



COMPUTER NETWORKS LAB
COURSE CODE: CS 381

SEMESTER – V

SUBMITTED TO: -

MS. SANGEETA

**SUBMITTED
BY: -**

**SHRUTI
MISHRA
(215/ICS/006)**

INDEX

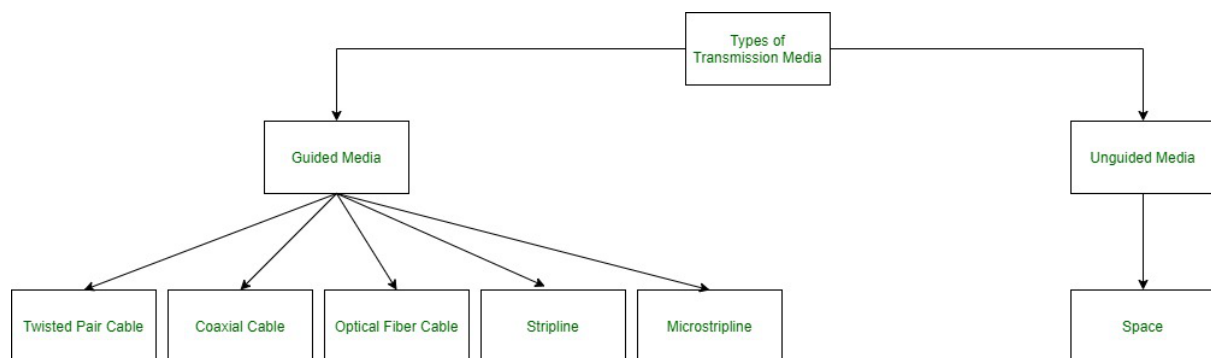
S.NO	Experiment NO	List of Programs	Date	Sign
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Program-1

Aim: Introduction to transmission media

- CAT5
- COXIAL CABLES
- OPITACL FIBRE CABLES

Theory: The transmission media is the physical media over which communication occurs in computer networks. One of the most convenient ways to transfer data from one computer to another, even before the birth of networking, was to save it on some storage media and transfer physical from one station to another.



- **Twisted Pair Cable:** cabling used for telephone communications and most modern Ethernet networks. A pair of wires forms a circuit that can transmit data. The pairs are twisted to provide protection against crosstalk, the noise generated by adjacent pairs

- **Coaxial Cable:** a type of shielded and insulated copper cable that is used in computer networks and to deliver cable TV services to end users.

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

- **Stripline:** a form of printed circuit transmission line where the signal trace is sandwiched between upper and lower ground planes

- **Microstripline:** the electromagnetic (EM) waves propagate through the conductors and circuit material, as well as through the air above and around the microstrip circuitry.

- **Unguided Media:** In unguided media, transmitted data travels through free space in the form of electromagnetic signals. For example, radio waves, lasers, etc

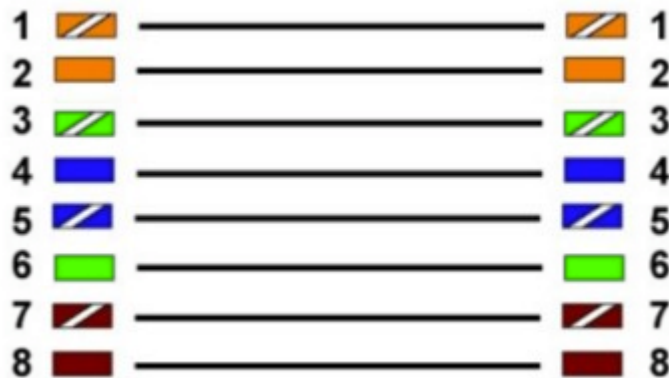
CAT5:-

Category 5 cable (Cat 5) is a twisted pair cable for computer networks. Since 2001, the variant commonly in use is the Category 5e specification (Cat 5e). The cable standard

SHRUTI MISHRA (ALEXZENDRENE)

provides performance of up to 100 MHz and is suitable for most varieties of Ethernet over twisted pair up to 2.5GBASE-T more commonly runs at 1000BASE-T (Gigabit Ethernet) speeds. Cat 5 is also used to carry other signals such as telephone and video.

Copper straight-through wire:-



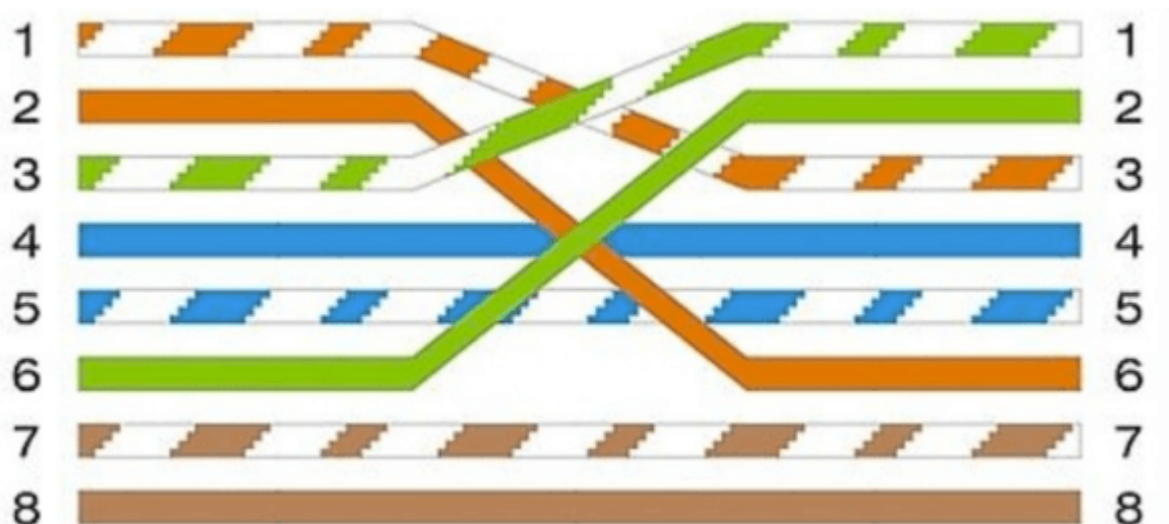
Straight-through cable is a type of CAT5 with RJ-45 connectors at each end, and each has the same pinout. It is in accordance with either the T568A or T568B standards. It uses the same colour code throughout the LAN for consistency. This type of twisted-pair cable is used in LAN to connect a computer or a network hub such as a router. It is one of the most common types of network cable.

Uses:

It helps you to connect a computer to a switch/hub's normal port.

- You can use it to connect a computer to a cable/DSL modem's LAN port.
- It allows you to connect a router's WAN port to a cable/DSL modem's LAN port.
- Connect 2 switches or hubs with one of the hub or switch using an uplink port and the other one using a normal port.

Copper cross-over wire:-



A Crossover cable is a type of CAT 5 where one end is T568A configuration and the other end is T568B Configuration. In this type of cable connection, Pin 1 is crossed with Pin 3, and Pin 2 is crossed with Pin 6.

Crossover cable is used to connect two or more computing devices. The internal wiring of crossover cables reverses the transmission and receive signals. It is widely used to connect two devices of the same type: e.g., two computers or two switches to each other.

In regard to physical appearance, Crossover Ethernet cables are very much similar to regular Ethernet cables. Still, they are different with regard to the order in which the wires are arranged. This type of Ethernet cable is made to connect to network devices of the same kind over Ethernet directly. Crossover cables are mostly used to connect two hosts directly.

Uses:

It can use a computer to a computer with no switch or hub.

- Network device to the network device. For example, the route to the router.
- Crossover cable enables one to establish a direct connection between two computing devices using Ethernet ports.
- It Connects two computers directly.
- You can connect two hubs/switches by using the normal port in both switches and hubs.

Coaxial Cable:-

- Coaxial cable, or coax (pronounced is a type of electrical cable consisting of an inner conductor surrounded by a concentric conducting shield, with the two separated by a dielectric (insulating material); many coaxial cables also have a protective outer sheath or jacket.
- The term coaxial refers to the inner conductor and the outer shield sharing a geometric axis.
- Coaxial cable is a type of transmission line, used to carry high-frequency electrical signals with low losses. It is used in such applications as telephone trunk lines, broadband
- Internet networking cables, high-speed computer data busses, cable television signals, and connecting radio transmitters and receivers to their antennas. It differs from other shielded cables because the dimensions of the cable and connectors are controlled to give a precise, constant conductor spacing, which is needed for it to function efficiently as a transmission line.

Optical fibre cable: - A fibre-optic cable, also known as an optical-fibre cable, is an assembly similar to an electrical cable, but containing one or more optical fibres that are used to carry light. The optical fibre elements are typically individually coated with plastic layers and contained in a protective tube suitable for the environment where the cable is used. Different types of cable[1] are used for different applications, for example, long-distance telecommunication, or providing a high-speed data connection between different parts of a building

Console Cable: A console cable is used to connect a computer or terminal to a networking device, like a router or switch, for configuration and management purposes.

Phone Cable: Phone cables, often referred to as RJ11 cables, are used to connect telephones and fax machines to phone lines.

Serial DCE (Data Communications Equipment): These cables connect data terminal equipment (DTE) like computers to data communications equipment like modems.

Serial DTE (Data Terminal Equipment): These cables connect data terminal equipment (DTE) like computers to data communications equipment like routers.

Octal Cable: An octal cable is used for connecting Cisco networking equipment to a terminal server or other devices.

IOD Custom Cable: This could refer to a custom cable designed for a specific purpose in networking or telecommunications. The term "IOD" is not standard and might be a specific acronym used in a particular context.

USB Cable: Universal Serial Bus (USB) cables are widely used for connecting various devices to computers, such as printers, external hard drives, and smartphones.

Program-2

Aim: Introduction to network interfaces (Wired and Wireless)

Theory:

A network interface is the point of interconnection between a computer and a private or public network. A network interface is generally a network interface card (NIC) but does not have to have a physical form. Instead, the network interface can be implemented in software.

- **Wireless Network Interface:** Wireless NICs use wireless technologies to access a network. These wireless network cards have an antenna coming out of them which allows them to connect to a network.

- **Wired Network Interface:** Wired NICs have an Ethernet network cable attached. This allows you to connect a computer to a network over a wired connection.

TYPES OF NETWORKS

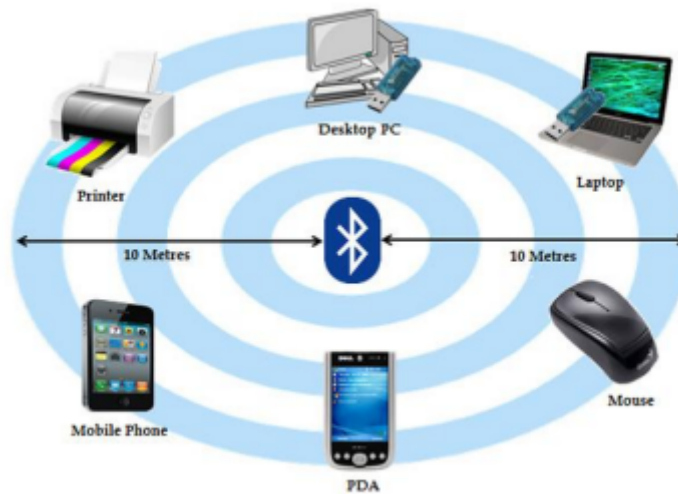
(a) Wi-Fi

The industry-standard wireless local area network (WLAN) technology for linking computers and other electronic devices to one another and the Internet. Wi-Fi is a wireless variant of a wired Ethernet network that is frequently used in conjunction with it (see Ethernet). WiFi is a type of wireless networking that uses radio frequencies to send and receive data. WiFi allows users to connect to the Internet at high speeds without the necessity of cables.



(b) Bluetooth

Bluetooth is a telecommunication industry standard that outlines how mobile devices, PCs, and other equipment can communicate wirelessly across short distances. This wireless technology allows Bluetooth-enabled devices to communicate with one another. It connects desktop and laptop computers, PDAs (such as the Palm Pilot or Handspring Visor), digital cameras, scanners, cellular phones, and printers over short distances.



