



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**.
- 1.2. Open the web browser.



- 1.3. 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**.

The screenshot shows the OpenStack Horizon login interface. At the top center is the OpenStack logo, which consists of a red square with a white 'O' shape inside. Below the logo, the word "openstack" is written in a large, lowercase, sans-serif font, with a registered trademark symbol (®) at the end. Underneath this, the word "Log in" is centered. Below "Log in" is a form with two fields: "User Name" and "Password". The "User Name" field contains the value "admin", and the "Password" field contains six black dots, indicating a password. Both the "User Name" and "Password" fields are enclosed in red boxes. At the bottom right of the form is a blue "Sign In" button.

- 1.4.** 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. The top navigation bar has a dropdown for 'Project' set to 'demo'. Below it, another dropdown is set to 'Compute'. The main content area is titled 'Instances' and shows 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 top of the table says 'No items to display.' To the right of the table is a search bar for 'Instance ID' and a 'Launch Instance' button.

- 1.5.** 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 is set to 'demo'. The 'Instance Name' field contains 'prod-Instance' and is highlighted with a red box. The 'Availability Zone' dropdown is set to 'nova'. The 'Count' input field contains '1'. To the right, there's a circular progress bar showing '10%' and a legend for 'Total Instances (10 Max)': 0 Current Usage, 1 Added, 9 Remaining. At the bottom are 'Cancel', '< Back', 'Next >', and 'Launch Instance' buttons.

- 1.6.** 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.				
Source *	Select Boot Source <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	Available <small>2</small> <input type="button" value="Select one"/> <input type="text"/> 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.

- 1.7.** 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							
Available (12) Select one							
<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

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.

- 1.9. 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.

- 1.10.** 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.

The screenshot shows the OpenStack Horizon dashboard under the 'Compute' section. The 'Instances' tab is selected. The 'Console' tab is highlighted with a red border. Below the tabs, there is a message: 'If console is not responding to keyboard input: click the grey status bar below. Click here to show only console'. A red box highlights the 'Click here to show only console' link.

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

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

```
$ ping -c3 192.168.233.2
```

The terminal window shows the output of a ping command:

```
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.

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

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

The screenshot shows the OpenStack Horizon dashboard under the 'Compute' section. The 'Instances' tab is selected. A red box highlights the 'Delete Instances' button. Below the table, there is a message: 'Displaying 1 item'.

Instance ID	Filter	Launch Instance	Delete Instances	More Actions						
			Delete Instances							
Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
<input checked="" type="checkbox"/> prod-instance	ubuntu	192.168.233.28	m1.small	-	Active	nova		Running	0 minutes	Create Snapshot

- 1.15.** 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

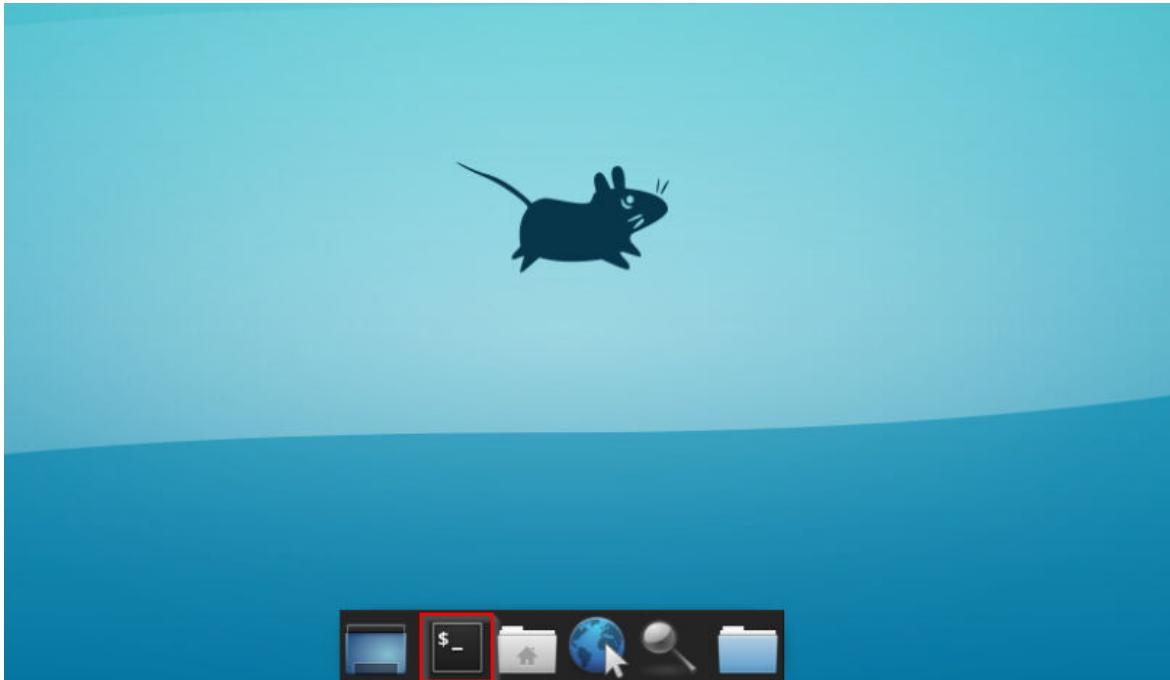
Delete Instances

- 1.16.** 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.

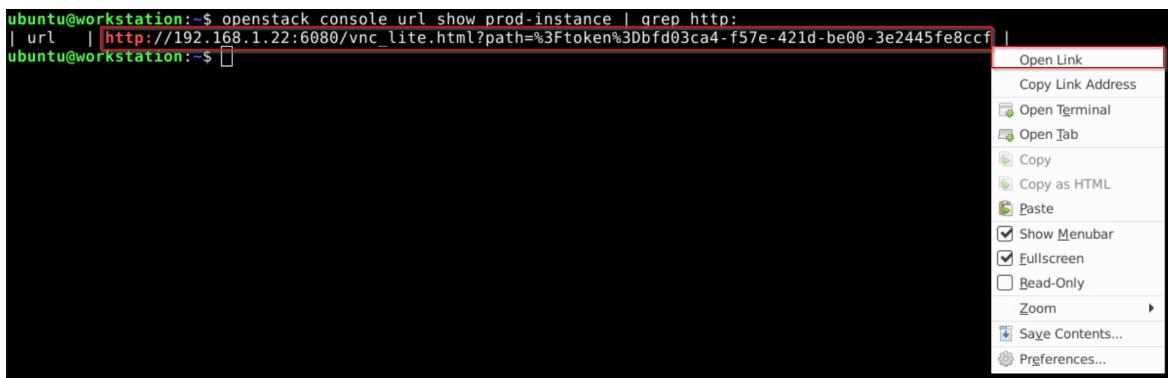
- 2.14.** Enter the command below to verify the log for the instance.

```
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 0x00000000000100000-0x00000000000fffff] usable
[ 0.00000] BIOS-e820: [mem 0x000000000007ffdd000-0x0000000007ffffff] reserved
[ 0.00000] BIOS-e820: [mem 0x0000000000fffc0000-0x000000000fffffff] 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.