MicroStack Up & Running

OpenInfra Community Days Korea 2021 임찬식

MicroStack ?

- https://microstack.run/
- 복잡한 OpenStack 배포를 간단하게 해결
- 명령어 두 개로 OpenStack 배포
- 포함하는 OpenStack 구성요소
 - Keystone, Nova, Neutron, Glance, Cinder
- 단일 노드 혹은 멀티 노드에 배포 가능
- 현재는 beta 상태

MicroStack for Developer

- 개발 과정에서 OpenStack 환경이 필요한 경우
- 기본적인 OpenStack 서비스만 있으면 충분
- 설정은 모두 기본 값으로 지정
- 개발 서버 안에서 작동하는 OpenStack
- 필요할 때만 띄워서 사용

MicroStack for Micro Clouds

- OpenStack 기반 Private Cloud 서비스 이용
- 적은 수의 노드를 이용해 시작 가능
- MicroStack 으로 쉽고 빠르게 배포 가능
- 단일 노드를 이용해 효율적인 Private Cloud 시작
- 필요하다면 멀티 노드로 확장

Setup MicroStack

Check MicroStack Version

- 최신 버전 확인
- 앞으로 설치 과정에서는 latest/edge 버전 사용

\$ sudo snap info microstack

```
name: microstack
summary: OpenStack on your laptop
publisher: Canonical↓
store-url: https://snapcraft.io/microstack
license: Apache-2.0
description: |
MicroStack gives you an easy way to develop and test OpenStack
workloads on your laptop or in a virtual machine.
channels:
latest/beta: ussuri 2021-10-27 (241) 436MB -
latest/edge: ussuri 2021-10-22 (241) 436MB -
rocky/edge: rocky 2019-12-06 (195) 398MB classic
```

Check Services and Ports

- MicroStack 에서 nginx, mysql 등의 서비스 실행
- 초기화 과정에서 포트가 겹칠 경우 초기화 실패
- 시스템에서 이미 사용 중인지 확인 필요
 - nginx: 80, 443
 - mysql:3306
 - o rabbitmq: 4369, 25672, 5671, 5672, 15672
- 초기화 과정을 마친 후 변경 가능

Install MicroStack

\$ sudo snap install microstack --devmode --edge
microstack (edge) ussuri from Canonical / installed

- --devmode : 옵션을 지정해야 beta, edge 채널 선택 가능
- --edge: beta 와 edge 중에 여기서는 edge 채널 선택

Performance Considerations

- OpenStack 플랫폼은 많은 시스템 자원 요구
- 리눅스 시스템이 많은 자원을 할당할 수 있도록 설정 변경

echo fs.inotify.max_queued_events=1048576 | sudo tee -a /etc/sysctl.conf echo fs.inotify.max_user_instances=1048576 | sudo tee -a /etc/sysctl.conf echo fs.inotify.max_user_watches=1048576 | sudo tee -a /etc/sysctl.conf echo vm.max_map_count=262144 | sudo tee -a /etc/sysctl.conf echo vm.swappiness=1 | sudo tee -a /etc/sysctl.conf sudo sysctl -p

Initialize MicroStack

- microstack init --auto --control 실행
- --auto: 설정할 내용을 물어보지 않고 기본값으로 지정
- --control: 노드의 역할을 control 로 지정

\$ sudo microstack init --auto --control 2021-10-31 01:23:52,405 - microstack_init - INFO - Configuring clustering ... 2021-10-31 01:23:52,622 - microstack_init - INFO - Setting up as a control node. 2021-10-31 01:23:55,194 - microstack_init - INFO - Generating TLS Certificate and Key 2021-10-31 01:23:56,366 - microstack_init - INFO - Configuring networking ... 2021-10-31 01:24:04,184 - microstack_init - INFO - Opening horizon dashboard up to * 2021-10-31 01:24:04,989 - microstack_init - INFO - Waiting for RabbitMQ to start ... waiting for 192.168.50.193:5672 2021-10-31 01:24:10.607 - microstack_init - INFO - RabbitMQ started! 2021-10-31 01:24:10,607 - microstack_init - INFO - Configuring RabbitMQ ... 2021-10-31 01:24:11.391 - microstack_init - INFO - RabbitMQ Configured! 2021-10-31 01:24:11,432 - microstack_init - INFO - Waiting for MySQL server to start ... waiting for 192.168.50.193:3306 2021-10-31 01:24:18,127 - microstack_init - INFO - Mysql server started! Creating databases ... 2021-10-31 01:24:19,857 - microstack_init - INFO - Configuring Keystone Fernet Keys ... 2021-10-31 01:24:31,771 - microstack_init - INFO - Bootstrapping Keystone ... 2021-10-31 01:24:38,734 - microstack_init - INFO - Creating service project ... 2021-10-31 01:24:42.944 - microstack_init - INFO - Keystone configured!

