



OpenStack Labs

Lab 06: Managing an OpenStack Instance

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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).
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Introduction

Up to this point, whenever you have launched an instance, its resources and running state have remained mostly constant. However, OpenStack instances are quite flexible, even after being launched. In this lab, you will launch an instance and perform several management operations while it is running.

Objectives

- Create a snapshot of an instance.
- Manage the running and power state of an 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 Creating a Snapshot Using the Horizon Dashboard

In this task, you will launch an instance, modify its configuration, and make a snapshot of it for later use. Taking a snapshot of an image captures its state and data on disk. An OpenStack snapshot can be used as an image to launch other instances. There are a couple situations where snapshots might be a useful tool. One is to aid in the backup of instance or as a precaution before a major change so that the image is easily recoverable. Another use of snapshots is to build off an existing image to create a better template for new instances. For instance, consider the case where you want to launch multiple customized FTP servers. Instead of launching each one from a basic Ubuntu image and modifying their configurations individually, you might set up one instance completely and take a snapshot. That snapshot could then be used as a template for the other instances to save time and prevent mistakes.

- 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 and navigate to **192.168.1.20**. Log into the dashboard as **admin** with the password **secret**.

1.4. Ensure the **demo** project is selected. Navigate to **Project > Compute > Instances**, and click **Launch Instance**.

1.5. In the *Details* tab, enter **instance1** in the *Instance Name* field and click **Next**.

1.6. In the *Source* tab, make sure **Image** is selected in the *Select Boot Source* dropdown and select **No** under *Create New Volume*. Select the **ubuntu** image by clicking the ↑ symbol in the same row. 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	Available <small>(2)</small> <input type="button" value="Select one"/>				
Server Groups					
Scheduler Hints	<input type="text"/> Click here for filters or full text search. <input type="button" value="X"/>				
Metadata	Displaying 2 Items				
	Name	Updated	Size	Format	Visibility
	» cirros-0.6.2-x86_64-disk	2/9/24 7:59 PM	20.44 MB	QCOW2	Public <input type="button" value="↑"/>
	» ubuntu	2/9/24 9:32 PM	647.50 MB	QCOW2	Shared <input type="button" value="↑"/>
	Displaying 2 Items				
<input type="button" value="Cancel"/>		<input type="button" value="Back"/> <input style="border: 2px solid red; color: red; background-color: white; border-radius: 5px; padding: 2px 10px;" type="button" value="Next"/>		<input type="button" value="Launch Instance"/>	

Stop

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

- 1.7.** In the *Flavor* tab, click the ↑ symbol in the same row as **m1.small**. 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	
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	
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.

- 1.8.** In the *Networks* tab, click the ↑ symbol in the same row as **shared**. 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	Select one or more																		
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																			
Metadata																			
	Displaying 2 items																		
	<div style="text-align: right;"> Cancel < Back Next > Launch Instance </div>																		

Stop

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

- 1.9.** Access the instance's console by clicking on **instance1** under the *Instance Name* column. Then, navigate to the *Console* tab if you are not directed there automatically. Click on **Click here to show only the console**.

The screenshot shows the OpenStack Horizon dashboard. The top navigation bar includes the OpenStack logo, project name 'demo', user 'admin', and a search bar. The left sidebar has sections for Project, API Access, Compute (selected), Overview, Instances (selected), Images, Key Pairs, and Server Groups. The main content area shows an instance named 'instance1'. Below the instance name are tabs: Overview, Interfaces, Log, and Console (which is highlighted with a red box). A large blue button labeled 'Instance Console' is present. Below it, a note says: 'If console is not responding to keyboard input: click the grey status bar below' followed by a red-link 'Click here to show only console'. Another note says: 'To exit the fullscreen mode, click the browser's back button.'

- 1.10.** Log into the instance as **root** with the password **secret**.

```
Ubuntu 22.04.3 LTS instance1 tty1

instance1 login: root
Password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-92-generic x86_64)

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

 System information as of Tue Jul 16 16:57:24 UTC 2024

 System load:  0.66943359375   Processes:          83
 Usage of /:   7.4% of 19.20GB  Users logged in:    0
 Memory usage: 8%              IPv4 address for ens3: 192.168.233.13
 Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/**/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@instance1:~# _
```

Note

It may take several minutes for the instance to fully boot up and present a login prompt.

- 1.11.** Now, we will make a change to the instance and create a snapshot. Create the `/root/hello.txt` file with the contents **Hello, world!**.

```
root@instance1:~# echo 'Hello, world!' > /root/hello.txt
```

```
root@instance1:~# echo 'Hello, world!' > /root/hello.txt
root@instance1:~#
```

- 1.12.** Now, navigate back to **Project > Compute > Instances**. Before creating a snapshot, click the dropdown next to **Create Snapshot** in the same row as **instance1**, then click **Shut Off Instance**. This will prevent any inconsistencies in the resulting snapshot.

Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
instance1	ubuntu	192.168.233.99	m1.small	-	Active	nova	None	Running	13 minutes	Create Snapshot

Tip

A “live snapshot” is a snapshot of a running instance, which may only include a snapshot of the disk, while some OS state may be lost.

Note

Stopping instances and otherwise changing their running states will be explored further later in this lab.

- 1.13.** When the *Status* column shows that **instance1** is **Shutoff**, click **Create Snapshot**.

Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
instance1	ubuntu	192.168.233.99	m1.small	-	Shutoff	nova	None	Shut Down	15 minutes	Create Snapshot

- 1.14.** In the **Create Snapshot** dialog, enter **instance1-snapshot** in the *Snapshot Name* field. Click **Create Snapshot**.

Create Snapshot

Snapshot Name *

instance1-snapshot

Description:

A snapshot is an image which preserves the disk state of a running instance.

Cancel

Create Snapshot

Stop

When you create the snapshot, you will be redirected to **Projects > Compute > Images**. Wait until **instance1-snapshot** is **Active** before proceeding.

- 1.15.** Navigate back to the **Instances** page. The instance is no longer needed, so select the checkbox next to **instance1** and click **Delete Instances**.

Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
Instance1	ubuntu	192.168.233.99	m1.small	-	Shutoff	nova	None	Shut Down	19 minutes	<button>Start Instance</button>

- 1.16.** In the **Confirm Delete Instances** dialog, click **Delete Instances**.

Confirm Delete Instances

You have selected: "instance1". Please confirm your selection. Deleted instances are not recoverable.

Cancel

Delete Instances

- 1.17.** To verify that the snapshot works correctly, launch another instance named **instance1** using the snapshot. Follow the same steps that were used to create **instance1**. However, in the *Source* tab of the **Launch Instance** dialog, select **Image Snapshot** under **Boot Source** click the ↑ symbol next to **instance1-snapshot**.

Launch Instance

Details

Source *

Flavor *

Networks *

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Select Boot Source

Instance Snapshot

Create New Volume

Yes No

Allocated

Displaying 0 items

Name Updated Size Format Visibility

Select an item from Available items below

Available 1 Select one

Click here for filters or full text search.

Name Updated Size Format Visibility

instance1-snapshot 7/10/24 2:21 PM 1.53 GB QCOW2 Private 

Displaying 1 item

 Cancel  Back  Next 

Tip

The snapshot will also appear on the **Project > Compute > Images** page. It should say **Snapshot** in the *Type* column. For an alternative method of launching an image using the snapshot, navigate to this page, click **Launch** in the same row as the snapshot, and enter the required information in the following dialog. The snapshot can also be deleted from here.

- 1.18. Open the instance's console and log in with the username **root** and password **secret**. Check that the file created in the previous instance also exists on this instance.

```
root@instance1:~# cat /root/hello.txt
```

```
root@instance1:~# cat /root/hello.txt
Hello, world!
root@instance1:~# _
```

Note

It may take several minutes for the instance to fully boot up and present a login prompt.

- 1.19.** Exit the instance's console, navigate back to **Project > Compute > Instances**, and delete the instance.

The screenshot shows the OpenStack Horizon dashboard under the 'Compute' tab. In the 'Instances' section, there is one item displayed: 'instance1'. The table includes columns for Instance Name, Image Name, IP Address, Flavor, Key Pair, Status, Availability Zone, Task, Power State, Age, and Actions. The 'Actions' column for 'instance1' contains a 'Delete Instances' button, which is highlighted with a red box.

- 1.20.** You will create another snapshot with the *OpenStack Unified CLI* in the next task, so **instance1-snapshot** can safely be deleted. Navigate to **Project > Compute > Images**, select **instance1-snapshot**, and click **Delete Images**.

The screenshot shows the OpenStack Horizon dashboard under the 'Compute' tab. In the 'Images' section, there are three items displayed: 'cirros-0.6.2-x86_64-disk', 'instance1-snapshot', and 'ubuntu'. The table includes columns for Owner, Name, Type, Status, Visibility, Protected, Disk Format, and Size. The 'Actions' column for 'instance1-snapshot' contains a 'Delete Images' button, which is highlighted with a red box. The 'instance1-snapshot' row has a checked checkbox in the 'Owner' column.

- 1.21.** In the **Confirm Delete Image** dialog, click **Delete Image**.

Confirm Delete Image

You have selected "instance1-snapshot". Deleted image is not recoverable.

Cancel **Delete Image**

- 1.22.** Log out of the dashboard, close the browser window, and continue to the next task.

2 Creating a Snapshot Using the OpenStack Unified CLI

In this task, you will repeat the steps from the previous task in the *OpenStack Unified CLI*.

- 2.1. Open a terminal window and source the keystone credentials for the **admin** user.

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

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

- 2.2. List the current instances. The list should be empty.

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

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

- 2.3. Now, we will create the same snapshot as before from the command line. Launch an instance. Use the **ubuntu** image, the **m1.small** flavor, and the **shared** network.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server create \
> --image ubuntu \
> --flavor m1.small \
> --nic net-id=shared \
instance2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server create \
> --image ubuntu \
> --flavor m1.small \
> --nic net-id=shared \
> 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 | NOSTATE |
| OS-EXT-STS:power_state | scheduling |
| OS-EXT-STS:task_state | building |
| OS-EXT-STS:vm_state | None |
| OS-SRV-USG:launched_at | None |
| OS-SRV-USG:terminated_at | None |
| accessIPv4 | |
| accessIPv6 | |
| addresses | |
| adminPass | LJgxqiZzF9DL |
| config_drive | |
| created | 2024-07-11T16:19:18Z |
| flavor | m1.small (2) |
| hostId | |
| id | 53b74de8-fbd6-4449-91d4-adda646fc12a |
| image | ubuntu (329d361e-f6dc-4b72-b200-3de0ec230e65) |
| key_name | None |
| name | instance2 |
| progress | 0 |
| project_id | 39e851b14f864573aad60582c35e40dc |
| properties | |
| security_groups | name='default' |
| status | BUILD |
| updated | 2024-07-11T16:19:18Z |
| user_id | 14f5376f00c04e90b7103dd8d4263040 |
| volumes_attached | |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

2.4. List the instances again to ensure it was created correctly.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
+-----+-----+-----+-----+-----+
| ID | Name | Status | Networks | Image | Flavor |
+-----+-----+-----+-----+-----+
| 53b74de8-fbd6-44 | instance2 | ACTIVE | shared=192.168.2 | ubuntu | m1.small |
| 49-91d4-adda646f | | | 33.122 | | |
| c12a | | | | | |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

Tip

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

2.5. Show the URL to the console of the instance. Right-click the URL and click **Open Link**.

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

Field	Value
type	novnc
url	http://192.168.1.20:6080/vnc_lite.html?path=%3Ftoken%3D16b98dff-e7f8-48d3-85fb-0bb09915b3d0

2.6. Log in to **instance2** as **root** with the password **secret**.

```
Ubuntu 22.04.3 LTS instance2 tty1

instance2 login: root
Password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-92-generic x86_64)

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

 System information as of Thu Jul 11 16:27:13 UTC 2024

 System load: 0.552734375      Processes:          82
 Usage of /:   7.4% of 19.20GB   Users logged in:    0
 Memory usage: 8%                  IPv4 address for ens3: 192.168.233.122
 Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@instance2:~# _
```

Note

It may take several minutes for the instance to fully boot up and present a login prompt.

2.7. Create the `/root/hello.txt` file with the contents **Hello, world!.**

```
root@instance2:~# echo 'Hello, world!' > /root/hello.txt
```

```
root@instance2:~# echo 'Hello, world!' > /root/hello.txt
root@instance2:~# _
```

- 2.8. Close the browser window and return focus to the terminal window. Stop the instance before making a snapshot.

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

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

- 2.9. List the current images. The list should have two items.

```
[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 |  
| 329d361e-f6dc-4b72-b200-3de0ec230e65 | ubuntu | active |  
+-----+-----+-----+  
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 2.10. Make a snapshot of the instance.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server image create \  
> instance2 \  
> --name instance2-snapshot \  
> --max-width 80
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server image create \
> instance2 \
> --name instance2-snapshot \
> --max-width 80
+-----+
| Field      | Value
+-----+
| checksum    | None
| container_format | None
| created_at  | 2024-07-11T16:41:11Z
| disk_format | None
| file        | /v2/images/8ecabdd4-bf66-49ee-b9c1-66496ccac8a2/file
| id          | 8ecabdd4-bf66-49ee-b9c1-66496ccac8a2
| min_disk    | 20
| min_ram    | 0
| name        | instance2-snapshot
| owner       | 39e851b14f864573aad60582c35e40dc
| properties   | base_image_ref='329d361e-f6dc-4b72-b200-3de0ec230e65',
|               | boot_roles='manager,reader,member,admin',
|               | hw_cdrom_bus='ide', hw_disk_bus='virtio',
|               | hw_machine_type='pc', hw_video_model='virtio',
|               | hw_vif_model='virtio', image_type='snapshot',
|               | instance_uuid='53b74de8-fbd6-4449-91d4-adda646fc12a',
|               | os_hash_algo='None', os_hash_value='None',
|               | os_hidden='False', owner_project_name='demo',
|               | owner_user_name='admin',
|               | user_id='14f5376f00c04e90b7103dd8d4263040'
| protected   | False
| schema      | /v2/schemas/image
| size        | None
| status      | queued
| tags        |
| updated_at  | 2024-07-11T16:41:11Z
| virtual_size | None
| visibility  | private
+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

- 2.11.** List the current images again to ensure the snapshot was created properly.

