



Assignment – 2  
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## Question 1

(a)

The IP address associated with facebook is 163.70.138.35 as can be seen from the highlighted part in figure 1

```
neeraj@loq: ~/Desktop/sem-7/cn-lab/02-lab-2
tracert www.facebook.com
tracert to www.facebook.com [163.70.138.35], 30 hops max, 60 byte packets
 1  _gateway [10.32.1.1] 5.495 ms 5.374 ms 5.322 ms
 2  14.139.174.49 [14.139.174.49] 5.635 ms 5.622 ms 5.611 ms
 3  10.162.69.161 [10.162.69.161] 95.138 ms 95.127 ms 95.116 ms
 4  10.255.236.85 [10.255.236.85] 81.711 ms 81.701 ms 82.058 ms
 5  10.255.238.237 [10.255.238.237] 77.380 ms 10.255.238.241 [10.255.238.241] 100.722 ms 10.255.237.41 [10.255.237.41] 85.122 ms
 6  10.255.239.158 [10.255.239.158] 85.633 ms 10.255.239.162 [10.255.239.162] 95.912 ms 10.255.239.30 [10.255.239.30] 81.531 ms
 7  10.255.222.229 [10.255.222.229] 71.698 ms 10.255.221.229 [10.255.221.229] 100.890 ms 10.255.222.229 [10.255.222.229] 84.921 ms
 8  10.255.222.1 [10.255.222.1] 75.623 ms 10.255.221.1 [10.255.221.1] 83.748 ms 10.255.222.1 [10.255.222.1] 74.645 ms
 9  115.244.136.21 [115.244.136.21] 70.166 ms 69.993 ms 72.559 ms
10  115.244.136.17 [115.244.136.17] 75.147 ms 83.744 ms 71.239 ms
11  * * *
12  * * *
13  po101.asw02.tir3.tfbnw.net [129.134.41.106] 72.839 ms ae14.pr01.tir1.tfbnw.net [157.240.66.228] 109.232 ms 82.787 ms
14  po101.asw02.tir3.tfbnw.net [129.134.41.106] 82.734 ms psw03.tir3.tfbnw.net [129.134.116.93] 72.803 ms 72.788 ms
15  psw02.tir3.tfbnw.net [129.134.116.94] 82.322 ms psw03.tir3.tfbnw.net [129.134.116.93] 82.731 ms 68.437 ms
16  173.252.67.203 [173.252.67.203] 72.650 ms * 173.252.67.171 [173.252.67.171] 68.592 ms
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

Figure 1: IP address of www.facebook.com

(b)

IP address and DNS name of the router one hop before the destination cannot be determined from the following traceroute in figure 2 since it is not being displayed. The possible reason can be that the router would have been configured to not reveal its IP address

```

neeraj-loc
1 2 3 4 5 6
75% 97% 0% 16% 28°C 70% 81% 11:46
~/Desktop/sem-7/cn-lab/02-lab-2 P main !1 71
tracert www.facebook.com
tracert to www.facebook.com (163.70.138.35), 30 hops max, 60 byte packets
 1 _gateway (10.32.1.1) 7.512 ms 7.480 ms 7.469 ms
 2 14.139.174.49 (14.139.174.49) 7.950 ms 7.940 ms 7.930 ms
 3 10.162.69.161 (10.162.69.161) 97.665 ms 97.655 ms 98.182 ms
 4 10.255.238.105 (10.255.238.105) 93.574 ms 10.255.236.85 (10.255.236.85) 83.871 ms 83.862 ms
 5 10.255.238.237 (10.255.238.237) 79.463 ms 79.454 ms 79.444 ms
 6 10.255.239.158 (10.255.239.158) 77.043 ms 10.255.239.30 (10.255.239.30) 81.594 ms 10.24.250.102 (10.24.250.102) 99.573 ms
 7 10.255.221.229 (10.255.221.229) 82.671 ms 10.255.222.229 (10.255.222.229) 69.414 ms 70.752 ms
 8 10.255.221.1 (10.255.221.1) 84.539 ms 10.255.222.1 (10.255.222.1) 74.086 ms 10.255.221.1 (10.255.221.1) 69.165 ms
 9 115.244.136.21 (115.244.136.21) 72.062 ms 85.492 ms 85.267 ms
10 115.244.136.17 (115.244.136.17) 86.629 ms 73.626 ms 70.288 ms
11 * * *
12 * ae14.pr01.tir1.tfbnw.net (157.240.66.228) 120.241 ms *
13 ae14.pr01.tir1.tfbnw.net (157.240.66.228) 67.231 ms 67.201 ms 71.240 ms
14 po101.asw01.tir3.tfbnw.net (129.134.34.148) 67.232 ms psw02.tir3.tfbnw.net (129.134.116.94) 81.812 ms po101.asw04.tir3.tfbnw.net (129.134.51.252) 69.481 ms
15 173.252.67.171 (173.252.67.171) 71.132 ms psw04.tir3.tfbnw.net (129.134.116.92) 67.128 ms psw02.tir3.tfbnw.net (129.134.116.94) 69.497 ms
