

Assignment – 1

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Enrollment No – 2023CSB047

Subject – Computer Networks Lab

1. Read the man pages of ifconfig, ping, traceroute, arp, dig, nslookup, and netstat and write their utilities in brief.

ifconfig

- Displays network interface details (IP, MAC, MTU, RX/TX stats).
- Used to enable/disable interfaces (up/down).
- Helps diagnose interface/link issues.

ping

- Checks whether a host is reachable using ICMP.
- Measures round-trip time (latency).
- Detects packet loss and unstable links.
- Helps separate DNS issue vs network issue (ping domain vs IP).

traceroute

- Shows route (hops) taken to reach destination.
- Identifies delay at each hop to find slow networks.
- Helps locate routing failures or packet drops.

arp

- Displays ARP cache (IP ↔ MAC address mapping).
- Adds or deletes ARP table entries.
- Useful for LAN troubleshooting and spoof detection.

dig

- Performs DNS queries for records (A, AAAA, MX, NS, TXT, etc.).
- Gives detailed output (authority section, response, time).
- Useful for debugging DNS resolution/propagation.
- Can query specific DNS server (dig @server).

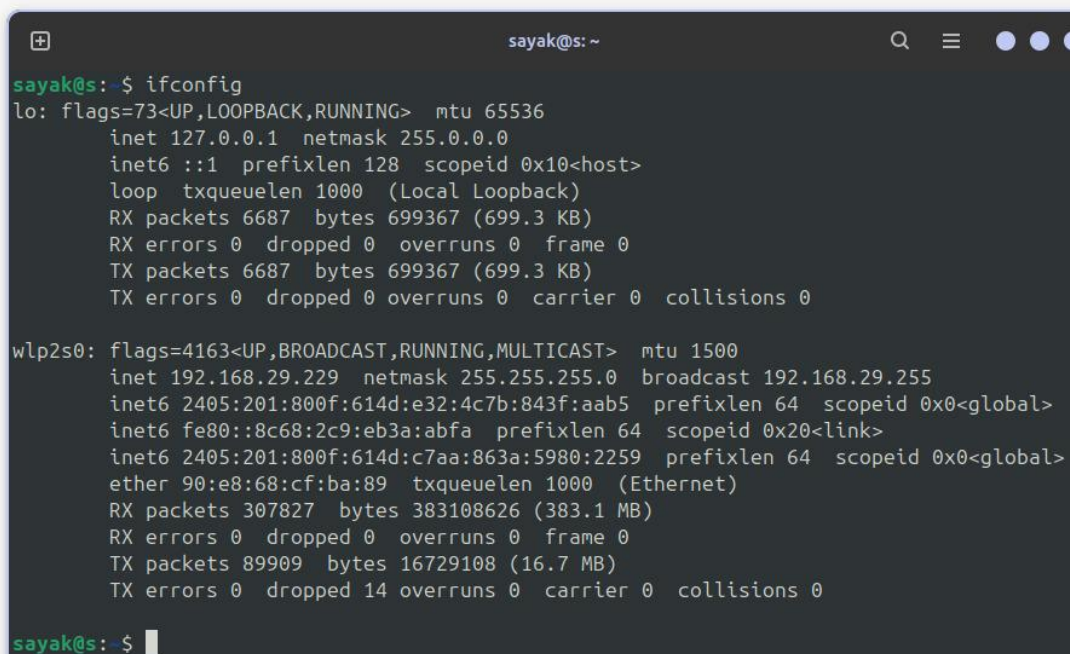
nslookup

- Resolves domain name to IP and reverse lookup.
- Can query a specific DNS server.
- Useful for quick DNS troubleshooting.

netstat

- Shows active network connections (TCP/UDP) with states.
- Lists listening ports and services.
- Displays routing table information.
- Useful for troubleshooting and checking suspicious connections.

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



```
sayak@sayak:~$ ifconfig
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 6687 bytes 699367 (699.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 6687 bytes 699367 (699.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp2s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.29.229 netmask 255.255.255.0 broadcast 192.168.29.255
    inet6 2405:201:800f:614d:e32:4c7b:843f:aab5 prefixlen 64 scopeid 0x0<global>
    inet6 fe80::8c68:2c9:eb3a:abfa prefixlen 64 scopeid 0x20<link>
    inet6 2405:201:800f:614d:c7aa:863a:5980:2259 prefixlen 64 scopeid 0x0<global>
    ether 90:e8:68:cf:ba:89 txqueuelen 1000 (Ethernet)
    RX packets 307827 bytes 383108626 (383.1 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 89909 bytes 16729108 (16.7 MB)
    TX errors 0 dropped 14 overruns 0 carrier 0 collisions 0

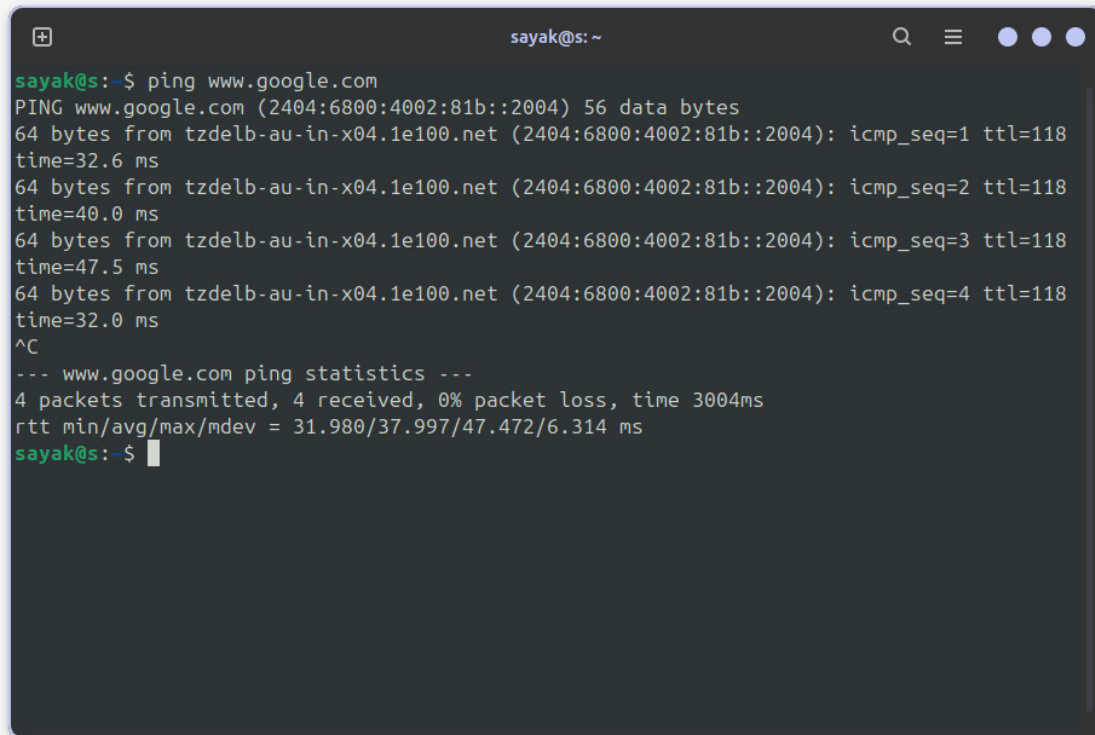
sayak@sayak:~$
```