```
[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 |
| 8ecabdd4-bf66-49ee-b9c1-66496ccac8a2 | instance2-snapshot      | active |
| 329d361e-f6dc-4b72-b200-3de0ec230e65 | ubuntu                | active |
+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ ]
```

- 2.12.** To verify the correctness of the snapshot, first delete the instance.

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

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

- 2.13. Confirm the deletion of the instance.

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

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

- 2.14. Now, recreate the instance, using **instance2-snapshot** as the image.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server create \
> --image instance2-snapshot \
> --flavor m1.small \
> --nic net-id=shared \
instance2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server create \
> --image instance2-snapshot \
> --flavor m1.small \
> --nic net-id=shared \
> 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 |
| 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 | tTiMDGu9yV63
| config_drive |
| created | 2024-07-11T16:43:39Z
| flavor | m1.small (2)
| hostId |
| id | 22ef1f5d-5e94-4707-983c-b788fb37e26c
| image | instance2-snapshot (8ecabdd4-bf66-49ee-b9c1-66496ccac8a2)
| key_name | None
| name | instance2
| progress | 0
| project_id | 39e851b14f864573aad60582c35e40dc
| properties |
| security_groups | name='default'
| status | BUILD
| updated | 2024-07-11T16:43:39Z
| user_id | 14f5376f00c04e90b7103dd8d4263040
| volumes_attached |
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 2.15. Using the same steps as before, log in to the instance's console as **root** using the password **secret**. Verify that the **/root/hello.txt** file exists.

```
root@instance2:~# cat /root/hello.txt
```

```
root@instance2:~# cat /root/hello.txt
Hello, world!
root@instance2:~# _
```

Note

It may take several minutes for the instance to fully boot up and present a login prompt.

- 2.16. This instance will be used in the following sections. Leave both the browser and terminal windows open and continue to the next task.

3 Managing the Running State of an Instance Using the Horizon Dashboard

OpenStack allows for managing the running and power state of instances in a variety of ways, and each method may be useful in different situations. In this task, you will manage the running and power state of an instance by starting, stopping, pausing, suspending, resuming, shelving, unshelving, and rebooting the instance using the *Horizon Dashboard*.

- 3.1. Open a new tab in the browser window and navigate to **192.168.1.20**. Log in as **admin** with the password **secret**.
- 3.2. Pausing an instance is one way to manage the running state of an OpenStack instance. When an instance is paused, its operation is frozen, and its state and memory are preserved in the RAM of the underlying compute node. Pausing an instance does not release its resources. When the instance is resumed, it will pick up any processes where they left off. To view the effects of pausing an instance, first focus back on the tab with the instance's console and continuously ping the DHCP server.

```
root@instance2:~# ping 192.168.233.2
```

```
root@instance2:~# ping 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=12.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=3.53 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.23 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.46 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.22 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.62 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.40 ms
-
```

Tip

Pausing an instance is useful when the operation of an instance needs to be interrupted while its state should be kept intact. For example, an instance might be paused while making changes to the underlying infrastructure to prevent disrupting processes and requiring applications or the instance to be restarted. Pausing an instance is similar to putting a computer in sleep mode.

- 3.3. To pause the instance, navigate to **Project > Compute > Instances**, click the dropdown next to **Create Snapshot** in the same row as **Instance2**, and click **Pause Instance**.

The screenshot shows the OpenStack Horizon dashboard under the 'Compute' project. The 'Instances' tab is selected. A table displays one instance named 'instance2-snapshot'. In the top right corner of the table row, there is a 'Create Snapshot' button with a dropdown menu. The 'Pause Instance' option in this menu is highlighted with a red box.

Note

You may have to scroll down to find the option.

- 3.4.** Now, view the console again to see that it is frozen and no more ping replies are appearing.

