

## LINUX NETWORKING MODULE 7 AND 8 ASSESSMENT SOLUTION

-BY SAKTHI KUMAR S

3. Explore traceroute/tracert for different websites eg google.com and analyse the parameters in the output and explore different options for traceroute command

Tracert for different websites:

```
Microsoft Windows [Version 10.0.26100.3476]
(c) Microsoft Corporation. All rights reserved.

C:\Users\sakthi kumar>tracert google.com

Tracing route to google.com [2404:6800:4009:81f::200e]
over a maximum of 30 hops:

  1  3 ms  4 ms  2 ms  2409:408d:4ec8:bce2::2a
  2  *  *  *  Request timed out.
  3  939 ms 404 ms 221 ms 2405:200:394:eeee:20::44
  4  89 ms 74 ms 304 ms 2405:200:801:4f00::130
  5  *  *  *  Request timed out.
  6  *  *  *  Request timed out.
  7  *  206 ms  *  2001:4860:1:1::d10
  8  *  *  *  Request timed out.
  9  541 ms 1124 ms 510 ms 2001:4860:0:1::163e
 10  971 ms 1086 ms 910 ms 2001:4860:0:1::880a
 11  96 ms 1121 ms 200 ms 2001:4860::9:4001:7734
 12  *  *  746 ms 2001:4860:0:1::f7d
 13  512 ms 178 ms 176 ms 2001:4860:0:1::4fe5
 14  205 ms 293 ms 202 ms bom07s29-in-x0e.1e100.net [2404:6800:4009:81f::200e]

Trace complete.

C:\Users\sakthi kumar>tracert facebook.com

Tracing route to facebook.com [2a03:2880:f137:182:face:b00c:0:25de]
over a maximum of 30 hops:

  1  5 ms  4 ms  4 ms  2409:408d:4ec8:bce2::2a
  2  *  *  *  Request timed out.
  3  1375 ms 1121 ms 933 ms 2405:200:394:eeee:20::44
  4  263 ms 882 ms 723 ms 2405:200:801:4f00::136
  5  *  *  *  Request timed out.
  6  *  *  *  Request timed out.
  7  968 ms 858 ms 875 ms ae0.pr02.maa2.tfbnw.net [2620:0:1cff:dead:beee::992]
  8  119 ms 394 ms 972 ms ae0.pr02.maa2.tfbnw.net [2620:0:1cff:dead:beee::992]
  9  582 ms 399 ms 723 ms po182.psw01.maa2.tfbnw.net [2620:0:1cff:dead:bef0::76b]
 10  451 ms 612 ms 145 ms po5.mswlag.02.maa2.tfbnw.net [2a03:2880:f037:ffff::2dd]
 11  128 ms 272 ms 1115 ms edge-star-mini16-shv-02-maa2.facebook.com [2a03:2880:f137:182:face:b00c:0:25de]

Trace complete.
```

```
C:\Users\sakthi kumar>tracert amazon.com

Tracing route to amazon.com [64:ff9b::36ef:1c55]
over a maximum of 30 hops:

  1  5 ms  4 ms  3 ms  2409:408d:4ec8:bce2::2a
  2  *  *  *  Request timed out.
  3  871 ms 1020 ms 139 ms 2405:200:394:eeee:20::44
  4  177 ms 794 ms 359 ms 2405:200:87f:3668:61::6
  5  688 ms 914 ms 350 ms 64:ff9b::c0a8:e503
  6  510 ms 894 ms 400 ms 64:ff9b::c0a8:73ae
  7  *  *  *  Request timed out.
  8  *  *  *  Request timed out.
  9  548 ms 549 ms 798 ms 64:ff9b::67c6:8cb0
 10  400 ms 1219 ms 401 ms 64:ff9b::67c6:8cc5
 11  *  *  *  Request timed out.
 12  *  *  *  Request timed out.
 13  *  *  *  Request timed out.
 14  *  *  *  Request timed out.
 15  *  *  *  Request timed out.
 16  *  *  *  Request timed out.
 17  *  *  *  Request timed out.
 18  *  *  *  Request timed out.
 19  *  *  *  Request timed out.
 20  *  1001 ms 766 ms 64:ff9b::36ef:1c55

Trace complete.

C:\Users\sakthi kumar>tracert github.com

Tracing route to github.com [64:ff9b::14cf:4952]
over a maximum of 30 hops:

  1  5 ms  5 ms  4 ms  2409:408d:4ec8:bce2::2a
  2  *  *  *  Request timed out.
  3  536 ms 835 ms 903 ms 2405:200:394:eeee:20::44
  4  599 ms 1001 ms 372 ms 2405:200:87f:3668:61::6
  5  714 ms 705 ms 350 ms 64:ff9b::c0a8:e502
  6  207 ms 200 ms 530 ms 64:ff9b::c0a8:73ac
  7  *  *  *  Request timed out.
  8  *  *  *  Request timed out.
  9  208 ms 788 ms 202 ms ae0-0.ier01.hyd30.ntwk.msn.net [64:ff9b::682c:3a0d]
 10  116 ms  *  520 ms 64:ff9b::682c:37f1
 11  984 ms 527 ms 593 ms 64:ff9b::682c:228f
 12  740 ms 509 ms 803 ms be-12-0.1br02.lon24.ntwk.msn.net [64:ff9b::682c:1c1e]
 13  930 ms 532 ms 483 ms ae106-0.rwa04.pnq21.ntwk.msn.net [64:ff9b::682c:1440]
 14  582 ms 505 ms 292 ms ae100-0.rwa01.pnq20.ntwk.msn.net [64:ff9b::682c:bba]
 15  *  *  *  Request timed out.
 16  *  *  *  Request timed out.
 17  *  *  *  Request timed out.
 18  *  *  *  Request timed out.
 19  *  *  *  Request timed out.
 20  *  211 ms 64:ff9b::14cf:4952

Trace complete.
```

