

# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Discover. Learn. Empower.

## Experiment : 2.3

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**Section/Group:** 601 A

**Semester:** 6<sup>th</sup>

**Date of Performance** 18-03-2024

**Subject Name:** Cloud Computing

**Subject Code:** 21CSH-355

**1. Aim:** To implement IaaS by installing OpenStack

### **2. Software Required:**

- a. VM VirtualBox
- b. Ubuntu OS

### **3. Procedure/Steps:**

1. Open VirtualBox with Virtual Ubuntu OS installed in it.

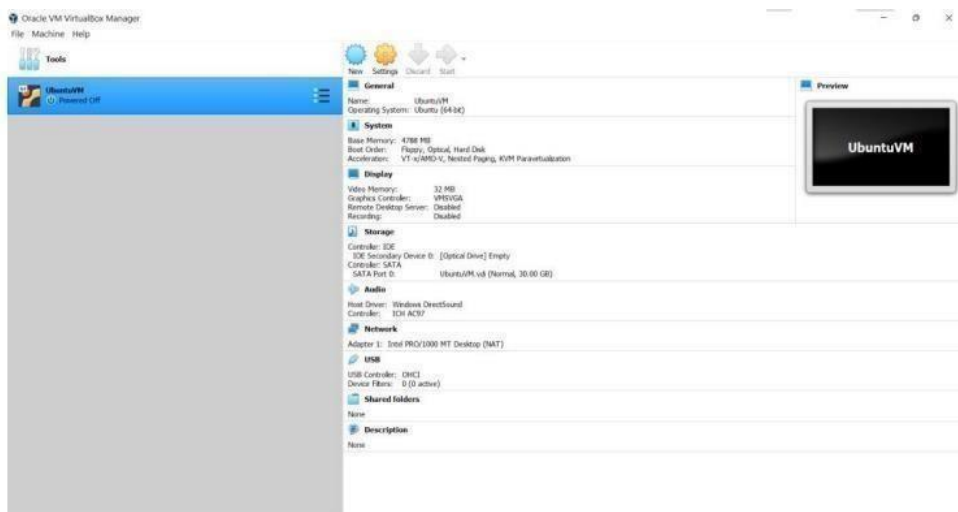


Fig 1

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2. Login to the Ubuntu OS.

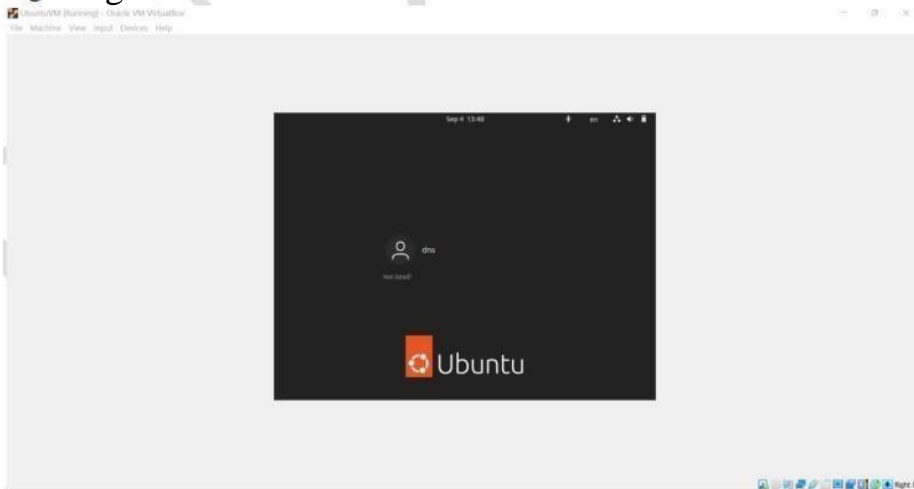
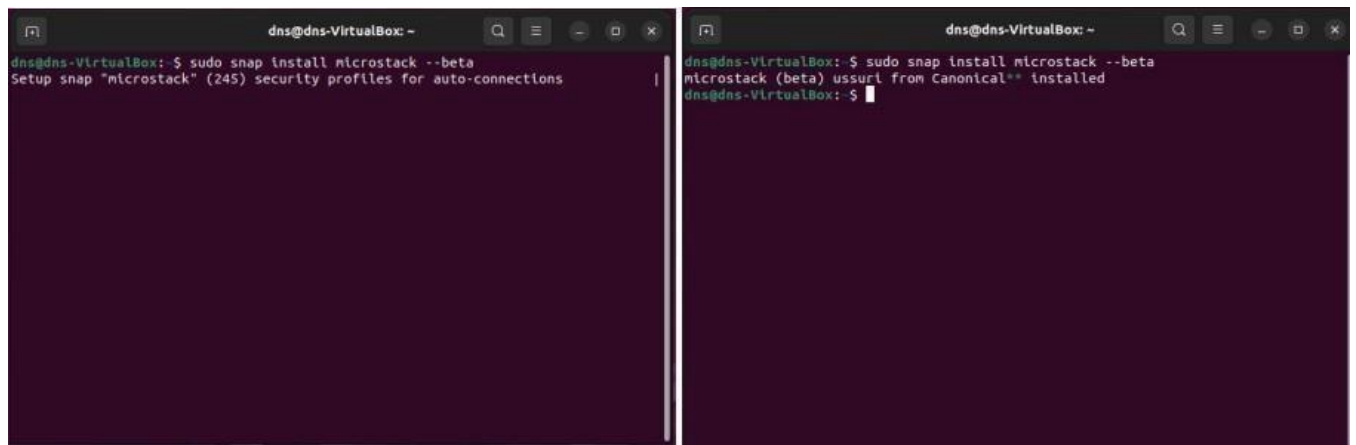


