Experiment No. 04

Title: OpenStack Instance

Batch: B–1 **Roll No.: 16010422234** **Experiment No.: 04**

Aim: Launch an instance on OpenStack (IaaS)

Resources needed: OpenStack

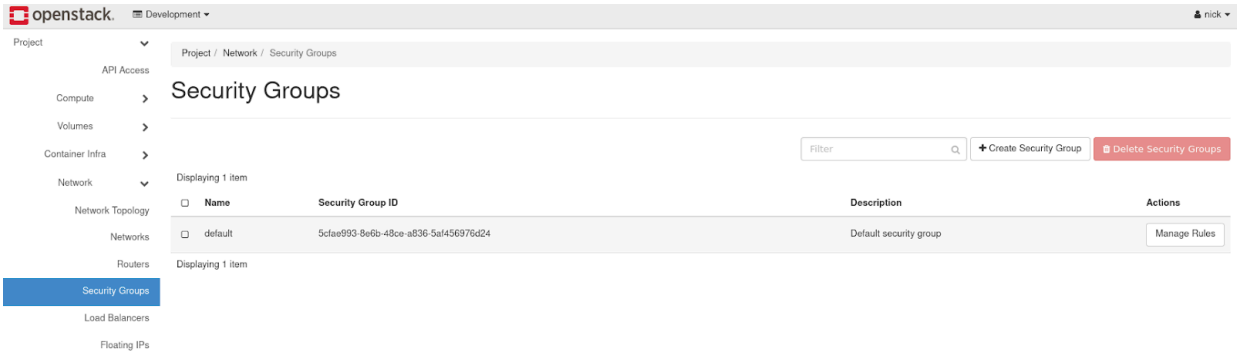
Prerequisite: Knowledge of Client Server communication

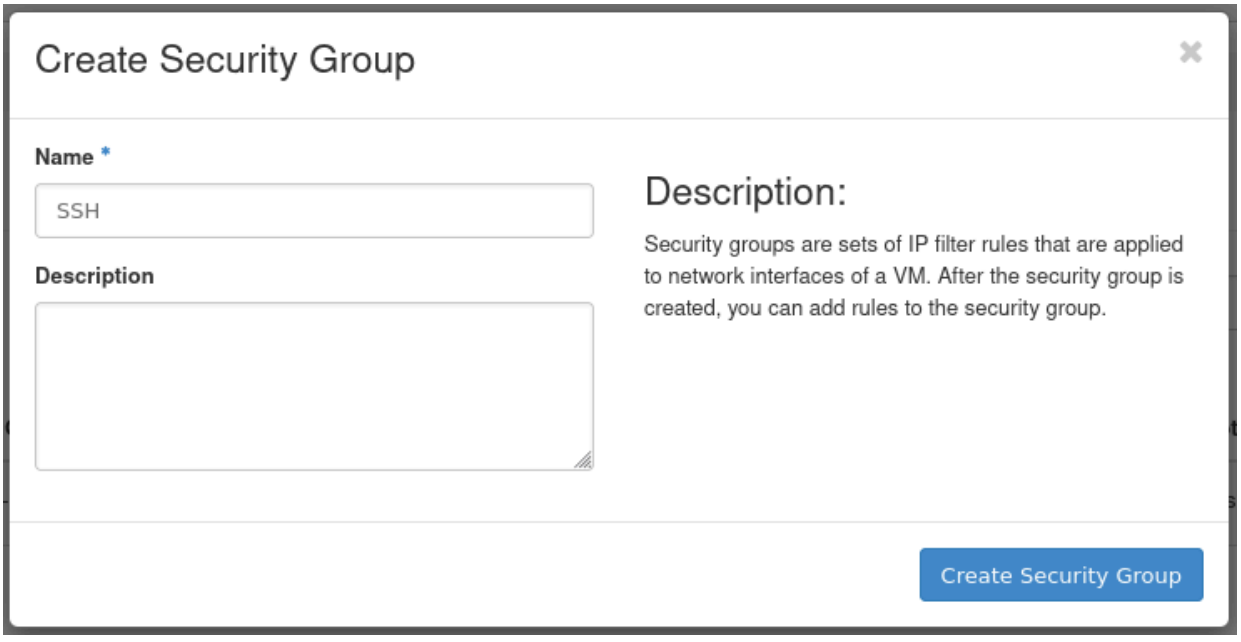
Theory:

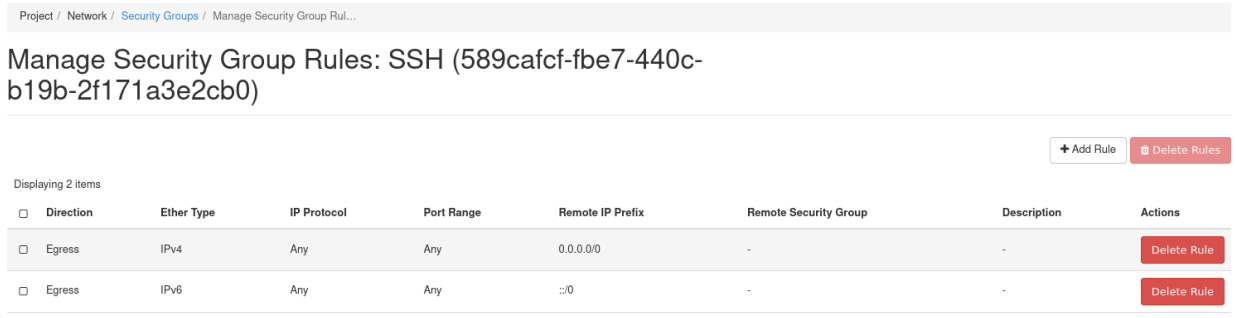
Procedure:

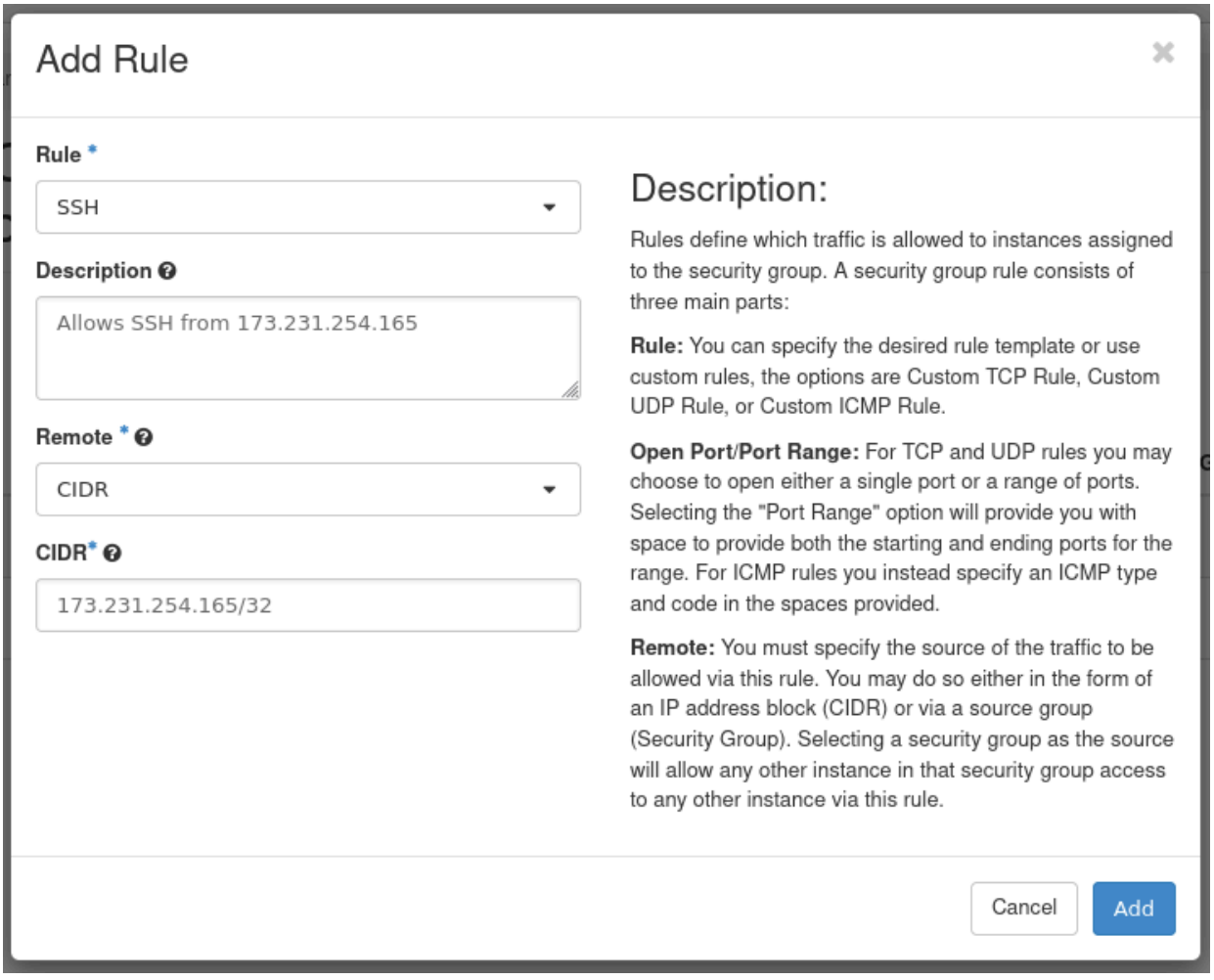
1. **Create an Instance**
2. **Assign and Attach Floating IP**
3. **Connect to the instance**

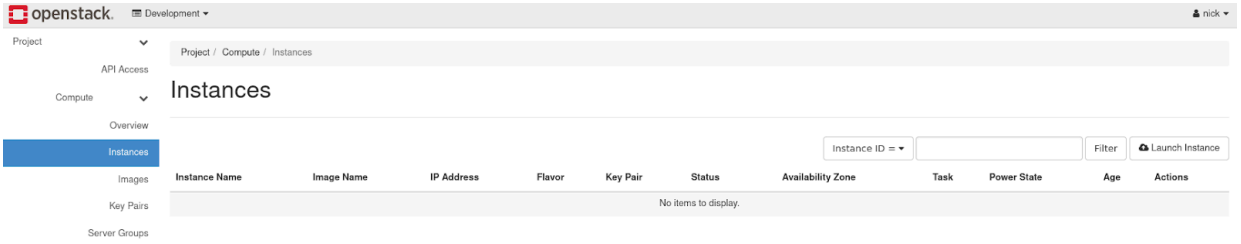
Result: (All steps with screenshots)

