Date: 4/06/2025

Lab Practical #01:

Study of basic networking commands and IP configuration.

Practical Assignment #01:

1. Perform and explain various networking commands listed below:
   i. ipconfig
   ii. ping
   iii. getmac
   iv. systeminfo
   v. traceroute / tracert
   vi. netstat
   vii. nslookup
   viii. hostname
   ix. pathping
   x. arp

1. ipconfig

Description:

Ipconfig is used to display and manage network configuration settings like IP Address, DNS server address etc.

Ipconfig is Useful to check if a device has an IP or to troubleshoot connectivity issues.

No.	Option	Description
1	/all	Displays full configuration information.
2	/release	Releases the IP address for the specified adapter.
3	/renew	Renews the IP address for the specified adapter.
4	/flushdns	Clears the DNS Resolver cache.
5	/displaydns	Displays the contents of the DNS Resolver cache.

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Implementation:

```
C:\Users\viraj>ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : VIRAJ-ODEDRA
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : 40-C2-BA-67-E8-6C
   DHCP Enabled. . . . . . . . . . . : Yes
   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
   Physical Address. . . . . . . . . : E8-BF-B8-9A-35-90
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
```

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```
Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : E8-BF-B8-9A-35-90
   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 #2
   Physical Address. . . . . . . . . : EA-BF-B8-9A-35-8F
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6 AX203
   Physical Address. . . . . . . . . : E8-BF-B8-9A-35-8F
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::3569:6526:4813:7642%4(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.120.16.84(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Lease Obtained. . . . . . . . . . : Wednesday, July 2, 2025 4:26:03 PM
   Lease Expires . . . . . . . . . . : Thursday, July 3, 2025 4:26:03 PM
   Default Gateway . . . . . . . . . : 10.120.1.1
   DHCP Server . . . . . . . . . . . : 10.120.1.1
   DHCPv6 IAID . . . . . . . . . . . : 99139512
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2E-51-B4-39-40-C2-BA-67-E8-6C
```

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```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6 AX203
   Physical Address. . . . . . . . . : E8-BF-B8-9A-35-8F
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::3569:6526:4813:7642%4(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.120.16.84(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Lease Obtained. . . . . . . . . . : Wednesday, July 2, 2025 4:26:03 PM
   Lease Expires . . . . . . . . . . : Thursday, July 3, 2025 4:26:03 PM
   Default Gateway . . . . . . . . . : 10.120.1.1
   DHCP Server . . . . . . . . . . . : 10.120.1.1
   DHCPv6 IAID . . . . . . . . . . . : 99139512
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2E-51-B4-39-40-C2-BA-67-E8-6C
   DNS Servers . . . . . . . . . . . : 8.8.8.8
                                       1.1.1.1
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : E8-BF-B8-9A-35-93
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

C:\Users\viraj>
```

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```
C:\Users\viraj>ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

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  . :
   Link-local IPv6 Address . . . . . : fe80::3569:6526:4813:7642%4
   Default Gateway . . . . . . . . . :

Ethernet adapter Bluetooth Network Connection:

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

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```
C:\Users\viraj>ipconfig /renew

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

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  . :
   Link-local IPv6 Address . . . . . : fe80::3569:6526:4813:7642%4
   IPv4 Address. . . . . . . . . . . : 10.120.16.84
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . : 10.120.1.1

Ethernet adapter Bluetooth Network Connection:

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

```
                                                    compartments

C:\Users\viraj>ipconfig /flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.

C:\Users\viraj>
```

```
Windows IP Configuration

Successfully flushed the DNS Resolver Cache.

C:\Users\viraj>ipconfig /displaydns

Windows IP Configuration
```

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2. ping

Description:

The ping command is a network utility used to test the reachability of a host (like a website or another computer) on an IP network. It sends ICMP (Internet Control Message Protocol) echo request packets to the target and waits for a reply. The command helps measure round-trip time and packet loss, indicating network connectivity and latency. It's commonly used for troubleshooting and diagnosing network issues.

No.	Option	Description
1	-t	Pings the target until stopped manually.
2	-n count	Specifies the number of Echo Request messages to send.
3	-l size	Sends packets with a custom byte size.
4	-4	Forces using IPv4.
5	-6	Forces using IPv6.

Implementation:

```
^C
C:\Users\viraj>ping -t google.com

Pinging google.com [142.251.221.238] with 32 bytes of data:
Reply from 142.251.221.238: bytes=32 time=19ms TTL=119
Reply from 142.251.221.238: bytes=32 time=19ms TTL=119
Reply from 142.251.221.238: bytes=32 time=25ms TTL=119
Reply from 142.251.221.238: bytes=32 time=19ms TTL=119
Reply from 142.251.221.238: bytes=32 time=20ms TTL=119

Ping statistics for 142.251.221.238:
    Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 25ms, Average = 20ms
Control-C
^C
C:\Users\viraj>
```

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```
C:\Users\WELCOME>ping /n 4 google.com

Pinging google.com [142.250.70.110] with 32 bytes of data:
Reply from 142.250.70.110: bytes=32 time=23ms TTL=116
Reply from 142.250.70.110: bytes=32 time=25ms TTL=116
Reply from 142.250.70.110: bytes=32 time=22ms TTL=116
Reply from 142.250.70.110: bytes=32 time=22ms TTL=116

Ping statistics for 142.250.70.110:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 22ms, Maximum = 25ms, Average = 23ms
```

```
C:\Users\WELCOME>ping /l 64 google.com

Pinging google.com [142.250.70.110] with 64 bytes of data:
Reply from 142.250.70.110: bytes=64 time=25ms TTL=116
Reply from 142.250.70.110: bytes=64 time=24ms TTL=116
Reply from 142.250.70.110: bytes=64 time=31ms TTL=116
Reply from 142.250.70.110: bytes=64 time=23ms TTL=116

Ping statistics for 142.250.70.110:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 23ms, Maximum = 31ms, Average = 25ms
```

```
C:\Users\WELCOME>ping -4 google.com

Pinging google.com [142.250.183.110] with 32 bytes of data:
Reply from 142.250.183.110: bytes=32 time=59ms TTL=112
Reply from 142.250.183.110: bytes=32 time=63ms TTL=112
Reply from 142.250.183.110: bytes=32 time=57ms TTL=112
Reply from 142.250.183.110: bytes=32 time=95ms TTL=112

Ping statistics for 142.250.183.110:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 57ms, Maximum = 95ms, Average = 68ms
```

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```
C:\Users\WELCOME>ping -6 google.com

Pinging google.com [2404:6800:4009:823::200e] with 32 bytes of data:
Reply from 2404:6800:4009:823::200e: time=115ms
Reply from 2404:6800:4009:823::200e: time=81ms
Reply from 2404:6800:4009:823::200e: time=91ms
Reply from 2404:6800:4009:823::200e: time=116ms

Ping statistics for 2404:6800:4009:823::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 81ms, Maximum = 116ms, Average = 100ms
```

3. getmac

Description: The getmac command displays the MAC (Media Access Control) addresses of a computer's network interfaces. It shows the physical address and the associated network transport name. This is useful for identifying devices on a network.

No.	Option	Description
1	/v	Shows verbose output with more details.
2	/fo table	Displays output in table format.
3	/fo list	Displays output in list format.
4	/fo csv	Displays output in CSV format.
5	/nh	Hides the column headers in the output.

Implementation :

```
C:\Users\viraj>getmac /v

Connection Name Network Adapter Physical Address    Transport Name
=============== =============== ================== ============================================================
Wi-Fi           Intel(R) Wi-Fi  E8-BF-B8-9A-35-8F   \Device\Tcpip_{0E470F2A-B04A-45E5-BD83-5D6E0BCD5879}
Ethernet        Realtek PCIe Gb 40-C2-BA-67-E8-6C   Media disconnected
Bluetooth Netwo Bluetooth Devic E8-BF-B8-9A-35-93   Media disconnected

C:\Users\viraj>
```

```
C:\Users\WELCOME>getmac /fo table

Physical Address    Transport Name
=================== ============================================================
04-BF-1B-5B-8B-24   Media disconnected
78-AF-08-18-AC-68   \Device\Tcpip_{7E118522-0AC2-4C9A-9566-F14BE7A7CB12}
```

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```
C:\Users\WELCOME>getmac /fo list

Physical Address: 04-BF-1B-5B-8B-24
Transport Name:   Media disconnected

Physical Address: 78-AF-08-18-AC-68
Transport Name:   \Device\Tcpip_{7E118522-0AC2-4C9A-9566-F14BE7A7CB12}
```

```
C:\Users\WELCOME>getmac /fo csv
"Physical Address","Transport Name"
"04-BF-1B-5B-8B-24","Media disconnected"
"78-AF-08-18-AC-68","\Device\Tcpip_{7E118522-0AC2-4C9A-9566-F14BE7A7CB12}"
```

```
C:\Users\viraj>getmac /nh

E8-BF-B8-9A-35-8F   \Device\Tcpip_{0E470F2A-B04A-45E5-BD83-5D6E0BCD5879}
40-C2-BA-67-E8-6C   Media disconnected
E8-BF-B8-9A-35-93   Media disconnected

C:\Users\viraj>
```

4. systeminfo:

Description : The systeminfo command displays detailed information about a computer's system configuration. It includes OS version, hardware details, memory, network info, and more. This helps in system diagnostics and troubleshooting.

No.	Option	Description
1	(no option)	Shows all system information.
2	/s	Specifies the remote system to connect to (hostname or IP address).
3	/u	Specifies the user context to use for the connection.
4	/p	Specifies the password for the user account provided in /U. If omitted, it will prompt.
5	/fo	Displays the output in given format.

Implementation :

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```
C:\Users\viraj>systeminfo

Host Name:                     VIRAJ-ODEDRA
OS Name:                       Microsoft Windows 11 Home Single Language
OS Version:                    10.0.26100 N/A Build 26100
OS Manufacturer:               Microsoft Corporation
OS Configuration:              Standalone Workstation
OS Build Type:                 Multiprocessor Free
Registered Owner:              virajodedra1808@outlook.com
Registered Organization:       N/A
Product ID:                    00342-42707-91551-AAOEM
Original Install Date:         12/17/2024, 6:08:53 PM
System Boot Time:              7/2/2025, 4:25:38 PM
System Manufacturer:           LENOVO
System Model:                  83DV
System Type:                   x64-based PC
Processor(s):                  1 Processor(s) Installed.
                               [01]: Intel64 Family 6 Model 183 Stepping 1 GenuineIntel ~2600 Mhz
BIOS Version:                  LENOVO NECN44WW, 4/1/2025
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:         24,284 MB
Available Physical Memory:     14,972 MB
Virtual Memory: Max Size:      25,820 MB
Virtual Memory: Available:     14,642 MB
Virtual Memory: In Use:        11,178 MB
Page File Location(s):         C:\pagefile.sys
Domain:                        WORKGROUP
Logon Server:                  \\VIRAJ-ODEDRA
Hotfix(s):                     4 Hotfix(s) Installed.
                               [01]: KB5056579
                               [02]: KB5060829
                               [03]: KB5059502
                               [04]: KB5062862
Network Card(s):               3 NIC(s) Installed.
                               [01]: Intel(R) Wi-Fi 6 AX203
```

