

# CCT College Dublin

## Assessment Cover Page

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<b>Module Title:</b>	Network Services & Virtualization
<b>Assessment Title:</b>	Proof of Concept Linux Virtual Network Project
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### Declaration

By submitting this assessment, I confirm that I have read the CCT policy on Academic Misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source. I declare it to be my own work and that all material from third parties has been appropriately referenced. I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

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## 1.1 Using commands to update and upgrade both machines

```
10 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Last login: Tue May 17 09:28:26 UTC 2022 on ttu1
xiaohui@ubuntuServer:~$ sudo apt-get update -y
[sudo] password for xiaohui:
Hit:1 http://ie.archive.ubuntu.com/ubuntu focal InRelease
Get:2 http://ie.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:3 http://ie.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:4 http://ie.archive.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:5 http://ie.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,7
37% [5 Packages 327 kB/1,790 kB 18%]

Get:5 http://ie.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,
Get:6 http://ie.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages
Fetched 3,047 kB in 6s (516 kB/s)
Reading package lists... Done
xiaohui@ubuntuServer:~$ sudo apt-get upgrade -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  fwupd
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
xiaohui@ubuntuServer:~$
```

**already upgrade**

## 1.2 Connectivity between machines

```
File Machine View Input Devices Help
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.50 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:fe13:87b7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:13:87:b7 txqueuelen 1000 (Ethernet)
    RX packets 184 bytes 25490 (25.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 201 bytes 38173 (38.1 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:fe13:87b7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:13:87:b7 txqueuelen 1000 (Ethernet)
