



APEX APIs

You Don't Know What You Don't Know

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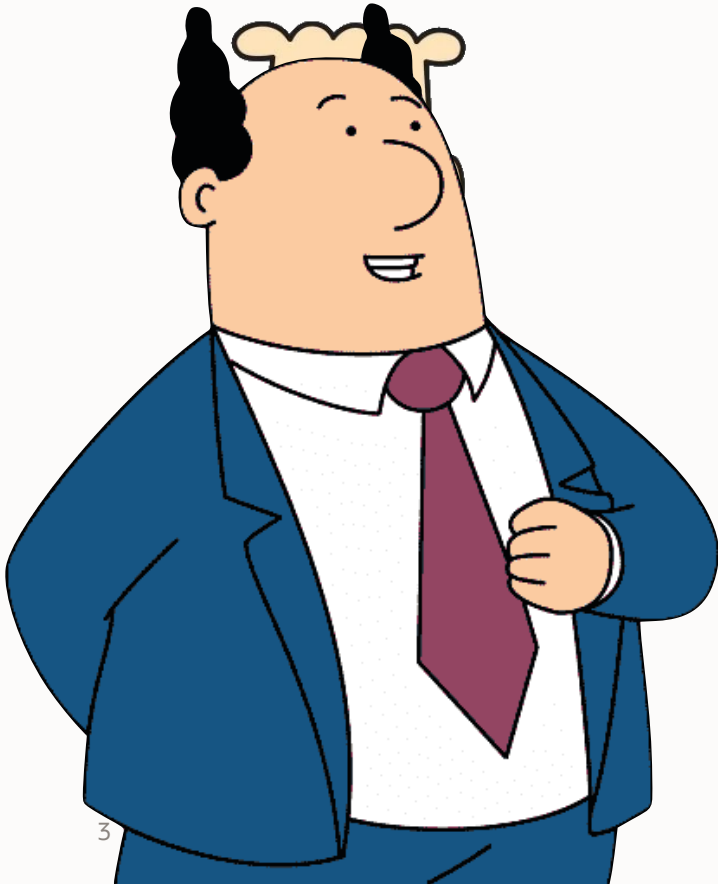
The background of the image is a photograph of the Nashville skyline at dusk. The sky is a mix of dark blue and orange, with some clouds. The city lights are visible, and the lights from the bridges and buildings are reflected in the water of the river in the foreground. The text 'ODTUG Kscope24' is overlaid on the image. 'ODTUG' is in a white, sans-serif font. 'Kscope' is in a larger, white, sans-serif font. '24' is in a colorful, geometric, low-poly style. The number '2' is yellow and orange, and the number '4' is blue and green.

ODTUG Kscope24

nashville, tn july 14 - 18

Welcome

About Me



A History of KScopes...

- 2004 - Scottsdale, AZ
- 2005 - New Orleans, LA
- 2006 - Washington, DC
- 2007 - Daytona Beach, FL
- 2008 - New Orleans, LA
- 2009 - Monterey, CA
- 2010 - Washington, DC
- 2011 - Long Beach, CA
- 2012 - San Antonio, TX
- 2013 - New Orleans, LA
- 2014 - Seattle, WA

- 
- 2015 - Hollywood, FL
 - 2016 - Chicago, IL
 - 2017 - San Antonio, TX
 - 2018 - Orlando, FL
 - 2019 - Seattle, WA
 - ~~2020 - Corona~~
 - 2021 - Virtual
 - 2022 - Dallas, TX
 - 2023 - Denver, CO
 - 2024 - Nashville, TN

Agenda

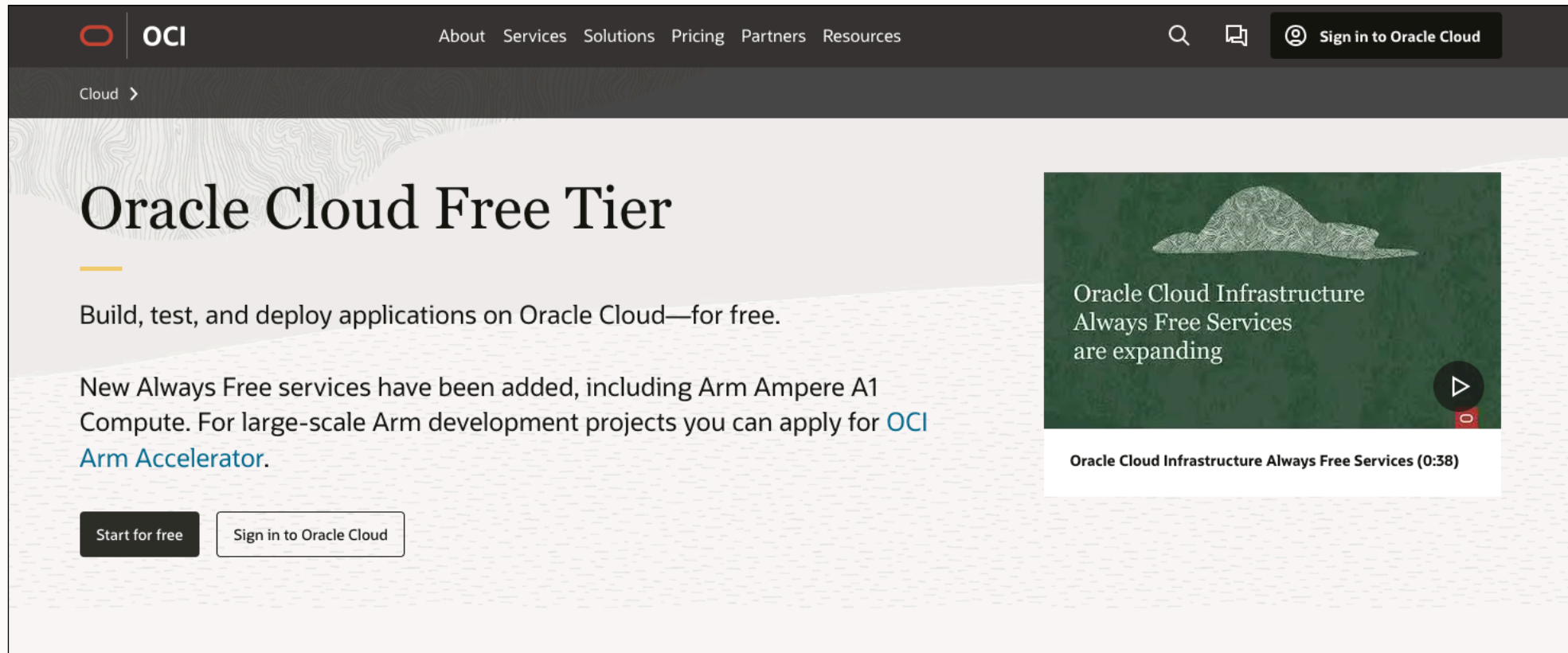
- Overview
- APEX APIs
- Summary



Overview

Oracle Cloud Free Tier

- Everything that I am going to demonstrate is being done on the Oracle Cloud Free Tier
 - Sign up today to get started
 - <https://www.oracle.com/cloud/free/>



The screenshot shows the Oracle Cloud Free Tier landing page. The top navigation bar includes the OCI logo, links for About, Services, Solutions, Pricing, Partners, and Resources, a search icon, a share icon, and a 'Sign in to Oracle Cloud' button. Below the navigation bar, the page features a large heading 'Oracle Cloud Free Tier' with a subheading 'Build, test, and deploy applications on Oracle Cloud—for free.' A paragraph below states: 'New Always Free services have been added, including Arm Ampere A1 Compute. For large-scale Arm development projects you can apply for [OCI Arm Accelerator](#).' At the bottom left, there are two buttons: 'Start for free' and 'Sign in to Oracle Cloud'. On the right side, there is a video player with a green background and a white cloud graphic. The video title is 'Oracle Cloud Infrastructure Always Free Services are expanding' and the duration is '0:38'. A play button is visible in the bottom right corner of the video player.

OCI

About Services Solutions Pricing Partners Resources

Cloud >

Oracle Cloud Free Tier

Build, test, and deploy applications on Oracle Cloud—for free.

New Always Free services have been added, including Arm Ampere A1 Compute. For large-scale Arm development projects you can apply for [OCI Arm Accelerator](#).

[Start for free](#) [Sign in to Oracle Cloud](#)

Oracle Cloud Infrastructure Always Free Services are expanding

Oracle Cloud Infrastructure Always Free Services (0:38)

