

## **Block Storage: Create, Attach, Detach, and Resize a Block Volume**

### **Lab 12-1 Practices**

# Get Started

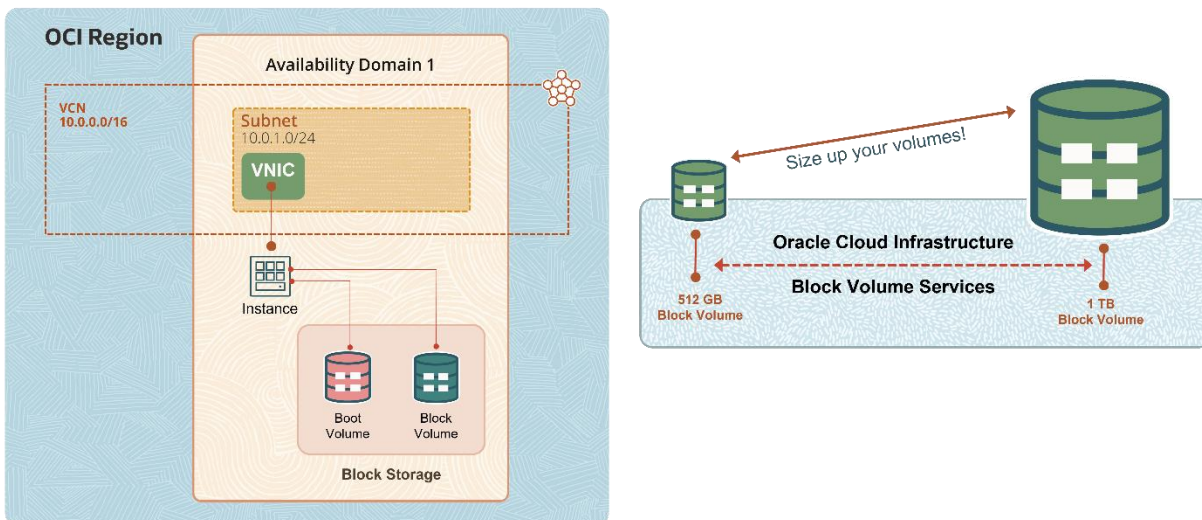
## Overview

The Oracle Cloud Infrastructure (OCI) Block Volume service lets you dynamically provision and manage block storage volumes. You can create, attach, connect, and move volumes, as well as change volume performance, as needed, to meet your storage, performance, and application requirements.

In this lab, you'll:

- Create a Virtual Cloud Network and its components
- Create a VM instance
- Create a block volume
- Attach a block volume to a compute instance
- Resize a block volume
- Detach a block volume

## Create and Attach Block Volume and Online Resize of Block Volume



## Assumptions

- In this lab, we consider Germany Central (Frankfurt) as your region.

# Create a Virtual Cloud Network and Its Components

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In this practice, you will learn how to create a Virtual Cloud Network (VCN), Subnet, and Internet Gateway, and add route rules in the Route Table.

## Tasks

1. Sign in to the Oracle Cloud Infrastructure (OCI) Console.
2. From the **Main Menu**, select **Networking**, and then click **Virtual Cloud Networks**.
3. Click **Create VCN**.
4. Enter the following:
  - a. **Name:** Enter **FRA-AA-LAB12-1-VCN-01**.
  - b. **Create in Compartment:** Select the *<compartment name>* assigned to you.
  - c. **IPv4 CIDR Blocks:** Type **10.0.0.0/16** and press **Enter** on your keyboard to add.  
**Note:** You can leave all the other options as default.
5. Click **Create VCN**. The VCN is now created successfully.
6. Click **Create Subnet**.
7. In the Create Subnet dialog box, enter the following:
  - a. **Name:** Enter **FRA-AA-LAB12-1-SNET-01**.
  - b. **Create in Compartment:** Select the *<compartment name>* assigned to you.
  - c. **Subnet Type:** Select **Regional**.
  - d. **IPv4 CIDR Blocks:** Enter **10.0.1.0/24**.
  - e. **Subnet Access:** Select **Public Subnet**.  
**Note:** You can leave all the other options as default.
8. Click **Create Subnet**. The subnet is now created successfully, and the state is Available.
9. In the left navigation pane, under **Resources**, click **Internet Gateways**.
10. Click **Create Internet Gateway**.

