Rancang Bangun Layanan Private Cloud Menggunakan OpenStack pada Ubuntu 22.04

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XIII SIJA B

PT. Indostorage Solusi Teknologi

Profil Perusahaan

PT. Indostorage Solusi Teknologi

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PT. Indostorage Solusi Teknologi

Visi

Menjadi perusahaan penyedia layanan teknologi informasi yang profesional dan kompetitif dengan memberikan layanan, solusi yang tepat terencana dan bernilai bagi pelanggan dan *stakeholders* serta mampu berkontribusi dalam memperkenalkan teknologi informasi kepada publik

Misi

- Memberikan solusi inovatif dan optimal kepada klien yang berorientasi pada kepentingan pelanggan.
- Berkomitmen untuk memberikan pelayanan terbaik sehingga dapat menjadi mitra bisnis yang tepercaya.
- Berusaha untuk selalu meningkatkan kapabilitas dan mengoptimalkan pengelolaan sumber daya manusia yang unggul dan mandiri.

Latar Belakang

Latar Belakang

Perusahaan pada umumnya membeli server baru ketika membutuhkan aplikasi baru untuk dijalankan.

Kendala dalam pengadaan suatu sistem maupun ketika dilakukan proses *upgrade.*

- *Data Center* penuh dengan *server*
- Menggunakan Sebagian kecil dari kapasitas
- Harus membayar biaya listrik untuk menjalankan server
- Lambat laun data center menjadi penuh dengan server
- Membayar biaya listrik untuk mendinginkan server

Tujuan

1. Implementasi penggunaan *private cloud* OpenStack dapat menghemat biaya perawatan perangkat server dan jaringan fisik dengan menggunakan layanan *virtual*.
2. Dengan membangun *private cloud* menggunakan OpenStack, dapat memaksimalkan penggunaan *resource* seperti RAM, CPU, maupun *storage* pada perangkat *server* fisik yang ada.

Batasan Masalah

- Proyek dibuat pada *virtual machine* (VM) yang berada di *server Research & Development* (R&D) milik PT. Indostorage Solusi Teknologi dengan sumber daya yang sudah disediakan.
- *Private cloud* yang penulis bangun bersifat simulasi dan tidak terkait dengan kebutuhan suatu perusahaan.
- Dalam pembuatan proyek, penulis menggunakan 2 *node,* yaitu c*ontroller node* dan *compute node*.
- Layanan yang dibangun pada OpenStack hanya layanan inti.
- Sistem operasi yang digunakan yaitu Ubuntu 22.04.
- Menggunakan OpenStack versi Yoga.
- *Dashboard service* dibangun di atas Docker versi 20.10.
- *Image* yang digunakan untuk pembuatan *virtual machine* di OpenStack adalah Ubuntu 22.04.

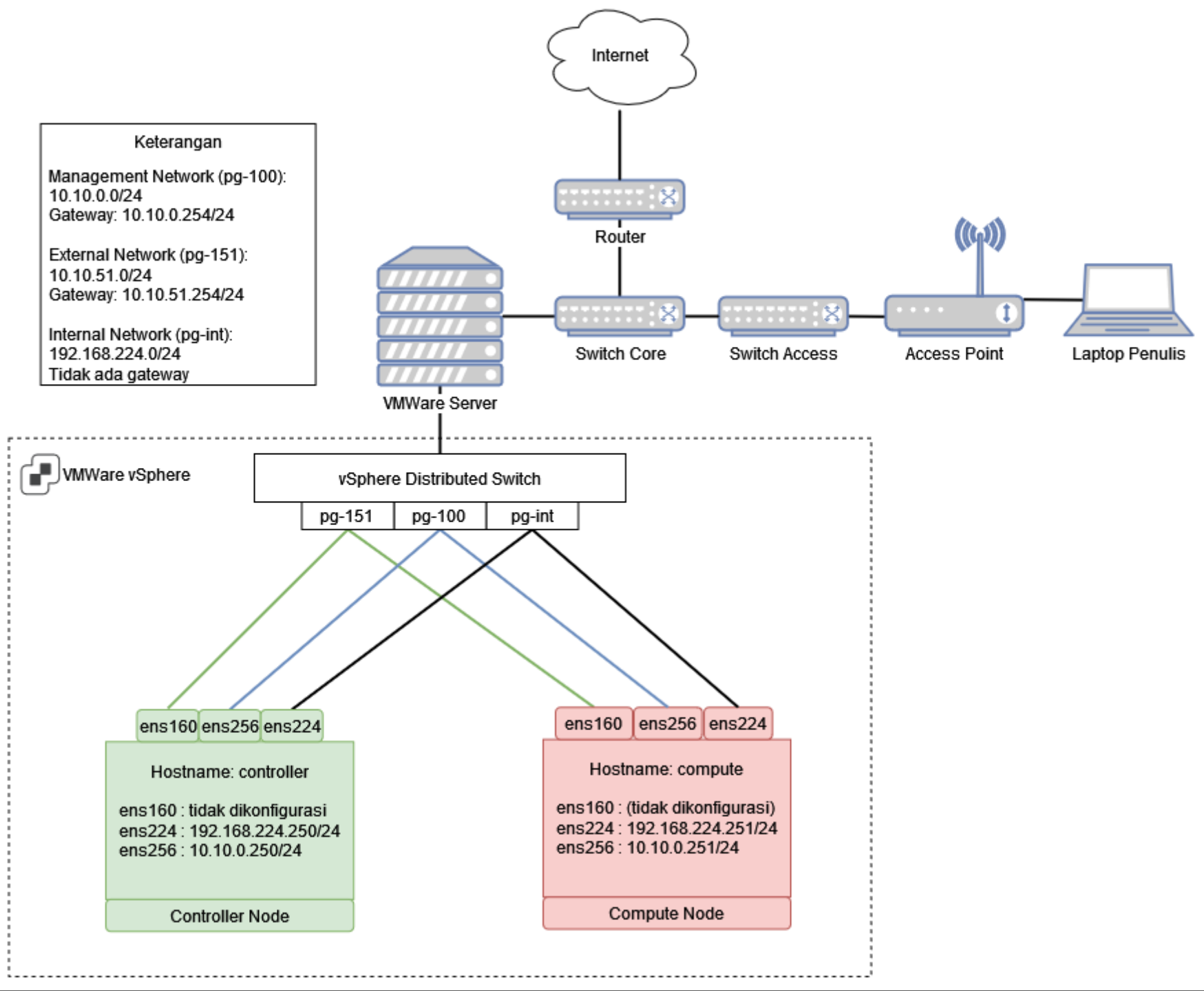
Spesifikasi Kebutuhan Perangkat

No	Perangkat	Spesifikasi
1	Controler Node	• Sistem operasi Ubuntu 22.04 • RAM 8 GB • *Harddisk* 50 GB • 6 *Core* CPU

