

## Experiment No. 8

Aim: Use basic networking commands in Linux (Ping, Traceroute, nslookup, netstat, ARP, RARP, ip, ifconfig, dig, route), etc.

P = 300, Q = 100, R = 7

### Theory:

- Ping

⇒ It is used to test network connectivity to a host.

For e.g., ping 192.168.32.31

- Traceroute

⇒ To trace the route packets take to reach a destination.

For e.g., traceroute www.google.com

- nslookup

⇒ To query DNS servers to resolve domain names.

For e.g., nslookup www.google.com

- netstat

⇒ To display network statistics and active connections.

For e.g., netstat -an  
netstat -l

netstat -atb  
netstat -au

- arp

⇒ To display or manipulate the ARP cache.

For e.g., arp -a

- rarp

⇒ Reverse ARP, used to map MAC address

to IP addresses of hosts at the

For e.g., rarp -a

- ip

⇒ A versatile command for configuring and managing network interfaces.

For e.g., ip addr

- ifconfig

⇒ An older command for internet interface configuration.

For e.g., ifconfig.

- dig

⇒ A tool for querying DNS servers for domain information.

For e.g., dig www.google.com

- route

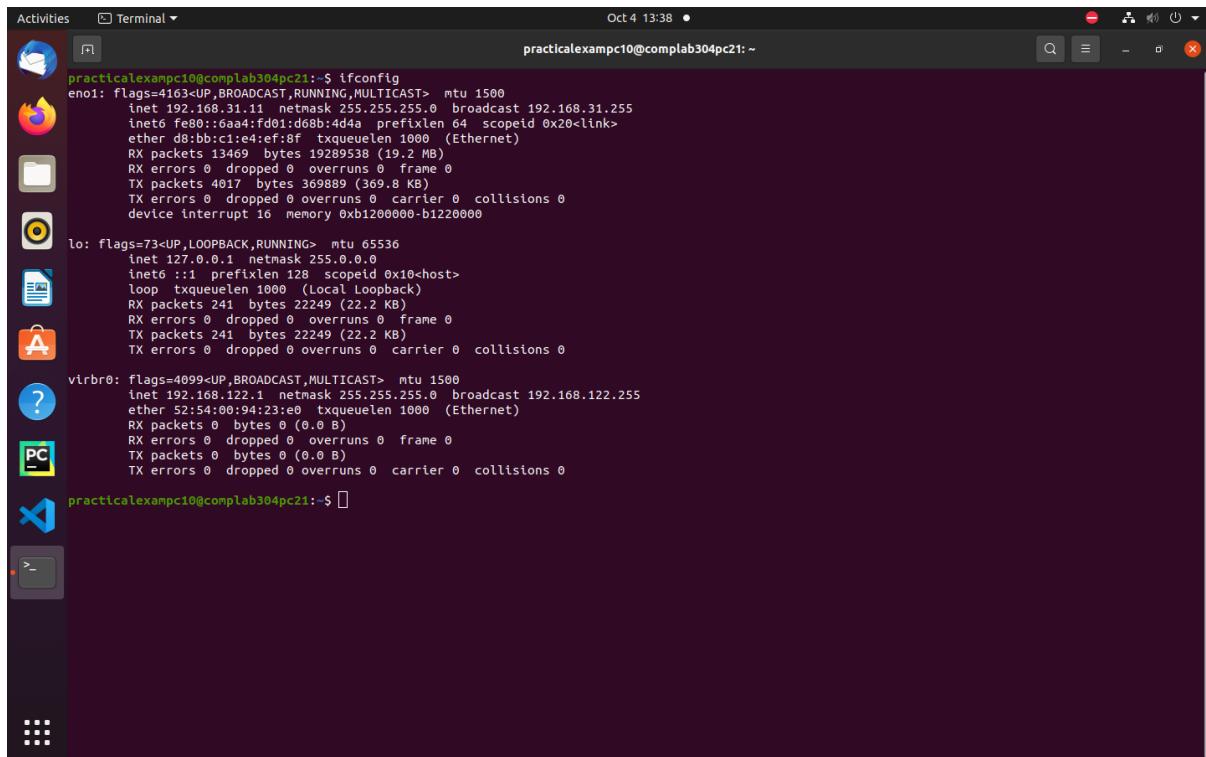
→ To view and manipulate the IP routing table.

For e.g., route -n

- These commands are essential for diagnosing and managing network-related tasks on a Linux system.