Initialize MicroStack (continued)

2021-10-31 01:24:42,992 - microstack_init - INFO - Configuring the Placement service... 2021-10-31 01:24:58,179 - microstack_init - INFO - Running Placement DB migrations... 2021-10-31 01:25:01,369 - microstack_init - INFO - Configuring nova control plane services ... 2021-10-31 01:25:09,739 - microstack_init - INFO - Running Nova API DB migrations (this may take a lot of time)... 2021-10-31 01:25:27,872 - microstack_init - INFO - Running Nova DB migrations (this may take a lot of time)... waiting for 192.168.50.193:8774 2021-10-31 01:26:14,258 - microstack_init - INFO - Creating default flavors... 2021-10-31 01:26:33,122 - microstack_init - INFO - Configuring nova compute hypervisor ... 2021-10-31 01:26:33,122 - microstack_init - INFO - Checking virtualization extensions presence on the host 2021-10-31 01:26:33,168 - microstack_init - INFO - Hardware virtualization is supported -KVM will be used for Nova instances 2021-10-31 01:26:36,073 - microstack_init - INFO - Configuring the Spice HTML5 console service... 2021-10-31 01:26:36,763 - microstack_init - INFO - Configuring Neutron Waiting for 192.168.50.193:9696 2021-10-31 01:27:41,786 - microstack_init - INFO - Configuring Glance ... waiting for 192.168.50.193:9292 2021-10-31 01:28:09,618 - microstack_init - INFO - Adding cirros image ... 2021-10-31 01:28:11,862 - microstack_init - INFO - Creating security group rules ... 2021-10-31 01:28:18,997 - microstack_init - INFO - Configuring the Cinder services... 2021-10-31 01:29:01,779 - microstack_init - INFO - Running Cinder DB migrations... 2021-10-31 01:29:12,013 - microstack_init - INFO - restarting libvirt and virtlogd ... 2021-10-31 01:29:30,216 - microstack_init - INFO - Complete. Marked microstack as initialized!

Check Running Services

- 초기화 과정에서 오류가 발생했다면, 겹치는 포트가 있는지 확인
- snap services microstack 명령으로 각서비스실행여부확인

\$ sudo snap services microstack Service microstack.cinder-backup microstack.cinder-scheduler microstack.cinder-uwsgi microstack.cinder-volume microstack.cluster-uwsgi microstack.external-bridge microstack.filebeat microstack.glance-api microstack.horizon-uwsgi microstack.iscsid microstack.keystone-uwsgi microstack.libvirtd microstack.load-modules microstack.memcached

Startup	Current	Notes
disabled	inactive	-
enabled	active	-
enabled	active	-
disabled	inactive	-
enabled	active	-
enabled	inactive	-
disabled	inactive	-
enabled	active	-
enabled	active	-
disabled	inactive	-
enabled	active	-
enabled	active	-
enabled	inactive	-
enabled	active	_

Check Running Services (continued)

microstack.mysqld	enabled	active	-
microstack.neutron-api	enabled	active	-
microstack.neutron-ovn-metadata-agent	enabled	active	
microstack.nginx	enabled	active	-
microstack.nova-api	enabled	active	
microstack.nova-api-metadata	enabled	active	
microstack.nova-compute	enabled	active	-
microstack.nova-conductor	enabled	active	-
microstack.nova-scheduler	enabled	active	-
microstack.nova-spicehtml5proxy	enabled	active	-
microstack.nrpe	disabled	inactive	-
microstack.ovn-controller	enabled	active	-
microstack.ovn-northd	enabled	active	-
microstack.ovn-ovsdb-server-nb	enabled	active	-
microstack.ovn-ovsdb-server-sb	enabled	active	-
microstack.ovs-vswitchd	enabled	active	-
microstack.ovsdb-server	enabled	active	-
microstack.placement-uwsgi	enabled	active	-
microstack.rabbitmq-server	enabled	active	-
microstack.setup-lvm-loopdev	disabled	inactive	-
microstack.target	disabled	inactive	-
microstack.telegraf	disabled	inactive	-
microstack.virtlogd	enabled	active	_

Access Web UI

- Web UI 주소: <u>https://10.20.20.1</u>
- 기본계정정보: admin
- 초기화 과정에서 생성한 비밀번호는 아래 명령으로 확인 가능

\$ sudo snap get microstack config.credentials.keystone-password
qAlpQQqc.....JqzDhVRq

• admin 계정과 비밀번호를 이용해 Web UI 접속

Access Web UI (continued)



Compute: Overview



Launch Instance

- 터미널에서 microstack.openstack 명령사용가능
- 여기에서는 Web UI 를 이용해 cirros 이미지로 VM 생성

istances			Instance	e ID = ▼	[Filt	er 🖸	Launch	Instance
Images	Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
Key Pairs					No	items to dis	play.				

