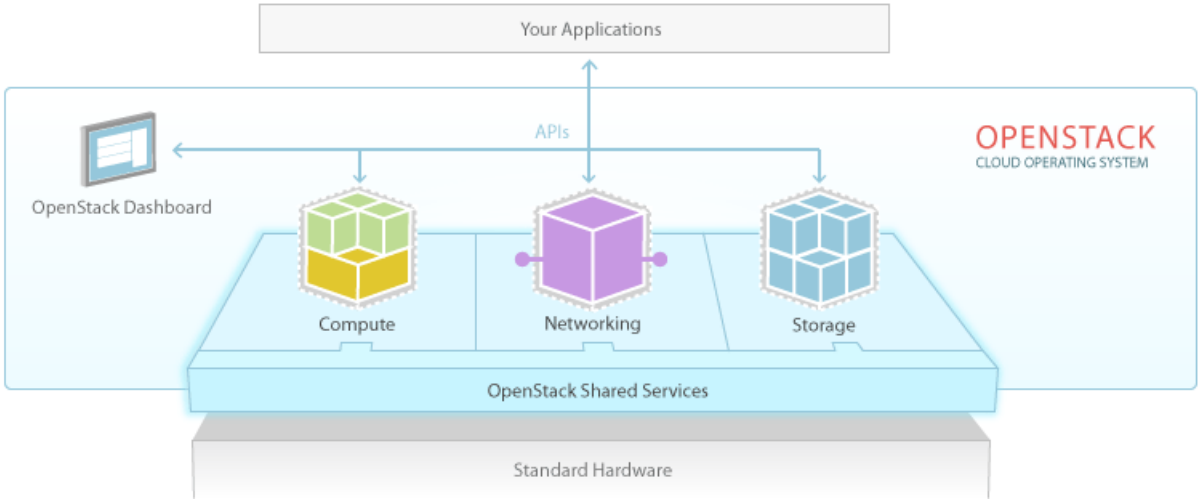
Openstack

Department of Computer Science and Information Engineering
Chaoyang University of Technology
Taichung, Taiwan, Republic of China

Instructor: De-Yu Wang (王德譽)
E-mail: dywang@csie.cyut.edu.tw
Homepage: http://dywang.csie.cyut.edu.tw
Phone: (04)23323000 ext 4538
Office: E738



Tuesday 27th October, 2026

- Instructor: De-Yu Wang
    1. Email: dywang@csie.cyut.edu.tw
    2. Homepage: http://dywang.csie.cyut.edu.tw
    3. 本文件 pdf 檔下載
    4. Phone: (04)23323000 ext 4538
    5. Office: E738
- 參考資料
    1. Openstack 官網
    2. Install openstack on CentOS 6.4 using packstack
    3. OpenStack Installation Guide for Red Hat Enterprise Linux, CentOS, and Fedora
    4. OpenStack Running an Instance
    5. virsh command
    6. Openstack Install Guide

Contents

I CentOS 7 + Queens **1**

1 環境準備 **2**

1.1 啓用 OpenStack repository 2
1.2 OpenStack 套件 3
1.3 SQL 資料庫 3
1.4 Message queue 6
1.5 Memcached 7
1.6 Etcd 8

2 Keystone **10**

2.1 安裝前準備 10
2.2 安裝與設定 11
2.3 設定 HTTP Server 12
2.4 設定管理者變數 13
2.5 產生 domains, projects, users, roles 13
2.6 驗證 15
2.7 環境腳本 16

3 Glance **18**

3.1 安裝前資料庫準備 18
3.2 安裝前環境準備 19
3.3 安裝與設定 21
3.4 驗證-新增 images 22

4 Nova **25**

4.1 安裝前資料庫準備 25
4.2 安裝前環境準備 26
4.3 控制節點安裝與設定 30
4.4 計算節點安裝與設定 34
4.5 新增計算節點到 CELL 資料庫 36

4.6 驗證 37

5 Neutron **40**
5.1 安裝前資料庫準備 40
5.2 安裝前環境準備–控制節點 41
5.3 Provider Networks 43
5.4 Self-service network 46
5.5 設定 metadata agent 48
5.6 服務啓動 49
5.7 驗證 50
5.8 重設 subnet pools 51
5.9 q-router 問題解決 53

6 Virtual Network **57**
6.1 Proivder Network 57
6.2 Self-service Network 60
6.3 Router 62
6.4 驗證 64
6.5 Security Groups 65

7 Instance **68**
7.1 新增 flavor 68
7.2 登入金鑰對 69
7.3 Security Group Rules 70
7.4 新增 Instance 前確認 73
7.5 使用 Selfservice network 新增 Instance cirros 75
7.6 存取 Instance cirros 77
7.7 使用 provider network 新增 Instance crtusb 78
7.8 驗證 81
7.9 VNC Client 82
7.10 Snapshot 83
7.11 Image 及 instance 刪除 88

8 Dashboard **90**
8.1 安裝與設定 90
8.2 NOVNC 設定 92
8.3 Firewall 92
8.4 測試 93

8.5 除錯 94
8.6 Instance Console 96

9 Server Resize/Rebuild 97
9.1 nova 配置 97
9.2 Resize 命令 98
9.3 Resize 98
9.4 snapshot 問題 102
9.5 遠端節點 105
9.6 Rebuild 107
9.7 Resize 問題 108

10 重新命名 110
10.1 Server 110
10.2 Flavor 111
10.3 Image 115

11 Vnc/Spice Port 及密碼 – Flavor 118
11.1 前言 118
11.2 driver.py 及 config 修改 118
11.3 Auotport 新增 Instance 120
11.4 指定 port 新增 Instance 123
11.5 修改 port 及密碼 126
11.6 待解決缺點 127

12 Vnc/Spice Port 及密碼 – Matadata 129
12.1 前言 129
12.2 driver.py 及 config 修改 129
12.3 指定 port 新增 Instance 131
12.4 Auotport 新增 Instance 133
12.5 修改 port 及密碼 135

13 Instance 問題解決 138
13.1 新增 Instance ERROR 1 138
13.2 RAM Quota 142
13.3 新增 Instance ERROR 2 146
13.4 Rebuild Instance ERROR 146

14 AMPQ 問題解決 **148**
14.1 AMQP ERROR 148
14.2 AMQP Server Unreachable 150

15 其他問題解決 **152**
15.1 問題：無法刪除 network 152
15.2 刪除 network 154
15.3 刪除 keypair 158
15.4 Dracut ERROR 159
15.5 Nested Virtualization 160

II DYW Linux 6 + Grizzly **163**

16 前言 **164**
16.1 認識 Openstack 164
16.2 環境說明 165

17 訊息代理 QPID **167**
17.1 認識 QPID 167
17.2 QPID 安裝 167

18 身份識別 Keystone **170**
18.1 認識 Keystone 170
18.2 Keystone 安裝 171
18.3 建立 Keystone 管理者 174
18.4 建立一般使用者 myuser 176

19 物件儲存 Swift **179**
19.1 認識 Swift 179
19.2 Swift 安裝 180
19.3 建立 Swift Storage Node 183
19.4 設定 Swift Service Ring 187
19.5 Swift Ring 配置錯誤修正 189
19.6 Swift 除錯 191
19.7 配置 Swift Object Storage Proxy 服務 192
19.8 確認 Swift Storage 安裝成功 192

20 Image 服務 Glance **195**
20.1 認識 Glance 195
20.2 Glance 安裝 195
20.3 新增作業系統 image 到 Glance 199

21 區塊儲存 Cinder **202**
21.1 認識 Cinder 202
21.2 Cinder 安裝 202
21.3 Cinder 服務啓動 205
21.4 建立 cinder-volumes group 208
21.5 新增 LVM Cinder volume 212

22 Glusterfs 檔案系統 **216**
22.1 認識 Glusterfs 216
22.2 建置 SAMBA Server 216
22.3 建置 Glusterfs Server 217
22.4 Gluster Client 新增 cinder volume 218
22.5 使用 Glusterfs volume 220

23 Quantum 網路服務 **224**
23.1 認識 Openstack Networking 224
23.2 建立 Openstack-Quantum 用户 224
23.3 安裝 Openstack-Quantum 227
23.4 設定 openvswitch 230
23.5 設定用户網路 237

24 Nova Compute and Controller **243**
24.1 認識 Nova 243
24.2 Nova 安裝 243
24.3 建立 Instances 251
24.4 測試 Instances 虛擬機 257
24.5 Instance 管理 cinder 空間 260
24.6 自訂虛擬機 Images 263

25 Dashboard **265**
25.1 認識 Dashboard 265
25.2 Dashboard 安裝 265
25.3 Dashboard 使用 267
25.4 KVM 調整 270

25.5 Instance 螢幕保護 271

26 除錯 **274**

26.1 問題一 274
26.2 問題二 275
26.3 問題三 275
26.4 問題四 277
26.5 問題五 278

Part I

CentOS 7 + Queens

Chapter 1

環境準備

1.1 啓用 OpenStack repository

1. 本文件範例使用 CentOS 7，先使用 yum 安裝 openstack-queens repository

```
[root@ip112 ~]# yum install centos-release-openstack-queens
```

2. 更新套件

```
[root@ip112 ~]# yum upgrade
```

3. 如果更新套件包含 kernel，必須重新開機才能使用新 kernel。

```
[root@ip112 ~]# reboot
```

4. 重開機後確定是使用新 kernel。

```
[root@ip112 ~]# uname -r
3.10.0-862.3.2.el7.x86_64
[root@ip112 ~]# rpm -qa | grep kernel
kernel-3.10.0-862.3.2.el7.x86_64
kernel-3.10.0-693.21.1.el7.x86_64
kernel-tools-libs-3.10.0-862.3.2.el7.x86_64
kernel-tools-3.10.0-862.3.2.el7.x86_64
```

1.2 OpenStack 套件

1. 安裝 OpenStack client

```
[root@ip112 ~]# yum install python-openstackclient
```

2. 預設啓用 SELinux，所以要安裝 openstack-selinux 管理 openstack 服務的安全政策。

```
[root@ip112 ~]# yum install openstack-selinux
```

1.3 SQL 資料庫

1. 安裝 mariadb 資料庫相關套件。

```
[root@ip112 ~]# yum install mariadb mariadb-server python2-PyMySQL
```

2. 新增並編輯 /etc/my.cnf.d/openstack.cnf，章節 mysqld 中加入以下設定，其中 bind-address 爲 contorl node 的 IP。

```
[root@ip112 ~]# vim /etc/my.cnf.d/openstack.cnf
[root@ip112 ~]# cat /etc/my.cnf.d/openstack.cnf
[mysqld]
bind-address = 163.17.10.112

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

3. 啓動 mariadb 服務，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable mariadb.service
Created symlink from /etc/systemd/system/multi-user.target.wants/mariadb
    .service
to /usr/lib/systemd/system/mariadb.service.

[root@ip112 ~]# systemctl start mariadb.service
```

```
[root@ip112 ~]# systemctl status mariadb.service
  mariadb.service - MariaDB 10.1 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled;
       vendor preset: disabled)
   Active: active (running) since Wed 2018-05-23 16:35:37 CST; 10s ago
  Process: 11833 ExecStartPost=/usr/libexec/mysql-check-upgrade (code=
      exited, status=0/SUCCESS)
  Process: 11647 ExecStartPre=/usr/libexec/mysql-prepare-db-dir %n (code
      =exited, status=0/SUCCESS)
  Process: 11623 ExecStartPre=/usr/libexec/mysql-check-socket (code=
      exited, status=0/SUCCESS)
 Main PID: 11806 (mysqld)
   Status: "Taking your SQL requests now..."
   CGroup: /system.slice/mariadb.service
           11806 /usr/libexec/mysqld --basedir=/usr

May 23 16:35:37 ip112.csie.cyut.edu.tw systemd[1]: Started MariaDB 10.1
    data...
Hint: Some lines were ellipsized, use -l to show in full.
```

4. mysql 安全設定，主要是設定 mysql 管理帳號 root 登入的密碼，其餘都按 Enter 使用預設值。

```
[root@ip112 ~]# mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE!  PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user.  If you've just installed MariaDB, and
you haven't set the root password yet, the password will be blank,
so you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password ensures that nobody can log into the MariaDB
root user without the proper authorisation.

Set root password? [Y/n] Y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
 ... Success!


By default, a MariaDB installation has an anonymous user, allowing
    anyone
to log into MariaDB without having to have a user account created for
them.  This is intended only for testing, and to make the installation
```

```
go a bit smoother.  You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n]
 ... Success!

Normally, root should only be allowed to connect from 'localhost'.  This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n]
 ... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access.  This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n]
 - Dropping test database...
 ... Success!
 - Removing privileges on test database...
 ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n]
 ... Success!

Cleaning up...

All done!  If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
```

5. 使用設定的密碼，確認可以登入 mysql。

```
[root@ip112 ~]# mysql -uroot -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 10
Server version: 10.1.20-MariaDB MariaDB Server

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
    statement.

MariaDB [(none)]> exit
Bye
```

1.4 Message queue

1. OpenStack 使用 message queue 訊息佇列來協調服務之間的操作和狀態訊息，OpenStack 支援多種訊息佇列服務，包括 RabbitMQ，Qpid 和 ZeroMQ，本文件使用 RabbitMQ 安裝 rabbitmq-server。

```
[root@ip112 ~]# yum install rabbitmq-server
```

2. 啓動 rabbitmq-server 服務，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable rabbitmq-server.service
Created symlink from /etc/systemd/system/multi-user.target.wants/
    rabbitmq-server.service
to /usr/lib/systemd/system/rabbitmq-server.service.

[root@ip112 ~]# systemctl start rabbitmq-server.service
[root@ip112 ~]# systemctl status rabbitmq-server.service
  rabbitmq-server.service - RabbitMQ broker
   Loaded: loaded (/usr/lib/systemd/system/rabbitmq-server.service;
       enabled; vendor preset: disabled)
   Active: active (running) since Wed 2018-05-23 16:54:02 CST; 9s ago
 Main PID: 12046 (beam.smp)
   Status: "Initialized"
   CGroup: /system.slice/rabbitmq-server.service
           12046 /usr/lib64/erlang/erts-8.3.5.3/bin/beam.smp -W w -A
             640 -...
           12884 erl_child_setup 1024
           12930 inet_gethost 4
           12931 inet_gethost 4

May 23 16:54:02 ip112.csie.cyut.edu.tw systemd[1]: Started RabbitMQ
    broker.
Hint: Some lines were ellipsized, use -l to show in full.
```

3. rabbitmq 新增 openstak 用户，最後一個參數 RABBIT_PASS 爲密碼，請更改成自己適用的密碼。

```
[root@ip112 ~]# rabbitmqctl add_user openstack RABBIT_PASS
Creating user "openstack" ...
```

4. rabbitmq 設定 openstak 用户有讀取及寫入的權限。

```
[root@ip112 ~]# rabbitmqctl set_permissions openstack ".*" ".*" ".*"
Setting permissions for user "openstack" in vhost "/" ...
```

5. 列印權限。

```
[root@ip112 ~]# rabbitmqctl list_permissions
Listing permissions in vhost "/" ...
openstack   .*  .*  .*
guest   .*  .*  .*
```

1.5 Memcached

1. OpenStack 使用 Memcached 做 cache tokens 暫存令牌，來進行服務的身份認證。memcached 服務通常運作在控制器節點上，安裝 memcached 服務。

```
[root@ip112 ~]# yum install memcached python-memcached
```

2. 編輯 /etc/sysconfig/memcached，修改 OPTIONS="-l 127.0.0.1,::1" 中 IP 爲控制節點的 IP，讓其他節點可以存取。

```
[root@ip112 ~]# vim /etc/sysconfig/memcached
[root@ip112 ~]# cat /etc/sysconfig/memcached
PORT="11211"
USER="memcached"
MAXCONN="1024"
CACHESIZE="64"
OPTIONS="-l 127.0.0.1,::1"
```

3. 啓動 memcached，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable memcached.service
Created symlink from /etc/systemd/system/multi-user.target.wants/
    memcached.service
to /usr/lib/systemd/system/memcached.service.

[root@ip112 ~]# systemctl start memcached.service
[root@ip112 ~]# systemctl status memcached.service
  memcached.service - memcached daemon
   Loaded: loaded (/usr/lib/systemd/system/memcached.service; enabled;
       vendor preset: disabled)
```

```
   Active: active (running) since Wed 2018-05-23 17:15:58 CST; 6s ago
 Main PID: 13794 (memcached)
   CGroup: /system.slice/memcached.service
           13794 /usr/bin/memcached -p 11211 -u memcached -m 64 -c
             1024 -l...

May 23 17:15:58 ip112.csie.cyut.edu.tw systemd[1]: Started memcached
    daemon.
May 23 17:15:58 ip112.csie.cyut.edu.tw systemd[1]: Starting memcached
    daemon...
Hint: Some lines were ellipsized, use -l to show in full.
```

1.6 Etcd

1. Etcd 是一個分散式鍵值儲存系統，用於分散式密鑰鎖定。OpenStack 可以使用 Etcd 爲集群之間提供可靠的共享數據服務。

```
[root@ip112 ~]# yum install etcd
```

2. 編輯 /etc/etcd/etcd.conf 設定檔，設定以下變數，163.17.10.112 爲控制節點的 IP。

```
[root@ip112 ~]# vim /etc/etcd/etcd.conf
[root@ip112 ~]# egrep '(#\[[MC]|^ETCD)' /etc/etcd/etcd.conf
#[Member]
ETCD_DATA_DIR="/var/lib/etcd/default.etcd"
ETCD_LISTEN_PEER_URLS="http://163.17.10.112:2380"
ETCD_LISTEN_CLIENT_URLS="http://163.17.10.112:2379"
ETCD_NAME="controller"
#[Clustering]
ETCD_INITIAL_ADVERTISE_PEER_URLS="http://163.17.10.112:2380"
ETCD_ADVERTISE_CLIENT_URLS="http://163.17.10.112:2379"
ETCD_INITIAL_CLUSTER="default=http://163.17.10.112:2380"
ETCD_INITIAL_CLUSTER_TOKEN="etcd-cluster-01"
ETCD_INITIAL_CLUSTER_STATE="new"
```

3. 啓動 etcd 服務，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable etcd.service
[root@ip112 ~]# systemctl start etcd.service
[root@ip112 ~]# systemctl status etcd.service
  etcd.service - Etcd Server
```

```
5    Loaded: loaded (/usr/lib/systemd/system/etcd.service; enabled; vendor
         preset: disabled)
     Active: active (running) since Wed 2018-05-23 19:23:23 CST; 19s ago
7  Main PID: 15849 (etcd)
     CGroup: /system.slice/etcd.service
9              15849 /usr/bin/etcd --name=controller --data-dir=/var/lib/
                 etcd/default.etcd --listen-client-url...
```

Chapter 2

Keystone

2.1 安裝前準備

1. keystone 是 OpenStack 在控制節點的身份認證服務，爲了擴展性，這個配置部署了 Fernet 令牌和 Apache HTTP 服務來處理請求。

2. 安裝 keystone 前必須先產生資料庫，登入 mysql：

```
[root@ip112 ~]# mysql -uroot -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.1.20-MariaDB MariaDB Server

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
    statement.
MariaDB [(none)]>
```

3. 產生資料庫 keystone。

```
MariaDB [(none)]> CREATE DATABASE keystone;
Query OK, 1 row affected (0.00 sec)
```

4. 產生用户 keystone 在 localhost，密碼 123qwe，對資料庫 keystone 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON keystone.* TO \
'keystone'@'localhost' IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

5. 產生用户 keystone 在所有地方，密碼 123qwe，對資料庫 keystone 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON keystone.* TO \
'keystone'@'%' IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

6. 退出 mysql。

```
MariaDB [(none)]> exit
Bye
```

2.2 安裝與設定

1. 安裝 keystone

```
[root@ip112 ~]# yum install openstack-keystone httpd mod_wsgi
```

2. 編輯 keystone.conf 設定檔，設定資料連線及使用的令牌，這兩項必須與前一節的資料設定匹配。

```
[root@ip112 ~]# vim /etc/keystone/keystone.conf
[root@ip112 ~]# egrep '^(\[token\]|\[database|connect|provider)' \
/etc/keystone/keystone.conf

[database]
connection = mysql+pymysql://keystone:123qwe@controller/keystone
[token]
provider = fernet
```

3. 確認 keystone 帳號存在，以 keystone 帳號執行 keystone-manage db_sync 進行資料庫同步。

```
[root@ip112 ~]# id keystone
uid=163(keystone) gid=163(keystone) groups=163(keystone)
```

```
[root@ip112 ~]# su -s /bin/sh -c "keystone-manage db_sync" keystone
```

4. 初始化 Fernet key 資料庫。

```
[root@ip112 ~]# keystone-manage fernet_setup --keystone-user \
keystone --keystone-group keystone
[root@ip112 ~]# keystone-manage credential_setup --keystone-user \
keystone --keystone-group keystone
```

5. Bootstap keystone 服務，其中主機名稱 controller 直接在 /etc/hosts 中做對應。

```
[root@ip112 ~]# vim /etc/hosts
[root@ip112 ~]# grep controller /etc/hosts
163.17.10.112   controller
[root@ip112 ~]# keystone-manage bootstrap --bootstrap-password 123qwe\
--bootstrap-admin-url http://controller:5000/v3/ \
--bootstrap-internal-url http://controller:5000/v3/ \
--bootstrap-public-url http://controller:5000/v3/ \
--bootstrap-region-id RegionOne
```

2.3 設定 HTTP Server

1. 設定 HTTP server 的名稱爲 controller。

```
[root@ip112 ~]# vim /etc/httpd/conf/httpd.conf
[root@ip112 ~]# grep ^ServerName /etc/httpd/conf/httpd.conf
ServerName controller
```

2. 建立 wsgi-keystone.conf 連結檔。

```
[root@ip112 ~]# ln -s /usr/share/keystone/wsgi-keystone.conf /etc/httpd/
    conf.d/
```

3. 啓動 httpd 服務，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable httpd.service
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.
    service
to /usr/lib/systemd/system/httpd.service.

[root@ip112 ~]# systemctl restart httpd.service
[root@ip112 ~]# systemctl status httpd.service
  httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled;
       vendor preset: disabled)
   Active: active (running) since Wed 2018-05-23 21:26:17 CST; 22s ago
     Docs: man:httpd(8)
           man:apachectl(8)
```

2.4 設定管理者變數

1. 編輯 admin.token，設定管理者令牌變數。

```
[root@ip112 ~]# vim admin.token
[root@ip112 ~]# cat admin.token
export OS_USERNAME=admin
export OS_PASSWORD=123qwe
export OS_PROJECT_NAME=admin
export OS_USER_DOMAIN_NAME=Default
export OS_PROJECT_DOMAIN_NAME=Default
export OS_AUTH_URL=http://controller:35357/v3
export OS_IDENTITY_API_VERSION=3
```

2. 要以管理者 admin 進行啓動 mariadb 服務，並設定開機啓動。

```
[root@ip112 ~]# source admin.token
```

2.5 產生 domains, projects, users, roles

1. keystone 認證服務使用 domains, projects, users, 及 roles 的組合，keystone-manage 預設就已存在”default” domain。

```
[root@ip112 ~]# source admin.token

[root@ip112 ~]# openstack domain list
+---------+---------+---------+--------------------+
```

```
| ID      | Name    | Enabled | Description        |
+---------+---------+---------+--------------------+
| default | Default | True    | The default domain |
+---------+---------+---------+--------------------+
```

2. 如果要自行產生 domain，可以如下產生名爲 deyu 的 domain。

```
[root@ip112 ~]# openstack domain create --description "An DE-YU Domain"
   deyu
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | An DE-YU Domain                  |
| enabled     | True                             |
| id          | f95fc426fb0d46f481f0e0fed290c2c8 |
| name        | deyu                             |
| tags        | []                               |
+-------------+----------------------------------+
```

3. 在 default domain 產生名爲 service 的 project。

```
[root@ip112 ~]# openstack project create --domain default \
--description "Service Project" service
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | Service Project                  |
| domain_id   | default                          |
| enabled     | True                             |
| id          | 7988966de4c047c39f6e22e5914697c3 |
| is_domain   | False                            |
| name        | service                          |
| parent_id   | default                          |
| tags        | []                               |
+-------------+----------------------------------+
```

4. 一般工作必須使用非管理者帳號，所以在 default domain 產生名爲 demo 的 project 作爲非管理工作用。

```
[root@ip112 ~]# openstack project create --domain default \
>   --description "Demo Project" demo
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | Demo Project                     |
| domain_id   | default                          |
```

```
| enabled     | True                             |
| id          | 92d1ec3e04384ad599c1a8f5aed73663 |
| is_domain   | False                            |
| name        | demo                             |
| parent_id   | default                          |
| tags        | []                               |
+-------------+----------------------------------+
```

5. 在 default domain 中產生名爲 demo 的 user，輸入密碼後產生。

```
[root@ip112 ~]# openstack user create --domain default \
>   --password-prompt demo
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 0d7bb3820384452abb97ec0b40c445b1 |
| name                | demo                             |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
```

6. 產生名爲 user 的 role。

```
[root@ip112 ~]# openstack role create user
+-----------+----------------------------------+
| Field     | Value                            |
+-----------+----------------------------------+
| domain_id | None                             |
| id        | 2fae7480399e4efe94a55bae18259edd |
| name      | user                             |
+-----------+----------------------------------+
```

7. 將名爲 user 的 role 加到 project demo, user demo。

```
[root@ip112 ~]# openstack role add --project demo --user demo user
```

2.6 驗證

1. 先取消變數 OS_AUTH_URL OS_PASSWORD。

```
[root@ip112 ~]# unset OS_AUTH_URL OS_PASSWORD
```

2. 使用 admin 用户取得認證令牌，輸入密碼後取得。

```
[root@ip112 ~]# openstack --os-auth-url http://controller:35357/v3 \
--os-project-domain-name Default --os-user-domain-name Default \
--os-project-name admin --os-username admin token issue
Password:
+------------+-----------------------------------------------+
| Field      | Value                                         |
+------------+-----------------------------------------------+
| expires    | 2018-05-24T01:06:41+0000                      |
| id         | gAAAAABbBgIReI4Wvh.......8cqOMRgXJwapvudJix-L4 |
| project_id | e28adc716118434c96b5833867faa08c              |
| user_id    | c5f79bab788049e7a59395b6f94a911f              |
+------------+-----------------------------------------------+
```

3. 使用 demo 用户取得認證令牌，輸入密碼後取得。

```
[root@ip112 ~]# openstack --os-auth-url http://controller:5000/v3 \
--os-project-domain-name Default --os-user-domain-name Default \
--os-project-name demo --os-username demo token issue
Password:
+------------+-----------------------------------------------+
| Field      | Value                                         |
+------------+-----------------------------------------------+
| expires    | 2018-05-24T01:11:44+0000                      |
| id         | gAAAAABbBgNAchJ1wMNWybT-7PcSkoIbJ7pKZkm27ao3s8 |
| project_id | 92d1ec3e04384ad599c1a8f5aed73663              |
| user_id    | 0d7bb3820384452abb97ec0b40c445b1              |
+------------+-----------------------------------------------+
```

2.7 環境腳本

1. admin 及 demo 用户權限不同，使用時環境變數必須調整，爲方便使用會將環境變數寫在一腳本檔案中。

```
[root@ip112 ~]# vim demo.token
[root@ip112 ~]# cat demo.token
export OS_PROJECT_DOMAIN_NAME=Default
export OS_USER_DOMAIN_NAME=Default
export OS_PROJECT_NAME=demo
export OS_USERNAME=demo
```

```
export OS_PASSWORD=DEMO_PASS
export OS_AUTH_URL=http://controller:5000/v3
export OS_IDENTITY_API_VERSION=3
export OS_IMAGE_API_VERSION=2
```

2. 使用 demo 用户時，讀取 demo.token 環境變數。

```
[root@ip112 ~]# . demo.token
```

3. 列出令牌資訊，其中 user_id 爲 demo 用户無誤。

```
[root@ip112 ~]# openstack token issue
+------------+-------------------------------------------------+
| Field      | Value                                           |
+------------+-------------------------------------------------+
| expires    | 2018-05-24T01:18:31+0000                        |
| id         | gAAAAABbBgTX8H2-kBBUQpPyYwE-CFLoT_Mj1SLBMQ1XY |
| project_id | 92d1ec3e04384ad599c1a8f5aed73663                |
| user_id    | 0d7bb3820384452abb97ec0b40c445b1                |
+------------+-------------------------------------------------+
```

Chapter 3

Glance

3.1 安裝前資料庫準備

1. Glance 是 Image 服務，安裝 glance 前必須先產生資料庫，登入 mysql：

```
[root@ip112 ~]# mysql -uroot -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.1.20-MariaDB MariaDB Server

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
    statement.
MariaDB [(none)]>
```

2. 產生資料庫 glance。

```
MariaDB [(none)]> CREATE DATABASE glance;
Query OK, 1 row affected (0.00 sec)
```

3. 產生用户 keystone 在 localhost，密碼 123qwe，對資料庫 glance 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'
    localhost' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

4. 產生用户 keystone 在所有地方，密碼 123qwe，對資料庫 glance 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'%' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

5. 退出 mysql。

```
MariaDB [(none)]> exit
Bye
```

3.2 安裝前環境準備

1. 先讀取 openstack 管理者 admin 環境變數。

```
[root@ip112 ~]# source admin.token
```

2. 新增 glance 用户，輸入密碼後產生。

```
[root@ip112 ~]# openstack user create --domain default --password-prompt
    glance
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | a222f467cc614229b61cbd0d35745a9e |
| name                | glance                           |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
```

3. 新增 admin role 到 glance user 及 service project。

```
[root@ip112 ~]# openstack role add --project service --user glance admin
```

4. 新增 glance service。

```
[root@ip112 ~]# openstack service create --name glance \
--description "OpenStack Image" image
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Image                  |
| enabled     | True                             |
| id          | e0d28b4eb10f49cab4c2826f15525ef3 |
| name        | glance                           |
| type        | image                            |
+-------------+----------------------------------+
```

5. 新增 image service API endpoints，interface public。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne \
image public http://controller:9292
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | b77ce68dd22f47b59df84f09cae14fac |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | e0d28b4eb10f49cab4c2826f15525ef3 |
| service_name | glance                           |
| service_type | image                            |
| url          | http://controller:9292           |
+--------------+----------------------------------+
```

6. 新增 image service API endpoints，interface internal。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne \
image internal http://controller:9292
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | db7eb4eecb184a189216ce7690a5858f |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | e0d28b4eb10f49cab4c2826f15525ef3 |
| service_name | glance                           |
| service_type | image                            |
| url          | http://controller:9292           |
+--------------+----------------------------------+
```

7. 新增 image service API endpoints，interface admin。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne \
image admin http://controller:9292
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | a0a59397989645528520 5478c55ebeab |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | e0d28b4eb10f49cab4c2826f15525ef3 |
| service_name | glance                           |
| service_type | image                            |
| url          | http://controller:9292           |
+--------------+----------------------------------+
```

3.3 安裝與設定

1. 安裝 openstack-glance。

```
[root@ip112 ~]# yum install openstack-glance
```

2. 編輯 /etc/glance/glance-api.conf，設定如下章節：

```
[root@ip112 ~]# vim /etc/glance/glance-api.conf
[root@ip112 ~]# egrep '^(\[database|\[keystone_auth|\[paste_deploy|\
\[glance_store|[a-z])' /etc/glance/glance-api.conf
[database]
connection = mysql+pymysql://glance:123qwe@controller/glance
[glance_store]
stores = file,http
default_store = file
filesystem_store_datadir = /var/lib/glance/images/
[keystone_authtoken]
auth_uri = http://controller:5000
auth_url = http://controller:5000
memcached_servers = controller:11211
auth_type = password
project_domain_name = Default
user_domain_name = Default
```

```
17 project_name = service
   username = glance
19 password = 123qwe
   [paste_deploy]
21 flavor = keystone
```

3. 編輯 /etc/glance/glance-registry.conf，設定如下章節：

```
1  [root@ip112 ~]# vim /etc/glance/glance-registry.conf
   [root@ip112 ~]# egrep '^(\[database|\[keystone_auth|\[paste_deploy|\
3  \[glance_store|[a-z])' /etc/glance/glance-registry.conf
   [database]
5  connection = mysql+pymysql://glance:123qwe@controller/glance
   [keystone_authtoken]
7  auth_uri = http://controller:5000
   auth_url = http://controller:5000
9  memcached_servers = controller:11211
   auth_type = password
11 project_domain_name = Default
   user_domain_name = Default
13 project_name = service
   username = glance
15 password = 123qwe
   [paste_deploy]
17 flavor = keystone
```

4. 以用户 glance 執行 glance-manage 進行 glance 資料庫同步。

```
1  [root@ip112 ~]# su -s /bin/sh -c "glance-manage db_sync" glance
```

5. 啓動 openstack-glance-api openstack-glance-registry 服務，並設定開機啓動。

```
1  [root@ip112 ~]# systemctl enable openstack-glance-api.service \
   openstack-glance-registry.service
3  [root@ip112 ~]# systemctl start openstack-glance-api.service \
   openstack-glance-registry.service
```

3.4 驗證-新增 images

1. 載入管理者環境變變數。

```
[root@ip112 ~]# . admin.token
```

2. 取得 VM image 檔，如果只是測試，可以下載 cirros image。

```
[root@ip112 ~]# wget http://download.cirros-cloud.net/0.3.5/cirros
    -0.3.5-x86_64-disk.img
```

3. 取得 crtusb.qcow2。

```
[root@ip112 ~]# scp 163.17.27.219:/var/lib/libvirt/images/crtusb.qcow2 .
root@163.17.27.219's password:
crtusb.qcow2                                  100% 3165MB  11.2MB/s
    04:42
```

4. 上傳 crtusb.qcow2 到 image 服務，disk 格式爲 qcow2，container 格式爲 bare，public 讓所有 project 可以存取。

```
[root@ip112 ~]# openstack image create "crtusb" --file crtusb.qcow2 \
--disk-format qcow2 --container-format bare --public
+------------------+------------------------------------------------------+

| Field            | Value
                                          |
+------------------+------------------------------------------------------+

| checksum         | 0c7385b6fabaf8b17cba5d0ede98abe2
                        |
| container_format | bare
                                           |
| created_at       | 2018-05-24T13:55:20Z
                                    |
| disk_format      | qcow2
                                          |
| file             | /v2/images/e4bea3db-581a-472d-a0dd-37b1e7055bbf/
    file |
| id               | e4bea3db-581a-472d-a0dd-37b1e7055bbf
                   |
| min_disk         | 0
                                              |
| min_ram          | 0
                                              |
| name             | crtusb
                                         |
| owner            | e28adc716118434c96b5833867faa08c
                        |
```

```
| protected        | False                                                          |
| schema           | /v2/schemas/image                                              |
| size             | 3318743040                                                     |
| status           | active                                                         |
| tags             |                                                                |
| updated_at       | 2018-05-24T13:55:33Z                                           |
| virtual_size     | None                                                           |
| visibility       | public                                                         |
+------------------+----------------------------------------------------------------+
```

5. 列出 image，確認上傳的 crtusb 可用。

```
[root@ip112 ~]# openstack image list
+--------------------------------------+--------+--------+
| ID                                   | Name   | Status |
+--------------------------------------+--------+--------+
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb | active |
+--------------------------------------+--------+--------+
```

Chapter 4

Nova

4.1 安裝前資料庫準備

1. Nova 是 Compute 服務，安裝 nova 前必須先產生資料庫，登入 mysql：

```
[root@ip112 ~]# mysql -uroot -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.1.20-MariaDB MariaDB Server

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
    statement.
MariaDB [(none)]>
```

2. 產生資料庫 nova_api, nova, nova_cell0。

```
MariaDB [(none)]> CREATE DATABASE nova_api;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]> CREATE DATABASE nova;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]> CREATE DATABASE nova_cell0;
Query OK, 1 row affected (0.00 sec)
```

3. 產生用户 nova 在 localhost，密碼 123qwe，對資料庫 nova_api, nova, nova_cell0 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_api.* TO 'nova'@'
    localhost' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'localhost' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_cell0.* TO 'nova'@'
    localhost' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

4. 產生用户 nova 在 localhost，密碼 123qwe，對資料庫 nova_api, nova, nova_cell0 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_api.* TO 'nova'@'%' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'%' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
MariaDB [(none)]> GRANT ALL PRIVILEGES ON nova_cell0.* TO 'nova'@'%' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

5. 退出 mysql。

```
MariaDB [(none)]> exit
Bye
```

4.2 安裝前環境準備

1. 先讀取 openstack 管理者 admin 環境變數。

```
[root@ip112 ~]# source admin.token
```

2. 新增 nova 用户，輸入密碼後產生。

```
[root@ip112 ~]# openstack user create --domain default --password-prompt
    nova
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 97aea43e81b047b39a58af7c4d4d1b1e |
| name                | nova                             |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
```

3. 新增 admin role 到 nova user 及 service project。

```
[root@ip112 ~]# openstack role add --project service --user nova admin
```

4. 新增 nova service。

```
[root@ip112 ~]# openstack service create --name nova \
--description "OpenStack Compute" compute
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Compute                |
| enabled     | True                             |
| id          | ca566f55091a40d9b1965300e6e1a13c |
| name        | nova                             |
| type        | compute                          |
+-------------+----------------------------------+
```

5. 新增 Compute API service endpoints，interface public。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne \
compute public http://controller:8774/v2.1
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | f66129d889db4659aa9ae8731b7be7b9 |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | ca566f55091a40d9b1965300e6e1a13c |
```

```
| service_name | nova                             |
| service_type | compute                          |
| url          | http://controller:8774/v2.1      |
+--------------+----------------------------------+
```

6. 新增 Compute API service endpoints，interface internal。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne \
compute internal http://controller:8774/v2.1
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | e2266bff21074f048984473845ffd761 |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | ca566f55091a40d9b1965300e6e1a13c |
| service_name | nova                             |
| service_type | compute                          |
| url          | http://controller:8774/v2.1      |
+--------------+----------------------------------+
```

7. 新增 Compute API service endpoints，interface admin。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne \
compute admin http://controller:8774/v2.1
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 3745bbc0c5084665b17b567256b7d53c |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | ca566f55091a40d9b1965300e6e1a13c |
| service_name | nova                             |
| service_type | compute                          |
| url          | http://controller:8774/v2.1      |
+--------------+----------------------------------+
```

8. 新增 Placement service 用户，輸入密碼 123qwe 後產生。

```
[root@ip112 ~]# openstack user create --domain default --password-prompt
    placement
User Password:
```

```
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | 3c5acc18f314451eafd55a51ed595e62 |
| name                | placement                        |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
```

9. 新增 admin role 到 placement user 及 service project。

```
[root@ip112 ~]# openstack role add --project service --user placement
    admin
```

10. 新增 Placement API entry。

```
[root@ip112 ~]# openstack service create --name placement --description
    "Placement API" placement
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | Placement API                    |
| enabled     | True                             |
| id          | b28b45e816a74c3a89f91dd620fea022 |
| name        | placement                        |
| type        | placement                        |
+-------------+----------------------------------+
```

11. 新增 Placement API service endpoints，interface public。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne placement
    public http://controller:8778
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 033e4a2cfe554791be117b6e907f1328 |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | b28b45e816a74c3a89f91dd620fea022 |
| service_name | placement                        |
| service_type | placement                        |
```

```
| url          | http://controller:8778           |
+--------------+----------------------------------+
```

12. 新增 Placement API service endpoints，interface internal。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne placement
    internal http://controller:8778
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | e7c2f2d7b4d5400094f6af4979c1c46b |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | b28b45e816a74c3a89f91dd620fea022 |
| service_name | placement                        |
| service_type | placement                        |
| url          | http://controller:8778           |
+--------------+----------------------------------+
```

13. 新增 Placement API service endpoints，interface admin。

```
[root@ip112 ~]# openstack endpoint create --region RegionOne placement
    admin http://controller:8778
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | 80829b253d9c4eacb80616775f0c989d |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | b28b45e816a74c3a89f91dd620fea022 |
| service_name | placement                        |
| service_type | placement                        |
| url          | http://controller:8778           |
+--------------+----------------------------------+
```

4.3 控制節點安裝與設定

1. 安裝控制節點 openstack-nova-* 套件。

```
[root@ip112 ~]# yum install openstack-nova-api openstack-nova-conductor
    \
openstack-nova-console openstack-nova-novncproxy \
openstack-nova-scheduler openstack-nova-placement-api
```

2. 編輯 /etc/nova/nova.conf，設定如下章節：

```
[root@ip112 ~]# vim /etc/nova/nova.conf
[root@ip112 ~]# egrep '^(\[DEF|\[api_d|\[data|\[api|\[keyst|\[vnc|\
\[glance|\[oslo_c|\[place|[a-z])' /etc/nova/nova.conf
[DEFAULT]
enabled_apis = osapi_compute,metadata
transport_url = rabbit://openstack:123qwe@controller
my_ip = 163.17.10.112
use_neutron = True
firewall_driver = nova.virt.firewall.NoopFirewallDriver
[api]
auth_strategy = keystone
[api_database]
connection = mysql+pymysql://nova:123qwe@controller/nova_api
[database]
connection = mysql+pymysql://nova:123qwe@controller/nova
[glance]
api_servers = http://controller:9292
[keystone]
[keystone_authtoken]
auth_url = http://controller:5000/v3
memcached_servers = controller:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = nova
password = 123qwe
[oslo_concurrency]
lock_path = /var/lib/nova/tmp
[placement]
os_region_name = RegionOne
project_domain_name = Default
project_name = service
auth_type = password
user_domain_name = Default
auth_url = http://controller:5000/v3
username = placement
password = 123qwe
[vnc]
enabled = true
server_listen = $my_ip
server_proxyclient_address = $my_ip
```

3. 編輯 /etc/httpd/conf.d/00-nova-placement-api.conf，開放所有 IP 可以存取 /usr/bin 目錄。

```
[root@ip112 ~]# vim /etc/httpd/conf.d/00-nova-placement-api.conf
[root@ip112 ~]# cat /etc/httpd/conf.d/00-nova-placement-api.conf
Listen 8778

<VirtualHost *:8778>
  WSGIProcessGroup nova-placement-api
  WSGIApplicationGroup %{GLOBAL}
  WSGIPassAuthorization On
  WSGIDaemonProcess nova-placement-api processes=3 threads=1 user=nova
      group=nova
  WSGIScriptAlias / /usr/bin/nova-placement-api
  <IfVersion >= 2.4>
    ErrorLogFormat "%M"
  </IfVersion>
  ErrorLog /var/log/nova/nova-placement-api.log
  #SSLEngine On
  #SSLCertificateFile ...
  #SSLCertificateKeyFile ...
</VirtualHost>

Alias /nova-placement-api /usr/bin/nova-placement-api
<Location /nova-placement-api>
  SetHandler wsgi-script
  Options +ExecCGI
  WSGIProcessGroup nova-placement-api
  WSGIApplicationGroup %{GLOBAL}
  WSGIPassAuthorization On
</Location>
<Directory /usr/bin>
   <IfVersion >= 2.4>
      Require all granted
   </IfVersion>
   <IfVersion < 2.4>
      Order allow,deny
      Allow from all
   </IfVersion>
</Directory>
```

4. 重新啓動 httpd 服務。

```
[root@ip112 ~]# systemctl restart httpd
```

5. 以用户 nova 執行 nova-manage 進行 nova-api 資料庫同步，此步驟輸出的錯誤訊息皆可忽略。

```
[root@ip112 ~]# su -s /bin/sh -c "nova-manage api_db sync" nova
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
exception.NotSupportedWarning
```

6. 以用户 nova 執行 nova-manage 產生 cell0 資料庫，此步驟輸出的錯誤訊息皆可忽略。

```
[root@ip112 ~]# su -s /bin/sh -c "nova-manage cell_v2 map_cell0" nova
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
  exception.NotSupportedWarning
```

7. 以用户 nova 執行 nova-manage 產生 cell1 資料庫，此步驟輸出的錯誤訊息皆可忽略。

```
[root@ip112 ~]# su -s /bin/sh -c "nova-manage cell_v2 create_cell --name
    =cell1 --verbose" nova
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
  exception.NotSupportedWarning
4b4e2923-ee89-4057-b7d1-473951f313c2
```

8. 以用户 nova 執行 nova-manage 進行 nova 資料庫同步，此步驟輸出的錯誤訊息皆可忽略。

```
[root@ip112 ~]# su -s /bin/sh -c "nova-manage db sync" nova
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
  exception.NotSupportedWarning
/usr/lib/python2.7/site-packages/pymysql/cursors.py:166: Warning: (1831,
u'Duplicate index `
    block_device_mapping_instance_uuid_virtual_name_device_name_idx`.
This is deprecated and will be disallowed in a future release.')
  result = self._query(query)
/usr/lib/python2.7/site-packages/pymysql/cursors.py:166: Warning: (1831,
    u'Duplicate
index `uniq_instances0uuid`. This is deprecated and will be disallowed
    in a future release.')
  result = self._query(query)
```

9. 確認 nova cell0 cell1 註冊正確，此步驟輸出的錯誤訊息皆可忽略。

```
[root@ip112 ~]# nova-manage cell_v2 list_cells
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
  exception.NotSupportedWarning
+-------+--------------------------------------+
|  Name |                 UUID                 |
+-------+--------------------------------------+
| cell0 | 00000000-0000-0000-0000-000000000000 |
| cell1 | 4b4e2923-ee89-4057-b7d1-473951f313c2 |
+-------+--------------------------------------+

-----------------------------------+-----------------------------------------------+

          Transport URL            |              Database Connection
                                   |
-----------------------------------+-----------------------------------------------+

              none:/               | mysql+pymysql://nova:****
                  @controller/nova_cell0 |
 rabbit://openstack:****@controller |    mysql+pymysql://nova:****
    @controller/nova    |
-----------------------------------+-----------------------------------------------+
```

10. 啓動 openstack-nova 控制節點相關的服務，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable openstack-nova-api.service \
openstack-nova-consoleauth.service openstack-nova-scheduler.service \
openstack-nova-conductor.service openstack-nova-novncproxy.service
[root@ip112 ~]# systemctl start openstack-nova-api.service \
openstack-nova-consoleauth.service openstack-nova-scheduler.service \
openstack-nova-conductor.service openstack-nova-novncproxy.service
```

4.4 計算節點安裝與設定

1. 安裝 openstack-nova-compute 套件。

```
[root@ip112 ~]# yum install openstack-nova-compute
```

2. 編輯 /etc/nova/nova.conf，設定如下章節：

```
[root@ip112 ~]# vim /etc/nova/nova.conf
[root@ip112 ~]# egrep '^(\[DEF|\[api_d|\[data|\[api|\[keyst|\[vnc|\
```

```
\[glance|\[oslo_c|\[place|[a-z])' /etc/nova/nova.conf
[DEFAULT]
enabled_apis = osapi_compute,metadata
transport_url = rabbit://openstack:123qwe@controller
my_ip = 163.17.10.112
use_neutron = True
firewall_driver = nova.virt.firewall.NoopFirewallDriver
[api]
auth_strategy = keystone
[api_database]
connection = mysql+pymysql://nova:123qwe@controller/nova_api
[database]
connection = mysql+pymysql://nova:123qwe@controller/nova
[glance]
api_servers = http://controller:9292
[keystone]
[keystone_authtoken]
auth_url = http://controller:5000/v3
memcached_servers = controller:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = nova
password = 123qwe
[oslo_concurrency]
lock_path = /var/lib/nova/tmp
[placement]
os_region_name = RegionOne
project_domain_name = Default
project_name = service
auth_type = password
user_domain_name = Default
auth_url = http://controller:5000/v3
username = placement
password = 123qwe
[vnc]
enabled = true
server_listen = $my_ip
server_proxyclient_address = $my_ip
```

3. 查看主機是否支援虛擬技術，只要數字大於 1，就表示支援。

```
[root@ip112 ~]# egrep -c '(vmx|svm)' /proc/cpuinfo
40
```

4. 編輯 /etc/nova/nova.conf，在章節 libvirt 中設定虛擬化 type 爲 qemu。

```
[root@ip112 ~]# vim /etc/nova/nova.conf
```

```
[root@ip112 ~]# egrep '^(\[libvirt|v)' /etc/nova/nova.conf
[libvirt]
virt_type=qemu
```

5. 啓動 libvirtd 及 openstack-nova-compute 服務，並設定開機啓動。

```
[root@ip112 ~]# systemctl enable libvirtd.service openstack-nova-compute
    .service
[root@ip112 ~]# systemctl start libvirtd.service openstack-nova-compute.
    service
```

4.5 新增計算節點到 CELL 資料庫

1. 載入管理者環境變變數。

```
[root@ip112 ~]# . admin.token
```

2. 確認資料庫中有計算主機。

```
[root@ip112 ~]# openstack compute service list --service nova-compute
+----+--------------+------------------------+------+---------+-------+----------------
| ID | Binary       | Host                   | Zone | Status  | State |
    Updated At                 |
+----+--------------+------------------------+------+---------+-------+----------------
| 13 | nova-compute | ip112.csie.cyut.edu.tw | nova | enabled | up    |
    2018-05-24T14:28:49.000000 |
+----+--------------+------------------------+------+---------+-------+----------------
```

3. 發理取得資料庫中的計算主機。

```
[root@ip112 ~]# su -s /bin/sh -c "nova-manage cell_v2 discover_hosts --
    verbose" nova
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
  exception.NotSupportedWarning
Found 2 cell mappings.
Skipping cell0 since it does not contain hosts.
Getting computes from cell 'cell1': 4b4e2923-ee89-4057-b7d1-473951f313c2
```

```
Checking host mapping for compute host 'ip112.csie.cyut.edu.tw': 9784
    a642-7c16-473b-91ed-95ee3d066021
Creating host mapping for compute host 'ip112.csie.cyut.edu.tw': 9784
    a642-7c16-473b-91ed-95ee3d066021
Found 1 unmapped computes in cell: 4b4e2923-ee89-4057-b7d1-473951f313c2
```

4. 當新增計算節點時，必須再執行上一個動作，也可在 /etc/nova/nova.conf 的 scheduler 章節中設定自動發現週期。

```
[root@ip112 ~]# egrep '^(\[scheduler|^discover)' /etc/nova/nova.conf
[scheduler]
discover_hosts_in_cells_interval = 300
```

4.6 驗證

1. 載入管理者環境變變數。

```
[root@ip112 ~]# . admin.token
```

2. 列出計算服務，確認有如下四項。

```
[root@ip112 ~]# openstack compute service list
+----+------------------+------------------------+----------+---------+-------+--------
| ID | Binary           | Host                   | Zone     | Status  |
    State | Updated At                 |
+----+------------------+------------------------+----------+---------+-------+--------
|  1 | nova-consoleauth | ip112.csie.cyut.edu.tw | internal | enabled |
    up    | 2018-05-24T14:37:55.000000 |
|  2 | nova-conductor   | ip112.csie.cyut.edu.tw | internal | enabled |
    up    | 2018-05-24T14:37:59.000000 |
|  4 | nova-scheduler   | ip112.csie.cyut.edu.tw | internal | enabled |
    up    | 2018-05-24T14:37:59.000000 |
| 13 | nova-compute     | ip112.csie.cyut.edu.tw | nova     | enabled |
    up    | 2018-05-24T14:37:59.000000 |
+----+------------------+------------------------+----------+---------+-------+--------
```

3. 列出身份服務中的 API endpoints 以確認連線。

```
[root@ip112 ~]# openstack catalog list
+-----------+-----------+-----------------------------------------+
| Name      | Type      | Endpoints                               |
+-----------+-----------+-----------------------------------------+
| keystone  | identity  | RegionOne                               |
|           |           |   internal: http://controller:5000/v3/  |
|           |           | RegionOne                               |
|           |           |   public: http://controller:5000/v3/    |
|           |           | RegionOne                               |
|           |           |   admin: http://controller:5000/v3/     |
|           |           |                                         |
| placement | placement | RegionOne                               |
|           |           |   public: http://controller:8778        |
|           |           | RegionOne                               |
|           |           |   admin: http://controller:8778         |
|           |           | RegionOne                               |
|           |           |   internal: http://controller:8778      |
|           |           |                                         |
| nova      | compute   | RegionOne                               |
|           |           |   admin: http://controller:8774/v2.1    |
|           |           | RegionOne                               |
|           |           |   internal: http://controller:8774/v2.1 |
|           |           | RegionOne                               |
|           |           |   public: http://controller:8774/v2.1   |
|           |           |                                         |
| glance    | image     | RegionOne                               |
|           |           |   admin: http://controller:9292         |
|           |           | RegionOne                               |
|           |           |   public: http://controller:9292        |
|           |           | RegionOne                               |
|           |           |   internal: http://controller:9292      |
|           |           |                                         |
+-----------+-----------+-----------------------------------------+
```

4. 上傳 crtusb.qcow2 到 image 服務，disk 格式爲 qcow2，container 格式爲 bare，public 讓所有 project 可以存取。

```
```

5. 列出 image，確認連線 image 服務。

```
[root@ip112 ~]# openstack image list
+--------------------------------------+--------+--------+
| ID                                   | Name   | Status |
+--------------------------------------+--------+--------+
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb | active |
+--------------------------------------+--------+--------+
```

6. 確認 cells 和 placement API 工作正常。

