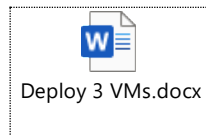
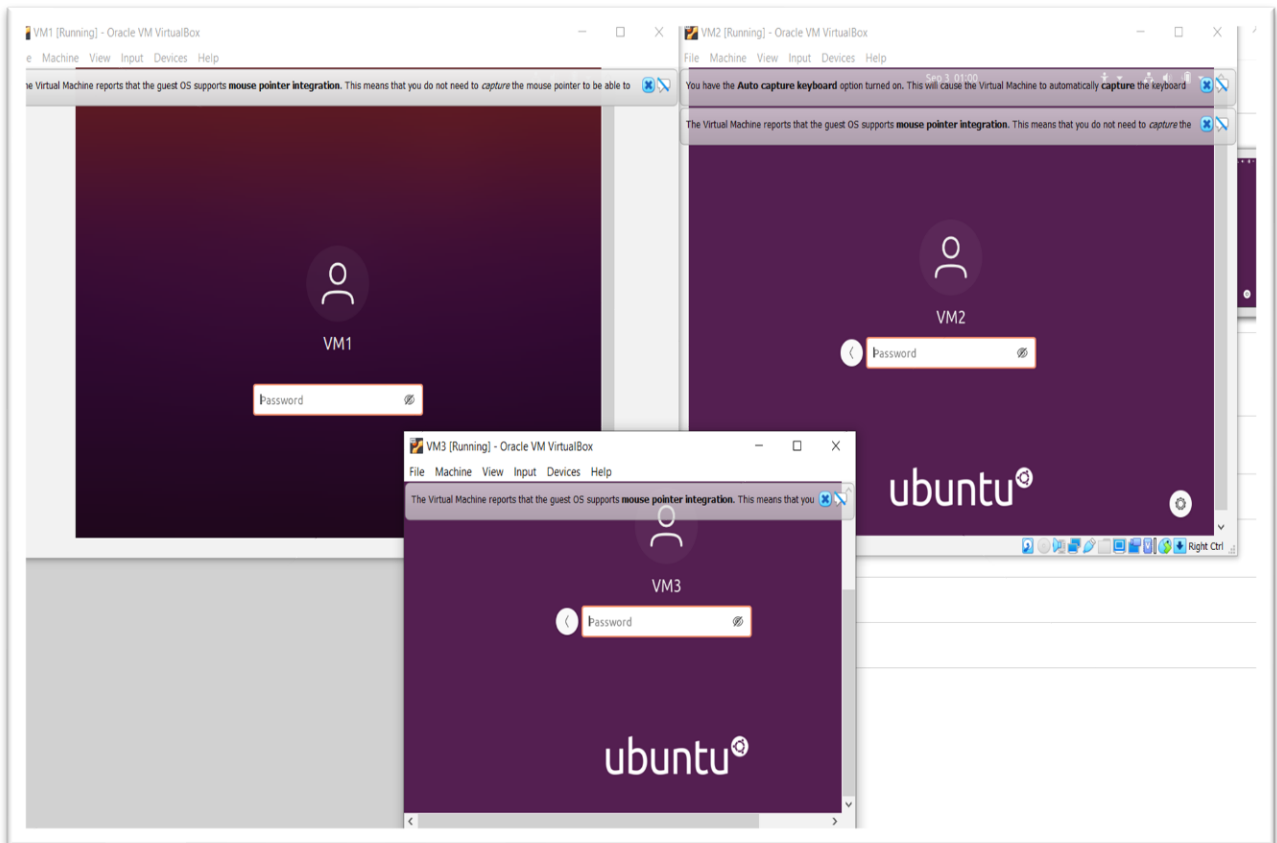


Assignment 01 – Ansible

- Deploy three (3) Virtual Machines
- Configure Ansible server on **VM 1** to deploy a webserver to **VM2** and **VM3** on port 8080 that displays the message: “Hello World from SJSU”
- Include in the Ansible playbook, plays to **deploy** and **un-deploy** all the webserver resources
- Due 9/12 (Sunday) at 11:59PM
- Submit a Word document via Canvas, with screenshots showing your work, and all ansible code/scripts via GitHub.

I. Deploying three (3) Virtual Machines



Steps for creating VMs are listed here –

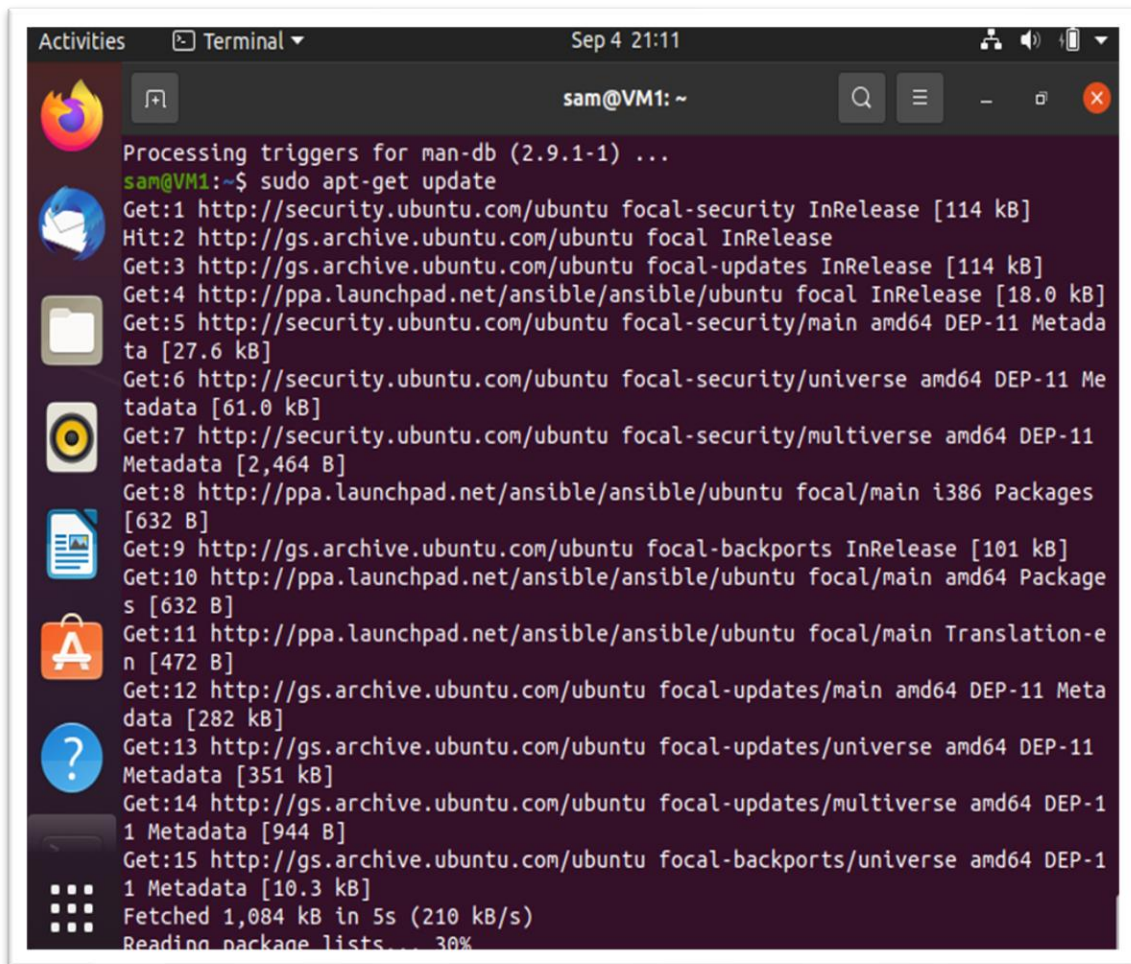
II. Configure Ansible server on VM 1 to deploy a webserver to VM2 and VM3 on port 8080 that displays the message: “Hello World from SJSU”