Launch Instance: Detail

● Instance Name 항목에 cirros-vm 입력

Details	Please provide the initial hostname for the instance, the available deployed, and the instance count. Increase the Count to with the same settings	ilability zone where it w create multiple instance
Source	Instance Name *	Total Instances
Flavor *	cirros-vm	(10 Max)
Networks *	Description	10%
Network Ports		
Security Groups	Availability Zone	0 Current Usage 1 Added
(au Dair	nova 🗸	9 Remaining
Ney Fall	Count *	
Configuration	1	

Launch Instance: Source



Launch Instance: Flavor

Name Mame Mane Manada	VCPUS 2 (1) (2) (2) (3) (4) (5) (5) (5) (5) (5) (5) (5) (5	RAM 4 GB	Total Disk 20 GB	- <u>사용아</u> Public Yes	려는 Fla	avor 선택
Name m1.medium Available (Q Click here	2 2 a for filters or fu	RAM 4 GB	Total Disk 20 GB	Public Yes	Select one	
 m1.medium Available (Click here 	2 a for filters or fu	4 GB	20 GB	Yes	Select one	
Available (4 For filters or full	III text search.	C.		Select one	
Q Click here	e for filters or fu	III text search.				
					<u> </u>	
Name	VCPUS	RAM	Total Disk	Public		
• m1.tiny	1	512 MB	1 GB	Yes	•	
m1.small	1	2 GB	20 GB	Yes	•	
m1.large	4	8 GB	20 GB	Yes	•	
m1.xlarge	8	16 GB	20 GB	Yes	•	
	m1.tiny m1.small m1.large m1.xlarge	m1.tiny1m1.small1m1.large4m1.xlarge8	m1.tiny1512 MBm1.small12 GBm1.large48 GBm1.xlarge816 GB	m1.tiny 1 512 MB 1 GB m1.small 1 2 GB 20 GB m1.large 4 8 GB 20 GB m1.xlarge 8 16 GB 20 GB	m1.tiny1512 MB1 GBYesm1.small12 GB20 GBYesm1.large48 GB20 GBYesm1.xlarge816 GB20 GBYes	m1.tiny1512 MB1 GBYesm1.small12 GB20 GBYesm1.large48 GB20 GBYesm1.xlarge816 GB20 GBYes

Launch Instance: Networks

Network > test	Shared	Admin State	Status		
> test	No				
	INO	Up	Active	•	
A					
Available 🕕			Select at least or	ne network	
Click here for ilte	ers or full text sea	rch.		×	
Network	Shared	Admin State	Status		
external	No	Up	Active	•	
	Available ① Click here for ilte Network external	Available ① Click here for Network Shared external	Available ① Iters or full text search. Click here for Iters or full text search. Network Shared Admin State external No Up	Available ① Select at least or Click here for ilters or full text search. Network Shared Admin State Status external No	Available ① Select at least one network Click here for itlers or full text search. Network Shared Admin State Status

Launch Instance: Key Pair

ource	+ Create Key Pair	
lavor	Allocated	
Vetworks	Displaying 0 items	
	Name	
Network Ports	Select a key pair from the available key p	airs below.
Security Groups	Displaying 0 items	
Key Pair	✓ Available	Select one
Configuration	Q Click here for filters or full text search.	×
Server Groups	Displaying 0 items	

Launch Instance: Key Pair (continued)

Create Key Pair	×
Key Pairs are how you login to your instance after it is launched. Choose a key pair name you will recognize only include alphanumeric characters, spaces, or dashes.	ze. Names may
microstack_id Key Type*	
Create Keypair Copy Private Key to Clipbo	ard Done
Key 파일로 사용할 이름고	과 형식 선택

Launch Instance: Key Pair (continued)

Key Pair Name *			
microstack_id			
Key Type*			
SSH Key	~		
Private Key			
BEGIN RSA PRIVATE KEY MIIEogIBAAKCAQEAu1A+1JXonh7UEAIFw9V1IDnrBipOtl3li4clHq+QII6KaDof AEeQawD9ewHTnTToFAeXw59QYz3bXTf9Bw6+3vtEyEAIGq6A16b6/GF2EmpN8iVI y2bldvu1hXk+bYrRJw0JcuBu5MLhyy6GhlklpxyIsmxrRb2jGZe4rOqXwsz/gq1j NTd+3ysX6lNhS12albAIrjst62RbJG8CPV49miLDV3rTcV0kIkieIR uoTTMIY1oxuf4w6OWqILxc/U4zG3A1KBs2uPyjhKAkv3aOyHCr ypTtSdFjID7w/un8NJtYuM4uJdbIMC/WutDn1wIDAQABAoIBAEHKFC4C30TQDnXL Ivh3mPT/yJx9ziaUgvxkb/cJAMf4U6N+FRFQBenM+Zzf5Jt6z2WGAyFxsqgLxC7v G5N4H8RBiSkIIvvLFPQKT5S1n4tFMFeomip1wBCp4drgq8Dvq7ipN85zZQfLJvb	Key 내용을 클립	보드로	복사
wLUPFJWATzSGbHGHmq/Y7Z41BNEitYDs/WMom/gKwIneA2tIETohfsfwH5OXyMLW PW258q0Iap0xWiAIPuozIxXLQ7zNq2Ohd1nnqnkT6bIJTWjkX8hm3cP/aw4ndQic csYZfkjTncDDzVXDDin+7NpJvuIDWgQEwHhuwsZ2NyFRsyNWFbvTJpmFGbUmwGhe +3joqrkCgYEA7mwyuKK2qVNLAOI8to3TLIt7BjUGpCibPJWteB7Hx18jI8/gt7ri CQmu2nOiRAXsz7yAKrDyjcSczkUPjg7n5E+jX5VHskx8BPWI3u+zDNiQfTZwmmtt +hG2xbVu2da4zjFo7t8BusynLa8g+fm0scj7sOkxbLJMISI+IIf69s0CgYEAyR9z 2/mWPYBnNs7L1ONIUPruZwjVUDz1Xb6mR3cgt3K+M0ULVcJvKOm2tjLwqTEQsCJ9			
	1115		
Create Keypair Copy Private	e Key to Clipboard Done		
			24

Launch Instance: Key Pair (continued)

- 생성한 비밀키를 \$HOME/.ssh 안에 저장하고 권한 지정
- 비밀키는 소유자만 읽고 쓸 수 있도록 권한 변경 필요

\$ cd ~/.ssh \$ cat > microstack_id ----BEGIN RSA PRIVATE KEY----MIIEogIBAAKCAQEAu1A+1JXonh7UEAIFw9V1IDnrBipOt131i4c1Hq+Q1I6KaDof AEeQawD9ewHTnTToFAeXw59QYz3bXTf9Bw6+3vtEyEAIGq6A16b6/GF2EmpN8iVI

```
...
y2bldvu1hxko/GDeyoqkX8Uzz/OGET0mNNN0aHMo7Cajp3P+biHEtfPL6HqNBrakmpP6i0+Lz3t
JZSiLhiiVQQ8brdrMnRJwbuiQViOeDfZFlfwSpTquAkofk5rzLM=
----END RSA PRIVATE KEY----
CTRL+D
```

\$ chmod 600 microstack_id

Launch Instance: Launch

Key Pair	
Configuration	✓ Available ⁽⁰⁾ Select one
Server Groups	Q Click here for filters or full text search. X
	Displaying 0 items
Scheduler Hints	Name
Metadata	No items to display.
	Displaying 0 items
K Cancel	< Back Next > Caunch Instance

• Launch Instance 버튼을 눌러 VM 생성

Instances: Spawning

- 설정이 올바르다면 cirros-vm 생성 시작
- 만약에 오류가 발생한다면, Source 항목에서
 Create New Volume 을 선택했는지 확인

n	stand	ces												
			Instance	ID = •				Filter	Launch Ins	tance	菌 Delete In	stances	More Action	ns 🔻
Disp	playing 1 iter	m												
D	Instance Name	lmage Name	IP Address	Flavor	Key Pair	Status		Availability Zone	Task	Power State	Age	Actions		
כ	cirros-v m	cirros	192.168.222.250	m1.medium	microstack_id	Build	se	nova	Spawning	No State	0 minutes	Associa	te Floating IP	-
)isț	playing 1 iter	m							-					

Instances: Associate Floating IP

D	Instance Name	lmage Name	IP Address	Flavor	Key Pair	Status		Availability Task Power Age Actions Zone State		Actions			
	cirros-vm	cirros	192.168.222.250	m1.medium	microstack_id	Active	зſ,	nova	None	Running	0 minutes	Create Snapshot	•
Displ	aying <mark>1</mark> item												

• 내부네트워크에생성한 VM 에 Floating IP 연결

Key Pair	Status		Availability Zone	Task	Power State	Age		Actions	
microstack_id	Active	aî ⁿ	nova	None	Running	14 minut	tes	Create Snapshot	•
						-1	Ass	sociate Floating IP	
							Att	ach Interface	
							De	tach Interface	
							Edi	t Instance	

Instances: Manage Floating IP

• Floating IP 추가

Manage Floating IP Associations	×
IP Address * No floating IP addresses allocated Port to be associated * cirros-vm: 192.168.222.250	Select the IP address you wish to associate with the selected instance or port.
	Cancel Associate

