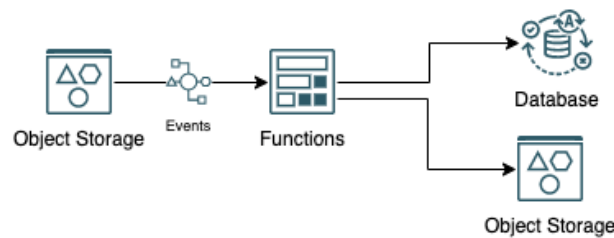


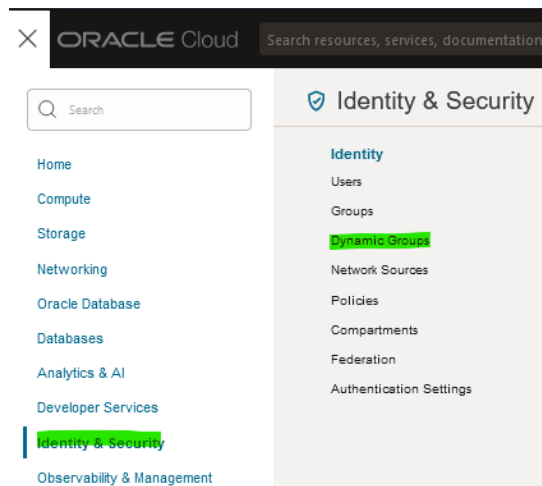
LABORATORIO CONSTRUCCIÓN DE APLICACIONES ORACLE CLOUD SERVERLESS

Este laboratorio esta enfocado a que puedas construir una aplicación Serverless, que realice la lectura, procesamiento y guardado de un archivo separado por comas(*.csv) en una base de datos autonoma, dicha aplicación tendra la siguiente aquitectura:



PRE-REQUISITOS

1. Creación de grupo dinámico con el nombre **FunctionGroup** y políticas de seguridad para manipulación de la infraestructura OCI por parte de la función serverless.



Esta imagen muestra el formulario 'Create dynamic group' en Oracle Cloud. El formulario tiene los siguientes campos:

- Name:** 'FunctionGroup' (destacado con un fondo verde).
- Description:** 'FunctionGroup'.
- Matching rules:** Sección que define las reglas para los recursos miembros. Incluye un ejemplo: 'Any {instance.id = 'ocid1.instance.oc1.iad..example'ocid1.compartment.oc1..exampleuniqueid2'}'. Hay dos opciones de selección: 'Match any rules defined below' (seleccionada) y 'Match all rules defined'.
- Rule 1:** 'ALL {resource.type = 'fnfunc'}' (destacado con un fondo verde).
- Botones:** 'Create' y 'Cancel'.

Estableciendo la siguiente regla para el grupo dinámico que permitirá a las funciones serverless acceder a los recursos OCI, a nivel de seguridad

ALL {resource.type = 'fnfunc'}

- Definición de políticas IAM para la manipulación de la infraestructura OCI por parte de la función serverless.

IMPORTANTE: Estas políticas deben ser definidas a nivel del compartiment **ROOT**

ORACLE Cloud Search resources, services, documentat

Search

Home

Compute

Storage

Networking

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Databases

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Developer Services

Identity & Security

Observability & Management

Identity & Security

- Users
- Groups
- Dynamic Groups
- Network Sources
- Policies**
- Compartments
- Federation
- Authentication Settings

Create Policy

Name

FunctionPolicies

No spaces. Only letters, numerals, hyphens, periods, or underscores.

Description

Permisos Serverless

Compartment

cxmteammcn (root)

Policy Builder Show manual editor ☒

- Allow dynamic-group **FunctionGroup** to manage functions-family in tenancy
- Allow dynamic-group **FunctionGroup** to use virtual-network-family in tenancy
- Allow dynamic-group **FunctionGroup** to manage repos in tenancy
- Allow dynamic-group **FunctionGroup** to inspect object-family in tenancy
- Allow dynamic-group **FunctionGroup** to manage objects in tenancy
- Allow dynamic-group **FunctionGroup** to manage autonomous-database-family in tenancy

Create Cancel ☐ Create Another Policy

Allow dynamic-group **FunctionGroup** to manage functions-family in tenancy

Allow dynamic-group **FunctionGroup** to use virtual-network-family in tenancy

Allow dynamic-group **FunctionGroup** to manage repos in tenancy

Allow dynamic-group **FunctionGroup** to inspect object-family in tenancy

Allow dynamic-group **FunctionGroup** to manage objects in tenancy

Allow dynamic-group **FunctionGroup** to manage autonomous-database-family in tenancy

Allow dynamic-group **FunctionGroup** to use ons-topics in tenancy

TOPIC PARA NOTIFICACIONES

En el menu general debemos ir al menú de notificaciones, y crear un topic con el nombre de empresa
Ejemplo: **ACME CORP**

The screenshot shows the Oracle Cloud Developer Services console. On the left is a navigation menu with links like Home, Compute, Storage, Networking, Oracle Database, Databases, Analytics & AI, and Developer Services (highlighted). The main area is titled 'Developer Services' and contains several categories: Containers & Artifacts, Application Integration, Functions, Visual Builder, and DevOps. The 'Notifications' link under 'Application Integration' is highlighted. On the right, the 'Create Topic' form is displayed. It has a 'Name' field with the placeholder 'NOMBRE-MI-COMPANIA', a 'Description' field, and a 'Create' button. A warning message states: 'Once the topic is created, an admin access.'

Copia el OCID del topic lo necesitaras más adelante

Dentro del TOPIC se deberá crear una suscripción al correo del **COMISARIO DE CARRERA** (nataly.diaz@oracle.com ó jose.borda@oracle.com), a este correo llegarán las notificaciones que serán fundamental para los **puntajes y clasificación**.


The screenshot shows the 'Create Subscription' form. It has a title 'Configure Subscription' and a 'Protocol' dropdown menu set to 'Email'. The 'Email' field contains the text 'CORREO COMISARIO DE CARRERO RACING TO THE CLOUD'. Below the field is a red error message: 'Enter a valid email address.' There is an information icon with a message: 'Email notifications use the sender "noreply" at a region-specific notif. Example sender: noreply@notification.us-ashburn-1.oci.oraclecloud. Creating a subscription for Email.' At the bottom, there is a 'Create Subscription' button and a 'Create' button with a 'Cancel' link.

El comisario de carrera deberá **aceptar** la suscripción


Create Subscription		
Subscription OCID	State	Protocol
ocid.....cbn2jtbq	● Active	Email

BASE DE DATOS

Crear o usar una base de datos autónoma existente, para esto **copia el OCID de esta base de datos lo necesitaras más adelante**

 Search resources, services, documentation, and Marketplace

[Overview](#) » [Autonomous Database](#) » Autonomous Database details


AVAILABLE

ADW

[Database actions](#) [Database connection](#) [Performance hub](#)

[Autonomous Database information](#) [Tool configuration](#)

General information

Database name: ADWDEMO

Workload type: Data Warehouse

Compartment: cxmteammcn (root)/Consumo_MCRN

OCID: ...nwrqma [Show](#) [Copy](#)

Created: Tue, Sep 27, 2022, 22:01:38 UTC

GENERAR AUTH TOKEN

En la esquina superior derecha del portal encontremos el **profile** del usuario donde podremos generar el token de autenticación:

The screenshot shows the Oracle Cloud console interface. At the top, there's a navigation bar with 'US East (Ashburn)' and various icons. Below this, the 'Profile' section is visible on the left, showing the email 'oracleidentitycloudservice/oscar.bernal@oracle.com' and 'Tenancy: juanitacaballero22'. On the right, the 'Resources' sidebar lists 'My groups', 'My applications', 'API keys', 'Auth tokens' (which is selected), 'Customer secret keys', and 'My access tokens'. The main content area is titled 'Auth tokens' and contains a 'Generate token' button and a 'Delete' button. Below these buttons is a table with a 'Description' header and two rows: 'bucket' and 'registry'. At the bottom of the table, it says '0 Selected'.

Generate token

The screenshot shows the 'Generate token' form. It has a 'Description' label and a text input field containing the word 'function'.

Guardar el valor generado por la consola el cual debemos usar en los pasos posteriores

Ejemplo: v#1iD<8Ycx+)Z+XUR5av

Generate token

The screenshot shows a notification box titled 'Generated token'. It contains the text 'Copy this token for your records. It will not be shown again.' and a masked token '*****' followed by 'Show' and 'Copy' links.

CREACION APLICACIÓN SERVERLESS & SETUP CLOUD SHELL ENVIROMENT

1. Creación o validación de existencias de la capa de red, debe existir una VCN y una subred, si ya tienes creada una VCN puedes usar la existente.

Start VCN Wizard

[Help](#)

☒ Create VCN with Internet Connectivity

☐ Add Internet Connectivity and Site-to-Site VPN to a VCN

Creates a VCN with a public subnet that can be reached from the internet. Also creates a private subnet that can connect to the internet through a NAT gateway, and also privately connect to the Oracle Services Network.

Includes: VCN, public subnet, private subnet, internet gateway (IG), NAT gateway (NAT), service gateway (SG).

Start VCN Wizard

[Cancel](#)

Configuration



Resource availability checked successfully.

Basic Information

VCN Name ⓘ

RedBullVCN

Compartment ⓘ

redbullhol

comteamcom (root)/TestEnvironment/redbullhol

Configure VCN and Subnets

VCN CIDR Block ⓘ

10.0.0.0/16

If you plan to peer this VCN with another VCN, the VCNs must not have overlapping CIDRs. [Learn more.](#)

Public Subnet CIDR Block ⓘ

10.0.0.0/24

The subnet CIDR blocks must not overlap.

Private Subnet CIDR Block ⓘ

10.0.1.0/24

The subnet CIDR blocks must not overlap.

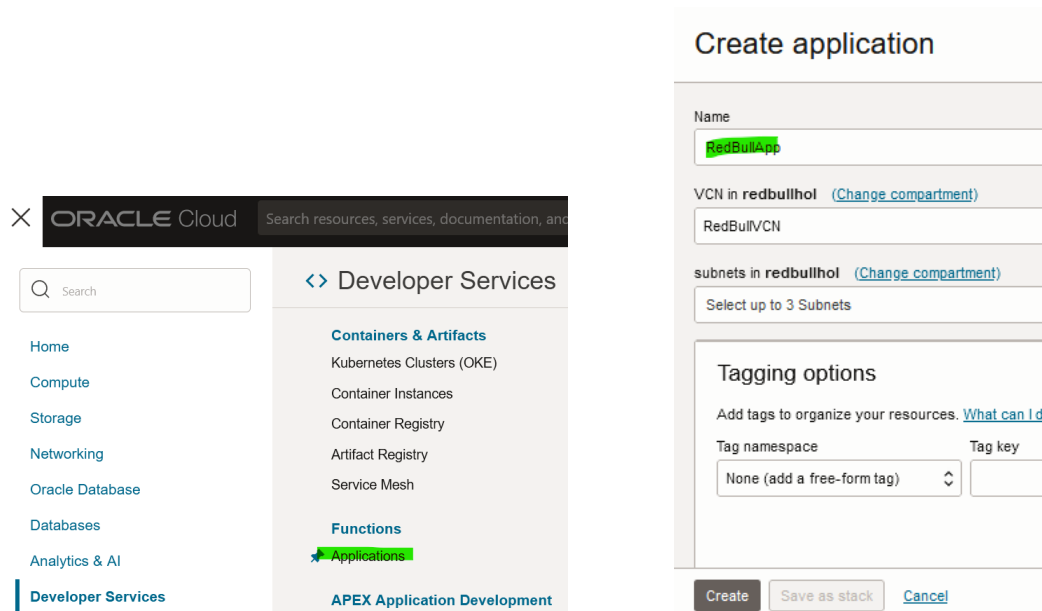
DNS Resolution

☒ Use DNS hostnames in this VCN

Required for Instance hostname assignment if you plan to use VCN DNS or a third-party DNS. This choice cannot be changed after the VCN is created. [Learn more.](#)

[Show Tagging Options](#)

2. Crear de Aplicación Serverless con el nombre **RedBullApp**



ORACLE Cloud Search resources, services, documentation, and more

Search

Developer Services

- Containers & Artifacts
 - Kubernetes Clusters (OKE)
 - Container Instances
 - Container Registry
 - Artifact Registry
 - Service Mesh
- Functions
 - Applications
- APEX Application Development

Create application

Name: RedBullApp

VCN in redbullhol (Change compartment): RedBullVCN

subnets in redbullhol (Change compartment): Select up to 3 Subnets

Tagging options

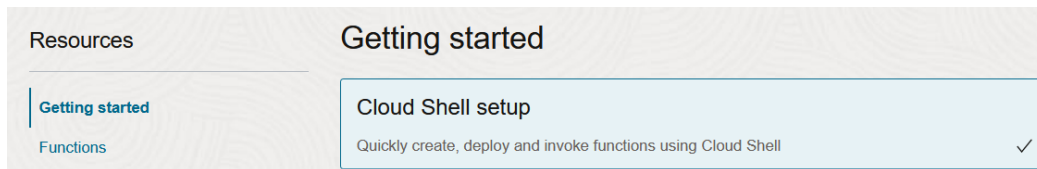
Add tags to organize your resources. [What can I do](#)

Tag namespace: None (add a free-form tag)

Tag key:

Create Save as stack Cancel

3. Setup del ambiente Cloud Shell para esto se deben seguir las instrucciones dadas en la consola en el siguiente apartado:



Resources

- Getting started
- Functions


Getting started

Cloud Shell setup

Quickly create, deploy and invoke functions using Cloud Shell

Aquí un ejemplo de los comandos y el resultado de cada una de las ejecuciones en Cloud Shell:

Dara clic en el botón “Launch Cloud Shell”

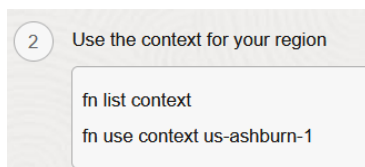


Begin your Cloud Shell session

[Learn more about Cloud Shell](#)

1 Launch Cloud Shell

Listar los diferentes contextos serverless correspondientes a cada una de las regiones que se estén usando, ***copiar y ejecutar los comandos que aparecen en la consola:***



2 Use the context for your region

fn list context

fn use context us-ashburn-1

```

Your Cloud Shell machine comes with 5GB of storage for your home directory. Your Cloud Shell (machine and home directory) are located in: US East (Ashburn).
You are using Cloud Shell in tenancy cxteammicrn as an OCI Local user oscar.bernal@oracle.com

Type 'help' for more info.
oscar_bern@cloudshell:~ (us-ashburn-1)$ fn list context
CURRENT NAME      PROVIDER      API URL
default           oracle-cs
* us-ashburn-1    oracle-cs     https://functions.us-ashburn-1.oci.oraclecloud.com
us-phoenix-1      oracle-cs     https://functions.us-phoenix-1.oci.oraclecloud.com
oscar_bern@cloudshell:~ (us-ashburn-1)$ fn use context us-ashburn-1

Fn: Context us-ashburn-1 currently in use

```

Actualizar el contexto para ser usado

3 Update the context with the function's compartment ID

```
fn update context oracle.compartment-id ocid1.compartment.oc1..aaaaaa
```

```

oscar_bern@cloudshell:~ (us-ashburn-1)$ fn update context oracle.compartment-id ocid1.compart
Current context updated oracle.compartment-id with ocid1.compartment.oc1..aaaaaaas76tr4yeb6

```

Establecer un **pre-fijo** para el contexto del repositorio de imágenes Docker

4 Provide a unique repository name prefix to distinguish your function images from other people's. For example, with 'jdoe' as the prefix, the image path for a 'hello' function image is '<region-key>.ocir.io/<tenancy-namespace>/jdoe/hello:0.0.1'

```
fn update context registry iad.ocir.io/idikzonisftg/[repo-name-prefix]
```

[Copy](#)

Establecer el repositorio de imágenes, para este caso **debes reemplazar [repo-name-prefix] por redbull**, en el comando dado por la consola quedado así:

```

oscar_bern@cloudshell:~ (us-ashburn-1)$ fn update context registry iad.ocir.io/idikzonisftg/redbull
Current context updated registry with iad.ocir.io/idikzonisftg/redbull
oscar_bern@cloudshell:~ (us-ashburn-1)$ 

```

Como en los pre-requisitos ya tenemos generado el token de autorización el paso 5 lo **omitiremos**

5 [Generate an Auth Token](#)

Establecer conexión al repositorio de imágenes

6 Log into the Registry using the Auth Token as your password

```
docker login -u 'idikzonisftg/oscar.bernal@oracle.com' iad.ocir.io
```

Debemos ingresar el **token** creado en pasos previos cuando el sistema nos solicite el **password**


```
oscar_bern@cloudshell:~ (us-ashburn-1)$ docker login -u 'idikzonisftg/oscar.bernal@oracle.com' iad.ocir.io
Password:
WARNING! Your password will be stored unencrypted in /home/oscar_bern/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
```

Para este ejercicio **omitiremos los pasos posteriores** ya que el código de la aplicación ya fue construido y se encuentra en un repositorio de Gitlab, solamente tendremos que importarlo y compilarlo en nuestro ambiente.

CONSTRUCCIÓN DE APLICACIÓN

1. En la sesión de Cloud Shell vamos importar el código de la aplicación, con el siguiente comando:

`git clone https://gitlab.com/oscarbm7/oci-serverless-python.git`

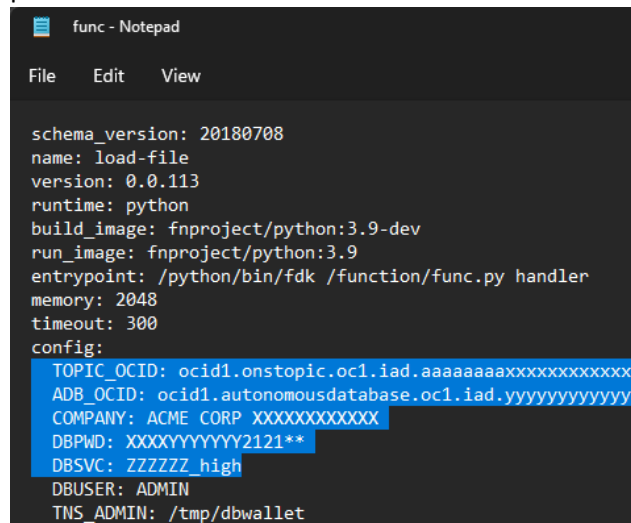
Cloud Shell

```
oscar_bern@cloudshell:~ (us-ashburn-1)$ git clone https://gitlab.com/oscarbm7/oci-serverless-python.git
Cloning into 'oci-serverless-python'...
remote: Enumerating objects: 3, done.
remote: Counting objects: 100% (3/3), done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), 2.79 KiB | 2.79 MiB/s, done.
oscar_bern@cloudshell:~ (us-ashburn-1)$
```

2. Descargar el archivo **func.yaml** el cual tiene los parámetros de configuración de la aplicación, ingresando al siguiente link:

<https://gitlab.com/oscarbm7/oci-serverless-python/-/raw/main/func.yaml?inline=false>

3. Editar el archivo (En Notepad) remplazando los valores resaltados por datos recopilados previamente:



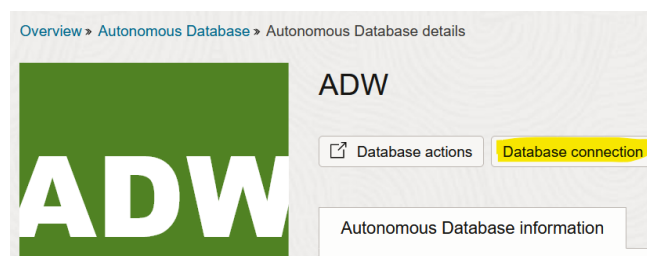
```
func - Notepad
File Edit View

schema_version: 20180708
name: load-file
version: 0.0.113
runtime: python
build_image: fnproject/python:3.9-dev
run_image: fnproject/python:3.9
entrypoint: /python/bin/fdk /function/func.py handler
memory: 2048
timeout: 300
config:
  TOPIC_OCID: ocid1.onstopic.oc1.iad.aaaaaaaaxxxxxxxxxxxxx
  ADB_OCID: ocid1.autonomousdatabase.oc1.iad.yyyyyyyyyyyyy
  COMPANY: ACME CORP XXXXXXXXXXXX
  DBPWD: XXXXXXXXXXXY2121**
  DBSVC: ZZZZZZ_high
  DBUSER: ADMIN
  TNS_ADMIN: /tmp/dbwallet
```

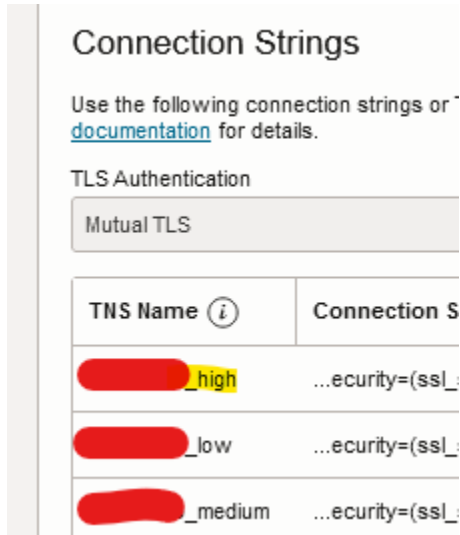
TOPIC_OCID: Es el **tema de notificaciones** que creamos en pasos anteriores, al igual que

ADB_OCID: OCID de la base de datos autónoma (creada en sesiones anteriores).

DBSVC: Debes ingresar el nombre de la conexión de la base de datos, la puedes localizar así:



Tomar cualquiera de las disponibles, por ejemplo: **xxxxxx_high** (este valor corresponde según tu base de datos y lo debes poner en el archivo func.yaml)



Connection Strings

Use the following connection strings or [documentation](#) for details.

TLS Authentication

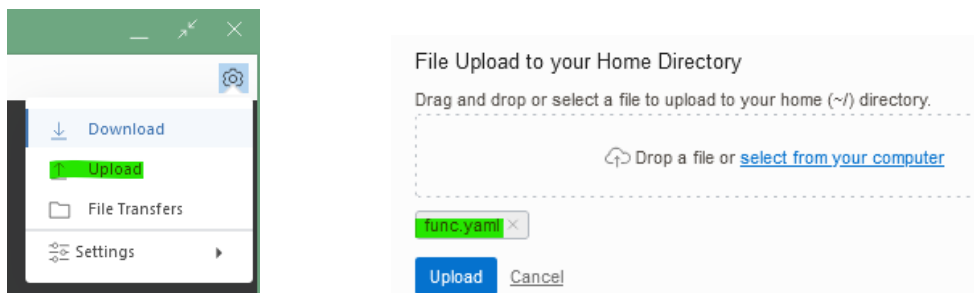
Mutual TLS

TNS Name ⓘ	Connection S
xxxxxx_high	...ecurity=(ssl_
xxxxxx_low	...ecurity=(ssl_
xxxxxx_medium	...ecurity=(ssl_

4. El archivo actualizado debe quedar así:

```
schema_version: 20180708
name: load-file
version: 0.0.114
runtime: python
build_image: fnproject/python:3.9-dev
run_image: fnproject/python:3.9
entrypoint: /python/bin/fdk /function/func.py handler
memory: 2048
timeout: 300
config:
  ADB_OCID: ocid1.autonomousdatabase.oc1.iad.anuwc1jtubxct
  COMPANY: ACME CORP XXX
  DBPWD: P...i**
  DBSVC: xxxxx_high
  DBUSER: ADMIN
  TNS_ADMIN: /tmp/dbwallet
  TOPIC_OCID: ocid1.onstopic.oc1.iad.aaaaaaaaruoyzvxfcz
```

5. Subir el archivo editado al Cloud Shell:



Este subirá al directorio home del Cloud Shell

6. Remplazar el archivo de la función con el subido previamente:

mv func.yaml oci-serverless-python

7. Ingresamos a la carpeta importada, con el siguiente comando: **cd oci-serverless-python**

```
oscar_bern@cloudshell:~ (us-ashburn-1)$ cd oci-serverless-python/
```

8. Compilar la aplicación serverless, con el comando: **fn -v deploy --app RedBullApp**

```
oscar_bern@cloudshell:oci-serverless-python (us-ashburn-1)$ fn -v deploy --app RedBullApp
Deploying load-file to app: RedBullApp
Bumped to version 0.0.97
Using Container engine docker
Building image iad.ocir.io/idikzonisftg/redbull/load-file:0.0.97
Dockerfile content
-----
FROM fnproject/python:3.9-dev as build-stage
WORKDIR /function
ADD requirements.txt /function/

RUN pip3 install --target /python/ --no-cache --no-cache-dir -r requirements.txt &&\
    rm -fr ~/.cache/pip /tmp* requirements.txt func.yaml Dockerfile .venv &&\
    chmod -R o+r /python
```

Si todo esta correcto el resultado en el CloudShell debe ser:

Successfully created function

9. Habilitar LOGS para rastreo de errores e información relevante

The screenshot shows the Oracle Cloud console interface. On the left, a sidebar contains navigation links: 'Getting started', 'Functions', 'Configuration', 'Signature verification', 'Metrics', and 'Logs' (highlighted in yellow). The main area displays the 'RedBullApp' configuration page. It includes a green circular icon with a white 'A' and the word 'ACTIVE' below it. The page is divided into 'General information' and 'Network information' sections. The 'General information' section shows the OCID, compartment, logging policy, trace name, creation and update timestamps, and signature verification status. The 'Network information' section shows subnets and network security groups. Below these sections is a 'Logs' table with columns for Category, Status, Log Name, Log Group, and Enable Log. The table shows one item: 'Function Invocation Logs' with a status of 'Not Enabled'. On the right side, a 'Enable Log' dialog is open. It contains a link to documentation, a compartment dropdown set to 'redbullhol', a log group dropdown set to 'Select a log group', radio buttons for 'Auto-create a default Log Group' (selected) and 'Create a new Log Group', a log name input field with 'RedBullApp_invoke', and a log retention dropdown set to '1 month (default)'. At the bottom of the dialog are 'Enable Log' and 'Cancel' buttons.

RedBullApp

Move application Add tags Delete

Application information Tags

General information

OCID: ...6l5spgq [Show](#) [Copy](#)

Compartment: redbullhol

Logging policy: None

Trace name: None

Created: Fri, Feb 3, 2023, 18:32:59 UTC

Last updated: Fri, Feb 3, 2023, 18:32:59 UTC

Signature verification: Disabled

Network information

Subnets: [Private Subnet-RedBullVCN](#)

Network security groups: None [Add](#)

Logs

Category	Status	Log Name	Log Group	Enable Log
Function Invocation Logs	-	-	-	Not Enabled

Showing 1 item

Enable Log

For more information about service logs, see [documentation](#).

Compartment

redbullhol

oxmteamman (root)/TestEnvironment/redbullhol

Log Group ⓘ

Select a log group

☒ Auto-create a default Log Group

☐ Create a new Log Group

Log Name

RedBullApp_invoke

Log Retention

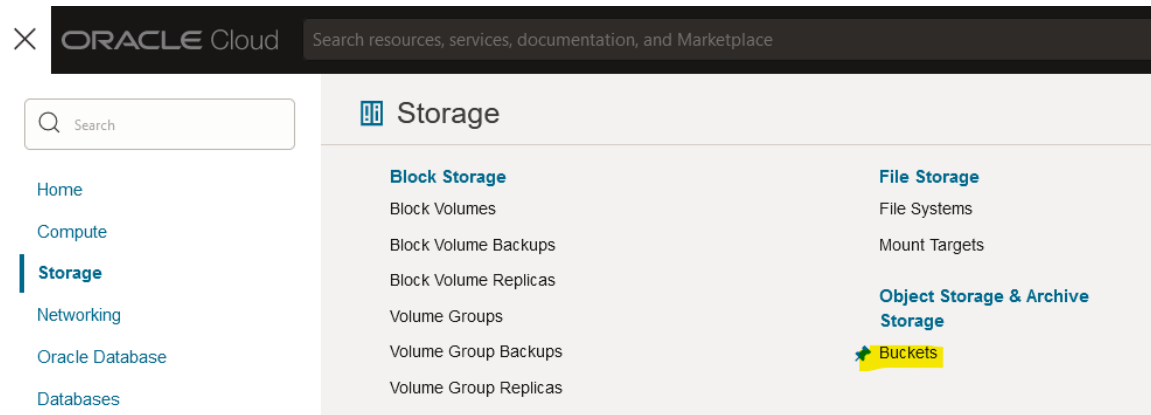
1 month (default)

1 month equals to 30 days

Enable Log Cancel

CREACION BUCKET PARA ARCHIVOS

Crear Bucket en el servicio de Object storage



IMPORTANTE: habilitar la opción de emisión de eventos, ya que esto es lo que ejecutara la función serverless para la carga del respectivo archivo.

Create Bucket

Bucket Name

Files

Default Storage Tier

☒ Standard

☐ Archive

The default storage tier for a bucket can only be specified during creation. Once set, you cannot change it.

☐ Enable Auto-Tiering

Automatically move infrequently accessed objects from the Standard tier to less expensive storage tiers.

☐ Enable Object Versioning

Create an object version when a new object is uploaded, an existing object is overwritten, or an object is deleted.

☒ Emit Object Events

Create automation based on object state changes using the [Events Service](#).

☐ Uncommitted Multipart Uploads Cleanup

Create a lifecycle rule to automatically delete uncommitted multipart uploads older than 7 days.

Encryption

☒ Encrypt using Oracle managed keys

Leaves all encryption-related matters to Oracle.

☐ Encrypt using customer-managed keys

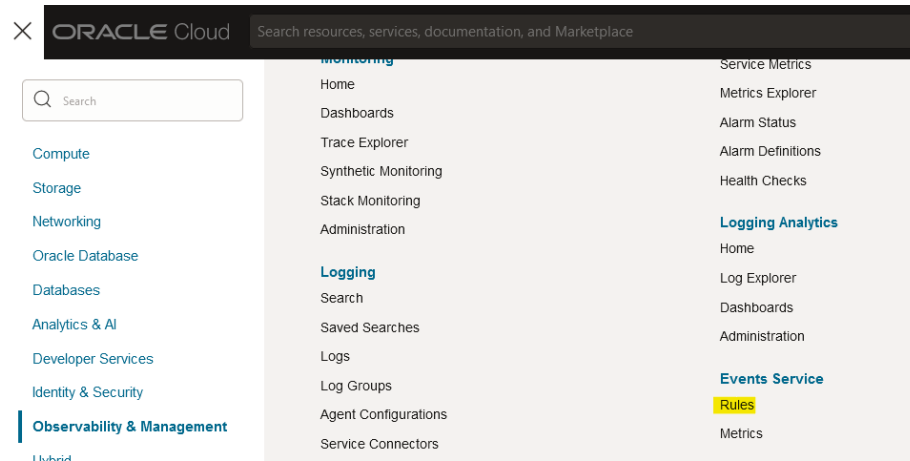
Requires a valid key from a vault that you have access to. [Learn more](#)

Tags

Create Cancel

CONFIGURACION SERVICE CONNECTOR HUB

En el módulo de Observability



Crear la regla que ejecutara la función cada vez que se cargue el archivo

Create Rule

[Help](#)

Display Name
load_files

Description
Describe what the rule does. Example: Sends a notification when backups complete.

Rule Conditions

Limit the events that trigger actions by defining conditions based on event types, attributes, and filter tags. [Learn more](#)

Condition : Service Name : Event Type

Event Type : Object Storage : Object - Create

To emit events for object state changes, enable Emit Object Events on the bucket details page. [Learn more](#).

Condition : Attribute Name : Attribute Values

Attribute : bucketName : Files

+ Another Condition

Rule Logic

```
MATCH event WHERE (
  eventType EQUALS ANY OF (
    com.oraclecloud.objectstorage.createobject
  )
  AND (
    bucketName MATCHES ANY OF (
      Files
    )
  )
)
```

[View example events \(JSON\)](#)

Validate Rule

Actions

Actions trigger for the specified event conditions. [Learn more](#).

Action Type : Function Compartment : Function Application : Function

Functions : redbullhol : RedBullApp : load-file

Create Rule Save as stack Cancel

PROBAR APLICACIÓN

Finalmente puedes probar tu aplicación únicamente cargando el archivo en el bucket creado previamente del servicio object storage.

1. Descargar archivo de prueba CSV:

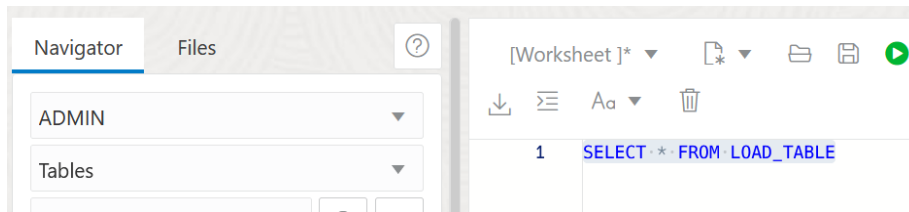
<https://objectstorage.us-ashburn-1.oraclecloud.com/p/MSmBkReA-TET1pfUpsvX5ZsC6uTFZpU140p7t7uitURUJ9hwOKOI0z0O5mn7stXJ/n/idikzonisftg/b/DataFile/o/Employees.csv>

2. Cargar el archivo en el bucket creado

The image shows two side-by-side screenshots from the Oracle Cloud console. The left screenshot displays the 'Bucket Details' page for a bucket named 'B'. It includes a 'Files' section with buttons for 'Edit Visibility', 'Move Resource', 'Re-encrypt', 'Add tags', and 'Delete'. Below this is the 'Bucket Information' tab showing details like Namespace, Compartment, Created date, ETag, and OCID. The 'Usage' section shows 1 object and 128 bytes. The right screenshot shows the 'Upload Objects' dialog. It has a text field for 'Object Name Prefix' (optional), a 'Storage Tier' dropdown set to 'Standard', and a 'Choose Files from your Computer' section. A file named 'Employees.csv' (128 bytes) is selected. At the bottom, there are 'Upload' and 'Cancel' buttons.

Después de cargado el archivo será procesado por la función Serverless y cargado en la base de datos en la tabla **LOAD_TABLE**

The image shows two side-by-side screenshots from the Oracle Cloud console. The left screenshot displays the 'Autonomous Database details' page for a database named 'ADW'. It includes a 'Database actions' button and a 'General information' section showing the database name. The right screenshot shows the 'Development' page, which features an 'SQL' icon and the text 'Execute queries and scripts, browse and manage your database object...'.



En el editor SQL ingresar la siguiente instrucción:

SELECT * FROM LOAD_TABLE

Query Result Script Output DBMS Output Explain Plan

Download Execution time: 0.003 seconds

	ID	NAME	LAST_NAME
1	1	Javier	Bernal
2	2	Maria	Sarmiento
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