

20.03.2025

# Unlocking the Power of Oracle Autonomous Databases for APEX Developers

Timo Herwix, Senior Consultant

code of change

 **Hyand** by  
GOD | MT

# Who am I?



Senior Consultant at Hyand Solutions GmbH since 2019

Previously worked as a Data Warehouse Developer

Oracle APEX since 2016

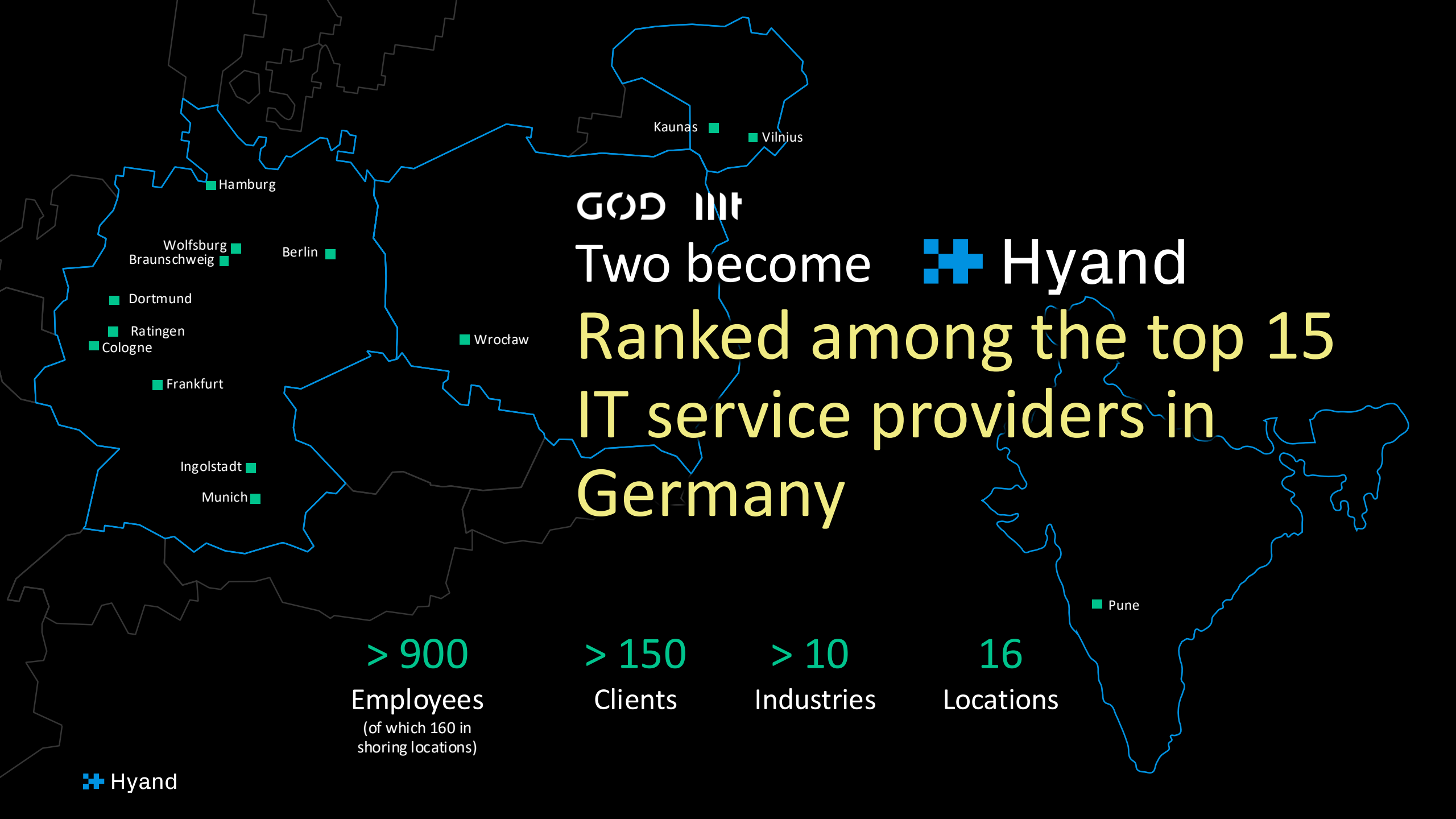
Oracle Databases since 2008

Blog author, conference speaker

Born in 1983, two children and living in Germany

**Timo Herwix**  
Senior Consultant





> 900

Employees  
(of which 160 in shoring locations)

> 150

Clients

> 10

Industries

16

Locations

1

Introduction

2

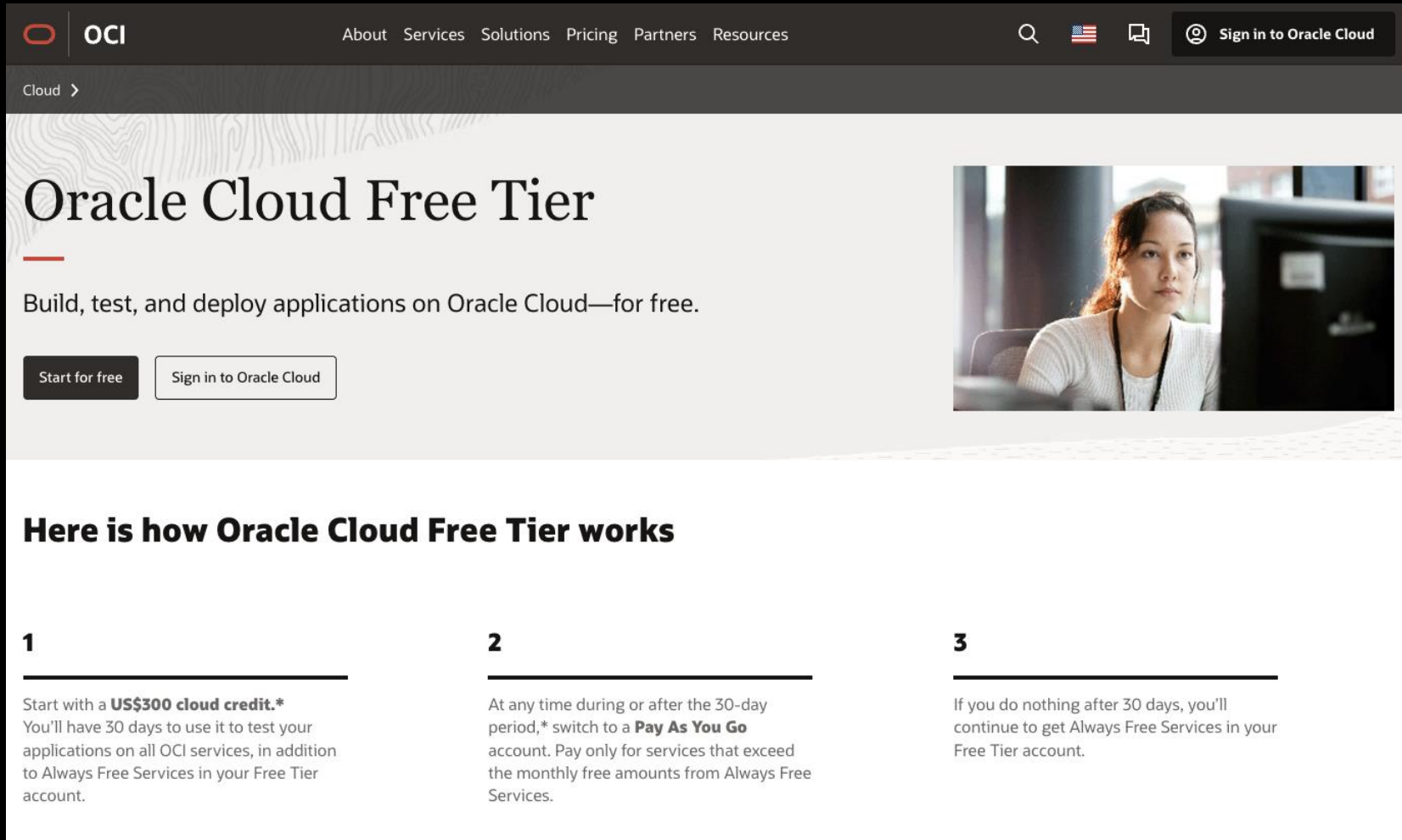
Let's dive deeper

3

Wrap-up

# Get started with Oracle Cloud Infrastructure!

# Get started with Oracle Cloud Infrastructure!



The screenshot shows the Oracle Cloud Infrastructure (OCI) website's landing page for the Free Tier. The top navigation bar includes the OCI logo, a search icon, a US flag, a language icon, and a "Sign in to Oracle Cloud" button. Below the navigation bar, the main heading is "Oracle Cloud Free Tier" with a sub-heading "Build, test, and deploy applications on Oracle Cloud—for free." Two buttons are present: "Start for free" and "Sign in to Oracle Cloud". To the right of the text is an image of a woman working at a computer. Below this is a section titled "Here is how Oracle Cloud Free Tier works" with three numbered steps:

- 1**  
Start with a **US\$300 cloud credit.\*** You'll have 30 days to use it to test your applications on all OCI services, in addition to Always Free Services in your Free Tier account.
- 2**  
At any time during or after the 30-day period,\* switch to a **Pay As You Go** account. Pay only for services that exceed the monthly free amounts from Always Free Services.
- 3**  
If you do nothing after 30 days, you'll continue to get Always Free Services in your Free Tier account.

<https://www.oracle.com/cloud/free/>

# Oracle APEX Application Development Service.

Fully managed, mission-critical stack for as low as \$122.39/month

- \$120.08 for 2 ECPUs and \$2.31 for 20 GB per month

Automatically scales up and down - supports dozens to millions of users

- Automatically Scales Compute and Storage
- Supports hundreds of thousands of page views per hour

- Lower costs
- Pay-per-use subscription model
- All-inclusive pricing—no per application, per user fees
- The free version you can use for an unlimited time



# Cloud Capabilities.

	Always Free	APEX Application Development Service	APEX with Autonomous Database
<b>APEX</b>	All Oracle APEX capabilities are available across all services. <a href="#">Learn more.</a>		
<b>Management</b>	Fully managed Oracle Autonomous Database and Oracle APEX with automated patches and upgrades.		
<b>Limits on apps, users, or developers</b>	No limits on number of APEX apps, end-users, or developers.		
<b>Elastic Compute &amp; Storage</b>	-	✓	✓
<b>Auto Scale</b>	-	✓	✓
<b>Automatic Backups</b>	-	✓	✓
<b>Auto-failover to standby</b>	-	-	✓
<b>Direct Database Connectivity<sup>3</sup></b>	✓	-	✓
<b>Full Instance Cloning</b>	✓	✓	✓
<b>Integrated Multicloud (Azure + OCI)</b>	-	✓	✓
<b>Access to Complementary OCI Services</b>	<ul style="list-style-type: none"> <li>• Artificial Intelligence (GenAI, chat, vision, speech...)</li> <li>• Analytics and BI</li> <li>• Object Storage</li> <li>• Email Delivery</li> <li>• Integration</li> <li>• Identity</li> <li>• <i>and 100+ more...</i></li> </ul>		



# Always Free Cloud Services.



## Autonomous Database

2 Databases  
20 GB storage



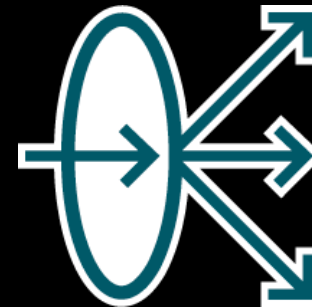
## Compute

2 VMs  
1 GB Memory each



## Storage

2 x 100 GB Block-Volumes  
20 GB Object Storage



## Load Balancing / Networking

10 Mbps LB  
10 TB Outbound  
Data Transfer  
2 VCNs



## Monitoring / Notifications

500 million ingestion  
1 billion retrieval  
10 GB Logging  
1 million Notifications  
3000 emails per month

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The matter with the URL!

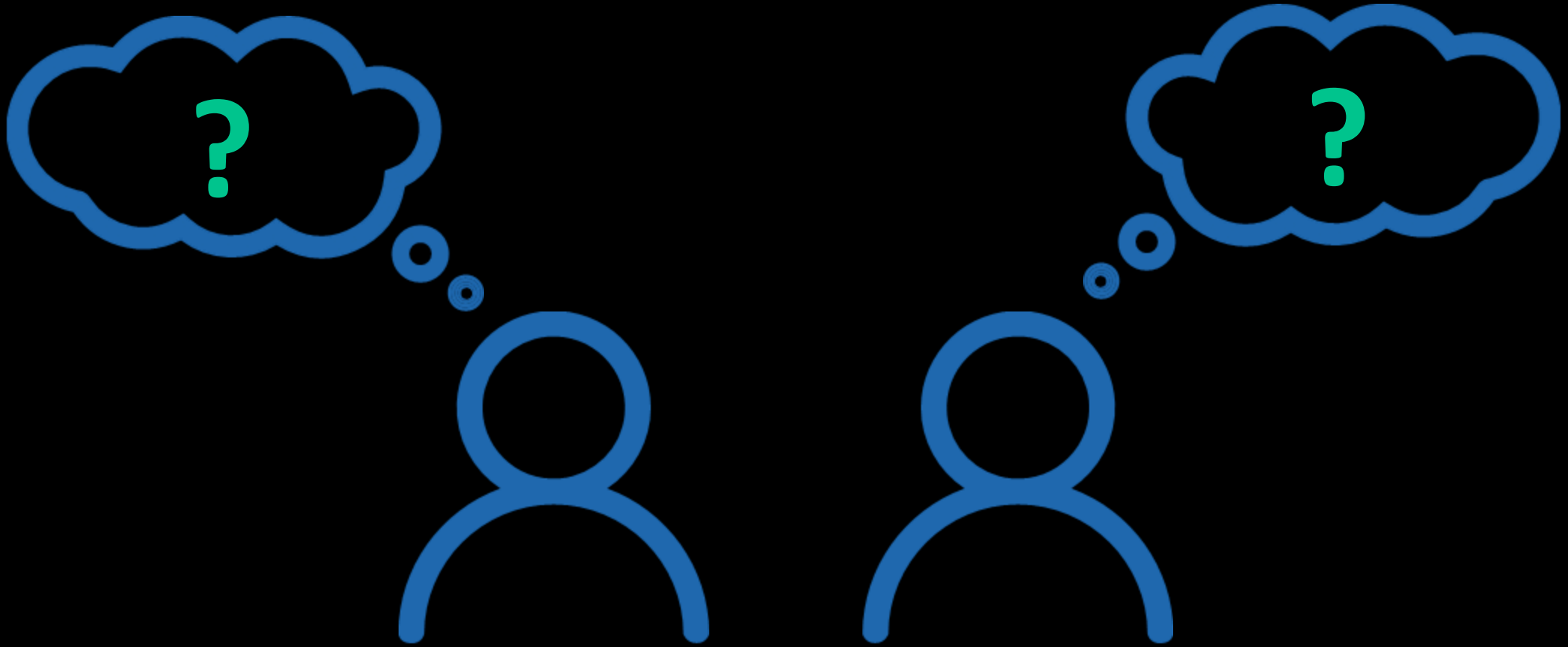
# Automatically generated URL by OCI.

`https://rf0vpurtyuaq9ko-therwix.adb.eu-frankfurt-1.oraclecloudapps.com`

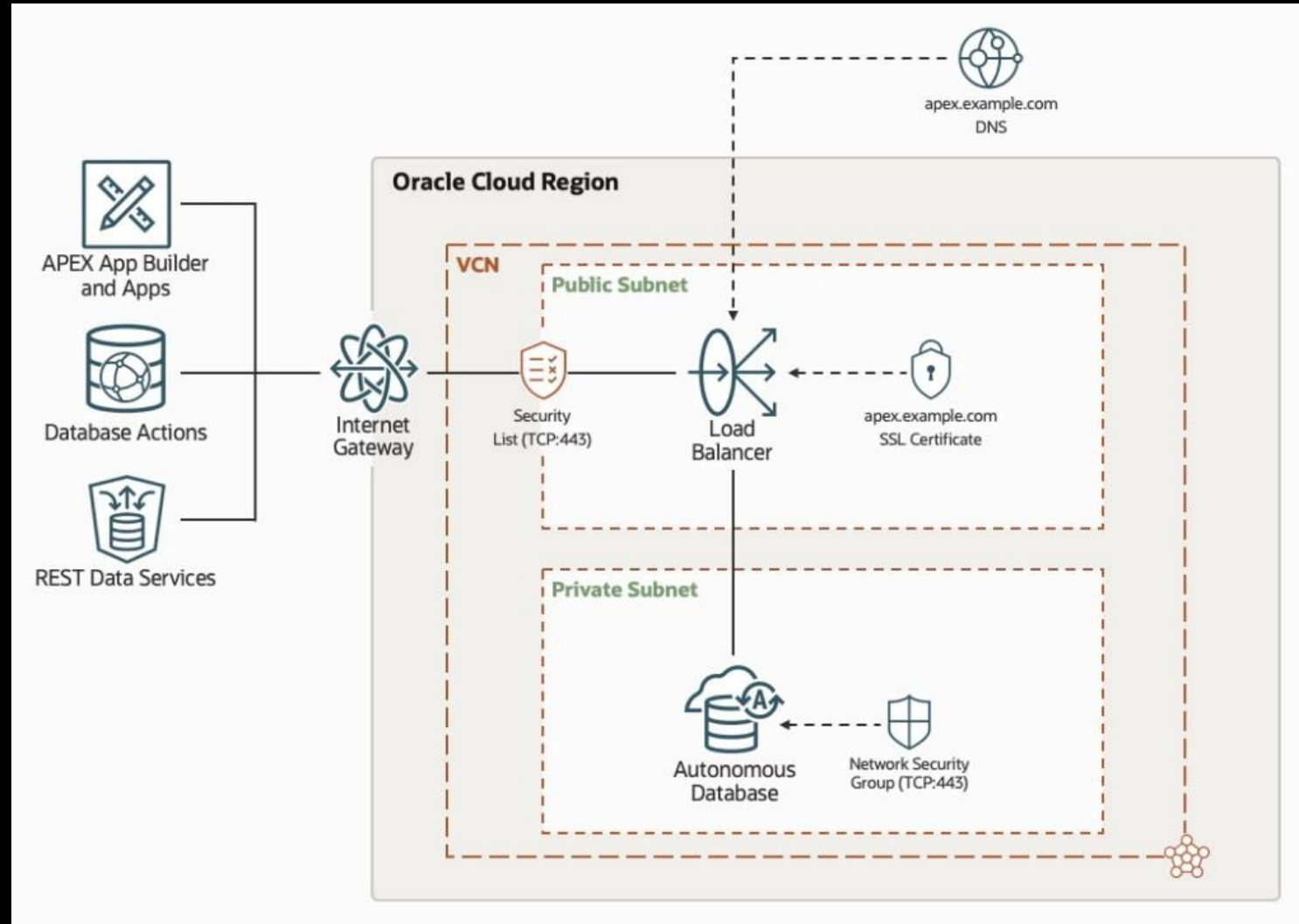
The URL is broken down into four parts, each indicated by a bracket and a label below it:

- Tenancy-ID**: `rf0vpurtyuaq9ko-therwix`
- Datenbank Name**: `adb`
- Datacenter Name**: `eu-frankfurt-1`
- Root Domain**: `.oraclecloudapps.com`

WHASUP?!?!?



# Boost your brand identity with Vanity URLs via OCI.



# Boost your brand identity with Vanity URLs via OCI.



Use only OCI services managed by Oracle



Social sign-in works

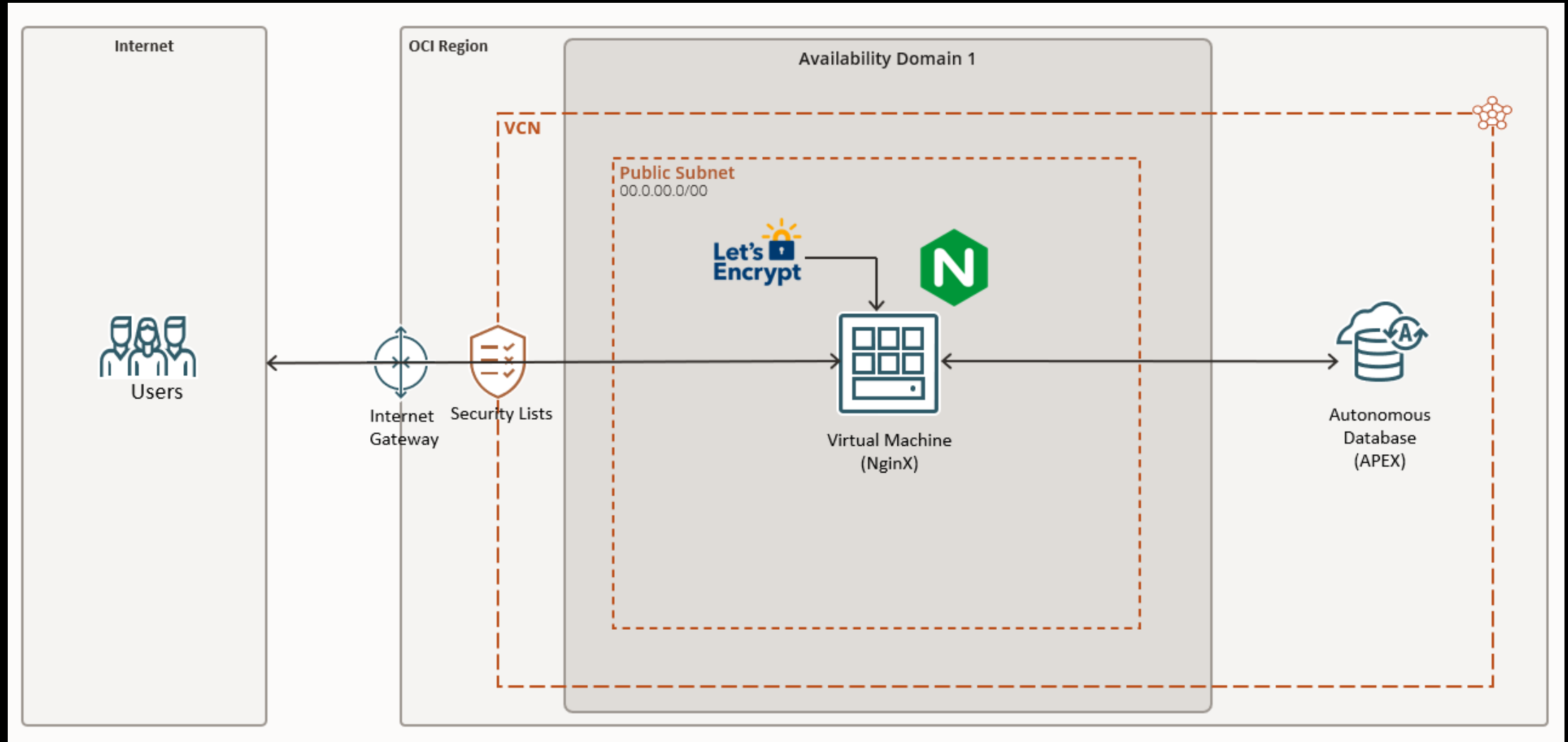


Cannot be implemented in a free tier



The renewal of the certificate is not automated

# Custom URLs using Nginx and let's encrypt.





# Custom URLs using Nginx and let's encrypt.



Can be implemented in a free tier



The renewal of the certificate is automated

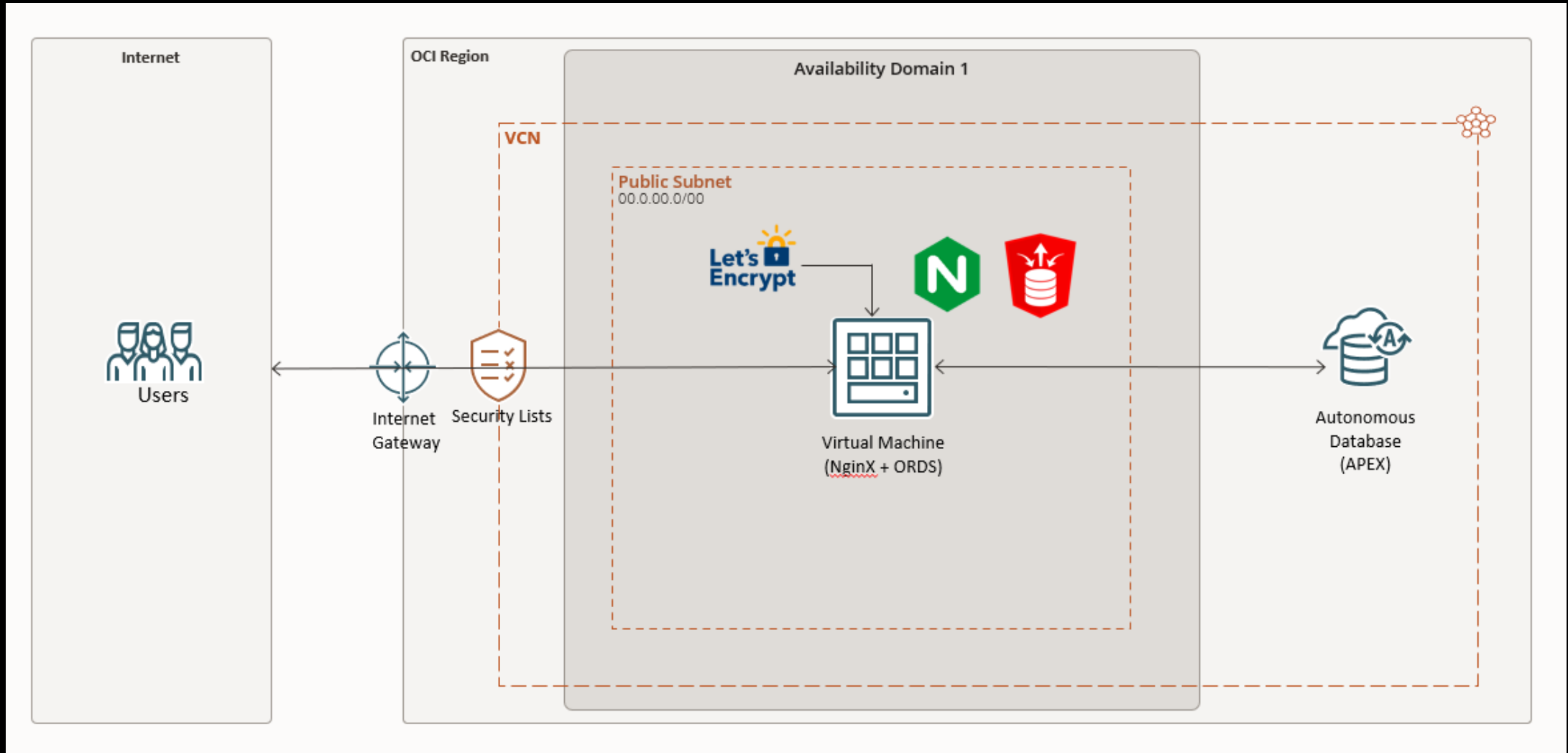


Use not only OCI services managed by Oracle



Social sign-in didn't work

# Custom URLs using Custom ORDS Server.



# Custom URLs using Custom ORDS Server.



Can be implemented in a free tier



The renewal of the certificate is automated



Social sign-in works



Use not only OCI services managed by Oracle

# The ephemeral IP address!

# Types of public IPs.

## Ephemeral IP address

- Only temporary and existing for the lifetime of the instance.