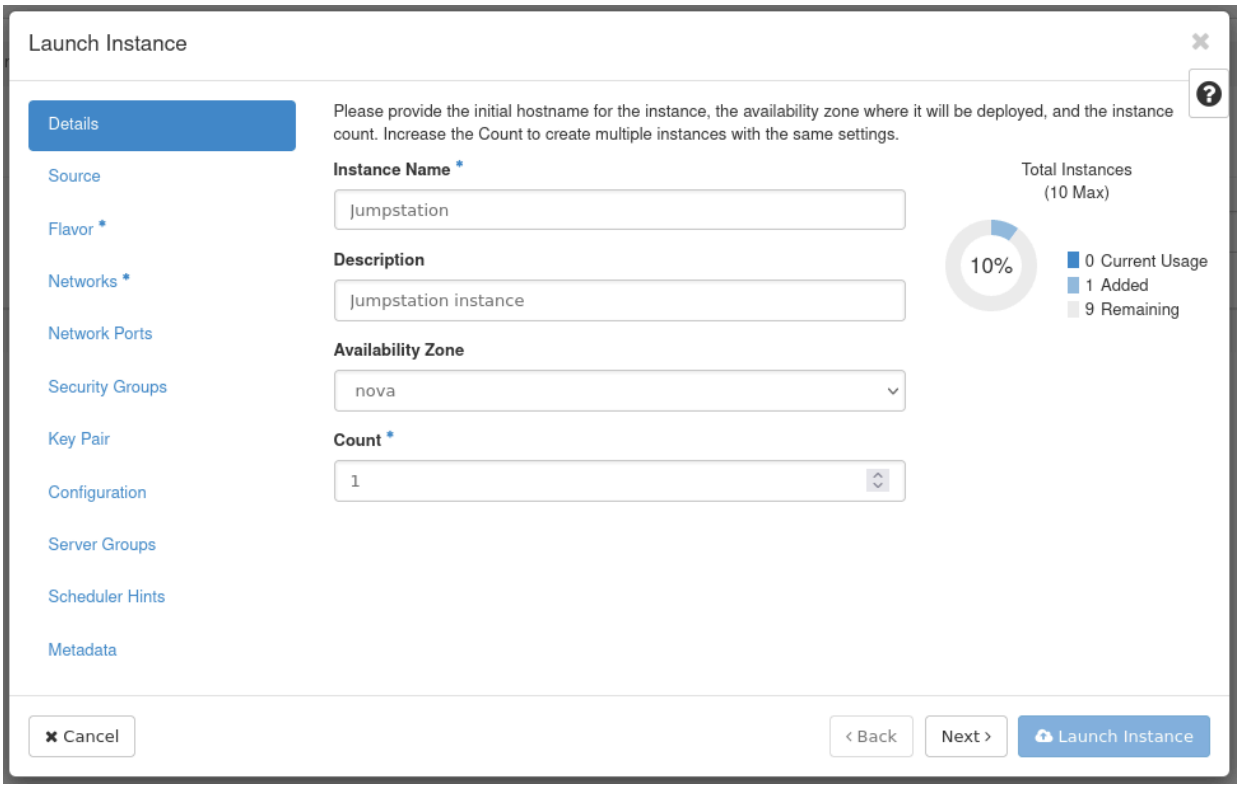


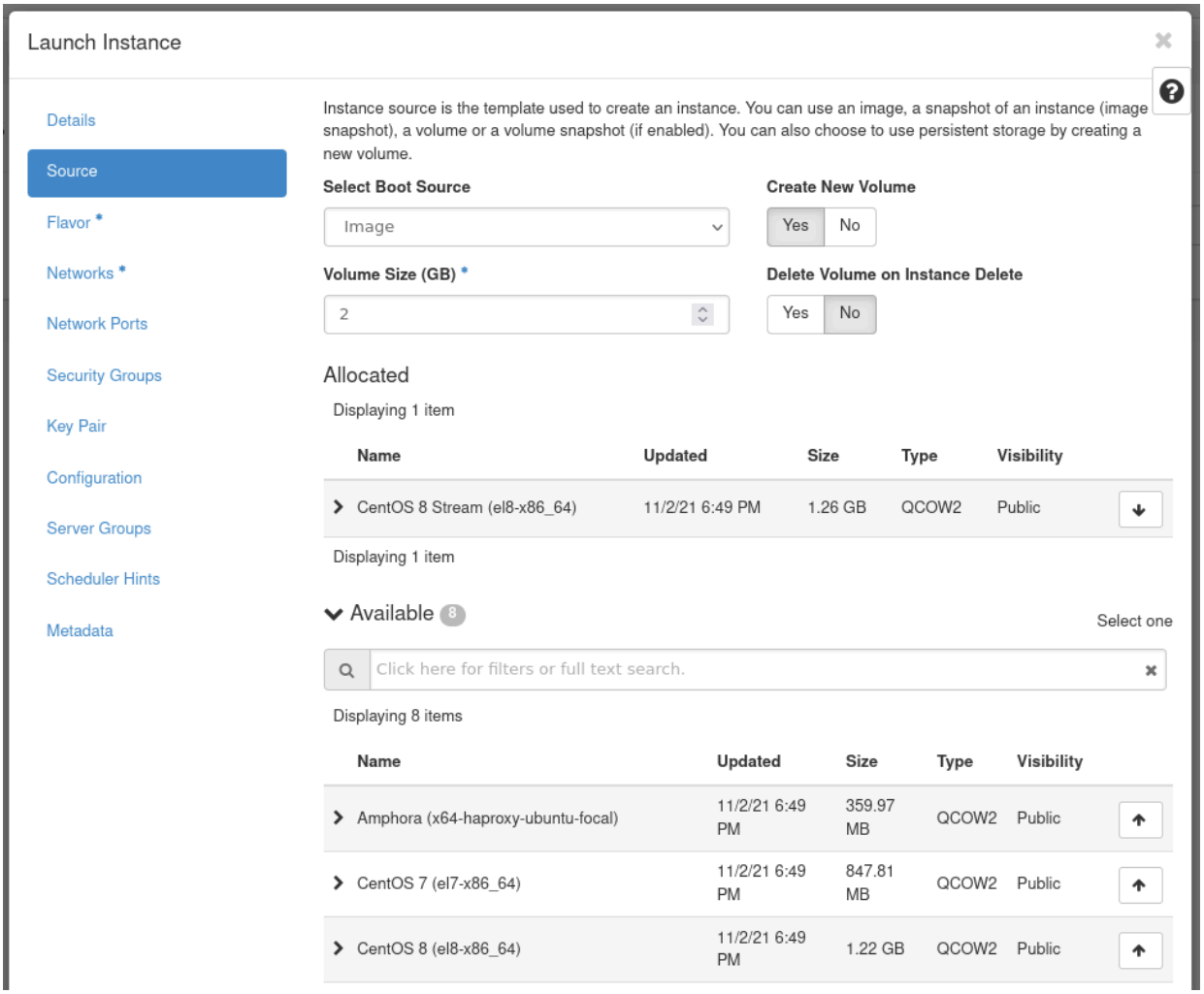


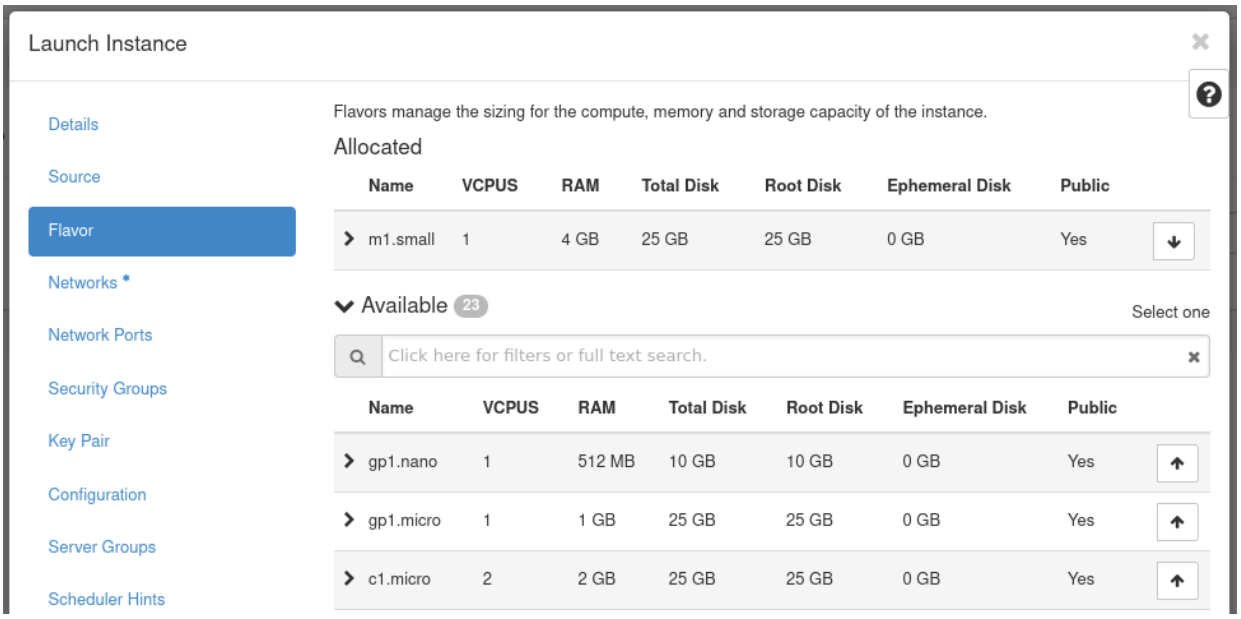

Project / Network / Security Groups / Manage Security Group Rul...
Manage Security Group Rules: SSH (589cafcf-fbe7-440c-b19b-2f171a3e2cb0)
+ Add Rule
Delete Rules
Displaying 2 items
Direction
Ether Type
IP Protocol
Port Range
Remote IP Prefix
Remote Security Group
Description
Actions
Egress
IPv4
Any
Any
0.0.0.0/0
-
-
Delete Rule
Egress
IPv6
Any
Any
::/0
-
-
Delete Rule

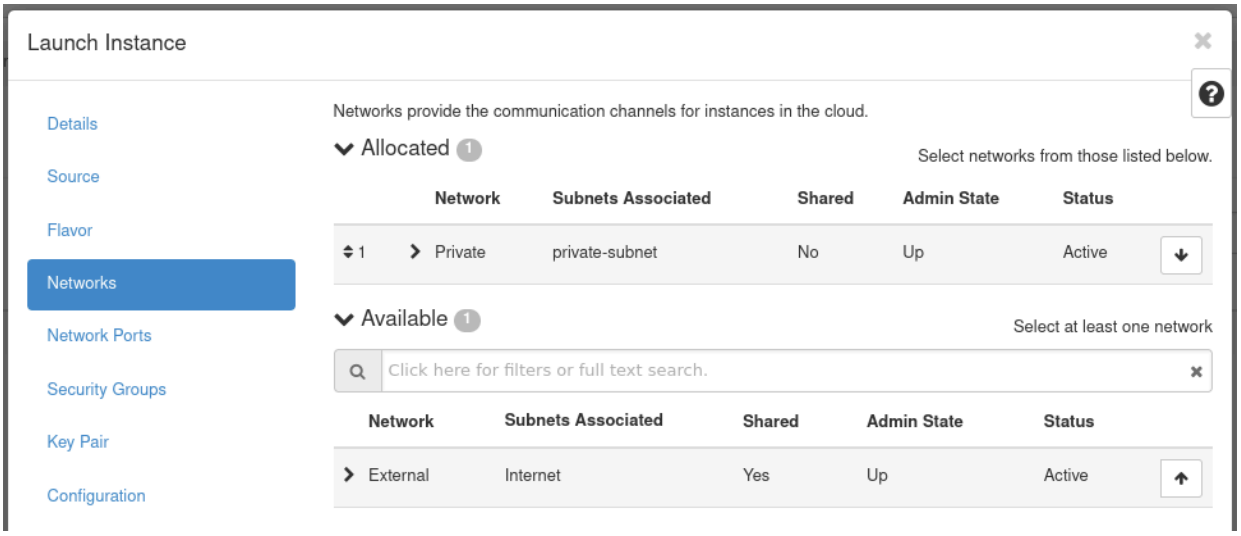

Add Rule
Rule *
SSH
Description
Allows SSH from 173.231.254.165
Remote *
CIDR
CIDR*
173.231.254.165/32
Description:
Rules define which traffic is allowed to instances assigned to the security group. A security group rule consists of three main parts:
Rule: You can specify the desired rule template or use custom rules, the options are Custom TCP Rule, Custom UDP Rule, or Custom ICMP Rule.
Open Port/Port Range: For TCP and UDP rules you may choose to open either a single port or a range of ports. Selecting the "Port Range" option will provide you with space to provide both the starting and ending ports for the range. For ICMP rules you instead specify an ICMP type and code in the spaces provided.
Remote: You must specify the source of the traffic to be allowed via this rule. You may do so either in the form of an IP address block (CIDR) or via a source group (Security Group). Selecting a security group as the source will allow any other instance in that security group access to any other instance via this rule.
Cancel
Add

