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BASIC NETWORKING COMMANDS IN WINDOWS OPERATING SYSTEM

Aim:

To study basic networking commands in windows operating system.

The Windows operating system provides its user with a powerful tool, Command Prompt, which allows the user to access and configure system settings and data.The network commands prove helpful when there is a need to configure or troubleshoot the network settings of our system.

ROUTE

Provides the data of routing data packets in the system over the communication channel.

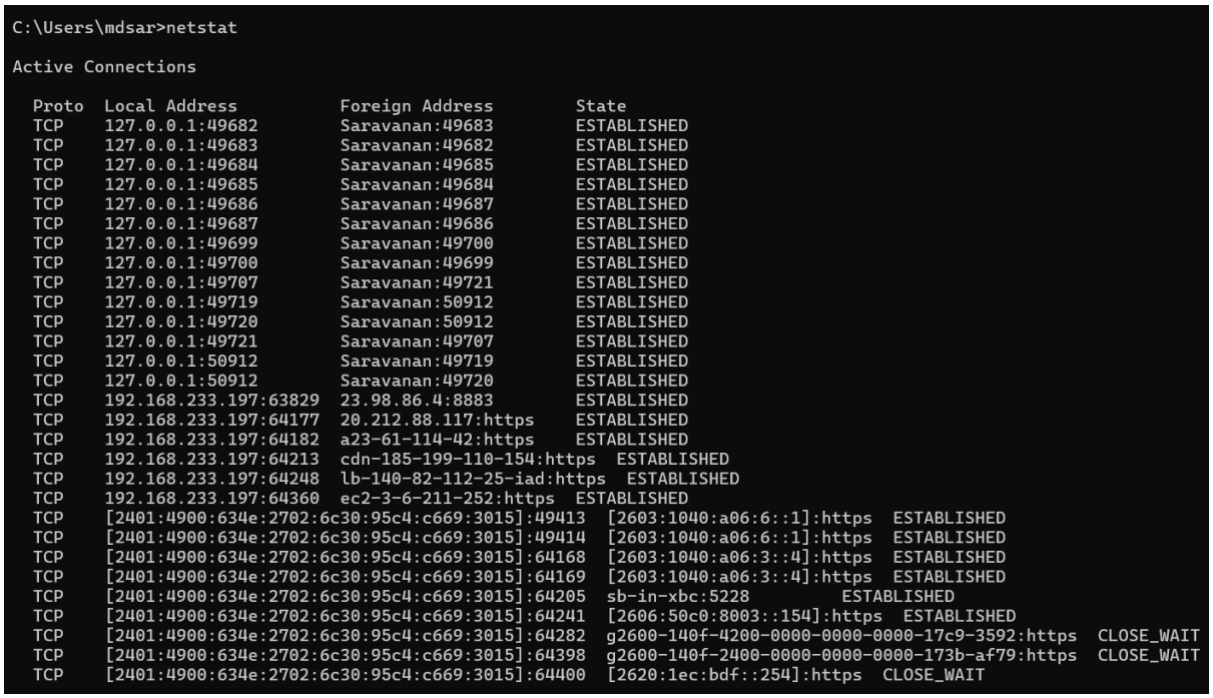
Command to enter in Prompt – route print

```
C:\Users\mdsar>route print
===========================================================================
Interface List
 12...04 bf 1b 8c 82 a2 ......Realtek PCIe GbE Family Controller
  6...74 13 ea 18 57 e6 ......Microsoft Wi-Fi Direct Virtual Adapter
  9...76 13 ea 18 57 e5 ......Microsoft Wi-Fi Direct Virtual Adapter #2
 18...74 13 ea 18 57 e5 ......Intel(R) Wi-Fi 6 AX201 160MHz
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0  192.168.233.194  192.168.233.197     50
        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
    192.168.233.0    255.255.255.0         On-link   192.168.233.197    306
  192.168.233.197  255.255.255.255         On-link   192.168.233.197    306
  192.168.233.255  255.255.255.255         On-link   192.168.233.197    306
        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   192.168.233.197    306
  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   192.168.233.197    306
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
 18     66 ::/0                     fe80::7cef:64ff:fe0e:186e
  1    331 ::1/128                  On-link
 18     66 2401:4900:634e:2702::/64 On-link
 18    306 2401:4900:634e:2702:ca5:c2e3:30d9:d2fe/128
                                    On-link
 18    306 2401:4900:634e:2702:6c30:95c4:c669:3015/128
                                    On-link
```

NETSTAT

The Netstat command as the name suggests displays an overview of all the network connections in the device. The table shows detail about the connection protocol, address, and the current state of the network.

