



Computer Network (01CE0410)

Lab Manual (2024-25)

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Practical 3: Demonstrate basic networking commands and Network configuration commands.

1. ipconfig – Displays basic IP configuration details of the system's network adapters.

```
Command Prompt
Microsoft Windows [Version 10.0.19045.4598]
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Z:\>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet 2:

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

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::6c5:9daa:97b0:7c6%14
    IPv4 Address. . . . . : 172.21.31.129
    Subnet Mask . . . . . : 255.255.254.0
    Default Gateway . . . . . : 192.168.16.3

Ethernet adapter VMware Network Adapter VMnet1:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::3161:aa1c:18f:4bd7%16
    IPv4 Address. . . . . : 192.168.209.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Ethernet adapter VMware Network Adapter VMnet8:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::2602:103:6ce5:ef9e%13
    IPv4 Address. . . . . : 192.168.223.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Z:\>
```

2. ipconfig /all – Shows detailed information about all network interfaces, including MAC addresses and DNS servers.

```
Command Prompt

Z:\>ipconfig/all

Windows IP Configuration

    Host Name . . . . . : MC220-CL129
    Primary Dns Suffix . . . . . : mefgl.com
    Node Type . . . . . : Hybrid
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No
    DNS Suffix Search List. . . . . : mefgl.com

Ethernet adapter Ethernet 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
    Description . . . . . : Sophos TAP Adapter
    Physical Address. . . . . : 00-FF-9F-07-1E-50
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix . :
    Description . . . . . : Realtek PCIe GbE Family Controller
    Physical Address. . . . . : 8C-EC-4B-96-5A-C4
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::6c5:9daa:97b0:7c6%14(Preferred)
    IPv4 Address. . . . . : 172.21.31.129(Preferred)
    Subnet Mask . . . . . : 255.255.254.0
    Default Gateway . . . . . : 192.168.16.3
    DHCPv6 IAID . . . . . : 222339399
    DHCPv6 Client DUID. . . . . : 00-01-00-01-2E-14-0A-66-8C-EC-4B-96-5A-C4
    DNS Servers . . . . . : 192.168.12.101
                           192.168.12.201
                           192.168.12.203
                           119.160.192.2
                           119.160.192.3
    NetBIOS over Tcpip. . . . . : Enabled

Ethernet adapter VMware Network Adapter VMnet1:

    Connection-specific DNS Suffix . :
    Description . . . . . : VMware Virtual Ethernet Adapter for VMnet1
    Physical Address. . . . . : 00-50-56-C0-00-01
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::3161:aa1c:18f:4bd7%16(Preferred)
    IPv4 Address. . . . . : 192.168.209.1(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : 27 January 2025 13:26:22
    Lease Expires . . . . . : 27 January 2025 14:09:34
    Default Gateway . . . . . :
    DHCP Server . . . . . : 192.168.209.254
```

3. hostname – Displays the computer's hostname (system name) on the network.

```
Z:\>hostname
MC220-CL129

Z:\>
```

4. getmac – Displays the MAC address of the network interfaces on the system.

```
Z:\>getmac

Physical Address      Transport Name
=====
8C-EC-4B-96-5A-C4    \Device\Tcpip_{AE6BAFD8-BF3F-407C-BC8F-959957514E44}
00-50-56-C0-00-01    \Device\Tcpip_{E630B2C5-8531-4353-9D41-18D3C063D040}
00-50-56-C0-00-08    \Device\Tcpip_{AC00086E-422C-451D-9EFD-9755656FF548}
00-FF-9F-07-1E-50    Media disconnected
```

