

MSCS-631: Python: Lab6: Traceroute

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MSCS-631 Advanced Computer Networks

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Screenshots of Output

For this assignment, I tried to run my traceroute.py program with 4 different hosts and they are:

1. www.google.com
2. www.facebook.com
3. www.youtube.com
4. www.bankofamerica.com

Below are the screenshots:

```
sandesh@sandesh-Inspiron-7373: /media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6
sandesh@sandesh-Inspiron-7373: /media/sandesh/easyst... x sandesh@sandesh-Inspiron-7373: /media/sandesh/easyst... x sandesh@sandesh-Inspiron-7373: /media/sandesh/easyst... x
sandesh@sandesh-Inspiron-7373: /media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$ sudo python3 traceroute
e.py
[sudo] password for sandesh:
Enter a hostname to trace route (e.g., google.com): www.google.com
1      rtt=2 ms      192.168.1.1
1      rtt=1 ms      192.168.1.1
2      *            *      Request timed out.
2      *            *      Request timed out.
3      rtt=12 ms     159.111.144.122
3      rtt=14 ms     159.111.144.122
4      rtt=13 ms     96.34.112.117
4      rtt=14 ms     96.34.112.117
5      rtt=17 ms     96.34.2.34
5      *            *      Request timed out.
6      rtt=16 ms     96.34.3.71
6      rtt=17 ms     96.34.3.71
7      rtt=17 ms     72.14.197.124
7      rtt=18 ms     72.14.197.124
8      rtt=21 ms     142.251.77.143
8      rtt=17 ms     142.251.77.143
9      rtt=29 ms     142.251.237.112
9      rtt=17 ms     142.251.237.112
10     rtt=13 ms     216.239.63.253
10     rtt=15 ms     216.239.63.253
11     rtt=31 ms     142.251.229.23
11     rtt=37 ms     142.251.229.23
12     rtt=37 ms     209.85.250.156
12     rtt=35 ms     209.85.250.156
13     rtt=51 ms     216.239.63.174
13     rtt=36 ms     216.239.63.174
14     rtt=41 ms     192.178.105.217
14     rtt=47 ms     192.178.105.217
15     rtt=38 ms     108.170.230.235
15     rtt=44 ms     108.170.230.235
16     rtt=46 ms     172.217.4.196
sandesh@sandesh-Inspiron-7373: /media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$
```

```
sandesh@sandesh-Inspiron-7373: /media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$ sudo python3 traceroute
e.py
Enter a hostname to trace route (e.g., google.com): www.facebook.com
1      rtt=2 ms      192.168.1.1
1      rtt=1 ms      192.168.1.1
2      *            *      Request timed out.
2      *            *      Request timed out.
3      rtt=12 ms     159.111.144.122
3      rtt=12 ms     159.111.144.122
4      rtt=20 ms     96.34.112.117
4      rtt=13 ms     96.34.112.117
5      *            *      Request timed out.
5      *            *      Request timed out.
6      rtt=18 ms     96.34.3.71
6      rtt=17 ms     96.34.3.71
7      rtt=30 ms     157.240.69.22
7      rtt=18 ms     157.240.69.22
8      rtt=20 ms     147.75.217.160
8      rtt=16 ms     147.75.217.160
9      rtt=15 ms     157.240.56.140
9      rtt=23 ms     157.240.56.140
10     rtt=32 ms     129.134.61.200
10     rtt=20 ms     129.134.61.200
11     rtt=20 ms     31.13.93.35
sandesh@sandesh-Inspiron-7373: /media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$
```

```
sandesh@sandesh-Inspiron-7373:/media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$ sudo python3 traceroute.py
Enter a hostname to trace route (e.g., google.com): www.youtube.com
1 rtt=5 ms 192.168.1.1
1 rtt=1 ms 192.168.1.1
2 * * * Request timed out.
2 * * * Request timed out.
3 rtt=21 ms 159.111.144.122
3 rtt=7 ms 159.111.144.122
4 rtt=15 ms 96.34.112.117
4 rtt=14 ms 96.34.112.117
5 * * * Request timed out.
5 * * * Request timed out.
6 rtt=29 ms 96.34.3.71
6 rtt=37 ms 96.34.3.71
7 rtt=19 ms 72.14.197.124
7 rtt=21 ms 72.14.197.124
8 rtt=24 ms 142.251.77.141
8 rtt=16 ms 108.170.225.147
9 rtt=16 ms 142.251.234.214
9 rtt=19 ms 216.239.58.16
10 Destination Unreachable
sandesh@sandesh-Inspiron-7373:/media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$
```

```
sandesh@sandesh-Inspiron-7373:/media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$ sudo python3 traceroute.py
Enter a hostname to trace route (e.g., google.com): www.bankofamerica.com
1 rtt=3 ms 192.168.1.1
1 rtt=1 ms 192.168.1.1
2 * * * Request timed out.
2 * * * Request timed out.
3 rtt=38 ms 159.111.144.122
3 rtt=44 ms 159.111.144.122
4 rtt=18 ms 96.34.112.117
4 rtt=30 ms 96.34.112.117
5 * * * Request timed out.
5 * * * Request timed out.
6 rtt=21 ms 96.34.3.91
6 rtt=18 ms 96.34.3.91
7 rtt=15 ms 206.223.118.209
7 rtt=14 ms 206.223.118.209
8 rtt=27 ms 23.57.102.245
8 rtt=16 ms 23.57.102.245
9 rtt=43 ms 72.52.1.145
9 rtt=20 ms 72.52.1.145
10 rtt=26 ms 72.52.1.244
10 rtt=25 ms 72.52.1.244
11 rtt=15 ms 72.52.1.141
11 rtt=25 ms 72.52.1.141
12 rtt=25 ms 72.52.1.131
12 rtt=16 ms 72.52.1.131
13 rtt=22 ms 23.57.102.249
13 * * * Request timed out.

Execution time limit reached (10 seconds). Stopping trace.
sandesh@sandesh-Inspiron-7373:/media/sandesh/easystore1/Sandesh_CumberLands_Assignments/Advanced_Computer_Network/MSCS-631-Python-Lab6$
```

Experience and Challenges in Implementing ICMP Traceroute

Implementing the ICMP Traceroute in Python was a valuable learning experience in network programming and ICMP packet handling. The ability to send and receive raw ICMP packets while dynamically tracking network hops provided deep insights into how traceroute functions at a lower level. Running the program against different target hosts demonstrated real-world network behavior, such as variable response times, intermediate routers dropping packets, and request timeouts due to firewalls. The addition of interactive user input enhanced usability, making the program more flexible for testing different domains without modifying the source code. Furthermore, setting an execution time limit ensured that the script did not run indefinitely, aligning with practical usage scenarios.

One of the primary challenges encountered was handling ICMP packet permissions, as raw sockets require administrative privileges. Running the script required sudo on Linux, which could be inconvenient. Additionally, some websites, like YouTube, returned a "Destination Unreachable" response, highlighting how certain domains block ICMP traffic for security reasons. Another challenge was dealing with intermittent timeouts, where some routers along the path did not respond, making it difficult to trace the complete route. Implementing an improved user-friendly exit mechanism for manual interruptions was also necessary to avoid displaying abrupt system errors. Despite these challenges, the project was successful in demonstrating how traceroute works, and the final implementation was robust enough to trace paths effectively while adhering to best practices in network programming.