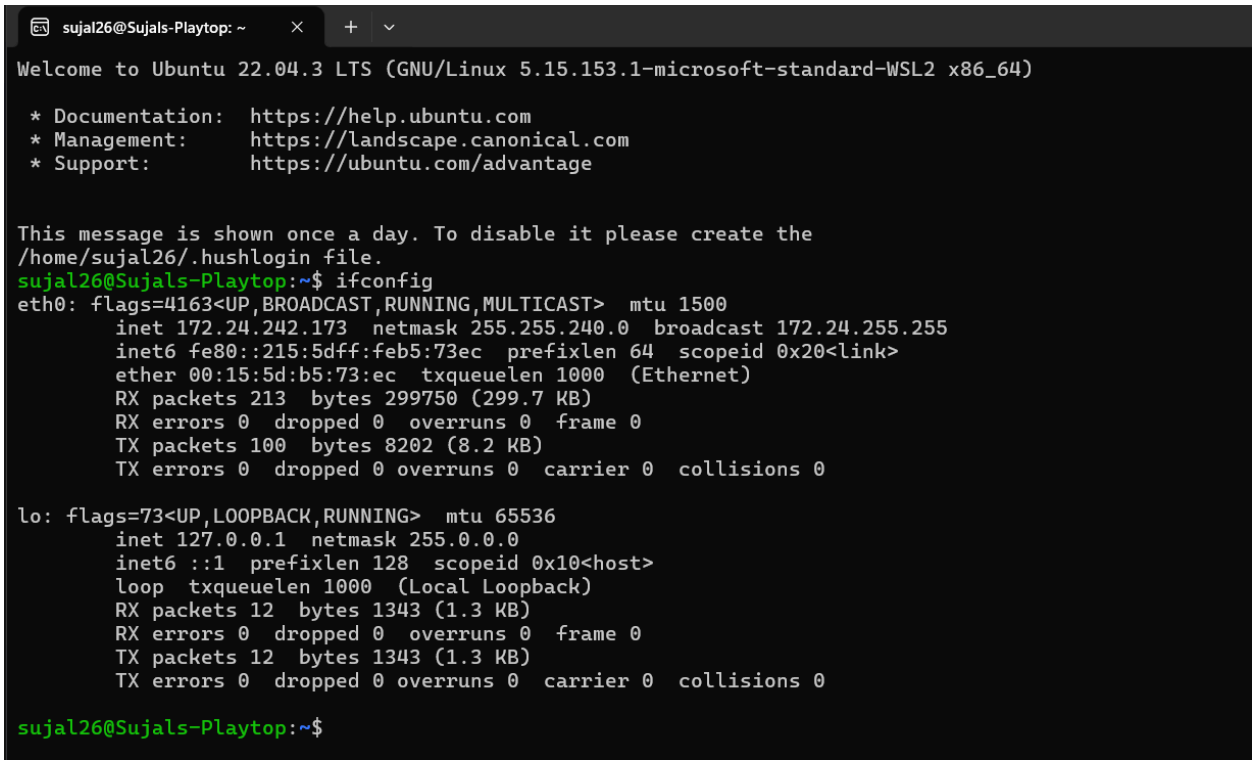
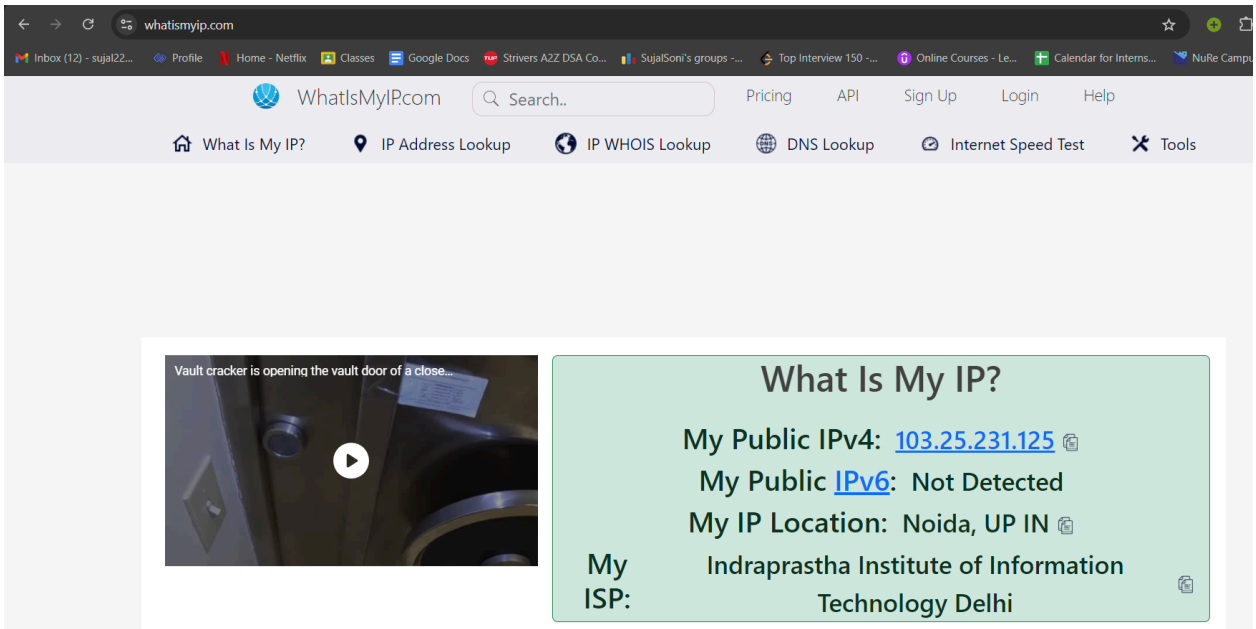
Assignment - 1

