

CCT College Dublin

Assessment Cover Page

Module Title:	Network Services & Virtualization
Assessment Title:	Proof of Concept: Linux & Windows Virtual Network Project
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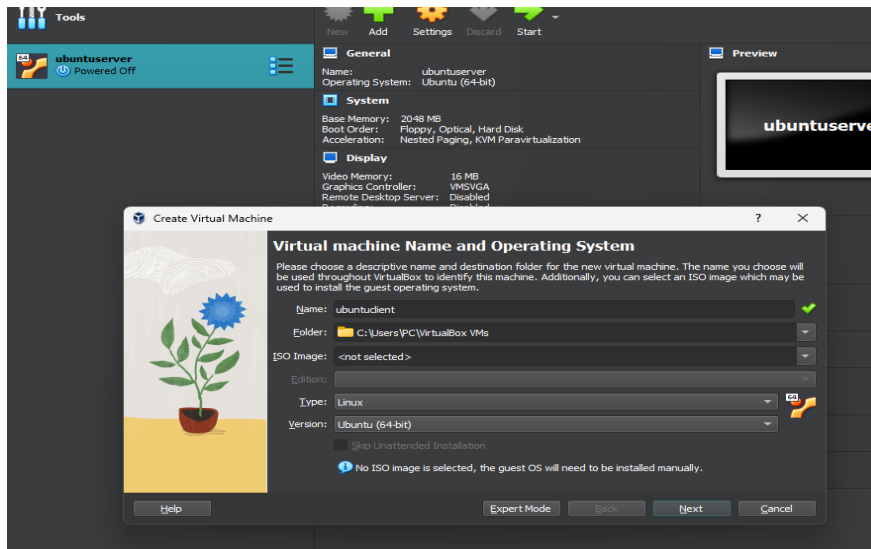
Table of Contents

Table of Contents.....	1
Part 1: Virtual Linux Network and Web server setup.....	3
Reference of NGINX.....	6
PART 2: IP ADDRESS MANAGEMENT	6
PART 3: FIREWALL	7
PART 4: Docker Container	10
PART 5: Creation of Web and DC servers, Setting up IP and RAID arrays:	13

A: 4 disks for RAID 5 volume Drive E	14
B: 2 disks for RAID 1 Mirrored Drive F.....	15
PART 6: Windows PowerShell scripting.....	16
10a. Convert the Windows Server into a Domain Controller.....	16
10b. Installing the IIS Web service using PowerShell script.....	18
Use of V-Box Snapshot.....	20
10c. Add Web-Server to Domian384.DCC using PowerShell script	21
PART 7: RESEARCH AND CHALLENGE ACTIVITIES.....	22
Q11. Samba File Server.....	22
Reference:	25
Q12. Setup DHCP server.....	25
Reference:	28
Q13. Iptables for allow and block Http traffic	29
Reference	30
Q15. Install the V-Box Guest Additions onto the ubuntu server.....	30
Reference:	32
Q17. Reset Password.....	33
Linux	33
Reference	35
Windows	35
Reference	39
Q16. Docker Container For Web Page.....	40
Reference	41

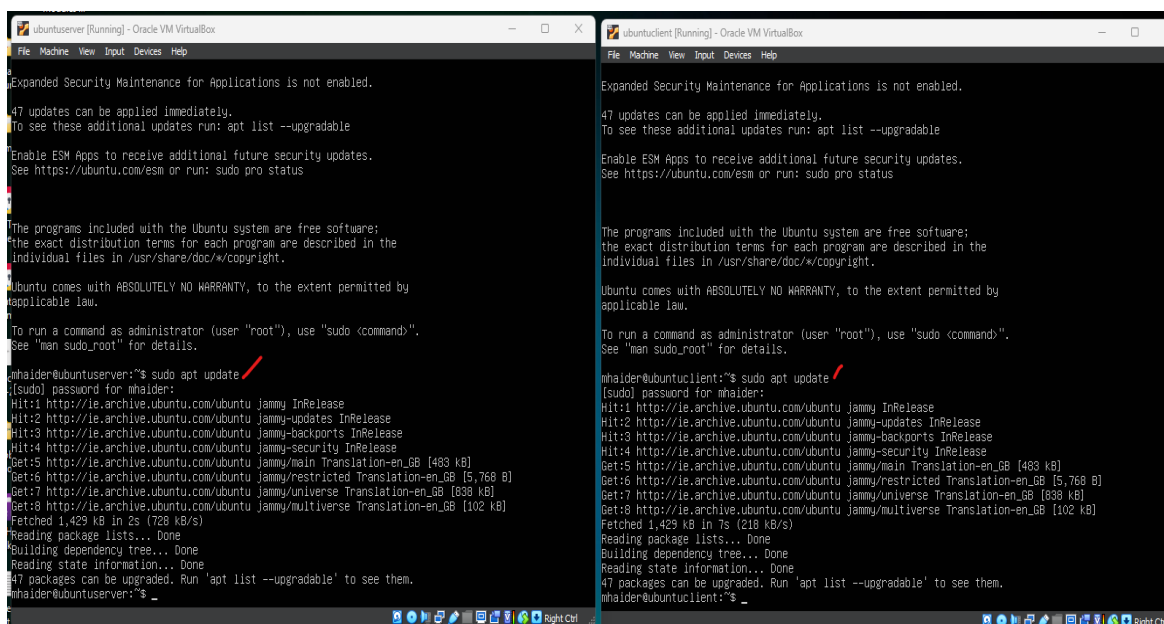
Part 1: Virtual Linux Network and Web server setup

- I made two Linux virtual machines with the same procedure, one of them is **ubuntuserver** and other one is **ubuntuclient**.
- I made them in **version ubuntu(64-bit)** as shown below:



- After it, I have set the **network adapters** of both machines by using **two adapters** of **both** machines such as **Adapter 1** and **Adapter 2** and I **attached Adapter 1** of both machines with Host-Only Network while **Adapter 2** with **NAT**.
- Then, I **obtained Linux updates** in **both** machines by using the command:

sudo apt update



- After that I Installed **ifconfig** in **both** of virtual machines by using command:

sudo apt install net-tools

- I gave **IP addresses** in both machines by using commands:

sudo ifconfig enp0s3 192.168.56.25 netmask 255.255.255.0 in **ubuntuserver** and **sudo ifconfig enp0s3 192.168.56.50 netmask 255.255.255.0** in **ubuntucient**.

- Screenshot below showed that **both** machines are **pinging** each other successfully.

The image shows two terminal windows side-by-side. The left window is titled 'ubuntuserver [Running] - Oracle VM VirtualBox' and shows the output of a ping command from 'ubuntucient' to '192.168.56.50'. It displays 19 successful pings with times ranging from 0.084ms to 0.518ms. The right window is titled 'ubuntucient [Running] - Oracle VM VirtualBox' and shows the output of a ping command from 'ubuntuserver' to '192.168.56.50'. It displays 16 successful pings with times ranging from 0.016ms to 0.045ms. Both windows show network statistics at the bottom, including packets transmitted, received, and dropped.

- After Installing **lynx** in **ubuntucient** with the command **sudo apt install lynx -y** and Installing **NGINX** in **ubuntuserver** with the command **sudo apt install nginx**.
- View of **NGINX** **html** page through the text editor **Lynx** in **ubuntucient** with the command **Lynx 192.168.56.25**.

The image shows a terminal window titled 'ubuntucient [Running] - Oracle VM VirtualBox'. The terminal displays the output of the 'lynx' command, which shows the NGINX welcome page. The page content includes 'Welcome to nginx!', a message about successful installation, and links to 'nginx.org' and 'nginx.com'. At the bottom, there are instructions for using the Lynx browser, such as using arrow keys to move, '?' for help, 'q' to quit, and '/' for search.

- Editing **NGINX** page in **ubuntuserver** with “Dublin City College – Website Under Construction” page along with name and student number by using **nano** command as shown below in shots.

```

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$ cat /var/www/html/index.html
cat: /var/www/html/index.html: No such file or directory
mhaider@ubuntuserver:~$ ls -al /var/www/html
total 12
drwxr-xr-x 2 root root 4096 May 11 03:11 .
drwxr-xr-x 3 root root 4096 May 11 03:11 ..
-rw-r--r-- 1 root root 612 May 11 03:11 index.nginx-debian.html
mhaider@ubuntuserver:~$ sudo nano /var/www/html/index.nginx-debian.html

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 6.2 /var/www/html/index.nginx-debian.html *
<!DOCTYPE html>
<html>
<head>
<title>Welcom to nginx!</title>
<style>
  body {
    width: 35em;
    margin: 0 auto;
    font-family: Tahoma, Verdana, Arial, sans-serif;
  }
</style>
</head>
<body>
<h1>Dublin City College – Website under construction</h1>
<p>Name : Muhammad Sajjad Haider
  Student Number : 2021384</p>
<p>For online documentation and support please refer to
<a href="http://nginx.org/">nginx.org</a>.<br/>
  Commercial support is available at
<a href="http://nginx.com/">nginx.com</a>.</p>
<p><em>Thank you for using nginx.</em></p>
</body>
</html>
G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Un
X Exit ^R Read File ^N Replace ^U Paste ^J Justify ^_ Go To Line M-E Re

```

- View of **Dublin City College** modified home page that is hosted on **NGINX** through **Lynx** in **ubuntuclient**.

```

ubuntuclient [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Dublin City College - Website under construction Welcom to nginx!

Name : Muhammad Sajjad Haider Student Number : 2021384

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

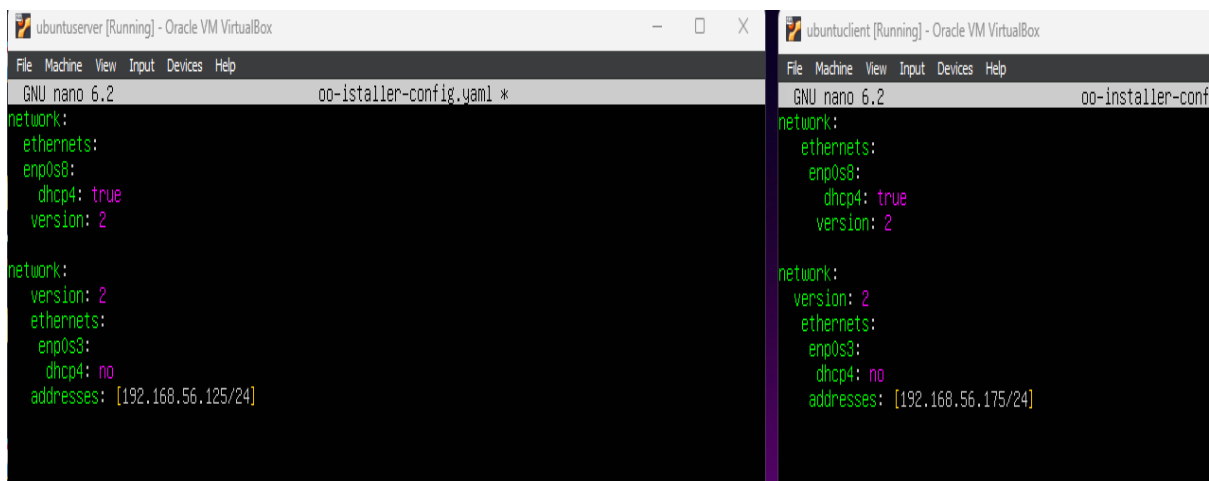
```

Reference of NGINX

Cherry Servers. (n.d.). *How to Install and Configure Nginx on Ubuntu 20.04 / Step-by-Step Tutorial*. [online] Available at: <https://www.cherryservers.com/blog/how-to-install-and-configure-nginx-on-ubuntu-20-04>.

PART 2: IP ADDRESS MANAGEMENT

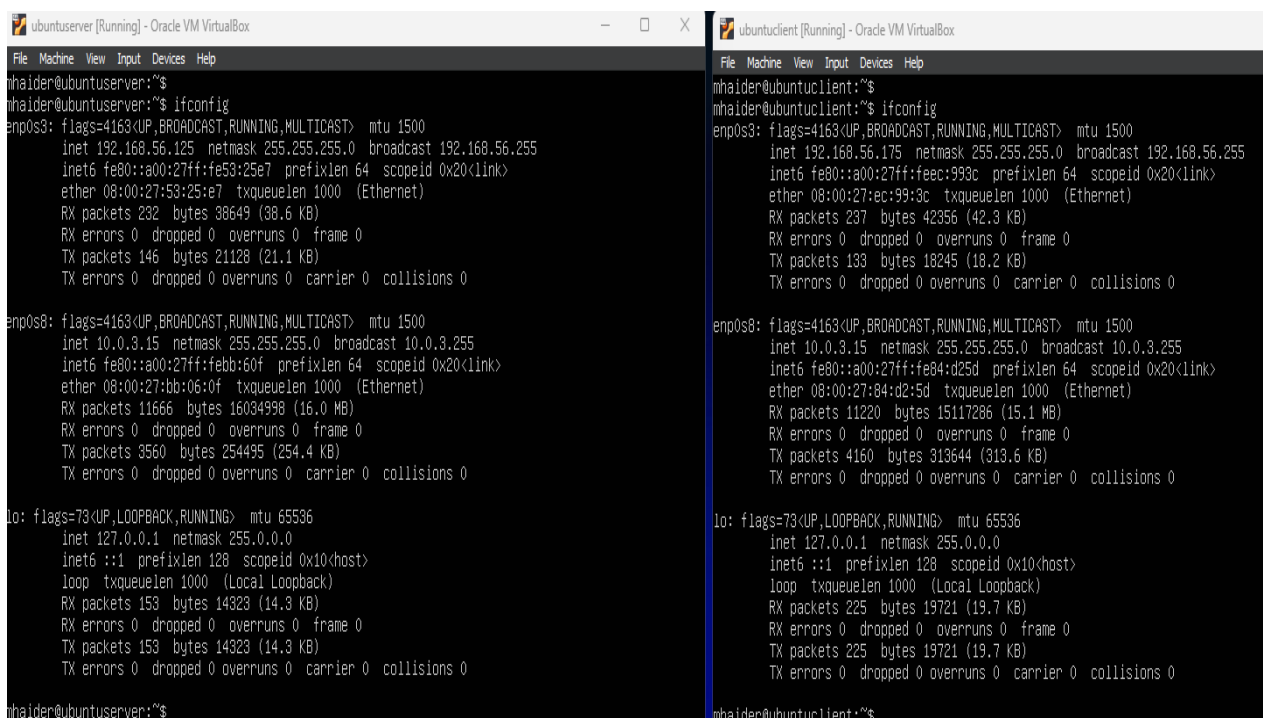
- I configured for `enp0s3` as a permanent address such as **192.168.56.125/24** and **192.168.56.175/24** in **ubuntuserver** and **ubuntuclient**, respectively.



```
ubuntu-server [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 6.2 oo-installer-config.yaml *
network:
  ethernets:
    enp0s8:
      dhcp4: true
      version: 2
  network:
    version: 2
    ethernets:
      enp0s3:
        dhcp4: no
        addresses: [192.168.56.125/24]

ubuntu-client [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
GNU nano 6.2 oo-installer-conf
network:
  ethernets:
    enp0s8:
      dhcp4: true
      version: 2
  network:
    version: 2
    ethernets:
      enp0s3:
        dhcp4: no
        addresses: [192.168.56.175/24]
```

- After applying `netplan` command `sudo netplan apply`, Ip addresses have set permanently in both ubuntu machines.



```
ubuntu-server [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntu-server:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.125 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:fe53:25e7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:53:25:e7 txqueuelen 1000 (Ethernet)
    RX packets 232 bytes 38649 (38.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 146 bytes 21128 (21.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.3.15 netmask 255.255.255.0 broadcast 10.0.3.255
    inet6 fe80::a00:27ff:febb:60f prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:bb:06:0f txqueuelen 1000 (Ethernet)
    RX packets 11666 bytes 16034998 (16.0 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 3560 bytes 254495 (254.4 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 153 bytes 14323 (14.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 153 bytes 14323 (14.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
mhaider@ubuntu-server:~$

ubuntu-client [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntu-client:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.175 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:feec:993c prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:ec:99:3c txqueuelen 1000 (Ethernet)
    RX packets 237 bytes 42356 (42.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 133 bytes 18245 (18.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.3.15 netmask 255.255.255.0 broadcast 10.0.3.255
    inet6 fe80::a00:27ff:fe84:d25d prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:84:d2:5d txqueuelen 1000 (Ethernet)
    RX packets 11220 bytes 15117286 (15.1 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 4160 bytes 313644 (313.6 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 225 bytes 19721 (19.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 225 bytes 19721 (19.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
mhaider@ubuntu-client:~$
```

- It can be seen that **both** machines **ping** each other with **new Ip** addresses.

The image shows two terminal windows side-by-side, both titled 'Ubuntu [Running] - Oracle VM VirtualBox'. The left window shows the output of the 'ifconfig' command for the 'os8' interface, displaying IP address 10.0.3.15 and MAC address 08:00:27:bb:06:0f. Below this, it shows the output of the 'ping' command to 192.168.56.175, showing successful responses from 192.168.56.175. The right window shows the output of the 'ifconfig' command for the 'enp0s8' interface, displaying IP address 10.0.3.15 and MAC address 08:00:27:84:d2:5d. Below this, it shows the output of the 'ping' command to 192.168.56.125, showing successful responses from 192.168.56.125.

PART 3: FIREWALL

- Firstly, I used the command **sudo ufw status** for checking the **status** of **fire-wall** in **ubuntu**server.
- It depicted **inactive**, then I used the command **sudo ufw enable** for **enabling** the **status** to **active**.

The image shows a terminal window titled 'ubuntu [Running] - Oracle VM VirtualBox'. The user 'mhaider' is at the prompt. They run 'sudo ufw status', which returns 'Status: inactive'. Then they run 'sudo ufw enable', which returns 'Firewall is active and enabled on system startup'. Finally, they run 'sudo ufw status', which returns 'Status: active'. Below this, a table shows the current firewall rules:

To	Action	From
80/tcp	ALLOW	Anywhere
80	DENY	Anywhere
80/tcp (v6)	ALLOW	Anywhere (v6)
80 (v6)	DENY	Anywhere (v6)

- After that, I used command such as **sudo ufw allow http**, allowing the web traffic through the firewall and **block traffic** of HTTP by using command **sudo ufw deny http**.

```

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$ sudo ufw allow http
Rule updated
Rule updated (v6)
mhaider@ubuntuserver:~$ sudo ufw status
Status: active

To Action From
--
80/tcp ALLOW Anywhere
80 DENY Anywhere
80/tcp (v6) ALLOW Anywhere (v6)
80 (v6) DENY Anywhere (v6)

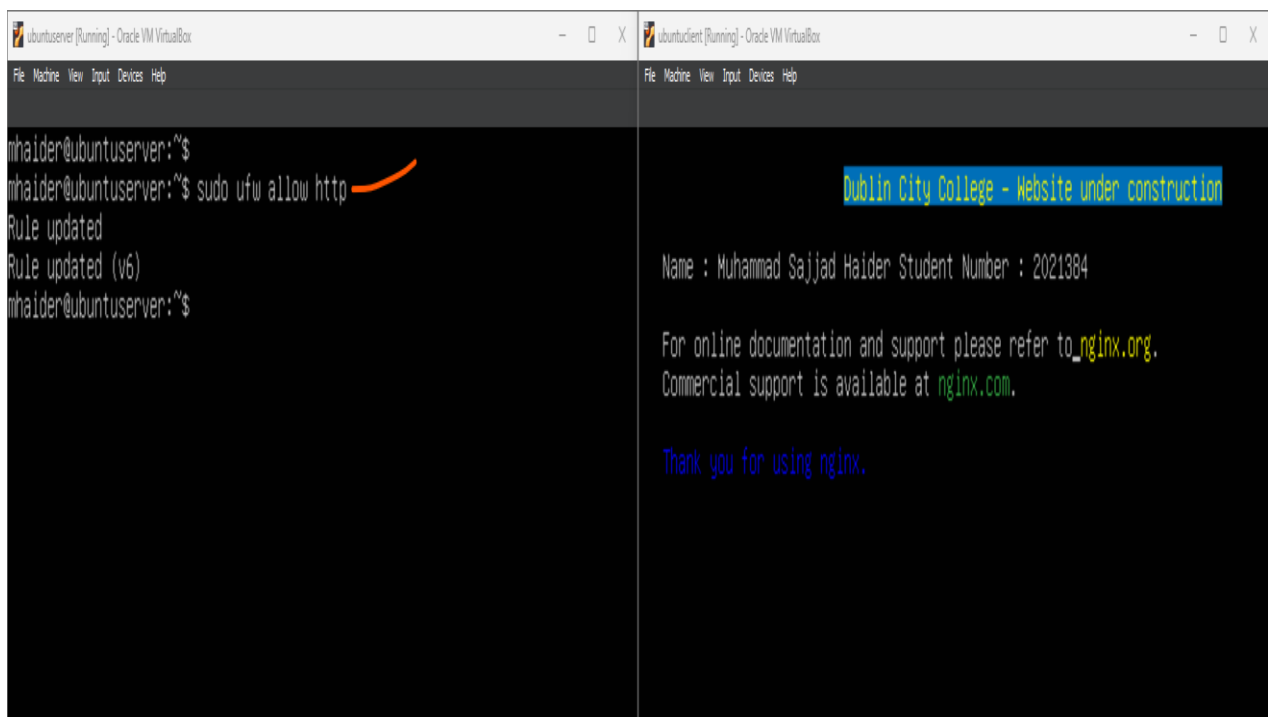
mhaider@ubuntuserver:~$ sudo ufw deny http
Rule updated
Rule updated (v6)
mhaider@ubuntuserver:~$ sudo ufw status
Status: active

To Action From
--
80/tcp DENY Anywhere
80 DENY Anywhere
80/tcp (v6) DENY Anywhere (v6)
80 (v6) DENY Anywhere (v6)

mhaider@ubuntuserver:~$

