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Lab 12 – Advanced Network Configuration

Scenario: You, as a network admin, are going to set up your Ubuntu VM as a gateway to provide Internet access to another client Ubuntu VM. The client VM needs to be in the same internal network as the gateway (as shown in Figure 1). Once the connection is ready, you need to configure the firewall to secure the network properly. The following requirements need to be satisfied to receive full credits.

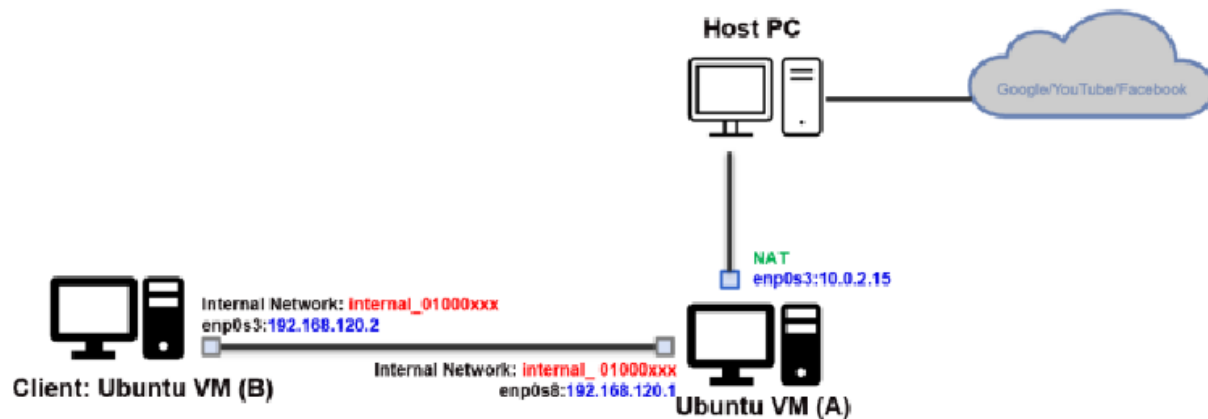
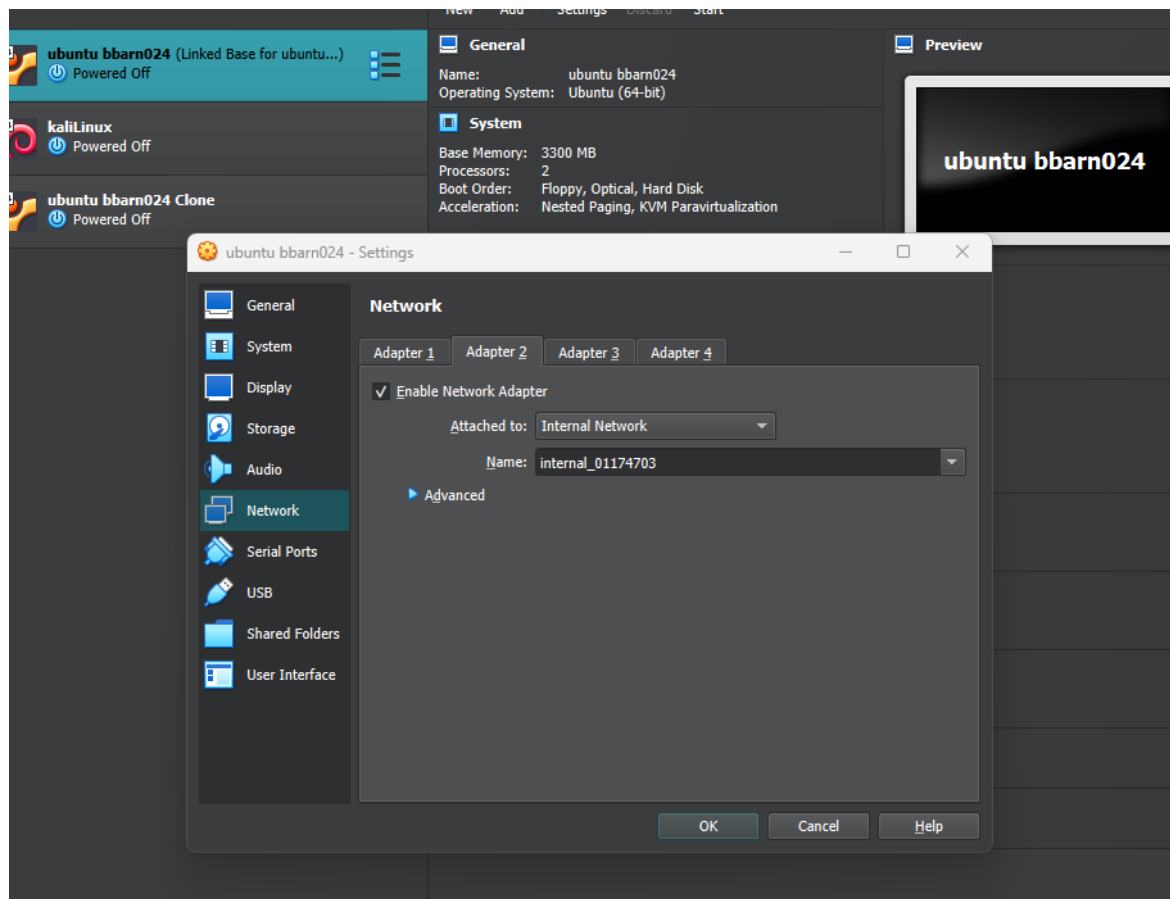
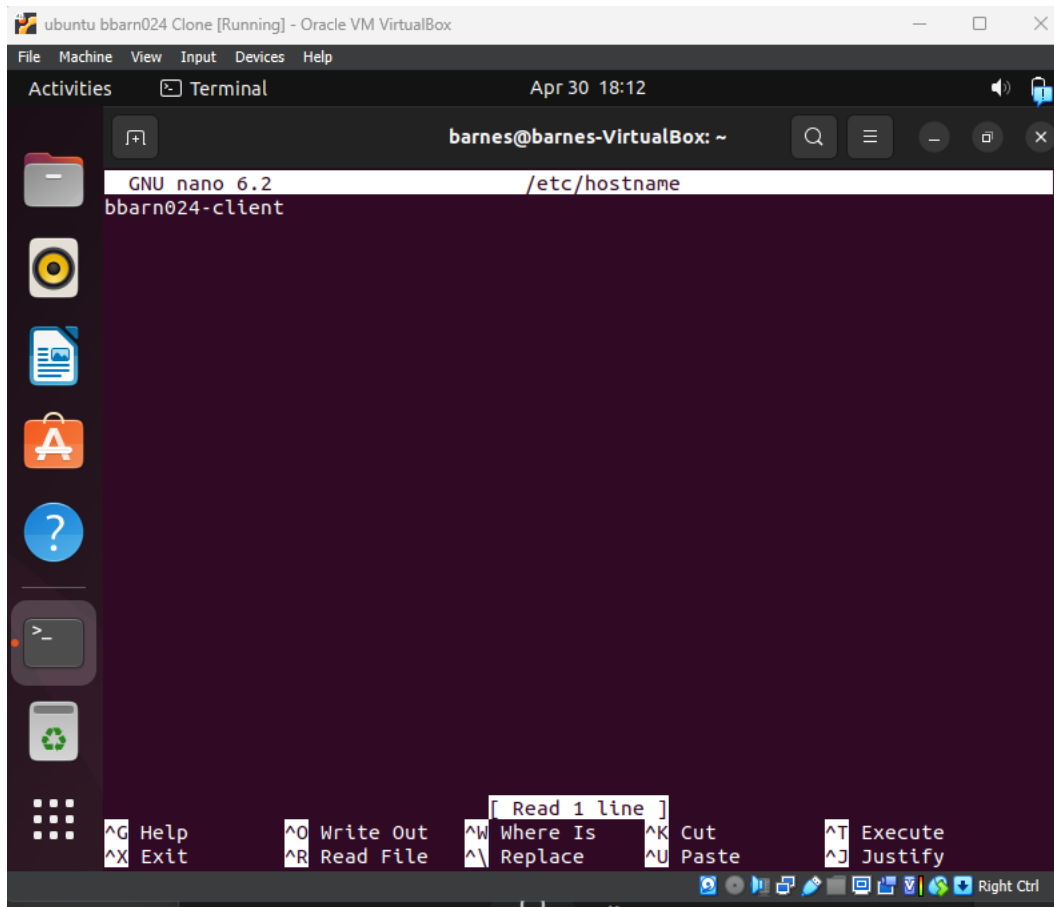