(c) Cloud Computing

A physical site called a data center houses a common pool of computer resources (such as hardware, software, and services like servers and internet storage). Your cloud service providers have data centers all around the world



Program-3

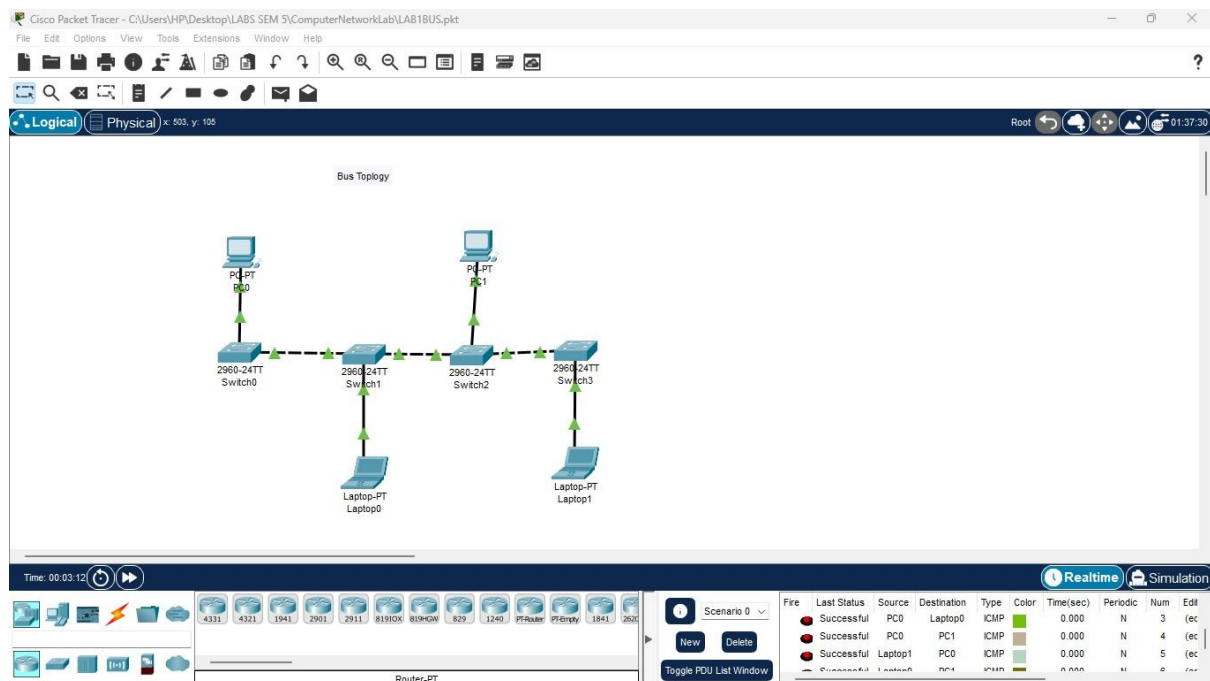
Aim: Topology Design

- Ring
- Bus

Theory: In Computer Network, there are various ways through which different components are connected to one another. Network Topology is the way that defines the structure, and how these components are connected to each other.

Bus Topology

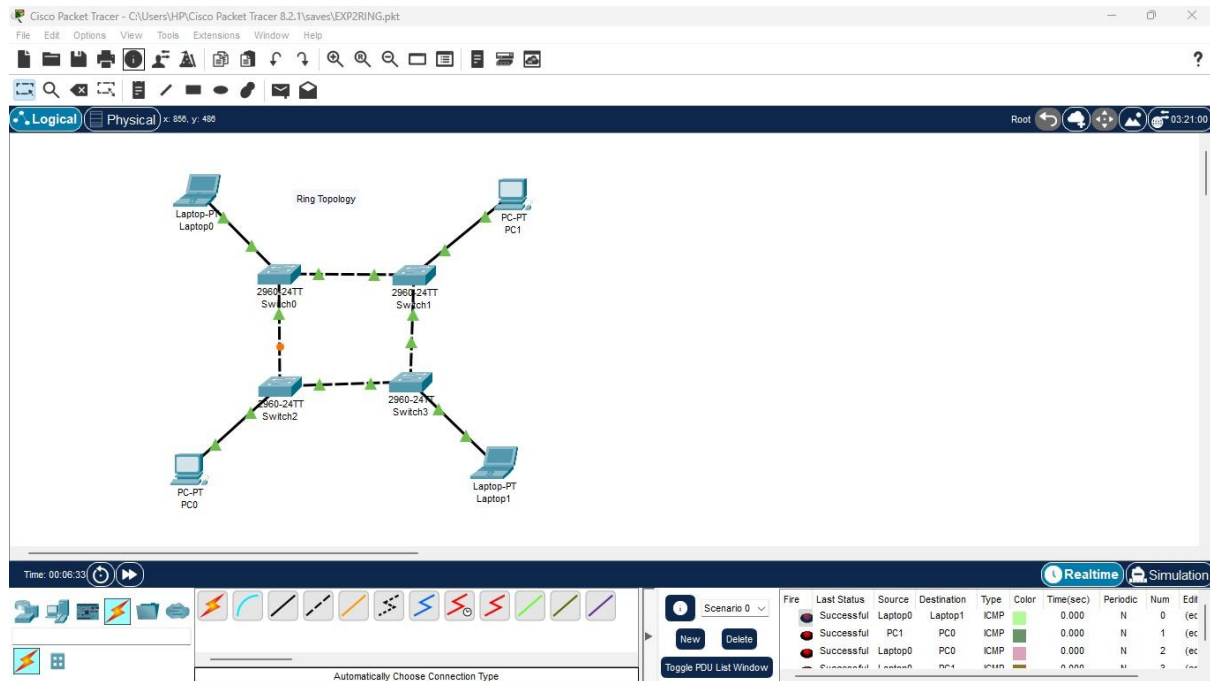
Bus Topology is a network type in which every computer and network device is connected to a single cable. It is bi-directional. It is a multi-point connection and a non-robust topology because if the backbone fails the topology crashes. In Bus Topology, various MAC (Media Access Control) protocols are followed by LAN ethernet connections like TDMA, Pure Aloha, CDMA, Slotted Aloha, etc.



Ring Topology

In a Ring Topology, it forms a ring connecting devices with exactly two neighbouring devices. A number of repeaters are used for Ring topology with a large number of nodes, because if someone wants to send some data to the last node in the ring topology with 100 nodes, then the data will have to pass through 99 nodes to reach the 100th node. Hence to prevent data loss repeaters are used in the network.

The data flows in one direction, i.e. it is unidirectional, but it can be made bidirectional by having 2 connections between each Network Node, it is called Dual Ring Topology. In-Ring Topology, the Token Ring Passing protocol is used by the workstations to transmit the data.



Result:

Bus Topology:

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
Successful	Successful	PC0	Laptop0	ICMP	Green	0.000	N	3	(ec)
Successful	Successful	PC0	PC1	ICMP	Green	0.000	N	4	(ec)
Successful	Successful	Laptop1	PC0	ICMP	Green	0.000	N	5	(ec)

Ring Topology:

Scenario 0

New Delete

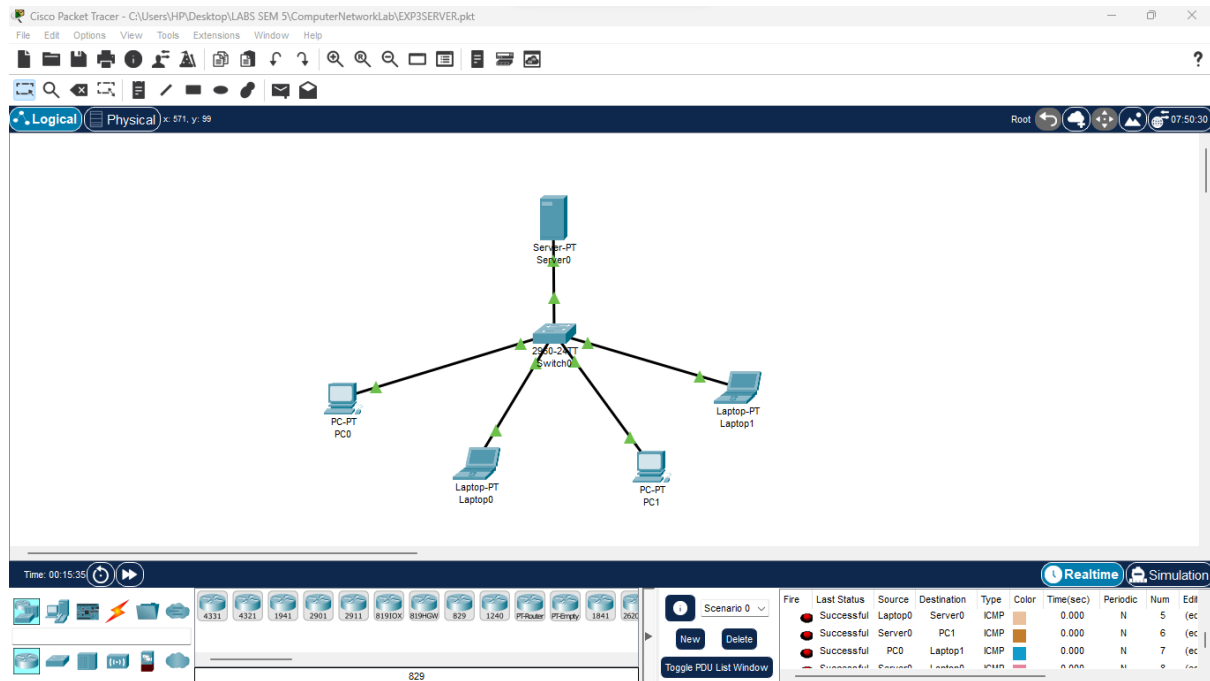
Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
Successful	Successful	Laptop0	Laptop1	ICMP	Green	0.000	N	0	(ec)
Successful	Successful	PC1	PC0	ICMP	Green	0.000	N	1	(ec)
Successful	Successful	Laptop0	PC0	ICMP	Green	0.000	N	2	(ec)

Program-4

Aim: To verify the Server Configuration

Theory: A server configuration defines a specific database as the repository for its data. To prevent corruption, that database can be associated with only one server configuration. However, that database can be used by other applications.



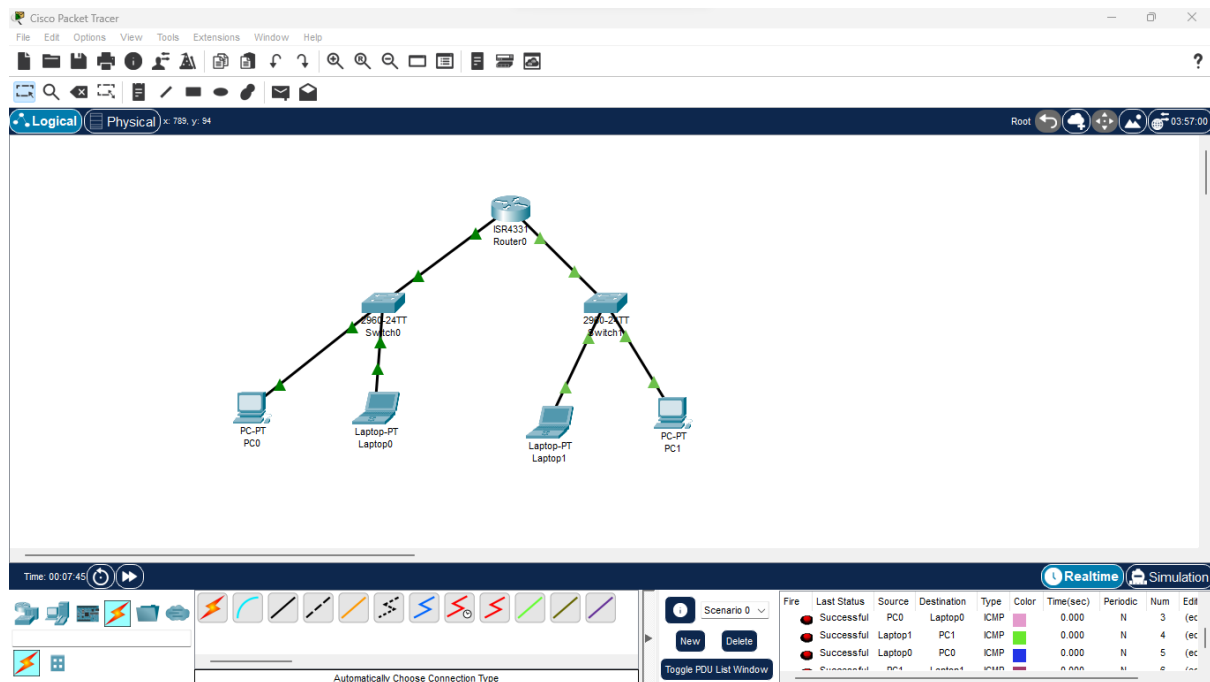
Output:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	Server0	Laptop0	ICMP		0.000	N	5	(ec
	Successful	PC0	Laptop1	ICMP		0.000	N	6	(ec
	Successful	Server0	PC1	ICMP		0.000	N	7	(ec

Program-5

Aim: To verify the Router Configuration

Theory: The documentation that came with the router gives you the router's Web page address. Usually, it's numerical, such as `http://192.168.0.1/`. After accessing the router, and (optionally) entering its password, you see a Web page displayed. The Web page is really the router's configuration program.











