

## Solaris 11.3 OpenStack UAR Configuration Cookbook by Tim Wort

This paper is a cookbook for configuring the Oracle Solaris 11.3 OpenStack Unified Archive. The Solaris 11.3 OpenStack Unified Archive is available as a Oracle Technology Network [download](#). The download page includes a README file with instructions describing the various methods to install the UAR file.

This paper assumes the installation and system configuration are complete.

- Host name configured
- Assigned IP address on local network (192.168.1.0/24)
- DNS configured
- Time, language, locale etc.
- root and (optional) user configured

After the system is installed you can open a web browser from a different system and log in to the Horizon Dashboard but some preparation is required to configure the environment to enable the creation of a Virtual Machine (VM).

**Note:** The paper uses line continuations “\”, you can type the backslash as displayed in the paper followed by a newline (return) and complete the line at the secondary shell prompt or do not type the backslash, rather type the complete line and enter a return.

### Configuring the Oracle Solaris Elastic Virtual Switch (EVS):

```
root@OSCloud:~# evsadm
evsadm: could not open connection to controller: failed connecting to EVS controller
```

The EVS user must first be configured.

```
root@OSCloud:~# evsadm set-prop -p controller=ssh://evsuser@localhost
```

The following shows the configured EVS information.

```
root@OSCloud:~# evsadm show-prop
PROPERTY          PERM VALUE          DEFAULT
controller        rw  ssh://evsuser@localhost  --

root@OSCloud:~# evsadm show-controlprop
PROPERTY          PERM VALUE          DEFAULT  HOST
l2-type          rw  vlan                vlan     --
uplink-port      rw  13stub0             --       --
uri-template     rw  ssh://              ssh://   --
uuid            r-  2dd0d1e2-d275-11e5-b7b5-e54ece1d96b3 --  --
vlan-range       rw  200-300             --       --
vlan-range-avail r-  200-300             --       --
vxlan-addr       rw  0.0.0.0             0.0.0.0 --
vxlan-ipvers     rw  v4                  v4       --
vxlan-mgroup     rw  0.0.0.0             0.0.0.0 --
vxlan-range      rw  --                  --       --
vxlan-range-avail r-  --                  --       --
```

## Environment variables

A set of environment variables need to be configured to use the OpenStack commands, you may type these directly in your current shell instance or place them into a file and source the file or you can add them to the root users `.profile` file.

In the example the variables are added to the `.profile` file.

```
root@OSCloud:~# vi /root/.profile
```

Added to the bottom of the file:

```
export OS_USERNAME=neutron
export OS_PASSWORD=neutron
export OS_TENANT_NAME=service
export OS_AUTH_URL=http://localhost:5000/v2.0
```

Source the file.

```
root@OSCloud:~# . /root/.profile
```

Verify the results.

```
root@OSCloud:~# env
HZ=
LC_MONETARY=
SHELL=/usr/bin/bash
TERM=xterm
LC_NUMERIC=
LC_ALL=
PAGER=/usr/bin/less -ins
MAIL=/var/mail/root
PATH=/usr/bin:/usr/sbin
LC_MESSAGES=
LC_COLLATE=
PWD=/root
OS_PASSWORD=neutron
LANG=
TZ=localtime
OS_AUTH_URL=http://localhost:5000/v2.0
OS_USERNAME=neutron
SHLVL=1
HOME=/root
OS_TENANT_NAME=service
LOGNAME=root
LC_CTYPE=
LC_TIME=
_=/usr/bin/env
```

Next the services are examined and all of the openstack services should be enabled and running.

```
root@OSCloud:~# svcs | grep openstack
online      9:37:25 svc:/application/openstack/swift/swift-upgrade:default
online      9:37:26 svc:/application/openstack/swift/swift-proxy-server:default
online      9:37:26 svc:/application/openstack/swift/swift-container-updater:default
online      9:37:26 svc:/application/openstack/swift/swift-account-replicator:default
```



admin_state_up	True
id	4206617b-f7c5-49c9-975f-ce91aeff81c5
name	INT
provider:network_type	vlan
provider:segmentation_id	200
router:external	False
shared	False
status	ACTIVE
subnets	
tenant_id	0382766fea50433d8fc5c4605548231e

A subnet is created and the IP address for the subnet is assigned. This network is private and only used by VMs defined in the tenant. ( int\_subnet is an arbitrary name selected for the subnet.)

```
root@OSCloud:~# neutron subnet-create --disable-dhcp --name int_subnet \
> --tenant-id 0382766fea50433d8fc5c4605548231e INT 192.168.0.0/24
Created a new subnet:
```

Field	Value
allocation_pools	{"start": "192.168.0.2", "end": "192.168.0.254"}
cidr	192.168.0.0/24
dns_nameservers	
enable_dhcp	False
gateway_ip	192.168.0.1
host_routes	
id	900d4cec-eae4-43da-91a4-e638b913ba60
ip_version	4
ipv6_address_mode	
ipv6_ra_mode	
name	int_subnet
network_id	4206617b-f7c5-49c9-975f-ce91aeff81c5
tenant_id	0382766fea50433d8fc5c4605548231e

The next configuration steps will create a router and a external network so that the VMs can be accessed from other systems on the LAN. While this network isn't necessary to create the first VM it is probably desirable. The network IP address assigned should be the LAN or have access to the LAN.

The first step is to enable IPv4 forwarding and the ipfilter service and then verify the service started correctly.

```
root@OSCloud:~# routeadm -ue ipv4-forwarding
```

```
root@OSCloud:~# ipadm show-prop -p forwarding ipv4
PROTO PROPERTY          PERM CURRENT    PERSISTENT  DEFAULT  POSSIBLE
ipv4 forwarding         rw   on           on          off      on,off
```

```
root@OSCloud:~# svcadm enable ipfilter
root@OSCloud:~# svcs -x
```

**(Note: the ipmon service will start as well. It is possible to see a message indicating it is offline if the `svcs -x` command is executed immediately after enabling ipfilter. If you run the `svcs -x` command again the ipmon service should have enough time to start.)**

Then the EVS Controller is reconfigured to add `vlan 1` which is used for untagged traffic.

```
root@OSCloud:~# evsadm set-controlprop -p vlan-range=1,200-300
```

```
root@OSCloud:~# evsadm show-controlprop
PROPERTY      PERM VALUE      DEFAULT  HOST
l2-type       rw  vlan        vlan     --
uplink-port   rw  l3stub0     --      --
uri-template  rw  ssh://      ssh://   --
uuid          r-  2dd0d1e2-d275-11e5-b7b5-e54ece1d96b3 -- --
vlan-range    rw  1,200-300   --      --
vlan-range-avail r-  1,201-300   --      --
vxlan-addr    rw  0.0.0.0     0.0.0.0 --
vxlan-ipvers  rw  v4          v4       --
vxlan-mgroup  rw  0.0.0.0     0.0.0.0 --
vxlan-range   rw  --          --       --
vxlan-range-avail r-  --          --       --
```

A router is created. (`gateway_router` is an arbitrary name selected for the router.)

```
root@OSCloud:~# neutron router-create gateway_router
Created a new router:
```

Field	Value
admin_state_up	True
external_gateway_info	
id	55286c46-0abd-4601-96d5-8bb590d7fbfa
name	gateway_router
status	ACTIVE
tenant_id	8cbae9fd55ba491c8019ace305f07b24

Now add a router ID to the `/etc/neutron/l3_agent.ini` file (Level 3 agent) using the router id from the previous output.

```
root@OSCloud:~# echo "router_id = 55286c46-0abd-4601-96d5-8bb590d7fbfa" >> \
/etc/neutron/l3_agent.ini
```

The `neutron-l3-agent` service is enabled and checked for a successful start.

```
root@OSCloud:~# svcadm enable neutron-l3-agent
root@OSCloud:~# svcs -x
```

Now the external network is created, a subnet is created and the IP address is assigned to the subnet. (`EXT` is an arbitrary name selected for the network.)

```
root@OSCloud:~# neutron net-create --provider:network_type=vlan \
--provider:segmentation_id=1 --router:external=true EXT
Created a new network:
+-----+-----+
```

Field	Value
admin_state_up	True
id	716a957d-2b67-480c-8e46-9394d2ccd707
name	EXT
provider:network_type	vlan
provider:segmentation_id	1
router:external	True
shared	False
status	ACTIVE
subnets	
tenant_id	8cbae9fd55ba491c8019ace305f07b24

The subnet is created, the value for `--gateway` is the IP address for the default route on the LAN and the `192.168.1.0/24` network address is the LAN network address. (`ext_subnet` is an arbitrary name selected for the subnet.)

```
root@OSCloud:~# neutron subnet-create --disable-dhcp --name ext_subnet EXT \
192.168.1.0/24 --gateway 192.168.1.1
Created a new subnet:
```

Field	Value
allocation_pools	{"start": "192.168.1.2", "end": "192.168.1.254"}
cidr	192.168.1.0/24
dns_nameservers	
enable_dhcp	False
gateway_ip	192.168.1.1
host_routes	
id	d13c43c5-4dbe-4fee-839f-93df9d1aa211
ip_version	4
ipv6_address_mode	
ipv6_ra_mode	
name	ext_subnet
network_id	716a957d-2b67-480c-8e46-9394d2ccd707
tenant_id	8cbae9fd55ba491c8019ace305f07b24

**Note:** Notice that the external network, the gateway router created previously and the floating IP addresses that are created next all belong to the service tenant, not to the demo tenant.

A shell “for” loop is used to create floating IP addresses assigned to the service tenant, These IP address will not be assigned to VMs.

```
root@OSCloud:~# for i in `seq 1 5`;do
> neutron floatingip-create EXT
> done
Created a new floatingip:
```

Field	Value
fixed_ip_address	
floating_ip_address	192.168.1.2
floating_network_id	716a957d-2b67-480c-8e46-9394d2ccd707
id	558ad97b-5812-490f-9cde-ece781b409fc
port_id	

router_id	
status	ACTIVE
tenant_id	8cbae9fd55ba491c8019ace305f07b24

Created a new floatingip:

Field	Value
fixed_ip_address	
floating_ip_address	192.168.1.3
floating_network_id	716a957d-2b67-480c-8e46-9394d2ccd707
id	aad2f7fb-fc6f-495c-92fe-dc7e29a229f0
port_id	
router_id	
status	ACTIVE
tenant_id	8cbae9fd55ba491c8019ace305f07b24

Created a new floatingip:

Field	Value
fixed_ip_address	
floating_ip_address	192.168.1.4
floating_network_id	716a957d-2b67-480c-8e46-9394d2ccd707
id	3850be6e-7770-4ad8-8058-855a26b17e21
port_id	
router_id	
status	ACTIVE
tenant_id	8cbae9fd55ba491c8019ace305f07b24

Created a new floatingip:

Field	Value
fixed_ip_address	
floating_ip_address	192.168.1.5
floating_network_id	716a957d-2b67-480c-8e46-9394d2ccd707
id	807cd199-f9b8-475b-9e4c-f980a4d680f9
port_id	
router_id	
status	ACTIVE
tenant_id	8cbae9fd55ba491c8019ace305f07b24

Created a new floatingip:

Field	Value
fixed_ip_address	
floating_ip_address	192.168.1.6
floating_network_id	716a957d-2b67-480c-8e46-9394d2ccd707
id	133b34b5-df36-4a40-a911-c3572152c1b0
port_id	
router_id	
status	ACTIVE
tenant_id	8cbae9fd55ba491c8019ace305f07b24

Below is a listing of the current state of the network configuration.

```
root@OSCloud:~# ipadm
NAME                CLASS/TYPE STATE      UNDER  ADDR
lo0                 loopback   ok        --      --
  lo0/v4            static     ok        --      127.0.0.1/8
  lo0/v6            static     ok        --      ::1/128
net0                ip         ok        --      --
  net0/v4           static     ok        --      192.168.1.239/24
  net0/v6           addrconf  ok        --      fe80::214:4fff:fe8d:6572/10
```

The router that was created earlier is added to the external network.

```
root@OSCloud:~# neutron router-gateway-set gateway_router EXT
Set gateway for router gateway_router
```

After the router gateway is set, notice the that a vnic is created and a IP address on the external network is assigned.

```
root@OSCloud:~# ipadm
NAME                CLASS/TYPE STATE      UNDER  ADDR
l3ec20cc447_b_0    ip         ok        --      --
  l3ec20cc447_b_0/v4 static ok        --      192.168.1.7/24
lo0                 loopback   ok        --      --
  lo0/v4            static     ok        --      127.0.0.1/8
  lo0/v6            static     ok        --      ::1/128
net0                ip         ok        --      --
  net0/v4           static     ok        --      192.168.1.239/24
  net0/v6           addrconf  ok        --      fe80::214:4fff:fe8d:6572/10
```

The tenants are listed to gather the correct tenant ID.

```
root@OSCloud:~# keystone tenant-list
+-----+-----+-----+
|          id          | name | enabled |
+-----+-----+-----+
| 0382766fea50433d8fc5c4605548231e | demo | True   |
| 8cbae9fd55ba491c8019ace305f07b24 | service | True  |
+-----+-----+-----+
```

The demo tenant shows the internal network, you can repeat the command using the service tenant ID to list the external network (not shown).

```
root@OSCloud:~# neutron net-list --tenant-id 1cb851c5711dee6cf28aa43d37129cc2
+-----+-----+-----+
| id          | name | subnets |
+-----+-----+-----+
| 4206617b-f7c5-49c9-975f-ce91aef81c5 | INT | 900d4cec-eae4-43da-91a4-e638b913ba60 | 192.168.0.0/24 |
+-----+-----+-----+
```

A interface from the internal network is added to the gateway\_router by using the UUID for the subnet of the internal network, the UUID can be found by listing the demo tenants network as in the previous command.

```
root@OSCloud:~# neutron router-interface-add gateway_router \
> 900d4cec-eae4-43da-91a4-e638b913ba60
Added interface c5f277ad-893f-4a15-ae36-d5501dee98e4 to router gateway_router.
```



The previous command results in a vnic being created and a IP address on the internal network is assigned, The vnic is associated with the etherstub created when the EVS was configured.

```
root@OSCloud:~# ipadm
NAME                CLASS/TYPE STATE      UNDER  ADDR
13ec20cc447_b_0     ip         ok         --      --
  13ec20cc447_b_0/v4 static ok         --      192.168.1.7/24
13ic5f277ad_8_0     ip         ok         --      --
  13ic5f277ad_8_0/v4 static ok         --      192.168.0.1/24
lo0                 loopback   ok         --      --
  lo0/v4             static    ok         --      127.0.0.1/8
  lo0/v6             static    ok         --      ::1/128
net0                 ip         ok         --      --
  net0/v4            static    ok         --      192.168.1.239/24
  net0/v6            addrconf  ok         --      fe80::214:4fff:fe8d:6572/10
```

```
root@OSCloud:~# dladm show-vnic
LINK                OVER          SPEED  MACADDRESS          MACADDRTYPE  IDS
13ec20cc447_b_0     net0          1000   fa:16:3e:fd:8a:b0   fixed        VID:0
13ic5f277ad_8_0     l3stub0      40000  fa:16:3e:7d:8e:5c   fixed        VID:200
```

