# Traceroute Command in Linux with Examples

Traceroute is a command-line tool used in Linux or other operating systems to track the path that data takes from your computer to a specified destination, such as a website.

When you enter traceroute a command followed by a destination address, it shows you each "hop" that the data packet makes along its journey. This includes the different servers or devices it passes through and how long each step takes.

## How to install traceroute?
   ❖ sudo apt install traceroute

## How To Run a Traceroute in Linux?
   1. Open Terminal on your computer.
   2. Type "traceroute [hostname]" (replace "[hostname]" with the website or address you want to trace).
   3. Press Enter.

## Traceroute Command With Examples

## 1. Basic Traceroute Usage
To perform a basic traceroute operation to a destination, simply execute the following command:
   ❖ traceroute google.com



```
prabhakar@Inspiron-3542:~$ traceroute google.com
traceroute to google.com (172.217.26.206), 30 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  2.014 ms  2.313 ms  2.588 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  75.449 ms  115.244 ms  115.224 ms
 4  10.45.8.178 (10.45.8.178)  93.856 ms  115.138 ms  93.822 ms
 5  10.45.8.187 (10.45.8.187)  115.116 ms  115.106 ms  115.070 ms
 6  * * *
 7  218.248.235.141 (218.248.235.141)  120.589 ms  108.033 ms  106.962 ms
 8  218.248.235.142 (218.248.235.142)  114.489 ms * *
 9  72.14.211.114 (72.14.211.114)  98.076 ms  93.232 ms  93.781 ms
10  108.170.253.113 (108.170.253.113)  98.688 ms  91.388 ms 108.170.253.97 (108.170.253.97)  107.241 ms
11  74.125.253.69 (74.125.253.69)  95.120 ms 72.14.237.165 (72.14.237.165)  102.594 ms  103.137 ms
12  maa03s23-in-f14.1e100.net (172.217.26.206)  101.794 ms  97.987 ms  97.165 ms
prabhakar@Inspiron-3542:~$
```

This command traces the route to the google.com domain, displaying the IP addresses and round-trip times for each hop along the path.

## 2. Using IPv4 With Traceroute

The -4 option allows users to specify the use of IPv4 when performing a traceroute operation. This is particularly useful when troubleshooting connectivity or network issues related to IPv4 addresses.
   ❖ traceroute -4 google.com

```
prabhakar@Inspiron-3542:~$ traceroute -4 google.com
traceroute to google.com (216.58.200.142), 30 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  2.674 ms  3.105 ms  3.386 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  85.189 ms  79.362 ms  92.649 ms
 4  10.45.8.178 (10.45.8.178)  92.855 ms  92.630 ms  92.828 ms
 5  10.45.8.187 (10.45.8.187)  84.991 ms  79.151 ms  79.159 ms
 6  * * *
 7  218.248.235.141 (218.248.235.141)  95.985 ms * *
 8  218.248.235.142 (218.248.235.142)  132.816 ms  103.333 ms  103.149 ms
 9  72.14.211.114 (72.14.211.114)  106.694 ms  95.282 ms  95.285 ms
10  74.125.242.129 (74.125.242.129)  106.375 ms  96.011 ms 74.125.242.145 (74.125.242.145)  102.853 ms
11  216.239.54.159 (216.239.54.159)  103.017 ms  103.076 ms  102.674 ms
12  maa05s10-in-f14.1e100.net (216.58.200.142)  97.516 ms  109.787 ms  97.040 ms
```

Explanation: By using the `-4` option, traceroute exclusively employs IPv4 addresses to trace the route to the destination `google.com`

**3. Using IPv6 With Traceroute**

Conversely, the `-6` option instructs traceroute to use IPv6 addresses for the traceroute operation. This option is essential when dealing with networks that primarily utilize IPv6 addressing.

❖ traceroute -6 google.com

```
prabhakar@Inspiron-3542:~$ traceroute -6 google.com
traceroute to google.com (2404:6800:4007:803::200e), 30 hops max, 80 byte packets
connect: Network is unreachable
```

Explanation: By specifying the `-6` option, traceroute utilizes IPv6 addresses to trace the route to the destination `google.com`.

**4. Do Not Fragment Packet**

The `-F` option prevents packet fragmentation during the traceroute operation. This can be beneficial when troubleshooting network connectivity issues related to packet fragmentation.

❖ traceroute -F google.com

```
prabhakar@Inspiron-3542:~$ traceroute -F google.com
traceroute to google.com (172.217.163.206), 30 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  2.188 ms  2.382 ms  5.081 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  118.615 ms  125.940 ms  124.751 ms
 4  10.45.8.178 (10.45.8.178)  135.458 ms  129.667 ms  142.277 ms
 5  10.45.8.187 (10.45.8.187)  142.421 ms  157.132 ms  142.208 ms
 6  * * *
 7  218.248.235.141 (218.248.235.141)  186.815 ms * *
 8  218.248.235.142 (218.248.235.142)  264.139 ms  242.742 ms *
 9  72.14.211.114 (72.14.211.114)  266.390 ms  266.223 ms  266.263 ms
10  74.125.242.129 (74.125.242.129)  266.092 ms  268.533 ms 74.125.242.145 (74.125.242.145)  213.051 ms
11  209.85.248.211 (209.85.248.211)  241.805 ms 209.85.248.219 (209.85.248.219)  224.571 ms 209.85.248.211 (209.85.248.211)  222.587 ms
12  maa05s06-in-f14.1e100.net (172.217.163.206)  224.814 ms  240.173 ms  305.656 ms
```

Explanation: By using the `-F` option, traceroute ensures that packets are not fragmented during the traceroute process to the destination `google.com`.

**5. Starting From a Specific TTL (Time To Live)**

The `-f` option allows users to specify the starting TTL (Time To Live) value for the traceroute operation. This option is helpful when you want to start tracing the route from a specific hop rather than the default starting point.

❖ traceroute -f 10 google.com

```
prabhakar@Inspiron-3542:~$ traceroute -f 10 google.com
traceroute to google.com (172.217.163.206), 30 hops max, 60 byte packets
10  74.125.242.145 (74.125.242.145)  106.172 ms 74.125.242.129 (74.125.242.129)  106.390 ms 74.125.242.145 (74.125.242.145)  92.749 ms
11  209.85.248.219 (209.85.248.219)  99.211 ms  108.019 ms 209.85.248.211 (209.85.248.211)  99.055 ms
12  maa05s06-in-f14.1e100.net (172.217.163.206)  92.795 ms  107.599 ms  106.364 ms
```

Explanation: By providing the `-f` option followed by the TTL value (e.g., 10), traceroute initiates the traceroute operation from the specified hop to the destination `google.com`.

## 6. Routing the Packet Through a Gate

The -g option enables users to route the packet through a specific gateway during the traceroute operation. This is useful for directing traffic through a specific network path for diagnostic purposes.

&#10070; traceroute -g 192.168.43.45 google.com

```
prabhakar@Inspiron-3542:~$ traceroute -g 192.168.43.45 google.com
traceroute to google.com (216.58.197.78), 30 hops max, 72 byte packets
 1  * * *
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
```

Explanation: By using the `-g` option followed by the gateway IP address, traceroute routes the packet through the specified gateway to reach the destination `google.com`.

## 7. Setting Maximum Number of Hops

The -m option allows users to set the maximum number of hops for the packet to reach the destination. By default, the maximum Timt to Live (TTL) value is set to 30.

&#10070; traceroute  -m 5 google.com

```
prabhakar@Inspiron-3542:~$ traceroute  -m 5 google.com
traceroute to google.com (172.217.163.174), 5 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  1.711 ms  2.009 ms  2.426 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  88.286 ms  87.902 ms  88.043 ms
 4  10.45.8.178 (10.45.8.178)  88.451 ms  97.658 ms  97.365 ms
 5  10.45.8.187 (10.45.8.187)  105.424 ms  104.818 ms  105.069 ms
```

Explanation: By specifying the `-m` option followed by the desired TTL value (e.g., 5), traceroute limits the traceroute operation to a maximum of 5 hops to the destination `google.com`.

## 8. Disabling IP Address Resolution

The `-n` option instructs traceroute not to resolve IP addresses to their corresponding domain names. This can speed up the traceroute operation by skipping the Domain Name Server (DNS) resolution process.

❖ traceroute -n google.com

```
prabhakar@Inspiron-3542:~$ traceroute -n google.com
traceroute to google.com (216.58.197.78), 30 hops max, 60 byte packets
 1  192.168.43.45  1.276 ms  2.567 ms  2.894 ms
 2  * * *
 3  10.45.1.230  213.144 ms  208.579 ms  208.552 ms
 4  10.45.8.178  208.533 ms  213.026 ms  224.356 ms
 5  10.45.8.187  224.303 ms  236.195 ms  320.501 ms
 6  * * *
 7  218.248.235.141  337.190 ms  136.746 ms  136.789 ms
 8  218.248.235.142  142.816 ms  138.503 ms  143.977 ms
 9  72.14.211.114  132.807 ms  138.627 ms  126.861 ms
10  * 108.170.253.97  145.860 ms 108.170.253.113  138.521 ms
11  108.170.237.95  138.488 ms 108.170.236.197  132.544 ms 108.170.237.95  132.564 ms
12  216.58.197.78  128.691 ms  128.919 ms  122.617 ms
```

Explanation: By using the `-n` option, traceroute displays IP addresses instead of resolving them to domain names during the traceroute operation to the destination `google.com`.