5.systeminfo – Provides detailed information about the system configuration, including OS, memory, and network adapter info.

```
Z:\>systeminfo

Host Name:                MC220-CL129
OS Name:                  Microsoft Windows 10 Pro
OS Version:               10.0.19045 N/A Build 19045
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Member Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:         admin
Registered Organization:
Product ID:                00330-80000-00000-AA535
Original Install Date:     18-06-2024, 15:06:22
System Boot Time:          27-01-2025, 13:26:13
System Manufacturer:       Dell Inc.
System Model:              OptiPlex 3060
System Type:               x64-based PC
Processor(s):               1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 158 Stepping 10 GenuineIntel ~3000 Mhz
BIOS Version:              Dell Inc. 1.30.0, 29-03-2024
Windows Directory:         C:\Windows
System Directory:          C:\Windows\system32
Boot Device:                \Device\HarddiskVolume3
System Locale:              4009
Input Locale:               00004009
Time Zone:                 (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory:      16,207 MB
Available Physical Memory:  12,516 MB
Virtual Memory: Max Size:   18,639 MB
Virtual Memory: Available:  15,107 MB
Virtual Memory: In Use:     3,532 MB
Page File Location(s):      C:\pagefile.sys
Domain:                     mefgi.com
Logon Server:               \\ADS-PRIMARY101
Hotfix(s):                  8 Hotfix(s) Installed.
                           [01]: KB5039865
                           [02]: KB5037592
                           [03]: KB5011048
                           [04]: KB5015684
                           [05]: KB5039299
                           [06]: KB5037995
                           [07]: KB5039336
                           [08]: KB5034441
Network Card(s):            4 NIC(s) Installed.
                           [01]: Realtek PCIe GbE Family Controller
                               Connection Name: Ethernet
                               DHCP Enabled:    No
                               IP address(es)
                                   [01]: 172.21.31.129
                                   [02]: fe80::6c5:9daa:97b0:7c6
                           [02]: VMware Virtual Ethernet Adapter for VMnet1
                               Connection Name: VMware Network Adapter VMnet1
                               DHCP Enabled:    Yes
                               DHCP Server:     192.168.209.254
                               IP address(es)
                                   [01]: 192.168.209.1
                                   [02]: fe80::3161:aalc:18f:4bd7
                           [03]: VMware Virtual Ethernet Adapter for VMnet8
                               Connection Name: VMware Network Adapter VMnet8
                               DHCP Enabled:    Yes
                               DHCP Server:     192.168.223.254
                               IP address(es)
                                   [01]: 192.168.223.1
                                   [02]: fe80::2602:103:6ce5:ef9e
                           [04]: Sophos TAP Adapter
                               Connection Name: Ethernet 2
                               Status:          Media disconnected
```



6.ping – Sends an ICMP echo request to check connectivity to a remote host.

```
Z:\>ping www.google.com

Pinging www.google.com [142.250.70.100] with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 142.250.70.100: bytes=32 time=60ms TTL=58
Reply from 142.250.70.100: bytes=32 time=53ms TTL=58

Ping statistics for 142.250.70.100:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 53ms, Maximum = 60ms, Average = 56ms

Z:\>_
```

7. ping {ip addr} – Pings a specific IP address to test connectivity to that address.

```
Z:\>ping 142.250.70.100

Pinging 142.250.70.100 with 32 bytes of data:
Request timed out.
Reply from 142.250.70.100: bytes=32 time=53ms TTL=58
Request timed out.
Reply from 142.250.70.100: bytes=32 time=60ms TTL=58

Ping statistics for 142.250.70.100:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 53ms, Maximum = 60ms, Average = 56ms
```



8. tracert – Traces the route packets take to reach a destination, showing the hops along the way.

```
Z:\>tracert www.google.com
```

```
Tracing route to www.google.com [142.250.192.4]  
over a maximum of 30 hops:
```

1	3 ms	3 ms	3 ms	172.21.30.1
2	35 ms	51 ms	*	192.168.15.91
3	*	44 ms	*	119.160.199.81
4	69 ms	*	51 ms	10.50.79.1
5	61 ms	67 ms	61 ms	10.250.10.205
6	73 ms	65 ms	70 ms	72.14.202.41
7	52 ms	*	*	74.125.37.7
8	54 ms	53 ms	*	108.170.231.79
9	54 ms	67 ms	74 ms	bom12s14-in-f4.1e100.net [142.250.192.4]

```
Trace complete.
```

9. route print – Displays the routing table, showing routes and associated network interfaces.

```

Z:\>route print
=====
Interface List
11...00 ff 9f 07 1e 50 .....Sophos TAP Adapter
14...8c ec 4b 96 5a c4 .....Realtek PCIe GbE Family Controller
16...00 50 56 c0 00 01 .....VMware Virtual Ethernet Adapter for VMnet1
13...00 50 56 c0 00 08 .....VMware Virtual Ethernet Adapter for VMnet8
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway          Interface        Metric
0.0.0.0                    0.0.0.0          192.168.16.3     172.21.31.129    281
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
172.21.30.0                255.255.254.0    On-link          172.21.31.129    281
172.21.31.129              255.255.255.255  On-link          172.21.31.129    281
172.21.31.255              255.255.255.255  On-link          172.21.31.129    281
192.168.209.0              255.255.255.0    On-link          192.168.209.1    291
192.168.209.1              255.255.255.255  On-link          192.168.209.1    291
192.168.209.255            255.255.255.255  On-link          192.168.209.1    291
192.168.223.0              255.255.255.0    On-link          192.168.223.1    291
192.168.223.1              255.255.255.255  On-link          192.168.223.1    291
192.168.223.255            255.255.255.255  On-link          192.168.223.1    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          192.168.209.1    291
224.0.0.0                  240.0.0.0        On-link          192.168.223.1    291
224.0.0.0                  240.0.0.0        On-link          172.21.31.129    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          192.168.209.1    291
255.255.255.255            255.255.255.255  On-link          192.168.223.1    291
255.255.255.255            255.255.255.255  On-link          172.21.31.129    281
=====
Persistent Routes:
Network Address            Netmask  Gateway Address  Metric
0.0.0.0                    0.0.0.0   192.168.16.3     Default
=====

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination Gateway
1 331 ::1/128 On-link
16 291 fe80::/64 On-link
13 291 fe80::/64 On-link
14 281 fe80::/64 On-link
14 281 fe80::6c5:9daa:97b0:7c6/128 On-link
13 291 fe80::2602:103:6ce5:ef9e/128 On-link
16 291 fe80::3161:aa1c:18f:4bd7/128 On-link
1 331 ff00::/8 On-link
16 291 ff00::/8 On-link
13 291 ff00::/8 On-link

```



10. pathping – Combines the functionality of ping and tracert, providing packet loss and latency information at each hop.

```
Z:\>pathping www.google.com

Tracing route to www.google.com [142.250.76.164]
over a maximum of 30 hops:
 0  MC220-CL129.mefgi.com [172.21.31.129]
 1  172.21.30.1
 2  192.168.15.91
 3  119.160.199.81
 4  10.50.79.1
 5  * * 10.250.10.205
 6  * 72.14.202.41
 7  72.14.238.215
 8  * * *

Computing statistics for 175 seconds...
```

Hop	RTT	Source to Here Lost/Sent = Pct	This Node/Link Lost/Sent = Pct	Address
0				MC220-CL129.mefgi.com [172.21.31.129]
1	6ms	0/ 100 = 0%	0/ 100 = 0%	172.21.30.1
2	49ms	44/ 100 = 44%	11/ 100 = 11%	192.168.15.91
3	52ms	33/ 100 = 33%	0/ 100 = 0%	119.160.199.81
4	48ms	49/ 100 = 49%	14/ 100 = 14%	10.50.79.1
5	61ms	51/ 100 = 51%	16/ 100 = 16%	10.250.10.205
6	72ms	43/ 100 = 43%	8/ 100 = 8%	72.14.202.41
7	66ms	35/ 100 = 35%	0/ 100 = 0%	72.14.238.215

Trace complete.

11. arp -a – Displays the current ARP (Address Resolution Protocol) table, mapping IP addresses to MAC addresses.

```
Z:\>arp -a

Interface: 192.168.223.1 --- 0xd
  Internet Address      Physical Address      Type
  192.168.223.254       00-50-56-e2-65-28     dynamic
  192.168.223.255       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: 172.21.31.129 --- 0xe
  Internet Address      Physical Address      Type
  172.21.30.1           00-19-e8-f8-26-4f     dynamic
  172.21.31.255         ff-ff-ff-ff-ff-ff     static
  192.168.16.3          00-19-e8-f8-26-4f     dynamic
  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

Interface: 192.168.209.1 --- 0x10
  Internet Address      Physical Address      Type
  192.168.209.254       00-50-56-e5-06-f0     dynamic
  192.168.209.255       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
```

12. nslookup – Queries DNS servers to obtain domain name or IP address information.

```
Z:\>nslookup www.google.com
Server:  ADS-PRIMARY101.mefgi.com
Address:  192.168.12.101

DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
DNS request timed out.
    timeout was 2 seconds.
Name:      www.google.com
Address:   2404:6800:4009:827::2004
```