(R)  
R  
R  
R

# EXP 8



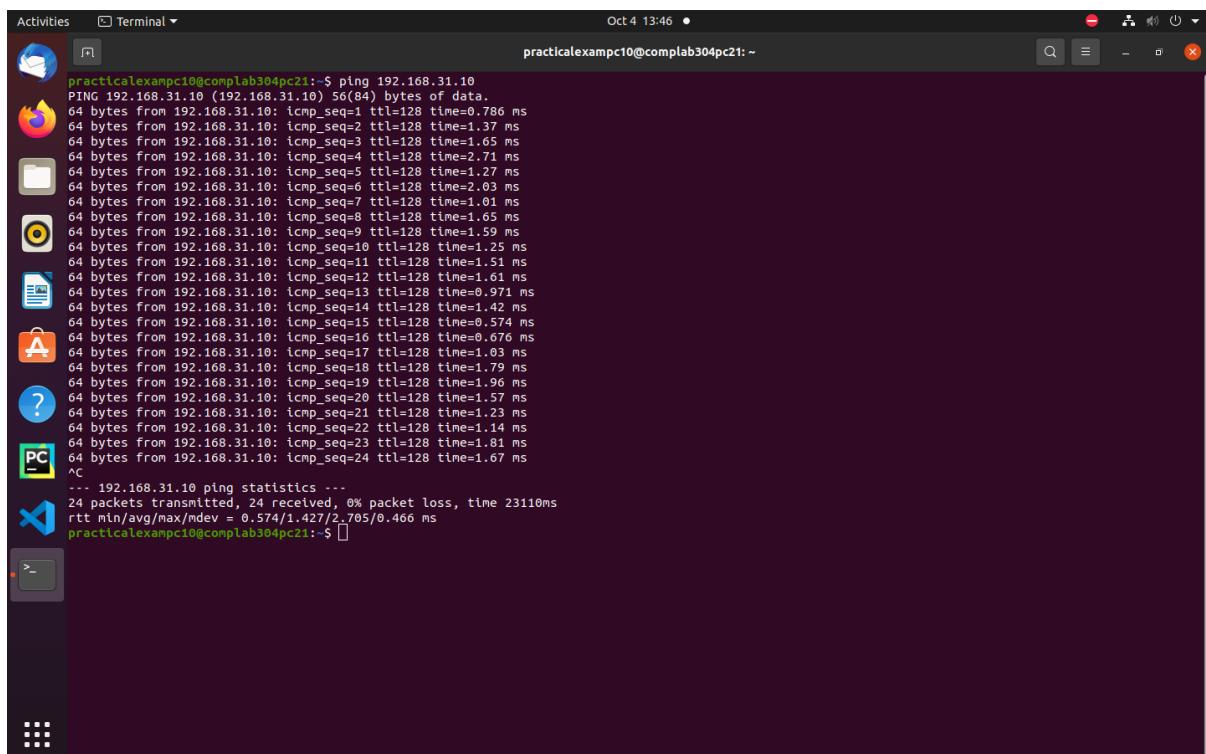
Activities Terminal Oct 4 13:38 •

```
practicalexampc10@complab304pc21:~$ ifconfig
en0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.31.11  netmask 255.255.255.0  broadcast 192.168.31.255
                inet fe80::6aa4:fd01:1d68b:4d4a  prefixlen 64  scopeid 0x20<link>
        ether d8:b8:c1:4:ef:8f  txqueuelen 1000  (Ethernet)
        RX packets 13469  bytes 19289538 (19.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 4017  bytes 369889 (369.8 KB)
        TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
        device interrupt 16  memory 0xb1200000-b1220000

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet0 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 241  bytes 22249 (22.2 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 241  bytes 22249 (22.2 KB)
        TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
                ether 52:54:00:94:23:e0  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

practicalexampc10@complab304pc21:~$
```



Activities Terminal Oct 4 13:46 •

```
practicalexampc10@complab304pc21:~$ ping 192.168.31.10
PING 192.168.31.10 (192.168.31.10) 56(84) bytes of data.
64 bytes from 192.168.31.10: icmp_seq=1 ttl=128 time=0.786 ms
64 bytes from 192.168.31.10: icmp_seq=2 ttl=128 time=1.37 ms
64 bytes from 192.168.31.10: icmp_seq=3 ttl=128 time=1.65 ms
64 bytes from 192.168.31.10: icmp_seq=4 ttl=128 time=2.71 ms
64 bytes from 192.168.31.10: icmp_seq=5 ttl=128 time=1.27 ms
64 bytes from 192.168.31.10: icmp_seq=6 ttl=128 time=2.03 ms
64 bytes from 192.168.31.10: icmp_seq=7 ttl=128 time=1.01 ms
64 bytes from 192.168.31.10: icmp_seq=8 ttl=128 time=1.65 ms
64 bytes from 192.168.31.10: icmp_seq=9 ttl=128 time=1.59 ms
64 bytes from 192.168.31.10: icmp_seq=10 ttl=128 time=1.25 ms
64 bytes from 192.168.31.10: icmp_seq=11 ttl=128 time=1.51 ms
64 bytes from 192.168.31.10: icmp_seq=12 ttl=128 time=1.61 ms
64 bytes from 192.168.31.10: icmp_seq=13 ttl=128 time=0.971 ms
64 bytes from 192.168.31.10: icmp_seq=14 ttl=128 time=1.42 ms
64 bytes from 192.168.31.10: icmp_seq=15 ttl=128 time=0.574 ms
64 bytes from 192.168.31.10: icmp_seq=16 ttl=128 time=0.676 ms
64 bytes from 192.168.31.10: icmp_seq=17 ttl=128 time=1.03 ms
64 bytes from 192.168.31.10: icmp_seq=18 ttl=128 time=1.79 ms
64 bytes from 192.168.31.10: icmp_seq=19 ttl=128 time=1.96 ms
64 bytes from 192.168.31.10: icmp_seq=20 ttl=128 time=1.57 ms
64 bytes from 192.168.31.10: icmp_seq=21 ttl=128 time=1.23 ms
64 bytes from 192.168.31.10: icmp_seq=22 ttl=128 time=1.14 ms
64 bytes from 192.168.31.10: icmp_seq=23 ttl=128 time=1.81 ms
64 bytes from 192.168.31.10: icmp_seq=24 ttl=128 time=1.67 ms
^C
... 192.168.31.10 ping statistics ...
24 packets transmitted, 24 received, 0% packet loss, time 23110ms
rtt min/avg/max/mdev = 0.574/1.427/2.705/0.466 ms
practicalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:48 ●

