OpenStack Lab Guide

Version 2.06d- Ubuntu – December 2014

OneCloud Consulting OpenStack Lab Guide

ATTENTION

The information contained in this guide is for training purposes only. This guide contains information and activities that, while beneficial for purposes of training in close, non-production environment, can result in downtime or other severe consequences and therefore are not intended as a reference guide.

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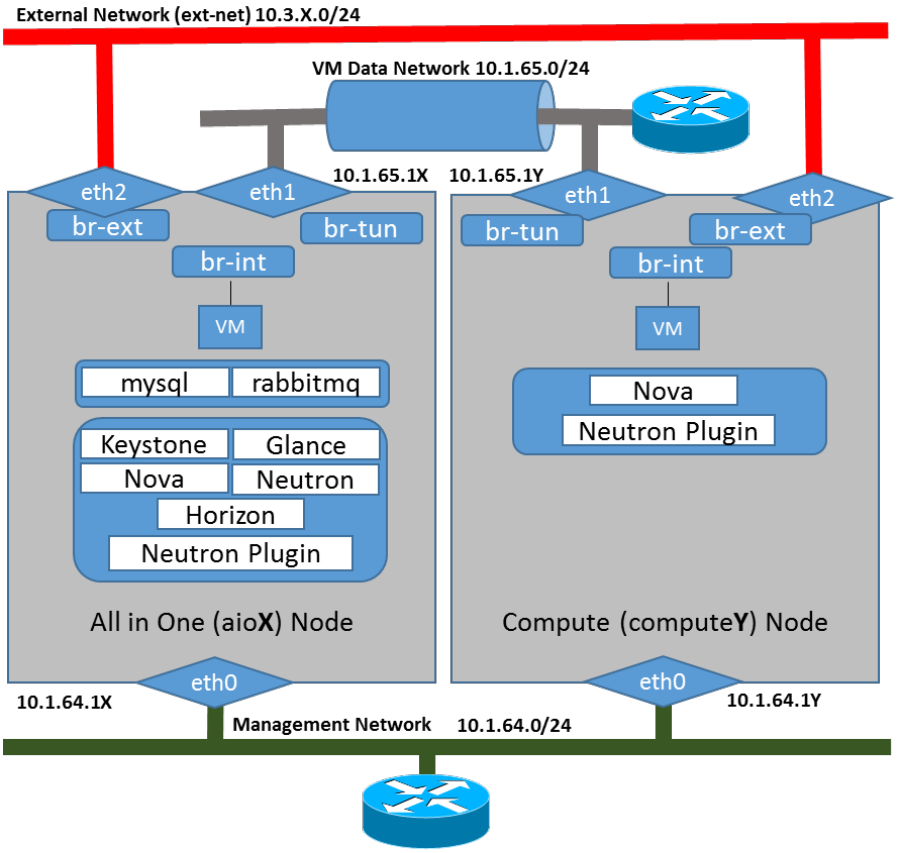
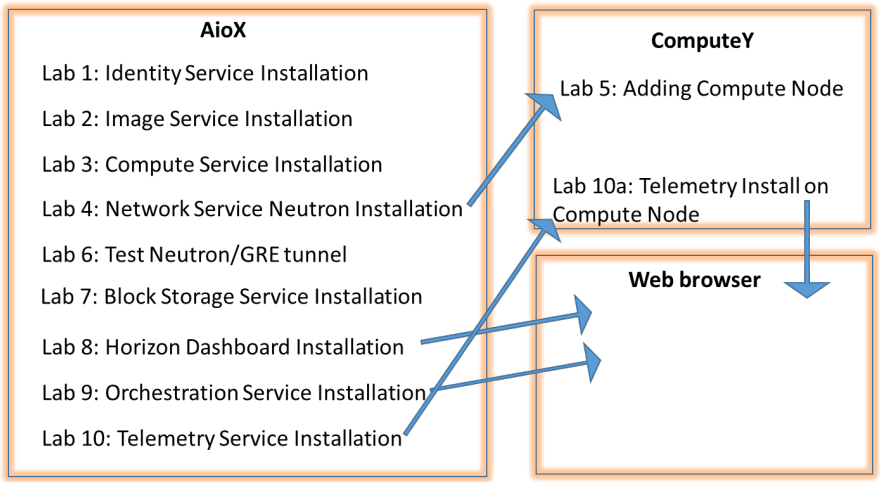
OpenStack Lab Overview

Lab Topology



OpenStack Labs – Flow



Lab Access

Download lab credentials in an Excel spreadsheet from the Github site provided in the lecture manual. Next, VNC to the POD machines with **VNC** credentials.

You will have an AIOX node and ComputeY node installed with Centos. Initially we will connect to aioX. From **within the virtual desktop** you just connected to, use the local terminal program to SSH to the Centos aioX machine using the provided aio credentials.

aioX Node

eth0 IP Address: 10.1.64.X

Username: localadmin

Password: ubuntu

In lab 5, we will be accessing our ComputY node in a similar way:

computeY Node

eth0 IP Address: 10.1.64.Y

Username: localadmin

Password: ubuntu

Once you are logged in as 'localadmin,' you are ready to start with Lab1.

How to debug issues in OpenStack

Part of the learning process- and the reality of working with OpenStack- is that problems do arise that require troubleshooting. Here we provide strategy and guidance about how to figure out where the problem may lie.

NOTE: In guidance below, replace {service} with the name of the service of interest to you.

screen: screen is a useful tool as it allows you to have multiple "views" in a single terminal window, and lets you switch between them with a keystroke rather than opening multiple windows and point/clicking between them. in addition, screen can log the output of a terminal session to disk, making it useful for capturing the output of failures for later review.

Start screen and log the output:
screen -L

Once started, you can create a new screen with:
<ctrl>-a c
Which is hold the control key, and press a, release the control and a, and the press c

Move between the screens with
<ctrl>-a <space>

Screen does live within a single "view" of the terminal, so to look at the scrollback buffer, you have to
<ctrl>-a <esc>
And then use the arrow keys on your keyboard to scroll up (<ctrl>-b scrolls back a page, <ctrl>-f scrolls forward)

Get help for screen (many more capabilities):
<ctrl>-a ?

log files: There are numerous log files per service, and often the error will be exposed in the log file output. Each project will have a log directory in /var/log/{service}. Since services have different components that operate in similar but not always equivalent fashion, it's best to use screen to open a session per log file so you can watch the entire set of possible outputs to find the system that isn't responding appropriately. You can follow the logs with the "tail" command such as:

```
tail -f /var/log/{service}/{service}-api.log
```

When you are done following the file, you can exit out with:

```
<ctrl>-c
```

· Logging may be low level, look at .conf file (/etc/{service}/*conf), turn on Verbose and Debug options. (e.g. etc/glance/glance.conf)
· Restart services if changing logging levels

Now that we know how to watch the logs and can see what's going on, we can try to spot the errors both in the .conf file (just by reviewing the actual lines typed in. Do you understand them?):

Usual issues are that AMQP isn't connected and eventually quits trying to connect (usually in the API log). The same is true for mysql mis-configurations. If an error is found it's best to restart all of the services in that project group (e.g. all the nova processes) in case there's a non-obvious interaction with Rabbit or Mysql buried in the application components themselves.

You can check through the following configurations in /etc/{service}/{service}.conf
the keystone API URI/URL components and port.
the hostname provided for all the different services
check target URI/URL components in .conf file
validate endpoint in keystone. You can do this via the {service} cli tool, for example:

```
glance --debug image-list
```

Should spit out something like:

```
$ glance --debug image-list
curl -i -X GET -H 'Accept-Encoding: gzip, deflate' -H 'Accept: */*'
-H 'User-Agent: python-glanceclient' -H 'Connection: keep-alive' -H
'X-Auth-Token: {SHA1}73459d07b6cf38f67503dc2ec9090c48c479c8b7' -H
'Content-Type: application/octet-stream' http://c240-
1.onecloud:9292/v1/images/detail?sort_key=name&sort_dir=asc&limit=2
0
```

REST Commands

The cli with --debug also spits out the correctly focused ReST calls (with curl as the application already even) that you can generally pasted into your console to see what's happening.

Rapidly restarting services
If you need to restart all of the nova or neutron services, you can do so quickly on Ubuntu as follows:

```
for name in `(cd /etc/init; ls *{service}' | cut -d. -f1)`; do
service ${name} restart; done
```

Lab 1: Identity Service Installation

Objective:

- Install prerequisites for OpenStack installation in AIO node
  - ntp
  - mysql
  - OpenStack packages
  - Messaging queue server - RabbitMQ Server
- Configuration and verification of Identity Service Keystone

Basic Configuration

Check the Network settings of AIO node

SSH to AIO node with the credentials in Lab access section (above)
Step 1:

Enter the following command and type **ubuntu** as the [sudo] password

```
sudo su -
```

```
vi /etc/network/interfaces
```

Enter the network details for aioX node as shown below. Only eth0 should have a gateway/dns configuration

eth0 10.1.64.1**X**

eth1 10.1.**65**.1**X**

The file should look something like:

```
auto eth0
iface eth0 inet static
        address 10.1.64.1X
        netmask 255.255.255.0
        network 10.1.64.0
        broadcast 10.1.64.255
        gateway 10.1.64.1
        # dns-* options are implemented by the resolvconf package, if installed
        dns-nameservers 10.1.1.92
        dns-search onecloud
auto eth1
```

```
iface eth1 inet static
   address 10.1.65.1X
   netmask 255.255.255.0
auto eth2
iface eth2  inet manual
      up ip link set dev $IFACE up
      down ip link set dev $IFACE down
```

Note: vi Editor

Press key "**i**" for insert in vi editor

<esc> to get out of edit mode

:wq to save the file.

:q! to exit without saving

Step 2:

Check the hosts file configuration

```
vi /etc/hosts
```

Enter the IP address and host names of aio node and compute01 node. (**X** - Student POD Number)

10.1.64.1**X**	aio**X**.onecloud	aio**X**
10.1.64.1**Y**	compute**Y**.onecloud	compute**Y**
10.1.64.1	gw.onecloud	gw

Openstack Packages

Step 3:

This section describes the configuration you must complete after you configure machine to install the OpenStack Icehouse packages.

```
apt-get install python-software-properties -y

apt-get update && apt-get dist-upgrade -y
```

Step 4:

Type following command to restart network interfaces

```
ifdown eth1; ifup eth1; ifdown eth2; ifup eth2
```

```
ifdown: interface eth1 not configured

ifdown: interface eth2 not configured
```

Note: it is ok if the system complains about interfaces not being configured in the previous step

Prerequisites for OpenStack

NTP Server

Step 5:

To synchronize services across OpenStack nodes (compute, controller and network).

```
ntpdate gw.onecloud

24 Aug 22:17:36 ntpdate[1163]: adjust time server 10.1.64.1
offset 0.000462 sec

apt-get install ntp -y
```

Edit the /etc/ntp.conf file to point to an accessible ntp server (the default may work as well):

```
vi /etc/ntp.conf
```

Remove or comment out the following the lines:

```
server 0.ubuntu.pool.ntp.org
server 1.ubuntu.pool.ntp.org
server 2.ubuntu.pool.ntp.org
server 3.ubuntu.pool.ntp.org
server ntp.ubuntu.com
```

and add the following line:

```
server gw.onecloud
```

Then restart NTP and make sure it's connected to the clock:

```
service ntp restart

ntpq –p
```

```
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
 li506-17.member 209.51.161.238   2 u   60   64    1   74.016   15.343   0.000
 sola-dal-09.ser 184.173.173.205  3 u   59   64    1   41.609   13.524   0.000
 tock5.usshc.com .GPS.            1 u   58   64    1   59.961   15.893   0.000
 199.96.82.197.r 132.163.4.103    2 u   57   64    1   54.124   13.980   0.000
 golem.canonical 192.93.2.20      2 u   56   64    1  139.331   17.047   0.000
```

```
gw.onecloud     91.189.94.4      3 u   55   64    1    1.159   14.705   0.000
```

MySQL

Step 6:

Most of the OpenStack services require a database to store information. Here we are using MySQL for that purpose.

```
apt-get install python-mysqldb mysql-server -y
```

Installation will prompt for password, Type **pass** as root password and press Enter. For this lab, it is important that you stick with the generic passwords and user-ids. Clearly you would use more secure random strings for a production system.

NOTE: Do not set a random password in the lab, just use the define passwords so that the configurations are consistent!

Step 7:

Edit /etc/mysql/my.cnf and set the bind-address to the IP address of AIO node, to enable access from outside.

```
vi /etc/mysql/my.cnf
```

Use **/bind-address** to find the **bind-address parameter** in **[mysqld]** section
Change the bind-address as 10.1.64.1**X** from its default of 127.0.0.1 so that remote services can access they Mysql service.

```
bind-address = 10.1.64.1X
```

Add the following lines to my.cnf below the bind-address

```
default-storage-engine = innodb
innodb_file_per_table
collation-server = utf8_general_ci
init-connect = 'SET NAMES utf8'
character-set-server = utf8
```

Step 8:

Restart the MySQL service to apply the changes.

```
service mysql restart
```

```
mysql_install_db
```

```
mysql_secure_installation
```

Press Enter for all prompts, yes to keep pass word the same, no to subsequent questions.

Messaging Queue Sever

Step 9:

Since OpenStack maintaining asynchronous calls between its services, we need a messaging server RabbitMQ server.

```
apt-get install rabbitmq-server -y
```

Step 10:

Change the default guest password of RabbitMQ to **pass**

```
rabbitmqctl change_password guest pass
```

```
service rabbitmq-server restart
```

Identity Service Keystone

Step 11:

Install the OpenStack identity service on node.

```
apt-get install keystone -y
```

The Identity Service uses a database to store information. Specify the location of the database in the configuration file. We use a MySQL database with the username keystone.

Step 12:

Edit /etc/keystone/keystone.conf and change connection in the [database] section for MySQL

```
vi /etc/keystone/keystone.conf
```

/[database] to find the **[database]** section

Change the connection parameter:

```
connection = mysql://keystone:pass@aio X/keystone
```

Press **Esc** key

Type **:wq** for save the file.