13. netstat – Displays active network connections, listening ports, and routing table.

```
Z:\>netstat

Active Connections

Proto Local Address           Foreign Address         State
TCP   127.0.0.1:49671          MC220-CL129:49672      ESTABLISHED
TCP   127.0.0.1:49672          MC220-CL129:49671      ESTABLISHED
TCP   127.0.0.1:58595          MC220-CL129:60110      ESTABLISHED
TCP   127.0.0.1:60110          MC220-CL129:58595      ESTABLISHED
TCP   172.21.31.129:56541      150.171.85.254:https    CLOSE_WAIT
TCP   172.21.31.129:56545      204.79.197.222:https    ESTABLISHED
TCP   172.21.31.129:56547      13.107.12.254:https     ESTABLISHED
TCP   172.21.31.129:56548      13.107.253.48:https     CLOSE_WAIT
TCP   172.21.31.129:56631      ADS-PRIMARY101:microsoft-ds ESTABLISHED
TCP   172.21.31.129:56665      a23-45-207-48:https     TIME_WAIT
TCP   172.21.31.129:56674      20.44.10.122:https      ESTABLISHED
TCP   172.21.31.129:56675      204.79.197.239:https    ESTABLISHED
TCP   172.21.31.129:56676      204.79.197.239:https    ESTABLISHED
TCP   172.21.31.129:56682      ADS-PRIMARY101:microsoft-ds ESTABLISHED
TCP   172.21.31.129:58493      a104-81-138-83:https    ESTABLISHED
TCP   172.21.31.129:58732      13.107.219.254:https    CLOSE_WAIT
TCP   172.21.31.129:58739      13.107.18.254:https     ESTABLISHED
TCP   172.21.31.129:58740      150.171.69.254:https    ESTABLISHED
TCP   172.21.31.129:58744      13.107.213.254:https    CLOSE_WAIT
TCP   172.21.31.129:58789      52.113.196.254:https    ESTABLISHED
TCP   172.21.31.129:58801      13.107.246.254:https    CLOSE_WAIT
TCP   172.21.31.129:58806      42.106.164.138:https    ESTABLISHED
```

14. netstat -a – Shows all active connections and listening ports.

```
Z:\>netstat -a
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:80	MC220-CL129:0	LISTENING
TCP	0.0.0.0:135	MC220-CL129:0	LISTENING
TCP	0.0.0.0:445	MC220-CL129:0	LISTENING
TCP	0.0.0.0:902	MC220-CL129:0	LISTENING
TCP	0.0.0.0:912	MC220-CL129:0	LISTENING
TCP	0.0.0.0:3389	MC220-CL129:0	LISTENING
TCP	0.0.0.0:5040	MC220-CL129:0	LISTENING
TCP	0.0.0.0:5560	MC220-CL129:0	LISTENING
TCP	0.0.0.0:5580	MC220-CL129:0	LISTENING
TCP	0.0.0.0:5800	MC220-CL129:0	LISTENING
TCP	0.0.0.0:5900	MC220-CL129:0	LISTENING
TCP	0.0.0.0:38000	MC220-CL129:0	LISTENING
TCP	0.0.0.0:39000	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49664	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49665	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49666	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49667	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49668	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49669	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49670	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49673	MC220-CL129:0	LISTENING
TCP	0.0.0.0:49674	MC220-CL129:0	LISTENING
TCP	127.0.0.1:4502	MC220-CL129:0	LISTENING
TCP	127.0.0.1:8001	MC220-CL129:0	LISTENING
TCP	127.0.0.1:49671	MC220-CL129:49672	ESTABLISHED
TCP	127.0.0.1:49672	MC220-CL129:49671	ESTABLISHED
TCP	127.0.0.1:58595	MC220-CL129:60110	ESTABLISHED
TCP	127.0.0.1:60110	MC220-CL129:0	LISTENING
TCP	127.0.0.1:60110	MC220-CL129:58595	ESTABLISHED
TCP	172.21.31.129:139	MC220-CL129:0	LISTENING
TCP	172.21.31.129:56541	150.171.85.254:https	CLOSE_WAIT
TCP	172.21.31.129:56545	204.79.197.222:https	ESTABLISHED
TCP	172.21.31.129:56547	13.107.12.254:https	ESTABLISHED

15. netstat -e – Displays Ethernet statistics, such as the number of bytes and packets sent/received.

```
Z:\>netstat -e
Interface Statistics


```

	Received	Sent
Bytes	106442611	18295768
Unicast packets	80016	96338
Non-unicast packets	340660	4450
Discards	0	0
Errors	0	0
Unknown protocols	0	

16. ipconfig /flushdns – Clears the DNS resolver cache to force fresh DNS lookups.

```
Z:\>ipconfig/flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.
```

17. nbtstat -r – Displays NetBIOS over TCP/IP statistics, including the resolution of names from the NetBIOS name cache.

```
Z:\>
Z:\>nbtstat/r

NetBIOS Names Resolution and Registration Statistics
-----

Resolved By Broadcast      = 0
Resolved By Name Server   = 0

Registered By Broadcast   = 9
Registered By Name Server = 0
```