Assignment-1
Subject: Network Lab
Sem: 4
Batch: S21
Roll no: 80

Aim: Basic Networking Commands

1. ifconfig- ifconfig (interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning.

a) ifconfig

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ifconfig
enp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>   mtu 1500
        inet 192.168.1.135   netmask 255.255.255.0   broadcast 192.168.1.255
        inet6 fe80::1511:e5c7:8967:4b5   prefixlen 64   scopeid 0x20<link>
        ether 04:0e:3c:1a:64:e4   txqueuelen 1000   (Ethernet)
        RX packets 2118   bytes 243549 (243.5 KB)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 321   bytes 36964 (36.9 KB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0

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 223   bytes 21818 (21.8 KB)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 223   bytes 21818 (21.8 KB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0
```

b) ifconfig –v

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ifconfig -v
enp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>   mtu 1500
        inet 192.168.1.135   netmask 255.255.255.0   broadcast 192.168.1.255
        inet6 fe80::1511:e5c7:8967:4b5   prefixlen 64   scopeid 0x20<link>
        ether 04:0e:3c:1a:64:e4   txqueuelen 1000   (Ethernet)
        RX packets 36577   bytes 29871844 (29.8 MB)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 25448   bytes 4152475 (4.1 MB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0

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 3761   bytes 393841 (393.8 KB)
        RX errors 0   dropped 0   overruns 0   frame 0
        TX packets 3761   bytes 393841 (393.8 KB)
        TX errors 0   dropped 0 overruns 0   carrier 0   collisions 0
```

c) ifconfig –s

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ifconfig -s
Iface      MTU      RX-OK RX-ERR RX-DRP RX-OVR     TX-OK TX-ERR TX-DRP TX-OVR Flg
enp3s0     1500     36558      0     0 0           25446      0      0      0 BMRU
lo         65536     3761      0     0 0            3761      0      0      0 LRU
```

d) ifconfig –help

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```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ifconfig -help
Usage:
  ifconfig [-a] [-v] [-s] <interface> [[<AF>] <address>]
  [add <address>[/<prefixlen>]]
  [del <address>[/<prefixlen>]]
  [[-]broadcast [<address>]]  [[-]pointopoint [<address>]]
  [netmask <address>]  [dstaddr <address>]  [tunnel <address>]
  [outfill <NN>] [keepalive <NN>]
  [hw <HW> <address>]  [mtu <NN>]
  [[-]trailers]  [[-]arp]  [[-]allmulti]
  [multicast]  [[-]promisc]
  [mem_start <NN>]  [io_addr <NN>]  [irq <NN>]  [media <type>]
  [txqueuelen <NN>]
  [[-]dynamic]
  [up|down] ...

  <HW>=Hardware Type.
  List of possible hardware types:
    loop (Local Loopback) slip (Serial Line IP) cslip (VJ Serial Line IP)
    slip6 (6-bit Serial Line IP) cslip6 (VJ 6-bit Serial Line IP) adaptive (Adaptive Serial Line IP)
    ash (Ash) ether (Ethernet) ax25 (AMPR AX.25)
    netrom (AMPR NET/ROM) rose (AMPR ROSE) tunnel (IPIP Tunnel)
    ppp (Point-to-Point Protocol) hdlc ((Cisco)-HDLC) lapb (LAPB)
    arcnet (ARCnet) dlci (Frame Relay DLCI) frad (Frame Relay Access Device)
    sit (IPv6-in-IPv4) fddi (Fiber Distributed Data Interface) hippi (HIPPI)
    irda (IrLAP) ec (Econet) x25 (generic X.25)
    eui64 (Generic EUI-64)
  <AF>=Address family. Default: inet
  List of possible address families:
    unix (UNIX Domain) inet (DARPA Internet) inet6 (IPv6)
    ax25 (AMPR AX.25) netrom (AMPR NET/ROM) rose (AMPR ROSE)
    ipx (Novell IPX) ddp (Appletalk DDP) ec (Econet)
    ash (Ash) x25 (CCITT X.25)
```

e) ifconfig –a

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ifconfig -a
enp3s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.135  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 fe80::1511:e5c7:8967:4b5  prefixlen 64  scopeid 0x20<link>
        ether 04:0e:3c:1a:64:e4  txqueuelen 1000  (Ethernet)
        RX packets 32198  bytes 26972730 (26.9 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 21736  bytes 3420232 (3.4 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

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 2807  bytes 299878 (299.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2807  bytes 299878 (299.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

