BASIC NETWORKING AND TROUBLESHOOTING COMMANDS

CSE1004(NETWORK AND COMMUNICATION)LAB:L53-L54

JANUARY 9, 2022
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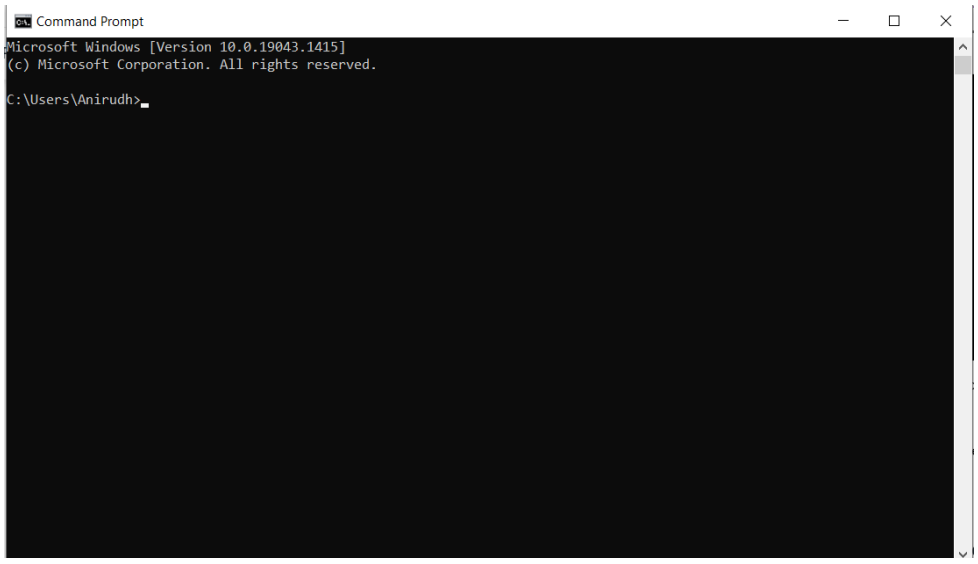
QUESTION:

Executing Basic Networking and Troubleshooting Commands and getting inference from it.

PROCEDURE:

- ➔ First open your preferred Command Prompt(Terminal) in Admin Mode
- ➔ Command Prompt Used: Hyper Terminal (Admin mode) / Default Command Prompt(Windows)



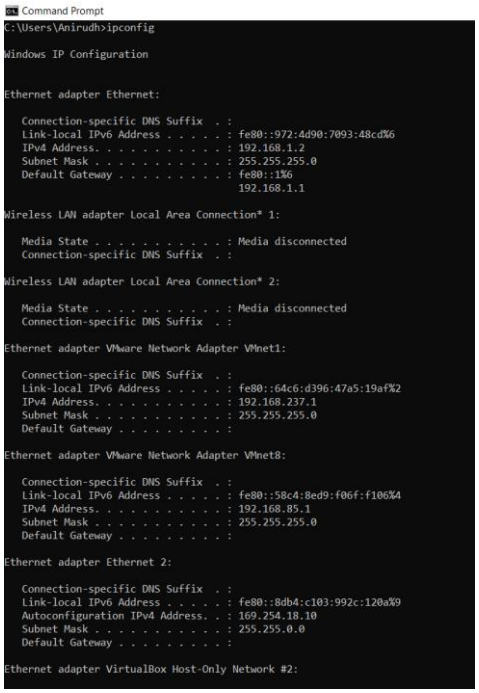
- ➔ Get to your default home directory or main directory
- ➔ Try executing basic networking commands
- ➔ you can only type one command per line, and press Enter after each one to execute it.

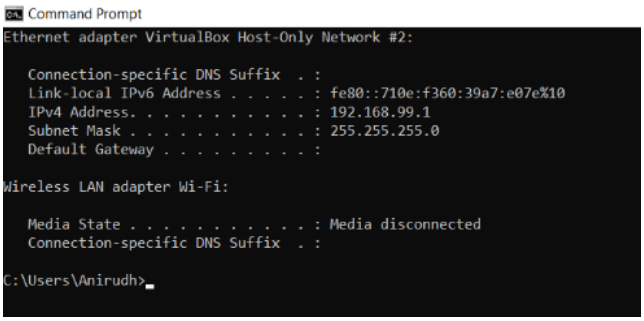
RUNTIME EXECUTION:

1. COMMAND NAME: ipconfig

DESCRIPTION: IPCONFIG stands for **Internet Protocol Configuration**. This is a command-line application which displays all the current TCP/IP (Transmission Control Protocol/Internet Protocol) network configuration, refreshes the DHCP (Dynamic Host Configuration Protocol) and DNS (Domain Name Server). It also displays IP address, subnet mask, and default gateway for all adapters. It is available for Microsoft Windows, ReactOS, and Apple macOS. ReactOS version was developed by Ged Murphy and licensed under the General Public License.

OUTPUT:

