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BASIC NETWORKING COMMANDS IN WINDOWS OPERATING SYSTEM

Aim:

To study the basic commands operating system in window operating system.

1. 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.

SYNTAX- ipconfig

EXAMPLE : ipconfig

OUTPUT:

```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   IPv6 Address. . . . . . . . . . . : 2401:4900:627c:2a61:9862:5395:90c1:5276
   Temporary IPv6 Address. . . . . . : 2401:4900:627c:2a61:fc13:88d:9b99:9c25
   Link-local IPv6 Address . . . . . : fe80::f8bb:f0d2:58f7:6e8c%6
   IPv4 Address. . . . . . . . . . . : 192.168.92.14
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::8e0:3bff:febf:798d%6
                                       192.168.92.49
```

2. 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.

Syntax– nslookup

Example : nslookup www.google.com

OUTPUT:

```
C:\Users\Windows>nslookup www.google.com
Server:  UnKnown
Address:  192.168.92.49

Non-authoritative answer:
Name:    www.google.com
Addresses:  2404:6800:4007:82b::2004
          142.250.193.100
```

3. 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.

SYNTAX- hostname

EXAMPLE : hostname

OUTPUT:

```
C:\Users\Windows>hostname
DESKTOP-B1SLH79
```

4. 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.

SYNTAX- ping www.destination_host_name.com

EXAMPLE : ping www.facebook.com

OUTPUT:

```
C:\Users\Windows>ping www.facebook.com

Pinging star-mini.c10r.facebook.com [2a03:2880:f184:186:face:b00c:0:25de] with 32 bytes of data:
Reply from 2a03:2880:f184:186:face:b00c:0:25de: time=23ms
Reply from 2a03:2880:f184:186:face:b00c:0:25de: time=54ms
Reply from 2a03:2880:f184:186:face:b00c:0:25de: time=47ms
Reply from 2a03:2880:f184:186:face:b00c:0:25de: time=37ms

Ping statistics for 2a03:2880:f184:186:face:b00c:0:25de:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 23ms, Maximum = 54ms, Average = 40ms
```

5. 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.

SYNTAX- tracert IP-address OR tracert www.destination_host_name.com

EXAMPLE : tracert www.facebook.com

OUTPUT:

```
C:\Users\Windows>tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [2a03:2880:f184:186:face:b00c:0:25de]
over a maximum of 30 hops:

  1     6 ms     4 ms     3 ms  2401:4900:627c:2a61::4c
  2     *        *        *     Request timed out.
  3    43 ms    25 ms    33 ms  2401:4900:c4:46bb::1
  4    62 ms    46 ms    41 ms  2401:4900:0:6f8::6
  5     *       59 ms    34 ms  2401:4900:0:6f8::1
  6     *        *        *     Request timed out.
  7    27 ms    31 ms    20 ms  2404:a800:3a00:1::4c5
  8    56 ms    25 ms    26 ms  2404:a800::92
  9    36 ms    24 ms    32 ms  ae5.pr01.tir1.tfbnw.net [2620:0:1cff:dead:beee::952]
 10    38 ms    20 ms    22 ms  po101.asw02.tir3.tfbnw.net [2620:0:1cff:dead:beef::3ca]
 11    59 ms    24 ms    24 ms  po238.psw03.tir3.tfbnw.net [2620:0:1cff:dead:beef::886f]
 12    22 ms    28 ms    31 ms  po3.msw1ad.02.tir3.tfbnw.net [2a03:2880:f09d:ffff::6f]
 13    75 ms    30 ms    25 ms  edge-star-mini6-shv-02-tir3.facebook.com [2a03:2880:f184:186:face:b00c:0:25de]

Trace complete.
```

6. 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.

SYNTAX- netstat EXAMPLE

: netstat

OUTPUT:

```
C:\Users\Windows>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49990        DESKTOP-B1SLH79:49991  ESTABLISHED
  TCP    127.0.0.1:49991        DESKTOP-B1SLH79:49990  ESTABLISHED
  TCP    192.168.92.14:60089    20.212.88.117:https    ESTABLISHED
  TCP    192.168.92.14:60145    4.193.45.35:https      ESTABLISHED
  TCP    192.168.92.14:60149    13.83.65.43:https      ESTABLISHED
  TCP    192.168.92.14:60158    13.83.65.43:https      ESTABLISHED
  TCP    192.168.92.14:60165    20.249.168.26:https    ESTABLISHED
  TCP    192.168.92.14:60212    relay-058f44e1:https   ESTABLISHED
  TCP    192.168.92.14:60377    52.96.190.162:https    ESTABLISHED
  TCP    [2401:4900:627c:2a61:fc13:88d:9b99:9c25]:60189  [2603:1063:15::10]:https  ESTABLISHED
  TCP    [2401:4900:627c:2a61:fc13:88d:9b99:9c25]:60316  [2603:1040:a06:6::]:https  ESTABLISHED
  TCP    [2401:4900:627c:2a61:fc13:88d:9b99:9c25]:60365  g2600-140f-2400-0000-0000-0000-173b-af33:https  CLOSE_WAIT
  TCP    [2401:4900:627c:2a61:fc13:88d:9b99:9c25]:60366  g2600-140f-2400-0000-0000-0000-173b-af33:https  CLOSE_WAIT
  TCP    [2401:4900:627c:2a61:fc13:88d:9b99:9c25]:60369  [2603:1046:c06:803::2]:https  ESTABLISHED
  TCP    [2401:4900:627c:2a61:fc13:88d:9b99:9c25]:60370  g2600-140f-2400-0000-0000-0000-173b-af33:https  CLOSE_WAIT
  TCP    [fe80::fe7e:8045:d871:a810%41]:1521  DESKTOP-B1SLH79:54128  ESTABLISHED
  TCP    [fe80::fe7e:8045:d871:a810%41]:54128  DESKTOP-B1SLH79:1521   ESTABLISHED
```

7. 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.