2. ipconfig- IPCONFIG stands for Internet Protocol Configuration. This is a command-line application which displays all the current TCP/IP (Transmission Control Protocol/Internet Protocol) network configuration, refreshes the DHCP (Dynamic Host Configuration Protocol) and DNS (Domain Name Server). It also displays IP address, subnet mask, and default gateway for all adapters. It is available for Microsoft Windows, ReactOS, and Apple macOS. ReactOS version was developed by Ged Murphy and licensed under the General Public License.
a) ipconfig

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```
C:\Users\lab1003>ipconfig

Windows IP Configuration

Wireless LAN adapter WiFi:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
Wireless LAN adapter Local Area Connection* 2:

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

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::f129:bf2b:70cc:7e30%15
   IPv4 Address. . . . . . . . . . . : 192.168.1.141
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1
Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

b) ipconfig/all

```
   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : 0E-96-E6-E4-30-87
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
   Physical Address. . . . . . . . . : 8E-96-E6-E4-30-87
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : F4-39-09-49-6C-FC
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::f129:bf2b:70cc:7e30%15(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.1.141(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 16 January 2024 10:37:09
   Lease Expires . . . . . . . . . . : 18 January 2024 07:13:18
   Default Gateway . . . . . . . . . : 192.168.1.1
   DHCP Server . . . . . . . . . . . : 192.168.1.1
   DHCPv6 IAID . . . . . . . . . . . : 167000329
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-25-7D-0B-26-F4-39-09-49-6C-FC
   DNS Servers . . . . . . . . . . . : 192.168.1.1
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : 0C-96-E6-E4-30-88
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
```

3. nslookup- Nslookup (stands for "Name Server Lookup") is a useful command for getting information from the DNS server. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record. It is also used to troubleshoot DNS-related problems.

```
C:\Users\lab1003>nslookup
Default Server:    UnKnown
Address:     192.168.1.1

> www.google.com
Server:    UnKnown
Address:     192.168.1.1

Non-authoritative answer:
Name:        www.google.com
Addresses:    2404:6800:4009:82b::2004
              142.250.192.132

> www.meta.com
Server:    UnKnown
Address:     192.168.1.1

Non-authoritative answer:
Name:        star.c10r.facebook.com
Addresses:    2a03:2880:f02f:112:face:b00c:0:2
              31.13.79.18
Aliases:    www.meta.com

> www.facebook.com
Server:    UnKnown
Address:     192.168.1.1

Non-authoritative answer:
Name:        star-mini.c10r.facebook.com
Addresses:    2a03:2880:f12f:183:face:b00c:0:25de
              31.13.79.35
Aliases:    www.facebook.com
```

4. ping- It is a utility that helps one to check if a particular IP address is accessible or not. Ping works by sending a packet to the specified address and waits for a reply. It also measures round trip time and reports errors. Ping is also used in checking if the computers on a local network are active.

```
>
C:\Users\lab1003>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
            [-r count] [-s count] [[-j host-list] | [-k host-list]]
            [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
            [-4] [-6] target_name

Options:
    -t             Ping the specified host until stopped.
                   To see statistics and continue - type Control-Break;
                   To stop - type Control-C.
    -a             Resolve addresses to hostnames.
    -n count       Number of echo requests to send.
    -l size        Send buffer size.
    -f             Set Don't Fragment flag in packet (IPv4-only).
    -i TTL         Time To Live.
    -v TOS         Type Of Service (IPv4-only. This setting has been deprecated
                   and has no effect on the type of service field in the IP
                   Header).
    -r count       Record route for count hops (IPv4-only).
    -s count       Timestamp for count hops (IPv4-only).
    -j host-list   Loose source route along host-list (IPv4-only).
    -k host-list   Strict source route along host-list (IPv4-only).
    -w timeout     Timeout in milliseconds to wait for each reply.
    -R             Use routing header to test reverse route also (IPv6-only).
                   Per RFC 5095 the use of this routing header has been
                   deprecated. Some systems may drop echo requests if
                   this header is used.
    -S srcaddr     Source address to use.
    -c compartment Routing compartment identifier.
    -p             Ping a Hyper-V Network Virtualization provider address.
    -4             Force using IPv4.
    -6             Force using IPv6.

C:\Users\lab1003>ping 142.250.192.132

Pinging 142.250.192.132 with 32 bytes of data:
Reply from 142.250.192.132: bytes=32 time=3ms TTL=57
Reply from 142.250.192.132: bytes=32 time=2ms TTL=57
Reply from 142.250.192.132: bytes=32 time=3ms TTL=57
Reply from 142.250.192.132: bytes=32 time=2ms TTL=57
```

5. traceroot/tracert- Traceroute is a widely used command-line utility available in almost all operating systems. It shows you the complete route to a destination address. It also shows the

time is taken (or delays) between intermediate routers.

```
C:\Windows\system32\cmd.exe

C:\Users\lab1003>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                      Do not resolve addresses to hostnames.
    -h maximum_hops         Maximum number of hops to search for target.
    -j host-list            Loose source route along host-list (IPv4-only).
    -w timeout              Wait timeout milliseconds for each reply.
    -R                      Trace round-trip path (IPv6-only).
    -S srcaddr              Source address to use (IPv6-only).
    -4                      Force using IPv4.
    -6                      Force using IPv6.

C:\Users\lab1003>tracert www.google.com

Tracing route to www.google.com [142.250.192.132]
over a maximum of 30 hops:

  1    <1 ms     <1 ms     <1 ms   192.168.1.1
  2     *         *         *      Request timed out.
  3     *         *         *      Request timed out.
  4     *         *         *      Request timed out.
  5     *         *         *      Request timed out.
  6     *         *        ^C
C:\Users\lab1003>_
```

6.netstat- The netstat command in Linux is a powerful networking tool used to display a variety of information related to network connections, routing tables, interface statistics, and more. It helps users diagnose network issues and gain insights into the current state of network activities on a system.

a) netstat

```
C:\Users\lab1003>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.1.141:51553    20.198.119.143:https   ESTABLISHED
  TCP    192.168.1.141:53438    a23-212-254-33:https    CLOSE_WAIT
  TCP    192.168.1.141:53485    a23-212-254-42:https    CLOSE_WAIT
  TCP    192.168.1.141:53486    a23-212-254-42:https    CLOSE_WAIT
  TCP    192.168.1.141:53490    117.18.232.200:https   CLOSE_WAIT
  TCP    192.168.1.141:53491    152.199.43.62:https    CLOSE_WAIT
  TCP    192.168.1.141:54175    bom12s19-in-f2:https    TIME_WAIT
  TCP    192.168.1.141:54176    bom12s19-in-f2:https    TIME_WAIT
  TCP    192.168.1.141:54177    bom12s19-in-f2:https    TIME_WAIT
  TCP    192.168.1.141:54179    bom12s04-in-f14:https   TIME_WAIT
  TCP    192.168.1.141:54180    bom07s45-in-f1:https    ESTABLISHED
  TCP    192.168.1.141:54183    51.104.15.252:https    TIME_WAIT
  TCP    192.168.1.141:54189    bom12s19-in-f3:https    CLOSE_WAIT
  TCP    192.168.1.141:54190    216.239.34.157:https   TIME_WAIT
  TCP    192.168.1.141:54191    216.239.34.157:https   TIME_WAIT
  TCP    192.168.1.141:54194    51.104.162.168:https   ESTABLISHED
  TCP    192.168.1.141:54195    pnbomb-ad-in-f2:https   ESTABLISHED
```

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b) netstat –an

```
C:\Users\lab1003>netstat -an

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            0.0.0.0:0              LISTENING
  TCP    0.0.0.0:445            0.0.0.0:0              LISTENING
  TCP    0.0.0.0:2869           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:5040           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:5357           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:7680           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49664          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49665          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49666          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49667          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49668          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49669          0.0.0.0:0              LISTENING
  TCP    192.168.1.141:139      0.0.0.0:0              LISTENING
  TCP    192.168.1.141:7680     192.168.1.104:62514    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.104:62517    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.104:62520    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.132:49938    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.132:49969    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.132:49995    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.132:50007    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.132:50016    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.132:50025    TIME_WAIT
  TCP    192.168.1.141:7680     192.168.1.135:62444    TIME_WAIT
  TCP    192.168.1.141:51553    20.198.119.143:443     ESTABLISHED
  TCP    192.168.1.141:53438    23.212.254.33:443      CLOSE_WAIT
  TCP    192.168.1.141:53485    23.212.254.42:443      CLOSE_WAIT
  TCP    192.168.1.141:53486    23.212.254.42:443      CLOSE_WAIT
  TCP    192.168.1.141:53490    117.18.232.200:443     CLOSE_WAIT
  TCP    192.168.1.141:53491    152.199.43.62:443      CLOSE_WAIT
  TCP    192.168.1.141:57180    142.250.182.227:443    ESTABLISHED
  TCP    [::]:135               [::]:0                 LISTENING
  TCP    [::]:445               [::]:0                 LISTENING
  TCP    [::]:2869              [::]:0                 LISTENING
  TCP    [::]:5357              [::]:0                 LISTENING
  TCP    [::]:7680              [::]:0                 LISTENING
  TCP    [::]:49664             [::]:0                 LISTENING
  TCP    [::]:49665             [::]:0                 LISTENING
  TCP    [::]:49666             [::]:0                 LISTENING
  TCP    [::]:49667             [::]:0                 LISTENING
```

