NETWORKING &
SYSTEM ADMINISTRATION LAB
20MCA136

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Networking Commands

- Every system is connected to numerous different networks and systems through internal or external network channels.
- These network settings often run into issues and affect the system's working.
- Such network problems can be resolved using 'networking commands.'

- These commands are specifically designed to troubleshoot network problems with minimum complexity using the windows command prompt tool.

Networking Commands

1. ipconfig
2. nslookup
3. ping
4. tracert (to trace the route)
5. route print

ip command

- ip command in Linux is a powerful utility for network configuration and management.
- It allows users to interact with various networking components such as network interfaces, routing tables, addresses, and more.

ipconfig

- IPCONFIG →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.

Ipconfig Output

```
C:\Users\admin>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::5c04:5e5f:fce:84e1%6
   IPv4 Address. . . . . . . . . . . : 192.168.56.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Ethernet adapter Ethernet 2:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::9302:31:1530:ba98%12
   IPv4 Address. . . . . . . . . . . : 192.168.6.110
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.6.100
```

IPCONFIG

- Ipconfig →
- Ipconfig/all -→ to display physical address & other details.

nslookup

- Nslookup → "Name Server Lookup"
- a useful command for getting information from the DNS server.
- It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record.
- Used to troubleshoot DNS-related problems.

Nslookup - output

```
C:\Users\admin>nslookup
Default Server:  UnKnown
Address:  192.168.6.254

> www.ajce.in
Server:  UnKnown
Address:  192.168.6.254

Non-authoritative answer:
Name:    ajce.in
Address:  103.148.156.198
Aliases:  www.ajce.in
```

cls

- To clear screen

ctrl+c

- Aborts the current execution

Ping

- Ping is a command used to test the reachability of a host on an IP network.
- It works by sending ICMP echo request packets to the target host and waiting for ICMP echo reply packets.
- This helps determine if the host is reachable and how long it takes for packets to travel to and from the target host.

- ✓ **To use it, simply open a command prompt or terminal and type "ping" followed by the target IP address or domain name.**
- ✓ **Example: ping www.example.com**

Ping - Output

```
C:\Users\admin>ping 103.148.156.198

Pinging 103.148.156.198 with 32 bytes of data:
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58

Ping statistics for 103.148.156.198:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 26ms, Maximum = 26ms, Average = 26ms
```

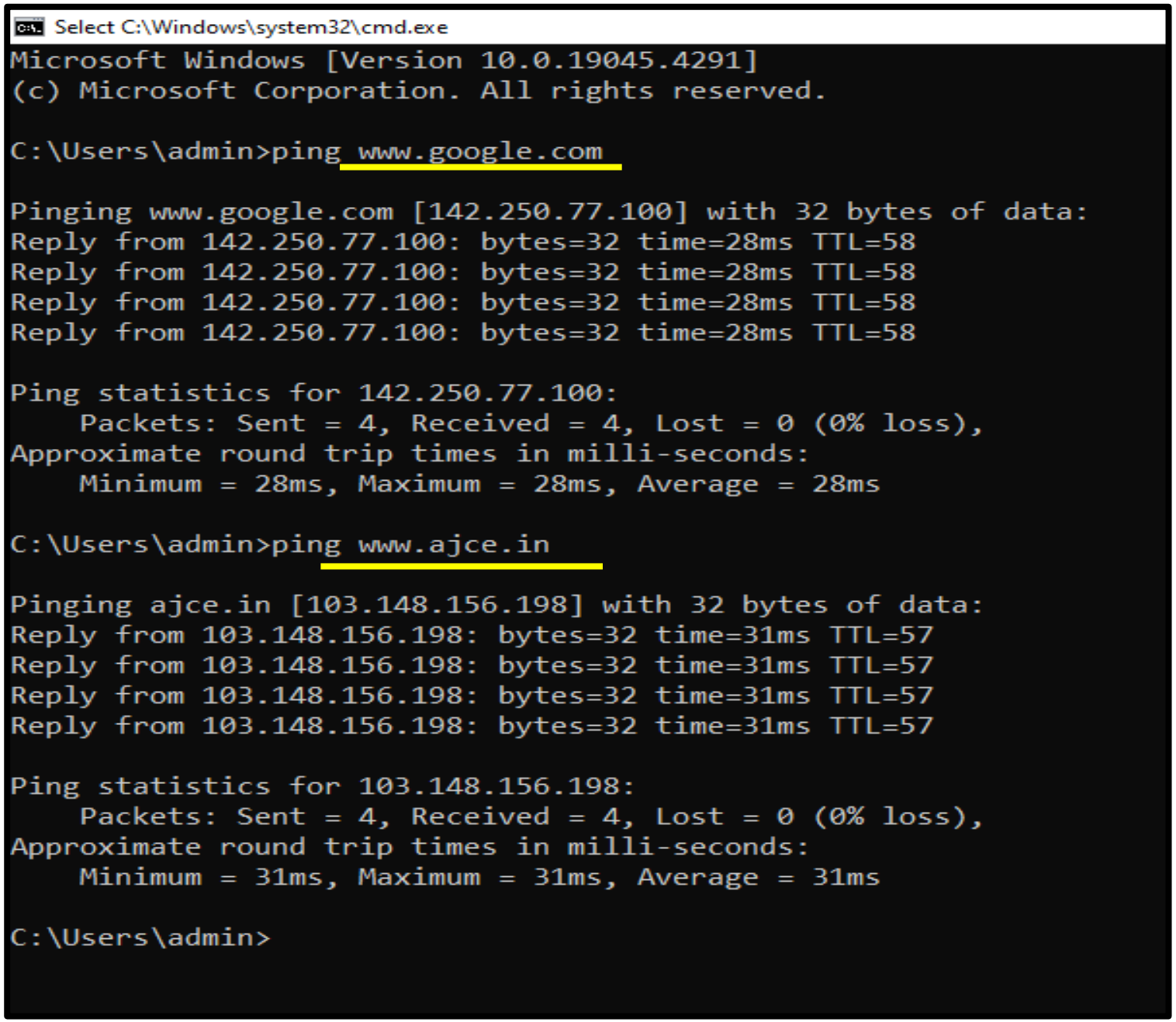
Ping

```
C:\Users\admin>ping www.ajce.in

Pinging ajce.in [103.148.156.198] with 32 bytes of data:
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58
Reply from 103.148.156.198: bytes=32 time=26ms TTL=58

Ping statistics for 103.148.156.198:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 26ms, Maximum = 26ms, Average = 26ms
```

