1. **PING**

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded

Options:

$ping -s <Packet_Size> <Target> : change size of packet
$ping -c <Target>: fix number of packets sent

Results:

iitrpr.ac.in:

- RTT(min/avg/max): 1.386/2.083/2.780 ms
- percent loss: 0%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max): 3.092/3.353/4.013 ms

google.com:

- RTT(min/avg/max): 34.859/37.303/43.868 ms
- percent loss: 0%
- default size:56 bytes
- RTT for 100 bytes sized packets(min/avg/max): 34.529/35.296/36.338 ms

google.co.in:

- RTT(min/avg/max): 30.138/31.774/32.391 ms
- percent loss: 0%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max): 31.372/39.636/86.359 ms

gmail.com:

- RTT(min/avg/max):32.536/33.154/33.672 ms
- percent loss: 0%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):33.129/33.246/33.381 ms

facebook.com:

- RTT(min/avg/max):33.111/33.536/34.216 ms
- percent loss: 0%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):32.044/57.134/117.535 ms

wikipedia.org:

- RTT(min/avg/max):209.774/246.667/289.854 ms
- percent loss: 0%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):192.411/231.738/271.139 ms

india.gov.in:

- RTT(min/avg/max):No Response
- percent loss: 100%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):No Response

nationalgeographic.com:

- RTT(min/avg/max):13.923/14.871/15.724 ms
- percent loss: 0%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):13.876/14.541/15.409 ms

nkn.gov.in:

- RTT(min/avg/max: No Response
- percent loss: 100%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):No Response

nationalgeographic.com:

- RTT(min/avg/max):No Response
- percent loss: 100%
- default size: 56 bytes
- RTT for 100 bytes sized packets(min/avg/max):No Response

2. **Traceroute**:

traceroute command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes.

Options:

$traceroute -F <target> : Do not fragment packet
$traceroute -m <max_hops> <target>: Limit number of hops of a packet to <max_hops>

Results:

iitrpr.ac.in:

```
$ traceroute iitrpr.ac.in
traceroute to iitrpr.ac.in (172.30.4.14), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.426 ms  2.372 ms  3.337 ms
 2  172.30.4.14 (172.30.4.14)  3.313 ms  3.228 ms  3.186 ms

$ traceroute -F iitrpr.ac.in
traceroute to iitrpr.ac.in (172.30.4.14), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  4.503 ms  4.431 ms  4.392 ms
 2  172.30.4.14 (172.30.4.14)  4.357 ms  4.319 ms  4.286 ms


$ traceroute -m 1 iitrpr.ac.in
traceroute to iitrpr.ac.in (172.30.4.14), 1 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.217 ms  2.153 ms  2.115 ms
```

google.com

```
$ traceroute google.com
traceroute to google.com (216.239.34.117), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  4.236 ms  4.146 ms  4.072 ms
 2  103.118.50.2 (103.118.50.2)  4.011 ms  7.010 ms  6.961 ms
 3  118.185.199.190 (118.185.199.190)  13.111 ms  13.062 ms
14.053 ms
 4  182.19.106.198 (182.19.106.198)  36.425 ms  36.421 ms  36.387
ms
 5  103.29.44.7 (103.29.44.7)  37.302 ms  37.240 ms *
 6  103.29.44.4 (103.29.44.4)  38.201 ms  34.177 ms  34.120 ms
 7  72.14.211.218 (72.14.211.218)  35.110 ms  31.831 ms  31.751 ms
 8  108.170.248.193 (108.170.248.193)  32.593 ms 108.170.248.209
(108.170.248.209)  36.990 ms 108.170.248.193 (108.170.248.193)
35.934 ms
 9  108.170.235.51 (108.170.235.51)  35.841 ms 172.253.77.23
(172.253.77.23)  33.595 ms 209.85.142.121 (209.85.142.121)  31.060
ms
10  216.239.34.117 (216.239.34.117)  33.325 ms  33.162 ms  33.114
ms

$ traceroute -F google.com
traceroute to google.com (216.239.34.117), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  1.863 ms  2.927 ms  2.906 ms
 2  103.118.50.2 (103.118.50.2)  3.872 ms * *
 3  118.185.199.190 (118.185.199.190)  12.348 ms  12.318 ms
13.279 ms
 4  182.19.106.198 (182.19.106.198)  44.481 ms  44.449 ms  44.416
ms
 5  103.29.44.7 (103.29.44.7)  39.192 ms  39.108 ms  39.102 ms
 6  103.29.44.4 (103.29.44.4)  39.074 ms  35.232 ms  32.903 ms
```

```
 7  72.14.211.218 (72.14.211.218)  37.125 ms  37.099 ms *
 8  108.170.248.161 (108.170.248.161)  39.062 ms 108.170.248.209
(108.170.248.209)  38.405 ms 108.170.248.177 (108.170.248.177)
38.484 ms
 9  209.85.242.125 (209.85.242.125)  36.903 ms 216.239.56.115
(216.239.56.115)  38.332 ms 142.250.60.135 (142.250.60.135)
40.678 ms
10  216.239.34.117 (216.239.34.117)  39.051 ms  39.011 ms  38.980
ms


$ traceroute -m 5 google.com
traceroute to google.com (216.239.32.117), 5 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  5.760 ms  5.613 ms  5.590 ms
 2  103.118.50.2 (103.118.50.2)  5.552 ms  5.515 ms  5.480 ms
 3  118.185.199.190 (118.185.199.190)  16.187 ms  16.170 ms
17.157 ms
 4  * 182.19.106.198 (182.19.106.198)  35.013 ms *
 5  103.29.44.7 (103.29.44.7)  34.944 ms  34.860 ms  34.859 ms
```

