The book cover features a dark, textured background with a subtle pattern of tall, thin trees. In the upper right corner, there is a stylized, abstract illustration of a person's head and shoulders in shades of blue, orange, and red. The title is written in large, bold, white sans-serif font.

Inovação com dados em nuvem

Criando Ambientes Híbridos
com Oracle MySQL Database
Service

Herbert Rogério B. de Menezes
Agosto 2021



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Guia para Laboratório *Hands-On*

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Introdução

Neste laboratório prático, vamos configurar uma topologia híbrida nuvem da Oracle para implantar criar uma replicação de dados entre um MySQL On-Premise e um MySQL Database Service através de uma VPN. É importante que os conceitos fundamentais desses recursos estejam claros para uma boa experiência em nossa nuvem.

Recursos usados

OCI (Conta Trial de 30 dias ou uma conta pagante)

- 1 nó do MySQL Database Service com o HeatWave (30 days free)
- 1 Compute Instance com o OpenVPN

Tópicos não cobertos

- Instalação dos softwares na máquina host
- Como criar uma conta na OCI

Lab 1.

Acessando seu ambiente



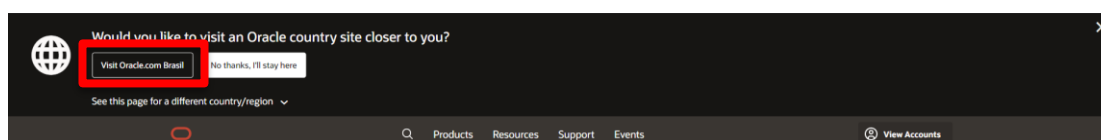
Lab 1. Acessando seu ambiente

Objetivos

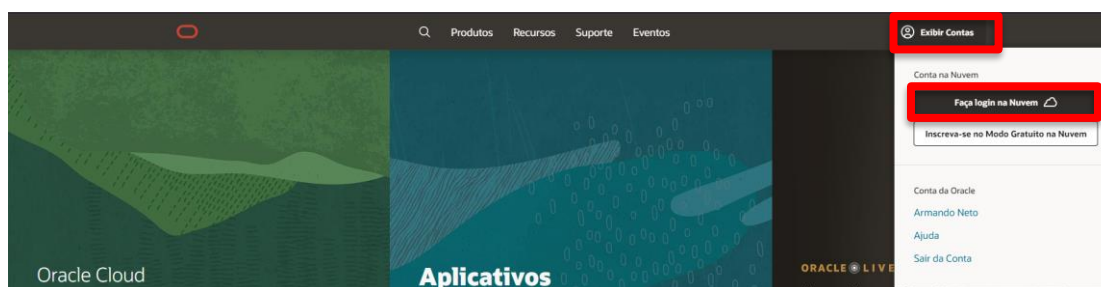
- Acessar o console da Oracle Cloud
- Conhecer os serviços de infraestrutura e plataforma
- Familiarizar-se com o ambiente

Nesta seção você aprenderá mais sobre o acesso inicial ao ambiente.

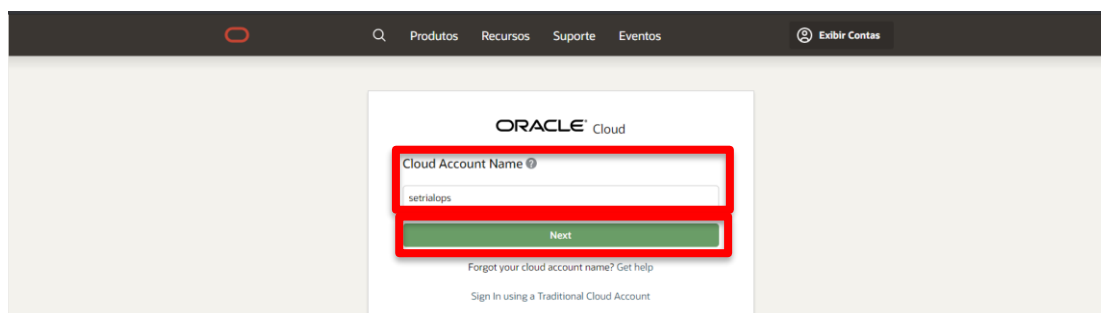
Vá para oracle.com. Você pode alterar o idioma dessa página antes do acesso ao ambiente:



No site já em português, clique em Exibir Contas e depois em Faça Login na Nuvem:



O login deve ser feito com o “Cloud Account Name”, onde somente é necessário informar o **nome da conta** (definido no momento de solicitação do trial ou do ambiente final).



A tela de login para usuário é apresentada. O usuário administrador é identificado pelo e-mail utilizado no cadastro do ambiente.

The image shows the Oracle Cloud Account Sign In page. At the top, the Oracle Cloud logo is displayed. Below it, the text 'Oracle Cloud Account Sign In' is centered. There are two input fields: 'User Name' with the value 'empresa@empresa' and 'Password' with masked characters '.....'. A blue 'Sign In' button is positioned below the password field. At the bottom, there is a link that says 'Need help signing in? Click here'.

No primeiro acesso é solicitado que sua senha seja alterada.

A tela principal do seu ambiente é apresentada. Nela, você consegue ver algumas ações rápidas para a criação de alguns recursos, alguns artigos de soluções dentro da nuvem da Oracle que possa ajudar, a parte de Learn que leva para a documentação, que é muito bem detalhada.

Na barra superior tem-se o menu que lista todas as abas da console da nuvem, a lupa para pesquisas no ambiente de nuvem, informação de qual a região que está sendo visualizada, no caso da imagem abaixo está sendo visualizado a região de Ashburn, o sino é aonde é feito os anúncios relacionados a nuvem, na interrogação é aonde tem alguns tópicos de ajuda e também onde é possível entrar em contato com o suporte ou abrir um chamado para aumentar os limites de serviço da nuvem, no mundo é aonde o usuário consegue mudar o idioma da console da nuvem e por fim no símbolo de usuário o mesmo pode encontrar as informações dele.

us-shbm-1

Quick Actions

COMPUTE
Create a VM instance

2-6 mins

AUTONOMOUS TRANSACTION PROCESSING
Create a database

2-6 mins

AUTONOMOUS DATA WAREHOUSE
Create a data warehouse

2-6 mins

NETWORKING
Create a virtual cloud network

1-2 mins

OBJECT STORAGE
Store data

2-4 mins

NETWORKING SOLUTIONS
Create an IPsec VPN connection

2-6 mins

Solutions

Jump Start
Hands-on use of Oracle Cloud Infrastructure with self-paced learning and demo labs, for free.

Mission Critical Databases
Leverage a range of modern cloud data management options, with 100% on-premises compatibility.

Resource Manager
Automate the provisioning of your cloud infrastructure resources using HashiCorp Terraform.

Big Data and Analytics
Deploy popular technologies like Cloudera, Databricks, Ceph, and H2O on the fastest cloud infrastructure.

Learn

Adding users and groups

Understanding compartments

Launching your first instance

Understanding service limits

Key concepts and terminology

Overview of Autonomous Database

All systems operational
[View health dashboard](#)

Action Center

User Management
[Go to user management](#)

Billing
Total credits: \$885,275.28 / used: \$88,511,105.00

Total days elapsed: 15 / 30

[Analyze costs](#)
[Upgrade your account](#)

What's New

Oracle and Microsoft announced cloud interoperability to support multi-cloud environments.
Jun 6, 2019

Meet demand with auto scaling and on-demand scaling for Autonomous Database.
Jun 6, 2019

Add new spatial intelligence support to your Autonomous Data Warehouse instance.
May 30, 2019

Leverage Border Gateway Protocol (BGP) routes routing for IPsec VPNs.
May 21, 2019

Streamline solution deployments by using Oracle Cloud Infrastructure Service Broker for Automates.
May 20, 2019

[View release notes...](#)

Get Help

[Contact Support](#)
[Developer Tools](#)
[Documentation](#)

[Terms of Use and Privacy](#) [Cookie Preferences](#)

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Lab 2.

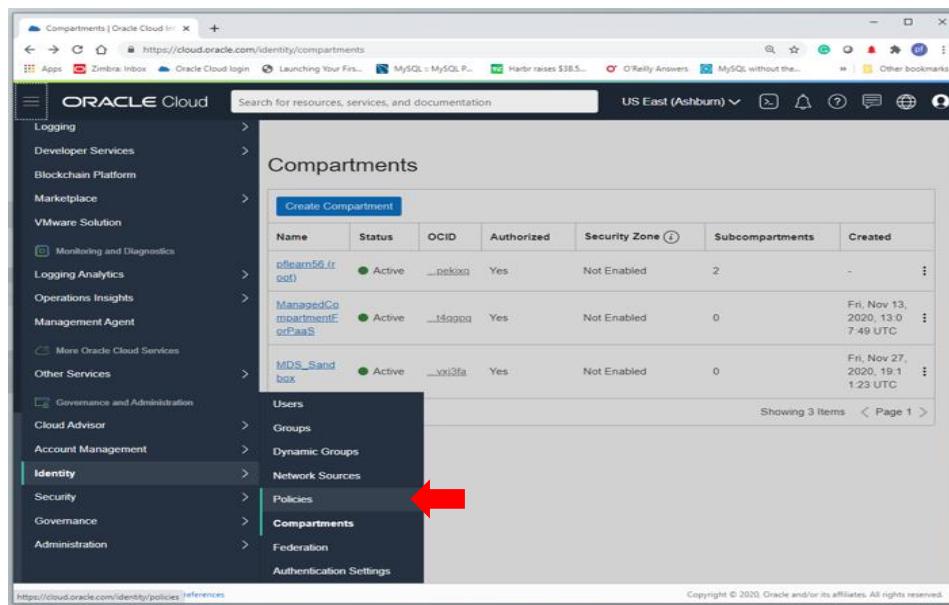
Criando uma instância do MySQL Database Service



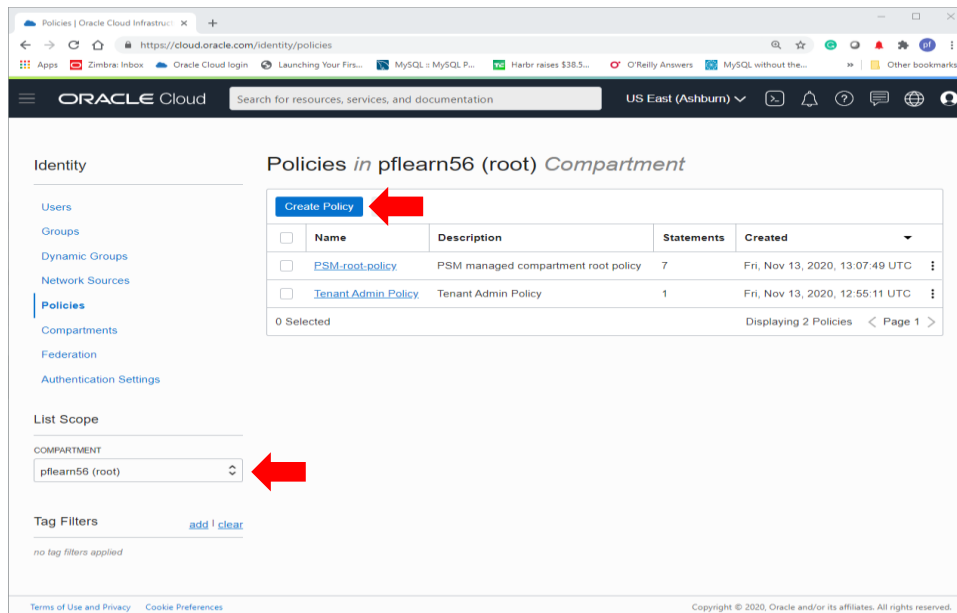
Lab 2. Criando uma instância do MySQL Database Service

2.1 Políticas para acesso ao MySQL Database Service

- a. No menu a esquerda, selecione Governance and Administration > Identity > Policies



- b. Na página de Policies, selecione o seu compartimento e clique em Create Policy

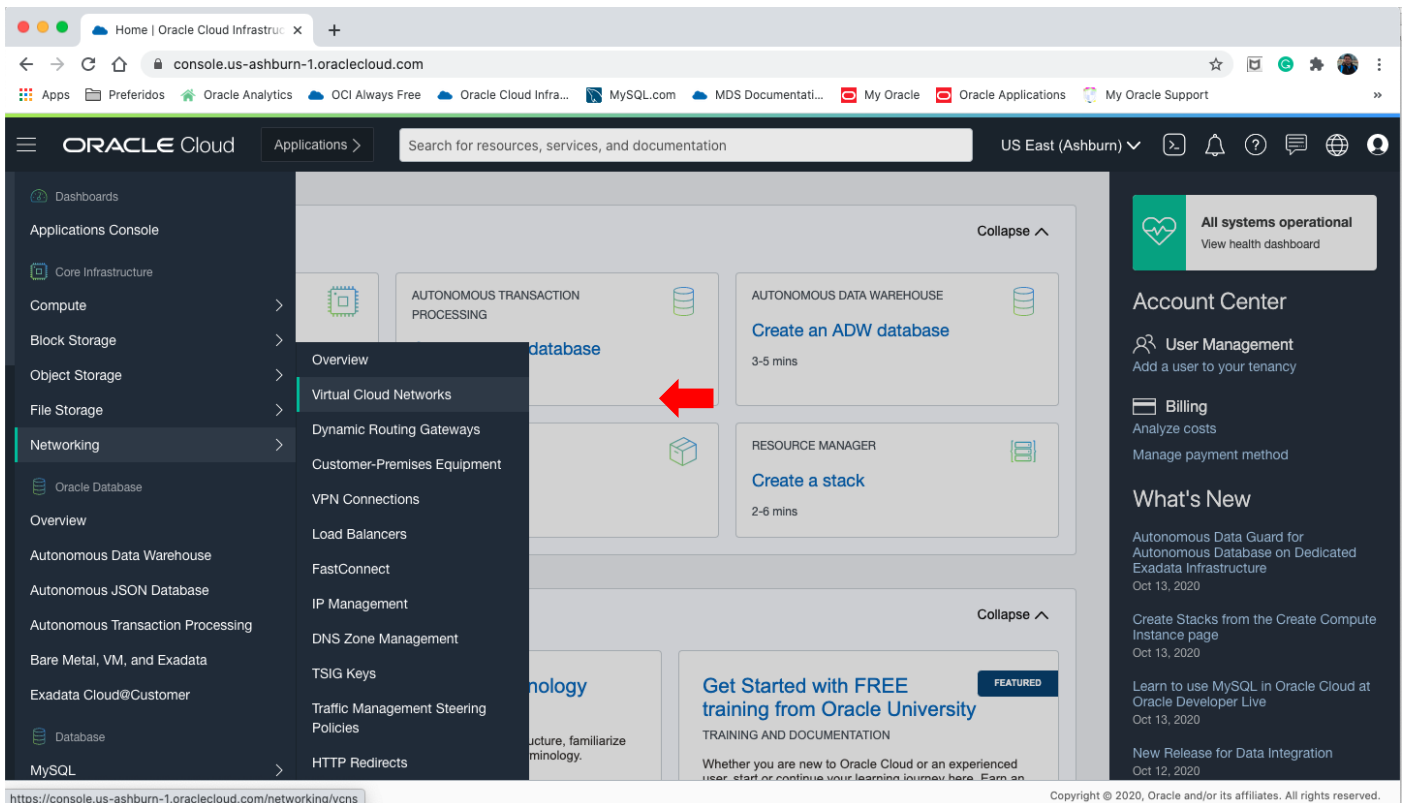


- c. Dê um nome para a sua política e adicione estas 3 políticas para o seu compartimento:

Allow group Administrators to {COMPARTMENT_INSPECT} in tenancy
 Allow group Administrators to {VCN_READ, SUBNET_READ, SUBNET_ATTACH, SUBNET_DETACH} in tenancy
 Allow group Administrators to manage mysql-family in tenancy

2.2 VCN

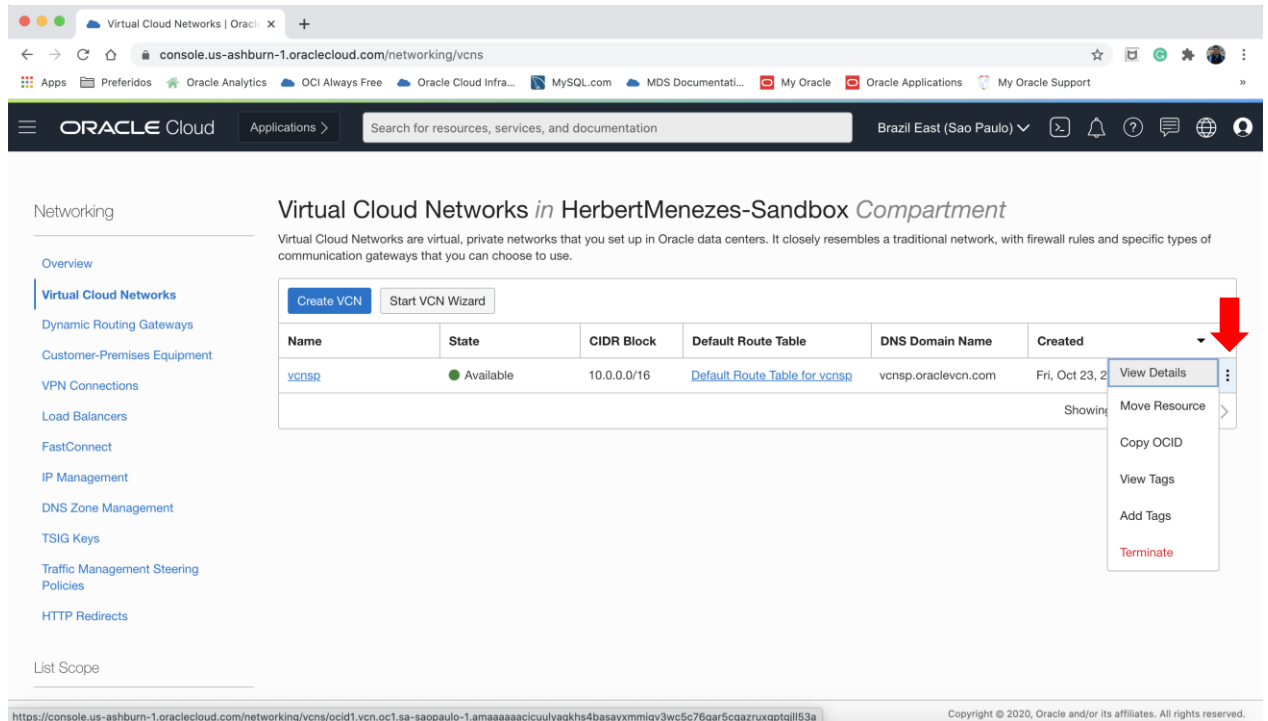
- a. No menu, selecione Networking > Virtual Cloud Network



