



IIT PALAKKAD

INDIAN INSTITUTE OF TECHNOLOGY PALAKKAD
Department of Computer Science and Engineering
CS4010 Computer Networks
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Assignment – 2
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Question 1

(a)

The IP address associated with facebook is 163.70.139.35 as can be seen from the highlighted part in figure 1

```
Command Prompt
C:\Users\NEERAJ KRISHNA N>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [163.70.139.35]
over a maximum of 30 hops:

  1  10 ms    2 ms    2 ms  10.32.1.1
  2   2 ms    2 ms    3 ms  14.139.174.49
  3  92 ms   90 ms   97 ms  10.162.69.161
  4  79 ms   77 ms   75 ms  10.255.238.105
  5  64 ms   62 ms   66 ms  10.255.238.197
  6  65 ms   64 ms   64 ms  10.255.239.158
  7  70 ms   68 ms   66 ms  10.255.222.229
  8  67 ms   90 ms   73 ms  10.255.221.1
  9  61 ms   61 ms   61 ms  115.244.136.21
 10  67 ms   66 ms   65 ms  115.244.136.17
 11  *        *        *      Request timed out.
 12  63 ms   73 ms   61 ms  ae14.pr01.tir1.tfbnw.net [157.240.66.228]
 13  68 ms   61 ms   63 ms  po101.asw02.tir3.tfbnw.net [129.134.41.106]
 14  59 ms   59 ms   60 ms  psw04.tir3.tfbnw.net [129.134.116.92]
 15  60 ms   65 ms   61 ms  157.240.39.183
 16  62 ms   63 ms   60 ms  edge-star-mini-shv-02-tir3.facebook.com [163.70.139.35]

Trace complete.

C:\Users\NEERAJ KRISHNA N>
```

Figure 1: IP address of www.facebook.com

(b)

IP address of the router one hop before the destination is 157.240.39.183.
DNS name of the router one hop before the destination cannot be determined from the following traceroute since the router did not send its DNS name back to the local machine. This can be seen in figure 2
The possible reason can be that the router would have been configured to not reveal its DNS name

```
Command Prompt  X  Windows PowerShell  X  +  v

C:\Users\NEERAJ KRISHNA N>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [163.70.139.35]
over a maximum of 30 hops:

  1    10 ms    2 ms    2 ms    10.32.1.1
  2     2 ms    2 ms    3 ms    14.139.174.49
  3    92 ms   90 ms   97 ms    10.162.69.161
  4    79 ms   77 ms   75 ms    10.255.238.105
  5    64 ms   62 ms   66 ms    10.255.238.197
  6    65 ms   64 ms   64 ms    10.255.239.158
  7    70 ms   68 ms   66 ms    10.255.222.229
  8    67 ms   90 ms   73 ms    10.255.221.1
  9    61 ms   61 ms   61 ms    115.244.136.21
 10    67 ms   66 ms   65 ms    115.244.136.17
 11     *      *      *      Request timed out.
 12    63 ms   73 ms   61 ms    ae14.pr01.tir1.tfbnw.net [157.240.66.228]
 13    68 ms   61 ms   63 ms    po101.asw02.tir3.tfbnw.net [129.134.41.106]
 14    59 ms   59 ms   60 ms    psw04.tir3.tfbnw.net [129.134.116.92]
 15    60 ms   65 ms   61 ms    157.240.39.183
 16    62 ms   63 ms   60 ms    edge-star-mini-shv-02-tir3.facebook.com [163.70.139.35]

Trace complete.

C:\Users\NEERAJ KRISHNA N>
```

Figure 2: One Hop before destination

(c)

