COMPUTER NETWORKS LAB

Practical-1

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AIM: To study Network Devices and network administrator Commands for Windows & Linux.

Part-1 Windows Commands

1. **ipconfig**: Displays the network configuration of a computer, including its IP address, subnet mask, default gateway, and more.

```
C:\Users\acer>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

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

Wireless LAN adapter Local Area Connection* 9:

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

Wireless LAN adapter Local Area Connection* 10:

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

Wireless LAN adapter Wi-Fi:

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

Ethernet adapter Bluetooth Network Connection:

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

2. **netstat -o**: Shows a list of active network connections along with the associated process ID (PID) on a Windows system.

```
C:\Users\acer>netstat -o

Active Connections

  Proto  Local Address          Foreign Address        State           PID
  TCP    [::1]:1521             DESKTOP-A68C9DE:53576   ESTABLISHED     7176
  TCP    [::1]:53576            DESKTOP-A68C9DE:1521    ESTABLISHED     10924
```

3. **netstat -a:** Lists all active network connections and listening ports on a computer.

```
C:\Users\acer>netstat -a

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:445            DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:1521           DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:5040           DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:49664          DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:49665          DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:49666          DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:49667          DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:49668          DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:49670          DESKTOP-A68C9DE:0       LISTENING
  TCP    0.0.0.0:52751          DESKTOP-A68C9DE:0       LISTENING
  TCP    127.0.0.1:5500         DESKTOP-A68C9DE:0       LISTENING
  TCP    127.0.0.1:52753        DESKTOP-A68C9DE:0       LISTENING
  TCP    127.0.0.1:52754        DESKTOP-A68C9DE:0       LISTENING
  TCP    127.0.0.1:52755        DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:135               DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:445               DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:1521              DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:49664             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:49665             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:49666             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:49667             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:49668             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:49670             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::]:52751             DESKTOP-A68C9DE:0       LISTENING
  TCP    [::1]:1521             DESKTOP-A68C9DE:53576   ESTABLISHED
  TCP    [::1]:49669            DESKTOP-A68C9DE:0       LISTENING
  TCP    [::1]:52075            DESKTOP-A68C9DE:0       LISTENING
  TCP    [::1]:53576            DESKTOP-A68C9DE:1521    ESTABLISHED
  UDP    0.0.0.0:5050           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    127.0.0.1:1900         *:*
  UDP    127.0.0.1:49664        127.0.0.1:49664
  UDP    127.0.0.1:53882        *:*
  UDP    [::]:5353              *:*
  UDP    [::1]:1900             *:*
  UDP    [::1]:53881            *:*
```

4. **netstat-rn**: Displays the routing table, showing how network traffic is routed in the system.

```
C:\Users\acer>netstat -rn
===========================================================================
Interface List
 23...08 97 98 ec 58 8b ......Realtek PCIe GbE Family Controller
 17...da f3 bc 77 72 33 ......Microsoft Wi-Fi Direct Virtual Adapter
 20...da f3 bc 77 62 23 ......Microsoft Wi-Fi Direct Virtual Adapter #2
 15...d8 f3 bc 77 52 13 ......MediaTek Wi-Fi 6 MT7921 Wireless LAN Card
 11...d8 f3 bc 77 52 14 ......Bluetooth Device (Personal Area Network)
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
        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
        224.0.0.0        240.0.0.0         On-link        127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link        127.0.0.1    331
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  1    331 ::1/128                  On-link
  1    331 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None
```

5. **arp -a:** Shows the ARP (Address Resolution Protocol) table, which maps IP addresses to MAC (Media Access Control) addresses on a Windows system.

```
C:\Windows\System32>arp -a

Interface: 192.168.61.99 --- 0xf
  Internet Address      Physical Address      Type
  192.168.61.97         7a-c0-72-4f-25-a8     dynamic
  192.168.61.255        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
```

6. **getmac**: Retrieves the MAC (Media Access Control) address of the local computer's network

```
C:\Users\acer>getmac

Physical Address    Transport Name

==================  =====================================================
D8-F3-BC-77-52-13   Media disconnected

08-97-98-EC-58-8B   Media disconnected

D8-F3-BC-77-52-14   Media disconnected
```

7. **whoami**: Displays the name of the currently logged-in user on a Windows system
8. **hostname**: Prints the hostname of the computer, which is its unique name on a network.
9. **systeminfo**: Provides detailed information about the computer's hardware and software, including the operating system version, installed updates, and more.

10. **nslookup**: Allows you to query DNS (Domain Name System) servers to resolve domain names into IP addresses or retrieve other DNS information.

```
C:\Users\acer>nslookup www.rknec.edu
Server:  UnKnown
Address:  192.168.61.97

Non-authoritative answer:
Name:    rknec.edu
Address:  143.95.251.8
Aliases:  www.rknec.edu
```

11. **tracert**: Traces the route taken by network packets to reach a destination IP address, displaying information about each hop along the way.

