



**OpenStack Labs**

**Lab 01: Launching an Instance**

## Contents

Introduction .....	2
Objectives .....	3
Lab Settings.....	4
1    Launching an Instance Using the Horizon Dashboard .....	5
2    Running the OpenStack Unified CLI .....	12

## 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

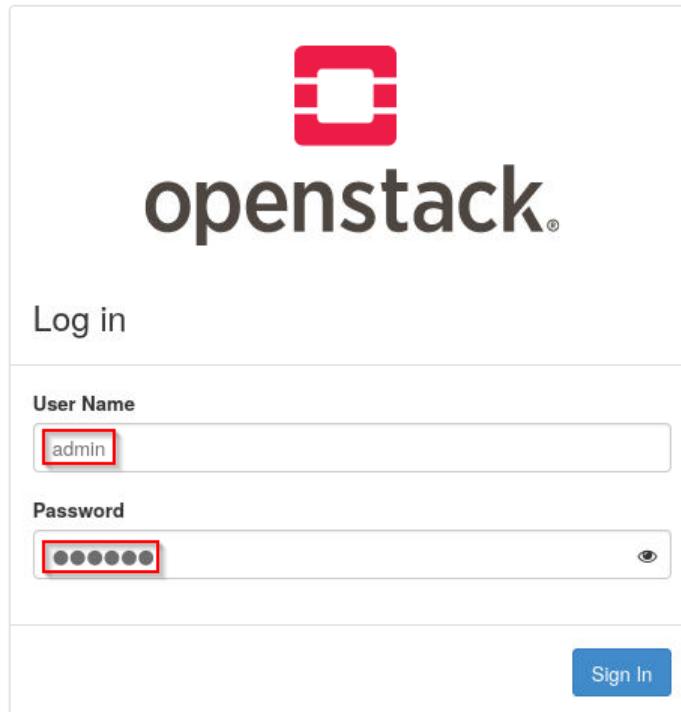
## 1 Launching an Instance Using the Horizon Dashboard

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 Dashboard login interface. At the top is the OpenStack logo. Below it is the word "openstack". Underneath is the "Log in" section. It has two input fields: "User Name" containing "admin" and "Password" containing "secret" (represented by five dots). Both input fields are highlighted with red boxes. At the bottom right 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.' The 'Instances' tab in the sidebar is also highlighted with a red box.

- 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 box. The 'Details' tab is active. On the left, there are several optional configuration sections: 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 'prod-Instance' and highlighted with a red box), 'Description' (empty), 'Availability Zone' (set to 'nova'), and 'Count\*' (set to 1). To the right of these fields is a circular progress indicator showing '10%' usage. Below the progress indicator is a legend: 'Total Instances (10 Max)' with segments for '0 Current Usage', '1 Added', and '9 Remaining'. At the bottom of the dialog are buttons for 'Cancel', '< Back', 'Next >', and 'Launch Instance' (which is highlighted with a red box).

- 1.6. In the *Select Boot Source* drop down, 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	<table border="1"> <thead> <tr> <th>Name</th> <th>Updated</th> <th>Size</th> <th>Format</th> <th>Visibility</th> </tr> </thead> <tbody> <tr> <td colspan="5">Select an item from Available items below</td> </tr> </tbody> </table>					Name	Updated	Size	Format	Visibility	Select an item from Available items below									
Name	Updated	Size	Format	Visibility																
Select an item from Available items below																				
Key Pair	Displaying 0 items																			
Configuration																				
Server Groups	<b>Available</b> <small>2</small> <input type="button" value="Select one"/> <input type="text"/> Click here for filters or full text search.																			
Scheduler Hints	Displaying 0 items																			
Metadata	<table border="1"> <thead> <tr> <th>Name</th> <th>Updated</th> <th>Size</th> <th>Format</th> <th>Visibility</th> </tr> </thead> <tbody> <tr> <td>ctiros-0.6.2-x86_64-disk</td> <td>12/22/23 4:12 AM</td> <td>20.44 MB</td> <td>QCOW2</td> <td>Public <input type="button" value="↑"/></td> </tr> <tr> <td>ubuntu</td> <td>12/22/23 7:25 PM</td> <td>644.50 MB</td> <td>QCOW2</td> <td>Public <input type="button" value="↑"/></td> </tr> </tbody> </table>					Name	Updated	Size	Format	Visibility	ctiros-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="↑"/>
Name	Updated	Size	Format	Visibility																
ctiros-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																			
<input type="button" value="Cancel"/>	<input type="button" value="Back"/>	<input type="button" value="Next &gt;"/>	<input type="button" value="Launch Instance"/>																	

### 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**

**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

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** **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**.

## Lab 01: Launching an 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.

**Allocated**

Displaying 0 items

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 Select one or more

**Key Pair**

**Configuration**

Displaying 2 items

Network	Subnets Associated	Shared	Admin State	Status
shared	shared-subnet	Yes	Up	Active
private	IPv6-private-subnet private-subnet	No	Up	Active

**Metadata**

Displaying 2 items

**Cancel** < Back Next > **Launch Instance**

### Stop

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

- 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

Images Key Pairs Server Groups Volumes Network Admin Identity

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	<b>Create Snapshot</b>

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)

## Lab 01: Launching an Instance

### Stop

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

- 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.

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

- 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.

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

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

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

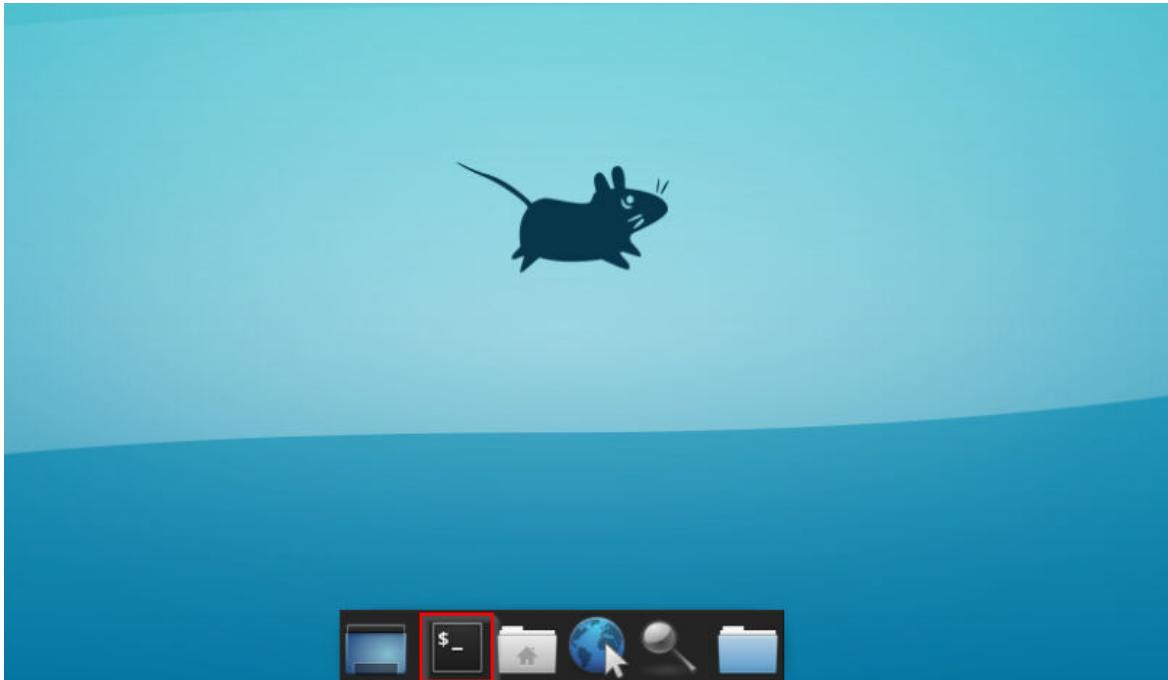
Delete Instances

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 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.

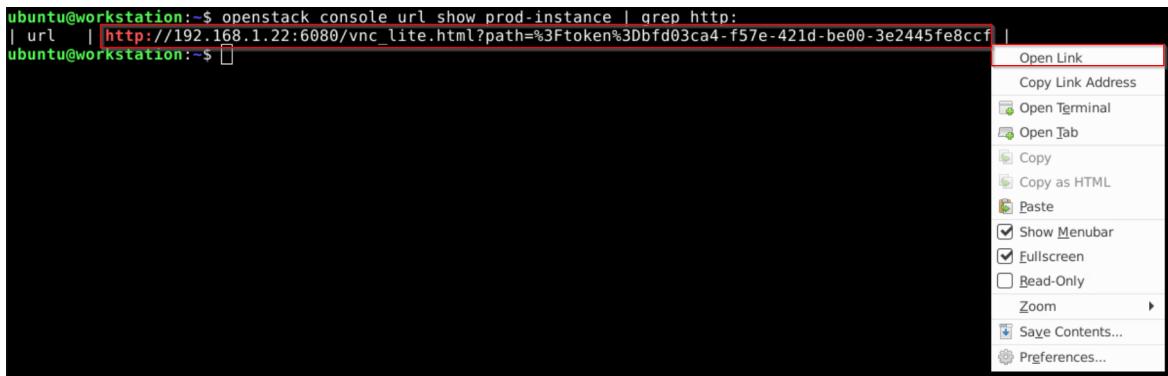
```
ubuntu@workstation:~$ openstack console log show prod-instance
```

## Lab 01: Launching an 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 0x0000000000000000-0x000000000009fbff] usable
[ 0.00000] BIOS-e820: [mem 0x000000000009fc00-0x00000000000fffff] reserved
[ 0.00000] BIOS-e820: [mem 0x000000000000f000-0x00000000000fffff] reserved
[ 0.00000] BIOS-e820: [mem 0x00000000000100000-0x0000000007ffdccfff] usable
[ 0.00000] BIOS-e820: [mem 0x000000000007ffdd000-0x0000000007fffffff] 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 0x000000007FE0040 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 |
+-----+-----+-----+-----+-----+
```

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. The lab is now complete.