EXPERIMENT 1A

DATE: 25.07.2024

BASIC NETWORKING COMMANDS IN WINDOWS OPERATING SYSTEM

AIM: To study about commands in windows operating system

The Windows operating system provides its user with a powerful tool, Command Prompt, which allows the user to access and configure system settings and data.The network commands prove helpful when there is a need to configure or troubleshoot the network settings of our system.

1. IPCONFIG

The IPCONFIG network command provides a comprehensive view of information regarding the IP address configuration of the device we are currently working on.

The IPConfig command also provides us with some variation in the primary command that targets specific system settings or data, which are:

- IPConfig/all - Provides primary output with additional information about network adapters.
- IPConfig/renew - Used to renew the system's IP address.
- IPConfig/release - Removes the system's current IP address.

Command to enter in Prompt - ipconfig

```
Windows IP Configuration


Wireless LAN adapter Local Area Connection* 3:

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

Wireless LAN adapter Local Area Connection* 4:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   IPv6 Address. . . . . . . . . . . . : 2401:4900:634e:2702:bedb:29cb:624c:3827
   Temporary IPv6 Address. . . . . . . : 2401:4900:634e:2702:281f:7e59:f3ca:845d
   Link-local IPv6 Address . . . . . . : fe80::a411:246:66cd:3bf1%15
   IPv4 Address. . . . . . . . . . . . : 192.168.233.233
   Subnet Mask . . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . . : fe80::7cef:64ff:fe0e:186e%15
                                         192.168.233.194

Ethernet adapter Bluetooth Network Connection:

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

2. NSLOOKUP

The NSLOOKUP command is used to troubleshoot network connectivity issues in the system. Using the nslookup command, we can access the information related to our system's DNS server, i.e., domain name and IP address.

Command to enter in Prompt – nslookup

```
> nslookup www.google.com
Server:  www.google.com
Addresses:  2404:6800:4007:82c::2004
          142.250.67.132
```

3. HOSTNAME

The HOSTNAME command displays the hostname of the system. The hostname command is much easier to use than going into the system settings to search for it.

Command to enter in Prompt - hostname

```
C:\Users\kkknf>hostname
LAPTOP-6H60T6N4
```

4. PING

The Ping command is one of the most widely used commands in the prompt tool, as it allows the user to check the connectivity of our system to another host.

This command sends four experimental packets to the destination host to check whether it receives them successfully, if so, then, we can communicate with the destination host. But in case the packets have not been received, that means, no communication can be established with the destination host.

Command to enter in Prompt - ping www.destination_host_name.com

```
Pinging www.google.com [2404:6800:4009:811::2004] with 32 bytes of data:
Reply from 2404:6800:4009:811::2004: time=76ms
Reply from 2404:6800:4009:811::2004: time=81ms
Reply from 2404:6800:4009:811::2004: time=53ms
Reply from 2404:6800:4009:811::2004: time=53ms

Ping statistics for 2404:6800:4009:811::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 53ms, Maximum = 81ms, Average = 65ms
```

5. TRACERT

The TRACERT command is used to trace the route during the transmission of the data packet over to the destination host and also provides us with the “hop” count during transmission.

Using the number of hops and the hop IP address, we can troubleshoot network issues and identify the point of the problem during the transmission of the data packet.

```
Tracing route to www.google.com [2404:6800:4007:824::2004]
over a maximum of 30 hops:

  1     7 ms     8 ms     5 ms  2401:4900:634e:2702::2a
  2     *        *        *     Request timed out.
  3    42 ms    45 ms    37 ms  2401:4900:0:7d7::1
  4    48 ms    75 ms    64 ms  2401:4900:0:6f6::6
  5    26 ms    21 ms    26 ms  2401:4900:0:6f7::1
  6     *        *        *     Request timed out.
  7    69 ms    47 ms    38 ms  2404:a800:3a00:1::605
  8    95 ms    34 ms    50 ms  2404:a800::92
  9     *        *       47 ms  2001:4860:1:1::d2e
 10    65 ms    85 ms    38 ms  2404:6800:8123::1
 11     *       22 ms    55 ms  2001:4860:0:1::564e
 12    47 ms    43 ms    38 ms  2001:4860:0:1::8826
 13    74 ms    50 ms    32 ms  2001:4860:0:1::1841
 14    30 ms    56 ms    32 ms  2001:4860:0:1::55d3
 15    43 ms    94 ms    48 ms  maa03s39-in-x04.1e100.net [2404:6800:4007:824::2004]

Trace complete.
```

6. NETSTAT

The Netstat command as the name suggests displays an overview of all the network connections in the device. The table shows detail about the connection protocol, address, and the current state of the network.

Command to enter in Prompt – netstat

```
Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.233.233:50538  20.212.88.117:https    ESTABLISHED
  TCP    192.168.233.233:50539  ec2-13-126-70-76:https  ESTABLISHED
  TCP    192.168.233.233:50975  server-108-158-251-69:https  TIME_WAIT
  TCP    192.168.233.233:50976  13.89.178.27:https     ESTABLISHED
  TCP    192.168.233.233:50977  a104-77-173-121:https  ESTABLISHED
  TCP    192.168.233.233:50982  a-0003:https           TIME_WAIT
  TCP    192.168.233.233:50984  20.189.173.5:https     ESTABLISHED
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50508  [2603:1040:a06:6::2]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50530  [2603:1040:a06:6::2]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50531  [2603:1040:a06:6::2]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50563  sg-in-f188:5228        ESTABLISHED
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50840  g2600-140f-2400-0000-0000-0000-173b-af81:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50842  g2600-140f-2400-0000-0000-0000-173b-af7b:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50849  g2600-140f-2400-0000-0000-0000-173b-af68:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50883  [2603:1046:700:70::2]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50885  [2606:2800:247:57cb:4371:48bc:8b00:14c3]:http  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50939  whatsapp-cdn6-shv-02-maa2:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50940  [2404:a800:6:126:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50941  whatsapp-cdn6-shv-01-tir3:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50942  [2404:a800:6:126:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50943  whatsapp-cdn6-shv-02-tir3:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50944  [2404:a800:6:8c:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50945  [2404:a800:6:127:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50946  [2404:a800:6:8c:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50947  [2404:a800:6:127:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50948  [2404:a800:6:8c:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50949  [2404:a800:6:127:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50950  [2404:a800:6:101:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50951  [2404:a800:6:101:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50952  [2404:a800:6:128:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50953  [2404:a800:6:128:face:b00c:3333:7020]:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:281f:7e59:f3ca:845d]:50954  [2404:a800:6:129:face:b00c:3333:7020]:https  CLOSE_WAIT
```

7. ARP(Address Resolution Protocol)

The ARP command is used to access the mapping structure of IP addresses to the MAC address. This provides us with a better understanding of the transmission of packets in the network channel.

```
Interface: 192.168.233.233 --- 0xf
  Internet Address      Physical Address      Type
  192.168.233.194       7e-ef-64-0e-18-6e     dynamic
  192.168.233.255       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
```

8. SYSTEMINFO

Using the SYSTEMINFO command, we can access the system's hardware and software details, such as processor data, booting data, Windows version, etc.

Command to enter in Prompt – systeminfo

```
Host Name:                 LAPTOP-6H60T6N4
OS Name:                   Microsoft Windows 11 Home Single Language
OS Version:                10.0.22631 N/A Build 22631
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:          kkknfamily@outlook.com
Registered Organization:   N/A
Product ID:                00356-24546-26855-AAOEM
Original Install Date:     05-10-2022, 15:55:23
System Boot Time:          30-07-2024, 19:17:08
System Manufacturer:       LENOVO
System Model:              81WH
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 122 Stepping 8 GenuineIntel ~1101 Mhz
BIOS Version:              LENOVO DVCN24WW, 14-04-2022
Windows Directory:         C:\WINDOWS
System Directory:          C:\WINDOWS\system32
Boot Device:               \Device\HarddiskVolume1
System Locale:             en-us;English (United States)
Input Locale:              00004009
Time Zone:                 (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory:     3,738 MB
Available Physical Memory: 661 MB
Virtual Memory: Max Size:  8,346 MB
Virtual Memory: Available: 3,164 MB
Virtual Memory: In Use:    5,182 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\LAPTOP-6H60T6N4
Hotfix(s):                 5 Hotfix(s) Installed.
```

```
Hotfix(s):                 5 Hotfix(s) Installed.
                           [01]: KB5039895
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5040442
                           [05]: KB5039338
Network Card(s):           2 NIC(s) Installed.
                           [01]: Intel(R) Wireless-AC 9560
                                 Connection Name: Wi-Fi
                                 DHCP Enabled:    Yes
                                 DHCP Server:     192.168.233.194
                                 IP address(es)
                                 [01]: 192.168.233.233
                                 [02]: fe80::a411:246:66cd:3bf1
                                 [03]: 2401:4900:634e:2702:281f:7e59:f3ca:845d
                                 [04]: 2401:4900:634e:2702:bedb:29cb:624c:3827
                           [02]: Bluetooth Device (Personal Area Network)
                                 Connection Name: Bluetooth Network Connection
                                 Status:          Media disconnected
Hyper-V Requirements:      VM Monitor Mode Extensions: Yes
                           Virtualization Enabled In Firmware: Yes
                           Second Level Address Translation: Yes
                           Data Execution Prevention Available: Yes
```

9. ROUTE

Provides the data of routing data packets in the system over the communication channel.

Command to enter in Prompt – route print

```
C:\Users\kkknf>route print
===========================================================================
Interface List
  4...ac 74 b1 98 1a 67 ......Microsoft Wi-Fi Direct Virtual Adapter #3
  3...ae 74 b1 98 1a 66 ......Microsoft Wi-Fi Direct Virtual Adapter #4
 15...ac 74 b1 98 1a 66 ......Intel(R) Wireless-AC 9560
  8...ac 74 b1 98 1a 6a ......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  192.168.233.194  192.168.233.233     50
        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
    192.168.233.0    255.255.255.0         On-link   192.168.233.233    306
  192.168.233.233  255.255.255.255         On-link   192.168.233.233    306
  192.168.233.255  255.255.255.255         On-link   192.168.233.233    306
        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   192.168.233.233    306
  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   192.168.233.233    306
===========================================================================
Persistent Routes:
  None
```

```
IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
 15     66 ::/0                     fe80::7cef:64ff:fe0e:186e
  1    331 ::1/128                  On-link
 15     66 2401:4900:634e:2702::/64 On-link
 15    306 2401:4900:634e:2702:281f:7e59:f3ca:845d/128
                                    On-link
 15    306 2401:4900:634e:2702:bedb:29cb:624c:3827/128
                                    On-link
 15    306 fe80::/64                On-link
 15    306 fe80::a411:246:66cd:3bf1/128
                                    On-link
  1    331 ff00::/8                 On-link
 15    306 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None
```

RESULT : The above commands are successfully executed and studied