```
practicalexampc10@complab304pc21:~ ping -c 5 192.168.31.10
PING 192.168.31.10 (192.168.31.10) 56(84) bytes of data.
64 bytes from 192.168.31.10: icmp_seq=1 ttl=128 time=1.53 ms
64 bytes from 192.168.31.10: icmp_seq=2 ttl=128 time=1.41 ms
64 bytes from 192.168.31.10: icmp_seq=3 ttl=128 time=1.59 ms
64 bytes from 192.168.31.10: icmp_seq=4 ttl=128 time=0.884 ms
64 bytes from 192.168.31.10: icmp_seq=5 ttl=128 time=2.19 ms
...
--- 192.168.31.10 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 0.884/1.519/2.189/0.416 ms
practicalexampc10@complab304pc21:~
```

Activities Terminal Oct 4 13:48 ●

```
practicalexampc10@complab304pc21:~ traceroute www.google.com
traceroute to www.google.com (142.250.183.196), 30 hops max, 60 byte packets
1 _gateway (192.168.31.1) 0.663 ms 0.618 ms 0.597 ms
2 203.212.25.1 (203.212.25.1) 1.909 ms 1.890 ms 1.871 ms
3 203.212.24.53 (203.212.24.53) 1.852 ms 1.833 ms 2.648 ms
4 * * *
5 72.14.196.213 (72.14.196.213) 2.926 ms 2.907 ms 2.887 ms
6 108.170.248.193 (108.170.248.193) 4.319 ms 2.657 ms 2.587 ms
7 142.251.64.9 (142.251.64.9) 2.961 ms 2.900 ms 2.853 ms
8 bom07s33-in-f4.1e100.net (142.250.183.196) 2.823 ms 2.802 ms 2.782 ms
practicalexampc10@complab304pc21:~
```

```
Activities Terminal Oct 4 13:49 •
practicalexampc10@complab304pc21:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Local Address           Foreign Address         State
udp      0      @ complab304pc21:bootpc  _gateway:bootps     ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCt Flags      State          I-Node  Path
unix    2      [ ]      DGRAM          47322  /run/user/1002/systemd/notify
unix    4      [ ]      DGRAM          CONNECTED 13572  /run/systemd/notify
unix    2      [ ]      DGRAM          CONNECTED 13588  /run/systemd/journal/syslog
unix   19      [ ]      DGRAM          CONNECTED 13598  /run/systemd/journal/dev-log
unix    9      [ ]      DGRAM          CONNECTED 13602  /run/systemd/journal/socket
unix    3      [ ]      STREAM          CONNECTED 66593  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 54404  /
unix    3      [ ]      STREAM          CONNECTED 35825  /
unix    3      [ ]      STREAM          CONNECTED 49710  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 53838  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 49703  /
unix    3      [ ]      STREAM          CONNECTED 51378  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 32169  /
unix    3      [ ]      STREAM          CONNECTED 49756  /
unix    3      [ ]      STREAM          CONNECTED 35931  /run/systemd/journal/stdout
unix    3      [ ]      STREAM          CONNECTED 52647  /
unix    3      [ ]      STREAM          CONNECTED 42866  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 42832  /
unix    3      [ ]      STREAM          CONNECTED 46710  /
unix    3      [ ]      STREAM          CONNECTED 55309  /
unix    3      [ ]      STREAM          CONNECTED 49286  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 34417  /
unix    3      [ ]      STREAM          CONNECTED 28272  /
unix    3      [ ]      STREAM          CONNECTED 59446  /
unix    3      [ ]      STREAM          CONNECTED 40529  /run/systemd/journal/stdout
unix    3      [ ]      STREAM          CONNECTED 52702  /
unix    3      [ ]      STREAM          CONNECTED 58577  /
unix    3      [ ]      STREAM          CONNECTED 48543  /run/systemd/journal/stdout
unix    3      [ ]      STREAM          CONNECTED 33291  /
unix    3      [ ]      STREAM          CONNECTED 30661  /
unix    3      [ ]      STREAM          CONNECTED 35704  /
unix    3      [ ]      STREAM          CONNECTED 46547  /
unix    3      [ ]      STREAM          CONNECTED 55319  /
unix    3      [ ]      STREAM          CONNECTED 54521  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 51627  /
unix    3      [ ]      STREAM          CONNECTED 51558  /
unix    3      [ ]      STREAM          CONNECTED 39949  /
unix    3      [ ]      STREAM          CONNECTED 33269  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 57187  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 37481  /
practicalexampc10@complab304pc21:~$
```