    RX packets 2962 bytes 395047 (3.9 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 925 bytes 50656 (50.6 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 104 bytes 8368 (8.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 104 bytes 8368 (8.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

xiaohui@ubuntuServer:~$ ping 192.168.56.60
PING 192.168.56.60 (192.168.56.60) 56(84) bytes of data:
64 bytes from 192.168.56.60: icmp_seq=1 ttl=64 time=0.734 ms
64 bytes from 192.168.56.60: icmp_seq=2 ttl=64 time=0.799 ms
64 bytes from 192.168.56.60: icmp_seq=3 ttl=64 time=0.797 ms
^C
--- 192.168.56.60 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 0.734/0.776/0.799/0.030 ms
xiaohui@ubuntuServer:~$

File Machine View Input Devices Help
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.60 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:fe1d:4e90 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:1d:4e:90 txqueuelen 1000 (Ethernet)
    RX packets 34 bytes 10074 (10.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 50 bytes 6156 (6.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

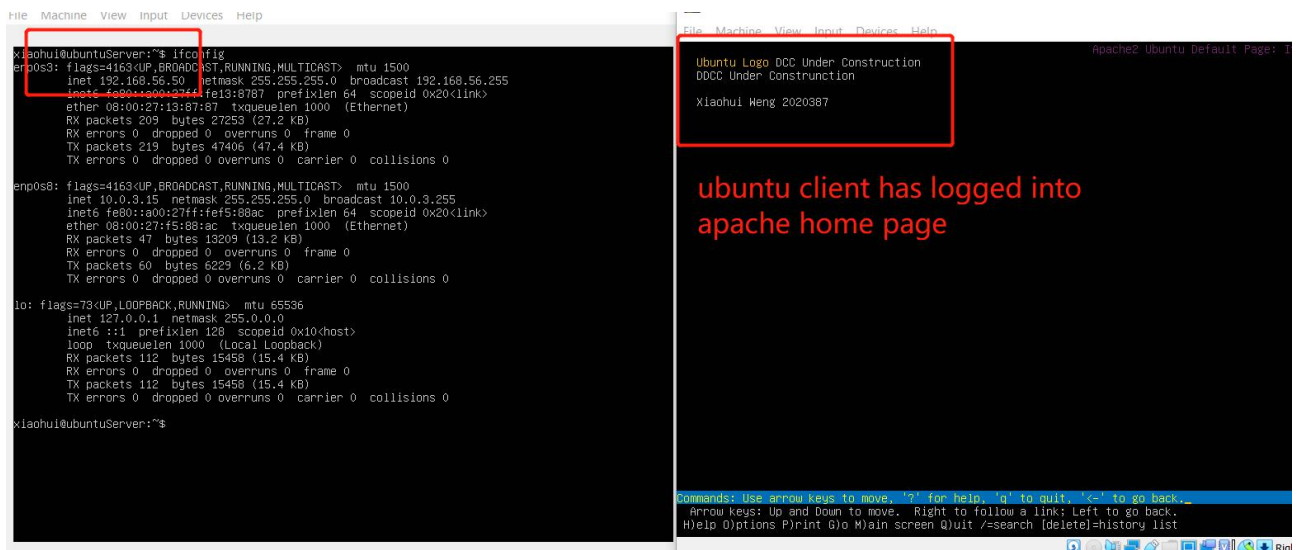
enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.3.15 netmask 255.255.255.0 broadcast 10.0.3.255
    inet6 fe80::a00:27ff:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:bf:3a:c7 txqueuelen 1000 (Ethernet)
    RX packets 54 bytes 14391 (14.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 73 bytes 7468 (7.4 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 98 bytes 7582 (7.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 98 bytes 7582 (7.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

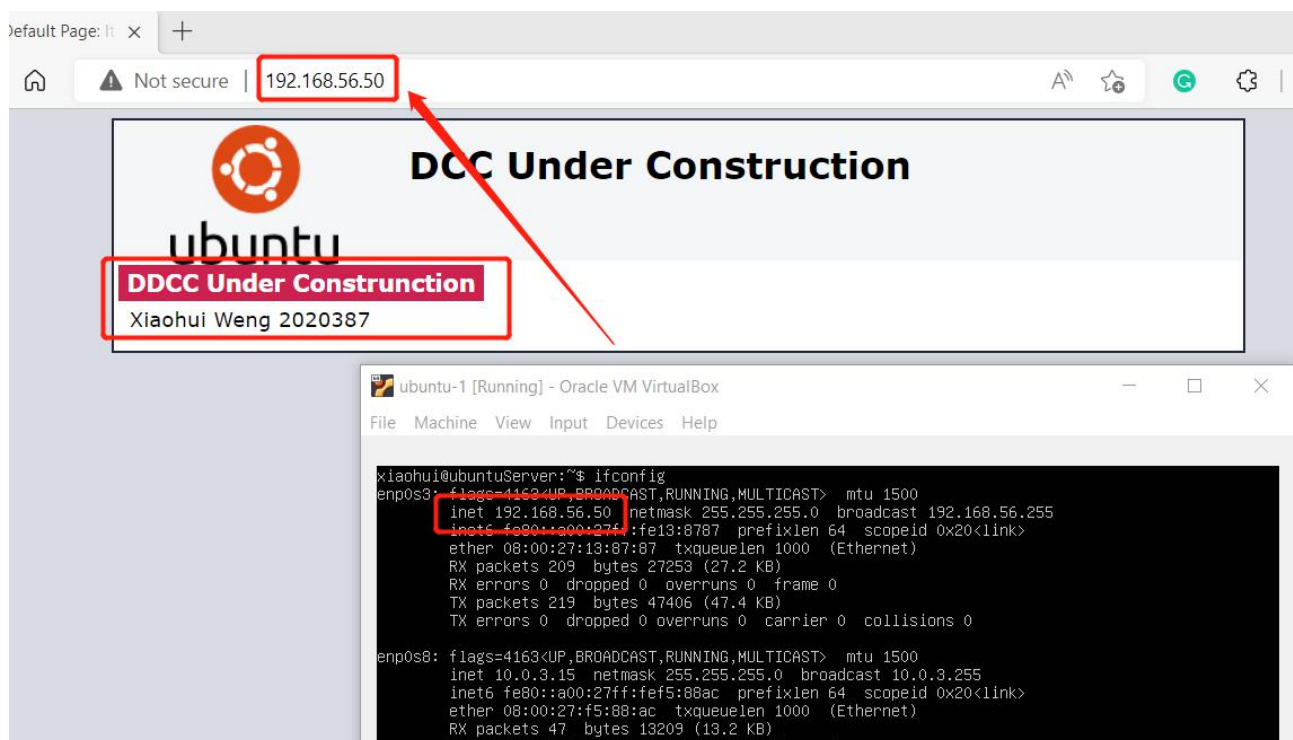
xiaohui@ubuntuClient:~$ ping 192.168.56.50
PING 192.168.56.50 (192.168.56.50) 56(84) bytes of data:
64 bytes from 192.168.56.50: icmp_seq=1 ttl=64 time=1.32 ms
64 bytes from 192.168.56.50: icmp_seq=2 ttl=64 time=0.853 ms
64 bytes from 192.168.56.50: icmp_seq=3 ttl=64 time=0.812 ms
^C
--- 192.168.56.50 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 0.812/0.936/1.318/0.228 ms
xiaohui@ubuntuClient:~$
```