Fig 2

3. Open Terminal and type the command  
a. **sudo snap install microstack --beta**




Fig

3

4. Check installation completion with the command  
a. **snap list microstack**

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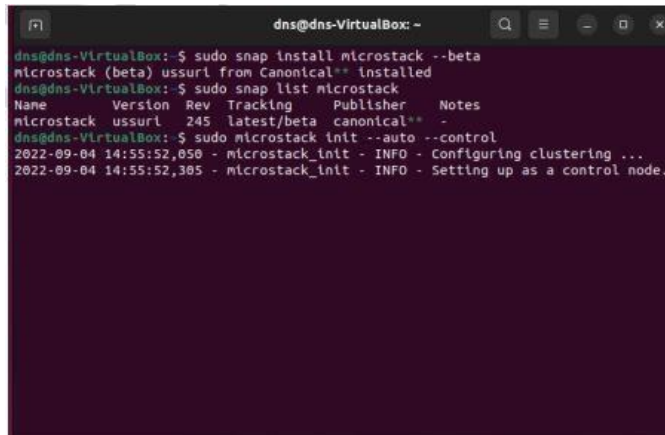


```
dns@dns-VirtualBox: ~  
dns@dns-VirtualBox:~$ sudo snap install microstack --beta  
microstack (beta) ussuri from Canonical** installed  
dns@dns-VirtualBox:~$ sudo snap list microstack  
Name      Version  Rev  Tracking  Publisher  Notes  
microstack ussuri   245  latest/beta canonical** -  
dns@dns-VirtualBox:~$
```

Fig 4

5. Initialize microstack with the command

a. **sudo microstack init --auto --control**



```
dns@dns-VirtualBox: ~  
dns@dns-VirtualBox:~$ sudo snap install microstack --beta  
microstack (beta) ussuri from Canonical** installed  
dns@dns-VirtualBox:~$ sudo snap list microstack  
Name      Version  Rev  Tracking  Publisher  Notes  
microstack ussuri   245  latest/beta canonical** -  
dns@dns-VirtualBox:~$ sudo microstack init --auto --control  
2022-09-04 14:55:52,050 - microstack_init - INFO - Configuring clustering ...  
2022-09-04 14:55:52,305 - microstack_init - INFO - Setting up as a control node.
```

Fig 5

6. After initialization of OpenStack. Use browser to launch OpenStack Dashboard. Use the IP address 10.20.20.1 to login to the dashboard.

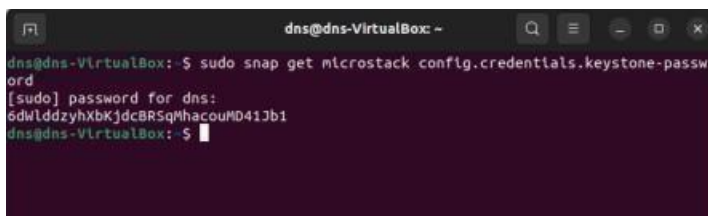
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Fig

6

7. Use “admin” as username. Get password for the login from Terminal using the command  
a. `sudo snap get microstack config.credentials.keystone-password`



Fig

7

8. Copy the password and use it to login to the dashboard.

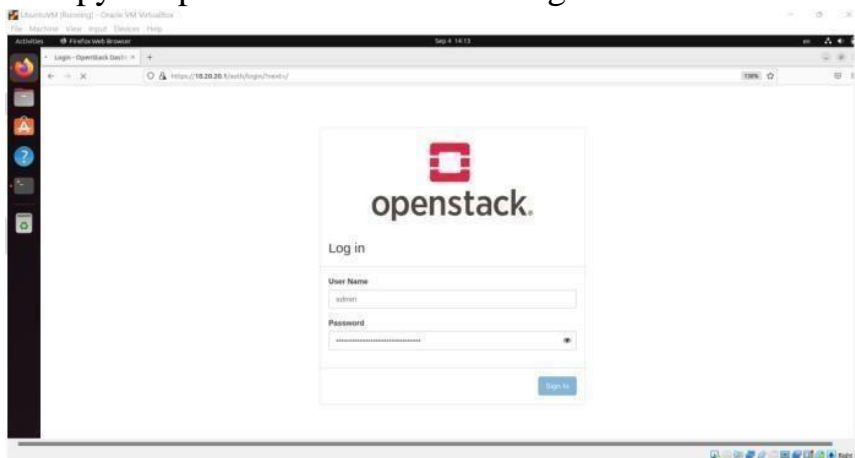


Fig 8

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9. Open Images Tab and click Create Image