```
root@instance2:~# ping 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=12.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=3.53 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.23 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.46 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.22 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.62 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.40 ms
-
```

- 3.5.** Navigate back to the **Instances** page. Click the dropdown next to **Create Snapshot** in the same row as **instance2** and click **Resume Instance**.

The screenshot shows the OpenStack Horizon dashboard under the 'Compute' project. The 'Instances' tab is selected. A table displays one instance named 'instance2-snapshot'. In the top right corner of the table row, there is a 'Create Snapshot' button with a dropdown menu. The 'Resume Instance' option in this menu is highlighted with a red box.

- 3.6.** View the console again to see that the ping replies have resumed. Press **Ctrl+C** to stop the **ping** command.

```
root@instance2:~# ping 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=12.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=3.53 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.23 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.46 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.22 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.62 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.40 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=4.00 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.90 ms
64 bytes from 192.168.233.2: icmp_seq=10 ttl=64 time=1.52 ms
^C
--- 192.168.233.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9024ms
rtt min/avg/max/mdev = 1.220/3.018/12.295/3.227 ms
root@instance2:~#
```

- 3.7.** Suspending an instance is similar to pausing an instance. The main difference is that the instance's state is written to a persistent disk of the underlying compute node rather than memory. This means the state can be preserved even if the compute node loses power during the suspension. Suspending an instance does not release its resources. When the instance is resumed, it will pick up any processes where they left off. To view the effects of suspending an instance, perform the same experiment as before. Focus on the tab with the instance's console and continuously ping the DHCP server.

```
root@instance2:~# ping 192.168.233.2
```

```
