



Computer Engineering Department &
Information Technology Engineering Department

Academic Year: 2021-2022

Class: S.Y.B.Tech Sem.: 4 Course: CCN

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AIM:	To find the network utilities and its commands
EXPERIMENT 1	
COMMANDS:	<p>PING Command</p> <p>Most Linux users are familiar with the ping command and know how to use it in its basic form. However, there are many additional ping options and variations. In this guide, we will walk you through some of the most useful Linux ping commands with examples.</p> <p>The commands in this article work with any UNIX or Linux distribution.</p> <p>The ping command allows you to:</p> <ul style="list-style-type: none">• Test your internet connection.• Check if a remote machine is online.• Analyze if there are network issues, such as dropped packages or high latency. <p>When you try to "ping" a remote host, your machine starts sending ICMP echo requests and waits for a response. If the connection is established, you receive an echo reply for every request.</p> <p>How to Use the ping Command</p> <p>The basic ping syntax includes ping followed by a hostname, a name of a website, or the exact IP address.</p> <p>ping [option] [hostname] or [IP address]</p> <p>Hence, to check whether a remote host is up, in this case, <i>google.com</i>, type in your terminal:</p> <p>ping google.com</p>



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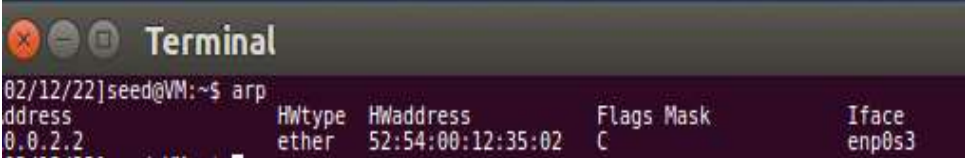
EXAMPLES:	<p>Example Pinging Google.com</p> <pre>[02/12/22]seed@VM:~\$ ping google.com PING google.com (142.250.76.206) 56(84) bytes of data: 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=1 ttl=119 time=4.42 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=2 ttl=119 time=4.34 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=3 ttl=119 time=4.88 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=4 ttl=119 time=9.97 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=5 ttl=119 time=4.25 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=6 ttl=119 time=5.40 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=7 ttl=119 time=6.90 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=8 ttl=119 time=7.30 ms 64 bytes from boml2s10-in-f14.1e100.net (142.250.76.206): icmp_seq=9 ttl=119 time=5.84 ms ^C --- google.com ping statistics --- 9 packets transmitted, 9 received, 0% packet loss, time 8046ms rtt min/avg/max/mdev = 4.257/5.926/9.971/1.767 ms [02/12/22]seed@VM:~\$</pre> <p>Example Bing com</p> <pre>[02/12/22]seed@VM:~\$ ping bing.com PING bing.com (13.107.21.200) 56(84) bytes of data: 64 bytes from 13.107.21.200: icmp_seq=1 ttl=120 time=6.55 ms 64 bytes from 13.107.21.200: icmp_seq=2 ttl=120 time=5.00 ms 64 bytes from 13.107.21.200: icmp_seq=3 ttl=120 time=4.70 ms 64 bytes from 13.107.21.200: icmp_seq=4 ttl=120 time=4.80 ms 64 bytes from 13.107.21.200: icmp_seq=5 ttl=120 time=4.65 ms 64 bytes from 13.107.21.200: icmp_seq=6 ttl=120 time=4.82 ms 64 bytes from 13.107.21.200: icmp_seq=7 ttl=120 time=4.60 ms ^C --- bing.com ping statistics --- 7 packets transmitted, 7 received, 0% packet loss, time 6036ms rtt min/avg/max/mdev = 4.603/5.021/6.550/0.639 ms [02/12/22]seed@VM:~\$</pre>
COMMANDS:	<p>ARP Command</p> <p>On Linux operating systems, the arp command manipulates or displays the kernel's IPv4 network neighbour cache. It can add entries to the table, delete one, or display the current content.</p> <p>ARP stands for Address Resolution Protocol, which is used to find the address of a network neighbor for a given IPv4 address.</p> <p>Installing arp</p> <p>Arp is part of the net-tools package. For example, on systems that use APT for package management, it can be installed with apt-get:</p> <pre>sudo apt-get update && sudo apt-get install net-tools</pre>



