East West University

Project Report

Design a full-fledged network for an organization with multiple subnets.

Course Code: CSE405

Course Title: Computer Networks

Semester: Spring-2022

Section: 01

Submitted to:

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ID: 2017-2-60-160

Date of submission: 14th May,2022

Title:

Designing a Full-fledged Network for an Organization with Multiple Subnets.

Project Statement:

In this project, a complex network infrastructure is designed for a web server, which will reflect the University of Professional's structure and provided facilities. Here, DHCP server is used for automatic IP allocation, and used Web Server (HTTP) and IPv4 addressing. Apart from wired internet access to all the classrooms, labs, employee PCs, library and other administrative and academic wings, the university also provides wireless internet access for everyone.

Components:

- ✓ DHCP Server
- ✓ DNS Server
- ✓ Web Server
- ✓ Connectors
- ✓ PC
- ✓ Switches
- ✓ Mobile Phone
- ✓ Laptop
- ✓ Wireless Routers
- ✓ Media Server

Tools: Cisco Packet Tracer

Implementation and Functionality Details:

- ❖ **Network and Subnetwork:** In my network design, I used A,B and C class Ip address. Campus 1 and 6, I used class A Ip addresses. Campus 3 and 2 I used C class Ip address. And campus 5 and 4, I used B class Ip addresses.

- ❖ **Personal Computers**: Each personal computer is connected to a switch. Each computer needs an IP address which is provided automatically by the DHCP Server. Using HTTP and DNS server we can browse in university of Professionals website**.**

- **Laptops:** Laptops and wireless device are for students, and which are connected by the wireless router and IP addresses are distributed by that wireless router.

- **Switches**: Switches are devices used on the network to transmit and receive data from one device to another or to many devices depending on the message intended. Switches are connected to multiple host server or routers. Switches also perform functions from the Data Link Layer.
- **Routers:** Routers are connected to Same Class Network. I used 6 routers for six campuses. To configure routers there are two option CLI command and config to type and save all the necessary terms (IPs, tables, routes). I mostly used CLI command for config routers.
- **Wireless Routers:** This is used to provide wireless network. Which is connected to a network by switch. Internet is configured by DHCP.
- **DHCP Server:** Dynamic Host Configuration Protocol (DHCP) server is connected to Campus 2 network. This server is used to provide IP address to all other network's host's. To provide IP address in same network we can configure server in config by typing all necessary IPs. To distribute IP to other network a command is required. This allows to use other network DHCP server.

  IP helper-address (DHCP IP)

  DHCP server provides IP addresses and also default gateway and DNS server IP address. IP address of DHCP is configure statically causes if IP changes dynamically other host won't be able to find the server.

- **HTTP & DNS Server:** HTTP server is used to host the webpages. Here I have import our university webpages to the HTTP server. DNS server is used convert the domain name to equivalent IP address. To use domain name, I have to know DNS server IP address. So, IP of DNS fixed statically. Here I used a one server to provide HTTP and DNS service. The IP of this server is distributed by DHCP server.

CLI Command for Router 3 Configuration:

```
enable
config t
interface fa0/0
ip address 200.168.11.254 255.255.255.0
no shut
```

```
do wr
exit
interface se2/0
ip address 200.168.30.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
interface se3/0
ip address 200.168.55.2 255.255.255.0
no shut
do wr
exit
interface se6/0
ip address 200.168.60.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
interface se7/0
ip address 200.168.65.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
interface se8/0
ip address 200.168.70.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
router ospf 3
```

network 200.168.11.0 0.0.0.255 area 1

network 200.168.30.0 0.0.0.255 area 1

network 200.168.55.0 0.0.0.255 area 1

network 200.168.60.0 0.0.0.255 area 1

network 200.168.65.0 0.0.0.255 area 1

network 200.168.70.0 0.0.0.255 area 1

interface fa0/0

ip helper-address 200.168.23.3

exit

Network Topology and Conceptual Modelling:

