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ENROLLMENT NO. – 2020CSB039  
GROUP – GX  
SUBJECT – COMPUTER NETWORK LAB

1. Read the man pages of **ifconfig**, **ping**, **traceroute**, **arp**, **dig**, **nslookup**, and **netstat** and write their utilities in brief.
  - **Ifconfig** : 'ifconfig' is a command used to configure network interfaces on Unix-based systems. It can be used to view and modify the settings of a network interface, such as its IP address, netmask, and status.
  - **Ping** :  
ping is a command used to test the connectivity between two network devices. It sends an ICMP echo request packet to a specified host and waits for an IMP echo reply. The time it takes for the reply to be received is known as the "ping time."
  - **Traceroute** : traceroute is a command used to trace the path that network packets take from the host to a destination. It shows the sequence of routers that packets go through to reach the destination and the time it takes for packets to reach each hop.
  - **ARP**: arp' is a command used to view and modify the Address Resolution Protocol (ARP) cache. ARP is used to map a network address (such as an IP address) to a physical address (such as a MAC address).
  - **DIG**: dig (domain information groper) is a command line tool for querying DNS name servers. It can be used to look up various types of DNS records, such as A, AAAA, MX, and NS.
  - **nslookup** : nslookup is a command-line administrative tool for testing and troubleshooting DNS servers. It can be used to query a specific DNS server for various types of DNS records, or to perform a zone transfer of a domain.
  - **netstat** : 'netstat is a command used to view statistics about the network connections on a system. It can be used to view information about active connections, such as the local and remote addresses and states, and to view the status of various network protocols, such as TCP and UDP.

2. Find the IP and hardware addresses of your machine using ifconfig command.



```
eno1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.1.49 netmask 255.255.0.0 broadcast 10.1.255.255
    inet6 fe80::5698:28ff:fe4f:7d3c prefixlen 64 scopeid 0<20<link>
    ether 5a:80:28:4f:7d:3c txqueuelen 1000 (Ethernet)
    RX packets 2095422603 bytes 103315767795 (103.3 GB)
    RX errors 0 dropped 2 overruns 0 frame 0
    TX packets 4307294697 bytes 6462696996025 (6.4 TB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 16
```

3. Use "ping <AnyURL>" command and find out
  - i. the average RTT(round trip time).
  - ii. the %packet loss.
  - iii. size of packet that is sent to <AnyURL> server.
  - iv. size of packet that is received by your machine.



```

— google.com ping statistics —
38 packets transmitted, 37 received, 2% packet loss, time 37081ms
rtt min/avg/max/mdev = 44.856/69.640/85.673/9.105 ms
indranilb@kaveri:~$

```

4. Use "dig <AnyURI>" command and find out
  - i 1. the IP address of <AnyURL>.
  - ii. the IP addresses of local DNS servers of IEST.



```

;; ANSWER SECTION:
www.apple.com. 64 IN CNAME www.apple.com.edgekey.net.
www.apple.com.edgekey.net. 6847 IN CNAME www.apple.com.edgekey.net.globalredir.akadns.net.
www.apple.com.edgekey.net.globalredir.akadns.net. 2633 IN CNAME e6858.dscx.akamaiedge.net.
e6858.dscx.akamaiedge.net. 4 IN A 23.201.200.214

;; Query time: 84 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Jan 13 14:48:21 IST 2023
;; MSG SIZE rcvd: 192

indranilb@kaveri:~$

```

5. Use "traceroute <AnyURL>" and find out
  - i. number of hops in between your machine and <AnyURL> server.
  - ii. the IP address of your network gateway of your subnet.



```

→ ~ traceroute www.google.com
traceroute to www.google.com (142.250.199.164), 64 hops max, 52 byte packets
 1 10.2.0.1 (10.2.0.1) 3.956 ms 2.941 ms 3.241 ms
 2 * * *
 3 10.119.235.13 (10.119.235.13) 4.700 ms 3.421 ms 3.262 ms
 4 10.173.35.185 (10.173.35.185) 61.522 ms 55.500 ms 57.671 ms
 5 10.255.238.166 (10.255.238.166) 66.134 ms 74.125 ms 88.630 ms
 6 10.152.7.214 (10.152.7.214) 62.703 ms 63.979 ms 77.056 ms
 7 142.250.172.80 (142.250.172.80) 93.214 ms 71.627 ms 72.319 ms
 8 * * *
 9 108.170.248.177 (108.170.248.177) 89.362 ms 73.589 ms
   142.250.238.200 (142.250.238.200) 76.288 ms
10 108.170.248.163 (108.170.248.163) 77.581 ms
   209.85.240.55 (209.85.240.55) 70.728 ms 85.081 ms
11 108.170.248.193 (108.170.248.193) 84.317 ms
   bom07s37-in-f4.1e100.net (142.250.199.164) 68.111 ms
   108.170.248.209 (108.170.248.209) 64.173 ms
→ ~

