

EE-424L Data Communication & Networking Fall 2024

Habib University

Dhanani School of Science & Engineering



LAB 3: Configuration and Validation of Key Network Servers

Lab #3 Marks distribution:

		LR2=30	LR5=40	LR9=10	AR4=20
In-Lab Tasks	Task 1	/5	/10	/10	/20
	Task 2	/5	/10		
	Task 3	/10	/10		
	Task 4	/10	/10		
Total Marks	100 /100				

Objectives

The objective of this lab is to configure and verify the functionality of various network servers, including SMTP (Simple Mail Transfer Protocol), FTP (File Transfer Protocol), HTTP (Hypertext Transfer Protocol), and DNS (Domain Name System). Students will learn how to set up each server, configure essential settings, test server operations, and troubleshoot common issues to ensure proper communication and data transfer across the network.

Introduction

1. SMTP

Simple Mail Transfer Protocol (SMTP) is the standard for email transmission across the Internet. SMTP is a relatively simple, text-based protocol, where one or more recipients of a message are specified (and in most cases verified to exist) and then the message text is transferred. It is quite easy to test a SMTP server using the telnet program.

2. FTP

FTP or file transfer protocol is a protocol used for exchanging files over the Internet. FTP works in the same way as HTTP for transferring Web pages from a server to a user's browser, and SMTP for transferring electronic mail across the Internet in that FTP uses the Internet's TCP/IP protocols to enable data transfer. FTP is most commonly used to download a file from a server using the Internet or to upload a file to a server (e.g., uploading a Web page file to a server).

3. HTTP

Hypertext Transfer Protocol (HTTP) is the primary method used to convey information on the World Wide Web. The original purpose was to provide a way to publish and receive HTML pages.

4. DNS

The Domain Name System (DNS) is a system that stores information associated with domain names in a distributed database on networks, such as the Internet. The domain name system associates many types of information with domain names, but most importantly, it provides the IP address associated with the domain name. It also lists mail exchange servers accepting e-mail for each domain. DNS is useful for several reasons. Most well-known, the DNS makes it possible to attach hard-to-remember IP addresses (such as 207.142.131.206) to easy-to-remember domain names (such as "wikipedia.org.")

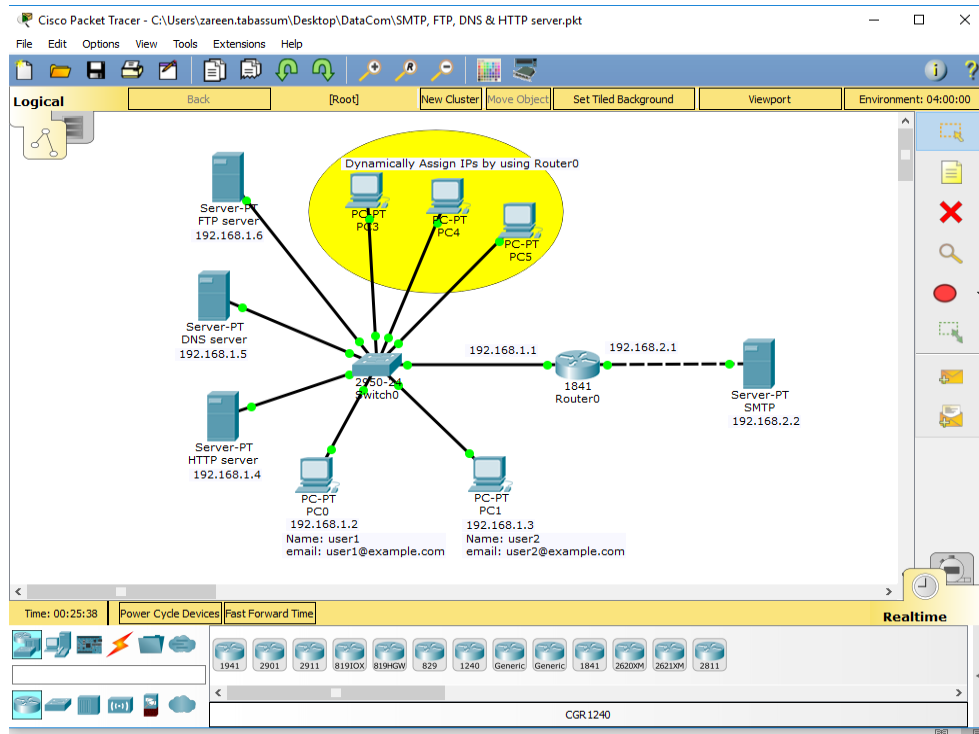
Task 1: SMTP Server

[15]

Building the Topology

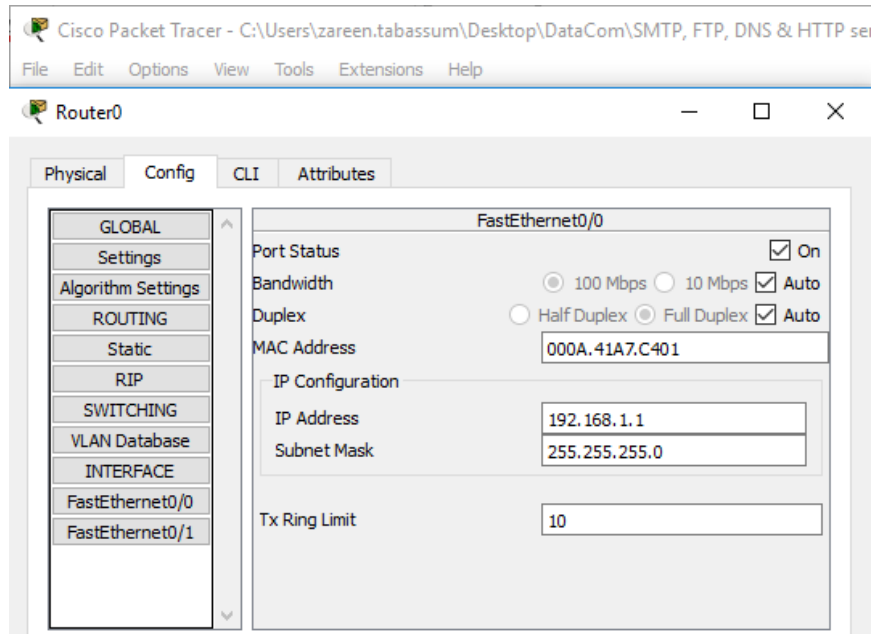
1. Move the devices (5 PCs, 4 servers, 1 switch and 1 router) into Topology area.
2. Select the appropriate connection type and connect them.
3. Re-write the server names and mention IPs as shown in below topology diagram.



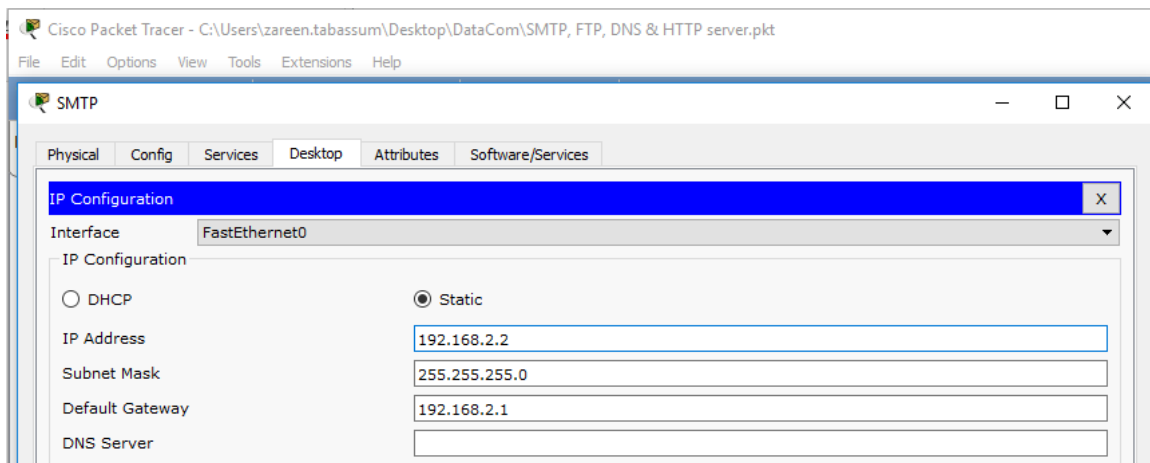


Steps:

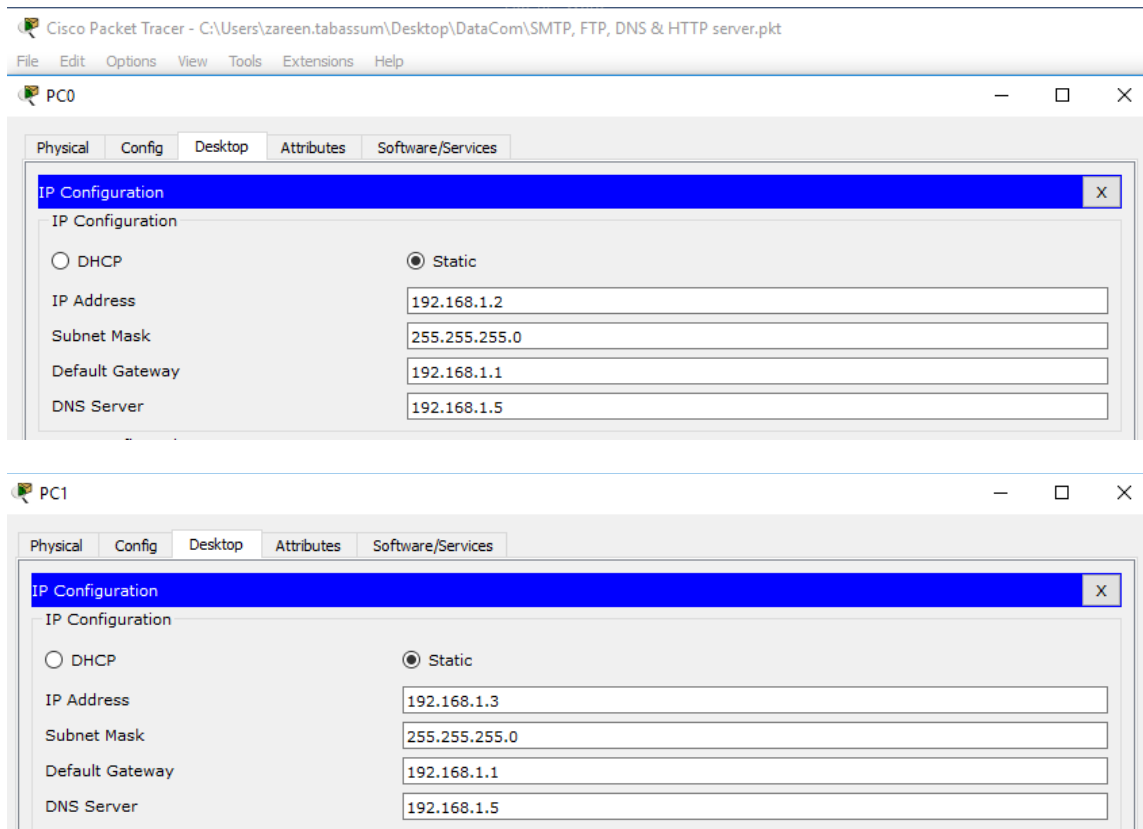
1. Check the router interface and assign IP and subnet mask 192.168.2.1/24 to router's interface i.e. connected with server. Similarly, assign 192.168.1.1/24 to router's interface i.e. connected with switch.



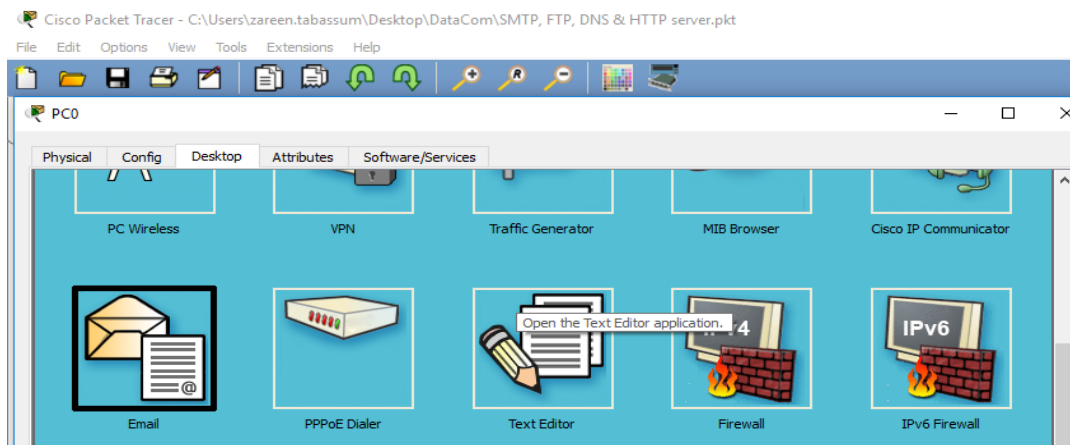
2. Click on SMTP server and assign below mentioned values.



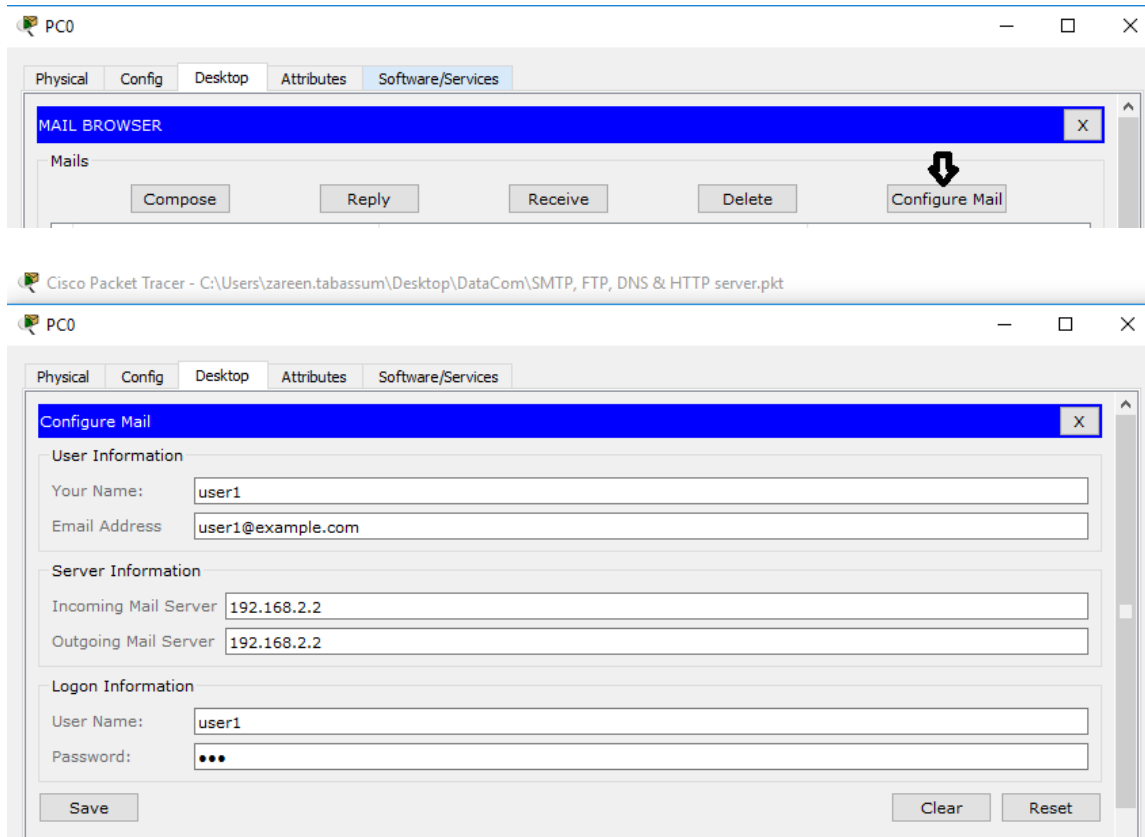
3. Go to services in SMTP server and click on **Email service**. "ON" SMTP and POP3 service. Write "example.com" in domain name and press set button.
4. Add two users in user setup.
 - User:** user1
 - Password:** 123 and click on "+" button.
 - User:** user2
 - Password:** 123 and click on "+" button.
5. Assign IPs to PC0 and PC1 as given below.