Figure 1 Desired Network Topology

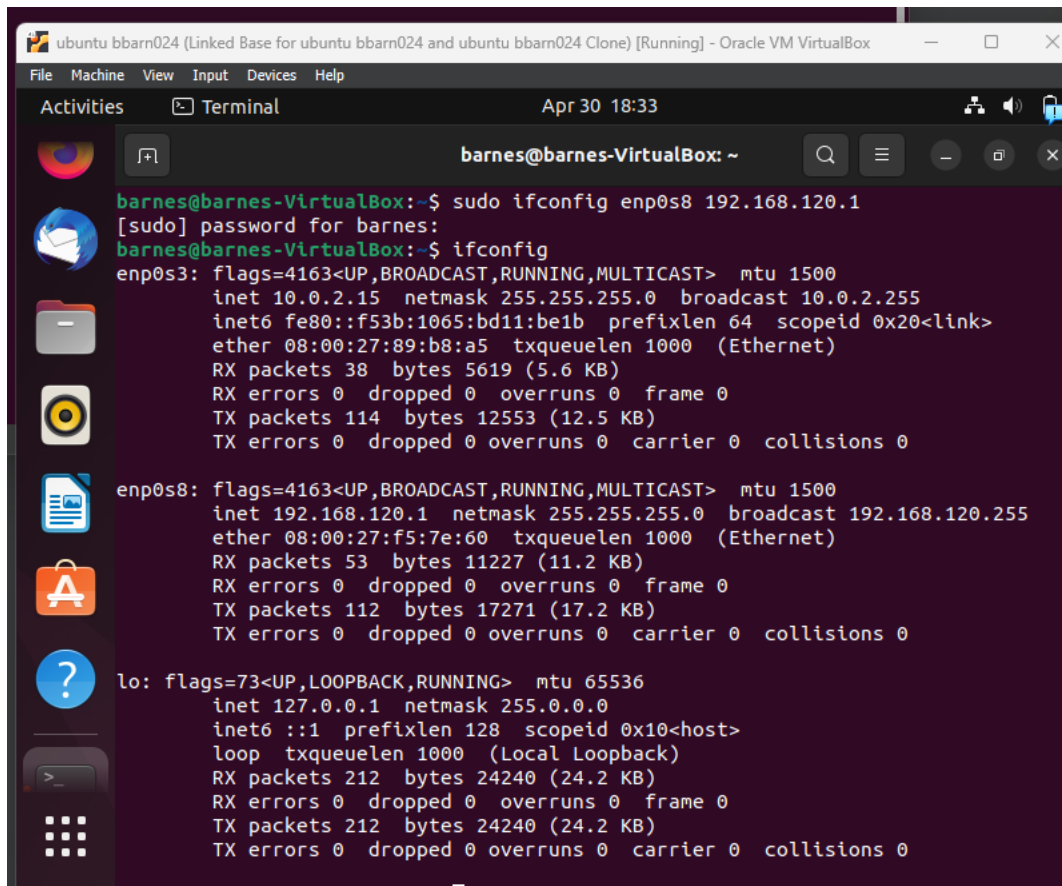
1. In the virtual box setting, connect two VMs in the same internal network, "internal_{UIN}". Replace {UIN} with your real UIN.



2. Change the hostname of the Client VM to "{MIDASname}-Client." Replace {MIDAS name} with your real MIDAS name.



3. Configure the temporary IP address on the Gateway Ubuntu, as shown in Figure 1.



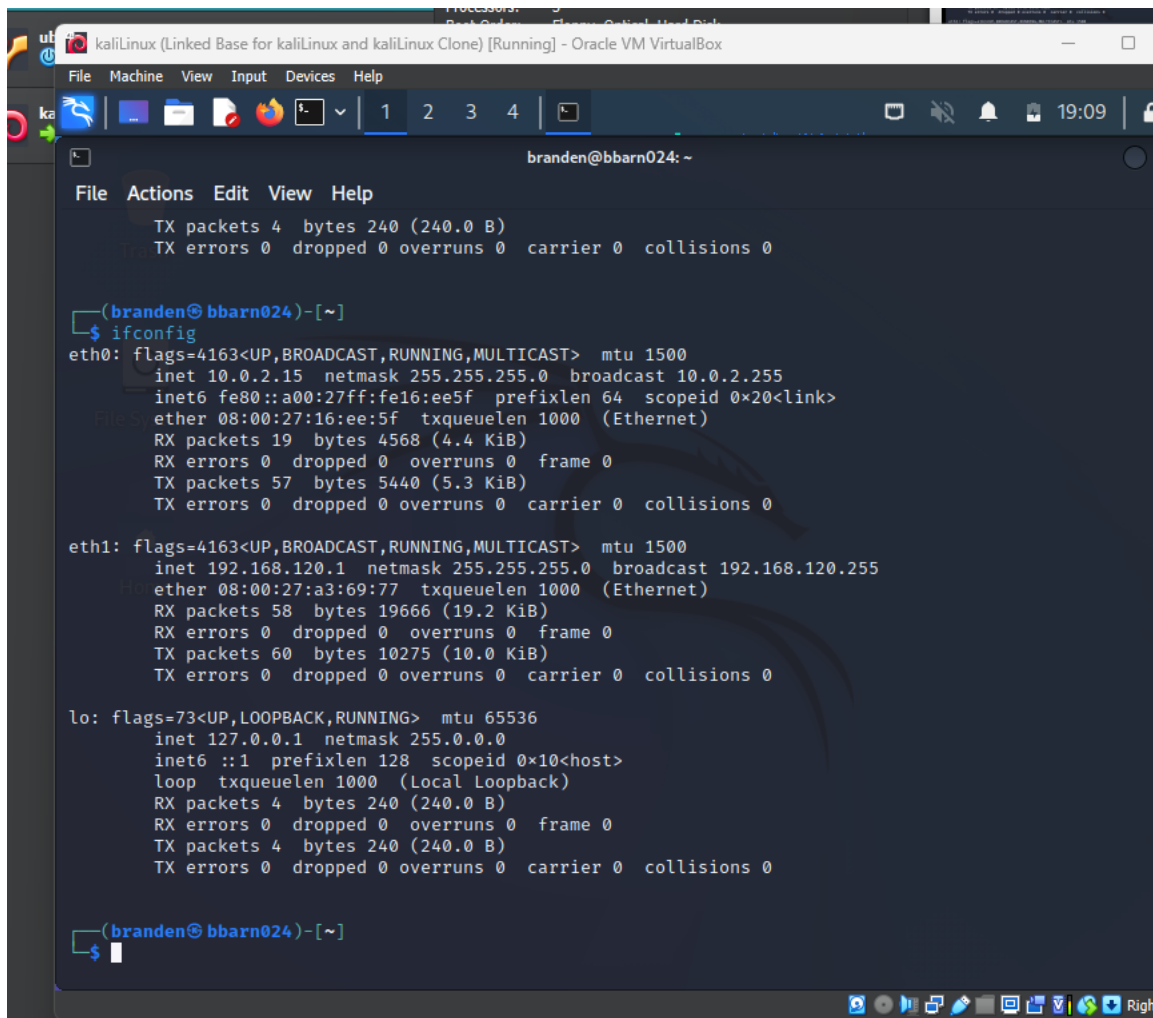
The screenshot shows a terminal window titled 'ubuntu bbarn024 (Linked Base for ubuntu bbarn024 and ubuntu bbarn024 Clone) [Running] - Oracle VM VirtualBox'. The terminal is running as the user 'barnes' on the host 'barnes-VirtualBox'. The user has executed the command 'sudo ifconfig enp0s8 192.168.120.1', and the system has responded with the IP address configuration for 'enp0s8'. The terminal output shows the configuration for three network interfaces: 'enp0s3', 'enp0s8', and 'lo'. Each interface configuration includes flags, MTU, IP address, netmask, broadcast address, ether address, txqueuelen, and statistics for RX and TX packets, bytes, errors, dropped, overruns, carrier, and collisions.

```
barnes@barnes-VirtualBox:~$ sudo ifconfig enp0s8 192.168.120.1
[sudo] password for barnes:
barnes@barnes-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::f53b:1065:bd11:be1b prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:89:b8:a5 txqueuelen 1000 (Ethernet)
    RX packets 38 bytes 5619 (5.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 114 bytes 12553 (12.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

enp0s8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.120.1 netmask 255.255.255.0 broadcast 192.168.120.255
    ether 08:00:27:f5:7e:60 txqueuelen 1000 (Ethernet)
    RX packets 53 bytes 11227 (11.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 112 bytes 17271 (17.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 212 bytes 24240 (24.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 212 bytes 24240 (24.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Switched to Kali Linux VM for the rest of the Lab.



