

EXP-11: Configure Application Layer Protocols –DNS, HTTP, Email, FTP, and Telnet

I. Aim:

Show the working of Application Layer Protocols –DNS, HTTP, Email, FTP, and Telnet.

Task 11.1 Setup DNS, HTTP, and E-Mail server in Cisco Packet tracer.

Task 11.2 Setup FTP server in Packet Tracer.

Task 11.3 Setup Telnet on router in Packet Tracer.

II. Components and Tools:

Tool: Packet Tracer

Components: As per the network setup

III. Description: HTTP, DNS, Email, FTP, Telnet

IV. Diagrams / Experimental set-up:

V. Procedure:

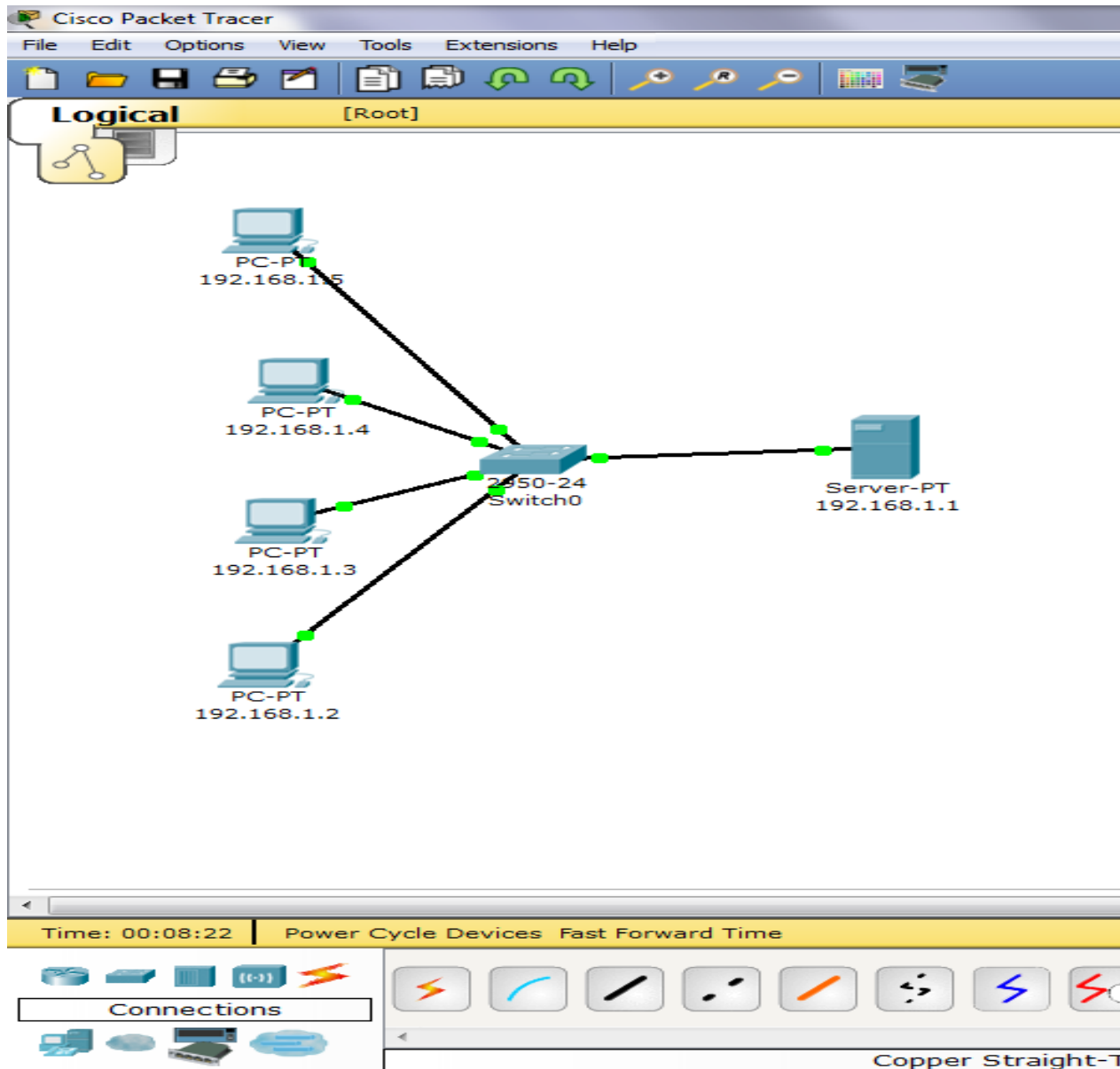
VI. Output Description/Analysis:

VII. Viva-Voce Questions:

Task 11.1

Setup DNS, HTTP, and E-Mail server in Cisco Packet tracer.

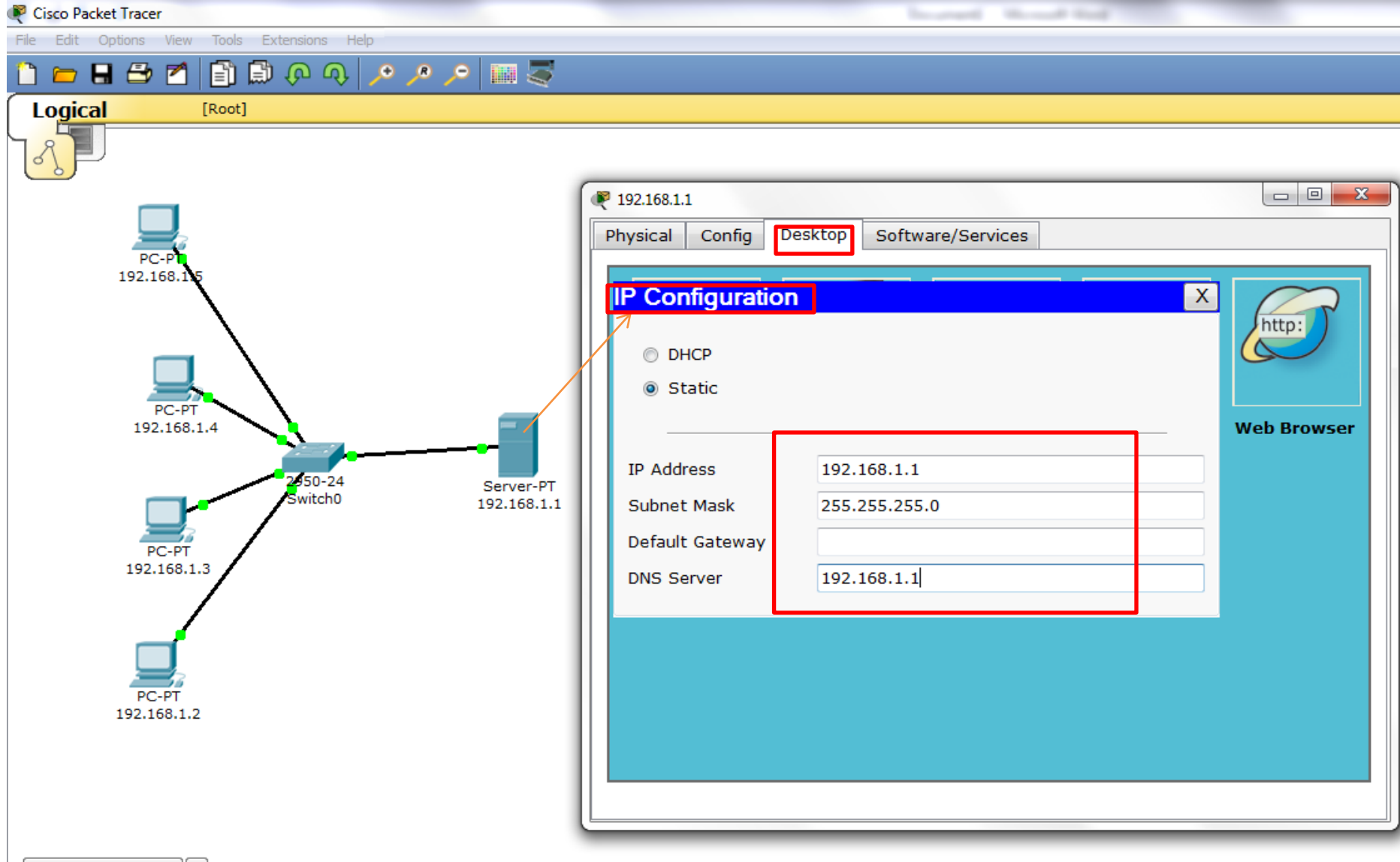
Creating the following Network



DNS Server

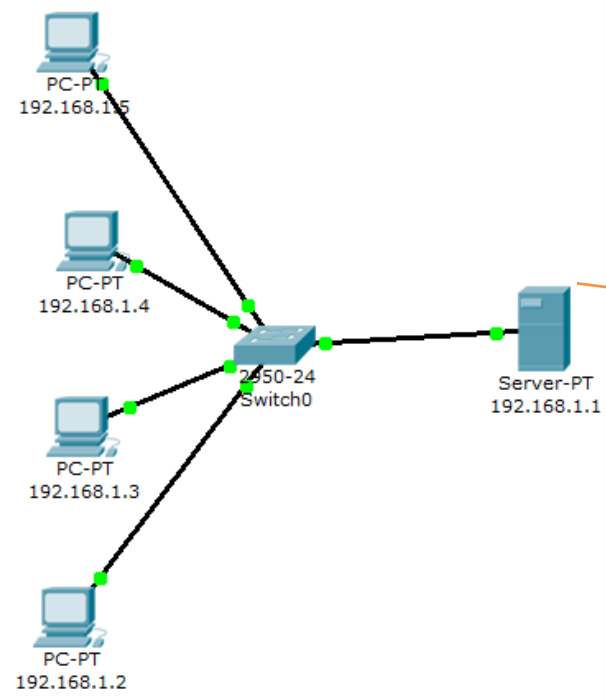
- Domain Name System (DNS) is the name resolution protocol for TCP/IP networks, such as the Internet.
- Client computers query a DNS server to resolve memorable, alphanumeric DNS names to the IP addresses that computers use to communicate with each other.

Setup DNS Server





Logical [Root]



192.168.1.1

Physical Config Desktop Software/Services

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

INTERFACE

FastEthernet

DNS

DNS Service ☒ On ☐ Off

Resource Records

Name computerscience.com Type A Record

Address 192.168.1.1

Add Save Remove

No.	Name	Type	Details
-----	------	------	---------

DNS Cache

Physical

Config

Desktop

Software/Services

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

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EMAIL

FTP

INTERFACE

FastEthernet

DNS

DNS Service

☒ On☐ Off

Resource Records

Name

Type

A Record ▾

Address

Add

Save

Remove

No.	Name	Type	Details
1	computerscience.com	A Record	192.168.1.1

DNS Cache

Configure PCs

The screenshot displays the Packet Tracer interface. On the left, a network topology is shown with four PCs (PC-PT 192.168.1.2 to 192.168.1.5) connected to a central 2950-24 Switch0, which is also connected to a Server-PT 192.168.1.1. An orange arrow points from PC-PT 192.168.1.2 to the IP Configuration window on the right.

The IP Configuration window for PC-PT 192.168.1.2 is open, showing the 'Desktop' tab. The 'IP Configuration' section has 'Static' selected. The IP Address is 192.168.1.2, Subnet Mask is 255.255.255.0, Default Gateway is empty, and DNS Server is 192.168.1.1. These fields are enclosed in a red box. Below this, there are icons for 'E Mail', 'PPPoE Dialer', and 'Text Editor'. On the right side of the window, there are icons for 'Web Browser' and 'Cisco IP Communicator'.

Note: Repeat the same steps to all other computers

HTTP Server

- Short for **Hyper Text Transfer Protocol**, the underlying protocol used by the World Wide Web.
- HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.
- For example, when you enter a URL in your browser, this actually sends an HTTP command to the Web server directing it to fetch and transmit the requested Web page.

Setup HTTP Server

Cisco Packet Tracer

File Edit Options View Tools Extensions Help

Logical [Root]

PC-PT 192.168.1.5

PC-PT 192.168.1.4

PC-PT 192.168.1.3

PC-PT 192.168.1.2

2950-24 Switch0

Server-PT 192.168.1.1

192.168.1.1

Physical Config Desktop Software/Services

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

INTERFACE

FastEthernet

HTTP

HTTP ☒ On ☐ Off

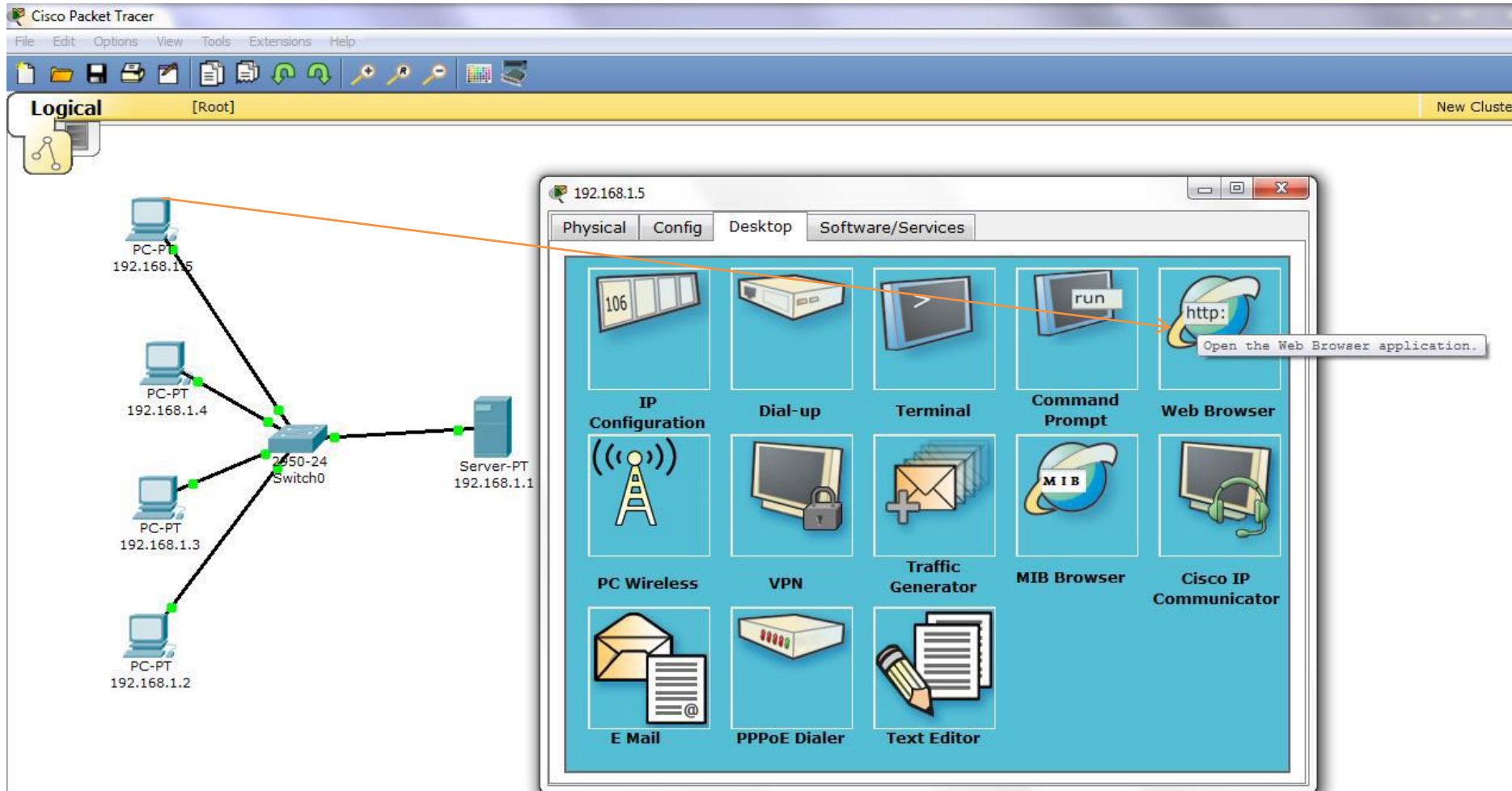
HTTPS ☒ On ☐ Off

File Name: index.html

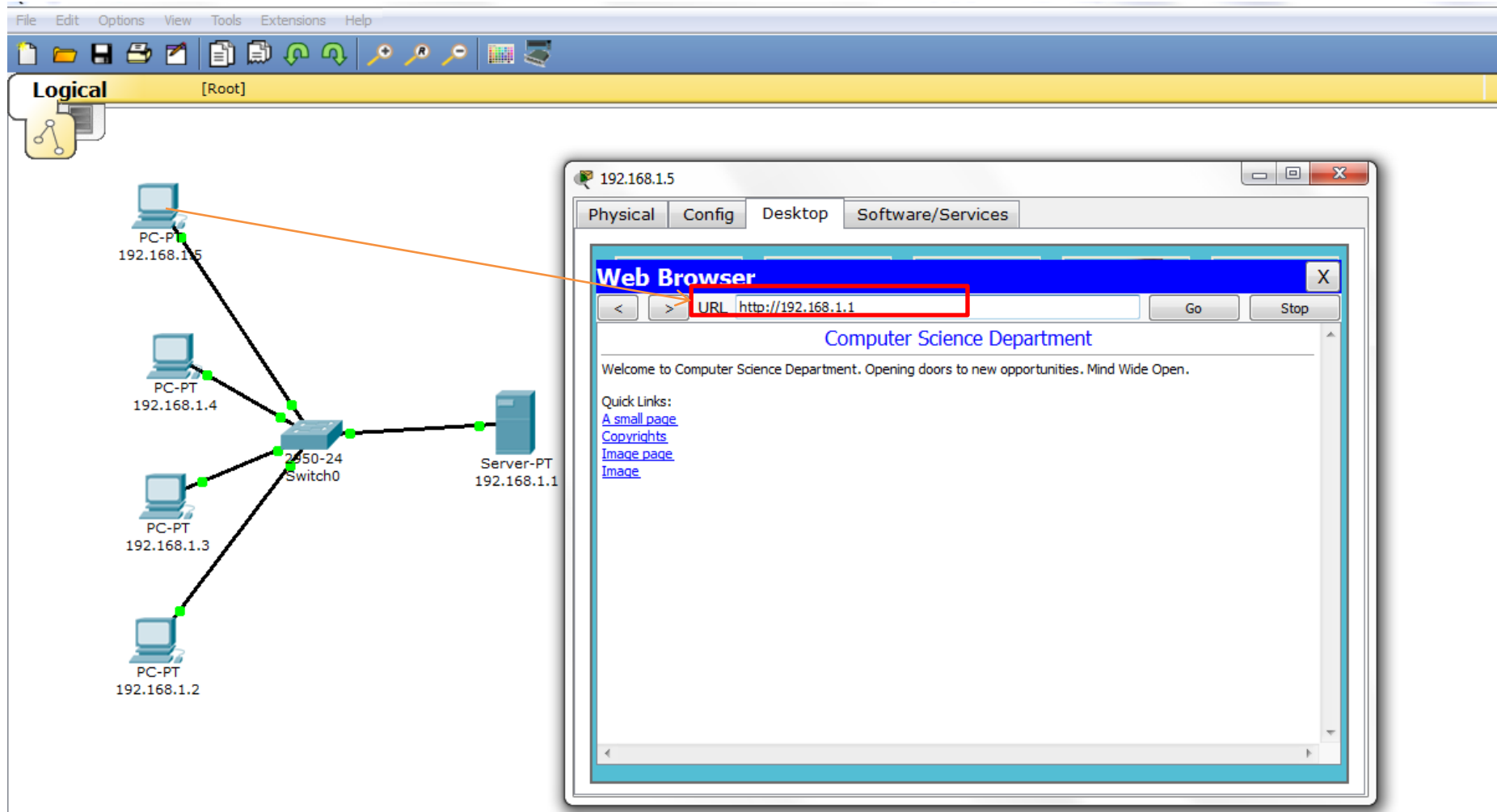
```
<html>
<center><font size='+2' color='blue'>Computer Science
Department</font></center>
<hr>Welcome to Computer Science Department. Opening doors to
new opportunities. Mind Wide Open.
<p>Quick Links:
<br><a href='helloworld.html'>A small page</a>
<br><a href='copyrights.html'>Copyrights</a>
<br><a href='image.html'>Image page</a>
<br><a href='image.jpg'>Image</a>
</html>
```