Instances: Allocate Floating IP

Allocate Floating I	P		×
Pool * external Description	•	Description: Allocate a floating IP from a Project Quotas Floating IP	a given floating IP pool. 0 of 50 Used
			Cancel Allocate IP
Allo	cate IP 버튼을		소 핰당

Instances: Assign Floating IP

P Address *		_	Select the IP address you wish to associate with the
10.20.20.198	•	+	selected instance or port.
ort to be associated *			
cirros-vm: 92.168.222.250		•	
			Cancel Associate

Access VM

• ssh 명령을 이용해 Floating IP 로 접속

\$ ssh -i ~/.ssh/microstack_id cirros@10.20.20.198 The authenticity of host '10.20.20.198 (10.20.20.198)' can't be established. ECDSA key fingerprint is SHA256:CugRKPfWZTs1U9qRB1N60s8cTzeQivzU+qfXjQp3q/4. Are you sure you want to continue connecting (yes/no/[fingerprint])? yes Warning: Permanently added '10.20.20.198' (ECDSA) to the list of known hosts. \$ hostname cirros-vm

• 할당한 메모리 확인: 4GB

\$ free -m					
	total	used	free	shared	buffers
Mem:	3951	61	3890	0	14
-/+ buffers:		46	3905		
Swap:	0	0	0		

Access VM (continued)

• 할당한 디스크 공간 확인: 20GB

\$ df -h Filesyste	Size	Used	Available	Use% Mounted on
m /dev /dev/vda1	1.9G 19 4G	О 23 4м	1.9G 18 7G	0% /dev 0% /
tmpfs tmpfs	1.9G 1.9G	0 92.0к	1.9G 1.9G	0% /dev/shm 0% /run

• 원하는 사양으로 VM 이 생성되었음을 확인

Create Image

Download Ubuntu Image

- Ubuntu Cloud Image 사용
- 아래 링크에서 ubuntu-20.04-server-cloudimg-arm64.img 다운 <u>https://cloud-images.ubuntu.com/releases/focal/release/</u>
- 받은 파일을 OpenStack 에 등록

~	Im	ages					
Overview Instances	Q	Click here f	or filters or full text search.			×	+ Create Image
Images	Disp	olaying 1 item			-		
Key Pairs	0	Owner	Name [•]	Туре	Status	Visib	lity Protected
ver Groups		> admin	cirros	Image	Active	Public	No No
>	Disp	olaying 1 item					

Create Image

- Image Name : 사용할 이미지 이름 지정
- Image Source: 받은 파일 지정
- Format: QCOW2 선택

Create	Image
--------	-------

Image Details	Image Details	
Metadata	Specify an image to upload to the Image Service. Image Name Image Description	
	ubuntu-focal64	
	Image Source	
	File* Browse ubuntu-20.04-server-cloudimg-amd64.ii	
	Format*	
	QCOW2 - QEMU Emulator	

Create Image (continued)

- Minimum Disk (GB): 필요한 최소 디스크 용량
- Minimum Ram (MB): 필요한 최소 메모리 용량

Image Requirements	
Kernel	Ramdisk
Choose an image ~	Choose an image 🗸 🗸
Architecture	Minimum Disk (GB)* 2 Image: State of the
Image Sharing Visibility	Protected
Private Shared Community Public	Yes No
	< Back Next > Create Image

Image List

• 다운받은 파일을 이용해 이미지 생성

Im	ages						
Q	Click here fo	r filters or full text search.			× Cre	ate Image	â Delete Images
Disp	laying 2 items						
	Owner	Name [▲]	Туре	Status	Visibility	Protected	
	> admin	cirros	Image	Active	Public	No	Launch -
	> admin	ubuntu-focal64	Image	Active	Shared	No	Launch -
Disp	laying 2 items						

Create VM with Ubuntu Image

• 생성한 ubuntu-foca164 이미지를 이용해 가상 머신 생성

Images							
٩	Click here fo	r filters or full text search.			× + Crea	ate Image	1 Delete Images
Displ	aying 2 items						
	Owner	Name [▲]	Туре	Status	Visibility	Protected	
	> admin	cirros	Image	Active	Public	No	Launch -
	> admin	ubuntu-focal64	Image	Active	Shared	No	Launch 💌
							_

Select Source

- ubuntu-foca164 이미지 선택
- Create New Volume 은 No 선택

Launch Instance		×
Details	Instance source is the template used to create an instance. Yo snapshot), a volume or a volume snapshot (if enabled). You ca new volume.	u can use an image, a snapshot of an instance (image an also choose to use persistent storage by creating a
Source	Select Boot Source	Create New Volume
Flavor *	Image 🗸	Yes No
Networks *	Allocated	
Network Ports	Displaying 1 item	
Security Groups	Name	
Key Pair	> ubuntu-focal64	▼
Configuration	Displaying 1 item	

Select Flavor

• 원하는 Flavor 선택

Details	Flavors manage the s Allocated	sizing for the compu	ite, memory and st	orage capacity of the in	nstance.	U
Source	Name	VCPUS	RAM	Total Disk	Public	
Flavor	> m1.medium	2	4 GB	20 GB	Yes	•
Networks *	✓ Available 4					Calastana
Network Ports		filtere er full teut ee	arab			Select one
Security Groups	Q Click here for	Thers of full text se	arcn.			×
	Name	VCPUS	RAM	Total Disk	Public	
Key Pair	> m1.tiny	1	512 MB	1 GB	Yes	↑
Configuration	> m1.small	1	2 GB	20 GB	Yes	↑
Server Groups						

Select Networks

• 앞에서 생성한 VM 과 같은 test 네트워크 선택

Details	Networks (provide the comm	nunication channels for	instances in the cloud.		
	✓ Alloc:	ated 🕕		S	elect networks from those	listed below
Source		Network	Shared	Admin State	Status	
lavor	\$1	> test	No	Up	Active	*
letworks		21		ά.		
	✓ Availa	able 🚺			Select at least	
etwork Ports					Geleci ai leasi	t one networ
etwork Ports ecurity Groups	Q Clie	ck here for filters	or full text search.			x
etwork Ports ecurity Groups	Q Cliv	ck here for filters ork	or full text search. Shared	Admin State	Status	×
etwork Ports ecurity Groups ey Pair	Q Clic Netwo	ck here for filters ork	or full text search. Shared	Admin State	Status	×

Select Key Pair

- 앞에서 생성한 microstack_id 선택
- Launch Instance 를 선택해 VM 생성

Flavor	Allocated
Networks	Displaying 1 item
Network Ports	Name
Security Groups	Displaving 1 item
Key Pair	
Configuration	✓ Available ① Select one
Server Groups	Q Click here for filters or full text search.
Schodulor Hinte	Displaying 0 items
Scheduler Hints	Name
Metadata	No items to display.
	Displaying 0 items
≭ Cancel	< Back Next > Aunch Instance

Instances

• Instance 목록에서 방금 생성한 ubuntu VM 확인

ns	stances						
Dicp	laving 2 itoms			[Instance ID = •		
Instance Name Image Name IP Address				Flavor	Key Pair	Status	
	ubuntu	ubuntu-focal64	192.168.222.60	m1.medi	um microstack_id	Active	
	cirros-vm	cirros	192,168,222,250, 10,20,20,198	m1.medi	um microstack id	Active	

Attach Floating IP

• 외부에서 접속할 수 있도록 Floating IP 연결



Access VM

• ubuntu 에 할당한 Floating IP 주소 확인

D	Instance Name	Image Name	IP Address	Flavor
D	ubuntu	ubuntu-focal64	192.168.222.60, 10.20.20.85	m1.medium
D	cirros-vm	cirros	192.168.222.250, 10.20.20.198	m1.medium
	-	-		_

• 접근할 수 있는 IP 인지 확인

\$ ping 10.20.20.85 PING 10.20.20.85 (10.20.20.85) 56(84) bytes of data. 64 bytes from 10.20.20.85: icmp_seq=1 ttl=63 time=1.71 ms 64 bytes from 10.20.20.85: icmp_seq=2 ttl=63 time=0.983 ms 64 bytes from 10.20.20.85: icmp_seq=3 ttl=63 time=0.158 ms 64 bytes from 10.20.20.85: icmp_seq=4 ttl=63 time=0.166 ms

Access VM (continued)

\$ ssh -i ~/.ssh/microstack_id ubuntu@10.20.20.85 The authenticity of host '10.20.20.85 (10.20.20.85)' can't be established. ECDSA key fingerprint is SHA256:r8pwGofhta18u8U5JfoTQd6eVxqVhHo6lIoIuPwzBdY. Are you sure you want to continue connecting (yes/no/[fingerprint])? yes Warning: Permanently added '10.20.20.85' (ECDSA) to the list of known hosts. Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-89-generic x86_64)

- * Documentation: https://help.ubuntu.com https:
 - lanagement: //landscape.canonical.com https
- * Support:
- ://ubuntu.com/advantage

System information as of Sun Oct 31 06:16:43 UTC 2021

System load:0.0Processes:117Usage of /:6.6% of 19.21GBUsers logged in:0Memory usage:5%IPv4 address for ens3:192.168.222.60Swap usage:0%192.168.222.60