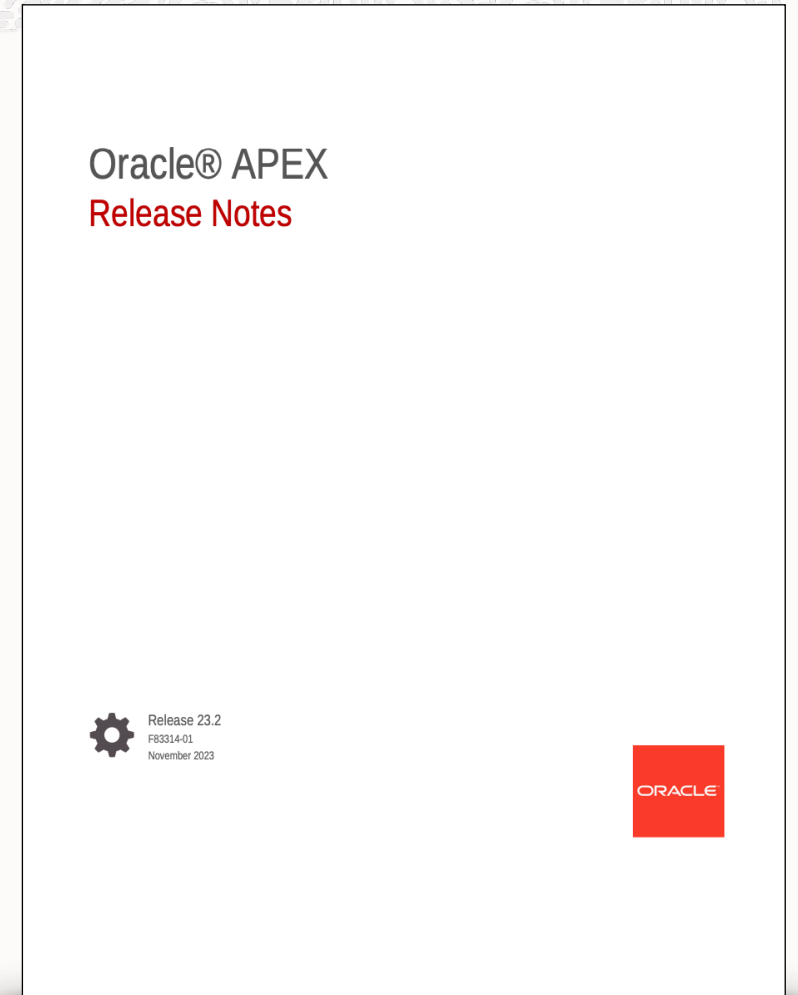
APEX Documentation



- Each time a new release of APEX comes out, I immediately download all of the documentation as PDFs and store it on my computer
- Navigate here:
 - <https://docs.oracle.com/en/database/oracle/apex/24.1/index.html>
 - Click **Download** under Books
 - Change the version in the URL accordingly
- You can also access the online version here:
 - <https://apex.oracle.com/en/learn/documentation/>
 - Or apex.oracle.com => Learn => Documentation