11. Enter the following:
  - a. **Name:** Enter **FRA-AA-LAB12-1-IG-01**.
  - b. **Create in Compartment:** Select the *<compartment name>* assigned to you.
12. Click **Create Internet Gateway**. The Internet Gateway is now created successfully, and the state is Available.
13. In the left navigation pane, under **Resources**, click **Route Tables**.
14. Click **Default Route Table for FRA-AA-LAB12-1-VCN-01**.
15. Click **Add Route Rules** and enter the following:
  - a. **Target Type:** Select **Internet Gateway** from the drop-down list.
  - b. **Destination CIDR Block:** Enter **0.0.0.0/0**.
  - c. **Target Internet Gateway:** Select **FRA-AA-LAB12-1-IG-01** from the drop-down list.
16. Click **Add Route Rules**. The route rule is now successfully added to the default Route Table.

# Create a VM Instance

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In this practice, you will learn how to create SSH keys using Cloud Shell and how to launch an instance.

## Tasks

1. Sign in to the Oracle Cloud Infrastructure (OCI) Console.
2. In the console ribbon at the top of the screen, click the **Cloud Shell** icon next to the Region selection menu.
3. Once the Cloud Shell is ready, enter the following commands:

```
$ mkdir .ssh
```

- **Important:** In case you get an error “Cannot create directory: File exists,” you can skip running this first command.

```
$ cd .ssh
```

```
$ ssh-keygen -b 2048 -t rsa -f <<sshkeyname>>
```

- **Remember:** After entering this third command, press **Enter** twice for no passphrase.

**Note:** Replace <<sshkeyname>> with `cloudshellkey`. Choose the key name you can remember. This will be the key name you will use to connect to the compute instance you create.

**Reminder:** The angle brackets «» should not appear in your code.

**Reminder:** Do not include the \$ symbol when pasting code into Cloud Shell.

4. Examine the two files that you just created by running the following command:

```
$ ls
```

**Note:** In the output, there are two files, a private key: <<sshkeyname>> and a public key: <<sshkeyname>>.pub. Keep the private key safe and don't share its content with anyone. The public key will be needed for various activities and can be uploaded to certain systems, as well as copied and pasted to facilitate secure communications in the cloud.

5. To list the contents of the public key, use the following command:

```
$ cat <<sshkeyname>>.pub
```

**Note:** Replace <<sshkeyname>> with `cloudshellkey`.

**Reminder:** The angle brackets «» should not appear in your code.

6. Copy the contents of the public key as you will need this in a subsequent step. Make sure that you remove any hard returns that may have been added when copying. The `.pub` key should be one line.
7. From the **Main Menu**, select **Compute**. Under **Compute**, click **Instances**.
8. Click **Create instance** and enter the following:
  - a. **Name:** Enter **FRA-AA-LAB12-1-VM-01**.
  - b. **Create in compartment:** Select the `<compartment name>` assigned to you.
  - c. **Placement:** Select Availability Domain **AD1**. Click **Show advanced options** and select **On-demand capacity** from the **Capacity type** menu.
  - d. **Image and shape:** Choose the image **Oracle Linux 8** and shape **VM.Standard.A1.Flex** (1 OCPU, 6GB Memory) [Shape series: Ampere].
  - e. **Networking:** Select the existing virtual cloud network **FRA-AA-LAB12-1-VCN-01** and existing subnet **FRA-AA-LAB12-1-SNET-01 (regional)**. Under **Public IP address**, select **Assign a public IPv4 address**.
  - f. **Add SSH keys:** Select **Paste public keys** and paste the contents of the public key, which you copied in Step 6, in the box.
  - g. **Boot volume:** Keep the default selection.
9. Click **Create**.