google.co.in

```
$ traceroute google.co.in
traceroute to google.co.in (216.239.38.117), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.142 ms  2.997 ms  2.882 ms
 2  103.118.50.2 (103.118.50.2)  3.694 ms *  4.524 ms
 3  118.185.199.190 (118.185.199.190)  11.971 ms  11.957 ms
11.925 ms
 4  182.19.106.198 (182.19.106.198)  34.573 ms  34.570 ms  34.537
ms
 5  103.29.44.7 (103.29.44.7)  34.503 ms  36.451 ms  36.428 ms
 6  103.29.44.4 (103.29.44.4)  36.375 ms  34.288 ms *
 7  72.14.211.218 (72.14.211.218)  37.457 ms  36.804 ms  36.764 ms
 8  108.170.248.209 (108.170.248.209)  37.818 ms  37.772 ms
108.170.248.177 (108.170.248.177)  38.818 ms
 9  209.85.246.5 (209.85.246.5)  36.608 ms 209.85.244.157
(209.85.244.157)  36.574 ms 216.239.47.149 (216.239.47.149)
38.610 ms
10  216.239.38.117 (216.239.38.117)  36.507 ms  36.732 ms  36.649
ms


$ traceroute -F google.co.in
traceroute to google.co.in (216.239.32.117), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.085 ms  2.965 ms  2.925 ms
 2  103.118.50.2 (103.118.50.2)  6.082 ms  6.105 ms *
 3  118.185.199.190 (118.185.199.190)  13.467 ms  13.467 ms
14.460 ms
 4  182.19.106.198 (182.19.106.198)  38.228 ms  38.234 ms  38.209
```

```
ms
 5  103.29.44.7 (103.29.44.7)  38.182 ms  38.163 ms  38.121 ms
 6  103.29.44.4 (103.29.44.4)  38.099 ms  33.856 ms  33.814 ms
 7  72.14.211.218 (72.14.211.218)  46.620 ms  38.071 ms  37.995 ms
 8  108.170.248.209 (108.170.248.209)  38.449 ms 108.170.248.161
(108.170.248.161)  39.422 ms 108.170.248.193 (108.170.248.193)
37.433 ms
 9  216.239.56.35 (216.239.56.35)  37.159 ms 216.239.50.167
(216.239.50.167)  42.268 ms 209.85.252.53 (209.85.252.53)  42.177
ms
10  * 216.239.32.117 (216.239.32.117)  36.903 ms  36.907 ms
$ traceroute -m 5 google.co.in
traceroute to google.co.in (216.239.32.117), 5 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.275 ms  3.182 ms  3.114 ms
 2  103.118.50.2 (103.118.50.2)  7.089 ms  6.709 ms *
 3  118.185.199.190 (118.185.199.190)  14.242 ms  14.235 ms
15.189 ms
 4  182.19.106.198 (182.19.106.198)  37.714 ms  36.644 ms *
 5  103.29.44.7 (103.29.44.7)  36.474 ms * *
```

gmail.com

```
$ traceroute gmail.com
traceroute to gmail.com (216.58.203.37), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.111 ms  3.050 ms  3.015 ms
 2  103.118.50.2 (103.118.50.2)  2.982 ms  3.969 ms  3.941 ms
 3  118.185.199.190 (118.185.199.190)  14.986 ms  14.976 ms
14.939 ms
 4  182.19.106.103 (182.19.106.103)  37.522 ms  38.512 ms  38.512
ms
 5  74.125.48.70 (74.125.48.70)  39.414 ms  39.436 ms  40.317 ms
 6  * * *
 7  108.170.232.204 (108.170.232.204)  40.722 ms hkg12s10-in-
f37.1e100.net (216.58.203.37)  39.640 ms 108.170.248.209
(108.170.248.209)  39.635 ms

$ traceroute -F gmail.com
traceroute to gmail.com (216.58.203.37), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.294 ms  4.306 ms  4.268 ms
 2  103.118.50.2 (103.118.50.2)  5.410 ms  5.350 ms  5.334 ms
 3  118.185.199.190 (118.185.199.190)  13.498 ms  13.488 ms
14.501 ms
 4  182.19.106.103 (182.19.106.103)  39.798 ms *  39.791 ms
 5  74.125.48.70 (74.125.48.70)  41.548 ms  41.504 ms  42.528 ms
 6  * * *
 7  108.170.232.204 (108.170.232.204)  41.146 ms 172.253.77.22
(172.253.77.22)  41.134 ms 209.85.242.110 (209.85.242.110)  38.746
ms
 8  108.170.248.203 (108.170.248.203)  37.527 ms 216.239.54.85
```

```
(216.239.54.85)  37.775 ms 108.170.248.210 (108.170.248.210)
39.748 ms
 9  bom12s05-in-f5.1e100.net (216.58.203.37)  37.587 ms  36.931 ms
108.170.248.161 (108.170.248.161)  39.272 ms

$ traceroute -m 4 gmail.com
traceroute to gmail.com (216.58.203.37), 4 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.765 ms  2.741 ms  2.724 ms
 2  103.118.50.2 (103.118.50.2)  3.826 ms  3.814 ms  4.774 ms
 3  118.185.199.190 (118.185.199.190)  12.291 ms  13.421 ms
13.429 ms
 4  182.19.106.103 (182.19.106.103)  38.390 ms  39.400 ms  39.417
ms
```

facebook.com

```
$ traceroute facebook.com
traceroute to facebook.com (31.13.79.35), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.757 ms  2.665 ms  2.506 ms
 2  * 103.118.50.2 (103.118.50.2)  3.405 ms *
 3  * 118.185.199.190 (118.185.199.190)  11.768 ms  11.746 ms
 4  182.19.106.103 (182.19.106.103)  38.157 ms  37.191 ms  37.134
ms
 5  ae41.pr01.bom1.tfbnw.net (103.4.99.20)  36.977 ms  37.015 ms
36.977 ms
 6  po101.psw01.bom1.tfbnw.net (31.13.29.205)  36.936 ms
po101.psw03.bom1.tfbnw.net (157.240.40.229)  35.601 ms
po101.psw01.bom1.tfbnw.net (31.13.29.205)  35.555 ms
 7  157.240.39.29 (157.240.39.29)  35.415 ms 157.240.36.139
(157.240.36.139)  35.371 ms 157.240.39.205 (157.240.39.205)
37.774 ms
 8  edge-star-mini-shv-02-bom1.facebook.com (31.13.79.35)  35.412
ms  36.726 ms 36.532 ms




$ traceroute -F facebook.com
traceroute to facebook.com (31.13.79.35), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.077 ms  3.994 ms  3.965 ms
 2  103.118.50.2 (103.118.50.2)  6.127 ms *  6.074 ms
 3  118.185.199.190 (118.185.199.190)  11.797 ms  11.683 ms
12.611 ms
 4  182.19.106.103 (182.19.106.103)  41.024 ms  41.023 ms  40.997
ms
 5  ae41.pr01.bom1.tfbnw.net (103.4.99.20)  78.361 ms  66.708 ms
66.718 ms
 6  po101.psw04.bom1.tfbnw.net (157.240.44.31)  37.320 ms
po101.psw02.bom1.tfbnw.net (157.240.33.239)  35.917 ms  35.332 ms
 7  157.240.39.147 (157.240.39.147)  36.441 ms 157.240.36.119
```

```
(157.240.36.119)  37.247 ms 173.252.67.209 (173.252.67.209)
36.275 ms
 8  edge-star-mini-shv-02-bom1.facebook.com (31.13.79.35)  35.736
ms  35.688 ms 35.653 ms

$ traceroute -m 4 facebook.com
traceroute to facebook.com (31.13.79.35), 4 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  1.890 ms  1.877 ms  1.865 ms
 2  103.118.50.2 (103.118.50.2)  4.209 ms  4.200 ms  4.189 ms
 3  118.185.199.190 (118.185.199.190)  12.253 ms  12.251 ms
12.242 ms
 4  182.19.106.103 (182.19.106.103)  34.670 ms  34.691 ms *
```

wikipedia.org

```
$ traceroute wikipedia.org
traceroute to wikipedia.org (103.102.166.224), 30 hops max, 60
byte packets
 1  172.21.12.2 (172.21.12.2)  2.740 ms  3.464 ms  3.441 ms
 2  103.118.50.2 (103.118.50.2)  4.735 ms *  4.660 ms
 3  118.185.199.190 (118.185.199.190)  12.860 ms  12.849 ms
12.817 ms
 4  182.19.106.198 (182.19.106.198)  39.461 ms  39.484 ms  39.453
ms
 5  103.29.44.3 (103.29.44.3)  36.166 ms  37.068 ms  37.055 ms
 6  103.29.44.0 (103.29.44.0)  39.296 ms  34.074 ms  34.049 ms
 7  ae31-100-xcr1.mlu.cw.net (213.38.254.33)  133.907 ms  133.931
ms  133.912 ms
 8  ae37.xcr1.mar.cw.net (195.2.21.185)  132.888 ms  142.381 ms
132.804 ms
 9  ae33-xcr1.sng.cw.net (195.2.2.58)  193.113 ms  185.674 ms
185.659 ms
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
```

```
29  * * *
30  * * *


$ traceroute -F wikipedia.org
traceroute to wikipedia.org (103.102.166.224), 30 hops max, 60
byte packets
 1  172.21.12.2 (172.21.12.2)  2.007 ms  3.941 ms  3.911 ms
 2  103.118.50.2 (103.118.50.2)  3.875 ms *  4.850 ms
 3  118.185.199.190 (118.185.199.190)  45.001 ms  44.968 ms
44.933 ms
 4  182.19.106.198 (182.19.106.198)  34.840 ms  34.863 ms  34.844
ms
 5  103.29.44.3 (103.29.44.3)  35.937 ms  35.966 ms  35.937 ms
 6  103.29.44.0 (103.29.44.0)  37.146 ms  33.219 ms  33.361 ms
 7  ae31-100-xcr1.mlu.cw.net (213.38.254.33)  135.611 ms  143.196
ms  143.100 ms
 8  ae37.xcr1.mar.cw.net (195.2.21.185)  133.605 ms  142.312 ms *
 9  ae33-xcr1.sng.cw.net (195.2.2.58)  184.119 ms  183.983 ms
184.894 ms
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *

$ traceroute -m 60 wikipedia.org
traceroute to wikipedia.org (103.102.166.224), 60 hops max, 60
byte packets
 1  172.21.12.2 (172.21.12.2)  5.354 ms  5.289 ms  5.253 ms
 2  103.118.50.2 (103.118.50.2)  5.219 ms *  5.145 ms
 3  118.185.199.190 (118.185.199.190)  14.442 ms  14.423 ms
14.389 ms
 4  182.19.106.198 (182.19.106.198)  35.877 ms  35.893 ms  35.862
ms
 5  103.29.44.3 (103.29.44.3)  35.830 ms  36.819 ms  36.731 ms
 6  103.29.44.0 (103.29.44.0)  36.745 ms  35.179 ms  35.063 ms
```

```
 7  ae31-100-xcr1.mlu.cw.net (213.38.254.33)  134.899 ms  133.931
ms  134.855 ms
 8  ae37.xcr1.mar.cw.net (195.2.21.185)  141.783 ms  132.961 ms
135.074 ms
 9  ae33-xcr1.sng.cw.net (195.2.2.58)  184.321 ms  192.684 ms
192.584 ms
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
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25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
31  * * *
32  * * *
33  * * *
34  * * *
35  * * *
36  * * *
37  * * *
38  * * *
39  * * *
40  * * *
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42  * * *
43  * * *
44  * * *
45  * * *
46  * * *
47  * * *
48  * * *
49  * * *
50  * * *
51  * * *
52  * * *
53  * * *
54  * * *
55  * * *
56  * * *
```

```
57  * * *
58  * * *
59  * * *
60  * * *
```

india.gov.in

```
$ traceroute india.gov.in
traceroute to india.gov.in (164.100.61.151), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.331 ms  2.250 ms  3.204 ms
 2  103.118.50.2 (103.118.50.2)  3.164 ms *  4.088 ms
 3  118.185.199.190 (118.185.199.190)  12.636 ms  12.645 ms *
 4  182.19.106.198 (182.19.106.198)  36.198 ms  36.216 ms  36.178
ms
 5  115.112.163.105.static-idc-andheri-mumbai.vsnl.net.in
(115.112.163.105)  37.154 ms  41.173 ms  40.081 ms
 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  * * *
```

```
$ traceroute -F india.gov.in
traceroute to india.gov.in (164.100.61.151), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.553 ms  2.489 ms  4.281 ms
 2  103.118.50.2 (103.118.50.2)  6.524 ms  6.505 ms  6.476 ms
 3  118.185.199.190 (118.185.199.190)  45.367 ms  45.293 ms *
 4  182.19.106.198 (182.19.106.198)  36.774 ms  37.845 ms  37.836
ms
```

```
 5  115.112.163.105.static-idc-andheri-mumbai.vsnl.net.in
(115.112.163.105)  39.795 ms  39.792 ms  41.816 ms
 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  * * *

$ traceroute -m 60 india.gov.in
traceroute to india.gov.in (164.100.61.151), 60 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.084 ms  3.009 ms  2.942 ms
 2  * 103.118.50.2 (103.118.50.2)  3.712 ms  3.682 ms
 3  118.185.199.190 (118.185.199.190)  12.136 ms  12.127 ms
12.094 ms
 4  182.19.106.198 (182.19.106.198)  36.681 ms  36.701 ms  36.668
ms
 5  115.112.163.105.static-idc-andheri-mumbai.vsnl.net.in
(115.112.163.105)  37.809 ms  38.599 ms  38.535 ms
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
```

```
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
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33  * * *
34  * * *
35  * * *
36  * * *
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39  * * *
40  * * *
41  * * *
42  * * *
43  * * *
44  * * *
45  * * *
46  * * *
47  * * *
48  * * *
49  * * *
50  * * *
51  * * *
52  * * *
53  * * *
54  * * *
55  * * *
56  * * *
57  * * *
58  * * *
59  * * *
60  * * *
```

nationalgeographic.com

```
$ traceroute nationalgeographic.com
traceroute to nationalgeographic.com (104.108.213.98), 30 hops
max, 60 byte packets
 1  172.21.12.2 (172.21.12.2)  6.020 ms  5.995 ms  5.980 ms
 2  103.118.50.2 (103.118.50.2)  5.965 ms  5.951 ms  5.941 ms
 3  118.185.199.190 (118.185.199.190)  12.539 ms  12.534 ms
12.525 ms
```

```
 4  182.19.110.48 (182.19.110.48)  15.882 ms  15.920 ms  15.913 ms
 5  125.16.248.205 (125.16.248.205)  15.907 ms  15.899 ms  15.893
ms
 6  182.79.181.23 (182.79.181.23)  17.774 ms 182.79.243.247
(182.79.243.247)  14.285 ms 182.79.181.43 (182.79.181.43)  14.279
ms
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *


$ traceroute -F nationalgeographic.com
traceroute to nationalgeographic.com (104.108.213.98), 30 hops
max, 60 byte packets
 1  172.21.12.2 (172.21.12.2)  4.897 ms  4.832 ms  5.941 ms
 2  103.118.50.2 (103.118.50.2)  7.986 ms  7.971 ms  7.938 ms
 3  118.185.199.190 (118.185.199.190)  15.278 ms  15.253 ms
15.223 ms
 4  182.19.110.48 (182.19.110.48)  18.295 ms  18.234 ms *
 5  * 125.16.248.205 (125.16.248.205)  24.792 ms *
 6  182.79.181.33 (182.79.181.33)  24.736 ms 182.79.234.229
(182.79.234.229)  14.568 ms 182.79.181.23 (182.79.181.23)  13.634
ms
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
```

```
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *

$ traceroute -m 15 nationalgeographic.com
traceroute to nationalgeographic.com (104.108.213.98), 15 hops
max, 60 byte packets
 1  172.21.12.2 (172.21.12.2)  3.134 ms  3.056 ms  3.018 ms
 2  103.118.50.2 (103.118.50.2)  4.937 ms  4.905 ms *
 3  118.185.199.190 (118.185.199.190)  12.539 ms  12.538 ms *
 4  182.19.110.48 (182.19.110.48)  13.500 ms * *
 5  125.16.248.205 (125.16.248.205)  15.671 ms  15.665 ms *
 6  182.79.181.25 (182.79.181.25)  16.853 ms  59.990 ms
182.79.181.35 (182.79.181.35)  59.947 ms
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
```

nkn.gov.in

```
$ traceroute nkn.gov.in
traceroute to nkn.gov.in (180.149.57.82), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.194 ms  3.088 ms  4.181 ms
 2  103.118.50.2 (103.118.50.2)  5.059 ms  5.034 ms  5.008 ms
 3  118.185.199.190 (118.185.199.190)  12.521 ms  13.581 ms *
 4  182.19.106.103 (182.19.106.103)  41.854 ms  41.858 ms  41.833
ms
 5  14.142.18.97.static-Mumbai.vsnl.net.in (14.142.18.97)  39.657
ms  39.652 ms  39.626 ms
 6  * * *
 7  * * *
 8  14.140.210.22.static-Delhi-vsnl.net.in (14.140.210.22)  59.023
ms  61.214 ms  58.693 ms
 9  * * *
```

```
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *


$ traceroute -F nkn.gov.in
traceroute to nkn.gov.in (180.149.57.82), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.242 ms  3.185 ms  4.065 ms
 2  103.118.50.2 (103.118.50.2)  5.149 ms  6.113 ms *
 3  118.185.199.190 (118.185.199.190)  14.640 ms *  14.590 ms
 4  182.19.106.103 (182.19.106.103)  39.834 ms  40.677 ms  39.794
ms
 5  14.142.18.97.static-Mumbai.vsnl.net.in (14.142.18.97)  42.776
ms  42.767 ms  42.734 ms
 6  * * *
 7  * * *
 8  14.140.210.22.static-Delhi-vsnl.net.in (14.140.210.22)  59.453
ms *  58.723 ms
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
```

```
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *


$ traceroute -m 15 nkn.gov.in
traceroute to nkn.gov.in (180.149.57.82), 15 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  3.939 ms  3.918 ms  3.902 ms
 2  103.118.50.2 (103.118.50.2)  3.886 ms *  3.852 ms
 3  118.185.199.190 (118.185.199.190)  12.377 ms  12.379 ms
12.367 ms
 4  182.19.106.103 (182.19.106.103)  39.331 ms  39.368 ms  39.359
ms
 5  14.142.18.97.static-Mumbai.vsnl.net.in (14.142.18.97)  42.392
ms  42.409 ms  42.398 ms
 6  * * *
 7  * * *
 8  14.140.210.22.static-Delhi-vsnl.net.in (14.140.210.22)  57.940
ms  57.929 ms  58.894 ms
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
```

irctc.co.in

```
$ traceroute irctc.co.in
traceroute to irctc.co.in (103.252.142.21), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.120 ms  2.078 ms  4.224 ms
 2  103.118.50.2 (103.118.50.2)  4.213 ms  4.199 ms  4.186 ms
 3  118.185.199.190 (118.185.199.190)  14.594 ms  14.616 ms
14.613 ms
 4  182.19.106.198 (182.19.106.198)  38.397 ms  38.412 ms *
 5  182.19.43.117 (182.19.43.117)  40.507 ms  40.474 ms  40.492 ms
 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  * * *

$ traceroute -F irctc.co.in
traceroute to irctc.co.in (103.252.142.19), 30 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  4.586 ms  4.528 ms  4.490 ms
 2  103.118.50.2 (103.118.50.2)  4.454 ms  5.035 ms *
 3  118.185.199.190 (118.185.199.190)  17.644 ms  17.647 ms
17.612 ms
 4  182.19.106.198 (182.19.106.198)  49.371 ms  49.373 ms  49.327
ms
 5  182.19.43.117 (182.19.43.117)  40.474 ms *  40.426 ms
 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  * * *
```

```
$ traceroute -m 15 irctc.co.in
traceroute to irctc.co.in (103.252.142.19), 15 hops max, 60 byte
packets
 1  172.21.12.2 (172.21.12.2)  2.853 ms  3.816 ms  3.783 ms
 2  103.118.50.2 (103.118.50.2)  4.975 ms  4.944 ms *
 3  118.185.199.190 (118.185.199.190)  17.669 ms  17.621 ms
17.559 ms
 4  182.19.106.198 (182.19.106.198)  42.116 ms  42.073 ms  42.022
ms
 5  182.19.43.117 (182.19.43.117)  39.921 ms  39.909 ms  39.868 ms
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
```

3. **Nslookup**

Nslookup (stands for “Name Server Lookup”) is a useful command for getting information from DNS server. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record.

Options:

nslookup [hostname]: lookup IP address(es) for hostname
nslookup [IP address]: lookup hostname for IP address

iitrpr.ac.in

```
$ nslookup iitrpr.ac.in
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     iitrpr.ac.in
Address: 117.252.3.35


$ nslookup 117.252.3.35
Server:         127.0.1.1
```

```
Address:  127.0.1.1#53

** server can't find 35.3.252.117.in-addr.arpa: NXDOMAIN
```

google.com

```
$ nslookup google.com
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     google.com
Address: 172.217.166.46


$ nslookup 172.217.166.46
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
46.166.217.172.in-addr.arpa   name = bom07s18-in-f14.1e100.net.

Authoritative answers can be found from:
217.172.in-addr.arpa     nameserver = ns1.google.com.
217.172.in-addr.arpa     nameserver = ns2.google.com.
217.172.in-addr.arpa     nameserver = ns3.google.com.
217.172.in-addr.arpa     nameserver = ns4.google.com.
ns1.google.com internet address = 216.239.32.10
ns1.google.com has AAAA address 2001:4860:4802:32::a
ns2.google.com internet address = 216.239.34.10
ns2.google.com has AAAA address 2001:4860:4802:34::a
ns3.google.com internet address = 216.239.36.10
ns3.google.com has AAAA address 2001:4860:4802:36::a
ns4.google.com internet address = 216.239.38.10
ns4.google.com has AAAA address 2001:4860:4802:38::a
```

google.co.in

```
$ nslookup google.co.in
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     google.co.in
Address: 172.217.160.163


$ nslookup 172.217.160.163
Server:         127.0.1.1
```

```
Address:  127.0.1.1#53

Non-authoritative answer:
163.160.217.172.in-addr.arpa  name = bom05s12-in-f3.1e100.net.

Authoritative answers can be found from:
217.172.in-addr.arpa    nameserver = ns4.google.com.
217.172.in-addr.arpa    nameserver = ns3.google.com.
217.172.in-addr.arpa    nameserver = ns2.google.com.
217.172.in-addr.arpa    nameserver = ns1.google.com.
ns1.google.com internet address = 216.239.32.10
ns1.google.com has AAAA address 2001:4860:4802:32::a
ns2.google.com internet address = 216.239.34.10
ns2.google.com has AAAA address 2001:4860:4802:34::a
ns3.google.com internet address = 216.239.36.10
ns3.google.com has AAAA address 2001:4860:4802:36::a
ns4.google.com internet address = 216.239.38.10
ns4.google.com has AAAA address 2001:4860:4802:38::a
```

gmail.com

```
$ nslookup gmail.com
Server:        127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:    gmail.com
Address: 216.58.203.37


$ nslookup 216.58.203.37
Server:        127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
37.203.58.216.in-addr.arpa    name = bom12s05-in-f5.1e100.net.
37.203.58.216.in-addr.arpa    name = hkg12s10-in-f5.1e100.net.
37.203.58.216.in-addr.arpa    name = hkg12s10-in-f37.1e100.net.

Authoritative answers can be found from:
203.58.216.in-addr.arpa  nameserver = ns1.google.com.
203.58.216.in-addr.arpa  nameserver = ns4.google.com.
203.58.216.in-addr.arpa  nameserver = ns3.google.com.
203.58.216.in-addr.arpa  nameserver = ns2.google.com.
ns1.google.com internet address = 216.239.32.10
ns1.google.com has AAAA address 2001:4860:4802:32::a
ns2.google.com internet address = 216.239.34.10
ns2.google.com has AAAA address 2001:4860:4802:34::a
ns3.google.com internet address = 216.239.36.10
ns3.google.com has AAAA address 2001:4860:4802:36::a
ns4.google.com internet address = 216.239.38.10
```

```
ns4.google.com has AAAA address 2001:4860:4802:38::a
```

facebook.com

```
$ nslookup facebook.com
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     facebook.com
Address: 31.13.79.35



$ nslookup 31.13.79.35
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
35.79.13.31.in-addr.arpa name = edge-star-mini-shv-02-
bom1.facebook.com.

Authoritative answers can be found from:
79.13.31.in-addr.arpa    nameserver = a.ns.facebook.com.
79.13.31.in-addr.arpa    nameserver = b.ns.facebook.com.
a.ns.facebook.com   internet address = 69.171.239.12
a.ns.facebook.com   has AAAA address
2a03:2880:fffe:c:face:b00c:0:35
b.ns.facebook.com   internet address = 69.171.255.12
b.ns.facebook.com   has AAAA address
2a03:2880:ffff:c:face:b00c:0:35
```

wikipedia.org

```
$ nslookup wikipedia.org
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     wikipedia.org
Address: 103.102.166.224


$ nslookup 103.102.166.224
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
224.166.102.103.in-addr.arpa  name = text-lb.eqsin.wikimedia.org.

Authoritative answers can be found from:
```

```
166.102.103.in-addr.arpa nameserver = ns2.wikimedia.org.
166.102.103.in-addr.arpa nameserver = ns1.wikimedia.org.
166.102.103.in-addr.arpa nameserver = ns0.wikimedia.org.
ns0.wikimedia.org   internet address = 208.80.154.238
ns1.wikimedia.org   internet address = 208.80.153.231
ns2.wikimedia.org   internet address = 91.198.174.239
```

india.gov.in

```
$ nslookup india.gov.in
Server:        127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     india.gov.in
Address: 164.100.61.151


$ nslookup 164.100.61.151
Server:        127.0.1.1
Address:  127.0.1.1#53

** server can't find 151.61.100.164.in-addr.arpa: NXDOMAIN
```

nationalgeographic.com

```
$ nslookup nationalgeographic.com
Server:        127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     nationalgeographic.com
Address: 23.57.112.227


$ nslookup 23.57.112.227
Server:        127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
227.112.57.23.in-addr.arpa    name = a23-57-112-
227.deploy.static.akamaitechnologies.com.

Authoritative answers can be found from:
```

nkn.gov.in

```
$ nslookup nkn.gov.in
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     nkn.gov.in
Address: 180.149.57.82


$ nslookup 180.149.57.82
Server:         127.0.1.1
Address:  127.0.1.1#53

** server can't find 82.57.149.180.in-addr.arpa: NXDOMAIN
```

irctc.co.in

```
$ nslookup irctc.co.in
Server:         127.0.1.1
Address:  127.0.1.1#53

Non-authoritative answer:
Name:     irctc.co.in
Address: 103.252.142.18
Name:     irctc.co.in
Address: 103.252.142.19
Name:     irctc.co.in
Address: 103.252.142.21

$ nslookup 103.252.142.18
Server:         127.0.1.1
Address:  127.0.1.1#53

** server can't find 18.142.252.103.in-addr.arpa: NXDOMAIN
```

4. NetStat

Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc

Options:

```
netstat -a: to show both listening and non listening sockets
netstat -at: show all TCP ports
netstat -l: show all listening ports
```

Results:

netstat -a

```
servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address
State
tcp        0      0 oem-HP-Laptop-15:domain *:*
LISTEN
tcp        0      0 localhost:ipp           *:*
LISTEN
tcp        0      0 172.21.13.185:58142     bom07s20-in-
f14.1:https ESTABLISHED
tcp        0      0 172.21.13.185:56902     bom07s11-in-
f3.1e:https ESTABLISHED
tcp        0      0 172.21.13.185:52618     bom05s09-in-
f10.1:https ESTABLISHED
tcp        0      0 172.21.13.185:49342     bom12s03-in-
f14.1:https ESTABLISHED
tcp        0      0 172.21.13.185:58340     ec2-54-191-252-
15:https ESTABLISHED
tcp        0      0 172.21.13.185:59826     42-106-162-
208.li:https ESTABLISHED
tcp        0      0 172.21.13.185:39460     bom05s12-in-
f10.1:https ESTABLISHED
tcp        0      0 172.21.13.185:55636     s.w.org:https
ESTABLISHED
tcp        0      0 172.21.13.185:35252     bom07s15-in-
f14.1:https ESTABLISHED
tcp        0      0 172.21.13.185:48944     bom05s15-in-
f2.1e:https ESTABLISHED
tcp        0      0 172.21.13.185:47472     216.239.38.117:https
ESTABLISHED
tcp        0      0 172.21.13.185:40948     216.239.36.117:https
ESTABLISHED
tcp        0      0 172.21.13.185:58160     104.17.65.4:https
ESTABLISHED
tcp        0      0 172.21.13.185:40164     172.217.194.155:https
ESTABLISHED
tcp        0      0 172.21.13.185:36190     bom12s05-in-
f14.1:https ESTABLISHED
tcp        0      0 172.21.13.185:52480     sc-in-
f189.1e100.:https ESTABLISHED
tcp        0      0 172.21.13.185:56884     bom07s11-in-
f3.1e:https ESTABLISHED
tcp        0      0 172.21.13.185:54726     bom07s11-in-
f8.1e:https ESTABLISHED
tcp6       0      0 ip6-localhost:ipp       [::]:*
LISTEN
udp        0      0 *:56674                 *:*
udp        0      0 oem-HP-Laptop-15:domain *:*
udp        0      0 *:bootpc                *:*
udp        0      0 *:ipp                   *:*
udp        0      0 *:54139                 *:*
udp        0      0 *:mdns                  *:*
udp6       0      0 [::]:60392              [::]:*
udp6       0      0 [::]:mdns               [::]:*
```

```
raw6       0      0 [::]:ipv6-icmp          [::]:*
7
```

netstat -at

```
$ netstat -at
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address
State
tcp        0      0 oem-HP-Laptop-15:domain *:*
LISTEN
tcp        0      0 localhost:ipp           *:*
LISTEN
tcp        0      0 172.21.13.185:58142     bom07s20-in-
f14.1:https TIME_WAIT
tcp        0      0 172.21.13.185:59206     ec2-35-164-149-
19:https ESTABLISHED
tcp        0      0 172.21.13.185:57824
filter67.adblockp:https TIME_WAIT
tcp        0      0 172.21.13.185:56902     bom07s11-in-
f3.1e:https TIME_WAIT
tcp        0      0 172.21.13.185:52618     bom05s09-in-
f10.1:https TIME_WAIT
tcp        0      0 172.21.13.185:49342     bom12s03-in-
f14.1:https TIME_WAIT
tcp        0      0 172.21.13.185:58340     ec2-54-191-252-
15:https ESTABLISHED
tcp        0      0 172.21.13.185:39460     bom05s12-in-
f10.1:https TIME_WAIT
tcp        0      0 172.21.13.185:55636     s.w.org:https
TIME_WAIT
tcp        0      0 172.21.13.185:35252     bom07s15-in-
f14.1:https ESTABLISHED
tcp        0      0 172.21.13.185:48944     bom05s15-in-
f2.1e:https TIME_WAIT
tcp        0      0 172.21.13.185:47472     216.239.38.117:https
TIME_WAIT
tcp        0      0 172.21.13.185:40948     216.239.36.117:https
TIME_WAIT
tcp        0      0 172.21.13.185:58160     104.17.65.4:https
TIME_WAIT
tcp        0      0 172.21.13.185:40164     172.217.194.155:https
TIME_WAIT
tcp        0      0 172.21.13.185:36190     hkg12s10-in-
f46.1:https TIME_WAIT
tcp        0      0 172.21.13.185:52480     sc-in-
f189.1e100.:https ESTABLISHED
tcp        0      0 172.21.13.185:56884     bom07s11-in-
f3.1e:https ESTABLISHED
tcp        0      0 172.21.13.185:54726     bom07s11-in-
f8.1e:https TIME_WAIT
tcp6       0      0 ip6-localhost:ipp       [::]:*
```

LISTEN

netstat -l

```
$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address
State
tcp        0      0 oem-HP-Laptop-15:domain *:*
LISTEN
tcp        0      0 localhost:ipp           *:*
LISTEN
tcp6       0      0 ip6-localhost:ipp       [::]:*
LISTEN
udp        0      0 *:56674                 *:*
udp        0      0 oem-HP-Laptop-15:domain *:*
udp        0      0 *:bootpc                *:*
udp        0      0 *:ipp                   *:*
udp        0      0 *:54139                 *:*
udp        0      0 *:mdns                  *:*
udp6       0      0 [::]:60392              [::]:*
udp6       0      0 [::]:mdns               [::]:*
raw6       0      0 [::]:ipv6-icmp          [::]:*
7
Active UNIX domain sockets (only servers)
Proto RefCnt Flags       Type       State         I-Node   Path
unix  2      [ ACC ]     STREAM     LISTENING     27951
@/tmp/.ICE-unix/1377
unix  2      [ ACC ]     STREAM     LISTENING     27255
/run/user/29999/systemd/private
unix  2      [ ACC ]     SEQPACKET  LISTENING     830
/run/udev/control
unix  2      [ ACC ]     STREAM     LISTENING     62285
/tmp/OSL_PIPE_29999_SingleOfficeIPC_87df742180bdb25e96ca1a9e595f1e
3
unix  2      [ ACC ]     STREAM     LISTENING     27330
/run/user/29999/keyring/control
unix  2      [ ACC ]     STREAM     LISTENING     27331
/run/user/29999/keyring/ssh
unix  2      [ ACC ]     STREAM     LISTENING     27334
/run/user/29999/keyring/pkcs11
unix  2      [ ACC ]     STREAM     LISTENING     27877
/run/user/29999/pulse/native
unix  2      [ ACC ]     STREAM     LISTENING     26227
@/tmp/.X11-unix/X0
unix  2      [ ACC ]     STREAM     LISTENING     25559
@/tmp/dbus-hKxms2HyCV
unix  2      [ ACC ]     STREAM     LISTENING     27952
/tmp/.ICE-unix/1377
unix  2      [ ACC ]     STREAM     LISTENING     26344
@/tmp/ibus/dbus-AXyPtPyt
unix  2      [ ACC ]     STREAM     LISTENING     821
```

```
/run/systemd/private
unix  2      [ ACC ]     STREAM     LISTENING     826
/run/lvm/lvmpolld.socket
unix  2      [ ACC ]     STREAM     LISTENING     832
/run/systemd/journal/stdout
unix  2      [ ACC ]     STREAM     LISTENING     874
/run/lvm/lvmetad.socket
unix  2      [ ACC ]     STREAM     LISTENING     889
/run/systemd/fsck.progress
unix  2      [ ACC ]     STREAM     LISTENING     25602
/var/run/avahi-daemon/socket
unix  2      [ ACC ]     STREAM     LISTENING     25603
/var/run/dbus/system_bus_socket
unix  2      [ ACC ]     STREAM     LISTENING     25604
/run/acpid.socket
unix  2      [ ACC ]     STREAM     LISTENING     25605
/run/uuidd/request
unix  2      [ ACC ]     STREAM     LISTENING     25606
/run/snapd.socket
unix  2      [ ACC ]     STREAM     LISTENING     25607
/run/snapd-snap.socket
unix  2      [ ACC ]     STREAM     LISTENING     24620
/var/run/cups/cups.sock
unix  2      [ ACC ]     STREAM     LISTENING     27419
@/tmp/dbus-Df4JnpowGk
unix  2      [ ACC ]     STREAM     LISTENING     27760
/var/run/NetworkManager/private-dhcp
unix  2      [ ACC ]     STREAM     LISTENING     28703
/home/oem/.gnupg/S.gpg-agent
unix  2      [ ACC ]     STREAM     LISTENING     26228
/tmp/.X11-unix/X0
unix  2      [ ACC ]     STREAM     LISTENING     25546
@/com/ubuntu/upstart-session/29999/1125
```

5. **ifconfig**

ifconfig(interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary.

Options:

ifconfig -a: display all interfaces, even if they are down
ifconfig -s: display a short list, instead of details

Results:

ifconfig

```
$ ifconfig
eno1      Link encap:Ethernet  HWaddr 18:60:24:11:5f:de
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
```

```
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:5855 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5855 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:932380 (932.3 KB)  TX bytes:932380 (932.3 KB)

wlo1      Link encap:Ethernet  HWaddr a0:af:bd:f4:64:24
          inet addr:172.21.13.185  Bcast:172.21.15.255
Mask:255.255.252.0
          inet6 addr: fe80::c1e5:4a64:be1a:2dd7/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:46111 errors:0 dropped:0 overruns:0 frame:0
          TX packets:30557 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:43579006 (43.5 MB)  TX bytes:4442845 (4.4 MB)


$ ifconfig -s
Iface   MTU Met   RX-OK RX-ERR RX-DRP RX-OVR    TX-OK TX-ERR TX-
DRP TX-OVR Flg
eno1       1500 0         0      0      0 0             0      0
0      0 BMU
lo        65536 0      6049      0      0 0          6049      0
0      0 LRU
wlo1       1500 0     47165      0      0 0         31318      0
0      0 BMRU
```

6. **Hostname**

hostname command in Linux is used to obtain the DNS(Domain Name System) name and set the system’s hostname or NIS(Network Information System) domain name.

Hostname -A: This option is used to get all FQDNs(Fully Qualified Domain Name) of the host system.
Hostname -b: Used to always set a hostname. Default name is used if none specified.

Results:

hostname:

```
$ hostname
oem-HP-Laptop-15g-br0xx
```

hostname -b:

```
$ hostname -b
oem-HP-Laptop-15g-br0xx
```

PART 1: d)

To answer why the output of traceroute has the same IP addresses initially for different targets is that packets travel from network to network. The first network that the packets travel through is common for all target websites. Then network switches cause different IP address outputs for different targets. The first network consists of all the swithces leading up to the router of the ISP. Passing this router, packets coming from/going to different targets go to different networks

PART 2: QUESTION 2:

To find the bandwidth between 2 systems, I have used the ping command. This gives the amount of data sent,and the time taken. In the test that I ran, it took 5 56 byte packets, with an average time of 0.093 ms to travel. Thus, we can calculate the bandwidth as:

(56 * 8)/(93 * 10^-6) bps = 4.8 Mbps