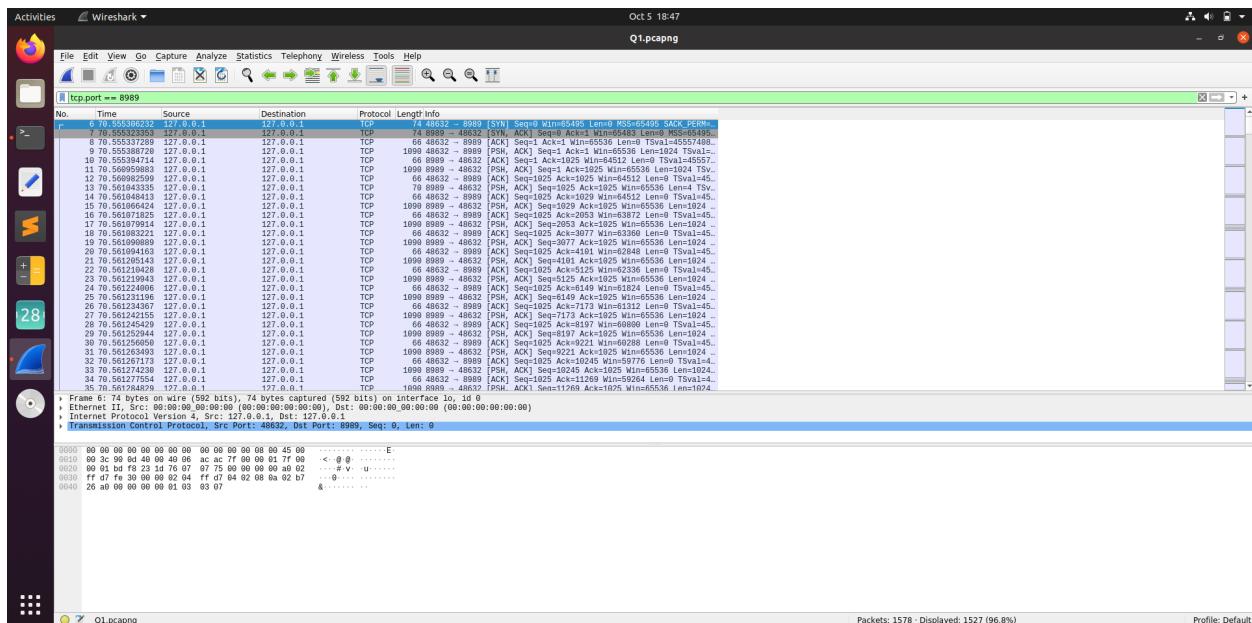


## Assignment-2

Q1)

Packets captured after opening the server-client for 2 mins

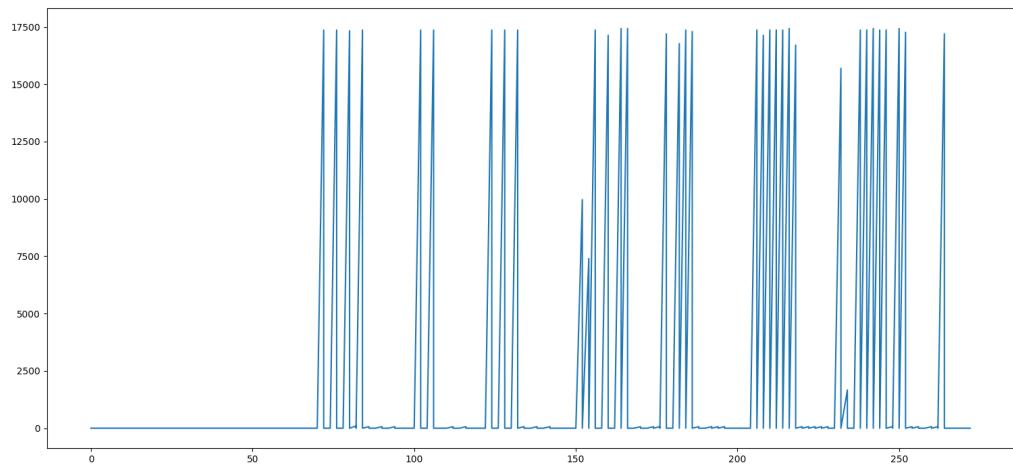
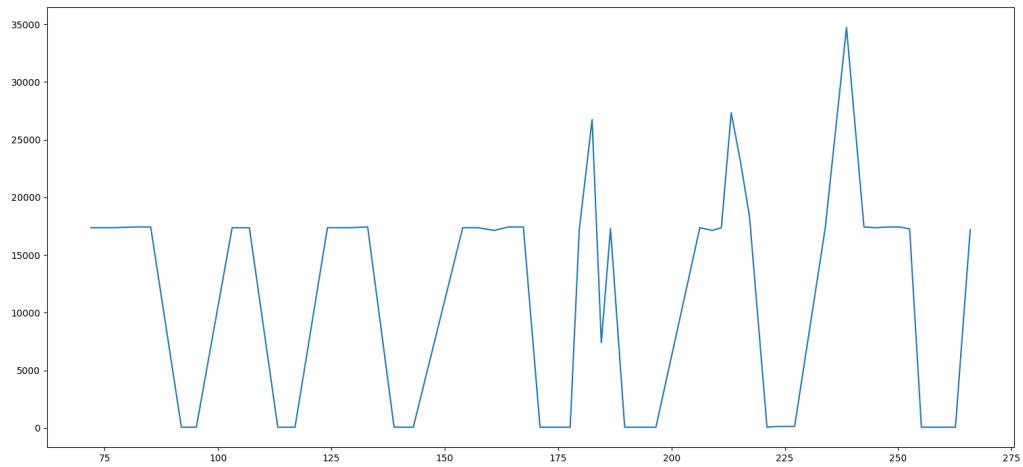


Inorder to capture the packets between the client and server communication, I have used wireshark. Before capturing the packets my client was at IP address 127.0.0.1 (which is the IP address of loopback) and my server was binder to an ip address that the system assigned to it (in the server code I had used ADDR\_ANY, because of which the system binds the server to a random ip address). Both my client and server sockets were on port no 8989. This information is helpful to capture the packets.

Now to capture packets , I opened wireshark through the command ‘sudo wireshark’ , I pressed on lo (network interface which my client socket was using) and started capturing packets from that interface. Then I opened the server and started running the client program continuously for 2 minutes. Then I closed the server and the clients. Then I went to wireshark where all the packets coming to the lo interface would have been captured till now. Then I set the display filter as tcp.port == 8989 (as seen in the pic). So all the packets that has src or destination port as 8989 got filtered. Since both my client and server was operating at the same port I was sure these are the packets from my client -server program.

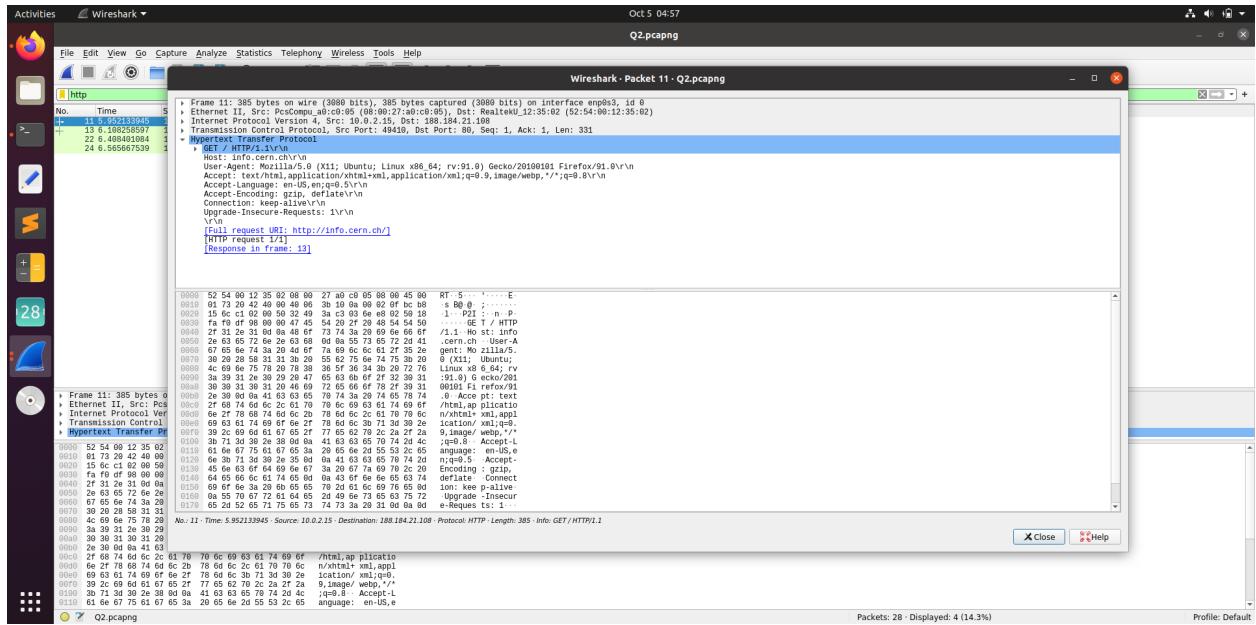
After filtering I got the response shown in the pic. I downloaded that response as csv file and ran a python code (which I had written) to plot the graph of aggregate throughput and time which can be seen below.

Plot generated is as follows:



Q2)

Following 2 HTTP request packets are captured:



HTTP PACKET TYPE: Request Message

HTTP REQUEST TYPE: GET / HTTP/1.1\r\n

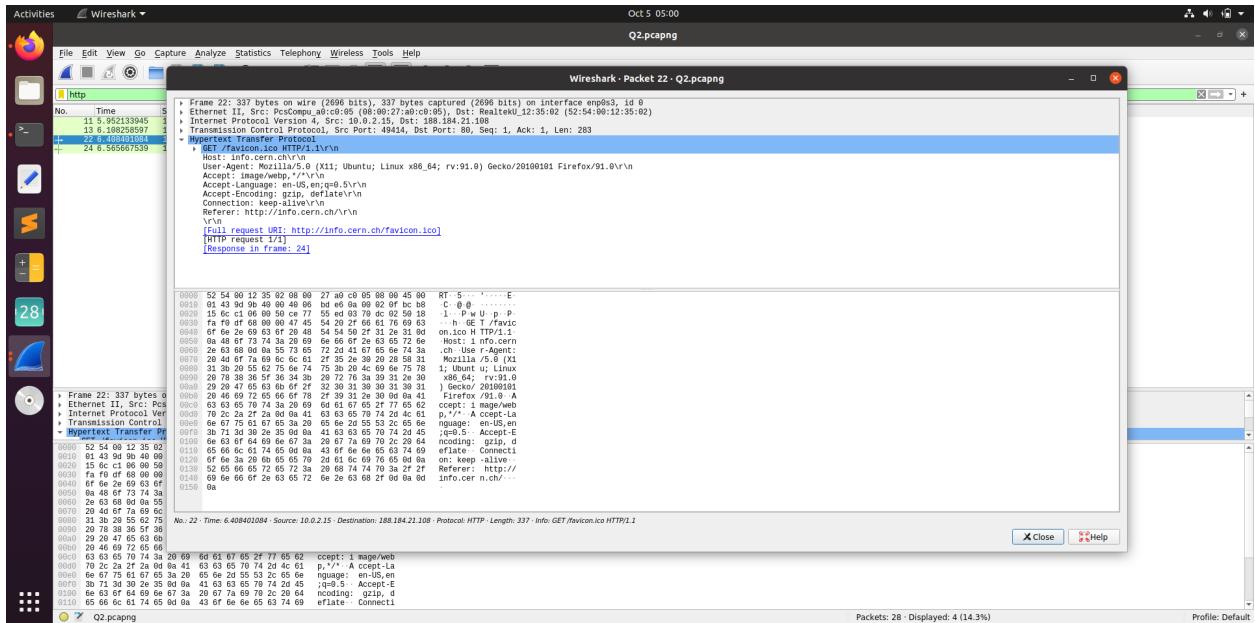
USER AGENT TYPE: Mozilla/5.0 (X11; Ubuntu; Linux x86\_64; rv:91.0) Gecko/20100101 Firefox/91.0

Firefox/91.0

HTTP REQUEST PACKET URL: /

NAME OF THE SERVER: info.cern.ch

VERSION OF THE SERVER: HTTP/1.1



## HTTP PACKET TYPE: Request Message

HTTP REQUEST TYPE: GET / HTTP/1.1\r\n

USER AGENT TYPE: Mozilla/5.0 (X11; Ubuntu; Linux x86\_64; rv:91.0) Gecko/20100101