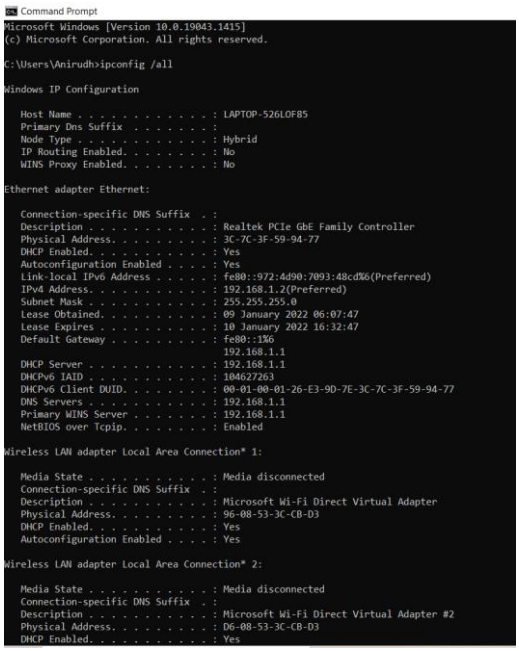


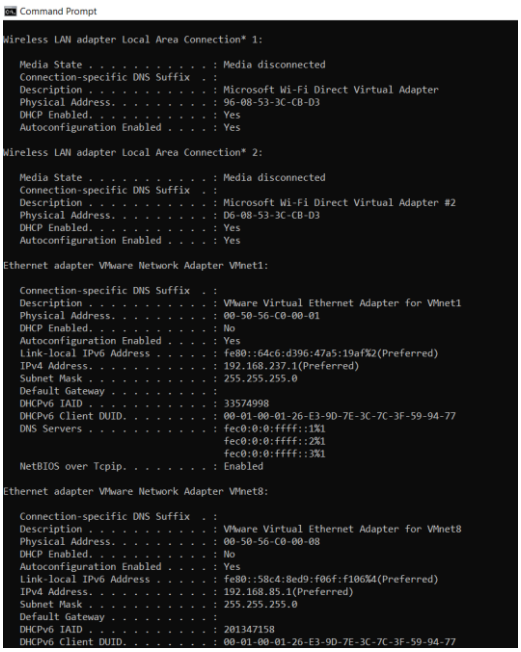


2. COMMAND NAME: ipconfig /all

DESCRIPTION: Displays the full TCP/IP configuration for all adapters. Adapters can represent physical interfaces, such as installed network adapters, or logical interfaces, such as dial-up connections.

OUTPUT:

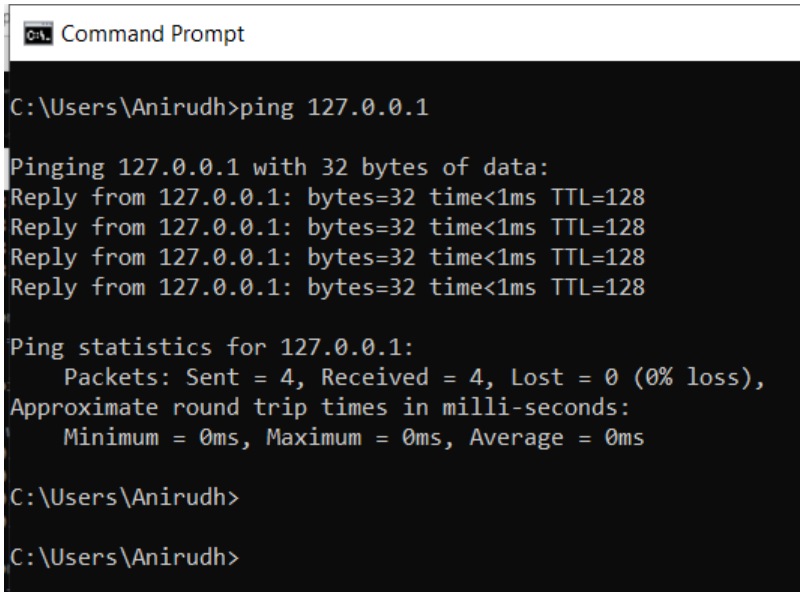




3. COMMAND NAME: ping 127.0.0.1

DESCRIPTION: Ping is used to testing a network host capacity to interact with another host. Just enter the command Ping, followed by the target host's name or IP address. The ping utilities seem to be the most common network tool. This is performed by using the Internet Control Message Protocol, which allows the echo packet to be sent to the destination host and a listening mechanism. If the destination host reply to the requesting host, that means the host is reachable. This utility usually gives a basic image of where there may be a specific networking issue,

OUTPUT:



In the above example, we're pinging *127.0.0.1*, also called the IPv4 localhost IP address or IPv4 loopback IP address, without options.

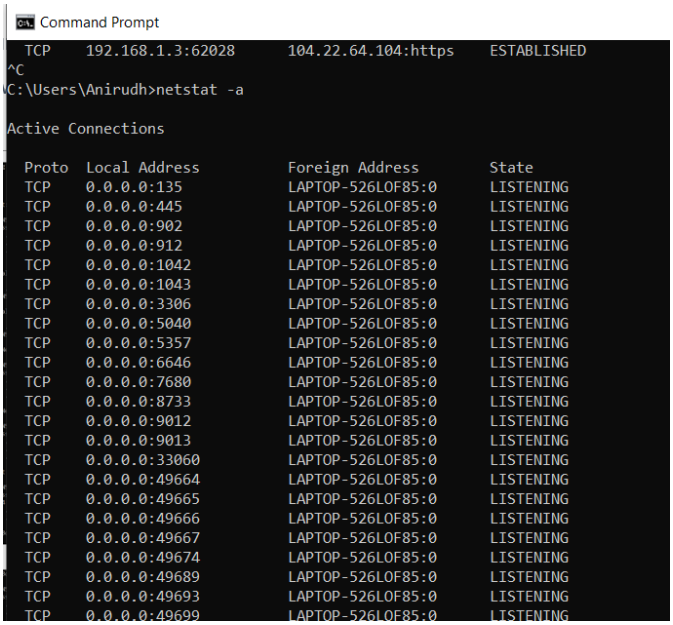
The *0% loss* reported under *Ping statistics for 127.0.0.1* explains that each ICMP Echo Request message sent to *localhost* was returned. This means that, as far as this network connection goes, it can communicate with localhost as specified just fine.

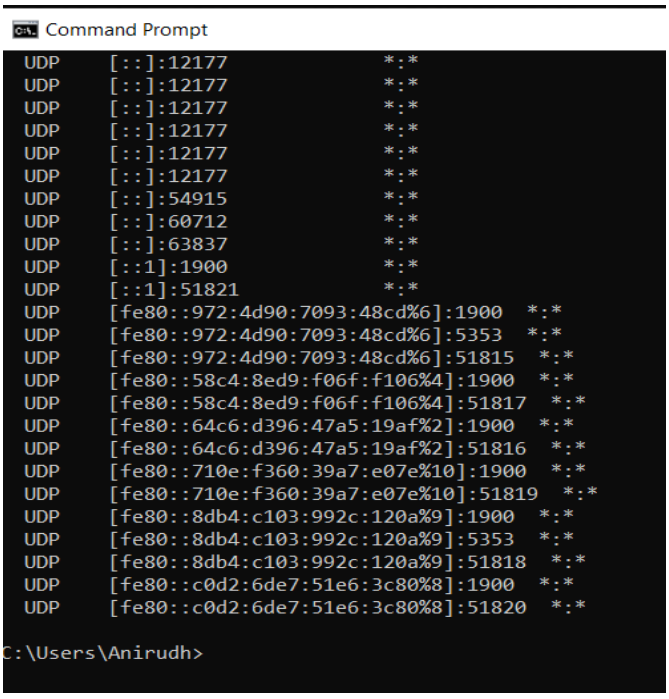
4. COMMAND NAME: netstat -a

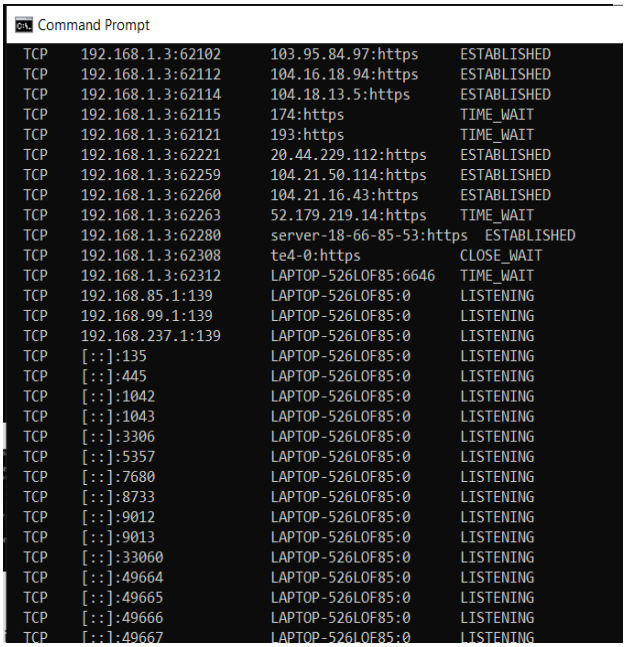
DESCRIPTION: Netstat is a Common TCP – IP networking command-line method present in most Windows, Linux, UNIX, and other operating systems. The netstat provides the statistics and information in the use of the current TCP-IP Connection network about the protocol.

-a: This will display all connection and ports

OUTPUT:





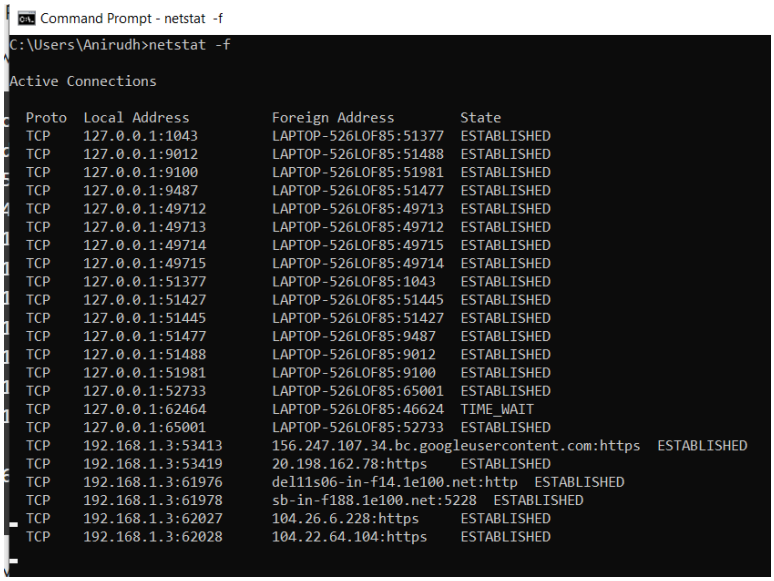


5. COMMAND NAME: netstat -f

DESCRIPTION: we execute netstat –f to show all active TCP connections.

We want to see the computers that we're connected to in FQDN format [**-f**] instead of a simple IP address.

OUTPUT:



6. COMMAND NAME: nslookup

DESCRIPTION: The Nslookup, which stands for name server lookup command, is a network utility command used to obtain information about internet servers. It provides name server information for the DNS (Domain Name System), i.e. the default DNS server's name and IP Address.

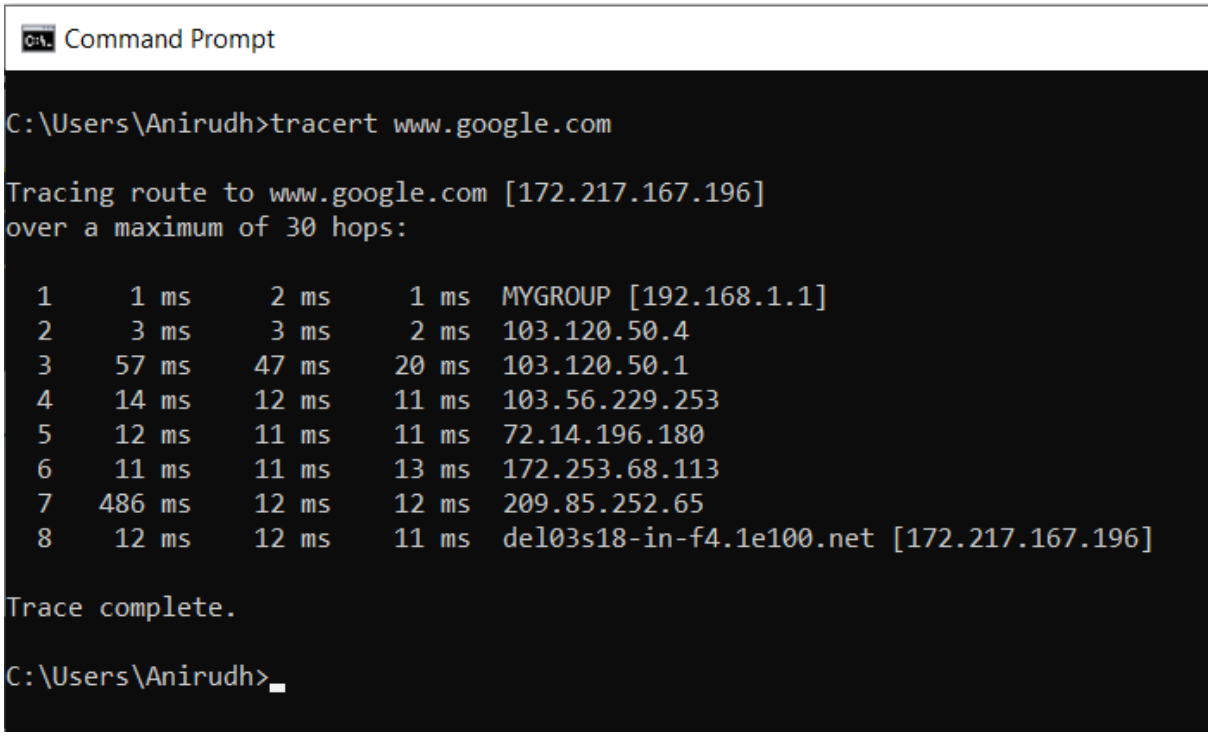
Take note of the prompt at the bottom of the command's output. nslookup remains running in the foreground after the command executes. The prompt at the end of the output lets you enter additional parameters. When you execute **nslookup** without specifying a domain name, the program enters interactive mode.

