

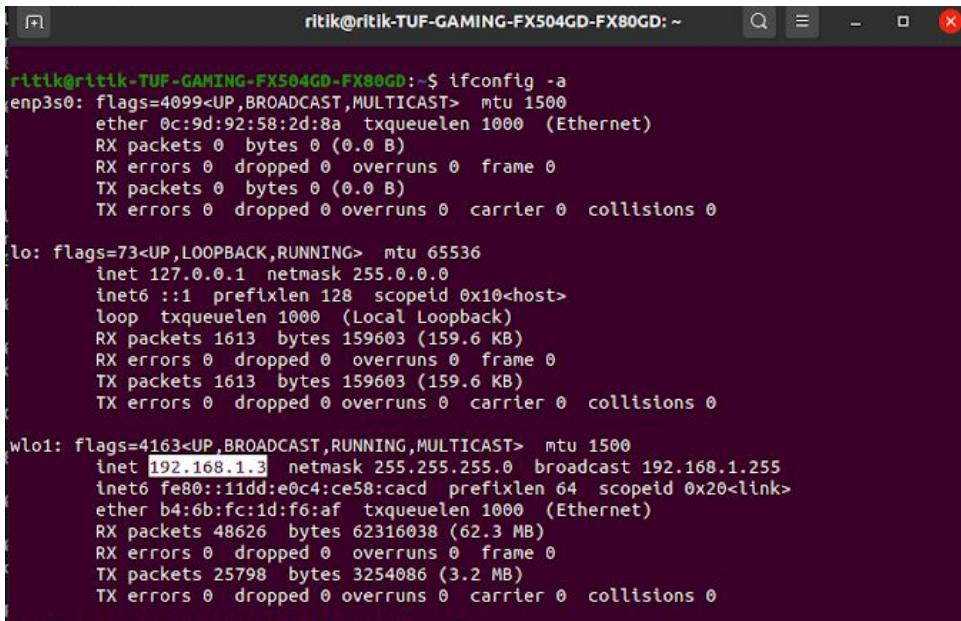
# Assignment 2

## Ritik Garg | 2018305

Q1.

(a) Command: **ifconfig**

Ip address : **192.168.1.3/24**

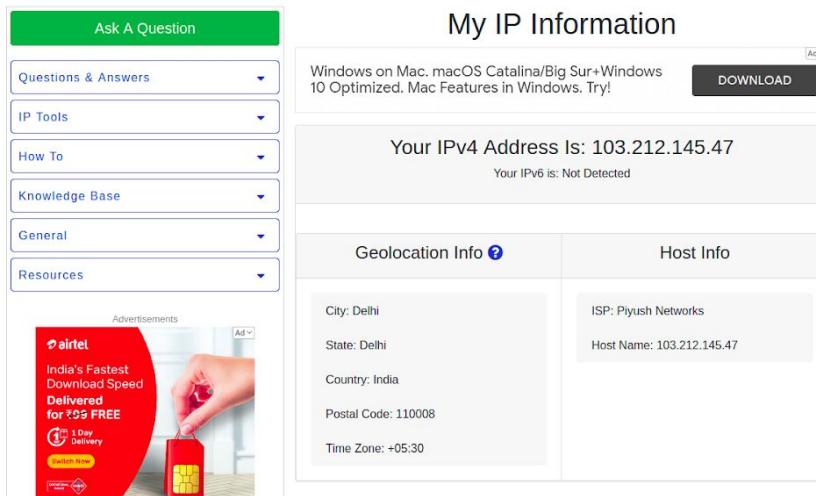


```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~$ ifconfig -a
enp3s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether 0c:9d:92:58:2d:8a txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 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 1613 bytes 159603 (159.6 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1613 bytes 159603 (159.6 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.3 netmask 255.255.255.0 broadcast 192.168.1.255
        inet6 fe80::11dd:e0c4:ce58:cad prefixlen 64 scopeid 0x20<link>
            ether b4:6b:fc:1d:f6:af txqueuelen 1000 (Ethernet)
            RX packets 48626 bytes 62316038 (62.3 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 25798 bytes 3254086 (3.2 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

(b) Here my IP address is : **103.212.145.47**. No they are not the same. The IP address shown on Whatsmyip is the public IP address (external IP). As we are behind the router, it's ip address is checked by the website.



The screenshot shows a web page titled "My IP Information". On the left, there is a sidebar with a green header "Ask A Question" and several dropdown menus: "Questions & Answers", "IP Tools", "How To", "Knowledge Base", "General", and "Resources". Below the sidebar is an advertisement for Airtel, featuring text about fast download speeds and a "Switch Now" button. The main content area is titled "My IP Information" and displays the following information:

My IP Information	
Windows on Mac, macOS Catalina/Big Sur+Windows 10 Optimized. Mac Features in Windows. Try!	
Your IPv4 Address Is: 103.212.145.47 Your IPv6 is: Not Detected	
DOWNLOAD	
Geolocation Info ⓘ	
City: Delhi	Host Info
State: Delhi	ISP: Piyush Networks
Country: India	Host Name: 103.212.145.47
Postal Code: 110008	
Time Zone: +05:30	

## Q2.

- (a) Command: `ping -c 10 google.com`

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ping -c 10 google.com
PING google.com (172.217.27.174) 56(84) bytes of data.
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=1 ttl=118 time=5.48 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=2 ttl=118 time=4.75 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=3 ttl=118 time=4.61 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=4 ttl=118 time=8.52 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=5 ttl=118 time=5.81 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=6 ttl=118 time=7.20 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=7 ttl=118 time=5.02 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=8 ttl=118 time=4.69 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=9 ttl=118 time=6.79 ms
64 bytes from kix05s07-in-f174.1e100.net (172.217.27.174): icmp_seq=10 ttl=118 time=5.53 ms

--- google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9014ms
rtt min/avg/max/mdev = 4.610/5.839/8.518/1.218 ms
```

Here the column: 'time=5.48 ms' show the latency. For network latency we can see the **min/avg/max/mdev = 4.610/5.839/8.518/1.218**.

- (b) To connect to the different machines on the same network, I will need my IP address and will use broadcasting to get all the devices on the same network.  
Command: `sudo nmap -sn 192.168.1.3/24`

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ sudo nmap -sn 192.168.1.3/24
Starting Nmap 7.80 ( https://nmap.org ) at 2020-09-23 11:19 IST
Nmap scan report for Tenda.Home (192.168.1.1)
Host is up (0.0044s latency).
MAC Address: 50:2B:73:08:2B:88 (Tenda Technology,Ltd.Dongguan branch)
Nmap scan report for android-8ecce34537738f73 (192.168.1.6)
Host is up (0.0038s latency).
MAC Address: 58:7A:6A:BE:37:1F (Guangdong Oppo Mobile Telecommunications)
Nmap scan report for DESKTOP-R0UOHF1 (192.168.1.3)
Host is up.
Nmap done: 256 IP addresses (3 hosts up) scanned in 3.16 seconds
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$
```

(For configuring the Firewall and to get the IP address of the device: In the WiFi setting options, select the same network and then go to the ip settings and make it static from DHCP to make it visible). Here I got the ip address of my phone and now I will ping that using `ping -c 100 192.168.1.6` and then redirect the output to the another file `ping2b.txt` and then used the python file to sort the ping time value and we can get the median, 90<sup>th</sup> percentile and 99<sup>th</sup> percentile (Please find attached the python file).

- Command: `ping -c 100 192.168.1.6 > ping2b.txt && python3 ping2.py`

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ping -c 100 192.168.1.6 > ping2b.txt && python3 ping2.py
Enter the part(b/c) to continue: b
DATA Latency(b)
Median: 16.0
90 Percentile: 93.0
99 Percentile: 238.0
```

