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Batch: S23 Network Lab

Assignment No. 1 Basic Networking Commands for Windows and Linux OS.

Aim : All 17 networking commands with description and appropriate options.

1.IPCONFIG

Syntax : ipconfig

Description :

IPCONFIG stands for INTERNET PROTOCOL CONFIGURATION .

ipconfig provides information about a computer's IP address, subnet mask, default gateway, DNS servers, MAC address, and connection-specific DNS suffix. It is a command-line utility in Windows, offering details on network configuration.

```
C:\Users\hp>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

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

Ethernet adapter Ethernet 2:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::fe35:7ced:3cda:6b66%21
   IPv4 Address. . . . . . . . . . . : 192.168.0.103
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.0.1

Ethernet adapter Bluetooth Network Connection:

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

The ipconfig command in Windows has several options that you can use to customize its output and gather specific information. Some options include:

A.ipconfig/all

Description : Displays detailed configuration information for all network interfaces, including DNS settings, DHCP information, and more.

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

Windows IP Configuration

   Host Name . . . . . . . . . . . . : LAPTOP-CD6EFDOA
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Hybrid
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . : SVV.local
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : BC-E9-2F-BF-62-BB
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : ExpressVPN TAP Adapter
   Physical Address. . . . . . . . . : 00-FF-6F-1D-B7-DA
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : F8-AC-65-03-B9-35
   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. . . . . . . . . : FA-AC-65-03-B9-34
   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. . . . . . . . . : F8-AC-65-03-B9-34
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::fe35:7ced:3cda:6b66%21(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.0.103(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 03 February 2024 12:03:26
   Lease Expires . . . . . . . . . . : 03 February 2024 15:26:33
   Default Gateway . . . . . . . . . : 192.168.0.1
   DHCP Server . . . . . . . . . . . : 192.168.0.1
   DHCPv6 IAID . . . . . . . . . . . : 335064165
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-26-80-BB-18-BC-E9-2F-BF-62-BB
   DNS Servers . . . . . . . . . . . : 192.168.0.1
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : F8-AC-65-03-B9-38
   DHCP Enabled. . . . . . . . . . . : Yes
```

b.ipconfig/renew.

Description :Renews the IP address for all network interfaces.

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

Windows IP Configuration

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

Ethernet adapter Ethernet:

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

Ethernet adapter Ethernet 2:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::fe35:7ced:3cda:6b66%21
   IPv4 Address. . . . . . . . . . . : 192.168.0.103
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.0.1

Ethernet adapter Bluetooth Network Connection:

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

c.ipconfig/release

Description : Releases the currently assigned IP address for all network interfaces.

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

Windows IP Configuration

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

Ethernet adapter Ethernet:

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

Ethernet adapter Ethernet 2:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::fe35:7ced:3cda:6b66%21
   Default Gateway . . . . . . . . . :

Ethernet adapter Bluetooth Network Connection:

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

d.ipcongig/release6

Description : releases the IPV6 address

```
C:\Users\hp>ipconfig/release6

Windows IP Configuration

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

Ethernet adapter Ethernet:

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

Ethernet adapter Ethernet 2:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::fe35:7ced:3cda:6b66%21
   IPv4 Address. . . . . . . . . . . : 192.168.0.103
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.0.1

Ethernet adapter Bluetooth Network Connection:

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

f.ipconfig/dispalydns

Description : Shows the contents of the DNS client resolver cache.