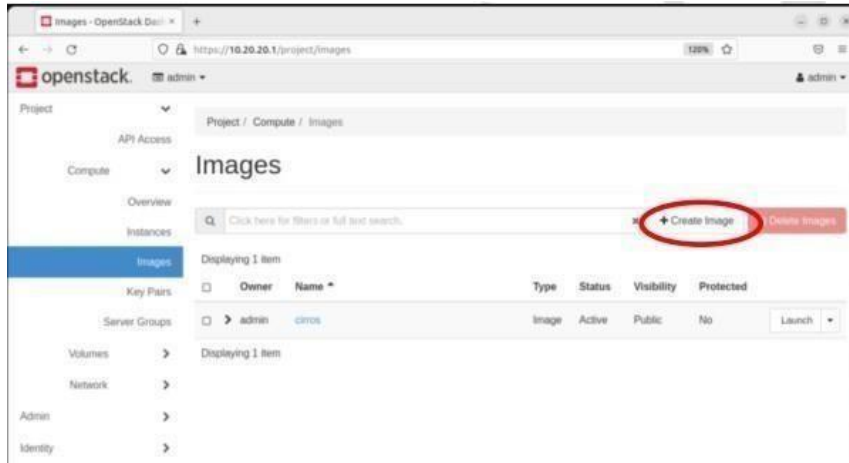


Fig 9

10. Provide the Image downloaded from <https://docs.openstack.org/image-guide/obtainimages.html> to create a new image. a. Provide Image Name

A screenshot of the 'Image Details' form in the OpenStack dashboard. The form is titled 'Image Details' and has a subtitle 'Specify an image to upload to the Image Service.' The form fields include: 'Image Name' (text input with 'NewOS' entered), 'Image Description' (text input with 'NewOS Cloud OS' entered), 'Image Source' (radio button selected for 'File'), 'Format' (dropdown menu), 'Image Requirements' (checkboxes for 'Kernel' and 'Architecture'), 'Random Disk' (checkbox), 'Minimum Disk (GB)' (text input), 'Minimum RAM (MB)' (text input), 'Image Sharing' (radio buttons for 'Private', 'Shared', 'Community', 'Public'), and 'Protected' (checkbox). At the bottom of the form are buttons for 'Cancel', 'Back', 'Next', and 'Create Image'.

Fig 9

b. Choose Image Source – Downloaded Cloud OS Image

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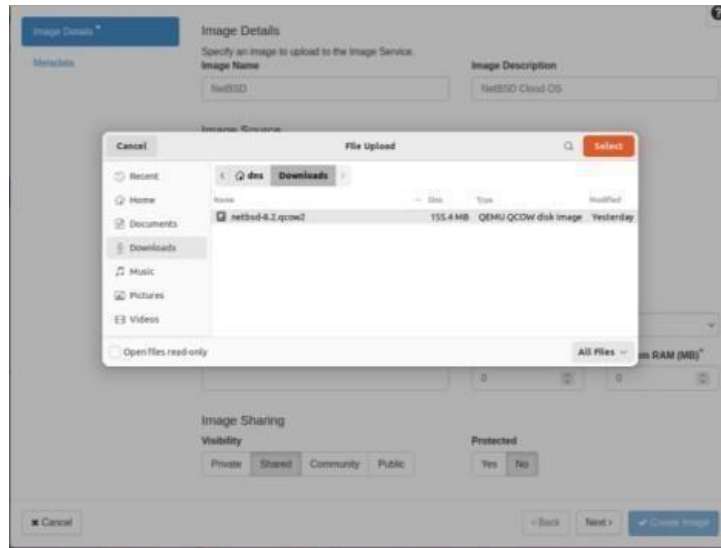


Fig 10

c. Choose File Format QCOW2

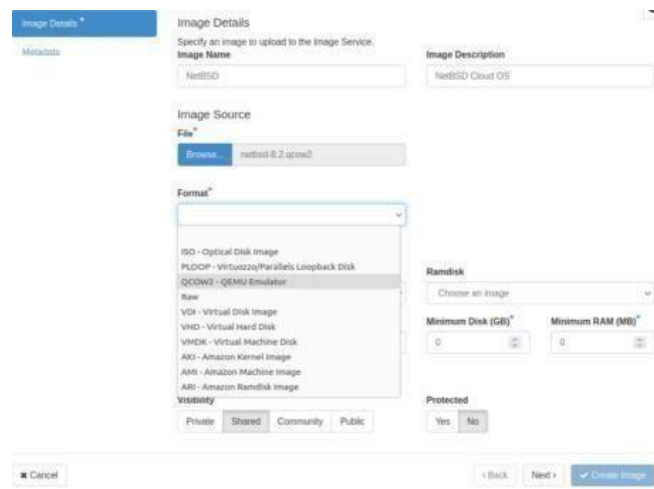


Fig 11

d. Choose Visibility Public and Create Image

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Image Details

Specify an image to upload to the Image Service.

