



OpenStack Labs

Lab 03: Deploying an Internal Instance

Contents

Introduction	iii
Objectives	iv
Lab Settings.....	v
1 Uploading Images.....	1
2 Developing Flavors	8
3 Managing Private Networks.....	14
4 Launching an Internal Instance.....	24
5 Verifying the Functionality of an Internal Instance.....	30

About This Document

- This document was developed by a team at the University of Tennessee at Chattanooga led by Dr. Mengjun Xie (mengjun-xie@utc.edu).
- The development of this document was supported by a National Centers of Academic Excellence in Cybersecurity Grant (#H98230-20-1-0351), housed at the National Security Agency.
- This document is licensed with a Creative Commons Attribution 4.0 International License.

Introduction

In this lab, you will manage images using the *Horizon Dashboard* and *OpenStack Unified CLI*, develop flavors, manage private networks, launch an internal instance, and verify the functionality of an internal instance.

Objectives

- Create and manage software profiles (images).
- Create and manage hardware profiles (flavors).
- Create and manage private networks.
- Launch and verify an internal instance.

Lab Settings

The information in the table below will be needed in order to complete the lab. The task sections below provide details on the use of this information.

Virtual Machine	IP Address	Account	Password
workstation	ens3: 192.168.1.21 ens4: 172.25.250.21	ubuntu	ubuntu
devstack	ens3: 192.168.20 ens4: 172.25.250.20	ubuntu	ubuntu

1 Uploading Images

In this task, you will create, modify, and delete images using the *Horizon Dashboard* and *OpenStack Unified CLI*.

- 1.1. Log into the **workstation** machine as the **ubuntu** user with password **ubuntu**.

```
Ubuntu 18.04.6 LTS workstation tty1
workstation login: ubuntu
Password:
```

- 1.2. Launch the graphical user interface.

```
ubuntu@workstation:~$ startx
```

```
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 4.15.0-213-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

 System information as of Fri Jun  7 21:01:55 UTC 2024

 System load:  0.6              Processes:           197
 Usage of /:   7.9% of 116.12GB  Users logged in:    0
 Memory usage: 13%            IP address for ens3: 192.168.1.21
 Swap usage:   0%            IP address for ens4: 172.25.250.21

 Expanded Security Maintenance for Infrastructure is not enabled.

 2 updates can be applied immediately.
 To see these additional updates run: apt list --upgradable

 146 additional security updates can be applied with ESM Infra.
 Learn more about enabling ESM Infra service for Ubuntu 18.04 at
 https://ubuntu.com/18-04

ubuntu@workstation:~$ startx_
```

- 1.3. Open the web browser. Navigate to **192.168.1.20** and log into the dashboard as **admin** with the password **secret**.
- 1.4. Switch to the **demo** project. In this lab, we will create our own Ubuntu images, so the default one is not needed and can be deleted. Navigate to **Project > Compute > Images**. Select the **ubuntu** image and click **Delete Image**.

The screenshot shows the OpenStack Compute Images interface. The left sidebar has 'Project' and 'Compute' expanded, with 'Images' selected. The main area displays a table of images:

	Owner	Name	Type	Status	Visibility	Protected	Disk Format	Size	Actions
<input type="checkbox"/>	admin	cirros-0.6.2-x86_64-disk	Image	Active	Public	No	QCOW2	20.44 MB	<button>Launch</button>
<input checked="" type="checkbox"/>	demo	ubuntu	Image	Active	Image from Other Project - Non-Public	No	QCOW2	2.01 GB	<button>Launch</button>

1.5. Click **Create Image** to create a new image.

The screenshot shows the OpenStack Compute Images interface after creating a new image. The left sidebar has 'Project' and 'Compute' expanded, with 'Images' selected. The main area displays a table of images:

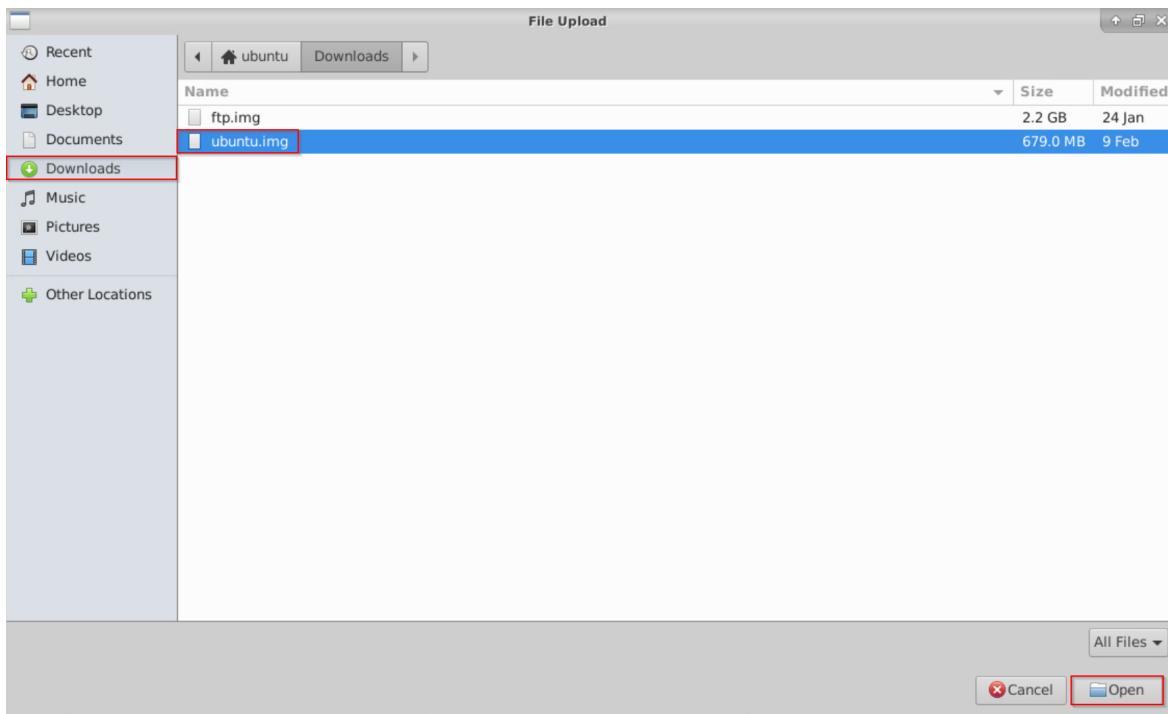
	Owner	Name	Type	Status	Visibility	Protected	Disk Format	Size	Actions
<input type="checkbox"/>	admin	cirros-0.6.2-x86_64-disk	Image	Active	Public	No	QCOW2	20.44 MB	<button>Launch</button>

1.6. Enter **ubuntu1** into the *Image Name* field. Under **File**, click **Browse...**

The screenshot shows the 'Create Image' dialog box. The 'Image Details' tab is selected, displaying the 'Image Details' section with the sub-instruction: 'Specify an image to upload to the Image Service.' The 'Image Name' field contains 'ubuntu1'.

Below the 'Image Details' tab, there are sections for 'Metadata' and 'Image Description'. Further down, under 'Image Source', there is a 'File*' field with a 'Browse...' button and the message 'No file selected.'

