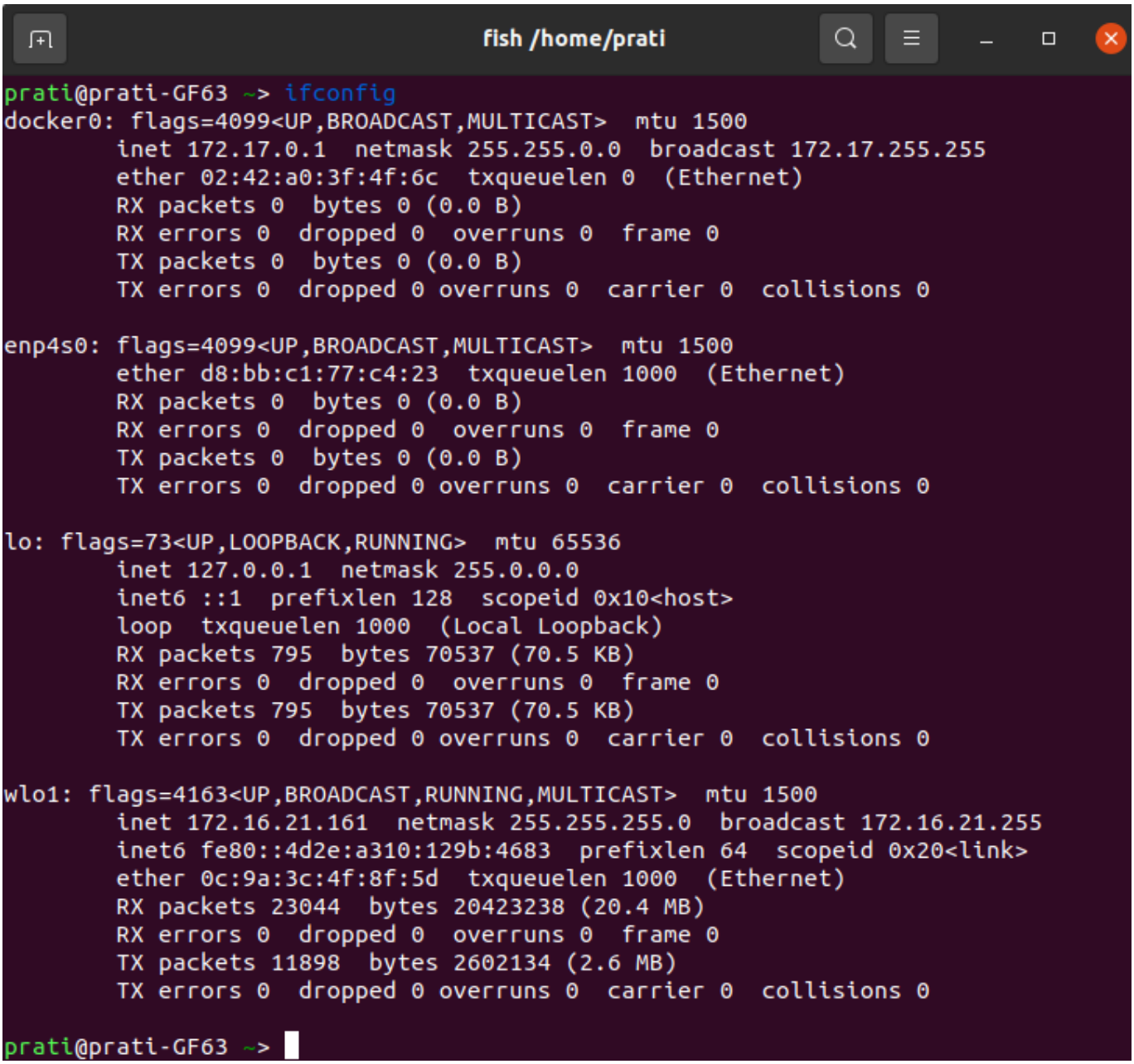
Problem 1

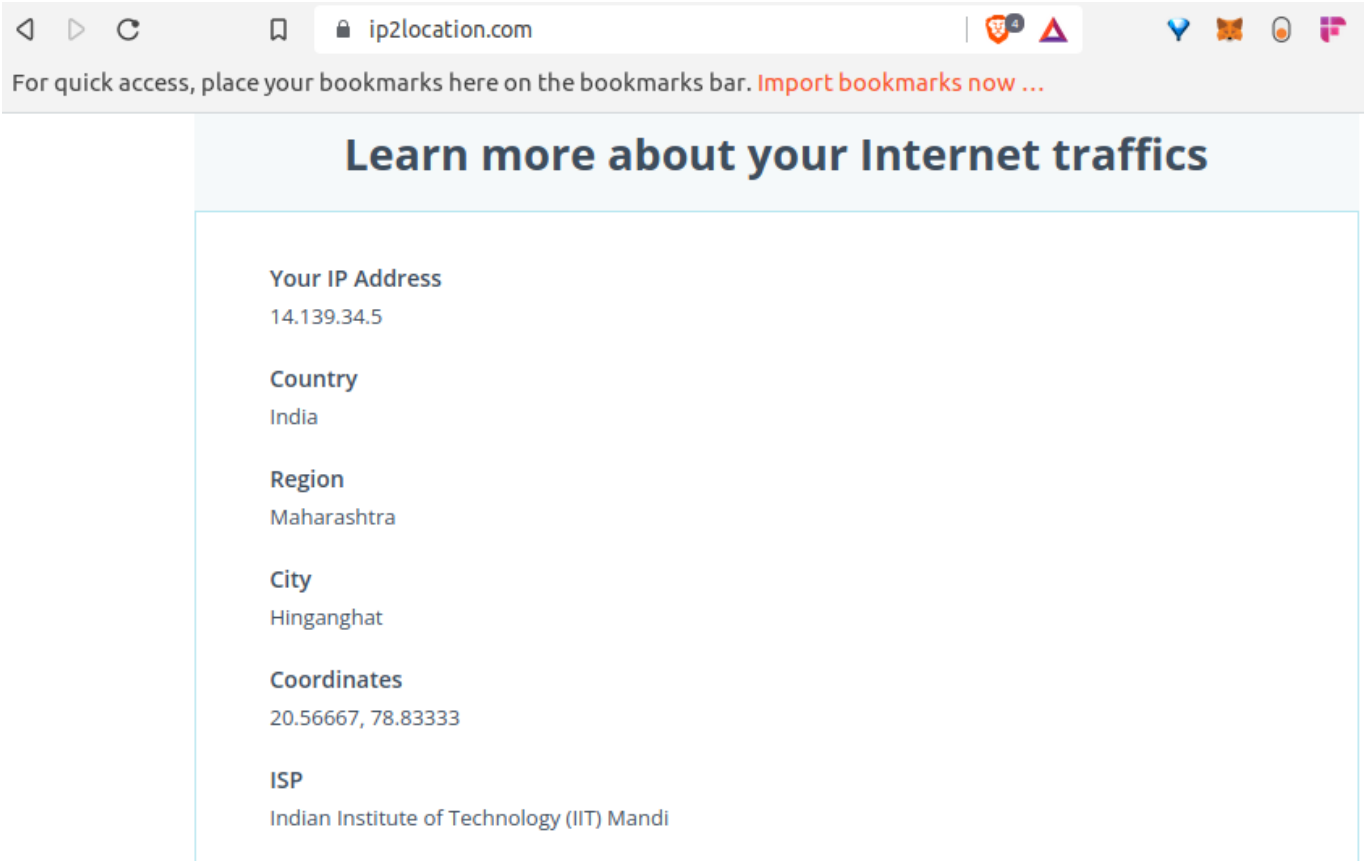
1A

Using ifconfig, the laptop gave the output of `172.16.21.161` On using iplocation.com, the IP address shown was `14.139.34.5`. These values are different. `172.16.21.161` is our Private IP Address. which is used to communicate within the network, and is use dto load the network. It has a local scope.

On the other hand, `14.139.34.5` is our Public IP Address which is used to communicate outside the network. It is used for accessing the internet.

Similarly, results for each of the team members: Pratiksha:





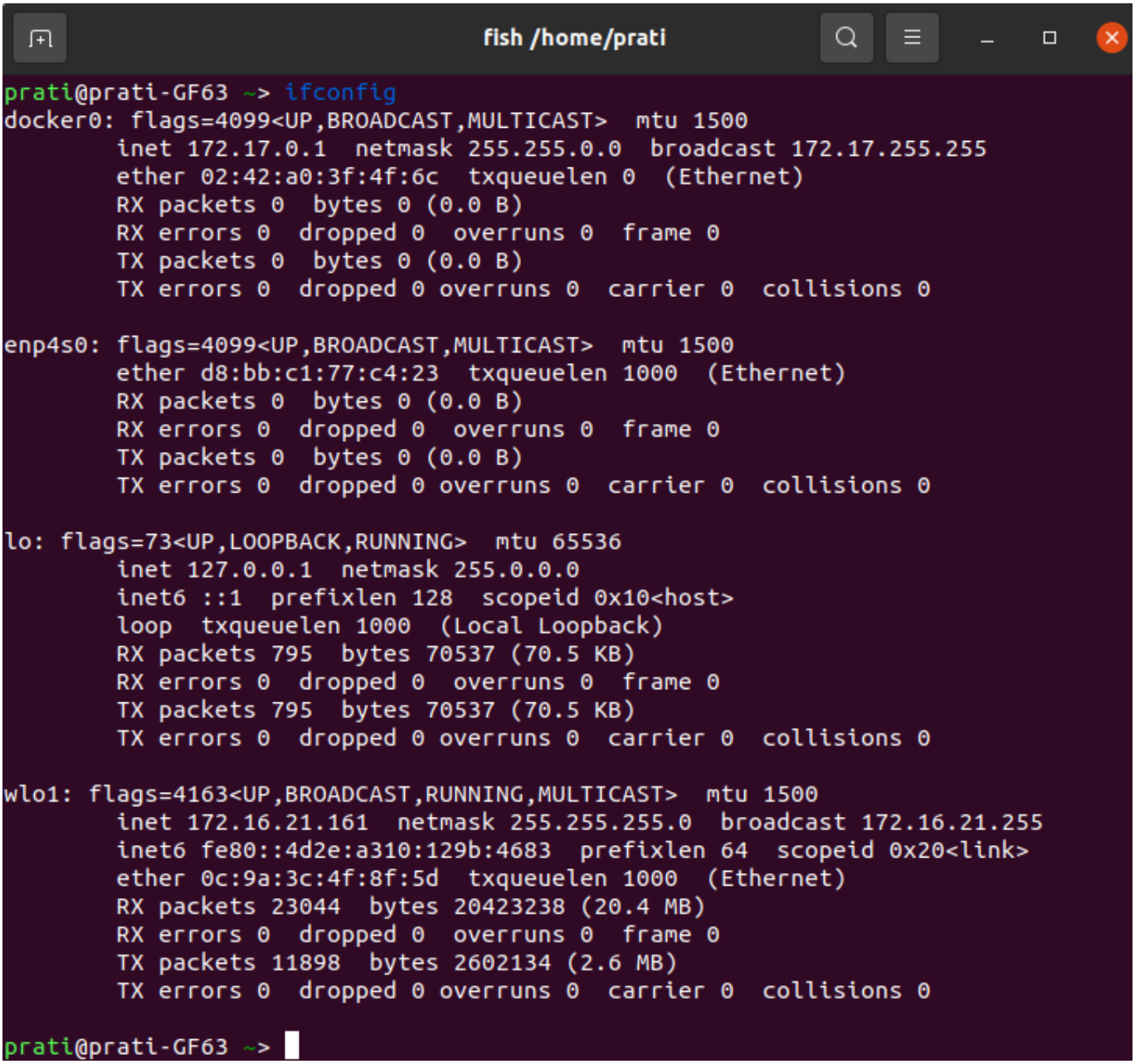
Solai Adithya:

```
wlp0s20f3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.10.129  netmask 255.255.255.0  broadcast 172.16.10.255
        inet6 fe80::7b41:43e0:ed16:280c  prefixlen 64  scopeid 0x20<link>
        ether c4:23:60:ae:3e:63  txqueuelen 1000  (Ethernet)
        RX packets 5595406  bytes 6333104905 (6.3 GB)
        RX errors 0  dropped 1  overruns 0  frame 0
        TX packets 1828656  bytes 408780873 (408.7 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Ayuj:

```
wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.255.166  netmask 255.255.255.0  broadcast 192.168.255.255
        inet6 fe80::f2f9:3c11:9e72:bb22  prefixlen 64  scopeid 0x20<link>
        inet6 2401:4900:c89:33ea:35de:93cd:2145:fa68  prefixlen 64  scopeid 0x0<global>
        inet6 2401:4900:c89:33ea:e6e7:4ef5:a440:95e2  prefixlen 64  scopeid 0x0<global>
        ether a0:af:bd:20:bd:bd  txqueuelen 1000  (Ethernet)
        RX packets 1229135  bytes 1522070640 (1.5 GB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 386707  bytes 54766509 (54.7 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Manan:


fish /home/prati
prati@prati-GF63 ~> ifconfig
docker0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
inet 172.17.0.1 netmask 255.255.0.0 broadcast 172.17.255.255
ether 02:42:a0:3f:4f:6c txqueuelen 0 (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
enp4s0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
ether d8:bb:c1:77:c4:23 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 795 bytes 70537 (70.5 KB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 795 bytes 70537 (70.5 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 172.16.21.161 netmask 255.255.255.0 broadcast 172.16.21.255
inet6 fe80::4d2e:a310:129b:4683 prefixlen 64 scopeid 0x20<link>
ether 0c:9a:3c:4f:8f:5d txqueuelen 1000 (Ethernet)
RX packets 23044 bytes 20423238 (20.4 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 11898 bytes 2602134 (2.6 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
prati@prati-GF63 ~>

Niveditha:

```
niveditha@niveditha-HP-Pavilion-Notebook:~$ ifconfig
eno1: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether c4:65:16:aa:43:e6  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 125  bytes 10879 (10.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 125  bytes 10879 (10.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlo1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.22.187  netmask 255.255.255.0  broadcast 172.16.22.
255
        inet6 fe80::f05a:9f4:5ef0:e254  prefixlen 64  scopeid 0x20<link
>
        ether 10:5b:ad:53:62:51  txqueuelen 1000  (Ethernet)
        RX packets 5086  bytes 476301 (476.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 609  bytes 65577 (65.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

niveditha@niveditha-HP-Pavilion-Notebook:~$
```

Harnanman:

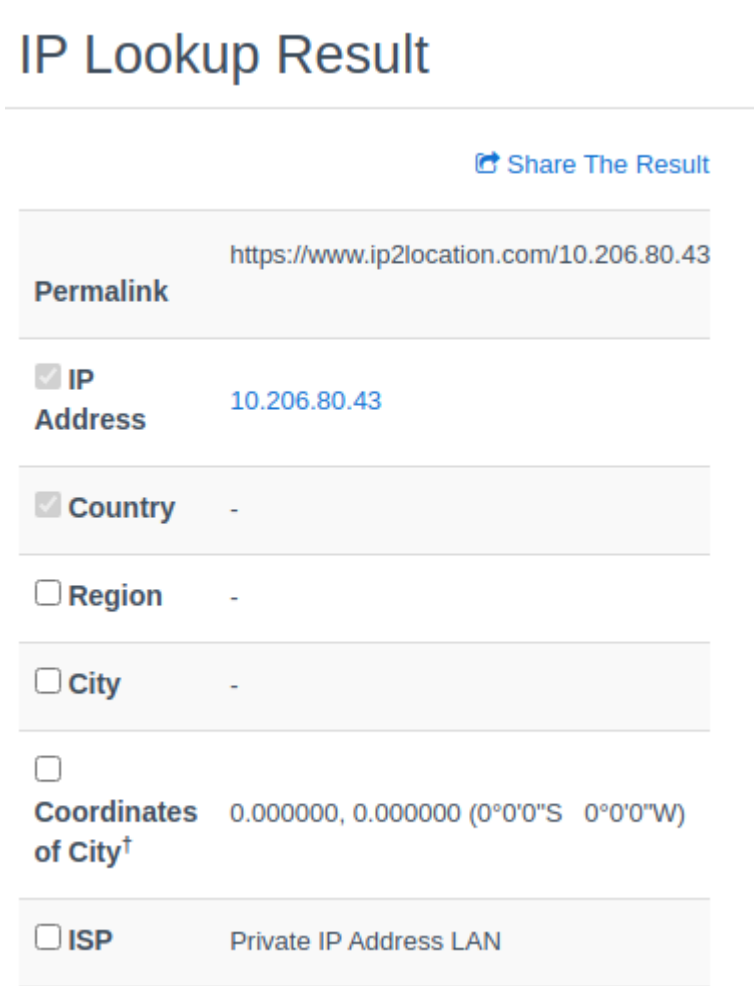
```
wlp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 172.16.22.162  netmask 255.255.255.0  broadcast 172.16.22.255
        inet6 fe80::eebf:9dcc:7181:1c08  prefixlen 64  scopeid 0x20<link>
        ether c0:b6:f9:98:3d:61  txqueuelen 1000  (Ethernet)
        RX packets 2560063  bytes 902103940 (902.1 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 142836  bytes 86990001 (86.9 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

harnaman24  ~
```

1B

We traced `www.amazon.com` Observations:

```
prati@prati-GF63 ~> traceroute www.amazon.com
traceroute to www.amazon.com (54.192.154.107), 30 hops max, 60 byte packets
 1  _gateway (192.168.114.232)  3.417 ms  4.442 ms  5.448 ms
 2  10.206.80.43 (10.206.80.43)  109.768 ms  120.283 ms  120.476 ms
 3  * * *
 4  10.155.98.41 (10.155.98.41)  121.996 ms 10.155.98.57 (10.155.98.57)  122.051
 ms *
 5  125.19.65.33 (125.19.65.33)  124.069 ms  124.144 ms  123.922 ms
 6  182.79.154.77 (182.79.154.77)  132.236 ms 182.79.154.75 (182.79.154.75)  116
.150 ms 116.119.73.33 (116.119.73.33)  119.248 ms
 7  99.83.64.168 (99.83.64.168)  113.801 ms  191.167 ms  184.644 ms
 8  150.222.217.116 (150.222.217.116)  184.502 ms 150.222.217.52 (150.222.217.52
)  182.927 ms 150.222.217.36 (150.222.217.36)  183.198 ms
 9  150.222.217.221 (150.222.217.221)  181.066 ms 150.222.217.199 (150.222.217.1
99)  180.896 ms  181.119 ms
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  server-54-192-154-107.del51.r.cloudfront.net (54.192.154.107)  54.352 ms  56
.034 ms  55.982 ms
prati@prati-GF63 ~>
```



IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/10.206.80.43
IP Address	10.206.80.43
Country	-
Region	-
City	-
Coordinates of City†	0.000000, 0.000000 (0°0'0"S 0°0'0"W)
ISP	Private IP Address LAN

Location of ip Addresses

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/10.155.98.41
IP Address	10.155.98.41
Country	-
Region	-
City	-
Coordinates of City†	0.000000, 0.000000 (0°0'0"S 0°0'0"W)
ISP	Private IP Address LAN

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/10.155.98.41
IP Address	10.155.98.41
Country	-
Region	-

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IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/125.19.65.33
IP Address	125.19.65.33
Country	India [IN]
Region	Punjab
City	Mohali
Coordinates of City†	30.679950, 76.722110 (30°40'48"N 76°4
ISP	Bharti Infotel Ltd.

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/182.79.154.7
IP Address	182.79.154.77
Country	India [IN]
Region	Delhi
City	Delhi
Coordinates of City†	28.666670, 77.216670 (28°40'0"N 77°13
ISP	Bharti Airtel Ltd.

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/99.83.64.168
IP Address	99.83.64.168
Country	United States of America [US]
Region	Virginia
City	Ashburn
Coordinates of City†	39.039474, -77.491809 (39°2'22"N 77°29'31"W)
ISP	Amazon.com Inc.

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/150.222.217.
IP Address	150.222.217.116
Country	United States of America [US]
Region	Washington
City	Seattle
Coordinates of City†	47.627500, -122.346200 (47°37'39"N 122°20'46"W)
ISP	Amazon Technologies Inc.

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/150.222.217.
IP Address	150.222.217.221
Country	United States of America [US]
Region	Washington
City	Seattle
Coordinates of City†	47.627500, -122.346200 (47°37'39"N 122°20'46"W)
ISP	Amazon Technologies Inc.

IP Lookup Result

Share The Result

Permalink	https://www.ip2location.com/54.192.154.1
IP Address	54.192.154.107
Country	India [IN]
Region	Delhi
City	Delhi
Coordinates of City†	28.666670, 77.216670 (28°40'0"N 77°13'0"E)
ISP	Amazon.com Inc.

1C

We set up remote server and satrted jupyter notebook:

```
prati@prati-GF63 ~> jupyter notebook --no-browser --port=1234
[I 12:29:16.626 NotebookApp] Serving notebooks from local directory: /home/prati
[I 12:29:16.627 NotebookApp] The Jupyter Notebook is running at:
[I 12:29:16.627 NotebookApp] http://localhost:1234/?token=02308b752e30c840ee63c2
b7269de3f41e3dd4627c621320
[I 12:29:16.627 NotebookApp] Use Control-C to stop this server and shut down all
 kernels (twice to skip confirmation).
[C 12:29:16.629 NotebookApp]

    To access the notebook, open this file in a browser:
        file:///run/user/1000/snap.jupyter/jupyter/nbserver-12411-open.html
    Or copy and paste one of these URLs:
        http://localhost:1234/?token=02308b752e30c840ee63c2b7269de3f41e3dd4627c6
21320
[I 12:29:39.659 NotebookApp] 302 GET / (127.0.0.1) 1.37ms
[I 12:29:39.709 NotebookApp] 302 GET /tree? (127.0.0.1) 2.69ms
[W 12:30:22.566 NotebookApp] 401 POST /login?next=%2Ftree%3F (127.0.0.1) 3.45ms
referer=http://localhost:4321/login?next=%2Ftree%3F
```

After that, we did port forwarding from the remote using the `ssh` command:

```
sudo /home/prati
prati@prati-GF63 ~> sudo ssh -R 4321:localhost:1234 -N -M adhi@172.16.10.129
adhi@172.16.10.129's password:
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
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connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
connect_to localhost port 1234: failed.
```

After that, on the "local" or different laptop, we looked at port:4321 and started the notebook - whose result is shown.

Problem 2

Compile in `/question1` using: `make`

Run using `./server` and `./client`

`details` : User id, total size transmitted, and list of files transferred are all included.

`<filename>`: Checks if the file is on the system and then transmits it to the client.

Objective : Multi-user file transfer programme that can handle very huge files.

Result : With the exception of slight loss in pdf and binary files, we developed a multi-user programme that permitted near-lossless transfer of text and picture data. We were unable to support files larger than 65 KB in size. Active users' information was also kept track of by the programme.

Problem 3

Compile `Makefile` in `/question3` using `make`

Run using `./server` and `./client`

A divisor of length 5 is predecided and the length of message to be transferred, i.e. N in 8*N is exchanged after connection is established between server and client. A random string of length 8*N is generated and it is divided into blocks of 8. For each block, crc is generated and appended next to it to generate the encoded string. The server sends the encoded string to the client.

The client receives the string, processes it in blocks of 8 to verify the crc and separate the data block from crc. The decoded string is displayed as output.

No errors were detected on the client, as expected, because communications on the same host are effectlively lossless.