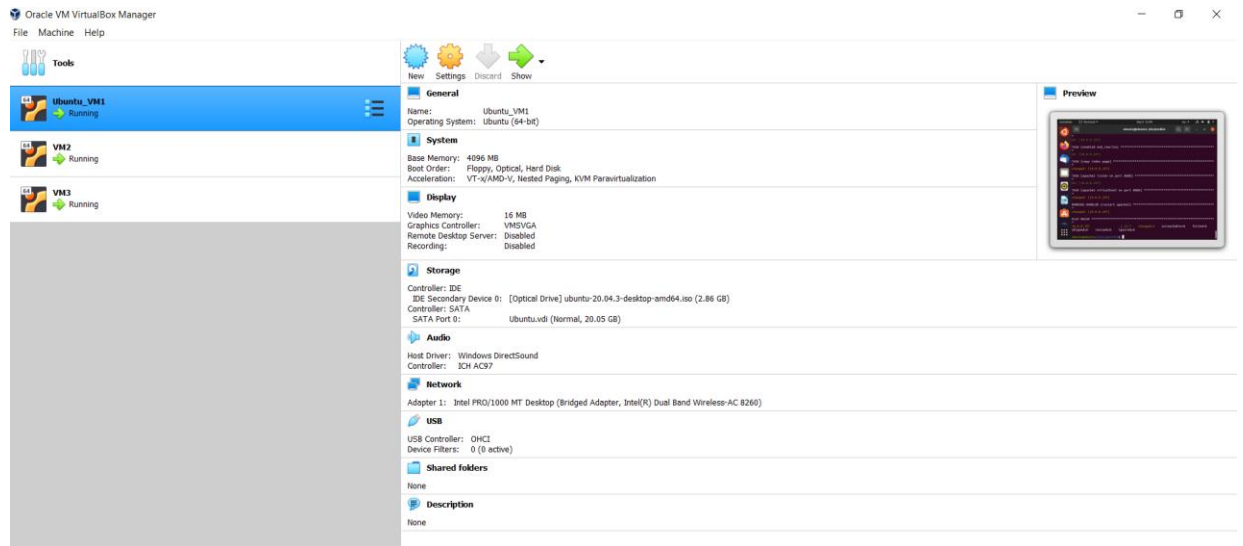


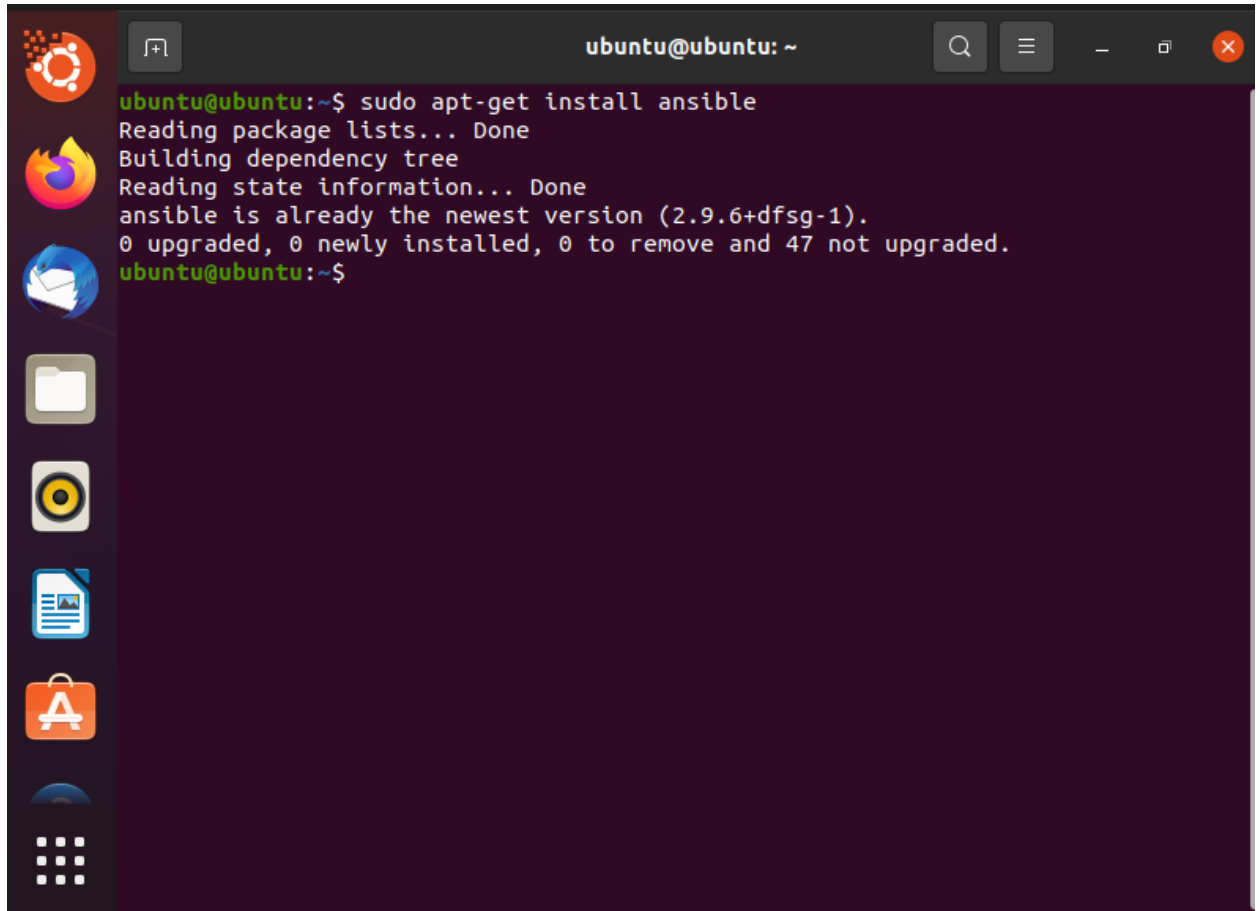
ASSIGNMENT 1: ANSIBLE

GitHub Repo: https://github.com/charucheema/CMPE272_AssignmentOne_Ansible

1. Provision 3 VMs: Ubuntu_VM1, will