Following steps are performed as part of the installation of Ansible:-

A. Ansible Installation in VM1:-

- Run below command :

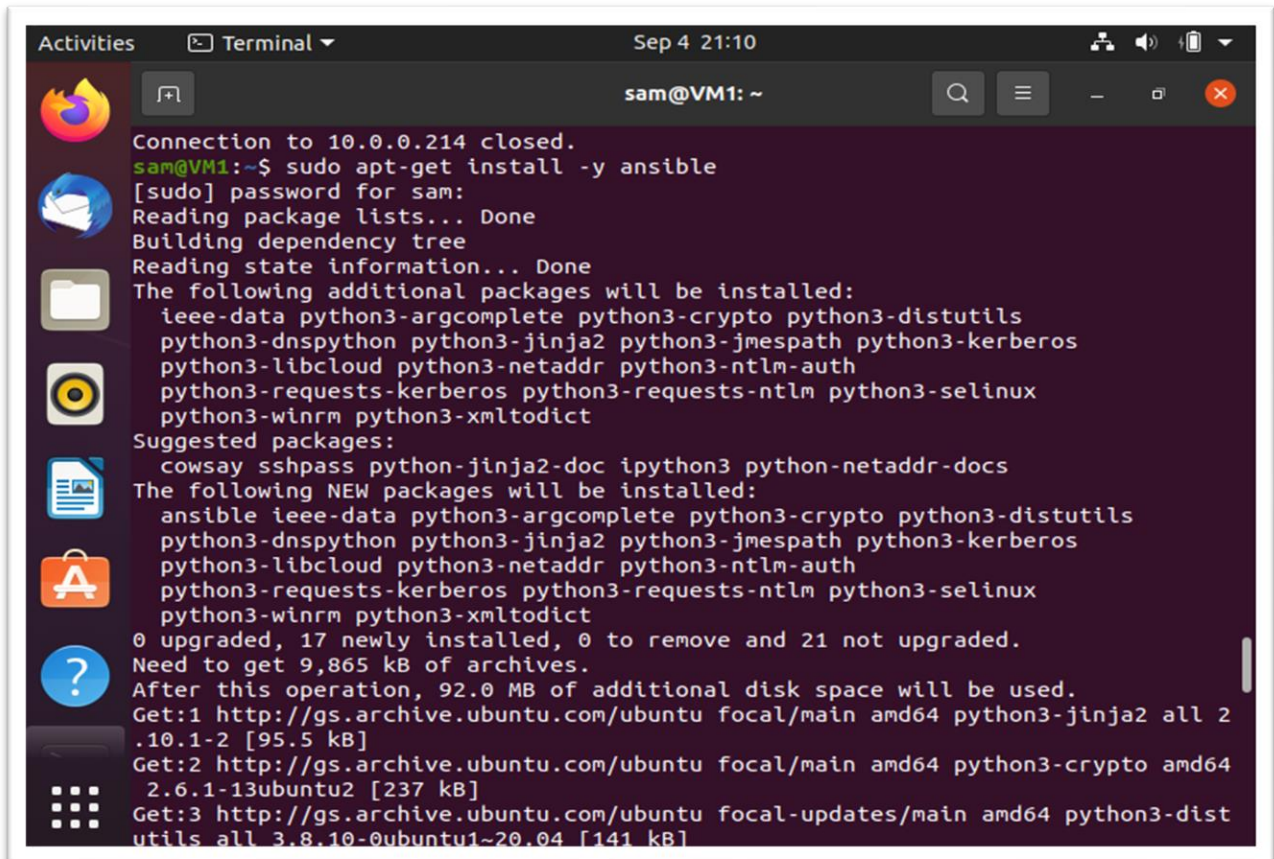
```
sudo apt-get update
```



```
Processing triggers for man-db (2.9.1-1) ...
sam@VM1:~$ sudo apt-get update
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Hit:2 http://gs.archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://gs.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://ppa.launchpad.net/ansible/ansible/ubuntu focal InRelease [18.0 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/main amd64 DEP-11 Metadata [27.6 kB]
Get:6 http://security.ubuntu.com/ubuntu focal-security/universe amd64 DEP-11 Metadata [61.0 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 DEP-11 Metadata [2,464 B]
Get:8 http://ppa.launchpad.net/ansible/ansible/ubuntu focal/main i386 Packages [632 B]
Get:9 http://gs.archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:10 http://ppa.launchpad.net/ansible/ansible/ubuntu focal/main amd64 Packages [632 B]
Get:11 http://ppa.launchpad.net/ansible/ansible/ubuntu focal/main Translation-en [472 B]
Get:12 http://gs.archive.ubuntu.com/ubuntu focal-updates/main amd64 DEP-11 Metadata [282 kB]
Get:13 http://gs.archive.ubuntu.com/ubuntu focal-updates/universe amd64 DEP-11 Metadata [351 kB]
Get:14 http://gs.archive.ubuntu.com/ubuntu focal-updates/multiverse amd64 DEP-11 Metadata [944 B]
Get:15 http://gs.archive.ubuntu.com/ubuntu focal-backports/universe amd64 DEP-11 Metadata [10.3 kB]
Fetched 1,084 kB in 5s (210 kB/s)
Reading package lists... 30%
```

- Install ansible.

```
sudo apt-get install -y ansible
```

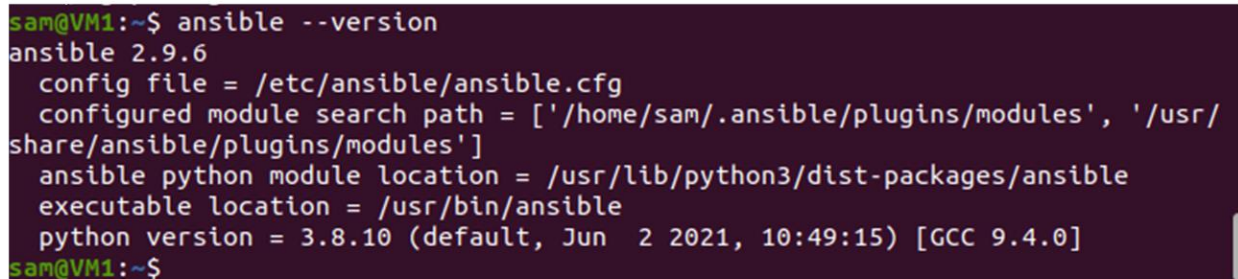


A terminal window titled 'Terminal' showing the command `sudo apt-get install -y ansible` being executed. The output lists additional packages to be installed, suggested packages, and the disk space requirements. The terminal output is as follows:

```
Connection to 10.0.0.214 closed.
sam@VM1:~$ sudo apt-get install -y ansible
[sudo] password for sam:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xlrd python3-xlsxwriter
Suggested packages:
  cowsay sshpass python-jinja2-doc ipython3 python-netaddr-docs
The following NEW packages will be installed:
  ansible ieee-data python3-argcomplete python3-crypto python3-distutils
  python3-dnspython python3-jinja2 python3-jmespath python3-kerberos
  python3-libcloud python3-netaddr python3-ntlm-auth
  python3-requests-kerberos python3-requests-ntlm python3-selinux
  python3-winrm python3-xlrd python3-xlsxwriter
0 upgraded, 17 newly installed, 0 to remove and 21 not upgraded.
Need to get 9,865 kB of archives.
After this operation, 92.0 MB of additional disk space will be used.
Get:1 http://gs.archive.ubuntu.com/ubuntu focal/main amd64 python3-jinja2 all 2
.10.1-2 [95.5 kB]
Get:2 http://gs.archive.ubuntu.com/ubuntu focal/main amd64 python3-crypto amd64
2.6.1-13ubuntu2 [237 kB]
Get:3 http://gs.archive.ubuntu.com/ubuntu focal-updates/main amd64 python3-dist
utils all 3.8.10-0ubuntu1~20.04 [141 kB]
```

- To check whether Ansible is working.

Run command: `ansible --version`

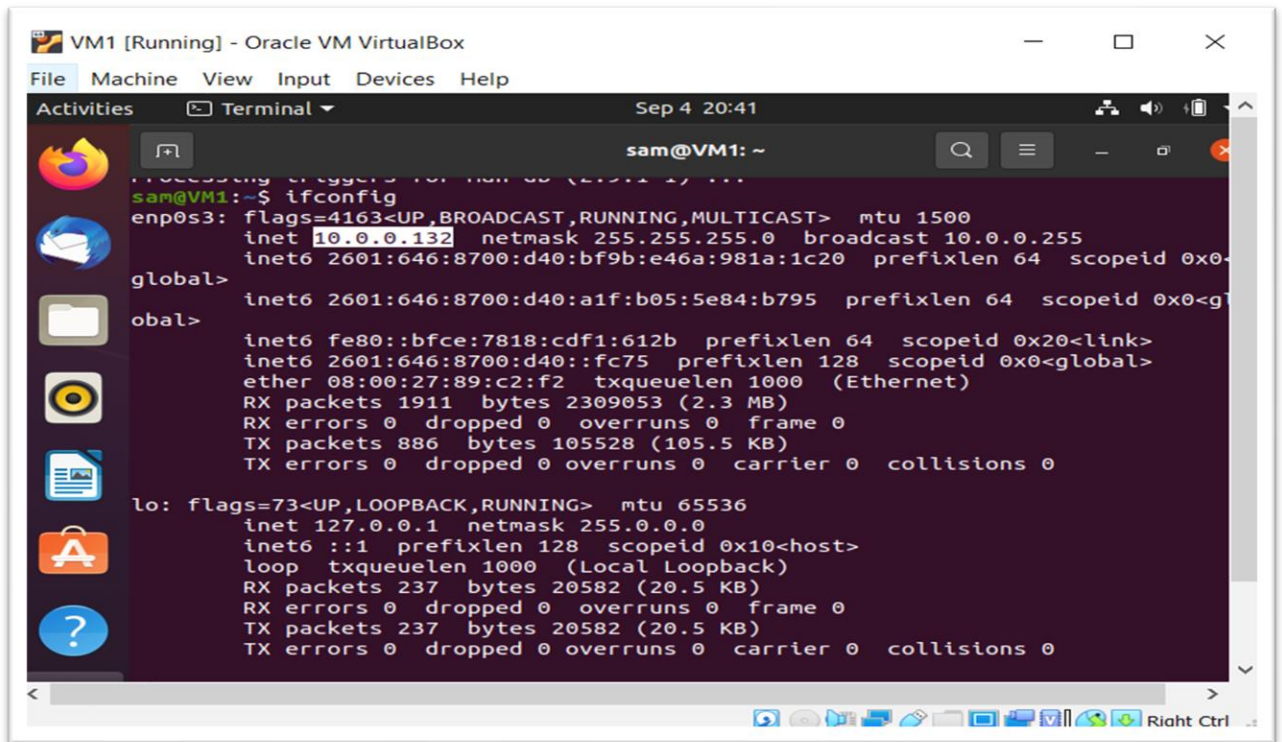


A terminal window showing the command `ansible --version` being executed. The output displays the version of Ansible and the configuration details.

```
sam@VM1:~$ ansible --version
ansible 2.9.6
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/sam/.ansible/plugins/modules', '/usr/
share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  executable location = /usr/bin/ansible
  python version = 3.8.10 (default, Jun  2 2021, 10:49:15) [GCC 9.4.0]
sam@VM1:~$
```


B. Get IP Addresses for VM1 , VM2 and VM3 (by installing Net-tools):

1. VM1 – 10.0.0.132



VM1 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Sep 4 20:41

Terminal window showing the output of the `ifconfig` command on VM1:

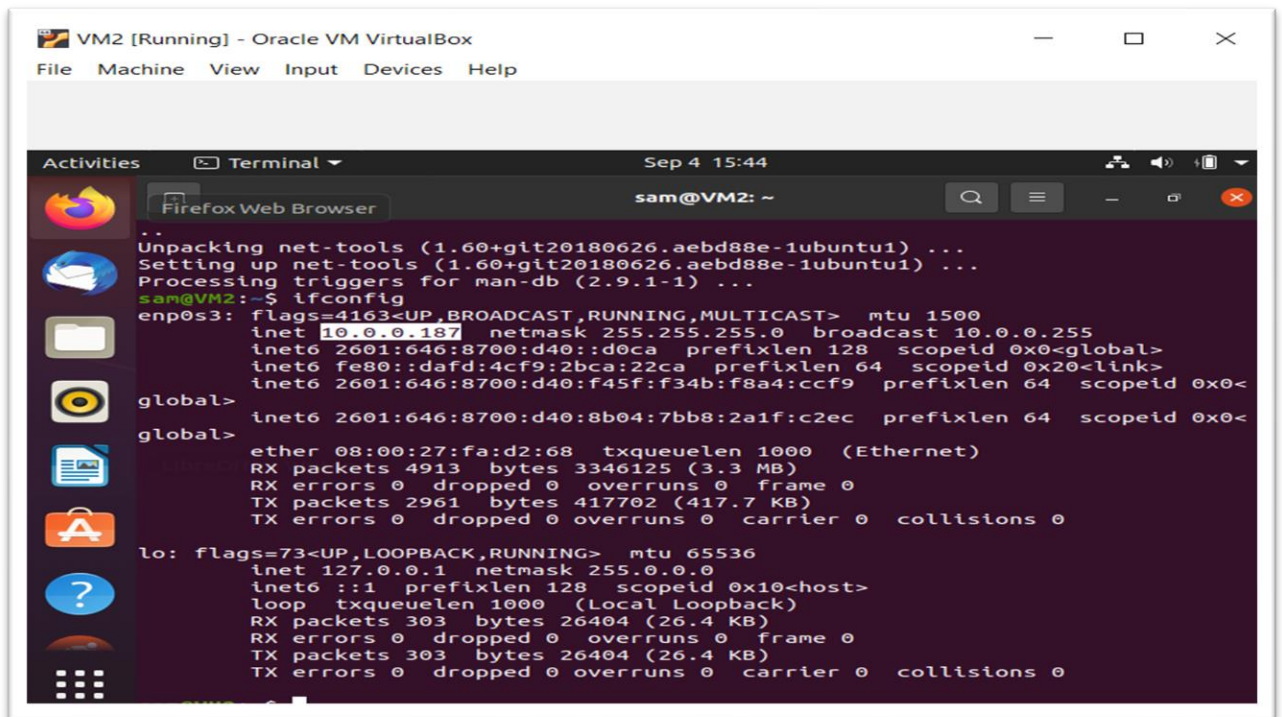
```

sam@VM1: ~
$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.0.132 netmask 255.255.255.0 broadcast 10.0.0.255
    inet6 2601:646:8700:d40:bf9b:e46a:981a:1c20 prefixlen 64 scopeid 0x0<global>
    global>
    inet6 2601:646:8700:d40:a1f:b05:5e84:b795 prefixlen 64 scopeid 0x0<global>
    global>
    inet6 fe80::bfce:7818:cdf1:612b prefixlen 64 scopeid 0x20<link>
    inet6 2601:646:8700:d40::fc75 prefixlen 128 scopeid 0x0<global>
    ether 08:00:27:89:c2:f2 txqueuelen 1000 (Ethernet)
    RX packets 1911 bytes 2309053 (2.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 886 bytes 105528 (105.5 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 237 bytes 20582 (20.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 237 bytes 20582 (20.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

2. VM2 – 10.0.0.187



VM2 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Sep 4 15:44

Terminal window showing the output of the `ifconfig` command on VM2 after installing net-tools:

```

..
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) ...
sam@VM2: ~
$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.0.187 netmask 255.255.255.0 broadcast 10.0.0.255
    inet6 2601:646:8700:d40::d0ca prefixlen 128 scopeid 0x0<global>
    inet6 fe80::dafd:4cf9:2bca:22ca prefixlen 64 scopeid 0x20<link>
    inet6 2601:646:8700:d40:f45f:f34b:f8a4:ccf9 prefixlen 64 scopeid 0x0<global>
    global>
    inet6 2601:646:8700:d40:8b04:7bb8:2a1f:c2ec prefixlen 64 scopeid 0x0<global>
    global>
    ether 08:00:27:fa:d2:68 txqueuelen 1000 (Ethernet)
    RX packets 4913 bytes 3346125 (3.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2961 bytes 417702 (417.7 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 303 bytes 26404 (26.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 303 bytes 26404 (26.4 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

3. VM3 – 10.0.0.214

```

VM3 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Setting up ncurses-term (6.2-0ubuntu2) ...
Processing triggers for systemd (245.4-4ubuntu3.11) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for ufw (0.36-6) ...
sam@VM3:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.0.214 netmask 255.255.255.0 broadcast 10.0.0.255
    inet6 2601:646:8700:d40:f038:bdcd:404b:24 prefixlen 64 scopeid 0x0<global>
    ether 08:00:27:9f:58:ff txqueuelen 1000 (Ethernet)
    RX packets 5295 bytes 3404499 (3.4 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 3342 bytes 474276 (474.2 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 384 bytes 33152 (33.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 384 bytes 33152 (33.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

C. Install Openssh server in all VMs before creating RSA key. (Also Install Firewalld as well.)

```
sudo apt-get install openssh-server (in all 3 VMs)
```

```

sam@VM1:~$ sudo apt-get install openssh-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  molly-guard monkeysphere ssh-pass

```

```

sam@VM2:~$ sudo apt-get install openssh-server
[sudo] password for sam:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id

```

```

sam@VM3:~$ sudo apt-get install openssh-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-sftp-server ssh-import-id
Suggested packages:
  ssh-keyscan

```

Create RSA key from VM1:

```
ssh-keygen -t rsa
```

```

VM1 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Processing triggers for systemd (245.4-4ubuntu3.11) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for ufw (0.36-6) ...
sam@VM1:~$ sudo apt-add-repository -y ppa:ansible/ansible
Error: retrieving gpg key timed out.
sam@VM1:~$
sam@VM1:~$
sam@VM1:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/sam/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/sam/.ssh/id_rsa
Your public key has been saved in /home/sam/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:UDp99PS1LRXJwTvsifzYGU8iv9xWBhJT7Y8xas+DPo4 sam@VM1
The key's randomart image is:
+---[RSA 3072]---+
  . . .++X|
  + . oo. *+
  + . . .ooo|
  o . . ++.
  S . oo+=
  +oo+=
  . *++=
  . oo=o
  Eoo.o+.
+-----[SHA256]-----+
sam@VM1:~$

```

D. **SSH key copied to VM2 and VM3 respectively** and validated password-less ssh connection to VM2 (IP – 10.0.0.187) and VM3 (IP – 10.0.0.214) from VM1 (IP – 10.0.0.132).

```
ssh-copy-id sam@<IP adress>
```


➤ VM1 → ssh → VM2(IP – 10.0.0.187)



```

Activities  Terminal  Sep 4 20:59
sam@VM2: ~
+----[SHA256]-----+
sam@VM1:~$ ssh-copy-id sam@10.0.0.187
The authenticity of host '10.0.0.187 (10.0.0.187)' can't be established.
ECDSA key fingerprint is SHA256:2cODT6RqYU6OK6/MCsqqZ8um0Zt+UvHtxS6YM3Kvyzs.
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
sam@10.0.0.187's password:
Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'sam@10.0.0.187'"
and check to make sure that only the key(s) you wanted were added.

sam@VM1:~$ ssh sam@10.0.0.187
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.11.0-27-generic x86_64)

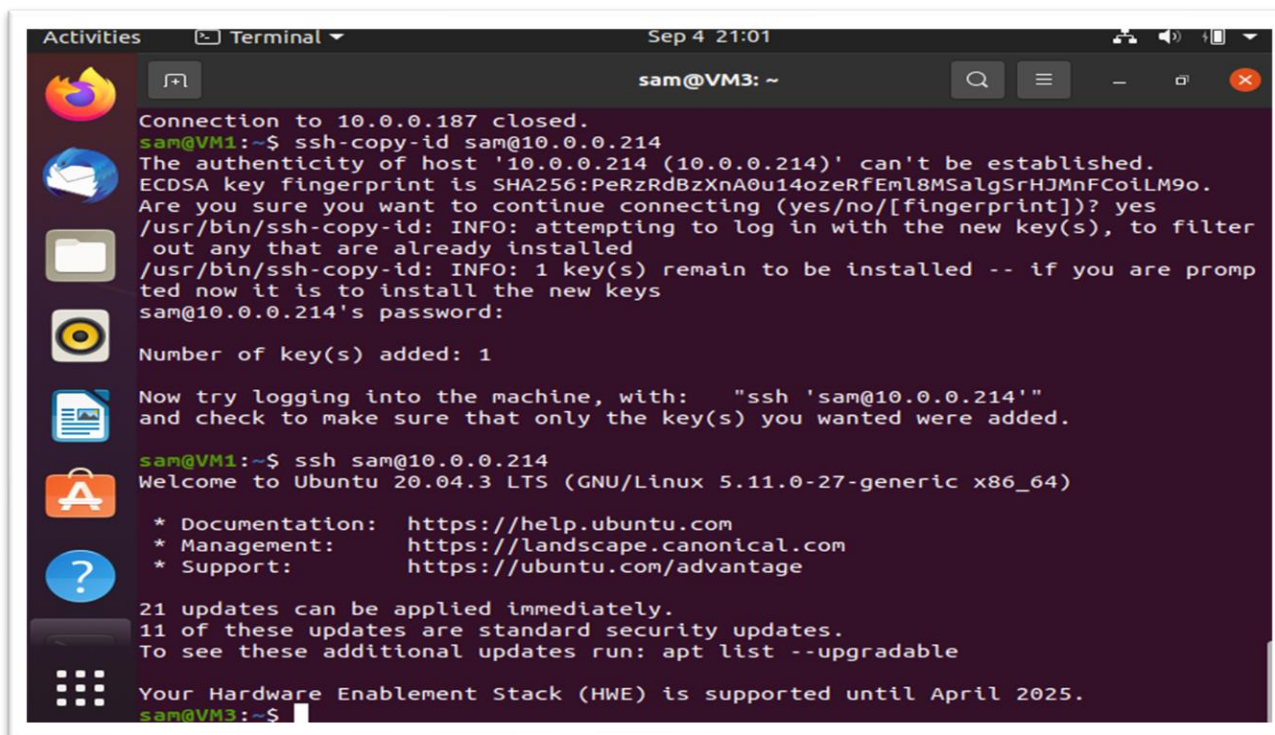
 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

21 updates can be applied immediately.
11 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
sam@VM2:~$

```

➤ VM1 → ssh → VM3(IP – 10.0.0.214)



```

Activities  Terminal  Sep 4 21:01
sam@VM3: ~
Connection to 10.0.0.187 closed.
sam@VM1:~$ ssh-copy-id sam@10.0.0.214
The authenticity of host '10.0.0.214 (10.0.0.214)' can't be established.
ECDSA key fingerprint is SHA256:PeRzRdBzXnA0u14ozeRfEmI8MSalgSrHJMnFCoiLM9o.
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
sam@10.0.0.214's password:
Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'sam@10.0.0.214'"
and check to make sure that only the key(s) you wanted were added.

sam@VM1:~$ ssh sam@10.0.0.214
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.11.0-27-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

21 updates can be applied immediately.
11 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Your Hardware Enablement Stack (HWE) is supported until April 2025.
sam@VM3:~$

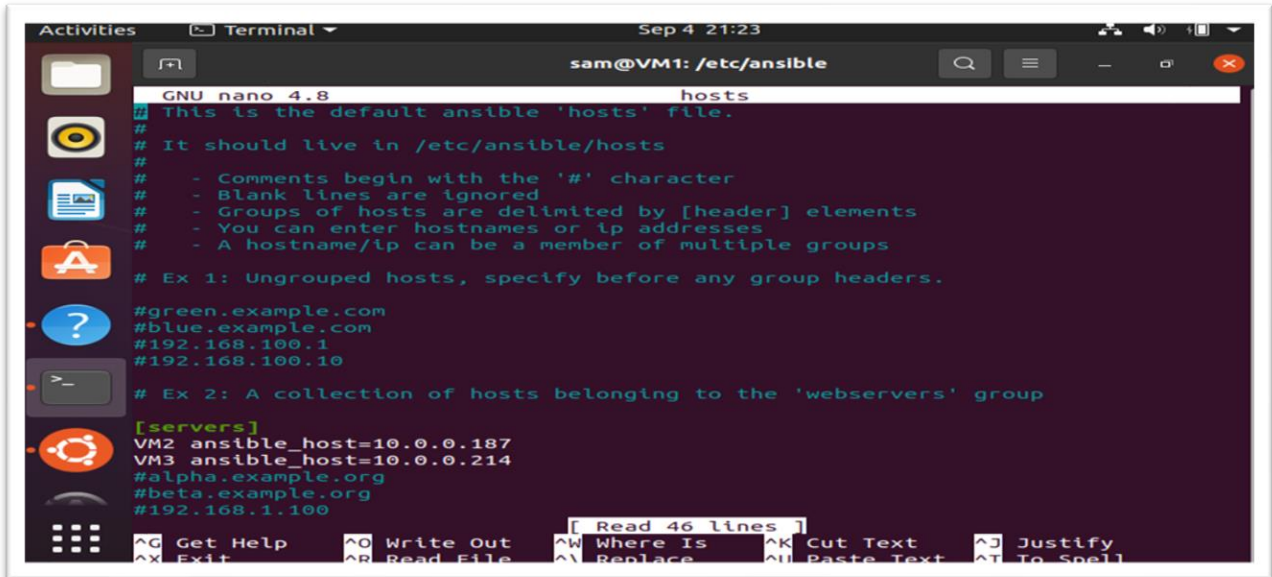
```

E. ANSIBLE: Ping

Once ansible is installed , hosts and ansible.cfg files will be present in path - /etc/ansible.

Modify the hosts file to add entries for VM2 and VM3 as shown below:-

The code is present in file path - /home/sam/Document/Ansible.

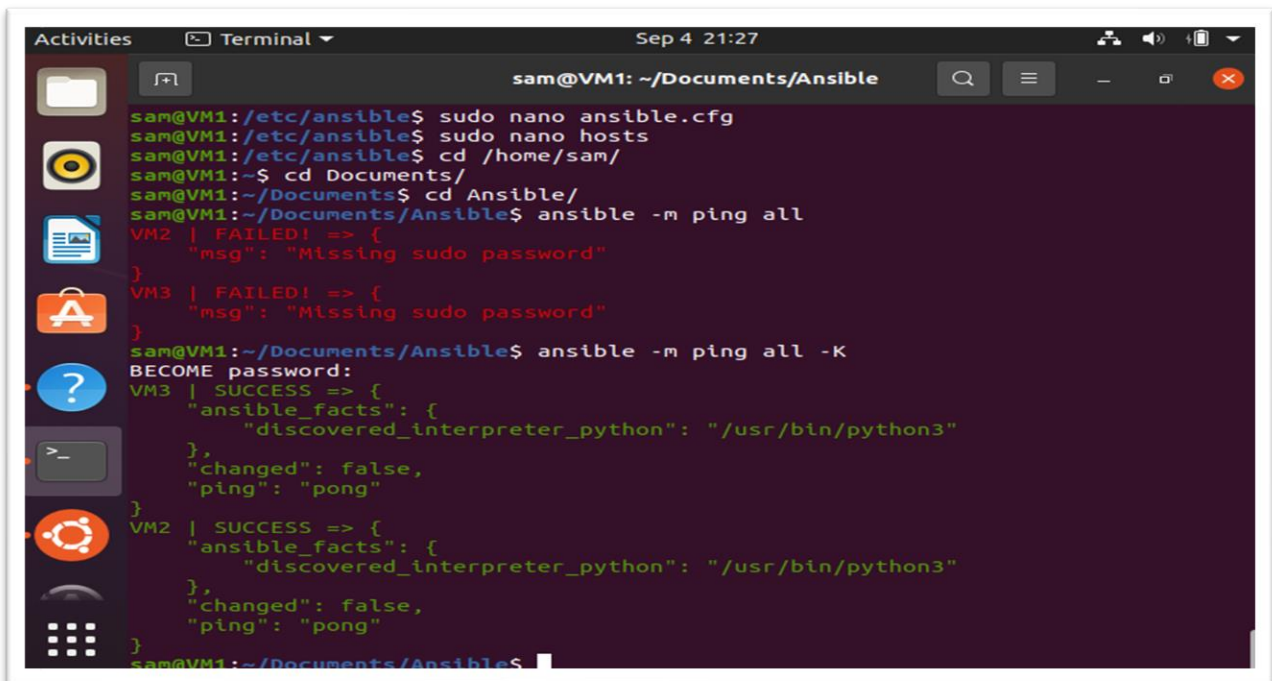


```

GNU nano 4.8 hosts
# This is the default ansible 'hosts' file.
# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups
#
# 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 'webserver' group
[servers]
VM2 ansible_host=10.0.0.187
VM3 ansible_host=10.0.0.214
#alpha.example.org
#beta.example.org
#192.168.1.100

```

F. Test connection to host servers using **ansible -m ping all**



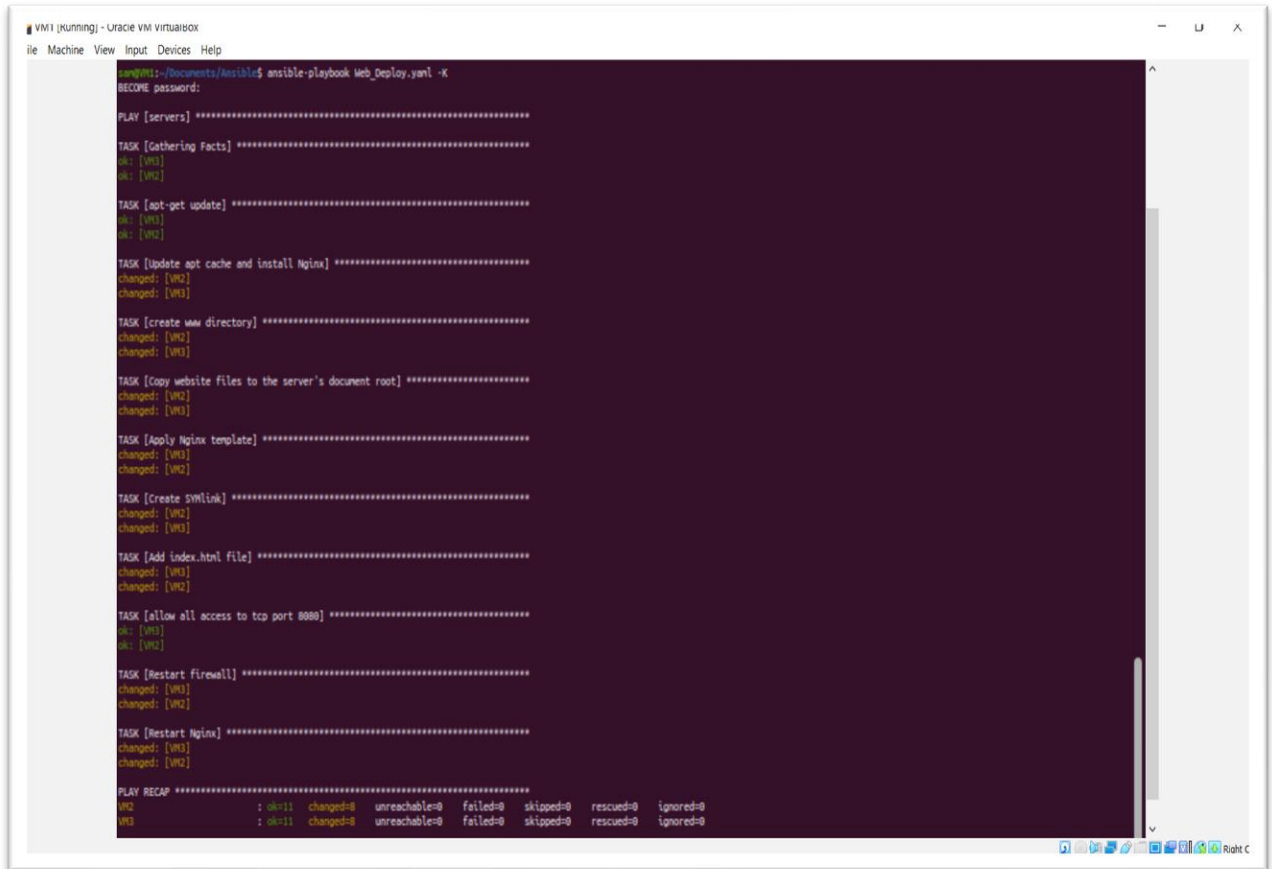
```

sam@VM1: ~/Documents/Ansible
sam@VM1:/etc/ansible$ sudo nano ansible.cfg
sam@VM1:/etc/ansible$ sudo nano hosts
sam@VM1:/etc/ansible$ cd /home/sam/
sam@VM1:~$ cd Documents/
sam@VM1:~/Documents$ cd Ansible/
sam@VM1:~/Documents/Ansible$ ansible -m ping all
VM2 | FAILED! => {
  "msg": "Missing sudo password"
}
VM3 | FAILED! => {
  "msg": "Missing sudo password"
}
sam@VM1:~/Documents/Ansible$ ansible -m ping all -K
BECOME password:
VM3 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
VM2 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
sam@VM1:~/Documents/Ansible$

```


- G. Run playbook named “Web_Deploy.yaml” using below command to configure Ansible server on VM1 to deploy Nginx webserver to VM2 and VM3 on port 8080 that displays the message: “Hello World from SJSU”

ansible-playbook Web_Deploy.yaml -K



```

VM1 [running] - Oracle VM VirtualBox
File Machine View Input Devices Help

sang@VM1:~/Documents/ansible$ ansible-playbook web_deploy.yaml -K
BECOME password:

PLAY [servers] *****
TASK [Gathering Facts] *****
ok: [VM2]
ok: [VM3]

TASK [apt-get update] *****
ok: [VM2]
ok: [VM3]

TASK [Update apt cache and install Nginx] *****
changed: [VM2]
changed: [VM3]

TASK [create www directory] *****
changed: [VM2]
changed: [VM3]

TASK [Copy website files to the server's document root] *****
changed: [VM2]
changed: [VM3]

TASK [Apply Nginx template] *****
changed: [VM2]
changed: [VM3]

TASK [Create symlink] *****
changed: [VM2]
changed: [VM3]

TASK [Add index.html file] *****
changed: [VM2]
changed: [VM3]

TASK [allow all access to tcp port 8080] *****
ok: [VM2]
ok: [VM3]

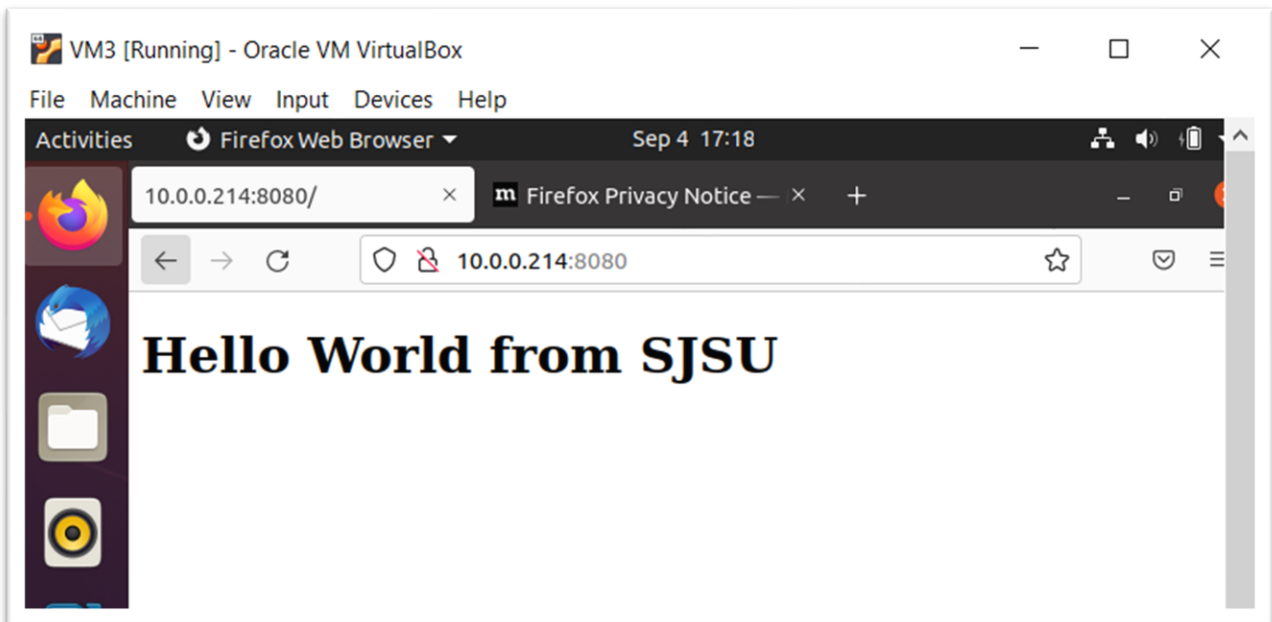
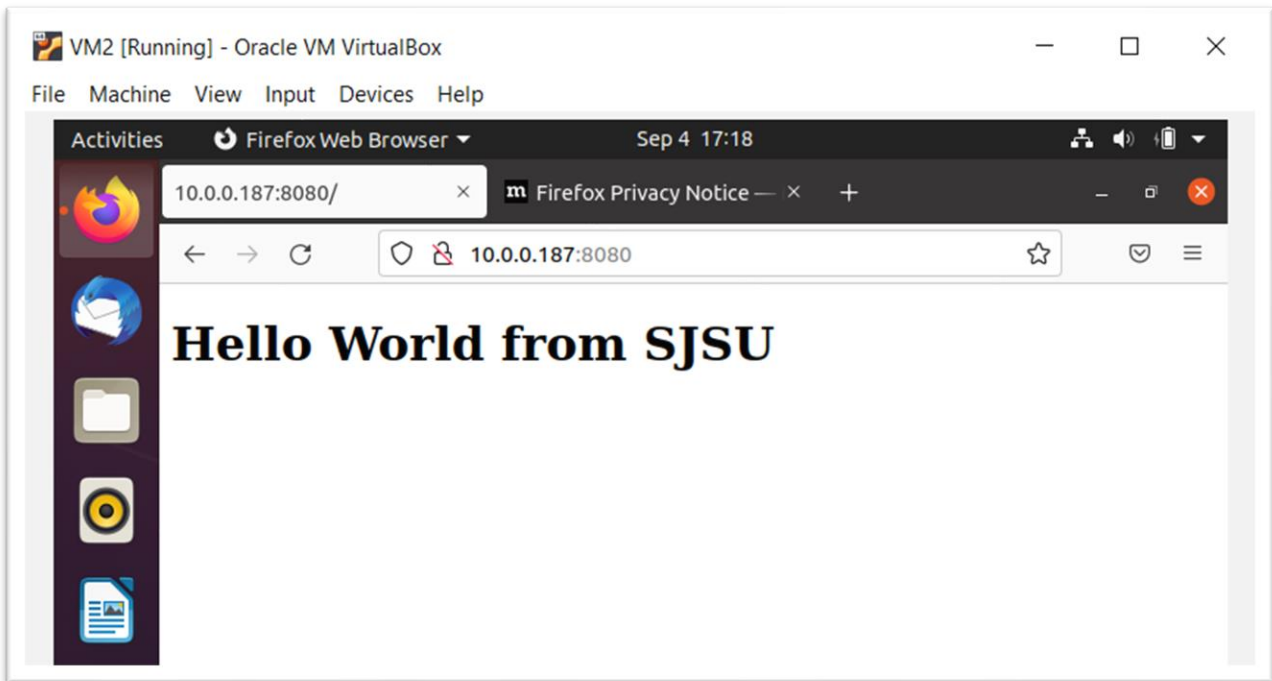
TASK [Restart Firewall] *****
changed: [VM2]
changed: [VM3]

TASK [Restart Nginx] *****
changed: [VM2]
changed: [VM3]

PLAY RECAP *****
VM2 : ok=11 changed=8 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0
VM3 : ok=11 changed=8 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0

```

Screenshots of webpage on VM2 and VM3:



III. Run Ansible playbook – Web_Undeploy.yaml on VM1 to un-deploy all the webserver resources.

```
ansible-playbook Web_Undeploy.yaml -K
```

```

sam@VM1: ~/Documents/Ansible
sam@VM1:~/Documents/Ansible$ ansible-playbook Web_Undeploy.yaml -K
BECOME password:

PLAY [all] *****

TASK [Gathering Facts] *****
ok: [VM2]
ok: [VM3]

TASK [Stop nginx] *****
changed: [VM2]
changed: [VM3]

TASK [Remove All Nginx config file] *****
changed: [VM3]
changed: [VM2]

TASK [Remove Demo files] *****
changed: [VM2]
changed: [VM3]

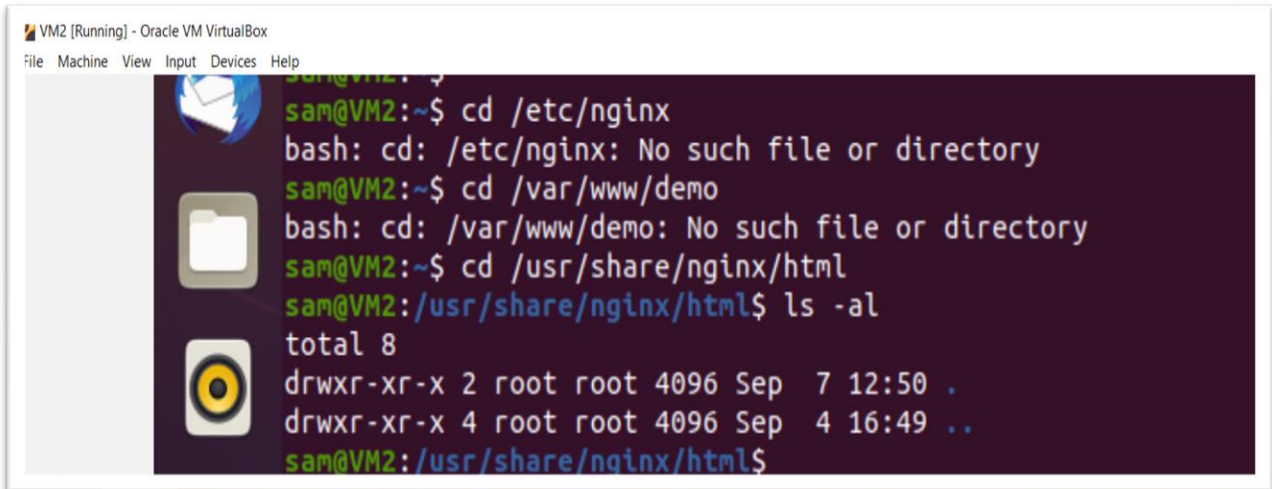
TASK [Delete index.html file] *****
changed: [VM2]
changed: [VM3]

TASK [Uninstall nginx] *****
changed: [VM2]
changed: [VM3]

PLAY RECAP *****
VM2                : ok=6    changed=5    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
VM3                : ok=6    changed=5    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

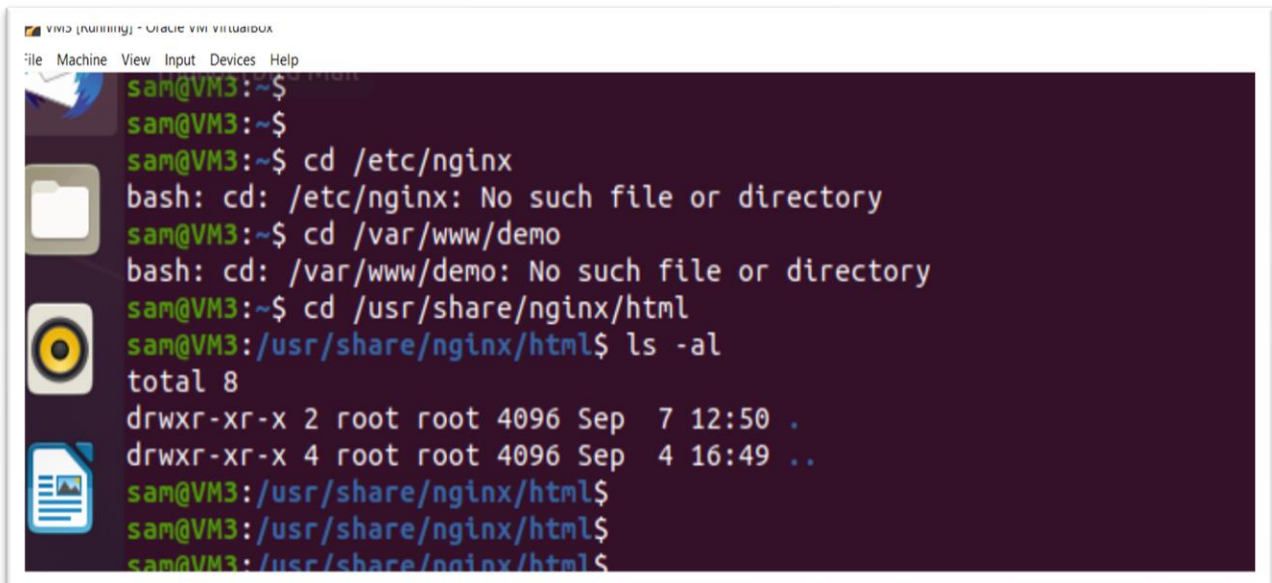
```


ALL Configuration files and resources were deleted on VM2 and VM3.



VM2 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
sam@VM2:~$ cd /etc/nginx
bash: cd: /etc/nginx: No such file or directory
sam@VM2:~$ cd /var/www/demo
bash: cd: /var/www/demo: No such file or directory
sam@VM2:~$ cd /usr/share/nginx/html
sam@VM2:/usr/share/nginx/html$ ls -al
total 8
drwxr-xr-x 2 root root 4096 Sep  7 12:50 .
drwxr-xr-x 4 root root 4096 Sep  4 16:49 ..
sam@VM2:/usr/share/nginx/html$
```



VM3 [Running] - Oracle VM VirtualBox

```
File Machine View Input Devices Help
sam@VM3:~$ 
sam@VM3:~$ 
sam@VM3:~$ cd /etc/nginx
bash: cd: /etc/nginx: No such file or directory
sam@VM3:~$ cd /var/www/demo
bash: cd: /var/www/demo: No such file or directory
sam@VM3:~$ cd /usr/share/nginx/html
sam@VM3:/usr/share/nginx/html$ ls -al
total 8
drwxr-xr-x 2 root root 4096 Sep  7 12:50 .
drwxr-xr-x 4 root root 4096 Sep  4 16:49 ..
sam@VM3:/usr/share/nginx/html$
sam@VM3:/usr/share/nginx/html$
sam@VM3:/usr/share/nginx/html$
```

Screenshots of webpage on VM2 and VM3 post uninstallation of Nginx server:-