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```
Domain:                           WORKGROUP
Logon Server:                     \\VIRAJ-ODEDRA
Hotfix(s):                        4 Hotfix(s) Installed.
                                  [01]: KB5056579
                                  [02]: KB5060829
                                  [03]: KB5059502
                                  [04]: KB5062862
Network Card(s):                  3 NIC(s) Installed.
                                  [01]: Intel(R) Wi-Fi 6 AX203
                                        Connection Name: Wi-Fi
                                        DHCP Enabled:    Yes
                                        DHCP Server:     10.120.1.1
                                        IP address(es)
                                        [01]: 10.120.16.84
                                        [02]: fe80::3569:6526:4813:7642
                                  [02]: Realtek PCIe GbE Family Controller
                                        Connection Name: Ethernet
                                        Status:          Media disconnected
                                  [03]: Bluetooth Device (Personal Area Network)
                                        Connection Name: Bluetooth Network Connection
                                        Status:          Media disconnected
Virtualization-based security:    Status: Running
                                  Required Security Properties:
                                  Available Security Properties:
                                        Base Virtualization Support
                                        Secure Boot
                                        DMA Protection
                                        UEFI Code Readonly
                                        SMM Security Mitigations 1.0
                                        Mode Based Execution Control
                                        APIC Virtualization
                                  Services Configured:
                                        Hypervisor enforced Code Integrity
                                  Services Running:
                                        Hypervisor enforced Code Integrity
                                  App Control for Business policy: Enforced
                                  App Control for Business user mode policy: Enforced
                                  Security Features Enabled:
Hyper-V Requirements:             A hypervisor has been detected. Features required for Hyper-V will not be displayed.

C:\Users\viraj>
```

```
C:\Users\viraj>systeminfo /s VIRAJ-ODEDRA

Host Name:                     VIRAJ-ODEDRA
OS Name:                       Microsoft Windows 11 Home Single Language
OS Version:                    10.0.26100 N/A Build 26100
OS Manufacturer:               Microsoft Corporation
OS Configuration:              Standalone Workstation
OS Build Type:                 Multiprocessor Free
Registered Owner:              virajodedra1808@outlook.com
Registered Organization:       N/A
Product ID:                    00342-42707-91551-AAOEM
Original Install Date:         12/17/2024, 6:08:53 PM
System Boot Time:              7/2/2025, 4:25:38 PM
System Manufacturer:           LENOVO
System Model:                  83DV
System Type:                   x64-based PC
Processor(s):                  1 Processor(s) Installed.
                               [01]: Intel64 Family 6 Model 183 Stepping 1 GenuineIntel ~2600 Mhz
BIOS Version:                  LENOVO NECN44WW, 4/1/2025
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:         24,284 MB
Available Physical Memory:     14,869 MB
Virtual Memory: Max Size:      25,820 MB
Virtual Memory: Available:     14,527 MB
Virtual Memory: In Use:        11,293 MB
Page File Location(s):         C:\pagefile.sys
Domain:                        WORKGROUP
Logon Server:                  \\VIRAJ-ODEDRA
Hotfix(s):                     4 Hotfix(s) Installed.
                               [01]: KB5056579
```

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```
C:\Users\viraj>systeminfo /s VIRAJ-ODEDRA /U viraj
WARNING: User credentials cannot be used for local connections

Host Name:                     VIRAJ-ODEDRA
OS Name:                       Microsoft Windows 11 Home Single Language
OS Version:                    10.0.26100 N/A Build 26100
OS Manufacturer:               Microsoft Corporation
OS Configuration:              Standalone Workstation
OS Build Type:                 Multiprocessor Free
Registered Owner:              virajodedra1808@outlook.com
Registered Organization:       N/A
Product ID:                    00342-42707-91551-AAOEM
Original Install Date:         12/17/2024, 6:08:53 PM
System Boot Time:              7/2/2025, 4:25:38 PM
System Manufacturer:           LENOVO
System Model:                  83DV
System Type:                   x64-based PC
Processor(s):                  1 Processor(s) Installed.
                               [01]: Intel64 Family 6 Model 183 Stepping 1 GenuineIntel ~2600 Mhz
BIOS Version:                  LENOVO NECN44WW, 4/1/2025
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:         24,284 MB
Available Physical Memory:     14,876 MB
Virtual Memory: Max Size:      25,820 MB
Virtual Memory: Available:     14,534 MB
Virtual Memory: In Use:        11,286 MB
Page File Location(s):         C:\pagefile.sys
Domain:                        WORKGROUP
Logon Server:                  \\VIRAJ-ODEDRA
Hotfix(s):                     4 Hotfix(s) Installed.
                               [01]: KB5056579
                               [02]: KB5060829
                               [03]: KB5059502
```

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```
C:\Users\viraj>systeminfo /s VIRAJ-ODEDRA /U viraj /P viraj
WARNING: User credentials cannot be used for local connections

Host Name:                     VIRAJ-ODEDRA
OS Name:                       Microsoft Windows 11 Home Single Language
OS Version:                    10.0.26100 N/A Build 26100
OS Manufacturer:               Microsoft Corporation
OS Configuration:              Standalone Workstation
OS Build Type:                 Multiprocessor Free
Registered Owner:              virajodedra1808@outlook.com
Registered Organization:       N/A
Product ID:                    00342-42707-91551-AAOEM
Original Install Date:         12/17/2024, 6:08:53 PM
System Boot Time:              7/2/2025, 4:25:38 PM
System Manufacturer:           LENOVO
System Model:                  83DV
System Type:                   x64-based PC
Processor(s):                  1 Processor(s) Installed.
                               [01]: Intel64 Family 6 Model 183 Stepping 1 GenuineIntel ~2600 Mhz
BIOS Version:                  LENOVO NECN44WW, 4/1/2025
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:         24,284 MB
Available Physical Memory:     15,055 MB
Virtual Memory: Max Size:      25,820 MB
Virtual Memory: Available:     14,721 MB
Virtual Memory: In Use:        11,099 MB
Page File Location(s):         C:\pagefile.sys
Domain:                        WORKGROUP
Logon Server:                  \\VIRAJ-ODEDRA
Hotfix(s):                     4 Hotfix(s) Installed.
                               [01]: KB5056579
                               [02]: KB5060829
                               [03]: KB5059502
                               [04]: KB5062862
```

Date: 4/06/2025

```
C:\Users\WELCOME>systeminfo /S KALP-VIRADIA /U WELCOME /P 11412 /FO LIST
WARNING: User credentials cannot be used for local connections

Host Name:                 KALP-VIRADIA
OS Name:                   Microsoft Windows 11 Home Single Language
OS Version:                10.0.26100 N/A Build 26100
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:          WELCOME
Registered Organization:   N/A
Product ID:                00356-24680-32924-AAOEM
Original Install Date:     18-05-2025, 08:53:10 AM
System Boot Time:          02-07-2025, 02:17:51 PM
System Manufacturer:       Dell Inc.
System Model:              Dell G15 5520
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 154 Stepping 3 GenuineIntel ~2500 Mhz
BIOS Version:              Dell Inc. 1.32.0, 26-03-2025
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:     24,261 MB
Available Physical Memory: 14,387 MB
Virtual Memory: Max Size:  25,797 MB
Virtual Memory: Available: 14,801 MB
Virtual Memory: In Use:    10,996 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\KALP-VIRADIA
Hotfix(s):                 3 Hotfix(s) Installed.
                           [01]: KB5056579
                           [02]: KB5063060
                           [03]: KB5059502
```

5. traceroute / tracert

Description:

The tracert (Windows) command shows the path data packets take to reach a destination across a network. It lists all the intermediate routers (hops) between your computer and the target. This helps identify where delays or failures occur in the network route.

No.	Option	Description
1	-d	Prevents resolving IPs to hostnames.
2	-h <max>	Sets the maximum number of hops.
3	-w <timeout>	Sets the timeout in milliseconds.
4	-4	Forces using IPv4.
5	-6	Forces using IPv6.

Date: 4/06/2025

Implementation:

```
C:\Users\viraj>tracert /d google.com

Tracing route to google.com [142.251.42.238]
over a maximum of 30 hops:

  1     1 ms     1 ms     1 ms  10.120.1.1
  2     4 ms     3 ms     3 ms  103.70.32.145
  3     5 ms     5 ms     4 ms  10.1.252.37
  4    21 ms    20 ms    19 ms  103.156.182.9
  5    21 ms    23 ms    20 ms  142.251.76.33
  6    21 ms    22 ms    22 ms  142.250.214.107
  7    21 ms    20 ms    20 ms  142.251.42.238

Trace complete.

C:\Users\viraj>
```

```
C:\Users\WELCOME>tracert /h 10 google.com

Tracing route to google.com [142.250.70.110]
over a maximum of 10 hops:

  1     2 ms     1 ms     2 ms  10.20.1.1
  2     3 ms     2 ms     2 ms  180.211.109.177
  3     *       24 ms     9 ms  202.131.109.41
  4     9 ms     3 ms     3 ms  120.72.95.129
  5     6 ms     5 ms     7 ms  202.131.109.57
  6    19 ms    16 ms    16 ms  202.131.99.106
  7    48 ms    87 ms    35 ms  72.14.204.217
  8    51 ms    24 ms    27 ms  142.251.76.27
  9    24 ms    21 ms    19 ms  192.178.86.241
 10    23 ms    20 ms    30 ms  pnbomb-ac-in-f14.1e100.net [142.250.70.110]

Trace complete.
```

Date: 4/06/2025

```
C:\Users\WELCOME>tracert -w 2 google.com

Tracing route to google.com [2404:6800:4009:80b::200e]
over a maximum of 30 hops:

  1     4 ms     2 ms     3 ms  2409:40c1:3101:6088::41
  2    42 ms    36 ms    37 ms  2405:200:5210:5:3924:110:3:307
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6    45 ms    35 ms    40 ms  2405:200:801:2e00::84
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9   124 ms   121 ms   105 ms  2404:6800:812f::1
 10   104 ms     *       69 ms  2404:6800:812f::1
 11   120 ms    74 ms    78 ms  2404:6800:812f::1
 12   128 ms    85 ms     *     2001:4860:0:1::539c
 13    67 ms    74 ms     *     2001:4860:0:1::77d0
 14    80 ms    89 ms    83 ms  2001:4860::9:4000:d773
 15    74 ms    79 ms     *     2001:4860::c:4004:53cb
 16    92 ms   115 ms     *     2001:4860::9:4002:d931
 17     *        *       85 ms  2001:4860:0:1::1baf
 18    77 ms    90 ms    72 ms  2001:4860:0:1::269f
 19     *       80 ms    74 ms  pnbomb-ba-in-x0e.1e100.net [2404:6800:4009:80b::200e]

Trace complete.
```

```
C:\Users\viraj>tracert -4 youtube.com

Tracing route to youtube.com [142.250.183.110]
over a maximum of 30 hops:

  1     1 ms     1 ms    <1 ms  10.120.1.1
  2     3 ms     3 ms     3 ms  103.70.32.145
  3     3 ms     3 ms     2 ms  10.1.252.37
  4    21 ms    19 ms    24 ms  103.156.182.9
  5    20 ms    20 ms    20 ms  142.251.49.177
  6    21 ms    22 ms    19 ms  72.14.233.59
  7    21 ms    20 ms    21 ms  bom12s13-in-f14.1e100.net [142.250.183.110]

Trace complete.
```

Date: 4/06/2025

```
C:\Users\WELCOME>tracert -6 google.com

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

  1    16 ms     9 ms    15 ms  2409:40c1:3101:6088::41
  2    47 ms    25 ms    28 ms  2405:200:5210:5:3924:110:3:307
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6    71 ms    37 ms    28 ms  2405:200:801:2e00::84
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9   122 ms    67 ms    68 ms  2405:200:802:760::8
 10   115 ms    94 ms    78 ms  2405:200:802:760::8
 11     *        *        *     Request timed out.
 12   104 ms    73 ms    77 ms  2404:6800:8281:240::1
 13   131 ms    71 ms    77 ms  2404:6800:8281:240::1
 14     *        *        *     Request timed out.
 15     *      116 ms     *     2001:4860:0:1::7976
 16    79 ms    78 ms    78 ms  2001:4860:0:1::8767
 17   108 ms    72 ms    78 ms  2001:4860:0:1::f69
 18   102 ms    78 ms    85 ms  bom12s13-in-x0e.1e100.net [2404:6800:4009:823::200e]

Trace complete.
```

6. netstat:

Description:

netstat displays network connections, routing tables, interface statistics, and more. It's used to monitor incoming and outgoing network traffic and diagnose network issues. It helps identify active connections and listening ports on a system.

No.	Option	Description
1	-a	Displays all connections and listening ports.
2	-n	Displays addresses and port numbers numerically.
3	-o	Displays owning process ID associated with each connection.
4	-e	Displays Ethernet statistics.
5	-s	Displays per-protocol statistics.

Implementation:

Date: 4/06/2025

```
C:\Users\viraj>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:445            VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:5040           VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:7680           VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:49664          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:49665          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:49666          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:49669          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:49674          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:49688          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:50128          VIRAJ-ODEDRA:0         LISTENING
  TCP    0.0.0.0:50131          VIRAJ-ODEDRA:0         LISTENING
  TCP    10.120.16.84:139       VIRAJ-ODEDRA:0         LISTENING
  TCP    10.120.16.84:50077     4.213.25.240:https     ESTABLISHED
  TCP    10.120.16.84:50088     sc-in-f188:5228        ESTABLISHED
  TCP    10.120.16.84:50284     whatsapp-cdn-shv-01-bom2:https  CLOSE_WAIT
  TCP    10.120.16.84:50285     whatsapp-cdn-shv-04-bom2:https  CLOSE_WAIT
  TCP    10.120.16.84:50286     whatsapp-cdn-shv-03-bom2:https  CLOSE_WAIT
  TCP    10.120.16.84:50287     whatsapp-cdn-shv-02-bom2:https  CLOSE_WAIT
  TCP    10.120.16.84:50288     whatsapp-cdn-shv-01-bom1:https  CLOSE_WAIT
  TCP    10.120.16.84:50289     whatsapp-cdn-shv-01-pnq1:https  CLOSE_WAIT
  TCP    10.120.16.84:50290     whatsapp-cdn-shv-02-bom1:https  CLOSE_WAIT
  TCP    10.120.16.84:50291     whatsapp-cdn-shv-02-pnq1:https  CLOSE_WAIT
  TCP    10.120.16.84:50292     whatsapp-cdn-shv-01-bom2:https  CLOSE_WAIT
  TCP    10.120.16.84:50305     dns:https              ESTABLISHED
  TCP    10.120.16.84:50307     bom12s15-in-f14:https  ESTABLISHED
  TCP    10.120.16.84:50308     pnbomb-bl-in-f2:https  ESTABLISHED
  TCP    10.120.16.84:50312     lcbomo-in-f94:https    ESTABLISHED
  TCP    10.120.16.84:50313     bom12s03-in-f3:https   TIME_WAIT
  TCP    10.120.16.84:50314     hkg12s09-in-f14:https  ESTABLISHED
  TCP    10.120.16.84:50315     104.18.32.47:https     ESTABLISHED
  TCP    10.120.16.84:50316     40.99.111.18:https     ESTABLISHED
  TCP    10.120.16.84:50318     bom12s13-in-f14:https  ESTABLISHED
```

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```
C:\Users\viraj>netstat -n

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    10.120.16.84:50077     4.213.25.240:443       ESTABLISHED
  TCP    10.120.16.84:50088     74.125.68.188:5228     ESTABLISHED
  TCP    10.120.16.84:50284     163.70.143.60:443      CLOSE_WAIT
  TCP    10.120.16.84:50285     57.144.177.32:443      CLOSE_WAIT
  TCP    10.120.16.84:50286     57.144.125.32:443      CLOSE_WAIT
  TCP    10.120.16.84:50287     163.70.144.60:443      CLOSE_WAIT
  TCP    10.120.16.84:50288     157.240.16.52:443      CLOSE_WAIT
  TCP    10.120.16.84:50289     157.240.242.60:443     CLOSE_WAIT
  TCP    10.120.16.84:50290     31.13.79.53:443        CLOSE_WAIT
  TCP    10.120.16.84:50291     157.240.237.60:443     CLOSE_WAIT
  TCP    10.120.16.84:50292     163.70.143.60:443      CLOSE_WAIT
  TCP    10.120.16.84:50305     8.8.8.8:443            ESTABLISHED
  TCP    10.120.16.84:50307     142.250.192.46:443     ESTABLISHED
  TCP    10.120.16.84:50308     142.250.207.162:443    ESTABLISHED
  TCP    10.120.16.84:50312     192.178.174.94:443     ESTABLISHED
  TCP    10.120.16.84:50313     172.217.174.227:443    TIME_WAIT
  TCP    10.120.16.84:50314     216.58.203.14:443      ESTABLISHED
  TCP    10.120.16.84:50315     104.18.32.47:443       ESTABLISHED
  TCP    10.120.16.84:50316     40.99.111.18:443       ESTABLISHED
  TCP    10.120.16.84:50318     142.250.183.110:443    ESTABLISHED
  TCP    10.120.16.84:50319     172.64.41.3:443        ESTABLISHED
  TCP    10.120.16.84:50320     142.250.70.67:443      TIME_WAIT
  TCP    10.120.16.84:50321     142.251.220.46:443     TIME_WAIT
  TCP    10.120.16.84:50324     172.217.70.119:443     ESTABLISHED
  TCP    10.120.16.84:50325     142.250.67.193:443     TIME_WAIT
  TCP    10.120.16.84:50326     173.194.154.73:443     ESTABLISHED
  TCP    10.120.16.84:50328     104.208.16.90:443      TIME_WAIT
  TCP    10.120.16.84:50329     142.250.70.110:443     ESTABLISHED
  TCP    10.120.16.84:50330     172.217.174.234:443    ESTABLISHED
  TCP    10.120.16.84:50335     104.18.32.47:443       ESTABLISHED
  TCP    10.120.16.84:50337     172.217.174.227:443    ESTABLISHED
  TCP    10.120.16.84:50338     142.251.220.46:443     ESTABLISHED
  TCP    10.120.16.84:50339     142.251.220.46:443     ESTABLISHED
  TCP    10.120.16.84:50340     142.251.220.46:443     ESTABLISHED
  TCP    127.0.0.1:49730        127.0.0.1:49731        ESTABLISHED
```