be acting as primary/deployer VM in this exercise and rest two VMs are going to be client VMs on which web servers will be deployed.



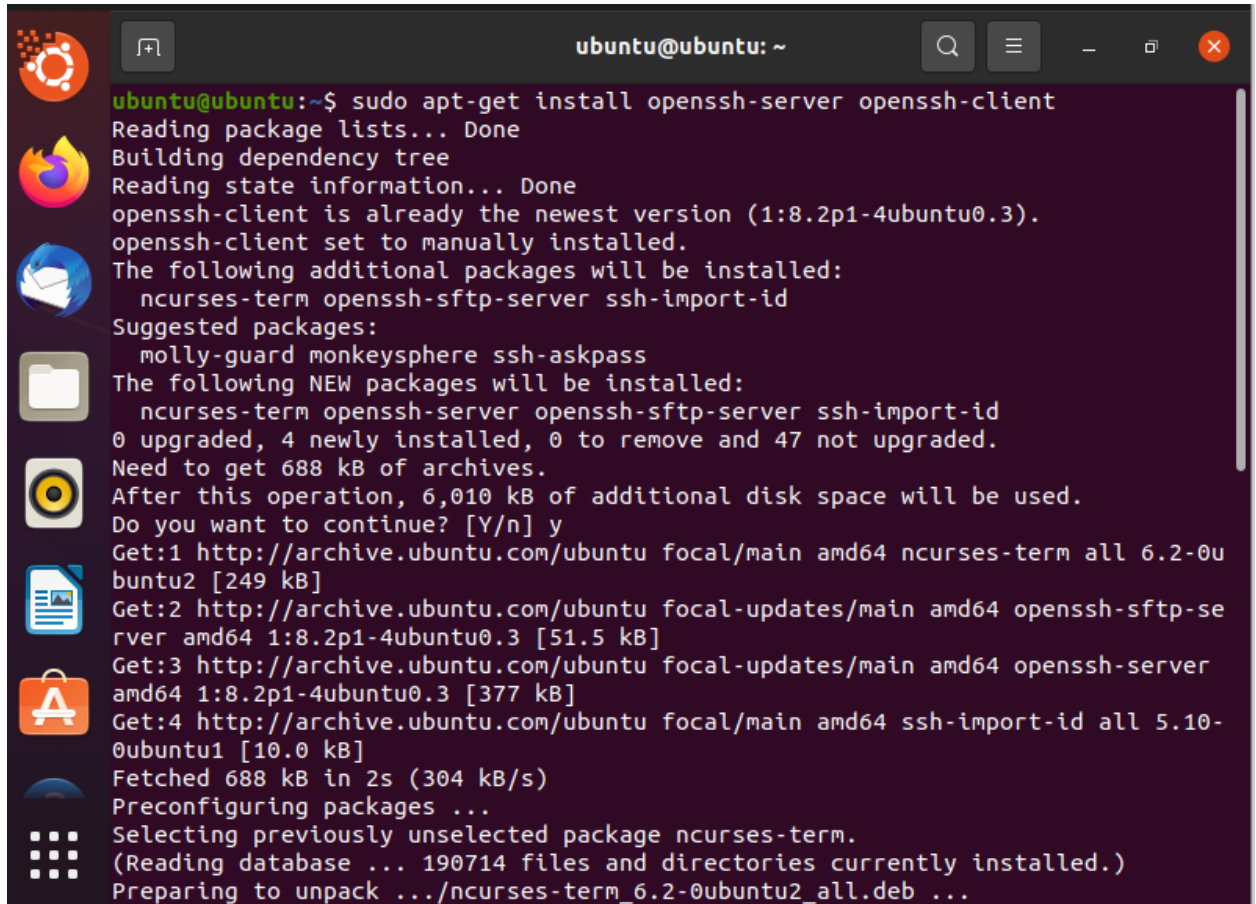
2. Install Ansible on primary VM.



