COMPUTER NETWORKS LAB – WEEK1

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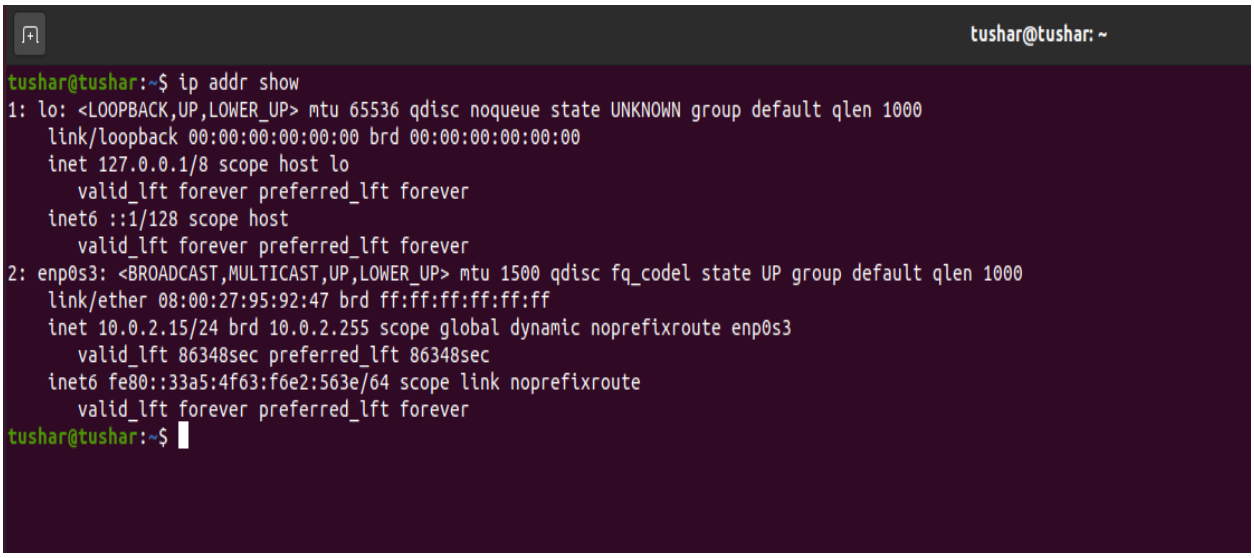
<u>Task 1</u>: Linux Interface Configuration

1.1 To display status of all active network interfaces.

Command- ip addr show



```
tushar@tushar: ~
tushar@tushar:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:95:92:47 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 86348sec preferred_lft 86348sec
    inet6 fe80::33a5:4f63:f6e2:563e/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
tushar@tushar:~$
```

Ip address table:

Interface Name	IP address(IPv4/IPv6)	MAC address
lo	127.0.0.1/::1	00:00:00:00:00:00
enp0s3	10.0.2.15/fe80::33a5:4f63:f6e2:563e	08:00:27:95:92:47

1.2 Assigning an IP address to an interface.

Command- sudo ip addr add 10.0.9.12/24 dev enp0s3

(Section I – 9, Roll No.:12)

```
tushar@tushar:~$ sudo ip addr add 10.0.9.12/24 dev enp0s3
[sudo] password for tushar:
tushar@tushar:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:95:92:47 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
       valid_lft 86098sec preferred_lft 86098sec
    inet 10.0.9.12/24 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fe80::33a5:4f63:f6e2:563e/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
tushar@tushar:~$
```

1.3 To activate and deactivate a network interface.

1.3.1 Deactivating an interface(enp0s3)

Command- sudo ifconfig enp0s3 down

```
tushar@tushar-VirtualBox:~$ sudo ifconfig enp0s3 down
tushar@tushar-VirtualBox:~$ ifconfig
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 317  bytes 27371 (27.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 317  bytes 27371 (27.3 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

tushar@tushar-VirtualBox:~$
```

1.3.2 Activating an interface(enp0s3)

Command- sudo ifconfig enp0s3 up

```
tushar@tushar:~$ sudo ifconfig enp0s3 up
tushar@tushar:~$ 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::33a5:4f63:f6e2:563e  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:95:92:47  txqueuelen 1000  (Ethernet)
        RX packets 139149  bytes 189994959 (189.9 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 33103  bytes 2054582 (2.0 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 321  bytes 27872 (27.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 321  bytes 27872 (27.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

tushar@tushar:~$
```

1.4 To show the current neighbor table in kernel.

Command- ip neigh

```
tushar@tushar:~$ ip neigh
10.0.2.2 dev enp0s3 lladdr 52:54:00:12:35:02 REACHABLE
tushar@tushar:~$
```

<u>Task 2:</u> Ping PDU (Packet Data Units) Capture

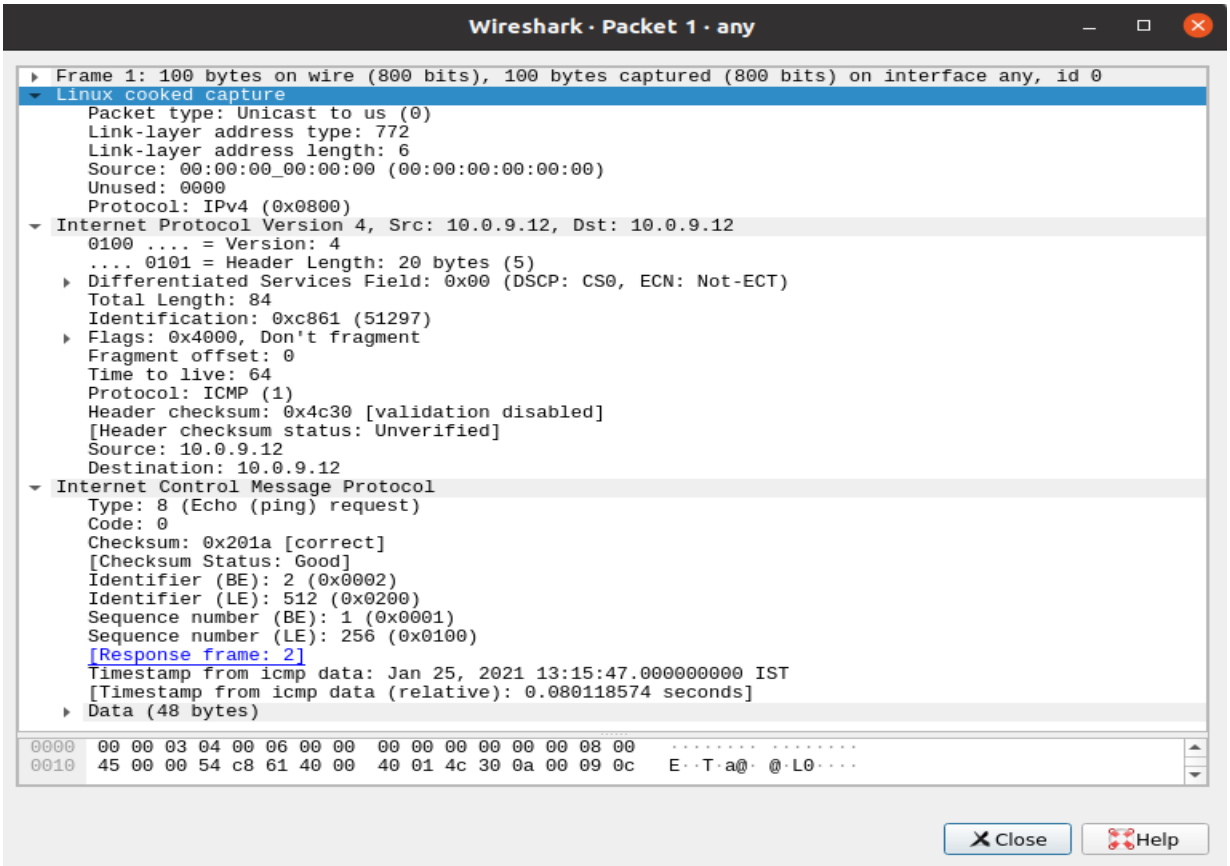
Command- ping 10.0.9.12

```
tushar@tushar:~$ ping 10.0.9.12
PING 10.0.9.12 (10.0.9.12) 56(84) bytes of data.
64 bytes from 10.0.9.12: icmp_seq=1 ttl=64 time=0.037 ms
64 bytes from 10.0.9.12: icmp_seq=2 ttl=64 time=0.084 ms
64 bytes from 10.0.9.12: icmp_seq=3 ttl=64 time=0.112 ms
64 bytes from 10.0.9.12: icmp_seq=4 ttl=64 time=0.040 ms
64 bytes from 10.0.9.12: icmp_seq=5 ttl=64 time=0.057 ms
64 bytes from 10.0.9.12: icmp_seq=6 ttl=64 time=0.110 ms
64 bytes from 10.0.9.12: icmp_seq=7 ttl=64 time=0.451 ms
64 bytes from 10.0.9.12: icmp_seq=8 ttl=64 time=0.288 ms
64 bytes from 10.0.9.12: icmp_seq=9 ttl=64 time=0.061 ms
64 bytes from 10.0.9.12: icmp_seq=10 ttl=64 time=0.089 ms
64 bytes from 10.0.9.12: icmp_seq=11 ttl=64 time=0.240 ms
64 bytes from 10.0.9.12: icmp_seq=12 ttl=64 time=0.109 ms
64 bytes from 10.0.9.12: icmp_seq=13 ttl=64 time=0.141 ms
64 bytes from 10.0.9.12: icmp_seq=14 ttl=64 time=0.122 ms
64 bytes from 10.0.9.12: icmp_seq=15 ttl=64 time=0.080 ms
64 bytes from 10.0.9.12: icmp_seq=16 ttl=64 time=0.106 ms
64 bytes from 10.0.9.12: icmp_seq=17 ttl=64 time=0.103 ms
64 bytes from 10.0.9.12: icmp_seq=18 ttl=64 time=0.168 ms
64 bytes from 10.0.9.12: icmp_seq=19 ttl=64 time=0.132 ms
64 bytes from 10.0.9.12: icmp_seq=20 ttl=64 time=0.090 ms
64 bytes from 10.0.9.12: icmp_seq=21 ttl=64 time=0.057 ms
64 bytes from 10.0.9.12: icmp_seq=22 ttl=64 time=0.105 ms
64 bytes from 10.0.9.12: icmp_seq=23 ttl=64 time=0.071 ms
64 bytes from 10.0.9.12: icmp_seq=24 ttl=64 time=0.196 ms
64 bytes from 10.0.9.12: icmp_seq=25 ttl=64 time=0.056 ms
64 bytes from 10.0.9.12: icmp_seq=26 ttl=64 time=0.112 ms
64 bytes from 10.0.9.12: icmp_seq=27 ttl=64 time=0.045 ms
64 bytes from 10.0.9.12: icmp_seq=28 ttl=64 time=0.057 ms
64 bytes from 10.0.9.12: icmp_seq=29 ttl=64 time=0.062 ms
64 bytes from 10.0.9.12: icmp_seq=30 ttl=64 time=0.048 ms
64 bytes from 10.0.9.12: icmp_seq=31 ttl=64 time=0.097 ms
64 bytes from 10.0.9.12: icmp_seq=32 ttl=64 time=0.099 ms
```