**Both machines can ping each other**

## 1.3 Ubuntu Client visit the Ubuntu Apache server website



## 1.4 Host machine access into Apache home page



## 1.5 Wireshark about ping ubuntuServer from host machines(ICMP)

The Wireshark capture shows a series of ICMP Echo (ping) requests and replies. The first request is at time 0.000000, and the first reply is at time 0.000196. The destination IP is 192.168.56.50. The Command Prompt window shows the command 'ping 192.168.56.50' and its output, which includes the IP address, bytes sent/received, time, and TTL for each reply.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.56.1	192.168.56.50	ICMP	74	Echo (ping) request id=0x0001, seq=156/39936, ttl=128 (reply in 2)
2	0.000196	192.168.56.50	192.168.56.1	ICMP	74	Echo (ping) reply id=0x0001, seq=156/39936, ttl=64 (request in 1)
3	1.001659	192.168.56.1	192.168.56.50	ICMP	74	Echo (ping) request id=0x0001, seq=157/40192, ttl=128 (reply in 4)
4	1.002129	192.168.56.50	192.168.56.1	ICMP	74	Echo (ping) reply id=0x0001, seq=157/40192, ttl=64 (request in 3)
5	2.009199	192.168.56.1	192.168.56.50	ICMP	74	Echo (ping) request id=0x0001, seq=158/40448, ttl=128 (reply in 6)
6	2.009615	192.168.56.50	192.168.56.1	ICMP	74	Echo (ping) reply id=0x0001, seq=158/40448, ttl=64 (request in 5)
7	3.014834	192.168.56.1	192.168.56.50	ICMP	74	Echo (ping) request id=0x0001, seq=159/40704, ttl=128 (reply in 8)
8	3.015323	192.168.56.50	192.168.56.1	ICMP	74	Echo (ping) reply id=0x0001, seq=159/40704, ttl=64 (request in 7)

Command Prompt output:

```
C:\Users\xiaoh>ping 192.168.56.50

Pinging 192.168.56.50 with 32 bytes of data:
Reply from 192.168.56.50: bytes=32 time<1ms TTL=64
Reply from 192.168.56.50: bytes=32 time<1ms TTL=64
Reply from 192.168.56.50: bytes=32 time<1ms TTL=64
Reply from 192.168.56.50: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.56.50:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

## 1.6 Three way handshake from host browser access into Apache website

The Wireshark capture shows a three-way handshake between 192.168.56.1 and 192.168.56.50. The first packet is a SYN request at time 0.000000, the second is a SYN-ACK reply at time 0.000251, and the third is an ACK request at time 0.000334. Below the capture, a browser window shows the Apache2 Ubuntu Default Page, which includes the Ubuntu logo and the text 'DCC Under Construction'.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.56.1	192.168.56.50	TCP	66	53549 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
2	0.000251	192.168.56.50	192.168.56.1	TCP	66	80 → 53549 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460 SACK_PERM=1 WS=128
3	0.000334	192.168.56.1	192.168.56.50	TCP	54	53549 → 80 [ACK] Seq=1 Ack=1 Win=2102272 Len=0

Browser window output:

```
Apache2 Ubuntu Default Page: 192.168.56.50
DCC Under Construction
ubuntu
DDCC Under Construction
Xiaohui Weng 2020387
```

## 2.1 log into ubuntuServer using Putty

The terminal window shows the login process for xiaohui on ubuntuServer. The user enters the password and is greeted by the Ubuntu 20.04.4 LTS login prompt. The terminal also shows system information and network configuration.