Ping

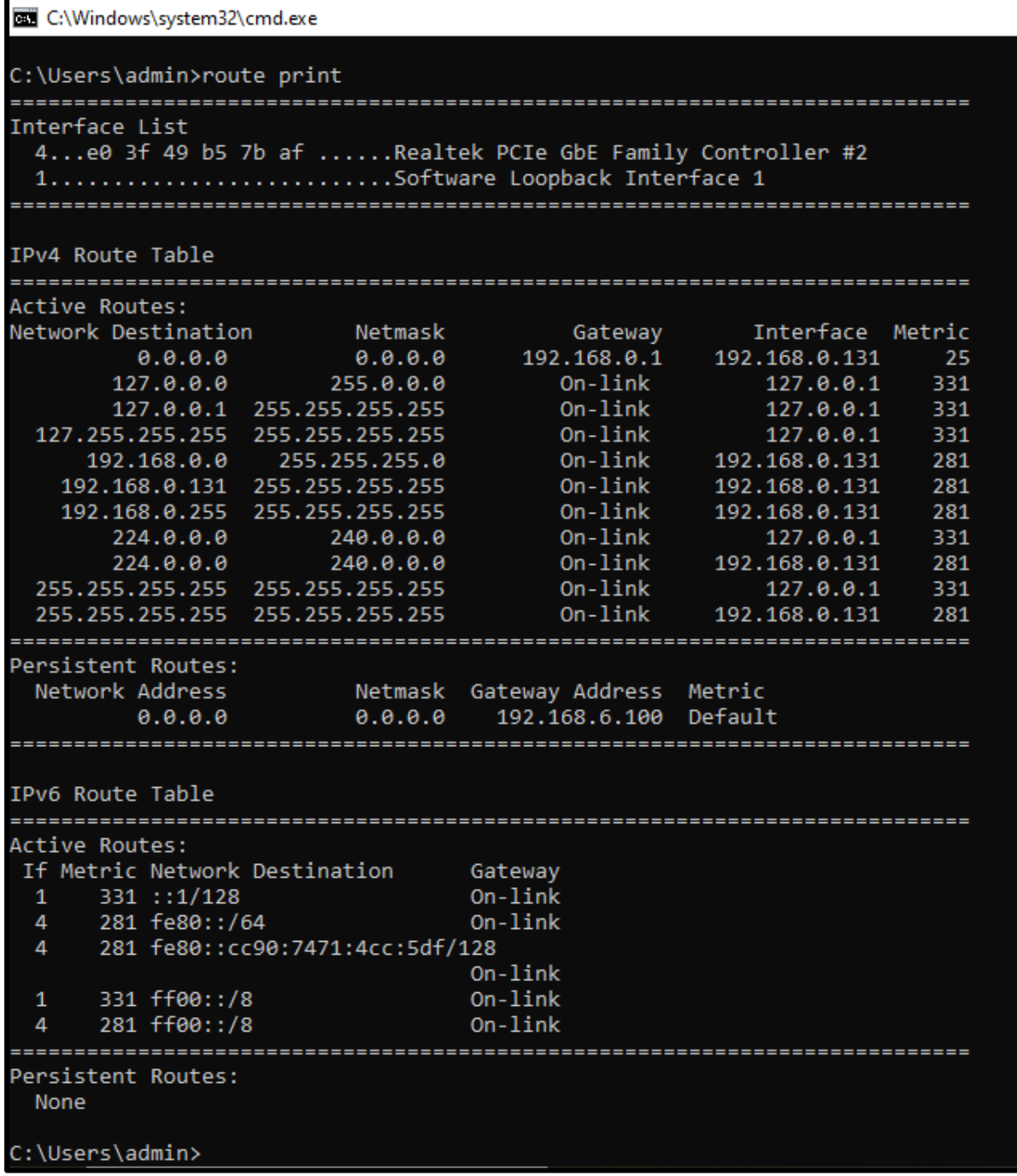

Select C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.4291]
(c) Microsoft Corporation. All rights reserved.
C:\Users\admin>ping www.google.com
Pinging www.google.com [142.250.77.100] with 32 bytes of data:
Reply from 142.250.77.100: bytes=32 time=28ms TTL=58
Reply from 142.250.77.100: bytes=32 time=28ms TTL=58
Reply from 142.250.77.100: bytes=32 time=28ms TTL=58
Reply from 142.250.77.100: bytes=32 time=28ms TTL=58
Ping statistics for 142.250.77.100:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 28ms, Maximum = 28ms, Average = 28ms
C:\Users\admin>ping www.ajce.in
Pinging ajce.in [103.148.156.198] with 32 bytes of data:
Reply from 103.148.156.198: bytes=32 time=31ms TTL=57
Reply from 103.148.156.198: bytes=32 time=31ms TTL=57
Reply from 103.148.156.198: bytes=32 time=31ms TTL=57
Reply from 103.148.156.198: bytes=32 time=31ms TTL=57
Ping statistics for 103.148.156.198:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 31ms, Maximum = 31ms, Average = 31ms
C:\Users\admin>

route (route print on Windows):

- The route command is used to view and manipulate the IP routing table in Windows.
- It displays the current routing table, including the destination network, gateway, interface, and metric.
- Additionally, it can be used to add or remove routes manually.
- Example: route print
- Displays and manipulates the IP routing table, showing the routing information used by the system to determine where to send packets.

route print

- In this example:
- The first route (0.0.0.0) is the default route, used for all packets with destinations not covered by more specific routes. It sends packets to the gateway at 192.168.0.1 via the interface with IP address 192.168.0.131.
- The second route (127.0.0.0) is for the loopback interface.
- The third route (192.168.0.0) is for the local network.
- The persistent route is set to make 192.168.6.100 the default gateway.



route print

- *Explanation of the columns:*

- **Network Destination:** The destination network or host.
- **Netmask**: The netmask associated with the destination.
- **Gateway**: The IP address of the **next hop** or **gateway.**
- **Interface:** The network interface associated with the route.
- **Metric**: The metric or **cost of the route**. Lower metrics indicate preferred routes.
- **Persistent Routes**: Routes that **persist across reboots.**

route print

C:\Windows\system32\cmd.exe

```
C:\Users\admin>route print
===========================================================================