```
C:\Users\hp>ipconfig/displaydns

Windows IP Configuration

    ssl.gstatic.com
    ----------------------------------------
    Record Name . . . . . : ssl.gstatic.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 118
    Data Length . . . . . : 4
    Section . . . . . . . : Answer
    A (Host) Record . . . : 142.250.183.99


    mtalk.google.com
    ----------------------------------------
    Record Name . . . . . : mtalk.google.com
    Record Type . . . . . : 5
    Time To Live  . . . . : 108
    Data Length . . . . . : 8
    Section . . . . . . . : Answer
    CNAME Record  . . . . : mobile-gtalk.l.google.com


    Record Name . . . . . : mobile-gtalk.l.google.com
    Record Type . . . . . : 1
    Time To Live  . . . . : 108
    Data Length . . . . . : 4
    Section . . . . . . . : Answer
    A (Host) Record . . . : 74.125.200.188
```

2.ifconfig

Description : The command ifconfig stands for interface configurator. This command enables us to initialize an interface, assign IP address, enable or disable an interface. It display route and network interface.You can view IP address, MAC address and MTU (Maximum Transmission Unit) with ifconfig command.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ifconfig
enp4s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.141  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 fe80::4ed1:4a9b:4a19:c19a  prefixlen 64  scopeid 0x20<link>
        ether f4:39:09:49:6c:fc  txqueuelen 1000  (Ethernet)
        RX packets 118  bytes 13265 (13.2 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 91  bytes 13130 (13.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 200  bytes 18896 (18.8 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 200  bytes 18896 (18.8 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lab1003@lab1003-HP-280-G4-MT-Business-PC:~$
```

To find IP address of all three differently, use command ifconfig eth0 ifconfig lo ifconfig wlan0

3.nslookup

Description: nslookup is a command-line tool for querying DNS servers, retrieving information such as IP addresses or mail server details for a given domain. It is commonly used for troubleshooting DNS issues, verifying proper DNS configuration, and conducting reverse DNS lookups. Users can test connectivity and diagnose network problems by querying DNS information with nslookup in the command prompt or terminal.

A.nslookup <url>

```
C:\Users\hp>nslookup
Default Server:  UnKnown
Address:  192.168.0.1

> www.tsec.org
Server:  UnKnown
Address:  192.168.0.1

Non-authoritative answer:
Name:    tsec.org
Addresses:  3.33.130.190
          15.197.148.33
Aliases:  www.tsec.org

> www.google.com
Server:  UnKnown
Address:  192.168.0.1

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

B.nslookup<IP_adress>

Performs revers lookup of the ip address and returns the corresponding domain name(if available)

```
C:\Users\hp>nslookup 172.217.174.68
Server:  UnKnown
Address:  192.168.0.1

Name:    bom07s25-in-f4.1e100.net
Address:  172.217.174.68
```

4.ip

Description :Linux IP command is the newer version of the ifconfig command. It is a handy tool for configuring the network interfaces for Linux administrators. It can be used to assign and remove addresses, take the interfaces up or down, and much more useful tasks.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ip
Usage: ip [ OPTIONS ] OBJECT { COMMAND | help }
       ip [ -force ] -batch filename
where  OBJECT := { link | address | addrlabel | route | rule | neigh | ntable |
                   tunnel | tuntap | maddress | mroute | mrule | monitor | xfrm |
                   netns | l2tp | fou | macsec | tcp_metrics | token | netconf | ila |
                   vrf | sr }
       OPTIONS := { -V[ersion] | -s[tatistics] | -d[etails] | -r[esolve] |
                    -h[uman-readable] | -iec |
                    -f[amily] { inet | inet6 | ipx | dnet | mpls | bridge | link } |
                    -4 | -6 | -I | -D | -B | -0 |
                    -l[oops] { maximum-addr-flush-attempts } | -br[ief] |
                    -o[neline] | -t[imestamp] | -ts[hort] | -b[atch] [filename] |
                    -rc[vbuf] [size] | -n[etns] name | -a[ll] | -c[olor]}
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$
```

