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Integrated Cloud Applications & Platform Services

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Oracle Cloud Infrastructure Fundamentals

Activity Guide

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Practices for Lesson 4: Compute Service

Practices for Lesson 4: Compute Service - Overview

In this lab, you were able to quickly create a virtual network in the cloud, launch an instance, download MEAN stack on to the instance, install and configure it for running on Oracle Bare Metal Cloud platform.

Oracle has built Oracle Cloud Infrastructure (OCI) platform that can run both Oracle workloads and cloud native applications. In this hands-on lab, we will walk through getting a cloud native application stack on BMC. The purpose of this lab is to get familiar with Bare Metal Cloud primitives. At the end of this lab, you will be familiar with creating a network, launching an instance, and accessing the instance.

For this lab, we will go through installing and running MEAN (MongoDB, Express, AngularJS, and Node.js) stack that is used widely by many applications. MongoDB is a popular NoSQL document database that is used by a wide variety of applications. Express is a Node.js server-side application framework. AngularJS is the client-side web application framework, and Node.js is a JavaScript run time popular for being a web server platform.

Prerequisites

- Oracle Cloud Infrastructure account credentials (User, Password, and Tenant)
- SSH key generated and available

SSH key generation

If you already have a public/private key pair, you can use that for SSH. If you need to generate an SSH key, refer for additional doc here: https://git-scm.com/book/en/v2/Git-on-the-Server-Generating-Your-SSH-Public-Key

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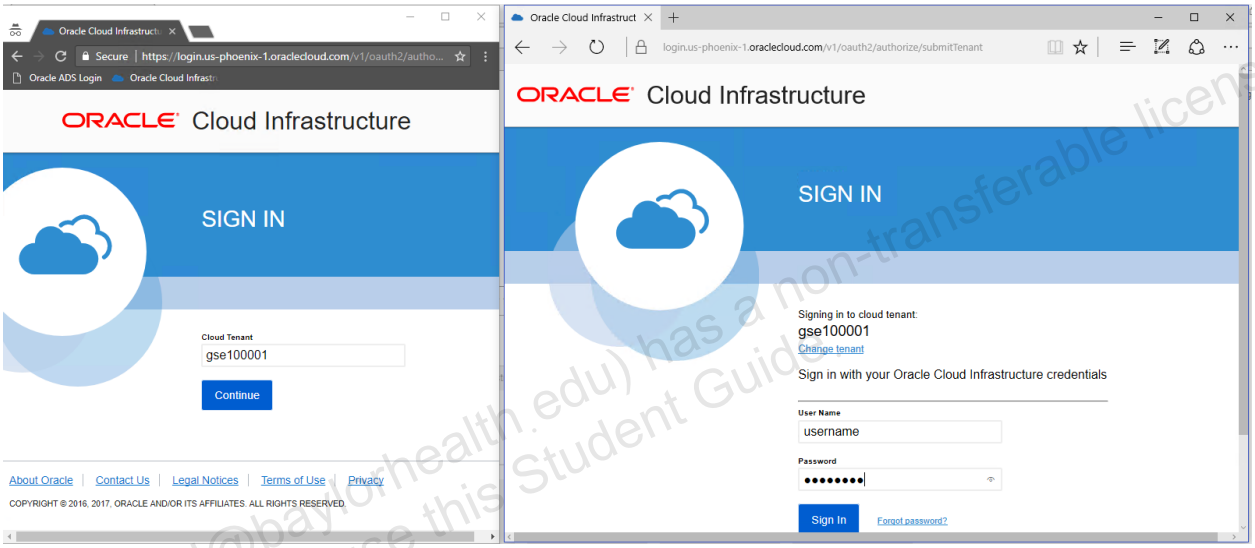
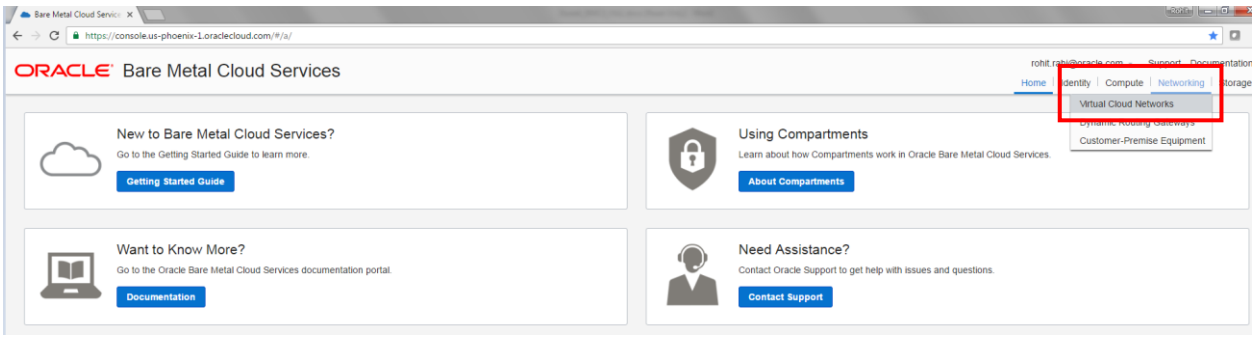
Practices 4-1: Sign into the Console and locate your compartment

1. Obtain the user ID, password, and tenant ID to log in to Bare Metal Cloud Services.
2. Navigate to https://console.us-phoenix-1.oraclecloud.com/. This is the URL to access the OCI console.
3. Enter your credentials to sign in:
   a. User: <>
   b. Password: <>
   c. Tenant: <>



Reach out to your room champion if you have any questions on account access.

4. After you log in to the OCI console, navigate to the networking tab and select Virtual Cloud Networks.



STOP and make sure you locate your compartment names.

E.g. for a user with a username such as demo.user48, the correct compartment name is c48, and so on. If you don't select the correct compartment, none of the steps below will work. You might need to scroll down under the compartment heading on

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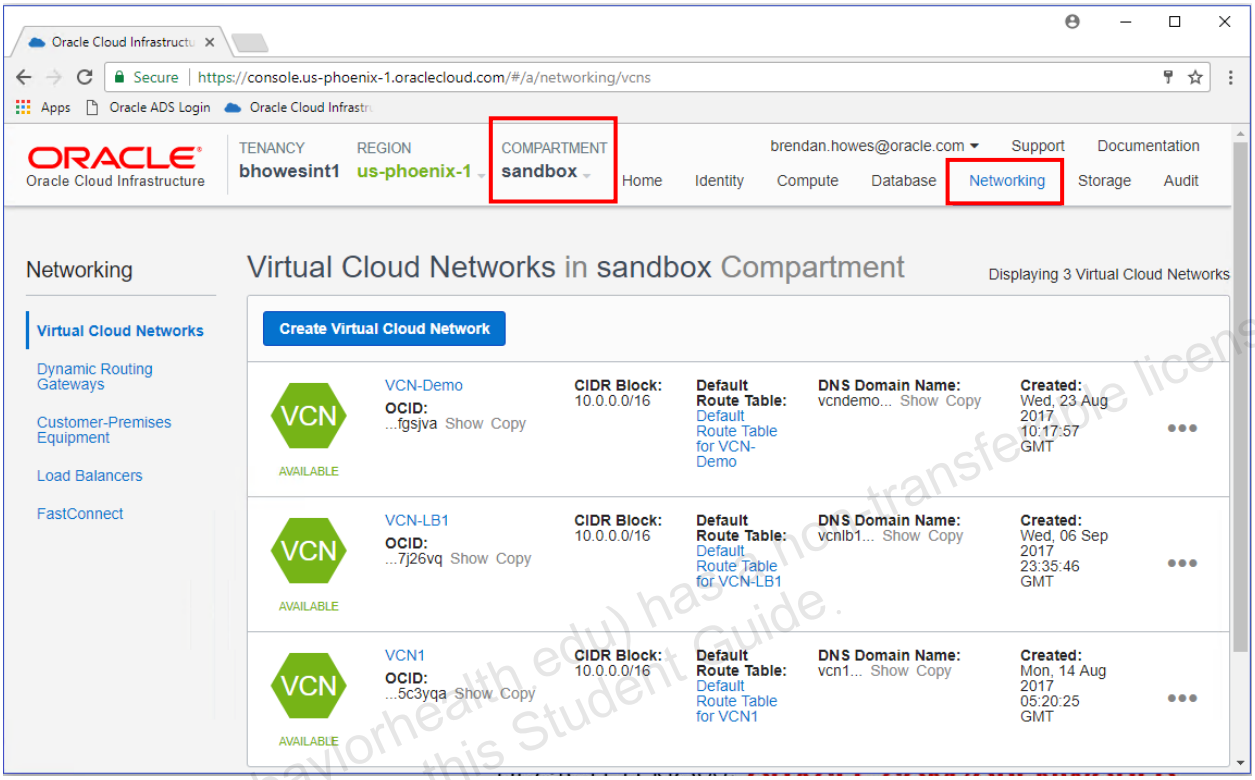
the left navigation menu to locate your specific compartment number. In all the steps below, you will be using your specific compartment number (and not the root compartment).



5. Generate SSH keys to be used later while launching an instance.

MAC/LINUX

a. Generate ssh-keys for your machine if you don't have one. As long as an id_rsa and id_rsa.pub keypair is present, they can be reused. By default these are stored in ~/.ssh/

```
$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/Users/username/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /Users/username/.ssh/id_rsa.
Your public key has been saved in /Users/username/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:tAn6nKkcZDTXl/vXRAD/pfLzdmF5rQ2948MQgz5CWe8
The key's randomart image is:
+---[RSA 2048]----+
|          ... |
|     .  o . . |
|  o o o = o . o|
| . + o * o + +.|
|  +  S o o +.=|
```

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```
|  o o o . + E.*+|
|   . =   . o B+=|
|  . o      ..B+|
|   o        .o=|
+----[SHA256]-----+
```

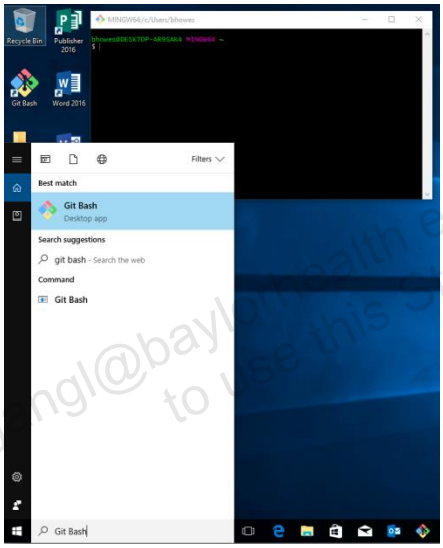
b. Make sure permissions are restricted, as sometimes ssh fails if private keys have permissive permissions.

```
$ chmod 0700 ~/.ssh
$ chmod 0600 ~/.ssh/id_rsa
$ chmod 0644 ~/.ssh/id_rsa.pub
```

FOR WINDOWS:

a) Install git for windows. Download https://github.com/git-for-windows/git/releases/download/v2.13.0.windows.1/Git-2.13.0-64-bit.exe and install.

b) Enter Git-bash:



c) Generate ssh-keys by running this command in Git Bash

```
$ ssh-keygen
Generating public/private rsa key pair
Enter file in which to save the key (/c/Users/username/.ssh/id_rsa):
Created directory '/c/Users/username/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /c/Users/username/.ssh/id_rsa.
Your public key has been saved in /c/Users/username/.ssh/id_rsa.pub.
```

Note: In Git-Bash, C:\Users\username\ is shown as /c/Users/username/

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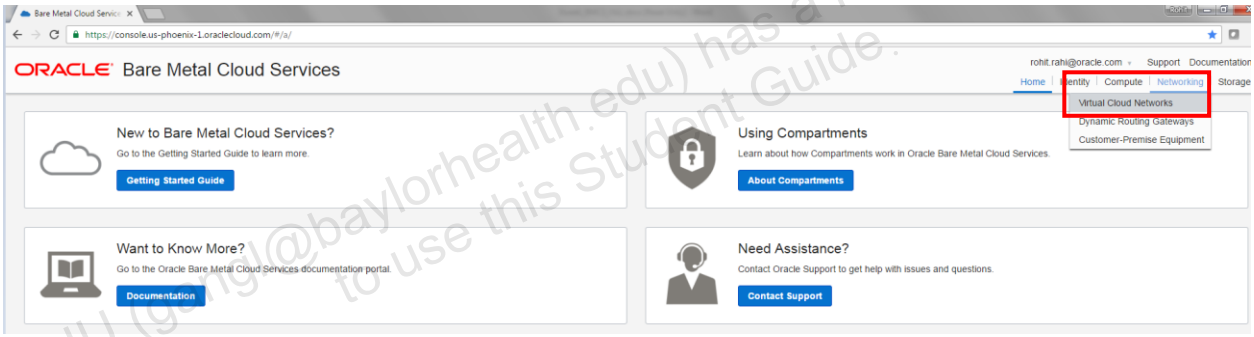
Practices 4-2: Create a Virtual Cloud Network (VCN)

A Virtual Cloud Network (VCN) is a virtual version of a traditional network—including subnets, route tables, and gateways—on which your compute instances run. Customers can bring their network topology to the cloud with VCN. Creating a VCN involves a few key aspects such as:

- Allocate a private IP block for the cloud (CIDR range for the VCN). Customers can bring their own RFC1918 IP addresses.
- Create Subnets by partitioning the CIDR range into smaller networks (sub networks for front end, back end, database).
- Create an optional Internet Gateway to connect VCN subnet with Internet. Instances created in this subnet will have a public IP address.
- Create Route table with route rules for Internet access.

Create Security Group to allow relevant ports for ingress and egress access

Step 1: After you log in, navigate to the networking tab and click Virtual Cloud Networks.



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Step 2: Create a Cloud Network by specifying a name for your VCN and selecting the "**Create VIRTUAL CLOUD NETWORK PLUS RELATED RESOURCES**" option. This will create a VCN, Subnets, Routing Table, Security Groups and Internet Gateway using a 10.0.0.0/16 CIDR range. Scroll to the bottom of the screen and click "create Virtual Cloud Network" button.

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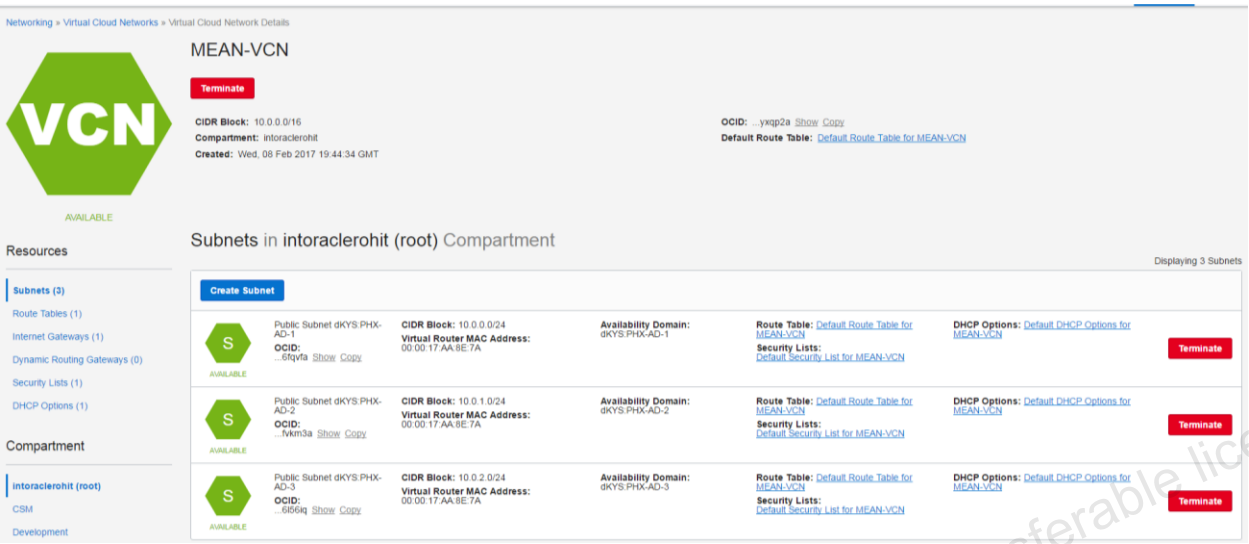
Once the VCN is created, navigating to the list of VCNs, you can see the “MEAN-VCN”, which you just created in the previous step.



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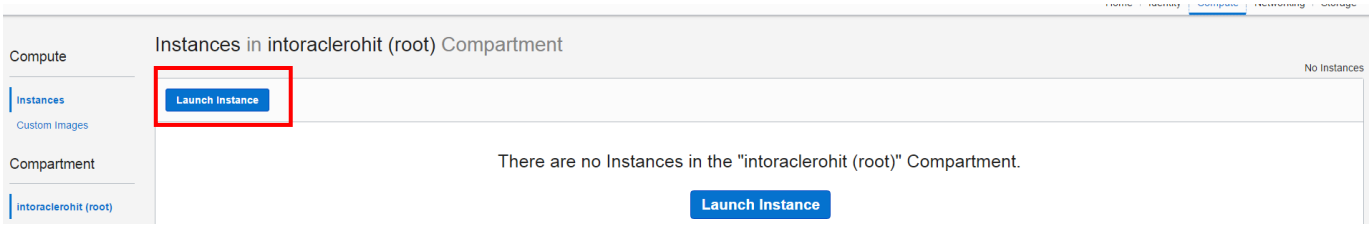
Practices 4-3: Launch a Virtual Machine (VM) Instance

Step 1: Navigate to the Compute tab and click Launch Instance. We will launch a VM instance for this lab.



Step 2: In order to launch the instance, choose an image (Oracle Linux 7.x – **Latest version**), choose a shape of the instance (VM.Standard1.1), AD to launch the instance (AD1, AD2 or AD3), the VCN network created above, subnet (in the appropriate Availability Domain) and the public SSH keys to access the instance. In this lab, we will focus on launching only a single instance VM in one AD.

If you get host out of capacity error, choose a different Availability Domain and try again. As you select a specific AD, the subnet dropdown will show you the correct subnet for the particular AD.

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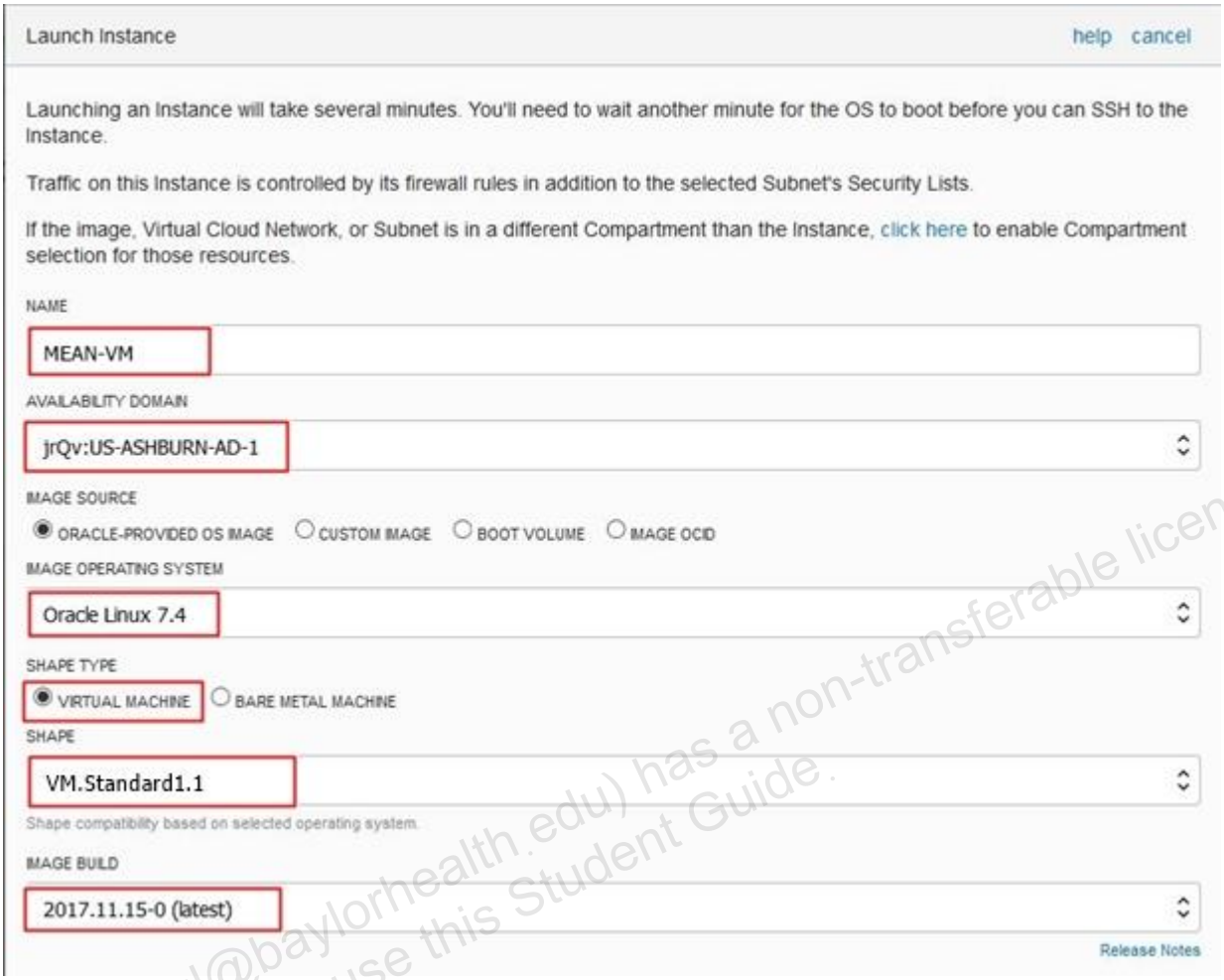

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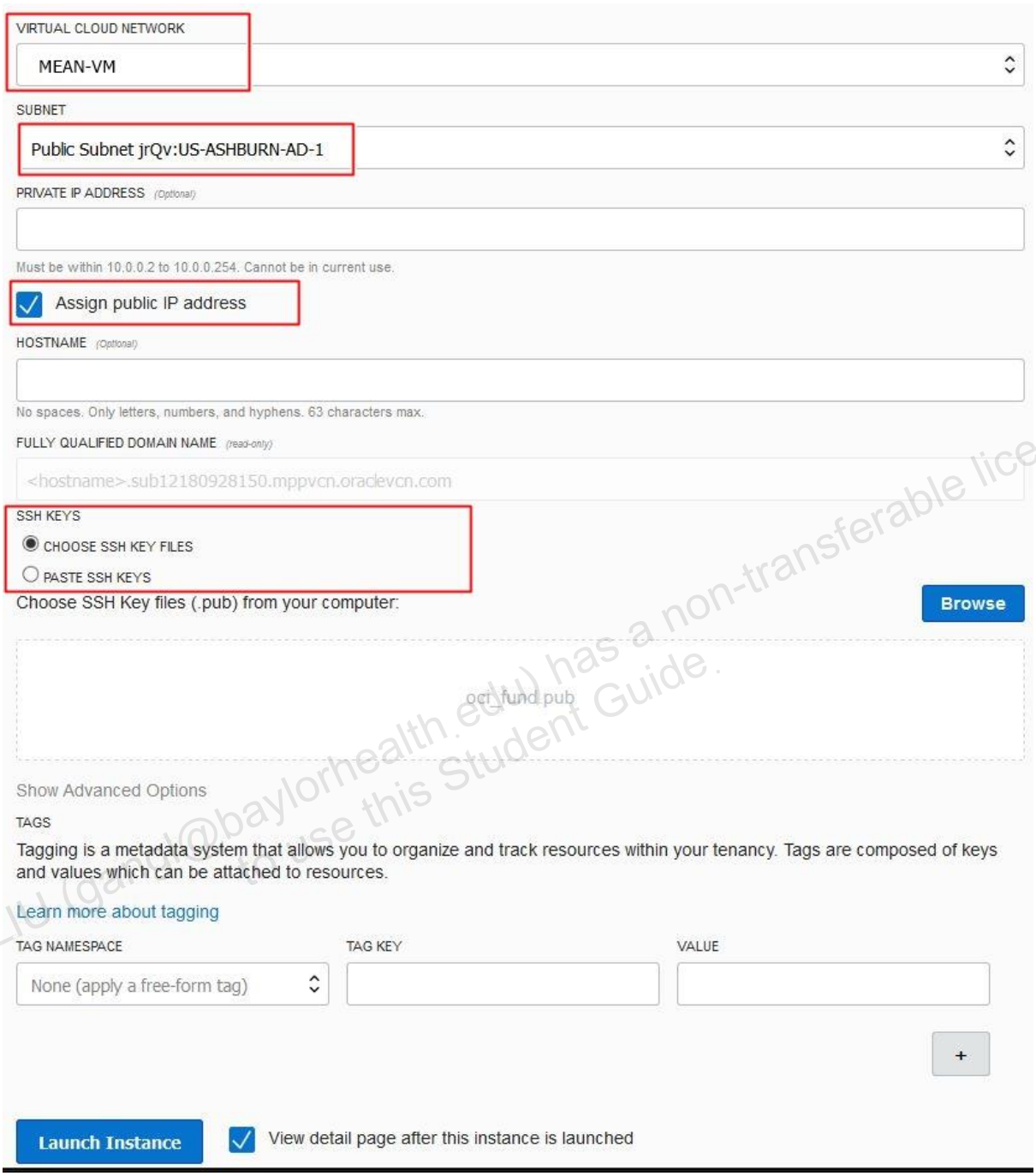

Launching an instance is simple and intuitive with few options to select. Provisioning of the compute instance will complete in less than a minute and the instance state will change from provisioning to running.

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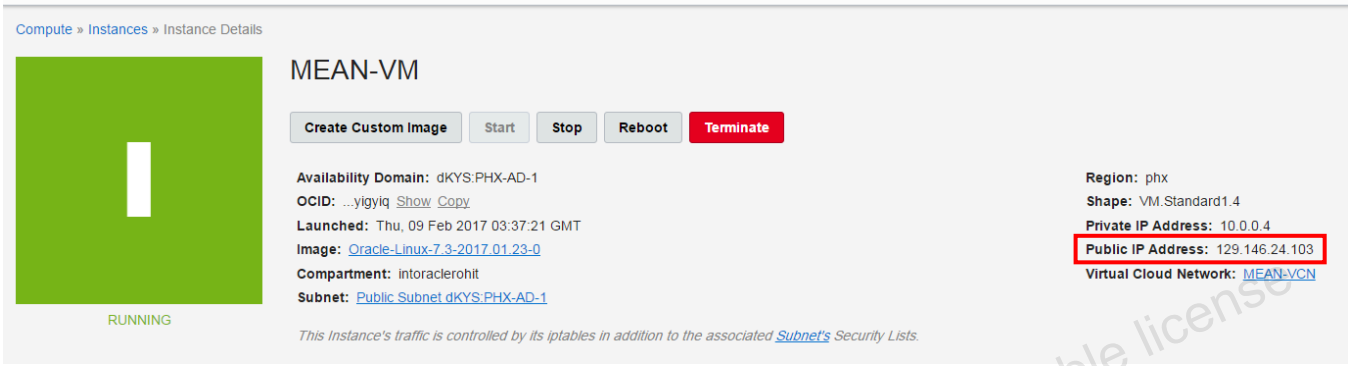
Practices 4-4: Connect to the Instance

Step 1: Once the instance state changes to Running, you can SSH to the Public IP address of the instance. Click the MEAN-VM link and you will find the public IP address listed there.



Step 2: SSH to the instance and mount the Volume as provided in the next section. You can use the following command to SSH into the OCI VM on UNIX-style system (including Linux, Solaris, BSD, and OS X).

```
$ ssh -i </path/privateKey> <PublicIP_Address>
```

For Windows, use a tool like PUTTY as shown below – provide the public IP address of the OCI VM. Expand on SSH in the LHS menu and click Auth. Click Browse, and provide the Private SSH key that you had saved earlier while generating the SSH key pair. Click Yes in the PUTTY Security Alert window.

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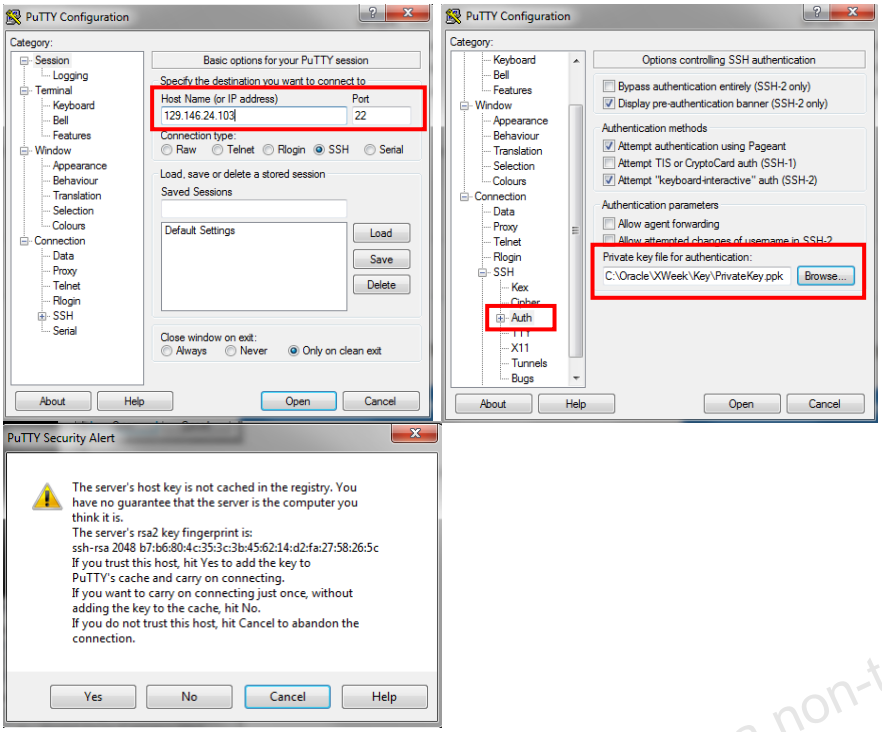
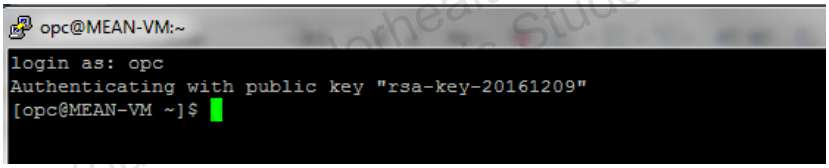


Step 3: Log in with the user name **opc** as shown below.



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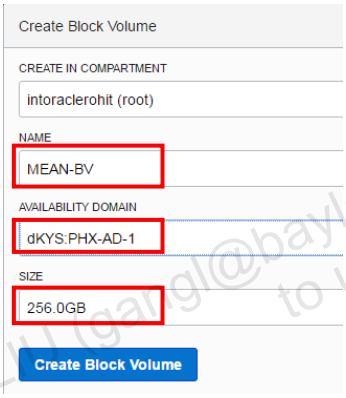
Practice 4-5: Create and Mount Block Volume Storage

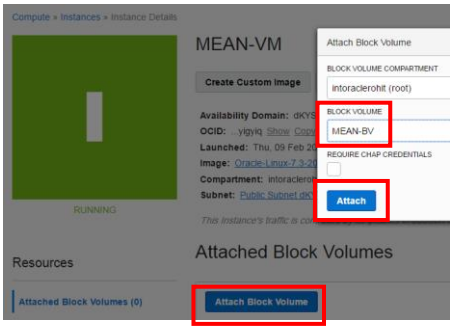
NOTE: Please use the same block volume created in the Storage HOL.

Step1: Navigate to the Storage tab on the top-right corner and click Create Block Volume.

Step 2: Click Create Block Volume that opens the window below and fill in the appropriate information as below. Make sure that your block volume is in the same AD as your instance. You can choose a 256.0 GB volume for this lab. Click Create Block Volume.



Step 3: Once the Block Volume is created, you can attach it to the VM instance you just launched. Go to the Compute instance tab, and navigate to the VM instance and click the Attach Block Volume button. Select the block volume you created earlier from the drop down and click Attach.



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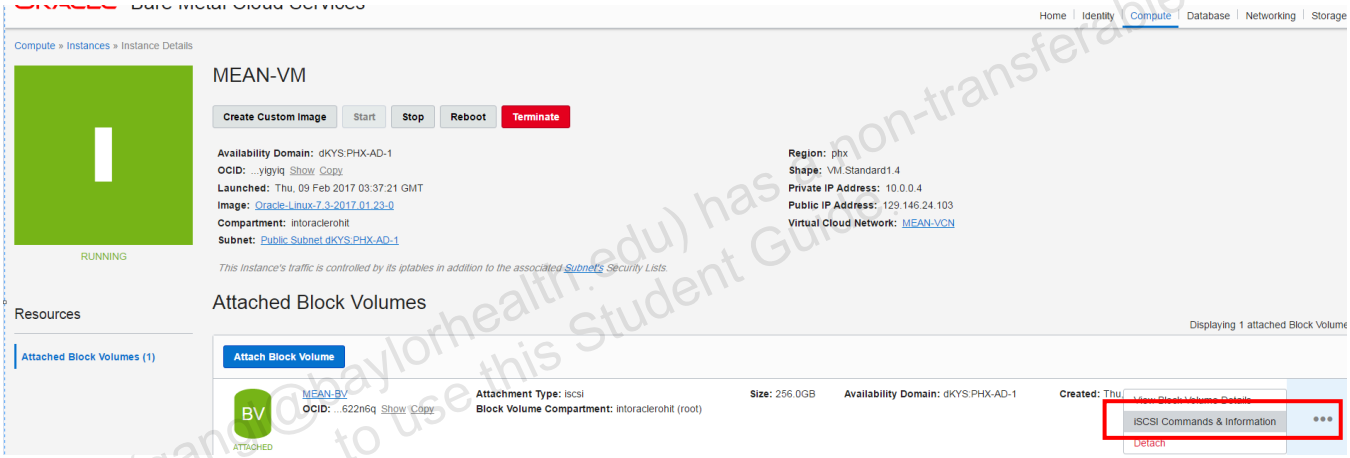
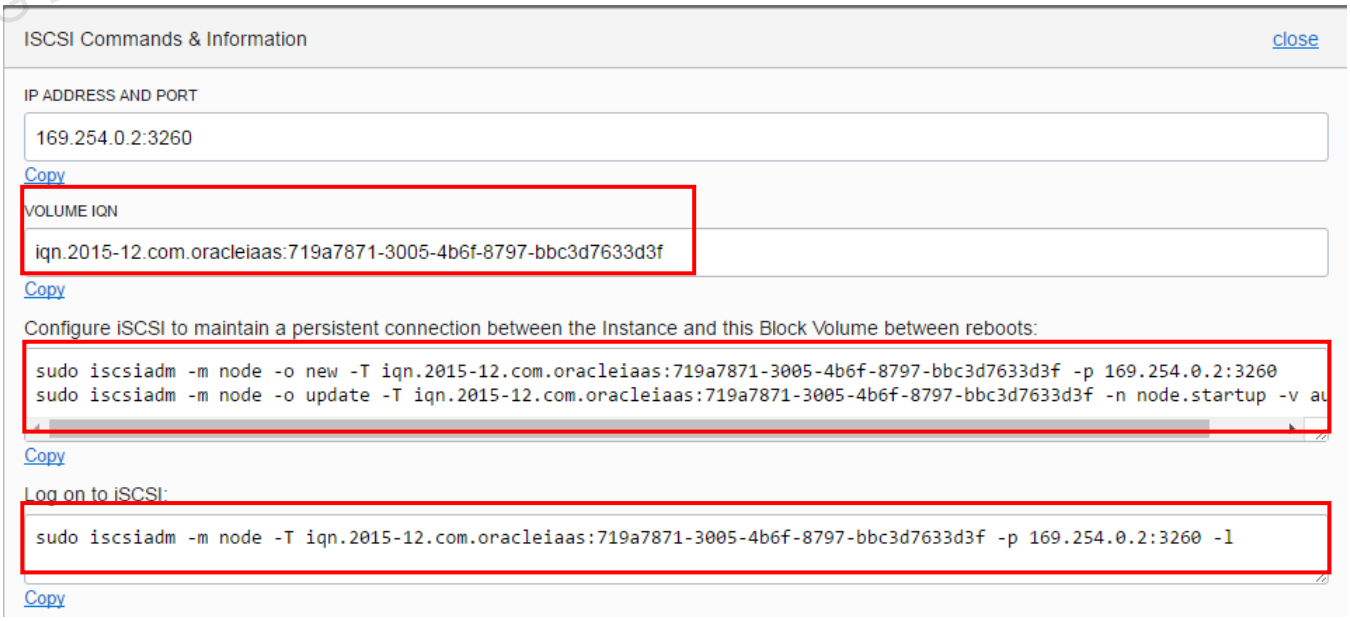
Note: For the purpose of this lab, leave the “Require CHAP Credentials” box deselected. In customer scenarios, this provides added authentication to attach the volume with an instance.

Step 4: Once the block volume is attached, you can navigate to view the iSCSI details for the volume in order to connect to the volume. It takes a minute for the volume to complete attaching.

Click the ellipsis and then click **iSCSI Command and Information link.** Connect to the instance through SSH and **run the iSCSI commands** as provided in the ISCSI Command and Information link shown below. The first two commands are for configuring iSCSI and the last one is for logging in to iSCSI. Do not proceed without connecting to the volume! Run these commands one at a time.





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Step 5: You can now format (if needed) and mount the volume. To get a list of mountable iSCSI devices on the instance, run the following command:

```
[opc@MEAN-VM ~]$ sudo fdisk -l
```

Run the following commands:

```
[opc@ MEAN-VM ~]$ sudo mkfs -t ext4 /dev/sdb
# Press y when prompted
[opc@ MEAN-VM ~]$ sudo mkdir /mnt/home
[opc@ MEAN-VM ~]$ sudo mount /dev/sdb /mnt/home
```

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Practice 4-6: Download and Configure MEAN Stack

For this lab, we are going to use a Bitnami MEAN Stack that provides a complete development environment for MongoDB and Node.js that can be deployed in one click. It includes the latest stable release of MongoDB, Express, Angular, Node.js, Git, PHP and RockMongo.

Step1: Use the following commands to download and install the MEAN stack on Linux. The downloaded file will be named 'bitnami-mean-linux-installer.run'.

```
$ sudo yum install wget -y
$ sudo wget -O bitnami-mean-linux-installer.run
https://bitnami.com/stack/mean/download_latest/linux-x64
```

To begin the installation process, give the installer executable permissions and then execute the installation file, as shown below:

```
$ sudo chmod 755 bitnami-mean-linux-installer.run
$ ./bitnami-mean-linux-installer.run
# follow the prompts and install Python, Git, ImageMagic, RockMongo, PHP
# provide name for a root folder for MEAN (choose any name)
# provide strong password for Mongo (choose any password)
# provide yes for launching Bitnami MEAN
```

Step 2: Enable firewall to have these ports 8080 and 3000 added

```
$ sudo firewall-cmd --permanent --add-port=8080/tcp
$ sudo firewall-cmd --permanent --add-port=3000/tcp
$ sudo firewall-cmd --reload
```

Navigate to http://<ipaddress>:8080 (the IP address of the MEAN VM) in your browser. Note that it doesn't return anything; that's because the Virtual Cloud Network needs to open certain ports for the MEAN stack to work.

Step 3: Click Virtual Cloud Network and then the VCN you created above, named MEAN-VCN. Click on Security Lists on the left navigation bar for the VCN. Then click the Default Security List for the MEAN-VCN. Here you need to open certain ports. Click Edit all rules.

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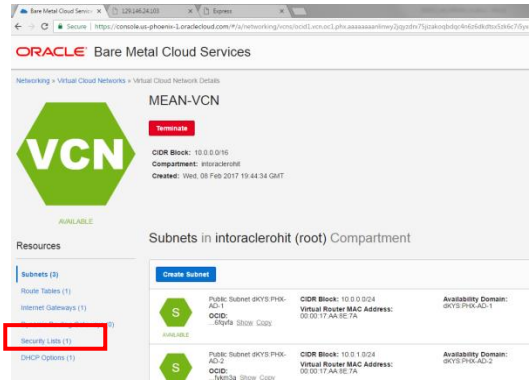
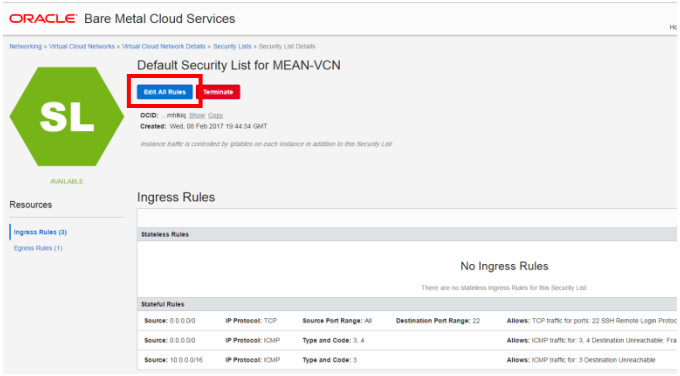
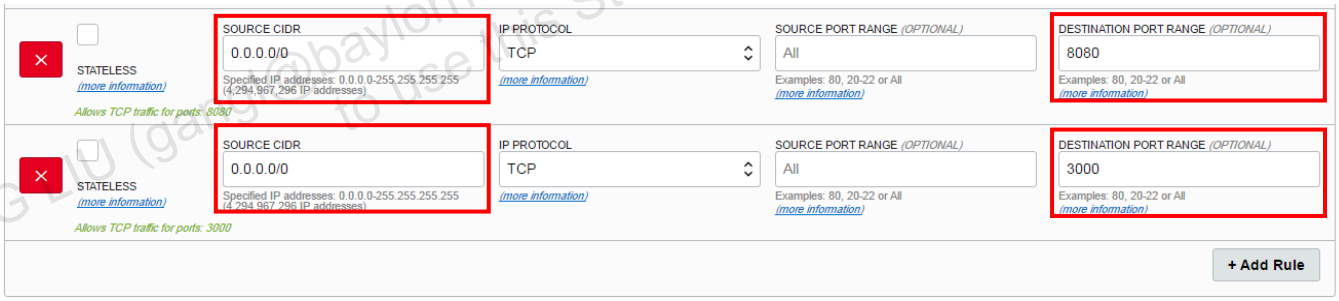
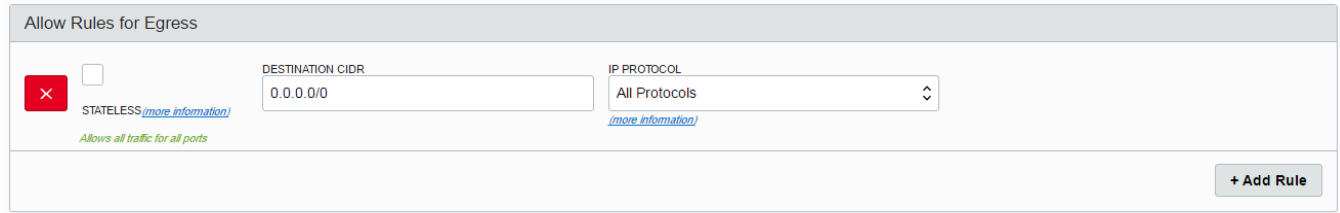
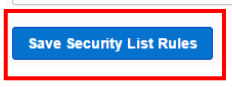




Step 4: Click +Add Rule twice and add the following values as shown below under the Allow Rules for Ingress. Click Save Security List Rules at the bottom.







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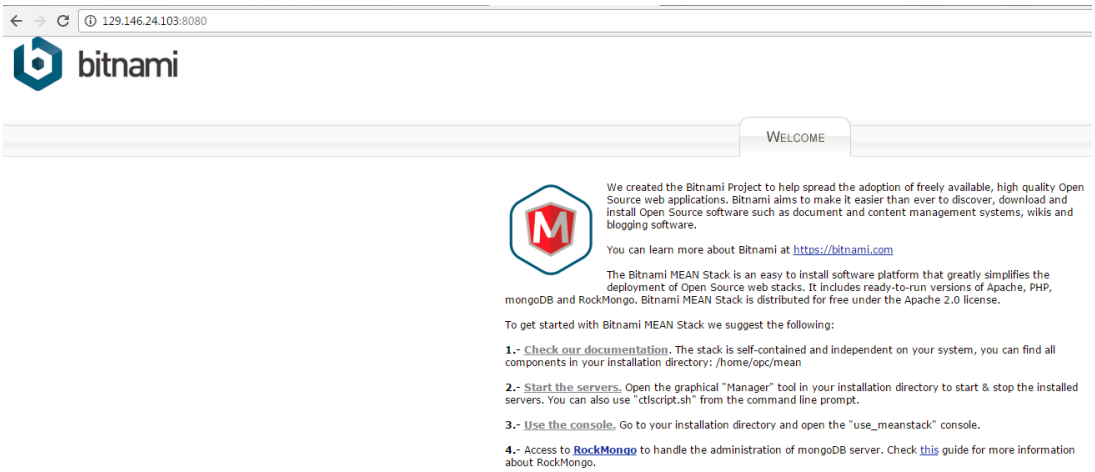
Navigate to http://<ipaddress>:8080 (the IP address of the MEAN VM) in your browser. Now you should see the following page:



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Practices for Lesson 6: Load Balancing Service

Practices for Lesson 6: Overview: Creating Highly Available Apps on Oracle Cloud Infrastructure

The Load Balancing Service provides automated traffic distribution from one entry point to multiple servers within your Virtual Cloud Network (VCN). The service offers a Public load balancer with a public IP address, provisioned bandwidth, and high availability. The Load Balancing Service provisions the public IP address across two subnets within a VCN to ensure accessibility even during an Availability Domain outage.

In this practice, you create a simple public load balancer and verify it with a basic web server application.

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Practices 6-1: SSH Keys

1. Generate SSH keys to be used later while launching an instance (If you already have ssh keys, please skip this step).

   MAC/LINUX

   a. Generate ssh-keys for your machine if you don't have one. As long as an id_rsa and id_rsa.pub keypair is present they can be reused. By default these are stored in ~/.ssh/

   ```
   $ ssh-keygen
   Generating public/private rsa key pair.
   Enter file in which to save the key (/Users/username/.ssh/id_rsa):
   Enter passphrase (empty for no passphrase):
   Enter same passphrase again:
   Your identification has been saved in /Users/username/.ssh/id_rsa.
   Your public key has been saved in /Users/username/.ssh/id_rsa.pub.
   The key fingerprint is:
   SHA256:tAn6nKkcZDTXl/vXRAD/pfLzdmF5rQ2948MQgz5CWe8
   The key's randomart image is:
   +---[RSA 2048]----+
   |           ...  |
   |      .   o . . |
   |  o o o = o . o|
   |   . + o * o + +.|
   |    +   S o o +.=|
   |   o o o . + E.*+|
   |    . =   . o B+=|
   |   . o       ..B+|
   |    o         .o=|
   +----[SHA256]-----+
   ```

   b. Make sure permissions are restricted; sometimes ssh fails if private keys have permissive permissions.

   ```
   $ chmod 0700 ~/.ssh
   $ chmod 0600 ~/.ssh/id_rsa
   $ chmod 0644 ~/.ssh/id_rsa.pub
   ```

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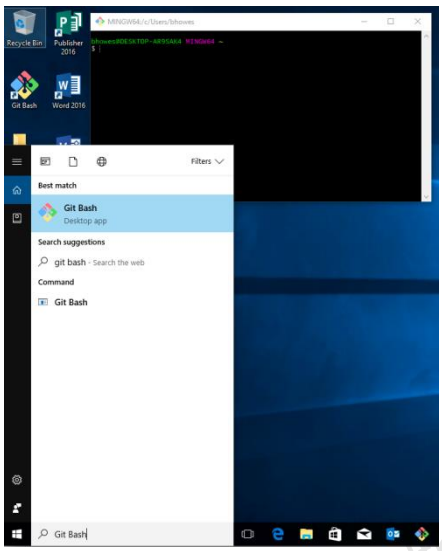
FOR WINDOWS:

a. Install git for windows. Download https://github.com/git-for-windows/git/releases/download/v2.13.0.windows.1/Git-2.13.0-64-bit.exe and install.

b. Enter Git-bash:



Generate ssh-keys by running this command in Git Bash
$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/c/Users/username/.ssh/id_rsa):
Created directory '/c/Users/username/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /c/Users/username/.ssh/id_rsa.
Your public key has been saved in /c/Users/username/.ssh/id_rsa.pub.

Note: In Git-Bash, C:\Users\username\ is shown as /c/Users/username/

2. Open up the Chrome Browser
   a. Sign in to the console before you begin the lab. You must obtain user / password / tenant credentials.
   b. Navigate to https://console.us-phoenix-1.oraclecloud.com
   c. Enter your credentials to sign-in:
   d. Tenant: <>
   e. User/Password

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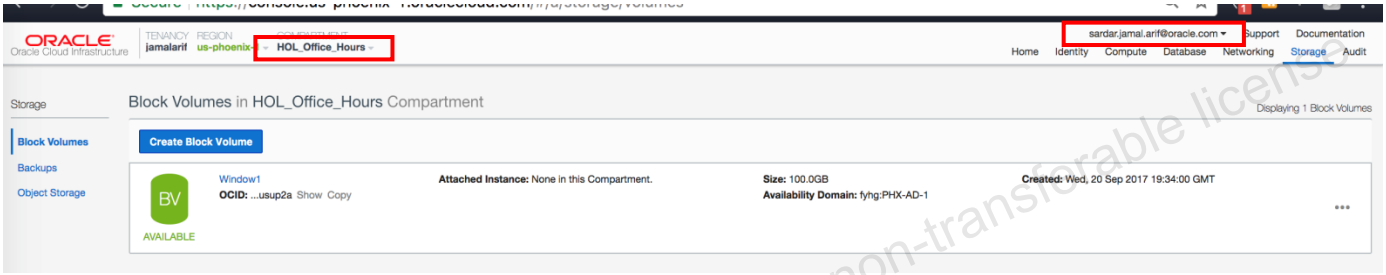
Practices 6-2: Compartment Overview

1. Once you log in, at the Home tab you can find the root and other compartments.

At this moment, please STOP and make sure the correct compartment is selected for all the exercises following this. E.g., for a user with a username such as demo.user48, the correct compartment is c48, and so on. If you don't select the correct compartment, there might be issues in between different users. You might need to scroll down under the compartment heading to locate your specific compartment number.



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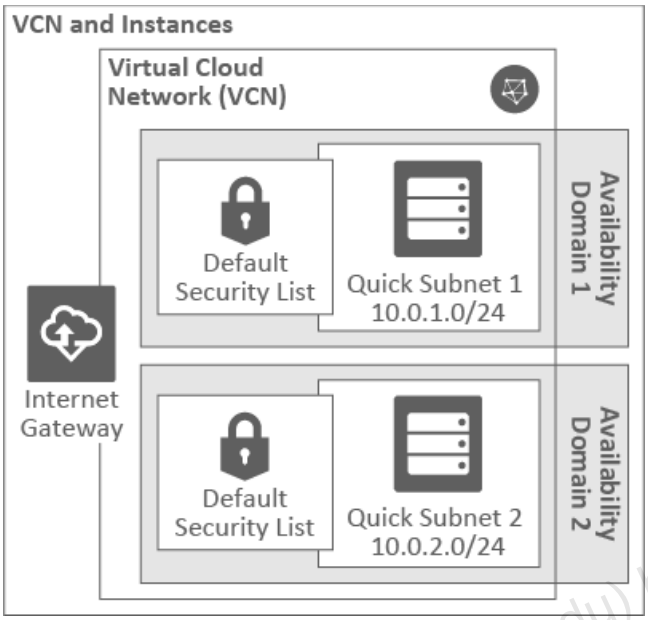
Practices 6-3: Creating a VCN

1. Create a VCN.

   The following diagram shows the prerequisite VCN and instances.



Creating a VCN automatically creates three subnets (one in each Availability Domain of a Region). In this practice, you launch instances in two of them.

   a. In the Console, click **Networking > Virtual Cloud Networks**.

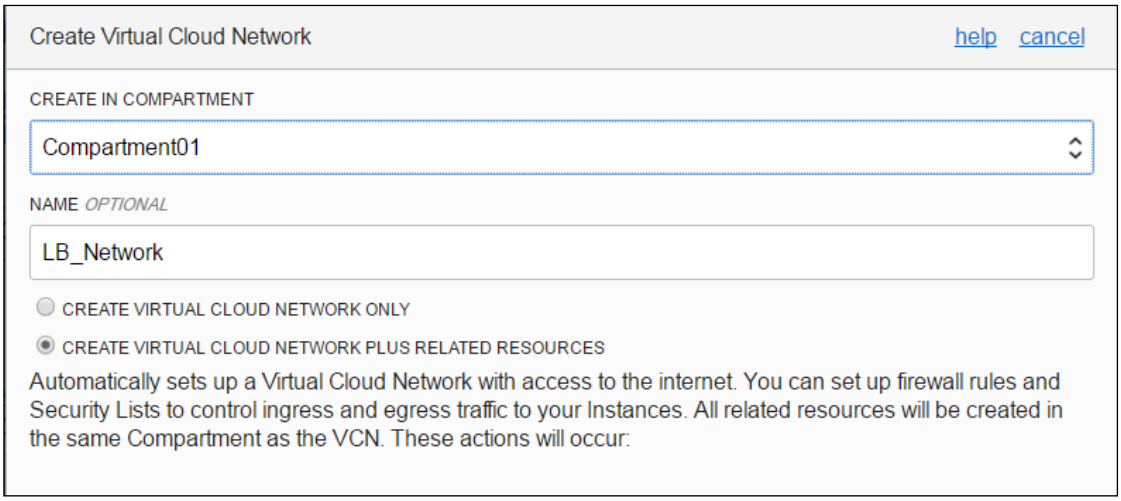
      Ensure that your compartment is the selected compartment on the left side of the Console.

   b. Click **Create Virtual Cloud Network**.

   c. In the dialog box, enter a **Name** for your cloud network (for example, LB_Network).

   d. Select Create Virtual Cloud Network Plus Related Resources.

   The dialog box expands to list the resources that will be created with your cloud network.



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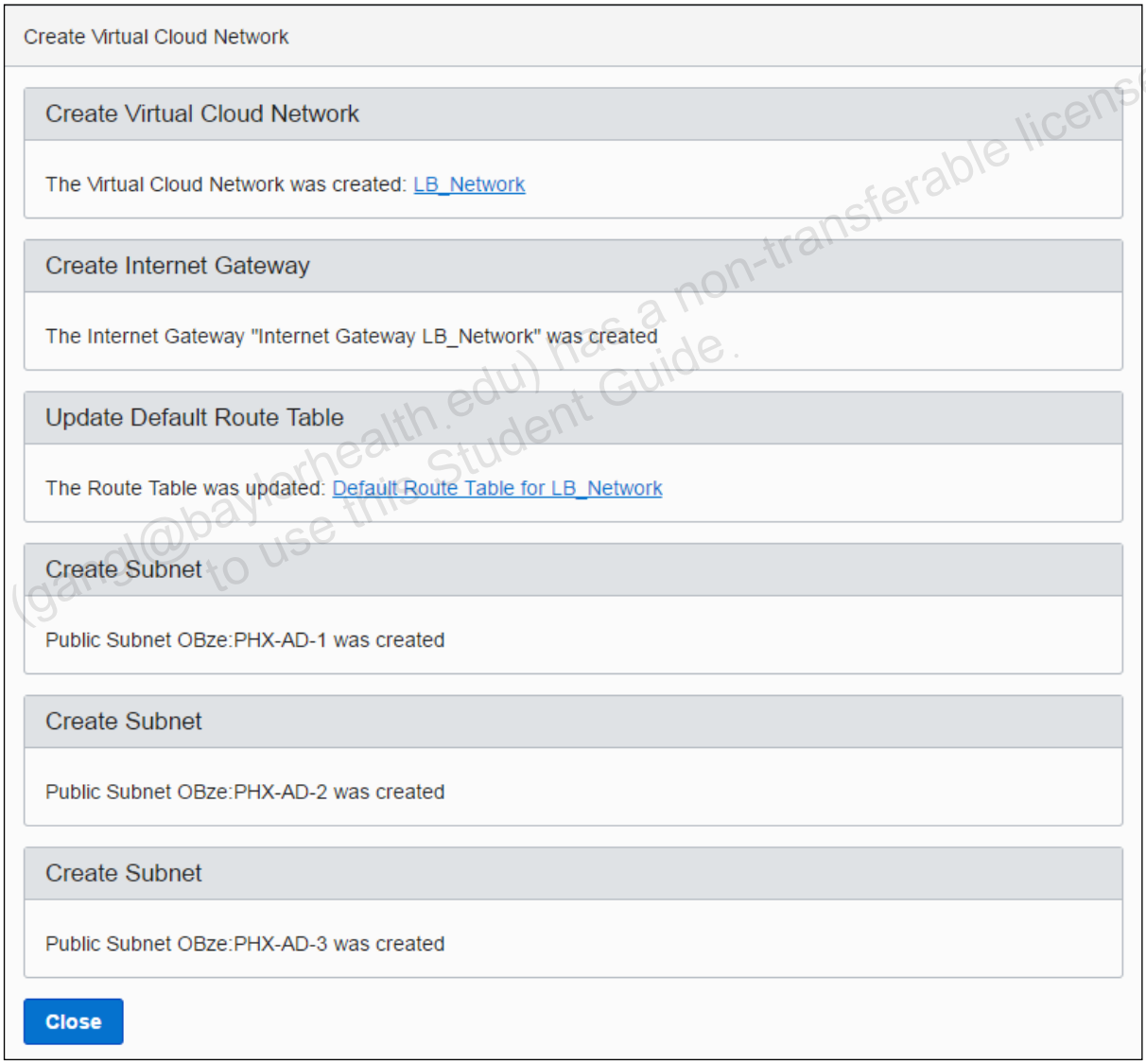
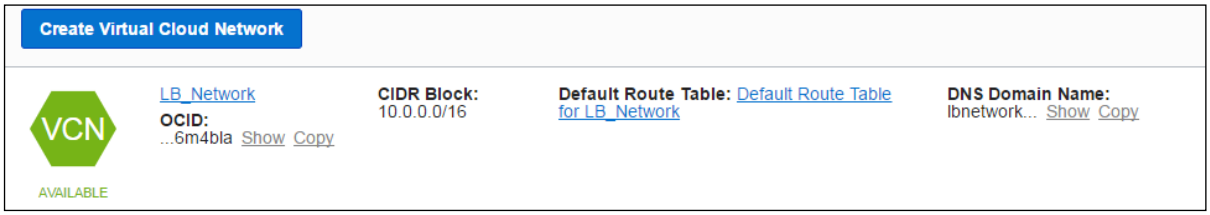
e. Scroll to the bottom of the dialog box and click **Create Virtual Cloud Network**.

A confirmation page displays the details of the cloud network that you created. The cloud network has the following resources and characteristics:

1) A CIDR block range of 10.0.0.0/16
2) An Internet Gateway
3) A route table with a route rule to enable traffic to and from the Internet Gateway. You will edit this route rule later in this practice.
4) A default security list. You will edit this default security list later in the practice.
5) A subnet in each Availability Domain





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Practices 6-4: Creating Two Web-Servers

In this practice, you create two instances and start a web server on each of them.

Tasks

1. Launch Two Instances

   This example uses a Standard1.1 shape.

   a. In the Console, click **Compute**.

   b. Click **Launch Instance**.

   c. In the **Launch Instance** dialog box, enter the following:

      1) **Name:** Enter a name (for example: **Webserver1**).

      2) **Availability Domain:** Select the first Availability Domain in the list, AD-1.

      3) **Image:** Select the Oracle-Linux-7.x image. (The image name has the latest patch date appended to it.)

      4) **Shape:** Select VM Standard1.1.

      5) **Virtual Cloud Network:** Select the cloud network that you created (**LB_Network**).

      6) **Subnet:** Select the subnet LB Subnet 1 in Availability Domain 1.

      7) **DNS name:** Leave blank.

      8) **SSH Keys:** Use the pub key generated in Exercise 1 to create this instance. **NOTE:** Make sure to use the keys that you have access too as you will use this key to ssh into the instances in next steps (The SSH keys are by default located in C:\Users\Lab\.ssh\.)

   d. Click **Launch Instance**.

   e. Repeat the previous steps, but this time enter the name **Webserver2**, select **Availability Domain AD-2, LB_Network** for the VCN, and **LB Subnet 2 for the subnet**.

2. Start a Web Application on Each Instance

   Use ssh to access the instances and start the web server by executing the following commands on each instance:

   Note: You can use two separate ssh sessions to execute these commands on both instances in parallel to save time.

   a. `ssh -i </path/privateKey>  opc@<PublicIP_Address>`

   b. Run yum update:

```
$> sudo yum -y update
```

   c. Install the Apache HTTP Server:

```
$> sudo yum -y install httpd
```

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d. Open port 80 on the firewall to allow http and https traffic through:

```
$> sudo firewall-cmd --permanent --add-port=80/tcp
```

e. Reload the firewall:

```
$> sudo firewall-cmd --reload
```

f. Start the web server:

```
$> sudo systemctl start httpd
```

g. Add an index.htm file on each instance to indicate which server it is.
On the first instance enter:

```
$> sudo su
$> echo 'WebServer1' >>/var/www/html/index.html
$> exit
```

h. On the second instance enter:

```
$> sudo su
$> echo 'WebServer2' >>/var/www/html/index.html
$> exit
```

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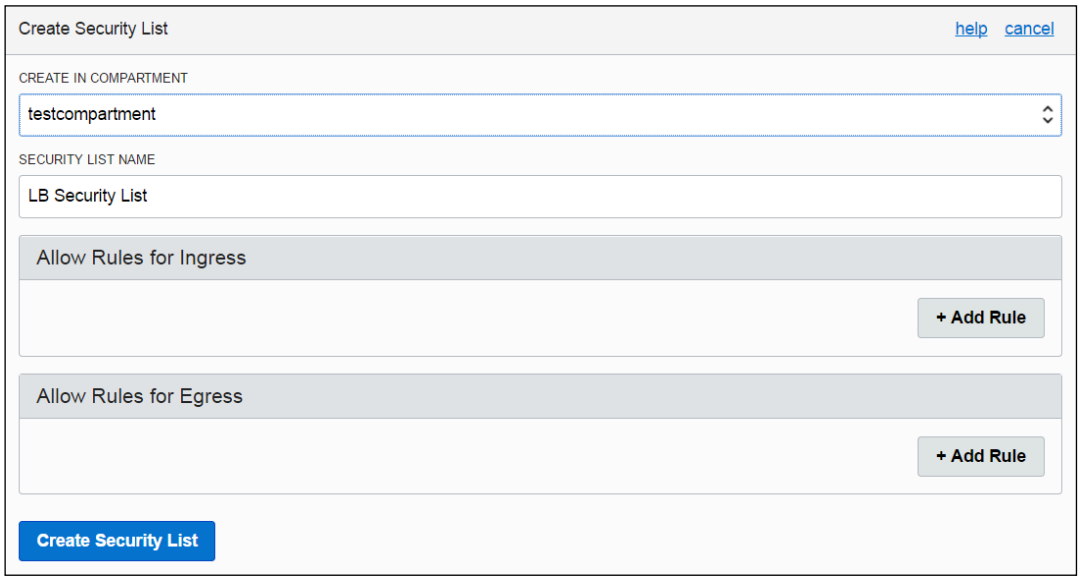
Practices 6-5: Creating and Testing Load Balancer

Note: Your load balancer should always reside in different subnets than your application instances. This allows you to keep your application instances secured in private subnets, while allowing public Internet traffic to the load balancer in the public subnets.

Tasks

1. Add Two Subnets to Your VCN to Host Your Load Balancer
   a. Add a Security List.
      1) In the **Console**, click **Networking**, and then click **Virtual Cloud Networks**. This displays the list of VCNs in the current compartment.
      2) Click the name of the VCN that includes your application instances.
      3) Under **Resources**, click **Security Lists**.
      4) Click **Create Security List**.
         a) **Create in Compartment:** This field defaults to the current compartment. Select the compartment you want to create the security list in, if it's not already selected.
         b) Enter a **Name** (for example, LB Security List).
         c) Delete the entry for the ingress rule and the entry for the egress rule.

         Note: The security list should have no rules. The correct rules are automatically added during the load balancer workflow.
         d) Click **Create Security List**.
         e) Return to your Virtual Cloud Network Details page.



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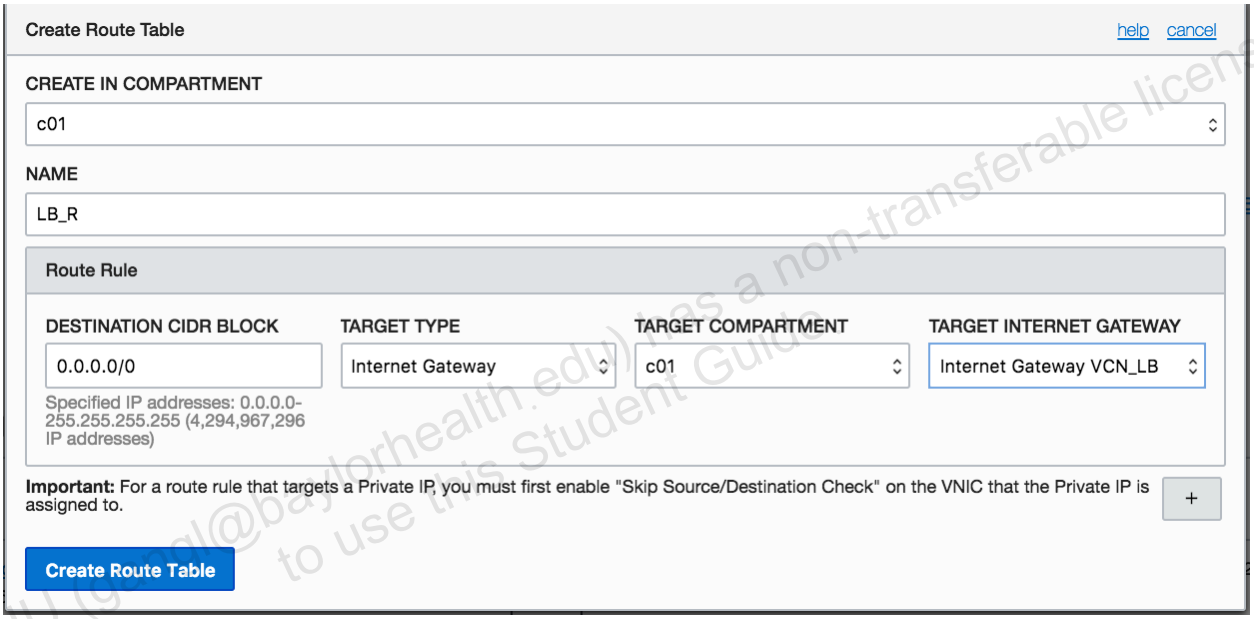
b. Add a Route Table.
   1) Under **Resources**, click **Route Tables**.
   2) Click **Create Route Table**. Enter the following:
      a) **Create in Compartment**: This field defaults to your current compartment. Select the compartment you want to create the route table in, if not already selected.
      b) **Name**: Enter a name (for example, LB Route Table)
      c) **CIDR Block**: Enter 0.0.0.0/0
      d) **Target**: Select the Internet Gateway for your VCN.
      e) Click **Create Route Table**.



c. Create the first subnet.
   1) Under **Resources**, click **Subnets**.
   2) Click **Create Subnet**.
   3) Enter the following:
      a) **Name:** Enter a name (for example, LB Subnet 1).
      b) **Availability Domain:** Choose the first Availability Domain (AD-1).
      c) **CIDR Block:** Enter 10.0.4.0/24.
      d) **Route Table:** Select the LB Route Table you created.
      e) **Subnet access**: select Public Subnet
      f) **DHCP Options:** Leave blank.
      g) **Security Lists:** Select the **LB Security List** you created.

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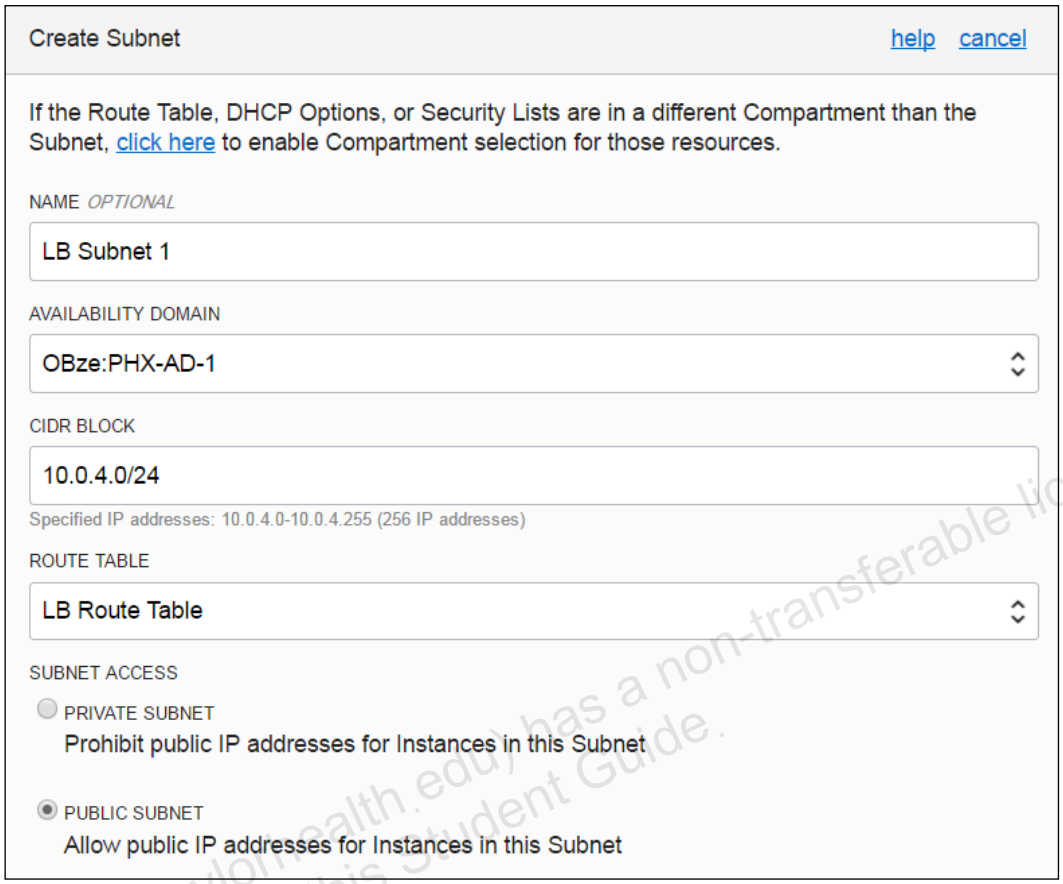
4) Click **Create**.



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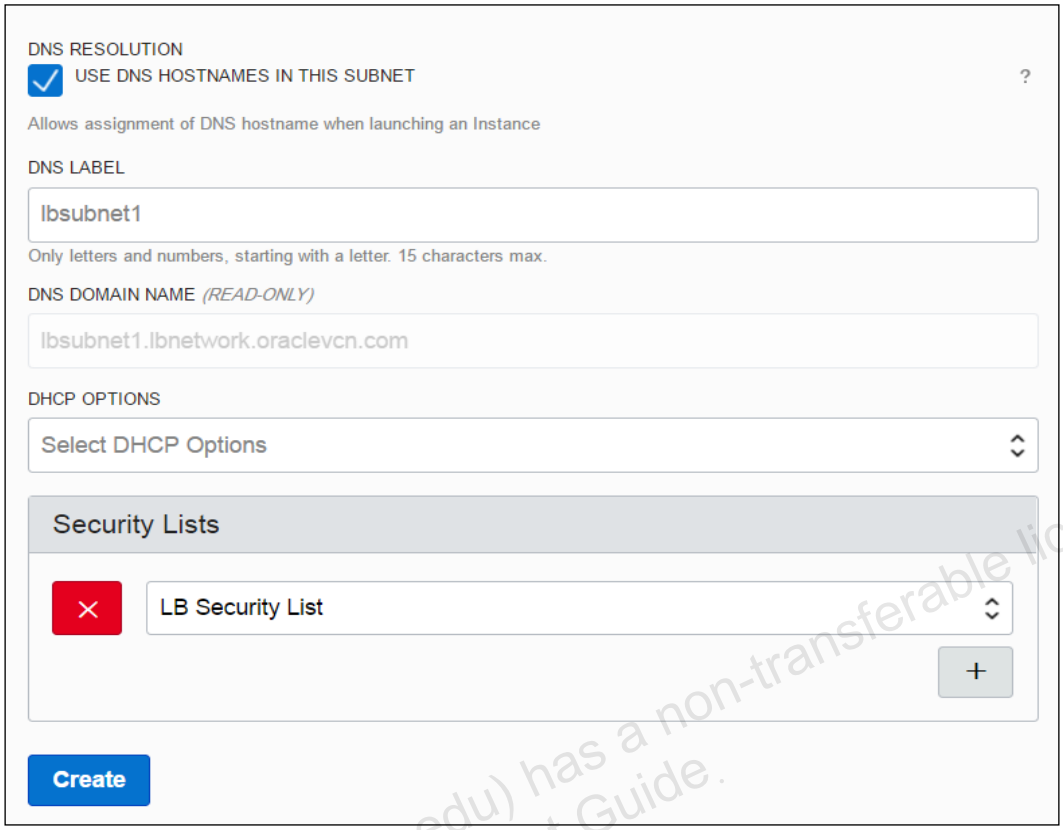

d. Create the second subnet.

Create a second load balancer subnet in a different Availability Domain from the subnet you previously created.

1) In the details page of your VCN, click **Create Subnet**.
2) Enter the following:
   a) **Name:** Enter a name (for example, LB Subnet 2).
   b) **Availability Domain:** Choose the second Availability Domain (AD-2).
   c) **CIDR Block:** Enter 10.0.5.0/24.
   d) **Route Table:** Select the LB Route Table you created.
   e) **Subnet access**: select Public Subnet
   f) **DHCP Options:** Leave blank.
   g) **Security Lists:** Select the **LB Security List** you created.

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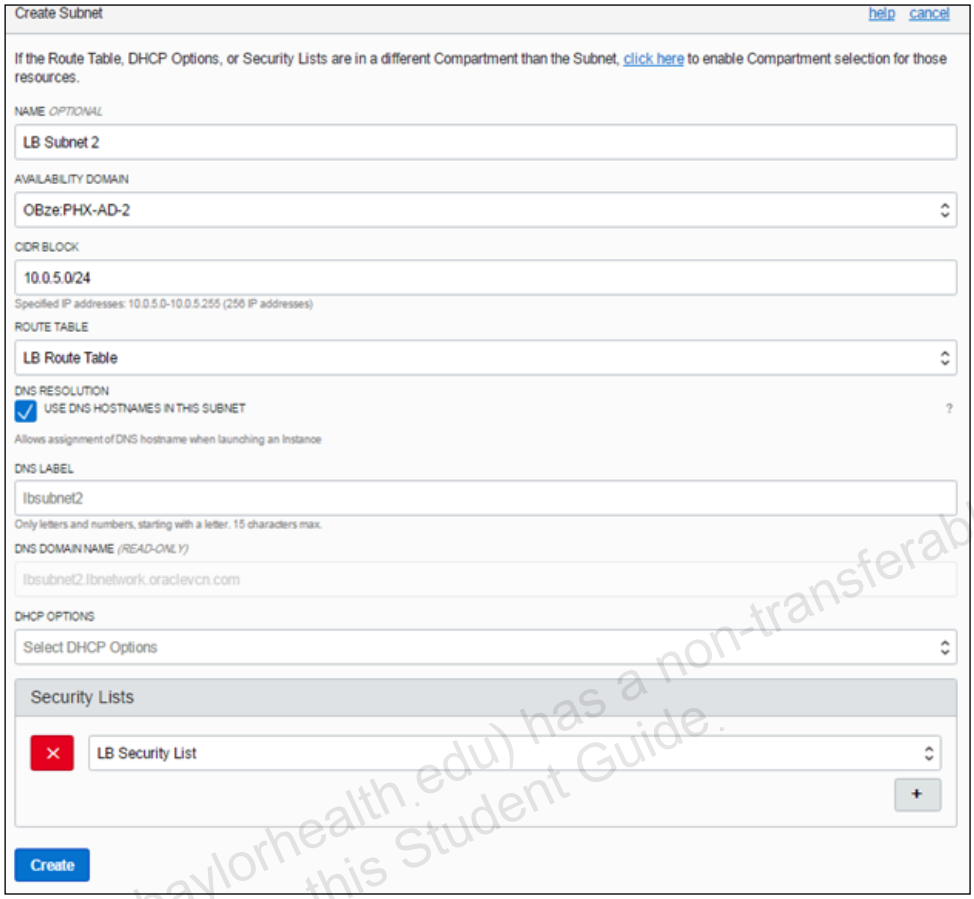
3) Click **Create**.



2. Create a Load Balancer