- Sujal Soni (2022513)

Q1. a.) Ip address of my network interface using ifconfig command is 172.24.242.173



b.) My IP address is as shown on whatismyip.com is 103.25.231.125



Both of these addresses are not identical. This is because ifconfig gives the private IP address of the machine and whatismyip.com gives the public IP address of our machine and these both are different.

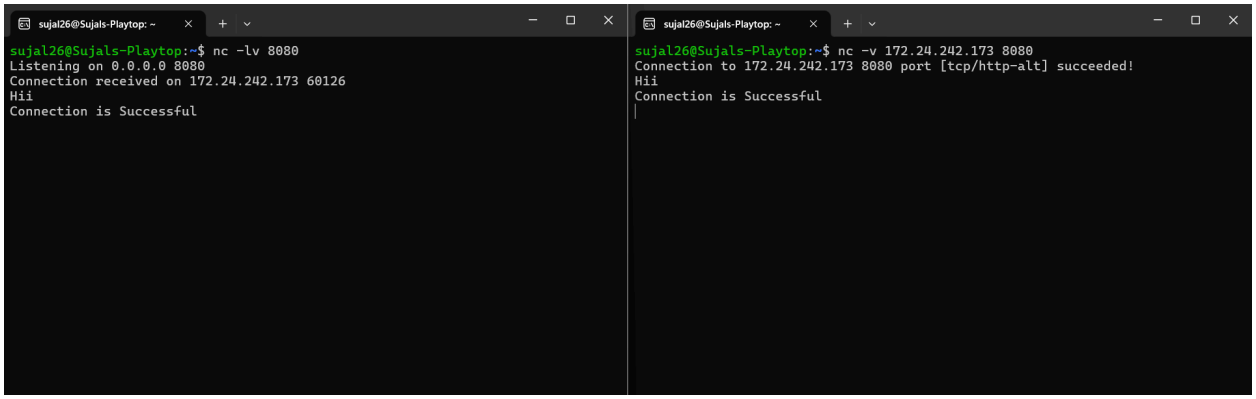
Q2. Changed the private IP address to 172.24.242.101 from 172.24.242.173

```
sujal26@Sujals-Playtop:~$ sudo ifconfig eth0 172.24.242.101
[sudo] password for sujal26:
sujal26@Sujals-Playtop:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.24.242.101  netmask 255.255.0.0  broadcast 172.24.255.255
        inet6 fe80::215:5dff:feb5:73ec  prefixlen 64  scopeid 0x20<link>
        ether 00:15:5d:b5:73:ec  txqueuelen 1000  (Ethernet)
        RX packets 12635  bytes 18665002 (18.6 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1446  bytes 154752 (154.7 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 36  bytes 3641 (3.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 36  bytes 3641 (3.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

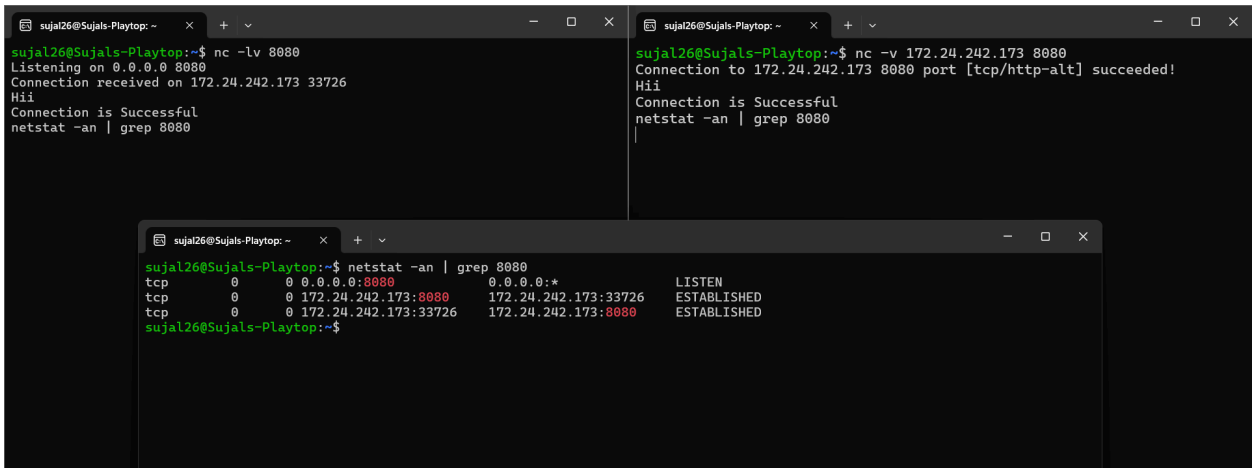
Reverting back to original ip address

```
sujal26@Sujals-Playtop:~$ sudo ifconfig eth0 172.24.242.173
sujal26@Sujals-Playtop:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.24.242.173  netmask 255.255.0.0  broadcast 172.24.255.255
        inet6 fe80::215:5dff:feb5:73ec  prefixlen 64  scopeid 0x20<link>
        ether 00:15:5d:b5:73:ec  txqueuelen 1000  (Ethernet)
        RX packets 12643  bytes 18666742 (18.6 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1446  bytes 154752 (154.7 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 36  bytes 3641 (3.6 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 36  bytes 3641 (3.6 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Q3. a.) Connection established using ‘nc’ command on port 8080.



b.) The state of tcp connections are shown in the screenshot below.



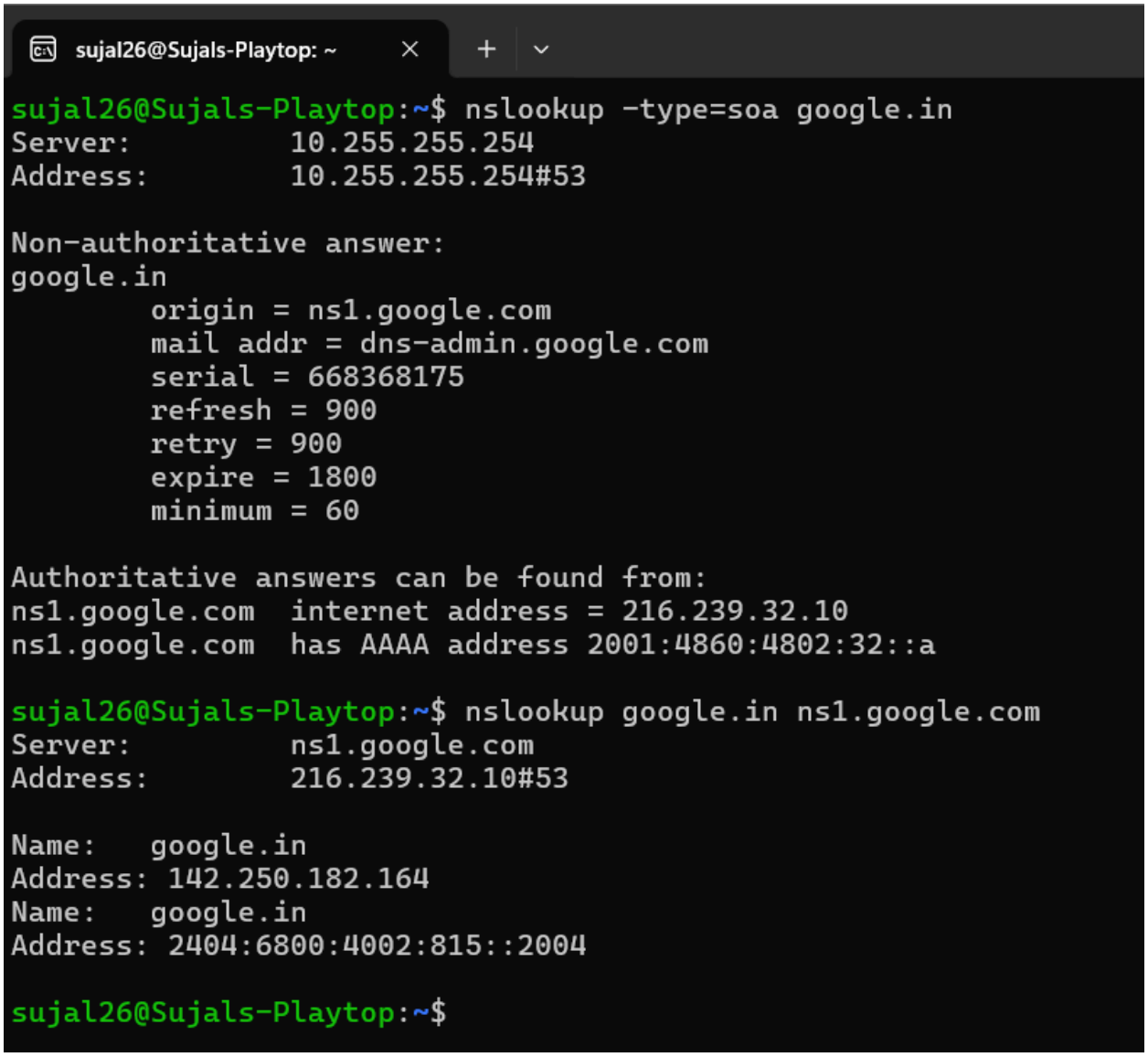
Q4.

