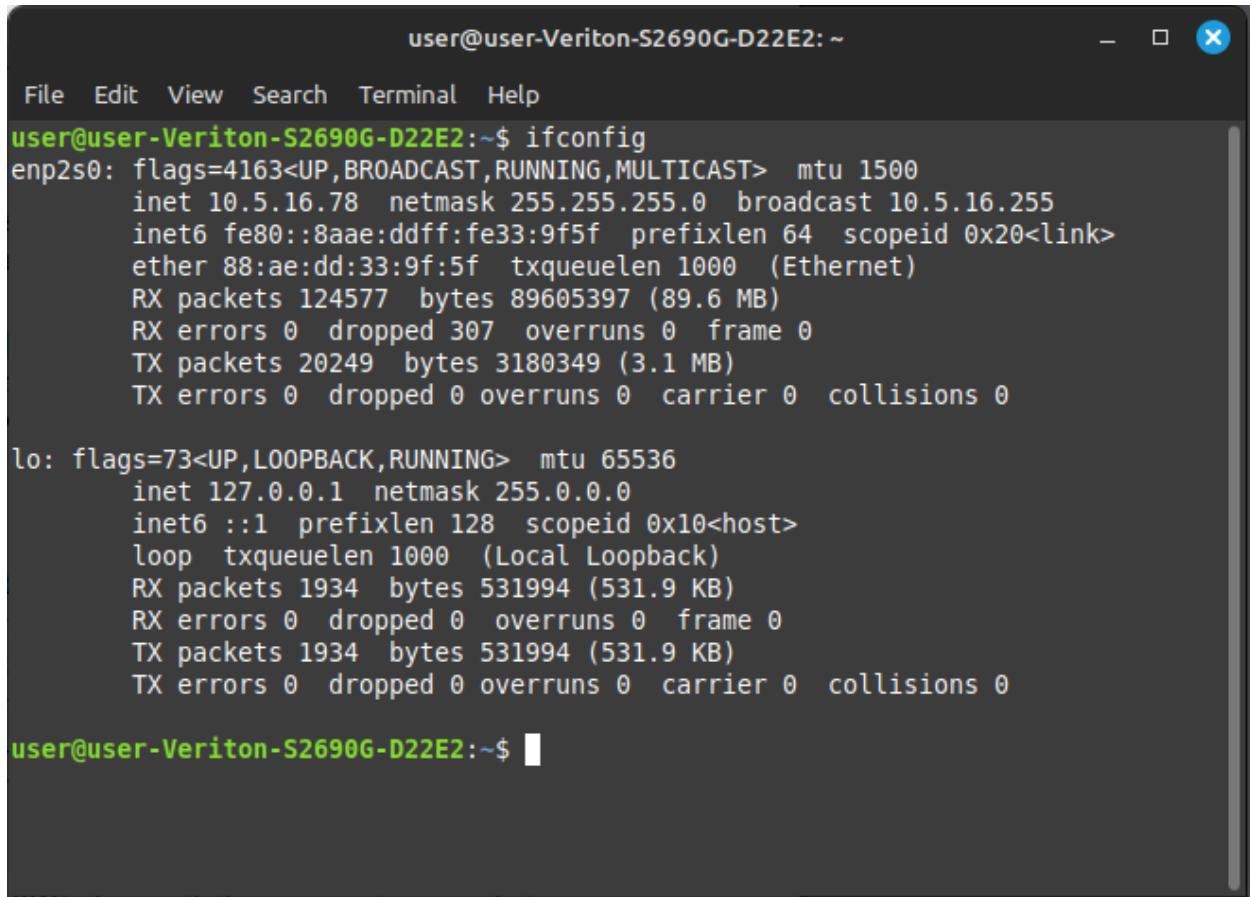


Assignment 1: Networking Tools and Wireshark

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Roll No:-22CS30056

Assignment 1: Networking Tools



```
user@user-Veriton-S2690G-D22E2: ~
File Edit View Search Terminal Help
user@user-Veriton-S2690G-D22E2:~$ ifconfig
enp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.5.16.78 netmask 255.255.255.0 broadcast 10.5.16.255
        inet6 fe80::8aae:ddff:fe33:9f5f prefixlen 64 scopeid 0x20<link>
          ether 88:ae:dd:33:9f:5f txqueuelen 1000 (Ethernet)
            RX packets 124577 bytes 89605397 (89.6 MB)
            RX errors 0 dropped 307 overruns 0 frame 0
            TX packets 20249 bytes 3180349 (3.1 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 1934 bytes 531994 (531.9 KB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1934 bytes 531994 (531.9 KB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

user@user-Veriton-S2690G-D22E2:~$
```

Ip Address:- 10.5.16.78

Subnet mask:- 255.255.255.0

Network id:- 10.5.16.0

www.google.com ip address:- 142.250.183.68

www.facebook.com ip address:- 157.240.13.35

```
user@user-Veriton-S2690G-D22E2: ~
File Edit View Search Terminal Help
user@user-Veriton-S2690G-D22E2:~$ nslookup www.google.com 172.16.1.164
nslookup www.google.com 172.16.1.180
nslookup www.google.com 172.16.1.165
nslookup www.google.com 172.16.1.166
Server:      172.16.1.164
Address:     172.16.1.164#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.183.68
Name:   www.google.com
Address: 2404:6800:4009:820::2004

Server:      172.16.1.180
Address:     172.16.1.180#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.193.36
Name:   www.google.com
Address: 2404:6800:4002:81a::2004

Server:      172.16.1.165
Address:     172.16.1.165#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.192.100
Name:   www.google.com
Address: 2404:6800:4009:82a::2004

Server:      172.16.1.166
Address:     172.16.1.166#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.77.36
Name:   www.google.com
Address: 2404:6800:4009:81c::2004

user@user-Veriton-S2690G-D22E2:~$
```

Reasons for the change of the Ip Address

DNS Load Balancing:

DNS Caching:

Different DNS Servers:

3).1. Ping with 64-byte packet size:

```
ping -s 64 -w 100 10.5.16.77
```

```
72 bytes from 10.5.16.77: icmp_seq=81 ttl=64 time=0.293 ms
72 bytes from 10.5.16.77: icmp_seq=82 ttl=64 time=0.554 ms
72 bytes from 10.5.16.77: icmp_seq=83 ttl=64 time=0.373 ms
72 bytes from 10.5.16.77: icmp_seq=84 ttl=64 time=0.689 ms
72 bytes from 10.5.16.77: icmp_seq=85 ttl=64 time=0.563 ms
72 bytes from 10.5.16.77: icmp_seq=86 ttl=64 time=0.434 ms
72 bytes from 10.5.16.77: icmp_seq=87 ttl=64 time=0.381 ms
72 bytes from 10.5.16.77: icmp_seq=88 ttl=64 time=0.414 ms
72 bytes from 10.5.16.77: icmp_seq=89 ttl=64 time=0.299 ms
72 bytes from 10.5.16.77: icmp_seq=90 ttl=64 time=0.374 ms
72 bytes from 10.5.16.77: icmp_seq=91 ttl=64 time=0.391 ms
72 bytes from 10.5.16.77: icmp_seq=92 ttl=64 time=0.381 ms
72 bytes from 10.5.16.77: icmp_seq=93 ttl=64 time=0.517 ms
72 bytes from 10.5.16.77: icmp_seq=94 ttl=64 time=0.450 ms
72 bytes from 10.5.16.77: icmp_seq=95 ttl=64 time=0.394 ms
72 bytes from 10.5.16.77: icmp_seq=96 ttl=64 time=0.435 ms
72 bytes from 10.5.16.77: icmp_seq=97 ttl=64 time=0.564 ms
72 bytes from 10.5.16.77: icmp_seq=98 ttl=64 time=0.377 ms

--- 10.5.16.77 ping statistics ---
98 packets transmitted, 98 received, 0% packet loss, time 99308ms
rtt min/avg/max/mdev = 0.217/0.447/0.704/0.116 ms
user@user-Veriton-S2690G-D22E2:~$
```

2. Ping with 128-byte packet size:

```
ping -s 128 -w 100 10.5.16.77
```

```
136 bytes from 10.5.16.77: icmp_seq=75 ttl=64 time=0.568 ms
136 bytes from 10.5.16.77: icmp_seq=76 ttl=64 time=0.522 ms
136 bytes from 10.5.16.77: icmp_seq=77 ttl=64 time=0.565 ms
136 bytes from 10.5.16.77: icmp_seq=78 ttl=64 time=0.431 ms
136 bytes from 10.5.16.77: icmp_seq=79 ttl=64 time=0.384 ms
136 bytes from 10.5.16.77: icmp_seq=80 ttl=64 time=0.379 ms
136 bytes from 10.5.16.77: icmp_seq=81 ttl=64 time=0.457 ms
136 bytes from 10.5.16.77: icmp_seq=82 ttl=64 time=0.370 ms
136 bytes from 10.5.16.77: icmp_seq=83 ttl=64 time=0.380 ms
136 bytes from 10.5.16.77: icmp_seq=84 ttl=64 time=0.489 ms
136 bytes from 10.5.16.77: icmp_seq=85 ttl=64 time=0.377 ms
136 bytes from 10.5.16.77: icmp_seq=86 ttl=64 time=0.373 ms
136 bytes from 10.5.16.77: icmp_seq=87 ttl=64 time=0.453 ms
136 bytes from 10.5.16.77: icmp_seq=88 ttl=64 time=0.289 ms
136 bytes from 10.5.16.77: icmp_seq=89 ttl=64 time=0.302 ms
136 bytes from 10.5.16.77: icmp_seq=90 ttl=64 time=0.315 ms
136 bytes from 10.5.16.77: icmp_seq=91 ttl=64 time=0.689 ms
136 bytes from 10.5.16.77: icmp_seq=92 ttl=64 time=0.300 ms
136 bytes from 10.5.16.77: icmp_seq=93 ttl=64 time=0.503 ms
136 bytes from 10.5.16.77: icmp_seq=94 ttl=64 time=0.540 ms
136 bytes from 10.5.16.77: icmp_seq=95 ttl=64 time=0.321 ms
136 bytes from 10.5.16.77: icmp_seq=96 ttl=64 time=0.686 ms
136 bytes from 10.5.16.77: icmp_seq=97 ttl=64 time=0.644 ms
136 bytes from 10.5.16.77: icmp_seq=98 ttl=64 time=0.381 ms

--- 10.5.16.77 ping statistics ---
98 packets transmitted, 98 received, 0% packet loss, time 99314ms
rtt min/avg/max/mdev = 0.288/0.480/0.702/0.134 ms
user@user-Veriton-S2690G-D22E2:~$
```

3. Ping with 512-byte packet size:

```
ping -s 512 -w 100 10.5.16.77
```

```
520 bytes from 10.5.16.77: icmp_seq=77 ttl=64 time=0.699 ms
520 bytes from 10.5.16.77: icmp_seq=78 ttl=64 time=0.710 ms
520 bytes from 10.5.16.77: icmp_seq=79 ttl=64 time=0.375 ms
520 bytes from 10.5.16.77: icmp_seq=80 ttl=64 time=0.502 ms
520 bytes from 10.5.16.77: icmp_seq=81 ttl=64 time=0.570 ms
520 bytes from 10.5.16.77: icmp_seq=82 ttl=64 time=0.516 ms
520 bytes from 10.5.16.77: icmp_seq=83 ttl=64 time=0.705 ms
520 bytes from 10.5.16.77: icmp_seq=84 ttl=64 time=0.536 ms
520 bytes from 10.5.16.77: icmp_seq=85 ttl=64 time=0.417 ms
520 bytes from 10.5.16.77: icmp_seq=86 ttl=64 time=0.707 ms
520 bytes from 10.5.16.77: icmp_seq=87 ttl=64 time=0.698 ms
520 bytes from 10.5.16.77: icmp_seq=88 ttl=64 time=0.653 ms
520 bytes from 10.5.16.77: icmp_seq=89 ttl=64 time=0.686 ms
520 bytes from 10.5.16.77: icmp_seq=90 ttl=64 time=0.282 ms
520 bytes from 10.5.16.77: icmp_seq=91 ttl=64 time=0.532 ms
520 bytes from 10.5.16.77: icmp_seq=92 ttl=64 time=0.323 ms
520 bytes from 10.5.16.77: icmp_seq=93 ttl=64 time=0.708 ms
520 bytes from 10.5.16.77: icmp_seq=94 ttl=64 time=0.688 ms
520 bytes from 10.5.16.77: icmp_seq=95 ttl=64 time=0.495 ms
520 bytes from 10.5.16.77: icmp_seq=96 ttl=64 time=0.317 ms
520 bytes from 10.5.16.77: icmp_seq=97 ttl=64 time=0.320 ms
520 bytes from 10.5.16.77: icmp_seq=98 ttl=64 time=0.516 ms

--- 10.5.16.77 ping statistics ---
98 packets transmitted, 98 received, 0% packet loss, time 99293ms
rtt min/avg/max/mdev = 0.282/0.552/0.714/0.137 ms
user@user-Veriton-S2690G-D22E2:~$
```

4) traceroute Command

```
> traceroute www.google.com
traceroute to www.google.com (142.250.77.36), 30 hops max, 60 byte packets
 1 _gateway (192.168.84.188)  1.813 ms  4.822 ms  3.701 ms
 2 10.145.0.3 (10.145.0.3)  51.524 ms  51.487 ms  51.452 ms
 3 10.120.0.25 (10.120.0.25)  51.475 ms  51.431 ms  51.381 ms
 4 10.255.1.3 (10.255.1.3)  51.420 ms  51.378 ms  51.344 ms
 5 * *
 6 * *
 7 * *
 8 * *
 9 142.250.172.80 (142.250.172.80)  1389.332 ms 72.14.204.62 (72.14.204.62)  1385.910 ms  1385.784 ms
10 * *
11 142.250.239.170 (142.250.239.170)  86.035 ms 192.178.86.244 (192.178.86.244)  1142.096 ms 192.178.86.202 (192.178.86.202)  86.077 ms
12 142.250.238.203 (142.250.238.203)  182.277 ms 142.250.238.201 (142.250.238.201)  181.991 ms 192.178.110.208 (192.178.110.208)  219.993 ms
13 bom07s26-in-f4.1e100.net (142.250.77.36)  86.627 ms 192.178.110.249 (192.178.110.249)  102.346 ms 142.250.226.135 (142.250.226.135)  102.002 ms
```

NUMBER OF hosts in the path is 13

We see *** in this means no response is received from that specific hop within the allowed time.

Occurs due to

Timeout: hop has taken too much time to respond

Firewalls: some firewalls are configured to produce no response
Network congestion: high traffics might cause delay to respond

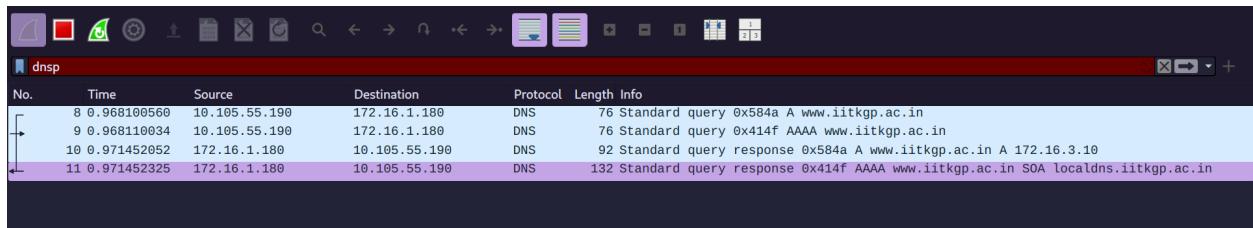
While * * * indicates packet loss for that hop, it does not necessarily mean there is an issue; it's often part of the network's normal behavior for security or traffic management.

Part 2: Packet Analysis

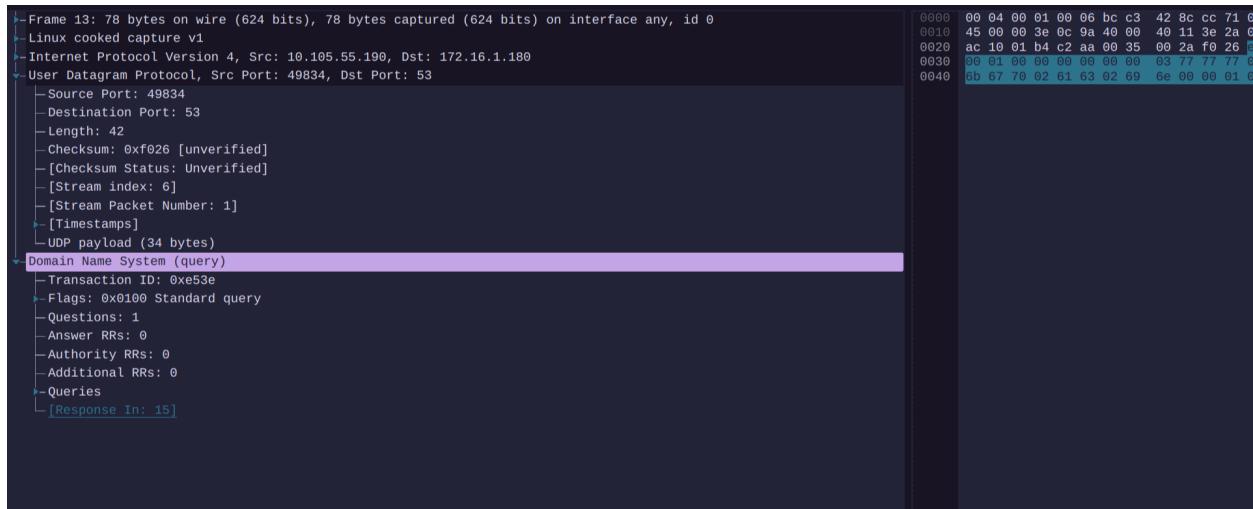
Website: iitkgp.ac.in

The command used to filter in Wireshark is `dns.qry.name contains "iitkgp.ac.in"'

Answer 1.a) DNS Query and Response Messages



DNS is using the UDP(User Datagram Protocol)



Answer 1.b)

Source IP: 10.105.55.190

Destination IP: 172.16.1.180

Answer 1.c)

4 DNS queries are sent from my browser to the DNS servers for resolving these domain names.

Answer 1.d)

The DNS server **172.16.1.180** replies with the actual IP address (**172.16.3.10**) for **www.iitkgp.ac.in**.

Answer 1.e)

Number of DNS servers involved is 2.

- 1) Local DNS Server(172.16.1.180)

This is used to query localdns.iitkgp.ac.in for resolution

- 2) localdns.iitkgp.ac.in .

- 3) This doesnot cirectly interact with client browser.

Answer 1.f)

Packet 8

Interface id: 0 (enp0s31f6)

Arrival Time: Jan 18, 2025 22:24:23.010433067 IST

Internet Protocol Version 4, Src: 10.105.55.190, Dst: 172.16.1.180

Time to Live: 64

Protocol: UDP (17)

User Datagram Protocol, Src Port: 51209, Dst Port: 53

Source Port: 51209

Frame Length: 76 bytes (608 bits)

UDP payload (34 bytes)

Name: www.iitkgp.ac.in

[Name Length: 16]

[Label Count: 4]

Type: A (1) (Host Address)

Class: IN (0x0001)

No.	Time	Source	Destination	Protocol	Length	Info
Frame 8: 76 bytes on wire (608 bits), 76 bytes captured (608 bits) on interface enp0s31f6, id 0						
		Section number: 1				
└ Interface id: 0 (enp0s31f6)						
		└ Interface name: enp0s31f6				
└ Encapsulation type: Ethernet (1)						
		└ Arrival Time: Jan 18, 2025 22:24:23.010433067 IST				
		└ UTC Arrival Time: Jan 18, 2025 16:54:23.010433067 UTC				
		└ Epoch Arrival Time: 1737219263.010433067				
		└ [Time shift for this packet: 0.000000000 seconds]				
		└ [Time delta from previous captured frame: 0.445039056 seconds]				
		└ [Time delta from previous displayed frame: 0.000000000 seconds]				
		└ [Time since reference or first frame: 0.968100560 seconds]				
		└ Frame Number: 8				
		└ Frame Length: 76 bytes (608 bits)				
		└ Capture Length: 76 bytes (608 bits)				
		└ [Frame is marked: False]				
		└ [Frame is ignored: False]				
		└ [Protocols in frame: eth:ethertype:ip:udp:dns]				
		└ [Coloring Rule Name: UDP]				
		└ [Coloring Rule String: udp]				
Ethernet II, Src: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71), Dst: Cisco_a8:35:83 (08:f3:fb:a8:35:83)						
		└ Destination: Cisco_a8:35:83 (08:f3:fb:a8:35:83)				
		└ Source: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71)				
		└ Type: IPv4 (0x800)				
		└ [Stream index: 0]				
Internet Protocol Version 4, Src: 10.105.55.190, Dst: 172.16.1.180						
		└ 0100 = Version: 4				
		└ 0101 = Header Length: 20 bytes (5)				
		└ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)				
		└ Total Length: 62				
		└ Identification: 0x2084 (8324)				
		└ 010. = Flags: 0x2, Don't fragment				
		└ ...0 0000 0000 0000 = Fragment Offset: 0				
		└ Time to Live: 64				
		└ Protocol: UDP (17)				
		└ Header Checksum: 0x2a40 [validation disabled]				
		└ [Header checksum status: Unverified]				
		└ Source Address: 10.105.55.190				
		└ Destination Address: 172.16.1.180				
		└ [Stream index: 3]				
User Datagram Protocol, Src Port: 51209, Dst Port: 53						
		└ Source Port: 51209				
		└ Destination Port: 53				
		└ Length: 42				
		└ Checksum: 0xf026 [unverified]				
		└ [Checksum Status: Unverified]				
		└ [Stream index: 1]				
		└ [Stream Packet Number: 1]				
		└ [Timestamps]				
		└ UDP payload (34 bytes)				
Domain Name System (query)						
		└ Transaction ID: 0x584a				
		└ Flags: 0x0100 Standard query				
		└ Questions: 1				
		└ Answer RRs: 0				

```
└─Domain Name System (query)
    └─Transaction ID: 0x584a
        ├─Flags: 0x0100 Standard query
        └─Questions: 1
            └─Answer RRs: 0
            └─Authority RRs: 0
            └─Additional RRs: 0
    └─Queries
        └─www.iitkgp.ac.in: type A, class IN
            └─Name: www.iitkgp.ac.in
            └─[Name Length: 16]
            └─[Label Count: 4]
            └─Type: A (1) (Host Address)
            └─Class: IN (0x0001)
    [Response In: 10]
```

Packet 9:

Interface id: 0 (enp0s31f6)
Arrival Time: Jan 18, 2025 22:24:23.010442541 IST
Frame Length: 76 bytes (608 bits)
Internet Protocol Version 4, Src: 10.105.55.190, Dst: 172.16.1.180
Total Length: 62
Time to Live: 64
Protocol: UDP (17)
Source Address: 10.105.55.190
Destination Address: 172.16.1.180
User Datagram Protocol, Src Port: 51209, Dst Port: 53
Source Port: 51209
Length: 42
UDP payload (34 bytes)
 Name: www.iitkgp.ac.in
 [Name Length: 16]
 [Label Count: 4]
 Type: AAAA (28) (IP6 Address)
 Class: IN (0x0001)

```
Frame 9: 76 bytes on wire (608 bits), 76 bytes captured (608 bits) on interface enp0s31f6, id 0
└── Section number: 1
    └── Interface id: 0 (enp0s31f6)
        └── Interface name: enp0s31f6
    └── Encapsulation type: Ethernet (1)
    └── Arrival Time: Jan 18, 2025 22:24:23.010442541 IST
    └── UTC Arrival Time: Jan 18, 2025 16:54:23.010442541 UTC
    └── Epoch Arrival Time: 1737219263.010442541
    └── [Time shift for this packet: 0.000000000 seconds]
    └── [Time delta from previous captured frame: 0.000009474 seconds]
    └── [Time delta from previous displayed frame: 0.000009474 seconds]
    └── [Time since reference or first frame: 0.968110034 seconds]
    └── Frame Number: 9
    └── Frame Length: 76 bytes (608 bits)
    └── Capture Length: 76 bytes (608 bits)
    └── [Frame is marked: False]
    └── [Frame is ignored: False]
    └── [Protocols in frame: eth:ethertype:ip:udp:dns]
    └── [Coloring Rule Name: UDP]
    └── [Coloring Rule String: udp]
Ethernet II, Src: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71), Dst: Cisco_a8:35:83 (08:f3:fb:a8:35:83)
└── Destination: Cisco_a8:35:83 (08:f3:fb:a8:35:83)
└── Source: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71)
└── Type: IPv4 (0x0800)
└── [Stream index: 0]
Internet Protocol Version 4, Src: 10.105.55.190, Dst: 172.16.1.180
└── 0100 .... = Version: 4
└── .... 0101 = Header Length: 20 bytes (5)
└── Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
└── Total Length: 62
└── Identification: 0x2085 (8325)
└── 010. .... = Flags: 0x2, Don't fragment
└── ...0 0000 0000 0000 = Fragment Offset: 0
└── Time to Live: 64
└── Protocol: UDP (17)
└── Header Checksum: 0xa3f [validation disabled]
└── [Header checksum status: Unverified]
└── Source Address: 10.105.55.190
└── Destination Address: 172.16.1.180
└── [Stream index: 3]
User Datagram Protocol, Src Port: 51209, Dst Port: 53
└── Source Port: 51209
└── Destination Port: 53
└── Length: 42
└── Checksum: 0xf026 [unverified]
└── [Checksum Status: Unverified]
└── [Stream index: 1]
└── [Stream Packet Number: 2]
└── [Timestamps]
└── UDP payload (34 bytes)
```

```
└─ Domain Name System (query)
    └─ Transaction ID: 0x414f
        └─ Flags: 0x0100 Standard query
            └─ Questions: 1
            └─ Answer RRs: 0
            └─ Authority RRs: 0
            └─ Additional RRs: 0
        └─ Queries
            └─ www.iitkgp.ac.in: type AAAA, class IN
                └─ Name: www.iitkgp.ac.in
                └─ [Name Length: 16]
                └─ [Label Count: 4]
                └─ Type: AAAA (28) (IP6 Address)
                └─ Class: IN (0x0001)
            └─ [Response In: 11]
```

Packet 10:

Interface id: 0 (enp0s31f6)
Arrival Time: Jan 18, 2025 22:24:23.013784559 IST
Frame Length: 92 bytes (736 bits)
Total Length: 78
Time to Live: 61
Protocol: UDP (17)
Source Address: 172.16.1.180
Destination Address: 10.105.55.190
User Datagram Protocol, Src Port: 53, Dst Port: 51209
Source Port: 53
Destination Port: 51209
Length: 58
 Name: www.iitkgp.ac.in
 [Name Length: 16]
 [Label Count: 4]
 Type: A (1) (Host Address)
 Class: IN (0x0001)

```

Frame 10: 92 bytes on wire (736 bits), 92 bytes captured (736 bits) on interface enp0s31f6, id 0
└── Section number: 1
    └── Interface id: 0 (enp0s31f6)
        └── Interface name: enp0s31f6
    └── Encapsulation type: Ethernet (1)
    └── Arrival Time: Jan 18, 2025 22:24:23.013784559 IST
    └── UTC Arrival Time: Jan 18, 2025 16:54:23.013784559 UTC
    └── Epoch Arrival Time: 1737219263.013784559
    └── [Time shift for this packet: 0.000000000 seconds]
    └── [Time delta from previous captured frame: 0.003342018 seconds]
    └── [Time delta from previous displayed frame: 0.003342018 seconds]
    └── [Time since reference or first frame: 0.971452052 seconds]
    └── Frame Number: 10
    └── Frame Length: 92 bytes (736 bits)
    └── Capture Length: 92 bytes (736 bits)
    └── [Frame is marked: False]
    └── [Frame is ignored: False]
    └── [Protocols in frame: eth:ethertype:ip:udp:dns]
    └── [Coloring Rule Name: UDP]
    └── [Coloring Rule String: udp]

Ethernet II, Src: Cisco_a8:35:83 (08:f3:fb:a8:35:83), Dst: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71)
└── Destination: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71)
└── Source: Cisco_a8:35:83 (08:f3:fb:a8:35:83)
└── Type: IPv4 (0x0800)
└── [Stream index: 0]

Internet Protocol Version 4, Src: 172.16.1.180, Dst: 10.105.55.190
└── Internet Protocol Version 4, Src: 172.16.1.180, Dst: 10.105.55.190
    └── 0100 .... = Version: 4
    └── .... 0101 = Header Length: 20 bytes (5)
    └── Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    └── Total Length: 78
    └── Identification: 0xb293 (45715)
    └── 000. .... = Flags: 0x0
    └── ...0 0000 0000 0000 = Fragment Offset: 0
    └── Time to Live: 61
    └── Protocol: UDP (17)
    └── Header Checksum: 0xdb20 [validation disabled]
    └── [Header checksum status: Unverified]
    └── Source Address: 172.16.1.180
    └── Destination Address: 10.105.55.190
    └── [Stream index: 3]

User Datagram Protocol, Src Port: 53, Dst Port: 51209
└── Source Port: 53
└── Destination Port: 51209
└── Length: 58
└── Checksum: 0x10d0 [unverified]
└── [Checksum Status: Unverified]
└── [Stream index: 1]
└── [Stream Packet Number: 3]
└── [Timestamps]
└── UDP payload (50 bytes)

```

```
└─ Domain Name System (response)
    └─ Transaction ID: 0x584a
        ▶─ Flags: 0x8580 Standard query response, No error
        └─ Questions: 1
            └─ Answer RRs: 1
            └─ Authority RRs: 0
            └─ Additional RRs: 0
        ▼─ Queries
            └─ www.iitkgp.ac.in: type A, class IN
                └─ Name: www.iitkgp.ac.in
                └─ [Name Length: 16]
                └─ [Label Count: 4]
                └─ Type: A (1) (Host Address)
                └─ Class: IN (0x0001)
        ▶─ Answers
            └─ [Request In: 8]
                └─ [Time: 0.003351492 seconds]
```

Packet 11

Interface id: 0 (enp0s31f6)
Arrival Time: Jan 18, 2025 22:24:23.013784832 IST
Frame Length: 132 bytes (1056 bits)
Total Length: 118
Time to Live: 61
Protocol: UDP (17)
Source Address: 172.16.1.180
Destination Address: 10.105.55.190

User Datagram Protocol, Src Port: 53, Dst Port: 51209

Source Port: 53
Destination Port: 51209
Length: 98
UDP payload (90 bytes)

Domain Name System (response)

Name: www.iitkgp.ac.in
[Name Length: 16]
[Label Count: 4]
Type: AAAA (28) (IP6 Address)
Class: IN (0x0001)

```
Frame 11: 132 bytes on wire (1056 bits), 132 bytes captured (1056 bits) on interface enp0s31f6, id 0
└── Section number: 1
    └── Interface id: 0 (enp0s31f6)
        └── Interface name: enp0s31f6
    └── Encapsulation type: Ethernet (1)
    └── Arrival Time: Jan 18, 2025 22:24:23.013784832 IST
    └── UTC Arrival Time: Jan 18, 2025 16:54:23.013784832 UTC
    └── Epoch Arrival Time: 1737219263.013784832
    └── [Time shift for this packet: 0.000000000 seconds]
    └── [Time delta from previous captured frame: 0.0000000273 seconds]
    └── [Time delta from previous displayed frame: 0.0000000273 seconds]
    └── [Time since reference or first frame: 0.971452325 seconds]
    └── Frame Number: 11
    └── Frame Length: 132 bytes (1056 bits)
    └── Capture Length: 132 bytes (1056 bits)
    └── [Frame is marked: False]
    └── [Frame is ignored: False]
    └── [Protocols in frame: eth:ethertype:ip:udp:dns]
    └── [Coloring Rule Name: UDP]
    └── [Coloring Rule String: udp]
Ethernet II, Src: Cisco_a8:35:83 (08:f3:fb:a8:35:83), Dst: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71)
└── Destination: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71)
└── Source: Cisco_a8:35:83 (08:f3:fb:a8:35:83)
└── Type: IPv4 (0x0800)
└── [Stream index: 0]

Internet Protocol Version 4, Src: 172.16.1.180, Dst: 10.105.55.190
└── 0100 .... = Version: 4
└── .... 0101 = Header Length: 20 bytes (5)
└── Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
└── Total Length: 118
└── Identification: 0xb294 (45716)
└── 000. .... = Flags: 0x0
└── ...0 0000 0000 0000 = Fragment Offset: 0
└── Time to Live: 61
└── Protocol: UDP (17)
└── Header Checksum: 0xdaf7 [validation disabled]
└── [Header checksum status: Unverified]
└── Source Address: 172.16.1.180
└── Destination Address: 10.105.55.190
└── [Stream index: 3]

User Datagram Protocol, Src Port: 53, Dst Port: 51209
└── Source Port: 53
└── Destination Port: 51209
└── Length: 98
└── Checksum: 0x286a [unverified]
└── [Checksum Status: Unverified]
└── [Stream index: 1]
└── [Stream Packet Number: 4]
└── [Timestamps]
└── UDP payload (90 bytes)
```

```

└─ Domain Name System (response)
    └─ Transaction ID: 0x414f
    └─ Flags: 0x8580 Standard query response, No error
    └─ Questions: 1
    └─ Answer RRs: 0
    └─ Authority RRs: 1
    └─ Additional RRs: 0
    └─ Queries
        └─ www.iitkgp.ac.in: type AAAA, class IN
            └─ Name: www.iitkgp.ac.in
            └─ [Name Length: 16]
            └─ [Label Count: 4]
            └─ Type: AAAA (28) (IP6 Address)
            └─ Class: IN (0x0001)
    └─ Authoritative nameservers
    └─ [Request In: 9]
    └─ [Time: 0.003342291 seconds]

```

The pcap file for this are included with the file name
 Sumit_Kumar_22CS30056_Part_2_analysis_of_DNS_packets.pcap

Question 2

Web Traffic (HTTP)

Question2.a)

HTTP packets between the client and the web server.

We can see the communication between the server and the client in different data packets

When the source ip is 10.105.55.190 the client(my system) is sending the request first

When the source ip is 69.43.111.82 the server(of the website) is responding to the above communication request.

No.	Time	Source	Destination	Protocol	Length	Info
108	2.515724189	10.105.55.190	69.43.111.82	HTTP	594	GET /~grovesd/ HTTP/1.1
119	2.750916368	69.43.111.82	10.105.55.190	HTTP	873	HTTP/1.1 200 OK (text/html)
121	2.850899035	10.105.55.190	69.43.111.82	HTTP	412	GET /~grovesd/css/base.css HTTP/1.1
124	3.087200384	69.43.111.82	10.105.55.190	HTTP	1062	HTTP/1.1 200 OK (text/css)
130	3.151681520	10.105.55.190	69.43.111.82	HTTP	477	GET /~grovesd/images/big-bear.png HTTP/1.1
166	3.629698281	69.43.111.82	10.105.55.190	HTTP	808	HTTP/1.1 200 OK (PNG)
273	5.373963904	10.105.55.190	69.43.111.82	HTTP	448	GET /favicon.ico HTTP/1.1
311	5.607914176	69.43.111.82	10.105.55.190	HTTP	462	HTTP/1.1 404 Not Found (text/html)
497	20.164591310	10.105.55.190	69.43.111.82	HTTP	473	GET /~grovesd/images/bear.png HTTP/1.1
510	20.498086881	69.43.111.82	10.105.55.190	HTTP	784	HTTP/1.1 200 OK (PNG)
512	20.842640809	10.105.55.190	69.43.111.82	HTTP	345	GET /~grovesd/css/base.css.map HTTP/1.1
515	21.084772813	69.43.111.82	10.105.55.190	HTTP	290	HTTP/1.1 200 OK (text/css)
525	23.316068540	10.105.55.190	69.43.111.82	HTTP	616	GET /~grovesd/ HTTP/1.1
526	23.555086839	69.43.111.82	10.105.55.190	HTTP	298	HTTP/1.1 304 Not Modified

Question 2.b)

HTTP Request Packet

ip.addr eq 69.43.111.82 and http

No.	Time	Source	Destination	Protocol	Length	Info
108	2.750916368	69.43.111.82	10.105.55.190	HTTP	504	GET /~grovesd/ HTTP/1.1
119	2.750916368	10.105.55.190	69.43.111.82	HTTP	873	HTTP/1.1 200 OK (text/html)
121	2.850899035	10.105.55.190	69.43.111.82	HTTP	412	GET /~grovesd/css/base.css HTTP/1.1
124	3.087200384	69.43.111.82	10.105.55.190	HTTP	1062	HTTP/1.1 200 OK (text/css)
130	3.151681520	10.105.55.190	69.43.111.82	HTTP	477	GET /~grovesd/images/big-bear.png HTTP/1.1
166	3.629698281	69.43.111.82	10.105.55.190	HTTP	808	HTTP/1.1 200 OK (PNG)
273	5.373963904	10.105.55.190	69.43.111.82	HTTP	448	GET /favicon.ico HTTP/1.1
311	5.607914176	69.43.111.82	10.105.55.190	HTTP	462	HTTP/1.1 404 Not Found (text/html)

```

Frame 108: 504 bytes on wire (4032 bits), 504 bytes captured (4032 bits) on interface enp0s31f6, id 0
Ethernet II, Src: PanasonicCom_8c:cc:71 (bc:c3:42:8c:cc:71), Dst: Cisco_a8:35:83 (08:f3:fb:a8:35:83)
Internet Protocol Version 4, Src: 10.105.55.190, Dst: 69.43.111.82
Transmission Control Protocol, Src Port: 80, Dst Port: 80, Seq: 1, Ack: 1, Len: 438
Hypertext Transfer Protocol
  GET /~grovesd/ HTTP/1.1\r\n
    Request Method: GET
    Request URI: /~grovesd/
    Request Version: HTTP/1.1
    Host: web.simmons.edu\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/129.0.0.0 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=0.7\r\n
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-US,en;q=0.9,hi;q=0.8\r\n
    \r\n
  [Response in frame: 119]
  [Full request URI: http://web.simmons.edu/~grovesd/]

```

HTTP Response Packet

ip.addr eq 69.43.111.82 and http

No.	Time	Source	Destination	Protocol	Length	Info
108	2.515724189	10.105.55.190	69.43.111.82	HTTP	504	GET /~grovesd/ HTTP/1.1
119	2.750916368	69.43.111.82	10.105.55.190	HTTP	873	HTTP/1.1 200 OK (text/html)
121	2.850899035	10.105.55.190	69.43.111.82	HTTP	412	GET /~grovesd/css/base.css HTTP/1.1
124	3.087200384	69.43.111.82	10.105.55.190	HTTP	1062	HTTP/1.1 200 OK (text/css)
130	3.151681520	10.105.55.190	69.43.111.82	HTTP	477	GET /~grovesd/images/big-bear.png HTTP/1.1
166	3.629698281	69.43.111.82	10.105.55.190	HTTP	808	HTTP/1.1 200 OK (PNG)
273	5.373963904	10.105.55.190	69.43.111.82	HTTP	448	GET /favicon.ico HTTP/1.1
311	5.607914176	69.43.111.82	10.105.55.190	HTTP	462	HTTP/1.1 404 Not Found (text/html)

```

HTTP/1.1 200 OK\r\n
  Response Version: HTTP/1.1
  Status Code: 200
  [Status Code Description: OK]
  Response Phrase: OK
  Date: Sat, 18 Jan 2025 17:14:41 GMT\r\n
  Server: Apache\r\n
  Last-Modified: Tue, 03 Sep 2019 00:33:59 GMT\r\n
  ETag: "7b2-5919b3e8debc0"\r\n
  Accept-Ranges: bytes\r\n
  Content-Length: 1970\r\n
  Keep-Alive: timeout=5, max=100\r\n
  Connection: Keep-Alive\r\n
  Content-Type: text/html; charset=UTF-8\r\n
  \r\n
  [Request in frame: 108]
  [Time since request: 0.235192179 seconds]
  [Request URI: /~grovesd/]
  [Full request URI: http://web.simmons.edu/~grovesd/]
  File Data: 1970 bytes
  Line-based text data: text/html (57 lines)

```

2.c) Main Page Request:

- Packet **No. 108**: Client sends `GET /~grovesd/`
- Packet **No. 119**: Server responds with `200 OK` (HTML content).
- **Resource Requests:**
 - CSS:
 - Packet **No. 121**: Request for `/~grovesd/css/base.css`.
 - Packet **No. 124**: Response `200 OK` with CSS content.
 - Images:
 - Packet **No. 130**: Request for `/~grovesd/images/big-bear.png`.
 - Packet **No. 166**: Response `200 OK` with PNG image.
 - Other resources like `/favicon.ico` and `/~grovesd/images/bear.png`.
- **Error and Other Status Codes:**
 - Packet **No. 273**: `404 Not Found` for a missing resource.
 - Packet **No. 526**: `304 Not Modified` indicates cached content.

Count of HTTP Packets:

- **Client Requests**: Count of `GET` requests made by the client.
- **Server Responses**: Count of responses from the server (`200 OK`, `404`, etc.).

From the screenshot:

1. **Client Requests**: There are 9 `GET` requests.
2. **Server Responses**: Corresponding to each request, there are 9 responses.

Thus, a total of **18 HTTP packets** are exchanged (9 requests + 9 responses).

Conclusion:

To load this web page completely:

- **Total HTTP packets exchanged**: 18
- **Reason**: This includes the main HTML page and all its resources (CSS, images, icons, etc.).

Part 3

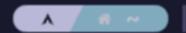
ICMP Traffic (Ping/Traceroute)

a)

Command used ping 10.145.91.63

Friend's IP Address: 10.145.91.63

```
> ping 10.145.91.63
PING 10.145.91.63 (10.145.91.63) 56(84) bytes of data.
64 bytes from 10.145.91.63: icmp_seq=1 ttl=63 time=281 ms
64 bytes from 10.145.91.63: icmp_seq=2 ttl=63 time=95.5 ms
64 bytes from 10.145.91.63: icmp_seq=3 ttl=63 time=375 ms
64 bytes from 10.145.91.63: icmp_seq=4 ttl=63 time=254 ms
64 bytes from 10.145.91.63: icmp_seq=5 ttl=63 time=115 ms
64 bytes from 10.145.91.63: icmp_seq=6 ttl=63 time=402 ms
64 bytes from 10.145.91.63: icmp_seq=7 ttl=63 time=116 ms
64 bytes from 10.145.91.63: icmp_seq=8 ttl=63 time=342 ms
64 bytes from 10.145.91.63: icmp_seq=9 ttl=63 time=371 ms
64 bytes from 10.145.91.63: icmp_seq=10 ttl=63 time=122 ms
64 bytes from 10.145.91.63: icmp_seq=11 ttl=63 time=207 ms
64 bytes from 10.145.91.63: icmp_seq=12 ttl=63 time=230 ms
64 bytes from 10.145.91.63: icmp_seq=13 ttl=63 time=156 ms
64 bytes from 10.145.91.63: icmp_seq=14 ttl=63 time=162 ms
64 bytes from 10.145.91.63: icmp_seq=15 ttl=63 time=142 ms
64 bytes from 10.145.91.63: icmp_seq=16 ttl=63 time=218 ms
64 bytes from 10.145.91.63: icmp_seq=17 ttl=63 time=179 ms
64 bytes from 10.145.91.63: icmp_seq=18 ttl=63 time=161 ms
64 bytes from 10.145.91.63: icmp_seq=19 ttl=63 time=186 ms
64 bytes from 10.145.91.63: icmp_seq=20 ttl=63 time=148 ms
^C
--- 10.145.91.63 ping statistics ---
20 packets transmitted, 20 received, 0% packet loss, time 19026ms
rtt min/avg/max/mdev = 95.506/213.195/401.614/92.274 ms
```



No.	Time	Source	Destination	Protocol	Length	Info
2	0.096994997	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=55/14080, ttl=63 (request in 1)
4	1.113318435	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=56/14336, ttl=63 (request in 3)
6	2.145376689	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=57/14592, ttl=63 (request in 5)
8	3.119067612	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=58/14848, ttl=63 (request in 7)
13	4.397876886	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=59/15104, ttl=63 (request in 11)
16	5.219485457	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=60/15360, ttl=63 (request in 15)
18	6.141533772	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=61/15616, ttl=63 (request in 17)
38	7.268077072	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=62/15872, ttl=63 (request in 37)
40	8.131916034	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=63/16128, ttl=63 (request in 39)
50	9.417750582	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=64/16384, ttl=63 (request in 48)
56	10.127448335	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=65/16640, ttl=63 (request in 55)
64	11.149809766	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=66/16896, ttl=63 (request in 61)
66	12.284939242	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=67/17152, ttl=63 (request in 65)
68	13.148862604	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=68/17408, ttl=63 (request in 67)
73	14.433763691	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=69/17664, ttl=63 (request in 69)
77	15.094996860	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=70/17920, ttl=63 (request in 76)
79	16.176222278	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=71/18176, ttl=63 (request in 78)
94	17.260330432	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=72/18432, ttl=63 (request in 93)
100	18.270538757	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=73/18688, ttl=63 (request in 97)
107	19.760274591	10.145.91.63	192.168.7.95	ICMP	100	Echo (ping) reply id=0x003e, seq=74/18944, ttl=63 (request in 106)

My IP is 192.168.7.95

Question 3.b)

Traceroute to a friend IP

```
> traceroute 10.145.91.63
traceroute to 10.145.91.63 (10.145.91.63), 30 hops max, 60 byte packets
 1 _gateway (192.168.7.187) 40.683 ms 40.677 ms 40.781 ms
 2 10.145.91.63 (10.145.91.63) 189.027 ms * 189.168 ms
```

No.	Time	Source	Destination	Protocol	Length Info
62	3.216381096	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)
63	3.262229822	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)
64	3.362567736	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)
65	3.362568118	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)
66	3.364540744	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)
67	3.364541147	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)
70	3.463215617	10.145.91.63	192.168.7.95	ICMP	104 Destination unreachable (Port unreachable)

Question 3.c)

Sending to an unreachable host

```
> ping 192.168.31.3
PING 192.168.31.3 (192.168.31.3) 56(84) bytes of data.
From 192.168.7.95 icmp_seq=14 Destination Host Unreachable
From 192.168.7.95 icmp_seq=15 Destination Host Unreachable
```

Internet Control Message Protocol					
Type:	8 (Echo (ping) request)				
Code:	0				
Checksum:	0xfed3 [correct]				
[Checksum Status:	Good]				
Identifier (BE):	31136 (0x79a0)				
Identifier (LE):	41081 (0xa079)				
Sequence Number (BE):	1 (0x0001)				
Sequence Number (LE):	256 (0x0100)				
[No response seen]					
[Expert Info (Warning/Sequence): No response seen to ICMP request]					
Timestamp from icmp data: Jan 17, 2025 19:01:37.914543000 IST					
[Timestamp from icmp data (relative): 0.000019391 seconds]					

ip.addr eq 192.168.31.3 and icmp					
No.	Time	Source	Destination	Protocol	Length Info
15549	598.382831848	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=1/256, ttl=64 (no response found!)
15634	599.425978969	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=2/512, ttl=64 (no response found!)
15637	600.4489051313	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=3/768, ttl=64 (no response found!)
15925	601.473649435	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=4/1024, ttl=64 (no response found!)
15935	602.496136514	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=5/1280, ttl=64 (no response found!)
15944	603.520117936	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=6/1536, ttl=64 (no response found!)
15952	604.54507978	10.145.58.48	192.168.31.3	ICMP	98 Echo (ping) request id=0x79a0, seq=7/1792, ttl=64 (no response found!)

Traceroute to an unreachable IP:

```
> traceroute 192.168.31.3
traceroute to 192.168.31.3 (192.168.31.3), 30 hops max, 60 byte packets
 1 _gateway (192.168.7.187) 24.220 ms 24.146 ms 25.100 ms
 2 10.145.0.3 (10.145.0.3) 68.290 ms 68.249 ms 68.218 ms
 3 10.120.0.25 (10.120.0.25) 68.359 ms 68.204 ms 68.392 ms
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
```

No.	Time	Source	Destination	Protocol	Length	Info
35	1.750956607	192.168.7.95	192.168.31.3	UDP	76	35790 → 33475 Len=32
36	1.751017748	192.168.7.95	192.168.31.3	UDP	76	48672 → 33476 Len=32
37	1.751056980	192.168.7.95	192.168.31.3	UDP	76	48547 → 33477 Len=32
38	1.751094911	192.168.7.95	192.168.31.3	UDP	76	32852 → 33478 Len=32
39	1.751132065	192.168.7.95	192.168.31.3	UDP	76	46795 → 33479 Len=32
40	1.751169014	192.168.7.95	192.168.31.3	UDP	76	55427 → 33480 Len=32
41	1.751266139	192.168.7.95	192.168.31.3	UDP	76	52598 → 33481 Len=32
42	1.770460697	192.168.7.95	192.168.31.3	UDP	76	39612 → 33482 Len=32
43	1.770538973	192.168.7.95	192.168.31.3	UDP	76	55002 → 33483 Len=32
44	1.7706594522	192.168.7.95	192.168.31.3	UDP	76	33370 → 33484 Len=32
45	1.913037220	192.168.7.95	192.168.31.3	UDP	76	53795 → 33485 Len=32
46	1.913184728	192.168.7.95	192.168.31.3	UDP	76	59262 → 33486 Len=32
47	1.913147590	192.168.7.95	192.168.31.3	UDP	76	46141 → 33487 Len=32
48	1.913188761	192.168.7.95	192.168.31.3	UDP	76	49106 → 33488 Len=32
49	2.067754999	192.168.7.95	192.168.31.3	UDP	76	37186 → 33489 Len=32
50	2.067927561	192.168.7.95	192.168.31.3	UDP	76	49158 → 33490 Len=32
69	6.754165916	192.168.7.95	192.168.31.3	UDP	76	55347 → 33491 Len=32
70	6.754211893	192.168.7.95	192.168.31.3	UDP	76	40799 → 33492 Len=32
71	6.754245609	192.168.7.95	192.168.31.3	UDP	76	33365 → 33493 Len=32
72	6.754271945	192.168.7.95	192.168.31.3	UDP	76	40986 → 33494 Len=32

When the host was reachable, we observed that `traceroute` functioned normally, successfully reaching the target host within the maximum allowed hops. Additionally, we were able to capture the ICMP request responses on Wireshark.

However, when the host was unreachable, `traceroute` started by probing successive hops in search of the host's IP address. Ultimately, since the host was unreachable, the process could not complete, and we observed the "Time to Live exceeded" error. This indicated that the target host could not be reached within the specified hop and time limits.