Various Tracert Types:

1.-d (Disable DNS Resolution) &-h Maximum Number of Hops

```
C:\Users\sakthi kumar>tracert -d google.com

Tracing route to google.com [2404:6800:4009:82d::200e]
over a maximum of 30 hops:

 1    4 ms    3 ms    4 ms  2409:408d:4ec8:bce2::2a
 2    *      *      *      Request timed out.
 3   482 ms  1035 ms  95 ms  2405:200:394:eeee:20::44
 4   209 ms  639 ms  679 ms  2405:200:801:4f00::130

PS C:\Users\sakthi kumar> tracert -h 20 google.com

Tracing route to google.com [2404:6800:4007:82a::200e]
over a maximum of 20 hops:

 1    3 ms   1172 ms  10 ms  2409:408d:4ec8:bce2::2a
 2    *      *      *      Request timed out.
 3   518 ms  119 ms  482 ms  2405:200:394:eeee:20::44
 4   379 ms  460 ms  860 ms  2405:200:801:4f00::136
 5    *      *      *      Request timed out.
 6    *      *      *      Request timed out.
 7    *      *      *      Request timed out.
 8    *      205 ms  *      2404:6800:8202:40::1
 9    *      *      *      Request timed out.
10   607 ms  301 ms  709 ms  2001:4060:0:1::8028
11    *      *      *      Request timed out.
12   403 ms  96 ms  514 ms  2001:4060:0:1::55ab
13   980 ms  528 ms  593 ms  maa03s45-in-x0e.1e100.net [2404:6800:4007:82a::200e]

Trace complete.
```

-w <timeout> (Wait Time in Milliseconds)

```
C:\Users\sakthi kumar>tracert -w 500 google.com

Tracing route to google.com [2404:6800:4009:81f::200e]
over a maximum of 30 hops:

 1    4 ms    4 ms    3 ms  2409:408d:4ec8:bce2::2a
 2    *      *      *      Request timed out.
 3   158 ms   *      387 ms  2405:200:394:eeee:20::44
 4    *      *      436 ms  2405:200:801:4f00::130
```

-R Trace round-trip path (IPv6-only).

```
PS C:\Users\sakthi kumar> tracert -R google.com

Tracing route to google.com [2404:6800:4007:802::200e]
over a maximum of 30 hops:

 1   330 ms   306 ms   305 ms  2409:408d:4ec8:bce2::2a
 2    *      *      *      Request timed out.
 3   690 ms   156 ms   191 ms  2405:200:394:eeee:20::44
 4   551 ms  1286 ms   719 ms  2405:200:801:4f00::136
```

In Linux:

Basic Traceroute

```
(base) sakthi-kumar-s@sakthi-kumar-s-VirtualBox:~$ traceroute google.com
traceroute to google.com (142.250.196.46), 64 hops max
 1  10.0.2.2  0.017ms  0.014ms  0.010ms
 2  * * *
 3  * * *
 4  * * *
```

