THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

EXPERIMENT NO. 8

Aim :- Use basic networking commands in Linux (ping, tracert, nslookup, netstat, ARP, RARP, ip, ipconfig, dig, route)

Theory :-

Following are some of the basic networking commands in the Linux :-

1. Ping :
ping is a command used to test the network connectivity between two devices by sending ICMP echo request packets and receiving ICMP echo reply packets.
It's commonly used to check if a remote host or IP address is reachable.

2. Traceroute (Tracert in Windows) :
traceroute is a command used to trace the route that packets take from your local machine to a destination host or IP address. It shows the IP addresses of immediate routers and the time it takes for packets to reach each hop.

3. nslookup (or dig) :
nslookup is used to query DNS (Domain Name System) servers to look up domain names and retrieve associated IP addresses. dig (Domain

Information (Groper) is another tool for DNS queries and provides more detailed information.

4. netstat :
netstat is a command used to display network statistics and active network connections. It shows information about listening ports, active connections, routing tables, and more.

5. ARP (Address Resolution Protocol) and RARP (Reverse ARP) :
arp is used to view and manipulate the ARP cache, which maps IP addresses to MAC (Media Access Control) addresses on local network. rarp (Reverse ARP) is used to map MAC addresses to IP addresses, but it's less commonly used.

6. ip :
The ip command is a versatile tool for configuring and managing network interfaces, routes, and tunnels. It can be used to assign the IP addresses, set up virtual interfaces, and manage routing tables.

7. ifconfig :
ifconfig (Interface Configuration) is used to view and configure network interfaces, including enabling or disabling interfaces, setting IP addresses, and managing network parameters.

8. route :
The route command is used to view and also manipulate kernel's IP routing table.
It's used to add or delete routes, change default gateways, and configure routing settings.

9. Usage Examples :
To ping : ping example.com
To trace route to server : traceroute example.com
To query DNS for IP address : nslookup example.com
or dig example.com
To display network statistics : netstat -i
To view ARP cache : arp -a
To configure network interfaces : ip addr add 192.168.1.2/24
To add a route : route add -net 192.168.2.0/24 gw 192.168.1.1

These basic networking commands are essential for diagnosing network issues, configuring network settings, and troubleshooting network connectivity in a Linux environment.

Conclusion :- Thus, we implemented the basic networking commands in Linux as they provide valuable insights into network status and help in maintaining functional network.