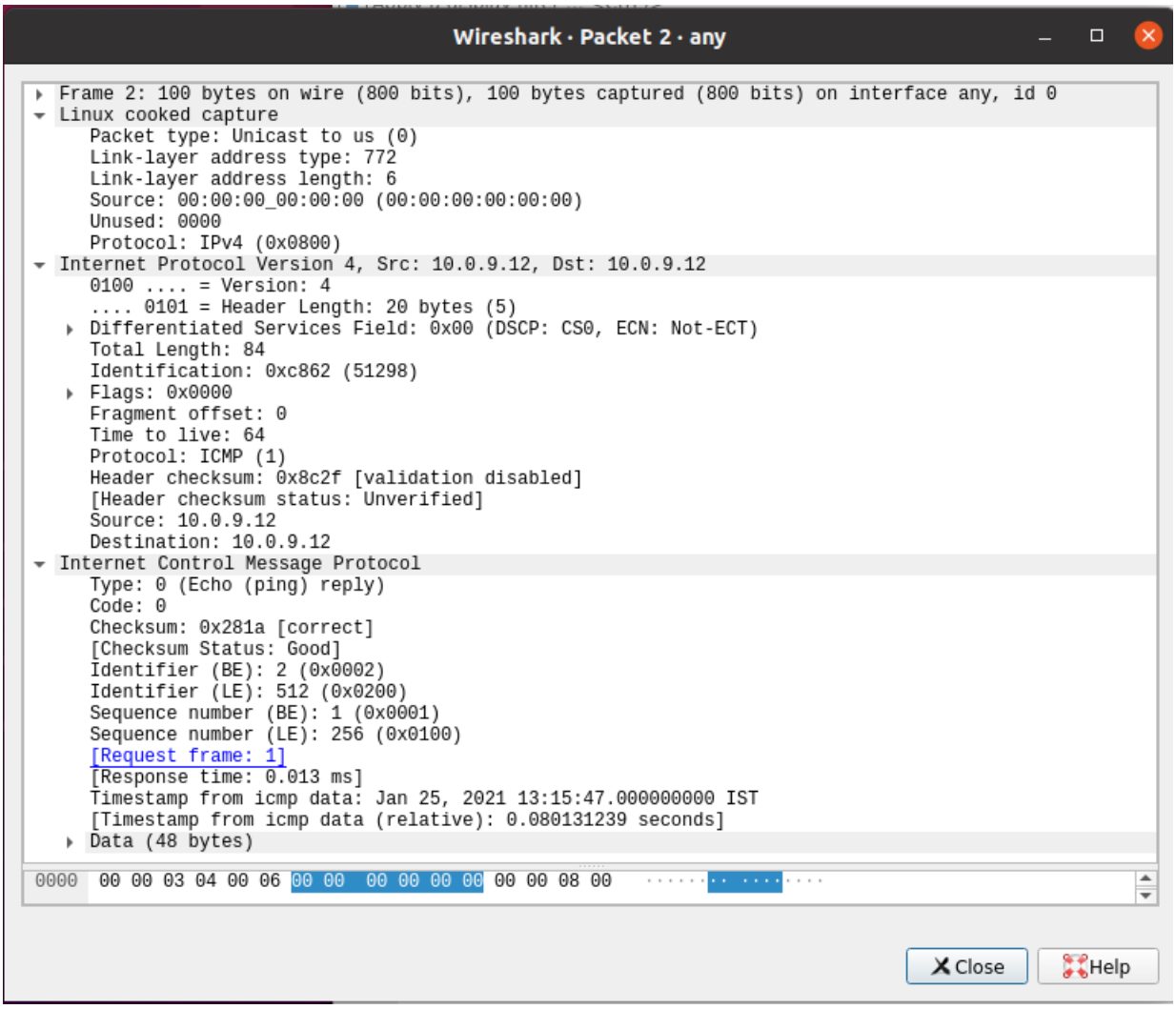
Observation:

TTL	64
Protocol used by ping	ICMP
Time	In the order of 10^{-2} ms

Echo Request Packet:



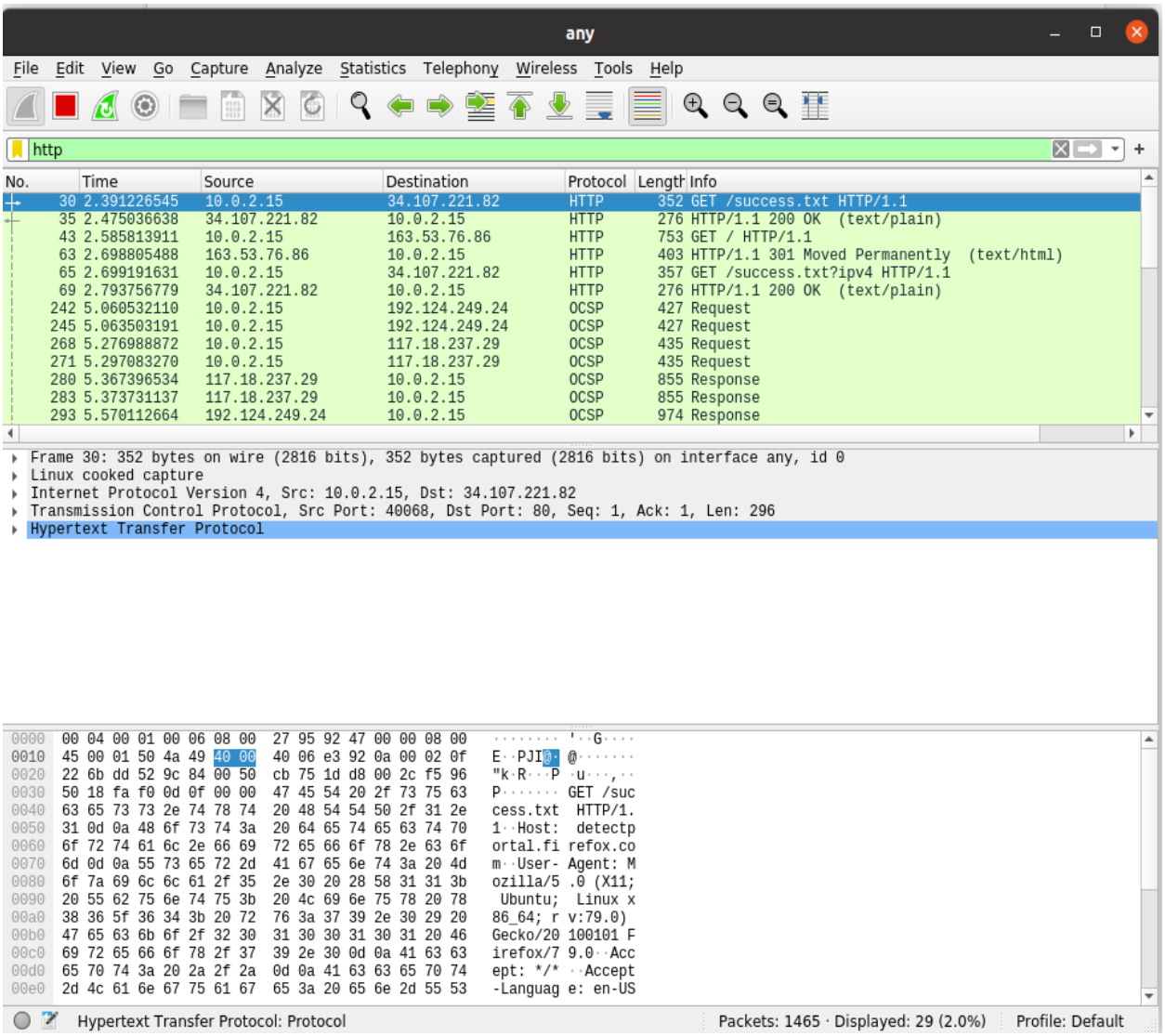
Echo Response Packet:



Details	First Echo Request	First Echo Reply
Frame Number	1	2
Source IP address	10.0.9.12	10.0.9.12
Destination IP address	10.0.9.12	10.0.9.12
ICMP Type Value	8	0
ICMP Code Value	0	0
Source Ethernet Address	00:00:00:00:00:00	00:00:00:00:00:00
Destination Ethernet Address	00:00:00:00:00:00	00:00:00:00:00:00
Internet Protocol Version	IPv4	IPv4
Time To Live (TTL) Value	64	64

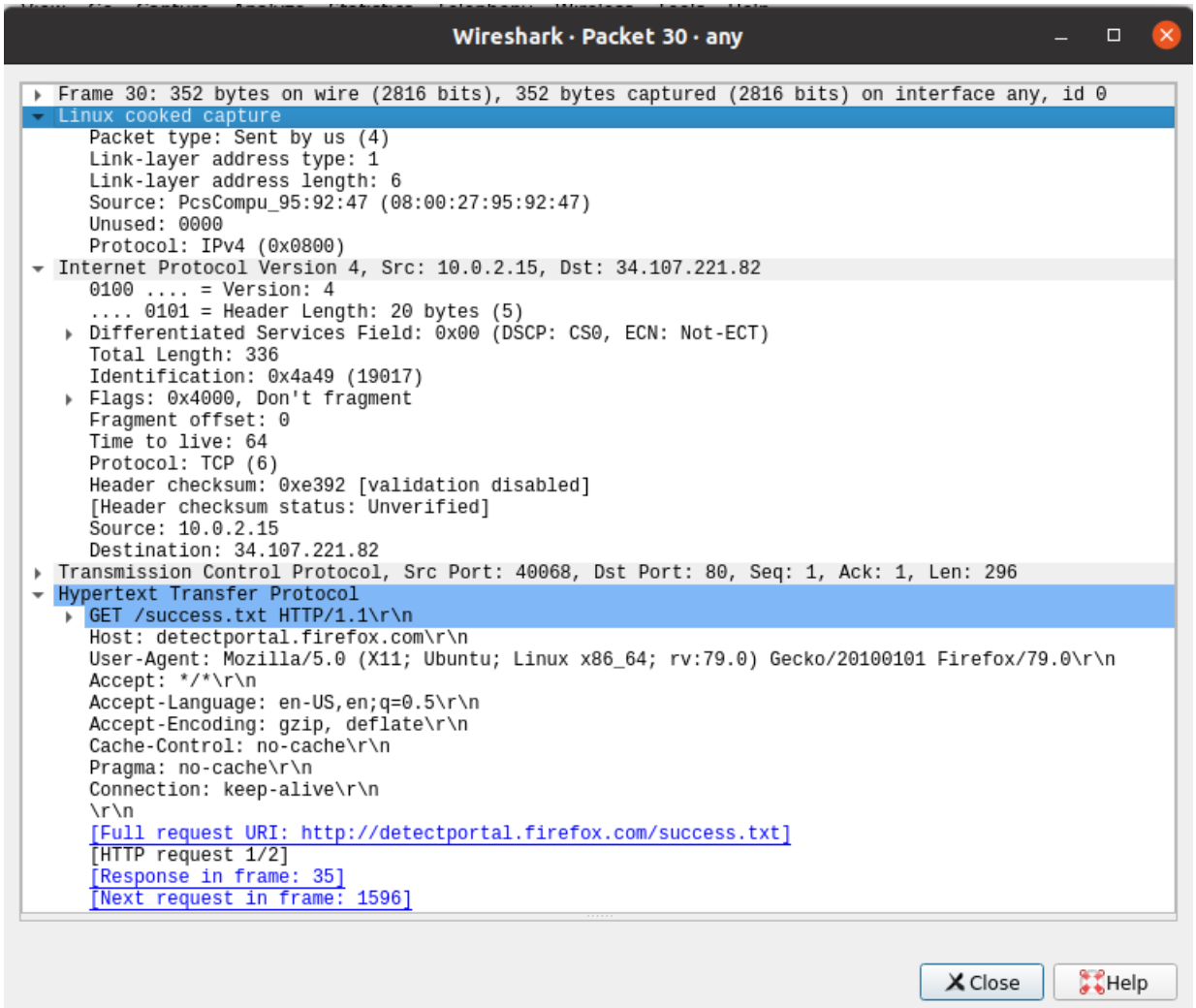
<u>Task 3:</u> HTTP PDU Capture

3.1 Upon browsing www.flipkart.com, and selecting ‘http’ in wireshark’s filter toolbar:

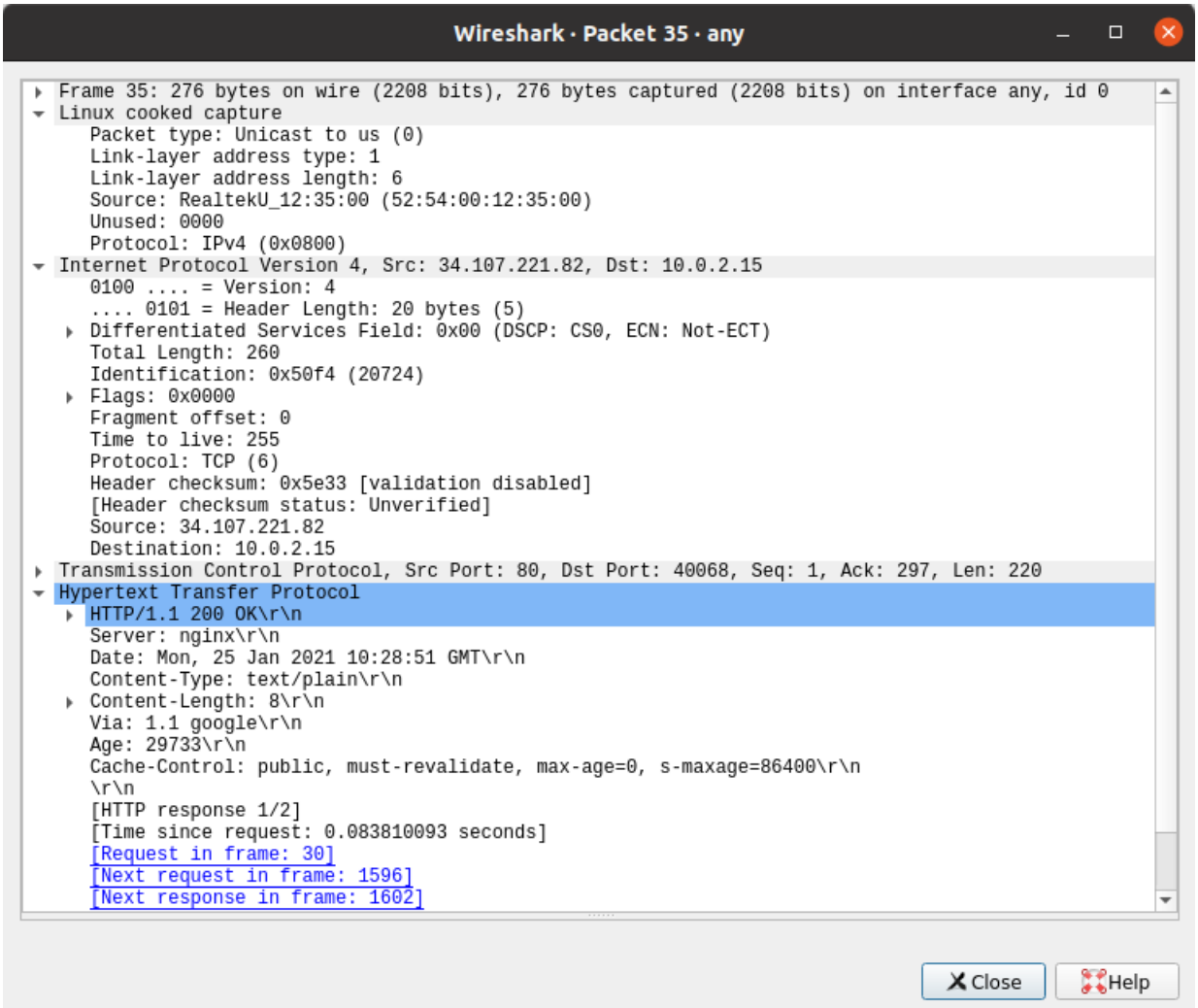


3.2 Echo Request and Reply:

3.2.1 Echo Request Packet:



3.2.2 Echo Response Packet:



3.2.3

Details	First Echo Request	First Echo Reply
Frame Number	30	35
Source Port	40068	80
Destination Port	80	40068
Source IP Address	10.0.2.15	34.107.221.82
Destination IP Address	34.107.221.82	10.0.2.15
Source Ethernet Address	08:00:27:95:92:47	52:54:00:12:35:00
Destination Ethernet Address	52:54:00:12:35:00	08:00:27:95:92:47

Wireshark’s follow TCP Stream:

Wireshark · Follow TCP Stream (tcp.stream eq 1) · any

```
GET / HTTP/1.1
Host: www.flipkart.com
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:79.0) Gecko/20100101 Firefox/
79.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Cookie: SN=VIF93D90BC382D4AE3A32D771B0EBBC17B.TOKB45CC7F0CE764D3A8B3183B1B102763A.
1611599351.LO;
AMCV_17EB401053DAF4840A490D4C%40AdobeOrg=-227196251%7CMCIDTS%7C18652%7CMCMID%7C70854
714864010822691603881039682784308%7CMCAAMLH-1612117820%7C12%7CMCAAMB-1612117820%7C6G
1ynYcLPuiQxYZrsz_pkqfLG9yMXBpb2zX5dvJdYQJzPXImdj0y%7CMCOPTOUT-1611520222s%7CNONE%7CM
CAID%7CNONE
Upgrade-Insecure-Requests: 1

HTTP/1.1 301 Moved Permanently
Server: nginx
Date: Mon, 25 Jan 2021 18:44:25 GMT
Content-Type: text/html
Content-Length: 178
Location: https://www.flipkart.com/

<html>
<head><title>301 Moved Permanently</title></head>
<body bgcolor="white">
<center><h1>301 Moved Permanently</h1></center>
<hr><center>nginx</center>
</body>
</html>
```

1 client pkt, 1 server pkt, 1 turn.

Entire conversation (1,044 bytes) | Show and save data as ASCII | Stream 1

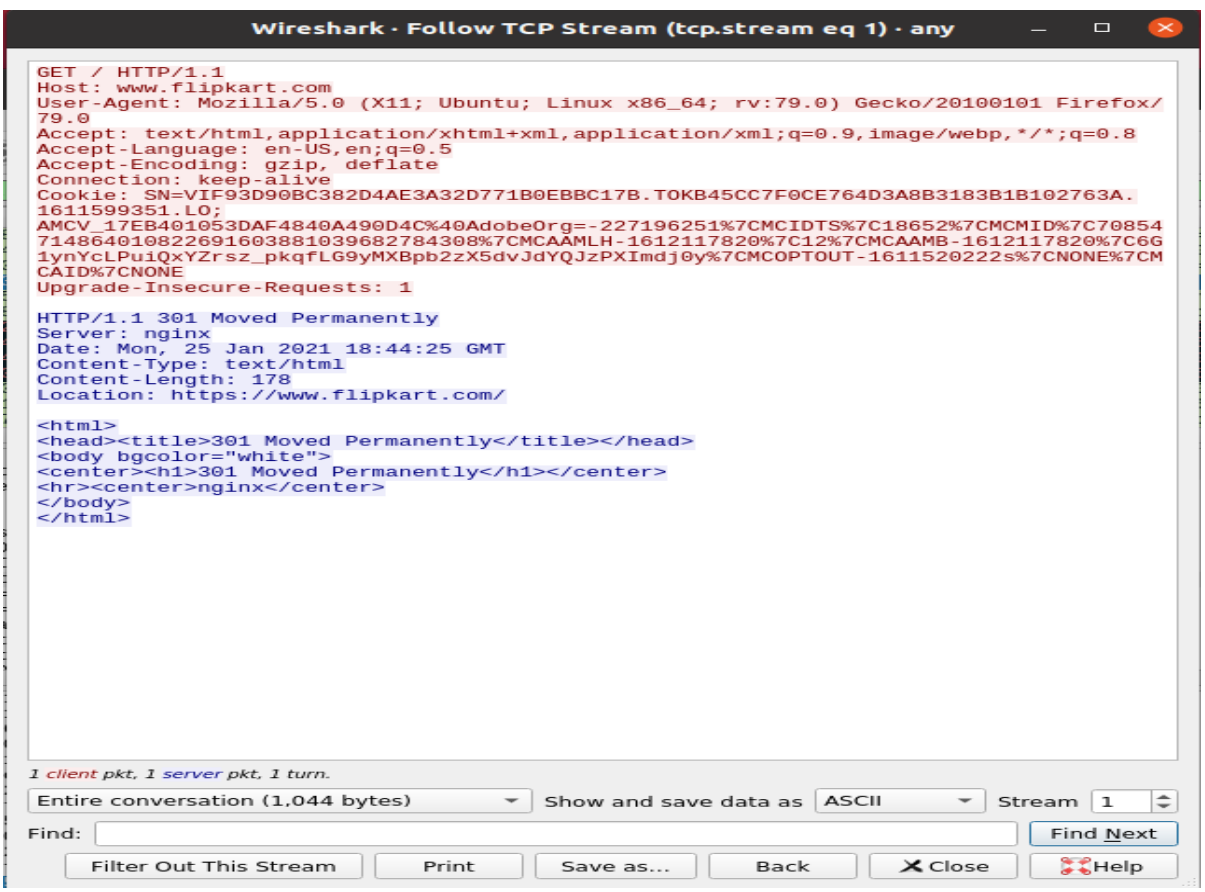
Find: | Find Next

Filter Out This Stream | Print | Save as... | Back | Close | Help

3.3 HTTP Request and Response:

HTTP Request		HTTP Response	
Get	GET/HTTP/1.1\r\n	Server	nginx
Host	www.flipkart.com	Content-Type	Text/plain\r\n
User-Agent	Mozilla/5.0 (X11; Ubuntu;Linux x86_64;rv:79.0) Gecko/20100101 Firefox/79.0\r\n	Date	Mon, 25 Jan 2021 10:28:51 GMT\r\n
Accept-Language	en-US,en;q=0.5\r\n	Location	https://www.flipkart.com/
Accept-Encoding	gzip,deflate\r\n	Content-Length	178
Connection	keep-alive\r\n	Connection	Keep-alive

3.4 Wireshark's follow TCP Stream:



<u>Task 4-</u> Capturing packets with tcpdump

4.1 Interfaces available for Capture:

Command- sudo tcpdump -D

```
tushar@tushar: ~
tushar@tushar:~$ sudo tcpdump -D
[sudo] password for tushar:
1.enp0s3 [Up, Running]
2.lo [Up, Running, Loopback]
3.any (Pseudo-device that captures on all interfaces) [Up, Running]
4.bluetooth-monitor (Bluetooth Linux Monitor) [none]
5.nflog (Linux netfilter log (NFLOG) interface) [none]
6.nfqueue (Linux netfilter queue (NFQUEUE) interface) [none]
tushar@tushar:~$
```

4.2 Capturing all packets in any interface:

Command- sudo tcpdump -i any

```
18:26:00.588801 IP localhost.domain > localhost.52626: 60173 1/0/1 PTR maa05s09-in-f4.1e100.net. (95)
18:26:00.591613 IP maa05s14-in-f2.1e100.net.https > tushar.51044: Flags [P.], seq 1432:1514, ack 197, win 65535, length 82
18:26:00.591648 IP tushar.51044 > maa05s14-in-f2.1e100.net.https: Flags [.], ack 1514, win 63020, length 0
18:26:00.594155 IP maa05s14-in-f2.1e100.net.https > tushar.51044: Flags [P.], seq 1514:1584, ack 197, win 65535, length 70
18:26:00.594190 IP tushar.51044 > maa05s14-in-f2.1e100.net.https: Flags [.], ack 1584, win 63020, length 0
18:26:00.594534 IP tushar.51044 > maa05s14-in-f2.1e100.net.https: Flags [P.], seq 197:236, ack 1584, win 63020, length 39
18:26:00.594851 IP maa05s14-in-f2.1e100.net.https > tushar.51044: Flags [.], ack 236, win 65535, length 0
18:26:00.680488 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 24, length 64
18:26:01.589970 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 25, length 64
18:26:01.691816 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 25, length 64
18:26:02.591494 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 26, length 64
18:26:02.682121 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 26, length 64
18:26:03.613432 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 27, length 64
18:26:03.692053 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 27, length 64
18:26:04.251394 IP tushar.43902 > 82.221.107.34.bc.googleusercontent.com.http: Flags [.], ack 58496221, win 64021, length 0
18:26:04.252367 IP localhost.47508 > localhost.domain: 39797+ [1au] PTR? 82.221.107.34.in-addr.arpa. (55)
18:26:04.252561 IP 82.221.107.34.bc.googleusercontent.com.http > tushar.43902: Flags [.], ack 1, win 65535, length 0
18:26:04.253580 IP tushar.44807 > dns.google.domain: 52624+ [1au] PTR? 82.221.107.34.in-addr.arpa. (55)
18:26:04.445566 IP tushar.43904 > 82.221.107.34.bc.googleusercontent.com.http: Flags [.], ack 58560221, win 64021, length 0
18:26:04.446617 IP 82.221.107.34.bc.googleusercontent.com.http > tushar.43904: Flags [.], ack 1, win 65535, length 0
18:26:04.476587 IP dns.google.domain > tushar.44807: 52624 1/0/1 PTR 82.221.107.34.bc.googleusercontent.com. (107)
18:26:04.615356 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 28, length 64
18:26:04.709626 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 28, length 64
18:26:04.952615 IP tushar.37344 > 117.18.237.29.http: Flags [.], ack 59649600, win 63920, length 0
18:26:04.953320 IP localhost.43213 > localhost.domain: 48412+ [1au] PTR? 29.237.18.117.in-addr.arpa. (55)
18:26:04.953673 IP 117.18.237.29.http > tushar.37344: Flags [.], ack 1, win 65535, length 0
```

4.3 To filter packets based on protocol(ex:icmp):

Command- sudo tcpdump -i any -c5 icmp

```
tushar@tushar:~$ sudo tcpdump -i any -c5 icmp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked v1), capture size 262144 bytes
18:29:32.691488 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 234, length 64
18:29:32.763592 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 234, length 64
18:29:33.692368 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 235, length 64
18:29:33.769779 IP maa05s09-in-f4.1e100.net > tushar: ICMP echo reply, id 2, seq 235, length 64
18:29:34.701080 IP tushar > maa05s09-in-f4.1e100.net: ICMP echo request, id 2, seq 236, length 64
5 packets captured
5 packets received by filter
0 packets dropped by kernel
tushar@tushar:~$
```

4.4 To check the packet content:

Command- sudo tcpdump -i any -c10 -nn -A port 80

```
tushar@tushar:~$ sudo tcpdump -i any -c10 -nn -A port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked v1), capture size 262144 bytes
18:34:31.932594 IP 10.0.2.15.59848 > 34.122.121.32.80: Flags [S], seq 3568749603, win 64240, options [mss 1460,sackOK,TS val 660127072 ecr 0,nop,wscale 7], length 0
E..<t.@.@../
..."zy ...P...#..................
'X.`........
18:34:32.326403 IP 34.122.121.32.80 > 10.0.2.15.59848: Flags [S.], seq 114688001, ack 3568749604, win 65535, options [mss 1460], length 0
E..,./..@..."zy
....P.........$`...^.........
18:34:32.326521 IP 10.0.2.15.59848 > 34.122.121.32.80: Flags [.], ack 1, win 64240, length 0
E..(t.@.@..B
..."zy ...P...$....P.......
18:34:32.326932 IP 10.0.2.15.59848 > 34.122.121.32.80: Flags [P.], seq 1:88, ack 1, win 64240, length 87: HTTP: GET / HTTP/1.1
E...t.@.@...
..."zy ...P...$....P.......GET / HTTP/1.1
Host: connectivity-check.ubuntu.com
Accept: */*
Connection: close


18:34:32.327650 IP 34.122.121.32.80 > 10.0.2.15.59848: Flags [.], ack 88, win 65535, length 0
E..(.0..@..."zy
....P.........{P...v.........
18:34:32.966365 IP 34.122.121.32.80 > 10.0.2.15.59848: Flags [P.], seq 1:149, ack 88, win 65535, length 148: HTTP: HTTP/1.1 204 No Content
E....1..@..b"zy
....P.........{P....Z..HTTP/1.1 204 No Content
Date: Mon, 25 Jan 2021 13:04:32 GMT
Server: Apache/2.4.18 (Ubuntu)
X-NetworkManager-Status: online
Connection: close
```

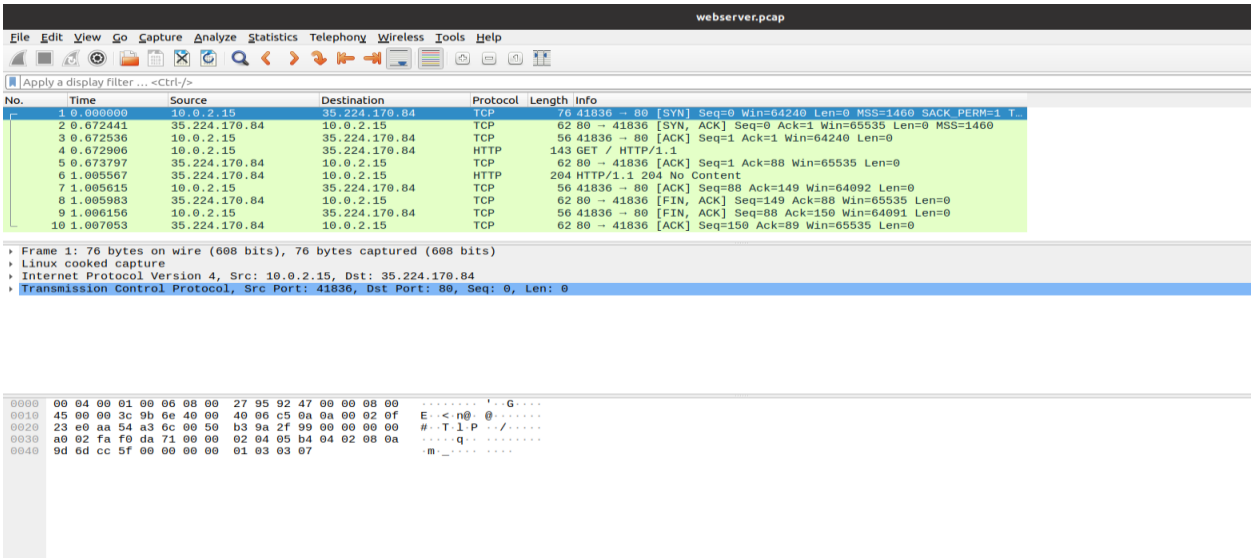
```
X-NetworkManager-Status: online
Connection: close


18:34:32.966437 IP 10.0.2.15.59848 > 34.122.121.32.80: Flags [.], ack 149, win 64092, length 0
E..(t.@.@..@
..."zy ...P...{....P..\....
18:34:32.966511 IP 34.122.121.32.80 > 10.0.2.15.59848: Flags [F.], seq 149, ack 88, win 65535, length 0
E..(.2..@..."zy
....P........{P...us........
18:34:32.966874 IP 10.0.2.15.59848 > 34.122.121.32.80: Flags [F.], seq 88, ack 150, win 64091, length 0
E..(t.@.@..?
..."zy ...P...{....P..[....
18:34:32.967762 IP 34.122.121.32.80 > 10.0.2.15.59848: Flags [.], ack 89, win 65535, length 0
E..(.3..@..."zy
....P........|P...ur........
10 packets captured
10 packets received by filter
0 packets dropped by kernel
tushar@tushar:~$
```

4.5 To save packets to a file:

Command- sudo tcpdump -i any -c10 -nn -w webserver.pcap port 80

```
tushar@tushar:~$ sudo tcpdump -i any -c10 -nn -w webserver.pcap port 80
tcpdump: listening on any, link-type LINUX_SLL (Linux cooked v1), capture size 262144 bytes
10 packets captured
10 packets received by filter
0 packets dropped by kernel
tushar@tushar:~$
```

webserver.pcap file:



Task 5- Perform Traceroute Checks

5.1 Running the traceroute:

Command- sudo traceroute www.google.com

```
tushar@tushar:~$ sudo traceroute www.google.com
traceroute to www.google.com (142.250.76.68), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.1)  2.561 ms  2.410 ms  2.351 ms
 2  * * *
 3  * * *
 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  * * *
tushar@tushar:~$
```

Destination address of google.com – 142.250.76.68

No. of hops – 30 max hops

5.2 Disabling the mapping of ip addresses with host names:

Command- sudo traceroute -n www.google.com

```
tushar@tushar:~$ sudo traceroute -n  www.google.com
traceroute to www.google.com (216.58.200.132), 30 hops max, 60 byte packets
 1  10.0.2.1  0.579 ms  0.377 ms  0.415 ms
 2  * * *
 3  * * *
 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  * * *
tushar@tushar:~$
```

5.3 Using -I option so that traceroute uses ICMP protocol:

Command- sudo traceroute -I www.google.com

```
tushar@tushar:~$ sudo traceroute -I  www.google.com
traceroute to www.google.com (216.58.200.132), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.1)  0.243 ms  0.208 ms  0.196 ms
 2  192.168.43.1 (192.168.43.1)  11.282 ms  11.286 ms  11.276 ms
 3  * * *
 4  10.72.203.242 (10.72.203.242)  106.745 ms 10.72.203.226 (10.72.203.226)  106.731 ms 10.72.203.242 (10.72.203.242)  106.917 ms
 5  192.168.65.252 (192.168.65.252)  112.624 ms  118.451 ms 192.168.65.250 (192.168.65.250)  118.460 ms
 6  192.168.65.253 (192.168.65.253)  118.817 ms 192.168.65.249 (192.168.65.249)  60.557 ms 192.168.65.253 (192.168.65.253)  72.154 ms
 7  172.26.74.20 (172.26.74.20)  71.945 ms  43.215 ms  55.515 ms
 8  172.26.77.242 (172.26.77.242)  70.373 ms  76.165 ms  76.188 ms
 9  192.168.65.138 (192.168.65.138)  76.802 ms  119.807 ms  126.821 ms
10  192.168.65.141 (192.168.65.141)  126.730 ms  126.746 ms  126.680 ms
11  172.26.29.107 (172.26.29.107)  128.071 ms  128.067 ms  85.781 ms
12  172.26.29.107 (172.26.29.107)  113.010 ms  98.150 ms  97.123 ms
13  10.70.80.197 (10.70.80.197)  97.743 ms  102.411 ms  59.570 ms
14  10.70.80.225 (10.70.80.225)  66.014 ms  71.672 ms  72.269 ms
15  74.125.48.26 (74.125.48.26)  70.993 ms  71.173 ms  75.467 ms
16  74.125.242.129 (74.125.242.129)  75.427 ms  64.580 ms  69.603 ms
17  216.239.54.197 (216.239.54.197)  64.801 ms  70.845 ms  65.624 ms
18  maa05s10-in-f4.1e100.net (216.58.200.132)  70.659 ms  57.151 ms  52.331 ms
tushar@tushar:~$
```

5.4 To test a TCP connection to gather data more relevant to web server:

Command- sudo traceroute -T www.google.com

```
tushar@tushar:~$ sudo traceroute -T  www.google.com
traceroute to www.google.com (216.58.200.132), 30 hops max, 60 byte packets
 1  maa05s10-in-f4.1e100.net (216.58.200.132)  78.687 ms  91.008 ms  91.103 ms
tushar@tushar:~$
```

<u>Task 6-</u> Explore an entire network for information (Nmap)

6.1 To scan a host using its hostname:

Command- nmap www.pes.edu

```
tushar@tushar:~$ nmap www.pes.edu
Starting Nmap 7.80 ( https://nmap.org ) at 2021-01-25 23:33 IST
Nmap scan report for www.pes.edu (13.71.123.138)
Host is up (0.33s latency).
Not shown: 998 filtered ports
PORT     STATE SERVICE
80/tcp   open  http
443/tcp  open  https

Nmap done: 1 IP address (1 host up) scanned in 125.62 seconds
tushar@tushar:~$
```

6.2 To scan a host using its IP address:

Command- nmap 163.53.78.128

```
tushar@tushar:~$ nmap 163.53.78.128
Starting Nmap 7.80 ( https://nmap.org ) at 2021-01-25 23:38 IST
Nmap scan report for 163.53.78.128
Host is up (0.32s latency).
Not shown: 998 filtered ports
PORT     STATE SERVICE
80/tcp   open  http
443/tcp  open  https

Nmap done: 1 IP address (1 host up) scanned in 192.30 seconds
tushar@tushar:~$
```

6.3 Scanning multiple IP address or subnet (IPv4):

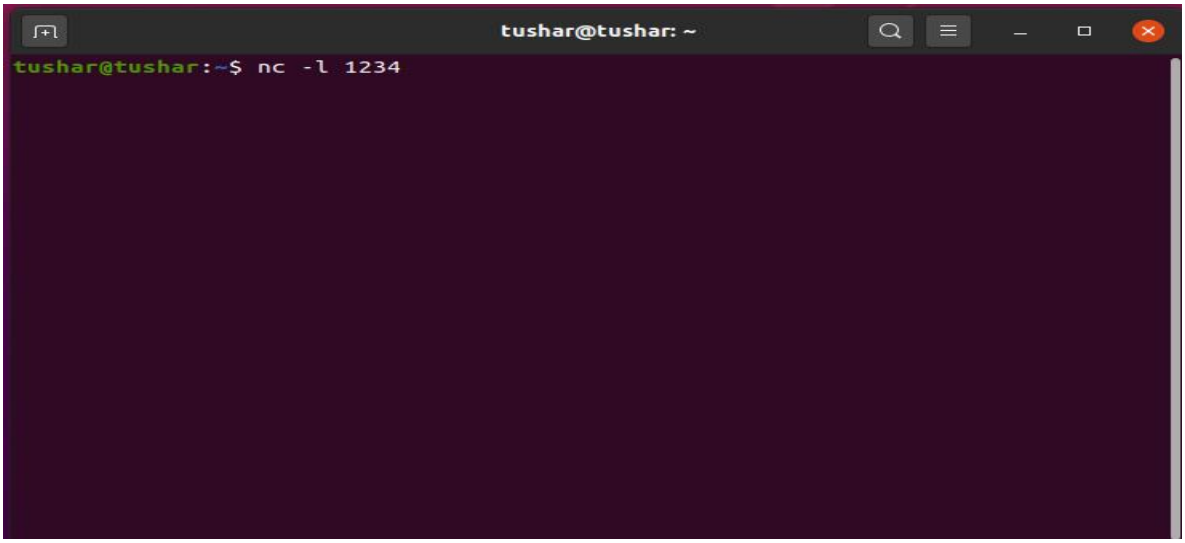
Command- nmap 192.168.1.1 192.168.1.2 192.168.1.3

```
tushar@tushar:~$ nmap 192.168.1.1 192.168.1.2 192.168.1.3
Starting Nmap 7.80 ( https://nmap.org ) at 2021-01-25 23:44 IST
Nmap done: 3 IP addresses (0 hosts up) scanned in 3.14 seconds
tushar@tushar:~$
```

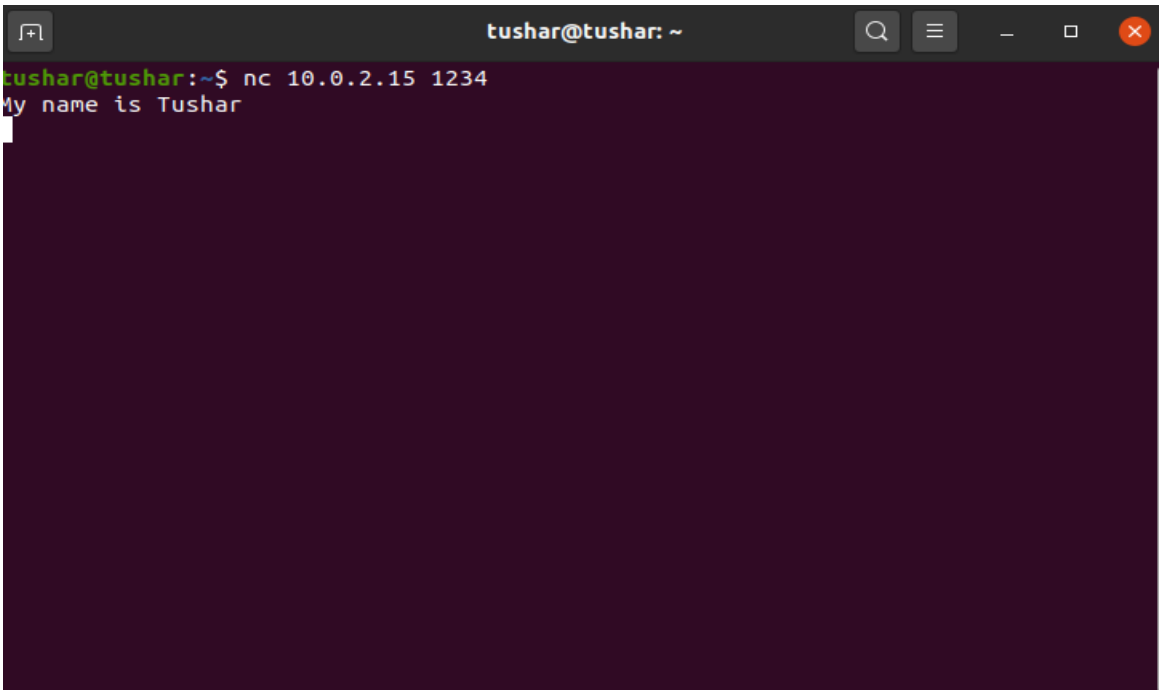
<u>Task 7 a)-</u> Netcat as Chat tool

7a.1 Intra system communication:

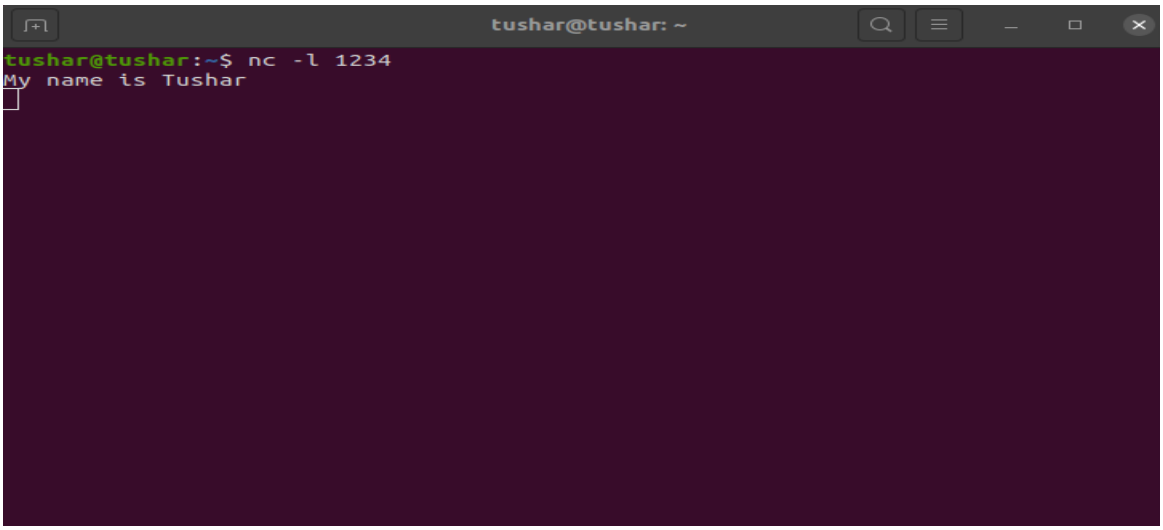
Command on server's terminal: nc -l 1234



Command on Client's terminal: nc 10.0.2.15 1234



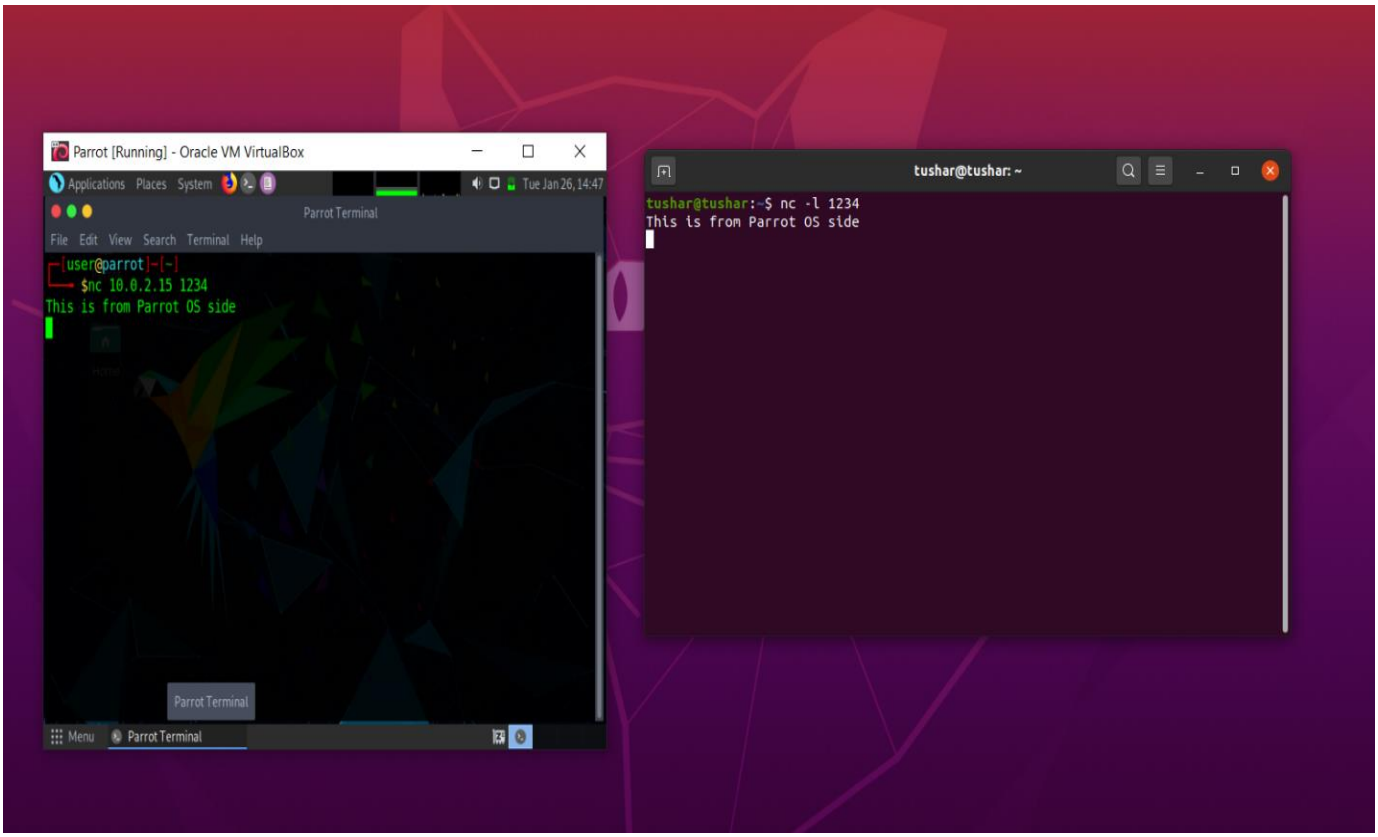
Whatever is typed on client's terminal is appearing on server side.



7a.2 Inter system communication:

Command on server's terminal (ubuntu): nc -l 1234

Command on clients's terminal (parrot): nc 10.0.2.15 1234

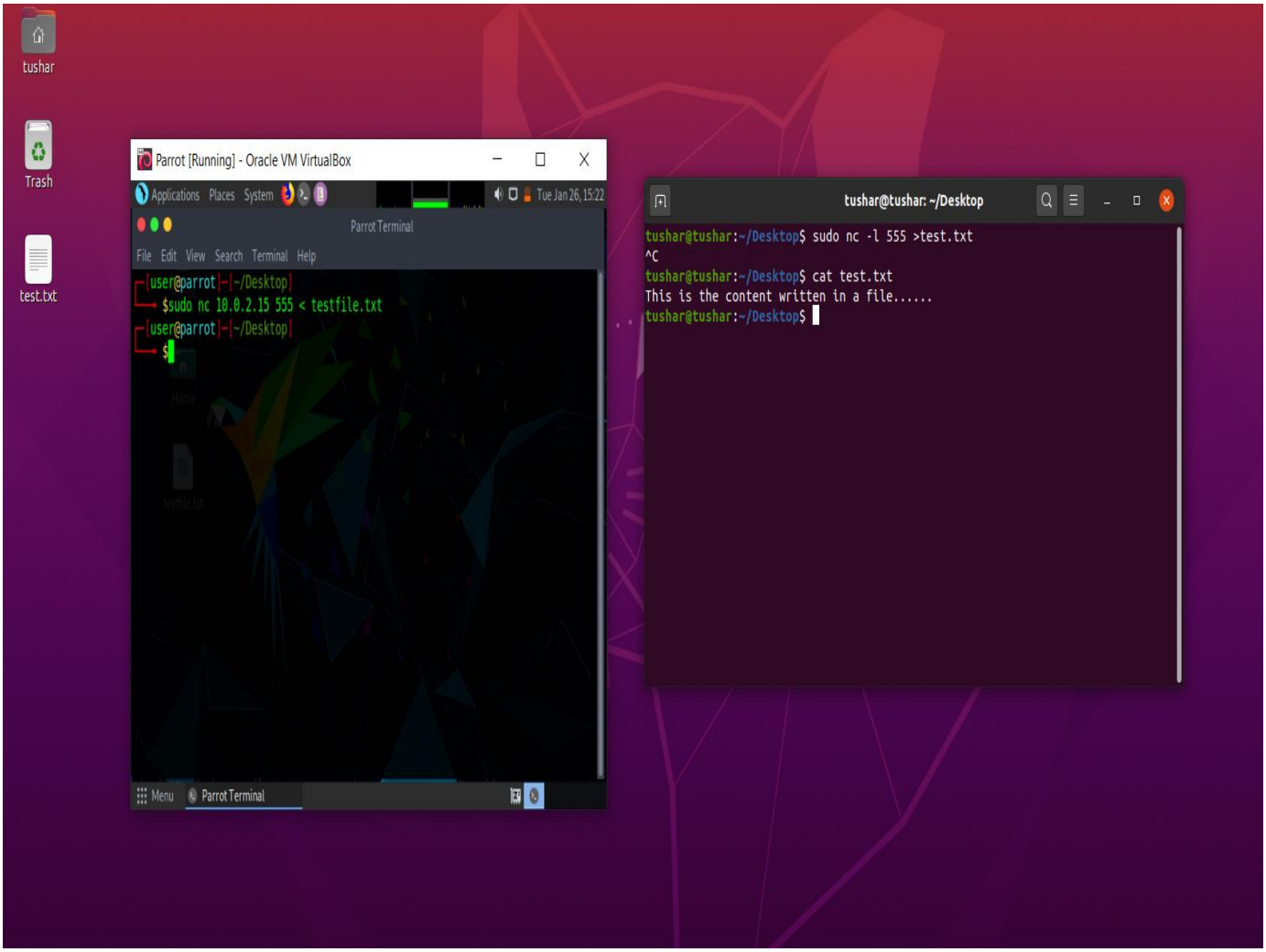


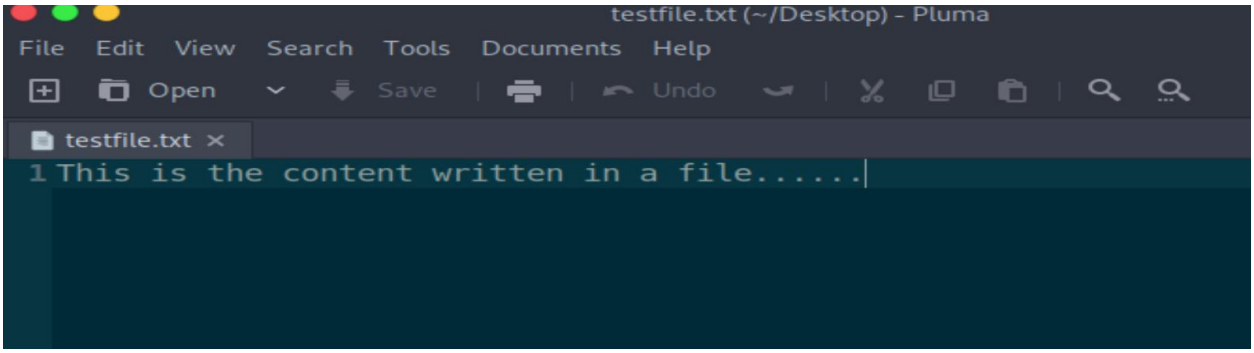
<u>Task 7 b)-</u> Using Netcat to transfer files

Command on server side (ubuntu): sudo nc -l 555 > test.txt

Command on client side (parrot): sudo nc 10.0.2.15 555 < testfile.txt

Command on server side to verfify file transfer: cat test.txt

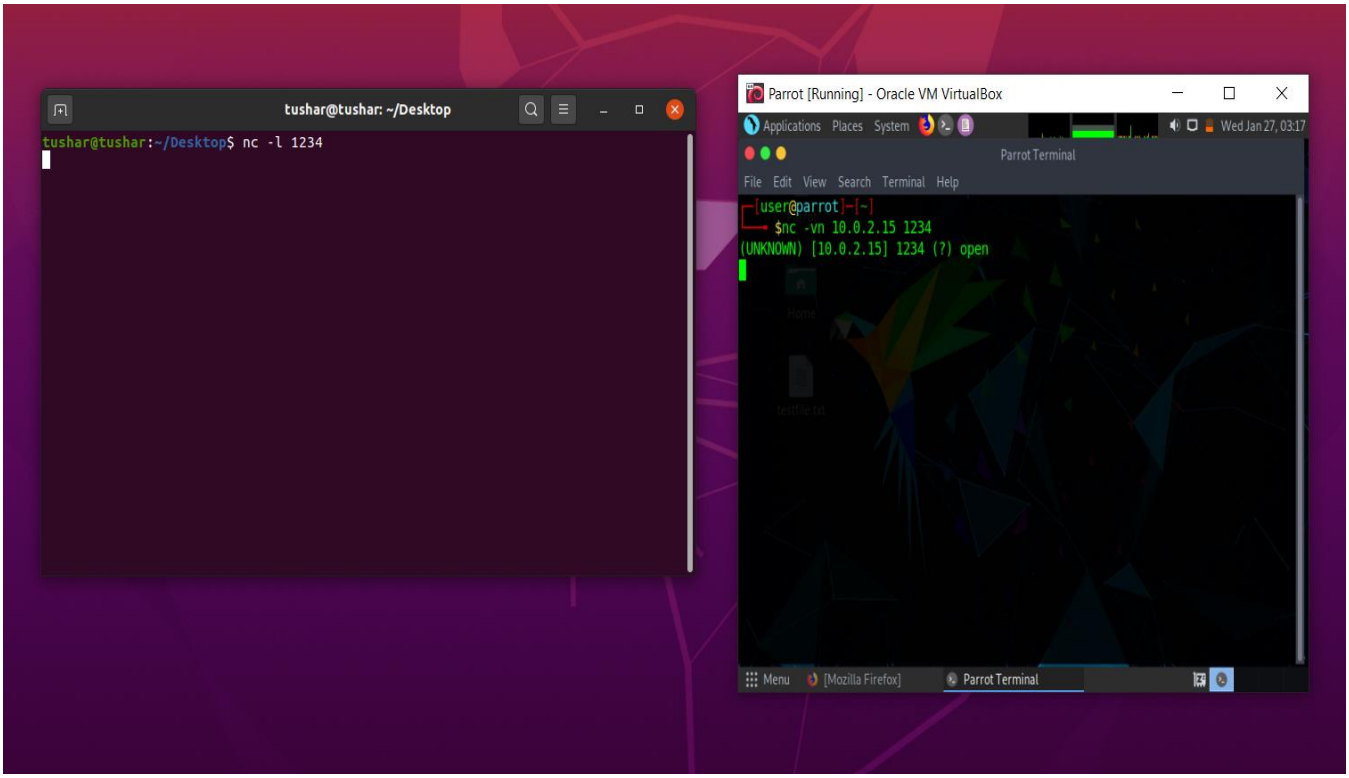




<u>Task 7 c)-</u> Other commands

7.1 To check if a particular TCP port of a remote host is open:

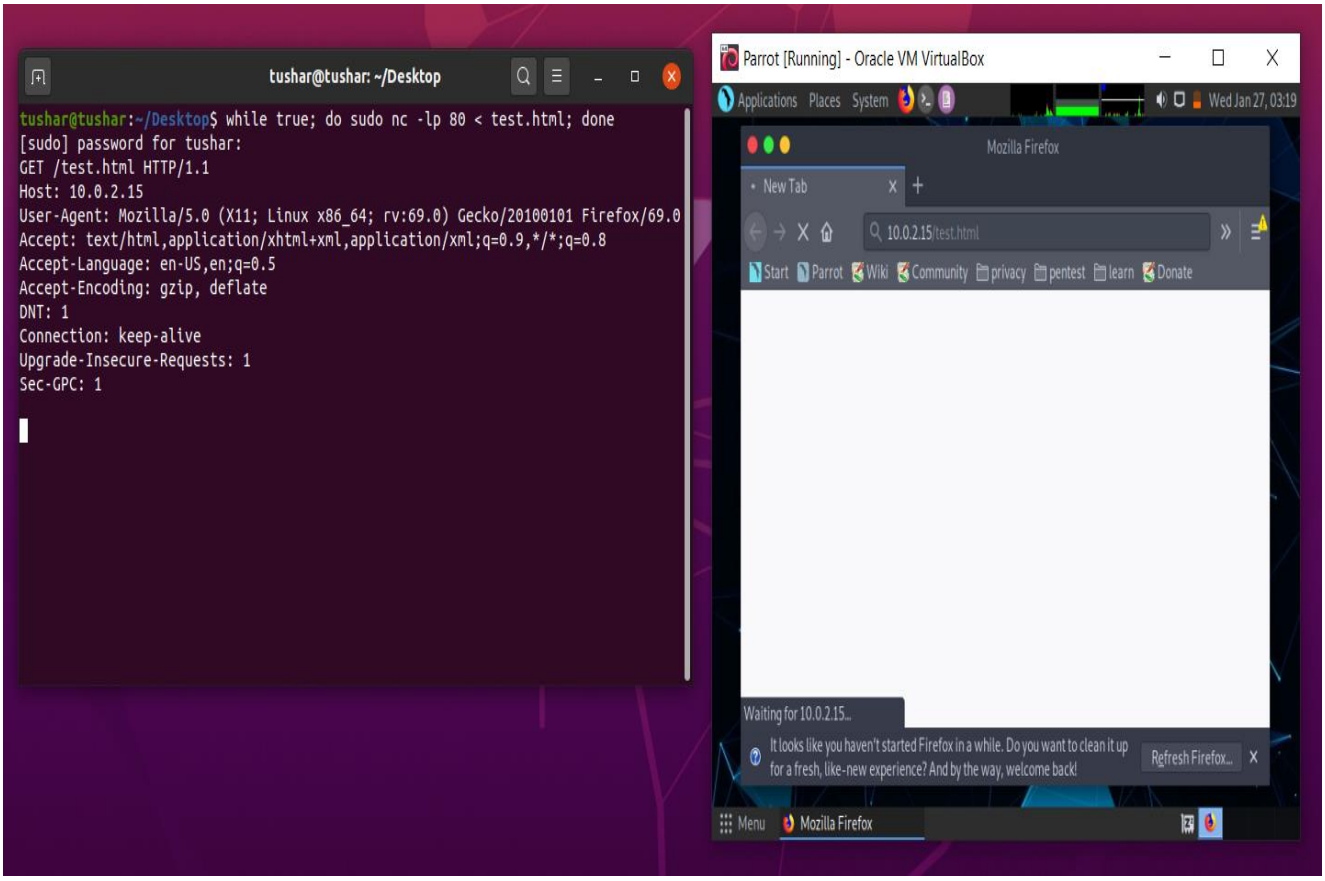
Command: nc -vn 10.0.2.15 1234



7.2 To start a web server that serves test.html on port 80:

Command on local host: while true; do sudo nc -lp 80 < test.html; done

After opening http://10.0.2.15/test.html from another host to access test.html:

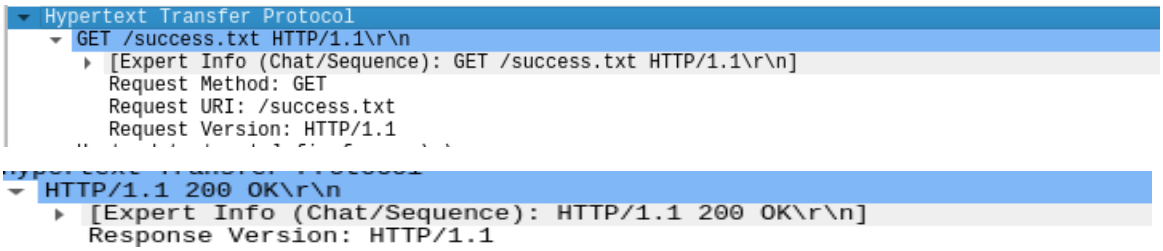


Questions:

1) Is your browser running HTTP version 1.0 or 1.1? What version of HTTP is the server?

Ans: My browser(Firefox) is running HTTP version 1.1.The request header contains the information of this version.

The server is also of HTTP version 1.1 and can be seen in the header of HTTP response.



2) When was the HTML file that you are retrieving last modified at the server?

Ans: It can be seen in the response packet as shown below:

3) How to tell ping to exit after a specified number of ECHO_REQUEST packets?

Ans: It can be done by using following command:

ping -c 15 www.google.com

Here no. of ECHO_REQUEST packets is 15.

4) How will you identify remote host apps and OS?

Ans: The server field in the HTTP response object stores the remote host app or server on which it is hosted.

Alternatively it can be found using the following command:

nmap -O -v www.flipkart.com