## Ping2b.txt:

```
ping2b.txt
~/Desktop/CN/Assignment2

2 64 bytes from 192.168.1.6: icmp_seq=1 ttl=64 time=100 ms
3 64 bytes from 192.168.1.6: icmp_seq=2 ttl=64 time=115 ms
4 64 bytes from 192.168.1.6: icmp_seq=3 ttl=64 time=4.60 ms
5 64 bytes from 192.168.1.6: icmp_seq=4 ttl=64 time=160 ms
6 64 bytes from 192.168.1.6: icmp_seq=5 ttl=64 time=85.2 ms
7 64 bytes from 192.168.1.6: icmp_seq=6 ttl=64 time=9.04 ms
8 64 bytes from 192.168.1.6: icmp_seq=7 ttl=64 time=5.18 ms
9 64 bytes from 192.168.1.6: icmp_seq=8 ttl=64 time=50.2 ms
10 64 bytes from 192.168.1.6: icmp_seq=9 ttl=64 time=88.8 ms
11 64 bytes from 192.168.1.6: icmp_seq=10 ttl=64 time=99.3 ms
12 64 bytes from 192.168.1.6: icmp_seq=11 ttl=64 time=4.42 ms
13 64 bytes from 192.168.1.6: icmp_seq=12 ttl=64 time=94.8 ms
14 64 bytes from 192.168.1.6: icmp_seq=13 ttl=64 time=5.18 ms
15 64 bytes from 192.168.1.6: icmp_seq=14 ttl=64 time=206 ms
16 64 bytes from 192.168.1.6: icmp_seq=15 ttl=64 time=5.10 ms
17 64 bytes from 192.168.1.6: icmp_seq=16 ttl=64 time=49.1 ms
18 64 bytes from 192.168.1.6: icmp_seq=17 ttl=64 time=5.03 ms
19 64 bytes from 192.168.1.6: icmp_seq=18 ttl=64 time=5.25 ms
20 64 bytes from 192.168.1.6: icmp_seq=19 ttl=64 time=17.4 ms
21 64 bytes from 192.168.1.6: icmp_seq=20 ttl=64 time=95.3 ms
22 64 bytes from 192.168.1.6: icmp_seq=21 ttl=64 time=63.3 ms
23 64 bytes from 192.168.1.6: icmp_seq=22 ttl=64 time=93.1 ms
24 64 bytes from 192.168.1.6: icmp_seq=23 ttl=64 time=5.77 ms
25 64 bytes from 192.168.1.6: icmp_seq=24 ttl=64 time=6.29 ms
26 64 bytes from 192.168.1.6: icmp_seq=25 ttl=64 time=55.9 ms
27 64 bytes from 192.168.1.6: icmp_seq=26 ttl=64 time=7.74 ms
28 64 bytes from 192.168.1.6: icmp_seq=27 ttl=64 time=4.67 ms
29 64 bytes from 192.168.1.6: icmp_seq=28 ttl=64 time=32.4 ms
30 64 bytes from 192.168.1.6: icmp_seq=29 ttl=64 time=74.8 ms
31 64 bytes from 192.168.1.6: icmp_seq=30 ttl=64 time=4.80 ms
32 64 bytes from 192.168.1.6: icmp_seq=31 ttl=64 time=68.0 ms
33 64 bytes from 192.168.1.6: icmp_seq=32 ttl=64 time=6.43 ms
34 64 bytes from 192.168.1.6: icmp_seq=33 ttl=64 time=29.3 ms
35 64 bytes from 192.168.1.6: icmp_seq=34 ttl=64 time=11.5 ms
36 64 bytes from 192.168.1.6: icmp_seq=35 ttl=64 time=74.7 ms
37 64 bytes from 192.168.1.6: icmp_seq=36 ttl=64 time=5.34 ms
38 64 bytes from 192.168.1.6: icmp_seq=37 ttl=64 time=16.6 ms
39 64 bytes from 192.168.1.6: icmp_seq=38 ttl=64 time=8.76 ms
40 64 bytes from 192.168.1.6: icmp_seq=39 ttl=64 time=4.64 ms
41 64 bytes from 192.168.1.6: icmp_seq=40 ttl=64 time=204 ms
42 64 bytes from 192.168.1.6: icmp_seq=41 ttl=64 time=4.32 ms
43 64 bytes from 192.168.1.6: icmp_seq=42 ttl=64 time=48.7 ms
44 64 bytes from 192.168.1.6: icmp_seq=43 ttl=64 time=9.07 ms
45 64 bytes from 192.168.1.6: icmp_seq=44 ttl=64 time=93.0 ms
46 64 bytes from 192.168.1.6: icmp_seq=45 ttl=64 time=8.44 ms
```

## Ping2.py:

```
GNU nano 4.8
ping2.py
import numpy as np
import pandas as pd

a = input("Enter the part(b/c) to continue: ")
#print(a)
if a == "b":
    data = pd.read_csv("/home/ritik/Desktop/CN/Assignment2/ping2b.txt",nrows = 99,header = None,sep=' |', engine = 'python') #read the data from the ping2.txt file
    data = data[data[5].notna()] #remove all the values that are null
    #print(data)
    data = data[:-1] # we are accidentally taking the last row, so we need to remove it
    data = data.loc[1:,[5]].to_numpy() #converting the values in to numpy array
    #print("SORTED DATA")
    data1 = np.array(sorted(data,key=float)) #sorted the array to calculate the percentile
    #print("Sorted Data")
    len1 = len(data1) #We need to find the percentile from the total received values
    print("DATA Latency(b)")
    print(" Median: " + str(float(data1[int(0.50*len1)-1])))
    print(" 90 Percentile: " + str(float(data1[int(0.90*len1)-1])))
    print(" 99 Percentile: " + str(float(data1[int(0.99*len1)-1])))

elif a == "c":
    data = pd.read_csv("/home/ritik/Desktop/CN/Assignment2/ping2c.txt",nrows = 99,header = None,sep=' |', engine='python') #read the data
    #print(data)
    data = data[data[5].notna()] #removed the null queries
    data = data[:-1] #dropped the last row
    data = data.loc[1:,[5]].to_numpy() #converting the rows to numpy array
    #print("SORTED DATA")
    data2 = np.array(sorted(data,key=float)) #sorting the data
    #print(len(data2))
    len2 = len(data2) #to calculate the percentile
    print("DATA Latency(c)")
    print(" Median: " + str(float(data2[int(len*0.50)-1])))
    print(" 90 Percentile: " + str(float(data2[int(0.90*len)-1])))
    print(" 99 Percentile: " + str(float(data2[int(0.99*len)-1])))

else :
    print("Enter valid choice") #for the invalid choice
```

(c). Pinging amazon.com 100 times.

Command: ping -c 100 amazon.com > ping2c.txt && python3 ping2.py

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ping -c 100 amazon.com > ping2c.txt && python3 ping2.py
Enter the part(b/c) to continue: c
DATA Latency(c)
Median: 413.0
90 Percentile: 525.0
99 Percentile: 644.0
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$
```

Ping2c.txt:

```
Open ▾ ping2c.txt ~Desktop/CN/Assignment2
1 PING amazon.com (176.32.103.205) 56(84) bytes of data.
2 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=1 ttl=232 time=389 ms
3 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=2 ttl=232 time=413 ms
4 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=3 ttl=232 time=437 ms
5 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=4 ttl=232 time=359 ms
6 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=5 ttl=232 time=382 ms
7 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=6 ttl=232 time=410 ms
8 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=7 ttl=232 time=533 ms
9 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=9 ttl=232 time=357 ms
10 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=10 ttl=232 time=383 ms
11 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=11 ttl=232 time=508 ms
12 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=12 ttl=232 time=532 ms
14 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=14 ttl=232 time=375 ms
15 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=15 ttl=232 time=404 ms
16 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=16 ttl=232 time=341 ms
17 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=17 ttl=232 time=449 ms
18 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=18 ttl=232 time=371 ms
19 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=19 ttl=232 time=501 ms
20 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=20 ttl=232 time=518 ms
21 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=21 ttl=232 time=440 ms
22 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=22 ttl=232 time=361 ms
23 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=23 ttl=232 time=591 ms
24 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=24 ttl=232 time=518 ms
25 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=25 ttl=232 time=434 ms
26 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=26 ttl=232 time=354 ms
27 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=27 ttl=232 time=596 ms
28 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=28 ttl=232 time=505 ms
29 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=29 ttl=232 time=426 ms
30 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=30 ttl=232 time=562 ms
31 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=31 ttl=232 time=473 ms
32 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=32 ttl=232 time=669 ms
33 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=33 ttl=232 time=420 ms
34 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=34 ttl=232 time=445 ms
35 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=35 ttl=232 time=363 ms
36 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=36 ttl=232 time=390 ms
37 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=37 ttl=232 time=425 ms
38 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=38 ttl=232 time=435 ms
39 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=39 ttl=232 time=356 ms
40 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=40 ttl=232 time=482 ms
41 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=41 ttl=232 time=404 ms
42 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=42 ttl=232 time=530 ms
43 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=43 ttl=232 time=455 ms
44 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=44 ttl=232 time=376 ms
45 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=45 ttl=232 time=501 ms
46 64 bytes from 176.32.103.205 (176.32.103.205): icmp_seq=46 ttl=232 time=424 ms
```

(d). Packets dropped:

In (b): 1 packet dropped out of 100.

```
102 --- 192.168.1.6 ping statistics ---
103 100 packets transmitted, 99 received, 1% packet loss, time 99148ms
104 rtt min/avg/max/mdev = 2.814/63.053/213.357/54.294 ms
```

In (c): 1 packet dropped out of 100

```
102 --- amazon.com ping statistics ---
103 100 packets transmitted, 99 received, 1% packet loss, time 99117ms
104 rtt min/avg/max/mdev = 239.520/247.684/321.078/14.275 ms
```

They both have the same packet drop count but latency for amazon.com is higher than for the mobile device because the number of routers in between to reach

amazon.com is more than to reach the mobile device, that's why (c) has more latency than (b).

**Q3.**

(a). Command: **ping -c 10 -M do -s 2000 google.com**

We can see all the 10 packets were dropped as we stopped the fragmentation by **-M do** and changed the size to 2000 by **-s**, due to this they dropped as the maximum mtu is 1500. So, the packet with mtu > 1500 will be dropped. After that the packet should be fragmented to smaller chunks.

(b). Command: **sudo netstat -atp**

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ sudo netstat -atp
[sudo] password for ritik:
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address          Foreign Address        State      PID/Program name
tcp    0      0      localhost:domain       0.0.0.0:*             LISTEN     815/systemd-resolve
tcp    0      0      localhost:ipp          0.0.0.0:*             LISTEN     827/cupsd
tcp    0      0      DESKTOP-R0UOHF1:56752  del03s17-in-f3.1e:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:42856  del03s10-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:38006  del11s05-in-f14.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:57730  del11s07-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:56256  del03s18-in-f14.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:48482  74.125.24.189:https   ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:51116  del03s15-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      1      DESKTOP-R0UOHF1:52748  5.85.222.35.bc.goo:http SYN_SENT   830/NetworkManager
tcp    0      0      DESKTOP-R0UOHF1:33812  del11s04-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:54636  ec2-52-35-220-92:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:34860  ec2-52-2-201-228:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:48826  del03s14-in-f1.1e:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:57728  del11s07-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:46750  del03s09-in-f14.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:60146  del03s16-in-f2.1e:https TIME_WAIT  -
tcp    0      0      DESKTOP-R0UOHF1:34666  del11s03-in-f13.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:42858  del03s10-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:56278  del03s17-in-f14.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:37998  del11s05-in-f14.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:46980  sa-in-f189.1e100.:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:33810  del11s04-in-f10.1:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:34594  whatsapp-cdn-shv:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:38064  del03s17-in-f4.1e:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:42886  del03s09-in-f3.1e:https ESTABLISHED 3006/firefox
tcp    0      0      DESKTOP-R0UOHF1:60668  del11s04-in-f14.1:https ESTABLISHED 3006/firefox
tcp6   0      0      ip6-localhost:ipp      [::]:*                  LISTEN     827/cupsd
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$
```

#### Q4.

(a). To get an authoritative answer for a website, we first need to check for **ns/soa** as it returns one or more authoritative name server records for the domain.

Command: **nslookup -type=ns google.com**

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ nslookup -type=ns google.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
google.com      nameserver = ns2.google.com.
google.com      nameserver = ns3.google.com.
google.com      nameserver = ns4.google.com.
google.com      nameserver = ns1.google.com.

Authoritative answers can be found from:
```

Now, to get authoritative answers, run **nslookup google.com ns1.google.com**  
It will check for the authoritative answer from **ns1.google.com**.

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ nslookup google.com ns1.google.com
Server: ns1.google.com
Address: 2001:4860:4802:32::a#53

Name: google.com
Address: 216.58.200.206
Name: google.com
Address: 2404:6800:4002:812::200e
```

(b). To get the time to live for the website on the local dns.

Command: **dig google.com**

Here the time 179 (units) is the time. Now we want to get unit

For that I used **+ttlunits** get the time in human readable format (Here the 's' is for seconds).

Command: **dig google.com && dig +ttlunits google.com**

```

ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ dig google.com && dig +ttlunits google.com
; <>> DiG 9.16.1-Ubuntu <>> google.com
; global options: +cmd
; Got answer:
; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 18974
; 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.        179     IN      A      142.250.67.238

; Query time: 0 msec
; SERVER: 127.0.0.53#53(127.0.0.53)
; WHEN: Wed Sep 23 18:35:10 IST 2020
; MSG SIZE rcvd: 55

; <>> DiG 9.16.1-Ubuntu <>> +ttlunits google.com
; global options: +cmd
; Got answer:
; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 57575
; 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.        2m59s   IN      A      142.250.67.238

; Query time: 0 msec
; SERVER: 127.0.0.53#53(127.0.0.53)
; WHEN: Wed Sep 23 18:35:10 IST 2020
; MSG SIZE rcvd: 55

```

On comparing the time, it came out to be in seconds i.e. **179secs ≡ 2m59secs**

So, it will change after 179sec.

## Q5. Command: traceroute -z 12345 -q 5 -f 4 -m 7 google.com

- z 12345:** wait for 12345 milliseconds
- q 5:** sends 5 probes for each hop sent
- f 4 -m 7:** displays the 4<sup>th</sup> to 7<sup>th</sup> hop

```

ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ traceroute -z 12345 -q 5 google.com
traceroute to google.com (172.217.27.174), 30 hops max, 60 byte packets
 1 Tenda.Home (192.168.1.1)  2.890 ms  3.928 ms  4.063 ms  3.947 ms  5.983 ms
 2 103.212.145.1 (103.212.145.1)  6.474 ms  6.693 ms  6.223 ms  7.943 ms  11.048 ms
 3 * * * *
 4 103.56.231.1 (103.56.231.1)  10.244 ms *  8.936 ms *  7.816 ms
 5 209.85.172.217 (209.85.172.217)  6.648 ms  25.880 ms  6.805 ms  6.425 ms  21.820 ms
 6 74.125.243.97 (74.125.243.97)  8.772 ms  9.915 ms  74.125.244.193 (74.125.244.193)  7.515 ms  74.125.243.97 (74.125.243.97)  6.750 ms  7.634 ms
 7 172.253.67.97 (172.253.67.97)  8.695 ms  9.284 ms  172.253.67.95 (172.253.67.95)  10.246 ms  172.253.67.97 (172.253.67.97)  8.442 ms  7.840 ms
 8 kix05s07-in-f14.1e100.net (172.217.27.174)  8.897 ms  10.191 ms  7.086 ms  5.132 ms  8.439 ms
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ traceroute -z 12345 -q 5 -f 4 -m 4 google.com
traceroute to google.com (172.217.27.174), 4 hops max, 60 byte packets
 4 * 103.56.231.1 (103.56.231.1)  9.686 ms *  14.251 ms *
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ traceroute -z 12345 -q 5 -f 4 -m 7 google.com
traceroute to google.com (172.217.27.174), 7 hops max, 60 byte packets
 4 103.56.231.1 (103.56.231.1)  24.319 ms *  9.837 ms *  10.243 ms
 5 209.85.172.217 (209.85.172.217)  6.484 ms  9.433 ms  15.122 ms  13.088 ms  6.025 ms
 6 74.125.243.97 (74.125.243.97)  8.912 ms  74.125.244.193 (74.125.244.193)  7.540 ms  6.597 ms  74.125.243.97 (74.125.243.97)  8.131 ms  74.125.244.193 (74.125.244.193)  6.750 ms
 7 172.253.67.95 (172.253.67.95)  7.292 ms  6.961 ms  172.253.67.97 (172.253.67.97)  7.899 ms  9.230 ms  172.253.67.95 (172.253.67.95)  11.497 ms
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ man traceroute

```

**Q6.** First we will make the loopback ifconfig down to make it STALE mode (no ping can be done to the device).

For this: **sudo ifconfig lo down**

This command will set the device in stale mode and the device can't ping to itself.

```
sudo: command not found
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ifconfig
enp3s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:9d:92:58:2d:8a txqueuelen 1000 (Ethernet)
        RX packets 0 bytes 0 (0.0 B)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 0 bytes 0 (0.0 B)
        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 112999 bytes 10143708 (10.1 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 112999 bytes 10143708 (10.1 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet 192.168.43.209 netmask 255.255.255.0 broadcast 192.168.43.255
        inet6 2402:3a80:9e1:58a9:9908:1238:839b:b10b prefixlen 64 scopeid 0x0<global>
        inet6 fe80::5142:1b90:7635:eb5a prefixlen 64 scopeid 0x20<link>
        inet6 2402:3a80:9e1:58a9:6a04:aa2f:97e:26ee prefixlen 64 scopeid 0x0<global>
          ether b4:6b:fc:id:f6:af txqueuelen 1000 (Ethernet)
            RX packets 1554264 bytes 941503651 (941.5 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 867570 bytes 235323331 (235.3 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ sudo ifconfig lo down
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ifconfig
enp3s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 0c:9d:92:58:2d:8a txqueuelen 1000 (Ethernet)
        RX packets 0 bytes 0 (0.0 B)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 0 bytes 0 (0.0 B)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet 192.168.43.209 netmask 255.255.255.0 broadcast 192.168.43.255
        inet6 2402:3a80:9e1:58a9:9908:1238:839b:b10b prefixlen 64 scopeid 0x0<global>
        inet6 fe80::5142:1b90:7635:eb5a prefixlen 64 scopeid 0x20<link>
        inet6 2402:3a80:9e1:58a9:6a04:aa2f:97e:26ee prefixlen 64 scopeid 0x0<global>
          ether b4:6b:fc:id:f6:af txqueuelen 1000 (Ethernet)
            RX packets 1554324 bytes 941510001 (941.5 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 867632 bytes 235331397 (235.3 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ping -c 10 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.

--- 127.0.0.1 ping statistics ---
10 packets transmitted, 0 received, 100% packet loss, time 9203ms
```

We can see first the loopback was on, then we made it down. Now if we try to ping it **Ping -c 10 127.0.0.1**, we can see all the packets lost.

Then, I made the loopback interface up, using **sudo ifconfig lo up**.

Now, If i again ping the device back using **ping -c 10 127.0.0.1**

We can see all the packets were received.

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ sudo ifconfig lo up
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ifconfig
enp3s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether 0c:9d:92:58:2d:8a txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    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 113089 bytes 10154392 (10.1 MB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 113089 bytes 10154392 (10.1 MB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.43.209 netmask 255.255.255.0 broadcast 192.168.43.255
        inet6 2402:3a80:9e1:58a9:9908:1238:839b:b10b prefixlen 64 scopeid 0x0<global>
        inet6 fe80::5142:1b90:7635:eb5a prefixlen 64 scopeid 0x20<link>
        inet6 2402:3a80:9e1:58a9:6a04:aa2f:97e:26ee prefixlen 64 scopeid 0x0<global>
    ether b4:6b:fc:1d:f6:af txqueuelen 1000 (Ethernet)
    RX packets 1554499 bytes 941544560 (941.5 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 867838 bytes 235370047 (235.3 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ping -c 10 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.043 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.039 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.036 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.040 ms
64 bytes from 127.0.0.1: icmp_seq=5 ttl=64 time=0.038 ms
64 bytes from 127.0.0.1: icmp_seq=6 ttl=64 time=0.039 ms
64 bytes from 127.0.0.1: icmp_seq=7 ttl=64 time=0.044 ms
64 bytes from 127.0.0.1: icmp_seq=8 ttl=64 time=0.023 ms
64 bytes from 127.0.0.1: icmp_seq=9 ttl=64 time=0.040 ms
64 bytes from 127.0.0.1: icmp_seq=10 ttl=64 time=0.040 ms

--- 127.0.0.1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9222ms
rtt min/avg/max/mdev = 0.023/0.038/0.044/0.005 ms
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ ]
```

**Q7. Command: dig google.com to get the ip address**

The ip address was: **142.250.67.238**

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ dig google.com
; <>> DiG 9.16.1-Ubuntu <>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 40585
;; 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.        281     IN      A      142.250.67.238

;; Query time: 43 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Sep 23 17:47:17 IST 2020
;; MSG SIZE rcvd: 55
```

Now if we do reverse domain lookup

Command: **dig -x 142.250.67.238**

```
ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ dig -x 142.250.67.238
; <>> DiG 9.16.1-Ubuntu <>> -x 142.250.67.238
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 24856
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;238.67.250.142.in-addr.arpa. IN      PTR

;; ANSWER SECTION:
238.67.250.142.in-addr.arpa. 84046 IN      PTR      bom07s24-in-f14.1e100.net.

;; Query time: 3 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Sep 23 17:48:00 IST 2020
;; MSG SIZE rcvd: 95
```

Now if we search for the IP address 8.8.8.8, Command: **dig -x 8.8.8.8**

```

ritik@ritik-TUF-GAMING-FX504GD-FX80GD:~/Desktop/CN/Assignment2$ dig -x 8.8.8.8

; <>> DiG 9.16.1-Ubuntu <>> -x 8.8.8.8
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33541
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;8.8.8.8.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
8.8.8.8.in-addr.arpa.  83937  IN      PTR      dns.google.

;; Query time: 3 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Sep 23 17:48:28 IST 2020
;; MSG SIZE rcvd: 73

```

We can see that Ip address that we got on reverse dns lookup, is also from google.

#### Technical details

IP address	142.250.67.238
Hostname	bom07s24-in-f14.1e100.net
Type	Public
CIDR	142.250.67.238/24

#### Location of IP address 142.250.67.238

Lookup information about the location associated with the IP address 142.250.67.238.

City	not provided
Country	United States (US) <i>(99% confidence)</i>
Continent	North America (NA)
Time zone	America/Chicago

#### ASN and ISP for IP address 142.250.67.238

General traits like organisation, autonomous system number (ASN) and ISP associated with the IP address 142.250.67.238.

ISP	Google
Organization	Google
User type	business
Autonomous system number (ASN)	15169
Autonomous system organization	GOOGLE

Anonymous proxy?	No
Satellite provider?	No

#### Registered and represented country

Details about the country in which the ISP has registered the IP address 142.250.67.238. Furthermore, if available, the represented country. For instance, the country represented by an overseas military base or embassy.

Registered country	United States (US)
Represented country	Not Provided

#### Location on the map for IP address 142.250.67.238