CYSE 270: Linux System for Cybersecurity

Lab 11 – Basic Network Configurations

You can use either Ubuntu VM or Kali Linux VM to complete the following tasks.

Task A – Explore Network Configurations (8 * 5 = 40 Points)

{{{{{{{{{Connect your VM in the NAT mode}}}}}}}}}

1. Use the correct **ifconfig** command to display the current network configuration. **Highlight your IP address, MAC address, and the network mask**.

```
┌──(pmacm001㉿kali-270)-[~]
└─$ 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:fe02:a4f  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:02:0a:4f  txqueuelen 1000  (Ethernet)
        RX packets 1  bytes 590 (590.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 23  bytes 3100 (3.0 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
```

2. Use the correct **route** command to display the current routing table.

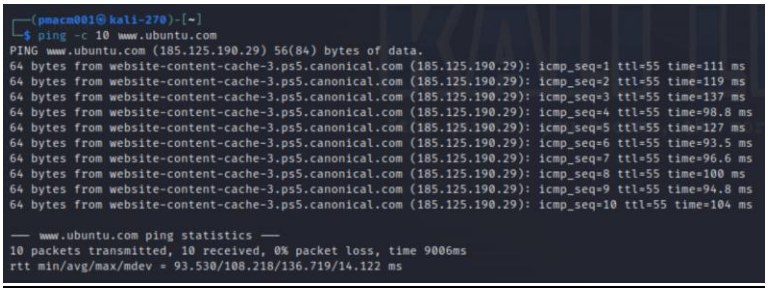
```
┌──(pmacm001㉿kali-270)-[~]
└─$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         10.0.2.2        0.0.0.0         UG    100    0        0 eth0
10.0.2.0        0.0.0.0         255.255.255.0   U     100    0        0 eth0
```

3. Use the **netstat** command to list current TCP connections.

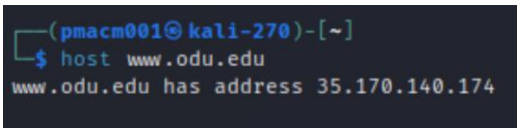
```
┌──(pmacm001㉿kali-270)-[~]
└─$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 10.0.2.15:bootpc        10.0.2.2:bootps         ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  3      [ ]         STREAM     CONNECTED     20057    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     20718    /run/dbus/system_bus_socket
unix  3      [ ]         STREAM     CONNECTED     20100
unix  3      [ ]         STREAM     CONNECTED     20646    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     19735    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     20033
unix  2      [ ]         DGRAM      CONNECTED     17818
unix  3      [ ]         STREAM     CONNECTED     20667    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     20779    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     20237
unix  3      [ ]         STREAM     CONNECTED     20050
unix  3      [ ]         STREAM     CONNECTED     19369
unix  3      [ ]         STREAM     CONNECTED     17828    /run/dbus/system_bus_socket
unix  3      [ ]         STREAM     CONNECTED     17238    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     17182    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     17343
unix  3      [ ]         STREAM     CONNECTED     20215
unix  3      [ ]         STREAM     CONNECTED     20617    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     21057    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     20471    /run/systemd/journal/stdout
unix  3      [ ]         STREAM     CONNECTED     20127    @/tmp/.ICE-unix/943
unix  3      [ ]         STREAM     CONNECTED     19826
unix  3      [ ]         STREAM     CONNECTED     19425    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     19949    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     20089    @/tmp/.ICE-unix/943
unix  3      [ ]         STREAM     CONNECTED     20376    @/tmp/.ICE-unix/943
unix  3      [ ]         STREAM     CONNECTED     19686
unix  3      [ ]         STREAM     CONNECTED     20417    @/tmp/.X11-unix/X0
unix  3      [ ]         STREAM     CONNECTED     20374    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     20020    @/tmp/.X11-unix/X0
```

4. Use the **ping** command to determine if the ubuntu.com system is accessible via the network.

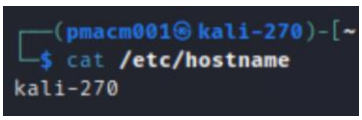
(Use the correct option to send 10 ping requests only.)



5. Use the **host** command to perform a DNS query on www.odu.edu

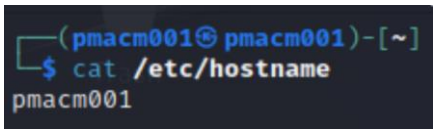


6. Use the **cat** command to display the contents of the file that contains the system's hostname.



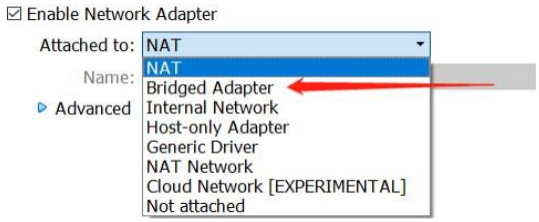
7. Use the **cat** command to display the contents of the file that contains the DNS servers for this system.