When you create a load balancer, you choose its shape (size) and you specify two subnets from different Availability Domains. This ensures that the load balancer is highly available and is only active in one subnet at a time.

a. In the Console, click **Networking**, and then click **Load Balancers**.

Ensure that the compartment designated for you is selected on the left.

b. Click **Create Load Balancer**.

c. Enter the following:

1) **Name:** Enter a name for your load balancer.

2) **Shape:** Select 100Mbps. This specifies the bandwidth of the load balancer. For the tutorial, use the smallest shape. Note that the shape cannot be changed later.

3) **Virtual Cloud Network:** Select the Virtual Cloud Network for your load balancer.

4) **Visibility**: select Create Public Load Balancer

5) **Subnet (1 of 2):** Select LB Subnet 1.

6) **Subnet (2 of 2):** Select LB Subnet 2. Note that the second subnet must reside in a different Availability Domain from the first.

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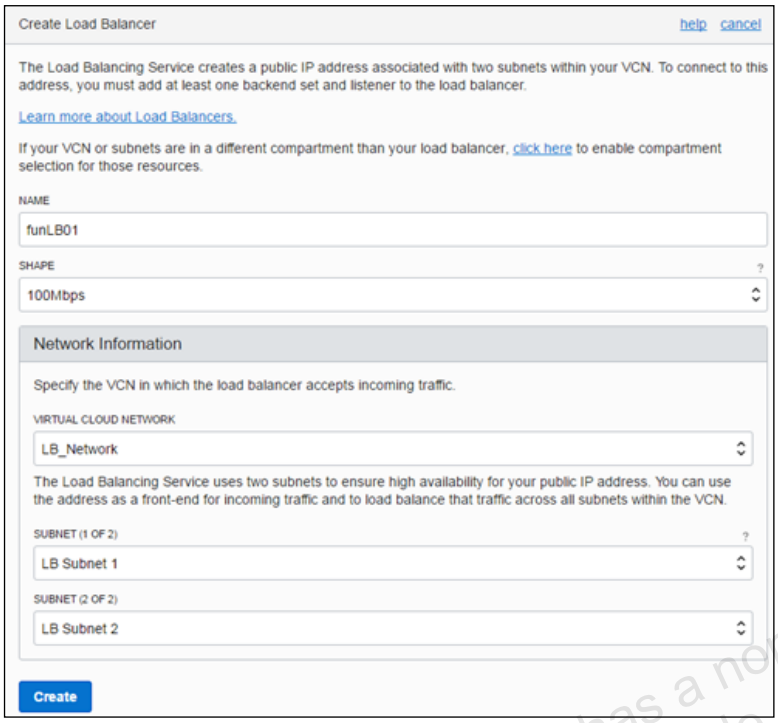
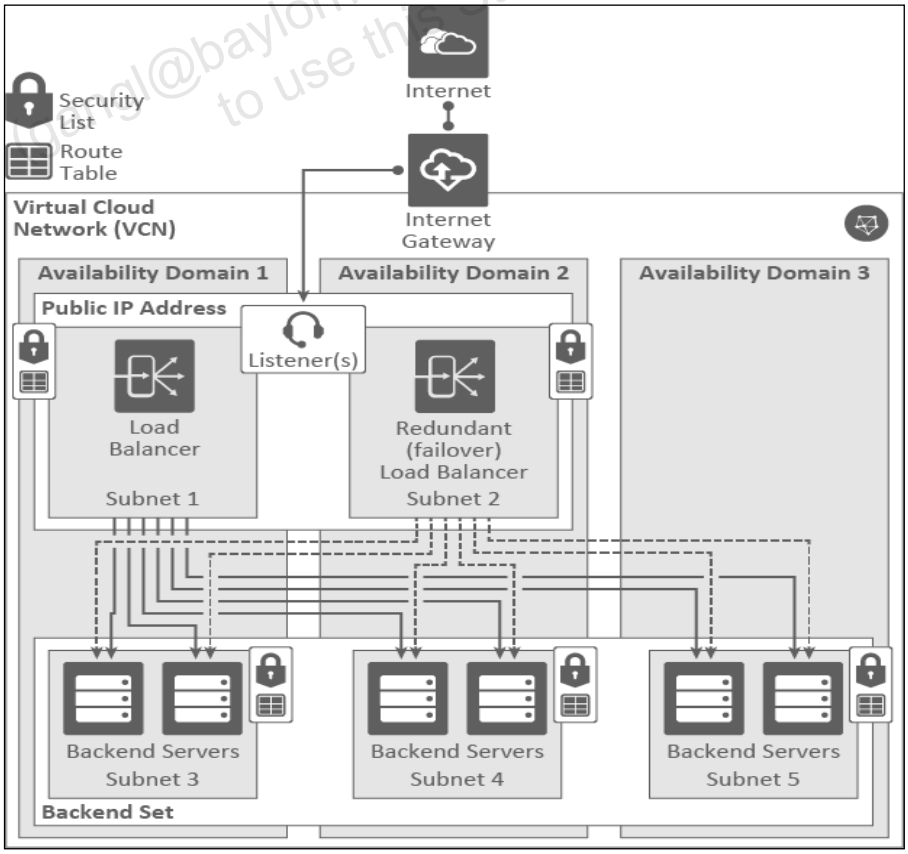
d. Click **Create**.



When a load balancer is created, you're assigned a public IP address to which you route all incoming traffic. The IP address is highly available, meaning it is available from both subnets that you specified. Note that it is only active in one subnet at a time.



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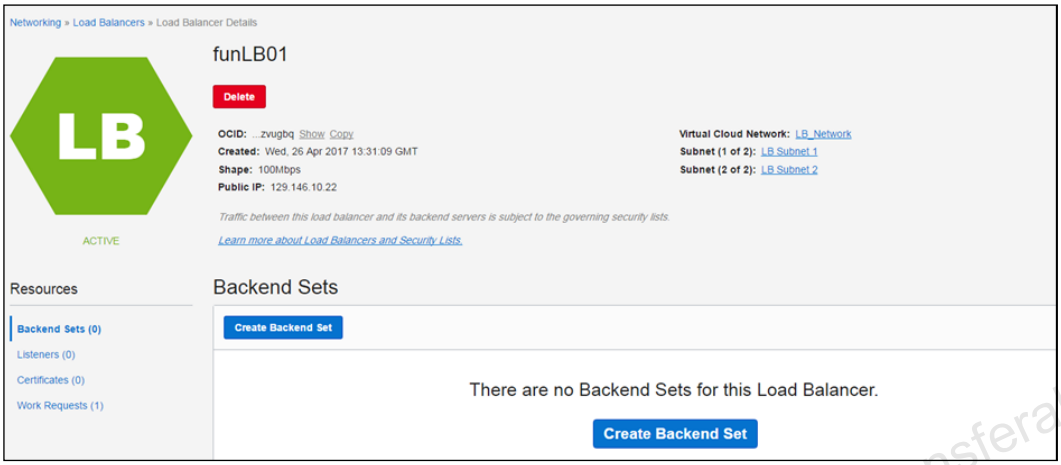
3. Create a Backend Set with Health Check

A backend set is a collection of backend servers to which your load balancer directs traffic. Define the backend set policy and health check.

a. Click the name of your load balancer to view its details.



b. Click Create Backend Set.

c. In the dialog box, enter:

1) **Name:** Give your load balancer backend set a name. The name cannot contain spaces.

2) **Policy:** Choose Weighted Round Robin.

d. Enter the Health Check details.

1) **Protocol:** Select HTTP

2) **Port:** Enter 80

3) **URL Path** (URI)**:** Enter "/"

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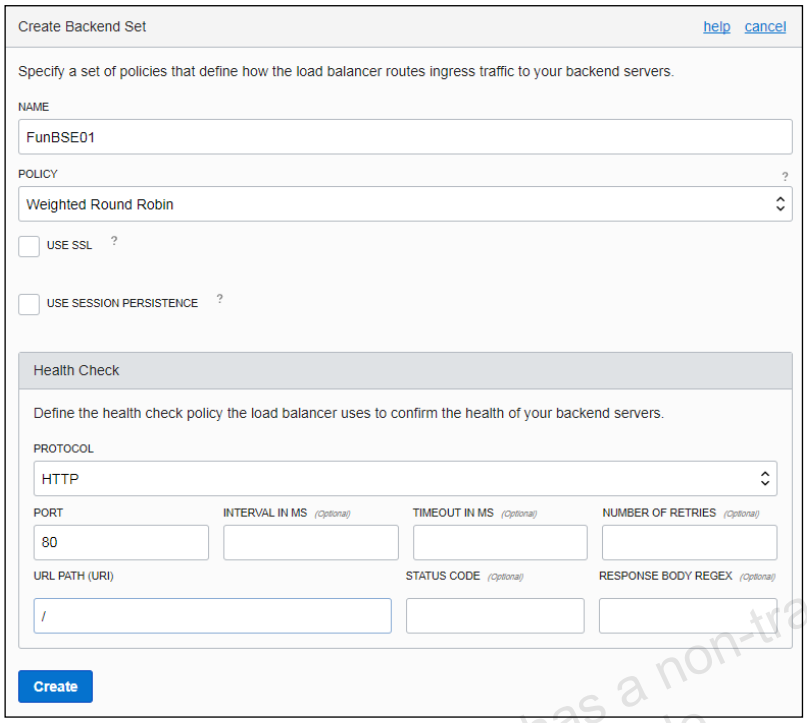
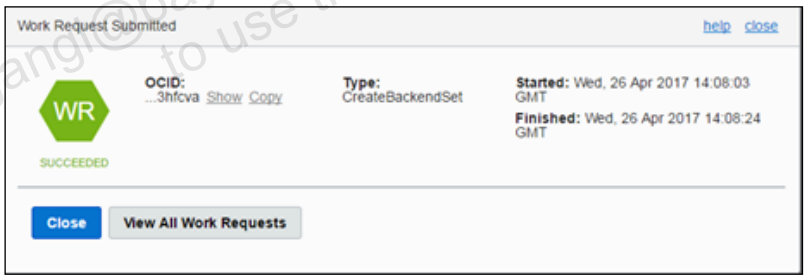
The rest of the fields are optional and can be left blank for this practice.



e. Click **Create**.

When the Backend Set is created, the Work Request status changes to Succeeded. Close the Work Request dialog box.



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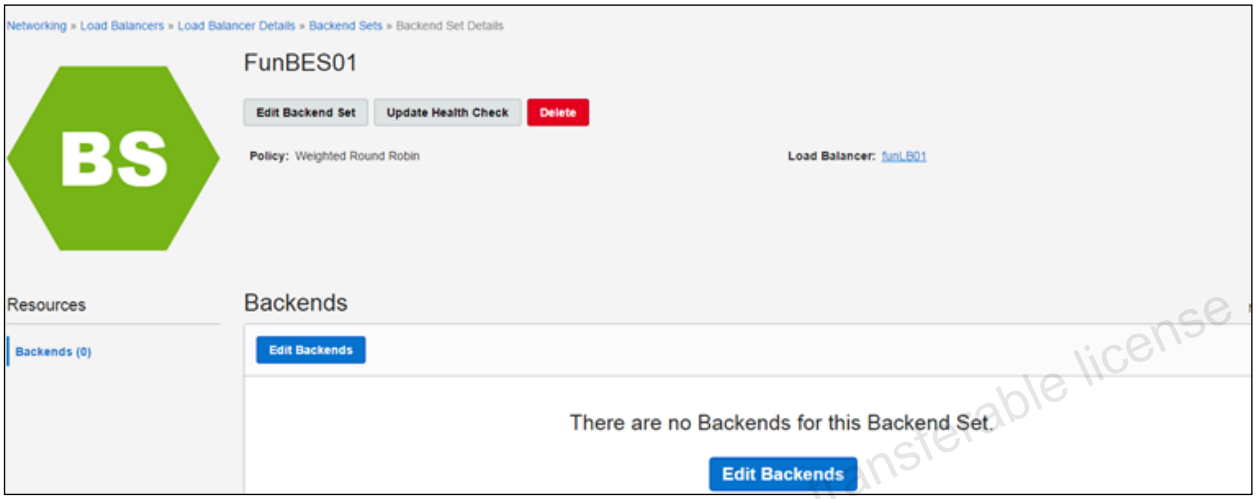
4. Add Backend Servers to Your Backend Set

   a. On the details page of your load balancer, click **Backend Sets**. The backend set you created is displayed.

   b. Click the name of the backend set to view its details.



   c. Click **Edit Backends**

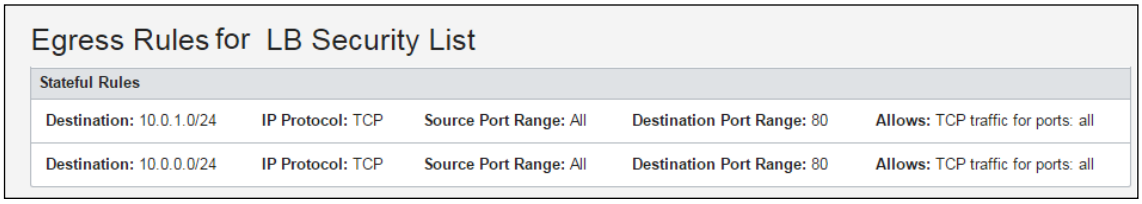
   In the dialog box, do the following:

   1) Ensure that **Help me create proper security list rules** is selected. Steps A and B below are for information only (you don't have to create these rules).

      a) Updates to the security list for your load balancer subnets are as follows:

         (i) Allow egress traffic to the backend server 1 subnet (for example, Public-Subnet-AD1)

         (ii) Allow egress traffic to the backend server 2 subnet (for example, Public-Subnet-AD2)



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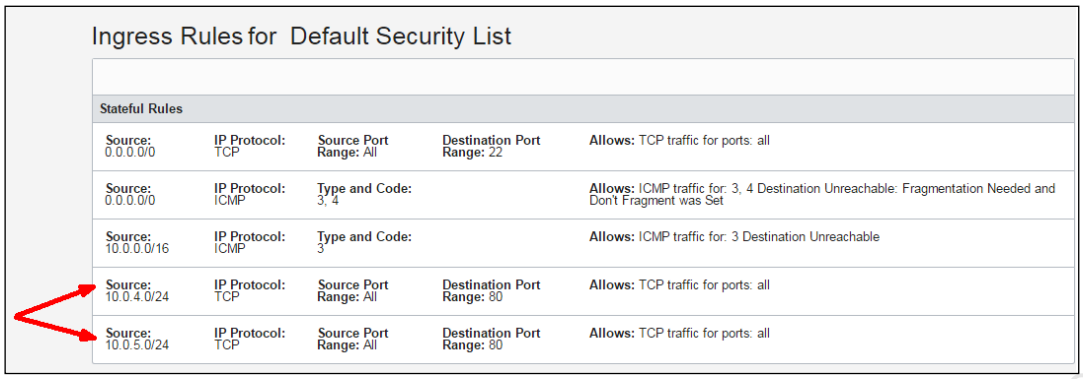
b) Updates to the security list for your backend server subnets are as follows:

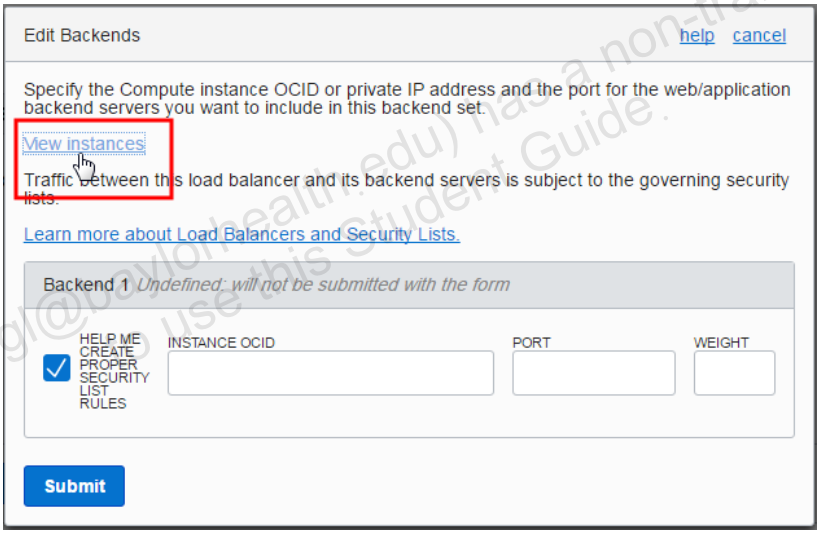
(i) Allow ingress traffic from load balancer subnet 1

(ii) Allow ingress traffic from load balancer subnet 2



2) **OCID:** Paste the OCID of the first instance (Webserver1).

a) In the dialog box, click **View Instances**.



This opens a new browser tab that displays the instances in the current compartment.

b) If your instances are not in the current compartment, select the compartment to which the instance belongs (select from the list on the left side of the page). A shortened version of the instance's OCID is displayed next to each instance.

c) Click **Copy** to copy the OCID. You can then paste it into the Instance ID field.

3) **Port:** Enter 80.

4) **Weight:** Leave blank to weight the servers evenly.

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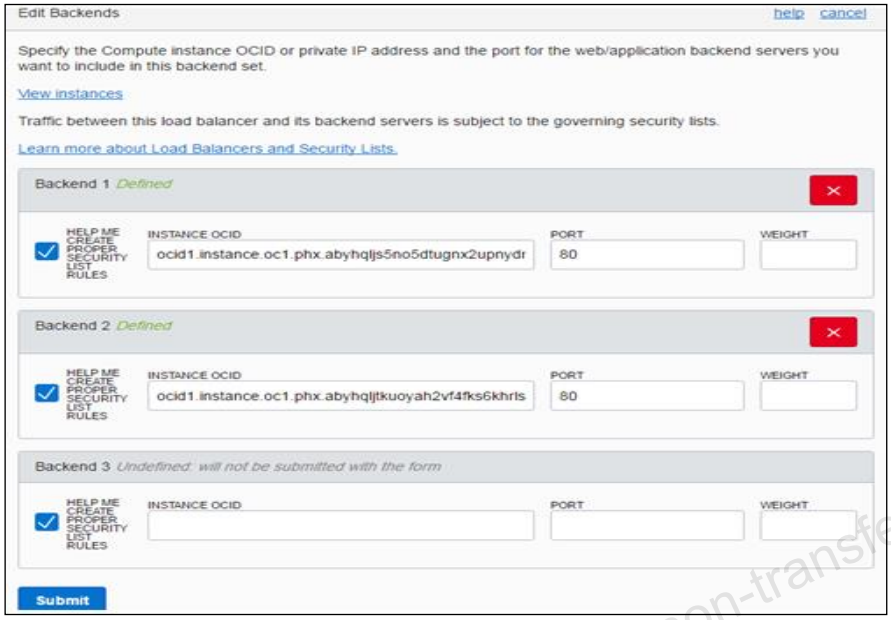
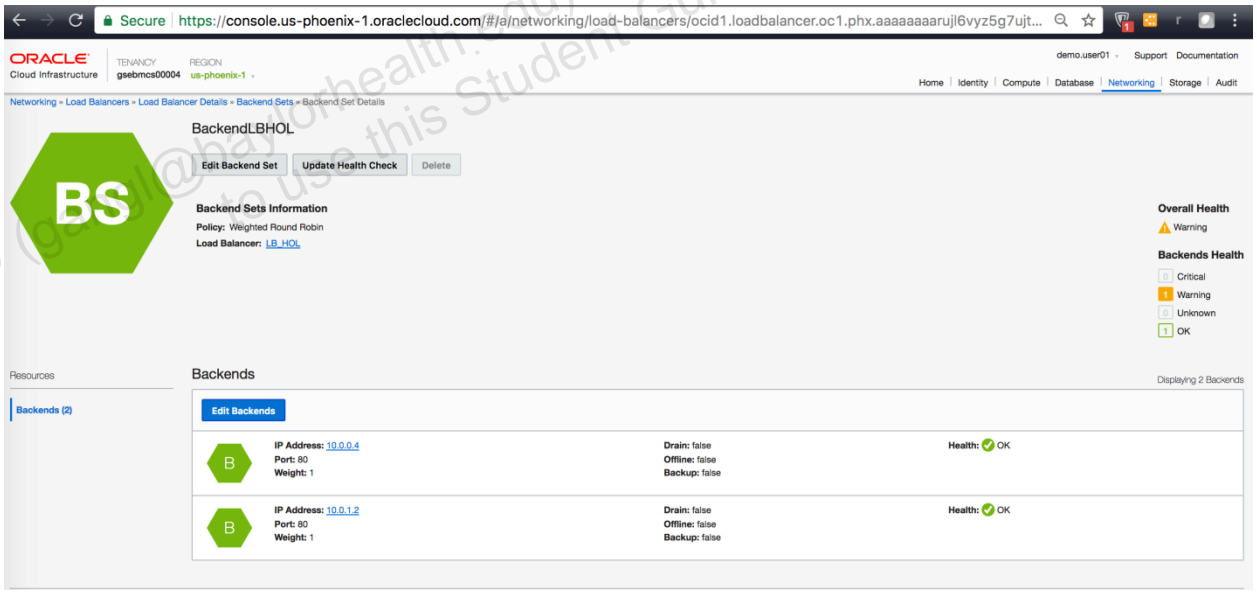
5) Repeat Steps 2 through 4, pasting in the OCID for the second instance (Webserver2).



