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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:

The ipconfig command is a Windows command-line utility that displays detailed information about the network configuration and settings of a computer. It is very useful for troubleshooting network connectivity issues, verifying network settings, and diagnosing network-related problems.

No.	Option	Description
1	ipconfig /all	Display full configuration information.
2	ipconfig /release	Release the IPv4 address for the specified adapter.
3	ipconfig /release6	Release the IPv6 address for the specified adapter.
4	ipconfig /renew	Renew the IPv4 address for the specified adapter.
5	ipconfig /renew6	Renew the IPv6 address for the specified adapter.

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Implementation:

```
C:\Users\Hensi Doshi>ipconfig

Windows IP Configuration


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. . . . . . . . . . . : 2402:3a80:4428:857a:cba8:6fc5:db37:1175
   Temporary IPv6 Address. . . . . . : 2402:3a80:4428:857a:a917:2ec7:e063:78c4
   Link-local IPv6 Address . . . . . : fe80::bda2:6fba:947e:9d4d%16
   IPv4 Address. . . . . . . . . . . : 192.168.18.203
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::60bf:97ff:fe5e:3a63%16
                                       192.168.18.90
```

```
C:\Users\Hensi Doshi>ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : DESKTOP-76JKOKM
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Mixed
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : D4-54-8B-7F-88-12
   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. . . . . . . . . : D6-54-8B-7F-88-11
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6 AX201 160MHz
   Physical Address. . . . . . . . . : D4-54-8B-7F-88-11
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   IPv6 Address. . . . . . . . . . . : 2402:3a80:4428:857a:cba8:6fc5:db37:1175(Preferred)
   Temporary IPv6 Address. . . . . . : 2402:3a80:4428:857a:a917:2ec7:e063:78c4(Preferred)
   Link-local IPv6 Address . . . . . : fe80::bda2:6fba:947e:9d4d%16(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.18.203(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 20 June 2024 09:57:15
   Lease Expires . . . . . . . . . . : 20 June 2024 11:27:24
   Default Gateway . . . . . . . . . : fe80::60bf:97ff:fe5e:3a63%16
                                       192.168.18.90
   DHCP Server . . . . . . . . . . . : 192.168.18.90
   DHCPv6 IAID . . . . . . . . . . . : 181687435
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2B-62-71-D2-D4-54-8B-7F-88-11
   DNS Servers . . . . . . . . . . . : 192.168.18.90
   NetBIOS over Tcpip. . . . . . . . : Enabled
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```
C:\Users\Hensi Doshi>ipconfig /release

Windows IP Configuration

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.

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. . . . . . . . . . . : 2402:3a80:4428:857a:cba8:6fc5:db37:1175
   Temporary IPv6 Address. . . . . . : 2402:3a80:4428:857a:a917:2ec7:e063:78c4
   Link-local IPv6 Address . . . . . : fe80::bda2:6fba:947e:9d4d%16
   Default Gateway . . . . . . . . . : fe80::60bf:97ff:fe5e:3a63%16
```

```
C:\Users\Hensi Doshi>ipconfig /release6

Windows IP Configuration

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.

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. . . . . . . . . . . : 2402:3a80:4430:56ed:bbd5:b6a7:e175:d4e1
   Temporary IPv6 Address. . . . . . : 2402:3a80:4430:56ed:69ac:f36:bddf:4b03
   Link-local IPv6 Address . . . . . : fe80::bda2:6fba:947e:9d4d%16
   IPv4 Address. . . . . . . . . . . : 192.168.18.203
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::60bf:97ff:fe5e:3a63%16
                                       192.168.18.90
```

```
C:\Users\Hensi Doshi>ipconfig /renew

Windows IP Configuration

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.

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. . . . . . . . . . . : 2402:3a80:4430:56ed:bbd5:b6a7:e175:d4e1
   Temporary IPv6 Address. . . . . . : 2402:3a80:4430:56ed:69ac:f36:bddf:4b03
   Link-local IPv6 Address . . . . . : fe80::bda2:6fba:947e:9d4d%16
   IPv4 Address. . . . . . . . . . . : 192.168.18.203
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::60bf:97ff:fe5e:3a63%16
                                       192.168.18.90
```

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```
C:\Users\Hensi Doshi>ipconfig /renew6

Windows IP Configuration

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.
An error occurred while renewing interface Wi-Fi : The semaphore timeout period has expired.


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. . . . . . . . . . . : 2409:4080:deb4:e3ed:14e:62df:9b3e:4813
   Temporary IPv6 Address. . . . . . : 2409:4080:deb4:e3ed:e028:3479:3195:976a
   Link-local IPv6 Address . . . . . : fe80::bda2:6fba:947e:9d4d%16
   IPv4 Address. . . . . . . . . . . : 192.168.244.203
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::4c77:aeff:fe29:2682%16
                                       192.168.244.166
```

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2. ping

Description:

The ping command is a widely used network diagnostic tool available on most operating systems, including Windows, macOS, and Linux. It's used to test the reachability of a remote host or server on a network and to measure the round-trip time (RTT) for packets sent from the local machine to the destination and back.

No.	Option	Description
1	ping -t	Ping the specified host until stopped. To see statistics and continue - type Control-Break; To stop - type Control-C.
2	ping -a	Resolve addresses to hostnames.
3	ping -n count	Number of echo requests to send.
4	ping -l size	Send buffer size.
5	ping -f	Set Don't Fragment flag in packet (IPv4-only).

Implementation:

```
C:\Users\Hensi Doshi>ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
            [-r count] [-s count] [[-j host-list] | [-k host-list]]
            [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
            [-4] [-6] target_name

Options:
    -t             Ping the specified host until stopped.
                   To see statistics and continue - type Control-Break;
                   To stop - type Control-C.
    -a             Resolve addresses to hostnames.
    -n count       Number of echo requests to send.
    -l size        Send buffer size.
    -f             Set Don't Fragment flag in packet (IPv4-only).
    -i TTL         Time To Live.
    -v TOS         Type Of Service (IPv4-only. This setting has been deprecated
                   and has no effect on the type of service field in the IP
                   Header).
    -r count       Record route for count hops (IPv4-only).
    -s count       Timestamp for count hops (IPv4-only).
    -j host-list   Loose source route along host-list (IPv4-only).
    -k host-list   Strict source route along host-list (IPv4-only).
    -w timeout     Timeout in milliseconds to wait for each reply.
    -R             Use routing header to test reverse route also (IPv6-only).
                   Per RFC 5095 the use of this routing header has been
                   deprecated. Some systems may drop echo requests if
                   this header is used.
    -S srcaddr     Source address to use.
    -c compartment Routing compartment identifier.
    -p             Ping a Hyper-V Network Virtualization provider address.
    -4             Force using IPv4.
    -6             Force using IPv6.
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```
C:\Users\Hensi Doshi>ping -t www.darshan.ac.in

Pinging darshan.ac.in [64:ff9b::670d:70b4] with 32 bytes of data:
Reply from 64:ff9b::670d:70b4: time=73ms
Reply from 64:ff9b::670d:70b4: time=83ms
Reply from 64:ff9b::670d:70b4: time=80ms
Reply from 64:ff9b::670d:70b4: time=85ms
Reply from 64:ff9b::670d:70b4: time=74ms
Reply from 64:ff9b::670d:70b4: time=80ms
Reply from 64:ff9b::670d:70b4: time=70ms
Reply from 64:ff9b::670d:70b4: time=83ms
Reply from 64:ff9b::670d:70b4: time=82ms
Reply from 64:ff9b::670d:70b4: time=64ms
Reply from 64:ff9b::670d:70b4: time=136ms
Reply from 64:ff9b::670d:70b4: time=74ms
Reply from 64:ff9b::670d:70b4: time=62ms
Reply from 64:ff9b::670d:70b4: time=61ms
Reply from 64:ff9b::670d:70b4: time=74ms
Reply from 64:ff9b::670d:70b4: time=74ms
Reply from 64:ff9b::670d:70b4: time=68ms
Reply from 64:ff9b::670d:70b4: time=69ms
Reply from 64:ff9b::670d:70b4: time=70ms
Reply from 64:ff9b::670d:70b4: time=76ms
Reply from 64:ff9b::670d:70b4: time=68ms
Reply from 64:ff9b::670d:70b4: time=76ms
Reply from 64:ff9b::670d:70b4: time=78ms

Ping statistics for 64:ff9b::670d:70b4:
    Packets: Sent = 23, Received = 23, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 61ms, Maximum = 136ms, Average = 76ms
Control-C
^C
C:\Users\Hensi Doshi>
```

```
C:\Users\Hensi Doshi> ping -a 192.168.1.22

Pinging 192.168.1.22 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.22:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Users\Hensi Doshi>ping -n 5 www.darshan.ac.in

Pinging darshan.ac.in [64:ff9b::670d:70b4] with 32 bytes of data:
Reply from 64:ff9b::670d:70b4: time=76ms
Reply from 64:ff9b::670d:70b4: time=83ms
Reply from 64:ff9b::670d:70b4: time=69ms
Reply from 64:ff9b::670d:70b4: time=89ms
Reply from 64:ff9b::670d:70b4: time=78ms