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```
C:\Users\viraj>netstat -o

Active Connections

  Proto  Local Address          Foreign Address        State           PID
  TCP    10.120.16.84:50077     4.213.25.240:https     ESTABLISHED     5756
  TCP    10.120.16.84:50088     sc-in-f188:5228        ESTABLISHED     18292
  TCP    10.120.16.84:50284     whatsapp-cdn-shv-01-bom2:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50285     whatsapp-cdn-shv-04-bom2:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50286     whatsapp-cdn-shv-03-bom2:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50287     whatsapp-cdn-shv-02-bom2:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50288     whatsapp-cdn-shv-01-bom1:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50289     whatsapp-cdn-shv-01-pnq1:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50290     whatsapp-cdn-shv-02-bom1:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50291     whatsapp-cdn-shv-02-pnq1:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50292     whatsapp-cdn-shv-01-bom2:https  CLOSE_WAIT      20312
  TCP    10.120.16.84:50305     dns:https              ESTABLISHED     18292
  TCP    10.120.16.84:50307     bom12s15-in-f14:https  ESTABLISHED     18292
  TCP    10.120.16.84:50308     pnbomb-bl-in-f2:https  TIME_WAIT       0
  TCP    10.120.16.84:50312     lcbomo-in-f94:https    ESTABLISHED     18292
  TCP    10.120.16.84:50313     bom12s03-in-f3:https   TIME_WAIT       0
  TCP    10.120.16.84:50314     hkg12s09-in-f14:https  ESTABLISHED     18292
  TCP    10.120.16.84:50315     104.18.32.47:https     ESTABLISHED     18292
  TCP    10.120.16.84:50316     40.99.111.18:https     ESTABLISHED     19472
  TCP    10.120.16.84:50318     bom12s13-in-f14:https  TIME_WAIT       0
  TCP    10.120.16.84:50319     172.64.41.3:https      ESTABLISHED     18292
  TCP    10.120.16.84:50324     sj-in-f119:https       TIME_WAIT       0
  TCP    10.120.16.84:50325     bom12s08-in-f1:https   TIME_WAIT       0
  TCP    10.120.16.84:50326     bom07s43-in-f9:https   ESTABLISHED     18292
  TCP    10.120.16.84:50328     104.208.16.90:https    TIME_WAIT       0
  TCP    10.120.16.84:50329     pnbomb-ac-in-f14:https  ESTABLISHED     18292
  TCP    10.120.16.84:50330     bom12s03-in-f10:https  ESTABLISHED     18292
  TCP    10.120.16.84:50335     104.18.32.47:https     ESTABLISHED     18292
  TCP    10.120.16.84:50337     bom12s03-in-f3:https   ESTABLISHED     18292
  TCP    10.120.16.84:50338     pnbomb-ba-in-f14:https  ESTABLISHED     18292
  TCP    10.120.16.84:50339     pnbomb-ba-in-f14:https  TIME_WAIT       0
  TCP    10.120.16.84:50340     pnbomb-ba-in-f14:https  ESTABLISHED     18292
  TCP    127.0.0.1:49730        VIRAJ-ODEDRA:49731     ESTABLISHED     8
  TCP    127.0.0.1:49731        VIRAJ-ODEDRA:49730     ESTABLISHED     8
```

```
C:\Users\WELCOME>netstat -e
Interface Statistics

                           Received            Sent

Bytes                     339407346        14091510
Unicast packets              283050           61350
Non-unicast packets               6            2118
Discards                          0               0
Errors                            0               0
Unknown protocols                 0
```

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```
  TCP    127.0.0.1:49736        VIRAJ-ODEDRA:49737     ESTABLISHED     2352
  TCP    127.0.0.1:49737        VIRAJ-ODEDRA:49736     ESTABLISHED     2352

C:\Users\viraj>netstat -s

IPv4 Statistics

  Packets Received                   = 434081
  Received Header Errors             = 0
  Received Address Errors            = 6
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 0
  Received Packets Discarded         = 6542
  Received Packets Delivered         = 432835
  Output Requests                    = 123942
  Routing Discards                   = 0
  Discarded Output Packets           = 34
  Output Packet No Route             = 40
  Reassembly Required                = 0
  Reassembly Successful              = 0
  Reassembly Failures                = 0
  Datagrams Successfully Fragmented  = 0
  Datagrams Failing Fragmentation    = 0
  Fragments Created                  = 0

IPv6 Statistics

  Packets Received                   = 9654
  Received Header Errors             = 0
  Received Address Errors            = 0
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 0
  Received Packets Discarded         = 4814
  Received Packets Delivered         = 9774
  Output Requests                    = 279
  Routing Discards                   = 0
  Discarded Output Packets           = 0
  Output Packet No Route             = 0
  Reassembly Required                = 0
  Reassembly Successful              = 0
  Reassembly Failures                = 0
  Datagrams Successfully Fragmented  = 0
  Datagrams Failing Fragmentation    = 0
  Fragments Created                  = 0

ICMPv4 Statistics

                            Received    Sent
  Messages                  271         223
  Errors                    0           0
```

