Assignment 1
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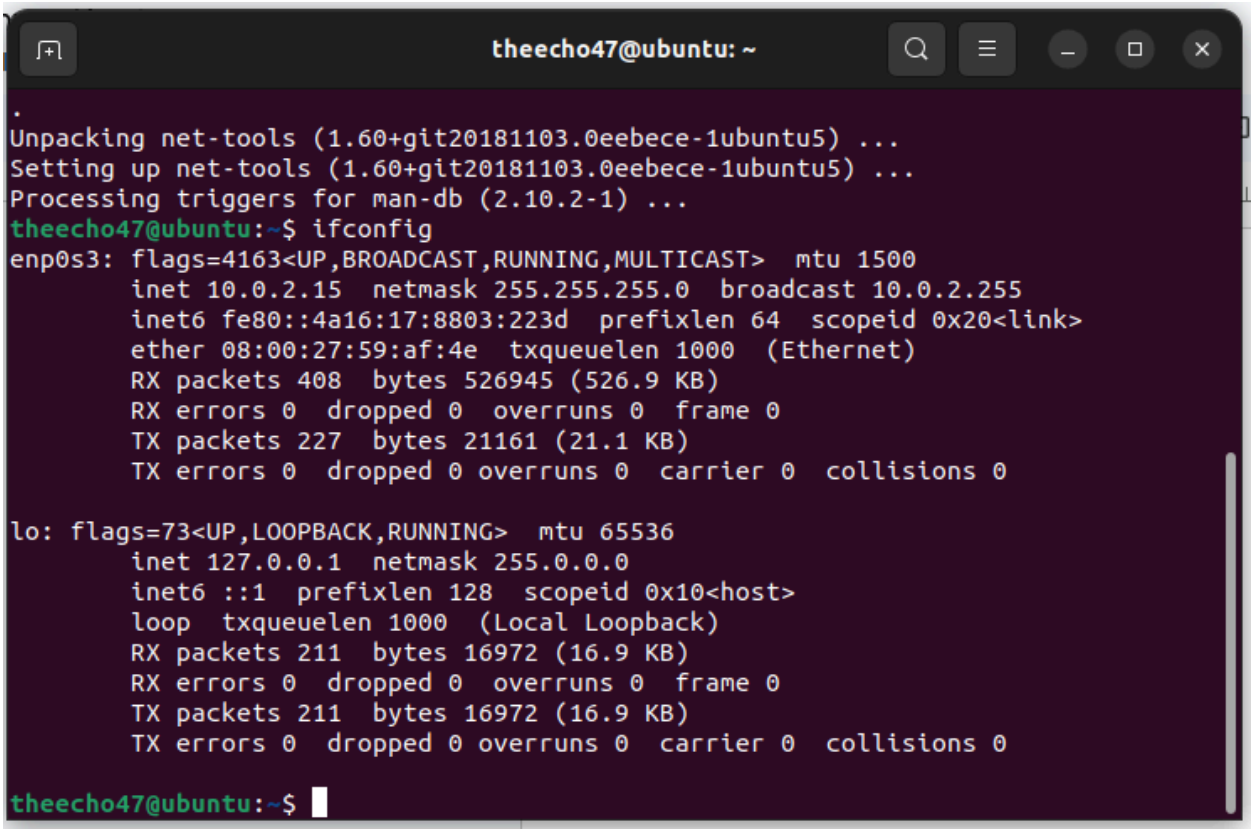
GitHub Repo : https://github.com/Akshat22055/CN_Monsoon-24

1. (a) Using ‘ifconfig’.

