



**OpenStack Labs**

**Lab 01: Launching an Instance**

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## Introduction

In this lab, you will launch an instance using the *Horizon Dashboard*, launch an instance using the *OpenStack Unified CLI*, and use the *OpenStack Unified CLI*.

## Objectives

- Use the *Horizon Dashboard*.
- Launch an instance using the *Horizon Dashboard*.
- Use the *OpenStack Unified CLI*.
- Launch an instance using the *OpenStack Unified CLI*.

## 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 Launching an Instance Using the Horizon Dashboard

In this task, you will launch an instance using the *Horizon Dashboard*.

- 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

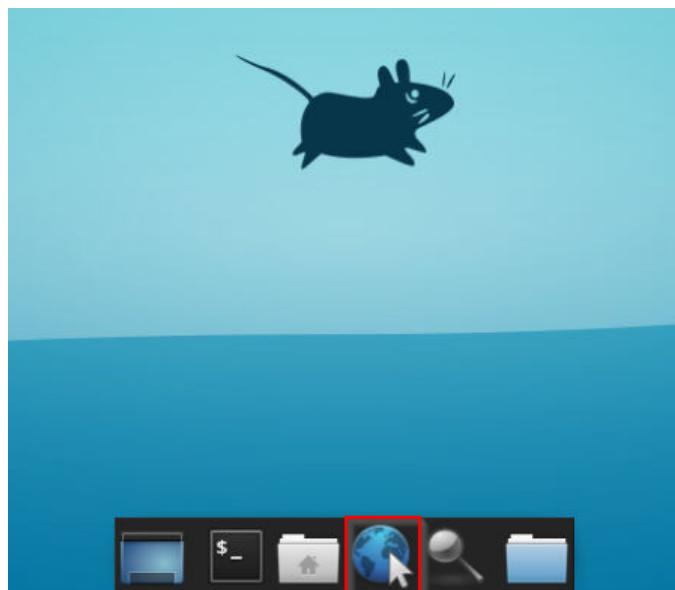
 Expanded Security Maintenance for Infrastructure is not enabled.

 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.



- 1.4.** Enter the IP address of the **devstack** machine (**192.168.1.20**) into the address bar, and log into the OpenStack Horizon Dashboard. The username is **admin** and the password is **secret**.

Log in

User Name

admin

Password

•••••

Sign In

- 1.5.** Click on the dropdown menu in the top left corner of the webpage, then select **demo** as the project. Navigate to **Project > Compute > Overview**, then click **Launch Instance** in the top right corner.

The screenshot shows the OpenStack Horizon dashboard under the 'demo' project. The 'Compute' dropdown is open, and the 'Instances' tab is selected. The main content area displays a table with columns: Instance Name, Image Name, IP Address, Flavor, Key Pair, Status, Availability Zone, Task, Power State, Age, and Actions. A message at the bottom says 'No items to display.' The 'Launch Instance' button in the top right is highlighted with a red box.

- 1.6.** In the *Instance Name* field, type **prod-instance**, and leave the other fields with their default values. Click **Next**.

The screenshot shows the 'Launch Instance' dialog. The 'Details' tab is active. The 'Project Name' field contains 'demo'. The 'Instance Name' field contains 'prod-Instance' and is highlighted with a red box. The 'Description' field is empty. The 'Availability Zone' dropdown is set to 'nova'. The 'Count' field is set to '1'. To the right, there is a circular progress bar indicating '10%' usage of a 10 instance limit. A legend shows '0 Current Usage', '1 Added', and '9 Remaining'. At the bottom, there are 'Cancel', '< Back', 'Next >', and 'Launch Instance' buttons. The 'Next >' button is highlighted with a red box.

- 1.7.** In the *Select Boot Source* drop dow, select **Image**, set *Create New Volume* to **No** and scroll down (if needed) to click the ↑ icon beside of **ubuntu** to use **ubuntu** as the image. Click **Next**.