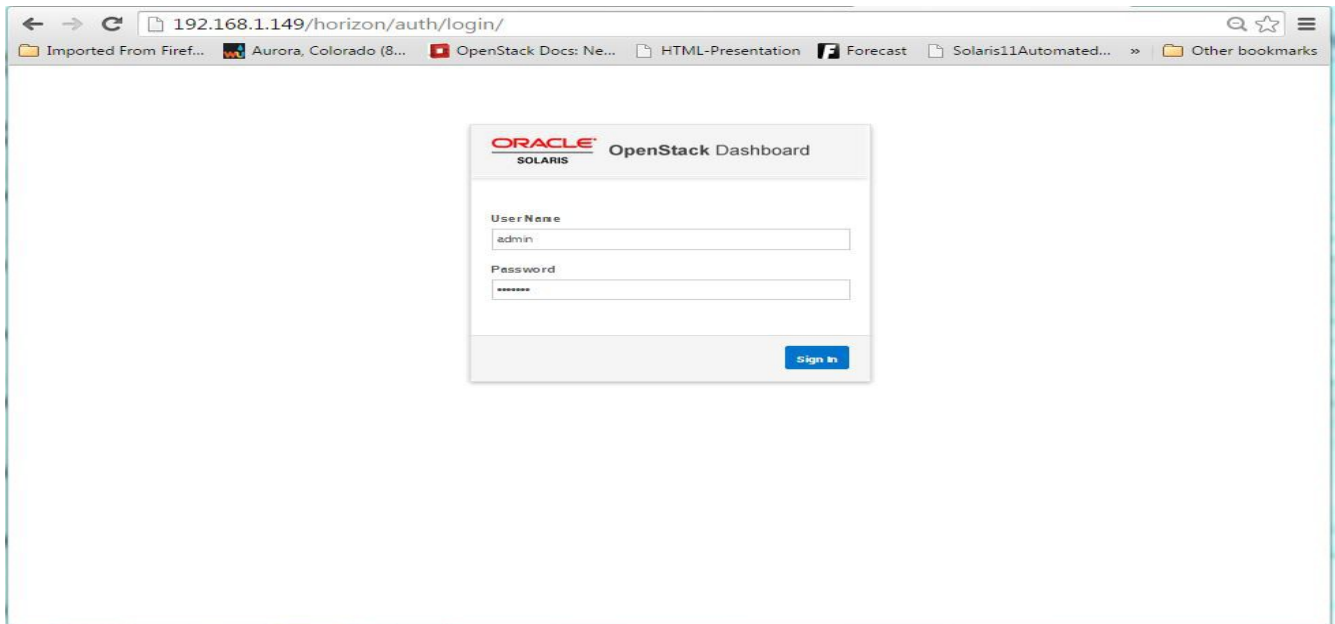
Create a floating IP address on the external network for this tenant. (In this example one address is created but more can be created if more than one VM will be launched.)

```
root@OSCloud:~# keystone tenant-list
+-----+-----+-----+
|          id          | name | enabled |
+-----+-----+-----+
| 0382766fea50433d8fc5c4605548231e | demo | True |
| 8cbae9fd55ba491c8019ace305f07b24 | service | True |
+-----+-----+-----+
```

```
root@OSCloud:~# neutron floatingip-create --tenant-id \
> 0382766fea50433d8fc5c4605548231e EXT
Created a new floatingip:
+-----+-----+
| Field                | Value |
+-----+-----+
| fixed_ip_address      |       |
| floating_ip_address   | 192.168.1.8 |
| floating_network_id   | 716a957d-2b67-480c-8e46-9394d2ccd707 |
| id                    | 2d55d37c-b21c-4630-b6a0-b04181dbeff2 |
| port_id               |       |
| router_id             |       |
| status                | ACTIVE |
| tenant_id             | 0382766fea50433d8fc5c4605548231e |
+-----+-----+
```

## Create a Virtual Machine

To create a VM a set of ssh keys are required. In a browser of your choice navigate to the Horizon dashboard, <http://<hostname or IP address>/horizon>. The configured user is admin with the password secreete.



To create a key pair go to the “Project” tab and then select the “Access & Security” node from the menu.

ORACLE SOLARIS OpenStack Dashboard

Logged in as: admin Settings Help Sign Out

Project Admin

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demo

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### Overview

#### Limit Summary

Instances Used 0 of 10	VCPUs Used 0 of 20	RAM Used 0 of 50.0 GB	Floating IPs Used 0 of 50	Security Groups Used 0 of 10
---------------------------	-----------------------	--------------------------	------------------------------	---------------------------------

Select a period of time to query its usage:

From: 2005-11-01 To: 2005-11-30 Submit The date should be in YYYY-mm-dd format.

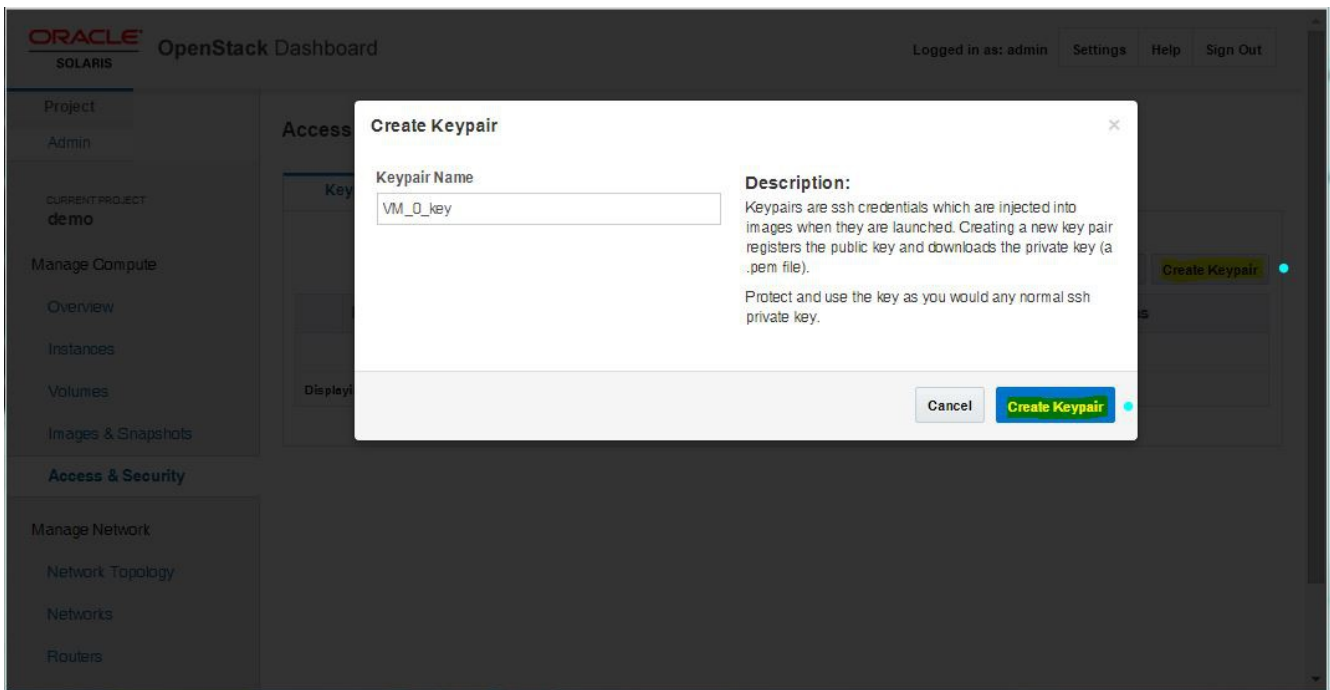
Active Instances: - Active RAM: - This Period's VCPU-Hours: 0.11 This Period's GB-Hours: 1.09

