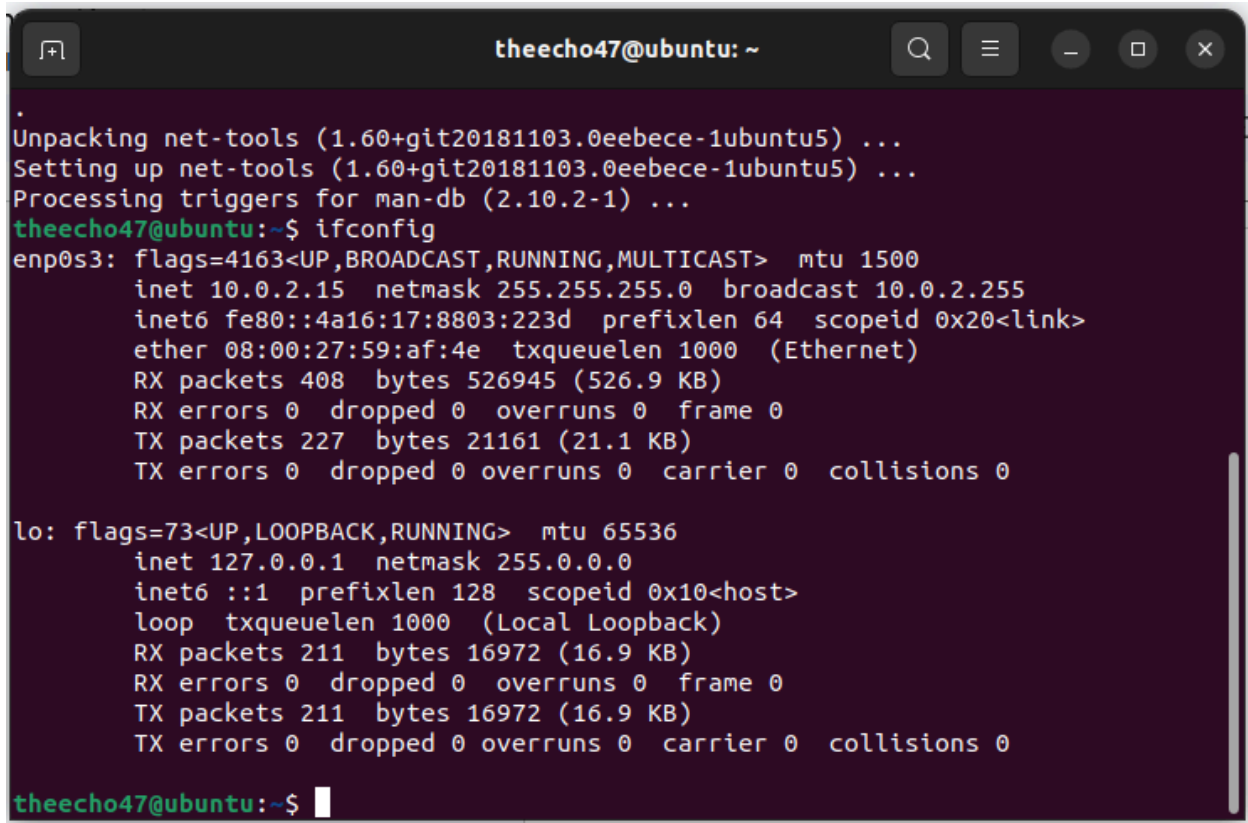


Assignment 1
Akshat Saxena
2022055

GitHub Repo : https://github.com/Akshat22055/CN_Monsoon-24

1. (a) Using 'ifconfig'.



```
theecho47@ubuntu: ~  
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...  
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...  
Processing triggers for man-db (2.10.2-1) ...  
theecho47@ubuntu:~$ 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::4a16:17:8803:223d prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:59:af:4e txqueuelen 1000 (Ethernet)  
    RX packets 408 bytes 526945 (526.9 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 227 bytes 21161 (21.1 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 211 bytes 16972 (16.9 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 211 bytes 16972 (16.9 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
theecho47@ubuntu:~$
```

IP address found : 10.0.2.255

My Public IPv4: 103.25.231.126

1. (b) Go to the webpage <https://www.whatismyip.com> and find out what IP is shown for your machine. Are they identical or different? Why?

Both give different IP addresses.

'Ifconfig' gives the IP address after considering the router's IP address. It takes into account our system's registration into the server and provides the router's IP Address.

WhatsMyIP gives directly the IP address registered for our machine regardless of the server or network or router we are using.

2. Initial IP address

```
theecho47@ubuntu: ~  
.  
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...  
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...  
Processing triggers for man-db (2.10.2-1) ...  
theecho47@ubuntu:~$ 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::4a16:17:8803:223d prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:59:af:4e txqueuelen 1000 (Ethernet)  
    RX packets 408 bytes 526945 (526.9 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 227 bytes 21161 (21.1 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 211 bytes 16972 (16.9 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 211 bytes 16972 (16.9 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
theecho47@ubuntu:~$
```

IP Address Changed using:

```
akshat@akshat-VirtualBox: ~  
akshat@akshat-VirtualBox:~$ sudo ifconfig enp0s3 123.2.3.22 netmask 255.255.255.0
```

Changed IP Address:

```
akshat@akshat-VirtualBox: ~  
akshat@akshat-VirtualBox:~$ sudo ifconfig enp0s3 123.2.3.22 netmask 255.255.255.0  
akshat@akshat-VirtualBox:~$ ifconfig -a  
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 123.2.3.22 netmask 255.255.255.0 broadcast 123.2.3.255  
    inet6 fe80::a00:27ff:fe09:ee19 prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:09:ee:19 txqueuelen 1000 (Ethernet)  
    RX packets 511 bytes 610966 (610.9 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 389 bytes 43332 (43.3 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 159 bytes 14348 (14.3 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 159 bytes 14348 (14.3 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
akshat@akshat-VirtualBox:~$
```