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EXAMPLES:	
COMMANDS:	<p>IFCONFIG Command</p> <p>ifconfig (interface configuration) is a network management tool. It is used to configure and view the status of the network interfaces in Linux operating systems. With ifconfig, you can assign IP addresses, enable or disable interfaces, manage ARP cache, routes, and more. In this article, we'll explore how to use the ifconfig command</p> <p>How to Use the ifconfig Command</p> <p>The basic syntax of the ifconfig command is shown below: ifconfig [-a] [-v] [-s] <interface> [[<AF>] <address>] Copy Where:</p> <ul style="list-style-type: none">• interface - is the name of the network interface.• address - is the IP address that you want to assign. <p>The configurations set with the ifconfig command are not persistent. After a system restart, all changes are lost. To make the changes permanent, you need to edit the distro-specific configuration files or add the commands to a startup script. Only root or users with sudo privileges can configure network interfaces</p> <p>Assign an IP address and Netmask to a Network Interface</p> <p>With the ifconfig command, you can assign an IP address and netmask to a network interface. Use the following syntax to assign the IP address and netmask: ifconfig [interface-name] [ip-address] netmask [subnet-mask]</p>



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	<p>Copy</p> <p>For example, to assign the IP address 192.168.0.101 and netmask 255.255.0.0 to the interface eth0, you would run: ifconfig eth0 192.168.0.101 netmask 255.255.0.0Copy</p> <p>You can also assign a secondary IP address to a network interface using the interface aliasing: ifconfig eth0:0 192.168.0.102 netmask 255.255.0.0</p> <p>Enable and Disable a Network Interface</p> <p>Sometimes, you may need to reset the network interface. In this case, the ifconfig command can be used to enable or disable a network interface.</p> <p>To disable an active network interface , enter the device name followed by the down flag: ifconfig eth0 downCopy</p> <p>To enable an inactive network interface, use the up flag: ifconfig eth0 up</p>
EXAMPLES:	<pre>[02/12/22]seed@VM:~\$ ifconfig enp0s3 Link encap:Ethernet HWaddr 08:00:27:b1:16:6c inet addr:10.0.2.15 Bcast:10.0.2.255 Mask:255.255.255.0 inet6 addr: fe80::c78d:ab83:43de:6dfd/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:56 errors:0 dropped:0 overruns:0 frame:0 TX packets:283 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:7141 (7.1 KB) TX bytes:27687 (27.6 KB) lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:273 errors:0 dropped:0 overruns:0 frame:0 TX packets:273 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:41989 (41.9 KB) TX bytes:41989 (41.9 KB)</pre>



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COMMANDS:	<h3 style="text-align: center;">NSLOOKUP Command</h3> <p>nslookup, which stands for "name server lookup", finds information about a named domain. By default, nslookup translates a domain name to an IP address (or vice versa). For instance, to find the IP address of microsoft.com, you could run the command: nslookup microsoft.com Server: 8.8.8.8 Address: 8.8.8.8#53 Non-authoritative answer: Name: microsoft.com Address: 134.170.185.46 Name: microsoft.com Address: 134.170.188.221</p> <h4>Technical description</h4> <p>nslookup is a program used to query Internet domain name servers for information. nslookup has two modes: interactive and non-interactive. Interactive mode allows the user to query name servers for information about various hosts</p>
EXAMPLES:	<pre>[02/12/22]seed@VM:~\$ nslookup google.com Server: 127.0.1.1 Address: 127.0.1.1#53 Non-authoritative answer: Name: google.com Address: 142.250.76.206 [02/12/22]seed@VM:~\$ nslookup 142.250.76.206 Server: 127.0.1.1 Address: 127.0.1.1#53 Non-authoritative answer: 206.76.250.142.in-addr.arpa name = bom12s10-in-f14.1e100.net. Authoritative answers can be found from: [02/12/22]seed@VM:~\$ nslookup > microsoft.com Server: 127.0.1.1 Address: 127.0.1.1#53 Non-authoritative answer: Name: microsoft.com Address: 104.215.148.63 Name: microsoft.com Address: 40.76.4.15 Name: microsoft.com Address: 40.112.72.205 Name: microsoft.com Address: 40.113.200.201 Name: microsoft.com Address: 13.77.161.179 > google.com Server: 127.0.1.1 Address: 127.0.1.1#53</pre>



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COMMANDS:

Installing Net-tools on Linux:

Netstat is part of a package named net-tools. You can get the net-tools package on Ubuntu with the command:

\$ sudo apt install net-tools

```
aqsa@aqsa-VirtualBox:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
net-tools is already the newest version (1.60+git20180626.aebd88e-lubuntu1).
The following packages were automatically installed and are no longer required:
  libfprint-2-tod1 liblvm10 linux-headers-5.8.0-40-generic linux-hwe-5.8-headers-5.8.0-40
  linux-image-5.8.0-40-generic linux-modules-5.8.0-40-generic
  linux-modules-extra-5.8.0-40-generic
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 5 not upgraded.
```

Check Version of Netstat:

Upon installation, check the installed version of Netstat:

\$ netstat -v

```
aqsa@aqsa-VirtualBox:~$ netstat -v
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 10.0.2.15:50536        111.68.98.122:8443     CLOSE_WAIT
tcp        0      0 10.0.2.15:50550        111.68.98.122:8443     CLOSE_WAIT
tcp        0      0 10.0.2.15:49326        35.224.170.84:http     SYN_SENT
tcp        0      0 10.0.2.15:50546        111.68.98.122:8443     CLOSE_WAIT
netstat: no support for 'AF_INET (sctp)' on this system.
netstat: no support for 'AF_INET (sctp)' on this system.
udp        0      0 localhost:39115         localhost:domain        ESTABLISHED
udp        0      0 10.0.2.15:47448        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:39910        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:44066        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:50551        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:38443        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:34487        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:bootpc       10.0.2.2:bootps         ESTABLISHED
udp        0      0 10.0.2.15:32862        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:50796        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:50888        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:52894        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:53823        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:53219        0.0.0.0:domain          ESTABLISHED
udp        0      0 10.0.2.15:bootpc       10.0.2.2:bootps         ESTABLISHED
Active UNIX domain sockets (w/o servers)
```

```
dave@howtogeek:~$ sudo netstat -g
IPv6/IPv4 Group Memberships
Interface RefCnt Group
-----
lo         1      224.0.0.251
lo         1      all-systems.mcast.net
enp0s3     1      224.0.0.251
enp0s3     1      all-systems.mcast.net
lo         1      ff02::fb
lo         1      ip6-allnodes
lo         1      ff01::1
enp0s3     1      ff02::1:ff16:7b64
enp0s3     1      ff02::fb
enp0s3     1      ip6-allnodes
enp0s3     1      ff01::1
dave@howtogeek:~$
```



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EXAMPLES:	<p>Netstat command in Linux:</p> <p>Display Routing table:</p> <p>Netstat command shows the routing table detail on the terminal. If you wish to see the routing table, use the -nr flag with Netstat; it shows the kernel routing table in the same way that route does. Use the below command:</p> <p>\$ netstat -nr</p> <pre>aqsa@aqsa-VirtualBox:~\$ netstat -nr Kernel IP routing table Destination Gateway Genmask Flags MSS Window irtt Iface 0.0.0.0 10.0.2.2 0.0.0.0 UG 0 0 0 enp0s3 10.0.2.0 0.0.0.0 255.255.255.0 U 0 0 0 enp0s3 169.254.0.0 0.0.0.0 255.255.0.0 U 0 0 0 enp0s3</pre> <p>Instead of using symbolic address names, the -nr option allows Netstat to print addresses divided by dots</p> <pre>[02/12/22]seed@VM:~\$ netstat -nr Kernel IP routing table Destination Gateway Genmask Flags MSS Window irtt Iface 0.0.0.0 10.0.2.2 0.0.0.0 UG 0 0 0 enp0s3 10.0.2.0 0.0.0.0 255.255.255.0 U 0 0 0 enp0s3 169.254.0.0 0.0.0.0 255.255.0.0 U 0 0 0 enp0s3 [02/12/22]seed@VM:~\$ netstat -p -tcp (Not all processes could be identified, non-owned process info will not be shown, you would have to be root to see it all.) Active Internet connections (w/o servers) Proto Recv-Q Send-Q Local Address Foreign Address State PID/Program name (Not all processes could be identified, non-owned process info will not be shown, you would have to be root to see it all.) Active Internet connections (w/o servers) Proto Recv-Q Send-Q Local Address Foreign Address State PID/Program name (Not all processes could be identified, non-owned process info will not be shown, you would have to be root to see it all.) Active Internet connections (w/o servers) Proto Recv-Q Send-Q Local Address Foreign Address State PID/Program name (Not all processes could be identified, non-owned process info will not be shown, you would have to be root to see it all.) Active Internet connections (w/o servers) Proto Recv-Q Send-Q Local Address Foreign Address State PID/Program name ^C</pre>
COMMANDS:	<p>TRACEROUTE Command</p> <p>Traceroute is a command used in network troubleshooting for mapping the path packets travel through the network. The tool aids in the discovery of possible routes of information from source to destination. Additionally, the command also helps calculate the transfer times between points</p> <p>How Does Traceroute Work?</p> <p>The protocol sends ICMP (Internet Control Message Protocol) packets to every router transferring between the source and destination. When you run a traceroute, the output displays:</p>