Interface List
  4...e0 3f 49 b5 7b af ......Realtek PCIe GbE Family Controller #2
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0      192.168.0.1    192.168.0.131     25
        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
      192.168.0.0    255.255.255.0         On-link     192.168.0.131    281
    192.168.0.131  255.255.255.255         On-link     192.168.0.131    281
    192.168.0.255  255.255.255.255         On-link     192.168.0.131    281
        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     192.168.0.131    281
  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     192.168.0.131    281
===========================================================================
Persistent Routes:
  Network Address          Netmask  Gateway Address  Metric
          0.0.0.0          0.0.0.0    192.168.6.100  Default
===========================================================================

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  1    331 ::1/128                  On-link
  4    281 fe80::/64                On-link
  4    281 fe80::cc90:7471:4cc:5df/128
                                    On-link
  1    331 ff00::/8                 On-link
  4    281 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None

C:\Users\admin>
```

traceroute

- also known as tracert on Windows systems;
- a network diagnostic tool used to trace the path that an Internet Protocol (IP) packet takes from the source to the destination.
- It helps in identifying the routers or hops that the packet traverses and measuring the transit delays of the packets across the network.

3. Traceroute(tracert)

```
C:\Users\admin>traceroute
'traceroute' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\admin>traceroute google.com
'traceroute' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\admin>traceroute www.google.com
'traceroute' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\admin>tracert www.google.com

Tracing route to www.google.com [142.250.76.68]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms  dlinkrouter.local [192.168.0.1]
  2    <1 ms    <1 ms    <1 ms  192.168.6.100
  3     2 ms     2 ms     2 ms  172.24.9.34
  4     *        *        *     Request timed out.
  5     *        *        *     Request timed out.
  6    63 ms    64 ms    70 ms  72.14.218.250
  7    24 ms    22 ms    21 ms  142.251.227.213
  8    48 ms    55 ms    60 ms  142.250.228.187
  9    19 ms    19 ms    19 ms  maa05s14-in-f4.1e100.net [142.250.76.68]

Trace complete.

C:\Users\admin>
```