Ping statistics for 64:ff9b::670d:70b4:
    Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 69ms, Maximum = 89ms, Average = 79ms
```

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```
C:\Users\Hensi Doshi>ping -l 7 www.darshan.ac.in

Pinging darshan.ac.in [64:ff9b::670d:70b4] with 7 bytes of data:
Reply from 64:ff9b::670d:70b4: time=87ms
Reply from 64:ff9b::670d:70b4: time=85ms
Reply from 64:ff9b::670d:70b4: time=84ms
Reply from 64:ff9b::670d:70b4: time=77ms

Ping statistics for 64:ff9b::670d:70b4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 77ms, Maximum = 87ms, Average = 83ms
```

```
C:\Users\Hensi Doshi>ping -f www.darshan.ac.in

Pinging darshan.ac.in [103.13.112.180] with 32 bytes of data:
Reply from 103.13.112.180: bytes=32 time=62ms TTL=118
Reply from 103.13.112.180: bytes=32 time=80ms TTL=118
Reply from 103.13.112.180: bytes=32 time=82ms TTL=118
Reply from 103.13.112.180: bytes=32 time=70ms TTL=118

Ping statistics for 103.13.112.180:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 62ms, Maximum = 82ms, Average = 73ms
```

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3. getmac

Description:

The getmac command is a Windows command-line utility that retrieves the Media Access Control (MAC) address and list of network adapters on a computer. MAC addresses are unique identifiers assigned to network interfaces, such as Ethernet cards and Wi-Fi adapters.

No.	Option	Description
1	getmac /FO format	Specifies the format in which the output is to be displayed. Valid values: "TABLE", "LIST", "CSV".
2	getmac /V	Specifies that verbose output is displayed.
3	getmac /NH	Specifies that the "Column Header" should not be displayed in the output. Valid only for TABLE and CSV formats.

Implementation:

```
C:\Users\Hensi Doshi>getmac

Physical Address    Transport Name
=================== ============================================================
D4-54-8B-7F-88-11   \Device\Tcpip_{C70AA951-F836-4EFD-A4C2-272A2841399F}
```

```
C:\Users\Hensi Doshi> GETMAC /FO csv
"Physical Address","Transport Name"
"D4-54-8B-7F-88-11","\Device\Tcpip_{C70AA951-F836-4EFD-A4C2-272A2841399F}"
```

```
C:\Users\Hensi Doshi>getmac /V

Connection Name Network Adapter Physical Address    Transport Name
=============== =============== ================== ============================================================
Wi-Fi           Intel(R) Wi-Fi  D4-54-8B-7F-88-11   \Device\Tcpip_{C70AA951-F836-4EFD-A4C2-272A2841399F}
```

```
C:\Users\Hensi Doshi>getmac /NH

D4-54-8B-7F-88-11    \Device\Tcpip_{C70AA951-F836-4EFD-A4C2-272A2841399F}
```

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4. systeminfo

Description:

The systeminfo command is a built-in utility in Windows operating systems that provides detailed information about the system's configuration, hardware, and software environment. It's a command-line tool that is useful for gathering comprehensive system information, especially in troubleshooting scenarios or when performing system audits.

No.	Option	Description
1	systeminfo /S system	Specifies the remote system to connect to.
2	systeminfo /S system /FO format	Specifies the format in which the output is to be displayed. Valid values: "TABLE", "LIST", "CSV".
3	systeminfo /S system /FO format /NH	Specifies that the "Column Header" should not be displayed in the output. Valid only for "TABLE" and "CSV" formats.

Implementation:

```
C:\Users\Hensi Doshi>systeminfo

Host Name:                 DESKTOP-76JKOKM
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:          Hensi Doshi
Registered Organization:   N/A
Product ID:                00342-42600-60700-AAOEM
Original Install Date:     28-02-2023, 14:15:39
System Boot Time:          21-06-2024, 21:00:27
System Manufacturer:       Dell Inc.
System Model:              Inspiron 15 5518
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz
BIOS Version:              Dell Inc. 2.18.0, 13-03-2023
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:     16,123 MB
Available Physical Memory: 7,795 MB
Virtual Memory: Max Size:  18,507 MB
Virtual Memory: Available: 9,362 MB
Virtual Memory: In Use:    9,145 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\DESKTOP-76JKOKM
Hotfix(s):                 6 Hotfix(s) Installed.
                           [01]: KB5037591
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5039212
                           [05]: KB5037663
                           [06]: KB5037959
Network Card(s):           1 NIC(s) Installed.
```

