



EAST WEST UNIVERSITY

Project Report

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

Course Title: Computer Networks

Course Code: CSE405

Section: 03

Semester: Spring-24

Submitted by:

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2021-3-60-260

Submitted to:

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Submission Date: 8/6/2024

Title:

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

Preface:

Apex University, is an enterprise like East West University, owns many computers, with a complex network infrastructure. 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 every campus. On top of that the university runs complex networked systems to support several of its business process like admissions, advising, results, eTender, library management, accounts and so on.

Now, The task is to create a complete model of a complex network by discovering the interconnectivity of the systems and subnetworks, which will reflect the University of Scholars structure and facilities, features within the network.

Tools:

Components Used:

- 2811- Router
- Wireless access point
- Straight Through Cable
- Serial DCE cables
- 2960-24TT Switches
- PC as end devices
- DNS Server
- Web Server
- DHCP server
- Smart Phone, Tablet

Software Used:

- Cisco Packet Tracer version 8.1.1.0022

- **Network Summary:**

- University's full network has covered with 7 campuses with 7 routers.
- All the Ip address set by one DHCP server automatically & DNS server is use to locate Web server and HTML code is use to modify the web page.

Physical Diagram: ALL Campus.

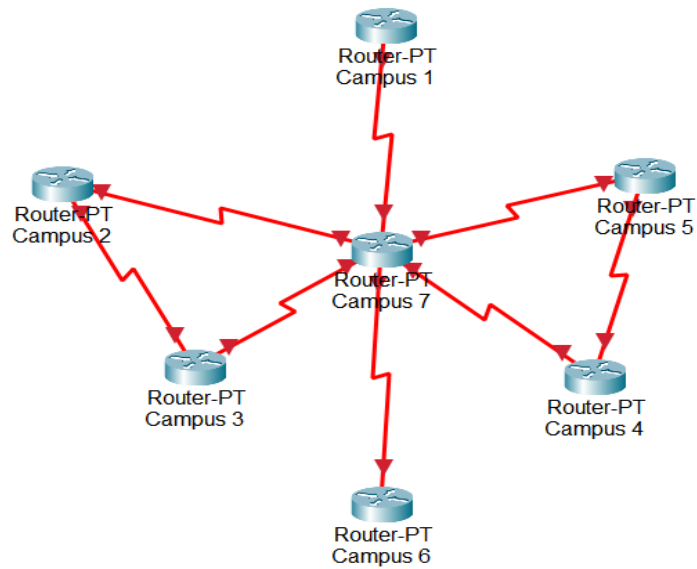


Figure 1: Network Model created in Cisco Packet Tracer

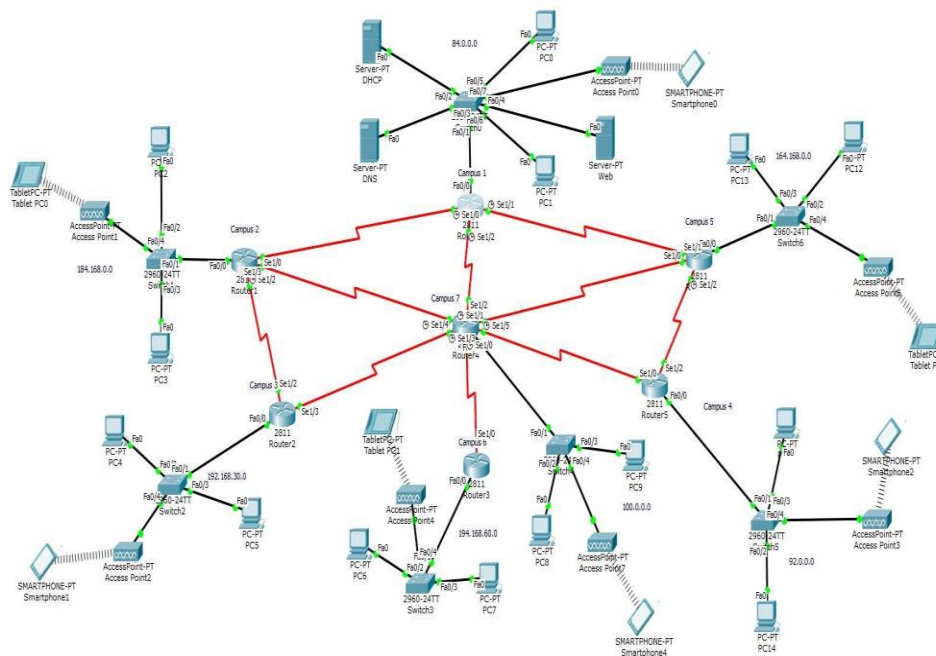


Figure 2: Network Model created in Cisco Packet Tracer

Design Issues:

Actually, there are no Design issues all the connections, servers, and End devices are working perfectly.

The classes that are used:

1. Class A: It is used for all end device networks.
2. Class B & Class C: It is used for router-to-router connection networks.

Limitations:

It's quite a complicated network. It may be difficult to maintain this network. It is difficult to add more university networks quickly. Hands-on configuration is required for additional networks. A maximum amount of hosts can be supported by the network.

Lines of Code:

Router configuration and inserting routing table:

Campus 1:

```
interface fa0/0
ip address 84.0.0.254 255.0.0.0
no shut
do wr
exit
```

```
ip dhcp pool campus1
```

```
network 84.0.0.0 255.0.0.0
default-router 84.0.0.254
dns-server 84.0.0.252
exit
ip dhcp excluded-address 84.0.0.254
```

```
interface se1/0
ip address 192.168.80.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

```
interface se1/1
ip address 192.168.90.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

```
interface se1/2
ip address 192.168.100.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

Campus 2:

```
interface fa0/0
ip address 184.168.0.254 255.255.0.0
no shut
do wr
exit
```

```
ip dhcp pool campus2
```

```
network 184.168.0.0 255.255.0.0
default-router 184.168.0.254
dns-server 84.0.0.252
exit
ip dhcp excluded-address 184.168.0.254
```

```
interface se1/2
ip address 192.168.130.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
interface se1/0
ip address 192.168.80.2 255.255.255.0
no shut
do wr
exit
```

```
interface se1/3
ip address 192.168.170.2 255.255.255.0
no shut
do wr
exit
```

Campus 3:

```
interface fa0/0
ip address 192.168.30.254 255.255.255.0
no shut
do wr
exit
```

```
ip dhcp pool campus3
```

```
network 192.168.30.0 255.255.255.0
default-router 192.168.30.254
dns-server 84.0.0.252
exit
ip dhcp excluded-address 192.168.30.254
```

```
interface se1/2
ip address 192.168.130.2 255.255.255.0
no shut
do wr
exit
```

```
interface se1/3
ip address 192.168.140.2 255.255.255.0
no shut
do wr
exit
```

Campus 4:

```
interface fa0/0
ip address 92.0.0.254 255.0.0.0
no shut
do wr
exit
```

```
ip dhcp pool campus4
```



```
network 92 0.0.0 255.0.0.0
default-router 92.0.0.254
dns-server 84.0.0.252
exit
ip dhcp excluded-address 92.0.0.254

interface se1/0
ip address 192.168.150.2 255.255.255.0
no shut
do wr
exit

interface se1/2
ip address 192.168.160.2 255.255.255.0
no shut
do wr
exit

interface se1/0
ip address 192.168.150.2 255.255.255.0
no shut
do wr
exit

interface se1/2
ip address 192.168.160.2 255.255.255.0
no shut
do wr
exit

interface se1/1
ip address 192.168.90.2 255.255.255.0
```

```
no shut
do wr
exit
```

```
interface se1/0
ip address 192.168.120.2 255.255.255.0
no shut
do wr
exit
```