```
File Machine View Input Devices Help
1 2 3 4
branden@bbarn024: ~
File Actions Edit View Help
TX packets 4 bytes 240 (240.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

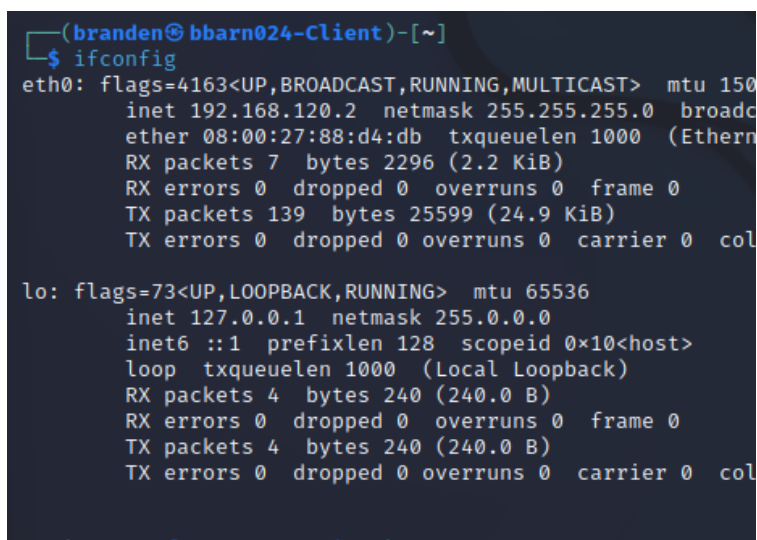
(branden@bbarn024)-[~]
$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
    inet6 fe80::a00:27ff:fe16:ee5f prefixlen 64 scopeid 0x20<link>
    ether 08:00:27:16:ee:5f txqueuelen 1000 (Ethernet)
    RX packets 19 bytes 4568 (4.4 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 57 bytes 5440 (5.3 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.120.1 netmask 255.255.255.0 broadcast 192.168.120.255
    ether 08:00:27:a3:69:77 txqueuelen 1000 (Ethernet)
    RX packets 58 bytes 19666 (19.2 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 60 bytes 10275 (10.0 KiB)
    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 4 bytes 240 (240.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 4 bytes 240 (240.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

(branden@bbarn024)-[~]
$
```

4. Configure the temporary IP address, routing table, and DNS server on Client VM as shown in Figure 1



```
(branden@bbarn024-Client)-[~]
$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.120.2 netmask 255.255.255.0 broadcast 192.168.120.255
    ether 08:00:27:88:d4:db txqueuelen 1000 (Ethernet)
    RX packets 7 bytes 2296 (2.2 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 139 bytes 25599 (24.9 KiB)
    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 4 bytes 240 (240.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 4 bytes 240 (240.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```

(branden@bbarn024-Client)-[~]
$ sudo ip route add default via 192.168.120.1
sudo: unable to resolve host bbarn024-Client: Temporary failure in name resolution

(branden@bbarn024-Client)-[~]
$ route -n
Kernel IP routing table
Destination      Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0          192.168.120.1  0.0.0.0         UG    0      0      0 eth0
192.168.120.0    0.0.0.0        255.255.255.0   U     0      0      0 eth0