```
Activities Terminal Oct 4 13:49 •
practicalexampc10@complab304pc21:~$ netstat
unix    3      [ ]      STREAM          CONNECTED 46831  /
unix    3      [ ]      STREAM          CONNECTED 54517  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 51444  /
unix    3      [ ]      DGRAM          CONNECTED 13574  /
unix    3      [ ]      STREAM          CONNECTED 49287  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 33276  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 42883  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 49705  /
unix    3      [ ]      STREAM          CONNECTED 33272  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 57556  @tmp/dbus-KZESQ03ghF
unix    3      [ ]      STREAM          CONNECTED 41596  /run/systemd/journal/stdout
unix    3      [ ]      STREAM          CONNECTED 21468  /
unix    3      [ ]      STREAM          CONNECTED 30603  /run/systemd/journal/stdout
unix    3      [ ]      DGRAM          CONNECTED 23640  /
unix    3      [ ]      STREAM          CONNECTED 53817  /
unix    3      [ ]      STREAM          CONNECTED 50606  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 49571  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 43946  /
unix    3      [ ]      STREAM          CONNECTED 43922  /
unix    3      [ ]      STREAM          CONNECTED 46384  /run/systemd/journal/stdout
unix    3      [ ]      STREAM          CONNECTED 34416  /
unix    3      [ ]      STREAM          CONNECTED 66591  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 50648  /
unix    2      [ ]      DGRAM          CONNECTED 53641  /
unix    3      [ ]      STREAM          CONNECTED 52690  /run/dbus/system_bus_socket
unix    3      [ ]      STREAM          CONNECTED 49708  /
unix    3      [ ]      STREAM          CONNECTED 48630  /
unix    2      [ ]      DGRAM          CONNECTED 20440  /
unix    3      [ ]      STREAM          CONNECTED 28512  /
unix    3      [ ]      STREAM          CONNECTED 54519  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 54493  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 47726  /run/user/1002/bus
unix    3      [ ]      STREAM          CONNECTED 51233  /
unix    3      [ ]      STREAM          CONNECTED 25405  /run/systemd/journal/stdout
unix    3      [ ]      STREAM          CONNECTED 52686  /
unix    3      [ ]      STREAM          CONNECTED 46711  @tmp/dbus-KZESQ03ghF
unix    3      [ ]      STREAM          CONNECTED 36722  /
unix    3      [ ]      STREAM          CONNECTED 35822  /
unix    3      [ ]      STREAM          CONNECTED 50738  /
unix    3      [ ]      STREAM          CONNECTED 49655  /
unix    3      [ ]      DGRAM          CONNECTED 31806  /
unix    3      [ ]      STREAM          CONNECTED 67866  /
unix    3      [ ]      STREAM          CONNECTED 47421  /run/systemd/journal/stdout
practicalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:50 •

```
practicalexampc10@complab304pc21:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Local Address           Foreign Address         State
tcp     0      0 localhost:domain    0.0.0.0:*             LISTEN
tcp     0      0 localhost:mysql    0.0.0.0:*             LISTEN
tcp     0      0 localhost:33060   0.0.0.0:*             LISTEN
tcp6    0      0 ip6-localhost:ipp  [::]:*                LISTEN
udp     0      0 complab304pc21:domain 0.0.0.0:*             LISTEN
udp     0      0 localhost:domain    0.0.0.0:*             LISTEN
udp     0      0 0.0.0.0:bootps    0.0.0.0:*             LISTEN
udp     0      0 complab304pc21:bootpc  _gateway:bootps      ESTABLISHED
udp     0      0 0.0.0.0:631       0.0.0.0:*             LISTEN
udp     0      0 0.0.0.0:59929    0.0.0.0:*             LISTEN
udp     0      0 0.0.0.0:mdns     0.0.0.0:*             LISTEN
udp6    0      0 [::]:32860        [::]:*                LISTEN
udp6    0      0 [::]:mdns        [::]:*                LISTEN
raw6   0      0 [::]:lpv6-icmp   [::]:*                7

Active UNIX domain sockets (servers and established)
Proto RefCmt Flags  Type      State     I-Node  Path
unix  2      [ ACC ]  STREAM    LISTENING  43993  /tmp/ssh-posylx80BGye/agent.1815
unix  2      [ ]      DGRAM     LISTENING  47322  /run/user/1002/systemd/notify
unix  2      [ ACC ]  STREAM    LISTENING  47325  /run/user/1002/systemd/private
unix  2      [ ACC ]  STREAM    LISTENING  47330  /run/user/1002/bus
unix  2      [ ACC ]  STREAM    LISTENING  47331  /run/user/1002/gnupg/S.dirmgr
unix  2      [ ACC ]  STREAM    LISTENING  47332  /run/user/1002/gnupg/S.gpg-agent.browser
unix  2      [ ACC ]  STREAM    LISTENING  47333  /run/user/1002/gnupg/S.gpg-agent.extra
unix  2      [ ACC ]  STREAM    LISTENING  47334  /run/acpid.socket
unix  2      [ ACC ]  STREAM    LISTENING  47334  /run/user/1002/gnupg/S.gpg-agent.ssh
unix  2      [ ACC ]  STREAM    LISTENING  47335  /run/user/1002/gnupg/S.gpg-agent
unix  2      [ ACC ]  STREAM    LISTENING  28221  /run/avahi-daemon/socket
unix  2      [ ACC ]  STREAM    LISTENING  47336  /run/user/1002/pk-debconf-socket
unix  2      [ ACC ]  STREAM    LISTENING  28223  /run/cups/cups.sock
unix  2      [ ACC ]  STREAM    LISTENING  47337  /run/user/1002/pulse/native
unix  2      [ ACC ]  STREAM    LISTENING  47338  /run/user/1002/snappy-session-agent.socket
unix  2      [ ACC ]  STREAM    LISTENING  28225  /run/dbus/system_bus_socket
unix  2      [ ACC ]  STREAM    LISTENING  41616  /tmp/.X11-unix/X0
unix  2      [ ACC ]  STREAM    LISTENING  28227  /run/libvirt/libvirt-sock
unix  2      [ ACC ]  STREAM    LISTENING  35620  /tmp/.ICE-unix/1920
unix  2      [ ACC ]  STREAM    LISTENING  35619  @tmp/.ICE-unix/1920
unix  2      [ ACC ]  STREAM    LISTENING  28229  /run/snappy.socket
unix  2      [ ACC ]  STREAM    LISTENING  28231  /run/snappy.snap.socket
unix  2      [ ACC ]  STREAM    LISTENING  28233  /run/uuid/request
unix  2      [ ACC ]  STREAM    LISTENING  28235  /run/libvirt/virtlockd-sock
unix  2      [ ACC ]  STREAM    LISTENING  41615  @/tmp/.X11-unix/X0
```