## Reserved IP address

- Exists permanently and not for the lifetime of the instance to which it is assigned. You can unassign it and reassign it to another instance whenever you want.



*By default, when you provision an instance into a public subnet, the instance gets an ephemeral public IP unless you directly deny it.*

# What about Security?

# Single-Sign On!

# Use OCI to access APEX.



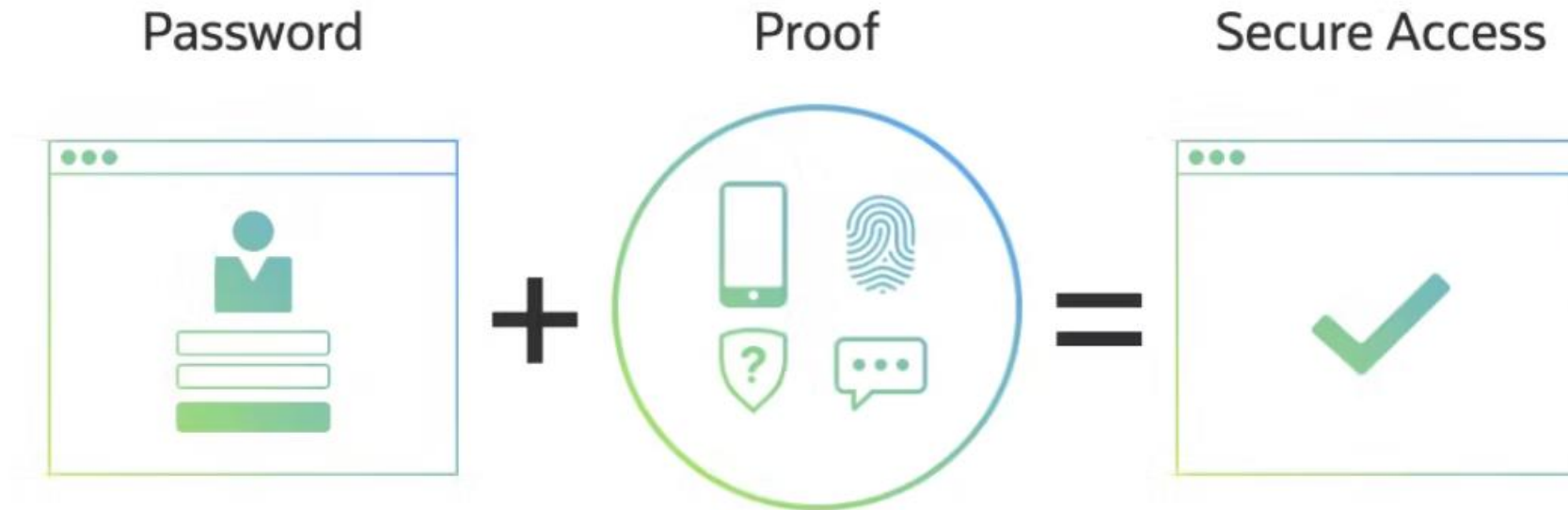
## Single sign-on for everybody!

- Use the same username/password credentials as OCI
- OCI allows multi-factor authentication



## Get the most out of it!

- OCI has inbuilt reports auditing sign-on
- OCI can link to one or more third-party identity providers (e.g. Azure AD etc) without additional code







## SAML Sign-In

With the **default ORDS** on the Autonomous Database, you can't modify any of the ORDS configuration options.

By installing and configuring a **Customer-Managed environment** for ORDS, we can adjust the ORDS settings, specifically our SAML configuration, to suit our needs.



## Cross-Origin Resource Sharing The SAML

authentication flow requires ORDS to **allow cross-origin requests** from your Identity Provider to Oracle APEX. Typically, ORDS blocks these requests to its PL/SQL gateway, including Oracle APEX. To fix this, configure ORDS to trust your Identity Provider by setting the **security.externalSessionTrustedOrigins** parameter.

Sign-on policy!

# Define your own Sign-on Rules.



The identity providers  
that will be used to  
authenticate



The groups that will be  
used to authenticate

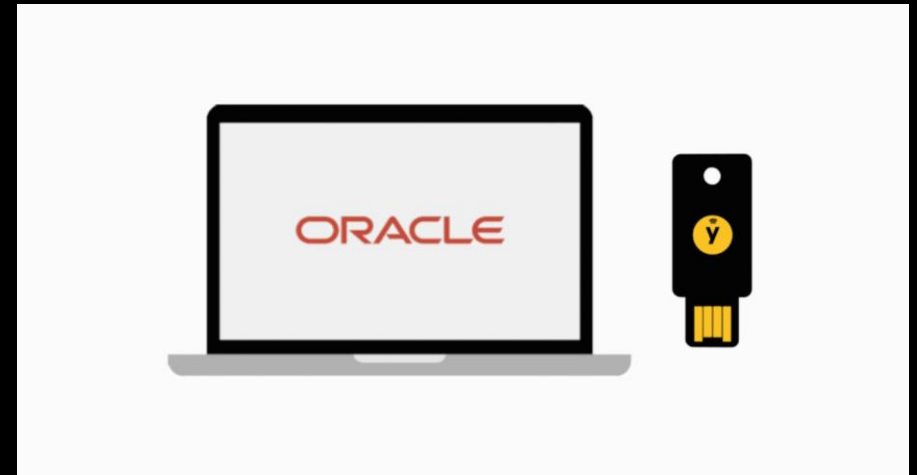
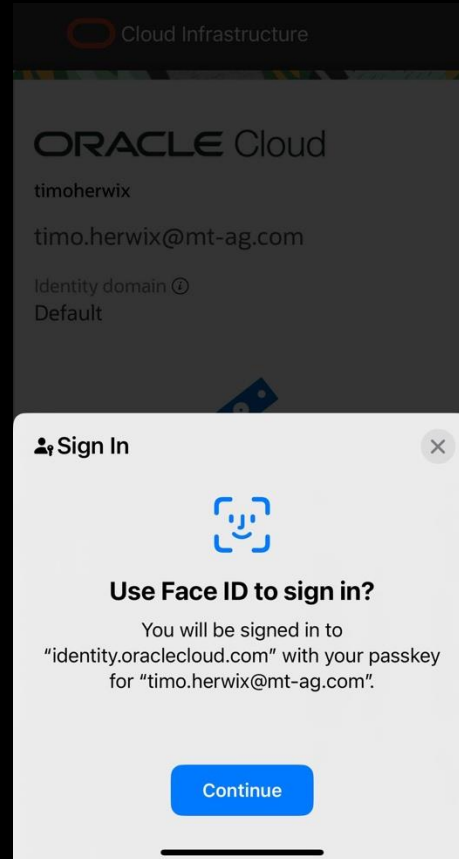
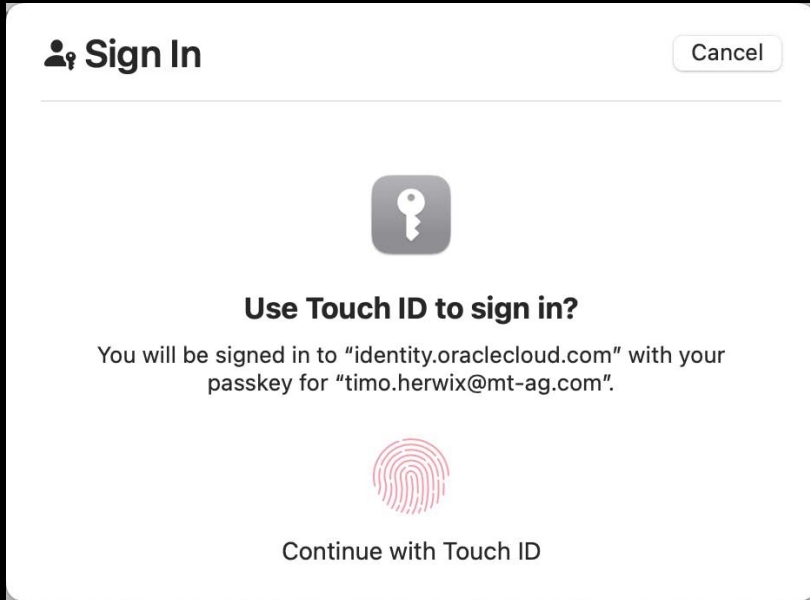


The frequency that will  
be used to authenticate

# Authentication Factors!

- **Security Questions:** Users verify their identity by answering a set number of questions after entering their username and password.
- **Email:** OCI sends a one-time passcode to the user's primary email for second verification.
- **Duo Security:** Enable Duo Security for MFA, allowing users to authenticate via the Duo App or other factors.
- **Fast ID Online (FIDO):** Configure FIDO authentication for users to utilize external devices like YubiKey or internal devices like Windows Hello or Mac Touch ID for identity domain authentication.
- **Mobile App Passcode:** Use an authenticator app like Oracle Mobile Authenticator or Google Authenticator for generating OTPs.
- **Mobile App Notification:** Send a push notification with an approval request for login attempts. After entering credentials, a request is sent to the user's phone app, and they tap Allow to authenticate.
- **Text Message (SMS) or Phone Call:** Users receive a passcode via text or call for use as a second verification method after entering their username and password.

# Passwordless Authentication!



High Security



Password + 2 Factor



Passwordless



Password

Convenient

Inconvenient

Low Security

# Network-Access-Control!



# Specify IP addresses that are allowed to access



## Network Perimeter!

If you or your VPN has a static IP address, you can configure OCI to reject all connections from unknown IP addresses.

Please note that there is a significant risk that you will be logged out if your static IP address changes!!!

# Specify IP addresses that are allowed to access

## Access Control List!

The network access rules you create for an access control list provide protection for your autonomous database by allowing only the public and VCN IP addresses in the list to connect to the database.

This adds an additional layer of security to your autonomous database.

ORACLE Cloud

Error code: 403

### IP Address Rejected

Your client needs to be part of this database's Access Control List to access this page.

[How to configure network access with Access Control Rules \(ACLs\)](#)

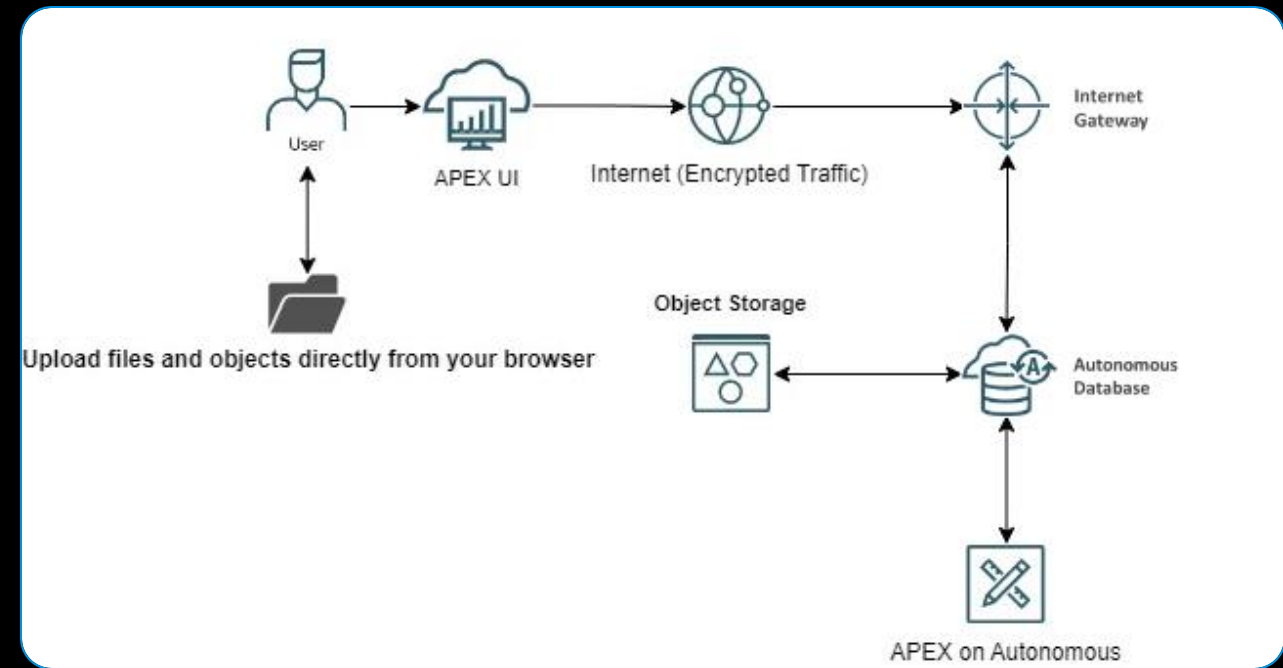
Request ID: 8849547c27daaebcbe55e773c9958aa0

# Document-Management!

# Use OCI Object Storage to store files.

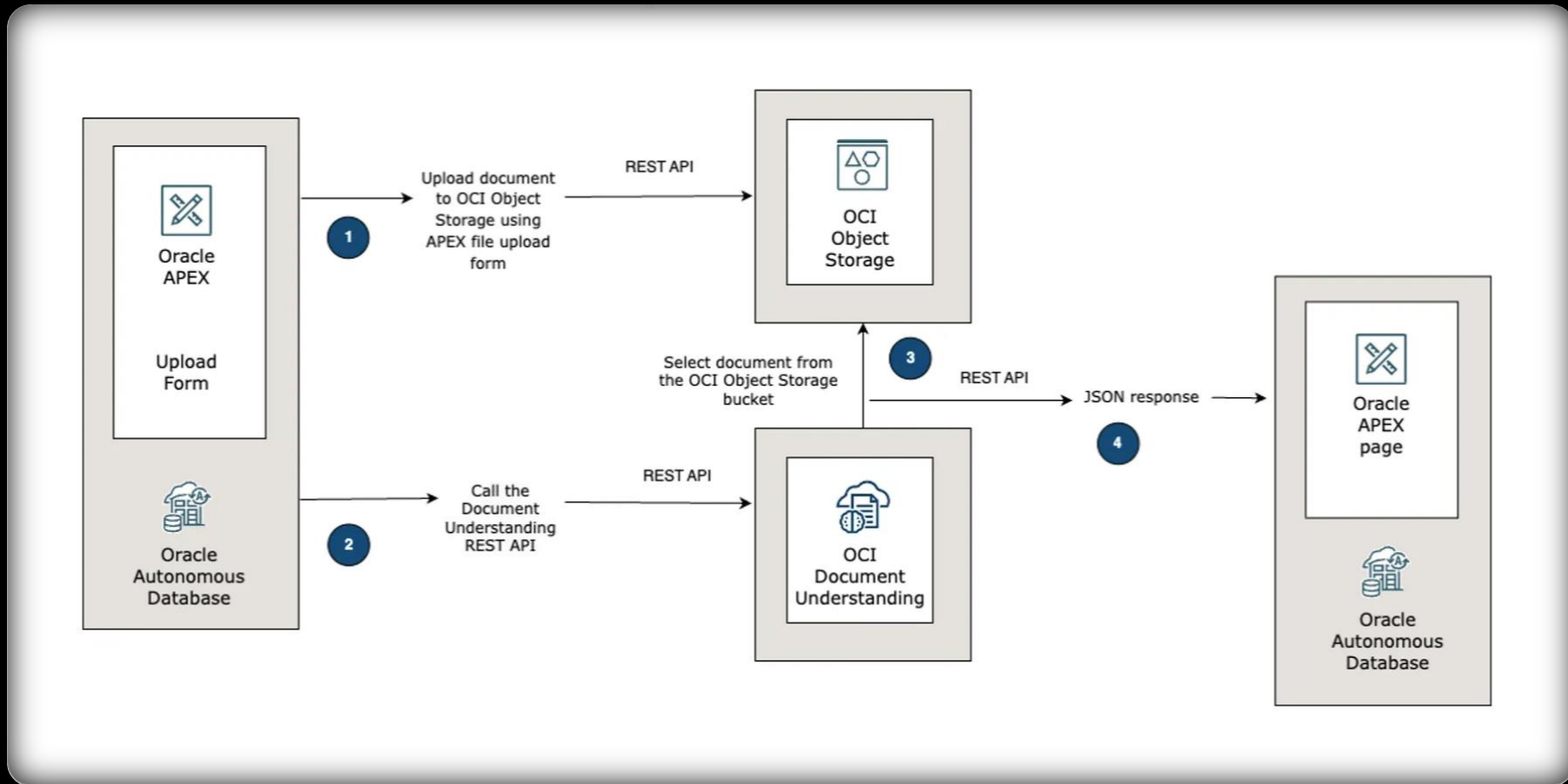
## Why to use?

- Always free databases have only 20 GB storage
- With OCI Object Storages you can get 20 GB more
- OCI Object Storage are high performance and resistant to hardware failures
- Use the DBMS\_CLOUD API to GET, PUT and DELETE files in OCI Object Store
- Quick and easy to integrate
- If you like, enable object versioning



# Analyze your documents.

Oracle Document Understanding is an **AI-powered service** of the Oracle Cloud Infrastructure (**OCI**) that enables its users to **automatically extract information** from certain kinds of Documents.



# Analyze your documents.

### Invoice Analysis

Uploaded PDF

Invoice-analysis 1 / 1 75%

**Invoice**  
Hyand  
GmbH & Co. KG

Company Name: Hyand Solutions GmbH  
Balkle Duern Allee 9  
40882 Ratingen

To: Tino Herwig  
Balkle Duern Allee 9  
40882 Ratingen

Invoice #: 001  
Invoice Date: 1/16/2024  
Invoice Total: **\$5,257.27**

Item Description	QTY	Quantity	Unit	Price
Item 001	1	1	\$0.00	\$0.00
Item 002	10	10	\$0.00	\$0.00
Item 003	10	10	\$0.00	\$0.00

**Notes:**

Balance Due: **\$5,257.27**

Key value extraction | Document classification | JSON response

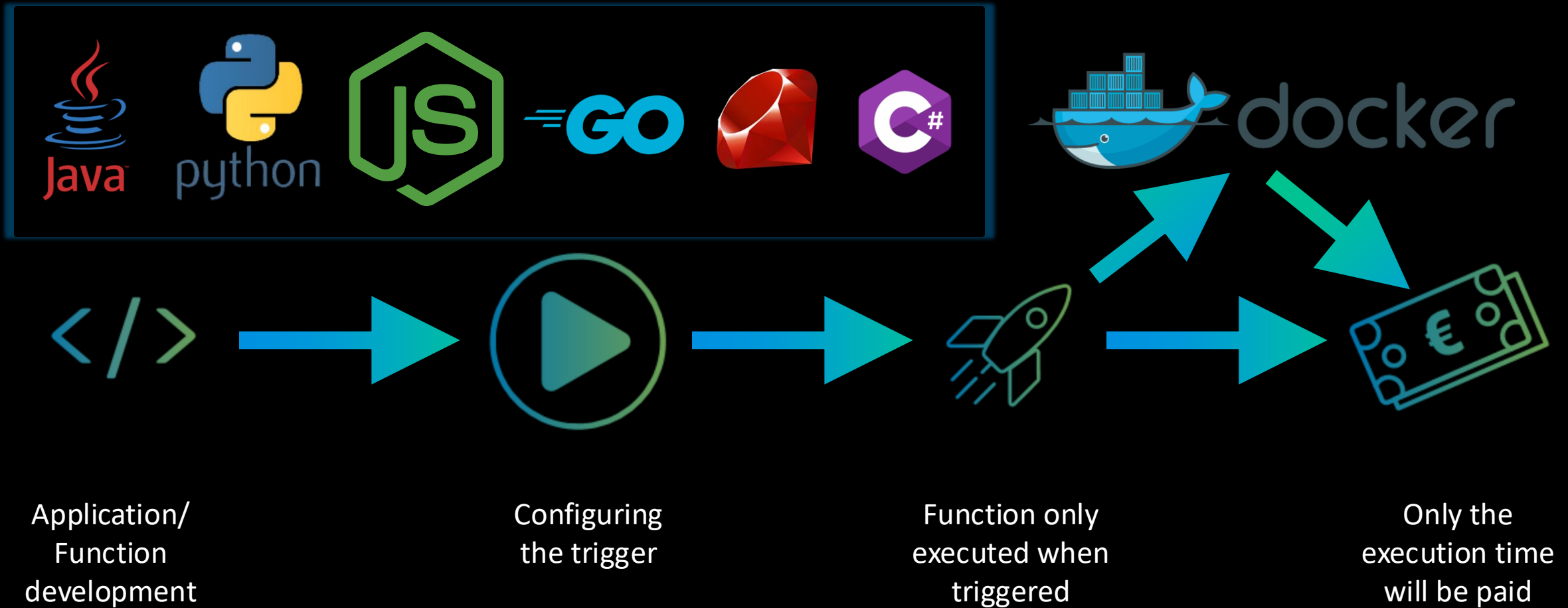
Field Label	Field Value	Label Score
Amount Due	525727	8773%
Customer Address	Balkle Duern Allee 9 40882 Ratingen	9679%
Customer Address Recipient	Tino Herwig	9979%
Due Date	2024-07-04T00:00:00.000Z	9789%
Invoice Date	2024-07-04T00:00:00.000Z	9197%
Invoice Id	001	9994%
Invoice Total	525727	9558%
Shipping Cost	10	7624%
Sub Total	489941	9527%
Total Tax	95089	8264%
Vendor Address	Balkle Duern Allee 9 40882 Ratingen	9994%
Vendor Address Recipient	Hyand Solutions GmbH	9990%
Vendor Name	Hyand Solutions GmbH	9990%
Vendor Name Logo	Hyand	7055%



# OCI Document Generator!



# Serverless functions.



# Pre-Built functions.

## Pre-Built Functions

Discover ready-to-use Functions that are pre-built to execute certain tasks or actions across OCI services and deploy them with one click without writing any code.

🔍 Search...

### Document Generator

This Pre-Built Function (PBF) generates documents in an Oracle Cloud Infrastructure (OCI) Object Storage bucket based on provided JSON data and an Office template document stored in Object Storage. Requires an App with GENERIC\_X86 shape.

### Object Storage File Extractor

This Pre-built Function (PBF) reads a zip file from an Oracle Cloud Infrastructure (OCI) Object Storage bucket and extracts it to the specified target bucket.

### Object Storage File Zip

This Pre-Built Function (PBF) is used to zip files stored in an Oracle Cloud Infrastructure (OCI) Object storage bucket and save the zip file to the specified target bucket.

### Media Workflow Job Spawner


This Pre-Built function (PBF) triggers a workflow job for the given Media workflow when video content is uploaded to Object storage bucket. To set up this automation - 1) Deploy this PBF as a Function in your compartment & configure its parameters 2) Configure an Event Rule on the object storage bucket where...

### Zero Quota Policy Creator

This Pre-Built Function (PBF) creates a quota policy to prevent the creation of Oracle Cloud Infrastructure (OCI) resources to help enforce budgets and manage your OCI spending. To set up an automation to create a zero quota policy preventing creation of OCI resources when spending threshold is crossed - 1) Create ...

# Create function.

Function > Applications > my\_functions > my\_pdf\_generator



ACTIVE

## my\_pdf\_generator

Edit Add tags Delete

General information Tags

**PBF Listing OCID:** ...njf7zamq [Show](#) [Copy](#)

**Compartment:** DEV\_THERWIX

**Timeout:** 300 seconds

**Created:** Wed, Feb 28, 2024, 15:21:30 UTC

**Provisioned concurrency units:** -

**OCID:** ...6ibtzuca [Show](#) [Copy](#)

**Memory:** 512 MB

**Endpoint:** ...s/invoke [Show](#) [Copy](#)

**Last updated:** Wed, Feb 28, 2024, 15:21:30 UTC

<https://<unique-id>.<region>.functions.oci.oraclecloud.com/20181201/functions/<function-id>/actions/invoke>

# Prerequisites.

## JSON data



```
1  {  
2    "data": {  
3      "first_name": "Timo",  
4      "last_name": "Herwix",  
5      "job": "Senior APEX Developer",  
6      "company": "MT GmbH"  
7    }  
8  }
```

## Office Template

Hey there! I'm {data.first\_name} {data.last\_name}, and I'm a {data.job} at {data.company}.

# Request body template.

```
1  {
2    "requestType": "SINGLE",
3    "tagSyntax": "DOCGEN_1_0",
4    "data": {
5      "source": "OBJECT_STORAGE",
6      "namespace": "my_namespace",
7      "bucketName": "my_bucket",
8      "objectName": "example.json",
9      "contentType": "application/json"
10   },
11   "template": {
12     "source": "OBJECT_STORAGE",
13     "namespace": "my_namespace",
14     "bucketName": "my_bucket",
15     "objectName": "example.docx",
16     "contentType": "application/vnd.openxmlformats-officedocument.wordprocessingml.document"
17   },
18   "output": {
19     "target": "OBJECT_STORAGE",
20     "namespace": "my_namespace",
21     "bucketName": "my_bucket",
22     "objectName": "example.pdf",
23     "contentType": "application/pdf"
24   }
25 }
```

Hey there! I'm Timo Herwix, and I'm a Senior APEX Developer at MT GmbH.

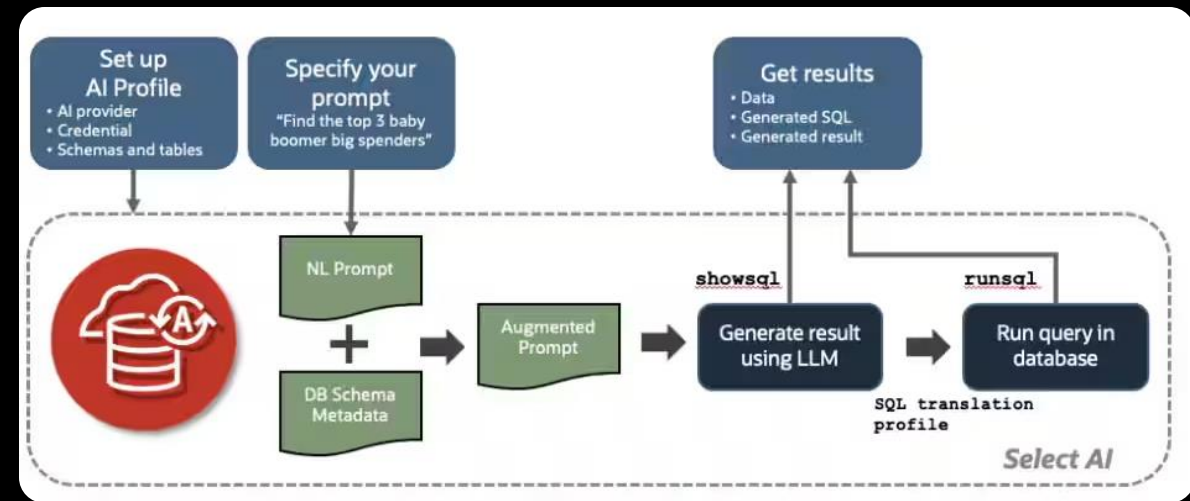


# Chat with your Database.



# Chat with your Database.

- Autonomous Database Select AI makes it easy to interact with important business data using natural language.
- Select AI supports the `showsql` and `runsql` commands to display and execute the generated SQL.
- It also includes `narrate` and `chat` commands for a more conversational and interactive experience.
- By making natural language queries simpler, Select AI empowers non-technical business users to easily access and analyze data without needing advanced SQL skills.



# Chat with your Database.



```
1 SELECT AI RUNSQL which are the ten articles that were sold most frequently;
```

return the SQL result set

return the generated query



```
1 SELECT AI SHOWSQL which are the ten articles that were sold most frequently;
```



```
1 SELECT AI EXPLAINSOL which are the ten articles that were sold most frequently;
```

explain generated SQL query



```
1 SELECT AI NARRATE show me what are the ten articles that were sold most frequently;
```

return a conversational result

general AI chat

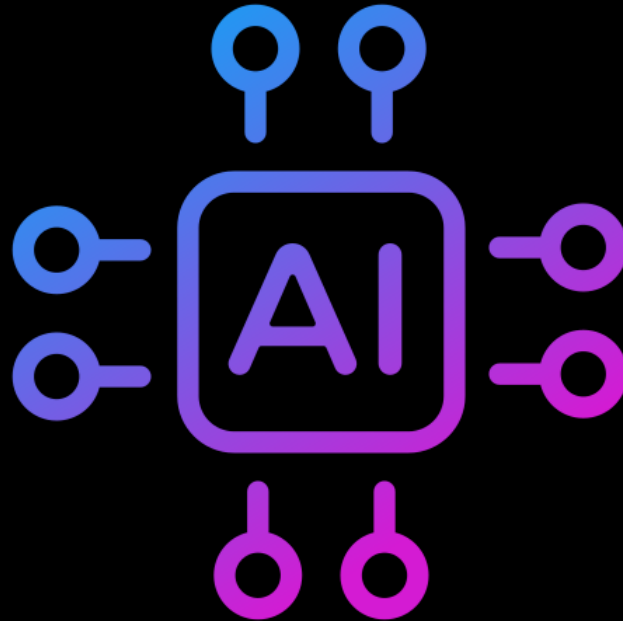


```
1 SELECT AI CHAT what is Oracle APEX;
```

# Chat with your Database.

Use the best LLM for your business and cloud deployment

- OCI Generative AI
- OpenAI
- Azure OpenAI
- Cohere
- Google Gemini
- Anthropic
- Hugging Face
- more coming...





# DevOps Made Easy!

# DevOps Made Easy!

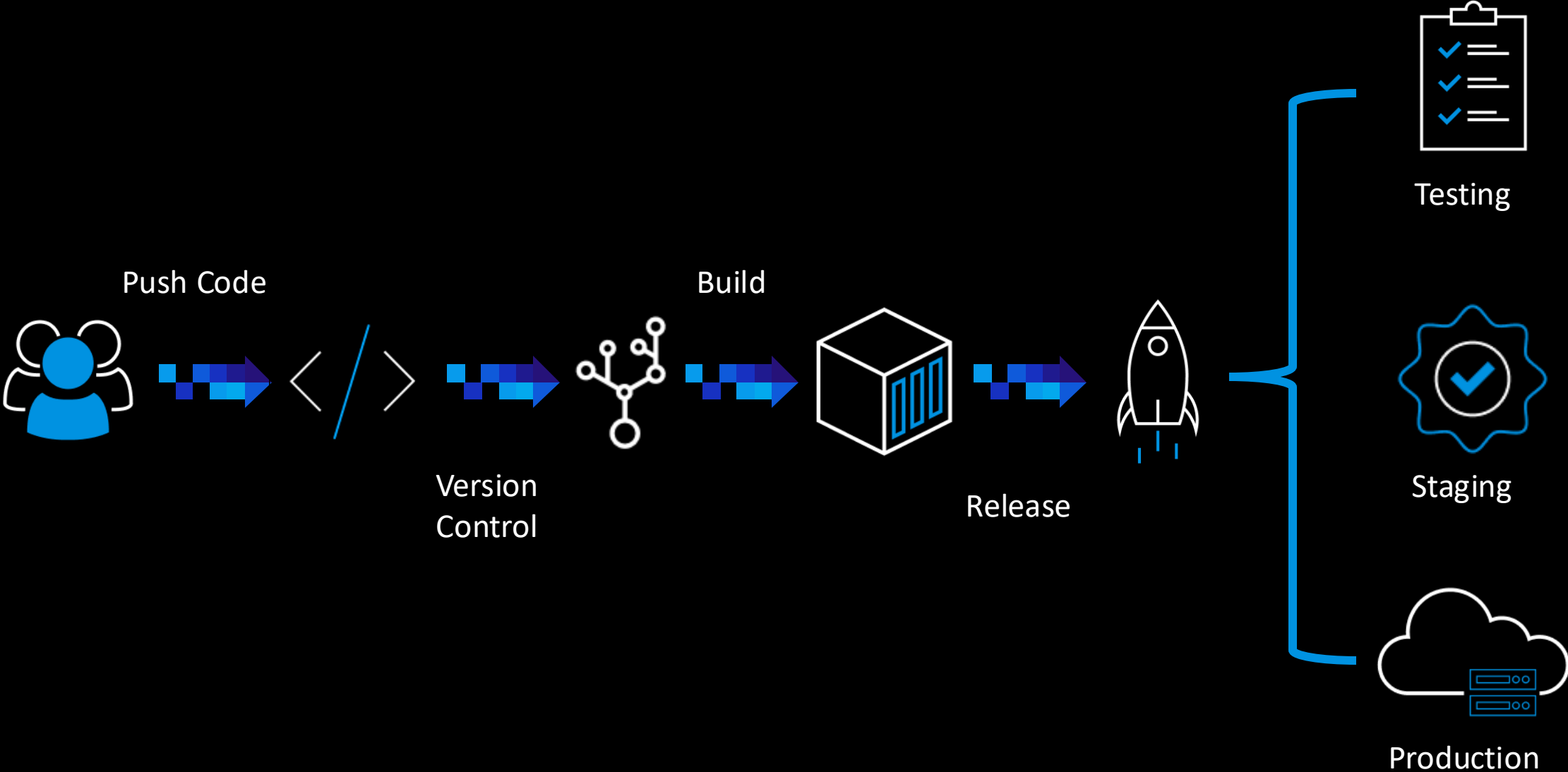
As an [APEX Developer](#), you might be looking to apply modern development methodologies and tools used in other development platforms to your Oracle APEX Low-Code Projects.