OUTPUT:

7. COMMAND NAME: tracert www.google.com

DESCRIPTION: The tracert command is a Command Prompt command which is used to get the network packet being sent and received and the number of hops required for that packet to reach to target. This command can also be referred to as a traceroute. It provides several details about the path that a packet takes from the source to the specified destination.

OUTPUT:



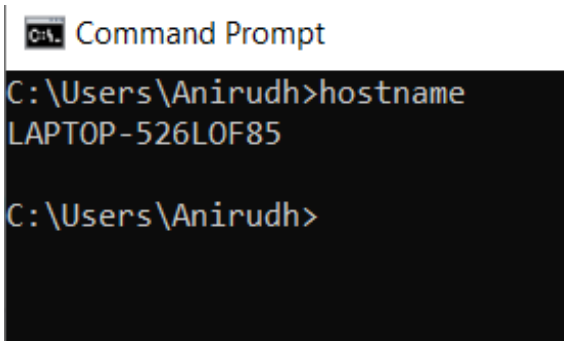
With the tracert command shown above, we're asking tracert to show us the path from the local computer all the way to the network device with the hostname www.google.com.

In this example, we can see that tracert identified 8 network devices including our router at *192.168.1.1* and all the way through to the *target* of *www.google.com*, which we now know uses the public IP address of [172.217.167.196], one of Google's many IP addresses.

8. COMMAND NAME: hostname

DESCRIPTION: To communicate with each and other, the computer needs a unique address. A hostname can be alphabetic or alphanumeric and contain specific symbols used specifically to define a specific node or device in the network. For example, a hostname should have a domain name (TLD) of the top-level and a distance between one and 63 characters when used in a domain name system (DNS) or on the Internet.

OUTPUT:

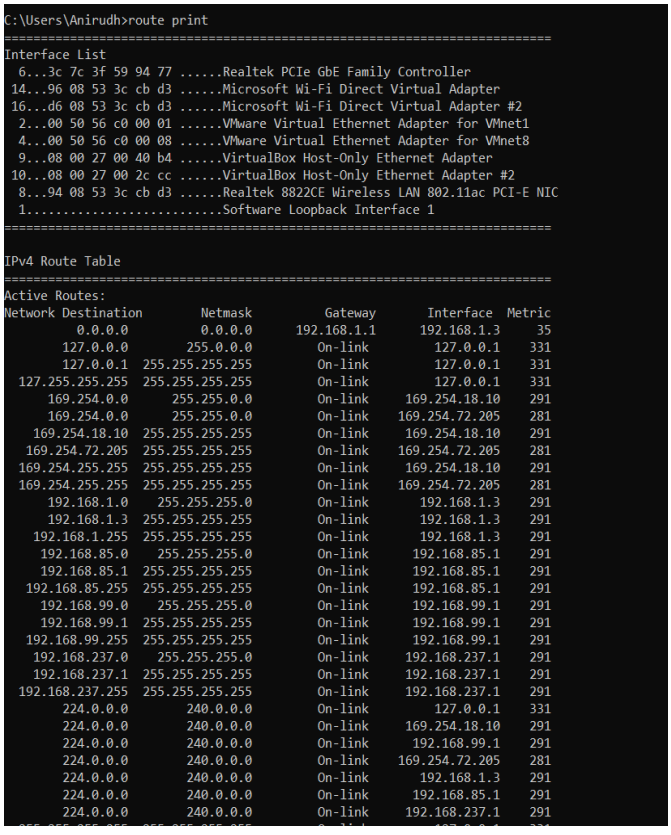


9. COMMAND NAME: route print

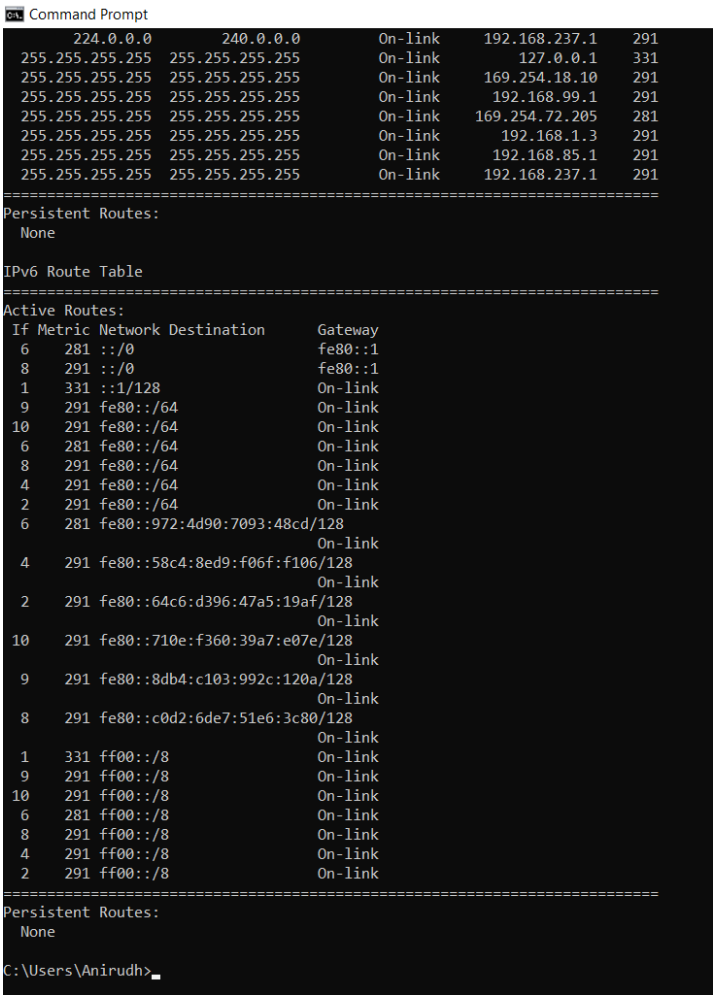
DESCRIPTION: In IP networks, routing tables are used to direct packets from one subnet to another. The Route command provides the device's routing tables. To get this result, just type route print. The Route command returns the routing table, and the user can make changes by Commands such as Route Add, Route Delete, and Route Change, which allows modifying the routing table as a requirement.

To display the routing table (both IPv4 and IPv6) in Windows, use the route print command.

OUTPUT:



```
C:\Users\Anirudh>route print
===========================================================================
Interface List
  6...3c 7c 3f 59 94 77 ......Realtek PCIe GbE Family Controller
 14...96 08 53 3c cb d3 ......Microsoft Wi-Fi Direct Virtual Adapter
 16...d6 08 53 3c cb d3 ......Microsoft Wi-Fi Direct Virtual Adapter #2
  2...00 50 56 c0 00 01 ......VMware Virtual Ethernet Adapter for VMnet1
  4...00 50 56 c0 00 08 ......VMware Virtual Ethernet Adapter for VMnet8
  9...08 00 27 00 40 b4 ......VirtualBox Host-Only Ethernet Adapter
 10...08 00 27 00 2c cc ......VirtualBox Host-Only Ethernet Adapter #2
  8...94 08 53 3c cb d3 ......Realtek 8822CE Wireless LAN 802.11ac PCI-E NIC
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0     192.168.1.1     192.168.1.3     35
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
      169.254.0.0      255.255.0.0         On-link     169.254.18.10    291
      169.254.0.0      255.255.0.0         On-link     169.254.72.205    281
    169.254.18.10  255.255.255.255         On-link     169.254.18.10    291
   169.254.72.205  255.255.255.255         On-link     169.254.72.205    281
  169.254.255.255  255.255.255.255         On-link     169.254.18.10    291
  169.254.255.255  255.255.255.255         On-link     169.254.72.205    281
      192.168.1.0    255.255.255.0         On-link      192.168.1.3    291
      192.168.1.3  255.255.255.255         On-link      192.168.1.3    291
    192.168.1.255  255.255.255.255         On-link      192.168.1.3    291
     192.168.85.0    255.255.255.0         On-link     192.168.85.1    291
     192.168.85.1  255.255.255.255         On-link     192.168.85.1    291
   192.168.85.255  255.255.255.255         On-link     192.168.85.1    291
     192.168.99.0    255.255.255.0         On-link     192.168.99.1    291
     192.168.99.1  255.255.255.255         On-link     192.168.99.1    291
   192.168.99.255  255.255.255.255         On-link     192.168.99.1    291
    192.168.237.0    255.255.255.0         On-link    192.168.237.1    291
    192.168.237.1  255.255.255.255         On-link    192.168.237.1    291
  192.168.237.255  255.255.255.255         On-link    192.168.237.1    291
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link     169.254.18.10    291
        224.0.0.0        240.0.0.0         On-link     192.168.99.1    291
        224.0.0.0        240.0.0.0         On-link     169.254.72.205    281
        224.0.0.0        240.0.0.0         On-link      192.168.1.3    291
        224.0.0.0        240.0.0.0         On-link     192.168.85.1    291
        224.0.0.0        240.0.0.0         On-link     192.168.237.1    291
```



```
Command Prompt
        224.0.0.0        240.0.0.0         On-link     192.168.237.1    291
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link     169.254.18.10    291
  255.255.255.255  255.255.255.255         On-link     192.168.99.1    291
  255.255.255.255  255.255.255.255         On-link     169.254.72.205    281
  255.255.255.255  255.255.255.255         On-link      192.168.1.3    291
  255.255.255.255  255.255.255.255         On-link     192.168.85.1    291
  255.255.255.255  255.255.255.255         On-link     192.168.237.1    291
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  6    281 ::/0                     fe80::1
  8    291 ::/0                     fe80::1
  1    331 ::1/128                  On-link
  9    291 fe80::/64                On-link
 10    291 fe80::/64                On-link
  6    281 fe80::/64                On-link
  8    291 fe80::/64                On-link
  4    291 fe80::/64                On-link
  2    291 fe80::/64                On-link
  6    281 fe80::972:4d90:7093:48cd/128
                                    On-link
  4    291 fe80::58c4:8ed9:f06f:f106/128
                                    On-link
  2    291 fe80::64c6:d396:47a5:19af/128
                                    On-link
 10    291 fe80::710e:f360:39a7:e07e/128
                                    On-link
  9    291 fe80::8db4:c103:992c:120a/128
                                    On-link
  8    291 fe80::c0d2:6de7:51e6:3c80/128
                                    On-link
  1    331 ff00::/8                 On-link
  9    291 ff00::/8                 On-link
 10    291 ff00::/8                 On-link
  6    281 ff00::/8                 On-link
  8    291 ff00::/8                 On-link
  4    291 ff00::/8                 On-link
  2    291 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None

C:\Users\Anirudh>
```

10. COMMAND NAME: arp

DESCRIPTION: ARP stands for Address Resolution Protocol. Although network communications can readily be thought of as an IP address, the packet delivery depends ultimately on the media access control (MAC). This is where the protocol for address resolution comes into effect. You can add the remote host IP address, which is an arp -a command, in case you have issues to communicate with a given host. The ARP command provides information like Address, Flags, Mask, IFace, Hardware Type, Hardware Address, etc.