- b. Pressione o botão “Start VCN Wizard”
- c. Selecione a opção VCN with Internet Connectivity e pressione o botão “START VCN WIZARD”
- d. Escolha um nome para a sua VCN e o compartimento onde ela será criada e pressione o botão “NEXT”
- e. Revise as informações e pressione o botão “CREATE”

2.3 Crie as regras de acesso na Security List

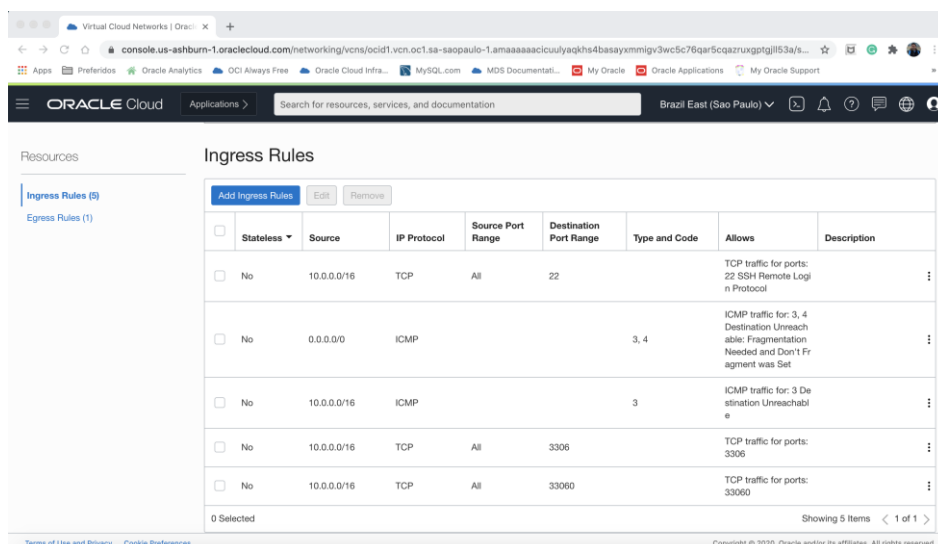
- a. Com a sua VCN criada, clique nos 3 pontos a direita do nome da sua VCN e selecione “View Details”



The screenshot shows the Oracle Cloud console interface. On the left, there's a sidebar with 'Networking' selected. The main area is titled 'Virtual Cloud Networks in HerbertMenezes-Sandbox Compartment'. Below this, there's a table of VCNs. One VCN named 'vcnsp' is listed with a state of 'Available'. A dropdown menu is open for this VCN, showing options like 'View Details', 'Move Resource', 'Copy OCID', 'View Tags', 'Add Tags', and 'Terminate'. A red arrow points to the 'View Details' option.

Name	State	CIDR Block	Default Route Table	DNS Domain Name	Created
vcnsp	Available	10.0.0.0/16	Default Route Table for vcnsp	vcnsp.oraclevcn.com	Fri, Oct 23, 2020

- b. Clique em “Security Lists” no menu a esquerda e então clique em “Security List for Private Subnet-<nome da sua VCN>” na lista de Security Lists da sua VCN
- c. Crie regras para que as portas 3306 e 33060 recebem tráfego da Subnet Pública de sua VCN. A sua Security List deve parecer com a do exemplo:

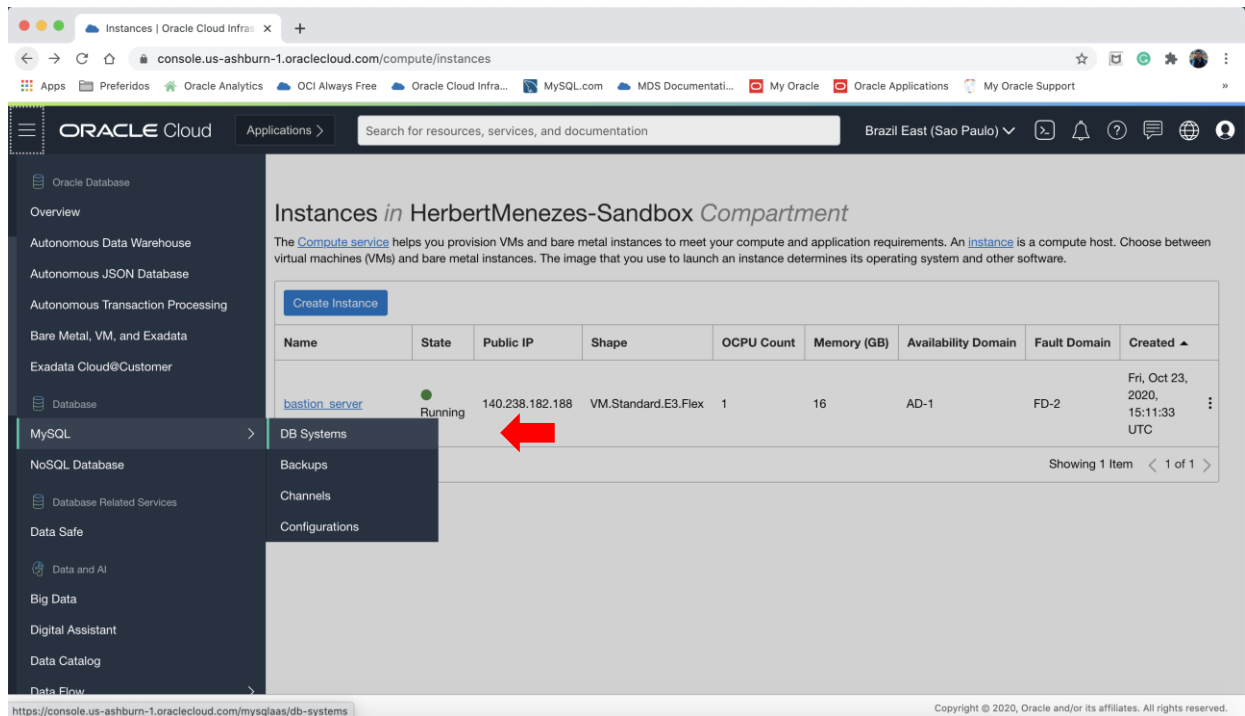


The screenshot shows the 'Ingress Rules' configuration page in the Oracle Cloud console. It displays a table of rules for a security list. The rules are configured to allow traffic on ports 22, 3306, and 33060.

Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description
<input type="checkbox"/>	10.0.0.0/16	TCP	All	22		TCP traffic for ports: 22 SSH Remote Login Protocol	
<input type="checkbox"/>	0.0.0.0/0	ICMP			3, 4	ICMP traffic for: 3, 4 Destination Unreachable: Fragmentation Needed and Don't Fragment was Set	
<input type="checkbox"/>	10.0.0.0/16	ICMP			3	ICMP traffic for: 3 Destination Unreachable	
<input type="checkbox"/>	10.0.0.0/16	TCP	All	3306		TCP traffic for ports: 3306	
<input type="checkbox"/>	10.0.0.0/16	TCP	All	33060		TCP traffic for ports: 33060	

2.4 Crie sua instância do MySQL Database Service

- a. No menu principal a esquerda, selecione a opção MySQL > DB Systems

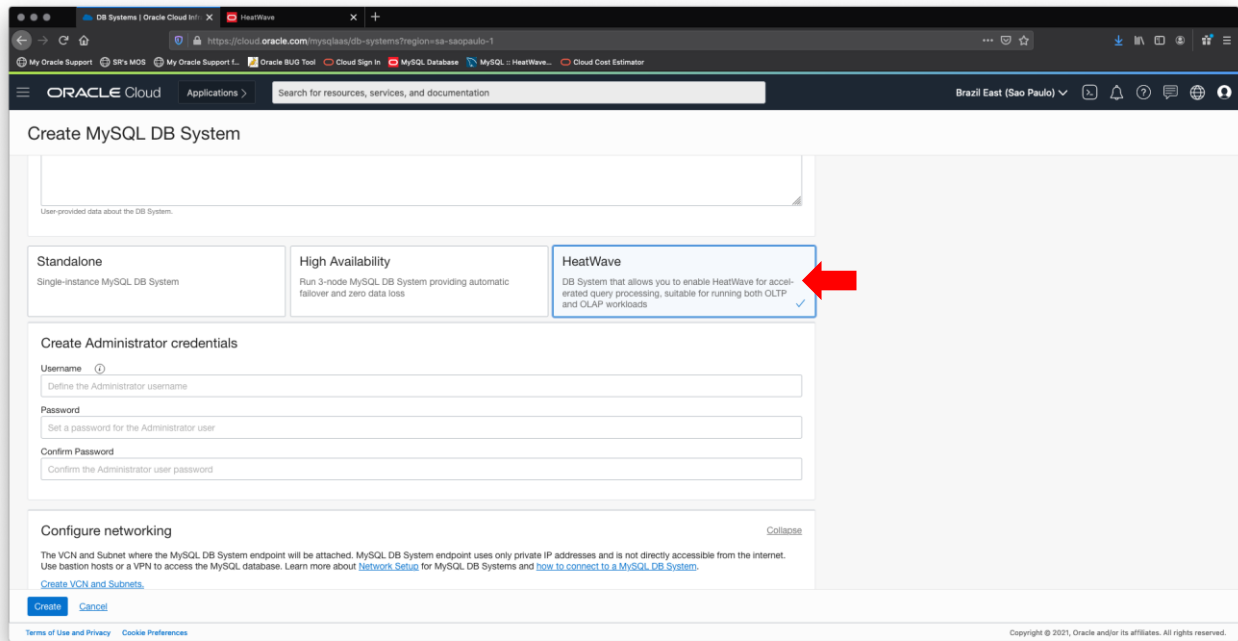


The screenshot shows the Oracle Cloud console interface. On the left sidebar, the navigation menu is expanded to 'MySQL', and the 'DB Systems' option is selected. A red arrow points to the 'DB Systems' link in the sidebar. The main content area displays the 'Instances' page for the 'HerbertMenezes-Sandbox' compartment. It includes a 'Create Instance' button and a table of existing instances.

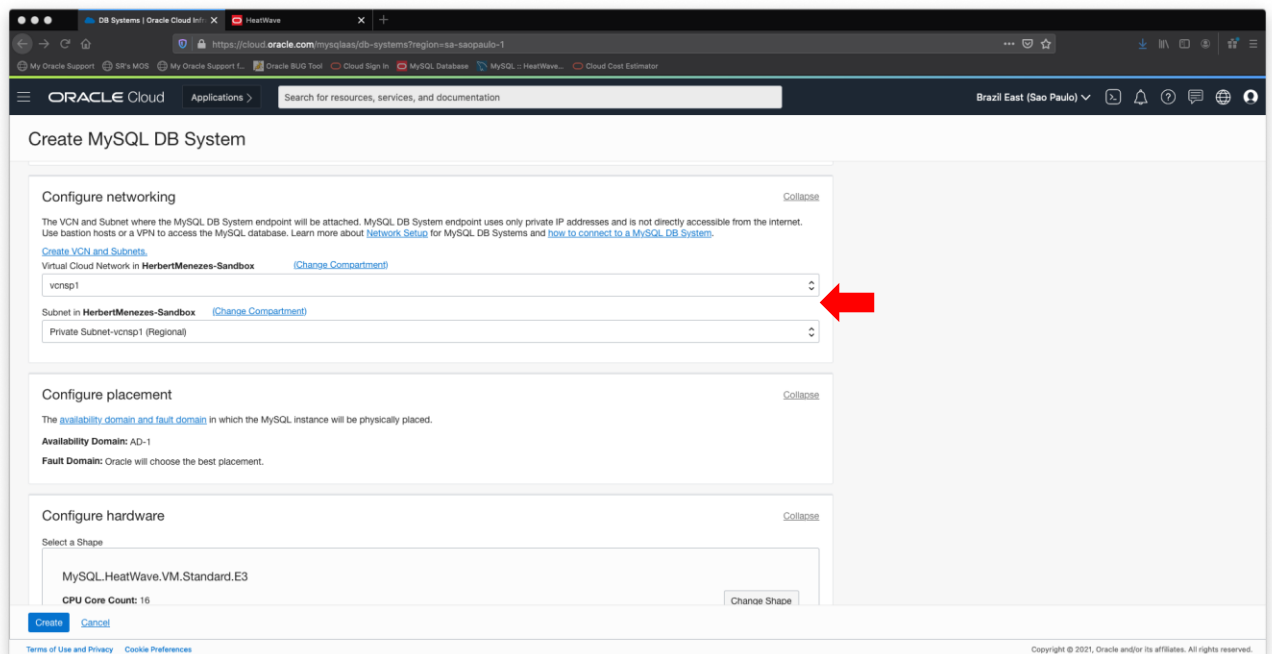
Name	State	Public IP	Shape	OCPU Count	Memory (GB)	Availability Domain	Fault Domain	Created
bastion_server	Running	140.238.182.188	VM.Standard.E3.Flex	1	16	AD-1	FD-2	Fri, Oct 23, 2020, 15:11:33 UTC

Showing 1 Item < 1 of 1 >

- b. Pressione o botão “CREATE MYSQL DB SYSTEM”
- c. Selecione o compartimento onde será criado o MDS
- d. Dê um nome a sua instância do MDS
- e. Escolha a opção **HeatWave** nas opções disponíveis



- f. Defina um nome para o usuário de administração da instância
- g. Defina a senha de acesso para este usuário
- h. Escolha a sua VCN para a criação da instância do MDS
- i. Escolha a sua subnet PRIVADA para a criação da instância do MDS



- j. Clique em Show Advanced Options

Create MySQL DB System

CPU Core Count: 16
Memory Size: 512 GB Change Shape

The shape determines CPU cores and memory allocated to each node in a MySQL DB System. In multi-node DB Systems the CPU core count and memory size will be multiplied by the total number of nodes.

Data Storage Size (GB)
1024

The amount of storage to allocate to the MySQL DB System for all data and log files.

Configure Backups

☒ **Enable Automatic Backups**
Enables automatic backups. You must also specify a retention period, and select a backup window.

Backup retention period Optional
The Retention Period defines how long to store the backups, in days. 1
7

Backup Window Start Time
The backup window start time defines the start of the time period during which your DB System is backed up. [Show More](#)

☒ **Default Backup Window**
The default backup window contains the time the window starts for the region.

☐ **Select Backup Window**
Select a backup window start time.

[Show Advanced Options](#)

Create Cancel

[Terms of Use and Privacy](#) [Cookie Preferences](#)

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k. Clique na aba Networking

Create MySQL DB System

☒ **Enable Automatic Backups**
Enables automatic backups. You must also specify a retention period, and select a backup window.

Backup retention period Optional
The Retention Period defines how long to store the backups, in days. 1
7

Backup Window Start Time
The backup window start time defines the start of the time period during which your DB System is backed up. [Show More](#)

☒ **Default Backup Window**
The default backup window contains the time the window starts for the region.

☐ **Select Backup Window**
Select a backup window start time.

[Hide Advanced Options](#)

Configuration Management **Networking** Tags

Hostname Optional 1
Define a DNS hostname for the MySQL DB System

MySQL Port Optional
3306

MySQL X Protocol Port Optional
33060

Create Cancel

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l. Defina um nome no campo **Hostname**

m. Pressione o botão “CREATE”

Lab 3.

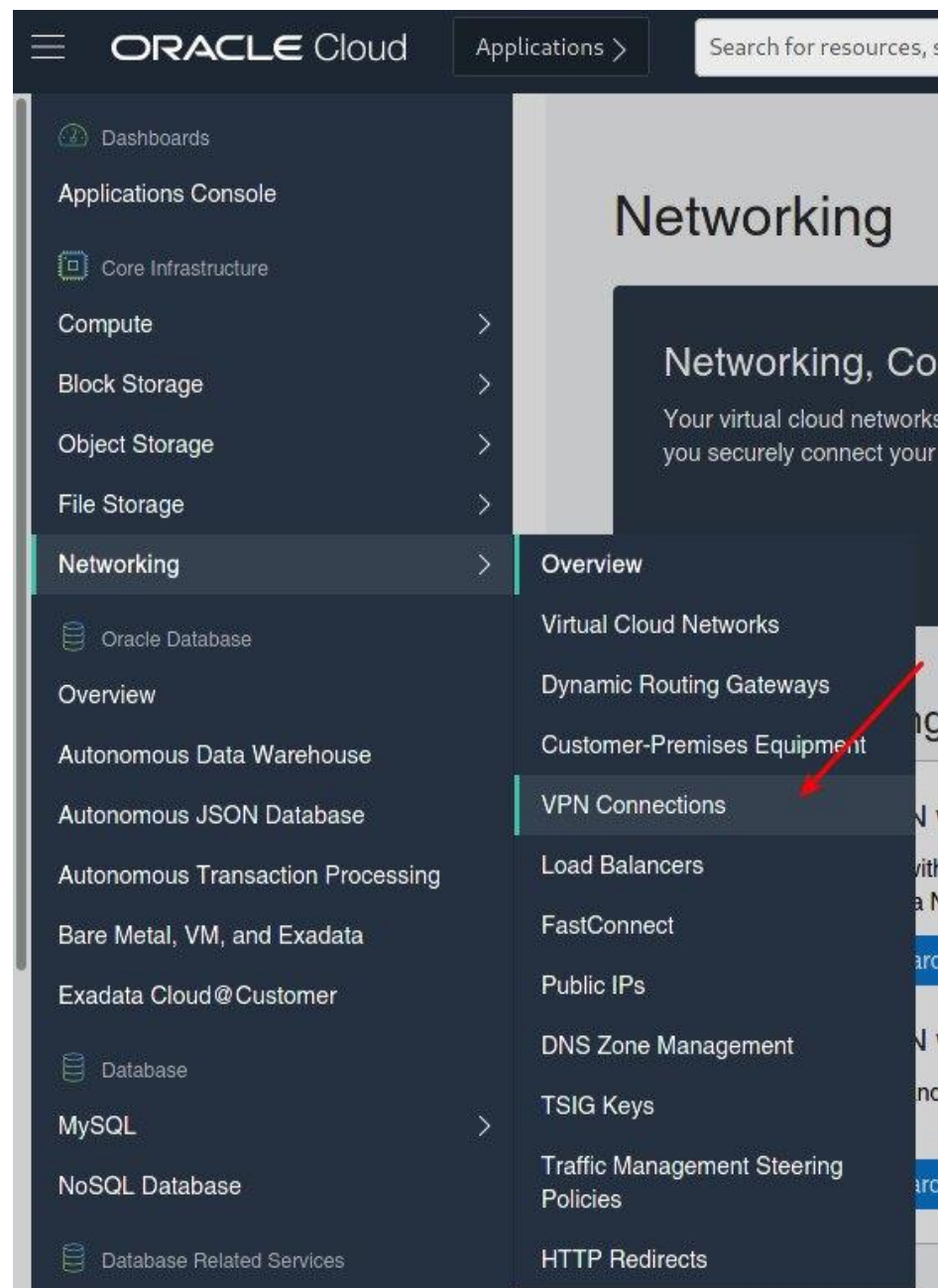
Criando um Servidor VPN



Lab 3. Criando um Servidor VPN

A OCI permite que você crie VPNs IPSEC facilmente com todos os hardwares de nível corporativo usados na indústria. Infelizmente, não temos essa oportunidade em casa (e não há necessidade dela), então vamos usar outra solução suportada que é mais apropriada para uso doméstico: OpenVPN. Se você é capaz de implantar a solução IPSEC, sugiro que a use.

Clique em Networking, VPN Connections



Nessa nova página, você tem um link para o Marketplace, onde pode implantar uma instância de computação para atuar como servidor OpenVPN:

VPN Connections *in sandbox-lefred Compartment*

VPN Connect is a site-to-site IPsec VPN that securely connects your on-premises corporate network to Oracle Cloud Infrastructure, using your existing internet connection.


If your users have client devices that need offsite access to Oracle cloud resources, you can also create an OpenVPN Access Server. See their [Marketplace solution](#).

[Create IPsec Connection](#) [Start VPN Wizard](#)

Name	Lifecycle State	Customer-Premises Equipment	Dynamic Routing Gateway
No connections found			

No marketplace, clique em Launch Stack

[Marketplace](#) » OpenVPN Access Server - BYOL



OpenVPN Access Server - BYOL

VPN solution for Virtual Cloud Network (VCN). Two connections for FREE. Buy license for more

OpenVPN Access Server delivers the enterprise VPN your business has been looking for. Protect your data communications, secure IoT resources, and provide encrypted remote access to on-premise, hybrid, and public cloud resources.

Categories: Security, Networking

Type
Stack

Version
AS ver 2.8.3 Stack -...

Compartment
sandbox-lefred

mdspm (root)/Sandbox/sandbox-lefred

☒ I have reviewed and accept the [Oracle Terms of Use](#) and the [Partner terms and conditions](#).

[Launch Stack](#)

Software Price per OCPU

BYOL

(Bring Your Own License)

There are additional fees for the infrastructure usage. ⓘ

Você precisa seguir o assistente e certificar-se de usar a VCN que criamos e a sub-rede pública:

Create Stack

- 1 Stack Information
- 2 [Configure Variables](#)
- 3 [Review](#)

Your application will launch as part of a stack that includes the infrastructure resources required to ensure that the application deploys and runs properly.

NAME *OPTIONAL*

OpenVPN Access Server - BYOL-20200818223309

DESCRIPTION *OPTIONAL*

CREATE IN COMPARTMENT

sandbox-lefred

mdspm (root)/Sandbox/sandbox-lefred

TERRAFORM VERSION

0.11.x

TAGS

Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values that can be attached to resources.

[Learn more about tagging](#)

TAG NAMESPACE

None (add a free-for... ▾)

TAG KEY

VALUE



+ Additional Tag

Next

[Cancel](#)

- ✓ [Stack Information](#)
- 2 **Configure Variables**
- 3 [Review](#)

Configure the variables for the infrastructure resources that this stack will create when you run the apply job for this execution plan.

Compute Configuration

OPENVPN ACCESS SERVER NAME

The name of the Instance

COMPUTE SHAPE

Compute Shape

Application Configuration

ADMINISTRATOR USERNAME

Administrator username used to log into administration portal

ADMINISTRATOR PASSWORD

Administrator password should have a minimum length of 8 and no special characters

ACTIVATION KEY *OPTIONAL*

Activation key is needed to handle more than two VPN connections. Purchase from <https://openvpn.net>

✓ Stack Information

2 Configure Variables

3 Review

Activation key is needed to handle more than two VPN connections. Purchase from <https://openvpn.net>

Network Configuration

NETWORK STRATEGY

Use Existing VCN

Create or use existing Network Stack (VCN and Subnet)

EXISTING NETWORK

lefred_vcn

An existing Virtual Cloud Network (VCN) in which to create the compute instances, network resources, and load balancers. If not specified, a new VCN is created.

EXISTING SUBNET ⓘ

Public Subnet-lefred_vcn (Regional)

An existing subnet to use for compute instances. This subnet must already be present in the chosen VCN.

Additional Configuration

COMPARTMENT

sandbox-lefred

The compartment in which to create all resources

PUBLIC SSH KEY STRING OPTIONAL

Public SSH Key to access VM via SSH

A instância de computação será iniciada pelo Terraform. Quando terminar, poderemos acessar a interface da web OpenVPN usando o IP público que foi atribuído a esta instância de computação usando as credenciais que inserimos no assistente:

Logs

Download Logs

Show Timestamps

```
Initializing provider plugins...
Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
data.template_file.bootstrap: Refreshing state...
oci_core_app_catalog_listing_resource_version_agreement.mp_image_agreement: Refreshing state... (ID:
data.oci_core_subnet.public_subnet: Refreshing state...
data.oci_core_app_catalog_subscriptions.mp_image_subscription: Refreshing state...
data.oci_core_vcn.vcn: Refreshing state...
oci_core_app_catalog_subscription.mp_image_subscription: Refreshing state... (ID: compartmentId/oci
data.oci_identity_availability_domain.ad: Refreshing state...
oci_core_network_security_group.as_network_security_group: Refreshing state... (ID: ocid1.networkse
oci_core_security_list.as_security_list: Refreshing state... (ID: ocid1.securitylist.oc1.iad.aaaaaa
oci_core_network_security_group_security_rule.as_network_security_group_security_rule_tcp443: Refre
oci_core_network_security_group_security_rule.as_network_security_group_security_rule_icmpall: Refre
oci_core_network_security_group_security_rule.as_network_security_group_security_rule_tcp943: Refre
oci_core_network_security_group_security_rule.as_network_security_group_security_rule_tcp22: Refre
oci_core_network_security_group_security_rule.as_network_security_group_security_rule_tcp945: Refre
oci_core_network_security_group_security_rule.as_network_security_group_security_rule_udp1194: Refre
oci_core_instance.as_instance: Refreshing state... (ID: ocid1.instance.oc1.iad.anuwcljxs3tnacac...l
data.oci_core_vnic_attachments.instance_vnics: Refreshing state...
data.oci_core_vnic.instance_vnic1: Refreshing state...
data.oci_core_private_ips.private_ips1: Refreshing state...
oci_core_public_ip.reserved_public_ip_assigned: Refreshing state... (ID: ocid1.publicip.oc1.iad.amaa

Apply complete! Resources: 0 added, 0 changed, 0 destroyed.

Outputs:
admin_password = *****
admin_username = root
instance_public_url = https://193.122.162.240/admin
```