```

6. Use "arp" command to find out the MAC address of the device that is performing as your network gateway.



```
*** System restart required ***
Last login: Fri Jan 13 14:31:59 2023 from 10.2.94.153
indranilb@kaveri:~$ arp
Address                  HWtype  HWaddress          Flags Mask          Iface
10.2.6.178               ether    30:8d:99:ac:cc:ac   C                   eno1
hanau.cs.iiests.ac.in    ether    9c:b6:54:8c:9e:8c   C                   eno1
169.254.232.32           (incomplete)                      eno1
10.2.1.225               ether    a0:8c:fd:84:53:69   C                   eno1
10.2.97.27               ether    ec:b1:d7:37:d1:a9   C                   eno1
10.2.94.153              ether    50:ed:3c:55:11:9d   C                   eno1
10.2.98.159              (incomplete)                      eno1
10.2.80.124              ether    40:b0:34:38:f9:51   C                   eno1
10.2.89.170              ether    80:e8:2c:cb:34:10   C                   eno1
hamsa.cs.iiests.ac.in    ether    9c:b6:54:96:62:28   C                   eno1
10.2.100.156             ether    a4:b1:c1:14:6b:a8   C                   eno1
10.2.63.0                 ether    3c:a6:f6:1b:c1:1d   C                   eno1
169.254.215.249          ether    b8:09:8a:c8:6f:79   C                   eno1
10.2.98.137              ether    ec:b1:d7:37:af:81   C                   eno1
10.2.92.193              ether    5c:ba:ef:43:c2:55   C                   eno1
10.2.0.50                 ether    2c:ea:7f:ce:ee:18   C                   eno1
10.2.1.221               ether    a0:8c:fd:83:14:95   C                   eno1
```

7. Use nslookup <AnyURL> command and find out the IP address of <AnyURL>. Use nslookup <IP address> command and perform reverse domain lookup.



```
indranilb@kaveri:~$ nslookup www.apple.com
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
www.apple.com    canonical name = www.apple.com.edgekey.net.
www.apple.com.edgekey.net    canonical name = www.apple.com.edgekey.net.globalredir.akadns.net.
www.apple.com.edgekey.net.globalredir.akadns.net    canonical name = e6858.dscx.akamaiedge.net.
Name:   e6858.dscx.akamaiedge.net
Address: 23.32.176.246
Name:   e6858.dscx.akamaiedge.net
Address: 2600:140f:1e00:4b7::1aca
Name:   e6858.dscx.akamaiedge.net
Address: 2600:140f:1e00:484::1aca
```

```
indranilb@kaveri:~$ nslookup 10.2.1.49
49.1.2.10.in-addr.arpa    name = kaveri.cs.iiests.ac.in.
49.1.2.10.in-addr.arpa    name = kaveri.
```

8. Use netstat command and find out the active connections of your machine.



```
indranilb@kaveri:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 kaveri.cs.iiests.ac:ssh 10.2.96.136:41618       ESTABLISHED
tcp        0    164 kaveri.cs.iiests.ac:ssh 10.2.94.153:64897       ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:swat hamsa.cs.iiests.ac.:nfs ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:ssh 10.2.100.156:54346      ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:ssh 10.2.97.27:35324        ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:ssh 10.2.96.136:33766       ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:ssh 10.2.94.78:51801        ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:948 hanau.cs.iiests.ac.:nfs ESTABLISHED
tcp        0      0 kaveri.cs.iiests.ac:ssh 10.2.94.153:64567       ESTABLISHED
```