31/10/23

```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ ifconfig
docker0   Link encap:Ethernet  HWaddr 02:42:cf:c7:15:71
          inet addr:172.17.0.1  Bcast:0.0.0.0  Mask:255.255.0.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

eth0      Link encap:Ethernet  HWaddr 44:37:e6:4d:df:1b
          inet addr:10.1.8.4  Bcast:10.255.255.255  Mask:255.0.0.0
          inet6 addr: fe80::4637:e6ff:fe4d:df1b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:51944 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18626 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:27621649 (27.6 MB)  TX bytes:2682227 (2.6 MB)
          Interrupt:17

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:2173 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2173 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:193433 (193.4 KB)  TX bytes:193433 (193.4 KB)

student@lenovo804-ThinkCentre-M70e:~$
```

```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ nslookup www.atharvacoe.ac.in
Server:         127.0.1.1
Address:        127.0.1.1#53

Non-authoritative answer:
www.atharvacoe.ac.in    canonical name = atharvacoe.ac.in.
Name:   atharvacoe.ac.in
Address: 192.185.180.65

student@lenovo804-ThinkCentre-M70e:~$
```

```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ ping -c 4 10.1.8.3
PING 10.1.8.3 (10.1.8.3) 56(84) bytes of data.
64 bytes from 10.1.8.3: icmp_seq=1 ttl=64 time=0.324 ms
64 bytes from 10.1.8.3: icmp_seq=2 ttl=64 time=0.333 ms
64 bytes from 10.1.8.3: icmp_seq=3 ttl=64 time=0.316 ms
64 bytes from 10.1.8.3: icmp_seq=4 ttl=64 time=0.302 ms

--- 10.1.8.3 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3000ms
rtt min/avg/max/mdev = 0.302/0.318/0.333/0.024 ms
student@lenovo804-ThinkCentre-M70e:~$
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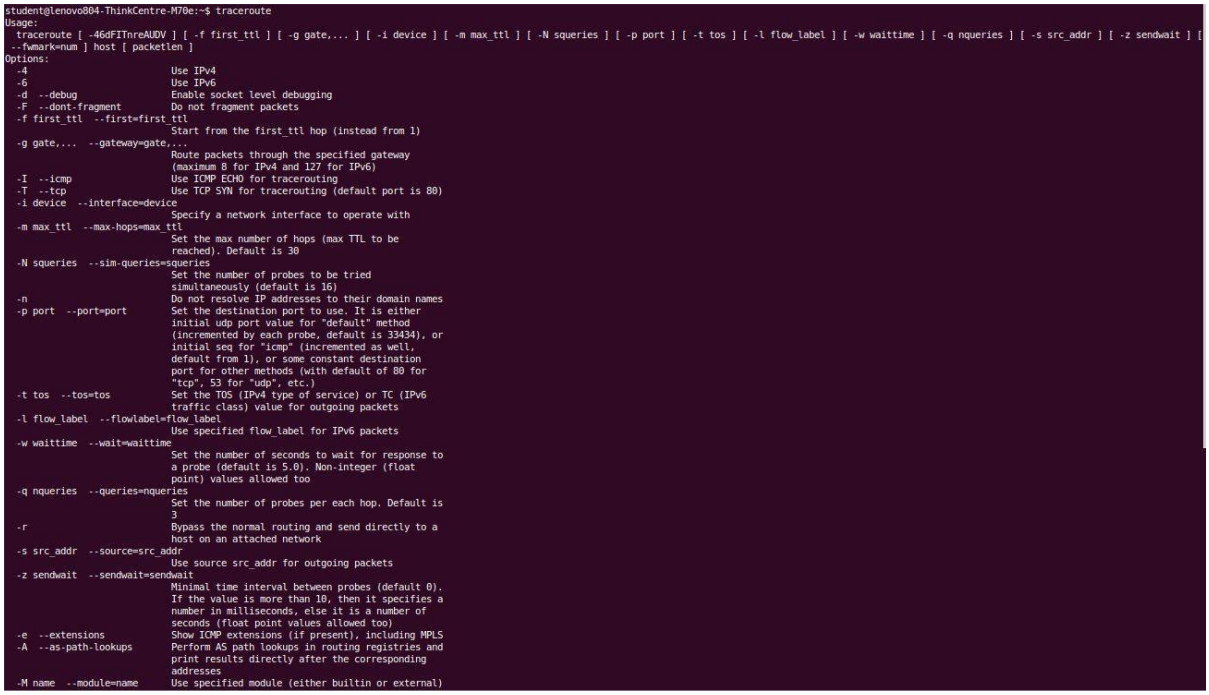

```
student@lenovo804-ThinkCentre-M70e:~$ traceroute
Usage:
  traceroute [ -46dFITnreAUDV ] [ -f first_ttl ] [ -g gate,... ] [ -i device ] [ -m max_ttl ] [ -N squeries ] [ -p port ] [ -t tos ] [ -l flow_label ] [ -w waittime ] [ -q nqueries ] [ -s src_addr ] [ -z sendwait ] [
  --fwmark=num ] host [ packetlen ]
Options:
  -4                      Use IPv4
  -6                      Use IPv6
  -d  --debug             Enable socket level debugging
  -F  --dont-fragment     Do not fragment packets
  -f first_ttl  --first=first_ttl
                          Start from the first_ttl hop (instead from 1)
  -g gate,...  --gateway=gate,...
                          Route packets through the specified gateway
                          (maximum 8 for IPv4 and 127 for IPv6)
  -I  --icmp              Use ICMP ECHO for tracerouting
  -T  --tcp               Use TCP SYN for tracerouting (default port is 80)
  -i device  --interface=device
                          Specify a network interface to operate with
  -m max_ttl  --max-hops=max_ttl
                          Set the max number of hops (max TTL to be
                          reached). Default is 30
  -N squeries  --sim-queries=squeries
                          Set the number of probes to be tried
                          simultaneously (default is 16)
  -n                      Do not resolve IP addresses to their domain names
  -p port  --port=port    Set the destination port to use. It is either
                          initial udp port value for "default" method
                          (incremented by each probe, default is 33434), or
                          initial seq for "icmp" (incremented as well,
                          default from 1), or some constant destination
                          port for other methods (with default of 80 for
                          "tcp", 53 for "udp", etc.)
  -t tos  --tos=tos       Set the TOS (IPv4 type of service) or TC (IPv6
                          traffic class) value for outgoing packets
  -l flow_label  --flowlabel=flow_label
                          Use specified flow_label for IPv6 packets
  -w waittime  --wait=waittime
                          Set the number of seconds to wait for response to
                          a probe (default is 5.0). Non-integer (float
                          point) values allowed too
  -q nqueries  --queries=nqueries
                          Set the number of probes per each hop. Default is
                          3
  -r                      Bypass the normal routing and send directly to a
                          host on an attached network
  -s src_addr  --source=src_addr
                          Use source src_addr for outgoing packets
  -z sendwait  --sendwait=sendwait
                          Minimal time interval between probes (default 0).
                          If the value is more than 10, then it specifies a