```

- I can access nginx page while allowing http through ufw as shown below:



- Meanwhile, I permitted and **blocked traffic of HTTP** through **ufw** by using **port number of HTTP** with commands **sudo ufw allow 80** and **sudo ufw deny 80** as shown below.

```

mhaider@ubuntuserver:~$ sudo ufw status
Status: active

To Action From
--
80/tcp DENY Anywhere
80 DENY Anywhere
80/tcp (v6) DENY Anywhere (v6)
80 (v6) DENY Anywhere (v6)

mhaider@ubuntuserver:~$ sudo ufw allow 80
Rule updated
Rule updated (v6)
mhaider@ubuntuserver:~$ sudo ufw status
Status: active

To Action From
--
80/tcp DENY Anywhere
80 ALLOW Anywhere
80/tcp (v6) DENY Anywhere (v6)
80 (v6) ALLOW Anywhere (v6)

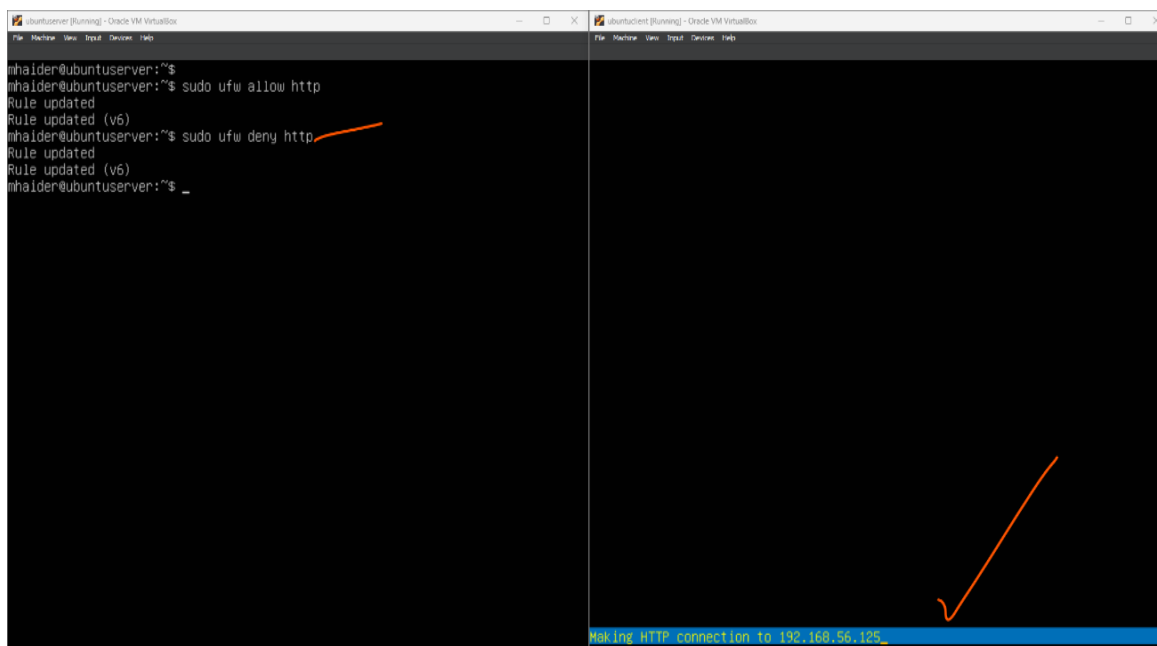
mhaider@ubuntuserver:~$ sudo ufw deny 80
Rule updated
Rule updated (v6)
mhaider@ubuntuserver:~$ sudo ufw status
Status: active

To Action From
--
80/tcp DENY Anywhere
80 DENY Anywhere
80/tcp (v6) DENY Anywhere (v6)
80 (v6) DENY Anywhere (v6)

mhaider@ubuntuserver:~$

```

- **Nginx page** cannot be **accessed** while **blocking http** through **ufw** as shown below:



PART 4: Docker Container

- First of all, I used the **update** command **sudo apt update**.
- Then, installed Docker by using command **sudo apt install docker.io -y**.

```
mhaider@ubuntu:~$ sudo apt update
[sudo] password for mhaider:
Hit:1 http://ie.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://ie.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:3 http://ie.archive.ubuntu.com/ubuntu jammy-backports InRelease [108 kB]
Get:4 http://ie.archive.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:5 http://ie.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [57 kB]
Get:6 http://ie.archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [16 kB]
Get:7 http://ie.archive.ubuntu.com/ubuntu jammy-updates/main amd64 c-n-f Metadata [9,416 B]
Get:8 http://ie.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [57 kB]
Get:9 http://ie.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [5,292 B]
Get:10 http://ie.archive.ubuntu.com/ubuntu jammy-updates/multiverse Translation-en [16 kB]
Get:11 http://ie.archive.ubuntu.com/ubuntu jammy-security/main amd64 Packages [57 kB]
Get:12 http://ie.archive.ubuntu.com/ubuntu jammy-security/main Translation-en [16 kB]
Get:13 http://ie.archive.ubuntu.com/ubuntu jammy-security/main amd64 c-n-f Metadata [9,416 B]
Get:14 http://ie.archive.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [57 kB]
Fetched 3,217 kB in 2s (1,911 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
47 packages can be upgraded. Run 'apt list --upgradable' to see them.
mhaider@ubuntu:~$ sudo apt install docker.io -y
```

- After installing Docker, I **gave** commands **sudo systemctl start docker** and **sudo systemctl enable docker** for **starting** and **enabling** docker.
- **sudo docker images** showed that there is **no** any **image yet** in the **shot** below:
- **sudo groupadd docker** showed docker group **already existed**.
- I used my **username** for becoming **user** by using the command **sudo su -mhaider** and have also set **password pass1234!** with the command **sudo passwd mhaider**.

```
Adding group `docker' (GID 119) ...
Done.
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service
→ /usr/lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr
lib/systemd/system/docker.socket.
Processing triggers for dbus (1.12.20-2ubuntu4.1) ...
Processing triggers for man-db (2.10.2-1) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.
No services need to be restarted.
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
mhaider@ubuntu:~$ sudo systemctl start docker
mhaider@ubuntu:~$ sudo systemctl enable docker
mhaider@ubuntu:~$ sudo docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
mhaider@ubuntu:~$ sudo groupadd docker
groupadd: group 'docker' already exists
mhaider@ubuntu:~$ sudo usermod -s /bin/bash mhaider
mhaider@ubuntu:~$ sudo passwd mhaider
New password:
Retype new password:
passwd: password updated successfully
mhaider@ubuntu:~$
```

- **sudo docker pull ubuntu:22.04** used for **downloading** the **ubuntu**.
- **sudo docker images** showed **ubuntu image** in list.
- **sudo mkdir Dockerfiles** used for **creating directory**.
- **ls -al** showed that **docker image** exists.
- **cd Dockerfiles** used to go **inside** the **directory**.
- **sudo touch Dockerfile** command used for **creating** the **new file** inside the directory with the name of **Dockerfile**.
- **ls -al Dockerfile** command showed that the **new file** has **created** inside.
- **sudo nano Dockerfile** used for **writing** inside the **newly created Dockerfile**.

```
mhaider@ubuntu:~$
mhaider@ubuntu:~$
mhaider@ubuntu:~$ sudo docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
mhaider@ubuntu:~$ sudo docker pull ubuntu:22.04
22.04: Pulling from library/ubuntu
dbf6a9befcde: Pull complete
Digest: sha256:dfd64a3b4296d8c9b62aa3309984f8620b98d87e47492599ee20739e8eb54fbf
Status: Downloaded newer image for ubuntu:22.04
docker.io/library/ubuntu:22.04
mhaider@ubuntu:~$ sudo docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
ubuntu 22.04 3b418d7b466a 2 weeks ago 77.8MB
mhaider@ubuntu:~$ sudo mkdir Dockerfiles
mhaider@ubuntu:~$ ls -al
total 36
drwxr-xr-x 5 mhaider mhaider 4096 May 13 03:07 .
drwxr-xr-x 3 root root 4096 May 11 02:42 ..
-rw-r--r-- 1 mhaider mhaider 220 Jan 6 2022 .bash_logout
-rw-r--r-- 1 mhaider mhaider 3771 Jan 6 2022 .bashrc
drwx----- 2 mhaider mhaider 4096 May 11 02:46 .cache
drwxr-xr-x 2 root root 4096 May 13 03:07 Dockerfiles
-rw-r--r-- 1 root root 161 May 11 23:54 oo-installer-config.yaml
-rw-r--r-- 1 mhaider mhaider 807 Jan 6 2022 .profile
drwx----- 2 mhaider mhaider 4096 May 11 02:42 .ssh
-rw-r--r-- 1 mhaider mhaider 0 May 11 02:50 .sudo_as_admin_successful
mhaider@ubuntu:~$ cd Dockerfiles
mhaider@ubuntu:~/Dockerfiles$ sudo touch Dockerfile
mhaider@ubuntu:~/Dockerfiles$ ls -al
total 8
drwxr-xr-x 2 root root 4096 May 13 03:08 .
drwxr-xr-x 5 mhaider mhaider 4096 May 13 03:07 ..
-rw-r--r-- 1 root root 0 May 13 03:08 Dockerfile
mhaider@ubuntu:~/Dockerfiles$ ls -al Dockerfile
-rw-r--r-- 1 root root 0 May 13 03:08 Dockerfile
mhaider@ubuntu:~/Dockerfiles$ sudo nano Dockerfile_
```

- I have written my **name** followed by **student email address** as a **Maintainer** inside the **Docker file** and **wrote** a message **“Welcome to Dublin City College!”** in **CMD**.

```
GNU nano 6.2 Dockerfile *
FROM ubuntu
MAINTAINER Muhammad Sajjad Haider <2021384@student.cct.ie>
RUN apt-get update -y
CMD ["echo", "Welcome to Dublin City College!"]
```

- **Docker container** named **my-first-image** has **built** by using the command **sudo docker build -t my-first-image .** (Note: Dot is necessary at the end of command).

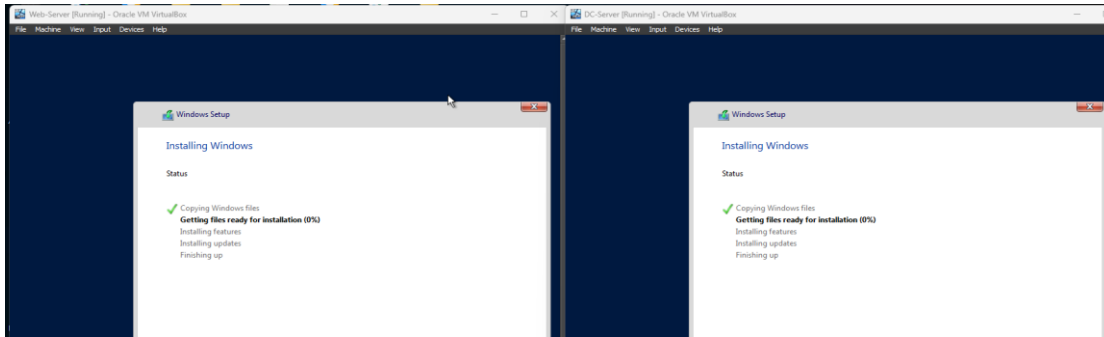
```
mhaider@ubuntuserver:~/Dockerfiles$ ls -al
total 16
drwxr-xr-x 2 root    root    4096 May 13 03:40 .
drwxr-x--- 5 mhaider mhaider 4096 May 13 03:07 ..
-rw-r--r-- 1 root    root    142 May 13 03:40 Dockerfile
-rw-r--r-- 1 root    root    116 May 13 03:31 Dockerfle
mhaider@ubuntuserver:~/Dockerfiles$ sudo docker build -t my-first-image .
```

- **sudo docker images** showed **my-first-image** docker container in the list.
- This docker container had **run** by using the command **sudo docker run my-first-image** which showed the message **“Welcome to Dublin City College!”**.

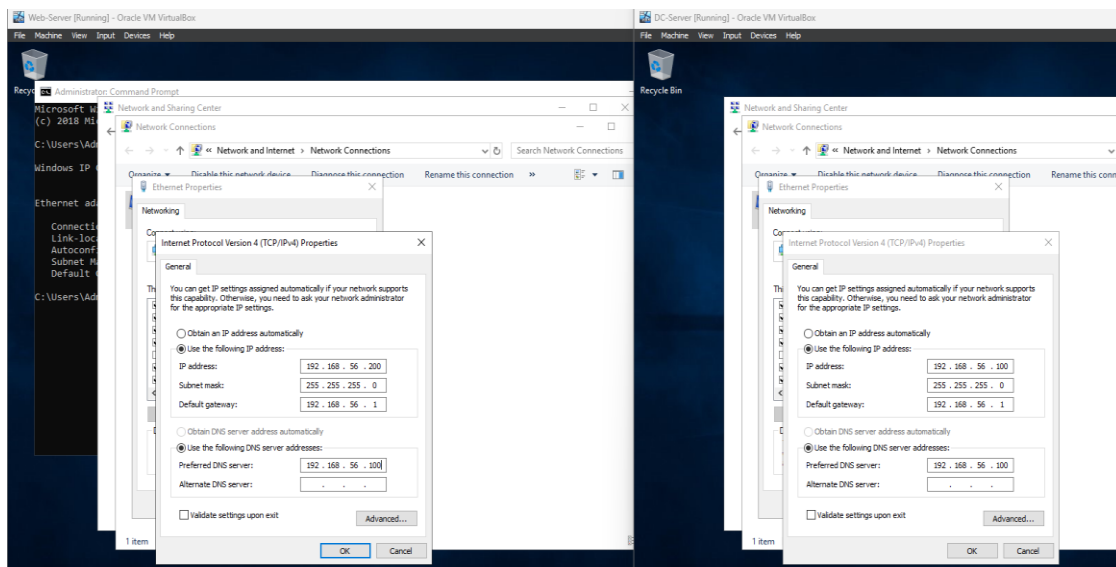
```
Get:5 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages
Get:6 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [
Get:7 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:8 http://archive.ubuntu.com/ubuntu jammy-backports InRelease [108 kB]
Get:9 http://archive.ubuntu.com/ubuntu jammy/restricted amd64 Packages [164 kB]
Get:10 http://archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [266 kB]
Get:11 http://archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [17.5 MB]
Get:12 http://archive.ubuntu.com/ubuntu jammy/main amd64 Packages [1792 kB]
Get:13 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1
Get:14 http://archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages
Get:15 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [738 k
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages
Get:17 http://archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [49.
Get:18 http://archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages
Fetched 24.3 MB in 6s (4138 kB/s)
Reading package lists...
Removing intermediate container 5d09c9ba501f
--> 7d582789ccf4
Step 4/4 : CMD ["echo", "Welcome to Dublin City College!"]
--> Running in 05fe55b5ce78
Removing intermediate container 05fe55b5ce78
--> 25b3d03b0e92
Successfully built 25b3d03b0e92
Successfully tagged my-first-image:latest
mhaider@ubuntuserver:~/Dockerfiles$ sudo docker images
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
my-first-image      latest          25b3d03b0e92   About a minute ago   117MB
ubuntu              22.04          3b418d7b466a   2 weeks ago       77.8MB
ubuntu              latest         3b418d7b466a   2 weeks ago       77.8MB
mhaider@ubuntuserver:~/Dockerfiles$ docker run my-first-image
docker: Got permission denied while trying to connect to the Docker daemon socke
/docker.sock: Post "http://%2Fvar%2Frun%2Fdocker.sock/v1.24/containers/create":
docker.sock: connect: permission denied.
See 'docker run --help'.
mhaider@ubuntuserver:~/Dockerfiles$ sudo docker run my-first-image
Welcome to Dublin City College!
mhaider@ubuntuserver:~/Dockerfiles$
```

PART 5: Creation of Web and DC servers, Setting up IP and RAID arrays:

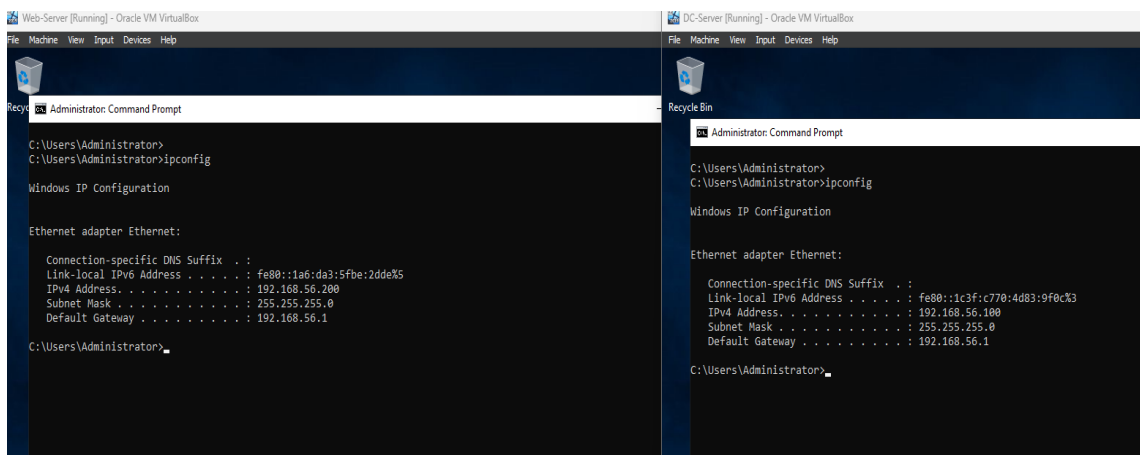
- First of all, I have **created two new virtual machines** with the names **Web-Server** and **DC-Server** as shown below:



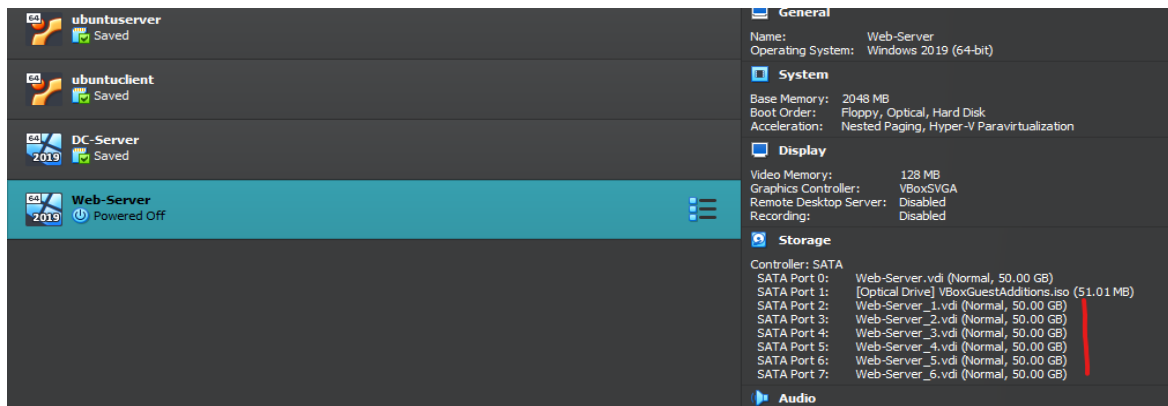
- Setup Ip addresses, subnet mask, default gateway and DNS in both machines** which have given in the assessment.