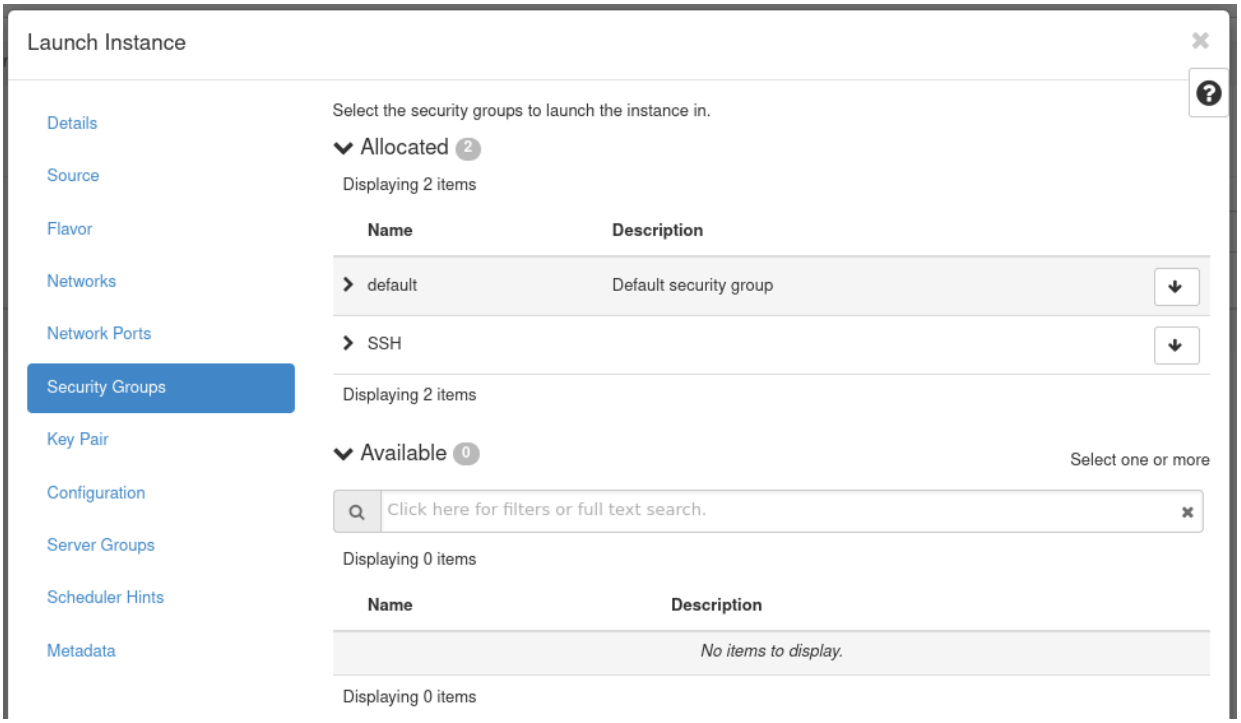

openstack.
Development
nick
Project
API Access
Compute
Overview
Instances
Images
Key Pairs
Server Groups
Project / Compute / Instances
Instances
Instance ID =
Filter
Launch Instance
Instance Name
Image Name
IP Address
Flavor
Key Pair
Status
Availability Zone
Task
Power State
Age
Actions
No items to display.

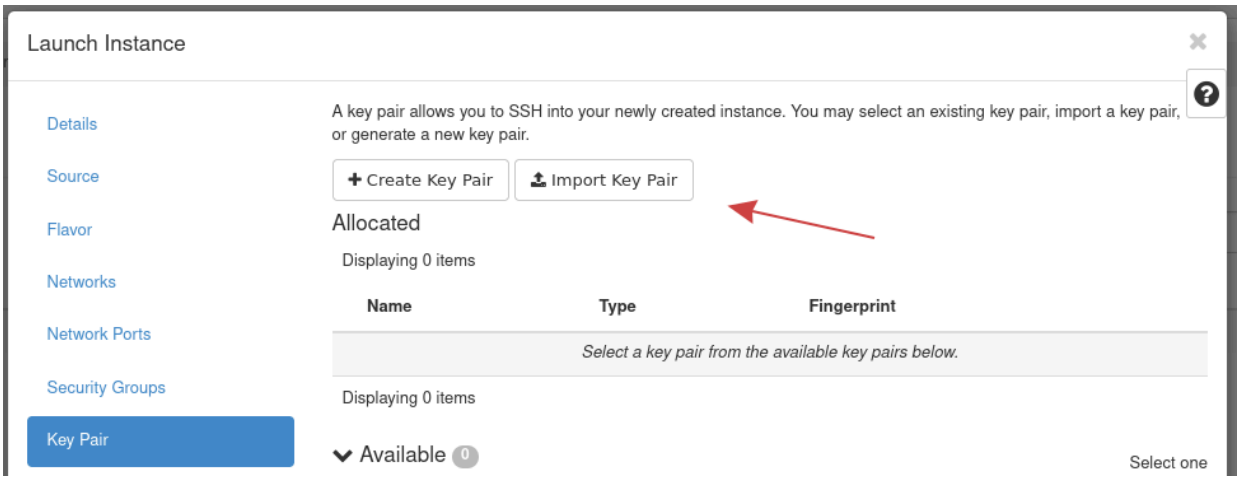

Launch Instance
Details
Source
Flavor *
Networks *
Network Ports
Security Groups
Key Pair
Configuration
Server Groups
Scheduler Hints
Metadata
Please provide the initial hostname for the instance, the availability zone where it will be deployed, and the instance count. Increase the Count to create multiple instances with the same settings.
Instance Name *
Jumpstation
Description
Jumpstation instance
Availability Zone
nova
Count *
1
Total Instances
(10 Max)
10%
0 Current Usage
1 Added
9 Remaining
Cancel
Back
Next
Launch Instance