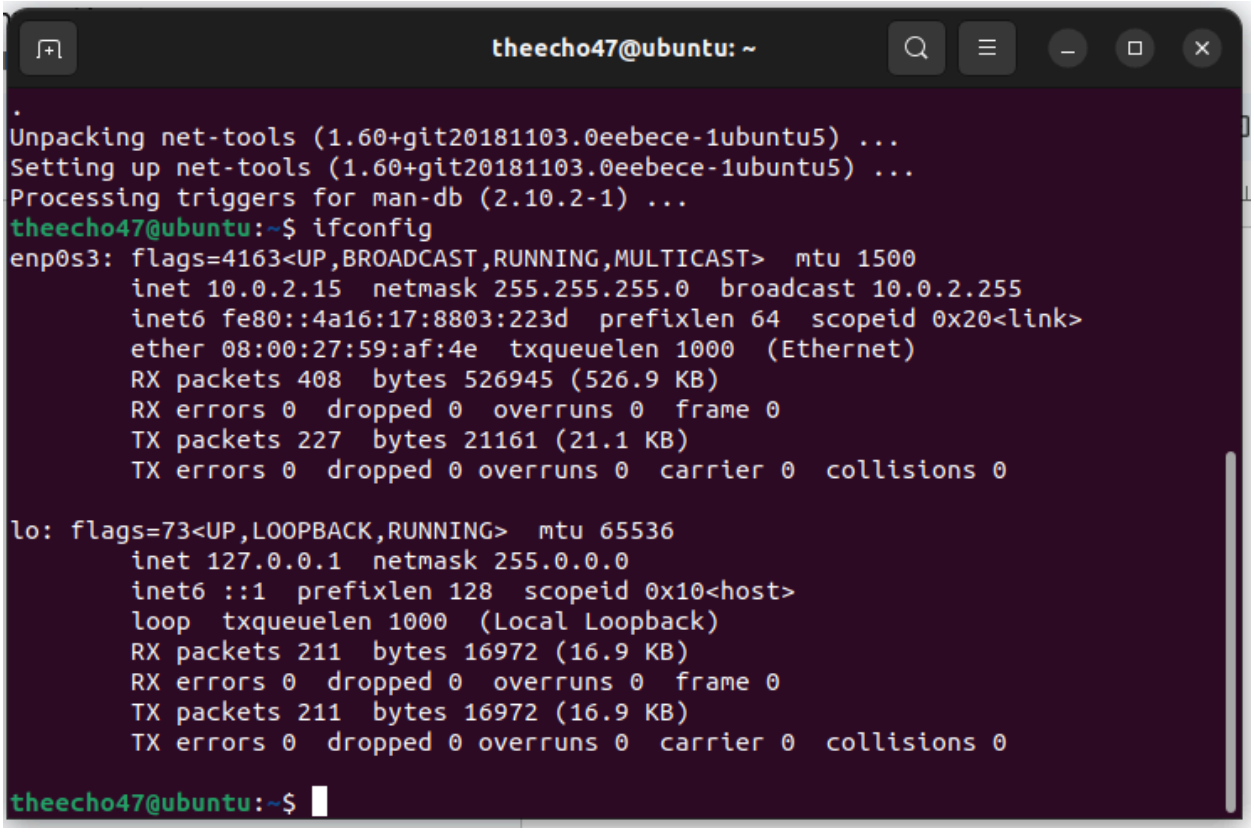


IP address found : 10.0.2.255
My Public IPv4: 103.25.231.126

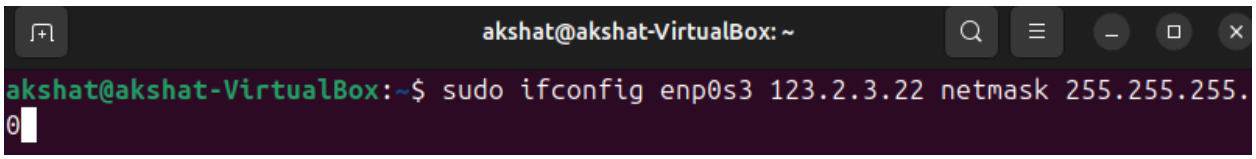
1. (b) Go to the webpage https://www.whatismyip.com and find out what IP is shown for your machine. Are they identical or different? Why?

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.

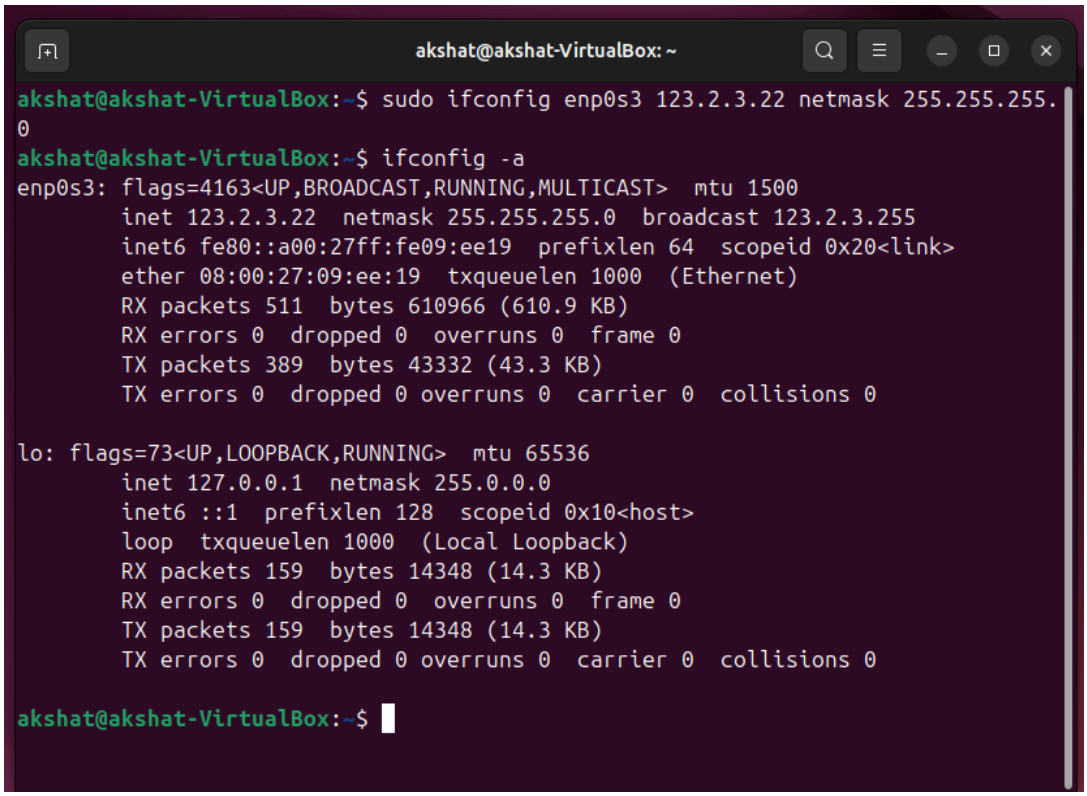
2. Initial IP address



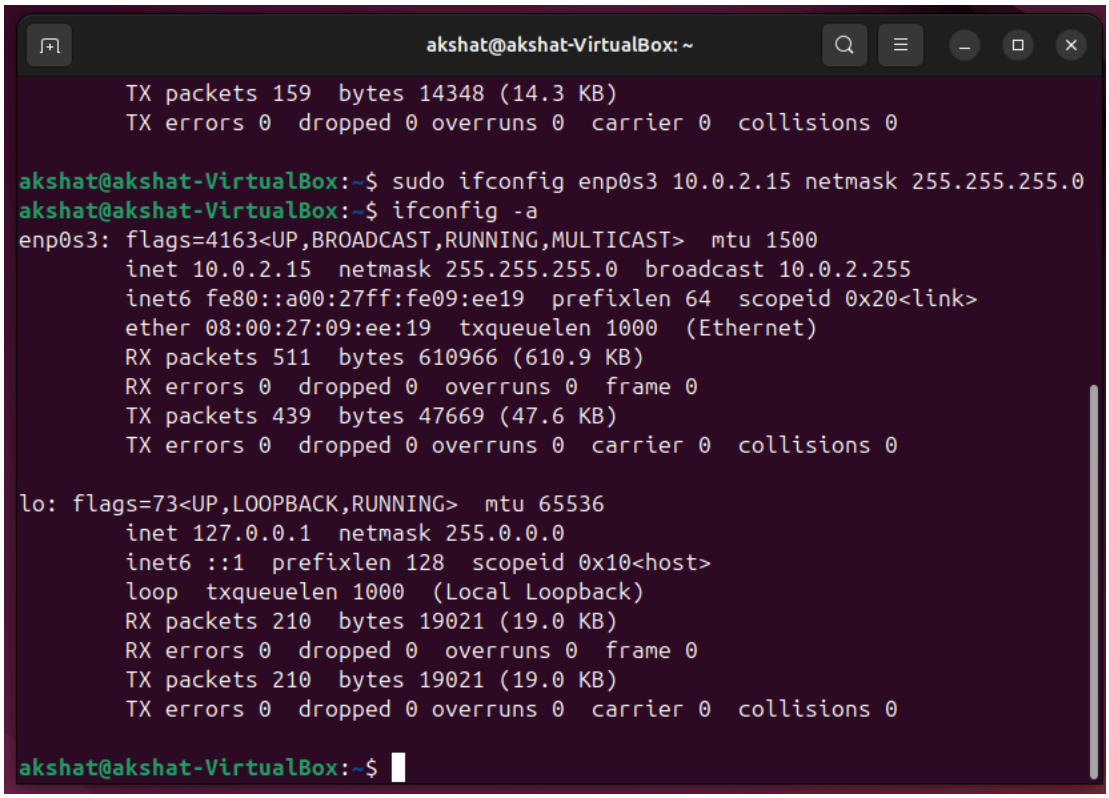
IP Address Changed using:



Changed IP Address:

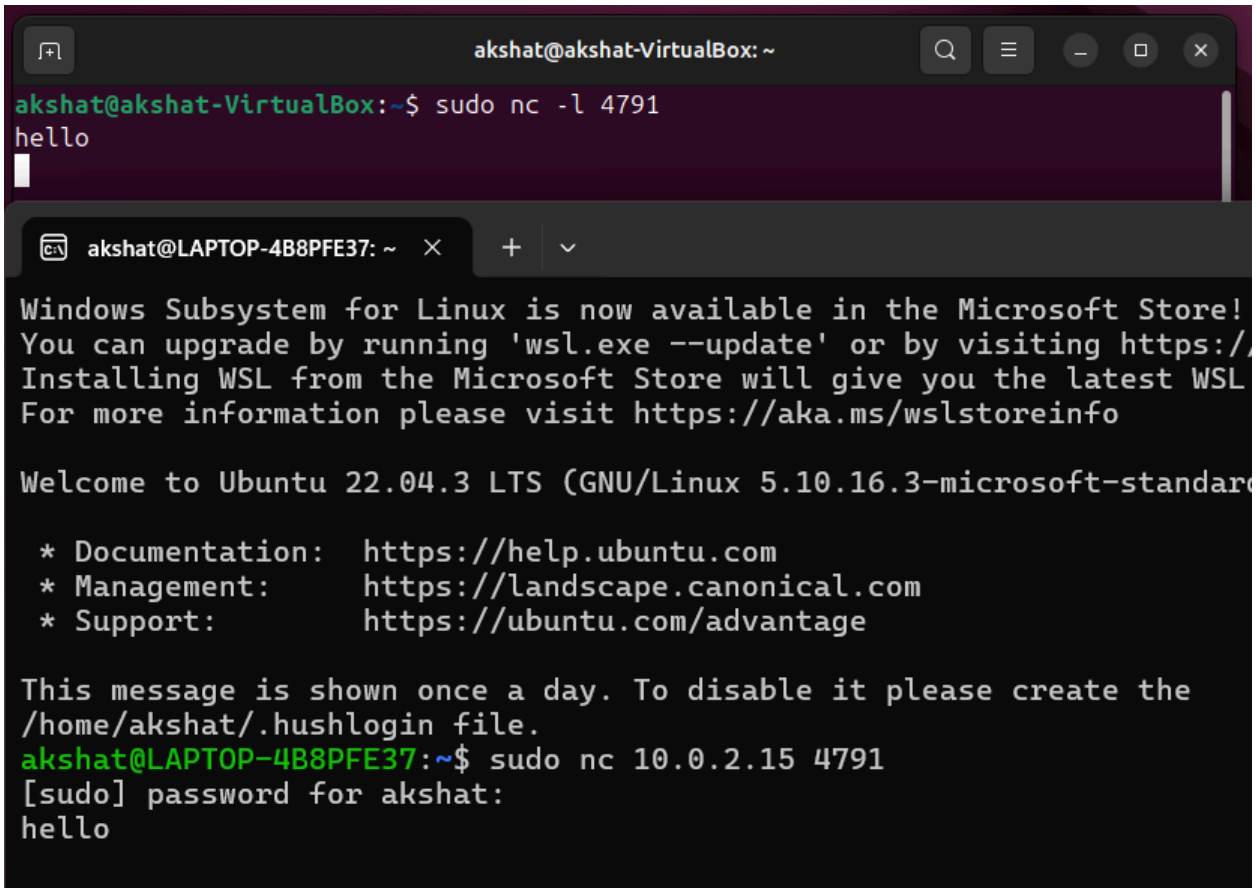


Changing IP address Back to Original:



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

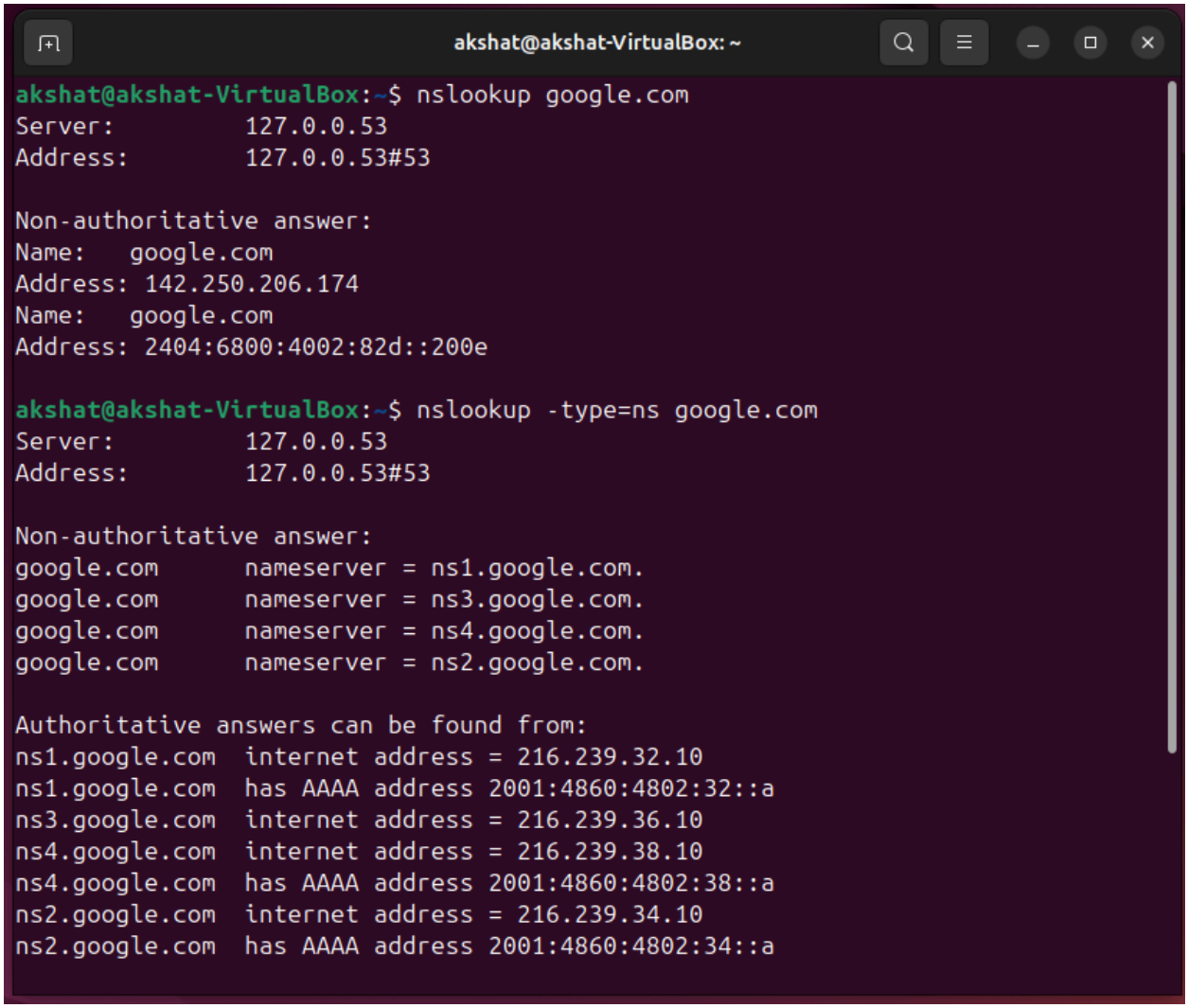
(b) Connection established using netcat using the command: sudo nc 10.0.2.15 4791
Writing ‘Hello’ on one terminal reflects on the other as well.



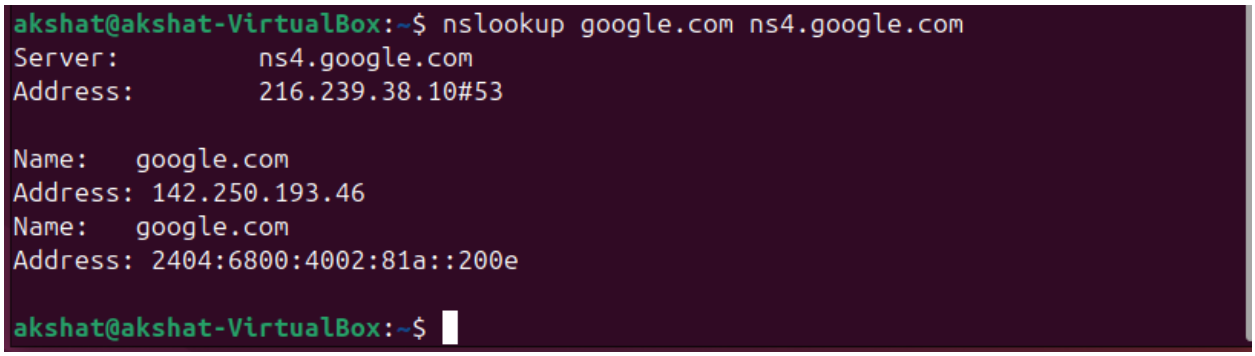
4.

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

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



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



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  del11s14-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 del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=1 ttl=111 time=48.4 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=2 ttl=111 time=46.3 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=3 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=4 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=5 ttl=111 time=45.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=6 ttl=111 time=46.3 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=7 ttl=111 time=46.4 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=8 ttl=111 time=51.6 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=9 ttl=111 time=46.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=10 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=11 ttl=111 time=46.8 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=12 ttl=111 time=77.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=13 ttl=111 time=46.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=14 ttl=111 time=45.8 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=15 ttl=111 time=56.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=16 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=17 ttl=111 time=46.4 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=18 ttl=111 time=45.8 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=19 ttl=111 time=46.6 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=20 ttl=111 time=45.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=21 ttl=111 time=46.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=22 ttl=111 time=48.6 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=23 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=24 ttl=111 time=55.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=25 ttl=111 time=46.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=26 ttl=111 time=46.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=27 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=28 ttl=111 time=46.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=29 ttl=111 time=46.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=30 ttl=111 time=55.2 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=31 ttl=111 time=65.4 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=32 ttl=111 time=47.2 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=33 ttl=111 time=50.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=34 ttl=111 time=45.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=35 ttl=111 time=46.3 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=36 ttl=111 time=45.8 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=37 ttl=111 time=48.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=38 ttl=111 time=46.2 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=39 ttl=111 time=46.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=40 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=41 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=42 ttl=111 time=49.7 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=43 ttl=111 time=46.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=44 ttl=111 time=45.8 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=45 ttl=111 time=46.2 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=46 ttl=111 time=45.9 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=47 ttl=111 time=46.1 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=48 ttl=111 time=46.0 ms
64 bytes from del11s14-in-f4.1e100.net (142.250.193.4): icmp_seq=49 ttl=111 time=47.1 ms
64 bytes from del11s14-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.