```
C:\Users\acer>tracert www.rknec.edu

Tracing route to rknec.edu [143.95.251.8]
over a maximum of 30 hops:

  1    95 ms     6 ms    11 ms  192.168.61.97
  2   131 ms    72 ms    85 ms  106.208.191.225
  3   125 ms    78 ms    59 ms  117.96.31.133
  4   114 ms    82 ms    65 ms  nsg-corporate-153.207.186.122.airtel.in [122.186.207.153]
  5   179 ms   171 ms   340 ms  116.119.61.232
  6   312 ms   312 ms   190 ms  mei-b5-link.ip.twelve99.net [62.115.42.118]
  7   297 ms   198 ms   189 ms  prs-bb1-link.ip.twelve99.net [62.115.124.54]
  8   226 ms   183 ms   308 ms  ldn-bb1-link.ip.twelve99.net [62.115.135.24]
  9   595 ms   454 ms   800 ms  nyk-bb2-link.ip.twelve99.net [62.115.113.20]
 10   423 ms   619 ms   415 ms  palo-b24-link.ip.twelve99.net [62.115.122.36]
 11   361 ms   346 ms   342 ms  salt-b2-link.ip.twelve99.net [62.115.140.53]
 12   339 ms   355 ms   354 ms  newfolddigital-ic-380138.ip.twelve99-cust.net [80.239.167.103]
 13   398 ms   367 ms   387 ms  69-195-64-105.unifiedlayer.com [69.195.64.105]
 14   357 ms   365 ms   347 ms  po99.prv-leaf8a.net.unifiedlayer.com [162.144.240.33]
 15   427 ms   717 ms   420 ms  ip-143-95-251-8.iplocal [143.95.251.8]

Trace complete.
```

12.route print: Shows the routing table on a Windows system, displaying information about how network traffic is directed.

```
C:\Users\acer>route print
===========================================================================
Interface List
 23...08 97 98 ec 58 8b ......Realtek PCIe GbE Family Controller
 17...da f3 bc 77 72 33 ......Microsoft Wi-Fi Direct Virtual Adapter
 20...da f3 bc 77 62 23 ......Microsoft Wi-Fi Direct Virtual Adapter #2
 15...d8 f3 bc 77 52 13 ......MediaTek Wi-Fi 6 MT7921 Wireless LAN Card
 11...d8 f3 bc 77 52 14 ......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    192.168.61.97   192.168.61.99     55
        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
     192.168.61.0    255.255.255.0         On-link    192.168.61.99    311
    192.168.61.99  255.255.255.255         On-link    192.168.61.99    311
   192.168.61.255  255.255.255.255         On-link    192.168.61.99    311
        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    192.168.61.99    311
  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    192.168.61.99    311
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  1    331 ::1/128                  On-link
 15    311 fe80::/64                On-link
 15    311 fe80::ca03:5882:ba41:e860/128
                                    On-link
  1    331 ff00::/8                 On-link
 15    311 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None
```

Part-02 Linux Commands

```
akshat@VEDANT:~/Desktop/a69_vedant$ # display all multicast network subscribed by this host
akshat@VEDANT:~/Desktop/a69_vedant$ netstat -g
IPv6/IPv4 Group Memberships
Interface       RefCnt Group
--------------- ------ --------------------
lo              1      mdns.mcast.net
lo              1      all-systems.mcast.net
enp0s3          1      mdns.mcast.net
enp0s3          1      all-systems.mcast.net
lo              1      ff02::fb
lo              1      ip6-allnodes
lo              1      ff01::1
enp0s3          1      ff02::1:ffec:c79f
enp0s3          1      ff02::fb
enp0s3          1      ip6-allnodes
enp0s3          1      ff01::1
akshat@VEDANT:~/Desktop/a69_vedant$ 
```

```
akshat@VEDANT:~/Desktop/a69_vedant$ # display only UDP connection
akshat@VEDANT:~/Desktop/a69_vedant$ netstat --udp
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
udp        0      0 VEDANT:bootpc           _gateway:bootps         ESTABLISHED
akshat@VEDANT:~/Desktop/a69_vedant$ 
```

```
akshat@VEDANT:~/Desktop/a69_vedant$ # display only tcp connection
akshat@VEDANT:~/Desktop/a69_vedant$ netstat --tcp
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address          State
tcp        0      0 VEDANT:53794           bom07s28-in-f3.1e:https  ESTABLISHED
tcp        0      0 VEDANT:54120           bom12s21-in-f5.1e:https  TIME_WAIT
tcp        0      0 VEDANT:41576           bom07s30-in-f14.1:https  ESTABLISHED
tcp        0      0 VEDANT:60230           55.65.117.34.bc.g:https  ESTABLISHED
akshat@VEDANT:~/Desktop/a69_vedant$ 
```

```
akshat@VEDANT:~/Desktop/a69_vedant$ nslookup google.com
Server:         127.0.0.53
Address:        127.0.0.53#53

Non-authoritative answer:
Name:   google.com
Address: 142.251.42.46
Name:   google.com
Address: 2404:6800:4009:830::200e

akshat@VEDANT:~/Desktop/a69_vedant$ 
```

```
akshat@VEDANT:~/Desktop/a69_vedant$ traceroute www.google.com
traceroute to www.google.com (142.251.42.100), 30 hops max, 60 byte packets
 1  _gateway (10.0.2.2)  1.318 ms  1.401 ms  1.376 ms
 2  * * *
 3  * * *
 4  * * *
 5  * * *
 6  * * *
 7  * * *
 8  * * *
 9  * * *
10  * * *
11  * * *
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  * * *
18  * * *
19  * * *
20  * * *
21  * * *
22  * * *
```

```
akshat@VEDANT:~/Desktop/a69_vedant$ # display routing table
akshat@VEDANT:~/Desktop/a69_vedant$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         _gateway        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
link-local      0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
akshat@VEDANT:~/Desktop/a69_vedant$ # display kernel IP routing information
akshat@VEDANT:~/Desktop/a69_vedant$ netstat -rn
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
0.0.0.0         10.0.2.2        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
169.254.0.0     0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
akshat@VEDANT:~/Desktop/a69_vedant$
```
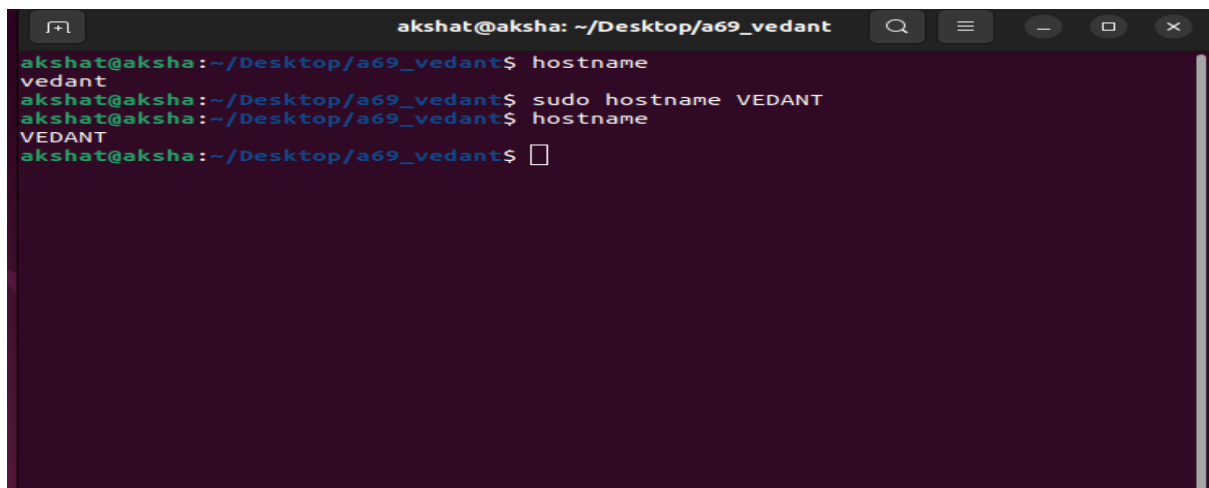
```
.
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Processing triggers for man-db (2.10.2-1) ...
akshat@VEDANT:~/Desktop/a69_vedant$ ifconfig
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::73c9:d863:2cec:c79f  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:28:0f:d4  txqueuelen 1000  (Ethernet)
        RX packets 154869  bytes 223868494 (223.8 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 17336  bytes 3367438 (3.3 MB)
        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 1995  bytes 199317 (199.3 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1995  bytes 199317 (199.3 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

akshat@VEDANT:~/Desktop/a69_vedant$
```

```
akshat@VEDANT:~/Desktop/a69_vedant$ ping www.google.com
PING www.google.com (142.251.42.100) 56(84) bytes of data.
64 bytes from bom07s45-in-f4.1e100.net (142.251.42.100): icmp_seq=1 ttl=54 time=
95.4 ms
64 bytes from bom07s45-in-f4.1e100.net (142.251.42.100): icmp_seq=2 ttl=54 time=
47.8 ms
64 bytes from bom07s45-in-f4.1e100.net (142.251.42.100): icmp_seq=3 ttl=54 time=
49.2 ms
64 bytes from bom07s45-in-f4.1e100.net (142.251.42.100): icmp_seq=4 ttl=54 time=
59.3 ms
64 bytes from bom07s45-in-f4.1e100.net (142.251.42.100): icmp_seq=5 ttl=54 time=
58.3 ms
64 bytes from bom07s45-in-f4.1e100.net (142.251.42.100): icmp_seq=6 ttl=54 time=
51.0 ms
^C
--- www.google.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5168ms
rtt min/avg/max/mdev = 47.796/60.191/95.438/16.352 ms
akshat@VEDANT:~/Desktop/a69_vedant$
```

Conclusion: In this practical we successfully packet run various commands of networking on windows and linux.