- Everything has setup successfully as shown below:**



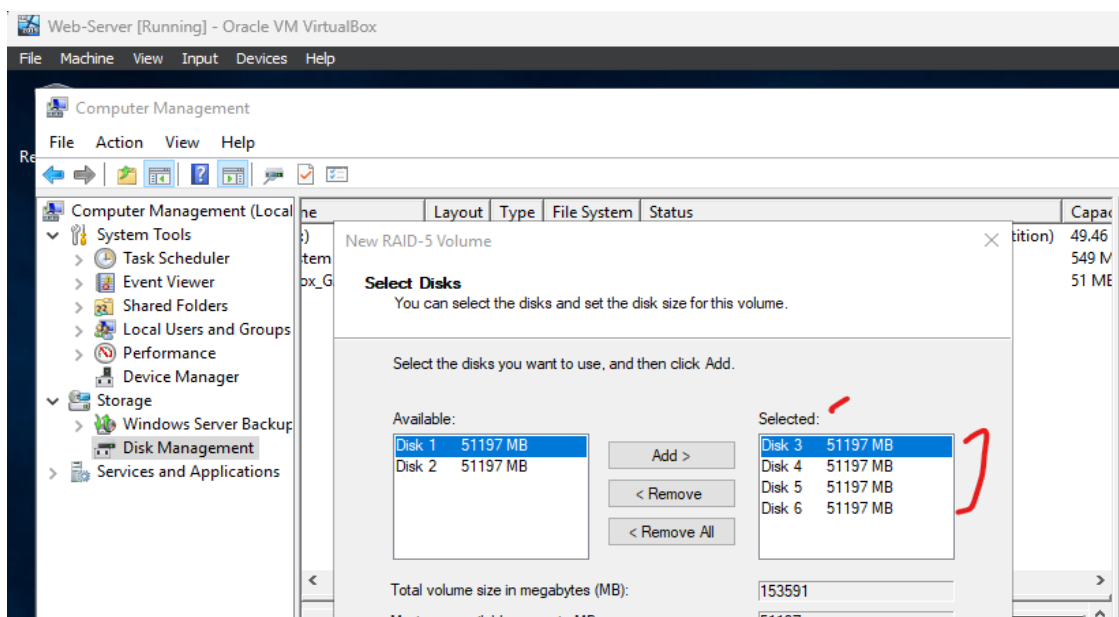
- First, I create total 6 hard disks for my Web-Server such as 4 for RAID 5 and 2 for RAID 1.



- I have set both RAIDS in my Web-Server by using **Disk Management** within the **Computer Management**.
- After installing **disk drives**, All the new disk are showing as **Unknown** and convert all disks to **dynamic** by using right-click on the **Unknown** disk.

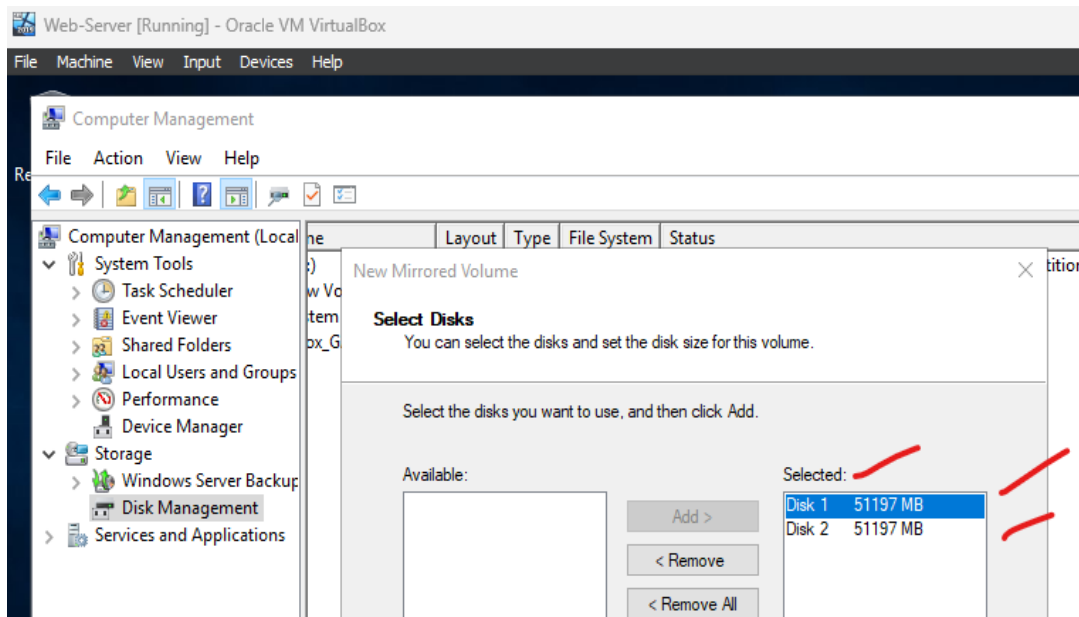
A: 4 disks for RAID 5 volume Drive E

- Right click on **Disk 4** and select **Volume**.
- In **wizard**, click **Next** and add **Disk 3, Disk 4, Disk 5 and Disk 6**.
- Select **Volume Name E**.
- Tick on **quick format**.

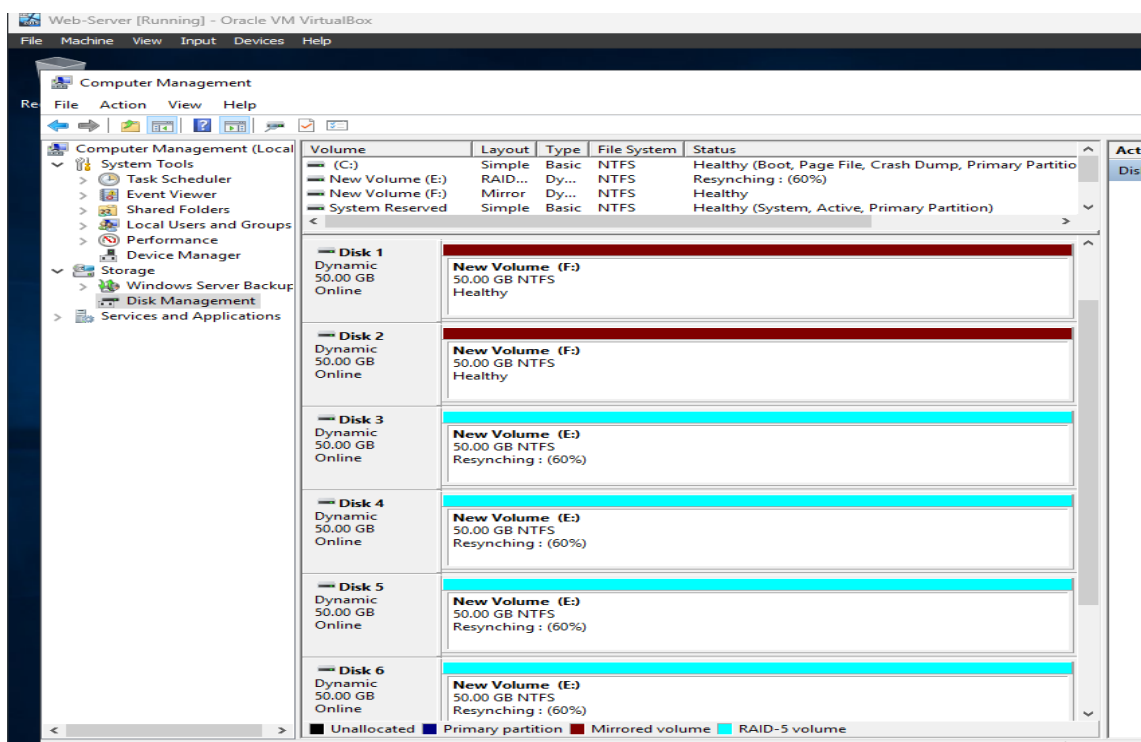


B: 2 disks for RAID 1 Mirrored Drive F

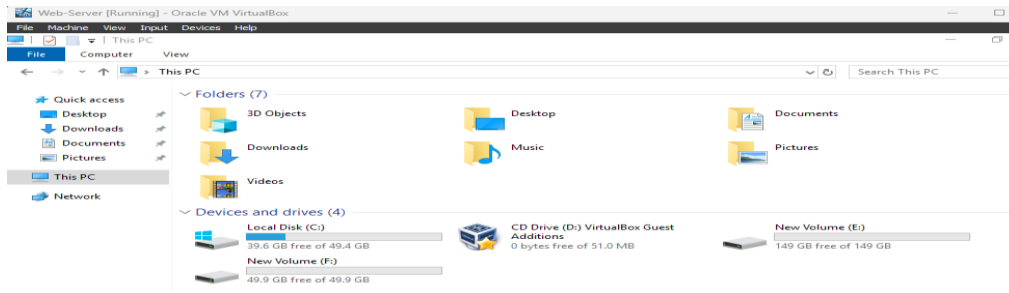
- Right click on **Disk 1** and select **Mirrored Volume**.
- In **wizard**, click **Next** and add **Disk 2** with **Disk 1**.
- Select **Volume Name F**.
- Tick on **quick format**.



- Setup **RAIDS** successfully.



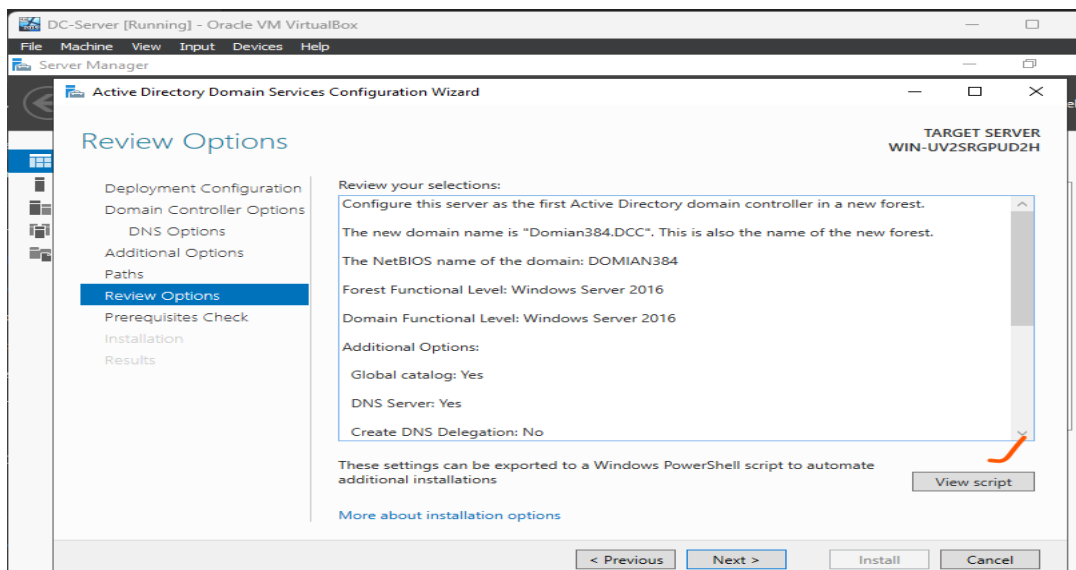
- **Disc E and F** showed in **This PC** also.



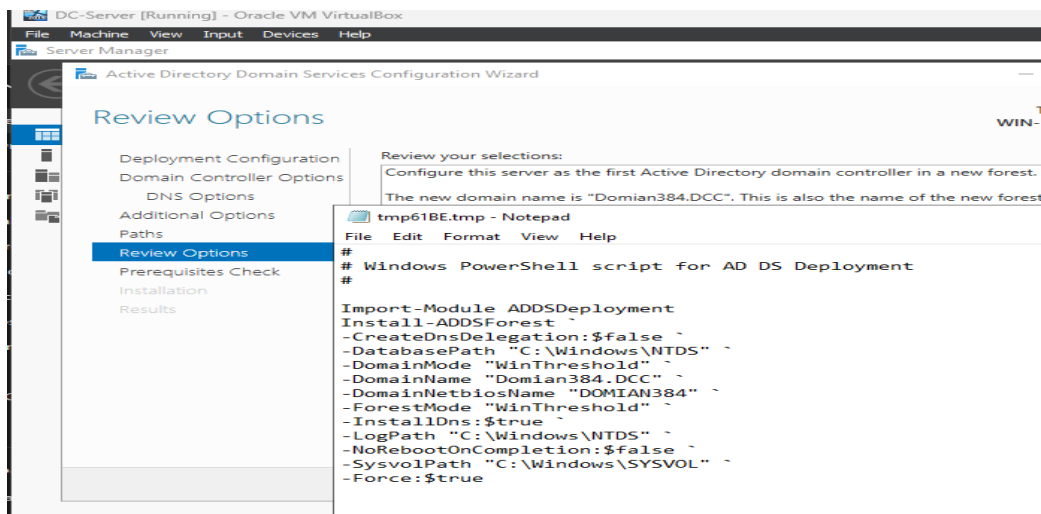
PART 6: Windows PowerShell scripting

10a. Convert the Windows Server into a Domain Controller

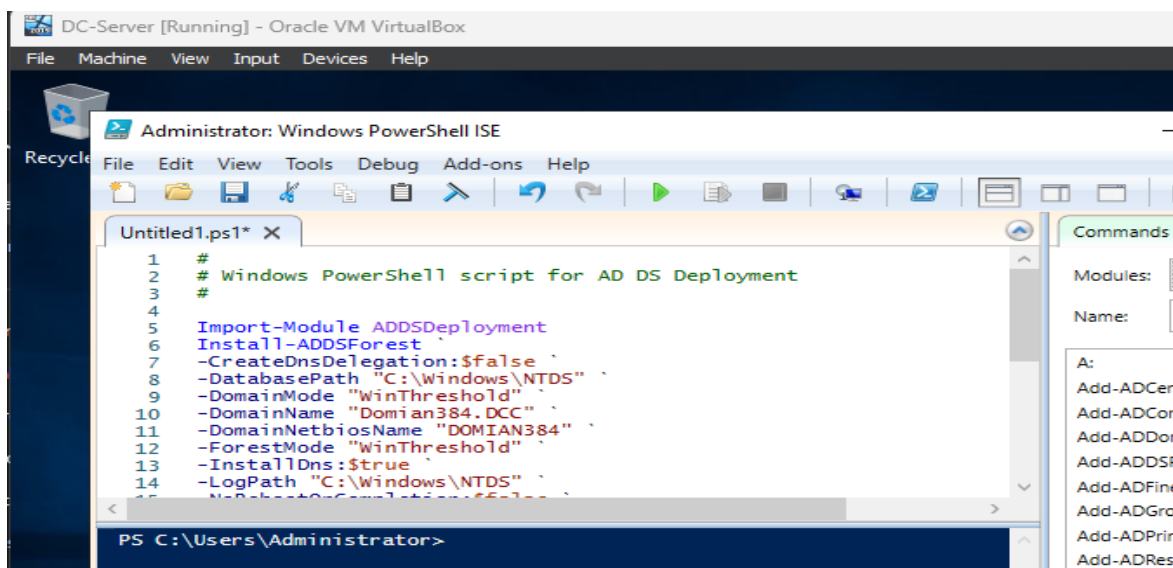
- Firstly, In **Server manager**, open **Add role and features**.
- Select **Role-based installation**.
- Select **Active Directory Domain Services** in **Server role** and **Add features** will tick the box and just hit next on other steps and **install**.
- After that go to **yellow flag mark** and click **Promote this server to a domain controller**.
- In new popping up screen, click on **Add new forest** and I gave the root **domain name** is **Domian384.DCC**. (Note: Spell mistake of Domain but worked properly).
- I have set password **Pass1234!** for **domain controller**.
- Hit **next** until reach **Review options** and click on **view script** from left bottom.



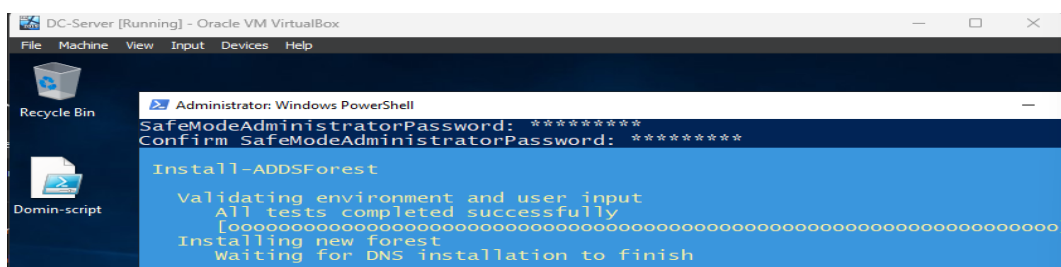
- A **script** opened, which will convert **DC-Server** into **Domain Controller** through **PowerShell**.



- I copied the **script** and **pasted** it in **Windows PowerShell ISE** as shown below:



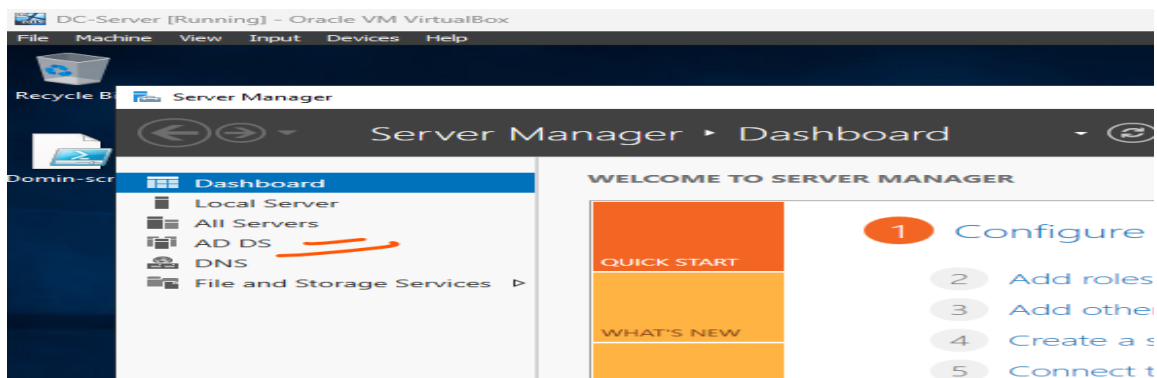
- **Saved** this **script** on **Desktop** with the name of **Domin-script**.
- **Run** this **script** with **PowerShell** by using **right-click** and it can be **seen** that **Domain Controlling** is **installing** in the shot below:



- **Login screen of DC-Server as a Domian384.DCC.**



- **DNS showed in Server manager.**

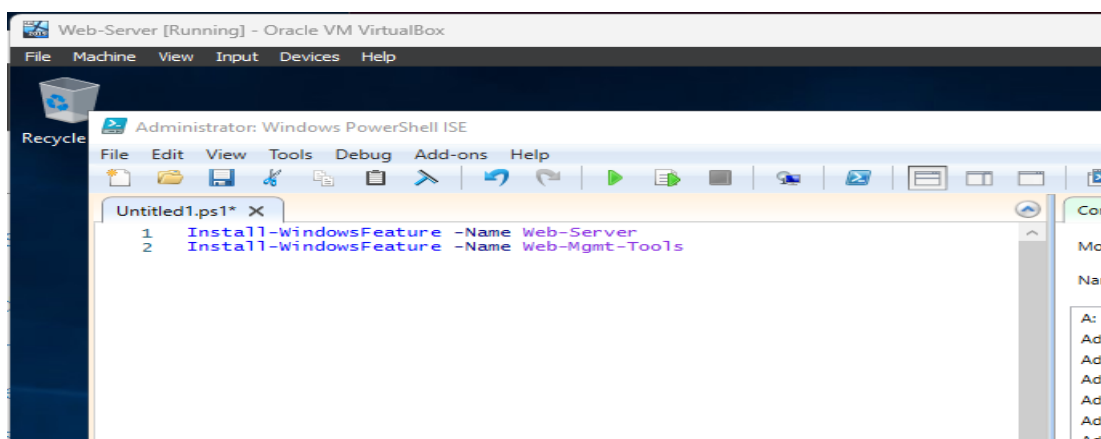


10b. Installing the IIS Web service using PowerShell script

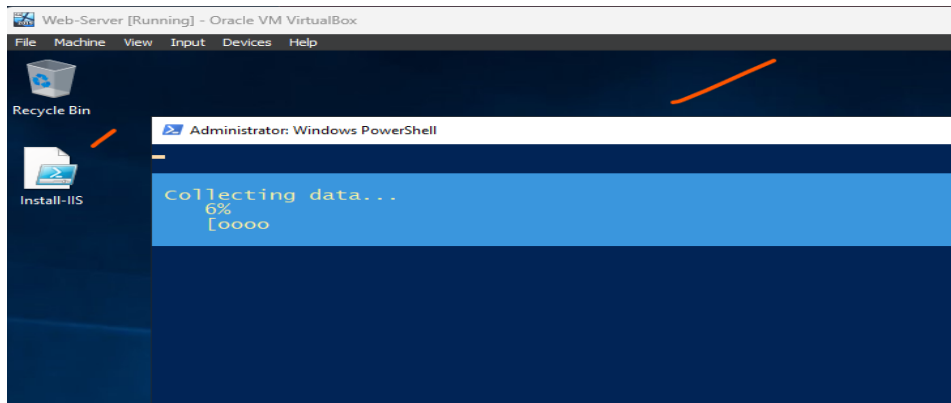
- First of all, I opened **Windows PowerShell ISE** in **Web-Server** and wrote a script:

Install-WindowsFeature -Name Web-Server

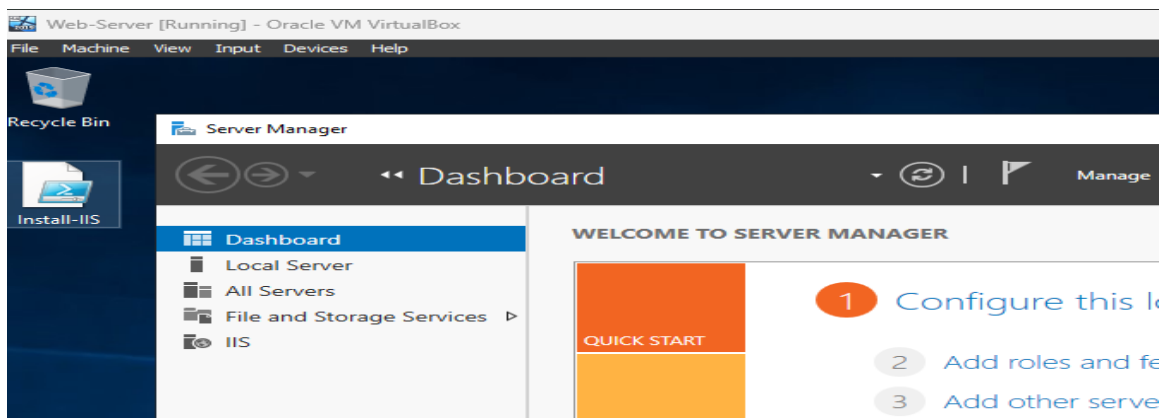
Install-WindowsFeature -Name Web-Mgmt-Tools



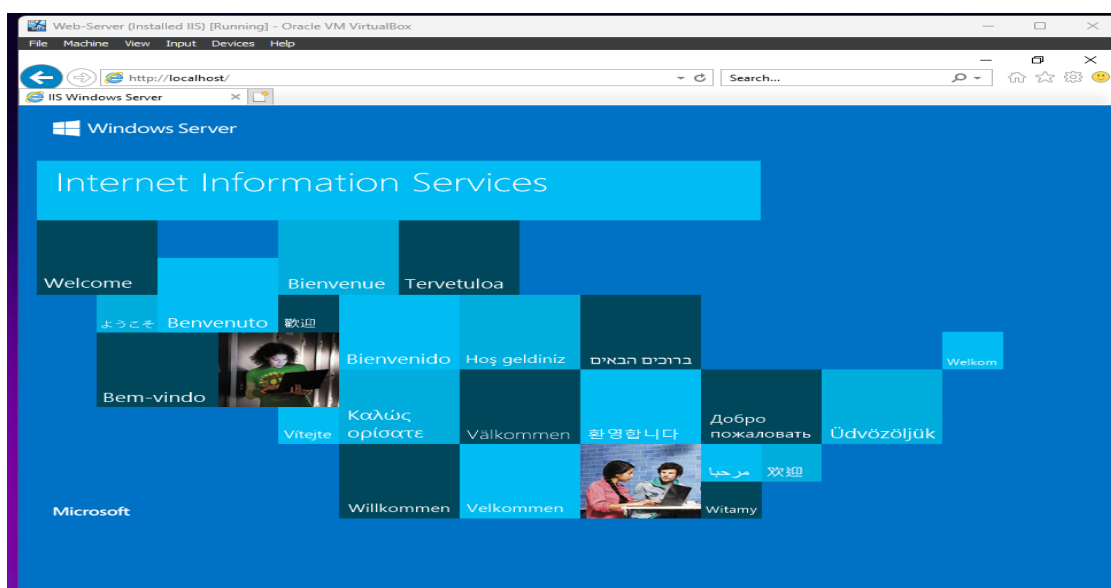
- **Saved this script** on **Desktop** with the name **Install-IIS**.
- It can be seen in the screen cast below that **IIS** is **installing** by **running** with **PowerShell**.



- **IIS** showed in **Server manager**.

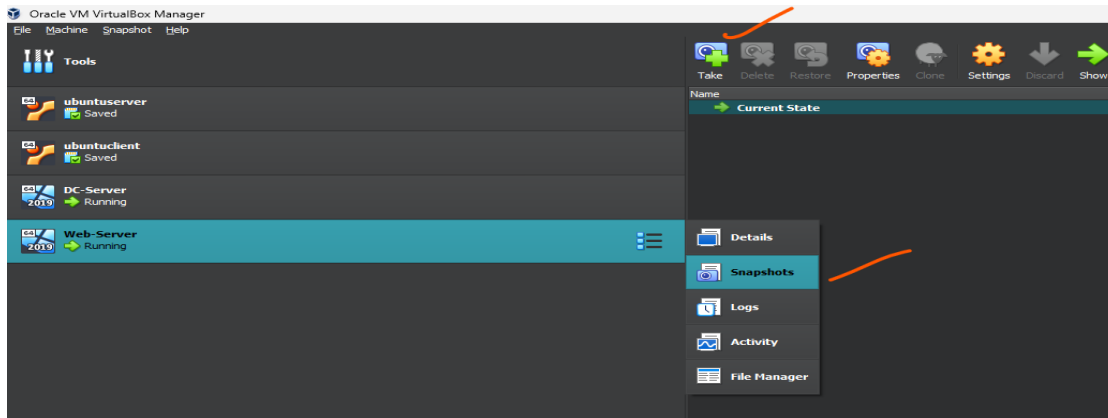


- **IIS** page **Web-Server** virtual machine by using **Internet Explorer**.

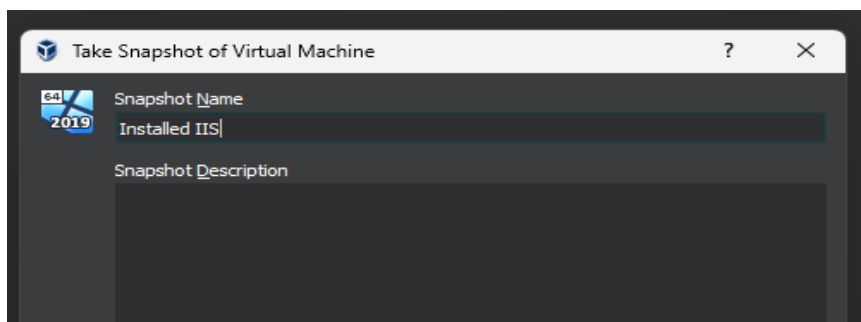


Use of V-Box Snapshot

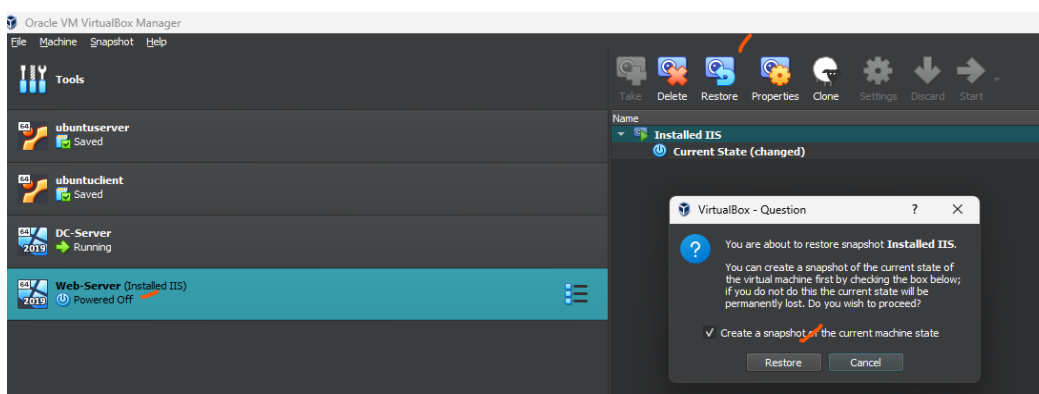
- Click on **three lines** which are **left** on the **Web-Server** in Oracle V-Box.
- Select **Snapshot** and click on **Take**.



- I took a **snapshot** of **current state** of **Web-Server** with the **name** of **Installed IIS**.
- **Take Snapshot** save the **current state** of **Virtual Box** while machine is **run-**
ning.



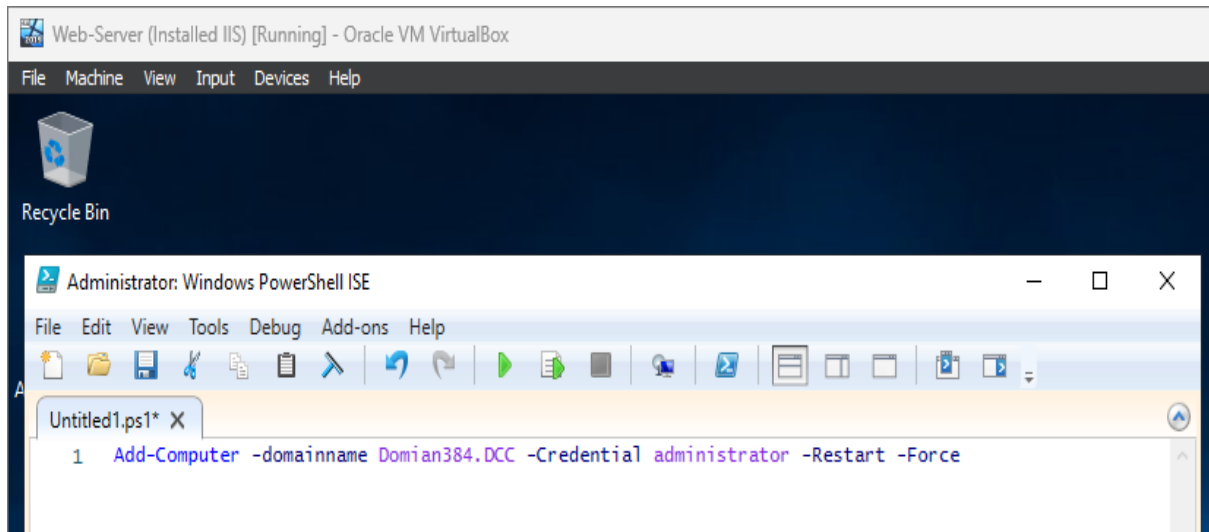
- It can be seen in the shot below that the **snapshot** has **taken** of **Web-Server**.
- Right click on **current state** and click on **restore**.
- When the **machine** is **restored** to the **exact state** in which **machine** is **run-**
ning and the **current state** will **lose**.



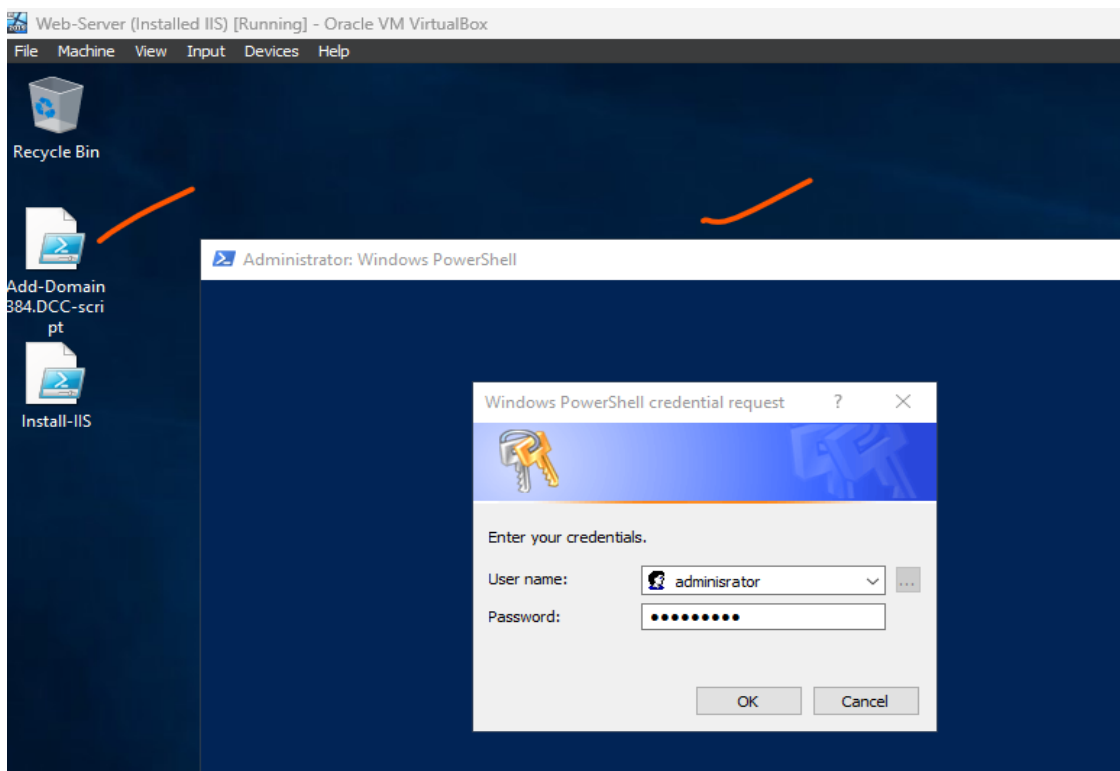
10c. Add Web-Server to Domian384.DCC using PowerShell script

- I opened **Windows PowerShell ISE** in **Web-Server** and wrote a script:

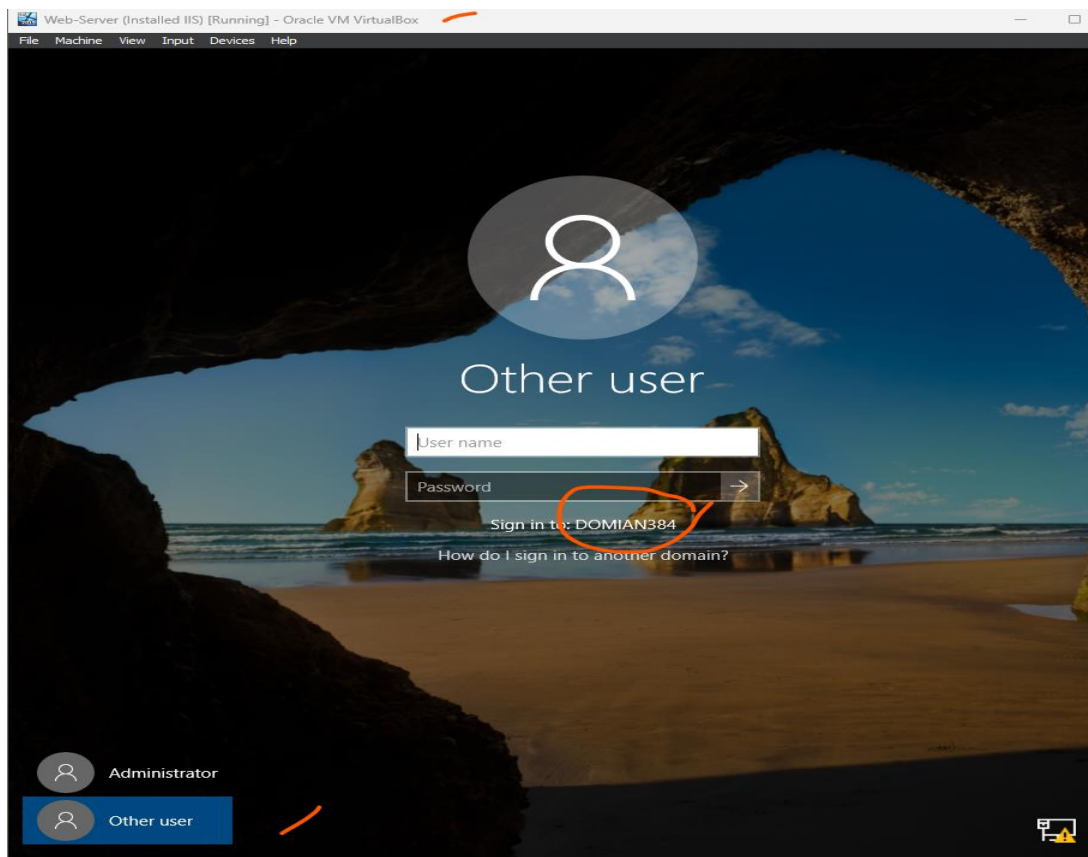
Add-Computer -domainname Domian384.DCC -Credential administrator -Restart -Force



- I saved this script on **Desktop** with the name **Add-Domain384.DCC-script**.
- Screenshot below showed that **Domain controller** asked password for is **installing** by running with **PowerShell**.



- Login screen of Web-Server showed as sign in **Domian384.DCC**.



PART 7: RESEARCH AND CHALLENGE ACTIVITIES

Q11. Samba File Server

- After **updating** by using command **sudo apt update**, I used command **sudo apt install samba -y** for installing the samba as shown below:

```

ubuntuuser [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$ sudo apt update -y
[sudo] password for mhaider:
Hit:1 http://ie.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://ie.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:3 http://ie.archive.ubuntu.com/ubuntu jammy-backports InRelease [108 kB]
Get:4 http://ie.archive.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Fetched 337 kB in 1s (422 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
47 packages can be upgraded. Run 'apt list --upgradable' to see them.
mhaider@ubuntuuser:~$ sudo apt install samba -y

```

- **sudo mkdir /share** used for creating the **share directory**.
- **sudo chmod 777 /share** for setting this directory to **777** and **sudo nano /etc/samba/smb.conf** for the **configuration of samba share file**.

```

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

Server role: ROLE_STANDALONE

Done
Setting up samba (2:4.15.13+dfsg-0ubuntu1.1) ...
Adding group `sambashare' (GID 121) ...
Done.
Samba is not being run as an AD Domain Controller: Masking samba-ad-dc.service
Please ignore the following error about deb-systemd-helper not finding those
(samba-ad-dc.service masked)
Created symlink /etc/systemd/system/multi-user.target.wants/nmbd.service → /usr/bin/deb-systemd-helper: error: systemctl preset failed on samba-ad-dc.service.
Failed to preset unit: Unit file /etc/systemd/system/samba-ad-dc.service is missing directory
Created symlink /etc/systemd/system/multi-user.target.wants/smbd.service → /usr/bin/deb-systemd-helper: error: systemctl preset failed on samba-ad-dc.service.
samba-ad-dc.service is a disabled or a static unit, not starting it.
Processing triggers for ufw (0.36.1-4build1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.1) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$ sudo mkdir /share
mhaider@ubuntuserver:~$ sudo chmod 777 /share
mhaider@ubuntuserver:~$ sudo nano /etc/samba/smb.conf_

```

- I configured **new share directory** with the **name of [my-samba-share]** and **started the services of samba and NetBIOS** by using commands **sudo systemctl start smbd** for **samba** and **sudo systemctl start nmbd** for **NetBIOS**.
- Then, I used **sudo systemctl start smbd** for **enabling them**.

```

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

printable = yes
guest ok = no
read only = yes
create mask = 0700

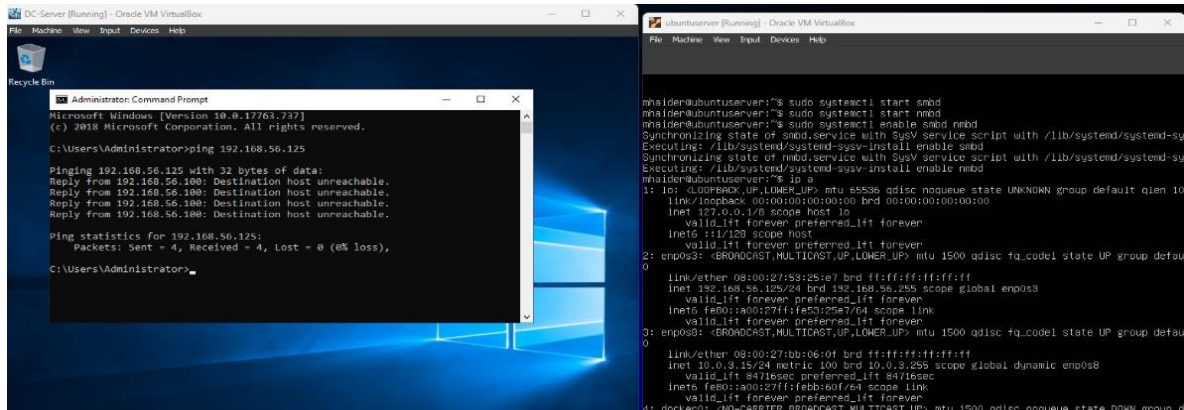
# Windows clients look for this share name as a source of downloadable
# printer drivers
[printers]
    comment = Printer Drivers
    path = /var/lib/samba/printers
    browseable = yes
    read only = yes
    guest ok = no
# Uncomment to allow remote administration of Windows print drivers.
# You may need to replace 'lpadmin' with the name of the group your
# admin users are members of.
# Please note that you also need to set appropriate Unix permissions
# to the drivers directory for these users to have write rights in it
; write list = root, @lpadmin

[my-samba-share]
    path = /share
    public = yes
    browseable = yes
    writable = yes
    comment = "My samba share"

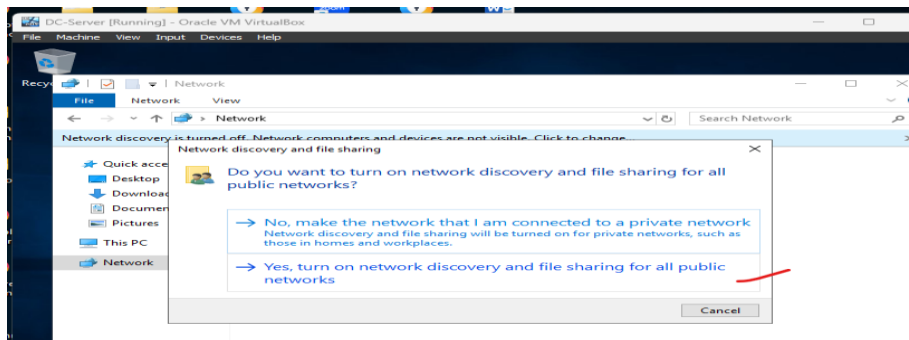
mhaider@ubuntuserver:~$ sudo systemctl start smbd
mhaider@ubuntuserver:~$ sudo systemctl start nmbd
mhaider@ubuntuserver:~$ sudo systemctl enable smbd nmbd
Synchronizing state of smbd.service with SysV service script with /lib/systemd/systemd-sy
Executing: /lib/systemd/systemd-sysv-install enable smbd
Synchronizing state of nmbd.service with SysV service script with /lib/systemd/systemd-sy
Executing: /lib/systemd/systemd-sysv-install enable nmbd
mhaider@ubuntuserver:~$

```

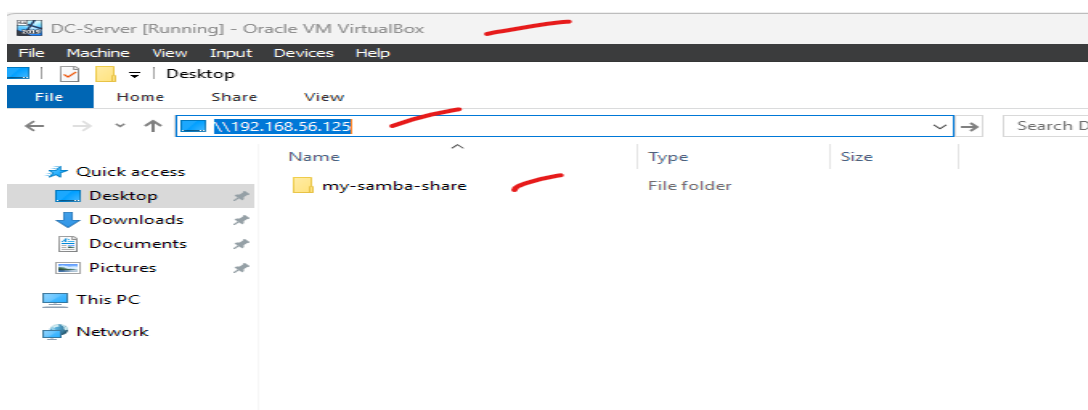

- After that I went to DC-Server which I used as Client window for this task.
- First of all, I checked that ping is successful between ubuntu host and window client because it must ping each other for sharing the file.
- I used command prompt of DC-Server with the command ping 192.168.56.125 for pingging the ubuntu host.



- I turned on network discovery in DC-Server for all public networks.



- After that I searched the samba file through file explore with the Ip address of host machine such as \\192.168.56.125 in DC-Server.
- It showed the file my-samba-share as shown below:



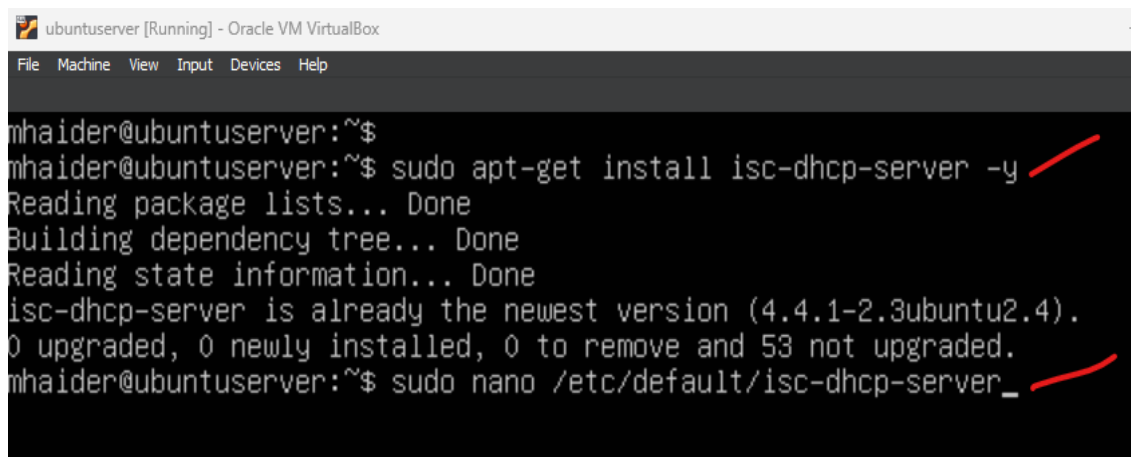
Reference:

(Old Experience of assignment 2 of semester 2, Subject: Operating System)

linuxize.com. (2019). *How to Install and Configure Samba on Ubuntu 18.04*. [online] Available at: <https://linuxize.com/post/how-to-install-and-configure-samba-on-ubuntu-18-04/#connecting-to-a-samba-share-from-linux>.

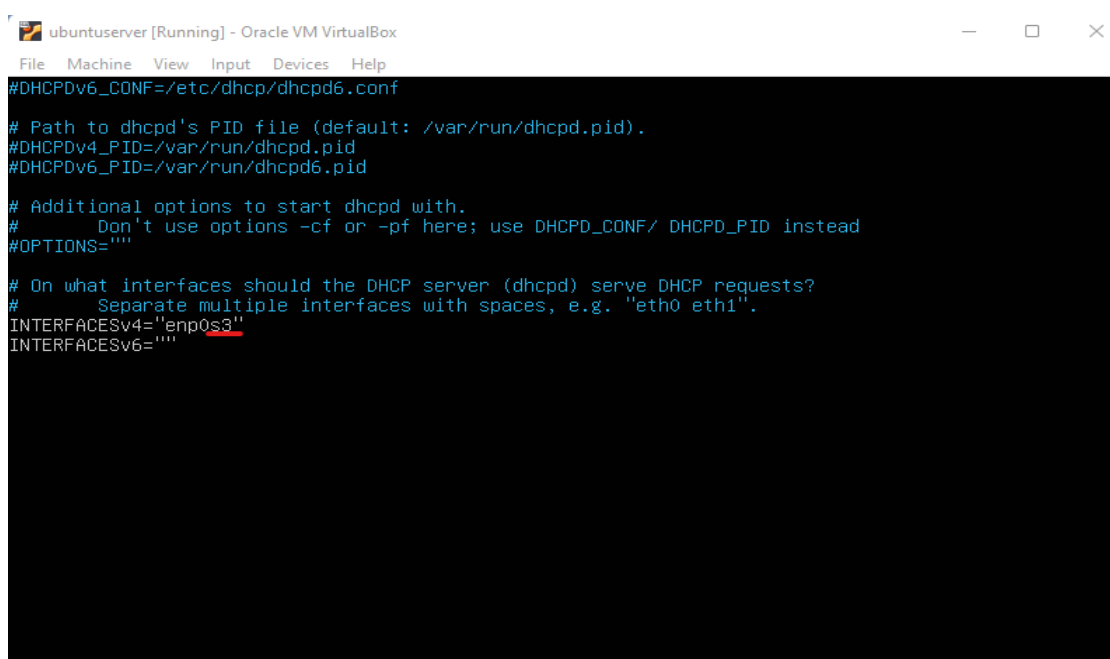
Q12. Setup DHCP server

- **sudo apt-get install isc-dhcp-server** command used for **installing** the **DHCP** in **ubuntuserver**.
- Then, I gave command **sudo nano /etc/default/isc-dhcp-server** for the **con-figuration**.



```
ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$ sudo apt-get install isc-dhcp-server -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
isc-dhcp-server is already the newest version (4.4.1-2.3ubuntu2.4).
0 upgraded, 0 newly installed, 0 to remove and 53 not upgraded.
mhaider@ubuntuserver:~$ sudo nano /etc/default/isc-dhcp-server_
```

- Then, I have set the **adapter** name **enp0s3** as **interfacesv4**.



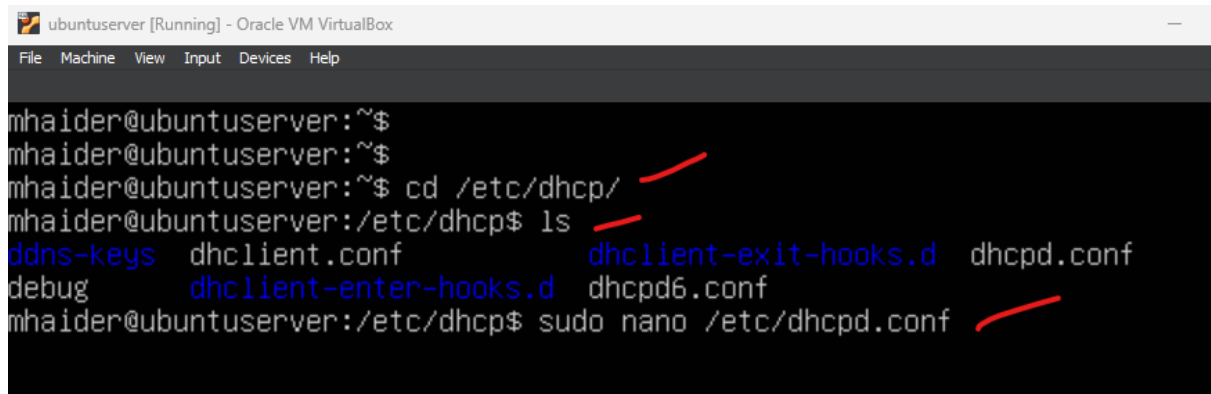
```
ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
#DHCPDv6_CONF=/etc/dhcp/dhcpd6.conf

# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPDv4_PID=/var/run/dhcpd.pid
#DHCPDv6_PID=/var/run/dhcpd6.pid

# Additional options to start dhcpd with.
# Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
# Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4="enp0s3"
INTERFACESv6=""
```

- After that I used commands **Cd /etc/dhcp** and **sudo nano /etc/dhcp/dhcpd.conf** for **configuring** the main **dhcp** file.

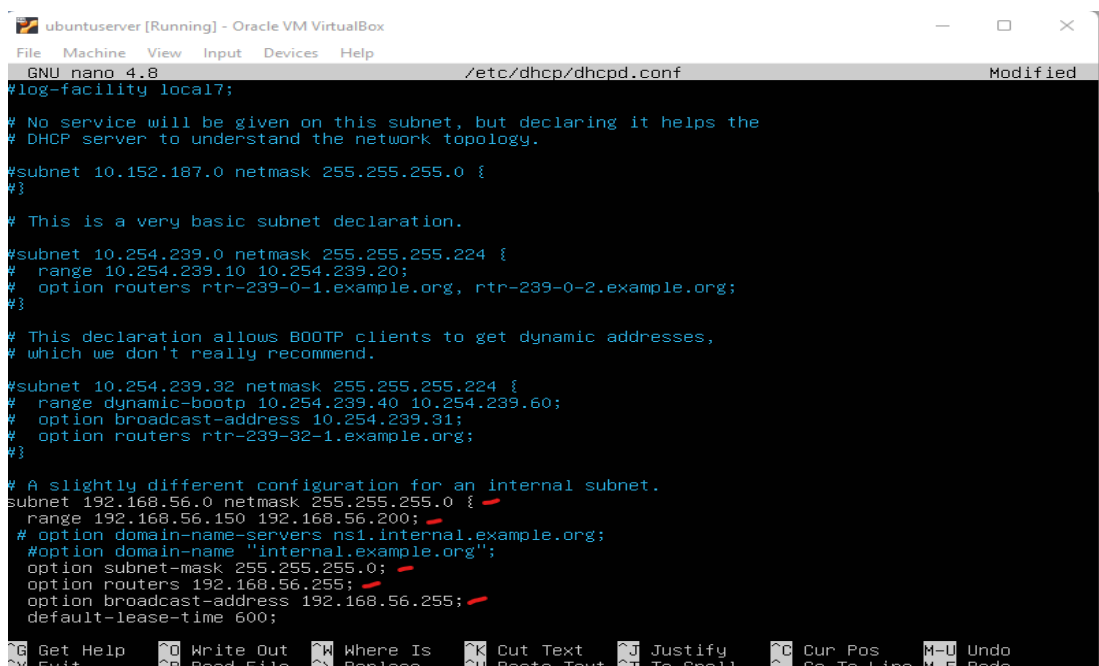


```

mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$ cd /etc/dhcp/
mhaider@ubuntuserver:/etc/dhcp$ ls
ddns-keys  dhcpclient.conf  dhcpclient-exit-hooks.d  dhcpd.conf
debug      dhcpclient-enter-hooks.d  dhcpd6.conf
mhaider@ubuntuserver:/etc/dhcp$ sudo nano /etc/dhcpd.conf

```

- In **configuration**, I **uncommented** the using options
- I gave **subnet 192.168.56.0** and **netmask 255.255.255.0**
- I set **range** from **192.168.56.150** to **192.168.56.200**



```

GNU nano 4.8 /etc/dhcp/dhcpd.conf Modified
#log-facility local7;

# No service will be given on this subnet, but declaring it helps the
# DHCP server to understand the network topology.

#subnet 10.152.187.0 netmask 255.255.255.0 {
#}

# This is a very basic subnet declaration.

#subnet 10.254.239.0 netmask 255.255.255.224 {
# range 10.254.239.10 10.254.239.20;
# option routers rtr-239-0-1.example.org, rtr-239-0-2.example.org;
#}

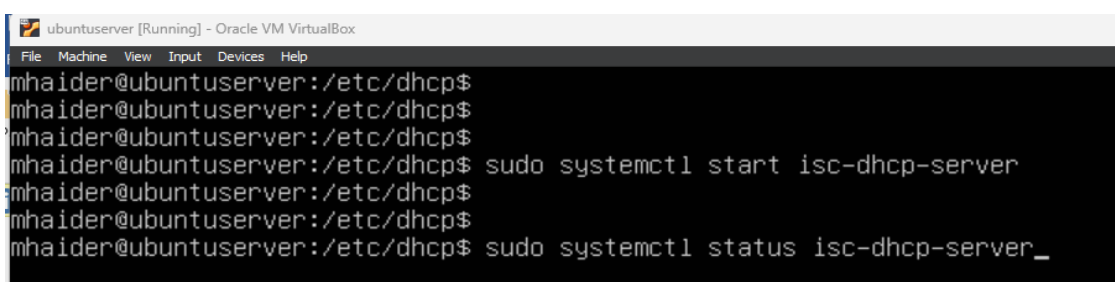
# This declaration allows BOOTP clients to get dynamic addresses,
# which we don't really recommend.

#subnet 10.254.239.32 netmask 255.255.255.224 {
# range dynamic-bootp 10.254.239.40 10.254.239.60;
# option broadcast-address 10.254.239.31;
# option routers rtr-239-32-1.example.org;
#}

# A slightly different configuration for an internal subnet.
subnet 192.168.56.0 netmask 255.255.255.0 {
range 192.168.56.150 192.168.56.200;
# option domain-name-servers ns1.internal.example.org;
#option domain-name "internal.example.org";
option subnet-mask 255.255.255.0;
option routers 192.168.56.255;
option broadcast-address 192.168.56.255;
default-lease-time 600;
}

```

- I started dhcp by using commands **sudo systemctl start isc-dhcp-server**.



```

mhaider@ubuntuserver:/etc/dhcp$
mhaider@ubuntuserver:/etc/dhcp$
mhaider@ubuntuserver:/etc/dhcp$ sudo systemctl start isc-dhcp-server
mhaider@ubuntuserver:/etc/dhcp$
mhaider@ubuntuserver:/etc/dhcp$ sudo systemctl status isc-dhcp-server_

```

- I checked status by using commands **sudo systemctl status isc-dhcp-server** and it showed **active**.

```

• isc-dhcp-server.service - ISC DHCP IPv4 server
  Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
  Active: active (running) since Mon 2022-05-09 05:04:06 UTC; 23s ago
    Docs: man:dhcpcd(8)
  Main PID: 6975 (dhcpcd)
    Tasks: 4 (limit: 1066)
  Memory: 4.5M
  CGroup: /system.slice/isc-dhcp-server.service
          └─6975 dhcpcd -user dhcpcd -group dhcpcd -f -4 -pf /run/dhcp-server/dhcpcd.pid -cf /etc/dh

May 09 05:04:06 web-server-384 sh[6975]: PID file: /run/dhcp-server/dhcpcd.pid
May 09 05:04:06 web-server-384 dhcpcd[6975]: Wrote 0 leases to leases file.
May 09 05:04:06 web-server-384 sh[6975]: Wrote 0 leases to leases file.
May 09 05:04:06 web-server-384 dhcpcd[6975]: Listening on LPF/enp0s3/08:00:27:f4:a7:86/192.168.56.0/24
May 09 05:04:06 web-server-384 sh[6975]: Listening on LPF/enp0s3/08:00:27:f4:a7:86/192.168.56.0/24
May 09 05:04:06 web-server-384 sh[6975]: Sending on LPF/enp0s3/08:00:27:f4:a7:86/192.168.56.0/24
May 09 05:04:06 web-server-384 sh[6975]: Sending on Socket/fallback/fallback-net
May 09 05:04:06 web-server-384 dhcpcd[6975]: Sending on LPF/enp0s3/08:00:27:f4:a7:86/192.168.56.0/24
May 09 05:04:06 web-server-384 dhcpcd[6975]: Sending on Socket/fallback/fallback-net
May 09 05:04:06 web-server-384 dhcpcd[6975]: Server starting service.
lines 1-20/20 (END)

```

- I used command **sudo ufw allow in on enp0s3 from any port 68 to any port 67 and the protocol udp** for trying to allow enp0s3 through firewall.

```

mhaider@ubuntu:~$ sudo ufw allow in on enp0s3 from any port 68 to any port 67 and the
mhaider@ubuntu:~$ protocol udp
ERROR: Invalid syntax
Usage: ufw COMMAND

Commands:
enable                enables the firewall
disable              disables the firewall
default ARG           set default policy
logging LEVEL         set logging to LEVEL
allow ARGS            add allow rule
deny ARGS            add deny rule
reject ARGS          add reject rule
limit ARGS           add limit rule
delete RULE|NUM       delete RULE
insert NUM RULE       insert RULE at NUM
prepend RULE         prepend RULE
route RULE           add route RULE
route delete RULE|NUM delete route RULE
route insert NUM RULE insert route RULE at NUM
reload              reload firewall
reset              reset firewall
status             show firewall status
status numbered     show firewall status as numbered list of RULES
status verbose      show verbose firewall status
show ARG           show firewall report
version            display version information

Application profile commands:
app list           list application profiles
app info PROFILE   show information on PROFILE
app update PROFILE update PROFILE
app default ARG    set default application policy

mhaider@ubuntu:~$

```

- In **ubuntucient**, I used command **sudo nano /etc/network/interfaces** for configuration.