Step 13:

By default, the Ubuntu packages create an SQLite database. Delete the keystone.db file created in the /var/lib/keystone/ directory so that it does not get used by mistake.

```
rm /var/lib/keystone/keystone.db
```

Keystone Database

Step 14:

Create Keystone database by login to mysql with password as **pass**

```
mysql -uroot -ppass

CREATE DATABASE keystone;

GRANT ALL PRIVILEGES ON keystone.* TO 'keystone'@'localhost'
IDENTIFIED BY 'pass';

GRANT ALL PRIVILEGES ON keystone.* TO 'keystone'@'%' IDENTIFIED
BY 'pass';

exit
```

Step 15:

Create the database tables for the Identity Service:

```
su -s /bin/sh -c "keystone-manage db_sync" keystone
```

Step 16:

Define an authorization token to use as a shared secret between the Identity Service and other OpenStack services. Edit /etc/keystone/keystone.conf and uncomment to change admin_token with ADMIN_TOKEN in [DEFAULT] section:

```
vi /etc/keystone/keystone.conf
```

```
# Administrative Token
# admin_token  = ADMIN_TOKEN
admin_token  = ADMIN_TOKEN
```

^ NOTE: There cannot be a space at the beginning of configuration parameter lines

Step 17:

Restart the Identity Service:

```
service keystone restart
```

Define users, tenants and roles

After you install the Identity Service, set up users, tenants, and roles. These are used to allow access to services and endpoints.
You would indicate a user and password to authenticate with the Identity Service. At this point, however, we have not created any users, so we have to use the authorization token created in an earlier step.
You can pass this with the --os-token option to the keystone command or set the OS_SERVICE_TOKEN environment variable. We'll set OS_SERVICE_TOKEN, as well as OS_SERVICE_ENDPOINT to specify where the Identity Service is running.

Step 18:

Note: Change **X** with AIO node Number

```
export OS_SERVICE_TOKEN=ADMIN_TOKEN

export OS_SERVICE_ENDPOINT=http://aioX:35357/v2.0
```

Create a tenant for an administrative user and a tenant for other OpenStack services

```
keystone tenant-create --name=admin --description="Admin Tenant"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |           Admin Tenant           |
|   enabled   |               True               |
|      id     | 6c7ecac71357496fabf959f70e0681b3 |
|     name    |              admin               |
+-------------+----------------------------------+
```

```
keystone tenant-create --name=service --description="Service Tenant"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |          Service Tenant          |
|   enabled   |               True               |
|      id     | 4e05f27ffc7a474db3821ada26b7a5fa |
|     name    |             service              |
+-------------+----------------------------------+
```

Create an administrative user called admin with password as **pass** and an email address for the account

```
keystone user-create --name=admin --pass=pass --email=admin@onecloud.com
```

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |        admin@onecloud.com        |
```

```
| enabled  |               True               |
|    id    | ffd8ac42900746919a1d9c3307c53445 |
|   name   |              admin               |
| username |              admin               |
+----------+----------------------------------+
```

Create a role for administrative tasks called admin. Any roles you create should map to roles specified in the policy.json files of the various OpenStack services. The default policy files use the admin role to allow access to most services.

keystone role-create --name=admin

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|    id    | ec81d33f35484a538d5cb050db8177eb |
|   name   |              admin               |
+----------+----------------------------------+
```

Add roles to users. Users always log in with a tenant, and roles are assigned to users within tenants. Add the admin role to the admin user when logging in with the admin tenant.

keystone user-role-add --user=admin --tenant=admin --role=admin

We also add a member role and add admin as a member of the admin tenant, otherwise Horizon will not properly load.

keystone user-role-add --user=admin --role=_member_ --tenant=admin

Check the user and tenant list

keystone user-list

```
+----------------------------------+-------+---------+--------------------+
|                id                |  name | enabled |       email        |
+----------------------------------+-------+---------+--------------------+
| ffd8ac42900746919a1d9c3307c53445 | admin |   True  | admin@onecloud.com |
+----------------------------------+-------+---------+--------------------+
```

keystone tenant-list

```
+----------------------------------+---------+---------+
|                id                |   name  | enabled |
+----------------------------------+---------+---------+
| 6c7ecac71357496fabf959f70e0681b3 |  admin  |   True  |
| 4e05f27ffc7a474db3821ada26b7a5fa | service |   True  |
+----------------------------------+---------+---------+
```

Define services and service endpoints

you must register each service in your OpenStack installation, so that the Identity Service can track which OpenStack services are installed and where they are located on the network. To register a service, run these commands:

- *keystone service-create* (Describes the service)
- *keystone endpoint-create* (Associates API endpoints with the service)

Step 19:

Create a service entry for the Identity Service:

```
keystone service-create --name=keystone --type=identity  --
description="Keystone Identity Service"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |    Keystone Identity Service     |
|   enabled   |               True               |
|      id     | aa421d6640fc4f6b8e697a800f6515ea |
|     name    |             keystone             |
|     type    |             identity             |
+-------------+----------------------------------+
```

When you specify an endpoint, you provide URLs for the public API, internal API, and admin API. Note that the Identity Service uses a different port for the admin API.

The service ID is randomly generated and is different from the one shown here. The following command will create a keystone identity service endpoint with **service-id** value from the **keystone service-create** command.

Note: Copy the Service id to use in endpoint-create command. Or we can use keystone service-list | awk '/ identity / {print $2}' to get the service id of type identity.

Note: Change **X** with AIO node Number

```
keystone endpoint-create --service-id=$(keystone service-list |
awk '/ identity / {print $2}') --publicurl=http://aioX:5000/v2.0
--internalurl=http://aioX:5000/v2.0 --
adminurl=http://aioX:35357/v2.0
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
|   adminurl  |     http://aio51:35357/v2.0      |
|      id     | c56a01e470d940eda883328b45d0be19 |
| internalurl |      http://aio51:5000/v2.0      |
|  publicurl  |      http://aio51:5000/v2.0      |
```

```
|    region    |            regionOne             |
|  service_id | aa421d6640fc4f6b8e697a800f6515ea |
+-------------+----------------------------------+
```

Verify the Identity service installation

To verify the Identity Service is installed and configured correctly, first unset the OS_SERVICE_TOKEN and OS_SERVICE_ENDPOINT environment variables. These were only used to bootstrap the administrative user and register the Identity Service.

Step 20:

```
unset OS_SERVICE_TOKEN OS_SERVICE_ENDPOINT
```

You can now use regular username-based authentication. Request an authentication token using the admin user and the password you chose during the earlier administrative user-creation step.

```
keystone --os-username=admin --os-password=pass --os-auth-
url=http://aioX:35357/v2.0 token-get
```

You should receive a token in response, paired with your user ID. This verifies that keystone is running on the expected endpoint, and that your user account is established with the expected credentials.(scroll up in ssh windows to see the user ID)
Next, verify that authorization is behaving as expected by requesting authorization on a tenant.

```
keystone --os-username=admin --os-password=pass --os-tenant-
name=admin --os-auth-url=http://aioX:35357/v2.0 token-get
```

You should receive a new token in response, this time including the ID of the tenant you specified. This verifies that your user account has an explicitly defined role on the specified tenant, and that the tenant exists as expected.

Step 21:

You can also set your --os-* variables in your environment to simplify command-line usage. Setup a **openrc.sh** file with the admin credentials and admin endpoint.

```
vi ~/openrc.sh
```

Enter following line in the openrc.sh file by pressing key "**i**" to insert.

```
export OS_USERNAME=admin
export OS_PASSWORD=pass
export OS_TENANT_NAME=admin
```

```
export OS_AUTH_URL=http://aioX:35357/v2.0
```

Press **Esc** and Type **:wq** to save the file.

You can source this file to read in the environment variables.

Step 22:

```
source ~/openrc.sh
```

Verify that your openrc.sh file is configured correctly by performing the same command as above, but without the --os-* arguments.

```
keystone token-get
```

The command returns a token and the ID of the specified tenant. This verifies that you have configured your environment variables correctly.
Finally, verify that your admin account has authorization to perform administrative commands.

```
keystone user-list
```

```
+----------------------------------+-------+---------+--------------------+
|                id                |  name | enabled |       email        |
+----------------------------------+-------+---------+--------------------+
| ffd8ac42900746919a1d9c3307c53445 | admin |   True  | admin@onecloud.com |
+----------------------------------+-------+---------+--------------------+
```

This verifies that your user account has the admin role, which matches the role used in the Identity Service policy.json file.

Identity service and prerequisites installed successfully.

Lab 2: Image Service Installation

The OpenStack Image Service enables users to storage and retrieve Operating Systems (virtual machine images), also known as the Glance project. The Image Service offers a REST API that enables you to query Virtual Machine Images and its metadata. Images can be stored in a variety of locations from simple file systems to object – storage systems like Openstack Object Storage.

This lab configures the Image Service to use the file backend. Images uploaded to the Image Service will be stored in a directory on the same system that hosts the service. By default this directory is/var/lib/glance/images/.

Image Service Installation

Step 1:

SSH to AIO node with the credentials in Lab access
Enter following command and Type **pass** as the [sudo] password

```
sudo su -

source ~/openrc.sh

apt-get install glance python-glanceclient -y
```

Create Database for Image Service

Step 2:

The Image Service stores information about images in a database. Create Keystone database by login to mysql with password as **pass**

```
mysql -uroot -ppass

CREATE DATABASE glance;

GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'localhost'
IDENTIFIED BY 'pass';

GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'%' IDENTIFIED BY
'pass';

exit
```

Step 3:

By default, the Ubuntu packages create a SQLite database. Delete the glance.sqlite file created in the /var/lib/glance/ directory so that it does not get used by mistake.

```
rm /var/lib/glance/glance.sqlite
```

```
rm: cannot remove â/var/lib/glance/glance.sqliteâ: No such file or directory
```

Note: This file may not exist in your system

User Creation

Create a glance user that the Image Service can use to authenticate with the Identity Service.

Step 4:

Choose a password as **pass** and specify an email address for the glance user. Use service as tenant and admin as role.

```
keystone user-create --name=glance --pass=pass --
email=glance@onecloud.com
```

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |       glance@onecloud.com        |
| enabled  |               True               |
|    id    | 6e652e807f934e1e893419165a9a788e |
|   name   |              glance              |
| username |              glance              |
+----------+----------------------------------+
```

```
keystone user-role-add --user=glance --tenant=service --
role=admin
```

Configure Image Service

The Image Service provides the glance-api and glance-registry services, each with its own configuration file glance-api.conf and glance-registry.conf

Update glance-api.conf and glance-registry.conf

Step 5:

Edit /etc/glance/glance-api.conf

```
vi /etc/glance/glance-api.conf
```

/rabbit_host to find and change the rabbit host details as below

```
rpc_backend = rabbit
rabbit_host = aio X
rabbit_userid = guest
rabbit_password = pass
```

Step 6:

Configure the location of the database.

Search for the [database] section: /[database] and add the sql connection information as follows:

```
#sqlite_db = /var/lib/glance/glance.sqlite
connection = mysql://glance:pass@aio X/glance
```

Note: You need to comment out the sqlite path if it exists.

Press **Down Arrow** key to Scroll down up to **[keystone_authtoken]** section. To configure the Image Service to use the Identity Service for authentication, edit the following keys under the **[keystone_authtoken]** section

```
auth_uri = http://aio X:5000
auth_host = aio X
auth_port=35357
auth_protocol=http
admin_tenant_name = service
admin_user = glance
admin_password = pass
```

Press **Down Arrow** key to scroll down up to **[paste_deploy]** section
Add the following key under the [paste_deploy] section:

```
flavor = keystone
```

Press **Esc** key and Type **:wq** to save the file.

Step 7:

Similarly edit /etc/glance/glance-registry.conf

```
vi /etc/glance/glance-registry.conf
```

Follow the instructions in **Step 6** to finish this task.

Define services and service endpoints

Register the Image Service with the Identity Service so that other OpenStack services can locate it.

Step 8:

Register the service and create the endpoint:

```
keystone service-create --name=glance --type=image --
description="Glance Image Service"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |       Glance Image Service       |
|   enabled   |               True               |
|      id     | 96d1583e720f4104855f624c3a2af733 |
|     name    |              glance              |
|     type    |              image               |
+-------------+----------------------------------+
```

Note: Service id to use in endpoint-create command

Note: Copy the Service id to use in endpoint-create command. Or we can use keystone service-list | awk '/ image / {print $2}' to get the service id of type image.
Note: Change **X** with AIO node Number

```
keystone endpoint-create --service-id=$(keystone service-list |
awk '/ image / {print $2}') --publicurl=http://aioX:9292 --
internalurl=http://aioX:9292 --adminurl=http://aioX:9292
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
|   adminurl  |        http://aio51:9292         |
|      id     | 9fb1114401334a3fbf7c2bdb7193558c |
| internalurl |        http://aio51:9292         |
|  publicurl  |        http://aio51:9292         |
|    region   |            regionOne             |
|  service_id | 96d1583e720f4104855f624c3a2af733 |
+-------------+----------------------------------+
```

Step 9:

Create the database tables for the Image Service:

```
su -s /bin/sh -c "glance-manage db_sync" glance
```

Step 10:

Restart the glance service with its new settings.

```
service glance-registry restart

service glance-api restart
```

Verify the Image Service Installation:

Step 11:

Download the image into a dedicated directory using wget or curl:

```
mkdir images

cd images/

wget http://10.1.1.92/images/cirros-0.3.2-x86_64-disk.img
```

Step 12:

Upload the image into Image service

```
glance image-create --name="CirrOS 0.3.2" --disk-format=qcow2 --
container-format=bare --is-public=true < cirros-0.3.2-x86_64-
disk.img
```

Confirm that the image was uploaded and display its attributes:

```
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| checksum         | 64d7c1cd2b6f60c92c14662941cb7913     |
| container_format | bare                                 |
| created_at       | 2014-08-25T00:11:02                  |
| deleted          | False                                |
| deleted_at       | None                                 |
| disk_format      | qcow2                                |
| id               | dd1193c0-e365-41e1-b879-89b3eedb4575 |
| is_public        | True                                 |
| min_disk         | 0                                    |
| min_ram          | 0                                    |
| name             | CirrOS 0.3.2                         |
| owner            | 6c7ecac71357496fabf959f70e0681b3     |
| protected        | False                                |
| size             | 13167616                             |
| status           | active                               |
| updated_at       | 2014-08-25T00:11:02                  |
| virtual_size     | None                                 |
+------------------+--------------------------------------+
```

```
glance image-list
```

```
+--------------------------------------+--------------+-------------+------------------+----------+--------+
| ID                                   | Name         | Disk Format | Container Format | Size     | Status |
+--------------------------------------+--------------+-------------+------------------+----------+--------+
| dd1193c0-e365-41e1-b879-89b3eedb4575 | CirrOS 0.3.2 | qcow2       | bare             | 13167616 | active |
+--------------------------------------+--------------+-------------+------------------+----------+--------+
```

```
cd ..
```

Image Service configured and image upload successfully.

Lab 3: Compute Service Installation

The Compute service is a cloud computing fabric controller, which is the main part of an IaaS system. Use it to host and manage cloud computing systems.

Compute interacts with the Identity Service for authentication, Image Service for images, and the Dashboard for the user and administrative interface. Access to images is limited by project and by user; quotas are limited per project (for example, the number of instances). The Compute service scales horizontally on standard hardware, and downloads images to launch instances as required.

Compute Service Installation

SSH to AIO node with the credentials in Lab access
Enter following command and Type **pass** as the [sudo] password

Step 1:

```
sudo su -

source ~/openrc.sh
```

Install Compute Controller Service packages

Step 2:

Install these Compute packages, which provide the Compute services that run on the controller node.