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```
C:\Users\Hensi Doshi> SYSTEMINFO /S DESKTOP-76JKOKM

Host Name:                 DESKTOP-76JKOKM
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:          Hensi Doshi
Registered Organization:   N/A
Product ID:                00342-42600-60700-AAOEM
Original Install Date:     28-02-2023, 14:15:39
System Boot Time:          21-06-2024, 21:00:27
System Manufacturer:       Dell Inc.
System Model:              Inspiron 15 5518
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz
BIOS Version:              Dell Inc. 2.18.0, 13-03-2023
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:     16,123 MB
Available Physical Memory: 8,479 MB
Virtual Memory: Max Size:  18,507 MB
Virtual Memory: Available: 9,307 MB
Virtual Memory: In Use:    9,200 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\DESKTOP-76JKOKM
Hotfix(s):                 6 Hotfix(s) Installed.
                           [01]: KB5037591
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5039212
                           [05]: KB5037663
                           [06]: KB5037959
```

```
C:\Users\Hensi Doshi>SYSTEMINFO /S DESKTOP-76JKOKM /FO csv
"Host Name","OS Name","OS Version","OS Manufacturer","OS Configuration","OS Build Type","Registered Owner","Registered Organization","Product ID","Original Install Date","System Boot Time","System Manufacturer","System Model","System Type","Processor(s)","BIOS Version","Windows Directory","System Directory","Boot Device","System Locale","Input Locale","Time Zone","Total Physical Memory","Available Physical Memory","Virtual Memory: Max Size","Virtual Memory: Available","Virtual Memory: In Use","Page File Location(s)","Domain","Logon Server","Hotfix(s)","Network Card(s)","Hyper-V Requirements"
"DESKTOP-76JKOKM","Microsoft Windows 11 Home Single Language","10.0.22631 N/A Build 22631","Microsoft Corporation","Standalone Workstation","Multiprocessor Free","Hensi Doshi","N/A","00342-42600-60700-AAOEM","28-02-2023, 14:15:39","21-06-2024, 21:00:27","Dell Inc.","Inspiron 15 5518","x64-based PC","1 Processor(s) Installed.,[01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz","Dell Inc. 2.18.0, 13-03-2023","C:\WINDOWS","C:\WINDOWS\system32","\Device\HarddiskVolume1","en-us;English (United States)","00004009","(UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi","16,123 MB","8,555 MB","18,507 MB","9,366 MB","9,141 MB","C:\pagefile.sys","WORKGROUP","\\DESKTOP-76JKOKM","6 Hotfix(s) Installed.,[01]: KB5037591,[02]: KB5012170,[03]: KB5027397,[04]: KB5039212,[05]: KB5037663,[06]: KB5037959","1 NIC(s) Installed.,[01]: Intel(R) Wi-Fi 6 AX201 160MHz,      Connection Name: Wi-Fi,      DHCP Enabled:    Yes,      DHCP Server:    192.168.244.166,      IP address(es),      [01]: 192.168.244.203,      [02]: fe80::bda2:6fba:947e:9d4d,      [03]: 2409:4080:dec5:93a9:fdcb:1282:3f42:400,      [04]: 2409:4080:dec5:93a9:61ac:b96c:70a9:5a39","VM Monitor Mode Extensions: Yes,Virtualization Enabled In Firmware: Yes,Second Level Address Translation: Yes,Data Execution Prevention Available: Yes"
```

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```
C:\Users\Hensi Doshi>SYSTEMINFO /S DESKTOP-76JKOKM /FO csv /NH
"DESKTOP-76JKOKM","Microsoft Windows 11 Home Single Language","10.0.22631 N/A Build 22631","Microsoft Corporation","Standalone Workstation","Multiprocessor
Free","Hensi Doshi","N/A","00342-42600-60700-AAOEM","28-02-2023, 14:15:39","21-06-2024, 21:00:27","Dell Inc.","Inspiron 15 5518","x64-based PC","1 Processor
(s) Installed.,[01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz","Dell Inc. 2.18.0, 13-03-2023","C:\WINDOWS","C:\WINDOWS\system32","\Devic
e\HarddiskVolume1","en-us;English (United States)","00004009","(UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi","16,123 MB","8,582 MB","18,507 MB","9,392 MB
","9,115 MB","C:\pagefile.sys","WORKGROUP","\\DESKTOP-76JKOKM","6 Hotfix(s) Installed.,[01]: KB5037591,[02]: KB5012170,[03]: KB5027397,[04]: KB5039212,[05]:
 KB5037663,[06]: KB5037959","1 NIC(s) Installed.,[01]: Intel(R) Wi-Fi 6 AX201 160MHz,      Connection Name: Wi-Fi,      DHCP Enabled:    Yes,      DHCP Serv
er:     192.168.244.166,      IP address(es),      [01]: 192.168.244.203,      [02]: fe80::bda2:6fba:947e:9d4d,      [03]: 2409:4080:dec5:93a9:fdcb:1282:3f4
2:400,      [04]: 2409:4080:dec5:93a9:61ac:b96c:70a9:5a39","VM Monitor Mode Extensions: Yes,Virtualization Enabled In Firmware: Yes,Second Level Address Tra
nslation: Yes,Data Execution Prevention Available: Yes"
```