2	Compute Node	• Sistem operasi Ubuntu 22.04
		• RAM 24 GB
		• *Harddisk*
		  • 80 GB di /dev/sda
		  • 100 GB di /dev/sdb (untuk layanan *Cinder*)
		  • 100 GB di /dev/sdc (untuk layanan *Cinder*)
		• 12 *Core* CPU

3	Laptop Penulis	• Sistem operasi Windows 10 • RAM 8 GB • *Harddisk* 500 GB • *Processor* Intel Core i3 5005U 2 CPUs

Topologi


Internet
Keterangan
Management Network (pg-100):
10.10.0.0/24
Gateway: 10.10.0.254/24
External Network (pg-151):
10.10.51.0/24
Gateway: 10.10.51.254/24
Internal Network (pg-int):
192.168.224.0/24
Tidak ada gateway
Router
Switch Core
Switch Access
Access Point
Laptop Penulis
VMWare Server
VMWare vSphere
vSphere Distributed Switch
pg-151
pg-100
pg-int
ens160
ens256
ens224
Hostname: controller
ens160 : tidak dikonfigurasi
ens224 : 192.168.224.250/24
ens256 : 10.10.0.250/24
Controller Node
ens160
ens256
ens224
Hostname: compute
ens160 : (tidak dikonfigurasi)
ens224 : 192.168.224.251/24
ens256 : 10.10.0.251/24
Compute Node

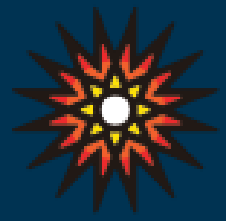
Langkah Kerja

Environment

Keystone

Glance

Placement



Nova

Neutron

Cinder

Skyline

Pengujian

Environment

Environment

1. Instalasi dan konfigurasi Chrony

```
root@controller:~# apt-get install chrony
```

/etc/chrony/chrony.conf

Controller node

```
server 0.id.pool.ntp.org iburst
allow 10.10.0.0/24
```

Compute node

```
server 10.10.0.250 iburst
```

Pengecekan layanan

Controller node

```
root@controller:~# systemctl restart chrony
root@controller:~# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^? 230.subnet-8.helium.co.id     3   6     3     0  +4148us[+4148us] +/-   95ms
root@controller:~#
```

Compute node

```
root@compute:~# systemctl restart chrony
root@compute:~# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^? 10.10.0.250                   4   6     3     1    -16us[  -16us] +/-   71ms
root@compute:~#
```

Environment

2. Instalasi openstack client

```
root@controller:~# apt-get install python3-openstackclient
```

3. Instalasi dan Konfigrasi MariadDB

```
root@controller:~# apt install mariadb-server python3-pymysql
```

/etc/mariadb/mariadb.conf.d/99-openstack.conf

```
[mysqld]
bind-address = 10.10.0.250

default-storage-engine = innodb
innodb_file_per_table = on
max_connections = 4096
collation-server = utf8_general_ci
character-set-server = utf8
```

```
root@controller:~# systemctl restart mariadb
```

4. Instalasi dan Konfigrasi RabbitMQ

```
root@controller:~# apt-get install rabbitmq-server
```

Menambah user & permission

```
root@controller:~# rabbitmqctl add_user openstack RABBIT_PASS
Adding user "openstack" ...
Done. Don't forget to grant the user permissions to some virtual hosts!
 See 'rabbitmqctl help set_permissions' to learn more.
root@controller:~#
```

```
root@controller:~# rabbitmqctl set_permissions openstack ".*" ".*" ".*"
Setting permissions for user "openstack" in vhost "/" ...
root@controller:~#
```

5. Instalasi dan Konfigrasi Memcached

```
root@controller:~# apt-get install python3-memcache
```

```
  GNU nano 6.2                  /etc/memcached.conf
# Specify which IP address to listen on. The default is to listen on a>
# This parameter is one of the only security measures that memcached h>
# it's listening on a firewalled interface.
-l 10.10.0.250
```

```
root@controller:~# systemctl restart memcached
root@controller:~#
```

Dilakukan di Controller Node

Environment

6. Instalasi dan Konfigrasi Etcd

```
root@controller:~# apt-get install etcd
```

```
 GNU nano 6.2                  /etc/default/etcd *
ETCD_NAME="controller"
ETCD_DATA_DIR="/var/lib/etcd"
ETCD_INITIAL_CLUSTER_STATE="new"
ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
ETCD_INITIAL_CLUSTER="controller=http://10.10.0.250:2380"
ETCD_INITIAL_ADVERTISE_PEER_URLS="http://10.10.0.250:2380"
ETCD_ADVERTISE_CLIENT_URLS="http://10.10.0.250:2379"
ETCD_LISTEN_PEER_URLS="http://0.0.0.0:2380"
ETCD_LISTEN_CLIENT_URLS="http://10.10.0.250:2379"
```

```
root@controller:~# systemctl restart etcd
root@controller:~#
```

Dilakukan di Controller Node

Keystone

Keystone

1. Membuat user dan database

```
MariaDB [(none)]> CREATE DATABASE keystone;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON keystone.* TO 'keystone'@'loc
alhost' \
    -> IDENTIFIED BY 'KEYSTONE_DBPASS';
Query OK, 0 rows affected (0.009 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON keystone.* TO 'keystone'@'%'
IDENTIFIED BY 'KEYSTONE_DBPASS';
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]>
```