1.7. In the file browser, click **Downloads**, then select the **ubuntu.img** file. Click the **Open** button.



- 1.8.** In the format dropdown, select **QCOW2 - QEMU Emulator**, and under *Image Sharing*, set *Visibility* to **Private**. Make sure **No** is selected for *Protected*, and click on **Create Image**.

Format*

QCOW2 - QEMU Emulator

Image Requirements

Kernel: Choose an Image

Ramdisk: Choose an Image

Architecture: [empty input field]

Minimum Disk (GB): 0

Minimum RAM (MB): 0

Image Sharing

Visibility: Private

Protected: No

Cancel Next > Create Image

Stop

Wait for the **ubuntu1** status to be *Active*. You may need to refresh the browser until you see the status of *Active*.

- 1.9.** To edit the image after it has been created, open the dropdown menu next to the **Launch** button in the row of **ubuntu1**, and click on **Edit Image**.

The screenshot shows the OpenStack Compute Images interface. The left sidebar has 'Project' and 'Compute' sections. Under 'Compute', 'Instances' is expanded, showing 'Key Pairs', 'Server Groups', 'Volumes' (with 'ubuntu1' listed), 'Network', 'Admin', and 'Identity'. The 'Images' tab is selected. The main area displays two items: 'cirros-0.6.2-x86_64-disk' (Image, Active, Public, QCOW2, 20.44 MB, Launch dropdown) and 'ubuntu1' (Image, Active, Private, QCOW2, 647.50 MB, Launch dropdown). A context menu is open over the 'ubuntu1' row, with options: 'Create Volume', 'Edit Image' (highlighted with a red box), 'Update Metadata', and 'Delete Image'.

- 1.10.** Enter **10** in the *Minimum Disk (GB)* field, and select **Yes** for *Protected*. Click the **Update Image** button. Adding a minimum disk amount will require any new instance created with this image to allocate at least 10 GB of disk space. When an image or other OpenStack resource is protected, it cannot be deleted without first making it unprotected again.

The screenshot shows the 'Edit Image' dialog. The 'Image Details' tab is active. In the 'Image Requirements' section, the 'Minimum Disk (GB)' field is set to 10 and highlighted with a red box. In the 'Protected' section, the 'Yes' checkbox is checked and highlighted with a red box. At the bottom right, the 'Update Image' button is highlighted with a red box.

- 1.11.** Reopen the dropdown next to the **Launch** button in the same row as **ubuntu1**. Notice that the option to delete the image no longer appears because the image is protected.

The screenshot shows the OpenStack Horizon Dashboard under the 'Compute' section. The 'Images' tab is selected. A search bar at the top right says 'Click here for filters or full text search.' Below it is a table with columns: Owner, Name, Type, Status, Visibility, Protected, Disk Format, and Size. Two items are listed: 'cirros-0.6.2-x86_64-disk' (Owner: admin, Status: Active, Public) and 'ubuntu1' (Owner: demo, Status: Active, Private). The 'ubuntu1' row has a red box around the 'Launch' button. A context menu is open over the 'ubuntu1' row with options: 'Create Volume', 'Edit Image', and 'Update Metadata'.

- 1.12. Log out of the *Horizon Dashboard* and close the web browser.
- 1.13. Open a terminal if one is not already open, and source the **keystonerc-admin** file to load the **admin** user credentials.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$
```

- 1.14. List the current OpenStack images.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image list
+-----+-----+-----+
| ID          | Name           | Status |
+-----+-----+-----+
| dfc5286d-bdb7-4338-8e4b-087422b21e68 | cirros-0.6.2-x86_64-disk | active |
| fd765042-c3e4-49a3-b1dc-9a81e02197c9 | ubuntu1        | active |
+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$
```

- 1.15. Try to delete the **ubuntu1** image while it is protected. It should return an error.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image delete ubuntu1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image delete ubuntu1
Failed to delete image with name or ID 'ubuntu1': 403 Forbidden: Image fd765042-
c3e4-49a3-b1dc-9a81e02197c9 is protected and cannot be deleted. (HTTP 403)
Failed to delete 1 of 1 images.
[ubuntu@workstation (keystone-admin)]:~$
```

- 1.16. Set the **ubuntu1** image to unprotected.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image set \
> --unprotected ubuntu1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image set \
> --unprotected ubuntu1
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.17.** Delete the **ubuntu1** image.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image delete ubuntu1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image delete ubuntu1
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.18.** List the images again to confirm that the image was deleted.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image list
+-----+-----+-----+
| ID          | Name           | Status |
+-----+-----+-----+
| dfc5286d-bdb7-4338-8e4b-087422b21e68 | cirros-0.6.2-x86_64-disk | active |
+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.19.** Create the **ubuntu1** image using the `~/Downloads/ubuntu.img` file and the QCOW2 format.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image create \
> --disk-format qcow2 \
> --file ~/Downloads/ubuntu.img \
> ubuntu2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image create \
> --disk-format qcow2 \
> --file ~/Downloads/ubuntu.img \
> ubuntu2
+-----+
| Field      | Value
+-----+
| checksum   | 1f21ec2cbf86c5bb9fd19e0672f1594f
| container_format | bare
| created_at  | 2024-06-12T16:59:25Z
| disk_format | qcow2
| file       | /v2/images/d55acaee-8cfb-4bcf-a8dc-26eea0922ea5/file
| id         | d55acaee-8cfb-4bcf-a8dc-26eea0922ea5
| min_disk   | 0
| min_ram   | 0
| name      | ubuntu2
| owner     | 39e051b14f864573aad60582c35e40dc
| properties | os.hash_algo='sha512', os.hash_value='9e3d0f13d0ba135956cb3dfa5743901caa2c22447f8aa4e9132601c71f6a348a20045a91e82b35fa3c3bb38096d18ca72fedf2155d572f957fdec528a86ff47', os.hidden='False'
| protected  | False
| schema    | /v2/schemas/image
| size       | 678952960
| status     | active
| tags      |
| updated_at | 2024-06-12T16:59:29Z
| virtual_size | 2361393152
| visibility | shared
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.20.** Confirm that the image was created by listing the images again.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image list
```

- 1.21.** Set the **ubuntu2** image status to **protected**, and set the minimum disk size to **10 GB**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image set \
> --protected \
> --min-disk 10 \
> ubuntu2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image set \
> --protected \
> --min-disk 10 \
> ubuntu2
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.22.** If no visibility is set on creation, an image defaults to being private, which means the image is only visible to the user who created it. Set the **ubuntu2** image to be public so it is visible to other users. Note that this action requires administrative privileges.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image set --public ubuntu2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image set \
> --public ubuntu2
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.23.** Display the details of the **ubuntu2** image and verify that it was correctly updated. Confirm the value for the *min_disk* field is **10**, the value for the *protected* field is **True**, and the value for *visibility* is **public**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image show ubuntu2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack image show ubuntu2
+-----+-----+
| Field | Value |
+-----+-----+
| checksum | 1f21ec2cbf8c5cbbfd19e0672f1594f |
| container_format | bare |
| created_at | 2024-06-12T16:59:25Z |
| disk_format | qcow2 |
| file | /var/lib/images/d55acae8-8cfb-4pcf-a8dc-26eea0922ea5/file |
| id | d55acae8-8cfb-4pcf-a8dc-26eea0922ea5 |
| min_disk | 10 |
| min_ram | 0 |
| name | ubuntu2 |
| owner | 39eb51b14fb8d4573aa060582c35e40dc |
| properties | os_hidden=False |
| protected | True |
| schemas | /v2/schemas/image |
| size | 678952960 |
| status | active |
| tags | |
| updated_at | 2024-06-12T17:04:13Z |
| virtual_size | 2361393152 |
| visibility | public |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 1.24.** Leave the terminal window open and continue to the next task.

