[2CEIT503 COMPUTER NETWORKS]

Practical: 3

AIM- Studying Windows network commands.
ping, pathping, ipconfig/ifconfig, arp, netstat, nbtstat, nslookup, route, traceroute/tracert, nmap.

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- **Hostname :**
  Useful to know machine name.

```
C:\Users\AMIT GOSWAMI>hostname
DESKTOP-IMLH0SH
```

- **Ipconfig :**
  The ipconfig command is a fast way of determining your computer's IP address and other information, such as the address of its default gateway useful if you want to know the IP address of your router's web interface.

```
C:\Users\AMIT GOSWAMI>IPCONFIG

Windows IP Configuration


Ethernet adapter Ethernet:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   IPv6 Address. . . . . . . . . . . : 2409:4041:2d1f:6d1f:2b35:6c96:72a:2e0a
   Temporary IPv6 Address. . . . . . : 2409:4041:2d1f:6d1f:ed1e:d50:765a:a9f2
   Link-local IPv6 Address . . . . . : fe80::f92:7282:e0e0:f0a2%17
   IPv4 Address. . . . . . . . . . . : 192.168.61.167
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::70c1:41ff:fe28:157b%17
                                       192.168.61.54

Ethernet adapter Bluetooth Network Connection:

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

- **Ipconfig/all :**
  Displays all current TCP/IP network configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings. Used without parameters, ipconfig displays Internet Protocol version 4 (IPv4) and IPv6 addresses, subnet mask, and default gateway for all adapters.

```
C:\Users\AMIT GOSWAMI>IPCONFIG/all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : DESKTOP-IMLH0SH
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Mixed
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe FE Family Controller
   Physical Address. . . . . . . . . : 60-18-95-55-B5-80
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #3
   Physical Address. . . . . . . . . : FA-89-D2-60-FD-F7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #4
   Physical Address. . . . . . . . . : FE-89-D2-60-FD-F7
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
```

- **Ping :**
  Ping sends out a packet to a designated internet host or network computer and measures its response time. Use ping whenever you need to verify that a host computer can connect to the TCP/IP network and network resources.

```
C:\Users\AMIT GOSWAMI>ping www.google.com

Pinging www.google.com [2404:6800:4009:828::2004] with 32 bytes of data:
Reply from 2404:6800:4009:828::2004: time=809ms
Reply from 2404:6800:4009:828::2004: time=721ms
Reply from 2404:6800:4009:828::2004: time=731ms
Reply from 2404:6800:4009:828::2004: time=831ms

Ping statistics for 2404:6800:4009:828::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 721ms, Maximum = 831ms, Average = 773ms
```

- **Arp -a :**
  A device that wants to communicate with others over the internet then ARP will broadcast a packet to all the devices of the source network. There the network ID of the packet is validated with the destination IP's network ID of the packet and if it's equal then it responds to the source with the MAC address(Physical Address) of the destination, else the packet reaches the gateway

of the network and broadcasts packet to the devices it is connected with and validates their network ID. The above process continues till the second last network device in the path reaches the destination where it gets validated and ARP, in turn, responds with the destination MAC address.

```
C:\Users\AMIT GOSWAMI>arp -a

Interface: 192.168.61.167 --- 0x11
  Internet Address      Physical Address      Type
  192.168.61.54         72-c1-41-28-15-7b     dynamic
  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

C:\Users\AMIT GOSWAMI>
```

- **Netstat :**
  netstat stands for network statistics. This command displays incoming and outgoing network connections as well as other network information. The netstat utility can show you the open connections on your computer, which programs are making which connections, how much data is being transmitted, and other information.The netstatcommand is a used to display very detailed information about how your computer is communicating with other computers or network devices.

```
C:\Users\AMIT GOSWAMI>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.61.167:55291   20.198.119.143:https   ESTABLISHED
  TCP    192.168.61.167:55346   52.232.209.85:https    ESTABLISHED
  TCP    192.168.61.167:55348   13.73.252.139:8883     ESTABLISHED
  TCP    192.168.61.167:55562   152.195.38.76:http     CLOSE_WAIT
  TCP    192.168.61.167:55613   20.198.118.190:https   ESTABLISHED
  TCP    192.168.61.167:55703   77.111.245.14:https    ESTABLISHED
  TCP    192.168.61.167:55848   1drv:https             ESTABLISHED
  TCP    192.168.61.167:55850   20.189.173.14:https    ESTABLISHED
  TCP    192.168.61.167:55878   52.109.124.115:https   TIME_WAIT
  TCP    192.168.61.167:55879   52.109.124.115:https   TIME_WAIT
```

- **Nslookup :**
  nslookup, which stands for "name server lookup", is a useful tool for finding out information about a domain named . This command helps diagnose the Domain Name System (DNS) infrastructure and comes with a number of sub-commands. These are mainly for systems administrators. The primary interest for average PC users is its use to find the computer name corresponding to a numeric IP.

```
C:\Users\AMIT GOSWAMI>nslookup www.google.com
Server:  UnKnown
Address:  192.168.61.54

Non-authoritative answer:
Name:    www.google.com
Addresses:  2404:6800:4009:81d::2004
          216.58.196.68
```

```
C:\Users\AMIT GOSWAMI>nslookup www.uvpce.guni.ac.in
Server:  UnKnown
Address:  192.168.61.54

Non-authoritative answer:
Name:    www.uvpce.guni.ac.in
Addresses:  13.35.128.32
          13.35.128.51
          13.35.128.69
          13.35.128.72
```

- **Nbtstat :**
  Displays NetBIOS over TCP/IP (NetBT) protocol statistics, NetBIOS name tables for both the local computer and remote computers, and the NetBIOS name cache. This command also allows a refresh of the NetBIOS name cache and the names registered with Windows Internet Name Service (WINS). Used without parameters, this command displays Help information.

```
C:\Users\AMIT GOSWAMI>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] ]
```

- **Tracert :**
  A tracert is a tracking of a packet sent to a server. During its route this packet goes through several network devices (routers, firewall, etc.) and then goes finally at the server. With the tracert you can see the IP as well as the response time between each barrier.

```
C:\Users\AMIT GOSWAMI>tracert www.google.com

Tracing route to www.google.com [2404:6800:4009:81d::2004]
over a maximum of 30 hops:

  1     3 ms     4 ms     5 ms  2409:4041:2d1f:6d1f::52
  2     *        *        *     Request timed out.
  3   720 ms   441 ms   749 ms  2405:200:321:eeee:20::1168
  4   813 ms   678 ms   539 ms  2405:200:801:b00::b54
  5     *        *        *     Request timed out.
  6     *        *        *     Request timed out.
  7   169 ms   520 ms   350 ms  2001:4860:1:1::3c8
  8   181 ms   579 ms   344 ms  2001:4860:1:1::3c8
  9   603 ms   654 ms   163 ms  2404:6800:8027::1
 10     *      910 ms     *     2001:4860:0:1::19c6
 11   391 ms   184 ms   402 ms  2001:4860:0:1::4b53
 12   563 ms   939 ms   645 ms  bom07s27-in-x04.1e100.net [2404:6800:4009:81d::2004]

Trace complete.
```

- **Route :**
  If this is used in conjunction with one of the commands (such as add, change, or delete), the table is cleared prior to running the command. -p : When used with the add command, the specified route is added to the registry and is used to initialize the IP routing table whenever the TCP/IP protocol is started.

```
C:\Users\AMIT GOSWAMI>route print
===========================================================================
Interface List
  2...60 18 95 55 b5 80 ......Realtek PCIe FE Family Controller
 25...fa 89 d2 60 fd f7 ......Microsoft Wi-Fi Direct Virtual Adapter #3
 16...fe 89 d2 60 fd f7 ......Microsoft Wi-Fi Direct Virtual Adapter #4
 17...f8 89 d2 60 fd f7 ......Realtek 8821CE Wireless LAN 802.11ac PCI-E NIC
  7...f8 89 d2 60 fd f8 ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.61.54   192.168.61.167     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
     192.168.61.0    255.255.255.0         On-link    192.168.61.167    311
   192.168.61.167  255.255.255.255         On-link    192.168.61.167    311
   192.168.61.255  255.255.255.255         On-link    192.168.61.167    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    192.168.61.167    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    192.168.61.167    311
===========================================================================
Persistent Routes:
  Network Address          Netmask  Gateway Address  Metric
          0.0.0.0          0.0.0.0     192.168.24.1  Default
===========================================================================

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
 17     71 ::/0                     fe80::70c1:41ff:fe28:157b
  1    331 ::1/128                  On-link
 17     71 2409:4041:2d1f:6d1f::/64 On-link
 17    311 2409:4041:2d1f:6d1f:2b35:6c96:72a:2e0a/128
                                    On-link
 17    311 2409:4041:2d1f:6d1f:ed1e:d50:765a:a9f2/128
                                    On-link
 17    311 fe80::/64                On-link
 17    311 fe80::f92:7282:e0e0:f0a2/128
                                    On-link
  1    331 ff00::/8                 On-link
 17    311 ff00::/8                 On-link
===========================================================================
```

- **Ipconfig -flusdns :**
  To ensure Windows is getting addresses from the new DNS servers instead of using old, cached entries, run the ipconfig /flushdns command after changing your DNS server.

```
C:\Users\AMIT GOSWAMI>ipconfig -flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.
```

- **Pathping :**
  The pathping command is a route tracing tool that combines features of the ping and tracert commands with additional information that neither of those tools provides. The pathping command sends packets to each router on the way to a final destination over a period of time, and then computes results based on the packets returned from each hop. Since the command shows the degree of packet loss at any given router or link, it is easy to determine which routers or links might be causing network problems.

  The main difference between tracert and pathping is that tracert helps to find the actual path from the source to the destination device while pathping is a command that provides information about network latency and network loss at intermediate hops between the source and the destination devices.

```
C:\Users\AMIT GOSWAMI>pathping www.google.com

Tracing route to www.google.com [2404:6800:4009:820::2004]
over a maximum of 30 hops:
  0  DESKTOP-IMLH0SH [2409:4041:2d1f:6d1f:ed1e:d50:765a:a9f2]
  1  2409:4041:2d1f:6d1f::52
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                          DESKTOP-IMLH0SH [2409:4041:2d1f:6d1f:ed1e:d50:765a:a9f2]
                                   0/ 100 =  0%   |
  1    4ms     0/ 100 =  0%     0/ 100 =  0%  2409:4041:2d1f:6d1f::52

Trace complete.
```