                          number in milliseconds, else it is a number of
                          seconds (float point values allowed too)
  -e  --extensions        Show ICMP extensions (if present), including MPLS
  -A  --as-path-lookups   Perform AS path lookups in routing registries and
                          print results directly after the corresponding
                          addresses
  -M name  --module=name  Use specified module (either builtin or external)
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```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 lenovo804-ThinkC:domain *:*                     LISTEN
tcp        0      0 localhost:ipp           *:*                     LISTEN
tcp        0      0 10.1.8.4:40190          bom05s11-in-f2.1e:https TIME_WAIT
tcp        0      0 10.1.8.4:52797          151.101.2.114:https     TIME_WAIT
tcp        0      0 10.1.8.4:38575          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:38576          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:52065          bom05s15-in-f4.1e:https TIME_WAIT
tcp        0      0 10.1.8.4:52796          151.101.2.114:https     TIME_WAIT
tcp        0      0 10.1.8.4:40191          bom05s11-in-f2.1e:https TIME_WAIT
tcp        0      0 10.1.8.4:38634          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:38637          bom05s15-in-f14.1:https TIME_WAIT
tcp        0      0 10.1.8.4:38573          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:37409          server-52-222-135:https TIME_WAIT
tcp        0      0 10.1.8.4:41299          a184-30-54-102.de:https TIME_WAIT
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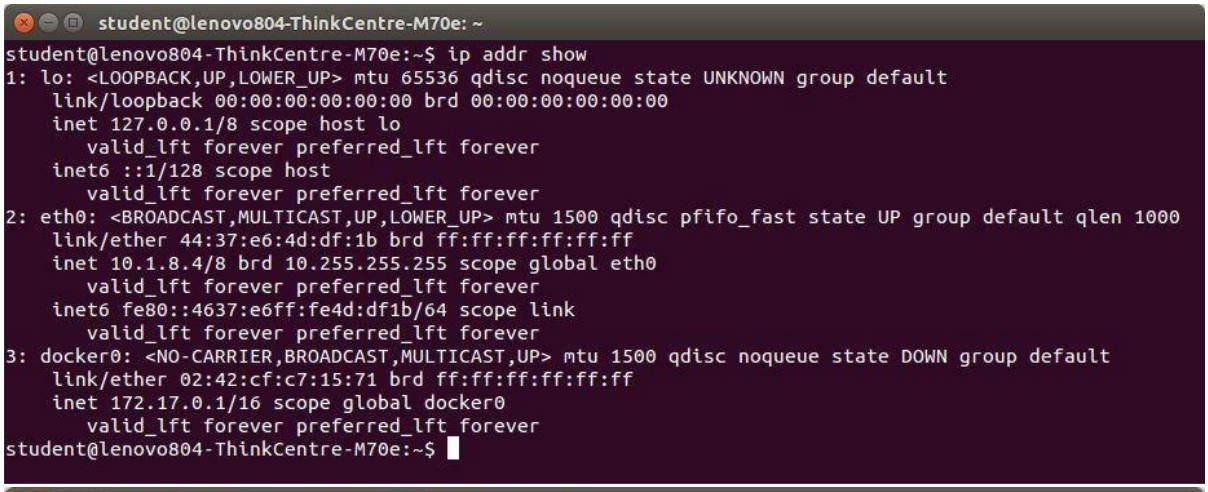
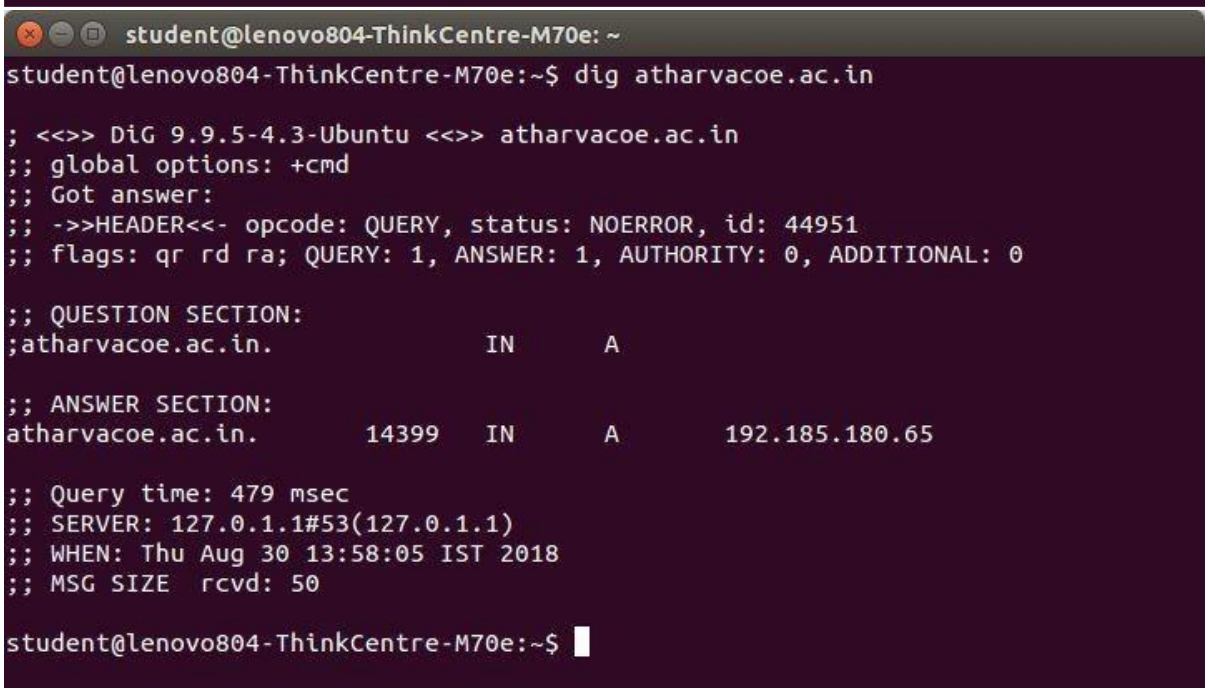
```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ arp -v
Address                  HWtype  HWaddress           Flags Mask            Iface
10.8.1.3                         (incomplete)                              eth0
10.0.0.3                 ether   08:35:71:f0:35:c0   C                     eth0
10.1.8.3                 ether   44:37:e6:4d:e0:f7   C                     eth0
Entries: 3      Skipped: 0      Found: 3
student@lenovo804-ThinkCentre-M70e:~$
```


student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
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: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether 44:37:e6:4d:df:1b brd ff:ff:ff:ff:ff:ff
inet 10.1.8.4/8 brd 10.255.255.255 scope global eth0
valid_lft forever preferred_lft forever
inet6 fe80::4637:e6ff:fe4d:df1b/64 scope link
valid_lft forever preferred_lft forever
3: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
link/ether 02:42:cf:c7:15:71 brd ff:ff:ff:ff:ff:ff
inet 172.17.0.1/16 scope global docker0
valid_lft forever preferred_lft forever
student@lenovo804-ThinkCentre-M70e:~$


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:~$