6) Click **Submit**.

7) Allow the job to complete. Scroll down and click **Create Rules**



5. Create a Listener

A listener is an entity that checks for connection requests. The load balancer listener listens for ingress client traffic using the port you specify within the listener and the load balancer's public IP.

In this practice, you define a listener that accepts HTTP requests on port 80.

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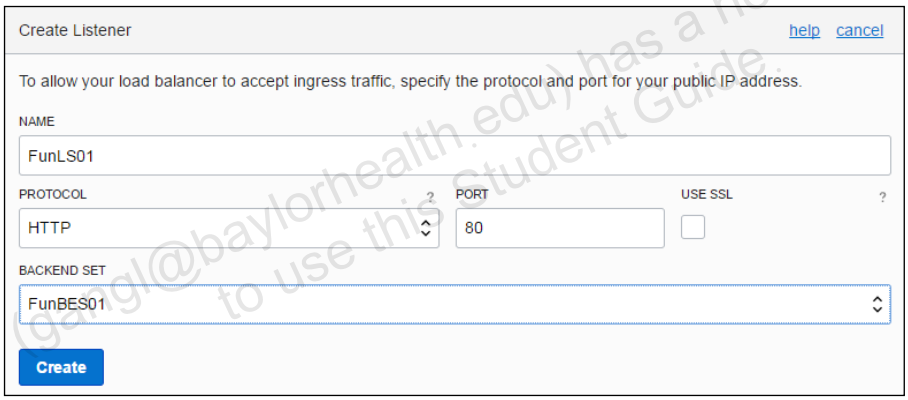
a. On your Load Balancer Details page, click **Listeners**.

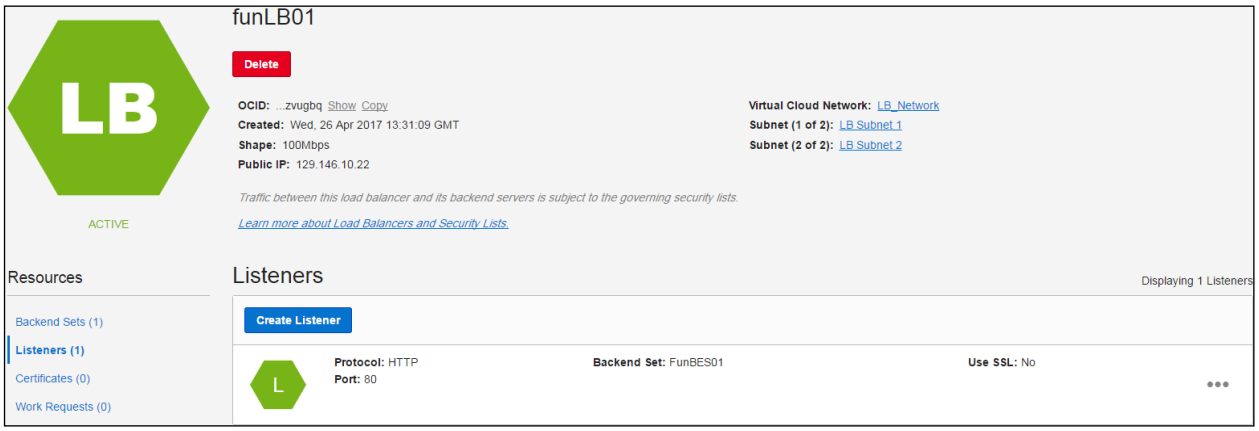
b. Click **Create Listener**.

c. Enter the following:

1) **Name:** Enter a friendly name.
2) **Protocol:** Select HTTP.
3) **Port:** Enter 80 as the port on which to listen for incoming traffic.
4) **Backend Set:** Select the backend set you created.



d. Click **Create**.



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6. Update the Load Balancer Subnet Security List to Allow Internet Traffic to the Listener

   To enable the traffic to get to the listener, update the load balancer subnet's security list.

   a. Go to your VCN details page.

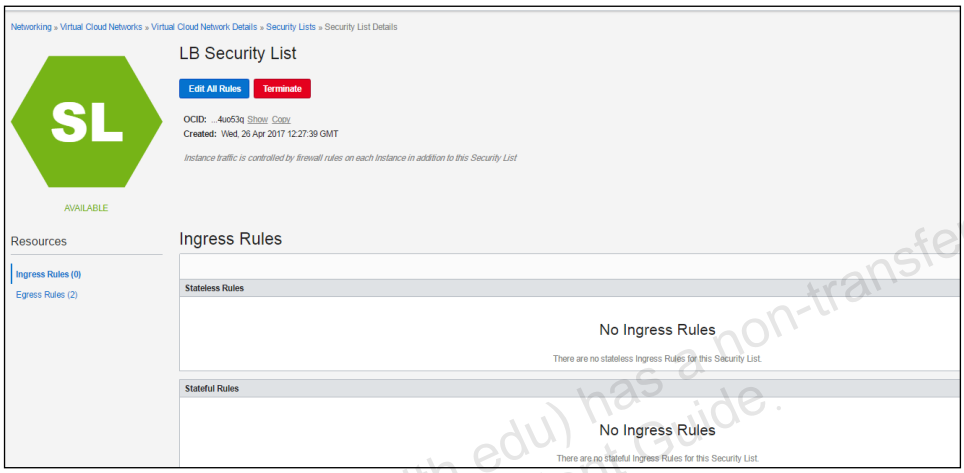
   b. Click **Security Lists**.

      A list of the security lists in the cloud network is displayed.

   c. Click the LB Security List.

      This displays the details of the LB Security List.

   d. Click **Edit All Rules**.



   e. Under Allow Rules for Ingress, click **Add Rule**.

   f. Enter the following ingress rule:

      - **Source CIDR:** Enter 0.0.0.0/0
      - **IP Protocol:** Select TCP

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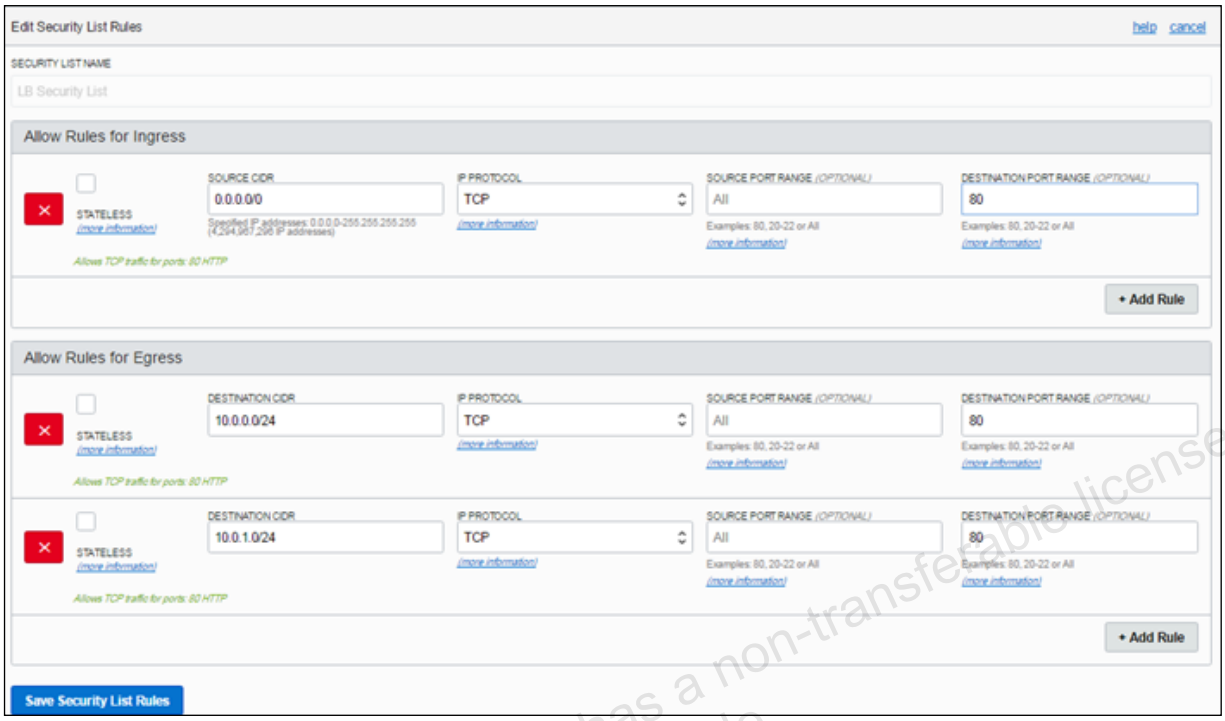
- **Destination Port Range:** Enter 80 (the listener port).



g. Click **Save Security List Rules**.

7. Verify Your Load Balancer

   Test the functionality of the load balancer by navigating to its public IP address on a web browser.

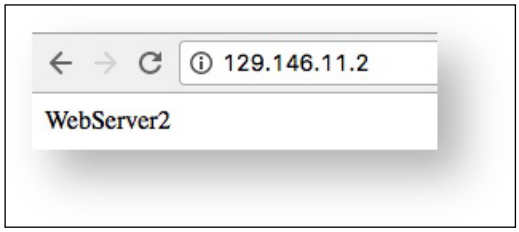
   a. Open a web browser.

   b. Enter the load balancer's public IP address.

      The index.htm page from one of your web servers is displayed.

   c. Refresh the web page.

      The index.htm page from the other web server should now be displayed. This demonstrates that the load of the web server is being shared between both instances.



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Practices for Lesson 7: Database Service

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Practices for Lesson 7: Database Service - Overview

In this practice, you create a one-node DB System.

Assumptions

You are familiar with the key concepts and terminology of Oracle Cloud Infrastructure and have been provisioned with a tenancy with the required access permissions.

Note: Some of the UIs might look a little different than the screenshots included in the instructions, but students can still use the instructions to complete the hands-on labs.

Prerequisites

a. The SSH public key from the key pair that you plan to use for connecting to the DB System via SSH
b. The name of a Virtual Cloud Network (VCN) to launch the DB System in
c. Each VCN subnet has a default security list that contains a rule to allow TCP traffic on destination port 22 (SSH) from source 0.0.0.0/0 and any source port.

   Note: Do not use a subnet that overlaps with 192.168.16.16/28, which is used by the Oracle Clusterware private interconnect on the database instance.

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Practices for Lesson 7: Creating a Database

The Database Service lets you quickly launch an Oracle Database System (DB System) and create one or more databases on it.

There are two types of DB Systems:

- One-node DB Systems consist of a single server running Oracle Linux 6.8, with locally attached NVMe storage.
- Two-Node RAC DB Systems consist of two servers in a RAC configuration, running Oracle Linux 6.8, with direct-attached shared storage. The cluster provides automatic failover.

Supported Database Editions and Versions

One- and two-node RAC DB Systems support the following Oracle Database editions:

- Standard Edition
- Enterprise Edition
- Enterprise Edition - High Performance
- Enterprise Edition - Extreme Performance (required for two-node RAC DB Systems)

The supported database versions are the following:

- Oracle Database 11g Release 2
- Oracle Database 12c Release 1
- Oracle Database 12c Release 2

Shapes for One and Two-node RAC DB Systems

When you launch a DB System, you choose its *shape*, which determines the resources allocated to the DB System. The shape that you choose for a DB System determines its total raw storage.

The available DB System shapes are:

- **BM.HighIO1.36:** Provides a one-node DB System
- **BM.DenseIO1.36:** Provides a one-node DB System
- **BM.RACLocalStorage1.72:** Provides a two-node RAC DB System

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Task

1. Launch a DB System
   a. Sign in to https://console.us-phoenix-1.oraclecloud.com/, open the Console, click **Database**, choose your **Compartment**, and then click **Launch DB System**.
   b. In the **Launch DB System** dialog box, enter the following:

DB System Information	
Display Name	Enter a display name for the DB System.
Availability Domain	Enter the Availability Domain Name in which the DB System resides.
Shape	Select **VM.Standard1.4**
Oracle Database Software Edition	Select **Enterprise Edition.**
Total Node Count	Select the default option, 1.
Available Storage Size	256 GB
SSH Public Key	Paste your ssh public key value into this field.
Network Information	
Virtual Cloud Network	Enter the VCN in which to launch the DB System.
Client Subnet	Enter the subnet name to which the DB System should attach.
Host Name Prefix	Enter your choice of host name for the DB System. Example: ocidb1.
Database Information	
Database Name	Enter a name for the database (db1).
Database Version	Select **12.2.0.1.**
PDB Name	Enter **pdb1.**
Database Admin Password	Enter **Welc0me2##OCIBM** for the SYS password.
Confirm Database Admin Password	Enter **Welc0me2##OCIBM.**
Database Workload	Select **Online Transactional Processing** for this practice.

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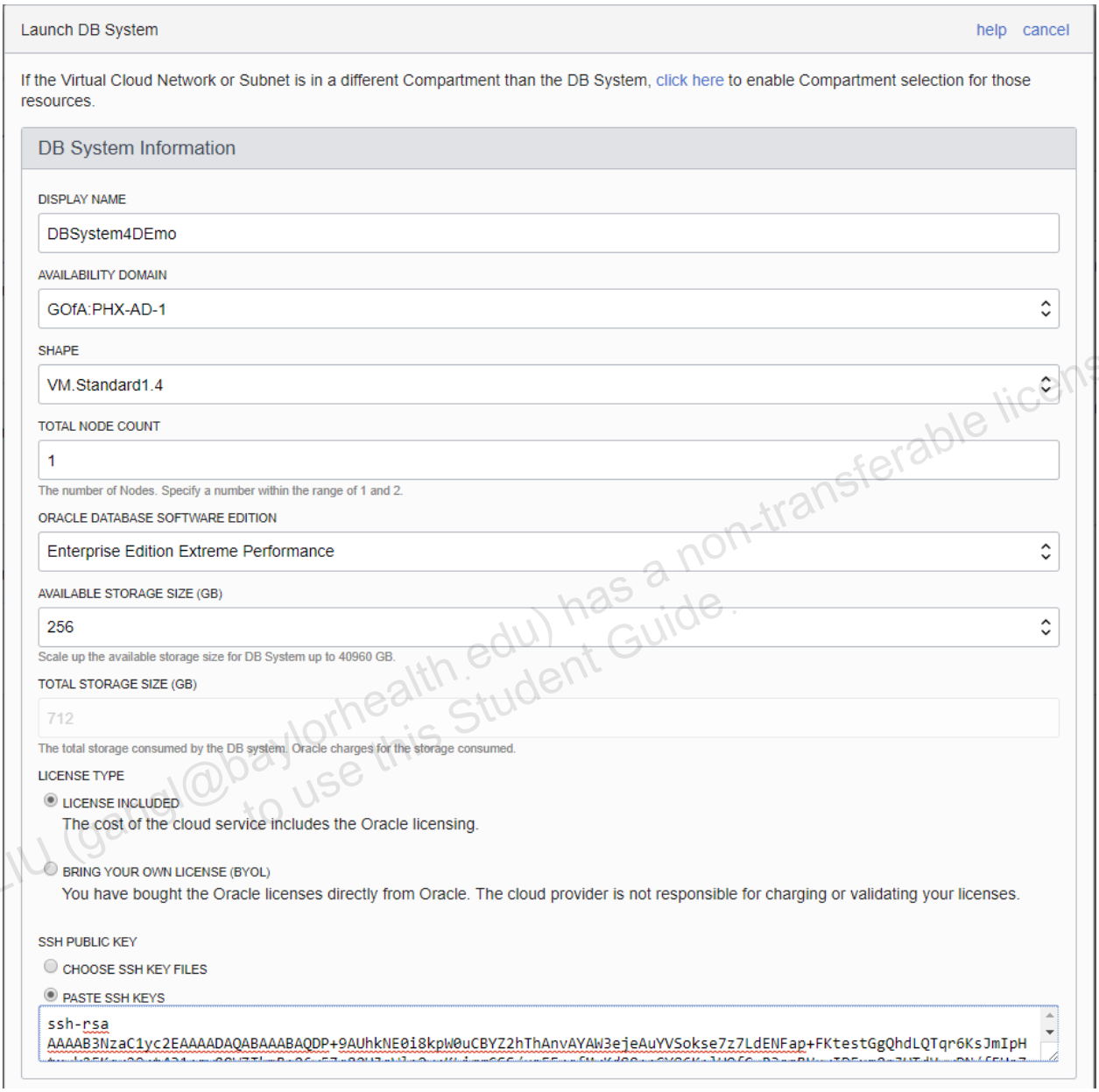
The following is a sample DB System Information screen:



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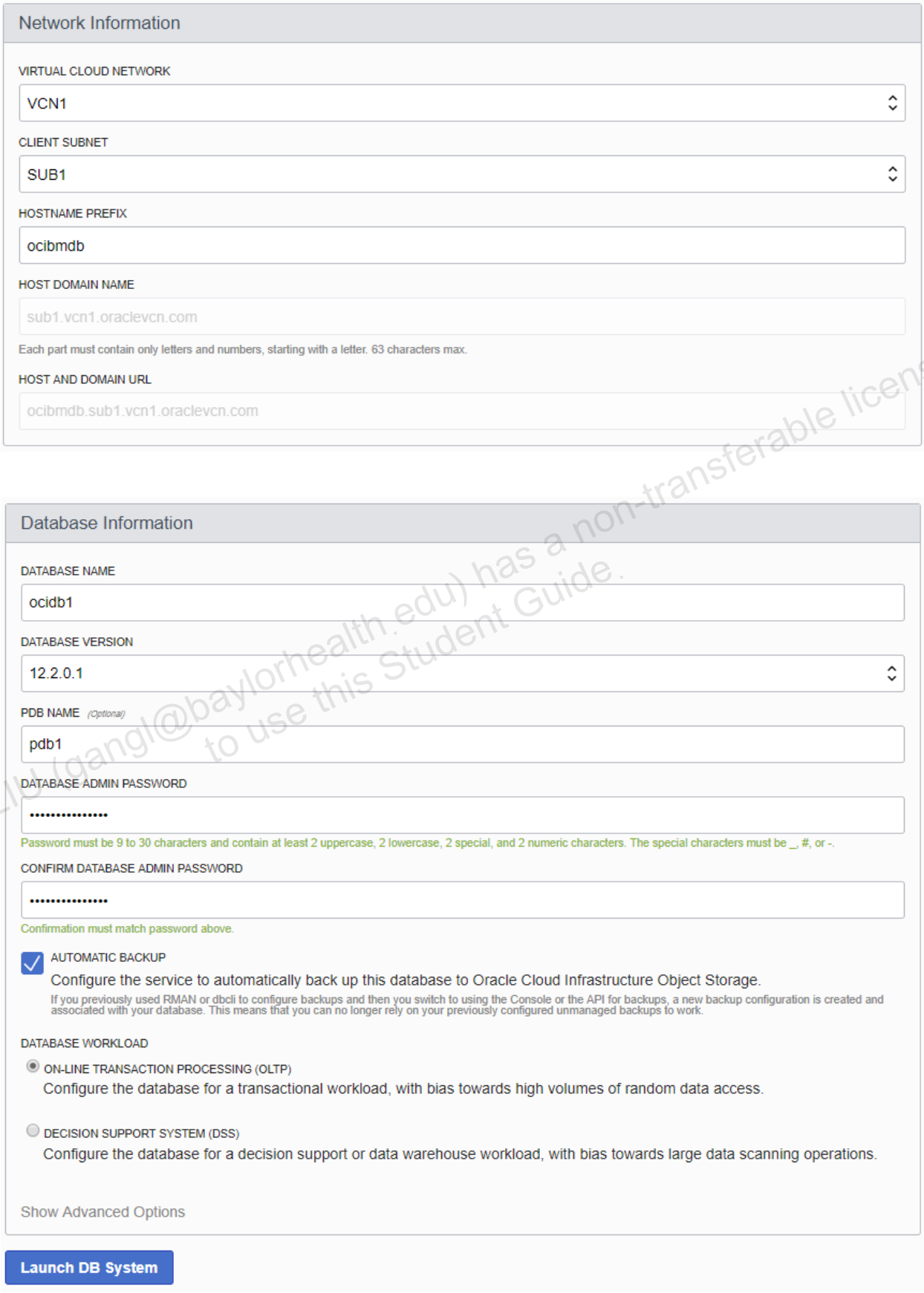

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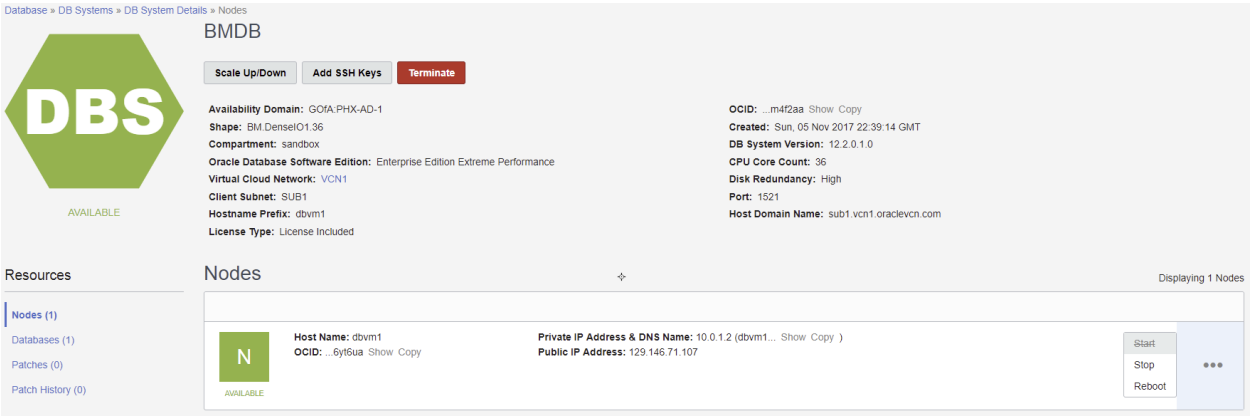
c. Click **Launch DB System.**

2. Check the Status of the DB System
   a. Open the Console, click **Database**, and then choose your **Compartment**.
   b. From the list of DB Systems, find the system that you're interested in and check its icon. The color of the icon and the text below it indicates the status of the system. The available statuses and their icon colors are:
      - **Provisioning:** Yellow icon
      - **Available:** Green icon
      - **Starting:** Yellow icon
      - **Stopping:** Yellow icon
      - **Stopped:** Yellow icon
      - **Terminating:** Gray icon
      - **Terminated:** Gray icon
      - **Failed:** Red icon

3. To Start, Stop, or Reboot a DB System:
   a. Open the Console, click **Database,** and then choose your **Compartment**.
   b. In the list of DB Systems, find the DB System that you want to stop, start, or reboot, and then click its name to display its details.



   c. In the list of nodes, click the **Actions** icon (● ● ●) for a node, and then click one of the following actions:

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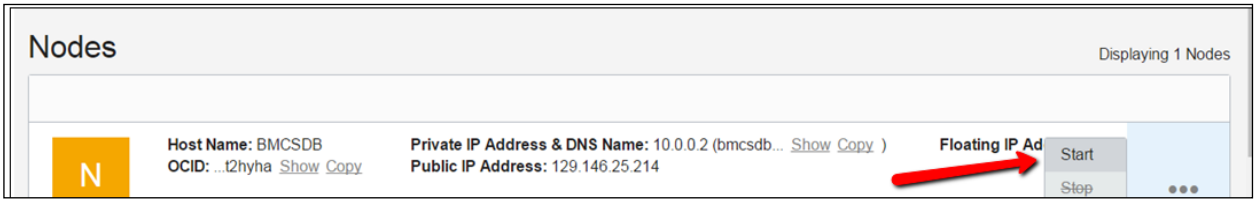
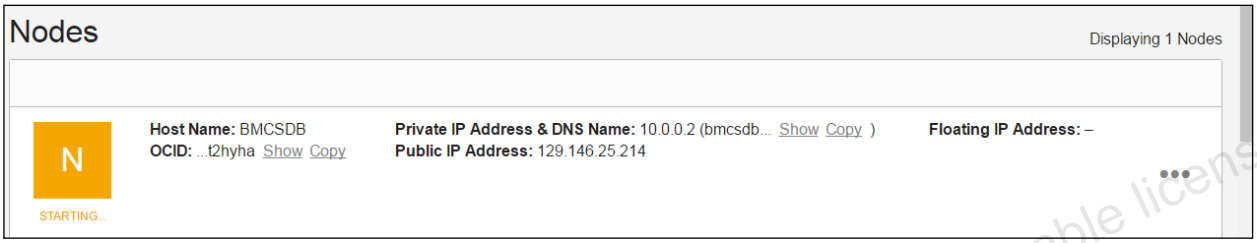
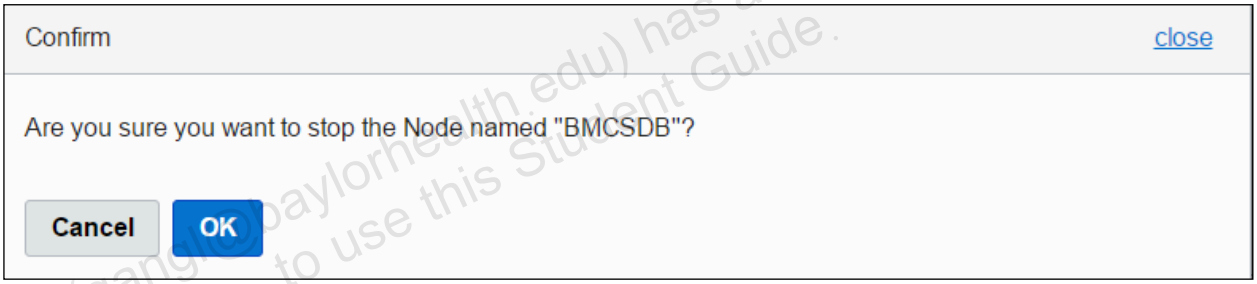
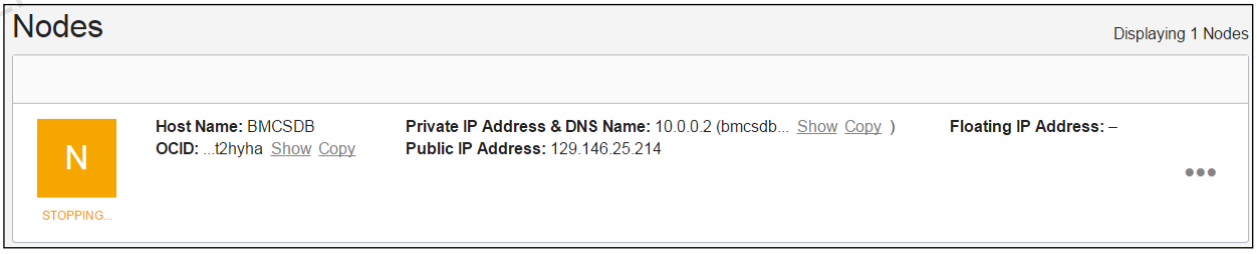
- **Start:** Restarts a stopped node. After the node has restarted, the **Stop** action is enabled

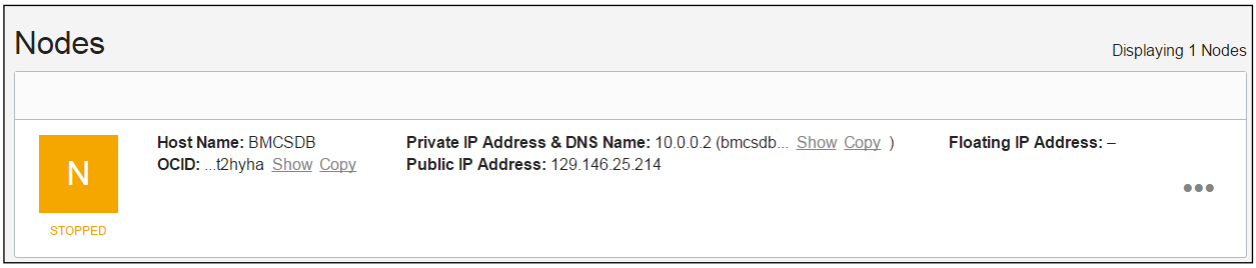




- **Stop:** Shuts down the node. After the node is powered off, the **Start** action is enabled.







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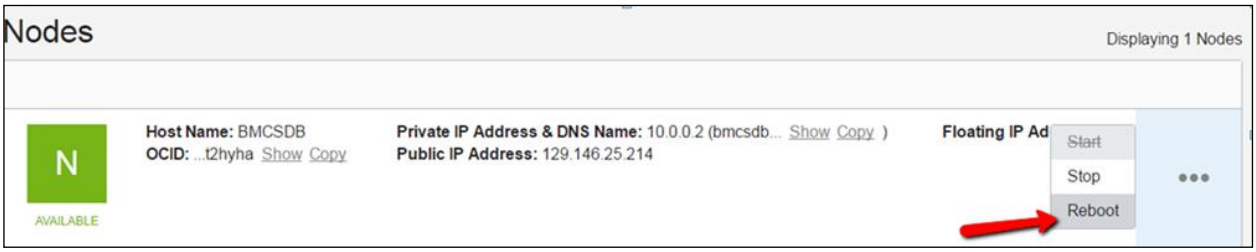
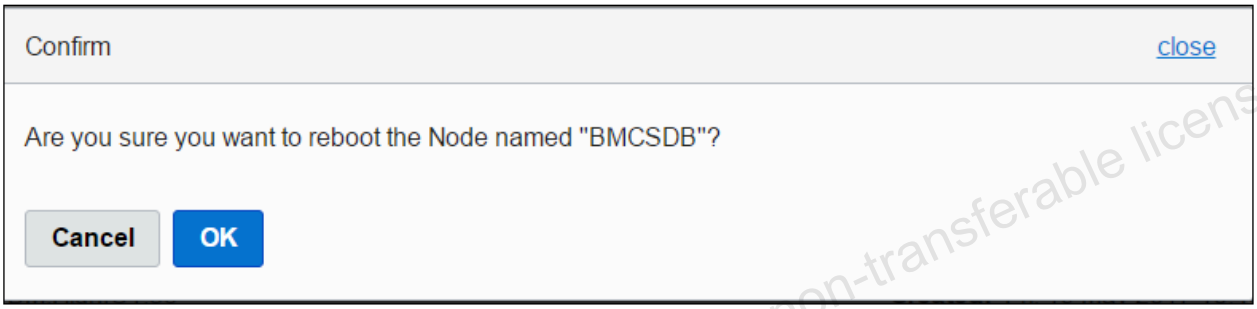
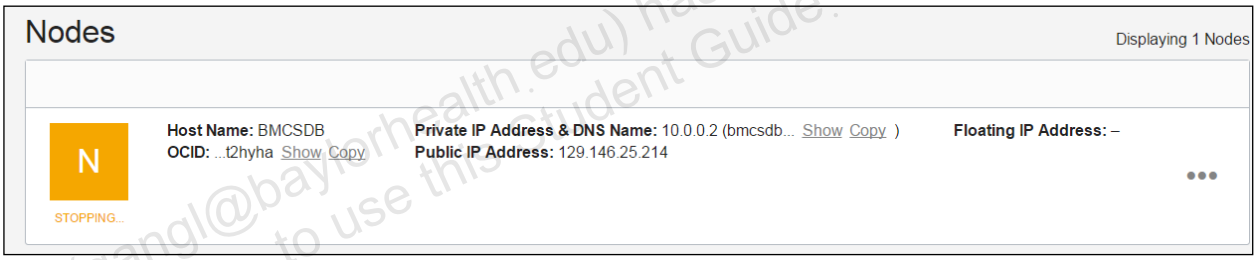
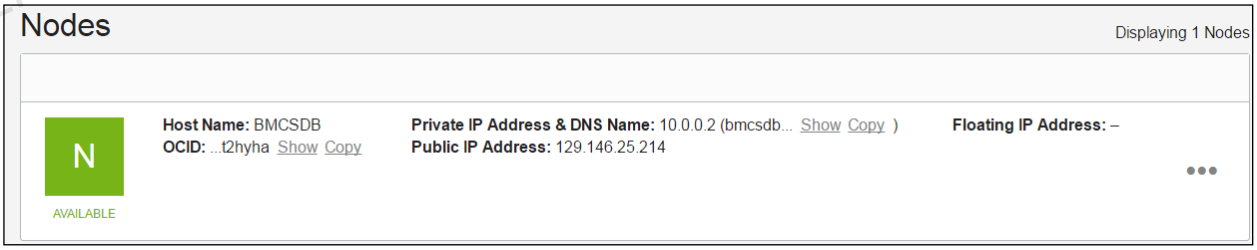
- **Reboot:** Shuts down the node, and then restarts it.









4. Connect to a DB System

Prerequisites:

- SSH Public key that you used when the DB System was launched
- The public IP address of the DB System

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a. Connecting to a database from a Linux/UNIX-style system

1) Open a shell and run the following SSH command to access the DB System:

```
$ ssh –i <private key> opc@<DB System IP address>
```

- *<private key>* is the full path and name of the file that contains the private key associated with the DB System you want to access.
- Use the DB System's private or public IP address depending on your network configuration.

5. Accessing a Database After You Connect

a. You have logged in as user opc, now sudo to the oracle user.

```
[opc@dbvm1 ~]$ sudo su - oracle
[oracle@dbvm1 ~]$
```

b. Set the environment to the ocidb1 instance and Perform a SQL query.

Note: If you forget your database name you can grep for it as follows:
"$ **ps auxw | grep ora**_ " and look for process like:

oracle 12112 0.0 0.0 8830804 67248 ? Ss 20:28 0:00 ora_w000_db1

In this case "db1" is one of the database names on the system.

```
oracle@dbvm1 ~]$ . oraenv
ORACLE_SID = [oracle] ? db1
The Oracle base has been set to /u01/app/oracle
[oracle@dbvm1 ~]$ sqlplus / as sysdba
SQL*Plus: Release 12.2.0.1.0 Production on Mon Nov 13 20:40:27
2017
Copyright (c) 1982, 2016, Oracle.  All rights reserved.
Connected to:
Oracle Database 12c EE Extreme Perf Release 12.2.0.1.0 - 64bit
Production
SQL> select username from dba_users;
SQL> select * from dba_users;
SQL> select tablespace_name, table_name from all_tables;
SQL> exit
```

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```
[oracle@dbvm1 ~]$ . oraenv
ORACLE_SID = [oracle] ? db1
The Oracle base has been set to /u01/app/oracle
[oracle@dbvm1 ~]$ sqlplus / as sysdba

SQL*Plus: Release 12.2.0.1.0 Production on Mon Nov 13 20:40:27 2017

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Connected to:
Oracle Database 12c EE Extreme Perf Release 12.2.0.1.0 - 64bit Production

SQL> select username from dba_users;

USERNAME
------------------------------------------------------------------------------
SYS
SYSTEM
XS$NULL
LBACSYS
OUTLN
DBSNMP
```

```
SYSTEM
UTL_RECOMP_SORTED

SYSAUX
WRI$_REPT_FORMATS

SYSAUX
WRM$_WR_SETTINGS


TABLESPACE_NAME
------------------------------
TABLE_NAME
--------------------------------------------------------------------------------
SYSTEM
UTL_RECOMP_COMPILED

SYSAUX
WRI$_REPT_COMPONENTS

SYSTEM
JAVA$MC$


2106 rows selected.

SQL> Disconnected from Oracle Database 12c EE Extreme Perf Release 12.2.0.1.0 - 64bit Production
[oracle@dbvm1 ~]$
```

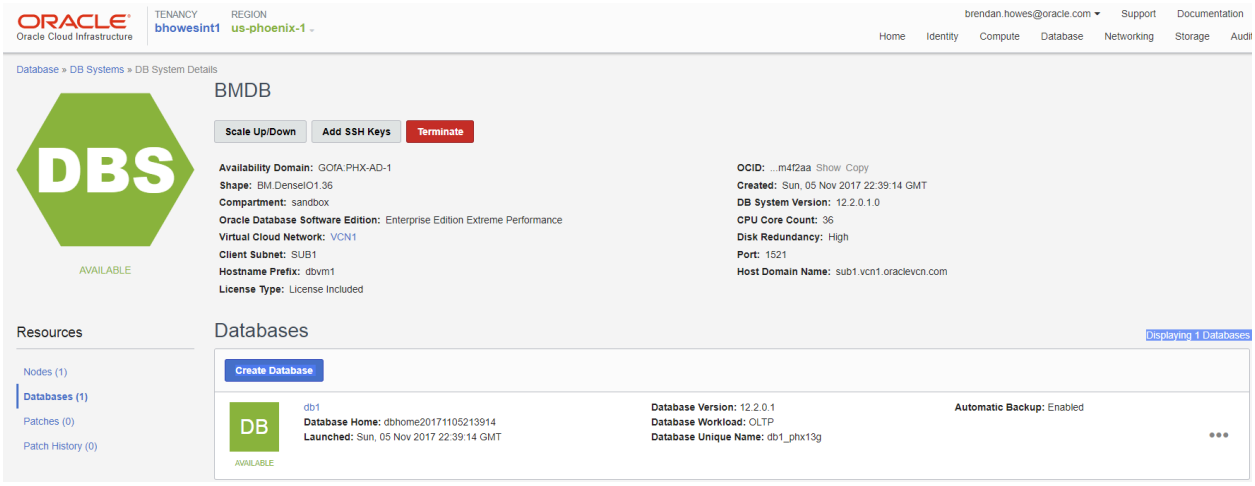
6. To terminate a DB System (Optional):

   Terminating a DB System permanently deletes it and any databases running on it.

   a. Open the Console, click **Database**, and then choose your **Compartment**.

      A list of DB Systems is displayed.

   b. For the DB System that you want to terminate, click the **Actions** icon (● ● ●),then click **Terminate**.



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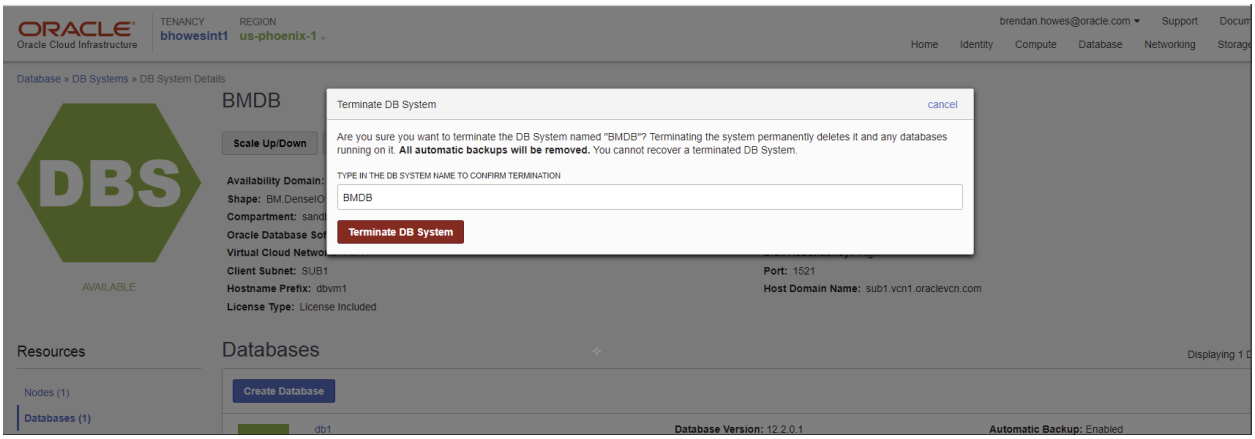

c. Confirm when prompted.

   The DB System's icon indicates Terminating.

   At this point, you cannot connect to the system and any open connections will be terminated.

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