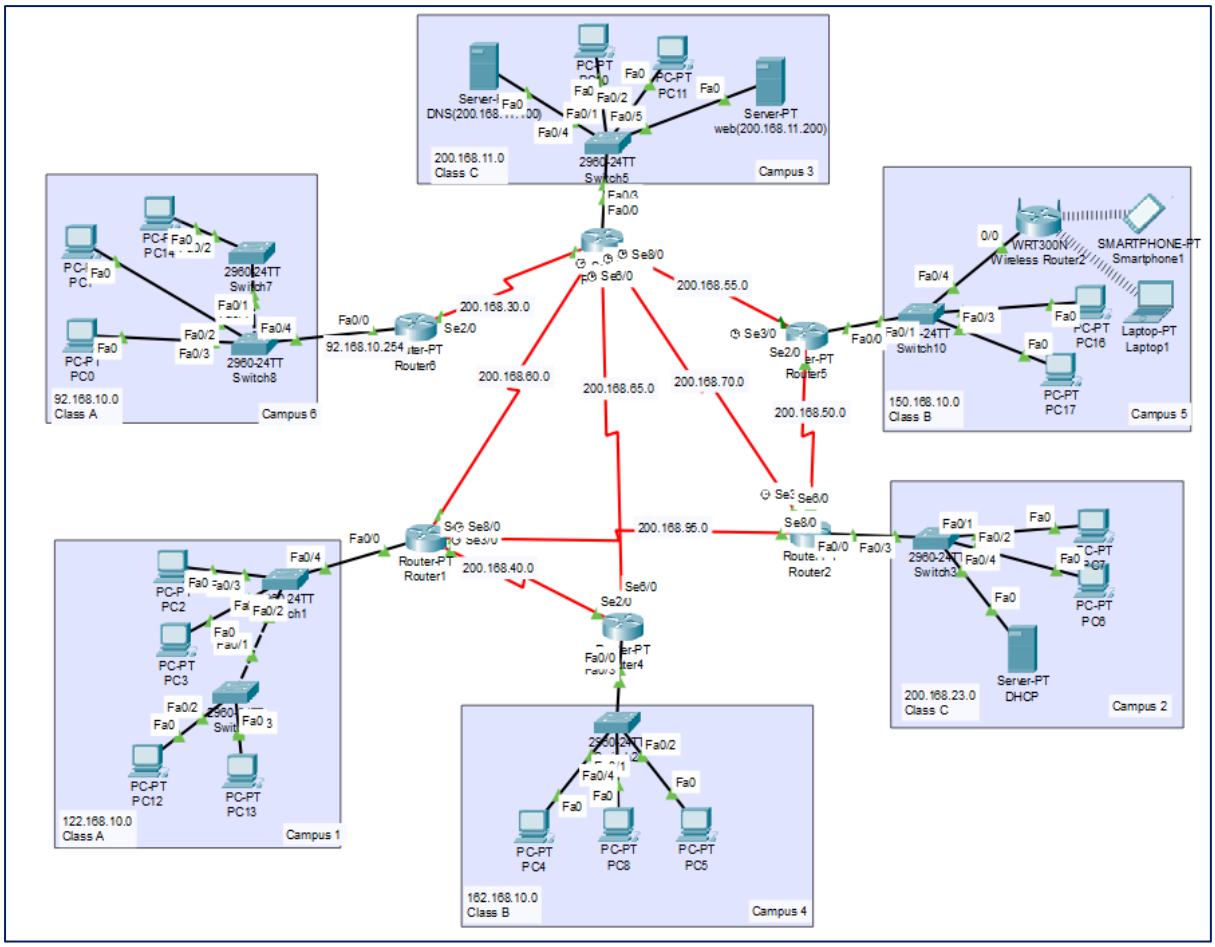
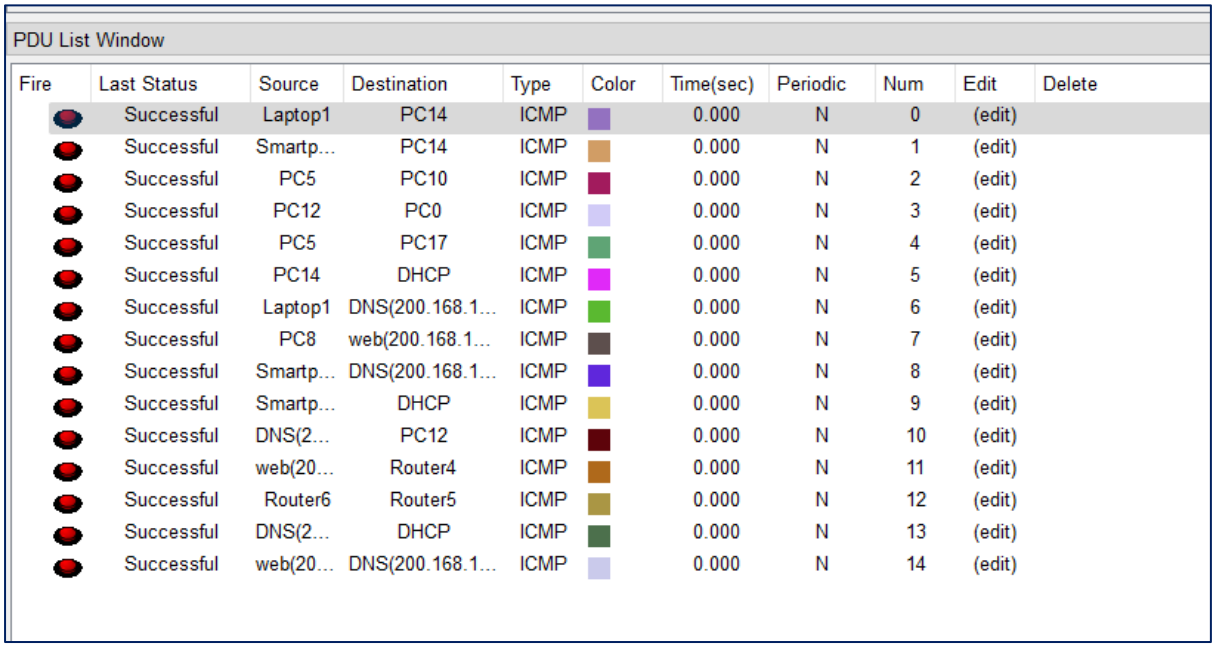


Figure 1: Network model created in cisco packet tracer

Ping Result:

I added sample PDU to understand whether a networks pc is communicating with other networks pc/laptop/mobile/ or not.



Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Laptop1	PC14	ICMP		0.000	N	0	(edit)	
	Successful	Smartp...	PC14	ICMP		0.000	N	1	(edit)	
	Successful	PC5	PC10	ICMP		0.000	N	2	(edit)	
	Successful	PC12	PC0	ICMP		0.000	N	3	(edit)	
	Successful	PC5	PC17	ICMP		0.000	N	4	(edit)	
	Successful	PC14	DHCP	ICMP		0.000	N	5	(edit)	
	Successful	Laptop1	DNS(200.168.1...	ICMP		0.000	N	6	(edit)	
	Successful	PC8	web(200.168.1...	ICMP		0.000	N	7	(edit)	
	Successful	Smartp...	DNS(200.168.1...	ICMP		0.000	N	8	(edit)	
	Successful	Smartp...	DHCP	ICMP		0.000	N	9	(edit)	
	Successful	DNS(2...	PC12	ICMP		0.000	N	10	(edit)	
	Successful	web(20...	Router4	ICMP		0.000	N	11	(edit)	
	Successful	Router6	Router5	ICMP		0.000	N	12	(edit)	
	Successful	DNS(2...	DHCP	ICMP		0.000	N	13	(edit)	
	Successful	web(20...	DNS(200.168.1...	ICMP		0.000	N	14	(edit)	

Figure 2: Ping Result List

Implementation Of DHCP:

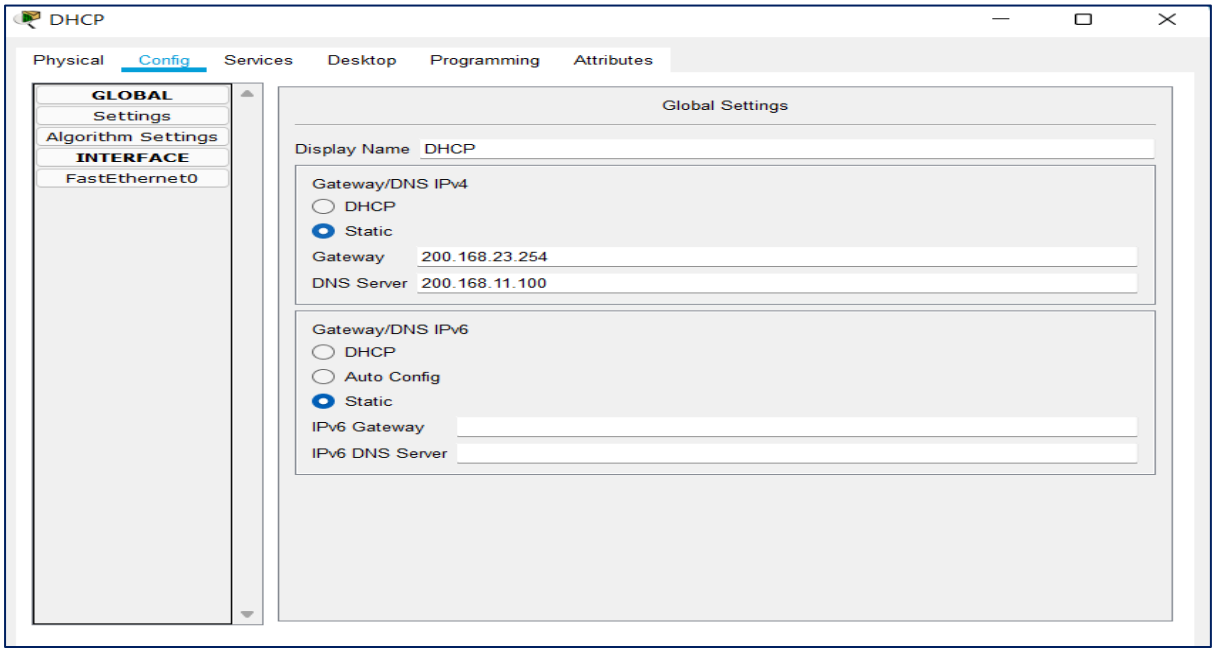


Figure 3: IP Configuration of DHCP Server

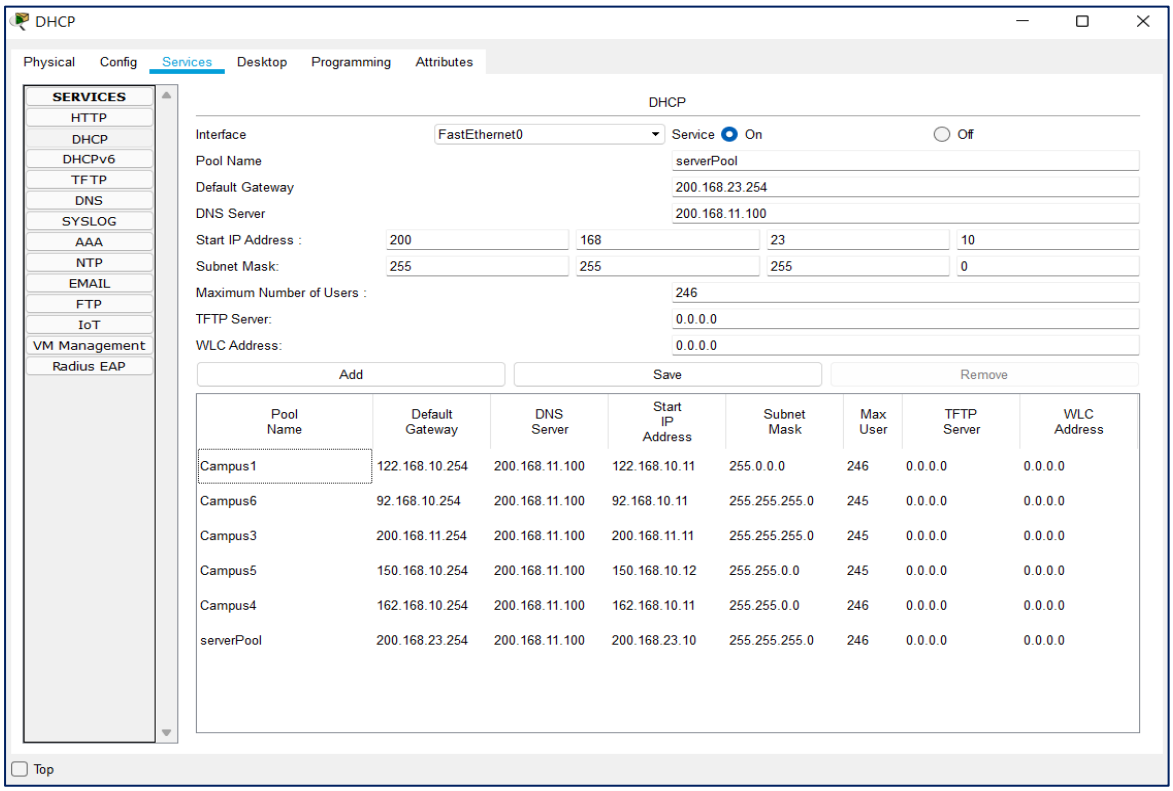


Figure 4: Creating Server Pool for Different Network

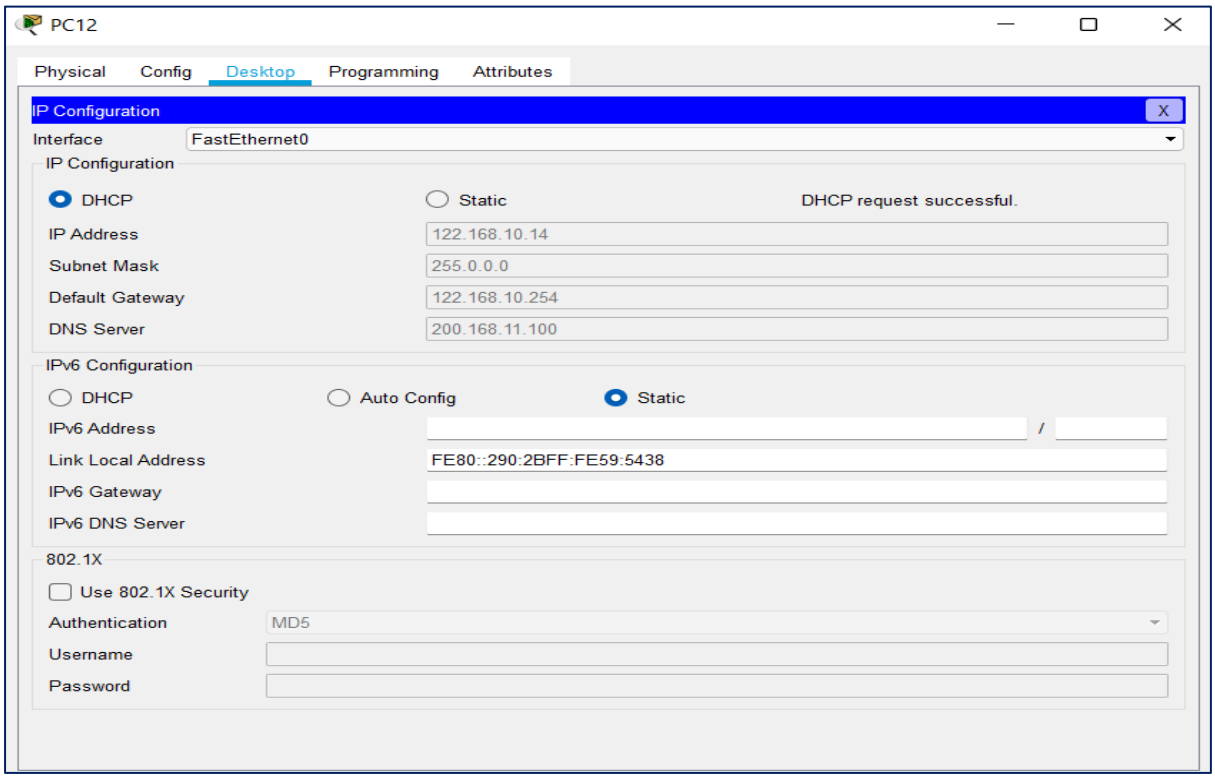


Figure 5: DHCP auto IP config for pc

Implementation of HTTP:

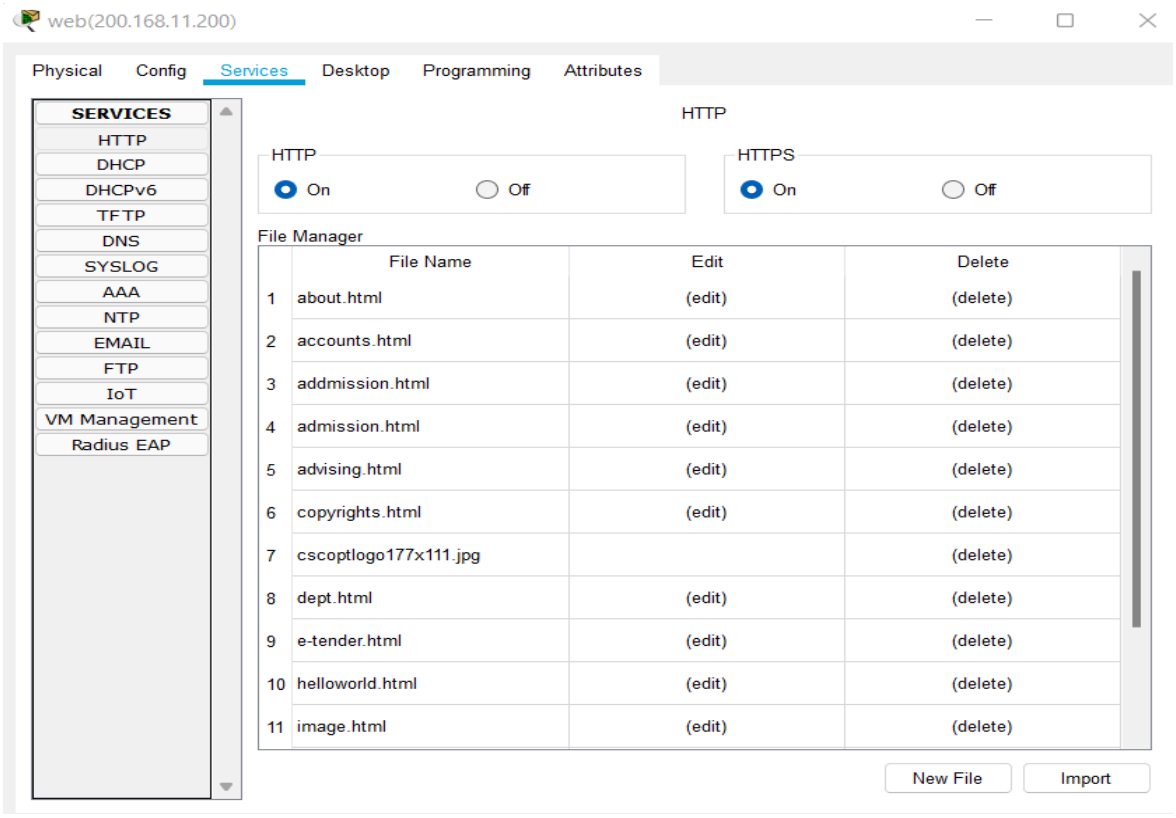


Figure 6: HTTP Web-Server

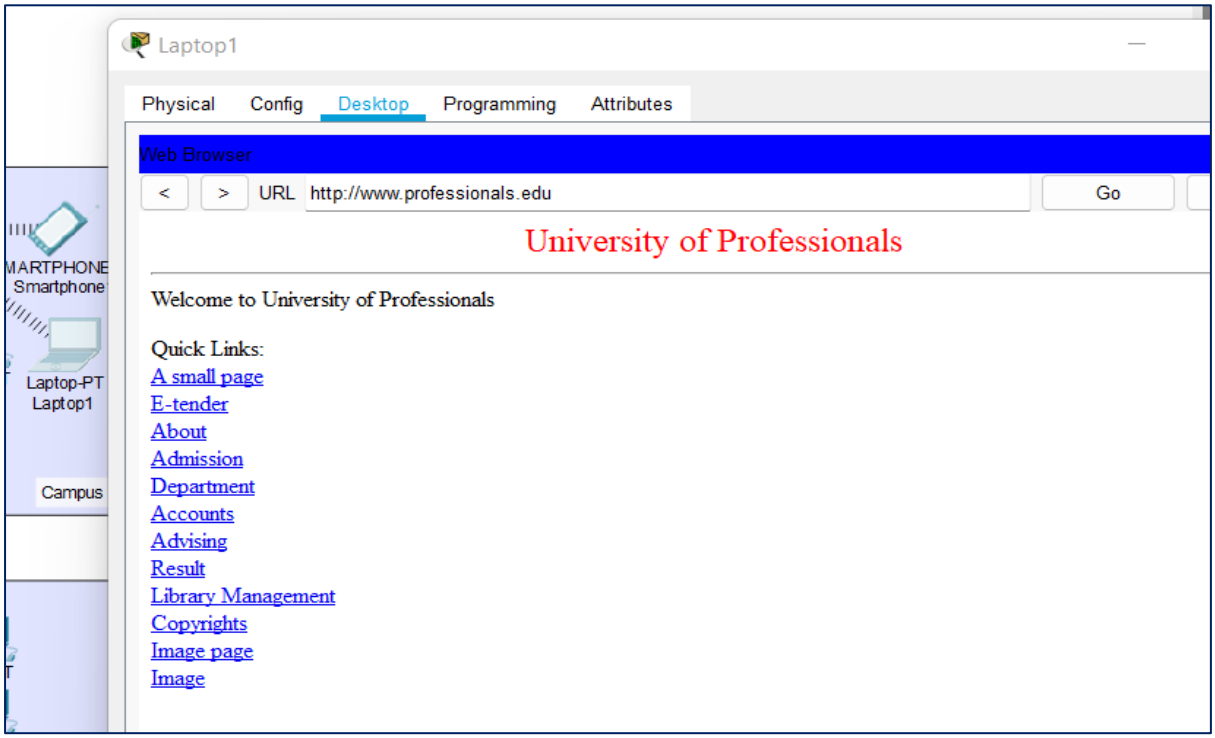


Figure 7: Home page for University of Professionals

Number of networks:

In my design, I used 14 Network.

Conclusion: In this project, we have implemented DNS, WEB and HTTP in Cisco Packet Tracer and the webpage. The DHCP server gives the IP address in all six networks with three classes. Our web-server reflects the university's link as the project demands.

Reference:

- **https://www.youtube.com/watch?v=Yn3H3bpC2Sk**
- **https://www.w3schools.com/**
- **https://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol**