Department of Computer Engineering
Class: S.Y. B.Tech. Semester: IV
Course Code: DJ19CEL405 Course Name: Computer Networks Lab

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Experiment No: 1

Aim: To study different networking commands.

Theory: (ADD THE COMMANDS PERFORMED ALONG WITH THE SCREENSHOTS FOR EACH – AT LEAST ANY 10)

1. Ifconfig/ipconfig:

```
PS C:\Users\meghs> echo Vinit Shah C-183 60004220097
Vinit
Shah
C-183
60004220097
PS C:\Users\meghs> ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : LAPTOP-852Q3K7E
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Wireless LAN adapter Local Area Connection* 3:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #3
   Physical Address. . . . . . . . . : 3C-9C-0F-36-50-D9
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 12:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #4
   Physical Address. . . . . . . . . : 3E-9C-0F-36-50-D8
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
```

```
Wireless LAN adapter Local Area Connection* 12:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #4
   Physical Address. . . . . . . . . : 3E-9C-0F-36-50-D8
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wireless-AC 9560
   Physical Address. . . . . . . . . : 3C-9C-0F-36-50-D8
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : 2401:4900:56d1:a852:5ce3:bb41:e5ae:19b8(Preferred)
   Temporary IPv6 Address. . . . . . : 2401:4900:56d1:a852:d569:b140:cb21:18d0(Preferred)
   Link-local IPv6 Address . . . . . : fe80::93e2:51ee:fb82:9c28%7(Preferred)
   IPv4 Address. . . . . . . . . . . : 172.20.10.10(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.240
   Lease Obtained. . . . . . . . . . : Sunday, August 11, 2024 7:23:08 AM
   Lease Expires . . . . . . . . . . : Monday, August 12, 2024 7:23:08 AM
   Default Gateway . . . . . . . . . : fe80::9850:2eff:fe1d:e064%7
                                       172.20.10.1
   DHCP Server . . . . . . . . . . . : 172.20.10.1
   DHCPv6 IAID . . . . . . . . . . . : 71080975
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-28-A8-4C-63-3C-9C-0F-36-50-D8
   DNS Servers . . . . . . . . . . . : fe80::9850:2eff:fe1d:e064%7
                                       172.20.10.1
   NetBIOS over Tcpip. . . . . . . . : Enabled
PS C:\Users\meghs>
```

2. **ping:** Used to test the reachability of a host on an IP network and measure the round-trip time for messages sent from the originating host to a destination computer.

```
PS C:\Users\meghs> ping google.com

Pinging google.com [2404:6800:4009:815::200e] with 32 bytes of data:
Reply from 2404:6800:4009:815::200e: time=33ms
Reply from 2404:6800:4009:815::200e: time=83ms
Reply from 2404:6800:4009:815::200e: time=79ms
Reply from 2404:6800:4009:815::200e: time=67ms

Ping statistics for 2404:6800:4009:815::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 33ms, Maximum = 83ms, Average = 65ms
PS C:\Users\meghs>
```

3. **nslookup:**
Used to query Internet domain name servers. It can be used to find the IP address associated with a domain name.

```
PS C:\Users\meghs> nslookup google.com
Server:  UnKnown
Address:  fe80::9850:2eff:fe1d:e064

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4009:82d::200e
          142.250.199.142
```

4. **hostname:**
   Displays the name of current host system.

```
PS C:\Users\meghs> nslookup google.com
Server:  UnKnown
Address:  fe80::9850:2eff:fe1d:e064

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4009:82d::200e
          142.250.199.142

PS C:\Users\meghs> hostname
LAPTOP-852Q3K7E
```

5. **netstat:**
   Displays network connections (both incoming and outgoing), routing tables, interface statistics, masquerade connections, and multicast memberships.