Launch Instance

Details	Instance source is the template used to create an Instance. You can use an Image, a snapshot of an Instance (Image snapshot), a volume or a volume snapshot (if enabled). You can also choose to use persistent storage by creating a new volume.				
<b>Source *</b>	<b>Select Boot Source</b> <input type="button" value="Image"/> <input type="button" value="Create New Volume"/> <input checked="" type="radio"/> Yes <input type="radio"/> No				
Flavor *					
Networks *	Allocated				
Network Ports	Displaying 0 items				
Security Groups	Name	Updated	Size	Format	Visibility
	Select an item from Available items below				
Key Pair	Displaying 0 items				
Configuration					
Server Groups	<b>Available</b> <span style="color: red;">(2)</span> <input type="button" value="Q"/> Click here for filters or full text search. <input type="button" value="X"/>				
Scheduler Hints	Displaying 0 items				
Metadata	Displaying 2 items				
	Name	Updated	Size	Format	Visibility
	» cirros-0.6.2-x86_64-disk	12/22/23 4:12 AM	20.44 MB	QCOW2	Public <input type="button" value="↑"/>
	» ubuntu	12/22/23 7:25 PM	644.50 MB	QCOW2	Public <input type="button" value="↑"/>
	Displaying 2 items				

### Stop

Before proceeding to the next step, confirm that **ubuntu** appears underneath the *Allocated* section.

- 1.8.** Scroll down (if needed) and click the ↑ icon beside the **m1.small** flavor. Click **Next**.

**Launch Instance**

Allocated							
Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public	
Select a flavor from the available flavors below.							
Displaying 0 items							
<b>Available (12)</b> <span style="float: right;">Select one</span>							
<input type="text"/> Click here for filters or full text search.							
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	
clios256	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	
ds1G	1	1 GB	10 GB	10 GB	0 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

### Stop

Before proceeding to the next step, confirm that **m1.small** appears underneath the *Allocated* section.

- Click the ↑ icon beside the **shared** network. If all required fields have been set, the **Launch Instance** button in the bottom right corner should now be clickable. 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																		
Flavor	Displaying 0 items																		
Networks *	<table border="1"> <thead> <tr> <th>Network</th> <th>Subnets Associated</th> <th>Shared</th> <th>Admin State</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td colspan="5">Select one or more networks from the available networks below.</td> </tr> </tbody> </table>				Network	Subnets Associated	Shared	Admin State	Status	Select one or more networks from the available networks below.									
Network	Subnets Associated	Shared	Admin State	Status															
Select one or more networks from the available networks below.																			
Network Ports	Displaying 0 items																		
Security Groups	Available 2																		
Key Pair	<input type="text"/> Click here for filters or full text search.																		
Configuration	Displaying 2 items																		
Server Groups	<table border="1"> <thead> <tr> <th>Network</th> <th>Subnets Associated</th> <th>Shared</th> <th>Admin State</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>shared</td> <td>shared-subnet</td> <td>Yes</td> <td>Up</td> <td>Active</td> </tr> <tr> <td>private</td> <td>Ipv6-private-subnet private-subnet</td> <td>No</td> <td>Up</td> <td>Active</td> </tr> </tbody> </table>				Network	Subnets Associated	Shared	Admin State	Status	shared	shared-subnet	Yes	Up	Active	private	Ipv6-private-subnet private-subnet	No	Up	Active
Network	Subnets Associated	Shared	Admin State	Status															
shared	shared-subnet	Yes	Up	Active															
private	Ipv6-private-subnet private-subnet	No	Up	Active															
Scheduler Hints	<table border="1"> <tr> <td>shared</td> <td>shared-subnet</td> <td>Yes</td> <td>Up</td> <td>Active</td> </tr> </table>				shared	shared-subnet	Yes	Up	Active										
shared	shared-subnet	Yes	Up	Active															
Metadata	<table border="1"> <tr> <td>private</td> <td>Ipv6-private-subnet private-subnet</td> <td>No</td> <td>Up</td> <td>Active</td> </tr> </table>				private	Ipv6-private-subnet private-subnet	No	Up	Active										
private	Ipv6-private-subnet private-subnet	No	Up	Active															
	Displaying 2 items																		
<input type="button"/> Cancel	<input type="button"/> Back <input type="button"/> Next <input style="background-color: red; color: white; border: 2px solid red;" type="button"/> Launch Instance																		

### Stop

Before proceeding to the next step, confirm that **shared** appears underneath the **Allocated** section.

- 1.10. To open the console of **prod-instance** in a new tab, right-click on the name **prod-instance** and select **Open Link in New Tab**, or middle-click (press in the mouse wheel) the name **prod-instance**.

openstack. demo ▾ admin ▾

Project API Access Compute Instances

Instances

Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
prod-instance	ubuntu	192.168.233.28	m1.small	-	Active	nova	None	Running	0 minutes	<input type="button"/> Create Snapshot

Images Key Pairs Server Groups Volumes Network Admin Identity

Instances

Displaying 1 item

Open Link in New Tab

Open Link in New Window

Open Link in New Private Window

Bookmark Link...

Save Link As...

Save Link to Pocket

Copy Link

Search Google for "prod-instance"

Inspect (Q)

### Stop

Wait for the **Power State** of **prod-instance** to display the status of *Running* before continuing to the next step.

- 1.11.** In the new tab, click the *Console* tab. Optionally, to make the console take up the whole tab, click the **Click here to show only console** link.



- 1.12.** Log into the console as **root** with the password **secret**.

- 1.13.** In the console, ping **192.168.233.2** (DHCP server) to verify connectivity.

```
$ ping -c3 192.168.233.2
```

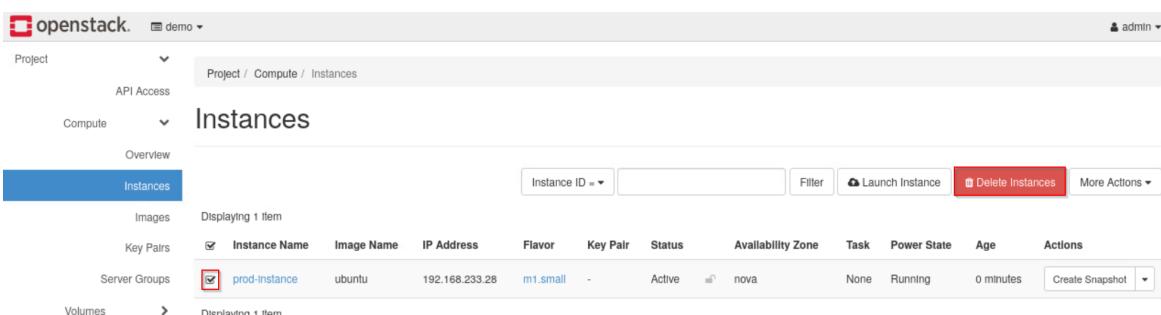
```
Connected to QEMU (instance-00000003)
root@prod-instance:~# ping -c3 192.168.233.2
PING 192.168.233.2 (192.168.233.2) 56(84) bytes of data.
64 bytes from 192.168.233.2: icmp_seq=1 ttl=64 time=9.73 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=2.18 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.42 ms
--- 192.168.233.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2006ms
rtt min/avg/max/mdev = 1.423/4.444/9.732/3.751 ms
root@prod-instance:~# _
```

### Note

You should have received three successful ping replies.

- 1.14.** Close the console tab for **prod-instance**.

- 1.15.** Focus back on the tab showing instances and delete **prod-instance**. Select the checkbox for **prod-instance** and click the **Delete Instances** button.



Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
prod-instance	ubuntu	192.168.233.28	m1.small	-	Active	nova		Running	0 minutes	<b>Delete Instances</b>

- 1.16.** Confirm the deletion by clicking the **Delete Instances** button.

### Confirm Delete Instances



You have selected: "prod-Instance". Please confirm your selection. Deleted Instances are not recoverable.

Cancel

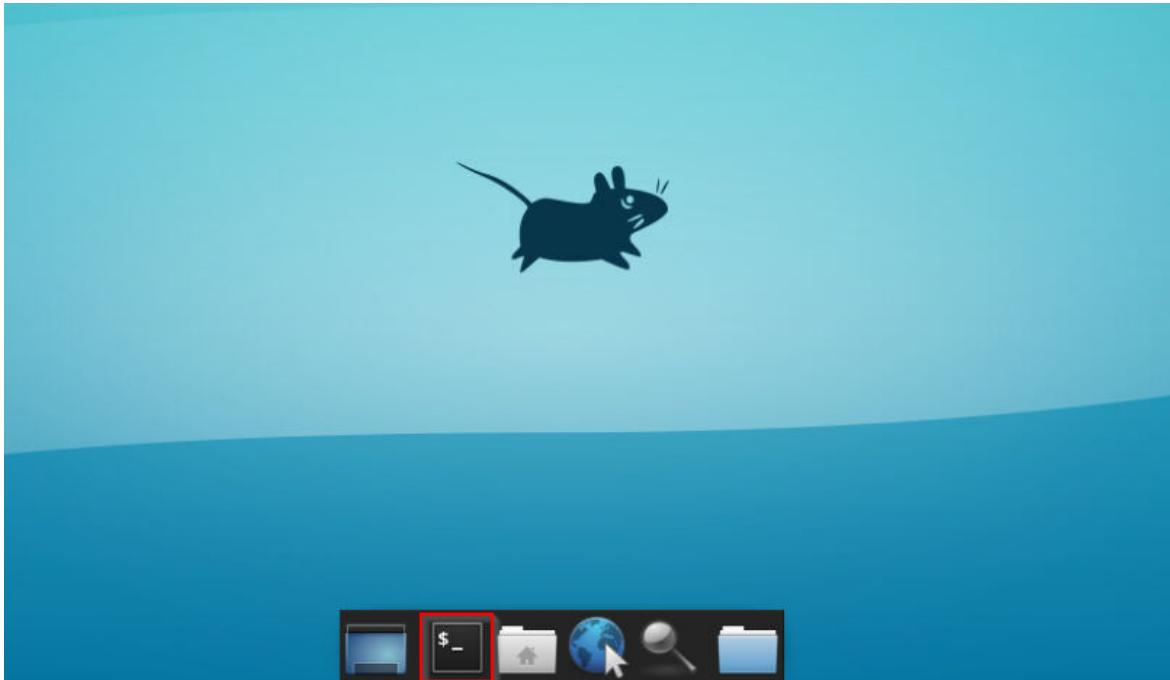
**Delete Instances**

- 1.17.** Close the web browser.

## 2 Running the OpenStack Unified CLI

In this task, you will use the *OpenStack Unified command-line interface (CLI)* to list and check the details of existing projects, users, flavors, images, and instances, and to launch an instance.

- 2.1. Open a terminal, either by right-clicking the desktop and selecting **Open Terminal Here**, by clicking the terminal icon in the icon bar at the bottom of the screen, or by selecting **Applications** at the top left of the screen, then selecting **Terminal Emulator**.



- 2.2. The **keystonerc-admin** file in the home directory defines several OS\_\* environment variables that allow you to use the OpenStack platform on the **devstack** server through the OpenStack Unified CLI. The username will be **admin**, the password will be **secret**, the project will be **demo**, and the IP address for **OS\_AUTH\_URL** is the IP address of the **devstack** server, **192.168.1.20**. You can run cat on the file to view its contents.

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

```
ubuntu@workstation:~$ cat ~/keystonerc-admin
unset OS_SERVICE_TOKEN
unset OS_TENANT_ID
unset OS_TENANT_NAME
export OS_USERNAME=admin
export OS_PASSWORD=secret
export OS_AUTH_URL=http://192.168.1.20/identity
export OS_REGION_NAME=RegionOne
export OS_PROJECT_NAME=demo
export OS_INTERFACE=public
export OS_IDENTITY_API_VERSION=3
ubuntu@workstation:~$ █
```

- 2.3. Use the source command with the **keystonerc-admin** argument to enable all the OS\_\* environment variables included in the **keystonerc-admin** file.

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

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

- 2.4. Verify that the OS\_\* environment variables have been exported to the shell environment.

```
ubuntu@workstation:~$ env | grep OS_
```

```
ubuntu@workstation:~$ env | grep OS_
OS_AUTH_URL=http://192.168.1.20/identity
OS_REGION_NAME=RegionOne
OS_PROJECT_NAME=demo
OS_IDENTITY_API_VERSION=3
OS_INTERFACE=public
OS_PASSWORD=secret
OS_USERNAME=admin
ubuntu@workstation:~$ █
```

**Tip**

Use the `openstack help project show` command to determine how to display the details of a particular project.

- 2.5. Enter the command below to gather additional information about the **admin** user's current project, **demo**.

```
ubuntu@workstation:~$ openstack project show demo
```

```
ubuntu@workstation:~$ openstack project show demo
+-----+-----+
| Field | Value |
+-----+-----+
| description |          |
| domain_id | default |
| enabled | True   |
| id | ac77ab3519ac4a588dfefcb7d7c31085 |
| is_domain | False  |
| name | demo   |
| options | {}    |
| parent_id | default |
| tags | []    |
+-----+-----+
ubuntu@workstation:~$ █
```

**Note**

The ID value for **demo** may differ from above since it is a unique ID.

**Tip**

Use the `openstack help user show` command to determine how to display details of a specific user account.

- 2.6. Enter the command below to check the details of **admin**.

```
ubuntu@workstation:~$ openstack user show admin
```

```
ubuntu@workstation:~$ openstack user show admin
+-----+-----+
| Field | Value |
+-----+-----+
| domain_id | default |
| enabled | True   |
| id | d20b6b5676724f12b891563fee6b62fd |
| name | admin  |
| options | {}    |
| password_expires_at | None |
+-----+-----+
ubuntu@workstation:~$ █
```

**Tip**

Use the openstack help flavor list command to determine how to display all available flavors.

- 2.7. Enter the command below to list all available flavors.

```
ubuntu@workstation:~$ openstack flavor list
```

```
ubuntu@workstation:~$ 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 |
| 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 |
| d2 | ds1G | 1024 | 10 | 0 | 1 | True |
| d3 | ds2G | 2048 | 10 | 0 | 2 | True |
| d4 | ds4G | 4096 | 20 | 0 | 4 | True |
+---+-----+-----+-----+-----+-----+-----+
ubuntu@workstation:~$
```

- 2.8. Enter the command below to display the details specifically for the **m1.small** flavor.

```
ubuntu@workstation:~$ openstack flavor show m1.small
```

```
ubuntu@workstation:~$ openstack flavor show m1.small
+-----+-----+
| Field | Value |
+-----+-----+
| OS-FLV-DISABLED:disabled | False |
| OS-FLV-EXT-DATA:ephemeral | 0 |
| access_project_ids | None |
| disk | 20 |
| id | 2 |
| name | m1.small |
| os-flavor-access:is_public | True |
| properties | hw_rng:allowed='True' |
| ram | 2048 |
| rxtx_factor | 1.0 |
| swap | 1 |
| vcpus | 1 |
+-----+
ubuntu@workstation:~$
```

**Tip**

Use the openstack help image command to determine how to list all images.

- 2.9. Enter the command below to list all available images.

```
ubuntu@workstation:~$ openstack image list
```

```
ubuntu@workstation:~$ openstack image list
+-----+-----+-----+
| ID      | Name          | Status |
+-----+-----+-----+
| 2c57a4c3-1681-433d-a0f0-091fa99057ad | cirros-0.6.2-x86_64-disk | active |
| b6e959dd-7ad1-409f-966c-9c34eee29b36 | ubuntu           | active |
+-----+-----+-----+
ubuntu@workstation:~$
```

**Tip**

Use the openstack help network command to determine how to list all networks.

- 2.10. Enter the command below to list all available networks.

```
ubuntu@workstation:~$ openstack network list
```

```
ubuntu@workstation:~$ openstack network list
+-----+-----+-----+
| ID      | Name    | Subnets   |
+-----+-----+-----+
| c2b73520-f786-4891-85d7-5474ff485db6 | private | 5073e887-6c34-4018-9023-19ab46028a6c, 64e819da-079c-4cff-8f54-2bc03c26f95e |
| d787b1d5-d630-4c1d-9274-4d4fd092223b | shared   | eaeafc117-3488-4d12-884f-13e77b53cae3
| ea56d8cd-a775-40f6-8806-6a34c80488e2 | public   | 041271d7-5c3b-4c84-a058-f0e8d705a5d1, eef4a8c1-8a72-45e2-8c3a-4ad48797d8c3 |
+-----+-----+-----+
ubuntu@workstation:~$
```

- 2.11. Enter the command below to create a new instance with the name **prod-instance**, using **ubuntu** as the image, **m1.small** as the flavor, and **shared** as the network.

```
ubuntu@workstation:~$ openstack server create \
> --image ubuntu \
> --flavor m1.small \
> --network shared \
> --wait prod-instance
```

```
ubuntu@workstation:~$ openstack server create \
> --image ubuntu \
> --flavor m1.small \
> --network shared \
> --wait prod-instance

+-----+-----+
| 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 | 2024-01-06T21:19:00.000000 |
| OS-SRV-USG:terminated_at | None |
| accessIPv4 | |
| accessIPv6 | |
| addresses | shared=192.168.233.116 |
| adminPass | H9LirHpuhpJN |
| config_drive | |
| created | 2024-01-06T21:18:57Z |
| flavor | m1.small (2) |
| hostId | 60247dd563bf84b4d3dc4347ffff74576a6541e87f7393d5deaa75690 |
| id | 14bce2df-cb40-4ce5-8f4b-2daff2cc8b99 |
| image | ubuntu (b6e959dd-7ad1-409f-966c-9c34eee29b36) |
| key_name | None |
| name | prod-instance |
| progress | 0 |
| project_id | c50851c6559442df92e0e0799376a84f |
| properties | |
| security_groups | name='default' |
| status | ACTIVE |
| updated | 2024-01-06T21:19:01Z |
| user_id | be70ca5cla9e46eb8be7b25a6cd18fba |
| volumes_attached | |
+-----+-----+
ubuntu@workstation:~$
```

### Tip

When typing the command, make sure there is a space between `ubuntu` and the `\`, and press **Enter** to get the `>` and continue typing the rest of the command.

## 2.12. Use the `openstack server list` command to list all the available instances.

```
ubuntu@workstation:~$ openstack server list
```

```
ubuntu@workstation:~$ openstack server list
+-----+-----+-----+-----+-----+
| ID      | Name     | Status  | Networks       | Image   | Flavor  |
+-----+-----+-----+-----+-----+
| 14bce2df-cb40-4ce5-8f4b-2daff2cc8b99 | prod-instance | ACTIVE | shared=192.168.233.116 | ubuntu | m1.small |
+-----+-----+-----+-----+-----+
ubuntu@workstation:~$
```

### Note

The UUID in the `ID` field and the IP address in the `Networks` field may differ from the screenshot provided.

- 2.13. Enter the command below to display more details about the instance **prod-instance**.

```
ubuntu@workstation:~$ openstack server show prod-instance
```

```
ubuntu@workstation:~$ openstack server show prod-instance
+-----+-----+
| 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 | 2024-01-06T21:19:00.000000 |
| OS-SRV-USG:terminated_at | None |
| accessIPv4 | shared=192.168.233.116 |
| accessIPv6 | |
| addresses | |
| config_drive | |
| created | 2024-01-06T21:18:57Z |
| flavor | m1.small (2) |
| hostId | 60247dd563bf84b4d3dc4347fff74576a6541e87f7393d5deaa75690 |
| id | 14bce2df-cb40-4ce5-8f4b-2daff2cc8b99 |
| image | ubuntu (b6e959dd-7ad1-409f-966c-9c34eee29b36) |
| key_name | None |
| name | prod-instance |
| progress | 0 |
| project_id | c50851c6559442df92e0e0799376a84f |
| properties | name='default' |
| security_groups | ACTIVE |
| status | 2024-01-06T21:19:01Z |
| updated | be70ca5cla9e46eb8be7b25a6cd18fba |
| user_id | |
| volumes_attached | |
+-----+-----+
ubuntu@workstation:~$
```

### Tip

The UUID for the instance **prod-instance** can be used in place of **prod-instance** in the above command to identify the instance.

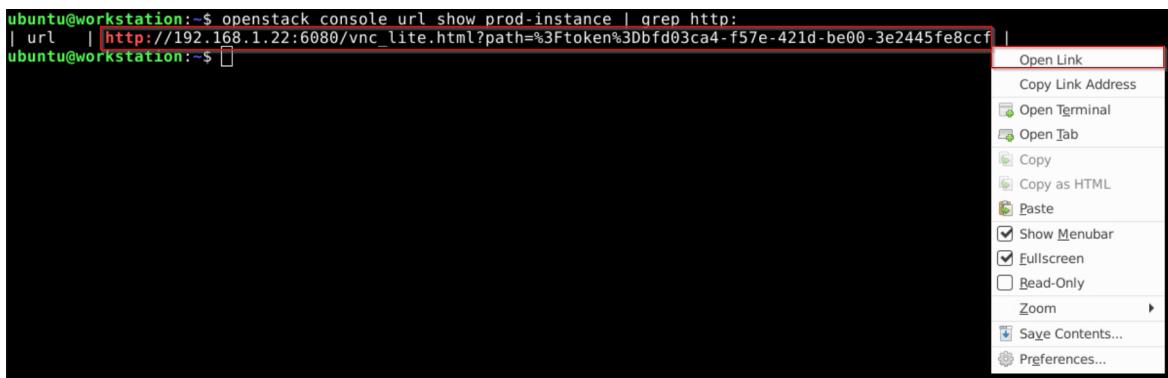
- 2.14. Enter the command below to verify the log for the instance.

```
ubuntu@workstation:~$ openstack console log show prod-instance
```

```
ubuntu@workstation:~$ openstack console log show prod-instance
[ 0.00000] Linux version 5.15.0-91-generic (buildd@lcy02-amd64-045) (gcc (Ubuntu 11.4.0-1ubuntu1-22.04) 11.4.0, GNU ld (GNU Binutils for Ubuntu) 2.38) #101-Ubuntu SMP Tue Nov 14 13:30:08 UTC 2023 (Ubuntu 5.15.0-91.101-generic 5.15.131)
[ 0.00000] Command line: BOOT_IMAGE=/boot/vmlinuz-5.15.0-91-generic root=LABEL=cloudimg-rootfs ro console=tty1 console=tty
S0
[ 0.00000] KERNEL supported cpus:
[ 0.00000]   Intel GenuineIntel
[ 0.00000]   AMD AuthenticAMD
[ 0.00000]   Hygon HygonGenuine
[ 0.00000]   Centaur CentaurHauls
[ 0.00000]   zhaoxin Shanghai
[ 0.00000] BIOS-provided physical RAM map:
[ 0.00000] BIOS-e820: [mem 0x0000000000000000-0x0000000000009fbfff] usable
[ 0.00000] BIOS-e820: [mem 0x0000000000009fc00-0x00000000000fffff] reserved
[ 0.00000] BIOS-e820: [mem 0x000000000000f0000-0x00000000000fffff] reserved
[ 0.00000] BIOS-e820: [mem 0x00000000000100000-0x00000000007ffdcffff] usable
[ 0.00000] BIOS-e820: [mem 0x000000000007ffdd000-0x000000007fffffff] reserved
[ 0.00000] BIOS-e820: [mem 0x0000000000fffc0000-0x000000000ffffffff] reserved
[ 0.00000] NX (Execute Disable) protection: active
[ 0.00000] SMBIOS 2.8 present.
[ 0.00000] DMI: OpenStack Foundation OpenStack Nova, BIOS 1.15.0-1 04/01/2014
[ 0.00000] tsc: Fast TSC calibration using PIT
[ 0.00000] tsc: Detected 2095.077 MHz processor
[ 0.017659] last_pfn = 0x7ffd max_arch_pfn = 0x400000000
[ 0.018870] x86/PAT: Configuration [0-7]: WB WC UC_ UC WB WP UC- WT
[ 0.040867] found SMP MP-table at [mem 0x000f5b80-0x000f5b8f]
[ 0.048240] RAMDISK: [mem 0x34381000-0x361b7fff]
[ 0.048821] ACPI: Early table checksum verification disabled
[ 0.049466] ACPI: RSDP 0x000000000000F5990 000014 (v00 BOCHS )
[ 0.049915] ACPI: RSDT 0x000000007FFE18B3 000034 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.050741] ACPI: FACP 0x000000007FFE1767 000074 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.051695] ACPI: DSDT 0x000000007FFE0040 001727 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.051848] ACPI: FACS 0x000000007FFE00040
[ 0.051952] ACPI: APIC 0x000000007FFE17DB 000078 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.052016] ACPI: HPET 0x000000007FFE1853 000038 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.052075] ACPI: WAET 0x000000007FFE188B 000028 (v01 BOCHS BXPC 00000001 BXPC 00000001)
[ 0.052224] ACPI: Reserving FACP table memory at [mem 0x7ffe1767-0x7ffe17da]
[ 0.052268] ACPI: Reserving DSDT table memory at [mem 0x7ffe0040-0x7ffe1766]
[ 0.052289] ACPI: Reserving FACS table memory at [mem 0x7ffe0000-0x7ffe003f]
```

- 2.15.** Enter the command below to display the instance's console URL. Pipe the command to grep so that you will get a link in the terminal you can click on. Then right click on the URL and select **Open Link**.

```
ubuntu@workstation:~$ openstack console url show prod-instance | grep http:
```



- 2.16.** The web browser will open directly to the instance's console through noVNC. Log into **prod-instance** using **root** as the username and **secret** as the password. Then use the ping command to verify connectivity with the DHCP server (**192.168.233.2**).

```
$ ping -c3 192.168.233.2
```

```
Connected to QEMU (Instance-00000002)

root@prod-instance:~# ping -c8 192.168.233.2
PING 192.168.233.2 (192.168.233.2) 56(84) bytes of data.
64 bytes from 192.168.233.2: icmp_seq=1 ttl=64 time=5.85 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=3.25 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.59 ms

--- 192.168.233.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 1.585/3.559/5.849/1.754 ms
root@prod-instance:~# _
```

**2.17.** Close the web browser and change focus back to the previous terminal window.

**2.18.** Enter the command below to stop the instance.

```
ubuntu@workstation:~$ openstack server stop prod-instance
```

```
ubuntu@workstation:~$ openstack server stop prod-instance
ubuntu@workstation:~$ █
```

**2.19.** **prod-instance** should now be in the SHUTOFF state. Enter the command below to verify this.

```
ubuntu@workstation:~$ openstack server list
```

```
ubuntu@workstation:~$ openstack server list
+-----+-----+-----+-----+-----+
| ID      | Name    | Status  | Networks   | Image   | Flavor  |
+-----+-----+-----+-----+-----+
| 14bce2df-cb40-4ce5-8f4b-2daff2cc8b99 | prod-instance | SHUTOFF | shared=192.168.233.116 | ubuntu | m1.small |
+-----+-----+-----+-----+-----+
ubuntu@workstation:~$ █
```

**2.20.** Enter the command below to delete the instance.

```
ubuntu@workstation:~$ openstack server delete prod-instance
```

```
ubuntu@workstation:~$ openstack server delete prod-instance
ubuntu@workstation:~$ █
```

**2.21.** Ensure that the instance was deleted by seeing that the server list is empty.

```
ubuntu@workstation:~$ openstack server list
```

```
ubuntu@workstation:~$ openstack server list
ubuntu@workstation:~$ █
```

**2.22.** The lab is now complete.