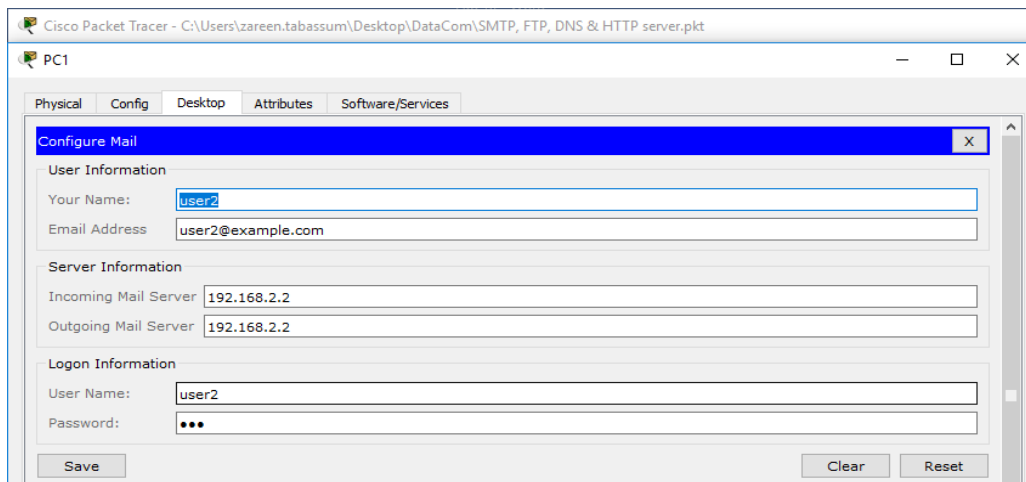
6. Now go to email in PC0 as given below.



7. Click on email and go to configure email. Fill the name, email address, server information and login information as mentioned below and save it.

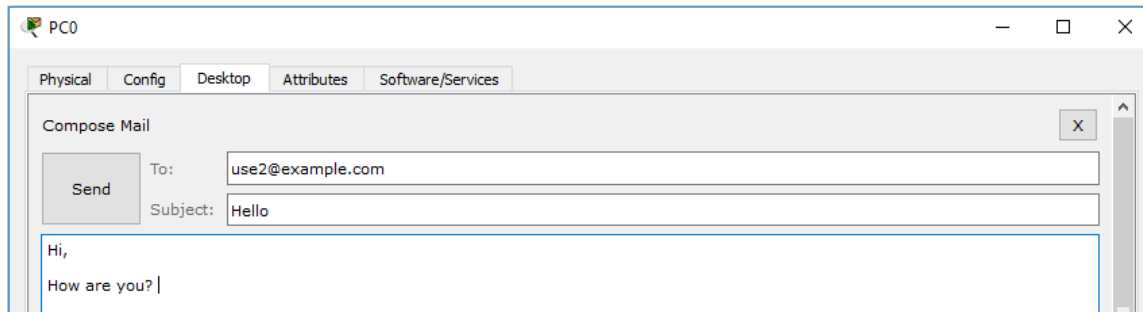
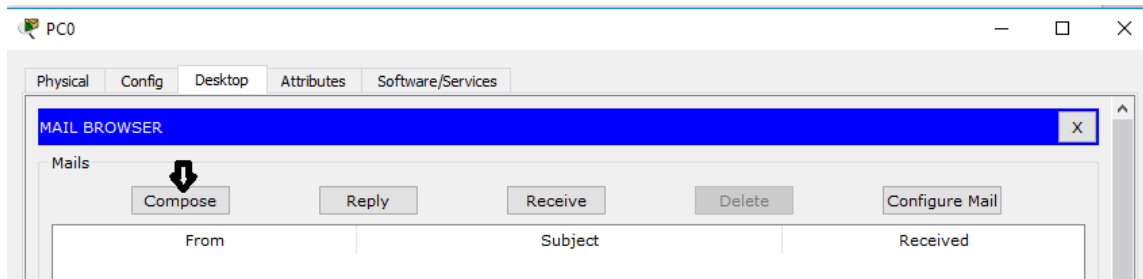


Do the same for PC1.



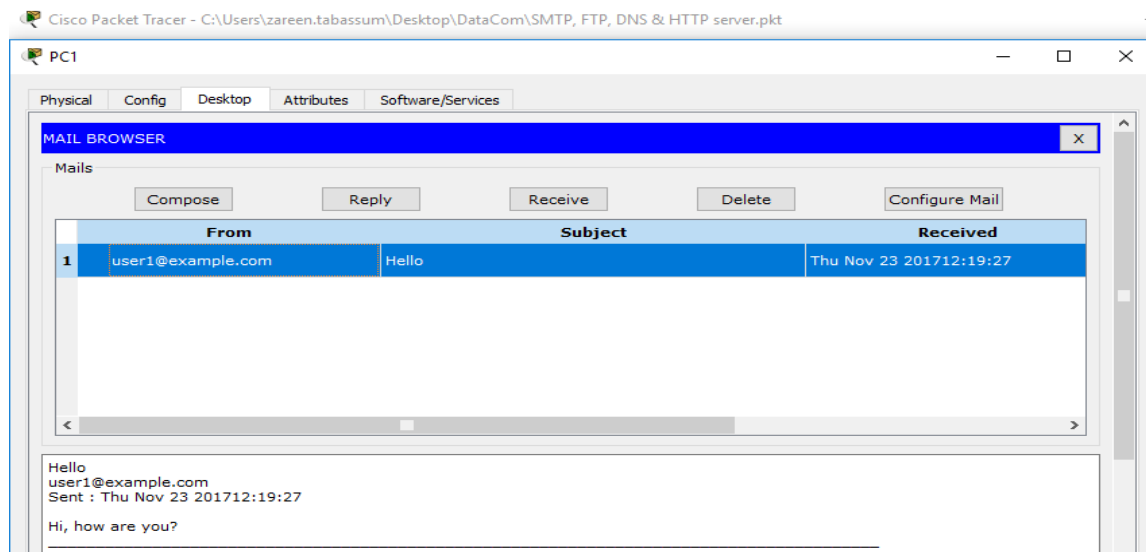
8. Now compose an email by again click on PC0 and go to email and then press compose button.





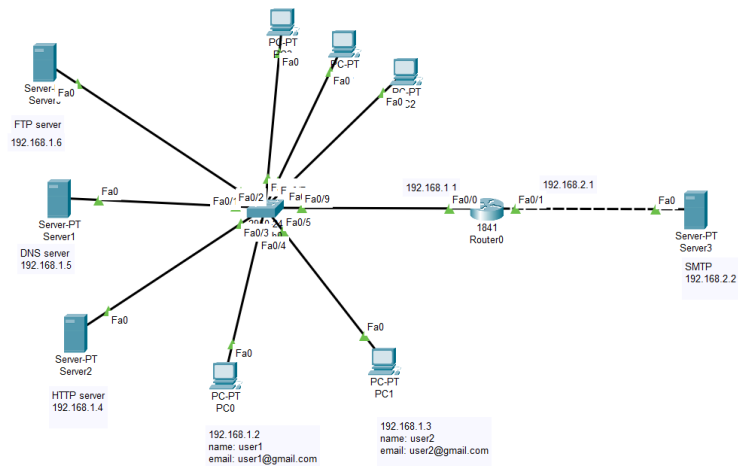
Send the email to user 2.