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```
PS C:\Users\meghs> hostname
LAPTOP-852Q3K7E
PS C:\Users\meghs> netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:445            LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:3306           LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:5040           LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:33060          LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:49664          LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:49665          LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:49666          LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:49667          LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:49668          LAPTOP-852Q3K7E:0      LISTENING
  TCP    0.0.0.0:49676          LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52296  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52334  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52395  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52466  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52503  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52511  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52542  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52548  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52556  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52561  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52573  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52576  TIME_WAIT
```

```
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52650  TIME_WAIT
  TCP    127.0.0.1:6880         LAPTOP-852Q3K7E:52653  TIME_WAIT
  TCP    127.0.0.1:6890         LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:27017        LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:49672        LAPTOP-852Q3K7E:49673  ESTABLISHED
  TCP    127.0.0.1:49673        LAPTOP-852Q3K7E:49672  ESTABLISHED
  TCP    127.0.0.1:49674        LAPTOP-852Q3K7E:49675  ESTABLISHED
  TCP    127.0.0.1:49675        LAPTOP-852Q3K7E:49674  ESTABLISHED
  TCP    127.0.0.1:49679        LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:49680        LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:50485        LAPTOP-852Q3K7E:0      LISTENING
  TCP    127.0.0.1:52318        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    127.0.0.1:52334        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    127.0.0.1:52345        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    127.0.0.1:52395        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    127.0.0.1:52448        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    127.0.0.1:52503        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    127.0.0.1:52650        LAPTOP-852Q3K7E:6880   TIME_WAIT
  TCP    192.168.29.218:139     LAPTOP-852Q3K7E:0      LISTENING
  TCP    192.168.29.218:52565   40.119.46.46:https     TIME_WAIT
  TCP    192.168.29.218:52566   ec2-3-94-40-55:https   ESTABLISHED
  TCP    192.168.29.218:52567   52.112.85.14:https     ESTABLISHED
  TCP    192.168.29.218:52568   bom12s06-in-f4:http    ESTABLISHED
  TCP    192.168.29.218:52570   49.44.206.7:http       TIME_WAIT
  TCP    192.168.29.218:52577   20.189.173.26:https    TIME_WAIT
  TCP    192.168.29.218:52578   20.189.173.8:https     TIME_WAIT
  TCP    192.168.29.218:52581   51.132.193.105:https   TIME_WAIT
  TCP    192.168.29.218:52586   52.112.50.37:https     TIME_WAIT
  TCP    192.168.29.218:52597   20.189.173.8:https     TIME_WAIT
  TCP    192.168.29.218:52598   20.189.173.8:https     TIME_WAIT
  TCP    192.168.29.218:52599   52.182.143.211:https   TIME_WAIT
  TCP    192.168.29.218:52606   20.189.173.26:https    TIME_WAIT
  TCP    192.168.29.218:52607   52.123.190.75:https    ESTABLISHED
  TCP    192.168.29.218:52614   a173c15f4de6c7caa:https  ESTABLISHED
```

6. **nbtstat:** Displays NetBIOS over TCP/IP statistics, NetBIOS name tables for both the local computer and remote computers, and the NetBIOS name cache.

```
PS C:\Users\meghs> nbtstat -n

Wi-Fi:
Node IpAddress: [192.168.29.218] Scope Id: []

               NetBIOS Local Name Table

       Name               Type         Status
    ---------------------------------------------
    LAPTOP-852Q3K7E<00>  UNIQUE      Registered
    LAPTOP-852Q3K7E<20>  UNIQUE      Registered
    WORKGROUP       <00>  GROUP       Registered

Local Area Connection* 3:
Node IpAddress: [0.0.0.0] Scope Id: []

    No names in cache

Local Area Connection* 12:
Node IpAddress: [0.0.0.0] Scope Id: []

    No names in cache
PS C:\Users\meghs>
```

7. **net:** Used to manage network resources such as viewing network computers, mapping network drives, and managing user accounts.

```
No names in cache
PS C:\Users\meghs> net view
System error 6118 has occurred.

The list of servers for this workgroup is not currently available
```

8. **tracert:** Traces the path that a packet takes to reach a destination. Useful for diagnosing network routing issues.