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```
IPv6 Statistics

  Packets Received                   = 9654
  Received Header Errors             = 0
  Received Address Errors            = 0
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 0
  Received Packets Discarded         = 4814
  Received Packets Delivered         = 9774
  Output Requests                    = 279
  Routing Discards                   = 0
  Discarded Output Packets           = 0
  Output Packet No Route             = 0
  Reassembly Required                = 0
  Reassembly Successful              = 0
  Reassembly Failures                = 0
  Datagrams Successfully Fragmented  = 0
  Datagrams Failing Fragmentation    = 0
  Fragments Created                  = 0

ICMPv4 Statistics

                            Received    Sent
  Messages                  271         223
  Errors                    0           0
  Destination Unreachable   114         66
  Time Exceeded             36          0
  Parameter Problems        0           0
  Source Quenches           0           0
  Redirects                 0           0
  Echo Replies              121         0
  Echos                     0           157
  Timestamps                0           0
  Timestamp Replies         0           0
  Address Masks             0           0
  Address Mask Replies      0           0
  Router Solicitations      0           0
  Router Advertisements     0           0

ICMPv6 Statistics

                            Received    Sent
  Messages                  71          10
  Errors                    0           0
  Destination Unreachable   0           0
  Packet Too Big            0           0
  Time Exceeded             0           0
  Parameter Problems        0           0
  Echos                     0           0
```

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7. nslookup:

Description: The nslookup command is used to query Domain Name System (DNS) servers for information about domain names and IP addresses. It helps troubleshoot DNS-related issues by showing how a domain name is resolved to an IP address. It can also provide mail server and other DNS record details.

No.	Option	Description
1	<domain>	Retrieves IP address for the domain.
2	<IP>	Retrieves domain name for the given IP (reverse lookup).
3	set type=MX	Retrieves Mail Exchange records.
4	set type=NS	Retrieves Name Server records.
5	server <IP>	Specifies DNS server for the query.

Implmentation :

```
C:\Users\viraj>nslookup google.coom 1.1.1.1
DNS request timed out.
    timeout was 2 seconds.
Server:  UnKnown
Address:  1.1.1.1

DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
*** Request to UnKnown timed-out
```

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```
C:\Users\viraj>nslookup 8.8.8.8
Server:  dns.google
Address:  8.8.8.8

Name:    dns.google
Address:  8.8.8.8


C:\Users\viraj>
```

```
C:\Users\WELCOME>nslookup -type=mx google.com
Server:  UnKnown
Address:  192.168.102.69

Non-authoritative answer:
google.com      MX preference = 10, mail exchanger = smtp.google.com
```

```
C:\Users\WELCOME>nslookup -type=ns google.com
Server:  UnKnown
Address:  192.168.102.69

Non-authoritative answer:
google.com      nameserver = ns2.google.com
google.com      nameserver = ns3.google.com
google.com      nameserver = ns1.google.com
google.com      nameserver = ns4.google.com

ns1.google.com  internet address = 216.239.32.10
ns1.google.com  AAAA IPv6 address = 2001:4860:4802:32::a
ns4.google.com  internet address = 216.239.38.10
ns4.google.com  AAAA IPv6 address = 2001:4860:4802:38::a
ns2.google.com  internet address = 216.239.34.10
ns2.google.com  AAAA IPv6 address = 2001:4860:4802:34::a
ns3.google.com  internet address = 216.239.36.10
ns3.google.com  AAAA IPv6 address = 2001:4860:4802:36::a
```

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```
C:\Users\viraj>nslookup
Default Server:  dns.google
Address:  8.8.8.8

> server 8.8.8.8
Default Server:  dns.google
Address:  8.8.8.8
```

8. hostname

Description: The hostname command displays the name of the current computer (host) on a network. It's used to view or set the system's hostname. This name helps identify the device within a network.

No.	Option	Description
1	hostname	Prints current hostname.

Implementation:

```
>
C:\Users\viraj>

C:\Users\viraj>hostname
VIRAJ-ODEDRA

C:\Users\viraj>
```

9. pathping:

Description:

The pathping command is a network diagnostic tool that combines the functions of ping and tracert. It shows the route to a destination and provides detailed statistics on packet loss at each hop.

This helps identify network bottlenecks or failures over time. It's more thorough but takes longer to complete than ping or tracert.

No.	Option	Description
1	-n	Prevents resolving hostnames.
2	-h <max>	Sets maximum number of hops.
3	-g <host-list>	Specifies loose source route along host list.

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4	-p <ms>	Wait time between pings.
5	-q <num>	Number of queries per hop.

Implementation:

```
C:\Users\viraj>pathping -n youtube.com

Tracing route to youtube.com [142.250.183.110]
over a maximum of 30 hops:
  0  10.120.16.84
  1  10.120.1.1
  2  103.70.32.145
  3  10.1.252.37
  4  103.156.182.9
  5  142.251.49.177
  6  72.14.233.59
  7  142.250.183.110

Computing statistics for 175 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           10.120.16.84
                                 0/ 100 =  0%   |
  1    3ms     0/ 100 =  0%     0/ 100 =  0%  10.120.1.1
                                 0/ 100 =  0%   |
  2    4ms     0/ 100 =  0%     0/ 100 =  0%  103.70.32.145
                                 0/ 100 =  0%   |
  3  ---     100/ 100 =100%   100/ 100 =100%  10.1.252.37
                                 0/ 100 =  0%   |
  4   19ms     0/ 100 =  0%     0/ 100 =  0%  103.156.182.9
                                 0/ 100 =  0%   |
  5   21ms     0/ 100 =  0%     0/ 100 =  0%  142.251.49.177
                                 0/ 100 =  0%   |
  6   21ms     0/ 100 =  0%     0/ 100 =  0%  72.14.233.59
                                 0/ 100 =  0%   |
  7   23ms     0/ 100 =  0%     0/ 100 =  0%  142.250.183.110

Trace complete.