5.ping

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

```
C:\Users\hp>ping www.tsec.org

Pinging tsec.org [3.33.130.190] with 32 bytes of data:
Reply from 3.33.130.190: bytes=32 time=3ms TTL=246
Reply from 3.33.130.190: bytes=32 time=11ms TTL=246
Reply from 3.33.130.190: bytes=32 time=2ms TTL=246
Reply from 3.33.130.190: bytes=32 time=2ms TTL=246

Ping statistics for 3.33.130.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 11ms, Average = 4ms

C:\Users\hp>ping www.google.com

Pinging www.google.com [172.217.174.68] with 32 bytes of data:
Reply from 172.217.174.68: bytes=32 time=3ms TTL=118
Reply from 172.217.174.68: bytes=32 time=3ms TTL=118
Reply from 172.217.174.68: bytes=32 time=3ms TTL=118
Reply from 172.217.174.68: bytes=32 time=4ms TTL=118

Ping statistics for 172.217.174.68:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 4ms, Average = 3ms
```

6.tracepath

It is similar to traceroute command, but it doesn't require root privileges. By default, it is installed in Ubuntu but you may have to download traceroute on Ubuntu. It traces the network path of the specified destination and reports each hop along the path. If you have a slow network then tracepath will show you where your network is weak.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ tracepath www.google.com
 1?: [LOCALHOST]                      pmtu 1500
 1:  _gateway                                              0.711ms
 1:  _gateway                                              0.612ms
 2:  no reply
 3:  no reply
 4:  no reply
 5:  no reply
 6:  no reply
 7:  no reply
 8:  no reply
 9:  no reply
10:  no reply
11:  no reply
12:  no reply
13:  no reply
14:  no reply
15:  no reply
16:  no reply
17:  no reply
18:  no reply
19:  no reply
20:  no reply
21:  no reply
22:  no reply
23:  no reply
24:  no reply
25:  no reply
26:  no reply
27:  no reply
28:  no reply
29:  no reply
30:  no reply
     Too many hops: pmtu 1500
     Resume: pmtu 1500
```

7.tracert

tracert, short for "traceroute," is a command-line utility used to trace the route that packets take to reach a destination on a computer network. It shows the sequence of routers or hops that data packets traverse from the source to the specified destination, providing information on the time it takes for each hop. tracert is valuable for diagnosing network connectivity issues and identifying bottlenecks by revealing the path and potential delays between the source and destination. To use it, enter "tracert" followed by the destination address or domain name in the Command Prompt or terminal

```
C:\Users\hp>tracert google.com

Tracing route to google.com [142.250.192.142]
over a maximum of 30 hops:

  1     1 ms     1 ms    10 ms  192.168.0.1
  2   208 ms     2 ms     3 ms  172.25.4.7
  3     8 ms     *        *     172.25.4.1
  4     *        8 ms     *     172.16.2.202
  5    11 ms     7 ms     3 ms  175.100.188.22
  6    16 ms     8 ms     7 ms  172.253.69.227
  7    12 ms     *      244 ms  142.250.238.81
  8     5 ms     4 ms     4 ms  bom12s18-in-f14.1e100.net [142.250.192.142]

Trace complete.
```

8.netstart

The netstat command is a command-line utility used to display information about network connections, routing tables, interface statistics, masquerade connections, and more on a computer. It provides details about open ports, active network connections, and listening sockets. netstat is valuable for diagnosing network issues, identifying active connections, and monitoring network activity. You can use parameters such as "-a" to display all connections and listening ports or "-n" to show numerical addresses.