```
[root@ip112 ~]# nova-status upgrade check
/usr/lib/python2.7/site-packages/oslo_db/sqlalchemy/enginefacade.py:332:
NotSupportedWarning: Configuration option(s) ['use_tpool'] not supported
  exception.NotSupportedWarning
Option "os_region_name" from group "placement" is deprecated.
Use option "region-name" from group "placement".
+---------------------------+
| Upgrade Check Results     |
+---------------------------+
| Check: Cells v2           |
| Result: Success           |
| Details: None             |
+---------------------------+
| Check: Placement API      |
| Result: Success           |
| Details: None             |
+---------------------------+
| Check: Resource Providers |
| Result: Success           |
| Details: None             |
+---------------------------+
```

Chapter 5

Neutron

5.1 安裝前資料庫準備

1. Neutron 是 Openstack 的網路服務，安裝 nova 前必須先產生資料庫，登入 mysql：

```
[root@controller ~]# mysql -uroot -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.1.20-MariaDB MariaDB Server

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
    statement.
MariaDB [(none)]>
```

2. 產生資料庫 neutron。

```
MariaDB [(none)]> CREATE DATABASE neutron;
Query OK, 1 row affected (0.00 sec)
```

3. 產生用户 nova 在 localhost，密碼 123qwe，對資料庫 neutron 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'
    localhost' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

4. 產生用户 nova 在 localhost，密碼 123qwe，對資料庫 neutron 有全部的存取權。

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON neutron.* TO 'neutron'@'%' \
IDENTIFIED BY '123qwe';
Query OK, 0 rows affected (0.00 sec)
```

5. 退出 mysql。

```
MariaDB [(none)]> exit
Bye
```

5.2 安裝前環境準備-控制節點

1. 先讀取 openstack 管理者 admin 環境變數。

```
[root@controller ~]# source admin.token
```

2. 新增 neutron 用户，輸入密碼後產生。

```
[root@controller ~]# openstack user create --domain default --password-
    prompt neutron
User Password:
Repeat User Password:
+---------------------+----------------------------------+
| Field               | Value                            |
+---------------------+----------------------------------+
| domain_id           | default                          |
| enabled             | True                             |
| id                  | a8cdd73f42c145019b6d622a1a730646 |
| name                | neutron                          |
| options             | {}                               |
| password_expires_at | None                             |
+---------------------+----------------------------------+
```

3. 新增 admin role 到 neutron user 及 service project。

```
[root@controller ~]# openstack role add --project service --user neutron
    admin
```

4. 新增 neutron service。

```
[root@controller ~]# openstack service create --name neutron \
--description "OpenStack Networking" network
+-------------+----------------------------------+
| Field       | Value                            |
+-------------+----------------------------------+
| description | OpenStack Networking             |
| enabled     | True                             |
| id          | 216edf9649f24fb3bb8a15f5c917e9b2 |
| name        | neutron                          |
| type        | network                          |
+-------------+----------------------------------+
```

5. 新增 Networking API service endpoints，interface public。

```
[root@controller ~]# openstack endpoint create --region RegionOne \
network public http://controller:9696
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | f4ffec0c55bd44018be966980ff0a772 |
| interface    | public                           |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 216edf9649f24fb3bb8a15f5c917e9b2 |
| service_name | neutron                          |
| service_type | network                          |
| url          | http://controller:9696           |
+--------------+----------------------------------+
```

6. 新增 Networking API service endpoints，interface internal。

```
[root@controller ~]# openstack endpoint create --region RegionOne \
network internal http://controller:9696
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | b946fece6fc5401eb29898c18b44e040 |
| interface    | internal                         |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 216edf9649f24fb3bb8a15f5c917e9b2 |
| service_name | neutron                          |
| service_type | network                          |
| url          | http://controller:9696           |
+--------------+----------------------------------+
```

7. 新增 Networking API service endpoints，interface admin。

```
[root@controller ~]# openstack endpoint create --region RegionOne \
network admin http://controller:9696
+--------------+----------------------------------+
| Field        | Value                            |
+--------------+----------------------------------+
| enabled      | True                             |
| id           | fa883698df874c6d8a22db2de9a221ee |
| interface    | admin                            |
| region       | RegionOne                        |
| region_id    | RegionOne                        |
| service_id   | 216edf9649f24fb3bb8a15f5c917e9b2 |
| service_name | neutron                          |
| service_type | network                          |
| url          | http://controller:9696           |
+--------------+----------------------------------+
```

5.3 Provider Networks

1. 安裝 neutron 網路套件。

```
[root@controller ~]# yum install openstack-neutron openstack-neutron-ml2
    \
openstack-neutron-linuxbridge ebtables
```

2. 編輯 /etc/neutron/neutron.conf，設定如下：

```
[root@controller ~]# vim /etc/neutron/neutron.conf
[root@controller ~]# egrep '^(\[data|\[DEF|\[keystone_a|\[nova|\[oslo_c
    |[a-z])' \
/etc/neutron/neutron.conf

[DEFAULT]
core_plugin = ml2
service_plugins =
transport_url = rabbit://openstack:123qwe@controller
auth_strategy = keystone
notify_nova_on_port_status_changes = true
notify_nova_on_port_data_changes = true

[database]
```

```
14 connection = mysql+pymysql://neutron:123qwe@controller/neutron

16 [keystone_authtoken]
auth_uri = http://controller:5000
18 auth_url = http://controller:35357
memcached_servers = controller:11211
20 auth_type = password
project_domain_name = default
22 user_domain_name = default
project_name = service
24 username = neutron
password = 123qwe
26
[nova]
28 auth_url = http://controller:35357
auth_type = password
30 project_domain_name = default
user_domain_name = default
32 region_name = RegionOne
project_name = service
34 username = nova
password = 123qwe
36
[oslo_concurrency]
38 lock_path = /var/lib/neutron/tmp
```

3. 編輯 /etc/neutron/plugins/ml2/ml2_conf.ini，設定 Modular Layer2 (ML2) 外掛。

```
[root@controller ~]# vim /etc/neutron/plugins/ml2/ml2_conf.ini
2 [root@controller ~]# egrep '^(\[ml2\]|\[ml2_type_flat|\[sec|[a-z])' \
/etc/neutron/plugins/ml2/ml2_conf.ini
4
[ml2]
6 type_drivers = flat,vlan
tenant_network_types =
8 mechanism_drivers = linuxbridge
extension_drivers = port_security
10
[ml2_type_flat]
12 flat_networks = provider

14 [securitygroup]
enable_ipset = true
```

4. 編輯 /etc/neutron/plugins/ml2/linuxbridge_agent.ini，設定 linux 橋接代理，其中 physical_interface_mappings 設定 em2 爲控制節點主機的網卡代號。

```
[root@controller ~]# vim /etc/neutron/plugins/ml2/linuxbridge_agent.ini
[root@controller ~]# egrep '^(\[linux_b|\[vxlan|\[sec|[a-z])' \
/etc/neutron/plugins/ml2/linuxbridge_agent.ini

[linux_bridge]
physical_interface_mappings = provider:em2

[securitygroup]
enable_security_group = true
firewall_driver = neutron.agent.linux.iptables_firewall.
    IptablesFirewallDriver

[vxlan]
enable_vxlan = false
```

5. 核心必須載入 br_netfilter 模組。

```
[root@controller ~]# modprobe br_netfilter
[root@controller ~]# lsmod | grep br_net
br_netfilter           22256  0
bridge                146976  2 br_netfilter,ebtable_broute
```

6. 設定開機時核心載入 br_netfilter 模組。

```
[root@controller ~]# echo "br_netfilter" > /etc/modules-load.d/
    br_netfilter.conf
```

7. sysctl 設定 net.bridge.bridge-nf-call-iptables 開啓。

```
[root@controller ~]# vim /etc/sysctl.d/k8s.conf
[root@controller ~]# cat /etc/sysctl.d/k8s.conf
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
[root@controller ~]# /sbin/sysctl -p /etc/sysctl.d/k8s.conf
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
[root@controller ~]# sysctl -a | grep bridge
net.bridge.bridge-nf-call-arptables = 1
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
net.bridge.bridge-nf-filter-pppoe-tagged = 0
net.bridge.bridge-nf-filter-vlan-tagged = 0
net.bridge.bridge-nf-pass-vlan-input-dev = 0
sysctl: reading key "net.ipv6.conf.all.stable_secret"
sysctl: reading key "net.ipv6.conf.default.stable_secret"
sysctl: reading key "net.ipv6.conf.em1.stable_secret"
```

```
sysctl: reading key "net.ipv6.conf.em2.stable_secret"
sysctl: reading key "net.ipv6.conf.em3.stable_secret"
sysctl: reading key "net.ipv6.conf.em4.stable_secret"
sysctl: reading key "net.ipv6.conf.lo.stable_secret"
```

8. 編輯 /etc/neutron/dhcp_agent.ini，設定 DHCP 代理。

```
[root@controller ~]# vim /etc/neutron/dhcp_agent.ini
[root@controller ~]# egrep '^(\[DEF|[a-z])' /etc/neutron/dhcp_agent.ini

[DEFAULT]
interface_driver = linuxbridge
dhcp_driver = neutron.agent.linux.dhcp.Dnsmasq
enable_isolated_metadata = true
```

5.4 Self-service network

1. 編輯 /etc/neutron/neutron.conf，增加 service_plugins, allow_overlapping_ips 兩項設定。

```
[root@controller ~]# vim /etc/neutron/neutron.conf
[root@controller ~]# egrep '^(\[data|\[DEF|\[keystone_a|\[nova|\[oslo_c
    |[a-z])' \
/etc/neutron/neutron.conf

[DEFAULT]
core_plugin = ml2
service_plugins = router     ##
allow_overlapping_ips = true    ##
transport_url = rabbit://openstack:123qwe@controller
auth_strategy = keystone
notify_nova_on_port_status_changes = true
notify_nova_on_port_data_changes = true

[database]
connection = mysql+pymysql://neutron:123qwe@controller/neutron

[keystone_authtoken]
auth_uri = http://controller:5000
auth_url = http://controller:35357
memcached_servers = controller:11211
auth_type = password
project_domain_name = default
user_domain_name = default
project_name = service
username = neutron
```

```
password = 123qwe

[nova]
auth_url = http://controller:35357
auth_type = password
project_domain_name = default
user_domain_name = default
region_name = RegionOne
project_name = service
username = nova
password = 123qwe

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

2. 編輯 /etc/neutron/plugins/ml2/ml2_conf.ini，設定 Modular Layer2 (ML2) 外掛。type_drivers 增加 vxlan，tenant_network_types 設爲 vxlan，mechanism_drivers 增加 l2population。

```
[root@controller ~]# vim /etc/neutron/plugins/ml2/ml2_conf.ini
[root@controller ~]# egrep '^(\[ml2\]|\[ml2_type_flat|\[sec|[a-z])' \
/etc/neutron/plugins/ml2/ml2_conf.ini

[ml2]
type_drivers = flat,vlan,vxlan   ##
tenant_network_types = vxlan     ##
mechanism_drivers = linuxbridge,l2population  ##
extension_drivers = port_security

[ml2_type_flat]
flat_networks = provider
vni_ranges = 1:1000     ##

[securitygroup]
enable_ipset = true
```

3. 編輯 /etc/neutron/plugins/ml2/linuxbridge_agent.ini，設定 linux 橋接代理，其中 physical_interface_mappings 設定 em2 爲控制節點主機的網卡代號。啓動 vxlan，設定 local_ip 爲控制主機的 IP。

```
[root@controller ~]# vim /etc/neutron/plugins/ml2/linuxbridge_agent.ini
[root@controller ~]# egrep '^(\[linux_b|\[vxlan|\[sec|[a-z])' \
/etc/neutron/plugins/ml2/linuxbridge_agent.ini

[linux_bridge]
physical_interface_mappings = provider:em2

```

```
[securitygroup]
enable_security_group = true
firewall_driver = neutron.agent.linux.iptables_firewall.
    IptablesFirewallDriver

[vxlan]
enable_vxlan = true     ##
local_ip = 163.17.10.112    ##
l2_population = true    ##
```

4. 編輯 /etc/neutron/dhcp_agent.ini，設定 DHCP 代理。

```
[root@controller ~]# vim /etc/neutron/dhcp_agent.ini
[root@controller ~]# egrep '^(\[DEF|[a-z])' /etc/neutron/dhcp_agent.ini

[DEFAULT]
interface_driver = linuxbridge
dhcp_driver = neutron.agent.linux.dhcp.Dnsmasq
enable_isolated_metadata = true
```

5.5 設定 metadata agent

1. 編輯 /etc/neutron/metadata_agent.ini，設定 [DEFAULT] 章節如下：

```
[root@controller ~]# vim /etc/neutron/metadata_agent.ini
[root@controller ~]# egrep '^(\[DEF|[a-z])' /etc/neutron/metadata_agent.
    ini
[DEFAULT]
nova_metadata_host = controller
metadata_proxy_shared_secret = METADATA_SECRET
```

2. 編輯 /etc/nova/nova.conf，確認 [neutron] 章節有如下設定：

```
[root@controller ~]# vim /etc/nova/nova.conf
[root@controller ~]# egrep '^(\[neutron)' -A20 /etc/nova/nova.conf |
    grep -v ^#

[neutron]
url = http://controller:9696
auth_url = http://controller:35357
auth_type = password
project_domain_name = default
user_domain_name = default
region_name = RegionOne
```

```
project_name = service
username = neutron
password = 123qwe
service_metadata_proxy = true
metadata_proxy_shared_secret = METADATA_SECRET
```

5.6 服務啓動

1. 設定 /etc/neutron/plugin.ini 連結到 /etc/neutron/plugins/ml2/ml2_conf.ini。

```
[root@controller ~]# ln -s /etc/neutron/plugins/ml2/ml2_conf.ini /etc/
    neutron/plugin.ini
```

2. 以編輯好的設定檔，更新資料庫。

```
[root@controller ~]# su -s /bin/sh -c "neutron-db-manage \
--config-file /etc/neutron/neutron.conf \
--config-file /etc/neutron/plugins/ml2/ml2_conf.ini upgrade head"
    neutron
.......
  OK
```

3. 重新啓動 compute API 服務。

```
[root@controller ~]# systemctl restart openstack-nova-api.service
```

4. 啓動 neutron 相關服務，並設定開機啓動。

```
[root@controller ~]# systemctl enable neutron-server.service \
neutron-linuxbridge-agent.service neutron-dhcp-agent.service \
neutron-metadata-agent.service
[root@controller ~]# systemctl start neutron-server.service \
neutron-linuxbridge-agent.service neutron-dhcp-agent.service \
neutron-metadata-agent.service
[root@controller ~]# systemctl enable neutron-l3-agent.service
[root@controller ~]# systemctl start neutron-l3-agent.service
```

5. 如果同時有 provider 及 self-service networks，重新啓動以下 neutron 相關服務，並設定開機啓動。

```
[root@controller ~]# systemctl restart neutron-server.service \
neutron-linuxbridge-agent.service \
neutron-dhcp-agent.service \
neutron-metadata-agent.service \
neutron-l3-agent.service
[root@controller ~]# systemctl enable neutron-server.service \
neutron-linuxbridge-agent.service \
neutron-dhcp-agent.service \
neutron-metadata-agent.service \
neutron-l3-agent.service
```

5.7 驗證

1. 載入管理者環境變變數。

```
[root@controller ~]# . admin.token
```

2. 列出 agent，確認可以使用 neutron agent，如果只有 provider network，會有以下三種 agent。

```
[root@controller ~]# openstack network agent list
+--------------------------------------+--------------------+------------+
| ID                                   | Agent Type         | Host
        |
+--------------------------------------+--------------------+------------+
| 3eb768a6-2f98-4c71-9c92-a964677c58d8 | DHCP agent         | controller
    |
| 532abb67-c6eb-4768-92e3-722684315909 | Linux bridge agent | controller
    |
| c4d53419-f893-4139-a4eb-3dfe45a4f063 | Metadata agent     | controller
    |
+--------------------------------------+--------------------+------------+

-------------------+-------+-------+---------------------------+
 Availability Zone | Alive | State | Binary                     |
-------------------+-------+-------+---------------------------+
 nova              | :-)   | UP    | neutron-dhcp-agent        |
 None              | :-)   | UP    | neutron-linuxbridge-agent |
 None              | :-)   | UP    | neutron-metadata-agent    |
-------------------+-------+-------+---------------------------+
```

3. 列出 agent，確認可以使用 neutron agent，如果也有 self-service network，則會多一項 L3 agent。

```
[root@controller ~]# . admin.token
[root@controller ~]# openstack network agent list
+--------------------------------------+--------------------+------------+-
| ID                                   | Agent Type         | Host
         |
+--------------------------------------+--------------------+------------+-
| 08c0fc32-63ff-44cd-8464-f756dfac0c8e | DHCP agent         | controller
     |
| 87c9eccb-24f6-4046-bcf2-324532c88767 | Linux bridge agent | controller
     |
| b5276b97-37a4-4a0e-828d-c0f5a6b1c947 | Metadata agent     | controller
     |
| f0c9588f-161e-4b8a-9ed5-bdfe3203e4eb | L3 agent           | controller
     |
+--------------------------------------+--------------------+------------+-

------------------+-------+-------+----------------------------+
Availability Zone | Alive | State | Binary                     |
------------------+-------+-------+----------------------------+
nova              | :-)   | UP    | neutron-dhcp-agent         |
None              | :-)   | UP    | neutron-linuxbridge-agent |
None              | :-)   | UP    | neutron-metadata-agent     |
nova              | :-)   | UP    | neutron-l3-agent           |
------------------+-------+-------+----------------------------+
```

5.8 重設 subnet pools

1. 載入管理者環境變變數。

```
[root@controller ~]# . admin.token
```

2. 列出 network，provider network 的 Subnets 是 2a7287d7-4a4f-43cc-beb2-bc9c023af929。

```
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
```

```
| ID                                   | Name        | Subnets
                                |
+--------------------------------------+-------------+-------------------------------

| 0b0ebcee-057b-4798-bf73-5dd449e7879a | provider    | 2a7287d7-4a4f-43
    cc-beb2-bc9c023af929 |
| 37d0dee7-d573-4f3b-863d-c92c05b6dbbb | selfservice | 36c70394-9a28-4
    cdf-bfee-9c65f4512027 |
+--------------------------------------+-------------+-------------------------------
```

3. subnet show 查看 2a7287d7-4a4f-43cc-beb2-bc9c023af929 的 IP 範圍爲 163.17.10.113 至 163.17.10.200。

```
[root@controller ~]# openstack subnet show 2a7287d7-4a4f-43cc-beb2-
    bc9c023af929
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| allocation_pools  | 163.17.10.113-163.17.10.200          |
| cidr              | 163.17.10.0/24                       |
| created_at        | 2018-05-26T07:32:01Z                 |
| description       |                                      |
| dns_nameservers   | 8.8.8.8                              |
| enable_dhcp       | True                                 |
| gateway_ip        | 163.17.10.254                        |
| host_routes       |                                      |
| id                | 2a7287d7-4a4f-43cc-beb2-bc9c023af929 |
| ip_version        | 4                                    |
| ipv6_address_mode | None                                 |
| ipv6_ra_mode      | None                                 |
| name              | provider                             |
| network_id        | 0b0ebcee-057b-4798-bf73-5dd449e7879a |
| project_id        | e28adc716118434c96b5833867faa08c     |
| revision_number   | 0                                    |
| segment_id        | None                                 |
| service_types     |                                      |
| subnetpool_id     | None                                 |
| tags              |                                      |
| updated_at        | 2018-05-26T07:32:01Z                 |
+-------------------+--------------------------------------+
```

4. unset subnet 2a7287d7-4a4f-43cc-beb2-bc9c023af929 的 allocation_pools。

```
[root@controller ~]# openstack subnet unset --allocation-pool \
start=163.17.10.113,end=163.17.10.200 2a7287d7-4a4f-43cc-beb2-
    bc9c023af929
```

5. 再設定 subnet 2a7287d7-4a4f-43cc-beb2-bc9c023af929 的 IP 範圍爲 163.17.10.113 至 163.17.10.121。

```
[root@controller ~]# openstack subnet set --allocation-pool start
    =163.17.10.113,end=163.17.10.121 2a7287d7-4a4f-43cc-beb2-
    bc9c023af929
```

6. subnet show 再查看 2a7287d7-4a4f-43cc-beb2-bc9c023af929 的 IP 範圍爲 163.17.10.113 至 163.17.10.121。

```
[root@controller ~]# openstack subnet show 2a7287d7-4a4f-43cc-beb2-
    bc9c023af929
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| allocation_pools  | 163.17.10.113-163.17.10.121          |
| cidr              | 163.17.10.0/24                       |
| created_at        | 2018-05-26T07:32:01Z                 |
| description       |                                      |
| dns_nameservers   | 8.8.8.8                              |
| enable_dhcp       | True                                 |
| gateway_ip        | 163.17.10.254                        |
| host_routes       |                                      |
| id                | 2a7287d7-4a4f-43cc-beb2-bc9c023af929 |
| ip_version        | 4                                    |
| ipv6_address_mode | None                                 |
| ipv6_ra_mode      | None                                 |
| name              | provider                             |
| network_id        | 0b0ebcee-057b-4798-bf73-5dd449e7879a |
| project_id        | e28adc716118434c96b5833867faa08c     |
| revision_number   | 2                                    |
| segment_id        | None                                 |
| service_types     |                                      |
| subnetpool_id     | None                                 |
| tags              |                                      |
| updated_at        | 2018-11-06T08:26:49Z                 |
+-------------------+--------------------------------------+
```

5.9 q-router 問題解決

1. 載入管理者環境變變數。

```
[root@controller ~]# . admin.token
```

2. 問題：ip netns 列出 namspace，只有 qdhcp，沒有 qrouter。

```
[root@ip110 ~]# ip netns list
qdhcp-6809ccd8-9959-4294-aede-0261ec25c159 (id: 1)
qdhcp-1ca17030-4dec-4e35-be69-725fb35d2b86 (id: 0)
```

3. 查詢 neutron 相關的服務狀態，發現 neutron-linuxbridge-agent 無法啓動。

```
[root@ip110 ~]# systemctl status neutron-linuxbridge-agent.service
  neutron-linuxbridge-agent.service - OpenStack Neutron Linux Bridge
    Agent
   Loaded: loaded (/usr/lib/systemd/system/neutron-linuxbridge-agent.
       service; enabled;
 vendor preset: disabled)
   Active: failed (Result: start-limit) since Wed 2018-12-12 17:00:33
       CST; 10s ago
  Process: 156682 ExecStart=/usr/bin/neutron-linuxbridge-agent --config-
      file
/usr/share/neutron/neutron-dist.conf --config-file /etc/neutron/neutron.
    conf
--config-file /etc/neutron/plugins/ml2/linuxbridge_agent.ini --config-
    dir
/etc/neutron/conf.d/common --config-dir /etc/neutron/conf.d/neutron-
    linuxbridge-agent
--log-file /var/log/neutron/linuxbridge-agent.log (code=exited, status
    =1/FAILURE)
  Process: 156675 ExecStartPre=/usr/bin/neutron-enable-bridge-firewall.
      sh (code=exited, status=0/SUCCESS)
 Main PID: 156682 (code=exited, status=1/FAILURE)

Dec 12 17:00:32 ip110 systemd[1]: Unit neutron-linuxbridge-agent.service
     entered failed state.
Dec 12 17:00:32 ip110 systemd[1]: neutron-linuxbridge-agent.service
    failed.
Dec 12 17:00:33 ip110 systemd[1]: neutron-linuxbridge-agent.service
    holdoff time over, scheduling restart.
Dec 12 17:00:33 ip110 systemd[1]: start request repeated too quickly for
     neutron-linuxbridge-agent.service
Dec 12 17:00:33 ip110 systemd[1]: Failed to start OpenStack Neutron
    Linux Bridge Agent.
Dec 12 17:00:33 ip110 systemd[1]: Unit neutron-linuxbridge-agent.service
     entered failed state.
Dec 12 17:00:33 ip110 systemd[1]: neutron-linuxbridge-agent.service
    failed.
```

4. 解決方式：降低 neutron 相關套件版本爲 12.0.3。

```
[root@ip110 ~]# yum downgrade python-neutron openstack-neutron-*
[root@ip110 ~]# rpm -qa | grep neutron
openstack-neutron-12.0.3-1.el7.noarch
python-neutron-12.0.3-1.el7.noarch
python2-neutronclient-6.7.0-1.el7.noarch
openstack-neutron-common-12.0.3-1.el7.noarch
python2-neutron-lib-1.13.0-1.el7.noarch
openstack-neutron-linuxbridge-12.0.3-1.el7.noarch
openstack-neutron-ml2-12.0.3-1.el7.noarch
```

5. 編輯 /usr/lib/python2.7/site-packages/tenacity/__init__.py，如下註解 elif tornado... (無效再改回)。

```
[root@ip110 ~]# vim /usr/lib/python2.7/site-packages/tenacity/__init__.
    py
[root@ip110 ~]# grep 'tornado.gen' -A5 -B3 /usr/lib/python2.7/site-
    packages/tenacity/__init__.py
        def wrap(f):
            if asyncio and asyncio.iscoroutinefunction(f):
                r = AsyncRetrying(*dargs, **dkw)
            #elif tornado and tornado.gen.is_coroutine_function(f):
                r = TornadoRetrying(*dargs, **dkw)
            else:
                r = Retrying(*dargs, **dkw)

            return r.wraps(f)
```

6. 再重啓 neutron-linuxbridge-agent 服務，正常啓動。

```
[root@ip110 ~]# systemctl restart neutron-linuxbridge-agent.service
[root@ip110 ~]# systemctl status neutron-linuxbridge-agent.service
  neutron-linuxbridge-agent.service - OpenStack Neutron Linux Bridge
    Agent
   Loaded: loaded (/usr/lib/systemd/system/neutron-linuxbridge-agent.
       service; enabled; vendor preset: disabled)
   Active: active (running) since Wed 2018-12-12 17:22:00 CST; 16min ago
  Process: 159291 ExecStartPre=/usr/bin/neutron-enable-bridge-firewall.
      sh (code=exited, status=0/SUCCESS)
 Main PID: 159298 (neutron-linuxbr)
    Tasks: 5
   CGroup: /system.slice/neutron-linuxbridge-agent.service
           159298 /usr/bin/python2 /usr/bin/neutron-linuxbridge-agent
             --config-file /usr/share/neutron/neutron-dist.conf...
           159320 sudo neutron-rootwrap-daemon /etc/neutron/rootwrap.
             conf
           159321 /usr/bin/python2 /usr/bin/neutron-rootwrap-daemon /
             etc/neutron/rootwrap.conf
```

```
13
Dec 12 17:21:59 ip110 systemd[1]: Starting OpenStack Neutron Linux
    Bridge Agent...
15 Dec 12 17:21:59 ip110 neutron-enable-bridge-firewall.sh[159291]: net.
    bridge.bridge-nf-call-iptables = 1
Dec 12 17:21:59 ip110 neutron-enable-bridge-firewall.sh[159291]: net.
    bridge.bridge-nf-call-ip6tables = 1
17 Dec 12 17:22:00 ip110 systemd[1]: Started OpenStack Neutron Linux Bridge
     Agent.
Dec 12 17:22:02 ip110 sudo[159320]:  neutron : TTY=unknown ; PWD=/ ;
    USER=root ; COMMAND=/bin/neutron-rootwrap-daemo...p.conf
19 Hint: Some lines were ellipsized, use -l to show in full.
```

7. ip netns 列出 namspace，已出現 qrouter。

```
1 [root@ip110 ~]# ip netns list
qrouter-6c759b42-53f7-4ca7-bd8f-a861870b0f8c (id: 2)
3 qdhcp-6809ccd8-9959-4294-aede-0261ec25c159 (id: 1)
qdhcp-1ca17030-4dec-4e35-be69-725fb35d2b86 (id: 0)
```

Chapter 6

Virtual Network

6.1 Proivder Network

1. 要開始 instance 前，必須先產生 virtual networks，載入 openstack 管理者 admin 環境變數。

```
[root@ip112 ~]# source admin.token
```

2. 產生新的網路，-share 允許所有 projects 使用，-external 設定爲對外網路。

```
[root@ip112 ~]# openstack network create  --share --external \
--provider-physical-network provider \
--provider-network-type flat provider
+---------------------------+--------------------------------------+
| Field                     | Value                                |
+---------------------------+--------------------------------------+
| admin_state_up            | UP                                   |
| availability_zone_hints   |                                      |
| availability_zones        |                                      |
| created_at                | 2018-05-26T07:25:41Z                 |
| description               |                                      |
| dns_domain                | None                                 |
| id                        | 0b0ebcee-057b-4798-bf73-5dd449e7879a |
| ipv4_address_scope        | None                                 |
| ipv6_address_scope        | None                                 |
| is_default                | False                                |
| is_vlan_transparent       | None                                 |
| mtu                       | 1500                                 |
| name                      | provider                             |
| port_security_enabled     | True                                 |
| project_id                | e28adc716118434c96b5833867faa08c     |
| provider:network_type     | flat                                 |
| provider:physical_network | provider                             |
| provider:segmentation_id  | None                                 |
| qos_policy_id             | None                                 |
```

```
| revision_number           | 5                                    |
| router:external           | External                             |
| segments                  | None                                 |
| shared                    | True                                 |
| status                    | ACTIVE                               |
| subnets                   |                                      |
| tags                      |                                      |
| updated_at                | 2018-05-26T07:25:41Z                 |
+---------------------------+--------------------------------------+
```

3. 查詢 network，出現 provider。

```
[root@controller ~]# openstack network list
+--------------------------------------+----------+---------+
| ID                                   | Name     | Subnets |
+--------------------------------------+----------+---------+
| 0b0ebcee-057b-4798-bf73-5dd449e7879a | provider |         |
+--------------------------------------+----------+---------+
```

4. 產生子網域 163.17.10.0/24，此網段爲 provider 橋接對外網卡 em2 的網段。

```
[root@controller ~]# grep provider:em2 -R /etc/neutron/
/etc/neutron/plugins/ml2/linuxbridge_agent.ini:
    physical_interface_mappings = provider:em2

[root@ip112 ~]# openstack subnet create --network provider \
--allocation-pool start=163.17.10.113,end=163.17.10.200 \
--dns-nameserver 8.8.8.8 --gateway 163.17.10.254 \
--subnet-range 163.17.10.0/24 provider
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| allocation_pools  | 163.17.10.113-163.17.10.200          |
| cidr              | 163.17.10.0/24                       |
| created_at        | 2018-05-26T07:32:01Z                 |
| description       |                                      |
| dns_nameservers   | 8.8.8.8                              |
| enable_dhcp       | True                                 |
| gateway_ip        | 163.17.10.254                        |
| host_routes       |                                      |
| id                | 2a7287d7-4a4f-43cc-beb2-bc9c023af929 |
| ip_version        | 4                                    |
| ipv6_address_mode | None                                 |
| ipv6_ra_mode      | None                                 |
| name              | provider                             |
| network_id        | 0b0ebcee-057b-4798-bf73-5dd449e7879a |
| project_id        | e28adc716118434c96b5833867faa08c     |
| revision_number   | 0                                    |
| segment_id        | None                                 |
```

```
| service_types     |                                      |
| subnetpool_id     | None                                 |
| tags              |                                      |
| updated_at        | 2018-05-26T07:32:01Z                 |
+-------------------+--------------------------------------+
```

5. 查詢網路 provider 出現 subnet。

```
[root@controller ~]# openstack network list
+--------------------------------------+----------+--------------------------------------
| ID                                   | Name     | Subnets
                                |
+--------------------------------------+----------+--------------------------------------
| 0b0ebcee-057b-4798-bf73-5dd449e7879a | provider | 2a7287d7-4a4f-43cc-
    beb2-bc9c023af929 |
+--------------------------------------+----------+--------------------------------------
```

6. 查詢網路 subnet，id 爲 2a7287d7-4a4f-43cc-beb2-bc9c023af929，出現 subnet 網段爲 163.17.10.0/24。

```
[root@controller ~]# openstack subnet list
+--------------------------------------+----------+--------------------------------------
| ID                                   | Name     | Network
                               | Subnet          |
+--------------------------------------+----------+--------------------------------------
| 2a7287d7-4a4f-43cc-beb2-bc9c023af929 | provider | 0b0ebcee-057b-4798-
    bf73-5dd449e7879a | 163.17.10.0/24 |
+--------------------------------------+----------+--------------------------------------
```

7. 查詢 port，subnet 2a7287d7-4a4f-43cc-beb2-bc9c023af929 有一個 port，IP 爲 163.17.10.113 爲產生網路時設定的 IP 起點。

```
[root@controller ~]# openstack port list
+--------------------------------------+------+-------------------+------------------------
| ID                                   | Name | MAC Address       |
    Fixed IP Addresses
+--------------------------------------+------+-------------------+------------------------
```

```
| 0e5cf9d2-eed5-41e0-978b-f816ba0e85d6 |      | fa:16:3e:d3:7a:11 |
   ip_address='163.17.10.113',
+--------------------------------------+------+-------------------+--------------------

-----------------------------------------------------+--------+
                                                     | Status |
-----------------------------------------------------+--------+
 subnet_id='2a7287d7-4a4f-43cc-beb2-bc9c023af929' | ACTIVE |
-----------------------------------------------------+--------+
```

8. ping 163.17.10.113 port，成功回覆。

```
[root@controller ~]# ping -c3 163.17.10.113
PING 163.17.10.113 (163.17.10.113) 56(84) bytes of data.
64 bytes from 163.17.10.113: icmp_seq=1 ttl=64 time=0.055 ms
64 bytes from 163.17.10.113: icmp_seq=2 ttl=64 time=0.043 ms
64 bytes from 163.17.10.113: icmp_seq=3 ttl=64 time=0.042 ms

--- 163.17.10.113 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 0.042/0.046/0.055/0.009 ms
```

6.2 Self-service Network

1. Self-service network 爲私有內網，以一般用户產生，載入一般用户 demo 環境變變數。

```
[root@controller ~]# . demo.token
```

2. 新增網路 selfservice。

```
[root@controller ~]# openstack network create selfservice
+---------------------------+--------------------------------------+
| Field                     | Value                                |
+---------------------------+--------------------------------------+
| admin_state_up            | UP                                   |
| availability_zone_hints   |                                      |
| availability_zones        |                                      |
| created_at                | 2018-05-26T07:45:07Z                 |
| description               |                                      |
| dns_domain                | None                                 |
| id                        | 37d0dee7-d573-4f3b-863d-c92c05b6dbbb |
| ipv4_address_scope        | None                                 |
| ipv6_address_scope        | None                                 |
```

```
| is_default                | False                                |
| is_vlan_transparent       | None                                 |
| mtu                       | 1450                                 |
| name                      | selfservice                          |
| port_security_enabled     | True                                 |
| project_id                | 92d1ec3e04384ad599c1a8f5aed73663     |
| provider:network_type     | None                                 |
| provider:physical_network | None                                 |
| provider:segmentation_id  | None                                 |
| qos_policy_id             | None                                 |
| revision_number           | 2                                    |
| router:external           | Internal                             |
| segments                  | None                                 |
| shared                    | False                                |
| status                    | ACTIVE                               |
| subnets                   |                                      |
| tags                      |                                      |
| updated_at                | 2018-05-26T07:45:07Z                 |
+---------------------------+--------------------------------------+
```

3. 查詢網路，出現 selfservice，但其還沒有 subnet。

```
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Subnets
                                |
+--------------------------------------+-------------+--------------------------------------
| 0b0ebcee-057b-4798-bf73-5dd449e7879a | provider    | 2a7287d7-4a4f-43
   cc-beb2-bc9c023af929 |
| 37d0dee7-d573-4f3b-863d-c92c05b6dbbb | selfservice |
                                |
+--------------------------------------+-------------+--------------------------------------
```

4. 網路 selfservice 新增 subnet，網段爲 192.168.10.0/24，gateway 爲 192.168.10.1。

```
[root@controller ~]# openstack subnet create --network selfservice \
--dns-nameserver 8.8.8.8 --gateway 192.168.10.1 \
--subnet-range 192.168.10.0/24 selfservice
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| allocation_pools  | 192.168.10.2-192.168.10.254          |
| cidr              | 192.168.10.0/24                      |
| created_at        | 2018-05-26T07:48:45Z                 |
| description       |                                      |
```

```
| dns_nameservers   | 8.8.8.8                                |
| enable_dhcp       | True                                   |
| gateway_ip        | 192.168.10.1                           |
| host_routes       |                                        |
| id                | 36c70394-9a28-4cdf-bfee-9c65f4512027 |
| ip_version        | 4                                      |
| ipv6_address_mode | None                                   |
| ipv6_ra_mode      | None                                   |
| name              | selfservice                            |
| network_id        | 37d0dee7-d573-4f3b-863d-c92c05b6dbbb |
| project_id        | 92d1ec3e04384ad599c1a8f5aed73663       |
| revision_number   | 0                                      |
| segment_id        | None                                   |
| service_types     |                                        |
| subnetpool_id     | None                                   |
| tags              |                                        |
| updated_at        | 2018-05-26T07:48:45Z                   |
+-------------------+----------------------------------------+
```

5. 查詢 subnet，selfservice 出現網段爲 192.168.10.0/24 的 subnet。

```
[root@controller ~]# openstack subnet list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Network
                                | Subnet          |
+--------------------------------------+-------------+--------------------------------------

| 2a7287d7-4a4f-43cc-beb2-bc9c023af929 | provider    | 0b0ebcee-057b
  -4798-bf73-5dd449e7879a | 163.17.10.0/24  |
| 36c70394-9a28-4cdf-bfee-9c65f4512027 | selfservice | 37d0dee7-d573-4
  f3b-863d-c92c05b6dbbb | 192.168.10.0/24 |
+--------------------------------------+-------------+--------------------------------------
```

6.3 Router

1. Self-service network 以 virtual router 連線到對外的 provider network，provider network 欄位 router:external 必須是 external，才可以讓 self-service network 經由 provider network 對外，這由產生 provider network 時以參數 -external 達成。

2. 以一般用户 demo 產生 router，載入一般用户 demo 環境變變數。

```
[root@controller ~]# . demo.token
```

3. 新增 router。

```
[root@controller ~]# openstack router create router
+-------------------------+--------------------------------------+
| Field                   | Value                                |
+-------------------------+--------------------------------------+
| admin_state_up          | UP                                   |
| availability_zone_hints |                                      |
| availability_zones      |                                      |
| created_at              | 2018-05-26T08:07:54Z                 |
| description             |                                      |
| distributed             | False                                |
| external_gateway_info   | None                                 |
| flavor_id               | None                                 |
| ha                      | False                                |
| id                      | 3ce2307f-d558-4aa3-b723-8e71ed990824 |
| name                    | router                               |
| project_id              | 92d1ec3e04384ad599c1a8f5aed73663     |
| revision_number         | 1                                    |
| routes                  |                                      |
| status                  | ACTIVE                               |
| tags                    |                                      |
| updated_at              | 2018-05-26T08:07:54Z                 |
+-------------------------+--------------------------------------+
```

4. 查詢 router，新增的爲 3ce2307f-d558-4aa3-b723-8e71ed990824。

```
[root@controller ~]# openstack router list
+--------------------------------------+--------+--------+-------+
| ID                                   | Name   | Status | State |
+--------------------------------------+--------+--------+-------+
| 3ce2307f-d558-4aa3-b723-8e71ed990824 | router | ACTIVE | UP    |
| 53bc7576-bcee-4ad4-ae06-d18d9be372a2 | router | ACTIVE | UP    |
+--------------------------------------+--------+--------+-------+
-------------+-------+----------------------------------+
 Distributed | HA    | Project                          |
-------------+-------+----------------------------------+
 False       | False | 92d1ec3e04384ad599c1a8f5aed73663 |
 False       | False | 92d1ec3e04384ad599c1a8f5aed73663 |
-------------+-------+----------------------------------+
```

5. 新增 selfservice 的 subnet 到 router 3ce2307f-d558-4aa3-b723-8e71ed990824。

```
[root@controller ~]# openstack router add subnet \
3ce2307f-d558-4aa3-b723-8e71ed990824 selfservice
```

6. 設定 router 3ce2307f-d558-4aa3-b723-8e71ed990824 對外 gateway 爲 provider network。

```
[root@controller ~]# openstack router set \
3ce2307f-d558-4aa3-b723-8e71ed990824 --external-gateway provider
```

6.4 驗證

1. 載入管理者 admin 環境變變數。

```
[root@controller ~]# . admin.token
```

2. 查詢 namespace，qrouter 3ce2307f-d558-4aa3-b723-8e71ed990824 會有兩個 qdhcp。

```
[root@controller ~]# . admin.token
[root@controller ~]# ip netns
qrouter-3ce2307f-d558-4aa3-b723-8e71ed990824 (id: 3)
qdhcp-37d0dee7-d573-4f3b-863d-c92c05b6dbbb (id: 1)
qdhcp-0b0ebcee-057b-4798-bf73-5dd449e7879a (id: 0)
qrouter-53bc7576-bcee-4ad4-ae06-d18d9be372a2 (id: 2)
```

3. 查詢 port，多出 IP 爲 163.17.10.117 的 port，這爲 selfservice 對外的 gateway。

```
[root@controller ~]# openstack port list
+--------------------------------------+------+-------------------+-------------
| ID                                   | Name | MAC Address       |
   Fixed IP Add
+--------------------------------------+------+-------------------+-------------
| 0e5cf9d2-eed5-41e0-978b-f816ba0e85d6 |      | fa:16:3e:d3:7a:11 |
   ip_address='
| 62d8f5fd-4d27-4627-9549-9839fce7172d |      | fa:16:3e:bd:be:2d |
   ip_address='
```

```
| 90ab060a-c002-475f-9fb4-0b17dac6b68a |      | fa:16:3e:95:ab:92 |
    ip_address='
| bbec6143-2d2a-48ec-afa1-c39733ff6e73 |      | fa:16:3e:7b:6c:92 |
    ip_address='
+--------------------------------------+------+-------------------+-------------


----------------------------------------------------------------------+--------+

resses                                                               |
    Status |
----------------------------------------------------------------------+--------+

163.17.10.113', subnet_id='2a7287d7-4a4f-43cc-beb2-bc9c023af929' |
    ACTIVE |
192.168.10.1', subnet_id='36c70394-9a28-4cdf-bfee-9c65f4512027'  |
    ACTIVE |
163.17.10.117', subnet_id='2a7287d7-4a4f-43cc-beb2-bc9c023af929' |
    ACTIVE |
192.168.10.2', subnet_id='36c70394-9a28-4cdf-bfee-9c65f4512027'  |
    ACTIVE |
----------------------------------------------------------------------+--------+
```

4. ping 163.17.10.117，成功回覆。

```
[root@controller ~]# ping -c3 163.17.10.117
PING 163.17.10.117 (163.17.10.117) 56(84) bytes of data.
64 bytes from 163.17.10.117: icmp_seq=1 ttl=64 time=0.105 ms
64 bytes from 163.17.10.117: icmp_seq=2 ttl=64 time=0.047 ms
64 bytes from 163.17.10.117: icmp_seq=3 ttl=64 time=0.041 ms

--- 163.17.10.117 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 0.041/0.064/0.105/0.029 ms
```

6.5 Security Groups

1. 載入用户 demo 環境變變數。

```
[root@controller ~]# . demo.token
```

2. 列出 security group，只有 default 一項。

```
[root@controller ~]# openstack security group list
```

```
+--------------------------------------+---------+----------------------+------------
| ID                                   | Name    | Description
              | Project                          |
+--------------------------------------+---------+----------------------+------------
| 1f149288-87c2-43b5-a3b3-89eb153c9249 | default | Default security
   group | 92d1ec3e04384ad599c1a8f5aed73663 |
+--------------------------------------+---------+----------------------+------------
```

3. 列出 default 的 security group rule。

```
[root@controller ~]# openstack security group rule list default
+--------------------------------------+-------------+-----------+------------+--------
| ID                                   | IP Protocol | IP Range  | Port
   Range | Remote Security Group |
+--------------------------------------+-------------+-----------+------------+--------
| 0e52cde4-637b-4c35-be1e-cc1b4a1c0518 | icmp        | 0.0.0.0/0 |
              | None                 |
| bc34846d-4398-4c7c-a250-33d37f363242 | tcp         | 0.0.0.0/0 | 22:22
         | None                 |
| da8408df-c316-4ee8-a809-35e3b62afbcb | tcp         | 0.0.0.0/0 | 80:80
         | None                 |
| f2404feb-c8e7-4176-b987-6292277b0c72 | tcp         | 0.0.0.0/0 |
   443:443    | None                 |
+--------------------------------------+-------------+-----------+------------+--------
```

4. 新增 default 的 security group rule，開放 3128/tcp。

```
[root@controller ~]# openstack security group rule create default \
--protocol tcp --dst-port 3128:3128 --remote-ip 0.0.0.0/0
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| created_at        | 2020-01-16T06:43:23Z                 |
| description       |                                      |
| direction         | ingress                              |
| ether_type        | IPv4                                 |
| id                | b170cb0c-0d94-4e11-8f10-7e30c624cfbe |
| name              | None                                 |
| port_range_max    | 3128                                 |
| port_range_min    | 3128                                 |
| project_id        | 92d1ec3e04384ad599c1a8f5aed73663     |
| protocol          | tcp                                  |
| remote_group_id   | None                                 |
```

```
| remote_ip_prefix  | 0.0.0.0/0                            |
| revision_number   | 0                                    |
| security_group_id | 1f149288-87c2-43b5-a3b3-89eb153c9249 |
| updated_at        | 2020-01-16T06:43:23Z                 |
+-------------------+--------------------------------------+
```

5. 列出 default 的 security group rule。

```
[root@controller ~]# openstack security group rule list default
+--------------------------------------+-------------+-----------+------------+--------
| ID                                   | IP Protocol | IP Range  | Port
   Range | Remote Security Group |
+--------------------------------------+-------------+-----------+------------+--------
| 0e52cde4-637b-4c35-be1e-cc1b4a1c0518 | icmp        | 0.0.0.0/0 |
              | None                 |
| b170cb0c-0d94-4e11-8f10-7e30c624cfbe | tcp         | 0.0.0.0/0 |
   3128:3128  | None                 |
| bc34846d-4398-4c7c-a250-33d37f363242 | tcp         | 0.0.0.0/0 | 22:22
         | None                 |
| da8408df-c316-4ee8-a809-35e3b62afbcb | tcp         | 0.0.0.0/0 | 80:80
         | None                 |
| f2404feb-c8e7-4176-b987-6292277b0c72 | tcp         | 0.0.0.0/0 |
   443:443    | None                 |
+--------------------------------------+-------------+-----------+------------+--------
```

Chapter 7

Instance

7.1 新增 flavor

1. 載入管理者 admin 環境變變數。

```
[root@controller ~]# . admin.token
```

2. 新增名爲 m1.nano flavor，64M ram。

```
[root@controller ~]# openstack flavor create --id 0 --vcpus 1 --ram 64
    --disk 1 m1.nano
+----------------------------+---------+
| Field                      | Value   |
+----------------------------+---------+
| OS-FLV-DISABLED:disabled   | False   |
| OS-FLV-EXT-DATA:ephemeral  | 0       |
| disk                       | 1       |
| id                         | 0       |
| name                       | m1.nano |
| os-flavor-access:is_public | True    |
| properties                 |         |
| ram                        | 64      |
| rxtx_factor                | 1.0     |
| swap                       |         |
| vcpus                      | 1       |
+----------------------------+---------+
```

3. 新增名爲 m1.crt flavor，4096M ram。

```
[root@controller ~]# openstack flavor create --id 1 --vcpus 2 --ram 4096
    --disk 16 m1.crt
+----------------------------+--------+
```

```
| Field                       | Value  |
+-----------------------------+--------+
| OS-FLV-DISABLED:disabled    | False  |
| OS-FLV-EXT-DATA:ephemeral   | 0      |
| disk                        | 16     |
| id                          | 1      |
| name                        | m1.crt |
| os-flavor-access:is_public  | True   |
| properties                  |        |
| ram                         | 4096   |
| rxtx_factor                 | 1.0    |
| swap                        |        |
| vcpus                       | 2      |
+-----------------------------+--------+
```

4. 查詢 flavor，有 m1.nano 及 m1.crt。

```
[root@controller ~]# openstack flavor list
+----+---------+------+------+-----------+-------+-----------+
| ID | Name    |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+---------+------+------+-----------+-------+-----------+
| 0  | m1.nano |   64 |    1 |         0 |     1 | True      |
| 1  | m1.crt  | 4096 |   16 |         0 |     2 | True      |
+----+---------+------+------+-----------+-------+-----------+
```

7.2 登入金鑰對

1. 載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 如果.ssh 目錄沒有金鑰對，就先執行 ssh-keygen 產生。

```
[root@controller ~]# ssh-keygen -q -N ""
Enter file in which to save the key (/root/.ssh/id_rsa): ^C
[root@controller ~]# ll .ssh/
total 16
-r--------. 1 root root  788 May 22 17:50 authorized_keys
-rw-------. 1 root root 1675 May 22 17:50 id_rsa
-rw-r--r--. 1 root root  392 May 22 17:50 id_rsa.pub
-rw-r--r--. 1 root root 1139 May 22 19:25 known_hosts
```

3. 將 public key 加到 openstack，設定名爲 mykey。

```
[root@controller ~]# openstack keypair create --public-key ~/.ssh/id_rsa
    .pub mykey
+-------------+-------------------------------------------------+
| Field       | Value                                           |
+-------------+-------------------------------------------------+
| fingerprint | 2d:0a:a2:58:e1:e7:f6:bd:55:c8:6f:27:9d:64:be:d9 |
| name        | mykey                                           |
| user_id     | 0d7bb3820384452abb97ec0b40c445b1                |
+-------------+-------------------------------------------------+
```

4. 確認 openstack 有 mykey 的金鑰對。

```
[root@controller ~]# openstack keypair list
+-------+-------------------------------------------------+
| Name  | Fingerprint                                     |
+-------+-------------------------------------------------+
| mykey | 2d:0a:a2:58:e1:e7:f6:bd:55:c8:6f:27:9d:64:be:d9 |
+-------+-------------------------------------------------+
```

7.3 Security Group Rules

1. 載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 預設的"default" security group 防火牆不允許遠端存取 instance，新增 ICMP(ping)。

```
[root@controller ~]# openstack security group list
+--------------------------------------+---------+------------------------+------------
| ID                                   | Name    | Description
              | Project                          |
+--------------------------------------+---------+------------------------+------------
| 1f149288-87c2-43b5-a3b3-89eb153c9249 | default | Default security
   group | 92d1ec3e04384ad599c1a8f5aed73663 |
+--------------------------------------+---------+------------------------+------------
```

3. ”default” security group 防火牆新增允許 ICMP(ping) 規則。

```
[root@controller ~]# openstack security group rule create --proto icmp
    default
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| created_at        | 2018-05-26T09:44:27Z                 |
| description       |                                      |
| direction         | ingress                              |
| ether_type        | IPv4                                 |
| id                | 0e52cde4-637b-4c35-be1e-cc1b4a1c0518 |
| name              | None                                 |
| port_range_max    | None                                 |
| port_range_min    | None                                 |
| project_id        | 92d1ec3e04384ad599c1a8f5aed73663     |
| protocol          | icmp                                 |
| remote_group_id   | None                                 |
| remote_ip_prefix  | 0.0.0.0/0                            |
| revision_number   | 0                                    |
| security_group_id | 1f149288-87c2-43b5-a3b3-89eb153c9249 |
| updated_at        | 2018-05-26T09:44:27Z                 |
+-------------------+--------------------------------------+
```

4. ”default” security group 防火牆新增允許 SSH 規則。

```
[root@controller ~]# openstack security group rule create --proto tcp --
    dst-port 22 default
+-------------------+--------------------------------------+
| Field             | Value                                |
+-------------------+--------------------------------------+
| created_at        | 2018-05-26T09:45:17Z                 |
| description       |                                      |
| direction         | ingress                              |
| ether_type        | IPv4                                 |
| id                | bc34846d-4398-4c7c-a250-33d37f363242 |
| name              | None                                 |
| port_range_max    | 22                                   |
| port_range_min    | 22                                   |
| project_id        | 92d1ec3e04384ad599c1a8f5aed73663     |
| protocol          | tcp                                  |
| remote_group_id   | None                                 |
| remote_ip_prefix  | 0.0.0.0/0                            |
| revision_number   | 0                                    |
| security_group_id | 1f149288-87c2-43b5-a3b3-89eb153c9249 |
| updated_at        | 2018-05-26T09:45:17Z                 |
+-------------------+--------------------------------------+
```

5. 列出”default” security group，防火牆新有允許 ICMP 及 SSH 規則。