2. Instalasi dan Konfigurasi Keystone

```
root@controller:~# apt-get install keystone
```

```
  GNU nano 6.2                 /etc/keystone/keystone.conf

[database]
#connection = sqlite:////var/lib/keystone/keystone.db
connection = mysql+pymysql://keystone:KEYSTONE_DBPASS@10.10.0.250/keystone
```

```
  GNU nano 6.2                 /etc/keystone/keystone.conf
# reason to change this option unless you are providing a custom entry point.
# (string value)
#driver = sql
[token]
provider = fernet
```

3. Sinkronasi database dengan layanan

```
root@controller:~# su -s /bin/sh -c "keystone-manage db_sync" keystone
root@controller:~# keystone-manage fernet_setup --keystone-user keystone --keysto
ne-group keystone
root@controller:~# keystone-manage credential_setup --keystone-user keystone --ke
ystone-group keystone
root@controller:~#
```

4. Bootstraping layanan

```
root@controller:~# keystone-manage bootstrap --bootstrap-password ADMIN_PASS \
        --bootstrap-admin-url http://10.10.0.250:5000/v3/ \
        --bootstrap-internal-url http://10.10.0.250:5000/v3/ \
        --bootstrap-public-url http://10.10.0.250:5000/v3/ \
        --bootstrap-region-id RegionOne
root@controller:~#
```

5. Membuat environment variable openstack client

```
  GNU nano 6.2                          admin-openrc
export OS_USERNAME=admin
export OS_PASSWORD=ADMIN_PASS
export OS_PROJECT_NAME=admin
export OS_USER_DOMAIN_NAME=Default
export OS_PROJECT_DOMAIN_NAME=Default
export OS_AUTH_URL=http://10.10.0.250:5000/v3
export OS_IDENTITY_API_VERSION=3
export OS_IMAGE_API_VERSION=2
export OS_VOLUME_API_VERSION=3
```

Dilakukan di Controller Node

Keystone

6. Membuat project untuk user layanan

```
root@controller:~# openstack project create --domain default \
  --description "Service Project" service
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | Service Project                  |
| domain_id   | default                          |
| enabled     | True                             |
| id          | 7907996049ea49358abf6ed2a38cef41 |
| is_domain   | False                            |
| name        | service                          |
| options     | {}                               |
| parent_id   | default                          |
| tags        | []                               |
+-------------+----------------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Glance

Glance

1. Membuat user dan database

```
MariaDB [(none)]> CREATE DATABASE glance;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'localhost' \
    ->   IDENTIFIED BY 'GLANCE_DBPASS';
Query OK, 0 rows affected (0.003 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'%' \
    ->   IDENTIFIED BY 'GLANCE_DBPASS';
Query OK, 0 rows affected (0.002 sec)
```

2. Membuat user layanan

```
root@controller:~# openstack user create --domain default --password-prompt glance
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | eb1ade58da604bcb81db060bd3e342df |
| name                | glance                           |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
root@controller:~# openstack role add --project service --user nova admin
root@controller:~#
```

3. Membuat entitas service

```
root@controller:~# openstack service create --name glance \
  --description "OpenStack Image" image
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Image                  |
| enabled     | True                             |
| id          | 7e70696fb86e4adbaff857bbc4c0e57c |
| name        | glance                           |
| type        | image                            |
+-------------+----------------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Glance

4. Membuat Endpoint Glance

```
root@controller:~# openstack endpoint create --region RegionOne image public http://10.10.0.250:9292 && \
openstack endpoint create --region RegionOne image internal http://10.10.0.250:9292 && \
openstack endpoint create --region RegionOne image admin http://10.10.0.250:9292
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 7174a13477cb4e30b8223b1d676cbde8 |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 3eb717bf67f84f7c96aa3803061267c9 |
| service_name | glance                           |
| service_type | image                            |
| url          | http://10.10.0.250:9292          |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 890151aa6a9c4c2880c2e19a16b05a56 |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 3eb717bf67f84f7c96aa3803061267c9 |
| service_name | glance                           |
| service_type | image                            |
| url          | http://10.10.0.250:9292          |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 7d7db07575114cfe80d6fa028a0a2468 |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 3eb717bf67f84f7c96aa3803061267c9 |
| service_name | glance                           |
| service_type | image                            |
| url          | http://10.10.0.250:9292          |
```

Glance

5. Instalasi dan konfigurasi Glance

```
root@controller:~# apt-get install glance
```

Menghubungkan glance dengan database

```
 GNU nano 6.2          /etc/glance/glance-api.conf *

[database]
connection = mysql+pymysql://glance:GLANCE_DBPASS@10.10.0.250/glance
```

Menghubungkan glance dengan keystone

```
 GNU nano 6.2          /etc/glance/glance-api.conf *

[keystone_authtoken]
www_authenticate_uri = http://10.10.0.250:5000
auth_url = http://10.10.0.250:5000
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = Default
user_domain_name = Default
project_name = service
username = glance
password = GLANCE_PASS
```

Menentukan lokasi dan cara penyimpanan image

```
 GNU nano 6.2          /etc/glance/glance-api.conf *

[glance_store]
stores = file,http
default_store = file
filesystem_store_datadir = /var/lib/glance/images/
```

Sinkronasi database dengan glance

```
root@controller:~# su -s /bin/sh -c "glance-manage db_sync" glance
```

```
root@controller:~# service glance-api restart
```

Dilakukan di Controller Node

Placement

Placement

1. Membuat user dan database

```
MariaDB [(none)]> CREATE DATABASE placement;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON placement.* TO 'placement'@'localhost' \
    ->   IDENTIFIED BY 'PLACEMENT_DBPASS';
Query OK, 0 rows affected (0.004 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON placement.* TO 'placement'@'%' \
    ->   IDENTIFIED BY 'PLACEMENT_DBPASS';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]>
```