16 173.252.67.189 (173.252.67.189) 69.471 ms 173.252.67.131 (173.252.67.131) 71.114 ms *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
15s 11:46:14
cn-lab neeraj 1:1 1:A* 2:B- 3:zsh 11:46:23 26-Aug-24 neeraj-loc

```

Figure 2: One Hop before destination

(c)

The max number of hops is 30 as can be seen from the figure 3. But, since all the routers after the 16th router is not responding, we cannot determine the actual number of hops it took for traceroute to reach the destination (www.facebook.com)

```

neeraj-loc
1 2 3 4 5 6
135% 99% 0% 16% 28°C 70% 80% 11:54
~/Desktop/sem-7/cn-lab/02-lab-2 P main !1 71
tracert www.facebook.com
tracert to www.facebook.com (163.70.138.35), 30 hops max, 60 byte packets
 1 _gateway (10.32.1.1) 5.809 ms 9.851 ms 5.760 ms
 2 14.139.174.49 (14.139.174.49) 6.061 ms 6.051 ms 7.051 ms
 3 10.162.69.161 (10.162.69.161) 97.196 ms 98.343 ms 98.333 ms
 4 10.255.238.105 (10.255.238.105) 95.305 ms 95.295 ms 10.255.236.85 (10.255.236.85) 87.756 ms
 5 10.255.238.197 (10.255.238.197) 83.704 ms 10.255.238.241 (10.255.238.241) 102.832 ms 10.255.238.237 (10.255.238.237) 81.804 ms
 6 10.255.239.30 (10.255.239.30) 83.616 ms 10.24.250.102 (10.24.250.102) 84.589 ms 10.255.239.158 (10.255.239.158) 68.996 ms
 7 10.255.222.229 (10.255.222.229) 69.280 ms 84.983 ms 69.225 ms
 8 10.255.222.1 (10.255.222.1) 75.598 ms 10.255.221.1 (10.255.221.1) 83.647 ms 10.255.222.1 (10.255.222.1) 88.319 ms
 9 115.244.136.21 (115.244.136.21) 70.804 ms 84.202 ms 81.325 ms
10 115.244.136.17 (115.244.136.17) 82.431 ms 70.687 ms 70.635 ms
11 * * *
12 * * ae14.pr01.tir1.tfbnw.net (157.240.66.228) 94.507 ms
13 ae14.pr01.tir1.tfbnw.net (157.240.66.228) 109.682 ms 79.371 ms 80.184 ms
14 psw03.tir3.tfbnw.net (129.134.116.93) 71.992 ms po101.asw01.tir3.tfbnw.net (129.134.34.148) 70.739 ms po101.asw04.tir3.tfbnw.net (129.134.51.252) 70.699 ms
15 psw04.tir3.tfbnw.net (129.134.116.92) 70.711 ms psw02.tir3.tfbnw.net (129.134.116.94) 71.925 ms 173.252.67.59 (173.252.67.59) 75.667 ms
16 * 173.252.67.61 (173.252.67.61) 69.788 ms 157.240.39.11 (157.240.39.11) 79.887 ms
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
16s 11:53:59
cn-lab neeraj 1:1 1:A* 2:B- 3:zsh 11:54:12 26-Aug-24 neeraj-loc

```

Figure 3: Number of Hops

(d)

The 13th link incurs the longest latency of 109.682 ms as can be seen from figure 4

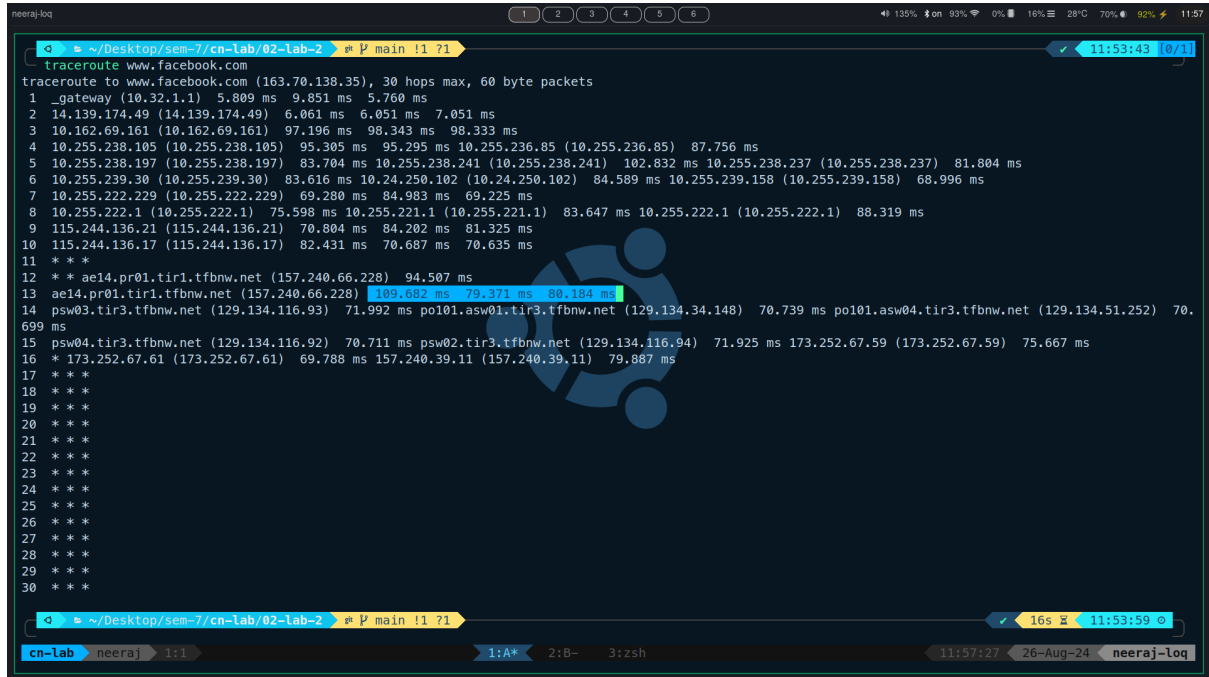


Figure 4: Longest Latency link

## Question 2

(a)

IP address of www.google.com is 172.217.163.196 as can be seen from the highlighted part of the last response in the traceroute shown in the figure 5

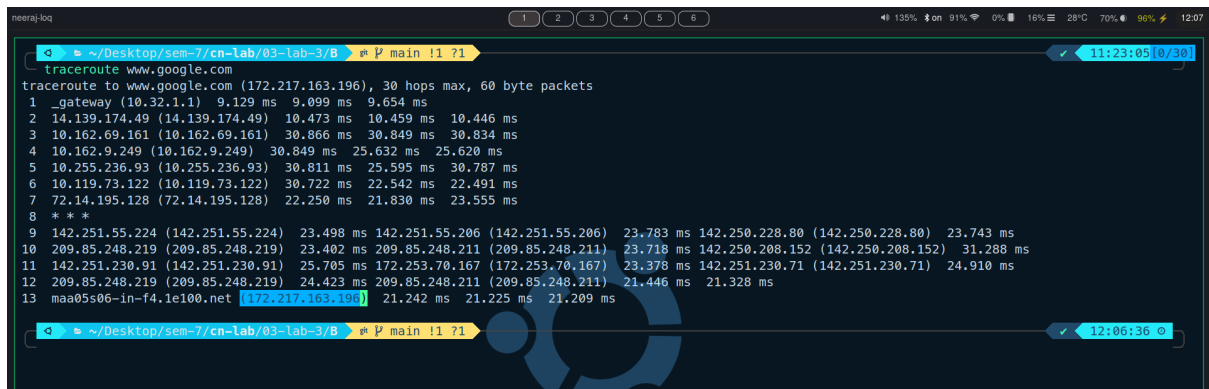


Figure 5: IP address of www.google.com

(b)

1. Servers of www.google.com are most likely located in major data centers like the US (.com represents "commercial")

2. Servers of `www.google.co.kr` are most likely located in South Korea since the domain (`.co.kr`) refers primarily to South Korea
3. Servers of `www.google.co.in` are most likely located in India since the domain (`.co.in`) refers primarily to India

(c)

Yes the 8th router was unresponsive as can be seen from the figure 6. The possible reason can be that the router is configured such that it does not reveal its IP address.

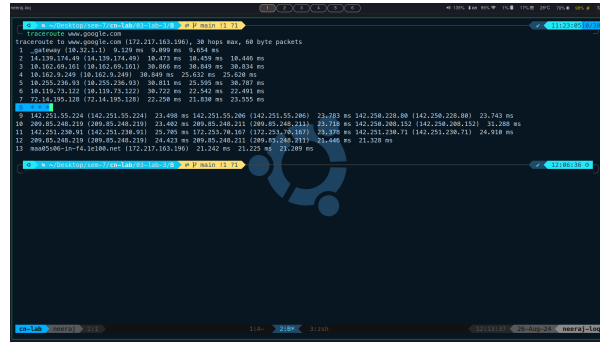


Figure 6: Unresponsive Router

(d)

There are abrupt jumps in the latency. One example is the latency difference between the 2nd and 3rd router (refer figure 7). Possible reason might be that the distance for the packet to travel from the machine to the 3rd router may be much higher than the distance from the machine to 2nd router.

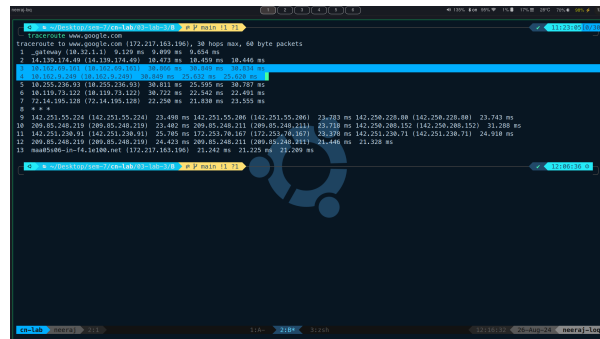


Figure 7: Latency Difference

## Question 3

The publicly available traceroute server used in this question is <https://dnschecker.org/online-traceroute.php>. The public IP address of my local machine is 14.139.174.50. This can be found out in 2 ways, either using the website <https://whatismyipaddress.com/> as shown in figure 8 or using the terminal command `curl ifconfig.me` as shown in figure 9

The traceroute was performed from the server to local machine shown in figure 10 and the output is shown in figure 11. Traceroute was performed from local machine to server using `traceroute` command and the output is shown in 12. As we can see, from the output in figures 11 and 12, the routers

observed in both directions are not same. One possible reason might be Network Traffic and Congestion. The traffic might be re-routed dynamically based on the network traffic and congestion

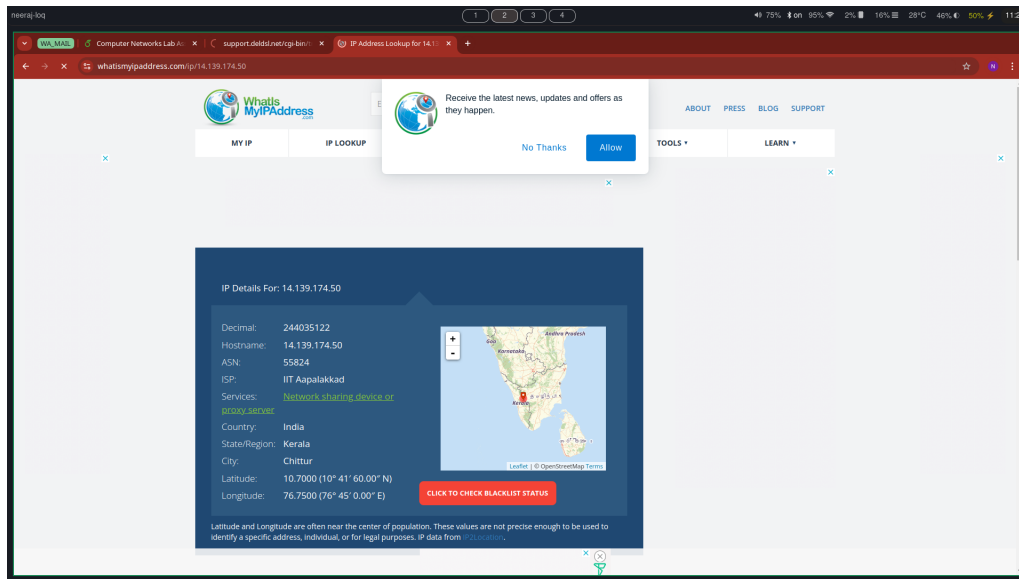


Figure 8: Finding public IP Address from whatismyipaddress.com

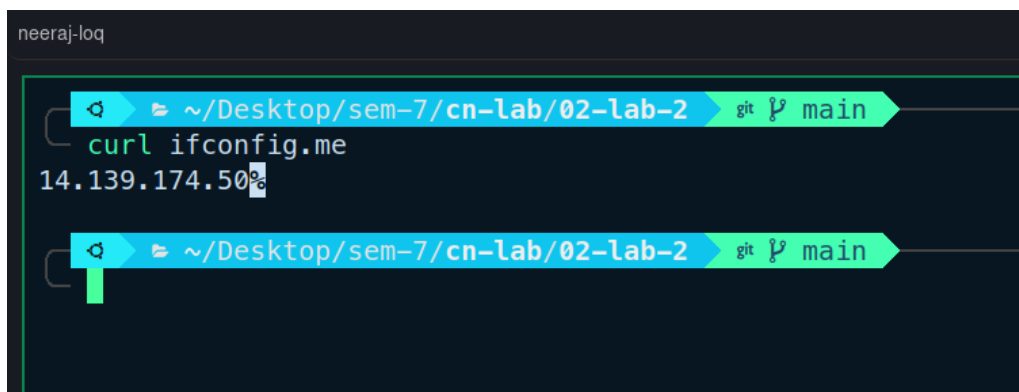


Figure 9: Finding public IP address from terminal

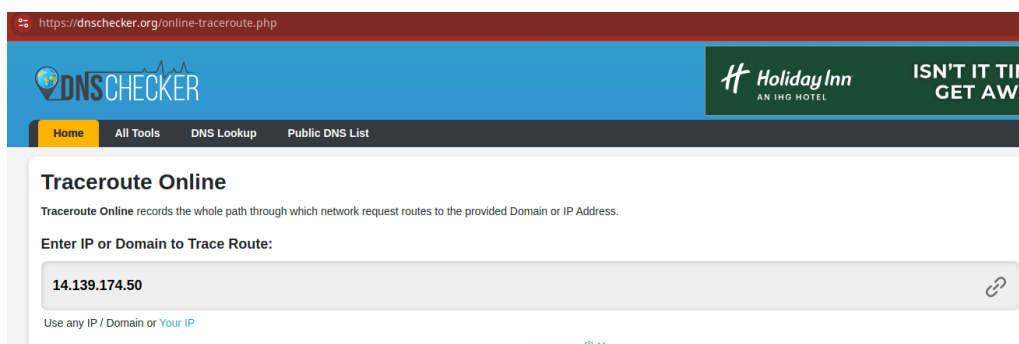


Figure 10: dnschecker-webpage

Converted IPv6 for: 14.139.174.50

```
Start: 2024-08-28T11:19:43+0500
HOST: DNSChecker.org
Loss% Snt Last Avg Best Wrst StDev
1 |-- ??? 100.0 3 0.0 0.0 0.0 0.0 0.0
2 |-- 19.74.132.79 0.0% 3 0.8 3.3 0.8 7.9 4.0
3 |-- 138.197.248.246 0.0% 3 38.8 13.8 0.8 38.8 21.7
4 |-- 143.244.192.162 0.0% 3 0.4 0.5 0.4 0.9 0.3
5 |-- 143.244.225.94 0.0% 3 1.0 1.1 0.9 1.4 0.2
6 |-- 143.244.225.23 0.0% 3 0.6 0.7 0.6 0.8 0.1
7 |-- INFRA.JIO.COM (206.82.104.142) 0.0% 3 1.9 1.7 1.5 1.9 0.2
8 |-- 183.198.140.26 0.0% 3 201.6 201.6 201.6 201.7 0.1
9 |-- 183.198.140.203 0.0% 3 186.3 186.7 186.3 187.1 0.4
10 |-- 183.198.140.42 0.0% 3 195.0 195.0 195.0 195.0 0.0
11 |-- 183.198.140.26 0.0% 3 201.0 201.0 201.0 201.0 0.0
12 |-- 49.44.220.242 0.0% 3 196.1 196.4 196.1 196.9 0.4
13 |-- ??? 100.0 3 0.0 0.0 0.0 0.0 0.0
14 |-- 115.247.69.86 0.0% 3 195.9 196.0 195.9 196.1 0.1
15 |-- ??? 100.0 3 0.0 0.0 0.0 0.0 0.0
16 |-- ??? 100.0 3 0.0 0.0 0.0 0.0 0.0
17 |-- ??? 100.0 3 0.0 0.0 0.0 0.0 0.0
18 |-- ??? 100.0 3 0.0 0.0 0.0 0.0 0.0
19 |-- 14.139.174.50 0.0% 3 300.2 297.8 296.1 300.2 2.1
```

Figure 11: Traceroute from server to local machine

```
tracert www.dnschecker.org
tracert to www.dnschecker.org (104.26.7.89), 30 hops max, 60 byte packets
1 _gateway (10.32.1.1) 7.565 ms 7.518 ms 7.499 ms
2 14.139.174.49 (14.139.174.49) 5.402 ms 5.382 ms 5.363 ms
3 10.162.69.161 (10.162.69.161) 102.945 ms 102.929 ms 103.791 ms
4 10.255.236.85 (10.255.236.85) 86.918 ms 86.899 ms 10.255.238.105 (10.255.238.105) 90.475 ms
5 10.255.237.41 (10.255.237.41) 90.456 ms 90.434 ms 10.255.238.197 (10.255.238.197) 80.605 ms
6 10.255.239.30 (10.255.239.30) 90.772 ms 10.255.239.158 (10.255.239.158) 71.508 ms 10.255.239.162 (10.255.239.162) 71.436 ms
7 10.255.222.229 (10.255.222.229) 92.202 ms 74.362 ms 10.255.221.229 (10.255.221.229) 100.460 ms
8 10.255.222.1 (10.255.222.1) 69.372 ms 10.255.221.1 (10.255.221.1) 72.866 ms 10.255.222.1 (10.255.222.1) 69.540 ms
9 115.244.136.21 (115.244.136.21) 72.471 ms 88.832 ms 75.428 ms
10 115.244.136.17 (115.244.136.17) 88.369 ms 70.994 ms 71.746 ms
11 * * *
12 * * *
13 49.44.220.133 (49.44.220.133) 68.852 ms 70.953 ms 104.26.7.89 (104.26.7.89) 71.850 ms
```

Figure 12: Traceroute from local machine to server