The number of hops it took for the traceroute to reach from my local machine to the destination is 16 as can be seen from the figure 3. The 16th entry in the traceroute is the destination.

```
Command Prompt
C:\Users\NEERAJ KRISHNA N>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [163.70.139.35]
over a maximum of 30 hops:

  1  10 ms    2 ms    2 ms  10.32.1.1
  2   2 ms    2 ms    3 ms  14.139.174.49
  3  92 ms    90 ms   97 ms  10.162.69.161
  4  79 ms    77 ms   75 ms  10.255.238.105
  5  64 ms    62 ms   66 ms  10.255.238.197
  6  65 ms    64 ms   64 ms  10.255.239.158
  7  70 ms    68 ms   66 ms  10.255.222.229
  8  67 ms    90 ms   73 ms  10.255.221.1
  9  61 ms    61 ms   61 ms  115.244.136.21
 10 67 ms    66 ms   65 ms  115.244.136.17
 11 *        *        *      Request timed out.
 12 63 ms    73 ms   61 ms  ae14.pr01.tir1.tfbnw.net [157.240.66.228]
 13 68 ms    61 ms   63 ms  po101.asw02.tir3.tfbnw.net [129.134.41.106]
 14 59 ms    59 ms   60 ms  psw04.tir3.tfbnw.net [129.134.116.92]
 15 60 ms    65 ms   61 ms  157.240.39.183
 16 62 ms    63 ms   60 ms  edge-star-mini-shv-02-tir3.facebook.com [163.70.139.35]

Trace complete.

C:\Users\NEERAJ KRISHNA N>
```

Figure 3: Number of Hops

(d)

The 3rd link faced the longest latency of 97ms as can be seen from figure 4

```
Command Prompt  Windows PowerShell
C:\Users\NEERAJ KRISHNA N>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [163.70.139.35]
over a maximum of 30 hops:

  1  10 ms    2 ms    2 ms  10.32.1.1
  2   2 ms    2 ms    3 ms  14.139.174.49
  3  92 ms    90 ms   97 ms  10.162.69.161
  4  79 ms    77 ms   75 ms  10.255.238.105
  5  64 ms    62 ms   66 ms  10.255.238.197
  6  65 ms    64 ms   64 ms  10.255.239.158
  7  70 ms    68 ms   66 ms  10.255.222.229
  8  67 ms    90 ms   73 ms  10.255.221.1
  9  61 ms    61 ms   61 ms  115.244.136.21
 10 67 ms    66 ms   65 ms  115.244.136.17
 11 *        *        *      Request timed out.
 12 63 ms    73 ms   61 ms  ae14.pr01.tir1.tfbnw.net [157.240.66.228]
 13 68 ms    61 ms   63 ms  po101.asw02.tir3.tfbnw.net [129.134.41.106]
 14 59 ms    59 ms   60 ms  psw04.tir3.tfbnw.net [129.134.116.92]
 15 60 ms    65 ms   61 ms  157.240.39.183
 16 62 ms    63 ms   60 ms  edge-star-mini-shv-02-tir3.facebook.com [163.70.139.35]

Trace complete.

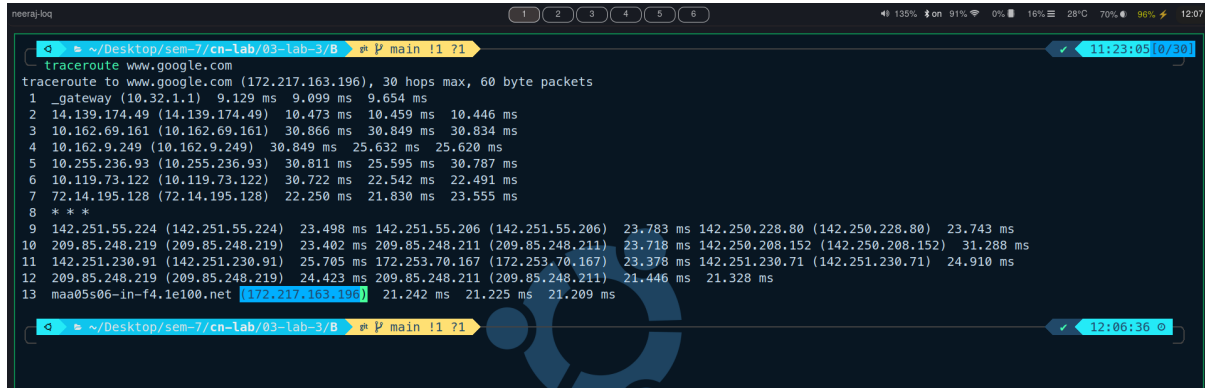
C:\Users\NEERAJ KRISHNA N>
```