Arp –a: It will show the IP address of your computer along with the IP address and MAC address of your router.

OUTPUT:

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

Interface: 192.168.237.1 --- 0x2
  Internet Address      Physical Address      Type
  192.168.237.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static

Interface: 192.168.85.1 --- 0x4
  Internet Address      Physical Address      Type
  192.168.85.255        ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static

Interface: 169.254.72.205 --- 0x6
  Internet Address      Physical Address      Type
  169.254.255.255       ff-ff-ff-ff-ff-ff     static
  192.168.1.1           bc-62-d2-33-12-bc     dynamic
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 192.168.1.3 --- 0x8
  Internet Address      Physical Address      Type
  192.168.1.1           bc-62-d2-33-12-bc     dynamic
  192.168.1.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 169.254.18.10 --- 0x9
```

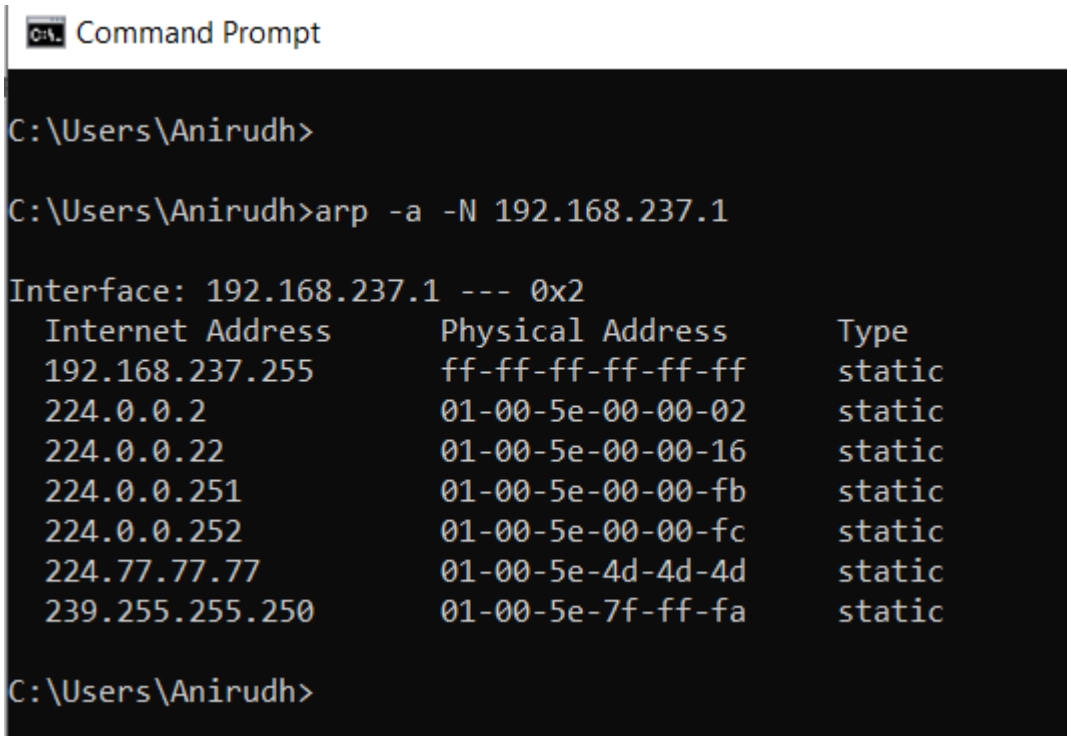
Command Prompt

```
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static

Interface: 169.254.72.205 --- 0x6
  Internet Address      Physical Address      Type
  169.254.255.255       ff-ff-ff-ff-ff-ff     static
  192.168.1.1           bc-62-d2-33-12-bc     dynamic
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 192.168.1.3 --- 0x8
  Internet Address      Physical Address      Type
  192.168.1.1           bc-62-d2-33-12-bc     dynamic
  192.168.1.255         ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 169.254.18.10 --- 0x9
  Internet Address      Physical Address      Type
  169.254.255.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static

Interface: 192.168.99.1 --- 0xa
  Internet Address      Physical Address      Type
  192.168.99.255        ff-ff-ff-ff-ff-ff     static
  224.0.0.2             01-00-5e-00-00-02     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
  224.77.77.77          01-00-5e-4d-4d-4d     static
  239.255.255.250       01-00-5e-7f-ff-fa     static

C:\Users\Anirudh>
```

11. COMMAND NAME: arp –a –N 192.168.237.1

DESCRIPTION: To display the ARP cache entry for a specific IP address, specify the IP address with the **-N** option. For example, the following command displays the ARP cache table for the interface that is assigned the IP address 192.168.237.1

OUTPUT:



12. COMMAND NAME: nbtstat

DESCRIPTION: The computer name is sometimes referred to as the NetBIOS name.

Windows uses several different methods to map NetBIOS names to IP addresses, such as broadcast, LMHost lookup, or even using the nearly extinct method of querying a WINS server.
Of course, NetBIOS over TCP/IP can occasionally break down. The NbtStat command can help you to diagnose and correct such problems.

➔ **NbtStat -n command for example, shows the NetBIOS names that are in use by a device.**

➔ **NbtStat -r command shows how many NetBIOS names the device has been able to resolve recently.**

OUTPUT:

Command Prompt

```
C:\Users\Anirudh>nbtstat -n

Ethernet 2:
Node IpAddress: [169.254.18.10] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

VMware Network Adapter VMnet8:
Node IpAddress: [192.168.85.1] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

VirtualBox Host-Only Network #2:
Node IpAddress: [192.168.99.1] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

