Darshan Institute of Engineering & Technology

Certificate

This is to certify that

Mr./Miss Kagathara Nirav G. Enrolment No. 22010101443, B.Tech. CSE Semester 5th has satisfactorily completed the course in the Subject *Computer Networks (2101CS501)* in this Institute.

Submission Date:___/___/_____

Staff in Charge **Program Coordinator**

_____ _____

Index

Sr.	Title	Date	Sign
1	Study of basic networking commands and IP configuration.	11/06/2024	
2	Study of different types of network cables & connectors and practically implement the cross-wired cable and straight through cable using clamping tool.	18/06/2024	
3	Study of different network devices in detail.	10/07/2024	
4	Installation of Network Simulator (Packet Tracer) and Implement different LAN topologies.	12/07/2024	
5	Study the concept of VLAN using packet tracer.	07/07/2024	
6	Study the application layer protocol DNS, DHCP, FTP.	06/08/2024	
7	Study Client-Server Socket programming - TCP & UDP	20/08/2024	
8	Study Packet capture and header analysis by Wireshark (TCP, UDP, IP).	20/08/2024	
9	Study of IP Addressing and sub-netting.	11/09/2024	
10	Study the concept of routing using packet tracer. (Static Routing)	16/09/2024	
11	Study the concept of routing using packet tracer. (Dynamic Routing)	16/09/2024	
12	To develop network using distance vector routing protocol and link state routing protocol.	20/09/2024	
13	Study & Survey of Institute organization network infrastructure.	20/08/2024	

Date: 6/11/2024

Lab Practical #01:
Study of basic networking commands and IP configuration.

Practical Assignment #01:

1. Perform and explain various networking commands listed below:
    i. ipconfig
    ii. ping
    iii. getmac
    iv. systeminfo
    v. traceroute / tracert
    vi. netstat
    vii. nslookup
    viii. hostname
    ix. pathping
    x. arp

1. ipconfig

Description:

The ipconfig command is a useful utility in Windows operating systems that provides information about a computer's network interfaces and IP configuration. The ipconfig (Internet Protocol Configuration) command is a command-line utility in Microsoft Windows that provides detailed information about the network interfaces and their configurations on a computer. It is an essential tool for network troubleshooting and management. Here are the details about the command and its various options:

No.	Option	Description
1	Ipconfig /all	Display full configuration information.
2	Ipconfig /release	Release the IPv4 address for the specified adapter.
3	Ipconfig /renew	Renew the IPv4 address for the specified adapter.
4	Ipconfig /flushdns	Purges the DNS Resolver cache.
5	Ipconfig /showclassid	Displays all the dhcp class IDs allowed for adapter.

Implementation:

- ipconfig /all

Date: 6/11/2024

```
Microsoft Windows [Version 10.0.22631.3672]
(c) Microsoft Corporation. All rights reserved.

C:\Users\LENOVO>i.ipconfig
'i.ipconfig' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\LENOVO>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::7354:500b:59aa:e839%22
   IPv4 Address. . . . . . . . . . . : 10.36.15.29
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . : 10.36.1.1

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\LENOVO>
```

- Ipconfig /all

```
C:\Users\LENOVO>ipconfig /all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : nirav
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Mixed
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Realtek PCIe GbE Family Controller
   Physical Address. . . . . . . . . : E4-A8-DF-E5-18-F6
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #3
   Physical Address. . . . . . . . . : E0-D0-45-EE-3D-8E
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #4
   Physical Address. . . . . . . . . : E2-D0-45-EE-3D-8D
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6 AX201 160MHz
   Physical Address. . . . . . . . . : E0-D0-45-EE-3D-8D
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::7354:500b:59aa:e839%22(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.36.15.29(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Lease Obtained. . . . . . . . . . : Tuesday, June 11, 2024 8:09:26 AM
   Lease Expires . . . . . . . . . . : Tuesday, June 11, 2024 5:14:13 PM
   Default Gateway . . . . . . . . . : 10.36.1.1
   DHCP Server . . . . . . . . . . . : 10.36.1.2
   DHCPv6 IAID . . . . . . . . . . . : 266391621
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2A-76-1E-1B-E4-A8-DF-E5-18-F6
   DNS Servers . . . . . . . . . . . : 8.8.8.8
                                       4.2.2.2
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : E0-D0-45-EE-3D-91
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

C:\Users\LENOVO>
```

Date: 6/11/2024

- Ipconfig /release

```
   DHCPv6 IAID . . . . . . . . . . . : 266391621
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2A-76-1E-1B-E4-A8-DF-E5-18-F6
   DNS Servers . . . . . . . . . . . : 8.8.8.8
                                       4.2.2.2
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : E0-D0-45-EE-3D-91
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

C:\Users\LENOVO>

C:\Users\LENOVO>ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Ethernet adapter Ethernet:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::7354:500b:59aa:e839%22
   Default Gateway . . . . . . . . . :

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\LENOVO>
```

- Ipconfig /renew

```
C:\Users\LENOVO>ipconfig /renew

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Ethernet adapter Ethernet:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::7354:500b:59aa:e839%22
   IPv4 Address. . . . . . . . . . . : 10.36.15.29
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . : 10.36.1.1

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\LENOVO>
```

Date: 6/11/2024

- Ipconfig /flushdns

- Ipconfig /showclassid

Date: 6/11/2024

2. ping

Description:

The ping command is a network utility used to test the reachability of a host on an Internet Protocol (IP) network and to measure the round-trip time for messages sent from the originating host to a destination computer. It helps diagnose network connectivity issues.

No.	Option	Description
1	ping -t example	Ping the specified host until stopped.
2	ping -n count example	Number of echo requests to send.
3	ping –a example	Resolve addresses to hostnames.
4	Ping -i TTL	Time To Live.
5	Ping -l size	Send Echo Request messages with a specified buffer size in bytes.

Implementation:

- ping –t www.google.com

```
C:\Users\LENOVO>ping -t google.com

Pinging google.com [142.250.192.14] with 32 bytes of data:
Reply from 142.250.192.14: bytes=32 time=19ms TTL=116
Reply from 142.250.192.14: bytes=32 time=44ms TTL=116
Reply from 142.250.192.14: bytes=32 time=23ms TTL=116
Reply from 142.250.192.14: bytes=32 time=95ms TTL=116
Reply from 142.250.192.14: bytes=32 time=23ms TTL=116
Reply from 142.250.192.14: bytes=32 time=25ms TTL=116
Reply from 142.250.192.14: bytes=32 time=23ms TTL=116
Reply from 142.250.192.14: bytes=32 time=26ms TTL=116
Reply from 142.250.192.14: bytes=32 time=51ms TTL=116
Reply from 142.250.192.14: bytes=32 time=26ms TTL=116
Reply from 142.250.192.14: bytes=32 time=25ms TTL=116
Reply from 142.250.192.14: bytes=32 time=41ms TTL=116
Reply from 142.250.192.14: bytes=32 time=27ms TTL=116
Reply from 142.250.192.14: bytes=32 time=36ms TTL=116
Reply from 142.250.192.14: bytes=32 time=29ms TTL=116
Reply from 142.250.192.14: bytes=32 time=21ms TTL=116
Reply from 142.250.192.14: bytes=32 time=52ms TTL=116
Reply from 142.250.192.14: bytes=32 time=65ms TTL=116
Reply from 142.250.192.14: bytes=32 time=236ms TTL=116
Reply from 142.250.192.14: bytes=32 time=82ms TTL=116
Reply from 142.250.192.14: bytes=32 time=93ms TTL=116
Reply from 142.250.192.14: bytes=32 time=101ms TTL=116
Reply from 142.250.192.14: bytes=32 time=33ms TTL=116
Reply from 142.250.192.14: bytes=32 time=25ms TTL=116
Reply from 142.250.192.14: bytes=32 time=162ms TTL=116
Reply from 142.250.192.14: bytes=32 time=21ms TTL=116
Reply from 142.250.192.14: bytes=32 time=152ms TTL=116
Reply from 142.250.192.14: bytes=32 time=76ms TTL=116
Reply from 142.250.192.14: bytes=32 time=88ms TTL=116
Reply from 142.250.192.14: bytes=32 time=103ms TTL=116
Request timed out.
Reply from 142.250.192.14: bytes=32 time=23ms TTL=116
Reply from 142.250.192.14: bytes=32 time=98ms TTL=116
Reply from 142.250.192.14: bytes=32 time=42ms TTL=116
Reply from 142.250.192.14: bytes=32 time=30ms TTL=116
Reply from 142.250.192.14: bytes=32 time=50ms TTL=116
Reply from 142.250.192.14: bytes=32 time=56ms TTL=116
Reply from 142.250.192.14: bytes=32 time=25ms TTL=116
Reply from 142.250.192.14: bytes=32 time=24ms TTL=116
Reply from 142.250.192.14: bytes=32 time=98ms TTL=116
Reply from 142.250.192.14: bytes=32 time=26ms TTL=116
Reply from 142.250.192.14: bytes=32 time=225ms TTL=116
Reply from 142.250.192.14: bytes=32 time=29ms TTL=116
Reply from 142.250.192.14: bytes=32 time=54ms TTL=116
Reply from 142.250.192.14: bytes=32 time=29ms TTL=116
Reply from 142.250.192.14: bytes=32 time=25ms TTL=116
Reply from 142.250.192.14: bytes=32 time=19ms TTL=116
Reply from 142.250.192.14: bytes=32 time=22ms TTL=116
Reply from 142.250.192.14: bytes=32 time=19ms TTL=116
Request timed out.
Reply from 142.250.192.14: bytes=32 time=22ms TTL=116
```

- ping –n count www.google.com

Date: 6/11/2024

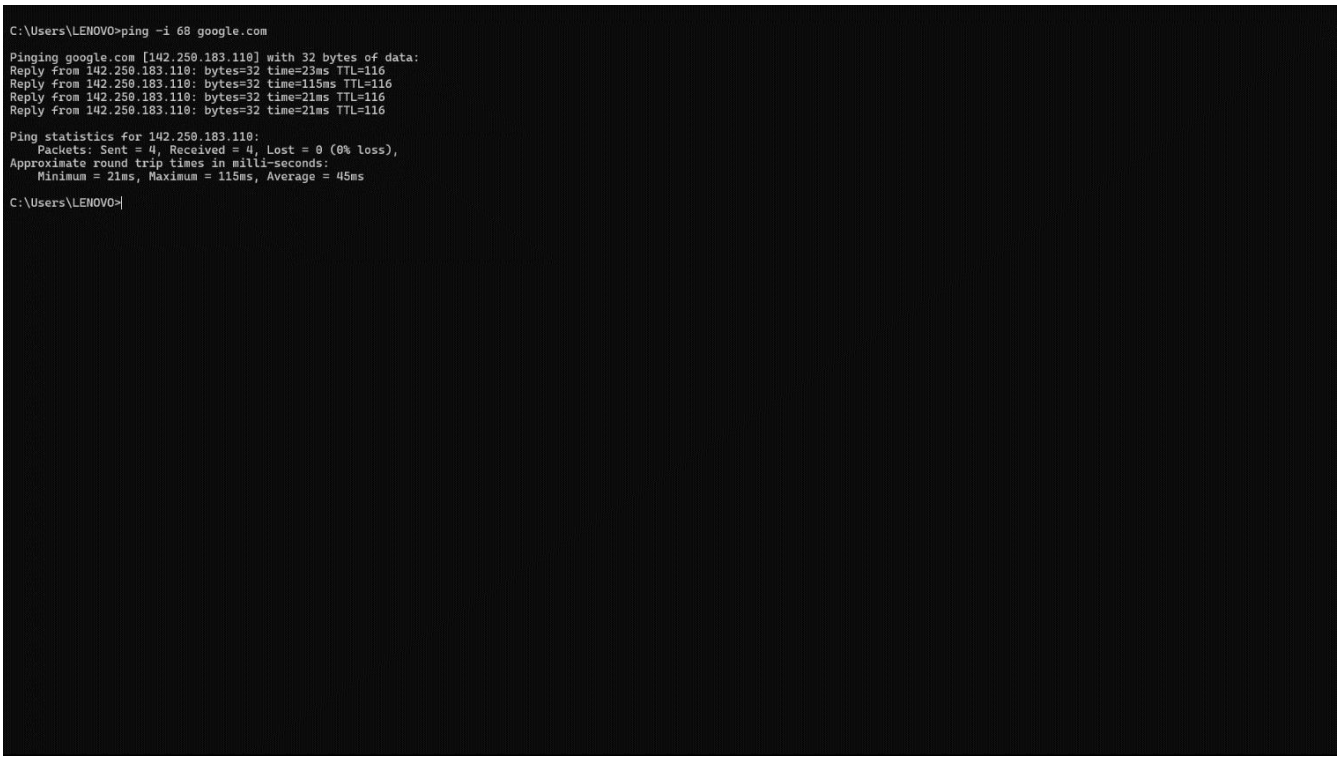
```
C:\Users\LENOVO>
C:\Users\LENOVO>ping -n 5 google.com

Pinging google.com [172.217.166.174] with 32 bytes of data:
Reply from 172.217.166.174: bytes=32 time=28ms TTL=116
Reply from 172.217.166.174: bytes=32 time=21ms TTL=116
Reply from 172.217.166.174: bytes=32 time=23ms TTL=116
Reply from 172.217.166.174: bytes=32 time=29ms TTL=116
Reply from 172.217.166.174: bytes=32 time=26ms TTL=116

Ping statistics for 172.217.166.174:
    Packets: Sent = 5, Received = 5, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 21ms, Maximum = 29ms, Average = 25ms

C:\Users\LENOVO>
```

- ping –a google.com

```
C:\Users\LENOVO>ping -a google.com

Pinging google.com [172.217.166.174] with 32 bytes of data:
Reply from 172.217.166.174: bytes=32 time=80ms TTL=116
Reply from 172.217.166.174: bytes=32 time=78ms TTL=116
Reply from 172.217.166.174: bytes=32 time=91ms TTL=116
Reply from 172.217.166.174: bytes=32 time=205ms TTL=116

Ping statistics for 172.217.166.174:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 78ms, Maximum = 205ms, Average = 113ms

C:\Users\LENOVO>
```

- ping -I TTL google.com

Date: 6/11/2024



- ping -l size

```
C:\Users\LENOVO>ping -l 50 google.com

Pinging google.com [2404:6800:4009:832::200e] with 50 bytes of data:
Reply from 2404:6800:4009:832::200e: time=79ms
Reply from 2404:6800:4009:832::200e: time=67ms
Reply from 2404:6800:4009:832::200e: time=58ms
Reply from 2404:6800:4009:832::200e: time=59ms

Ping statistics for 2404:6800:4009:832::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 58ms, Maximum = 79ms, Average = 65ms

C:\Users\LENOVO>
```

3. getmac

Description:

The getmac command is a Windows command-line utility that displays the Media Access Control (MAC) addresses for the network interfaces on a system. It can be used to retrieve the physical address (MAC address) of all network adapters, whether they are active or inactive.

No.	Option	Description

Date: 6/11/2024

1	getmac /fo csv	Specifies the format in which the output is to be displayed. Valid values: “TABLE”,“LIST”,“CSV”
2	getmac /v	Specifies that verbose output is displayed.
3	getmac /nh	Resolve addresses to hostnames.
4	getmac /s system	Specifies the remote system to connect to.
5	Getmac /u	Specifies the user context under which the command should execute

Implementation:

- getmac /fo csv1

```
C:\Users\LENOVO>getmac /fo csv
"Physical Address","Transport Name"
"E0-D0-45-EE-3D-8D","\Device\Tcpip_{F8ABF95F-DED6-427A-B0AE-2E3E615C0244}"
"E4-A8-DF-E5-18-F6","Media disconnected"
"E0-D0-45-EE-3D-91","Media disconnected"

C:\Users\LENOVO>
```

- getmac /v

```
C:\Users\LENOVO>getmac /v

Connection Name Network Adapter Physical Address    Transport Name
=============== =============== ================== ============================================================
Wi-Fi           Intel(R) Wi-Fi  E0-D0-45-EE-3D-8D   \Device\Tcpip_{F8ABF95F-DED6-427A-B0AE-2E3E615C0244}
Ethernet        Realtek PCIe Gb E4-A8-DF-E5-18-F6   Media disconnected
Bluetooth Netwo Bluetooth Devic E0-D0-45-EE-3D-91   Media disconnected

C:\Users\LENOVO>
```

- getmac /nh

```
C:\Users\LENOVO>getmac /nh

E0-D0-45-EE-3D-8D   \Device\Tcpip_{F8ABF95F-DED6-427A-B0AE-2E3E615C0244}
E4-A8-DF-E5-18-F6   Media disconnected
E0-D0-45-EE-3D-91   Media disconnected

C:\Users\LENOVO>
```

- getmac /s

Date: 6/11/2024

```
C:\Users\LENOVO>getmac /S NIRAV

Physical Address    Transport Name
=================== ==========================================================
E0-D0-45-EE-3D-8D   Media disconnected
E4-A8-DF-E5-18-F6   \Device\Tcpip_{5CC4BD96-33C1-45AD-8805-9202E2248588}

C:\Users\LENOVO>
```

- getmac /u

```
C:\Users\LENOVO>GETMAC /S NIRAV /U WORKGROUP
WARNING: User credentials cannot be used for local connections.

Physical Address    Transport Name
=================== ==========================================================
E0-D0-45-EE-3D-8D   Media disconnected
E4-A8-DF-E5-18-F6   \Device\Tcpip_{5CC4BD96-33C1-45AD-8805-9202E2248588}

C:\Users\LENOVO>
```

4. systeminfo

Description:

The 'systeminfo' command is a command-line utility in Windows that provides detailed information about the system's hardware and software configuration. It displays information such as the operating system version, hardware details, network configuration, and other system properties.

No.	Option	Description
1	systeminfo /S	Specifies the remote system to connect to.
2	systeminfo /FO format	Specifies the user context under which the command should execute. Valid values: "TABLE", "LIST", "CSV".
3	systeminfo /NH	Specifies that the "Column Header" should not be displayed in the output. Valid only for TABLE and CSV formats.
4	systeminfo /P	Specifies the password for the given user context. Prompts for input if omitted.
5	systeminfo /U	Specifies the user context under which the command should execute.

Date: 6/11/2024

Implementation:

- systeminfo /S

```
C:\Users\LENOVO>systeminfo /S NIRAV

Host Name:                 NIRAV
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:          LENOVO
Registered Organization:   N/A
Product ID:                00356-24607-04717-AAOEM
Original Install Date:     11/28/2022, 8:12:20 PM
System Boot Time:          6/13/2024, 12:12:20 PM
System Manufacturer:       LENOVO
System Model:              82K1
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~3187 Mhz
BIOS Version:              LENOVO H4CN23WW(V1.08), 2/11/2022
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:     7,975 MB
Available Physical Memory: 2,551 MB
Virtual Memory: Max Size:  20,775 MB
Virtual Memory: Available: 12,040 MB
Virtual Memory: In Use:    8,735 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\NIRAV
Hotfix(s):                 5 Hotfix(s) Installed.
                           [01]: KB5037591
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5039212
                           [05]: KB5037959
Network Card(s):           3 NIC(s) Installed.
                           [01]: Intel(R) Wi-Fi 6 AX201 160MHz
                                 Connection Name: Wi-Fi
                                 Status:          Media disconnected
                           [02]: Realtek PCIe GbE Family Controller
                                 Connection Name: Ethernet
                                 Status:          Media disconnected
                           [03]: Remote NDIS based Internet Sharing Device
                                 Connection Name: Ethernet 2
                                 DHCP Enabled:    Yes
                                 DHCP Server:     192.168.152.100
                                 IP address(es)
                                 [01]: 192.168.152.237
                                 [02]: fe80::2e40:928:fb0c:33b
                                 [03]: 2409:4080:ce9f:32da:a1e1:9ea1:ac4a:1e69
                                 [04]: 2409:4080:ce84:62a5:a1e1:9ea1:ac4a:1e69
                                 [05]: 2409:4080:ce84:62a5:22b9:ffdc:643:d436
                                 [06]: 2409:4080:ce1f:e8e6:a1e1:9ea1:ac4a:1e69
                                 [07]: 2409:4080:ce1f:e8e6:1eb3:ada4:1130:5d5c
                                 [08]: 2409:4080:ce1c:8eeb:c93c:82ac:53eb:6233
                                 [09]: 2409:4080:ce1c:8eeb:a1e1:9ea1:ac4a:1e69
                                 [10]: 2409:4080:ce0f:1c8b:a1e1:9ea1:ac4a:1e69
                                 [11]: 2409:4080:ce0f:1c8b:64c:c174:9ad2:1646
                                 [12]: 2409:4080:ce9f:32da:bf7f:efeb:3b42:a05b
Hyper-V Requirements:      A hypervisor has been detected. Features required for Hyper-V will not be displayed.

C:\Users\LENOVO>
```

- systeminfo /FO format

Date: 6/11/2024

```
C:\Users\LENOVO>systeminfo /FO LIST

Host Name:                 NIRAV
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:          LENOVO
Registered Organization:   N/A
Product ID:                00356-24607-04717-AAOEM
Original Install Date:     11/28/2022, 8:12:20 PM
System Boot Time:          6/13/2024, 12:12:20 PM
System Manufacturer:       LENOVO
System Model:              82K1
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~3187 Mhz
BIOS Version:              LENOVO H4CN23WW(V1.08), 2/11/2022
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:     7,975 MB
Available Physical Memory: 2,103 MB
Virtual Memory: Max Size:  20,775 MB
Virtual Memory: Available: 11,933 MB
Virtual Memory: In Use:    8,842 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\NIRAV
Hotfix(s):                 5 Hotfix(s) Installed.
                           [01]: KB5037591
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5039212
                           [05]: KB5037959
Network Card(s):           3 NIC(s) Installed.
                           [01]: Intel(R) Wi-Fi 6 AX201 160MHz
                                 Connection Name: Wi-Fi
                                 Status:          Media disconnected
                           [02]: Realtek PCIe GbE Family Controller
                                 Connection Name: Ethernet
                                 Status:          Media disconnected
                           [03]: Remote NDIS based Internet Sharing Device
                                 Connection Name: Ethernet 2
                                 DHCP Enabled:    Yes
                                 DHCP Server:     192.168.152.100
                                 IP address(es)
                                 [01]: 192.168.152.237
                                 [02]: fe80::2e40:928:fb0c:33b
                                 [03]: 2409:4080:ce9f:32da:a1e1:9ea1:ac4a:1e69
                                 [04]: 2409:4080:ce84:62a5:a1e1:9ea1:ac4a:1e69
                                 [05]: 2409:4080:ce84:62a5:22b9:ffdc:643:d436
                                 [06]: 2409:4080:ce1f:e8e6:a1e1:9ea1:ac4a:1e69
                                 [07]: 2409:4080:ce1f:e8e6:1eb3:ada4:1130:5d5c
                                 [08]: 2409:4080:ce1c:8eeb:c93c:82ac:53eb:6233
                                 [09]: 2409:4080:ce1c:8eeb:a1e1:9ea1:ac4a:1e69
                                 [10]: 2409:4080:ce0f:1c8b:a1e1:9ea1:ac4a:1e69
                                 [11]: 2409:4080:ce0f:1c8b:64c:c174:9ad2:1646
                                 [12]: 2409:4080:ce9f:32da:bf7f:efeb:3b42:a05b
Hyper-V Requirements:      A hypervisor has been detected. Features required for Hyper-V will not be displayed.

C:\Users\LENOVO>
```

- systeminfo /U

Date: 6/11/2024

```
C:\Users\LENOVO>systemi                                    KGROUP
WARNING: User credentials cannot be used for local connections

Host Name:                 NIRAV
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:          LENOVO
Registered Organization:   N/A
Product ID:                00356-24607-04717-AAOEM
Original Install Date:     11/28/2022, 8:12:20 PM
System Boot Time:          6/13/2024, 12:12:20 PM
System Manufacturer:       LENOVO
System Model:              82K1
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~3187 Mhz
BIOS Version:              LENOVO H4CN23WW(V1.08), 2/11/2022
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:     7,975 MB
Available Physical Memory: 2,012 MB
Virtual Memory: Max Size:  20,775 MB
Virtual Memory: Available: 11,734 MB
Virtual Memory: In Use:    9,041 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\NIRAV
Hotfix(s):                 5 Hotfix(s) Installed.
                           [01]: KB5037591
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5039212
                           [05]: KB5037959
Network Card(s):           3 NIC(s) Installed.
                           [01]: Intel(R) Wi-Fi 6 AX201 160MHz
                                 Connection Name: Wi-Fi
                                 Status:          Media disconnected
                           [02]: Realtek PCIe GbE Family Controller
                                 Connection Name: Ethernet
                                 Status:          Media disconnected
                           [03]: Remote NDIS based Internet Sharing Device
                                 Connection Name: Ethernet 2
                                 DHCP Enabled:    Yes
                                 DHCP Server:     192.168.152.100
                                 IP address(es)
                                 [01]: 192.168.152.237
                                 [02]: fe80::2e40:928:fb0c:33b
                                 [03]: 2409:4080:ce9f:32da:a1e1:9ea1:ac4a:1e69
                                 [04]: 2409:4080:ce84:62a5:a1e1:9ea1:ac4a:1e69
                                 [05]: 2409:4080:ce84:62a5:22b9:ffdc:643:d436
                                 [06]: 2409:4080:ce1f:e8e6:a1e1:9ea1:ac4a:1e69
                                 [07]: 2409:4080:ce1f:e8e6:1eb3:ada4:1130:5d5c
                                 [08]: 2409:4080:ce1c:8eeb:c93c:82ac:53eb:6233
                                 [09]: 2409:4080:ce1c:8eeb:a1e1:9ea1:ac4a:1e69
                                 [10]: 2409:4080:ce0f:1c8b:a1e1:9ea1:ac4a:1e69
                                 [11]: 2409:4080:ce0f:1c8b:64c:c174:9ad2:1646
                                 [12]: 2409:4080:ce9f:32da:bf7f:efeb:3b42:a05b
Hyper-V Requirements:      A hypervisor has been detected. Features required for Hyper-V will not be displayed.
```

- systeminfo /NH

```
C:\Users\LENOVO>systeminfo /fo CSV /nh
"NIRAV","Microsoft Windows 11 Home Single Language","10.0.22631 N/A Build 22631","Microsoft Corporation","Standalone Workstation","Multiprocessor Free","LENOVO","N/A","00356-24607-04717-AAOEM","11/28/2022, 8:12:20 PM","6/13/2024, 12:12
:20 PM","LENOVO","82K1","x64-based PC","1 Processor(s) Installed.,[01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~3187 Mhz","LENOVO H4CN23WW(V1.08), 2/11/2022","C:\WINDOWS","C:\WINDOWS\system32","\Device\HarddiskVolume1","en-
us;English (United States)","00004009","(UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi","7,975 MB","1,937 MB","20,775 MB","11,602 MB","9,173 MB","C:\pagefile.sys","WORKGROUP","\\NIRAV","5 Hotfix(s) Installed.,[01]: KB5037591,[02]: KB5
012170,[03]: KB5027397,[04]: KB5039212,[05]: KB5037959","3 NIC(s) Installed.,[01]: Intel(R) Wi-Fi 6 AX201 160MHz,      Connection Name: Wi-Fi,      Status:          Media disconnected,[02]: Realtek PCIe GbE Family Controller,      Conn
ection Name: Ethernet,      Status:          Media disconnected,[03]: Remote NDIS based Internet Sharing Device,      Connection Name: Ethernet 2,      DHCP Enabled:    Yes,      DHCP Server:     192.168.152.100,      IP address(es),
    [01]: 192.168.152.237,      [02]: fe80::2e40:928:fb0c:33b,      [03]: 2409:4080:ce9f:32da:a1e1:9ea1:ac4a:1e69,      [04]: 2409:4080:ce84:62a5:a1e1:9ea1:ac4a:1e69,      [05]: 2409:4080:ce84:62a5:22b9:ffdc:643:d436,      [06]: 2409:4
080:ce1f:e8e6:a1e1:9ea1:ac4a:1e69,      [07]: 2409:4080:ce1f:e8e6:1eb3:ada4:1130:5d5c,      [08]: 2409:4080:ce1c:8eeb:c93c:82ac:53eb:6233,      [09]: 2409:4080:ce1c:8eeb:a1e1:9ea1:ac4a:1e69,      [10]: 2409:4080:ce0f:1c8b:a1e1:9ea1:ac4
a:1e69,      [11]: 2409:4080:ce0f:1c8b:64c:c174:9ad2:1646,      [12]: 2409:4080:ce9f:32da:bf7f:efeb:3b42:a05b","A hypervisor has been detected. Features required for Hyper-V will not be displayed."

C:\Users\LENOVO>
```

- systeminfo /P

Date: 6/11/2024

```
C:\Users\LENOVO>systeminfo /S NIRAV /U WORKGROUP /P 123
WARNING: User credentials cannot be used for local connections

Host Name:                 NIRAV
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:          LENOVO
Registered Organization:   N/A
Product ID:                00356-24607-04717-AAOEM
Original Install Date:     11/28/2022, 8:12:20 PM
System Boot Time:          6/13/2024, 12:12:20 PM
System Manufacturer:       LENOVO
System Model:              82K1
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~3187 Mhz
BIOS Version:              LENOVO H4CN23WW(V1.08), 2/11/2022
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:     7,975 MB
Available Physical Memory: 1,254 MB
Virtual Memory: Max Size:  20,775 MB
Virtual Memory: Available: 11,392 MB
Virtual Memory: In Use:    9,383 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\NIRAV
Hotfix(s):                 5 Hotfix(s) Installed.
                           [01]: KB5037591
                           [02]: KB5012170
                           [03]: KB5027397
                           [04]: KB5039212
                           [05]: KB5037959
Network Card(s):           3 NIC(s) Installed.
                           [01]: Intel(R) Wi-Fi 6 AX201 160MHz
                                 Connection Name: Wi-Fi
                                 Status:          Media disconnected
                           [02]: Realtek PCIe GbE Family Controller
                                 Connection Name: Ethernet
                                 Status:          Media disconnected
                           [03]: Remote NDIS based Internet Sharing Device
                                 Connection Name: Ethernet 2
                                 DHCP Enabled:    Yes
                                 DHCP Server:     192.168.152.100
                                 IP address(es)
                                 [01]: 192.168.152.237
                                 [02]: fe80::2e40:928:fb0c:33b
                                 [03]: 2409:4080:ce9f:32da:e116:a1d2:74d0:4afb
                                 [04]: 2409:4080:ce9f:32da:bf7f:efeb:3b42:a05b
Hyper-V Requirements:      A hypervisor has been detected. Features required for Hyper-V will not be displayed.
```

5. tracert

Description:

The ‘tracert’ (short for "trace route") command in Windows is a diagnostic tool used to track the path that packets take from your computer to a specified destination (like a website or IP address). It shows each hop along the route and the time it takes for each hop.

No.	Option	Description
1	tracert -d	Do not resolve addresses to hostnames.
2	tracert -h	Maximum number of hops to search for target.
3	tracert -w	Wait timeout milliseconds for each reply.
4	tracert -4	Force using IPv4.
5	tracert -6	Force using IPv6.

Implementation:

- tracert -d

Date: 6/11/2024

```
C:\Users\LENOVO>tracert -d google.com

Tracing route to google.com [2404:6800:4009:82c::200e]
over a maximum of 30 hops:

  1     1 ms    <1 ms    <1 ms  2409:4080:ce9f:32da::bd
  2     *        *        *     Request timed out.
  3    42 ms    36 ms    38 ms  2405:200:324:eeee:20::36
  4    41 ms    45 ms    41 ms  2405:200:801:2700::6c
  5    45 ms   339 ms    47 ms  2405:200:801:2700::6b
  6     *        *        *     Request timed out.
  7    61 ms    49 ms    59 ms  2001:4860:1:1::a7c
  8    60 ms    45 ms    59 ms  2404:6800:8157::1
  9    65 ms    48 ms    66 ms  2001:4860:0:1::5cd2
 10   362 ms    47 ms    57 ms  2001:4860:0:1::269f
 11    57 ms    65 ms    55 ms  2404:6800:4009:82c::200e

Trace complete.

C:\Users\LENOVO>
```

- tracert -h

```
C:\Users\LENOVO>tracert -h 5 google.com

Tracing route to google.com [2404:6800:4009:82c::200e]
over a maximum of 5 hops:

  1    <1 ms     1 ms    <1 ms  2409:4080:ce9f:32da::bd
  2     *        *        *     Request timed out.
  3    53 ms    36 ms    36 ms  2405:200:324:eeee:20::36
  4   352 ms    36 ms    37 ms  2405:200:801:2700::6c
  5    47 ms    37 ms    38 ms  2405:200:801:2700::6b

Trace complete.
```

- tracert -w

Date: 6/11/2024

```
C:\Users\LENOVO>tracert -h 5 -w 1000 google.com

Tracing route to google.com [2404:6800:4009:82c::200e]
over a maximum of 5 hops:

  1     1 ms    <1 ms    <1 ms  2409:4080:ce9f:32da::bd
  2     *        *        *     Request timed out.
  3    52 ms    39 ms    38 ms  2405:200:324:eeee:20::36
  4   352 ms    35 ms    38 ms  2405:200:801:2700::6c
  5    47 ms    37 ms    38 ms  2405:200:801:2700::6b

Trace complete.
```

- tracert -4

```
C:\Users\LENOVO>tracert -4 -h 5 google.com

Tracing route to google.com [142.251.42.110]
over a maximum of 5 hops:

  1     1 ms     1 ms     1 ms  192.168.162.25
  2     *        *        *     Request timed out.
  3     *        *        *     Request timed out.
  4     *        *        *     Request timed out.
  5    50 ms    47 ms    38 ms  172.17.185.2

Trace complete.
```

- tracert -6

```
C:\Users\LENOVO>tracert -6 -h 5 google.com

Tracing route to google.com [2404:6800:4009:82c::200e]
over a maximum of 5 hops:

  1     2 ms     2 ms     1 ms  2409:4080:ce9f:32da::47
  2     *        *        *     Request timed out.
  3    51 ms    37 ms    39 ms  2405:200:324:eeee:20::34
  4    38 ms    38 ms    38 ms  2405:200:801:2700::68
  5    65 ms    32 ms    37 ms  2405:200:801:2700::67

Trace complete.
```

Date: 6/11/2024

6. netstat

Description:

The 'netstat' (network statistics) command is a powerful networking tool in Windows that displays various network connections, routing tables, interface statistics, masquerade connections, and multicast memberships. It's widely used for diagnosing network issues and monitoring network performance.