```
[root@controller ~]# openstack security group show default
+-----------------+------------------------------------------------------------------------

| Field           | Value
+-----------------+------------------------------------------------------------------------

| created_at      | 2018-05-25T11:36:54Z
| description     | Default security group
| id              | 1f149288-87c2-43b5-a3b3-89eb153c9249
| name            | default
| project_id      | 92d1ec3e04384ad599c1a8f5aed73663
| revision_number | 6
| rules           | created_at='2018-05-26T09:44:27Z', direction='
    ingress', ethertype='IPv4',
|                 | created_at='2018-05-25T11:36:54Z', direction='egress
    ', ethertype='IPv4',
|                 | created_at='2018-05-25T11:36:54Z', direction='
    ingress', ethertype='IPv4',
|                 | created_at='2018-05-25T11:36:54Z', direction='egress
    ', ethertype='IPv6',
|                 | created_at='2018-05-26T09:45:17Z', direction='
    ingress', ethertype='IPv4',
|                 | created_at='2018-05-25T11:36:54Z', direction='
    ingress', ethertype='IPv6',
| updated_at      | 2018-05-26T09:45:17Z
+-----------------+------------------------------------------------------------------------

-------------------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------




 id='0e52cde4-637b-4c35-be1e-cc1b4a1c0518', protocol='icmp',
     remote_ip_prefix='0.0.0.0/0', up
id='83bd79ae-99a7-4291-8dde-835bbb8233cd', updated_at='2018-05-25T11
    :36:54Z'
 id='987bfd05-3b42-4ae7-a50e-58bb8ec7c6a1', remote_group_id='1f149288-87
     c2-43b5-a3b3-89eb153c
id='b84190e5-a903-4961-91ee-d08eeb797d6a', updated_at='2018-05-25T11
    :36:54Z'
 id='bc34846d-4398-4c7c-a250-33d37f363242', port_range_max='22',
     port_range_min='22', protoco
 id='fc9d2544-23ac-4d18-b4c0-b6dc1f197d08', remote_group_id='1f149288-87
     c2-43b5-a3b3-89eb153c

-------------------------------------------------------------------------------------------

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

```
                                                                                |
38 ------------------------------------------------------------------------------+
                                                                                |
40                                                                              |
                                                                                |
42                                                                              |
                                                                                |
44                                                                              |
dated_at='2018-05-26T09:44:27Z'
                                                        |
46                                                                              |
9249', updated_at='2018-05-25T11:36:54Z'
                                        |
48                                                                              |
l='tcp', remote_ip_prefix='0.0.0.0/0', updated_at='2018-05-26T09:45:17Z'
     |
50 9249', updated_at='2018-05-25T11:36:54Z'
                                        |
                                                                                |
52 ------------------------------------------------------------------------------+
```

7.4 新增 Instance 前確認

1. 載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 列出 falvor。

```
1 [root@controller ~]# openstack flavor list
  +----+---------+------+------+-----------+-------+-----------+
3 | ID | Name    |  RAM | Disk | Ephemeral | VCPUs | Is Public |
  +----+---------+------+------+-----------+-------+-----------+
5 | 0  | m1.nano |   64 |    1 |         0 |     1 | True      |
```

```
| 1  | m1.crt  | 4096 |   16 |         0 |     2 | True      |
+----+---------+------+------+-----------+-------+-----------+
```

3. 列出 image。

```
[root@controller ~]# openstack image list
+--------------------------------------+--------+--------+
| ID                                   | Name   | Status |
+--------------------------------------+--------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb | active |
+--------------------------------------+--------+--------+
```

4. 列出 network。

```
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Subnets
                                     |
+--------------------------------------+-------------+--------------------------------------
| 0b0ebcee-057b-4798-bf73-5dd449e7879a | provider    | 2a7287d7-4a4f-43
   cc-beb2-bc9c023af929 |
| 37d0dee7-d573-4f3b-863d-c92c05b6dbbb | selfservice | 36c70394-9a28-4
   cdf-bfee-9c65f4512027 |
+--------------------------------------+-------------+--------------------------------------
```

5. 列出 security group。

```
[root@controller ~]# openstack security group list
+--------------------------------------+---------+----------------------+------------
| ID                                   | Name    | Description
              | Project                          |
+--------------------------------------+---------+----------------------+------------
| 1f149288-87c2-43b5-a3b3-89eb153c9249 | default | Default security
   group | 92d1ec3e04384ad599c1a8f5aed73663 |
+--------------------------------------+---------+----------------------+------------
```

6. 確認 project 92d1ec3e04384ad599c1a8f5aed73663 是 demo，不是管理者 admin。

```
[root@controller ~]# openstack project list
+----------------------------------+---------+
| ID                               | Name    |
+----------------------------------+---------+
| 92d1ec3e04384ad599c1a8f5aed73663 | demo    |
+----------------------------------+---------+
```

7.5 使用 Selfservice network 新增 Instance cirros

1. 載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 以 flavor m1.nano, image cirros, network selfservice, security group default 新增 server。

```
[root@controller ~]# openstack server create --flavor m1.nano --image
    cirros \
--nic net-id=37d0dee7-d573-4f3b-863d-c92c05b6dbbb \
--security-group default \
--key-name mykey cirros1
+-----------------------------+------------------------------------------------+
| Field                       | Value                                          |
+-----------------------------+------------------------------------------------+
| OS-DCF:diskConfig           | MANUAL                                         |
| OS-EXT-AZ:availability_zone |                                                |
| OS-EXT-STS:power_state      | NOSTATE                                        |
| OS-EXT-STS:task_state       | scheduling                                     |
| OS-EXT-STS:vm_state         | building                                       |
| OS-SRV-USG:launched_at      | None                                           |
| OS-SRV-USG:terminated_at    | None                                           |
| accessIPv4                  |                                                |
```

```
| accessIPv6                   |
                                                    |
17 | addresses                    |
                                                    |
   | adminPass                    | KN4nA7xQgkYx
                                         |
19 | config_drive                 |
                                                    |
   | created                      | 2018-05-26T13:32:56Z
                                |
21 | flavor                       | m1.nano (0)
                                       |
   | hostId                       |
                                                    |
23 | id                           | bfaefe36-2310-4241-bbea-e02e1a4a482f
            |
   | image                        | cirros (5bb44bde-d1e8-4937-b0fc-
     d3cdab6929c5) |
25 | key_name                     | mykey
                                              |
   | name                         | cirros1
                                         |
27 | progress                     | 0
                                                  |
   | project_id                   | 92d1ec3e04384ad599c1a8f5aed73663
                |
29 | properties                   |
                                                    |
   | security_groups              | name='1f149288-87c2-43b5-a3b3-89
     eb153c9249'    |
31 | status                       | BUILD
                                              |
   | updated                      | 2018-05-26T13:32:56Z
                                |
33 | user_id                      | 0d7bb3820384452abb97ec0b40c445b1
                |
   | volumes_attached             |
                                                    |
35 +------------------------------+------------------------------------------------+
```

3. 列出 instance cirros1，狀態是 ACTIVE。

```
1  [root@controller ~]# openstack server list
   +--------------------------------------+---------+--------+--------------------------+-
3  | ID                                   | Name    | Status | Networks
                    | Image  | Flavor  |
   +--------------------------------------+---------+--------+--------------------------+-
5  | bfaefe36-2310-4241-bbea-e02e1a4a482f | cirros1 | ACTIVE | selfservice
     =192.168.10.5 | cirros | m1.nano |
```

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

7.6 存取 Instance cirros

1. 載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 取得 VNC session URL，可以使用網頁開啓終端機，但這是在本機 127.0.0.1 主機上才能開啓。

```
[root@controller ~]# openstack console url show cirros1
+-------+-------------------------------------------------------------------------------
| Field | Value
    |
+-------+-------------------------------------------------------------------------------
| type  | novnc
    |
| url   | http://127.0.0.1:6080/vnc_auto.html?token=612e5260-50a6-469b
   -95d7-8e666af61101 |
+-------+-------------------------------------------------------------------------------
```

3. 列出 instance crt1-instance 及 cirros1-instance，但狀態都是 ERROR。

```
+--------------------------------------+-----------------+--------+----------+--------
| ID                                   | Name            | Status |
   Networks | Image  | Flavor |
+--------------------------------------+-----------------+--------+----------+--------
| 3fec7b0e-dabb-47da-bb41-f8ade99b3a5d | cirros1-instance | ERROR  |
            | cirros | m1.crt |
| df02f9e2-833e-44d6-b25e-556387459d0a | crt1-instance    | ERROR  |
            | crtusb | m1.crt |
+--------------------------------------+-----------------+--------+----------+--------
```

4. 刪除 instance crt1-instance 及 cirros1-instance。

```
[root@controller ~]# openstack server delete 3fec7b0e-dabb-47da-bb41-
    f8ade99b3a5d
[root@controller ~]# openstack server delete df02f9e2-833e-44d6-b25e
    -556387459d0a
[root@controller ~]# openstack server list
```

7.7 使用 provider network 新增 Instance crtusb

1. 載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 再列一次必要環境。

```
[root@controller ~]# openstack flavor list
+----+---------+------+------+-----------+-------+-----------+
| ID | Name    |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+---------+------+------+-----------+-------+-----------+
| 0  | m1.nano |   64 |    1 |         0 |     1 | True      |
| 1  | m1.crt  | 4096 |   16 |         0 |     2 | True      |
+----+---------+------+------+-----------+-------+-----------+
[root@controller ~]# openstack image list
+--------------------------------------+--------+--------+
| ID                                   | Name   | Status |
+--------------------------------------+--------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb | active |
+--------------------------------------+--------+--------+
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Subnets
                                |
+--------------------------------------+-------------+--------------------------------------
| 0b0ebcee-057b-4798-bf73-5dd449e7879a | provider    | 2a7287d7-4a4f-43
    cc-beb2-bc9c023af929 |
| 37d0dee7-d573-4f3b-863d-c92c05b6dbbb | selfservice | 36c70394-9a28-4
    cdf-bfee-9c65f4512027 |
+--------------------------------------+-------------+--------------------------------------

[root@controller ~]# openstack security group list
+--------------------------------------+---------+------------------------+------------
```

```
| ID                                   | Name    | Description
              | Project                          |
+--------------------------------------+---------+------------------------+------------

| 1f149288-87c2-43b5-a3b3-89eb153c9249 | default | Default security
   group | 92d1ec3e04384ad599c1a8f5aed73663 |
+--------------------------------------+---------+------------------------+------------
```

3. 以 flavor m1.crt, image crtusb, network selfservice, security group default 新增名爲 crt1 的 server。

```
[root@controller ~]# openstack server create --flavor m1.crt --image
   crtusb \
--nic net-id=0b0ebcee-057b-4798-bf73-5dd449e7879a --security-group
   default \
--key-name mykey crt1
+-----------------------------+------------------------------------------------+

| Field                       | Value
                                |
+-----------------------------+------------------------------------------------+

| OS-DCF:diskConfig           | MANUAL
                                |
| OS-EXT-AZ:availability_zone |
                                |
| OS-EXT-STS:power_state      | NOSTATE
                                |
| OS-EXT-STS:task_state       | scheduling
                                |
| OS-EXT-STS:vm_state         | building
                                |
| OS-SRV-USG:launched_at      | None
                                |
| OS-SRV-USG:terminated_at    | None
                                |
| accessIPv4                  |
                                |
| accessIPv6                  |
                                |
| addresses                   |
                                |
| adminPass                   | YURzGpQ8sK2r
                                |
| config_drive                |
                                |
| created                     | 2018-05-27T08:51:58Z
                                |
| flavor                      | m1.crt (1)
                                |
```

```
| hostId                       |
                                                  |
| id                           | 60da86d9-bb99-4a20-80cd-6c62581d6276
            |
| image                        | crtusb (e4bea3db-581a-472d-a0dd-37
    b1e7055bbf) |
| key_name                     | mykey
                                          |
| name                         | crt1
                                           |
| progress                     | 0
                                                 |
| project_id                   | 92d1ec3e04384ad599c1a8f5aed73663
                 |
| properties                   |
                                                  |
| security_groups              | name='1f149288-87c2-43b5-a3b3-89
    eb153c9249'    |
| status                       | BUILD
                                          |
| updated                      | 2018-05-27T08:51:58Z
                                |
| user_id                      | 0d7bb3820384452abb97ec0b40c445b1
                 |
| volumes_attached             |
                                                  |
+------------------------------+------------------------------------------------+
```

4. 列出 server，目前有兩台 VM，一台使用 selfservice network 的 cirros1，IP 爲 192.168.10.5，另一台使用 provider network 剛新增的 crt1，自動取得 IP 爲 163.17.10.115。

```
[root@controller ~]# openstack server list
+--------------------------------------+---------+--------+--------------------------+-
| ID                                   | Name    | Status | Networks
                    | Image  | Flavor  |
+--------------------------------------+---------+--------+--------------------------+-
| 60da86d9-bb99-4a20-80cd-6c62581d6276 | crt1    | ACTIVE | provider
    =163.17.10.115   | crtusb | m1.crt  |
| bfaefe36-2310-4241-bbea-e02e1a4a482f | cirros1 | ACTIVE | selfservice
    =192.168.10.5 | cirros | m1.nano |
+--------------------------------------+---------+--------+--------------------------+-
```

5. 成功 ping 163.17.10.115。

```
[root@controller ~]# ping -c3 163.17.10.115
PING 163.17.10.115 (163.17.10.115) 56(84) bytes of data.
64 bytes from 163.17.10.115: icmp_seq=1 ttl=64 time=1.65 ms
64 bytes from 163.17.10.115: icmp_seq=2 ttl=64 time=1.64 ms
64 bytes from 163.17.10.115: icmp_seq=3 ttl=64 time=7.86 ms

--- 163.17.10.115 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 1.640/3.721/7.868/2.932 ms
```

6. SSH 成功連線 163.17.10.115。

```
[root@controller ~]# ssh 163.17.10.115
The authenticity of host '163.17.10.115 (163.17.10.115)' can't be
    established.
RSA key fingerprint is SHA256:
    bVYrBjLSTxVa7SleYd3ADBhysnzIUiOyxRYbcKrckjo.
RSA key fingerprint is MD5:9e:5d:fa:d4:3c:ea:66:e4:2c:4e:46:99:ca:14:c7
    :07.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '163.17.10.115' (RSA) to the list of known
    hosts.
root@163.17.10.115's password:
[root@deyu ~]# exit
logout
Connection to 163.17.10.115 closed.
[root@controller ~]#
```

7.8 驗證

1. 載入管理者環境變變數。

```
[root@controller ~]# . admin.token
```

2. 列出 agent，確認可以使用 neutron agent。

```
[root@controller ~]# openstack network agent list
+--------------------------------------+--------------------+------------+
| ID                                   | Agent Type         | Host
        |
+--------------------------------------+--------------------+------------+
```

```
| 3eb768a6-2f98-4c71-9c92-a964677c58d8 | DHCP agent         | controller
    |
| 532abb67-c6eb-4768-92e3-722684315909 | Linux bridge agent | controller
    |
| c4d53419-f893-4139-a4eb-3dfe45a4f063 | Metadata agent     | controller
    |
+--------------------------------------+--------------------+------------+


-------------------+-------+-------+---------------------------+
 Availability Zone | Alive | State | Binary                    |
-------------------+-------+-------+---------------------------+
 nova              | :-)   | UP    | neutron-dhcp-agent        |
 None              | :-)   | UP    | neutron-linuxbridge-agent |
 None              | :-)   | UP    | neutron-metadata-agent    |
-------------------+-------+-------+---------------------------+
```

7.9 VNC Client

1. 查詢目前 instance 狀態，只有 crt2 active

```
[root@controller ~]# . demo.token
[root@controller ~]# openstack server list
+--------------------------------------+---------+---------+--------------------------
| ID                                   | Name    | Status  | Networks
                    | Image  | Flavor  |
+--------------------------------------+---------+---------+--------------------------
| 4c06d1cd-4dbf-43de-a5e3-3c5945f61ff1 | fsa1    | SHUTOFF | provider
   =163.17.10.118   | fsa    | m2.crt  |
| c92c1859-ec57-46f8-a13f-6f23edbfc761 | esm1    | SHUTOFF | provider
   =163.17.10.125   | esm    | m1.esm  |
| 84c92c8d-0b61-4269-a711-ea0a06e2f6c7 | crt2    | ACTIVE  | provider
   =163.17.10.123   | crtusb | m2.crt  |
| bfaefe36-2310-4241-bbea-e02e1a4a482f | cirros1 | SHUTOFF | selfservice
   =192.168.10.5 | cirros | m1.nano |
+--------------------------------------+---------+---------+--------------------------
```

2. 取得 crt2 的 novnc 連線網址，使用瀏覽器輸入此網址即可進入操作 console。

```
[root@controller ~]# openstack console url show 84c92c8d-0b61-4269-a711-
   ea0a06e2f6c7
+-------+-------------------------------------------------------------------------
```

```
| Field | Value

   |
+-------+-------------------------------------------------------------------------
| type  | novnc

   |
| url   | http://163.17.10.112:6080/vnc_auto.html?token=65105063-ec3c-4
   ff9-a03c-c356e238dda3 |
+-------+-------------------------------------------------------------------------
```

3. 每個 active 的 instance 都可以使用 vncviewer 連線 IP:PORT，其中 IP 爲 openstack host IP 此例爲 163.17.10.112，PORT 預設從 5900 開始。

```
[root@dyw219 ~]# vncviewer 163.17.10.112:5900
```

7.10 Snapshot

1. 取得 demo 的令牌

```
[root@controller ~]# source demo.token
```

2. 查看 instance

```
[root@controller ~]# openstack server list
+--------------------------------------+--------------+---------+-----------------
| ID                                   | Name         | Status  |
   Networks                 | Image    | Flavor  |
+--------------------------------------+--------------+---------+-----------------
| 7cefeb1d-e5aa-4588-9bf4-25ab9664682f | gitlab       | ACTIVE  |
   provider=163.17.10.122   | kvm7-14g | m1.crt  |
| 2071879e-e2ae-4daa-9c97-6212d0b7fd9b | kvm7-centos7 | ACTIVE  |
   provider=163.17.10.116   | kvm7     | m1.crt  |
| 4c06d1cd-4dbf-43de-a5e3-3c5945f61ff1 | fsa1         | SHUTOFF |
   provider=163.17.10.118   | fsa      | m2.crt  |
| c92c1859-ec57-46f8-a13f-6f23edbfc761 | esm1         | SHUTOFF |
   provider=163.17.10.125   | esm      | m1.esm  |
| 84c92c8d-0b61-4269-a711-ea0a06e2f6c7 | crt2         | SHUTOFF |
   provider=163.17.10.123   | crtusb   | m2.crt  |
```

```
| bfaefe36-2310-4241-bbea-e02e1a4a482f | cirros1      | SHUTOFF |
   selfservice=192.168.10.5 | cirros   | m1.nano |
+--------------------------------------+-------------+---------+----------------------
```

3. 產生 gitlab 的 snapshot

```
[root@controller ~]# openstack server image create --name gitlab
   -20181121.qcow2 gitlab
+------------------+------------------------------------------------------+
| Field            | Value
                                                  |
+------------------+------------------------------------------------------+
| checksum         | None
                                                  |
| container_format | None
                                                  |
| created_at       | 2018-11-21T08:58:12Z
                                  |
| disk_format      | None
                                                  |
| file             | /v2/images/2e3d968a-57b5-4748-a95f-66a09cdc4c02/
   file    |
| id               | 2e3d968a-57b5-4748-a95f-66a09cdc4c02
     |
| min_disk         | 16
                                                    |
| min_ram          | 0
                                                     |
| name             | gitlab-20181121.qcow2
                                 |
| owner            | 92d1ec3e04384ad599c1a8f5aed73663
        |
| properties       | base_image_ref='95544249-56c6-4b30-91db-0
   f7d05f4d695',' |
| protected        | False
                                                  |
| schema           | /v2/schemas/image
                                |
| size             | None
                                                  |
| status           | queued
                                                |
| tags             |
                                                     |
| updated_at       | 2018-11-21T08:58:12Z
                                  |
| virtual_size     | None
                                                  |
```

```
| visibility       | private                                                  |
+------------------+----------------------------------------------------------+
```

4. 列出 image，出現新建立的 gitlab-20181121.qcow2。

```
[root@controller ~]# openstack image list
+--------------------------------------+------------------------+--------+
| ID                                   | Name                   | Status |
+--------------------------------------+------------------------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros                 | active |
| ba1684d2-def8-4325-a2a4-ab7689baf0ab | crt2-20191002          | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb                 | active |
| be9ab170-d0b4-46ec-8eda-e073b03f00a0 | esm                    | active |
| 5c7046c9-9196-4668-a7e3-50acaf32d41f | fsa                    | active |
| 2e3d968a-57b5-4748-a95f-66a09cdc4c02 | gitlab-20181121.qcow2  | active |
| 609332b6-0440-4606-8981-8b4732c893bc | kvm7                   | active |
| 95544249-56c6-4b30-91db-0f7d05f4d695 | kvm7-14g               | active |
+--------------------------------------+------------------------+--------+
```

5. 刪除新建立的 gitlab-20181121.qcow2。

```
[root@controller ~]# openstack image delete 2e3d968a-57b5-4748-a95f-66
    a09cdc4c02
[root@controller ~]# openstack image list
+--------------------------------------+---------------+--------+
| ID                                   | Name          | Status |
+--------------------------------------+---------------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros        | active |
| ba1684d2-def8-4325-a2a4-ab7689baf0ab | crt2-20191002 | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb        | active |
| be9ab170-d0b4-46ec-8eda-e073b03f00a0 | esm           | active |
| 5c7046c9-9196-4668-a7e3-50acaf32d41f | fsa           | active |
| 609332b6-0440-4606-8981-8b4732c893bc | kvm7          | active |
| 95544249-56c6-4b30-91db-0f7d05f4d695 | kvm7-14g      | active |
+--------------------------------------+---------------+--------+
```

6. 重新產生 gitlab 的 snapshot gitlab-20181121。

```
[root@controller ~]# openstack server image create --name gitlab
    -20181121 gitlab
+------------------+------------------------------------------------------+
| Field            | Value                                                |
+------------------+------------------------------------------------------+
| checksum         | None                                                 |
| container_format | None                                                 |
| created_at       | 2018-11-21T09:16:30Z                                 |
| disk_format      | None                                                 |
| file             | /v2/images/0e608ed1-70ac-4f39-a001-810b9eb181fa/
    file     |
| id               | dc6f8495-0f44-4502-8812-5f8e6b1bdf77                 |
| min_disk         | 16                                                   |
| min_ram          | 0                                                    |
| name             | gitlab-20181121                                      |
| owner            | 92d1ec3e04384ad599c1a8f5aed73663                     |
| properties       | base_image_ref='95544249-56c6-4b30-91db-0
    f7d05f4d695', ' |
| protected        | False                                                |
| schema           | /v2/schemas/image                                    |
| size             | None                                                 |
| status           | queued                                               |
| tags             |                                                      |
| updated_at       | 2018-11-21T09:16:30Z                                 |
| virtual_size     | None                                                 |
| visibility       | private                                              |
+------------------+------------------------------------------------------+
```

7. 列出 image，出現新建立的 gitlab-20181121，狀態 queued。

```
[root@controller ~]# openstack image list
+--------------------------------------+-----------------+--------+
| ID                                   | Name            | Status |
+--------------------------------------+-----------------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros          | active |
| ba1684d2-def8-4325-a2a4-ab7689baf0ab | crt2-20191002   | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb          | active |
| be9ab170-d0b4-46ec-8eda-e073b03f00a0 | esm             | active |
| 5c7046c9-9196-4668-a7e3-50acaf32d41f | fsa             | active |
| dc6f8495-0f44-4502-8812-5f8e6b1bdf77 | gitlab-20181121 | queued |
| 609332b6-0440-4606-8981-8b4732c893bc | kvm7            | active |
| 95544249-56c6-4b30-91db-0f7d05f4d695 | kvm7-14g        | active |
+--------------------------------------+-----------------+--------+
```

8. 稍後再列出 image，出現新建立的 gitlab-20181121，狀態 active。

```
[root@controller ~]# openstack image list
+--------------------------------------+-----------------+--------+
| ID                                   | Name            | Status |
+--------------------------------------+-----------------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros          | active |
| ba1684d2-def8-4325-a2a4-ab7689baf0ab | crt2-20191002   | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb          | active |
| be9ab170-d0b4-46ec-8eda-e073b03f00a0 | esm             | active |
| 5c7046c9-9196-4668-a7e3-50acaf32d41f | fsa             | active |
| dc6f8495-0f44-4502-8812-5f8e6b1bdf77 | gitlab-20181121 | active |
| 609332b6-0440-4606-8981-8b4732c893bc | kvm7            | active |
| 95544249-56c6-4b30-91db-0f7d05f4d695 | kvm7-14g        | active |
+--------------------------------------+-----------------+--------+
```

9. 將新建立的 gitlab-20181121 image 存檔 /usr/src/gitlab-20181121.img，大小 7.3G。

```
[root@controller ~]# openstack image save --file /usr/src/gitlab
    -20181121.img gitlab-20181121
[root@controller ~]# ll -h /usr/src/gitlab-20181121.img
-rw-r--r--. 1 root root 7.3G Nov 21 17:32 /usr/src/gitlab-20181121.img
```

7.11 Image 及 instance 刪除

1. 取得 demo 的令牌

```
[root@controller ~]# source demo.token
```

2. 查看 instance

```
[root@controller ~]# openstack server list
+--------------------------------------+-------------+--------+-----------------------
| ID                                   | Name        | Status |
  Networks                  | Image    | Flavor |
+--------------------------------------+-------------+--------+-----------------------
| 7b50da3e-1895-460d-b9aa-325c66931631 | win7-test1  | SHUTOFF |
  selfservice=192.168.10.11 | win7     | m1.crt |
| bfaefe36-2310-4241-bbea-e02e1a4a482f | cirros1     | SHUTOFF |
  selfservice=192.168.10.5  | cirros   | m1.nano |
+--------------------------------------+-------------+--------+-----------------------
```

3. 刪除 instance win7-test1

```
[root@controller ~]# openstack server delete win7-test1
[root@controller ~]# openstack server list
+--------------------------------------+-------------+--------+-----------------------

| ID                                   | Name        | Status |
  Networks                  | Image    | Flavor |
+--------------------------------------+-------------+--------+-----------------------

| bfaefe36-2310-4241-bbea-e02e1a4a482f | cirros1     | SHUTOFF |
  selfservice=192.168.10.5  | cirros   | m1.nano |
+--------------------------------------+-------------+--------+-----------------------
```

4. 取得 admin 的令牌

```
[root@controller ~]# source admin.token
```

5. 列出 images

```
[root@controller ~]# openstack image list
+--------------------------------------+-----------------+--------+
| ID                                   | Name            | Status |
+--------------------------------------+-----------------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros          | active |
| ba1684d2-def8-4325-a2a4-ab7689baf0ab | crt2-20191002   | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb          | active |
| be9ab170-d0b4-46ec-8eda-e073b03f00a0 | esm             | active |
| 5c7046c9-9196-4668-a7e3-50acaf32d41f | fsa             | active |
| dc6f8495-0f44-4502-8812-5f8e6b1bdf77 | gitlab-20181121 | active |
| 609332b6-0440-4606-8981-8b4732c893bc | kvm7            | active |
| 95544249-56c6-4b30-91db-0f7d05f4d695 | kvm7-14g        | active |
| c2e0bf58-c685-449d-bfb2-4d16c7d9567e | win7            | active |
+--------------------------------------+-----------------+--------+
```

6. 刪除 image win7

```
[root@controller ~]# openstack image delete win7
```

7. 列出所有 images，win7 已刪除。

```
[root@controller ~]# openstack image list
+--------------------------------------+-----------------+--------+
| ID                                   | Name            | Status |
+--------------------------------------+-----------------+--------+
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros          | active |
| ba1684d2-def8-4325-a2a4-ab7689baf0ab | crt2-20191002   | active |
| e4bea3db-581a-472d-a0dd-37b1e7055bbf | crtusb          | active |
| be9ab170-d0b4-46ec-8eda-e073b03f00a0 | esm             | active |
| 5c7046c9-9196-4668-a7e3-50acaf32d41f | fsa             | active |
| dc6f8495-0f44-4502-8812-5f8e6b1bdf77 | gitlab-20181121 | active |
| 609332b6-0440-4606-8981-8b4732c893bc | kvm7            | active |
| 95544249-56c6-4b30-91db-0f7d05f4d695 | kvm7-14g        | active |
+--------------------------------------+-----------------+--------+
```

Chapter 8

Dashboard

8.1 安裝與設定

1. 安裝 openstack-dashboard 套件。

```
[root@controller ~]# yum install openstack-dashboard
```

2. 編輯設定檔 /etc/openstack-dashboard/local_settings。

```
[root@controller ~]# vim /etc/openstack-dashboard/local_settings
```

3. 設定允許所有 IP 存取 dashboard，dashboard 主機在 controoler，其中 163.17.10. 表示接受 163.17.10.xxx IP，另 controller IP 163.17.10.112 一定要加入，否則將無法存取。

```
[root@controller ~]# egrep '^(OPENSTACK_HOST|ALLOWED_HOSTS)'  /etc/
    openstack-dashboard/local_settings
ALLOWED_HOSTS = ['.cyut.edu.tw', 'localhost']
ALLOWED_HOSTS = ['163.17.27.219', '163.17.10.', 'localhost', '
    163.17.10.112']

OPENSTACK_HOST = "controller"
```

4. 設定 memcached session 儲存服務。

```
[root@controller ~]# egrep -A6 '^SESSION_ENGINE'  /etc/openstack-
    dashboard/local_settings
SESSION_ENGINE = 'django.contrib.sessions.backends.cache'
CACHES = {
```

```
    'default': {
        'BACKEND': 'django.core.cache.backends.memcached.MemcachedCache'
            ,
        'LOCATION': 'controller:11211',
    },
}
```

5. 啓動 Identity API version 3，支援 multidomain，預設 doamin 爲 default，預設 role 爲 user。

```
[root@controller ~]# egrep '^OPENSTACK_KEYSTONE_'  /etc/openstack-
    dashboard/local_settings
OPENSTACK_KEYSTONE_MULTIDOMAIN_SUPPORT = True
OPENSTACK_KEYSTONE_DEFAULT_DOMAIN = 'Default'
OPENSTACK_KEYSTONE_URL = "http://%s:5000/v3" % OPENSTACK_HOST
OPENSTACK_KEYSTONE_DEFAULT_ROLE = "user"
OPENSTACK_KEYSTONE_BACKEND = {
```

6. API 版本。

```
[root@controller ~]# egrep -A4 '^OPENSTACK_API_VERSIONS'  /etc/openstack
    -dashboard/local_settings
OPENSTACK_API_VERSIONS = {
    "identity": 3,
    "image": 2,
    "volume": 2,
}
```

7. 網路設定。

```
[root@controller ~]# egrep -A8 '^OPENSTACK_NEUTRON_NETWORK'  /etc/
    openstack-dashboard/local_settings
OPENSTACK_NEUTRON_NETWORK = {
    'enable_router': False,
    'enable_quotas': False,
    'enable_distributed_router': False,
    'enable_ha_router': False,
    'enable_lb': False,
    'enable_firewall': False,
    'enable_vpn': False,
    'enable_fip_topology_check': False,
```

8. 設定時區 Asia/Taipei。

```
[root@controller ~]# egrep '^TIME_ZONE'  /etc/openstack-dashboard/
    local_settings
TIME_ZONE = "Asia/Taipei"
```

9. 重新啓動 httpd 及 memcached 服務。

```
[root@controller ~]# systemctl restart httpd.service memcached.service
```

8.2 NOVNC 設定

1. 設定 novncproxy url。

```
[root@controller ~]# vim /etc/nova/nova.conf
[root@controller ~]# grep ^novncproxy /etc/nova/nova.conf
novncproxy_base_url=http://163.17.10.112:6080/vnc_auto.html
```

2. 重新啓動服務。

```
[root@controller ~]#  systemctl restart openstack-nova-novncproxy.
    service \
openstack-nova-compute.service openstack-nova-console.service
```

8.3 Firewall

1. Dashboard vnc console 的 6080/tcp 必須開啓。

```
[root@controller ~]# firewall-cmd --permanent --add-port=6080/tcp
success
[root@controller ~]# firewall-cmd --permanent --add-port=5900/tcp
success
[root@controller ~]# firewall-cmd --reload
success
```

2. Dashboard 開啓 instance console 進行 SSH 連線，所以必須確認防火牆有開啓 ssh 服務。

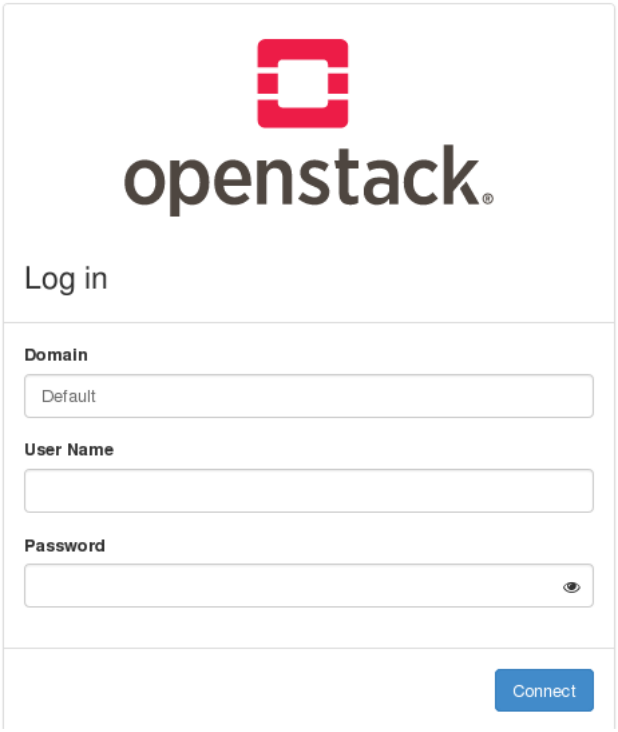
```
[root@controller ~]# firewall-cmd --add-service=ssh
success
[root@controller ~]# firewall-cmd --add-service=ssh --permanent
success
```

3. 查詢目前的 firewall。

```
[root@controller ~]# firewall-cmd --list-all
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: em2
  sources:
  services: dhcpv6-client https http ssh
  ports: 6080/tcp 5900/tcp
  protocols:
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
```

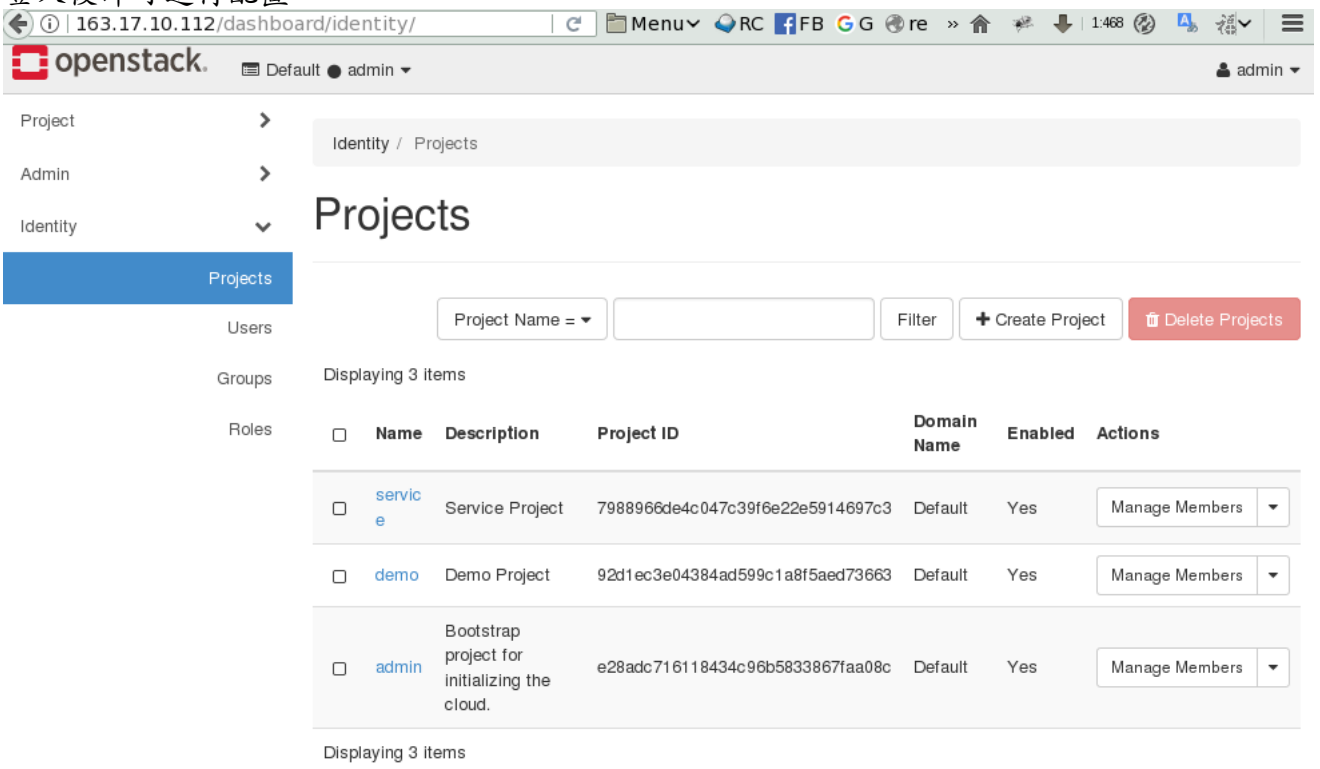
8.4 測試

1. 使用瀏覽器連到 http://163.17.10.112/dashboard，出現畫面如下：



2. 管理者帳號爲 admin，密碼是 keystone 安裝時設定。

3. 登入後即可進行配置



8.5 除錯

1. dashboard 登入畫面沒有 domain 可選，無法登入，檢查 memcached 服務啓動失敗。



```
[root@controller ~]# systemctl status memcached.service
  memcached.service - memcached daemon
   Loaded: loaded (/usr/lib/systemd/system/memcached.service; enabled;
       vendor preset: disabled)
   Active: failed (Result: exit-code) since Tue 2018-09-18 19:34:49 CST;
        5s ago
  Process: 177450 ExecStart=/usr/bin/memcached -p ${PORT} -u ${USER} -m
     ${CACHESIZE}
-c ${MAXCONN} $OPTIONS (code=exited, status=71)
 Main PID: 177450 (code=exited, status=71)

Sep 18 19:34:49 controller systemd[1]: Started memcached daemon.
Sep 18 19:34:49 controller systemd[1]: Starting memcached daemon...
Sep 18 19:34:49 controller memcached[177450]: bind(): Cannot assign
    requested address
Sep 18 19:34:49 controller memcached[177450]: failed to listen on TCP
    port 11211:
Cannot assign requested address
Sep 18 19:34:49 controller systemd[1]: memcached.service: main process
    exited,
code=exited, status=71/n/a
Sep 18 19:34:49 controller systemd[1]: Unit memcached.service entered
    failed state.
Sep 18 19:34:49 controller systemd[1]: memcached.service failed.
```

2. /usr/bin/memcached 執行命令的參數在 /etc/sysconfig/memcached

```
[root@controller ~]# cat /etc/sysconfig/memcached
PORT="11211"
USER="memcached"
MAXCONN="1024"
CACHESIZE="64"
OPTIONS="-l 163.17.10.112,::1"
```

3. 問題出在 /etc/sysconfig/memcached 中 OPTIONS 參數不對，修改如下：

```
[root@controller ~]# grep OPTION /etc/sysconfig/memcached
OPTIONS="-l 163.17.10.112"
```

4. 重新啓動 memcached 服務，狀態正常。

```
[root@controller ~]# systemctl restart memcached.service
[root@controller ~]# systemctl status memcached.service
  memcached.service - memcached daemon
   Loaded: loaded (/usr/lib/systemd/system/memcached.service; enabled;
       vendor preset: disabled)
```

```
   Active: active (running) since Tue 2018-09-18 19:40:44 CST; 4s ago
 Main PID: 178062 (memcached)
    Tasks: 10
   CGroup: /system.slice/memcached.service
           178062 /usr/bin/memcached -p 11211 -u memcached -m 64 -c
             1024 -l 163.17.10.112

Sep 18 19:40:44 controller systemd[1]: Started memcached daemon.
Sep 18 19:40:44 controller systemd[1]: Starting memcached daemon...
```

8.6 Instance Console

1. 當 Instance 開機卡住或網路無法連線時，必須開啓 Instance 的 vnc console 進行除錯，不用登入 dashboard，先查詢 Instance 的 console url 直接連線 vnc。

```
[root@ip111 ~]# openstack console url show dy.m5
+-------+-------------------------------------------------------------------+

| Field | Value
   |
+-------+-------------------------------------------------------------------+

| type  | novnc
   |
| url   | http://163.17.10.111:6080/vnc_auto.html?token=d3bc1406-05122a
   |
+-------+-------------------------------------------------------------------+
```

Chapter 9

Server Resize/Rebuild

9.1 nova 配置

1. instance 管理，先載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. openstack nova.conf 配置預設不允許 resize instance，執行 resize 後 instance 狀態不會變成 RESIZE，所以進行 confirm 確認時會出現以下錯誤訊息：

```
[root@ip110 ~]<demo># openstack server resize --confirm DYW_Master
Cannot 'confirmResize' instance a5f03d78-4436-4c0e-ad24-4dc0a6553700
    while it is in
vm_state active (HTTP 409) (Request-ID: req-3f94c054-2bc2-4676-bd8f-5
    b2b7dd668ce)
```

3. 編輯 nova.conf 配置檔，加入三項：

   (a) `allow_resize_to_same_host`：允許 resize instance 主機

   (b) `resize_confirm_window`：自動確認時間間隔，如果設定，則可不用執行 confirm 進行確認。

   (c) `scheduler_default_filters`：排程器設定爲 AllHostsFilter。

```
[root@ip110 ~]<demo># vim /etc/nova/nova.conf
[root@ip110 ~]<demo># egrep 'resize|Filter' /etc/nova/nova.conf
allow_resize_to_same_host=true
resize_confirm_window=5
scheduler_default_filters = AllHostsFilter
```

4. 重新啓動 openstack-nova-api 服務。

```
[root@ip110 ~]<demo># systemctl restart openstack-nova-api.service
```

9.2 Resize 命令

1. 查詢 openstack server resize 輔助說明。

```
[root@ip110 ~]<demo># openstack help server resize
usage: openstack server resize [-h] [--flavor <flavor> | --confirm | --
    revert]
                               [--wait]
                               <server>

Scale server to a new flavor. A resize operation is implemented by
    creating a
new server and copying the contents of the original disk into a new one.
     It is
also a two-step process for the user: the first is to perform the resize
    , the
second is to either confirm (verify) success and release the old server,
     or to
declare a revert to release the new server and restart the old one.

positional arguments:
  <server>            Server (name or ID)

optional arguments:
  -h, --help          show this help message and exit
  --flavor <flavor>   Resize server to specified flavor
  --confirm           Confirm server resize is complete
  --revert            Restore server state before resize
  --wait              Wait for resize to complete
```

9.3 Resize

1. 列印目前 server DYW_Master 使用的 flavor 爲 fv_DYW。

```
[root@ip110 ~]<demo># openstack server list
```

```
+--------------------------------------+------------+--------+----------+--------+---
| ID                                   | Name       | Status | Networks
     | Image  | Flavor |
+--------------------------------------+------------+--------+----------+--------+---
| a5f03d78-4436-4c0e-ad24-4dc0a6553700 | DYW_Master | SHUTOFF | provider
   = | dyw2   | fv_DYW |
+--------------------------------------+------------+--------+----------+--------+---
```

2. 查詢 flavor，fv_DYW disk 16G, RAM 2G。

```
[root@ip110 ~]<demo># openstack flavor list
+----+-----------+------+------+-----------+-------+-----------+
| ID | Name      |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+-----------+------+------+-----------+-------+-----------+
| 0  | fv_cirros |   64 |    1 |         0 |     1 | True      |
| 1  | dyw.ce8   | 4096 |   30 |         0 |     2 | True      |
| 2  | fv_Win10  | 8192 |   30 |         0 |     4 | True      |
| 3  | fv_DYW    | 2048 |   16 |         0 |     2 | True      |
+----+-----------+------+------+-----------+-------+-----------+
```

3. Server DYW_Master resize 成 flavor dyw.ce8，也就是 Disk 30G, RAM 4G。

```
[root@ip110 ~]<demo># openstack server resize --flavor dyw.ce8
   DYW_Master
```

4. 執行 resize 後，server DYW_Master 狀態進入 VERIFY_RESIZE，使用的 falvor 已改成 dyw.ce8。

```
[root@ip110 ~]<demo># openstack server show DYW_Master
+----------------------------+-------------------------------------------------------
| Field                      | Value
                                                    |
+----------------------------+-------------------------------------------------------
| OS-DCF:diskConfig          | MANUAL
                                                   |
| OS-EXT-AZ:availability_zone | nova
                                                     |
| OS-EXT-STS:power_state     | Running
                                                  |
| OS-EXT-STS:task_state      | None
                                                     |
```

```
| OS-EXT-STS:vm_state          | resized
                                                  |
| OS-SRV-USG:launched_at       | 2020-05-28T07:58:53.000000
                                    |
| OS-SRV-USG:terminated_at     | None
                                                       |
| accessIPv4                   |
                                                          |
| accessIPv6                   |
                                                          |
| addresses                    | provider=163.17.10.138
                                          |
| config_drive                 |
                                                          |
| created                      | 2019-09-22T22:55:39Z
                                                  |
| flavor                       | dyw.ce8 (1)
                                                |
| hostId                       | 71
    c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
| id                           | a5f03d78-4436-4c0e-ad24-4dc0a6553700
                          |
| image                        | dyw2snapshot (6822eb82-0147-4422-a244-4
    b0768eba52b)      |
| key_name                     | rsa_key
                                                  |
| name                         | DYW_Master
                                                     |
| progress                     | 0
                                                          |
| project_id                   | 0abfdfea73d142d08192aab5cc051642
                                |
| properties                   |
                                                          |
| security_groups              | name='default'
                                                 |
| status                       | VERIFY_RESIZE
                                                    |
| updated                      | 2020-05-28T07:58:53Z
                                                  |
| user_id                      | fdae41299d574ea59fc26bef4793885b
                                |
| volumes_attached             |
                                                          |
+------------------------------+-----------------------------------------------------------
```

5. 因爲已設定 resize_confirm_window=5：自動確認時間間隔爲 5 秒，可不用執行 confirm 進行確認。

```
[root@ip110 ~]<demo># openstack server resize --confirm DYW_Master
```

6. Confirm 確認後，server `DYW_Master` 狀態進入 `ACTIVE`。

```
[root@ip110 ~]<demo># openstack server show DYW_Master
+------------------------------+------------------------------------------------------------
| Field                        | Value
                                                 |
+------------------------------+------------------------------------------------------------
| OS-DCF:diskConfig            | MANUAL
                                               |
| OS-EXT-AZ:availability_zone  | nova
                                                   |
| OS-EXT-STS:power_state       | Running
                                             |
| OS-EXT-STS:task_state        | None
                                                   |
| OS-EXT-STS:vm_state          | active
                                               |
| OS-SRV-USG:launched_at       | 2020-05-28T07:58:53.000000
                                   |
| OS-SRV-USG:terminated_at     | None
                                                   |
| accessIPv4                   |
                                                             |
| accessIPv6                   |
                                                             |
| addresses                    | provider=163.17.10.138
                                       |
| config_drive                 |
                                                             |
| created                      | 2019-09-22T22:55:39Z
                                           |
| flavor                       | dyw.ce8 (1)
                                                         |
| hostId                       | 71
   c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
| id                           | a5f03d78-4436-4c0e-ad24-4dc0a6553700
                         |
| image                        | dyw2snapshot (6822eb82-0147-4422-a244-4
   b0768eba52b)        |
| key_name                     | rsa_key
                                             |
| name                         | DYW_Master
                                         |
| progress                     | 0
                                                          |
| project_id                   | 0abfdfea73d142d08192aab5cc051642
                            |
| properties                   |
```

```
| security_groups             | name='default'
27 | status                      | ACTIVE
| updated                     | 2020-05-28T08:01:13Z
29 | user_id                     | fdae41299d574ea59fc26bef4793885b
| volumes_attached            |
31 +-----------------------------+-----------------------------------------------------------
```

9.4 snapshot 問題

1. Instance dyw.1 resize。

```
1 [root@ip110 ~]# . demo.token
[root@ip110 ~]<demo># openstack server resize --flavor dyw.ce8 dyw.1
```

2. 錯誤訊息是 image 有 snapshot，無法 resize。

```
[root@ip110 ~]<demo># openstack server show dyw.1
2 +-----------------------------+-----------------------------------------------------------

| Field                       | Value
4 +-----------------------------+-----------------------------------------------------------

| OS-DCF:diskConfig           | MANUAL
6 | OS-EXT-AZ:availability_zone | nova
| OS-EXT-STS:power_state      | Running
8 | OS-EXT-STS:task_state       | None
| OS-EXT-STS:vm_state         | error
10 | OS-SRV-USG:launched_at      | 2020-06-20T07:40:39.000000
| OS-SRV-USG:terminated_at    | None
12 | accessIPv4                  |
```

```
| accessIPv6                   |
                                                                  |
14 | addresses                    | selfservice=192.168.10.19
                                     |
   | config_drive                 |
                                                                  |
16 | created                      | 2019-09-22T22:45:48Z
                                            |
   | fault                        | {u'message': u'Unexpected error while
     running command.\n
18                                 Command: qemu-img resize /var/lib/nova/
                                       instances/
                                   29627608-17a4-48dc-9247-631e46e15ece/
                                       disk 32212254720\n
20                                 Exit code: 1\nStdout: u\'\'\nStderr: u"
                                       qemu-img: Can\'t
                                   resize an image which has snapshots\\n"
                                       ', u'code': 500,
22                                 u'created': u'2020-06-20T07:43:45Z'}
   | flavor                       | dyw.csa (3)
                                                  |
24 | hostId                       | 71
     c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
   | id                           | 29627608-17a4-48dc-9247-631e46e15ece
                            |
26 | image                        | dyw.csa8 (450e4793-19c2-421f-a60a-
     bd44518bc259)          |
   | key_name                     | rsa_key
                                                |
28 | name                         | dyw.1
                                                  |
   | project_id                   | 0abfdfea73d142d08192aab5cc051642
                             |
30 | properties                   | hw:passwd='85c04ca9', hw:port='5903'
                           |
   | security_groups              | name='default'
                                          |
32 | status                       | ERROR
                                                |
   | updated                      | 2020-06-20T10:22:58Z
                                           |
34 | user_id                      | fdae41299d574ea59fc26bef4793885b
                            |
   | volumes_attached             |
                                                                  |
36 +------------------------------+------------------------------------------------------------
```

3. 查詢 dyw.1 的 image，確實有 snapshot。

```
[root@ip110 ~]<demo># qemu-img info /var/lib/nova/instances/29627608-17
    a4-48dc-9247-631e46e15ece/disk
```

```
image: /var/lib/nova/instances/29627608-17a4-48dc-9247-631e46e15ece/disk
file format: qcow2
virtual size: 16G (17179869184 bytes)
disk size: 7.8G
cluster_size: 65536
backing file: /var/lib/nova/instances/_base/1058359
    c3f7c027c8cdca0b2c0c75b0789fd7d84
Snapshot list:
ID        TAG                 VM SIZE                DATE       VM CLOCK
2         Original                0 2020-05-20 17:55:58   00:00:00.000
Format specific information:
    compat: 1.1
    lazy refcounts: false
    refcount bits: 16
    corrupt: false
```

4. 刪除 snapshot，2 是 snapshot 的 ID，但無法寫入。

```
[root@ip110 ~]<demo># qemu-img snapshot -d 2 \
 /var/lib/nova/instances/29627608-17a4-48dc-9247-631e46e15ece/disk
qemu-img: Could not open '/var/lib/nova/instances/29627608-17a4-48dc
-9247-631e46e15ece/disk': Failed to get "write" lock
Is another process using the image?
```

5. dyw.1 關機，再刪除 snapshot。

```
[root@ip110 ~]<demo># openstack server stop dyw.1
[root@ip110 ~]<demo># qemu-img snapshot -d 2 \
/var/lib/nova/instances/29627608-17a4-48dc-9247-631e46e15ece/disk
```

6. 查詢 disk 已無 snapshot。

```
[root@ip110 ~]<demo># qemu-img info \
/var/lib/nova/instances/29627608-17a4-48dc-9247-631e46e15ece/disk
image: /var/lib/nova/instances/29627608-17a4-48dc-9247-631e46e15ece/disk
file format: qcow2
virtual size: 16G (17179869184 bytes)
disk size: 6.5G
cluster_size: 65536
backing file: /var/lib/nova/instances/_base/1058359
    c3f7c027c8cdca0b2c0c75b0789fd7d84
Format specific information:
    compat: 1.1
    lazy refcounts: false
    refcount bits: 16
    corrupt: false
```

7. 重新啓動 dyw.1。

```
[root@ip110 ~]<demo># openstack server reboot --hard dyw.1
```

8. 使用 flavor dyw.ce8，resize dyw.1。

```
[root@ip110 ~]<demo># openstack server resize --wait --flavor dyw.ce8
    dyw.1
Complete
clean_up ResizeServer:
END return value: 0
```