a.) We get the authoritative answers for google.in by using SOA(Start of Authority) records.

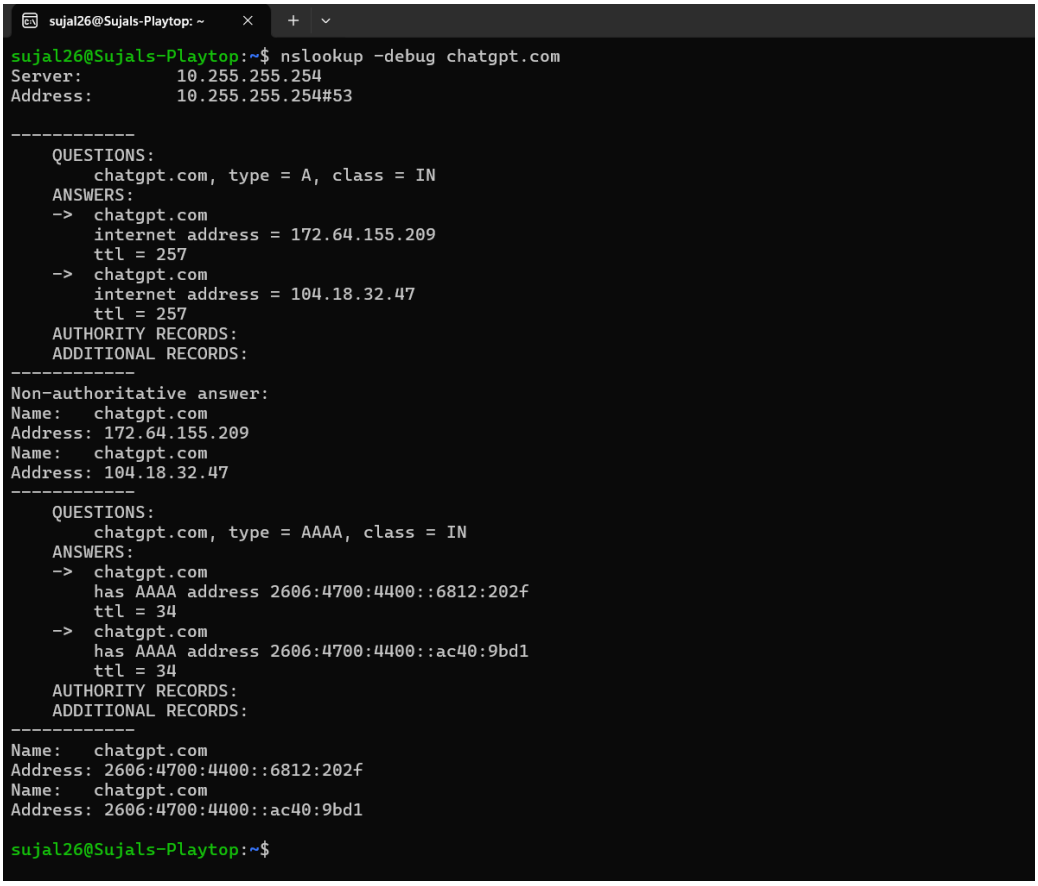
The SOA record provides administrative information about the zone, including the primary authoritative name server and contact details and various timers.

Then by using nslookup for authoritative nameserver

(in this case ns1.google.com) we got authoritative results for google.in.



b.) I looked up Time To Live(ttl) for chatgpt.com using the nslookup command using -debug flag.
For A records it shows ttl = 257. This value is in seconds.
Therefore in 257 seconds this entry will be removed from the Local DNS server.



Q5

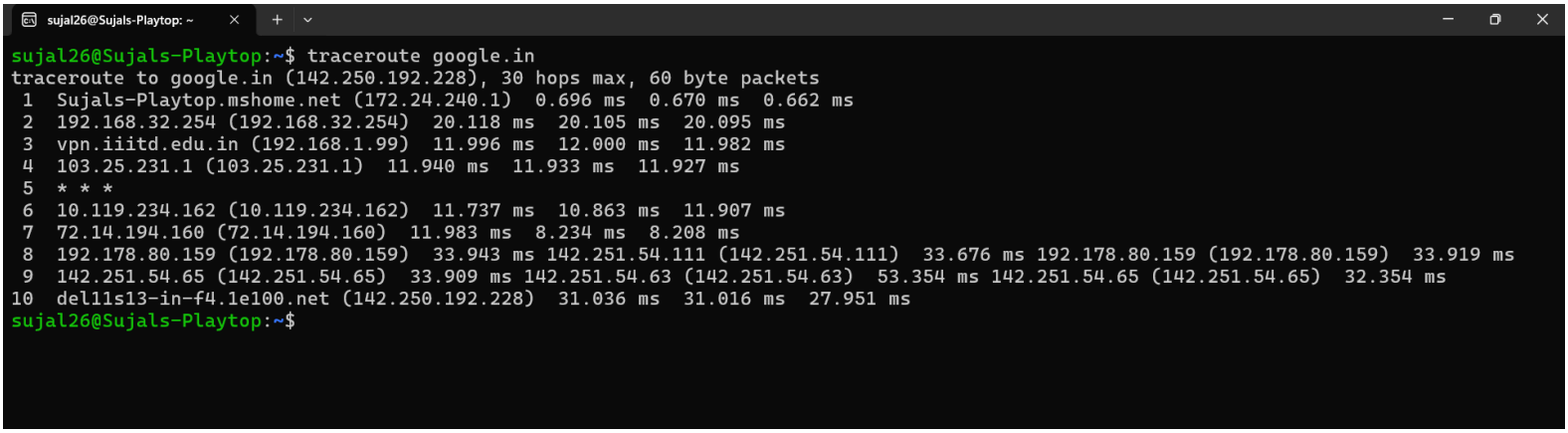
a.) On running “traceroute google.in” we see 10 intermediate hosts out of which 1 is “* * *”.

The IP addresses of these are

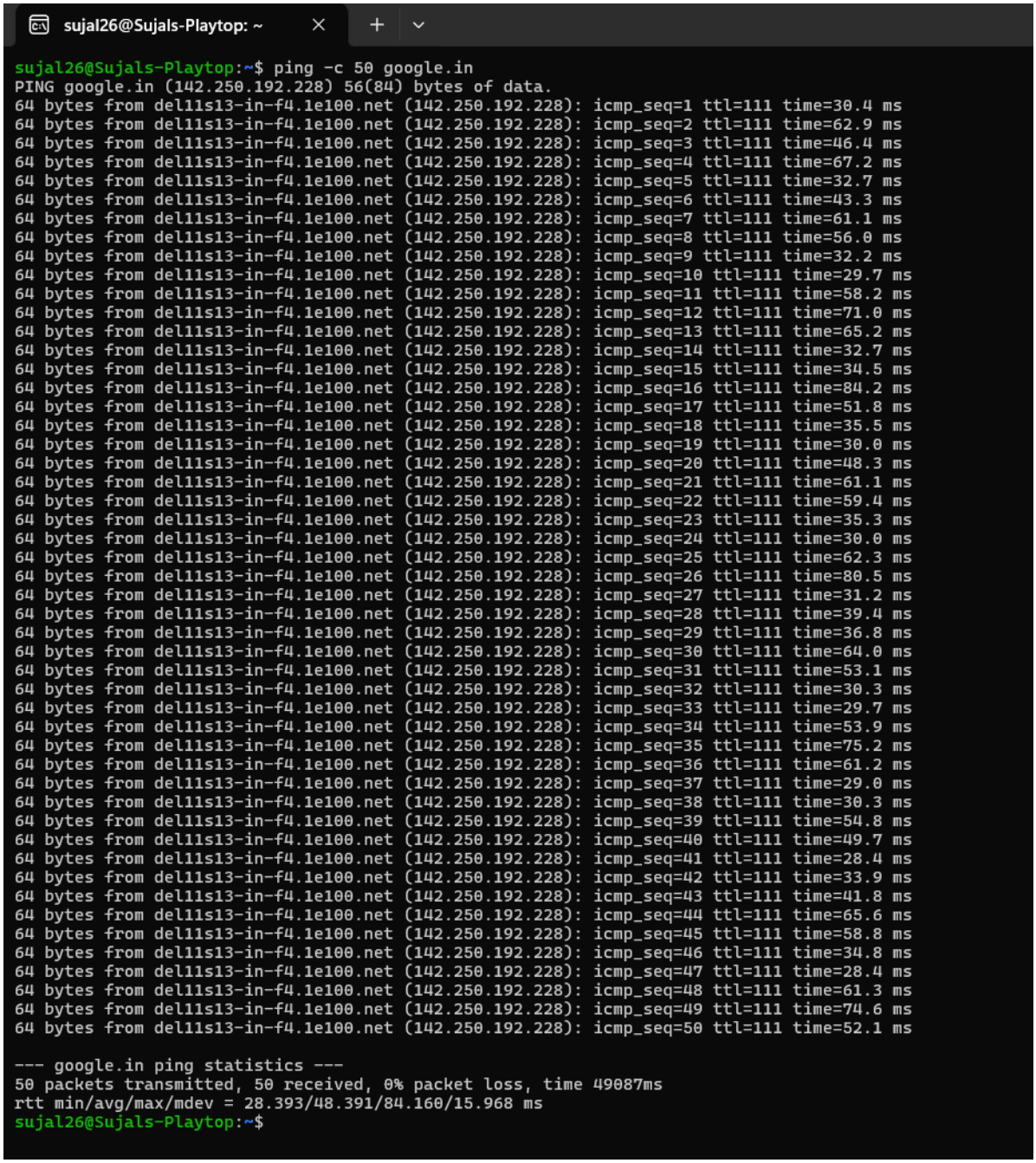
- Sujals-Playtop.mshome.net (172.24.240.1)
- 192.168.32.254 (192.168.32.254)
- vpn.iiitd.edu.in (192.168.1.99)
- 103.25.231.1 (103.25.231.1)
- 10.119.234.162 (10.119.234.162)
- 72.14.194.160 (72.14.194.160)
- 192.178.80.159 (192.178.80.159)
- 142.251.54.65 (142.251.54.65)
- del11s13-in-f4.1e100.net (142.250.192.228)

Average Latency to each intermediate hosts are :-

Hosts	Avg. Latency
Sujals-Playtop.mshome.net (172.24.240.1)	0.676 ms
192.168.32.254 (192.168.32.254)	20.106 ms
vpn.iiitd.edu.in (192.168.1.99)	11.992 ms
103.25.231.1 (103.25.231.1)	11.953 ms
10.119.234.162 (10.119.234.162)	11.502 ms
72.14.194.160 (72.14.194.160)	9.475 ms
192.178.80.159 (192.178.80.159)	33.846 ms
142.251.54.65 (142.251.54.65)	39.872 ms
del11s13-in-f4.1e100.net (142.250.192.228)	30.001 ms



b.) Average round trip time of 50 ping messages to google.in is 48.391 ms.



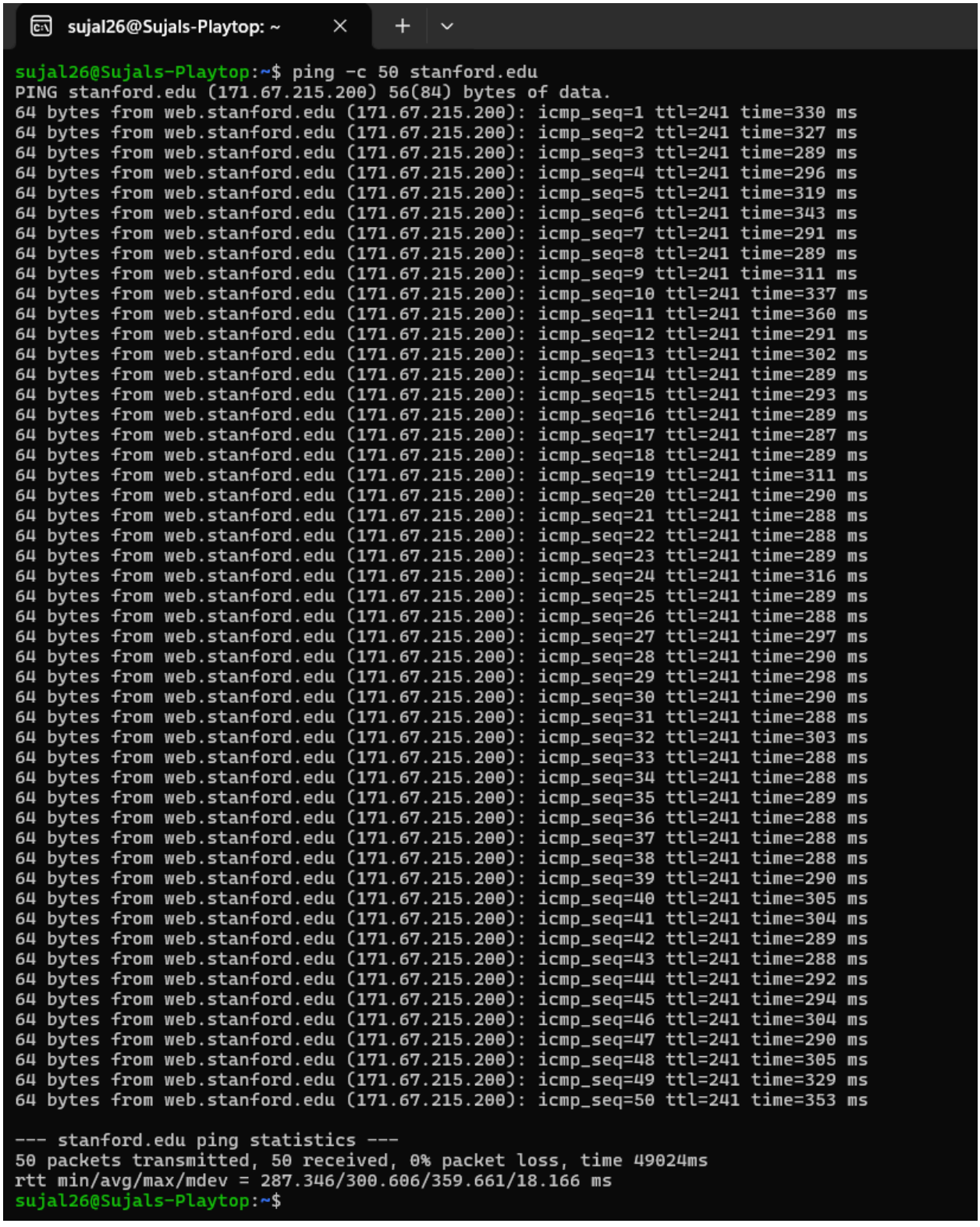
c.) No, adding up the latencies of part a) does not match with average latency found in part b), rather the difference is noticeable. Adding latencies of part (a) gives 169.423 ms whereas part (b) gives 48.391 ms.
The ping command measures the round-trip time directly to google.in, while the traceroute shows the cumulative latency to each intermediate hop. Some differences can arise due to network congestion, different routing paths, or how the ping and traceroute commands measure time.

d.) Maximum latency from traceroute google.in is 53.354 ms
Avg ping latency using ping google.in is 48.391 ms.

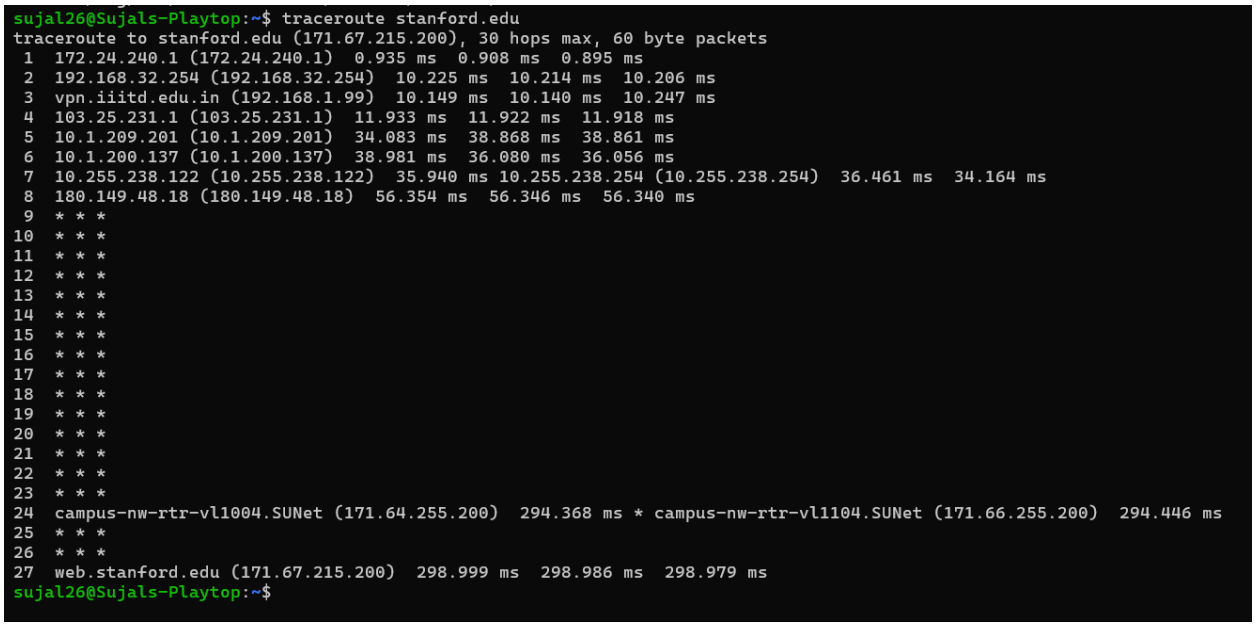
The traceroute shows the latency to intermediate hosts, while the ping measures the round-trip time to the final destination (Google.in).
Network conditions may fluctuate, causing variations in response times.
Some intermediate routers or hosts may introduce delays that are not representative of the end-to-end path.

e.) Multiple entries for a single hop in traceroute represent the round-trip times for multiple probe packets sent to that hop.
These entries help give a more detailed view of the variability in network performance at each step along the route to the destination.
This allows you to see how consistent or variable the latency is for a given hop, which can help diagnose network issues such as congestion or instability.

f.) The average ping latency for 50 ping messages to stanford.edu is 300.606 ms


sujal26@Sujals-Playtop: ~
sujal26@Sujals-Playtop:~$ ping -c 50 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=330 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=2 ttl=241 time=327 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=3 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=4 ttl=241 time=296 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=5 ttl=241 time=319 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=6 ttl=241 time=343 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=7 ttl=241 time=291 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=8 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=9 ttl=241 time=311 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=10 ttl=241 time=337 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=11 ttl=241 time=360 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=12 ttl=241 time=291 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=13 ttl=241 time=302 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=14 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=15 ttl=241 time=293 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=16 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=17 ttl=241 time=287 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=18 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=19 ttl=241 time=311 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=20 ttl=241 time=290 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=21 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=22 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=23 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=24 ttl=241 time=316 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=25 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=26 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=27 ttl=241 time=297 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=28 ttl=241 time=290 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=29 ttl=241 time=298 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=30 ttl=241 time=290 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=31 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=32 ttl=241 time=303 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=33 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=34 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=35 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=36 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=37 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=38 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=39 ttl=241 time=290 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=40 ttl=241 time=305 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=41 ttl=241 time=304 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=42 ttl=241 time=289 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=43 ttl=241 time=288 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=44 ttl=241 time=292 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=45 ttl=241 time=294 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=46 ttl=241 time=304 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=47 ttl=241 time=290 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=48 ttl=241 time=305 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=49 ttl=241 time=329 ms
64 bytes from web.stanford.edu (171.67.215.200): icmp_seq=50 ttl=241 time=353 ms
--- stanford.edu ping statistics ---
50 packets transmitted, 50 received, 0% packet loss, time 49024ms
rtt min/avg/max/mdev = 287.346/300.606/359.661/18.166 ms
sujal26@Sujals-Playtop:~$

g.) Number of hops for traceroute stanford.edu is 27 out of which 17 are hidden.
Number of hops for traceroute google.in were 10 out of which 1 was hidden.



h.) Average ping latency for ping google.in is 48.391 ms
Average ping latency for ping stanford.edu 300.606 ms

Possible Possible Reasons for Latency Differences :-

Geographical Distance: The physical distance between me and the servers can significantly affect latency. Google.in has its servers in India whereas stanford.edu has its servers in California.
Network Path and Routing: The number of hops and the efficiency of the routing path can impact latency. More hops or less optimized paths can increase latency. In this case google.in has 10 hops which is significantly lower than 27 hops for stanford.edu.

Q6.

To make the ping command fail for 127.0.0.1 which is the private IP address for ‘lo’ Network interface I just turned down the network interface. Now as the interface is down no probe packets will be received, Hence we will get 100% packet loss.