```
xiaohui@ubuntuServer: ~
login as: xiaohui
xiaohui@192.168.56.50's password:
Welcome to Ubuntu 20.04.4 LTS (GNU/Linux 5.4.0-110-generic x86_64)

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

System information as of Tue May 17 2022 10:40:50 AM UTC

System load:  0.0      Users logged in:  1
Usage of /:   47.6% of 8.90GB
Memory usage: 21%
Swap usage:   0%
Processes:   112

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.
   https://ubuntu.com/blog/microk8s-memory-optimisation

10 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Last login: Tue May 17 10:29:49 2022
xiaohui@ubuntuServer: ~$
```

Network configuration output:

```
xiaohui@ubuntuServer:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.50 netmask 255.255.255.0 broadcast 192.168.56.255
    ether 08:00:27:13:87:87 txqueuelen 1000 (Ethernet)
    RX packets 59 bytes 5885 (5.8 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 44 bytes 7512 (7.5 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:fe5:88ac prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:f5:88:ac txqueuelen 1000 (Ethernet)
    RX packets 40 bytes 12699 (12.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 50 bytes 5489 (5.4 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 112 bytes 15458 (15.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 112 bytes 15458 (15.4 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



## 2.2 Wiresharke show the SSH traffic

The image displays a Wireshark packet capture of SSH traffic between two hosts. The packet list shows several encrypted packets from both client and server. Below the capture, two terminal windows are shown. The left terminal, titled 'xiahui@ubuntuServer', displays system information including system load, memory usage, and IP addresses for interfaces enp0s3 and enp0s8. The right terminal, titled 'xiahui@ubuntuServer', shows the output of the 'ifconfig' command for the same interfaces.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	192.168.56.1	192.168.56.50	SSH	134	Client: Encrypted packet (len=80)
2	0.006648	192.168.56.50	192.168.56.1	SSH	134	Server: Encrypted packet (len=80)
3	0.046870	192.168.56.1	192.168.56.50	TCP	54	53440 → 22 [ACK] Seq=81 Ack=81 Win=10
4	3.965437	192.168.56.1	192.168.56.50	SSH	326	Client: Encrypted packet (len=272)
5	3.978189	192.168.56.50	192.168.56.1	SSH	102	Server: Encrypted packet (len=48)
6	3.978976	192.168.56.1	192.168.56.50	SSH	134	Client: Encrypted packet (len=80)
7	4.021342	192.168.56.50	192.168.56.1	TCP	60	22 → 53440 [ACK] Seq=129 Ack=433 Win=
8	4.266585	192.168.56.50	192.168.56.1	SSH	710	Server: Encrypted packet (len=656)
9	4.306460	192.168.56.1	192.168.56.50	TCP	54	53440 → 22 [ACK] Seq=433 Ack=785 Win=
10	4.306898	192.168.56.50	192.168.56.1	SSH	118	Server: Encrypted packet (len=64)
11	4.307650	192.168.56.1	192.168.56.50	SSH	230	Client: Encrypted packet (len=176)
12	4.308174	192.168.56.50	192.168.56.1	TCP	60	22 → 53440 [ACK] Seq=849 Ack=609 Win=
13	4.310358	192.168.56.50	192.168.56.1	SSH	214	Server: Encrypted packet (len=160)

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

System information as of Tue 17 May 2022 10:43:55 AM UTC

System load:  0.0      Users logged in:  1
Usage of /:   47.6% of 8.90GB
Memory usage: 21%
Swap usage:   0%
Processes:   113

IPv4 address for enp0s3: 192.168.56.50
IPv4 address for enp0s8: 10.0.3.15
```

## 3.1 Make ip address to be permanent(Netplan configuration examples,05.2022)

The image shows two side-by-side terminal windows displaying Netplan configuration files. The left window shows the configuration for 'ubuntu-1' with the IP address 192.168.56.100/24 assigned to enp0s3. The right window shows the configuration for 'ubuntu-2' with the IP address 192.168.56.125/24 assigned to enp0s3. Red arrows point from the IP addresses in the left window to the right window, indicating a change in the IP address. A red text label 'change enp0s3 ip address in Netplan' is placed between the two windows.

change enp0s3 ip address in Netplan

```
File Machine View Input Devices Help
After apply netplan configuration, ip has been changed

xiaohui@ubuntuServer:/etc/netplan$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.100 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:13:87:87 txqueuelen 1000 (Ethernet)
    RX packets 282 bytes 44489 (44.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 308 bytes 61584 (61.6 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:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:f5:8b:ac txqueuelen 1000 (Ethernet)
    RX packets 4875 bytes 6515933 (6.5 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1400 bytes 95737 (95.7 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 126 bytes 16988 (16.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 126 bytes 16988 (16.9 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

xiaohui@ubuntuServer:/etc/netplan$

File Machine View Input Devices Help
Press ENTER before the timeout to accept the new configuration
Changes will revert in 119 seconds
Configuration accepted.
xiaohui@ubuntuClient:/etc/netplan$ 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:febf:4e90 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:1d:4e:90 txqueuelen 1000 (Ethernet)
    RX packets 51 bytes 15335 (15.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 76 bytes 11208 (11.2 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:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:bf:3a:c7 txqueuelen 1000 (Ethernet)
    RX packets 3432 bytes 4616413 (4.6 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 677 bytes 49378 (49.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 98 bytes 7702 (7.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 98 bytes 7702 (7.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

xiaohui@ubuntuClient:/etc/netplan$

File Machine View Input Devices Help
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.56.100 netmask 255.255.255.0 broadcast 192.168.56.255
    inet6 fe80::a00:27ff:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:13:87:87 txqueuelen 1000 (Ethernet)
    RX packets 282 bytes 44489 (44.4 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 308 bytes 61584 (61.6 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:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:f5:8b:ac txqueuelen 1000 (Ethernet)
    RX packets 4875 bytes 6515933 (6.5 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 1400 bytes 95737 (95.7 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 126 bytes 16988 (16.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 126 bytes 16988 (16.9 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

xiaohui@ubuntuServer:/etc/netplan$ ping 192.168.56.125
PING 192.168.56.125 (192.168.56.125) 56(84) bytes of data:
64 bytes from 192.168.56.125: icmp_seq=1 ttl=64 time=1.46 ms
64 bytes from 192.168.56.125: icmp_seq=2 ttl=64 time=0.855 ms
64 bytes from 192.168.56.125: icmp_seq=3 ttl=64 time=0.840 ms
^C
--- 192.168.56.125 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 0.840/1.050/1.456/0.285 ms
xiaohui@ubuntuServer:/etc/netplan$

File Machine View Input Devices Help
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:febf:4e90 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:1d:4e:90 txqueuelen 1000 (Ethernet)
    RX packets 51 bytes 15335 (15.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 76 bytes 11208 (11.2 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:febf:3ac7 prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:bf:3a:c7 txqueuelen 1000 (Ethernet)
    RX packets 3432 bytes 4616413 (4.6 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 677 bytes 49378 (49.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 98 bytes 7702 (7.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 98 bytes 7702 (7.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

xiaohui@ubuntuClient:/etc/netplan$ ping 192.168.56.100
PING 192.168.56.100 (192.168.56.100) 56(84) bytes of data:
64 bytes from 192.168.56.100: icmp_seq=1 ttl=64 time=0.574 ms
64 bytes from 192.168.56.100: icmp_seq=2 ttl=64 time=0.716 ms
64 bytes from 192.168.56.100: icmp_seq=3 ttl=64 time=0.694 ms
^C
--- 192.168.56.100 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 0.574/0.661/0.716/0.062 ms
xiaohui@ubuntuClient:/etc/netplan$
```

### 3.2 Rename Host-name

```
Ubuntu 20.04.4 LTS web-server-xiaohui-weng-2020387 tty1
web-server-xiaohui-weng-2020387 login: xiaohui
Password:
Welcome to Ubuntu 20.04.4 LTS (GNU/Linux 5.4.0-110-generic x86_64)

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

System information disabled due to load higher than 1.0

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.
   https://ubuntu.com/blog/microk8s-memory-optimisation

2 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Last login: Tue May 17 18:31:22 UTC 2022 on tty1
xiaohui@web-server-xiaohui-weng-2020387:~$

Ubuntu 20.04.4 LTS web-client-xiaohui-weng-2020387 tty1
web-client-xiaohui-weng-2020387 login: xiaohui
Password:
Welcome to Ubuntu 20.04.4 LTS (GNU/Linux 5.4.0-110-generic x86_64)

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

System information as of Tue 17 May 2022 12:40:58 PM UTC

System load:  0.81          Processes:           110
Usage of /:   47.0% of 8.90GB Users logged in:          0
Memory usage: 20%          IPv4 address for enp0s3: 192.168.56.125
Swap usage:   0%           IPv4 address for enp0s8: 10.0.3.15

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.
   https://ubuntu.com/blog/microk8s-memory-optimisation

0 updates can be applied immediately.

Last login: Tue May 17 12:38:58 UTC 2022 on tty1
xiaohui@web-client-xiaohui-weng-2020387:~$
xiaohui@web-client-xiaohui-weng-2020387:~$
```

after changing hostname, and reboot, hostname has changed

## 4.1 Firewall - SSH traffic

192.168.56.100 - PuTTY  
login as: [ ]

now is able to connect ssh

```
xiaohui@web-server-xiaohui-weng-2020387:~$ sudo ufw status
[sudo] password for xiaohui:
Status: active

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

xiaohui@web-server-xiaohui-weng-2020387:~$ sudo ufw allow ssh
Skipping adding existing rule
Skipping adding existing rule (v6)
xiaohui@web-server-xiaohui-weng-2020387:~$ sudo ufw status
Status: active

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

xiaohui@web-server-xiaohui-weng-2020387:~$
```

status: active

Putty Fatal Error

Remote side unexpectedly closed network connection

OK

after deny, it isn't able to connect

```
xiaohui@web-server-xiaohui-weng-2020387:~$ sudo ufw deny ssh
Rule updated
Rule updated (v6)
xiaohui@web-server-xiaohui-weng-2020387:~$
```

## 4.2 Firewall - http traffic

192.168.56.100

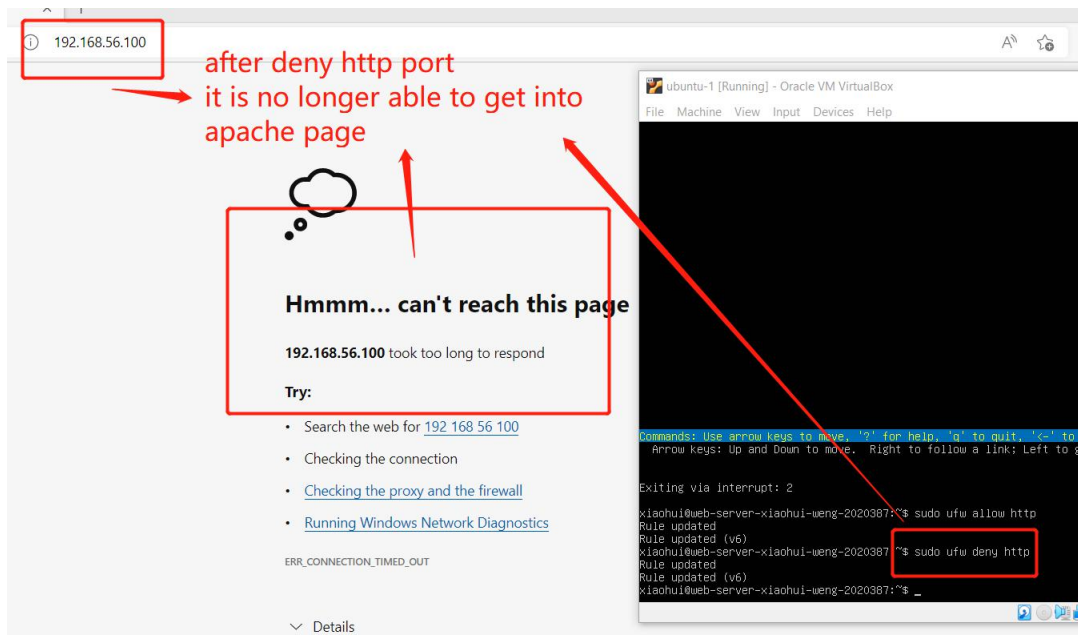
ubuntu  
DDCC Under Construction  
Xiaohui Weng 2020387

now is able to go to apache page

ubuntu-1 [Running] - Oracle VM VirtualBox

```
xiaohui@web-server-xiaohui-weng-2020387:~$ sudo ufw allow http
Rule updated
Rule updated (v6)
xiaohui@web-server-xiaohui-weng-2020387:~$
```





## 5. Research

## References

Netplan configuration examples [online] Available:<https://netplan.io/examples/> [Accessed 17. 05. 2022]