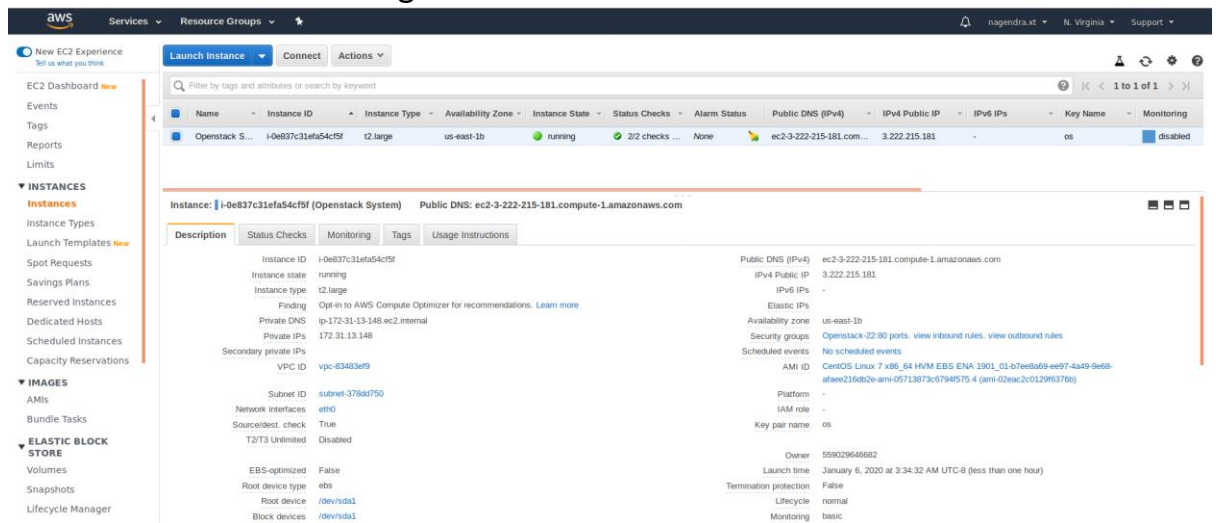


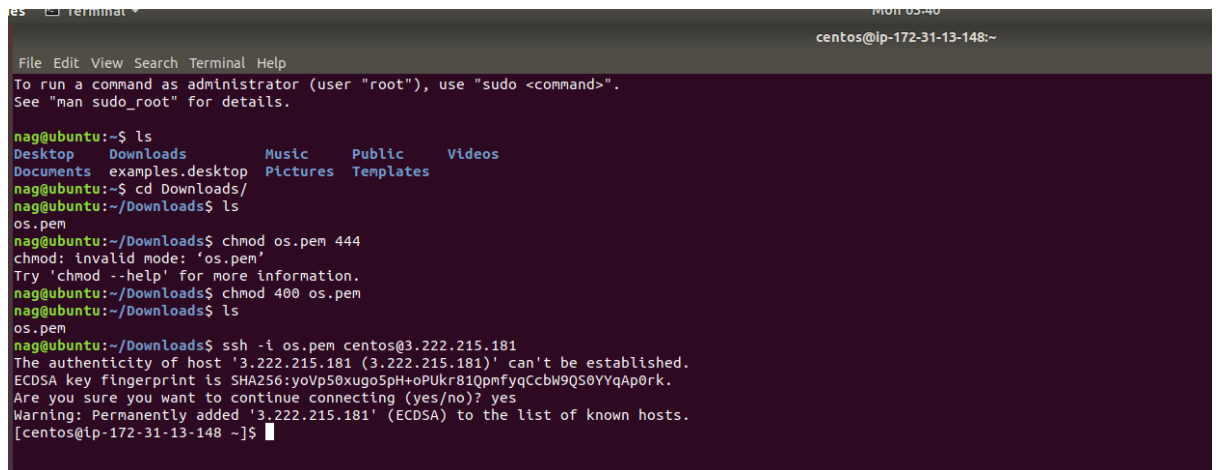
Creating an Open Stack Single Node Private Cloud Deployment on EC2 on AWS

1. Create EC2 instance t2.large with Centos 7



The screenshot shows the AWS Management Console interface. On the left, there is a navigation menu with options like 'EC2 Dashboard', 'Events', 'Tags', 'Reports', 'Limits', 'INSTANCES', 'IMAGES', and 'ELASTIC BLOCK STORE'. The main area displays the details of an EC2 instance named 'Openstack S...' with ID 'i-0e837c31efa54cf5f'. The instance is of type 't2.large' in the 'us-east-1b' availability zone, with a state of 'running'. It has a public DNS of 'ec2-3-222-215-181.compute-1.amazonaws.com' and a private DNS of 'ip-172-31-13-148.ec2.internal'. The instance is associated with a key pair named 'os'. The 'Description' tab is selected, showing various configuration details like 'Instance ID', 'Instance state', 'Instance type', 'Private DNS', 'Private IPs', 'Secondary private IPs', 'VPC ID', 'Subnet ID', 'Network interfaces', 'Source/dest. check', 'T2/T3 Unlimited', 'EBS-optimized', 'Root device type', 'Root device', 'Block devices', 'Public DNS (IPv4)', 'IPv4 Public IP', 'IPv6 IPs', 'Elastic IPs', 'Availability zone', 'Security groups', 'Scheduled events', 'AMI ID', 'Platform', 'IAM role', 'Key pair name', 'Owner', 'Launch time', 'Termination protection', 'Lifecycle', and 'Monitoring'.