VMware Network Adapter VMnet1:
Node IpAddress: [192.168.237.1] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

Ethernet:
Node IpAddress: [169.254.72.205] Scope Id: []
```

Command Prompt

```
      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

VMware Network Adapter VMnet1:
Node IpAddress: [192.168.237.1] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

Ethernet:
Node IpAddress: [169.254.72.205] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

Wi-Fi:
Node IpAddress: [192.168.1.3] Scope Id: []

               NetBIOS Local Name Table

      Name               Type         Status
   ---------------------------------------------
   LAPTOP-526LOF85<20>  UNIQUE      Registered
   LAPTOP-526LOF85<00>  UNIQUE      Registered
   WORKGROUP      <00>  GROUP       Registered

Local Area Connection* 1:
Node IpAddress: [0.0.0.0] Scope Id: []

   No names in cache

Local Area Connection* 2:
Node IpAddress: [0.0.0.0] Scope Id: []

   No names in cache

C:\Users\Anirudh>
```

13. COMMAND NAME: nbtstat -r

OUTPUT:

```
C:\Users\Anirudh>nbtstat -r

    NetBIOS Names Resolution and Registration Statistics
    ----------------------------------------------------

    Resolved By Broadcast     = 0
    Resolved By Name Server   = 0

    Registered By Broadcast   = 36
    Registered By Name Server = 0

C:\Users\Anirudh>
```

14. COMMAND NAME: 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.

The following command output is typical of the pathping command. (Using an -n switch causes the display to use numeric IP numbers only, instead of DNS host names. Although fully qualified host names are convenient, they tend to be very long for network routers, which makes the pathping output very difficult to decipher.)

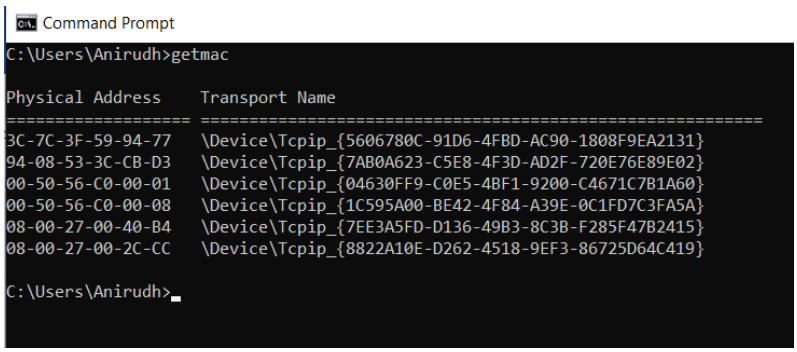
OUTPUT:

```
C:\Users\Anirudh>pathping -n www.lowewriter.com

Tracing route to www.lowewriter.com [208.91.197.27]
over a maximum of 30 hops:
  0  192.168.1.3
  1  192.168.1.1
  2  103.120.50.4
  3  103.120.50.1
  4  14.142.243.45
  5  172.31.167.54
  6  14.141.123.226
  7  180.87.36.165
  8  180.87.36.6
  9  180.87.37.10
 10  180.87.38.1
 11     *        *        *
Computing statistics for 250 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           192.168.1.3
                                 0/ 100 =  0%   |
  1    1ms     0/ 100 =  0%     0/ 100 =  0%  192.168.1.1
                                 0/ 100 =  0%   |
  2    2ms     0/ 100 =  0%     0/ 100 =  0%  103.120.50.4
                                 0/ 100 =  0%   |
  3    3ms     0/ 100 =  0%     0/ 100 =  0%  103.120.50.1
                                 0/ 100 =  0%   |
  4    4ms     0/ 100 =  0%     0/ 100 =  0%  14.142.243.45
                                 0/ 100 =  0%   |
  5   ---     100/ 100 =100%   100/ 100 =100%  172.31.167.54
                                 0/ 100 =  0%   |
  6   44ms     0/ 100 =  0%     0/ 100 =  0%  14.141.123.226
                                 0/ 100 =  0%   |
  7   54ms     0/ 100 =  0%     0/ 100 =  0%  180.87.36.165
                                 0/ 100 =  0%   |
  8   54ms     0/ 100 =  0%     0/ 100 =  0%  180.87.36.6
                                 0/ 100 =  0%   |
  9   34ms     0/ 100 =  0%     0/ 100 =  0%  180.87.37.10
                                 0/ 100 =  0%   |
 10   33ms     0/ 100 =  0%     0/ 100 =  0%  180.87.38.1

Trace complete.