Page: 1/3 < > + X

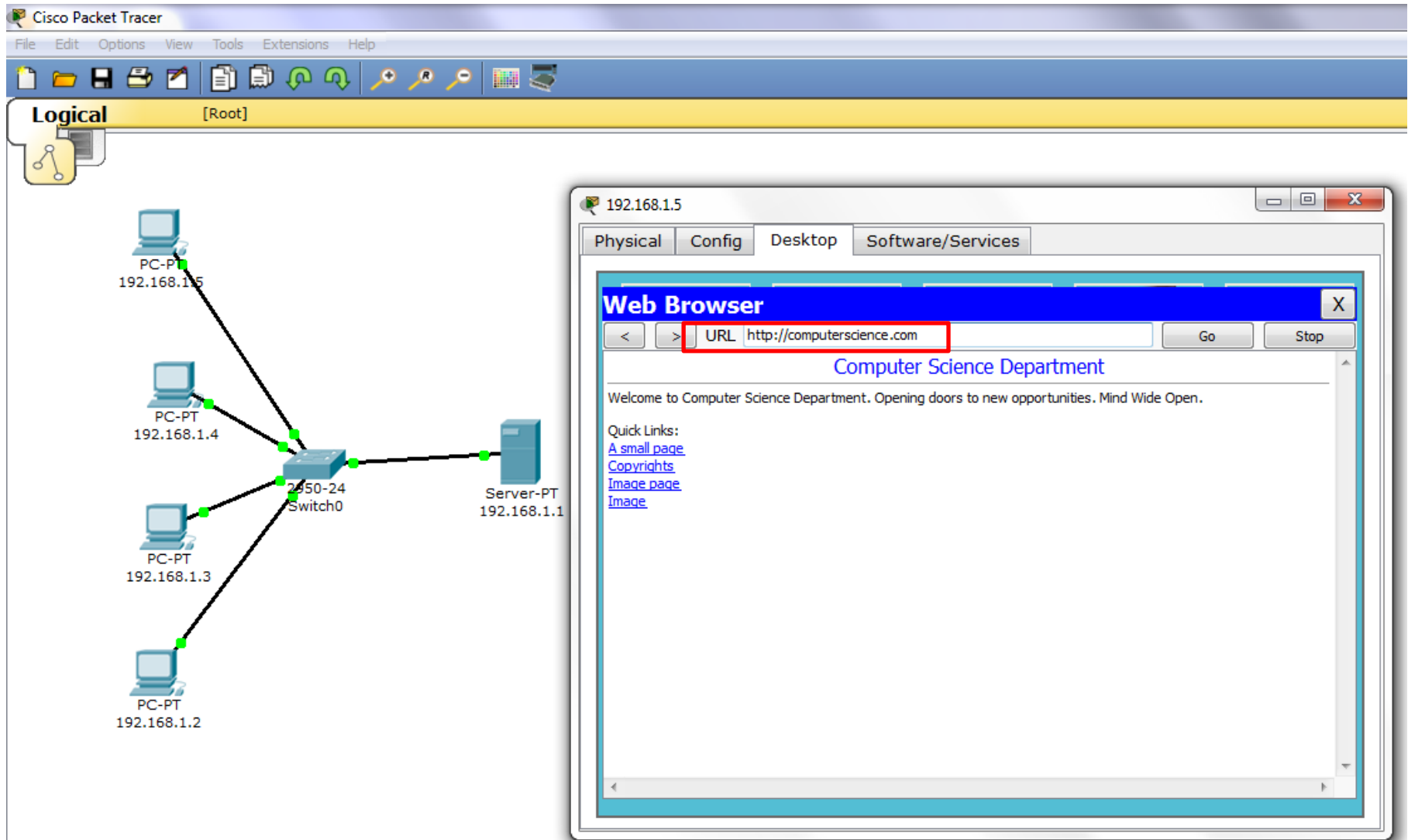
Open Web Page from PC



Type the IP address of DNS server



Type the Domain name



E-mail server

- Often referred to as simply "mail server", an e-mail server is a computer within your network that works as your virtual post office.
- A mail server usually consists of a storage area where e-mail is stored for local users, a set of user definable rules which determine how the mail server should react to the destination of a specific message, a database of user accounts that the mail server recognizes and will deal with locally, and communications modules which are the components that actually handle the transfer of messages to and from other mail servers and email clients.

Setup E-mail server

Cisco Packet Tracer

File Edit Options View Tools Extensions Help

Logical [Root]

PC-PT PC1

PC-PT PC0

PC-PT PC2

PC-PT PC3

2950-24 Switch1

Server-PT Server1

Server1

Physical Config Desktop Software/Services

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

INTERFACE

FastEthernet

EMAIL

SMTP Service ☒ ON ☐ OFF

POP3 Service ☒ ON ☐ OFF

Domain Name: **computerscience.com** Set

User Setup

User cs1 Password cs1

+ -

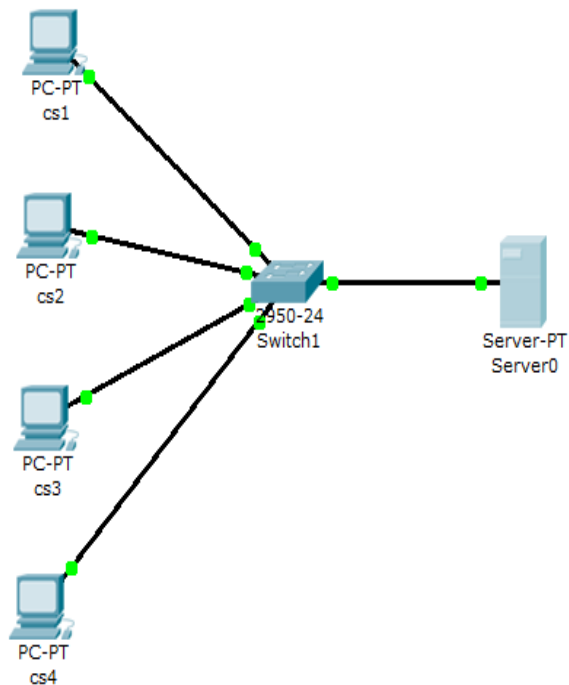
Change Password



Logical

[Root]

New Cluster



Server0

Physical Config Desktop Software/Services

GLOBAL

Settings

Algorithm Settings

SERVICES

HTTP

DHCP

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

INTERFACE

FastEthernet

EMAIL

SMTP Service ☒ ON ☐ OFF

POP3 Service ☒ ON ☐ OFF

Domain Name:

User Setup

User Password

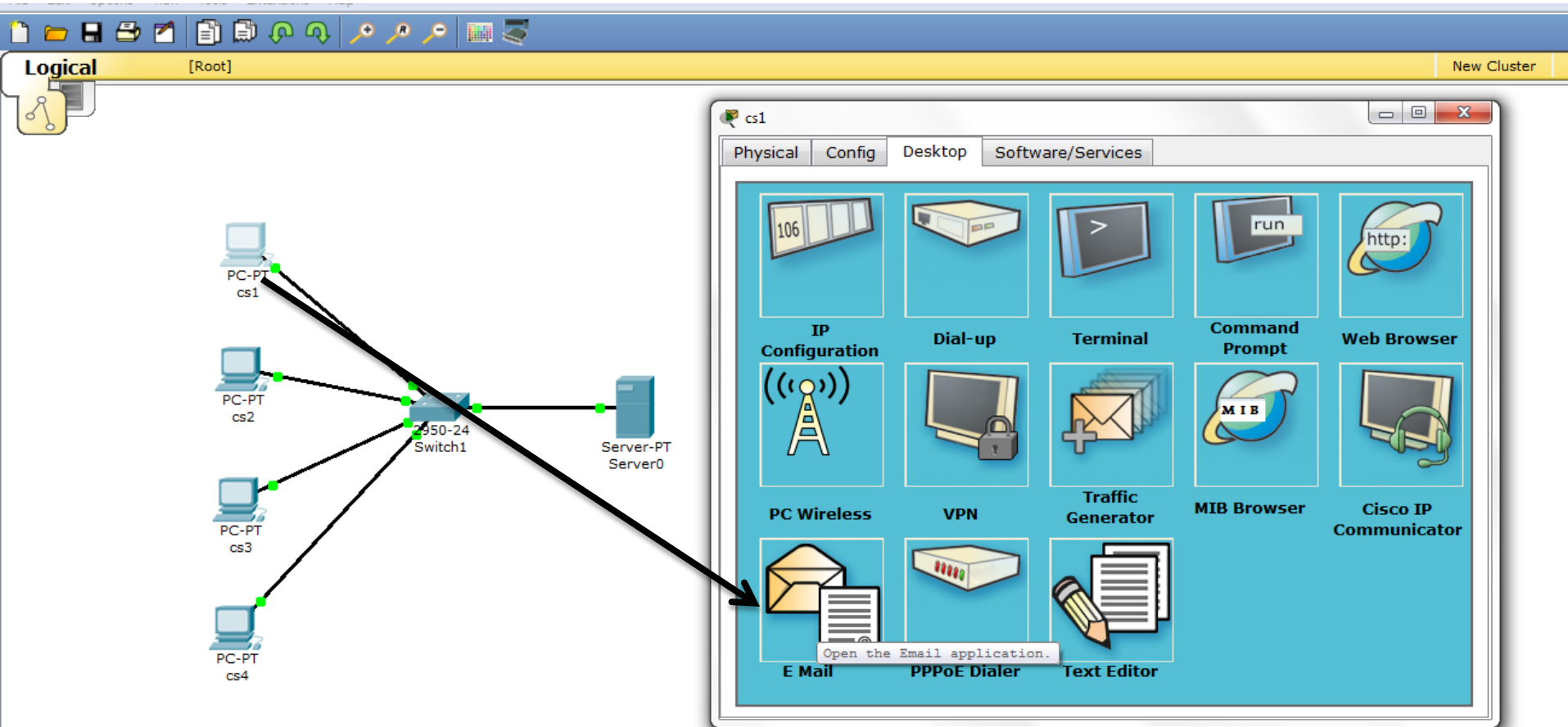
cs1

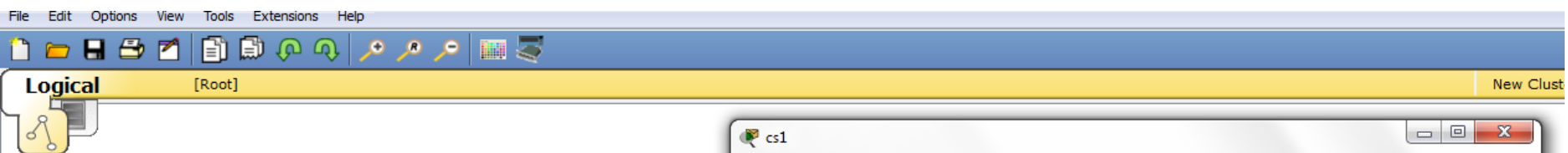
cs2

cs3

cs4

Create Email in PC





cs1

Physical Config Desktop Software/Services

Configure Mail

User Information

Your Name:

Email Address:

Server Information

Incoming Mail Server:

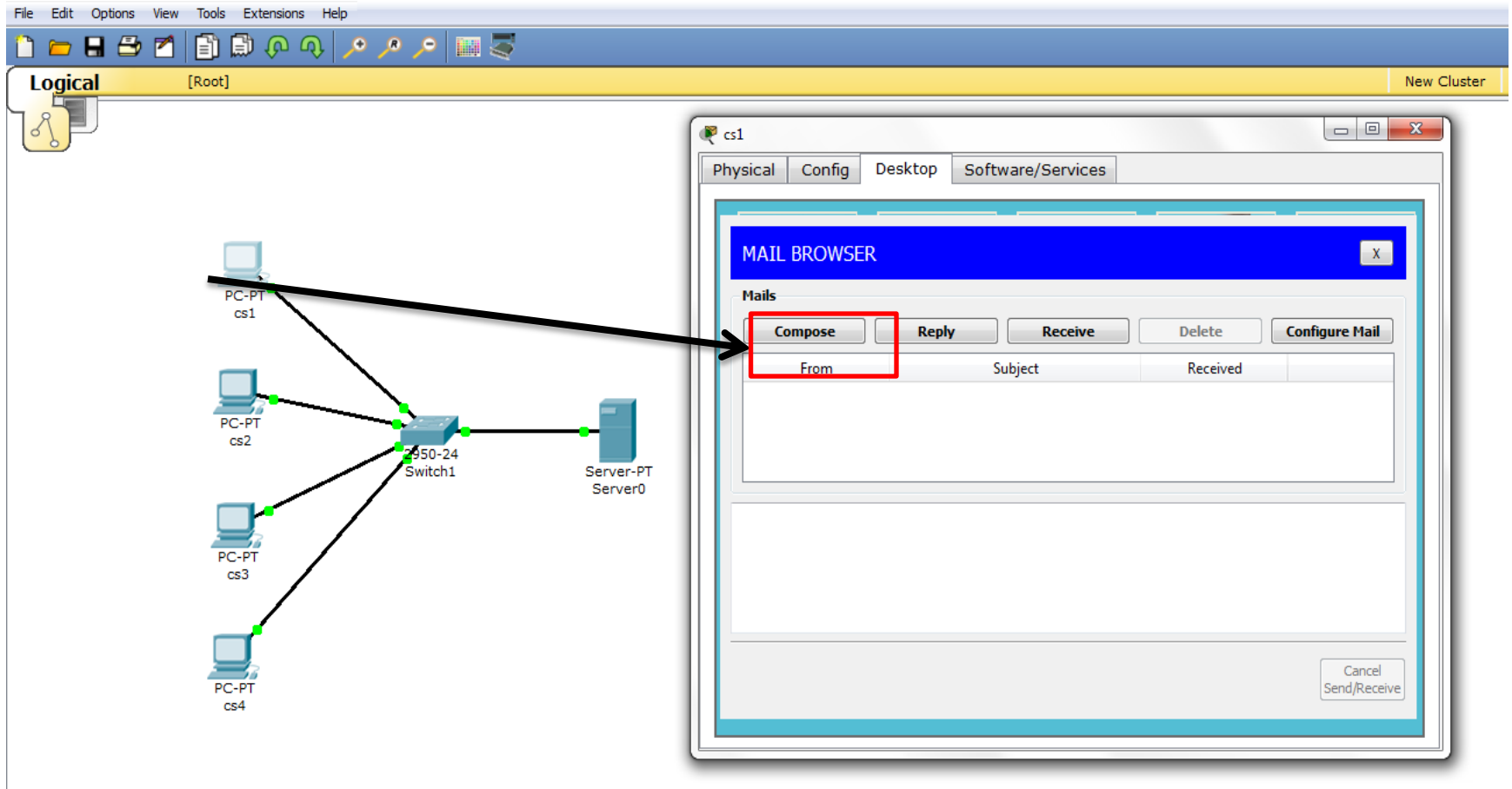
Outgoing Mail Server:

Logon Information

User Name:

Password:

Send Email from cs1 to cs2

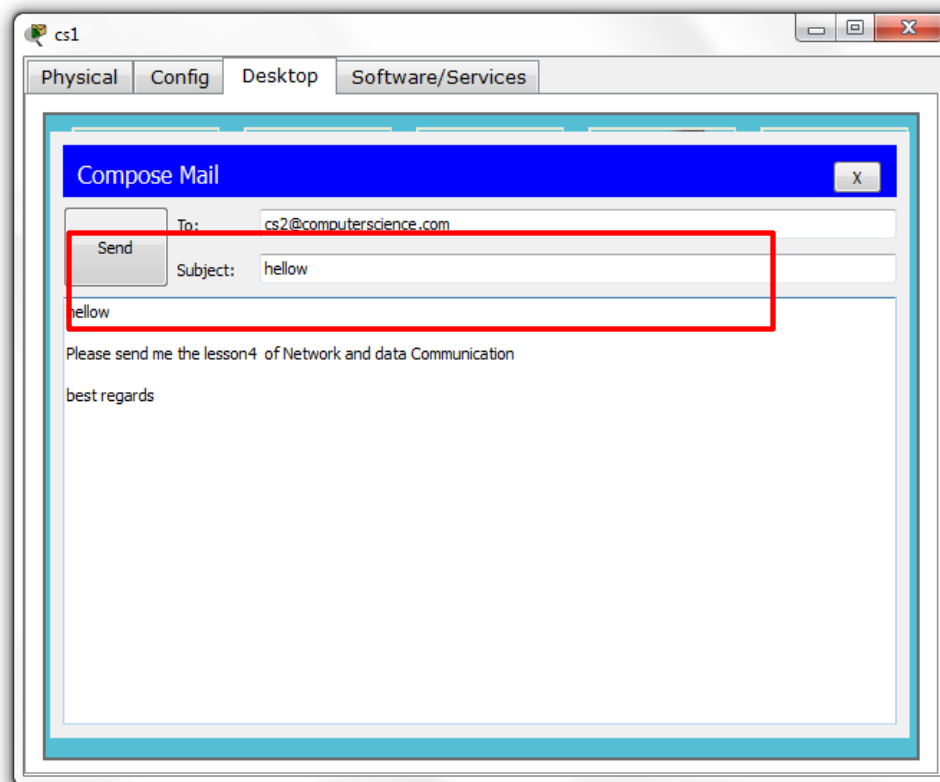
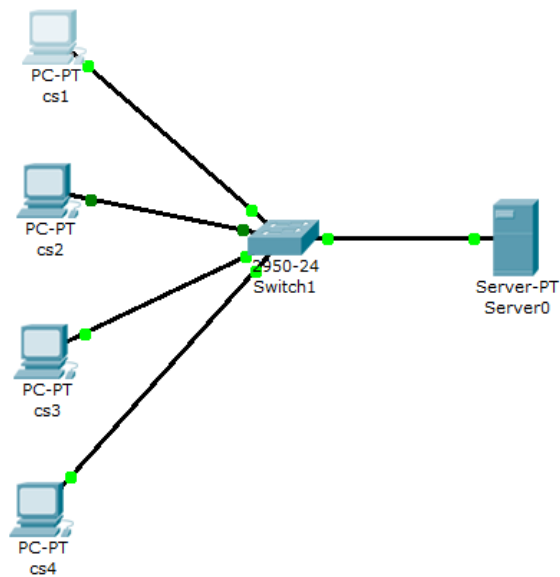




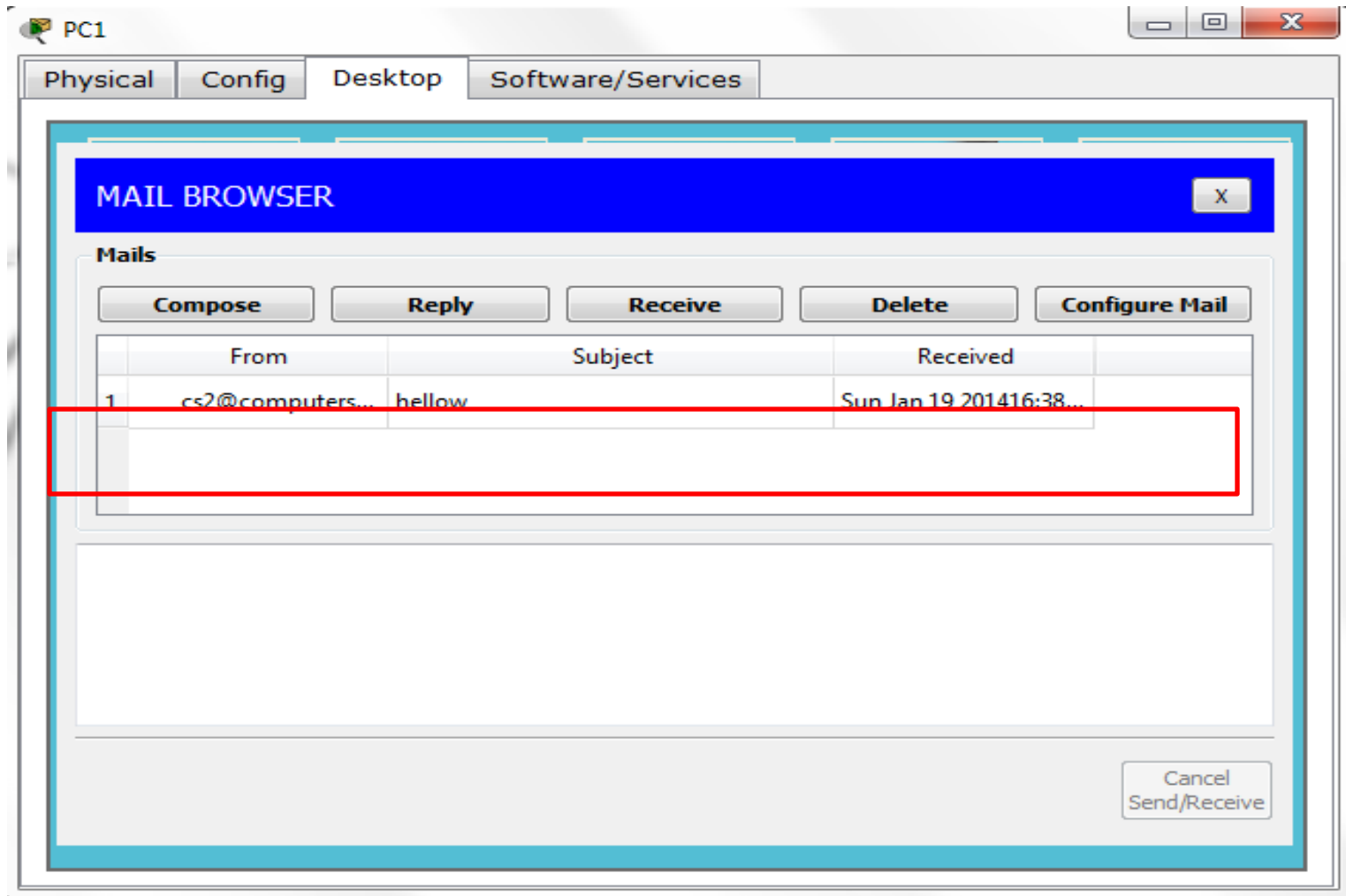
Logical

[Root]

New Cluster



Receive Email of cs1 from cs2



Task 11.2

Setup FTP server in Packet Tracer.