Instance Networks

Internet Connectivity

• 생성한 VM 에서 외부 인터넷 연결이 제대로 되지 않는 문제

```
ubuntu@ubuntu:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
^C
--- 8.8.8.8 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1010ms
ubuntu@ubuntu:~$ ping 1.1.1.1
PING 1.1.1.1 (1.1.1.1) 56(84) bytes of data.
^C
--- 1.1.1.1 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1018ms
```

Internet Connectivity (continued)

- 인스턴스에서 외부 인터넷 연결은 막혀있는 상태
- 호스트 서버에서 인스턴스 접근은 가능

\$ ping 10.20.20.85 PING 10.20.20.85 (10.20.20.85) 56(84) bytes of data. 64 bytes from 10.20.20.85: icmp_seq=1 ttl=63 time=1.80 ms 64 bytes from 10.20.20.85: icmp_seq=2 ttl=63 time=1.05 ms 64 bytes from 10.20.20.85: icmp_seq=3 ttl=63 time=0.177 ms 64 bytes from 10.20.20.85: icmp_seq=4 ttl=63 time=0.193 ms

IPTable & NAT

- 인스턴스에서 외부 인터넷과 연결하기 위해 iptables 사용
- 10.20.20.0/24 대역패킷을 Gateway 인터페이스로 전달
- Gateway 인터페이스에는 MASQUERADE 기능 활성화
- 10.20.20.0/24 대역 패킷을 외부 인터넷으로 전송하도록 설정

```
sudo sysctl -w net.ipv4.ip_forward=1
sudo iptables -A FORWARD -s 10.20.20.0/24 -i br-ex -o enp7s0 \
    -m conntrack --ctstate NEW -j ACCEPT
sudo iptables -A FORWARD -m conntrack --ctstate RELATED,ESTABLISHED \
    -j ACCEPT
sudo iptables -t nat -A POSTROUTING -o enp7s0 -j MASQUERADE
```

Check Instance Networks

iptables 명령으로 10.20.20.0/24 대역 패킷이 외부망으로 제대로 전송되는지 확인

ubuntu@ubuntu:~\$ ping 1.1.1.1

```
PING 1.1.1.1 (1.1.1.1) 56(84) bytes of data.
64 bytes from 1.1.1.1: icmp_seq=1 ttl=50 time=3.90 ms
64 bytes from 1.1.1.1: icmp_seq=2 ttl=50 time=2.89 ms
^C
--- 1.1.1.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 2.894/3.398/3.903/0.504 ms
```

Check Instance Networks (continued)

ubuntu@ubuntu:~\$ sudo apt update Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB] Hit:2 http://archive.ubuntu.com/ubuntu focal InRelease ... Fetched 20.4 MB in 6s (3293 kB/s) Reading package lists... Done Building dependency tree Reading state information... Done 10 packages can be upgraded. Run 'apt list --upgradable' to see them.

ubuntu@ubuntu:~\$ sudo apt upgrade -y
Reading package lists... Done Build
ing dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages will be upgraded:
 apport bind9-dnsutils bind9-host bind9-libs libnetplan0
 netplan.io open-vm-tools python3-apport
 python3-problem-report tzdata

53

Volumes

LVM Volumes

- LVM 으로 Logical Volume 을 생성해 추가 가능
- 디스크 전체를 사용하거나 디스크 이미지 파일을 사용할 수 있음
- LVM 을 사용하기 위해 1vm2 패키지 설치 필요

sudo apt install lvm2

• 디스크 이미지 파일을 생성해 볼륨으로 사용할 수 있도록 설정

Create LVM Disk Image

• /dev/loop* 을 이용해 이미지 파일을 블록 디바이스로 사용

sudo fallocate -1 400G /mnt/ext-disk/cinder-volumes.img sudo losetup /dev/loop99 /mnt/ext-disk/cinder-volumes.img sudo pvcreate /dev/loop99 sudo vgcreate cinder-volumes /dev/loop99

• 블록 스토리지와 관련된 서비스 실행

sudo snap start --enable microstack.cinder-volume
sudo snap start --enable microstack.cinder-backup
sudo snap start --enable microstack.iscsid

Create LVM Disk Image (continued)

- 생성한 LVM Volume 확인
 - Physical Volume
 - Volume Group
 - Logical Volume
- \$ sudo pvscan
 PV /dev/loop99 VG cinder-volumes lvm2 [<400.00 GiB / <19.81 GiB free]
 Total: 1 [<400.00 GiB] / in use: 1 [<400.00 GiB] / in no VG: 0 [0]</pre>
- \$ sudo vgscan
 Found volume group "cinder-volumes" using metadata type lvm2
- \$ sudo lvscan ACTIVE '/dev/cinder-volumes/cinder-volumes-pool' [380.00 GiB] inherit

Create Volume

• Create Volume 을 선택해 볼륨 생성

Compute	>	Volu	umes								
Volumes	~										
	Volumes						Filter		Q	+ Cr	eate Volume
Sr	napshots	Name	Description	Size	Status	Group	Туре	Attached To	Availability	Zone	Bootable
	Groups						N	o items to displa	ıy.		