2. SSH to EC2 instance



```
File Edit View Search Terminal Help
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

nag@ubuntu:~$ ls
Desktop  Downloads      Music    Public    Videos
Documents examples.desktop Pictures  Templates
nag@ubuntu:~$ cd Downloads/
nag@ubuntu:~/Downloads$ ls
os.pem
nag@ubuntu:~/Downloads$ chmod os.pem 444
chmod: invalid mode: 'os.pem'
Try 'chmod --help' for more information.
nag@ubuntu:~/Downloads$ chmod 400 os.pem
nag@ubuntu:~/Downloads$ ls
os.pem
nag@ubuntu:~/Downloads$ ssh -i os.pem centos@3.222.215.181
The authenticity of host '3.222.215.181 (3.222.215.181)' can't be established.
ECDSA key fingerprint is SHA256:yoVp50xugo5pH+oPUkr81QpmfyqCcbW9QS0YYqAp0rk.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '3.222.215.181' (ECDSA) to the list of known hosts.
[centos@ip-172-31-13-148 ~]$
```

3. Phase-1 Commands

```
nag@ubuntu:~/Downloads$ ssh -i os.pem centos@3.222.215.181
The authenticity of host '3.222.215.181 (3.222.215.181)' can't be established.
ECDSA key fingerprint is SHA256:yoVp50xugo5pH+oPUkr81QpmfyqCcbW9QS0YYqAp0rk.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '3.222.215.181' (ECDSA) to the list of known hosts.
[centos@ip-172-31-13-148 ~]$ sudo yum update -y
Loaded plugins: fastestmirror
Determining fastest mirrors
 * base: mirrors.advancedhosters.com
 * extras: mirrors.advancedhosters.com
 * updates: mirrors.advancedhosters.com

Complete!
[centos@ip-172-31-13-148 ~]$ sudo yum install -y centos-release-openstack-queens
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirrors.advancedhosters.com
 * extras: mirrors.advancedhosters.com
 * updates: mirrors.advancedhosters.com
Resolving Dependencies
--> Running transaction check
--> Package centos-release-openstack-queens.noarch 0:1-2.el7.centos will be installed
--> Processing Dependency: centos-release-qemu-ev for package: centos-release-openstack-queens-1-2.el7.centos.noarch

Installed:
  centos-release-openstack-queens.noarch 0:1-2.el7.centos

Dependency Installed:
  centos-release-ceph-luminous.noarch 0:1.1-2.el7.centos          centos-release-qemu-ev.noarch 0:1.0-4.el7.centos
  centos-release-virt-common.noarch 0:1-1.el7.centos

Complete!
[centos@ip-172-31-13-148 ~]$
[centos@ip-172-31-13-148 ~]$
[centos@ip-172-31-13-148 ~]$ sudo yum-config-manager --enable openstack-queens
Loaded plugins: fastestmirror
[centos@ip-172-31-13-148 ~]$
```

Restart the EC2 instance

4. Phase-2 commands

```
[centos@ip-172-31-13-148 ~]$ sudo yum update -y
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirrors.advancedhosters.com
 * centos-qemu-ev: mirrors.advancedhosters.com
 * extras: mirrors.advancedhosters.com
 * updates: mirrors.advancedhosters.com
No packages marked for update
[centos@ip-172-31-13-148 ~]$

[centos@ip-172-31-13-148 ~]$ sudo yum install -y openstack-packstack
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirrors.advancedhosters.com
 * centos-qemu-ev: mirrors.advancedhosters.com
 * extras: mirrors.advancedhosters.com
 * updates: mirrors.advancedhosters.com
Resolving Dependencies
--> Running transaction check
--> Package openstack-packstack.noarch 1:12.0.1-1.el7 will be installed
--> Processing Dependency: openstack-packstack-quest...
```

5. Phase 3 Commands

```
Complete!
[centos@ip-172-31-13-148 ~]$
[centos@ip-172-31-13-148 ~]$ sudo yum install nano
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
 * base: mirrors.advancedhosters.com
 * centos-qemu-ev: mirrors.advancedhosters.com
 * extras: mirrors.advancedhosters.com
 * updates: mirrors.advancedhosters.com
Resolving Dependencies
--> Running transaction check
---> Package nano.x86_64 0:2.3.1-10.el7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

File Edit View Search Terminal Help
GNU nano 2.3.1 File: /etc/environ

LANG=en_US.utf-8
LC_ALL=en_US.utf-8
```

6. Phase 4 Commands

```
centos@ip-172-31-13-148:~
File Edit View Search Terminal Help
[centos@ip-172-31-13-148 ~]$ sudo packstack --allinone
Welcome to the Packstack setup utility

The installation log file is available at: /var/tmp/packstack/20200106-125900-qFhLMG/openstack-setup.log
Packstack changed given value to required value /root/.ssh/id_rsa.pub

Installing:
Clean Up [ DONE ]
Discovering ip protocol version [ DONE ]
```