9. Check the email on PC1 by clicking on email and press receive button.

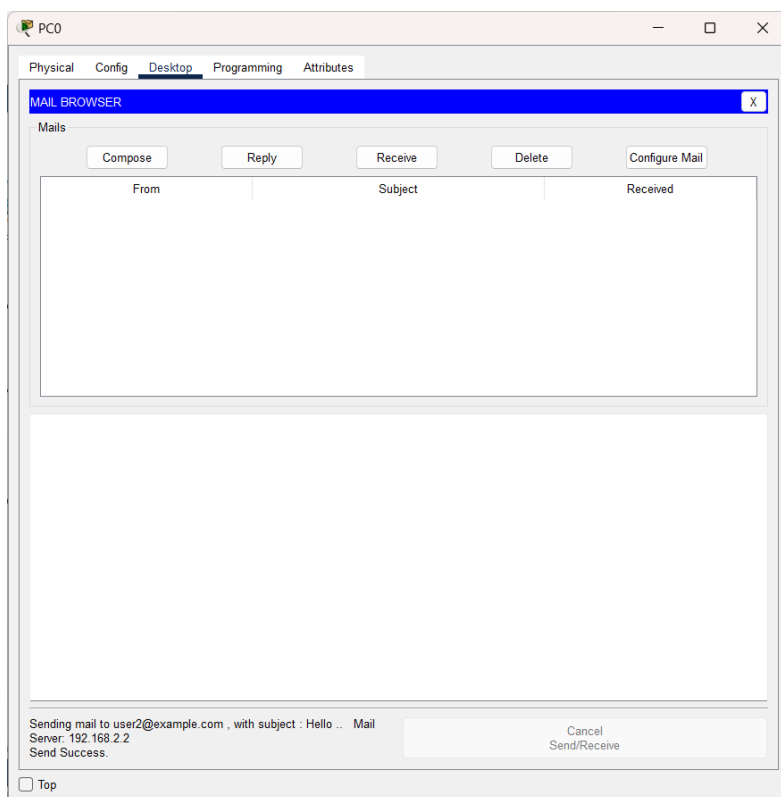


PC1 received an email from user1. Reply on this email and check on PC0 whether you receive reply from user2 or not. **Attach the screenshot of email sent and received.**

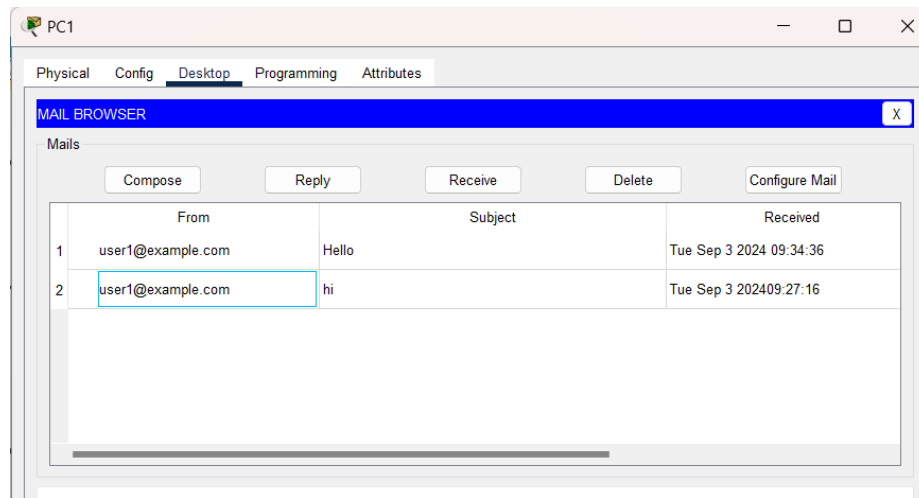
Topology:



Email sent:



Email received:

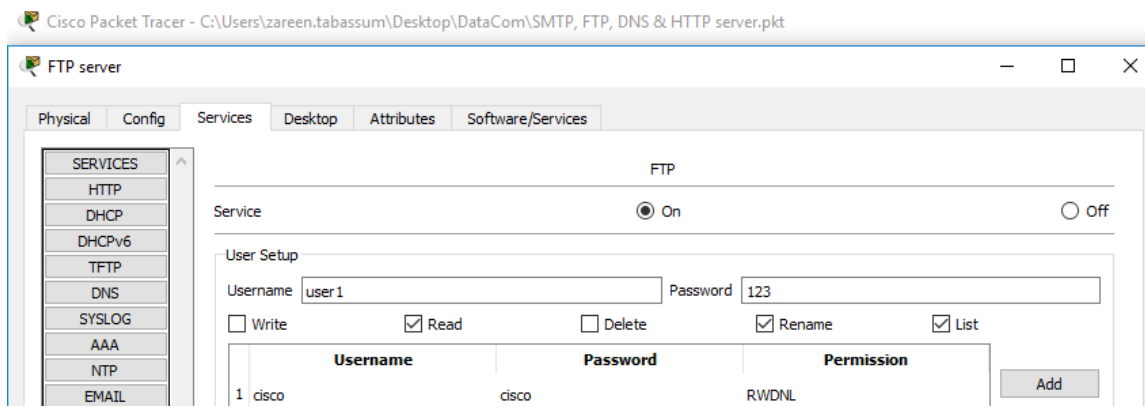


Task 2: Configure FTP server

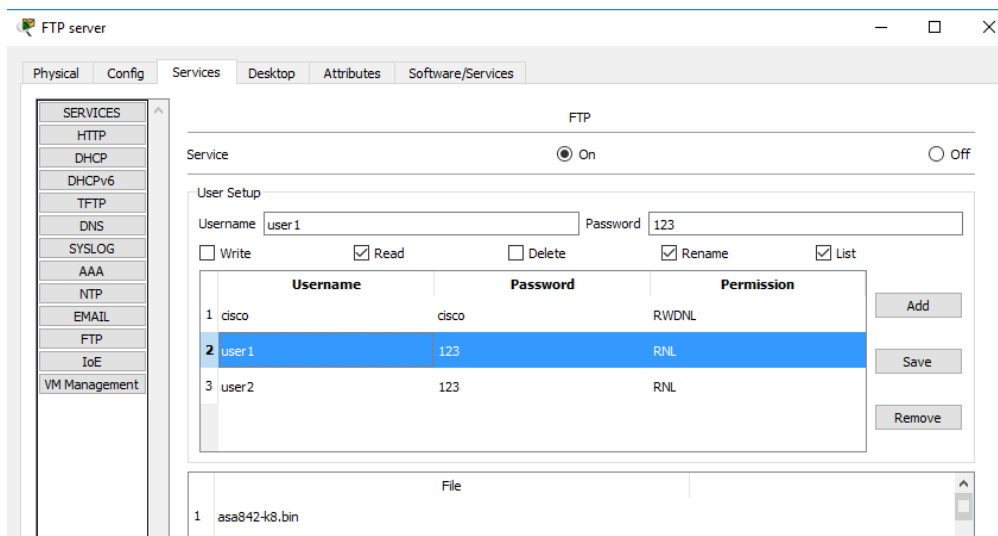
[15]

Steps:

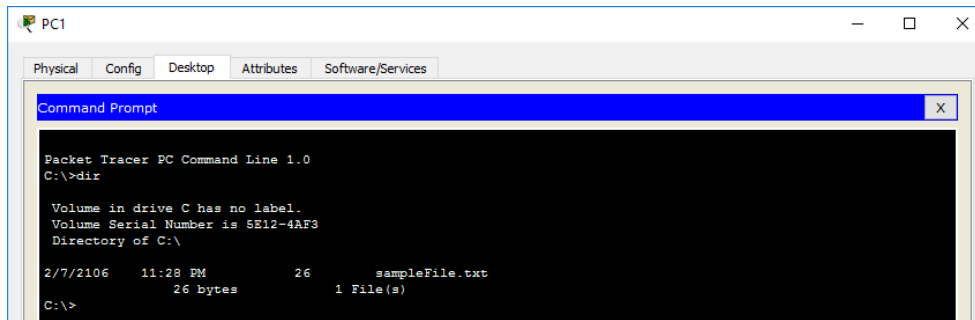
1. Click on FTP server and do the following configuration on FTP server (assign IP, subnet mask, gateway and DNS server) as shown in topology in task 1.
2. Go to services in FTP server and click on FTP service from left side. “ON” the FTP service.
3. Add user name (user1) and their password in User Setup. Check on Read, Rename and list and click on Add.



Similarly, add user2.



4. Open the command prompt on PC1. Check the directory of C using **dir**. Currently there is only file present in it as shown below.



