Openstack Essex Guide

for Ubuntu Precise

OpenStack Guide for Ubuntu Precise v1.5, 19 June 2012

Emilien Macchi

Mail Feedback to : emilien.macchi@gmail.com

Preface

Introduction

I'm doing my internship with StackOps-Technologies in Madrid.

My project is about Networking as a Service in OpenStack with Quantum.

This documentation helps anybody who wants to install Essex in single-node or dual node with Quantum & Open-vSwitch.

N.B. : This document will **evolve** in the future.

Requirements

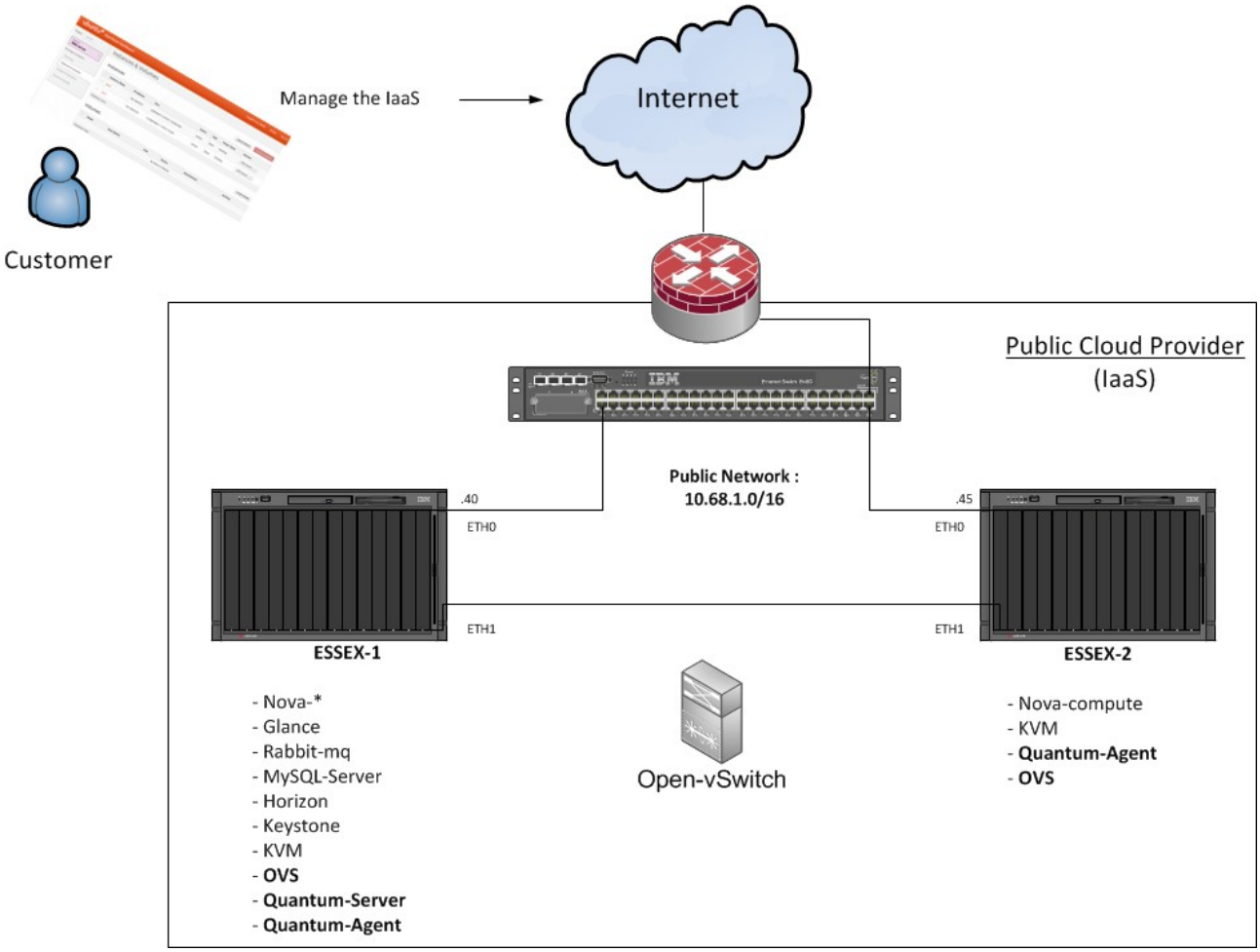
- One or two physical(s) / virtual(s) server(s).
- 2 disks for ESSEX-1 (for nova-volumes)
- 2 NIC on each server
- Ubuntu 12.04 LTS that you can download here.
- Configuration files & scripts that you can download here.

Contents

Architecture

For this documentation, I'm working in a dual-node configuration.

All the services will run on « **ESSEX-1** » server, and « **ESSEX-2** » will run nova-compute.



Essex-1 : 10.68.1.40
Essex-2 : 10.68.1.45
Router : 10.68.1.254

N.B. : Public Network is here in a private class, but it's for the example.

ESSEX-1 : Installation & Configuration

OS Installation

Install Ubuntu with this parameters :

- Time zone : **UTC**
- Hostname : **essex-1**
- Packages to install : **OpenSSH-Server & Virtual Host Machine**

After OS Installation, reboot the server .

N.B. : During the documentation, I'm always logged with root (*sudo -i*).

OS Preparation

```
apt-get update && apt-get -y dist-upgrade
```

Reboot the server.

Export the locale variable :

```
export LANG=C
```

Network configuration

Edit **/etc/network/interfaces** :

```
auto eth0
iface eth0 inet static
address 10.68.1.40
netmask 255.255.0.0
gateway 10.68.1.254
dns-nameservers 8.8.8.8

auto eth1
iface eth1 inet manual
up ifconfig $IFACE 0.0.0.0 up
up ip link set $IFACE promisc on
down ip link set $IFACE promisc off
down ifconfig $IFACE down
```

Restart the service :

```
/etc/init.d/networking restart
```

Assumption : two NIC, **eth0** for public network and **eth1** used by Open-vSwitch for bridging (must be a **tagged port** on physical Switch).

Edit the **/etc/sysctl.conf** file, uncomment "**net.ipv4.ip_forward=1**" and launch :

```
echo 1 > /proc/sys/net/ipv4/ip_forward
```

Edit the **/etc/hosts** file and add **essex-1** & **essex-2** hostnames with IP.

NTP configuration

```
apt-get -y install ntp
```

Edit /etc/ntp.conf file :

```
server ntp.ubuntu.com iburst
server 127.127.1.0
fudge 127.127.1.0 stratum 10
```

Restart NTP service :

```
/etc/init.d/ntp restart
```

iSCSI tools

```
apt-get -y install tgt

apt-get -y install open-iscsi open-iscsi-utils
```

LVM Configuration (for nova-volumes) :

apt-get -y install lvm2

```
fdisk /dev/sdb
n, p, 1, [ENTER], +50G, w

pvcreate /dev/sdb1
vgcreate nova-volumes /dev/sdb1
```

Rabbitmq & Memcached

```
apt-get -y install rabbitmq-server memcached python-memcache
```

Database

```
apt-get -y install mysql-server python-mysqldb
```

Edit the **/etc/mysql/my.cnf** and change bind-address parameter :

```
bind-address = 0.0.0.0
```

Restart MySQL :

```
service mysql restart
```

Now create the user accounts in MySQL and grant them access on the according database :

```
mysql -u root -ppassword <<EOF
CREATE DATABASE nova;
GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'localhost' IDENTIFIED BY 'password';
GRANT ALL PRIVILEGES ON nova.* TO 'nova'@'essex-2' IDENTIFIED BY 'password';
CREATE DATABASE glance;
GRANT ALL PRIVILEGES ON glance.* TO 'glance'@'localhost' IDENTIFIED BY
'password';
CREATE DATABASE keystone;
GRANT ALL PRIVILEGES ON keystone.* TO 'keystone'@'localhost' IDENTIFIED BY
'password';
CREATE DATABASE ovs_quantum;
GRANT ALL PRIVILEGES ON ovs_quantum.* TO 'ovs_quantum'@'localhost' IDENTIFIED BY
'password';
GRANT ALL PRIVILEGES ON ovs_quantum.* TO 'ovs_quantum'@'essex-2' IDENTIFIED BY
'password';
FLUSH PRIVILEGES;
EOF
```

Keystone

```
apt-get -y install keystone python-keystone python-keystoneclient
```

Edit **/etc/keystone/keystone.conf** :

- set a value for **admin_token=password**

- change **connection** to :

connection = mysql://keystone:password@localhost:3306/keystone

Edit the **[catalog]** section like this :

```
[catalog]
driver = keystone.catalog.backends.templated.TemplatedCatalog
template_file = /etc/keystone/default_catalog.templates
```

Quantum with Keystone is not working very well at this time. But if you want to try Quantum with Keystone, follow this step :

Add this section in **/etc/keystone/default_catalog.templates** :

```
catalog.RegionOne.network.publicURL = http://localhost:9696/
catalog.RegionOne.network.adminURL = http://localhost:9696/
catalog.RegionOne.network.internalURL = http://localhost:9696/
catalog.RegionOne.network.name = Quantum Service
```

Anyway :

Restart Keystone :

```
service keystone restart
keystone-manage db_sync
```

Create **novarc** file with :

```
export OS_TENANT_NAME=admin
export OS_USERNAME=admin
export OS_PASSWORD=password
export OS_AUTH_URL="http://essex-1:5000/v2.0/"
```

And load the variables :

```
source novarc
```

Edit the **.bashrc** file to export the variables all time :

```
echo “source /root/novarc” >>/root/.bashrc
```

Then, download and execute “**keystone.sh**”.

Run '**keystone user-list**' to make sure Keystone is working.

Glance

```
apt-get -y install glance glance-api glance-client glance-common glance-registry
```

Edit **/etc/glance/glance-api-paste.ini** and give admin credentials :

```
admin_tenant_name = admin
admin_user = admin
admin_password = password
```

Do the same for **/etc/glance/glance-registry-paste.ini**

Edit **/etc/glance/glance-registry.conf** and modify SQL connection :

```
sql_connection = mysql://glance:password@localhost/glance
```

To use Glance with Keystone, add at the end of **/etc/glance/glance-registry.conf** and **/etc/glance/glance-api.conf** files :

```
[paste_deploy]
flavor = keystone
```

Synchronize Glance :

```
glance-manage version_control 0
glance-manage db_sync
```

Restart Glance :

```
service glance-api restart && service glance-registry restart
```

We can add Ubuntu 12.04 LTS Cloud image in the index :

```
wget http://uec-images.ubuntu.com/releases/precise/release/ubuntu-12.04-server-cloudimg-amd64.tar.gz

tar xzvf ubuntu-12.04-server-cloudimg-amd64.tar.gz

glance add name="Ubuntu 12.04 LTS" is_public=true container_format=ovf disk_format=qcow2 < precise-server-cloudimg-amd64.img
```

Check if Glance works :

```
glance index
```

KVM, QEMU

To use Quantum, we need to modify the default configuration of QEMU.

Edit **/etc/libvirt/qemu.conf** :

```
cgroup_device_acl = [
        "/dev/null", "/dev/full", "/dev/zero",
        "/dev/random", "/dev/urandom",
        "/dev/ptmx", "/dev/kvm", "/dev/kqemu",
        "/dev/rtc", "/dev/hpet", "/dev/net/tun",
]
```

To add VirtIO driver by default on the Vms (with the goal to have GigaBit on Virtual NIC), you should modify **/usr/share/pyshared/nova/virt/libvirt.xml.template** file and add :

```
<model type='virtio'/>
```

… after line 125, so you must have something like this :

```
<interface type='ethernet'>
      <target dev='${nic.name}' />
      <mac address='${nic.mac_address}' />
      <script path='${nic.script}' />
      <model type='virtio'/>
</interface>
```

And restart LibVirt service :

```
service libvirt-bin restart
```

Nova

Install the packages :

```
apt-get -y install nova-api nova-cert nova-common nova-compute nova-compute-kvm

apt-get -y install nova-doc nova-network nova-objectstore nova-scheduler

apt-get -y install nova-vncproxy nova-volume python-nova

apt-get -y install python-novaclient nova-consoleauth novnc
```

Copy "**nova.conf**" to **/etc/nova/**.

You need to change the Public Network parameters.

Edit **/etc/nova/nova-compute.conf** :

```
--libvirt_type=kvm
--libvirt_ovs_bridge=br-int
--libvirt_vif_type=ethernet
--libvirt_vif_driver=nova.virt.libvirt.vif.LibvirtOpenVswitchDriver
--libvirt_use_virtio_for_bridges=True
```

Edit **/etc/nova/api-paste.ini** and give the correct credentials at the end :

```
admin_tenant_name = service
admin_user = nova
admin_password = password
```

To restart the "main" services is something very boring to do manually.
I give a simple script to do that.

Synchronise the database :

```
nova-manage db sync
```

Restart the services with the script.

Horizon

```
apt-get install -y libapache2-mod-wsgi openstack-dashboard
```

Edit **/etc/openstack-dashboard/local_settings.py** and configure the cache back-end :

```
CACHE_BACKEND = 'memcached://127.0.0.1:11211/'
```

Restart Apache :

```
service apache2 restart
```

Quantum

Quantum is a new project in OpenStack, and is in "*incubation*" for Essex. In the future (*Folsom*), it will be a core project.

N.B. : Quantum is "*bleeding edge*", so don't worry if you meet some troubles. Check the log files and find the issue !

```
apt-get install -y quantum-server quantum-plugin-openvswitch python-keystone

apt-get install -y python-keystoneclient openvswitch-datapath-source
```

Edit **/etc/quantum/plugins.ini** and change the default plugin :

```
[PLUGIN]
provider = quantum.plugins.openvswitch.ovs_quantum_plugin.OVSQuantumPlugin
```

Open-vSwitch

```
mkdir /etc/quantum
apt-get install -y openvswitch-switch quantum-plugin-openvswitch-agent

modprobe openvswitch_mod

echo "openvswitch_mod">>/etc/modules
```

Edit **/etc/quantum/plugins/openvswitch/ovs_quantum_plugin.ini** and change the SQL connection to :

```
sql_connection = mysql://ovs_quantum:password@localhost:3306/ovs_quantum
```

Copy "**quantum-agent.sh**" to **/etc/init.d**.

```
service openvswitch-switch start
chmod +x /etc/init.d/quantum-agent.sh
update-rc.d quantum-agent.sh defaults
ovs-vsctl add-br br-int
ovs-vsctl add-port br-int eth1
/etc/init.d/quantum-agent.sh &
```

We can now create a private network :

```
nova-manage network create --label=public --fixed_range_v4=172.15.1.0/24
```

By default, this network will be common for every projects.

If you need to create a network for a specific tenant :

```
keystone tenant-list

nova-manage network create --label=TENANT-NAME --fixed_range_v4=172.15.2.0/24
--project_id=XXXXXXXX
```

More informations about network connectivity here.

To configure floating IP for public network :

```
nova-manage floating create --ip_range=10.68.5.0/24
```

We can now check if all nova services are working :

```
nova-manage service list
```

If you can see "**:-)**" on each binary, that's good, we can continue.

ESSEX-2 : Installation & Configuration (Optional)

OS Installation

Install Ubuntu with this parameters :

- Time zone : **UTC**
- Hostname : **essex-2**
- Packages to install : **OpenSSH-Server & Virtual Host Machine**

After OS Installation, reboot the server .

OS Preparation

```
apt-get update && apt-get -y dist-upgrade
```

Reboot the server.

Export the locale variable :

```
export LANG=C
```

Network configuration

Edit /etc/network/interfaces :

```
auto eth0
iface eth0 inet static
address 10.68.1.45
netmask 255.255.0.0
gateway 10.68.1.254
dns-nameservers 8.8.8.8

iface eth1 inet manual
up ifconfig $IFACE 0.0.0.0 up
up ip link set $IFACE promisc on
down ip link set $IFACE promisc off
down ifconfig $IFACE down
```

Restart the service :

```
/etc/init.d/networking restart
```

Assumption : two NIC, **eth0** for public network and **eth1** used by Open-vSwitch for bridging (must be a **tagged port** on physical Switch).

Edit the **/etc/sysctl.conf** file, uncomment "**net.ipv4.ip_forward=1**" and launch :

```
echo 1 > /proc/sys/net/ipv4/ip_forward
```

Edit the **/etc/hosts** file and add **essex-1** & **essex-2** hostnames with IP.

NTP configuration

```
apt-get install -y ntp
```

Edit **/etc/ntp.conf** file :

```
server essex-1
```

Restart NTP service :

```
/etc/init.d/ntp restart
```

iSCSI tools

```
apt-get install tgt

service tgt start

apt-get install open-iscsi open-iscsi-utils
```

KVM, QEMU

Edit **/etc/libvirt/qemu.conf** :

```
cgroup_device_acl = [
        "/dev/null", "/dev/full", "/dev/zero",
        "/dev/random", "/dev/urandom",
        "/dev/ptmx", "/dev/kvm", "/dev/kqemu",
        "/dev/rtc", "/dev/hpet", "/dev/net/tun",
]
```

As we did with Essex-1, for adding VirtIO driver by default on the Vms (with the goal to have GigaBit on Virtual NIC), you should modify **/usr/share/pyshared/nova/virt/libvirt.xml.template** file and add :

```
<model type='virtio'/>
```

… after line 125, so you must have something like this :

```
<interface type='ethernet'>
      <target dev='${nic.name}' />
      <mac address='${nic.mac_address}' />
      <script path='${nic.script}' />
      <model type='virtio'/>
</interface>
```

And restart LibVirt service :

```
service libvirt-bin restart
```

Nova

Install the packages :

```
apt-get -y install nova-api nova-common nova-compute nova-compute-kvm

apt-get -y install nova-vncproxy python-nova

apt-get -y install python-novaclient nova-consoleauth novnc
```

Copy "**nova.conf**" to **/etc/nova/**.
You need to change the Public Network parameters.

Edit **/etc/nova/nova-compute.conf** :

```
--libvirt_type=kvm
--libvirt_ovs_bridge=br-int
--libvirt_vif_type=ethernet
--libvirt_vif_driver=nova.virt.libvirt.vif.LibvirtOpenVswitchDriver
--libvirt_use_virtio_for_bridges=True
```

Restart the Nova services (with my simple script for example).

Open-vSwitch & Quantum-agent

```
apt-get install openvswitch-switch quantum-plugin-openvswitch-agent
modprobe openvswitch_mod
echo "openvswitch_mod">>/etc/modules
```

Edit **/etc/quantum/plugins/openvswitch/ovs_quantum_plugin.ini** and change the SQL connection to :

```
sql_connection = mysql://ovs_quantum:password@essex-1:3306/ovs_quantum"
```

Copy "**quantum-agent**" to **/etc/init.d**.

Now, launch :

```
service openvswitch-switch start
chmod +x /etc/init.d/quantum-agent.sh
update-rc.d quantum-agent.sh defaults
ovs-vsctl add-br br-int
ovs-vsctl add-port br-int eth1
/etc/init.d/quantum-agent.sh &
```

We can check if all nova services are working :

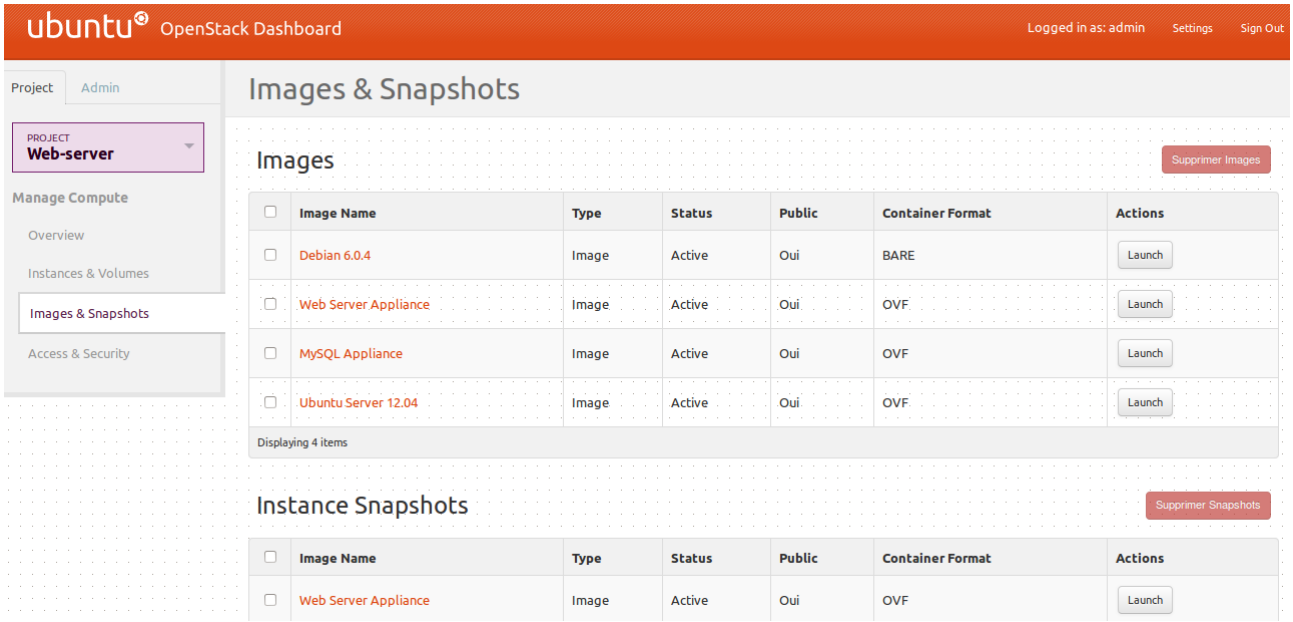
```
nova-manage service list
```

If you can see "**:-)**" on each binary, that's very good !

Conclusion

You can now log on to the dashboard with you favourite web browser with ***admin*** / ***password*** credentials.

Enjoy !



In Essex, *Quantum* UI is not incubated in Horizon, but you can download it on this URL.

Credits

Thank's to :

All the StackOps Team of course ! :-)

Pedro Navarro Pérez : My mentor and friend.

Dan Wendlandt - Nicira Networks

Loïc Dachary – eNovance

Kord Campbell – Loggly

Razique Mahroua - Nuage & Co

All the OpenStack Community

Sources :

http://www.hastexo.com/resources/docs/installing-openstack-essex-20121-ubuntu-1204-precise-pangolin (Thank's to Martin for keystone.sh)

http://cssoss.wordpress.com/2011/04/27/openstack-beginners-guide-for-ubuntu-11-04-installation-and-configuration/

http://docs.openstack.org/incubation/openstack-network/admin/content/

http://openvswitch.org/openstack/documentation/

Launchpads, forums, blogs, …

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