

Ex. No. 1A  
21 July 2021

Network Commands  
UCS1511 - Networks Lab

Karthik D  
195001047

### Aim

To study and understand basic networking commands in linux and their usage variations

#### 1. **netstat [--tcp|-t] [--udp|-u]**

### **Description**

This command is used to display a description of the contents of the packets on a network interface. A boolean expression can be specified to filter out the results. It is referred to as a packet sniffing and analyzing tool, commonly used to troubleshoot connectivity issues

### **Options**

The following options are supported by the *netstat* command and can be used in combination

- **-D** displays the list of network interfaces available for *tcpdump* on the system
- **-i** is used to specify an interface to listen on. If not specified, it chooses an available interface with lowest number on the interface list
- **-c** is used to specify a number of packets. The *tcpdump* command exits after receiving this any packets

### **Sample Usage**

1. Option **-D** to display list of network interfaces

```
(base) karthikd@Karthik-DEBIAN:~$ sudo tcpdump -D
1.wlp2s0 [Up, Running]
2.any (Pseudo-device that captures on all interfaces) [Up, Running]
3.lo [Up, Running, Loopback]
4.eno1:avahi [Up]
5.eno1 [Up]
6.bluetooth0 (Bluetooth adapter number 0)
7.nflog (Linux netfilter log (NFLOG) interface)
8.nfqueue (Linux netfilter queue (NFQUEUE) interface)
9.usbmon1 (USB bus number 1)
10.usbmon2 (USB bus number 2)
11.usbmon3 (USB bus number 3)
12.usbmon4 (USB bus number 4)
```

## 2. Option **-i** to listen on a specific interface

```
(base) karthikd@Karthik-DEBIAN:~$ sudo tcpdump -i 2
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on any, link-type LINUX_SLL (Linux cooked), capture size 262144 bytes
13:59:45.275233 IP 192.168.0.109.8001 > st-routers.mcast.net.8001: UDP, length 184
13:59:45.276552 IP 192.168.0.105.15842 > 192.168.0.1.domain: 10405+ PTR? 7.0.0.224.in-addr.arpa. (40)
13:59:45.377178 ARP, Request who-has 192.168.0.1 tell 192.168.0.109, length 46
13:59:45.554686 IP 192.168.0.1.domain > 192.168.0.105.15842: 10405 1/0/0 PTR st-routers.mcast.net. (74)
13:59:45.555160 IP 192.168.0.105.19600 > 192.168.0.1.domain: 39384+ PTR? 109.0.168.192.in-addr.arpa. (44)
13:59:45.589131 IP 192.168.0.1.domain > 192.168.0.105.19600: 39384 NXDomain 0/1/0 (121)
13:59:45.589662 IP 192.168.0.105.55308 > 192.168.0.1.domain: 40694+ PTR? 1.0.168.192.in-addr.arpa. (42)
13:59:45.622238 IP 192.168.0.1.domain > 192.168.0.105.55308: 40694 NXDomain 0/1/0 (119)
13:59:47.323300 IP 192.168.0.109.8001 > st-routers.mcast.net.8001: UDP, length 184
13:59:47.424366 ARP, Request who-has 192.168.0.1 tell 192.168.0.109, length 46
13:59:48.141001 ARP, Request who-has 192.168.0.104 tell 192.168.0.1, length 28
13:59:48.141354 IP 192.168.0.105.46073 > 192.168.0.1.domain: 47842+ PTR? 104.0.168.192.in-addr.arpa. (44)
13:59:48.184040 IP 192.168.0.1.domain > 192.168.0.105.46073: 47842 NXDomain 0/1/0 (121)
```

## 3. Option **-c** to listen until a specific number of packets are received

```
(base) karthikd@Karthik-DEBIAN:~$ sudo tcpdump -c10
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on wlp2s0, link-type EN10MB (Ethernet), capture size 262144 bytes
14:00:58.489764 ARP, Request who-has 192.168.0.1 tell 192.168.0.109, length 46
14:00:58.491338 IP 192.168.0.105.57358 > 192.168.0.1.domain: 866+ PTR? 1.0.168.192.in-addr.arpa. (42)
14:00:58.524765 IP 192.168.0.1.domain > 192.168.0.105.57358: 866 NXDomain 0/1/0 (119)
14:00:58.525214 IP 192.168.0.105.11068 > 192.168.0.1.domain: 22278+ PTR? 109.0.168.192.in-addr.arpa. (44)
14:00:58.557361 IP 192.168.0.1.domain > 192.168.0.105.11068: 22278 NXDomain 0/1/0 (121)
14:00:58.557983 IP 192.168.0.105.37863 > 192.168.0.1.domain: 49276+ PTR? 105.0.168.192.in-addr.arpa. (44)
14:00:58.591149 IP 192.168.0.1.domain > 192.168.0.105.37863: 49276 NXDomain 0/1/0 (121)
14:00:59.003094 IP 192.168.0.109.8001 > st-routers.mcast.net.8001: UDP, length 184
14:00:59.003503 IP 192.168.0.105.63109 > 192.168.0.1.domain: 61174+ PTR? 7.0.0.224.in-addr.arpa. (40)
14:00:59.035507 IP 192.168.0.1.domain > 192.168.0.105.63109: 61174 1/0/0 PTR st-routers.mcast.net. (74)
10 packets captured
10 packets received by filter
0 packets dropped by kernel
```

## 2. netstat [--tcp|-t] [--udp|-u]

### Description

Netstat prints information about the Linux networking subsystem. It can display information about network connections, routing tables, interfaced statistics, masquerade connections and multicast memberships. The type of information printed is controlled by the first argument. By default, it displays a list of open sockets. However, specific information can be obtained by using a suitable first argument

- **-r** displays the kernel route tables
- **-g** displays multicast group membership
- **-i** displays a table of network interfaces and their reception and transmission error count
- **-M** displays a list of masqueraded connections
- **-s** displays summary statistics for each protocol

### Options

The following options are supported by the *netstat* command and can be used in combination

- **-a, --all** shows both listening and non-listening sockets

- **-l, --list** displays only the listening sockets
- **-s, --statistics** displays summary statistics for each protocol
- **-t, --tcp** displays only TCP socket connections. With **-a**, it includes listening and non-listening sockets. With **-l** it includes only the listening sockets
- **-u, --udp** displays only UDP socket connections. With **-a**, it includes listening and non-listening sockets. With **-l** it includes only the listening sockets

## Sample Usage

1. Without any arguments

```
(base) karthikd@Karthik-DEBIAN:~$ netstat | more
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 192.168.0.105:42140     maa05s26-in-f14.1:https ESTABLISHED
tcp        0      0 192.168.0.105:21970     maa03s45-in-f5.1e:https ESTABLISHED
tcp        0      0 192.168.0.105:32501     relay-058f44e1.net:http ESTABLISHED
tcp        0      0 192.168.0.105:4876      maa05s06-in-f3.1e:https ESTABLISHED
tcp        0      0 192.168.0.105:43968     maa05s19-in-f1.1e:https TIME_WAIT
tcp        0      0 192.168.0.105:58100     maa05s12-in-f4.1e:https TIME_WAIT
tcp        0      0 192.168.0.105:41790     ec2-52-13-236-190:https ESTABLISHED
tcp        0      0 192.168.0.105:28786     lb-140-82-112-26:https  ESTABLISHED
udp6       0      0 localhost:28537         localhost:28537         ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State      I-Node  Path
unix    2      [ ]          DGRAM                    20283    /run/wpa_supplicant/wlp2s0
unix    2      [ ]          DGRAM                    27507    /run/user/1000/systemd/notify
unix    4      [ ]          DGRAM                    1907     /run/systemd/notify
unix   21      [ ]          DGRAM                    1926     /run/systemd/journal/dev-log
unix    7      [ ]          DGRAM                    1941     /run/systemd/journal/socket
unix    2      [ ]          DGRAM                    20385    /run/systemd/journal/syslog
unix    2      [ ]          SEQPACKET  CONNECTED   885501
unix    2      [ ]          SEQPACKET  CONNECTED   174640
unix    3      [ ]          STREAM     CONNECTED   31745
unix    3      [ ]          DGRAM                    20835
unix    3      [ ]          SEQPACKET  CONNECTED   1181518
unix    2      [ ]          SEQPACKET  CONNECTED   1162378
unix    3      [ ]          STREAM     CONNECTED   987066    /var/run/dbus/system_bus_socket
unix    3      [ ]          STREAM     CONNECTED   62889
unix    2      [ ]          DGRAM                    32079
unix    3      [ ]          STREAM     CONNECTED   30139     @/tmp/.X11-unix/X0
unix    3      [ ]          STREAM     CONNECTED   748574
unix    3      [ ]          STREAM     CONNECTED   30491     @/tmp/dbus-RumvwBKX
unix    3      [ ]          STREAM     CONNECTED   30783
unix    2      [ ]          SEQPACKET  CONNECTED   893012
unix    2      [ ]          SEQPACKET  CONNECTED   876401
unix    3      [ ]          STREAM     CONNECTED   639488
unix    3      [ ]          STREAM     CONNECTED   62920
unix    3      [ ]          SEQPACKET  CONNECTED   1181464
unix    3      [ ]          STREAM     CONNECTED   1131919
unix    3      [ ]          STREAM     CONNECTED   31834
unix    3      [ ]          STREAM     CONNECTED   1110286
unix    2      [ ]          SEQPACKET  CONNECTED   753144
unix    3      [ ]          SEQPACKET  CONNECTED   249259
```