Create Volume (continued)

× Create Volume Volume Name Description: ubuntu-volume Volumes are block devices that can be attached to Description instances. Volume Type Description: Volume Source DEFAULT No source, empty volume Ŧ Default Volume Type Type Volume Limits DEFAULT Total Gibibytes 0 of 1.000 GiB Used Size (GiB)* Number of Volumes ٠ 20 -Availability Zone "nova" 영역이 추가됨 nova -Group 😧 No group -

Create Volume (continued)

- Availability zone 에 nova 영역표시
- ubuntu-volume 으로 20GiB 크기로 볼륨 생성

Vo	lume	es						
				[Filter		۹ 🕇	Create Volume
Displ	aying 1 iten	n						
	Name	Description	Size	Status	Group	Туре	Attached To	Availability Zone
0	ubuntu- volume	-	20GiB	Available	-	DEFAULT		nova
Displ	aying 1 iten	n						

Attach Volume

• 볼륨을 추가할 인스턴스에서 Attach Volume 선택



Attach Volume (continued)

• 미리 생성해둔 볼륨 선택

Attach Volume	×
Volume ID * ❷ ubuntu-volume (93c77302-1592-40a2-82f8-e3a2 ▼	Description: Attach Volume to Running Instance.
	Cancel Attach Volume
앞에서 생성한 볼	·륨을 목록에서 선택

Check Attached Volume

• ubuntu VM 안에서 추가된 볼륨 확인

ubuntu@ubuntu:~\$ ls -al /dev/vd* brw-rw---- 1 root disk 252, 0 Oct 31 08:34 /dev/vda brw-rw---- 1 root disk 252, 1 Oct 31 08:34 /dev/vda1 brw-rw---- 1 root disk 252, 14 Oct 31 08:34 /dev/vda14 brw-rw---- 1 root disk 252, 15 Oct 31 08:34 /dev/vda15 brw-rw---- 1 root disk 252, 16 Oct 31 10:31 /dev/vdb

ubuntu@ubuntu:/mnt\$ sudo fdisk -1 /dev/vdb Disk /dev/vdb: 20 GiB, 21474836480 bytes, 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

• /dev/vdb 볼륨이 추가된 것 확인

Mount Attached Volume

• ext4 파일시스템으로 포맷 후에시스템에 마운트

ubuntu@ubuntu:~\$ sudo mkfs.ext4 /dev/vdb mke2fs 1.45.5 (07-Jan-2020) Discarding device blocks: done Creating filesystem with 5242880 4k blocks and 1310720 inodes Filesystem UUID: 2193249c-b2bb-4997-9c95-6b2239e76c46 Superblock backups stored on blocks: 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208, 4096000

Allocating group tables: done writing inode tables: done Creating journal (32768 blocks): done writing superblocks and filesystem accounting information: done

Mount Attached Volume (continued)

```
ubuntu@ubuntu:~$ sudo mkdir /mnt/new-volume
ubuntu@ubuntu:~$ sudo mount /dev/vdb /mnt/new-volume
ubuntu@ubuntu:~$ cd /mnt/new-volume/
ubuntu@ubuntu:/mnt/new-volume$ ls -1
total 16
drwx----- 2 root root 16384 Oct 31 10:53 lost+found
```

ubuntu@ubuntu:/mnt/new-volume\$ df -h									
Filesystem	Size	Used	Avail	Use%	Mounted on				
udev	2.0G	0	2.0G	0%	/dev				
tmpfs	394м	968K	393м	1%	/run				
/dev/vda1	20G	1.5G	18G	8%	/				
•••									
/dev/loop1	68M	68M	0	100%	/snap/1xd/21545				
/dev/loop0	62M	62м	0	100%	/snap/core20/1169				
/dev/vda15	105M	5.2м	100M	5%	/boot/efi				
/dev/loop2	33M	33M	0	100%	/snap/snapd/13640				
tmpfs	394м	0	394м	0%	/run/user/1000				
/dev/vdb	20G	45M	19G	1%	/mnt/new-volume				

Summary

MicroStack Up & Running

- 장점
 - 명령어 몇 개로 쉽고 빠르게 OpenStack 환경 구축
 - MicroStack 을 띄우는 서버에 영향을 주지 않음
 - 。LVM 볼륨을 생성해 인스턴스에 붙일 디스크 공간 제공 가능
- · 단점
 - 초기화 단계에서 내부 서비스 포트 변경 불가
 - 인스턴스에서 외부 네트워크 연결을 위해 iptables 필요
 - 아직은 beta 단계의 프로젝트 성숙도

MicroStack Up & Running

감사합니다

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