A terminal window titled 'ubuntu@ubuntu: ~' with standard window controls. The terminal output shows the command 'sudo apt-get install ansible' being executed. The system reports that the package lists are done, the dependency tree is built, and state information is read. It then states that 'ansible is already the newest version (2.9.6+dfsg-1)' and that '0 upgraded, 0 newly installed, 0 to remove and 47 not upgraded.' The prompt returns to 'ubuntu@ubuntu:~\$'.

```
ubuntu@ubuntu:~$ sudo apt-get install ansible
Reading package lists... Done
Building dependency tree
Reading state information... Done
ansible is already the newest version (2.9.6+dfsg-1).
0 upgraded, 0 newly installed, 0 to remove and 47 not upgraded.
ubuntu@ubuntu:~$
```

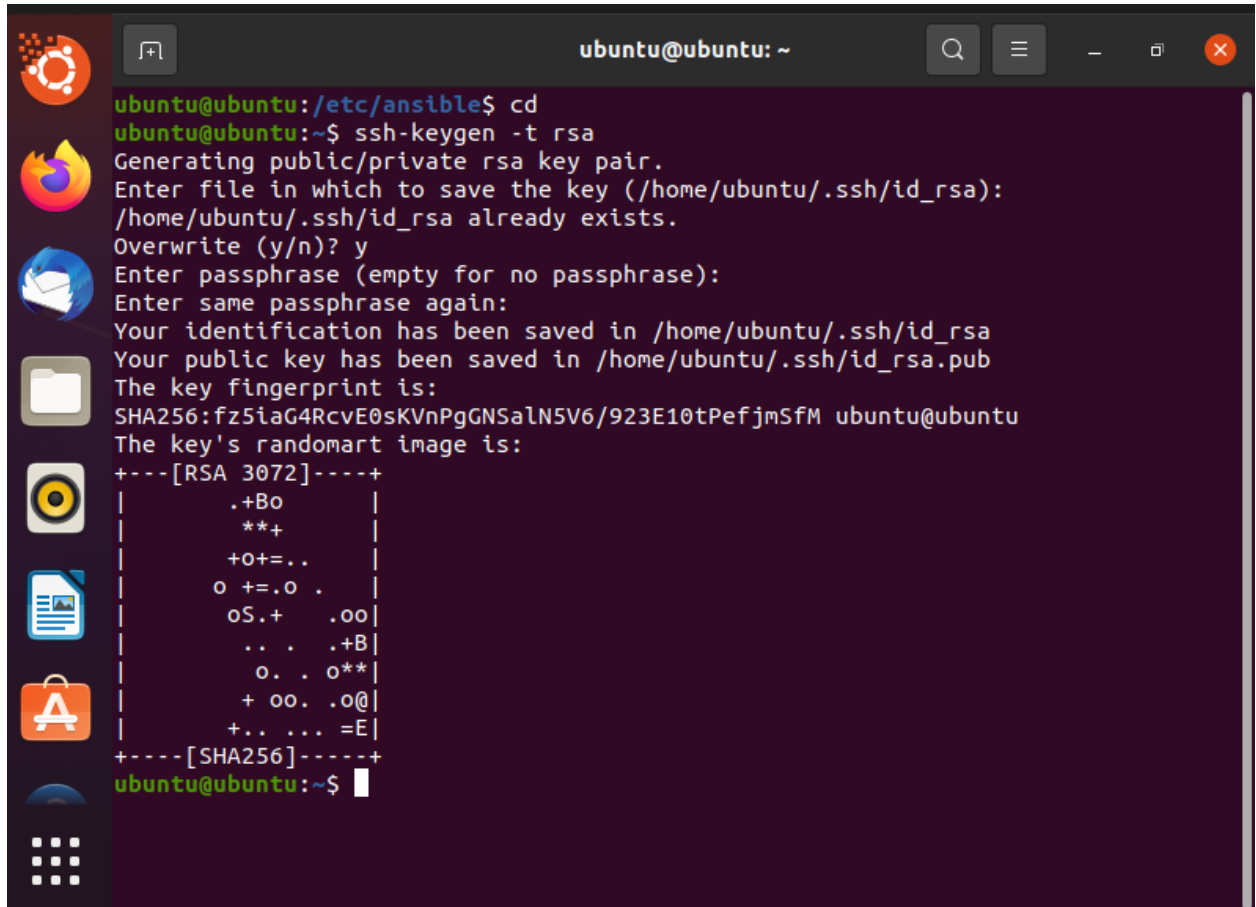
3. Install openssh server and client on all VMs.



The image shows a terminal window titled 'ubuntu@ubuntu: ~' with a search icon, a menu icon, and window control buttons. The terminal output shows the command 'sudo apt-get install openssh-server openssh-client' being executed. The output includes package list reading, dependency tree building, state information reading, and a list of additional packages to be installed: ncurses-term, openssh-sftp-server, and ssh-import-id. It also shows suggested packages: molly-guard, monkeysphere, and ssh-askpass. The terminal then lists the new packages to be installed, the disk space requirements, and the sources from which the packages were fetched. Finally, it shows the preconfiguration of packages and the selection of previously unselected packages.

```
ubuntu@ubuntu:~$ sudo apt-get install openssh-server openssh-client
Reading package lists... Done
Building dependency tree
Reading state information... Done
openssh-client is already the newest version (1:8.2p1-4ubuntu0.3).
openssh-client set to manually installed.
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-askpass
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
0 upgraded, 4 newly installed, 0 to remove and 47 not upgraded.
Need to get 688 kB of archives.
After this operation, 6,010 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu focal/main amd64 ncurses-term all 6.2-0ubuntu2 [249 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-sftp-server amd64 1:8.2p1-4ubuntu0.3 [51.5 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 openssh-server amd64 1:8.2p1-4ubuntu0.3 [377 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal/main amd64 ssh-import-id all 5.10-0ubuntu1 [10.0 kB]
Fetched 688 kB in 2s (304 kB/s)
Preconfiguring packages ...
Selecting previously unselected package ncurses-term.
(Reading database ... 190714 files and directories currently installed.)
Preparing to unpack .../ncurses-term_6.2-0ubuntu2_all.deb ...
```

4. Generate keys on primary VM.



```
ubuntu@ubuntu: ~  
ubuntu@ubuntu:/etc/ansible$ cd  
ubuntu@ubuntu:~$ ssh-keygen -t rsa  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):  
/home/ubuntu/.ssh/id_rsa already exists.  
Overwrite (y/n)? y  
Enter passphrase (empty for no passphrase):  
Enter same passphrase again:  
Your identification has been saved in /home/ubuntu/.ssh/id_rsa  
Your public key has been saved in /home/ubuntu/.ssh/id_rsa.pub  
The key fingerprint is:  
SHA256:fz5iaG4RcvE0sKVnPgGNSalN5V6/923E10tPefjmSfM ubuntu@ubuntu  
The key's randomart image is:  
+----[RSA 3072]-----+  
|      .+Bo      |  
|      **+      |  
|    +O+=..     |  
|  O +=.O .     |  
| OS.+ .oo|     |  
| .. . .+B|     |  
| O. . o**|     |  
| + oo. .O@|     |  
| +.. ... =E|     |  
+----[SHA256]-----+  
ubuntu@ubuntu:~$
```

5. Determine IPs of client machines (VM2 and VM3) using ifconfig command and copy primary machine's ssh key into client machine's authorized keys.