Command to enter in Prompt – netstat



```
C:\Users\mdsar>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49682        Saravanan:49683        ESTABLISHED
  TCP    127.0.0.1:49683        Saravanan:49682        ESTABLISHED
  TCP    127.0.0.1:49684        Saravanan:49685        ESTABLISHED
  TCP    127.0.0.1:49685        Saravanan:49684        ESTABLISHED
  TCP    127.0.0.1:49686        Saravanan:49687        ESTABLISHED
  TCP    127.0.0.1:49687        Saravanan:49686        ESTABLISHED
  TCP    127.0.0.1:49699        Saravanan:49700        ESTABLISHED
  TCP    127.0.0.1:49700        Saravanan:49699        ESTABLISHED
  TCP    127.0.0.1:49707        Saravanan:49721        ESTABLISHED
  TCP    127.0.0.1:49719        Saravanan:50912        ESTABLISHED
  TCP    127.0.0.1:49720        Saravanan:50912        ESTABLISHED
  TCP    127.0.0.1:49721        Saravanan:49707        ESTABLISHED
  TCP    127.0.0.1:50912        Saravanan:49719        ESTABLISHED
  TCP    127.0.0.1:50912        Saravanan:49720        ESTABLISHED
  TCP    192.168.233.197:63829  23.98.86.4:8883        ESTABLISHED
  TCP    192.168.233.197:64177  20.212.88.117:https    ESTABLISHED
  TCP    192.168.233.197:64182  a23-61-114-42:https    ESTABLISHED
  TCP    192.168.233.197:64213  cdn-185-199-110-154:https  ESTABLISHED
  TCP    192.168.233.197:64248  lb-140-82-112-25-iad:https  ESTABLISHED
  TCP    192.168.233.197:64360  ec2-3-6-211-252:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:49413  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:49414  [2603:1040:a06:6::1]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64168  [2603:1040:a06:3::4]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64169  [2603:1040:a06:3::4]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64205  sb-in-xbc:5228         ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64241  [2606:50c0:8003::154]:https  ESTABLISHED
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64282  g2600-140f-4200-0000-0000-0000-17c9-3592:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64398  g2600-140f-2400-0000-0000-0000-173b-af79:https  CLOSE_WAIT
  TCP    [2401:4900:634e:2702:6c30:95c4:c669:3015]:64400  [2620:1ec:bdf::254]:https  CLOSE_WAIT
```

SYSTEMINFO

Using the SYSTEMINFO command, we can access the system's hardware and software details, such as processor data, booting data, Windows version, etc.

Command to enter in Prompt – systeminfo

```
C:\Users\mdsar>systeminfo

Host Name:                 SARAVANAN
OS Name:                   Microsoft Windows 11 Home Single Language
OS Version:                10.0.22631 N/A Build 22631
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:          mdsaravanan.2005@outlook.com
Registered Organization:   N/A
Product ID:                00342-42658-16239-AAOEM
Original Install Date:     09-11-2023, 21:58:29
System Boot Time:          03-08-2024, 10:18:41
System Manufacturer:       Dell Inc.
System Model:              Dell G15 5530
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 183 Stepping 1 GenuineIntel ~1500 Mhz
BIOS Version:              Dell Inc. 1.15.1, 13-05-2024
Windows Directory:         C:\Windows
System Directory:          C:\Windows\system32
Boot Device:               \Device\HarddiskVolume1
System Locale:             en-us;English (United States)
Input Locale:              00004009
Time Zone:                 (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory:     16,069 MB
Available Physical Memory: 6,941 MB
Virtual Memory: Max Size:  16,581 MB
Virtual Memory: Available: 5,508 MB
Virtual Memory: In Use:    11,073 MB
Page File Location(s):     D:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\SARAVANAN
Hotfix(s):                 6 Hotfix(s) Installed.
                           [01]: KB5039895
                           [02]: KB5027397
                           [03]: KB5031274
                           [04]: KB5032381
                           [05]: KB5040527
                           [06]: KB5040568
```

ARP(Address Resolution Protocol)

The ARP command is used to access the mapping structure of IP addresses to the MAC address. This provides us with a better understanding of the transmission of packets in the network channel.