root@instance2:~# ping 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=12.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=3.53 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.23 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.46 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.22 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.62 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.40 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=4.00 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.90 ms
64 bytes from 192.168.233.2: icmp_seq=10 ttl=64 time=1.52 ms
-
```

Tip

Suspending an instance is useful in similar situations as pausing. However, suspending an image allows the compute node to be rebooted or migrated without disrupting the processes of the instance and requiring applications or the instance to be restarted. Suspending an instance is similar to putting a computer in hibernation mode.

- 3.8. To suspend the instance, navigate back to **Project > Compute > Instances**, click the dropdown next to **Create Snapshot**, and click **Suspend Instance**.

The screenshot shows the OpenStack Horizon dashboard with the 'Instances' tab selected. A context menu is open over an instance named 'Instance2'. The 'Actions' dropdown menu is visible, with the 'Suspend Instance' option highlighted and surrounded by a red box.

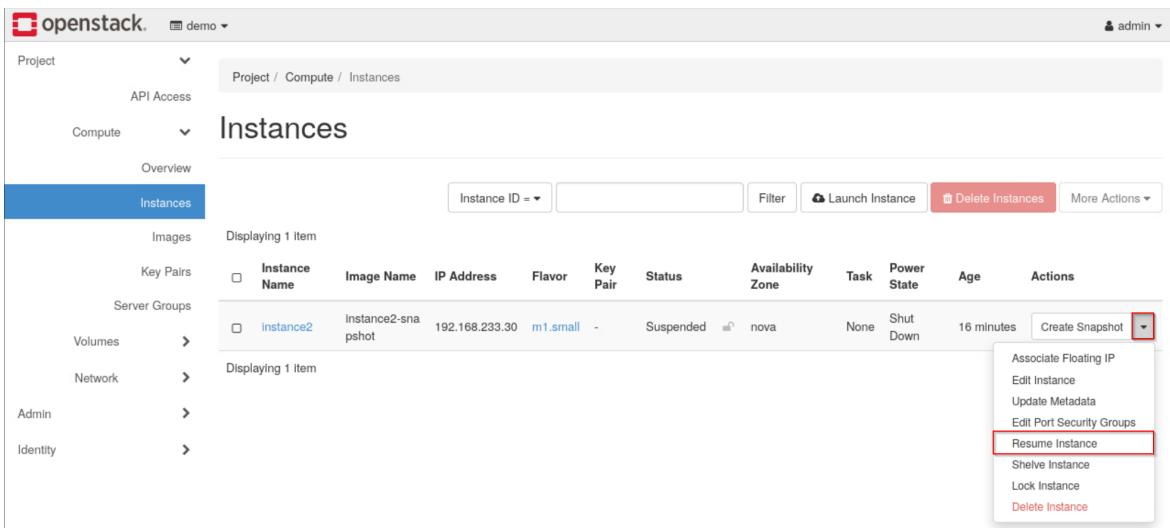
Note

You may have to scroll down to find the option.

- 3.9. View the console again to see that the connection has been ended. When the instance is resumed, a new connection will be created, and this tab will still be unresponsive. Close the tab containing the instance console.



- 3.10.** Navigate back to the **Instances** page. Click the dropdown next to **Create Snapshot** in the same row as **instance2** and click **Resume Instance**.



The screenshot shows the OpenStack Horizon Instances page. The left sidebar is collapsed. The main content area has a title "Instances" and a table displaying one item:

	Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
<input type="checkbox"/>	Instance2	Instance2-snapshot	192.168.233.30	m1.small	-	Suspended	nova	None	Shut Down	16 minutes	Create Snapshot ▼

A context menu is open over the "Create Snapshot" button, listing several options: Associate Floating IP, Edit Instance, Update Metadata, Edit Port Security Groups, **Resume Instance** (which is highlighted with a red box), Shelve Instance, Lock Instance, and Delete Instance.

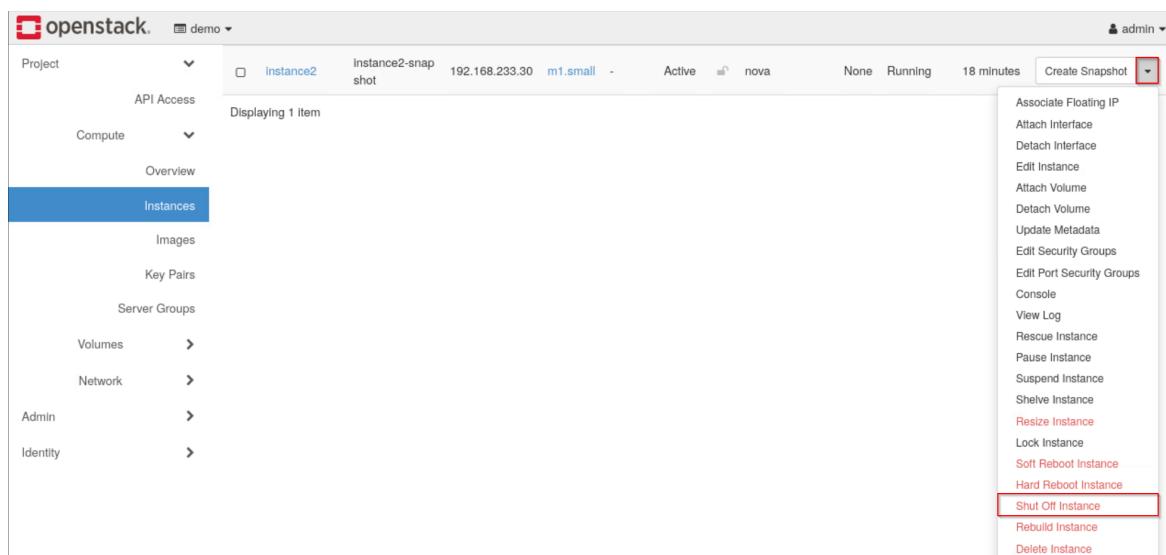
- 3.11.** Click on **instance2** and select the **Console** tab to see that the ping replies have resumed. Press **Ctrl+C** to stop the **ping** process.

```

root@instance2:~# ping 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=2.98 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=2.58 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.41 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.66 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.58 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.31 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=18.8 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=1.60 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.30 ms
64 bytes from 192.168.233.2: icmp_seq=10 ttl=64 time=0.816 ms
64 bytes from 192.168.233.2: icmp_seq=11 ttl=64 time=1.89 ms
64 bytes from 192.168.233.2: icmp_seq=12 ttl=64 time=1.18 ms
64 bytes from 192.168.233.2: icmp_seq=13 ttl=64 time=1.18 ms
64 bytes from 192.168.233.2: icmp_seq=14 ttl=64 time=1.77 ms
64 bytes from 192.168.233.2: icmp_seq=15 ttl=64 time=1.53 ms
^C
--- 192.168.233.2 ping statistics ---
15 packets transmitted, 15 received, 0% packet loss, time 14038ms
rtt min/avg/max/mdev = 0.816/2.770/18.765/4.307 ms
root@instance2:~# 

```

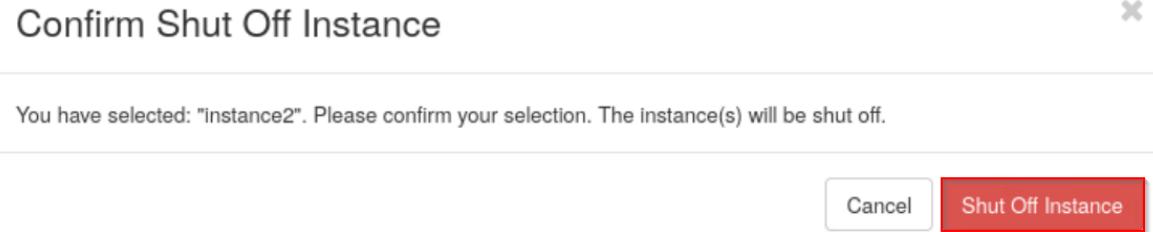
- 3.12.** Shutting off or stopping an instance turns off the instance. The instance state and any data stored in the instance's RAM will be lost. Stopping an instance does not release its resources. To stop an instance, navigate to the **Instances** page. Click the dropdown next to **Create Snapshot** in the same row as **instance2** and click **Shut Off Instance**.



Note

You may have to scroll down to find the option.

3.13. In the **Confirm Shut Off Instance** dialog, click **Shut Off Instance**.



3.14. When the power state of the instance indicates that it is shut off, the **Create Snapshot** button will become **Start Instance**. Click this button to turn the instance back on.

	Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
<input type="checkbox"/>	Instance2	Instance2-snapshot	192.168.233.30	m1.small	-	Shutoff	nova	None	Shut Down	24 minutes	Start Instance

Tip

In addition to shutting off an instance, an instance can also be soft or hard rebooted, or turned off and back on. A soft reboot allows the instance to perform a graceful shutdown, while hard rebooting an instance is analogous to pulling the power cord from a computer.

3.15. Close the browser window and continue to the next task.

4 Managing the Running State of an Instance Using the OpenStack Unified CLI

In this task, you will repeat the steps from the previous task in the *OpenStack Unified CLI*.

- 4.1.** If a terminal window is not already open, open one and source the keystone credentials for the **admin** user.

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

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

- 4.2.** Show the URL to the console of the instance. Right-click the URL and click **Open Link**.

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

Field	Value
type	novnc
url	http://192.168.1.20:6080/vnc_lite.html?path=%3Ftoken%3D16b98dff-e7f8-48d3-85fb-0bb09915b3d0

Open Link
Copy Link Address

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

```
Ubuntu 22.04.3 LTS instance2 tty1
instance2 login: root
Password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-92-generic x86_64)

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

 System information as of Thu Jul 11 19:08:54 UTC 2024

 System load:  0.08349609375   Processes:          83
 Usage of /:   7.6% of 19.20GB  Users logged in:     0
 Memory usage: 8%                IPv4 address for ens3: 192.168.233.30
 Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your Internet connection or proxy settings

Last login: Thu Jul 11 16:48:01 UTC 2024 on tty1
root@instance2:~# _
```

- 4.4. Continuously ping the DHCP server to see the effects of pausing an instance.

```
root@instance2:~# ping 192.168.233.2
```

```
root@instance2:~# ping 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=13.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=4.27 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.54 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.17 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.19 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.84 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.32 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=1.51 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.15 ms
```

- 4.5. Focus back on the terminal window and pause the instance.

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

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

- 4.6. Now, view the browser window again to see that the instance is frozen and no more ping replies are appearing.

```
root@instance2:~# ping 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=13.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=4.27 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.54 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.17 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.19 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.84 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.32 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=1.51 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.15 ms
```

- 4.7. Focus back on the terminal window and resume the instance

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

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

- 4.8.** View the browser window again to see that more ping replies are coming in. Press **Ctrl+C** to stop the **ping** process.

```
root@instance2:~# ping 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=1.48 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=1.21 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.71 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=2.08 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.21 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.81 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.18 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=1.19 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.46 ms
64 bytes from 192.168.233.2: icmp_seq=10 ttl=64 time=1.19 ms
64 bytes from 192.168.233.2: icmp_seq=11 ttl=64 time=1.51 ms
^C
--- 192.168.233.2 ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 10028ms
rtt min/avg/max/mdev = 1.175/1.457/2.081/0.289 ms
root@instance2:~# _
```

- 4.9.** Start the **ping** process again to view the effects of suspending an instance.

```
root@instance2:~# ping 192.168.233.2
```

```
root@instance2:~# ping 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=13.3 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=4.27 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.54 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.17 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.19 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.84 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.32 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=1.51 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=1.15 ms
```

- 4.10.** Focus back on the terminal window and suspend the instance.

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

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

- 4.11. View the console again to see that the connection has been ended. When the instance is resumed, a new connection will be created, and this tab will still be unresponsive. Close the browser window.



- 4.12. Focus back on the terminal window and resume the instance.

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

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

- 4.13. Show the URL to the console of the instance. Right-click the URL and click **Open Link**.

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

```
[ubuntu@workstation (keystone-admin)]:~$ openstack console url show instance2
+-----+
| Field | Value
+-----+
| type  | novnc
| url   | http://192.168.1.20:6080/vnc_lite.html?path=%3Ftoken%3D940e1dcf-3d48-4421-9cd1-1a0810697dd6
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

A screenshot of a terminal window showing the command "openstack console url show instance2". The output displays a table with two rows: "Field" and "Value". The "Field" column contains "type" and "url". The "Value" column contains "novnc" and "http://192.168.1.20:6080/vnc_lite.html?path=%3Ftoken%3D940e1dcf-3d48-4421-9cd1-1a0810697dd6". To the right of the URL, a context menu is open with "Open Link" highlighted in red.