(branden@bbarn024-Client)-[~]
$

```

```

branden@bbarn024-Client: ~
File Actions Edit View Help
(branden@bbarn024-Client)-[~]
$ sudo vi /etc/resolv.conf
sudo: unable to resolve host bbarn024-Client: Temporary failure in name resolution
[sudo] password for branden:

(branden@bbarn024-Client)-[~]
$ tail -2 /etc/resolv.conf
# Generated by NetworkManager
nameserver 8.8.8.8

(branden@bbarn024-Client)-[~]
$

```

5. Configure gateway Ubuntu to enable IP forwarding (to forward the traffic) (also NAT configuration)

```

kaliLinux (Linked Base for kaliLinux and kaliLinux Clone) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
1 2 3 4

root@bbarn024: /home/branden
File Actions Edit View Help
(root@bbarn024)-[/home/branden]
# echo 1 > /proc/sys/net/ipv4/ip forward
zsh: no such file or directory: /proc/sys/net/ipv4/ip

(root@bbarn024)-[/home/branden]
# echo 1 > /proc/sys/net/ipv4/ip_forward

(root@bbarn024)-[/home/branden]
# cat /proc/sys/net/ipv4/ip_forward
1

(root@bbarn024)-[/home/branden]
#

```

6. Test your ping connection to 8.8.8.8 and www.google.com in the client VM, respectively

```
File Machine View Input Devices Help
1 2 3 4
branden@bbarn024-Client: ~
File Actions Edit View Help

(branden@bbarn024-Client)-[~]
$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=57 time=19.2 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=57 time=18.4 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=57 time=25.7 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=57 time=18.3 ms
^C
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3003ms
rtt min/avg/max/mdev = 18.325/20.415/25.676/3.056 ms

(branden@bbarn024-Client)-[~]
$ ping www.google.com
PING www.google.com (172.253.122.99) 56(84) bytes of data.
64 bytes from bh-in-f99.1e100.net (172.253.122.99): icmp_seq=1 ttl=107 time=18.2 ms
64 bytes from bh-in-f99.1e100.net (172.253.122.99): icmp_seq=2 ttl=107 time=21.4 ms
64 bytes from bh-in-f99.1e100.net (172.253.122.99): icmp_seq=3 ttl=107 time=22.4 ms
64 bytes from bh-in-f99.1e100.net (172.253.122.99): icmp_seq=4 ttl=107 time=24.8 ms
64 bytes from bh-in-f99.1e100.net (172.253.122.99): icmp_seq=5 ttl=107 time=18.9 ms
^C
--- www.google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 18.211/21.158/24.830/2.405 ms

(branden@bbarn024-Client)-[~]
$
```

Task B

1. Configure the iptables on the gateway Ubuntu to block all the inbound ICMP packets from the Client VM.
2. Configure the iptables on the gateway Ubuntu to block all the outbound ICMP packets that originated from the gateway Ubuntu itself

```
kaliLinux (Linked Base for kaliLinux and kaliLinux Clone) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
1 2 3 4
branden@bbarn024: ~
File Actions Edit View Help

(branden@bbarn024)-[~]
$ sudo iptables -A INPUT -s 192.168.120.2 -p icmp -j DROP
sudo: unable to resolve host bbarn024: Name or service not known

(branden@bbarn024)-[~]
$ sudo iptables -A OUTPUT -p icmp -j DROP
sudo: unable to resolve host bbarn024: Name or service not known

(branden@bbarn024)-[~]
$
```

Extra Credit: Set the permanent IP address on the Client Ubuntu based on the above network topology.

kaliLinux Clone [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

1 2 3 4

branden@bbarn024-Client: ~

File Actions Edit View Help

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

source /etc/network/interfaces.d/*

# The loopback network interface
auto lo
iface lo inet loopback

network:
  version: 2
  renderer: networkd
  ethernets:
    eth0:
      addresses:
        - 192.168.120.2
      routes:
        - to: default
          via: 8.8.8.8
      nameservers:
        search: [mydomain, otherdomain]
        addresses: [192.168.120.2, 8.8.8.8]
```

-- INSERT --

23,1 All