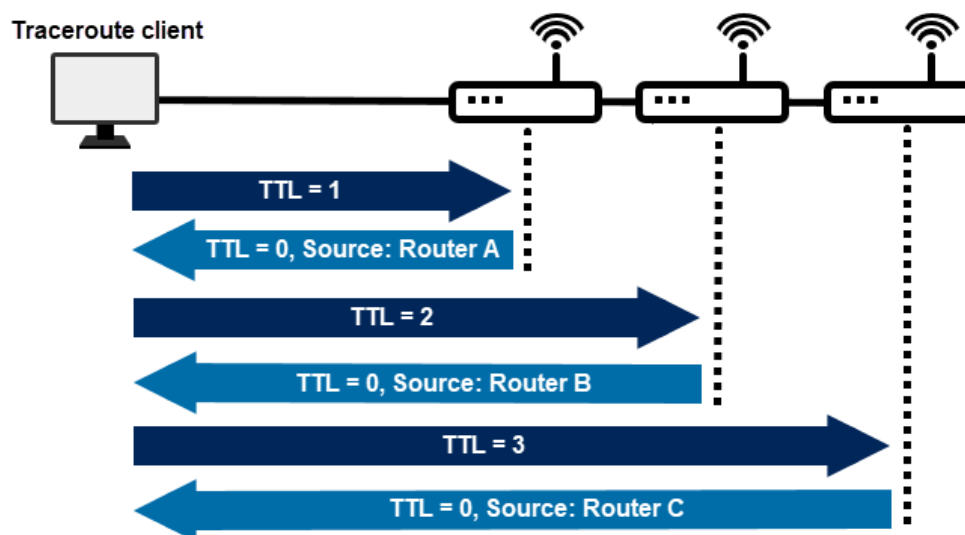
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- The IP address of the router that successfully received the packet.
- The travel latency, or the amount of time it took to get a response for each of the three probes.

Traceroute acts as a series of ping commands. While ping requests a response from the destination, traceroute gathers the intermediate information as well.



Run a Traceroute on Linux

On Ubuntu, the **traceroute** command is not available by default. Install the tool using the apt package manager.

1. Open the terminal (**CTRL+ALT+T**) and install traceroute with:

```
sudo apt install traceroute
```

2. In the terminal, run a traceroute with:

```
traceroute [options] <hostname or IP> [packet length]
```

For example, traceroute one of phoenixNAP's speed test IP locations:

```
traceroute 131.153.40.84
```




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EXAMPLES:

```
[02/12/22]seed@VM:~$ traceroute google.com
traceroute to google.com (142.250.76.206), 30 hops max, 60 byte packets
 1  10.0.2.2 (10.0.2.2)  0.240 ms  0.214 ms  0.119 ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
23  * * *
24  * * *
25  * * *
26  * * *
27  * * *
28  * * *
29  * * *
30  * * *
```

RESULT: I Learnt about the different network utilities and how to install it. We can type `sudo apt-get install` to install different utilities easily
I learnt about the different pinging commands to trace a website