Image Name:

Image Description:

Image Source

File\*

Browser:

Format\*

QCOW2 - QEMU Emulator

Image Requirements

Kernel:

Ramdisk:

Architecture:

Minimum Disk (GB)\*:

Minimum RAM (MB)\*:

Image Sharing

Visibility:

Protected:

Cancel Back Next

Fig 12

11. Create Instance from the available Images using web interface or Terminal Interface.

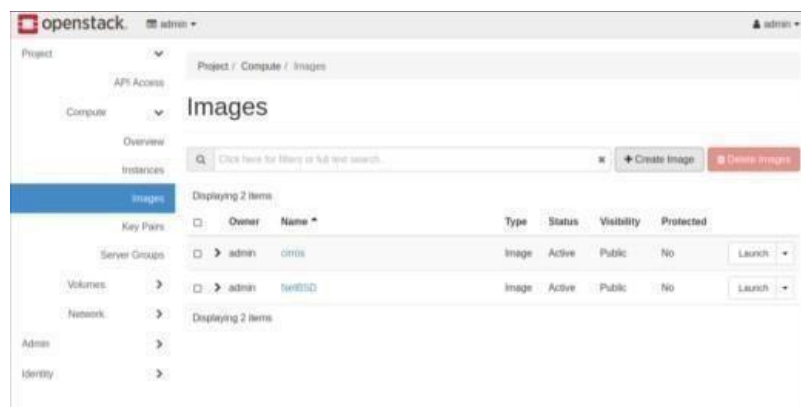


Fig 13

12. Instance Creation Using Web Interface

a. Open Interfaces section and select Launch Instance

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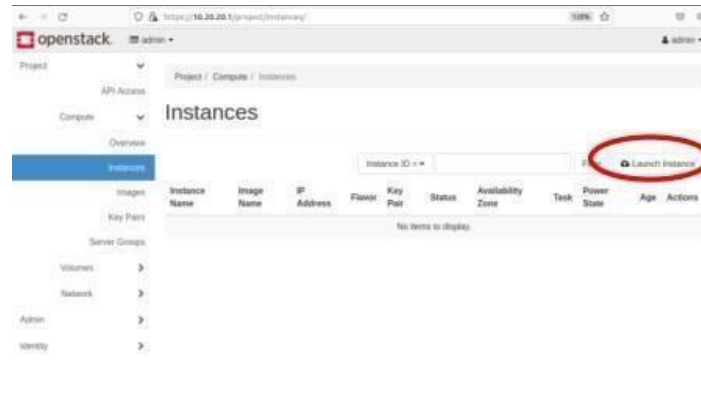


Fig 14

b. Provide Instance Name and select Next

A screenshot of the 'Launch Instance' form in the OpenStack dashboard. The form is divided into a left sidebar with tabs (Details, Source, Flavor, Networks, Network Ports, Security Groups, Key Pair, Configuration, Server Groups, Scheduler Hints, Metadata) and a main content area. The 'Details' tab is active. The main content area contains the following fields: 'Instance Name' (with value 'MyVM1'), 'Description' (with value 'My Cloud Virtual Machine-1'), 'Availability Zone' (with value 'nova'), and 'Count' (with value '1'). A 'Launch Instance' button is at the bottom right. A 'Next' button is also visible. On the right side, there is a 'Total Instances (10 Max)' gauge showing '10%' usage, with a breakdown: '0 Current Usage', '1 Added', and '9 Remaining'.

Fig 15

c. Select “cirros” as source form the available images



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The image displays two screenshots of the AWS Management Console 'Create Instance' wizard, specifically the 'Choose AMI' step. The left sidebar shows the navigation menu with 'Source' selected. The main content area is divided into sections: 'Select Boot Source', 'Create New Volume', 'Delete Volume on Instance Delete', 'Allocated', and 'Available'.

**Top Screenshot:**

- Select Boot Source:** 'Image' is selected in the dropdown.
- Create New Volume:** 'Yes' and 'No' buttons are visible.
- Delete Volume on Instance Delete:** 'Yes' and 'No' buttons are visible.
- Allocated:** 'Displaying 0 items'.
- Available:** 'Displaying 2 items'. The list shows two items: 'cirros' and 'HetzlBSD'.

