Lab 04: Assignment: Ping Utility Analysis

Task 1: Tracert Basics

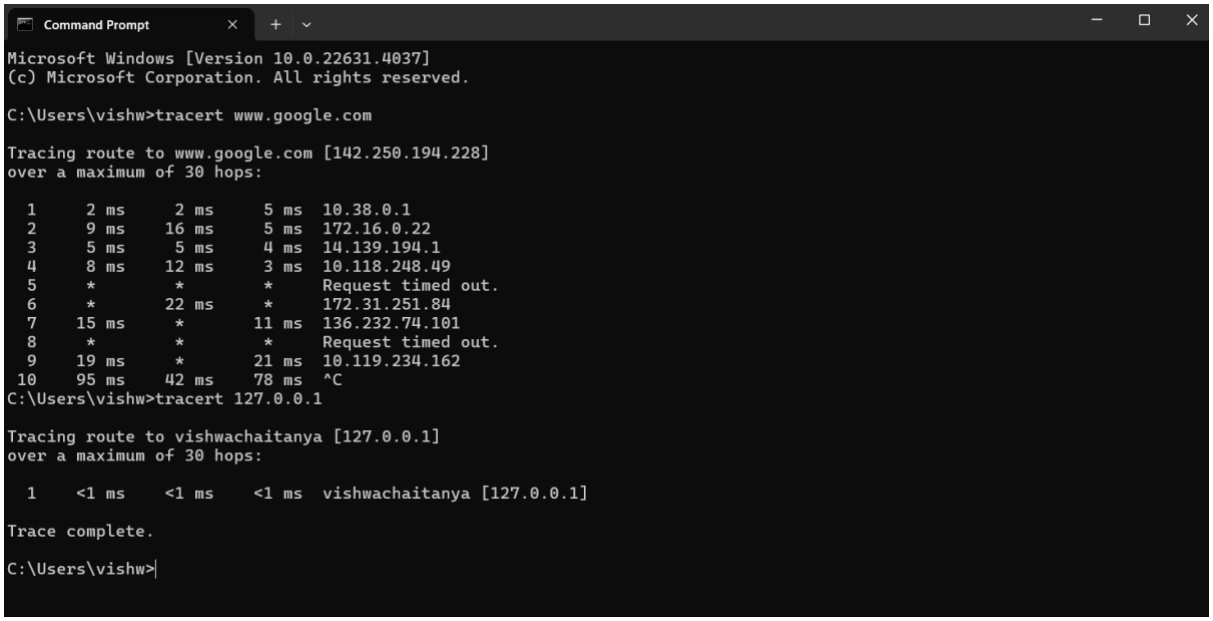
Purpose of Tracert Utility: Tracert (or traceroute) is a network diagnostic tool used to trace the path that packets take from the source to the destination. It shows each hop (router) the packets pass through and the time it takes to reach each one. This helps in identifying network issues, such as delays or unreachable destinations

Syntax: tracert [options] <destination>

Trace route to a website: tracert www.google.com

Trace route to a local host: tracert 127.0.0.1

Task 2: Tracert Output Analysis



Output Analysis:

- **Hop Number:** The sequential number of the hop.
- **RTT (Round-Trip Time):** The time in milliseconds it takes for the packet to reach the hop and return.
- **IP Address:** The IP address of the router at that hop.
- **Significance:** This output shows the path and time taken at each hop. It helps in identifying the network's route and pinpointing where delays or issues may occur.
- **Analysis:** This trace is direct since 127.0.0.1 is the loopback address, meaning the trace stays within the local machine.

3. Tracert Options:

-d (Do not resolve hostnames):

- Skips resolving IP addresses to hostnames for faster output**.**

```
Microsoft Windows [Version 10.0.22631.4037]
(c) Microsoft Corporation. All rights reserved.

C:\Users\vishw>tracert -d www.google.com

Tracing route to www.google.com [142.250.194.164]
over a maximum of 30 hops:

  1     8 ms    12 ms     7 ms  10.38.0.1
  2     3 ms     1 ms     2 ms  172.16.0.22
  3     9 ms     2 ms     5 ms  14.139.194.1
  4    24 ms    12 ms    29 ms  122.252.251.197
  5    29 ms     *       10 ms  172.31.251.85
  6    10 ms     9 ms     *     172.31.251.84
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *       25 ms  10.119.234.162
 10    50 ms    41 ms    44 ms  72.14.195.56
 11    75 ms     *       71 ms  142.251.249.5
 12    61 ms    65 ms    69 ms  142.251.52.221
 13    48 ms    51 ms    55 ms  142.250.194.164

Trace complete.
```

-h (Maximum number of hops):

- Sets the maximum number of hops before giving up.

```
C:\Users\vishw>tracert -h 10 www.google.com

Tracing route to www.google.com [142.250.182.164]
over a maximum of 10 hops:

  1     1 ms     1 ms     5 ms  10.38.0.1
  2     3 ms     1 ms     2 ms  172.16.0.22
  3     5 ms     2 ms     5 ms  ws240-251-252-122.rcil.gov.in [122.252.251.241]
  4    19 ms     7 ms     1 ms  10.118.248.49
  5    88 ms     *        *     172.31.251.85
  6     *        *       12 ms  172.31.251.84
  7    23 ms    13 ms    11 ms  136.232.74.101
  8     *        *        *     Request timed out.
  9    73 ms    41 ms     *     10.119.234.162
 10     *       61 ms    53 ms  72.14.195.56

Trace complete.
```

-w (Timeout in milliseconds):

- Sets the timeout for each reply.

```
C:\Users\vishw>tracert -w 1000 www.google.com

Tracing route to www.google.com [142.250.194.228]
over a maximum of 30 hops:

  1    12 ms    20 ms     5 ms  10.38.0.1
  2    12 ms     1 ms     1 ms  172.16.0.22
  3     7 ms     6 ms    29 ms  ws240-251-252-122.rcil.gov.in [122.252.251.241]
  4     9 ms     4 ms     6 ms  ws197-251-252-122.rcil.gov.in [122.252.251.197]
  5     *        *        *     Request timed out.
  6     *       19 ms     *     172.31.251.84
  7    12 ms     *       13 ms  136.232.74.101
  8     *        *        *     Request timed out.
  9    20 ms    20 ms     *     10.119.234.162
 10    48 ms    76 ms    74 ms  74.125.147.192
 11    44 ms    67 ms    68 ms  142.251.249.3
 12    63 ms    65 ms    65 ms  142.251.52.215
 13    67 ms    64 ms    69 ms  del12s08-in-f4.1e100.net [142.250.194.228]

Trace complete.
```

Task 4: Troubleshooting with Tracert

If users experience slow connectivity to a website, tracert can be used to diagnose where the delay occurs.

Command: tracert -h 20 -w 2000 www.slowwebsite.com

- **Diagnosis:**
    - Identify the hop where delays begin.
    - Check for high RTT values or "*" indicating timeouts.
    - This indicates the point in the network causing the delay.

Task 5: Conclusion

Tracert is a valuable tool for diagnosing network issues, showing the path and time taken for packets to reach their destination.

Limitations:

- Firewalls may block ICMP packets used by tracert.
- Some hops may not respond, leading to incomplete traces.