2. Membuat user layanan

```
root@controller:~# openstack user create --domain default --password-prompt placement
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 792e05907856490da72bc559367d70e4 |
| name                | placement                        |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
root@controller:~# openstack role add --project service --user placement admin
root@controller:~#
```

3. Membuat entitas service

```
root@controller:~# openstack service create --name placement --description "Placement API" placement
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | Placement API                    |
| enabled     | True                             |
| id          | 313873be11d647dd9a3a914626ee2fdc |
| name        | placement                        |
| type        | placement                        |
+-------------+----------------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Placement

4. Membuat Endpoint Placement

```
root@controller:~# openstack endpoint create --region RegionOne placement public http://10.10.0.250:8778 && \
openstack endpoint create --region RegionOne placement internal http://10.10.0.250:8778 && \
openstack endpoint create --region RegionOne placement admin http://10.10.0.250:8778
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 004255580ade40b58a29077a12ec715f |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | ee990e8c6bdc40a1ab923b0b76442459 |
| service_name | placement                        |
| service_type | placement                        |
| url          | http://10.10.0.250:8778          |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 596b56e373eb4625acea98b3ad0247c2 |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | ee990e8c6bdc40a1ab923b0b76442459 |
| service_name | placement                        |
| service_type | placement                        |
| url          | http://10.10.0.250:8778          |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 35bb1529c8d84963ac8b3109967195fa |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | ee990e8c6bdc40a1ab923b0b76442459 |
| service_name | placement                        |
| service_type | placement                        |
| url          | http://10.10.0.250:8778          |
```

Dilakukan di Controller Node

Placement

5. Instalasi dan konfigurasi Placement

```
root@controller:~# apt-get install placement-api
```

Menghubungkan Placement dengan database

```
 GNU nano 6.2              /etc/placement/placement.conf *

[placement_database]
connection = mysql+pymysql://placement:PLACEMENT_PASS@10.10.0.250/placement
```

Menghubungkan Placement dengan Keystone

```
 GNU nano 6.2              /etc/placement/placement.conf *

[keystone_authtoken]
auth_url = http://10.10.0.250:5000/v3
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = Default
user_domain_name = Default
project_name = service
username = placement
password = PLACEMENT_PASS

[api]
auth_strategy = keystone
```

Sinkronasi database dengan Placement

```
root@controller:~# su -s /bin/sh -c "placement-manage db sync" placement
```

```
root@controller:~# service apache2 restart
```

Dilakukan di Controller Node

Nova

Nova

1. Membuat user dan database

```
MariaDB [(none)]> CREATE DATABASE nova_api;
MariaDB [(none)]> CREATE DATABASE nova;
MariaDB [(none)]> CREATE DATABASE nova_cell0;
MariaDB [(none)]>
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_api.* TO 'nova'@'localhost'
    -> IDENTIFIED BY 'NOVA_PASS';
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_api.* TO 'nova'@'%'
    -> IDENTIFIED BY 'NOVA_PASS';
MariaDB [(none)]>
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'localhost'
    -> IDENTIFIED BY 'NOVA_PASS';
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'%'
    -> IDENTIFIED BY 'NOVA_PASS';
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_cell0.* TO 'nova'@'localhost'
    -> IDENTIFIED BY 'NOVA_PASS';
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_cell0.* TO 'nova'@'%'
    -> IDENTIFIED BY 'NOVA_PASS';
MariaDB [(none)]>
```

2. Membuat user layanan

```
root@controller:~# openstack user create --domain default --password-prompt nova
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 8a7e9fdf059243e0a5e5f4ace777c287 |
| name                | nova                             |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
root@controller:~# openstack role add --project service --user nova admin
root@controller:~#
```

3. Membuat entitas service

```
root@controller:~# openstack service create --name nova \
  --description "OpenStack Compute" compute
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Compute                |
| enabled     | True                             |
| id          | d24db86c19c5496e8bb70a76e7587083 |
| name        | nova                             |
| type        | compute                          |
+-------------+----------------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Nova

4. Membuat Endpoint Nova

```
root@controller:~# openstack endpoint create --region RegionOne compute public http://10.10.0.250:8774/v2.1 && \
openstack endpoint create --region RegionOne compute internal http://10.10.0.250:8774/v2.1 && \
openstack endpoint create --region RegionOne compute admin http://10.10.0.250:8774/v2.1
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 7ee60fdba6ef4c3598c0ce144032e2ed |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | d3014f92bb804ed0b71a6883ee051218 |
| service_name | nova                             |
| service_type | compute                          |
| url          | http://10.10.0.250:8774/v2.1     |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 92e8772a36cb49c5a38bb165f6a4a9ff |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | d3014f92bb804ed0b71a6883ee051218 |
| service_name | nova                             |
| service_type | compute                          |
| url          | http://10.10.0.250:8774/v2.1     |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 0ad8df3fc2ce44369f27d0a5408ae842 |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | d3014f92bb804ed0b71a6883ee051218 |
| service_name | nova                             |
| service_type | compute                          |
| url          | http://10.10.0.250:8774/v2.1     |
```

Nova

5. Instalasi dan konfigurasi Nova

```
root@controller:~# apt-get install nova-api nova-conductor \
> nova-novncproxy nova-scheduler
```

Menghubungkan Placement dengan database

```
 GNU nano 6.2                  /etc/nova/nova.conf *

[api_database]
connection = mysql+pymysql://nova:NOVA_PASS@10.10.0.250/nova_api

[database]
connection = mysql+pymysql://nova:NOVA_PASS@10.10.0.250/nova
```

Menghubungkan Nova dengan Keystone

```
 GNU nano 6.2                  /etc/nova/nova.conf *

[keystone_authtoken]
www_authenticate_uri = http://10.10.0.250:5000/
auth_url = http://10.10.0.250:5000/
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = Default
user_domain_name = Default
project_name = service
username = nova
password = NOVA_PASS

[api]
auth_strategy = keystone
```

Konfigurasi VNC

```
 GNU nano 6.2                  /etc/nova/nova.conf *

[vnc]
enabled = true
server_listen = 10.10.0.250
server_proxyclient_address = 10.10.0.250
```