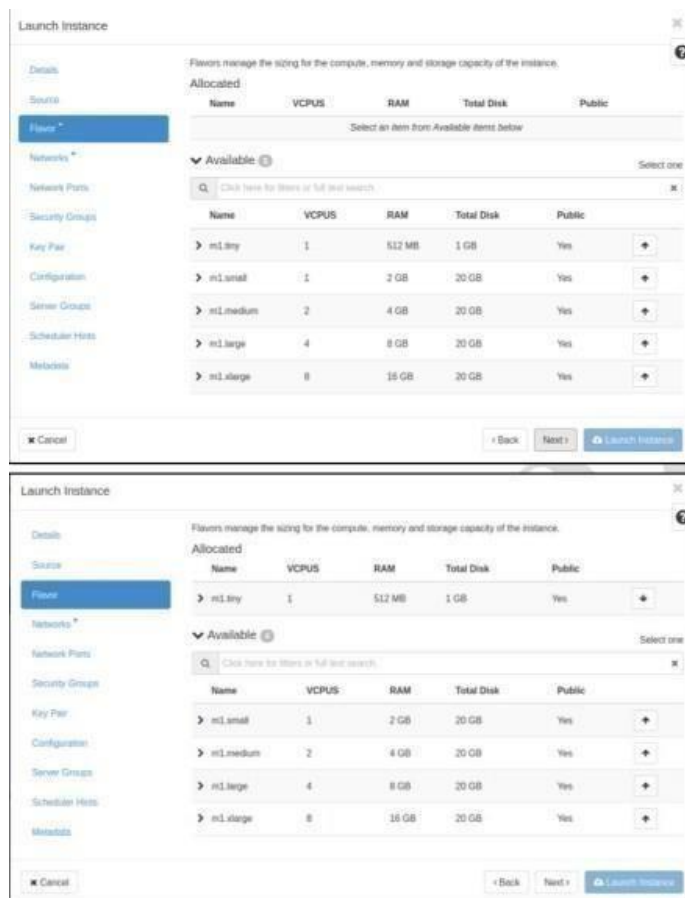
**Bottom Screenshot:**

- Select Boot Source:** 'Image' is selected in the dropdown.
- Create New Volume:** 'Yes' and 'No' buttons are visible.
- Delete Volume on Instance Delete:** 'Yes' and 'No' buttons are visible.
- Allocated:** 'Displaying 1 item'. The list shows one item: 'cirros'.
- Available:** 'Displaying 1 item'. The list shows one item: 'HetzlBSD'.

Both screenshots show the 'Flavor' dropdown set to 'm1.tiny' and the 'Volume Size (GB)' set to '1'. The 'Launch Instance' button is visible at the bottom right of the bottom screenshot.

d. Select Flavor “m1.tiny” from the available Flavors

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**Launch Instance**

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

**Allocated**

Name	VCPUS	RAM	Total Disk	Public
Select an item from Available items below				

**Available**

Name	VCPUS	RAM	Total Disk	Public
m1.tiny	1	512 MB	1 GB	Yes
m1.small	1	2 GB	20 GB	Yes
m1.medium	2	4 GB	20 GB	Yes
m1.large	4	8 GB	20 GB	Yes
m1.xlarge	8	16 GB	20 GB	Yes

**Launch Instance**

**Launch Instance**

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

**Allocated**

Name	VCPUS	RAM	Total Disk	Public
m1.tiny	1	512 MB	1 GB	Yes

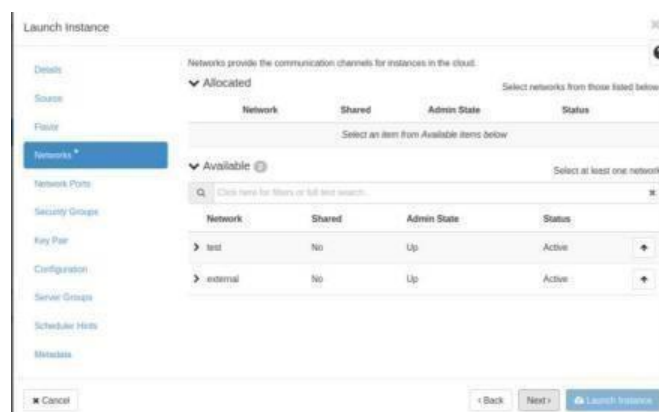
**Available**

Name	VCPUS	RAM	Total Disk	Public
m1.small	1	2 GB	20 GB	Yes
m1.medium	2	4 GB	20 GB	Yes
m1.large	4	8 GB	20 GB	Yes
m1.xlarge	8	16 GB	20 GB	Yes

**Launch Instance**

Fig 16

e. Select “external” network as the network for the Instance



**Launch Instance**

Networks provide the communication channels for instances in the cloud.