Download CSV Summary

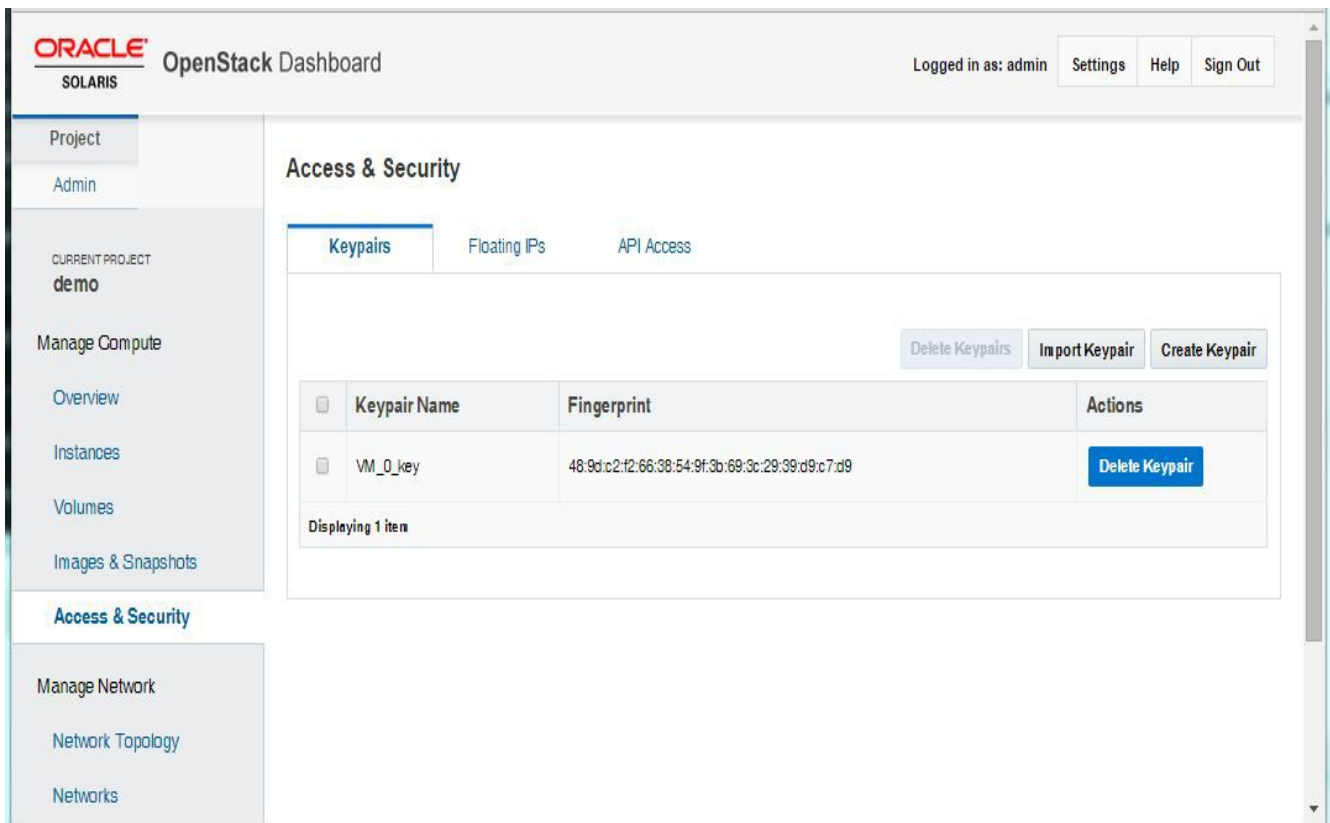
Instance Name	VCPUs	Disk	RAM	Uptime
No items to display.				

Displaying 0 items

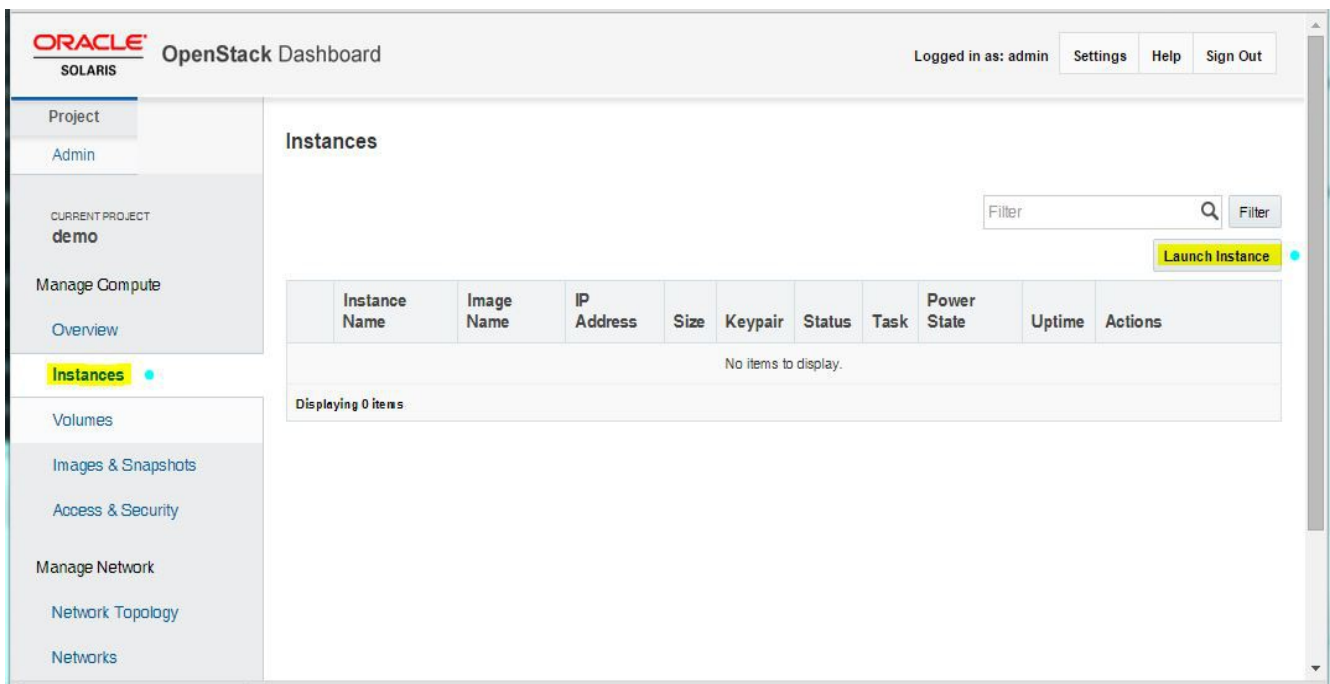
In the “Access & Security” window select the “Create Keypair” button on the right hand side of the screen, in the “Create Keypair” window enter a name for the key pair and select the “Create Keypair” button.



The private key is downloaded as a .pem file, the public key will be added to the VM when it is created. Select the “Access & Security” menu again to examine the newly created key file.

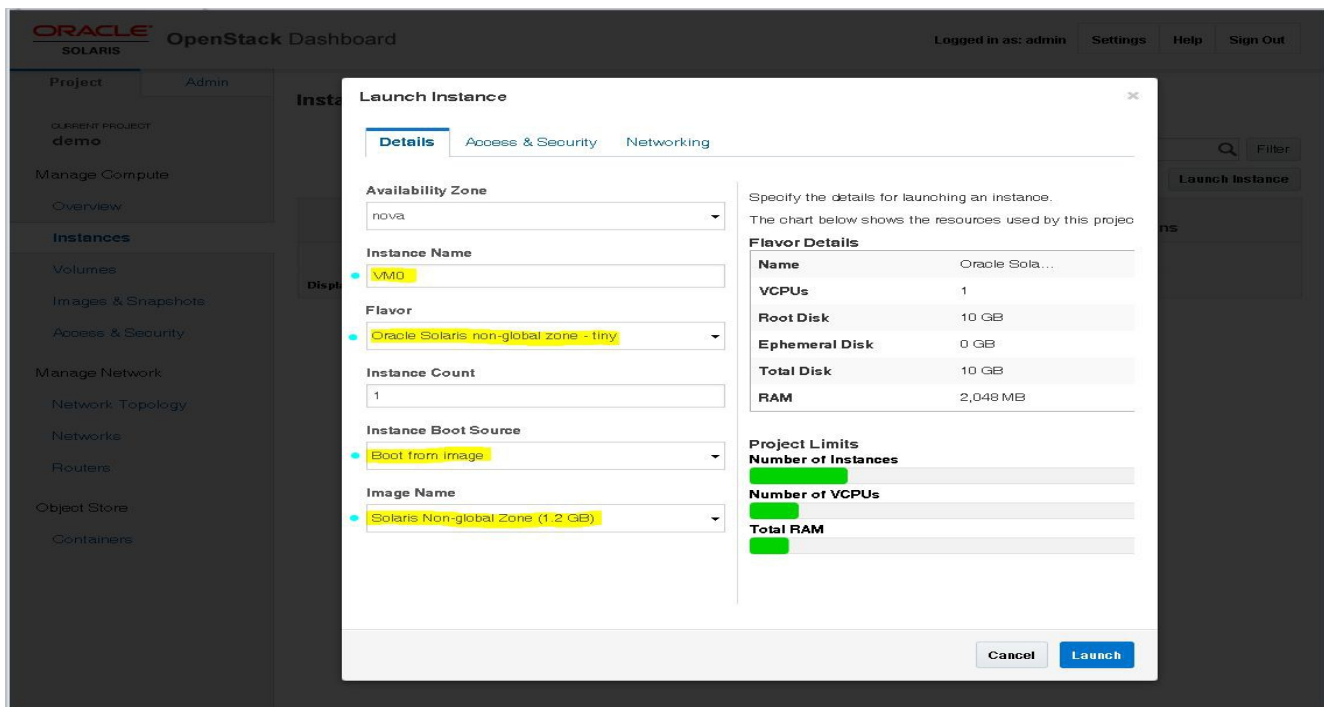


Select the “Instances” node in the menu and the “Launch Instances” button on the right hand side of the screen.

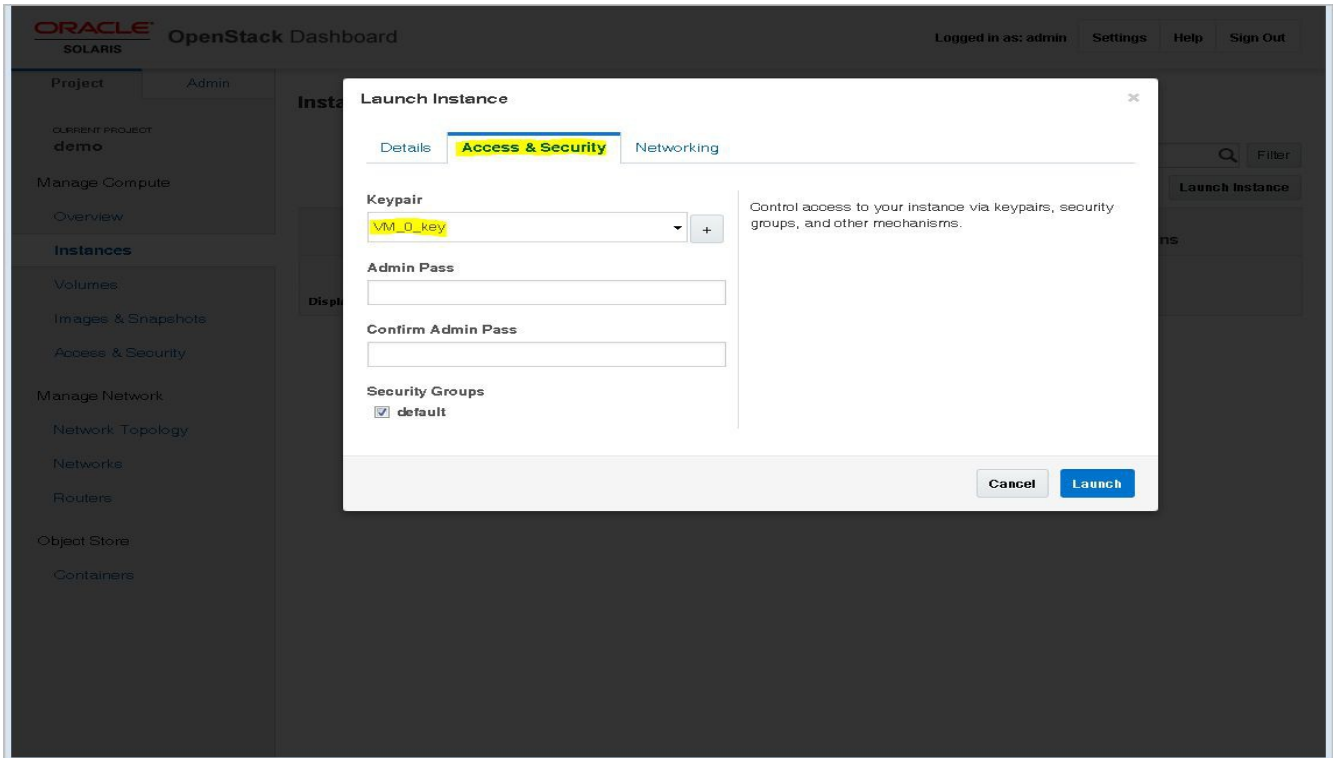


In the “Launch Instance” window:

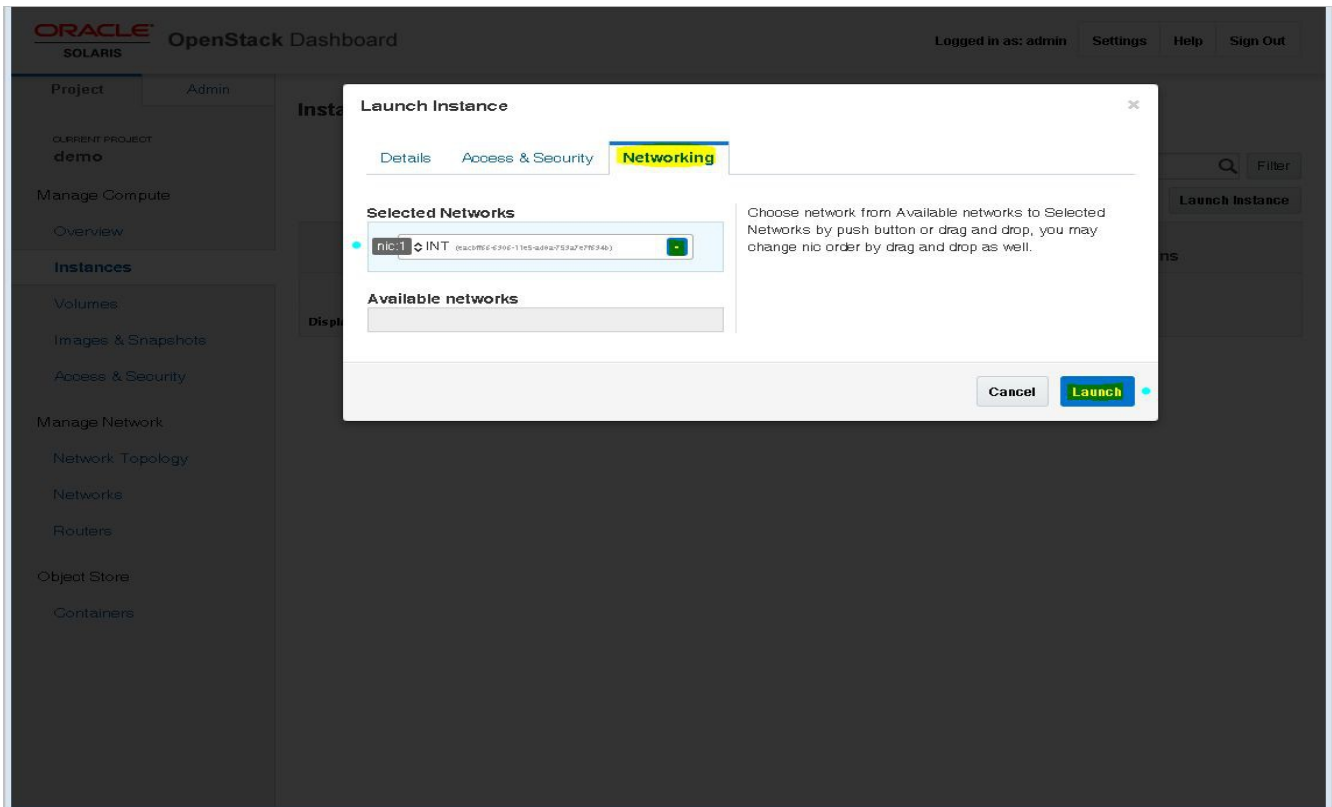
- Add a name for the VM
- Select a non-global zone configuration from the “Flavor” pull down menu
- Select “Boot from image” in the “Instance Boot Source” pull down menu
- Select “Solaris Non-global Zone (1.2GB)” from the “Image Name” pull down menu



Select the “Access & Security” tab and select the key pair from the pull down menu.



Next select the “Networking” tab. In the window then select the “+” button to add the internal network and select the “Launch” button to create the VM.



Wait for the VM to install to complete.

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### Instances

Filter  [Filter](#)

[Terminate Instances](#) [Soft Reboot Instances](#) [Launch Instance](#)

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Keypair	Status	Task	Power State	Uptime	Actions
<input type="checkbox"/>	VM0	Solaris Non-global Zone	192.168.0.2	Oracle Solaris non-global zone - tiny   2GB RAM   1 VCPU   10.0GB Disk	VM_0_key	Build	Spawning	No State	0 minutes	<a href="#">Associate Floating IP</a> <a href="#">More</a>

Displaying 1 item

After the install completes the screen shows the internal network IP address as well as the state of the VM. Select the pull down menu on the right and select "Associate Floating IP"

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### Instances

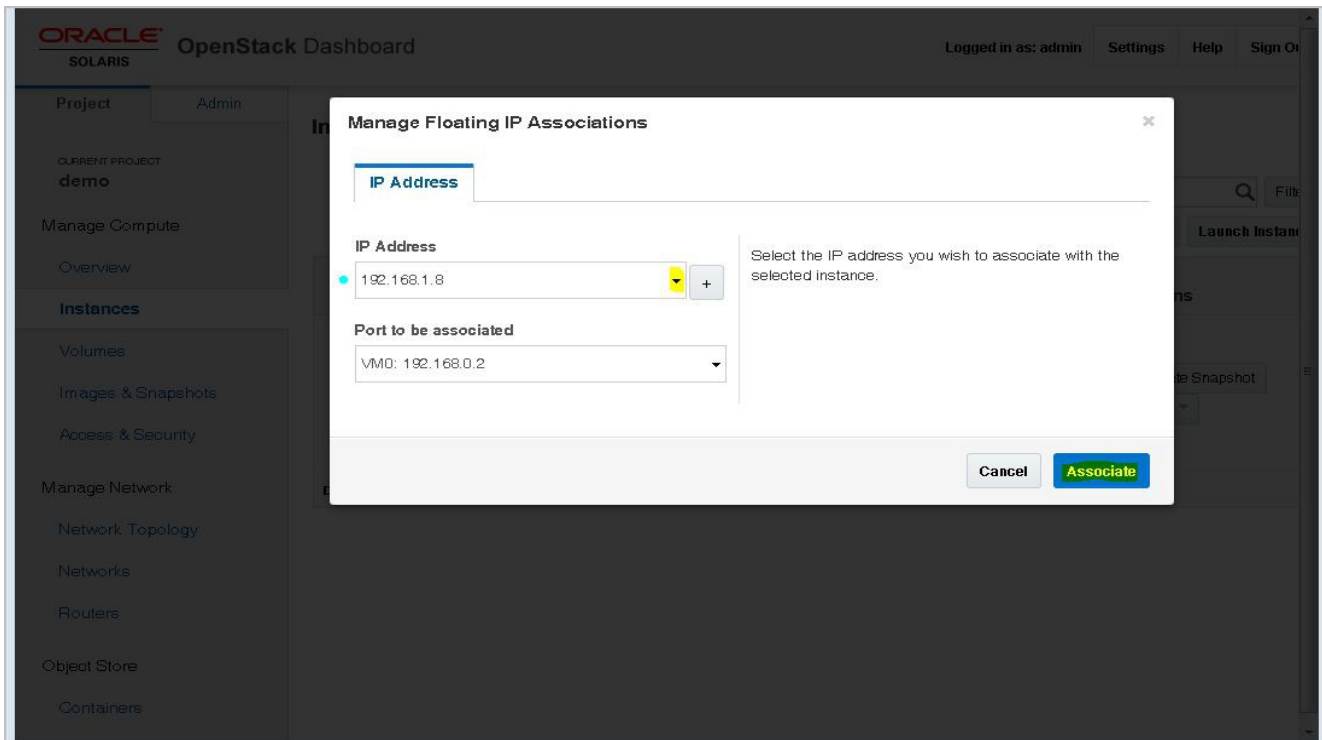
Filter  [Filter](#)

[Terminate Instances](#) [Soft Reboot Instances](#) [Launch Instance](#)

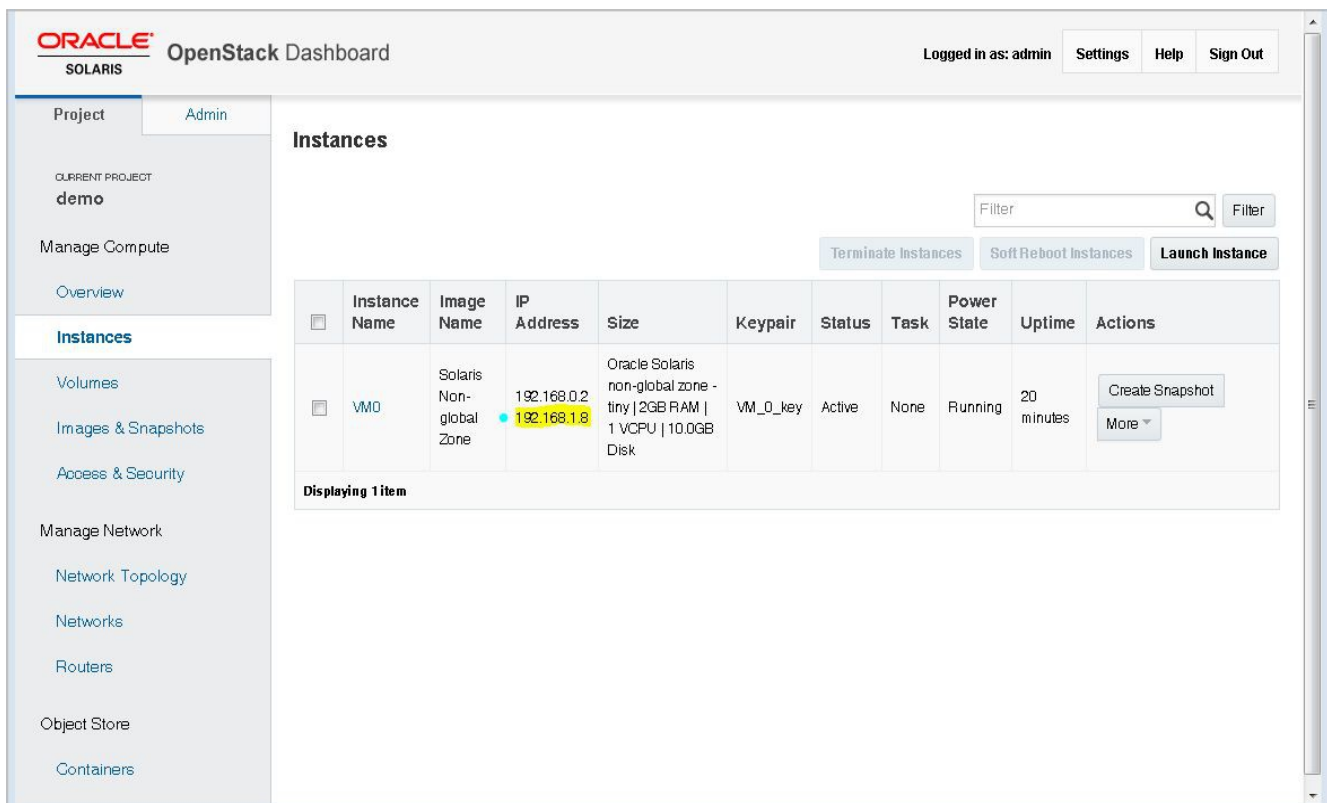
<input type="checkbox"/>	Instance Name	Image Name	IP Address	Size	Keypair	Status	Task	Power State	Uptime	Actions
<input type="checkbox"/>	VM0	Solaris Non-global Zone	192.168.0.2	Oracle Solaris non-global zone - tiny   2GB RAM   1 VCPU   10.0GB Disk	VM_0_key	Active	None	Running	2 minutes	<a href="#">Create Snapshot</a> <a href="#">More</a> <ul style="list-style-type: none"> <li><a href="#">Associate Floating IP</a></li> <li><a href="#">Disassociate Floating IP</a></li> <li><a href="#">Edit Instance</a></li> <li><a href="#">Edit Security Groups</a></li> <li><a href="#">Console</a></li> <li><a href="#">View Log</a></li> <li><a href="#">Pause Instance</a></li> <li><a href="#">Suspend Instance</a></li> <li><a href="#">Resize Instance</a></li> <li><a href="#">Soft Reboot Instance</a></li> <li><a href="#">Hard Reboot Instance</a></li> <li><a href="#">Shut Off Instance</a></li> <li><a href="#">Rebuild Instance</a></li> <li><a href="#">Terminate Instance</a></li> </ul>

Displaying 1 item

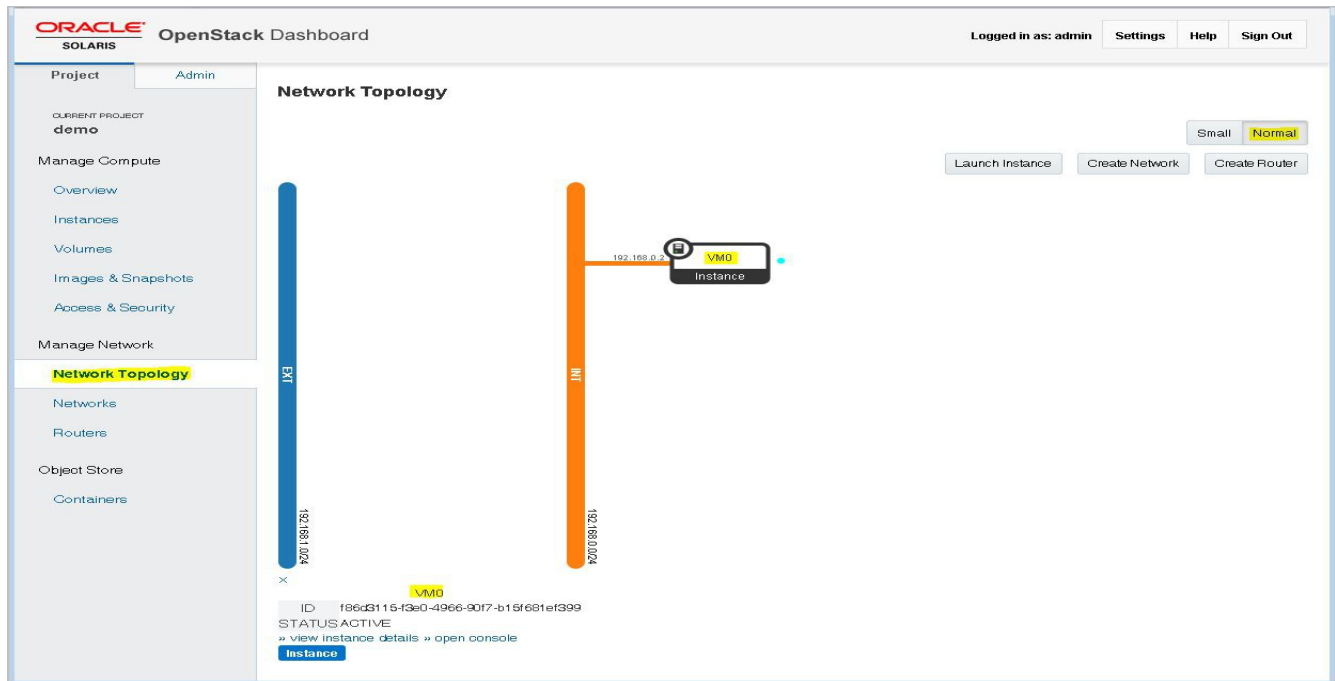
From the “Manage Floating IP Associations” Window select the IP address from the “IP Address” pull down menu. Select the “Associate” button.



Select the “Instances” node from the menu. Observe the IP address on the external network has been added in the “IP Address” field.



The “Network Topology” node shows the internal and external networks and the newly created VM. Click the VM icon to examine details about the VM.



## After the VM installation.

In the following commands notice the floating IP address is added as an address object `13ec20cc447_b_0/v4a` to the interface created for the external network. A new vnic is created over the `13stub0` etherstub and is used by the zone (`vm0/instance-00000001`).

```
root@OSCloud:~# zoneadm list -cv
  ID NAME                STATUS      PATH                                     BRAND  IP
  0 global                 running    /                                       solaris shared
  2 instance-00000001 running  /system/zones/instance-00000001 solaris  excl
```

```
root@OSCloud:~# ipadm
NAME                CLASS/TYPE STATE      UNDER      ADDR
13ec20cc447_b_0     ip          ok         --          --
  13ec20cc447_b_0/v4 static ok         --          192.168.1.7/24
  13ec20cc447_b_0/v4a static ok         --          192.168.1.8/32
13ic5f277ad_8_0     ip          ok         --          --
  13ic5f277ad_8_0/v4 static ok         --          192.168.0.1/24
lo0                  loopback   ok         --          --
  lo0/v4              static    ok         --          127.0.0.1/8
  lo0/v6              static    ok         --          ::1/128
net0                 ip          ok         --          --
  net0/v4              static    ok         --          192.168.1.239/24
  net0/v6              addrconf  ok         --          fe80::214:4fff:fe8d:6572/10
```

```
root@OSCloud:~# dladm
LINK      CLASS      MTU      STATE      OVER
net2      phys       1500     unknown    --
net1      phys       1500     unknown    --
net3      phys       1500     unknown    --
```



```

net0                phys      1500    up      --
l3stub0             etherstub 9000    unknown --
l3ec20cc447_b_0     vnic      1500    up      net0
l3ic5f277ad_8_0     vnic      9000    up      l3stub0
instance-00000001/net0 vnic      9000    up      l3stub0

```

```

root@OSCloud:~# dladm show-vnic
LINK                OVER          SPEED  MACADDRESS          MACADDRTYPE  IDS
l3ec20cc447_b_0     net0          1000   fa:16:3e:fd:8a:b0   fixed        VID:0
l3ic5f277ad_8_0     l3stub0      40000  fa:16:3e:7d:8e:5c   fixed        VID:200
instance-00000001/net0 l3stub0     40000  fa:16:3e:76:25:fb   fixed        VID:200

```

The ipfilter and ipnat configurations are examined.

```

root@OSCloud:~# ipfstat -io
empty list for ipfilter(out)
block in quick on l3ic5f277ad_8_0 from 192.168.0.0/24 to pool/8228444
pass in on l3ic5f277ad_8_0 to l3ec20cc447_b_0:192.168.1.1 from any to !
192.168.0.0/24

```

```

root@OSCloud:~# ipnat -l
List of active MAP/Redirect filters:
rdr l3ic5f277ad_8_0 169.254.169.254/32 port 80 -> 192.168.0.1 port 9697 tcp
map l3ec20cc447_b_0 192.168.0.0/24 -> 192.168.1.7/32

```

List of active sessions:

To log into the newly created zone you can use the private key file that was downloaded earlier when the ssh key pair was created. First move the key file to the OpenStack system.

```

root@OSCloud:~# scp tim@192.168.1.1:/export/data/Downloads/vm_0_key.pem /var/tmp
Password:
vm_0_key.pem          100% |*****| 1675          00:00

```

```

root@OSCloud:~# mv /var/tmp/vm_0_key.pem /root/.ssh

```

```

root@OSCloud:~# chmod 600 /root/.ssh/vm_0_key.pem

```

```

root@OSCloud:~# chown root:root /root/.ssh/vm_0_key.pem

```

Now log into the VM.

```

root@OSCloud:~# ssh -i /root/.ssh/vm_0_key.pem 192.168.0.2
The authenticity of host '192.168.0.2 (192.168.0.2)' can't be established.
RSA key fingerprint is 5e:6a:44:92:18:a1:15:52:00:69:a2:69:d1:6e:25:4d.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.0.2' (RSA) to the list of known hosts.
Last login: Mon Oct  5 11:09:17 2015 from 192.168.0.1
Oracle Corporation      SunOS 5.11      11.2      June 2014
root@vm0:~#

```

The public key was added to the newly installed VM in the root users authorized\_keys file.

```

root@vm0:~# cat /root/.ssh/authorized_keys
ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAQEAnv9NipLD+z4uDaqksEdC2a6WnDBzZsNc4wy/ewpi3qa0rfhXOnWSqjR
vX/QhbdHriJ6hGQxfdlTsFrh68wbxM1rNKHSUiK10gXNqcXYD20v8KWYxPCuIvgaz9Qw/tyJpBpSGKAsbMk

```

```
cKBo9xu04jVIB88KtgqdYH2K6pO2K5s/H4bKXSgdu7NNs6NPWNU6KgnfyhvYezpYlBJy5QvCCvtJK4/7AHj
RkU8UxUNVzAQtwwEuHezRGMig8+s/sAHym1BL8FzZ96Cts18a0KxarGZRSLwvOkkYX4U7aUJxwVhqPsEDMx
t5f2SW2Lq39VQGi32oFlwULPDPqghGMkn7uuYw== Generated by Nova
```

No root user password is set so password based logins are not allowed to the new VM.

```
root@vm0:~# grep root /etc/shadow
root:NP:16713:::~:~:
```

You can now ping the external gateway.

```
root@VM0:~# ping 192.168.1.1
192.168.1.1 is alive
```

Next a ping is demonstrated from the remote gateway to the floating IP address of the VM.

```
root@VM0:~# exit
logout
Connection to 192.168.0.2 closed.
```

```
root@OSCloud:~# ssh tim@192.168.1.1
Password:
```

```
Last login: Sat Feb 13 10:19:31 2016 from 192.168.1.239
Oracle Corporation      SunOS 5.11      11.2      August 2015
```

```
mornin' tim
chaos-gw:/home/tim> /usr/sbin/ping 192.168.1.8
192.168.1.8 is alive
```

Next the ssh key is configured on the gateway system. Then a login to the VM is preformed.

```
chaos-gw:/home/tim> su -
Password:
Oracle Corporation      SunOS 5.11      11.2      August 2015
```

```
root@chaos-gw:~# cp /export/data/Downloads/vm_0_key.pem /var/tmp
```

```
root@chaos-gw:~# mv /var/tmp/vm_0_key.pem /root/.ssh
```

```
root@chaos-gw:~# chmod 600 /root/.ssh/vm_0_key.pem
```

```
root@chaos-gw:~# chown root:root /root/.ssh/vm_0_key.pem
```

```
root@chaos-gw:~# ssh -i /root/.ssh/vm_0_key.pem 192.168.1.8
The authenticity of host '192.168.1.8 (192.168.1.8)' can't be established.
RSA key fingerprint is 56:6e:70:e4:0c:4a:77:64:7a:ee:62:cb:24:d0:11:c3.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.1.8' (RSA) to the list of known hosts.
Last login: Sat Feb 13 18:17:38 2016 from 192.168.0.1
Oracle Corporation      SunOS 5.11      11.3      September 2015
root@VM0:~#
```

The VM can be logged into from the OpenStack host using the `zlogin` command or with the ssh key as described above, then add a root password if desired, configure users and applications as needed.