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.

```
berline@berline-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::52a:f0b3:b629:8f98  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:bd:05:71  txqueuelen 1000  (Ethernet)
        RX packets 1157  bytes 1276256 (1.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 595  bytes 59103 (59.1 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 272  bytes 22631 (22.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 272  bytes 22631 (22.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

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

```
berline@berline-VirtualBox:~$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         _gateway        0.0.0.0         UG    100    0        0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U     100    0        0 enp0s3
link-local      0.0.0.0         255.255.0.0     U     1000   0        0 enp0s3
```

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

```
berline@berline-VirtualBox:~$ netstat -ta
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:ipp           0.0.0.0:*               LISTEN
tcp        0      0 localhost:domain        0.0.0.0:*               LISTEN
tcp6       0      0 ip6-localhost:ipp       [::]:*                  LISTEN
```

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.)

```
berline@berline-VirtualBox:~$ ping -c 10 ubuntu.com
PING ubuntu.com (185.125.190.20) 56(84) bytes of data.
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=1 ttl=51 time=106 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=2 ttl=51 time=104 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=3 ttl=51 time=99.9 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=4 ttl=51 time=116 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=5 ttl=51 time=97.7 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=6 ttl=51 time=98.1 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=7 ttl=51 time=168 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=8 ttl=51 time=96.8 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=9 ttl=51 time=98.7 ms
64 bytes from website-content-cache-1.ps5.canonical.com (185.125.190.20)
: icmp_seq=10 ttl=51 time=99.4 ms

--- ubuntu.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9012ms
rtt min/avg/max/mdev = 96.822/108.496/168.368/20.688 ms
```

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

```
berline@berline-VirtualBox:~$ host www.odu.edu
www.odu.edu has address 35.170.140.174
```

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

```
berline@berline-VirtualBox:~$ cat /etc/hostname
berline-VirtualBox
```

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

```
berline@berline-VirtualBox:~$ cat /etc/resolv.conf
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-r
esolved(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /etc/resolv.conf and seeing this text, you have followed the symlink.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs should typically not access this file directly, b
ut only
# through the symlink at /etc/resolv.conf. To manage man:resolv.conf(5)
in a
# different way, replace this symlink by a static file or a different sy
mlink.
#
# See man:systemd-resolved.service(8) for details about the supported mo
des of
# operation for /etc/resolv.conf.

nameserver 127.0.0.53
```

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.

```
berline@bnaja001:~$ cat /etc/hostname
bnaja001
berline@bnaja001:~$
```

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.

1. The numbers of IP address broadcast and packets changed

```
berline@bnaja001:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.192  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 2600:8805:a15:5c00:e6b2:db5:9e75:1abc  prefixlen 64  scopeid 0x0<g
lobal>
        inet6 fe80::52a:f0b3:b629:8f98  prefixlen 64  scopeid 0x20<link>
        inet6 2600:8805:a15:5c00::9f71  prefixlen 128  scopeid 0x0<global>
        inet6 2600:8805:a15:5c00:e84c:b54:f00e:2b28  prefixlen 64  scopeid 0x0<g
lobal>
        ether 08:00:27:bd:05:71  txqueuelen 1000  (Ethernet)
        RX packets 325  bytes 259430 (259.4 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 423  bytes 72328 (72.3 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 91  bytes 10231 (10.2 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 91  bytes 10231 (10.2 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

2. The IP address have been changed

```
berline@bnaja001:~$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         _gateway        0.0.0.0         UG    100    0        0 enp0s3
link-local      0.0.0.0         255.255.0.0     U     1000   0        0 enp0s3
192.168.0.0     0.0.0.0         255.255.255.0   U     100    0        0 enp0s3
```

3. everything stay the same

```
berline@bnaja001:~$ netstat -ta
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:domain        0.0.0.0:*               LISTEN
tcp        0      0 localhost:ipp           0.0.0.0:*               LISTEN
tcp6       0      0 ip6-localhost:ipp       [::]:*                  LISTEN
```

4.

```
56 data bytes
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=1 ttl=51 time=98.0 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=2 ttl=51 time=97.5 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=3 ttl=51 time=102 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=4 ttl=51 time=102 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=5 ttl=51 time=113 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=6 ttl=51 time=97.5 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=7 ttl=51 time=96.4 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=8 ttl=51 time=109 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=9 ttl=51 time=97.2 ms
64 bytes from website-content-cache-1.canonical.com (2620:2d:4000:1::26): ic
mp_seq=10 ttl=51 time=113 ms

--- ubuntu.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9013ms
rtt min/avg/max/mdev = 96.352/102.410/112.703/6.206 ms
```

5. Same output

```
berline@bnaja001:~$ host www.odu.edu
www.odu.edu has address 35.170.140.174
berline@bnaja001:~$
```

6. Host name changed to my Midas name

```
berline@bnaja001:~$ cat /etc/hostname
bnaja001
```

7. everything stay the same on DNS sever

```
berline@bnaja001:~$ cat /etc/resolv.conf
# This is /run/systemd/resolve/stub-resolv.conf managed by man:systemd-resol
ved(8).
# Do not edit.
#
# This file might be symlinked as /etc/resolv.conf. If you're looking at
# /etc/resolv.conf and seeing this text, you have followed the symlink.
#
# This is a dynamic resolv.conf file for connecting local clients to the
# internal DNS stub resolver of systemd-resolved. This file lists all
# configured search domains.
#
# Run "resolvectl status" to see details about the uplink DNS servers
# currently in use.
#
# Third party programs should typically not access this file directly, but o
nly
# through the symlink at /etc/resolv.conf. To manage man:resolv.conf(5) in a
# different way, replace this symlink by a static file or a different symlin
k.
#
# See man:systemd-resolved.service(8) for details about the supported modes
of
# operation for /etc/resolv.conf.

nameserver 127.0.0.53
```

3. Highlight the differences at the end of each step and discuss what do you find.