2 Developing Flavors

In this task, you will create and delete flavors using the *Horizon Dashboard* and *OpenStack Unified CLI*.

- 2.1. Open the web browser and navigate to **192.168.1.20**. Log in to the dashboard as the **admin** user with the password **secret**.
- 2.2. Switch to the **demo** project. We will not need any of the existing flavors in this lab, and they can be safely deleted. For demonstration, navigate to **Admin > Compute > Flavors**, select the **ds1G** flavor, and click **Delete Flavors**.

Flavor Name	VCPUs	RAM	Root Disk	Ephemeral Disk	Swap Disk	RX/TX factor	ID	Public	Metadata	Actions
cirros256	1	256MB	1GB	0GB	0MB	1.0	c1	Yes	Yes	<button>Update Metadata</button>
ds1G	1	1GB	10GB	0GB	0MB	1.0	d2	Yes	Yes	<button>Update Metadata</button>
ds2G	2	2GB	10GB	0GB	0MB	1.0	d3	Yes	Yes	<button>Update Metadata</button>
ds4G	4	4GB	20GB	0GB	0MB	1.0	d4	Yes	Yes	<button>Update Metadata</button>
ds512M	1	512MB	5GB	0GB	0MB	1.0	d1	Yes	Yes	<button>Update Metadata</button>

Tip

Alternatively, to delete a flavor, you can open the dropdown next to the **Update Metadata** button in the same row as the flavor, then click **Delete Flavor**.

- 2.3. Now, we will create our own flavor. On the same page, click **Create Flavor**.

Flavor Name	VCPUs	RAM	Root Disk	Ephemeral Disk	Swap Disk	RX/TX factor	ID	Public	Metadata	Actions
cirros256	1	256MB	1GB	0GB	0MB	1.0	c1	Yes	Yes	<button>Update Metadata</button>
ds2G	2	2GB	10GB	0GB	0MB	1.0	d3	Yes	Yes	<button>Update Metadata</button>
ds4G	4	4GB	20GB	0GB	0MB	1.0	d4	Yes	Yes	<button>Update Metadata</button>
ds512M	1	512MB	5GB	0GB	0MB	1.0	d1	Yes	Yes	<button>Update Metadata</button>
m1.large	4	8GB	80GB	0GB	0MB	1.0	4	Yes	Yes	<button>Update Metadata</button>

- 2.4. Enter **flavor1** in the *Name* field, **2** in the *VCPUs* field, **1024** in the *RAM (MB)* field, and **10** in the *Root Disk (GB)* field. Click on **Create Flavor**.

Create Flavor

Flavor Information *

<p>Name *</p> <input style="border: 2px solid red; width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="flavor1"/> <p>ID ?</p> <input style="width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="auto"/> <p>VCPUs *</p> <input style="border: 2px solid red; width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="2"/> <p>RAM (MB) *</p> <input style="border: 2px solid red; width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="1024"/> <p>Root Disk (GB) *</p> <input style="border: 2px solid red; width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="10"/> <p>Ephemeral Disk (GB)</p> <input style="width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="0"/> <p>Swap Disk (MB)</p> <input style="width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="0"/> <p>RX/TX Factor</p> <input style="width: 100%; height: 20px; margin-bottom: 5px;" type="text" value="1"/>	<p>Flavors define the sizes for RAM, disk, number of cores, and other resources and can be selected when users deploy instances.</p>
--	--

Note

There is currently no way to update flavors (apart from their metadata) from the Horizon Dashboard after a flavor has been created. Any changes will require deleting the flavor and remaking it.

- 2.5. Log out of the *Horizon Dashboard* and close the web browser.
- 2.6. If a terminal is not already open, open one and source the `~/keystonerc-admin` file.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