```
C:\Users\hp>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49684        LAPTOP-CD6EFDOA:49685  ESTABLISHED
  TCP    127.0.0.1:49685        LAPTOP-CD6EFDOA:49684  ESTABLISHED
  TCP    127.0.0.1:49686        LAPTOP-CD6EFDOA:49687  ESTABLISHED
  TCP    127.0.0.1:49687        LAPTOP-CD6EFDOA:49686  ESTABLISHED
  TCP    127.0.0.1:49719        LAPTOP-CD6EFDOA:49720  ESTABLISHED
  TCP    127.0.0.1:49720        LAPTOP-CD6EFDOA:49719  ESTABLISHED
  TCP    127.0.0.1:49721        LAPTOP-CD6EFDOA:49722  ESTABLISHED
  TCP    127.0.0.1:49722        LAPTOP-CD6EFDOA:49721  ESTABLISHED
  TCP    127.0.0.1:49723        LAPTOP-CD6EFDOA:49724  ESTABLISHED
  TCP    127.0.0.1:49724        LAPTOP-CD6EFDOA:49723  ESTABLISHED
  TCP    127.0.0.1:49725        LAPTOP-CD6EFDOA:49726  ESTABLISHED
  TCP    127.0.0.1:49726        LAPTOP-CD6EFDOA:49725  ESTABLISHED
  TCP    192.168.0.103:51815    li695-222:https        ESTABLISHED
  TCP    192.168.0.103:51824    li781-4:https          ESTABLISHED
  TCP    192.168.0.103:52405    20.212.88.117:https    ESTABLISHED
  TCP    192.168.0.103:63850    52.123.168.210:https   ESTABLISHED
  TCP    192.168.0.103:64649    52.114.44.79:https     ESTABLISHED
  TCP    192.168.0.103:64655    20.198.119.143:https   ESTABLISHED
  TCP    192.168.0.103:64785    whatsapp-cdn-shv-01-bom2:https  ESTABLISHED
  TCP    192.168.0.103:64786    whatsapp-cdn-shv-01-bom1:https  ESTABLISHED
  TCP    192.168.0.103:64787    whatsapp-cdn-shv-01-bom1:https  ESTABLISHED
  TCP    192.168.0.103:64788    whatsapp-cdn-shv-01-bom2:https  ESTABLISHED
  TCP    192.168.0.103:64789    whatsapp-cdn-shv-01-maa2:https  ESTABLISHED
  TCP    192.168.0.103:64790    whatsapp-cdn-shv-02-maa2:https  ESTABLISHED
  TCP    192.168.0.103:64818    bom07s31-in-f10:https  ESTABLISHED
  TCP    192.168.0.103:64832    sl-in-f188:5228        ESTABLISHED
  TCP    192.168.0.103:64833    bom12s09-in-f10:https  ESTABLISHED
  TCP    192.168.0.103:64834    bom12s09-in-f10:https  ESTABLISHED
  TCP    192.168.0.103:64835    162.247.243.29:https   ESTABLISHED
  TCP    192.168.0.103:64841    whatsapp-chatd-edge-shv-02-bom2:https  FIN_WAIT_2
  TCP    192.168.0.103:64842    103.226.191.225:https  ESTABLISHED
  TCP    192.168.0.103:64843    bom12s18-in-f5:https   ESTABLISHED
```

9.wget

wget is a command-line utility for non-interactive downloading of files from the web. It is widely used on Unix-like operating systems, including Linux. With wget, you can retrieve files using various protocols such as HTTP, HTTPS, FTP, and FTPS. Some common use cases include downloading files, mirroring entire websites, and fetching content for automated tasks or scripts. To use wget, you typically enter a command like wget [URL] in the terminal, where [URL] represents the web address of the file you want to download

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ wget www.geeksforgeeks.com
--2024-02-02 15:57:11--  http://www.geeksforgeeks.com/
Resolving www.geeksforgeeks.com (www.geeksforgeeks.com)... 199.59.243.225
Connecting to www.geeksforgeeks.com (www.geeksforgeeks.com)|199.59.243.225|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1066 (1.0K) [text/html]
Saving to: 'index.html.1'

index.html.1                      100%[=================================================================>]   1.04K  --.-KB/s    in 0s

2024-02-02 15:57:12 (40.6 MB/s) - 'index.html.1' saved [1066/1066]
```

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ wget www.google.com
--2024-02-02 15:52:48--  http://www.google.com/
Resolving www.google.com (www.google.com)... 172.217.27.196, 2404:6800:4009:800::2004
Connecting to www.google.com (www.google.com)|172.217.27.196|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [text/html]
Saving to: 'index.html'

index.html                          [ <=>                                                ]  19.98K  --.-KB/s    in 0s

