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**Lab Pactical #01**

**Practical Assigment #01:**

*Perform and explain various networking commands listed below :*

1. ipconfig
2. ping
3. getmac
4. systeminfo
5. traceroute /tracert
6. netstat
7. nslookup
8. hostname
9. pathping
10. arp

**1. ipconfig (Internet Protocol Configuration)**

*Description :*

*Ipconfig is a console application designed to run from the windows command prompt. This utility allows you to get the IP address of a windows computer. It also allows some control over your network adapters, IP addresses (DHCP — assigned specifically), even your DNS cache. The output of the default command contains the IP address, network mask, and gateway for all physical and virtual network adapters.*

No.	Option	Description
1	<i>ipconfig/all</i>	<i>This option display the same IP addressing information for each adapter as the default option. Additionally, its displays DNS and WINS settings for each adapter as well as a whole host of additional information.</i>
2	<i>ipconfig/release</i>	<i>This option terminates any active TCP/IP connections on all network adopters and releases those IP addresses for use by other applications. ipconfig/release can be used with specific windows connection names.</i>
3	<i>ipconfig/renew</i>	<i>This option re-establishes TCP/IP connections on all network adapters. As with the release option, ipconfig /renew takes an optional connection name specifier. Both /renew and/releases options only work on clientsconfigured for dynamic (DHCP) addressing.</i>

### Implementation :

```

C:\Users\HP>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

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

Ethernet adapter Ethernet 2:

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

Unknown adapter Local Area Connection:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2402:3a80:16ec:2388:fb82:39aa:2683:fe71
    Temporary IPv6 Address. . . . . : 2402:3a80:16ec:2388:8c85:9512:ba0f:63fa
    Link-local IPv6 Address . . . . . : fe80::78df:9b30:4ae2:af62%6
    IPv4 Address. . . . . : 192.168.45.83
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::2869:7eff:fea3:724f%6
  
```

## 2. ping (Packet Internet Groper)

### Description :

*Ping is used to test the network connectivity between two system. It's a simple way to verify that a computer can communicate with another computer or network device. Ping uses Internet Control Message Protocol (ICMP) for echo request and reply messages to check physical and logical connectivity of machines on on internet.*

No.	Option	Description
1	<i>ping -n [count][hostname)</i>	<i>This option sets the number of ICMP echo request to send, from 1 to 4294967295. The ping command will send 4 default if -n is not used.</i>
2	<i>ping -l [size][hostname)</i>	<i>Use this option to set the size in bytes of the echo request Packet from 32 to 65527. The ping will send a 32-bytes echo request if you don't use the -l option.</i>

3	<code>ping -t [hostname]</code>	Using this option will ping the target until you force it to stop by using <u>CTRL + C</u> . Otherwise it will sent echo requests until do not you press <u>CTRL + C</u> .
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*Implementation :*

```
C:\Users\HP>ping www.google.com

Pinging www.google.com [2404:6800:4009:823::2004] with 32 bytes of data:
Reply from 2404:6800:4009:823::2004: time=58ms
Reply from 2404:6800:4009:823::2004: time=179ms
Reply from 2404:6800:4009:823::2004: time=189ms
Reply from 2404:6800:4009:823::2004: time=202ms

Ping statistics for 2404:6800:4009:823::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 58ms, Maximum = 202ms, Average = 157ms
```

### 3. *getmac (Media Access Control)*

*Description :*

*Getmac is a windows command used to display the Media Access Control (MAC) address for each network adopter in the computer. Using getmac command we could see the address of all media control like bluetooth, wi-fi etc.*

No.	Option	Description
1	<code>getmac /s [hostname]</code>	Specifies the remote system to connect. This can be either on IP address or a host name (do not use backslashes). The default is the local computer.
2	<code>getmac /u [hostname]</code>	Specifies the user context under which the command should execute. The default is the permissions of the current logged on user on the computer issuing the command.
3	<code>getmac /fo [format]</code>	Specifies the format in which the output is to be displayed. Valid format values: "TABLE", "LIST", "CSV". default is Table.

*Implementation :*

```

C:\Users\HP>getmac /v

Connection Name Network Adapter Physical Address Transport Name
=====
Ethernet        Realtek Gaming C8-5A-CF-A6-1A-FE Media disconnected
Ethernet 2      ExpressVPN TAP 00-FF-6B-8F-1B-BC Media disconnected
Local Area Conn ExpressVPN Wint N/A Media disconnected
Wi-Fi           Realtek RTL8852 14-13-33-0D-F1-FB \Device\Tcpip_{382760FE-BBCB-4CA1-A3E5-81A17DD15B4A}

C:\Users\HP>

```

### 4. systeminfo (System Information)

#### Description :

This command displays detailed configuration information about a computer and its operating system, including operating system configuration, security information, product ID and hardware properties (such as RAM, disk space and network cards).

No.	Option	Description
1	<code>systeminfo /s [hostname]</code>	Specifies the name or IP address of a remote computer (do not use backslashes). The default is the local computer.
1	<code>systeminfo /p [hostname]</code>	Specifies the password of the user account that is specified in the /u parameter.
3	<code>systeminfo /fo [format]</code>	Specifies the format in which the output is to be displayed. Valid format values: "TABLE", "LIST", "CSV". default is List.

#### Implementation :

,

```

C:\Users\HP>systeminfo

Host Name:                DIVYANK
OS Name:                  Microsoft Windows 11 Home Single Language
OS Version:               10.0.22621 N/A Build 22621
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:         HP
Registered Organization:   HP
Product ID:                00356-24523-73194-AAOEM
Original Install Date:     09-10-2022, 08:10:38
System Boot Time:          09-07-2023, 00:05:13
System Manufacturer:       HP
System Model:              HP Pavilion Gaming Laptop 15-ec2xxx
System Type:               x64-based PC
Processor(s):               1 Processor(s) Installed.
                           [01]: AMD64 Family 25 Model 80 Stepping 0 AuthenticAMD ~3301 Mhz
BIOS Version:              AMI F.24, 22-02-2023
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
  
```

### 5. *tracert/tracert (Trace Route)*

#### *Description :*

*The tracert command is a Command Prompt command that's used to show several details about the path that a packet takes from the computer or device you are on to whatever destination you specify.*

*You might also sometimes see the tracert command referred to as the trace route Command or traceroute command.*

No.	Option	Description
1	<i>tracert -d [hostname]</i>	<i>This option prevents tracers from resolving IP addresses to hostnames, often resulting in much faster results..</i>
2	<i>tracert -h [number of hops] [hostname]</i>	<i>This tracert option specifies the maximum number of hops in the search for the target. If you do not specify MaxHops, and a target has not been found by 30 hops, tracers will stop looking.</i>
3	<i>tracert -w [mili-seconds] [hostname]</i>	<i>You can specify the time, in milliseconds, to allow each reply before timeout using this tracers option.</i>

## Implementation :

```

C:\Users\HP>tracert www.google.com

Tracing route to www.google.com [2404:6800:4009:826::2004]
over a maximum of 30 hops:

  1  55 ms    1 ms     1 ms    2402:3a80:16ec:2388::80
  2  189 ms   101 ms   101 ms   2402:3a80:16ec:2388:0:39:729:3440
  3  194 ms   101 ms   101 ms   fd00:abcd:abcd:129::1
  4  *        159 ms   15 ms    fd00:169:254:41::1
  5  391 ms   101 ms   14 ms    2400:5200:1400:82::2
  6  339 ms   101 ms   101 ms   2402:6800:760:7::72
  7  116 ms   102 ms   101 ms   2001:4860:1:1::fe8
  8  107 ms   101 ms   100 ms   2404:6800:8114::1
  9  404 ms   100 ms   *        2001:4860:0:1::4fec
 10  102 ms   103 ms   100 ms   2001:4860:0:1::5429
 11  108 ms   101 ms   101 ms   bom07s33-in-x04.1e100.net [2404:6800:4009:826::2004]

Trace complete.

```

## 6. netstat (Network Statistics)

### Description :

The netstat command generates displays that show network <notes and protocol statistics. You can display the status of TCP and UDP endpoints in table format, routing table information and interface information. its used to display very detailed information about how your computer is communicating with other computers or network devices. Since netstat is a cross-platform command, it's also available in other operating systems like macOS and Linux.

No.	OptiOn	Description
1	netstat -a	This switch displays active TCP connections, TCP connections with the listening state, as well as UDP ports that are being listened to.
2	netstat -o	A handy option /or many troubleshooting tasks, the -o switch displays the process identifier(PID) ossoc/ored with each displayed connection.
3	netstat -r	Execute netstat with -r to show the IP routing table. This is the same as using the route command to execute route print.

### Implementation :

```

Command Prompt

C:\Users\HP>netstat

Active Connections

Proto Local Address           Foreign Address         State
TCP    127.0.0.1:49669          Divyank:49670           ESTABLISHED
TCP    127.0.0.1:49670          Divyank:49669           ESTABLISHED
TCP    127.0.0.1:49671          Divyank:49672           ESTABLISHED
TCP    127.0.0.1:49672          Divyank:49671           ESTABLISHED
TCP    192.168.45.83:49378      static:https            ESTABLISHED
TCP    192.168.45.83:64917      relay-fcac249d:https    ESTABLISHED
TCP    [2402:3a80:16ec:2388:8c85:9512:ba0f:63fa]:49375 [64:ff9b::9d5a:d2d0]:https ESTABLISHED
TCP    [2402:3a80:16ec:2388:8c85:9512:ba0f:63fa]:49379 [64:ff9b::8ac9:c25a]:https CLOSE_WAIT
TCP    [2402:3a80:16ec:2388:8c85:9512:ba0f:63fa]:49380 [64:ff9b::8ac9:c25a]:https CLOSE_WAIT
TCP    [2402:3a80:16ec:2388:8c85:9512:ba0f:63fa]:64913 [64:ff9b::14c6:7754]:https ESTABLISHED
TCP    [2402:3a80:16ec:2388:8c85:9512:ba0f:63fa]:65391 se-in-f188:5228         ESTABLISHED
  
```

## 7. nslookup (Name Server Lookup)

### Description :

Microsoft Windows includes a tool called NSLOOKUP that you can use via the command prompt. This tool can be used to check DNS records propagation and resolution using different servers and perform other troubleshooting steps. NSLOOKUP can be use in interactive and non-interactive mode.

Its used to find the IP address of o host, domain name of an IP address and mail servers for a domain.

No.	Option	Description
1	nslookup finger	Connects with the finger server on the current computer.
2	nslookup ls	Lists information for a DNS domain.
3	nslookup root	Changes the default server to the server for the root of the DNS domain name space.

*Implementation :*



```
Command Prompt
C:\Users\HP>nslookup www.google.com
Server: UnKnown
Address: 192.168.45.196

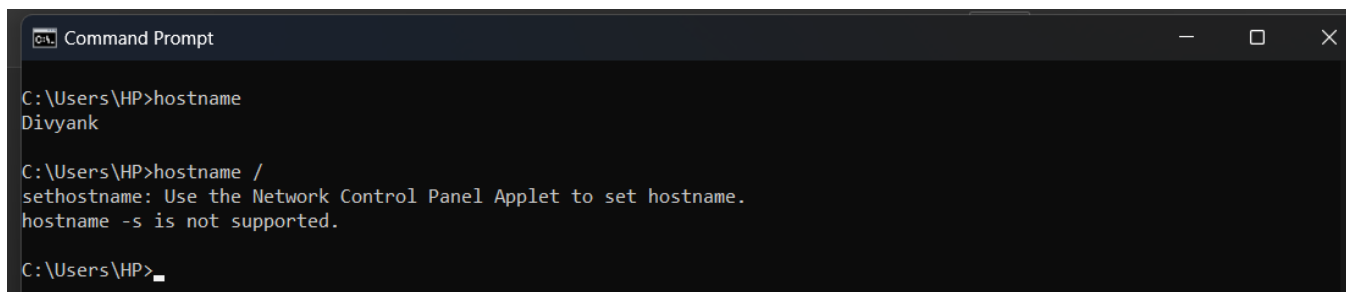
Non-authoritative answer:
Name: www.google.com
Addresses: 2404:6800:4009:826::2004
          142.250.183.196
```

### 8. *hostname*

*Description :*

*Prints the name of the current host of the specific device.*

*Implementation :*



```
Command Prompt
C:\Users\HP>hostname
Divyank

C:\Users\HP>hostname /s
sethostname: Use the Network Control Panel Applet to set hostname.
hostname -s is not supported.

C:\Users\HP>
```



## 9. pathping

### Description :

Provides information about network latency and network loss at intermediate hops between a source and destination. This command sends multiple echo Request messages to each router between a source and destination, over a period of time, and then computes results based on the packets returned from each router. Because this command displays the degree of packet loss at any given router or link, you can determine which routers or subnets might be having network problems. Used without parameters, this command displays help.

No.	Option	Description
1	<i>Pathping /n [hostname]</i>	Prevents pathping from attempting to resolve t/ie IP addresses of intermediate routers to their names. This might expedite the display of pathping results.
2	<i>pathping /q [hostname]</i>	Specifies the number of echo Request messages sent to each router in the path. The default is 100 queries.
3	<i>pathping /h [hostname]</i>	Specifies the maximum number of hops in the path to search for the target (destination). The default is 30 hops.

### Implementation :

```
Command Prompt

C:\Users\HP>pathping www.google.com

Tracing route to www.google.com [2404:6800:4009:826::2004]
over a maximum of 30 hops:
 0  Divyank [2402:3a80:16ec:2388:8c85:9512:ba0f:63fa]
 1  2402:3a80:16ec:2388::80
 2  2402:3a80:16ec:2388:0:39:729:3440
 3  fd00:abcd:abcd:129::1
 4  fd00:169:254:41::1
 5  2400:5200:1400:82::2
 6  2402:6800:760:7::72
 7  2001:4860:1:1::fe8
 8  2404:6800:8114::1
 9  *      2001:4860:0:1::4fec
10  2001:4860:0:1::5429
11  bom07s33-in-x04.1e100.net [2404:6800:4009:826::2004]
```

## 10. ARP (Local Address Resolution Protocol)

### **Description :**

Display and modifies entries in the Address Resolution Protocol (ARP) cache. The ARP cache contains one or more tables that are used to store IP addresses and their resolved Ethernet or Token Ring physical addresses. There is a separate table for each Ethernet or Token Ring network adapter installed on your computer. Used without parameters, arp displays help information.

No.	Opt7on	Description
1	arp -a	Displays current ARP entries by interrogating the current protocol data. If inet_addr is specified, the IP and Physical for only the specified computer are displayed. If more than one network interface uses ARP, entries for each ARP table are displayed.
2	arp -v	Displays current ARP entries in verbose mode. AJ/ invalid entries and entries on the loop-back interface will be shown.
3	arp -s	Adds the host and associates the Internet address inet_addr with the Physical address eth_addr. The Physical address is as 6 hexadecimal bytes separated by hyphens. The entry permanent.

### **Implementation :**

```
Command Prompt
C:\Users\HP>arp -a
Interface: 192.168.45.83 --- 0x6
Internet Address      Physical Address      Type
192.168.45.196        2a-69-7e-a3-72-4f    dynamic
192.168.45.255        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
239.255.102.18        01-00-5e-7f-66-12    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static
```