CSE 232: Computer Network

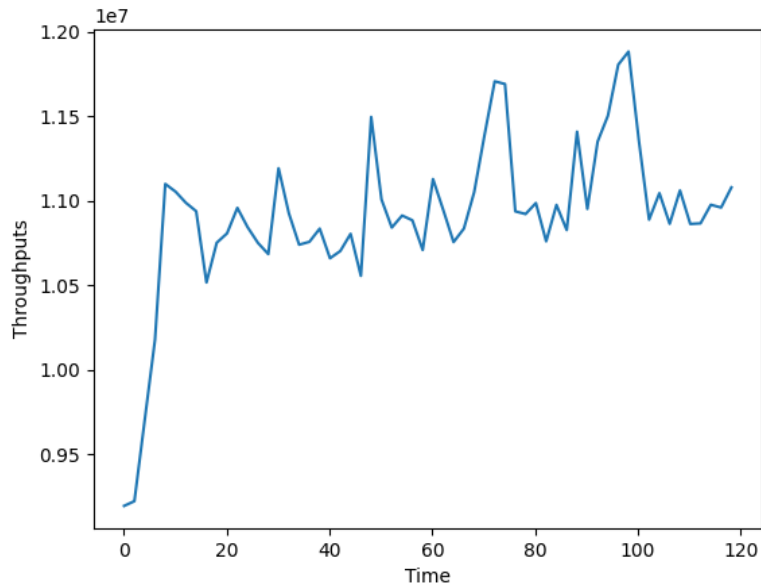# REPORT

Assignment 2: Command-line utilities

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Question 1:

I first collected data for 2 minutes using Wireshark. Then convert that data to a CSV file. Imported the CSV file to a python program and then calculated the throughput for every 2 seconds by dividing the length of packets sent (bytes) by the time taken for every 2-second interval. Then put all this throughput data into a list and plot data.

Question 2:

No.	Time	Source	Destination	Protocol	Length	Info
16	2.92731…	2401:4900:1…	2001:1458:d00:…	HTTP	518	GET / HTTP/1.1
21	3.30121…	2001:1458:d…	2401:4900:16d9…	HTTP	964	HTTP/1.1 200 OK (text/html)
32	3.44288…	2401:4900:1…	2001:1458:d00:…	HTTP	459	GET /favicon.ico HTTP/1.1
37	3.91349…	2001:1458:d…	2401:4900:16d9…	HTTP	452	HTTP/1.1 200 OK (image/vnd.microsoft.icon)

```
Hypertext Transfer Protocol
▸ GET / HTTP/1.1\r\n
  Host: info.cern.ch\r\n
  Connection: keep-alive\r\n
  Upgrade-Insecure-Requests: 1\r\n
  User-Agent: Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/94.0.4606.61 Safari/537.36\r\n
  Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.9\r\n
  Accept-Encoding: gzip, deflate\r\n
  Accept-Language: en-GB,en-US;q=0.9,en;q=0.8\r\n
  \r\n
  [Full request URI: http://info.cern.ch/]
  [HTTP request 1/1]
  [Response in frame: 21]
```

```
GET / HTTP/1.1\r\n
 ▸ [Expert Info (Chat/Sequence): GET / HTTP/1.1\r\n]
   Request Method: GET
   Request URI: /
   Request Version: HTTP/1.1
Host: info.cern.ch\r\n
Connection: keep-alive\r\n

HTTP/1.1 200 OK\r\n
 ▾ [Expert Info (Chat/Sequence): HTTP/1.1 200 OK\r\n]
     [HTTP/1.1 200 OK\r\n]
     [Severity level: Chat]
     [Group: Sequence]
   Response Version: HTTP/1.1
   Status Code: 200
   [Status Code Description: OK]
   Response Phrase: OK
```

HTTP packet type: There are two types of packets. One type of packet is the request to the webserver to perform a certain task. One type packet the response received from the server.

For HTTP request packets
HTTP request type :GET
User-agent type: Mozilla
HTTP request packet's URL: /
Name and version of the webserver: Apache \r\n

For HTTP response packets
HTTP response code :

```
   <html><head></head><body><header>\n
   <title>http://info.cern.ch</title>\n
   </header>\n
   \n
   <h1>http://info.cern.ch - home of the first website</h1>\n
   <p>From here you can:</p>\n
   <ul>\n
   <li><a href="http://info.cern.ch/hypertext/WWW/TheProject.html">Browse the first
website</a></li>\n
   <li><a href="http://line-mode.cern.ch/www/hypertext/WWW/TheProject.html">Browse the
first website using the line-mode browser simulator</a></li>\n
```

Learn about the birth of the web
\n
    Learn about CERN, the physics laboratory where the web was born
\n
    \n
    </body></html>\n

HTTP response description : 200 OK

Question 3:
A)

```
~ ifconfig
anbox0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.250.1  netmask 255.255.255.0  broadcast 0.0.0.0
        inet6 fe80::8cff:58ff:fef1:67ec  prefixlen 64  scopeid 0x20<link>
        ether 8e:ff:58:f1:67:ec  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 955  bytes 188771 (188.7 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

The private ip address is 192.168.250.1

```
~ curl ifconfig.me
27.62.152.13
~ |
```

The command 'curl ifconfig.me' give me the public address 27.62.152.13

B)

The ip address on the website and the one observed using the ifconfig command are different.
They are different because the IP address shown on the website is the public Ipv4 address.
The one observed using the ifconfig command is my private Ipv4 address.
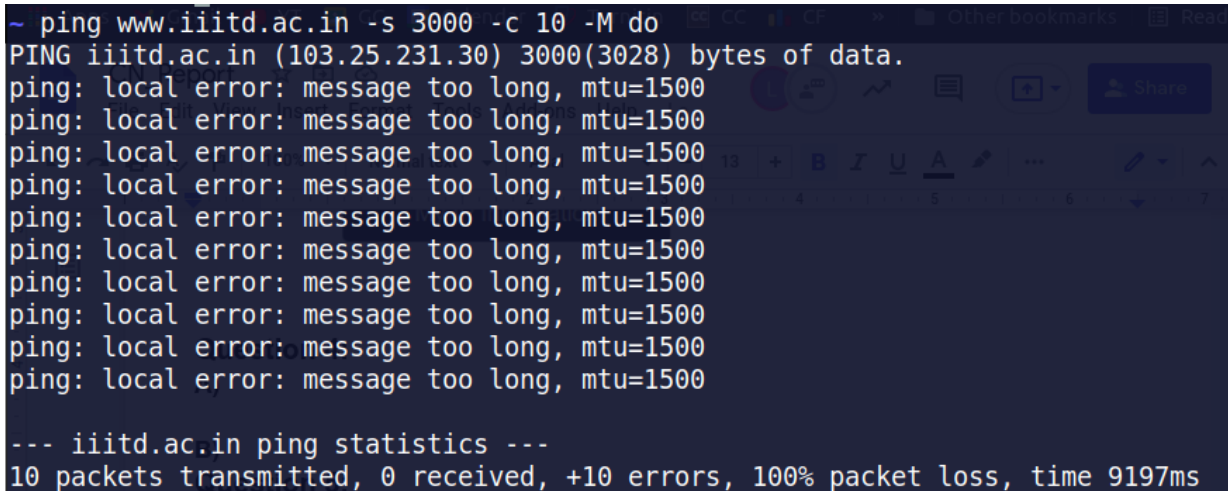
Question 4:
A)

```
~ ping www.iiitd.ac.in -s 3000 -c 10 -M do
PING iiitd.ac.in (103.25.231.30) 3000(3028) bytes of data.
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500
ping: local error: message too long, mtu=1500

--- iiitd.ac.in ping statistics ---
10 packets transmitted, 0 received, +10 errors, 100% packet loss, time 9197ms
```

I used the ping command to send mtu 3000 packets to 'www.iiitd.ac.in'. Since we asked to send a single packet of size 3000 units that means we cannot break this packet into further pieces to send it further. The flag '-s' specifies the size of the packet that is : 3000.
The flag '-c' specifies the number of packets to be sent: 10.
and the flag '-M' specifies that the packet should not be broken down into smaller fragments.

As we can see from the screenshot above that the process failed.

This happened because the maximum mtu allowed for a single packet is 1500 units. However, since the size of our packet is 3000 and it cannot be broken down into smaller packets, the 'message too long' error message was thrown.

B)
Command = netstat -at -p
Flags used:

a = to display all active connections

t = display only TCP connections.

p = used to display PIDs.

```
~ netstat -at -p
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address        Foreign Address             State       PID/Program name
tcp       0      0 localhost:5939        0.0.0.0:*                   LISTEN      -
tcp       0      0 localhost:domain      0.0.0.0:*                   LISTEN      -
tcp       0      0 0.0.0.0:ssh           0.0.0.0:*                   LISTEN      -
tcp       0      0 localhost:ipp         0.0.0.0:*                   LISTEN      -
tcp       0      0 dolly:43960           ec2-52-207-179-22:https ESTABLISHED 11009/chrome --type
tcp       0      0 dolly:35920           aeab55d76dd13c9bb:https ESTABLISHED 11009/chrome --type
tcp       0      0 dolly:46900           68.42.214.35.bc.g:https ESTABLISHED 11009/chrome --type
tcp       0      0 dolly:57992           server-54-182-1-2:https ESTABLISHED 11009/chrome --type
tcp       0      0 dolly:47830           ec2-54-229-107-164:8282 ESTABLISHED 11009/chrome --type
tcp       0      0 dolly:55922           179.213.227.35.bc:https ESTABLISHED 11009/chrome --type
tcp       0      0 dolly:43958           ec2-52-207-179-22:https ESTABLISHED 11009/chrome --type
tcp6      0      0 [::]:33060            [::]:*                      LISTEN      -
tcp6      0      0 [::]:mysql            [::]:*                      LISTEN      -
tcp6      0      0 [::]:ssh              [::]:*                      LISTEN      -
tcp6      0      0 ip6-localhost:ipp     [::]:*                      LISTEN      -
tcp6      0      0 dolly:40856           bom12s10-in-x05.1:https TIME_WAIT   -
tcp6      0      0 dolly:36538           del03s13-in-x03.1:https ESTABLISHED 11009/chrome --type
tcp6      0      0 dolly:36536           del03s13-in-x03.1:https ESTABLISHED 11009/chrome --type
tcp6      0      0 dolly:33678           sb-in-xbc.1e100.ne:5228 ESTABLISHED 11009/chrome --type
tcp6      0      0 dolly:40872           bom12s10-in-x05.1:https TIME_WAIT   -
tcp6      0      0 dolly:33680           sb-in-f188.1e100.n:5228 ESTABLISHED 11009/chrome --type
~ |
```

Question 5:
A)

```
~ nslookup -type=soa gmail.com
Server:             127.0.0.53
Address:            127.0.0.53#53

Non-authoritative answer:
gmail.com
        origin = ns1.google.com
        mail addr = dns-admin.google.com
        serial = 400672185
        refresh = 900
        retry = 900
        expire = 1800
        minimum = 60

Authoritative answers can be found from:
```

Most of the answers that we get from nslookup are non-authoritative servers. To get an authoritative answer we need to add the name of an authoritative server in our nslookup command. To find the name of an authoritative server first run the command - 'nslookup -type=soa gmail.com'

This command will return an authoritative name server for gmail.com

Now, since we have the name of an authoritative name server for gmail.com, we can use this name server to get an authoritative result back from nslookup using the command - 'nslookup smtp.gmail.com ns1.google.com'

```
~ nslookup smtp.gmail.com ns1.google.com
Server:             ns1.google.com
Address:            2001:4860:4802:32::a#53

Name:    smtp.gmail.com
Address: 172.217.194.109
Name:    smtp.gmail.com
Address: 2404:6800:4003:c04::6d
```

B)

```
~ dig +ttlunits coinmarketcap.com

; <<>> DiG 9.16.1-Ubuntu <<>> +ttlunits coinmarketcap.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 26984
;; flags: qr rd ra; QUERY: 1, ANSWER: 5, AUTHORITY: 0, ADDITIONAL: 1

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

;; ANSWER SECTION:
coinmarketcap.com.      2m58s   IN      A       104.17.138.178
coinmarketcap.com.      2m58s   IN      A       104.17.139.178
coinmarketcap.com.      2m58s   IN      A       104.17.140.178
coinmarketcap.com.      2m58s   IN      A       104.17.137.178
coinmarketcap.com.      2m58s   IN      A       104.17.141.178

;; Query time: 80 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Tue Oct 05 18:05:43 IST 2021
;; MSG SIZE   rcvd: 126
```

I have used the dig command to find out the time to live (ttl) of the website coinmarketcap.com
The flag '+ttlunits' returns the time to live of the website in minutes and seconds.
So the time to live on coinmarket.com is 2minutes and 58 seconds.

Question 6:

A)

I see 8 intermediate hosts.

1)10.50.111.109   Avg Latency ⇒ 62.525 ms
2)10.50.143.106   Avg Latency ⇒ 62.067 ms
3)125.21.46.69   Avg Latency ⇒ 61.259 ms
4)182.79.146.178   Avg Latency ⇒ 101.048 ms
5)182.79.239.145   Avg Latency ⇒70.627 ms
6)182.79.206.230   Avg Latency ⇒ 79.774 ms
7)115.242.184.26   Avg Latency ⇒ 120.775 ms
8)196.12.53.50   Avg Latency ⇒ 70.771 ms

```
~ traceroute www.iiith.ac.in
traceroute to www.iiith.ac.in (196.12.53.50), 30 hops max, 60 byte packets
 1  _gateway (192.168.43.1)  2.675 ms  2.629 ms  2.600 ms
 2  * * *
 3  10.50.111.109 (10.50.111.109)  62.560 ms  62.535 ms  62.481 ms
 4  10.50.143.106 (10.50.143.106)  61.436 ms  62.402 ms  62.363 ms
 5  125.21.46.69 (125.21.46.69)  61.264 ms  61.274 ms  61.241 ms
 6  182.79.146.178 (182.79.146.178)  101.048 ms 182.79.239.145 (182.79.239.145)  70
.719 ms  70.536 ms
 7  182.79.206.230 (182.79.206.230)  77.327 ms  77.121 ms  84.874 ms
 8  * * *
 9  115.242.184.26.static.jio.com (115.242.184.26)  128.006 ms *  127.945 ms
10  196.12.34.76 (196.12.34.76)  98.619 ms 115.242.184.26.static.jio.com (115.242.1
84.26)  127.791 ms  99.367 ms
11  196.12.53.50 (196.12.53.50)  70.408 ms 196.12.34.76 (196.12.34.76)  78.482 ms
88.250 ms
~ |
```

Question 6:

A)

B)

```
~ ping -c 100 www.iiith.ac.in
PING www.iiit.ac.in (196.12.53.50) 56(84) bytes of data.
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=1 ttl=56 time=74.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=2 ttl=56 time=71.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=3 ttl=56 time=63.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=4 ttl=56 time=81.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=5 ttl=56 time=70.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=6 ttl=56 time=87.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=7 ttl=56 time=79.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=8 ttl=56 time=74.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=9 ttl=56 time=86.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=10 ttl=56 time=72.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=11 ttl=56 time=82.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=12 ttl=56 time=72.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=13 ttl=56 time=80.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=14 ttl=56 time=150 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=15 ttl=56 time=79.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=16 ttl=56 time=64.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=17 ttl=56 time=63.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=18 ttl=56 time=62.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=19 ttl=56 time=74.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=20 ttl=56 time=63.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=21 ttl=56 time=74.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=22 ttl=56 time=73.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=23 ttl=56 time=81.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=24 ttl=56 time=80.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=25 ttl=56 time=73.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=26 ttl=56 time=73.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=27 ttl=56 time=76.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=28 ttl=56 time=76.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=29 ttl=56 time=73.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=30 ttl=56 time=86.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=31 ttl=56 time=119 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=32 ttl=56 time=71.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=33 ttl=56 time=80.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=34 ttl=56 time=79.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=35 ttl=56 time=76.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=36 ttl=56 time=84.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=37 ttl=56 time=86.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=38 ttl=56 time=85.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=39 ttl=56 time=81.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=40 ttl=56 time=68.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=41 ttl=56 time=81.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=42 ttl=56 time=66.6 ms
```

```
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=62 ttl=56 time=80.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=63 ttl=56 time=80.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=64 ttl=56 time=83.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=65 ttl=56 time=68.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=66 ttl=56 time=75.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=67 ttl=56 time=85.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=68 ttl=56 time=68.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=69 ttl=56 time=98.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=70 ttl=56 time=82.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=71 ttl=56 time=81.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=72 ttl=56 time=81.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=73 ttl=56 time=78.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=74 ttl=56 time=68.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=75 ttl=56 time=76.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=76 ttl=56 time=64.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=77 ttl=56 time=90.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=78 ttl=56 time=82.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=79 ttl=56 time=82.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=80 ttl=56 time=112 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=81 ttl=56 time=91.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=82 ttl=56 time=92.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=83 ttl=56 time=71.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=84 ttl=56 time=61.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=85 ttl=56 time=83.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=86 ttl=56 time=79.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=87 ttl=56 time=79.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=88 ttl=56 time=78.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=89 ttl=56 time=83.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=90 ttl=56 time=75.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=91 ttl=56 time=68.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=92 ttl=56 time=80.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=93 ttl=56 time=76.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=94 ttl=56 time=70.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=95 ttl=56 time=85.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=96 ttl=56 time=75.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=97 ttl=56 time=83.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=98 ttl=56 time=82.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=99 ttl=56 time=75.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=100 ttl=56 time=68.8 ms

--- www.iiit.ac.in ping statistics ---
100 packets transmitted, 100 received, 0% packet loss, time 99136ms
rtt min/avg/max/mdev = 61.891/79.083/149.709/11.716 ms
~
```

Avg latency of 100 pings: 79.083 ms

C)

```
~ ping -c 1 10.50.111.109
PING 10.50.111.109 (10.50.111.109) 56(84) bytes of data.
64 bytes from 10.50.111.109: icmp_seq=1 ttl=252 time=29.5 ms

--- 10.50.111.109 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 29.465/29.465/29.465/0.000 ms
~ ping -c 1 10.50.143.106
PING 10.50.143.106 (10.50.143.106) 56(84) bytes of data.
64 bytes from 10.50.143.106: icmp_seq=1 ttl=252 time=34.3 ms

--- 10.50.143.106 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 34.296/34.296/34.296/0.000 ms
~ ping -c 1 125.21.46.69
PING 125.21.46.69 (125.21.46.69) 56(84) bytes of data.
64 bytes from 125.21.46.69: icmp_seq=1 ttl=60 time=39.5 ms

--- 125.21.46.69 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 39.499/39.499/39.499/0.000 ms
~ ping -c 1 182.79.146.178
PING 182.79.146.178 (182.79.146.178) 56(84) bytes of data.
64 bytes from 182.79.146.178: icmp_seq=1 ttl=59 time=86.9 ms