## 9. Setting Destination Port
The -p option allows users to specify the destination port to use during the traceroute operation. By default, the destination port is set to 33434. Syntax:

❖ traceroute  -p 20292 google.com

```
prabhakar@Inspiron-3542:~$ traceroute  -p 20292 google.com
traceroute to google.com (172.217.166.110), 30 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  2.225 ms  2.969 ms  3.448 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  84.320 ms  84.313 ms  96.305 ms
 4  10.45.8.178 (10.45.8.178)  89.330 ms  84.408 ms  98.763 ms
 5  10.45.8.187 (10.45.8.187)  103.916 ms  98.679 ms  104.101 ms
 6  * * *
 7  218.248.235.141 (218.248.235.141)  109.061 ms  108.844 ms  108.871 ms
 8  218.248.235.142 (218.248.235.142)  108.751 ms * 114.215 ms
 9  * * *
10  * * *
11  * * *
12  * * *
```

Explanation: By providing the `-p` option followed by the desired port number (e.g., 20292), traceroute uses the specified port for the traceroute operation to the destination `google.com`.

## 10. Setting Number of Probes per Hop
The -q option enables users to set the number of probes sent to each hop during the traceroute operation. By default, three probes are sent per hop.

❖ traceroute -q 1 google.com

```
prabhakar@Inspiron-3542:~$ traceroute -q 1 google.com
traceroute to google.com (172.217.166.110), 30 hops max, 60 byte packets
 1  192.168.43.45 (192.168.43.45)  2.695 ms
 2  *
 3  10.45.1.230 (10.45.1.230)  741.244 ms
 4  10.45.8.178 (10.45.8.178)  741.541 ms
 5  10.45.8.187 (10.45.8.187)  741.212 ms
 6  *
 7  218.248.235.141 (218.248.235.141)  739.848 ms
 8  218.248.235.142 (218.248.235.142)  739.706 ms
 9  72.14.211.114 (72.14.211.114)  737.569 ms
10  74.125.242.129 (74.125.242.129)  738.603 ms
11  74.125.252.215 (74.125.252.215)  738.817 ms
12  maa05s09-in-f14.1e100.net (172.217.166.110)  738.675 ms
```

Explanation: By using the `-q` option followed by the desired number of probes (e.g., 1), traceroute sends the specified number of probes per hop during the traceroute operation to the destination `google.com`.

## 11. Setting Packet Length
Users can specify the full packet length using the `packetlen` option. By default, traceroute uses 60-byte packets.

❖ traceroute  google.com 100

```
prabhakar@Inspiron-3542:~$ traceroute  google.com 100
traceroute to google.com (172.217.166.110), 30 hops max, 100 byte packets
 1  192.168.43.45 (192.168.43.45)  3.227 ms  3.262 ms  3.351 ms
 2  * * *
 3  10.45.1.230 (10.45.1.230)  747.141 ms  747.139 ms  747.119 ms
 4  10.45.8.178 (10.45.8.178)  747.099 ms  747.303 ms  747.038 ms
 5  10.45.8.187 (10.45.8.187)  747.248 ms  747.549 ms  747.539 ms
 6  * * *
 7  218.248.235.141 (218.248.235.141)  108.841 ms *  139.397 ms
 8  218.248.235.142 (218.248.235.142)  114.140 ms *  125.519 ms
 9  72.14.211.114 (72.14.211.114)  131.408 ms  119.901 ms  131.631 ms
10  74.125.242.129 (74.125.242.129)  139.624 ms  85.952 ms  89.597 ms
11  74.125.252.209 (74.125.252.209)  93.783 ms 74.125.252.215 (74.125.252.215)  93.906 ms 74.125.252.209 (74.125.252.209)  93.510 ms
12  maa05s09-in-f14.1e100.net (172.217.166.110)  93.421 ms  122.645 ms  122.473 ms
```

Explanation: By providing the packet length value (e.g., 100), traceroute utilizes packets with the specified length during the traceroute operation to the destination `google.com`.

## 12. Displaying Help Messages
The --help option displays help messages and exits, providing users with information about the usage and available options of the traceroute command.

❖ traceroute --help

```
prabhakar@Insplron-3542:~$ traceroute --help
Usage:
  traceroute [ -46dFITnreAUDV ] [ -f first_ttl ] [ -g gate,...
 _label ] [ -w waittime ] [ -q nqueries ] [ -s src_addr ] [ -z
Options:
  -4                              Use IPv4
  -6                              Use IPv6
  -d  --debug                     Enable socket level debugging
  -F  --dont-fragment             Do not fragment packets
  -f first_ttl  --first=first_ttl
                                  Start from the first_ttl hop (i
  -g gate...    --gateway=gate...
```

Explanation: By executing the `traceroute --help` command, traceroute displays help messages that detail the usage and available options of the traceroute command.