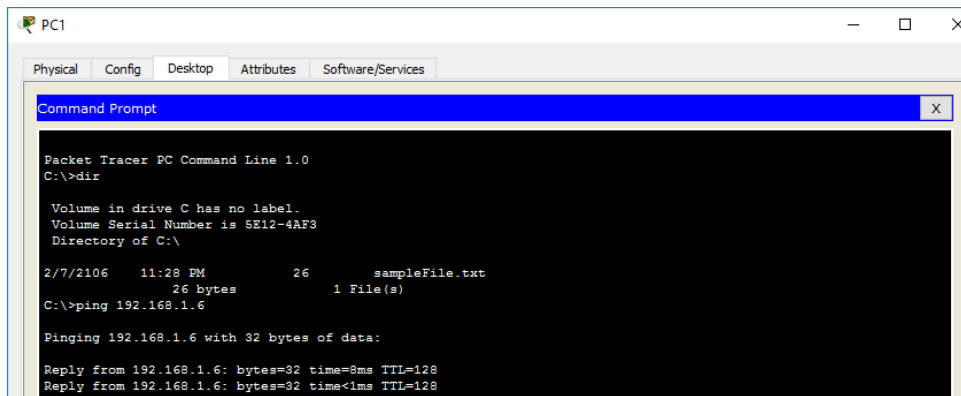
```
Packet Tracer PC Command Line 1.0
C:\>dir

Volume in drive C has no label.
Volume Serial Number is 5E12-4AF3
Directory of C:\

2/7/2106  11:28 PM           26      sampleFile.txt
                26 bytes          1 File(s)

C:\>
```

5. Ping FTP server (192.168.1.6) from PC1.



```
Packet Tracer PC Command Line 1.0
C:\>dir

Volume in drive C has no label.
Volume Serial Number is 5E12-4AF3
Directory of C:\

2/7/2106  11:28 PM           26      sampleFile.txt
                26 bytes          1 File(s)

C:\>ping 192.168.1.6

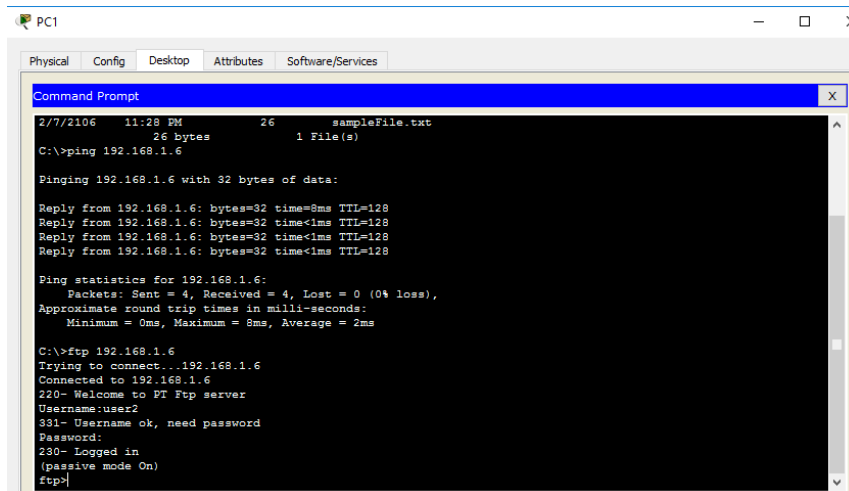
Pinging 192.168.1.6 with 32 bytes of data:

Reply from 192.168.1.6: bytes=32 time=8ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>
```

6. Type ftp 192.168.1.6. Enter user name (user2) and password (123).



```
2/7/2106  11:28 PM           26      sampleFile.txt
                26 bytes          1 File(s)

C:\>ping 192.168.1.6

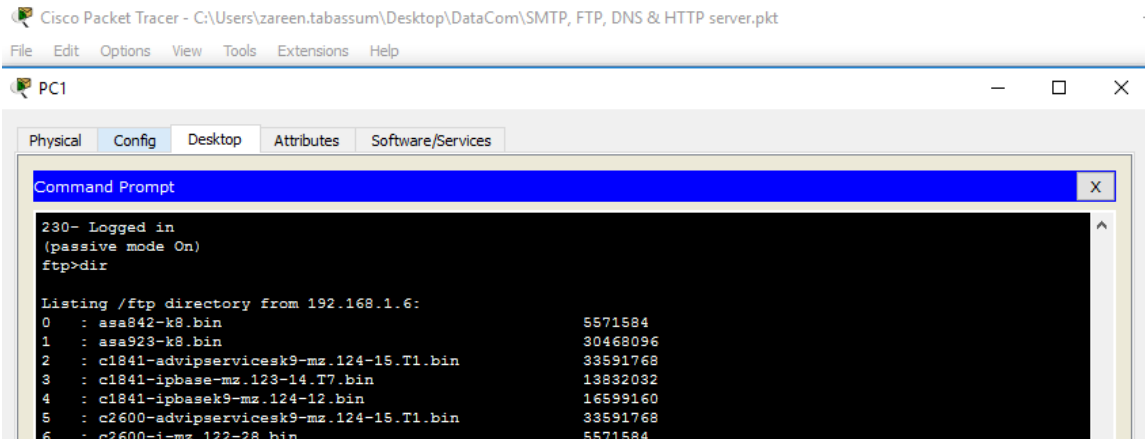
Pinging 192.168.1.6 with 32 bytes of data:

Reply from 192.168.1.6: bytes=32 time=8ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 8ms, Average = 2ms

C:\>ftp 192.168.1.6
Trying to connect...192.168.1.6
Connected to 192.168.1.6
220- Welcome to FT Ftp server
Username:user2
331- Username ok, need password
Password:
230- Logged in
      (passive mode On)
ftp>
```

7. Write dir to check ftp directory from 192.168.1.6.



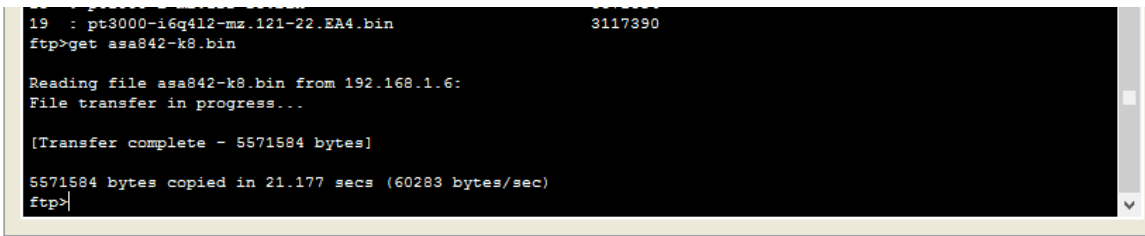
```
Cisco Packet Tracer - C:\Users\zareen.tabassum\Desktop\DataCom\SMTP, FTP, DNS & HTTP server.pkt
File Edit Options View Tools Extensions Help

PC1
Physical Config Desktop Attributes Software/Services

Command Prompt
230- Logged in
(passive mode On)
ftp>dir

Listing /ftp directory from 192.168.1.6:
0 : asa842-k8.bin 5571584
1 : asa923-k8.bin 30468096
2 : c1841-advipservicesk9-mz.124-15.T1.bin 33591768
3 : c1841-ipbase-mz.123-14.T7.bin 13832032
4 : c1841-ipbasek9-mz.124-12.bin 16599160
5 : c2600-advipservicesk9-mz.124-15.T1.bin 33591768
6 : c2600-i-mz.122-28.bin 5571584
```

Transfer file (asa842-k8.bin) present on top using **get asa842-k8.bin** command.



```
19 : pt3000-i6q412-mz.121-22.EA4.bin 3117390
ftp>get asa842-k8.bin

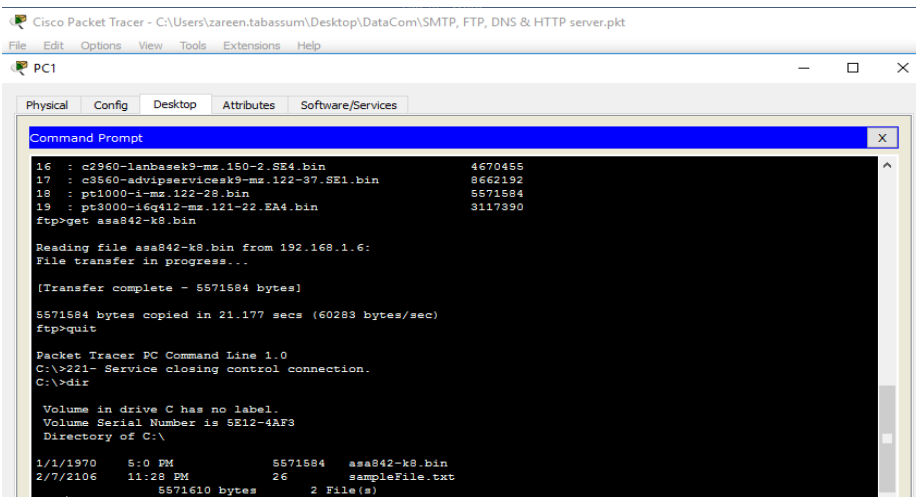
Reading file asa842-k8.bin from 192.168.1.6:
File transfer in progress...

[Transfer complete - 5571584 bytes]

5571584 bytes copied in 21.177 secs (60283 bytes/sec)
ftp>
```

End the session by using quit command.