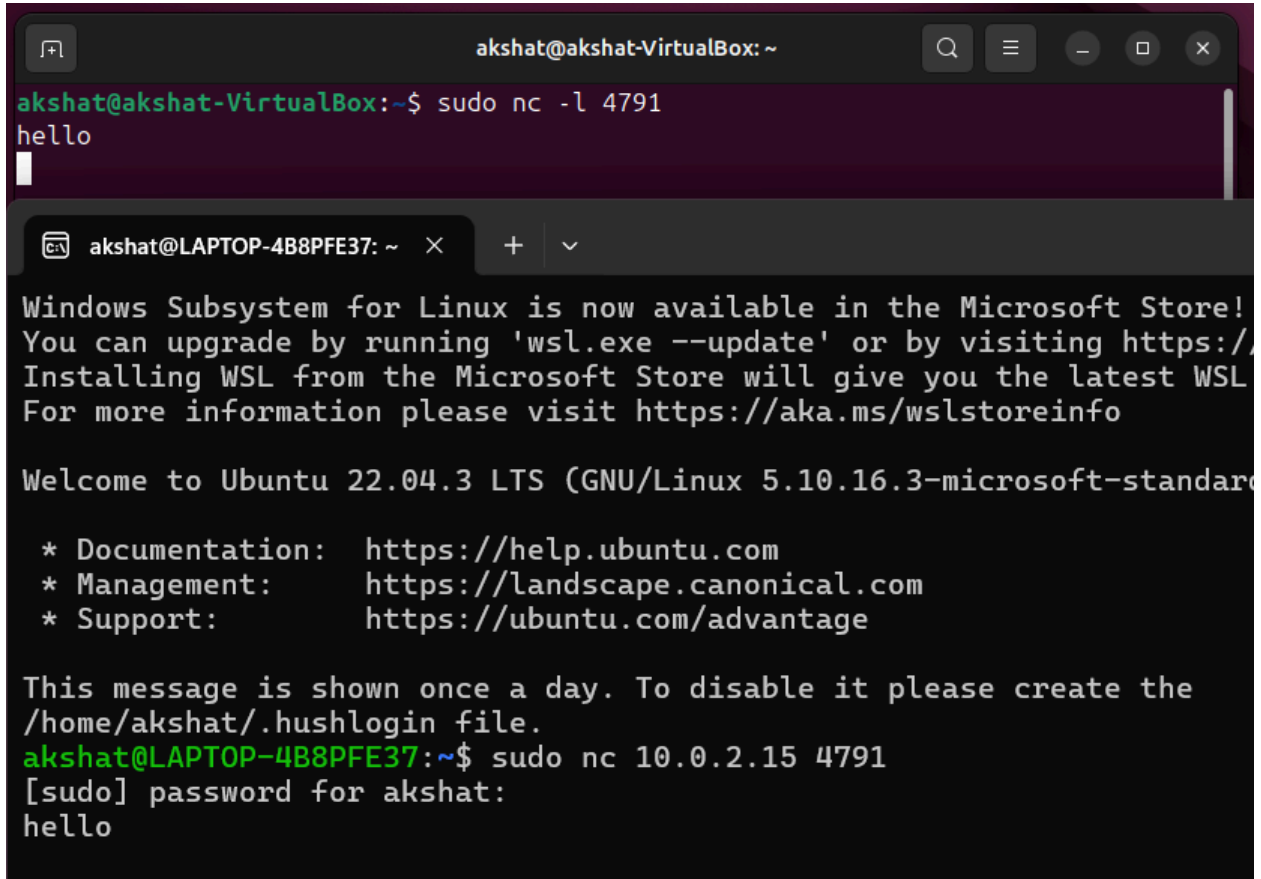
Changing IP address Back to Original:

```
akshat@akshat-VirtualBox: ~  
TX packets 159 bytes 14348 (14.3 KB)  
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
akshat@akshat-VirtualBox:~$ sudo ifconfig enp0s3 10.0.2.15 netmask 255.255.255.0  
akshat@akshat-VirtualBox:~$ ifconfig -a  
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::a00:27ff:fe09:ee19 prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:09:ee:19 txqueuelen 1000 (Ethernet)  
    RX packets 511 bytes 610966 (610.9 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 439 bytes 47669 (47.6 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 210 bytes 19021 (19.0 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 210 bytes 19021 (19.0 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
akshat@akshat-VirtualBox:~$
```

3. (a) Server setup command used: Sudo nc -l 4791

(b) Connection established using netcat using the command: sudo nc 10.0.2.15 4791

Writing 'Hello' on one terminal reflects on the other as well.



The image shows two terminal windows. The top window, titled 'akshat@akshat-VirtualBox: ~', shows a netcat listener command 'sudo nc -l 4791' being executed, followed by the receipt of the word 'hello'. The bottom window, titled 'akshat@LAPTOP-4B8PFE37: ~', shows a Windows Subsystem for Linux (WSL) environment. It displays a welcome message for Ubuntu 22.04.3 LTS, followed by links for documentation, management, and support. Below this, it says 'This message is shown once a day. To disable it please create the /home/akshat/.hushlogin file.' Then, the command 'sudo nc 10.0.2.15 4791' is executed, and after a password prompt, the word 'hello' is sent, which is received by the listener in the top window.

```
akshat@akshat-VirtualBox: ~  
akshat@akshat-VirtualBox:~$ sudo nc -l 4791  
hello  
  
akshat@LAPTOP-4B8PFE37: ~  
Windows Subsystem for Linux is now available in the Microsoft Store!  
You can upgrade by running 'wsl.exe --update' or by visiting https://aka.ms/wslstoreinfo  
Installing WSL from the Microsoft Store will give you the latest WSL  
For more information please visit https://aka.ms/wslstoreinfo  
  
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.10.16.3-microsoft-standard-headers)   
  
 * Documentation:  https://help.ubuntu.com  
 * Management:    https://landscape.canonical.com  
 * Support:        https://ubuntu.com/advantage  
  
This message is shown once a day. To disable it please create the  
/home/akshat/.hushlogin file.  
akshat@LAPTOP-4B8PFE37:~$ sudo nc 10.0.2.15 4791  
[sudo] password for akshat:  
hello
```

4.