Activities Terminal Oct 4 13:50 •

```
practicalexampc10@complab304pc21:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Local Address           Foreign Address         State
tcp     3      [ ]      STREAM    CONNECTED  46831  /run/user/1002/bus
tcp     3      [ ]      STREAM    CONNECTED  54517  /run/user/1002/bus
tcp     3      [ ]      STREAM    CONNECTED  51444
tcp     3      [ ]      DGRAM     CONNECTED  13574
tcp     3      [ ]      STREAM    CONNECTED  49287
tcp     3      [ ]      STREAM    CONNECTED  33276
tcp     3      [ ]      STREAM    CONNECTED  42883
tcp     3      [ ]      STREAM    CONNECTED  49705
tcp     3      [ ]      STREAM    CONNECTED  33272
tcp     3      [ ]      STREAM    CONNECTED  57556
tcp     3      [ ]      STREAM    CONNECTED  41596
tcp     3      [ ]      STREAM    CONNECTED  21468
tcp     3      [ ]      STREAM    CONNECTED  30603
tcp     3      [ ]      DGRAM     CONNECTED  23640
tcp     3      [ ]      STREAM    CONNECTED  53817
tcp     3      [ ]      STREAM    CONNECTED  50606
tcp     3      [ ]      STREAM    CONNECTED  49571
tcp     3      [ ]      STREAM    CONNECTED  43946
tcp     3      [ ]      STREAM    CONNECTED  43922
tcp     3      [ ]      STREAM    CONNECTED  46384
tcp     3      [ ]      STREAM    CONNECTED  34416
tcp     3      [ ]      STREAM    CONNECTED  66591
tcp     3      [ ]      STREAM    CONNECTED  50648
tcp     2      [ ]      DGRAM     CONNECTED  53641
tcp     3      [ ]      STREAM    CONNECTED  52690
tcp     3      [ ]      STREAM    CONNECTED  49708
tcp     3      [ ]      STREAM    CONNECTED  48630
tcp     2      [ ]      DGRAM     CONNECTED  20440
tcp     3      [ ]      STREAM    CONNECTED  28512
tcp     3      [ ]      STREAM    CONNECTED  54519
tcp     3      [ ]      STREAM    CONNECTED  54493
tcp     3      [ ]      STREAM    CONNECTED  47726
tcp     3      [ ]      STREAM    CONNECTED  51233
tcp     3      [ ]      STREAM    CONNECTED  25405
tcp     3      [ ]      STREAM    CONNECTED  52686
tcp     3      [ ]      STREAM    CONNECTED  46711
tcp     3      [ ]      STREAM    CONNECTED  36722
tcp     3      [ ]      STREAM    CONNECTED  35822
tcp     3      [ ]      STREAM    CONNECTED  50738
tcp     3      [ ]      STREAM    CONNECTED  49655
tcp     3      [ ]      DGRAM     CONNECTED  31806
tcp     3      [ ]      STREAM    CONNECTED  67866
tcp     3      [ ]      STREAM    CONNECTED  47421
tcp     3      [ ]      STREAM    CONNECTED  47421  /run/systemd/journal/stdout
```

Activities Terminal Oct 4 13:51 ● practicalalexampc10@complab304pc21:~

```
practicalalexampc10@complab304pc21:~$ netstat -at
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp     0      0 localhost:domain          0.0.0.0:*              LISTEN
tcp     0      0 localhost:mysql            0.0.0.0:*              LISTEN
tcp     0      0 localhost:ipp             0.0.0.0:*              LISTEN
tcp     0      0 complab304pc21:domain   0.0.0.0:*              LISTEN
tcp6    0      0 ip6-localhost:ipp        [::]:*                LISTEN
practicalalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:51 ● practicalalexampc10@complab304pc21:~

```
practicalalexampc10@complab304pc21:~$ netstat -au
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp    0      0 complab304pc21:domain   0.0.0.0:*              LISTEN
udp    0      0 localhost:domain          0.0.0.0:*              LISTEN
udp    0      0 0.0.0.0:bootps          0.0.0.0:*              LISTEN
udp    0      0 complab304pc21:bootpc  _gateway:bootps        ESTABLISHED
udp    0      0 0.0.0.0:631             0.0.0.0:*              LISTEN
udp    0      0 0.0.0.0:59929            0.0.0.0:*              LISTEN
udp    0      0 0.0.0.0:mdns             0.0.0.0:*              LISTEN
udp6   0      0 [::]:32860              [::]:*                LISTEN
udp6   0      0 [::]:mdns              [::]:*                LISTEN
practicalalexampc10@complab304pc21:~$
```

```
Activities Terminal Oct 4 13:52 • practicalalexampc10@complab304pc21:~$ netstat -l
Active Internet connections (only servers)
Proto Recv-Q Local Address           Foreign Address         State
tcp     0      localhost:domain     0.0.0.0:*          LISTEN
tcp     0      localhost:mysql     0.0.0.0:*          LISTEN
tcp     0      localhost:ipp       0.0.0.0:*          LISTEN
tcp     0      localhost:33060    0.0.0.0:*          LISTEN
tcp     0      complab304pc21:domain 0.0.0.0:*          LISTEN
tcp6    0      ip6-localhost:ipp     [::]:*             LISTEN
udp    0      0.0.0.0:59929      0.0.0.0:*          LISTEN
udp    0      0.0.0.0:mdns       0.0.0.0:*          LISTEN
udp6   0      [::]:32860        [::]:*             LISTEN
udp6   0      [::]:mdns        [::]:*             LISTEN
raw6   0      0.0.0.0:ipv6-icmp  [::]:*             7
Active UNIX domain sockets (only servers)
Proto RefCnt Flags       Type      State      I-Node Path
unix  2      [ ACC ]     STREAM    LISTENING  43993  /tmp/ssh-posYlx80BGye/agent.1815
unix  2      [ ACC ]     STREAM    LISTENING  47325  /run/user/1002/systemd/private
unix  2      [ ACC ]     STREAM    LISTENING  47336  /run/user/1002/bus
unix  2      [ ACC ]     STREAM    LISTENING  47331  /run/user/1002/gnupg/S.dirmngr
unix  2      [ ACC ]     STREAM    LISTENING  47332  /run/user/1002/gnupg/S.gpg-agent.browser
unix  2      [ ACC ]     STREAM    LISTENING  47333  /run/user/1002/gnupg/S.gpg-agent.extra
unix  2      [ ACC ]     STREAM    LISTENING  28219  /run/acpid.socket
unix  2      [ ACC ]     STREAM    LISTENING  47334  /run/user/1002/gnupg/S.gpg-agent.ssh
unix  2      [ ACC ]     STREAM    LISTENING  47335  /run/user/1002/gnupg/S.gpg-agent
unix  2      [ ACC ]     STREAM    LISTENING  28221  /run/avahi-daemon/socket
unix  2      [ ACC ]     STREAM    LISTENING  47336  /run/user/1002/pk-debconf-socket
unix  2      [ ACC ]     STREAM    LISTENING  28223  /run/cups/cups.sock
unix  2      [ ACC ]     STREAM    LISTENING  47337  /run/user/1002/pulse/native
unix  2      [ ACC ]     STREAM    LISTENING  47338  /run/user/1002/snappy-session-agent.socket
unix  2      [ ACC ]     STREAM    LISTENING  28225  /run/dbus/system_bus_socket
unix  2      [ ACC ]     STREAM    LISTENING  41616  /tmp/X11-unix/X0
unix  2      [ ACC ]     STREAM    LISTENING  28227  /run/libvirt/libvirt-sock
unix  2      [ ACC ]     STREAM    LISTENING  35620  /tmp/ICE-unix/1920
unix  2      [ ACC ]     STREAM    LISTENING  35619  @tmp/ICE-unix/1920
unix  2      [ ACC ]     STREAM    LISTENING  28229  /run/snapd.socket
unix  2      [ ACC ]     STREAM    LISTENING  28231  /run/snapd-snap.socket
unix  2      [ ACC ]     STREAM    LISTENING  28233  /run/uuid/request
unix  2      [ ACC ]     STREAM    LISTENING  28235  /run/libvirt/virtlockd-sock
unix  2      [ ACC ]     STREAM    LISTENING  41615  @tmp/X11-unix/X0
unix  2      [ ACC ]     STREAM    LISTENING  28237  /run/libvirt/virtlockd-admin-sock
unix  2      [ ACC ]     STREAM    LISTENING  28239  /run/libvirt/virtlockd-admin-sock
Oct 4 13:52 • practicalalexampc10@complab304pc21:~$
```