**Allocated**

Network	Shared	Admin State	Status
Select networks from those listed below			

**Available**

Network	Shared	Admin State	Status
test	No	Up	Active
external	No	Up	Active

**Launch Instance**

Fig 17

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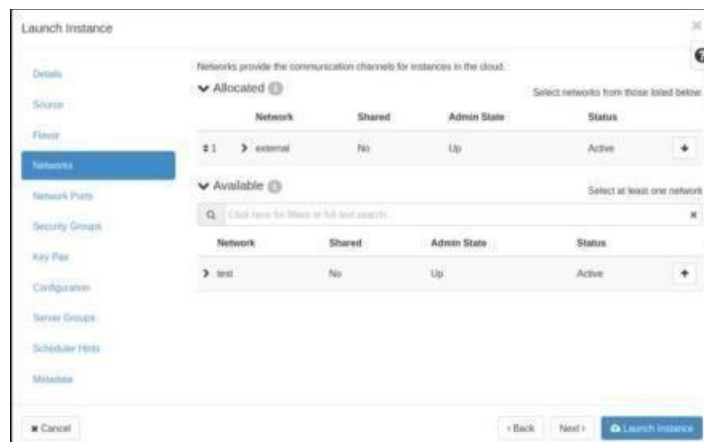


Fig 18

- f. Network Ports and Security Group use the default Options. In Key Pair Section Create a new SSH Key Pair with name “microstack” and select it

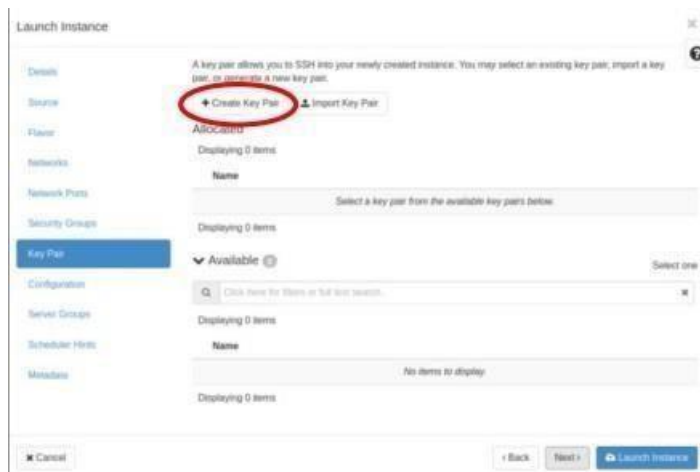


Fig 19

- g. Provide Key Name “microstack” and Choose Key Type as “SSH”

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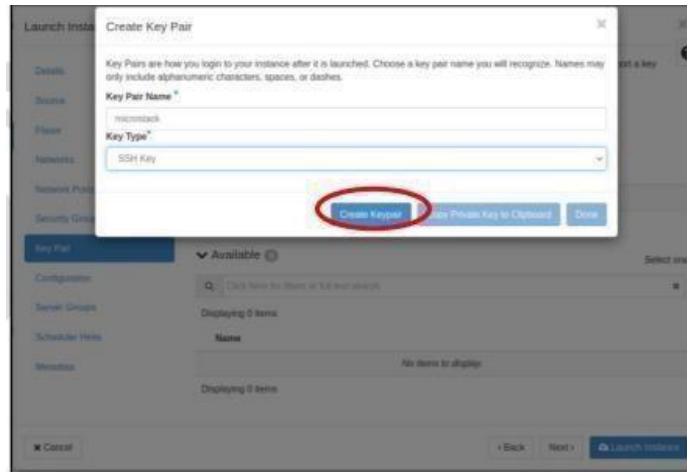


Fig 20

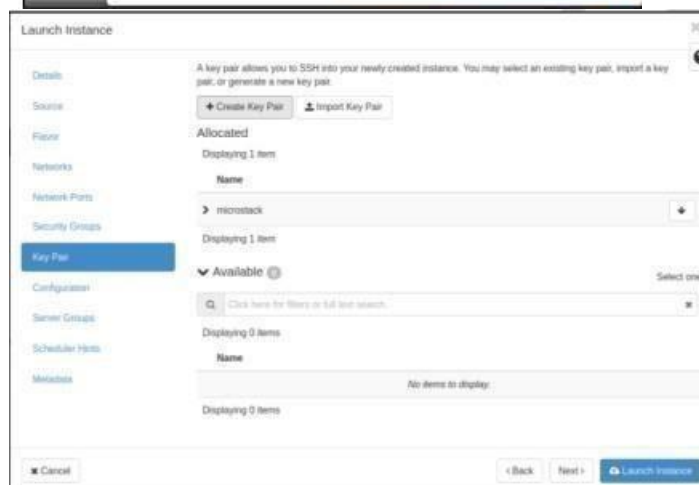
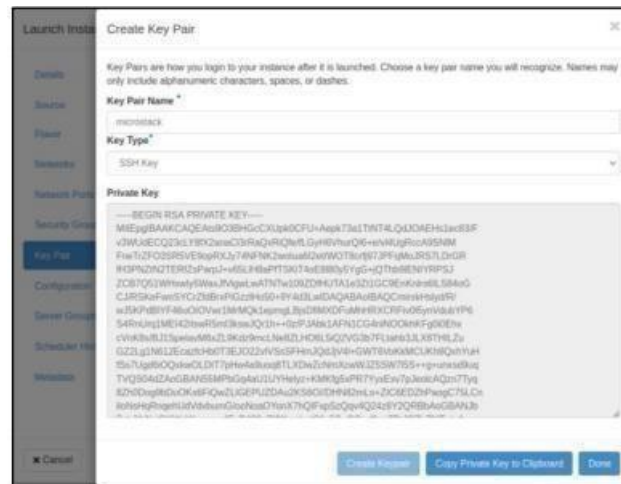


Fig 21

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h. Remaining Options “Configuration”, “Server Groups”, “Scheduler Hints” and “Metadata” keep the default values. Launch the Instance.