Date: 21/6/24

5. traceroute / tracert

Description:

Traceroute (on Unix/Linux) and tracert (on Windows) are network diagnostic commands used to trace the route packets take from your computer to a destination host or server on the internet.

No.	Option	Description
1	tracert -d	Do not resolve addresses to hostnames.
2	tracert -4	Force using IPv4.
3	tracert -6	Force using IPv6.

Implementation:

```
C:\Users\Hensi Doshi>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                 Do not resolve addresses to hostnames.
    -h maximum_hops    Maximum number of hops to search for target.
    -j host-list       Loose source route along host-list (IPv4-only).
    -w timeout         Wait timeout milliseconds for each reply.
    -R                 Trace round-trip path (IPv6-only).
    -S srcaddr         Source address to use (IPv6-only).
    -4                 Force using IPv4.
    -6                 Force using IPv6.
```

```
C:\Users\Hensi Doshi>tracert -d www.darshan.ac.in

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 30 hops:

  1     3 ms     1 ms     1 ms  2409:4080:deb4:e3ed::33
  2     *        *        *     Request timed out.
  3    42 ms    48 ms    67 ms  2405:200:325:eeee:20::46
  4    50 ms    26 ms    47 ms  2405:200:896:3668:61::7
  5    52 ms    65 ms    29 ms  64:ff9b::ac1b:f922
  6    61 ms    68 ms    48 ms  64:ff9b::ac1c:210
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9    65 ms    67 ms    92 ms  64:ff9b::73f5:7652
 10    60 ms    48 ms    67 ms  64:ff9b::67d8:5f8a
 11    64 ms    55 ms    81 ms  64:ff9b::67d8:5f22
 12    55 ms    69 ms    56 ms  64:ff9b::cb70:8412
 13    51 ms    80 ms    82 ms  64:ff9b::670d:70b4

Trace complete.
```

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```
C:\Users\Hensi Doshi>tracert -4 www.darshan.ac.in

Tracing route to darshan.ac.in [103.13.112.180]
over a maximum of 30 hops:

  1    40 ms     1 ms     2 ms  192.168.244.166
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5     *       83 ms    45 ms  172.27.249.35
  6    51 ms    52 ms    38 ms  172.28.2.18
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9     *        *        *     Request timed out.
 10   101 ms    83 ms   107 ms  115.245.118.82
 11    89 ms    58 ms    58 ms  103.216.95.138
 12  1461 ms  1271 ms   809 ms  103.216.95.34
 13  1012 ms   284 ms    80 ms  203.112.132.18
 14    87 ms    72 ms    59 ms  103.13.112.180

Trace complete.
```

```
C:\Users\Hensi Doshi>tracert -6 www.darshan.ac.in

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 30 hops:

  1     2 ms     1 ms     2 ms  2409:4080:deb4:e3ed::33
  2     *        *        *     Request timed out.
  3    53 ms    42 ms    46 ms  2405:200:325:eeee:20::46
  4    42 ms    40 ms    58 ms  2405:200:896:3668:61::7
  5    56 ms    39 ms    59 ms  64:ff9b::ac1b:f922
  6    51 ms    41 ms    55 ms  64:ff9b::ac1c:20e
  7     *        *        *     Request timed out.
  8     *        *        *     Request timed out.
  9   130 ms    52 ms    62 ms  64:ff9b::73f5:7652
 10    71 ms    56 ms    58 ms  64:ff9b::67d8:5f8a
 11    83 ms    72 ms    63 ms  64:ff9b::67d8:5f22
 12    75 ms    57 ms    56 ms  64:ff9b::cb70:8412
 13    54 ms    63 ms    58 ms  64:ff9b::670d:70b4

Trace complete.
```

Date: 21/6/24

6. netstat

Description:

The netstat command is a powerful networking tool used to display network connections, routing tables, interface statistics, masquerade connections, and multicast memberships. It is commonly used to troubleshoot network issues and monitor network performance.

No.	Option	Description
1	netstat -a	Displays all connections and listening ports.
2	netstat -e	Displays Ethernet statistics. This may be combined with the -s option.
3	netstat -f	Displays Fully Qualified Domain Names (FQDN) for foreign addresses.
4	netstat -i	Displays the time spent by a TCP connection in its current state.
5	netstat -n	Displays addresses and port numbers in numerical form.

Implementation:

```
C:\Users\Hensi Doshi>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.244.203:49985  192.168.244.166:domain  TIME_WAIT
  TCP    192.168.244.203:49994  192.168.244.166:domain  TIME_WAIT
  TCP    192.168.244.203:49995  192.168.244.166:domain  TIME_WAIT
  TCP    192.168.244.203:49996  192.168.244.166:domain  TIME_WAIT
  TCP    192.168.244.203:51937  57.128.101.86:https    ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49409  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49986  [64:ff9b::1448:cdd1]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49987  [64:ff9b::2b9f:467b]:http  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49988  [2405:200:1630:a00::312c:c242]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49989  [2405:200:1630:a00::312c:c21a]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49990  [2603:1030:501:2::fa]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49991  [64:ff9b::312c:5f1b]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49992  [64:ff9b::d47:373a]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49993  [2606:2800:147:120f:30c:1ba0:fc6:3000]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49997  [64:ff9b::284f:bd3a]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49998  [64:ff9b::284f:bd3a]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49999  [2603:1030:c02:2::284]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50000  g2600-140f-d800-01b7-0000-0000-0000-4106:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50003  a104-104-60-61:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50004  a104-104-61-88:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50005  [2405:200:1630:a00::312c:c270]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51824  [64:ff9b::142d:7b80]:8883  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51903  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51957  [2405:200:1630:a00::b856:f8c1]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51961  [2405:200:1630:a00::b856:f8b0]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51985  [2405:200:1630:a00::b856:f8a3]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52102  [64:ff9b::14d4:5875]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52103  sb-in-f188:5228        ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52124  [2405:200:1602::312c:8244]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52160  [64:ff9b::14c3:5150]:5671  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52434  [2a04:4e42:8e::684]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52459  [2600:1901:1:7c5::]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52460  [64:ff9b::3498:5aac]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52462  a-0003:https           ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52463  a-0003:https           ESTABLISHED
```

Date: 21/6/24

```
C:\Users\Hensi Doshi>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:445            DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:5040           DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:7070           DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:49664          DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:49665          DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:49666          DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:49667          DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:49668          DESKTOP-76JKOKM:0      LISTENING
  TCP    0.0.0.0:49674          DESKTOP-76JKOKM:0      LISTENING
  TCP    127.0.0.1:5700         DESKTOP-76JKOKM:0      LISTENING
  TCP    127.0.0.1:8884         DESKTOP-76JKOKM:0      LISTENING
  TCP    127.0.0.1:27017        DESKTOP-76JKOKM:0      LISTENING
  TCP    127.0.0.1:51809        DESKTOP-76JKOKM:0      LISTENING
  TCP    192.168.244.203:139    DESKTOP-76JKOKM:0      LISTENING
  TCP    192.168.244.203:51937  relay-c9546b89:https   ESTABLISHED
  TCP    [::]:135               DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:445               DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:49664             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:49665             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:49666             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:49667             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:49668             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::]:49674             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::1]:5700             DESKTOP-76JKOKM:0      LISTENING
  TCP    [::1]:42050            DESKTOP-76JKOKM:0      LISTENING
  TCP    [::1]:49669            DESKTOP-76JKOKM:0      LISTENING
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49409  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49991  [64:ff9b::312c:5f1b]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49998  [64:ff9b::284f:bd3a]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50005  [2405:200:1630:a00::312c:c270]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50006  [2606:2800:147:120f:30c:1ba0:fc6:3001]:http  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50007  [64:ff9b::1445:89e4]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50008  [2603:1046:1400::7]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50009  [2603:1046:1400::7]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50010  [2620:1ec:42::132]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50012  [64:ff9b::14bd:ad18]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51824  [64:ff9b::142d:7b80]:8883  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51903  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51957  [2405:200:1630:a00::b856:f8c1]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51961  [2405:200:1630:a00::b856:f8b0]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51985  [2405:200:1630:a00::b856:f8a3]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52102  [64:ff9b::14d4:5875]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52103  sb-in-f188:5228        ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52124  [2405:200:1602::312c:8244]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52160  [64:ff9b::14c3:5150]:5671  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52459  [2600:1901:1:7c5::]:https  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52462  a-0003:https           TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52463  a-0003:https           TIME_WAIT
  UDP    0.0.0.0:123            *:*
  UDP    0.0.0.0:500            *:*
  UDP    0.0.0.0:4500           *:*
  UDP    0.0.0.0:5050           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5355           *:*
  UDP    0.0.0.0:50001          *:*
  UDP    0.0.0.0:59440          *:*
  UDP    127.0.0.1:1900         *:*
```

Date: 21/6/24