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



```
neeraj-loc
~/Desktop/sem-7/cn-lab/03-lab-3/B
# P main !1 71
traceroute www.google.com
traceroute to www.google.com (172.217.163.196), 30 hops max, 60 byte packets
 1  gateway (10.32.1.1)  9.129 ms  9.099 ms  9.654 ms
 2  14.139.174.49 (14.139.174.49)  10.473 ms  10.459 ms  10.446 ms
 3  10.162.69.161 (10.162.69.161)  30.866 ms  30.849 ms  30.834 ms
 4  10.162.9.249 (10.162.9.249)  30.849 ms  25.632 ms  25.620 ms
 5  10.255.236.93 (10.255.236.93)  30.811 ms  25.595 ms  30.787 ms
 6  10.119.73.122 (10.119.73.122)  30.722 ms  22.542 ms  22.491 ms
 7  72.14.195.128 (72.14.195.128)  22.250 ms  21.830 ms  23.555 ms
 8  * * *
 9  142.251.55.224 (142.251.55.224)  23.498 ms  142.251.55.206 (142.251.55.206)  23.783 ms  142.250.228.80 (142.250.228.80)  23.743 ms
10  209.85.248.219 (209.85.248.219)  23.402 ms  209.85.248.211 (209.85.248.211)  23.718 ms  142.250.208.152 (142.250.208.152)  31.288 ms
11  142.251.230.91 (142.251.230.91)  25.705 ms  172.253.70.167 (172.253.70.167)  23.378 ms  142.251.230.71 (142.251.230.71)  24.910 ms
12  209.85.248.219 (209.85.248.219)  24.423 ms  209.85.248.211 (209.85.248.211)  21.446 ms  21.328 ms
13  maa05s06-in-f4.1e100.net [172.217.163.196]  21.242 ms  21.225 ms  21.209 ms
```

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.

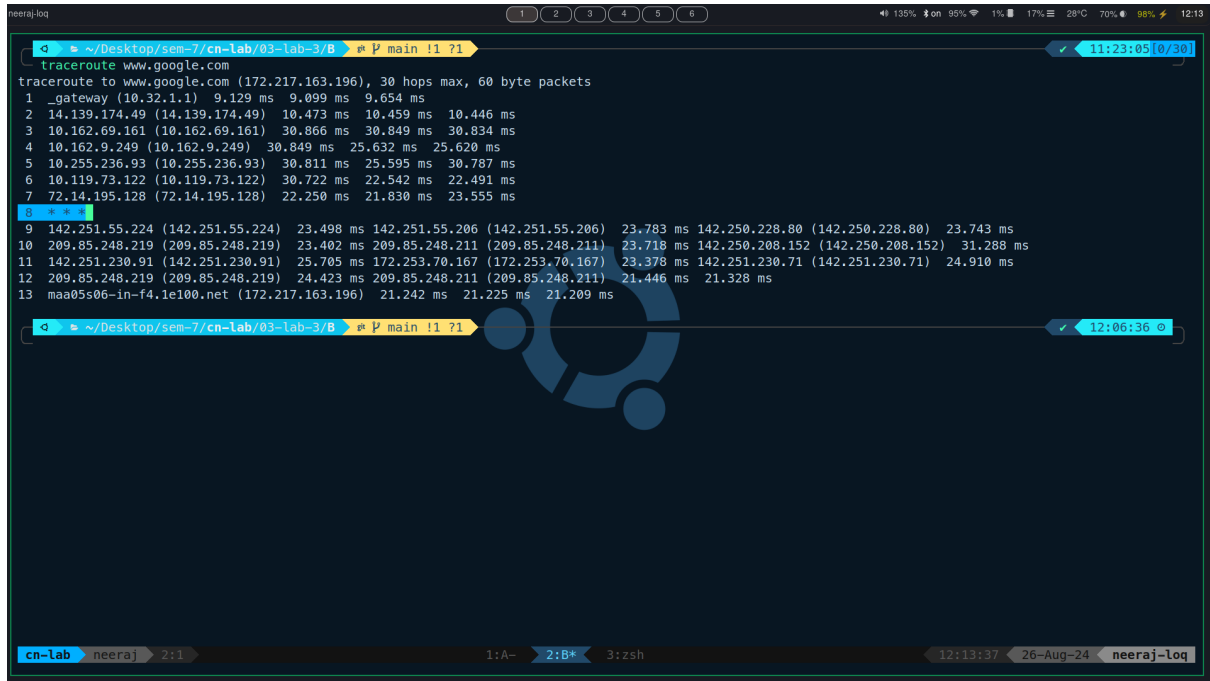


Figure 6: Unresponsive Router

(d)

There are abrupt jumps in the traceroute. 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.