Computer IP Address – 127.0.0.1

Machine Address – 90 : e8 : 68 : cf : ba : 89

3. Use “ping <AnyURL>” command and find out

1. the average RTT(round trip time).
2. the %packet loss.
3. size of packet that is sent to <AnyURL> server.
4. size of packet that is received by your machine.



```
sayak@s: ~  
sayak@s:~$ ping www.google.com  
PING www.google.com (2404:6800:4002:81b::2004) 56 data bytes  
64 bytes from tzdelb-au-in-x04.1e100.net (2404:6800:4002:81b::2004): icmp_seq=1 ttl=118  
time=32.6 ms  
64 bytes from tzdelb-au-in-x04.1e100.net (2404:6800:4002:81b::2004): icmp_seq=2 ttl=118  
time=40.0 ms  
64 bytes from tzdelb-au-in-x04.1e100.net (2404:6800:4002:81b::2004): icmp_seq=3 ttl=118  
time=47.5 ms  
64 bytes from tzdelb-au-in-x04.1e100.net (2404:6800:4002:81b::2004): icmp_seq=4 ttl=118  
time=32.0 ms  
^C  
--- www.google.com ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3004ms  
rtt min/avg/max/mdev = 31.980/37.997/47.472/6.314 ms  
sayak@s:~$
```

1. Average RTT - 37.997
2. %Packet Loss – 0%
3. Size of packet sent – 56 bytes data + 8 bytes header
4. Size of packet received – 64 bytes

4. Use “dig <AnyURL>” command and find out

1. The IP address of <AnyURL>.
2. The IP addresses of local DNS servers of IIST.

```
sayak@:~$ dig www.google.com

; <<>> DiG 9.18.39-0ubuntu0.24.04.2-Ubuntu <<>> www.google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9374
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;www.google.com.                IN      A

;; ANSWER SECTION:
www.google.com.                 30      IN      A      142.251.223.4

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Fri Jan 09 22:08:47 IST 2026
;; MSG SIZE rcvd: 59

sayak@:~$
```

IP Address of www.google.com – 142.251.223.4

```
sayak@:~$ dig cs.iiests.ac.in

; <<>> DiG 9.18.39-0ubuntu0.24.04.2-Ubuntu <<>> cs.iiests.ac.in
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 50984
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;cs.iiests.ac.in.              IN      A

;; ANSWER SECTION:
cs.iiests.ac.in.               2496    IN      A      14.139.223.166

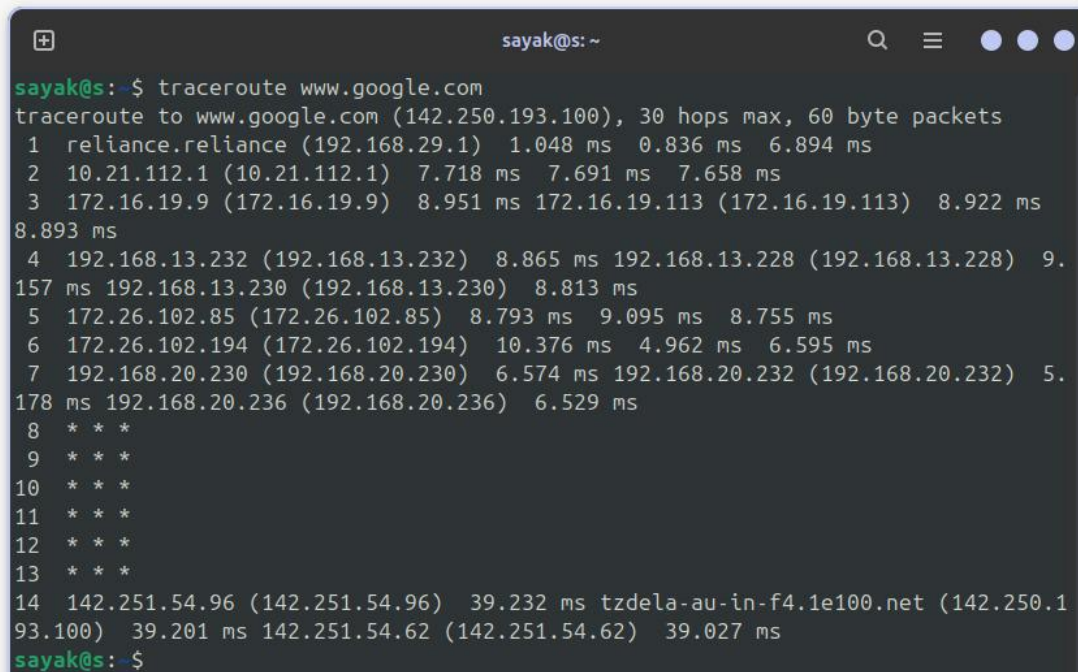
;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Fri Jan 09 22:10:03 IST 2026
;; MSG SIZE rcvd: 60

sayak@:~$
```