Menghubungkan Nova dengan Glance

```
 GNU nano 6.2                  /etc/nova/nova.conf *

[glance]
api_servers = http://10.10.0.250:9292
```

Menghubungkan Nova dengan Placement

```
 GNU nano 6.2                  /etc/nova/nova.conf *

[placement]
region_name = RegionOne
project_domain_name = Default
project_name = service
auth_type = password
user_domain_name = Default
auth_url = http://10.10.0.250:5000/v3
username = placement
password = PLACEMENT_PASS
```

Dilakukan di Controller Node

Nova

Menghubungkan Nova dengan RabbitMQ

```
 GNU nano 6.2                  /etc/nova/nova.conf
[DEFAULT]
lock_path = /var/lock/nova
state_path = /var/lib/nova
vif_plugging_is_fatal = True
vif_plugging_timeout = 300
force_config_drive = true

transport_url = rabbit://openstack:RABBIT_PASS@10.10.0.250:5672/
```

Restart layanan Nova

```
root@controller:~# systemctl restart nova-api.service nova-scheduler.service \
> nova-conductor.service nova-novncproxy.service
root@controller:~#
```

Dilakukan di Controller Node

Nova (Compute)

6. Instalasi dan konfigurasi Nova Compute

```
root@compute:~# apt-get install nova-compute
```

Menghubungkan Nova Compute dengan RabbitMQ

```
 GNU nano 6.2                                    /etc/nova/nova.conf *
#from compute
[DEFAULT]
log_dir = /var/log/nova
lock_path = /var/lock/nova
state_path = /var/lib/nova
use_neutron = true
force_config_drive = true

transport_url = rabbit://openstack:RABBIT_PASS@10.10.0.250:5672/
```

Konfigurasi VNC

```
 GNU nano 6.2                                    /etc/nova/nova.conf *

[vnc]
enabled = true
server_listen = 0.0.0.0
server_proxyclient_address = 10.10.0.251
novncproxy_base_url = http://10.10.0.250:6080/vnc_auto.html
#
```

Menghubungkan Nova Compute dengan Keystone

```
 GNU nano 6.2                                    /etc/nova/nova.conf *

[keystone_authtoken]
www_authenticate_uri = http://10.10.0.250:5000/
auth_url = http://10.10.0.250:5000/
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = Default
user_domain_name = Default
project_name = service
username = nova
password = NOVA_PASS

[api]
auth_strategy = keystone
```

Menghubungkan Nova Compute dengan Glance

```
 GNU nano 6.2                                    /etc/nova/nova.conf *

[glance]
api_servers = http://10.10.0.250:9292

# Configuration options for the Image service
```

Dilakukan di Compute Node

Nova (Compute)

Menghubungkan Nova Compute dengan Placement

```
GNU nano 6.2                                    /etc/nova/nova.conf

[placement]
region_name = RegionOne
project_domain_name = Default
project_name = service
auth_type = password
user_domain_name = Default
auth_url = http://10.10.0.250:5000/v3
username = placement
password = PLACEMENT_PASS
```

Menentukan Hypervisor

```
GNU nano 6.2                                    /etc/nova/nova-compute.conf *
[DEFAULT]
compute_driver=libvirt.LibvirtDriver
[libvirt]
virt_type=qemu
```

Discovery compute node

```
GNU nano 6.2                                    /etc/nova/nova.conf *

[scheduler]
discover_hosts_in_cells_interval = 300
```

7. Restart Nova Compute

```
root@compute:~# systemctl restart nova-compute.service
```

Dilakukan di Compute Node

Nova

8. Sinkronasi database dengan Nova

```
root@controller:~# su -s /bin/sh -c "nova-manage cell_v2 map_cell0" nova && \
>  su -s /bin/sh -c "nova-manage cell_v2 create_cell --name=cell1" nova && \
> su -s /bin/sh -c "nova-manage db sync" nova && \
> su -s /bin/sh -c "nova-manage cell_v2 list_cells" nova
```

9. Mengecek layanan Nova

```
root@controller:~# openstack compute service list
+--------------------------------------+----------------+------------+----------+---------+-------+----------------------------+
| ID                                   | Binary         | Host       | Zone     | Status  | State | Updated At                 |
+--------------------------------------+----------------+------------+----------+---------+-------+----------------------------+
| 351b3944-b852-4c57-803c-2f0ff20460bf | nova-scheduler | controller | internal | enabled | up    | 2023-02-19T06:15:04.000000 |
| 5beac64b-60e6-4117-b0ab-dfdddf6d8cfd | nova-conductor | controller | internal | enabled | up    | 2023-02-19T06:15:09.000000 |
| fc0b27e8-6b45-495b-ad1a-7ac0806bbfe2 | nova-compute   | compute    | nova     | enabled | up    | 2023-02-19T06:15:02.000000 |
+--------------------------------------+----------------+------------+----------+---------+-------+----------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Neutron

Neutron

1. Membuat user dan database

```
MariaDB [(none)]> CREATE DATABASE neutron;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'localhost'

    -> IDENTIFIED BY 'NEUTRON_PASS';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'%'
    -> IDENTIFIED BY 'NEUTRON_PASS';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]>
```

2. Membuat user layanan

```
root@controller:~# openstack user create --domain default --password-prompt neutron
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 363b928eac844d8290d8df70a94d3886 |
| name                | neutron                          |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
root@controller:~# openstack role add --project service --user neutron admin
root@controller:~#
```

3. Membuat entitas service

```
root@controller:~# openstack service create --name neutron \
> --description "OpenStack Networking" network
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Networking             |
| enabled     | True                             |
| id          | eae54b0547144bd8b54073c47aac5c6c |
| name        | neutron                          |
| type        | network                          |
+-------------+----------------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Neutron