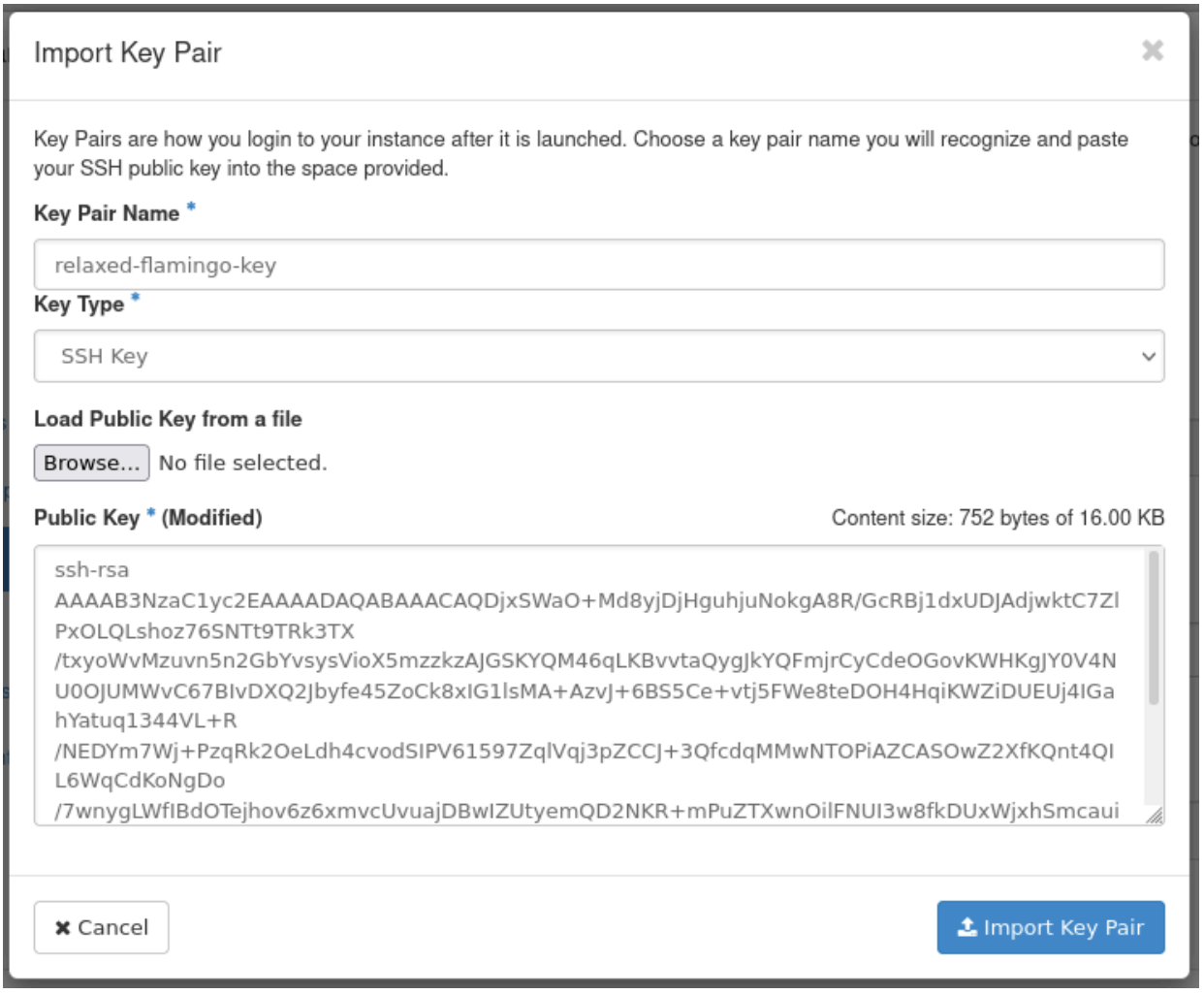

Launch Instance
Details
Source
Flavor *
Networks *
Network Ports
Security Groups
Key Pair
Configuration
Server Groups
Scheduler Hints
Metadata
Instance source is the template used to create an instance. You can use an image, a snapshot of an instance (image snapshot), a volume or a volume snapshot (if enabled). You can also choose to use persistent storage by creating a new volume.
Select Boot Source
Image
Create New Volume
Yes
No
Volume Size (GB) *
2
Delete Volume on Instance Delete
Yes
No
Allocated
Displaying 1 item
Name
Updated
Size
Type
Visibility
CentOS 8 Stream (el8-x86_64)
11/2/21 6:49 PM
1.26 GB
QCOW2
Public
Displaying 1 item
Available 8
Select one
Click here for filters or full text search.
Displaying 8 items
Name
Updated
Size
Type
Visibility
Amphora (x64-haproxy-ubuntu-focal)
11/2/21 6:49 PM
359.97 MB
QCOW2
Public
CentOS 7 (el7-x86_64)
11/2/21 6:49 PM
847.81 MB
QCOW2
Public
CentOS 8 (el8-x86_64)
11/2/21 6:49 PM
1.22 GB
QCOW2
Public

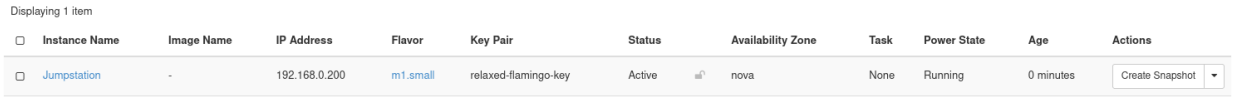

Launch Instance
Details
Source
Flavor
Networks *
Network Ports
Security Groups
Key Pair
Configuration
Server Groups
Scheduler Hints
Flavors manage the sizing for the compute, memory and storage capacity of the instance.
Allocated
Name VCPUS RAM Total Disk Root Disk Ephemeral Disk Public
m1.small 1 4 GB 25 GB 25 GB 0 GB Yes
Available 23
Select one
Click here for filters or full text search.
Name VCPUS RAM Total Disk Root Disk Ephemeral Disk Public
gp1.nano 1 512 MB 10 GB 10 GB 0 GB Yes
gp1.micro 1 1 GB 25 GB 25 GB 0 GB Yes
c1.micro 2 2 GB 25 GB 25 GB 0 GB Yes

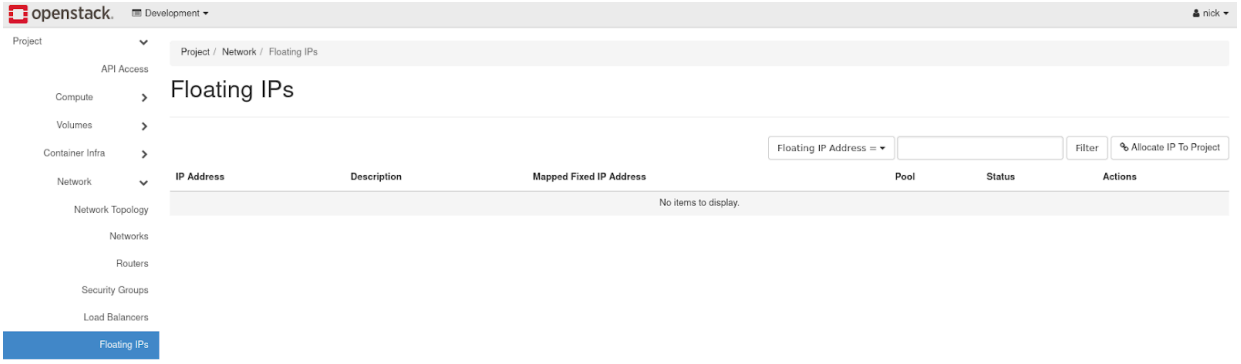

Launch Instance
Details
Source
Flavor
Networks
Network Ports
Security Groups
Key Pair
Configuration
Networks provide the communication channels for instances in the cloud.
Allocated 1
Select networks from those listed below.
Network Subnets Associated Shared Admin State Status
1 Private private-subnet No Up Active
Available 1
Select at least one network
Click here for filters or full text search.
Network Subnets Associated Shared Admin State Status
External Internet Yes Up Active

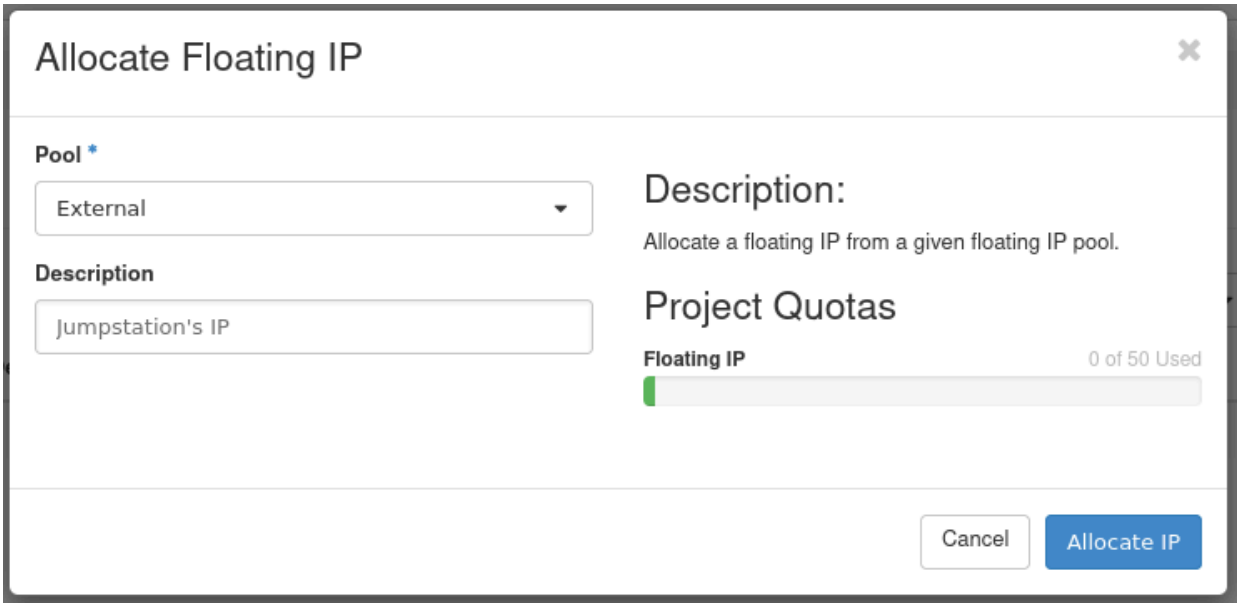

Launch Instance
Details
Source
Flavor
Networks
Network Ports
Security Groups
Key Pair
Configuration
Server Groups
Scheduler Hints
Metadata
Select the security groups to launch the instance in.
Allocated 2
Displaying 2 items
Name Description
default Default security group
SSH
Displaying 2 items
Available 0
Select one or more
Click here for filters or full text search.
Displaying 0 items
Name Description
No items to display.
Displaying 0 items


Launch Instance
Details
Source
Flavor
Networks
Network Ports
Security Groups
Key Pair
A key pair allows you to SSH into your newly created instance. You may select an existing key pair, import a key pair, or generate a new key pair.
+ Create Key Pair
Import Key Pair
Allocated
Displaying 0 items
Name
Type
Fingerprint
Select a key pair from the available key pairs below.
Displaying 0 items
Available 0
Select one

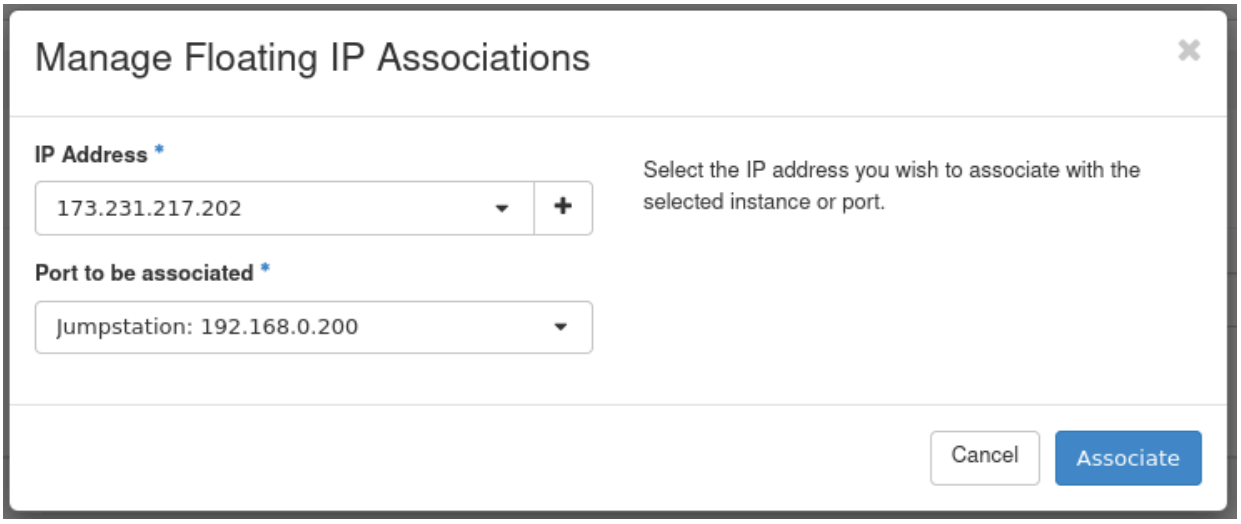

Import Key Pair
Key Pairs are how you login to your instance after it is launched. Choose a key pair name you will recognize and paste your SSH public key into the space provided.
Key Pair Name *
relaxed-flamingo-key
Key Type *
SSH Key
Load Public Key from a file
Browse...
No file selected.
Public Key * (Modified)
Content size: 752 bytes of 16.00 KB
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAACAQDjxSWaO+Md8yjDjHguhjuNokgA8R/GcRBj1dxUDJAdjwktC7Zl
PxOLQLshoz76SNTt9TRk3TX
/txyoWvMzuvn5n2GbYvsysVioX5mzzkzAJGSKYQM46qLKBvvtaQygJkYQFmjrCyCdeOGovKWHKgJY0V4N
U0OJUMWvC67BIvDXQ2Jbyfe45ZoCk8xIG1lsMA+AzvJ+6BS5Ce+vtj5FWe8teDOH4HqiKWZiDUEUj4IGa
hYatuq1344VL+R
/NEDYm7Wj+PzqRk2OeLdh4cvodSIPV61597ZqlVqj3pZCCJ+3QfcdqMMwNTOPiAZCASOwZ2XfKQnt4QI
L6WqCdKoNgDo
/7wnygLWfIBdOTejhov6z6xmvcUvuajDBwIZUtyemQD2NKR+mPuZTXwnOilFNUI3w8fkDUxWjxhSmcaui
Cancel
Import Key Pair


Displaying 1 item
Instance Name
Image Name
IP Address
Flavor
Key Pair
Status
Availability Zone
Task
Power State
Age
Actions
Jumpstation
-
192.168.0.200
m1.small
relaxed-flamingo-key
Active
nova
None
Running
0 minutes
Create Snapshot


openstack.
Development
nick
Project
API Access
Compute
Volumes
Container Infra
Network
Network Topology
Networks
Routers
Security Groups
Load Balancers
Floating IPs
Project / Network / Floating IPs
Floating IPs
Floating IP Address =
Filter
Allocate IP To Project
IP Address
Description
Mapped Fixed IP Address
Pool
Status
Actions
No items to display.


Allocate Floating IP
Pool *
External
Description
Jumpstation's IP
Description:
Allocate a floating IP from a given floating IP pool.
Project Quotas
Floating IP
0 of 50 Used
Cancel
Allocate IP


Displaying 1 item
IP Address
Description
Mapped Fixed IP Address
Pool
Status
Actions
173.231.217.202
Jumpstation's IP
-
External
Down
Associate


Manage Floating IP Associations
IP Address *
173.231.217.202
Port to be associated *
Jumpstation: 192.168.0.200
Select the IP address you wish to associate with the selected instance or port.
Cancel
Associate

Questions:

1. **Compare OpenStack with Eucalyptus and Nimbus.**

OpenStack:

- Open-source cloud platform that enables users to create and manage both public and private clouds.
- Offers a variety of services such as compute (Nova), storage (Cinder), and networking (Neutron).
- Supports virtual machine and container orchestration.
- Highly flexible and customizable for organizations with specific cloud infrastructure needs.
- Offers strong community support and is widely adopted by large cloud providers and private data centers.

Eucalyptus:

- Another open-source cloud platform similar to OpenStack, but it is primarily designed for private cloud environments.
- Eucalyptus supports Amazon Web Services (AWS)-compatible APIs, which makes it easier for organizations to migrate workloads between AWS and private clouds.
- It has been mainly focused on IaaS offerings and includes compute, storage, and network management features.
- Unlike OpenStack, it does not have as many services or extensions for container management and other advanced cloud features.
- Eucalyptus is less popular in comparison to OpenStack and has a more limited ecosystem.

Nimbus:

- A cloud infrastructure platform primarily designed for scientific computing and academic purposes.
- Offers IaaS functionality, similar to OpenStack, but it's more focused on the scientific community with support for high-performance computing (HPC).
- Nimbus is less customizable compared to OpenStack and lacks the broader enterprise cloud features found in OpenStack or Eucalyptus.
- Unlike OpenStack, Nimbus is not as widely adopted and has a smaller ecosystem of contributors.

Comparison Summary:

- **Flexibility and Community Support:** OpenStack offers more flexibility, a larger ecosystem, and better community support compared to Eucalyptus and Nimbus.
- **Usage Focus:** Eucalyptus is more AWS-focused, and Nimbus is tailored for academic/scientific use. OpenStack, however, provides broader cloud services for enterprise and public cloud environments.
- **Feature Set:** OpenStack provides a richer feature set than both Eucalyptus and Nimbus, especially with container orchestration, Kubernetes, and enhanced networking options.

2. **Compare OpenStack, OpenMetal and OpenShift.**

OpenStack:

- An open-source platform designed for building and managing cloud infrastructure (IaaS). It is highly customizable and widely used by public and private cloud providers.
- Focuses on virtualized resources, including compute, storage, and networking, providing a foundation for managing large-scale cloud environments.
- It can be extended to support container orchestration, but it is primarily a virtual machine-based cloud platform.

OpenMetal:

- A cloud platform that combines bare-metal servers and OpenStack functionality, offering a hybrid approach to cloud computing.
- Focuses on providing dedicated hardware resources with the scalability of a cloud infrastructure. OpenMetal allows for more customization and higher performance than traditional virtualized solutions.
- Typically used in industries where high performance, low latency, and specialized hardware requirements are needed.

OpenShift:

- An open-source container orchestration platform built on top of Kubernetes, designed to automate the deployment, scaling, and management of containerized applications.

- While OpenStack and OpenMetal focus on infrastructure (IaaS), OpenShift is a platform-as-a-service (PaaS) designed specifically for deploying and managing applications.
- OpenShift offers integrated CI/CD tools and has a strong emphasis on managing containerized workloads, which makes it ideal for microservices architectures.

Comparison Summary:

- **Focus:** OpenStack and OpenMetal are more focused on providing infrastructure (IaaS), while OpenShift is designed to simplify the management and deployment of containerized applications (PaaS).
- **Deployment:** OpenStack can be used to manage virtualized machines, OpenMetal provides bare-metal infrastructure with cloud features, and OpenShift enables container orchestration on top of Kubernetes.
- **Use Cases:** OpenStack and OpenMetal are suitable for creating custom cloud infrastructures, whereas OpenShift is ideal for cloud-native applications, particularly in containerized environments.

Outcomes: CO3 — Analyze different cloud architectures and IOT cloud

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Conclusion: (Conclusion to be based on the objectives and outcomes achieved)

In this experiment, we successfully launched an instance on OpenStack and performed key tasks such as assigning and attaching a floating IP, followed by connecting to the instance using SSH. Through these activities, we gained practical experience in managing cloud instances on OpenStack, understanding the basic functionalities of OpenStack's IaaS (Infrastructure as a Service). This exercise also reinforced our knowledge of cloud infrastructure, instance management, and networking concepts, which are essential in modern cloud environments. The hands-on nature of the experiment provided a solid foundation for working with OpenStack and cloud technologies.

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of faculty in-charge with date

References:

1. Create a User and Project in OpenStack Horizon

https://openmetal.io/docs/manuals/operators-manual/day-1/horizon/create-user-project

2. Connecting to an Instance using the OpenStack Console

https://carleton.ca/scs/2024/connecting-to-an-instance-using-the-openstack-console/