2.7. List the current OpenStack flavors.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor list
```

ID	Name	RAM	Disk	Ephemeral	VCPUs	Is Public
1	m1.tiny	512	1	0	1	True
2	m1.small	2048	20	0	1	True
3	m1.medium	4096	40	0	2	True
36e8dc04-8957-48cd-8434-f6da50080173	flavor1	1024	10	0	2	True
4	m1.large	8192	80	0	4	True
42	m1.nano	128	1	0	1	True
5	m1.xlarge	16384	160	0	8	True
84	m1.micro	192	1	0	1	True
c1	cirros256	256	1	0	1	True
d1	ds512M	512	5	0	1	True
d3	ds2G	2048	10	0	2	True
d4	ds4G	4096	20	0	4	True

2.8. Create a flavor named **flavor2**. Configure the flavor with **1 VCPU**, **1024 MB** of RAM, a **10 GB** root disk, a **2 GB** ephemeral disk, and a **1024 MB** swap disk.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor create \
> --vcpus 1 \
> --ram 1024 \
> --disk 10 \
> --ephemeral 2 \
> --swap 1024 \
> flavor2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor create \
> --vcpus 1 \
> --ram 1024 \
> --disk 10 \
> --ephemeral 2 \
> --swap 1024 \
> flavor2
+-----+
| Field | Value |
+-----+
| OS-FLV-DISABLED:disabled | False |
| OS-FLV-EXT-DATA:ephemeral | 2 |
| disk | 10 |
| id | 12c985b6-5506-4656-808b-cde996342518 |
| name | flavor2 |
| os-flavor-access:is_public | True |
| properties | |
| ram | 1024 |
| rxtx_factor | 1.0 |
| swap | 1024 |
| vcpus | 1 |
+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

Note

Ephemeral storage is storage that, from the user's point of view, disappears when an instance is terminated. Swap space allows the operating system to use a portion of hard disk space as additional RAM if the physical memory becomes full.

- 2.9.** Verify that the **flavor2** flavor has been created and has the correct values by listing the flavors.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor list
+-----+-----+-----+-----+-----+-----+-----+
| ID | Name | RAM | Disk | Ephemeral | VCPUs | Is Public |
+-----+-----+-----+-----+-----+-----+-----+
| 1 | m1.tiny | 512 | 1 | 0 | 1 | True |
| 12c985b6-5506-4656-808b-cde996342518 | flavor2 | 1024 | 10 | 2 | 1 | True |
| 2 | m1.small | 2048 | 20 | 0 | 1 | True |
| 3 | m1.medium | 4096 | 40 | 0 | 2 | True |
| 36e8dc04-8957-48cd-8434-f6da50080173 | flavor1 | 1024 | 10 | 0 | 2 | True |
| 4 | m1.large | 8192 | 80 | 0 | 4 | True |
| 42 | m1.nano | 128 | 1 | 0 | 1 | True |
| 5 | m1.xlarge | 16384 | 160 | 0 | 8 | True |
| 84 | m1.micro | 192 | 1 | 0 | 1 | True |
| c1 | cirros256 | 256 | 1 | 0 | 1 | True |
| d1 | ds512M | 512 | 5 | 0 | 1 | True |
| d3 | ds2G | 2048 | 10 | 0 | 2 | True |
| d4 | ds4G | 4096 | 20 | 0 | 4 | True |
+-----+-----+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

- 2.10.** Show more details about **flavor2**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor show flavor2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor show flavor2
+-----+-----+
| Field | Value |
+-----+-----+
| OS-FLV-DISABLED:disabled | False |
| OS-FLV-EXT-DATA:ephemeral | 2 |
| access_project_ids | None |
| disk | 10 |
| id | 12c985b6-5506-4656-808b-cde996342518 |
| name | flavor2 |
| os-flavor-access:is_public | True |
| properties | |
| ram | 1024 |
| rxtx_factor | 1.0 |
| swap | 1024 |
| vcpus | 1 |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 2.11.** The **flavor1** flavor is no longer needed. Delete the **flavor1** flavor to demonstrate deletion from the command line.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor delete flavor1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor delete flavor1
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 2.12.** Verify that the **flavor1** has been deleted by listing all the available flavors and noting that **flavor1** does not appear in the list.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor list
+-----+-----+-----+-----+-----+-----+-----+
| ID | Name | RAM | Disk | Ephemeral | VCPUs | Is Public |
+-----+-----+-----+-----+-----+-----+-----+
| 1 | m1.tiny | 512 | 1 | 0 | 1 | True |
| 12c985b6-5506-4656-808b-cde996342518 | flavor2 | 1024 | 10 | 2 | 1 | True |
| 2 | m1.small | 2048 | 20 | 0 | 1 | True |
| 3 | m1.medium | 4096 | 40 | 0 | 2 | True |
| 4 | m1.large | 8192 | 80 | 0 | 4 | True |
| 42 | m1.nano | 128 | 1 | 0 | 1 | True |
| 5 | m1.xlarge | 16384 | 160 | 0 | 8 | True |
| 84 | m1.micro | 192 | 1 | 0 | 1 | True |
| c1 | cirros256 | 256 | 1 | 0 | 1 | True |
| d1 | ds512M | 512 | 5 | 0 | 1 | True |
| d3 | ds2G | 2048 | 10 | 0 | 2 | True |
| d4 | ds4G | 4096 | 20 | 0 | 4 | True |
+-----+-----+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

Tip

An alternative method is appending — **grep flavor1** to this command and noting that the output is empty.

Note

There are currently no standard OpenStack commands to update a flavor after creation. Any changes will require deleting the flavor and remaking it.

2.13. Leave the terminal window open and continue to the next task.

3 Managing Private Networks

In this task, you will manage networks and subnets using the *Horizon Dashboard* and *OpenStack Unified CLI*. You will create and delete networks and subnetworks, update their settings, and rename them.

- 3.1. Open the web browser and navigate to **192.168.1.20**. Log in to the dashboard as the **admin** user with the password **secret**.
- 3.2. Switch to the **demo** project. We will create and manage our own networks in this lab, so any existing network can be safely deleted. To delete a network, all of its ports must first be deleted. Navigate to **Project > Network > Networks** and click on the **shared** network.

Name	Subnets Associated	Shared	External	Status	Admin State	Availability Zones	Actions
shared	shared-subnet 192.168.233.0/24	Yes	No	Active	UP	-	<button>Edit Network</button>
private	ipv6-private-subnet fd96:731b:22b0::/64 private-subnet 10.0.0.0/26	No	No	Active	UP	-	<button>Edit Network</button>
public	ipv6-public-subnet 2001:db8::/64 public-subnet 172.24.4.0/24	No	Yes	Active	UP	-	<button>Edit Network</button>

- 3.3. Navigate to the **Ports** tab. Select all ports and click **Delete Ports**.

Name	Fixed IPs	MAC Address	Attached Device	Status	Admin State	Actions
(aefc38ee-eff9)	192.168.233.2	fa:16:3e:15:49:e8	network:distributed	Down	UP	<button>Edit Port</button>

Tip

We will see in the next lab that if a network is attached to a router, the interfaces connecting the network to the router must be deleted from the router side, or the

entire router could be deleted. Then, once all ports of the network have been deleted, the network itself can be deleted.

- 3.4.** Click **Delete Ports** in the **Confirm Delete Ports** dialog to confirm deletion.

Confirm Delete Ports

You have selected: "(aefc38ee-eff9)". Please confirm your selection. This action cannot be undone.

[Cancel](#) [Delete Ports](#)

- 3.5.** Finally, to delete the **shared** network, navigate back to **Project > Network > Networks**, select the **shared** network, and click **Delete Networks**.

Name	Subnets Associated	Shared	External	Status	Admin State	Availability Zones	Actions
shared	shared-subnet 192.168.233.0/24	Yes	No	Active	UP	-	Edit Network
private	ipv6-private-subnet fd96:731b:22b0::/64 private-subnet 10.0.0.0/26	No	No	Active	UP	-	Edit Network
public	ipv6-public-subnet 2001:db8::/64 public-subnet 172.24.4.0/24	No	Yes	Active	UP	-	Edit Network

- 3.6.** Click **Delete Networks** in the **Confirm Delete Networks** dialog box to confirm deletion.

Confirm Delete Networks

You have selected: "shared". Please confirm your selection. This action cannot be undone.

[Cancel](#) [Delete Networks](#)

- 3.7.** Now, we will create our own network and subnet. Navigate back to **Project > Network > Networks** and click **Create Network**.

The screenshot shows the OpenStack interface under the 'demo' project. The left sidebar has 'Compute', 'Volumes', and 'Network' sections. Under 'Network', there's a 'Network Topology' section with 'Networks', 'Routers', 'Security Groups', and 'Floating IPs'. The 'Networks' section displays two items:

Name	Subnets Associated	Shared	External	Status	Admin State	Availability Zones	Actions
private	ipv6-private-subnet fd96:731b:22b0::/64 private-subnet 10.0.0.0/26	No	No	Active	UP	-	<button>Edit Network</button>
public	ipv6-public-subnet 2001:db8::/64 public-subnet 172.24.4.0/24	No	Yes	Active	UP	-	<button>Edit Network</button>

- 3.8. Enter **net1** in the *Network Name* field. Verify that the **Create Subnet** check box is selected. Click **Next**.

Create Network

Network **Subnet** **Subnet Details**

Network Name
 net1

Enable Admin State ?

Shared

Create Subnet Create Subnet

Availability Zone Hints ?

MTU ?
 1500

Cancel « Back Next »

- 3.9. Enter **subnet1** in the *Subnet Name* field, and enter **10.0.0.0/24** in the *Network Address* field. Click **Next**.

Create Network

Network Subnet **Subnet Details**

Subnet Name
subnet1

Network Address Source
Enter Network Address manually

Network Address 10.0.0.0/24

IP Version IPv4

Gateway IP

Disable Gateway

Creates a subnet associated with the network. You need to enter a valid "Network Address" and "Gateway IP". If you did not enter the "Gateway IP", the first value of a network will be assigned by default. If you do not want gateway please check the "Disable Gateway" checkbox. Advanced configuration is available by clicking on the "Subnet Details" tab.

Cancel **« Back** **Next »**

3.10. Leave the defaults in the *Subnet Details* tab and click **Create**.

Create Network

[Network](#) [Subnet](#) [Subnet Details](#)

Enable DHCP Specify additional attributes for the subnet.

Allocation Pools ?

DNS Name Servers ?

Host Routes ?

[Cancel](#) [« Back](#) [Create](#)

3.11. Log out of the *Horizon Dashboard* and close the web browser.

3.12. If a terminal window is not already open, open one and source the `~/keystonerc-admin` file to load the **admin** user credentials.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

3.13. List the current OpenStack networks.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
+-----+-----+
| ID      | Name   | Subnets
+-----+-----+
| 32da4c25-b517-40c5-97e3-cea031467d13 | public  | 4fc6bf88-919c-49df-83c4-b09bd65776ad, c7916655-8954-4bf4-913d-416702f35d1b |
| 966ecb4f-4ff8-44ea-a476-2df18955085 | private | 674205b6-1357-4727-a21a-94220492a57f, fa8a2545-5a8c-44a2-bacc-1b86c253b880 |
| fb0015fd-0a5c-4be1-99f9-064c50ba36a8 | net1    | 51bd8639-92af-414a-a437-011ef10215fe
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 3.14.** Create a network named **net2** using the command below.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network create net2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network create net2
+-----+-----+
| Field          | Value
+-----+-----+
| admin_state_up | UP
| availability_zone_hints |
| availability_zones |
| created_at     | 2024-06-13T00:22:18Z
| description    |
| dns_domain     | None
| id             | 77520fd5-cd86-4dfe-9340-497bf4eda481
| ipv4_address_scope | None
| ipv6_address_scope | None
| is_default     | False
| is_vlan_transparent | None
| mtu            | 1442
| name           | net2
| port_security_enabled | True
| project_id     | 39e851b14f864573aad60582c35e40dc
| provider:network_type | geneve
| provider:physical_network | None
| provider:segmentation_id | 786
| qos_policy_id   | None
| revision_number | 1
| router:external | Internal
| segments        | None
| shared          | False
| status          | ACTIVE
| subnets         |
| tags            |
| updated_at      | 2024-06-13T00:22:18Z
+-----+
[ubuntu@workstation (keystone-admin)]:~$
```