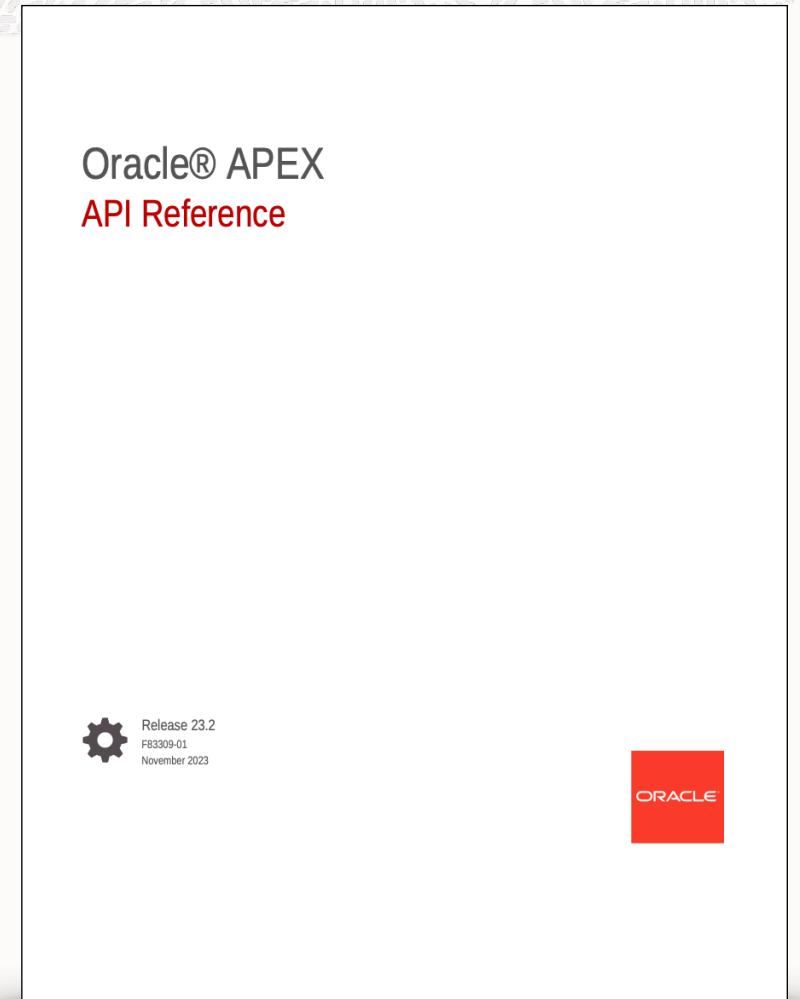
Release Notes

- For each new release, start with the **Release Notes**
 - Specifically **New Features, Changed Behavior & Deprecated Features**
- This will give you an overview of what's new, what's changed and what's going to stop working soon
- You should read this document for each version of APEX and prepare accordingly
 - Perhaps a feature that you rely on is going away...
 - Perhaps a new feature does something native that you had built a workaround...



API Reference

- Next, have a look at the **API Reference**
- I've joked in the past that it's a good read, has a thrilling plot and compelling characters
 - ***This is not a joke***
- While reading it cover to cover may be overkill, you should spend some time with this document to get a sense what the APIs can and can't do
 - ***You don't know what you don't know...***
- Pay specific attention to **Chapter 1**
 - Changes in Release XXX for Oracle APEX API Reference



JavaScript API Reference

- There is a separate JavaScript API Reference document
 - HTML only, but will be included if you download all of the APEX documentation
 - <https://docs.oracle.com/en/database/oracle/apex/24.1/aexjs/index.html>
 - Note the version number in the URL

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Introduction

ORACLE

Oracle APEX JavaScript API Reference

This section describes the JavaScript APIs available to Oracle APEX applications. You can use these functions to provide client-side functionality, such as showing and hiding page elements, or making Ajax (Asynchronous JavaScript and XML) requests.

Most of the APEX JavaScript APIs are organized into namespaces. A namespace is simply a global singleton object that contains a number of functions. There is one top level APEX namespace called **apex**. This has a number of sub namespaces such as **apex.server** and **apex.util**. Namespaces help to organize code and reduce the chance of name conflicts with other JavaScript libraries.

There are some older global functions that are not in a namespace. Most of these start with a \$ character. These are known as **Non-namespace APIs**. Global symbols that start with **apex** or **\$** are reserved by APEX.

Some functions return an interface that allows access to a specific instance of a page component or other entity. The returned interface is an object that contains functions known as methods and variables known as properties.

APEX also includes a number of UI widgets based on the jQuery UI widget factory. Widgets are high level user interface components such as menus, trees, or grids. APEX makes it easy to declaratively add components such as items and regions to a page. Internally some components are implemented using these widgets. Default component behavior does not require any JavaScript programming. To implement advanced use cases you can leverage the documented widget methods, options and events.

Adding JavaScript to an APEX application

Oracle APEX handles the details of rendering a page so compared to authoring your own HTML file, it may not be initially clear where you should add your JavaScript code. APEX provides a number of specific places for you to add JavaScript code. You should avoid entering your own **<script>** tags in places where markup is allowed. Also avoid entering JavaScript code using the **javascript:** pseudo-protocol in places where URLs are allowed.

Various components may have specific attributes for JavaScript code snippets. For example some regions and items have an Advanced: Initialization JavaScript Function attribute that is used for advanced configuration of the region or item. This code is applied in a specific context for a specific purpose. See the associated attribute help in Page Designer for details.

Dynamic Actions provide a way to respond to events. There are a number of declarative actions that can be run in response to an event. In addition you can use the Execute JavaScript Code action to execute your own JavaScript. This code is added to the page and run when the specified event occurs. Dynamic Actions added to the Global Page can apply to all pages subject to any Server-Side Condition.

APEX APIs



- APEX APIs have been around since early versions of APEX
 - First introduced in APEX 2.0
 - Previous versions did not have a published API set
 - Developers would call WWV_FLOW packages, which is still not a good idea
- There are currently **almost 100 APIs for APEX**
- No one knows all of them off of the top of their head
 - Best you can do is be familiar with the more commonly used ones and know where to look for the others

If you're about to write some code to do something in APEX that you feel “*should be part of the product*”, it's time to check the API Reference to see which API you should call instead.