IP Address of Local IUESTS Server – 14.139.223.166

5. Use “tracert <AnyURL>” and find out

1. number of hops in between your machine and <AnyURL> server.
2. the IP address of your network gateway of your subnet.

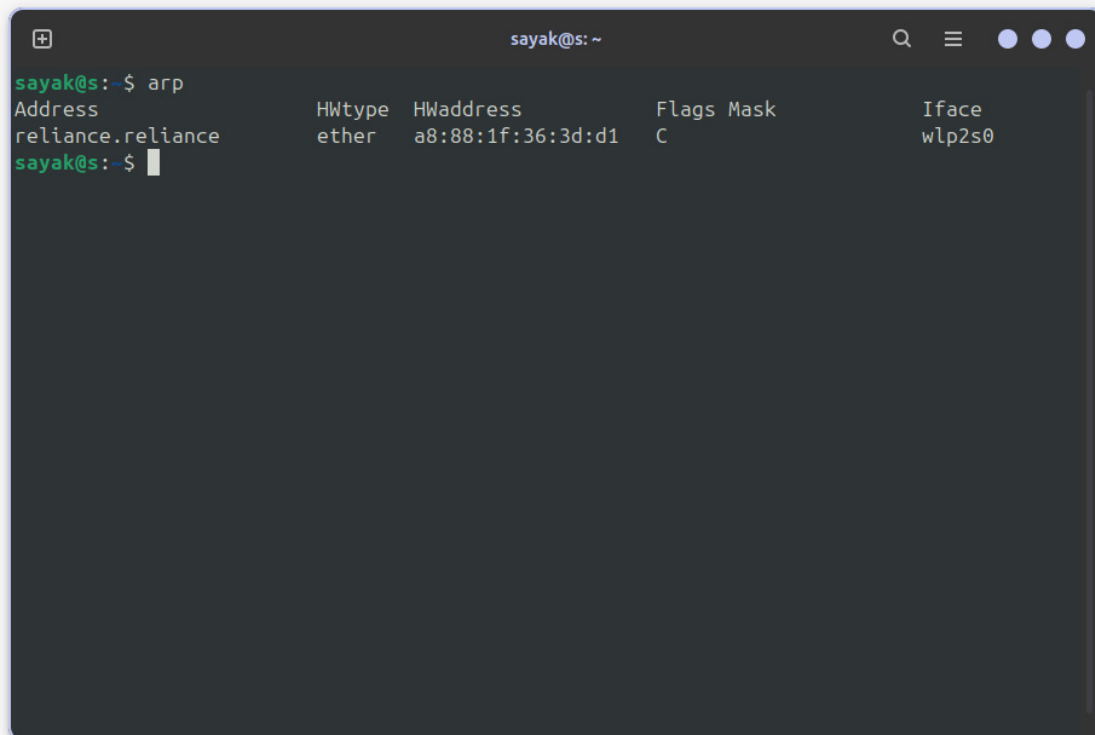


```
sayak@s: ~  
sayak@s: $ traceroute www.google.com  
traceroute to www.google.com (142.250.193.100), 30 hops max, 60 byte packets  
 1  reliance.reliance (192.168.29.1)  1.048 ms  0.836 ms  6.894 ms  
 2  10.21.112.1 (10.21.112.1)  7.718 ms  7.691 ms  7.658 ms  
 3  172.16.19.9 (172.16.19.9)  8.951 ms  172.16.19.113 (172.16.19.113)  8.922 ms  
 8.893 ms  
 4  192.168.13.232 (192.168.13.232)  8.865 ms  192.168.13.228 (192.168.13.228)  9.  
157 ms  192.168.13.230 (192.168.13.230)  8.813 ms  
 5  172.26.102.85 (172.26.102.85)  8.793 ms  9.095 ms  8.755 ms  
 6  172.26.102.194 (172.26.102.194)  10.376 ms  4.962 ms  6.595 ms  
 7  192.168.20.230 (192.168.20.230)  6.574 ms  192.168.20.232 (192.168.20.232)  5.  
178 ms  192.168.20.236 (192.168.20.236)  6.529 ms  
 8  * * *  
 9  * * *  
10  * * *  
11  * * *  
12  * * *  
13  * * *  
14  142.251.54.96 (142.251.54.96)  39.232 ms  tzdela-au-in-f4.1e100.net (142.250.1  
93.100)  39.201 ms  142.251.54.62 (142.251.54.62)  39.027 ms  
sayak@s: $
```

