Tutorial 1

From ACE Lab

Team Name: _____

Part 1 - Cloud Access

CHPC Private Cloud

In this tutorial you will learn how to access the CHPC's private cloud and create your virtual cluster. Once this tutorial is complete you will have a head node and compute node VMs.

1. Open your web browser and visit www.ace.chpc.ac.za
2. Follow the OpenNebula link and login with your team's account
3. Go to Virtual Resources->Images
4. Create a clone of scc_centos called headnode
5. Create a clone of scc_centos called node
6. Set both images to persistent
7. Go to Virtual Resources->Templates
8. Create a clone of scc_headnode called headnode
9. Create a clone of scc_node called node
10. Select headnode and click “Update”
11. On the storage tab choose “headnode” as the disk
12. On the network tab “add another nic” and choose the one with your team's name
13. Set its IP address to 10.0.0.1
14. Click “Update”
15. Repeat for “node” but with the “node” disk instead of “headnode” and don't set an IP
16. Select your headnode and node and click “Instantiate”
17. Go to “Virtual Resources->Virtual Machines”
18. Here you see a list of your active virtual machines

In the list of active virtual machines you will see IP addresses. The 192.168.0.x address is your public address. The 10.0.0.x address is your private address and can only be access through your headnode.

Your public address is not exposed to the Internet so you will have to login via a CHPC server. To do this open Putty and SSH to cluster.ace.chpc.ac.za and login with your team's account. From cluster.ace.chpc.ac.za you can SSH to your headnode and from your headnode to your compute nodes.

To make it easier to distinguish between your headnode and your compute nodes you should change their hostnames to something logical.

Only your headnode will have access to the Internet. To give your compute nodes access to the Internet you will have to setup a NAT on headnode. This can be done using iptables (the Linux firewall).

Part 2 - DNS

DNS Server Setup

In this tutorial you will install and configure a DNS server on your cluster's head node and direct the compute nodes to use the aforementioned server. The DNS server will be used to assign names to the computers in the cluster.

QUESTION 1:
What is the function of a DNS server?

_____
_____
_____

1. Use the “yum” command to install a DNS server called “bind”.

2. Edit bind's “named.conf” configuration file and edit the following lines in the “options” stanza:

```
listen-on port 53 { 127.0.0.1; 10.0.0.1; };
allow-query     { any; };
dnssec-validation no;
```

Add forwarders to the end of the “options” stanza:

```
forwarders {
     8.8.8.8;        //Google
     8.8.4.4;        //Google
};
```

QUESTION 2:
What do forwarders do?

_____
_____
_____

3. Add zones to the bind configuration for forward and reverse lookups

```
zone "cluster.scc" {
    type master;
    file "/etc/named/cluster.scc.zone";
};
```

```
zone "0.0.10.in-addr.arpa" {
    type master;
    file "/etc/named/rev.0.0.10.in-addr.arpa";
};
```

QUESTION 3:
What are zones?

_____

_____

_____

4. Create the files for the forward and reverse lookup zones.

5. Edit the forward lookup file and add this information:

```
$ORIGIN .
$TTL 86400      ; 1 day
cluster.scc           IN SOA   headnode.cluster.scc. root.localhost. (
                               0       ; serial
                               604800     ; refresh (1 week)
                               86400      ; retry (1 day)
                               2419200    ; expire (4 weeks)
                               86400      ; minimum (1 day)
                               )
                        NS      headnode.cluster.scc.
$ORIGIN cluster.scc.
<name>                  A       <x.x.x.x>
```

NOTE: Change <name> and <x.x.x.x> to suit your cluster.

6. Edit reverse lookup file:

```
$ORIGIN .
$TTL 86400      ; 1 day
0.0.10.in-addr.arpa     IN SOA  headnode.cluster.scc. root.localhost. (
                               0       ; serial
                               604800     ; refresh (1 week)
                               86400      ; retry (1 day)
                               2419200    ; expire (4 weeks)
                               86400      ; minimum (1 day)
                               )
                        NS      headnode.cluster.scc.
$ORIGIN 0.0.10.in-addr.arpa.
<x>                       PTR     <name>.cluster.scc.
```

NOTE: Change <name> and <x.x.x.x> to suit your cluster.

7. Restart the “named” service.

NOTE: If you recive a rndc error run:

```
rndc-confgen -a -r /dev/urandom -t /var/named/chroot
```

NOTE: “bind-utils” is a useful package.

QUESTION 4:
What is the difference between a forward and reverse lookup?

_____

_____

_____

For DNS to work after a system reboot, set named service to run at startup:

```
systemctl enable named
```

DNS Client Setup

You need to set each compute node and the head node to use your DNS server. To do this login to the compute nodes and edit resolv.conf

```
domain cluster.scc
search cluster.scc
nameserver 127.0.0.1
```

NOTE: Some applications edit resolv.conf and can override your settings. To prevent this make the file indelible with “chattr +i”