```
PS C:\Users\meghs> tracert google.com

Tracing route to google.com [2404:6800:4009:823::200e]
over a maximum of 30 hops:

  1     3 ms     7 ms     5 ms  2405:201:0:2af8:b6a7:c6ff:fe98:e3d4
  2     *        *        *     Request timed out.
  3    17 ms     9 ms     9 ms  2405:203:400:100:172:31:0:238
  4    17 ms    15 ms     9 ms  2001:4860:1:1::167a
  5    13 ms     8 ms     8 ms  2001:4860:1:1::167a
  6    26 ms    12 ms    12 ms  2404:6800:8114::1
  7   176 ms    28 ms    12 ms  2001:4860:0:1::4fea
  8   253 ms    49 ms    55 ms  2001:4860:0:1::879a
  9    21 ms    20 ms    14 ms  2001:4860:0:1::870b
 10    14 ms    13 ms    11 ms  2001:4860:0:1::fb5
 11    12 ms    12 ms     7 ms  bom12s13-in-x0e.1e100.net [2404:6800:4009:823::200e]

Trace complete.
PS C:\Users\meghs>
```

9. **arp:** Displays and modifies the IP-to-Physical address translation tables used by the Address Resolution Protocol (ARP).

```
PS C:\Users\meghs> arp -a

Interface: 192.168.29.218 --- 0x7
  Internet Address      Physical Address      Type
  192.168.29.1          b4-a7-c6-98-e3-d4     dynamic
  192.168.29.255        ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
PS C:\Users\meghs>
```

10. **getmac:** Displays the MAC address for network adapters on a system.

```
PS C:\Users\meghs> getmac

Physical Address    Transport Name
=================== ==========================================================
3C-9C-0F-36-50-D8   \Device\Tcpip_{3292C9C2-D71D-4AD9-B3AE-E4F22E868846}
```

11. **Path ping:** Combines the functionality of ping and tracert to provide information about network latency and packet loss at intermediate hops between a source and destination.

```
PS C:\Users\meghs> pathping google.com

Tracing route to google.com [2404:6800:4009:823::200e]
over a maximum of 30 hops:
  0  LAPTOP-852Q3K7E [2405:201:0:2af8:a8fe:14c9:b7e1:4a53]
  1  2405:201:0:2af8:b6a7:c6ff:fe98:e3d4
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                          LAPTOP-852Q3K7E [2405:201:0:2af8:a8fe:14c9:b7e1:4a53]
                                   0/ 100 =  0%   |
  1   31ms     0/ 100 =  0%     0/ 100 =  0%  2405:201:0:2af8:b6a7:c6ff:fe98:e3d4

Trace complete.
```

12. route: Displays and modifies the IP routing table. Useful for adding or deleting routes.

```
PS C:\Users\meghs> route print
===========================================================================
Interface List
 17...3c 9c 0f 36 50 d9 ......Microsoft Wi-Fi Direct Virtual Adapter #3
  4...3e 9c 0f 36 50 d8 ......Microsoft Wi-Fi Direct Virtual Adapter #4
  7...3c 9c 0f 36 50 d8 ......Intel(R) Wireless-AC 9560
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0     192.168.29.1   192.168.29.218     55
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
     192.168.29.0    255.255.255.0         On-link    192.168.29.218    311
   192.168.29.218  255.255.255.255         On-link    192.168.29.218    311
   192.168.29.255  255.255.255.255         On-link    192.168.29.218    311
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link    192.168.29.218    311
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link    192.168.29.218    311
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  7     71 ::/0                     fe80::b6a7:c6ff:fe98:e3d4
  1    331 ::1/128                  On-link
  7     71 2405:201:0:2af8::/64     On-link
  7    311 2405:201:0:2af8:a8fe:14c9:b7e1:4a53/128
                                    On-link
  7    311 2405:201:0:2af8:bd35:d41:a062:2d85/128
                                    On-link
  7    311 fe80::/64               On-link
  7    311 fe80::93e2:51ee:fb82:9c28/128
                                    On-link
  1    331 ff00::/8                On-link
  7    311 ff00::/8                On-link
===========================================================================
Persistent Routes:
  None
```

Conclusion:

Thus, we have studied and used different networking commands.