**Note:** After a couple of minutes, you see that the Instance is successfully created and the state is Running.

10. Under **Instance access**, copy the **Public IP address**.

11. Click the **Cloud Shell** icon to open Cloud Shell, and use SSH to connect to your instance by using the following command:

**Note:** Enter **yes** in response to “Are you sure you want to continue connecting (yes/no)?”

```
$ ssh -i <private_key_file> <username>@<public-ip-address>
```

**Reminders:**

- <private\_key\_file> is the full path and name of the file that contains the private key associated with the instance you want to access.
- <username> is the default user **opc**.
- <public-ip-address> is the Public IP address of the instance.

12. You are now connected to the Instance FRA-AA-LAB12-1-VM-01. Run the following command to display information about the block devices:

```
$ lsblk
```

**Note:** You will only see the boot disk **sda**.



# Create a Block Volume

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The Oracle Cloud Infrastructure (OCI) Block Volume service lets you dynamically provision and manage block storage volumes.

In this practice, you will learn how to create a block volume.

## Tasks

1. Sign in to the Oracle Cloud Infrastructure (OCI) Console.
2. Open the **Main Menu** and click **Storage**. Under **Block Storage**, click **Block Volumes**.
3. Click **Create Block Volume**.
4. Fill in the required volume information:
  - a. **Name:** Enter **FRA-AA-LAB12-1-BV-01**.
  - b. **Create in Compartment:** Select the *<compartment name>* assigned to you.
  - c. **Availability Domain:** Select the first availability domain.
  - d. **Volume Size and Performance:** Select **Custom** and specify the following:
    - 1) **Volume Size (in GB):** Enter **512**.
    - 2) **Target Volume Performance:** Drag the VPUs/GB slider to the left to make the performance **Lower Cost**.
  - e. **Backup Policies:** Do not specify any policy.
  - f. **Cross Region Replication:** Keep the **OFF** default selection.
  - g. **Encryption:** Keep the default **Encrypt using Oracle-managed keys** selection.
5. Click **Create Block Volume**. You now see that the Block Volume state becomes Available.

# Attach a Block Volume to a Compute Instance

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You can create, attach, connect, and move volumes. You can also change volume performance, as needed, to meet your storage, performance, and application requirements. After you attach and connect a volume to an instance, you can use the volume like a regular hard drive.

In this practice, you'll learn how to attach a block volume to a compute instance and perform various configuration tasks on the attached volume.

## Tasks

1. Open the **Main Menu** and click **Compute**. Under **Compute**, click **Instances**.
2. In the **Instances** list, click the instance **FRA-AA-LAB12-1-VM-01**.
3. In the left navigation pane, under **Resources**, click **Attached block volumes**.
4. Click **Attach block volume**.
5. Specify the volume you want to attach to. For example, to use the volume name, choose **Select volume**, and then select the volume **FRA-AA-LAB12-1-BV-01** from the **Volume** drop-down list.
6. If the instance supports consistent device paths, and the volume you are attaching is not a boot volume, select the path **/dev/oracleoci/oraclevd** from the **Device path** drop-down list. This enables you to specify a device path for the volume attachment that remains consistent between instance reboots.
7. In the **Attachment type** section, select **Paravirtualized**.

**Note:** After you attach a volume using the Paravirtualized attachment type, it is ready to use, and you do not need to run any additional commands.

8. In the **Access** section, select **Read/Write**.

**Note:** This is the default option for volume attachments and, with this option, an instance can read and write data to the volume.

9. Click **Attach**. You now see the state as Attached and, since the attachment type is Paravirtualized, you can use the volume without running any additional commands.

10. Ensure that you are connected to the Instance **FRA-AA-LAB12-1-VM-01**.

**Note:** For help with this, refer to Step 11 in the **Create a VM Instance** practice.

11. Run the following command to display information about the block devices:

```
$ lsblk
```

**Note:** You now see that the system recognizes a new disk device, and the size is 512 GB.

12. To verify that the volume is attached to the instance, run the following command:

```
$ ll /dev/oracleoci/oraclevd*
```

13. To partition the disk using `fdisk`, run the following command:

```
$ sudo fdisk /dev/oracleoci/oraclecvdb
```

**Note:** Enter the following responses as seen in the Cloud Shell:

a. Command (m for help): Enter **n** to create a new partition.

b. Select (default p): Enter **p**.

c. Partition number (1,4, default 1): Press **Enter**.

d. First sector: Press **Enter**.

e. Last sector: Press **Enter**.

f. Command (m for help): Enter **w** to write the new partition.

14. To format the partition, run the following command:

```
$ sudo mkfs -t ext4 /dev/oracleoci/oraclecvdb1
```

15. To mount the partition, run the following commands:

```
$ sudo mkdir -p /mnt/volume1
```

```
$ sudo mount /dev/oracleoci/oraclecvdb1 /mnt/volume1
```

**Note:** On Linux instances, if you want to automatically mount volumes on an instance boot, you need to set some specific options in the `/etc/fstab` file.

16. To display information about the block devices, run the following command:

```
$ lsblk
```

**Note:** You now see the partition and the mountpoint `/mnt/volume1`.

# Resize a Block Volume

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With online resizing, you can expand the volume size without detaching the volume from an instance.

In this practice, you will resize a block volume.

## Tasks

1. From the **Main Menu**, select **Storage**. Under **Block Storage**, click **Block Volumes**.
2. In the **Block Volumes** list, select the block volume **FRA-AA-LAB12-1-BV-01**.
3. Click **Edit**.
4. Under **Volume Size and Performance**, enter the new size **1024** in the **Volume Size (in GB)** field.

**Note:** You must specify a larger value than the block volume's current size.

5. Click **Save Changes**.

**Note:** A window appears with a list of commands. The commands are required to rescan the disk after the volume is provisioned. You need to run these commands so that the operating system identifies the expanded volume size. Click the **Copy** link to copy the commands, and then click **Close** to close the window.

6. Connect to your instance **FRA-AA-LAB12-1-VM-01**.

**Note:** For help with this, refer to Step 11 in the **Create a VM Instance** practice.

7. Paste and run the rescan commands you copied in the previous step into your instance session window:

```
$ sudo dd iflag=direct if=/dev/oracleoci/oraclevdb of=/dev/null count=1
```

```
$ echo "1" | sudo tee /sys/class/block/`readlink /dev/oracleoci/oraclevdb | cut -d'/' -f 2`/device/rescan
```

**Note:** After you've run the volume rescan commands, you need to extend the partition and grow the file system; however, this is beyond the scope of this lab activity. For more details on this topic, see [Extending the Partition for a Block Volume \(oracle.com\)](https://www.oracle.com/extended-partition-for-a-block-volume/) at:

[https://docs.oracle.com/en-us/iaas/Content/Block/Tasks/extendingblockpartition.htm#Extending\\_the\\_Partition\\_for\\_a\\_Block\\_Volume](https://docs.oracle.com/en-us/iaas/Content/Block/Tasks/extendingblockpartition.htm#Extending_the_Partition_for_a_Block_Volume)

# Detach a Block Volume

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When an instance no longer needs access to a volume, you can detach the volume from the instance without affecting the volume's data.

In this practice, you will detach a block volume.

## Tasks

1. From the **Main Menu**, select **Compute**. Under **Compute**, click **Instances**.
2. In the **Instance** list, click the instance **FRA-AA-LAB12-1-VM-01** to display the instance details.
3. In the left navigation pane, under **Resources**, click **Attached block volumes**.
4. From the **Attached block volumes** list, click the three dots on the right to open the Actions menu, then click **Detach**.
5. Click **OK** to confirm detachment. You now see that there are no block volumes attached to the instance **FRA-AA-LAB12-1-VM-01**.