```
interface se1/2
ip address 192.168.160.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

Campus 6:

```
interface fa0/0
ip address 194.168.60.254 255.255.255.0
no shut
do wr
exit
```

```
ip dhcp pool campus6
```

```
network 194.168.60.0 255.255.255.0
default-router 194.168.60.254
dns-server 84.0.0.252
exit
ip dhcp excluded-address 194.168.60.254
```

```
interface se1/0
ip address 192.168.110.2 255.255.255.0
no shut
do wr
exit
```

Campus 7:

```
interface fa0/0
ip address 100.0.0.254 255.0.0.0
no shut
do wr
exit
```

```
ip dhcp pool campus7
```

```
network 100.0.0.0 255.0.0.0
default-router 100.0.0.254
dns-server 84.0.0.252
exit
ip dhcp excluded-address 100.0.0.254
```

```
interface se1/2
ip address 192.168.100.2 255.255.255.0
no shut
do wr
exit
```

```
interface se1/0
ip address 192.168.110.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

```
interface se1/1
ip address 192.168.120.1 255.255.255.0
clock rate 64000
no shut
do wr
exit
```

```
interface se1/3
ip address 192.168.140.1 255.255.255.0
```

```
clock rate 64000
```

```
no shut
```

```
do wr
```

```
exit
```

```
interface se1/5
```

```
ip address 192.168.150.1 255.255.255.0
```

```
clock rate 64000
```

```
no shut
```

```
do wr
```

```
exit
```

```
interface se1/2
```

```
ip address 192.168.160.1 255.255.255.0
```

```
clock rate 64000
```

```
no shut
```

```
do wr
```

```
exit
```

```
interface se1/4
```

```
ip address 192.168.170.1 255.255.255.0
```

```
clock rate 64000
```

```
no shut
```

```
do wr
```

```
exit
```

Routing Table:

Campus 1:

```
router ospf 1
```

```
network 84.0.0.0 0.255.255.255 area 1
```

```
network 192.168.80.0 0.0.0.255 area 1
```

```
network 192.168.90.0 0.0.0.255 area 1
```

```
network 192.168.100.0 0.0.0.255 area 1
```

```
exit
```

Campus 2:

```
router ospf 2
network 184.168.0.0 0.0.255.255 area 1
network 192.168.80.0 0.0.0.255 area 1
network 192.168.130.0 0.0.0.255 area 1
network 192.168.170.0 0.0.0.255 area 1
```

```
exit
```

Campus 3:

```
router ospf 3
network 192.168.30.0 0.0.0.255 area 1
network 192.168.130.0 0.0.0.255 area 1
network 192.168.140.0 0.0.0.255 area 1
```

```
exit
```

Campus 4:

```
router ospf 4
network 92.0.0.0 0.0.0.255 area 1
network 192.168.150.0 0.0.0.255 area 1
network 192.168.160.0 0.0.0.255 area 1
```

```
exit
```

Campus 5:

```
router ospf 5
network 164.168.0.0 0.0.255.255 area 1
network 192.168.90.0 0.0.0.255 area 1
network 192.168.120.0 0.0.0.255 area 1
exit
```

Campus 6:

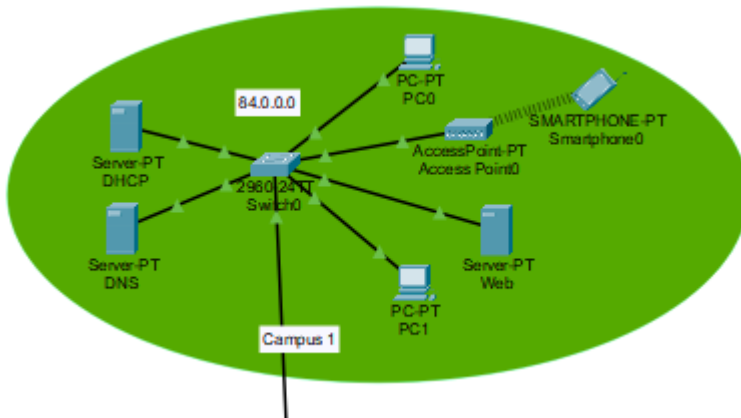
```
router ospf 6
network 194.168.60.0 0.0.0.255 area 1
network 192.168.110.0 0.0.0.255 area 1

exit
```

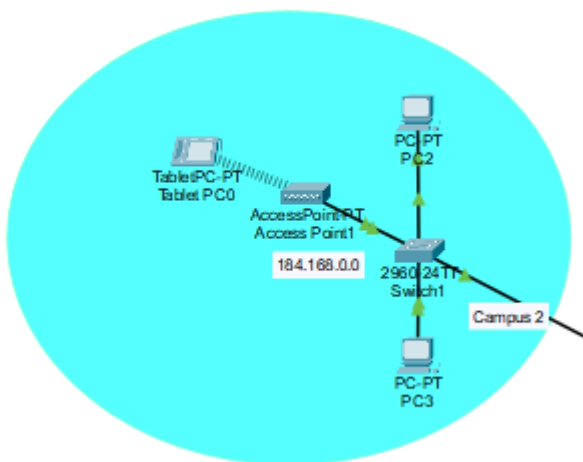
Campus 7:

```
router ospf 7
network 100.0.0.0 0.255.255.255 area 1
network 192.168.100.0 0.0.0.255 area 1
network 192.168.110.0 0.0.0.255 area 1
network 192.168.120.0 0.0.0.255 area 1
network 192.168.140.0 0.0.0.255 area 1
network 192.168.150.0 0.0.0.255 area 1
network 192.168.170.0 0.0.0.255 area
```

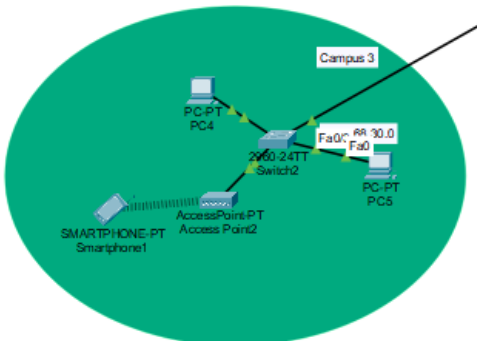
Campus 1: Campus 1 is for Server Room.



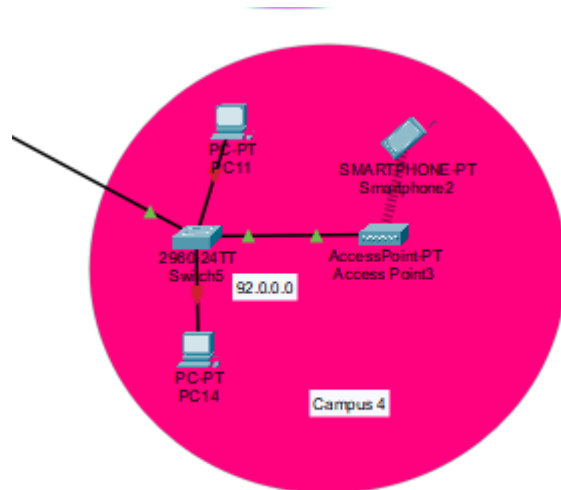
Campus 2: Campus 2 is for the Employee's Room.



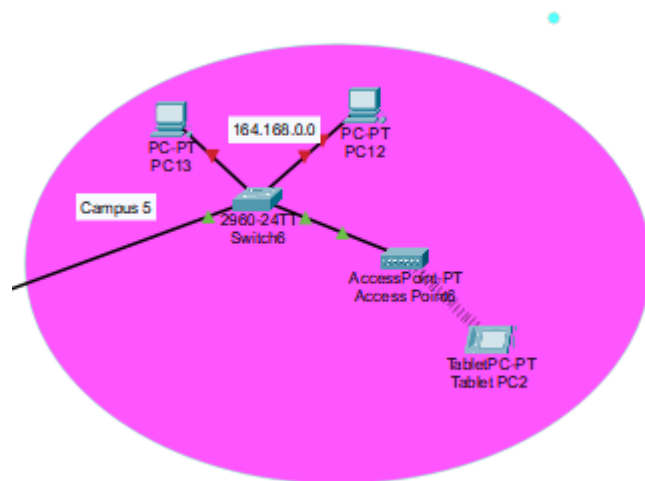
Campus 3: Campus 3 is for Library.



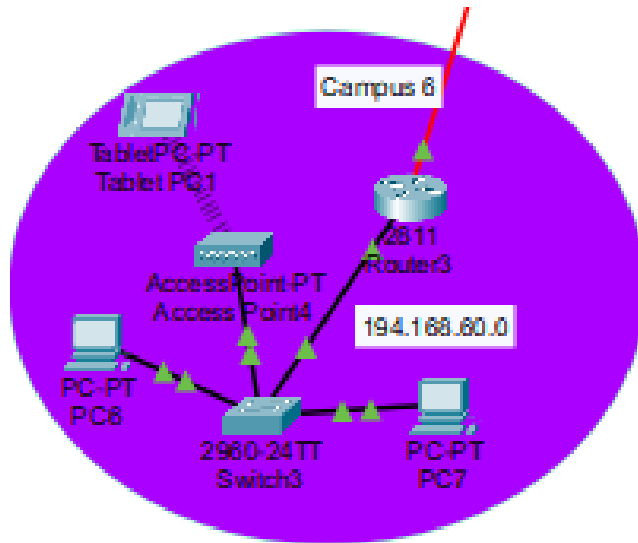
Campus 4: Campus 4 is for Labs.



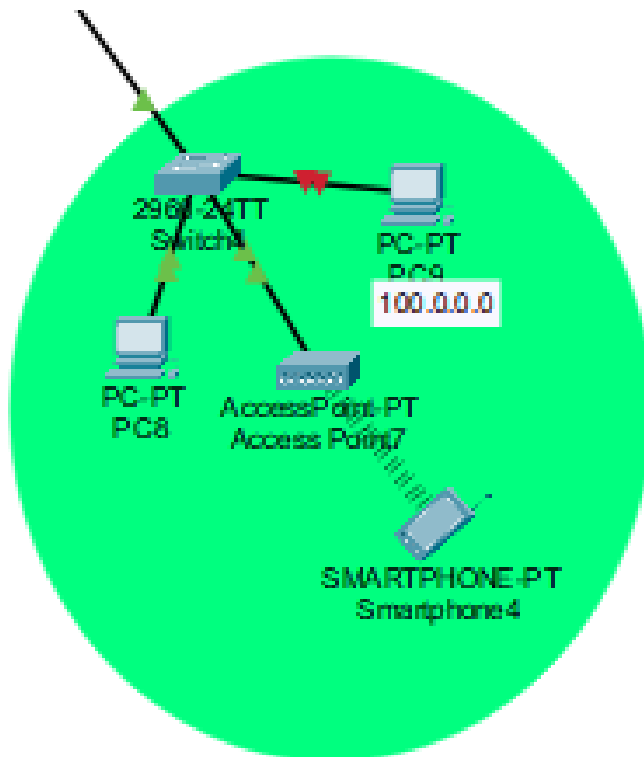
Campus 5: Campus 5 Faculty & Department Rooms.



Campus 6: Campus 6 is for Classrooms



Campus 7: Campus 7 is for Admission Office.



Server Configuration:

DHCP Server: [IP: 84.0.0.254]

DHCP can serve IP across the network automatically. We use 1 DHCP server for 7 campuses. When a device is requested DHCP server can serve a unique IP address according to their Campus network.

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool1	84.0.0.254	84.0.0.252	84.0.0.1	255.0.0.0	512	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	84.0.0.0	255.0.0.0	512	0.0.0.0	0.0.0.0

Figure 10: DHCP Server

PC14

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 169.254.221.210

Subnet Mask 255.255.0.0

Default Gateway 0.0.0.0

DNS Server 84.0.0.252

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::20B:BEFF:FE55:DDD2

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

Figure 11: DHCP successfully giving Ip

DNS Server: [IP: 84.0.0.253]

The screenshot shows a web-based configuration interface for a DNS server. The 'Services' tab is active, and 'DNS' is selected in the left sidebar. The main area shows the DNS Service is turned 'On'. A Resource Record is being configured with the name 'www.apex.edu.bd' and type 'A Record'. The address is set to '84.0.0.253'. A table below shows one existing record with the same details. At the bottom, there is a 'DNS Cache' button and a 'Top' link.

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

No.	Name	Type	Detail
0	www.apex.edu.bd	A Record	84.0.0.253

☐ Top

Figure 12: Config DNS Server

WEB Server: [IP: 84.0.0.253]

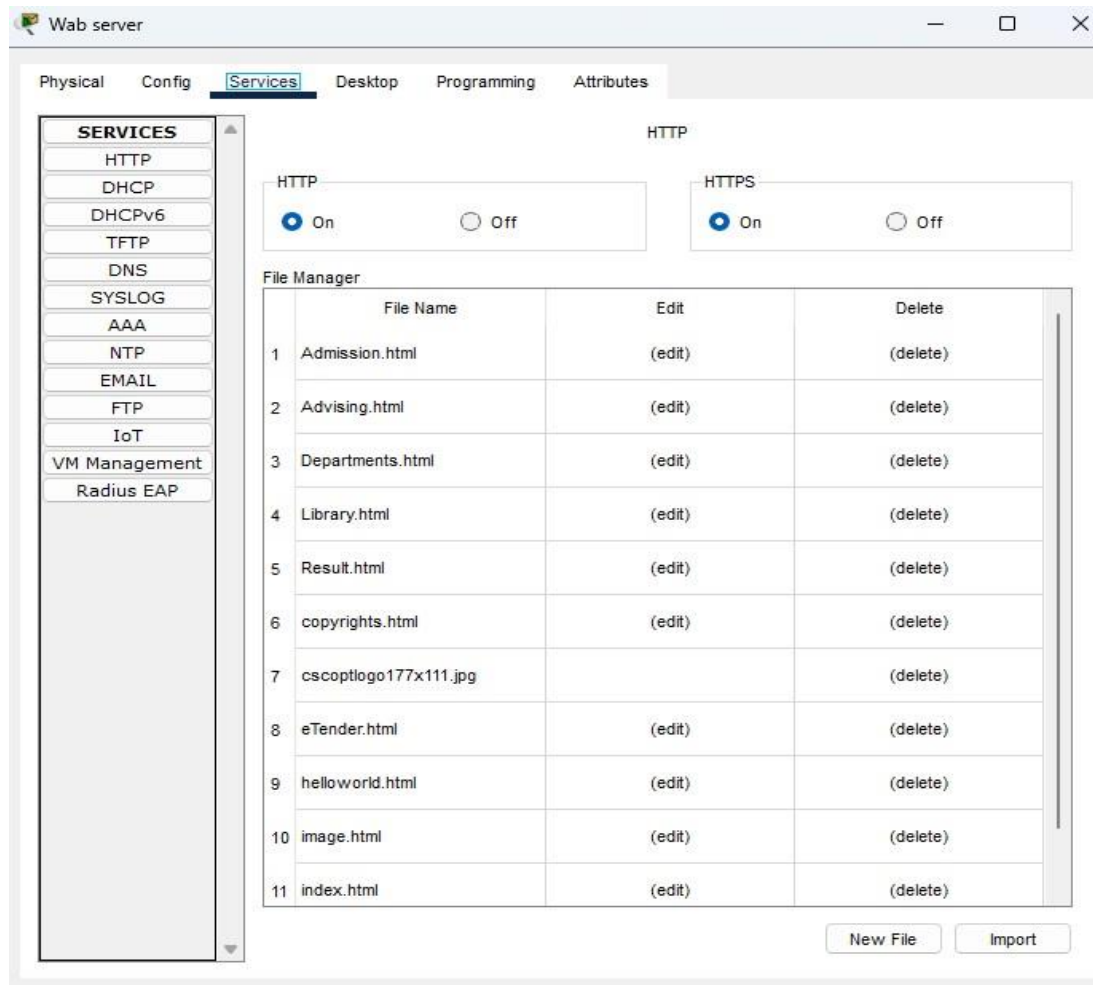


Figure 13: Config WEB server

Web

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

Welcome Al Imam Uddin

```

<html>

<center></center>

<center><font size='+2' color="purple">Welcome to Apex University web page. </font></center> <h3><color='red'> I am Al
Imam Uddin. And EWU ID:2021-3-60-260</h3>
<h3><color='red'> I Love CODING. </h3>
<h4>Quick Links:</h4>

<h3><a href='Departments.html'>Departments</a>

<br><a href='Admission.html'>Admission</a>

<br><a href='Result.html'>Result</a>

<br><a href='Advising.html'>Advising</a>

<br><a href='Library.html'>Library</a>

<br><a href='eTender.html'>eTender</a>

</html>

<h3><color='red'> Apex University in Bangladesh is a prestigious institution known for its commitment to academic
excellence. With a dedicated faculty, modern facilities, and a focus on research, the university offers a diverse range of
undergraduate and postgraduate programs. Emphasizing holistic development, Apex University provides students with a
vibrant campus life through extracurricular activities, contributing to their overall growth and success. </h3>

```

File Manager

Save

☐ Top

Figure 14: HTML code to Edit Home page

Physical
Config
Services
Desktop
Programming
Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

File Name: Departments.html

```

<html>

<h1>Departments</h1>

Department of Computer Science & Engineering<br>

<br>Department of Electrical & Electronic Engineering<br>

<br>Department of Electronics and Communications Engineering<br>

<br>Department of Genetic Engineering and Biotechnology<br>

<br>Department of Pharmacy<br>

<br>Department of Civil Engineering<br>

<br>Department of Mathematical and Physical Sciences<br>

<br>Department of Business Administration<br>

<br>Department of Economics<br>

<br>Department of English<br>

<br>Department of Law<br>

<br>Department of Social Relations<br>

<br>Department of Information Studies<br>

<br>Department of Sociology<br>

<br><a href="index.html">Back</a>

</html>

```

File Manager
Save

Figure 15: HTML code to Edit Department page

University's Homepage Access

By writing `http://www.apex.edu.bd` OR `1.0.0.3` in Web browser.

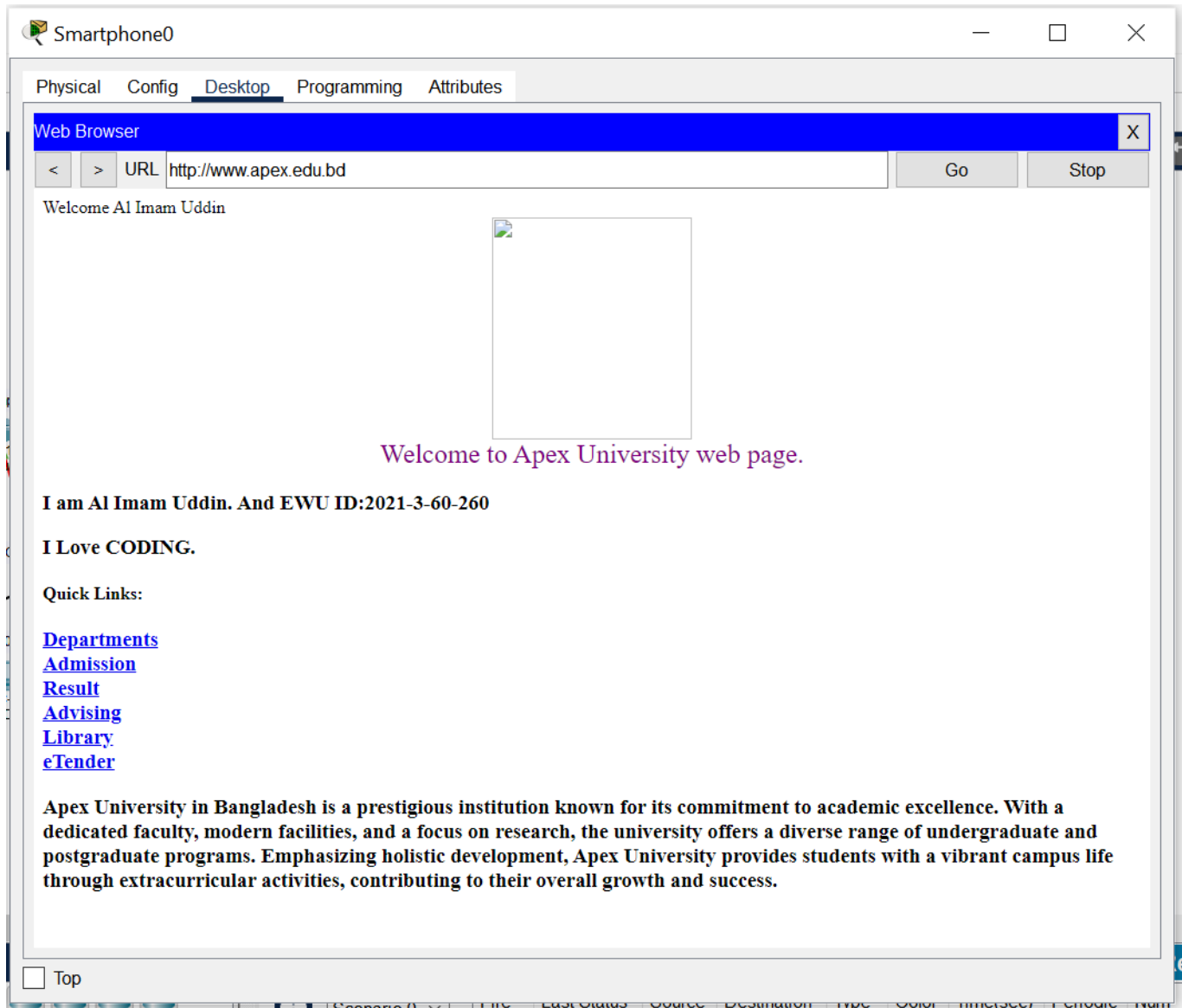


Figure 16: University's Home page

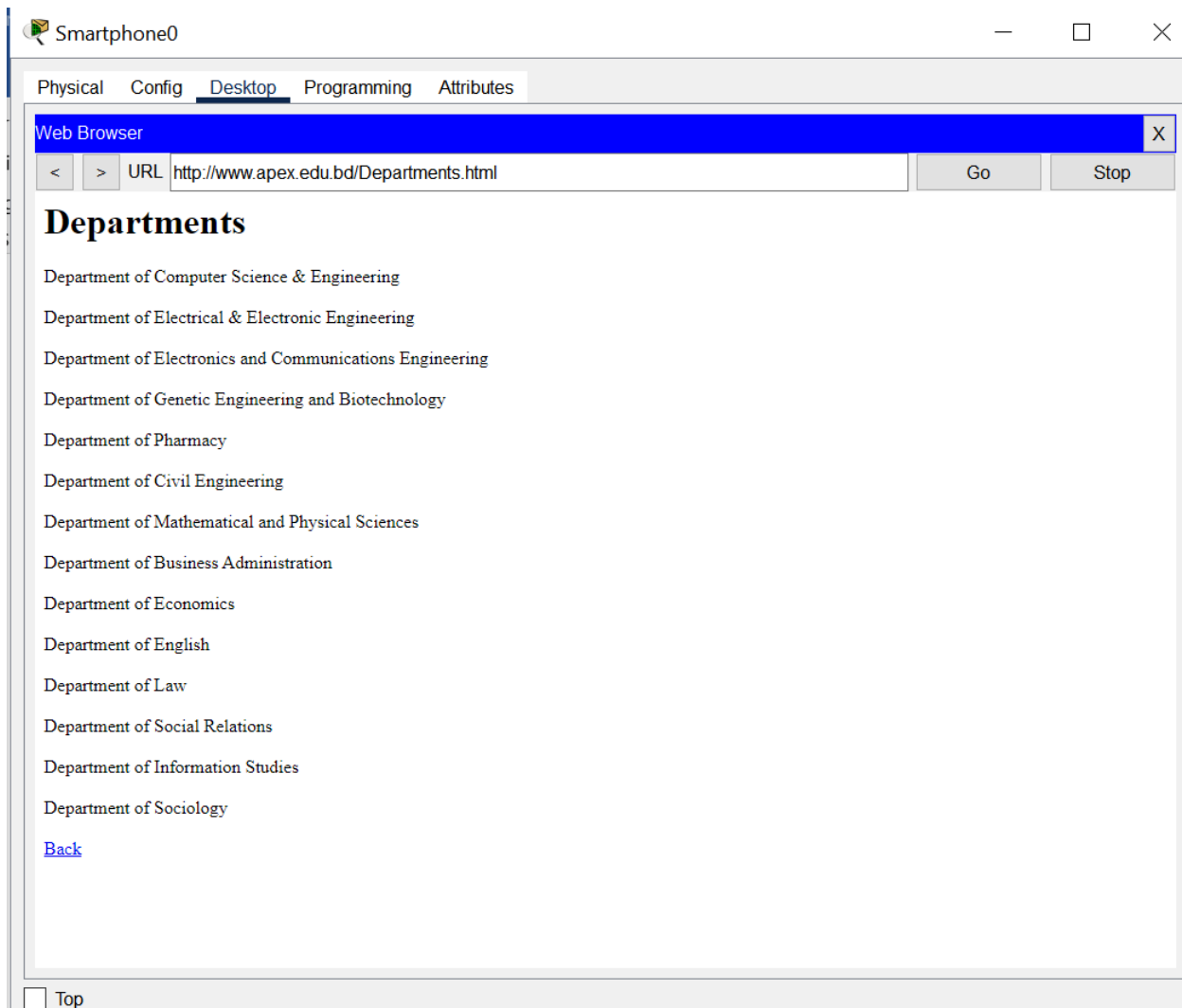


Figure 17: University's Department page

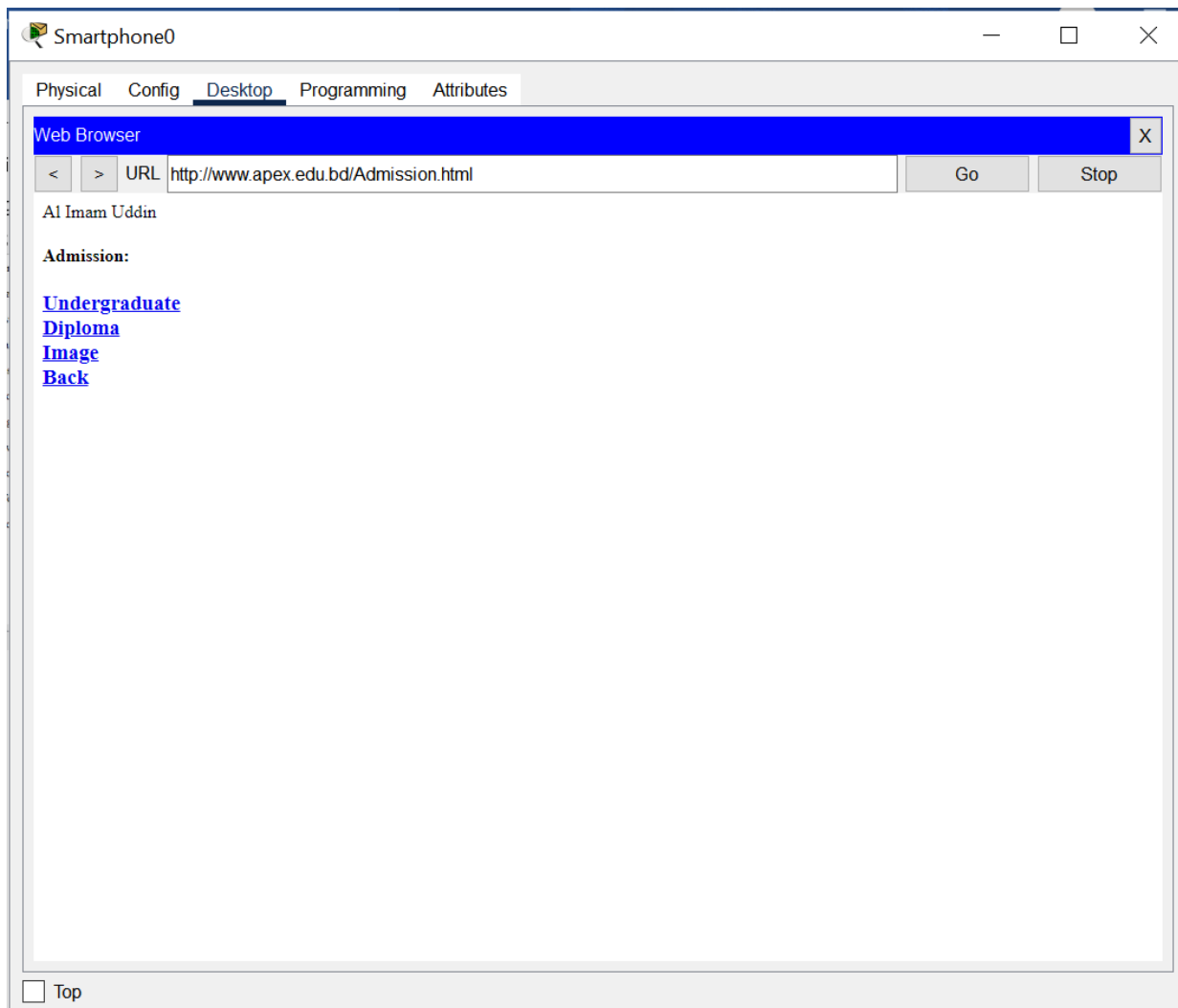


Figure 18: University's Admission page

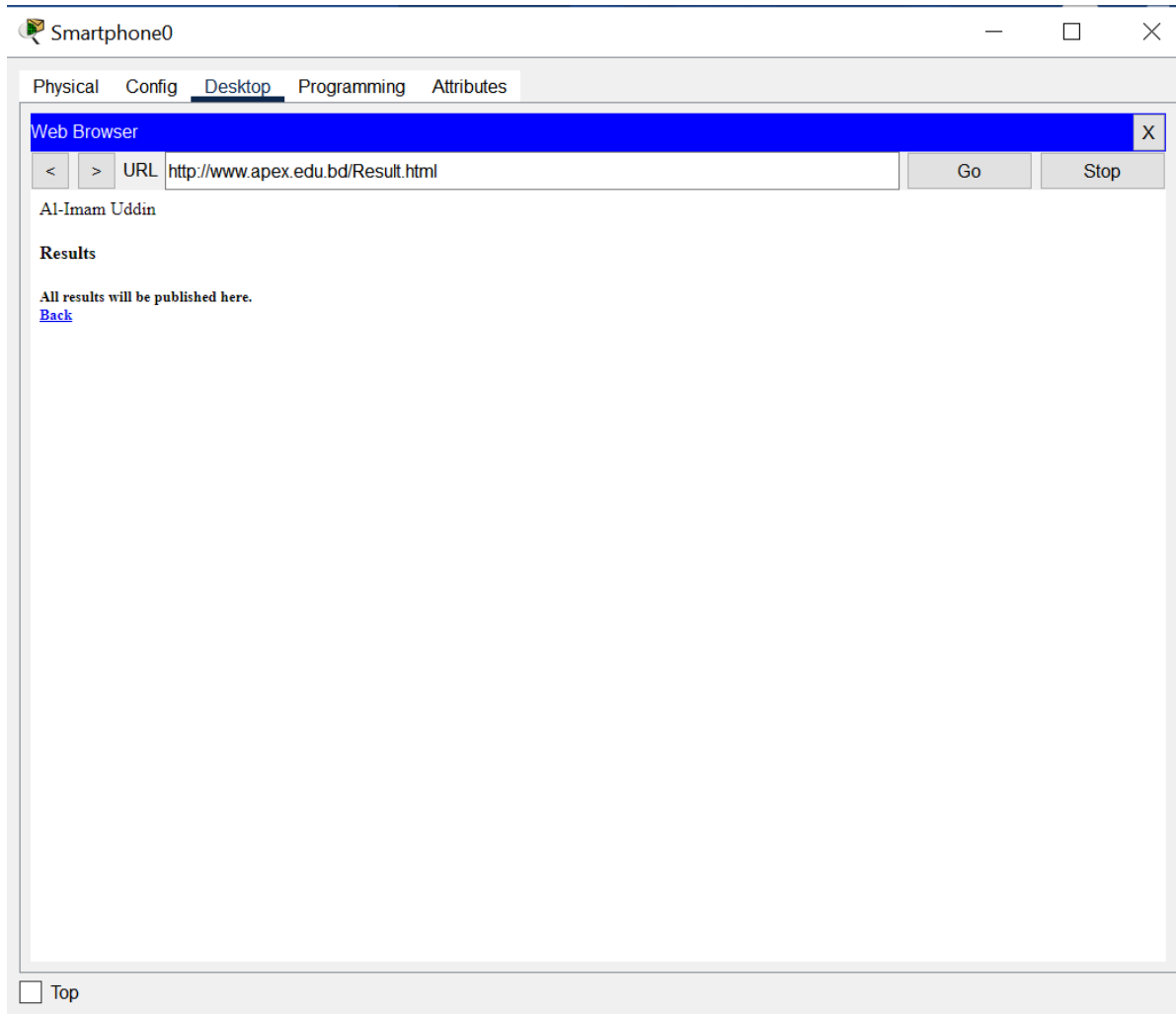


Figure 19: University's Result page

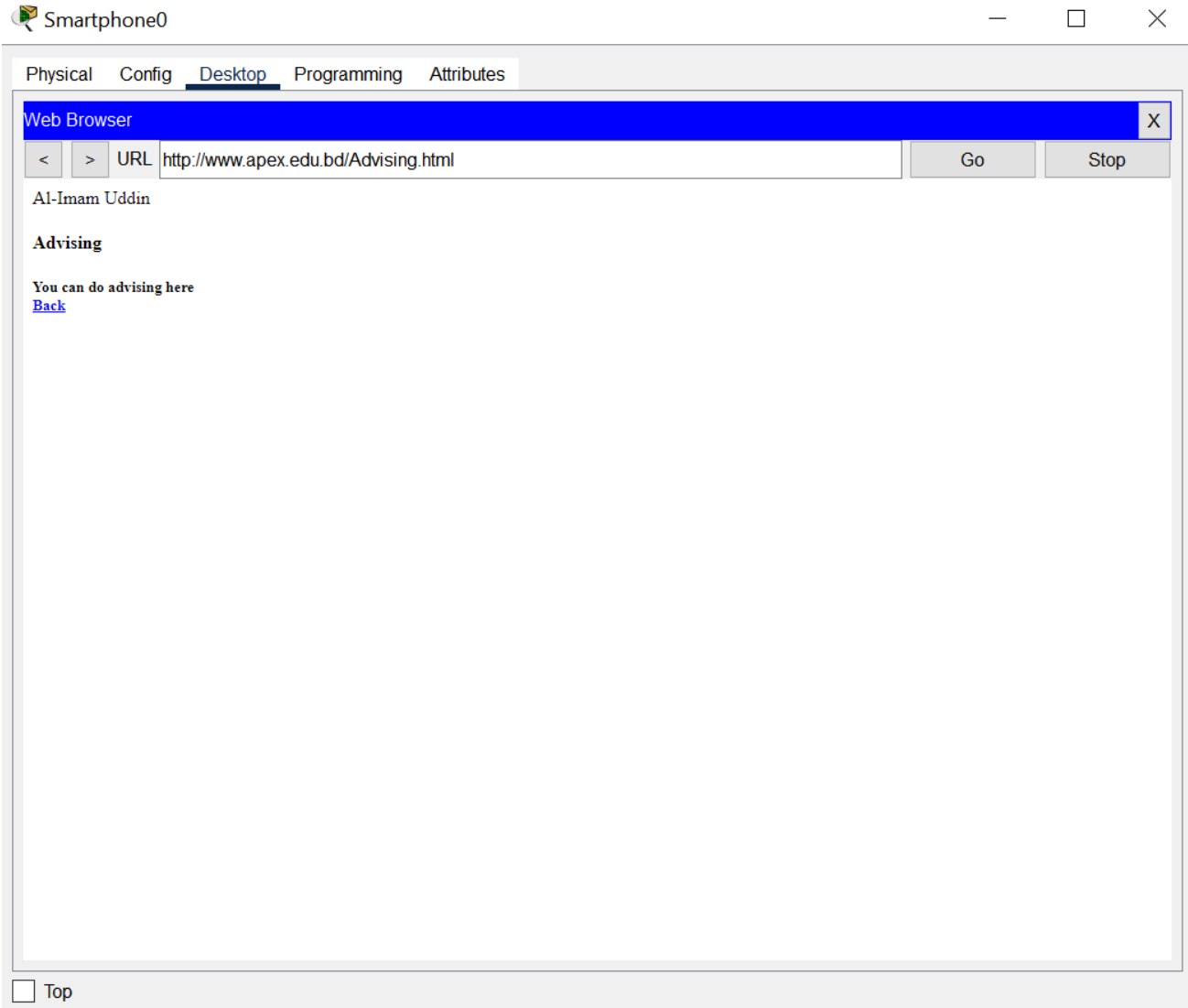


Figure 20: University's Advising page

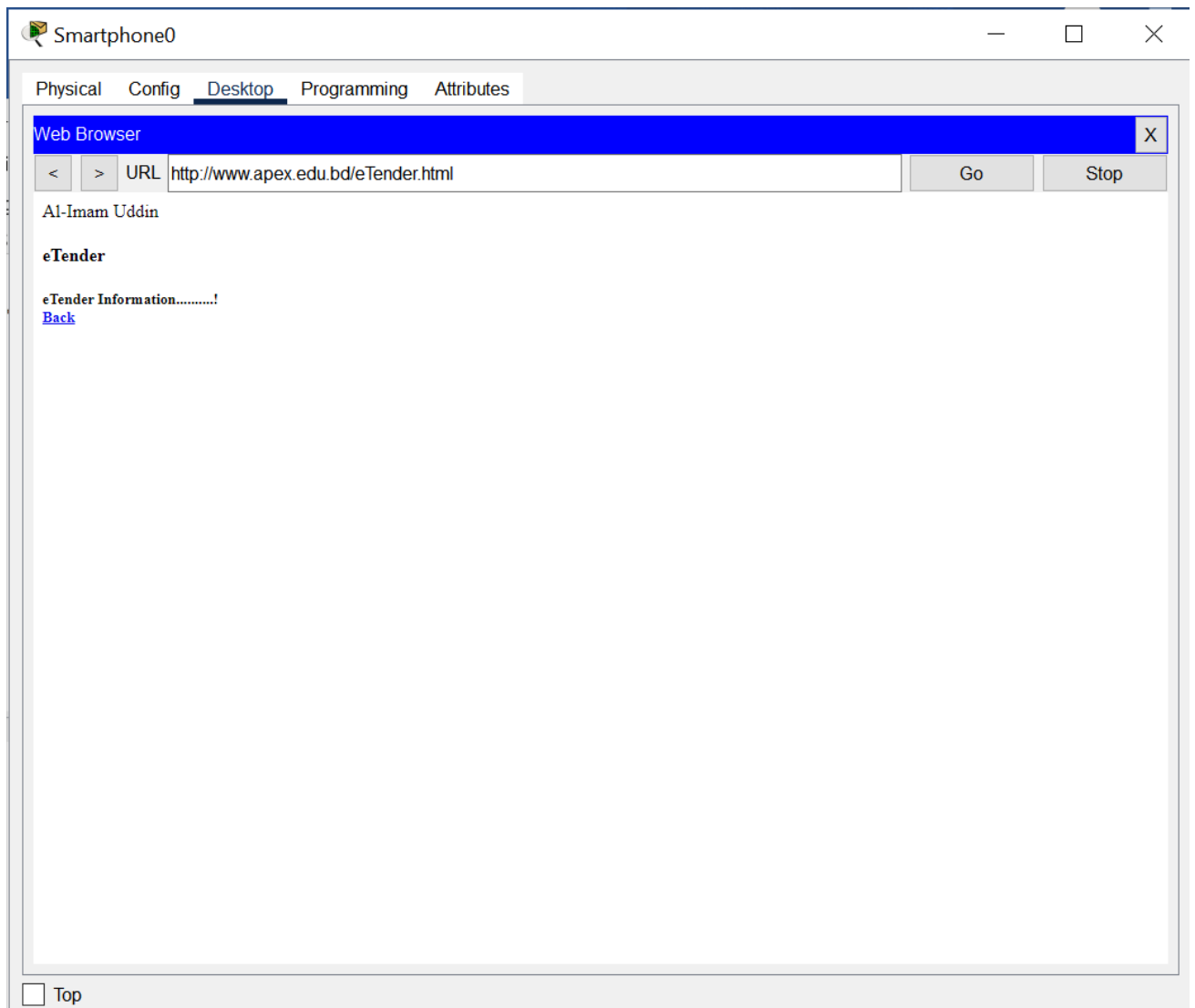


Figure 21: eTender page

Ping between 2 PC (Same network):

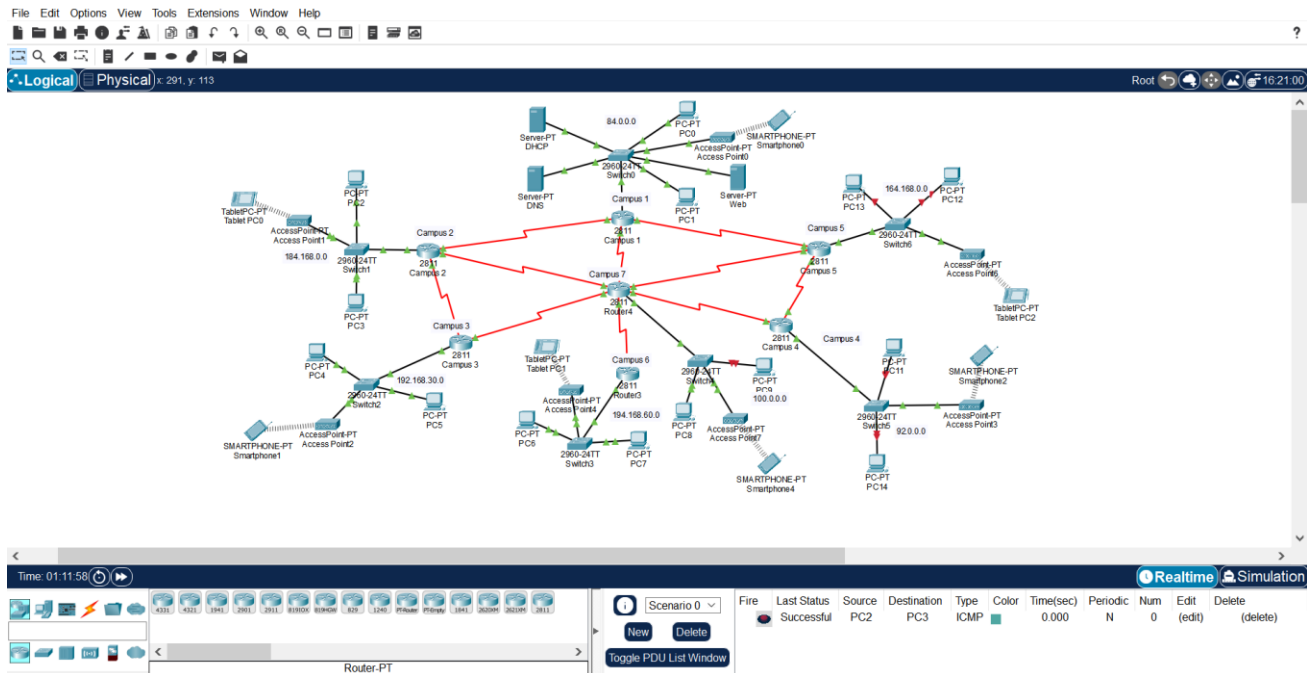


Figure 22: Sending ICMP packet in same network

Ping between 2PC (Different Network):

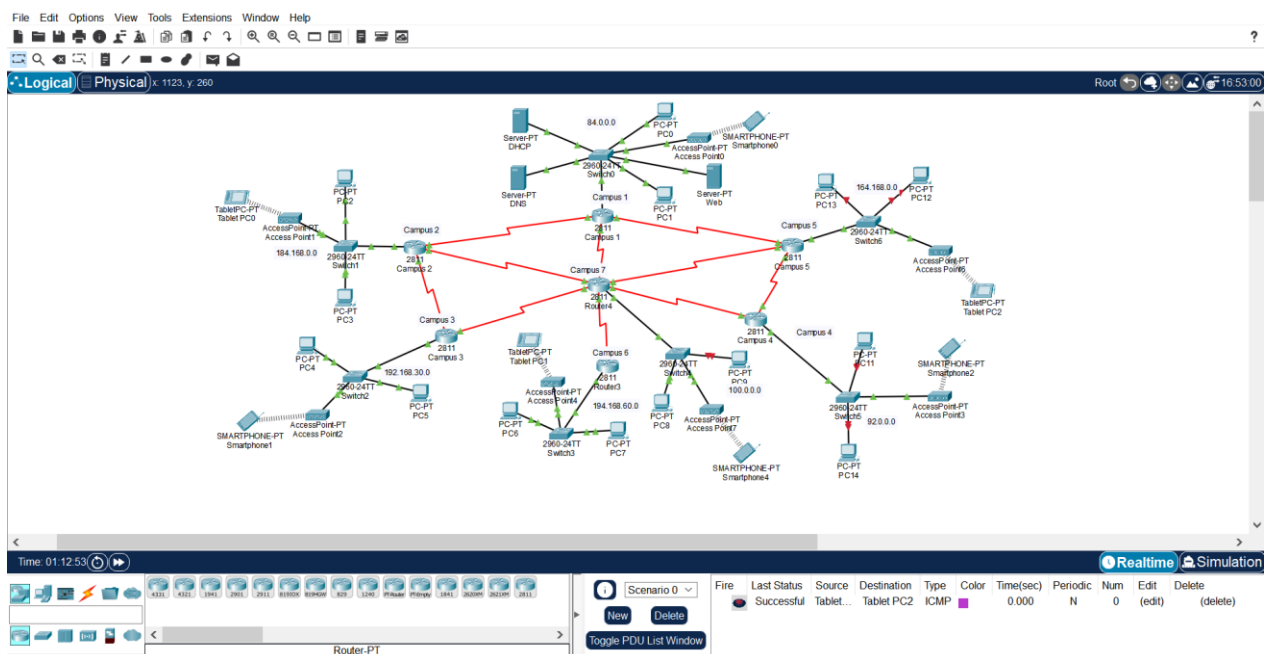


Figure 23: Sending ICMP packet in different network

Wireless Device:

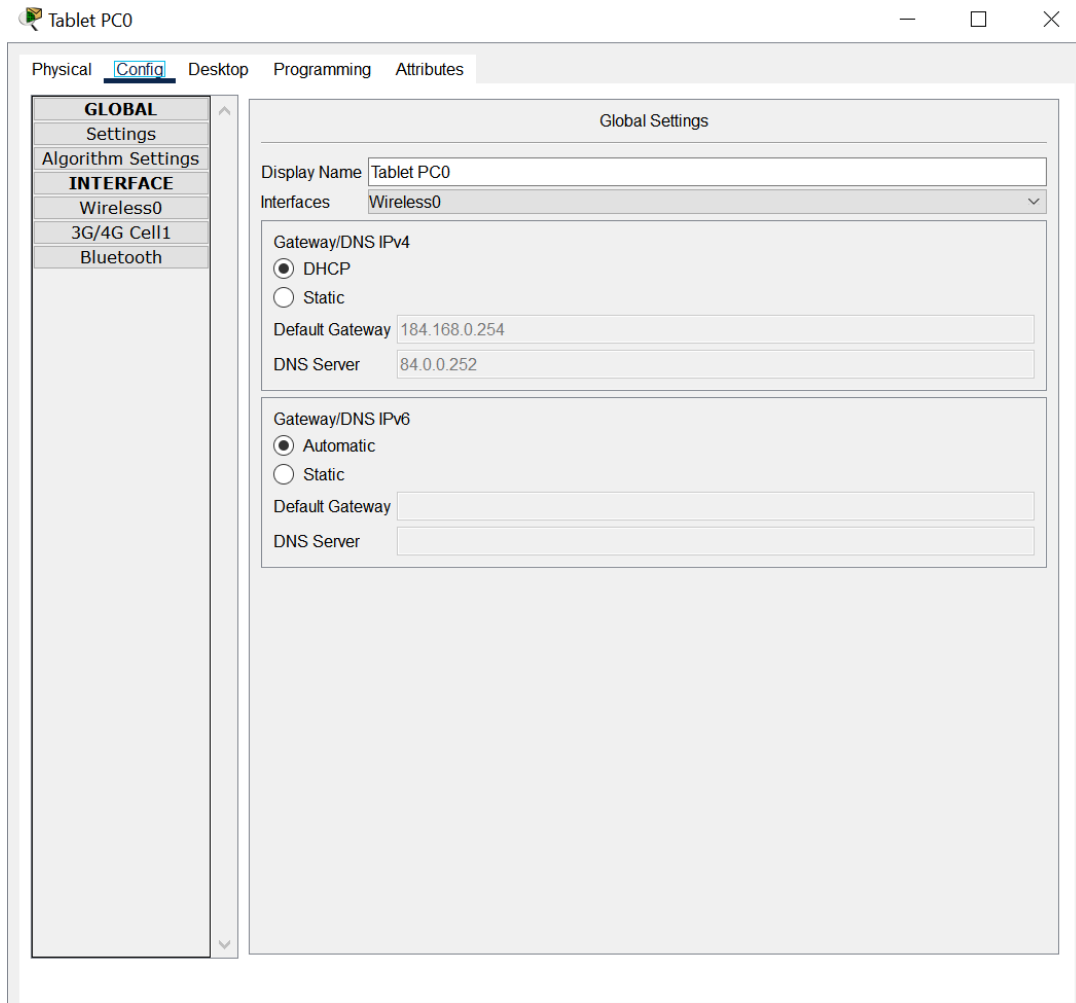


Figure 24: Config wireless device Laptop

Conclusion:

To complete the project flawlessly, I tried my best. Through the use of devices including computers, switches, routers, and wireless routers, I was able to fully simulate an intricate network for this assignment. Without any issues, all of these devices were able to communicate with one another via the network. To display the University's internet page, I also configured a dedicated server. With HTML, a unique type of code, I even altered the website's appearance. When a computer needs an IP address, I added a system that assigns them all a unique number. From this course and assignment, I gained a lot of knowledge.