No.	Option	Description
1	netstat –a	Displays all connections and listening ports.
2	netstat –e	Displays Ethernet statistics. This may be combined with the –s option.
3	netstat –f	Displays Fully Qualified Domain Names (FQDN) for foreign addresses.
4	netstat –i	Displays the time spent by a TCP connection in its current state.
05	netstat -x	Displays NetworkDirect connections, listeners, and shared endpoints.

Date: 6/11/2024

Implementation:

- netstat -a

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

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    0.0.0.0:135            nirav:0                LISTENING
  TCP    0.0.0.0:445            nirav:0                LISTENING
  TCP    0.0.0.0:5040           nirav:0                LISTENING
  TCP    0.0.0.0:7680           nirav:0                LISTENING
  TCP    0.0.0.0:49664          nirav:0                LISTENING
  TCP    0.0.0.0:49665          nirav:0                LISTENING
  TCP    0.0.0.0:49666          nirav:0                LISTENING
  TCP    0.0.0.0:49667          nirav:0                LISTENING
  TCP    0.0.0.0:49668          nirav:0                LISTENING
  TCP    0.0.0.0:49670          nirav:0                LISTENING
  TCP    127.0.0.1:9080         nirav:0                LISTENING
  TCP    127.0.0.1:27017        nirav:0                LISTENING
  TCP    127.0.0.1:49722        nirav:65001            ESTABLISHED
  TCP    127.0.0.1:49740        nirav:0                LISTENING
  TCP    127.0.0.1:49740        nirav:64293            ESTABLISHED
  TCP    127.0.0.1:49748        nirav:64465            FIN_WAIT_2
  TCP    127.0.0.1:64293        nirav:49740            ESTABLISHED
  TCP    127.0.0.1:64465        nirav:49740            CLOSE_WAIT
  TCP    127.0.0.1:65001        nirav:0                LISTENING
  TCP    127.0.0.1:65001        nirav:49722            ESTABLISHED
  TCP    192.168.162.173:139    nirav:0                LISTENING
  TCP    192.168.162.173:64511  10.71.11.186:ms-do     SYN_SENT
  TCP    192.168.162.173:64512  10.71.14.239:ms-do     SYN_SENT
  TCP    192.168.162.173:64514  49.44.192.32:https     ESTABLISHED
  TCP    [::]:135               nirav:0                LISTENING
  TCP    [::]:445               nirav:0                LISTENING
  TCP    [::]:7680              nirav:0                LISTENING
  TCP    [::]:49664             nirav:0                LISTENING
  TCP    [::]:49665             nirav:0                LISTENING
  TCP    [::]:49666             nirav:0                LISTENING
  TCP    [::]:49667             nirav:0                LISTENING
  TCP    [::]:49668             nirav:0                LISTENING
  TCP    [::]:49670             nirav:0                LISTENING
  TCP    [::1]:49669            nirav:0                LISTENING
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:49427  [2603:1040:a06:6::]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:49428  [2603:1040:a06:6::]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64476  [2603:1046:1400:1::2]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64479  sc-in-f188:5228        ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64487  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64488  [2603:1046:1404:1::18]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64489  [2603:1046:1404:1::18]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64492  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64493  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64494  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64495  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64496  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64497  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64498  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64499  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64500  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64501  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64502  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64503  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64504  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64505  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64506  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64507  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64508  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64509  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64510  [64:ff9b::34b6:8d3f]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64517  [64:ff9b::2877:f9e4]:https  ESTABLISHED
  UDP    0.0.0.0:5050           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5353           *:*
  UDP    0.0.0.0:5355           *:*
  UDP    0.0.0.0:49204          *:*
  UDP    0.0.0.0:52145          *:*
  UDP    0.0.0.0:60145          *:*
  UDP    0.0.0.0:60694          *:*
  UDP    0.0.0.0:65422          *:*
  UDP    127.0.0.1:1900         *:*
  UDP    127.0.0.1:10010        *:*
  UDP    127.0.0.1:49664        127.0.0.1:49664
  UDP    127.0.0.1:55946        *:*
  UDP    127.0.0.1:65421        *:*
  UDP    192.168.162.173:137    *:*
  UDP    192.168.162.173:138    *:*
  UDP    192.168.162.173:1900   *:*
  UDP    192.168.162.173:5353   *:*
  UDP    192.168.162.173:55945  *:*
  UDP    [::]:5353              *:*
  UDP    [::]:5353              *:*
  UDP    [::]:5355              *:*
  UDP    [::]:49204             *:*
  UDP    [::]:52145             *:*
  UDP    [::]:60145             *:*
  UDP    [::]:60694             *:*
  UDP    [::]:65423             *:*
  UDP    [::1]:1900             *:*
  UDP    [::1]:5353             *:*
  UDP    [::1]:55944            *:*
  UDP    [fe80::7354:500b:59aa:e839%22]:1900  *:*
  UDP    [fe80::7354:500b:59aa:e839%22]:55943  *:*
```

- netstat -e

Date: 6/11/2024

```
C:\Users\LENOVO>netstat -e
Interface Statistics

                           Received            Sent

Bytes                      32617176         4636848
Unicast packets               27762           21144
Non-unicast packets              12            1074
Discards                          0               0
Errors                            0               0
Unknown protocols                 0

C:\Users\LENOVO>
```

- netstat -f

```
C:\Users\LENOVO>netstat -f

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:49722        nirav:65001            ESTABLISHED
  TCP    127.0.0.1:49740        nirav:64293            ESTABLISHED
  TCP    127.0.0.1:64293        nirav:49740            ESTABLISHED
  TCP    127.0.0.1:65001        nirav:49722            ESTABLISHED
  TCP    192.168.162.173:64540  10.65.8.11:ms-do       SYN_SENT
  TCP    192.168.162.173:64541  192.168.137.155:ms-do  SYN_SENT
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:49427  [2603:1040:a06:6::]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:49428  [2603:1040:a06:6::]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64476  [2603:1046:1400:1::2]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64479  sc-in-f188.1e100.net:5228  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64524  [2603:1046:1400:1::e]:https  TIME_WAIT
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64525  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64526  [2603:1046:1404:1::18]:https  TIME_WAIT
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64527  [2603:1046:1404:1::18]:https  TIME_WAIT
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64533  [2603:1046:1400:1::e]:https  ESTABLISHED
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64538  [2603:1046:1406::5]:https  TIME_WAIT
  TCP    [2409:4080:ce9f:32da:a0ef:dd47:4d27:f222]:64539  [2603:1046:1404:1::18]:https  ESTABLISHED
```

- netstat -i

```
C:\Users\LENOVO>netstat -i

Active Connections

  Proto  Local Address          Foreign Address        State           Time in State (ms)
TCP    127.0.0.1:49722        nirav:65001            ESTABLISHED        27693791
TCP    127.0.0.1:49740        nirav:64293            ESTABLISHED        1101560
TCP    127.0.0.1:64293        nirav:49740            ESTABLISHED        1101560
TCP    127.0.0.1:65001        nirav:49722            ESTABLISHED        27693791

C:\Users\LENOVO>
```

- netstat -x

Date: 6/11/2024

```
C:\Users\LENOVO>netstat -x

Active NetworkDirect Connections, Listeners, SharedEndpoints

  Mode   IfIndex Type           Local Address          Foreign Address        PID

C:\Users\LENOVO>
```

7. nslookup

Description:

The 'nslookup' (name server lookup) command is a network administration command-line tool available in many computer operating systems for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or for any other specific DNS record.

No.	Option	Description
1	nslookup	Displays information that you can use to diagnose Domain Name System infrastructure
2	nslookup is	Lists information for a DNS domain
3	nslookup finger	Connects with the finger server on the currentcomputer.
4	nslookup -port	Specify a different port.
5	nslookup -timeout	Set timeout for a reply.

Implementation:

- nslookup

```
C:\Users\LENOVO>nslookup
Default Server:  UnKnown
Address:  192.168.162.25

>
```

- nslookup is

```
C:\Users\LENOVO>nslookup is
Server:  UnKnown
Address:  192.168.162.25

DNS request timed out.
    timeout was 2 seconds.
Name:    is.

C:\Users\LENOVO>
```

Date: 6/11/2024

- nslookup finger

```
C:\Users\LENOVO>nslookup finger
Server:  UnKnown
Address:  192.168.162.25

*** UnKnown can't find finger: Non-existent domain
```

- nslookup -port

```
C:\Users\LENOVO>nslookup -port=53 google.com
Server:  UnKnown
Address:  192.168.162.25

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4009:832::200e
          142.251.42.110
```

- nslookup -timeout

```
C:\Users\LENOVO>nslookup -timeout=10 google.com
Server:  UnKnown
Address:  192.168.162.25

Non-authoritative answer:
Name:    google.com
Addresses:  2404:6800:4009:832::200e
          142.251.42.110
```

8. hostname

Description:

The 'hostname' command in Windows displays the name of the current host, which is typically the computer name.

Date: 6/11/2024

No.	Option	Description
1	hostname –a	Displays all connections and listening ports.
2	hostname –e	Displays Ethernet statistics. This may be combined with the –s option.

Implementation:

```
C:\Users\LENOVO>hostname
nirav
```

```
C:\Users\LENOVO>hostname -a
sethostname: Use the Network Control Panel Applet to set hostname.
hostname -s is not supported.
```

9. pathping

Description:

The 'pathping' command is a network diagnostic tool available in Windows that combines the functionality of 'ping' and 'tracert'. It provides information about network latency and packet loss along the path between the local computer and a specified destination, similar to 'tracert', while also measuring the round-trip time of each hop, similar to ping.

No.	Option	Description
1	pathping –4	Force using IPv4.
2	pathping –g	Loose source route along host-list.
3	pathping –n	Do not resolve addresses to hostnames.
4	pathping –q	Number of queries per hop.
5	pathping -w	Wait timeout milliseconds for each reply.

Implementation:

- pathping -4

Date: 6/11/2024

```
C:\Users\LENOVO>pathping -4 -h 5 google.com

Tracing route to google.com [142.250.66.14]
over a maximum of 5 hops:
  0  nirav [192.168.162.173]
  1  192.168.162.25
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           nirav [192.168.162.173]
                                    0/ 100 =  0%   |
  1   15ms     0/ 100 =  0%     0/ 100 =  0%  192.168.162.25

Trace complete.
```

- pathping -g

```
C:\Users\LENOVO>pathping -g -h 5 google.com

Tracing route to google.com [142.251.42.110]
over a maximum of 5 hops:
  0  nirav [192.168.152.237]
  1     *        *        *
Computing statistics for 0 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           nirav [192.168.152.237]

Trace complete.
```

- pathping -n

```
C:\Users\LENOVO>pathping -n -h 5 google.com

Tracing route to google.com [142.251.42.110]
over a maximum of 5 hops:
  0  192.168.152.237
  1  192.168.152.100
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           192.168.152.237
                                    0/ 100 =  0%   |
  1    0ms     0/ 100 =  0%     0/ 100 =  0%  192.168.152.100

Trace complete.
```

- pathping -q

Date: 6/11/2024

```
C:\Users\LENOVO>pathping -q 3 -h 5 google.com

Tracing route to google.com [142.251.42.110]
over a maximum of 5 hops:
  0  nirav [192.168.152.237]
  1  192.168.152.100
  2     *        *        *
Computing statistics for 0 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           nirav [192.168.152.237]
                                    0/   3 =  0%   |
  1    0ms     0/   3 =  0%     0/   3 =  0%  192.168.152.100

Trace complete.
```

- pathping -w

```
C:\Users\LENOVO>pathping -w 100 -h 5 google.com

Tracing route to google.com [142.251.42.110]
over a maximum of 5 hops:
  0  nirav [192.168.152.237]
  1  192.168.152.100
  2     *        *        *
Computing statistics for 25 seconds...
            Source to Here   This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                                           nirav [192.168.152.237]
                                  32/ 100 = 32%   |
  1    8ms    32/ 100 = 32%     0/ 100 =  0%  192.168.152.100

Trace complete.
```

Description:

The ‘arp’ (Address Resolution Protocol) command in Windows displays and modifies the local Address Resolution Protocol (ARP) cache, which maps IP addresses to physical MAC (Media Access Control) addresses on a local network.

Date: 6/11/2024

No.	Option	Description
1	arp –a	Display ARP Cache for All Interfaces
2	arp -g	Displays the ARP cache for a specific interface.
3	arp /?	Display and modify the enteris in the address resolution protocol.

Implementation:

- arp -a

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

Interface: 192.168.152.237 --- 0xa
  Internet Address      Physical Address      Type
  192.168.152.100       c2-e2-54-23-0e-6c     dynamic
  192.168.152.255       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: 192.168.162.173 --- 0x16
  Internet Address      Physical Address      Type
  192.168.162.25        62-b6-93-0b-36-0b     dynamic
  192.168.162.255       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
```

- arp -g

Date: 6/11/2024

```
C:\Users\LENOVO>arp -g

Interface: 192.168.152.237 --- 0xa
  Internet Address      Physical Address      Type
  192.168.152.100       c2-e2-54-23-0e-6c     dynamic
  192.168.152.255       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: 192.168.162.173 --- 0x16
  Internet Address      Physical Address      Type
  192.168.162.25        62-b6-93-0b-36-0b     dynamic
  192.168.162.255       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
```

- arp /?

```
C:\Users\LENOVO>arp /?

Displays and modifies the IP-to-Physical address translation tables used by
address resolution protocol (ARP).

ARP -s inet_addr eth_addr [if_addr]
ARP -d inet_addr [if_addr]
ARP -a [inet_addr] [-N if_addr] [-v]

  -a            Displays current ARP entries by interrogating the current
                protocol data.  If inet_addr is specified, the IP and Physical
                addresses for only the specified computer are displayed.  If
                more than one network interface uses ARP, entries for each ARP
                table are displayed.
  -g            Same as -a.
  -v            Displays current ARP entries in verbose mode.  All invalid
                entries and entries on the loop-back interface will be shown.
  inet_addr     Specifies an internet address.
  -N if_addr    Displays the ARP entries for the network interface specified
                by if_addr.
  -d            Deletes the host specified by inet_addr. inet_addr may be
                wildcarded with * to delete all hosts.
  -s            Adds the host and associates the Internet address inet_addr
                with the Physical address eth_addr.  The Physical address is
                given as 6 hexadecimal bytes separated by hyphens. The entry
                is permanent.
  eth_addr      Specifies a physical address.
  if_addr       If present, this specifies the Internet address of the
                interface whose address translation table should be modified.
                If not present, the first applicable interface will be used.
Example:
  > arp -s 157.55.85.212   00-aa-00-62-c6-09  .... Adds a static entry.
  > arp -a                                    .... Displays the arp table.
```

Date: 18/ 06/2024

Lab Practical #02:

Study of different types of network cables & connectors and practically implement the cross-wired cable and straight through cable using clamping tool.

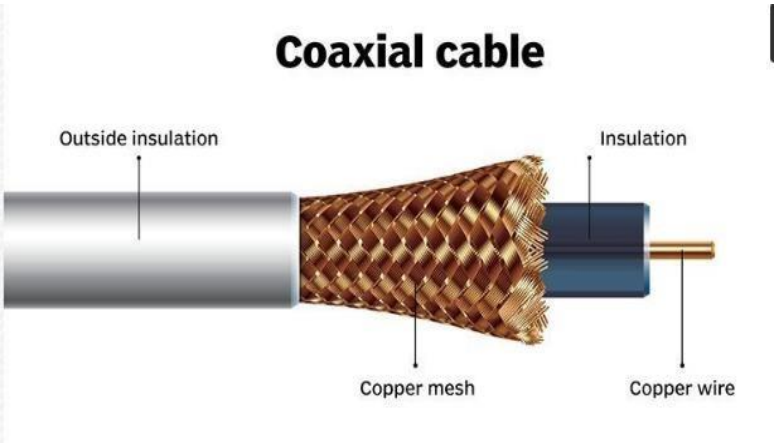
Practical Assignment #02:

1. List various networks cable and connectors. Also, write short description.
2. Give cross-wired cable and straight through cable diagram (Color Code wise).

1. List various networks cable and connectors. Also, write short description.

a) Network Cable Name: Coaxial Cable (RG-6/RG-59)

- **Network Cable Type:** Guided
- **Description**: A coaxial cable is an electrical cable with a copper conductor and an insulator shielding around it and a braided metal mesh that prevents signal interference and cross talk. Coaxial cable is also known as **coax.**
- Coaxial cables are commonly used for cable TV and broadband internet connections. They have a central conductor surrounded by insulation, a metallic shield, and an outer protective layer.
- **Diagram**:



RG6 Coaxial Cable

Diameter: RG6 cables have a diameter of approximately 0.27 inches (6.86 mm).

Frequency Range: They support frequencies up to 3 GHz, suitable for most home applications.

Attenuation:RG6 cables have higher attenuation, meaning they lose signal strength more quickly over long distances.

Applications: These cables are commonly used for home internet and cable TV installations.

Center Conductor: Typically, RG6 cables use a copper-clad steel center conductor.

Shielding: RG6 cables can have single or dual-layer shielding.

Flexibility:They are more flexible and easier to install, especially in tight spaces.

Date: 18/ 06/2024

Cost:RG6 cables are generally less expensive compared to RG11 cables.
Max Distance:RG6 cables are effective over shorter distances compared to RG11.

RG11 Coaxial Cable

Diameter:RG11 cables have a larger diameter of approximately 0.40 inches (10.29 mm).
Frequency Range:Like RG6, RG11 cables support frequencies up to 3 GHz.
Attenuation:RG11 cables have lower attenuation, meaning they maintain signal quality over longer distances.
Applications:RG11 cables are used for long-distance cable runs and professional applications where signal quality is critical.
Center Conductor:RG11 cables typically use a solid copper center conductor for better conductivity.
Shielding: RG11 cables are usually quad-shielded, offering superior protection against interference.
Flexibility:RG11 cables are less flexible and more rigid, making them harder to install in tight spaces.
Cost: RG11 cables are more expensive due to their enhanced performance and materials.
Max Distance:RG11 cables can effectively carry signals over longer distances than RG6 cables.

b) Network Cable Name: USB Cable (Universal Serial Bus)

- **Network Cable Type:** Unguided
- **Description**: The term USB stands for "Universal Serial Bus". USB cable assemblies are some of the most popular cable types available, used mostly to connect computers to peripheral devices such as cameras, camcorders, printers, scanners, and more.
- USB cables are primarily used for connecting peripheral devices, such as printers, keyboards, and external storage devices, to computers. They also support networking through USB-to-Ethernet adapters.
- **Diagram**:

c) Network Cable Name: Fiber Optic Cable

- **Network Cable Type:** Guided
- **Description**: A fiber-optic cable contains anywhere from a few to hundreds of optical fibers within a plastic casing. Also known as optic cables or optical fiber cables, they transfer data signals in the form of light and travel hundreds of miles significantly faster than those used in traditional electrical cables.
- **Diagram**:

Date: 18/ 06/2024

1. **Multimode**:-

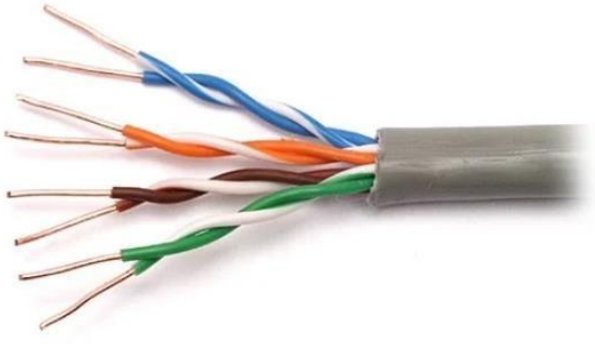
Multimode fibre can carry multiple light rays (modes) at the same time by having varying optical properties at the core; essentially light travelling the shortest path (down the middle) travels the slowest.The larger core simplifies connections and takes advantage of the lower cost LED & VCSEL technologies which operate in the 850nm window. Due to dispersion the range is limited so it tends to be used as premises cabling when less than a kilometre. It comes in two core sizes, 62.5 and 50 microns.

2. **Singlemode**:-

Singlemode fibre has a much smaller core size of 9 microns and has a single light path and can travel much longer distances of up to 100km. These require more expensive electronics which operate in the 1310 and 1550nm windows and are typically used in longer distance LAN's, Cable TV and telephony applications.

d) Network Cable Name: Twisted Pair Cable

- **Network Cable Type:** Guided
- **Description**: Twisted pair cable is a type of network cable that consists of pairs of insulated copper wires twisted together in a specific pattern. It is widely used in Ethernet networks for transmitting data signals.
- **Diagram**:

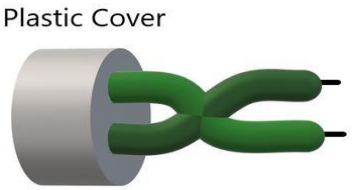


Twisted Pair Cables are further of two types :

Date: 18/ 06/2024

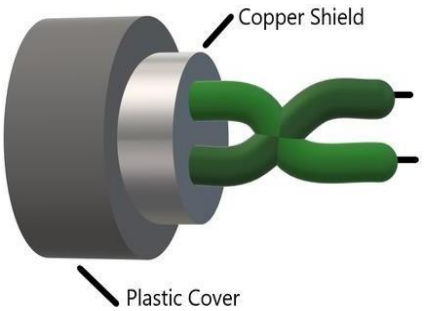
1. **Unshielded Twisted Pair Cables (UTP) :**

   - **Description:**These are a pair of two insulated copper wires twisted together without any other insulation or shielding and hence are called unshielded twisted pair cables. They reduce the external interference due to the presence of insulation. Unshielded twisted pair cables are arranged in pairs so that we can add a new connection whenever required. The DSL or telephone lines in our houses have one extra pair in them.



2. **Shielded Twisted Pair Cables (STP) :**

   - **Description:**These types of cables have extra insulation or protective covering over the conductors in the form of a copper braid covering. This covering provides strength to the overall structure of the cable. It also reduces noise and signal interference in the cable.



Difference:

Shielded Cable	Unshielded Cable
Expensive	Less costly compared to shielded cable

Date: 18/ 06/2024

Less flexible	Flexible
Bigger in dia than unshielded	Diameter less than shielded
No technical issues including EMI	EMI may cause problem
Suitable for high-traffic networks	Not advisable for networks with increased traffic
Ideal for bigger firms	Suitable for offices and offices with fewer traffic with large network area

e) Network Cable Name: HDMI Cable (High-Definition Multimedia Interface)

- **Network Cable Type:** Unguided
- **Description:** HDMI cables are used to transmit audio and video signals between devices, such as computers, game consoles, Blu-ray players, and TVs. They support high-definition video and multi-channel audio.
- **Diagram**:

f) Network Cable Name: DisplayPort Cable:

- **Network Cable Type:** Unguided
- **Description**: DisplayPort cables are commonly used to connect computers and displays, such as monitors and projectors. They support high-definition video and audio signals.
- **Diagram**:

Date: 18/ 06/2024

g) Network Cable Name: Thunderbolt Cable

- **Network Cable Type:** Unguided
- **Description**: Thunderbolt cables provide high-speed data transfer and video output capabilities. They are commonly used for connecting external devices, such as storage drives and displays, to computers.
- **Diagram**:

h) Network Cable Name: T Type Connecter

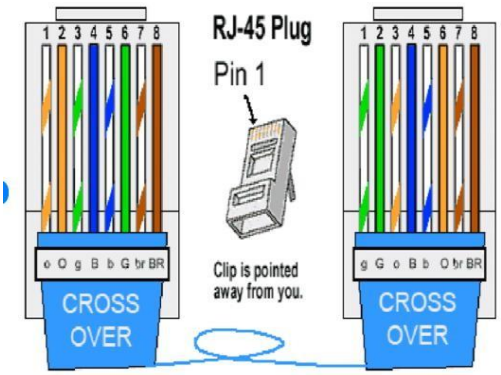
- **Network Cable Type:** Unguided
- **Description**: A fiber-optic cable contains anywhere from a few to hundreds of optical fibers within a plastic casing. Also known as optic cables or optical fiber cables, they transfer data signals in the form of light and travel hundreds of miles significantly faster than those used in traditional electrical cables
- **Diagram**:

Date: 18/ 06/2024

i) **Network Cable Name: RJ-45 connecter**
   - **Network Cable Type:** Guided
   - **Description**: A fiber-optic cable contains anywhere from a few to hundreds of optical fibers within a plastic casing. Also known as optic cables or optical fiber cables, they transfer data signals in the form of light and travel hundreds of miles significantly faster than those used in traditional electrical cables
   - **Diagram**:

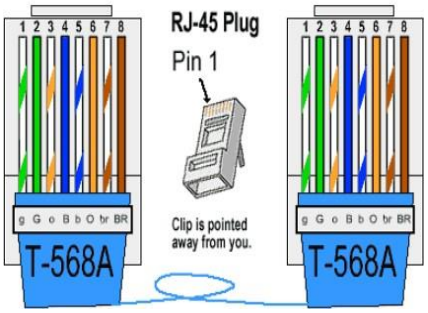
Give cross-wired cable and straight through cable diagram (Color Code wise).

a) Cross-wired Cable Diagram (Color Code)



Date: 18/ 06/2024

b) Straight Through Cable Diagram (Color Code)



Date: 10/07/2024

Lab Practical #03:

Study of different network devices in detail.

Practical Assignment #03:

1. Give difference between below network devices.
   - Hub and Switch
   - Switch and Router
   - Router and Gateway
2. Working of below network devices:
   - Switch
   - Router
   - Gateway

Hub and Switch

No.	Hub	Switch
1	Physical layer. Hubs are classified as Layer 1 devices per the OSI model.	Data link Layer. Network switches operate at Layer 2 of the OSI model.
2	Passive Device (Without Software).	Active Device (With Software) & Networking device.
3	Hubs always perform frame flooding : may be unicast, multicast or broadcast.	First broadcast : then unicast & multicast as needed.
4	A network hub cannot learn or store MAC address.	A network switch stores MAC addresses in a lookup table.
5	Half duplex.	Full duplex.

Switch and Router

No.	Switch	Router
1	LAN for office, Data Center or Campus environment.	WAN for Office, Data center or Campus environment.
2	Does not support MPLS and VPN services.	Router provides MPLS and VPN services like PPP etc.
3	Forwarding is performed by specialized ASICs.	Performed by software.
4	Smaller routing table compared to router.	Considerably bigger to support multiple route entires.
5	Transmission mode : Half & Full duplex	Transmission mode : Full duplex.

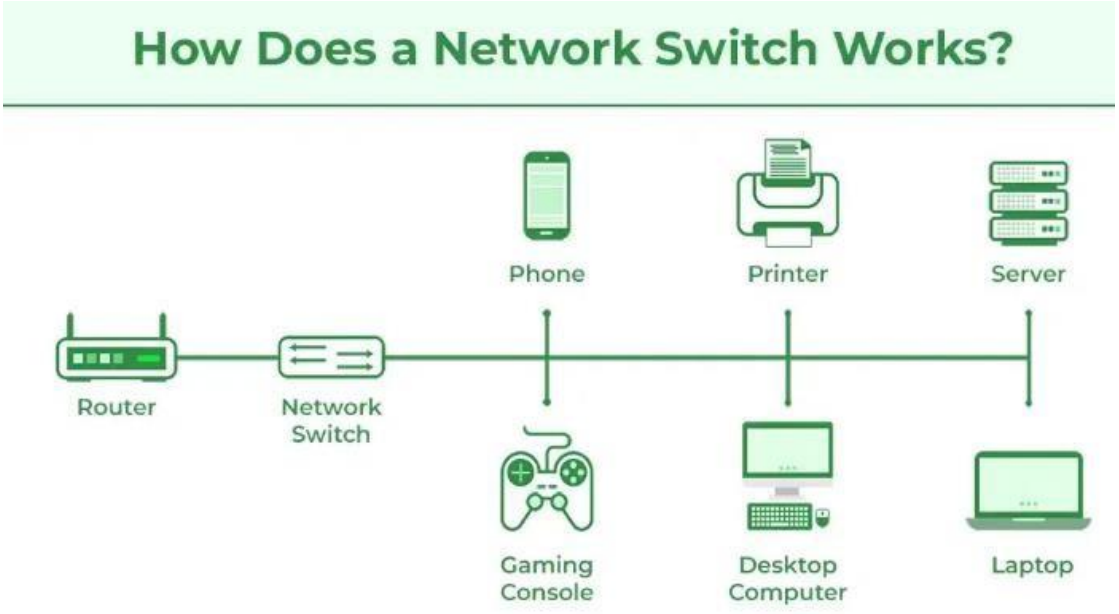
Date: 10/07/2024

Router and Gateway

No.	Router	Gateway
1	Can only work with similar networks.	Can work with dissimilar networks
2	Using TCP/IP and UDP protocols.	Using different protocols.
3	Routes data packet from one network to another based on internal routing tables.	Converts the data packets protocols from one format to another
4	Support both static and dynamic routing.	Doesn't support both.
5	Connect purely dedicated physical hardware.	Can connect a physical and virtual devices.

Working of below network devices:

1. Switch
    - When the source wants to send the data packet to the destination, the packet first enters the switch and the switch reads its header and finds the MAC address of the destination to identify the device then it sends the packet out through the appropriate ports that lead to the destination devices.
    - Switch established a temporary connection between the source and destination for communication and terminates and connection once the conversation is done. Also, it offers full bandwith to network traffic going to and from a device simultaneously to reduce collision.



Date: 10/07/2024

2. Router

- Consider a router as an air traffic controller, and consider data packets as planes flying to various airports. Each packet must be directed as quickly as possible to its destination, just as each plane has a distinct destination and travels a distinct route. A router assists in guiding data packets to their intended IP address, just like an air traffic controller ensures that aircraft reach their destinations without getting lost or experiencing significant disruptions in a route.
- An internal routing table, which is a list of routes to different network destinations, is used by a router to effectively direct packets. In order to determine the destination of a packet, the router first scans its header. Then, it consults the routing table. Forward packet to next packet.

3. Gateway

- The user end's application made a request for a certain amount of data via its portal to the gateway. For example, A smart door made a request for the data type : "password" and send this request to the gateway.
- The gateway sends this request for a password to the server.
- The server receives the request and search for the data type : "password" for a certain "id" and made the data "password" transfer to the gateway.
- The data is then sent to the smart door interface where it is matched with the data entered for data type : "password". If these two data matches then the door gets unlocked.

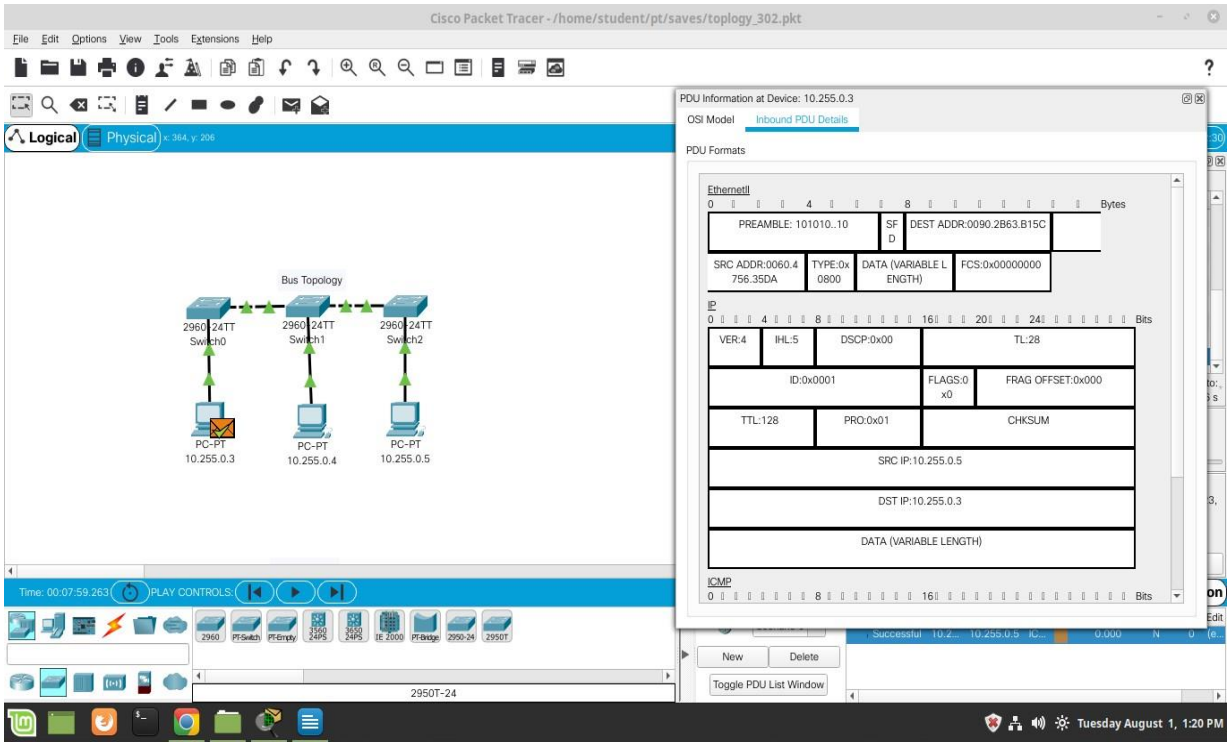
Date: 12/07/2024

Lab Practical #04:

Installation of Network Simulator (Packet Tracer) and Implement different LAN topologies.

Practical Assignment #04:

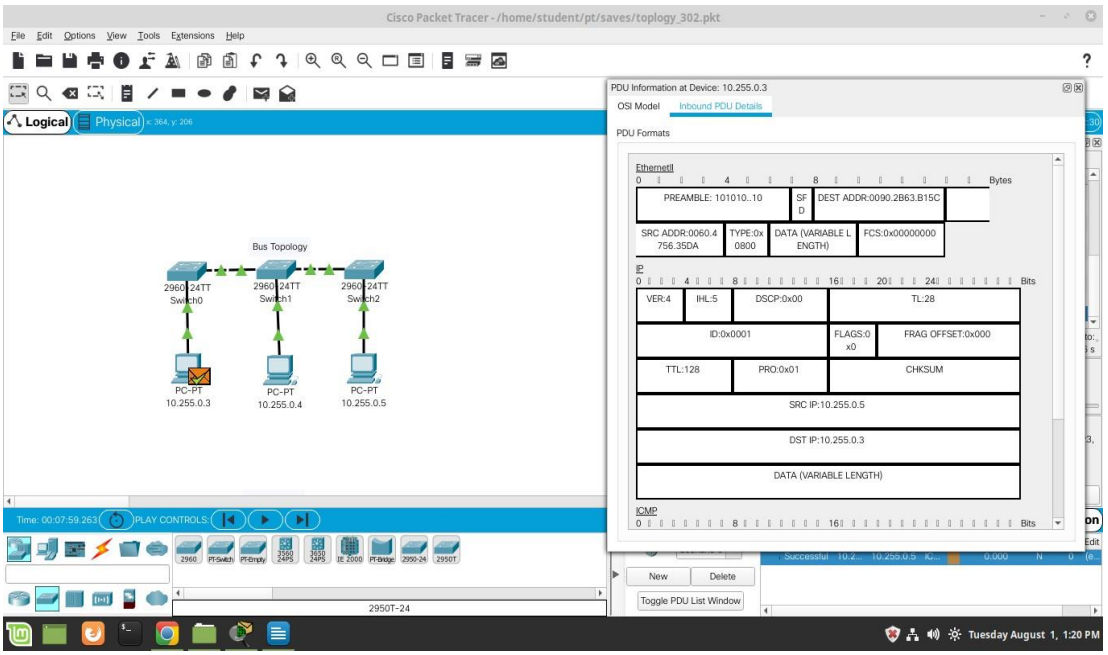
1. **Create a simple network with switch and two or more pc. Also check connectivity between them using ping command or PDU utility.**



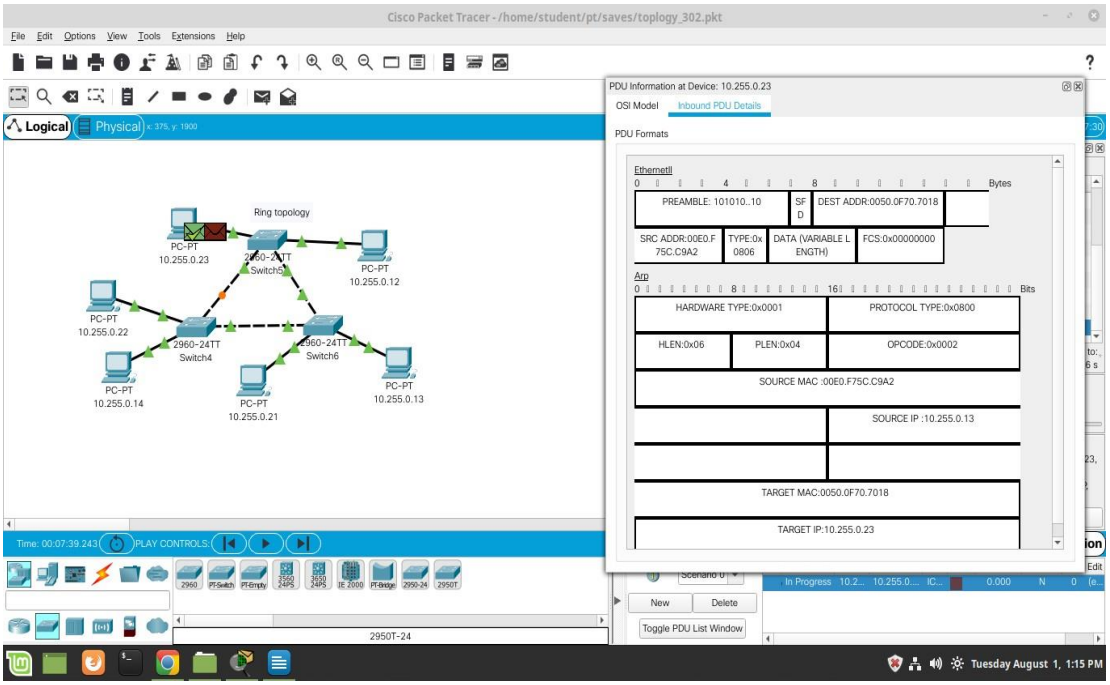
Date: 12/07/2024

2. Implement different topologies in packet tracer.

a. Bus

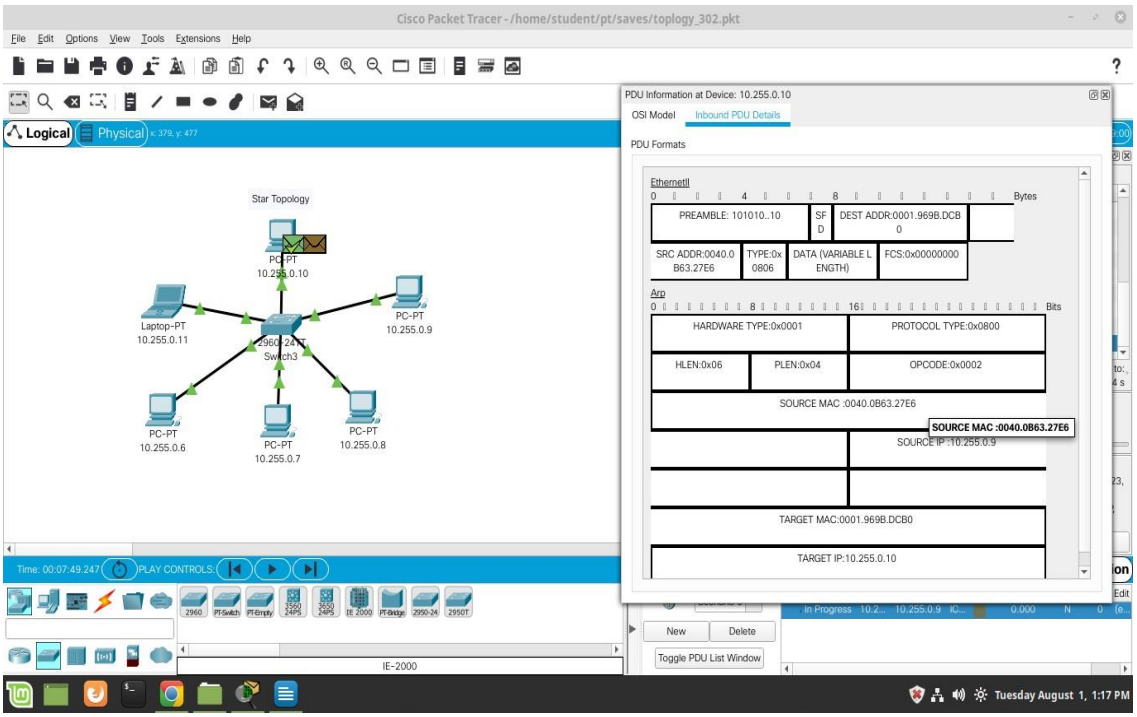


b. Ring

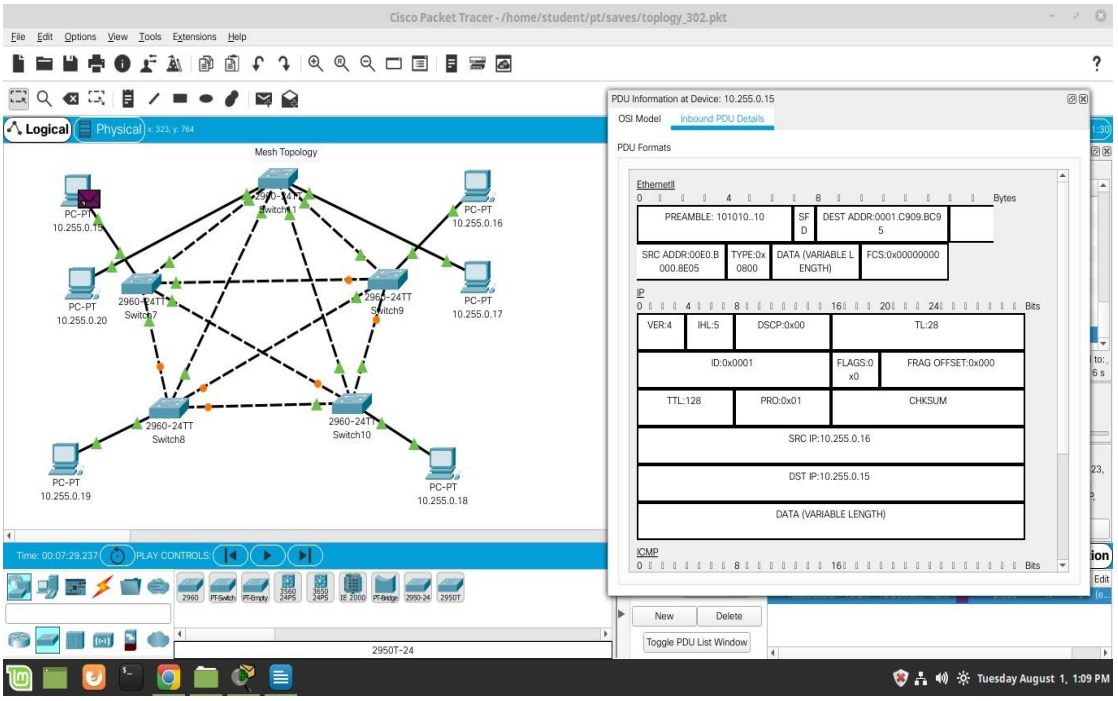


Date: 12/07/2024

c. Star

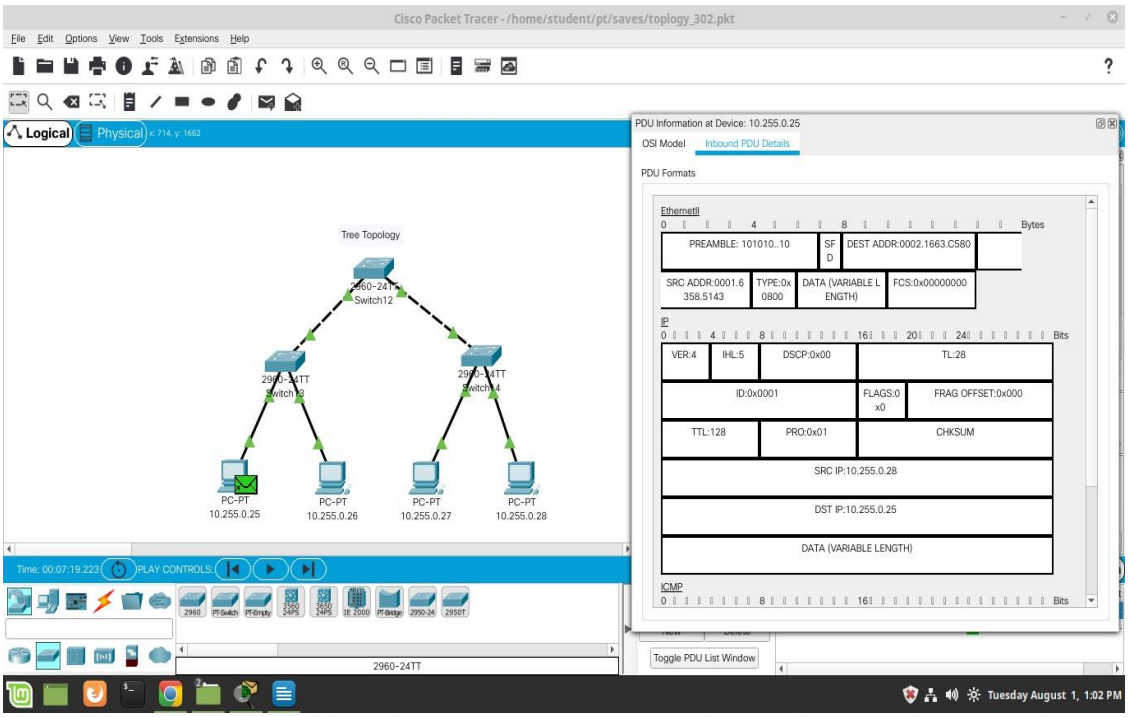


d. Mesh



Date: 12/07/2024

e. Tree



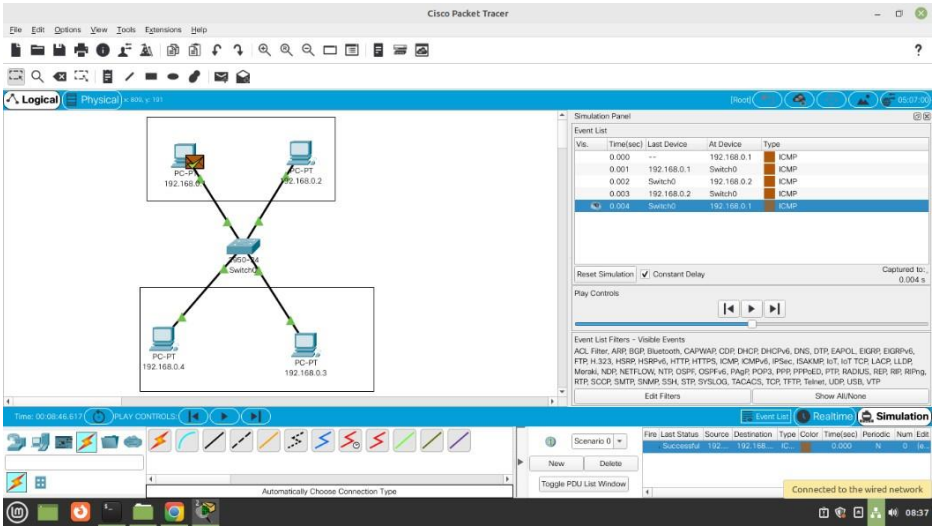
Date: 7/07/2024

Lab Practical #05:

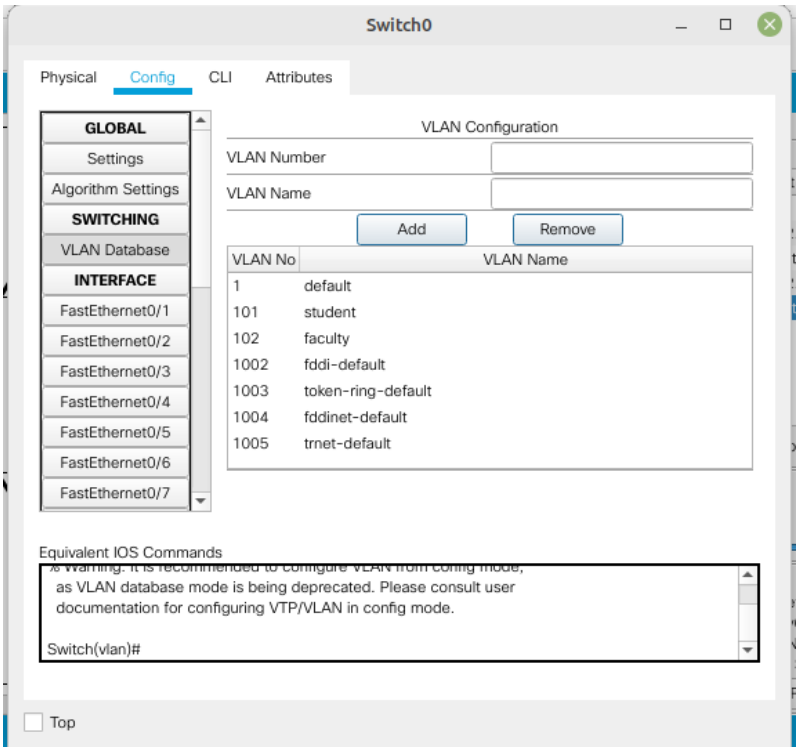
Study the concept of VLAN using packet tracer.

Practical Assignment #05:

1. **Implement the different network structures in VLAN and VLAN trunking. Also check connectivity between them using ping command or PDU utility.**
   1. **VLAN - 1 :**

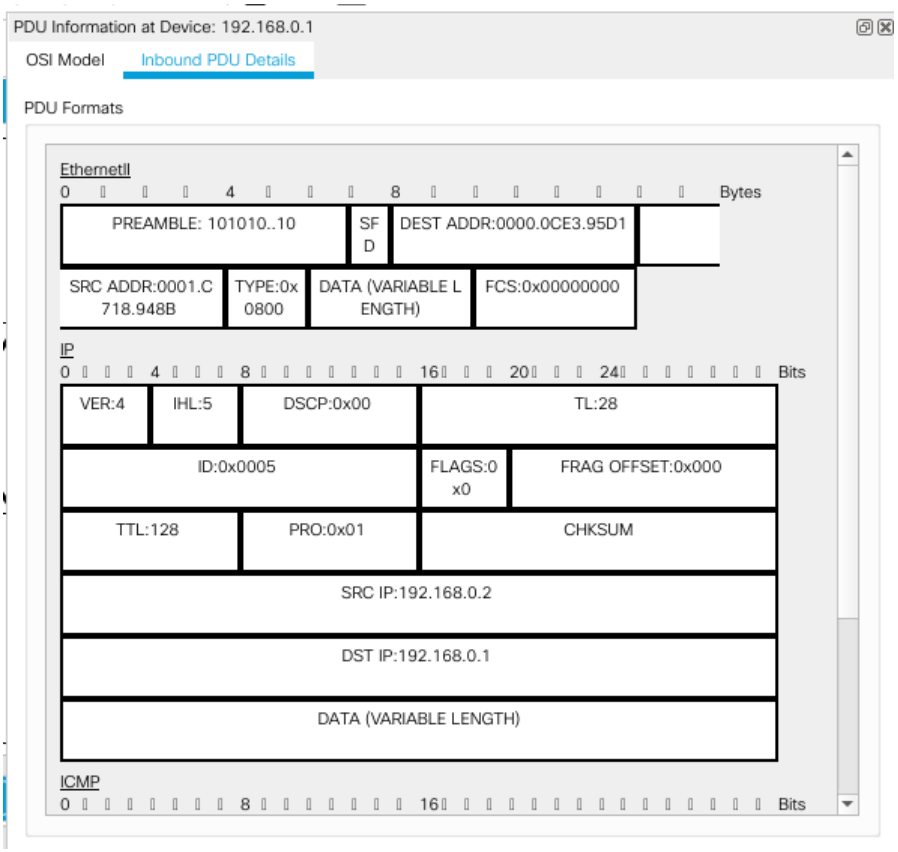


   2. **VLAN – 1 (Database) :**

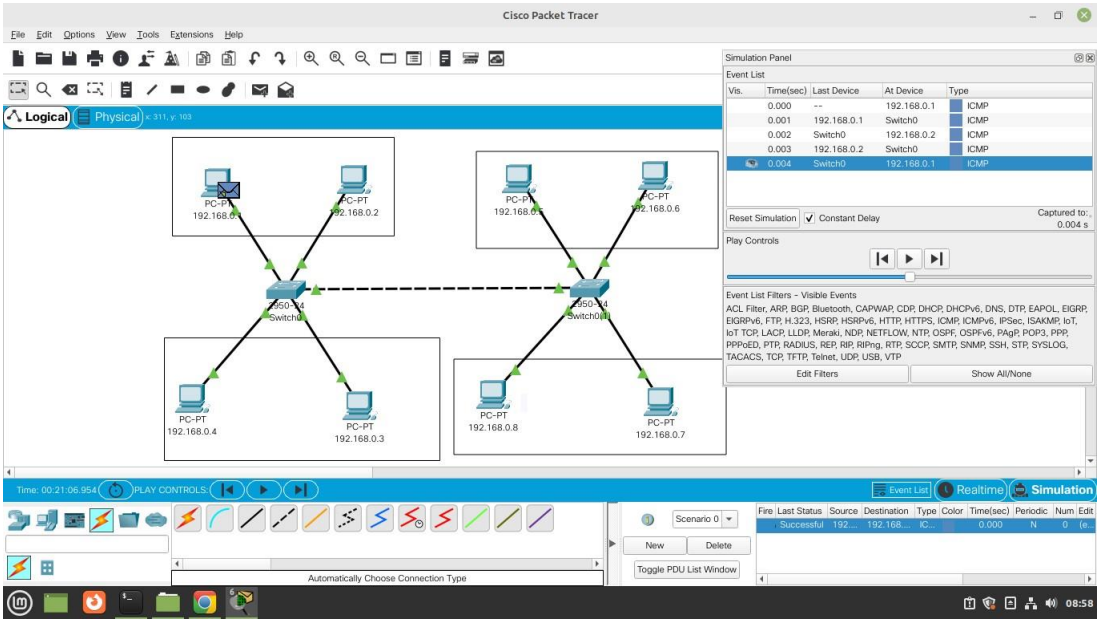


Date: 7/07/2024

3. VLAN – 1 (PDU Information) :

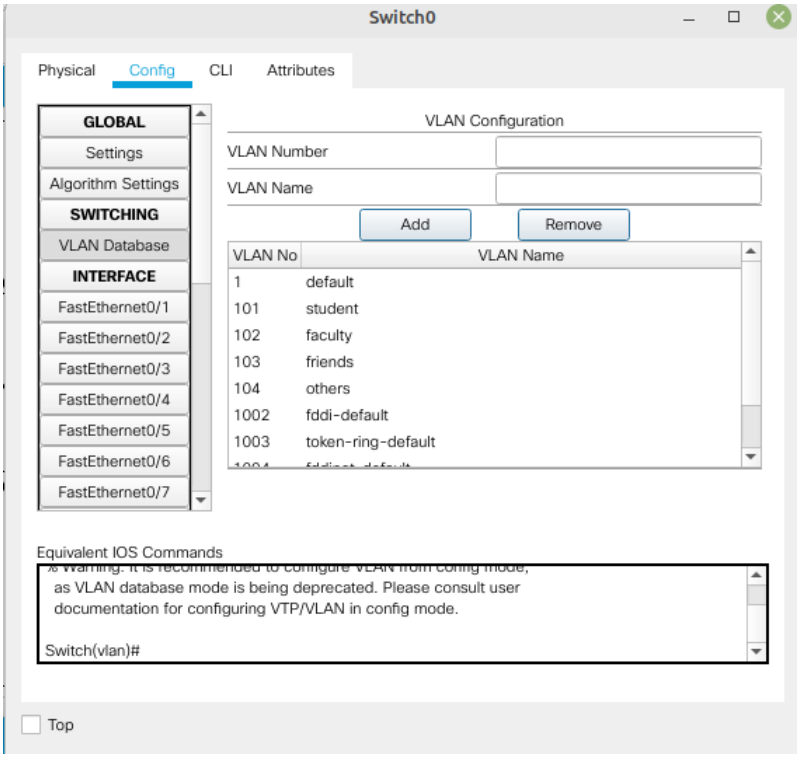


4. VLAN - 2 :

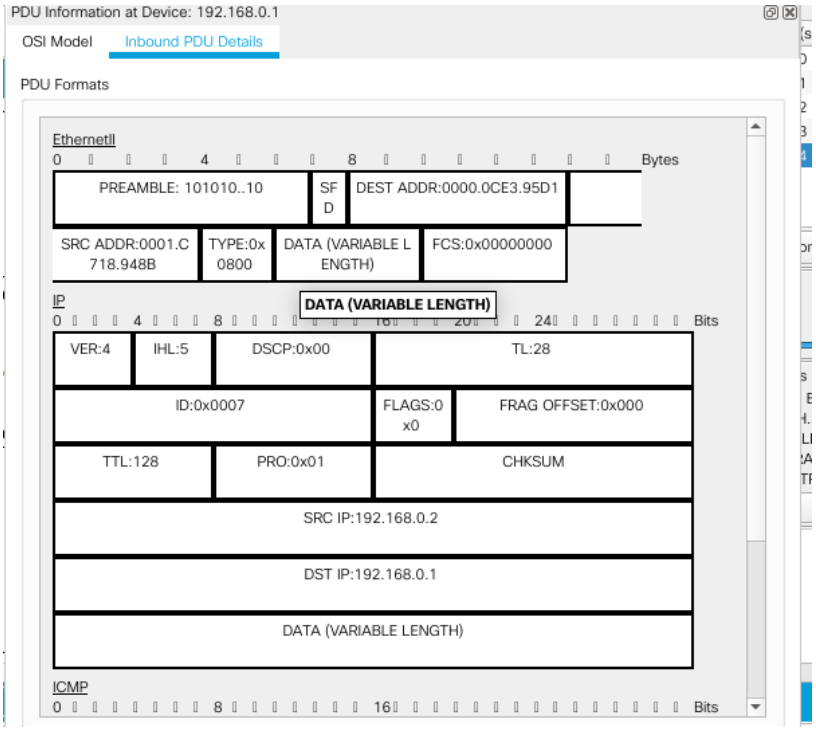


Date: 7/07/2024

5. VLAN - 2 (Database) :

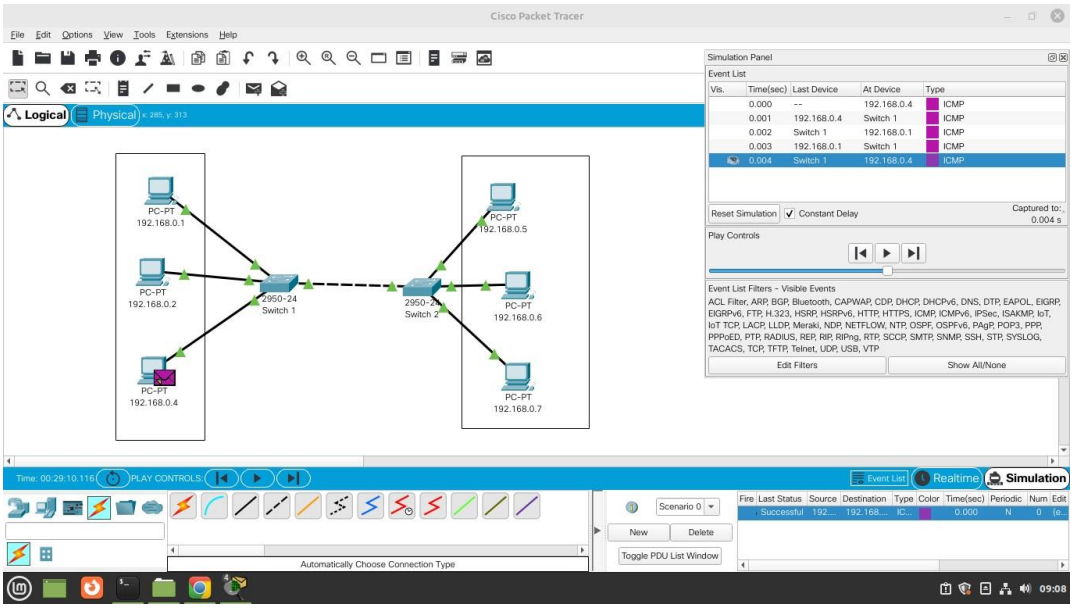


6. VLAN – 2 (PDU Information) :

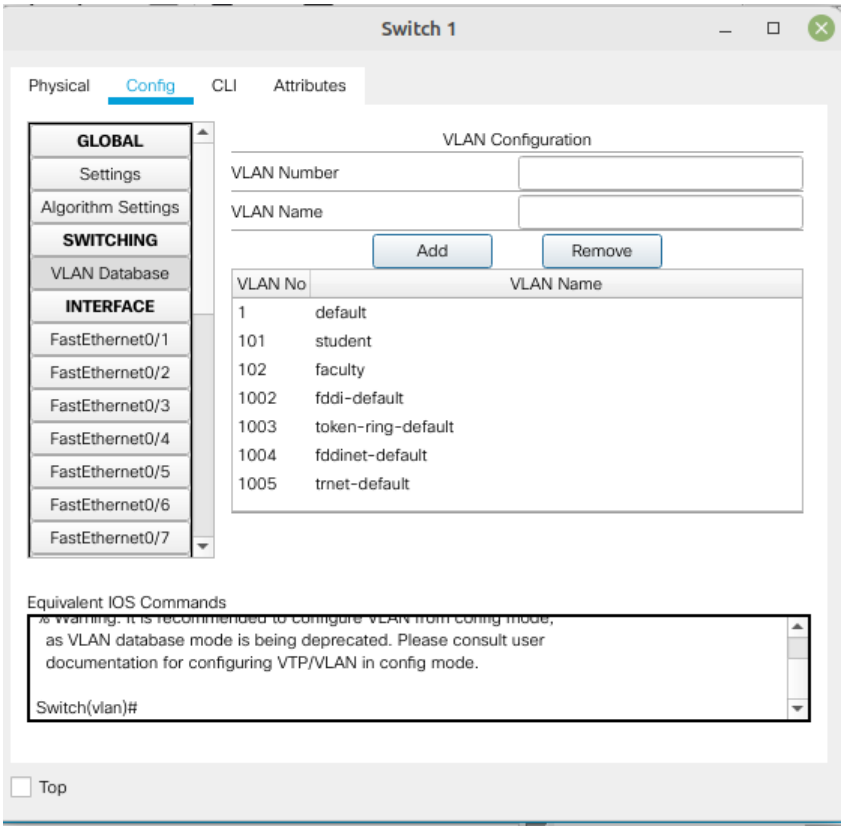


Date: 7/07/2024

7. VLAN - 3 :

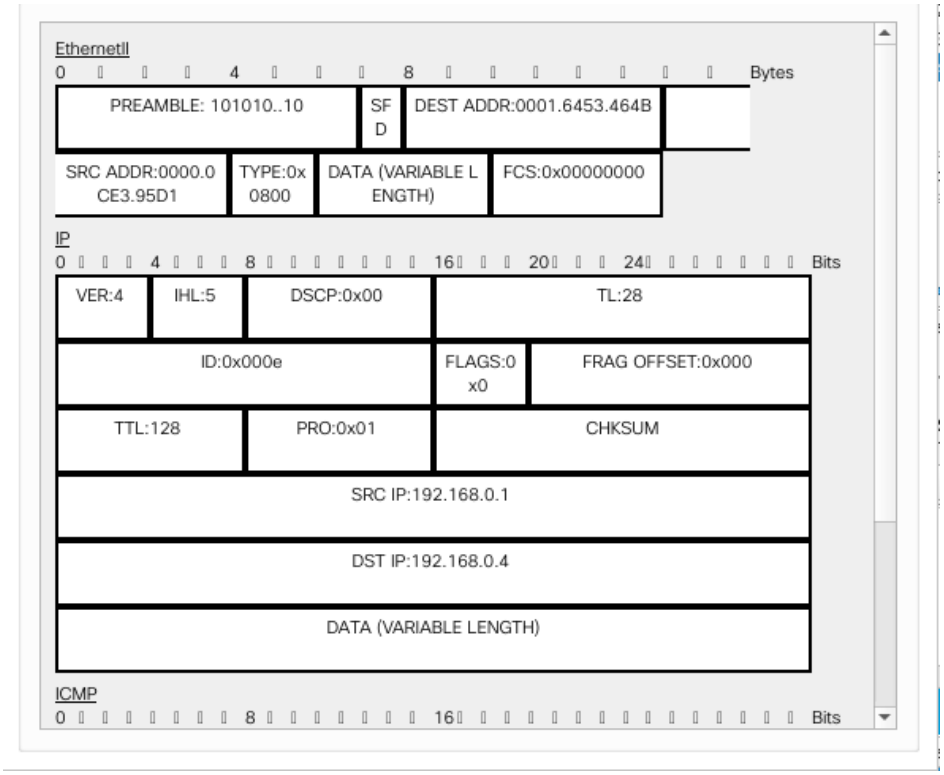


8. VLAN – 3 (Database) :

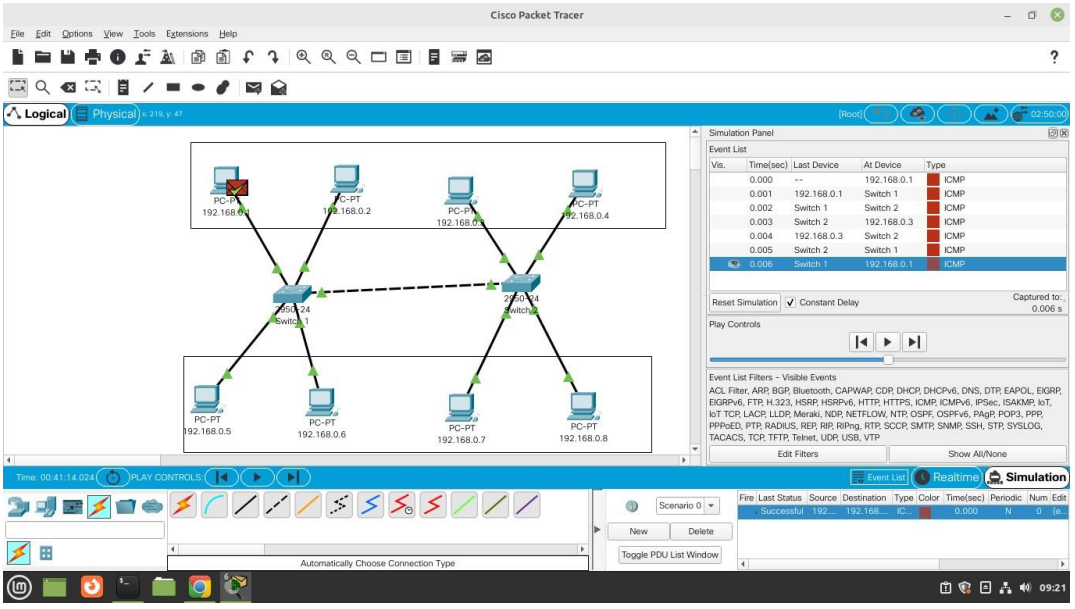


Date: 7/07/2024

9. VLAN – 3 (PDU Information) :

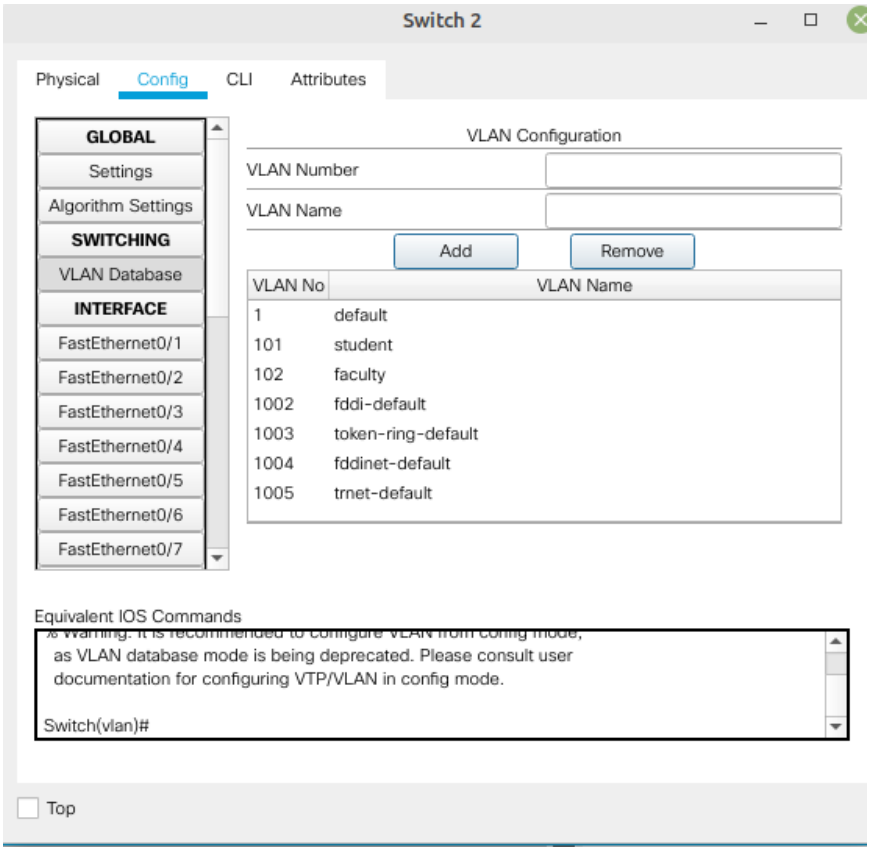


10.VLAN - 4 :