```
apt-get install nova-api nova-cert nova-conductor nova-
consoleauth nova-novncproxy nova-scheduler python-novaclient -y
```

Install Compute Node packages

Step 3:

Install the appropriate packages for the Compute service.

```
apt-get install nova-compute-kvm python-guestfs -y
```

To make the current kernel readable, run the following command

```
dpkg-statoverride  --update --add root root 0644 /boot/vmlinuz-
$(uname -r)
```

Create Database for Compute Service

Step 4:

Create Database nova for Compute service by login to mysql with password as **pass**

```
mysql -uroot -ppass

CREATE DATABASE nova;

GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'localhost' IDENTIFIED
BY 'pass';

GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'%' IDENTIFIED BY
'pass';
```

exit

Step 5:

By default, the Ubuntu packages create a SQLite database. Delete the nova.sqlite file created in the /var/lib/nova/ directory so that it does not get used by mistake.

rm /var/lib/nova/nova.sqlite

Step 6:

Create a nova user that Compute uses to authenticate with the Identity Service. Use the service tenant and give the user the admin role: (**X** Student POD Number)

keystone user-create --name=nova --pass=pass --email=nova@onecloud.com

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |        nova@onecloud.com         |
| enabled  |               True               |
|    id    | 0b3c90d65d514fce813666320cb7b103 |
|   name   |               nova               |
| username |               nova               |
+----------+----------------------------------+
```

keystone user-role-add --user=nova --tenant=service --role=admin

Configure Compute Service

Update nova.conf

Step 7:

Edit /etc/nova/nova.conf

vi /etc/nova/nova.conf

Configure the Compute Service to use the RabbitMQ message broker by adding these configuration keys at the end of **[DEFAULT]** section

```
vif_plugging_is_fatal=false
vif_plugging_timeout=0
rpc_backend =rabbit
rabbit_host=aioX
rabbit_password=pass
```

Add the my_ip, vncserver_listen, and vncserver_proxyclient_address configuration options to to the **[DEFAULT]** section: To get vnc acces from the pod machine give IP address instead of hostname.

```
my_ip=10.1.64.1X
vnc_enabled = True
vncserver_listen=10.1.64.1X
vncserver_proxyclient_address=10.1.64.1X
novncproxy_base_url=http://10.1.64.1X:6080/vnc_auto.html

auth_strategy=keystone
glance_host=aioX
```

To configure the location of the database, add following lines to the **[database]** and **[keystone_authtoken]** section:

```
[database]
connection = mysql://nova:pass@aioX/nova

[keystone_authtoken]
auth_uri = http://aioX:5000
auth_host = aioX
auth_port = 35357
auth_protocol = http
admin_tenant_name = service
admin_user = nova
admin_password = pass
```

Press **Esc** and Type **:wq** to Save the file.

Edit Nova-Compute.Conf

Step 8:

Edit the [libvirt] section in the /etc/nova/nova-compute.conf

`vi /etc/nova/nova-compute.conf`

```
virt_type=qemu
```

Press **Esc** and Type **:wq** to Save the file.

Define services and service endpoints

Register the Compute service and specify the endpoint: (**X** Student POD Number)

Step 9:

```
keystone service-create --name=nova --type=compute --
description="Nova Compute service"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |       Nova Compute service       |
|   enabled   |               True               |
|      id     | 3c85f9ccd55d4485a4096ff4a014e593 |
|     name    |               nova               |
|     type    |             compute              |
+-------------+----------------------------------+
```

Note: Copy the Service id to use in endpoint-create command. Or we can use keystone service-list | awk '/ compute / {print $2}' to get the service id of type compute.

Note: Change **X** with AIO node Number

```
keystone endpoint-create --service-id=$(keystone service-list |
awk '/ compute / {print $2}') --
publicurl=http://aioX:8774/v2/%\(tenant_id\)s --
internalurl=http://aioX:8774/v2/%\(tenant_id\)s --
adminurl=http://aioX:8774/v2/%\(tenant_id\)s
```

```
+-------------+-----------------------------------+
|   Property  |               Value               |
+-------------+-----------------------------------+
|   adminurl  | http://aio51:8774/v2/%(tenant_id)s |
|      id     |  5c1c4cada2ea41299c53a31df57be562  |
| internalurl | http://aio51:8774/v2/%(tenant_id)s |
|  publicurl  | http://aio51:8774/v2/%(tenant_id)s |
|    region   |             regionOne             |
|  service_id |  3c85f9ccd55d4485a4096ff4a014e593  |
+-------------+-----------------------------------+
```

Step 10:

Create the database tables for the nova database and Restart nova services

```
su -s /bin/sh -c "nova-manage db sync" nova

service nova-api restart

service nova-cert restart

service nova-consoleauth restart

service nova-scheduler restart
```

```
service nova-conductor restart

service nova-novncproxy restart

service nova-compute restart
```

Compute Service is installed successfully.

Lab 4: Network Service Neutron Installation

Like Nova Networking, Neutron manages software-defined networking for your OpenStack installation. However, unlike Nova Networking, you can configure Neutron for advanced virtual network topologies, such as per-tenant private networks and more.

Any given Neutron set up has at least one external network. This network, unlike the other networks, is not merely a virtually defined network. Instead, it represents the view into a slice of the external network that is accessible outside the OpenStack installation.

The Open vSwitch plug-in is one of the most popular core plug-ins. Open vSwitch configurations consists of bridges and ports. With Open vSwitch, you can use two different technologies to create the virtual networks: GRE or VLANs. To use GRE with Open vSwitch, Neutron creates GRE tunnels. These tunnels are ports on a bridge and enable bridges on different systems to act as though they were one bridge, which allows the compute and network nodes to act as one for the purposes of routing.

SSH to AIO node with the credentials in Lab access
Enter following command and Type **pass** as the [sudo] password

Step 1:

```
sudo su -

source ~/openrc.sh
```

Neutron Installation

Step 2:

```
apt-get install neutron-server neutron-plugin-ml2 -y
```

```
apt-get install neutron-plugin-ml2 neutron-dhcp-agent neutron-
plugin-openvswitch-agent openvswitch-datapath-dkms neutron-l3-
agent -y
```

Database Creation

Create neutron database by login to mysql with password as **pass**

Step 3:

```
mysql -u root -ppass

CREATE DATABASE neutron;

GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'localhost' \

IDENTIFIED BY 'pass';

GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'%' \

IDENTIFIED BY 'pass';

exit
```

Create User Neutron with password as pass

Step 4:

```
keystone user-create --name=neutron --pass=pass --
email=neutron@onecloud.com
```

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |       neutron@onecloud.com       |
| enabled  |               True               |
|    id    | 249487a4198d447389cd050b109bf446 |
|   name   |             neutron              |
| username |             neutron              |
+----------+----------------------------------+
```

```
keystone user-role-add --user=neutron --tenant=service --
role=admin
```

Define services and service endpoints

Step 5:

```
keystone service-create --name=neutron --type=network \

     --description="OpenStack Networking Service"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |   OpenStack Networking Service   |
|   enabled   |               True               |
|      id     | f5fafa686097469bb31f8cc77fd9b51f |
|     name    |             neutron              |
|     type    |             network              |
+-------------+----------------------------------+
```

Note: Copy the Service id to use in endpoint-create command. Or we can use keystone service-list | awk '/ network / {print $2}' to get the service id of type network.

Note: Change **X** with AIO node Number

```
keystone endpoint-create --service-id $(keystone service-list |
awk '/ network / {print $2}') --publicurl http://aioX:9696 --
adminurl http://aioX:9696 --internalurl http://aioX:9696
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
|   adminurl  |        http://aio51:9696         |
|      id     | e79afffbbe7645478e444840b1af76e9 |
| internalurl |        http://aio51:9696         |
|  publicurl  |        http://aio51:9696         |
|    region   |            regionOne             |
|  service_id | f5fafa686097469bb31f8cc77fd9b51f |
+-------------+----------------------------------+
```

Enable packet forwarding and disable packet destination filtering so that the network node can coordinate traffic for the VMs. Edit the /etc/sysctl.conf file, as follows:

Step 6:

```
vi /etc/sysctl.conf
```

Edit the following settings

```
net.ipv4.ip_forward=1
net.ipv4.conf.all.rp_filter=0
net.ipv4.conf.default.rp_filter=0
```

Save the file by pressing '**Esc'** and then type **:wq**
Type the following command and confirm the changes are saved

```
sysctl -p
```

Configure Neutron Service

Edit the /etc/neutron/neutron.conf file.

Step 7:

vi /etc/neutron/neutron.conf

```
[DEFAULT]
core_plugin = ml2
service_plugins = router
auth_strategy = keystone
allow_overlapping_ips = True
```

```
rpc_backend = neutron.openstack.common.rpc.impl_kombu
rabbit_host = aioX
rabbit_password = pass

[keystone_authtoken]
auth_uri = http://aioX:5000
auth_host = aioX
auth_protocol = http
auth_port = 35357
admin_tenant_name = service
admin_user = neutron
admin_password = pass

[database]
connection = mysql://neutron:pass@aioX/neutron
```

Step 8:

Edit the /etc/neutron/neutron.conf file and add the following keys to the [DEFAULT] section:
Obtain the service tenant identifier (id) with following command and fill it in neutron.conf

keystone tenant-get service

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |          Service Tenant          |
|   enabled   |               True               |
|      id     | d1f0515ee4174c9ca4e6f73f13f0da2f |
|     name    |             service              |
+-------------+----------------------------------+
```

```
[DEFAULT]
notify_nova_on_port_status_changes = True
notify_nova_on_port_data_changes = True
nova_url = http://aioX:8774/v2
nova_admin_username = nova
nova_admin_tenant_id = SERVICE_TENANT_ID (Get it from the output of keystone tenant-get service)
```

```
nova_admin_password = pass
nova_admin_auth_url = http://aioX:35357/v2.0
```

To perform DHCP on the software-defined networks, Networking supports several different plug-ins. However, in this lab we are using Dnsmasq plug-in.

Step 9:

Edit the /etc/neutron/dhcp_agent.ini file:

`vi /etc/neutron/dhcp_agent.ini`

```
interface_driver = neutron.agent.linux.interface.OVSInterfaceDriver
dhcp_driver = neutron.agent.linux.dhcp.Dnsmasq
use_namespaces = True
```

Step 10:

Edit the /etc/neutron/l3_agent.ini: uncomment

`vi /etc/neutron/l3_agent.ini`

```
interface_driver = neutron.agent.linux.interface.OVSInterfaceDriver
use_namespaces = True
```

Step 11:

Edit the /etc/neutron/plugins/ml2/ml2_conf.ini file:

Add the following keys to the [ml2], [ml2_type_gre] section:

```
[ml2]
type_drivers = gre
tenant_network_types = gre
mechanism_drivers = openvswitch

[ml2_type_gre]
tunnel_id_ranges = 1:1000

[securitygroup]
firewall_driver = neutron.agent.linux.iptables_firewall.OVSHybridIptablesFirewallDriver
enable_security_group = True

[ovs]
local_ip = eth1_INTERFACE_IP_ADDRESS #replace text with IP address
tunnel_type = gre
enable_tunneling = True
```

Step 12:

Edit the /etc/neutron/metadata_agent.ini file and modify the [DEFAULT] section:

`vi /etc/neutron/metadata_agent.ini`

```
[DEFAULT]
auth_url = http://aioX:5000/v2.0
auth_region = regionOne
admin_tenant_name = service
admin_user = neutron
admin_password = pass
nova_metadata_ip = aioX
metadata_proxy_shared_secret = pass
```

Step 13:

Edit the /etc/nova/nova.conf file to define a secret key that will be shared between the Compute Service and the Networking metadata agent.

`vi /etc/nova/nova.conf`

Add following to the [DEFAULT] section:

```
[DEFAULT]
service_neutron_metadata_proxy = true
neutron_metadata_proxy_shared_secret = pass

network_api_class=nova.network.neutronv2.api.API
neutron_url=http://aioX:9696
neutron_auth_strategy=keystone
neutron_admin_tenant_name=service
neutron_admin_username=neutron
neutron_admin_password=pass
neutron_admin_auth_url=http://aioX:35357/v2.0
linuxnet_interface_driver = nova.network.linux_net.LinuxOVSInterfaceDriver
firewall_driver = nova.virt.firewall.NoopFirewallDriver
security_group_api = neutron
```

No matter which networking technology you use, you must add the br-int integration bridge, which connects to the VMs, and the br-ex external bridge, which connects to the outside world.

Step 14:

`service nova-api restart`

```
service nova-scheduler restart

service nova-conductor restart

service neutron-plugin-openvswitch-agent restart

service neutron-l3-agent restart

service neutron-dhcp-agent restart

service neutron-metadata-agent restart

service openvswitch-switch restart

ovs-vsctl add-br br-ex

ovs-vsctl add-port br-ex eth2
```

Restart Services

Step 15:

```
service nova-scheduler restart

service nova-conductor restart

service neutron-server restart

service neutron-dhcp-agent restart

service neutron-l3-agent restart

service neutron-metadata-agent restart

service neutron-plugin-openvswitch-agent restart

service openvswitch-switch restart

service nova-compute restart
```

Check all the Neutron agents are working

```
neutron agent-list
```

```
+--------------------------------------+--------------------+-------+-------+----------------+
| id                                   | agent_type         | host  | alive | admin_state_up |
+--------------------------------------+--------------------+-------+-------+----------------+
| 05d590f8-68a6-4803-8f9c-2820e37454f8 | Open vSwitch agent | aio51 | :-)   | True           |
| 2bf643e6-2114-4187-ae33-04c9ec435d05 | Metadata agent     | aio51 | :-)   | True           |
| 592f2bbc-4e9f-4517-adaa-33cc10a6f62d | L3 agent           | aio51 | :-)   | True           |
| 5b332f0a-f9f7-4bc3-8d59-76258cd5a3a6 | DHCP agent         | aio51 | :-)   | True           |
+--------------------------------------+--------------------+-------+-------+----------------+ X
```

Step 16:

Create the Tenant network:

```
neutron net-create private-net
```

Created a new Subnet for Tenant network:

```
neutron subnet-create private-net --name private-subnet
10.10.10.0/24
```

Neutron has been installed successfully in AIO node

Lab 5: Adding Compute Node

We are going add Compute**Y** as a compute node to the AIO**X** node and installing Neutron agent to Compute**Y**

Basic Configuration

Check the Network settings of Compute**Y** node

SSH to Compute**Y** node with the credentials in Lab access
Enter the following command and Type pass as the [sudo] password

Step 1:

```
sudo su –
```

```
vi /etc/network/interfaces
```

Enter the network details for the Compute**Y** node as shown below.

```
auto eth0
iface eth0 inet static
        address 10.1.64.1Y
        netmask 255.255.255.0
        gateway 10.1.64.1
        dns-nameservers 10.1.1.92
        dns-search onecloud
auto eth1
iface eth1 inet static
```

```
        address 10.1.65.1Y
        netmask 255.255.255.0
auto eth2
iface eth2 inet manual
 up ip link set dev $IFACE up
 down ip link set dev $IFACE down
```

Check the /etc/hosts file and add ip address and host name for aio node.

Step 2:

`vi /etc/hosts`

Edit the file as follows

```
10.1.64.1X      aioX.onecloud           aioX
10.1.64.1Y      computeY.onecloud               computeY
```

Step 3:

Edit /etc/sysctl.conf file and run the following command to activate changes:

`vi /etc/sysctl.conf`

```
net.ipv4.conf.all.rp_filter=0
net.ipv4.conf.default.rp_filter=0
```

`sysctl –p`

```
net.ipv4.conf.all.rp_filter = 0
net.ipv4.conf.default.rp_filter = 0
net.ipv6.conf.default.autoconf = 0
net.ipv6.conf.default.accept_ra = 0
net.ipv6.conf.all.autoconf = 0
net.ipv6.conf.all.accept_ra = 0
```

Type following command to restart network service

`ifdown eth1; ifup eth1; ifdown eth2; ifup eth2`

```
ifdown: interface eth1 not configured
```

```
ifdown: interface eth2 not configured
```

Note: it is ok if the system complains about interfaces not being configured in the previous step

Step 4:

Install Openstack Packages in Compute Node

```
ntpdate gw.onecloud
```

```
25 Aug 19:01:19 ntpdate[1837]: adjust time server 10.1.64.1 offset 0.026366 sec
```

```
apt-get install -y ntp
```

```
echo "server gw.onecloud iburst" > /etc/ntp.conf
```

```
service ntp restart
```

```
apt-get update && apt-get dist-upgrade -y
```

Note, if doing this outside the lab, you'll also want to do the following to add the Ubuntu cloud archives:

 # add-apt-repository cloud-archive:Icehouse

Step 5:

Install Nova Hypervisor and Network plugins

```
apt-get install -y neutron-common neutron-plugin-ml2 neutron-plugin-openvswitch-agent openvswitch-datapath-dkms
```

```
apt-get install -y nova-compute-kvm python-novaclient python-guestfs
```

```
dpkg-statoverride  --update --add root root 0644 /boot/vmlinuz-$(uname -r)
```

Step 6:

Create openrc.sh file

```
cd
```

```
vi ~/openrc.sh
```

Type the following lines in openrc.sh file

```
export OS_USERNAME=admin
export OS_PASSWORD=pass
export OS_TENANT_NAME=admin
export OS_AUTH_URL=http://aio**X**:35357/v2.0
```

Save the file by pressing **Esc** key and then type **:wq**

```
source ~/openrc.sh
```

Step 7:

Edit /etc/nova/nova.conf and add to the [DEFAULT] section

```
vi /etc/nova/nova.conf
```

```
[DEFAULT]
vif_plugging_is_fatal=false
vif_plugging_timeout=0
auth_strategy=keystone
rpc_backend = rabbit
rabbit_host = aioX
rabbit_password = pass

my_ip=10.1.64.1Y
vnc_enabled=True
vncserver_listen=0.0.0.0
vncserver_proxyclient_address=10.1.64.1Y
novncproxy_base_url=http://10.1.64.1X:6080/vnc_auto.html

glance_host=aioX

#networking
network_api_class = nova.network.neutronv2.api.API
neutron_url = http://aioX:9696
neutron_auth_strategy = keystone
neutron_admin_tenant_name = service
neutron_admin_username = neutron
neutron_admin_password = pass
neutron_admin_auth_url = http://aioX:35357/v2.0
linuxnet_interface_driver = nova.network.linux_net.LinuxOVSInterfaceDriver
firewall_driver = nova.virt.firewall.NoopFirewallDriver
security_group_api = neutron

[database]
connection = mysql://nova:pass@aioX/nova
```

Step 8:

Edit the [libvirt] section in the /etc/nova/nova-compute.conf

```
vi /etc/nova/nova-compute.conf
```

```
virt_type=qemu
```

Press **Esc** and Type **:wq** to Save the file.

Step 9:

Edit the file /etc/neutron/neutron.conf

`vi /etc/neutron/neutron.conf`

```
auth_strategy = keystone
core_plugin = ml2
rpc_backend = neutron.openstack.common.rpc.impl_kombu
rabbit_host = aioX
rabbit_password = pass

[keystone_authtoken]
auth_uri = http://aioX:35357/v2.0
auth_host = aioX
auth_protocol = http
auth_port = 35357
admin_tenant_name = service
admin_user = neutron
admin_password = pass

[database]
connection = mysql://neutron:pass@aioX/neutron
```

Step 10:

The ML2 plug-in uses the Open vSwitch (OVS) mechanism (agent) to build the virtual networking framework for instances.

Edit the /etc/neutron/plugins/ml2/ml2_conf.ini file:

Add the following keys to the [ml2] section:

```
 [ml2]
type_drivers = gre
tenant_network_types = gre
mechanism_drivers = openvswitch

[ml2_type_gre]
tunnel_id_ranges = 1:1000

[ovs]
local_ip = INSTANCE_TUNNELS_INTERFACE_IP_ADDRESS #replace with eth1 IP address
tunnel_type = gre
enable_tunneling = True
```

```
[securitygroup]
firewall_driver = neutron.agent.linux.iptables_firewall.OVSHybridIptablesFirewallDriver
enable_security_group = True
```

Step 11:

Create a bridge for internal communication and restart the services

```
service nova-compute restart

service openvswitch-switch restart

service neutron-plugin-openvswitch-agent restart
```

Step 12:

Source the openrc.sh file

```
source ~/openrc.sh
```

Step 13:

Type following command and check the new Compute node is listed

```
nova service-list
```

```
+------------------+-----------+----------+---------+-------+----------------------------+-----------------+
| Binary           | Host      | Zone     | Status  | State | Updated_at                 | Disabled Reason |
+------------------+-----------+----------+---------+-------+----------------------------+-----------------+
| nova-cert        | aio51     | internal | enabled | up    | 2014-08-25T19:25:46.000000 | -               |
| nova-consoleauth | aio51     | internal | enabled | up    | 2014-08-25T19:25:46.000000 | -               |
| nova-scheduler   | aio51     | internal | enabled | up    | 2014-08-25T19:25:44.000000 | -               |
| nova-conductor   | aio51     | internal | enabled | up    | 2014-08-25T19:25:48.000000 | -               |
| nova-compute     | aio51     | nova     | enabled | up    | 2014-08-25T19:25:46.000000 | -               |
| nova-compute     | compute61 | nova     | enabled | up    | 2014-08-25T19:25:48.000000 | -               |
+------------------+-----------+----------+---------+-------+----------------------------+-----------------+
```

```
neutron agent-list
```

```
+--------------------------------------+--------------------+-----------+-------+----------------+
| id                                   | agent_type         | host      | alive | admin_state_up |
+--------------------------------------+--------------------+-----------+-------+----------------+
| 431efefa-a00c-485a-b788-a560f6f73134 | Open vSwitch agent | aio51     | :-)   | True           |
| 6e6a914e-f2cb-43a4-9014-57bd9222af17 | DHCP agent         | aio51     | :-)   | True           |
| 9865554f-bce0-4b5e-aed6-88626a24a9ec | L3 agent           | aio51     | :-)   | True           |
| a4850201-79ba-4e7a-aeb1-05cfc3bd8695 | Metadata agent     | aio51     | :-)   | True           |
| ae466dc9-93b2-4b35-816d-7b97d60da398 | Open vSwitch agent | compute61 | :-)   | True           |
+--------------------------------------+--------------------+-----------+-------+----------------+
```

```
ovs-vsctl show
```

```
Bridge br-int
```

```
        fail_mode: secure
        Port br-int
            Interface br-int
                type: internal
        Port patch-tun
            Interface patch-tun
                type: patch
                options: {peer=patch-int}
    Bridge br-tun
        Port br-tun
            Interface br-tun
                type: internal
        Port "gre-0a000205"
            Interface "gre-0a000205"
                type: gre
                options: {in_key=flow, local_ip="10.0.2.4", out_key=flow, remote_ip="10.0.2.5"}
        Port patch-int
            Interface patch-int
                type: patch
                options: {peer=patch-tun}
    ovs_version: "2.0.1"
```

The output should shows GRE, local_ip and remote_ip.

Now Compute**Y** is successfully added to AIO node as a Compute Node.

Lab 6: Test Neutron/GRE tunnel

Log On to the AIOX node with the credentials in LAB access Sheet

Launch an Instance

An instance is a virtual machine that OpenStack provisions on a Compute servers.

Generate a keypair that consists of a private and public key to be able to launch instances on OpenStack. These keys are injected into the instances to make password-less SSH access to the instance.

Step 1:

Type ssh-keygen to generate the keypair and Press **Enter** for all prompts

`ssh-keygen`

```
root@aio51:~# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Created directory '/root/.ssh'.
Enter passphrase (empty for no passphrase):
```

```
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
b4:d7:7f:6c:25:4f:19:dc:9f:6f:7c:ed:90:a8:d1:fd root@aio51
The key's randomart image is:
+--[ RSA 2048]----+
|                 |
|               . .|
|         .      o.|
|        . . .    =|
|         S . . .o+|
|          . . + B+|
|           . o = @|
|            o   B.|
|           .     E|
+-----------------+
```

Add the key to the system as mykey

nova keypair-add --pub_key ~/.ssh/id_rsa.pub mykey

You have just created the mykey keypair. The id_rsa private key is saved locally in ~/.ssh, which you can use to connect to an instance launched by using mykey as the keypair. To view available keypairs:

nova keypair-list

```
+-------+-------------------------------------------------+
| Name  | Fingerprint                                     |
+-------+-------------------------------------------------+
| mykey | b4:d7:7f:6c:25:4f:19:dc:9f:6f:7c:ed:90:a8:d1:fd |
+-------+-------------------------------------------------+
```

Step 2:

To use SSH and ping to the VMs, configure security group rules.

nova secgroup-add-rule default tcp 22 22 0.0.0.0/0

```
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| tcp         | 22        | 22      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
```

nova secgroup-add-rule default icmp -1 -1 0.0.0.0/0

```
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
```

```
| icmp        | -1        | -1       | 0.0.0.0/0 |               |
+-------------+-----------+----------+-----------+---------------+
```

To launch an instance, you must specify the flavor ID, keypair, image ID. A flavor is a resource allocation profile. It specifies how many virtual CPUs and how much RAM your instance gets.

Step 3:

To see a list of the available profiles:

nova flavor-list

```
+----+-----------+-----------+------+-----------+------+-------+-------------+-----------+
| ID | Name      | Memory_MB | Disk | Ephemeral | Swap | VCPUs | RXTX_Factor | Is_Public |
+----+-----------+-----------+------+-----------+------+-------+-------------+-----------+
| 1  | m1.tiny   | 512       | 1    | 0         |      | 1     | 1.0         | True      |
| 2  | m1.small  | 2048      | 20   | 0         |      | 1     | 1.0         | True      |
| 3  | m1.medium | 4096      | 40   | 0         |      | 2     | 1.0         | True      |
| 4  | m1.large  | 8192      | 80   | 0         |      | 4     | 1.0         | True      |
| 5  | m1.xlarge | 16384     | 160  | 0         |      | 8     | 1.0         | True      |
+----+-----------+-----------+------+-----------+------+-------+-------------+-----------+
```

Get the ID of the image to use for the instance:

nova image-list

```
+--------------------------------------+--------------+--------+--------+
| ID                                   | Name         | Status | Server |
+--------------------------------------+--------------+--------+--------+
| dd1193c0-e365-41e1-b879-89b3eedb4575 | CirrOS 0.3.2 | ACTIVE |        |
+--------------------------------------+--------------+--------+--------+
```

Step 4:

Create one VM in each host

Note: Change **X** and **Y** Values with your Aio and Compute numbers

nova boot --image CirrOS\ 0.3.2 --flavor 1 --availability_zone nova:aioX --key_name mykey test-aio

nova boot --image CirrOS\ 0.3.2 --flavor 1 --availability_zone nova:ComputeY --key_name mykey test-compute

Check to see if the VMs were spun up correctly

nova list

```
+--------------------------------------+-------------+-------+-----------+-------------+-------------------
+
```

```
| ID                                   | Name         | Status | Task State | Power State | Networks
|
+--------------------------------------+--------------+--------+------------+-------------+--------------------
+
| 8ca061ea-f1f1-4cd4-a1cf-7b0be9a56561 | test-aio     | ACTIVE | -          | Running     | private=172.16.0.2
|
| b4b0cba6-bc3f-4266-b5be-1894683fc835 | test-compute | ACTIVE | -          | Running     | private=172.16.0.7
|
+--------------------------------------+--------------+--------+------------+-------------+--------------------
+
```

Note the IP address of the VMs

Get the VM's VNC console URL by following command

nova get-vnc-console test-aio novnc

```
+-------+-----------------------------------------------------------------------------------+
| Type  | Url                                                                               |
+-------+-----------------------------------------------------------------------------------+
| novnc | http://10.1.64.151:6080/vnc_auto.html?token=045600c3-297d-49f9-a9da-3d7b8b804639 |
+-------+-----------------------------------------------------------------------------------+
```

Paste this URL in a web browser and login to the vm console with the user name and password shown in the console of Cirros VM.

Ping the other VM and confirm that GRE tunnel has been established.

Lab 7: Block Storage Service Installation

In Storage service, we are installing and configuring block storage service Cinder. The Block Storage Service enables management of volumes, volume snapshots, and volume types. The Block Storage Service interacts with Compute to provide volumes for instances.

SSH to AIO node with the credentials in Lab access
Enter following command and Type **ubuntu** as the [sudo] password
Step 1:

sudo su -

source ~/openrc.sh

Cinder Installation on AIO Node

In multinode environment install following OpenStack Block Storage services on the Controller node. The Storage node contains the disk that serves volumes.

Step 2:

You can configure OpenStack to use various storage systems. This Lab is using LVM.

```
apt-get install -y cinder-api cinder-scheduler

apt-get install -y lvm2

apt-get install -y cinder-volume
```

Create Database for Storage Service

Step 3:

Create Database cinder for Storage service by login to mysql with password as **pass**

```
mysql -u root -ppass

CREATE DATABASE cinder;

GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'localhost'
IDENTIFIED BY 'pass';

GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'%' IDENTIFIED BY
'pass';

exit
```

Step 4:

By default, the Ubuntu packages create a SQLite database. Delete the cinder.sqlite file created in the /var/lib/cinder/ directory so that it does not get used by mistake.

```
rm /var/lib/cinder/cinder.sqlite
```

Step 5:

Create a cinder user that Storage uses to authenticate with the Identity Service. Use the service tenant and give the user the admin role

```
keystone user-create --name=cinder --pass=pass --
email=cinder@onecloud.com
```

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |       cinder@onecloud.com        |
| enabled  |               True               |
|    id    | 98cde01da3044f18a6f3cf3ccf7babaa |
|   name   |              cinder              |
| username |              cinder              |
+----------+----------------------------------+
```

keystone user-role-add --user=cinder --tenant=service --role=admin

Define services and service endpoints

Step 6:

Register the Block Storage Service with the Identity Service so that other OpenStack services can locate it. Register the service and specify the endpoint.

keystone service-create --name=cinder --type=volume --description="OpenStack Block Storage"

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |     OpenStack Block Storage      |
|   enabled   |               True               |
|      id     | a934854782f6481ba5b5ffe479a0e9cc |
|     name    |              cinder              |
|     type    |              volume              |
+-------------+----------------------------------+
```

Note: Copy the Service id to use in endpoint-create command. Or we can use keystone service-list | awk '/ volume / {print $2}' to get the service id of type volume.

Note: Change **X** with AIO node Number

keystone endpoint-create --service-id=$(keystone service-list | awk '/ volume / {print $2}') --publicurl=http://aioX:8776/v1/%\(tenant_id\)s --internalurl=http://aioX:8776/v1/%\(tenant_id\)s --adminurl=http://aioX:8776/v1/%\(tenant_id\)s

```
+-------------+-----------------------------------+
|   Property  |               Value               |
+-------------+-----------------------------------+
|   adminurl  | http://aio51:8776/v1/%(tenant_id)s |
|      id     |  055f81541eb5474ba46b75e3a7883a70  |
| internalurl | http://aio51:8776/v1/%(tenant_id)s |
|  publicurl  | http://aio51:8776/v1/%(tenant_id)s |
|    region   |             regionOne             |
|  service_id |  a934854782f6481ba5b5ffe479a0e9cc  |
+-------------+-----------------------------------+
```

Similarly register a service and endpoint for version 2 of the Block Storage service API.

keystone service-create --name=cinderv2 --type=volumev2 --description="OpenStack Block Storage v2"

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |    OpenStack Block Storage v2    |
|   enabled   |               True               |
|      id     | 3d7606abdd134e68bc81964796f43807 |
|     name    |             cinderv2             |
|     type    |             volumev2             |
+-------------+----------------------------------+
```

Note: Copy the Service id to use in endpoint-create command. Or we can use keystone service-list | awk '/ volumev2 / {print $2}' to get the service id of type volumev2.
Note: Change **X** with AIO node Number

keystone endpoint-create --service-id=$(keystone service-list | awk '/ volumev2 / {print $2}') --publicurl=http://aioX:8776/v2/%\(tenant_id\)s --internalurl=http://aioX:8776/v2/%\(tenant_id\)s --adminurl=http://aioX:8776/v2/%\(tenant_id\)s

```
+-------------+-----------------------------------+
|   Property  |              Value                |
+-------------+-----------------------------------+
|   adminurl  | http://aio51:8776/v2/%(tenant_id)s |
|      id     |  b9d142c8346143189eb03455fdddf3bb  |
| internalurl | http://aio51:8776/v2/%(tenant_id)s |
|  publicurl  | http://aio51:8776/v2/%(tenant_id)s |
|    region   |             regionOne             |
|  service_id |  3d7606abdd134e68bc81964796f43807  |
+-------------+-----------------------------------+
```

Configure Cinder Service

Step 7:

Edit /etc/cinder/cinder.conf

vi /etc/cinder/cinder.conf

Change the following in [DEFAULT], [keystone_authtoken] and [database] sections

```
[DEFAULT]
rpc_backend = cinder.openstack.common.rpc.impl_kombu
rabbit_host = aioX
rabbit_port = 5672
rabbit_userid = guest
rabbit_password = pass
```

```
glance_host = aioX

[keystone_authtoken]
auth_uri = http://aioX:5000
auth_host = aioX
auth_port = 35357
auth_protocol = http
admin_tenant_name = service
admin_user = cinder
admin_password = pass

[database]
connection = mysql://cinder:pass@aioX/cinder
```

Configure physical hard disks

Step 8:

Type following commands to configure physical disks and create cinder-vloumes

dd if=/dev/zero of=/dev/sdb count=100 bs=1M

```
100+0 records in
100+0 records out
104857600 bytes (105 MB) copied, 1.20612 s, 86.9 MB/s
```

fdisk -l

```
Disk /dev/sda: 21.5 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders, total 41943040 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000cb3c6

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *        2048      499711      248832   83  Linux
/dev/sda2          501758    41940991    20719617    5  Extended
/dev/sda5          501760    41940991    20719616   8e  Linux LVM

Disk /dev/sdb: 21.5 GB, 21474836480 bytes
255 heads, 63 sectors/track, 2610 cylinders, total 41943040 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000
```

```
Disk /dev/sdb doesn't contain a valid partition table

Disk /dev/mapper/aio51--vg-root: 16.9 GB, 16903045120 bytes
255 heads, 63 sectors/track, 2055 cylinders, total 33013760 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

Disk /dev/mapper/aio51--vg-root doesn't contain a valid partition
table

Disk /dev/mapper/aio51--vg-swap_1: 4290 MB, 4290772992 bytes
255 heads, 63 sectors/track, 521 cylinders, total 8380416 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

Disk /dev/mapper/aio51--vg-swap_1 doesn't contain a valid partition
table
```

Select the second disk and create physical volume and cinder volume group

pvcreate /dev/sdb

vgcreate cinder-volumes /dev/sdb

```
Volume group "cinder-volumes" successfully created
```

pvdisplay

```
--- Physical volume ---
  PV Name               /dev/sdb
  VG Name               cinder-volumes
  PV Size               20.00 GiB / not usable 4.00 MiB
  Allocatable           yes
  PE Size               4.00 MiB
  Total PE              5119
  Free PE               5119
  Allocated PE          0
  PV UUID               33ZiCg-9fR8-YucF-dVZe-l477-Coba-S8JFGa

  --- Physical volume ---
  PV Name               /dev/sda5
  VG Name               aio51-vg
  PV Size               19.76 GiB / not usable 2.00 MiB
```

```
  Allocatable           yes
  PE Size               4.00 MiB
  Total PE              5058
  Free PE               5
  Allocated PE          5053
  PV UUID               ZLqVnW-PDPy-rgwL-G2Yw-tfUR-s5cC-VGU2SG
```

vgdisplay

```
  --- Volume group ---
  VG Name               cinder-volumes
  System ID
  Format                lvm2
  Metadata Areas        1
  Metadata Sequence No  1
  VG Access             read/write
  VG Status             resizable
  MAX LV                0
  Cur LV                0
  Open LV               0
  Max PV                0
  Cur PV                1
  Act PV                1
  VG Size               20.00 GiB
  PE Size               4.00 MiB
  Total PE              5119
  Alloc PE / Size       0 / 0
  Free  PE / Size       5119 / 20.00 GiB
  VG UUID               peIcCZ-i2bl-ncC3-cvb2-M49k-bp7G-wip1sY

  --- Volume group ---
  VG Name               aio51-vg
  System ID
  Format                lvm2
  Metadata Areas        1
  Metadata Sequence No  3
  VG Access             read/write
  VG Status             resizable
  MAX LV                0
  Cur LV                2
  Open LV               2
  Max PV                0
  Cur PV                1
  Act PV                1
  VG Size               19.76 GiB
  PE Size               4.00 MiB
  Total PE              5058
  Alloc PE / Size       5053 / 19.74 GiB
  Free  PE / Size       5 / 20.00 MiB
```

```
  VG UUID               5EEPnH-XI3s-51qa-CHcM-OcWu-aR1u-BxLisd
```

Step 9:

Populate Database and Restart Services

```
su -s /bin/sh -c "cinder-manage db sync" cinder

service cinder-scheduler restart

service cinder-api restart

service cinder-volume restart

service tgt restart
```

Test Cinder Service

Step 10:

Create 10GB of block storage as Vol1.

```
cinder create --display-name Vol1 10
```

```
+---------------------+--------------------------------------+
|       Property      |                Value                 |
+---------------------+--------------------------------------+
|     attachments     |                  []                  |
|  availability_zone  |                 nova                 |
|       bootable      |                false                 |
|      created_at     |      2014-08-25T17:43:37.106041      |
| display_description |                 None                 |
|     display_name    |                 Vol1                 |
|      encrypted      |                False                 |
|          id         | 2fecb1f2-e0d0-4283-bfad-15267eb0564c |
|       metadata      |                  {}                  |
|         size        |                  10                  |
|     snapshot_id     |                 None                 |
|     source_volid    |                 None                 |
|        status       |               creating               |
|     volume_type     |                 None                 |
+---------------------+--------------------------------------+
```

```
cinder list
```

```
+--------------------------------------+-----------+--------------+------+-------------+----------+-------------+
|                  ID                  |   Status  | Display Name | Size | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------+----------+-------------+
| 2fecb1f2-e0d0-4283-bfad-15267eb0564c | available |     Vol1     |  10  |     None    |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------+----------+-------------+
```

If the status is available, then volume creation and Cinder installation Completed successfully.

Lab 8: Horizon Dashboard Installation

The OpenStack dashboard, also known as Horizon, is a Web interface that enables cloud administrators and users to manage various OpenStack resources and services.

The dashboard enables web-based interactions with the OpenStack Compute cloud controller through the OpenStack APIs.

Step 1:

SSH to AIO node with the credentials in Lab access
Enter following command and Type **pass** as the [sudo] password

```
sudo su -

source ~/openrc.sh
```

Install Horizon

Step 2:

Install the dashboard on the node that can contact the Identity Service as root. Remove the openstack-dashboard-ubuntu-theme package. This theme prevents translations, several menus as well as the network map from rendering correctly:

```
apt-get install apache2 memcached libapache2-mod-wsgi openstack-dashboard -y

apt-get remove --purge openstack-dashboard-ubuntu-theme -y
```

Step 3:

Edit /etc/openstack-dashboard/local_settings.py and change OPENSTACK_HOST to the hostname of your Identity Service:

```
vi /etc/openstack-dashboard/local_settings.py
```

OPENSTACK_HOST = "aio**X**"

Step 4:

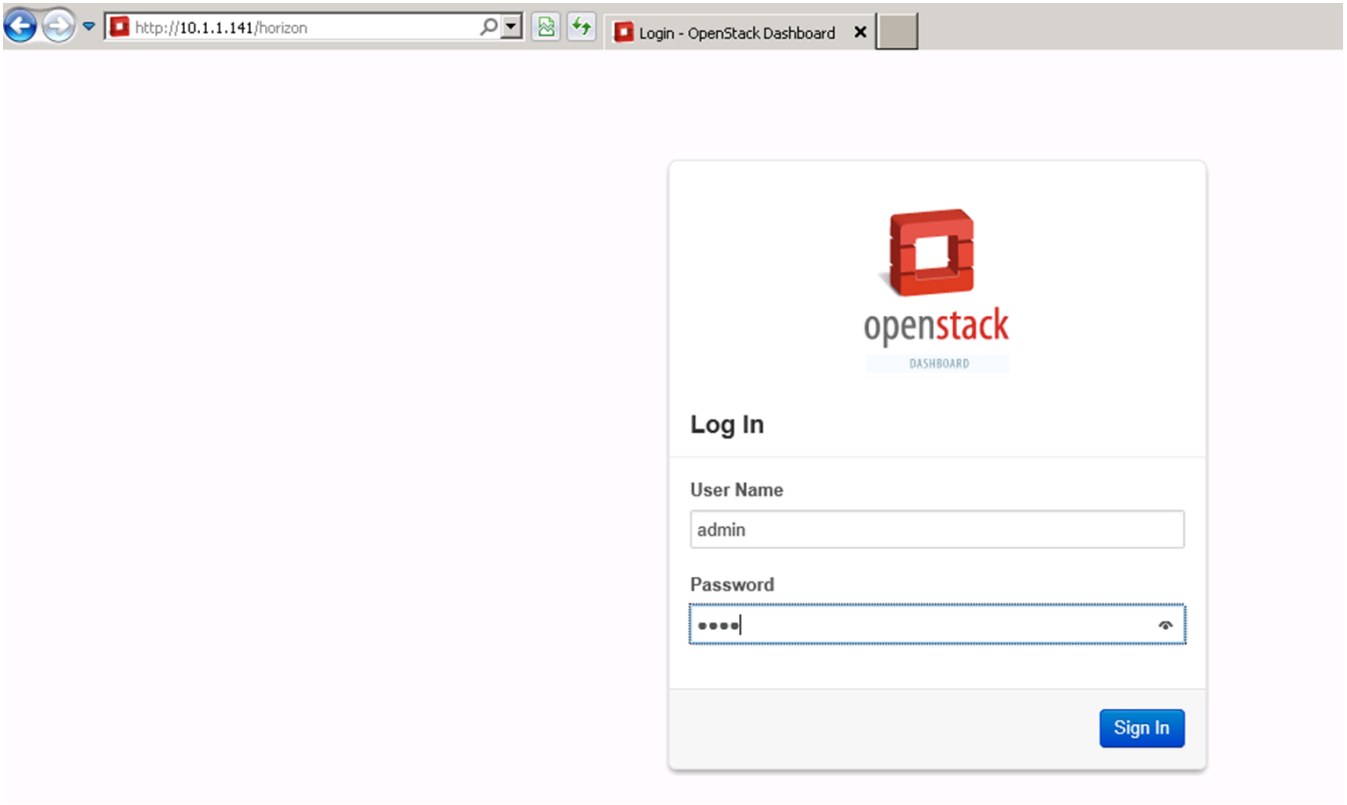
Start the Apache web server and memcached:

```
service apache2 restart

service memcached restart
```

Step 5:

Open the webbrowser and type http://***aio node IP address***/horizon
Type user name as admin and password as **pass**



Lab 8a: Log in to the dashboard

The dashboard is available on the node with the nova-dashboard server role.

1. Ask the cloud operator for the host name or public IP address from which you can access the dashboard, and for your user name and password.
2. Open a web browser that has JavaScript and cookies enabled.

   To use the Virtual Network Computing (VNC) client for the dashboard, your browser must support HTML5 Canvas and HTML5 WebSockets. The VNC client is based on noVNC. For details, see noVNC: HTML5 VNC Client. For a list of supported browsers, see Browser support.

3. In the address bar, enter the host name or IP address for the dashboard.

   ```
   http://ipAddressOrHostName/horizon
   ```

   If a certificate warning appears when you try to access the URL for the first time, a self-signed certificate is in use, which is not considered trustworthy by default. Verify the certificate or add an exception in the browser to bypass the warning.

4. On the **Log In** page, enter your user name and password, and click **Sign In**.

   The top of the window displays your user name. You can also access **Settings** or sign out of the dashboard.

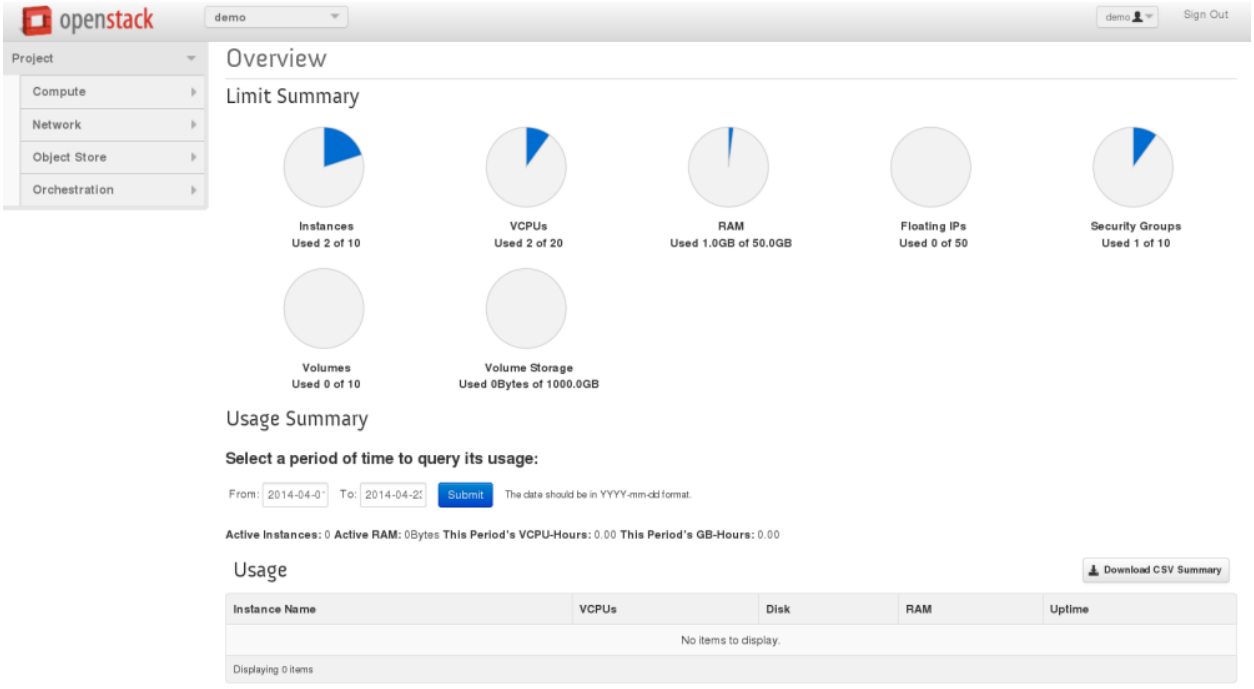
   The visible tabs and functions in the dashboard depend on the access permissions, or roles, of the user you are logged in as.

   - If you are logged in as an end user, the Project tab is displayed.
   - If you are logged in as an administrator, the Project tab and Admin tab are displayed.

OpenStack dashboard—Project tab

Projects are organizational units in the cloud, and are also known as tenants or accounts. Each user is a member of one or more projects. Within a project, a user creates and manages instances.

From the Project tab, you can view and manage the resources in a selected project, including instances and images. You select the project from the CURRENT PROJECT list at the top of the tab.



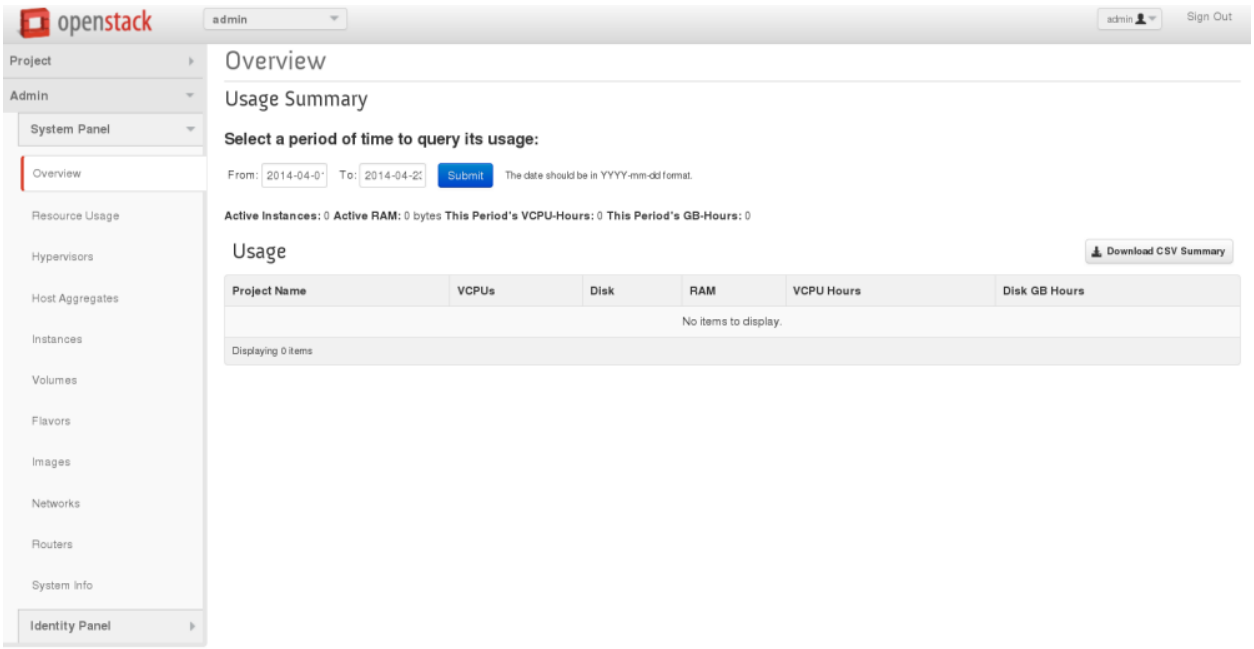
From the **Project** tab, you can access the following tabs:

Compute tab	
Overview	View reports for the project.
Instances	View, launch, create a snapshot from, stop, pause, or reboot instances, or connect to them through VNC.
Volumes	Use the following tabs to complete these tasks: **Volumes** View, create, edit, and delete volumes. **Volume Snapshots** View, create, edit, and delete volume snapshots.
Images	View images and instance snapshots created by project users, plus any images that are publicly available. Create, edit, and delete images, and launch instances from images and snapshots.
Access & Security	Use the following tabs to complete these tasks: **Security Groups**

Compute tab	
	View, create, edit, and delete security groups and security group rules. **Key Pairs** View, create, edit, import, and delete key pairs. **Floating IPs** Allocate an IP address to or release it from a project. **API Access** View API endpoints.
Network tab	
Network Topology	View the network topology.
Networks	Create and manage public and private networks.
Routers	Create and manage subnets.
Object Store tab	
Containers	Create and manage containers and objects.
Orchestration tab	
Containers	Use the REST API to orchestrate multiple composite cloud applications.

OpenStack dashboard—Admin tab

Administrative users can use the Admin tab to view usage and to manage instances, volumes, flavors, images, projects, users, services, and quotas.



Access the following categories to complete these tasks:

System Panel tab	
Overview	View basic reports.
Resource Usage	Use the following tabs to view the following usages: **Daily Report** View the daily report. **Stats** View the statistics of all resources.
Hypervisors	View the hypervisor summary.
Host Aggregates	View, create, and edit host aggregates. View the list of availability zones.
Instances	View, pause, resume, suspend, migrate, soft or hard reboot, and delete running instances that belong to users of some, but not all, projects. Also, view the log for an instance or access an instance through VNC.
Volumes	View, create, edit, and delete volumes and volume types.

System Panel tab	
Flavors	View, create, edit, view extra specifications for, and delete flavors. A flavor is size of an instance.
Images	View, create, edit properties for, and delete custom images.
Networks	View, create, edit properties for, and delete networks.
Routers	View, create, edit properties for, and delete routers.
System Info	Use the following tabs to view the service information: **Services** View a list of the services. **Compute Services** View a list of all Compute services. **Network Agents** View the network agents. **Default Quotas** View default quota values. Quotas are hard-coded in OpenStack Compute and define the maximum allowable size and number of resources.
Identity Panel tab	
Projects	View, create, assign users to, remove users from, and delete projects.
Users	View, create, enable, disable, and delete users.

Lab 8b: Upload and manage image

A virtual machine image, referred to in this document simply as an image, is a single file that contains a virtual disk that has a bootable operating system installed on it. Images are used to create virtual machine instances within the cloud. For information about creating image files, see the OpenStack Virtual Machine Image Guide.

Depending on your role, you may have permission to upload and manage virtual machine images. Operators might restrict the upload and management of images to cloud administrators or operators only. If you have the appropriate privileges, you can use the dashboard to upload and manage images in the admin project.

You can also use the **glance** and **nova** command-line clients or the Image Service and Compute APIs to manage images. See the section called “Manage images”.

Upload an image

Follow this procedure to upload an image to a project.

1. Log in to the dashboard.
2. From the CURRENT PROJECT on the Project tab, select the appropriate project.
3. On the Project tab, click Images.
4. Click Create Image.

   The Create an Image dialog box appears.
5. Enter the following values:

Name	Enter a name for the image.
Description	Optionally, enter a brief description of the image.
Image Source	Choose the image source from the list. Your choices are Image Location and Image File.
Image File or Image	Based on your selection for Image Source, you either enter

Location	the location URL of the image in the Image Location field. or browse to the image file on your system and add it. e.g. http source and: http://10.1.1.92/images/cirros-0.3.2-x86_64-disk.img
Format	Select the correct format (for example, QCOW2) for the image.
Architecture	Specify the architecture. For example, i386 for a 32-bit architecture or x86-64for a 64-bit architecture.
Minimum Disk (GB) andMinimum RAM (MB)	Leave these optional fields empty.
Public	Select this check box to make the image public to all users with access to the current project.
Protected	Select this check box to ensure that only users with permissions can delete the image.

6. Click Create Image.

   The image is queued to be uploaded. It might take some time before the status changes from Queued to Active.

Update an image

Follow this procedure to update an existing image.

1. Log in to the dashboard.
2. From the **CURRENT PROJECT** on the **Project** tab, select the appropriate project.
3. On the **Project** tab, click **Images**.
4. Select the image that you want to edit.

5. In the **Actions** column, click **More** and then select **Edit** from the list.
6. In the Update Image dialog box, you can perform the following actions:
    - Change the name of the image.
    - Select the **Public** check box to make the image public.
    - Clear the **Public** check box to make the image private.
7. Click **Update Image**.

Delete an image

Deletion of images is permanent and **cannot** be reversed. Only users with the appropriate permissions can delete images.

1. Log in to the dashboard.
2. From the **CURRENT PROJECT** on the **Project** tab, select the appropriate project.
3. On the **Project** tab, click **Images**.
4. Select the images that you want to delete.
5. Click **Delete Images**.
6. In the **Confirm Delete Image** dialog box, click **Delete Images** to confirm the deletion.

Lab 8c: Configure access and security for instances

Before you launch an instance, you should add security group rules to enable users to ping and use SSH to connect to the instance. To do so, you either add rules to the default security group or add a security group with rules.

Key pairs are SSH credentials that are injected into an instance when it is launched. To use key pair injection, the image that the instance is based on must contain the cloud-init package. Each project should have at least one key pair. For more information, see the section called “Add a key pair”.

If you have generated a key pair with an external tool, you can import it into OpenStack. The key pair can be used for multiple instances that belong to a project. For more information, see the section called “Import a key pair”.

When an instance is created in OpenStack, it is automatically assigned a fixed IP address in the network to which the instance is assigned. This IP address is permanently associated with the instance until the instance is terminated. However, in addition to the fixed IP address, a floating IP address can also be attached to an instance. Unlike fixed IP addresses, floating IP addresses are able to have their associations modified at any time, regardless of the state of the instances involved.

Add a rule to the default security group

This procedure enables SSH and ICMP (ping) access to instances. The rules apply to all instances within a given project, and should be set for every project unless there is a reason to prohibit SSH or ICMP access to the instances.

This procedure can be adjusted as necessary to add additional security group rules to a project, if your cloud requires them.

1. Log in to the dashboard, choose a project, and click **Access & Security**. The **Security Groups** tab shows the security groups that are available for this project.
2. Select the **default** security group and click **Edit Rules**.
3. To allow SSH access, click **Add Rule**.
4. In the Add Rule dialog box, enter the following values:

Rule	SSH
Remote	CIDR
CIDR	0.0.0.0/0

To accept requests from a particular range of IP addresses, specify the IP address block in the **CIDR** box.

5. Click **Add**.

   Instances will now have SSH port 22 open for requests from any IP address.
6. To add an ICMP rule, click **Add Rule**.
7. In the Add Rule dialog box, enter the following values:

Rule	All ICMP
Direction	Ingress
Remote	CIDR
CIDR	0.0.0.0/0

8. Click **Add**.

   Instances will now accept all incoming ICMP packets.

Add a key pair

Create at least one key pair for each project.

1. Log in to the dashboard, choose a project, and click **Access & Security**.
2. Click the **Keypairs** tab, which shows the key pairs that are available for this project.
3. Click **Create Keypair**.
4. In the Create Keypair dialog box, enter a name for your key pair, and click **Create Keypair**.
5. Respond to the prompt to download the key pair.

Import a key pair

If you don't have a keypair on your local machine (aka OS-X or Linux or the AIO control host):

```
cat ~/.ssh/id_rsa.pub
```

If that is blank, then:

```
ssh-keygen –t rsa –f ~/.ssh/id_rsa –N ''
```

1. Log in to the dashboard, choose a project, and click **Access & Security**.
2. Click the **Keypairs** tab, which shows the key pairs that are available for this project.
3. Click **Import Keypair**.
4. In the Import Keypair dialog box, enter the name of your key pair, copy the public key into the **Public Key** box, and then click **Import Keypair**.

If you are using the dashboard from a Windows computer, use PuTTYgen to load the *.pem file and convert and save it as *.ppk. For more information see the WinSCP web page for PuTTYgen.

The Compute database registers the public key of the key pair.

The dashboard lists the key pair on the Access & Security tab, though you can not download the public keypair directly from horizon.

Allocate a floating IP address to an instance

When an instance is created in OpenStack, it is automatically assigned a fixed IP address in the network to which the instance is assigned. This IP address is permanently associated with the instance until the instance is terminated.

However, in addition to the fixed IP address, a floating IP address can also be attached to an instance. Unlike fixed IP addresses, floating IP addresses can have their associations modified at any time, regardless of the state of the instances involved. This procedure details the reservation of a floating IP address from an existing pool of addresses and the association of that address with a specific instance.

1. Log in to the dashboard, choose a project, and click **Access & Security**.
2. Click the **Floating IPs** tab, which shows the floating IP addresses allocated to instances.
3. Click **Allocate IP to Project**.
4. Choose the pool from which to pick the IP address.
5. Click **Allocate IP**.
6. In the **Floating IPs** list, click **Associate**.
7. In the Manage Floating IP Associations dialog box, choose the following options:
    - The **IP Address** field is filled automatically, but you can add a new IP address by clicking the **+** button.
    - In the **Ports to be associated** field, select a port from the list.
8. The list shows all the instances with their fixed IP addresses.
9. Click **Associate**.

To disassociate an IP address from an instance, click the Disassociate button.

To release the floating IP address back into the pool of addresses, click the More button and select the Release Floating IP option.

Lab 8d: Launch and manage instances

Instances are virtual machines that run inside the cloud.

You can launch an instance from the following sources:

- Images uploaded to the OpenStack Image Service, as described in the section called "Upload and manage images".
- Image that you have copied to a persistent volume. The instance launches from the volume, which is provided by the cinder-volume API through iSCSI.

Launch an instance

When you launch an instance from an image, OpenStack creates a local copy of the image on the compute node where the instance starts.

When you launch an instance from a volume, note the following steps:

- To select the volume to from which to launch, launch an instance from an arbitrary image on the volume. The image that you select does not boot. Instead, it is replaced by the image on the volume that you choose in the next steps.

  To boot a Xen image from a volume, the image you launch in must be the same type, fully virtualized or paravirtualized, as the one on the volume.

- Select the volume or volume snapshot from which to boot. Enter a device name. Enter vda for KVM images or xvda for Xen images.

1. Log in to the dashboard, choose a project, and click **Images**.

   The dashboard shows the images that have been uploaded to OpenStack Image Service and are available for this project.

   For details on creating images, see Creating images manually in the *OpenStack Virtual Machine Image Guide*.

2. Select an image and click **Launch**.
3. In the Launch Instance dialog box, specify the following values:

Details tab	
Availability Zone	By default, this value is set to the availability zone given by the cloud provider (for example, `us-west` or `apac-south`). For some cases, it could be `nova`.
Instance Name	Assign a name to the virtual machine. The name you assign here becomes the initial host name of the server. After the server is built, if you change the server name in the API or change the host name directly, the names are not updated in the dashboard. Server names are not guaranteed to be unique when created so you could have two instances with the same host name.
Flavor	Specify the size of the instance to launch. The flavor is selected based on the size of the image selected for launching an instance. For example, while creating an image, if you have entered the value in the **Minimun RAM (MB)**field as 2048, then on selecting the image, the default flavor is **m1.small**.
Instance Count	To launch multiple instances, enter a value greater than 1. The default is 1.
Instance Boot Source	Your options are: **Boot from image** If you choose this option, a new field for **Image Name** displays. You can select the image from the list. **Boot from snapshot** If you choose this option, a new field for **Instance Snapshot**displays. You can select the snapshot from the list. **Boot from volume** If you choose this option, a new field for **Volume** displays. You can select the volume from the list. **Boot from image (creates a new volume)** With this option, you can boot from an image and create a volume by entering the **Device Size** and **Device Name** for your volume.

Details tab	
	Click the **Delete on Terminate** option to delete the volume on terminating the instance. **Boot from volume snapshot (creates a new volume)** Using this option, you can boot from a volume snapshot and create a new volume by choosing **Volume Snapshot** from a list and adding a **Device Name** for your volume. Click the **Delete on Terminate**option to delete the volume on terminating the instance. Since you are launching an instance from an image, **Boot from image** is chosen by default.
Image Name	This field changes based on your previous selection. Since you have chosen to launch an instance using an image, the **Image Name** field displays. Select the image name from the dropdown list.
Access & Security tab	
Keypair	Specify a key pair. If the image uses a static root password or a static key set (neither is recommended), you do not need to provide a key pair to launch the instance.
Security Groups	Activate the security groups that you want to assign to the instance. Security groups are a kind of cloud firewall that defines which incoming network traffic is forwarded to instances. For details, see the section called "Add a rule to the default security group". If you have not created any security groups, you can assign only the default security group to the instance.
Networking tab	
Selected Networks	To add a network to the instance, click the **+** in the **Available Networks**field.
Post-Creation tab	
Customization Script	Specify a customization script that runs after your instance launches.
Advanced Options tab	

Details tab	
Disk Partition	Select the type of disk partition from the dropdown list. **Automatic** Entire disk is single partition and automatically resizes. **Manual** Faster build times but requires manual partitioning.

4. Click **Launch**.

   The instance starts on a compute node in the cloud.

The **Instances** tab shows the instance's name, its private and public IP addresses, size, status, task, and power state.

If you did not provide a key pair, security groups, or rules, users can access the instance only from inside the cloud through VNC. Even pinging the instance is not possible without an ICMP rule configured. To access the instance through a VNC console, see the section called “Access an instance through a console”.

Connect to your instance by using SSH

To use SSH to connect to your instance, you use the downloaded keypair file.

The user name is ubuntu for the Ubuntu cloud images on TryStack.

1. Copy the IP address for your instance.
2. Use the **ssh** command to make a secure connection to the instance. For example:

   $ ssh -i MyKey.pem ubuntu@10.0.0.2

3. At the prompt, type yes.

Track usage for instances

You can track usage for instances for each project. You can track costs per month by showing metrics like number of vCPUs, disks, RAM, and uptime for all your instances.

1. Log in to the dashboard, choose a project, and click **Overview**.
2. To query the instance usage for a month, select a month and click **Submit**.
3. To download a summary, click **Download CSV Summary**.

Create an instance snapshot

1. Log in to the dashboard, choose a project, and click **Instances**.
2. Select the instance from which to create a snapshot.
3. In the **Actions** column, click **Create Snapshot**.
4. In the Create Snapshot dialog box, enter a name for the snapshot, and click **Create Snapshot**.

The **Images** category shows the instance snapshot.

To launch an instance from the snapshot, select the snapshot and click **Launch**. Proceed with the section called “Launch an instance”.

Manage an instance

1. Log in to the dashboard, choose a project, and click **Instances**.
2. Select an instance.
3. In the **More** list in the **Actions** column, select the state.

You can resize or rebuild an instance. You can also choose to view the instance console log, edit instance or the security groups. Depending on the current state of the instance, you can pause, resume, suspend, soft or hard reboot, or terminate it.

Lab 8e: Create and manage volumes

Volumes are block storage devices that you attach to instances to enable persistent storage. You can attach a volume to a running instance or detach a volume and attach it to another instance at any time. You can also create a snapshot from or delete a volume. Only administrative users can create volume types.

Create a volume

1. Log in to the dashboard, choose a project, and click **Volumes**.
2. Click **Create Volume**.

In the dialog box that opens, enter or select the following values.

Volume Name	Specify a name for the volume.
Description	Optionally, provide a brief description for the volume.
Type	Leave this field blank.
Size (GB)	The size of the volume in gigabytes.
Volume Source	Select one of the following options: **No source, empty volume** Creates an empty volume. An empty volume does not contain a file system or a partition table. **Snapshot** If you choose this option, a new field for **Use snapshot as a source** displays. You can select the snapshot from the list. **Image** If you choose this option, a new field for **Use image as a source**displays. You can select the image from the list. Select the **Availability Zone** from the list. By default, this value is set to the availability zone given by the cloud provider (for example,`us-west` or `apac-south`). For some cases, it could be `nova`. **Volume** If you choose this option, a new field for **Use volume as a source**displays. You can select the volume from the list. Options to use a snapshot or a volume as the source for a volume are displayed only if there are existing snapshots or volumes.

3. Click **Create Volume**.

The dashboard shows the volume on the **Volumes** tab.

Attach a volume to an instance

After you create one or more volumes, you can attach them to instances. You can attach a volume to one instance at a time.

1. Log in to the dashboard, choose a project, and click **Volumes**.
2. Select the volume to add to an instance and click **Edit Attachments**.
3. In the **Manage Volume Attachments** dialog box, select an instance.
4. Enter the name of the device from which the volume is accessible by the instance.

   The actual device name might differ from the volume name because of hypervisor settings.
5. Click **Attach Volume**.

The dashboard shows the instance to which the volume is now attached and the device name.

You can view the status of a volume in the **Volumes** tab of the dashboard. The volume is either Available or In-Use.

Now you can log in to the instance and mount, format, and use the disk.

Detach a volume from an instance

1. Log in to the dashboard, choose a project, and click **Volumes**.
2. Select the volume and click **Edit Attachments**.
3. Click **Detach Volume** and confirm your changes.

A message indicates whether the action was successful.

Create a snapshot from a volume

1. Log in to the dashboard, choose a project, and click **Volumes**.
2. Select a volume from which to create a snapshot.
3. From the **More** list, select **Create Snapshot**.

4. In the dialog box that opens, enter a snapshot name and a brief description.
5. Confirm your changes.

   The dashboard shows the new volume snapshot in **Volume Snapshots** tab.

Edit a volume

1. Log in to the dashboard, choose a project, and click **Volumes**.
2. From the **CURRENT PROJECT** on the **Project** tab, select the appropriate project.
3. On the **Project** tab, click **Volumes**.
4. Select the image that you want to edit.
5. In the **Actions** column, click **Edit Volume**.
6. In the **Edit Volume** dialog box, update the name and description of the image.
7. Click **Edit Volume**.

You can extend a volume by using the **Extend Volume** option available in the **More** dropdown list and entering the new value for volume size.

Delete a volume

When you delete an instance, the data in its attached volumes is not destroyed.

1. Log in to the dashboard, choose a project, and click **Volumes**.
2. Select the check boxes for the volumes that you want to delete.
3. Click **Delete Volumes** and confirm your choice.

A message indicates whether the action was successful.

Lab 8f: Create and manage networks

The OpenStack Networking service provides a scalable system for managing the network connectivity within an OpenStack cloud deployment. It can easily and quickly react to changing network needs (for example, creating and assigning new IP addresses).

Networking in OpenStack is complex. This section provides the basic instructions for creating a network and a router. For detailed information about managing networks, refer to the OpenStack Cloud Administrator Guide.

Create a network

1. Log in to the dashboard, choose a project, and click **Networks**.
2. Click **Create Network**.
3. In the Create Network dialog box, specify the following values.

Network tab	
Network Name	Specify a name to identify the network.
Subnet tab	
Create Subnet	Select this check box to create a subnet You do not have to specify a subnet when you create a network, but if you do not, any attached instance receives an Error status.
Subnet Name	Specify a name for the subnet.
Network Address	Specify the IP address for the subnet.
IP Version	Select IPv4 or IPv6.
Gateway IP	Specify an IP address for a specific gateway. This parameter is optional.
Disable Gateway	Select this check box to disable a gateway IP address.
Subnet Detail tab	
Enable DHCP	Select this check box to enable DHCP.

Network tab	
Allocation Pools	Specify IP address pools.
DNS Name Servers	Specify a name for the DNS server.
Host Routes	Specify the IP address of host routes.

4. Click **Create**.

   The dashboard shows the network on the **Networks** tab.

Create a router

1. Log in to the dashboard, choose a project, and click **Routers**.
2. Click **Create Router**.
3. In the Create Router dialog box, specify a name for the router and click **Create Router**.

   The new router is now displayed in the **Routers** tab.
4. Click the new router's **Set Gateway** button.
5. In the **External Network** field, specify the network to which the router will connect, and then click **Set Gateway**.
6. To connect a private network to the newly created router, perform the following steps:
   a) On the **Routers** tab, click the name of the router.
   b) On the Router Details page, click **Add Interface**.
   c) In the Add Interface dialog box, specify the following information:

Subnet	Select a subnet.
IP Address (optional)	Enter the router interface IP address for the selected subnet. Note: If this value is not set, then by default, the first host IP address in the subnet is used by OpenStack Networking.

   The **Router Name** and **Router ID** fields are automatically updated.

7. Click **Add Interface**.

You have successfully created the router. You can view the new topology from the **Network Topology** tab.

Lab 9: Orchestration Service Installation

In Orchestration Service, we are installing and configuring orchestration service Heat.The Orchestration Service provides a template-based orchestration for describing a cloud application by running OpenStack API calls to generate running cloud applications. The software integrates other core components of OpenStack into a one-file template system. The templates enable you to create most OpenStack resource types, such as instances, floating IPs, volumes, security groups, users, and so on.

SSH to AIO node with the credentials in Lab access
Enter following command

Step 1:

```
sudo su -

source openrc.sh
```

Heat Installation on AIO Node

Step 2:

On controller node install the orchestration module.

```
apt-get install heat-api heat-api-cfn heat-engine -y
```

Create Database for Orchestration Service

Step 3:

Create Database heat for Orchestration service by login to mysql with password as **pass**

```
mysql -u root -ppass

mysql> CREATE DATABASE heat;

mysql> GRANT ALL PRIVILEGES ON heat.* TO 'heat'@'localhost'
IDENTIFIED BY 'pass';

mysql> GRANT ALL PRIVILEGES ON heat.* TO 'heat'@'%' IDENTIFIED
BY 'pass';

mysql> exit
```

Step 4:

By default, the Ubuntu packages create a SQLite database. Delete the heat.sqlite file created in the /var/lib/heat/ directory so that it does not get used by mistake.

```
rm /var/lib/heat/heat.sqlite
```

Step 5:

Create a heat user that the Orchestration service uses to authenticate with the Identity Service. Use the service tenant and give the user the admin role

```
keystone user-create --name=heat --pass=pass --
email=heat@onecloud.com

keystone user-role-add --user=heat --tenant=service --role=admin

keystone role-create --name heat_stack_user
```

Define services and service endpoints

Register the Heat and CloudFormation APIs with the Identity Service so that other OpenStack services can locate these APIs. Register the services and specify the endpoints:

Step 6:

```
keystone service-create --name=heat --type=orchestration --
description="Orchestration"
```

Note: Create service endpoint for the service. Change **X** with AIO node Number

```
keystone endpoint-create \

--service-id=$(keystone service-list | awk '/ orchestration /
{print $2}') \

--publicurl=http://aioX:8004/v1/%\(tenant_id\)s \

--internalurl=http://aioX:8004/v1/%\(tenant_id\)s \

--adminurl=http://aioX:8004/v1/%\(tenant_id\)s
```

Similarly register a service and endpoint for heat-cfn.

```
keystone service-create --name=heat-cfn --type=cloudformation \

  --description="Orchestration CloudFormation"
```

Note: copy the service id and use it create the service end point

```
keystone endpoint-create \

--service-id=$(keystone service-list | awk '/ cloudformation /
{print $2}') \
```

```
--publicurl=http://aioX:8000/v1 \

--internalurl=http://aioX:8000/v1 \

--adminurl=http://aioX:8000/v1
```

Configure Heat Service

Edit /etc/heat/heat.conf

Step 7:

```
vi /etc/heat/heat.conf
```

Change the following in [DEFAULT], [keystone_authtoken], [ec2authtoken] and [database] sections

```
[DEFAULT]
...
rabbit_host = aioX
rabbit_password = pass
...
heat_metadata_server_url = http://10.1.64.1X:8000
heat_waitcondition_server_url = http:// 10.1.64.1X:8000/v1/waitcondition

[database]
connection = mysql://heat:pass@aioX/heat

[keystone_authtoken]
auth_host = aioX
auth_port = 35357
auth_protocol = http
auth_uri = http://aioX:5000/v2.0
admin_tenant_name = service
admin_user = heat
admin_password = pass

[ec2authtoken]
auth_uri = http://aioX:5000/v2.0
```

Step 8:

```
su -s /bin/sh -c "heat-manage db_sync" heat

service heat-api restart

service heat-api-cfn restart
```

```
service heat-engine restart
```

Verify the Orchestration service installation

Step 9:

Create a test template in the test-stack.yml file with the following content:

```
vi test-stack.yml
```

Copy following content to the test-stack.yml:

```
heat_template_version: 2013-05-23

description: Simple template to deploy a single compute instance

resources:
  my_instance:
    type: OS::Nova::Server
    properties:
      name: Stack-VM
      key_name: mykey
      image: CirrOS 0.3.2
      flavor: m1.tiny
```

Use the **heat stack-create** command to create a stack from this template:

```
heat stack-create -f test-stack.yml Stack1
```

Verify that the stack was created successfully with the **heat stack-list** command:

```
heat stack-list
```

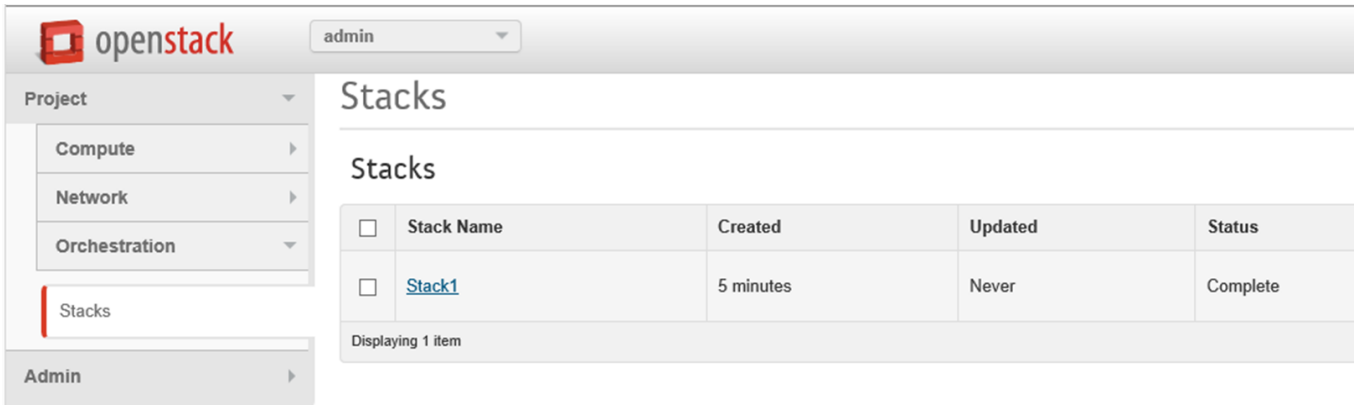
```
+--------------------------------------+------------+-----------------+----------------------+
| id                                   | stack_name | stack_status    | creation_time        |
+--------------------------------------+------------+-----------------+----------------------+
| 847ee6a4-61ff-4bbe-953a-7d080cbac2f8 | Stack1     | CREATE_COMPLETE | 2014-08-30T15:08:15Z |
+--------------------------------------+------------+-----------------+----------------------+
```

Step 10:

Log on to Openstack Dashboard by Opening the webbrowser and type http://***aio node IP address***/horizon. Type user name as **admin** and password as **pass**

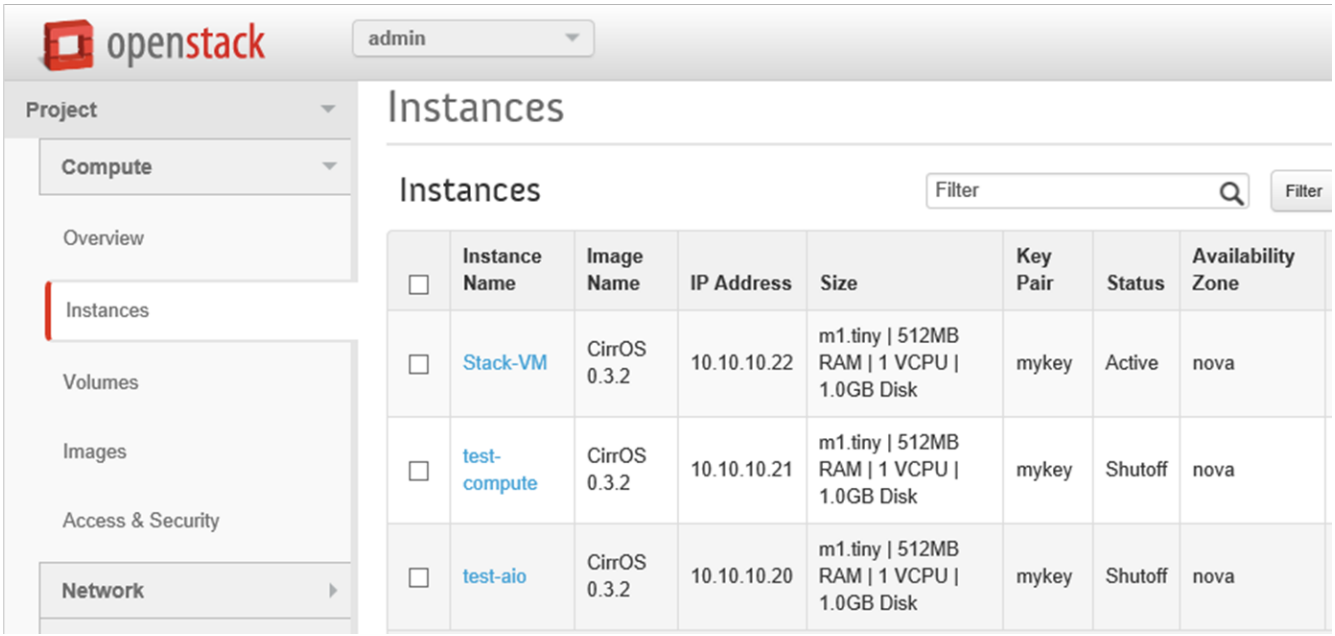
Goto Project → Orchestration → Stacks

Click on **Stack1**



This will create a new instance Stack-VM as described in the Stack1 template.

Goto Project → Compute → Instance



Now Orchestration service is installed and working successfully.

Lab 10: Telemetry Service Installation

The Telemetry module:

- Efficiently collets the metering data about the CPI and network costs.
- Collects data by monitoring notifications sent from servers or by polling the infrastructures

- Configures the type of collected data to meet various operating requirements. Accessing and inserting metering data through the REST API.
- Expands the framework to collect custom usage data by additional plug-ins.
- Produces signed metering messages that cannot be repudiated.

Step 1:

SSH to AIO node with the credentials in Lab access
Enter following command

```
sudo su -

source openrc.sh
```

Telemetry Module Installation on AIO Node

Telemetry provides an API service that provides a collector and a range of disparate agents. Before you can install these agents on nodes such as the compute node, you must use this procedure to install the core components on the controller node.

Step 2:

```
apt-get install ceilometer-api ceilometer-collector ceilometer-
agent-central ceilometer-agent-notification ceilometer-alarm-
evaluator ceilometer-alarm-notifier python-ceilometerclient
```

Since we have installed Compute in AIOX, we need install ceilometer agent for compute

```
apt-get install ceilometer-agent-compute
```

Create Database for Telemetry Service

The Telemetry service uses a database to store information. Specify the location of the database in the configuration file. The examples use a MySQL database on the controller node:

Step 3:

```
mysql -u root -ppass

mysql> CREATE DATABASE ceilometer;

mysql> GRANT ALL PRIVILEGES ON ceilometer.* TO
'ceilometer'@'localhost' IDENTIFIED BY 'pass';

mysql> GRANT ALL PRIVILEGES ON ceilometer.* TO 'ceilometer'@'%'
IDENTIFIED BY 'pass';
```

```
mysql> exit
```

Step 4:

By default, the Ubuntu packages create a SQLite database. Delete the ceilometer.sqlite file created in the /var/lib/ceilometer/ directory so that it does not get used by mistake.

```
rm /var/lib/ceilometer/ceilometer.sqlite
```

Step 5:

Create a ceilometer user that the Telemetry service uses to authenticate with the Identity Service. Use the service tenant and give the user the admin role:

```
keystone user-create --name=ceilometer --pass=pass --
email=ceilometer@onecloud.com
```

```
keystone user-role-add --user=ceilometer --tenant=service --
role=admin
```

Define services and service endpoints

Step 6:

Register the Telemetry service with the Identity Service so that other OpenStack services can locate it. Use the keystone command to register the service and specify the endpoint:

```
keystone service-create --name=ceilometer --type=metering --
description="Telemetry"
```

Note: Create the service end point for the service. Change **X** with AIO node Number

```
keystone endpoint-create \
```

```
--service-id=$(keystone service-list | awk '/ metering / {print
$2}') \
```

```
--publicurl=http://aioX:8777 \
```

```
--internalurl=http://aioX:8777 \
```

```
--adminurl=http://aioX:8777
```

Configure Ceilometer Service

Step 7:

Edit /etc/ceilometer/ceilometer.conf

vi /etc/ceilometer/ceilometer.conf

Uncomment and Update the following in [Default] Section

```
[DEFAULT]
…
auth_strategy = keystone
…
log_dir = /var/log/ceilometer
…
rabbit_host = aio X
…
rabbit_password = pass
```

Update the following in [database] Section

```
[database]
connection = mysql://ceilometer:pass@aio X/ceilometer
```

Uncomment and Update the following in [keystone_authtoken] Section

```
[keystone_authtoken]
auth_host = aio X
auth_port = 35357
auth_protocol = http
auth_uri = http://aio X:5000
admin_user = ceilometer
admin_password = pass
admin_tenant_name = service
```

Uncomment and Update the following in [publisher] Section

```
[publisher]
metering_secret = pass
```

Uncomment and Update the following in [service_credentials] Section

```
[service_credentials]
os_username = ceilometer
os_password = pass
os_tenant_name = service
os_auth_url = http://aio X:5000/v2.0
```

Configure Compute agent for Telemetry

Telemetry provides an API service that provides a collector and a range of disparate agents. This procedure details how to install the agent that runs on the compute node.

Step 8:

Edit the /etc/nova/nova.conf file and add the following lines to the [DEFAULT] section:

vi /etc/nova/nova.conf

```
[DEFAULT]
…
instance_usage_audit = True
instance_usage_audit_period = hour
notify_on_state_change = vm_and_task_state
notification_driver = nova.openstack.common.notifier.rpc_notifier
notification_driver = ceilometer.compute.nova_notifier
```

Configure the Image Service for Telemetry

Step 9:

To retrieve image samples, you must configure the Image Service to send notifications to the bus.

Edit /etc/glance/glance-api.conf

Uncomment and modify the [DEFAULT] section:

```
notification_driver = messaging
rpc_backend = rabbit
rabbit_host = aioX
rabbit_password = pass
```

Add Block Storage service agent for Telemetry

Step 10:

To retrieve volume samples, you must configure the Block Storage service to send notifications to the bus.

Edit /etc/cinder/cinder.conf and add in the [DEFAULT] section on the controller and volume nodes:

vi /etc/cinder/cinder.conf

```
control_exchange = cinder
notification_driver = cinder.openstack.common.notifier.rpc_notifier
```

Step 11:

Run the following command to populate database

ceilometer-dbsync

Restart the following service

```
service ceilometer-agent-central restart

service ceilometer-agent-notification restart

service ceilometer-api restart

service ceilometer-collector restart

service ceilometer-alarm-evaluator restart

service ceilometer-alarm-notifier restart

service ceilometer-agent-compute restart

service glance-registry restart

service glance-api restart

service cinder-api restart

service cinder-scheduler restart

service cinder-volume restart

service nova-compute restart
```

Step 12:

Use the ceilometer meter-list command to test the access to Telemetry:

```
ceilometer meter-list
```

Lab 10a: Telemetry Service Installation on Compute Node

Install the Telemetry service on the compute node(ComputeY):

Step 1:

Log On to Compute**Y** and type following commands

```
sudo su -
```

Install telemetry agent for compute to collect information from Compute Node.

```
apt-get install ceilometer-agent-compute
```

Step 2:

Edit the /etc/nova/nova.conf file and add the following lines to the [DEFAULT] section:

```
[DEFAULT]
...
instance_usage_audit = True
instance_usage_audit_period = hour
notify_on_state_change = vm_and_task_state
notification_driver = nova.openstack.common.notifier.rpc_notifier
notification_driver = ceilometer.compute.nova_notifier
```

Configure Ceilometer Service

Step 3:

Edit /etc/ceilometer/ceilometer.conf

```
vi /etc/ceilometer/ceilometer.conf
```

Uncomment and Update the following in [Default] Section

```
[DEFAULT]
…
log_dir = /var/log/ceilometer
…
rabbit_host = aioX
…
rabbit_password = pass
```

Update the following in [database] Section

```
[database]
connection = mysql://ceilometer:pass@aioX/ceilometer
```

Uncomment and Update the following in [keystone_authtoken] Section

```
[keystone_authtoken]
auth_host = aioX
auth_port = 35357
auth_protocol = http
auth_uri = http://aioX:5000
admin_user = ceilometer
admin_password = pass
admin_tenant_name = service
```

Uncomment and Update the following in [publisher] Section

```
[publisher]
metering_secret = pass
```

Uncomment and Update the following in [service_credentials] Section

```
[service_credentials]
os_username = ceilometer
os_password = pass
os_tenant_name = service
os_auth_url = http://aioX:5000/v2.0
```

Step 4:

Restart the following service

```
service nova-compute restart

service ceilometer-agent-compute restart
```

Verify the Telemetry service installation

Step 5:

Download an image from the Image Service:

```
glance image-download "CirrOS 0.3.2" > cirros.img
```

You can now get usage statistics for the various meters:

```
ceilometer statistics -m image.download -p 60
```

This command will give a statistics of image download meter.

Step 6:

Log on to Openstack Dashboard by Open the webbrowser and type http://***aio node IP address***/horizon. Type user name as **admin** and password as **pass**

Goto Admin → System Panel →Resource Usage

Click **Stats** and check for different Metric

Telemetry Service is now installed successfully.

Lab 11: Install OpenStack with DevStack

Instructions for installing OpenStack using DevStack and VirtualBox are documented in a separate document available at:

https://github.com/onecloud/openstack_bootcamp

Files needed for this exercise are available for free online or may be available from your instructor.

Thank you