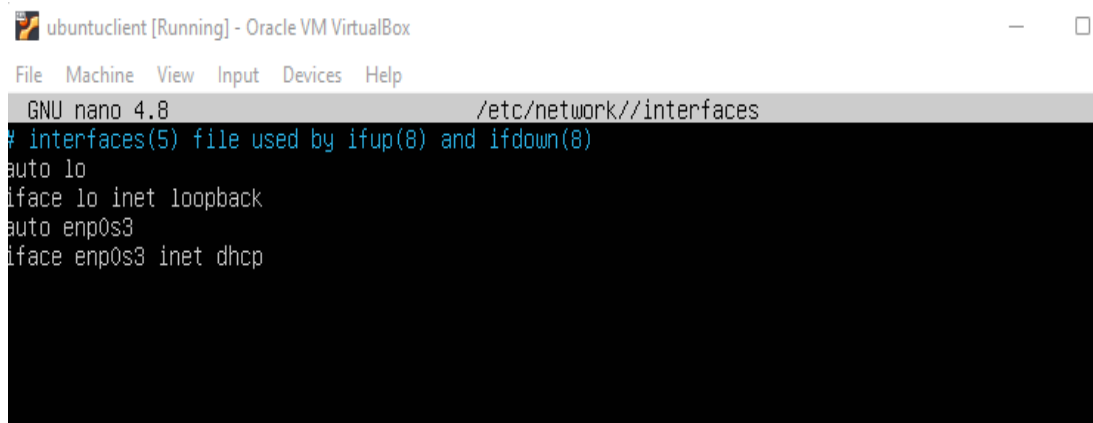
```

ubuntucient [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

mhaider@ubuntucient:~$
mhaider@ubuntucient:~$
mhaider@ubuntucient:~$ sudo nano /etc/network/interfaces
[sudo] password for mhaider: _

```

- I configured **enp0s3** in **ubuntucient** as shown below:

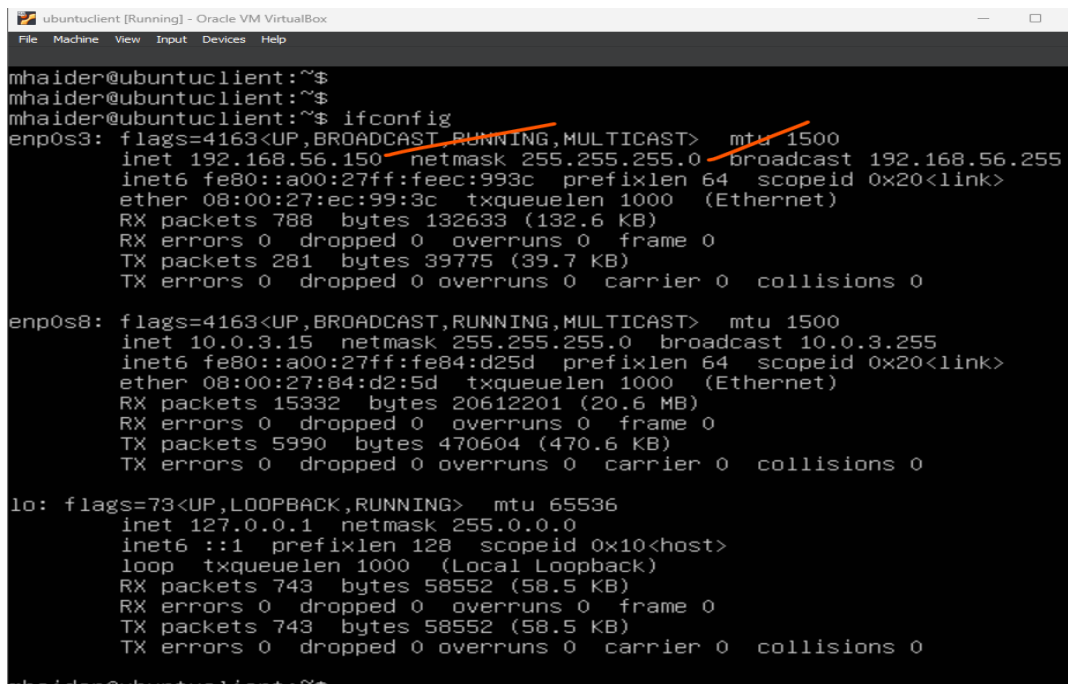


```

GNU nano 4.8 /etc/network/interfaces
# interfaces(5) file used by ifup(8) and ifdown(8)
auto lo
iface lo inet loopback
auto enp0s3
iface enp0s3 inet dhcp

```

- Finally, **ubuntucient** received **first Ip address 192.168.56.150** with the **net-mask 255.255.255.0** as shown below:



```

mhaider@ubuntucient:~$
mhaider@ubuntucient:~$
mhaider@ubuntucient:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.150 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:feec:993c prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:ec:99:3c txqueuelen 1000 (Ethernet)
    RX packets 788 bytes 132633 (132.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 281 bytes 39775 (39.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.3.15 netmask 255.255.255.0 broadcast 10.0.3.255
    inet6 fe80::a00:27ff:fe84:d25d prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:84:d2:5d txqueuelen 1000 (Ethernet)
    RX packets 15332 bytes 20612201 (20.6 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 5990 bytes 470604 (470.6 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 743 bytes 58552 (58.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 743 bytes 58552 (58.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
mhaider@ubuntucient:~$

```

Reference:

(Old Experience of assignment 2 of semester 2, Subject: Operating System)

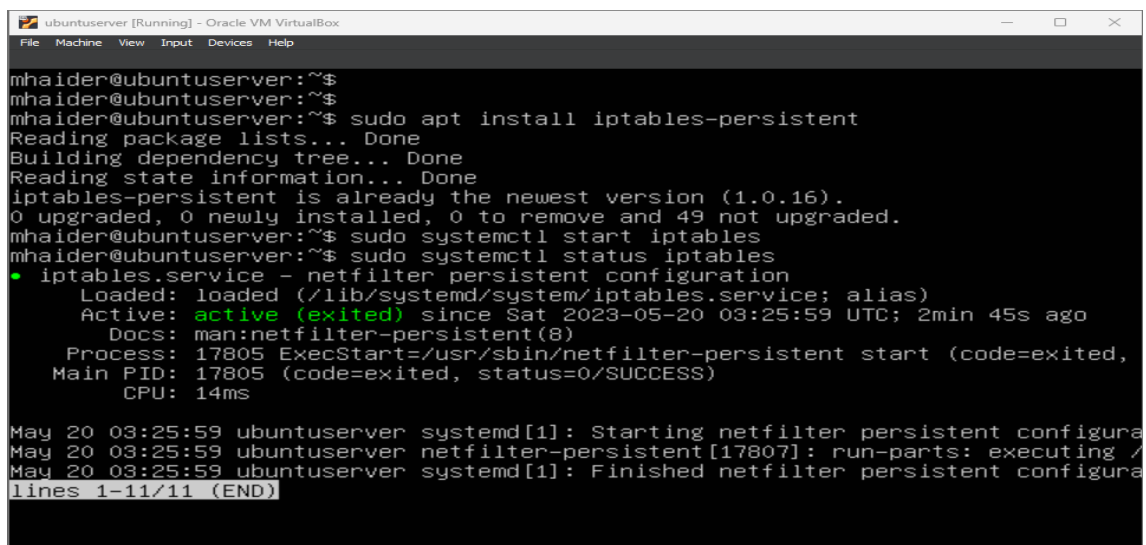
www.youtube.com. (n.d.). *How to configure DHCP Server in Ubuntu Linux 18.04 (Complete Server & client)*. [online] Available at:

<https://www.youtube.com/watch?v=j3wsYskgdAs>

[Accessed 13 May 2022].

Q13. Iptables for allow and block Http traffic

- Firstly, I installed **persistent package** of **iptables** by using command **sudo apt install iptables-persistent**.
- After that I **started** the services of **iptables** by using command **sudo systemctl start iptables**.
- Then, I checked **status** with the command **sudo apt systemctl status iptables** and it showed **active (exited)** as shown below in screen saver:

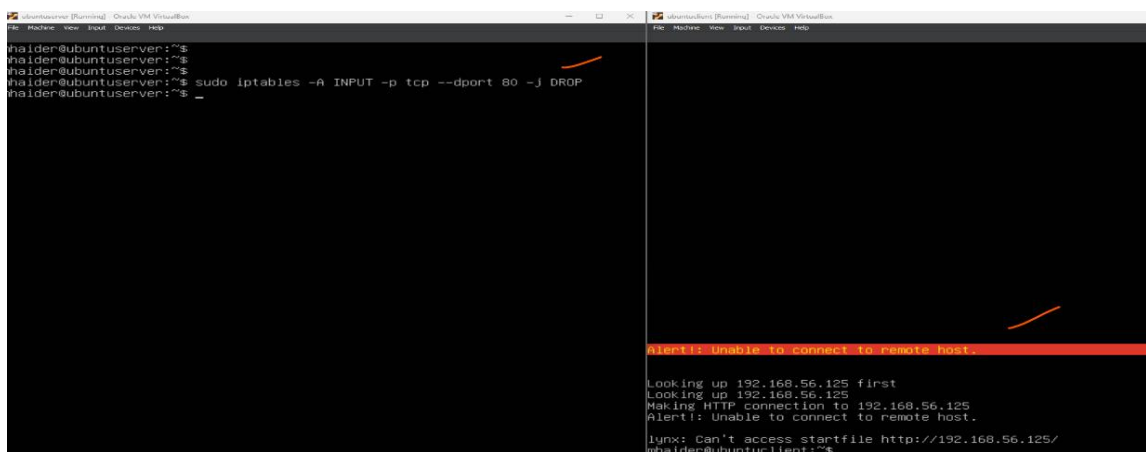


```
ubuntuuser [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help

mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$ sudo apt install iptables-persistent
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
iptables-persistent is already the newest version (1.0.16).
0 upgraded, 0 newly installed, 0 to remove and 49 not upgraded.
mhaider@ubuntuuser:~$ sudo systemctl start iptables
mhaider@ubuntuuser:~$ sudo systemctl status iptables
• iptables.service - netfilter persistent configuration
   Loaded: loaded (/lib/systemd/system/iptables.service; alias)
   Active: active (exited) since Sat 2023-05-20 03:25:59 UTC; 2min 45s ago
     Docs: man:netfilter-persistent(8)
   Process: 17805 ExecStart=/usr/sbin/netfilter-persistent start (code=exited,
   Main PID: 17805 (code=exited, status=0/SUCCESS)
      CPU: 14ms

May 20 03:25:59 ubuntuuser systemd[1]: Starting netfilter persistent configura
May 20 03:25:59 ubuntuuser netfilter-persistent[17807]: run-parts: executing /
May 20 03:25:59 ubuntuuser systemd[1]: Finished netfilter persistent configura
lines 1-11/11 (END)
```

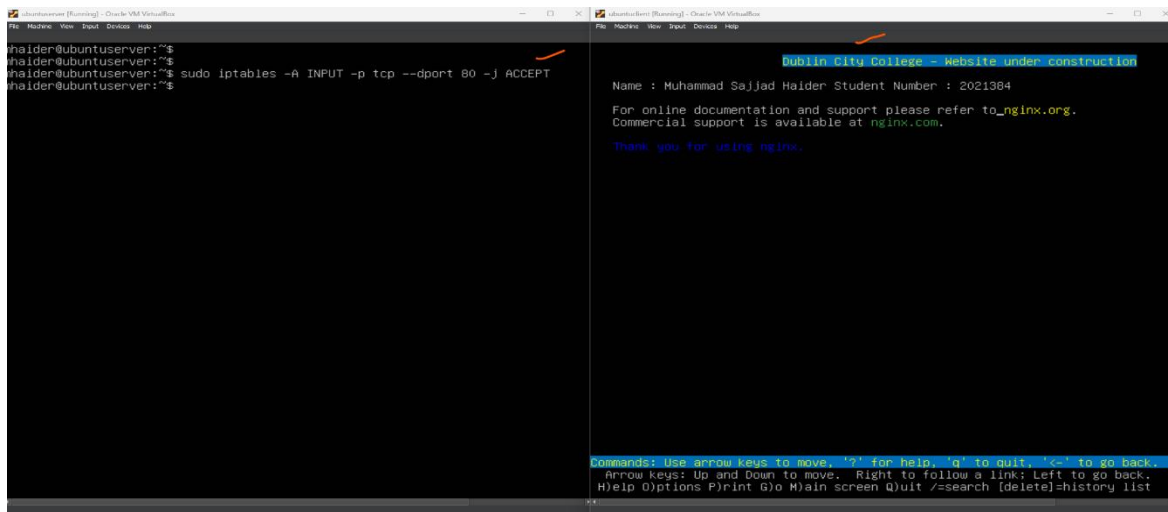
- After setting rules and services of **iptables**, I used command **sudo iptables -A INPUT -p tcp --dport 80 -j DROP** for **blocking** the **HTTP** traffic.
- And **sudo service iptables save** used for **save** the **iptables** rule.
- It can be seen that **NGINX** page **couldn't** be **accessed** from **ubuntucient** by using command **lynx 192.168.56.125**.



```
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$ sudo iptables -A INPUT -p tcp --dport 80 -j DROP
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$ sudo service iptables save

lynx: Can't access startfile http://192.168.56.125/
mhaider@ubuntucient:~$
```

- I used command **sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT** for allowing the **HTTP** traffic.
- And **sudo service iptables save** used for save the **iptables** rule.
- It can be seen that **NGINX** page can be accessed from **ubuntucient** by using command **lynx 192.168.56.125**.



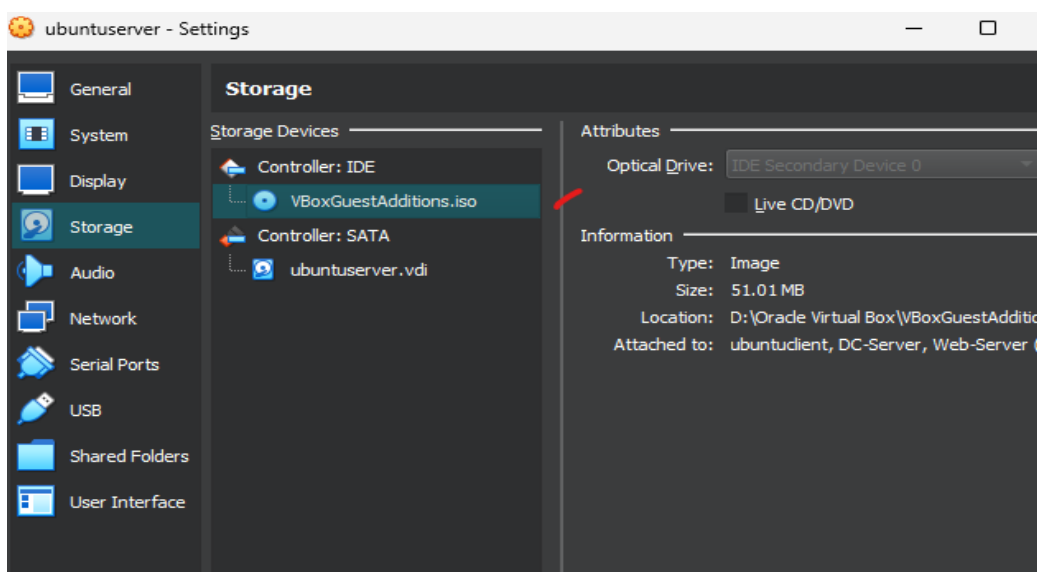
Reference

Anicas, M. (2015). *Iptables Essentials: Common Firewall Rules and Commands*.

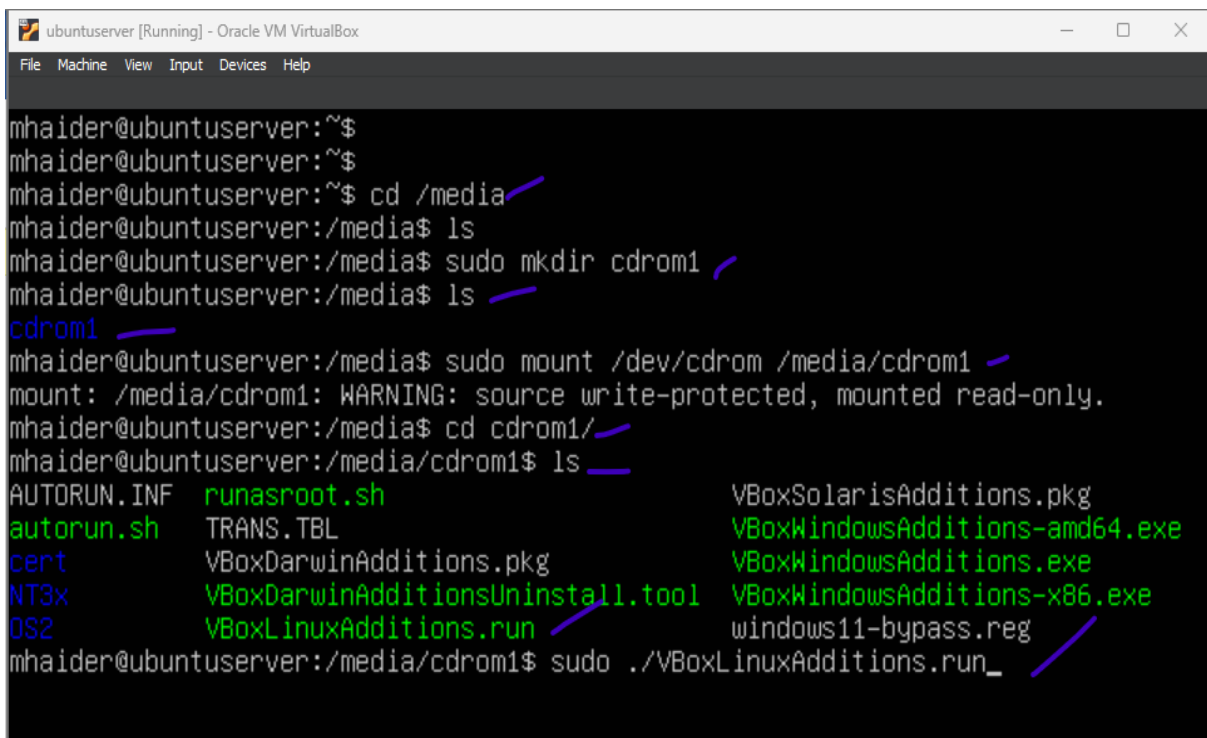
[online] Digitalocean.com. Available at: <https://www.digitalocean.com/community/tutorials/iptables-essentials-common-firewall-rules-and-commands>.

Q15. Install the V-Box Guest Additions onto the ubuntuserver

- It can be seen that **VirtualBox Guest Additions CD drive** has already attached with **ubuntuserver**.



- I used **cd /media** for creating **new directory** with command **sudo mkdir cdrom1** in **media** and **mount cd** with the command **sudo mount /dev/cdrom /media/cdrom1**.
- I used command **sudo ./VBoxLinuxAdditions.run** for **installing** the V-Box.

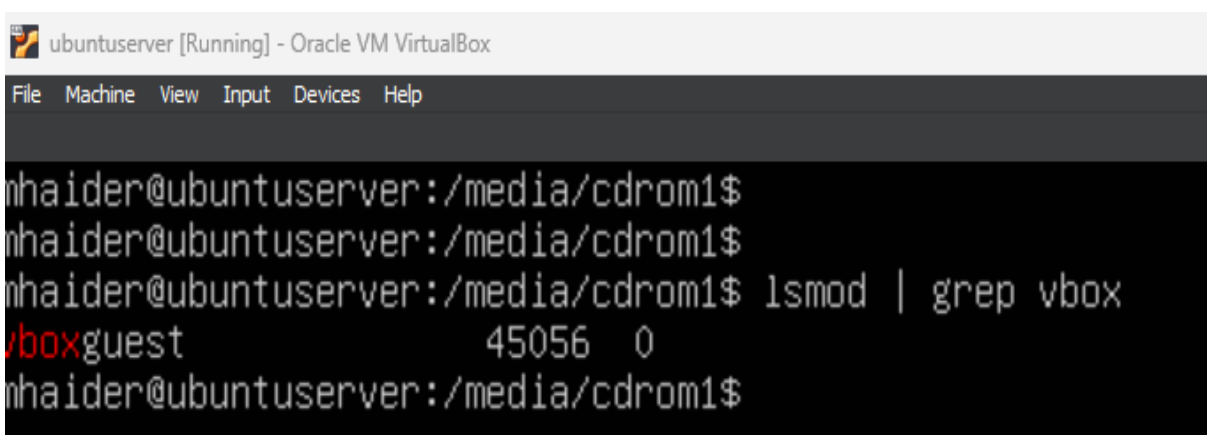


```

mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$
mhaider@ubuntuserver:~$ cd /media
mhaider@ubuntuserver:/media$ ls
mhaider@ubuntuserver:/media$ sudo mkdir cdrom1
mhaider@ubuntuserver:/media$ ls
cdrom1
mhaider@ubuntuserver:/media$ sudo mount /dev/cdrom /media/cdrom1
mount: /media/cdrom1: WARNING: source write-protected, mounted read-only.
mhaider@ubuntuserver:/media$ cd cdrom1/
mhaider@ubuntuserver:/media/cdrom1$ ls
AUTORUN.INF  runasroot.sh          VBoxSolarisAdditions.pkg
autorun.sh   TRANS.TBL             VBoxWindowsAdditions-amd64.exe
cert        VBoxDarwinAdditions.pkg  VBoxWindowsAdditions.exe
NT3x        VBoxDarwinAdditionsUninstall.tool  VBoxWindowsAdditions-x86.exe
OS2         VBoxLinuxAdditions.run  windows11-bypass.reg
mhaider@ubuntuserver:/media/cdrom1$ sudo ./VBoxLinuxAdditions.run_

```

- After that I used **sudo reboot** command for rebooting the machine and **lsmod | grep vbox** command for showing **V-Boxguest** is **successfully** installed.

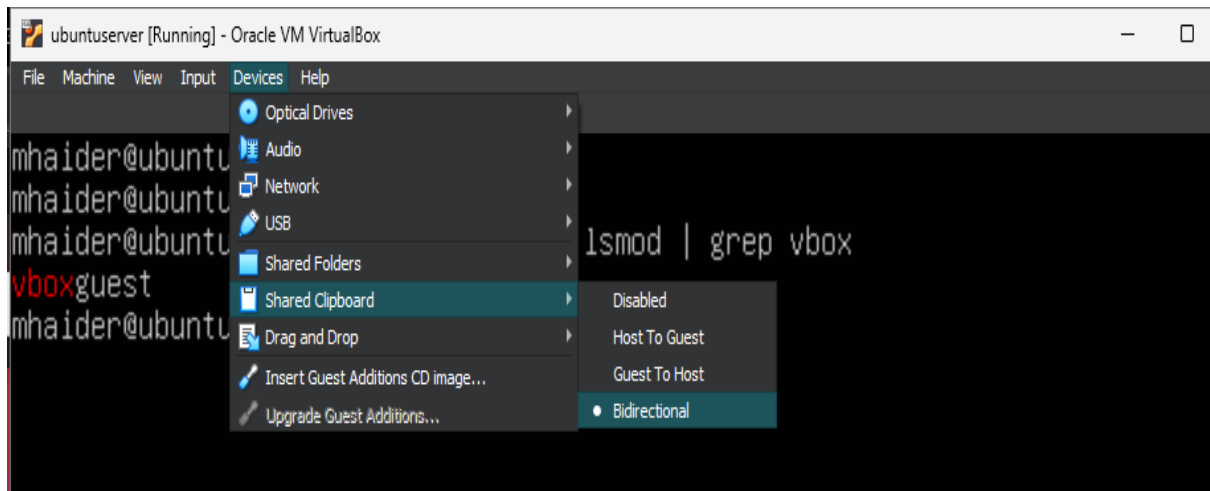


```

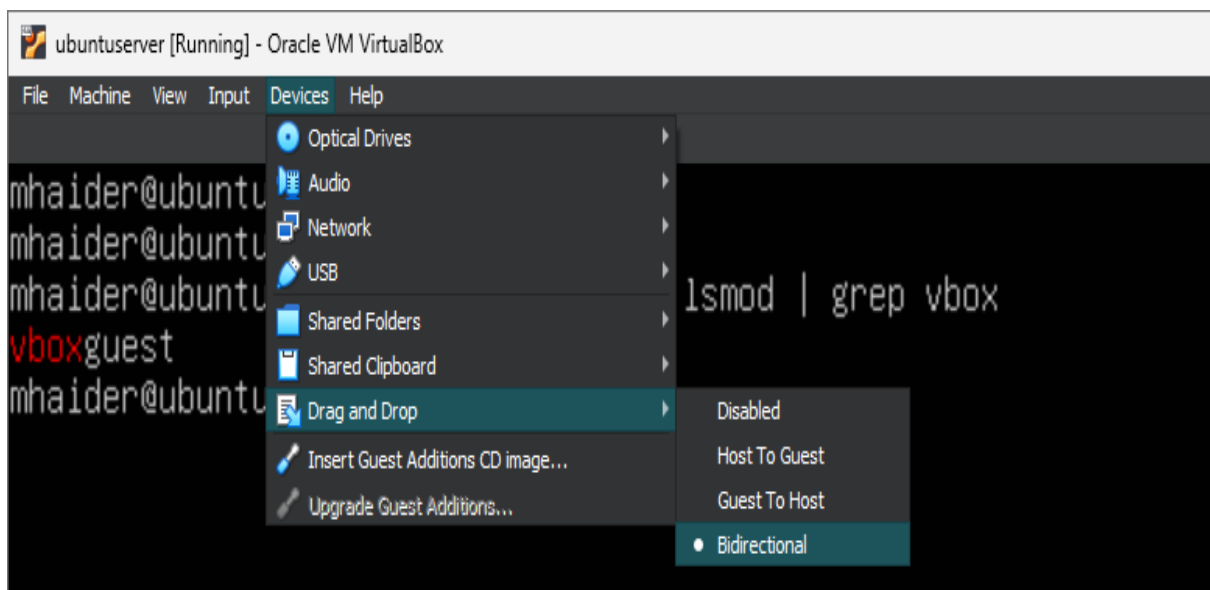
mhaider@ubuntuserver:/media/cdrom1$
mhaider@ubuntuserver:/media/cdrom1$
mhaider@ubuntuserver:/media/cdrom1$ lsmod | grep vbox
vboxguest      45056  0
mhaider@ubuntuserver:/media/cdrom1$

```

- Go to **Devices**, click **shared clipboard** and set it on **Bidirectional**.



- Go to **Devices**, click **Drag and Drop** and set it on **Bidirectional**.



Reference:

(Old Experience of assignment 2 of semester 2, Subject: Operating System)

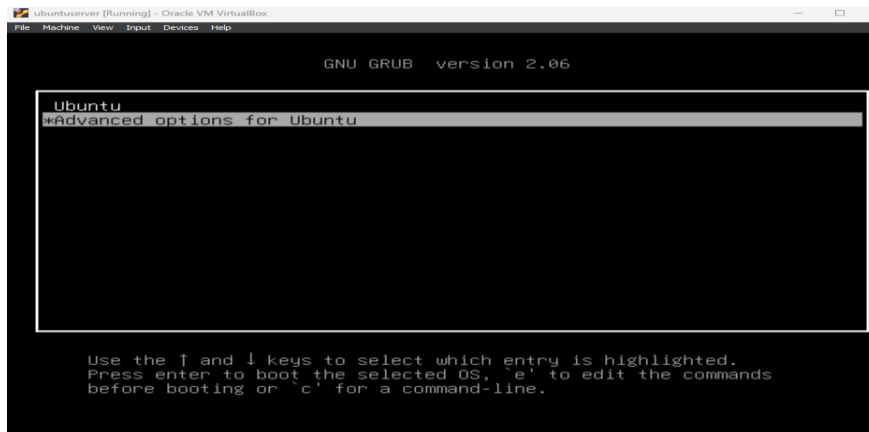
Website title: Youtube.com

URL: <https://www.youtube.com/watch?v=WiYNrx1Grak>

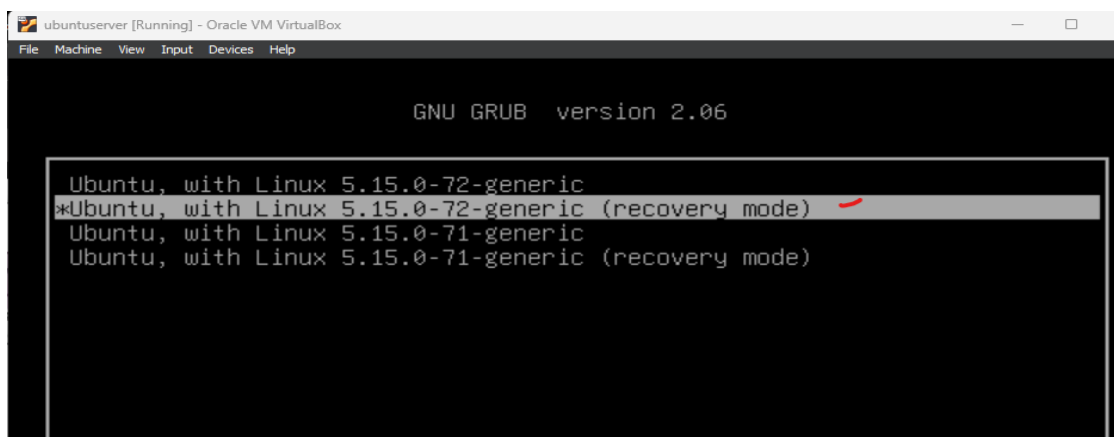
Q17. Reset Password

Linux

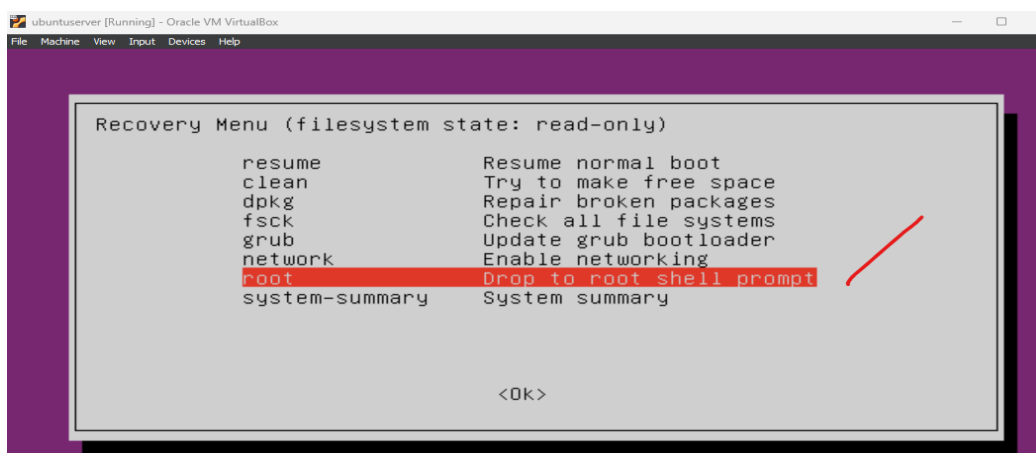
- I started **ubuntuserver** for **resetting** the **password** and **press** and **hold Shift** key until the **GNU GRUB** appeared.
- **Selected** second option **Advanced options for ubuntu**.



- Then, select **ubuntu 5.15.0-72 (recovery mode)**.



- Now, in **Recovery** menu, select **seventh option root**.



- Press Enter first and then I tried to use command such as **mount -o rw, remount /** for remounting.
- Then, I used command **ls / home** and it showed me the **username** of **ubuntuserver**.
- After that, I used command **passwd mhaider** for setting **new password** in **ubuntuserver**.
- I gave new password **haider12!** and it can be seen that **password has reset successfully** in the screen shot below:

```

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
grub update grub boot loader
network Enable networking
root Drop to root shell prompt
system-summary System summary

<Ok>

Press Enter for maintenance
(or press Control-D to continue):
root@ubuntuserver:~# mount -o rw, remount /
mount: /: special device remount does not exist.
root@ubuntuserver:~# ls /home
mhaider
root@ubuntuserver:~# passwd mhaider
New password:
Retype new password:
passwd: password updated successfully
root@ubuntuserver:~# _

```

- Login with new password.

```

ubuntuserver [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
swap usage: 0% IPv4 address for enp0s8: 10.0.3.13
Processes: 104

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

* Introducing Expanded Security Maintenance for Applications.
Receive updates to over 25,000 software packages with your
Ubuntu Pro subscription. Free for personal use.

https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.
48 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Wed May 17 22:06:34 UTC 2023 on tty1
mhaider@ubuntuserver:~$ _

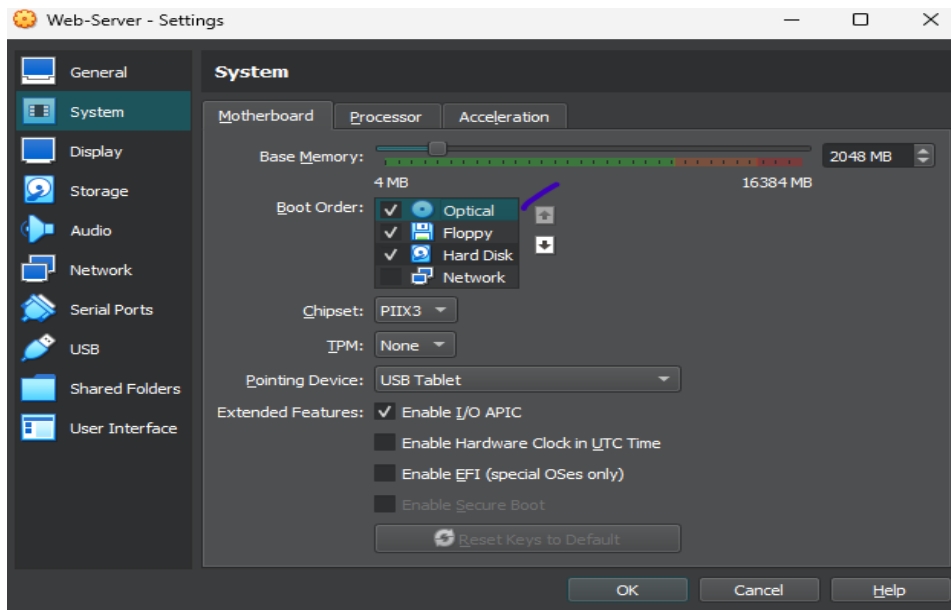
```

Reference

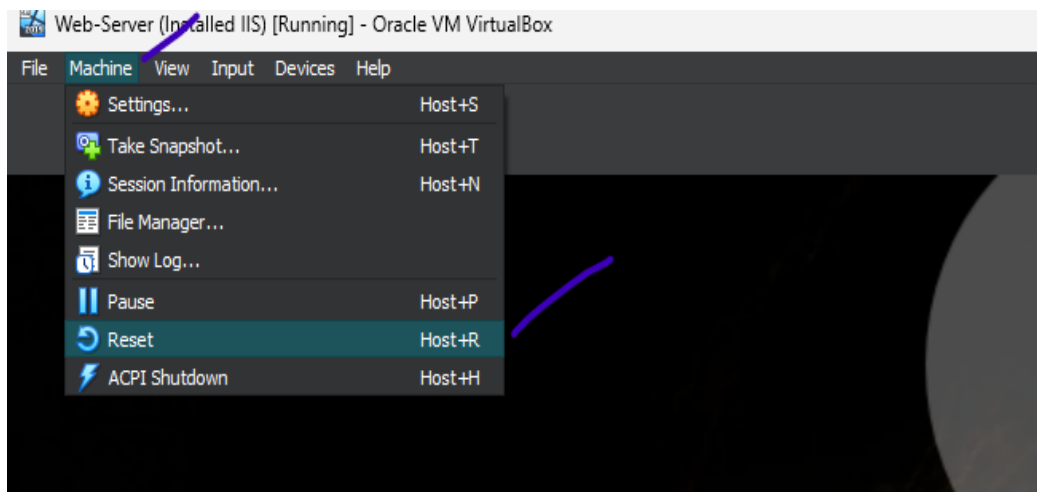
www.youtube.com. (n.d.). *How to reset ubuntu password in virtualbox || 2 min fix*. [online] Available at: <https://www.youtube.com/watch?v=b8U7UCLccUg> [Accessed 17 May 2023].

Windows

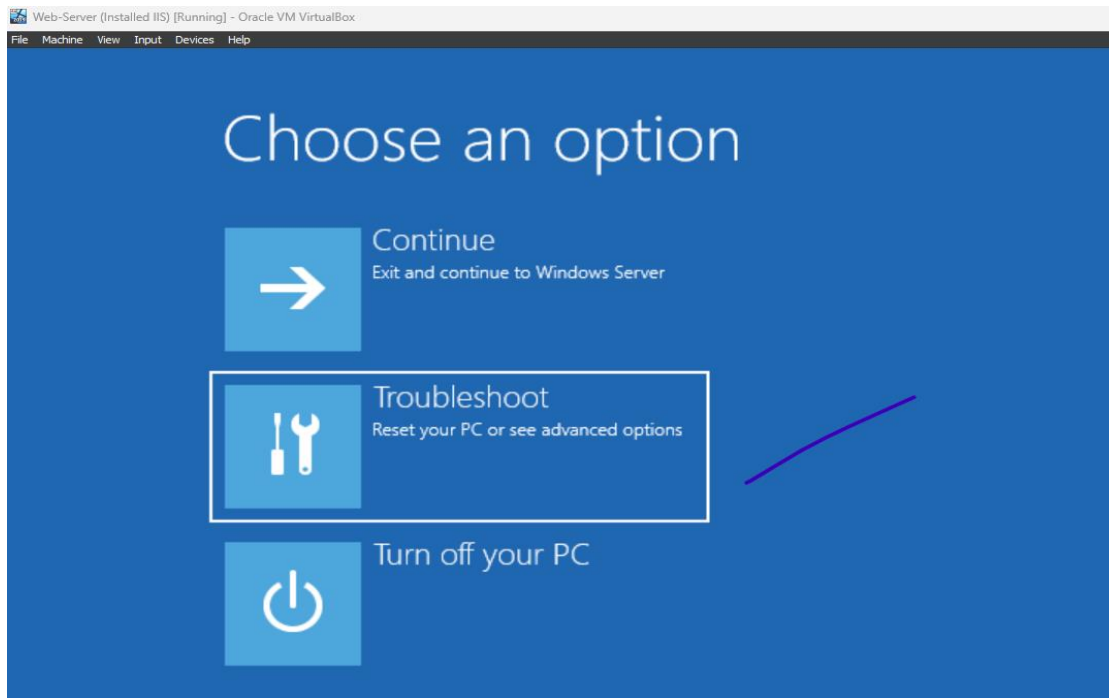
- Move **optical disc** to **first up** in **system setting** of **Web-Server**.



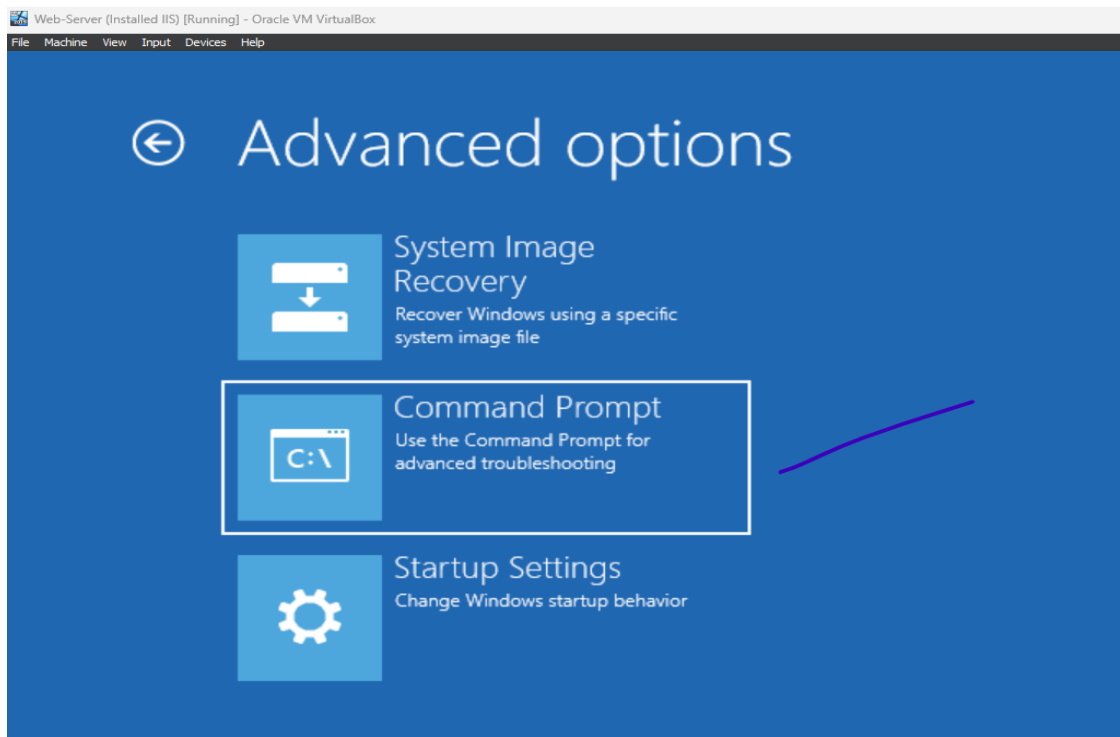
- In **Machine**, click on **Reset**.



- Press **F12** while **resetting** or **Enter key** until **Advance setting** page appeared and select **Troubleshoot**.



- Select **Command Prompt**.



- Commands **d:** and then **dir** for checking **windows availability** inside.
- Then I **gave boot commands** and which showed **operation successfully completed** and **cls** to clear page.

```

Administrator: X:\windows\system32\cmd.exe
Microsoft Windows [Version 10.0.17763.737]
(c) 2018 Microsoft Corporation. All rights reserved.

X:\windows\system32>d:
D:\>dir
Volume in drive D has no label.
Volume Serial Number is 7028-EC3D

Directory of D:\

05/17/2023  04:27 PM    <DIR>          inetpub
09/14/2018  11:19 PM    <DIR>          PerfLogs
05/13/2023  05:59 PM    <DIR>          Program Files
05/13/2023  05:47 PM    <DIR>          Program Files (x86)
05/13/2023  05:47 PM    <DIR>          Users
05/17/2023  04:27 PM    <DIR>          Windows
               0 File(s)              0 bytes
               6 Dir(s)  42,571,747,328 bytes free

D:\>bcdedit /set {bootmgr} displaybootmenu yes
The operation completed successfully.

D:\>bcdedit /set {bootmgr} timeout 15
The operation completed successfully.

D:\>cls
  
```

- I went inside in **windows\system32>** and used commands **ren utilman.exe utilman.123** and **copy cmd.exe utilman.exe** for renaming and copy.
- **dir** commands showed the **operation setup**.

```

Administrator: X:\windows\system32\cmd.exe
D:\>cd windows
D:\Windows>cd system32
D:\Windows\System32>ren utilman.exe utilman.123
D:\Windows\System32>copy cmd.exe utilman.exe
1 file(s) copied.
D:\Windows\System32>dir cmd.exe
Volume in drive D has no label.
Volume Serial Number is 7028-EC3D

Directory of D:\Windows\System32

09/06/2019  04:29 PM                278,528 cmd.exe
               1 File(s)                278,528 bytes
               0 Dir(s)  42,571,468,800 bytes free

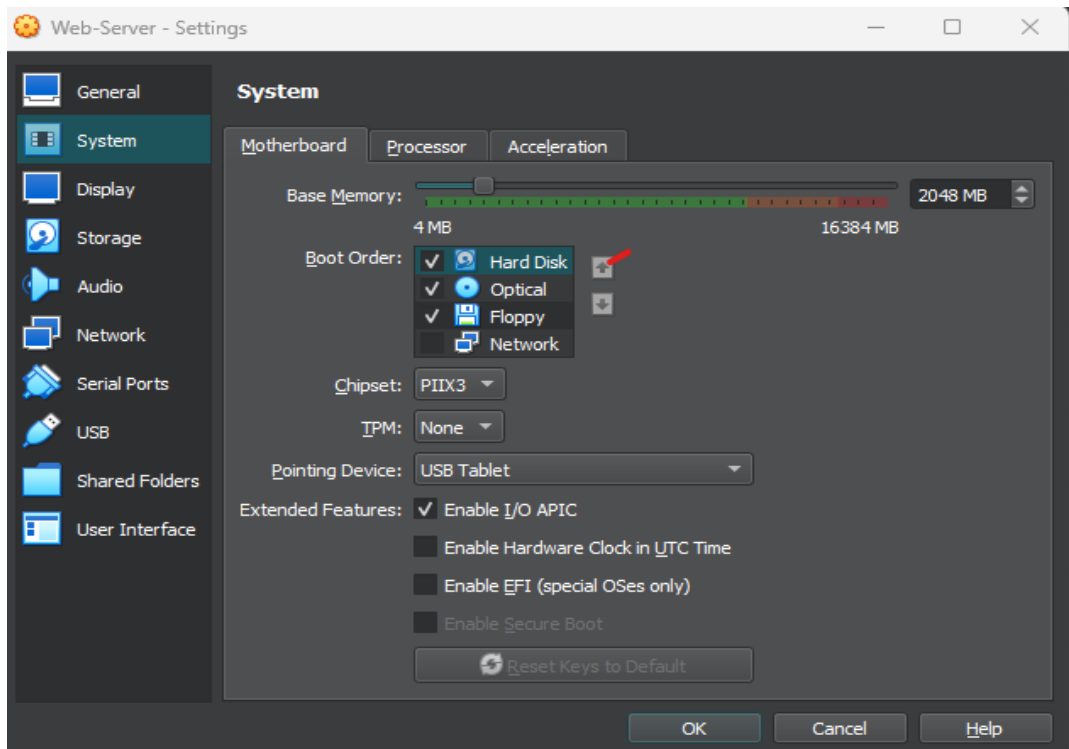
D:\Windows\System32>dir utilman.exe
Volume in drive D has no label.
Volume Serial Number is 7028-EC3D

Directory of D:\Windows\System32

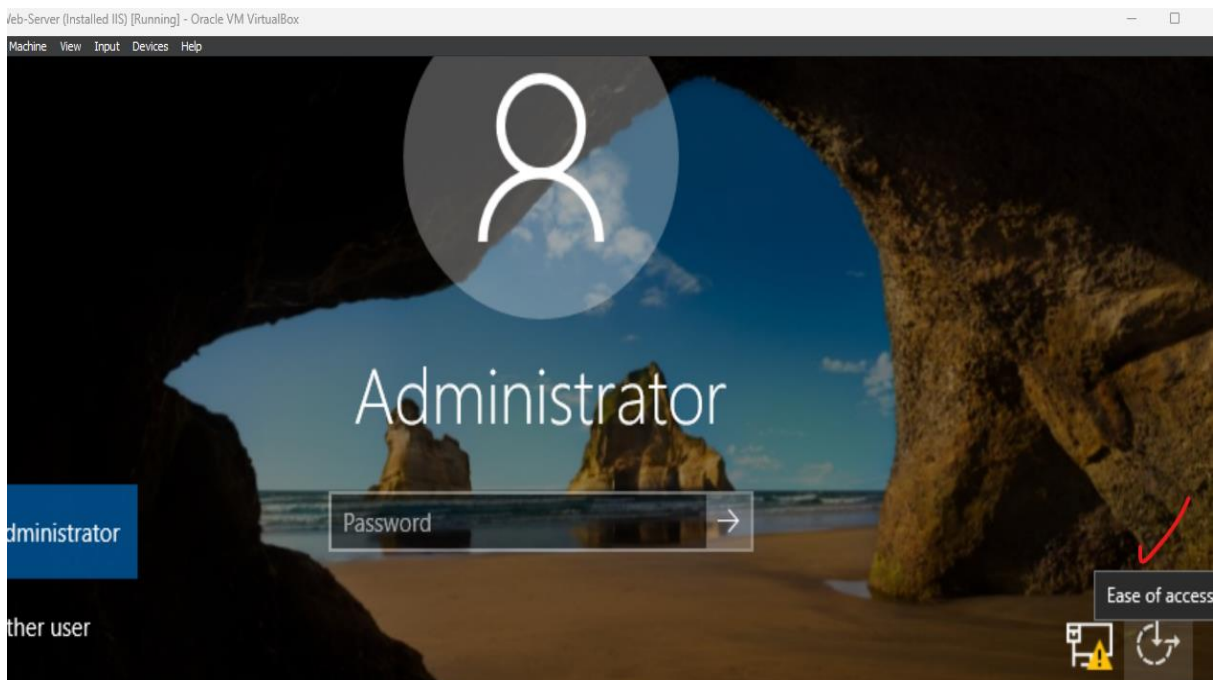
09/06/2019  04:29 PM                278,528 utilman.exe
               1 File(s)                278,528 bytes
               0 Dir(s)  42,571,468,800 bytes free

D:\Windows\System32>
  
```

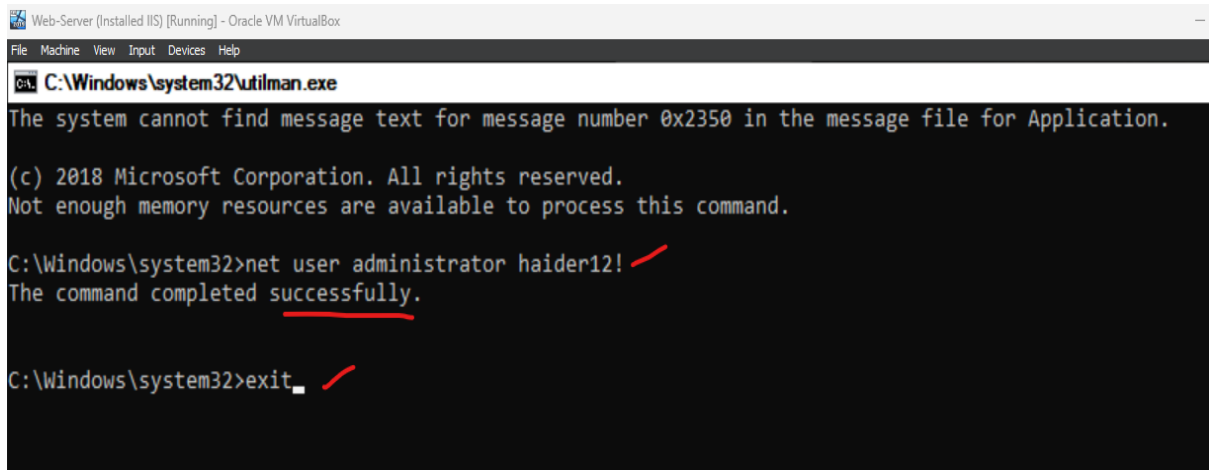
- Moved **Hard Disc** again to **first up**.



- Click on **ease of access** and **command prompt** will open.

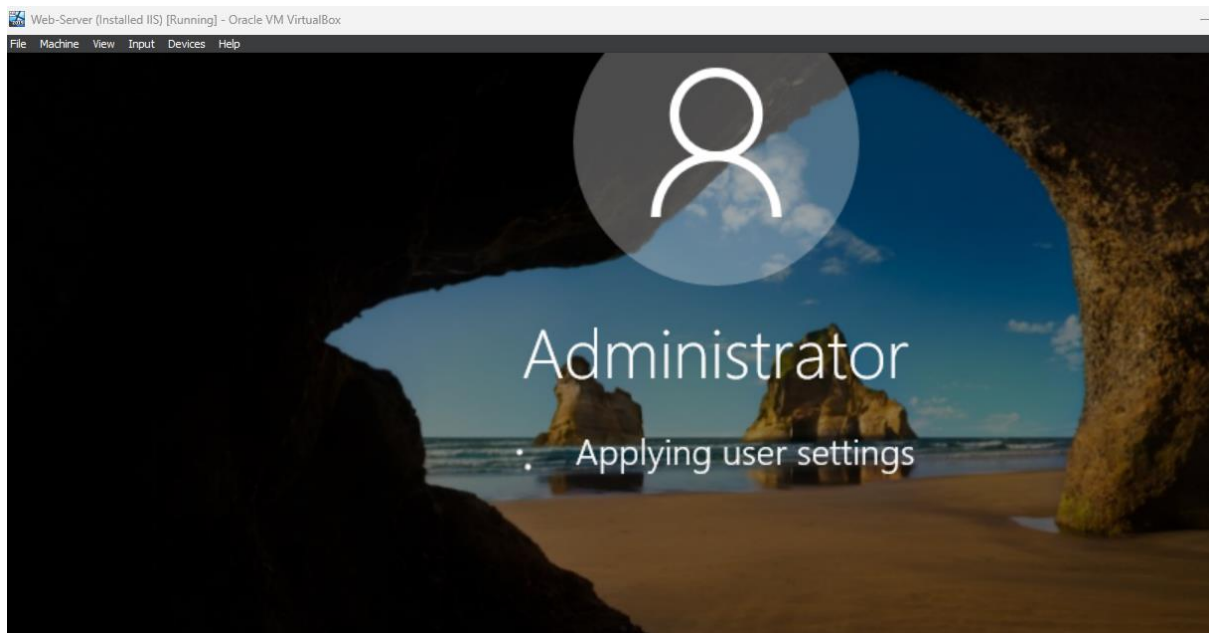


- I used command **net user administrator haider12!** for **setting new password** as **haider12!** and it can be seen that **password** has **reset successfully**.



```
Web-Server (Installed IIS) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
C:\Windows\system32\utilman.exe
The system cannot find message text for message number 0x2350 in the message file for Application.
(c) 2018 Microsoft Corporation. All rights reserved.
Not enough memory resources are available to process this command.
C:\Windows\system32>net user administrator haider12! ✓
The command completed successfully.
C:\Windows\system32>exit_ ✓
```

- **Administrator welcoming page** with the **new password**.



Reference

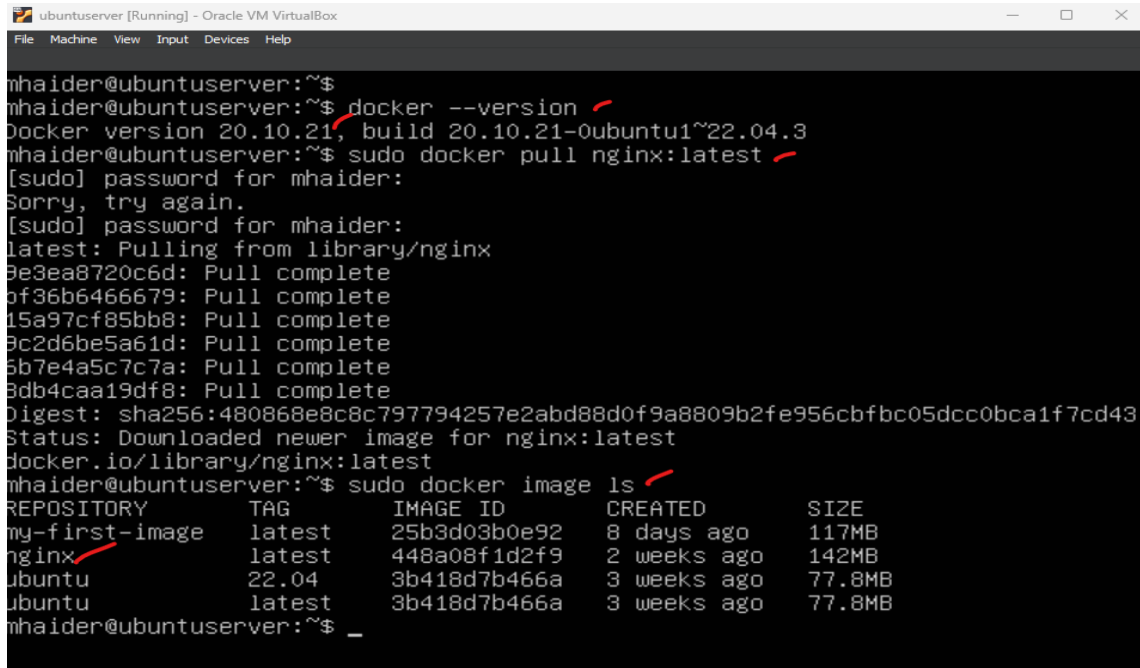
www.youtube.com. (n.d.). *How to reset a lost administrator password in Windows Server 2019*. [online] Available at:

<https://www.youtube.com/watch?v=j5FFrxb9vwg>

[Accessed 21 May 2023].

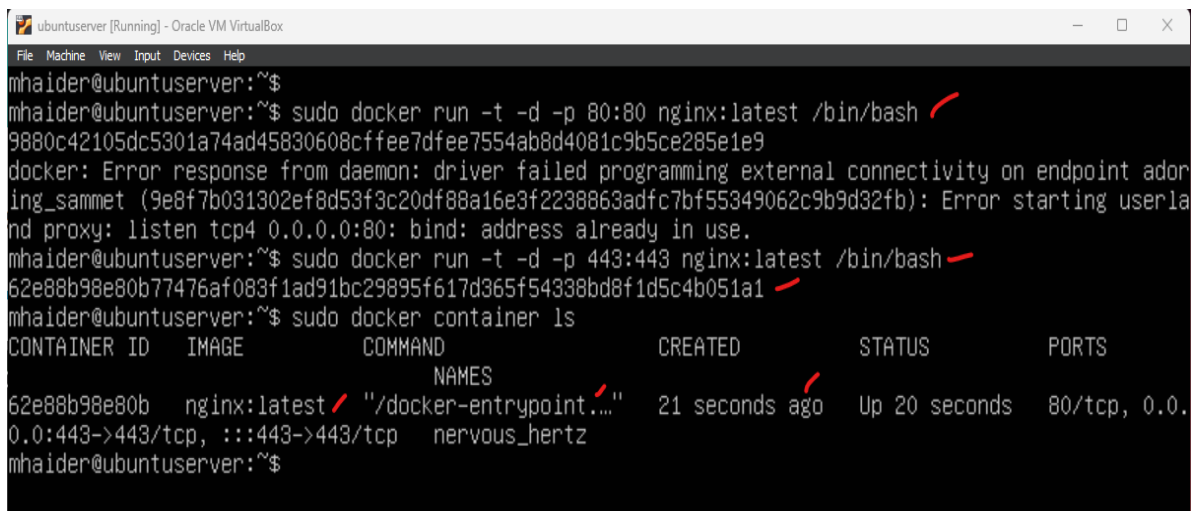
Q16. Docker Container For Web Page

- Firstly, checked **Docker version** which is **latest** installed **20.10.21**.
- Then, **used** command **sudo docker pull nginx:latest** for **pulling docker** with **nginx**.
- **sudo docker image ls** showed **nginx docker image** has **created** in the shot below:



```
ubuntuuser [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$ docker --version
Docker version 20.10.21, build 20.10.21-0ubuntu1~22.04.3
mhaider@ubuntuuser:~$ sudo docker pull nginx:latest
[sudo] password for mhaider:
Sorry, try again.
[sudo] password for mhaider:
latest: Pulling from library/nginx
9e3ea8720c6d: Pull complete
bf36b6466679: Pull complete
15a97cf85bb8: Pull complete
9c2d6be5a61d: Pull complete
5b7e4a5c7c7a: Pull complete
8db4caa19df8: Pull complete
Digest: sha256:480868e8c8c797794257e2abd88d0f9a8809b2fe956cbfbc05dcc0bca1f7cd43
Status: Downloaded newer image for nginx:latest
docker.io/library/nginx:latest
mhaider@ubuntuuser:~$ sudo docker image ls
REPOSITORY          TAG             IMAGE ID        CREATED         SIZE
my-first-image      latest          25b3d03b0e92    8 days ago     117MB
nginx                latest          448a08f1d2f9    2 weeks ago    142MB
ubuntu              22.04          3b418d7b466a    3 weeks ago    77.8MB
ubuntu              latest          3b418d7b466a    3 weeks ago    77.8MB
mhaider@ubuntuuser:~$ _
```

- After that I run **docker** with **/bin/bash** on the **port 443** because **port 80** was **already used** in **above task** with the command **sudo docker run -t -d -p 443:443 nginx:latest /bin/bash** and it **successfully running** with **nginx:latest** as shown below:



```
ubuntuuser [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
mhaider@ubuntuuser:~$
mhaider@ubuntuuser:~$ sudo docker run -t -d -p 80:80 nginx:latest /bin/bash
9880c42105dc5301a74ad45830608cffee7dfce7554ab8d4081c9b5ce285e1e9
docker: Error response from daemon: driver failed programming external connectivity on endpoint ador
ing_sammet (9e8f7b031302ef8d53f3c20df88a16e3f2238863adfc7bf55349062c9b9d32fb): Error starting userla
nd proxy: listen tcp4 0.0.0.0:80: bind: address already in use.
mhaider@ubuntuuser:~$ sudo docker run -t -d -p 443:443 nginx:latest /bin/bash
62e88b98e80b77476af083f1ad91bc29895f617d365f54338bd8fd5c4b051a1
mhaider@ubuntuuser:~$ sudo docker container ls
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS
62e88b98e80b   nginx:latest   "/docker-entrypoint...." 21 seconds ago Up 20 seconds 80/tcp, 0.0.
0.0:443->443/tcp, :::443->443/tcp   nervous_hertz
mhaider@ubuntuuser:~$
```


- Now, I run docker container with the command **sudo docker exec -ti <nginx image ID> /bin/bash** and **went inside the container.**
- **Inside container, I checked nginx is not running** with command **service nginx status** and **activated nginx** with the command **service nginx start.**
- **sudo docker image ls** showed that **docker container is running properly.**

```

mhaider@ubuntuserver:~$ sudo docker container ls
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS
62e88b98e80b   nginx:latest   "/docker-entrypoint..." 3 minutes ago  Up 3 minutes  80/tcp, 0.0.0.
0:443->443/tcp, :::443->443/tcp   nervous_hertz
mhaider@ubuntuserver:~$ sudo docker exec -ti 62e88b98e80b
"docker exec" requires at least 2 arguments.
See 'docker exec --help'.

Usage:  docker exec [OPTIONS] CONTAINER COMMAND [ARG...]

Run a command in a running container
mhaider@ubuntuserver:~$ sudo docker exec -ti 62e88b98e80b /bin/bash
root@62e88b98e80b:/# service nginx status
nginx is not running ... failed!
root@62e88b98e80b:/# service nginx start
2023/05/21 19:41:48 [notice] 31#31: using the "epoll" event method
2023/05/21 19:41:48 [notice] 31#31: nginx/1.23.4
2023/05/21 19:41:48 [notice] 31#31: built by gcc 10.2.1 20210110 (Debian 10.2.1-6)
2023/05/21 19:41:48 [notice] 31#31: OS: Linux 5.15.0-72-generic
2023/05/21 19:41:48 [notice] 31#31: getrlimit(RLIMIT_NOFILE): 1048576:1048576
root@62e88b98e80b:/# 2023/05/21 19:41:48 [notice] 32#32: start worker processes
2023/05/21 19:41:48 [notice] 32#32: start worker process 33

root@62e88b98e80b:/# service nginx status
nginx is running.
root@62e88b98e80b:/# exit
exit
mhaider@ubuntuserver:~$ sudo docker container ls
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS
62e88b98e80b   nginx:latest   "/docker-entrypoint..." 10 minutes ago  Up 10 minutes  80/tcp, 0.0.0.
0.0:443->443/tcp, :::443->443/tcp   nervous_hertz
mhaider@ubuntuserver:~$

```

Reference

www.techtarget.com. (n.d.). *Easily spin up a Docker Ubuntu container* | Tech-Target. [online] Available at: <https://www.techtarget.com/searchdatacenter/video/Easily-spin-up-a-Docker-Ubuntu-container> [Accessed 21 May 2023].