Output:

Scenario 0

New

Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC0	Laptop0	ICMP		0.000	N	3	(ec
	Successful	Laptop1	PC1	ICMP		0.000	N	4	(ec
	Successful	Laptop0	PC0	ICMP		0.000	N	5	(ec
	Successful	PC1	Laptop1	ICMP		0.000	N	6	(ec

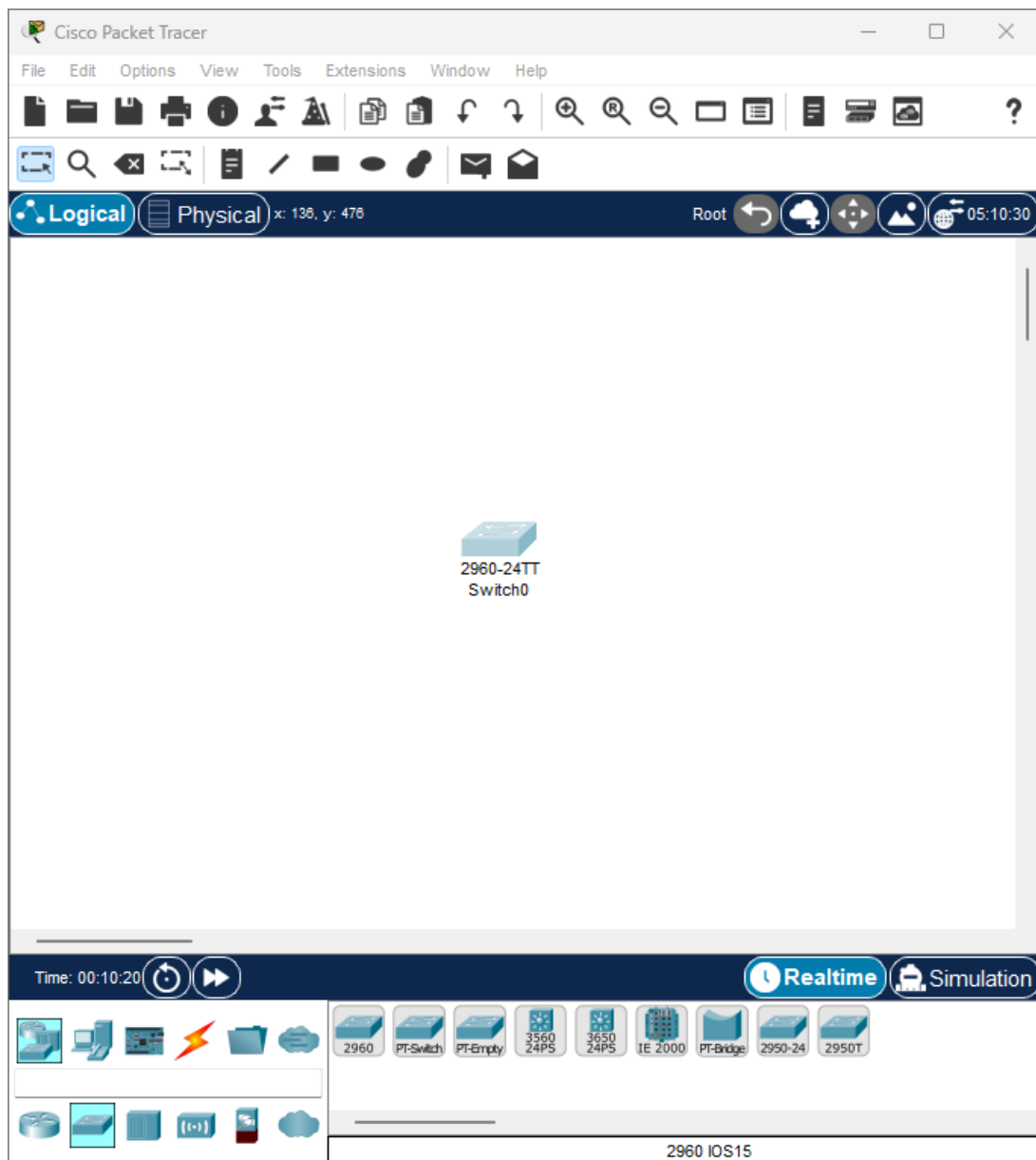
Program-6

Aim: To verify the Switch Configuration

Theory: The switch is a network device that is used to segment the networks into different subnetworks called subnets or LAN segments. It is responsible for filtering and forwarding the packets between LAN segments based on the MAC address.

Steps to Configure the Switch:

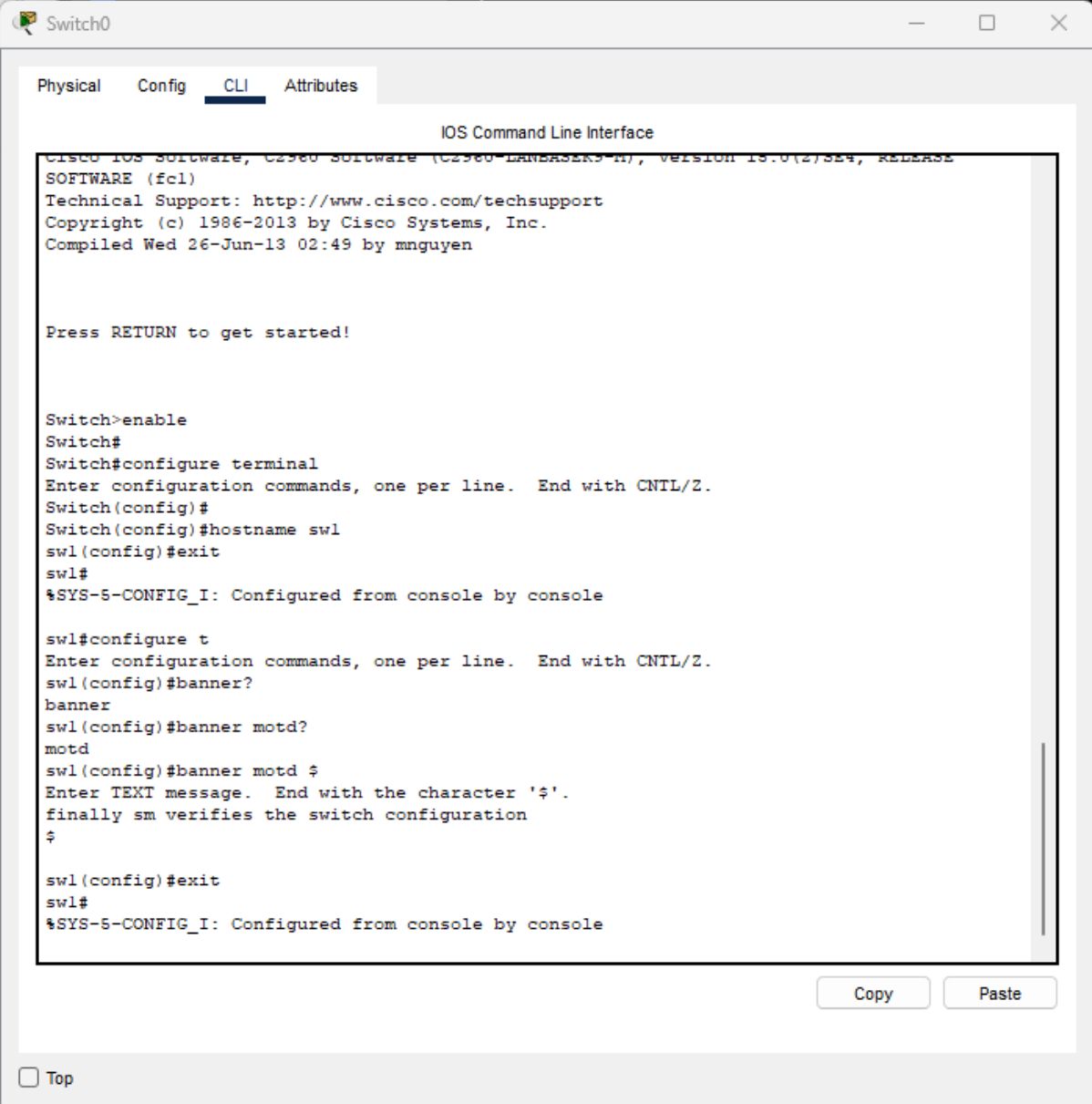
Step 1: Open the packet tracer desktop and take a switch (2960) from the devices.



Step 2: Configure the Host name of the switch.

- Click on the switch and go to Command Line Interface.
- Then change the hostname to "sw1"

Step 3: Set a message of the day (MOTD) banner for the users. Then, enter MOTD and end it with '\$' to exit



```
Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed 26-Jun-13 02:49 by mnnguyen

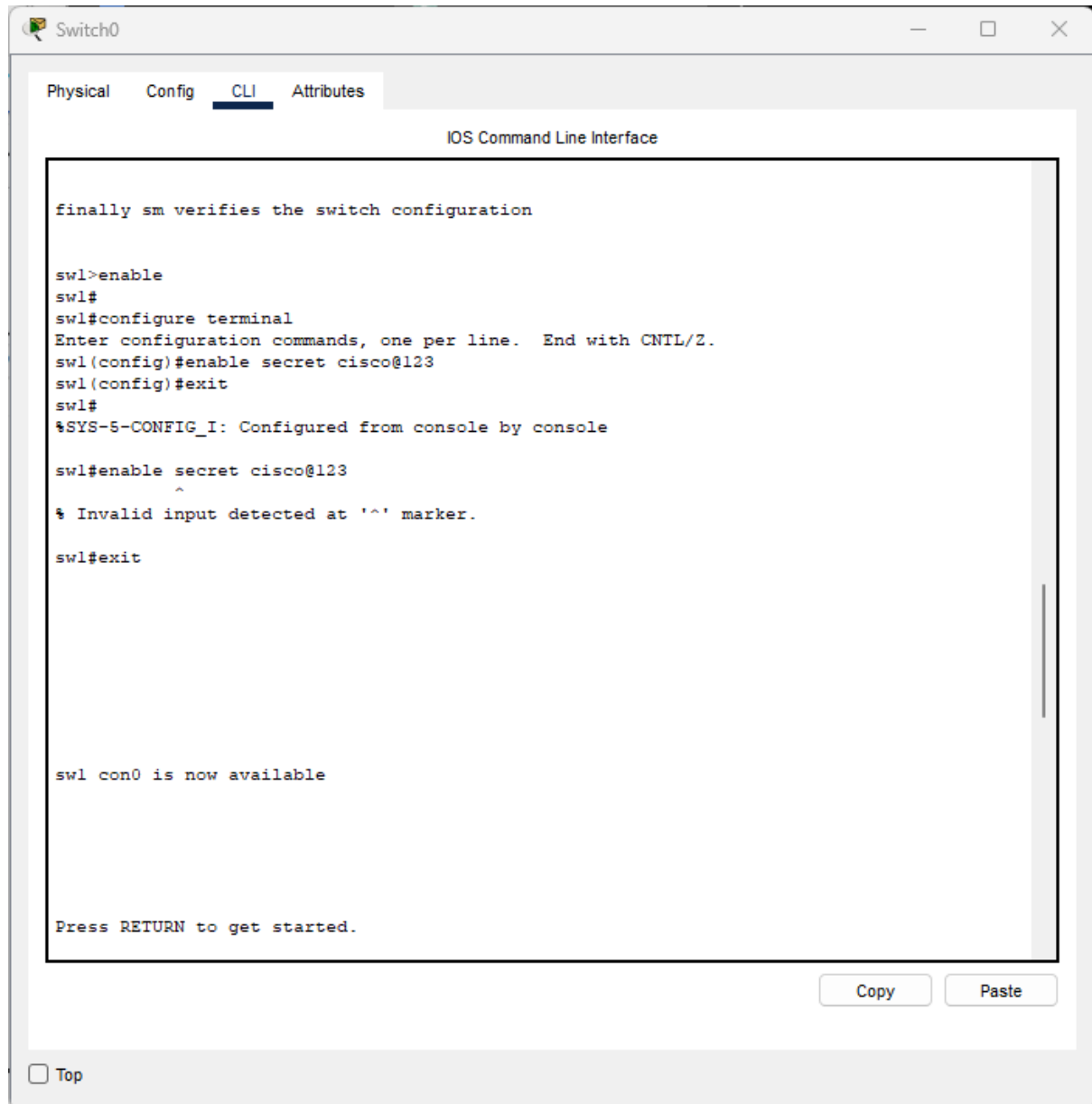
Press RETURN to get started!

Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#hostname swl
swl(config)#exit
swl#
%SYS-5-CONFIG_I: Configured from console by console

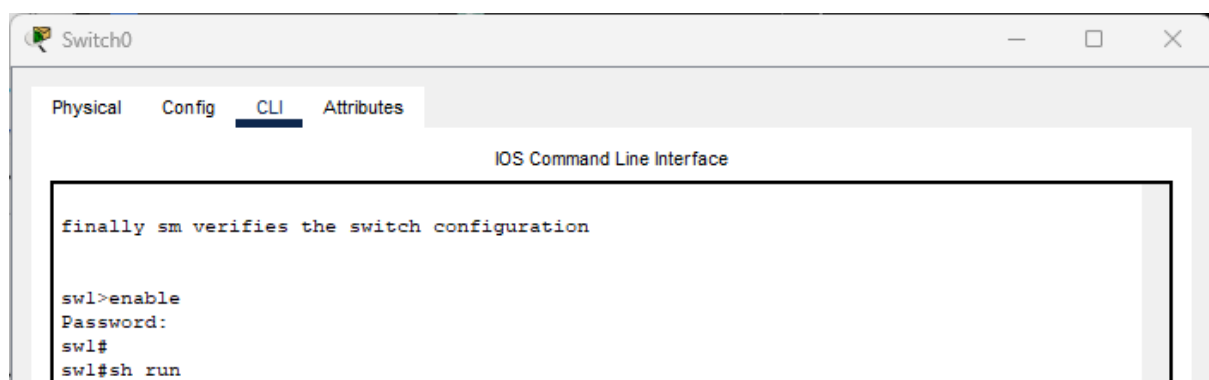
swl#configure t
Enter configuration commands, one per line. End with CNTL/Z.
swl(config)#banner?
banner
swl(config)#banner motd?
motd
swl(config)#banner motd $
Enter TEXT message. End with the character '$'.
finally sm verifies the switch configuration
$

swl(config)#exit
swl#
%SYS-5-CONFIG_I: Configured from console by console
```

Step 4: Set up line control password and enable secret password.

**Step 5: Verify the password**

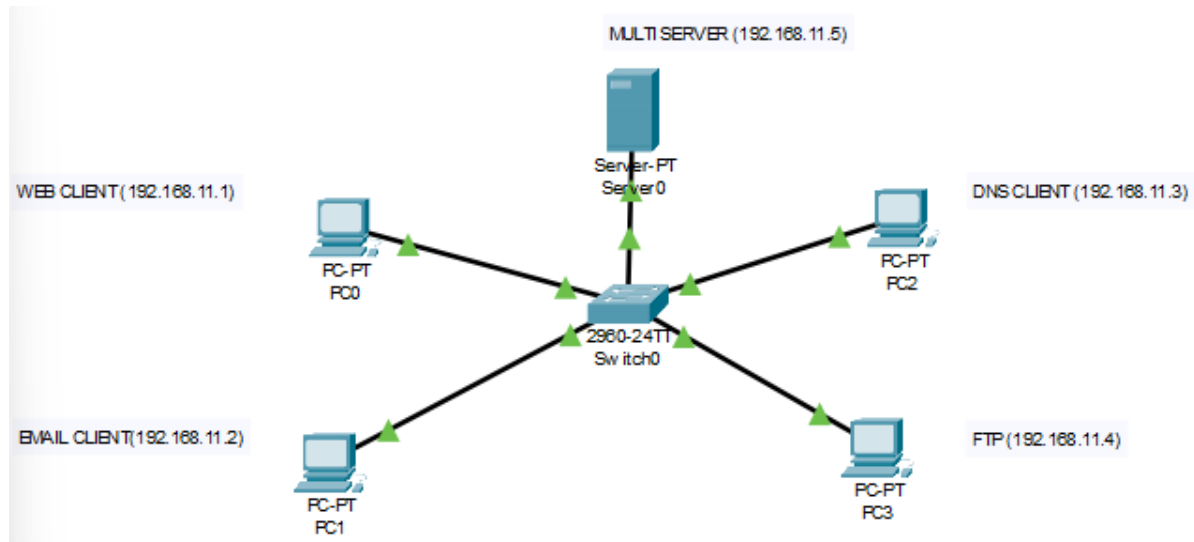
- When you try to log in first, it will ask for the line control password.
- Then, to configure the terminal it will ask to enable a secret password



Program-7

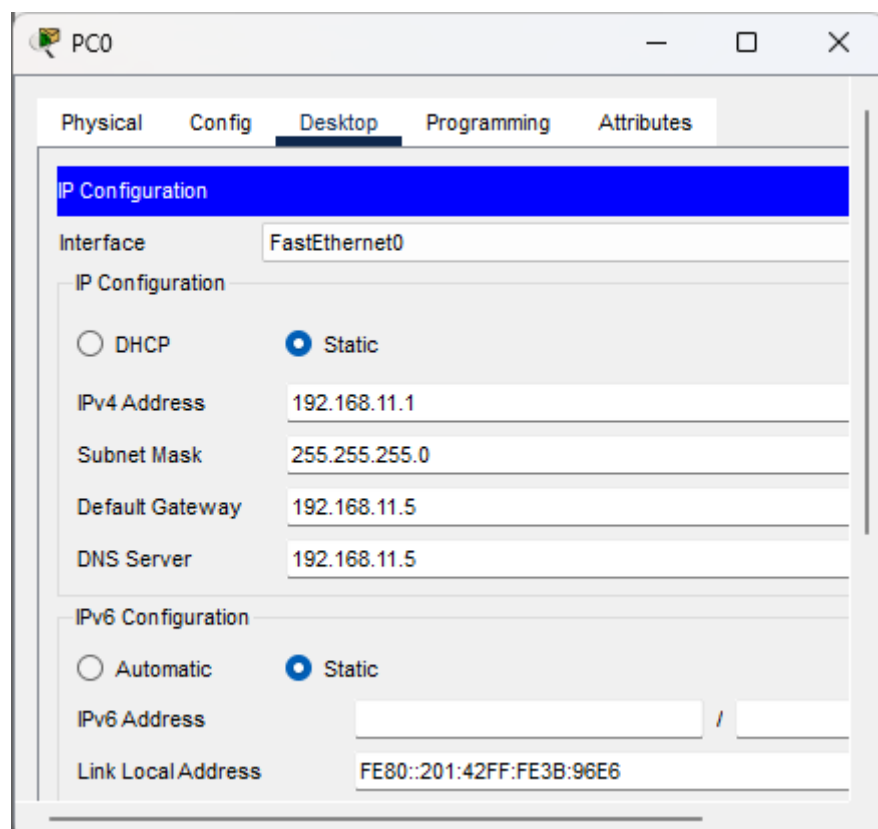
Aim: HTTP (hyper text transfer protocol) configuration.

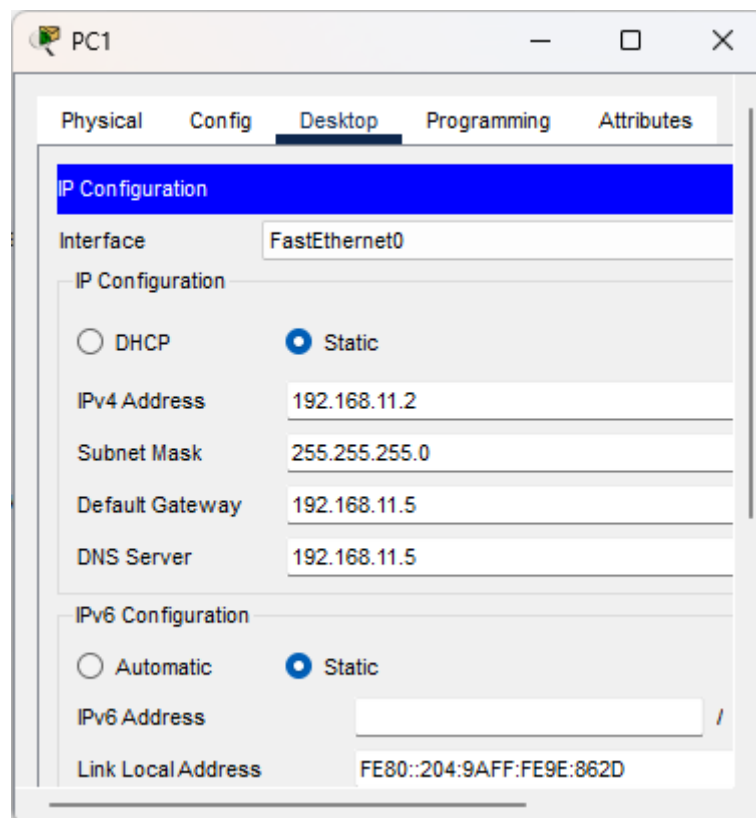
Theory:



Step 1 :-

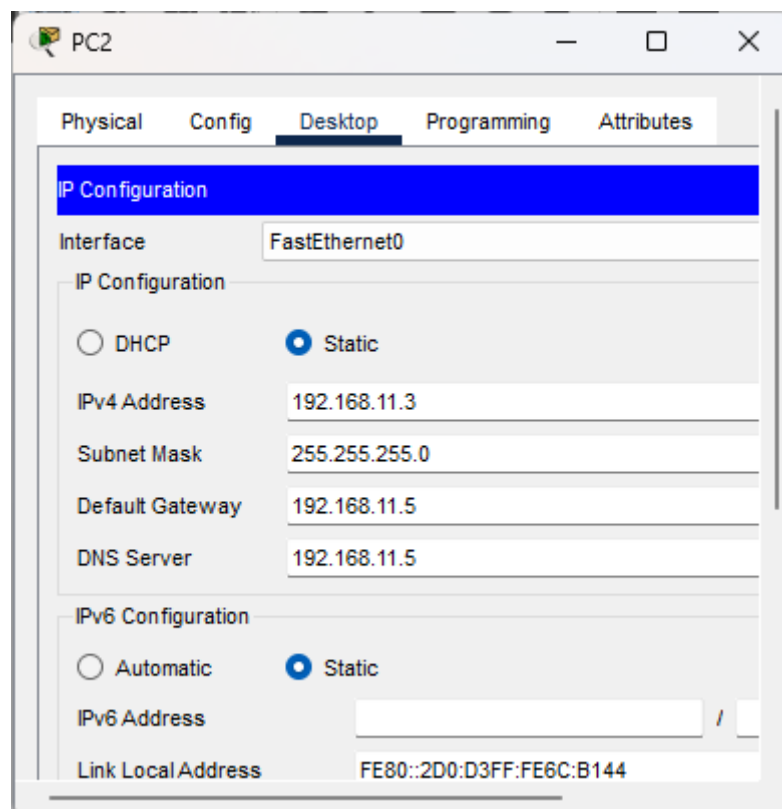
A) click on PC 0 (WEB CLIENT) to configure IP address , also give the DNS server address also.



B) PC1 (EMAIL CLIENT)

The screenshot shows the 'PC1' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is highlighted in blue. The 'Interface' is set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' radio button is selected. The fields are filled with: IPv4 Address: 192.168.11.2, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.11.5, and DNS Server: 192.168.11.5. Under 'IPv6 Configuration', the 'Static' radio button is also selected. The 'IPv6 Address' field is empty, and the 'Link Local Address' is set to FE80::204:9AFF:FE9E:862D.

Section	Field	Value
IP Configuration	Interface	FastEthernet0
	Configuration Type	Static
	IPv4 Address	192.168.11.2
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.11.5
	DNS Server	192.168.11.5
IPv6 Configuration	Configuration Type	Static
	IPv6 Address	
	Link Local Address	FE80::204:9AFF:FE9E:862D

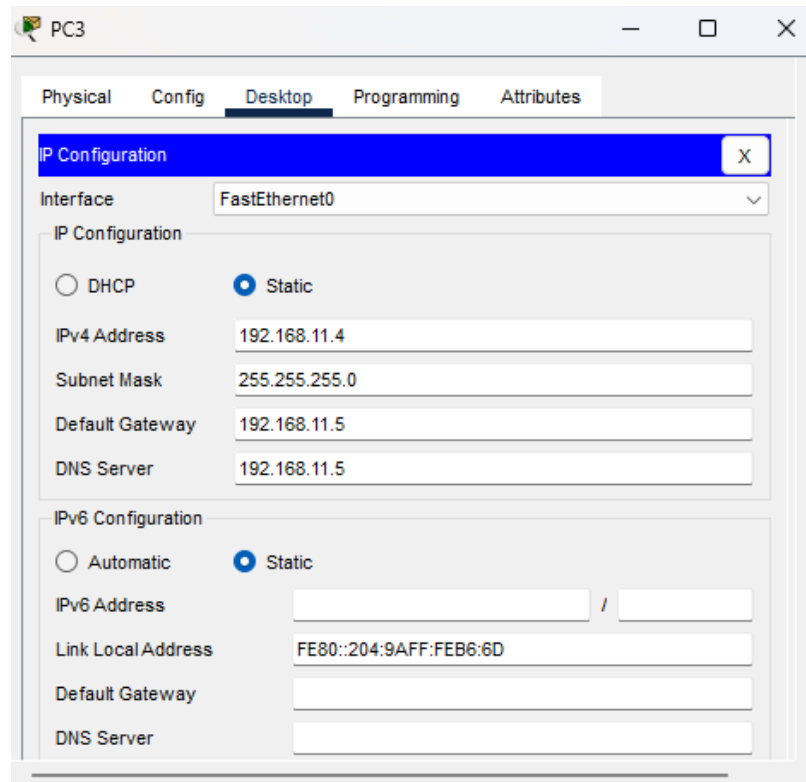
C) PC2 (DNS CLIENT)

The screenshot shows the 'PC2' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is highlighted in blue. The 'Interface' is set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' radio button is selected. The fields are filled with: IPv4 Address: 192.168.11.3, Subnet Mask: 255.255.255.0, Default Gateway: 192.168.11.5, and DNS Server: 192.168.11.5. Under 'IPv6 Configuration', the 'Static' radio button is also selected. The 'IPv6 Address' field is empty, and the 'Link Local Address' is set to FE80::2D0:D3FF:FE6C:B144.

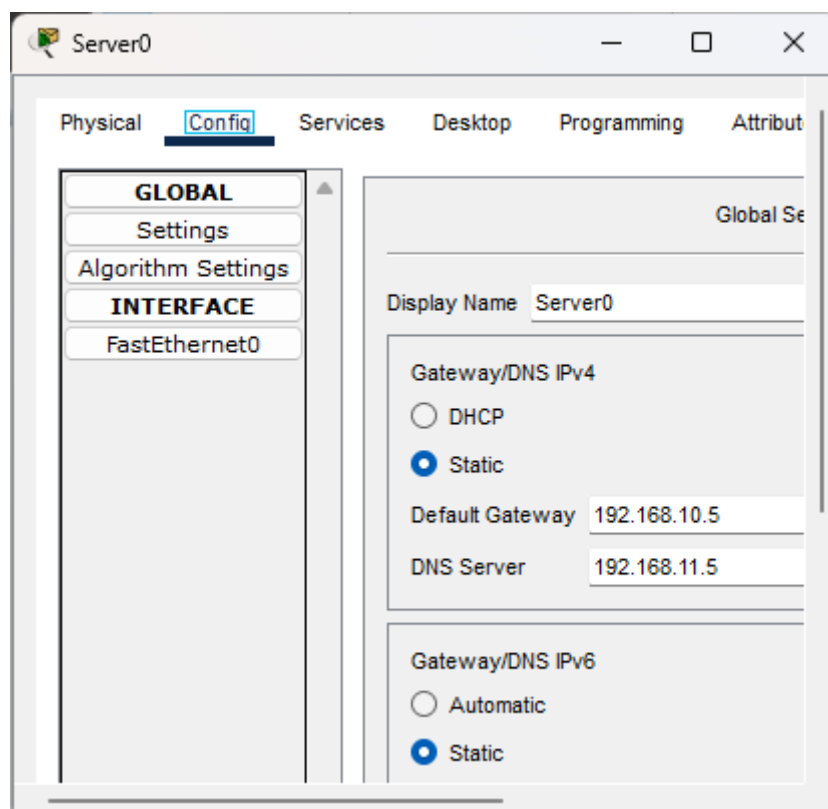
Section	Field	Value
IP Configuration	Interface	FastEthernet0
	Configuration Type	Static
	IPv4 Address	192.168.11.3
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.11.5
	DNS Server	192.168.11.5
IPv6 Configuration	Configuration Type	Static
	IPv6 Address	
	Link Local Address	FE80::2D0:D3FF:FE6C:B144

D) PC3 (FTP)

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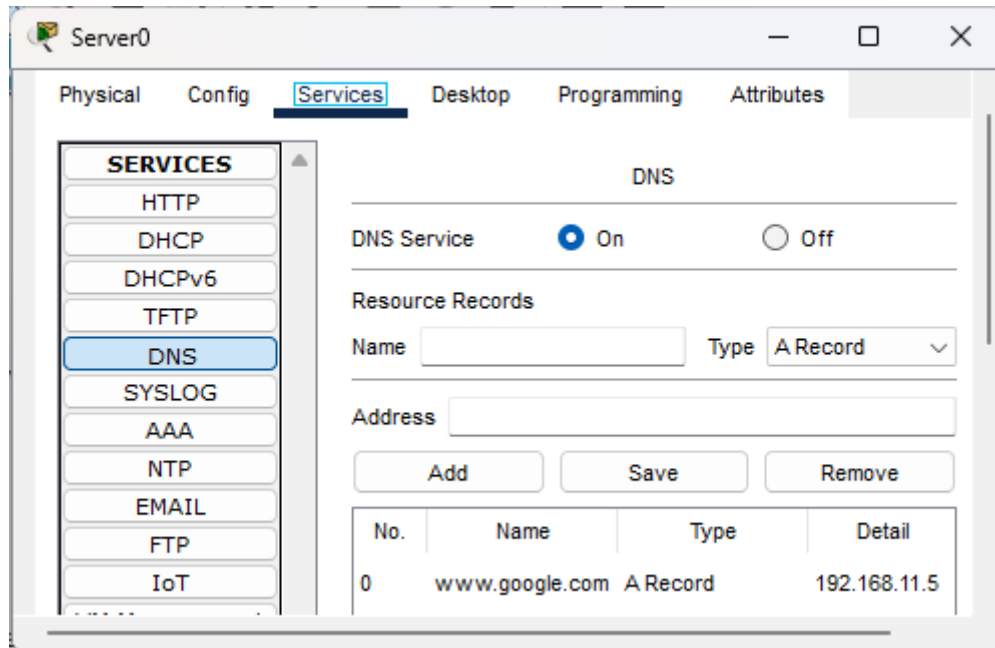


E) Server (DNS also)



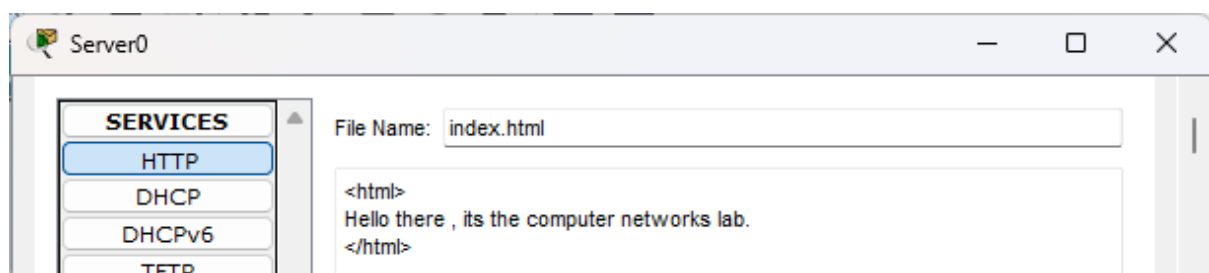
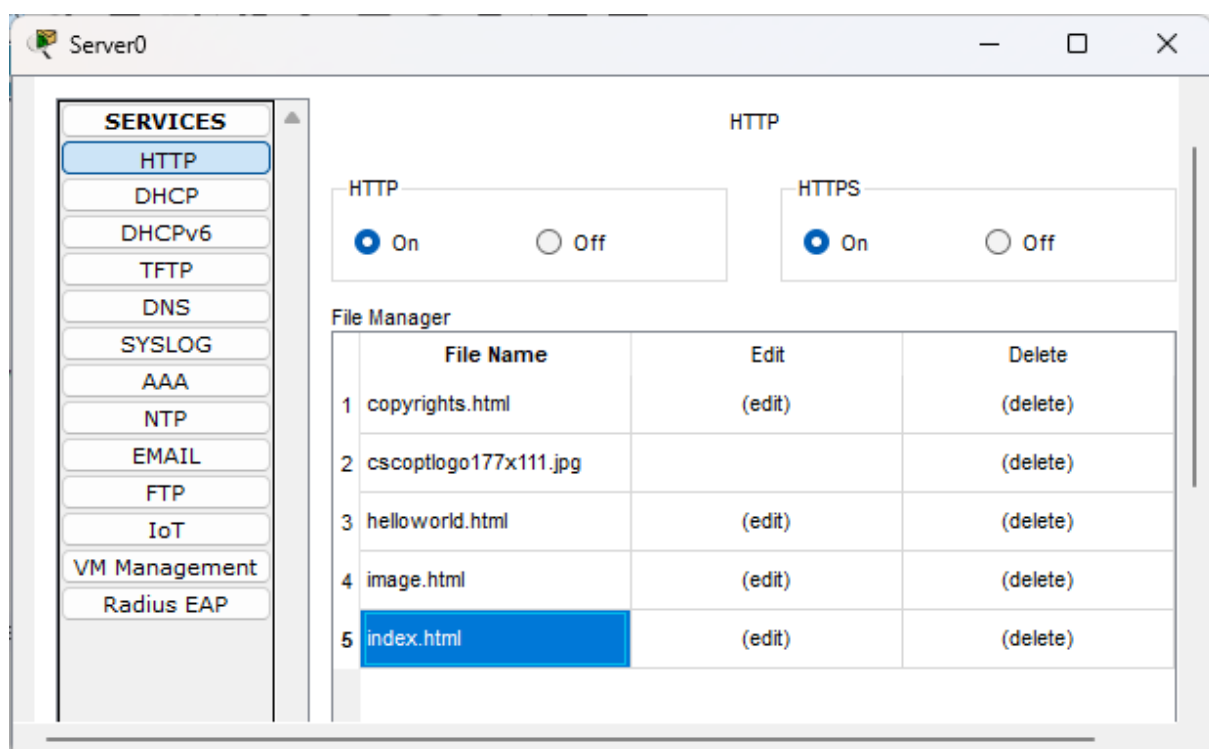
Step 2:-

- i) go to server in services then go to DNS (Domain Name System)
→ fill out Name , Address, then click on add button.



ii) Go to the HTTP in services.

→ Click on the index.html, go to edit option after that write a program what ever you want of do.



→ Click on save

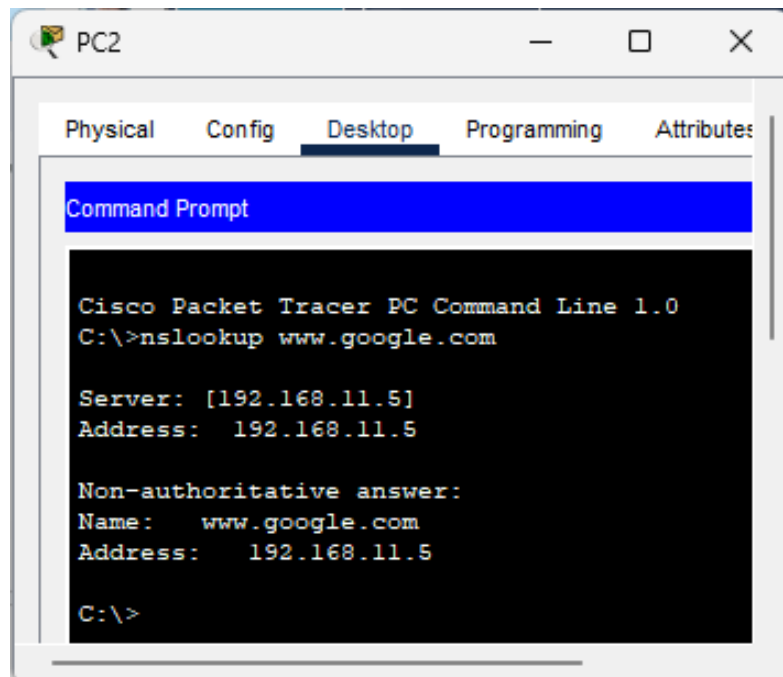
SHRUTI MISHRA (ALEXZENDRENE)

Step 3 :-

i) Go to PC 2 (DNS)

→ Go to desktop > CMD click on it

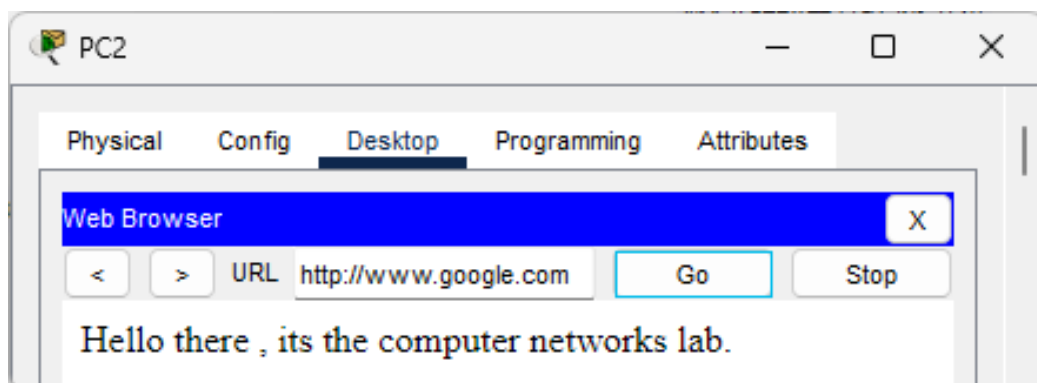
Type there → nslookup www.google.com



ii) Go to PC 2 (DNS)

→ Go to desktop > web browser click on it

Type there → <http://www.google.com>, click on GO

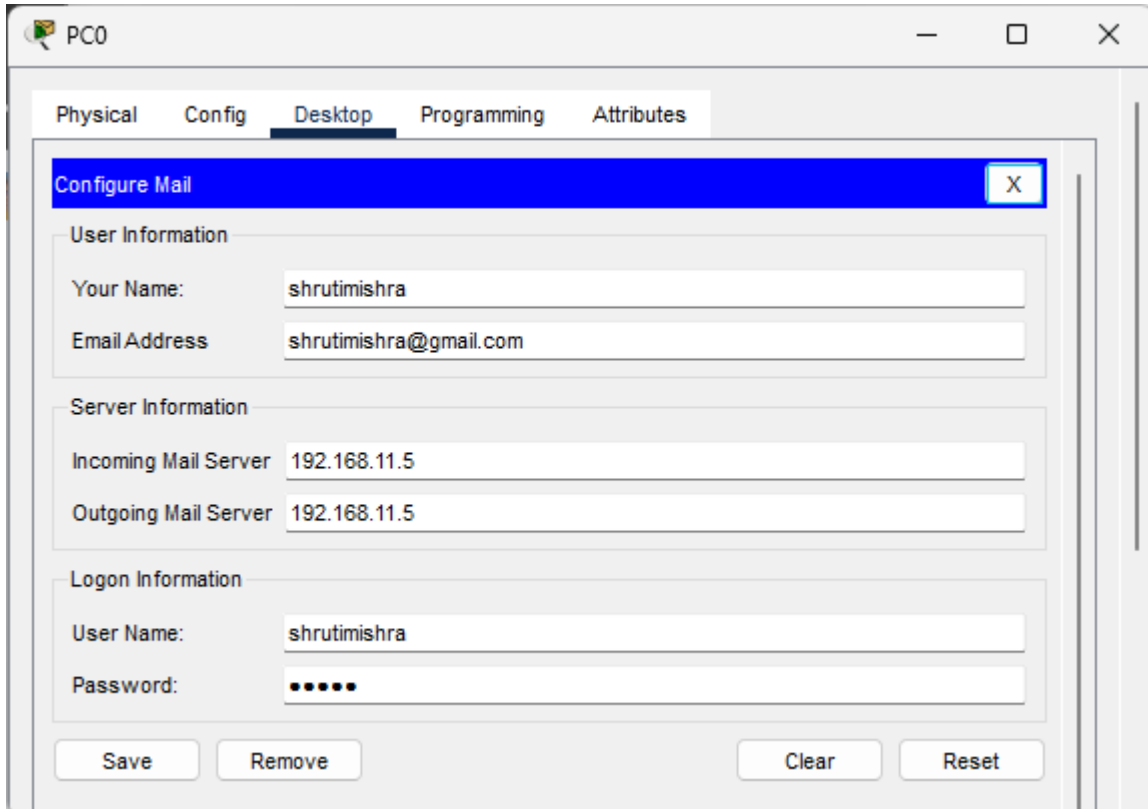


Step 4 :-

Go to PC 0 (Web Client)

→ click on desktop > Email > configure

→ fill out the user info, server info and login info.



The screenshot shows a window titled 'PC0' with tabs for Physical, Config, Desktop, Programming, and Attributes. The 'Desktop' tab is selected. A 'Configure Mail' dialog box is open, containing three sections: User Information, Server Information, and Logon Information. The 'Your Name' field is filled with 'shrutimishra' and the 'Email Address' field is filled with 'shrutimishra@gmail.com'. In the 'Server Information' section, both 'Incoming Mail Server' and 'Outgoing Mail Server' are set to '192.168.11.5'. In the 'Logon Information' section, the 'User Name' is 'shrutimishra' and the 'Password' is masked with dots. At the bottom of the dialog are buttons for 'Save', 'Remove', 'Clear', and 'Reset'.

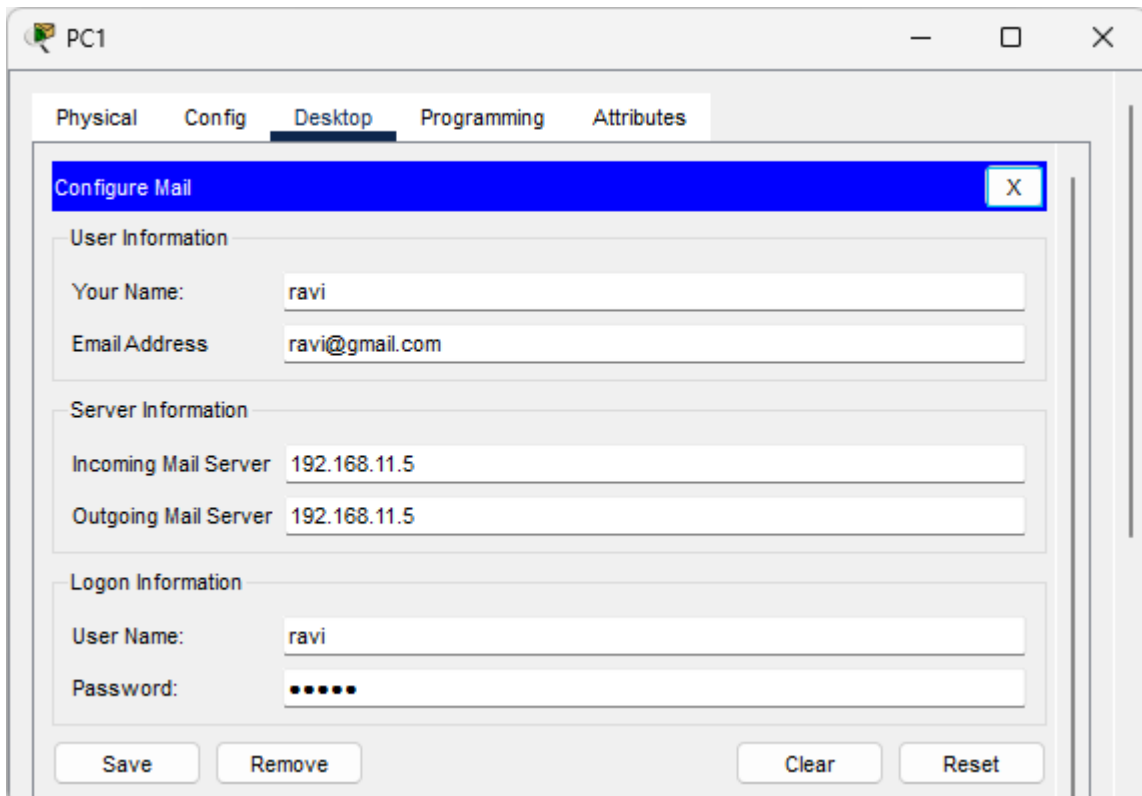
→ click on Save button

Step 5 :-

Go to PC 1 (Email Client)

→ click on Desktop > Email > configure

→ fill out the user info, server info and login info.



The screenshot shows a window titled 'PC1' with tabs for Physical, Config, Desktop, Programming, and Attributes. The 'Desktop' tab is selected. A 'Configure Mail' dialog box is open, containing three sections: User Information, Server Information, and Logon Information. The 'Your Name' field is filled with 'ravi' and the 'Email Address' field is filled with 'ravi@gmail.com'. In the 'Server Information' section, both 'Incoming Mail Server' and 'Outgoing Mail Server' are set to '192.168.11.5'. In the 'Logon Information' section, the 'User Name' is 'ravi' and the 'Password' is masked with dots. At the bottom of the dialog are buttons for 'Save', 'Remove', 'Clear', and 'Reset'.

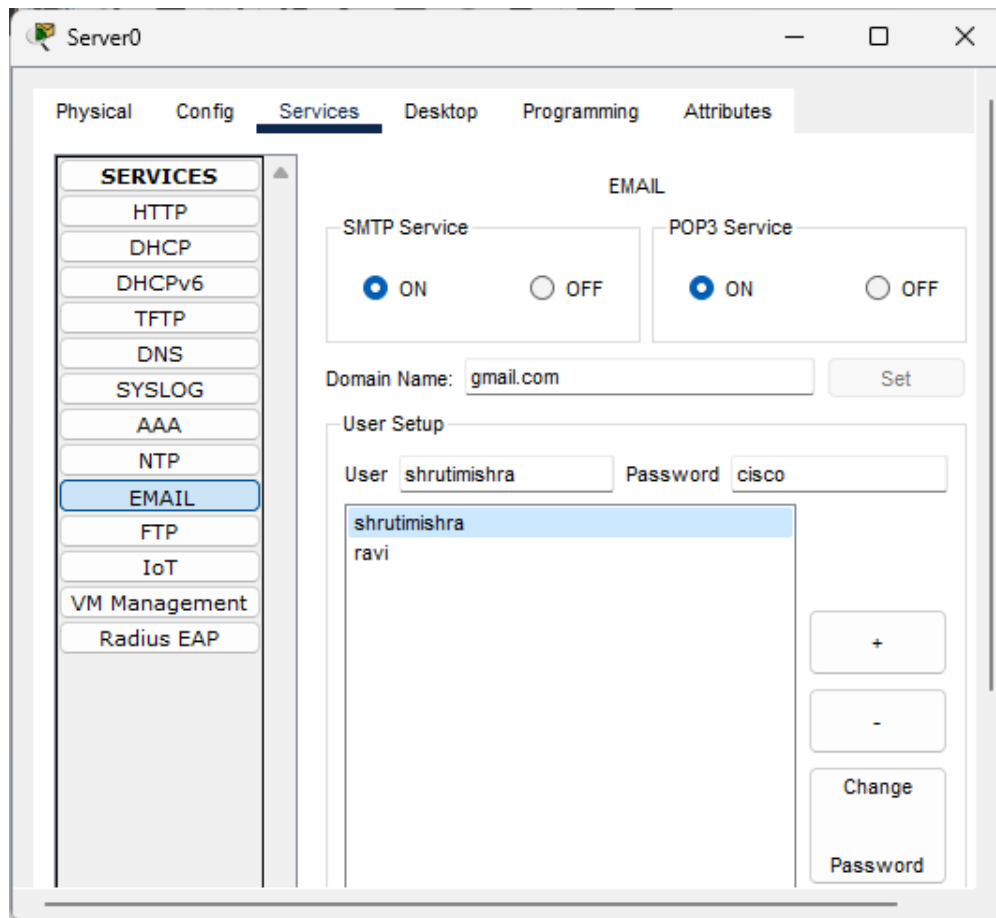
→ click on Save button

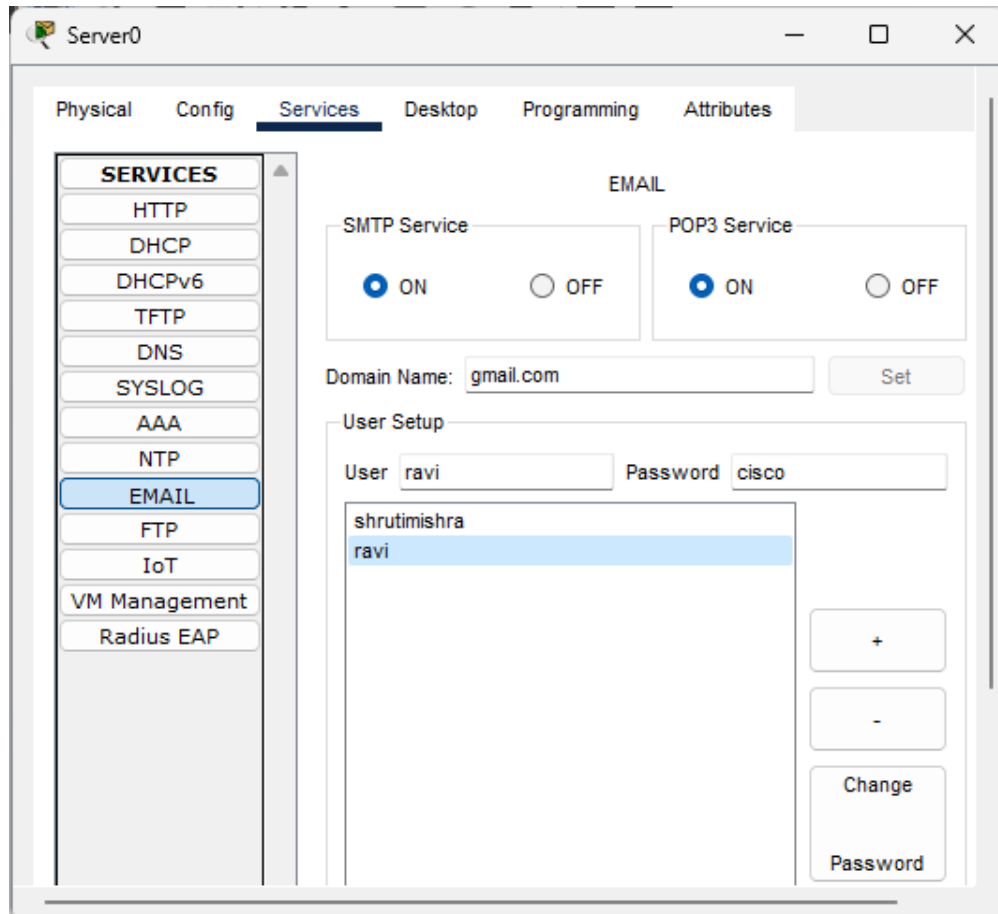
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Step 6 :-**Go to Multi Server**

→ **click on services > Email**

→ **Create the Domain Name > user setup > click on “ + ”.**

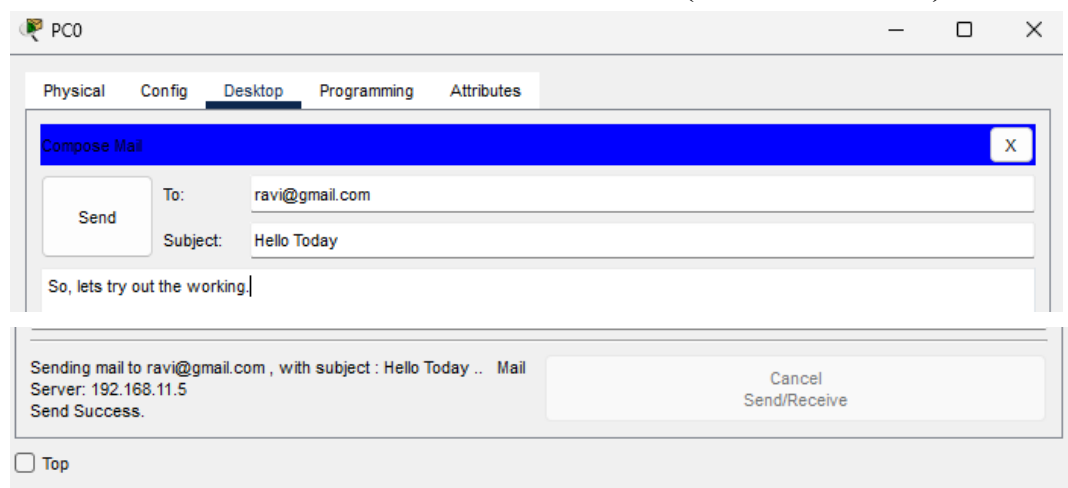




→ Go to the web client

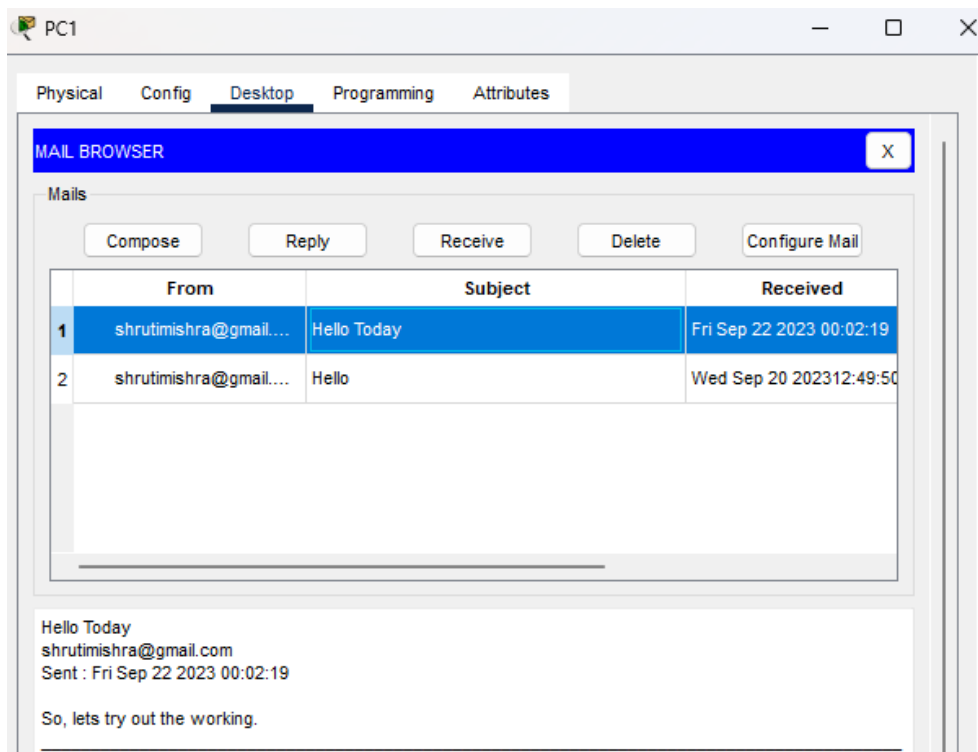
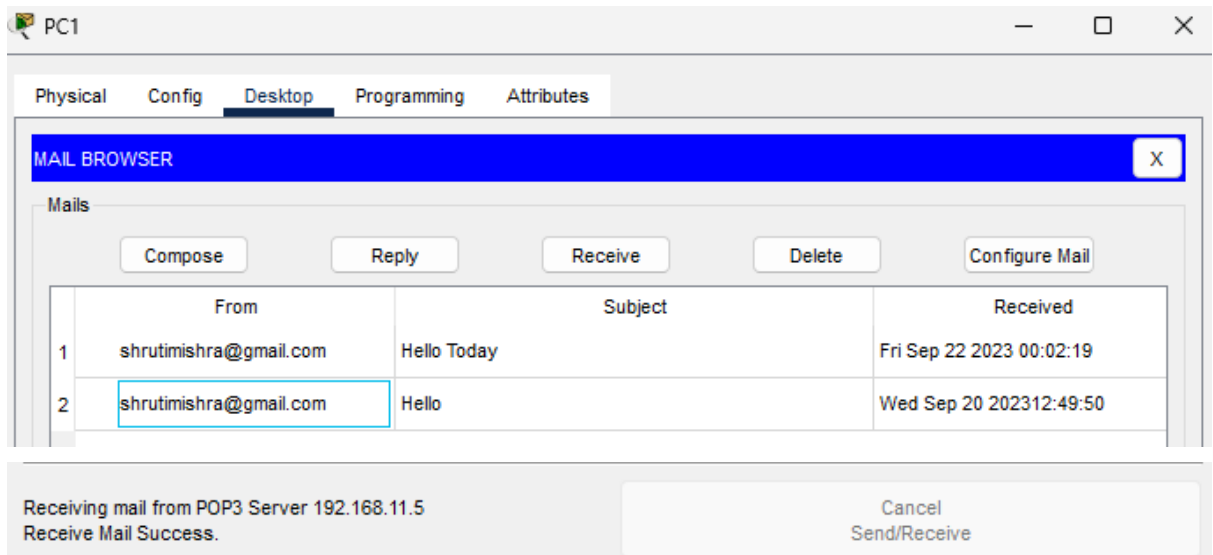
→ go to Desktop > email again

→ we need to send a mail from web client to PC 1 (EMAIL CLIENT)



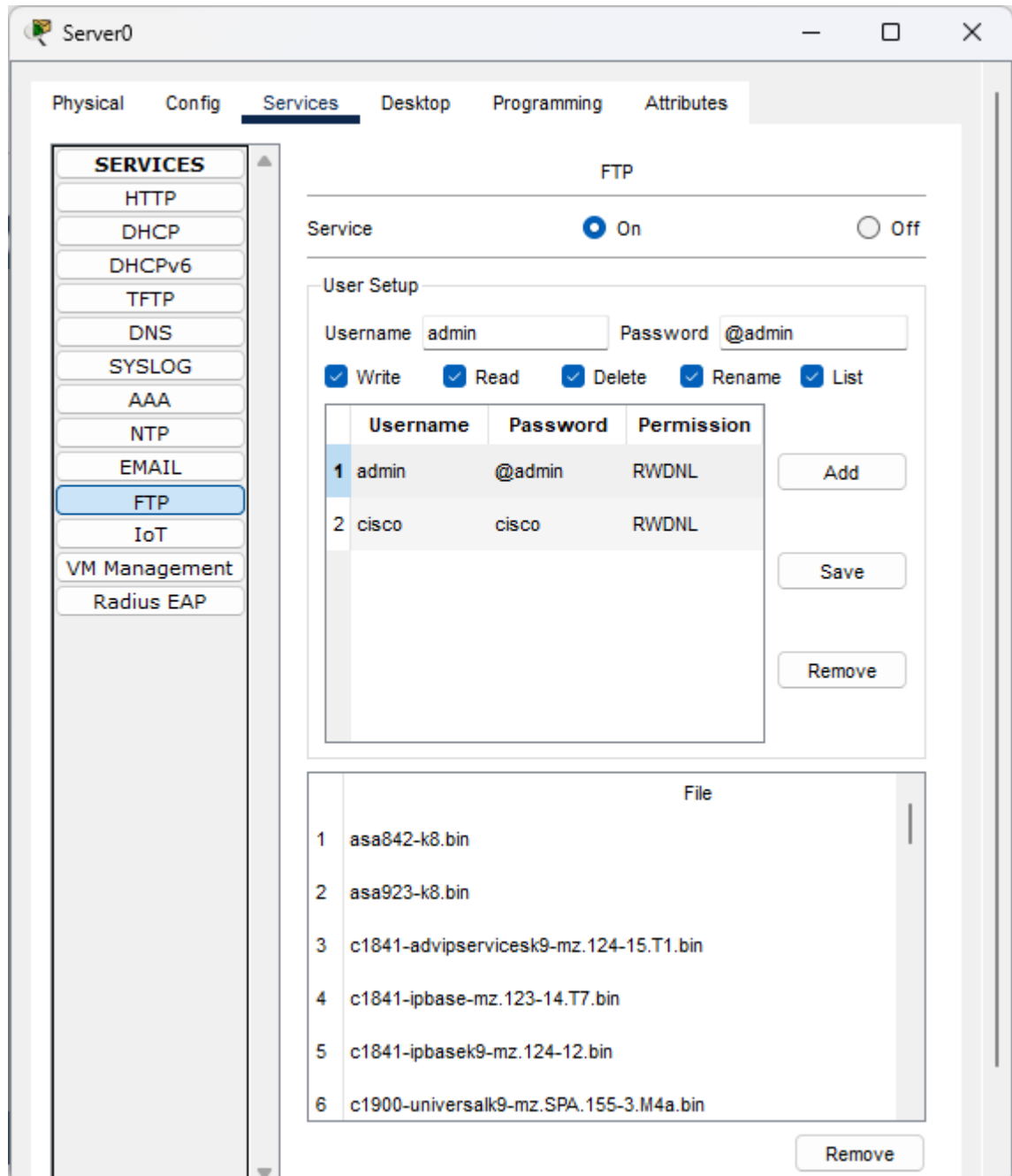
→ NOW GO TO EMAIL CLIENT

→ desktop > email > receive button



Step 7 :-

- Go to PC 4 (FTP)
- Go to multi server > services > FTP



→ Click on ADD button

a) Go to FTP Client

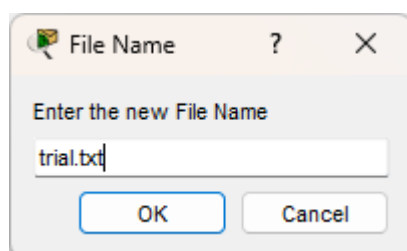
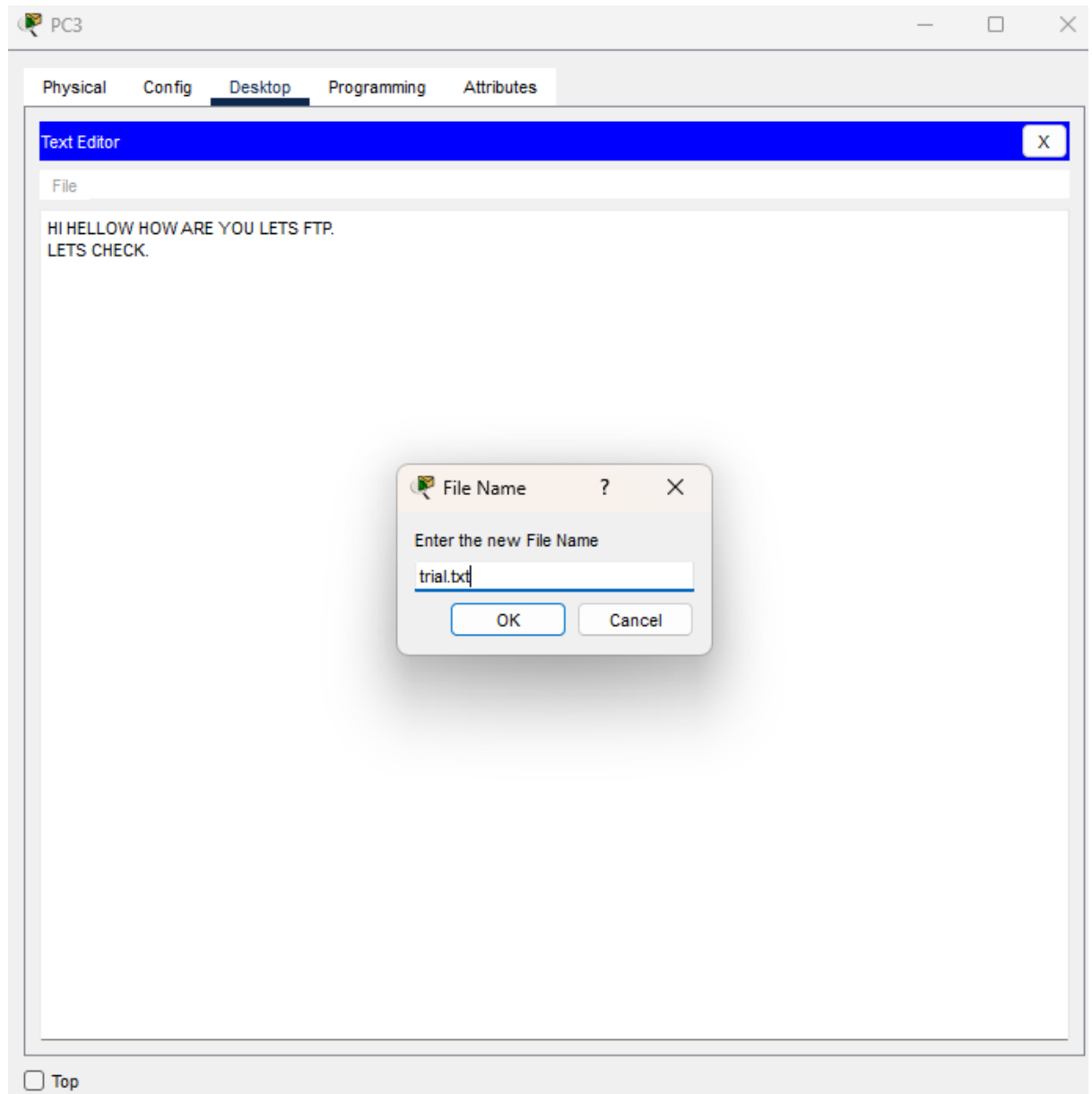
→ click on cmd

And type ftp www.google.com

Username: admin

Password: @admin

b) Go to text editor (desktop PC



→ go to cmd
ftp > put trial.txt
ftp > dir

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ftp www.google.com
Trying to connect...www.google.com
Connected to www.google.com
220- Welcome to FT Ftp server
Username:admin
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>put trial.txt

Writing file trial.txt to www.google.com:
File transfer in progress...

[Transfer complete - 44 bytes]

44 bytes copied in 0.081 secs (543 bytes/sec)

```

```

ftp>dir

Listing /ftp directory from www.google.com:
0   : asa842-k8.bin                               5571584
1   : asa923-k8.bin                               30468096
2   : cl841-advipservicesk9-mz.124-15.T1.bin      33591768
3   : cl841-ipbase-mz.123-14.T7.bin               13832032
4   : cl841-ipbasek9-mz.124-12.bin                16599160
5   : cl900-universalk9-mz.SPA.155-3.M4a.bin      33591768
6   : c2600-advipservicesk9-mz.124-15.T1.bin      33591768
7   : c2600-i-mz.122-28.bin                       5571584
8   : c2600-ipbasek9-mz.124-8.bin                 13169700
9   : c2800nm-advipservicesk9-mz.124-15.T1.bin    50938004
10  : c2800nm-advipservicesk9-mz.151-4.M4.bin     33591768
11  : c2800nm-ipbase-mz.123-14.T7.bin             5571584
12  : c2800nm-ipbasek9-mz.124-8.bin               15522644
13  : c2900-universalk9-mz.SPA.155-3.M4a.bin      33591768
14  : c2950-i6q412-mz.121-22.EA4.bin             3058048
15  : c2950-i6q412-mz.121-22.EA8.bin             3117390
16  : c2960-lanbase-mz.122-25.FX.bin              4414921
17  : c2960-lanbase-mz.122-25.SEE1.bin            4670455
18  : c2960-lanbasek9-mz.150-2.SE4.bin            4670455
19  : c3560-advipservicesk9-mz.122-37.SE1.bin     8662192
20  : c3560-advipservicesk9-mz.122-46.SE.bin      10713279
21  : c800-universalk9-mz.SPA.152-4.M4.bin         33591768
22  : c800-universalk9-mz.SPA.154-3.M6a.bin       83029236
23  : cat3k_caa-universalk9.16.03.02.SPA.bin      505532849
24  : cgr1000-universalk9-mz.SPA.154-2.CG         159487552
25  : cgr1000-universalk9-mz.SPA.156-3.CG         184530138
26  : ir800-universalk9-bundle.SPA.156-3.M.bin    160968869
27  : ir800-universalk9-mz.SPA.155-3.M           61750062
28  : ir800-universalk9-mz.SPA.156-3.M           63753767
29  : ir800_yocto-1.7.2.tar                      2877440
30  : ir800_yocto-1.7.2_python-2.7.3.tar         6912000
31  : pt1000-i-mz.122-28.bin                     5571584
32  : pt3000-i6q412-mz.121-22.EA4.bin            3117390
33  : text.txt                                    55
34  : trial.txt                                  44

ftp>

```

Step 8 :-

→ Go to DNS> desktop > cmd

→ type - ftp www.google.com

Username: admin

Password: @admin

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ftp www.google.com
Trying to connect...www.google.com
Connected to www.google.com
220- Welcome to PT Ftp server
Username:admin
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
```

→ ftp> get trial.txt > enter (downloading the file)

```
ftp>get trial.txt

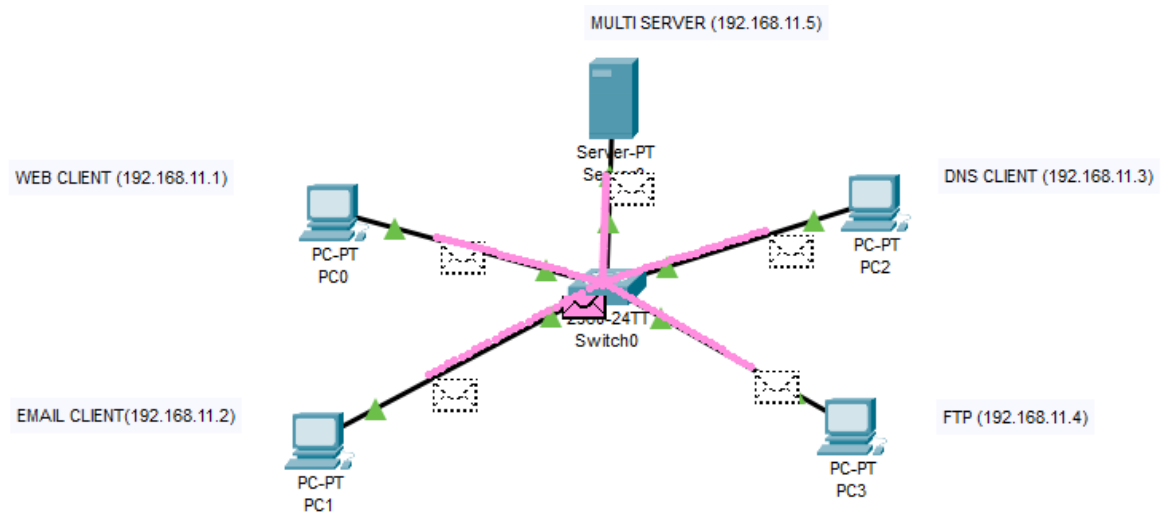
Reading file trial.txt from www.google.com:
File transfer in progress...

[Transfer complete - 44 bytes]

44 bytes copied in 0 secs
ftp>
```

Step 9:-

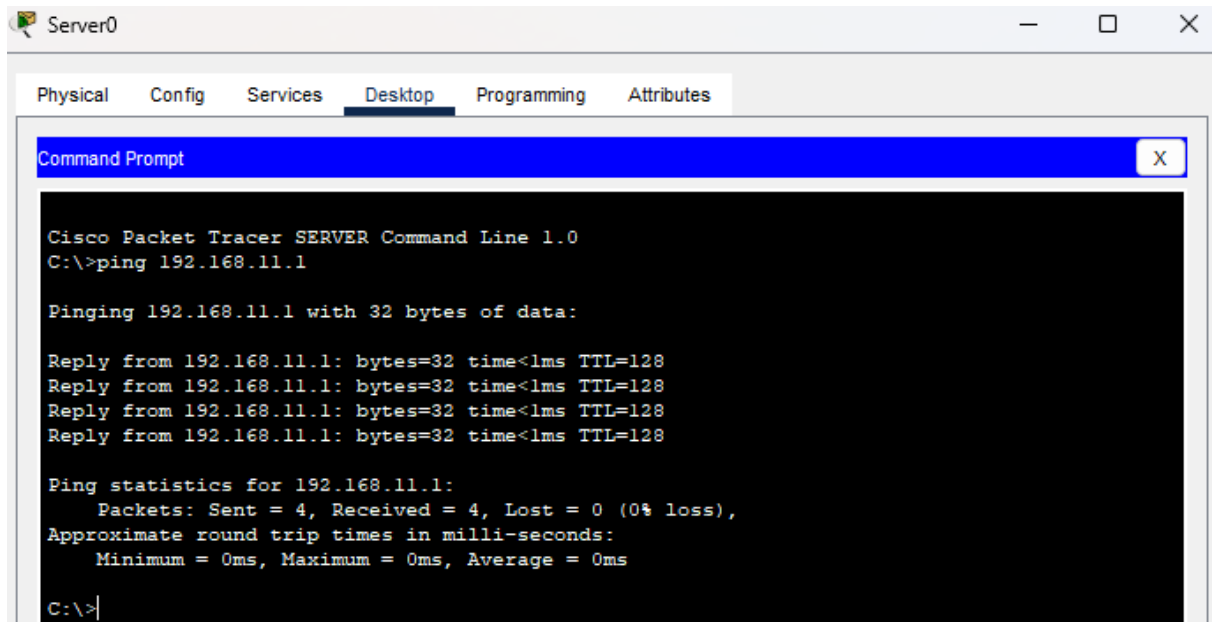
→ go to the simulation mode



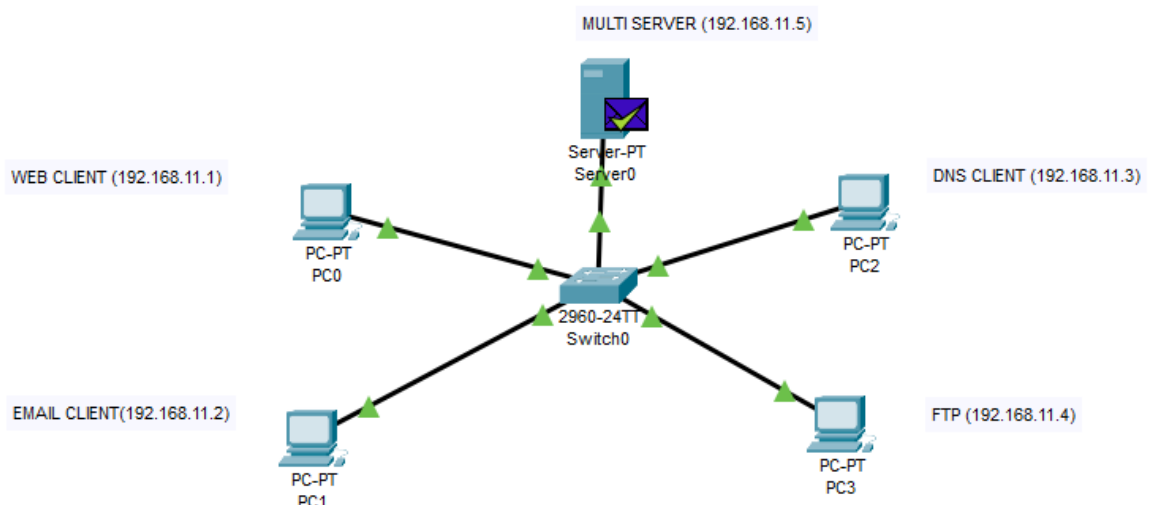
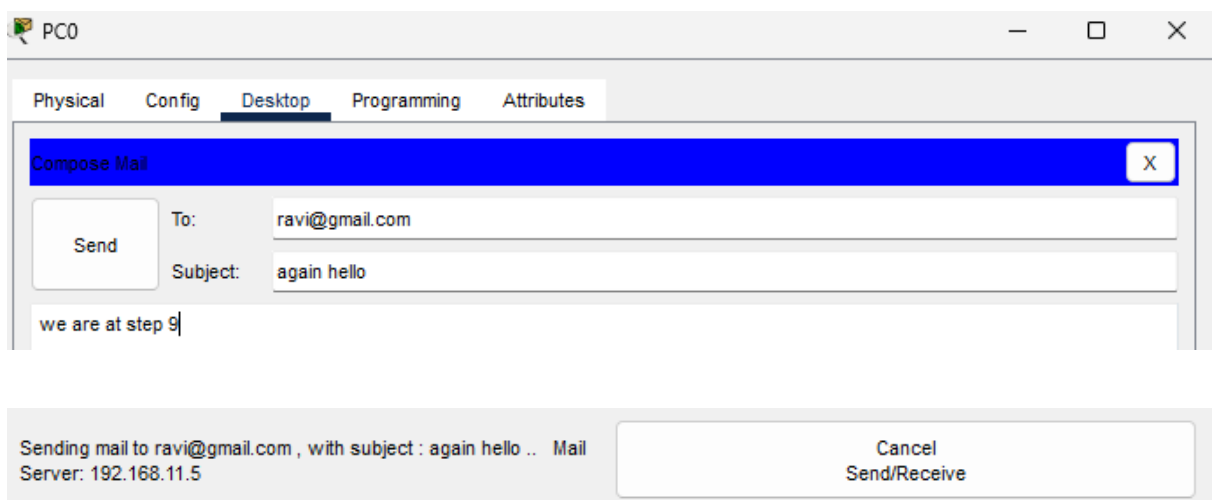
→ go to multi-server

→ click on cmd

→ Type - ping 192.168.11.1



→ click on web client > desktop > email
 → compose the email again



→ click on MAIL CLIENT > RECIEVE button

Network Diagram:

- Central device: 2960-24TT Switch0
- Server: Server-PT Server0 (MULTI SERVER 192.168.11.5)
- Clients: PC-PT PC0, PC-PT PC1, PC-PT PC2 (DNS CLIENT 192.168.11.3), PC-PT PC3 (FTP 192.168.11.4)

Status Bar:

Sending mail to ravi@gmail.com , with subject : again hello .. Mail Server: 192.168.11.5 Send Success.

Buttons: Cancel, Send/Receive

PC1 Desktop Environment:

MAIL BROWSER

Physical Config **Desktop** Programming Attributes

MAILS

Buttons: Compose, Reply, Receive, Delete, Configure Mail

	From	Subject	Received
1	shrutimishra@gmail.com	again hello	Wed Sep 20 2023 12:17:44
2	shrutimishra@gmail.com	Hello Today	Fri Sep 22 2023 00:02:19
3	shrutimishra@gmail.com	Hello	Wed Sep 20 2023 12:49:50

Status Bar:

Receiving mail from POP3 Server 192.168.11.5 Receive Mail Success.

Buttons: Cancel, Send/Receive

→ Click on FTP Client

→ go to cmd

→ Type - put trial.txt

```
ftp>put trial.txt

Writing file trial.txt to www.google.com:
File transfer in progress...

[Transfer complete - 44 bytes]

44 bytes copied in 0.087 secs (505 bytes/sec)
ftp>
```

- Click on DNS Client
 - click on cmd
 - type - nslookup www.google.com

```
ftp>
bye
Invalid Command.

C:\>nslookup www.google.com

Server: [192.168.11.5]
Address: 192.168.11.5

Non-authoritative answer:
Name: www.google.com
Address: 192.168.11.5

C:\>
```