(a) Non authoritative result for google : nslookup google.com

Authoritative name servers for google : nslookup -type=ns google.com

```
akshat@akshat-VirtualBox: ~  
akshat@akshat-VirtualBox:~$ nslookup google.com  
Server:          127.0.0.53  
Address:         127.0.0.53#53  
  
Non-authoritative answer:  
Name:   google.com  
Address: 142.250.206.174  
Name:   google.com  
Address: 2404:6800:4002:82d::200e  
  
akshat@akshat-VirtualBox:~$ nslookup -type=ns google.com  
Server:          127.0.0.53  
Address:         127.0.0.53#53  
  
Non-authoritative answer:  
google.com      nameserver = ns1.google.com.  
google.com      nameserver = ns3.google.com.  
google.com      nameserver = ns4.google.com.  
google.com      nameserver = ns2.google.com.  
  
Authoritative answers can be found from:  
ns1.google.com  internet address = 216.239.32.10  
ns1.google.com  has AAAA address 2001:4860:4802:32::a  
ns3.google.com  internet address = 216.239.36.10  
ns4.google.com  internet address = 216.239.38.10  
ns4.google.com  has AAAA address 2001:4860:4802:38::a  
ns2.google.com  internet address = 216.239.34.10  
ns2.google.com  has AAAA address 2001:4860:4802:34::a
```

Authoritative result for google : nslookup google.com ns4.google.com

```
akshat@akshat-VirtualBox:~$ nslookup google.com ns4.google.com  
Server:          ns4.google.com  
Address:         216.239.38.10#53  
  
Name:   google.com  
Address: 142.250.193.46  
Name:   google.com  
Address: 2404:6800:4002:81a::200e  
  
akshat@akshat-VirtualBox:~$
```

4.

(b) Command used to find TTYL for google : dig google.com

We observe the value to be 46, indicating the local DNS server will discard this record after 46 seconds.

```
akshat@akshat-VirtualBox:~$ dig google.com

; <<>> DiG 9.18.24-0ubuntu5-Ubuntu <<>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 25742
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.                IN      A

;; ANSWER SECTION:
google.com.                 46      IN      A      142.250.206.174

;; Query time: 7 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Fri Aug 30 14:03:52 IST 2024
;; MSG SIZE rcvd: 55

akshat@akshat-VirtualBox:~$
```

5. (a)

```
akshat@LAPTOP-4B8PFE37:~$ traceroute google.in
traceroute to google.in (142.250.193.4), 30 hops max, 60 byte packets
 1 LAPTOP-4B8PFE37.mshome.net (172.24.64.1) 0.228 ms 0.209 ms 0.276 ms
 2 192.168.32.254 (192.168.32.254) 44.753 ms 44.748 ms 44.742 ms
 3 vpn.iiitd.edu.in (192.168.1.99) 26.560 ms 26.555 ms 26.551 ms
 4 103.25.231.1 (103.25.231.1) 26.859 ms 26.855 ms 26.851 ms
 5 * * *
 6 10.119.234.162 (10.119.234.162) 26.876 ms 25.878 ms 25.873 ms
 7 72.14.195.56 (72.14.195.56) 25.847 ms 9.398 ms 10.395 ms
 8 142.251.54.111 (142.251.54.111) 55.603 ms 192.178.80.159 (192.178.80.159) 32.517 ms 31.066 ms
 9 142.251.54.89 (142.251.54.89) 27.831 ms 142.251.54.87 (142.251.54.87) 35.067 ms 142.251.54.89 (142.251.54.89) 30.312 ms
10 dell1s14-in-f4.1e100.net (142.250.193.4) 48.016 ms 55.332 ms 47.661 ms
akshat@LAPTOP-4B8PFE37:~$
```

IP address	Average Ping Latency
172.24.64.1	0.237
192.168.32.254	44.747
192.168.32.254	26.5
192.168.1.99	26.855
103.25.231.1	NA
10.119.234.162	26.209
72.14.195.56	15.21
142.251.54.111	39.72
142.251.54.89	31.07
142.250.193.4	50.336

5. (b)

Average latency using command 'ping -c 50 google.in' : 48.201

```
akshat@LAPTOP-4B8PFE37:~$ ping -c 50 google.in
PING google.in (142.250.193.4) 56(84) bytes of data:
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=1 ttl=111 time=48.4 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=2 ttl=111 time=46.3 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=3 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=4 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=5 ttl=111 time=45.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=6 ttl=111 time=46.3 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=7 ttl=111 time=46.4 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=8 ttl=111 time=51.6 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=9 ttl=111 time=46.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=10 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=11 ttl=111 time=46.8 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=12 ttl=111 time=77.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=13 ttl=111 time=46.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=14 ttl=111 time=45.8 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=15 ttl=111 time=56.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=16 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=17 ttl=111 time=46.4 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=18 ttl=111 time=45.8 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=19 ttl=111 time=46.6 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=20 ttl=111 time=45.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=21 ttl=111 time=46.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=22 ttl=111 time=46.6 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=23 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=24 ttl=111 time=55.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=25 ttl=111 time=46.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=26 ttl=111 time=46.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=27 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=28 ttl=111 time=46.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=29 ttl=111 time=46.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=30 ttl=111 time=55.2 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=31 ttl=111 time=65.4 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=32 ttl=111 time=47.2 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=33 ttl=111 time=50.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=34 ttl=111 time=45.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=35 ttl=111 time=46.3 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=36 ttl=111 time=45.8 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=37 ttl=111 time=48.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=38 ttl=111 time=46.2 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=39 ttl=111 time=46.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=40 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=41 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=42 ttl=111 time=49.7 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=43 ttl=111 time=46.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=44 ttl=111 time=45.8 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=45 ttl=111 time=46.2 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=46 ttl=111 time=45.9 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=47 ttl=111 time=46.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=48 ttl=111 time=46.0 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=49 ttl=111 time=47.1 ms
64 bytes from dell1s14-in-f4.1e100.net (142.250.193.4): icmp_seq=50 ttl=111 time=46.2 ms

--- google.in ping statistics ---
50 packets transmitted, 50 received, 0% packet loss, time 49080ms
rtt min/avg/max/mdev = 45.773/48.201/77.120/5.440 ms
akshat@LAPTOP-4B8PFE37:~$
```

5. (c)

Total Ping Latency : 234.384

Average Ping Latency in (a) is : 26.042

Average Latency in (b) is : 48.201

The averages differ because the ping command measures the total time it takes for data to travel to a server and back, while the traceroute command shows the time it takes for data to reach each step along the way to the server.

5.(d)

Max latency with traceroute : 55

Max Latency with Ping : 77

This is observed because the time taken for packets to reach each hop along the route to the server is less than a round trip record.

5.(e)

The times listed are how long it takes for packets to travel back and forth. If the times are similar, it means the connection is steady for that step. If the times vary, it could mean the network is experiencing some issues.

5. (f)

```
akshat@LAPTOP-4B8PFE37:~$ traceroute stanford.edu
traceroute to stanford.edu (171.67.215.200), 30 hops max, 60 byte packets
 1 LAPTOP-4B8PFE37.mshome.net (172.24.64.1)  0.340 ms  0.322 ms  0.313 ms
 2 192.168.32.254 (192.168.32.254)  34.381 ms  34.360 ms  16.403 ms
 3 auth.iiitd.edu.in (192.168.1.99)  10.716 ms  10.711 ms  10.707 ms
 4 103.25.231.1 (103.25.231.1)  11.242 ms  11.237 ms  11.232 ms
 5 10.1.209.201 (10.1.209.201)  34.899 ms  34.896 ms  34.892 ms
 6 10.1.200.137 (10.1.200.137)  34.887 ms  33.734 ms  33.727 ms
 7 10.255.238.122 (10.255.238.122)  55.090 ms  52.124 ms  52.103 ms
 8 180.149.48.18 (180.149.48.18)  38.457 ms  38.014 ms  37.935 ms
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 campus-ial-nets-b-vl1104.SUNet (171.66.255.200)  290.898 ms  *  *
26 web.stanford.edu (171.67.215.200)  286.807 ms  *  285.999 ms
akshat@LAPTOP-4B8PFE37:~$
```

5.(g)

Number of Hops Google : 10

Number of Hops Stanford : 26

Stanford>Google


```

akshat@LAPTOP-4B8PFE37:~$ ping stanford.edu
PING stanford.edu (171.67.215.200) 56(84) bytes of data.
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=1 ttl=241 time=291 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=2 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=3 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=4 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=5 ttl=241 time=298 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=6 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=7 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=8 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=9 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=10 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=11 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=12 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=13 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=14 ttl=241 time=286 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=15 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=16 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=17 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=18 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=19 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=20 ttl=241 time=285 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=21 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=22 ttl=241 time=286 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=23 ttl=241 time=285 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=24 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=25 ttl=241 time=293 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=26 ttl=241 time=287 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=27 ttl=241 time=293 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=28 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=29 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=30 ttl=241 time=287 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=31 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=32 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=33 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=34 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=35 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=36 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=37 ttl=241 time=287 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=38 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=39 ttl=241 time=317 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=40 ttl=241 time=292 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=41 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=42 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=43 ttl=241 time=286 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=44 ttl=241 time=285 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=45 ttl=241 time=285 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=46 ttl=241 time=283 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=47 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=48 ttl=241 time=286 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=49 ttl=241 time=284 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=50 ttl=241 time=291 ms
^C
--- stanford.edu ping statistics ---
51 packets transmitted, 50 received, 1.96078% packet loss, time 50018ms
rtt min/avg/max/mdev = 282.734/285.985/317.036/5.472 ms

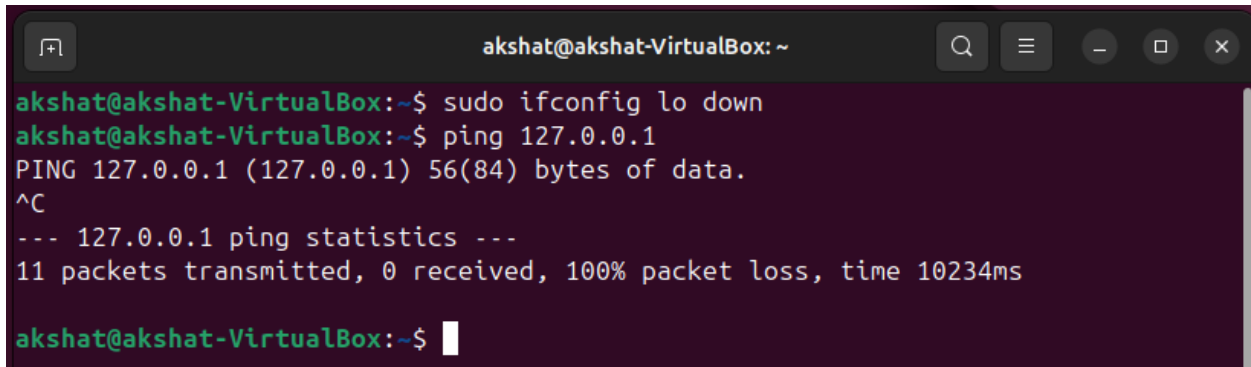
```

5.(h)

When you connect to Google.in, there are fewer steps and quicker response times because Google's servers are nearby, and their network is highly optimized. On the other hand, connecting to Stanford.edu might take more steps and be slower because Stanford's servers are in the U.S., which is farther away, and the connection uses public networks with less optimization.

6.

Command used to disable the loopback interface of the system : `sudo ifconfig lo down`
System is no longer able to send or receive traffic either to or from itself through 127.0.0.1
Therefore, result is 100% packet loss



```
akshat@akshat-VirtualBox: ~  
akshat@akshat-VirtualBox:~$ sudo ifconfig lo down  
akshat@akshat-VirtualBox:~$ ping 127.0.0.1  
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.  
^C  
--- 127.0.0.1 ping statistics ---  
11 packets transmitted, 0 received, 100% packet loss, time 10234ms  
  
akshat@akshat-VirtualBox:~$
```