Number of hops between my machine and www.google.com – 18

The IP Address of network gateway – 192.168.29.1

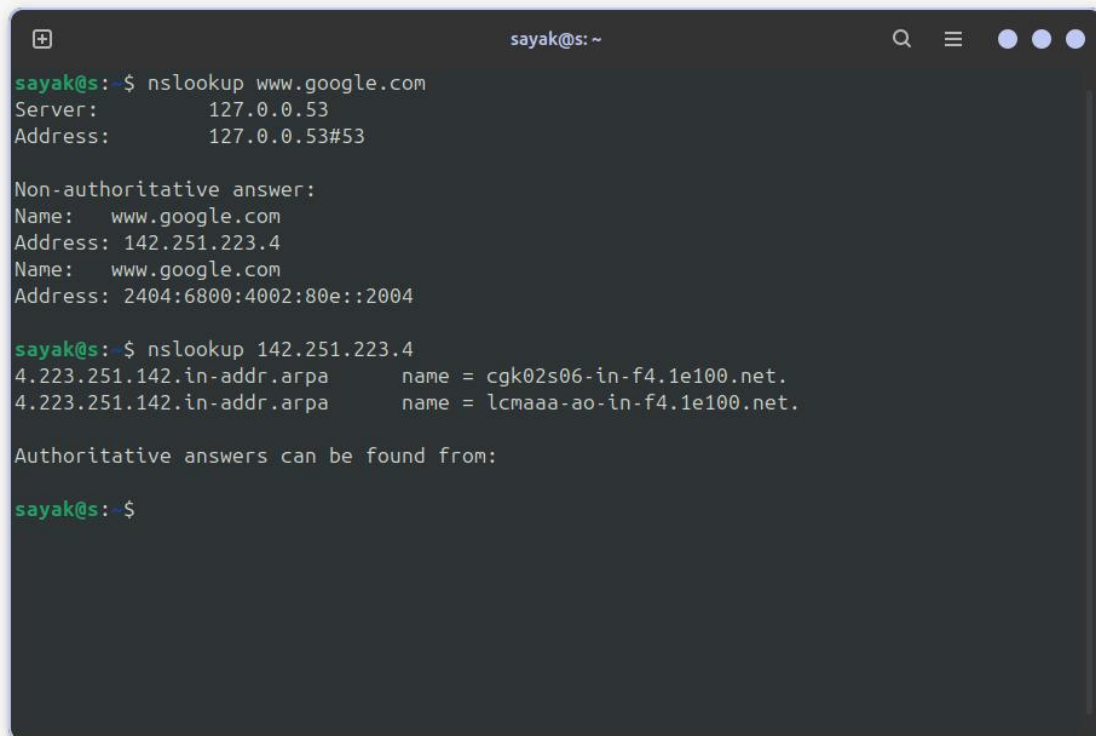
6. Use “arp” command to find out the MAC address of the device that is performing as your network gateway.