8. File (asa842-k8.bin) is successfully transferred to PC1. Verify by using dir command.



```
Cisco Packet Tracer - C:\Users\zareen.tabassum\Desktop\DataCom\SMTP, FTP, DNS & HTTP server.pkt
File Edit Options View Tools Extensions Help

PC1
Physical Config Desktop Attributes Software/Services

Command Prompt
16 : c2960-lanbasek9-mz.150-2.SE4.bin 4670455
17 : c3560-advipservicesk9-mz.122-37.SE1.bin 8662192
18 : pt1000-i-mz.122-28.bin 5571584
19 : pt3000-i6q412-mz.121-22.EA4.bin 3117390
ftp>get asa842-k8.bin

Reading file asa842-k8.bin from 192.168.1.6:
File transfer in progress...

[Transfer complete - 5571584 bytes]

5571584 bytes copied in 21.177 secs (60283 bytes/sec)
ftp>quit

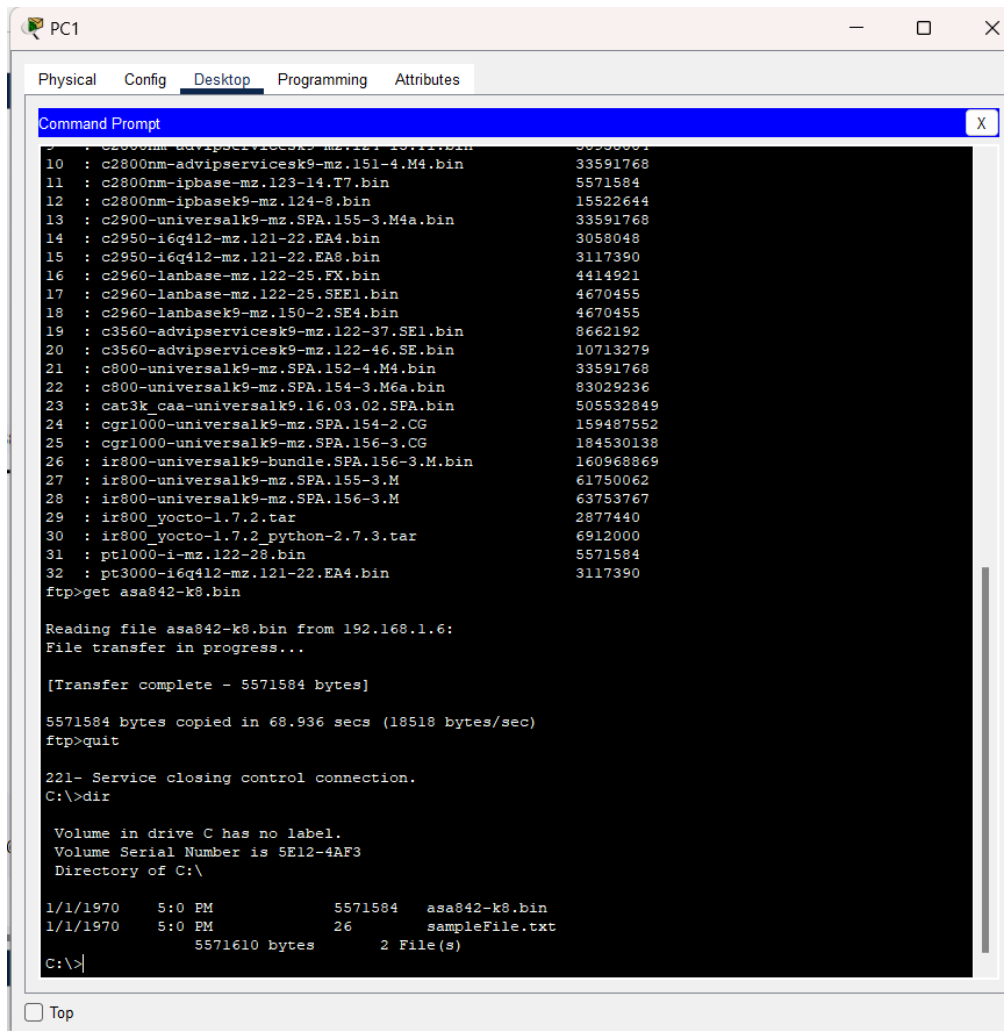
Packet Tracer PC Command Line 1.0
C:\>221- Service closing control connection.
C:\>dir

Volume in drive C has no label.
Volume Serial Number is SE12-4AF3
Directory of C:\

1/1/1970 5:0 PM 5571584 asa842-k8.bin
2/7/2106 11:28 PM 26 sampleFile.txt
5571610 bytes 2 File(s)
```



Screenshot:



The screenshot shows a window titled "PC1" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows a list of files and their sizes, followed by an FTP session.

```
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.SE1.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
ftp>get asa842-k8.bin

Reading file asa842-k8.bin from 192.168.1.6:
File transfer in progress...

[Transfer complete - 5571584 bytes]

5571584 bytes copied in 68.936 secs (18518 bytes/sec)
ftp>quit

221- Service closing control connection.
C:\>dir

Volume in drive C has no label.
Volume Serial Number is 5E12-4AF3
Directory of C:\

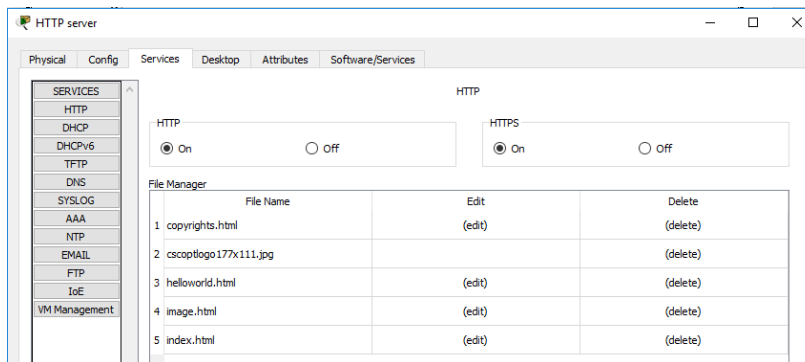
1/1/1970  5:0 PM                5571584  asa842-k8.bin
1/1/1970  5:0 PM                 26      sampleFile.txt
               5571610 bytes      2 File(s)
```

Task 3: Configure HTTP

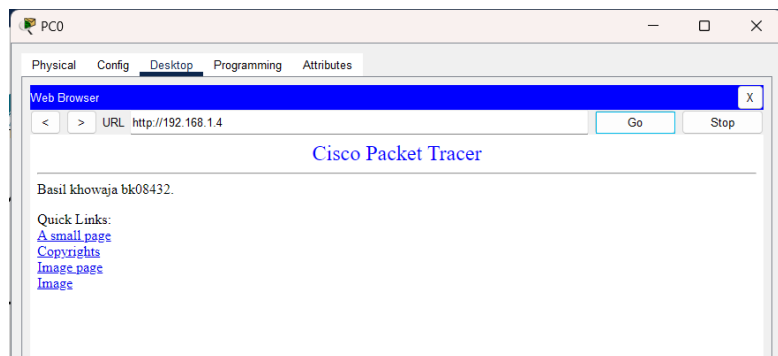
[20]

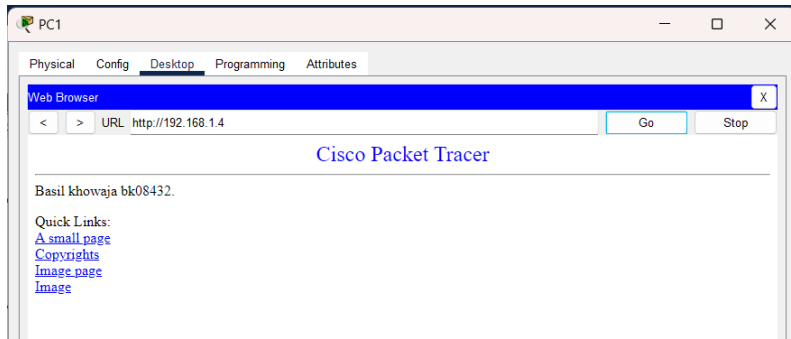
Steps:

1. Click on HTTP server and do the following configuration on HTTP server (assign IP, subnet mask and gateway) as shown in topology in task 1.
2. Go to services in HTTP server and click on HTTP service from left side. “ON” the service. Click on edit in index.html file.



3. Edit Index.html file and write down your Name and Roll Number in Index.html file instead of this **Welcome to Cisco Packet Tracer. Opening doors to new opportunities. Mind Wide Open.**
4. Open the web browser in PC0 or PC1 using http server IP (192.168.1.4) and attach its screenshot below.



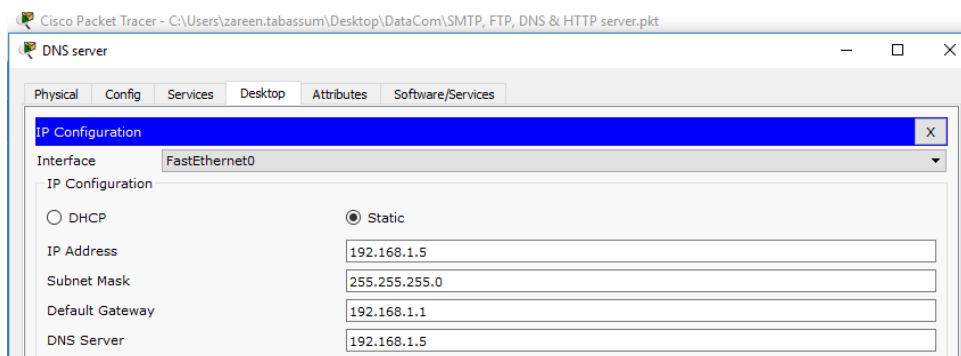


Task 4: Configure DNS Server

[20]

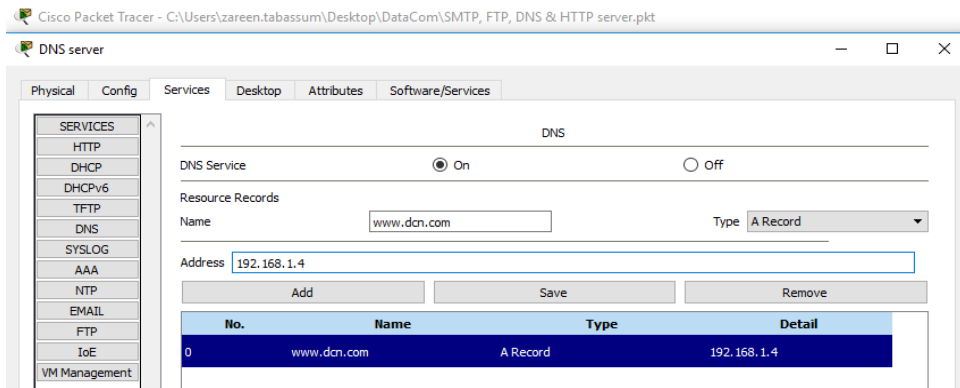
Steps:

1. Click on DNS server and do the following configuration on DNS server (assign IP, subnet mask, gateway and DNS server) as shown below.

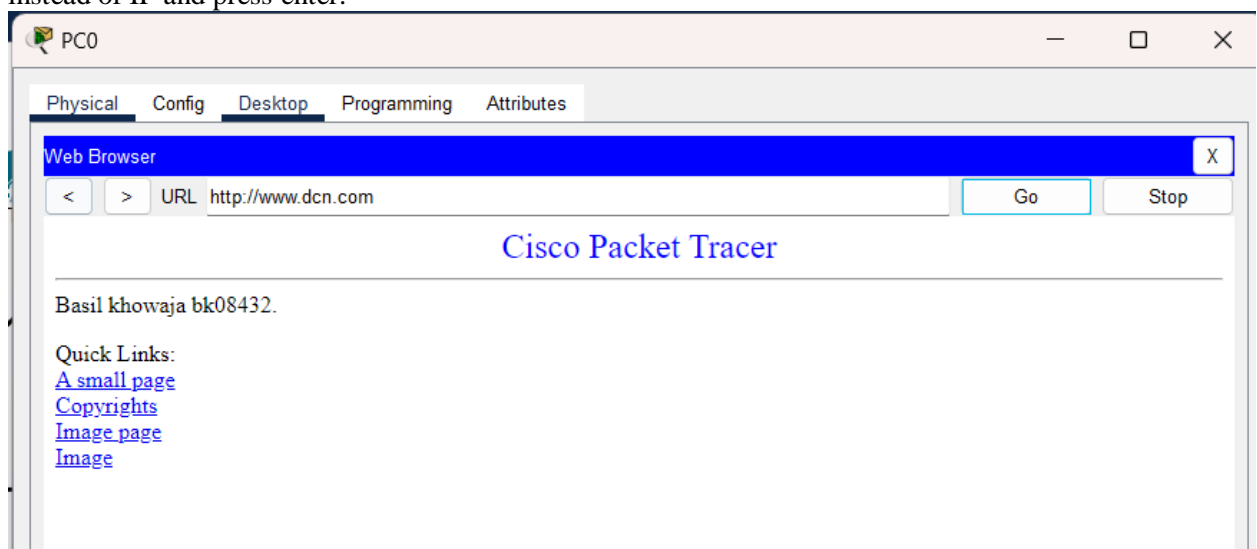


2. Go to services in DNS server and click on DNS service from left side. "ON" the service. Write www.dcn.com in name and address 192.168.1.4. Press save button.





3. Open the web browser in PC0 or PC1. Type domain name (www.dcn.com) in URL location instead of IP and press enter.



Dynamically assign IPs by using Router

Steps:

1. Go to CLI mode of Router0 and enter these commands as given below.

```
Router(config)#ip dhcp pool cisco
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns-server 192.168.1.5
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.1.1 192.168.1.7
Router(config)#exit
```

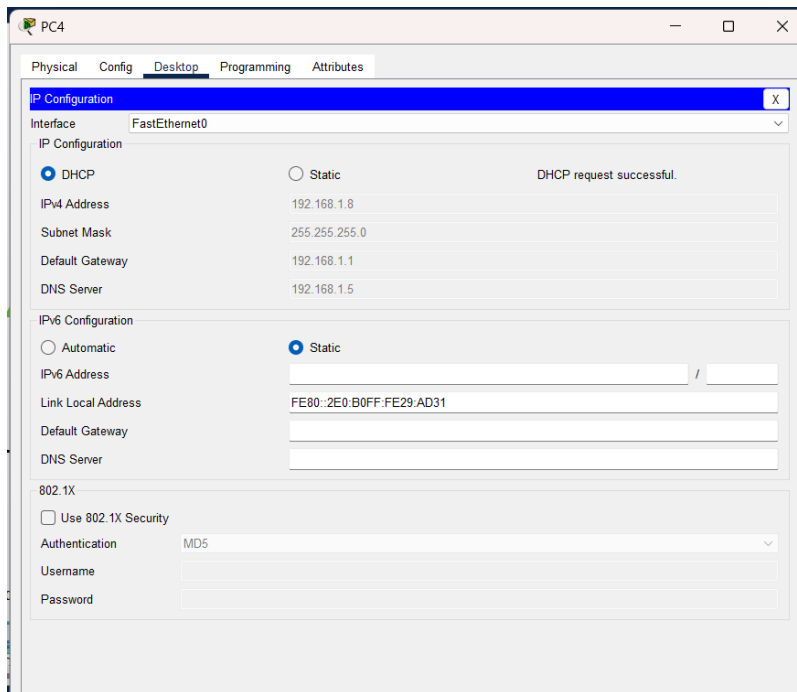

In the following command “ip dhcp pool cisco”, we are creating a pool for DHCP called cisco. cisco is the name here and we can name it whatever we want. Similarly, in the command “default-router “ we are telling the DHCP about the default route to follow.

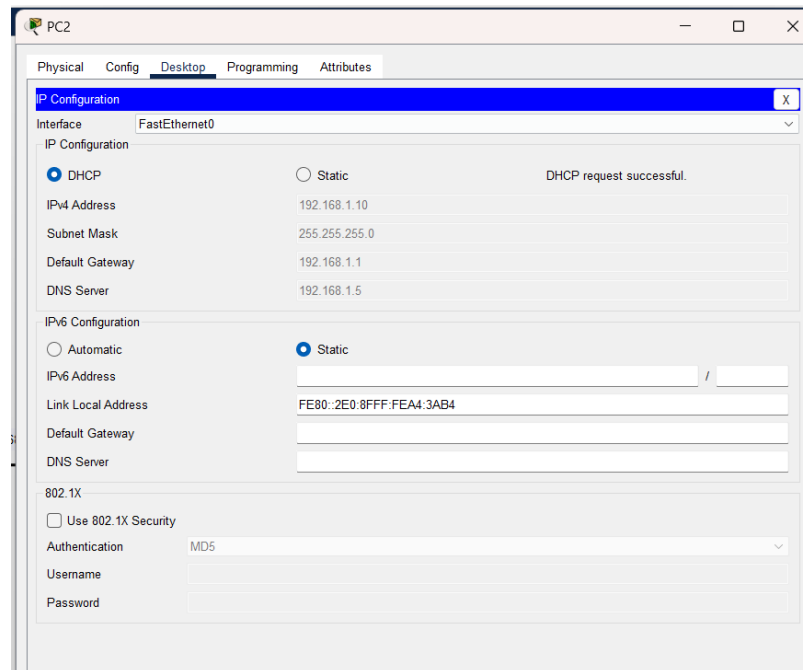
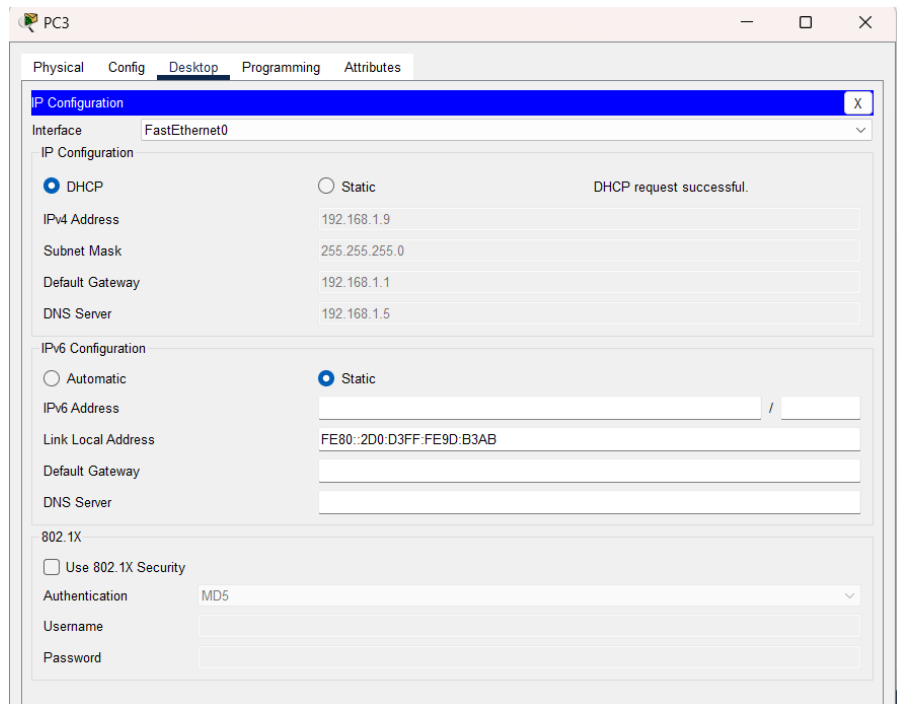
Notice, after we exit from DHCP mode, we are excluding some IP addresses by applying this command “ip dhcp excluded-addresses x-x”, where x is the starting and ending IP address respectively. We are basically reserving some IPs for our use. It can be used to attach printers, or assign it to some specific users for security purposes. You can also give dns address in dhcp by using the following command. dns-server 192.168.1.5.

2. Now, Open the PC4. Click on IP configuration. Select from static to DHCP and after DHCP request is successful, Attach the screenshot of IPs assigned by DHCP to PC3, PC4 and PC5.

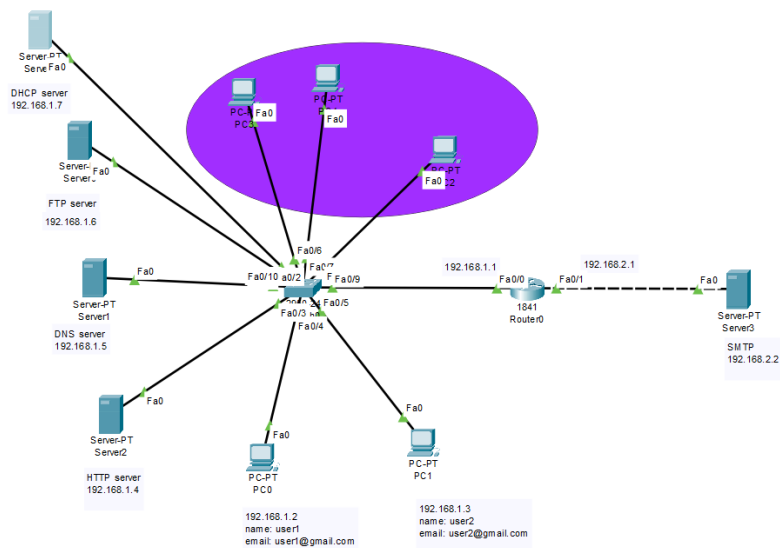
```
Router>config
Translating "config"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

Router>enable
Router#config
Configuring from terminal, memory, or network [terminal]?
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp pool cisco
Router(dhcp-config)#ne
% Incomplete command.
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#dns-server 192.168.1.5
Router(dhcp-config)#exit
Router(config)#ip dhcp exx
Router(config)#ip dhcp excluded-address 192.168.1.1 192.169.1.7
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```





Final topology after dhcp server:



Lab Evaluation Assessment Rubric

EE-424 Lab 3

#	Assessment Elements	Level 1: Unsatisfactory Points 0-1	Level 2: Developing Points 2	Level 3: Good Points 3	Level 4: Exemplary Points 4
LR2	Program/Code/ Simulation Model/ Network Model	Program/code/simulation model/network model does not implement the required functionality and has several errors. The student is not able to utilize even the basic tools of the software.	Program/code/simulation model/network model has some errors and does not produce completely accurate results. Student has limited command on the basic tools of the software.	Program/code/simulation model/network model gives correct output but not efficiently implemented or implemented by computationally complex routine.	Program/code/simulation /network model is efficiently implemented and gives correct output. Student has full command on the basic tools of the software.
LR4	Data Collection	Measurements are incomplete, inaccurate and imprecise. Observations are incomplete or not included. Symbols, units and significant figures are not included.	Measurements are somewhat inaccurate and imprecise. Observations are incomplete or vague. Major errors are there in using symbols, units and significant digits.	Measurements are mostly accurate. Observations are generally complete. Minor errors are present in using symbols, units and significant digits.	Measurements are both accurate and precise. Data collection is systematic. Observations are very thorough and include appropriate symbols, units and significant digits and task completed in due time.
LR5	Results & Plots	Figures/ graphs / tables are not developed or are poorly constructed with erroneous results. Titles, captions, units are not mentioned. Data is presented in an obscure manner.	Figures, graphs and tables are drawn but contain errors. Titles, captions, units are not accurate. Data presentation is not too clear.	All figures, graphs, tables are correctly drawn but contain minor errors or some of the details are missing.	Figures / graphs / tables are correctly drawn and appropriate titles/captions and proper units are mentioned. Data presentation is systematic.
LR9	Report	All the in-lab tasks are not included in report.	Most of the tasks are included in report but are not well explained. All the necessary figures / plots are not included.	Good summary of most of the in-lab tasks is included in report. The work is supported by figures and plots with explanations.	Detailed summary of the in-lab tasks is provided. All tasks are included and explained well. Data is presented clearly including all the necessary figures, plots and tables.
AR4	*Report Submission	Late submission after 1 week and in between 2 weeks.	Late submission after 2 days and within a week.	Late submission after the lab timing and within 2 days of the due date.	Timely submission of the report and in the lab time.

***Report:** Report will not be accepted after 1 week of due date

