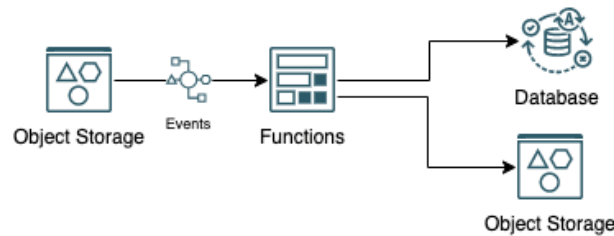


LABORATORIO CONSTRUCCIÓN DE APLICACIONES ORACLE CLOUD SERVERLESS

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.

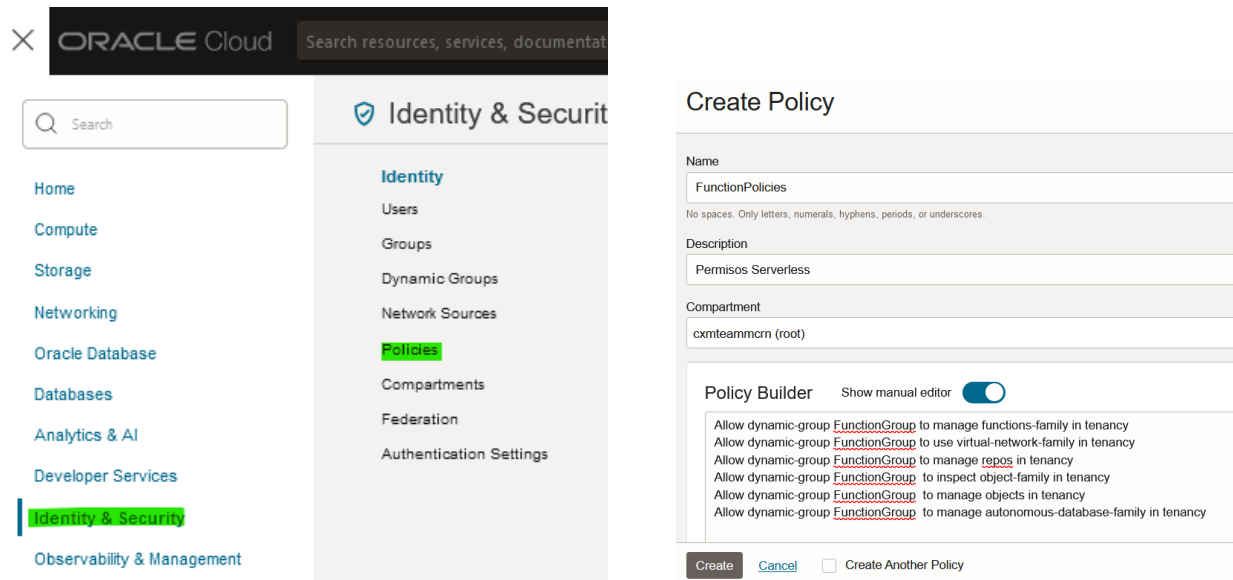
La imagen muestra la interfaz de usuario de Oracle Cloud. A la izquierda, hay un menú de navegación con opciones como Home, Compute, Storage, Networking, Oracle Database, Databases, Analytics & AI, Developer Services, Identity & Security (destacado) y Observability & Management. En el centro, se muestra el panel de 'Identity & Security' con subopciones como Users, Groups, Dynamic Groups (destacado), Network Sources, Policies, Compartments, Federation y Authentication Settings. A la derecha, se muestra el formulario 'Create dynamic group'. El formulario tiene los siguientes campos: 'Name' con el valor 'FunctionGroup', 'Description' con el valor 'FunctionGroup', y una sección 'Matching rules'. En esta sección, se indica que las reglas definen qué recursos son miembros del grupo dinámico. Se muestra un ejemplo de regla: 'Any {instance.id = 'ocid1.instance.oc1.iad..example'ocid1.compartment.oc1..exampleuniqueid2'}'. Se selecciona la opción 'Match any rules defined below'. En la sección 'Rule 1', se ha ingresado la regla: 'ALL {resource.type = 'fnfunc'}'. Al final del formulario, hay 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'}

2. 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**



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 image shows a screenshot of the Oracle Cloud console. On the left, the 'Developer Services' menu is visible with 'Developer Services' highlighted. The main content area shows the 'Create Topic' form. The form has a 'Name' field with the value 'NOMBRE-MI-COMPANIA', a 'Description' field, and a 'Create' button. A warning message states: 'Once the topic is created, an admin access.' The form also includes a 'Show advanced options' link and a 'Cancel' button.

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 image shows a screenshot of the 'Create Subscription' form in the Oracle Cloud console. The form is titled 'Configure Subscription' and has a 'Protocol' dropdown set to 'Email'. The 'Email' field contains the text 'CORREO COMISARIO DE CARRERO RACING TO THE CLOUD'. A warning message states: 'Enter a valid email address.' The form also includes a 'Show advanced options' link and a 'Create' button. A warning message states: 'Email notifications use the sender "noreply" at a region-specific notification. Example sender: noreply@notification.us-ashburn-1.oci.oraclecloud. Creating a subscription for Email.'

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**



[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

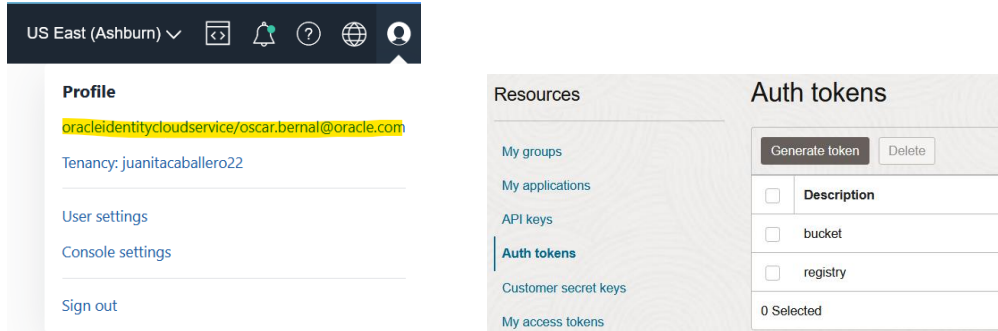
Compartment: cxmteammcn (root)/Consumo_MCRN

OCID: ...nwrhma [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 Identity Cloud Service user profile page. The top navigation bar includes 'US East (Ashburn)' and various icons. The left sidebar contains links for 'Profile', 'User settings', 'Console settings', and 'Sign out'. The main content area is divided into 'Resources' and 'Auth tokens'. The 'Auth tokens' section has a 'Generate token' button and a table with columns for 'Description' and 'Action'. The table currently shows two entries: 'bucket' and 'registry', both with checkboxes in the 'Action' column. Below the table, it says '0 Selected'.

Generate token

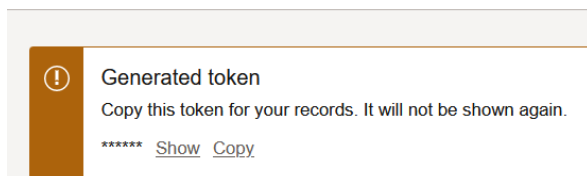


The screenshot shows the 'Generate token' form. It has a 'Description' label and a text input field containing the word 'function'.

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

i Resource availability checked successfully.

Basic Information

VCN Name **i**

RedBullVCN

Compartment **i**

redbullhol

cmteam00m (root)/TestEnvironment/redbullhol

Configure VCN and Subnets

VCN CIDR Block **i**

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 **i**

10.0.0.0/24

The subnet CIDR blocks must not overlap.

Private Subnet CIDR Block **i**

10.0.1.0/24

The subnet CIDR blocks must not overlap.

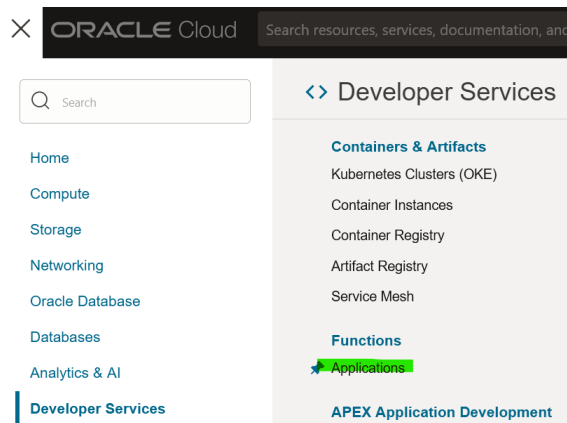
DNS Resolution

☒ 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](#)

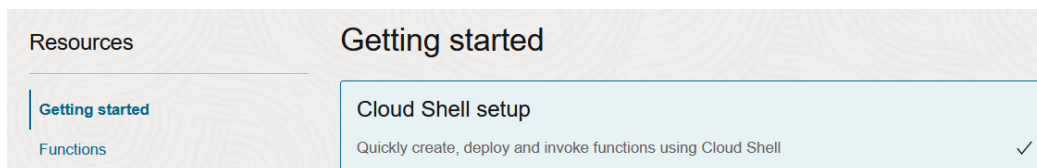
2. Creación de Aplicación Serverless



Crear una aplicación con el nombre **RedBullApp**

The screenshot shows the 'Create application' form. The 'Name' field contains 'RedBullApp' (highlighted with a green box). The 'VCN in redbullhol' field contains 'RedBullVCN' and has a '(Change compartment)' link. The 'subnets in redbullhol' field has a '(Change compartment)' link and a 'Select up to 3 Subnets' button. Below these is the 'Tagging options' section, which includes a link 'What can I do', a 'Tag namespace' dropdown menu set to 'None (add a free-form tag)', and an empty 'Tag key' field. At the bottom are three buttons: 'Create', 'Save as stack', and 'Cancel'.

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

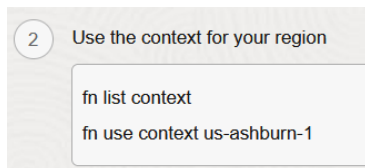


Aquí un ejemplo de los comandos y el resultado de cada una de las ejecuciones en Cloud Shell:

Dada clic en el botón “Launch Cloud Shell”



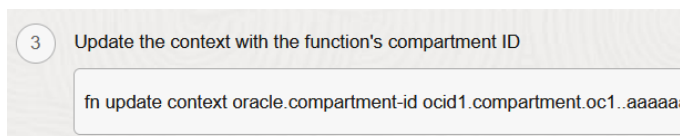
Listar los diferentes contextos serverless correspondientes a cada una de las regiones que se estén usando, ***copiar y ejecutar los comandos que aparecen en la consola:***



```
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 cxnteamcrn as an OCI Local user oscar.bernal@oracle.com

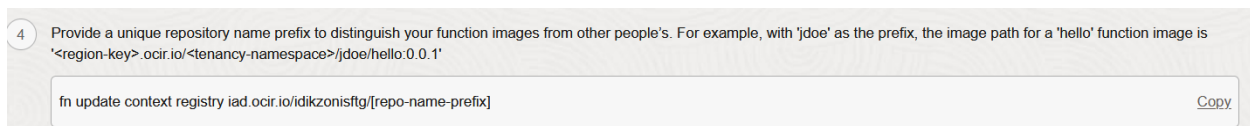
Type 'help' for more info.
oscar_bern@cloudshell:~ (us-ashburn-1)$ fn list context
CURRENT NAME      PROVIDER  API URL
*   default       oracle-cs
    us-ashburn-1  oracle-cs https://functions.us-ashburn-1.oci.oraclecloud.com
    us-phoenix-1  oracle-cs https://functions.us-phoenix-1.oci.oraclecloud.com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



```
oscar_bern@cloudshell:~ (us-ashburn-1)$ fn update context oracle.compartment-id ocid1.compart
Current context updated oracle.compartment-id with ocid1.compartment.oc1..aaaaaaas76tcr4yeb6
```

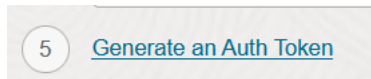
Establecer un **pre-fijo** para el contexto del repositorio de imágenes Docker



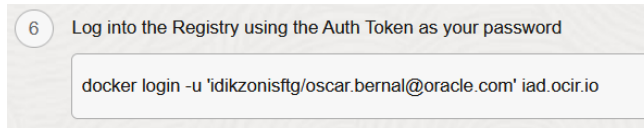
Establecer el repositorio de imágenes, para este caso **debes reemplazar [repo-name-prefix] por redbull**, en el comando dado por la consola quedado así:

```
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**



Establecer conexión al repositorio de imágenes



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 en el siguiente repositorio de Gitlab tendremos disponible el código de la aplicación y únicamente tendremos que importarlo y compilarlo en nuestra cuenta cloud.

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)$
```

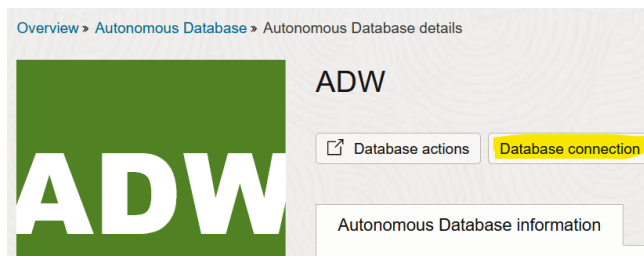
2. Descargar el archivo **func.yaml** el cual tiene los parámetros de configuración de la aplicación, ingresando al siguiente link:
<https://gitlab.com/oscarbm7/oci-serverless-python/-/raw/main/func.yaml?inline=false>
3. Editar el archivo(En Notepad) ingresando los valores resaltados por los recopilados previamente:

```
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.aaaaaaaaxxxxxxxxxxxxxxxxxxxxxxxx
  ADB_OCID: ocid1.autonomousdatabase.oc1.iad.yyyyyyyyyyyyyyyyyyy
  COMPANY: ACME CORP XXXXXXXXXXXXX
  DBPWD: XXXYYYYYYY2121**
  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: **adwdemo_medium** (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 TNS names for your connections. See the [documentation](#) for details.

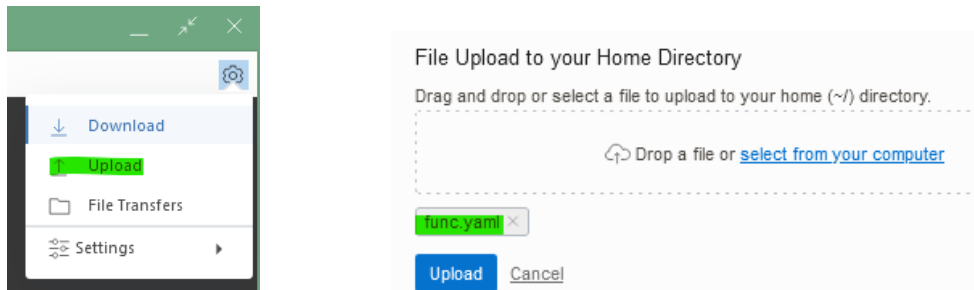
TLS Authentication

Mutual TLS	
TNS Name ⓘ	Connection String ⓘ
adwdemo_high	...ecurity=(ssl_server_dn_match=yes))) Show Copy
adwdemo_low	...ecurity=(ssl_server_dn_match=yes))) Show Copy
adwdemo_medium	...ecurity=(ssl_server_dn_match=yes))) Show Copy

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.anuwcljtubxct
  COMPANY: ACME CORP XXX
  DBPWD: P@ssw0rd1**
  DBSVC: adwdemo_high
  DBUSER: ADMIN
  TNS_ADMIN: /tmp/dbwallet
  TOPIC_OCID: ocid1.onstopic.oc1.iad.aaaaaaaagruoyzvxfcz
```

5. Subir el archivo 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_berrn@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

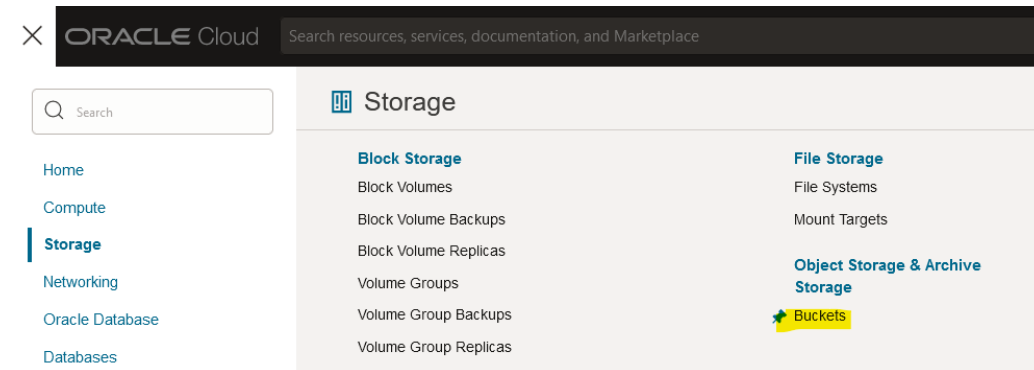
The screenshot shows the Oracle Cloud console interface. On the left, a sidebar contains navigation links: 'Getting started', 'Functions', 'Configuration', 'Signature verification', 'Metrics', and 'Logs' (highlighted in yellow). The main area displays the 'RedBullApp' configuration page. At the top, there's a green circle with a white 'A' and the word 'ACTIVE'. Below it, there are buttons for 'Move application', 'Add tags', and 'Delete'. The page is divided into two tabs: 'Application information' and 'Tags'. The 'Application information' tab is active, showing 'General information' and 'Network information'. The 'General information' section includes fields for OCID, Compartment, Logging policy, Trace name, Created, Last updated, and Signature verification. The 'Network information' section includes Subnets and Network security groups. Below this, there's a 'Logs' section with a table showing log configuration. The table has columns for Category, Status, Log Name, Log Group, and Enable Log. The 'Function Invocation Logs' row shows a status of 'Not Enabled' with a yellow toggle switch. To the right of the main configuration page, a 'Enable Log' dialog is open. It contains a link to 'documentation', a 'Compartment' dropdown set to 'redbullhol', a 'Log Group' dropdown with a search icon, and two radio buttons: 'Auto-create a default Log Group' (selected) and 'Create a new Log Group'. Below these, there's a 'Log Name' field with the value 'RedBullApp_invoke' and a 'Log Retention' dropdown set to '1 month (default)'. At the bottom of the dialog, there are 'Enable Log' and 'Cancel' buttons.

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

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

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.

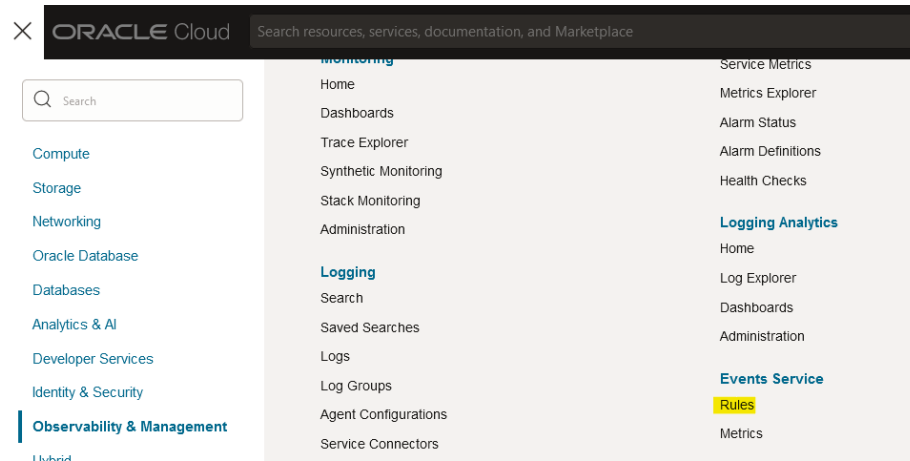
☐ Encrypt using customer-managed keys
Requires a valid key from a vault that you have access to. [Learn more](#)

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

Event Type

:

Service Name

Object Storage

Event Type

Object - Create

×

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

Condition

Attribute

:

Attribute Name

bucketName

Attribute Values

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

Functions

Function Compartment

redbullhol

Function Application

RedBullApp

Function

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:

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

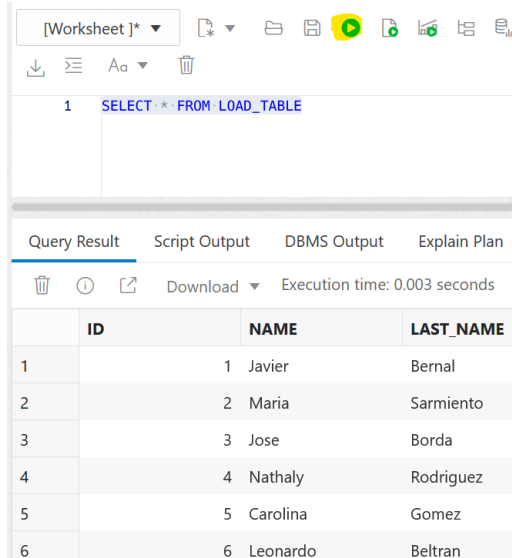
The image shows two side-by-side screenshots from the Oracle Cloud console. The left screenshot displays the 'Bucket Details' for a bucket named 'B'. It includes a 'Files' section with buttons for 'Edit Visibility', 'Move Resource', 'Re-encrypt', 'Add tags', and 'Delete'. Below this is a 'General' section with metadata: Namespace: idikzonisftg, Compartment: edbulhol, Created: Thu, Feb 9, 2023, 19:06:03 UTC, ETag: 414fd376-04c0-444a-8745-870f2ac26a90, and OCID: ...7bsz2phq. 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 screenshots from the Oracle Cloud console. The left screenshot displays the 'Autonomous Database' (ADW) details page. It features a large 'ADW' logo and a 'Database actions' button. The 'General information' section shows the database name as 'ADW'. The right screenshot shows the 'Development' section of the SQL Developer interface. It includes an 'SQL' icon and the text 'Execute queries and scripts, browse and manage your database object...'. Below this, a SQL query is entered in a text area: 'SELECT * FROM LOAD_TABLE'.

En el editor SQL ingresar la siguiente instrucción:

SELECT * FROM LOAD_TABLE



The screenshot shows an SQL editor interface. At the top, there is a toolbar with various icons for file operations and execution. Below the toolbar, the SQL query `SELECT * FROM LOAD_TABLE` is entered in a text area. The interface has tabs for 'Query Result', 'Script Output', 'DBMS Output', and 'Explain Plan'. The 'Query Result' tab is active, displaying a table with 6 rows and 4 columns: ID, NAME, and LAST_NAME. The execution time is noted as 0.003 seconds.

	ID	NAME	LAST_NAME
1	1	Javier	Bernal
2	2	Maria	Sarmiento
3	3	Jose	Borda
4	4	Nathaly	Rodriguez
5	5	Carolina	Gomez
6	6	Leonardo	Beltran

Bibliografía:

<https://docs.oracle.com/en-us/iaas/Content/Functions/Concepts/functionsoverview.htm>

<https://oracle.github.io/python-oracledb/>

<https://fnproject.io/>

<https://medium.com/oracledevs/an-exploration-using-oci-functions-4c5d4e70d00c>

<https://oracle-cloud-infrastructure-python-sdk.readthedocs.io/en/latest/api>