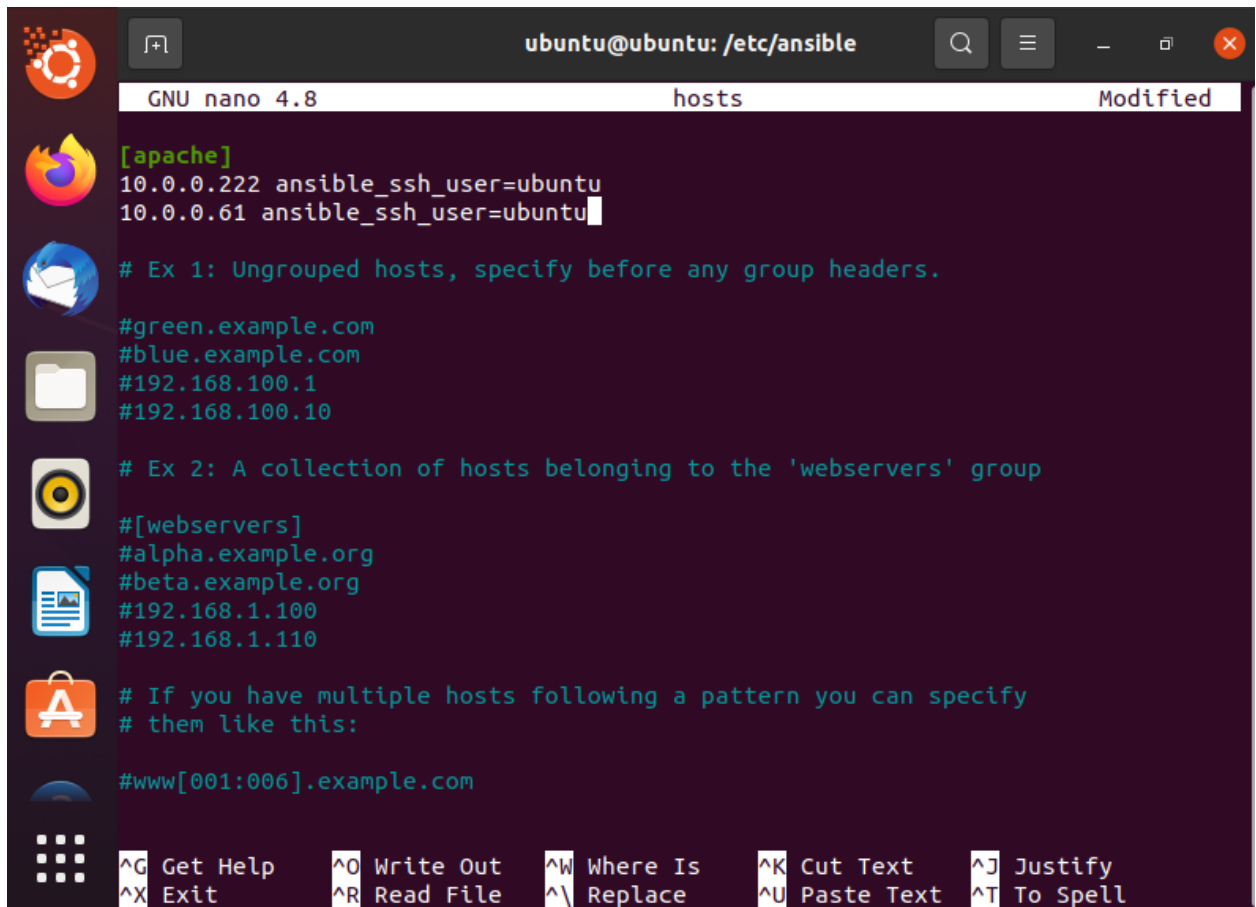
```
ubuntu@ubuntu: ~  
..  
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...  
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...  
Processing triggers for man-db (2.9.1-1) ...  
ubuntu@ubuntu:~$ ifconfig  
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 10.0.0.222 netmask 255.255.255.0 broadcast 10.0.0.255  
    inet6 2601:647:4001:4f90:bab1:5f6f:4dc0:decc prefixlen 64 scopeid 0x0  
    <global>  
    inet6 2601:647:4001:4f90::93af prefixlen 128 scopeid 0x0<global>  
    inet6 2601:647:4001:4f90:fcc8:723f:bf2b:7c0e prefixlen 64 scopeid 0x0  
    <global>  
    inet6 fe80::817b:7b25:1991:336f prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:e0:57:9a txqueuelen 1000 (Ethernet)  
    RX packets 6196 bytes 6373313 (6.3 MB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 2398 bytes 292461 (292.4 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536  
    inet 127.0.0.1 netmask 255.0.0.0  
    inet6 ::1 prefixlen 128 scopeid 0x10<host>  
    loop txqueuelen 1000 (Local Loopback)  
    RX packets 292 bytes 25308 (25.3 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 292 bytes 25308 (25.3 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
ubuntu@ubuntu: ~  
ubuntu@ubuntu:~$ ssh-copy-id -i ubuntu@10.0.0.222  
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/ubuntu/.ssh/id_rsa.pub"  
The authenticity of host '10.0.0.222 (10.0.0.222)' can't be established.  
ECDSA key fingerprint is SHA256:D/QVqCgrA1f+uOruPCZ744Mx565b0yOZ20m59RTLGww.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter  
out any that are already installed  
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys  
ubuntu@10.0.0.222's password:  
  
Number of key(s) added: 1  
  
Now try logging into the machine, with: "ssh 'ubuntu@10.0.0.222'"  
and check to make sure that only the key(s) you wanted were added.  
  
ubuntu@ubuntu:~$
```

```
ubuntu@ubuntu: ~  
..  
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...  
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...  
Processing triggers for man-db (2.9.1-1) ...  
ubuntu@ubuntu:~$ ifconfig  
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 10.0.0.61 netmask 255.255.255.0 broadcast 10.0.0.255  
    inet6 fe80::d63d:bc6a:f80f:ccfc prefixlen 64 scopeid 0x20<link>  
    inet6 2601:647:4001:4f90:8ddd:aefe:1faf:418d prefixlen 64 scopeid 0x0  
<global>  
    inet6 2601:647:4001:4f90::a5e8 prefixlen 128 scopeid 0x0<global>  
    inet6 2601:647:4001:4f90:2ae0:8fa2:851b:7bf4 prefixlen 64 scopeid 0x0  
<global>  
    ether 08:00:27:22:bd:79 txqueuelen 1000 (Ethernet)  
    RX packets 6179 bytes 6374934 (6.3 MB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 2420 bytes 300343 (300.3 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536  
    inet 127.0.0.1 netmask 255.0.0.0  
    inet6 ::1 prefixlen 128 scopeid 0x10<host>  
    loop txqueuelen 1000 (Local Loopback)  
    RX packets 285 bytes 25646 (25.6 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 285 bytes 25646 (25.6 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

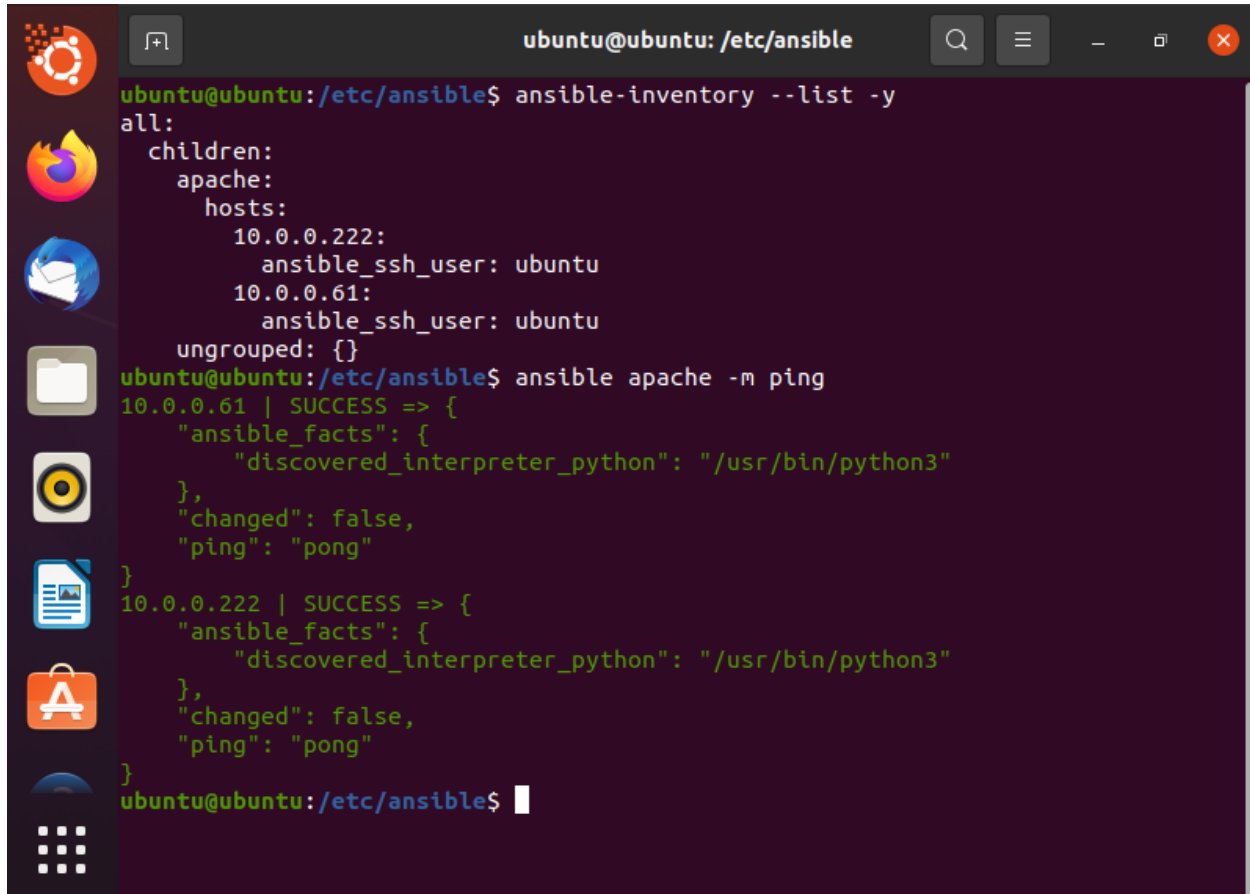
```
ubuntu@ubuntu:~$ ssh-copy-id -i ubuntu@10.0.0.61  
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/ubuntu/.ssh/id_rsa.pub"  
The authenticity of host '10.0.0.61 (10.0.0.61)' can't be established.  
ECDSA key fingerprint is SHA256:1dF7yVdADS1E7J9hJGJwLEyVwWlZoZxQe0qWT2a/yGo.  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter  
out any that are already installed  
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are promp  
ted now it is to install the new keys  
ubuntu@10.0.0.61's password:  
  
Number of key(s) added: 1  
  
Now try logging into the machine, with: "ssh 'ubuntu@10.0.0.61'"  
and check to make sure that only the key(s) you wanted were added.  
ubuntu@ubuntu:~$
```

- Update the hosts file in /etc/ansible directory to specify our client VMs IP address as part of a new group '[apache]' (Since I have used Apache webserver as part of this assignment).



```
ubuntu@ubuntu: /etc/ansible
GNU nano 4.8 hosts Modified
[apache]
10.0.0.222 ansible_ssh_user=ubuntu
10.0.0.61 ansible_ssh_user=ubuntu
# Ex 1: Ungrouped hosts, specify before any group headers.
#green.example.com
#blue.example.com
#192.168.100.1
#192.168.100.10
# Ex 2: A collection of hosts belonging to the 'webservers' group
#[webservers]
#alpha.example.org
#beta.example.org
#192.168.1.100
#192.168.1.110
# If you have multiple hosts following a pattern you can specify
# them like this:
#www[001:006].example.com
^G Get Help      ^O Write Out    ^W Where Is     ^K Cut Text     ^J Justify
^X Exit          ^R Read File    ^\ Replace      ^U Paste Text   ^T To Spell
```


7. Verify that ansible inventory is updated to reflect newly added server group and make sure that all the host in '[apache]' group are pingable.



The image shows a terminal window titled 'ubuntu@ubuntu: /etc/ansible'. The terminal displays the output of the command 'ansible-inventory --list -y', which shows a hierarchical inventory structure. The 'all' group contains a 'children' group, which includes an 'apache' group. The 'apache' group has two hosts: '10.0.0.222' and '10.0.0.61', both with 'ansible_ssh_user: ubuntu'. There is also an 'ungrouped' group with an empty list. Following this, the command 'ansible apache -m ping' is executed, resulting in two successful ping responses. The first response is for '10.0.0.61', showing 'ansible_facts' with 'discovered_interpreter_python: /usr/bin/python3', 'changed: false', and 'ping: pong'. The second response is for '10.0.0.222', showing similar facts and a 'pong' response. The terminal ends with the prompt 'ubuntu@ubuntu: /etc/ansible\$'.

```
ubuntu@ubuntu: /etc/ansible$ ansible-inventory --list -y
all:
  children:
    apache:
      hosts:
        10.0.0.222:
          ansible_ssh_user: ubuntu
        10.0.0.61:
          ansible_ssh_user: ubuntu
      ungrouped: {}
ubuntu@ubuntu: /etc/ansible$ ansible apache -m ping
10.0.0.61 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
10.0.0.222 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
ubuntu@ubuntu: /etc/ansible$
```

8. Deploy Apache webserver on both client machines by means of the curated playbook "deploy_apache_webserver.yml"
(https://github.com/charucheema/CMPE272_AssignmentOne_Ansible/blob/main/deploy_apache_webserver.yml).



```
ubuntu@ubuntu: /etc/ansible
ubuntu@ubuntu:/etc/ansible$ ansible-playbook deploy_apache_webserver.yml

PLAY [apache] *****
*

TASK [Gathering Facts] *****
*
ok: [10.0.0.222]
ok: [10.0.0.61]

TASK [install apache2] *****
*
changed: [10.0.0.61]
changed: [10.0.0.222]

TASK [enabled mod_rewrite] *****
*
changed: [10.0.0.222]
changed: [10.0.0.61]

TASK [copy index page] *****
*
changed: [10.0.0.61]
changed: [10.0.0.222]

TASK [configure apache2 to listen on port 8080] *****
*
changed: [10.0.0.222]
changed: [10.0.0.61]