Uses ICMP Instead of UDP

```
(base) sakthi-kumar-s@sakthi-kumar-s-VirtualBox:~$ traceroute -I google.com
traceroute to google.com (142.250.196.46), 64 hops max
 1  * * *
 2  * * *
 3  142.250.196.46  82.985ms  80.201ms  73.526ms
```

nmap (For Traceroute with Service Discovery)

```
(base) sakthi-kumar-s@sakthi-kumar-s-VirtualBox:~$ sudo su
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# nmap --traceroute google.com
Starting Nmap 7.94SVN ( https://nmap.org ) at 2025-03-15 19:42 IST
Nmap scan report for google.com (142.250.192.46)
Host is up (0.023s latency).
Other addresses for google.com (not scanned): 2404:6800:4009:81f::200e
rDNS record for 142.250.192.46: bom12s15-in-f14.1e100.net
Not shown: 998 filtered tcp ports (no-response)
PORT      STATE SERVICE
80/tcp    open  http
443/tcp   open  https

TRACEROUTE (using port 80/tcp)
HOP RTT      ADDRESS
1  26.15 ms  bom12s15-in-f14.1e100.net (142.250.192.46)

Nmap done: 1 IP address (1 host up) scanned in 15.12 seconds
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s#
```

## tcptraceroute (For Networks Blocking Regular Traceroute)

```
(base) sakthi-kumar-s@sakthi-kumar-s-VirtualBox:~$ tcptraceroute google.com 80
Selected device enp0s3, address 10.0.2.15, port 53987 for outgoing packets
Tracing the path to google.com (142.250.192.46) on TCP port 80 (http), 30 hops max
 1  bom12s15-in-f14.1e100.net (142.250.192.46) [open]  82.220 ms  98.698 ms  259.038 ms
```

## Traceroute with Specific Network Interface

```
(base) sakthi-kumar-s@sakthi-kumar-s-VirtualBox:~$ traceroute -i enp0s3 google.com
traceroute to google.com (142.250.182.238), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  33.469 ms  32.723 ms  25.878 ms
 2  * * *
 3  * * *
 4  * * *
```

## TCP-based Traceroute (Bypass Firewalls)

```
(base) sakthi-kumar-s@sakthi-kumar-s-VirtualBox:~$ sudo su
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -T google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  pnmaaa-ar-in-f14.1e100.net (142.250.205.78)  170.700 ms  159.428 ms  160.508 ms
```

Sets the maximum number of hops (TTL).

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -m 20 google.com
traceroute to google.com (142.250.205.78), 20 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  1.722 ms  1.236 ms  1.053 ms
 2  * * *
 3  * * *
```

Prevents DNS resolution, displaying only numerical IP addresses.

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -n google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  10.0.2.2  13.569 ms  12.141 ms  10.854 ms
 2  * * *
 3  * * *
```

Specifies the destination port (useful for UDP and TCP mode).

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -p 443 google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  7.704 ms  31.036 ms  30.295 ms
 2  * * *
 3  * * *
```

Sets a firewall mark on packets (useful for policy routing)

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute --fwmark=1 google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  10.0.2.2 (10.0.2.2)  2.274 ms  1.313 ms  3.202 ms
 2  * * *
 3  * * *
```

Attempts to map each hop to an AS (Autonomous System) number

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -A google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2) [*]  20.042 ms  19.229 ms  18.509 ms
 2  * * *
 3  * * *
```

Probes the Path MTU (Maximum Transmission Unit) along the route

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute --mtu google.com
traceroute to google.com (142.250.205.78), 30 hops max, 65000 byte packets
 1  _gateway (10.0.2.2)  10.287 ms F=1500  3.949 ms  7.194 ms
 2  * * *
```

Displays reverse path information

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute --back google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  3.939 ms  3.392 ms  2.995 ms
 2  * * *
 3  * * *
```

Sets the number of probe packets per hop

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -q 5 google.com
traceroute to google.com (142.250.205.78), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  3.617 ms  2.785 ms  2.546 ms  2.346 ms  2.152 ms
 2  * * * * *
 3  * * * * *
```

Uses UDP instead of the default ICMP/UDP mode.

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -U google.com
traceroute to google.com (142.250.199.142), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  1.872 ms  1.659 ms  1.246 ms
 2  * * *
```

Specifies loose source routing

```
root@sakthi-kumar-s-VirtualBox:/home/sakthi-kumar-s# traceroute -g 10.0.2.2 google.com
traceroute to google.com (142.250.199.142), 30 hops max, 72 byte packets
 1  * * *
 2  * * *
```