SYNTAX- arp
EXAMPLE : arp -a

OUTPUT:

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

Interface: 192.168.92.14 --- 0x6
  Internet Address      Physical Address      Type
  192.168.92.49         0a-e0-3b-bf-79-8d     dynamic
  192.168.92.255        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

Interface: 192.168.56.1 --- 0x29
  Internet Address      Physical Address      Type
  192.168.56.255        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
```

8. SYSTEMINFO

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

SYNTAX– systeminfo

EXAMPLE : systeminfo
OUTPUT:

```
C:\Users\Windows>systeminfo

Host Name:                 DESKTOP-B1SLH79
OS Name:                   Microsoft Windows 10 Pro
OS Version:                10.0.19045 N/A Build 19045
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:          Windows
Registered Organization:
Product ID:                00330-52334-95812-AAOEM
Original Install Date:     27-05-2024, 01:04:28
System Boot Time:          18-07-2024, 20:39:06
System Manufacturer:       Dell Inc.
System Model:              Latitude 7480
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 78 Stepping 3 GenuineIntel ~2607 Mhz
BIOS Version:              Dell Inc. 1.36.0, 29-01-2024
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:     8,073 MB
Available Physical Memory: 3,074 MB
Virtual Memory: Max Size:  15,694 MB
Virtual Memory: Available: 8,540 MB
Virtual Memory: In Use:    7,154 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\DESKTOP-B1SLH79
Hotfix(s):                 7 Hotfix(s) Installed.
                           [01]: KB5037587
Logon Server:              \\DESKTOP-B1SLH79
Hotfix(s):                 7 Hotfix(s) Installed.
                           [01]: KB5037587
                           [02]: KB5037592
                           [03]: KB5011048
                           [04]: KB5015684
                           [05]: KB5039211
                           [06]: KB5037240
                           [07]: KB5037995
Network Card(s):           4 NIC(s) Installed.
                           [01]: Intel(R) Ethernet Connection (4) I219-LM
                                 Connection Name: Ethernet
                                 Status:          Media disconnected
                           [02]: Intel(R) Dual Band Wireless-AC 8265
                                 Connection Name: Wi-Fi
                                 DHCP Enabled:    Yes
                                 DHCP Server:     192.168.92.49
                                 IP address(es)
                                 [01]: 192.168.92.14
                                 [02]: fe80::f8bb:f0d2:58f7:6e8c
                                 [03]: 2401:4900:627c:2a61:fc13:88d:9b99:9c25
                                 [04]: 2401:4900:627c:2a61:9862:5395:90c1:5276
                           [03]: Bluetooth Device (Personal Area Network)
                                 Connection Name: Bluetooth Network Connection
                                 Status:          Media disconnected
                           [04]: VirtualBox Host-Only Ethernet Adapter
                                 Connection Name: Ethernet 2
                                 DHCP Enabled:    No
                                 IP address(es)
                                 [01]: 192.168.56.1
                                 [02]: fe80::fe7e:8045:d871:a810
Hyper-V Requirements:      VM Monitor Mode Extensions: Yes
                           Virtualization Enabled In Firmware: Yes
                           Second Level Address Translation: Yes
                           Data Execution Prevention Available: Yes
```

9. ROUTE

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

SYNTAX – route print EXAMPLE

: route print

OUTPUT:

```
C:\Users\Windows>route print
===========================================================================
Interface List
 16...8c 04 ba 33 04 12 ......Intel(R) Ethernet Connection (4) I219-LM
 41...0a 00 27 00 00 29 ......VirtualBox Host-Only Ethernet Adapter
 15...dc 71 96 ea 88 ba ......Microsoft Wi-Fi Direct Virtual Adapter
 17...de 71 96 ea 88 b9 ......Microsoft Wi-Fi Direct Virtual Adapter #2
  6...dc 71 96 ea 88 b9 ......Intel(R) Dual Band Wireless-AC 8265
  5...dc 71 96 ea 88 bd ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0    192.168.92.49    192.168.92.14     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
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    330
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    330
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    330
     192.168.92.0    255.255.255.0         On-link     192.168.92.14    306
    192.168.92.14  255.255.255.255         On-link     192.168.92.14    306
   192.168.92.255  255.255.255.255         On-link     192.168.92.14    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     192.168.92.14    306
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    330
  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     192.168.92.14    306
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    330
===========================================================================
Persistent Routes:
  Network Address          Netmask  Gateway Address  Metric
===========================================================================
Persistent Routes:
  Network Address          Netmask  Gateway Address  Metric
          0.0.0.0          0.0.0.0      172.16.18.1  Default
===========================================================================

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  6     66 ::/0                     fe80::8e0:3bff:febf:798d
  1    331 ::1/128                  On-link
  6     66 2401:4900:627c:2a61::/64 On-link
  6    306 2401:4900:627c:2a61:9862:5395:90c1:5276/128
                                    On-link
  6    306 2401:4900:627c:2a61:fc13:88d:9b99:9c25/128
                                    On-link
  6    306 fe80::/64                On-link
 41    281 fe80::/64                On-link
  6    306 fe80::f8bb:f0d2:58f7:6e8c/128
                                    On-link
 41    281 fe80::fe7e:8045:d871:a810/128
                                    On-link
  1    331 ff00::/8                 On-link
  6    306 ff00::/8                 On-link
 41    281 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None
```

RESULT

Hence, the study of basic networking commands in window operating system is studied.