C:\Users\viraj>
```

Date: 4/06/2025

```
C:\Users\WELCOME>pathping -h 10 google.com

Tracing route to google.com [2404:6800:4009:829::200e]
over a maximum of 10 hops:
  0  KALP-VIRADIA [2409:40c1:3101:6088:c908:852f:eec6:4ee7]
  1  2409:40c1:3101:6088::41
  2  2405:200:5210:5:3924:110:3:307
  3     *        *        *
Computing statistics for 50 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           KALP-VIRADIA [2409:40c1:3101:6088:c908:852f:eec6:4ee7]
                                    0/ 100 =  0%   |
  1    7ms     0/ 100 =  0%     0/ 100 =  0%  2409:40c1:3101:6088::41
                                    0/ 100 =  0%   |
  2   41ms     0/ 100 =  0%     0/ 100 =  0%  2405:200:5210:5:3924:110:3:307

Trace complete.
```

```
C:\Users\WELCOME>pathping -g 192.168.1.1 8.8.8.8 google.com

Tracing route to google.com [142.251.220.46]
over a maximum of 30 hops:
  0  KALP-VIRADIA [192.168.102.91]
  1     *        *        *
Computing statistics for 0 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           KALP-VIRADIA [192.168.102.91]

Trace complete.
```

Date: 4/06/2025

```
C:\Users\WELCOME>pathping -p 500 google.com

Tracing route to google.com [2404:6800:4009:80b::200e]
over a maximum of 30 hops:
  0  KALP-VIRADIA [2409:40c1:3101:6088:c908:852f:eec6:4ee7]
  1  2409:40c1:3101:6088::41
  2  2405:200:5210:5:3924:110:3:307
  3     *        *        *
Computing statistics for 100 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           KALP-VIRADIA [2409:40c1:3101:6088:c908:852f:eec6:4ee7]
                                    0/ 100 =  0%   |
  1   25ms     0/ 100 =  0%     0/ 100 =  0%  2409:40c1:3101:6088::41
                                    0/ 100 =  0%   |
  2   35ms     0/ 100 =  0%     0/ 100 =  0%  2405:200:5210:5:3924:110:3:307

Trace complete.
```

```
C:\Users\WELCOME>pathping -q 3 google.com

Tracing route to google.com [2404:6800:4009:80b::200e]
over a maximum of 30 hops:
  0  KALP-VIRADIA [2409:40c1:3101:6088:c908:852f:eec6:4ee7]
  1  2409:40c1:3101:6088::41
  2  2405:200:5210:5:3924:110:3:307
  3     *        *        *
Computing statistics for 1 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           KALP-VIRADIA [2409:40c1:3101:6088:c908:852f:eec6:4ee7]
                                    0/   3 =  0%   |
  1   20ms     0/   3 =  0%     0/   3 =  0%  2409:40c1:3101:6088::41
                                    0/   3 =  0%   |
  2   69ms     0/   3 =  0%     0/   3 =  0%  2405:200:5210:5:3924:110:3:307

Trace complete.
```

10. arp

Description : The arp (Address Resolution Protocol) command displays and modifies the ARP cache, which maps IP addresses to MAC addresses on a local network. It's useful for diagnosing network issues related to address resolution. You can use it to view, add, or delete ARP entries.

No.	Option	Description
1	-a	Displays current ARP entries.
2	-g	Displays current ARP entries (same as -a).
3	-d <IP>	Deletes ARP entry for the specified IP address.
4	-s <IP> <MAC>	Adds a static ARP entry.
5	-v	Shows verbose output.

Implementation:

Date: 4/06/2025

```
C:\Users\viraj>arp -a

Interface: 10.120.16.84 --- 0x4
  Internet Address      Physical Address      Type
  10.120.1.1            7c-5a-1c-ce-2f-57     dynamic
  10.120.15.169         60-e9-aa-d2-f6-51     dynamic
  10.120.16.93          40-ec-99-08-cf-ff     dynamic
  10.120.22.97          18-47-3d-10-c5-cd     dynamic
  10.120.255.255        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

C:\Users\viraj>
```

```
C:\Users\viraj>arp -g

Interface: 10.120.16.84 --- 0x4
  Internet Address      Physical Address      Type
  10.120.1.1            7c-5a-1c-ce-2f-57     dynamic
  10.120.15.169         60-e9-aa-d2-f6-51     dynamic
  10.120.16.93          40-ec-99-08-cf-ff     dynamic
  10.120.22.97          18-47-3d-10-c5-cd     dynamic
  10.120.255.255        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

C:\Users\viraj>
```

Date: 4/06/2025

```
C:\Users\viraj>arp -v

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

  -a            Displays current ARP entries by interrogating the current
                protocol data.  If inet_addr is specified, the IP and Physical
                addresses for only the specified computer are displayed.  If
                more than one network interface uses ARP, entries for each ARP
                table are displayed.
  -g            Same as -a.
  -v            Displays current ARP entries in verbose mode.  All invalid
                entries and entries on the loop-back interface will be shown.
  inet_addr     Specifies an internet address.
  -N if_addr    Displays the ARP entries for the network interface specified
                by if_addr.
  -d            Deletes the host specified by inet_addr. inet_addr may be
                wildcarded with * to delete all hosts.
  -s            Adds the host and associates the Internet address inet_addr
                with the Physical address eth_addr.  The Physical address is
                given as 6 hexadecimal bytes separated by hyphens. The entry
                is permanent.
  eth_addr      Specifies a physical address.
  if_addr       If present, this specifies the Internet address of the
                interface whose address translation table should be modified.
                If not present, the first applicable interface will be used.
Example:
  > arp -s 157.55.85.212   00-aa-00-62-c6-09  .... Adds a static entry.
  > arp -a                                    .... Displays the arp table.

C:\Users\viraj>
```

```
C:\Windows\System32>arp -d 192.168.102.69
```

```
C:\Windows\System32>arp -s 192.168.1.100 00-aa-bb-cc-dd-ee
```