APEX APIs

APIs



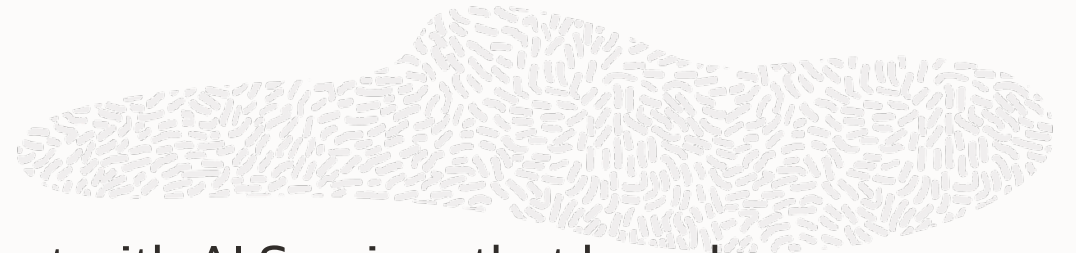
- APEX_AI
- APEX_APPLICATION_ADMIN
- APEX_BARCODE
- APEX_CREDENTIAL
- APEX_DATA_PARSER
- APEX_DEBUG
- APEX_ERROR
- APEX_HTTP
- APEX_SESSION
- APEX_STRING & APEX_STRING_UTIL
- APEX_ZIP

New
in 24.1

APEX_AI

APEX_AI contains the APIs for Oracle APEX Generative AI

APEX_AI



- **APEX_AI** provides a programatic interface to interact with AI Services that have been configured with APEX
 - Note: you must provide an API key to an AI service, which means that someone needs to spend money to get this to work in a production environment
- Two main APIs:
 - **CHAT**
 - Provides a way to have a conversation
 - **GENERATE**
 - Provides a way to simply summarize / answer a single question
 - No history of previous replies

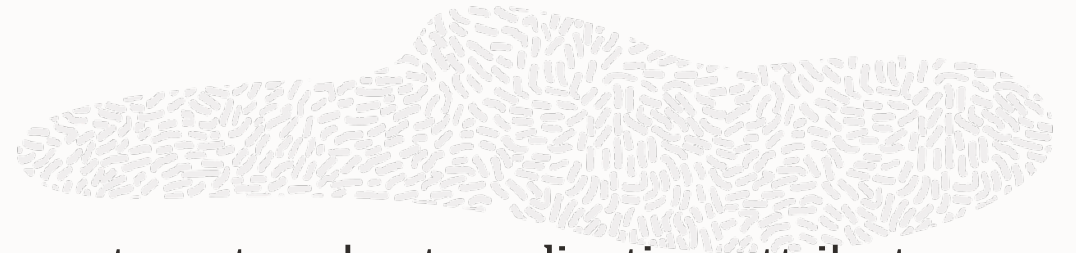
Demonstration

APEX_API

APEX_APPLICATION_ADMIN

Provides APIs to modify application attributes of installed Oracle APEX applications

APEX_APPLICATION_ADMIN



- **APEX_APPLICATION_ADMIN** allows a privileged user to get and set application attributes
 - Can be used as a lightweight management layer that doesn't require full SYS or Workspace access to make changes
- Can both GET and SET a number of Application-level parameters
 - Thus, usage be closely guarded, as some of the SET APIs can disable applications, alter functionality
- Application that makes the call to APEX_APPLICATION_ADMIN needs to have **Modify Other Applications** enabled:

A screenshot of a software interface showing an 'Advanced' settings panel. The panel has a light gray header with the word 'Advanced' in bold. Below the header, there are two sections. The first section is titled 'Runtime API Usage' and contains three checkboxes: 'Modify This Application' (unchecked), 'Modify Other Applications' (checked with a green checkmark), and 'Modify Workspace Repository' (unchecked). To the right of these checkboxes is a small circular help icon with a question mark. The second section is titled 'Pass ECID' and contains a green toggle switch that is currently turned on, followed by a small circular help icon with a question mark.

APEX_APPLICATION_ADMIN



- **SET_APPLICATION_STATUS**
 - Allows you to set the status of an application
 - Warning: this can disable applications for some or all users
- **SET_GLOBAL_NOTIFICATION**
 - Allows you to set the Global Notification for an application
 - Message will appear on all pages

Demonstration

APEX_APPLICATION_ADMIN

APEX_BARCODE

Contains the implementation to generate different types of barcodes

APEX_BARCODE



- Generates popular bar codes without the need of additional libraries
 - Can be either PNG (BLOB) or SVG (CLOB)
 - SVGs can be easily displayed in-line on the page
 - PNGs should be stored in the database or elsewhere
 - Can also be attached to emails or anything else you can do with a BLOB
- Support for three types:
 - EAN 8
 - Code 128
 - QR Code

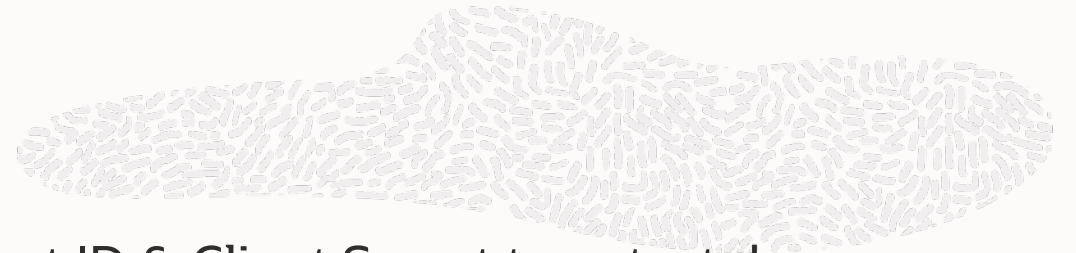
Demonstration

APEX_BARCODE

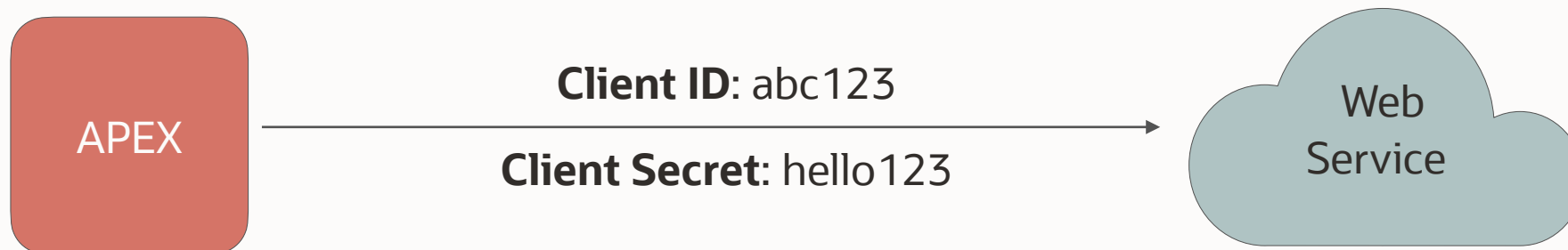
APEX_CREDENTIAL

Change stored credentials either persistently or for the current APEX session only

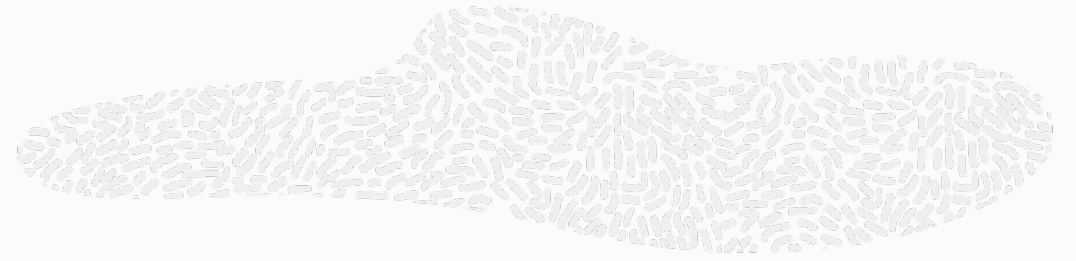
APEX_CREDENTIALIAL



- With most web services, you need to present a Client ID & Client Secret to get a token
 - That token is then presented for each request
- With APEX, the Client ID & Client Secret should be stored in Web Credentials
 - Secure storage location designed for using web services of all different flavors
- Typically, the Client Secret is rotated every X days
 - Which means that you'll need to pull the new Client Secret and store it in the Web Credential
 - This is something that should be automated as part of your DevOps Process



APEX_CREDENTIAL



- Thus, the **APEX_CREDENTIAL** API was created
- This is mainly used to manage Web Credentials
 - Create
 - Drop
 - Modify
- It can set the duration to either persistent or session

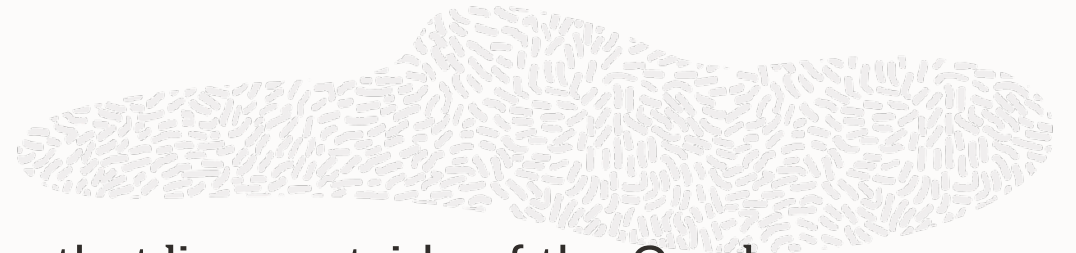
Demonstration

APEX_CREDENTIAL

APEX_DATA_PARSER

Contains the implementation for the file parser in APEX

APEX_DATA_PARSER



- If you have data that you need to import / report on that lives outside of the Oracle database, you NEED to learn about APEX_DATA_PARSER
- It makes importing & parsing external data simple without any code
- Supported formats:
 - XML
 - JSON
 - CSV
 - XLSX

DISCOVER & GET_COLUMNS



- **DISCOVER**

- Will display the profile of a file
- Basically calls PARSE and then GET_FILE_PROFILE
- Results are a JSON file

- **GET_COLUMNS**

- Returns the columns and their attributes of a file as a table
- Can be used to help in processing the loading of a file

PARSE



- **PARSE**

- If you're looking to pull in data, this is all you really need
- Returns a generic table (COL001...COL300) that you can easily use in any APEX report type
 - All columns are VARCHAR; you can create a view or convert inline if needed
- Data is not stored to a collection or a temporary table; parsing is real-time
- Lots of format-specific options; see the documentation for details

Demonstration

APEX_DATA_PARSER

APEX_DEBUG

Provides utility functions for managing the debug message log

APEX_DEBUG

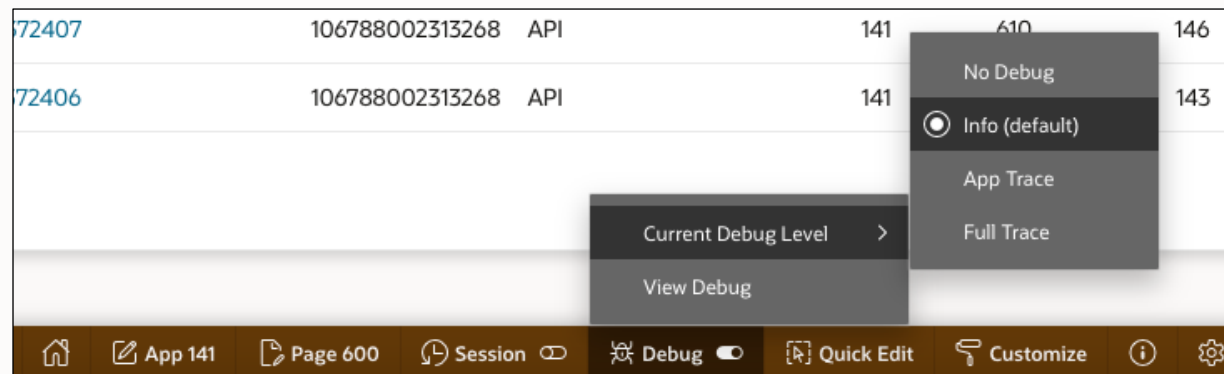


- The **APEX_DEBUG** API is a set of procedures that you can use to augment your PL/SQL code with a robust logging framework
 - It has all of the hallmarks of a robust logging framework:
 - Easy to implement
 - Adds no overhead unless active
 - Does not need to be removed when not in use
 - Think of all the times you've added **http.p** or **dbms_output** only to have to remove them and then add them back and then remove them and...

APEX_DEBUG



- While there is an interactive way for a developer to enable debug mode, the APIs can be used to programmatically operate on user's sessions, even on production
- Common APEX_DEBUG operations include:
 - Put a session in DEBUG mode
 - Using different levels
 - Take a session out of DEBUG mode
 - Capture the session state of a session



Demonstration

APEX_DEBUG

APEX_ERROR

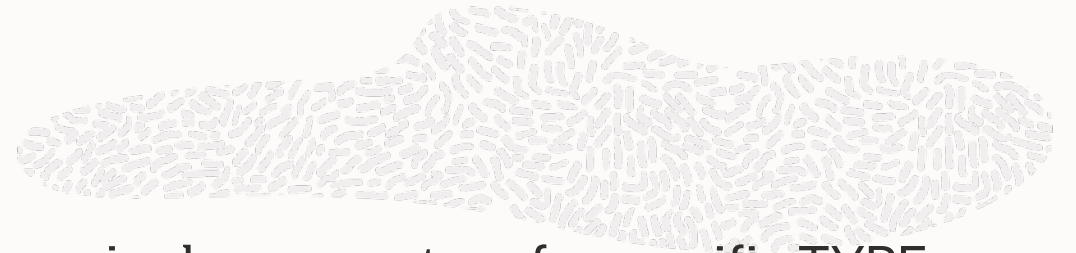
Provides the interface declarations and utility functions to raise errors in an APEX application

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.
- All applications should have at least a basic error handling function
 - Main reason is to mask sensitive data that could be otherwise displayed in error messages
- This error handling package is also a great place to instrument APEX to log errors
 - If you don't hear about it, then did it really happen?

APEX_ERROR



- Main thing to understand is that **APEX_ERROR** has a single parameter of a specific TYPE - **t_error** - to pass data into
- It also has a single parameter of a specific TYPE - **t_error_result** - that it will return data into
- When APEX calls the error function, it knows what to pass to it
 - All you need to reference is the function or package.function in the application or page where it's defined
- You will need to understand the definition of both of these types to get and set data accordingly

Simple 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_constraint_name varchar2(255);
Begin

-- initialize the error
l_result := apex_error.init_error_result
(
  p_error => p_error
);

-- extract the constraint name
l_constraint_name := apex_error.extract_constraint_name (p_error => p_error );
```

Simple Error Handling Function



case

```
-- Unique Constraint
when p_error.ora_sqlcode = -1 then
    l_result.message := 'That value already exists. (Constraint: ' || l_constraint_name || ')';

-- Not Null
when p_error.ora_sqlcode = -1400 then
    l_result.message := 'Please enter a value.';

-- Invalid datatype
when p_error.ora_sqlcode = -1722 then
    l_result.message := 'Please enter a number.';

-- Everything and anything else
else
    l_result.message := 'An unexpected error occurred.';

end case;

return l_result;

end apex_error_handling_example;
```

Demonstration

APEX_ERROR

New
in 24.1

APEX_HTTP

The APEX_HTTP package provides APIs to download files

APEX_HTTP



- A new API with 24.1, **APEX_HTTP** provides the ability to download files from the database
 - Basically it's a wrapper for **WPG_DOCLOAD.DOWNLOAD_FILE**
- Can also support downloading CLOBs

WPG_DOCLOAD

```
sys.OWA_UTIL.mime_header(l_mime_type, FALSE);
sys.HTP.p('Content-Length: '
  || DBMS_LOB.getlength(l_blob_content));
sys.HTP.p('Content-Disposition: filename="'
  || p_file_name || '");
sys.OWA_UTIL.http_header_close;
sys.WPG_DOCLOAD.download_file(l_blob_content);
apex_application.stop_apex_engine;
```

APEX_HTTP

```
apex_http.download
(
  p_blob => l_file
  ,p_content_type => l_content_type
  ,p_filename => l_filename
);
```

Demonstration

APEX_HTTP

APEX_SESSION

Enables you to configure Oracle APEX sessions

Demonstration

APEX_SESSION

APEX_STRING & APEX_STRING_UTIL

Provides string related utilities

APEX_STRING & APEX_STRING_UTIL



- One of the most useful pairs of APIs, **APEX_STRING** & **APEX_STRING_UTIL** provide a number of clever ways to work with strings - all of which will save you time and sanity
- **APEX_STRING**
 - If you need to do any operations on text - specifically CLOBs - be sure to take a look at APEX_STRING
 - Lots of functions in there that as a developer, you have probably written 100x
 - Useful for processing arrays from multi-select type items
- **APEX_STRING_UTIL**
 - Newer API, offers some cool utilities that are pretty purpose-specific
 - Namely finding strings from larger blocks of text

Demonstration

APEX_STRING & APEX_STRING_UTIL

APEX_ZIP

Compress and to uncompress files and store them in a ZIP file

APEX_ZIP



- Quite simply, **APEX_ZIP** enables you to ZIP multiple files into a single, compressed file
 - File can be stored in a BLOB, Object Storage, downloaded, etc.
- Currently no support for password protection

Demonstration

APEX_ZIP

Summary

Summary



- The APEX APIs are a **powerful set of components** that every APEX developer should be familiar with
- Not only do they **save you time**, they are **constantly enhanced** each release, instantly and effortlessly adding additional functionality automatically
- Thus - before you embark down the path of writing code, **take a few minutes and check** to see if there's already an API

ORACLE

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ODTUG Kscope24

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Welcome