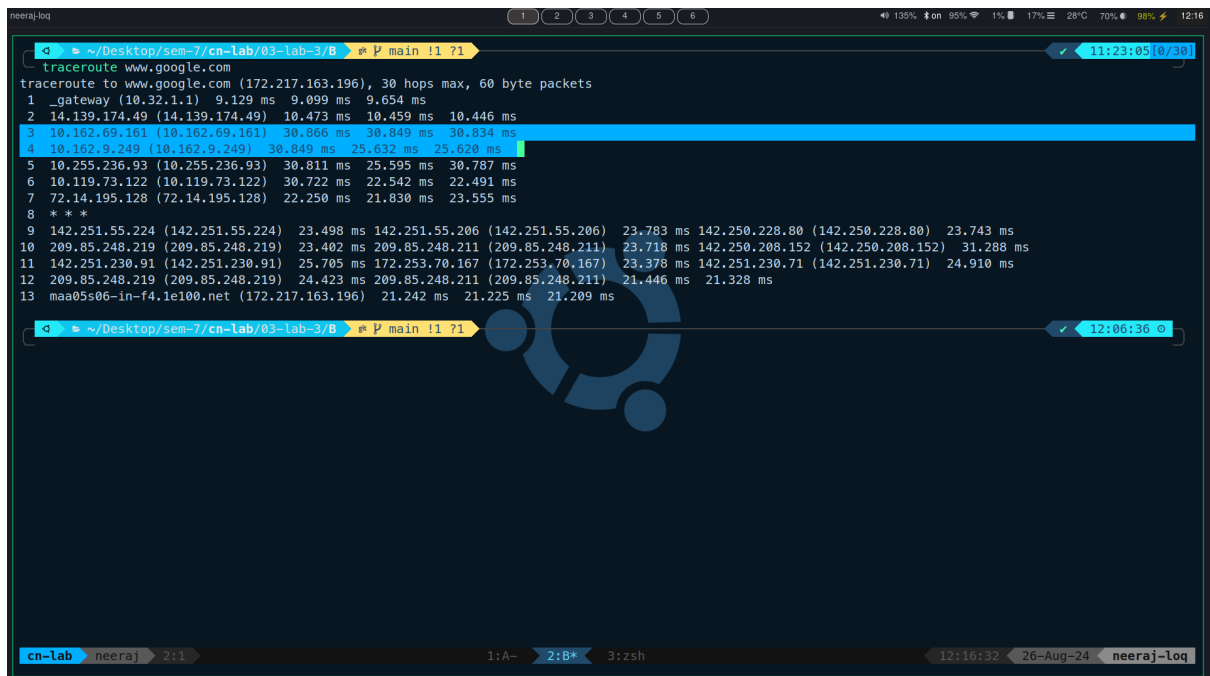


Figure 7: Latency Difference

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

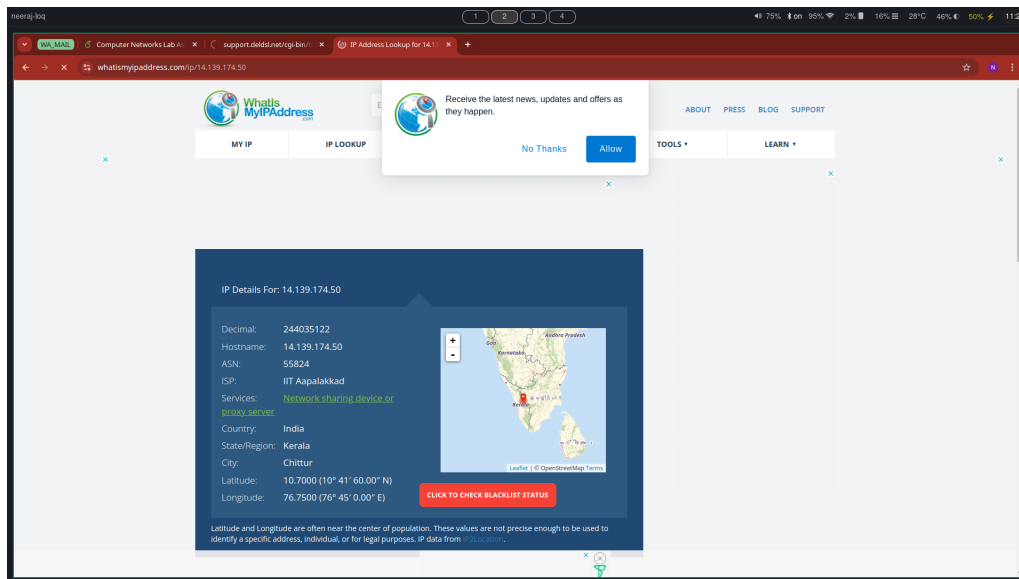


Figure 8: Finding public IP Address from whatismyipaddress.com

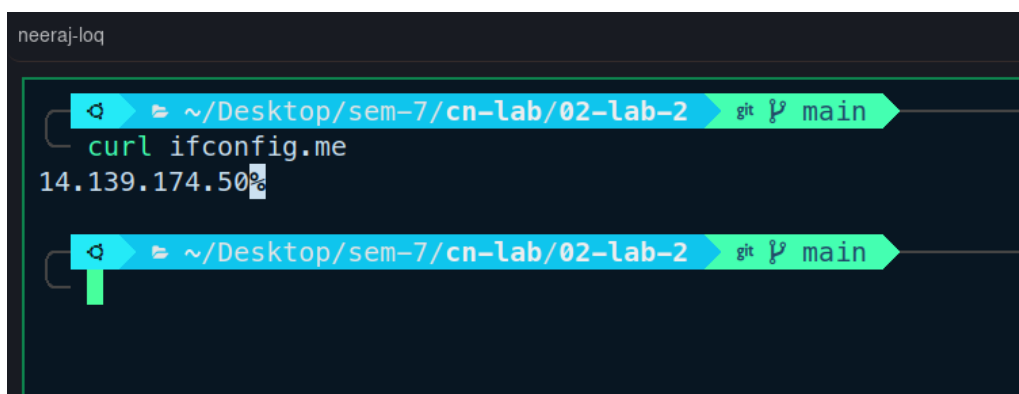


Figure 9: Finding public IP address from terminal

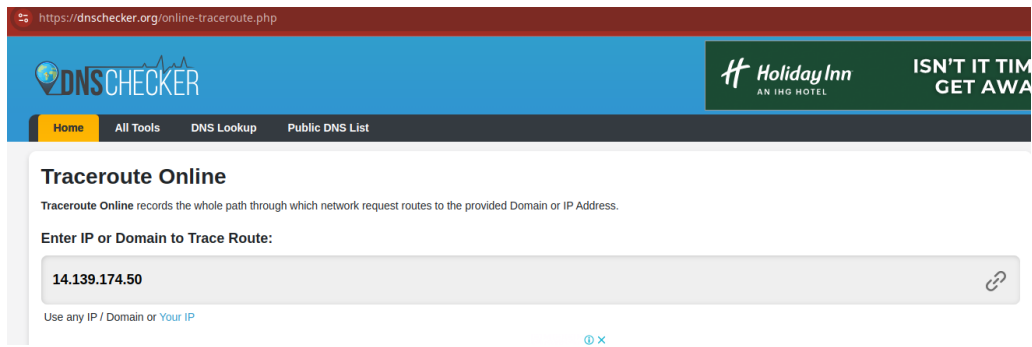


Figure 10: dnschecker-webpage

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. -- 10.74.132.79	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. -- 193.198.140.26	0.0%	3	201.6	201.6	201.6	201.7	0.1
9. -- 193.198.140.203	0.0%	3	186.3	186.7	186.3	187.1	0.4
10. -- 193.198.140.42	0.0%	3	195.0	195.0	195.0	195.0	0.0
11. -- 193.198.140.26	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