```
Activities Terminal Oct 4 13:52 • practicalalexampc10@complab304pc21:~$ netstat -l
Active Internet connections (only servers)
Proto RefCnt Flags       Type      State      I-Node Path
unix  2      [ ACC ]     STREAM    LISTENING  47332  /run/user/1002/gnupg/S.gpg-agent.browser
unix  2      [ ACC ]     STREAM    LISTENING  47333  /run/user/1002/gnupg/S.gpg-agent.extra
unix  2      [ ACC ]     STREAM    LISTENING  28219  /run/acpid.socket
unix  2      [ ACC ]     STREAM    LISTENING  47334  /run/user/1002/gnupg/S.gpg-agent.ssh
unix  2      [ ACC ]     STREAM    LISTENING  47335  /run/user/1002/gnupg/S.gpg-agent
unix  2      [ ACC ]     STREAM    LISTENING  28221  /run/avahi-daemon/socket
unix  2      [ ACC ]     STREAM    LISTENING  47336  /run/user/1002/pk-debconf-socket
unix  2      [ ACC ]     STREAM    LISTENING  28223  /run/cups/cups.sock
unix  2      [ ACC ]     STREAM    LISTENING  47337  /run/user/1002/pulse/native
unix  2      [ ACC ]     STREAM    LISTENING  28225  /run/dbus/system_bus_socket
unix  2      [ ACC ]     STREAM    LISTENING  41616  /tmp/X11-unix/X0
unix  2      [ ACC ]     STREAM    LISTENING  28227  /run/libvirt/libvirt-sock
unix  2      [ ACC ]     STREAM    LISTENING  35620  /tmp/ICE-unix/1920
unix  2      [ ACC ]     STREAM    LISTENING  35619  @tmp/ICE-unix/1920
unix  2      [ ACC ]     STREAM    LISTENING  28229  /run/snapd.socket
unix  2      [ ACC ]     STREAM    LISTENING  28231  /run/snapd-snap.socket
unix  2      [ ACC ]     STREAM    LISTENING  28233  /run/uuid/request
unix  2      [ ACC ]     STREAM    LISTENING  28235  /run/libvirt/virtlockd-sock
unix  2      [ ACC ]     STREAM    LISTENING  41615  @tmp/X11-unix/X0
unix  2      [ ACC ]     STREAM    LISTENING  28237  /run/libvirt/virtlockd-admin-sock
unix  2      [ ACC ]     STREAM    LISTENING  28239  /run/libvirt/virtlockd-admin-sock
unix  2      [ ACC ]     STREAM    LISTENING  28241  /run/libvirt/virtlogd-admin-sock
unix  2      [ ACC ]     STREAM    LISTENING  28249  /run/libvirt/libvirt-admin-sock
unix  2      [ ACC ]     STREAM    LISTENING  39794  /run/user/1002/keyring/control
unix  2      [ ACC ]     STREAM    LISTENING  28251  /run/libvirt/libvirt-sock-ro
unix  2      [ ACC ]     STREAM    LISTENING  51299  /run/user/1002/keyring/pkcs11
unix  2      [ ACC ]     STREAM    LISTENING  38678  @tmp/dbus-IdBHHSBv
unix  2      [ ACC ]     STREAM    LISTENING  40528  /var/run/mysql/mysqld.sock
unix  2      [ ACC ]     STREAM    LISTENING  47679  /run/user/1002/keyring/sh
unix  2      [ ACC ]     STREAM    LISTENING  40671  /var/run/mysql/mysqld.sock
unix  2      [ ACC ]     STREAM    LISTENING  38677  @tmp/dbus-ojvxGGrG
unix  2      [ ACC ]     STREAM    LISTENING  36994  /run/irqbalance/irqbalance844.sock
unix  2      [ ACC ]     STREAM    LISTENING  50509  @tmp/dbus-KZESQ03ghF
unix  2      [ ACC ]     STREAM    LISTENING  13575  /run/systemd/private
unix  2      [ ACC ]     STREAM    LISTENING  46548  @/home/practicalalexampc10/.cache/ibus/dbus-nVp84MjN
unix  2      [ ACC ]     STREAM    LISTENING  13577  /run/systemd/userdb/io.systemd.DynamicUser
unix  2      [ ACC ]     STREAM    LISTENING  13586  /run/lvm/lvmpoolid.socket
unix  2      [ ACC ]     STREAM    LISTENING  13590  /run/systemd/fsck.progress
unix  2      [ ACC ]     STREAM    LISTENING  13600  /run/systemd/journal/stdout
unix  2      [ ACC ]     SEQPACKET  LISTENING  13604  /run/udev/control
unix  2      [ ACC ]     STREAM    LISTENING  19548  /run/systemd/journal/io.systemd.journal
unix  2      [ ACC ]     STREAM    LISTENING  36501  @/tmp/dbus-AlI6ws42
unix  2      [ ACC ]     STREAM    LISTENING  36502  @/tmp/dbus-hNR9WAGP
Oct 4 13:52 • practicalalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:53 ● practicalalexampc10@complab304pc21: ~

```
practicalalexampc10@complab304pc21:~$ netstat -s
Ip:
Forwarding: 1
10154 total packets received
0 forwarded
0 incoming packets discarded
10118 incoming packets delivered
4796 requests sent out
20 outgoing packets dropped
1 dropped because of missing route
Icmp:
272 ICMP messages received
0 input ICMP message failed
ICMP input histogram:
    destination unreachable: 103
    timeout in transit: 18
    echo replies: 151
508 ICMP messages sent
0 ICMP messages failed
ICMP output histogram:
    destination unreachable: 92
    echo requests: 416
IcmpMsg:
InType0: 151
InType3: 103
InType11: 18
OutType3: 92
OutType8: 416
Tcp:
32 active connection openings
0 passive connection openings
4 failed connection attempts
0 connection resets received
0 connections established
8296 segments received
3965 segments sent out
18 segments retransmitted
0 bad segments received
35 resets sent
Udp:
993 packets received
44 packets to unknown port received
0 packet receive errors
469 packets sent
0 receive buffer errors
0 send buffer errors
0 receive buffer errors
0 send buffer errors
```

Activities Terminal Oct 4 13:53 ● practicalalexampc10@complab304pc21: ~

```
practicalalexampc10@complab304pc21: ~
```

```
44 packets to unknown port received
0 packet receive errors
469 packets sent
0 receive buffer errors
0 send buffer errors
IgnoredMulti: 462
Udppipe:
TcpExt:
12 TCP sockets finished time wait in fast timer
9 delayed acks sent
1 delayed acks further delayed because of locked socket
2938 packet headers predicted
50 acknowledgments not containing data payload received
17 predicted acknowledgments
TCPLostRetransmit: 14
TCPTimeouts: 18
TCPLossProbes: 2
5 connections reset due to unexpected data
2 connections aborted due to timeout
IPReversePathFilter: 1
TCPRcvCoalesce: 4465
TCPOffQueue: 4989
TCPAutoCorking: 7
TCPOrigDataSent: 126
TCPDelivered: 145
TCPAckCompressed: 3508
TcpTimeoutRehash: 16
IpExt:
InNoRoutes: 2
InMcastPkts: 710
OutMcastPkts: 111
InBcastPkts: 462
OutBcastPkts: 2
InOctets: 19071200
OutOctets: 373169
InMcastOctets: 100108
OutMcastOctets: 8323
InBcastOctets: 79729
OutBcastOctets: 108
InNoECTPkts: 14945
InECT1Pkts: 2
InECT0Pkts: 13
InEPkts: 6
MPTcpExt:
practicalalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:54 • practicalalexampc10@complab304pc21:~

```
practicalalexampc10@complab304pc21:~$ nslookup -type=mx gmail.com
Server:      127.0.0.53
Address:    127.0.0.53#53

Non-authoritative answer:
gmail.com      mail exchanger = 30 alt3.gmail-smtp-in.l.google.com.
gmail.com      mail exchanger = 5 gmail-smtp-in.l.google.com.
gmail.com      mail exchanger = 20 alt2.gmail-smtp-in.l.google.com.
gmail.com      mail exchanger = 10 alt1.gmail-smtp-in.l.google.com.
gmail.com      mail exchanger = 40 alt4.gmail-smtp-in.l.google.com.

Authoritative answers can be found from:
practicalalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:59 • practicalalexampc10@complab304pc21:~

```
practicalalexampc10@complab304pc21:~$ dig www.google.com
; <>> DiG 9.16.1-Ubuntu <><> www.google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<- opcode: QUERY, status: NOERROR, id: 56532
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: udp: 65494
;; QUESTION SECTION:
;www.google.com.           IN      A
;; ANSWER SECTION:
www.google.com.        187     IN      A       142.250.183.196
;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Oct 04 13:59:11 IST 2023
;; MSG SIZE  rcvd: 59
practicalalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 13:59 ● practicalalexampc10@complab304pc21: ~

```
practicalalexampc10@complab304pc21:~$ arp
Address          HWtype  HWaddress           Flags Mask     Iface
192.168.31.17    ether    a4:ae:12:84:81:2e  C      eno1
192.168.31.21    ether    d8:bb:c1:c2:9a:72  C      eno1
192.168.31.31    ether    (incomplete)
_gateway         ether    9c:53:22:05:6a:19  C      eno1
192.168.31.10    ether    d8:bb:c1:c2:99:72  C      eno1
practicalalexampc10@complab304pc21:~$
```

Activities Terminal Oct 4 14:00 ● practicalalexampc10@complab304pc21: ~

```
practicalalexampc10@complab304pc21:~$ ip address
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether d8:bb:c1:e4:ef:8f brd ff:ff:ff:ff:ff:ff
    altname enp0s31f6
    inet 192.168.31.11/24 brd 192.168.31.255 scope global dynamic noprefixroute eno1
        valid_lft 5781sec preferred_lft 5781sec
    inet6 fe80::6a4:fd01:d08b:4d4a/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default qlen 1000
    link/ether 52:54:00:94:23:ee brd ff:ff:ff:ff:ff:ff
    inet 192.168.122.1/24 brd 192.168.122.255 scope global virbr0
        valid_lft forever preferred_lft forever
4: virbr0-nic: <BROADCAST,MULTICAST> mtu 1500 qdisc fq_codel master virbr0 state DOWN group default qlen 1000
    link/ether 52:54:00:94:23:e0 brd ff:ff:ff:ff:ff:ff
practicalalexampc10@complab304pc21:~$
```