This includes:

- Git-based code version management
- Code review
- Continuous delivery of apps from one instance to another
- Tracking issues
- Managing your team development



# DevOps Made Easy!

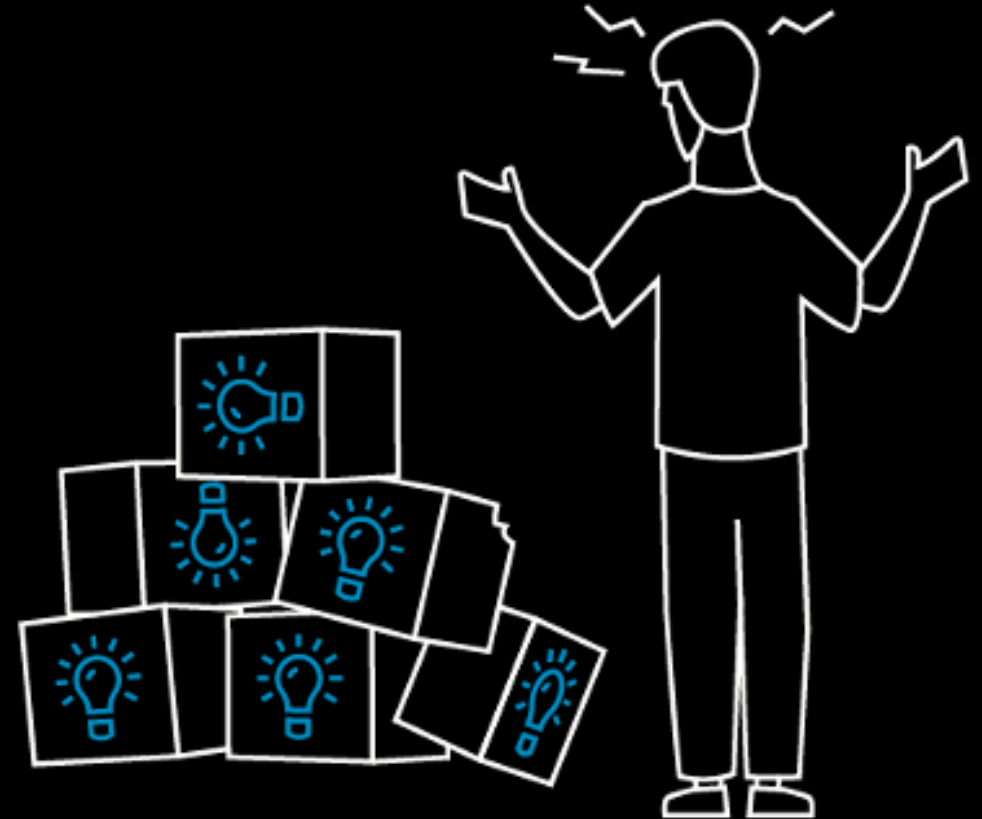


# DevOps Made Easy!

The Oracle Autonomous Database (ADB) includes the `DBMS_CLOUD_REPO` package, an extremely powerful package that provides **easy** access to files in Cloud Code (Git) Repositories.

With this package, you can:

- Manage repositories
- Handle code in a repository
- Export database schemas and objects
- Execute SQL statements from committed files



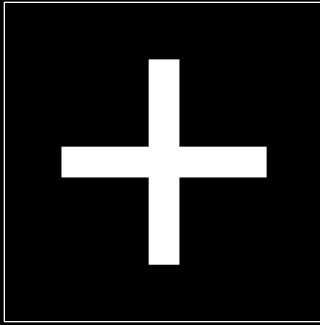


# Supported Code Repositories.



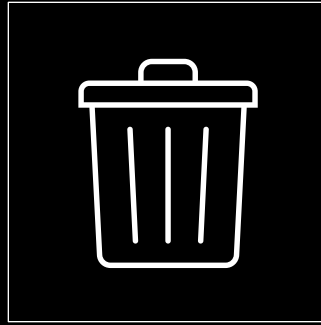
Azure Repos

# Subprograms for the Repository Management Operations



## CREATE\_REPOSITORY

This procedure creates a Code Repository.



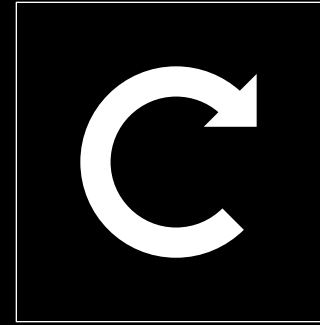
## DELETE\_REPOSITORY

This procedure deletes the Code Repository.



## LIST\_REPOSITORIES

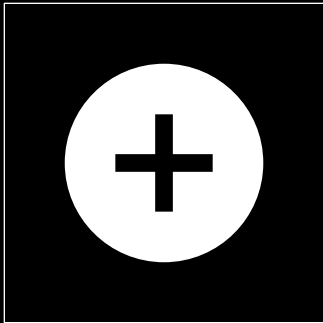
This function lists all the Code Repositories.



## UPDATE\_REPOSITORY

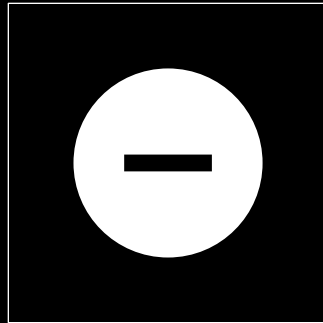
This procedure updates a Code repository.

# Subprograms for the Repository Branch Management Operations



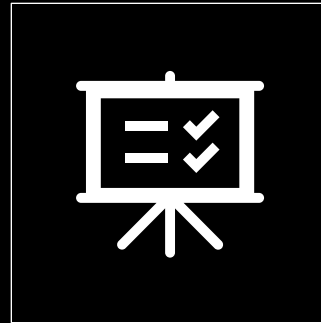
**CREATE\_BRANCH**

This procedure creates a branch in a Code Repository.



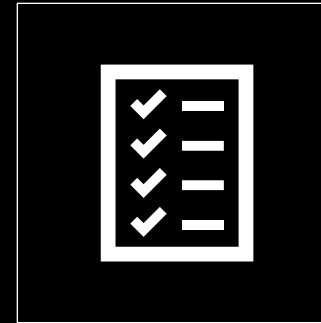
**DELETE\_BRANCH**

This procedure deletes a branch in a Code Repository.



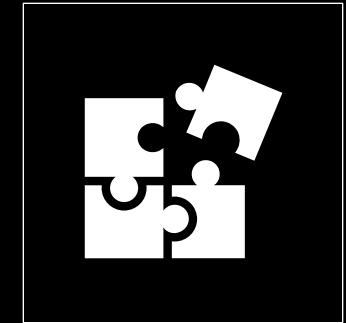
**LIST\_BRANCHES**

This function lists all the Code Repository branches.



**LIST\_COMMITS**

This function lists all the commits in a Code Repository branch.



**MERGE\_BRANCH**

This procedure merges a branch into another specified branch in a Code Repository.

# Create a new Repository

```
1 declare
2     repoHandle      clob;
3     repoCredential  varchar2(50 CHAR) := 'GITHUB_CRED';      -- Name of the previously created credential
4     repoName        varchar2(50 CHAR) := 'APEX_WORLD_2024'; -- Name of the new GitHub Repository
5     repoOwner       varchar2(50 CHAR) := 'therwix';        -- Name of the GitHub Repository Owner
6 begin
7     repoHandle := dbms_cloud_repo.init_github_repo(
8         credential_name => repoCredential,
9         repo_name       => repoName,
10        owner           => repoOwner
11    );
12
13    dbms_cloud_repo.create_repository(
14        repo           => repoHandle,
15        description    => 'Repo created with DBMS_CLOUD_REPO',
16        private        => TRUE
17    );
18 end;
19 /
```

# Initialize a new Repository

```
1 declare
2     repoHandle      clob;
3     repoCredential  varchar2(50 CHAR) := 'GITHUB_CRED';      -- Name of the previously created credential
4     repoName        varchar2(50 CHAR) := 'APEX_WORLD_2024';  -- Name of the GitHub Repository
5     repoOwner       varchar2(50 CHAR) := 'therwix';         -- Name of the GitHub Repository Owner
6 begin
7     repoHandle := dbms_cloud_repo.init_github_repo(
8         credential_name => repoCredential,
9         repo_name       => repoName,
10        owner           => repoOwner
11    );
12
13    dbms_cloud_repo.put_file(
14        repo => repoHandle,
15        file_path => 'readme.md',
16        contents => utl_raw.cast_to_raw('APEX WORLD 2024'),
17        branch_name => 'main',
18        commit_details => json_object('message' value 'DBMS_CLOUD_REPO commit',
19                                     'author' value 'therwix',
20                                     'email' value 'timo.herwix@mt-ag.com'
21    )
22 );
23
24 end;
25 /
```



# 1

Introduction

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Wrap-up

## Give it a try!

Is it possible to use a FREE tier in a production-ready architecture?! How amazing would that be?!

OMG!  
Can you believe it?  
We can totally use our own custom URL to boost our identity!  
How awesome is that?!

**YES YOU CAN!**

Can we enable single sign-on? This will be a game-changer for our organization!

Yo, is the cloud really secure? Can we trust it to keep our stuff safe?



# Blog



Scan me!

A screenshot of the ā'pěks (forclapex) blog homepage. The page has a dark theme. At the top, the logo 'ā'pěks (forclapex)' is in the top left, and search, settings, and a dropdown menu are in the top right. Below the logo are social media icons for X, GitHub, LinkedIn, and RSS. A navigation bar contains links for Home, Cloud Computing, Secure Access Made Easy, APEX Tips, Other Series, About Us, and Newsletter. The main content area features a large article preview for 'Start Generating Dynamic PDFs in APEX Easily with OCI Pre-Built Functions' with a thumbnail showing a Word document and a PDF icon. To the right, there are two smaller article previews: 'Implementing Social Sign-In with Microsoft Azure/365 in APEX' and 'Mastering Identity Lifecycle Management for OCI IAM and Azure AD'. At the bottom, there is a footer with a list of hashtags: #oracle, #orclapex, #lowcode, #plsql, #JavaScript, #AutonomousDatabase, #Cloud.

# Are you interested?



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