8. Edit the same file you display in the previous step, set the system's hostname to your MIDAS ID permanently. Reboot system and **repeat step 6**.



Task B – A Different Network Setting (3 * 20 = 60 Points)

1. Change the VM network connection from NAT to the bridge mode (you will lose your Internet connection if you are connected to the ODU campus Wi-Fi network, but it is okay).
2. Reboot your system, then repeat Steps 1 – 7 in Task A.
3. Highlight the differences at the end of each step and discuss what do you find.



Step 1: We can clearly see that the network/ip address has changed from part A.

```
┌──(pmacm001㉿pmacm001)-[~]
└─$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.176  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 fe80::a00:27ff:fe02:a4f  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:02:0a:4f  txqueuelen 1000  (Ethernet)
        RX packets 125  bytes 38292 (37.3 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 44  bytes 14142 (13.8 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
```

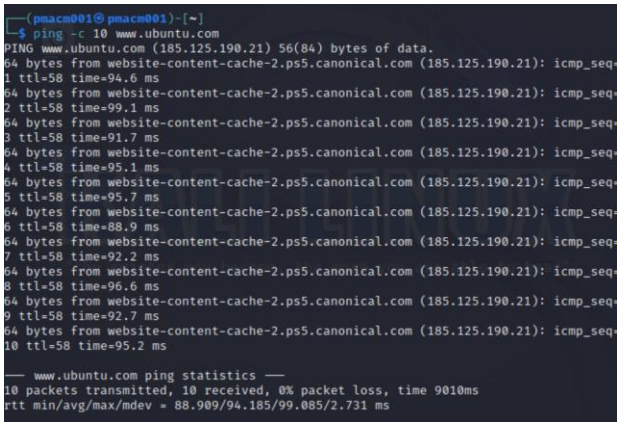
Step 2: We see that the gateway has changed when compared to part A.

```
┌──(pmacm001㉿pmacm001)-[~]
└─$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         Fios_Quantum_Ga 0.0.0.0         UG    100    0        0 eth0
192.168.1.0     0.0.0.0         255.255.255.0   U     100    0        0 eth0
```

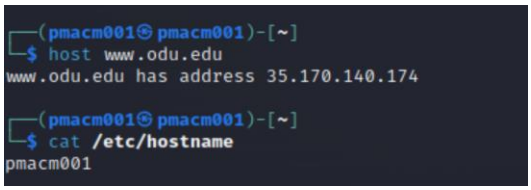
Step 3: We notice that both the local and foreign addresses change to reflect the change in network adapter.

```
┌──(pmacm001㉿pmacm001)-[~]
└─$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 pmacm001.fios-ro:bootpc Fios_Quantum_Gat:bootps ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  3      [ ]         STREAM     CONNECTED     19353
unix  3      [ ]         STREAM     CONNECTED     17059
unix  3      [ ]         STREAM     CONNECTED     19753    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     20425
unix  2      [ ]         DGRAM                    19979
unix  3      [ ]         STREAM     CONNECTED     20477    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     20631
unix  3      [ ]         STREAM     CONNECTED     20103    /run/user/1000/bus
unix  3      [ ]         STREAM     CONNECTED     19683    /run/user/1000/bus
unix  2      [ ]         DGRAM                    17437
unix  3      [ ]         DGRAM      CONNECTED     16028
unix  3      [ ]         STREAM     CONNECTED     19806
unix  3      [ ]         STREAM     CONNECTED     20051
unix  3      [ ]         STREAM     CONNECTED     18630
unix  3      [ ]         STREAM     CONNECTED     19857    /run/user/1000/pipewire-
0
unix  3      [ ]         STREAM     CONNECTED     19645    /run/user/1000/at-spi/bu
s_0
unix  3      [ ]         STREAM     CONNECTED     20271
unix  3      [ ]         STREAM     CONNECTED     19612    @/tmp/.ICE-unix/865
unix  3      [ ]         STREAM     CONNECTED     19358
unix  3      [ ]         STREAM     CONNECTED     18953    /run/user/1000/bus
unix  2      [ ]         DGRAM                    18632
unix  3      [ ]         STREAM     CONNECTED     19723
```

Step 4: Nothing of note here, output of ping command looks the same as part A.



Steps 5 & 6: Main difference is that the host name was changed from kali-270 to pmacm001



Step 7: No change from part A.