--- 182.79.146.178 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 86.892/86.892/86.892/0.000 ms
~ ping -c 1 182.79.239.145
PING 182.79.239.145 (182.79.239.145) 56(84) bytes of data.
64 bytes from 182.79.239.145: icmp_seq=1 ttl=59 time=77.1 ms

--- 182.79.239.145 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 77.096/77.096/77.096/0.000 ms
~ ping -c 1 182.79.206.230
PING 182.79.206.230 (182.79.206.230) 56(84) bytes of data.
64 bytes from 182.79.206.230: icmp_seq=1 ttl=247 time=82.3 ms

--- 182.79.206.230 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 82.275/82.275/82.275/0.000 ms
```

```
~ ping -c 1 182.79.206.230
PING 182.79.206.230 (182.79.206.230) 56(84) bytes of data.
64 bytes from 182.79.206.230: icmp_seq=1 ttl=247 time=82.3 ms

--- 182.79.206.230 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 82.275/82.275/82.275/0.000 ms
~ ping -c 1 115.242.184.26
PING 115.242.184.26 (115.242.184.26) 56(84) bytes of data.
64 bytes from 115.242.184.26: icmp_seq=1 ttl=55 time=82.4 ms

--- 115.242.184.26 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 82.368/82.368/82.368/0.000 ms
~ ping -c 1 196.12.53.50
PING 196.12.53.50 (196.12.53.50) 56(84) bytes of data.
64 bytes from 196.12.53.50: icmp_seq=1 ttl=56 time=84.2 ms

--- 196.12.53.50 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 84.166/84.166/84.166/0.000 ms
```

1)10.50.111.109   Latency ⇒ 29.465 ms
2)10.50.143.106   Latency ⇒ 34.296 ms
3)125.21.46.69   Latency ⇒ 39.499 ms
4)182.79.146.178   Latency ⇒ 86.892 ms
5)182.79.239.145   Latency ⇒ 77.096 ms
6)182.79.206.230   Latency ⇒ 82.275 ms
7)115.242.184.26   Latency ⇒ 82.368 ms
8)196.12.53.50   Latency ⇒ 84.166 ms

Sum of all ping latency: 516.057 ms
Average latency in part b): 79.083 ms
There are not matching, since the sum of all the ping latencies will be a lot more than the average of 100 ping latency.

D)
Maximum of ping latency among the intermediate hosts: 86.892 ms
Average latency in part b): 79.083 ms

They are not matching, however, they are very close. This is because the maximum among all the intermediate hosts is the maximum value of latency reached among all the values. This is the reason its value is close to the average of 100 pings to iiitd.ac.in

E)

```
~ dig +noall +answer -x 10.50.143.106
~ dig +noall +answer -x 192.168.1.99
~ dig +noall +answer -x 115.242.184.26
26.184.242.115.in-addr.arpa. 3600 IN     PTR      115.242.184.26.static.jio.com.
~ dig +noall +answer -x 196.12.53.50
~ dig +noall +answer -x 196.12.53.50
~ dig +noall +answer -x 182.79.239.145
;; connection timed out; no servers could be reached

~ dig +noall +answer -x 10.50.111.109
~ dig +noall +answer -x 125.21.46.69
~ dig +noall +answer -x 182.79.239.145
;; connection timed out; no servers could be reached

~ dig +noall +answer -x 182.79.206.230
;; connection timed out; no servers could be reached

~ |
```

The hostname for 115.242.184.26: 115.242.184.26.static.jio.com,

Question 7:

```
~ sudo ifconfig lo down
~ 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 ---
20 packets transmitted, 0 received, 100% packet loss, time 19461ms

~ |
```

To make the ping command fail for 127.0.0.1 with 100% packet loss, we have to disable the loopback interface by using the command 'ifconfig lo down', the down flag causes the driver for this interface to shut down. After deactivating, when we ping at 127.0.0.1 we achieve the 100% packet loss.