```
C:\Users\Hensi Doshi>netstat -e
Interface Statistics

                           Received            Sent

Bytes                     512978766        40669362
Unicast packets              421662          241710
Non-unicast packets              30            3624
Discards                          0               0
Errors                            0               0
Unknown protocols                 0
```

```
C:\Users\Hensi Doshi>netstat -f

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.244.203:51937  relay-c9546b89.net.anydesk.com:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49409  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50017  [64:ff9b::312c:5f1b]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51824  [64:ff9b::142d:7b80]:8883  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51903  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51957  [2405:200:1630:a00::b856:f8c1]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51961  [2405:200:1630:a00::b856:f8b0]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51985  [2405:200:1630:a00::b856:f8a3]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52102  [64:ff9b::14d4:5875]:https  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52103  sb-in-f188.1e100.net:5228  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52124  [2405:200:1602::312c:8244]:https  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52160  [64:ff9b::14c3:5150]:5671  ESTABLISHED
```

```
C:\Users\Hensi Doshi>netstat -i

Active Connections

  Proto  Local Address          Foreign Address        State           Time in State (ms)
TCP    192.168.244.203:51937  relay-c9546b89:https   ESTABLISHED        1325552
```

```
C:\Users\Hensi Doshi>netstat -n

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.244.203:51937  57.128.101.86:443      ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:49409  [2603:1040:a06:6::1]:443  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50018  [2603:1046:1400::7]:443  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50019  [2603:1046:1400::7]:443  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50022  [64:ff9b::330b:a8e8]:443  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50023  [64:ff9b::330b:a8e8]:443  TIME_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:50024  [2620:1ec:42::132]:443  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51824  [64:ff9b::142d:7b80]:8883  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51903  [2603:1040:a06:6::1]:443  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51957  [2405:200:1630:a00::b856:f8c1]:443  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51961  [2405:200:1630:a00::b856:f8b0]:443  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:51985  [2405:200:1630:a00::b856:f8a3]:443  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52102  [64:ff9b::14d4:5875]:443  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52103  [2404:6800:4003:c01::bc]:5228  ESTABLISHED
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52124  [2405:200:1602::312c:8244]:443  CLOSE_WAIT
  TCP    [2409:4080:deb4:e3ed:e028:3479:3195:976a]:52160  [64:ff9b::14c3:5150]:5671  ESTABLISHED
```

Date: 21/6/24

7. nslookup

Description:

The nslookup command is a network administration command-line tool used for querying the Domain Name System (DNS) to obtain domain name or IP address mapping, or for any other specific DNS record. It is available on many operating systems including Windows, macOS, and Linux.

No.	Option	Description
1	nslookup -timeout	Specify a timeout value (in seconds)
2	nslookup -retry	Specify the number of retries
3	nslookup -retry	Specify the record type to query
4	nslookup	Query using a specific DNS server (e.g., 8.8.8.8)

Implementation:

```
C:\Users\Hensi Doshi>nslookup www.darshan.ac.in
Server:  UnKnown
Address:  192.168.244.166

Non-authoritative answer:
Name:    darshan.ac.in
Addresses:  64:ff9b::670d:70b4
          103.13.112.180
Aliases:  www.darshan.ac.in
```

```
C:\Users\Hensi Doshi>nslookup -timeout=10 google.com
Server:  UnKnown
Address:  192.168.244.166

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4009:828::200e
          142.250.183.206
```

```
C:\Users\Hensi Doshi>nslookup -retry=3 google.com
Server:  UnKnown
Address:  192.168.244.166

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4009:828::200e
          142.250.183.206
```

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```
C:\Users\Hensi Doshi>nslookup -query=MX google.com
Server:  UnKnown
Address:  192.168.244.166

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

```
C:\Users\Hensi Doshi>nslookup google.com 8.8.8.8
Server:  dns.google
Address:  8.8.8.8

