

Experiment No. 1

Familiarization with Networking Commands

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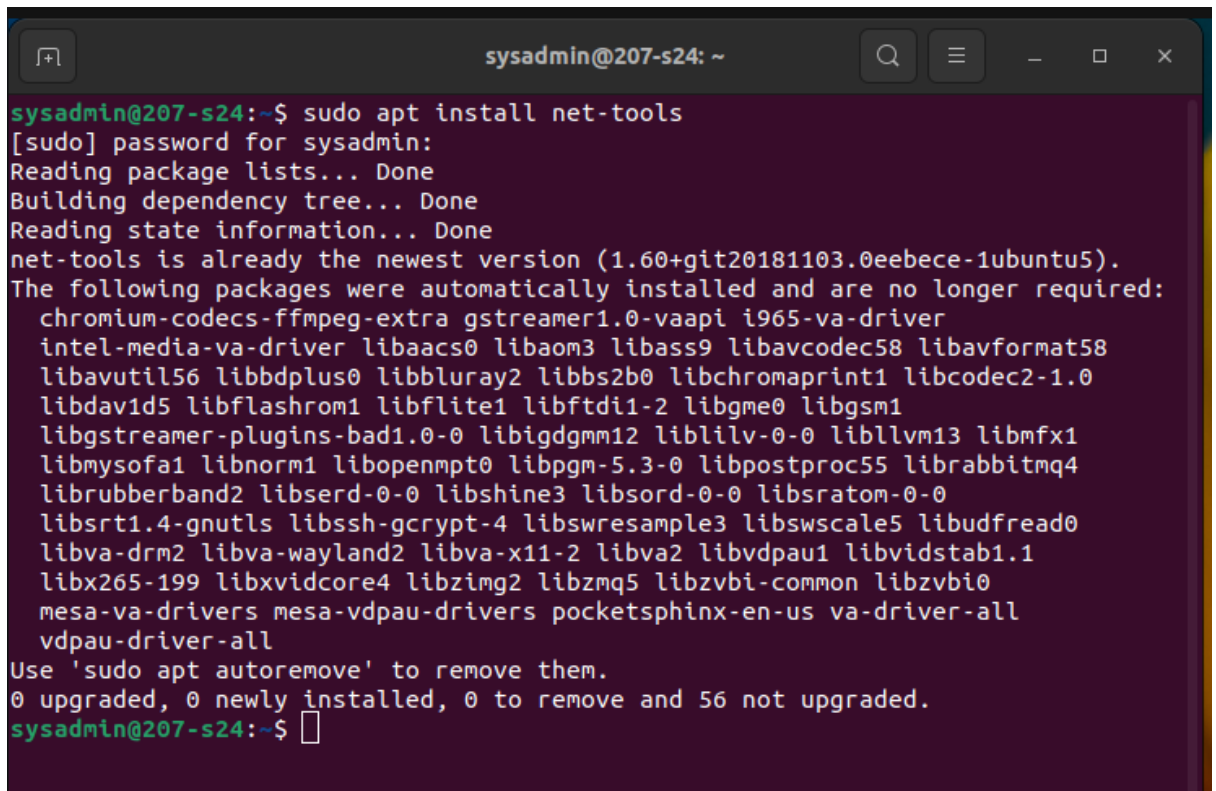
Roll No.: ECE/21152

AIM: To study the basic networking commands.

APPARATUS (Software): Linux OS and Terminal.

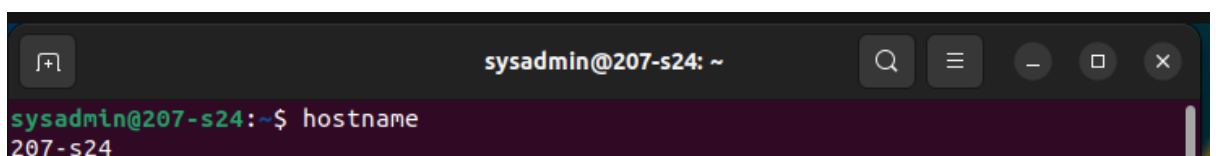
TASKS:

1. Install net-tools using **sudo apt install <package name>**

A terminal window titled 'sysadmin@207-s24: ~' showing the command 'sudo apt install net-tools'. The output indicates that net-tools is already the newest version (1.60+git20181103.0eebece-1ubuntu5) and lists 56 automatically installed packages that are no longer required. The user is prompted to use 'sudo apt autoremove' to remove them. The terminal shows 0 upgraded, 0 newly installed, 0 to remove, and 56 not upgraded.

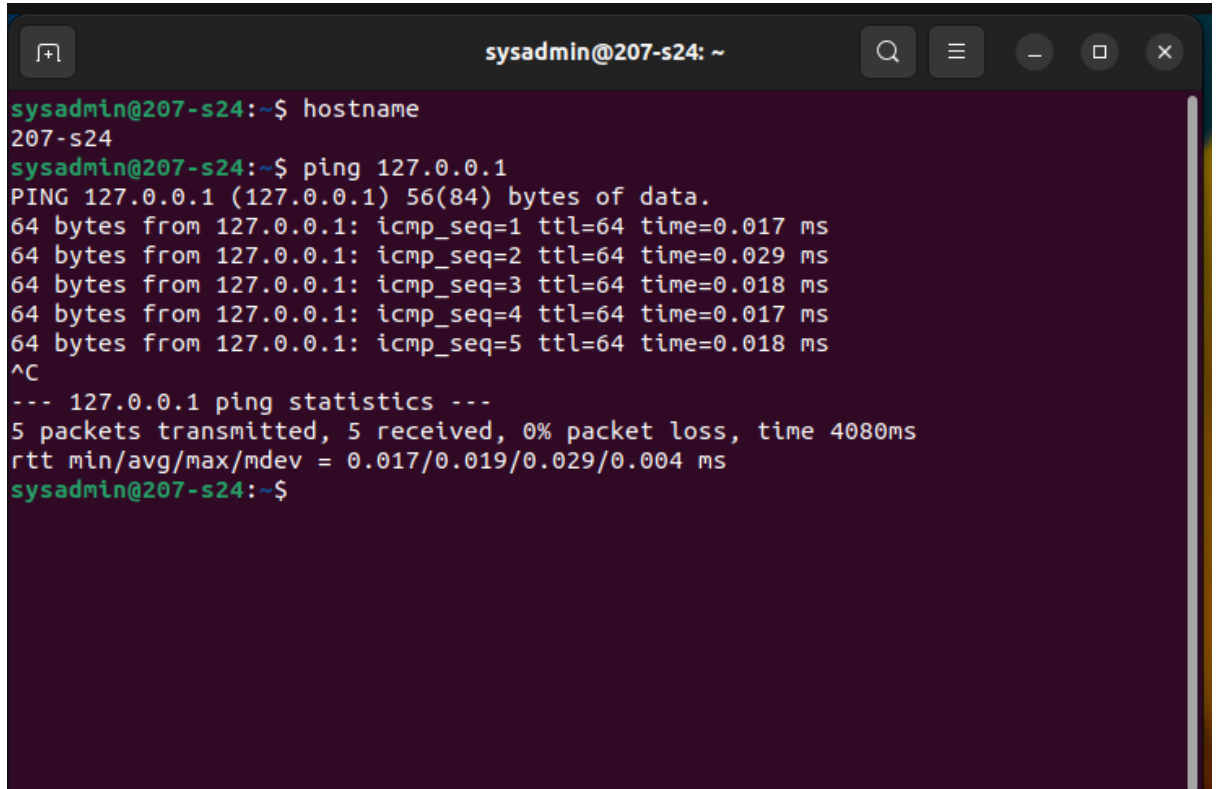
```
sysadmin@207-s24:~$ sudo apt install net-tools
[sudo] password for sysadmin:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
net-tools is already the newest version (1.60+git20181103.0eebece-1ubuntu5).
The following packages were automatically installed and are no longer required:
  chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi i965-va-driver
  intel-media-va-driver libaacs0 libaom3 libass9 libavcodec58 libavformat58
  libavutil56 libbdplus0 libbluray2 libbs2b0 libchromaprint1 libcodec2-1.0
  libdavid5 libflashrom1 libflite1 libftdi1-2 libgme0 libgsm1
  libgstreamer-plugins-bad1.0-0 libigdgmm12 liblilv-0-0 libllvm13 libmfx1
  libmysofa1 libnorm1 libopenmpt0 libpgm-5.3-0 libpostproc55 librabbitmq4
  librubberband2 libserd-0-0 libshine3 libsord-0-0 libsratom-0-0
  libsrt1.4-gnutls libssh-gcrypt-4 libswresample3 libswscale5 libudfread0
  libva-drm2 libva-wayland2 libva-x11-2 libva2 libvdpau1 libvidstab1.1
  libx265-199 libxvidcore4 libzimg2 libzmq5 libzvbi-common libzvbi0
  mesa-va-drivers mesa-va-drivers pocketsphinx-en-us va-driver-all
  vdpau-driver-all
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 56 not upgraded.
sysadmin@207-s24:~$
```

2. Use a command to display the name of your computer.

A terminal window titled 'sysadmin@207-s24: ~' showing the command 'hostname'. The output is '207-s24'.

```
sysadmin@207-s24:~$ hostname
207-s24
```

3. Use a command to check whether a system is connected to a network or not.

A terminal window titled 'sysadmin@207-s24: ~' with standard window controls. The terminal shows the execution of 'hostname' and 'ping 127.0.0.1' commands. The 'ping' command output shows five successful packets with varying times. The user then presses Ctrl-C (^C) to stop the ping, and the terminal displays the 'ping statistics' summary, indicating 0% packet loss and a total time of 4080ms.

```
sysadmin@207-s24:~$ hostname
207-s24
sysadmin@207-s24:~$ ping 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.017 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.029 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.018 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.017 ms
64 bytes from 127.0.0.1: icmp_seq=5 ttl=64 time=0.018 ms
^C
--- 127.0.0.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4080ms
rtt min/avg/max/mdev = 0.017/0.019/0.029/0.004 ms
sysadmin@207-s24:~$
```

4. Use a command to display statistics of your network.

```

sysadmin@207-s24:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 207-s24:bootpc         _gateway:bootps        ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags   Type       State         I-Node  Path
unix   3      [ ]     STREAM    CONNECTED    29275    /run/systemd/journal/stdout
unix   3      [ ]     STREAM    CONNECTED    28159    /run/user/1000/bus
unix   3      [ ]     STREAM    CONNECTED    24514
unix   3      [ ]     STREAM    CONNECTED    24464
unix   3      [ ]     STREAM    CONNECTED    24960
unix   3      [ ]     STREAM    CONNECTED    30768
unix   3      [ ]     STREAM    CONNECTED    28103
unix   3      [ ]     STREAM    CONNECTED    23090    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    30785    /run/user/1000/pulse/native
unix   3      [ ]     STREAM    CONNECTED    29326    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    26476    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    42982
unix   3      [ ]     STREAM    CONNECTED    30103
unix   3      [ ]     STREAM    CONNECTED    27316
unix   2      [ ]     DGRAM     CONNECTED    24649
unix   3      [ ]     STREAM    CONNECTED    28435    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    29222
unix   3      [ ]     STREAM    CONNECTED    24201    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    28277    /run/user/1000/at-spi/bus
unix   3      [ ]     STREAM    CONNECTED    23699
unix   3      [ ]     STREAM    CONNECTED    23088    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    39962
unix   3      [ ]     STREAM    CONNECTED    29394
unix   3      [ ]     STREAM    CONNECTED    22748
unix   3      [ ]     STREAM    CONNECTED    31123    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    28279
unix   3      [ ]     STREAM    CONNECTED    28264
unix   2      [ ]     DGRAM     CONNECTED    25513
unix   3      [ ]     STREAM    CONNECTED    30756
unix   3      [ ]     STREAM    CONNECTED    26418    /run/dbus/system_bus_socket
unix   3      [ ]     STREAM    CONNECTED    23702    /run/systemd/journal/stdout
unix   3      [ ]     STREAM    CONNECTED    29436    /run/user/1000/at-spi/bus
unix   3      [ ]     STREAM    CONNECTED    21336    /run/systemd/journal/stdout
unix   3      [ ]     STREAM    CONNECTED    28204
unix   3      [ ]     STREAM    CONNECTED    28165    /run/user/1000/bus
unix   3      [ ]     STREAM    CONNECTED    24535    /run/user/1000/bus
unix   3      [ ]     STREAM    CONNECTED    28197
unix   2      [ ]     STREAM    CONNECTED    30725
unix   3      [ ]     STREAM    CONNECTED    25477    /run/systemd/journal/stdout
unix   3      [ ]     STREAM    CONNECTED    25380

```

5. Use command **arp**. Check the result and explain the role of arp.

```

sysadmin@207-s24:~$ arp
Address HWtype HWaddress Flags Mask Iface
_gateway ether 40:b9:3c:ba:88:73 C enp0s31f6
sysadmin@207-s24:~$

```

The arp command is used to access the mapping structure of IP addresses to the MAC address. This provides us with a better understanding of the transmission of packets in the network channel. [arp -a displays the mapping of IP addresses to their corresponding MAC addresses.]

6. Use the command **ifconfig**. Check the result and explain the role of ifconfig.

```
sysadmin@207-s24:~$ ifconfig
enp0s31f6: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.16.4.57 netmask 255.255.255.0 broadcast 172.16.4.255
    inet6 fe80::f7ed:5cc1:502f:dc91 prefixlen 64 scopeid 0x20<link>
    ether 50:9a:4c:40:7d:af txqueuelen 1000 (Ethernet)
    RX packets 14592 bytes 10476892 (10.4 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 3542 bytes 341174 (341.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 16 memory 0xef080000-ef0a0000

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 576 bytes 49886 (49.8 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 576 bytes 49886 (49.8 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

sysadmin@207-s24:~$
```

The ifconfig network command provides a collective view of information regarding the IP address configuration of the device we are currently working on.

7. Use the command **nslookup**. Check the result and explain the role of nslookup.

```
sysadmin@207-s24:~$ nslookup google.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.250.207.206
Name:   google.com
Address: 2404:6800:4002:82e::200e

sysadmin@207-s24:~$
```

The nslookup command in Linux is used to query DNS servers and get information about domain names and their corresponding IP addresses.

8. Use the command **tracpath**. Check the result and explain the role of tracpath.

```
sysadmin@207-s24:~$ tracpath www.google.com
1?: [LOCALHOST] pmtu 1500
1: no reply
2: no reply
3: ??? 2.898ms
4: 10.200.30.2 18.061ms
5: 10.220.220.1 15.875ms
6: 10.102.102.5 48.547ms
7: 74.125.48.252 57.050ms asymm 8
8: no reply
9: no reply
10: no reply
11: no reply
12: no reply
13: no reply
14: no reply
15: no reply
16: no reply
17: no reply
18: no reply
19: no reply
20: no reply
21: no reply
22: no reply
23: no reply
24: no reply
25: no reply
26: no reply
27: no reply
28: no reply
29: no reply
30: no reply
Too many hops: pmtu 1500
Resume: pmtu 1500
sysadmin@207-s24:~$
```

The tracpath command is used to trace the path from the origin to the destination. Each line in the tracpath output represents a router (hop) that the packet passes through.