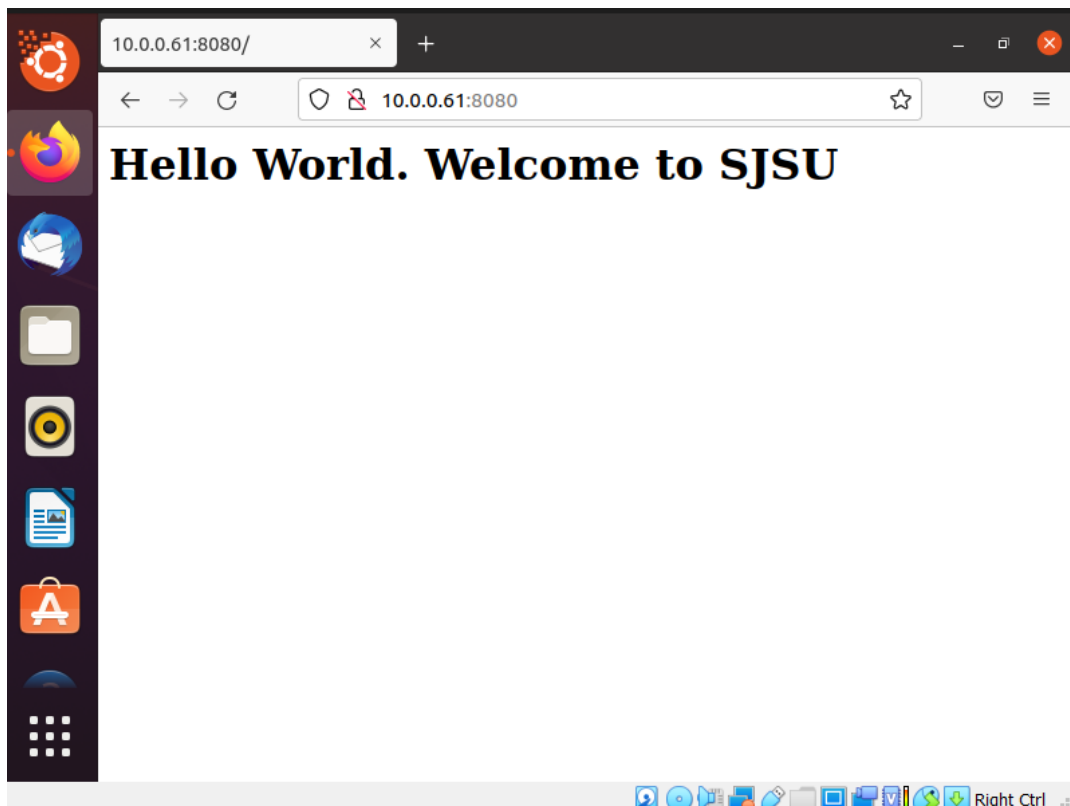
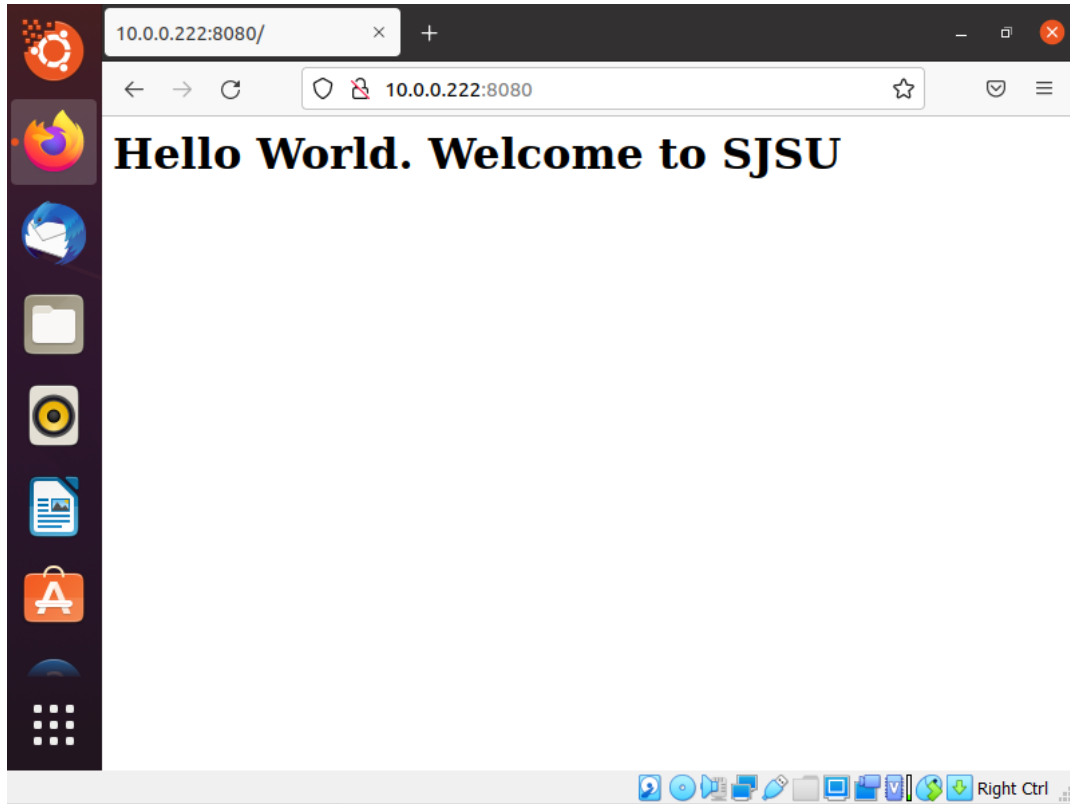
TASK [configure apache2 virtualhost on port 8080] *****
*
changed: [10.0.0.222]
changed: [10.0.0.61]

RUNNING HANDLER [restart apache2] *****
*
changed: [10.0.0.222]
changed: [10.0.0.61]

PLAY RECAP *****
10.0.0.222      : ok=7    changed=6    unreachable=0    failed=0
skipped=0      rescued=0    ignored=0
10.0.0.61      : ok=7    changed=6    unreachable=0    failed=0
skipped=0      rescued=0    ignored=0

ubuntu@ubuntu:/etc/ansible$
```

9. Verify that deployed webserver are up and running.



10. Un-deploy Apache server from client VMs by means of second curated playbook
"undeploy_apache_webserver.yml"
(https://github.com/charucheema/CMPE272_AssignmentOne_Ansible/blob/main/undeploy_apache_webserver.yml).

```
ubuntu@ubuntu:/etc/ansible$ sudo nano undeploy_apache_webserver.yml
ubuntu@ubuntu:/etc/ansible$ ansible-playbook undeploy_apache_webserver.yml

PLAY [apache] *****
*

TASK [Gathering Facts] *****
*
ok: [10.0.0.61]
ok: [10.0.0.222]

TASK [Uninstall Apache server] *****
*
changed: [10.0.0.222]
changed: [10.0.0.61]

TASK [Remove leftover Apache2 packages] *****
*
changed: [10.0.0.222]
changed: [10.0.0.61]

PLAY RECAP *****
*
10.0.0.222      : ok=3    changed=2    unreachable=0    failed=0
skipped=0      rescued=0    ignored=0
10.0.0.61      : ok=3    changed=2    unreachable=0    failed=0
skipped=0      rescued=0    ignored=0

ubuntu@ubuntu:/etc/ansible$
```

11. Verify that webserver are not responding anymore.