Command to enter in Prompt - arp

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

Interface: 192.168.233.197 --- 0x12
  Internet Address      Physical Address      Type
  192.168.233.194       7e-ef-64-0e-18-6e     dynamic
  192.168.233.255       ff-ff-ff-ff-ff-ff     static
  224.0.0.22            01-00-5e-00-00-16     static
  224.0.0.251           01-00-5e-00-00-fb     static
  224.0.0.252           01-00-5e-00-00-fc     static
  239.255.255.250       01-00-5e-7f-ff-fa     static
  255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

PING

The Ping command is one of the most widely used commands in the prompt tool, as it allows the user to check the connectivity of our system to another host.

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.

Command to enter in Prompt - ping www.destination_host_name.com

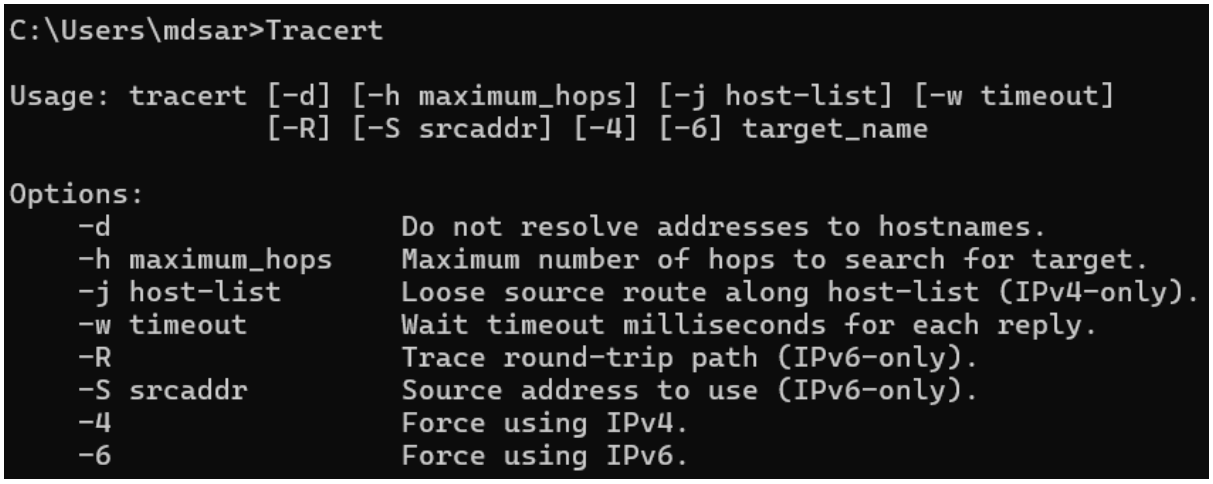
```
C:\Users\mdsar>ping www.google.com

Pinging www.google.com [2404:6800:4007:82c::2004] with 32 bytes of data:
Reply from 2404:6800:4007:82c::2004: time=87ms
Reply from 2404:6800:4007:82c::2004: time=43ms
Reply from 2404:6800:4007:82c::2004: time=62ms
Reply from 2404:6800:4007:82c::2004: time=31ms

Ping statistics for 2404:6800:4007:82c::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 31ms, Maximum = 87ms, Average = 55ms
```

TRACERT

The TRACERT command is used to trace the route during the transmission of the data packet over to the destination host and also provides us with the “hop” count during transmission.

Using the number of hops and the hop IP address, we can troubleshoot network issues and identify the point of the problem during the transmission of the data packet.

Command to enter in Prompt- tracert IP-address OR tracert www.destination_host_name.com



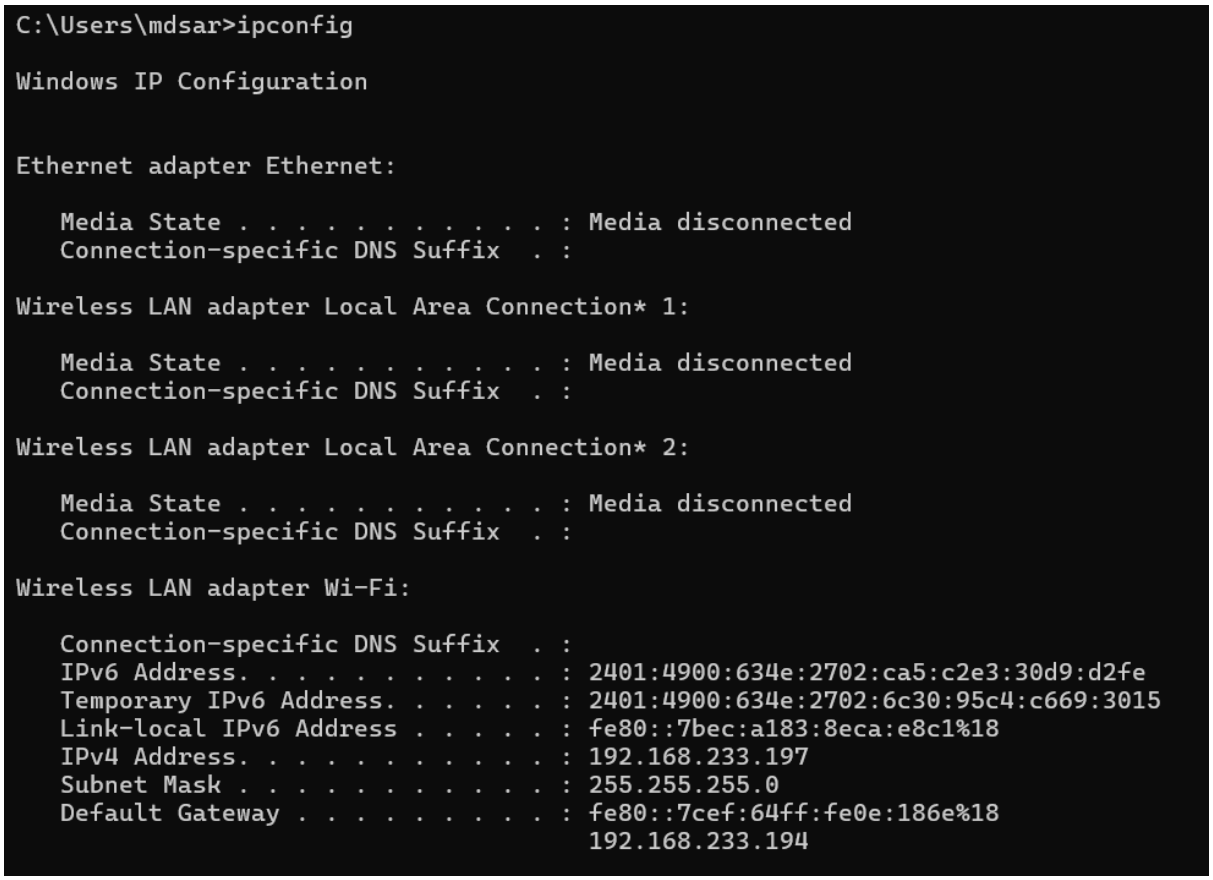
IPCONFIG

The IPCONFIG network command provides a comprehensive view of information regarding the IP address configuration of the device we are currently working on.

The IPConfig command also provides us with some variation in the primary command that targets specific system settings or data, which are:

- IPConfig/all - Provides primary output with additional information about network adapters.
- IPConfig/renew - Used to renew the system's IP address.
- IPConfig/release - Removes the system's current IP address.

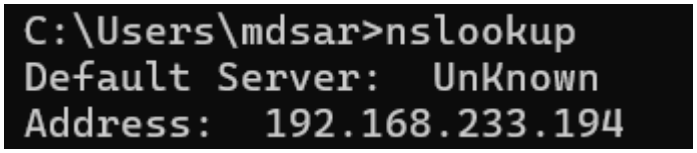
Command to enter in Prompt - ipconfig



NSLOOKUP

The NSLOOKUP command is used to troubleshoot network connectivity issues in the system. Using the nslookup command, we can access the information related to our system's DNS server, i.e., domain name and IP address.

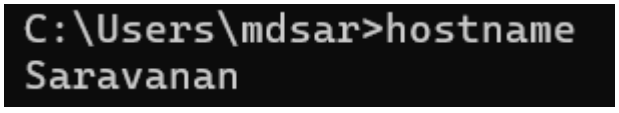
Command to enter in Prompt – nslookup



HOSTNAME

The HOSTNAME command displays the hostname of the system. The hostname command is much easier to use than going into the system settings to search for it.

Command to enter in Prompt – hostname



Result:

Hence, basic networking commands in windows operating system are studied and executed.

CSE (CYBER SECURITY)