Caso você tenha perdido esses logs, o ip está disponível na página Compute-> Instances:

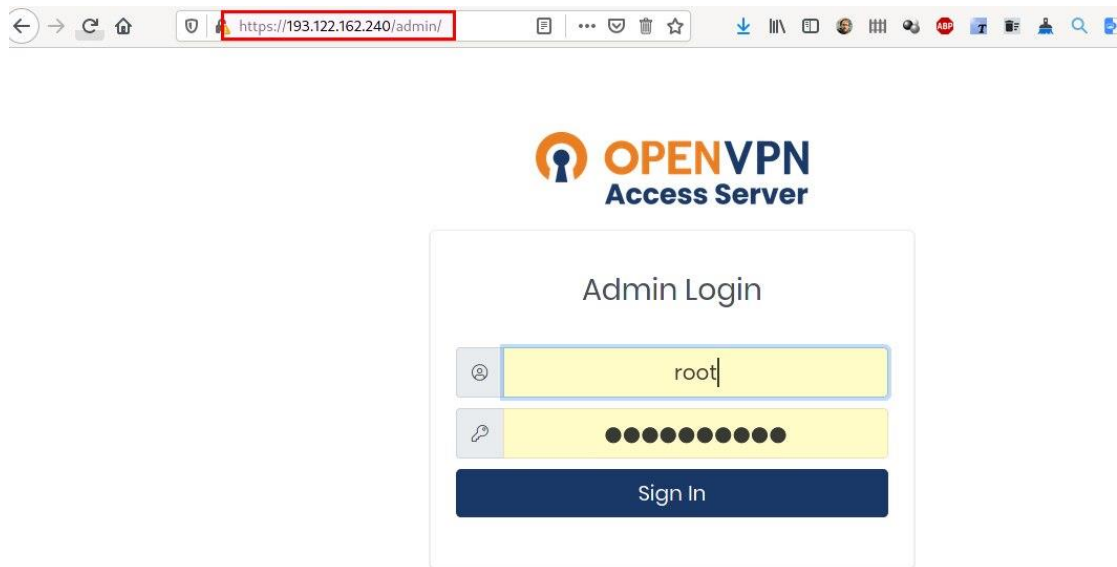
Instances *in* sandbox-lefred *Compartment*

The [Compute service](#) helps you provision VMs and bare metal instances to meet your compute and application requirements. compute host. Choose between virtual machines (VMs) and bare metal instances. The image that you use to launch an instance operating system and other software.

Create Instance

Name	State	Public IP	Shape	OCPU Count	Memory (GB)	Availab
openvpn_access_server	● Running	193.122.162.240	VM.Standard1.1	1	7	AD-1

Assim que a instância do OpenVPN for implantada, podemos acessar a interface da web e configurar o OpenVPN:



Como queremos ser capazes de nos conectar de nossa instância MDS a nosso servidor MySQL local para replicação, precisaremos configurar nossa VPN para usar roteamento em vez de NAT:

VPN Settings

VPN IP Network
Specify the addresses and netmasks for the virtual networks created for VPN clients

Dynamic IP Address Network
When a user does not have a specific VPN IP address configured on the [User Permissions](#) page, the user's VPN client is assigned an address from this network.

Network Address: # of Netmask bits:

Static IP Address Network (Optional)
Any static VPN IP addresses specified for particular users on the [User Permissions](#) page must be within this network

Network Address: # of Netmask bits:

Group Default IP Address Network (Optional)
When a group does not have a specific Dynamic IP Address pool setting, the dynamic IP address pool for the group will be allocated from this list of subnets.

Routing

Should VPN clients have access to private subnets (non-public networks on the server side)?

Specify the private subnets to which all clients should be given access (one per line):

Allow access from these private subnets to all VPN client IP addresses and subnets

Should client Internet traffic be routed through the VPN?

Should clients be allowed to access network services on the VPN gateway IP address?

Também especificamos dois intervalos, pois realmente queremos um IP estático para nossa instância do MySQL local, caso contrário, o IP pode mudar na próxima vez que nos conectarmos à VPN.

A próxima etapa é a criação de um usuário que usaremos para nos conectar à VPN:

User Permissions

Search By Username/Group (use '%' as wildcard)

Username	Group	More Settings	Admin	Log
lefred	No Default Group		<input type="checkbox"/>	<input type="checkbox"/>
root	No Default Group		<input checked="" type="checkbox"/>	<input type="checkbox"/>
New Username	No Default Group		<input type="checkbox"/>	<input type="checkbox"/>

Essas configurações para o usuário também são muito importantes:

Local Password
Password:

Allow password change from CWS: ☒ Default ☐ Yes ☐ No
Enable password strength checking in CWS: ☒ Default ☐ Yes ☐ No

IP Addressing
Select IP Addressing: ☐ Use Dynamic ☒ Use Static
VPN Static IP Address:

Access Control
Select addressing method: ☐ Use NAT ☒ Use Routing
Allow Access To these Networks:

10.0.0.0/24
10.0.1.0/24

Allow Access From:
Allow Access From: ☒ all server-side private subnets
☐ all other VPN clients

VPN Gateway
Configure VPN Gateway: ☒ No ☐ Yes

DMZ settings
Configure DMZ IP address: ☒ No ☐ Yes

Salve as configurações e clique no banner para reiniciar o OpenVPN.

Agora, nos conectamos ao servidor de VPN usando o usuário que criamos para baixar seu perfil:



Admin Login

Sign In



OpenVPN Connect Recommended for your device:



OpenVPN Connect for all Platforms:



OpenVPN Connect v3:



Available Connection Profiles:



[Yourself \(user-locked profile\)](#)

Change Password

Logout

Esse arquivo client.ovpn precisa ser copiado para o servidor MySQL local.

Se o OpenVPN ainda não estiver instalado no servidor MySQL local, é hora de instalá-lo e iniciar a VPN.

1.

Lab 4.

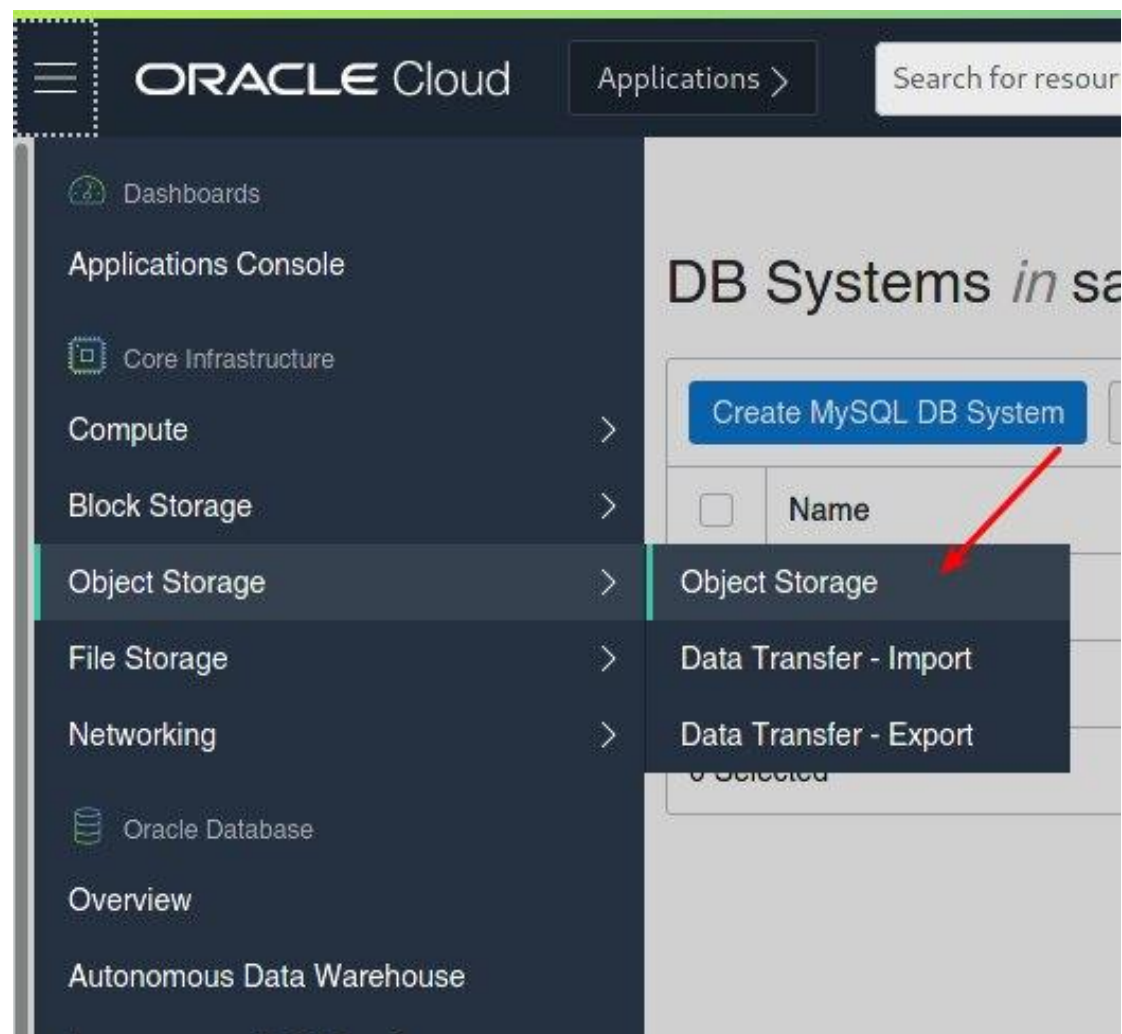
Criando um Dump do Servidor On-Prem para um Object Storage na OCI



Lab 4. Criando um Dump do Servidor On-Prem para um Object Storage na OCI

Object Storage

Para transferir nossos dados para a nuvem, usaremos o armazenamento de objetos.



E criamos um bucket:

Buckets *in* sandbox-lefred *Compartment*

Object Storage provides unlimited, high-performance, durable, and secure data storage. Data is up [more](#)

Create Bucket

Create Bucket

[Help](#) [Cancel](#)

BUCKET NAME

lefred_bucket

STORAGE TIER

Storage tier for a bucket can only be specified during creation. Once set, you cannot change the storage tier in which a bucket resides.

☒ STANDARD

☐ ARCHIVE

OBJECT EVENTS ⓘ

☐ EMIT OBJECT EVENTS

OBJECT VERSIONING ⓘ

☐ ENABLE OBJECT VERSIONING

ENCRYPTION

☒ ENCRYPT USING ORACLE MANAGED KEYS

Leaves all encryption-related matters to Oracle.

☐ ENCRYPT USING CUSTOMER-MANAGED KEYS

Requires you to have access to a valid Key Management key. [Learn More](#)

TAGS

Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values that can be attached to resources.

[Learn more about tagging](#)

TAG NAMESPACE

None (add a free-for... ⌵)

TAG KEY

VALUE

×

+ Additional Tag

Create Bucket

Cancel

Dump dos Dados

Para realizar o dump os dados de nosso servidor MySQL local, usaremos o MySQL Shell que tem a capacidade de carregar e restaurar grandes conjuntos de dados de maneira otimizada e compatível para OCI desde a versão 8.0.21.

Verifique esses links para obter mais detalhes:

<https://docs.cloud.oracle.com/en-us/iaas/mysql-database/doc/importing-and-exporting-databases.html>

<https://mysqlserverteam.com/mysql-shell-dump-load-part-1-demo/>

<https://mysqlserverteam.com/mysql-shell-dump-load-part-2-benchmarks/>

<https://mysqlserverteam.com/mysql-shell-dump-load-part-3-load-dump/>

<https://mysqlserverteam.com/mysql-shell-8-0-21-speeding-up-the-dump-process/>


OCI Config

A primeira etapa é criar um arquivo de configuração OCI semelhante a este:

```
[DEFAULT]
user=ocidl.user.ocl.....
fingerprint=xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx:xx
key_file=/home/lefred/oci_api_key.pem
tenancy=ocidl.tenancy.ocl.....
compartment=ocidl.compartment.ocl.....
region=us-ashburn-1
```

As informações e a chave do usuário podem ser encontradas na seção Identidade:

Identity » Users » User Details » API Keys



ACTIVE

f [redacted]

MySQL Community Manager [redacted]

[Edit User](#)
[Create/Reset Password](#)
[Enable Multi-Factor Authentication](#)
[Resend Verification](#)
[More Actions](#)

User Information Tags

OCID: ...7cyvqa [Show](#) [Copy](#)
 Created: Wed, May 13, 2020, 03:44:48 UTC
 Multi-factor authentication: Disabled
 Email: [redacted]

Federated: No
My Oracle Support account: -

Capabilities
 Local password: Yes SMTP credentials: Yes
 API keys: Yes Customer secret keys: Yes
 Auth tokens: Yes

Resources

- Groups
- API Keys**
- Auth Tokens
- Customer Secret Keys
- SMTP Credentials

API Keys

[Add Public Key](#)

Fingerprint	Created
[redacted]	Tue, Aug 18, 2020, 08:41:45 UTC

Consulte a [página deste manual](#) para gerar uma chave PEM.

Agora que temos um arquivo de configuração oci (chamado oci.config no meu caso), precisamos verificar se nosso servidor MySQL Local está usando GTID:

```
on-premise mysql> select @@gtid_mode;
+-----+
| @@gtid_mode |
+-----+
| OFF         |
+-----+
1 row in set (0.00 sec)
```


Por padrão, o modo GTID está desabilitado e precisamos habilitá-lo. Para poder realizar essa operação sem reiniciar a instância do MySQL, proceda da seguinte maneira:

```
on-premise mysql> SET PERSIST server_id=1;
on-premise mysql> SET PERSIST enforce_gtid_consistency=true;
on-premise mysql> SET PERSIST gtid_mode=off_permissive;
on-premise mysql> SET PERSIST gtid_mode=on_permissive;
on-premise mysql> SET PERSIST gtid_mode=on;
on-premise mysql> select @@gtid_mode;
+-----+
| @@gtid_mode |
+-----+
| ON          |
+-----+
```

Roteamento e Segurança

Precisamos adicionar algumas regras de roteamento e firewall ao nosso VCN para permitir o tráfego de e para a VPN.

Networking » Virtual Cloud Networks » lefred_vcn » Route Table Details



AVAILABLE

Route Table for Private Subnet-lefred_vcn

[Move Resource](#) [Add Tags](#) [Terminate](#)

Route Table Information

OCID: ...vr4efq [Show](#) [Copy](#)

Created: Thu, May 28, 2020, 15:03:01 UTC

Resources

Route Rules (3)

Route Rules

[Add Route Rules](#) [Edit](#) [Remove](#)

<input type="checkbox"/>	Destination	Target Type
<input type="checkbox"/>	0.0.0.0/0	NAT Gateway

Add Route Rules

[Help](#)

Important:

For a route rule that targets a Private IP, you must first enable "Skip Source/Destination Check" on the VNIC that the Private IP is assigned to.

Route Rule

TARGET TYPE

Private IP

DESTINATION TYPE

CIDR Block

DESTINATION CIDR BLOCK

172.27.232.0/24

Specified IP addresses: 172.27.232.0-172.27.232.255 (256 IP addresses)

TARGET SELECTION

10.0.0.11

Private IP: 10.0.0.11 [Copy](#)

OCID: ...43rsass6mq [Show](#) [Copy](#)

DESCRIPTION OPTIONAL

routing to OpenVPN

Maximum 255 characters

Observe que 10.0.0.11 é o IP privado da instância de computação OpenVPN.

Networking » Virtual Cloud Networks » lefred_vcn » Security List Details

Security List for Private Subnet-lefred_vcn

Instance traffic is controlled by firewall rules on each Instance in addition to this Security List

SL

AVAILABLE

[Move Resource](#) [Add Tags](#) [Terminate](#)

Security List Information **Tags**

OCID: ...n2x62q [Show](#) [Copy](#)

Created: Thu, May 28, 2020, 15:03:01 UTC

Resources

[Ingress Rules \(8\)](#)

Ingress Rules

[Add Ingress Rules](#) [Edit](#) [Remove](#)

<input type="checkbox"/>	No	<u>172.27.232.0/24</u>	TCP	All	<u>3306</u>	TCP traffic for ports: 3306	⋮
<input type="checkbox"/>	No	<u>172.27.232.0/24</u>	TCP	All	<u>33060</u>	TCP traffic for ports: 33060	⋮

Agora que lidamos com roteamento e segurança, é hora de fazer o dump dos dados no Object Store conectando o MySQL Shell ao nosso servidor local e usar `util.dumpInstance()`:

```
$ mysqlsh
MySQL JS > \c root@localhost
[...]
MySQL localhost:33060+ ssl JS > util.dumpInstance('onpremise', {ociConfigFile:
"oci.config",osBucketName: "lefred_bucket", osNamespace: "xxxxxxxxxxxx",threads: 4,
ocimds: true, compatibility: ["strip_restricted_grants", "strip_definers"]})
```

Você também pode encontrar mais informações nesta página de manual do MDS: <https://docs.cloud.oracle.com/en-us/iaas/mysql-database/doc/importing-and-exporting-databases.html>

Lab 5.

Restaurando o dados no MDS



Lab 5. Restaurando os dados no MDS

Os dados agora já estão na nuvem e precisamos carregá-los em nossa instância MDS.

Primeiro, nos conectamos à nossa instância MDS usando Shell. Poderíamos usar uma instância de computação na sub-rede pública ou na VPN que criamos. Vou usar a segunda opção:

```
MySQL localhost:33060+ ssl JS > \c admin@10.0.1.11
Creating a session to 'admin@10.0.1.11'
Fetching schema names for autocompletion... Press ^C to stop.
Closing old connection...
Your MySQL connection id is 283 (X protocol)
Server version: 8.0.21-ul-cloud MySQL Enterprise - Cloud
No default schema selected; type \use to set one.
```

É hora de carregar os dados do Object Storage para o MDS:

```
MySQL 10.0.1.11:33060+ ssl JS > util.loadDump('onpremise', {ociConfigFile:
"oci.config",osBucketName: "lefred_bucket", osNamespace: "xxxxxxxxxxxx",threads: 4})
```

Ainda precisamos definir as informações executadas do GTID de quando o dump foi feito.

No MDS, essa operação pode ser realizada chamando um procedimento dedicado chamado `sys.set_gtid_purged ()`

Agora vamos encontrar o valor que precisamos adicionar lá. O valor do GTID executado a partir do dump é escrito no arquivo @.json. Este arquivo está localizado no Object Storage e precisamos recuperá-lo:

Object Storage » Bucket Details

lefred_bucket

Edit Visibility Move Resource Re-encrypt Add Tags Delete

Bucket Information Tags

Visibility: Private
 Namespace: idinfdw2eouj
 Storage Tier: Standard
 Approximate Count: 36 objects ⓘ
 ETag: 056c7faa-89e8-42ef-bd34-5a51e3f2c3a8
 OCID: ...sprdtwma [Show](#) [Copy](#)

Encryption Key: Oracle managed key [Assign](#)
 Created: Thu, May 21, 2020, 19:07:04 UTC
 Compartment: [sandbox-lefred](#)
 Approximate Size: 35.6 MiB ⓘ
 Emit Object Events: ● Disabled [Edit](#) ⓘ
 Object Versioning: ● Disabled [Edit](#) ⓘ

Resources

- Objects
- Metrics
- Pre-Authenticated Requests
- Work Requests
- Lifecycle Policy Rules
- Replication Policy
- Retention Rules

Objects

Upload Restore Delete Search by prefix

<input type="checkbox"/>	Name	Size	Last Modified	Status
<input type="checkbox"/>	onpremise/@.done.json	327 bytes	Tue, Aug	⋮
<input checked="" type="checkbox"/>	onpremise/@.json	564 bytes	Tue, Aug	⋮
<input type="checkbox"/>	onpremise/@.post.sql	240 bytes	Tue, Aug	⋮
<input type="checkbox"/>	onpremise/@.sql	240 bytes	Tue, Aug	⋮
<input type="checkbox"/>	onpremise/@.users.sql	1.79 KiB	Tue, Aug	⋮

View Object Details
Download
Copy
Restore
Create Pre-Authenticated Request

Pegue o valor de `gtidExecuted` nesse arquivo, e o defina no MDS:

```
MySQL 10.0.1.11:33060+ ssl
SQL > call sys.set_gtid_purged("ae82914d-e096-11ea-8a7a-08002718d305:1")
```


Lab 6.

Inbound Replication



Lab 6. Inbound Replication

Criando o usuário de replicação

No MySQL local, precisamos criar um usuário dedicado à replicação:

```
mysql> CREATE USER 'repl'@'10.0.1.%' IDENTIFIED BY 'C0mpl1c4t3d!Paddw0rd' REQUIRE SSL;  
mysql> GRANT REPLICATION SLAVE ON *.* TO 'repl'@'10.0.1.%';
```

Criando o canal de replicação

Voltamos ao painel do OCI e na página de detalhes da nossa instância MDS, clicamos em Canais:

The screenshot shows the Oracle Cloud console interface. At the top, there's a navigation bar with the Oracle Cloud logo and a search bar. Below the navigation bar, the main content area is divided into two sections: 'Resources' on the left and 'Metrics' on the right. In the 'Resources' section, a sidebar lists 'Metrics', 'Endpoints', 'Backups', and 'Channels'. A red arrow points to the 'Channels' link. The 'Metrics' section displays a 'START TIME' and 'END TIME' filter, both set to 'Aug 17, 2020 7:28:54 AM' and 'Aug 17, 2020 8:28:54 AM' respectively. Below these filters, there's a 'QUICK SELECTS' dropdown set to 'Last hour'. The 'CURRENT CONNECTIONS' section is visible below the filters, showing a list of connections with a table icon.

Agora criamos um canal e seguimos o assistente:

ORACLE Cloud

Applications >

Search for resources, services, and documentation

US En

Create Channel

CREATE IN COMPARTMENT

sandbox-lefred

mdspgm (root)/Sandbox/sandbox-lefred

NAME

mysqlchannel20200814125358

A user-friendly name for the channel.

☒ ENABLED AUTOMATICALLY UPON CREATION

DESCRIPTION OPTIONAL

Write a Channel description

Source

Configure the MySQL source

HOSTNAME

Define the MySQL Source Hostname

PORT OPTIONAL

3306

USERNAME ⓘ

repl

PASSWORD

●●●●●●●●

CONFIRM PASSWORD

Usamos as credenciais que acabamos de criar e como nome de host colocamos o IP do nosso cliente OpenVPN: 172.27.232.134

Depois de um tempo, o canal será criado e no MySQL Shell quando conectado à sua instância MDS, você pode ver que a replicação está em execução.

```
mysql> 10.0.1.11:33060> ssl [SQL] SELECT
-> concat(conn.status.channel_name, ' (' , worker_id,')') AS channel,
-> conn.status.service_state AS io_state,
-> applier.status.service_state AS sql_state,
-> format_pico_time((GOTID.SUBTRACT(LAST_QUEUED_TRANSACTION, LAST_APPLIED_TRANSACTION) = "", "0",
-> abs(time_to_sec((if(time_to_sec(APPLYING_TRANSACTION.ORIGINAL_COMMIT_TIMESTAMP)=0.0,
-> timediff(APPLYING_TRANSACTION.ORIGINAL_COMMIT_TIMESTAMP, now())))) * 1000000000000) latency),
-> format_pico_time((LAST_QUEUED_TRANSACTION.START_QUEUE_TIMESTAMP -
-> LAST_QUEUED_TRANSACTION.ORIGINAL_COMMIT_TIMESTAMP) * 1000000000000) transport_time,
-> format_pico_time((LAST_QUEUED_TRANSACTION.END_QUEUE_TIMESTAMP -
-> LAST_QUEUED_TRANSACTION.START_QUEUE_TIMESTAMP) * 1000000000000) time_to_relay_log,
-> format_pico_time((LAST_APPLIED_TRANSACTION.END_APPLY_TIMESTAMP -
-> LAST_APPLIED_TRANSACTION.START_APPLY_TIMESTAMP) * 1000000000000) apply_time,
-> conn.status.LAST_QUEUED_TRANSACTION AS last_queued_transaction,
-> applier.status.LAST_APPLIED_TRANSACTION AS last_applied_transaction
-> FROM
-> performance_schema.replication_connection_status AS conn_status
-> JOIN performance_schema.replication_applier_status_by_worker AS applier_status
-> ON applier_status.channel_name = conn_status.channel_name
-> ;
```

channel	io_state	sql_state	latency	transport_time	time_to_relay_log	apply_time	last_queued_transaction	last_applied_transaction
replication_channel (3)	ON	ON	0 ps	6.61 ms	369.00 us	4.12 ms	ae82914d-e096-11ea-8a7a-08002718d305:3	ae82914d-e096-11ea-8a7a-08002718d305:3
replication_channel (2)	ON	ON	0 ps	6.61 ms	369.00 us	0 ps	ae82914d-e096-11ea-8a7a-08002718d305:3	
replication_channel (3)	ON	ON	0 ps	6.61 ms	369.00 us	0 ps	ae82914d-e096-11ea-8a7a-08002718d305:3	
replication_channel (4)	ON	ON	0 ps	6.61 ms	369.00 us	0 ps	ae82914d-e096-11ea-8a7a-08002718d305:3	

```
4 rows in set (0.0952 sec)
```

Parabéns!

Você completou o Laboratório

Hands-On