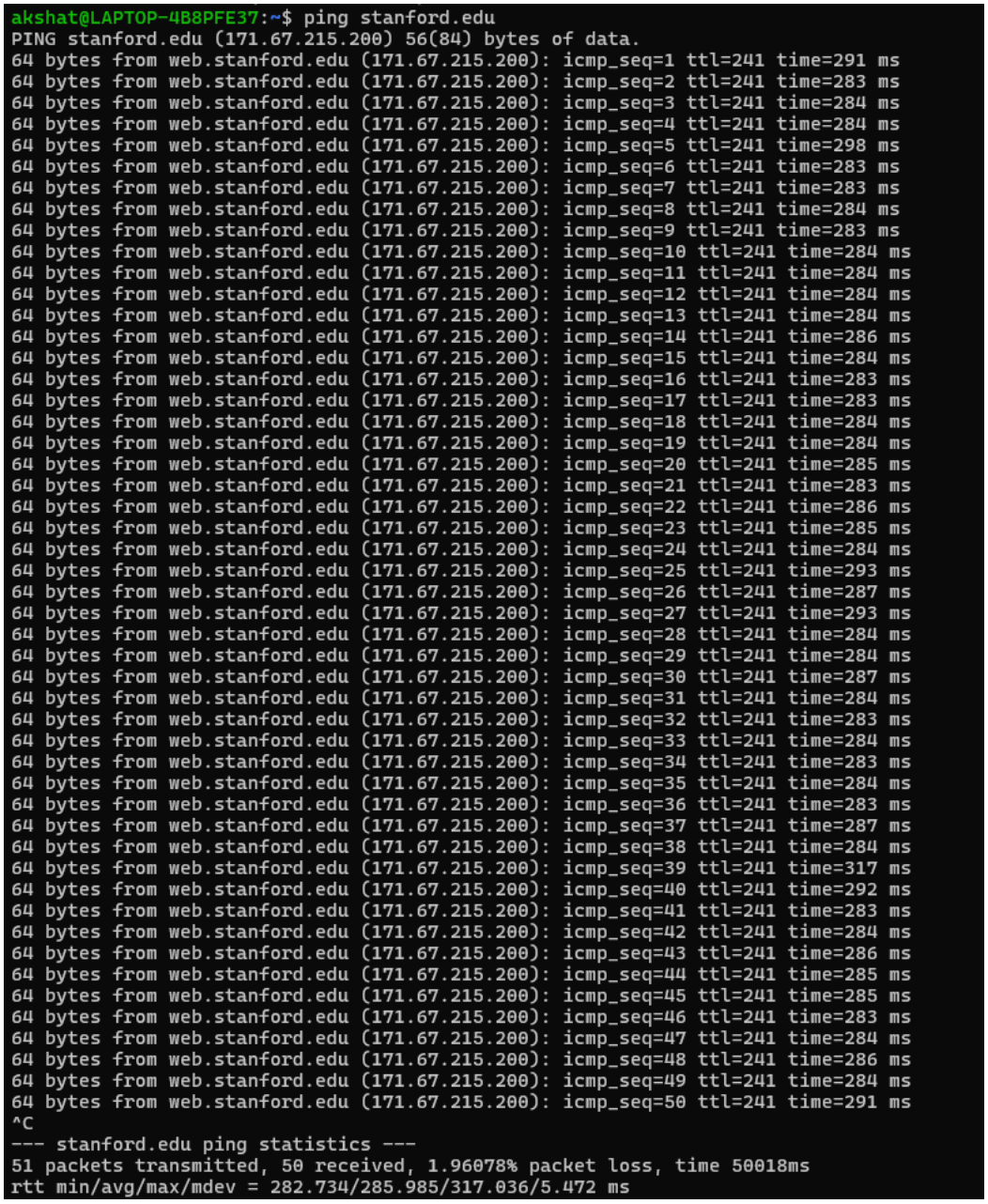
5.(e)

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



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