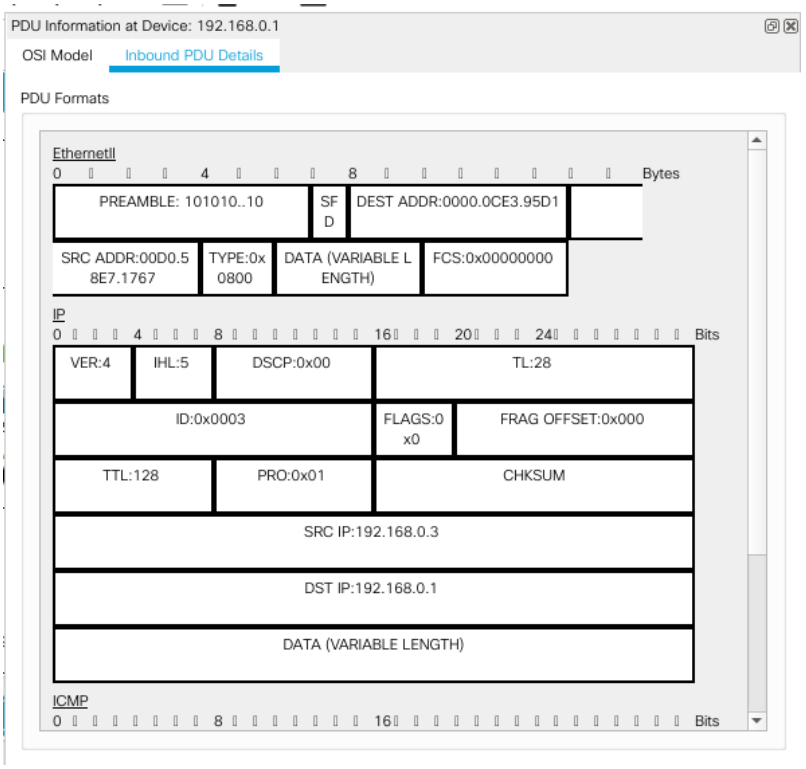
Date: 7/07/2024

11.VLAN – 4 (Database) :



Date: 7/07/2024

12.VLAN – 4(PDU Information) :



Date: 06 / 08 / 24

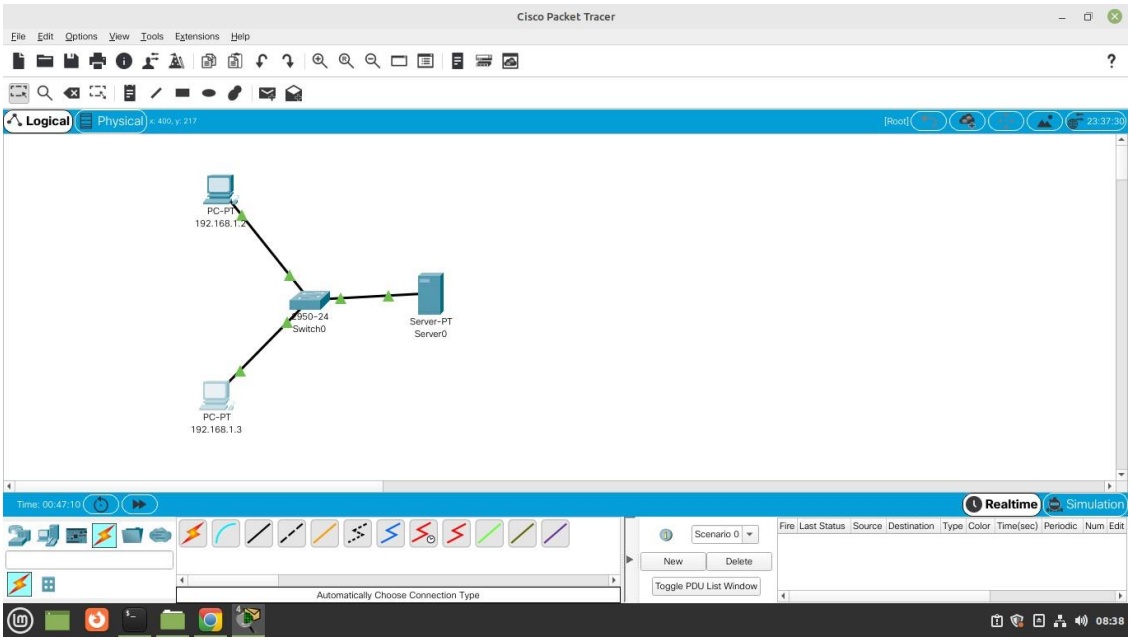
Lab Practical #06:

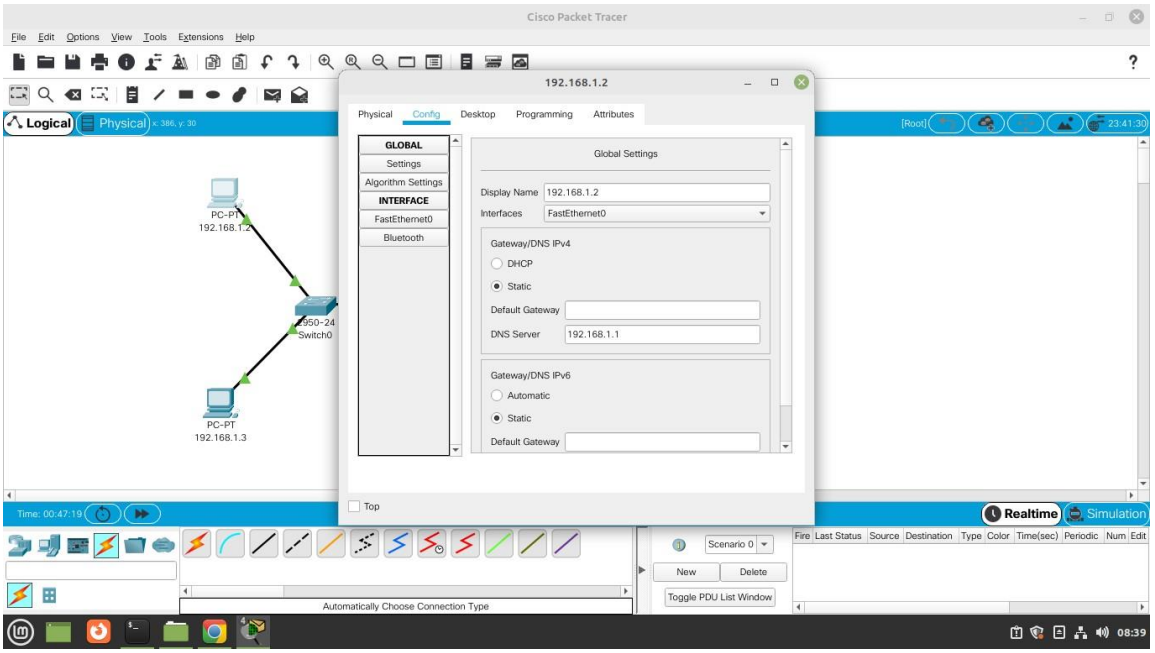
Study the application layer protocol DNS, DHCP, FTP.

Practical Assignment #06:

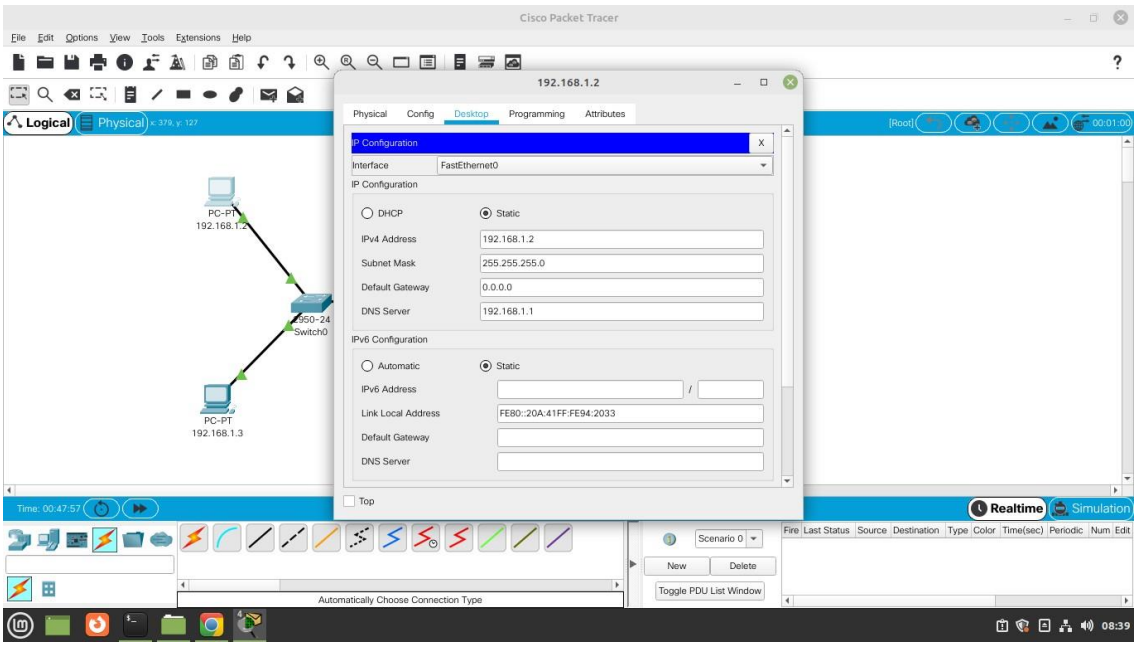
1. Implement the application layer protocol DNS, DHCP, and FTP. Also check connectivity between them using ping command or PDU utility.

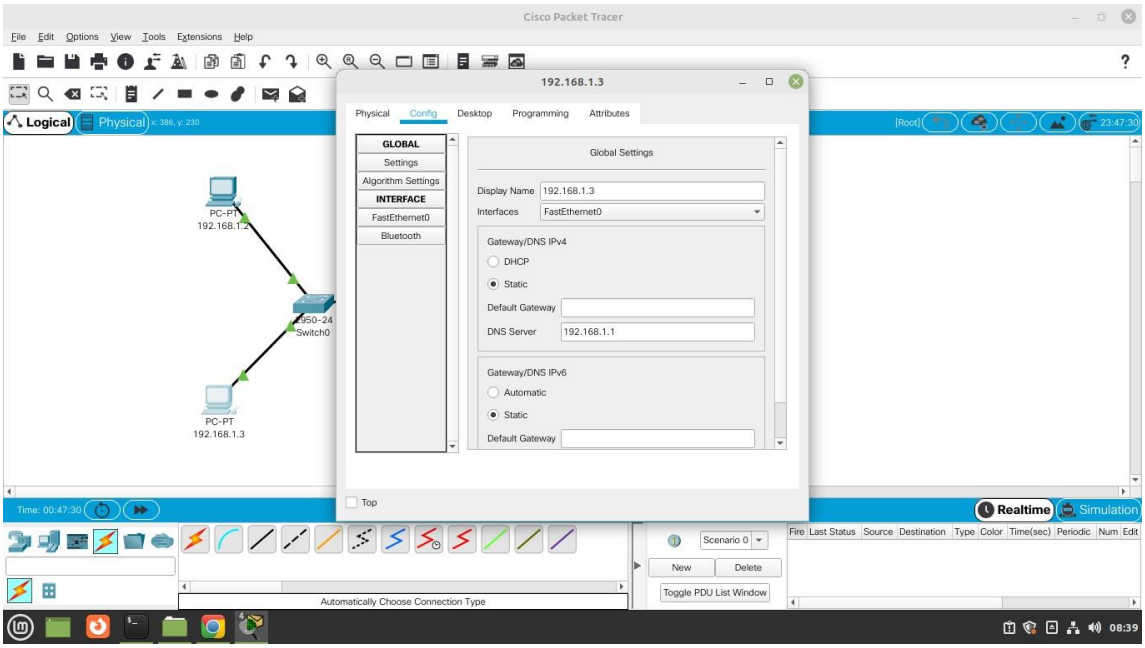
1. DNS – Protocol Configuration :



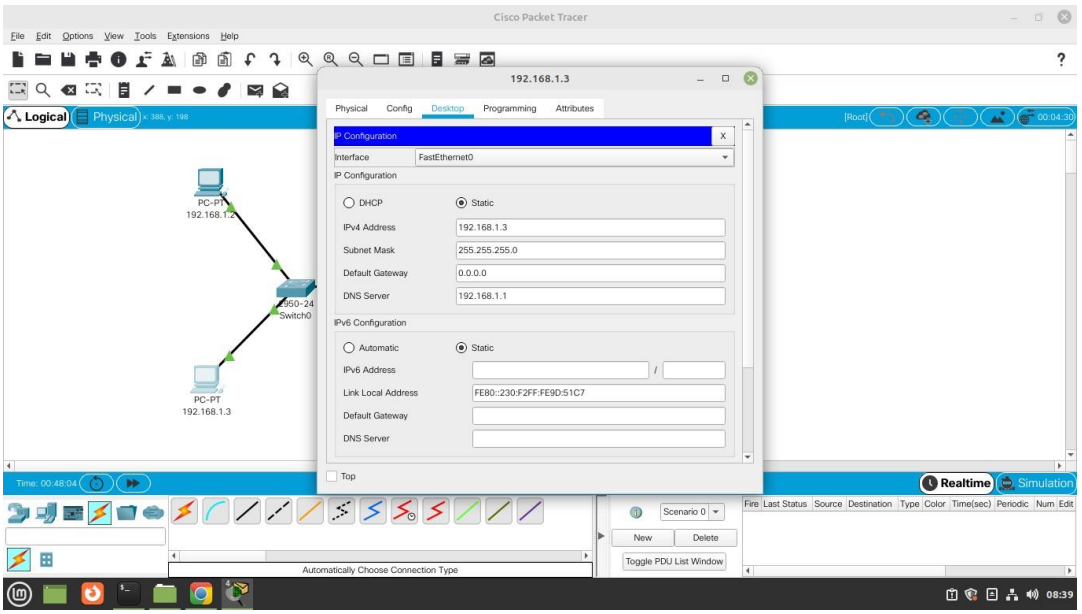


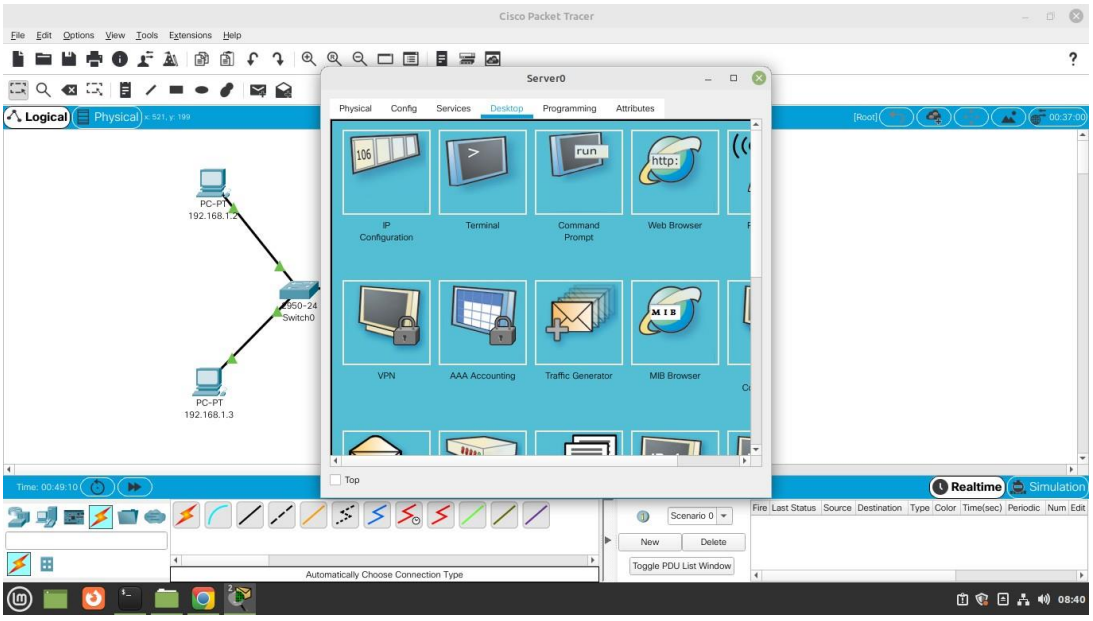
Date: 06 / 08 / 24


Cisco Packet Tracer
192.168.1.2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
DHCP
Static
IPv4 Address
192.168.1.2
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
192.168.1.1
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::20A:41FF:FE94:2033
Default Gateway
DNS Server
Top
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
New
Delete
Toggle PDU List Window
08:39

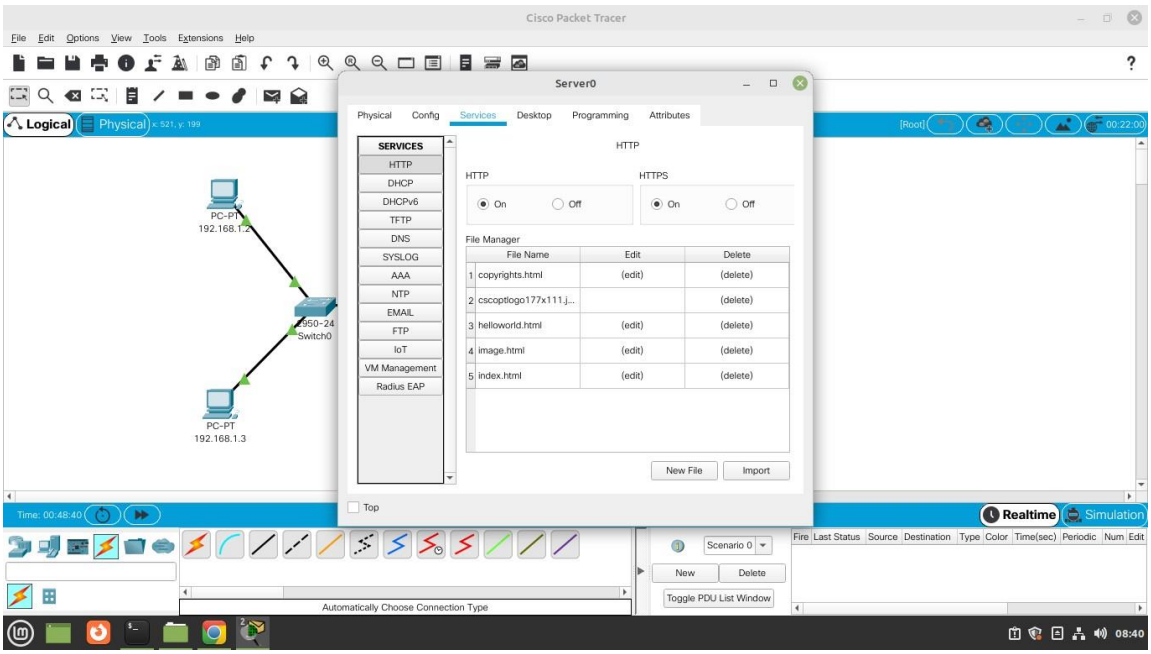

Cisco Packet Tracer
192.168.1.3
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
192.168.1.3
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Default Gateway
DNS Server
192.168.1.1
Gateway/DNS IPv6
Automatic
Static
Default Gateway
Top
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
New
Delete
Toggle PDU List Window
08:39

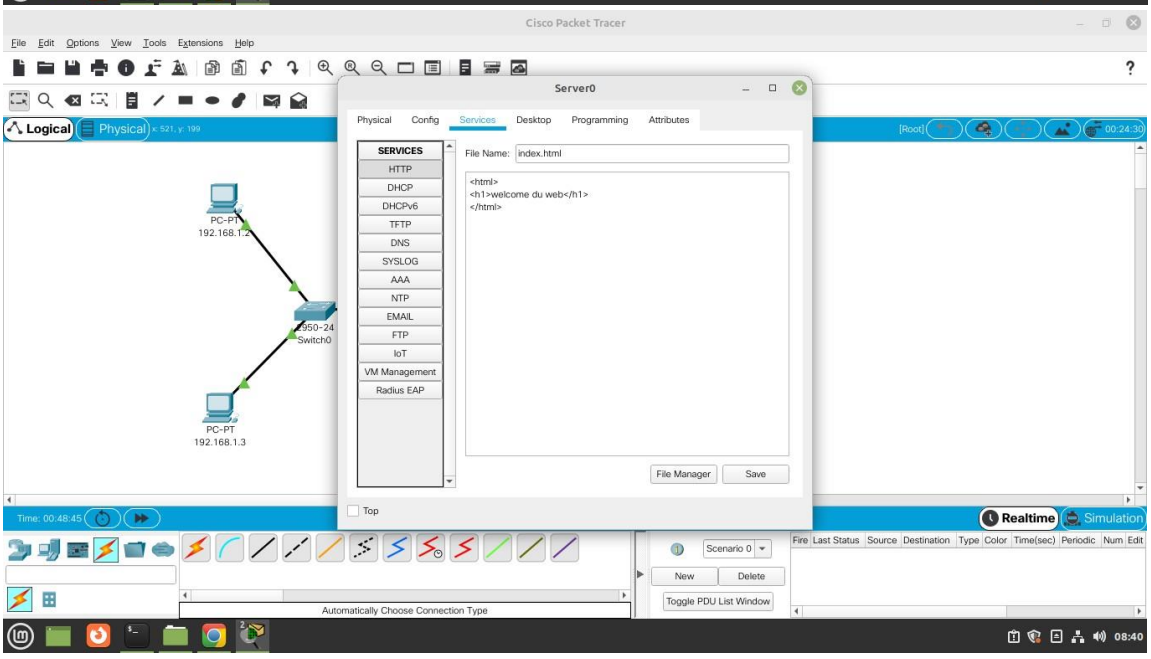
Date: 06 / 08 / 24


Cisco Packet Tracer
192.168.1.3
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
DHCP
Static
IPv4 Address
192.168.1.3
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
192.168.1.1
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::230:F2FF:FE9D:51C7
Default Gateway
DNS Server
Top
Logical
Physical
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
08:39

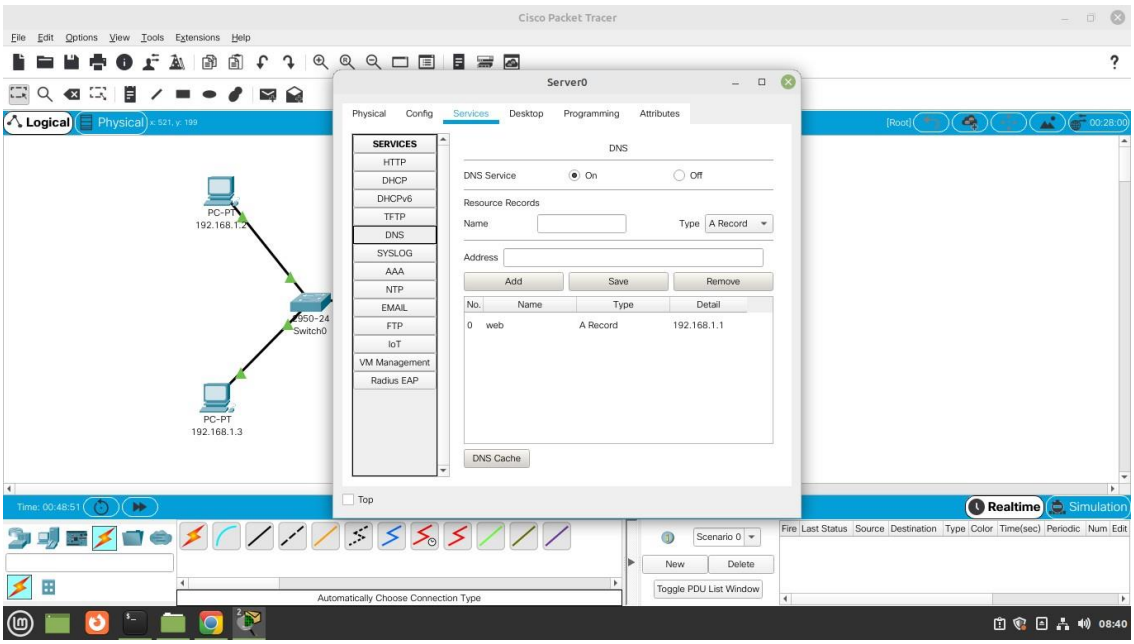

Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
Terminal
Command Prompt
Web Browser
VPN
AAA Accounting
Traffic Generator
MIB Browser
Top
Logical
Physical
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
08:40

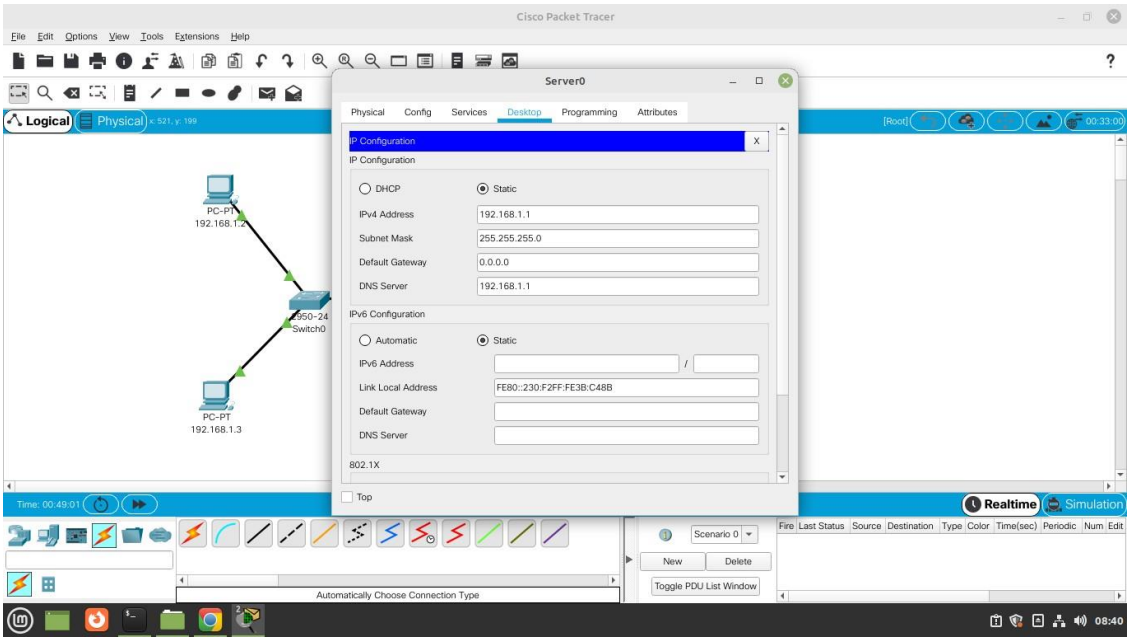
Date: 06 / 08 / 24


Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
HTTP
HTTP
HTTPS
On
Off
On
Off
File Manager
File Name
Edit
Delete
1 copyrights.html (edit) (delete)
2 cscoptlogo177x111.j... (delete)
3 helloworld.html (edit) (delete)
4 image.html (edit) (delete)
5 index.html (edit) (delete)
New File
Import
Top
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window

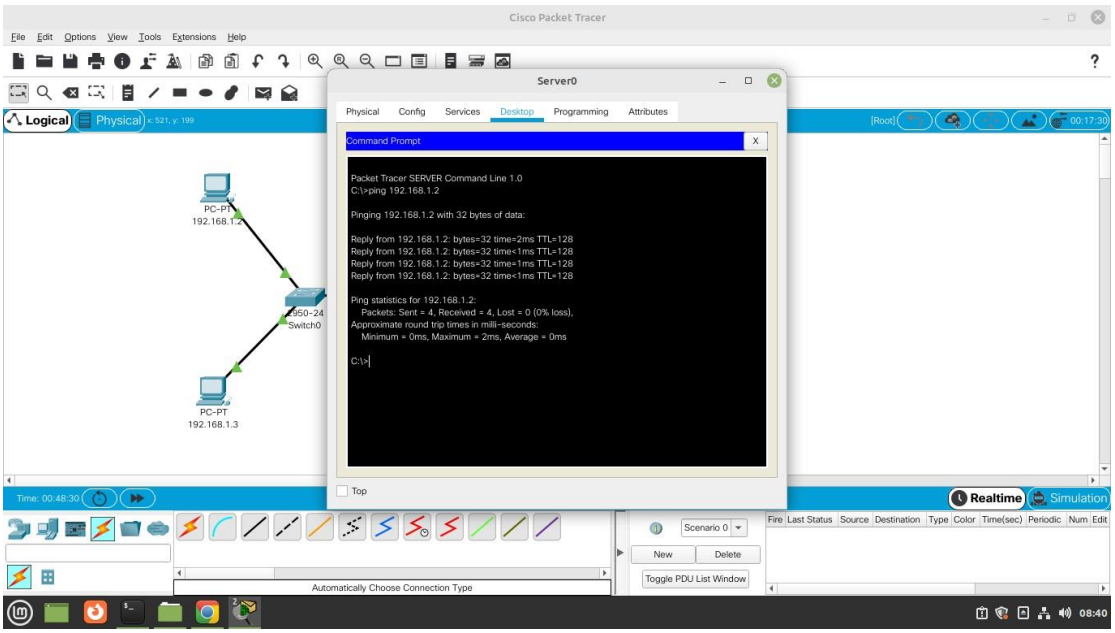

Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
File Name: index.html
<html>
<h1>welcome du web</h1>
</html>
File Manager
Save
Top
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window