File Transfer Protocol

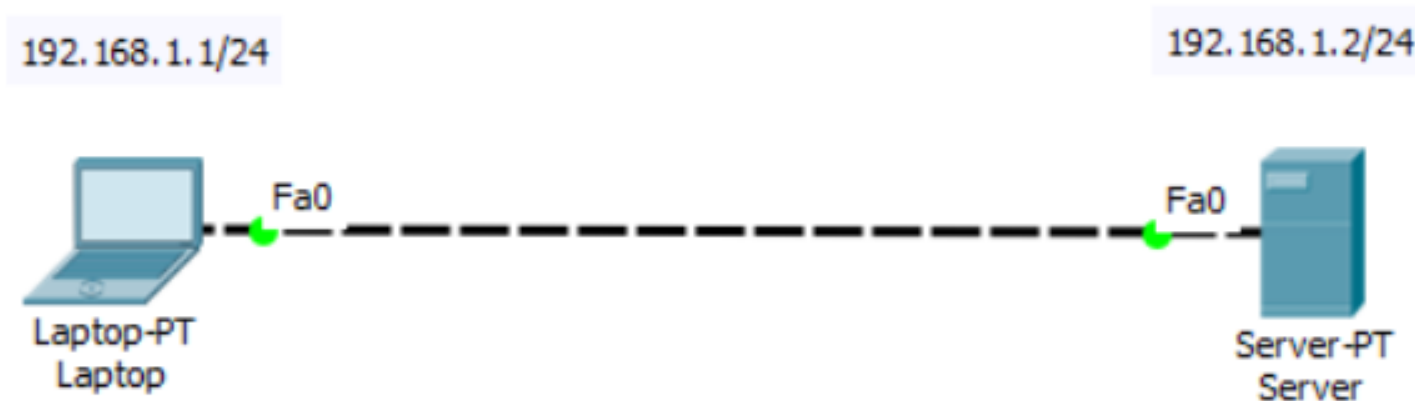
- The **File Transfer Protocol (FTP)** is a standard network protocol used for the transfer of computer files between a client and server on a computer network.
- FTP employs a **client-server** architecture whereby the client machine has an **FTP client** installed and establishes a connection to an **FTP server** running on a remote machine. After the connection has been established and the user is successfully authenticated, the data transfer phase can begin.
- Although FTP does support **user authentication**, all data is sent in clear text, including usernames and passwords. For **secure** transmission that protects the username and password, and encrypts the content, FTP is often secured with [SSL/TLS \(FTPS\)](#) or replaced with [SSH File Transfer Protocol \(SFTP\)](#).

File transfer protocol server configuration

Objectives:

- To Configure FTP Services on Server.
- To Upload a File into the FTP Server from Remote PC.
- To Download a File from the FTP Server from Remote PC.

1. Build the network topology.



2. Configure static IP addresses on the Laptop and the server.

Laptop: IP address: 192.168.1.1 Subnet Mask: 255.255.255.0

Server: IP address: 192.168.1.2 Subnet Mask: 255.255.255.0

Checking connections from PC0 to the server0 in the network using ping Command in Command Prompt.

3. Configure FTP in the server.

- Go to services and open FTP Service.
- Go to user setup and create a username (pvpsit) and password (pvpsit).
- Select all the permissions (Write, Read, Delete, Rename, List) and add the user.

User setup:

The screenshot shows the 'Server0' configuration window with the 'Services' tab selected. The 'FTP' service is configured with the 'Os' protocol. In the 'User Setup' section, the 'Username' is 'vinayedula' and the 'Password' is 'vinay'. All permissions (Write, Read, Delete, Rename, List) are checked. A table below lists the configured users:

	Username	Password	Permission
1	cisco	cisco	RWDNL
2	vinayedula	vinay	RWDNL

Buttons for 'Add', 'Save', and 'Remove' are on the right. Below the table, a 'File' list shows several files, including '1.txt' and various binary files.

4. Connect the FTP server from Laptop

- From the Laptop's command prompt, FTP the server using the server IP address by typing:

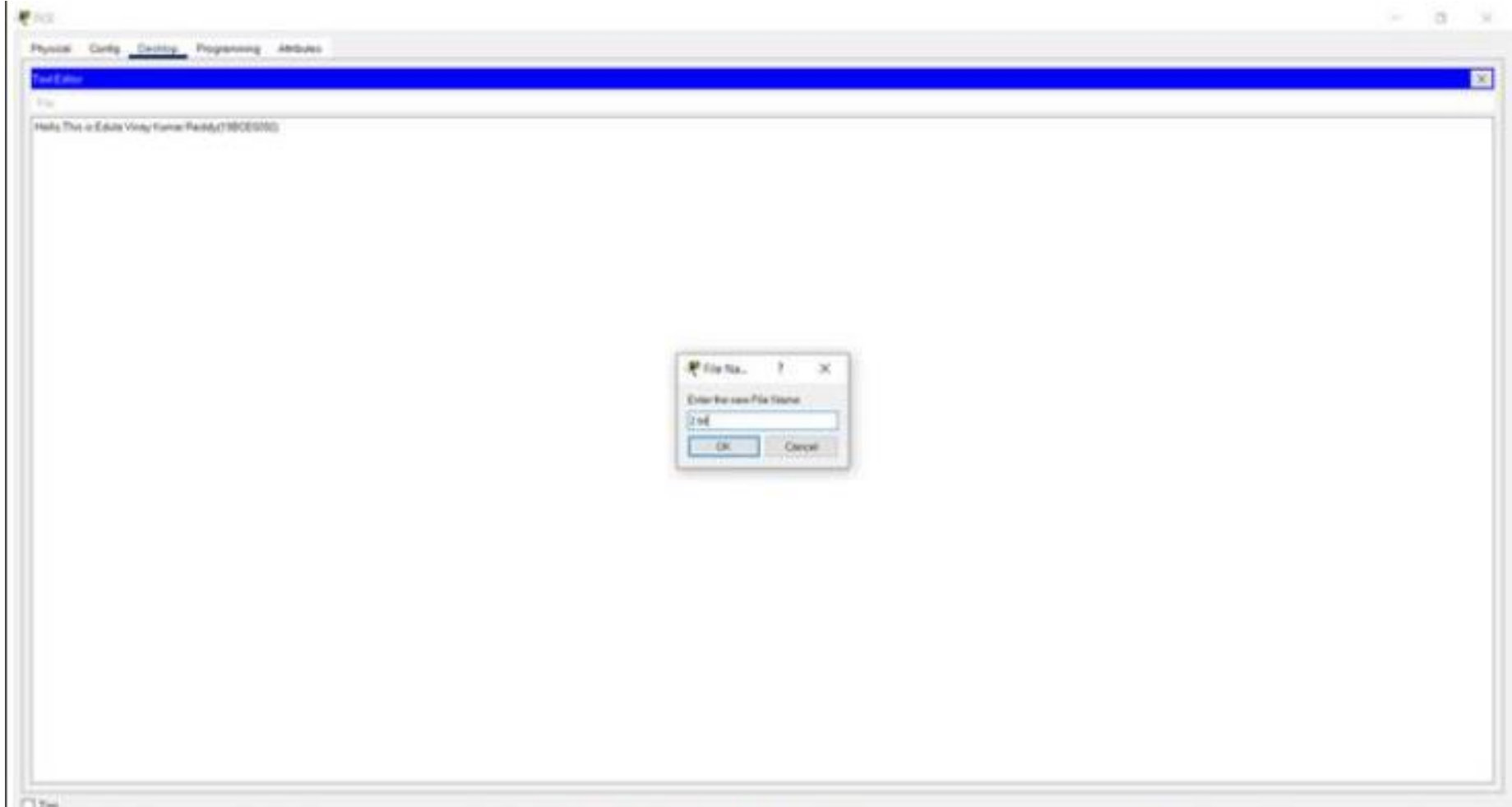
ftp 192.168.1.2

- Provide the **username(pvpsit)** and **password(pvpsit)** for ftp login.
- You are now in the FTP prompt .

```
C:\>
C:\>ftp 192.168.1.2
Trying to connect...192.168.1.2
Connected to 192.168.1.2
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>
```

5. Create a file in the Laptop then upload it to the server using FTP.

- Open the **Text Editor** in the Laptop, create a file and give it your name of choice.
- Type any text in the editor then **save** your file. e.g. myFile.txt.



6. Now upload the file from the Laptop to the server using FTP
(An FTP connection has to be started first. But this is what we've done in step 4)

So to do an FTP upload, we'll type:

put MyFile.txt

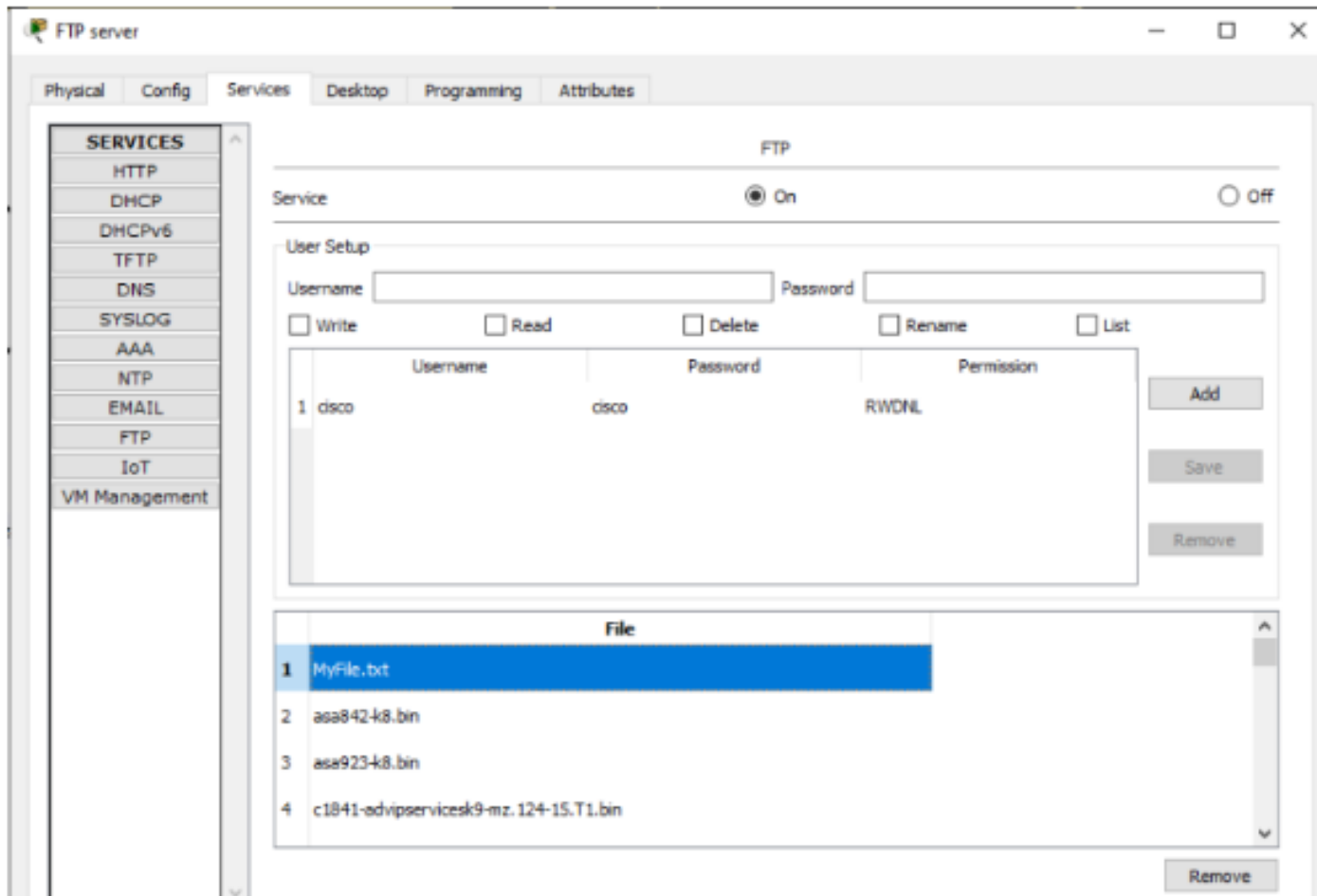
```
ftp>
ftp>put MyFile.txt

Writing file MyFile.txt to 192.168.1.2:
File transfer in progress...

[Transfer complete - 47 bytes]

47 bytes copied in 0.023 secs (2043 bytes/sec)
ftp>
```

7. Once file upload is successful, go to the Server FTP directory to verify if the file sent has been received . To do this, go to **Server->Services->FTP**. Here look for **MyFile.txt** sent from the laptop.



To check **other FTP commands** supported by the FTP client running on the Laptop(or PC), you can use a question mark (?) on the Laptop's command prompt as shown below:

```
ftp> ?  
?  
cd  
delete  
dir  
get  
help  
passive  
put  
pwd  
quit  
rename
```

get—used to get(download) a file from the server.

For example: get MyFile.txt

delete— to delete a file in the FTP directory with the server

For example: delete MyFile.txt

Rename— used to Rename a file

- **cd** – used to change directory.
- For example, we can open an **HTTP directory** in the server by typing: **cd /http**.
- This will change the current directory from FTP directory to HTTP directory
- Once the http directory is open, you can upload a file to the HTTP server.
- You're now uploading a file to an HTTP folder(directory) using FTP.
- For example: **put MyFile.txt**
- let's **open** an **HTTP directory** and upload(**put**) a file to it using FTP:

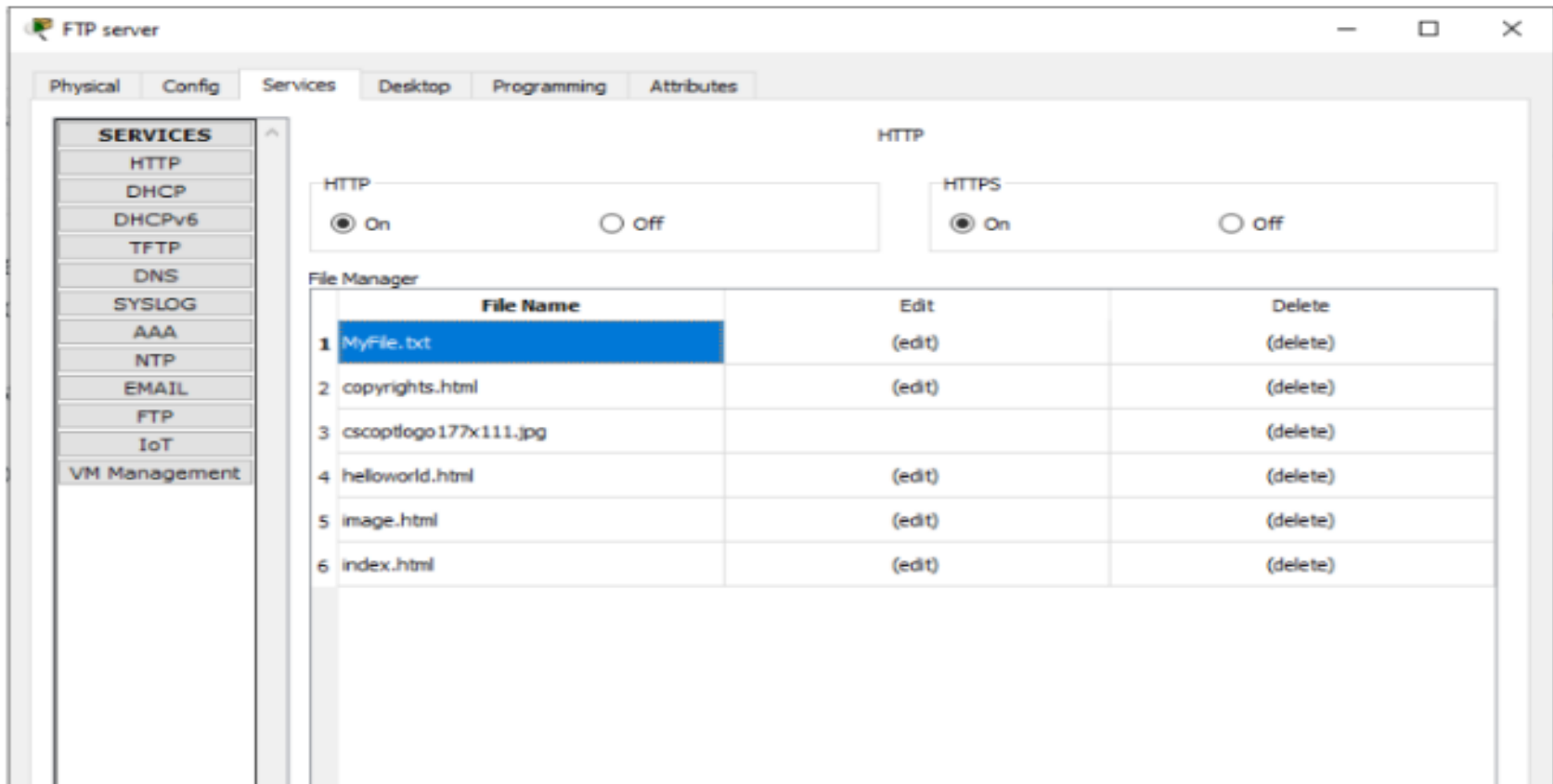
```
ftp>cd /http
ftp>
Working directory changed to /http successfully
ftp>put MyFile.txt

Writing file MyFile.txt to 192.168.1.2:
File transfer in progress...

[Transfer complete - 47 bytes]

47 bytes copied in 0.01 secs (4700 bytes/sec)
```


You can now check up in the **HTTP directory** in the server and verify that the file uploaded from the Laptop(MyFile.txt) is well received:

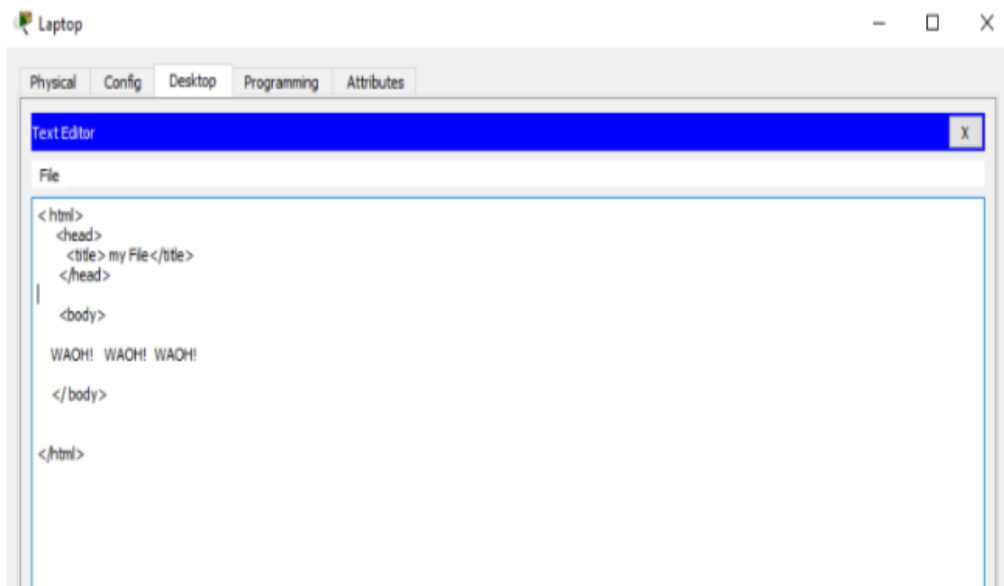


Notice that we are uploading files to an HTTP Server directory using File Transfer Protocol.

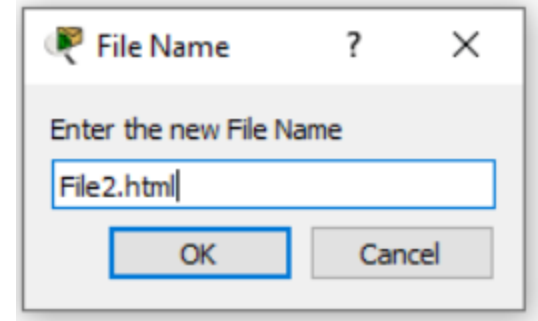
This is what actually happens when you use an **FTP client** such as **FileZilla** client to upload files to a website. In our case here, we are using an FTP client **built-in** the Laptop.

Task-1 **create** an html file in our Laptop, **upload** it to HTTP server directory using FTP, then try to **access** the file from the Laptop's browser.

On the Laptop, open the **text editor**, then type some markup(html) and save the file with the extension *.html*. See all this below:



Save your file as an html file like this:

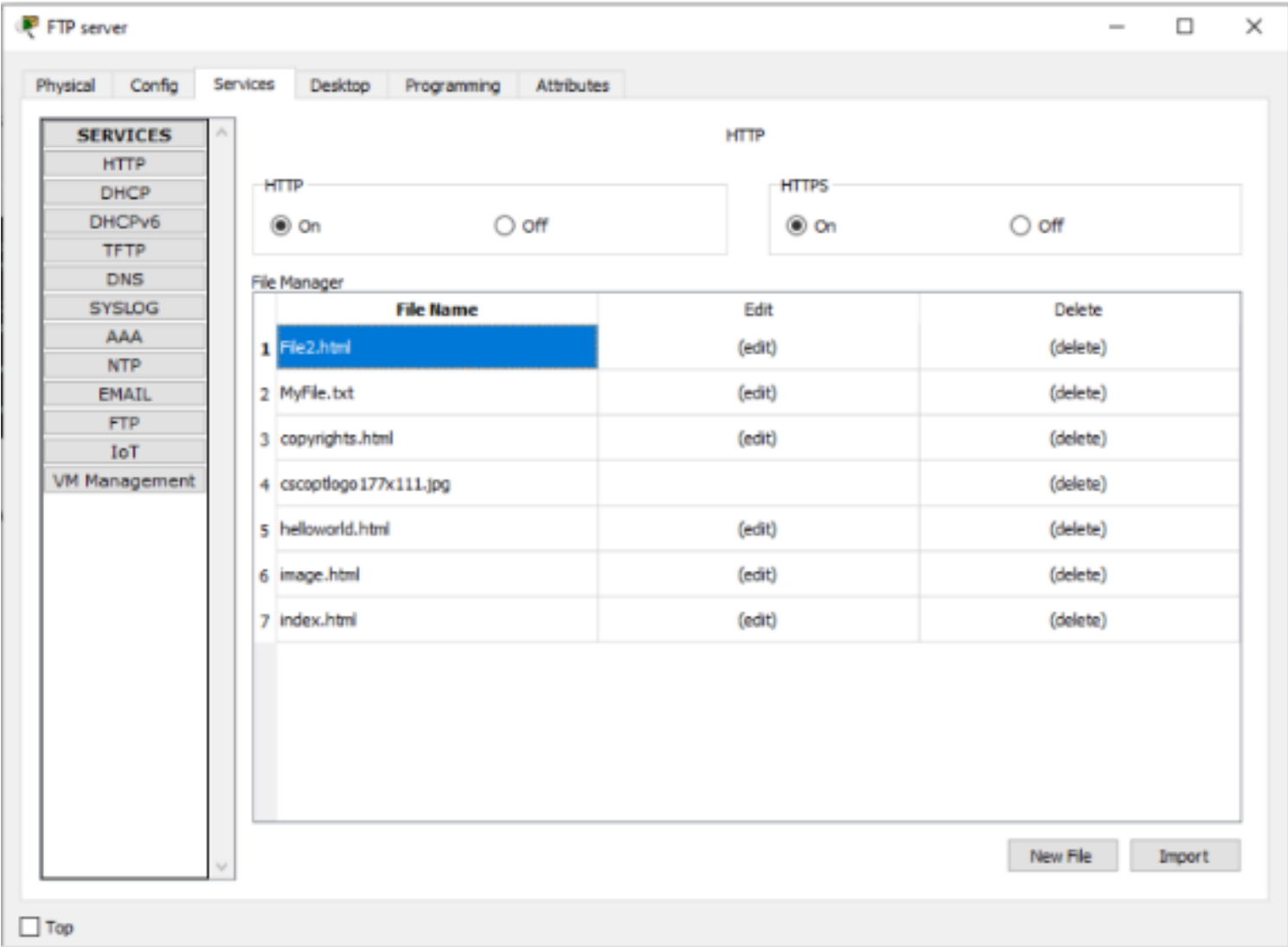


Now upload the file(File2.html) to the HTTP server using FTP.

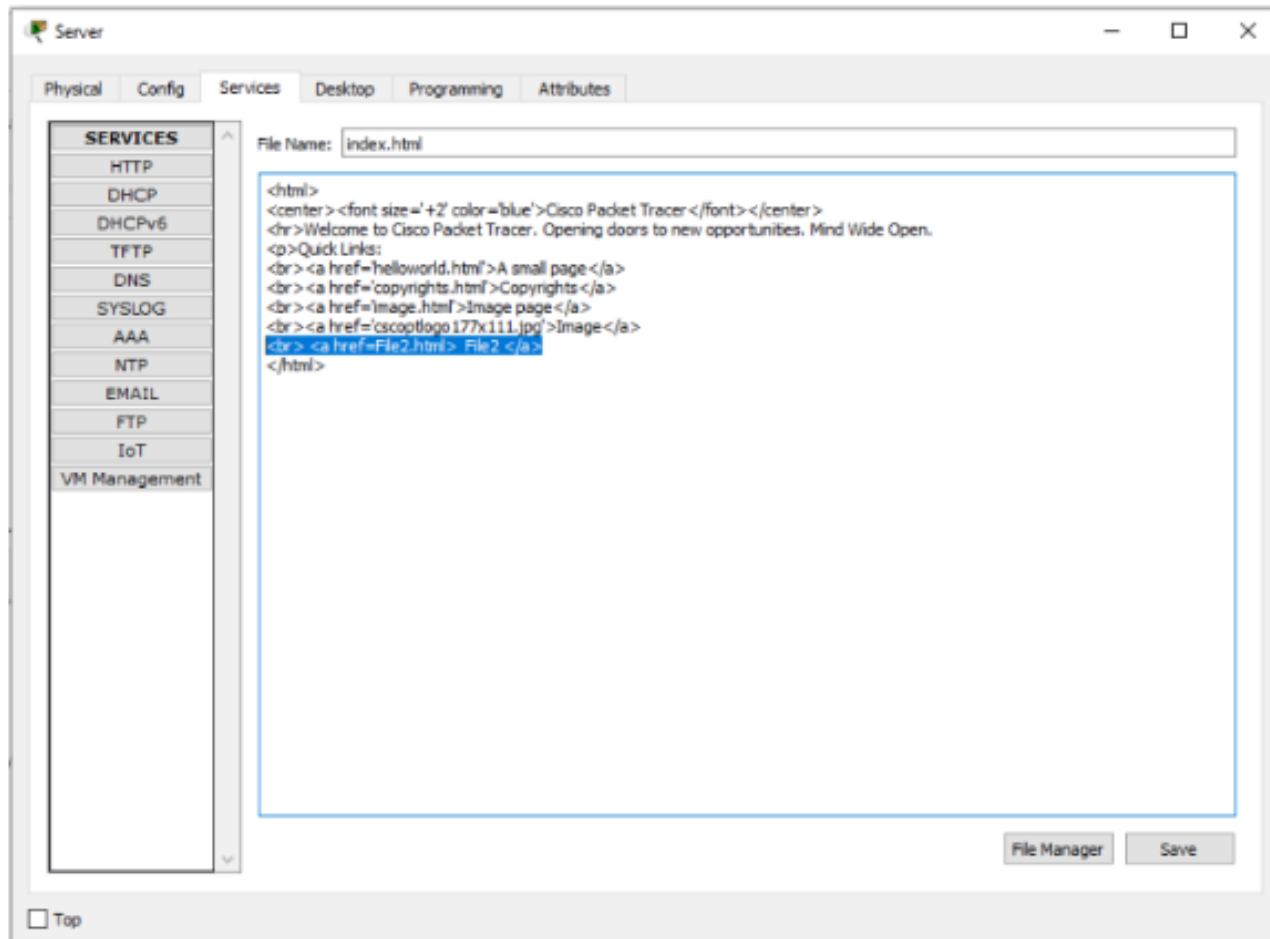
If you're already in the HTTP directory, you just need to type: **put File2.html**.

If no, first ftp the server(**ftp 192.168.1.2**), provide the login username(pvpsit) and password(pvpsit); change the current directory to HTTP(**cd /http**) , and finally upload the html file onto the HTTP directory(**put File2.html**)

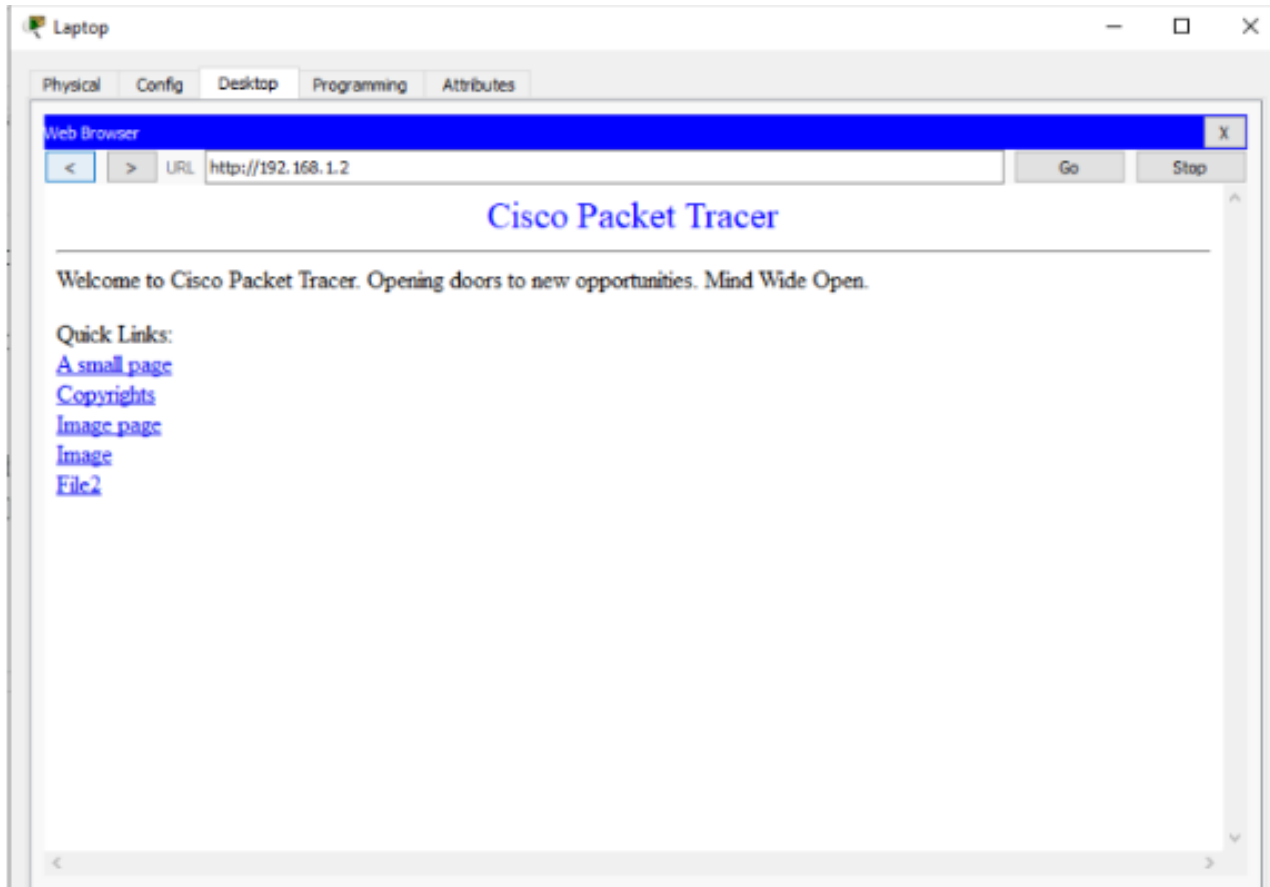
Check whether the html file uploaded has been received in the HTTP directory:
Go to **Server->Services-> HTTP**. Then look up for the file in the File Manager.



- Now edit index.html file in the **HTTP directory** so as to include a link to File2 that we've just uploaded.
- This will make File2 accessible from the Laptop's browser.
- To do this, locate index.html then click **edit**.
- Proceed to edit it as shown below.
- Then **save** and accept overwrite.

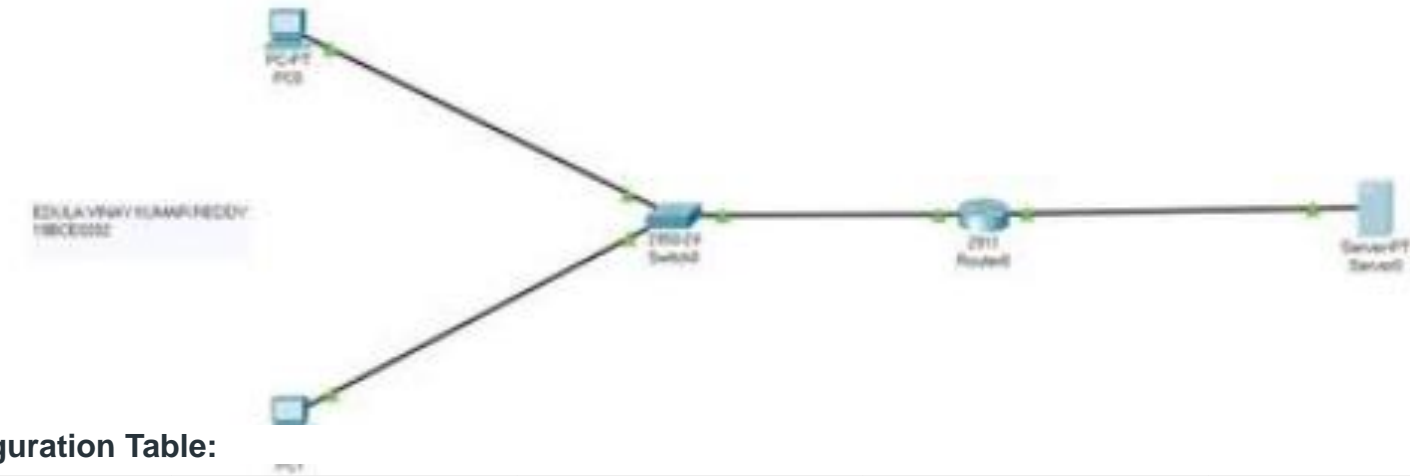


- Finally, try to access the newly uploaded file from the Laptop's browser.
- So go to the Laptop's browser and access the server using the server's IP address.
- By doing this, the browser is making an http request to the server.
- The server will respond to the Laptop with the index.html file containing a **link** to File2 which we've uploaded from the Laptop using FTP.



Click **File2** link to view the contents of the file in the browser.

Task of FTP



Router Configuration Table:

Device Name	IP address GigabitEthernet0/0	Subnet Mask	IP Address GigabitEthernet0/1	Subnet Mask
2911 Router0	192.168.1.1	255.255.255.0	10.0.0.1	255.255.255.0

PC Configuration Table:

Device Name	Device Type	IP address	Subnet Mask	Default Gateway
PC 0	PC-PT	192.168.1.2	255.255.255.0	192.168.1.1
PC 1	PC-PT	192.168.1.3	255.255.255.0	192.168.1.1

Telnet and SSH

What is Telnet?

- Telnet is a protocol that allows you to connect to remote computers (called hosts) over a TCP/IP network.

What is SSH?

- SSH is a secure remote login protocol. The major difference between ssh and other remote login programs is that ssh encrypts the password and other information so that it can't be "sniffed" by others as you type it.

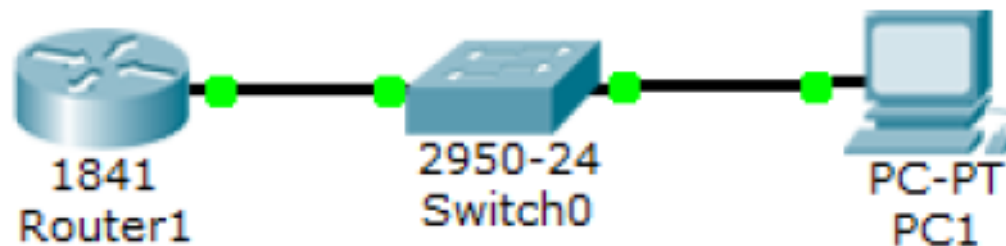
How do we enable Telnet and SSH?

- To enable telnet, we start configuring VTY ports. VTY ports are specifically virtual not physical ports used for remote access using Telnet or SSH.

Telnet VS. SSH:

- 1. SSH and Telnet commonly serves the same purpose
- 2. SSH is more secure compared to Telnet
- 3. SSH encrypts the data while Telnet sends data in plain text
- 4. SSH uses a public key for authentication while Telnet does not use any authentication
- 5. SSH adds a bit more overhead to the bandwidth compared to Telnet.
- 6. Telnet has been all but replaced by SSH in almost all uses.

Configuring Telnet



Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.0.245	/24	N/A
PC1	NIC	192.168.0.15	/24	192.168.0.245

NOTE: Keep the CLI screen and the command terminal screen opened !

1. Draw the above network in packet tracer and configure it with the addresses.
2. Open the Router's CLI and write the following lines to enable the telnet protocol.

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#line vty 0 4
```

* Configuring hostname is mandatory in enabling SSH and Telnet.

3. Now open the PC's terminal and write the following lines to (We will try to remotely access the router from the PC using the telnet protocol):

```
PC>telnet 192.168.0.245
Trying 192.168.0.245 ...Open
[Connection to 192.168.0.245 ...closed by foreign host]
```

Are you able to access the router? [yes/no]

4. Go back to R1's CLI and write the following code to set Line connection password (password for remote access Telnet):

```
R1 (config-line)#password cisco
```

5. Return back to the PC's terminal and try accessing R1 again:

```
PC>telnet 192.168.0.245
Trying 192.168.0.245 ...Open
User Access Verification
Password:
R1>
R1> enable
% No password set.
R1>
```

Are you able to access the router now? [yes/no]

Are you able to reach the configuration mode of R1? [yes/no]

Go back to R1's CLI and write the following code to set R1's Global Configuration mode password:

```
R1 (config)# enable secret ct1306
```

6. Return back to the PC's terminal and try accessing R1 again:

```
PC>telnet 192.168.0.245
Trying 192.168.0.245 ...Open
User Access Verification
Password:
R1>
R1> enable
R1#
```

Now you will gain full access to R1's router and you can configure it completely from PC1

To exit from the telnet access to R1 simply writes the following line:

```
R1#exit
R1>exit

PC1>
```

Configuring SSH



Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	10.0.0.1	/8	N/A
PC1	NIC	10.0.0.2	/8	10.0.0.1

1. Draw the above network in packet tracer and configure it with the addresses.
2. Open the Router's CLI and write the following lines to enable the SSH protocol.

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#ip domain-name example.com
R1(config)#crypto key generate rsa
How many bits in the modulus [512]: 800
R1(config)#username ct1306 password 855
R1(config)#ip ssh time-out 30
```

```
R1(config)#ip ssh authentication-retries 5
R1(config)#line vty 0 4
R1(config-line)#transport input ssh
R1(config-line)#login local
R1(config-line)# exit
```

3. Now open the PC's terminal and write the following lines to (We will try to remotely access the router from the PC using the ssh protocol): use the password that has been set to the ssh connection (855)

```
PC>ssh -l ct1306 10.0.0.1
Open
Password:

R1>enable
%No password set.
R1>
```

Are you able to access the router? [yes/no]

Are you able to reach the configuration mode of R1? [yes/no]

4. Go back to R1's CLI and write the following code to set R1's Global Configuration mode password:

```
R1 (config)# enable secret ex4
```

5. Return back to the PC's terminal and try accessing R1 again, use the password that has been set for the Router's Global Configuration (ex4)

```
PC>ssh -l ct1306 10.0.0.1
Open
Password:

R1>enable
R1#
```

Now you will gain full access to R1's router and you can configure it completely from PC1

END of EXP-11