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

```

Ubuntu 22.04.3 LTS instance2 tty1

instance2 login: root
Password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-92-generic x86_64)

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

 System information as of Thu Jul 11 19:08:54 UTC 2024

 System load: 0.08349609375   Processes:          83
 Usage of /: 7.6% of 19.20GB  Users logged in:      0
 Memory usage: 8%           IPv4 address for ens3: 192.168.233.30
 Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your Internet connection or proxy settings

Last login: Thu Jul 11 16:48:01 UTC 2024 on tty1
root@instance2:~# 

```

- 4.15.** Note that more ping replies are now coming in. Press **Ctrl+C** to stop the **instance**, and close the browser window.

```

root@instance2:~# ping 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=2.53 ms
64 bytes from 192.168.233.2: icmp_seq=2 ttl=64 time=2.98 ms
64 bytes from 192.168.233.2: icmp_seq=3 ttl=64 time=1.61 ms
64 bytes from 192.168.233.2: icmp_seq=4 ttl=64 time=1.61 ms
64 bytes from 192.168.233.2: icmp_seq=5 ttl=64 time=1.25 ms
64 bytes from 192.168.233.2: icmp_seq=6 ttl=64 time=1.69 ms
64 bytes from 192.168.233.2: icmp_seq=7 ttl=64 time=1.96 ms
64 bytes from 192.168.233.2: icmp_seq=8 ttl=64 time=1.20 ms
64 bytes from 192.168.233.2: icmp_seq=9 ttl=64 time=10.3 ms
64 bytes from 192.168.233.2: icmp_seq=10 ttl=64 time=3.09 ms
64 bytes from 192.168.233.2: icmp_seq=11 ttl=64 time=1.23 ms
64 bytes from 192.168.233.2: icmp_seq=12 ttl=64 time=1.49 ms
64 bytes from 192.168.233.2: icmp_seq=13 ttl=64 time=1.93 ms
64 bytes from 192.168.233.2: icmp_seq=14 ttl=64 time=1.19 ms
64 bytes from 192.168.233.2: icmp_seq=15 ttl=64 time=1.58 ms
64 bytes from 192.168.233.2: icmp_seq=16 ttl=64 time=1.13 ms
64 bytes from 192.168.233.2: icmp_seq=17 ttl=64 time=1.18 ms

--- 192.168.233.2 ping statistics ---
^C17 packets transmitted, 17 received, 0% packet loss, time 16045ms
rtt min/avg/max/mdev = 1.127/2.231/10.292/2.100 ms
root@instance2:~# 

```

- 4.16.** Focus back on the terminal window and confirm that **instance2** is listed as **ACTIVE**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
+-----+-----+-----+-----+-----+
| ID      | Name    | Status | Networks | Image        | Flavor   |
+-----+-----+-----+-----+-----+
| 22ef1f5d- | instance2 | ACTIVE | shared=192.1 | instance2-snap | m1.small |
| 5e94-4707  |           |         | 68.233.30   | shot          |
| -983c-    |           |         |             |               |
| b788fb37e26c|           |         |             |               |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

4.17. Stop the instance.

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

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

4.18. Verify that the status of **instance2** is SHUTOFF.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
+-----+-----+-----+-----+-----+
| ID      | Name    | Status | Networks | Image        | Flavor   |
+-----+-----+-----+-----+-----+
| 22ef1f5d- | instance2 | SHUTOFF | shared=192.1 | instance2-sna | m1.small |
| 5e94-4707  |           |         | 68.233.30   | pshot         |
| -983c-    |           |         |             |               |
| b788fb37e26c|           |         |             |               |
+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

4.19. Power the instance back on.

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

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

4.20. Verify that the status of **instance2** is ACTIVE.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack server list \
> --max-width 80
+-----+-----+-----+-----+-----+-----+
| ID      | Name     | Status  | Networks   | Image        | Flavor    |
+-----+-----+-----+-----+-----+-----+
| 22ef1f5d-
| 5e94-4707
| -983c-
| b788fb37e26c |
+-----+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.21. The lab is now complete.