9. 查詢 dyw.1 的 flavor 已改成 dyw.ce8。

```
[root@ip110 ~]<demo># openstack server list --name dyw.1$ \
-cName -cFlavor -cImage -cStatus
+-------+--------+----------+---------+
| Name  | Status | Image    | Flavor  |
+-------+--------+----------+---------+
| dyw.1 | ACTIVE | dyw.csa8 | dyw.ce8 |
+-------+--------+----------+---------+
```

9.5 遠端節點

1. Instance dyw.31 在節點 ip111，resize 時看似正常，沒有錯誤訊息。

```
[root@ip110 ~]# . demo.token
[root@ip110 ~]<demo># openstack server resize --flavor dyw.ce8 dyw.31
```

2. 查詢 server dyw.31，使用的 Flavor 還是 dyw.csa。

```
[root@ip110 ~]<demo># openstack server list --name dyw.31 \
-cName -cFlavor -cImage -cStatus
+--------+--------+----------+---------+
| Name   | Status | Image    | Flavor  |
+--------+--------+----------+---------+
| dyw.31 | ACTIVE | dyw.csa8 | dyw.csa |
```

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

3. 原因爲控制端 ip110 的用户 nova，必須可以免密碼 ssh 登入節點端 nova@ip111，修改 ip110 及 ip111 的用户使用 shell /bin/bash 。

```
[root@ip110 ~]<demo># usermod -s /bin/bash nova
[root@ip110 ~]<demo># getent passwd nova
nova:x:162:162:OpenStack Nova Daemons:/var/lib/nova:/bin/bash

[root@ip111 ~]# usermod -s /bin/bash nova
[root@ip111 ~]# getent passwd nova
nova:x:162:162:OpenStack Nova Daemons:/var/lib/nova:/bin/bash
```

4. 參考 ssh 免密碼文件，設計 nova@ip110 可以免密碼登入 nova@ip111。

```
[root@ip110 ~]<demo># su - nova
Last login: Sat Jun 20 20:34:26 CST 2020 on pts/0
-bash-4.2$ ssh nova@ip111
Last login: Sat Jun 20 20:34:28 2020 from 163.17.10.110
-bash-4.2$ logout
Connection to ip111 closed.
-bash-4.2$ logout
[root@ip110 ~]<demo>#
```

5. 控制端 ip110 目錄 /usr/lib/python2.7/site-packages/nova/virt/libvirt/ 下，driver.py 及 config.py 修改過，節點 ip111 也必須做一樣的修改，複製這兩個檔到 ip111。

```
[root@ip110 ~]<demo># cd /usr/lib/python2.7/site-packages/nova/virt/
    libvirt/
[root@ip110 libvirt]<demo># scp driver.py driver.py ip111:`pwd`/
driver.py                                     100%  395KB  94.3MB/s
    00:00
driver.py                                     100%  395KB 100.8MB/s
    00:00
```

6. 節點 ip111 重新啓動 openstack-nova-computer 服務。

```
[root@ip111 ~]# systemctl restart openstack-nova-compute.service
```

7. resize instance dyw.30 使用 flavor dyw.ce8。

```
[root@ip110 ~]<demo># openstack server resize --wait --flavor dyw.ce8
    dyw.30
Complete
clean_up ResizeServer:
END return value: 0
```

8. instance dyw.30 成功 resize，使用 flavor dyw.ce8。

```
[root@ip110 ~]<demo># openstack server list --name dyw.30 -cName -
    cFlavor -cImage -cStatus
+--------+--------+----------+---------+
| Name   | Status | Image    | Flavor  |
+--------+--------+----------+---------+
| dyw.30 | ACTIVE | dyw.csa8 | dyw.ce8 |
+--------+--------+----------+---------+
```

9.6 Rebuild

1. instance 管理，先載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 查詢可用 images。

```
[root@controller ~]# openstack image list
+--------------------------------------+-----------+--------+
| ID                                   | Name      | Status |
+--------------------------------------+-----------+--------+
| 1f455ef9-1969-4816-a4c4-8a43e47d7f1c | c8.28t    | active |
| 5bb44bde-d1e8-4937-b0fc-d3cdab6929c5 | cirros    | active |
| 5329f9cd-7471-48fa-b469-37050fe79879 | crt30g1   | active |
| 46d2fd8b-7535-432b-85ed-4ab1a99d0942 | crtv8     | active |
| 2d4d5ee3-2d22-4fa8-8e5f-836bc60a8c38 | kvm7-dhcp | active |
| a9046231-69ea-4d88-8ca6-9a4889b36702 | kvm8      | active |
+--------------------------------------+-----------+--------+
```

3. 查詢 server crtv8.1，使用的 image 是空白，表示原用 image 已刪除，不存在了。

```
[root@controller ~]# openstack server list --name crtv8.1 -c Name -c
    Image -c Flavor
+---------+-------+--------+
| Name    | Image | Flavor |
+---------+-------+--------+
| crtv8.1 |       | m2.crt |
+---------+-------+--------+
```

4. server crtv8.1 rebuild 爲 c8.28t。

```
[root@controller ~]# openstack server rebuild --image c8.28t --wait
    crtv8.1
```

5. 再查詢 server crtv8.1，使用的 image 已改成 c8.28t。

```
[root@controller ~]# openstack server list --name crtv8.1 -c Name -c
    Image -c Flavor
+---------+--------+--------+
| Name    | Image  | Flavor |
+---------+--------+--------+
| crtv8.1 | c8.28t | m2.crt |
+---------+--------+--------+
```

9.7 Resize 問題

1. resize 時出現以下錯誤訊息：

```
[root@controller ~]# openstack server resize --flavor m4.crt crtv8
No valid host was found. No valid host found for resize (HTTP 400) ...
```

2. 查詢紀錄檔沒有足夠的 hosts 可用。

```
[root@controller ~]# grep -i 'not enough' -R /var/log/nova/
/var/log/nova/nova-conductor.log:..... NoValidHost_Remote: \
No valid host was found. There are not enough hosts available.
```

3. 原因爲硬碟空間、CPU 或記憶體。

```
[root@controller ~]# grep -i 'not enough' -R /var/log/nova/
/var/log/nova/nova-conductor.log:..... NoValidHost_Remote: \
No valid host was found. There are not enough hosts available.
```

4. 解決方式：若沒有實體空間或記憶體可調整，可更改 nova 設定硬碟空間、CPU 及記憶體配置爲 2 倍。

```
[root@controller ~]# grep allocation_ratio /etc/nova/nova.conf
cpu_allocation_ratio=2.0
ram_allocation_ratio=2.0
disk_allocation_ratio=2.0
```

5. 重新啓動 openstack-nova-* 服務，再 resize instance，成功 resize。

```
[root@controller ~]# systemctl restart openstack-nova-*
```

6. 再執行 server resize，成功完成。

```
[root@controller ~]# openstack server resize --flavor m4.crt crtv8 --
    wait
Complete
```

7. server crtv8 已改用 m4.crt flavor。

```
[root@controller ~]# openstack server list --flavor m4.crt -c Name
+-------+
| Name  |
+-------+
| crtv8 |
+-------+
```

Chapter 10

重新命名

10.1 Server

1. 載入用户 demo 環境變數。

```
[root@ip110 ~]# . demo.token
[root@ip110 ~]<demo>#
```

2. 列出 server，其中 ID 56d77ef3-2dd9-4482-975c-ed622dcce584 的 server，名爲 Cirros_Master。

```
[root@ip110 ~]<demo># openstack server list
+--------------------------------------+--------------+---------+-------------+-------
| ID                                   | Name         | Status  |
   Networks    | Image   | Flavor    |
+--------------------------------------+--------------+---------+-------------+-------
| 56d77ef3-2dd9-4482-975c-ed622dcce584 | Cirros_Master | SHUTOFF |
   selfservice | cirros  | fv_cirros |
+--------------------------------------+--------------+---------+-------------+-------
```

3. 查詢 server set 命令，有 -name 選項可以重新命名。

```
[root@ip110 ~]<demo># openstack help server set
usage: openstack server set [-h] [--name <new-name>] [--root-password]
                            [--property <key=value>] [--state <state>]
                            <server>

Set server properties
```

```
positional arguments:
  <server>              Server (name or ID)

optional arguments:
  -h, --help            show this help message and exit
  --name <new-name>     New server name
  --root-password       Set new root password (interactive only)
  --property <key=value>
                        Property to add/change for this server (repeat
                            option
                        to set multiple properties)
  --state <state>       New server state (valid value: active, error)
```

4. 將 server Cirros_Master 重新命名爲 cirros.m。

```
[root@ip110 ~]<demo># openstack server set --name cirros.m Cirros_Master
```

5. 列出 server，其中 ID 56d77ef3-2dd9-4482-975c-ed622dcce584 的 server，名稱已改爲 cirros.m。

```
[root@ip110 ~]<demo># openstack server list
+--------------------------------------+-----------+---------+-------------+---------+-
| ID                                   | Name      | Status  | Networks
      | Image   | Flavor    |
+--------------------------------------+-----------+---------+-------------+---------+-
| 56d77ef3-2dd9-4482-975c-ed622dcce584 | cirros.m  | SHUTOFF |
   selfservice | cirros  | fv_cirros |
+--------------------------------------+-----------+---------+-------------+---------+-
```

10.2 Flavor

1. 載入管理者 admin 環境變數。

```
[root@ip110 ~]# . admin.token
[root@ip110 ~]<admin>#
```

2. 查看 flavor set 命令，沒有重新命名的選項。

```
[root@ip110 ~]<admin># openstack help flavor set
usage: openstack flavor set [-h] [--no-property] [--property <key=value
    >]
                            [--project <project>]
                            [--project-domain <project-domain>]
                            <flavor>

Set flavor properties

positional arguments:
  <flavor>              Flavor to modify (name or ID)

optional arguments:
  -h, --help            show this help message and exit
  --no-property         Remove all properties from this flavor (specify
      both
                        --no-property and --property to remove the
                            current
                        properties before setting new properties.)
  --property <key=value>
                        Property to add or modify for this flavor (
                            repeat
                        option to set multiple properties)
  --project <project>   Set flavor access to project (name or ID) (admin
       only)
  --project-domain <project-domain>
                        Domain the project belongs to (name or ID). This
                             can
                        be used in case collisions between project names
                        exist.
```

3. 載入用户 demo 環境變數。

```
[root@ip110 ~]<admin># . demo.token
```

4. 列出 server，其中 ID 56d77ef3-2dd9-4482-975c-ed622dcce584 的 server，使用的 flavor 名稱爲 fv_cirros。

```
[root@ip110 ~]<demo># openstack server list
+--------------------------------------+----------+--------+------------+---------+-
| ID                                   | Name     | Status | Networks
      | Image   | Flavor    |
+--------------------------------------+----------+--------+------------+---------+-
| 56d77ef3-2dd9-4482-975c-ed622dcce584 | cirros.m | SHUTOFF |
   selfservice | cirros  | fv_cirros |
```

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

5. 載入管理者 admin 環境變數。

```
[root@ip110 ~]<demo># . admin.token
```

6. 列出 flavor，fv_cirros 的 ID 是 0。

```
[root@ip110 ~]<admin># openstack flavor list
+----+-----------+------+------+-----------+-------+-----------+
| ID | Name      |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+-----------+------+------+-----------+-------+-----------+
| 0  | fv_cirros |   64 |    1 |         0 |     1 | True      |
| 1  | dyw.ce8   | 4096 |   30 |         0 |     2 | True      |
| 2  | fv_Win10  | 8192 |   30 |         0 |     4 | True      |
| 3  | fv_DYW    | 2048 |   16 |         0 |     2 | True      |
+----+-----------+------+------+-----------+-------+-----------+
```

7. 刪除 ID 是 0 的 flavor。

```
[root@ip110 ~]<admin># openstack flavor delete 0
```

8. 再列出 flavor，ID 是 0 的 flavor fv_cirros 已不存在。

```
[root@ip110 ~]<admin># openstack flavor list
+----+----------+------+------+-----------+-------+-----------+
| ID | Name     |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+----------+------+------+-----------+-------+-----------+
| 1  | dyw.ce8  | 4096 |   30 |         0 |     2 | True      |
| 2  | fv_Win10 | 8192 |   30 |         0 |     4 | True      |
| 3  | fv_DYW   | 2048 |   16 |         0 |     2 | True      |
+----+----------+------+------+-----------+-------+-----------+
```

9. 重新新增一個 ID 是 0，名爲 dyw.tiny 的 flavor，其 vcpus, ram, disk 都與先前的 fv_cirros 相同。

```
[root@ip110 ~]<admin># openstack flavor create --id 0 --vcpus 1 --ram 64
    --disk 1 dyw.tiny
+----------------------------+----------+
```

```
| Field                       | Value    |
+-----------------------------+----------+
| OS-FLV-DISABLED:disabled    | False    |
| OS-FLV-EXT-DATA:ephemeral   | 0        |
| disk                        | 1        |
| id                          | 0        |
| name                        | dyw.tiny |
| os-flavor-access:is_public  | True     |
| properties                  |          |
| ram                         | 64       |
| rxtx_factor                 | 1.0      |
| swap                        |          |
| vcpus                       | 1        |
+-----------------------------+----------+
```

10. 載入用户 demo 環境變數。

```
[root@ip110 ~]# . demo.token
```

11. 再列出 flavor，ID 是 0 的 flavor 名爲 dyw.tiny。

```
[root@ip110 ~]<demo># openstack flavor list
+----+----------+------+------+-----------+-------+-----------+
| ID | Name     |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+----------+------+------+-----------+-------+-----------+
| 0  | dyw.tiny |   64 |    1 |         0 |     1 | True      |
| 1  | dyw.ce8  | 4096 |   30 |         0 |     2 | True      |
| 2  | fv_Win10 | 8192 |   30 |         0 |     4 | True      |
| 3  | fv_DYW   | 2048 |   16 |         0 |     2 | True      |
+----+----------+------+------+-----------+-------+-----------+
```

12. 列出 server，其中 ID 56d77ef3-2dd9-4482-975c-ed622dcce584 的 server，使用的 flavor 名稱也改爲 dyw.tiny。

```
[root@ip110 ~]<demo># openstack server list
+--------------------------------------+----------+--------+------------+---------+-
| ID                                   | Name     | Status | Networks
      | Image   | Flavor    |
+--------------------------------------+----------+--------+------------+---------+-
| 56d77ef3-2dd9-4482-975c-ed622dcce584 | cirros.m | SHUTOFF |
   selfservice | cirros  | dyw.tiny  |
+--------------------------------------+----------+--------+------------+---------+-
```

10.3 Image

1. 載入管理者 admin 環境變數。

```
[root@ip110 ~]# . admin.token
[root@ip110 ~]<admin>#
```

2. 查看 image set 命令，有選項 -name 可以重新命名 image。

```
[root@ip110 ~]<admin># openstack help image set
usage: openstack image set [-h] [--name <name>] [--min-disk <disk-gb>]
                           [--min-ram <ram-mb>]
                           [--container-format <container-format>]
                           [--disk-format <disk-format>]
                           [--protected | --unprotected]
                           [--public | --private | --community | --
                              shared]
                           [--property <key=value>] [--tag <tag>]
                           [--architecture <architecture>]
                           [--instance-id <instance-id>]
                           [--kernel-id <kernel-id>] [--os-distro <os-
                              distro>]
                           [--os-version <os-version>]
                           [--ramdisk-id <ramdisk-id>]
                           [--deactivate | --activate] [--project <
                              project>]
                           [--project-domain <project-domain>]
                           [--accept | --reject | --pending]
                           <image>

Set image properties

positional arguments:
  <image>               Image to modify (name or ID)

optional arguments:
  -h, --help            show this help message and exit
  --name <name>         New image name
.......................
```

3. 列出 image，其中 ID 450e4793-19c2-421f-a60a-bd44518bc259 的 image 名爲 DYW_Linux。

```
[root@ip110 ~]<admin># openstack image list
+--------------------------------------+----------------+--------+
| ID                                   | Name           | Status |
+--------------------------------------+----------------+--------+
| 450e4793-19c2-421f-a60a-bd44518bc259 | DYW_Linux      | active |
```

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

4. 載入用户 demo 環境變數。

```
[root@ip110 ~]# . demo.token
```

5. 列出 server，其中 ID 401daf32-bab2-4b92-b265-ad48f9efb604 的 server，使用的 image 爲 DYW_Linux。

```
[root@ip110 ~]<demo># openstack server list
+--------------------------------------+--------+--------+-------------+-----------+--
| ID                                   | Name   | Status | Networks
   | Image     | Flavor    |
+--------------------------------------+--------+--------+-------------+-----------+--
| 401daf32-bab2-4b92-b265-ad48f9efb604 | dyw.31 | ACTIVE | selfservice
   | DYW_Linux | dyw.csa   |
+--------------------------------------+--------+--------+-------------+-----------+--
```

6. 載入管理者 admin 環境變數。

```
[root@ip110 ~]<demo># . admin.token
```

7. 設定名爲 DYW_Linux 的 image，名稱改爲 dyw.csa。

```
[root@ip110 ~]<admin># openstack image set --name dyw.csa DYW_Linux
```

8. 列出 image，其中 ID 450e4793-19c2-421f-a60a-bd44518bc259 的 image 已改爲 dyw.csa8。

```
[root@ip110 ~]<admin># openstack image list
+--------------------------------------+---------------+--------+
| ID                                   | Name          | Status |
+--------------------------------------+---------------+--------+
| 450e4793-19c2-421f-a60a-bd44518bc259 | dyw.csa8      | active |
+--------------------------------------+---------------+--------+
```

9. 再載入用户 demo 環境變數。

```
[root@ip110 ~]<admin># . demo.token
```

10. 列出 server，其中 ID 401daf32-bab2-4b92-b265-ad48f9efb604 的 server，使用的 image 也改爲 dyw.csa。

```
[root@ip110 ~]<demo># openstack server list
+--------------------------------------+--------+---------+-------------+-----------+--
| ID                                   | Name   | Status  | Networks
   | Image     | Flavor    |
+--------------------------------------+--------+---------+-------------+-----------+--
| 401daf32-bab2-4b92-b265-ad48f9efb604 | dyw.31 | ACTIVE  | selfservice
   | dyw.csa8  | dyw.csa   |
+--------------------------------------+--------+---------+-------------+-----------+--
```

Chapter 11

Vnc/Spice Port 及密碼 - Flavor

11.1 前言

1. Openstack 以 vnc/spice 遠端桌面連線 instance (VM)，預設是自動給連線的埠號且沒設定密碼。

2. VM 的 xml 配置檔，如下檔案 graphics autoport=yes，/var/run 下的 xml 檔案是記憶體暫存，/etc/ 下的 xml 則是自動產生。

```
[root@ip110 ~]# grep graphic /var/run/libvirt/qemu/instance-0000012f.xml
      <graphics type='spice' port='5901' autoport='yes' listen='0.0.0.0'
          keymap='en-us'>
      </graphics>
[root@ip110 ~]# grep graphic /etc/libvirt/qemu/instance-0000012f.xml
    <graphics type='spice' autoport='yes' listen='0.0.0.0' keymap='en-us
        '>
    </graphics>
```

3. 變更 xml 後重新開機，依然會回到原設定值。

4. openstack server create 也沒有選項可以設定密碼及指定埠號。

5. 必須修改 nova 的 driver.py 及 config.py 才能解決。

11.2 driver.py 及 config 修改

1. 切換工作目錄

```
[root@ip110 ~]# cd /usr/lib/python2.7/site-packages/nova/virt/libvirt/
[root@ip110 libvirt]#
```

2. 修改 driver.py：self._guest_add_video_device 函式增加引數 flavor，判斷 flavor.extra_specs 是否設定 hw_set_port，有則使用且 graphics.autoport= False。判斷 flavor.extra_specs 是否設定 hw_set_posswd，有則使用此密碼。

```
[root@ip110 libvirt]# diff -uN driver.py.orig driver.py
--- driver.py.orig  2020-06-03 14:29:50.404375116 +0800
+++ driver.py   2020-06-05 19:16:50.664707455 +0800
@@ -5200,7 +5200,7 @@

         self._guest_add_spice_channel(guest)

-        if self._guest_add_video_device(guest):
+        if self._guest_add_video_device(guest,flavor):
             self._add_video_driver(guest, image_meta, flavor)

             # We want video == we want graphical console. Some
                 architectures
@@ -5285,7 +5285,7 @@
                 raise exception.PciDeviceUnsupportedHypervisor(type=
                     virt_type)

     @staticmethod
-    def _guest_add_video_device(guest):
+    def _guest_add_video_device(guest,flavor):
         # NB some versions of libvirt support both SPICE and VNC
         # at the same time. We're not trying to second guess which
         # those versions are. We'll just let libvirt report the
@@ -5310,6 +5310,10 @@
                 # necessitate deprecating this option entirely in the
                     future.
                 # Refer to bug #1682020 for more information.
                 graphics.keymap = CONF.spice.keymap
+            graphics.port = flavor.extra_specs.get('hw_set_port')
+            if graphics.port: graphics.autoport = False
+            else: graphics.autoport = True
+            graphics.passwd = flavor.extra_specs.get('hw_set_passwd')
             graphics.listen = CONF.spice.server_listen
             guest.add_device(graphics)
             add_video_driver = True
```

3. 修改 config.py：增加 port 及 passwd 的設定。

```
[root@ip110 libvirt]# diff -uN config.py.orig config.py
--- config.py.orig  2020-06-03 14:19:38.122154902 +0800
+++ config.py   2020-06-05 16:50:30.358531089 +0800
@@ -1542,6 +1542,8 @@

         self.type = "vnc"
         self.autoport = True
```

```
+        self.port = None
+        self.passwd = None
         self.keymap = None
         self.listen = None

@@ -1553,6 +1555,9 @@
             dev.set("autoport", "yes")
         else:
             dev.set("autoport", "no")
+            dev.set("port", self.port)
+        if self.passwd:
+            dev.set("passwd", self.passwd)
         if self.keymap:
             dev.set("keymap", self.keymap)
         if self.listen:
```

4. 修改後必須重新啓動 openstack-nova-compute 服務才會生效。

```
[root@ip110 libvirt]# systemctl restart openstack-nova-compute.service
```

11.3 Auotport 新增 Instance

1. 載入用户 demo 環境變數。

```
[root@ip110 ~]# . demo.token
[root@ip110 ~]<demo>#
```

2. 查詢可用 flavor。

```
[root@ip110 ~]<demo># openstack flavor list
+----+-----------+------+------+-----------+-------+-----------+
| ID | Name      |  RAM | Disk | Ephemeral | VCPUs | Is Public |
+----+-----------+------+------+-----------+-------+-----------+
| 0  | dyw.tiny  |   64 |    1 |         0 |     1 | True      |
| 1  | dyw.ce8   | 4096 |   30 |         0 |     2 | True      |
| 2  | dyw.large | 8192 |   16 |         0 |     4 | True      |
| 3  | dyw.csa   | 2048 |   16 |         0 |     2 | True      |
+----+-----------+------+------+-----------+-------+-----------+
```

3. 查詢 flavor dyw.tiny 的各欄位值，沒有 extra_specs 設定。

```
[root@ip110 ~]<demo># openstack flavor show dyw.tiny
+----------------------------+----------+
| Field                      | Value    |
+----------------------------+----------+
| OS-FLV-DISABLED:disabled   | False    |
| OS-FLV-EXT-DATA:ephemeral  | 0        |
| access_project_ids         | None     |
| disk                       | 1        |
| id                         | 0        |
| name                       | dyw.tiny |
| os-flavor-access:is_public | True     |
| properties                 |          |
| ram                        | 64       |
| rxtx_factor                | 1.0      |
| swap                       |          |
| vcpus                      | 1        |
+----------------------------+----------+
```

4. 使用 flavor dyw.tiny 新增 instance cirros2。

```
[root@ip110 ~]<demo># openstack server create --flavor dyw.tiny \
--image cirros5 --nic net-id=6ed4de53-ecc1-4c79-a9d2-8e511b26557a \
--security-group default --availability-zone nova:ip110:ip110 \
cirros2 --wait
+----------------------------+-----------------------------------------------+

| Field                      | Value
                                             |
+----------------------------+-----------------------------------------------+

| OS-DCF:diskConfig          | MANUAL
                                            |
| OS-EXT-AZ:availability_zone | nova
                                              |
| OS-EXT-STS:power_state     | Running
                                           |
| OS-EXT-STS:task_state      | None
                                              |
| OS-EXT-STS:vm_state        | active
                                            |
| OS-SRV-USG:launched_at     | 2020-06-05T11:23:18.000000
                                 |
| OS-SRV-USG:terminated_at   | None
                                              |
| accessIPv4                 |
                                                   |
| accessIPv6                 |
                                                   |
| addresses                  | selfservice=192.168.10.33
                                |
| adminPass                  | qHLrZhi4MbAS
```

```
                                    |
| config_drive                | |
                                                |
| created                     | 2020-06-05T11:22:55Z
                              |
| flavor                      | dyw.tiny (0)
                                    |
| hostId                      | 71
  c30f5bf734c2046ae66e4ceec5af8350decb8905a171 |
| id                          | 62f81add-c3ca-4023-9bd4-a687116a7c8c
            |
| image                       | cirros5 (c60627cd-df9c-4fdd-858c-
  a39fb94d9234) |
| key_name                    | None
                                         |
| name                        | cirros2
                                   |
| progress                    | 0
                                        |
| project_id                  | 0abfdfea73d142d08192aab5cc051642
                |
| properties                  |
                                             |
| security_groups             | name='default'
                                    |
| status                      | ACTIVE
                                       |
| updated                     | 2020-06-05T11:23:18Z
                              |
| user_id                     | fdae41299d574ea59fc26bef4793885b
                |
| volumes_attached            |
                                                |
+-----------------------------+------------------------------------------------+
```

5. 載入管理者 admin 的環境變數，查詢 instance cirros2 的 xml 檔名稱爲 instance-0000014f。

```
[root@ip110 ~]<demo># . admin.token
[root@ip110 ~]<admin># nova list --all --fields=name,instance_name,
   status | grep cirros2
| 62f81add-c3ca-4023-9bd4-a687116a7c8c | cirros2  | instance-0000014f |
   ACTIVE  |
```

6. 查詢 instance-0000014f.xml 得知，其使用自動取得的 5902 埠號，沒有設定連線密碼。

```
[root@ip110 ~]<admin># grep graphic /var/run/libvirt/qemu/instance
    -0000014f.xml
      <graphics type='spice' port='5902' autoport='yes' listen='0.0.0.0'
          keymap='en-us'>
      </graphics>
[root@ip110 ~]<admin># grep graphic /etc/libvirt/qemu/instance-0000014f.
    xml
    <graphics type='spice' autoport='yes' listen='0.0.0.0' keymap='en-us
        '>
    </graphics>
```

11.4 指定 port 新增 Instance

1. 載入管理者 admin 環境變數。

```
[root@ip110 ~]# . admin.token
[root@ip110 ~]<admin>#
```

2. flavor dyw.tiny 新增 hw_set_port 及 hw_set_passwd 兩項 extra specs。

```
[root@ip110 ~]<admin># openstack flavor set dyw.tiny \
```

3. 查詢 flavor dyw.tiny，properties 新增了 hw_set_port 及 hw_set_passwd 兩項 extra specs。

```
--property hw_set_port=5999 --property hw_set_passwd='123qwe'
[root@ip110 ~]<admin># openstack flavor show dyw.tiny
+----------------------------+--------------------------------------------+
| Field                      | Value
                                        |
+----------------------------+--------------------------------------------+
| OS-FLV-DISABLED:disabled   | False
                                        |
| OS-FLV-EXT-DATA:ephemeral  | 0
                                           |
| access_project_ids         | None
                                            |
| disk                       | 1
                                           |
| id                         | 0
                                           |
```

```
| name                        | dyw.tiny
| os-flavor-access:is_public | True
| properties                  | hw_set_passwd='123qwe', hw_set_port='5999
  ' |
| ram                         | 64
| rxtx_factor                 | 1.0
| swap                        |
| vcpus                       | 1
+-----------------------------+------------------------------------------+
```

4. 載入用户 demo 環境變數，使用 flavor dyw.tiny 新增 instance cirros3。

```
[root@ip110 ~]<admin># . demo.token
[root@ip110 ~]<demo># openstack server create --flavor dyw.tiny --image
   cirros5 \
--nic net-id=6ed4de53-ecc1-4c79-a9d2-8e511b26557a --security-group
   default \
--availability-zone nova:ip110:ip110 cirros3 --wait

+-----------------------------+------------------------------------------------------
| Field                       | Value
+-----------------------------+------------------------------------------------------
| OS-DCF:diskConfig           | MANUAL
| OS-EXT-AZ:availability_zone | nova
| OS-EXT-STS:power_state      | Running
| OS-EXT-STS:task_state       | None
| OS-EXT-STS:vm_state         | active
| OS-SRV-USG:launched_at      | 2020-06-05T11:51:51.000000
| OS-SRV-USG:terminated_at    | None
| accessIPv4                  |
| accessIPv6                  |
| addresses                   | selfservice=192.168.10.4
```

```
| adminPass                    | aS4z3NpgNHhM
                                                    |
| config_drive                 |
                                                                |
| created                      | 2020-06-05T11:51:45Z
                                            |
| flavor                       | dyw.tiny (0)
                                                    |
| hostId                       | 71
  c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
| id                           | 44267063-3f4f-4faf-813a-d4f367588934
                          |
| image                        | cirros5 (c60627cd-df9c-4fdd-858c-
  a39fb94d9234)           |
| key_name                     | None
                                                |
| name                         | cirros3
                                            |
| progress                     | 0
                                                |
| project_id                   | 0abfdfea73d142d08192aab5cc051642
                        |
| properties                   |
                                                |
| security_groups              | name='default'
                                        |
| status                       | ACTIVE
                                            |
| updated                      | 2020-06-05T11:51:51Z
                                            |
| user_id                      | fdae41299d574ea59fc26bef4793885b
                        |
| volumes_attached             |
                                                |
+------------------------------+-------------------------------------------------------
```

5. 載入管理者 admin 環境變數，用 instance cirros3 的 id 查詢其 xml 檔爲 instance-00000150。

```
[root@ip110 ~]<demo># . admin.token
[root@ip110 ~]<admin># nova list --all --fields=name,instance_name,
   status | grep cirros3
| 44267063-3f4f-4faf-813a-d4f367588934 | cirros3  | instance-00000150 |
   ACTIVE  |
```

6. 查詢 instance-00000150.xml 得知，其使用固定埠號 5999，且設定連線密碼 123qwe。

```
[root@ip110 ~]<admin># grep graphic /etc/libvirt/qemu/instance-00000150.
    xml
    <graphics type='spice' port='5999' autoport='no' listen='0.0.0.0'
       keymap='en-us' passwd='123qwe'>
    </graphics>
[root@ip110 ~]<admin># grep graphic /var/run/libvirt/qemu/instance
    -00000150.xml
      <graphics type='spice' port='5999' autoport='no' listen='0.0.0.0'
         keymap='en-us' passwd='123qwe'>
```

11.5 修改 port 及密碼

1. instance 的 flavor extra spces 儲存於資料庫 nova 的資料表 instance_extra，其中 hw_set_port 爲 5999，hw_set_passwd 爲 123qwe。

```
[root@ip110 ~]# mysql -unova -pxxxxxx -e "use nova; use nova;\
 select flavor from instance_extra where \
 instance_uuid='44267063-3f4f-4faf-813a-d4f367588934'\G"

*************************** 1. row ***************************
flavor: {"new": null, "old": null, "cur": {"nova_object.version": "1.2",
 "nova_object.changes": ["extra_specs"], "nova_object.name": "Flavor",
 "nova_object.data": {"disabled": false, "root_gb": 1, "description":
    null,
 "flavorid": "0", "deleted": false, "created_at": "2020-05-28T23:50:43Z"
    ,
 "ephemeral_gb": 0, "updated_at": null, "memory_mb": 64, "vcpus": 1,
 "extra_specs": {"hw_set_passwd": "123qwe", "hw_set_port": "5999"}, "
    swap": 0,
 "rxtx_factor": 1.0, "is_public": true, "deleted_at": null, "vcpu_weight
    ": 0,
 "id": 14, "name": "dyw.tiny"}, "nova_object.namespace": "nova"}}
```

2. 修改資料庫 nova 的資料表 instance_extra，設定其欄位 flavor 的 extra_specs，hw_set_port 爲 5998，hw_set_passwd 爲 123456。

```
[root@ip110 ~]# mysql -unova -pxxxxxx -e "use nova; use nova;\
update instance_extra set flavor=regexp_replace(flavor,'(extra_specs\":
    \
{)[^}]*', '\\\1\"hw_set_passwd\": \"123456\", \"hw_set_port\": \"5998\"'
    ) \
where instance_uuid='44267063-3f4f-4faf-813a-d4f367588934'\G"
```

3. 再查詢 instance cirros3 的 flavor extra spces，其中 hw_set_port 改爲 5998，hw_set_passwd 改爲 123456。

```
[root@ip110 ~]# mysql -unova -pxxxxxx -e "use nova; use nova;\
 select flavor from instance_extra \
where instance_uuid='44267063-3f4f-4faf-813a-d4f367588934'\G"

*************************** 1. row ***************************
flavor: {"new": null, "old": null, "cur": {"nova_object.version": "1.2",
 "nova_object.changes": ["extra_specs"], "nova_object.name": "Flavor",
 "nova_object.data": {"disabled": false, "root_gb": 1, "description":
    null,
 "flavorid": "0", "deleted": false, "created_at": "2020-05-28T23:50:43Z"
    ,
 "ephemeral_gb": 0, "updated_at": null, "memory_mb": 64, "vcpus": 1,
 "extra_specs": {"hw_set_passwd": "123456", "hw_set_port": "5998"}, "
    swap": 0,
 "rxtx_factor": 1.0, "is_public": true, "deleted_at": null, "vcpu_weight
    ": 0,
 "id": 14, "name": "dyw.tiny"}, "nova_object.namespace": "nova"}}
```

4. 重新啓動 instance cirros3。

```
[root@ip110 ~]<demo># openstack server reboot --hard cirros3
```

5. 再查詢 instance cirros3 的 xml 檔，autoport='no'，port 爲 5998，passwd 爲 123456。

```
[root@ip110 ~]<demo># grep graphic /var/run/libvirt/qemu/instance
   -00000150.xml
   <graphics type='spice' port='5998' autoport='no' listen='0.0.0.0'
      keymap='en-us' passwd='123456'>
   </graphics>
[root@ip110 ~]<demo># grep graphic /etc/libvirt/qemu/instance-00000150.
   xml
  <graphics type='spice' port='5998' autoport='no' listen='0.0.0.0'
     keymap='en-us' passwd='123456'>
  </graphics>
```

11.6 待解決缺點

1. 載入管理者 admin 環境變數。

```
[root@ip110 ~]# . admin.token
[root@ip110 ~]<admin>#
```

2. flavor 不太可能只用於新增一個 instance，設定 flavor 的 extra spaces，固定 port 及密碼，新增下一個 instance 時會使用相同的 port 及密碼，所以每次新增 instance 時都要先清除再設定。

```
[root@ip110 ~]<admin># openstack flavor unset dyw.tiny --property
    hw_set_port --property hw_set_passwd
```

Chapter 12

Vnc/Spice Port 及密碼 – Matadata

12.1 前言

1. 上一章「Vnc/Spice Port 及密碼 – Flavor」11 在 flavor 的 extra spaces，新增 hw_set_port 及 hw_set_passwd 參數，此方法有以下問題：
   (a) 在新增 instance 時必須用管理者權限設定 falvor，若沒有管理者權限無法執行。
   (b) 完成後還要用管理者權限取消 flavor 的 extra specs 設定。
   (c) 若要變定 port 或密碼，必須有權限登入 mysql 變更 flavor 的 extra specs。
2. 基於以上問題，固定 port 及設定連線密碼，應該改在 instance 的 metadata。

12.2 driver.py 及 config 修改

1. 切換工作目錄。

```
[root@ip110 ~]# cd /usr/lib/python2.7/site-packages/nova/virt/libvirt/
[root@ip110 libvirt]#
```

2. 修改 driver.py：self._guest_add_video_device 函式增加引數 instance，判斷 instance.metadata 是否設定 hw:port，有則使用且 graphics.autoport=False。判斷 instance.metadata 是否設定 hw:posswd，有則使用此密碼。

```
[root@ip110 libvirt]# diff -uN driver.py.orig driver.py
```

```
--- driver.py.orig  2020-06-03 14:29:50.404375116 +0800
+++ driver.py   2020-06-06 17:17:49.127199302 +0800
@@ -5200,7 +5200,7 @@

         self._guest_add_spice_channel(guest)

-        if self._guest_add_video_device(guest):
+        if self._guest_add_video_device(guest,instance):
             self._add_video_driver(guest, image_meta, flavor)

             # We want video == we want graphical console. Some
                 architectures
@@ -5285,7 +5285,7 @@
                 raise exception.PciDeviceUnsupportedHypervisor(type=
                     virt_type)

     @staticmethod
-    def _guest_add_video_device(guest):
+    def _guest_add_video_device(guest,instance):
         # NB some versions of libvirt support both SPICE and VNC
         # at the same time. We're not trying to second guess which
         # those versions are. We'll just let libvirt report the
@@ -5310,6 +5310,10 @@
                 # necessitate deprecating this option entirely in the
                     future.
                 # Refer to bug #1682020 for more information.
                 graphics.keymap = CONF.spice.keymap
+            graphics.port = instance.metadata.get('hw:port')
+            if graphics.port: graphics.autoport = False
+            else: graphics.autoport = True
+            graphics.passwd = instance.metadata.get('hw:passwd')
             graphics.listen = CONF.spice.server_listen
             guest.add_device(graphics)
             add_video_driver = True
```

3. 修改 config.py：增加 port 及 passwd 的設定。

```
[root@ip110 libvirt]# diff -uN config.py.orig config.py
--- config.py.orig  2020-06-03 14:19:38.122154902 +0800
+++ config.py   2020-06-05 16:50:30.358531089 +0800
@@ -1542,6 +1542,8 @@

         self.type = "vnc"
         self.autoport = True
+        self.port = None
+        self.passwd = None
         self.keymap = None
         self.listen = None

@@ -1553,6 +1555,9 @@
             dev.set("autoport", "yes")
         else:
```

```
16              dev.set("autoport", "no")
+               dev.set("port", self.port)
18          if self.passwd:
+               dev.set("passwd", self.passwd)
20          if self.keymap:
                dev.set("keymap", self.keymap)
22          if self.listen:
```

4. 修改後必須重新啓動 openstack-nova-compute 服務才會生效。

```
[root@ip110 libvirt]# systemctl restart openstack-nova-compute.service
```

12.3 指定 port 新增 Instance

1. 載入用户 demo 環境變數。

```
1 [root@ip110 ~]# . demo.token
  [root@ip110 ~]<demo>#
```

2. 使用 flavor dyw.tiny 新增 instance cirros4，使用 -property 選項設定 hw:port 及 hw:passwd 兩個 metadata。

```
  [root@ip110 ~]<demo># openstack server create --flavor dyw.tiny \
2 --image cirros5 --nic net-id=6ed4de53-ecc1-4c79-a9d2-8e511b26557a \
  --security-group default --availability-zone nova:ip110:ip110 \
4 --property hw:port='5994' --property hw:passwd='123qwe' cirros4 --wait

6 +-----------------------------+-------------------------------------------------------------
  | Field                       | Value
                                                                |
8 +-----------------------------+-------------------------------------------------------------
  | OS-DCF:diskConfig           | MANUAL
                                                              |
10| OS-EXT-AZ:availability_zone | nova
                                                                |
  | OS-EXT-STS:power_state      | Running
                                                            |
12| OS-EXT-STS:task_state       | None
                                                                |
  | OS-EXT-STS:vm_state         | active
                                                              |
```

```
| OS-SRV-USG:launched_at      | 2020-06-06T07:51:23.000000
| OS-SRV-USG:terminated_at    | None
| accessIPv4                  |
| accessIPv6                  |
| addresses                   | selfservice=192.168.10.22
| adminPass                   | WDJfU2PvYn3P
| config_drive                |
| created                     | 2020-06-06T07:51:14Z
| flavor                      | dyw.tiny (0)
| hostId                      | 71
  c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
| id                          | 1f1af534-e9fd-4748-bd14-0d6a00d4614a
| image                       | cirros5 (c60627cd-df9c-4fdd-858c-
  a39fb94d9234)
| key_name                    | None
| name                        | cirros4
| progress                    | 0
| project_id                  | 0abfdfea73d142d08192aab5cc051642
| properties                  | hw:passwd='123qwe', hw:port='5994'
| security_groups             | name='default'
| status                      | ACTIVE
| updated                     | 2020-06-06T07:51:23Z
| user_id                     | fdae41299d574ea59fc26bef4793885b
| volumes_attached            |
+-----------------------------+-----------------------------------------------------
```

3. 載入管理者 admin 的環境變數，查詢 instance cirros4 的 xml 檔名稱爲 instance-00000152。

```
[root@ip110 ~]<demo># . admin.token
```

```
[root@ip110 ~]<admin># nova list --all --fields=name,instance_name,
    status | grep cirros4
| 1f1af534-e9fd-4748-bd14-0d6a00d4614a | cirros4  | instance-00000152 |
    ACTIVE  |
```

4. 查詢 instance-00000152.xml 得知，其使用設定的 5994 埠號，連線密碼爲 123qwe，都符合要求。

```
[root@ip110 ~]<admin># grep graphic /etc/libvirt/qemu/instance-00000152.
    xml
    <graphics type='spice' port='5994' autoport='no' listen='0.0.0.0'
       keymap='en-us' passwd='123qwe'>
    </graphics>
[root@ip110 ~]<admin># grep graphic /var/run/libvirt/qemu/instance
    -00000152.xml
      <graphics type='spice' port='5994' autoport='no' listen='0.0.0.0'
         keymap='en-us' passwd='123qwe'>
      </graphics>
```

12.4 Auotport 新增 Instance

1. 載入用户 demo 環境變數。

```
[root@ip110 ~]# . demo.token
[root@ip110 ~]<demo>#
```

2. 使用 flavor dyw.tiny 新增 instance cirros5，沒有使用 -property 選項設定 metadata。

```
[root@ip110 ~]<demo># openstack server create --flavor dyw.tiny --image
    cirros5 \
--nic net-id=6ed4de53-ecc1-4c79-a9d2-8e511b26557a --security-group
    default \
--availability-zone nova:ip110:ip110 cirros5 --wait
+-----------------------------+-------------------------------------------------------
| Field                       | Value
                                                    |
+-----------------------------+-------------------------------------------------------
| OS-DCF:diskConfig           | MANUAL
                                                  |
```

```
| OS-EXT-AZ:availability_zone | nova |
| OS-EXT-STS:power_state      | Running |
| OS-EXT-STS:task_state       | None |
| OS-EXT-STS:vm_state         | active |
| OS-SRV-USG:launched_at      | 2020-06-06T08:04:53.000000 |
| OS-SRV-USG:terminated_at    | None |
| accessIPv4                  | |
| accessIPv6                  | |
| addresses                   | selfservice=192.168.10.44 |
| adminPass                   | MDdefcQG4d8q |
| config_drive                | |
| created                     | 2020-06-06T08:04:38Z |
| flavor                      | dyw.tiny (0) |
| hostId                      | 71
  c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
| id                          | c9a9f517-7e33-41dd-98eb-c95de8a11218 |
| image                       | cirros5 (c60627cd-df9c-4fdd-858c-
  a39fb94d9234) |
| key_name                    | None |
| name                        | cirros5 |
| progress                    | 0 |
| project_id                  | 0abfdfea73d142d08192aab5cc051642 |
| properties                  | |
| security_groups             | name='default' |
| status                      | ACTIVE |
| updated                     | 2020-06-06T08:04:53Z |
| user_id                     | fdae41299d574ea59fc26bef4793885b |
| volumes_attached            | |
+-----------------------------+------------------------------------------------------
```

3. 載入管理者 admin 的環境變數，使用 instance cirros5 的 xml 檔名稱爲 instance-00000153。

```
[root@ip110 ~]<demo># . admin.token
[root@ip110 ~]<admin># nova list --all --fields=name,instance_name,
    status | grep cirros5
| c9a9f517-7e33-41dd-98eb-c95de8a11218 | cirros5  | instance-00000153 |
    ACTIVE  |
```

4. 查詢 instance-00000153.xml 得知，其使用自動取得的 5911 埠號，沒有設定連線密碼。

```
[root@ip110 ~]<demo># grep graphic /var/run/libvirt/qemu/instance
    -00000153.xml
      <graphics type='spice' port='5911' autoport='yes' listen='0.0.0.0'
          keymap='en-us'>
      </graphics>
[root@ip110 ~]<demo># grep graphic /etc/libvirt/qemu/instance-00000153.
    xml
    <graphics type='spice' autoport='yes' listen='0.0.0.0' keymap='en-us
        '>
```

12.5 修改 port 及密碼

1. instance cirros5 新增時使用 autoport，且沒設定連線密碼，現在使用 –property 選項設定 `hw:port` 及 `hw:passwd` 兩個 metadata。

```
[root@ip110 ~]<demo># openstack server set --property hw:port=5995 --
    property hw:passwd=123321 cirros5
```

2. 查詢 instance cirros5 的 properties 有印出設定的值。

```
[root@ip110 ~]<demo># openstack server show cirros5
+-----------------------------+-------------------------------------------------
| Field                       | Value
                                                  |
+-----------------------------+-------------------------------------------------
```

```
| OS-DCF:diskConfig           | MANUAL
                                                                |
| OS-EXT-AZ:availability_zone | nova
                                                                  |
| OS-EXT-STS:power_state      | Running
                                                               |
| OS-EXT-STS:task_state       | None
                                                                  |
| OS-EXT-STS:vm_state         | active
                                                                |
| OS-SRV-USG:launched_at      | 2020-06-06T08:04:53.000000
                                                                    |
| OS-SRV-USG:terminated_at    | None
                                                                  |
| accessIPv4                  |
                                                                        |
| accessIPv6                  |
                                                                        |
| addresses                   | selfservice=192.168.10.44
                                                                       |
| config_drive                |
                                                                        |
| created                     | 2020-06-06T08:04:38Z
                                                                |
| flavor                      | dyw.tiny (0)
                                                                    |
| hostId                      | 71
  c30f5bf734c2046ae66e4ceec5af8350decb8905a171de520776a9 |
| id                          | c9a9f517-7e33-41dd-98eb-c95de8a11218
                                                  |
| image                       | cirros5 (c60627cd-df9c-4fdd-858c-
  a39fb94d9234)                                  |
| key_name                    | None
                                                                  |
| name                        | cirros5
                                                               |
| progress                    | 0
                                                                       |
| project_id                  | 0abfdfea73d142d08192aab5cc051642
                                                 |
| properties                  | hw:passwd='123321', hw:port='5995'
                                                |
| security_groups             | name='default'
                                                           |
| status                      | ACTIVE
                                                                  |
| updated                     | 2020-06-06T08:55:18Z
                                                                  |
| user_id                     | fdae41299d574ea59fc26bef4793885b
                                                 |
| volumes_attached            |
                                                                        |
+-----------------------------+-------------------------------------------------------------------
```

3. 重新啓動 instance cirros5。

```
[root@ip110 ~]<demo># openstack server reboot --hard cirros5
```

4. 再查詢 instance cirros5 的 xml 檔，autoport='no'，port 爲 5995，passwd 爲 123321。

```
[root@ip110 ~]<demo># grep graphic /var/run/libvirt/qemu/instance
    -00000153.xml
    <graphics type='spice' port='5995' autoport='no' listen='0.0.0.0'
        keymap='en-us' passwd='123321'>
    </graphics>
[root@ip110 ~]<demo># grep graphic /etc/libvirt/qemu/instance-00000153.
    xml
    <graphics type='spice' port='5995' autoport='no' listen='0.0.0.0'
        keymap='en-us' passwd='123321'>
    </graphics>
```

Chapter 13

Instance 問題解決

13.1 新增 Instance ERROR 1

1. 以 flavor m1.crt, image crtusb, network provider 新增 server，因爲 security group 有三個 default，所以使用 id。

```
[root@controller ~]# openstack server create --flavor m1.crt --image
    crtusb \
--nic net-id=0b0ebcee-057b-4798-bf73-5dd449e7879a \
--security-group 03924e93-f88e-4000-acb4-2c06922dae59 \
--key-name mykey crt1-instance
+-------------------------------------+-----------------------------------------------+
| Field                               | Value                                         |
+-------------------------------------+-----------------------------------------------+
| OS-DCF:diskConfig                   | MANUAL                                        |
| OS-EXT-AZ:availability_zone         |                                               |
| OS-EXT-SRV-ATTR:host                | None                                          |
| OS-EXT-SRV-ATTR:hypervisor_hostname | None                                          |
| OS-EXT-SRV-ATTR:instance_name       |                                               |
| OS-EXT-STS:power_state              | NOSTATE                                       |
| OS-EXT-STS:task_state               | scheduling                                    |
| OS-EXT-STS:vm_state                 | building                                      |
| OS-SRV-USG:launched_at              | None                                          |
| OS-SRV-USG:terminated_at            | None                                          |
```

```
| accessIPv4                           |
                                                |
| accessIPv6                           |
                                                |
| addresses                            |
                                                |
| adminPass                            | sRXshjY3rhLG
                                       |
| config_drive                         |
                                                |
| created                              | 2018-05-26T09:09:58Z
                                  |
| flavor                               | m1.crt (0)
                                        |
| hostId                               |
                                                |
| id                                   | df02f9e2-833e-44d6-b25e
  -556387459d0a          |
| image                                | crtusb (e4bea3db-581a-472d-a0dd
  -37b1e7055bbf) |
| key_name                             | mykey
                                            |
| name                                 | crt1-instance
                                       |
| progress                             | 0
                                                |
| project_id                           | e28adc716118434c96b5833867faa08c
                    |
| properties                           |
                                                |
| security_groups                      | name='03924e93-f88e-4000-acb4-2
  c06922dae59'    |
| status                               | BUILD
                                            |
| updated                              | 2018-05-26T09:09:58Z
                                  |
| user_id                              | c5f79bab788049e7a59395b6f94a911f
                   |
| volumes_attached                     |
                                                |
+--------------------------------------+-------------------------------------------------+
```

2. 列出 instance crt1-instance，但狀態是 ERROR。

```
[root@controller ~]# openstack server list
+--------------------------------------+--------------+--------+----------+--------+--
| ID                                   | Name         | Status |
  Networks | Image  | Flavor |
+--------------------------------------+--------------+--------+----------+--------+--
```

```
| df02f9e2-833e-44d6-b25e-556387459d0a | crt1-instance | ERROR  |
            | crtusb | m1.crt |
+--------------------------------------+---------------+--------+----------+--------+--
```

3. 以 flavor m1.crt, image crtusb, network provider 新增 server，因爲 security group 有三個 default，所以使用 id。

```
[root@controller ~]# openstack server create --flavor m1.crt --image
    cirros \
--nic net-id=0b0ebcee-057b-4798-bf73-5dd449e7879a \
--security-group 03924e93-f88e-4000-acb4-2c06922dae59 \
--key-name mykey cirros1-instance
+-------------------------------------+-----------------------------------------------+
| Field                               | Value                                         |
+-------------------------------------+-----------------------------------------------+
| OS-DCF:diskConfig                   | MANUAL                                        |
| OS-EXT-AZ:availability_zone         |                                               |
| OS-EXT-SRV-ATTR:host                | None                                          |
| OS-EXT-SRV-ATTR:hypervisor_hostname | None                                          |
| OS-EXT-SRV-ATTR:instance_name       |                                               |
| OS-EXT-STS:power_state              | NOSTATE                                       |
| OS-EXT-STS:task_state               | scheduling                                    |
| OS-EXT-STS:vm_state                 | building                                      |
| OS-SRV-USG:launched_at              | None                                          |
| OS-SRV-USG:terminated_at            | None                                          |
| accessIPv4                          |                                               |
| accessIPv6                          |                                               |
| addresses                           |                                               |
| adminPass                           | L46SXegpeSji                                  |
| config_drive                        |                                               |
| created                             | 2018-05-26T09:15:16Z                          |
```

```
| flavor                               | m1.crt (0)
                                      |
| hostId                               |
                                                |
| id                                   | 3fec7b0e-dabb-47da-bb41-
  f8ade99b3a5d          |
| image                                | cirros (5bb44bde-d1e8-4937-b0fc-
  d3cdab6929c5) |
| key_name                             | mykey
                                           |
| name                                 | cirros1-instance
                                  |
| progress                             | 0
                                                  |
| project_id                           | e28adc716118434c96b5833867faa08c
                  |
| properties                           |
                                                |
| security_groups                      | name='03924e93-f88e-4000-acb4-2
  c06922dae59'    |
| status                               | BUILD
                                           |
| updated                              | 2018-05-26T09:15:16Z
                               |
| user_id                              | c5f79bab788049e7a59395b6f94a911f
                  |
| volumes_attached                     |
                                                |
+--------------------------------------+-------------------------------------------------+
```

4. 列出 instance crt1-instance 及 cirros1-instance，但狀態都是 ERROR。

```
[root@controller ~]# openstack server list
+--------------------------------------+-----------------+--------+----------+--------
| ID                                   | Name            | Status |
  Networks | Image  | Flavor |
+--------------------------------------+-----------------+--------+----------+--------
| 3fec7b0e-dabb-47da-bb41-f8ade99b3a5d | cirros1-instance | ERROR  |
           | cirros | m1.crt |
| df02f9e2-833e-44d6-b25e-556387459d0a | crt1-instance    | ERROR  |
           | crtusb | m1.crt |
+--------------------------------------+-----------------+--------+----------+--------
```

5. 原因：nova-compute 服務啓動不正常，先刪除 instance crt1-instance 及 cirros1-instance。解決方式如下節「AMQP ERROR」。

```
[root@controller ~]# openstack server delete 3fec7b0e-dabb-47da-bb41-
    f8ade99b3a5d
[root@controller ~]# openstack server delete df02f9e2-833e-44d6-b25e
    -556387459d0a
[root@controller ~]# openstack server list
```

13.2 RAM Quota

1. 載入用户 demo 環境變變數。

```
[root@ip110 ~]# . demo.token
[root@ip110 ~]<demo>#
```

2. 新增 instance 時，回應 ram 使用超過 quota。

```
[root@ip110 ~]<demo># openstack server create --flavor dyw.ce8 --image
    crt28g \
--nic net-id=6ed4de53-ecc1-4c79-a9d2-8e511b26557a \
--security-group default --key-name rsa_key dyw.master
Quota exceeded for ram: Requested 4096, but already used 73792 of 76800
    ram
(HTTP 403) (Request-ID: req-ef73f0db-022e-4b15-9584-087c044ceb18)
```

3. 查看 project 名稱爲 demo。

```
[root@ip110 ~]<demo># openstack project list
+----------------------------------+------+
| ID                               | Name |
+----------------------------------+------+
| 0abfdfea73d142d08192aab5cc051642 | demo |
+----------------------------------+------+
```

4. 載入管理者 admin 環境變變數。

```
[root@ip110 ~]<demo># . admin.token
```

5. 查看 project demo 的 quota，其中 ram 爲 76800。

```
[root@ip110 ~]<admin># openstack quota show demo
+----------------------+----------------------------------+
| Field                | Value                            |
+----------------------+----------------------------------+
| cores                | 80                               |
| fixed-ips            | -1                               |
| floating-ips         | 50                               |
| health_monitors      | None                             |
| injected-file-size   | 10240                            |
| injected-files       | 5                                |
| injected-path-size   | 255                              |
| instances            | 100                              |
| key-pairs            | 100                              |
| l7_policies          | None                             |
| listeners            | None                             |
| load_balancers       | None                             |
| location             | None                             |
| name                 | None                             |
| networks             | 100                              |
| pools                | None                             |
| ports                | 500                              |
| project              | 0abfdfea73d142d08192aab5cc051642 |
| project_name         | demo                             |
| properties           | 128                              |
| ram                  | 76800                            |
| rbac_policies        | 10                               |
| routers              | 10                               |
| secgroup-rules       | 100                              |
| secgroups            | 10                               |
| server-group-members | 10                               |
| server-groups        | 10                               |
| subnet_pools         | -1                               |
| subnets              | 100                              |
+----------------------+----------------------------------+
```

6. 設定 project demo 的 quota，ram 改爲 91260。

```
[root@ip110 ~]<admin># openstack quota set --ram 91260 demo
```

7. 再查看 project demo 的 quota，ram 已改爲 91260。

```
[root@ip110 ~]<admin># openstack quota show demo
+----------------------+----------------------------------+
| Field                | Value                            |
+----------------------+----------------------------------+
| cores                | 80                               |
| fixed-ips            | -1                               |
| floating-ips         | 50                               |
```

```
| health_monitors      | None                             |
| injected-file-size   | 10240                            |
| injected-files       | 5                                |
| injected-path-size   | 255                              |
| instances            | 100                              |
| key-pairs            | 100                              |
| l7_policies          | None                             |
| listeners            | None                             |
| load_balancers       | None                             |
| location             | None                             |
| name                 | None                             |
| networks             | 100                              |
| pools                | None                             |
| ports                | 500                              |
| project              | 0abfdfea73d142d08192aab5cc051642 |
| project_name         | demo                             |
| properties           | 128                              |
| ram                  | 91260                            |
| rbac_policies        | 10                               |
| routers              | 10                               |
| secgroup-rules       | 100                              |
| secgroups            | 10                               |
| server-group-members | 10                               |
| server-groups        | 10                               |
| subnet_pools         | -1                               |
| subnets              | 100                              |
+----------------------+----------------------------------+
```

8. 載入用户 demo 環境變數。

```
[root@ip110 ~]<admin># . demo.token
```

9. 成功新增 instance dyw.master。

```
[root@ip110 ~]<demo># openstack server create --flavor dyw.ce8 --image
    crt28g \
--nic net-id=6ed4de53-ecc1-4c79-a9d2-8e511b26557a \
--security-group default --key-name rsa_key dyw.master
+-----------------------------+------------------------------------------------+

| Field                       | Value
                                |
+-----------------------------+------------------------------------------------+

| OS-DCF:diskConfig           | MANUAL
                                |
| OS-EXT-AZ:availability_zone |
                                |
| OS-EXT-STS:power_state      | NOSTATE
                                |
```

```
| OS-EXT-STS:task_state       | scheduling
                                        |
11 | OS-EXT-STS:vm_state         | building
                                          |
   | OS-SRV-USG:launched_at      | None
                                              |
13 | OS-SRV-USG:terminated_at    | None
                                              |
   | accessIPv4                  |
                                                    |
15 | accessIPv6                  |
                                                    |
   | addresses                   |
                                                    |
17 | adminPass                   | DpZ9GGHKEV2f
                                         |
   | config_drive                |
                                                    |
19 | created                     | 2020-05-24T10:12:30Z
                                       |
   | flavor                      | dyw.ce8 (1)
                                           |
21 | hostId                      |
                                                    |
   | id                          | 51cf276d-244c-45fb-971c-baa73d6cdf7d
              |
23 | image                       | crt28g (215adf1b-237c-4bbf-8739-
     b88bf5237223) |
   | key_name                    | rsa_key
                                                |
25 | name                        | dyw.master
                                          |
   | progress                    | 0
                                                  |
27 | project_id                  | 0abfdfea73d142d08192aab5cc051642
                  |
   | properties                  |
                                                    |
29 | security_groups             | name='7c45a094-326a-4732-82b7-
     aa1c09630c15'    |
   | status                      | BUILD
                                              |
31 | updated                     | 2020-05-24T10:12:30Z
                                       |
   | user_id                     | fdae41299d574ea59fc26bef4793885b
                  |
33 | volumes_attached            |
                                                    |
   +-----------------------------+------------------------------------------------+
```

13.3 新增 Instance ERROR 2

1. 新增 instance 時，狀態 ERROR，查詢 log，只有 manager.py, config.py, ... 等 python 程式回應錯誤。

```
[root@ip110 ~]<demo># grep -m1 ERROR.*site /var/log/nova/nova-compute.
    log
2020-05-26 08:00:31.520 141464 ERROR nova.compute.manager [instance:
dce5c044-ebb5-465b-8225-0ad48861902c]   File "/usr/lib/python2.7/site-
    packages/
nova/compute/manager.py", line 2239, in _build_resources
```

2. log 查無其他問題，但就是 openstack server create 新增 instance，狀態一直是 ERROR。問題爲 /usr/lib/python2.7/site-packages/nova/virt/libvirt 目錄中的 driver.py 及 config.py 修改過，將 nova 相關的套件□版或重安裝，成功新增 instance。

```
[root@ip110 ~]<demo># yum downgrade python-nova openstack-nova-*

[root@ip110 ~]<demo># rpm -qa | grep nova
python-nova-17.0.6-1.el7.noarch
openstack-nova-placement-api-17.0.6-1.el7.noarch
openstack-nova-scheduler-17.0.6-1.el7.noarch
openstack-nova-console-17.0.6-1.el7.noarch
openstack-nova-spicehtml5proxy-17.0.6-1.el7.noarch
python2-novaclient-10.1.0-1.el7.noarch
openstack-nova-compute-17.0.6-1.el7.noarch
openstack-nova-novncproxy-17.0.6-1.el7.noarch
openstack-nova-api-17.0.6-1.el7.noarch
openstack-nova-common-17.0.6-1.el7.noarch
openstack-nova-conductor-17.0.6-1.el7.noarch
```

13.4 Rebuild Instance ERROR

1. Rebuild instance 時，狀態 ERROR，查詢 log 有 Virtual Interface creation failed 錯誤。

```
[root@ip110 ~]<demo># grep -m1 'ERR.*VirtualInterface.*failed' /var/log/
    nova/nova-compute.log
2020-07-23 08:34:48.447 190023 ERROR nova.compute.resource_tracker
[req-39c24936-3b1a-4401-8a6d-9be3d02a9fd7
    fdae41299d574ea59fc26bef4793885b
0abfdfea73d142d08192aab5cc051642 - default default]
```

```
[instance: a5f03d78-4436-4c0e-ad24-4dc0a6553700] Failed to clean
    allocation
 of evacuated instance on the destination node
516b5a65-f23c-493a-8484-c2c05dace512:
 VirtualInterfaceCreateException: Virtual Interface creation failed
```

2. 解決方式：在 /etc/nova/nova.conf 配置檔，增加兩項設定。

```
[root@ip110 ~]# egrep '^(\[DEF|vif)' /etc/nova/nova.conf
[DEFAULT]
vif_plugging_is_fatal = False
vif_plugging_timeout = 0
```

3. 重新啓動 openstack-nova 相關的服務。

```
[root@ip110 ~]# systemctl restart openstack-nova-*
```

Chapter 14

AMPQ 問題解決

14.1 AMQP ERROR

1. AMQP server 無法連線，錯誤訊息中 user openstack 無法登入。

```
[root@controller ~]# grep -i error /var/log/nova/nova-scheduler.log

MessageDeliveryFailure: Unable to connect to AMQP server on controller
    :5672 after
None tries: (0, 0): (403) ACCESS_REFUSED - Login was refused using
    authentication
mechanism AMQPLAIN. For details see the broker logfile.

[root@controller ~]# tail /var/log/rabbitmq/rabbit@controller.log

=INFO REPORT==== 26-May-2018::20:18:00 ===
Connection <0.3526.1> (163.17.10.112:45272 -> 163.17.10.112:5672) has a
    client-provided
name: nova-compute:99477:d58489ed-f453-4fc6-b3bb-60334e49cb87

=ERROR REPORT==== 26-May-2018::20:18:00 ===
Error on AMQP connection <0.3526.1> (163.17.10.112:45272 ->
    163.17.10.112:5672, state: starting):
AMQPLAIN login refused: user 'openstack' - invalid credentials

=INFO REPORT==== 26-May-2018::20:18:00 ===
closing AMQP connection <0.3526.1> (163.17.10.112:45272 ->
    163.17.10.112:5672 -
nova-compute:99477:d58489ed-f453-4fc6-b3bb-60334e49cb87)
```

2. rabbitmqctl 列出 user，只有 guest，沒有 openstack。

```
[root@controller ~]# rabbitmqctl list_users
Listing users ...
guest   [administrator]
```

3. rabbitmqctl 新增 user openstack。

```
[root@controller ~]# rabbitmqctl add_user openstack 123qwe
Creating user "openstack" ...
[root@controller ~]# rabbitmq list_users
-bash: rabbitmq: command not found
[root@controller ~]# rabbitmqctl list_users
Listing users ...
openstack    []
guest    [administrator]
```

4. 重新啓動 neutron-l3-agent，再查看 log，訊息是 user openstack 拒絕存取。

```
[root@controller ~]# systemctl restart neutron-l3-agent.service
[root@controller ~]# tail /var/log/rabbitmq/rabbit@controller.log

=ERROR REPORT==== 26-May-2018::20:23:06 ===
Error on AMQP connection <0.6189.1> (163.17.10.112:47618 ->
    163.17.10.112:5672 -
nova-conductor:104133:d627cecc-52f8-47b8-a30c-41d37a474ebd, user: '
    openstack', state: opening):
access to vhost '/' refused for user 'openstack'
[root@controller ~]# systemctl restart neutron-l3-agent.service
[root@controller ~]# tail /var/log/rabbitmq/rabbit@controller.log

=INFO REPORT==== 26-May-2018::20:23:06 ===
Connection <0.6189.1> (163.17.10.112:47618 -> 163.17.10.112:5672) has a
    client-provided
name: nova-conductor:104133:d627cecc-52f8-47b8-a30c-41d37a474ebd

=ERROR REPORT==== 26-May-2018::20:23:06 ===
Error on AMQP connection <0.6189.1> (163.17.10.112:47618 ->
    163.17.10.112:5672 -
nova-conductor:104133:d627cecc-52f8-47b8-a30c-41d37a474ebd, user: '
    openstack', state: opening):
access to vhost '/' refused for user 'openstack'

=INFO REPORT==== 26-May-2018::20:23:06 ===
closing AMQP connection <0.6189.1> (163.17.10.112:47618 ->
    163.17.10.112:5672 -
nova-conductor:104133:d627cecc-52f8-47b8-a30c-41d37a474ebd)
```

5. rabbitmqctl 新增 user openstack 存取權。

```
[root@controller ~]# . admin.token
[root@controller ~]# rabbitmqctl set_permissions openstack ".*" ".*"
    ".*"
Setting permissions for user "openstack" in vhost "/" ...
```

6. 重新啓動 neutron-l3-agent，再查看 log，已正常連線。

```
[root@controller ~]# systemctl restart neutron-l3-agent.service
[root@controller ~]# tail /var/log/rabbitmq/rabbit@controller.log
accepting AMQP connection <0.8705.1> (163.17.10.112:48866 ->
    163.17.10.112:5672)

=INFO REPORT==== 26-May-2018::20:25:39 ===
Connection <0.8705.1> (163.17.10.112:48866 -> 163.17.10.112:5672) has a
    client-provided
name: nova-conductor:106769:310eab3b-768d-43df-981c-6af4d8286e88

=INFO REPORT==== 26-May-2018::20:25:40 ===
accepting AMQP connection <0.8723.1> (163.17.10.112:48870 ->
    163.17.10.112:5672)

=INFO REPORT==== 26-May-2018::20:25:40 ===
Connection <0.8723.1> (163.17.10.112:48870 -> 163.17.10.112:5672) has a
    client-provided
name: nova-conductor:106771:046fa1d3-4c17-486c-8aed-5b26d84109ed
```

14.2 AMQP Server Unreachable

1. 新增 instance 時，狀態 ERROR，查詢 log，AMQP server on ip110:5672 is unreachable。

```
[root@ip110 ~]<demo># grep -m1 AMQP /var/log/nova/nova-api.log
2020-05-27 08:52:56.753 181993 ERROR oslo.messaging._drivers.impl_rabbit
[req-b7e43d4c-7134-4baa-8b2b-97825e947326
    fdae41299d574ea59fc26bef4793885b
0abfdfea73d142d08192aab5cc051642 - default default]
[1fe95ac0-bc0b-4873-b169-52bfa1fa929c] AMQP server on ip110:5672 is
    unreachable:
 [Errno 32] Broken pipe. Trying again in 1 seconds.
Client port: 4306: error: [Errno 32] Broken pipe
```

2. telnet 連線 ip110 的 5672 port，連線成功，表示 AMQP server 運作正常，也防火牆沒擋。

```
[root@ip110 ~]<demo># telnet ip110 5672
Trying 163.17.10.110...
Connected to ip110.
Escape character is '^]'.

Connection closed by foreign host.
```

3. 查詢 nova.conf 的連線帳號爲 openstack，密碼 xxxxxx。

```
[root@ip110 ~]<demo># grep rabbit: /etc/nova/nova.conf
transport_url=rabbit://openstack:xxxxxx@ip110
```

4. 重新設定 openstack 的密碼。

```
[root@ip110 ~]<demo># rabbitmqctl change_password openstack xxxxxx
```

5. 重新設定 openstack 的密碼還是無效，刪除帳號 openstack，重新產生並設定權限。

```
[root@ip110 ~]<demo># rabbitmqctl add_user openstack xxxxxx
[root@ip110 ~]<demo># rabbitmqctl set_permissions openstack ".*" ".*"
    ".*"
```

6. 重新啓動 rabbitmq-server 服務，成功解決問題。

```
[root@ip110 ~]<demo># systemctl restart rabbitmq-server.service
```

Chapter 15

其他問題解決

15.1 問題：無法刪除 network

1. 使用 openstack network delete network-id 無法刪除 network，訊息如下：

```
[root@controller ~]# openstack network delete 21cfc7b1-5a8e-4775-84dd-83
    b872b46cab
Failed to delete network with name or ID '21cfc7b1-5a8e-4775-84dd-83
    b872b46cab':
Unable to delete Network for openstack.network.v2.network.Network(
    provider:physical_network=None,
 ipv6_address_scope=None, revision_number=3, port_security_enabled=True,
      mtu=1450,
id=21cfc7b1-5a8e-4775-84dd-83b872b46cab, router:external=False,
    availability_zone_hints=[],
availability_zones=[u'nova'], ipv4_address_scope=None, shared=False,
project_id=92d1ec3e04384ad599c1a8f5aed73663, status=ACTIVE,
subnets=[u'538a1fa1-0570-4422-96a5-8be33f9d02e0'], description=, tags
    =[],
updated_at=2018-05-25T12:28:23Z, provider:segmentation_id=56, name=
    selfservice,
admin_state_up=True, created_at=2018-05-25T12:19:45Z, provider:
    network_type=vxlan)
1 of 1 networks failed to delete.
```

2. 原因爲 network 下有 subnet，subnet 下有 port，其中 route-gateway 是必要的 port，但這個 port 無法使用 openstack port delete port-id 刪除，必須以 clean 清除。解決步驟如下：

   (a) 查詢 port，要移除的是 53bc7576-bcee-4ad4-ae06-d18d9be372a2。

```
[root@controller ~]# neutron router-list
neutron CLI is deprecated and will be removed in the future. Use
    openstack CLI instead.
```

```
3 +--------------------------------------+--------+----------------------------------
  | id                                   | name   | tenant_id
                          |
5 +--------------------------------------+--------+----------------------------------
  | 53bc7576-bcee-4ad4-ae06-d18d9be372a2 | router | 92
    d1ec3e04384ad599c1a8f5aed73663 |
7 +--------------------------------------+--------+----------------------------------
```

(b) 使用 neutron route-gateway-clear 移除 53bc7576-bcee-4ad4-ae06-d18d9be372a2。

```
1 [root@controller ~]# neutron router-gateway-clear 53bc7576-bcee-4
    ad4-ae06-d18d9be372a2
  neutron CLI is deprecated and will be removed in the future. Use
    openstack CLI instead.
3 Removed gateway from router 53bc7576-bcee-4ad4-ae06-d18d9be372a2
```

(c) 查詢 subnet id 是 538a1fa1-0570-4422-96a5-8be33f9d02e0。

```
1 [root@controller ~]# openstack subnet list
  +--------------------------------------+-------------+
3 | ID                                   | Name        |
  +--------------------------------------+-------------+
5 | 37adab37-d710-406f-bdfa-66c2a4d13203 | selfservice |
  | 538a1fa1-0570-4422-96a5-8be33f9d02e0 | provider    |
7 +--------------------------------------+-------------+
  --------------------------------------+-----------------+
9  Network                              | Subnet          |
  --------------------------------------+-----------------+
11 3d2fe8f3-6871-4072-8688-4c83f597cda1 | 172.16.1.0/24   |
   21cfc7b1-5a8e-4775-84dd-83b872b46cab | 192.168.10.0/24 |
13 --------------------------------------+-----------------+
```

(d) 刪除 subnet 538a1fa1-0570-4422-96a5-8be33f9d02e0。

```
1 [root@controller ~]# openstack subnet delete 538a1fa1-0570-4422-96
    a5-8be33f9d02e0
```

(e) 查詢要刪除的 network provider 已無 subnet，其 id 是 21cfc7b1-5a8e-4775-84dd-83b872b46cab。

```
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Subnets
                                |
+--------------------------------------+-------------+--------------------------------------
| 21cfc7b1-5a8e-4775-84dd-83b872b46cab | provider    |
                                       |
| 3d2fe8f3-6871-4072-8688-4c83f597cda1 | selfservice | 37adab37-
   d710-406f-bdfa-66c2a4d13203 |
+--------------------------------------+-------------+--------------------------------------
```

(f) 刪除 network 21cfc7b1-5a8e-4775-84dd-83b872b46cab。

```
[root@controller ~]# openstack network delete 21cfc7b1-5a8e-4775-84
   dd-83b872b46cab
```

(g) 再列出 network，provider 已刪除。

```
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Subnets
                                |
+--------------------------------------+-------------+--------------------------------------
| 3d2fe8f3-6871-4072-8688-4c83f597cda1 | selfservice | 37adab37-
   d710-406f-bdfa-66c2a4d13203 |
+--------------------------------------+-------------+--------------------------------------
```

15.2 刪除 network

1. 要刪除網路 selfservice 是用户 demo 創建，所以先載入用户 demo 的環境變數。

```
[root@controller ~]# . demo.token
```

2. 要刪除網路是 selfservice。

```
[root@controller ~]# openstack network list
+--------------------------------------+-------------+--------------------------------------
| ID                                   | Name        | Subnets
                                |
+--------------------------------------+-------------+--------------------------------------
| 3d2fe8f3-6871-4072-8688-4c83f597cda1 | selfservice | 37adab37-d710-406
    f-bdfa-66c2a4d13203 |
+--------------------------------------+-------------+--------------------------------------
\end{enumerate}
\item 列出 ports，兩個 ports 於 subnet 37adab37-d710-406f-bdfa-66
    c2a4d13203，這是 selfservice 的 subnet。
\begin{myverbatim}
[root@controller ~]# openstack port list
+--------------------------------------+------+-------------------+-------------------
| ID                                   | Name | MAC Address       |
    Fixed IP Addresses
+--------------------------------------+------+-------------------+-------------------
| 92485f50-e5c0-471a-9f24-ba1355d0f36c |      | fa:16:3e:de:db:25 |
    ip_address='172.16.1.2',
| b1ba39ec-4646-46b6-850c-13ab5cfd9c3f |      | fa:16:3e:ea:66:23 |
    ip_address='172.16.1.1',
+--------------------------------------+------+-------------------+-------------------
-----------------------------------------------------+--------+
                                                     | Status |
-----------------------------------------------------+--------+
 subnet_id='37adab37-d710-406f-bdfa-66c2a4d13203' | ACTIVE |
 subnet_id='37adab37-d710-406f-bdfa-66c2a4d13203' | ACTIVE |
-----------------------------------------------------+--------+
\end{enumerate}
\item 以 port delete 刪除 port，port b1ba39ec-4646-46b6-850c-13
    ab5cfd9c3f 無法刪除，原於是其爲 router 的 gateway。
\begin{myverbatim}
[root@controller ~]# openstack port delete 92485f50-e5c0-471a-9f24-
    ba1355d0f36c
[root@controller ~]# openstack port delete b1ba39ec-4646-46b6-850c-13
    ab5cfd9c3f
Failed to delete port with name or ID 'b1ba39ec-4646-46b6-850c-13
    ab5cfd9c3f':
Unable to delete Port for openstack.network.v2.port.Port(status=BUILD,
created_at=2018-05-25T12:29:00Z, description=, allowed_address_pairs=[],
     tags=[],
network_id=3d2fe8f3-6871-4072-8688-4c83f597cda1, tenant_id=92
    d1ec3e04384ad599c1a8f5aed73663,
extra_dhcp_opts=[], admin_state_up=True, updated_at=2018-05-26T04:23:50Z
    , name=,
device_owner=network:router_interface, revision_number=15, mac_address=
    fa:16:3e:ea:66:23,
port_security_enabled=False, binding:vnic_type=normal, fixed_ips=[{u'
```

```
    subnet_id':
u'37adab37-d710-406f-bdfa-66c2a4d13203', u'ip_address': u'172.16.1.1'}],
id=b1ba39ec-4646-46b6-850c-13ab5cfd9c3f, security_groups=[],
device_id=53bc7576-bcee-4ad4-ae06-d18d9be372a2)
1 of 1 ports failed to delete.
\end{enumerate}
\item router list 列出 router，但一樣無法刪除。
\begin{myverbatim}
[root@controller ~]# openstack router list
+--------------------------------------+--------+--------+-------+-------------+-------

| ID                                   | Name   | Status | State |
    Distributed | HA    | Project                          |
+--------------------------------------+--------+--------+-------+-------------+-------

| 53bc7576-bcee-4ad4-ae06-d18d9be372a2 | router | ACTIVE | UP    | False
          | False | 92d1ec3e04384ad599c1a8f5aed73663 |
+--------------------------------------+--------+--------+-------+-------------+-------

[root@controller ~]# openstack router delete 53bc7576-bcee-4ad4-ae06-
    d18d9be372a2
Failed to delete router with name or ID '53bc7576-bcee-4ad4-ae06-
    d18d9be372a2':
Unable to delete Router for openstack.network.v2.router.Router(status=
    ACTIVE,
external_gateway_info=None, availability_zone_hints=[],
    availability_zones=[u'nova'],
description=, tags=[], tenant_id=92d1ec3e04384ad599c1a8f5aed73663,
created_at=2018-05-25T12:28:46Z, admin_state_up=True, updated_at
    =2018-05-26T01:37:32Z,
flavor_id=None, routes=[], revision=7, id=53bc7576-bcee-4ad4-ae06-
    d18d9be372a2, name=router)
1 of 1 routers failed to delete.
\end{enumerate}
\item router 先 unset gateway。
\begin{myverbatim}
[root@controller ~]# openstack router unset --external-gateway 53bc7576-
    bcee-4ad4-ae06-d18d9be372a2
\end{enumerate}
\item 再查一下 ports，除原無法刪除的 b1ba39ec-4646-46b6-850c-13
    ab5cfd9c3f，又自動生成 e34033f0-dfef-40d5-933d-b7a5584cca94。
\begin{myverbatim}
[root@controller ~]# openstack port list
+--------------------------------------+------+-------------------+-------------------

| ID                                   | Name | MAC Address       |
    Fixed IP Addresses
+--------------------------------------+------+-------------------+-------------------

| b1ba39ec-4646-46b6-850c-13ab5cfd9c3f |      | fa:16:3e:ea:66:23 |
    ip_address='172.16.1.1',
| e34033f0-dfef-40d5-933d-b7a5584cca94 |      | fa:16:3e:68:a3:d2 |
    ip_address='172.16.1.2',
+--------------------------------------+------+-------------------+-------------------
```

```
+--------------------------------------------------+--------+
                                                   | Status |
+--------------------------------------------------+--------+
 subnet_id='37adab37-d710-406f-bdfa-66c2a4d13203' | BUILD  |
 subnet_id='37adab37-d710-406f-bdfa-66c2a4d13203' | BUILD  |
+--------------------------------------------------+--------+
\end{enumerate}
\item 將 port b1ba39ec-4646-46b6-850c-13ab5cfd9c3f 從 router b1ba39ec
   -4646-46b6-850c-13ab5cfd9c3f 中移除。
\begin{myverbatim}
[root@controller ~]# openstack router remove port 53bc7576-bcee-4ad4-
   ae06-d18d9be372a2 b1ba39ec-4646-46b6-850c-13ab5cfd9c3f
\end{enumerate}
\item 再查一下 ports，只剩剛剛生成 e34033f0-dfef-40d5-933d-b7a5584cca94
   。
\begin{myverbatim}
[root@controller ~]# openstack port list
+--------------------------------------+------+-------------------+-------------------
| ID                                   | Name | MAC Address       |
   Fixed IP Addresses
+--------------------------------------+------+-------------------+-------------------
| e34033f0-dfef-40d5-933d-b7a5584cca94 |      | fa:16:3e:68:a3:d2 |
   ip_address='172.16.1.2',
+--------------------------------------+------+-------------------+-------------------
+--------------------------------------------------+--------+
                                                   | Status |
+--------------------------------------------------+--------+
 subnet_id='37adab37-d710-406f-bdfa-66c2a4d13203' | BUILD  |
+--------------------------------------------------+--------+
\end{enumerate}
\item port e34033f0-dfef-40d5-933d-b7a5584cca94 不是 gateway，直接以
   port delete 刪除，直到沒有列出 port。
\begin{myverbatim}
[root@controller ~]# openstack port delete e34033f0-dfef-40d5-933d-
   b7a5584cca94
[root@controller ~]# openstack port list
\end{enumerate}
\item 查詢 subnet id 37adab37-d710-406f-bdfa-66c2a4d13203。
\begin{myverbatim}
[root@controller ~]# openstack subnet list
+--------------------------------------+-------------+-------------------------------
| ID                                   | Name        | Network
                                  | Subnet        |
+--------------------------------------+-------------+-------------------------------
| 37adab37-d710-406f-bdfa-66c2a4d13203 | selfservice | 3d2fe8f3
   -6871-4072-8688-4c83f597cda1 | 172.16.1.0/24 |
+--------------------------------------+-------------+-------------------------------
```

```
\end{enumerate}
\item 刪除 subnet 37adab37-d710-406f-bdfa-66c2a4d13203。
\begin{myverbatim}
[root@controller ~]# openstack subnet delete 37adab37-d710-406f-bdfa-66
    c2a4d13203
\end{enumerate}
\item 查詢 network id 是 3d2fe8f3-6871-4072-8688-4c83f597cda1。
\begin{myverbatim}
[root@controller ~]# openstack network list
+--------------------------------------+-------------+---------+
| ID                                   | Name        | Subnets |
+--------------------------------------+-------------+---------+
| 3d2fe8f3-6871-4072-8688-4c83f597cda1 | selfservice |         |
+--------------------------------------+-------------+---------+
\end{enumerate}
\item 刪除 network 3d2fe8f3-6871-4072-8688-4c83f597cda1。
\begin{myverbatim}
[root@controller ~]# openstack network delete 3d2fe8f3-6871-4072-8688-4
    c83f597cda1
\end{enumerate}
\item 再查 network 已是空的。
\begin{myverbatim}
[root@controller ~]# openstack network list
```

15.3 刪除 keypair

1. 載入管理者 admin 環境變變數。

```
[root@controller ~]# . admin.token
```

2. openstack 有 mykey 的金鑰對。

```
[root@controller ~]# openstack keypair list
+-------+-------------------------------------------------+
| Name  | Fingerprint                                     |
+-------+-------------------------------------------------+
| mykey | 2d:0a:a2:58:e1:e7:f6:bd:55:c8:6f:27:9d:64:be:d9 |
+-------+-------------------------------------------------+
```

3. 刪除 keypair mykey。

```
[root@controller ~]# openstack keypair delete mykey
```

4. 沒有任何 keypair。

```
[root@controller ~]# openstack keypair list
```

15.4 Dracut ERROR

1. CentOS 7 的 Instance 啓動時出現如下訊息，無法開機。

```
[...] Warning: dracut-initqueue timeout - starting timeout scripts
```

2. 原因是 Instance 使用的原始 Image 是 Xen (libvirt) Host，要使用 KVM 開機時，initramfs 檔中沒有 virt 相關的驅動程式，所以無法開機。解決方式：回到原始來源 Image 的系統，將 virt 相關的驅動程式加入 initramfs。

3. 找到目前版本核心中的 virt 相關的模組

```
[root@esm ~]# find /lib/modules/3.10.0-514.el7.x86_64/\
kernel/drivers/ -name *virt*.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/block/virtio_blk.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/char/hw_random/virtio-
    rng.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/char/virtio_console.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/dma/virt-dma.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/gpu/drm/virtio/virtio-
    gpu.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/net/virtio_net.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/scsi/virtio_scsi.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_balloon.
    ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_input.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_pci.ko
/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_ring.ko
```

4. 加入找到 virt 相關模組重新產生並覆蓋原來的 initramfs。

```
[root@esm ~]# dracut --add-drivers \
"`find /lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/ \
-name *virt*.ko | sed 's|.*/||g'`" --force
```

5. 檢查新產生的 initramfs 已包含 virt 相關模組。

```
[root@esm ~]# zcat /boot/initramfs-3.10.0-514.el7.x86_64.img | cpio -t |
    grep virt
usr/bin/systemd-detect-virt
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_ring.
    ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/
    virtio_balloon.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_input
    .ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/virtio/virtio_pci.
    ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/block/virtio_blk.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/char/hw_random/
    virtio-rng.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/char/virtio_console
    .ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/dma/virt-dma.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/gpu/drm/virtio
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/gpu/drm/virtio/
    virtio-gpu.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/net/virtio_net.ko
usr/lib/modules/3.10.0-514.el7.x86_64/kernel/drivers/scsi/virtio_scsi.ko
88917 blocks
```

15.5 Nested Virtualization

1. 先確定 Openstack 主機 nested kvm ENABLE。

```
[root@controller ~]# cat /sys/module/kvm_intel/parameters/nested
Y
```

2. nova.conf 的 virt_type=kvm 而且 cpu_mode=host-passthrough。

```
[root@controller ~]# vim /etc/nova/nova.conf
[root@controller ~]# egrep '^(virt|cpu)_' /etc/nova/nova.conf
virt_type=kvm
cpu_mode=host-passthrough
```

3. 重新啓動 openstack-nova 相關服務。

```
[root@controller ~]# systemctl restart openstack-nova-*
```

4. instance crt2 先關機。

```
[root@controller ~]# openstack server stop crt2
```

5. instance crt2 安裝時使用的 cpu mode 是 host-modle，將其修改爲 host-passthrough。

```
[root@controller ~]# vim /etc/libvirt/qemu/instance-00000017.xml
[root@controller ~]# grep 'cpu mode' /etc/libvirt/qemu/instance
    -00000017.xml
  <cpu mode='host-passthrough' check='none'>
```

6. instance crt2 開機。

```
[root@controller ~]# openstack server start crt2
```

7. 登入 instance crt2，查看 CPU 訊息，Virtualization: VT-x 表示支援虛擬化技術。

```
[root@dywmac ~]# ssh -X 163.17.xx.xxx
[root@deyu ~]# lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                4
On-line CPU(s) list:   0-3
Thread(s) per core:    1
Core(s) per socket:    1
Socket(s):             4
NUMA node(s):          1
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 63
Stepping:              2
CPU MHz:               2299.996
BogoMIPS:              4599.99
Virtualization:        VT-x
Hypervisor vendor:     KVM
Virtualization type:   full
L1d cache:             32K
L1i cache:             32K
```

```
23 L2 cache:              4096K
   L3 cache:              16384K
25 NUMA node0 CPU(s):     0-3
```

Part II

DYW Linux 6 + Grizzly

Chapter 16

前言

16.1 認識 Openstack

1. OpenStack 由好幾個不同的功能的雲端服務套件所構成的開源雲端軟體。
2. 目前共有 7 個功能不同的套件：
   (a) 身分識別套件 Keystone：具有中央目錄，能查看哪位使用者可存取哪些服務，並且，提供了多種驗證方式。
   (b) 物件儲存套件 Swift：可擴展的分布式儲存平臺，以防止單點故障的情況產生，可存放非結構化的資料。
   (c) 映象檔管理套件 Glance：硬碟或伺服器的映象檔尋找、註冊以及服務交付等功能。
   (d) 區塊儲存套件 Cinder：整合了運算套件，可讓 IT 人員查看儲存設備的容量使用狀態，具有快照功能。
   (e) 網通套件 Quantum：可擴展、隨插即用，透過 API 來管理的網路架構系統，以確保 IT 人員在部署雲端服務時，網路服務不會出現瓶頸，或是成爲無法部署的因素之一。
   (f) 運算套件 Nova：部署與管理虛擬機器的功能
   (g) 提供管理介面的儀表板套件 Horizon：圖形化的網頁介面，讓 IT 人員可以綜觀雲端服務目前的規模與狀態，並能夠統一存取、部署與管理所有雲端服務所使用到的資源。
3. 可依照自己的需求安裝套件，並非每個套件皆要安裝。
4. OpenStack 每個版本都有不同的名稱：

(a) 2010 年 10 月，OpenStack 第一版誕生，名爲 Austin，這個版本僅有運算套件 Nova 與物件儲存套件 Swift。

(b) 2013 年 4 月釋出安全性支援的穩定版 Grizzly

(c) 2013 年 12 月版本 Havana，爲目前最新的穩定版本。

(d) 2014 年發展版爲 Icehouse

5. 本文件實作以 Grizzly 版本進行雲端架設。

16.2 環境說明

1. 作業系統：DYW Linux (以 CentOS 爲基礎)。

2. Grizzly 套件已納入 DWY Linux YUM server http:// dywang.csie.cyut.edu.tw/centos6，設定 YUM 如下：

```
[root@kvm7 ~]# vim /etc/yum.repos.d/dywang.repo
[dywang]
name=DE-YU WANG
baseurl=http://dywang.csie.cyut.edu.tw/centos6
gpgcheck=0
enabled=1
```

3. 下載 DYW Linux，安裝在 64 G 以上的硬碟。

4. Openstack 各個服務可獨立安裝在不同的電腦。

5. 若作業系統無其他用途，可不使用虛擬機架設 Openstack。

6. 本文件實作環境，使用 KVM 虛擬機，且所有服務皆安裝此虛擬機。

(a) 虛擬機安裝硬碟 32G。

(b) 增加 /dev/vdb /dev/vdc 各 1G 的硬碟。

(c) 單一網卡，實際使用時建議使用 2 張網卡。

(d) 記憶體 RAM 最少 3G。

(e) CPU CORE 數最少 2，這裡用 4。

7. 虛擬機安裝指令如下：

```
virt-install --accelerate --name osusb --ram 3072 --vcpus 4\
--disk path=/var/lib/libvirt/images/osusb.qcow2,format=qcow2,size=32,bus
    =virtio \
--extra "ks=ftp://192.168.122.1/pub/centos6/add/os-ks.cfg" \
--location=ftp://192.168.122.1/pub/centos6/ \
--disk path=/var/lib/libvirt/images/vdb.ovl,format=qcow2,size=1,bus=
    virtio \
--disk path=/var/lib/libvirt/images/vdc.ovl,format=qcow2,size=1,bus=
    virtio
```

Chapter 17

訊息代理 QPID

17.1 認識 QPID

1. 訊息安全有兩個方式：

   (a) 使用者帳號及密碼認證，才能使用 Openstack 的服務。

   (b) 使用 SSL 加密通訊資料，以增加安全性。

2. Openstack 服務使用 Qpid 訊息系統進行安全的資料通訊。

17.2 QPID 安裝

1. 安裝套件

```
[root@kvm4 ~]# yum install -y qpid-cpp-server qpid-cpp-server-ssl cyrus-
    sasl-md5 nss-tools
```

2. 產生 Simple Authentication and Security Layer（SASL）使用者帳號及密碼

```
1 [root@kvm4 ~]# saslpasswd2 -f /var/lib/qpidd/qpidd.sasldb -u QPID
    qpidauth
Password: 123qwe
3 Again (for verification): 123qwe
```

3. 確認 SASL 使用者帳號

```
[root@kvm4 ~]# sasldblistusers2 -f /var/lib/qpidd/qpidd.sasldb
qpidauth@QPID: userPassword
```

4. 設定使用者 qpidauth 認證

```
[root@kvm4 ~]# echo 'acl allow qpidauth@QPID all all' > /etc/qpid/
    qpidauth.acl
[root@kvm4 ~]# echo "QPIDD_OPTIONS='--acl-file /etc/qpid/qpidauth.acl'"
    >> /etc/sysconfig/qpidd
[root@kvm4 ~]# chown qpidd /etc/qpid/qpidauth.acl
[root@kvm4 ~]# chmod 600 /etc/qpid/qpidauth.acl
```

5. 不允許匿名者連線

```
[root@kvm4 ~]# sed -i 's/\(^cluster.* \)\(ANONYMOUS\)/\1#\2/' /etc/qpidd
    .conf
[root@kvm4 ~]# grep ANONYMOUS -A1 /etc/qpidd.conf
cluster-mechanism=DIGEST-MD5 #ANONYMOUS
auth=yes
```

6. 建立 Qpid 認證目錄

```
[root@kvm4 ~]# mkdir /etc/pki/tls/qpid
[root@kvm4 ~]# chmod 700 /etc/pki/tls/qpid
[root@kvm4 ~]# chown qpidd /etc/pki/tls/qpid
```

7. 產生 Qpid 認證密碼

```
[root@kvm4 ~]# echo '123qwe' > /etc/qpid/qpid.pass
[root@kvm4 ~]# chmod 600 /etc/qpid/qpid.pass
[root@kvm4 ~]# chown qpidd /etc/qpid/qpid.pass
```

8. 產生 Qpid 認證資料庫，其中命令選項：
   -N 產生新的認證，後接 -d 指定目錄 -f 指定密碼檔案

-S 建立認證並加入資料庫

```
[root@kvm4 ~]# echo $HOSTNAME
kvm4.deyu.wang
[root@kvm4 ~]# certutil -N -d /etc/pki/tls/qpid/ -f /etc/qpid/qpid.pass
[root@kvm4 ~]# certutil -S -d /etc/pki/tls/qpid/ -n $HOSTNAME \
-s "CN=$HOSTNAME" -t "CT,," -x -f /etc/qpid/qpid.pass -z /usr/bin/
    certutil

Generating key.  This may take a few moments...
```

9. 確認使用者 qpidd 可使用 Qpid 認證目錄

```
[root@kvm4 ~]# chown -R qpidd /etc/pki/tls/qpid/
```

10. 修改 /etc/qpidd.conf 設定檔

```
[root@kvm4 ~]# chown -R qpidd /etc/pki/tls/qpid/
[root@kvm4 ~]# cat >> /etc/qpidd.conf << EOF
> ssl-cert-db=/etc/pki/tls/qpid/
> ssl-cert-name=$HOSTNAME
> ssl-cert-password-file=/etc/qpid/qpid.pass
> require-encryption=yes
> EOF
```

11. 啓動並設定開機啓動 qpidd 服務

```
[root@kvm4 ~]# /etc/init.d/qpidd start
Starting Qpid AMQP daemon:                                 [  OK  ]
[root@kvm4 ~]# chkconfig qpidd on
```

Chapter 18

身份識別 Keystone

18.1 認識 Keystone

1. Keystone 服務提供身份識別、服務規則及服務令牌 (Token)。
2. Keystone 是整個 Openstack 的註册表，其他服務經由 keystone 來註册其 Endpoint（服務存取的 URL）。
3. 任何服務之間相互作用，都需要經由 Keystone 的身份驗證，以獲得目標服務的 Endpoint。
4. Keystone 基本概念
   (a) User，用户：可以經由 keystone 認證，進而存取各服務的用户或程序。
   (b) Tenant，租户：各個服務中一些可以存取的資合集合。例如，在 Nova 中一個 tenant 可以是一些電腦，在 Swift 和 Glance 中一個 tenant 可以是一些儲存裝置，在 Quantum 中一個 tenant 可以是一些網路資源。
   (c) Role，角色：用户可以存取的資源權限。例如 Nova 中的虛擬機、Glance 中的儲存裝置。用户可以被添加到任意一個全域或租户内的角色中。在全局的角色中，用户的角色權限作用於所有的租户，可以對所有的策户執行角色規定的權限；在租户内的角色，用户僅能在目前租户内執行角色規定的權限。
   (d) Service，服務：如 Nova、Glance、Swift。根據 User，Tenant 和 Role 三個概念，一個服務可以確認目前用户是否具有存取其資源的權限。
   (e) Endpoint，端點：存取一個服務的 URL。

18.2 Keystone 安裝

1. 安裝套件：openstack-selinux 提供 Openstack SELinux 策略。

```
[root@kvm4 ~]# yum install -y openstack-keystone openstack-selinux
```

2. 安裝 openstack 工具，並利用其建立 MySQL 資料庫。

```
[root@kvm4 ~]# yum install -y openstack-utils
[root@kvm4 ~]# openstack-db --init --service keystone
mysql-server is not installed.  Would you like to install it now? (y/n):
    y
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
Setting up Install Process
Resolving Dependencies
.........
Transaction Summary
================================================================================
Install       4 Package(s)
Upgrade       0 Package(s)

Total download size: 10 M
Installed size: 29 M
Is this ok [y/N]: y
Downloading Packages:
....
Complete!
mysqld is not running.  Would you like to start it now? (y/n): y
....
Please report any problems with the /usr/bin/mysqlbug script!

                                                           [  OK  ]
Starting mysqld:                                           [  OK  ]
Since this is a fresh installation of MySQL, please set a password for
   the 'root' mysql user.
Enter new password for 'root' mysql user: 123qwe
Enter new password again: 123qwe
Verified connectivity to MySQL.
Creating 'keystone' database.
Initializing the keystone database, please wait...
Complete!
```

3. 設定 keystone 的 PKI（Public Key Infrastructure），公開金鑰基礎設施。

```
[root@kvm4 ~]# keystone-manage pki_setup --keystone-user keystone --
    keystone-group keystone
Generating RSA private key, 1024 bit long modulus
....++++++
.....................................................++++++
e is 65537 (0x10001)
Generating RSA private key, 1024 bit long modulus
.........++++++
.++++++
e is 65537 (0x10001)
Using configuration from /etc/keystone/ssl/certs/openssl.conf
Check that the request matches the signature
Signature ok
The Subject's Distinguished Name is as follows
countryName           :PRINTABLE:'US'
stateOrProvinceName   :PRINTABLE:'Unset'
localityName          :PRINTABLE:'Unset'
organizationName      :PRINTABLE:'Unset'
commonName            :PRINTABLE:'www.example.com'
Certificate is to be certified until Jan 24 11:38:50 2015 GMT (365 days)

Write out database with 1 new entries
Data Base Updated
```

4. 設定 /etc/keystone/ssl 的用户及群組爲 keystone。

```
[root@kvm4 ~]# chown -R keystone:keystone /etc/keystone/ssl/
```

5. 必須指定環境變數 SERVICE_TOKEN 及 SERVICE_ENDPOINT 才能管理 keystone 服務。

```
[root@kvm4 ~]# export SERVICE_TOKEN=$(openssl rand -hex 10)
[root@kvm4 ~]# export SERVICE_ENDPOINT=http://kvm4.deyu.wang:35357/v2.0
[root@kvm4 ~]# echo $SERVICE_TOKEN > /root/ks_admin_token
[root@kvm4 ~]# cat /root/ks_admin_token
cce1ab806ec81844117c
```

6. 在 /etc/keystone/keystone.conf 中設定管理的 TOKEN 爲剛剛產生的 SERVICE_TOKEN cce1ab806ec81844117c

```
[root@kvm4 ~]# openstack-config --set /etc/keystone/keystone.conf
    DEFAULT admin_token $SERVICE_TOKEN
[root@kvm4 ~]# grep admin_token /etc/keystone/keystone.conf
admin_token = cce1ab806ec81844117c
```

7. 啓動並設定開機啓動 openstack-keystone 服務

```
[root@kvm4 ~]# /etc/init.d/openstack-keystone start
Starting keystone:                                         [  OK  ]
[root@kvm4 ~]# chkconfig openstack-keystone on
```

8. 確認 keystone-all 程序執行中並檢查有無錯誤？

```
[root@kvm4 ~]# ps -ef | grep keystone-all
keystone 19265   1  0 19:49 ?   00:00:00 /usr/bin/python /usr/bin/
    keystone-all \
--config-file /usr/share/keystone/keystone-dist.conf \
--config-file /etc/keystone/keystone.conf
root     19277  1525  0 19:52 pts/0    00:00:00 grep keystone-all
[root@kvm4 ~]# grep ERROR /var/log/keystone/keystone.log
```

9. 產生 keystone 服務，並記下其 id 作爲建立 endpoint 連結服務使用。

```
[root@kvm4 ~]# keystone service-create --name=keystone \
--type=identity --description="Keystone Identity Service"
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |    Keystone Identity Service     |
|      id     | 487d5875de1a47898329fb7b68c718e8 |
|     name    |             keystone             |
|     type    |             identity             |
+-------------+----------------------------------+
```

10. 建立 keystone 服務的 endpoint

```
[root@kvm4 ~]# keystone endpoint-create \
```

```
--service-id 487d5875de1a47898329fb7b68c718e8 \
--publicurl 'http://kvm4.deyu.wang:5000/v2.0' \
--adminurl 'http://kvm4.deyu.wang:35357/v2.0' \
--internalurl 'http://kvm4.deyu.wang:5000/v2.0'
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
|   adminurl  | http://kvm4.deyu.wang:35357/v2.0 |
|      id     | 4b065578e3d74a3c9c9268b01f5a244a |
| internalurl | http://kvm4.deyu.wang:5000/v2.0  |
|  publicurl  | http://kvm4.deyu.wang:5000/v2.0  |
|    region   |            regionOne             |
|  service_id | 487d5875de1a47898329fb7b68c718e8 |
+-------------+----------------------------------+
```

18.3 建立 Keystone 管理者

1. 產生管理用户 admin 及設定密碼。

```
[root@kvm4 ~]# keystone user-create --name admin --pass 123qwe
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | 14613b36f501472abd93caa822477e90 |
|   name   |              admin               |
| tenantId |                                  |
+----------+----------------------------------+
```

2. 產生管理者角色 admin。

```
[root@kvm4 ~]# keystone role-create --name admin
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|    id    | 91f1e2429c614bac8efe19cef39e8e7d |
|   name   |              admin               |
+----------+----------------------------------+
```

3. 產生管理者租户 admin。

```
[root@kvm4 ~]# keystone tenant-create --name admin
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |                                  |
|   enabled   |               True               |
|      id     | a57da7d8a5f944c9b6258d0d91b8dee2 |
|     name    |              admin               |
+-------------+----------------------------------+
```

4. 增加用户 admin 爲角色 admin，租户爲 admin。

```
[root@kvm4 ~]# keystone user-role-add --user admin --role admin --tenant
    admin
```

5. 要存取 openstack 的各項服務，必須先確認身份，爲變換身份方便起見，每一身份皆必須建立自己的身份變數腳本。以下爲管理者的身份變數腳本：

```
[root@kvm4 ~]# cat > /root/keystonerc_admin << EOF
> if [ "\$1" == "" -o "\$1" == 'export' ];then
>     export OS_USERNAME=admin
>     export OS_TENANT_NAME=admin
>     export OS_PASSWORD=123qwe
>     export OS_AUTH_URL=http://kvm4.deyu.wang:35357/v2.0/
>     export PS1='[\u@\h \W(keystone_admin)]\\$ '
> else
>     unset OS_USERNAME
>     unset OS_TENANT_NAME
>     unset OS_PASSWORD
>     unset OS_AUTH_URL
>     export PS1='[\u@\h \W]\\$ '
> fi
> EOF
```

6. 清除 SERVICE_TOKEN 及 SERVICE_ENDPOINT 變數後，沒有 token，無法以 keystone 執行任何命令。

```
[root@kvm4 ~]# unset SERVICE_TOKEN
[root@kvm4 ~]# unset SERVICE_ENDPOINT
[root@kvm4 ~]# keystone user-list
```

```
Expecting authentication method via
  either a service token, --os-token or env[OS_SERVICE_TOKEN],
  or credentials, --os-username or env[OS_USERNAME].
```

7. 執行管理者身份變數腳本，以管理者身份列出目前使用者。

```
[root@kvm4 ~]# source /root/keystonerc_admin
[root@kvm4 ~(keystone_admin)]# keystone user-list
+----------------------------------+-------+---------+-------+
|                id                |  name | enabled | email |
+----------------------------------+-------+---------+-------+
| 14613b36f501472abd93caa822477e90 | admin |   True  |       |
+----------------------------------+-------+---------+-------+
```

18.4 建立一般使用者 myuser

1. 載入 keystone 管理者 admin 環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

2. 產生一般使用者 myuser 及設定密碼。

```
[root@kvm4 ~(keystone_admin)]# keystone user-create --name myuser --pass
    123qwe
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | 9904d73f9a1841fa89381fccd2bc59df |
|   name   |              myuser              |
| tenantId |                                  |
+----------+----------------------------------+
```

3. 產生 member 角色。

```
[root@kvm4 ~(keystone_admin)]# keystone role-create --name member
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|    id    | 1b5a478342bc4f67a83484ce60e0f322 |
|   name   |              member              |
+----------+----------------------------------+
```

4. 產生租户 mytenant。

```
[root@kvm4 ~(keystone_admin)]# keystone tenant-create --name mytenant
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |                                  |
|   enabled   |               True               |
|      id     | 6c26d132e38f4b83a1d9f5a777beeb52 |
|     name    |             mytenant             |
+-------------+----------------------------------+
```

5. 增加用户 myuser 在租户 mytenant 的角色爲 member。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-add --user myuser --
    role member --tenant mytenant
```

6. 建立 myuser 環境變數匯入腳本。

```
[root@kvm4 ~(keystone_admin)]# cat > /root/keystonerc_myuser << EOF
> if [ "\$1" == "" -o "\$1" == 'export' ];then
>     export OS_USERNAME=myuser
>     export OS_TENANT_NAME=mytenant
>     export OS_PASSWORD=123qwe
>     export OS_AUTH_URL=http://kvm4.deyu.wang:35357/v2.0/
>     export PS1='[\u@\h \W(keystone_myuser)]\\$ '
> else
>     unset OS_USERNAME
>     unset OS_TENANT_NAME
>     unset OS_PASSWORD
>     unset OS_AUTH_URL
>     export PS1='[\u@\h \W]\\$ '
> fi
```

```
15 > EOF
```

Chapter 19

物件儲存 Swift

19.1 認識 Swift

1. Swift 服務提供用户諸存物件於虛擬容器中。
2. Swift 支援水平擴展、資料除錯，適用多租用户配置。
3. Swift 基本概念
   (a) Storage replicas，儲存副本：爲保護儲存的物件，每個物件最好設定複製三個以上副本。
   (b) Storage zones，儲存區：爲確保每個物件副件是分開儲存，一個 zone 代表獨立的硬碟、陣列、主機或整個資料中心。
   (c) Storage regions，儲存區域：一組儲存區。
4. Swift 組件
   (a) openstack-swift-proxy，代理服務器：負責將 Swift 架構其餘的部分整合起來。查閱每一個請求位於 ring 上的 account, container, 或者 object，然後對應這個請求的路由。
   (b) openstack-swift-object，物件服務器：用來儲存、檢索和刪除儲存在本地設備上的物件。物件以二進制文件的形式儲存在系統上，數據儲存在文件的擴展屬性（xattrs）中，物件服務器的文件系統支持 xattrs，一些文件系統，例如 ext3 預設 xattrs 是關閉的。每個物件使用物件名稱的 hash 值及操作時間組成的路徑來儲存。
   (c) openstack-swift-container，容器服務器：物件儲存位置列表。這個列表以 sqlite 資料庫形式儲存。
   (d) openstack-swift-account，帳號服務器：與容器服務類似，只是負責列表爲容器，而不是物件。

5. Ring files：包含所有儲存的細節。ring files 產生工具 swift-ring-builder，swift 需要 account, container 和 object 三個 ring files。

6. Ring files 產生必須有三個參數：

   (a) partition power：計算 partition 的數量用，partitions 的數量 = 2 ^ partition power，實作時 partition 的數量設置成磁碟數的 100 倍，會有比較好的效率。例如：預計整個系統不會使用超過 5 個磁碟，partition 數爲 500，則設定 partition power 爲 9（ 2^9=512）。

   (b) replica count：資料在叢集複製的數量，主要是爲了除錯。副本數愈大，用來儲存資料的 partitions 就愈少，同一個 partition，不同的副本，存在不同的 zone。預設副本數爲 3。

   (c) min_part_hours：最小移動間隔。partition 會因某些原因移動數據。爲了避免網路擁塞，partition 不會頻繁的移動。預設最小移動間隔爲 1 小時。

7. Object storage，物件儲存：檔案系統格式必須是 ext4，或是 XFS。掛載點在 /srv/node。

19.2 Swift 安裝

1. 安裝套件

```
[root@kvm4 ~]# yum install -y openstack-swift openstack-swift-proxy \
openstack-swift-object openstack-swift-container \
openstack-swift-account memcached
```

2. 載入管理者環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

3. 產生用户 swift。

```
[root@kvm4 ~(keystone_admin)]# keystone user-create --name swift --pass
    123qwe
+----------+----------------------------------+
```

```
| Property |              Value                |
+----------+-----------------------------------+
|  email   |                                   |
| enabled  |               True                |
|    id    | a863ddc96851437fa48e2a35981c7e1f |
|   name   |              swift                |
| tenantId |                                   |
+----------+-----------------------------------+
```

4. 確認管理者角色存在？

```
[root@kvm4 ~(keystone_admin)]# keystone role-list | grep admin
| 91f1e2429c614bac8efe19cef39e8e7d |  admin   |
```

5. 如果不存在，則必須產生管理者角色

```
[root@kvm4 ~]# keystone role-create --name admin
```

6. 確認租户 services 存在？

```
[root@kvm4 ~(keystone_admin)]# keystone tenant-list | grep services
[root@kvm4 ~(keystone_admin)]#
```

7. 如果不存在，必須產生租户 services。

```
[root@kvm4 ~(keystone_admin)]# keystone tenant-create --name services
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |                                  |
|   enabled   |               True               |
|      id     | da7fe21aa92743f9baa51fd4368e6726 |
|     name    |             services             |
+-------------+----------------------------------+
```

8. 以管理者 admin 角色新增用户 swift 到 services 租户。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-add \
--role admin --tenant services --user swift
```

9. 確認 object store 服務是否存在？

```
[root@kvm4 ~(keystone_admin)]# keystone service-list
+----------------------------------+----------+----------+----------------------------+
|                id                |   name   |   type   |
   description        |
+----------------------------------+----------+----------+----------------------------+
| 487d5875de1a47898329fb7b68c718e8 | keystone | identity | Keystone
   Identity Service |
+----------------------------------+----------+----------+----------------------------+
```

10. 如果 object store 服務不存在，則必須產生並記下其 id，做爲建立 swift endpoint 用。

```
[root@kvm4 ~(keystone_admin)]# keystone service-create \
--name swift --type object-store --description "Swift Storage Service"
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |      Swift Storage Service       |
|      id     | 8133b2b0b179450c9e177f617a228f7a |
|     name    |              swift               |
|     type    |           object-store           |
+-------------+----------------------------------+
```

11. 建立 swift 服務的 endpoint

```
[root@kvm4 ~(keystone_admin)]# keystone endpoint-create \
--service-id 8133b2b0b179450c9e177f617a228f7a \
--publicurl "http://kvm4.deyu.wang:8080/v1/AUTH_%(tenant_id)s" \
--adminurl "http://kvm4.deyu.wang:8080/v1/AUTH_%(tenant_id)s" \
--internalurl "http://kvm4.deyu.wang:8080/v1/AUTH_%(tenant_id)s"
```

```
+-------------+----------------------------------------------------+
|   Property  |                       Value                        |
+-------------+----------------------------------------------------+
|   adminurl  | http://kvm4.deyu.wang:8080/v1/AUTH_%(tenant_id)s |
|      id     |         7fd689cdf42d4dbda513f1fd3ca25244           |
| internalurl | http://kvm4.deyu.wang:8080/v1/AUTH_%(tenant_id)s |
|  publicurl  | http://kvm4.deyu.wang:8080/v1/AUTH_%(tenant_id)s |
|    region   |                    regionOne                       |
|  service_id |         8133b2b0b179450c9e177f617a228f7a           |
+-------------+----------------------------------------------------+
```

19.3 建立 Swift Storage Node

1. 查看 /dev/vdb 及 /dev/vdc 各有 104 M，並已切割好 /dev/vdb1 及 /dev/vdc1。如果沒切割好分的分割區，就先執行 fdisk -uc 進入分割。

```
[root@kvm4 ~]# fdisk -luc /dev/vdb /dev/vdc

Disk /dev/vdb: 104 MB, 104857600 bytes
15 heads, 14 sectors/track, 975 cylinders, total 204800 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x9d217a56

   Device Boot      Start         End      Blocks   Id  System
/dev/vdb1            2048      186367       92160   83  Linux

Disk /dev/vdc: 104 MB, 104857600 bytes
15 heads, 14 sectors/track, 975 cylinders, total 204800 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x1eb6d3a5

   Device Boot      Start         End      Blocks   Id  System
/dev/vdc1            2048      186367       92160   83  Linux
```

2. 將 /dev/vdb1 格式成 ext4。

```
[root@kvm4 ~]# mkfs.ext4 /dev/vdb1
mke2fs 1.41.12 (17-May-2010)
Filesystem label=
```

```
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
Stride=0 blocks, Stripe width=0 blocks
23040 inodes, 92160 blocks
4608 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=67371008
12 block groups
8192 blocks per group, 8192 fragments per group
1920 inodes per group
Superblock backups stored on blocks:
    8193, 24577, 40961, 57345, 73729

Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 33 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

3. 將 /dev/vdc1 格式成 ext4。

```
[root@kvm4 ~]# mkfs.ext4 /dev/vdc1
mke2fs 1.41.12 (17-May-2010)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
Stride=0 blocks, Stripe width=0 blocks
23040 inodes, 92160 blocks
4608 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=67371008
12 block groups
8192 blocks per group, 8192 fragments per group
1920 inodes per group
Superblock backups stored on blocks:
    8193, 24577, 40961, 57345, 73729

Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 25 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

4. 建立掛載點，並設定開機自動掛載，注意掛載參數必須包含 acl 及 user_xattr。

```
[root@kvm4 ~]# mkdir -p /srv/node/z{1,2}d1
[root@kvm4 ~]# cp /etc/fstab /etc/fstab.orig
[root@kvm4 ~]# echo "/dev/vdb1 /srv/node/z1d1 ext4 acl,user_xattr 0 0"
   >> /etc/fstab
[root@kvm4 ~]# echo "/dev/vdc1 /srv/node/z2d1 ext4 acl,user_xattr 0 0"
   >> /etc/fstab
```

5. 重新掛載 /etc/fstab 中的掛載點，沒有訊息表示一切正常。

```
[root@kvm4 ~]# mount -a
[root@kvm4 ~]#
```

6. 改變目錄 /srv/node 的擁有者及群組皆爲 swift

```
[root@kvm4 ~]# chown -R swift:swift /srv/node/
[root@kvm4 ~]# ll -d /srv/node/
drwxr-xr-x. 4 swift swift 4096 Jan 24 22:51 /srv/node/
```

7. 重置目錄 /srv 的 SELinux context。

```
[root@kvm4 ~]# restorecon -Rv /srv/
restorecon reset /srv/node context unconfined_u:object_r:var_t:s0->
   system_u:object_r:swift_data_t:s0
restorecon reset /srv/node/z1d1 context system_u:object_r:file_t:s0->
   system_u:object_r:swift_data_t:s0
restorecon reset /srv/node/z1d1/lost+found context system_u:object_r:
   file_t:s0->system_u:object_r:swift_data_t:s0
restorecon reset /srv/node/z2d1 context system_u:object_r:file_t:s0->
   system_u:object_r:swift_data_t:s0
restorecon reset /srv/node/z2d1/lost+found context system_u:object_r:
   file_t:s0->system_u:object_r:swift_data_t:s0
```

8. 先備份 swift 主設定檔及服務 account, container 及 object 設定檔。

```
[root@kvm4 ~]# cp /etc/swift/swift.conf /etc/swift/swift.conf.orig
```

```
[root@kvm4 ~]# cp /etc/swift/account-server.conf /etc/swift/account-
    server.conf.orig
[root@kvm4 ~]# cp /etc/swift/container-server.conf /etc/swift/container-
    server.conf.orig
[root@kvm4 ~]# cp /etc/swift/object-server.conf /etc/swift/object-server
    .conf.orig
```

9. 設定 swift 主設定檔 /etc/swift/swift.conf，檔案存放位置的字首 (prefix) 及字尾 (suffix) 的 hash。

```
[root@kvm4 ~]# openstack-config --set /etc/swift/swift.conf swift-hash
    swift_hash_path_suffix $(openssl rand -hex 10)
[root@kvm4 ~]# openstack-config --set /etc/swift/swift.conf swift-hash
    swift_hash_path_prefix $(openssl rand -hex 10)
```

10. 設定 account, container 及 object 連結 ip。

```
[root@kvm4 ~]# openstack-config --set /etc/swift/account-server.conf
    DEFAULT bind_ip 192.168.122.4
[root@kvm4 ~]# openstack-config --set /etc/swift/container-server.conf
    DEFAULT bind_ip 192.168.122.4
[root@kvm4 ~]# openstack-config --set /etc/swift/object-server.conf
    DEFAULT bind_ip 192.168.122.4
```

11. 啓動 account, container 及 object 服務並設定開機啓動。

```
[root@kvm4 ~]# /etc/init.d/openstack-swift-account start
Starting openstack-swift-account:                          [  OK  ]
[root@kvm4 ~]# chkconfig openstack-swift-account on
[root@kvm4 ~]# /etc/init.d/openstack-swift-container start
Starting openstack-swift-container:                        [  OK  ]
[root@kvm4 ~]# chkconfig openstack-swift-container on
[root@kvm4 ~]# /etc/init.d/openstack-swift-object start
Starting openstack-swift-object:                           [  OK  ]
[root@kvm4 ~]# chkconfig openstack-swift-object on
```

12. 若變更設定後要重新啓動 account, container 及 object 服務，可使用 swift-init 一次重新啓動所有服務。

```
[root@kvm4 ~(keystone_admin)]$ swift-init all restart
```

19.4 設定 Swift Service Ring

1. 載入 keystone 管理者 admin 環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

2. 使用 swift-ring-builder 工具建立每個服務的 ring，partitions=2^9=512, replicas=2, min_part_hours=1。執行工具就會出現參數說明。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder
swift-ring-builder <builder_file> create <part_power> <replicas> <
    min_part_hours>
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/account.
    builder create 9 2 1
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder create 9 2 1
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/object.
    builder create 9 2 1
```

3. 將裝置加入到 account 服務，如果做錯了要修改，可參考下節「Swift Ring 配置錯誤修正」19.5。執行命令就會出現參數說明。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder
swift-ring-builder <builder_file> add
    [r<region>]z<zone>-<ip>:<port>/<device_name>_<meta> <weight>

    Adds devices to the ring with the given information. No partitions
        will be
    assigned to the new device until after running 'rebalance'. This is
        so you
    can make multiple device changes and rebalance them all just once.

[root@kvm4 ~(keystone_admin)]# for i in 1 2; do
```

```
> swift-ring-builder /etc/swift/account.builder add z${i
    }-192.168.122.4:6002/z${i}d1 100
> done
WARNING: No region specified for z1-192.168.122.4:6002/z1d1. Defaulting
    to region 1.
Device r1z1-192.168.122.4:6002/z1d1_"" with 100.0 weight got id 0
WARNING: No region specified for z2-192.168.122.4:6002/z2d1. Defaulting
    to region 1.
Device r1z2-192.168.122.4:6002/z2d1_"" with 100.0 weight got id
```

4. 將裝置加入到 container 服務。

```
[root@kvm4 ~(keystone_admin)]# for i in 1 2; do swift-ring-builder /etc/
    swift/container.builder add z${i}-192.168.122.4:6001/z${i}d1 100;
    done
WARNING: No region specified for z1-192.168.122.4:6001/z1d1. Defaulting
    to region 1.
Device r1z1-192.168.122.4:6001/z1d1_"" with 100.0 weight got id 0
WARNING: No region specified for z2-192.168.122.4:6001/z2d1. Defaulting
    to region 1.
Device r1z2-192.168.122.4:6001/z2d1_"" with 100.0 weight got id 1
```

5. 將裝置加入到 object 服務。

```
[root@kvm4 ~(keystone_admin)]# for i in 1 2; do swift-ring-builder /etc/
    swift/object.builder add z${i}-192.168.122.4:6000/z${i}d1 100; done
WARNING: No region specified for z1-192.168.122.4:6000/z1d1. Defaulting
    to region 1.
Device r1z1-192.168.122.4:6000/z1d1_"" with 100.0 weight got id 0
WARNING: No region specified for z2-192.168.122.4:6000/z2d1. Defaulting
    to region 1.
Device r1z2-192.168.122.4:6000/z2d1_"" with 100.0 weight got id 1
```

6. rebalance 剛剛產生的 rings。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/account.
    builder rebalance
Reassigned 512 (100.00%) partitions. Balance is now 0.00.
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder rebalance
Reassigned 512 (100.00%) partitions. Balance is now 0.00.
```

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/object.
    builder rebalance
Reassigned 512 (100.00%) partitions. Balance is now 0.00.
```

7. 確認 ring files 是否成功產生？

```
[root@kvm4 ~(keystone_admin)]# ll /etc/swift/*gz
-rw-r--r--. 1 root root 445 Jan 25 00:35 /etc/swift/account.ring.gz
-rw-r--r--. 1 root root 448 Jan 25 00:35 /etc/swift/container.ring.gz
-rw-r--r--. 1 root root 447 Jan 25 00:35 /etc/swift/object.ring.gz
```

8. 改變目錄 /etc/swift 的群組爲 swift。

```
[root@kvm4 ~(keystone_admin)]# chown -R root:swift /etc/swift
[root@kvm4 ~(keystone_admin)]# ll -d /etc/swift/
drwxr-xr-x. 7 root swift 4096 Jan 25 00:35 /etc/swift/
```

19.5 Swift Ring 配置錯誤修正

1. 查看 container.builder，其中前二項 ip address 錯誤爲 192.168.122。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder
/etc/swift/container.builder, build version 4
512 partitions, 2.000000 replicas, 1 regions, 2 zones, 4 devices, 100.00
     balance
The minimum number of hours before a partition can be reassigned is 1
Devices:    id  region  zone      ip address  port      name weight
    partitions balance meta
             0     1     1     192.168.122  6001      z1d1 100.00
                        512 100.00
             1     1     2     192.168.122  6001      z2d1 100.00
                        512 100.00
             2     1     1   192.168.122.4  6001      z1d1 100.00
                         0-100.00
             3     1     2   192.168.122.4  6001      z2d1 100.00
                         0-100.00
```

2. 刪除錯誤的兩項，移除時系統提醒要做 rebalance 才生效。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder remove 192.168.122/z1d1
d0r1z1-192.168.122:6001/z1d1_"" marked for removal and will be removed
    next rebalance.
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder remove 192.168.122/z2d1
d1r1z2-192.168.122:6001/z2d1_"" marked for removal and will be removed
    next rebalance.
```

3. 進行 container.builde 的 rebalance。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder rebalance
Reassigned 512 (100.00%) partitions. Balance is now 0.00.
```

4. 再次查看 container.builde，已剩下正確的兩項，且 partitions 也修正。

```
[root@kvm4 ~(keystone_admin)]# swift-ring-builder /etc/swift/container.
    builder
/etc/swift/container.builder, build version 7
512 partitions, 2.000000 replicas, 1 regions, 2 zones, 2 devices, 0.00
    balance
The minimum number of hours before a partition can be reassigned is 1
Devices:    id  region  zone      ip address  port      name weight
    partitions balance meta
             2     1     1   192.168.122.4  6001      z1d1 100.00
                         512   0.00
             3     1     2   192.168.122.4  6001      z2d1 100.00
                         512   0.00
```

5. 使用以下方式直接刪除 account 的相關檔案，就可以重新再做。

```
[root@kvm4 ~(keystone_admin)]# rm /etc/swift/account.builder
[root@kvm4 ~(keystone_admin)]# rm /etc/swift/account.ring.gz
[root@kvm4 ~(keystone_admin)]# rm /etc/swift/backups/*account.builder
[root@kvm4 ~(keystone_admin)]# rm /etc/swift/backups/*account.ring.gz
```

19.6 Swift 除錯

1. swift list 出現以下錯誤訊息：

```
[root@kvm4 ~(keystone_admin)]$ swift list
Account GET failed: http://kvm4.deyu.wang:8080/v1/
    AUTH_bfa67652fc31431ab574a09f3db9a852?format=json \
503 Internal Server Error  [first 60 chars of response] \
<html><h1>Service Unavailable</h1><p>The server is currently
```

2. 到 /var/log/message 查詢與 swift 要存取的目錄 srv 有關的訊息，發現拒絕存取。

```
[root@kvm4 ~(keystone_admin)]$ grep srv /var/log/messages
..... [Errno 13] Permission denied: '/srv/node/z2d1/objects'
```

3. 查看此目錄的用户爲 root。

```
[root@kvm4 ~(keystone_admin)]$ ll -d /srv/node/z1d1/
drwxr-xr-x. 6 root root 1024 Apr 11 11:15 /srv/node/z1d1/
```

4. 改變整目錄以下的用户及群組爲 swift。

```
[root@kvm4 ~(keystone_admin)]$ chown swift.swift -R /srv/node
```

5. 再查看此目錄的用户及群組爲 swift。

```
[root@kvm4 ~(keystone_admin)]$ ll -d /srv/node/z1d1/
drwxr-xr-x. 6 swift swift 1024 Apr 11 11:15 /srv/node/z1d1/
```

6. swift list 正常輸出，目前爲空的。

```
[root@kvm4 ~(keystone_admin)]$ swift list
[root@kvm4 ~(keystone_admin)]$
```

19.7 配置 Swift Object Storage Proxy 服務

1. 設定檔更新。

```
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/swift/proxy-
    server.conf \
filter:authtoken admin_tenant_name services
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/swift/proxy-
    server.conf \
filter:authtoken admin_host 192.168.122.4
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/swift/proxy-
    server.conf \
filter:authtoken admin_user swift
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/swift/proxy-
    server.conf \
filter:authtoken admin_password 123qwe
```

2. 啓動服務並設定開機自動啓動。

```
[root@kvm4 ~(keystone_admin)]# /etc/init.d/memcached start
Starting memcached:                                        [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig memcached on
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-swift-proxy start
Starting openstack-swift-proxy:                            [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-swift-proxy on
```

19.8 確認 Swift Storage 安裝成功

1. 列出目前 swift 是空的。

```
[root@kvm4 ~(keystone_admin)]# swift list
[root@kvm4 ~(keystone_admin)]#
```

2. 產生 3 個 512 個隨機字元的檔案。

```
[root@kvm4 ~(keystone_admin)]# head -c 512 /dev/urandom > data1.file
[root@kvm4 ~(keystone_admin)]# head -c 512 /dev/urandom > data2.file
[root@kvm4 ~(keystone_admin)]# head -c 512 /dev/urandom > data3.file
```

3. 上傳檔案至 containers。

```
[root@kvm4 ~(keystone_admin)]# swift --help
Usage: swift <command> [options] [args]

Commands:
  stat [container] [object]
    Displays information for the account, container, or object depending
        on the
    args given (if any).
  list [options] [container]
    Lists the containers for the account or the objects for a container.
        -p or
    --prefix is an option that will only list items beginning with that
       prefix.
    -d or --delimiter is option (for container listings only) that will
       roll up
    items with the given delimiter (see Cloud Files general
       documentation for
    what this means).
  upload [options] container file_or_directory [file_or_directory] [...]

[root@kvm4 ~(keystone_admin)]# swift upload c1 data1.file
data1.file
[root@kvm4 ~(keystone_admin)]# swift upload c1 data2.file
data2.file
[root@kvm4 ~(keystone_admin)]# swift upload c2 data3.file
data3.file
```

4. 再列出目前 swift 有兩個 containers c1 及 c2。

```
[root@kvm4 ~(keystone_admin)]# swift list
c1
c2
```

5. 列出 containers 中的內容，是剛剛上傳的檔案。

```
[root@kvm4 ~(keystone_admin)]# swift list c1
data1.file
data2.file
[root@kvm4 ~(keystone_admin)]# swift list c2
data3.file
```

6. 找出上傳檔案儲存狀況，發現每個檔案各有一個副本，且存在不同的 partition，與先前設定的副本數一致。

```
[root@kvm4 ~(keystone_admin)]# find /srv/node/ -type f -name "*data"
/srv/node/z1d1/objects/100/f0e/323b355ca91af8f729f7dc88e779cf0e
    /1390585465.01657.data
/srv/node/z1d1/objects/45/a62/16a1247b40242e3c4e4bb5b39072fa62
    /1390585473.22765.data
/srv/node/z1d1/objects/74/485/253ba7238aa99020182b73f00cb30485
    /1390585459.15301.data
/srv/node/z2d1/objects/45/a62/16a1247b40242e3c4e4bb5b39072fa62
    /1390585473.22765.data
/srv/node/z2d1/objects/74/485/253ba7238aa99020182b73f00cb30485
    /1390585459.15301.data
/srv/node/z2d1/objects/100/f0e/323b355ca91af8f729f7dc88e779cf0e
    /1390585465.01657.data
```

Chapter 20

Image 服務 Glance

20.1 認識 Glance

1. Glance 服務提供虛擬機映像檔使用、註冊及取得服務。
2. 使用 MySQL 儲存 images 的 metadata 資訊。
3. Glance 支援的 images 格式有：
   (a) raw
   (b) vhd
   (c) vdi
   (d) iso
   (e) qcow2
   (f) aki,ari and ami
4. Glance 支援的 container 格式有：
   (a) bare
   (b) ovf
   (c) aki, ari and ami

20.2 Glance 安裝

1. 安裝套件

```
[root@kvm4 ~]# yum install -y openstack-glance
```

2. 使用 glance 原始設定檔

```
[root@kvm4 ~]# cp /usr/share/glance/glance-registry-dist.conf /etc/
    glance/glance-registry.conf
cp: overwrite `/etc/glance/glance-registry.conf'? y
```

3. 初使化 glance 資料庫。

```
[root@kvm4 ~]# openstack-db --init --service glance --password 123qwe --
    rootpw 123qwe
Creating 'glance' database.
Updating 'glance' database password in /etc/glance/glance-registry.conf
    /etc/glance/glance-api.conf
Initializing the glance database, please wait...
Complete!
```

4. 使用 openstack-config 工具設定 glance-api.conf。

```
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-api.conf \
paste_deploy flavor keystone
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-api.conf \
keystone_authtoken admin_tenant_name admin
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-api.conf \
keystone_authtoken admin_user admin
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-api.conf \
keystone_authtoken admin_password 123qwe
```

5. 使用 openstack-config 工具設定 glance-registry.conf。

```
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-registry.conf \
paste_deploy flavor keystone
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-registry.conf \
keystone_authtoken admin_tenant_name admin
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-registry.conf \
keystone_authtoken admin_user admin
```

```
[root@kvm4 ~]# openstack-config --set /etc/glance/glance-registry.conf \
keystone_authtoken admin_password 123qwe
```

6. 啓動並設定開機自動啓動 openstack-glance-registry openstack-glance-api 服務。

```
[root@kvm4 ~]# /etc/init.d/openstack-glance-registry start
Starting openstack-glance-registry:                [  OK  ]
[root@kvm4 ~]# chkconfig openstack-glance-registry on
[root@kvm4 ~]# /etc/init.d/openstack-glance-api start
Starting openstack-glance-api:                     [  OK  ]
[root@kvm4 ~]# chkconfig openstack-glance-api on
```

7. 查看 glance 紀錄檔，錯誤訊息不影響往後實作，原因待說明。

```
[root@kvm4 ~]# tail /var/log/glance/*
==> /var/log/glance/api.log <==
2014-01-25 03:03:25.193 21202 WARNING glance.store.base [-] \
Failed to configure store correctly: Store s3 could not be configured
    correctly. \
Reason: Could not find s3_store_host in configuration options. Disabling
     add method.
2014-01-25 03:03:25.203 21202 ERROR glance.store.swift [-] \
Could not find swift_store_auth_address in configuration options.
2014-01-25 03:03:25.203 21202 WARNING glance.store.base [-] \
Failed to configure store correctly: Store swift could not be configured
     correctly. \
Reason: Could not find swift_store_auth_address in configuration options
    . Disabling add method.

==> /var/log/glance/registry.log <==
```

8. 導入 admin 環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]$
```

9. 產生 glance 用户，並新增其在租用户 services 爲 admin 角色。

```
[root@kvm4 ~(keystone_admin)]# keystone user-create --name glance --pass
    123qwe
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | d019862a71594e47805ae5cc3752f346 |
|   name   |              glance              |
| tenantId |                                  |
+----------+----------------------------------+
```

10. 設定用户 glance 在租户 services 的角色爲 admin。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-add --user glance --
   role admin --tenant services
```

11. 產生 glance 服務，並記下其 id，以建立 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone service-create \
--name glance --type image --description "Glance Image Service"
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |       Glance Image Service       |
|      id     | 67b9bbfd101a43f7843d337ba6dbb585 |
|     name    |              glance              |
|     type    |              image               |
+-------------+----------------------------------+
```

12. 建立 glance 的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone endpoint-create \
--service-id 67b9bbfd101a43f7843d337ba6dbb585 \
--publicurl http://kvm4.deyu.wang:9292 \
--adminurl http://kvm4.deyu.wang:9292 \
--internalurl http://kvm4.deyu.wang:9292
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
|   adminurl  |    http://kvm4.deyu.wang:9292    |
```

```
|      id     | ab01fca343c541bcb4ec4e6b0ab3f51c |
| internalurl |    http://kvm4.deyu.wang:9292    |
|  publicurl  |    http://kvm4.deyu.wang:9292    |
|    region   |            regionOne             |
|  service_id | 67b9bbfd101a43f7843d337ba6dbb585 |
+-------------+----------------------------------+
```

20.3 新增作業系統 image 到 Glance

1. 導入 admin 環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

2. 上傳作業系統 image，目前 glance 只接受 http，不支援 ftp。

```
[root@kvm4 ~(keystone_admin)]# glance image-create \
--name "minkvm" \
--is-public True \
--disk-format qcow2 \
--container-format bare \
--copy-from http://deyu.wang/minkvm.qcow2
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| checksum         | None                                 |
| container_format | bare                                 |
| created_at       | 2014-01-24T19:29:18                  |
| deleted          | False                                |
| deleted_at       | None                                 |
| disk_format      | qcow2                                |
| id               | 7d4b5a3d-2ce5-4d6d-b35d-c21675693a95 |
| is_public        | True                                 |
| min_disk         | 0                                    |
| min_ram          | 0                                    |
| name             | minkvm                               |
| owner            | a57da7d8a5f944c9b6258d0d91b8dee2     |
| protected        | False                                |
| size             | 0                                    |
| status           | queued                               |
| updated_at       | 2014-01-24T19:29:18                  |
+------------------+--------------------------------------+
```

3. 列出可用的 image，其狀態爲存檔中。

```
[root@kvm4 ~(keystone_admin)]# glance image-list
+--------------------------------------+--------+-------------+------------------+-----
| ID                                   | Name   | Disk Format |
  Container Format | Size      | Status |
+--------------------------------------+--------+-------------+------------------+-----
| 79e088a9-0d8c-40fc-b5d5-13865cc891d2 | minkvm | qcow2       | bare
             | 941756416 | saving |
+--------------------------------------+--------+-------------+------------------+-----
```

4. 列出可用的 image minkvm 細部資訊。

```
[root@kvm4 ~(keystone_admin)]# glance image-show minkvm
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| checksum         | b01710b20d305795d3a834cd3e01d62b     |
| container_format | bare                                 |
| created_at       | 2014-01-24T19:31:49                  |
| deleted          | False                                |
| disk_format      | qcow2                                |
| id               | 79e088a9-0d8c-40fc-b5d5-13865cc891d2 |
| is_public        | True                                 |
| min_disk         | 0                                    |
| min_ram          | 0                                    |
| name             | minkvm                               |
| owner            | a57da7d8a5f944c9b6258d0d91b8dee2     |
| protected        | False                                |
| size             | 941756416                            |
| status           | active                               |
| updated_at       | 2014-01-24T19:32:01                  |
+------------------+--------------------------------------+
```

5. 經過一段時間，再列出 image minkvm，狀態已變爲 active。

```
[root@kvm4 ~(keystone_admin)]# glance image-list
+--------------------------------------+--------+-------------+------------------+-----
| ID                                   | Name   | Disk Format |
  Container Format | Size      | Status |
```

```
4 +--------------------------------------+--------+-------------+-----------------+-----
  | 79e088a9-0d8c-40fc-b5d5-13865cc891d2 | minkvm | qcow2       | bare
                | 941756416 | active |
6 +--------------------------------------+--------+-------------+-----------------+-----
```

Chapter 21

區塊儲存 Cinder

21.1 認識 Cinder

1. Cinder 提供虛擬機資料儲存空間。
2. Cinder 的 Block storage 區塊儲存功能有三種服務：
   (a) openstack-cinder-api，API 服務：提供 http endpoint 並處理區塊儲存的請求。
   (b) openstack-cinder-scheduler，scheduler 服務：從訊息排隊列 (queue) 讀取服務請求，並處理區塊儲存的的請求。
   (c) openstack-cinder-volume，volume 服務：處理來自 scheduler 服務的請求，volume 服務依據請求進行 volume 的產生、刪除及變更。

21.2 Cinder 安裝

1. 安裝套件

```
[root@kvm4 ~]# yum install -y openstack-cinder
```

2. 使用 cinder 原始設定檔

```
1 [root@kvm4 ~]# cp /usr/share/cinder/cinder-dist.conf /etc/cinder/cinder.
    conf
cp: overwrite `/etc/cinder/cinder.conf'? y
```

3. 載入管理者環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

4. 初使化 cinder 資料庫。

```
[root@kvm4 ~(keystone_admin)]# openstack-db --init \
--service cinder --password 123qwe --rootpw 123qwe
Verified connectivity to MySQL.
Creating 'cinder' database.
Updating 'cinder' database password in /etc/cinder/cinder.conf
Initializing the cinder database, please wait...
Complete!
```

5. 產生用户 cinder。

```
[root@kvm4 ~(keystone_admin)]# keystone user-create --name cinder --pass
    123qwe
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | eb9ca7e7be3e42e081c3011810e1ada5 |
|   name   |              cinder              |
| tenantId |                                  |
+----------+----------------------------------+
```

6. 增加用户 cinder 在租户 services 的角色爲 admin 前，注意 role admin, tenant services 都必須存在，否則當然無法成功增加 role，可先使用 keystone role-list, keystone tenant-list 檢查是否存在，尤其是 tenant service 是在第 19 章建立物件儲存 Swift 時新增的，若沒有做 swift，此時就必須先產生。如果不存在，必須產生租户 services。

```
[root@kvm4 ~(keystone_admin)]# keystone tenant-create --name services
+-------------+----------------------------------+
|   Property  |              Value               |
```

```
+-------------+----------------------------------+
| description |                                  |
|   enabled   |               True               |
|      id     | da7fe21aa92743f9baa51fd4368e6726 |
|     name    |             services             |
+-------------+----------------------------------+
```

7. 增加用户 cinder 在租户 services 的角色爲 admin。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-add \
--user cinder --role admin --tenant services
```

8. 增加 cinder service，並記其 id，以建立此服務的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone service-create \
--name=cinder --type=volume --description="Openstack Block Storage
    Service"
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description | Openstack Block Storage Service  |
|      id     | 3b211e63665d432ca5c5bf488b0ae6fb |
|     name    |              cinder              |
|     type    |              volume              |
+-------------+----------------------------------+
```

9. 建立 cinder service 的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone endpoint-create \
--service-id 3b211e63665d432ca5c5bf488b0ae6fb \
--publicurl 'http://kvm4.deyu.wang:8776/v1/%(tenant_id)s' \
--adminurl 'http://kvm4.deyu.wang:8776/v1/%(tenant_id)s' \
--internalurl 'http://kvm4.deyu.wang:8776/v1/%(tenant_id)s'
+-------------+-----------------------------------------+
|   Property  |                  Value                  |
+-------------+-----------------------------------------+
|   adminurl  | http://kvm4.deyu.wang:8776/v1/%(tenant_id)s |
|      id     |       b5430f44463b4d99b7760df709c53c59      |
| internalurl | http://kvm4.deyu.wang:8776/v1/%(tenant_id)s |
|  publicurl  | http://kvm4.deyu.wang:8776/v1/%(tenant_id)s |
|    region   |                 regionOne               |
|  service_id |       3b211e63665d432ca5c5bf488b0ae6fb      |
```

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

10. 使用 openstack-config 工具設定 ciner.conf。

```
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/cinder/cinder
    .conf \
keystone_authtoken admin_tenant_name services
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/cinder/cinder
    .conf \
keystone_authtoken admin_user cinder
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/cinder/cinder
    .conf \
keystone_authtoken admin_password 123qwe
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/cinder/cinder
    .conf \
DEFAULT qpid_username qpidauth
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/cinder/cinder
    .conf \
DEFAULT qpid_password 123qwe
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/cinder/cinder
    .conf \
DEFAULT qpid_protocol ssl
```

21.3 Cinder 服務啓動

1. 啓動並設定開機自動啓動 openstack-cinder-scheduler, openstack-cinder-api 及 openstack-cinder-volume 服務。

```
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-scheduler
    start
Starting openstack-cinder-scheduler:                [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-cinder-scheduler on
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-api start
Starting openstack-cinder-api:                      [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-cinder-api on
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-volume start
Starting openstack-cinder-volume:                   [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-cinder-volume on
```

2. 查看 cinder 服務的錯誤訊息。

```
[root@kvm4 ~(keystone_admin)]# tail /var/log/cinder/*
==> /var/log/cinder/api.log <==

==> /var/log/cinder/cinder-manage.log <==

==> /var/log/cinder/scheduler.log <==

==> /var/log/cinder/volume.log <==
    self.driver.check_for_setup_error()
  File "/usr/lib/python2.6/site-packages/cinder/volume/drivers/lvm.py",
      line 76, in check_for_setup_error
    run_as_root=True)
  File "/usr/lib/python2.6/site-packages/cinder/utils.py", line 190, in
      execute
    cmd=' '.join(cmd))
ProcessExecutionError: Unexpected error while running command.
Command: sudo cinder-rootwrap /etc/cinder/rootwrap.conf vgs --noheadings
     -o name
Exit code: 1
Stdout: ''
Stderr: 'sudo: sorry, you must have a tty to run sudo\n'
```

3. 以上錯誤訊息爲用户 cinder 無法使用 sudo 執行 cinder-rootwrap，必須 visudo 增加其權限。

```
[root@kvm4 ~(keystone_admin)]# visudo
Defaults:cinder !requiretty
cinder ALL = (root) NOPASSWD: /usr/bin/cinder-rootwrap /etc/cinder/
   rootwrap.conf *
```

4. 其實 cinder, nova, quantum 等套件安裝時，已將必須以 sudo 執行的命令權限寫在 /etc/sudoers.d 目錄下，但因 /etc/sudoers 沒有將此目錄包含進去，造成執行失敗。執行 visudo 在最後面加入 #includedir /etc/sudoers.d，注意最前面的符號 #不是註解，一定要存在。

```
[root@kvm4 ~(keystone_admin)]# ll /etc/sudoers.d/
total 12
-r--r-----. 1 root root 111 Jan 25 15:36 cinder

[root@kvm4 ~(keystone_admin)]# visudo
[root@kvm4 ~(keystone_admin)]# grep includedir /etc/sudoers
#includedir /etc/sudoers.d
```

5. 刪除紀錄檔，再重新啓動 openstack-cinder-scheduler, openstack-cinder-api 及 openstack-cinder-volume 服務。

```
[root@kvm4 ~(keystone_admin)]# rm -f /var/log/cinder/*
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-scheduler
    restart
Stopping openstack-cinder-scheduler:                [  OK  ]
Starting openstack-cinder-scheduler:                [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-api restart
Stopping openstack-cinder-api:                      [  OK  ]
Starting openstack-cinder-api:                      [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-volume
    restart
Stopping openstack-cinder-volume:                   [FAILED]
Starting openstack-cinder-volume:                   [  OK  ]
```

6. 再查看 cinder 服務的紀錄，已無錯誤訊息。

```
[root@kvm4 ~(keystone_admin)]# tail /var/log/cinder/*
==> /var/log/cinder/api.log <==

==> /var/log/cinder/scheduler.log <==
2014-01-25 06:07:01 CRITICAL [cinder] need more than 0 values to unpack

==> /var/log/cinder/volume.log <==
```

7. 編輯 /etc/tgt/targets.conf，設定 ISCSI 包含 cinder volumes。

```
[root@kvm4 ~(keystone_admin)]# echo 'include /etc/cinder/volumes/*' >> /
    etc/tgt/targets.conf
```

8. 啓動 tgtd 服務，並設定開機自動啓動。

```
[root@kvm4 ~(keystone_admin)]# /etc/init.d/tgtd start
Starting SCSI target daemon:                        [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig tgtd on
```

9. 檢查是否有錯？

```
[root@kvm4 ~(keystone_admin)]# tail /var/log/messages
Jan 25 06:53:36 kvm4 tgtd: semkey 0x6102fbaf
Jan 25 06:53:36 kvm4 tgtd: tgtd daemon started, pid:24650
Jan 25 06:53:36 kvm4 tgtd: tgtd logger started, pid:24653 debug:0
Jan 25 06:53:36 kvm4 tgtd: work_timer_start(146) use timer_fd based
    scheduler
Jan 25 06:53:36 kvm4 tgtd: bs_init(313) use signalfd notification
```

10. 檢查 openstack 服務的狀態。

```
[root@kvm4 ~(keystone_admin)]# openstack-status
== Glance services ==
openstack-glance-api:         active
openstack-glance-registry:    active
== Keystone service ==
openstack-keystone:           active
== Swift services ==
openstack-swift-proxy:        active
openstack-swift-account:      active
openstack-swift-container:    active
openstack-swift-object:       active
== Cinder services ==
openstack-cinder-api:         active
openstack-cinder-scheduler:   active
openstack-cinder-volume:      active
== Support services ==
mysqld:                       active
tgtd:                         active
qpidd:                        active
memcached:                    active
```

21.4 建立 cinder-volumes group

1. 啓動 openstack-cinder-volume 服務，應該會自動產生 cinder-volumes 的 vg。

```
[root@deyu ~]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]# vgscan
  Reading all physical volumes.  This may take a while...
  Found volume group "cinder-volumes" using metadata type lvm2
```

```
  Found volume group "vg_os" using metadata type lvm2
```

2. 如果但查詢紀錄檔出現以下錯誤訊息，表示 vg cinder-volumes 不存在，必須自行產生。

```
[root@kvm4 ~(keystone_myuser)]# /etc/init.d/openstack-cinder-volume
    restart
[root@deyu ~(keystone_myuser)]# tail /var/log/cinder/*
==> /var/log/cinder/api.log <==

==> /var/log/cinder/scheduler.log <==

==> /var/log/cinder/volume.log <==
    launcher.run_server(server)
  File "/usr/lib/python2.6/site-packages/cinder/service.py", line 95, in
      run_server
    server.start()
  File "/usr/lib/python2.6/site-packages/cinder/service.py", line 355,
     in start
    self.manager.init_host()
  File "/usr/lib/python2.6/site-packages/cinder/volume/manager.py", line
      143, in init_host
    self.driver.check_for_setup_error()
  File "/usr/lib/python2.6/site-packages/cinder/volume/drivers/lvm.py",
     line 81, in check_for_setup_error
    raise exception.VolumeBackendAPIException(data=exception_message)
VolumeBackendAPIException: Bad or unexpected response from the storage
    volume backend API: volume group cinder-volumes doesn't exist
```

3. 新增分割區，type 設爲 LVM。

```
[root@deyu ~(keystone_myuser)]# fdisk -uc /dev/vda

Command (m for help): p

Disk /dev/vda: 160.0 GB, 160000000000 bytes
255 heads, 63 sectors/track, 19452 cylinders, total 312500000 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000b0430

   Device Boot      Start         End      Blocks   Id  System
/dev/vda1   *        2048     1026047      512000   83  Linux
/dev/vda2         1026048   210741247   104857600   8e  Linux LVM

```

```
Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
p
Partition number (1-4): 3
First sector (210741248-312499999, default 210741248):
Using default value 210741248
Last sector, +sectors or +size{K,M,G} (210741248-312499999, default
    312499999): +5G

Command (m for help): t
Partition number (1-4): 3
Hex code (type L to list codes): 8e
Changed system type of partition 3 to 8e (Linux LVM)

Command (m for help): p

Disk /dev/vda: 160.0 GB, 160000000000 bytes
255 heads, 63 sectors/track, 19452 cylinders, total 312500000 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000b0430

   Device Boot      Start         End      Blocks   Id  System
/dev/vda1   *        2048     1026047      512000   83  Linux
/dev/vda2         1026048   210741247   104857600   8e  Linux LVM
/dev/vda3       210741248   221227007     5242880   8e  Linux LVM

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or
    resource busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.
```

4. 加入新分割區的 mapping。

```
[root@deyu ~(keystone_myuser)]# partx -va /dev/vda
device /dev/vda:
start 0 size 312500000
gpt: 0 slices
dos: 4 slices
# 1:      2048-  1026047 (  1024000 sectors,    524 MB)
# 2:   1026048-210741247 (209715200 sectors, 107374 MB)
```

```
# 3: 210741248-221227007 ( 10485760 sectors,   5368 MB)
# 4:         0-       -1 (        0 sectors,      0 MB)
BLKPG: Device or resource busy
error adding partition 1
BLKPG: Device or resource busy
error adding partition 2
BLKPG: Device or resource busy
error adding partition 3
```

5. 建立 pv。

```
[root@deyu ~(keystone_myuser)]# pvcreate /dev/vda3
  Physical volume "/dev/vda3" successfully created
```

6. 建立 vg cinder-volumes。

```
[root@deyu ~(keystone_myuser)]# vgcreate -s 32M cinder-volumes /dev/vda3
  Volume group "cinder-volumes" successfully created
```

7. 刪除紀錄檔，再重新啓動 openstack-cinder-scheduler, openstack-cinder-api 及 openstack-cinder-volume 服務。

```
[root@kvm4 ~(keystone_admin)]# rm -f /var/log/cinder/*
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-scheduler
   restart
Stopping openstack-cinder-scheduler:                [  OK  ]
Starting openstack-cinder-scheduler:                [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-api restart
Stopping openstack-cinder-api:                      [  OK  ]
Starting openstack-cinder-api:                      [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-cinder-volume
   restart
Stopping openstack-cinder-volume:                   [FAILED]
Starting openstack-cinder-volume:                   [  OK  ]
```

8. 再查看 cinder 服務的紀錄，已無錯誤訊息。

```
[root@kvm4 ~(keystone_admin)]# tail /var/log/cinder/*
==> /var/log/cinder/api.log <==

==> /var/log/cinder/scheduler.log <==
2014-01-25 06:07:01 CRITICAL [cinder] need more than 0 values to unpack

==> /var/log/cinder/volume.log <==
```

21.5 新增 LVM Cinder volume

1. 備份 /etc/cinder/cinder.conf。

```
[root@kvm4 ~]# cp /etc/cinder/cinder.conf /etc/cinder/cinder.conf.orig
```

2. 設定 /etc/cinder/cinder.conf。

```
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
DEFAULT enabled_backends glusterfs,lvm
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
lvm volume_group cinder-volumes
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
lvm volume_driver cinder.volume.drivers.lvm.LVMISCSIDriver
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
lvm volume_backend_name LVM
```

3. 編輯 /etc/tgt/targets.conf，設定 ISCSI 包含 cinder volumes。

```
[root@kvm4 ~(keystone_admin)]# echo 'include /etc/cinder/volumes/*' >> /
    etc/tgt/targets.conf
```

4. cinder 產生 lvm 的 type。

```
[root@kvm4 ~(keystone_admin)]# cinder type-create lvm
+--------------------------------------+------+
|                  ID                  | Name |
```

```
+--------------------------------------+------+
| 6e55b910-bba5-416c-af84-d419f4d60b97 | lvm  |
+--------------------------------------+------+
```

5. 設定 type lvm 的後台名稱爲 LVM。

```
[root@kvm4 ~(keystone_admin)]# cinder type-key lvm set
    volume_backend_name=LVM
```

6. 改變環境變數爲一般使用者 myuser。

```
[root@kvm4 ~(keystone_admin)]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]#
```

7. 產生一個 1G 名爲 vol1 的 volume。

```
[root@kvm4 ~(keystone_myuser)]# cinder create --volume-type lvm --
    display-name vol1 1
+---------------------+--------------------------------------+
|       Property      |                Value                 |
+---------------------+--------------------------------------+
|     attachments     |                  []                  |
|  availability_zone  |                 nova                 |
|       bootable      |                false                 |
|      created_at     |      2014-01-24T23:35:59.465894      |
| display_description |                 None                 |
|     display_name    |                 vol1                 |
|          id         | 6b8c7db4-1326-4a57-a847-1741c76a50d0 |
|       metadata      |                  {}                  |
|         size        |                  1                   |
|     snapshot_id     |                 None                 |
|     source_volid    |                 None                 |
|        status       |               creating               |
|     volume_type     |                 lvm                  |
+---------------------+--------------------------------------+
```

8. 查看產生的 volume vol1。

```
[root@kvm4 ~(keystone_myuser)]# cinder list
+--------------------------------------+-----------+--------------+------+-------------
|                  ID                  |   Status  | Display Name | Size
    | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------
| 6b8c7db4-1326-4a57-a847-1741c76a50d0 | available |     vol1     |  1
     |     lvm     |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------
```

9. 使用 LVM 命令 vgs 查看，VG 必須有 cinder-volumes。

```
[root@kvm4 ~(keystone_myuser)]# vgs
  VG             #PV #LV #SN Attr   VSize  VFree
  cinder-volumes   1   1   0 wz--n-  4.88g 3.88g
  vg_os            1   3   0 wz--n- 19.53g 3.86g
```

10. 使用 LVM 命令 lvs 查看，VG cinder-volumes 中有一 LV，大小爲 1G。

```
[root@kvm4 ~(keystone_myuser)]# lvs
  LV                                          VG             Attr
      LSize Origin Snap%  Move Log Copy%  Convert
  volume-6b8c7db4-1326-4a57-a847-1741c76a50d0 cinder-volumes -wi-ao 1.00
      g
  root                                        vg_os          -wi-ao 3.91
      g
  swap                                        vg_os          -wi-ao 2.00
      g
  var                                         vg_os          -wi-ao 9.77
      g
```

11. 如果要刪除 vol1，使用下列指令。

```
[root@kvm4 ~(keystone_myuser)]# cinder delete vol1
```

12. 再次使用 LVM 命令 lvs 查看，已無 VG cinder-volumes 的 LV。

```
[root@kvm4 ~(keystone_myuser)]# lvs
  LV                                          VG             Attr
      LSize Origin Snap%  Move Log Copy%  Convert
  root                                        vg_os          -wi-ao 3.91
      g
  swap                                        vg_os          -wi-ao 2.00
      g
  var                                         vg_os          -wi-ao 9.77
      g
```

Chapter 22

Glusterfs 檔案系統

22.1 認識 Glusterfs

1. Glusterfs 爲分散式檔案系統。
2. glusterfs 可以將許多不同的儲存空間整合在一起，變成一個分散式的虛擬儲存空間。
3. glusterfs 提供複製功能，可將同一個檔案存放在兩個以上的儲存空間。
4. glusterfs 提供分條功能，可將一個檔案打散在多個不同的儲存空間。
5. 架設一台 glusterfs 的服務端，另外一台則作爲 glusterfs 的用户端。但本實作只爲實現其功能，伺服器及用户端都架設在同一台主機。

22.2 建置 SAMBA Server

1. 安裝 samba server 套件。

```
1 [root@kvm4 ~]# yum install -y samba
```

2. 建立 samba 分享目錄。

```
1 [root@kvm4 ~]# mkdir -p /mnt/samba/volume4
```

3. 設定 samba 分享目錄。

```
[root@kvm4 ~]# cat >> /etc/samba/smb.conf << EOF
> [gluster-volume4]
> comment=For samba export of volume volume4
> path=/mnt/samba/volume4
> read only=no
> guest ok=yes
> EOF

[root@deyu ~(keystone_admin)]# grep ^\\[gluster /etc/samba/smb.conf -A5
[gluster-volume4]
comment=For samba export of volume volume4
path=/mnt/samba/volume4
read only=no
guest ok=yes
```

4. 啓動 smb 服務並設定開機自動啓動。

```
[root@kvm4 ~]# /etc/init.d/smb start
Starting SMB services:                                     [  OK  ]
[root@kvm4 ~]# chkconfig smb on
```

22.3 建置 Glusterfs Server

1. 安裝 gluster server 套件。

```
[root@kvm4 ~]# yum install -y glusterfs-server
```

2. 啓動 glusterd 服務並設定開機自動啓動。

```
[root@kvm4 ~]# /etc/init.d/glusterd start
Starting glusterd:                                         [  OK  ]
[root@kvm4 ~]# chkconfig glusterd on
```

3. 使用上節分享的 samba 目錄，建立 gluster volume。

```
[root@kvm4 ~]# gluster volume create volume4 kvm4.deyu.wang:/mnt/samba/
    volume4
Creation of volume volume4 has been successful. Please start the volume
    to access data.
```

4. 啓動 gluster volume volume4。

```
[root@kvm4 ~]# gluster volume start volume4
Starting volume volume4 has been successful
```

22.4 Gluster Client 新增 cinder volume

1. 安裝 gluster-fuse 套件。

```
[root@kvm4 ~]# yum install -y glusterfs-fuse
```

2. 備份 /etc/cinder/cinder.conf。

```
[root@kvm4 ~]# cp /etc/cinder/cinder.conf /etc/cinder/cinder.conf.orig
```

3. 設定 /etc/cinder/cinder.conf。

```
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
DEFAULT enabled_backends glusterfs,lvm
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
lvm volume_group cinder-volumes
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
lvm volume_driver cinder.volume.drivers.lvm.LVMISCSIDriver
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
lvm volume_backend_name LVM
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
glusterfs volume_driver cinder.volume.drivers.glusterfs.GlusterfsDriver
```

```
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
glusterfs glusterfs_shares_config /etc/cinder/shares.conf
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
glusterfs glusterfs_sparsed_volumes false
[root@kvm4 ~]# openstack-config --set /etc/cinder/cinder.conf \
glusterfs volume_backend_name RHS
```

4. 建立分享 volume 設定檔，加入 volume4。

```
[root@kvm4 ~]# echo "kvm4.deyu.wang:volume4" >> /etc/cinder/shares.conf
```

5. 重新啓動 openstack-cinder-schduler 及 openstack-cinder-volume 服務。

```
[root@kvm4 ~]# /etc/init.d/openstack-cinder-scheduler restart
Stopping openstack-cinder-scheduler:                [  OK  ]
Starting openstack-cinder-scheduler:                [  OK  ]
[root@kvm4 ~]# /etc/init.d/openstack-cinder-volume restart
Stopping openstack-cinder-volume:                   [  OK  ]
Starting openstack-cinder-volume:                   [  OK  ]
```

6. 查看啓動情況，沒訊息表示啓動正常。

```
[root@kvm4 ~]# tail /var/log/cinder/volume.log
```

7. 查看掛載狀況，volume4 已掛載。

```
[root@kvm4 ~]# df
Filesystem           1K-blocks      Used Available Use% Mounted on
/dev/mapper/vg_os-root
                       4031680    968084   2858796  26% /
tmpfs                  1478460         0   1478460   0% /dev/shm
/dev/vda1               194366     25853    158478  15% /boot
/dev/mapper/vg_os-var
                      10079084   1237012   8330072  13% /var
/dev/vdb1                89243      5721     78914   7% /srv/node/z1d1
/dev/vdc1                89243      5719     78916   7% /srv/node/z2d1
kvm4.deyu.wang:volume4
```

```
                          4031616    968064   2858752  26% /var/lib/cinder/
                            mnt/528c07a5e99cd72c63f4bdf80da8dcde
```

22.5 使用 Glusterfs volume

1. 載入管理者環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

2. 查看 cinder type。

```
[root@kvm4 ~(keystone_admin)]# cinder type-list
+--------------------------------------+------+
|                  ID                  | Name |
+--------------------------------------+------+
| d6b9ab23-819f-41fd-8779-4b1a4163058c | lvm  |
+--------------------------------------+------+
```

3. 如果 lvm 不存在，就產生 cinder volume 儲存後端，type 爲 lvm。

```
[root@kvm4 ~(keystone_admin)]# cinder type-create lvm
+--------------------------------------+------+
|                  ID                  | Name |
+--------------------------------------+------+
| d6b9ab23-819f-41fd-8779-4b1a4163058c | lvm  |
+--------------------------------------+------+
```

4. 設定 type lvm 的後台名稱爲 LVM。

```
[root@kvm4 ~(keystone_admin)]# cinder type-key lvm set
   volume_backend_name=LVM
```

5. 產生 cinder volume 儲存後端，type 爲 glusterfs。

```
[root@kvm4 ~(keystone_admin)]# cinder type-create glusterfs
+--------------------------------------+-----------+
|                  ID                  |    Name   |
+--------------------------------------+-----------+
| 7960b2ca-9bed-4aee-860b-856a3a366f00 | glusterfs |
+--------------------------------------+-----------+
```

6. 設定 type glusterfs 的後台名稱爲 RHS。

```
[root@kvm4 ~(keystone_admin)]# cinder type-key glusterfs set
   volume_backend_name=RHS
```

7. 確認 cinder type 包含 lvm 及 glusterfs。

```
[root@kvm4 ~(keystone_admin)]# cinder type-list
+--------------------------------------+-----------+
|                  ID                  |    Name   |
+--------------------------------------+-----------+
| 7960b2ca-9bed-4aee-860b-856a3a366f00 | glusterfs |
| d6b9ab23-819f-41fd-8779-4b1a4163058c |    lvm    |
+--------------------------------------+-----------+
```

8. 在 lvm 儲存後端，產生 1G 空間，名稱 vol2。

```
[root@kvm4 ~(keystone_admin)]# cinder create --volume-type lvm --display
   -name vol2 1
+---------------------+--------------------------------------+
|       Property      |                Value                 |
+---------------------+--------------------------------------+
|     attachments     |                  []                  |
|  availability_zone  |                 nova                 |
|       bootable      |                false                 |
|      created_at     |      2014-01-25T02:12:07.088789      |
| display_description |                 None                 |
|     display_name    |                 vol2                 |
|          id         | bd1a2e7f-ca81-46ae-b8c4-e20269b53370 |
|       metadata      |                  {}                  |
|         size        |                  1                   |
```

```
|     snapshot_id     |                  None                  |
|     source_volid    |                  None                  |
|        status       |                creating                |
|     volume_type     |                  lvm                   |
+---------------------+----------------------------------------+
```

9. 確認 vol2。

```
[root@kvm4 ~(keystone_admin)]# cinder list
+--------------------------------------+-----------+--------------+------+-------------
|                  ID                  |   Status  | Display Name | Size
    | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------
| bd1a2e7f-ca81-46ae-b8c4-e20269b53370 | available |     vol2     |  1
     |     lvm     |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------
```

10. 在 glusterfs 儲存後端，產生 1G 空間，名稱 vol3。

```
[root@kvm4 ~(keystone_admin)]# cinder create --volume-type glusterfs --
   display-name vol3 1
+---------------------+----------------------------------------+
|       Property      |                 Value                  |
+---------------------+----------------------------------------+
|     attachments     |                   []                   |
|  availability_zone  |                  nova                  |
|       bootable      |                 false                  |
|      created_at     |      2014-01-25T02:14:34.716899        |
| display_description |                  None                  |
|     display_name    |                  vol3                  |
|          id         | a5f7637f-780d-4004-84e2-4cfa2c396c35 |
|       metadata      |                   {}                   |
|         size        |                   1                    |
|     snapshot_id     |                  None                  |
|     source_volid    |                  None                  |
|        status       |                creating                |
|     volume_type     |               glusterfs                |
+---------------------+----------------------------------------+
```

11. 確認 vol3。

```
[root@kvm4 ~(keystone_admin)]# cinder list
+--------------------------------------+-----------+--------------+------+-------------
|                  ID                  |   Status  | Display Name | Size
    | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------
| a5f7637f-780d-4004-84e2-4cfa2c396c35 | available |     vol3     |  1
     |  glusterfs  |  false   |             |
| bd1a2e7f-ca81-46ae-b8c4-e20269b53370 | available |     vol2     |  1
     |     lvm     |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------
```

12. 移除 vol2 及 vol3。

```
[root@kvm4 ~(keystone_admin)]# cinder delete vol2
[root@kvm4 ~(keystone_admin)]# cinder delete vol3
```

13. 列出 cinder 爲空。

```
[root@kvm4 ~(keystone_admin)]# cinder list
[root@kvm4 ~(keystone_admin)]#
```

Chapter 23

Quantum 網路服務

23.1 認識 Openstack Networking

1. Openstack Networking 服務是一個虛擬的網路服務。
2. 可以設定豐富的網路拓樸 (topologies)，建構網路及子網路。
3. 做爲 Openstack 各服務間的連結。
4. Openstack Networking 允許租户設定自己的私有網路。
5. Openstack 網路套件 Quantum。

23.2 建立 Openstack-Quantum 用户

1. 開始網路服務架設與設定前，請先安裝 kernel-2.6.32-358.114.1.openstack，否則網路會有很多問題。

```
[root@kvm4 ~]# vim /etc/yum.repo.d/openstack.repo
[openstack]
name=OpenStack
baseurl=http://dywang.csie.cyut.edu.tw/OpenStack
gpgcheck=0
enabled=1

[root@kvm4 ~]# yum install -y kernel iproute --enablerepo=openstack
[root@kvm4 ~]# reboot
```

2. 載入管理者環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

3. 在 keystone 產生名稱爲 quantum 的網路服務，並記下其 id，以建立此服務的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone service-create \
--name quantum \
--type network \
--description 'Openstack Networking Service'
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |   Openstack Networking Service   |
|      id     | eeac3353b8a44562b2695721e271aece |
|     name    |             quantum              |
|     type    |             network              |
+-------------+----------------------------------+
```

4. 建立 quantum 的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone endpoint-create \
--service-id eeac3353b8a44562b2695721e271aece \
--publicurl http://kvm4.deyu.wang:9696 \
--adminurl http://kvm4.deyu.wang:9696 \
--internalurl http://kvm4.deyu.wang:9696
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
|   adminurl  |    http://kvm4.deyu.wang:9696    |
|      id     | b86b7c0c90d1445d96c5b1bbc54f6c9c |
| internalurl |    http://kvm4.deyu.wang:9696    |
|  publicurl  |    http://kvm4.deyu.wang:9696    |
|    region   |            regionOne             |
|  service_id | eeac3353b8a44562b2695721e271aece |
+-------------+----------------------------------+
```

5. 產生網路服務用户，名稱 quantum，密碼 123qwe。

```
[root@kvm4 ~(keystone_admin)]# keystone user-create \
--name quantum --pass 123qwe
```

```
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | 3ba95de7669c4979acbe7b5b6eb4f651 |
|   name   |             quantum              |
| tenantId |                                  |
+----------+----------------------------------+
```

6. 設定用户 quantum 在租户 services 的角色爲 admin。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-add \
--user quantum --role admin --tenant services
```

7. 列出用户角色，發現 user_id 並不是 quantum，原因是目前的環境變數爲 admin。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-list
+----------------------------------+-------+----------------------------------+--------
|                id                |  name |             user_id
|            tenant_id             |
+----------------------------------+-------+----------------------------------+--------
| 91f1e2429c614bac8efe19cef39e8e7d | admin | 14613
   b36f501472abd93caa822477e90 | a57da7d8a5f944c9b6258d0d91b8dee2 |
+----------------------------------+-------+----------------------------------+--------
```

8. 使用 quantum 環境變數列出角色，比對 user_id ，這才是 quantum 的角色。

```
[root@kvm4 ~(keystone_admin)]# keystone --os-username quantum \
--os-password 123qwe \
--os-tenant-name services user-role-list
+----------------------------------+-------+----------------------------------+--------
|                id                |  name |             user_id
|            tenant_id             |
+----------------------------------+-------+----------------------------------+--------
```

```
| 91f1e2429c614bac8efe19cef39e8e7d | admin | 3
    ba95de7669c4979acbe7b5b6eb4f651 | da7fe21aa92743f9baa51fd4368e6726 |
+----------------------------------+-------+----------------------------------+--------
```

23.3 安裝 Openstack-Quantum

1. 安裝 quantum 套件。

```
[root@kvm4 ~(keystone_admin)]# yum install -y openstack-quantum
    openstack-quantum-openvswitch
```

2. Openstack Networking 服務必須連結 qpidd，先確認此服務正常運作。

```
[root@kvm4 ~(keystone_admin)]# /etc/init.d/qpidd status
qpidd (pid  17255) is running...
```

3. 設定 Openstack Networking。

```
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
DEFAULT rpc_backend quantum.openstack.common.rpc.impl_qpid
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
DEFAULT qpid_hostname 192.168.122.4
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
DEFAULT qpid_username qpidauth
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
DEFAULT qpid_password 123qwe
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
DEFAULT qpid_protocol ssl
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
keystone_authtoken admin_tenant_name services
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
keystone_authtoken admin_user quantum
```

```
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/quantum/
    quantum.conf \
16 keystone_authtoken admin_password 123qwe
```

4. 建立用户 quantum 環境變數載入腳本。

```
[root@kvm4 ~(keystone_admin)]# cat > keystonerc_quantum << EOF
2 > if [ "\$1" == "" -o "\$1" == 'export' ];then
> export OS_USERNAME=quantum
4 > export OS_TENANT_NAME=services
> export OS_PASSWORD=123qwe
6 > export OS_AUTH_URL=http://kvm4.deyu.wang:35357/v2.0/
> export PS1='[\u@\h \W(keystone_quantum)]\\$ '
8 > else
> unset OS_USERNAME
10 > unset OS_TENANT_NAME
> unset OS_PASSWORD
12 > unset OS_AUTH_URL
> export PS1='[\u@\h \W]\\$ '
14 > fi
> EOF
```

5. 變換環境變數爲用户 quantum。

```
1 [root@kvm4 ~(keystone_admin)]# source keystonerc_quantum
[root@kvm4 ~(keystone_quantum)]#
```

6. 網路設定前一定要先確定本機的主機名稱及對應 ip。

```
[root@kvm4 ~(keystone_quantum)]# hostname
2 kvm4.deyu.wang
[root@kvm4 ~(keystone_quantum)]# host kvm4.deyu.wang
4 kvm4.deyu.wang has address 192.168.122.4
```

7. Openstack Networking 設定會改變設定檔 /etc/nova/nova.conf，故先安裝包含此設定檔的套件 openstack-nova-common，其設定及使用請參考第 **??**。

```
[root@kvm4 ~(keystone_quantum)]# yum install -y openstack-nova-common
```

8. 設定 openstack networking 使用外掛 openvswitch。

```
[root@kvm4 ~(keystone_quantum)]# quantum-server-setup --yes --rootpw 123
    qwe --plugin openvswitch
Quantum plugin: openvswitch
Plugin: openvswitch => Database: ovs_quantum
Verified connectivity to MySQL.
Configuration updates complete!
```

9. 啓動 quantum-server，並設定開機自動啓動。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-server start
Starting quantum-server:                                   [  OK  ]
[root@kvm4 ~(keystone_quantum)]# chkconfig quantum-server on
```

10. 查看啓動紀錄，是否有錯誤？沒有訊息表示正常。

```
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /server.log
```

11. 查看 openstack 狀況，注意 quantum，目前只有 quantum-server 啓動。

```
[root@kvm4 ~(keystone_quantum)]# openstack-status
.....
== Quantum services ==
quantum-server:                 active
quantum-dhcp-agent:             inactive (disabled on boot)
quantum-l3-agent:               inactive (disabled on boot)
quantum-linuxbridge-agent:      dead (disabled on boot)
quantum-openvswitch-agent:      inactive (disabled on boot)
openvswitch:                    dead
.....
```

23.4 設定 openvswitch

1. 設定 openvswitch 主機 ip。

```
[root@kvm4 ~(keystone_quantum)]# quantum-node-setup --plugin openvswitch
    --qhost 192.168.122.4
Quantum plugin: openvswitch
Would you like to update the nova configuration files? (y/n):
y
Configuration updates complete!
```

2. 啓動 openvswitch，並設定開機自動啓動。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/openvswitch start
/etc/openvswitch/conf.db does not exist ... (warning).
Creating empty database /etc/openvswitch/conf.db    [  OK  ]
Starting ovsdb-server                               [  OK  ]
Configuring Open vSwitch system IDs                 [  OK  ]
Inserting openvswitch module                        [  OK  ]
Starting ovs-vswitchd                               [  OK  ]
[root@kvm4 ~(keystone_quantum)]# chkconfig openvswitch on
```

3. 檢查啓動是否正常？沒有訊息表示正常。

```
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/
   openvswitch/*
```

4. 產生名爲 br-int 的 OpenvSwitch 橋接器，指定 instance (也就是虛擬機) 的 interface。

```
[root@kvm4 ~(keystone_quantum)]# ovs-vsctl add-br br-int
[root@kvm4 ~(keystone_quantum)]# ovs-vsctl show
1ff32c6e-03e9-4544-86fe-e8a726830ff0
    Bridge br-int
        Port br-int
            Interface br-int
                type: internal
    ovs_version: "1.9.0"
```

5. 設定 br-int 爲 integration bridge。

```
[root@kvm4 ~(keystone_quantum)]# openstack-config --set \
/etc/quantum/plugins/openvswitch/ovs_quantum_plugin.ini OVS
    integration_bridge br-int
```

6. 啓動 quantum-openvswitch-agent，並設定開機自動啓動。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-openvswitch-agent
    start
Starting quantum-openvswitch-agent:                        [  OK  ]
[root@kvm4 ~(keystone_quantum)]# chkconfig quantum-openvswitch-agent on
```

7. 檢查啓動是否正常？出現無法執行指令的訊息，此爲用户 quantum 無法使用 sudo。

```
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /openvswitch-agent.log
2014-01-25 12:10:58    ERROR [quantum.agent.linux.ovs_lib] \
Unable to execute ['ovs-vsctl', '--timeout=2', '--', '--if-exists', \
'del-port', 'br-int', 'patch-tun']. Exception:
2014-01-25 12:10:58    ERROR [quantum.agent.linux.ovs_lib] \
Unable to execute ['ovs-ofctl', 'del-flows', 'br-int']. Exception:
2014-01-25 12:10:58    ERROR [quantum.agent.linux.ovs_lib] \
Unable to execute ['ovs-ofctl', 'add-flow', 'br-int', \
'hard_timeout=0,idle_timeout=0,priority=1,actions=normal']. Exception:
2014-01-25 12:10:58    ERROR [quantum.agent.linux.ovs_lib] \
Unable to execute ['ovs-vsctl', '--timeout=2', 'list-ports', 'br-int'].
    Exception:
```

8. visudo 加入用户 quantum 使用指令權限。

```
[root@kvm4 ~(keystone_quantum)]# cat >> /etc/sudoers << EOF
> Defaults:quantum !requiretty
> quantum ALL = (root) NOPASSWD: /usr/bin/quantum-rootwrap
> EOF
```

9. 刪除 /var/log/quantum/openvswitch-agent.log，重新啓動 quantum-openvswitch-agent，再檢查已正常。

```
[root@kvm4 ~(keystone_quantum)]# rm -f /var/log/quantum/openvswitch-
    agent.log
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-openvswitch-agent
    restart
Stopping quantum-openvswitch-agent:                [  OK  ]
Starting quantum-openvswitch-agent:                [  OK  ]
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /openvswitch-agent.log
```

10. 設定開機啓動 quantum-ovs-cleanup，以保證 Openstack Networking agents 可以完全控制網路設備。

```
[root@kvm4 ~(keystone_quantum)]# chkconfig quantum-ovs-cleanup on
```

11. 設定 Openstack Networking DHCP 主機 ip。

```
[root@kvm4 ~(keystone_quantum)]# quantum-dhcp-setup --plugin openvswitch
    --qhost 192.168.122.4
Quantum plugin: openvswitch
Configuration updates complete!
```

12. 啓動 quantum-dhcp-agent，並設定開機啓動。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-dhcp-agent start
Starting quantum-dhcp-agent:                       [  OK  ]
[root@kvm4 ~(keystone_quantum)]# chkconfig quantum-dhcp-agent on
```

13. 檢查啓動是否正常？quantum-dhcp 啓動失敗。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-dhcp-agent restart
Stopping quantum-dhcp-agent:                                [  OK  ]
Starting quantum-dhcp-agent:                                [  OK  ]
```

```
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /dhcp-agent.log
2015-04-12 15:35:07    ERROR [quantum.agent.dhcp_agent] Unable to enable
    dhcp.
2015-04-12 15:35:15    ERROR [quantum.agent.dhcp_agent] Unable to enable
    dhcp.
```

14. 解決方式：安裝 kernel-2.6.32-358.114.1.openstack，並重新開機。

```
[root@kvm4 ~(keystone_quantum)]# yum install -y kernel iproute \
--enablerepo=openstack && reboot
```

15. 再啓動 quantum-dhcp-agent，並檢查啓動是否正常？沒有訊息表示正常。

```
[root@kvm4 ~]# source keystonerc_quantum
[root@kvm4 ~(keystone_quantum)]# rm /var/log/quantum/dhcp-agent.log
rm: remove regular file `/var/log/quantum/dhcp-agent.log'? y
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-dhcp-agent restart
Stopping quantum-dhcp-agent:                               [  OK  ]
Starting quantum-dhcp-agent:                               [  OK  ]
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /dhcp-agent.log
[root@kvm4 ~(keystone_quantum)]#
```

16. 產生橋接器 br-ex，作爲連結外部網路用。

```
[root@kvm4 ~(keystone_quantum)]# ovs-vsctl add-br br-ex
```

17. 備份並複製網卡 eth0 爲 br-ex。

```
[root@kvm4 ~(keystone_quantum)]# cp /etc/sysconfig/network-scripts/ifcfg
    -eth0 /root/
[root@kvm4 ~(keystone_quantum)]# cp /etc/sysconfig/network-scripts/ifcfg
    -eth0 \
/etc/sysconfig/network-scripts/ifcfg-br-ex
```

18. 刪除網卡 eth0 中的設定，保留以下三行：

```
[root@kvm4 ~(keystone_quantum)]# vim /etc/sysconfig/network-scripts/
    ifcfg-eth0
DEVICE="eth0"
HWADDR="52:54:00:0F:C9:09"
ONBOOT="yes"
```

19. 橋接器 br-ex 爲對外網路設定，必須保留原有對外網卡的設定，只需要修改 DEVICE 爲 br-ex 即可。

```
[root@kvm4 ~(keystone_quantum)]# vim /etc/sysconfig/network-scripts/
    ifcfg-br-ex
DEVICE="br-ex"
BOOTPROTO="static"
DNS1="192.168.122.1"
GATEWAY="192.168.122.1"
IPADDR="192.168.122.4"
NETMASK="255.255.255.0"
ONBOOT="yes"
```

20. 增加網卡 eth0 到橋接器 br-ex，並重新啓動網路。

```
[root@kvm4 ~(keystone_quantum)]# ovs-vsctl add-port br-ex eth0; /etc/
    init.d/network restart
Shutting down interface eth0:                              [  OK  ]
Shutting down loopback interface:                          [  OK  ]
Bringing up loopback interface:                            [  OK  ]
Bringing up interface br-ex:                               [  OK  ]
Bringing up interface eth0:                                [  OK  ]
```

21. 確認網路橋接器 br-ex 的 port 是否爲 eth0？

```
[root@kvm4 ~(keystone_quantum)]# ovs-vsctl show
1ff32c6e-03e9-4544-86fe-e8a726830ff0
    Bridge br-int
        Port br-int
            Interface br-int
                type: internal
    Bridge br-ex
```

```
        Port br-ex
            Interface br-ex
                type: internal
        Port "eth0"
            Interface "eth0"
    ovs_version: "1.9.0"
```

22. 設定 Openstack Networking L3 Agent 主機 ip。

```
[root@kvm4 ~(keystone_quantum)]# quantum-l3-setup --plugin openvswitch
    --qhost 192.168.122.4
Quantum plugin: openvswitch
Configuration updates complete!
```

23. 啓動 quantum-l3-agent，並設定開機啓動。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-l3-agent start
Starting quantum-l3-agent:                                 [  OK  ]
[root@kvm4 ~(keystone_quantum)]# chkconfig quantum-l3-agent on
```

24. 檢查啓動是否正常？出現 CRITICAL 訊息，查看紀錄檔 /var/log/quantum/l3-agnet.log，發現 ip 指定沒有物件 netns，也就是網路 namespace，由於 openstack 虛擬網路各裝置皆使用的 UUID，目前 ifconfig 及 ip 指令不認得這些裝置，必須使用支援 openstack 的 kernel，且套件 iproute 也必須更新。

```
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /l3-agent.log
2014-01-25 12:51:31 CRITICAL [quantum]

[root@kvm4 ~(keystone_quantum)]# tail /var/log/quantum/l3-agent.log
    output = cls._execute('', 'netns', ('list',), root_helper=
        root_helper)
  File "/usr/lib/python2.6/site-packages/quantum/agent/linux/ip_lib.py",
      line 58, in _execute
    root_helper=root_helper)
  File "/usr/lib/python2.6/site-packages/quantum/agent/linux/utils.py",
      line 61, in execute
    raise RuntimeError(m)
RuntimeError:
Command: ['sudo', 'quantum-rootwrap', '/etc/quantum/rootwrap.conf', 'ip'
    , 'netns', 'list']
```

```
Exit code: 255
Stdout: ''
Stderr: 'Object "netns" is unknown, try "ip help".\n'

[root@kvm4 ~(keystone_quantum)]# ip netns
Object "netns" is unknown, try "ip help".
```

25. 安裝支援 openstack 網路的 kernel 及 iproute，並重新啓動。

```
[root@kvm4 ~(keystone_quantum)]# yum install -y kernel-2.6.32-358.114.1.
    openstack.el6.x86_64 iproute
[root@kvm4 ~(keystone_quantum)]# rpm -qa | grep iproute
iproute-2.6.32-23.el6ost.netns.2.x86_64
[root@kvm4 ~(keystone_quantum)]# reboot
```

26. 重新啓動後，再導入用户 quantum 環境變數，檢查 quantum-l3-agent 啓動是否正常？沒有訊息表示正常。

```
[root@kvm4 ~]# source keystonerc_quantum
[root@kvm4 ~(keystone_quantum)]# rm -f /var/log/quantum/l3-agent.log
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-l3-agent restart
Stopping quantum-l3-agent:                                 [  OK  ]
Starting quantum-l3-agent:                                 [  OK  ]
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /l3-agent.log
```

27. 確認 Openstack Networking 狀態，先前設定的 quantum 相關服務已正常啓動。

```
[root@kvm4 ~(keystone_quantum)]# openstack-status
.......
== Quantum services ==
quantum-server:                 active
quantum-dhcp-agent:             active
quantum-l3-agent:               active
quantum-linuxbridge-agent:      dead (disabled on boot)
quantum-openvswitch-agent:      active
openvswitch:                    active
......
```

23.5 設定用户網路

1. 使用一般用户 myuser，設定私有網路。

```
[root@kvm4 ~(keystone_quantum)]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]#
```

2. 產生名爲 router1 的路由。

```
[root@kvm4 ~(keystone_myuser)]# quantum router-create router1
Created a new router:
+-----------------------+--------------------------------------+
| Field                 | Value                                |
+-----------------------+--------------------------------------+
| admin_state_up        | True                                 |
| external_gateway_info |                                      |
| id                    | 8ab14c8e-c533-47f6-ab63-fc277fada633 |
| name                  | router1                              |
| status                | ACTIVE                               |
| tenant_id             | 6c26d132e38f4b83a1d9f5a777beeb52     |
+-----------------------+--------------------------------------+
```

3. 產生名爲 private 的網路。

```
[root@kvm4 ~(keystone_myuser)]# quantum net-create private
Created a new network:
+-----------------+--------------------------------------+
| Field           | Value                                |
+-----------------+--------------------------------------+
| admin_state_up  | True                                 |
| id              | 48e9c08e-158d-4c6a-9623-b4eeaea5716c |
| name            | private                              |
| router:external | False                                |
| shared          | False                                |
| status          | ACTIVE                               |
| subnets         |                                      |
| tenant_id       | 6c26d132e38f4b83a1d9f5a777beeb52     |
+-----------------+--------------------------------------+
```

4. 產生網路 private 的子網路，名爲 subpriv，網域爲 192.168.32.0/24。

```
[root@kvm4 ~(keystone_myuser)]# quantum subnet-create --name subpriv
    private 192.168.32.0/24
Created a new subnet:
+------------------+------------------------------------------------------+

| Field            | Value
    |
+------------------+------------------------------------------------------+

| allocation_pools | {"start": "192.168.32.2", "end": "192.168.32.254"}
    |
| cidr             | 192.168.32.0/24
    |
| dns_nameservers  |
    |
| enable_dhcp      | True
    |
| gateway_ip       | 192.168.32.1
    |
| host_routes      |
    |
| id               | af75410d-6cf3-457c-a393-891641e563db
    |
| ip_version       | 4
    |
| name             | subpriv
    |
| network_id       | 48e9c08e-158d-4c6a-9623-b4eeaea5716c
    |
| tenant_id        | 6c26d132e38f4b83a1d9f5a777beeb52
    |
+------------------+------------------------------------------------------+
```

5. 設定子網路 subpriv 的路由爲 router1。

```
[root@kvm4 ~(keystone_myuser)]# quantum router-interface-add router1
    subpriv
Added interface to router router1
```

6. 確認 interface。

```
[root@kvm4 ~(keystone_myuser)]# quantum port-list
+--------------------------------------+------+-------------------+-------------------
```

```
| id                                   | name | mac_address       |
   fixed_ips

   |
+--------------------------------------+------+-------------------+--------------------
| 2083dc85-3b21-4aec-b88f-b4865fab4b4d |      | fa:16:3e:b4:ca:2d | {"
   subnet_id": "af75410d-6cf3-457c-a393-891641e563db", "ip_address": "
   192.168.32.1"} |
+--------------------------------------+------+-------------------+--------------------
```

7. 爲產生對外的公開網路，先匯入管理者 admin 的環境變數。

```
[root@kvm4 ~(keystone_myuser)]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

8. 產生名爲 public 的公開網路。

```
[root@kvm4 ~(keystone_admin)]# quantum net-create \
--tenant-id services public -- --router:external=True
Created a new network:
+---------------------------+--------------------------------------+
| Field                     | Value                                |
+---------------------------+--------------------------------------+
| admin_state_up            | True                                 |
| id                        | f9179863-802b-4a9c-b711-206dc9a5a9b4 |
| name                      | public                               |
| provider:network_type     | local                                |
| provider:physical_network |                                      |
| provider:segmentation_id  |                                      |
| router:external           | True                                 |
| shared                    | False                                |
| status                    | ACTIVE                               |
| subnets                   |                                      |
| tenant_id                 | services                             |
+---------------------------+--------------------------------------+
```

9. 產生網路 public 的子網路，名爲 subpub，網域必須爲目前對外網域，故爲 192.168.122.0/24，gateway 要設定正確，否則無法連接外部網路。目前 192.168.122.0/24 網域已存在 dhcp，所以此子網路關閉 dhcp，且 ip 開始至結束的範圍也要避開已正在使用的 ip。

```
[root@kvm4 ~(keystone_admin)]# quantum subnet-create \
--tenant-id services \
--allocation-pool start=192.168.122.10,end=192.168.122.99 \
--gateway 192.168.122.1 \
--disable-dhcp \
--name subpub public 192.168.122.0/24
Created a new subnet:
+------------------+------------------------------------------------------+
| Field            | Value                                                |
+------------------+------------------------------------------------------+
| allocation_pools | {"start": "192.168.122.10", "end": "192.168.122.99"
   } |
| cidr             | 192.168.122.0/24                                     |
| dns_nameservers  |                                                      |
| enable_dhcp      | False                                                |
| gateway_ip       | 192.168.122.1                                        |
| host_routes      |                                                      |
| id               | 76055bb3-ebb3-4e75-8971-64d90c5d8af6                 |
| ip_version       | 4                                                    |
| name             | subpub                                               |
| network_id       | f9179863-802b-4a9c-b711-206dc9a5a9b4                 |
| tenant_id        | services                                             |
+------------------+------------------------------------------------------+
```

10. 設定網路 public，作爲路由 router1 的 gateway。

```
[root@kvm4 ~(keystone_admin)]# quantum router-gateway-set router1 public
Set gateway for router router1
```

11. 列出 port，發現網路 public 的路由已被指定 ip 爲 192.168.122.10。

```
[root@kvm4 ~(keystone_admin)]# quantum port-list
+--------------------------------------+------+-------------------+-------------------
| id                                   | name | mac_address       |
   fixed_ips

   |
+--------------------------------------+------+-------------------+-------------------
| 68e1526f-523b-41ba-bc9b-e8d0804bacd7 |      | fa:16:3e:97:53:5a | {"
   subnet_id": "69336db7-7888-48ef-a2c8-acb4a29ed224", "ip_address": "
   192.168.32.1"}   |
| c66c16a0-6314-468b-b354-59263711ae7b |      | fa:16:3e:d5:97:7c | {"
   subnet_id": "6973d14c-ae1a-4759-af7a-3ee3c4eb63c2", "ip_address": "
   192.168.122.10"} |
+--------------------------------------+------+-------------------+-------------------
```

12. 匯入一般使用者 myuser 環境變數。

```
[root@kvm4 ~(keystone_admin)]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]#
```

13. 在網路 public 中產生浮動 ip。

```
[root@kvm4 ~(keystone_myuser)]# quantum floatingip-create public
Created a new floatingip:
+---------------------+--------------------------------------+
| Field               | Value                                |
+---------------------+--------------------------------------+
| fixed_ip_address    |                                      |
| floating_ip_address | 192.168.122.10                       |
| floating_network_id | f9179863-802b-4a9c-b711-206dc9a5a9b4 |
| id                  | 9a01e37b-8927-4311-9b6e-9615df28eb0f |
| port_id             |                                      |
| router_id           |                                      |
| tenant_id           | 6c26d132e38f4b83a1d9f5a777beeb52     |
+---------------------+--------------------------------------+
```

14. 列出浮動 ip 爲 192.168.122.10。

```
[root@kvm4 ~(keystone_myuser)]# quantum floatingip-list
```

```
+--------------------------------------+-----------------+--------------------+------
| id                                   | fixed_ip_address |
   floating_ip_address | port_id |
+--------------------------------------+-----------------+--------------------+------
| 9a01e37b-8927-4311-9b6e-9615df28eb0f |                  |
   192.168.122.10      |         |
+--------------------------------------+-----------------+--------------------+------
```

Chapter 24

Nova Compute and Controller

24.1 認識 Nova

1. Nova 又稱 OpenStack Compute，提供雲端運算。
2. Nova Compute node 執行虛擬化軟體，以開啓並管理 instances。
3. instances 是 openstack 中的虛擬機，可指定浮動 ip，與外部網路連結。

24.2 Nova 安裝

1. 安裝 nova 套件

```
[root@kvm4 ~]# yum install -y openstack-nova openstack-nova-novncproxy
```

2. 載入管理者環境變數。

```
[root@kvm4 ~]# source keystonerc_admin
[root@kvm4 ~(keystone_admin)]#
```

3. 改變 nova 管理紀錄檔的用户與群組爲 nova。

```
[root@kvm4 ~(keystone_admin)]# chown nova:nova /var/log/nova/nova-manage
    .log
```

4. 初使化 nova 資料庫。

```
[root@kvm4 ~(keystone_admin)]# openstack-db --init --service nova \
--password 123qwe --rootpw 123qwe
Verified connectivity to MySQL.
Creating 'nova' database.
Updating 'nova' database password in /etc/nova/nova.conf
Initializing the nova database, please wait...
Complete!
```

5. 產生用户 nova。

```
[root@kvm4 ~(keystone_admin)]# keystone user-create --name nova --pass
    123qwe
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | 490e3d3086dd4b628ca4015014c3face |
|   name   |               nova               |
| tenantId |                                  |
+----------+----------------------------------+
```

6. 增加用户 nova 在租户 services 的角色爲 admin。

```
[root@kvm4 ~(keystone_admin)]# keystone user-role-add \
--user nova --role admin --tenant services
```

7. 增加 nova service，並記其 id，以建立此服務的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone service-create \
--name nova --type compute --description "Openstack Compute Service"
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |    Openstack Compute Service     |
|      id     | fa2efe6481eb45898f3b0ce4169584dd |
|     name    |               nova               |
|     type    |             compute              |
```

```
10 +-------------+----------------------------------+
```

8. 建立 nova service 的 endpoint。

```
[root@kvm4 ~(keystone_admin)]# keystone endpoint-create \
2 --service-id fa2efe6481eb45898f3b0ce4169584dd \
--publicurl 'http://kvm4.deyu.wang:8774/v2/%(tenant_id)s' \
4 --adminurl 'http://kvm4.deyu.wang:8774/v2/%(tenant_id)s' \
--internalurl 'http://kvm4.deyu.wang:8774/v2/%(tenant_id)s'
6 +-------------+-----------------------------------------+
|   Property  |                  Value                  |
8 +-------------+-----------------------------------------+
|   adminurl  | http://kvm4.deyu.wang:8774/v2/%(tenant_id)s |
10 |      id     |       b460744fb0ba494e8408b5a5bf301f5d      |
| internalurl | http://kvm4.deyu.wang:8774/v2/%(tenant_id)s |
12 |  publicurl  | http://kvm4.deyu.wang:8774/v2/%(tenant_id)s |
|    region   |                 regionOne               |
14 |  service_id |       fa2efe6481eb45898f3b0ce4169584dd      |
+-------------+-----------------------------------------+
```

9. 使用 openstack-config 工具設定 nova。

```
1 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/api-
    paste.ini \
filter:authtoken admin_tenant_name services
3 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/api-
    paste.ini \
filter:authtoken admin_user nova
5 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/api-
    paste.ini \
filter:authtoken admin_password 123qwe
7 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/api-
    paste.ini \
filter:authtoken admin_host 192.168.122.4
9 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT qpid_username qpidauth
11 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT qpid_password 123qwe
13 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT qpid_protocol ssl
15 [root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT novncproxy_base_url http://192.168.122.4:6080/vnc_auto.html
```

```
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT vncserver_listen 192.168.122.4
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT vncserver_proxyclient_address 192.168.122.4
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT libvirt_vif_driver nova.virt.libvirt.vif.
    LibvirtHybridOVSBridgeDriver
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT auth_strategy keystone
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT libvirt_type qemu
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT libvirt_cpu_mode none
[root@kvm4 ~(keystone_admin)]# openstack-config --set /etc/nova/nova.
    conf \
DEFAULT verbose true
```

10. 啓動並設定開機啓動 nova 相關的服務。

```
[root@kvm4 ~(keystone_admin)]# /etc/init.d/libvirtd start
Starting libvirtd daemon:                                  [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-scheduler
    start
Starting openstack-nova-scheduler:                         [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-api start
Starting openstack-nova-api:                               [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-compute start
Starting openstack-nova-compute:                           [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-conductor
    start
Starting openstack-nova-conductor:                         [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-consoleauth
    start
Starting openstack-nova-consoleauth:                       [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-novncproxy
    start
Starting openstack-nova-novncproxy:                        [  OK  ]
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-nova-scheduler on
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-nova-api on
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-nova-compute on
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-nova-conductor on
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-nova-consoleauth on
[root@kvm4 ~(keystone_admin)]# chkconfig openstack-nova-novncproxy on
```

11. 查看 nova 相關服務的錯誤訊息，發現 nova 無法 sudo 執行 nova-rootwrap 指令。

```
[root@kvm4 ~(keystone_admin)]# tail /var/log/nova/*
==> /var/log/nova/api.log <==
2014-01-25 15:24:30.710 29372 TRACE nova.service \
    cmd=' '.join(cmd))
2014-01-25 15:24:30.710 29372 TRACE nova.service \
ProcessExecutionError: Unexpected error while running command.
2014-01-25 15:24:30.710 29372 TRACE nova.service \
Command: sudo nova-rootwrap /etc/nova/rootwrap.conf iptables-save -c
2014-01-25 15:24:30.710 29372 TRACE nova.service Exit code: 1
2014-01-25 15:24:30.710 29372 TRACE nova.service Stdout: ''
2014-01-25 15:24:30.710 29372 TRACE nova.service \
Stderr: 'sudo: sorry, you must have a tty to run sudo\n'
2014-01-25 15:24:30.710 29372 TRACE nova.service
2014-01-25 15:24:30.718 29372 INFO nova.wsgi [-] \
Stopping WSGI server.
2014-01-25 15:24:30.722 28941 INFO nova.service [-] \
Child 29372 exited with status 2
2014-01-25 15:24:30.723 28941 INFO nova.service [-] \
Started child 29397

==> /var/log/nova/compute.log <==
2014-01-25 15:23:41.852 28948 AUDIT nova.compute.resource_tracker \
[-] Free ram (MB): 2504
2014-01-25 15:23:41.852 28948 AUDIT nova.compute.resource_tracker \
[-] Free disk (GB): 9
2014-01-25 15:23:41.852 28948 AUDIT nova.compute.resource_tracker \
[-] Free VCPUS: 1
2014-01-25 15:23:42.037 28948 INFO nova.compute.resource_tracker \
[-] Compute_service record created for kvm4.deyu.wang:kvm4.deyu.wang
2014-01-25 15:24:12.146 AUDIT nova.compute.resource_tracker \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] \
Auditing locally available compute resources
2014-01-25 15:24:12.370 AUDIT nova.compute.resource_tracker \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] Free ram (MB): 2504
2014-01-25 15:24:12.370 AUDIT nova.compute.resource_tracker \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] Free disk (GB): 9
2014-01-25 15:24:12.371 AUDIT nova.compute.resource_tracker \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] Free VCPUS: 1
2014-01-25 15:24:12.653 INFO nova.compute.resource_tracker \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] \
Compute_service record updated for kvm4.deyu.wang:kvm4.deyu.wang
2014-01-25 15:24:12.827 INFO nova.compute.manager \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] \
Updating bandwidth usage cache

==> /var/log/nova/conductor.log <==
2014-01-25 15:23:29.171 28955 AUDIT nova.service [-] \
Starting conductor node (version 2013.1.2-4.el6ost)
2014-01-25 15:23:31.838 INFO nova.openstack.common.rpc.impl_qpid \
```

```
[req-926940e5-2ea3-488c-bfbf-14b5f0cfeaae None None] \
Connected to AMQP server on localhost:5672
2014-01-25 15:23:41.150 INFO nova.openstack.common.rpc.impl_qpid \
[req-54f88c9d-cfcd-4c77-8aa1-d06f5ddf0e04 None None] \
Connected to AMQP server on localhost:5672
2014-01-25 15:24:12.564 INFO nova.openstack.common.rpc.impl_qpid \
[req-6c8e9e6f-5dc0-4b0e-a0f4-60bd87234d9a None None] \
Connected to AMQP server on localhost:5672
2014-01-25 15:24:12.579 INFO nova.openstack.common.rpc.impl_qpid \
[req-961356f1-0cce-4fe4-a55d-f8e08881f5fc None None] \
Connected to AMQP server on localhost:5672

==> /var/log/nova/consoleauth.log <==
2014-01-25 15:23:29.381 28962 AUDIT nova.service [-] \
Starting consoleauth node (version 2013.1.2-4.el6ost)
2014-01-25 15:23:31.974 INFO nova.openstack.common.rpc.impl_qpid \
[req-4d503f6c-8e85-4f70-9acd-77cea9b42e8d None None] \
Connected to AMQP server on localhost:5672

==> /var/log/nova/nova-manage.log <==
2014-01-25 11:53:27.771 CRITICAL nova \
[req-cad77826-aa34-4223-a5c7-b23dac8866c9 None None] (OperationalError)
    \
(1045, "Access denied for user 'nova'@'localhost' (using password: YES)"
    ) None None
2014-01-25 13:14:06.299 CRITICAL nova \
[req-bdea1867-ecb2-4ddc-93ad-61e82feabb31 None None] (OperationalError)
    \
(1045, "Access denied for user 'nova'@'localhost' (using password: YES)"
    ) None None

==> /var/log/nova/scheduler.log <==
2014-01-25 15:23:29.241 28934 AUDIT nova.service [-] \
Starting scheduler node (version 2013.1.2-4.el6ost)
2014-01-25 15:23:31.917 INFO nova.openstack.common.rpc.impl_qpid \
[req-d0bd6e4c-1a3e-4cc8-abcc-68bbb4c14661 None None] \
Connected to AMQP server on localhost:5672
2014-01-25 15:23:32.064 INFO nova.openstack.common.rpc.impl_qpid \
[req-d0bd6e4c-1a3e-4cc8-abcc-68bbb4c14661 None None] \
Connected to AMQP server on localhost:5672
```

12. 以上錯誤訊息爲用户 cinder 無法使用 sudo 執行 cinder-rootwrap，必須 visudo 增加其權限。

```
[root@kvm4 ~(keystone_admin)]# visudo
Defaults:cinder !requiretty
cinder ALL = (root) NOPASSWD: /usr/bin/cinder-rootwrap /etc/cinder/
    rootwrap.conf *
```

13. cinder, nova, quantum 等套件安裝時，已將必須以 sudo 執行的命令權限寫在 /etc/sudoers.d 目錄下，但因 /etc/sudoers 沒有將此目錄包含進去，造成執行失敗。執行 visudo 加入 #includedir /etc/sudoers.d，注意最前面的符號 #不是註解，一定要存在。

```
[root@kvm4 ~(keystone_admin)]# ll /etc/sudoers.d/
total 12
-r--r-----. 1 root root 111 Jan 25 15:36 cinder
-r--r-----. 1 root root 103 Jan 25 15:39 nova
-r--r-----. 1 root root  95 Jul  4  2013 quantum

[root@kvm4 ~(keystone_admin)]# visudo
[root@kvm4 ~(keystone_admin)]# grep includedir /etc/sudoers
#includedir /etc/sudoers.d
```

14. 刪除紀錄檔，再重新啓動 nova 相關服務。

```
[root@kvm4 ~(keystone_admin)]# rm /var/log/nova/* -f
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-scheduler
    restart
Stopping openstack-nova-scheduler:                         [  OK  ]
Starting openstack-nova-scheduler:                         [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-api restart
Stopping openstack-nova-api:                               [  OK  ]
Starting openstack-nova-api:                               [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-compute
    restart
Stopping openstack-nova-compute:                           [  OK  ]
Starting openstack-nova-compute:                           [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-conductor
    restart
Stopping openstack-nova-conductor:                         [  OK  ]
Starting openstack-nova-conductor:                         [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-consoleauth
    restart
Stopping openstack-nova-consoleauth:                       [  OK  ]
Starting openstack-nova-consoleauth:                       [  OK  ]
[root@kvm4 ~(keystone_admin)]# /etc/init.d/openstack-nova-novncproxy
    restart
Stopping openstack-nova-novncproxy:                        [  OK  ]
Starting openstack-nova-novncproxy:                        [  OK  ]
```

15. 再查看 cinder 服務的紀錄，已無錯誤訊息。

```
[root@kvm4 ~(keystone_admin)]# tail /var/log/nova/*
==> /var/log/nova/api.log <==
2014-01-25 15:56:42.384 6973 INFO nova.service [-] Starting 1 workers
2014-01-25 15:56:42.386 6973 INFO nova.service [-] Started child 6988
2014-01-25 15:56:42.388 6973 INFO nova.network.driver \
[-] Loading network driver 'nova.network.linux_net'
2014-01-25 15:56:42.395 6988 INFO nova.osapi_compute.wsgi.server \
[-] (6988) wsgi starting up on http://0.0.0.0:8774/

==> /var/log/nova/compute.log <==
2014-01-25 15:56:41.279 5087 INFO nova.service \
[-] Caught SIGTERM, exiting
2014-01-25 15:56:43.436 6995 INFO nova.manager \
[-] Skipping periodic task _periodic_update_dns because its interval is
    negative
2014-01-25 15:56:43.516 6995 INFO nova.virt.driver \
[-] Loading compute driver 'libvirt.LibvirtDriver'
2014-01-25 15:56:43.660 INFO nova.openstack.common.rpc.impl_qpid \
[req-9df6f81e-414c-4943-b8cb-6cbf8f5fe73c None None] \
Connected to AMQP server on localhost:5672
2014-01-25 15:56:43.705 INFO nova.openstack.common.rpc.impl_qpid \
[req-9df6f81e-414c-4943-b8cb-6cbf8f5fe73c None None] \
Connected to AMQP server on localhost:5672

==> /var/log/nova/conductor.log <==
2014-01-25 15:56:42.464 5109 INFO nova.service \
[-] Caught SIGTERM, exiting
2014-01-25 15:56:44.182 7017 AUDIT nova.service \
[-] Starting conductor node (version 2013.1.2-4.el6ost)
2014-01-25 15:56:44.814 INFO nova.openstack.common.rpc.impl_qpid \
[req-b127355e-0058-488f-a851-20fd40e9bc7a None None] \
Connected to AMQP server on localhost:5672

==> /var/log/nova/consoleauth.log <==
2014-01-25 15:56:43.652 5133 INFO nova.service \
[-] Caught SIGTERM, exiting
2014-01-25 15:56:46.108 7039 AUDIT nova.service \
[-] Starting consoleauth node (version 2013.1.2-4.el6ost)
2014-01-25 15:56:46.565 INFO nova.openstack.common.rpc.impl_qpid \
[req-17daa1bf-db06-49a0-84f9-c208dbc9a5f7 None None] \
Connected to AMQP server on localhost:5672

==> /var/log/nova/scheduler.log <==
2014-01-25 15:56:38.924 5059 INFO nova.service \
[-] Caught SIGTERM, exiting
2014-01-25 15:56:40.998 6951 AUDIT nova.service \
[-] Starting scheduler node (version 2013.1.2-4.el6ost)
2014-01-25 15:56:41.838 INFO nova.openstack.common.rpc.impl_qpid \
[req-07ec083e-5763-4910-b111-23489a6a3f49 None None] \
Connected to AMQP server on localhost:5672
2014-01-25 15:56:41.881 INFO nova.openstack.common.rpc.impl_qpid \
[req-07ec083e-5763-4910-b111-23489a6a3f49 None None] \
Connected to AMQP server on localhost:5672
```

16. 檢查 openstack 中 nova 相關服務的狀態。

```
[root@kvm4 ~(keystone_admin)]# openstack-status
== Nova services ==
openstack-nova-api:           active
openstack-nova-cert:          inactive (disabled on boot)
openstack-nova-compute:       active
openstack-nova-network:       inactive (disabled on boot)
openstack-nova-scheduler:     active
openstack-nova-volume:        dead (disabled on boot)
openstack-nova-conductor:     active
.....
== Support services ==
mysqld:                       active
libvirtd:                     active
tgtd:                         active
qpidd:                        active
memcached:                    active
```

24.3 建立 Instances

1. 改變環境變數爲一般使用者 myuser。

```
[root@kvm4 ~(keystone_admin)]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]#
```

2. 複製終端機訊息提示檔至 /tmp 目錄，並加入一行提示此 instance 是由 nova 命令安裝。

```
[root@kvm4 ~(keystone_myuser)]# cp /etc/issue /tmp/
[root@kvm4 ~(keystone_myuser)]# echo "Installed using nova comman-line"
    >> /tmp/issue
```

3. 產生一組新的 SSH 登入鑰匙，名爲 key1，存於 /root 目錄下。

```
[root@kvm4 ~(keystone_myuser)]# nova keypair-add key1 > /root/key1.pem
[root@kvm4 ~(keystone_myuser)]# ll /root/key1.pem
-rw-r--r--. 1 root root 1676 Jan 25 16:11 /root/key1.pem
```

4. 產生新的 security group，名爲 mysecgroup。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-create mysecgroup "SSH"
+------------+-------------+
| Name       | Description |
+------------+-------------+
| mysecgroup | SSH         |
+------------+-------------+
```

5. mysecgroup 允許 0.0.0.0/0 以 TCP/22 port 連結，也就是所有 ip 皆可以 TCP 協定連接 22 port。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-add-rule mysecgroup tcp 22
    22 0.0.0.0/0
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| tcp         | 22        | 22      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
```

6. 建立 instance 必須知道使用的 image, flavor, net 等 id 或名稱。查詢 image id。

```
[root@kvm4 ~(keystone_myuser)]# nova image-list
+--------------------------------------+--------+--------+--------+
| ID                                   | Name   | Status | Server |
+--------------------------------------+--------+--------+--------+
| 79e088a9-0d8c-40fc-b5d5-13865cc891d2 | minkvm | ACTIVE |        |
+--------------------------------------+--------+--------+--------+
```

7. 查詢 flavor 名稱。

```
[root@kvm4 ~(keystone_myuser)]# nova flavor-list
+----+-----------+-----------+------+-----------+------+-------+-------------+---------
| ID | Name      | Memory_MB | Disk | Ephemeral | Swap | VCPUs |
   RXTX_Factor | Is_Public | extra_specs |
+----+-----------+-----------+------+-----------+------+-------+-------------+---------
| 1  | m1.tiny   | 512       | 0    | 0         |      | 1     | 1.0
           | True      | {}          |
| 2  | m1.small  | 2048      | 20   | 0         |      | 1     | 1.0
           | True      | {}          |
| 3  | m1.medium | 4096      | 40   | 0         |      | 2     | 1.0
           | True      | {}          |
| 4  | m1.large  | 8192      | 80   | 0         |      | 4     | 1.0
           | True      | {}          |
| 5  | m1.xlarge | 16384     | 160  | 0         |      | 8     | 1.0
           | True      | {}          |
+----+-----------+-----------+------+-----------+------+-------+-------------+---------
```

8. 查詢網路 id。

```
[root@kvm4 ~(keystone_myuser)]# quantum net-list
+--------------------------------------+---------+-------------------------------------
| id                                   | name    | subnets
                                                 |
+--------------------------------------+---------+-------------------------------------
| 48e9c08e-158d-4c6a-9623-b4eeaea5716c | private | af75410d-6cf3-457c-
   a393-891641e563db 192.168.32.0/24 |
| f9179863-802b-4a9c-b711-206dc9a5a9b4 | public  | 76055bb3-ebb3-4e75
   -8971-64d90c5d8af6                |
+--------------------------------------+---------+-------------------------------------
```

9. 使用 m1.tiny flavor, minkvm image, key1 key, mysecgroup security group, private network ID and /tmp/issue file 產生 instance，名爲 minkvm。

```
[root@kvm4 ~(keystone_myuser)]# nova boot --flavor m1.tiny \
--image minkvm --key-name key1 --security-group mysecgroup \
--nic net-id=48e9c08e-158d-4c6a-9623-b4eeaea5716c \
--file /etc/issue=/tmp/issue minkvm
+-----------------------------+--------------------------------------+
```

```
| Property                     | Value                                |
+------------------------------+--------------------------------------+
| status                       | BUILD                                |
| updated                      | 2014-01-26T23:00:51Z                 |
| OS-EXT-STS:task_state        | scheduling                           |
| key_name                     | key1                                 |
| image                        | minkvm                               |
| hostId                       |                                      |
| OS-EXT-STS:vm_state          | building                             |
| flavor                       | m1.tiny                              |
| id                           | 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 |
| security_groups              | [{u'name': u'mysecgroup'}]           |
| user_id                      | 9904d73f9a1841fa89381fccd2bc59df     |
| name                         | minkvm                               |
| adminPass                    | u7FqWFdcUdk5                         |
| tenant_id                    | 6c26d132e38f4b83a1d9f5a777beeb52     |
| created                      | 2014-01-26T23:00:50Z                 |
| OS-DCF:diskConfig            | MANUAL                               |
| metadata                     | {}                                   |
| accessIPv4                   |                                      |
| accessIPv6                   |                                      |
| progress                     | 0                                    |
| OS-EXT-STS:power_state       | 0                                    |
| OS-EXT-AZ:availability_zone  | nova                                 |
| config_drive                 |                                      |
+------------------------------+--------------------------------------+
```

10. 使用 nova list 查看 instance 狀態，目前爲建置中 (BUILD)。

```
[root@kvm4 ~(keystone_myuser)]# nova list
+--------------------------------------+--------+--------+----------+
| ID                                   | Name   | Status | Networks |
+--------------------------------------+--------+--------+----------+
| 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 | minkvm | BUILD  |          |
+--------------------------------------+--------+--------+----------+
```

11. 經過一段時間再查看 instance 已建置完成，狀態爲啓動 (ACTIVE)。

```
[root@kvm4 ~(keystone_myuser)]# nova list
+--------------------------------------+--------+--------+---------------------
| ID                                   | Name   | Status | Networks
                |
+--------------------------------------+--------+--------+---------------------
| 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 | minkvm | ACTIVE | private
   =192.168.32.2 |
```

```
6 +--------------------------------------+--------+--------+-------------------+
```

12. 若 instance 狀態爲錯誤 (ERROR)，必須查看建置過程紀錄檔 /var/log/nova/compute.log，錯誤的可能原因：

    (a) 自行產生的 image 需要較大的 RAM，但指定使用的 flavor 不够大。

    (b) 自行設計的作業系統，也就是匯入的 image 硬碟分割使用兩個 vg，但其中一個無法使用。

    (c) 並不是任意的 image 檔都可使用，詳細請參考「自訂虛擬機 Images」24.6。

13. instance minkvm 指定的 ip 爲 192.168.32.2，使用 quantum port-list 找到連結此 ip 的 port ID。

```
[root@kvm4 ~(keystone_myuser)]# quantum port-list
2 +--------------------------------------+------+-------------------+------------------
| id                                   | name | mac_address       |
   fixed_ips
   |
4 +--------------------------------------+------+-------------------+------------------
| 79dd275e-7ac9-4e1c-82f6-f49d9409d014 |      | fa:16:3e:93:3b:37 | {"
   subnet_id": "af75410d-6cf3-457c-a393-891641e563db", "ip_address": "
   192.168.32.3"} |
6 | 8febcb98-132d-4bf8-8189-dcf7184a15de |      | fa:16:3e:91:dc:9a | {"
   subnet_id": "af75410d-6cf3-457c-a393-891641e563db", "ip_address": "
   192.168.32.2"} |
+--------------------------------------+------+-------------------+------------------
```

14. 找到浮動 ip 的 ID。

```
1 [root@kvm4 ~(keystone_myuser)]# quantum floatingip-list
+--------------------------------------+------------------+---------------------+------
3 | id                                   | fixed_ip_address |
   floating_ip_address | port_id |
+--------------------------------------+------------------+---------------------+------
```

```
| 9a01e37b-8927-4311-9b6e-9615df28eb0f |                  |
    192.168.122.10      |          |
+--------------------------------------+------------------+--------------------+------
```

15. 連結 192.168.32.2 的 port 到指定的浮動 ip，讓 instance 可以連接外部網路。

```
[root@kvm4 ~(keystone_myuser)]# quantum floatingip-associate \
9a01e37b-8927-4311-9b6e-9615df28eb0f 8febcb98-132d-4bf8-8189-
    dcf7184a15de
Associated floatingip 9a01e37b-8927-4311-9b6e-9615df28eb0f
```

16. 再次查看浮動 ip 192.168.122.10 已連結到 192.168.32.2 的 port。

```
[root@kvm4 ~(keystone_myuser)]# quantum floatingip-list
+--------------------------------------+------------------+--------------------+------

| id                                   | fixed_ip_address |
    floating_ip_address | port_id                              |
+--------------------------------------+------------------+--------------------+------

| 9a01e37b-8927-4311-9b6e-9615df28eb0f | 192.168.32.2     |
    192.168.122.10      | 8febcb98-132d-4bf8-8189-dcf7184a15de |
+--------------------------------------+------------------+--------------------+------
```

17. 以 ssh 使用 key1.pem 登入 192.168.122.10。由於虛擬機開機較慢且自行製作的 image，有可能開機有問題，因而無法登入。建議先使用下一章的 dashboard 開啓網頁中的虛擬機 console，先看是否正常開機，且網路沒問題。

```
[root@kvm4 ~(keystone_myuser)]# chmod 600 /root/key1.pem
[root@kvm4 ~(keystone_myuser)]# ssh -i /root/key1.pem root@192
    .168.122.10
The authenticity of host '192.168.122.10 (192.168.122.10)' can't be
    established.
RSA key fingerprint is 14:9f:cd:45:1e:fe:cd:15:98:57:76:c9:18:99:77:49.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.122.10' (RSA) to the list of known
    hosts.
Last login: Sun Jan 26 21:28:13 2014
[root@kvm3 ~]# hostname
```

```
kvm3.deyu.wang
[root@kvm3 ~]#
```

24.4 測試 Instances 虛擬機

1. 遠端登入虛擬機。

```
[root@dywH ~]# ssh 192.168.122.10
The authenticity of host '192.168.122.10 (192.168.122.10)' can't be
    established.
RSA key fingerprint is 14:9f:cd:45:1e:fe:cd:15:98:57:76:c9:18:99:77:49.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.122.10' (RSA) to the list of known
    hosts.
root@192.168.122.10's password:
Warning: No xauth data; using fake authentication data for X11
    forwarding.
Last login: Mon Jan 27 07:22:25 2014 from 192.168.122.4
[root@kvm3 ~]#
```

2. 虛擬機可連上 internet。

```
[root@kvm3 ~]# ping -c 3 163.17.1.1
PING 163.17.1.1 (163.17.1.1) 56(84) bytes of data.
64 bytes from 163.17.1.1: icmp_seq=1 ttl=53 time=140 ms

--- 163.17.1.1 ping statistics ---
3 packets transmitted, 1 received, 66% packet loss, time 3005ms
rtt min/avg/max/mdev = 140.077/140.077/140.077/0.000 ms
```

3. 設定 DNS。

```
[root@kvm3 ~]# vi /etc/resolv.conf
; generated by /sbin/dhclient-script
search openstacklocal
nameserver 192.168.122.1
nameserver 192.168.32.3
```

4. 虛擬機的安全性由 openstack 主機控制，故關閉本身防火牆。

```
[root@kvm3 ~]# chkconfig iptables off
[root@kvm3 ~]# /etc/init.d/iptables stop
iptables: Flushing firewall rules:                         [  OK  ]
iptables: Setting chains to policy ACCEPT: filter          [  OK  ]
iptables: Unloading modules:
```

5. 安裝 httpd。

```
[root@kvm3 ~]# yum -y install httpd
```

6. 啓動網頁服務 httpd，並設定開機啓動。

```
[root@kvm3 ~]# /etc/init.d/httpd start
Starting httpd:                                            [  OK  ]
[root@kvm3 ~]# chkconfig httpd on
```

7. 產生 index.html。

```
[root@kvm3 ~]# echo 'Instance kvm3 web test.' >> /var/www/html/index.
    html
```

8. 到 openstack 主機，改變環境變數爲一般使用者 myuser。

```
[root@kvm4 ~(keystone_admin)]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]#
```

9. 增加 mysecgroup icmp port，讓遠端可以 ping 虛擬機。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-add-rule mysecgroup icmp
    -1 -1 0.0.0.0/0
```

```
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| icmp        | -1        | -1      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
```

10. 增加 mysecgroup 80 port。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-add-rule mysecgroup tcp 80
    80 0.0.0.0/0
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| tcp         | 80        | 80      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
```

11. 列出 mysecgroup 開放的 ports。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-list-rules mysecgroup
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| icmp        | -1        | -1      | 0.0.0.0/0 |              |
| tcp         | 22        | 22      | 0.0.0.0/0 |              |
| tcp         | 80        | 80      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
```

12. ping 虛擬機。

```
[root@kvm4 ~(keystone_myuser)]# ping -c 3 192.168.122.10
PING 192.168.122.10 (192.168.122.10) 56(84) bytes of data.
64 bytes from 192.168.122.10: icmp_seq=1 ttl=63 time=2.24 ms
64 bytes from 192.168.122.10: icmp_seq=2 ttl=63 time=0.348 ms
64 bytes from 192.168.122.10: icmp_seq=3 ttl=63 time=0.393 ms

--- 192.168.122.10 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 0.348/0.993/2.240/0.882 ms
```

13. 測試虛擬機網頁。

```
[root@kvm4 ~(keystone_myuser)]# wget http://192.168.122.10
--2014-01-27 08:44:44--  http://192.168.122.10/
Connecting to 192.168.122.10:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 24 [text/html]
Saving to: “index.html”

100%[======================================>] 24          --.-K/s   in 0
    s

2014-01-27 08:44:44 (5.53 MB/s) - “index.html” saved [24/24]

[root@kvm4 ~(keystone_myuser)]# cat index.html
Instance kvm3 web test.
```

24.5 Instance 管理 cinder 空間

1. 載入一般使用者 myuser 環境變數。

```
[root@kvm4 ~]# source keystonerc_myuser
[root@kvm4 ~(keystone_myuser)]#
\item 產生一個 1G，type 爲 lvm，名爲 vol1 的空間。
\\\begin{myverbatim}
[root@kvm4 ~(keystone_myuser)]# cinder create --volume-type lvm --
    display-name vol1 1
+---------------------+--------------------------------------+
|       Property      |                Value                 |
+---------------------+--------------------------------------+
|     attachments     |                  []                  |
|  availability_zone  |                 nova                 |
|       bootable      |                false                 |
|      created_at     |      2014-01-27T11:43:48.057284      |
| display_description |                 None                 |
|     display_name    |                 vol1                 |
|          id         | b8e18b4a-5731-4f5e-9aa7-a9871368bc39 |
|       metadata      |                  {}                  |
|         size        |                  1                   |
|     snapshot_id     |                 None                 |
|     source_volid    |                 None                 |
|        status       |               creating               |
|     volume_type     |                 lvm                  |
+---------------------+--------------------------------------+
```

2. 列出 cinder，有一個名爲 vol1 的 1G 空間可用，記下其 id。

```
[root@kvm4 ~(keystone_myuser)]# cinder list
+--------------------------------------+-----------+--------------+------+-------------
|                  ID                  |   Status  | Display Name | Size
    | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------
| b8e18b4a-5731-4f5e-9aa7-a9871368bc39 | available |     vol1     |  1
     |     lvm     |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------
```

3. 列出虛擬機，有一台名爲 minkvm 可用。

```
[root@kvm4 ~(keystone_myuser)]# nova list
+--------------------------------------+--------+--------+-----------------------------
| ID                                   | Name   | Status | Networks
                                |
+--------------------------------------+--------+--------+-----------------------------
| 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 | minkvm | ACTIVE | private
   =192.168.32.2, 192.168.122.10 |
+--------------------------------------+--------+--------+-----------------------------
```

4. 附上 vol1 的空間給虛擬機 minkvm。

```
[root@kvm4 ~(keystone_myuser)]# nova volume-attach minkvm b8e18b4a
   -5731-4f5e-9aa7-a9871368bc39 auto
+----------+--------------------------------------+
| Property | Value                                |
+----------+--------------------------------------+
| device   | /dev/vdb                             |
| serverId | 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 |
| id       | b8e18b4a-5731-4f5e-9aa7-a9871368bc39 |
| volumeId | b8e18b4a-5731-4f5e-9aa7-a9871368bc39 |
+----------+--------------------------------------+
```

5. 列出 cinder，可以看到 vol1 正在加入 instance minkvm 中。

```
[root@kvm4 ~(keystone_myuser)]# cinder list
+--------------------------------------+-----------+--------------+------+-------------
|                  ID                  |   Status  | Display Name | Size
    | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------
| b8e18b4a-5731-4f5e-9aa7-a9871368bc39 | attaching |     vol1     |  1
     |     None    |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------
```

6. 過一段時間再次列出 cinder，可以看到 vol1 已加入 instance minkvm 中。

```
[root@kvm4 ~(keystone_myuser)]# cinder list
+--------------------------------------+--------+--------------+------+-------------+--
|                  ID                  | Status | Display Name | Size |
   Volume Type | Bootable |             Attached to              |
+--------------------------------------+--------+--------------+------+-------------+--
| b8e18b4a-5731-4f5e-9aa7-a9871368bc39 | in-use |     vol1     |  1   |
       lvm     |  false   | 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 |
+--------------------------------------+--------+--------------+------+-------------+--
```

7. 登入 instance minkvm。

```
[root@kvm4 ~(keystone_myuser)]# ssh -i /root/key1.pem root@192
    .168.122.10
Last login: Mon Jan 27 07:51:38 2014 from 192.168.122.1
[root@kvm3 ~]#
```

8. 看到有一顆 1G 的硬碟 /dev/vdb 可用。

```
[root@kvm3 ~]# fdisk -luc /dev/vdb

Disk /dev/vdb: 1073 MB, 1073741824 bytes
```

```
16 heads, 63 sectors/track, 2080 cylinders, total 2097152 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000
```

24.6 自訂虛擬機 Images

1. 虛擬機 images 的產生有一定的要求，詳如 Openstack docs。
2. 爲確認 openstack nova 沒有問題，可先下載 cirros-xxx.img 或 small.img。
3. 虛擬機 image 製作重點：
   (a) 不需要分割 /boot 及 swap
   (b) 先只建立一個 partition 安裝系統，lvm 或 linux 皆可。實作時曾分割一個 partition /boot 及兩個 lvm vg，nova boot 時出現 error 是因其中有一個 vg 的 lv 無法掛載。這部分可參考 Openstack docs，做進一步的測試。
   (c) 開機關閉 iptables 防火牆服務。

```
chkconfig iptables off
```

   (d) 記得開機啓動 sshd 服務，否則無法連線。

```
chkconfig sshd on
```

   (e) 由於建立 instance 虛擬機，網卡硬體位址會不同，一定要清除 eth0 網卡中的硬體位址 HWADD，且清除網卡產生檔案，否則虛擬機開機無法啓動網路，也就無法連線。建立虛擬機時清除網卡指令如下，不要使用連結 ln -sf /dev/null 方式，否則雲端虛擬機無法開機。

```
sed -i 's/^HWADDR=.*$//' /etc/sysconfig/network-scripts/ifcfg-eth0
echo '' > /etc/udev/rules.d/70-persistent-net.rules
echo '' > /lib/udev/rules.d/75-persistent-net-generator.rules
```

4. 產生本本實作中使用的 image minkvm.qcow2，使用的自動安裝 kickstart 檔 minkvm-ks.cfg。

5. 以 virt-install 安裝完成的 Image 檔 minkvm.qcow2 下載。

Chapter 25

Dashboard

25.1 認識 Dashboard

1. Dashboard 是 OpenStack 中的網頁管理系統。
2. Dashboard 使用 Django 設計，程式語言爲 python。
3. Dashboard 幫助管理者管理 openstack，就如 phpmyadmin 幫忙管理者管理 MySQL。

25.2 Dashboard 安裝

1. 安裝 Dashboard 套件

```
[root@kvm7 ~]# yum install -y mod_wsgi httpd mod_ssl openstack-dashboard
    memcached python-memcached
```

2. 設定 dashboard。

```
[root@kvm7 ~]# vim /etc/openstack-dashboard/local_settings
OPENSTACK_HOST="192.168.122.7"
CACHE_BACKEND ='/memcached://127.0.0.1:11211/'
```

3. Dashboard 需要名爲 member 的 keystone 角色，所以導入 admin 環境變數，查看有沒有 member 角色，如果沒有增加這個角色。

```
[root@kvm7 ~]# source keystonerc_admin
[root@kvm7 ~(keystone_admin)]# keystone role-list
+----------------------------------+----------+
|                id                |   name   |
+----------------------------------+----------+
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_ |
| 91f1e2429c614bac8efe19cef39e8e7d |  admin   |
| 1b5a478342bc4f67a83484ce60e0f322 |  member  |
+----------------------------------+----------+
[root@kvm7 ~(keystone_admin)]#
[root@kvm7 ~(keystone_admin)]# keystone role-create --name member
```

4. 修改 SELinux 政策，允許從網頁連結 openstack。

```
[root@kvm7 ~(keystone_admin)]# setsebool -P httpd_can_network_connect on
```

5. 啓動 httpd 服務，並設定開機啓動。

```
[root@kvm7 ~(keystone_admin)]# /etc/init.d/httpd start
Starting httpd:                                            [  OK  ]
[root@kvm7 ~(keystone_admin)]# chkconfig httpd on
```

6. iptables 暫時開啓 https 443 port。

```
[root@kvm7 ~(keystone_myuser)]# iptables -I INPUT -p tcp \
-m state --state NEW -m tcp --dport 443 -j ACCEPT
```

7. iptables 永久開啓 https 443 port，先將目前的防火牆設定寫入 /etc/sysconfig/iptables。

```
[root@kvm7 ~]# /etc/init.d/iptables save
iptables: Saving firewall rules to /etc/sysconfig/iptables:[  OK  ]
```

8. iptables 開啓 https 443 port 的規則寫入 /etc/sysconfig/iptables。

```
[root@kvm7 ~]# vim /etc/sysconfig/iptables
[root@kvm7 ~]# grep 443 -C2 /etc/sysconfig/iptables
-A INPUT -i lo -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 22 -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 443 -j ACCEPT
-A INPUT -j REJECT --reject-with icmp-host-prohibited
-A FORWARD -j quantum-filter-top
```

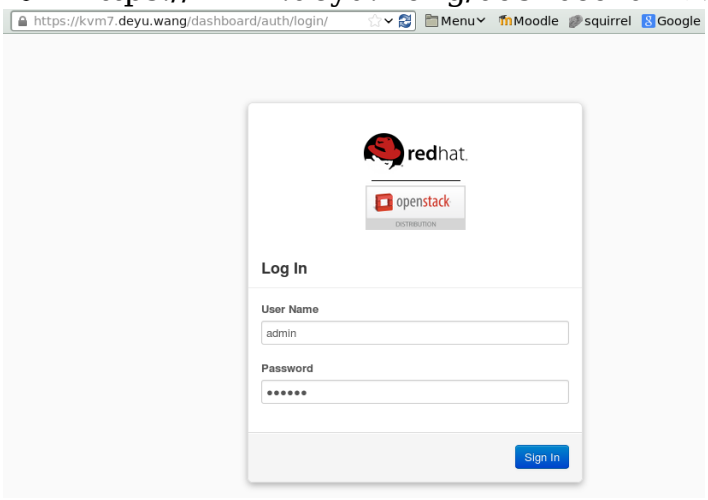
9. 重新啓動 iptables。

```
[root@kvm7 ~]# /etc/init.d/iptables restart
iptables: Flushing firewall rules:                         [  OK  ]
iptables: Setting chains to policy ACCEPT: mangle nat filte[  OK  ]
iptables: Unloading modules:  iptable_nat iptable_filter ip[FAILED]t
    iptable_filter ip_tables
iptables: Applying firewall rules:                         [  OK  ]
```

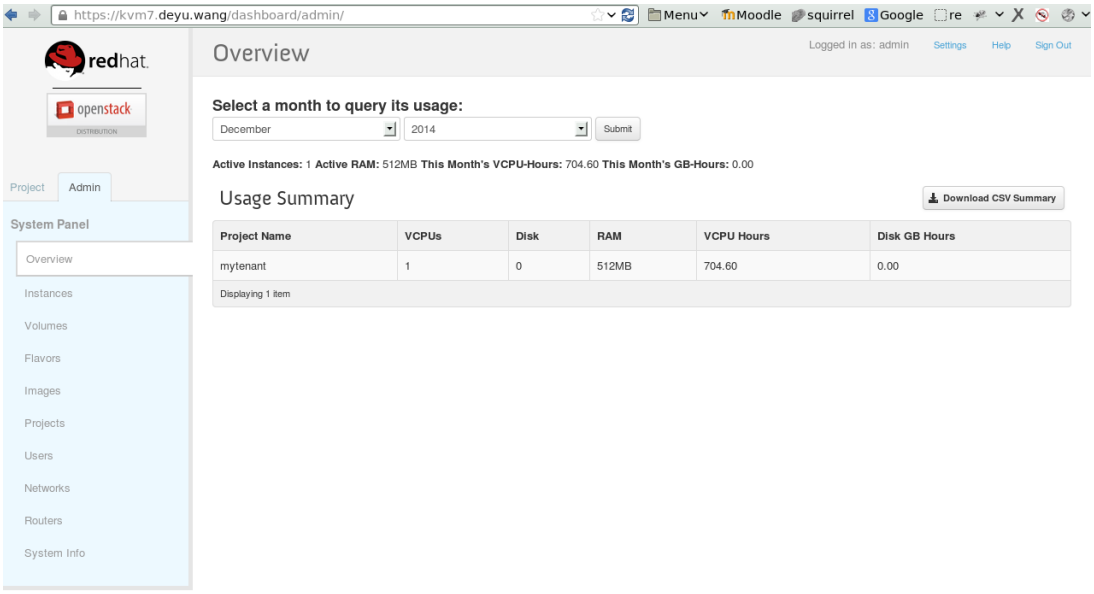
25.3 Dashboard 使用

1. 此節畫面爲 kvm7.deyu.wang，與本文的 kvm4.deyu.wang 有出入，但不影響成果展示。

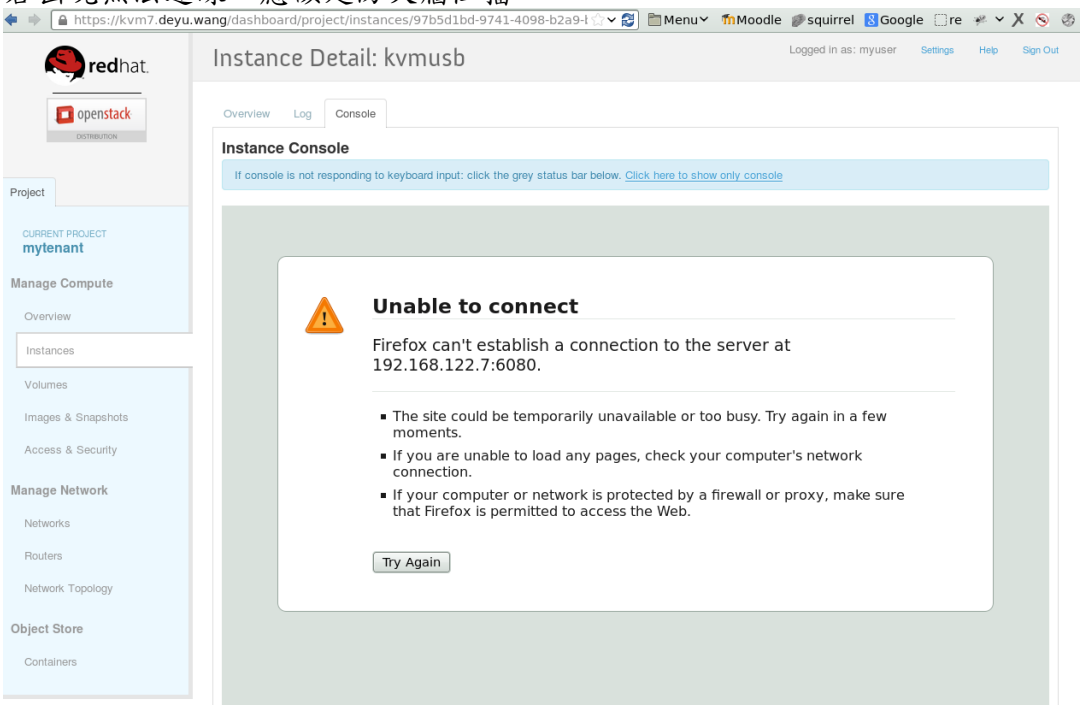
2. 連結 https://kvm7.deyu.wang/dashboard，出現登入畫面。



3. admin 管理者登入畫面。



4. 以帳號 myuser，密碼 123qwe 登入，點選 instances -> minkvm -> console 若出現無法連線，應該是防火牆阻擋。

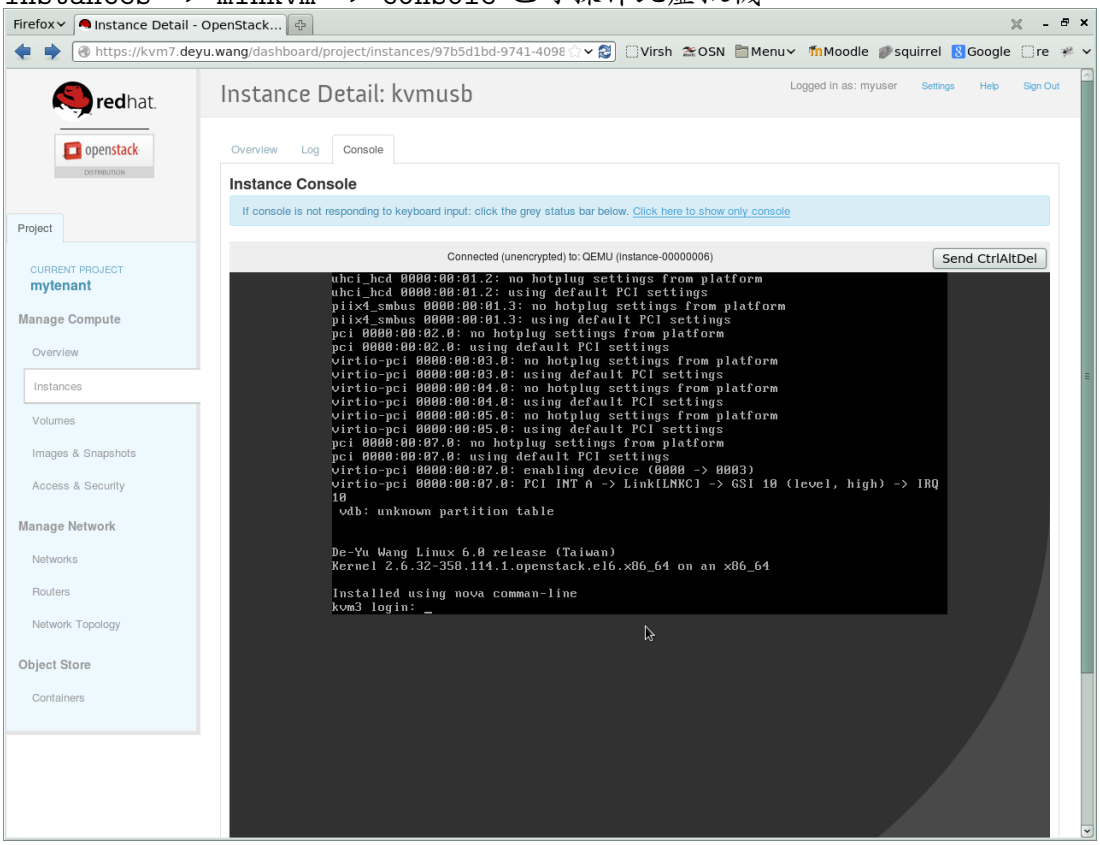


5. 防火牆開啓 6080 port。

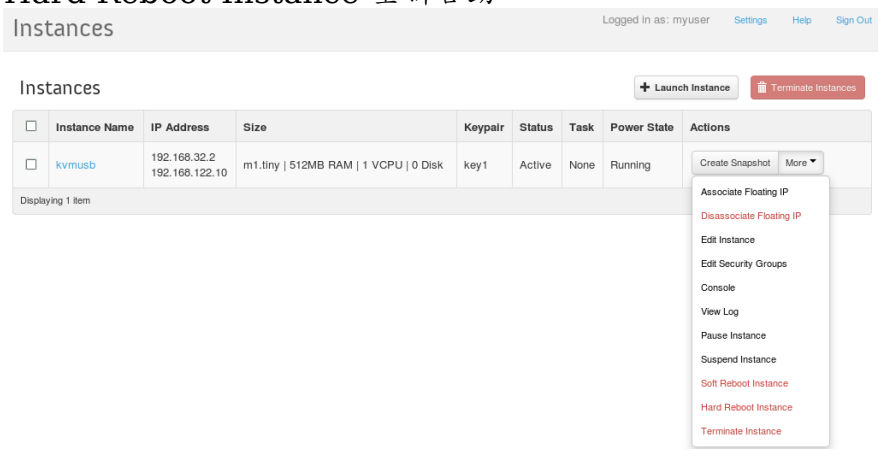
```
[root@kvm7 ~(keystone_myuser)]# iptables -I INPUT -p tcp \
-m multiport --dports 6080 -m comment \
--comment "console incoming" -j ACCEPT
```

6. 以帳號 myuser，密碼 123qwe 登入，再點選

instances -> minkvm -> console 已可操作此虛擬機。



7. Nova instance 狀態爲 SHUTOFF，可以使用 Soft Reboot Instance 或 Hard Reboot Instance 重新啓動。



8. Nova instance 狀態爲 SHUTOFF，也可以使用文字界面指令，Soft Reboot Instance 或 Hard Reboot Instance 重新啓動。

```
[root@kvm7 ~(keystone_myuser)]# nova list
+--------------------------------------+--------+--------+-------------------------------
| ID                                   | Name   | Status | Networks
                                |
```

```
+--------------------------------------+--------+--------+-----------------------------
| 97b5d1bd-9741-4098-b2a9-bd16d5373cb7 | minkvm | ACTIVE | private
   =192.168.32.2, 192.168.122.10 |
+--------------------------------------+--------+--------+-----------------------------

[root@kvm7 ~(keystone_myuser)]# nova reboot --hard minkvm
```

25.4 KVM 調整

1. 因本實作環境 Openstack 架在 KVM 虛擬機上，虛擬機裡還要執行虛擬機，如果 RAM 不夠大或 CPU CORE 數太小，虛擬機內的擬虛機，也就是所謂的 instance，開機會很慢或開機開到當掉，尤其是 CPU core 數太小，在執行 instance 時 CPU 使用率接近 100%，速度非常慢。查看目前虛擬機 osusb 的 CPU core 數量爲 2，必須加大。

```
[root@kvm7 ~]# nproc
2
```

2. 以 virsh edit 指令編輯 osusb 虛擬機的 XML 設定檔，找到 vcpu 參數，改成 4，找到 memory 改成 3145728，也就是 3G。

```
[root@dywH ~]# virsh edit osusb
Domain osusb XML configuration edited.

[root@dywH ~]# grep vcpu /etc/libvirt/qemu/osusb.xml
  <vcpu placement='static'>4</vcpu>

[root@dywH ~]# grep memory /etc/libvirt/qemu/osusb.xml
  <memory unit='KiB'>3145728</memory>
```

3. 關閉 osusb 虛擬機。

```
[root@dywH ~]# virsh destroy osusb
Domain osusb destroyed
```

4. 啓動 osusb 虛擬機。

```
[root@dywH ~]# virsh start osusb
Domain osusb started
```

5. 再重新登入 osusb 虛擬機，檢查 CPU core 數量已變爲 4。

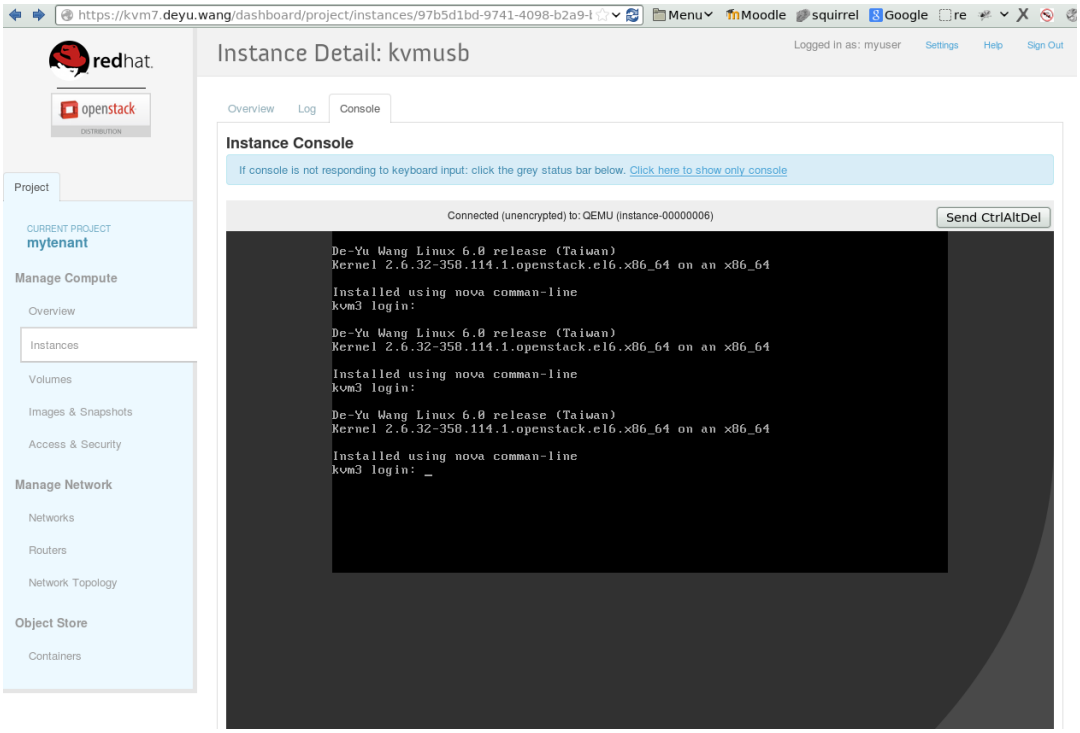
```
[root@dywH ~]# ssh kvm7.deyu.wang
root@kvm7.deyu.wang's password:
Last login: Wed Dec 31 09:55:35 2014 from 192.168.122.1
[root@kvm7 ~]# nproc
4
```

6. 修改後以指令 nova reboot 重新啓動 openstack 內的虛擬機 minkvm，並以 top 觀察 CPU 使用率仍然接近 100%，但 minkvm 重開機速度已加快許多。

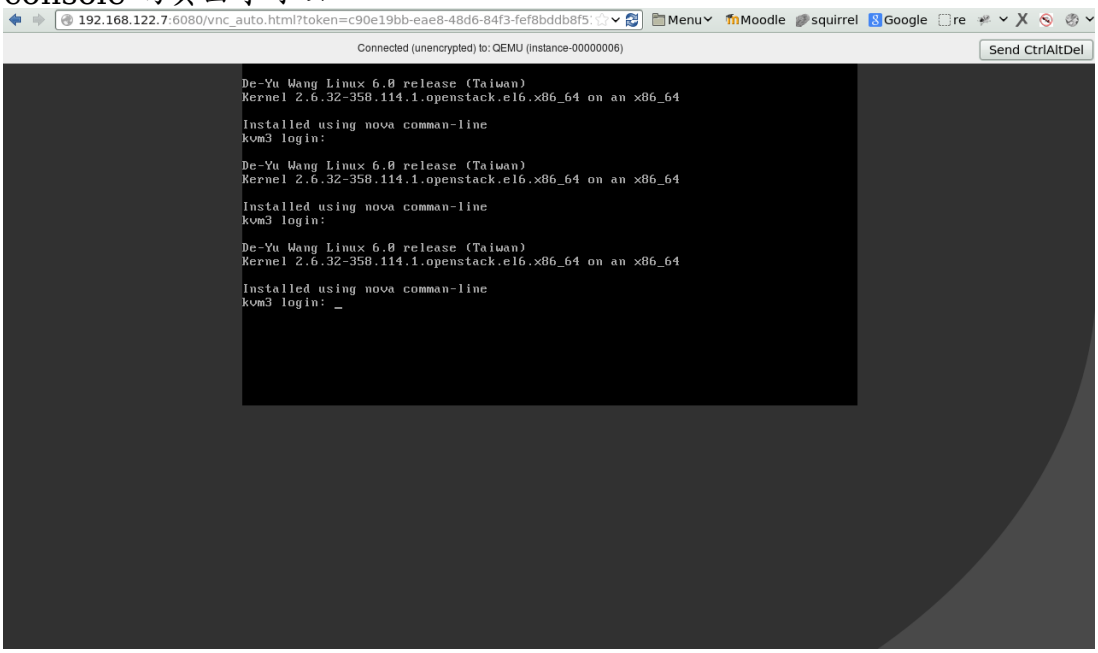
```
[root@kvm7 ~]# source keystonerc_myuser
[root@kvm7 ~(keystone_myuser)]# nova reboot --hard minkvm
```

25.5 Instance 螢幕保護

1. Openstack 進入 instance console 畫面，在此畫面 console 不接受鍵盤訊號，也就是無法操作。



2. 要操作 instance，必須點選「Click here to show only console」進入只有 console 的頁面才可以。



3. 當一段時間沒動作，遠端機器會進入螢幕保護狀態，文字界面的機器出現全黑畫面，必須按任何鍵喚醒。建議開閉 instance 的螢幕保護。

4. 查詢目前的 instance，待機 600 秒主機會進入螢幕保護狀態，必須將其改成 0，也就是關閉。

```
[root@kvm3 ~]# cat /sys/module/kernel/parameters/consoleblank
600
```

5. 修改開機選單，在 kernel 參數最後加入 consoleblank=0。

```
[root@kvm3 ~]# vim /boot/grub/grub.conf
[root@kvm3 ~]# grep blank /boot/grub/grub.conf
    kernel /boot/vmlinuz-2.6.32-358.114.1.openstack.el6.x86_64 ro \
root=UUID=28ce3d82-17eb-4b70-a878-feb970e09f7d \
rd_NO_LUKS rd_NO_LVM rd_NO_MD rd_NO_DM \
LANG=en_US.UTF-8 SYSFONT=latarcyrheb-sun16 \
KEYBOARDTYPE=pc KEYTABLE=us crashkernel=auto \
consoleblank=0
```

6. 不要在 instance 內下 reboot 指令重新啓動，只會關機卻不會開機。

```
[root@kvm3 ~]# reboot
```

7. 先登出回到 kvm7 主機，以 myuser 環境重新啓動 instance。

```
[root@kvm3 ~]# exit
[root@kvm7 ~(keystone_myuser)]# nova reboot --hard minkvm
```

8. 再登入 instance ，查詢待機 0 秒主機會進入螢幕保護狀態，也就是取消螢幕保護讀秒。

```
[root@kvm7 ~(keystone_myuser)]# ssh -i /root/key1.pem 192.168.122.10
Last login: Wed Dec 31 15:55:23 2014 from 192.168.122.7

[root@kvm3 ~]# cat /sys/module/kernel/parameters/consoleblank
0
```

9. 使用 dashboard 連線 instance，已不再進入螢幕保護的黑畫面了。

Chapter 26

除錯

26.1 問題一

1. cloun-init-local 啓動失敗。

```
[root@kvm7 ~]# /etc/init.d/cloud-init-local restart
Starting cloud-init: Cloud-init v. 0.7.1 running 'init-local' at Mon, 05
    Jan 2015 11:15:18 +0000. Up 439.95 seconds.
Traceback (most recent call last):
  File "/usr/bin/cloud-init", line 509, in <module>
    sys.exit(main())
  File "/usr/bin/cloud-init", line 505, in main
    return functor(name, args)
  File "/usr/bin/cloud-init", line 234, in main_init
    init.purge_cache()
  File "/usr/lib/python2.6/site-packages/cloudinit/stages.py", line 133,
     in purge_cache
    util.del_file(f)
  File "/usr/lib/python2.6/site-packages/cloudinit/util.py", line 1316,
     in del_file
    raise e
OSError: [Errno 21] Is a directory: '/var/lib/cloud/instance'
```

2. 解決方式：移除 /var/lib/cloud/instance 目錄

```
[root@kvm7 ~]# mv /var/lib/cloud/instance /tmp/
[root@kvm7 ~]# /etc/init.d/cloud-init-local restart
Starting cloud-init: Cloud-init v. 0.7.1 running 'init-local' at Mon, 05
    Jan 2015 11:20:06 +0000. Up 727.87 seconds.
[root@kvm7 ~]# ll /var/lib/cloud/instances/
total 4
drwxr-xr-x. 5 root root 4096 Jan 26  2014 iid-datasource-none
```

```
[root@kvm7 ~]# ll /var/lib/cloud/instances -d
drwxr-xr-x. 3 root root 4096 Jan 26  2014 /var/lib/cloud/instances
```

26.2 問題二

1. quantum-dhcp 啓動失敗。

```
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-dhcp-agent restart
Stopping quantum-dhcp-agent:                               [  OK  ]
Starting quantum-dhcp-agent:                               [  OK  ]
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /dhcp-agent.log
2015-04-12 15:35:07    ERROR [quantum.agent.dhcp_agent] Unable to enable
     dhcp.
2015-04-12 15:35:15    ERROR [quantum.agent.dhcp_agent] Unable to enable
     dhcp.
```

2. 解決方式：安裝 kernel-2.6.32-358.114.1.openstack。

```
[root@kvm4 ~(keystone_quantum)]# yum install -y kernel iproute \
--enablerepo=openstack && reboot

[root@kvm4 ~]# source keystonerc_quantum
[root@kvm4 ~(keystone_quantum)]# rm /var/log/quantum/dhcp-agent.log
rm: remove regular file `/var/log/quantum/dhcp-agent.log'? y
[root@kvm4 ~(keystone_quantum)]# /etc/init.d/quantum-dhcp-agent restart
Stopping quantum-dhcp-agent:                               [  OK  ]
Starting quantum-dhcp-agent:                               [  OK  ]
[root@kvm4 ~(keystone_quantum)]# egrep 'ERROR|CRITICAL' /var/log/quantum
    /dhcp-agent.log
```

26.3 問題三

1. instance 無法 ssh 連線。

```
[root@kvm4 ~(keystone_myuser)]# ssh -i key1.pem 192.168.122.11
ssh: connect to host 192.168.122.11 port 22: No route to host
```

2. 檢查使用的安全群組 mysecgroup 有沒有開啓 22 port，看來是有，但沒有指定適用 IP 範圍。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-list
+------------+-------------+
| Name       | Description |
+------------+-------------+
| default    | default     |
| mysecgroup | SSH         |
+------------+-------------+
[root@kvm4 ~(keystone_myuser)]# nova secgroup-list-rules mysecgroup
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range | Source Group |
+-------------+-----------+---------+-----------+--------------+
| tcp         | 22        | 22      |           | mysecgroup   |
+-------------+-----------+---------+-----------+--------------+
```

3. 解決方式：在 mysecgroup 再增加一項規則，對所有 IP 開放 22 port。

```
[root@kvm4 ~(keystone_myuser)]# nova secgroup-add-rule  mysecgroup tcp
   22 22 0.0.0.0/0
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| tcp         | 22        | 22      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
[root@kvm4 ~(keystone_myuser)]# nova secgroup-list-rules mysecgroup
+-------------+-----------+---------+-----------+--------------+
| IP Protocol | From Port | To Port | IP Range  | Source Group |
+-------------+-----------+---------+-----------+--------------+
| tcp         | 22        | 22      |           | mysecgroup   |
| tcp         | 22        | 22      | 0.0.0.0/0 |              |
+-------------+-----------+---------+-----------+--------------+
```

4. 再次嘗試登入成功。

```
[root@kvm4 ~(keystone_myuser)]# ssh 192.168.122.11
root@192.168.122.11's password:
Last login: Sun Apr 12 16:40:03 2015 from 192.168.122.4
[root@minkvm ~]#
```

26.4 問題四

1. 啓動 cinder quantum nova 等服務時出現以下錯誤訊息，且確定 qpidd.conf 設定無誤也運作正常。

```
[root@kvm4 ~(keystone_myuser)]# tail /var/log/cinder/*

==> /var/log/cinder/volume.log <==
2015-04-25 10:37:50    ERROR [cinder.openstack.common.rpc.impl_qpid] \
Unable to connect to AMQP server: Error in sasl_client_start (-1) \
SASL(-1): generic failure: GSSAPI Error: Unspecified GSS failure.  \
Minor code may provide more information (\
Credentials cache file '/tmp/krb5cc_165' not found). Sleeping 2 seconds
```

2. 原因爲安裝了 cyrus-sasl-gssapi 套件做認證，但又沒設定好。

3. 解決方式：因 openstack 不使用此認證，故將其移除再重新啓動 qpidd 服務即可。

```
[root@kvm4 ~(keystone_myuser)]# yum remove cyrus-sasl-gssapi
[root@kvm4 ~(keystone_myuser)]# /etc/init.d/qpidd restart
```

4. 再次重新啓動 ciner 相關服務，已無錯誤訊息。

```
[root@kvm4 ~(keystone_admin)]# cat a.sh
rm /var/log/cinder/* -f
/etc/init.d/openstack-cinder-scheduler restart
/etc/init.d/openstack-cinder-api restart
/etc/init.d/openstack-cinder-volume restart
sleep 4
tail /var/log/cinder/*

[root@kvm4 ~(keystone_myuser)]# sh a.sh
[root@deyu ~(keystone_admin)]# sh a.sh
Stopping openstack-cinder-scheduler:                       [  OK  ]
Starting openstack-cinder-scheduler:                       [  OK  ]
Stopping openstack-cinder-api:                             [  OK  ]
```

```
Starting openstack-cinder-api:                             [  OK  ]
Stopping openstack-cinder-volume:                          [  OK  ]
Starting openstack-cinder-volume:                          [  OK  ]
==> /var/log/cinder/api.log <==

==> /var/log/cinder/scheduler.log <==
2015-04-25 10:49:54 CRITICAL [cinder] need more than 0 values to unpack

==> /var/log/cinder/volume.log <==
```

26.5 問題五

1. cinder 無法認證。

```
[root@deyu ~(keystone_admin)]# cinder list
ERROR: Unauthorized
```

2. keystone 的紀錄出現錯誤訊息。

```
[root@deyu ~(keystone_admin)]# tail -n1 /var/log/keystone/keystone.log
2015-05-16 06:41:54  WARNING [keystone.common.wsgi] Authorization failed
    .\
 The request you have made requires authentication. from 127.0.0.1
```

3. 除錯方式：

   (a) 查看 keystone user，用户 cinder 存在且可登入 mysql。

```
[root@deyu ~(keystone_admin)]# keystone user-list
+----------------------------------+--------+---------+-------+
|                id                |  name  | enabled | email |
+----------------------------------+--------+---------+-------+
| ff99e4ef2f3945b3b1bac587b269850c | admin  |   True  |       |
| 5ec845f701db4f13b094a9f744243490 | cinder |   True  |       |
| ada0dcb023d94a18887fd85346f82628 | glance |   True  |       |
| ed828cc47d934ecb9cc17c8911993ad9 | myuser |   True  |       |
+----------------------------------+--------+---------+-------+
```

(b) keystone 刪除 cinder user，重新產生。

```
[root@deyu ~(keystone_admin)]# keystone user-delete 5
    ec845f701db4f13b094a9f744243490

[root@deyu ~(keystone_admin)]# keystone user-list
+----------------------------------+--------+---------+-------+
|                id                |  name  | enabled | email |
+----------------------------------+--------+---------+-------+
| ff99e4ef2f3945b3b1bac587b269850c | admin  |   True  |       |
| ada0dcb023d94a18887fd85346f82628 | glance |   True  |       |
| ed828cc47d934ecb9cc17c8911993ad9 | myuser |   True  |       |
+----------------------------------+--------+---------+-------+
```

(c) keystone 重新產生 user cinder。

```
[root@deyu ~(keystone_admin)]# keystone user-create --name cinder
    --pass 123qwe
+----------+----------------------------------+
| Property |              Value               |
+----------+----------------------------------+
|  email   |                                  |
| enabled  |               True               |
|    id    | 114d0320faa84ca594c75df0b6db4f3c |
|   name   |              cinder              |
| tenantId |                                  |
+----------+----------------------------------+
```

(d) keystone 列出 service cinder 也存在，也是刪除再重新產生。

```
[root@deyu ~(keystone_admin)]# keystone service-list
+----------------------------------+----------+----------+--------------------------

|                id                |   name   |   type   |
             description           |
+----------------------------------+----------+----------+--------------------------

| e300fa9ccb3b424e8bb38ae8f61b24af |  cinder  |  volume  |
    OpenStack Block Storage Service |
| 9d80262e915745aabe7e6cf6b341e383 |  glance  |  image   |
    OpenStack Image Service     |
| 9b8bf35474aa43aca37fefdc57c6e6a3 | keystone | identity |
    Keystone Identity Service    |
+----------------------------------+----------+----------+--------------------------
```

(e) keystone 刪除 cinder service。

```
[root@deyu ~(keystone_admin)]# keystone service-delete
   e300fa9ccb3b424e8bb38ae8f61b24af
```

(f) keystone 列出 endpoint，並沒有 cinder 產生 port 8776 的 endpoint，當然無法連線，表示一開始就沒有產生成功。

```
[root@deyu ~(keystone_admin)]# keystone endpoint-list
+----------------------------------+-----------+-------------------------------+-----
|                id                |   region  |          publicurl
            |         internalurl          |           adminurl
            |             service_id             |
+----------------------------------+-----------+-------------------------------+-----
| a9da1cafdbf84441a1fc268c1df7561b | regionOne |   http://deyu.wang
   :9292    |   http://deyu.wang:9292    |    http://deyu.wang:9292
       | 9d80262e915745aabe7e6cf6b341e383 |
| ca4b563329944e41a77eaf62658be7d9 | regionOne | http://deyu.wang
   :5000/v2.0 | http://deyu.wang:5000/v2.0 | http://deyu.wang
   :35357/v2.0 | 9b8bf35474aa43aca37fefdc57c6e6a3 |
+----------------------------------+-----------+-------------------------------+-----
```

(g) keystone 再加入 cinder 的 role 時發現 tenant service 並不存在，這才是問題的主因。

```
[root@deyu ~(keystone_admin)]# keystone user-role-add \
> --user cinder --role admin --tenant services
No tenant with a name or ID of 'services' exists.
```

(h) keystone 查詢 tenant，並沒有名爲 services 的 tenant。

```
[root@deyu ~(keystone_admin)]# keystone tenant-list
+----------------------------------+----------+---------+
|                id                |   name   | enabled |
```

```
+----------------------------------+----------+---------+
| bc6c37d6af2b4bc98295cf42191e6193 |  admin   |   True  |
| 8516007a522e4e29a05db19e0c93a185 | mytenant |   True  |
+----------------------------------+----------+---------+
```

(i) keystone 產生名爲 services 的 tenant。

```
[root@deyu ~(keystone_admin)]# keystone tenant-create --name
    services
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description |                                  |
|   enabled   |               True               |
|      id     | 26247a78e43545aea49d8e81d085401c |
|     name    |             services             |
+-------------+----------------------------------+
```

(j) keystone 列出 tenant，已出現 services。

```
[root@deyu ~(keystone_admin)]# keystone tenant-list
+----------------------------------+----------+---------+
|                id                |   name   | enabled |
+----------------------------------+----------+---------+
| bc6c37d6af2b4bc98295cf42191e6193 |  admin   |   True  |
| 8516007a522e4e29a05db19e0c93a185 | mytenant |   True  |
| 26247a78e43545aea49d8e81d085401c | services |   True  |
+----------------------------------+----------+---------+
```

(k) keystone 也可成功將用户 cinder 加入角色。

```
[root@deyu ~(keystone_admin)]# keystone user-role-add --user cinder
    --role admin --tenant services
```

(l) keystone 重新產生 cinder 的服務。

```
[root@deyu ~(keystone_admin)]# keystone service-create \
> --name=cinder --type=volume --description="Openstack Block
    Storage Service"
```

```
+-------------+----------------------------------+
|   Property  |              Value               |
+-------------+----------------------------------+
| description | Openstack Block Storage Service  |
|      id     | 7f899835e900452a9250629cd827765f |
|     name    |              cinder              |
|     type    |              volume              |
+-------------+----------------------------------+
```

(m) 記下 cinder service 的 id，產生 endpoint。

```
[root@deyu ~(keystone_admin)]# keystone endpoint-create \
--service-id 7f899835e900452a9250629cd827765f \
--publicurl 'http://deyu.wang:8776/v1/%(tenant_id)s' \
--adminurl 'http://deyu.wang:8776/v1/%(tenant_id)s' \
--internalurl 'http://deyu.wang:8776/v1/%(tenant_id)s'
+-------------+-----------------------------------------+
|   Property  |                Value                    |
+-------------+-----------------------------------------+
|   adminurl  | http://deyu.wang:8776/v1/%(tenant_id)s |
|      id     |    1fece0bf014f4b26b16d593cd456eee0     |
| internalurl | http://deyu.wang:8776/v1/%(tenant_id)s |
|  publicurl  | http://deyu.wang:8776/v1/%(tenant_id)s |
|    region   |                regionOne                |
|  service_id |    7f899835e900452a9250629cd827765f     |
+-------------+-----------------------------------------+
```

(n) 重新啓動 cinder 服務，a.sh 腳本只是將三個服務的啓動寫在一起，方便 cinder 重新啓動。

```
[root@deyu ~(keystone_admin)]# sh a.sh
Stopping openstack-cinder-scheduler:                       [  OK  ]
Starting openstack-cinder-scheduler:                       [  OK  ]
Stopping openstack-cinder-api:                             [  OK  ]
Starting openstack-cinder-api:                             [  OK  ]
Stopping openstack-cinder-volume:                          [  OK  ]
Starting openstack-cinder-volume:                          [  OK  ]
```

(o) 再執行 cinder list 已可成功認證，沒有錯誤訊息。

```
[root@deyu ~(keystone_admin)]# cinder list
```