

EXPERIMENT NO. 1

Introduction to Linux and Windows Basic Networking Commands

Aim/Objective: To understand the basic Windows and Linux based network commands.

Requirements:

1. Personal Computer with network interface card
2. Windows Operating System
3. Ubuntu Operating System

Procedure for Windows based Network Commands:

Students have to perform and understand following network commands as listed in the table-

- a. Open the command prompt.
- b. Change the **root directory** (C:\ or D\) using the command **cd..** before starting with the commands.
- c. Implement each of the commands listed below with proper syntax.

Sr. No	Network Command	Description
1	ping	<p>Verifies IP-level connectivity to another TCP/IP computer by sending Internet Control Message Protocol (ICMP) Echo Request messages. The receipt of corresponding Echo Reply messages are displayed, along with round-trip times. Ping is the primary TCP/IP command used to troubleshoot connectivity, reachability, and name resolution. If used without parameters, ping displays help.</p> <p>Example: c:\>ping google.com</p>
2	ipconfig	<p>Displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings. If used without parameters, ipconfig displays your IP address, your router's IP address, DNS server IP address, subnet mask, and default gateway for all adapters.</p> <p>Example: c:\>ipconfig</p>
3	ipconfig /all	<p>Displays detailed information about all the adapters.</p> <p>Example: c:\>ipconfig/all</p>
4	hostname	<p>Displays the host name portion of the full computer name.</p> <p>Example: c:\>hostname</p>
5	Tracert	<p>Determines the path taken to a destination by sending Internet Control Message Protocol (ICMP) Echo Request messages to the destination with incrementally increasing Time to Live (TTL) field values. The path displayed is the list of near-side router interfaces of the routers in the path between a source host and a destination. The near-side interface is the interface of the router that is closest to the sending host in the path. If used without parameters, tracert displays help.</p> <p>Example: c:\>tracert google.com</p>

6	netstat	Display current TCP/IP network connections and protocol statistics.
7	pathping	Traces the route to target system and reports packet losses on each router in the route. Example: c:\>pathping google.com

The screenshots of the outputs need to be taken and complied in a Google doc file with proper observations for each network command.

Procedure for Ubuntu based network Commands

Open the Ubuntu network terminal and then use the following commands-

Sr. No	Network Command	Description
1	ping	Ping is a computer network tool used to test whether a particular host is reachable across an IP network. This is very basic and powerful tool to check Internet connection. Example: ping -c 4 google.com Example: ping 10.10.10.10 (-c option is used to pass how many packets you're sending)
2	clear	Clears the current screen of all the text
3	exit	Close the terminal window
4	ls	Lists the current directory. It's like MS-DOS's 'Dir' command
5	rm	Removes the files from the current directory
6	cd dir	Changes to the specified directory
7	cd -	Go back one step up towards root directory
8	pwd	Gives the host name. You can also use the host name command to give a new hostname to your system Example: sudo hostname temp.com
9	mkdir	To make new directory or folder
10	mtr	It is a computer network tool used to determine the route taken by packets across an IP network. It display the output as live updating as it does pinging of the hosts through the route. Example: mtr google.com
11	netstat	This command display connection info, routing table information etc. To displays routing table information use option as -r. Example: netstat -r
12	ifconfig or ip a or ip addr	ip command is used to display and manipulate routes and network interfaces. ip command is the newer version of ifconfig. ifconfig works in all the systems, but it is better to use ip command instead of ifconfig. Example: ip a or ip addr
13	Tracepath	Traces the path of the network to the destination you have provided. It attempts to list the series of host through which your packets travel on their way to a given destination. Example: tracepath google.com

Students need to execute the above commands, keep a copy of screen shots and note down the observations for each of the executed command.

Conclusion (*to be written on Journal sheet*): The network commands were implemented for both windows and Linux operating systems. (*Followed by your brief conclusion*)

Post Experimental Exercise (*to be written on Journal sheet*)

1. Explore and implement **any two** network commands of Windows and Linux system which are not listed in the laboratory write up and write conclusions about them.

(Hint: Try commands, getmac, arp, arp -a in windows and ip a, route -n in ubuntu)

2. Answer following questions,

- a. What is the full form of ICMP? Find which layer protocol is this?
- b. What is TTL? Explain how is it used?
- c. What is the full form of DHCP? Find which layer protocol is this?
- d. What is the IP address of your PC? (192.168.1.220)
- e. What is the MAC address of your PC?(C8-7F-54-16-BC-7A)

WINDOWS

In-Lab Exercise:

1. Ping

```
C:\Users\Student>ping vishalrmahajan.in

Pinging vishalrmahajan.in [76.76.21.241] with 32 bytes of data:
Reply from 76.76.21.241: bytes=32 time=2ms TTL=244
Reply from 76.76.21.241: bytes=32 time=10ms TTL=244
Reply from 76.76.21.241: bytes=32 time=2ms TTL=244
Reply from 76.76.21.241: bytes=32 time=4ms TTL=244

Ping statistics for 76.76.21.241:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 10ms, Average = 4ms

C:\Users\Student>
```

Observation:

When I use the command "ping vishalrmahajan.in," it successfully sends ICMP echo requests to the domain vishalrmahajan.in and receives responses, indicating that the domain is reachable and responsive.

2.IPCONFIG

```
C:\Users\Student>ipconfig

Windows IP Configuration

Wireless LAN adapter Local Area Connection* 9:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Wireless LAN adapter Local Area Connection* 10:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Ethernet adapter Ethernet:
  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::75b9:91e0:509a:184b%16
  IPv4 Address. . . . . : 192.168.1.220
  Subnet Mask . . . . . : 255.255.248.0
  Default Gateway . . . . . : fe80::7a98:e8ff:fe13:5595%16
                                         192.168.7.254

Wireless LAN adapter Wi-Fi:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

Ethernet adapter Bluetooth Network Connection:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :

C:\Users\Student>
```

Observation:

When I use the ipconfig command, it displays the network configuration of the local machine, including details such as the IP address, subnet mask, and default gateway for each network adapter.

3.IPCONFIG /ALL

```
C:\Users\Student>ipconfig /all

Windows IP Configuration

Host Name . . . . . : INFT-313-03
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Wireless LAN adapter Local Area Connection* 9:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
Physical Address. . . . . . . . . : DC-46-28-79-E8-58
DHCP Enabled. . . . . . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes

Wireless LAN adapter Local Area Connection* 10:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
Physical Address. . . . . . . . . : DE-46-28-79-E8-57
DHCP Enabled. . . . . . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes
```

```
Ethernet adapter Ethernet:  
Connection-specific DNS Suffix . . . . .  
Description . . . . . : Intel(R) Ethernet Connection (17) I219-V  
Physical Address. . . . . : C8-7F-54-16-BC-7A  
DHCP Enabled. . . . . : Yes  
Autoconfiguration Enabled . . . . . : Yes  
Link-local IPv6 Address . . . . . : fe80::75b9:91e0:509a:184b%16(Preferred)  
IPv4 Address. . . . . : 192.168.1.220(Preferred)  
Subnet Mask . . . . . : 255.255.248.0  
Lease Obtained. . . . . : 16 January 2024 08:24:43  
Lease Expires . . . . . : 18 January 2024 10:31:17  
Default Gateway . . . . . : fe80::7a98:e8ff:fe13:5595%16  
                          192.168.7.254  
DHCP Server . . . . . : 192.168.7.254  
DHCPv6 IAID . . . . . : 214466388  
DHCPv6 Client DUID. . . . . : 00-01-00-07-2D-0C-2D-69-76-5C-40-0C-63-2C  
  
DNS Servers . . . . . : 192.168.7.254  
Primary WINS Server . . . . . : 192.168.0.104  
NetBIOS over Tcpip. . . . . : Enabled  
  
Wireless LAN adapter Wi-Fi:  
Media State . . . . . . . . . : Media disconnected  
Connection-specific DNS Suffix . . . . .  
Description . . . . . . . . . : Intel(R) Wi-Fi 6 AX201 160MHz  
Physical Address. . . . . . . . : DC-46-28-79-E8-57  
DHCP Enabled. . . . . . . . : Yes  
Autoconfiguration Enabled . . . . . : Yes  
  
Ethernet adapter Bluetooth Network Connection:  
Media State . . . . . . . . . : Media disconnected  
Connection-specific DNS Suffix . . . . .  
Description . . . . . . . . . : Bluetooth Device (Personal Area Network)  
Physical Address. . . . . . . . : DC-46-28-79-E8-5B  
DHCP Enabled. . . . . . . . : Yes  
Autoconfiguration Enabled . . . . . : Yes
```

Observation:

When I use the ipconfig /all command, it displays detailed information about the network configuration of the local machine, including the IP address, subnet mask, default gateway, DHCP server, DNS server, and other network-related information for each network adapter.

4.Hostname:

```
C:\Users\Student>hostname  
INFT-313-03  
C:\Users\Student>
```

Observation

When I use the `hostname` command, it displays the hostname of the local machine i,e, INFT-313-03 , which is the unique name assigned to the machine on a network.

5.Tracert

```
C:\Users\Student>tracert vishalrmahajan.in  
  
Tracing route to vishalrmahajan.in [76.76.21.241]  
over a maximum of 30 hops:  
  
 1    <1 ms      <1 ms      <1 ms  sophos.sfit.co.in [192.168.7.254]  
 2     8 ms       3 ms       4 ms  static-245.28.248.49-tataidc.co.in [49.248.28.245]  
  
 3     *          *          *          Request timed out.  
 4     3 ms       3 ms       2 ms   99.83.92.224  
 5     *          *          *          Request timed out.  
 6     *          *          *          Request timed out.  
 7     *          *          *          Request timed out.  
 8     *          *          *          Request timed out.  
 9     3 ms       3 ms       3 ms   52.95.67.99  
10    3 ms       3 ms       3 ms   52.95.67.142  
11    2 ms       2 ms       2 ms   76.76.21.241  
  
Trace complete.  
C:\Users\Student>
```

Observation:

When I use the `tracert vishalrmahajan.in` command, it traces the route that packets take from the local machine to the domain vishalrmahajan.in, showing the IP addresses of each hop along the way and the round-trip times for packets to reach each hop. This can help diagnose network connectivity issues by identifying where packets are being delayed or dropped.

6.Netstat

```
C:\Users\Student>netstat  
Active Connections  
  
Proto Local Address          Foreign Address        State  
TCP   127.0.0.1:49690       INFT-313-03:49691    ESTABLISHED  
TCP   127.0.0.1:49691       INFT-313-03:49690    ESTABLISHED  
TCP   127.0.0.1:49701       INFT-313-03:49702    ESTABLISHED  
TCP   127.0.0.1:49702       INFT-313-03:49701    ESTABLISHED  
TCP   127.0.0.1:49743       INFT-313-03:49744    ESTABLISHED  
TCP   127.0.0.1:49744       INFT-313-03:49743    ESTABLISHED  
TCP   192.168.1.220:55450    20.198.119.143:https ESTABLISHED  
TCP   192.168.1.220:55472    bom07s29-in-f14:http  TIME_WAIT  
TCP   192.168.1.220:55473    123:http                ESTABLISHED  
TCP   192.168.1.220:55474    123:https               TIME_WAIT  
TCP   192.168.1.220:55478    bom07s29-in-f14:http  TIME_WAIT  
TCP   192.168.1.220:55479    a23-54-82-227:https TIME_WAIT  
TCP   192.168.1.220:55480    13.107.3.254:https ESTABLISHED  
TCP   192.168.1.220:55482    52.108.9.254:https ESTABLISHED  
TCP   192.168.1.220:55483    117.18.232.200:https ESTABLISHED  
TCP   192.168.1.220:55484    204.79.197.222:https TIME_WAIT  
TCP   192.168.1.220:55485    20.189.173.11:https ESTABLISHED  
TCP   192.168.1.220:55488    20.198.119.84:https ESTABLISHED  
TCP   192.168.1.220:55489    relay-aa6a8e8a:https ESTABLISHED  
TCP   192.168.1.220:55492    bom07s29-in-f14:http  ESTABLISHED  
TCP   192.168.1.220:55498    a23-54-82-227:https ESTABLISHED  
TCP   192.168.1.220:55499    13.107.246.254:https ESTABLISHED  
TCP   192.168.1.220:55500    204.79.197.254:https ESTABLISHED  
TCP   192.168.1.220:55501    13.107.42.254:https ESTABLISHED  
TCP   192.168.1.220:55502    204.79.197.222:https ESTABLISHED  
TCP   [::1]:54428           INFT-313-03:55168      ESTABLISHED  
TCP   [::1]:55168           INFT-313-03:54428      ESTABLISHED
```

```
C:\Users\Student>
```

Observation:

When I use the `netstat` command, it displays information about network connections, routing tables, interface statistics, and other network-related information on the local machine.

7.PathPing

```
C:\Users\Student>pathping vishalrmahajan.in

Tracing route to vishalrmahajan.in [76.76.21.241]
over a maximum of 30 hops:
  0  INFT-313-03 [192.168.1.220]
  1  sophos.sfit.co.in [192.168.7.254]
  2  static-245.28.248.49-tataidc.co.in [49.248.28.245]
  3  *          *          *

Computing statistics for 50 seconds...
              Source to Here   This Node/Link
Hop  RTT      Lost/Sent = Pct  Lost/Sent = Pct  Address
  0           0/ 100 = 0%        0/ 100 = 0%    INFT-313-03 [192.168.1.220]
                                         0/ 100 = 0%  |
  1     0ms      0/ 100 = 0%        0/ 100 = 0%  sophos.sfit.co.in [192.168.7.254]
                                         0/ 100 = 0%  |
  2     2ms      0/ 100 = 0%        0/ 100 = 0%  static-245.28.248.49-tataidc.co.in
                                         [49.248.28.245]

Trace complete.

C:\Users\Student>
```

Observation:

When I use the `pathping vishalrmahajan.in` command, it provides a combination of traceroute and ping functionality. It traces the route to the specified domain, vishalrmahajan.in, and provides information about the latency and packet loss at each hop along the path.

WINDOWS

Post Experiment Exercise:

1.Getmac

```
C:\Users\Student>getmac

Physical Address      Transport Name
===== =====
C8-7F-54-16-BC-7A    \Device\Tcpip_{D4E6ADC8-D2C9-42E6-821B-26B8885F0D90}
DC-46-28-79-E8-5B    Media disconnected
DC-46-28-79-E8-57    Media disconnected

C:\Users\Student>
```

Observation:

When I use the `getmac` command, it displays the Media Access Control (MAC) address of each network adapter on the local machine.

2. arp -a

```
C:\Users\Student>arp -a

Interface: 192.168.1.220 --- 0x10
  Internet Address      Physical Address      Type
  192.168.0.1            c4-71-54-30-cb-14    dynamic
  192.168.0.2            00-15-2a-6e-62-8b    dynamic
  192.168.0.55           b0-7b-25-28-4f-56    dynamic
  192.168.0.104          e4-54-e8-bd-b5-5a    dynamic
  192.168.0.120          d2-70-82-f9-8c-6f    dynamic
  192.168.0.175          c8-7f-54-16-b8-14    dynamic
  192.168.1.191          c8-7f-54-16-b9-6a    dynamic
  192.168.1.231          8c-89-a5-92-61-11    dynamic
  192.168.2.25           c4-65-16-13-75-54    dynamic
  192.168.2.151          e4-54-e8-b8-1d-59    dynamic
  192.168.2.240          b0-7b-25-1b-0e-5d    dynamic
  192.168.3.80            54-77-87-b6-b5-e4    dynamic
  192.168.3.103          c8-7f-54-16-b9-39    dynamic
  192.168.3.108          c8-7f-54-16-b9-77    dynamic
  192.168.3.110          c8-7f-54-16-bd-de    dynamic
  192.168.3.116          08-bf-b8-d6-d1-2f    dynamic
  192.168.3.117          08-bf-b8-d6-d1-48    dynamic
  192.168.3.119          c8-7f-54-16-b9-27    dynamic
  192.168.3.122          08-bf-b8-d6-c5-83    dynamic
  192.168.3.128          c8-7f-54-16-bb-4d    dynamic
  192.168.3.129          c8-7f-54-16-bc-ed    dynamic
  192.168.3.130          08-bf-b8-d6-d1-cb    dynamic
  192.168.3.131          c8-7f-54-16-b7-c5    dynamic
  192.168.3.152          e4-54-e8-b8-57-40    dynamic
  192.168.3.162          c8-7f-54-16-bc-65    dynamic
  192.168.3.165          08-bf-b8-d6-d1-8a    dynamic
  192.168.3.167          c8-7f-54-16-bc-61    dynamic
  192.168.3.168          c8-7f-54-16-bb-3f    dynamic
  192.168.3.170          08-bf-b8-d6-c5-88    dynamic
  192.168.3.177          c8-7f-54-16-b9-78    dynamic
  192.168.3.186          c8-7f-54-16-bc-3d    dynamic
  192.168.3.192          08-bf-b8-d6-c4-f5    dynamic
  192.168.3.196          08-bf-b8-d6-d1-3e    dynamic
  192.168.3.198          08-bf-b8-d6-c4-9c    dynamic
  192.168.3.200          c8-7f-54-16-bb-14    dynamic
```

Observation:

When I use the `arp -a` command, it displays the current ARP (Address Resolution Protocol) cache, which contains mappings of IP addresses to MAC addresses for devices on the local network.

UBUNTU

In-Lab Exercise:

1.Ping

```
student@313-03:~/Desktop$ ping vishalrmahajan.in
PING vishalrmahajan.in (76.76.21.142) 56(84) bytes of data.
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=1 ttl=243 time=3.20
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=2 ttl=243 time=2.83
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=3 ttl=243 time=3.03
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=4 ttl=243 time=3.04
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=5 ttl=243 time=2.60
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=6 ttl=243 time=4.22
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=7 ttl=243 time=4.44
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=8 ttl=243 time=2.68
ms
64 bytes from 76.76.21.142 (76.76.21.142): icmp_seq=9 ttl=243 time=2.73
ms
^C
--- vishalrmahajan.in ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8011ms
rtt min/avg/max/mdev = 2.599/3.197/4.442/0.635 ms
student@313-03:~/Desktop$
```

Observation:

When I used the Ubuntu command `ping vishalrmahajan.in`, it successfully sent ICMP echo requests to the domain vishalrmahajan.in and received responses, indicating that the domain is reachable and responsive.

2. ls, mkdir and rmdir

```
student@313-03:~/Desktop$ ls
'temp folder for command'
student@313-03:~/Desktop$ mkdir "Created Folder"
student@313-03:~/Desktop$ ls
'Created Folder'  'temp folder for command'
student@313-03:~/Desktop$ rmdir  "Created Folder"
student@313-03:~/Desktop$ ls
'temp folder for command'
student@313-03:~/Desktop$
```

Observation:

When I used the Ubuntu commands ls, mkdir, and rm, here's what each did:

- ls: Lists the files and directories in the current directory.
- mkdir: Creates a new directory.
- rm: Removes (deletes) files or directories.

3.mtr

```
My traceroute [v0.95]
313-03 (192.168.1.220) -> vishalrmahajan.in (76.76.21.93)          2024-01-17T15:05:38+0530
Keys: Help  Display mode  Restart statistics  Order of fields  quit
                                         Packets                               Pings
Host                                         Loss%     Snt    Last   Avg   Best Wrst StDev
1. sophos.sfit.co.in                         0.0%     27    0.9   0.9   0.6   2.2   0.3
2. static-245.28.248.49-tataidc.co.in        0.0%     27    2.8   4.1   2.8  15.5   2.5
3. 10.118.143.1                            96.2%    27    4.6   4.6   4.6   4.6   0.0
4. 99.83.92.224                           0.0%     27    2.8   4.1   2.3  26.2   4.6
5. (waiting for reply)
6. (waiting for reply)
7. (waiting for reply)
8. (waiting for reply)
9. 52.95.67.33                            0.0%     27    3.1   6.4   2.8  18.9   5.4
10. 52.95.67.98                           0.0%     27    3.4   7.8   2.7  28.7   6.0
11. 76.76.21.93                           0.0%     27    2.7   2.8   2.6   3.1   0.1
```

Observation:

When I used the Ubuntu command mtr, it displayed continuous network diagnostic information, monitoring the network connection to a specified destination and showing statistics for each hop along the route.

4.netstats

```
student@313-03:~/Desktop$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 313-03:58048          pnbomb-ad-in-f1.1:https ESTABLISHED
udp      0      0 313-03:32835          bom12s12-in-f14.1:https ESTABLISHED
udp      0      0 313-03:bootpc        sophos.sft.co.i:bootps ESTABLISHED
udp      0      0 313-03:33196          bom07s31-in-f14.1:https ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type      State     I-Node   Path
unix    3      [ ]      STREAM    CONNECTED  43609
unix    3      [ ]      STREAM    CONNECTED  33164   /run/dbus/system_bus_socket
unix    3      [ ]      STREAM    CONNECTED  52263
unix    3      [ ]      STREAM    CONNECTED  38888
unix    3      [ ]      STREAM    CONNECTED  29520   /run/systemd/journal/stdout
unix    3      [ ]      STREAM    CONNECTED  19449
unix    3      [ ]      STREAM    CONNECTED  33163   /run/dbus/system_bus_socket
unix    2      [ ]      DGRAM    CONNECTED  31107
```

Observation:

When I used the Ubuntu command `netstat`, it displayed information about network connections, routing tables, interface statistics, and other network-related information on the local machine.

5.ifconfig

```
student@313-03:~/Desktop$ ifconfig
enp0s31f6: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
          inet 192.168.1.220  netmask 255.255.248.0  broadcast 192.168.7.255
                  inet6 fe80::8084:648d:761f:5aa1  prefixlen 64  scopeid 0x20<link>
                      ether c8:7f:54:16:bc:7a  txqueuelen 1000  (Ethernet)
                        RX packets 192543  bytes 38323063 (38.3 MB)
                        RX errors 0  dropped 6641  overruns 0  frame 0
                        TX packets 18508  bytes 6980314 (6.9 MB)
                        TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0
                      device interrupt 19  memory 0x81300000-81320000

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 681  bytes 56675 (56.6 KB)
                        RX errors 0  dropped 0  overruns 0  frame 0
                        TX packets 681  bytes 56675 (56.6 KB)
                        TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

student@313-03:~/Desktop$
```

Observation:

When I used the Ubuntu command `ifconfig`, it displayed information about the network interfaces on the local machine, including their IP addresses, MAC addresses, and network-related settings.

6.tracepath

```
student@313-03:~/Desktop$ tracepath vishalrmahajan.in
1?: [LOCALHOST]                                pmtu 1500
1: sophos.sfit.co.in                           1.551ms
1: sophos.sfit.co.in                           1.446ms
2: static-245.28.248.49-tataidc.co.in         4.054ms
3: no reply
4: 99.83.92.224                               3.682ms asymm
5
5: no reply
^Z
[1]+  Stopped                  tracepath vishalrmahajan.in
student@313-03:~/Desktop$
```

Observation:

When I used the Ubuntu command `tracepath vishalramahajan.in`, it traced the route that packets take from the local machine to the domain vishalramahajan.in, showing the IP addresses of each hop along the way and the round-trip times for packets to reach each hop.

UBUNTU

Post Experiment Exercise:

1.ip a

```
student@313-03:~/Desktop$ ip a
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: enp0s31f6: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default
qlen 1000
    link/ether c8:7f:54:16:bc:7a brd ff:ff:ff:ff:ff:ff
        inet 192.168.1.220/21 brd 192.168.7.255 scope global dynamic noprefixroute enp0s31f6
            valid_lft 84329sec preferred_lft 84329sec
        inet6 fe80::8084:648d:761f:5aa1/64 scope link noprefixroute
            valid_lft forever preferred_lft forever
student@313-03:~/Desktop$
```

Observation:

When I used the Ubuntu command `ip a`, it displayed detailed information about the network interfaces on the local machine, including their IP addresses, MAC addresses, and network-related settings.

2.route -n

```
student@313-03:~/Desktop$ route -n
Kernel IP routing table
Destination     Gateway         Genmask        Flags Metric Ref  Use Iface
0.0.0.0         192.168.7.254   0.0.0.0       UG    100    0      0 enp0s31f6
169.254.0.0     0.0.0.0        255.255.0.0   U     1000   0      0 enp0s31f6
192.168.0.0     0.0.0.0        255.255.248.0 U     100    0      0 enp0s31f6
student@313-03:~/Desktop$
```

Observation:

When I used the Ubuntu command `route -n`, it displayed the kernel's routing table, showing the current routing configuration, including the destination network, gateway, netmask, and interface.