- 3.15.** List the networks again to confirm that the network was successfully created.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
+-----+-----+
| ID          | Name | Subnets
+-----+-----+
| 32da4c25-b517-40c5-97e3-cea031467d13 | public | 4fc6bf88-919c-49df-83c4-b09bd65776ad, c7916655-8954-4bf4-913d-416702f35d1b |
| 77520fd5-cd86-4dfe-9340-497bf4eda481 | net2  |
| 966ecb4f-4ff8-44ea-a476-2d2f18955085 | private | 674205b6-1357-4727-a21a-94220492a57f, fa8a2545-5a8c-44a2-bacc-1b86c253b880 |
| be5d9b78-36ea-4058-90e6-012d280f7dd7 | net1  | 73ceba28-9ffd-49ab-98b3-b3d54981d41e
+-----+
[ubuntu@workstation (keystone-admin)]:~$
```

- 3.16.** Create a subnet named **subnet2** for the **net2** network. Configure this subnet to use the **192.168.1.0./24** range and **172.25.250.254** as the DNS name server.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet create \
> --subnet-range 192.168.1.0/24 \
> --dns-nameserver 172.25.250.254 \
> --network net2 \
> subnet2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet create \
> --subnet-range 192.168.1.0/24 \
> --dns-nameserver 172.25.250.254 \
> --network net2 \
> subnet2
+-----+
| Field      | Value
+-----+
| allocation_pools | 192.168.1.2-192.168.1.254
| cidr        | 192.168.1.0/24
| created_at   | 2024-06-13T00:28:33Z
| description   |
| dns_nameservers | 172.25.250.254
| enable_dhcp    | True
| gateway_ip     | 192.168.1.1
| host_routes    |
| id            | b5c61b0d-5951-421f-8df7-3fcbb6cc2e98
| ip_version     | 4
| ipv6_address_mode | None
| ipv6_ra_mode    | None
| name          | subnet2
| network_id     | 77520fd5-cd86-4dfe-9340-497bf4eda481
| project_id      | 39e851b14f864573aad60582c35e40dc
| revision_number | 0
| segment_id      | None
| service_types   |
| subnetpool_id    | None
| tags           |
| updated_at      | 2024-06-13T00:28:33Z
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 3.17. The name of a network can also be changed. To demonstrate this, change the name of the **net1** network to **net3**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network set \
> --name net3 net1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network set \
> --name net3 net1
[ubuntu@workstation (keystone-admin)]:~$ █
```

Note

The desired name for the network follows the **-name** option, while the current network name is the final argument of the command.

- 3.18.** Verify that the **net1** network has been successfully changed to **net3**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
+-----+-----+
| ID      | Name   | Subnets
+-----+-----+
| 32da4c25-b517-40c5-97e3-cea031467d13 | public  | 4fc6bf88-919c-49df-83c4-b09bd65776ad, c7916655-8954-4bf4-913d-416702f35d1b |
| 77520fd5-cd86-4dfe-9340-497bf4eda481 | net2    | b5c61b0d-5951-421f-8df7-3fc26cc2e98
| 966ecb4f-4ff8-44ea-a476-2d2f18955085 | private | 674205b6-1357-4727-a21a-94220492a57f, fa8a2545-5a8c-44a2-bacc-1b86c253b880 |
| be5d9b78-36ea-4058-90e6-012d280f7dd7 | net3    | 73ceba28-9ffd-49ab-98b3-b3d54981d41e
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$
```

- 3.19.** To avoid confusion, also rename **subnet1** to **subnet3**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet set \
> --name subnet3 subnet1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet set \
> --name subnet3 subnet1
[ubuntu@workstation (keystone-admin)]:~$
```

