

Semester 5th | Practical Assignment | Computer Networks (2101CS501)

Date: 13/06/2024

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 a command-line utility in Windows operating systems used to display and manage the network configuration of a computer. It provides details about the IP address, subnet mask, default gateway, and other network information for each network adapter. Additionally, it allows users to release and renew DHCP-assigned IP addresses and manage DNS settings.

No.	Option	Description
1	/all	Display full configuration information.
2	/renew	Renew the IPv4 address for the specified adapter.
3	/release	Release the IPv4 address for the specified adapter.
4	/displaydns	Display the contents of the DNS Resolver Cache.
5	/flushdns	Purges the DNS Resolver cache.

Implementation:

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ipconfig

ipconfig /all

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ipconfig /release

ipconfig /renew

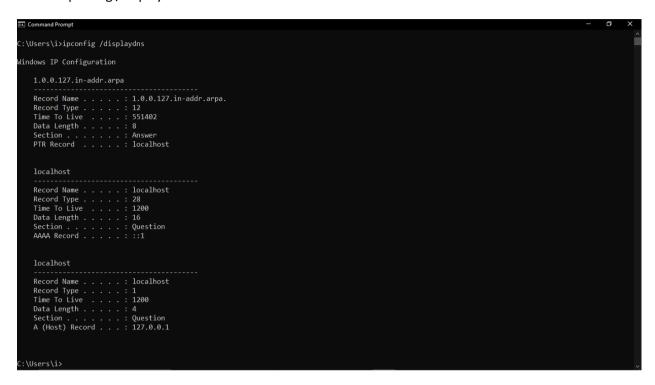
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> ipconfig /displaydns



ipconfig /flushdns





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2. ping

Description:

The ping command is a network utility used to test the reachability of a host on an IP network. It also measures the round-trip time for messages sent from the originating host to a destination computer. This command is useful for diagnosing network connectivity issues.

No.	Option	Description
1	-t	Ping the specified host until stopped. To see statistics and continue - type Control-Break. To stop - type Control-C.
2	-n count	Number of echo requests to send.
3	-l size	Send buffer size.
4	-4	Force using IPv4.
5	-i TTL	Time To Live.

Implementation:

ping www.google.com

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ping <u>www.google.com</u> -t

```
ES select Command Prompt

- 0 X

C:\Users\ipping www.google.com -t

Pinging www.google.com [2404:6800:4009:82a::2004] with 32 bytes of data:
Reply from 2404:6800:4009:32a::2004: time=790ms
Reply from 2404:6800:4009:32a::2004: time=790ms
Reply from 2404:6800:4009:32a::2004: time=790ms
Reply from 2404:6800:4009:32a::2004: time=790ms
Reply from 2404:6800:4009:32a::2004: time=50ms
Reply from 2404:6800:4009:32a::2004: time=50ms
Reply from 2404:6800:4009:32a::2004: time=50ms
Reply from 2404:6800:4009:32a::2004: time=50ms
Reply from 2404:6800:4009:32a::2004: time=790ms
Reply from 2404:6800:4009:32a::2004: time=700ms
Reply from 2404:6800:4009:32a::2004: time=500ms
Reply from 2404:6800:4009:32a::2004:
```

ping <u>www.google.com</u> –n 10

```
Select Command Prompt

C:\Users\i>ping www.google.com -n 10

Pinging www.google.com [2404:6800:4009:82a::2004] with 32 bytes of data:
Reply from 2404:6800:4009:82a::2004: time=142ms
Reply from 2404:6800:4009:82a::2004: time=207ms
Reply from 2404:6800:4009:82a::2004: time=207ms
Reply from 2404:6800:4009:82a::2004: time=1249ms
Reply from 2404:6800:4009:82a::2004: time=108ms
Reply from 2404:6800:4009:82a::2004: time=108ms
Reply from 2404:6800:4009:82a::2004: time=96ms
Reply from 2404:6800:4009:82a::2004: time=200ms
Reply from 2404:6800:4009:82a::2004: time=200ms
Reply from 2404:6800:4009:82a::2004: time=200ms
Reply from 2404:6800:4009:82a::2004: time=201ms

Ping statistics for 2404:6800:4009:82a::2004:
Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 79ms, Maximum = 1249ms, Average = 257ms

C:\Users\i>_
```

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> ping <u>www.google.com</u> -l 1000

```
C:\Users\i>ping www.google.com -1 1000

Pinging www.google.com [2404:6800:4009:827::2004] with 1000 bytes of data:
Reply from 2404:6800:4009:827::2004: time=844ms
Reply from 2404:6800:4009:827::2004: time=130ms
Reply from 2404:6800:4009:827::2004: time=124ms
Reply from 2404:6800:4009:827::2004: time=136ms

Ping statistics for 2404:6800:4009:827::2004: time=136ms

Ping statistics for 2404:6800:4009:827::2004: packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 124ms, Maximum = 844ms, Average = 308ms

C:\Users\i>
```

ping <u>www.google.com</u> -4

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

Pinging www.google.com [142.250.192.4] with 32 bytes of data:
Reply from 142.250.192.4: bytes=32 time=68ms TTL=54
Reply from 142.250.192.4: bytes=32 time=87ms TTL=54

Ping statistics for 142.250.192.4:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 57ms, Maximum = 87ms, Average = 74ms

C:\Users\i>_
```

ping -i 4 www.google.com

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

Pinging www.google.com [2404:6800:4009:827::2004] with 32 bytes of data:
Reply from 2404:6800:4009:827::2004: TTL expired in transit.

Ping statistics for 2404:6800:4009:827::2004:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\i>____
```



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3. getmac

Description:

The getmac command is a command-line utility in Windows operating systems that displays the MAC addresses for network adapters on the system. The MAC address, or Media Access Control address, is a unique identifier assigned to network interfaces for communications at the data link layer of a network segment.

No.	Option	Description
1	/S system	Specifies the remote system to connect to.
2	/U [domain\]user	Specifies the user context under which the command should execute.
3	/V	Specifies that verbose output is displayed.
4	/FO format	Specifies the format in which the output is to be displayed. Valid values: "TABLE", "LIST", "CSV".
5	/NH	Specifies that the "Column Header" should not be displayed in the output. Valid only for TABLE and CSV formats.

Implementation:

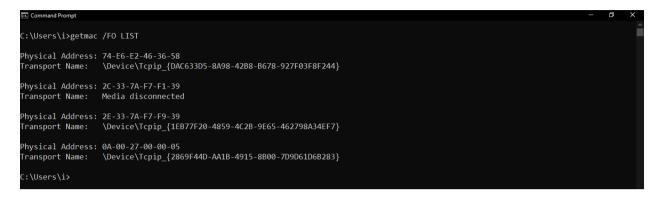
> getmac

getmac /FO TABLE

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getmac /FO LIST



getmac /FO CSV

```
C:\Users\i>getmac /FO CSV

"Physical Address","Transport Name"

"74-E6-E2-46-36-58","\Device\Tcpip_{DAC633D5-8A98-42B8-B678-927F03F8F244}"

"2C-33-7A-F7-F1-39","Media disconnected"

"2E-33-7A-F7-F9-39","\Device\Tcpip_{1EB77F20-4859-4C2B-9E65-462798A34EF7}"

"0A-00-27-00-00-05","\Device\Tcpip_{2869F44D-AA1B-4915-8B00-7D9D61D6B283}"

C:\Users\i>_
```

getmac /FO CSV /NH

```
EX Command Prompt

C:\Users\i>getmac /FO CSV /NH

"74-E6-E2-46-36-58", "\Device\Tcpip_{DAC633D5-8A98-42B8-B678-927F03F8F244}"
"2C-33-7A-F7-F1-39", "Media disconnected"
"2E-33-7A-F7-F9-39", "\Device\Tcpip_{1EB77F20-4859-4C28-9E65-462798A34EF7}"
"0A-00-27-00-00-05", "\Device\Tcpip_{2869F44D-AA1B-4915-8800-7D9D61D6B283}"

C:\Users\i>
```

getmac /v



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4. systeminfo

Description:

 ${\tt systeminfo} \ is \ a \ command-line \ utility \ in \ Microsoft \ Windows \ that \ provides \ detailed \ information \ about \ the \ system's \ configuration. \ It \ gathers \ and \ displays \ various \ parameters \ related \ to \ the \ operating \ system, \ hardware, \ and \ software \ environment$

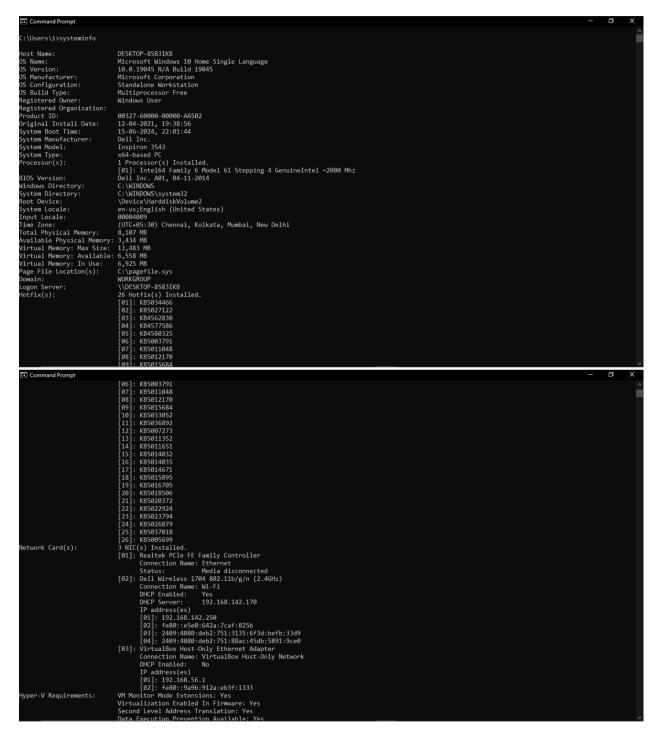
No.	Option	Description
1	/S system	Specifies the remote system to connect to.
2	/U [domain\]user	Specifies the user context under which the command should execute.
3	/P [password]	Specifies the password for the given user context. Prompts for input if omitted.
4	/FO format	Specifies the format in which the output is to be displayed. Valid values: "TABLE", "LIST", "CSV".
5	/NH	Specifies that the "Column Header" should not be displayed in the output. Valid only for "TABLE" and "CSV" formats.

Implementation:

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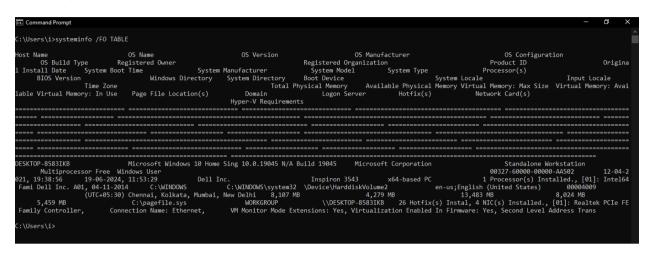
> systeminfo



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> systeminfo /FH TABLE



systeminfo /FO CSV

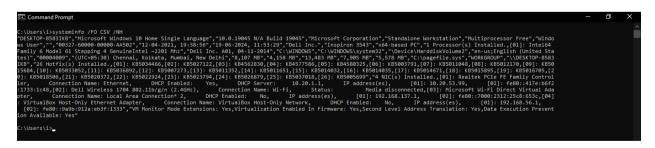
C:\Users\isysteminfo /FO CSV

"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", "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-RSSIXIKB", "Microsoft Windows 10 Home Single Language", "100. 019945 N/A Build 19045", "Microsoft Corporation", "Standalone Workstation", "Multiprocessor Free", "Windows User", """, "00327-60000-00000-0A0502", "12-04-2021, 19:38:56", "19-06-2024, 11:53:29", "Dell Inc., "Inspiron 3543", "Ko4-based PC", "I Processor(s) Installed., [01]: Intel64

Family 6 Model 61 Stepping 4 GenuinalIntel ~2021 Mhz", "Del1 Inc. A01, 04-11-2014", "C: WINDOWS," "C: \NVINDOWS," "\NVINDOWS," "\NVIND

systeminfo /NH





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5. traceroute/tracert

Description:

The tracert command (short for "trace route") is a network diagnostic tool available in Windows operating systems. It is used to determine the path packets take from your computer to a destination host. This command helps in identifying where in the network the issues are occurring, such as delays or failures in data transmission.

No.	Option	Description
1	-d	Do not resolve addresses to hostnames.
2	-h maximum_hops	Maximum number of hops to search for target.
3	-w timeout	Wait timeout milliseconds for each reply.
4.	-S srcaddr	Source address to use (IPv6-only).
5	-4	Force using IPv4.

Implementation:

tracert www.google.com

```
C:\Users\i>tracert www.google.com
Tracing route to www.google.com [2404:6800:4009:82a::2004]
 ver a maximum of 30 hops:
                  3 ms
                            2 ms 2409:4080:deb2:751::95
        2 ms
                                   Request timed out.
       59 ms
                 49 ms
                           46 ms 2405:200:325:eeee:20::30
                 48 ms
                           48 ms
                                   2405:200:801:2e00::54
                                  Request timed out.
Request timed out.
2001:4860:1:1::2218
      118 ms
                142 ms
                          163 ms
       95 ms
                 83 ms
                                   2001:4860:1:1::2218
                           75 ms
      109 ms
                 85 ms
                           96 ms
                                   2404:6800:8040::1
       88 ms
                 95 ms
                          101 ms
                                   2001:4860:0:1::15e
                                  2001:4860:0:1::78b6
2001:4860::9:4001:67bd
                 74 ms
      122 ms
                           82 ms
                 75 ms
                           74 ms
       88 ms
      104 ms
                 94 ms
                           77 ms
                                  2001:4860:0:1::876b
      106 ms
                           82 ms
                                   2001:4860:0:1::161
      104 ms
                           97 ms bom12s17-in-x04.1e100.net [2404:6800:4009:82a::2004]
Trace complete.
:\Users\i>
```

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> tracert -d www.google.com

```
::\Users\i>tracert -d www.google.com
Tracing route to www.google.com [2404:6800:4009:82a::2004]
over a maximum of 30 hops:
                                      2 ms 2409:4080:deb2:751::95
                                               Request timed out.
        756 ms
                       60 ms
                                     34 ms 2405:200:801:2e00::54

* Request timed out.

* Request timed out.
                       41 ms
                                    74 ms 2001:4860:1:1::2218
91 ms 2001:4860:1:1::2218
        90 ms
101 ms
                       76 ms
89 ms
        100 ms
                                   146 ms 2001:4860:0:1::53a4
82 ms 2001:4860:0:1::77dc
        695 ms
137 ms
                       97 ms
                                   101 ms 2001:4860::9:4002:d931
                       85 ms
97 ms
                                   178 ms 2001:4860:0:1::876b
100 ms 2001:4860:0:1::161
86 ms 2404:6800:4009:82a::2004
        88 ms
121 ms
                       83 ms
Trace complete.
 ::\Users\i>_
```

tracert –h 3 www.google.com

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> tracert -w 3000 www.google.com

```
C:\Users\i>tracert -w 3000 www.google.com
Tracing route to www.google.com [2404:6800:4009:82a::2004]
over a maximum of 30 hops:
                         4 ms
            5 ms
                                        2 ms 2409:4080:deb2:751::95
 2
3
4
5
6
7
8
9
10
11
12
                                                  Request timed out.
                                    42 ms 2405:200:325:eeee:20::30
227 ms 2405:200:801:2e00::54
* Request timed out.
* Request timed out.
          59 ms
                        29 ms
         125 ms
                      150 ms
         124 ms
                        83 ms
                                      71 ms 2001:4860:1:1::2218
                                      73 ms 2404:6800:1:1:2218

73 ms 2404:6800:8040:1

75 ms 2001:4860:0:1::15e

77 ms 2001:4860:0:1::78b6
          91 ms
85 ms
                        80 ms
77 ms
79 ms
         111 ms
103 ms
         104 ms
                        93 ms
                                      96 ms 2001:4860::9:4001:67bd
                                      92 ms 2001:4860::9:4001:7734
85 ms 2001:4860:0:1::8769
         123 ms
 14
15
         114 ms
                        91 ms
                                    85 ms 2001:4860:0:1::161
100 ms bom12s17-in-x04.1e100.net [2404:6800:4009:82a::2004]
         120 ms
97 ms
                      88 ms
105 ms
Trace complete.
C:\Users\i>
```

tracert –S 2001:0db8:85a3:0000:0000:8a2e:0370:7334 ipv6.google.com

```
C:\Users\i>tracert -S 2001:0db8:85a3:0000:0000:8a2e:0370:7334 ipv6.google.com

Tracing route to ipv6.l.google.com [2404:6800:4009:822::200e]
over a maximum of 30 hops:

1 Transmit error: code 1214.

Trace complete.

C:\Users\i>_

**C:\Users\i>_

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tracert –4 www.google.com

```
C:\Users\i>tracert -4 www.google.com
Tracing route to www.google.com [142.250.192.4]
over a maximum of 30 hops:
                            3 ms 192.168.142.170
6 ms 192.0.0.1
 2
3
4
5
6
7
8
9
10
        6 ms
                   6 ms
                                    Request timed out.
                                    Request timed out.
                                   Request timed out.
                                   Request timed out.
                                   Request timed out.
                                   Request timed out.
                                    Request timed out.
                                    Request timed out.
                                    Request timed out.
12
13
                           * Request timed out.
76 ms bom12s14-in-f4.1e100.net [142.250.192.4]
       64 ms
                 76 ms
Trace complete.
C:\Users\i>
```



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6. netstat

Description:

The netstat command is a network utility that displays network connections, routing tables, interface statistics, masquerade connections, and multicast memberships. It is available in various operating systems including Windows, Linux, and macOS. The command is useful for network troubleshooting and performance monitoring.

No.	Option	Description
1	-a	Displays all connections and listening ports.
2	-е	Displays Ethernet statistics. This may be combined with the –s option.
3	-f	Displays Fully Qualified Domain Names (FQDN) for foreign addresses.
4	-0	Displays the owning process ID associated with each connection
5	-r	Displays the routing table.

Implementation:

```
\Users\i>netstat
Active Connections
                                         Foreign Address
DESKTOP-8583IKB:49678
          Local Address
                                                                        State
          127.0.0.1:49677
127.0.0.1:49678
                                                                        ESTABLISHED
 TCP
                                         DESKTOP-8583IKB:49677
                                                                        ESTABLISHED
          127.0.0.1:49679
                                         DESKTOP-8583IKB:49680
                                                                        ESTABLISHED
          127.0.0.1:49680 DESKTOP-8583IKB:496
192.168.142.250:49228 a23-63-110-88:https
 TCP
                                         DESKTOP-8583IKB:49679
                                                                        ESTABLISHED
 TCP
                                                                        CLOSE WAIT
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]:49152
                                                                          [64:ff9b::98c3:264c]:http CLOSE_WAIT whatsapp-cdn6-shv-01-pnq1:https CLOSE
 TCP
 TCP
TCP
TCP
TCP
TCP
TCP
TCP
TCP
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]:49221
                                                                                                                      CLOSE WAIT
                                                                          whatsapp-cdn6-shv-01-pnq1:https
whatsapp-cdn6-shv-01-bom1:https
           .
[2409:4080:deb2:751:3135:6f3d:befb:33d9]:49222
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]:49223
[2409:4080:deb2:751:3135:6f3d:befb:33d9]:49224
[2409:4080:deb2:751:3135:6f3d:befb:33d9]:49225
                                                                          Whatsapp-cdn6-shv-01-bom1:https cLOSE_WAIT
[2405:200:1630:b57:face:b00c:3333:7020]:https
[2405:200:1602::312c:7689]:https CLOSE_WAIT
[2405:200:1602::312c:8244]:https CLOSE_WAIT
                                                                                                                                        CLOSE WAIT
           .
[2409:4080:deb2:751:3135:6f3d:befb:33d9]:49231
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]
                                                                :49237
           -
[2409:4080:deb2:751:3135:6f3d:befb:33d9]
                                                                :49242
                                                                           2606:2800:147:120f:30c:1ba0:fc6:265a]:https
                                                                                                                                       CLOSE_WAIT
                                                                          [2409:4080:deb2:751:3135:6f3d:befb:33d9]:49243
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]:49246
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]:65369
 TCP
           .
[2409:4080:deb2:751:3135:6f3d:befb:33d9]:65472
                                                                          sg-in-f188:5228 ESTABLISHED
[2405:200:1630:90::57]:https CLOSE_WAIT
            2409:4080:deb2:751:3135:6f3d:befb:33d9]:65488
           [2409:4080:deb2:751:3135:6f3d:befb:33d9]:65534
::\Users\i>_
```

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netstat -a

```
| The content of the
```

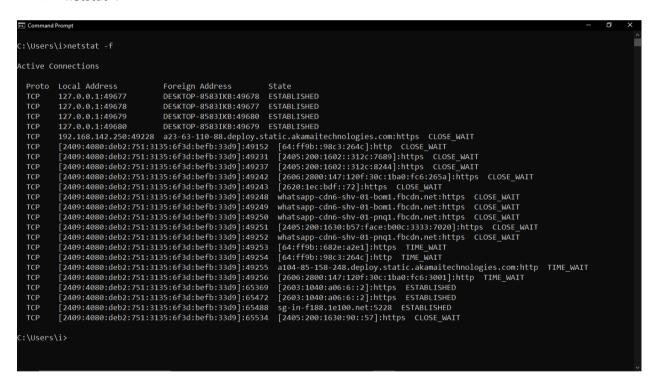
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netstat -e



netstat -f



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netstat -o



netstat -r

```
Cilleer/Unrettest -r

Cilleer/Unrettest -r

Interface List
13...48 of 2 46 96 98 88 .... Realtek PCIe FE Family Controller
3...68 00 77 08 00 99 .... Wirthallow Insolvoily Ethernet Adapter
3...68 00 77 08 00 99 .... Wirthallow Insolvoily Ethernet Adapter
4....28 37 n f 7 n 99 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2.....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2.....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2.....22 37 n f 7 n 19 .... Microrefit Lift | Direct Virtual Adapter 92
2.....22 37 n f 7 n 19 ... Microrefit Lift | Direct Virtual Adapter 92
2....... Microrefit Lift | Direct Virtual Adapter 92
2...... Microrefit Lift | Direct Virtual Adapter 92
2...... Microrefit Lift | Direct Virtual Adapter 92
2...... Microrefit Lift | Direct Virtual Adapter 92
2..... Microrefit Lift | Direct Virtual Adapter 92
2...
```



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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 information. It can be used to find the IP address associated with a domain name or the domain name associated with an IP address. This tool is useful for diagnosing DNS issues and verifying DNS configurations.

No.	Option	Description
1	-debug	Enables the display of debugging information
2	-type=any	Lookup for any record We can also view all the available DNS records using the -type=any option.
3	-type=SOA	Lookup for a soa record SOA record (start of authority), provides the authoritative information about the domain, the e-mail address of the domain admin, the domain serial number, etc

Implementation:

nslookup www.google.com

```
© Command Prompt

C:\Users\i>nslookup www.google.com

Server: UnKnown
Address: 10.20.1.1

Non-authoritative answer:
Name: www.google.com
Addresses: 2404:6800:4009:829::2004
142.250.183.196

C:\Users\i>■
```

nslookup –type=any <u>www.google.com</u>

```
© Command Prompt

C:\Users\i>nslookup -type=any www.google.com
Server: UnKnown
Address: 192.168.204.159

Non-authoritative answer:
www.google.com internet address = 142.250.192.68
www.google.com AAAA IPv6 address = 2404:6800:4009:829::2004

C:\Users\i>■
```

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> nslookup -type=SOA <u>www.google.com</u>

```
© CommandPrompt

C:\Users\i>nslookup -type=SOA www.google.com

Server: UnKnown

Address: 192.168.204.159

google.com

primary name server = ns1.google.com

responsible mail addr = dns-admin.google.com

serial = 646797294

refresh = 900 (15 mins)

retry = 900 (15 mins)

expire = 1800 (30 mins)

default TTL = 60 (1 min)

C:\Users\i>
■
```

nslookup –debug <u>www.google.com</u>

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8. hostname

Description:

The hostname command is a simple command-line utility used in various operating systems (Windows, Linux, macOS) to display or set the name of the current host system. The hostname is a unique identifier assigned to a machine on a network.

Implementation:





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9. pathping

Description:

The pathping command in Windows is a network diagnostic tool that combines the features of ping and tracert. It provides detailed information about network latency and packet loss along the route from the source to the destination. This tool is particularly useful for identifying problematic routers or links in a network path.

No.	Option	Description
1	-h maximum_hops	Maximum number of hops to search for target.
2	-n	Do not resolve addresses to hostnames.
3	q num_queries	Number of queries per hop.
4	-w timeout	Wait timeout milliseconds for each reply.
5	-4	Force using IPv4.

Implementation:

pathping www.google.com

pathping –h 5 www.google.com

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pathping –n www.google.com

pathping –q 5 www.google.com

```
EX Command Prompt

C:\Users\i>pathping -q 5 www.google.com

Tracing route to www.google.com [2404:6800:4009:827::2004]
over a maximum of 30 hops:
0 DESKTOP-8583IKB [2409:4080:deb2:751:1408:7c17:ab64:f1b]
1 2409:4080:deb2:751::79
2 * * *

Computing statistics for 1 seconds...
Source to Here This Node/Link

Hop RTT Lost/Sent = Pct Lost/Sent = Pct Address
0 DESKTOP-8583IKB [2409:4080:deb2:751:1408:7c17:ab64:f1b]
1 58ms 0/ 5 = 0% 0/ 5 = 0% 2409:4080:deb2:751::79

Trace complete.

C:\Users\i>
```

pathping –w 3000 www.google.com

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pathping -4 www.google.com

```
EX Command Prompt

C:\Users\i>pathping -4 www.google.com

Tracing route to www.google.com [142.250.192.4]

over a maximum of 30 hops:
0 DESKTOP-85831KB [192.168.142.250]
1 192.168.142.170
2 192.0.0.1
3 * *

Computing statistics for 50 seconds...
Source to Here This Node/Link

Hop RTT Lost/Sent = Pct Lost/Sent = Pct Address
0 DESKTOP-85831KB [192.168.142.250]
0/100 = 0% DESKTOP-85831KB [192.168.142.250]
1 116ms 0/100 = 0% 0/100 = 0% 192.168.142.170
0/100 = 0% 192.168.142.170
1 Trace complete.

C:\Users\i>
```

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10.arp

Description:

The arp (Address Resolution Protocol) command in Windows is used to view and manipulate the ARP cache, which stores mappings of IP addresses to physical MAC addresses. This command is useful for diagnosing network issues and ensuring proper network configuration.

No.	Option	Description
1	-a	Displays current ARP entries by interrogating the currentprotocol 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	-V	Displays current ARP entries in verbose mode. All invalid entries and entries on the loop-back interface will be shown.
3	inet_addr.	Specifies an internet address

Implementation:

> arp

```
:\Users\i>arp
Displays and modifies the IP-to-Physical address translation tables used by
 ddress 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]
                                        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.
                                         Same as -a.
Displays current ARP entries in verbose mode. All invalid entries and entries on the loop-back interface will be shown. Specifies an internet address.
Displays the ARP entries for the network interface specified
    inet_addr
-N if_addr
                                         Displays the ARP entries for the network interface specified by if_addr.

Deletes the host specified by inet_addr. inet_addr may be wildcarded with * to delete all hosts.

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 nermant.
                                          is permanent.
                                         Specifies a physical address.

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.
   eth_addr
if addr
  xample:
  xample:
> arp -s 157.55.85.212   00-aa-00-62-c6-09  ... Adds a static entry.
> arp -a   ... Displays the arp table.
    \Users\i>_
```

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> arp -a

➤ arp –a

arp –a –v