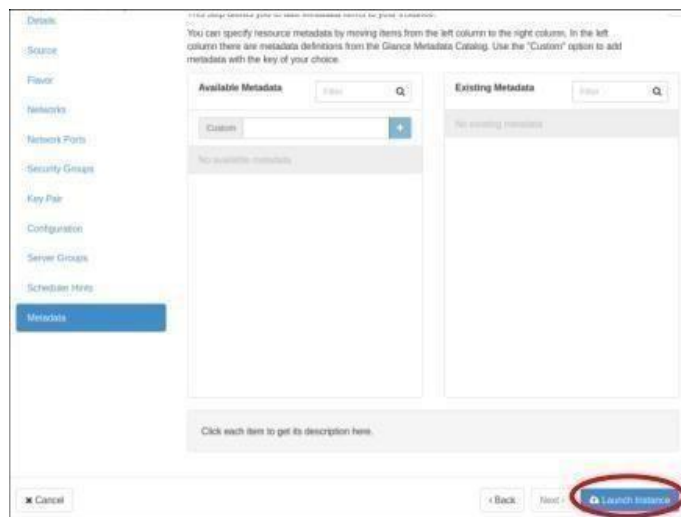


Fig 22

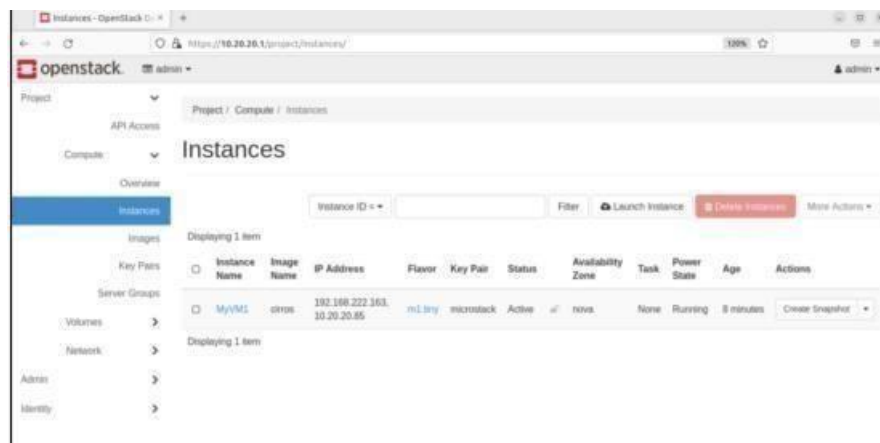
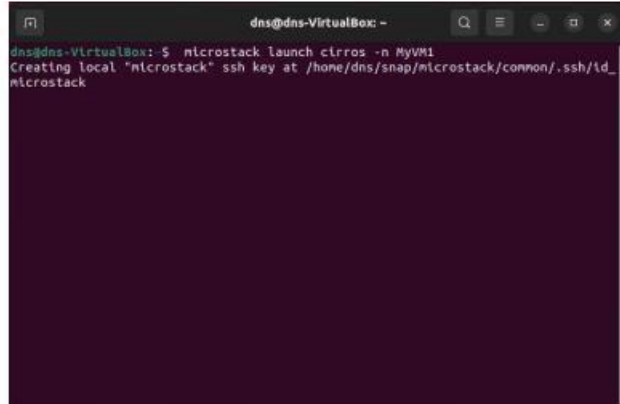


Fig 23

13. Instance Creation using Terminal Interface using the given command

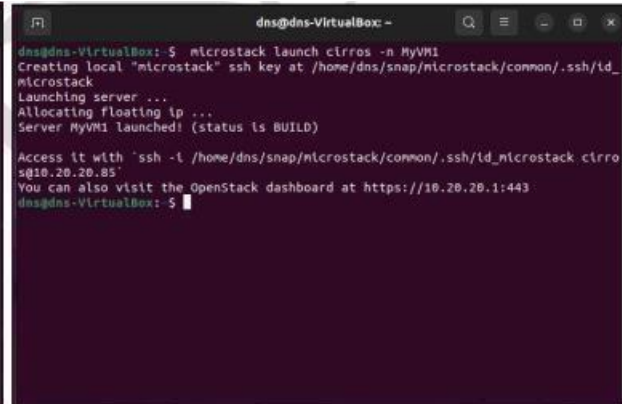
a. microstack launch cirros -n MyVM1

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```
dns@dns-VirtualBox: ~$ microstack launch cirros -n MyVM1
Creating local "microstack" ssh key at /home/dns/snap/microstack/common/.ssh/id_microstack
```

Fig 24

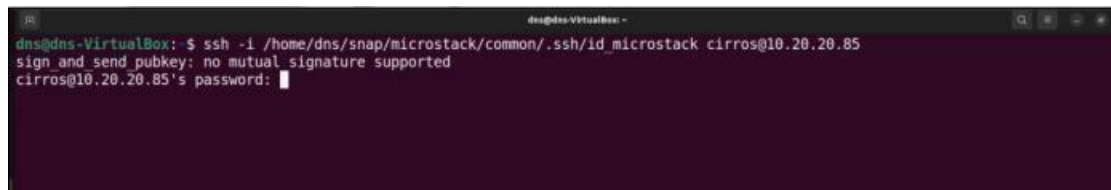


```
dns@dns-VirtualBox: ~$ microstack launch cirros -n MyVM1
Creating local "microstack" ssh key at /home/dns/snap/microstack/common/.ssh/id_microstack
Launching server ...
Allocating floating ip ...
Server MyVM1 launched! (status is BUILD)

Access it with 'ssh -i /home/dns/snap/microstack/common/.ssh/id_microstack cirros@10.20.20.85'
You can also visit the OpenStack dashboard at https://10.20.20.1:443
dns@dns-VirtualBox: ~$
```

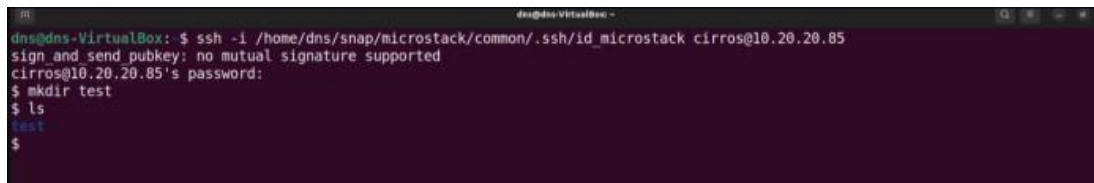
Fig 25

14. Type the “ssh” command created to login to the system



```
dns@dns-VirtualBox: ~$ ssh -i /home/dns/snap/microstack/common/.ssh/id_microstack cirros@10.20.20.85
sign and send pubkey: no mutual signature supported
cirros@10.20.20.85's password: 
```

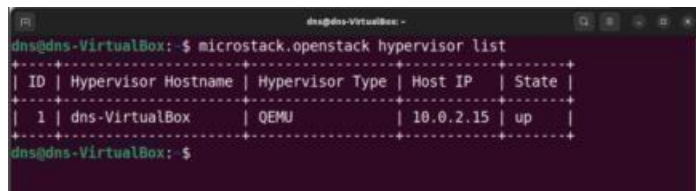
15. Enter “gocubsgo” as the password to login to the instance. Create a folder “test” and display it.



```
dns@dns-VirtualBox: ~$ ssh -i /home/dns/snap/microstack/common/.ssh/id_microstack cirros@10.20.20.85
sign and send pubkey: no mutual signature supported
cirros@10.20.20.85's password: gocubsgo
$ mkdir test
$ ls
test
$
```

Fig 26

14. Try Creating another Instance with NetBSD Image using the Command a. Get the host name using microstack.openstack hypervisor list



```
dns@dns-VirtualBox: ~$ microstack.openstack hypervisor list
+-----+-----+-----+-----+-----+
| ID | Hypervisor | Hostname | Hypervisor Type | Host IP | State |
+-----+-----+-----+-----+-----+
| 1 | dns-VirtualBox | QEMU | 10.0.2.15 | up |
+-----+-----+-----+-----+-----+
dns@dns-VirtualBox: ~$
```

Fig 27

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- b. Use the Terminal Command `microstack launch NetBSD -n MyVM2 -f m1.small -t external --availability-zone nova:dns-VirtualBox`

**Result:** Thus implementation of OpenStack installation to realize IaaS is completed and verified.

A screenshot of a terminal window with a dark background. The prompt is 'dns@dns-VirtualBox:'. The command entered is 'microstack launch NetBSD -n MyVM2 -f m1.small -t external --availability-zone nova:dns-VirtualBox -w'. The output shows 'Launching server ...'.

Fig 28

## 6. Analysis:

Constructing Infrastructure as a Service (IaaS) through OpenStack involves orchestrating a symphony of components: Nova, Swift, Cinder, Neutron, Keystone, Glance, and Horizon. This intricate dance demands a deep dive into hardware prerequisites, network intricacies, storage nuances, security fortifications, and seamless integration with existing ecosystems. Vigilant oversight, adept management, and empowering education form the bedrock for sustaining peak performance and ensuring a frictionless experience. While OpenStack empowers with flexibility and dominion over infrastructure, organizations must navigate the fiscal landscape and invest judiciously in expertise to unlock its full potential.