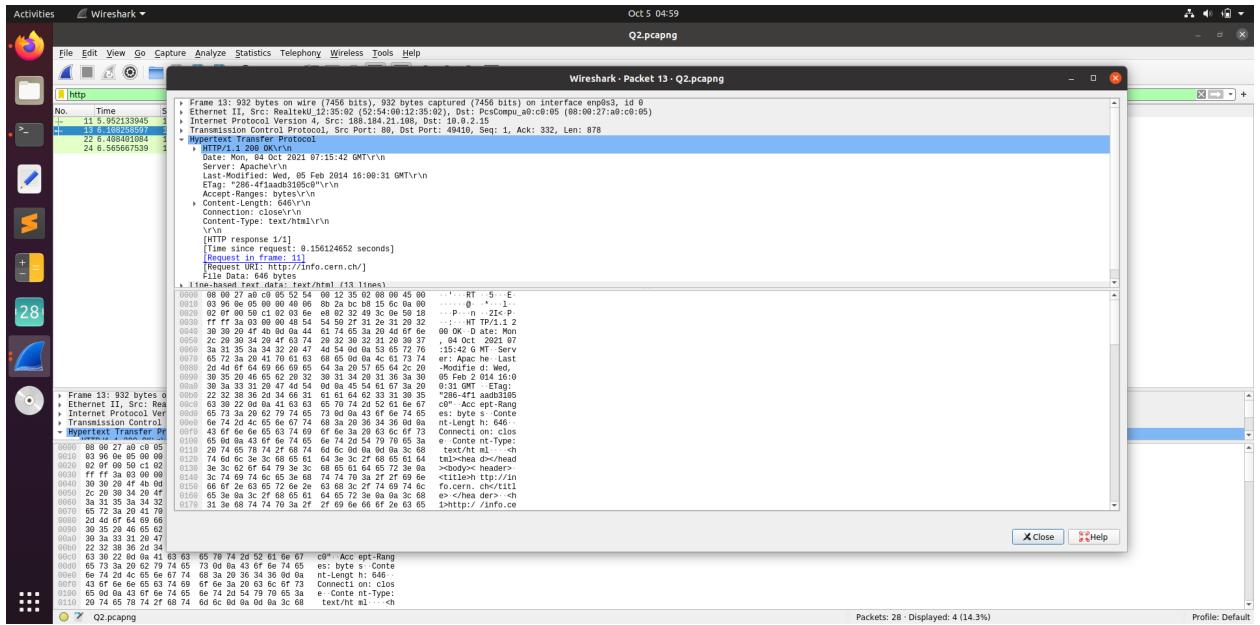
Firefox/91.0

## HTTP REQUEST PACKET URL: /favicon.ico

NAME OF THE SERVER: info.cern.ch

VERSION OF THE SERVER: HTTP/1.1

Following 2 response packets are captured:

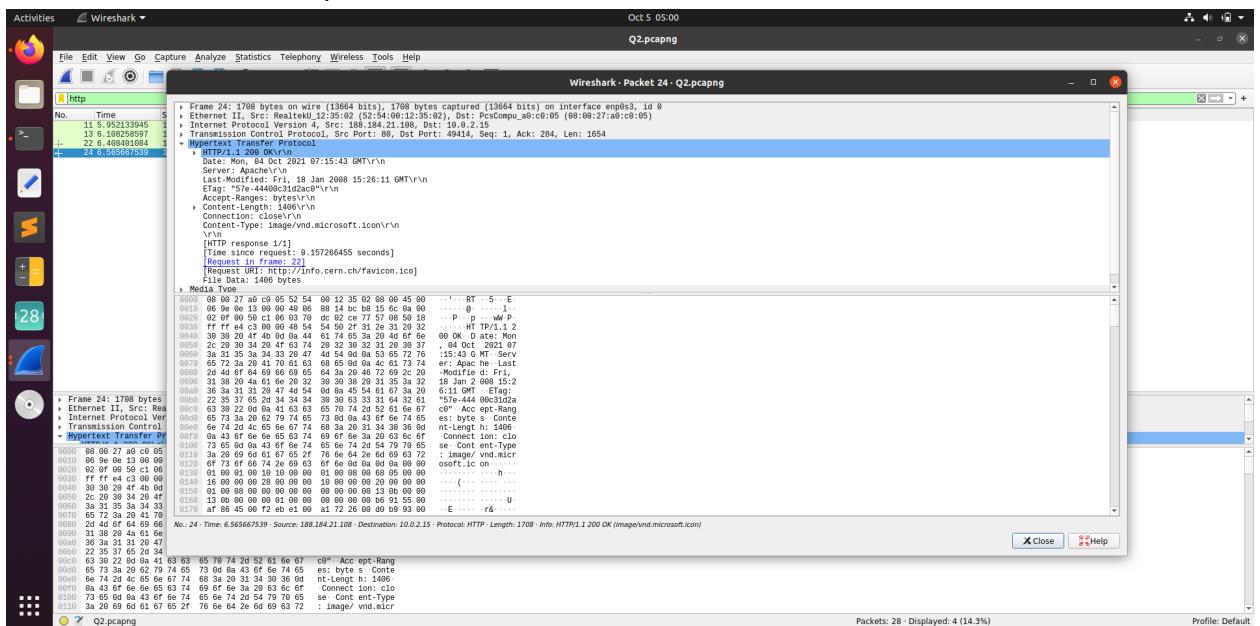


HTTP PACKET TYPE: Response Message

HTTP RESPONSE CODE : 200

HTTP RESPONSE DESCRIPTION: OK

NAME WEB SERVER: Apache



HTTP PACKET TYPE: Response Message

HTTP RESPONSE CODE : 200

HTTP RESPONSE DESCRIPTION: OK

NAME WEB SERVER: Apache

Q3)

a)

```
Activities Terminal vanislkka@vanislkka-VirtualBox: ~ Oct 4 00:27
vanislkka@vanislkka-VirtualBox: ~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 brd 10.0.2.255 netmask 255.255.255.0 broadcast 10.0.2.255
                inet6 fe80::ca38:c0d9:68f0:ae5d brd ff02::1 link-layer scopeid 0x20<link>
                        ether 08:00:27:18:68:f0 txqueuelen 1000 (Ethernet)
                        RX packets 15727 bytes 19057424 (19.0 MB)
                        RX errors 0 dropped 0 overruns 0 frame 0
                        TX packets 5879 bytes 980748 (980.7 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 brd 127.0.0.1 netmask 255.0.0.0
                inet6 ::1 brd ::1 prefixlen 128 link-layer scopeid 0x10<host>
                        loop txqueuelen 1000 (Local Loopback)
                        RX packets 1301 bytes 130422 (130.4 KB)
                        RX errors 0 dropped 0 overruns 0 frame 0
                        TX packets 1301 bytes 130422 (130.4 KB)
                        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
vanislkka@vanislkka-VirtualBox: ~$ ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.0.2.15 brd 10.0.2.255 netmask 255.255.255.0 broadcast 10.0.2.255
                inet6 fe80::ca38:c0d9:68f0:ae5d brd ff02::1 link-layer scopeid 0x20<link>
                        ether 08:00:27:18:68:f0 txqueuelen 1000 (Ethernet)
                        RX packets 15727 bytes 19057424 (19.0 MB)
                        RX errors 0 dropped 0 overruns 0 frame 0
                        TX packets 5879 bytes 980748 (980.7 KB)
                        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
vanislkka@vanislkka-VirtualBox: ~$
```

In the above picture, the IP address written after inet in enp0s3 network interface is the IP address of my network interface. So the IP address of my network interface (as mentioned in the pic ) is 10.0.2.15. ifconfig is used to configure network interfaces that reside in kernel space. It is used to assign IP addresses and netmask to the network interfaces. From the list, enp0s3 is the active interface of my network. That's why the ifconfig command to get the IP address is on this network interface.

b)

Activities Firefox Web Browser vanislkka@vanislkka-VirtualBox: ~ Oct 4 00:36

Assignment 2: Command: What Is My IP Quickly

https://www.whatismyip.com

WhatIsMyIP.com Speed Test IP Lookup Change IP Hide IP Search ... Sign Up Login

IP Address Lookup

IP Whois Lookup

Tools

Investigate

Privacy

WiFi

Safety

Learn

My Public IPv4 is:  
**106.214.102.6**

My Public IPv6 is:  
Not Detected

My IP Location: Agra, UP IN

ISP: Bharti Airtel Ltd.

My IP Information

What Is My IP?

WhatIsMyIP.com is the industry leader in providing IP address information. Knowing your [public IP address](#) is crucial for online gaming, using remote desktop connections, and connecting to a security camera DVR. The IP address assigned to your home network allows you to be connected to the internet. WhatIsMyIP.com can also help you identify your VPN location if your goal is to protect your privacy or watch Netflix from a different region.

WhatIsMyIP.com provides tools that allow users to perform an IP Location Lookup, IP Whois Lookup, Internet Speed Test, Proxy Detection, and more. Extensive tutorials show users [how to trace an email address](#), [how to create strong passwords](#), and [how to avoid being tracked by ads online](#).

Cookies Settings

What Is An IP Address?

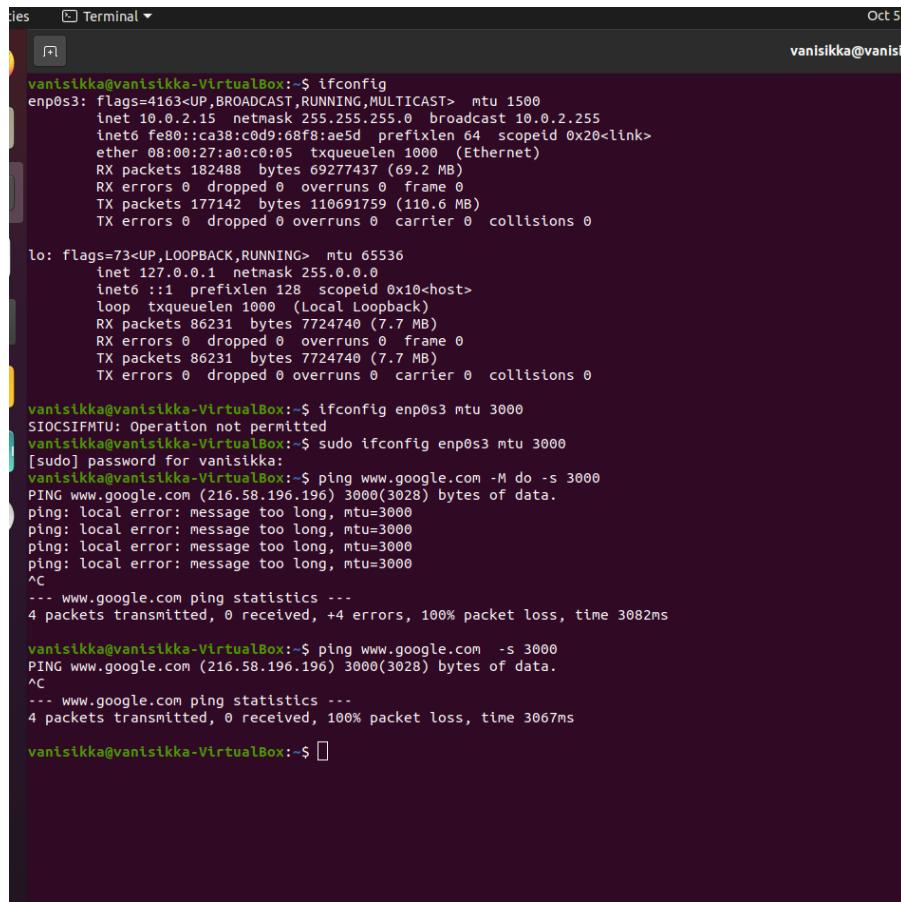
IP address stands for Internet Protocol Address. An IP is a unique number assigned to all information technology connected devices such as printers, routers, modems, and even refrigerators. The IP address identifies and allows these devices the ability to communicate with each other

https://www.whatismyip.com/privacy-policy/

The IP address given by the ifconfig command is different from the one shown on the site (as evident from both the above pics). This difference is because the Ifconfig command returns a private IP address and the site is telling the public IP address of your network. A private IP address is unique in the same network and globally across different networks they may not be unique. So because of which private IP addresses are used to communicate within the same network. But the public IP address is unique globally across different networks and is used to communicate globally across different networks. The public and private IP addresses of the network are not the same. That's why the IP address given by the ifconfig command and the site are different.

Q4)

a)



```

files Terminal Oct 5
vanisikka@vanisikka-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
    inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::ca38:009:68f8:ae5d  prefixlen 64  scopeid 0x20<link>
            ether 08:00:27:a0:c0:05  txqueuelen 1000  (Ethernet)
            RX packets 182488  bytes 69277437 (69.2 MB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 177142  bytes 116691759 (110.6 MB)
            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 86231  bytes 7724740 (7.7 MB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 86231  bytes 7724740 (7.7 MB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

vanisikka@vanisikka-VirtualBox:~$ ifconfig enp0s3 mtu 3000
SIOCSIFMTU: Operation not permitted
vanisikka@vanisikka-VirtualBox:~$ sudo ifconfig enp0s3 mtu 3000
[sudo] password for vanisikka:
vanisikka@vanisikka-VirtualBox:~$ ping www.google.com -M do -s 3000
PING www.google.com (216.58.196.196) 3000(3028) bytes of data.
ping: local error: message too long, mtu=3000
^C
--- www.google.com ping statistics ---
4 packets transmitted, 0 received, +4 errors, 100% packet loss, time 3082ms

vanisikka@vanisikka-VirtualBox:~$ ping www.google.com -s 3000
PING www.google.com (216.58.196.196) 3000(3028) bytes of data.
^C
--- www.google.com ping statistics ---
4 packets transmitted, 0 received, 100% packet loss, time 3067ms

vanisikka@vanisikka-VirtualBox:~$ 

```

mtu stands for Maximum Transmission Unit , basically used to tell the largest packet size that can be sent over the network. So in order to send a single packet with mtu 3000, I had first increased the mtu amount accepted by my ethernet network interface. Now to test whether I am able to send a single packet with mtu 3000 to '[www.google.com](http://www.google.com)', I have used 2 types of ping command.

Command: ping [www.google.com](http://www.google.com) -M do -s 3000

In the above command we know that ping uses ICMP protocol where it sends a echo request to the host, it takes the IP address of the host and sends a data packet to the host. Now along with ping I have used the flag -M do flag which doesn't allow the packets to be fragmented . The -c flag makes sure that only 100 ping requests are sent to google.com.-s flag specifies the size of the packet so I have mentioned 3000, so it means that ping is sending packet of size 3000 bytes to [www.google.com](http://www.google.com) and this packet is not allowed to be fragmented so a single packet of size 3000 byte is sent to google.com in all the 100 ping requests. But as you see the test failed because the network through which these packets are sent can not transmit a packet of size 3000 bytes. That's why we get an error as 'Message too long' as the client can not send a packet as big as 3000 bytes without fragmenting it into smaller parts.

Command: ping [www.google.com](http://www.google.com) -s 3000

This command is similar to that of previous one but here the packets are allowed to be fragmented into smallled packets but here also us can see that the test fail because after getting fragmented into smaller parts , the frgments are still so big that the network can send send these big messages across the network.

(b)

```

vanistikka@vanistikka-VirtualBox: ~$ sudo netstat -atp
[sudo] password for vanistikka:
Active Internet connections (servers and established)
Proto Recv-Q Local Address           Foreign Address         State      PID/Program name
tcp        0      0 localhost:domain          0.0.0.0:            LISTEN    554/systemd-resolve
tcp        0      0 localhost:ipp            0.0.0.0:            LISTEN    594/cupsd
tcp        0      0 vanistikka-Virtual:57968  de11519-1n-f10.1:https TIME_WAIT  -
tcp        0      0 vanistikka-Virtual:53270  239.237.117.34.bc:https ESTABLISHED 2358/firefox
tcp        0      0 vanistikka-Virtual:36768  116.119.76.79:https TIME_WAIT  -
tcp        0      0 vanistikka-Virtual:40206  ne103517-1n-f1.ie:https ESTABLISHED 2358/firefox
tcp        0      0 vanistikka-Virtual:57918  nrt12s12-1n-f193:https ESTABLISHED 2358/firefox
tcp        0      0 vanistikka-Virtual:36768  116.119.76.79:https TIME_WAIT  -
tcp        0      0 vanistikka-Virtual:46442  de11518-1n-f141:https TIME_WAIT  -
tcp        0      0 vanistikka-Virtual:55964  ec2-52-38-31-225:https ESTABLISHED 2358/firefox
tcp6       0      0 ip6-localhost:ipp        [::]:*                LISTEN    594/cupsd
vanistikka@vanistikka-VirtualBox: ~

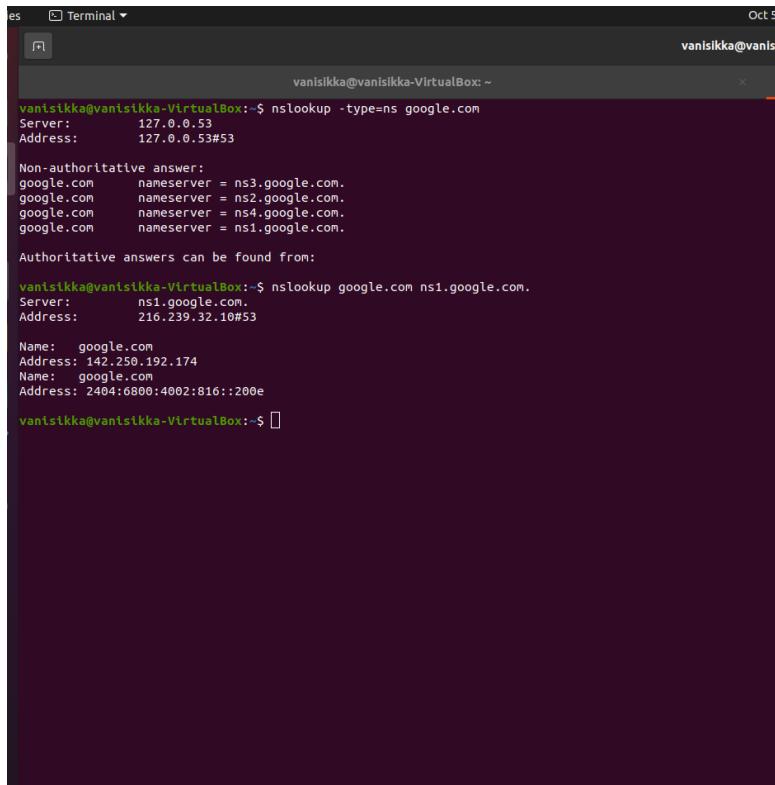
```

The command used is : sudo netstat -atp

netstat is a command used to list the various active connections with your systems. Such internet connections could be incoming and outgoing. There are various flags that can be used with this command. I have used flags a,t,p. Flag a makes sure that output only contains the active internet connection, t flags ensure that output will have only TCP and p flag ensures that the output also displays the pid of the program to which the socket is binded to.

Q5)

a)



The screenshot shows a terminal window with the following content:

```
vanisikka@vanisikka-VirtualBox:~$ nslookup -type=ns google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

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

Authoritative answers can be found from:
vanisikka@vanisikka-VirtualBox:~$ nslookup google.com ns1.google.com.
Server:      ns1.google.com.
Address:    236.239.32.10#53

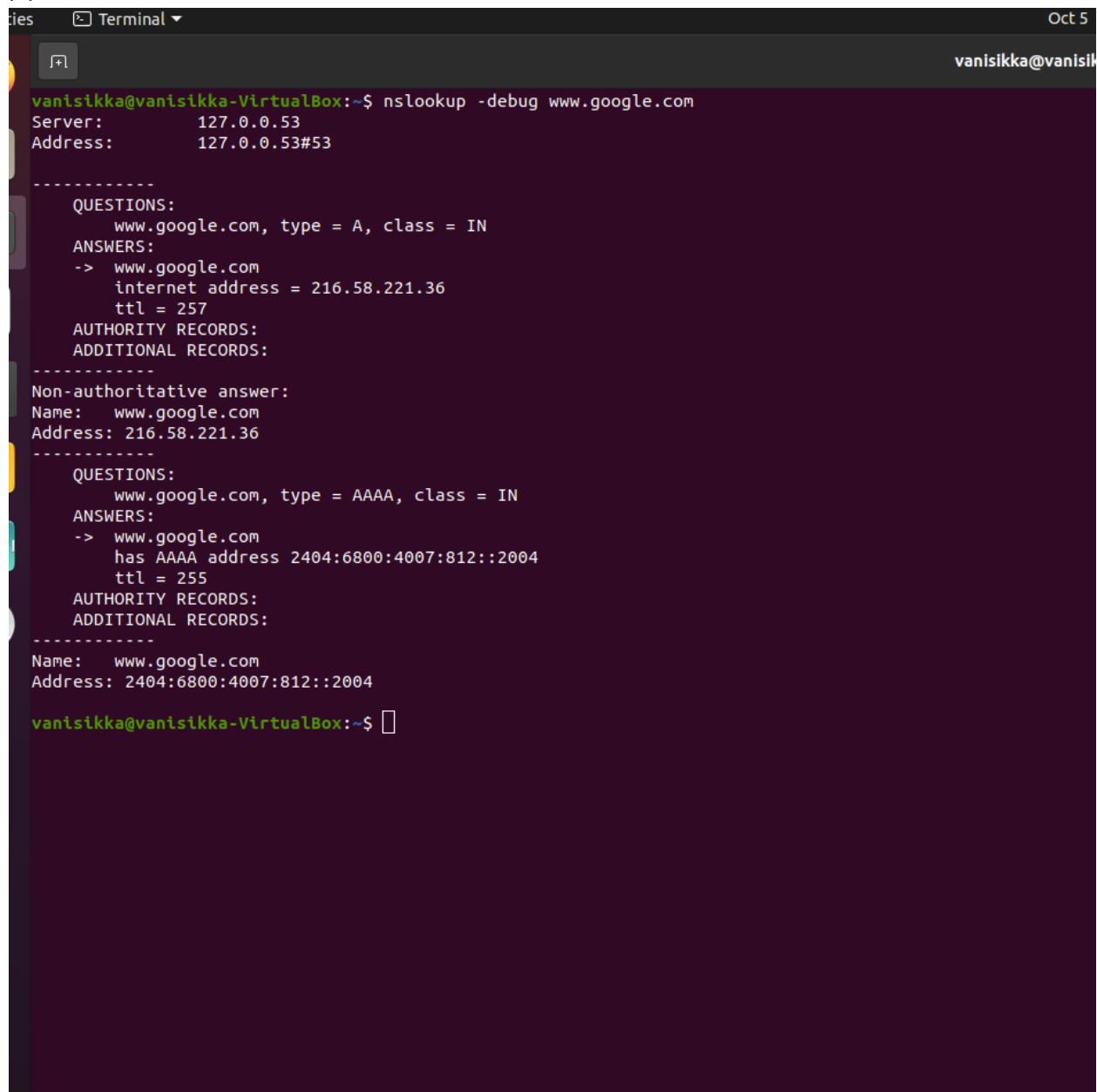
Name:  google.com
Address: 142.250.192.174
Name:  google.com
Address: 2404:6800:4002:816::200e

vanisikka@vanisikka-VirtualBox:~$
```

In the question , we are asked to get an authoritative answer for nslookup iiith.ac.in .Authoritative answer can only be obtained from the authoritative servers also called name servers. But if we simply put the command ‘nslookup google.com’ I always received non-authoritative results. This is because of web caching when you visit a site for the first time it would not be present in the web cache, so the ip address to the URL is fetched from root DNS to Domain DNS to Authoritative DNS. Once the response comes then the web cache saves this response IP address to the corresponding URL of that site. Then when again you visit the site, the Ip address is not fetched from the Authoritative servers. Now the IP address is simply returned by your web cache as it had saved it the previous time.

So when the web cache returns the IP address the nslookup calls it a non authoritative answer. So in the picture when I did nslookup on google I set the type flag to ns.This command helped me fetch the name server of google.com that is stored in the web cache. The next time I did the nslookup command I mentioned both the google url and the name server url (which I got from my previous command) . When I mentioned both the url, then nslookup instead of fetching IP address if google.com from the web cache it fetched the IP address from the name server ns1.google.com. Since the answer is coming from the name server hence the output returned is the authoritative answer for www.google.com.

(b)

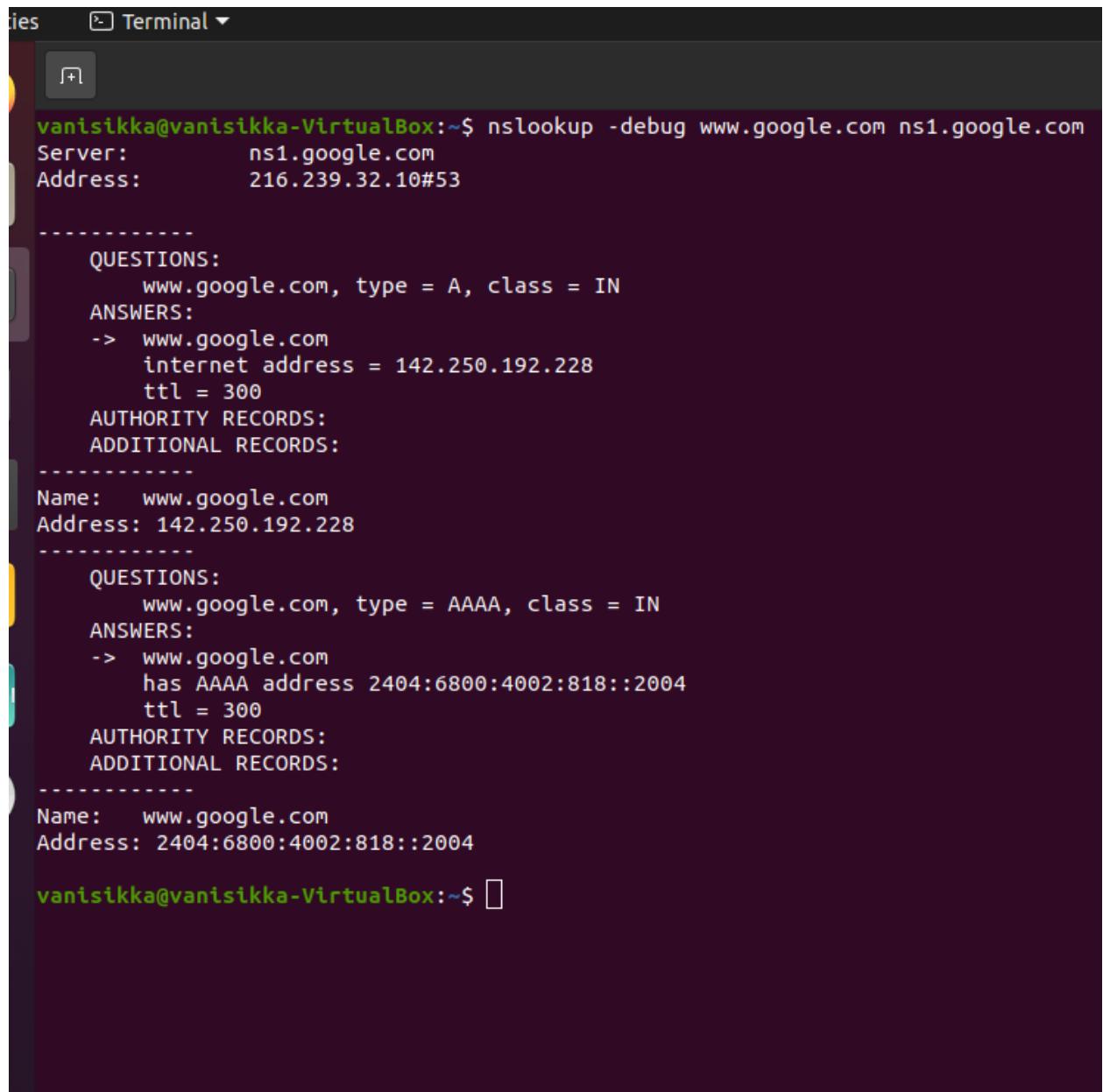


The screenshot shows a terminal window titled "Terminal" with the command "nslookup -debug www.google.com" run by the user "vanisikka" on "Oct 5". The output shows the DNS query process for "www.google.com". It starts with a local query (Server: 127.0.0.53) and then proceeds to a recursive query (ANSWERS: -> www.google.com). The response includes the internet address (216.58.221.36), TTL (257), and authority records. A non-authoritative answer is also provided, showing the same information. The final output shows the IPv6 address (2404:6800:4007:812::2004).

```
ties Terminal Oct 5
vanisikka@vanisikka-VirtualBox:~$ nslookup -debug www.google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

-----
QUESTIONS:
    www.google.com, type = A, class = IN
ANSWERS:
->  www.google.com
    internet address = 216.58.221.36
    ttl = 257
AUTHORITY RECORDS:
ADDITIONAL RECORDS:
-----
Non-authoritative answer:
Name:   www.google.com
Address: 216.58.221.36
-----
QUESTIONS:
    www.google.com, type = AAAA, class = IN
ANSWERS:
->  www.google.com
    has AAAA address 2404:6800:4007:812::2004
    ttl = 255
AUTHORITY RECORDS:
ADDITIONAL RECORDS:
-----
Name:   www.google.com
Address: 2404:6800:4007:812::2004
vanisikka@vanisikka-VirtualBox:~$
```

From the screenshot it is evident that the entry will expire after 257 secs



```
vanisikka@vanisikka-VirtualBox:~$ nslookup -debug www.google.com ns1.google.com
Server:      ns1.google.com
Address:     216.239.32.10#53

-----
QUESTIONS:
    www.google.com, type = A, class = IN
ANSWERS:
->  www.google.com
    internet address = 142.250.192.228
    ttl = 300
AUTHORITY RECORDS:
ADDITIONAL RECORDS:

Name:  www.google.com
Address: 142.250.192.228

-----
QUESTIONS:
    www.google.com, type = AAAA, class = IN
ANSWERS:
->  www.google.com
    has AAAA address 2404:6800:4002:818::2004
    ttl = 300
AUTHORITY RECORDS:
ADDITIONAL RECORDS:

Name:  www.google.com
Address: 2404:6800:4002:818::2004

vanisikka@vanisikka-VirtualBox:~$
```

Here in this screenshot the response came from name servers of google, that entry will expire after 5 mins or 300sec

Q6)

a)

```
C:\ Command Prompt
Microsoft Windows [Version 10.0.19043.1237]
(c) Microsoft Corporation. All rights reserved.

C:\Users\VANI SIKKA>tracert iiit.ac.in

Tracing route to iiit.ac.in [196.12.53.50]
over a maximum of 30 hops:

 1   2 ms      3 ms      3 ms  dsldevice.lan [192.168.1.1]
 2   7 ms      8 ms      6 ms  233.182.79.255
 3   8 ms     12 ms      8 ms  nsg-corporate-5.30.187.122.airtel.in [122.187.30.5]
 4   45 ms     45 ms     55 ms  182.79.142.239
 5   47 ms     49 ms     48 ms  49.44.220.188
 6   *          *          * Request timed out.
 7   56 ms     60 ms     56 ms  115.242.184.26.static.jio.com [115.242.184.26]
 8   69 ms     68 ms     68 ms  196.12.34.76
 9   68 ms     69 ms     68 ms  196.12.53.50

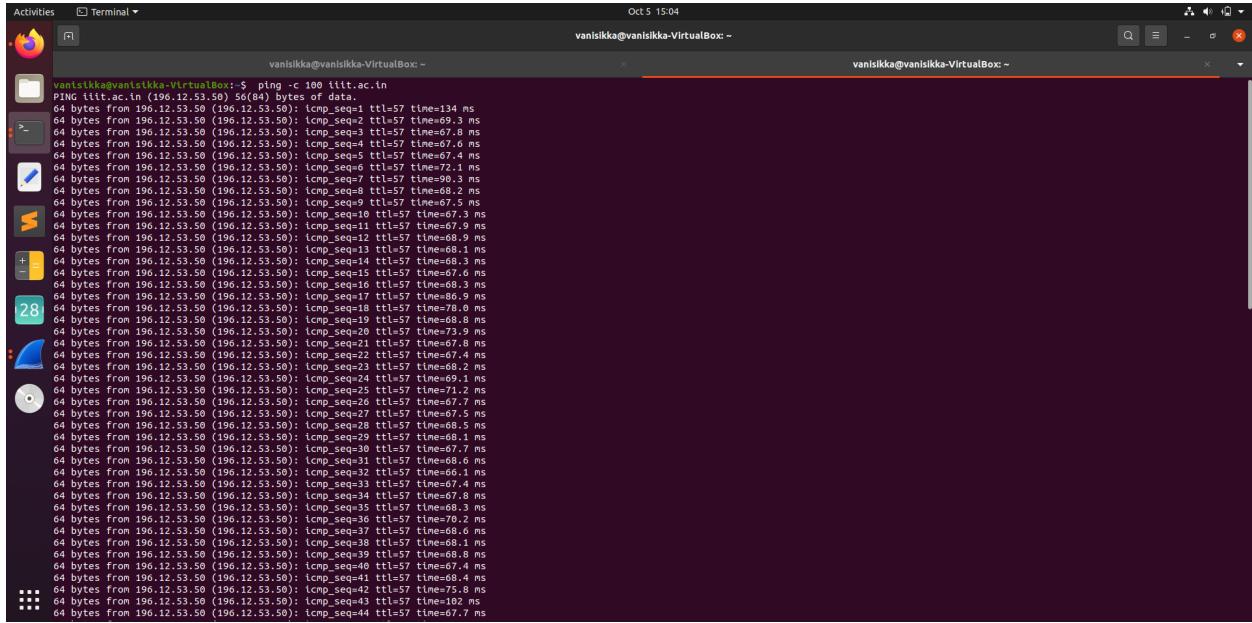
Trace complete.

C:\Users\VANI SIKKA>
```

As evident from the screenshot there are 9 intermediate host, the last one i.e.the 9th one is iiit.ac.in itself.

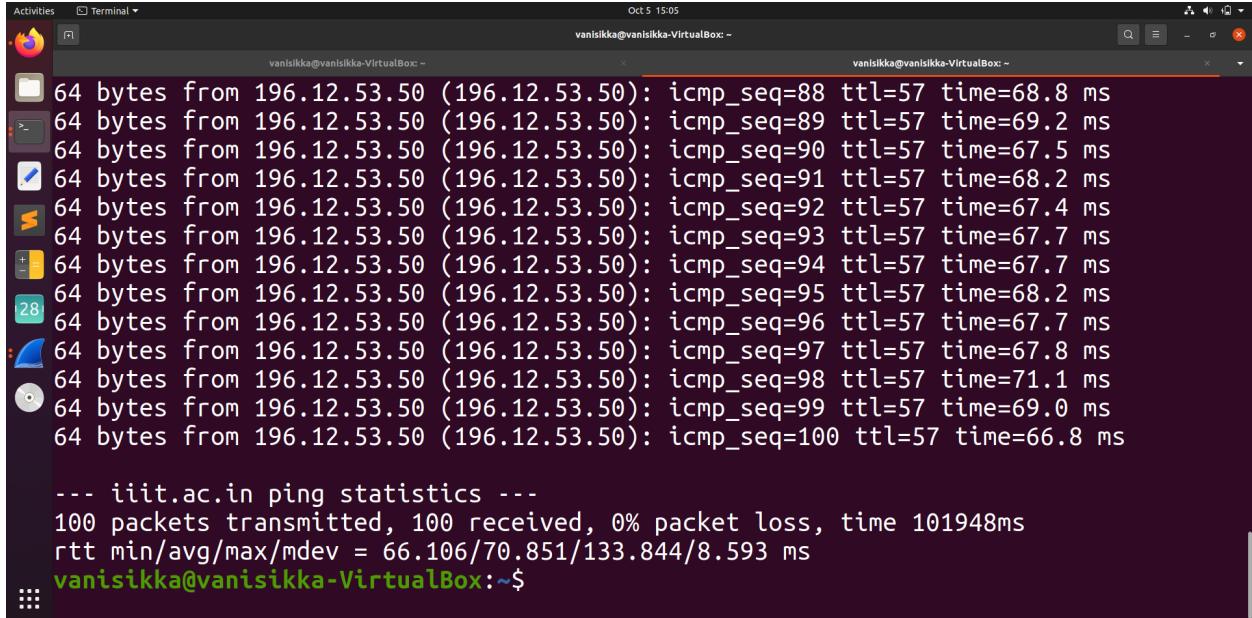
IP ADDRESS OF INTERMEDIATE HOST	AVERAGE LATENCY
1. 192.168.1.1	2.667 ms(2+3+3/3)
2. 233.182.79.255	7ms (7+8+6/3)
3. 122.187.30.5	9.333 ms (8+12+8/3)
4. 182.79.142.239	48.333ms (45+45+55/3)
5. 49.44.220.188	48 ms (47+49+48/3)
6. 115.242.184.26	57.33ms (56+60+56/3)
7. 196.12.34.76	68.33ms (69+68+68/3)
8. 196.12.53.50	68.33ms (68+69+68/3)

b)



Activities Terminal Oct 5 15:04 vanisikka@vanisikka-VirtualBox: ~

```
ping iiit.ac.in -c 100 iiit.ac.in
PING 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=57 time=134 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=2 ttl=57 time=69.3 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=3 ttl=57 time=67.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=4 ttl=57 time=67.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=5 ttl=57 time=67.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=6 ttl=57 time=67.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=7 ttl=57 time=90.3 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=8 ttl=57 time=68.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=9 ttl=57 time=67.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=10 ttl=57 time=67.3 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=11 ttl=57 time=69.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=12 ttl=57 time=68.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=13 ttl=57 time=68.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=14 ttl=57 time=68.3 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=15 ttl=57 time=67.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=16 ttl=57 time=68.3 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=17 ttl=57 time=68.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=18 ttl=57 time=67.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=19 ttl=57 time=68.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=20 ttl=57 time=73.9 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=21 ttl=57 time=67.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=22 ttl=57 time=67.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=23 ttl=57 time=68.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=24 ttl=57 time=67.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=25 ttl=57 time=71.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=26 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=27 ttl=57 time=67.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=28 ttl=57 time=68.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=29 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=30 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=31 ttl=57 time=68.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=32 ttl=57 time=66.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=33 ttl=57 time=67.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=34 ttl=57 time=67.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=35 ttl=57 time=68.3 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=36 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=37 ttl=57 time=68.6 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=38 ttl=57 time=68.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=39 ttl=57 time=68.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=40 ttl=57 time=67.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=41 ttl=57 time=68.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=42 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=43 ttl=57 time=102 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=44 ttl=57 time=67.7 ms
```



Activities Terminal Oct 5 15:05 vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~

```
ping iiit.ac.in -c 100 iiit.ac.in
PING 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=88 ttl=57 time=68.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=89 ttl=57 time=69.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=90 ttl=57 time=67.5 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=91 ttl=57 time=68.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=92 ttl=57 time=67.4 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=93 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=94 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=95 ttl=57 time=68.2 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=96 ttl=57 time=67.7 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=97 ttl=57 time=67.8 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=98 ttl=57 time=71.1 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=99 ttl=57 time=69.0 ms
64 bytes from 196.12.53.50 (196.12.53.50): icmp_seq=100 ttl=57 time=66.8 ms

--- iiit.ac.in ping statistics ---
100 packets transmitted, 100 received, 0% packet loss, time 101948ms
rtt min/avg/max/mdev = 66.106/70.851/133.844/8.593 ms
vani@vanisikka-VirtualBox:~$
```

As computed by the ping command, average latency of 100 ping messages to iiit.ac.in is **70.815ms**

```

Activities Terminal Oct 5 15:09 vanisikka@vansikka-VirtualBox: ~ vanisikka@vansikka-VirtualBox: ~ vanisikka@vansikka-VirtualBox: ~ vanisikka@vansikka-VirtualBox: ~
vanisikka@vansikka-VirtualBox: ~$ ping -c 100 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=63 time=3.19 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=63 time=2.96 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=63 time=4.55 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=63 time=3.78 ms
64 bytes from 192.168.1.1: icmp_seq=5 ttl=63 time=4.07 ms
64 bytes from 192.168.1.1: icmp_seq=6 ttl=63 time=3.07 ms
64 bytes from 192.168.1.1: icmp_seq=7 ttl=63 time=2.99 ms
64 bytes from 192.168.1.1: icmp_seq=8 ttl=63 time=2.99 ms
64 bytes from 192.168.1.1: icmp_seq=9 ttl=63 time=2.93 ms
64 bytes from 192.168.1.1: icmp_seq=10 ttl=63 time=2.88 ms
64 bytes from 192.168.1.1: icmp_seq=11 ttl=63 time=3.19 ms
64 bytes from 192.168.1.1: icmp_seq=12 ttl=63 time=3.87 ms
64 bytes from 192.168.1.1: icmp_seq=13 ttl=63 time=3.04 ms
64 bytes from 192.168.1.1: icmp_seq=14 ttl=63 time=2.95 ms
64 bytes from 192.168.1.1: icmp_seq=15 ttl=63 time=3.03 ms
64 bytes from 192.168.1.1: icmp_seq=16 ttl=63 time=5.01 ms
64 bytes from 192.168.1.1: icmp_seq=17 ttl=63 time=4.87 ms
64 bytes from 192.168.1.1: icmp_seq=18 ttl=63 time=2.85 ms
64 bytes from 192.168.1.1: icmp_seq=19 ttl=63 time=2.91 ms
64 bytes from 192.168.1.1: icmp_seq=20 ttl=63 time=2.92 ms
64 bytes from 192.168.1.1: icmp_seq=21 ttl=63 time=2.96 ms
64 bytes from 192.168.1.1: icmp_seq=22 ttl=63 time=2.95 ms
64 bytes from 192.168.1.1: icmp_seq=23 ttl=63 time=4.47 ms
64 bytes from 192.168.1.1: icmp_seq=24 ttl=63 time=2.96 ms
64 bytes from 192.168.1.1: icmp_seq=25 ttl=63 time=2.89 ms
64 bytes from 192.168.1.1: icmp_seq=26 ttl=63 time=2.95 ms
64 bytes from 192.168.1.1: icmp_seq=27 ttl=63 time=2.95 ms
64 bytes from 192.168.1.1: icmp_seq=28 ttl=63 time=4.77 ms
64 bytes from 192.168.1.1: icmp_seq=29 ttl=63 time=3.05 ms
64 bytes from 192.168.1.1: icmp_seq=30 ttl=63 time=2.71 ms
64 bytes from 192.168.1.1: icmp_seq=31 ttl=63 time=5.96 ms
64 bytes from 192.168.1.1: icmp_seq=32 ttl=63 time=4.01 ms
64 bytes from 192.168.1.1: icmp_seq=33 ttl=63 time=2.95 ms
64 bytes from 192.168.1.1: icmp_seq=34 ttl=63 time=2.98 ms
64 bytes from 192.168.1.1: icmp_seq=35 ttl=63 time=5.10 ms
64 bytes from 192.168.1.1: icmp_seq=36 ttl=63 time=3.62 ms
64 bytes from 192.168.1.1: icmp_seq=37 ttl=63 time=3.86 ms
64 bytes from 192.168.1.1: icmp_seq=38 ttl=63 time=2.63 ms
64 bytes from 192.168.1.1: icmp_seq=39 ttl=63 time=3.87 ms
64 bytes from 192.168.1.1: icmp_seq=40 ttl=63 time=2.75 ms
64 bytes from 192.168.1.1: icmp_seq=41 ttl=63 time=4.62 ms
64 bytes from 192.168.1.1: icmp_seq=42 ttl=63 time=3.96 ms
64 bytes from 192.168.1.1: icmp_seq=43 ttl=63 time=3.64 ms
64 bytes from 192.168.1.1: icmp_seq=44 ttl=63 time=4.15 ms

Activities Terminal Oct 5 15:10 vanisikka@vansikka-VirtualBox: ~ vanisikka@vansikka-VirtualBox: ~ vanisikka@vansikka-VirtualBox: ~ vanisikka@vansikka-VirtualBox: ~
vanisikka@vansikka-VirtualBox: ~$ ping -c 100 192.168.1.1
64 bytes from 192.168.1.1: icmp_seq=84 ttl=63 time=3.51 ms
64 bytes from 192.168.1.1: icmp_seq=85 ttl=63 time=2.95 ms
64 bytes from 192.168.1.1: icmp_seq=86 ttl=63 time=2.98 ms
64 bytes from 192.168.1.1: icmp_seq=87 ttl=63 time=4.04 ms
64 bytes from 192.168.1.1: icmp_seq=88 ttl=63 time=11.7 ms
64 bytes from 192.168.1.1: icmp_seq=89 ttl=63 time=2.77 ms
64 bytes from 192.168.1.1: icmp_seq=90 ttl=63 time=2.47 ms
64 bytes from 192.168.1.1: icmp_seq=91 ttl=63 time=3.19 ms
64 bytes from 192.168.1.1: icmp_seq=92 ttl=63 time=4.98 ms
64 bytes from 192.168.1.1: icmp_seq=93 ttl=63 time=2.77 ms
64 bytes from 192.168.1.1: icmp_seq=94 ttl=63 time=3.31 ms
64 bytes from 192.168.1.1: icmp_seq=95 ttl=63 time=3.07 ms
64 bytes from 192.168.1.1: icmp_seq=96 ttl=63 time=4.09 ms
64 bytes from 192.168.1.1: icmp_seq=97 ttl=63 time=2.94 ms
64 bytes from 192.168.1.1: icmp_seq=98 ttl=63 time=3.18 ms
64 bytes from 192.168.1.1: icmp_seq=99 ttl=63 time=3.14 ms
64 bytes from 192.168.1.1: icmp_seq=100 ttl=63 time=2.91 ms

--- 192.168.1.1 ping statistics ---
100 packets transmitted, 100 received, 0% packet loss, time 99243ms
rtt min/avg/max/ndev = 2.470/5.712/103.477/11.599 ms

```

As computed by the ping command, average latency of 100 ping messages to ip is 5.712ms

```

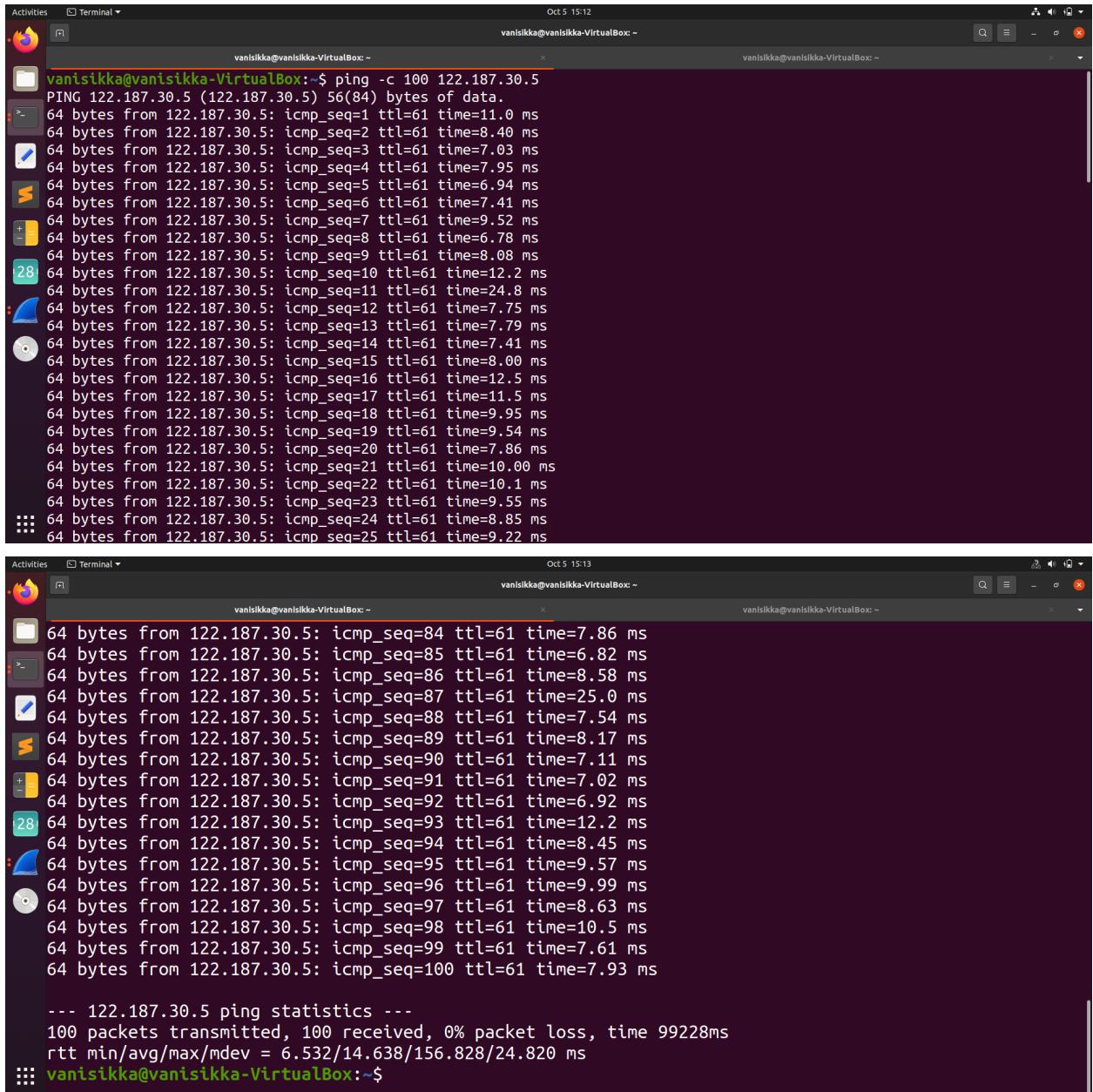
Activities Terminal vanisikka@vanisikka-VirtualBox: ~ Oct 5 15:10
vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox: ~$ ping -c 100 223.182.79.255
PING 223.182.79.255 (223.182.79.255) 56(84) bytes of data.
64 bytes from 223.182.79.255: icmp_seq=1 ttl=253 time=8.57 ms
64 bytes from 223.182.79.255: icmp_seq=2 ttl=253 time=7.73 ms
64 bytes from 223.182.79.255: icmp_seq=3 ttl=253 time=8.91 ms
64 bytes from 223.182.79.255: icmp_seq=4 ttl=253 time=7.59 ms
64 bytes from 223.182.79.255: icmp_seq=5 ttl=253 time=21.6 ms
64 bytes from 223.182.79.255: icmp_seq=6 ttl=253 time=6.98 ms
64 bytes from 223.182.79.255: icmp_seq=7 ttl=253 time=7.42 ms
64 bytes from 223.182.79.255: icmp_seq=8 ttl=253 time=6.79 ms
64 bytes from 223.182.79.255: icmp_seq=9 ttl=253 time=13.5 ms
64 bytes from 223.182.79.255: icmp_seq=10 ttl=253 time=7.59 ms
64 bytes from 223.182.79.255: icmp_seq=11 ttl=253 time=7.36 ms
64 bytes from 223.182.79.255: icmp_seq=12 ttl=253 time=9.06 ms
64 bytes from 223.182.79.255: icmp_seq=13 ttl=253 time=8.74 ms
64 bytes from 223.182.79.255: icmp_seq=14 ttl=253 time=7.06 ms
64 bytes from 223.182.79.255: icmp_seq=15 ttl=253 time=9.00 ms
64 bytes from 223.182.79.255: icmp_seq=16 ttl=253 time=8.08 ms
64 bytes from 223.182.79.255: icmp_seq=17 ttl=253 time=10.3 ms
64 bytes from 223.182.79.255: icmp_seq=18 ttl=253 time=6.95 ms
64 bytes from 223.182.79.255: icmp_seq=19 ttl=253 time=8.26 ms
64 bytes from 223.182.79.255: icmp_seq=20 ttl=253 time=6.78 ms
64 bytes from 223.182.79.255: icmp_seq=21 ttl=253 time=7.48 ms
64 bytes from 223.182.79.255: icmp_seq=22 ttl=253 time=8.66 ms
64 bytes from 223.182.79.255: icmp_seq=23 ttl=253 time=6.82 ms
64 bytes from 223.182.79.255: icmp_seq=24 ttl=253 time=11.6 ms
64 bytes from 223.182.79.255: icmp_seq=25 ttl=253 time=8.04 ms
64 bytes from 223.182.79.255: icmp_seq=26 ttl=253 time=7.01 ms
64 bytes from 223.182.79.255: icmp_seq=27 ttl=253 time=6.14 ms
64 bytes from 223.182.79.255: icmp_seq=28 ttl=253 time=6.59 ms
64 bytes from 223.182.79.255: icmp_seq=29 ttl=253 time=8.82 ms
64 bytes from 223.182.79.255: icmp_seq=30 ttl=253 time=8.87 ms

Activities Terminal vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~ Oct 5 15:11
vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox: ~$ ping -c 100 223.182.79.255
64 bytes from 223.182.79.255: icmp_seq=83 ttl=253 time=9.42 ms
64 bytes from 223.182.79.255: icmp_seq=84 ttl=253 time=6.84 ms
64 bytes from 223.182.79.255: icmp_seq=85 ttl=253 time=6.46 ms
64 bytes from 223.182.79.255: icmp_seq=86 ttl=253 time=8.22 ms
64 bytes from 223.182.79.255: icmp_seq=87 ttl=253 time=7.87 ms
64 bytes from 223.182.79.255: icmp_seq=88 ttl=253 time=7.27 ms
64 bytes from 223.182.79.255: icmp_seq=89 ttl=253 time=6.83 ms
64 bytes from 223.182.79.255: icmp_seq=90 ttl=253 time=6.58 ms
64 bytes from 223.182.79.255: icmp_seq=91 ttl=253 time=6.91 ms
64 bytes from 223.182.79.255: icmp_seq=92 ttl=253 time=8.69 ms
64 bytes from 223.182.79.255: icmp_seq=93 ttl=253 time=6.63 ms
64 bytes from 223.182.79.255: icmp_seq=94 ttl=253 time=7.77 ms
64 bytes from 223.182.79.255: icmp_seq=95 ttl=253 time=44.9 ms
64 bytes from 223.182.79.255: icmp_seq=96 ttl=253 time=10.2 ms
64 bytes from 223.182.79.255: icmp_seq=97 ttl=253 time=10.4 ms
64 bytes from 223.182.79.255: icmp_seq=98 ttl=253 time=7.20 ms
64 bytes from 223.182.79.255: icmp_seq=99 ttl=253 time=7.16 ms

--- 223.182.79.255 ping statistics ---
100 packets transmitted, 99 received, 1% packet loss, time 99212ms
rtt min/avg/max/mdev = 5.720/9.144/44.923/5.251 ms

```

As computed by the ping command, average latency of 100 ping messages to ip is 9.144ms



The image shows two terminal windows side-by-side, both titled "vanisikka@vanisikka-VirtualBox: ~". The left terminal window displays the output of a ping command with the "-c 100" option, targeting the IP address 122.187.30.5. The right terminal window displays the output of a ping command with the "-c 100" option, targeting the IP address 122.187.30.5, with the output truncated at the bottom.

```
Oct 5 15:12 vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox: ~$ ping -c 100 122.187.30.5
PING 122.187.30.5 (122.187.30.5) 56(84) bytes of data.
64 bytes from 122.187.30.5: icmp_seq=1 ttl=61 time=11.0 ms
64 bytes from 122.187.30.5: icmp_seq=2 ttl=61 time=8.40 ms
64 bytes from 122.187.30.5: icmp_seq=3 ttl=61 time=7.03 ms
64 bytes from 122.187.30.5: icmp_seq=4 ttl=61 time=7.95 ms
64 bytes from 122.187.30.5: icmp_seq=5 ttl=61 time=6.94 ms
64 bytes from 122.187.30.5: icmp_seq=6 ttl=61 time=7.41 ms
64 bytes from 122.187.30.5: icmp_seq=7 ttl=61 time=9.52 ms
64 bytes from 122.187.30.5: icmp_seq=8 ttl=61 time=6.78 ms
64 bytes from 122.187.30.5: icmp_seq=9 ttl=61 time=8.08 ms
28 64 bytes from 122.187.30.5: icmp_seq=10 ttl=61 time=12.2 ms
64 bytes from 122.187.30.5: icmp_seq=11 ttl=61 time=24.8 ms
64 bytes from 122.187.30.5: icmp_seq=12 ttl=61 time=7.75 ms
64 bytes from 122.187.30.5: icmp_seq=13 ttl=61 time=7.79 ms
64 bytes from 122.187.30.5: icmp_seq=14 ttl=61 time=7.41 ms
64 bytes from 122.187.30.5: icmp_seq=15 ttl=61 time=8.00 ms
64 bytes from 122.187.30.5: icmp_seq=16 ttl=61 time=12.5 ms
64 bytes from 122.187.30.5: icmp_seq=17 ttl=61 time=11.5 ms
64 bytes from 122.187.30.5: icmp_seq=18 ttl=61 time=9.95 ms
64 bytes from 122.187.30.5: icmp_seq=19 ttl=61 time=9.54 ms
64 bytes from 122.187.30.5: icmp_seq=20 ttl=61 time=7.86 ms
64 bytes from 122.187.30.5: icmp_seq=21 ttl=61 time=10.00 ms
64 bytes from 122.187.30.5: icmp_seq=22 ttl=61 time=10.1 ms
64 bytes from 122.187.30.5: icmp_seq=23 ttl=61 time=9.55 ms
64 bytes from 122.187.30.5: icmp_seq=24 ttl=61 time=8.85 ms
64 bytes from 122.187.30.5: icmp_seq=25 ttl=61 time=9.22 ms

Oct 5 15:13 vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox: ~$ ping -c 100 122.187.30.5
64 bytes from 122.187.30.5: icmp_seq=84 ttl=61 time=7.86 ms
64 bytes from 122.187.30.5: icmp_seq=85 ttl=61 time=6.82 ms
64 bytes from 122.187.30.5: icmp_seq=86 ttl=61 time=8.58 ms
64 bytes from 122.187.30.5: icmp_seq=87 ttl=61 time=25.0 ms
64 bytes from 122.187.30.5: icmp_seq=88 ttl=61 time=7.54 ms
64 bytes from 122.187.30.5: icmp_seq=89 ttl=61 time=8.17 ms
64 bytes from 122.187.30.5: icmp_seq=90 ttl=61 time=7.11 ms
64 bytes from 122.187.30.5: icmp_seq=91 ttl=61 time=7.02 ms
64 bytes from 122.187.30.5: icmp_seq=92 ttl=61 time=6.92 ms
28 64 bytes from 122.187.30.5: icmp_seq=93 ttl=61 time=12.2 ms
64 bytes from 122.187.30.5: icmp_seq=94 ttl=61 time=8.45 ms
64 bytes from 122.187.30.5: icmp_seq=95 ttl=61 time=9.57 ms
64 bytes from 122.187.30.5: icmp_seq=96 ttl=61 time=9.99 ms
64 bytes from 122.187.30.5: icmp_seq=97 ttl=61 time=8.63 ms
64 bytes from 122.187.30.5: icmp_seq=98 ttl=61 time=10.5 ms
64 bytes from 122.187.30.5: icmp_seq=99 ttl=61 time=7.61 ms
64 bytes from 122.187.30.5: icmp_seq=100 ttl=61 time=7.93 ms

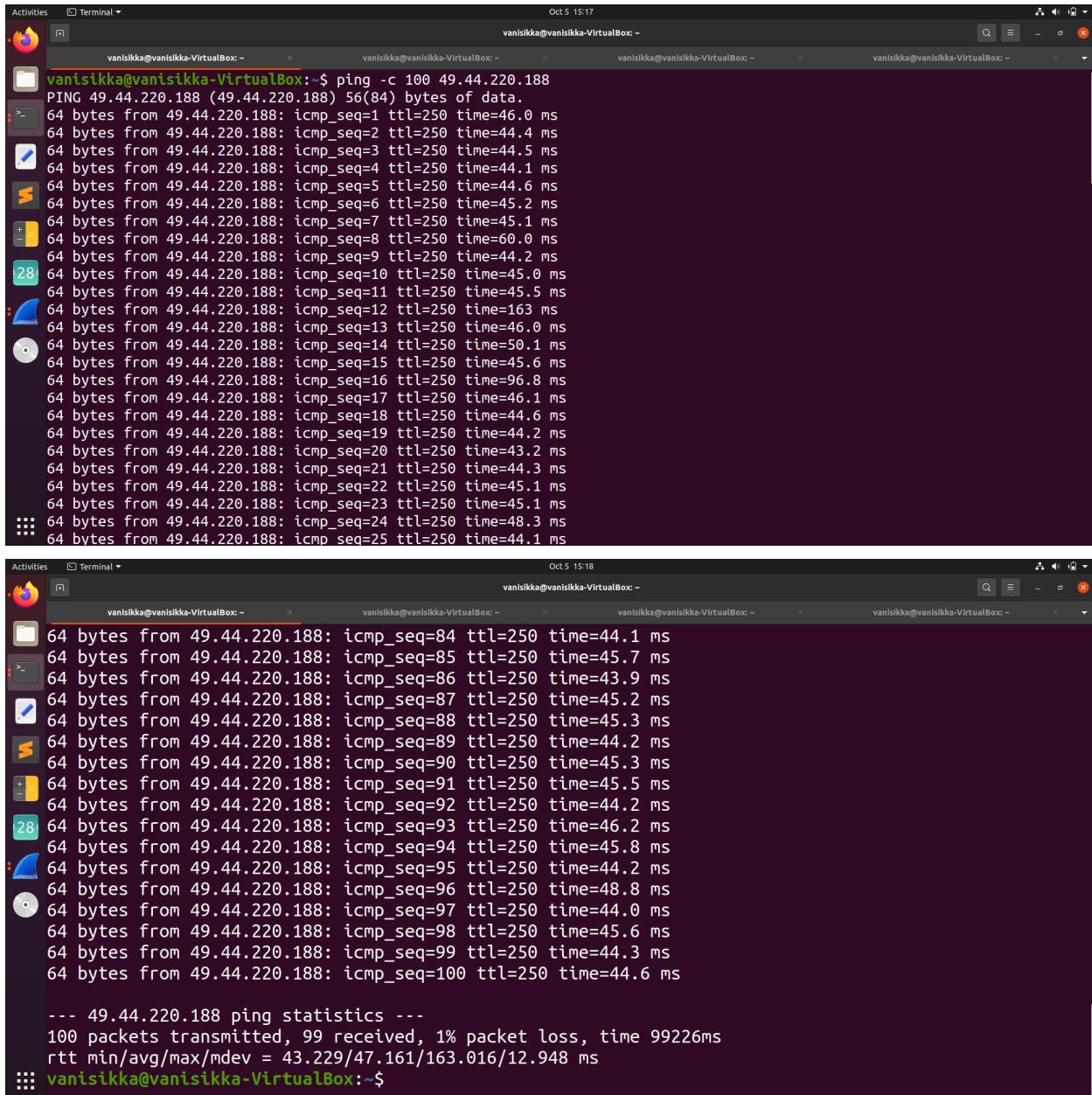
--- 122.187.30.5 ping statistics ---
100 packets transmitted, 100 received, 0% packet loss, time 99228ms
rtt min/avg/max/mdev = 6.532/14.638/156.828/24.820 ms
vanisikka@vanisikka-VirtualBox:~$
```

As computed by the ping command, average latency of 100 ping messages to ip is 14.638ms

```
Activities Terminal vanisikka@vanisikka-VirtualBox:~$ ping -c 100 182.79.142.239
Oct 5 15:13
PING 182.79.142.239 (182.79.142.239) 56(84) bytes of data.
64 bytes from 182.79.142.239: icmp_seq=1 ttl=60 time=49.8 ms
64 bytes from 182.79.142.239: icmp_seq=2 ttl=60 time=49.2 ms
64 bytes from 182.79.142.239: icmp_seq=3 ttl=60 time=48.6 ms
64 bytes from 182.79.142.239: icmp_seq=4 ttl=60 time=60.0 ms
64 bytes from 182.79.142.239: icmp_seq=5 ttl=60 time=61.5 ms
64 bytes from 182.79.142.239: icmp_seq=6 ttl=60 time=45.5 ms
64 bytes from 182.79.142.239: icmp_seq=7 ttl=60 time=53.5 ms
64 bytes from 182.79.142.239: icmp_seq=8 ttl=60 time=56.3 ms
64 bytes from 182.79.142.239: icmp_seq=9 ttl=60 time=47.3 ms
64 bytes from 182.79.142.239: icmp_seq=10 ttl=60 time=57.3 ms
64 bytes from 182.79.142.239: icmp_seq=11 ttl=60 time=52.7 ms
64 bytes from 182.79.142.239: icmp_seq=12 ttl=60 time=46.6 ms
64 bytes from 182.79.142.239: icmp_seq=13 ttl=60 time=48.2 ms
64 bytes from 182.79.142.239: icmp_seq=14 ttl=60 time=46.4 ms
64 bytes from 182.79.142.239: icmp_seq=15 ttl=60 time=47.0 ms
64 bytes from 182.79.142.239: icmp_seq=16 ttl=60 time=747 ms
64 bytes from 182.79.142.239: icmp_seq=17 ttl=60 time=46.2 ms
64 bytes from 182.79.142.239: icmp_seq=18 ttl=60 time=50.1 ms
64 bytes from 182.79.142.239: icmp_seq=19 ttl=60 time=147 ms
64 bytes from 182.79.142.239: icmp_seq=20 ttl=60 time=148 ms
64 bytes from 182.79.142.239: icmp_seq=21 ttl=60 time=45.8 ms
64 bytes from 182.79.142.239: icmp_seq=22 ttl=60 time=148 ms
Oct 5 15:14
Activities Terminal vanisikka@vanisikka-VirtualBox:~$ vanisikka@vanisikka-VirtualBox:~$ ping -c 100 182.79.142.239
64 bytes from 182.79.142.239: icmp_seq=86 ttl=60 time=52.6 ms
64 bytes from 182.79.142.239: icmp_seq=87 ttl=60 time=45.4 ms
64 bytes from 182.79.142.239: icmp_seq=88 ttl=60 time=47.5 ms
64 bytes from 182.79.142.239: icmp_seq=89 ttl=60 time=46.0 ms
64 bytes from 182.79.142.239: icmp_seq=90 ttl=60 time=47.6 ms
64 bytes from 182.79.142.239: icmp_seq=91 ttl=60 time=47.8 ms
64 bytes from 182.79.142.239: icmp_seq=92 ttl=60 time=46.4 ms
64 bytes from 182.79.142.239: icmp_seq=93 ttl=60 time=45.9 ms
64 bytes from 182.79.142.239: icmp_seq=94 ttl=60 time=46.0 ms
64 bytes from 182.79.142.239: icmp_seq=95 ttl=60 time=47.7 ms
64 bytes from 182.79.142.239: icmp_seq=96 ttl=60 time=46.3 ms
64 bytes from 182.79.142.239: icmp_seq=97 ttl=60 time=45.7 ms
64 bytes from 182.79.142.239: icmp_seq=98 ttl=60 time=46.1 ms
64 bytes from 182.79.142.239: icmp_seq=100 ttl=60 time=55.6 ms

--- 182.79.142.239 ping statistics ---
100 packets transmitted, 99 received, 1% packet loss, time 99229ms
rtt min/avg/max/mdev = 44.984/58.834/747.095/71.723 ms
vanisikka@vanisikka-VirtualBox:~$
```

As computed by the ping command, average latency of 100 ping messages to ip is 58.834ms



The image shows two screenshots of a Linux desktop environment, likely Ubuntu, displaying multiple terminal windows. The terminals are running the 'ping' command to an IP address. The top screenshot shows a series of 25 ICMP echo requests being sent to 49.44.220.188. The bottom screenshot shows a similar sequence of 100 ICMP echo requests, followed by statistics: 100 packets transmitted, 99 received, 1% packet loss, time 99226ms, and rtt min/avg/max/mdev = 43.229/47.161/163.016/12.948 ms.

```
Oct 5 15:17 vanisikka@vanisikka-VirtualBox:~$ ping -c 100 49.44.220.188
PING 49.44.220.188 (49.44.220.188) 56(84) bytes of data.
64 bytes from 49.44.220.188: icmp_seq=1 ttl=250 time=46.0 ms
64 bytes from 49.44.220.188: icmp_seq=2 ttl=250 time=44.4 ms
64 bytes from 49.44.220.188: icmp_seq=3 ttl=250 time=44.5 ms
64 bytes from 49.44.220.188: icmp_seq=4 ttl=250 time=44.1 ms
64 bytes from 49.44.220.188: icmp_seq=5 ttl=250 time=44.6 ms
64 bytes from 49.44.220.188: icmp_seq=6 ttl=250 time=45.2 ms
64 bytes from 49.44.220.188: icmp_seq=7 ttl=250 time=45.1 ms
64 bytes from 49.44.220.188: icmp_seq=8 ttl=250 time=60.0 ms
64 bytes from 49.44.220.188: icmp_seq=9 ttl=250 time=44.2 ms
64 bytes from 49.44.220.188: icmp_seq=10 ttl=250 time=45.0 ms
64 bytes from 49.44.220.188: icmp_seq=11 ttl=250 time=45.5 ms
64 bytes from 49.44.220.188: icmp_seq=12 ttl=250 time=163 ms
64 bytes from 49.44.220.188: icmp_seq=13 ttl=250 time=46.0 ms
64 bytes from 49.44.220.188: icmp_seq=14 ttl=250 time=50.1 ms
64 bytes from 49.44.220.188: icmp_seq=15 ttl=250 time=45.6 ms
64 bytes from 49.44.220.188: icmp_seq=16 ttl=250 time=96.8 ms
64 bytes from 49.44.220.188: icmp_seq=17 ttl=250 time=46.1 ms
64 bytes from 49.44.220.188: icmp_seq=18 ttl=250 time=44.6 ms
64 bytes from 49.44.220.188: icmp_seq=19 ttl=250 time=44.2 ms
64 bytes from 49.44.220.188: icmp_seq=20 ttl=250 time=43.2 ms
64 bytes from 49.44.220.188: icmp_seq=21 ttl=250 time=44.3 ms
64 bytes from 49.44.220.188: icmp_seq=22 ttl=250 time=45.1 ms
64 bytes from 49.44.220.188: icmp_seq=23 ttl=250 time=45.1 ms
64 bytes from 49.44.220.188: icmp_seq=24 ttl=250 time=48.3 ms
64 bytes from 49.44.220.188: icmp_seq=25 ttl=250 time=44.1 ms

Oct 5 15:18 vanisikka@vanisikka-VirtualBox:~$ ping -c 100 49.44.220.188
PING 49.44.220.188 (49.44.220.188) 56(84) bytes of data.
64 bytes from 49.44.220.188: icmp_seq=84 ttl=250 time=44.1 ms
64 bytes from 49.44.220.188: icmp_seq=85 ttl=250 time=45.7 ms
64 bytes from 49.44.220.188: icmp_seq=86 ttl=250 time=43.9 ms
64 bytes from 49.44.220.188: icmp_seq=87 ttl=250 time=45.2 ms
64 bytes from 49.44.220.188: icmp_seq=88 ttl=250 time=45.3 ms
64 bytes from 49.44.220.188: icmp_seq=89 ttl=250 time=44.2 ms
64 bytes from 49.44.220.188: icmp_seq=90 ttl=250 time=45.3 ms
64 bytes from 49.44.220.188: icmp_seq=91 ttl=250 time=45.5 ms
64 bytes from 49.44.220.188: icmp_seq=92 ttl=250 time=44.2 ms
64 bytes from 49.44.220.188: icmp_seq=93 ttl=250 time=46.2 ms
64 bytes from 49.44.220.188: icmp_seq=94 ttl=250 time=45.8 ms
64 bytes from 49.44.220.188: icmp_seq=95 ttl=250 time=44.2 ms
64 bytes from 49.44.220.188: icmp_seq=96 ttl=250 time=48.8 ms
64 bytes from 49.44.220.188: icmp_seq=97 ttl=250 time=44.0 ms
64 bytes from 49.44.220.188: icmp_seq=98 ttl=250 time=45.6 ms
64 bytes from 49.44.220.188: icmp_seq=99 ttl=250 time=44.3 ms
64 bytes from 49.44.220.188: icmp_seq=100 ttl=250 time=44.6 ms

--- 49.44.220.188 ping statistics ---
100 packets transmitted, 99 received, 1% packet loss, time 99226ms
rtt min/avg/max/mdev = 43.229/47.161/163.016/12.948 ms
```

As computed by the ping command, average latency of 100 ping messages to ip is 47.161ms

```
Activities Terminal vanisikka@vanisikka-VirtualBox: ~ Oct 5 15:19 vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox:~$ ping -c 100 115.242.184.26
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=56 time=55.5 ms
64 bytes from 115.242.184.26: icmp_seq=2 ttl=56 time=56.7 ms
64 bytes from 115.242.184.26: icmp_seq=3 ttl=56 time=57.1 ms
64 bytes from 115.242.184.26: icmp_seq=4 ttl=56 time=55.2 ms
64 bytes from 115.242.184.26: icmp_seq=5 ttl=56 time=57.5 ms
64 bytes from 115.242.184.26: icmp_seq=6 ttl=56 time=55.8 ms
64 bytes from 115.242.184.26: icmp_seq=7 ttl=56 time=58.1 ms
64 bytes from 115.242.184.26: icmp_seq=8 ttl=56 time=55.2 ms
64 bytes from 115.242.184.26: icmp_seq=9 ttl=56 time=54.8 ms
28 64 bytes from 115.242.184.26: icmp_seq=10 ttl=56 time=61.1 ms
64 bytes from 115.242.184.26: icmp_seq=11 ttl=56 time=55.3 ms
64 bytes from 115.242.184.26: icmp_seq=12 ttl=56 time=128 ms
64 bytes from 115.242.184.26: icmp_seq=13 ttl=56 time=55.8 ms
64 bytes from 115.242.184.26: icmp_seq=14 ttl=56 time=56.4 ms
64 bytes from 115.242.184.26: icmp_seq=15 ttl=56 time=56.3 ms
64 bytes from 115.242.184.26: icmp_seq=16 ttl=56 time=55.4 ms
64 bytes from 115.242.184.26: icmp_seq=17 ttl=56 time=56.1 ms
64 bytes from 115.242.184.26: icmp_seq=18 ttl=56 time=60.8 ms
64 bytes from 115.242.184.26: icmp_seq=19 ttl=56 time=64.0 ms
64 bytes from 115.242.184.26: icmp_seq=20 ttl=56 time=64.2 ms
64 bytes from 115.242.184.26: icmp_seq=21 ttl=56 time=66.0 ms
64 bytes from 115.242.184.26: icmp_seq=22 ttl=56 time=56.3 ms
64 bytes from 115.242.184.26: icmp_seq=23 ttl=56 time=59.1 ms
64 bytes from 115.242.184.26: icmp_seq=24 ttl=56 time=54.3 ms
64 bytes from 115.242.184.26: icmp_seq=25 ttl=56 time=62.9 ms

Activities Terminal vanisikka@vanisikka-VirtualBox: ~ Oct 5 15:19 vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~ vanisikka@vanisikka-VirtualBox: ~
64 bytes from 115.242.184.26: icmp_seq=84 ttl=56 time=55.5 ms
64 bytes from 115.242.184.26: icmp_seq=85 ttl=56 time=55.0 ms
64 bytes from 115.242.184.26: icmp_seq=86 ttl=56 time=55.1 ms
64 bytes from 115.242.184.26: icmp_seq=87 ttl=56 time=56.3 ms
64 bytes from 115.242.184.26: icmp_seq=88 ttl=56 time=55.5 ms
64 bytes from 115.242.184.26: icmp_seq=89 ttl=56 time=54.9 ms
64 bytes from 115.242.184.26: icmp_seq=90 ttl=56 time=356 ms
28 64 bytes from 115.242.184.26: icmp_seq=91 ttl=56 time=159 ms
64 bytes from 115.242.184.26: icmp_seq=92 ttl=56 time=159 ms
64 bytes from 115.242.184.26: icmp_seq=93 ttl=56 time=156 ms
64 bytes from 115.242.184.26: icmp_seq=94 ttl=56 time=155 ms
64 bytes from 115.242.184.26: icmp_seq=95 ttl=56 time=55.7 ms
64 bytes from 115.242.184.26: icmp_seq=96 ttl=56 time=155 ms
64 bytes from 115.242.184.26: icmp_seq=97 ttl=56 time=155 ms
64 bytes from 115.242.184.26: icmp_seq=98 ttl=56 time=56.1 ms
64 bytes from 115.242.184.26: icmp_seq=99 ttl=56 time=56.2 ms
64 bytes from 115.242.184.26: icmp_seq=100 ttl=56 time=56.2 ms

--- 115.242.184.26 ping statistics ---
100 packets transmitted, 99 received, 1% packet loss, time 99282ms
rtt min/avg/max/mdev = 54.185/66.511/356.110/38.368 ms
vanisikka@vanisikka-VirtualBox:~$
```

As computed by the ping command, average latency of 100 ping messages to ip is 66.511ms

The image shows two terminal windows side-by-side, both titled "vanisikka@vanisikka-VirtualBox: ~". The top terminal window displays the output of a ping command to the IP address 196.12.34.76, with 100 packets transmitted. The bottom terminal window displays the output of a ping command to the IP address 196.12.34.76, with 100 packets transmitted. Both outputs show the sequence number (icmp\_seq), TTL, and time taken for each packet.

```
Oct 5 15:20 vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox:~$ ping -c 100 196.12.34.76
PING 196.12.34.76 (196.12.34.76) 56(84) bytes of data.
64 bytes from 196.12.34.76: icmp_seq=1 ttl=249 time=57.5 ms
64 bytes from 196.12.34.76: icmp_seq=2 ttl=249 time=55.1 ms
64 bytes from 196.12.34.76: icmp_seq=3 ttl=249 time=56.7 ms
64 bytes from 196.12.34.76: icmp_seq=4 ttl=249 time=62.4 ms
64 bytes from 196.12.34.76: icmp_seq=5 ttl=249 time=55.1 ms
64 bytes from 196.12.34.76: icmp_seq=6 ttl=249 time=55.6 ms
64 bytes from 196.12.34.76: icmp_seq=7 ttl=249 time=54.6 ms
64 bytes from 196.12.34.76: icmp_seq=8 ttl=249 time=55.2 ms
64 bytes from 196.12.34.76: icmp_seq=9 ttl=249 time=54.8 ms
28 64 bytes from 196.12.34.76: icmp_seq=10 ttl=249 time=57.9 ms
64 bytes from 196.12.34.76: icmp_seq=11 ttl=249 time=53.6 ms
64 bytes from 196.12.34.76: icmp_seq=12 ttl=249 time=55.0 ms
64 bytes from 196.12.34.76: icmp_seq=13 ttl=249 time=56.0 ms
64 bytes from 196.12.34.76: icmp_seq=14 ttl=249 time=57.7 ms
64 bytes from 196.12.34.76: icmp_seq=15 ttl=249 time=54.8 ms
64 bytes from 196.12.34.76: icmp_seq=16 ttl=249 time=56.1 ms
64 bytes from 196.12.34.76: icmp_seq=17 ttl=249 time=56.8 ms
64 bytes from 196.12.34.76: icmp_seq=18 ttl=249 time=54.7 ms
64 bytes from 196.12.34.76: icmp_seq=19 ttl=249 time=57.5 ms
64 bytes from 196.12.34.76: icmp_seq=20 ttl=249 time=60.3 ms
64 bytes from 196.12.34.76: icmp_seq=21 ttl=249 time=55.9 ms
64 bytes from 196.12.34.76: icmp_seq=22 ttl=249 time=56.2 ms
64 bytes from 196.12.34.76: icmp_seq=23 ttl=249 time=56.8 ms
64 bytes from 196.12.34.76: icmp_seq=24 ttl=249 time=61.0 ms
64 bytes from 196.12.34.76: icmp_seq=25 ttl=249 time=54.1 ms

Oct 5 15:20 vanisikka@vanisikka-VirtualBox: ~
vanisikka@vanisikka-VirtualBox:~$ ping -c 100 196.12.34.76
PING 196.12.34.76 (196.12.34.76) 56(84) bytes of data.
64 bytes from 196.12.34.76: icmp_seq=84 ttl=249 time=54.9 ms
64 bytes from 196.12.34.76: icmp_seq=85 ttl=249 time=55.0 ms
64 bytes from 196.12.34.76: icmp_seq=86 ttl=249 time=59.3 ms
64 bytes from 196.12.34.76: icmp_seq=87 ttl=249 time=54.5 ms
64 bytes from 196.12.34.76: icmp_seq=88 ttl=249 time=55.0 ms
64 bytes from 196.12.34.76: icmp_seq=89 ttl=249 time=54.6 ms
64 bytes from 196.12.34.76: icmp_seq=90 ttl=249 time=54.7 ms
64 bytes from 196.12.34.76: icmp_seq=91 ttl=249 time=57.3 ms
64 bytes from 196.12.34.76: icmp_seq=92 ttl=249 time=54.6 ms
28 64 bytes from 196.12.34.76: icmp_seq=93 ttl=249 time=56.7 ms
64 bytes from 196.12.34.76: icmp_seq=94 ttl=249 time=54.9 ms
64 bytes from 196.12.34.76: icmp_seq=95 ttl=249 time=54.3 ms
64 bytes from 196.12.34.76: icmp_seq=96 ttl=249 time=55.8 ms
64 bytes from 196.12.34.76: icmp_seq=97 ttl=249 time=56.0 ms
64 bytes from 196.12.34.76: icmp_seq=98 ttl=249 time=54.8 ms
64 bytes from 196.12.34.76: icmp_seq=99 ttl=249 time=55.6 ms
64 bytes from 196.12.34.76: icmp_seq=100 ttl=249 time=55.4 ms

--- 196.12.34.76 ping statistics ---
100 packets transmitted, 100 received, 0% packet loss, time 99236ms
rtt min/avg/max/mdev = 53.394/71.005/1117.215/106.722 ms, pipe 2
vanisikka@vanisikka-VirtualBox:~$
```

As computed by the ping command, average latency of 100 ping messages to ip is 71.005ms

```
Activities Terminal vanisikka@vanisikka-VirtualBox:~$ ping -c 100 196.12.53.50
Oct 5 15:21
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=57 time=55.6 ms
64 bytes from 196.12.53.50: icmp_seq=2 ttl=57 time=56.1 ms
64 bytes from 196.12.53.50: icmp_seq=3 ttl=57 time=54.2 ms
64 bytes from 196.12.53.50: icmp_seq=4 ttl=57 time=55.0 ms
64 bytes from 196.12.53.50: icmp_seq=5 ttl=57 time=118 ms
64 bytes from 196.12.53.50: icmp_seq=6 ttl=57 time=55.2 ms
64 bytes from 196.12.53.50: icmp_seq=7 ttl=57 time=57.0 ms
64 bytes from 196.12.53.50: icmp_seq=8 ttl=57 time=55.1 ms
64 bytes from 196.12.53.50: icmp_seq=9 ttl=57 time=55.2 ms
64 bytes from 196.12.53.50: icmp_seq=10 ttl=57 time=54.1 ms
64 bytes from 196.12.53.50: icmp_seq=11 ttl=57 time=55.2 ms
64 bytes from 196.12.53.50: icmp_seq=12 ttl=57 time=59.4 ms
64 bytes from 196.12.53.50: icmp_seq=13 ttl=57 time=54.6 ms
64 bytes from 196.12.53.50: icmp_seq=14 ttl=57 time=54.3 ms
64 bytes from 196.12.53.50: icmp_seq=15 ttl=57 time=55.7 ms
64 bytes from 196.12.53.50: icmp_seq=16 ttl=57 time=53.7 ms
64 bytes from 196.12.53.50: icmp_seq=17 ttl=57 time=105 ms
64 bytes from 196.12.53.50: icmp_seq=18 ttl=57 time=63.7 ms
64 bytes from 196.12.53.50: icmp_seq=19 ttl=57 time=63.9 ms
64 bytes from 196.12.53.50: icmp_seq=20 ttl=57 time=53.8 ms
64 bytes from 196.12.53.50: icmp_seq=21 ttl=57 time=54.2 ms
64 bytes from 196.12.53.50: icmp_seq=22 ttl=57 time=53.7 ms
Oct 5 15:22
Activities Terminal vanisikka@vanisikka-VirtualBox:~$ ping -c 100 196.12.53.50
64 bytes from 196.12.53.50: icmp_seq=78 ttl=57 time=54.0 ms
64 bytes from 196.12.53.50: icmp_seq=79 ttl=57 time=56.5 ms
64 bytes from 196.12.53.50: icmp_seq=80 ttl=57 time=56.5 ms
64 bytes from 196.12.53.50: icmp_seq=81 ttl=57 time=53.9 ms
64 bytes from 196.12.53.50: icmp_seq=82 ttl=57 time=53.7 ms
64 bytes from 196.12.53.50: icmp_seq=83 ttl=57 time=54.7 ms
64 bytes from 196.12.53.50: icmp_seq=89 ttl=57 time=97.6 ms
64 bytes from 196.12.53.50: icmp_seq=90 ttl=57 time=154 ms
64 bytes from 196.12.53.50: icmp_seq=91 ttl=57 time=56.4 ms
64 bytes from 196.12.53.50: icmp_seq=95 ttl=57 time=54.2 ms
64 bytes from 196.12.53.50: icmp_seq=96 ttl=57 time=54.9 ms
64 bytes from 196.12.53.50: icmp_seq=98 ttl=57 time=55.2 ms
64 bytes from 196.12.53.50: icmp_seq=99 ttl=57 time=54.8 ms
64 bytes from 196.12.53.50: icmp_seq=100 ttl=57 time=53.8 ms

--- 196.12.53.50 ping statistics ---
100 packets transmitted, 90 received, 10% packet loss, time 99375ms
rtt min/avg/max/mdev = 53.249/71.575/1069.126/107.059 ms, pipe 2
vanisikka@vanisikka-VirtualBox:~$
```

As computed by the ping command, average latency of 100 ping messages to ip is 71.575ms

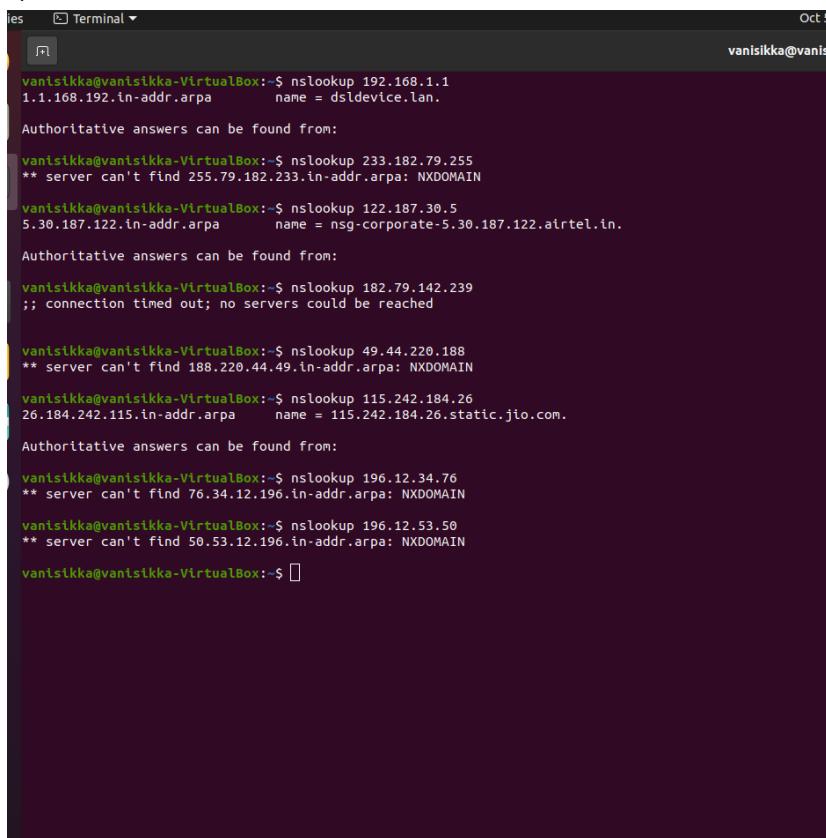
c) If you add the above mentioned latency values for all the ping requests made to all the intermediate hosts you would get the sum as 344.58 ms. But the average latency to iiit.ac.in was 70.851 ms as calculated in part b. So we can see that the sum of latencies is more than the latency we get if we ping iiit.ac.in directly.

The reason for getting a higher number is because when we ping each individual host the average latency that we get is the round trip time between your computer and that host. So in the case of two successive hosts, say host 1 and host 2. So the average latency of host 1 is the rtt time between my computer and host 1 and host 2 is successive of host 1. So average latency host 2 is the rtt time between my computer and host 2. So basically we can see rtt time between host 2 and rtt time between my computer and host 1 plus rtt time between host 1 and host 2. So when we add the average latency of host 1 and host 2 we care actually double counting the rtt time of host 1. Now if we extend it to this question when we are adding all the average latency of intermediate hosts it leads to double counting hence the value of the addition is bigger than the average latency of directly pinging iiit.ac.in

d)

Maximum of ping latency amongst the intermediate hosts is coming out to be 71.575 which is greater than 70.851 i.e. the average latency of directly pinging iiit.ac.in. The latency we get will vary differently across different times the packet traverses through different nodes. This variation is because the traffic in the network varies from time to time. Due to these variations the maximum latency will always be higher than the average latency of directly pinging iiit.ac.in

e)



```
ies Terminal ▾ vanisikka@vanisikka-VirtualBox:~$ nslookup 192.168.1.1
1.1.168.192.in-addr.arpa      name = dsldevice.lan.

Authoritative answers can be found from:

vanisikka@vanisikka-VirtualBox:~$ nslookup 233.182.79.255
** server can't find 255.79.182.233.in-addr.arpa: NXDOMAIN

vanisikka@vanisikka-VirtualBox:~$ nslookup 122.187.30.5
5.30.187.122.in-addr.arpa      name = nsg-corporate-5.30.187.122.airtel.in.

Authoritative answers can be found from:

vanisikka@vanisikka-VirtualBox:~$ nslookup 182.79.142.239
;; connection timed out; no servers could be reached

vanisikka@vanisikka-VirtualBox:~$ nslookup 49.44.220.188
** server can't find 188.220.44.49.in-addr.arpa: NXDOMAIN

vanisikka@vanisikka-VirtualBox:~$ nslookup 115.242.184.26
26.184.242.115.in-addr.arpa      name = 115.242.184.26.static.jio.com.

Authoritative answers can be found from:

vanisikka@vanisikka-VirtualBox:~$ nslookup 196.12.34.76
** server can't find 76.34.12.196.in-addr.arpa: NXDOMAIN

vanisikka@vanisikka-VirtualBox:~$ nslookup 196.12.53.50
** server can't find 50.53.12.196.in-addr.arpa: NXDOMAIN

vanisikka@vanisikka-VirtualBox:~$
```

### IP ADDRESS OF INTERMEDIATE HOST

- 1) 192.168.1.1
- 2) 233.182.79.255
- 3) 122.187.30.5
- 4) 182.79.142.239
- 5) 49.44.220.188
- 6) 115.242.184.26
- 7) 196.12.34.76
- 8) 196.12.53.50

### REVERSE DNS LOOKUP

- dsldevice.lan.
- NXDOMAIN
- nsg-corporate-5.30.187.122.airtel.in.
- no servers could be reached
- NXDOMAIN
- 115.242.184.26.static.jio.com.
- NXDOMAIN
- NXDOMAIN

Q7)

The screenshot shows a terminal window with the following content:

```
Activities Terminal Oct 4 00:12
vanisikka@vanisikka-VirtualBox:~$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 192.168.1.1 netmask 255.255.255.0 broadcast 192.168.1.255
          link layer ...
        inet6 fe80::ca38:c0ff:fe0f:8a5d brd fe80::ff:fe0f:8a5d scopeid 64
          ether 08:00:27:a0:c0:05 txqueuelen 10000 (Ethernet)
        RX packets 15328 bytes 18958662 (18.9 MB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 5506 bytes 933064 (933.0 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
          link layer ...
        inet6 ::1 brd :: scopeid 0x10<host>
          ether 00:00:00:00:00:00 txqueuelen 10000 (Local Loopback)
        RX packets 1198 bytes 119663 (119.6 KB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 1198 bytes 119663 (119.6 KB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

vanisikka@vanisikka-VirtualBox:~$ sudo ifconfig lo down
[...]
vanisikka@vanisikka-VirtualBox:~$ 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 ---
6 packets transmitted, 0 received, 100% packet loss, time 5098ms
vanisikka@vanisikka-VirtualBox:~$
```

Ifconfig is used to configure network interfaces that reside in kernel space. It is used to assign IP addresses and netmask to the network interfaces. As it is evident from the picture with the ifconfig command I have used down, the syntax of the above command is 'ifconfig <network interface> down'. By using down I am telling the kernel to deactivate the specified network interface. When that network interface gets deactivated then it no longer receives any packets that are sent to it. Hence any packet sent request made to this interface will fail with 100% packet loss. Since in the question, it is specified that ping request to 127.0.0.1 should fail, 127.0.0.1 is the IP address that kernel assigns to loopback (lo mentioned in the pic) interface. So I have deactivated the lo interface by using the above-mentioned ifconfig command. Since the lo is deactivated ping request (in ping request packets are sent to lo interface) made to lo interface has failed (as seen in the pic) and the message is displayed that there was 100% packet loss.