7. Backend Execution

```
centos@ip-172-31-13-148:~
File Edit View Search Terminal Help
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

nag@ubuntu:~/Downloads$ ssh -i os.pem centos@3.222.215.181
Last login: Mon Jan 6 12:39:43 2020 from 122.171.166.166
[centos@ip-172-31-13-148 ~]$ sudo tail -f /var/log/messages
```

```
File Edit View Search Terminal Help
centos@ip-172-31-13-148:~
Checking if the cinder server has a cinder-volumes vg [ DONE ]
Preparing cinder entries [ DONE ]
Preparing Nova API entries [ DONE ]
Creating ssh keys for Nova migration [ DONE ]
Gathering ssh host keys for Nova migration [ DONE ]
Preparing Nova Compute entries [ DONE ]
Preparing Nova Scheduler entries [ DONE ]
Preparing Nova VNC Proxy entries [ DONE ]
Preparing OpenStack Network-related Nova entries [ DONE ]
Preparing Nova Common entries [ DONE ]
Preparing Neutron LBaaS Agent entries [ DONE ]
Preparing Neutron API entries [ DONE ]
Preparing Neutron L3 entries [ DONE ]
Preparing Neutron L2 Agent entries [ DONE ]
Preparing Neutron DHCP Agent entries [ DONE ]
Preparing Neutron Metering Agent entries [ DONE ]
Checking if NetworkManager is enabled and running [ DONE ]
Preparing OpenStack Client entries [ DONE ]
Preparing Horizon entries [ DONE ]
Preparing Swift builder entries [ DONE ]
Preparing Swift proxy entries [ DONE ]
Preparing Swift storage entries [ DONE ]
Preparing Gnocchi entries [ DONE ]
Preparing Redis entries [ DONE ]
Preparing Cellometer entries [ DONE ]
Preparing Aodh entries [ DONE ]
Preparing Puppet manifests [ DONE ]
Copying Puppet modules and manifests [ DONE ]
Applying 172.31.13.148_controller.pp [ DONE ]
172.31.13.148_controller.pp: [ DONE ]
Applying 172.31.13.148_network.pp [ DONE ]
172.31.13.148_network.pp: [ DONE ]
Applying 172.31.13.148_compute.pp [ DONE ]
172.31.13.148_compute.pp: [ DONE ]
Applying Puppet manifests [ DONE ]
Finalizing [ DONE ]

**** Installation completed successfully ****

Additional information:
* A new answerfile was created in: /root/packstack-answers-20200106-125900.txt
* Time synchronization installation was skipped. Please note that unsynchronized time on server instances might be problem for some OpenStack components.
* File /root/keystonerc_admin has been created on OpenStack client host 172.31.13.148. To use the command line tools you need to source the file.
* To access the OpenStack Dashboard browse to http://172.31.13.148/dashboard .
Please, find your login credentials stored in the keystonerc_admin in your home directory.
* The installation log file is available at: /var/tmp/packstack/20200106-125900-qFhLMG/openstack-setup.log
* The generated manifests are available at: /var/tmp/packstack/20200106-125900-qFhLMG/manifests
[centos@ip-172-31-13-148 ~]$
```

8. Phase 5 commands

```
Please, find your login credentials stored in the keystonerc_admin in your home directory.
* The installation log file is available at: /var/tmp/packstack/20200106-125900-qFhLMG/openstack-setup.log
* The generated manifests are available at: /var/tmp/packstack/20200106-125900-qFhLMG/manifests
[centos@ip-172-31-13-148 ~]$ cd /etc/httpd/conf.d
[centos@ip-172-31-13-148 conf.d]$ sudo nano 15-horizon_vhost.conf and replace the IP address
[centos@ip-172-31-13-148 conf.d]$ ^C
[centos@ip-172-31-13-148 conf.d]$ ^C
[centos@ip-172-31-13-148 conf.d]$ ^C
[centos@ip-172-31-13-148 conf.d]$ ^C
[centos@ip-172-31-13-148 conf.d]$ ^C
[centos@ip-172-31-13-148 conf.d]$ ^C
[centos@ip-172-31-13-148 conf.d]$ sudo nano 15-horizon_vhost.conf
```

```
centos@ip-172-31-13-148:/etc/httpd/conf.d
File Edit View Search Terminal Help
GNU nano 2.3.1 File: 15-horizon_vhost.conf

# *****
# Vhost template in module puppetlabs-apache
# Managed by Puppet
# *****

<VirtualHost *:80>
    ServerName ip-172-31-13-148.ec2.internal

    ## Vhost docroot
    DocumentRoot "/var/www/"
    ## Alias declarations for resources outside the DocumentRoot
    Alias /dashboard/static "/usr/share/openstack-dashboard/static"

    ## Directories, there should at least be a declaration for /var/www/

    <Directory "/var/www/">
        Options Indexes FollowSymLinks MultiViews
        AllowOverride None
        Require all granted
    </Directory>

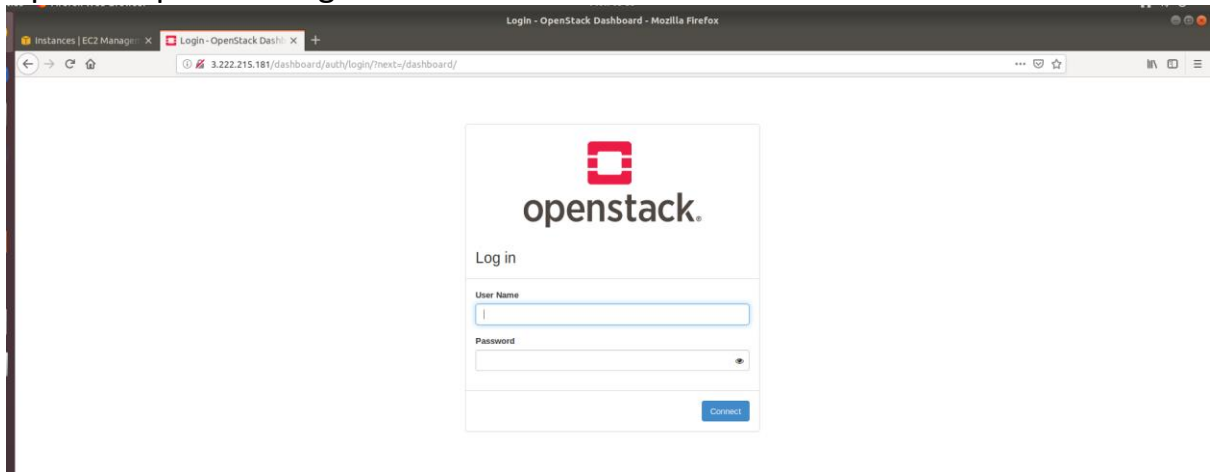
    ## Logging
    ErrorLog "/var/log/httpd/horizon_error.log"
    ServerSignature Off
    CustomLog "/var/log/httpd/horizon_access.log" combined

    ## RedirectMatch rules
    RedirectMatch permanent ^/$ /dashboard

    ## Server aliases
    ServerAlias 3.222.215.181
    ServerAlias ip-172-31-13-148.ec2.internal
    ServerAlias localhost
    WSGIApplicationGroup %{GLOBAL}
    WSGIDaemonProcess apache display-name=horizon group=apache processes=3 threads=10 user=apache
    WSGIProcessGroup apache
    WSGIScriptAlias /dashboard "/usr/share/openstack-dashboard/openstack_dashboard/wsgi/django.wsgi"
</VirtualHost>
```

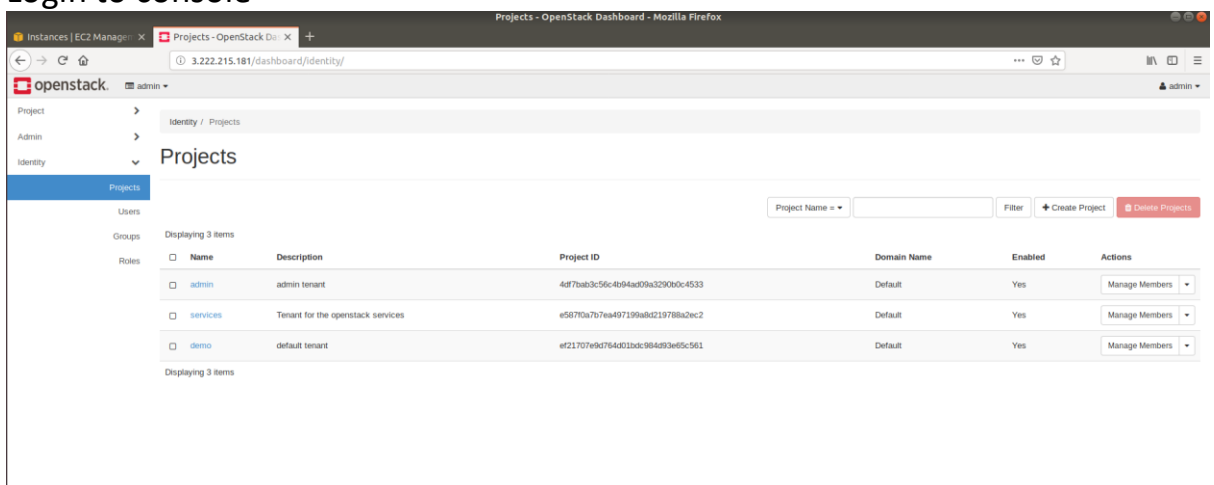
```
File Edit View Search Terminal Help
centos@ip-172-31-13-148:/etc/httpd/conf.d$ sudo systemctl stop httpd
[centos@ip-172-31-13-148 conf.d]$ sudo systemctl start httpd
[centos@ip-172-31-13-148 conf.d]$
```

Open the public using browser



9. Phase 6

Login to console



10. Observations

- OpenStack certainly lacks some of the pre-installed AWS applications and setups such as the excellent security module.
- Besides AWS services available globally which attracts start-ups
- Both the platforms offer similar services and it boils down to the usability and integration factor of the application with your organizational needs. OpenStack, on one hand, offers better resiliency and increased corporate profitability with its open frame network; AWS appeal to start-ups and small IT firms due to its many offerings and flexible customer support.

11. Creating cirros instance

Creating SSH port under security group

openstack

admin

Project

API Access

Compute

Volumes

Network

Network Topology

Networks

Routers

Security Groups

Floating IPs

Trunks

Object Store

Admin

Identity

Project / Network / Security Groups / Manage Security Group Rule...

Manage Security Group Rules: default (0ba390b4-fdd6-42fe-aaeb-c9110ab1fe87)

+ Add Rule

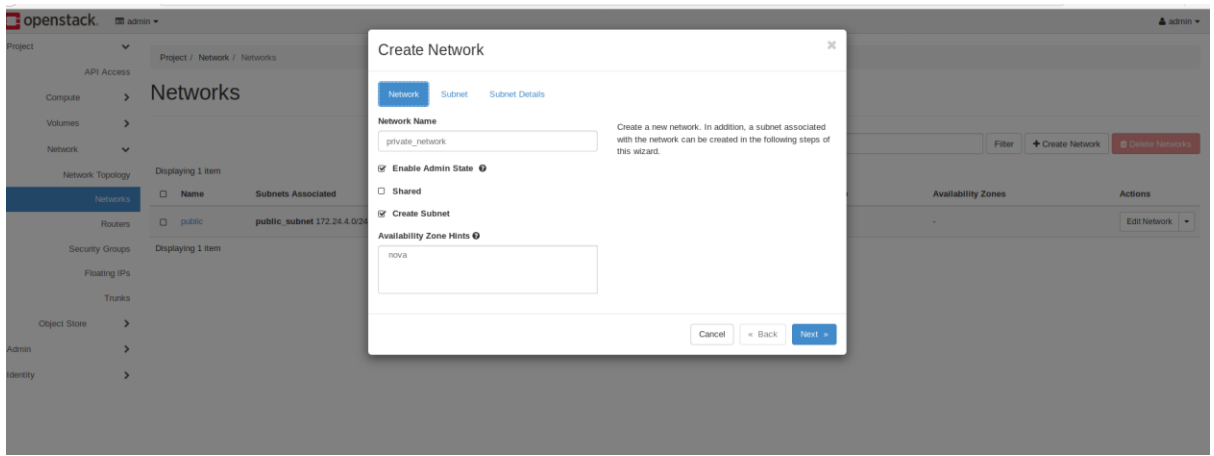
Delete Rules

Displaying 6 items

<input type="checkbox"/>	Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix	Remote Security Group	Actions
<input type="checkbox"/>	Egress	IPv4	Any	Any	0.0.0.0/0	-	<div>Delete Rule</div>
<input type="checkbox"/>	Egress	IPv6	Any	Any	:::0	-	<div>Delete Rule</div>
<input type="checkbox"/>	Ingress	IPv4	Any	Any	-	default	<div>Delete Rule</div>
<input type="checkbox"/>	Ingress	IPv4	ICMP	Any	0.0.0.0/0	-	<div>Delete Rule</div>
<input type="checkbox"/>	Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0	-	<div>Delete Rule</div>
<input type="checkbox"/>	Ingress	IPv6	Any	Any	-	default	<div>Delete Rule</div>

Displaying 6 items

Creating Network



Create Network

Network

Subnet

Subnet Details

Subnet Name

private_subnet

Network Address ?

10.0.0.0/24

IP Version

IPv4

Gateway IP ?

☐ **Disable Gateway**

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

Cancel

« Back

Next »

Project / Network / Networks

Networks

Name =

Filter

+ Create Network

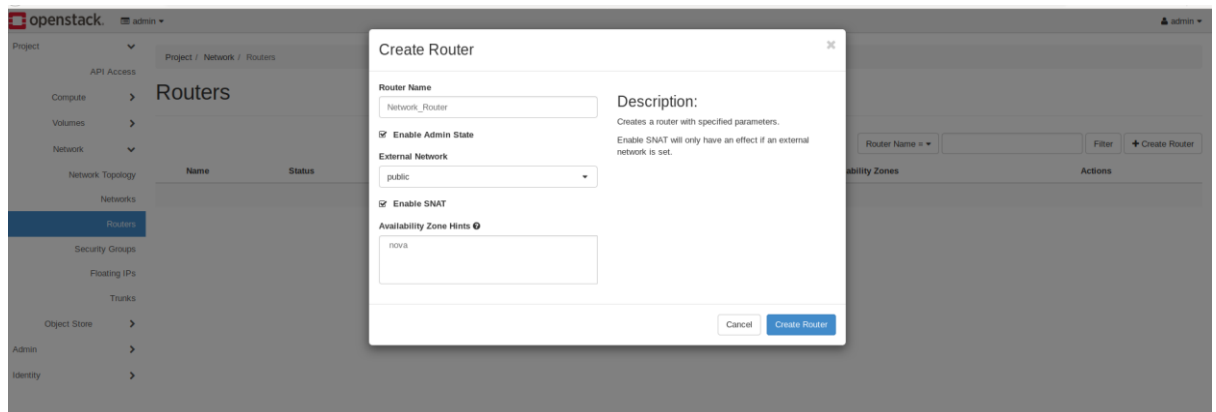
Delete Networks

Displaying 2 Items

<input type="checkbox"/>	Name	Subnets Associated	Shared	External	Status	Admin State	Availability Zones	Actions
<input type="checkbox"/>	private_network	private_subnet 10.0.0.0/24	No	No	Active	UP	nova	Edit Network
<input type="checkbox"/>	public	public_subnet 172.24.4.0/24	No	Yes	Active	UP	-	Edit Network

Displaying 2 Items

Creating Router



The screenshot shows the OpenStack dashboard with the 'Routers' page selected. A 'Create Router' dialog box is open, displaying the following fields and options:

- Router Name:** A text input field containing 'Network_Router'.
- Description:** A text area with the text: 'Creates a router with specified parameters. Enable SNAT will only have an effect if an external network is set.'
- Enable Admin State:** A checkbox that is checked.
- External Network:** A dropdown menu showing 'public'.
- Enable SNAT:** A checkbox that is checked.
- Availability Zone Hints:** A text input field containing 'nova'.

At the bottom of the dialog, there are 'Cancel' and 'Create Router' buttons.

Add interface

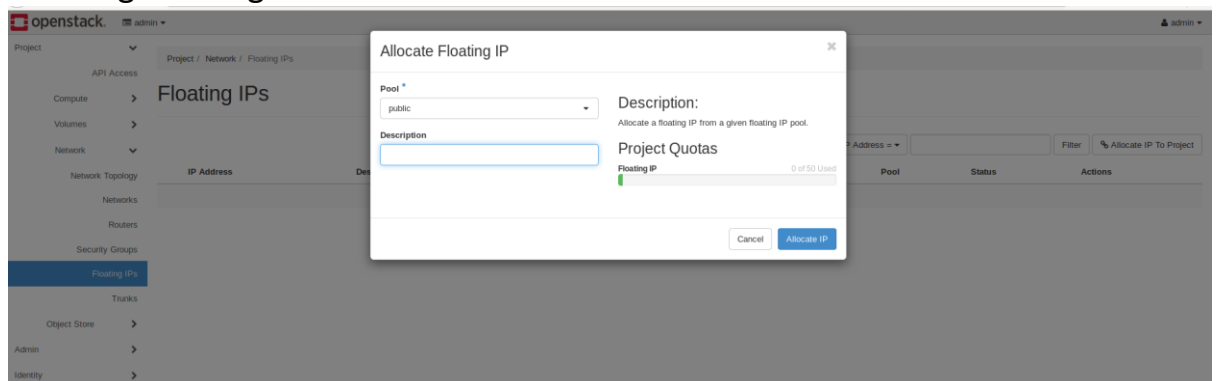


The screenshot shows the 'Add Interface' dialog box with the following fields and options:

- Subnet:** A dropdown menu showing 'private_network: 10.0.0.0/24 (private_subnet)'.
- IP Address (optional):** A text input field.
- Description:** A text area with the text: 'You can connect a specified subnet to the router. If you don't specify an IP address here, the gateway's IP address of the selected subnet will be used as the IP address of the newly created interface of the router. If the gateway's IP address is in use, you must use a different address which belongs to the selected subnet.'

At the bottom right, there are 'Cancel' and 'Submit' buttons.

Creating Floating IP



The screenshot shows the 'Allocate Floating IP' dialog box with the following fields and options:

- Pool:** A dropdown menu showing 'public'.
- Description:** A text input field.
- Description:** A text area with the text: 'Allocate a floating IP from a given floating IP pool.'
- Project Quotas:** A section showing 'Floating IP' with a progress bar indicating '0 of 50 Used'.

At the bottom right, there are 'Cancel' and 'Allocate IP' buttons.

Project

API Access

Compute

Volumes

Network

Network Topology

Networks

Security Groups

Floating IPs

Trunks

Object Store

Admin

Identity

Project / Network / Routers / Network_Router

Network_Router

Overview Interfaces Static Routes

+ Add Interface

Delete Interfaces

Displaying 2 items

Name	Fixed IPs	Status	Type	Admin State	Actions
(30660851-c763)	• 10.0.0.1	Active	Internal Interface	UP	Delete Interface
(c04b08c-614f)	• 172.24.4.13	Active	External Gateway	UP	Delete Interface

Displaying 2 items

Create an Instance with below options

openstack

admin

Project / Compute / Instances

Instances

Overview

Images

Key Pairs

Volumes

Network

Object Store

Admin

Identity

Launch Instance

Details

Source

Flavor

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

Instance Name *

Appliance

Description

Availability Zone

nova

Count *

1

Total Instances (20 Max)

10%

0 Current Usage

1 Added

9 Remaining

Cancel

Back

Next

Launch Instance

Launch Instance

Details

Source

Flavor

Networks

Network Ports

Security Groups

Key Pair

Configuration

Server Groups

Scheduler Hints

Metadata

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.

Select Boot Source

Image

Create New Volume

Yes No

Volume Size (GB) *

1

Delete Volume on Instance Delete

Yes No

Allocated

Name	Updated	Size	Type	Visibility	
> cirros	1/6/20 5:09 AM	12.65 MB	qcow2	Public	Download

Available 0

Select one

Click here for filters.

Name	Updated	Size	Type	Visibility
No available items				

Cancel

Back

Next

Launch Instance

Launch Instance

[Details](#)[Source](#)[Flavor](#)[Networks *](#)[Network Ports](#)[Security Groups](#)[Key Pair](#)[Configuration](#)[Server Groups](#)[Scheduler Hints](#)[Metadata](#)

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



Allocated

Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public	
> m1.tiny	1	512 MB	1 GB	1 GB	0 GB	Yes	↓

▼ Available 4

Select one

Q	Click here for filters.						×
Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public	
> m1.small	1	2 GB	20 GB	20 GB	0 GB	Yes	↑
> m1.medium	2	4 GB	40 GB	40 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	↑

[✕ Cancel](#)[◀ Back](#)[Next >](#)[Launch Instance](#)

Launch Instance

[Details](#)[Source](#)[Flavor](#)[Networks](#)[Network Ports](#)[Security Groups](#)[Key Pair](#)[Configuration](#)[Server Groups](#)[Scheduler Hints](#)[Metadata](#)

A key pair allows you to SSH into your newly created instance. You may select an existing key pair, import a key pair, or generate a new key pair.

[+ Create Key Pair](#)[Import Key Pair](#)

Allocated

Displaying 0 items

Name	Fingerprint
Select a key pair from the available key pairs below.	

Displaying 0 items

▼ Available 0

Select one

Q	Click here for filters.						×
---	-------------------------	--	--	--	--	--	---

Displaying 0 items

Name	Fingerprint
No items to display.	

Displaying 0 items

[✕ Cancel](#)[◀ Back](#)[Next >](#)[Launch Instance](#)

Create Key Pair



Key Pairs are how you login to your instance after it is launched. Choose a key pair name you will recognize. Names may only include alphanumeric characters, spaces, or dashes.

Key Pair Name *

Create Keypair

Copy Private Key to Clipboard

Done

Select a key pair from the available key pairs below

Create Key Pair



Key Pairs are how you login to your instance after it is launched. Choose a key pair name you will recognize. Names may only include alphanumeric characters, spaces, or dashes.

Key Pair Name *

Private Key

```
-----BEGIN RSA PRIVATE KEY-----
MIIEowIBAAKCAQEAxS8GNCNJ/2Cv73VNNN5vf4fA/aR6sLyUkBE5ov9/beOdC0k7
FuniG2LfXOsTFre1w9PrTStpzVo4IB+kq3GZY2OR7qEB+HpacyEDmRpODXu+BQP
cpxbzOzeKQWj8MFkb1Bey4sniXEA1T2/CNhn2nUaGnXNFG60Ps8c+MY8a6Hg9YF
v1ev7A2w4gN0zGRQonDwQEF7O/GV7hBuBJU8YnGwnGRWXuLsaMi5PoFIUikz0kj8
NYQI7g4+wMsR2EARH6X3w2Cg8Hxoq01pFhJDi/1d27Q3dSEFvNMiFQLDxLi40+6t
LbW3imoZtU2pp9UOnkEA5Z/8j03xQFvt3D71TwIDAQABAoIBAFIG7BqwthZR8efk
mYiXxnF3Q/mDHu6J17Zj+4q74wccpc2jkB0n0WFngneuOyRAA7rHyHoUHXgMTJYR
fte7rxgj6INXLw6Yg+80KUZW6VT59S/cboSdoy/VCqGVGD/o1fYXrhHsaJesWqa
+7xs51HaG4L0uJDfieuPH9DtEQPLpiJVgn2VNe7bbQW9VklxJeP0H/71SeSn37bEc
vWAFRU1rrYqfKc/a36GwkXnhjU2XCHuAXhLA4Lda4eBmyw2bzSjGPEesYIsRYG4i
OKkTWrZdaqjrdmVb3tgNsc0Gk+MbugLuFFJMtS1vR8OpmDoxtwU85o0XqVyEo7w8
yLu0tbECgYEA7Cqx17LRPhy0YLN2YPCTYFpjfG5qb0v5MaWTSa76JciWU9oLQoab
4m/CrckImrWuhSzx8urZqr/GV47f7YD4z4qbm65NhaDKRWEMtuagp/9NM7vb9abN
AsDBJaPEYhKPMzsLK9okhBx66FJBUR2C6EUYNRIQ3QriPknryXWAKBcCgYEA1b49
S1dMF1dltRGh0z/JJ7voKAu91d6B/I8WdXI GOR9iJnJwR7Xuw5e5Mmvn+hhGSTn9
```

Create Keypair

Copy Private Key to Clipboard

Done

Instance Launched

The screenshot shows the OpenStack dashboard interface. The left sidebar contains navigation links for Project, API Access, Compute, Overview, Instances (selected), Images, Key Pairs, Volumes, Network, Object Store, Admin, and Identity. The main content area displays the 'Instances' page. At the top, there's a breadcrumb 'Project / Compute / Instances' and a title 'Instances'. Below this, there's a table with columns: Instance Name, Image Name, IP Address, Flavor, Key Pair, Status, Availability Zone, Task, Power State, Time since created, and Actions. One instance is listed: 'AppInstance' with image '-', IP '10.0.0.4', flavor 'm1.tiny', key pair 'oskp', status 'Active', availability zone 'nova', task 'None', power state 'Running', and time '0 minutes'. An action button 'Create Snapshot' is visible for this instance.

Allocate Floating IP

The screenshot shows the OpenStack dashboard with a modal dialog box titled 'Manage Floating IP Associations'. The dialog has two sections. The first section, 'IP Address', has a dropdown menu labeled 'Select an IP address' and a plus icon. The second section, 'Port to be associated', has a dropdown menu showing 'AppInstance: 10.0.0.4'. Below these sections are 'Cancel' and 'Associate' buttons. The background shows the same 'Instances' page as the previous screenshot, but it is dimmed.

The screenshot shows the OpenStack dashboard with the 'Instances' page. The instance 'AppInstance' is now shown with a floating IP address of 10.0.0.4. The 'Time since created' is now '3 minutes'. The 'Actions' column still shows the 'Create Snapshot' button.

Ping the Floating IP from EC2 instance

```
centos@ip-172-31-13-148:~  
File Edit View Search Terminal Help  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
nag@ubuntu:~/Downloads$ ssh -t os.pem centos@3.222.215.181  
Last login: Mon Jan  6 13:00:13 2020 from 122.171.166.166  
[centos@ip-172-31-13-148 ~]$ ping 172.24.4.7  
PING 172.24.4.7 (172.24.4.7) 56(84) bytes of data:  
64 bytes from 172.24.4.7: icmp_seq=1 ttl=63 time=5.05 ms  
64 bytes from 172.24.4.7: icmp_seq=2 ttl=63 time=0.687 ms  
64 bytes from 172.24.4.7: icmp_seq=3 ttl=63 time=0.868 ms  
64 bytes from 172.24.4.7: icmp_seq=4 ttl=63 time=0.507 ms  
64 bytes from 172.24.4.7: icmp_seq=5 ttl=63 time=0.526 ms  
64 bytes from 172.24.4.7: icmp_seq=6 ttl=63 time=0.552 ms  
64 bytes from 172.24.4.7: icmp_seq=7 ttl=63 time=0.566 ms  
64 bytes from 172.24.4.7: icmp_seq=8 ttl=63 time=0.496 ms  
64 bytes from 172.24.4.7: icmp_seq=9 ttl=63 time=0.551 ms  
64 bytes from 172.24.4.7: icmp_seq=10 ttl=63 time=0.591 ms  
64 bytes from 172.24.4.7: icmp_seq=11 ttl=63 time=0.556 ms  
^C
```

Creating pem file using Key pair downloaded

```
centos@ip-172-31-13-148:~  
File Edit View Search Terminal Help  
-----BEGIN RSA PRIVATE KEY-----  
MIIEowIBAAKCAQEAS8GNCNJ/2Cv73VNNN5vf4fA/aR6sLyUkBE5ov9/beOdC0k7  
FunIG2LFX0sTFre1w9PrTSTtpzVo4IB+kq3GZY2OR7qEB+HpacyEDmRp0DXu+BQP  
cpxbz0ZeKQWj8MFkb1Bey4sniXEA1T2/CNhn2nUaGnXNFG60Ps8c+MY8a6Hg9YF  
y1ev7A2w4gN0ZGRQonDwQEF70/GV7h8uBJU8YnGwncRWXLSaMi5PoFIUIkz0kj8  
NYQL7g4+wMsR2EARH6X3w2Cg8Hxoq01pFhJD1/1d27Q3dSEFvNMlFQLDxL140+6t  
LbW3ImoZtU2pp9UonKEASZ/8j03xQFvt3D71TwIDAQABAoIBAFL7BqwthZR8efk  
hYiXxnF3Q/mDHu6J17Zj+4q74wccpc2jkb0n0WFnqneuOyRAA7rHyHoUHXgMTJYR  
fte7rxgj6LNXLw6Yg+80KUZW6VT59S/cboSdoy/VCqGVGD/o1fYXrhHsaJesWqa  
+7xs51HaG4L0uJDIEuPH9DtEQPLpiJvgn2VNe7bbQW9VklxJeP0H/71SeSn37bEc  
vMAFRU1rrYqfKc/a36GwkXnhjU2XCHuAXhLA4Lda4eBmyw2bzSJGPEesYlsRYG4i  
DKkTWrZdaqjrdmVb3tgNSc0Gk+MbugLuFFJMtS1vR80pmDoxtwU85o0XqVyEo7w8  
yLu0tBEcgYEA7Cqx17LRPHY0YLN2YPCTYFpjfg5qb0v5MaWTSa76JciWU9oLQoab  
4m/CrcklmrWuhSzx8urZqr/GV47f7YD4z4qbm65NhaDKRWEMtuagp/9NM7vb9abN  
AsDBJaPEYhKPMzSLK9okhBx66FJBUR2C6EUYNRLQ3QriPknryXWAKBcGcYEA1b49  
S1dME1dITRGb0z/JJzyoKAu91d6B/L8WdXLG089iJnJwR7Xuw5e5Mmyo+bbGSTq9  
iqHLlrcelmwbsUZ85dz30ncyY2YTLT9EDmymIGV4rQDRA1HCDX6S2cVXPXI0FA62  
s9vv4e5b+FU756NthizlyBwPEIj1UHLVKDHTj4kCgYEA1YaMoQ8nKuA9XikkyOVi  
+nz+8iQKy3IPbpnbng0ckkjX0hyUja0TEZomLGYPHP+gAUJygbRd1kfIubD/bqqsv  
ssZxhsKdIMwL1bC3hC7Lfr+3L4zEHuG4L8KbX2LATk0LgZZitVVYKrJtVdv4/8wk  
rci66FdpS1Fp2R0QwechRCUCGYBbbIPLNgvU0gFfca1MxNXNRq4Bk2srP/tTb7N  
fcpMyuewikJ8adU21C7i4pdK0EmYQCqgRgp07QShepxdt0i1CU73NwTWf1K0h9sU  
JGS+dglnVzIPS+rq2rj1bPNj10Uwrxp21BEoEkxEbDCzY7P1MD8Y20eYqvxC7Nts  
Je0sAQKBgDbqRnC+1rdkfhrqqgjFtCUnLkEN51k8iZjw0JE+ANx32hcbbIOXqHLW  
D30jBksD4GbXNsQFuo/hitN1N86rQ23Z6LPBRYQssH00EL8TrmpT3ASTRCyWccb  
BW5xCISFSXt6VQ7S1a4dm1UhFZiJHLQPgpzdLHftSls+6A6jnyvf  
-----END RSA PRIVATE KEY-----  
  
ospk.pem" 27L, 1666C
```

```
centos@ip-172-31-13-148:~  
File Edit View Search Terminal Help  
[centos@ip-172-31-13-148 ~]$ vi ospk.pem  
[centos@ip-172-31-13-148 ~]$ vi ospk.pem  
[centos@ip-172-31-13-148 ~]$ chmod 400 ospk.pem  
[centos@ip-172-31-13-148 ~]$
```

SSH to the Cirros instance

```
[centos@ip-172-31-13-148 ~]$ vi ospk.pem
[centos@ip-172-31-13-148 ~]$ vi ospk.pem
[centos@ip-172-31-13-148 ~]$ chmod 400 ospk.pem
[centos@ip-172-31-13-148 ~]$ ssh -i ospk.pem cirros@172.24.4.7
The authenticity of host '172.24.4.7 (172.24.4.7)' can't be established.
RSA key fingerprint is SHA256:WeKprTDDrc2QjR6y54eDrL642mcTiIEpk0FKM6iUDXo.
RSA key fingerprint is MD5:d9:b4:88:17:24:91:19:73:19:03:61:5e:9f:0d:7a:1b.
Are you sure you want to continue connecting (yes/no)? yes
```