2024-02-02 15:52:48 (77.1 MB/s) - 'index.html' saved [20464]
```

10.dig

dig, which stands for Domain Information Groper, is a command-line utility for querying Domain Name System (DNS) servers. It is commonly used on Unixlike operating systems, including Linux. dig provides detailed information about DNS queries and can be used to retrieve various types of DNS records such as A (IPv4 address), AAAA (IPv6 address), MX (mail exchange), and others. It's a versatile tool for troubleshooting DNS-related issues, checking DNS configurations, and obtaining DNS information for domain names

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ dig

; <<>> DiG 9.11.3-1ubuntu1.18-Ubuntu <<>>
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: SERVFAIL, id: 31634
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;.                              IN      NS

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Feb 02 15:45:01 IST 2024
;; MSG SIZE  rcvd: 28
```

11.hostname

The hostname command is a command-line utility that provides the hostname of the current system. On Unix-like operating systems (including Linux and macOS) and Windows, using the hostname command without any options typically displays the host or computer name assigned to that system.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ hostname
lab1003-HP-280-G4-MT-Business-PC
```

```
C:\Users\hp>hostname
LAPTOP-CD6EFDOA
```

12.arp

The arp command is a network utility available on various operating systems, including Windows and Unix-like systems. It stands for Address Resolution Protocol and is used to display and manipulate the ARP cache, which is a table that maps IP addresses to MAC addresses on a local network.

The ARP command is useful for troubleshooting and verifying connectivity at the link layer of the OSI model. It helps in identifying and resolving issues related to MAC address resolution on a local network.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ arp
Address                  HWtype  HWaddress           Flags Mask            Iface
_gateway                 ether   10:27:f5:a9:23:47   C                     enp4s0
```

```
C:\Users\hp>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.

C:\Users\hp>
```