7. ss- The 'ss' command is a valuable tool for examining network sockets and connections on a Linux system. Its flexibility and numerous options make it suitable for a wide range of tasks, from troubleshooting network issues to monitoring network activity.

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```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ss
Netid   State   Recv-Q  Send-Q                         Local Address:Port                  Peer Address:Port
u_str   ESTAB   0       0                                          * 90629                         * 94331
u_str   ESTAB   0       0                       @/tmp/dbus-YyOIvn6W 30257                         * 35934
u_str   ESTAB   0       0                                          * 27155                         * 27156
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 36904                       * 36903
u_str   ESTAB   0       0                                          * 71963                         * 71964
u_str   ESTAB   0       0                           /run/user/1000/bus 38377                       * 34665
u_str   ESTAB   0       0                       @/tmp/dbus-qsHVoCTU65 37297                         * 40015
u_str   ESTAB   0       0                                          * 36373                         * 34568
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 38003                       * 38002
u_str   ESTAB   0       0                       @/tmp/dbus-rvmPKCS4 30285                          * 35433
u_str   ESTAB   0       0                                          * 29075                         * 29721
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 26615                       * 28970
u_str   ESTAB   0       0                                          * 73246                         * 70270
u_str   ESTAB   0       0                                          * 37372                         * 36582
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 28992                       * 29713
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 25211                       * 26248
u_str   ESTAB   0       0                                          * 81147                         * 74654
u_str   ESTAB   0       0                       @/tmp/.X11-unix/X0 35749                           * 34409
u_str   ESTAB   0       0                                          * 36025                         * 30347
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 14277                       * 17338
u_str   ESTAB   0       0                                          * 134423                        * 0
u_seq   ESTAB   0       0                                          * 74008                         * 74009
u_str   ESTAB   0       0                           /run/user/1000/bus 37951                       * 36879
u_str   ESTAB   0       0                                          * 128901                        * 128900
u_str   ESTAB   0       0                                          * 34684                         * 37547
u_str   ESTAB   0       0           @/dbus-vfs-daemon/socket-PPerQkAW 36493                       * 34651
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 36933                       * 36351
u_str   ESTAB   0       0                                          * 37948                         * 34472
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 29722                       * 29076
u_str   ESTAB   0       0                       @/tmp/.X11-unix/X1024 22967                        * 28257
u_str   ESTAB   0       0                           /run/user/1000/bus 132704                      * 137956
u_str   ESTAB   0       0                  /run/systemd/journal/stdout 36581                       * 37371
```

8. dig- The term "dig" in the context of computer networks typically refers to a command-line utility used for querying DNS (Domain Name System) servers. DNS is a fundamental system that translates human-readable domain names into IP addresses that computers use to identify each other on a network.

```
lab1003@lab1003-HP-280-G2-MT:~$ dig

; <<>> DiG 9.11.3-1ubuntu1.18-Ubuntu <<>>
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 55366
;; flags: qr rd ra; QUERY: 1, ANSWER: 13, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;.                              IN      NS

;; ANSWER SECTION:
.                       85198   IN      NS      g.root-servers.net.
.                       85198   IN      NS      i.root-servers.net.
.                       85198   IN      NS      m.root-servers.net.
.                       85198   IN      NS      b.root-servers.net.
.                       85198   IN      NS      k.root-servers.net.
.                       85198   IN      NS      l.root-servers.net.
.                       85198   IN      NS      d.root-servers.net.
.                       85198   IN      NS      h.root-servers.net.
.                       85198   IN      NS      f.root-servers.net.
.                       85198   IN      NS      a.root-servers.net.
.                       85198   IN      NS      j.root-servers.net.
.                       85198   IN      NS      e.root-servers.net.
.                       85198   IN      NS      c.root-servers.net.