## 2. Option **-a**, displaying inclusive of listening and non-listening sockets

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -a | more
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:ipp            0.0.0.0:*               LISTEN
tcp        0      0 localhost:postgresql     0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:7070             0.0.0.0:*               LISTEN
tcp        0      0 192.168.0.105:42140      maa05s26-in-f14.1:https ESTABLISHED
tcp        0      0 192.168.0.105:21970      maa03s45-in-f5.1e:https ESTABLISHED
tcp        0      0 192.168.0.105:32501      relay-058f44e1.net:http ESTABLISHED
tcp        0      0 192.168.0.105:4876       maa05s06-in-f3.1e:https ESTABLISHED
tcp        0      0 192.168.0.105:41790      ec2-52-13-236-190:https ESTABLISHED
tcp        0      0 192.168.0.105:28786      lb-140-82-112-26:https  ESTABLISHED
tcp6       0      0 localhost:ipp            [::]:*                  LISTEN
tcp6       0      0 localhost:postgresql     [::]:*                  LISTEN
tcp6       0      0 [::]:3389                [::]:*                  LISTEN
tcp6       0      0 [::]:33060               [::]:*                  LISTEN
tcp6       0      0 [::]:mysql               [::]:*                  LISTEN
tcp6       0      0 [::]:http                [::]:*                  LISTEN
tcp6       0      0 localhost:3350           [::]:*                  LISTEN
udp        0      0 0.0.0.0:14689            0.0.0.0:*               *
udp        0      0 0.0.0.0:ipp              0.0.0.0:*               *
udp        0      0 0.0.0.0:43807            0.0.0.0:*               *
udp        0      0 0.0.0.0:50001            0.0.0.0:*               *
udp        0      0 0.0.0.0:mdns              0.0.0.0:*               *
udp        0      0 0.0.0.0:57028            0.0.0.0:*               *
udp        0      0 0.0.0.0:bootpc           0.0.0.0:*               *
udp        0      0 0.0.0.0:bootpc           0.0.0.0:*               *
udp6       0      0 [::]:mdns                [::]:*                  *
udp6       0      0 [::]:9759                 [::]:*                  *
udp6       0      0 localhost:28537          localhost:28537         ESTABLISHED
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type       State      I-Node    Path
unix   2      [ ACC ]     STREAM    LISTENING   30784    @/tmp/.ICE-unix/1355
unix   2      [ ACC ]     STREAM    LISTENING   27569    /tmp/ssh-0wpr53GGwdAj/agent.1261
unix   2      [ ACC ]     STREAM    LISTENING   24408    /tmp/.X11-unix/X0
unix   2      [ ACC ]     STREAM    LISTENING   24407    @/tmp/.X11-unix/X0
unix   2      [ ACC ]     STREAM    LISTENING   30785    /tmp/.ICE-unix/1355
unix   2      [ ]       DGRAM          20283    /run/wpa_supplicant/wlp2s0
unix   2      [ ACC ]     STREAM    LISTENING   22593    /run/avahi-daemon/socket
unix   2      [ ACC ]     STREAM    LISTENING   22596    /var/run/dbus/system_bus_socket
unix   2      [ ACC ]     STREAM    LISTENING   22600    /run/snapd.socket
unix   2      [ ACC ]     STREAM    LISTENING   22603    /run/snapd-snap.socket
unix   2      [ ]       DGRAM          27507    /run/user/1000/systemd/notify
```

3. Option `-s`, displaying statistical summary

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -s | more
Ip:
  Forwarding: 2
  4016694 total packets received
  19 with invalid addresses
  0 forwarded
  0 incoming packets discarded
  3995263 incoming packets delivered
  2212870 requests sent out
  1150 outgoing packets dropped
  165 dropped because of missing route
Icmp:
  267 ICMP messages received
  0 input ICMP message failed
  ICMP input histogram:
    destination unreachable: 147
    timeout in transit: 90
    echo replies: 30
  596 ICMP messages sent
  0 ICMP messages failed
  ICMP output histogram:
    destination unreachable: 566
    echo requests: 30
IcmpMsg:
  InType0: 30
  InType3: 147
  InType11: 90
  OutType3: 566
  OutType8: 30
Tcp:
  12565 active connection openings
  7 passive connection openings
  44 failed connection attempts
  715 connection resets received
  6 connections established
  842104 segments received
  654330 segments sent out
  3135 segments retransmitted
  190 bad segments received
  13360 resets sent
Udp:
  3135596 packets received
  498 packets to unknown port received
```

4. Option **-at**, displaying inclusive of listening and non-listening TCP sockets

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -at | more
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address          State
tcp        0      0 localhost:ipp            0.0.0.0:*                LISTEN
tcp        0      0 localhost:postgresql     0.0.0.0:*                LISTEN
tcp        0      0 0.0.0.0:7070             0.0.0.0:*                LISTEN
tcp        0      0 192.168.0.105:21996      maa03s45-in-f5.1e:https ESTABLISHED
tcp        0      0 192.168.0.105:42140      maa05s26-in-f14.1:https ESTABLISHED
tcp        0      0 192.168.0.105:32501      relay-058f44e1.net:http  ESTABLISHED
tcp        0      0 192.168.0.105:4876       maa05s06-in-f3.1e:https ESTABLISHED
tcp        0      0 192.168.0.105:55576      maa05s15-in-f10.1:https ESTABLISHED
tcp        0      0 192.168.0.105:28786      lb-140-82-112-26:https  ESTABLISHED
tcp6       0      0 localhost:ipp            [::]:*                  LISTEN
tcp6       0      0 localhost:postgresql     [::]:*                  LISTEN
tcp6       0      0 [::]:3389                [::]:*                  LISTEN
tcp6       0      0 [::]:33060                [::]:*                  LISTEN
tcp6       0      0 [::]:mysql                [::]:*                  LISTEN
tcp6       0      0 [::]:http                 [::]:*                  LISTEN
tcp6       0      0 localhost:3350           [::]:*                  LISTEN
```

5. Option **-au**, displaying inclusive of listening and non-listening UDP sockets

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -au | more
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address          State
udp        0      0 0.0.0.0:14689            0.0.0.0:*
udp        0      0 0.0.0.0:ipp              0.0.0.0:*
udp        0      0 0.0.0.0:43807            0.0.0.0:*
udp        0      0 0.0.0.0:50001            0.0.0.0:*
udp        0      0 0.0.0.0:mdns              0.0.0.0:*
udp        0      0 0.0.0.0:57028            0.0.0.0:*
udp        0      0 0.0.0.0:bootpc           0.0.0.0:*
udp        0      0 0.0.0.0:bootpc           0.0.0.0:*
udp6       0      0 [::]:mdns                 [::]:*
udp6       0      0 [::]:9759                  [::]:*
udp6       0      0 localhost:28537           localhost:28537          ESTABLISHED
```

6. Option **-l**, displaying listening sockets only

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -l | more
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:ipp            0.0.0.0:*               LISTEN
tcp        0      0 localhost:postgresql     0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:7070             0.0.0.0:*               LISTEN
tcp6       0      0 localhost:ipp            [::]:*                  LISTEN
tcp6       0      0 localhost:postgresql     [::]:*                  LISTEN
tcp6       0      0 [::]:3389                [::]:*                  LISTEN
tcp6       0      0 [::]:33060               [::]:*                  LISTEN
tcp6       0      0 [::]:mysql               [::]:*                  LISTEN
tcp6       0      0 [::]:http                [::]:*                  LISTEN
tcp6       0      0 localhost:3350           [::]:*                  LISTEN
udp        0      0 0.0.0.0:14689            0.0.0.0:*               *
udp        0      0 0.0.0.0:ipp              0.0.0.0:*               *
udp        0      0 0.0.0.0:43807            0.0.0.0:*               *
udp        0      0 0.0.0.0:50001            0.0.0.0:*               *
udp        0      0 0.0.0.0:mdns             0.0.0.0:*               *
udp        0      0 0.0.0.0:42298            0.0.0.0:*               *
udp        0      0 0.0.0.0:57028            0.0.0.0:*               *
udp        0      0 0.0.0.0:bootpc           0.0.0.0:*               *
udp        0      0 0.0.0.0:bootpc           0.0.0.0:*               *
udp6       0      0 [::]:mdns                [::]:*                  *
udp6       0      0 [::]:9759                [::]:*                  *
```

7. Option **-lt**, displaying listening TCP sockets only

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -lt | more
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:ipp            0.0.0.0:*               LISTEN
tcp        0      0 localhost:postgresql     0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:7070             0.0.0.0:*               LISTEN
tcp6       0      0 localhost:ipp            [::]:*                  LISTEN
tcp6       0      0 localhost:postgresql     [::]:*                  LISTEN
tcp6       0      0 [::]:3389                [::]:*                  LISTEN
tcp6       0      0 [::]:33060               [::]:*                  LISTEN
tcp6       0      0 [::]:mysql               [::]:*                  LISTEN
tcp6       0      0 [::]:http                [::]:*                  LISTEN
tcp6       0      0 localhost:3350           [::]:*                  LISTEN
```



8. Option **-lu**, displaying listening UDP sockets only

```
(base) karthikd@Karthik-DEBIAN:~$ netstat -lu | more
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp      0      0 0.0.0.0:4313             0.0.0.0:*
udp      0      0 0.0.0.0:14689            0.0.0.0:*
udp      0      0 0.0.0.0:ipp              0.0.0.0:*
udp      0      0 0.0.0.0:43807            0.0.0.0:*
udp      0      0 0.0.0.0:50001            0.0.0.0:*
udp      0      0 0.0.0.0:mdns             0.0.0.0:*
udp      0      0 0.0.0.0:57028            0.0.0.0:*
udp      0      0 0.0.0.0:bootpc           0.0.0.0:*
udp      0      0 0.0.0.0:bootpc           0.0.0.0:*
udp6     0      0 [::]:mdns                [::]:*
udp6     0      0 [::]:9759                [::]:*
```

### 3. **ifconfig [-v] [-a] [-s] [interface]**

#### Description

This command is used to configure a kernel-resident network interface. Further, it is used at boot-time to configure interfaces and normally when debugging or tuning the system. Without any arguments, it displays the status of currently active interfaces

#### Options

The following options are supported by the *ifconfig* command and can be used in combination

- **-a** shows all the interfaces which are currently available(including the ones in *down* state)
- **-s** displays a short list with reduced information about the interfaces
- **[interface]** is used to display the details and state of a specific interface
- **[interface] up** is used to activate the driver for the specified interface
- **[interface] down** is used to deactivate the driver for the specified interface



## Sample Usage

1. Without any arguments. Displays all interfaces' information

```
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig
enol: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether d4:be:d9:70:d5:f7 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 20 memory 0xf7e00000-f7e20000

enol:avahi: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 169.254.12.232 netmask 255.255.0.0 broadcast 169.254.255.255
    ether d4:be:d9:70:d5:f7 txqueuelen 1000 (Ethernet)
    device interrupt 20 memory 0xf7e00000-f7e20000

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 3174 bytes 385529 (376.4 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 3174 bytes 385529 (376.4 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.105 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::6267:20ff:fe4d:2da8 prefixlen 64 scopeid 0x20<link>
    ether 60:67:20:4d:2d:a8 txqueuelen 1000 (Ethernet)
    RX packets 4074005 bytes 4386840320 (4.0 GiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2285997 bytes 611994525 (583.6 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

2. Option **-a**, displaying all the interfaces configured on the system

```
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig -a
[sudo] password for karthikd:
eno1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether d4:be:d9:70:d5:f7 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 20 memory 0xf7e00000-f7e20000

eno1:avahi: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    inet 169.254.12.232 netmask 255.255.0.0 broadcast 169.254.255.255
    ether d4:be:d9:70:d5:f7 txqueuelen 1000 (Ethernet)
    device interrupt 20 memory 0xf7e00000-f7e20000

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 3173 bytes 385449 (376.4 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 3173 bytes 385449 (376.4 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.105 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::6267:20ff:fe4d:2da8 prefixlen 64 scopeid 0x20<link>
    ether 60:67:20:4d:2d:a8 txqueuelen 1000 (Ethernet)
    RX packets 4073959 bytes 4386835896 (4.0 GiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2285975 bytes 611984317 (583.6 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

3. Option **-s**, displaying a short list of interfaces with reduced information

```
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig -s
Iface      MTU    RX-OK RX-ERR RX-DRP RX-OVR    TX-OK TX-ERR TX-DRP TX-OVR Flg
eno1       1500      0      0      0  0          0      0      0      0  0 BMU
eno1:ava   1500      - no statistics available -          0      0      0      0  0 BMU
lo         65536   3174      0      0  0          3174      0      0      0  0 LRU
wlp2s0     1500 4074024      0      0  0        2286015      0      0      0  0 BMRU
```

4. **eth01 up**, to activate the driver for *eth01* (ethernet) interface

```
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig eno1 up
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig eno1
eno1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether d4:be:d9:70:d5:f7 txqueuelen 1000  (Ethernet)
    RX packets 0  bytes 0 (0.0 B)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 0  bytes 0 (0.0 B)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
    device interrupt 20  memory 0xf7e00000-f7e20000
```

5. **eth01 down**, to deactivate the driver for *eth01* (ethernet) interface

```
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig eno1 down
(base) karthikd@Karthik-DEBIAN:~$ sudo ifconfig eno1
eno1: flags=4098<BROADCAST,MULTICAST> mtu 1500
    ether d4:be:d9:70:d5:f7 txqueuelen 1000  (Ethernet)
    RX packets 0  bytes 0 (0.0 B)
    RX errors 0  dropped 0  overruns 0  frame 0
    TX packets 0  bytes 0 (0.0 B)
    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
    device interrupt 20  memory 0xf7e00000-f7e20000
```

#### 4. nslookup [-option] [name | -] [server]

##### Description

*nslookup* stands for Name Server Lookup. This command is used to query the internet domain name servers. It displays the name and requested information for the given host or domain. Commonly used for troubleshooting DNS problems

##### Sample Usage

1. For [www.google.com](http://www.google.com)

```
(base) karthikd@Karthik-DEBIAN:~$ nslookup www.google.com
Server:          192.168.0.1
Address:         192.168.0.1#53

Non-authoritative answer:
Name:   www.google.com
Address: 142.250.67.36
Name:   www.google.com
Address: 2404:6800:4007:804::2004
```

2. For [www.gmail.com](http://www.gmail.com)

```
(base) karthikd@Karthik-DEBIAN:~$ nslookup www.gmail.com
Server:          192.168.0.1
Address:         192.168.0.1#53

Non-authoritative answer:
www.gmail.com    canonical name = mail.google.com.
mail.google.com canonical name = googlemail.l.google.com.
Name:   googlemail.l.google.com
Address: 142.250.196.69
Name:   googlemail.l.google.com
Address: 2404:6800:4007:82b::2005
```

3. For [www.youtube.com](http://www.youtube.com)

```
(base) karthikd@Karthik-DEBIAN:~$ nslookup www.youtube.com
Server:          192.168.0.1
Address:         192.168.0.1#53

Non-authoritative answer:
www.youtube.com canonical name = youtube-ui.l.google.com.
Name:   youtube-ui.l.google.com
Address: 142.250.182.46
Name:   youtube-ui.l.google.com
Address: 142.250.182.78
Name:   youtube-ui.l.google.com
Address: 142.250.182.110
Name:   youtube-ui.l.google.com
Address: 142.250.182.142
Name:   youtube-ui.l.google.com
Address: 142.250.183.238
Name:   youtube-ui.l.google.com
Address: 142.250.193.110
Name:   youtube-ui.l.google.com
Address: 142.250.193.142
Name:   youtube-ui.l.google.com
Address: 142.250.193.174
Name:   youtube-ui.l.google.com
Address: 172.217.167.142
```

#### 4. Reverse look-up from IP address

```
(base) karthikd@Karthik-DEBIAN:~$ nslookup 142.250.67.36
36.67.250.142.in-addr.arpa      name = maa05s12-in-f4.1e100.net.

Authoritative answers can be found from:
```

#### 5. **tracert** [ -options ] host

##### Description

This command is used to route packets taken from an IP network on their way to a given host. The host can be specified by its name, which will be resolved against a DNS system, or be specified directly by its IP address. With widespread use of firewalls, the traditional traceroute mechanism may fail

##### Sample Usage

##### 1. For [www.google.com](http://www.google.com)

```
(base) karthikd@Karthik-DEBIAN:~$ traceroute www.google.com
traceroute to www.google.com (142.250.67.36), 30 hops max, 60 byte packets
 1  192.168.0.1 (192.168.0.1)  1.997 ms  2.474 ms  3.000 ms
 2  * broadband.actcorp.in (202.83.20.43)  9.347 ms *
 3  121.242.109.165.static-bangalore.vsnl.net.in (121.242.109.165)  11.272 ms  11.277 ms  11.387 ms
 4  172.31.167.46 (172.31.167.46)  17.748 ms  16.987 ms  24.407 ms
 5  121.240.1.46 (121.240.1.46)  24.472 ms  25.009 ms  24.914 ms
 6  74.125.242.129 (74.125.242.129)  17.463 ms  74.125.242.145 (74.125.242.145)  10.550 ms  10.827 ms
 7  142.250.228.83 (142.250.228.83)  22.973 ms  12.808 ms  22.471 ms
 8  maa05s12-in-f4.1e100.net (142.250.67.36)  22.362 ms  23.627 ms  23.870 ms
```

##### 2. For [www.gmail.com](http://www.gmail.com)

```
(base) karthikd@Karthik-DEBIAN:~$ traceroute www.gmail.com
traceroute to www.gmail.com (142.250.196.69), 30 hops max, 60 byte packets
 1  192.168.0.1 (192.168.0.1)  1.955 ms  2.405 ms  2.901 ms
 2  * * *
 3  121.242.109.165.static-bangalore.vsnl.net.in (121.242.109.165)  9.866 ms  9.743 ms  9.954 ms
 4  172.31.167.46 (172.31.167.46)  16.421 ms  20.335 ms *
 5  121.240.1.46 (121.240.1.46)  20.747 ms  29.939 ms  20.738 ms
 6  108.170.253.113 (108.170.253.113)  20.071 ms  11.123 ms  11.423 ms
 7  142.251.55.121 (142.251.55.121)  10.934 ms  142.250.236.157 (142.250.236.157)  13.465 ms  142.251.55.121 (142.251.55.121)  12.269 ms
 8  maa03s46-in-f5.1e100.net (142.250.196.69)  12.780 ms  14.363 ms  14.571 ms
```

3. For [www.youtube.com](http://www.youtube.com)

```
(base) karthikd@Karthik-DEBIAN:~$ traceroute www.youtube.com
traceroute to www.youtube.com (142.250.71.14), 30 hops max, 60 byte packets
 1  192.168.0.1 (192.168.0.1)  1.888 ms  2.310 ms  2.886 ms
 2  * * *
 3  121.242.109.165.static-bangalore.vsnl.net.in (121.242.109.165)  8.744 ms  8.809 ms  14.159 ms
 4  172.31.167.58 (172.31.167.58)  15.184 ms  14.136 ms  15.704 ms
 5  14.140.100.6.static-vsnl.net.in (14.140.100.6)  14.608 ms  16.285 ms  23.998 ms
 6  115.112.71.65.STDILL-Chennai.vsnl.net.in (115.112.71.65)  24.320 ms  11.679 ms  12.603 ms
 7  121.240.1.50 (121.240.1.50)  13.164 ms  12.019 ms  16.539 ms
 8  108.170.253.97 (108.170.253.97)  18.037 ms  17.934 ms  18.694 ms
 9  172.253.73.35 (172.253.73.35)  14.654 ms  172.253.73.29 (172.253.73.29)  16.735 ms  16.785 ms
10  maa03s34-in-f14.1e100.net (142.250.71.14)  15.190 ms  17.155 ms  10.051 ms
```

## 6. `ping [ -options ] destination`

### Description

This command basically sends ICMP ECHO\_REQUESTs to the specified network host. Through this datagram, it elicits an ICMP ECHO\_RESPONSE from the host or gateway. The response is used to analyse network connectivity of client, reachability of the host as well as the quality of connection in terms of packet loss

### Options

- `-v` option is used to display a verbose description of the datagram interchange between the client and the host
- `-w timeout` option is used to specify a timeout, in seconds, before the *ping* command exits

### Sample Usage

1. For [www.google.com](http://www.google.com)

```
(base) karthikd@Karthik-DEBIAN:~$ ping -v -w10 www.google.com
PING www.google.com (142.250.67.68) 56(84) bytes of data.
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=1 ttl=117 time=12.0 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=2 ttl=117 time=11.6 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=3 ttl=117 time=8.69 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=4 ttl=117 time=10.8 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=5 ttl=117 time=8.99 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=6 ttl=117 time=8.78 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=7 ttl=117 time=9.31 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=8 ttl=117 time=8.85 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=9 ttl=117 time=48.10 ms
64 bytes from maa05s13-in-f4.1e100.net (142.250.67.68): icmp_seq=10 ttl=117 time=10.3 ms

--- www.google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 23ms
rtt min/avg/max/mdev = 8.692/13.820/48.967/11.772 ms
```

2. For [www.gmail.com](http://www.gmail.com)

```
(base) karthikd@Karthik-DEBIAN:~$ ping -v -w10 www.gmail.com
PING googlemail.l.google.com (142.250.196.69) 56(84) bytes of data.
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=1 ttl=118 time=10.6 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=2 ttl=118 time=12.3 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=3 ttl=118 time=10.4 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=4 ttl=118 time=13.1 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=5 ttl=118 time=11.0 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=6 ttl=118 time=25.1 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=7 ttl=118 time=13.3 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=8 ttl=118 time=17.2 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=9 ttl=118 time=10.4 ms
64 bytes from maa03s46-in-f5.1e100.net (142.250.196.69): icmp_seq=10 ttl=118 time=74.9 ms

--- googlemail.l.google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 22ms
rtt min/avg/max/mdev = 10.421/19.845/74.938/18.853 ms
```

3. For [www.youtube.com](http://www.youtube.com)

```
PING youtube-ui.l.google.com (142.250.195.174) 56(84) bytes of data.
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=1 ttl=118 time=9.08 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=2 ttl=118 time=8.82 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=3 ttl=118 time=8.87 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=4 ttl=118 time=10.8 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=5 ttl=118 time=8.75 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=6 ttl=118 time=9.70 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=7 ttl=118 time=8.69 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=8 ttl=118 time=8.71 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=9 ttl=118 time=8.65 ms
64 bytes from maa03s41-in-f14.1e100.net (142.250.195.174): icmp_seq=10 ttl=118 time=8.67 ms

--- youtube-ui.l.google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 23ms
rtt min/avg/max/mdev = 8.646/9.075/10.821/0.660 ms
```

## **Result**

Studied and understood the basic networking commands in linux and their usage variations in using different options and arguments