- 3.20.** Update the **subnet3** subnet to disable DHCP.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet set \
> --no-dhcp subnet3
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet set \
> --no-dhcp subnet3
[ubuntu@workstation (keystone-admin)]:~$
```

- 3.21.** Verify that the **subnet3** subnetwork has been correctly updated.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet show subnet3
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet show subnet3
+-----+-----+
| Field | Value |
+-----+-----+
| allocation_pools | 10.0.0.2-10.0.0.254 |
| cidr | 10.0.0.0/24 |
| created_at | 2024-06-13T00:26:31Z |
| description | |
| dns_nameservers | |
| enable_dhcp | False |
| gateway_ip | 10.0.0.1 |
| host_routes | |
| id | 73ceba28-9ffd-49ab-98b3-b3d54981d41e |
| ip_version | 4 |
| ipv6_address_mode | None |
| ipv6_ra_mode | None |
| name | subnet3 |
| network_id | be5d9b78-36ea-4058-90e6-012d280f7dd7 |
| project_id | 39e851b14f864573aad60582c35e40dc |
| revision_number | 2 |
| segment_id | None |
| service_types | |
| subnetpool_id | None |
| tags | |
| updated_at | 2024-06-13T00:31:10Z |
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 3.22. The **net3** network is now ready to be deleted, which will also delete its subnets. To confirm this, first list the current subnets.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet list
+-----+-----+-----+-----+
| ID | Name | Network | Subnet |
+-----+-----+-----+-----+
| 4fc6bf88-919c-49df-83c4-b09bd65776ad | ipv6-public-subnet | 32da4c25-b517-40c5-97e3-cea031467d13 | 2001:db8::/64 |
| 674205b6-1357-4727-a21a-94220492a57f | ipv6-private-subnet | 966ecb4f-4ff8-44ea-a476-2d2f18955085 | fd96:731b:22b0::/64 |
| 73ceba28-9ffd-49ab-98b3-b3d54981d41e | subnet3 | be5d9b78-36ea-4058-90e6-012d280f7dd7 | 10.0.0.0/24 |
| b5c61b0d-5951-421f-8df7-3fc26cc2e98 | subnet2 | 77520fd5-cd86-4dfe-9340-497bf4eda481 | 192.168.1.0/24 |
| c7916655-8954-4bf4-913d-416702f35d1b | public-subnet | 32da4c25-b517-40c5-97e3-cea031467d13 | 172.24.4.0/24 |
| fa8a2545-5a8c-44a2-bacc-1b86c253b880 | private-subnet | 966ecb4f-4ff8-44ea-a476-2d2f18955085 | 10.0.0.0/26 |
+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 3.23. Delete the **net3** network.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network delete net3
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network delete net3
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 3.24.** Verify that the **net3** network has been deleted by listing all available networks and noting that **net3** is not present in the list.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack network list
```

ID	Name	Subnets
32da4c25-b517-40c5-97e3-cea031467d13	public	4fc6bf88-919c-49df-83c4-b09bd65776ad, c7916655-8954-4bf4-913d-416702f35d1b
77520fd5-cd86-4dfe-9340-497bf4eda481	net2	b5c61b0d-5951-421f-8df7-3fc26cc2e98
966ecb4f-4ff8-44ea-a476-2d2f18955085	private	674205b6-1357-4727-a21a-94220492a57f, fa8a2545-5a8c-44a2-bacc-1b86c253b880