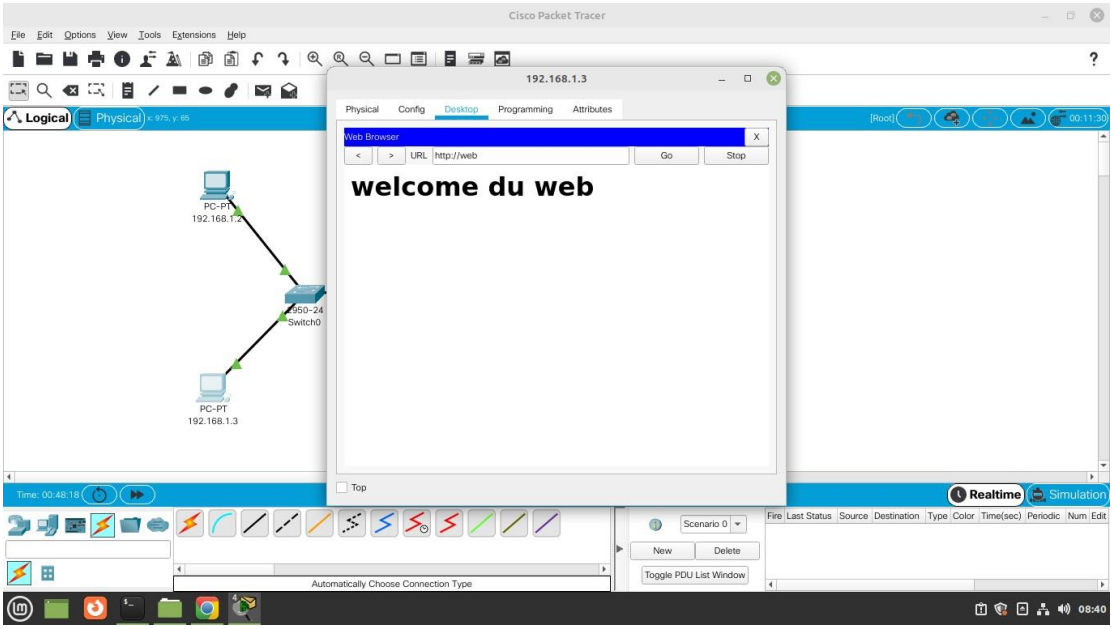
Date: 06 / 08 / 24


Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
DNS
DNS Service
On
Off
Resource Records
Name
Type
A Record
Address
Add
Save
Remove
No.
Name
Type
Detail
0
web
A Record
192.168.1.1
DNS Cache
Top
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
08:40

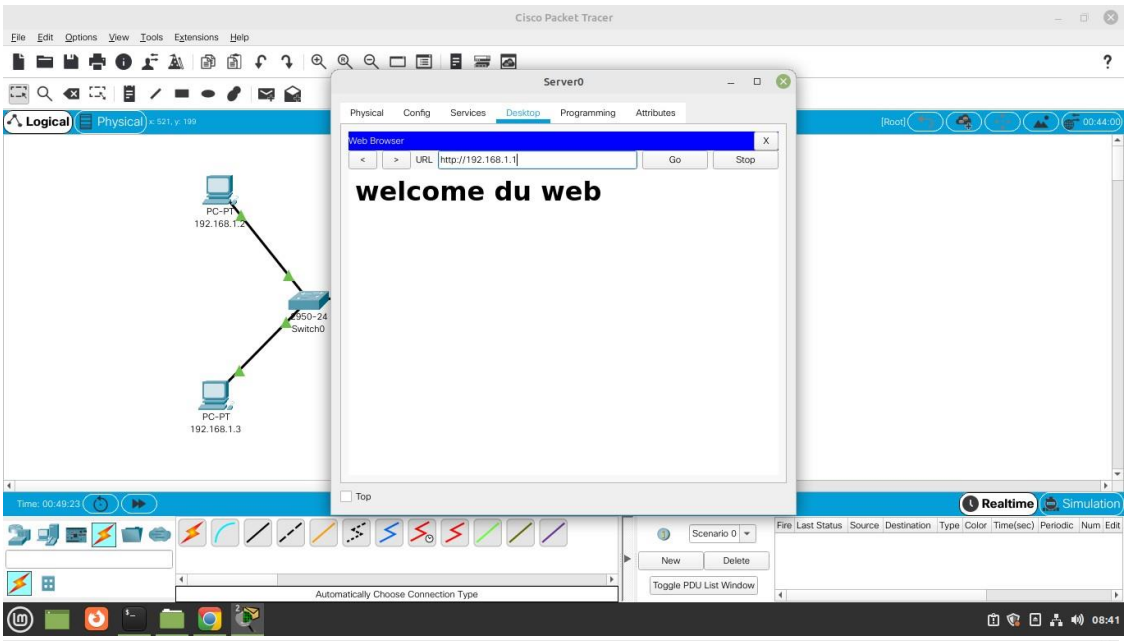

Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.1
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
192.168.1.1
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::230:F2FF:FE3B:C48B
Default Gateway
DNS Server
802.1X
Top
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
08:40

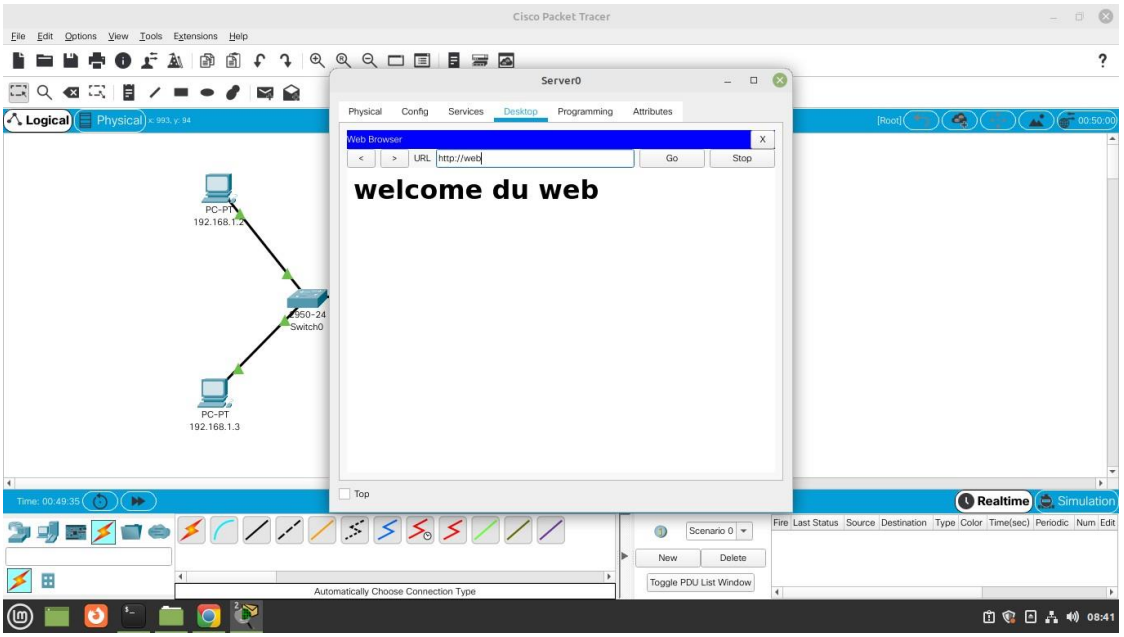
Date: 06 / 08 / 24


Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
Command Prompt
Packet Tracer SERVER Command Line 1.0
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time=2ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 2ms, Average = 0ms
C:\>
PC-PT
192.168.1.2
2960-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type


Cisco Packet Tracer
192.168.1.3
Physical
Config
Desktop
Programming
Attributes
Web Browser
URL
http://web
Go
Stop
welcome du web
PC-PT
192.168.1.2
2960-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type

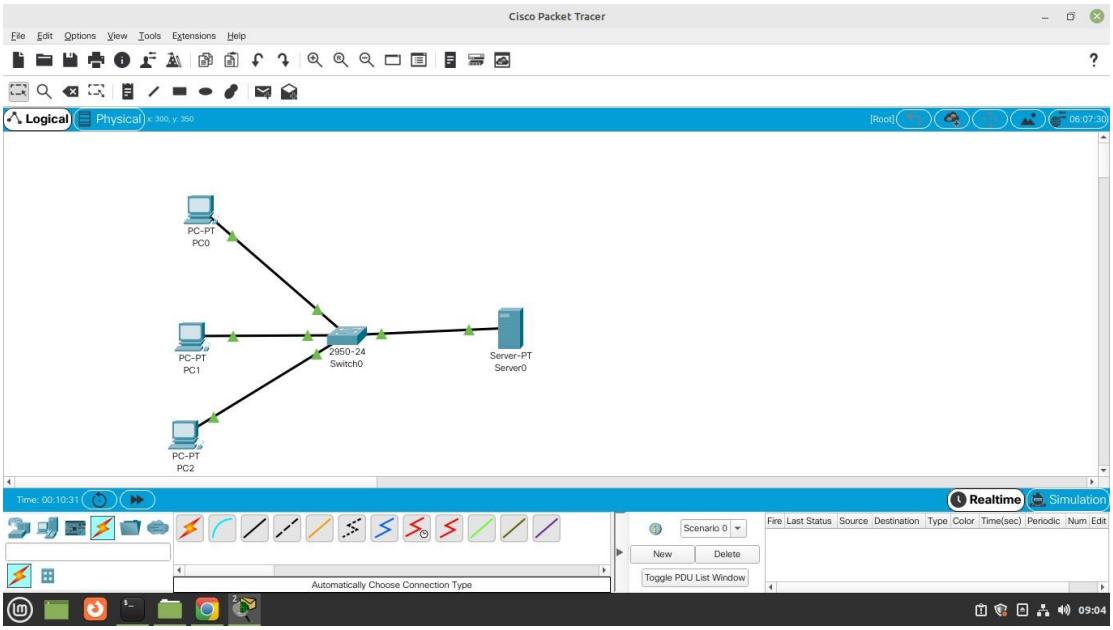
Date: 06 / 08 / 24

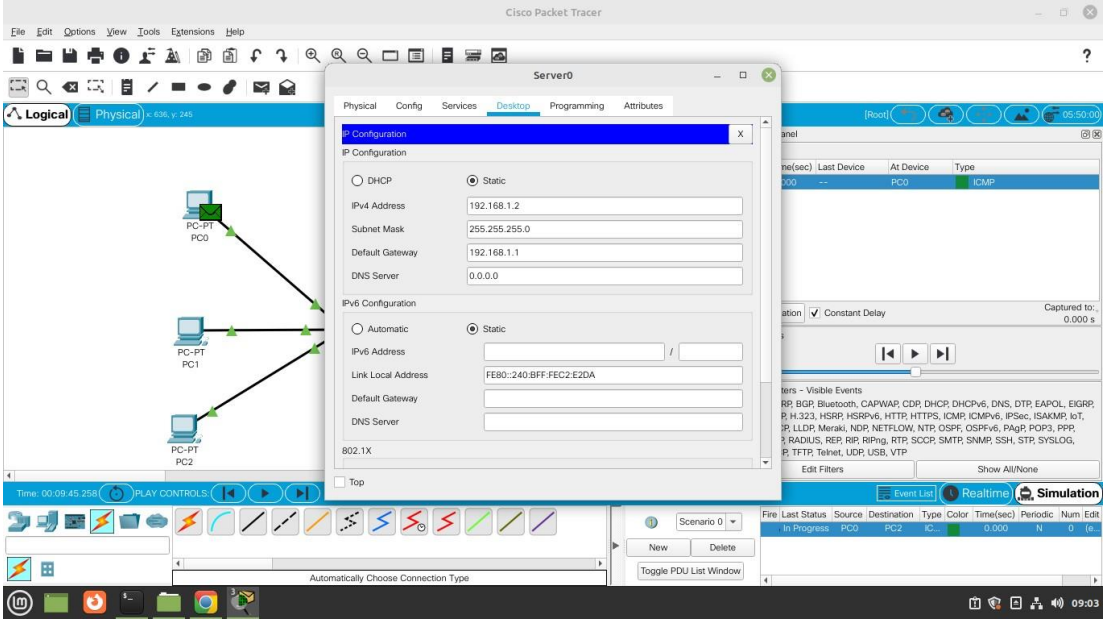

Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
Web Browser
URL
http://192.168.1.1
Go
Stop
welcome du web
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
New
Delete
Toggle PDU List Window


Cisco Packet Tracer
Server0
Physical
Config
Services
Desktop
Programming
Attributes
Web Browser
URL
http://web
Go
Stop
welcome du web
PC-PT
192.168.1.2
2950-24
Switch0
PC-PT
192.168.1.3
Logical
Physical
Realtime
Simulation
Automatically Choose Connection Type
New
Delete
Toggle PDU List Window

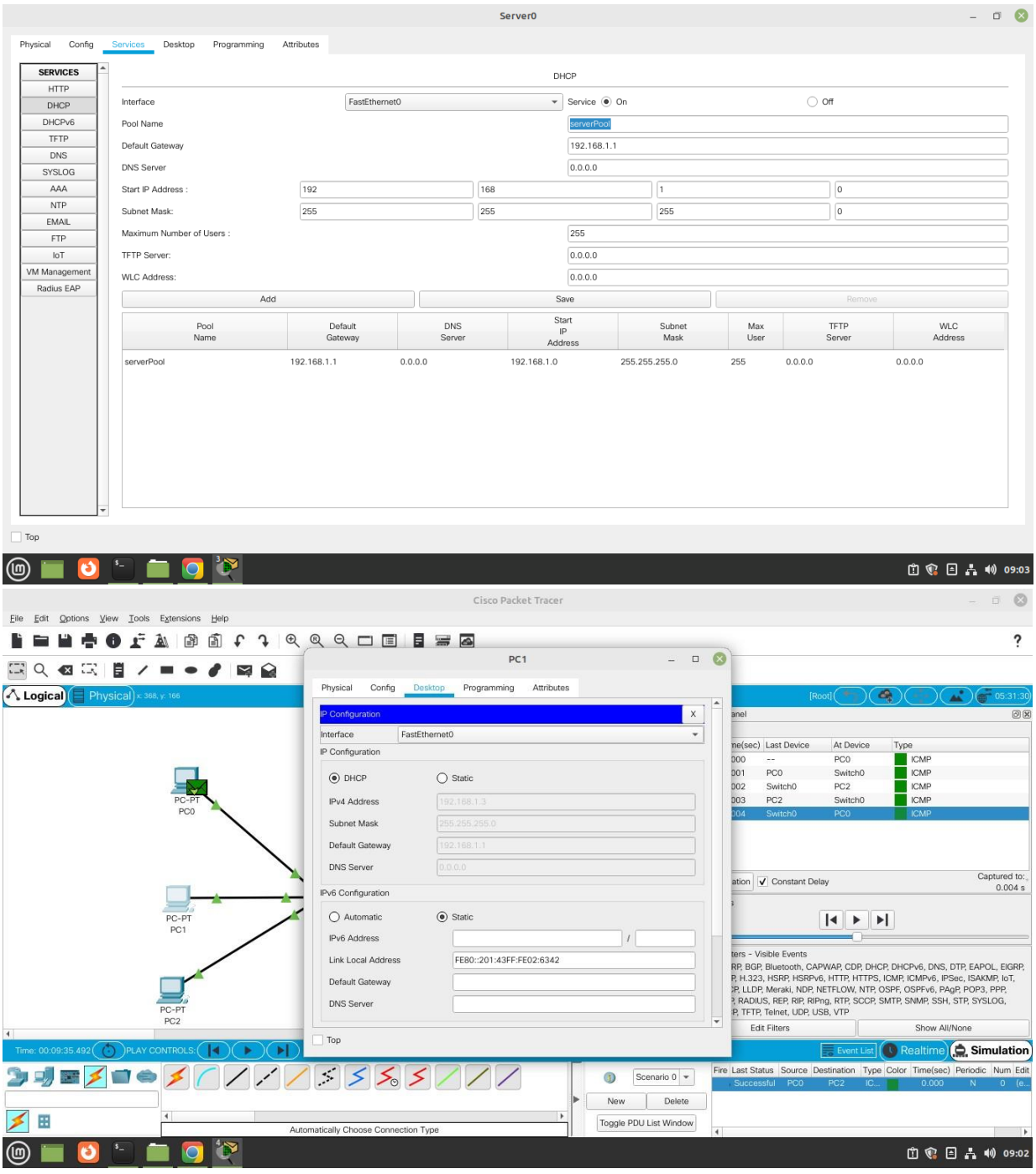
Date: 06 / 08 / 24

2. DHCP Configuration :

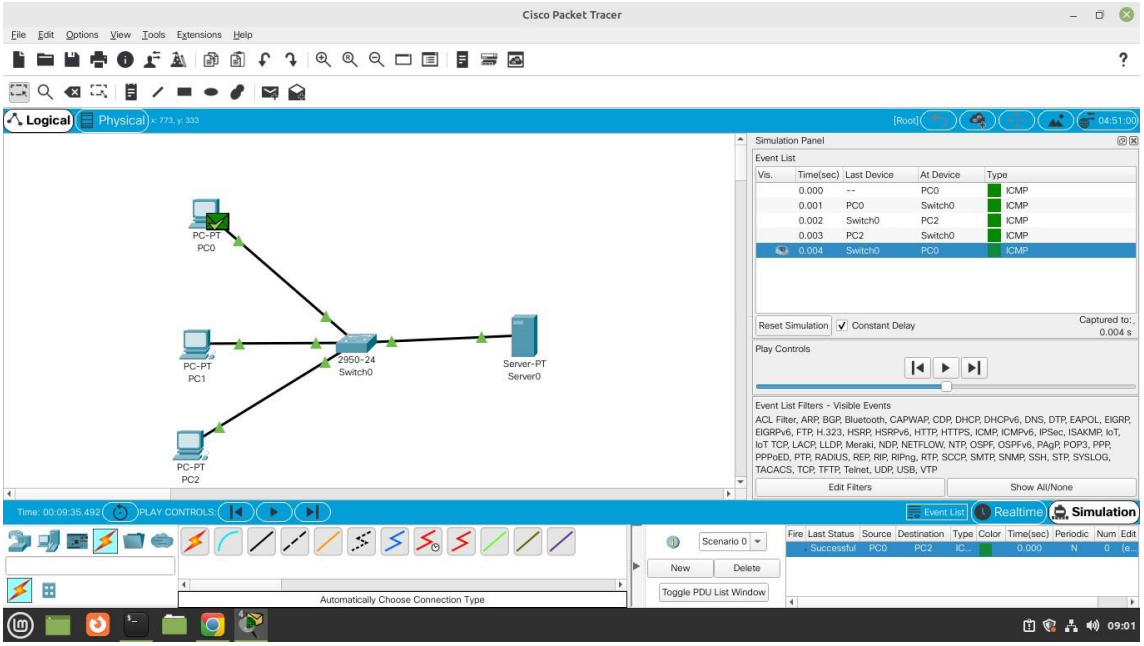


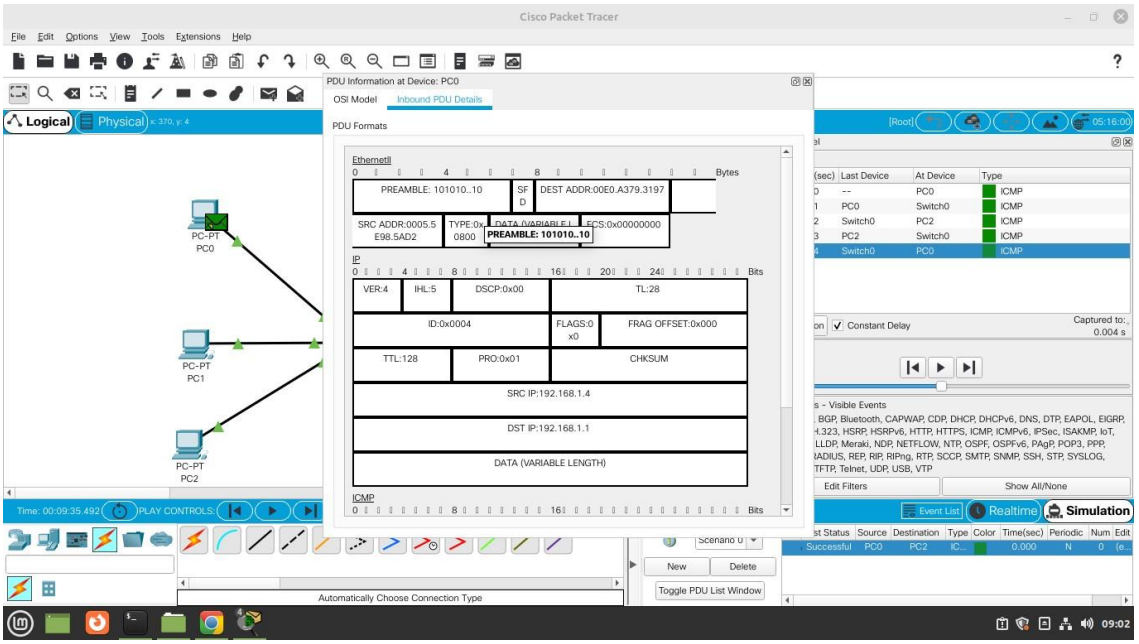


Date: 06 / 08 / 24


Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
DHCP
Interface
FastEthernet0
Service
On
Off
Pool Name
serverPool
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
Start IP Address :
192
168
1
0
Subnet Mask:
255
255
255
0
Maximum Number of Users :
255
TFTP Server:
0.0.0.0
WLC Address:
0.0.0.0
Add
Save
Remove
Pool Name
Default Gateway
DNS Server
Start IP Address
Subnet Mask
Max User
TFTP Server
WLC Address
serverPool
192.168.1.1
0.0.0.0
192.168.1.0
255.255.255.0
255
0.0.0.0
0.0.0.0
Top
09:03
Cisco Packet Tracer
File
Edit
Options
View
Tools
Extensions
Help
PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
DHCP
Static
IPv4 Address
Subnet Mask
Default Gateway
DNS Server
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::201:43FF:FE02:6342
Default Gateway
DNS Server
Top
Logical
Physical
PC-PT PC0
PC-PT PC1
PC-PT PC2
Time: 00:09:35.492
PLAY CONTROLS:
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
Realtime
Simulation
Edit Filters
Show All/None
Constant Delay
09:02

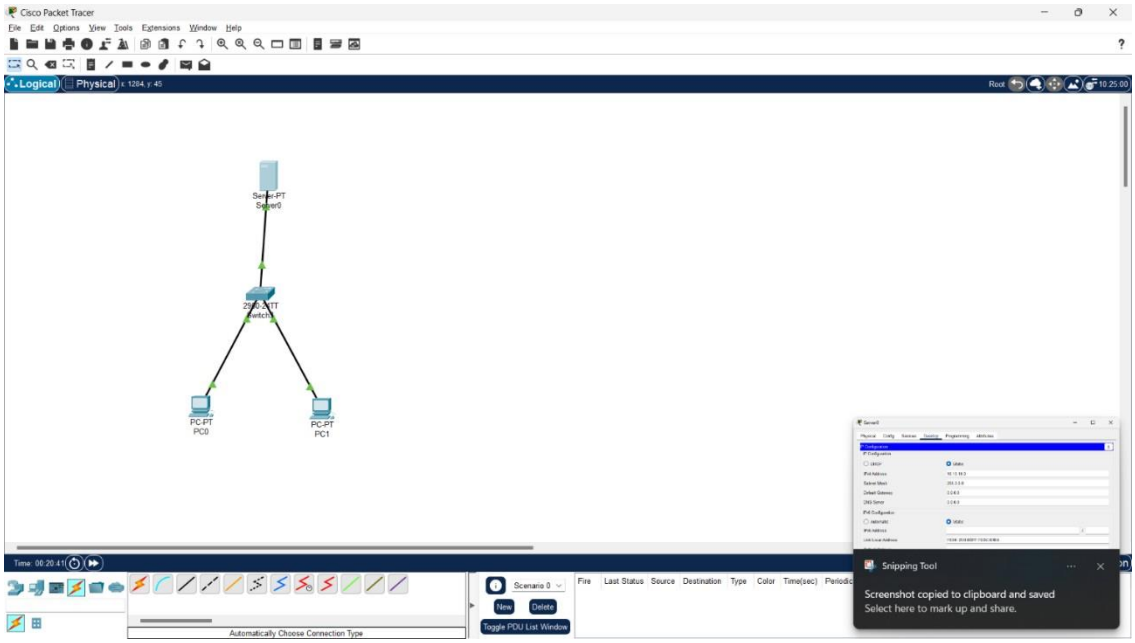
Date: 06 / 08 / 24

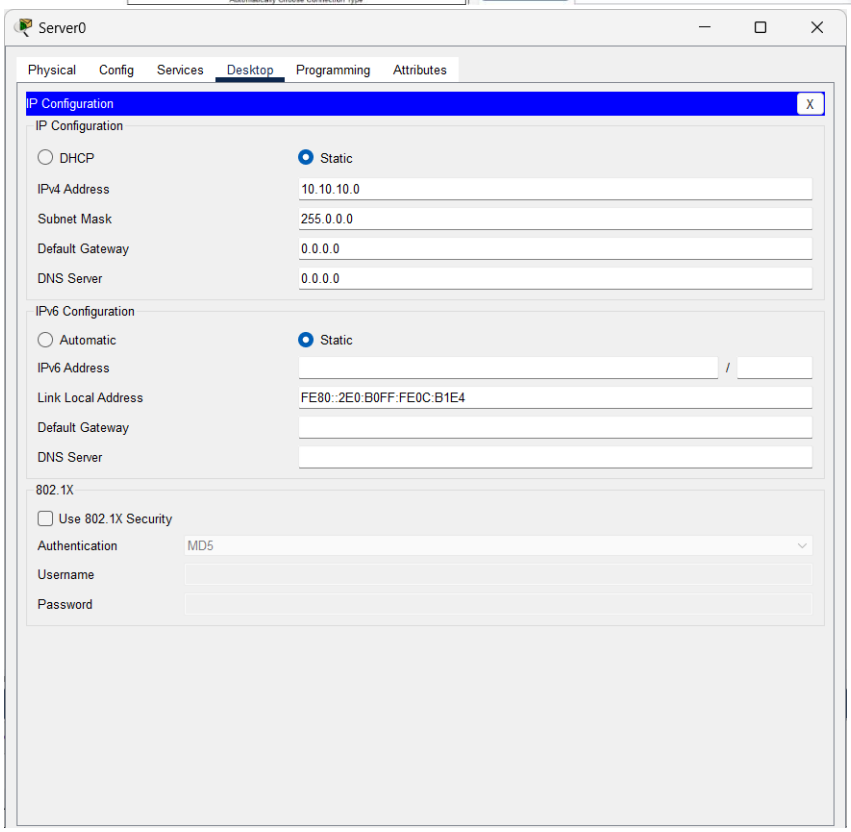

Cisco Packet Tracer
File Edit Options View Tools Extensions Help
Logical
Physical
PC-PT PC0
PC-PT PC1
PC-PT PC2
2950-24 Switch0
Server-PT Server0
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type
0.000 -- PC0 ICMP
0.001 PC0 Switch0 ICMP
0.002 Switch0 PC2 ICMP
0.003 PC2 Switch0 ICMP
0.004 Switch0 PC0 ICMP
Reset Simulation
Constant Delay
Play Controls
Event List Filters - Visible Events
Edit Filters
Show All/None
Event List
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Automatically Choose Connection Type


Cisco Packet Tracer
PDU Information at Device: PC0
OSI Model
Inbound PDU Details
PDU Formats
Ethernet II
PREAMBLE: 101010..10
DEST ADDR:00E0.A379.3197
SRC ADDR:0005.5E98.5AD2
PREAMBLE: 101010..10
IP
VER:4
IHL:5
DSCP:0x00
TL:28
ID:0x0004
FLAGS:0 x0
FRAG OFFSET:0x000
TTL:128
PRO:0x01
CHKSUM
SRC IP:192.168.1.4
DST IP:192.168.1.1
DATA (VARIABLE LENGTH)
ICMP

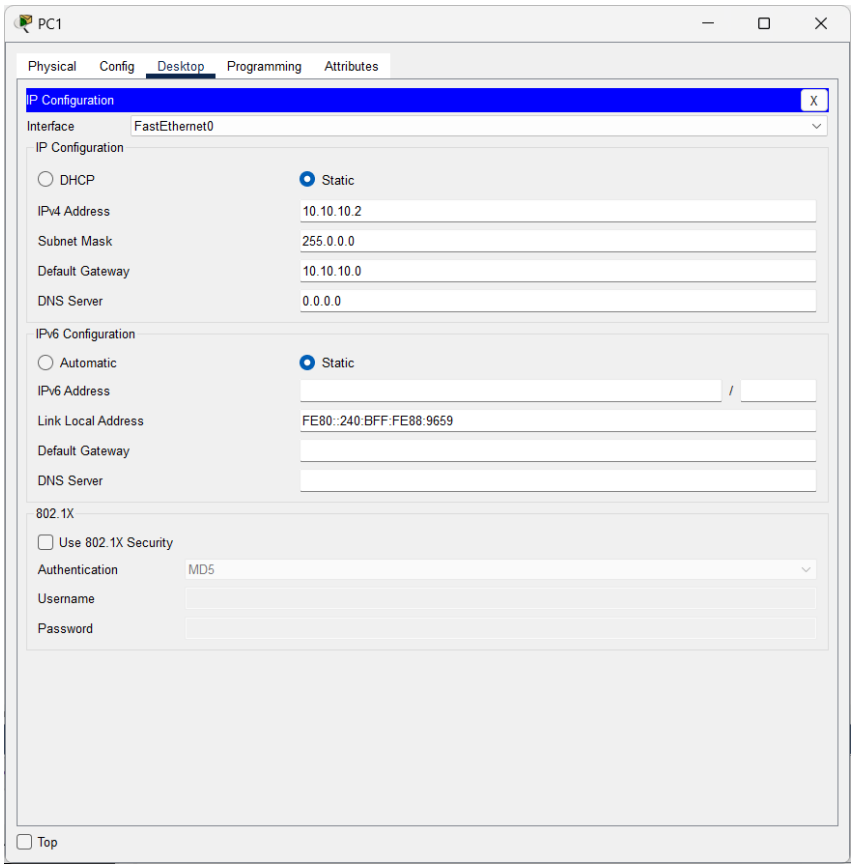
Date: 06 / 08 / 24

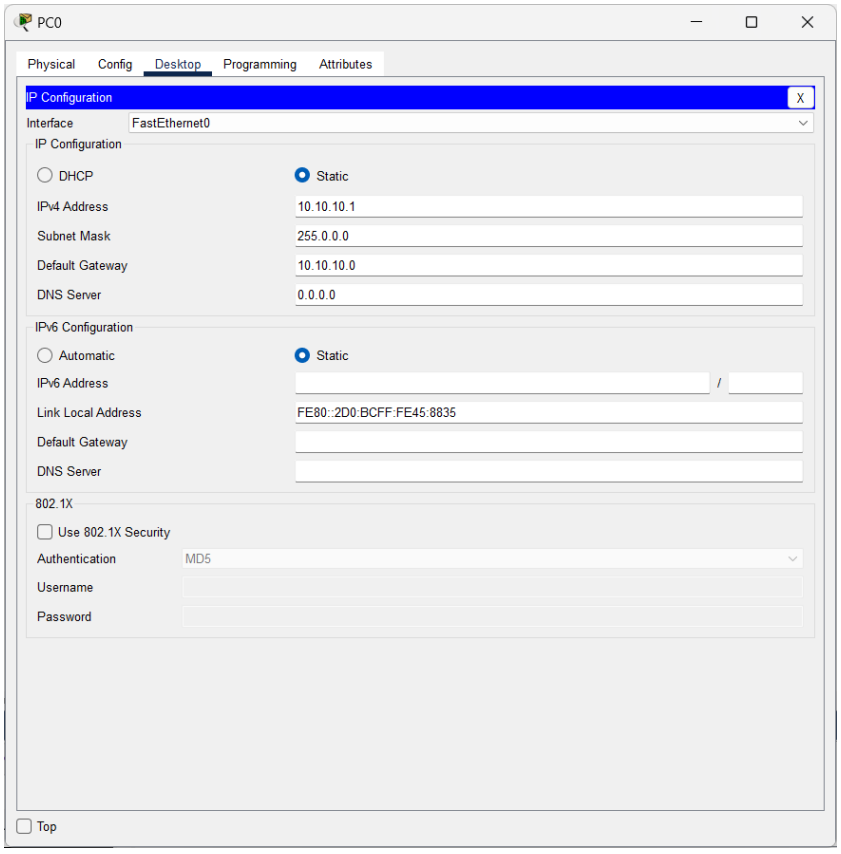
3. FTP Configuration :



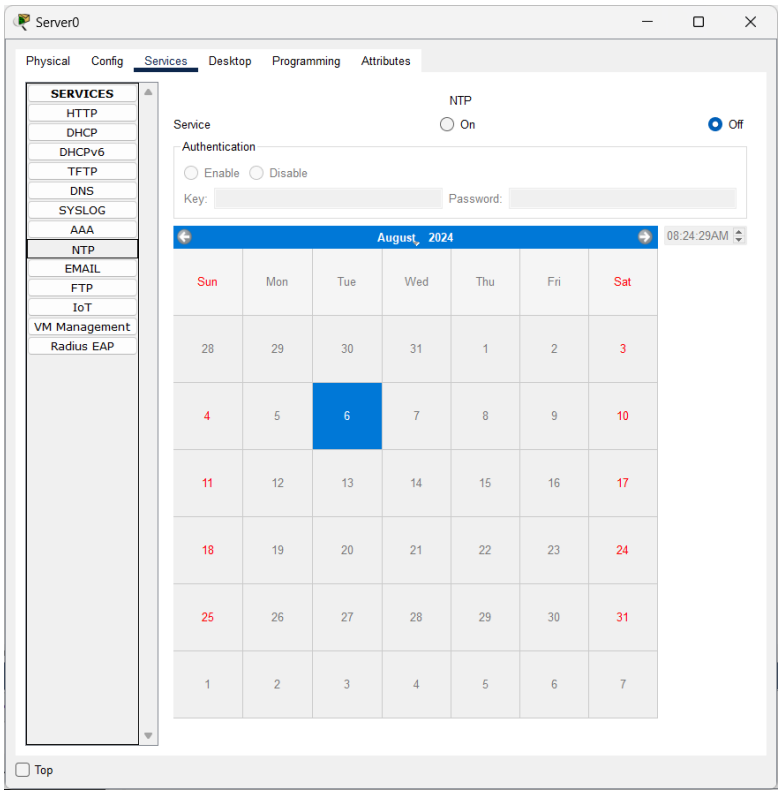


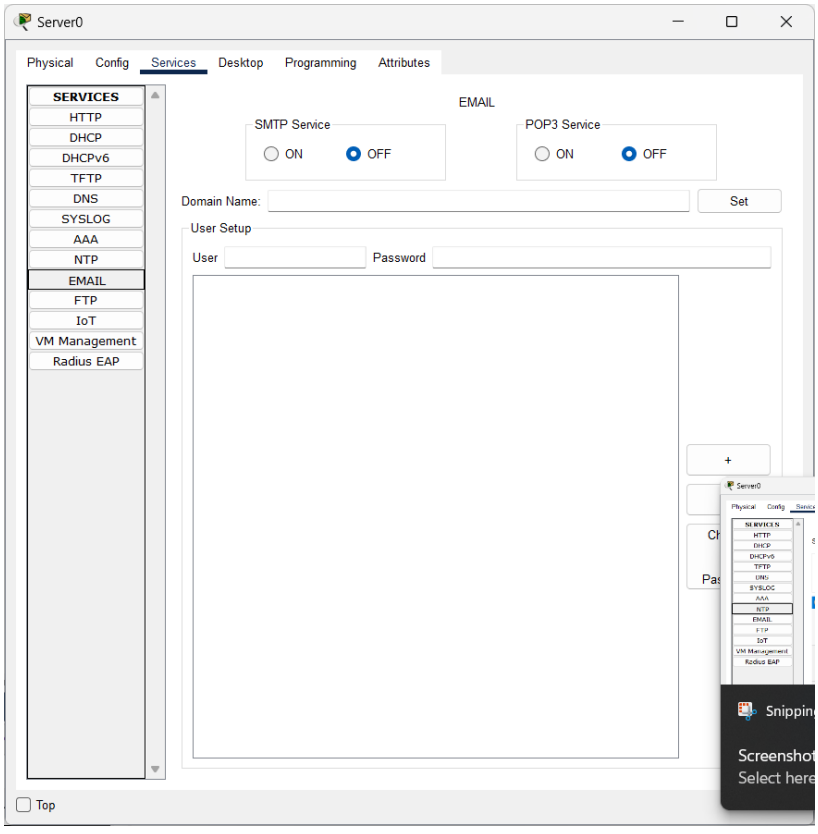
Date: 06 / 08 / 24


PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.10.10.2
Subnet Mask
255.0.0.0
Default Gateway
10.10.10.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::240:BFF:FE88:9659
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

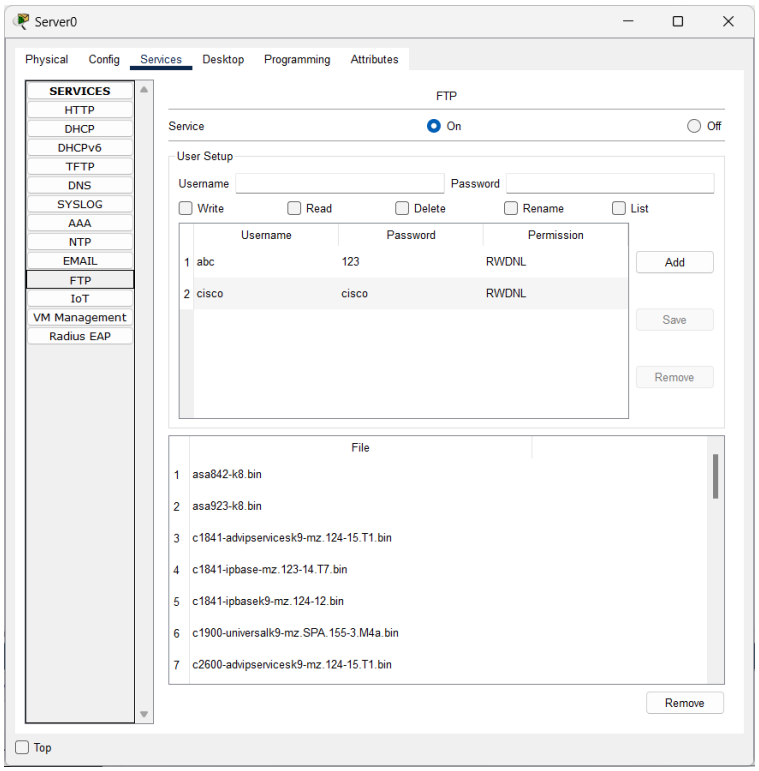

PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
10.10.10.1
Subnet Mask
255.0.0.0
Default Gateway
10.10.10.0
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address
FE80::2D0:BCFF:FE45:8835
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

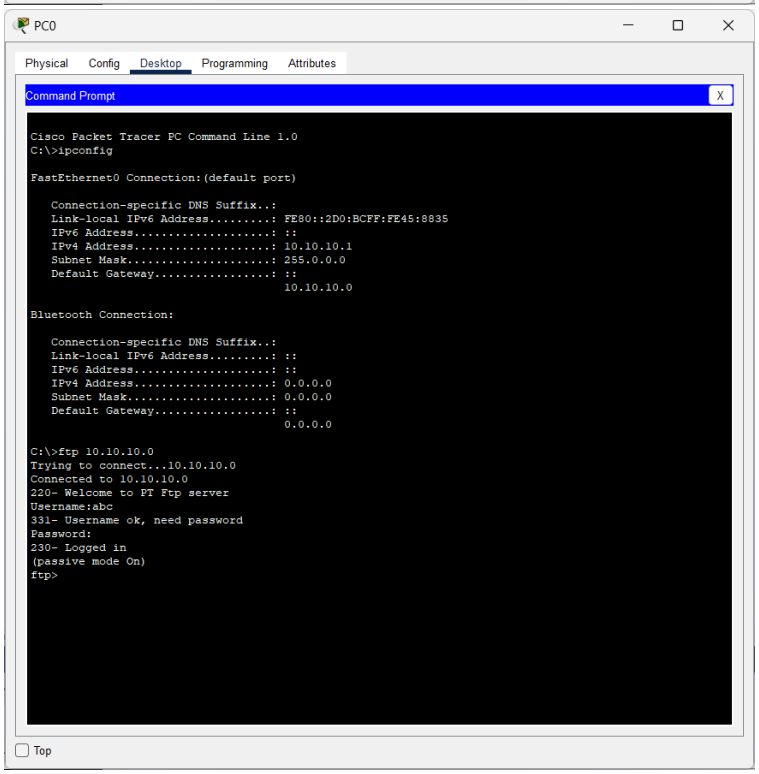
Date: 06 / 08 / 24


Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
NTP
Service
On
Off
Authentication
Enable
Disable
Key:
Password:
August, 2024
08:24:29AM
Sun
Mon
Tue
Wed
Thu
Fri
Sat
Top

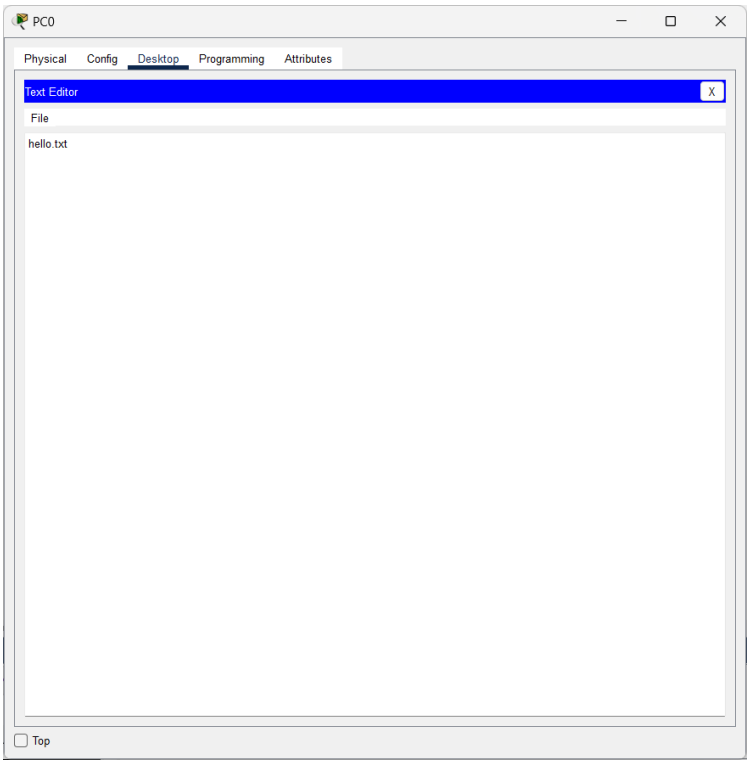

Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
EMAIL
SMTP Service
ON
OFF
POP3 Service
ON
OFF
Domain Name:
Set
User Setup
User
Password
Top

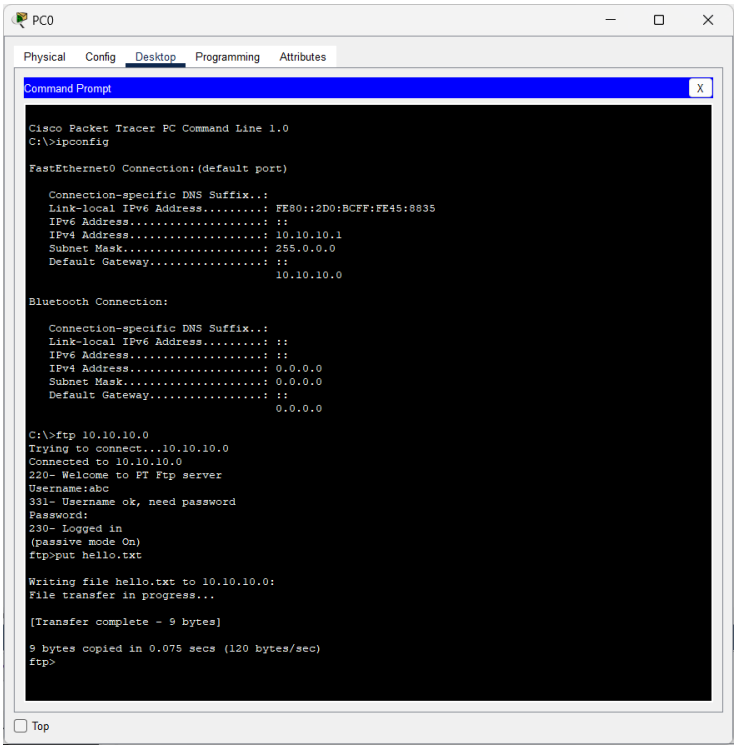
Date: 06 / 08 / 24


Server0
Physical
Config
Services
Desktop
Programming
Attributes
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoT
VM Management
Radius EAP
FTP
Service
On
Off
User Setup
Username
Password
Write
Read
Delete
Rename
List
Username
Password
Permission
1 abc 123 RWDNL
2 cisco cisco RWDNL
Add
Save
Remove
File
1 asa842-k8.bin
2 asa923-k8.bin
3 c1841-advipservicesk9-mz.124-15.T1.bin
4 c1841-ipbase-mz.123-14.T7.bin
5 c1841-ipbasek9-mz.124-12.bin
6 c1900-universalk9-mz.SPA.155-3.M4a.bin
7 c2600-advipservicesk9-mz.124-15.T1.bin
Remove
Top

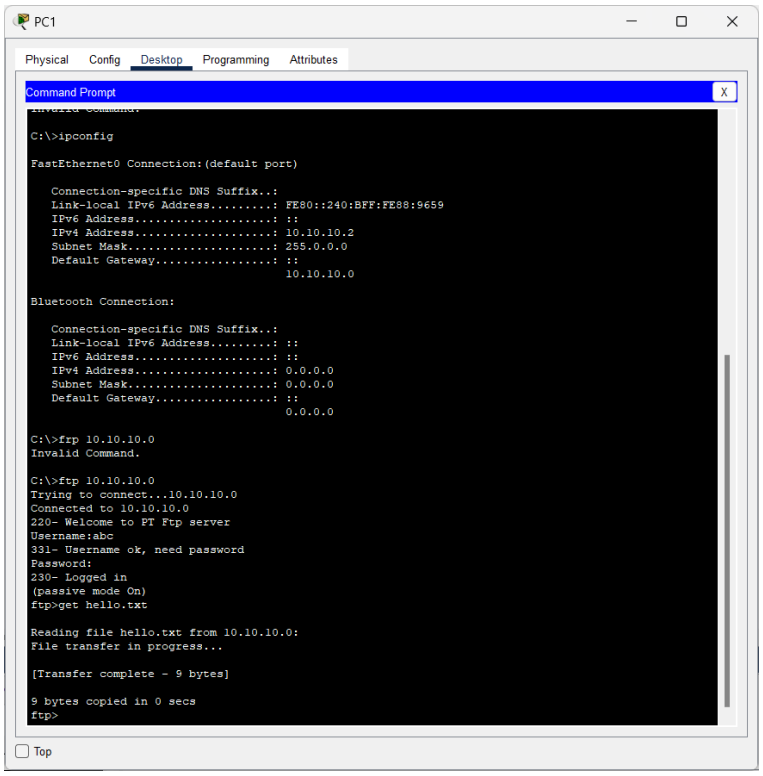

PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::2D0:BCFF:FE45:8835
IPv6 Address.....: ::
IPv4 Address.....: 10.10.10.1
Subnet Mask.....: 255.0.0.0
Default Gateway.....: ::
10.10.10.0
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>ftp 10.10.10.0
Trying to connect...10.10.10.0
Connected to 10.10.10.0
220- Welcome to PT Ftp server
Username:abc
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>
Top

Date: 06 / 08 / 24


PC0
Physical
Config
Desktop
Programming
Attributes
Text Editor
File
hello.txt
Top


PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::2D0:BCFF:FE45:8835
IPv6 Address.....: ::
IPv4 Address.....: 10.10.10.1
Subnet Mask.....: 255.0.0.0
Default Gateway.....: ::
10.10.10.0
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>ftp 10.10.10.0
Trying to connect...10.10.10.0
Connected to 10.10.10.0
220- Welcome to PT Ftp server
Username:abc
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>put hello.txt
Writing file hello.txt to 10.10.10.0:
File transfer in progress...
[Transfer complete - 9 bytes]
9 bytes copied in 0.075 secs (120 bytes/sec)
ftp>
Top

Date: 06 / 08 / 24


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::240:BFF:FE88:9659
IPv6 Address.....: ::
IPv4 Address.....: 10.10.10.2
Subnet Mask.....: 255.0.0.0
Default Gateway.....: ::
10.10.10.0
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>frp 10.10.10.0
Invalid Command.
C:\>ftp 10.10.10.0
Trying to connect...10.10.10.0
Connected to 10.10.10.0
220- Welcome to PT Ftp server
Username:abc
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>get hello.txt
Reading file hello.txt from 10.10.10.0:
File transfer in progress...
[Transfer complete - 9 bytes]
9 bytes copied in 0 secs
ftp>
Top

Date: 20/08/2024

Lab Practical #07

Study Client-Server Socket programming - TCP & UDP

Practical Assignment #07:

1. **Write a C/Java code for TCP Server-Client Socket Programming.**
2. **Write a C/Java code for UDP Server-Client Socket Programming.**

1. For TCP Server-Client:

TCP Server Program:

```
import java.io.BufferedInputStream;
import java.io.DataInputStream;
import java.net.*;
import java.io.*;

public class Server {
   private Socket socket = null;
   private ServerSocket server = null;
   private DataInputStream in = null;

   public Server (int port) {
      //starts server and waits for a connection
      try {
         server = new ServerSocket(port);
         System.out.println("Server started...");
         System.out.println("Waiting for a client...");
         socket = server.accept();
         System.out.println("Client accepted");
         //takes input from the client socket
         in = new DataInputStream(new BufferedInputStream(socket.getInputStream()));
         String line = "";
         // reads message from client until "Over" is sent
         while(!line.equals("Over")) {
            try {
               line = in.readUTF();
               System.out.println(line);
            } catch(IOException e) {
               System.out.println(e);
            }
         }
         System.out.println("Closing connection");
         //close connection
         socket.close();
         in.close();
```

Date: 20/08/2024

```
    }
    catch(IOException e) {
      System.out.println(e);
    }
  }
  public static void main(String args[]) {
    Server server = new Server(5000);
  }
}
```

TCP Client Program:

```
import java.net.*;
import java.io.*;
public class Client1
{
  //initialize socket and i/o stream
  private Socket socket = null;
  private BufferedReader input = null;
  private DataOutputStream out = null;

  //constructor to put IP address and port
  public Client1(String address, int port) {
    //establish a connection
    try{
      socket = new Socket(address, port);
      System.out.println("Connnected");
      //take input from terminal
      input = new BufferedReader(new InputStreamReader(System.in));
      //sends output to the socket
      out = new DataOutputStream(socket.getOutputStream());
    }
    catch(UnknownHostException e) {
      System.out.println("unknownHost :: " + e);
    }
    catch(IOException e) {
      System.out.println("ioException :: " + e);
    }

    //String to read message from input tab
    String line = "";
    while(!line.equals("Over")) {
      try{
        line = input.readLine();
        out.writeUTF(line);
```

Date: 20/08/2024

```
        }
        catch(IOException e) {
            System.out.println("ioException :: " + e);
        }
    }
    //close the connection
    try {
        input.close();
        out.close();
        socket.close();
    } catch(IOException e) {
        System.out.println("ioException :: " + e);
    }
  }
  public static void main(String args[]) {
    Client1 client = new Client1("127.0.0.1",5000);
  }
}
```

2. For UDP Server-Client:

UDP Server Program:

```
import java.io.IOException;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.net.SocketException;

public class udpBaseServer_2
{
  public static void main(String[] args) throws IOException
  {
    // Step 1 : Create a socket to listen at port 1234
    DatagramSocket ds = new DatagramSocket(1234);
    byte[] receive = new byte[65535];

    DatagramPacket DpReceive = null;
    while (true)
    {

      // Step 2 : create a DatgramPacket to receive the data.
      DpReceive = new DatagramPacket(receive, receive.length);

      // Step 3 : revieve the data in byte buffer.
      ds.receive(DpReceive);
```

Date: 20/08/2024

```
        System.out.println("Client:-" + data(receive));

        // Exit the server if the client sends "bye"
        if (data(receive).toString().equals("bye"))
        {
            System.out.println("Client sent bye .... EXITING");
            break;
        }

        // Clear the buffer after every message.
        receive = new byte[65535];
    }
  }

  // A utility method to convert the byte array
  // data into a string representation.
  public static StringBuilder data(byte[] a)
  {
    if (a == null)
        return null;
    StringBuilder ret = new StringBuilder();
    int i = 0;
    while (a[i] != 0)
    {
        ret.append((char) a[i]);
        i++;
    }
    return ret;
  }
}
```

UDP Client Program:

Date: 20/08/2024

```
import java.io.IOException;
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.util.Scanner;

public class udpBaseClient_2
{
   public static void main(String args[]) throws IOException
   {
      Scanner sc = new Scanner(System.in);

      // Step 1:Create the socket object for
      // carrying the data.
      DatagramSocket ds = new DatagramSocket();

      InetAddress ip = InetAddress.getLocalHost();
      byte buf[] = null;

      // loop while user not enters "bye"
      while (true)
      {
         String inp = sc.nextLine();

         // convert the String input into the byte array.
         buf = inp.getBytes();

         // Step 2 : Create the datagramPacket for sending
         // the data.
         DatagramPacket DpSend =
               new DatagramPacket(buf, buf.length, ip, 1234);

         // Step 3 : invoke the send call to actually send
         // the data.
         ds.send(DpSend);

         // break the loop if user enters "bye"
         if (inp.equals("bye"))
            break;
      }
   }
}
```

Date: 20/08/2024

Lab Practical #08:

Study Packet capture and header analysis by Wireshark (TCP, UDP, IP).

Practical Assignment #08:

1. Explain usage of Wireshark tool.

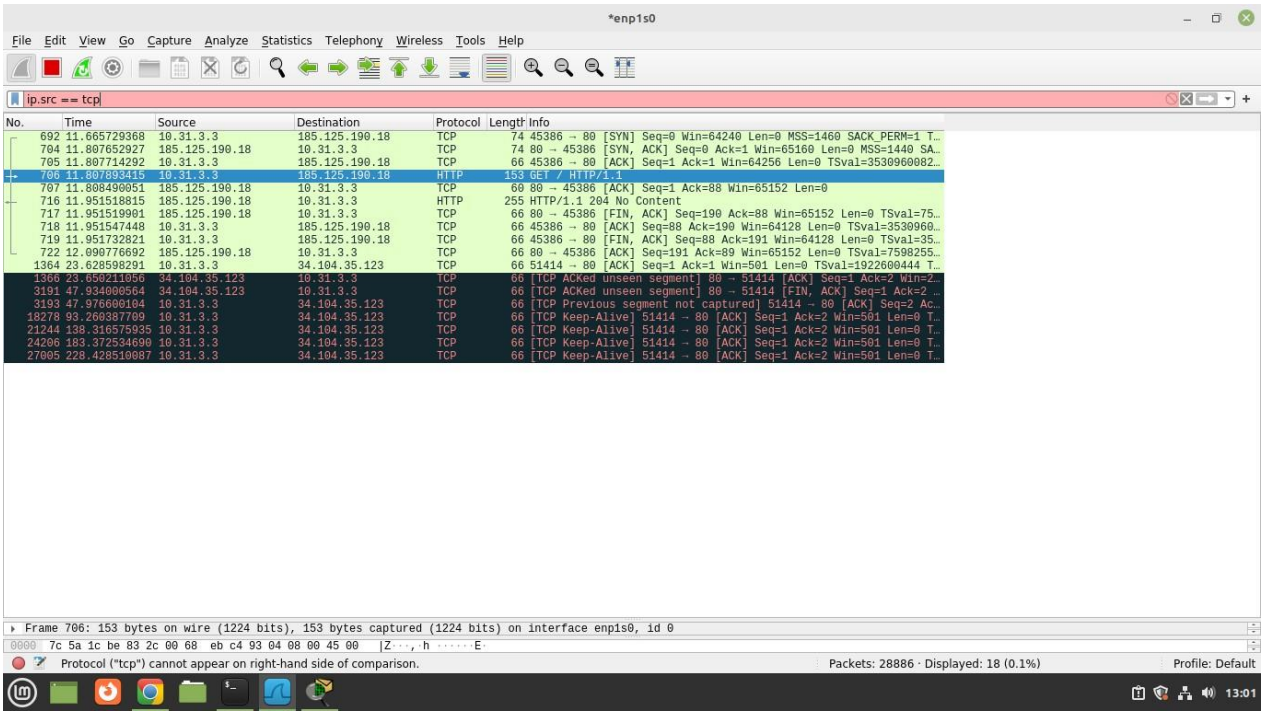
Wireshark is a software tool used to monitor the network traffic through a network interface. It is the most widely used network monitoring tool today. Wireshark is loved equally by system administrators, network engineers, network enthusiasts, network security professionals and black hat hackers.

There are many reasons why Wireshark is so popular :

1. It has a great GUI as well as a conventional CLI(T Shark).
2. It offers network monitoring on almost all types of network standards (ethernet, wlan, Bluetooth etc)
3. It is open-source with a large community of backers and developers.
4. All the necessary components for monitoring, analyzing and documenting the network traffic are present. It is free to use.

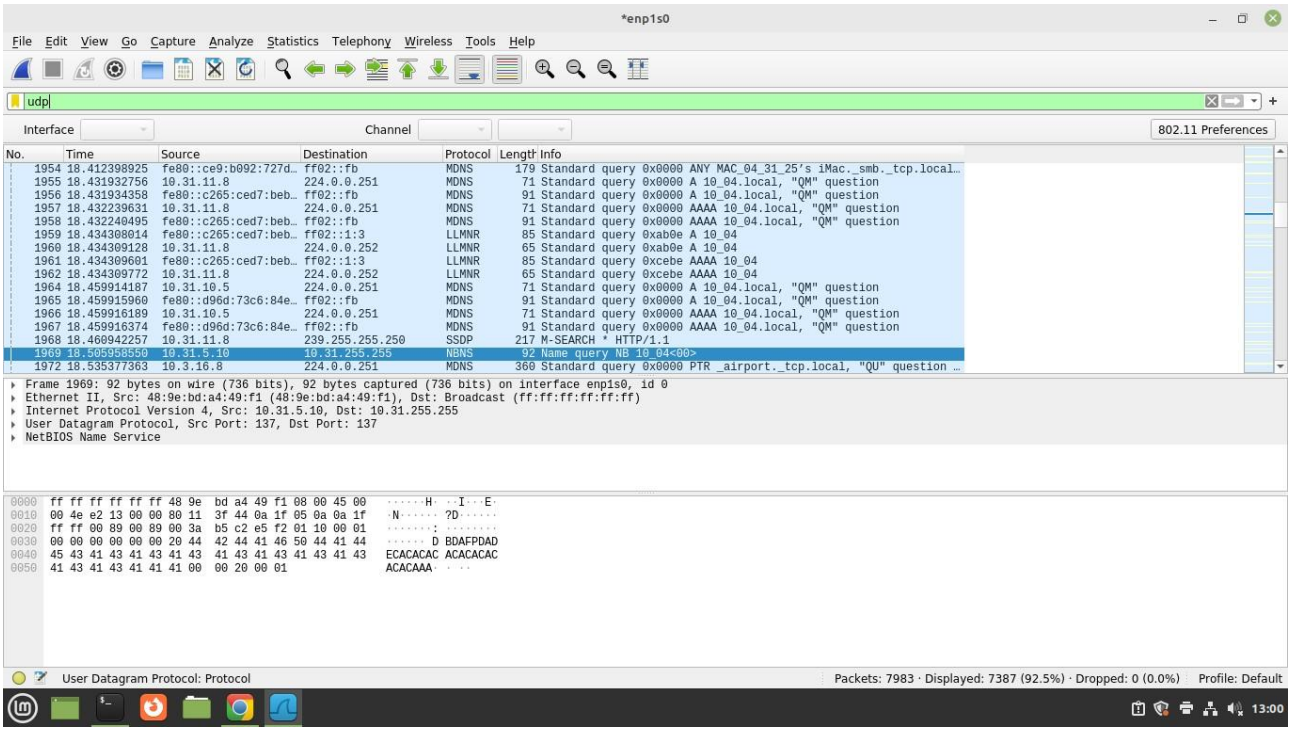
2. Packet capture and header analysis by Wireshark (TCP, UDP, IP).

TCP

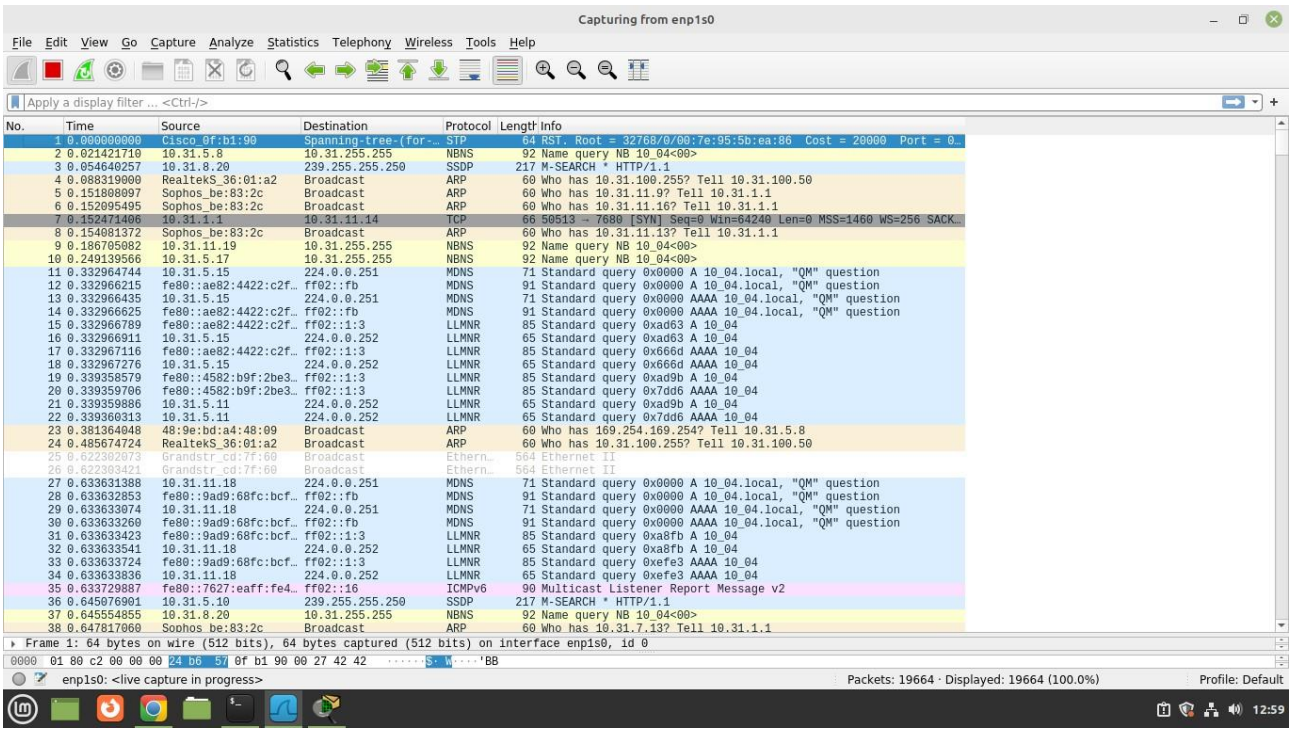


Date: 20/08/2024

UDP



IP



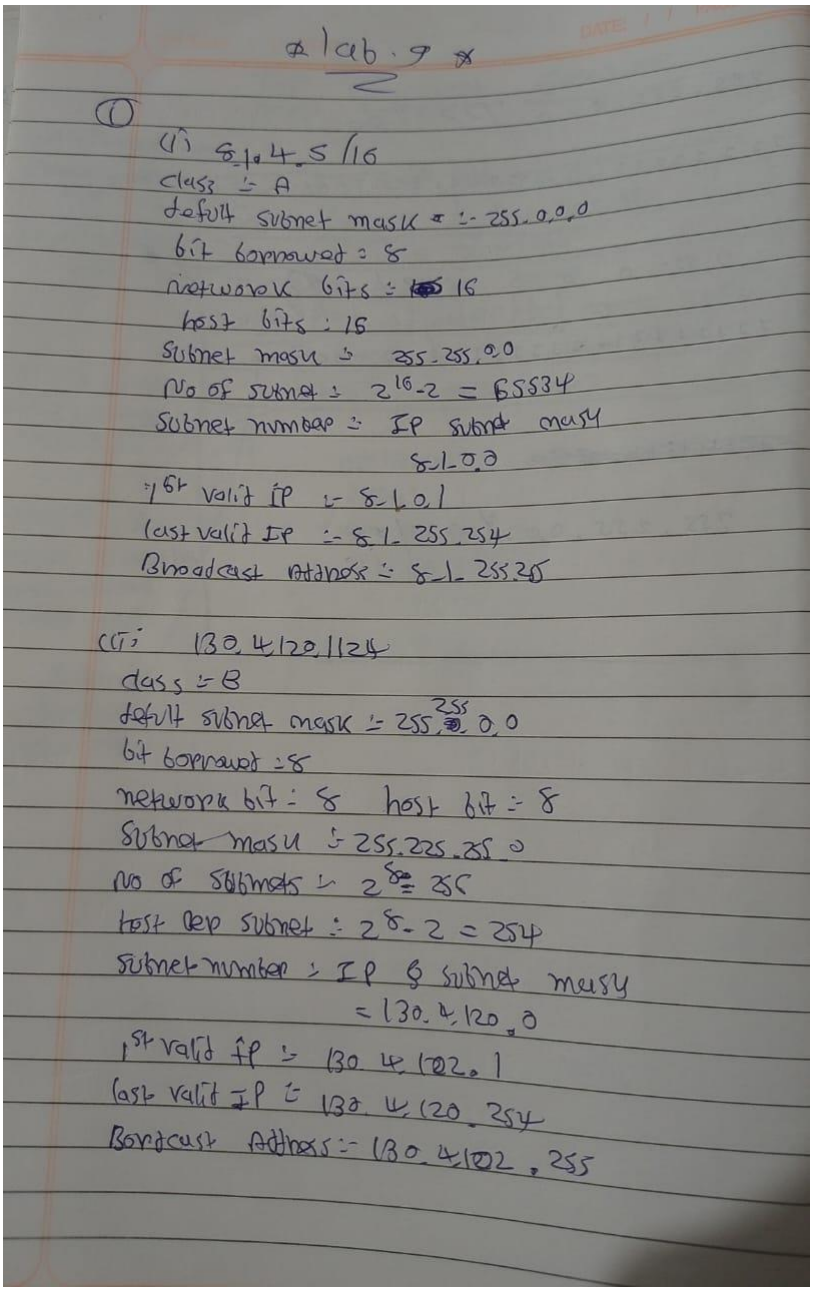
Date: 11/09/2024

Study of IP Addressing and sub-netting.