A terminal window titled 'sayak@s: ~' with standard macOS window controls. The terminal shows the command 'arp' being executed. The output is a table with columns: Address, HWtype, HWaddress, Flags, Mask, and Iface. The first entry shows 'reliance.reliance' as the address, 'ether' as the hardware type, 'a8:88:1f:36:3d:d1' as the hardware address, 'C' as the flag, and 'wlp2s0' as the interface. The prompt 'sayak@s:~\$' is visible at the bottom.

```
sayak@s:~$ arp
Address          HWtype  HWaddress    Flags Mask    Iface
reliance.reliance ether    a8:88:1f:36:3d:d1  C             wlp2s0
sayak@s:~$
```

MAC Address of the device that is performing as network gateway – a8 : 88 : 1f : 36 : 3d : d1

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

A terminal window with a dark background and light text. The window title is 'sayak@s: ~'. The user 'sayak@s' has entered the command 'nslookup www.google.com'. The output shows the server as 127.0.0.53 and the address as 127.0.0.53#53. It then shows a non-authoritative answer for 'www.google.com' with IP address 142.251.223.4 and a DNSSEC record. The user then enters 'nslookup 142.251.223.4', and the output shows reverse DNS records for the IP address, identifying the server as 'cgk02s06-in-f4.1e100.net' and 'lcmaaa-ao-in-f4.1e100.net'. The terminal ends with the prompt 'sayak@s:~\$'.

IP Address of www.google.com - 142.251.223.4

Name of server of server – cgk02s06-in-f4.1e100.net

8. Use netstat command and find out the active connections of your pc/laptop.

```
sayak@s: ~  
sayak@s:~$ netstat  
Active Internet connections (w/o servers)  
Proto Recv-Q Send-Q Local Address           Foreign Address         State  
tcp        0      0 s:36896                93.243.107.34.bc.:https ESTABLISHED  
tcp        0      0 s:36892                93.243.107.34.bc.:https ESTABLISHED  
tcp6       0      0 s:45410                pnmaa-ba-in-x0e.:https ESTABLISHED  
tcp6       0      0 s:33802                ubuntu-content-cac:http TIME_WAIT  
tcp6       0      0 s:44750                2a04:4e42:59::347:https ESTABLISHED  
tcp6       0      0 s:44752                2a04:4e42:59::347:https ESTABLISHED  
udp        0      0 s:bootpc               reliance.relianc:bootps ESTABLISHED  
Active UNIX domain sockets (w/o servers)  
Proto RefCnt Flags               Type           State         I-Node  Path  
unix    3      [ ]                 STREAM         CONNECTED     173362  
unix    3      [ ]                 STREAM         CONNECTED     18750    /run/systemd/journal/stdout  
unix    3      [ ]                 STREAM         CONNECTED     167688  
unix    3      [ ]                 STREAM         CONNECTED     154104  
unix    3      [ ]                 STREAM         CONNECTED     174283    /run/user/1000/at-spi/bus  
unix    3      [ ]                 STREAM         CONNECTED     147769    /run/user/1000/pipewire-0  
unix    3      [ ]                 STREAM         CONNECTED     133831  
unix    3      [ ]                 STREAM         CONNECTED     19854    /run/systemd/journal/stdout  
unix    3      [ ]                 STREAM         CONNECTED     20800  
unix    3      [ ]                 STREAM         CONNECTED     21656  
unix    3      [ ]                 STREAM         CONNECTED     20717  
unix    3      [ ]                 STREAM         CONNECTED     42116  
unix    3      [ ]                 STREAM         CONNECTED     18901
```