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4002:821::200e
          142.250.194.14
```

Date: 21/6/24

8. hostname

Description:

The hostname command is used to display or set the system's hostname. The hostname is a label assigned to a device on a network and is used to identify the device in various forms of electronic communication. The specific functionality of the hostname command can vary slightly between operating systems, but its basic usage remains consistent.

No.	Option	Description
1	hostname	Prints the name of the current host.

Implementation:

```
C:\Users\Hensi Doshi>hostname
DESKTOP-76JKOKM
```

Date: 21/6/24

9. pathping

Description:

The pathping command is a network utility that combines the functionality of ping and tracert (traceroute) to provide detailed information about the path and performance characteristics of a network route. It is available on Windows operating systems.

No.	Option	Description
1	pathping -g	Loose source route along host-list.
2	pathping -h	Maximum number of hops to search for target.
3	pathping -n	Do not resolve addresses to hostnames.
4	pathping -p	Wait period milliseconds between pings.
5	pathping -q	Number of queries per hop.

Implementation:

```
C:\Users\Hensi Doshi>pathping

Usage: pathping [-g host-list] [-h maximum_hops] [-i address] [-n]
                [-p period] [-q num_queries] [-w timeout]
                [-4] [-6] target_name

Options:
    -g host-list     Loose source route along host-list.
    -h maximum_hops  Maximum number of hops to search for target.
    -i address       Use the specified source address.
    -n               Do not resolve addresses to hostnames.
    -p period        Wait period milliseconds between pings.
    -q num_queries   Number of queries per hop.
    -w timeout       Wait timeout milliseconds for each reply.
    -4               Force using IPv4.
    -6               Force using IPv6.
```

```
C:\Users\Hensi Doshi>pathping www.darshan.ac.in -g

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 30 hops:
  0  DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
  1  General failure.

Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
                               100/ 100 =100%   |
  1  ---     100/ 100 =100%     0/ 100 =  0%  DESKTOP-76JKOKM [::]

Trace complete.
```

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```
C:\Users\Hensi Doshi>pathping www.darshan.ac.in -h 7

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 7 hops:
  0  DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
  1  2409:4080:deb4:e3ed::33
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
                                 0/ 100 =  0%   |
  1    4ms     0/ 100 =  0%     0/ 100 =  0%  2409:4080:deb4:e3ed::33

Trace complete.
```

```
C:\Users\Hensi Doshi>pathping www.darshan.ac.in -n

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 30 hops:
  0  2409:4080:deb4:e3ed:e028:3479:3195:976a
  1  2409:4080:deb4:e3ed::33
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           2409:4080:deb4:e3ed:e028:3479:3195:976a
                                 0/ 100 =  0%   |
  1    4ms     0/ 100 =  0%     0/ 100 =  0%  2409:4080:deb4:e3ed::33

Trace complete.
```

```
C:\Users\Hensi Doshi>pathping www.darshan.ac.in -p 7

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 30 hops:
  0  DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
  1  2409:4080:deb4:e3ed::33
  2     *        *        *
Computing statistics for 0 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
                                 0/ 100 =  0%   |
  1    3ms     0/ 100 =  0%     0/ 100 =  0%  2409:4080:deb4:e3ed::33

Trace complete.
```

```
C:\Users\Hensi Doshi>pathping www.darshan.ac.in -q 5

Tracing route to darshan.ac.in [64:ff9b::670d:70b4]
over a maximum of 30 hops:
  0  DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
  1  2409:4080:deb4:e3ed::33
  2     *        *        *
Computing statistics for 1 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           DESKTOP-76JKOKM [2409:4080:deb4:e3ed:e028:3479:3195:976a]
                                 0/   5 =  0%   |
  1    5ms     0/   5 =  0%     0/   5 =  0%  2409:4080:deb4:e3ed::33

Trace complete.
```

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10.arp

Description:

The arp (Address Resolution Protocol) command is a network utility used to view and manage the ARP cache on a computer. ARP is used to map IP addresses to MAC (Media Access Control) addresses, which are essential for communication within a local network.

No.	Option	Description
1	arp -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.
2	arp -a	Display ARP Entries for a Specific IP Address

Implementation:

```
C:\Users\Hensi Doshi>arp

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.
```

Date: 21/6/24

```
C:\Users\Hensi Doshi>arp -a

Interface: 192.168.244.203 --- 0x10
  Internet Address      Physical Address      Type
  192.168.244.166       4e-77-ae-29-26-82     dynamic
  192.168.244.255       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\Hensi Doshi>arp -a  192.168.244.166

Interface: 192.168.244.203 --- 0x10
  Internet Address      Physical Address      Type
  192.168.244.166       4e-77-ae-29-26-82     dynamic
```