4. Membuat Endpoint Neutron

```
root@controller:~# openstack endpoint create --region RegionOne network public http://10.10.0.250:9696 && \
openstack endpoint create --region RegionOne network internal http://10.10.0.250:9696 && \
openstack endpoint create --region RegionOne network admin http://10.10.0.250:9696
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 6e61523d04044bba90150339e26a7add |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 65ad14e29c674506bb9a1d2bf75a479b |
| service_name | neutron                          |
| service_type | network                          |
| url          | http://10.10.0.250:9696          |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 99a6225113354995a5e03b7133f05c9d |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 65ad14e29c674506bb9a1d2bf75a479b |
| service_name | neutron                          |
| service_type | network                          |
| url          | http://10.10.0.250:9696          |
+--------------+----------------------------------+
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 06fedd6ac3264f638203790476d901fc |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 65ad14e29c674506bb9a1d2bf75a479b |
| service_name | neutron                          |
| service_type | network                          |
| url          | http://10.10.0.250:9696          |
```

Dilakukan di Controller Node

Neutron

5. Instalasi dan konfigurasi Neutron

```
root@controller:~# apt-get install neutron-server neutron-common \
> neutron-ovn-metadata-agent openvswitch-switch ovn-central
```

Menambah beberapa konfigurasi pada [DEFAULT]

```
 GNU nano 6.2                /etc/neutron/neutron.conf *
[DEFAULT]
core_plugin = neutron.plugins.ml2.plugin.Ml2Plugin
service_plugins = ovn-router
transport_url = rabbit://openstack:RABBIT_PASS@10.10.0.250
auth_strategy = keystone
notify_nova_on_port_status_changes = true
notify_nova_on_port_data_changes = true
```

Menghubungkan Neutron dengan Keystone

```
[keystone_authtoken]
www_authenticate_uri = http://10.10.0.250:5000
auth_url = http://10.10.0.250:5000
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = neutron
password = NEUTRON_PASS
```

Menghubungkan Neutron dengan Keystone

```
[database]
connection = mysql+pymysql://neutron:NEUTRON_PASS@10.10.0.250/neutron
```

Menghubungkan Neutron dengan Nova

```
[nova]
auth_url = http://10.10.0.250:5000
auth_type = password
project_domain_name = default
user_domain_name = default
region_name = RegionOne
project_name = service
username = nova
password = NOVA_PASS
```

Helper untuk proses layanan *Neutron*

```
[oslo_concurrency]
lock_path = /var/lib/neutron/tmp

[agent]
root_helper = "sudo /usr/bin/neutron-rootwrap /etc/neutron/rootwrap.conf"
```

Dilakukan di Controller Node

Neutron

6. Konfigurasi OVN

```
root@controller:~# ovn-nbctl set-connection ptcp:6641:192.168.224.195 -- \
set connection . inactivity_probe=60000
root@controller:~# ovn-sbctl set-connection ptcp:6642:192.168.224.195 -- \
set connection . inactivity_probe=60000
root@controller:~# ovs-vsctl set open . external-ids:ovn-remote=tcp:192.168.224.195:6642
root@controller:~# ovs-vsctl set open . external-ids:ovn-encap-type=geneve
root@controller:~# ovs-vsctl set open . external-ids:ovn-encap-ip=192.168.224.195
root@controller:~# ovs-vsctl add-br br-provider -- add-port br-provider ens160
root@controller:~# ovs-vsctl set open . external-ids:ovn-bridge-mappings=provider:br-provider
root@controller:~# ovs-vsctl set open . external-ids:ovn-cms-options=enable-chassis-as-gw
root@controller:~#
```

Dilakukan di Controller Node

Neutron

7. Konfigurasi Neutron Plugin ML2

```
  GNU nano 6.2    /etc/neutron/plugins/ml2/ml2_conf.ini *
[ml2]
type_drivers = flat,geneve
tenant_network_types = geneve
mechanism_drivers = ovn
extension_drivers = port_security
overlay_ip_version = 4


[ml2_type_flat]

flat_networks = provider

[ml2_type_geneve]

vni_ranges = 1:65536
max_header_size = 38

[securitygroup]
firewall_driver = neutron.agent.linux.iptables_firewall.IptablesFir>
enable_security_group = true
enable_ipset = true

[ovn]
ovn_nb_connection = tcp:192.168.224.195:6641
ovn_sb_connection = tcp:192.168.224.195:6642
ovn_l3_scheduler = leastloaded
ovn_metadata_enabled = true
```

8. Konfigurasi Neutron Agent

```
  GNU nano 6.2              /etc/neutron/neutron_ovn_metadata_agent.ini *
[DEFAULT]
nova_metadata_host = 10.10.0.250
metadata_proxy_shared_secret = METADATA_SECRET

[ovn]
ovn_nb_connection = tcp:192.168.224.195:6641
ovn_sb_connection = tcp:192.168.224.195:6642
ovn_metadata_enabled = True
```

9. Menghubungkan Neutron dengan Nova

```
  GNU nano 6.2              /etc/nova/nova.conf *

[neutron]
auth_url = http://10.10.0.250:5000
auth_type = password
project_domain_name = default
user_domain_name = default
region_name = RegionOne
project_name = service
username = neutron
password = NEUTRON_PASS
service_metadata_proxy = true
metadata_proxy_shared_secret = METADATA_SECRET
```

Dilakukan di Controller Node

Neutron (Compute)

10. Instalasi dan Konfigurasi OVN Controller

```
root@controller:~# apt-get install openvswitch-switch ovn-host
```

```
root@controller:~# ovs-vsctl set open . external-ids:ovn-remote=tcp:192.168.224.195:6642
root@controller:~# ovs-vsctl set open . external-ids:ovn-encap-type=geneve
root@controller:~# ovs-vsctl set open . external-ids:ovn-encap-ip=192.168.224.196
root@controller:~#
```

Dilakukan di Compute Node

Neutron

11. Mengecek Neutron Service

```
root@controller:~# openstack network agent list
+--------------------------------------+------------------------------+------------+-------------------+-------+-------+-----------------------------+
| ID                                   | Agent Type                   | Host       | Availability Zone | Alive | State | Binary                      |
+--------------------------------------+------------------------------+------------+-------------------+-------+-------+-----------------------------+
| e0317099-206c-58df-9301-2aa0dadf904c | OVN Metadata agent           | controller |                   | :-)   | UP    | neutron-ovn-metadata-agent  |
| a128fa7f-9d01-4d2a-a38b-e9afe7df4589 | OVN Controller Gateway agent | controller |                   | :-)   | UP    | ovn-controller              |
| 5268ff17-c615-4ce4-a884-f73b4a0ebf4e | OVN Controller agent         | compute    |                   | :-)   | UP    | ovn-controller              |
+--------------------------------------+------------------------------+------------+-------------------+-------+-------+-----------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Cinder

Cinder

1. Membuat user dan database

```
MariaDB [(none)]> DROP DATABASE cinder;
Query OK, 0 rows affected (0.003 sec)

MariaDB [(none)]> CREATE DATABASE cinder;
Query OK, 1 row affected (0.000 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'localhost' \
    -> IDENTIFIED BY 'CINDER_PASS';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON cinder.* TO 'cinder'@'%' \
    -> IDENTIFIED BY 'CINDER_PASS';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]>
```

2. Membuat user layanan

```
root@controller:~# openstack user create --domain default --password-prompt cinder
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 611505213dcb42178498e1c2d30facf0 |
| name                | cinder                           |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
root@controller:~# openstack role add --project service --user cinder admin
root@controller:~#
```

3. Membuat entitas service

```
root@controller:~# openstack service create --name cinderv3 \
> --description "OpenStack Block Storage" volumev3
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Block Storage          |
| enabled     | True                             |
| id          | 054ddf3bf6034ca1983681e8cd5bbdbe |
| name        | cinderv3                         |
| type        | volumev3                         |
+-------------+----------------------------------+
root@controller:~#
```

Dilakukan di Controller Node

Cinder

4. Instalasi dan Konfigurasi Cinder

```
root@controller:~# apt-get install apt install cinder-api cinder-scheduler
```

5. Membuat Endpoint Cinder

```
root@controller:~# openstack endpoint create --region RegionOne \
  volumev3 public http://10.10.0.250:8776/v3/%\(project_id\)s && \
openstack endpoint create --region RegionOne \
  volumev3 internal http://10.10.0.250:8776/v3/%\(project_id\)s && \
openstack endpoint create --region RegionOne \
  volumev3 admin http://10.10.0.250:8776/v3/%\(project_id\)s
```

6. Konfigurasi /etc/cinder/cinder-api.conf

Menghubungkan Cinder dengan database

```
[database]
connection = mysql+pymysql://cinder:CINDER_PASS@10.10.0.250/cinder
```

Menghubungkan Cinder dengan RabbitMQ

```
#add to [DEFAULT]
transport_url = rabbit://openstack:RABBIT_PASS@10.10.0.250
auth_strategy = keystone
```

Menghubungkan Cinder dengan Keystone

```
[keystone_authtoken]
# ...
www_authenticate_uri = http://10.10.0.250:5000
auth_url = http://10.10.0.250:5000
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = cinder
password = CINDER_PASS
```

7. Sinkronasi DB dengan Cinder & restart layanan

```
root@controller:~# su -s /bin/sh -c "cinder-manage db sync" cinder
```

```
root@controller:~# systemctl restart cinder-scheduler.service apache2.service
root@controller:~#
```

Dilakukan di Controller Node

Cinder (Compute)

1. Instalasi Cinder Volume

```
root@compute:~# apt-get install lvm2 thin-provisioning-tools \
> cinder-volume tgt
```

2. Mengecek disk

```
root@compute:~# lsblk /dev/sd*
NAME                      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sda                         8:0    0   80G  0 disk
├─sda1                      8:1    0    1M  0 part
├─sda2                      8:2    0    2G  0 part /boot
├─sda3                      8:3    0   48G  0 part
│ └─ubuntu--vg-ubuntu--lv 253:0    0   78G  0 lvm  /
└─sda4                      8:4    0   30G  0 part
  └─ubuntu--vg-ubuntu--lv 253:0    0   78G  0 lvm  /
sda1                        8:1    0    1M  0 part
sda2                        8:2    0    2G  0 part /boot
sda3                        8:3    0   48G  0 part
└─ubuntu--vg-ubuntu--lv   253:0    0   78G  0 lvm  /
sda4                        8:4    0   30G  0 part
└─ubuntu--vg-ubuntu--lv   253:0    0   78G  0 lvm  /
sdb                         8:16   0  100G  0 disk
sdc                         8:32   0  100G  0 disk
root@compute:~#
```

3. Konfigurasi LVM

```
  GNU nano 6.2                          /etc/lvm/lvm.conf

# Configuration section devices.
# How LVM uses block devices.
devices {

        filter = [ "a/sda/", "a/sdb/", "a/sdc/", "r/.*/"]
```

4. Membuat physical volume

```
root@compute:~# pvcreate /dev/sdb /dev/sdc
  Physical volume "/dev/sdb" successfully created.
  Physical volume "/dev/sdc" successfully created.
root@compute:~# pvs
  PV         VG        Fmt  Attr PSize   PFree
  /dev/sda3  ubuntu-vg lvm2 a--  <48.00g      0
  /dev/sda4  ubuntu-vg lvm2 a--  <30.00g      0
  /dev/sdb             lvm2 ---  100.00g 100.00g
  /dev/sdc             lvm2 ---  100.00g 100.00g
root@compute:~#
```

Dilakukan di Compute Node

Cinder

5. Membuat Volume Group

```
root@compute:~# vgcreate cinder-volumes /dev/sdb
  Volume group "cinder-volumes" successfully created
root@compute:~# vgextend cinder-volumes /dev/sdc
  Volume group "cinder-volumes" successfully extended
root@compute:~# vgs
  VG             #PV #LV #SN Attr   VSize   VFree
  cinder-volumes   2   0   0 wz--n- 199.99g 199.99g
  ubuntu-vg        2   1   0 wz--n-  77.99g      0
root@compute:~#
```

6. Menghubungkan Cinder Volume dengan Keystone

```
  GNU nano 6.2    /etc/cinder/cinder.conf

[keystone_authtoken]
# ...
www_authenticate_uri = http://10.10.0.250:5000
auth_url = http://10.10.0.250:5000
memcached_servers = 10.10.0.250:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = cinder
password = CINDER_PASS
```

Menghubungkan Cinder Volume dengan RabbitMQ

```
#add ke [DEFAULT]
transport_url = rabbit://openstack:RABBIT_PASS@10.10.0.250
glance_api_servers = http://10.10.0.250:9292
auth_strategy = keystone
```

Menghubungkan Cinder Volume dengan Database

```
[database]
connection = mysql+pymysql://cinder:CINDER_PASS@10.10.0.250/cinder
```

Konfigurasi Cinder Backend

```
[lvm]
# ...
volume_driver = cinder.volume.drivers.lvm.LVMVolumeDriver
volume_group = cinder-volumes
target_protocol = iscsi
target_helper = tgtadm
```

7. Restart Cinder Volume

```
root@compute:~# systemctl restart cinder-volume.service tgt.service
```

Dilakukan di Compute Node

Cinder

8. Mengecek Cinder service

```
root@controller:~# openstack volume service list
+------------------+-------------+------+---------+-------+----------------------------+
| Binary           | Host        | Zone | Status  | State | Updated At                 |
+------------------+-------------+------+---------+-------+----------------------------+
| cinder-scheduler | controller  | nova | enabled | up    | 2023-02-22T19:43:35.000000 |
| cinder-volume    | compute@lvm | nova | enabled | up    | 2023-02-22T19:43:37.000000 |
+------------------+-------------+------+---------+-------+----------------------------+
```

Dilakukan di Controller Node

Skyline

Skyline

1. Membuat user dan database

```
MariaDB [(none)]> CREATE DATABASE skyline DEFAULT CHARACTER SET \
    ->   utf8 DEFAULT COLLATE utf8_general_ci;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON skyline.* TO 'skyline'@'localhost' \
    -> IDENTIFIED BY 'SKYLINE_DBPASS';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON skyline.* TO 'skyline'@'%' \
    ->   IDENTIFIED BY 'SKYLINE_DBPASS';
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]>
```

2. Membuat user layanan OpenStack

```
root@controller:~#  openstack user create --domain default --password-prompt skyline
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | c0e0cfc67daf4dbbba6971308a71e9f8 |
| name                | skyline                          |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
root@controller:~#  openstack role add --project service --user skyline admin
root@controller:~#
```

3. Instalasi Docker

```
root@controller:~# apt-get install ca-certificates \
> curl gnupg lsb-release
```

```
root@controller:~# mkdir -m 0755 -p /etc/apt/keyrings
root@controller:~# curl -fsSL https://download.docker.com/linux/ubuntu/gpg | gpg
 --dearmor -o /etc/apt/keyrings/docker.gpg
File '/etc/apt/keyrings/docker.gpg' exists. Overwrite? (y/N) y
root@controller:~#
```

```
root@controller:~# echo \
  "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg]
 https://download.docker.com/linux/ubuntu \
  $(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /de
v/null
```

```
root@controller:~# apt-get install docker-ce docker-ce-cli containerd.io
```

Dilakukan di Controller Node

Skyline

4. Pulling docker image

```
root@controller:~# docker pull 99cloud/skyline:latest
latest: Pulling from 99cloud/skyline
b549f31133a9: Pull complete
f3828da355dd: Pull complete
d04a9623a81d: Pull complete
a730a582037b: Pull complete
df891be359a0: Pull complete
1d10db8d8519: Pull complete
Digest: sha256:e1dea7a5072d5e9967ee27bc8242205e06bcfb72900d9ead12c10bb14d38d4f8
Status: Downloaded newer image for 99cloud/skyline:latest
docker.io/99cloud/skyline:latest
root@controller:~# mkdir -p /etc/skyline /var/log/skyline /var/lib/skyline /var/
log/nginx
```

5. Konfigurasi layanan

```
  GNU nano 6.2              /etc/skyline/skyline.yaml
default:
  database_url: mysql://skyline:SKYLINE_DBPASS@10.10.0.250:3306/skyline
  debug: true
  log_dir: /var/log/skyline
openstack:
  keystone_url: http://10.10.0.250:5000/v3/
  system_user_password: SKYLINE_PASS
```

6. Pulling docker image Skyline

```
root@controller:~#  docker run -d --name skyline_bootstrap \
>  -e KOLLA_BOOTSTRAP="" \
> -v /etc/skyline/skyline.yaml:/etc/skyline/skyline.yaml \
>  -v /var/log:/var/log \
> --net=host 99cloud/skyline:latest
60c2e16dbb3fc0c385c72790f66245aa78e56b3416857f81140ccc8876ea8f31
root@controller:~# docker ps -a
CONTAINER ID   IMAGE                      COMMAND               CREATED
     STATUS                       PORTS     NAMES
60c2e16dbb3f   99cloud/skyline:latest   "start_service.sh"   6 seconds a
go   Exited (0) 4 seconds ago              skyline_bootstrap
root@controller:~#
```

```
root@controller:~# docker rm skyline_bootstrap
skyline_bootstrap
root@controller:~#
```

7. Menjalankan layanan

```
root@controller:~# docker run -d --name skyline --restart=always \
> -v /etc/skyline/skyline.yaml:/etc/skyline/skyline.yaml \
> -v /var/log:/var/log \
> --net=host 99cloud/skyline:latest
0df14d0555ad063d22efb3e4fe035bb6d7728371ff5d9df3c786dd6a8262b826
root@controller:~#
```

Dilakukan di Controller Node

Pengujian

Kesimpulan

- Menerapkan model *private cloud* dapat mengurangi penggunaan perangkat *server* fisik dan jaringan fisik dengan dibuatnya *virtual network* dan *virtual machine* pada *platform* OpenStack.

- Fleksibilitas dari OpenStack dapat memaksimalkan pengunaan *resource* dari perangkat fisik yang ada, dengan terpusatnya manajemen *resource* perangkat *server* fisik dan *resource* tersebut dapat dialokasikan menjadi *resource virtual* sesuai dengan kebutuhan.

Terima Kasih