C:\Users\Anirudh>
```

15. COMMAND NAME: getmac

DESCRIPTION: The getmac (short for *get MAC address*) is a simple *Windows* network command-line utility used to find the physical address of the network adapters (NIC) in a computer. This tool is typically used in troubleshooting network issues.

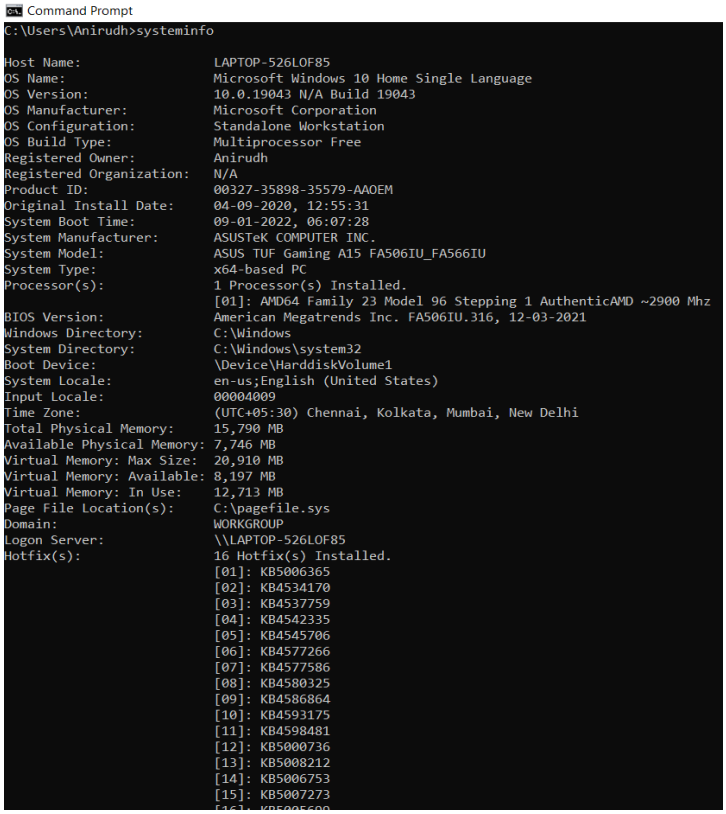
OUTPUT:

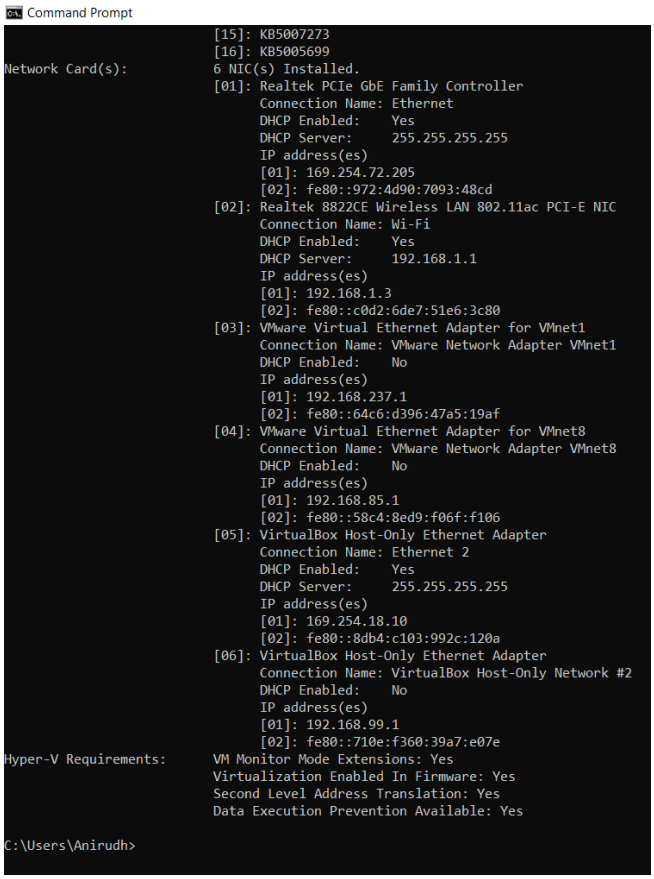


16. COMMAND NAME: systeminfo

DESCRIPTION: The SystemInfo command displays a detailed list of configuration information about your Windows 10 PC. The information listed by this command is too lengthy to mention in full but includes the installed version of Windows 10, the host name, the Product ID, the type and number of CPUs, RAM configuration, network card details and installed hotfixes.

OUTPUT:





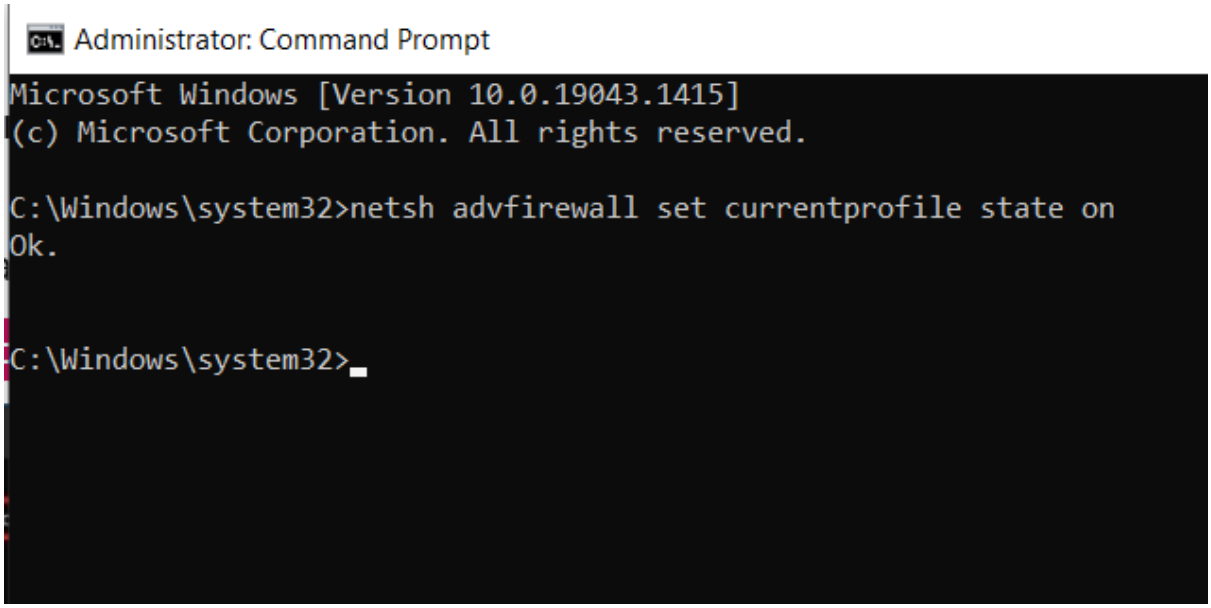
17. COMMAND NAME: netsh

DESCRIPTION: On Windows 10, **netsh** (Network Shell) is a legacy command-line tool that allows you to display and change virtually any network configuration. For instance, you can use the tool to view current network configuration, manage wireless connections, reset the network stack to fix most common problems, enable or disable the firewall, and a lot more.

OUTPUT:

netsh advfirewall set currentprofile state on

To enable windows defender firewall



Here ok means the firewall was successfully enabled.

18. COMMAND NAME: net view

DESCRIPTION: it is used for Viewing devices connected to a network
The caveat with this command is that it may not show all of the devices connected to your network.

It works well enough for private networks but will fail to identify devices such as smartphones and printers, and it can have trouble identifying devices running a different operating system to Windows.

OUTPUT: