

# **Fr. Conceicao Rodrigues College of Engineering**

## **Department of Computer Engineering**

**Academic Term: July-Nov 2023-24**

**Class: T.E. (Computer B)**

**Subject Name: Computer Network Lab**

**Subject Code: CSL 502**

<b>Experiment No:</b>	<b>1</b>
<b>Date of Performance:</b>	<b>27/ 07/2023</b>
<b>Roll No:</b>	<b>9614</b>
<b>Name of the Student:</b>	<b>AQIB FIRDOUS KHAN</b>

**AIM:** Use basic networking commands in Linux (ping, tracert, nslookup, netstat, ARP, RARP, ip, ifconfig, dig, route )

### **THEORY:**

**(Write the theory of commands you have studied and attach Screenshot of it)**

## EXPERIMENT NO.2

**AIM:** Use basic networking commands in Linux (ping, tracer, nslookup, netstat, ARP, RARP, ip, ifconfig, dig, route )

### THEORY:

#### 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. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.

**ip**

```
C:\Users\aqibf>ipconfig

Windows IP Configuration

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 10:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2402:e280:3d3e:2ea:b54b:91f6:4147:4b7
2    Temporary IPv6 Address. . . . . : 2402:e280:3d3e:2ea:e1c1:c175:6cd1:245
d
    Link-local IPv6 Address . . . . . : fe80::d128:d69f:dd13:956d%17
    IPv4 Address. . . . . : 192.168.1.9
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::1%17
                                192.168.1.254

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\aqibf>
```

## 2. NSLOOKUP

**Nslookup** (stands for “Name Server Lookup”) is a useful command for getting information from 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\aqibf>nslookup www.google.com
Server:    dsldevice.lan
Address:   192.168.1.254

Non-authoritative answer:
Name:      www.google.com
Addresses: 2404:6800:4009:82d::2004
          142.250.199.132
```

### 3. Ping

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded which is called latency. Fast ping low latency means faster connection. Ping uses [ICMP\(Internet Control Message Protocol\)](#) to send an **ICMP echo message** to the specified host if that host is available then it sends **ICMP reply message**. Ping is generally measured in millisecond every modern operating system has this ping pre-installed.

```
C:\Users\aqibf>ping www.google.com

Pinging www.google.com [2404:6800:4009:82c::2004] with 32 bytes of data:
Reply from 2404:6800:4009:82c::2004: time=8ms
Reply from 2404:6800:4009:82c::2004: time=7ms
Reply from 2404:6800:4009:82c::2004: time=8ms
Reply from 2404:6800:4009:82c::2004: time=6ms

Ping statistics for 2404:6800:4009:82c::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 8ms, Average = 7ms
```

#### 4. TRACEROUTE

**tracert** command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the route and about all the hops that a packet takes. Below image depicts how traceroute command is used to reach the Google(172.217.26.206) host from the local machine and it also prints detail about all the hops that it visits in between

```
C:\Users\aqibf>tracert www.google.com

Tracing route to www.google.com [2404:6800:4009:82c::2004]
over a maximum of 30 hops:

  1      5 ms      4 ms      2 ms      2402:e280:3d3e:2ea::1
  2      8 ms      6 ms      7 ms      2402:e280:4100::2
  3      7 ms      6 ms      7 ms      2001:4860:1:1::e9e
  4     40 ms      9 ms      6 ms      2404:6800:8027::1
  5      7 ms      6 ms      7 ms      2001:4860:0:1::1900
  6      8 ms      6 ms      6 ms      2001:4860:0:1::269d
  7      8 ms     21 ms     13 ms      bom07s35-in-x04.1e100.net [2404:6800:4009
c::2004]

Trace complete.
```

#### 5. Netstat

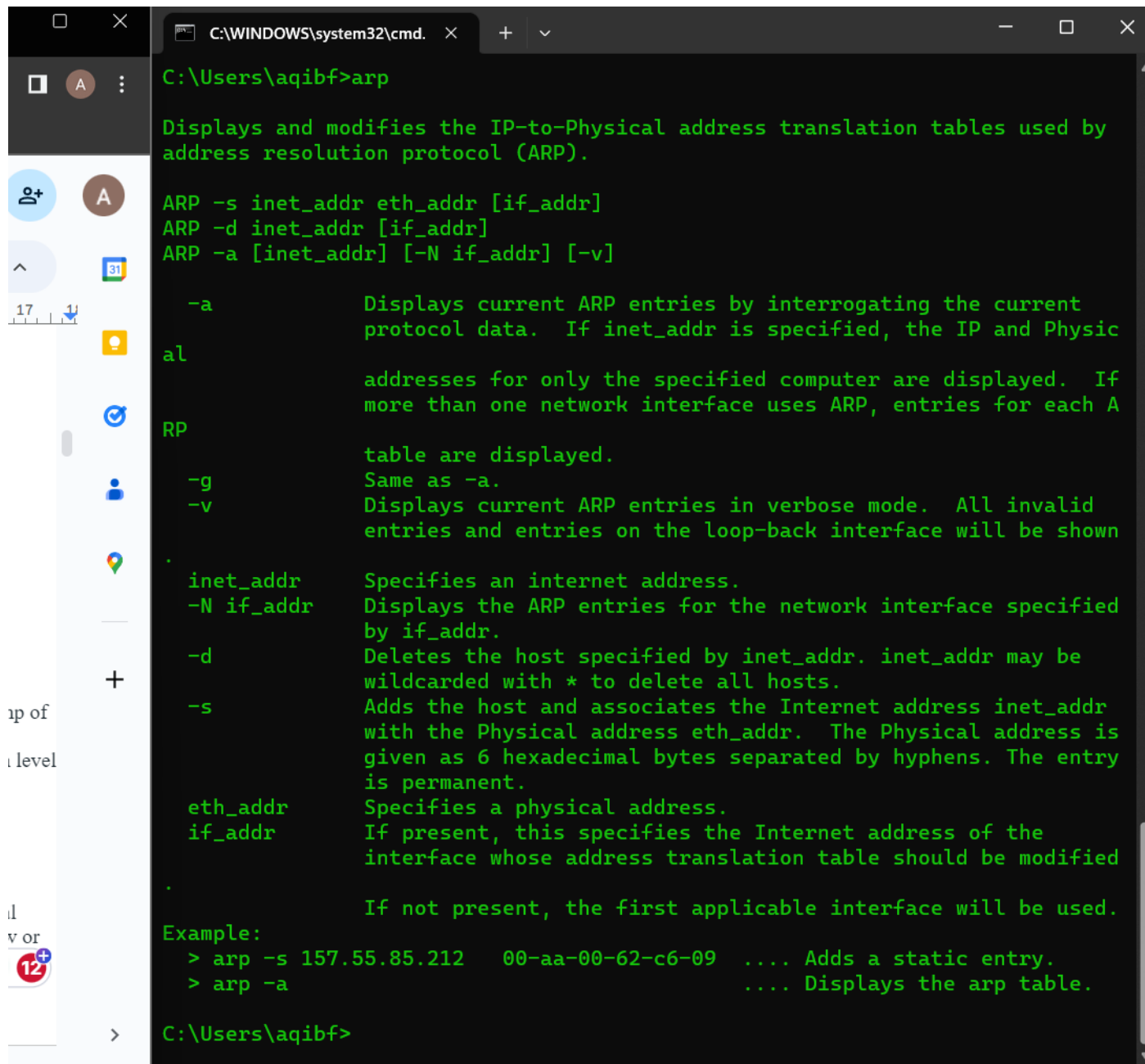
Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships, etc.,