- 3.25.** Verify that the subnet attached to the **net3** network was deleted along with the network.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack subnet list
```

ID	Name	Network	Subnet
4fc6bf88-919c-49df-83c4-b09bd65776ad	ipv6-public-subnet	32da4c25-b517-40c5-97e3-cea031467d13	2001:db8::/64
674205b6-1357-4727-a21a-94220492a57f	ipv6-private-subnet	966ecb4f-4ff8-44ea-a476-2d2f18955085	fd96:731b:22b0::/64
b5c61b0d-5951-421f-8df7-3fc26cc2e98	subnet2	77520fd5-cd86-4dfe-9340-497bf4eda481	192.168.1.0/24
c7916655-8954-4bf4-913d-416702f35d1b	public-subnet	32da4c25-b517-40c5-97e3-cea031467d13	172.24.4.0/24
fa8a2545-5a8c-44a2-bacc-1b86c253b880	private-subnet	966ecb4f-4ff8-44ea-a476-2d2f18955085	10.0.0.0/26

- 3.26.** Leave the terminal window open and continue to the next task.

4 Launching an Internal Instance

In this task, you will launch an internal instance with the *Horizon Dashboard*. You will then delete that instance and launch a new instance by using the *Horizon Unified CLI*.

- 4.1. Open the web browser and navigate to **192.168.1.20**. Login as the **admin** user with the password **secret**.
- 4.2. Switch to the **demo** project and navigate to **Projects > Compute > Instances**. Click **Launch Instance**.

The screenshot shows the Horizon Dashboard interface. The top navigation bar has 'openstack.' and a dropdown set to 'demo'. Below it, there's a 'Project Access' dropdown set to 'Project'. The main menu includes 'Compute' (selected), 'Overview', 'Instances' (highlighted with a blue box), 'Images', 'Key Pairs', 'Server Groups', 'Volumes', 'Network', 'Admin', and 'Identity'. The 'Instances' section shows a table with columns: Instance Name, Image Name, IP Address, Flavor, Key Pair, Status, Availability Zone, Task, Power State, Age, and Actions. A search bar at the top right includes 'Instance ID', 'Filter', and a 'Launch Instance' button (highlighted with a red box). A message below the table says 'No items to display.'

- 4.3. Ensure that **demo** is entered in the *Project Name* field, and enter **instance1** in the *Instance Name* field. Click **Next**.

The screenshot shows the 'Launch Instance' dialog. The 'Details' tab is active. On the left, there are tabs for 'Source *', 'Flavor *', 'Networks *', 'Network Ports', 'Security Groups', 'Key Pair', 'Configuration', 'Server Groups', 'Scheduler Hints', and 'Metadata'. On the right, there are fields for 'Project Name' (set to 'demo'), 'Instance Name *' (set to 'instance1'), 'Description' (empty), 'Availability Zone' (set to 'nova'), and 'Count *' (set to '1'). To the right of these fields is a circular progress chart labeled 'Total Instances (10 Max)' with '10%' filled. Below the chart is a legend: '0 Current Usage' (blue), '1 Added' (light blue), and '9 Remaining' (grey). At the bottom are buttons for '< Back', 'Next >' (highlighted with a red box), and 'Launch Instance'.

- 4.4. Make sure **Image** is selected in the *Select Boot Source* dropdown, and click **No** under *Create New Volume*. Click the \uparrow button on the same row as the **ubuntu2** image to allocate the image, and then click **Next**.

Launch Instance

Details

Source *

Flavor *

Networks *

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Allocated

Displaying 0 items

Select Boot Source

Image

Create New Volume

Yes No

Available ②

Select one

Click here for filters or full text search.

Displaying 2 items

Name	Updated	Size	Format	Visibility	Actions
cirros-0.6.2-x86_64-disk	2/9/24 7:59 PM	20.44 MB	QCOW2	Public	\uparrow
ubuntu2	6/12/24 10:21 PM	647.50 MB	QCOW2	Public	\uparrow

Displaying 2 items

Cancel Back Next > Launch Instance

Stop

Verify that **ubuntu2** appears in the *Allocated* section before moving on to the next step.

- 4.5. Click the \uparrow button on the same row as the **flavor2** flavor to allocate that flavor, then click **Next**.

Launch Instance

Details

Flavors manage the sizing for the compute, memory and storage capacity of the instance.

Allocated

Displaying 0 items

Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public
Select a flavor from the available flavors below:						

Networks *

Displaying 0 items

Security Groups

▼ Available (12) Select one

Q Click here for filters or full text search. X

Configuration

Displaying 12 items

Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public
» m1.nano	1	128 MB	1 GB	⚠ 1 GB	0 GB	Yes ↑
» m1.micro	1	192 MB	1 GB	⚠ 1 GB	0 GB	Yes ↑
» cirros256	1	256 MB	1 GB	⚠ 1 GB	0 GB	Yes ↑
» m1.tiny	1	512 MB	1 GB	⚠ 1 GB	0 GB	Yes ↑
» ds512M	1	512 MB	5 GB	⚠ 5 GB	0 GB	Yes ↑
» flavor2	1	1 GB	12 GB	10 GB	2 GB	Yes ↑
» m1.small	1	2 GB	20 GB	20 GB	0 GB	Yes ↑
» ds2G	2	2 GB	10 GB	10 GB	0 GB	Yes ↑
» m1.medium	2	4 GB	40 GB	40 GB	0 GB	Yes ↑
» ds4G	4	4 GB	20 GB	20 GB	0 GB	Yes ↑
» m1.large	4	8 GB	80 GB	80 GB	0 GB	Yes ↑
» m1.xlarge	8	16 GB	160 GB	160 GB	0 GB	Yes ↑

Displaying 12 items

Cancel Back Next > Launch Instance

Note

The warning signs in the *Root Disk* column indicate that the flavor in that row has a disk size less than the minimum size specified for the selected image.

- 4.6.** Click the ↑ button on the same row as the **net2** network, and click **Launch Instance**.

Launch Instance

Details

Networks provide the communication channels for instances in the cloud. You can select ports instead of networks or a mix of both.

Source

Allocated

Displaying 0 items

Network	Subnets Associated	Shared	Admin State	Status
Select one or more networks from the available networks below.				

Flavor

Network Ports

Displaying 0 items

Security Groups

Available (2)

Select one or more

Key Pair

Configuration

Displaying 2 items

Network	Subnets Associated	Shared	Admin State	Status	
net2	subnet2	No	Up	Active	↑
private	ipv6-private-subnet private-subnet	No	Up	Active	↑

Server Groups

Scheduler Hints

Metadata

Displaying 2 items

Cancel **Next >** **Launch Instance**

Stop

Verify that **net2** appears under the *Allocated* section. Wait for the instance to have a power state of **Running** before proceeding further.

4.7. Log out of the *Horizon Dashboard* and close the web browser.

4.8. If a terminal window is not already open, open one and source the `~/keystonerc-admin` file to load the **admin** user credentials.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

4.9. List the available instances and see that the instance created from the *Horizon Dashboard* appears.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
+-----+-----+-----+-----+-----+
| ID      | Name    | Status | Networks       | Image   | Flavor |
+-----+-----+-----+-----+-----+
| b0db1d25-dd6c-47b9-907f-1c683e7a4856 | instance1 | ACTIVE | net2=192.168.1.38 | ubuntu2 | flavor2 |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.10. Now, we will recreate the instance using the CLI. First, the **instance1** instance.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server delete instance1
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server delete instance1
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.11. List the instances again to verify that **instance1** was deleted successfully.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.12. Create a new instance named **instance2**. Use the previously created **ubuntu2** image, **flavor2** flavor, and **net2** network.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server create \
> --image ubuntu2 \
> --flavor flavor2 \
> --nic net-id=net2 \
> instance2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server create \
> --image ubuntu2 \
> --flavor flavor2 \
> --nic net-id=net2 \
> instance2
+-----+-----+
| Field | Value |
+-----+-----+
| OS-DCF:diskConfig | MANUAL |
| OS-EXT-AZ:availability_zone | None |
| OS-EXT-SRV-ATTR:host | None |
| OS-EXT-SRV-ATTR:hypervisor_hostname | None |
| OS-EXT-SRV-ATTR:instance_name | instance2 |
| OS-EXT-STS:power_state | NOSTATE |
| OS-EXT-STS:task_state | scheduling |
| OS-EXT-STS:vm_state | building |
| OS-SRV-USG:launched_at | None |
| OS-SRV-USG:terminated_at | None |
| accessIPv4 | |
| accessIPv6 | |
| addresses | |
| adminPass | YFkPYMUwddc2 |
| config_drive | |
| created | 2024-06-13T00:51:42Z |
| flavor | flavor2 (641a6748-3495-4ca3-adeb-8304ab64053b) |
| hostId | |
| id | bb55ad62-155b-4e29-92c8-cf58a2cc36c3 |
| image | ubuntu2 (c5a2b30b-439b-4fc8-bf95-05d9d86fd94e) |
| key_name | None |
| name | instance2 |
| progress | 0 |
| project_id | 39e851b14f864573aad60582c35e40dc |
| properties | |
| security_groups | name='default' |
| status | BUILD |
| updated | 2024-06-13T00:51:42Z |
| user_id | 14f5376f00c04e90b7103dd8d4263040 |
| volumes_attached | |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

- 4.13. List all the available instance to verify that the **instance2** instance is running.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
+-----+-----+-----+-----+-----+
| ID | Name | Status | Networks | Image | Flavor |
+-----+-----+-----+-----+-----+
| bb55ad62-155b-4e29-92c8-cf58a2cc36c3 | instance2 | ACTIVE | net2=192.168.1.228 | ubuntu2 | flavor2 |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

- 4.14. Leave the terminal window open and continue to the next task.

5 Verifying the Functionality of an Internal Instance

In this task, you will connect to the instance and verify the flavor settings. You will also pause and stop an instance using the *OpenStack Unified CLI*.

- 5.1.** If a terminal window is not already open, open one and source the `~/keystonerc-admin` file to load the **admin** user credentials.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 5.2.** List all the available instances to find the name of the running instance.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
+-----+-----+-----+-----+-----+
| ID   | Name    | Status | Networks      | Image   | Flavor  |
+-----+-----+-----+-----+-----+
| bb55ad62-155b-4e29-92c8-cf58a2cc36c3 | instance2 | ACTIVE | net2=192.168.1.228 | ubuntu2 | flavor2 |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 5.3.** Show more details of the instance.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server show instance2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server show instance2
+-----+-----+
| Field | Value |
+-----+-----+
| OS-DCF:diskConfig | MANUAL |
| OS-EXT-AZ:availability_zone | nova |
| OS-EXT-SRV-ATTR:host | devstack |
| OS-EXT-SRV-ATTR:hypervisor_hostname | devstack |
| OS-EXT-SRV-ATTR:instance_name | instance-00000002 |
| OS-EXT-STS:power_state | Running |
| OS-EXT-STS:task_state | None |
| OS-EXT-STS:vm_state | active |
| OS-SRV-USG:launched_at | 2024-06-13T00:51:45.000000 |
| OS-SRV-USG:terminated_at | None |
| accessIPv4 | |
| accessIPv6 | |
| addresses | net2=192.168.1.228 |
| config_drive | |
| created | 2024-06-13T00:51:42Z |
| flavor | flavor2 (641a6748-3495-4ca3-adeb-8304ab64053b) |
| hostId | 1b8ddb84262b5472c62a2892fd623993d3a98d2faf2f7862e90ce419 |
| id | bb55ad62-155b-4e29-92c8-cf58a2cc36c3 |
| image | ubuntu2 (c5a2b30b-439b-4fc8-bf95-05d9d86fd94e) |
| key_name | None |
| name | instance2 |
| progress | 0 |
| project_id | 39e851b14f864573aad60582c35e40dc |
| properties | |
| security_groups | name='default' |
| status | ACTIVE |
| updated | 2024-06-13T00:51:46Z |
| user_id | 14f5376f00c04e90b7103dd8d4263040 |
| volumes_attached | |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ 
```

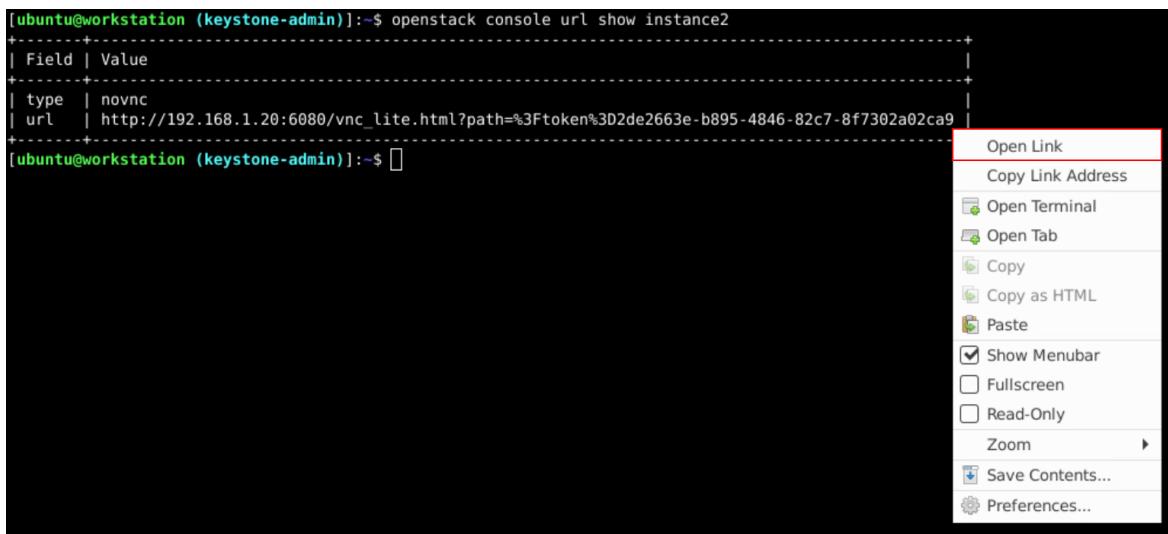
5.4. Review the specifications of the **flavor2** flavor.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor show flavor2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack flavor show flavor2
+-----+-----+
| Field | Value |
+-----+-----+
| OS-FLV-DISABLED:disabled | False |
| OS-FLV-EXT-DATA:ephemeral | 2 |
| access_project_ids | None |
| disk | 10 |
| id | 641a6748-3495-4ca3-adeb-8304ab64053b |
| name | flavor2 |
| os-flavor-access:is_public | True |
| properties | |
| ram | 1024 |
| rxtx_factor | 1.0 |
| swap | 1024 |
| vcpus | 1 |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ 
```

- 5.5.** Retrieve the URL for the noVNC console connection. Right-click the link and select **Open Link**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack console url show instance2
```



- 5.6.** Log in to the **instance2** instance as **root** with the password **secret**.

```
Ubuntu 22.04.3 LTS instance2 tty1
instance2 login: root
Password: _
```

- 5.7.** Use the **free** command to ensure that the RAM and swap amount matches the one defined by the flavor, which is **1024 MB** for each.

```
root@instance2:~# free -m
```

```
root@instance2:~# free -m
              total        used        free      shared  buff/cache   available
Mem:          957         163        488          3         305        645
Swap:        1023          0       1023
root@instance2:~# _
```

- 5.8.** Use the **df** command to ensure that the instance has a disk size of **10 GB**, as defined by the flavor. Notice that **/dev/vda1** and **/dev/vdb** add up to almost 10 GB.

```
root@instance2:~# df -h
```

```
root@instance2:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           96M   976K  95M   1% /run
/dev/vda1       9.6G  1.5G  8.1G  15% /
tmpfs          479M     0  479M   0% /dev/shm
tmpfs          5.0M     0  5.0M   0% /run/lock
/dev/vda15     105M   6.1M  99M   6% /boot/efi
/dev/vdb        2.0G   24K  1.8G   1% /mnt
tmpfs           96M   4.0K  96M   1% /run/user/0
root@instance2:~#
```

- 5.9.** Determine the number of CPUs that the instance is using. Ensure the number matches the number of VCPUs defined by the flavor, which is **1**. Notice that under the **Architecture** heading at the top of the command output, there is a **CPU(s)** heading, whose value is **1**.

```
root@instance2:~# lscpu
```

```
root@instance2:~# lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         40 bits physical, 48 bits virtual
Byte Order:            Little Endian
CPU(s):                1
On-line CPU(s) list:  0
Vendor ID:             GenuineIntel
Model name:            Intel Core i7 9xx (Nehalem Class Core i7)
CPU family:            6
Model:                 26
Thread(s) per core:   1
Core(s) per socket:   1
Socket(s):            1
Stepping:              3
BogoMIPS:              4988.33
Flags:                 fpu de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 syscall nx lm constant_tsc rep_good nopl xtTopology cpuid pnpi ssse3 cx16 sse4_1 sse4_2 popcnt hypervisor lahf_lm pt i
Caches (sum of all):
    L1d:                  32 KiB (1 instance)
    L1i:                  32 KiB (1 instance)
    L2:                   4 MiB (1 instance)
    L3:                   16 MiB (1 instance)
NUMA:
    NUMA node(s):        1
    NUMA node0 CPU(s):   0
Vulnerabilities:
    Gather data sampling: Not affected
    Itlb multihit:       KVM: Mitigation: VMX unsupported
    L1tf:                 Mitigation: PTE Inversion
    Mds:                  Vulnerable: Clear CPU buffers attempted, no microcode; SMT Host state unknown
    Meltdown:             Mitigation: PTI
    Mmio stale data:     Unknown: No mitigations
    Retbleed:             Not affected
    Spec rstack overflow: Not affected
    Spec store bypass:   Vulnerable
    Spectre v1:           Mitigation: usercopy/swaps barriers and __user pointer sanitization
    Spectre v2:           Mitigation: Retpolines, STIBP disabled, RSB filling, PBRSB-eIBRS Not affected
    Srbds:                Not affected
    Tsx async abort:     Not affected
root@instance2:~#
```

- 5.10.** Use the **ping** command from the instance to reach the DHCP server defined for the network. Leave the **ping** command running, as it will be used in the following steps.

```
root@instance2:~# ping -c3 192.168.1.2
```

```
root@instance2:~# ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2) 56(84) bytes of data.
64 bytes from 192.168.1.2: icmp_seq=1 ttl=64 time=4.83 ms
64 bytes from 192.168.1.2: icmp_seq=2 ttl=64 time=0.742 ms
64 bytes from 192.168.1.2: icmp_seq=3 ttl=64 time=0.456 ms
```

Note

You should receive 3 successful ping replies.

5.11. Close the web browser and switch focus to the terminal on **workstation**.

5.12. List the current OpenStack instances.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
+-----+-----+-----+-----+-----+
| ID      | Name    | Status | Networks   | Image   | Flavor  |
+-----+-----+-----+-----+-----+
| bb55ad62-155b-4e29-92c8-cf58a2cc36c3 | instance2 | ACTIVE | net2=192.168.1.228 | ubuntu2 | flavor2 |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

5.13. Delete **instance2**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server delete instance2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server delete instance2
[ubuntu@workstation (keystone-admin)]:~$ █
```

5.14. List all available instances to verify the **instance2** instance has been deleted.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list
[ubuntu@workstation (keystone-admin)]:~$ █
```

5.15. Close the terminal window and the web browser.

5.16. The lab is now complete.