;; Query time: 5 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Thu Jan 25 12:27:02 IST 2024
;; MSG SIZE  rcvd: 239
```

9. nslookup- nslookup (Name Server Lookup) is a command-line tool used to query the Domain Name System (DNS) to obtain domain name or IP address mapping information. It is a network administration tool for diagnosing and troubleshooting DNS-related issues.

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```
C:\Users\admin>nslookup google.com
Server:    UnKnown
Address:    192.168.0.1

Non-authoritative answer:
Name:        google.com
Addresses:    2404:6800:4009:823::200e
            142.250.183.110
```

10. route- In computer networks, a route serves the purpose of determining the path that data packets take from the source to the destination. Routing is a fundamental function in networking that enables communication between devices on different networks.

```
C:\Users\admin>route

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
                [MASK netmask]  [gateway] [METRIC metric]  [IF interface]

  -f            Clears the routing tables of all gateway entries.  If this is
                used in conjunction with one of the commands, the tables are
                cleared prior to running the command.

  -p            When used with the ADD command, makes a route persistent across
                boots of the system. By default, routes are not preserved
                when the system is restarted. Ignored for all other commands,
                which always affect the appropriate persistent routes.

  -4            Force using IPv4.

  -6            Force using IPv6.

  command       One of these:
                    PRINT       Prints    a route
                    ADD         Adds      a route
                    DELETE      Deletes a route
                    CHANGE      Modifies an existing route
  destination   Specifies the host.
  MASK          Specifies that the next parameter is the 'netmask' value.
  netmask       Specifies a subnet mask value for this route entry.
                If not specified, it defaults to 255.255.255.255.
  gateway       Specifies gateway.
  interface     the interface number for the specified route.
  METRIC        specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
database file HOSTS.

If the command is PRINT or DELETE. Destination or gateway can be a wildcard,
(wildcard is specified as a star '*'), or the gateway argument may be omitted.

If Dest contains a * or ?, it is treated as a shell pattern, and only
```

11. mtr- MTR, which stands for "My TraceRoute," is a network diagnostic tool that combines the functionality of two other popular tools: Ping and Traceroute. The purpose of MTR is to provide a comprehensive analysis of the network path and measure the quality of the connection between your computer and a destination host.

a) mtr

```
                                    My traceroute  [v0.92]
lab1003-HP-280-G4-MT-Business-PC (127.0.0.1)                          2024-01-25T12:10:19+0530
Keys:  Help   Display mode   Restart statistics   Order of fields   quit
                                                   Packets              Pings
Host                                             Loss%   Snt   Last   Avg  Best  Wrst StDev
1. localhost                                      0.0%   152   0.1   0.1   0.0   0.1   0.0
```

b) mtr [url] -r

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ mtr google.com -r
Start: 2024-01-25T12:15:23+0530
```

c) mtr [url] –p

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```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ mtr google.com -p
1 192.168.1.1 0 1 1 0 0 0 0
1 _gateway 0 1 1 0 0 0
10 142.251.42.46 0 1 1 3 3 3
10 bom12s20-in-f14.1e100.net 0 1 1 3 3 3
1 _gateway 0 2 2 0 0 0
10 bom12s20-in-f14.1e100.net 0 2 2 2 3 3
1 _gateway 0 3 3 0 0 0
10 bom12s20-in-f14.1e100.net 0 3 3 2 3 5
1 _gateway 0 4 4 0 0 0
10 bom12s20-in-f14.1e100.net 0 4 4 2 3 5
1 _gateway 0 5 5 0 0 0
10 bom12s20-in-f14.1e100.net 0 5 5 2 3 5
1 _gateway 0 6 6 0 0 0
10 bom12s20-in-f14.1e100.net 0 6 6 2 3 5
1 _gateway 0 7 7 0 0 0
10 bom12s20-in-f14.1e100.net 0 7 7 2 5 20
1 _gateway 0 8 8 0 0 1
10 bom12s20-in-f14.1e100.net 0 8 8 2 7 20
1 _gateway 0 9 9 0 0 2
10 bom12s20-in-f14.1e100.net 0 9 9 2 8 20
1 _gateway 0 10 10 0 1 2
10 bom12s20-in-f14.1e100.net 0 10 10 2 9 20
1 _gateway 0 11 11 0 1 2
10 bom12s20-in-f14.1e100.net 0 11 11 2 9 20
1 _gateway 0 12 12 0 1 2
10 bom12s20-in-f14.1e100.net 0 12 12 2 10 20
1 _gateway 0 13 13 0 1 2
10 bom12s20-in-f14.1e100.net 0 13 13 2 10 20
1 _gateway 0 14 14 0 1 2
10 bom12s20-in-f14.1e100.net 0 14 14 2 11 24
1 _gateway 0 15 15 0 1 2
10 bom12s20-in-f14.1e100.net 0 15 15 2 12 24
1 _gateway 0 16 16 0 1 2
10 bom12s20-in-f14.1e100.net 0 16 16 2 12 24
1 _gateway 0 17 17 0 1 2
10 bom12s20-in-f14.1e100.net 0 17 17 2 12 24
1 _gateway 0 18 18 0 1 2
```

12. arp- ARP, which stands for Address Resolution Protocol, is a fundamental protocol used in computer networks, specifically in the context of the Internet Protocol (IP) suite. Its primary purpose is to resolve or map a known IP address to the corresponding hardware (MAC) address within a local network.
a) arp

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ arp
Address                HWtype  HWaddress           Flags Mask        Iface
192.168.1.132          ether   04:0e:3c:1a:5c:c8   C                 enp3s0
_gateway               ether   10:27:f5:a9:23:47   C                 enp3s0
```

b) arp -v

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ arp -v
Address                HWtype  HWaddress           Flags Mask        Iface
192.168.1.132          ether   04:0e:3c:1a:5c:c8   C                 enp3s0
_gateway               ether   10:27:f5:a9:23:47   C                 enp3s0
Entries: 2     Skipped: 0     Found: 2
```

13. hostname- The hostname in a computer network serves as a human-readable label assigned to a device within that network. It is used to identify a specific device in a more user-friendly manner than an IP address, which is a numerical label assigned to each device on the network.

```
C:\Users\admin>hostname
DESKTOP-805FLRG
```

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14. whois- WHOIS (pronounced as who is) is a protocol and a database commonly used in computer networks to look up information about domain names, IP addresses, and autonomous system numbers. The primary purpose of WHOIS is to provide information about the entities that own or are responsible for a specific resource on the Internet.
a) whois

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ whois
Usage: whois [OPTION]... OBJECT...

-h HOST, --host HOST    connect to server HOST
-p PORT, --port PORT    connect to PORT
-H                      hide legal disclaimers
     --verbose          explain what is being done
     --help             display this help and exit
     --version          output version information and exit

These flags are supported by whois.ripe.net and some RIPE-like servers:
-l                      find the one level less specific match
-L                      find all levels less specific matches
-m                      find all one level more specific matches
-M                      find all levels of more specific matches
-c                      find the smallest match containing a mnt-irt attribute
-x                      exact match
-b                      return brief IP address ranges with abuse contact
-B                      turn off object filtering (show email addresses)
-G                      turn off grouping of associated objects
-d                      return DNS reverse delegation objects too
-i ATTR[,ATTR]...       do an inverse look-up for specified ATTRibutes
-T TYPE[,TYPE]...       only look for objects of TYPE
-K                      only primary keys are returned
-r                      turn off recursive look-ups for contact information
-R                      force to show local copy of the domain object even
                        if it contains referral
-a                      also search all the mirrored databases
-s SOURCE[,SOURCE]...   search the database mirrored from SOURCE
-g SOURCE:FIRST-LAST    find updates from SOURCE from serial FIRST to LAST
-t TYPE                 request template for object of TYPE
-v TYPE                 request verbose template for object of TYPE
-q [version|sources|types]  query specified server info
```

b) whois [url]

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```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ whois geeksforgeeks.org
Domain Name: geeksforgeeks.org
Registry Domain ID: f507261c73964021b7430545a8b370ee-LROR
Registrar WHOIS Server: http://whois.publicdomainregistry.com
Registrar URL: http://www.publicdomainregistry.com
Updated Date: 2022-04-21T06:36:07Z
Creation Date: 2009-03-19T06:08:55Z
Registry Expiry Date: 2030-03-19T06:08:55Z
Registrar: PDR Ltd. d/b/a PublicDomainRegistry.com
Registrar IANA ID: 303
Registrar Abuse Contact Email: abuse@publicdomainregistry.com
Registrar Abuse Contact Phone: +1.2013775952
Domain Status: clientTransferProhibited https://icann.org/epp#clientTransferProhibited
Registry Registrant ID: REDACTED FOR PRIVACY
Registrant Name: REDACTED FOR PRIVACY
Registrant Organization: Privacy Protect, LLC (PrivacyProtect.org)
Registrant Street: REDACTED FOR PRIVACY
Registrant City: REDACTED FOR PRIVACY
Registrant State/Province: MA
Registrant Postal Code: REDACTED FOR PRIVACY
Registrant Country: US
Registrant Phone: REDACTED FOR PRIVACY
Registrant Phone Ext: REDACTED FOR PRIVACY
Registrant Fax: REDACTED FOR PRIVACY
Registrant Fax Ext: REDACTED FOR PRIVACY
Registrant Email: Please query the RDDS service of the Registrar of Record identified in this output for information on how to contact the Reg
istrant, Admin, or Tech contact of the queried domain name.
Registry Admin ID: REDACTED FOR PRIVACY
Admin Name: REDACTED FOR PRIVACY
Admin Organization: REDACTED FOR PRIVACY
Admin Street: REDACTED FOR PRIVACY
Admin City: REDACTED FOR PRIVACY
Admin State/Province: REDACTED FOR PRIVACY
Admin Postal Code: REDACTED FOR PRIVACY
Admin Country: REDACTED FOR PRIVACY
Admin Phone: REDACTED FOR PRIVACY
```

c) whois -h

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ whois -h
whois: option requires an argument -- 'h'
Usage: whois [OPTION]... OBJECT...

-h HOST, --host HOST    connect to server HOST
-p PORT, --port PORT    connect to PORT
-H                      hide legal disclaimers
    --verbose           explain what is being done
    --help              display this help and exit
    --version           output version information and exit

These flags are supported by whois.ripe.net and some RIPE-like servers:
-l                      find the one level less specific match
-L                      find all levels less specific matches
-m                      find all one level more specific matches
-M                      find all levels of more specific matches
-c                      find the smallest match containing a mnt-irt attribute
-x                      exact match
-b                      return brief IP address ranges with abuse contact
-B                      turn off object filtering (show email addresses)
-G                      turn off grouping of associated objects
-d                      return DNS reverse delegation objects too
-i ATTR[,ATTR]...       do an inverse look-up for specified ATTRibutes
-T TYPE[,TYPE]...       only look for objects of TYPE
-K                      only primary keys are returned
-r                      turn off recursive look-ups for contact information
-R                      force to show local copy of the domain object even
                        if it contains referral
-a                      also search all the mirrored databases
-s SOURCE[,SOURCE]...   search the database mirrored from SOURCE
-g SOURCE:FIRST-LAST    find updates from SOURCE from serial FIRST to LAST
-t TYPE                 request template for object of TYPE
-v TYPE                 request verbose template for object of TYPE
-q [version|sources|types]  query specified server info
```

15.host- In computer networks, a host refers to any device that participates in network

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communication. This can include computers, servers, printers, routers, and other networked devices. The purpose of hosts in computer networks is to enable communication and the exchange of data between different devices.

a) host

```
lab1003@lab1003-HP-280-G2-MT:~$ host 8.8.8.8
8.8.8.8.in-addr.arpa domain name pointer dns.google.
lab1003@lab1003-HP-280-G2-MT:~$ ▮
```

b) host [url]

```
lab1003@lab1003-HP-280-G2-MT:~$ host google.com
google.com has address 142.251.42.46
google.com has IPv6 address 2404:6800:4009:830::200e
google.com mail is handled by 10 smtp.google.com.
lab1003@lab1003-HP-280-G2-MT:~$ ▮
```

c) host -t ns [url]

```
lab1003@lab1003-HP-280-G2-MT:~$ host -t ns google.com
google.com name server ns3.google.com.
google.com name server ns4.google.com.
google.com name server ns2.google.com.
google.com name server ns1.google.com.
lab1003@lab1003-HP-280-G2-MT:~$ ▮
```

16. curl- curl is a command-line tool and library for making HTTP requests and working with URLs. It is widely used in computer networks for various purposes. The primary purpose of curl is to perform data transfers between a client and a server, making it a valuable tool for interacting with web services and APIs.

a) curl

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```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ curl https://www.geeksforgeeks.org

<!DOCTYPE html>
<!--[if IE 7]>
<html class="ie ie7" lang="en-US" prefix="og: http://ogp.me/ns#">
<![endif]-->
<!--[if IE 8]>
<html class="ie ie8" lang="en-US" prefix="og: http://ogp.me/ns#">
<![endif]-->
<!--[if !(IE 7) | !(IE 8)  ]><!-->
<html lang="en-US" prefix="og: http://ogp.me/ns#" >

<!--<![endif]-->
<head>
<meta charset="UTF-8" />
<meta name="keywords" content="Data Structures, Algorithms, Python, Java, C, C++, JavaScript, Android Development, SQL, Data Science, Machine
Learning, PHP, Web Development, System Design, Tutorial, Technical Blogs, Interview Experience, Interview Preparation, Programming, Competitiv
e Programming, Jobs, Coding Contests, GATE CSE, HTML, CSS, React, NodeJS, Placement, Aptitude, Quiz, Computer Science, Programming Examples, G
eeksforGeeks Courses, Puzzles, SSC, Banking, UPSC, Commerce, Finance, CBSE, School, k12, General Knowledge, News, Mathematics, Exams">
<meta name="viewport" content="width=device-width, initial-scale=1.0, minimum-scale=0.5, maximum-scale=3.0">
<meta property="og:description" name="description" content="A Computer Science portal for geeks. It contains well written, well thought and we
ll explained computer science and programming articles, quizzes and practice/competitive programming/company interview Questions."><meta prope
rty="og:url" content="https://www.geeksforgeeks.org/" /><meta name="verify-admitad" content="d656723ea9" />
<link rel="shortcut icon" href="https://media.geeksforgeeks.org/wp-content/cdn-uploads/gfg_favicon.png" type="image/x-icon" />
<link rel="preconnect" href="https://fonts.googleapis.com">
<link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>

<meta name="theme-color" content="#308D46" />
<meta name='robots' content='index, follow, max-image-preview:large, max-snippet:-1' />

<meta name="image" property="og:image" content="https://media.geeksforgeeks.org/wp-content/cdn-uploads/gfg_200x200-min.png">
<meta property="og:image:type" content="image/png">
<meta property="og:image:width" content="200">
<meta property="og:image:height" content="200">
```

b) curl -o

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ curl -o bye.zip ftp://speedtest.tele2.net/1MB.zip
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 1024k  100 1024k    0     0   395k      0  0:00:02  0:00:02 --:--:--   395k
```

c) curl --limit-rate

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ curl --limit-rate 1000K -O ftp://speedtest.tele2.net/1MB.zip
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0
curl: (28) Timeout was reached
```

17. wget- wget is a command-line utility in Unix and Unix-like operating systems that is used for retrieving files from the web. Its primary purpose is to download files from the Internet or an intranet using various protocols such as HTTP, HTTPS, and FTP.

a) wget

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ wget https://www.geeksforgeeks.org/ifconfig-command-in-linux-with-examples/
--2024-01-25 11:09:58--  https://www.geeksforgeeks.org/ifconfig-command-in-linux-with-examples/
Resolving www.geeksforgeeks.org (www.geeksforgeeks.org)... 108.158.46.116, 108.158.46.28, 108.158.46.2, ...
Connecting to www.geeksforgeeks.org (www.geeksforgeeks.org)|108.158.46.116|:443... connected.
HTTP request sent, awaiting response... 403 Forbidden
2024-01-25 11:09:58 ERROR 403: Forbidden.
```

b) wget -v

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```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ wget -v http://example.com/samplefile.tar.gz
--2024-01-25 11:34:35--  http://example.com/samplefile.tar.gz
Resolving example.com (example.com)... 93.184.216.34, 2606:2800:220:1:248:1893:25c8:1946
Connecting to example.com (example.com)|93.184.216.34|:80... connected.
HTTP request sent, awaiting response... 404 Not Found
2024-01-25 11:34:36 ERROR 404: Not Found.
```

c) wget -i

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ wget -i inputfile https://www.geeksforgeeks.org/wget-command-in-linux-unix/
--2024-01-25 11:36:53--  https://www.geeksforgeeks.org/wget-command-in-linux-unix/
Resolving www.geeksforgeeks.org (www.geeksforgeeks.org)... 108.158.46.2, 108.158.46.28, 108.158.46.116, ...
Connecting to www.geeksforgeeks.org (www.geeksforgeeks.org)|108.158.46.2|:443... connected.
HTTP request sent, awaiting response... 403 Forbidden
2024-01-25 11:36:54 ERROR 403: Forbidden.

inputfile: No such file or directory
No URLs found in inputfile.
```

d) wget -b

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ wget -b http://www.example.com/samplepage.php
Continuing in background, pid 6125.
Output will be written to 'wget-log'.
```


Lab outcome: To get familiar with the basic network administration commands