```
C:\Users\aqibf>netstat
```

### Active Connections

Proto	Local Address	Foreign Address	State
TCP	192.168.1.9:58573	myhostusservice:7000	ESTABLISHED
TCP	192.168.1.9:58584	20.198.119.143:https	ESTABLISHED
TCP	192.168.1.9:58670	20.198.119.143:https	ESTABLISHED
TCP	192.168.1.9:58883	a23-54-83-10:https	ESTABLISHED
TCP	192.168.1.9:58885	a-0003:https	TIME_WAIT
TCP	192.168.1.9:58905	a-0003:https	ESTABLISHED
TCP	192.168.1.9:58906	52.168.112.66:https	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58633	whatsapp-chatd-edge	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58650	bom07s45-in-x0a:htt	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58715	sf-in-f188:5228	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58722	sf-in-f188:5228	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58781	ec2-75-101-192-62:h	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58873	bom12s12-in-x0a:htt	TIME_WAIT
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58874	bom12s11-in-x0a:htt	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58875	bom12s19-in-x0a:htt	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58876	bom12s19-in-x0a:htt	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58888	bom07s30-in-x0a:htt	ESTABLISHED
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58891	[2603:1047:1:60::80	TIME_WAIT
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58892	bom12s21-in-x03:htt	TIME_WAIT
TCP	[2402:e280:3d3e:2ea:e1c1:c175:6cd1:245d]:58894	[2600:9000:2379:da0	

**arp command** manipulates the System's ARP cache. It also allows a complete dump of the ARP cache. ARP stands for Address Resolution Protocol. The primary function of this protocol is to resolve the IP address of a system to its mac address; hence, it works between level 2(Data link layer) and level 3(Network layer).



```
C:\WINDOWS\system32\cmd. x + v
C:\Users\aqibf>arp

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

-a          Displays current ARP entries by interrogating the current
al          protocol data. If inet_addr is specified, the IP and Physic
al          addresses for only the specified computer are displayed. If
RP          more than one network interface uses ARP, entries for each A
RP          table are displayed.
-g          Same as -a.
-v          Displays current ARP entries in verbose mode. All invalid
            entries and entries on the loop-back interface will be shown

inet_addr   Specifies an internet address.
-N if_addr  Displays the ARP entries for the network interface specified
            by if_addr.
-d          Deletes the host specified by inet_addr. inet_addr may be
            wildcarded with * to delete all hosts.
-s          Adds the host and associates the Internet address inet_addr
            with the Physical address eth_addr. The Physical address is
            given as 6 hexadecimal bytes separated by hyphens. The entry
            is permanent.
eth_addr    Specifies a physical address.
if_addr     If present, this specifies the Internet address of the
            interface whose address translation table should be modified

            If not present, the first applicable interface will be used.

Example:
> arp -s 157.55.85.212 00-aa-00-62-c6-09 .... Adds a static entry.
> arp -a          .... Displays the arp table.

C:\Users\aqibf>
```

## Dig

**dig** command stands for *Domain Information Groper*. It is used for retrieving information about DNS name servers. It is basically used by network administrators. It is used for verifying and troubleshooting DNS problems and to perform DNS lookups. Dig command replaces older tools such as [nslookup](#) and the [host](#).

```

student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ dig atharvacoe.ac.in

; <<>> DiG 9.9.5-4.3-Ubuntu <<>> atharvacoe.ac.in
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 44951
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;atharvacoe.ac.in.                IN      A

;; ANSWER SECTION:
atharvacoe.ac.in.                14399   IN      A      192.185.180.65

;; Query time: 479 msec
;; SERVER: 127.0.1.1#53(127.0.1.1)
;; WHEN: Thu Aug 30 13:58:05 IST 2018
;; MSG SIZE rcvd: 50

student@lenovo804-ThinkCentre-M70e:~$ █

```

**SCHTASKS:**Schedules commands and programs to run on a computer.

Folder: \Microsoft\Windows\BrokerInfrastructure		
TaskName	Next Run Time	Status
=====		
===		
BgTaskRegistrationMaintenanceTask	N/A	Ready
Folder: \Microsoft\Windows\capabilityaccessmanager		
TaskName	Next Run Time	Status
=====		
===		
maintenancetasks	N/A	Ready
Folder: \Microsoft\Windows\CertificateServicesClient		
TaskName	Next Run Time	Status
=====		
===		
UserTask	N/A	Ready
UserTask-Roam	N/A	Ready
Folder: \Microsoft\Windows\Chkdsk		
TaskName	Next Run Time	Status
=====		
===		
ProactiveScan	N/A	Ready
SyspartRepair	N/A	Ready
Folder: \Microsoft\Windows\CloudExperienceHost		
TaskName	Next Run Time	Status



**DEFRAG:** Defragments a disk and optimizes its performance

```
C:\Users\aqibf>defrag

Defrag <Volumes> <Operations> [<Options>]

Volumes:
  /C | /AllVolumes      On each volume run only the preferred operations from
                        the given list of operations.
  /E | /VolumesExcept <volume paths> Perform all the given operations on each volume except.
                        those specified. If the exception list is empty, this
                        behaves as /AllVolumes.
                        volume paths Specifies the drive letter followed by a colon, mount point
                        or volume name. More than one volume can be specified.
d. Run                  all the given operations on each specified volume..

Operations:
  /A | /Analyze         Perform analysis.
  /B | /BootOptimize    Perform boot optimization to increase boot performance.
  /D | /Defrag          Perform traditional defrag (this is the default). On
a tiered                volume, traditional defrag is performed only on the
Capacity                tier.
  /G | /TierOptimize    On tiered volumes, optimize files to reside on the appropriate
                        storage tier.
  /K | /SlabConsolidate On thinly provisioned volumes, perform slab consolidation to
                        increase slab usage efficiency.
  /L | /Retrim          On thinly provisioned volumes, perform retrim to release free
                        slabs. On SSDs perform retrim to improve write performance.
```

**cipher:** Displays or alters the encryption of directories and files on NTFS partitions.

```
C:\Users\aqibf>cipher
```

```
Listing C:\Users\aqibf\
```

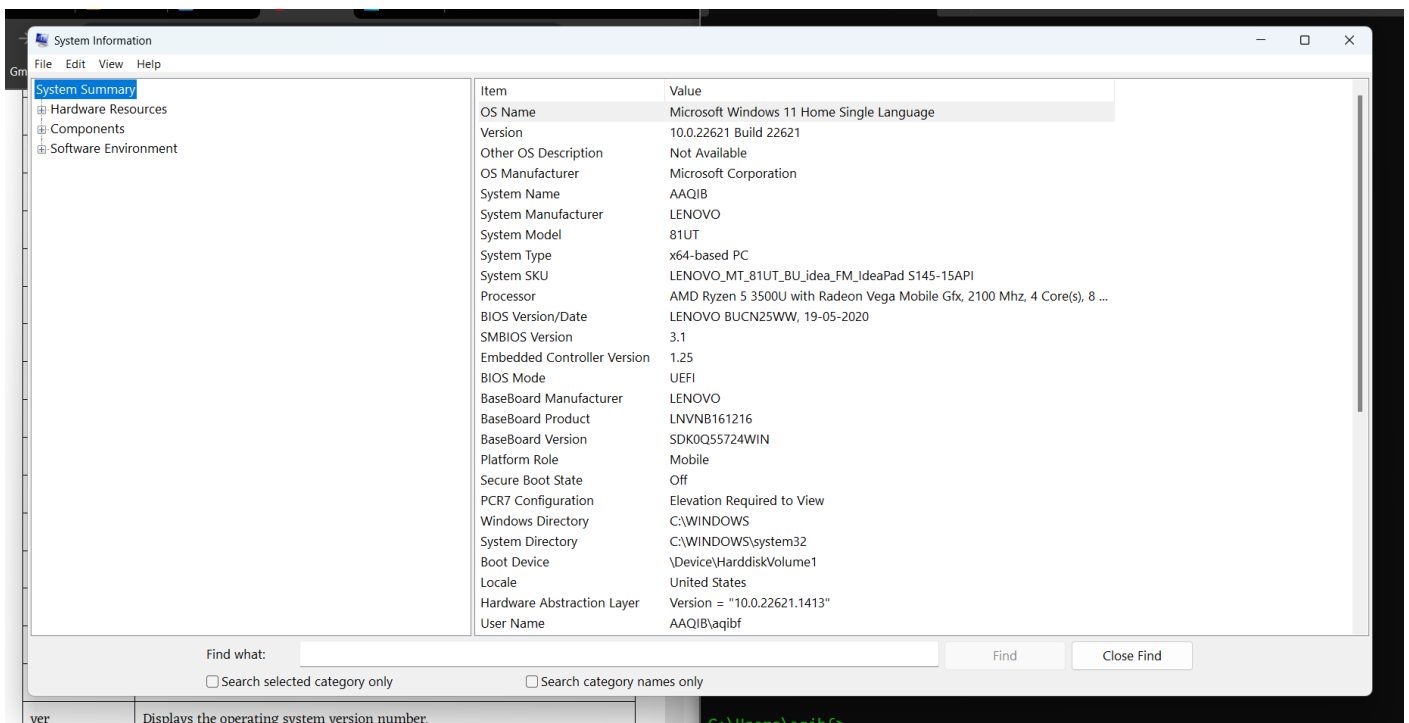
```
New files added to this directory will not be encrypted.
```

```
U .android
U .atom
U .cache
U .dist
U .dotnet
U .eclipse
U .emulator_console_auth_token
U .gitconfig
U .gradle
U .idlerc
U .m2
U .ms-ad
U .p2
U .vscode
U a.java
U AndroidStudioProjects
U banker.py
U blog
U Contacts
U cpracs2
U Documents
U Downloads
U eclipse
U eclipse-workspace
U EDM
U env
U Exp.txt
U exp6.py
U Exp6.txt
U FarmerHelperApp
U Favorites
U file.txt
```

**winver:** Displays the Windows version and build information.



## MSINFO32: DISPLAYS DETAILED SYSTEM INFORMATION



## GETMAC: Display the MAC addresses of network interfaces

```
C:\Users\aqibf>getmac

Physical Address      Transport Name
=====
82-30-00-C0-F9-38    \Device\Tcpip_{E99EF6C8-DC08-4037-8DC1-A981B6791222}
80-30-49-C0-DE-44    Media disconnected

C:\Users\aqibf>
```

## netsh wlan: Configure wireless network settings

```
C:\Users\aqibf>netsh wlan

The following commands are available:

Commands in this context:
?                - Displays a list of commands.
add              - Adds a configuration entry to a table.
connect         - Connects to a wireless network.
delete          - Deletes a configuration entry from a table.
disconnect      - Disconnects from a wireless network.
dump            - Displays a configuration script.
export          - Saves WLAN profiles to XML files.
help            - Displays a list of commands.
IHV             - Commands for IHV logging.
refresh         - Refresh hosted network settings.
reportissues    - Generate WLAN smart trace report.
set             - Sets configuration information.
show            - Displays information.
start           - Start hosted network.
stop            - Stop hosted network.

To view help for a command, type the command, followed by a space, and then
type ?.
```

## netsh dns: Configure DNS settings

```
C:\Users\aqibf>netsh dns
```

The following commands are available:

Commands in this context:

?	- Displays a list of commands.
add	- Adds a configuration entry to a table.
delete	- Deletes a configuration entry from a table.
dump	- Displays a configuration script.
help	- Displays a list of commands.
set	- Sets configuration information.
show	- Displays information.

To view help for a command, type the command, followed by a space, and then type ?.

**Route: View or modify the network routing table**

```
C:\Users\aqibf>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

**NBTSTAT : Display NetBIOS over TCP/IP protocol statistics**

```
C:\Users\aqibf>nbtstat
```

Displays protocol statistics and current TCP/IP connections using NBT (NetBIOS over TCP/IP).

```
NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]
```

-a	(adapter status)	Lists the remote machine's name table given its name
-A	(Adapter status)	Lists the remote machine's name table given its IP address.
-c	(cache)	Lists NBT's cache of remote [machine] names and their IP addresses
-n	(names)	Lists local NetBIOS names.
-r	(resolved)	Lists names resolved by broadcast and via WINS
-R	(Reload)	Purges and reloads the remote cache name table
-S	(Sessions)	Lists sessions table with the destination IP addresses
-s	(sessions)	Lists sessions table converting destination IP addresses to computer NETBIOS names.
-RR	(ReleaseRefresh)	Sends Name Release packets to WINS and then, starts Refresh

RemoteName	Remote host machine name.
IP address	Dotted decimal representation of the IP address.
interval	Redisplays selected statistics, pausing interval seconds between each display. Press Ctrl+C to stop redisplaying statistics.

**CONCLUSION:** Hence, in this experiment, we have successfully studied some important networking command and also implemented them in Linux