_if_exists	If TRUE, any existing headers with the same name remain unchanged. For example, if you pass in "Content-Type" as p_name_NN and that header is already present in the apex_web_services.g_request_headers array, then the value that you pass in does **not** override the existing header value for that name.

Example 1

The following example appends "Content-Type" and "User-Agent" HTTP request headers to the already existing headers, but only if they do not exist yet.

```
begin
    apex_web_service.set_request_headers(
        p_name_01        => 'Content-Type',
        p_value_01       => 'application/json',
        p_name_02        => 'User-Agent',
        p_value_02       => 'APEX',
        p_reset          => false,
        p_skip_if_exists => true );
end;
```

Example 2

The following example clears existing request headers and sets "Content-Type" and "User-Agent."

```
begin
    apex_web_service.set_request_headers(
        p_name_01        => 'Content-Type',
        p_value_01       => 'application/json',
        p_name_02        => 'User-Agent',
```

```
        p_value_02       => 'APEX' );
end;
```

48
APEX_ZIP

This package allows to compress and to uncompress files and store them in a ZIP file.

48.1 Data Types

The `APEX_ZIP` package uses the following data types.

t_files

```
type t_files is table of varchar2(32767) index by binary_integer;
```

48.2 ADD_FILE Procedure

This procedure adds a single file to a zip file. You can call this procedure multiple times to add multiple files to the same zip file.

> **Note:**
>
> After all files are added, you must call the `APEX_ZIP.FINISH` procedure.

Syntax

```
APEX_ZIP.ADD_FILE (
    p_zipped_blob IN OUT NOCOPY BLOB,
    p_file_name   IN VARCHAR2,
    p_content     IN BLOB );
```

Parameters

Table 48-1 ADD_FILE Procedure Parameters

Parameter	Description
`p_zipped_blob`	BLOB containing the zip file.

Table 48-1 (Cont.) ADD_FILE Procedure Parameters

Parameter	Description
p_file_name	File name, including path, of the file to be added to the zip file.
p_content	BLOB containing the file.

Example

This example reads multiple files from a table and puts them into a single zip file.

```
declare
    l_zip_file blob;
begin
    for l_file in ( select file_name,
                           file_content
                      from my_files )
    loop
        apex_zip.add_file (
            p_zipped_blob => l_zip_file,
            p_file_name   => l_file.file_name,
            p_content     => l_file.file_content );
    end loop;

    apex_zip.finish (
        p_zipped_blob => l_zip_file );

end;
```

> **See Also:**
>
> "FINISH Procedure"

48.3 FINISH Procedure

This procedure completes the creation of a zip file after adding files with APEX_ZIP.ADD_FILE.

Syntax

```
APEX_ZIP.FINISH (
    p_zipped_blob IN OUT NOCOPY BLOB );
```

Parameters

Table 48-2 FINISH Procedure Parameters

Parameter	Description
p_zipped_blob	BLOB containing the zip file.

Example

See "ADD_FILE Procedure" for an example.

48.4 GET_FILE_CONTENT Function

This function returns the BLOB of a file contained in a provided zip file.

Syntax

```
APEX_ZIP.GET_FILE_CONTENT (
    p_zipped_blob IN BLOB,
    p_file_name   IN VARCHAR2,
    p_encoding    IN VARCHAR2 DEFAULT NULL )
RETURN BLOB;
```

Parameters

Table 48-3 GET_FILE_CONTENT Function Parameters

Parameter	Description
p_zipped_blob	This is the BLOB containing the zip file.
p_file_name	File name, including path, of a file located in the zip file.
p_encoding	Encoding used to zip the file.

Returns

Table 48-4 GET_FILE_CONTENT Function Returns

Return	Description
BLOB	BLOB containing the zip file.

Example

See "GET_FILES Function" for an example.

48.5 GET_FILES Function

This function returns an array of file names, including the path, of a provided zip file that contains a BLOB.

Syntax

```
APEX_ZIP.GET_FILES (
    p_zipped_blob IN BLOB,
    p_only_files  IN BOOLEAN DEFAULT TRUE,
    p_encoding    IN VARCHAR2 DEFAULT NULL )
RETURN t_files;
```

Parameters

Table 48-5 GET_FILES Function Parameters

Parameter	Description
p_zipped_blob	This is the zip file containing the BLOB.
p_only_files	If set to TRUE, empty directory entries are not included in the returned array. Otherwise, set to FALSE to include empty directory entries.
p_encoding	This is the encoding used to zip the file.

Returns

Table 48-6 GET_FILES Function Returns

Return	Description
t_files	A table of file names and path. See "Data Types" for more details.

Example

This example demonstrates reading a zip file from a table, extracting it and storing all files of the zip file into my_files.

```
declare
    l_zip_file      blob;
    l_unzipped_file blob;
    l_files         apex_zip.t_files;
begin
    select file_content
        into l_zip_file
        from my_zip_files
    where file_name = 'my_file.zip';

    l_files := apex_zip.get_files (
            p_zipped_blob => l_zip_file );

    for i in 1 .. l_files.count loop
        l_unzipped_file := apex_zip.get_file_content (
            p_zipped_blob => l_zip_file,
            p_file_name   => l_files(i) );
```

```
        insert into my_files ( file_name, file_content )
        values ( l_files(i), l_unzipped_file );
    end loop;
end;
```

49
JavaScript APIs

This content has been moved to the *Oracle APEX JavaScript API Reference*.

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