13.ss

The ss command is a utility for investigating sockets in Unix-like operating systems, providing information about network connections, listening ports, and socket statistics. It is often used as an alternative to the older netstat command.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ ss
Netid      State       Recv-Q      Send-Q                                Local Address:Port                  Peer Address:Port
u_str      ESTAB       0           0                                                 * 47439                            * 43957
u_str      ESTAB       0           0                                                 * 50450                            * 49490
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 31278                            * 34918
u_str      ESTAB       0           0                                                 * 32896                            * 31949
u_str      ESTAB       0           0                                                 * 29270                            * 26521
u_str      ESTAB       0           0                            @/tmp/.X11-unix/X0 38531                            * 41184
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 32075                            * 34955
u_str      ESTAB       0           0                                                 * 31096                            * 31809
u_str      ESTAB       0           0                  /var/run/dbus/system_bus_socket 34035                            * 32105
u_str      ESTAB       0           0                                                 * 30566                            * 30567
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 32888                            * 33944
u_str      ESTAB       0           0                                                 * 29474                            * 31898
u_str      ESTAB       0           0                                                 * 30099                            * 30100
u_str      ESTAB       0           0                  /var/run/dbus/system_bus_socket 26319                            * 28027
u_str      ESTAB       0           0                  /var/run/dbus/system_bus_socket 26803                            * 19433
u_str      ESTAB       0           0                                                 * 22277                            * 20461
u_seq      ESTAB       0           0                                                 * 39411                            * 39410
u_str      ESTAB       0           0                            /run/user/1000/bus 37199                            * 33264
u_str      ESTAB       0           0                  /var/run/dbus/system_bus_socket 32897                            * 34863
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 25434                            * 27637
u_str      ESTAB       0           0                                                 * 27275                            * 28503
u_str      ESTAB       0           0                            /run/user/121/bus 26371                            * 24993
u_str      ESTAB       0           0                                                 * 24924                            * 27934
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 23672                            * 19089
u_str      ESTAB       0           0                  /var/run/dbus/system_bus_socket 43960                            * 47441
u_seq      ESTAB       0           0                                                 * 34648                            * 34647
u_str      ESTAB       0           0                                                 * 34921                            * 32005
u_str      ESTAB       0           0                                                 * 29264                            * 25379
u_str      ESTAB       0           0                                                 * 25355                            * 28464
u_str      ESTAB       0           0                                                 * 41163                            * 41162
u_str      ESTAB       0           0                  /var/run/dbus/system_bus_socket 34026                            * 34968
u_str      ESTAB       0           0                                                 * 31092                            * 31091
u_str      ESTAB       0           0                                                 * 48311                            * 50483
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 34872                            * 33968
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 31903                            * 33854
u_str      ESTAB       0           0                                                 * 29471                            * 32811
u_str      ESTAB       0           0                                                 * 30102                            * 25393
u_str      ESTAB       0           0                            /run/user/121/bus 28794                            * 27816
u_str      ESTAB       0           0                     /run/systemd/journal/stdout 34265                            * 35436
```

14.route

The route command is a network utility used to display or manipulate the IP routing table on Unix-like operating systems, including Linux. The routing table is a key component of a computer's network configuration, specifying how network packets should be forwarded to their destination.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         _gateway        0.0.0.0         UG    100    0        0 enp4s0
link-local      0.0.0.0         255.255.0.0     U     1000   0        0 enp4s0
192.168.1.0     0.0.0.0         255.255.255.0   U     100    0        0 enp4s0
```

```
C:\Users\hp>route

Manipulates network routing tables.

ROUTE [-f] [-p] [-4|-6] command [destination]
                  [MASK netmask]  [gateway] [METRIC metric]  [IF interface]

  -f            Clears the routing tables of all gateway entries.  If this is
                used in conjunction with one of the commands, the tables are
                cleared prior to running the command.

  -p            When used with the ADD command, makes a route persistent across
                boots of the system. By default, routes are not preserved
                when the system is restarted. Ignored for all other commands,
                which always affect the appropriate persistent routes.

  -4            Force using IPv4.

  -6            Force using IPv6.

  command       One of these:
                  PRINT     Prints  a route
                  ADD       Adds    a route
                  DELETE    Deletes a route
                  CHANGE    Modifies an existing route
  destination   Specifies the host.
  MASK          Specifies that the next parameter is the 'netmask' value.
  netmask       Specifies a subnet mask value for this route entry.
                If not specified, it defaults to 255.255.255.255.
  gateway       Specifies gateway.
  interface     the interface number for the specified route.
  METRIC        specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database
file NETWORKS. The symbolic names for gateway are looked up in the host name
database file HOSTS.

If the command is PRINT or DELETE. Destination or gateway can be a wildcard,
(wildcard is specified as a star '*'), or the gateway argument may be omitted.

If Dest contains a * or ?, it is treated as a shell pattern, and only
matching destination routes are printed. The '*' matches any string,
and '?' matches any one char. Examples: 157.*.1, 157.*, 127.*, *224*.

Pattern match is only allowed in PRINT command.
Diagnostic Notes:
    Invalid MASK generates an error, that is when (DEST & MASK) != DEST.
    Example> route ADD 157.0.0.0 MASK 155.0.0.0 157.55.80.1 IF 1
             The route addition failed: The specified mask parameter is invalid. (Destination & Mask) != Destination.

Examples:

    > route PRINT
    > route PRINT -4
    > route PRINT -6
    > route PRINT 157*            .... Only prints those matching 157*

    > route ADD 157.0.0.0 MASK 255.0.0.0  157.55.80.1 METRIC 3 IF 2
              destination^      ^mask      ^gateway     metric^    ^
                                                        Interface^
      If IF is not given, it tries to find the best interface for a given
      gateway.
    > route ADD 3ffe::/32 3ffe::1

    > route CHANGE 157.0.0.0 MASK 255.0.0.0 157.55.80.5 METRIC 2 IF 2

      CHANGE is used to modify gateway and/or metric only.

    > route DELETE 157.0.0.0
    > route DELETE 3ffe::/32

C:\Users\hp>
```

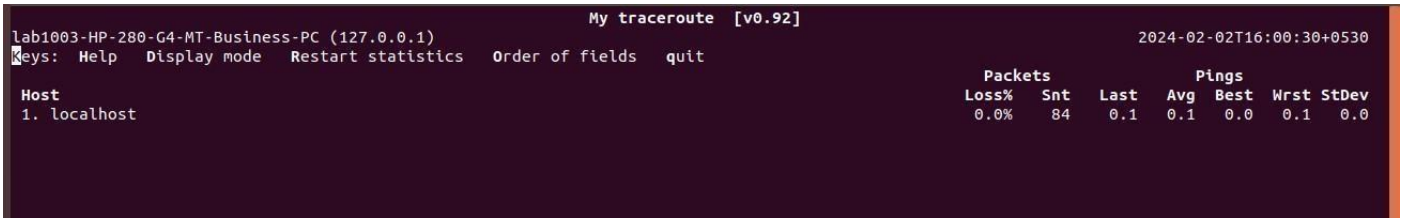
15.host

The host command is a utility used to perform Domain Name System (DNS) lookups and retrieve information about domain names or IP addresses. It is available on Unix-like operating systems, including Linux.

```
lab1003@lab1003-HP-280-G4-MT-Business-PC:~$ host
Usage: host [-aCdilrTvVw] [-c class] [-N ndots] [-t type] [-W time]
            [-R number] [-m flag] hostname [server]
       -a is equivalent to -v -t ANY
       -c specifies query class for non-IN data
       -C compares SOA records on authoritative nameservers
       -d is equivalent to -v
       -i IP6.INT reverse lookups
       -l lists all hosts in a domain, using AXFR
       -m set memory debugging flag (trace|record|usage)
       -N changes the number of dots allowed before root lookup is done
       -r disables recursive processing
       -R specifies number of retries for UDP packets
       -s a SERVFAIL response should stop query
       -t specifies the query type
       -T enables TCP/IP mode
       -v enables verbose output
       -V print version number and exit
       -w specifies to wait forever for a reply
       -W specifies how long to wait for a reply
       -4 use IPv4 query transport only
       -6 use IPv6 query transport only
```

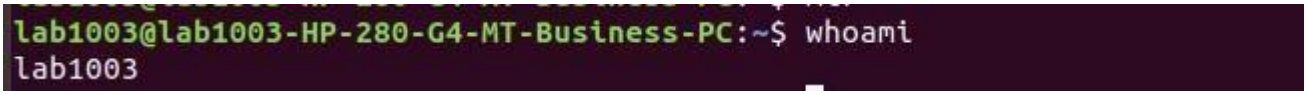
16.mtr

The mtr command, which stands for "My Traceroute," is a network diagnostic tool that combines the functionalities of traceroute and ping. It provides a continuous traceroute by sending packets to each hop on the route to a destination and measuring the response times. mtr is available on Unix-like operating systems, including Linux.



17.whoami

The whoami command is a simple command-line utility that prints the username associated with the current user who is executing the command. When you run whoami in a terminal or command prompt, it returns the username of the user logged in or executing the session.



CONCLUSION : problems and ensure smooth communication within a network infrastructure. configure network settings. With this newfound knowledge, we can effectively diagnose basic network ipconfig (or ifconfig on macOS/Linux), allowing you to verify connectivity, identify network paths, and navigating and troubleshooting network issues. We explored essential commands like ping, traceroute, and The network assignment on basic networking commands equips you with a foundational skillset for

BASED ON LO1 : To get familiar with the basic network administration commands