Practical Assignment #09:

1. Find default subnet marks, network bits, host bits, hosts per subnet, no of subnets, subnet number, 1st valid IP address, last valid IP address, and broadcast address.
   i. 8.1.4.5/16
   ii. 130.4.102.1/24
   iii. 199.1.1.1/24
   iv. 130.4.102.1/22
   v. 199.1.1.100/27

Date: 11/09/2024



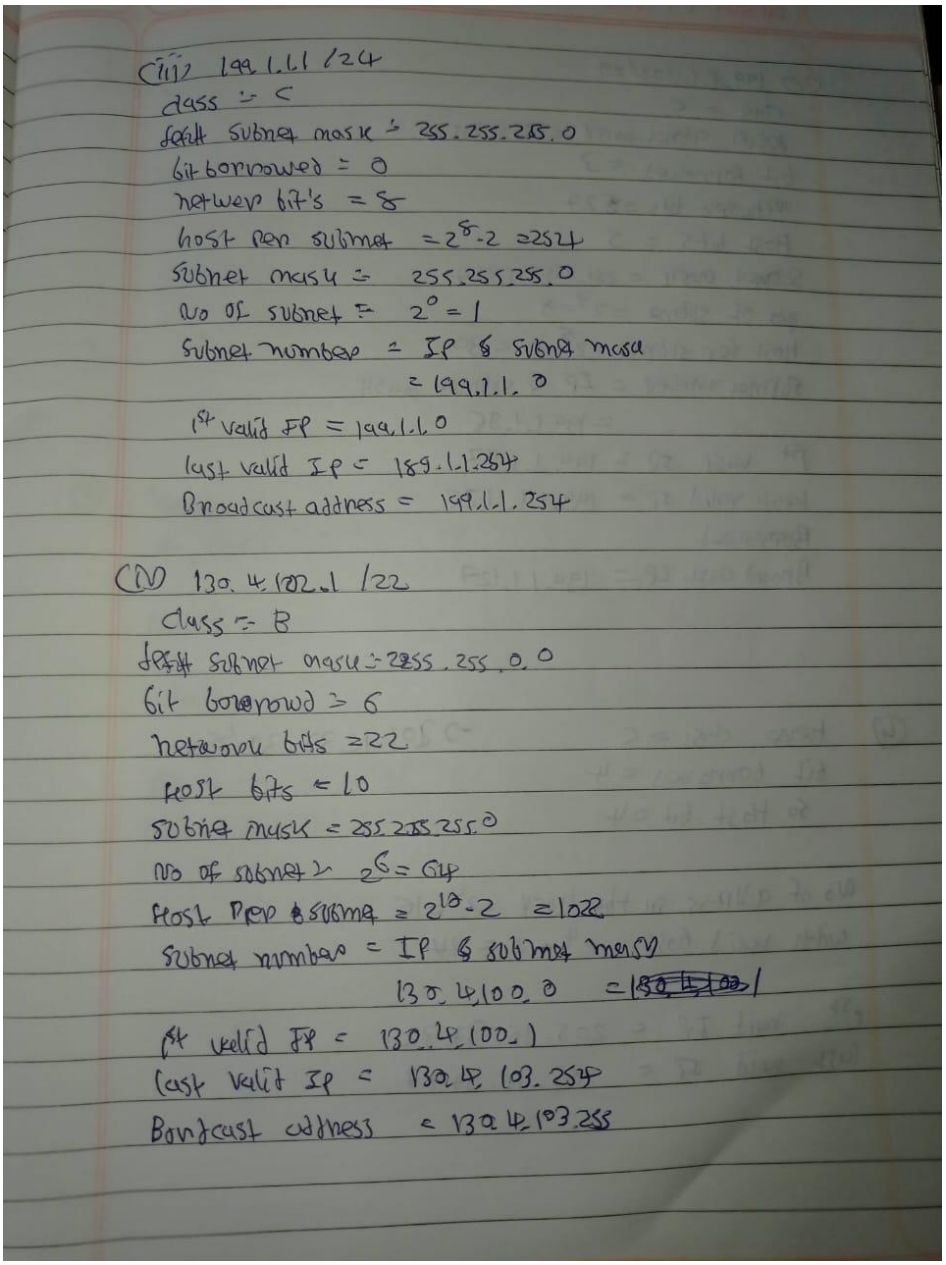
lab - 9

(1)

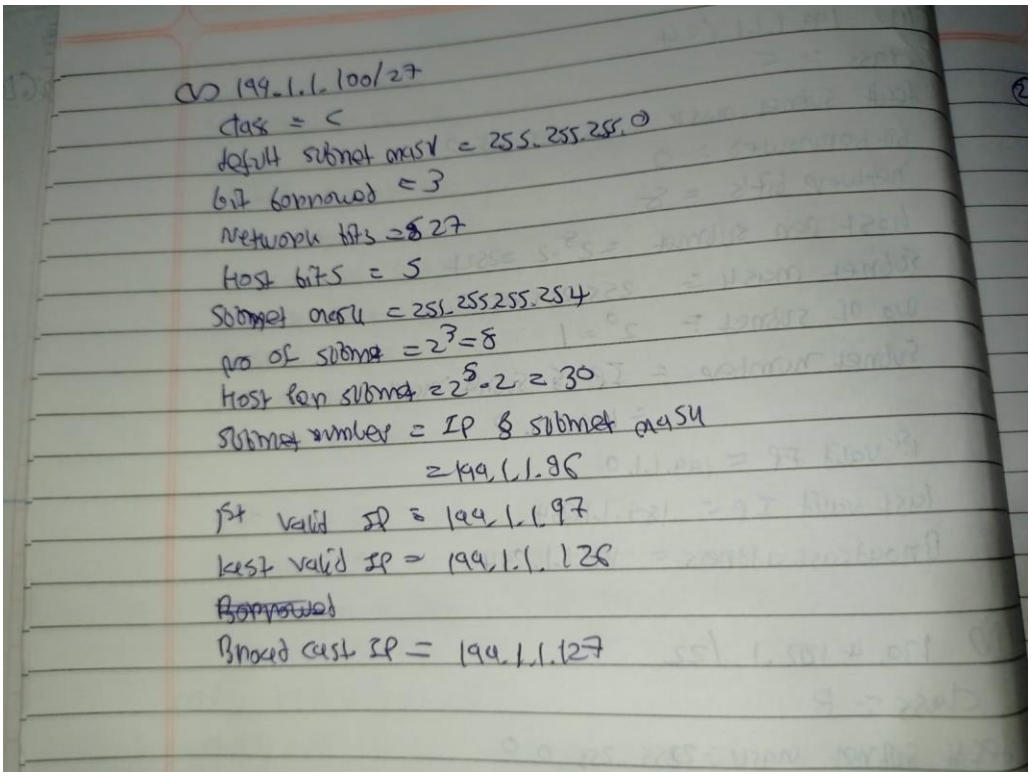
(i) 8.1.4.5/16
class :- A
default subnet mask :- 255.0.0.0
bit borrowed :- 8
network bits :- 16
host bits :- 16
subnet mask :- 255.255.0.0
No of subnet :- $2^{16}-2 = 65534$
subnet number :- IP & subnet mask
8.1.0.0
1st valid IP :- 8.1.0.1
last valid IP :- 8.1.255.254
Broadcast address :- 8.1.255.255

(ii) 130.4.120.1/24
class :- B
default subnet mask :- 255.255.0.0
bit borrowed :- 8
network bit :- 8 host bit :- 8
subnet mask :- 255.225.255.0
No of subnets :- $2^8 = 256$
host per subnet :- $2^8 - 2 = 254$
subnet number :- IP & subnet mask
= 130.4.120.0
1st valid ip :- 130.4.120.1
last valid IP :- 130.4.120.254
Boradcast Address :- 130.4.120.255

Date: 11/09/2024

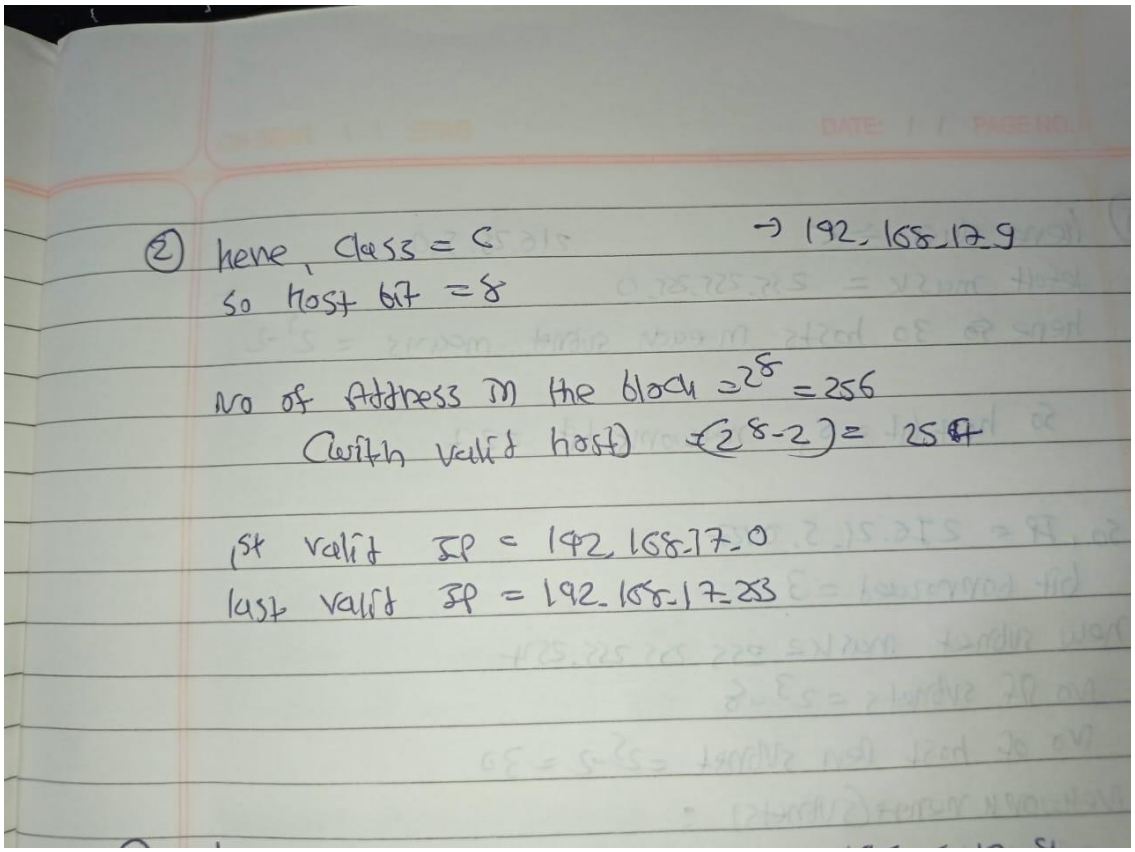


Date: 11/09/2024



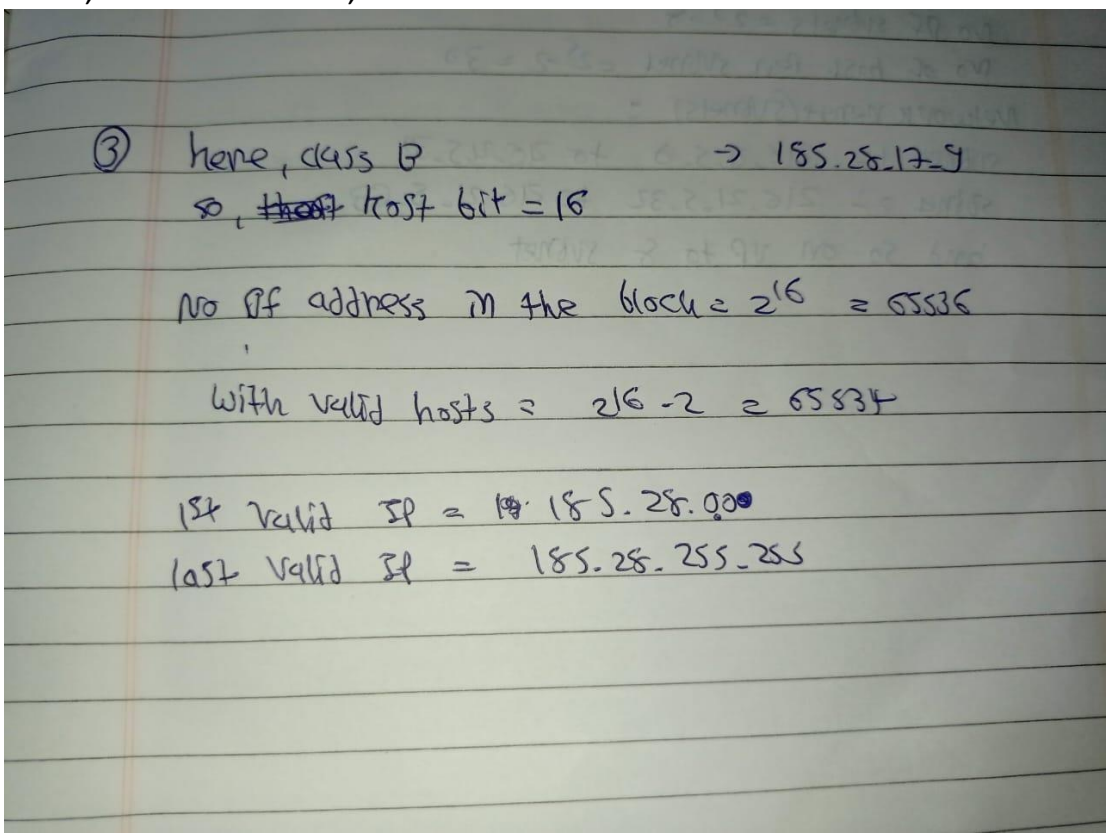
Date: 11/09/2024

2. A host in a class C network has been assigned an IP address 192.168.17.9. Find the number of addresses in the block, the first address, and the last address.



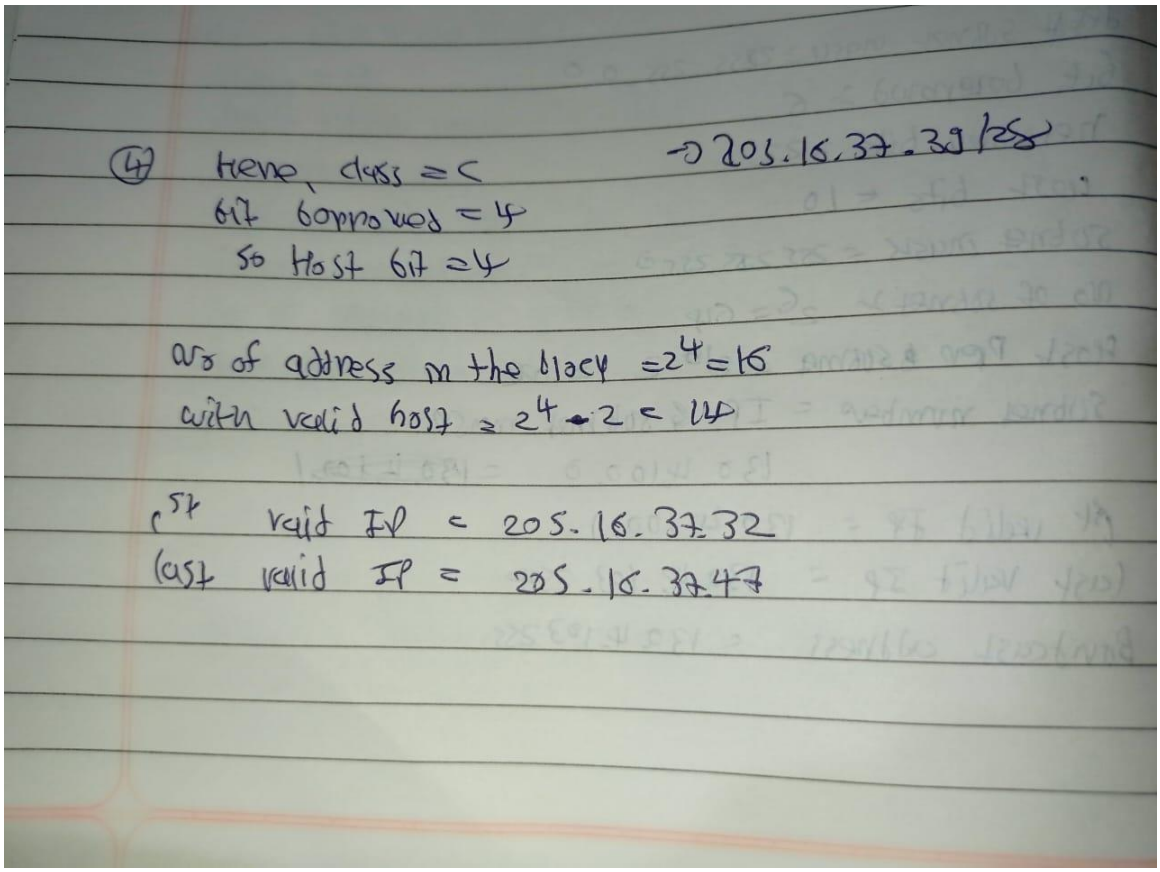
Date: 11/09/2024

3. An address in a block is given as 185.28.17.9. Find the number of addresses in the block, the first address, and the last address.



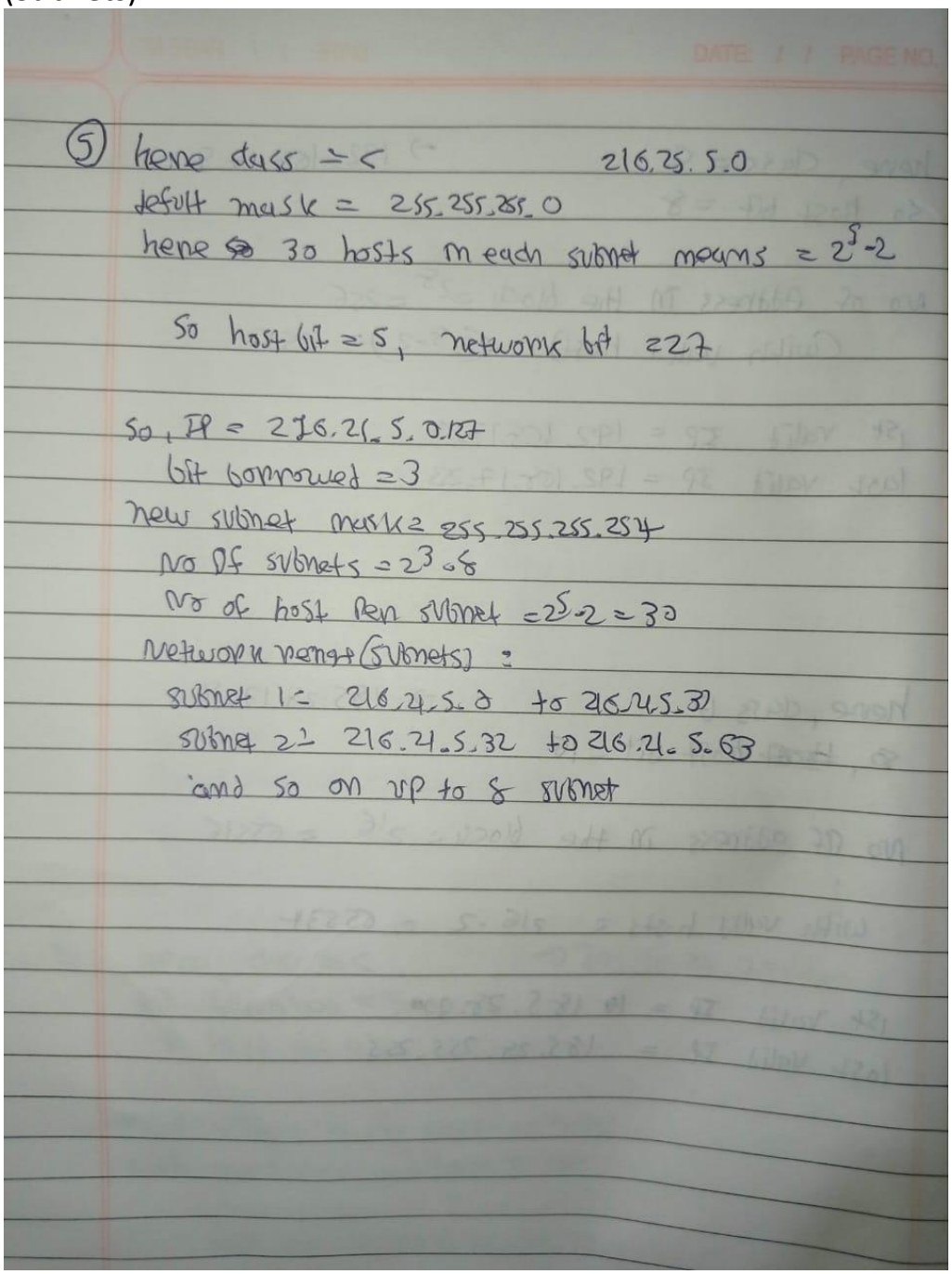
Date: 11/09/2024

4. A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first address, last address, number of addresses in a block.



Date: 11/09/2024

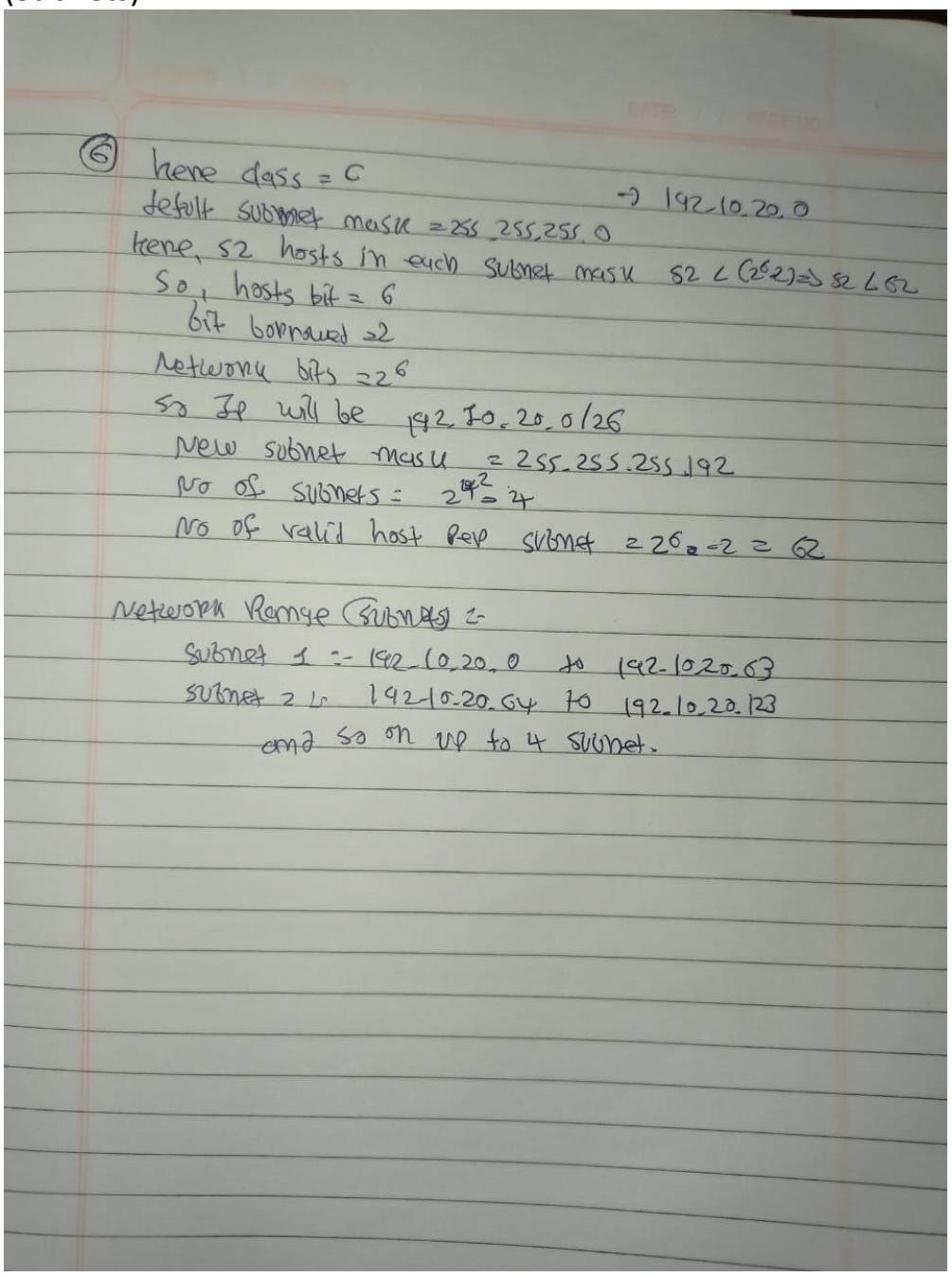
5. Subnet the IP address 216.21.5.0 into 30 hosts in each subnet. Find Class, Default Mask, Bit Borrowed, New subnet mask, No. of Hosts & Subnet, Network Ranges (Subnets).



(5) here class = C 216.25.5.0
default mask = 255.255.255.0
here 30 hosts in each subnet means = $2^5 - 2$
So host bit = 5, network bit = 27
So, IP = 216.21.5.0/27
bit borrowed = 3
new subnet mask = 255.255.255.224
No of subnets = $2^3 = 8$
No of host per subnet = $2^5 - 2 = 30$
Network range (Subnets) :
subnet 1 = 216.21.5.0 to 216.45.31
subnet 2 = 216.21.5.32 to 216.21.5.63
and so on up to 8 subnet

Date: 11/09/2024

6. Subnet the IP address 192.10.20.0 into 52 hosts in each subnet. Find Class, Default Mask, Bit Borrowed, New subnet mask, No. of Hosts & Subnet, Network Ranges (Subnets).



(6) here class = C → 192.10.20.0
default subnet mask = 255.255.255.0
here, 52 hosts in each subnet mask 52 < (2^6 - 2) ⇒ 52 < 62
So, hosts bit = 6
bit borrowed = 2
Network bits = 2^6
So IP will be 192.10.20.0/26
New subnet mask = 255.255.255.192
No of subnets = 2^2 = 4
No of valid host per subnet = 2^6 - 2 = 62

Network Range (Subnets) :-
subnet 1 :- 192.10.20.0 to 192.10.20.63
subnet 2 :- 192.10.20.64 to 192.10.20.123
and so on up to 4 subnet.

Date: 16/9/2024

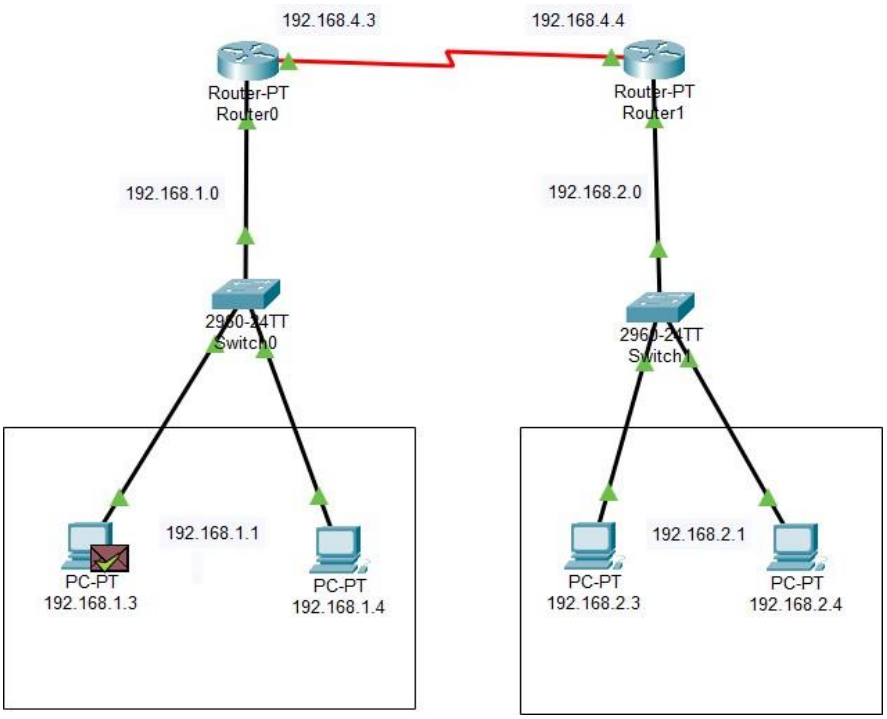
Lab Practical #10:

Study the concept of routing using packet tracer. (Static Routing)

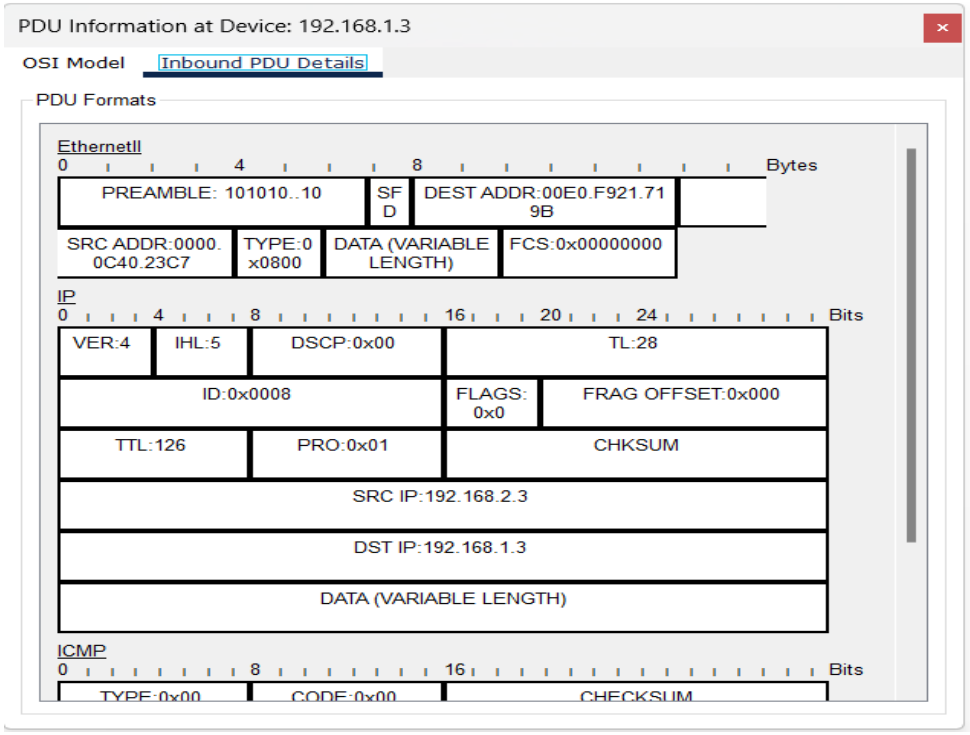
Practical Assignment #10:

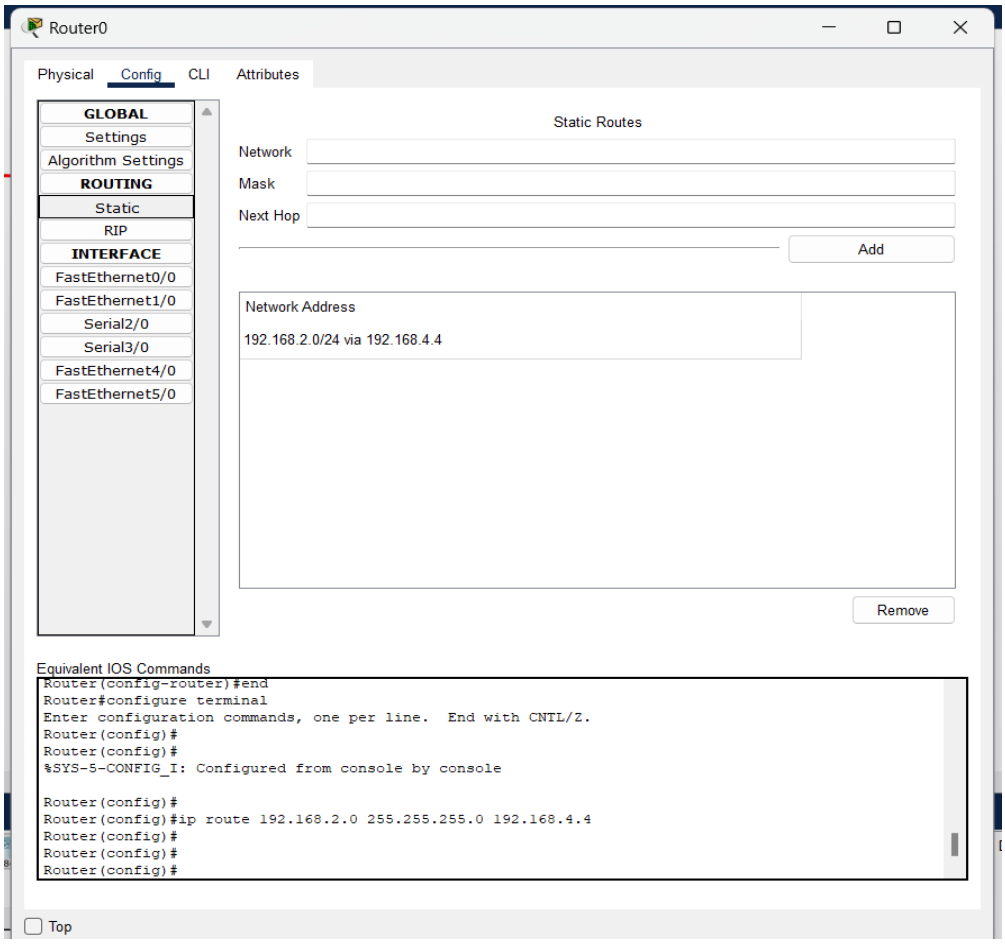
1. Connect the two different networks based on the calculated IP addresses and subnet using a packet tracer.

Static:



Date: 16/9/2024

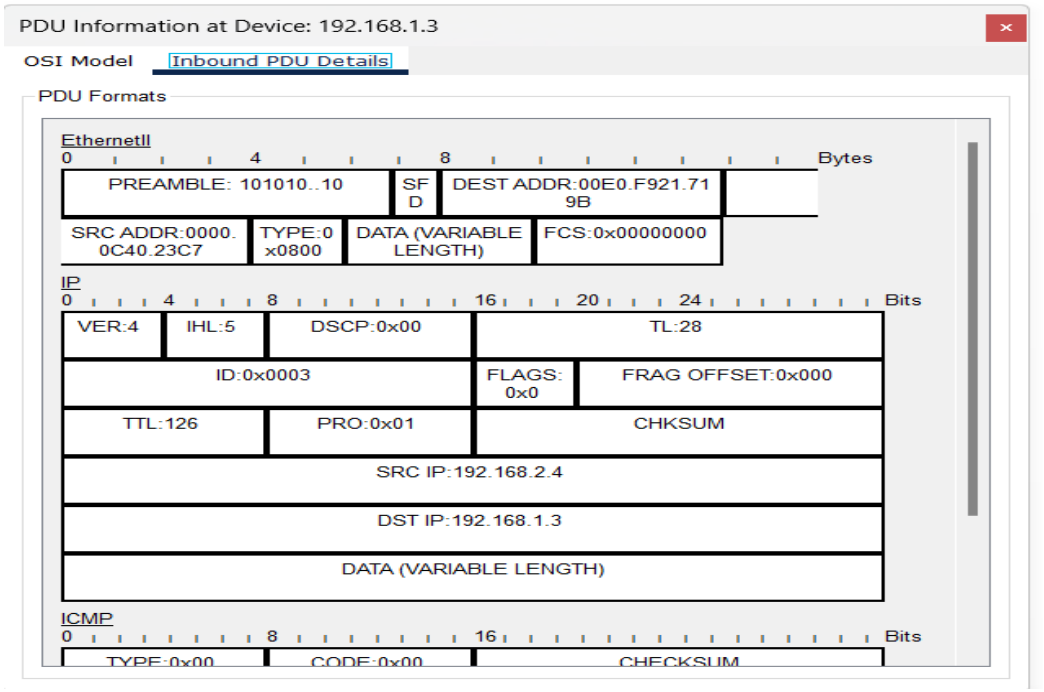


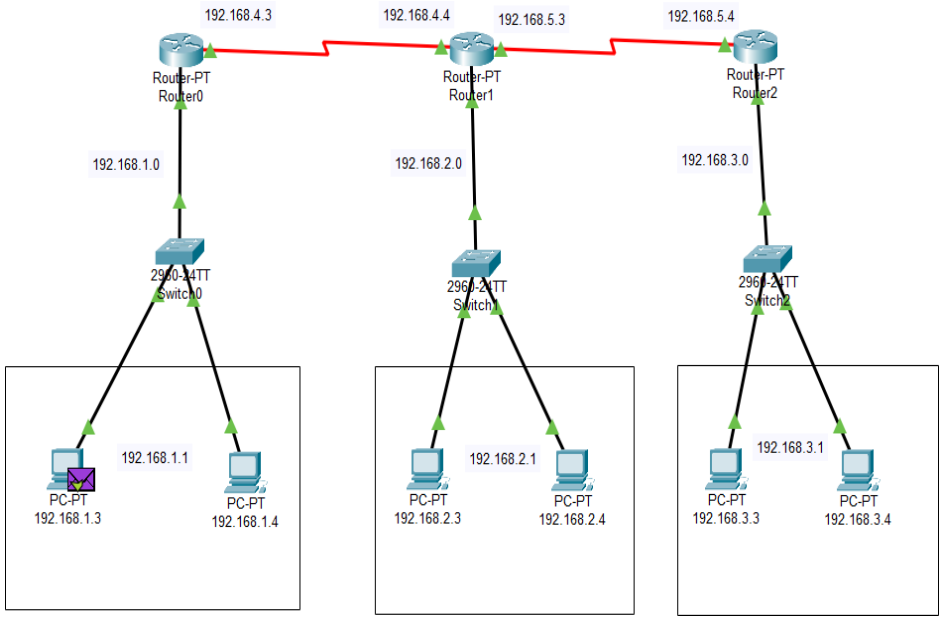


Date: 16/9/2024

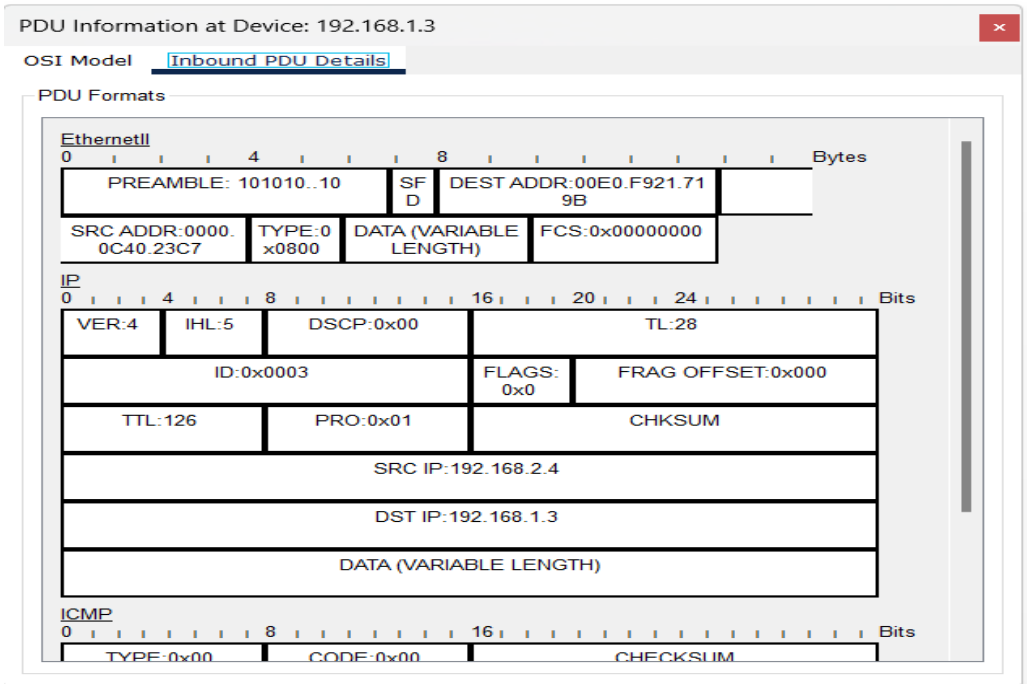
2. Connect the three different networks based on the calculated IP addresses and subnet using a packet tracer.

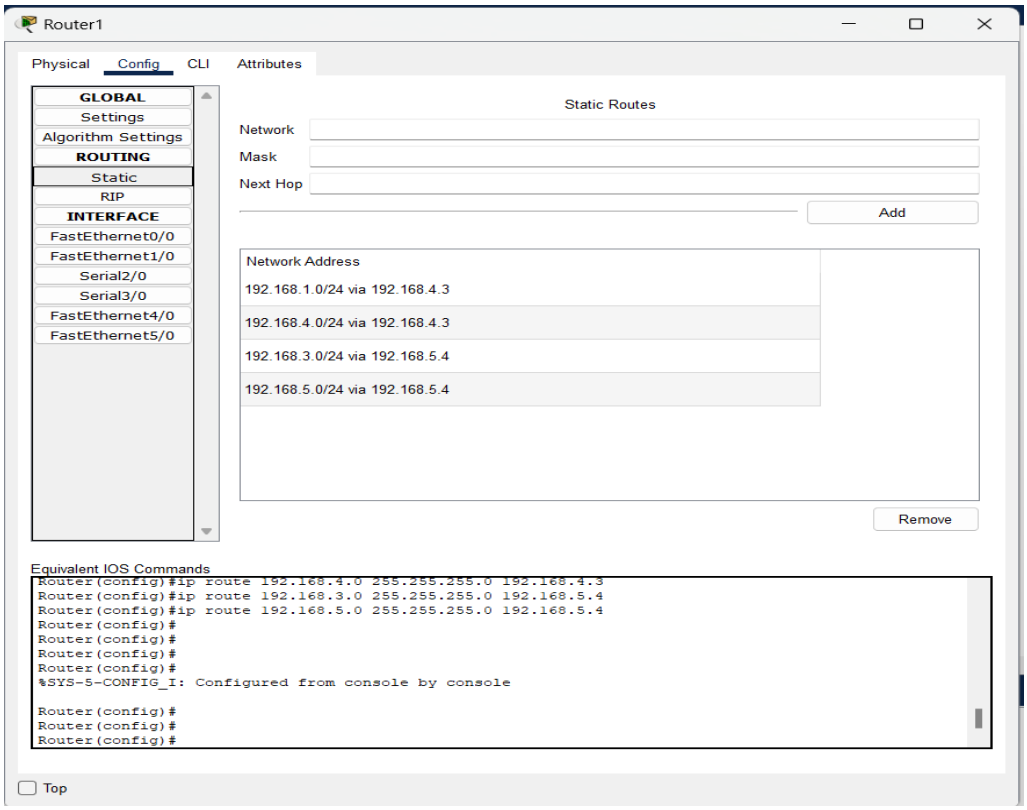
Static:





Date: 16/9/2024





Date: 16/09/2024

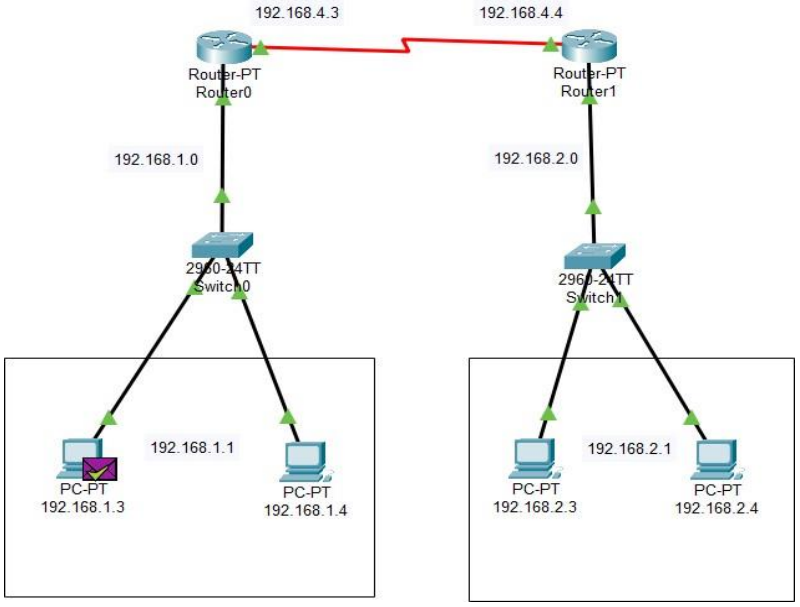
Lab Practical #11:

Study the concept of routing using packet tracer. (Dynamic Routing)

Practical Assignment #11:

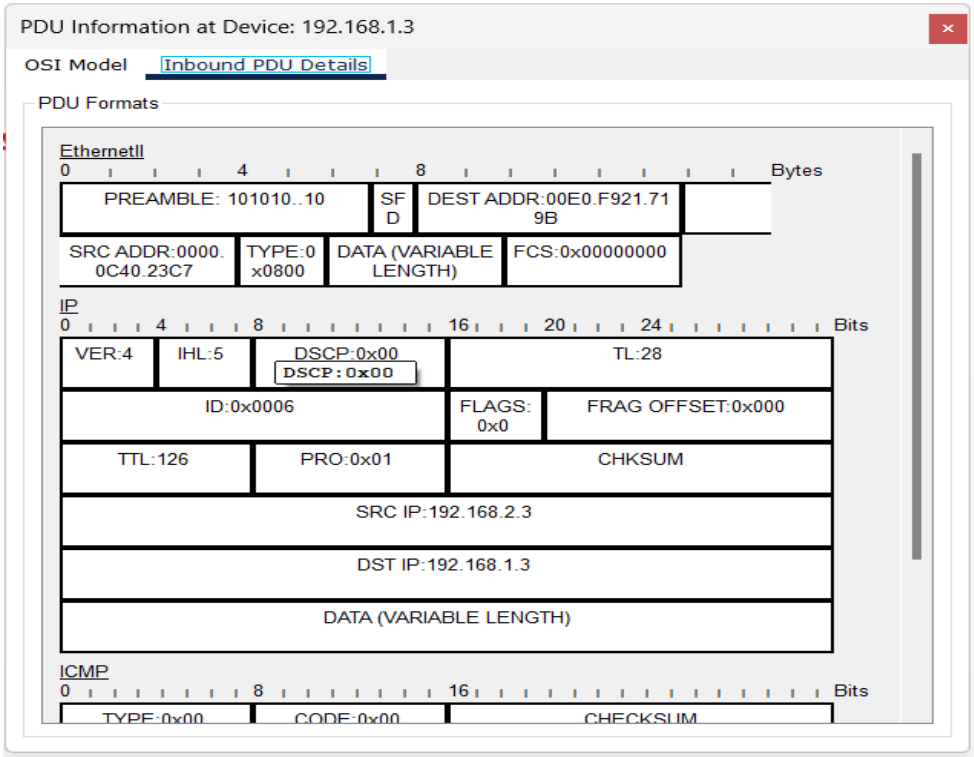
1. Connect the two different networks based on the calculated IP addresses and subnet using a packet tracer.

Dynamic:

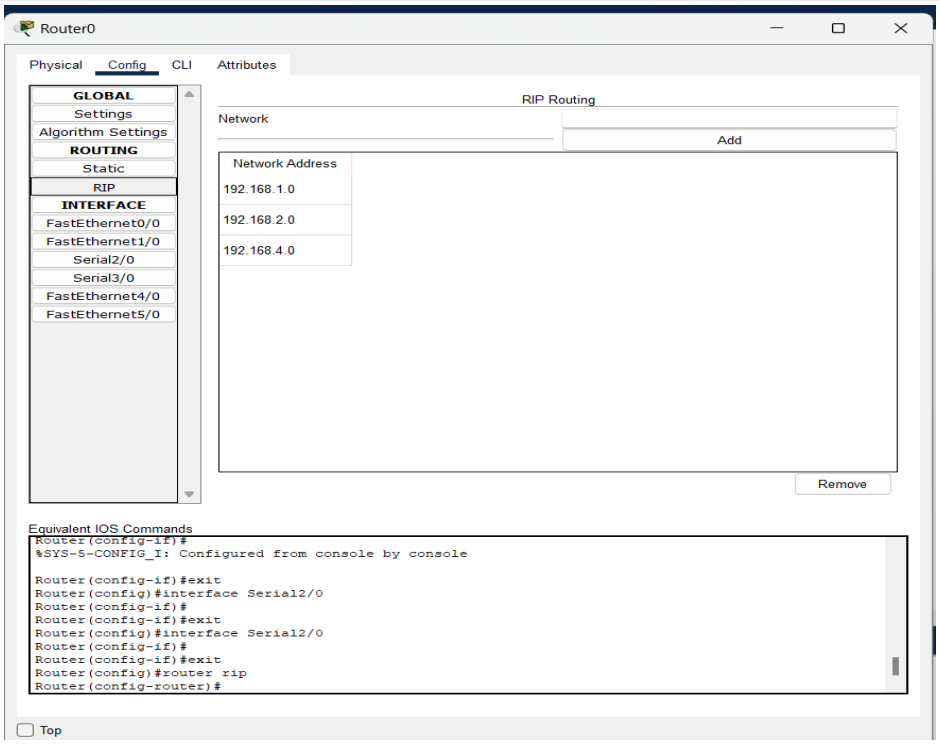


2.

Date: 16/09/2024



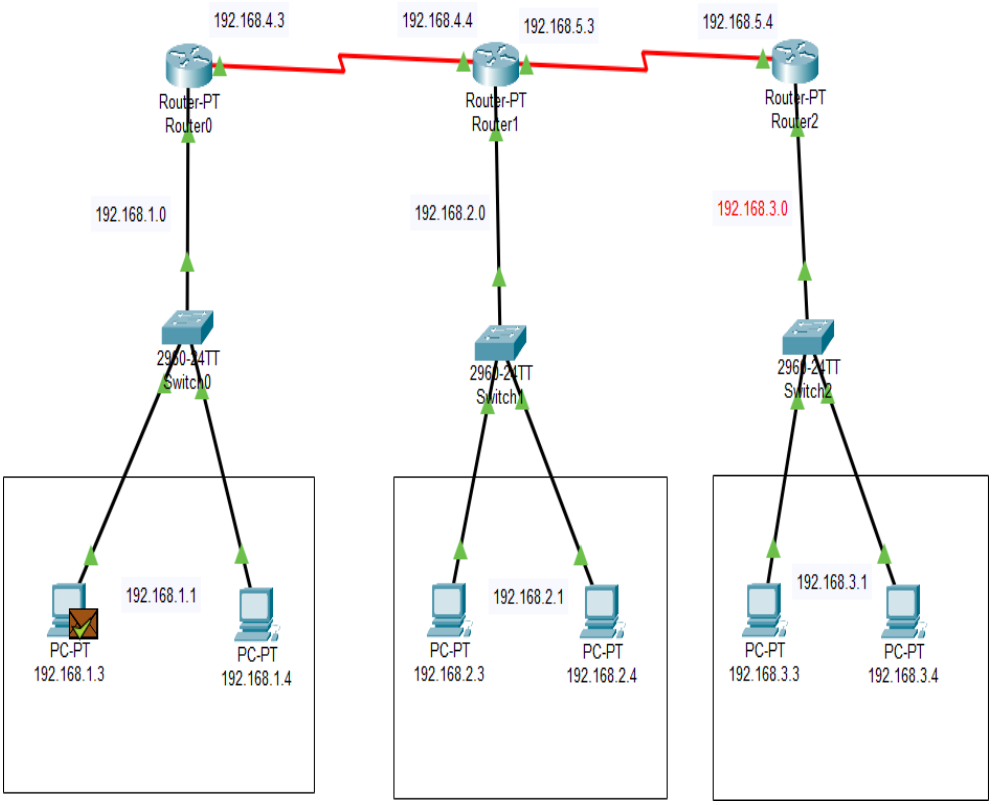
3.



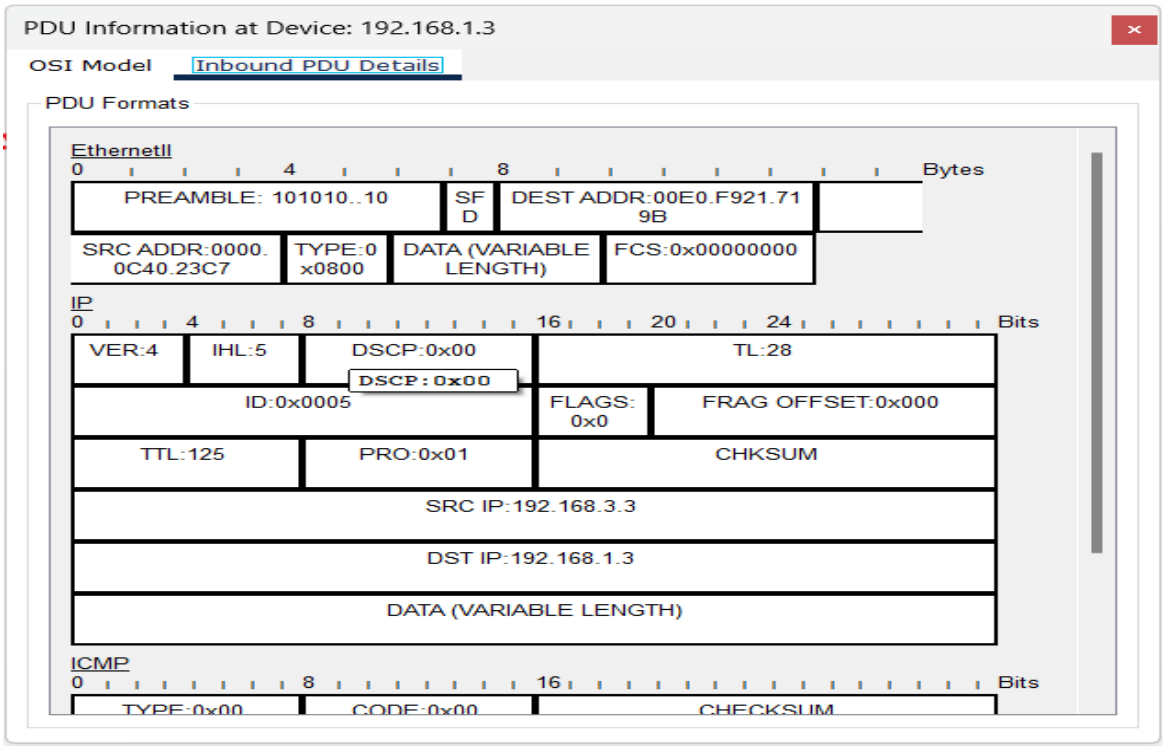
Date: 16/09/2024

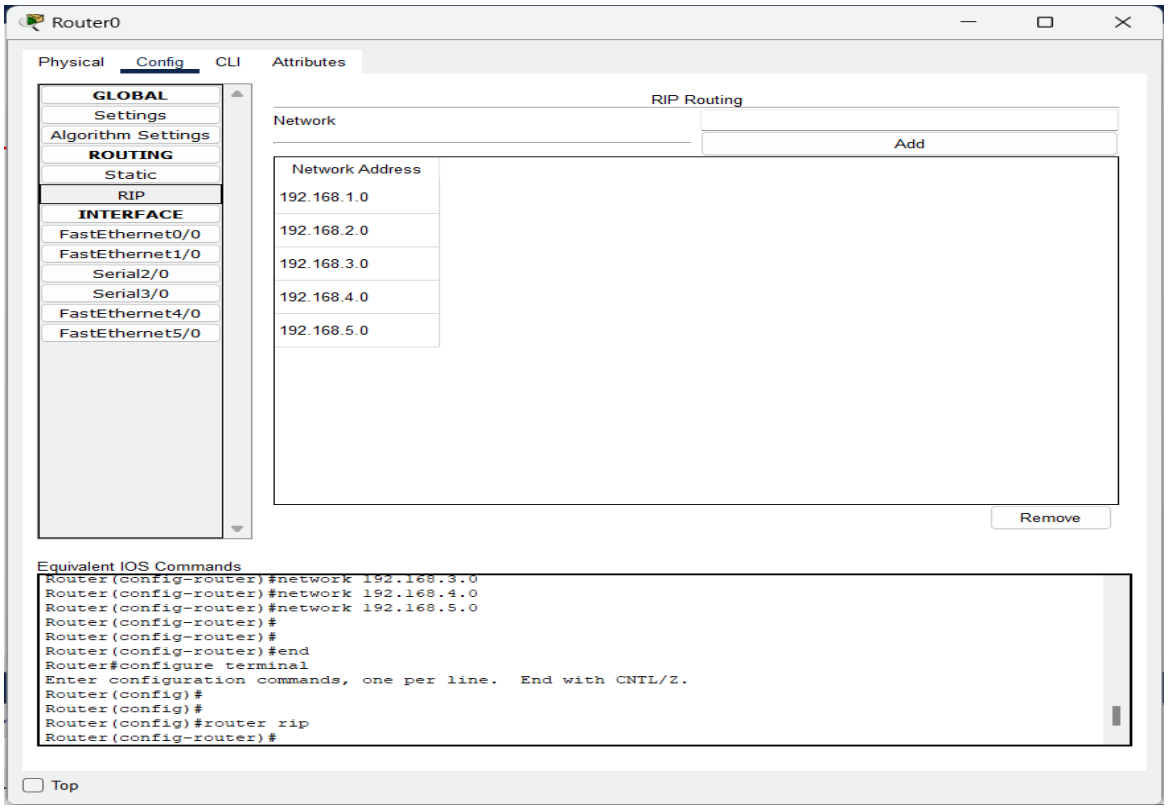
4. Connect the three different networks based on the calculated IP addresses and subnet using a packet tracer.

Dynamic:



Date: 16/09/2024





Date:20/9/2024

Lab Practical #12:

To develop network using distance vector routing protocol and link state routing protocol.

Practical Assignment #12:

1. C/JAVA Program: Distance Vector Routing Algorithm using Bellman Ford's Algorithm.

```
#include<stdio.h>
struct node
{
    unsigned dist[20];
    unsigned from[20];
}rt[10];
int main()
{
    int costmat[20][20];
    int nodes,i,j,k,count=0;
    printf("\nEnter the number of nodes : ");
    scanf("%d",&nodes);//Enter the nodes
    printf("\nEnter the cost matrix :\n");
    for(i=0;i<nodes;i++)
    {
        for(j=0;j<nodes;j++)
        {
            scanf("%d",&costmat[i][j]);
            costmat[i][i]=0;
            rt[i].dist[j]=costmat[i][j];//initialise the distance equal to cost matrix
            rt[i].from[j]=j;
        }
    }
        do
        {
            count=0;
for(i=0;i<nodes;i++)//We choose arbitary vertex k and we calculate the direct distance from the node i tok
    using the cost matrix
            //and add the distance from k to node j
            for(j=0;j<nodes;j++)
            for(k=0;k<nodes;k++)
                if(rt[i].dist[j]>costmat[i][k]+rt[k].dist[j])
                {//We calculate the minimum distance
                    rt[i].dist[j]=rt[i].dist[k]+rt[k].dist[j];
                    rt[i].from[j]=k;
                    count++;
                }
        }while(count!=0);
```

Date:20/9/2024

```
39.         for(i=0;i<nodes;i++)
40.         {
41.            printf("\n\n For router %d\n",i+1);
42.            for(j=0;j<nodes;j++)
43.            {
44.               printf("\t\nnode %d via %d Distance %d ",j+1,rt[i].from[j]+1,rt[i].dist[j]);
45.            }
46.         }
47.      printf("\n\n");
48.      getch();
49.  }
50.
```

2. C/JAVA Program: Link state routing algorithm.

```
#include  <stdio.h>
#include <string.h>
int main()
{
int count,src_router,i,j,k,w,v,min;
int cost_matrix[100][100],dist[100],last[100];
int flag[100];
 printf("\n Enter the no of routers");
scanf("%d",&count);
printf("\n Enter the cost matrix values:");
for(i=0;i<count;i++)
{
for(j=0;j<count;j++)
{
 printf("\n%d->%d:",i,j);
scanf("%d",&cost_matrix[i][j]);
if(cost_matrix[i][j]<0)cost_matrix[i][j]=1000;
}
}
 printf("\n Enter the source router:");
scanf("%d",&src_router);
for(v=0;v<count;v++)
{
flag[v]=0;
last[v]=src_router;
dist[v]=cost_matrix[src_router][v];
}
flag[src_router]=1;
for(i=0;i<count;i++)
{
```

Date:20/9/2024

```
min=1000;
for(w=0;w<count;w++)
{
if(!flag[w])
if(dist[w]<min)
{
v=w;
min=dist[w];
}
}
flag[v]=1;
for(w=0;w<count;w++)
{
if(!flag[w])
if(min+cost_matrix[v][w]<dist[w])
{
dist[w]=min+cost_matrix[v][w];
last[w]=v;
}
}
}
for(i=0;i<count;i++)
{
 printf("\n%d==>%d:Path taken:%d",src_router,i,i);
w=i;
while(w!=src_router)
{
 printf("\n<--%d",last[w]);w=last[w];
}
 printf("\n Shortest path cost:%d",dist[i]);
}
}
```

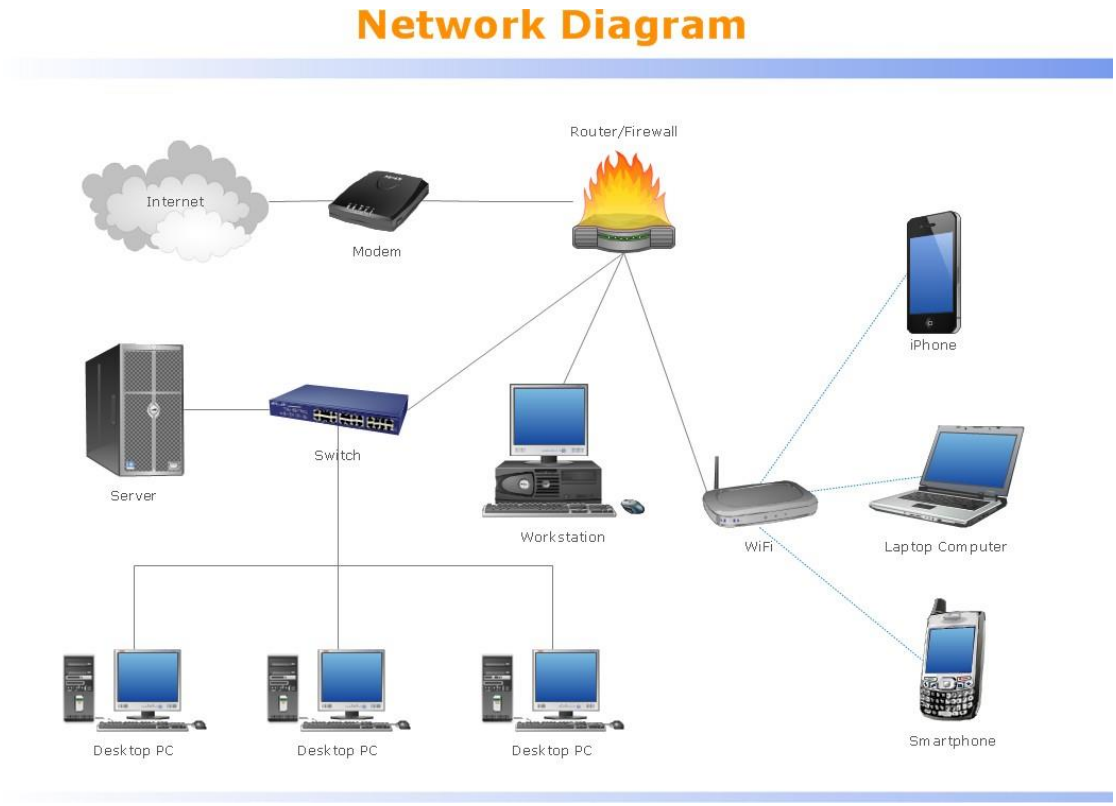
Date: 20 / 08 / 24

Lab Practical #13:

Study & Survey of Institute organization network infrastructure.

Practical Assignment #13:

1. **Identify type of network in your institute. Draw a design of network in your institute (Any Lab/Floor/Building).**



Date: 20 / 08 / 24

2. List how many network devices and types of cable used and give its details.

Network Devices:

1. **Router/Firewall** - Manages the traffic between the internal network and the internet, providing security by filtering incoming and outgoing traffic.
2. **Modem** - Connects the local network to the internet by converting digital data from a computer to analog signals and vice versa.
3. **Switch** - Connects multiple devices within the same network, allowing them to communicate with each other.
4. **Server** - A powerful computer that provides services, data, and resources to other computers within the network.
5. **Workstation** - A computer connected to the network, typically used for business or professional work.
6. **Desktop PCs** (3 in the diagram) - Personal computers connected to the network, typically used for everyday tasks like browsing the internet, creating documents, etc.
7. **Laptop Computer** - A portable computer connected to the network, typically used for mobile work.
8. **WiFi Access Point** - Provides wireless connectivity to devices like laptops, smartphones, and tablets.
9. **Smartphone and iPhone** (2 in the diagram) - Mobile devices that connect to the network via WiFi.

Types of Cables:

1. **Ethernet Cables** - Used to connect the server, desktop PCs, workstation, switch, and router/firewall. These are usually CAT5 or CAT6 cables, which support high-speed data transfer.
2. **Coaxial Cable** - Likely used to connect the modem to the internet service provider (ISP).
3. **Wireless (WiFi)** - Though not a physical cable, wireless signals connect the laptop, smartphone, and iPhone to the network.

Details:

- **Ethernet Cable**: Commonly used for wired connections in local area networks (LANs), providing reliable and fast data transfer. Ethernet cables often come in different categories (e.g., CAT5, CAT6), which indicate the maximum speed and bandwidth they can handle.
- **Coaxial Cable**: Typically used for connecting modems to the ISP. Coaxial cables can carry high-frequency signals with minimal interference, making them suitable for internet connections.
- **WiFi (Wireless)**: Used for devices that require mobility or where cabling is impractical. WiFi provides flexibility but can be subject to interference and generally offers lower speeds compared to wired connections.