MINISTRY OF EDUCATION
IMAM ABDULRAHMAN BIN
FAISAL UNIVERSITY
COLLEGE OF COMPUTER
SCIENCE& INFORMATION
TECHNOLOGY

وزارة التعليم
جامعة الإمام
عبد الرحمن بن فيصل
كلية علوم الحاسب
وتقنية المعلومات

جامعة الإمام عبد الرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

University Network

IT Infrastructure Management (CIS 326)

2nd Semester 2022-2023

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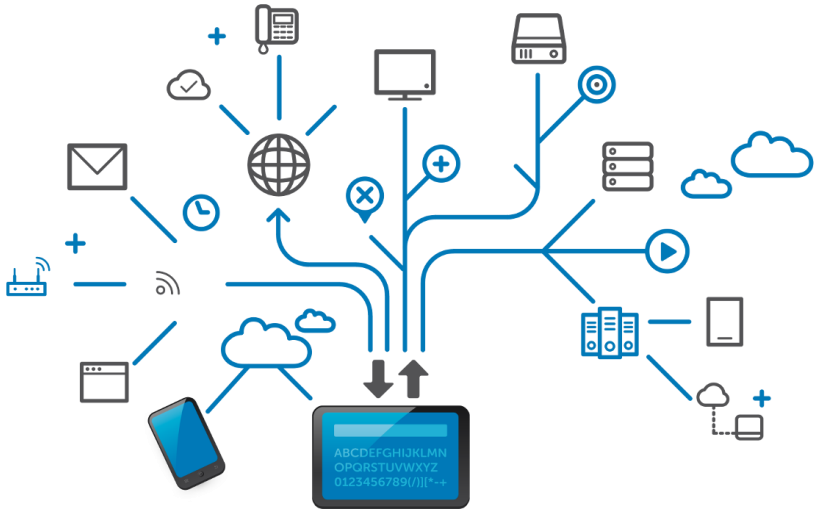
Instructor: dr. Ruba Alsalah



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Abstract

The purpose of this project is to design and configure a network for a small educational organization. We made a well-built university network contains a several colleges connected together to benefit the students and to ease the educational process. We designed our topology specifically to meet the requirements of the university network and according to the project manual. We used many devices such as PCs, laptops, tablets, light weight access points, wireless LAN controllers and many other things, and we connected them with switches and routers using some protocols (OSPF/RIP) to build this network.

Introduction

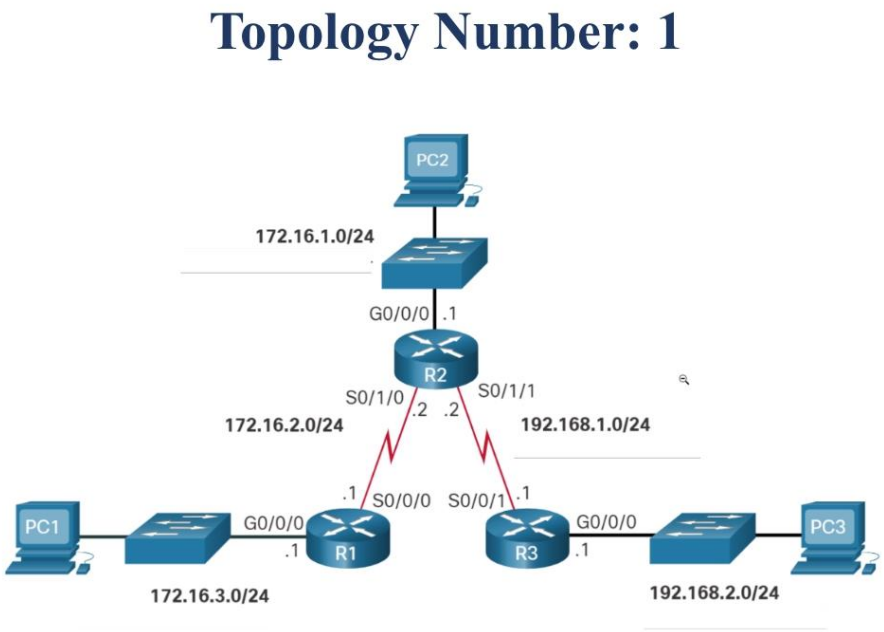
IT infrastructure is defined as the equipment (hardware), software, multiple and composite network resources services that is necessary to sustain, operate and manage an enterprise IT environment. IT infrastructure enables an organization to provide IT solutions and services to its employees, partners or clients. It is usually internal to an organization and deployed on its own premises (Techopedia, 2022).

In our university network, we used three routers to enable connections between our LANs. We used four switches, and each switch has a Vlan that represents a college (nursing - Computer science - engineering) and one of the Vlans represents (Faculty/Staff). Also, we used wireless LAN controllers and lightweight access points beside the servers. The Wireless LAN Controller (WLC) acts as a central hub in the network and works together with Lightweight Access Points, and It handles the configuration of the wireless access points automatically. Also, it has a comprehensive understanding of the wireless LAN environment due to its central position. The WLC offers various services that reduce deployment costs, simplify management process, and provide multiple security layers. We also used many other devices such as PCs, laptops, tablets, and printers (Din, 2021).

Addressing Table

Device	Port	IP Address	Subnet Mask	Default Gateway
Router 0	GigabitEthernet 0/0	172.16.1.1	255.255.255.0	N/A
	Serial 0/1/0	172.16.2.2	255.255.255.0	
	Serial 0/1/1	192.168.1.2	255.255.255.0	
Router 1	GigabitEthernet 0/0	172.16.3.1	255.255.255.0	N/A
	Serial 0/1/0	172.15.2.1	255.255.255.0	
Router 2	GigabitEthernet 0/0	192.168.2.1	255.255.255.0	N/A
	Serial 0/1/0	192.168.1.1	255.255.255.0	
PC 0	FastEthernet0	172.16.1.4	255.255.255.0	172.16.1.1
PC 3		172.16.1.2	255.255.255.0	
PC 4		172.16.1.3	255.255.255.0	
PC 1	FastEthernet0	172.16.3.2	255.255.255.0	172.16.3.1
PC 5		172.16.3.7	.255.255.255.0	
PC 7		172.16.3.9	255.255.255.0	
PC 2	FastEthernet0	192.168.2.5	255.255.255.0	192.168.2.1
Laptop0	FastEthernet0	172.16.1.6	255.255.255.0	172.16.1.1
Laptop 2	FastEthernet0	172.16.3.5	255.255.255.0	172.16.3.1
Laptop 4		172.16.3.8	255.255.255.0	
Laptop 1	FastEthernet0	192.168.2.2	255.255.255.0	192.168.2.1
Laptop 3		192.168.2.3	255.255.255.0	
Laptop 5		192.168.2.103	255.255.255.0	
WLAN3	Management	172.16.3.4	255.255.255.0	172.16.3.1
WLAN1		192.168.2.254	255.255.255.0	192.168.2.1
Server0	FastEthernet0	172.16.3.6	255.255.255.0	172.16.3.1
Server1		192.168.2.7	255.255.255.0	192.168.2.1
Printer0	FastEthernet0	172.16.1.5	255.255.255.0	172.16.1.1
Printer1		172.16.3.3	255.255.255.0	172.16.3.1

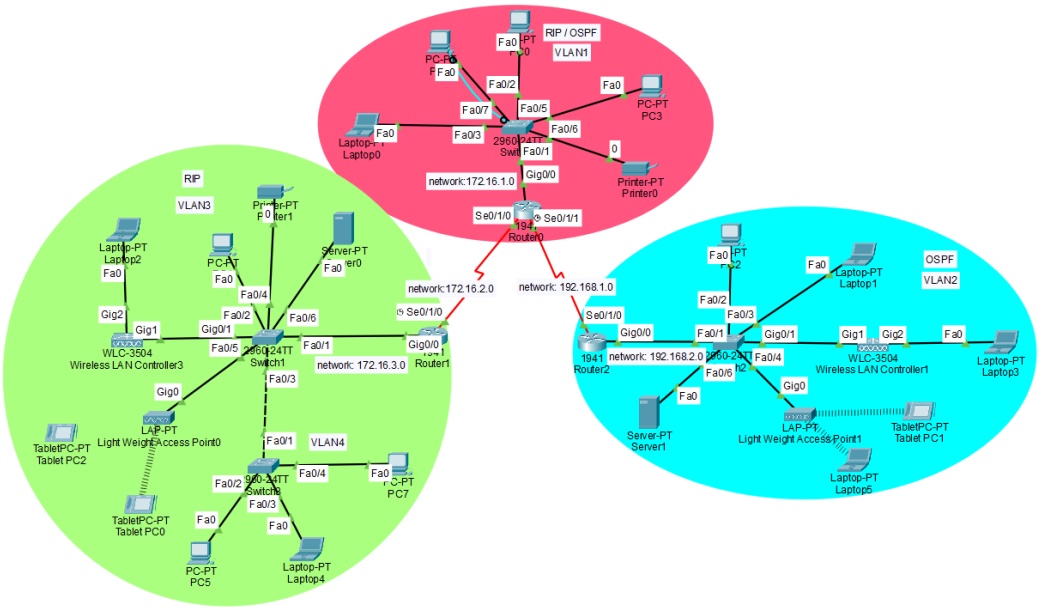
Our topology and setup



We used:

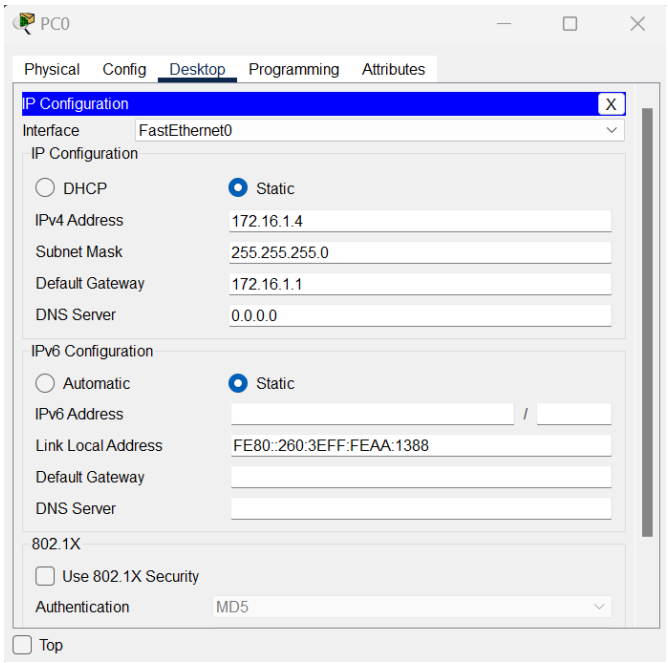
Name	Quantity
PC'S	7
Tablet	3
Laptops	6
Switches	4
Routers	3
Printer	2
Wireless LAN Controller	2
Lightweight Access Point	2
Server	2
Crossover cables	1
Straight – through cables	23
Serial cables	2
Console cables	1

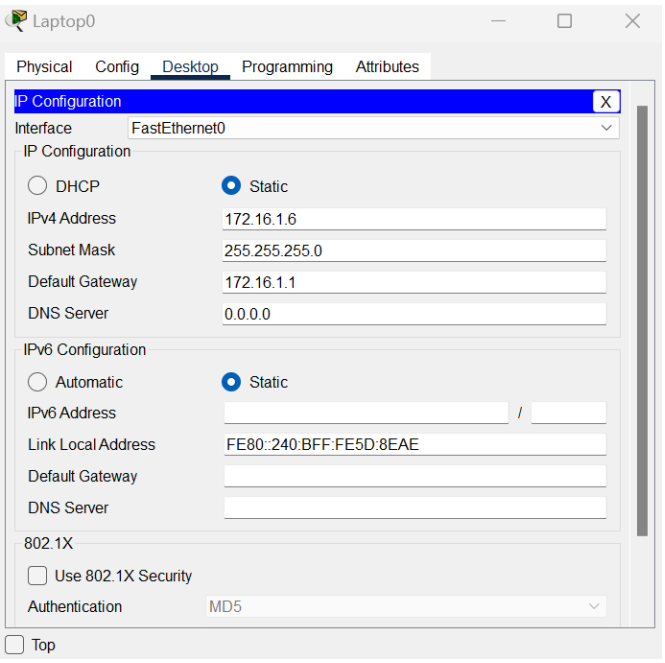
The topology set up:



PCs and Laptops static configuration

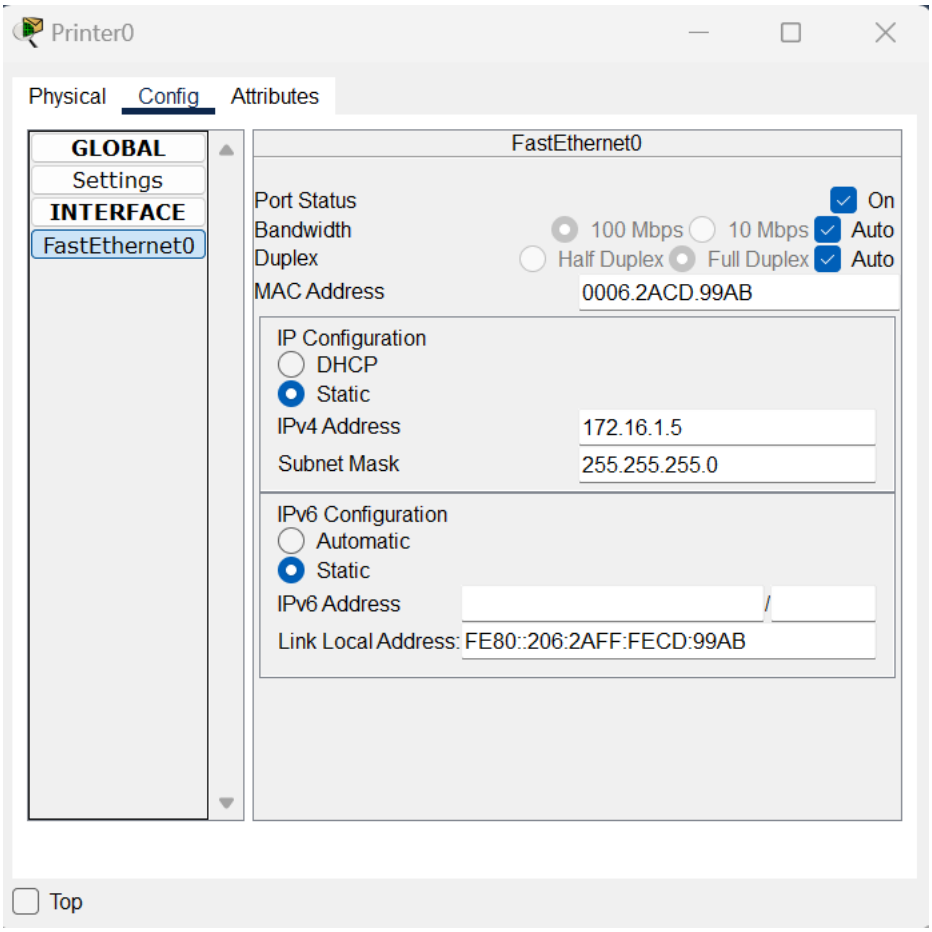
1- Go to the PC or the Laptop and click on desktop.
2- Click on IP configuration and enter the IP address.





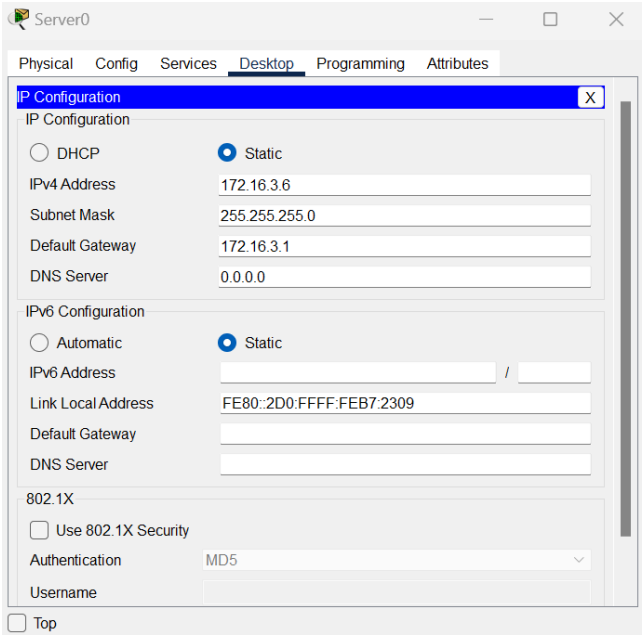
Steps of Configuration a printer

1- Assign the IP address and subnet mask.
2- Assign the default gateway.

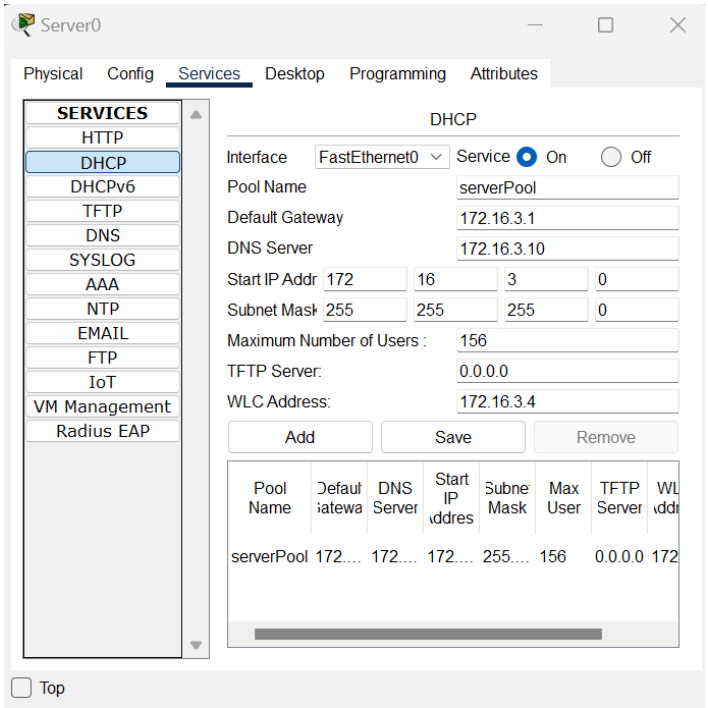


Configure DHCP Server

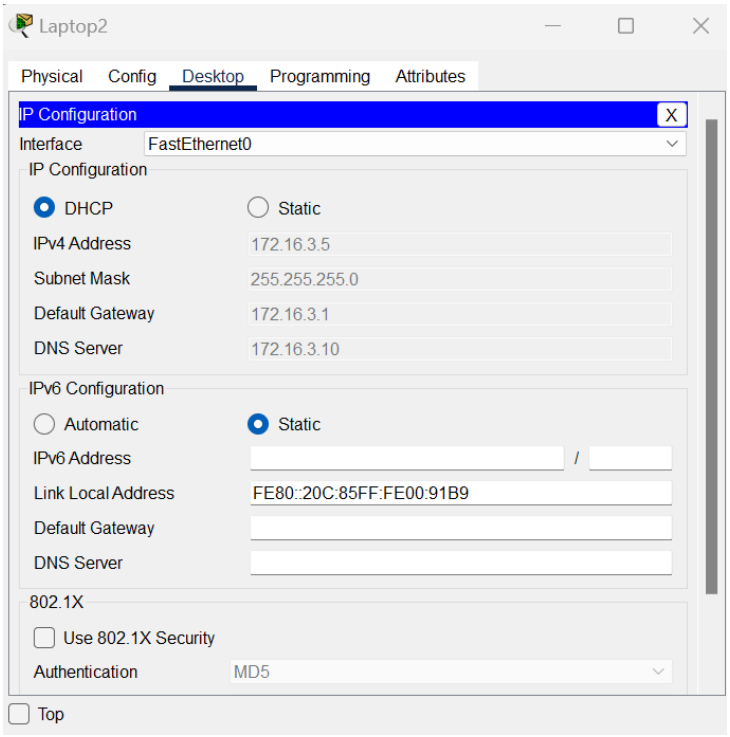
1- Go to the server and click on desktop then click on IP configuration to set the IP address, subnet mask, and default gateway.



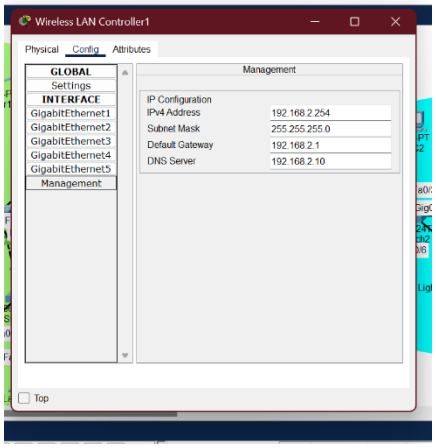
2- Go to the services, choose DHCP, turn it on and set the network information needed for DHCP for sending the IP addresses for the DHCP devices then click on add.

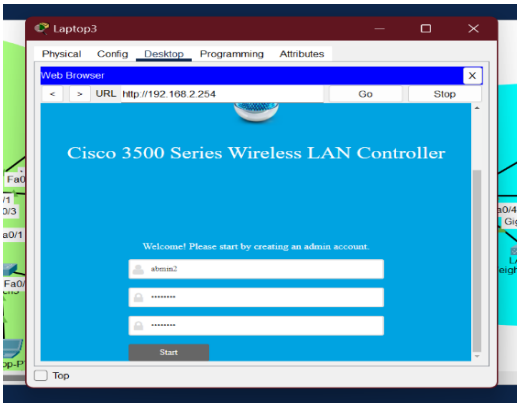


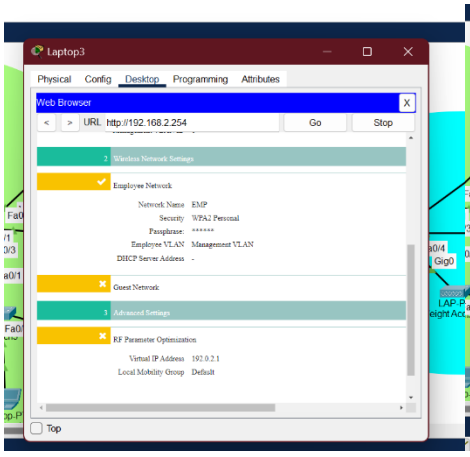
3- Go to the laptop using same steps mentioned before for configuring the laptop, but this time we click on DHCP.

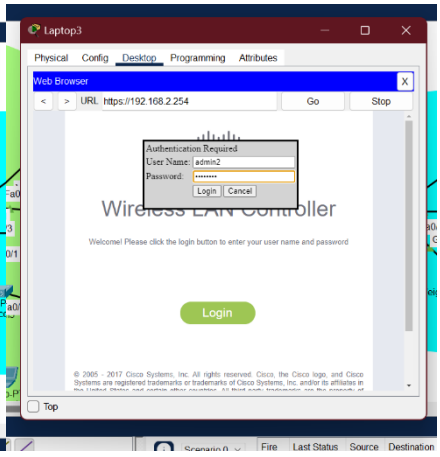


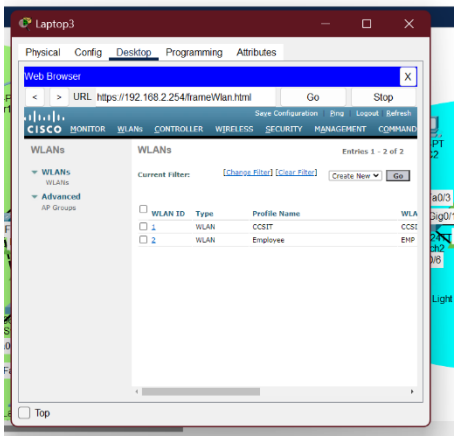
Wireless LAN Controller & lightweight Access Point Configuration





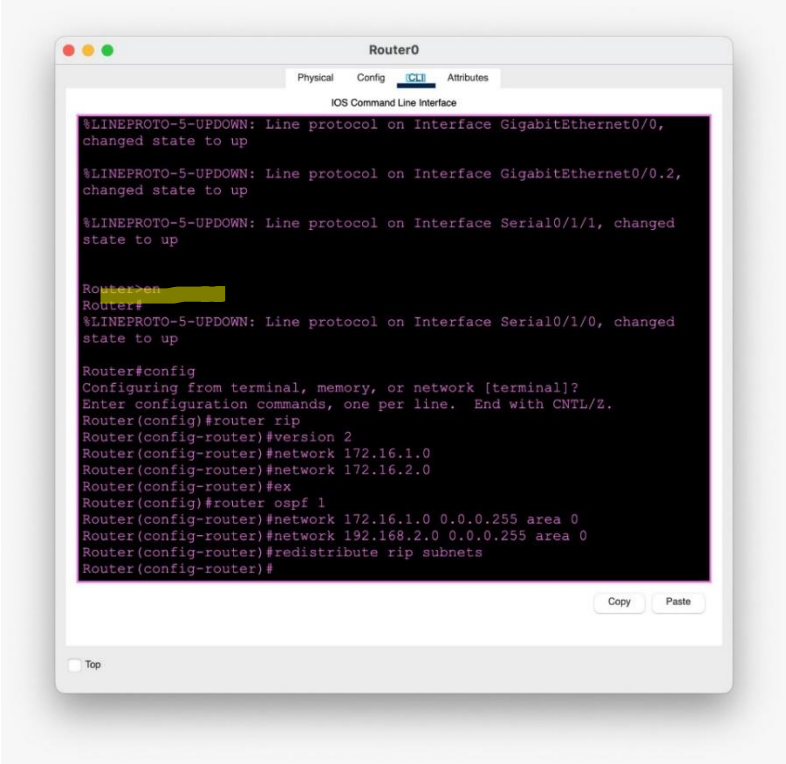


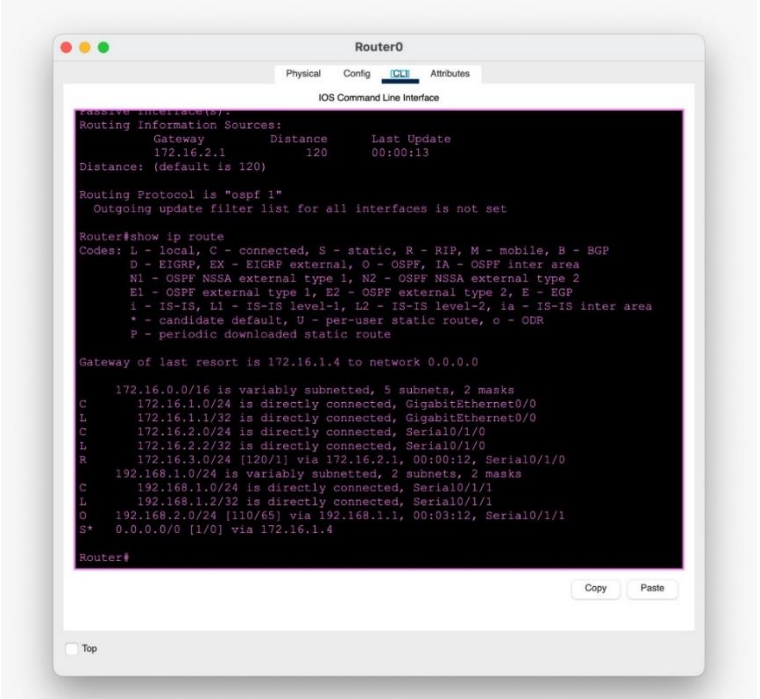




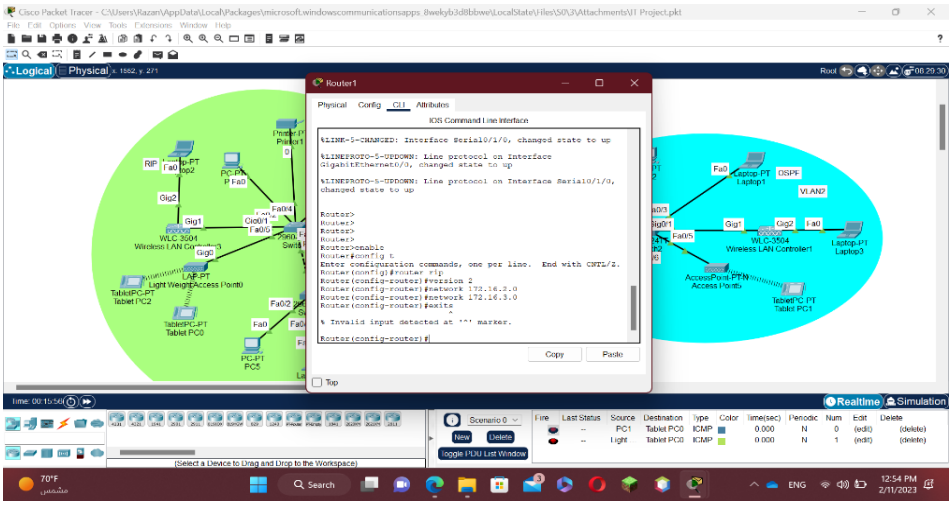
Configure RIPv2 and OSPF Routing

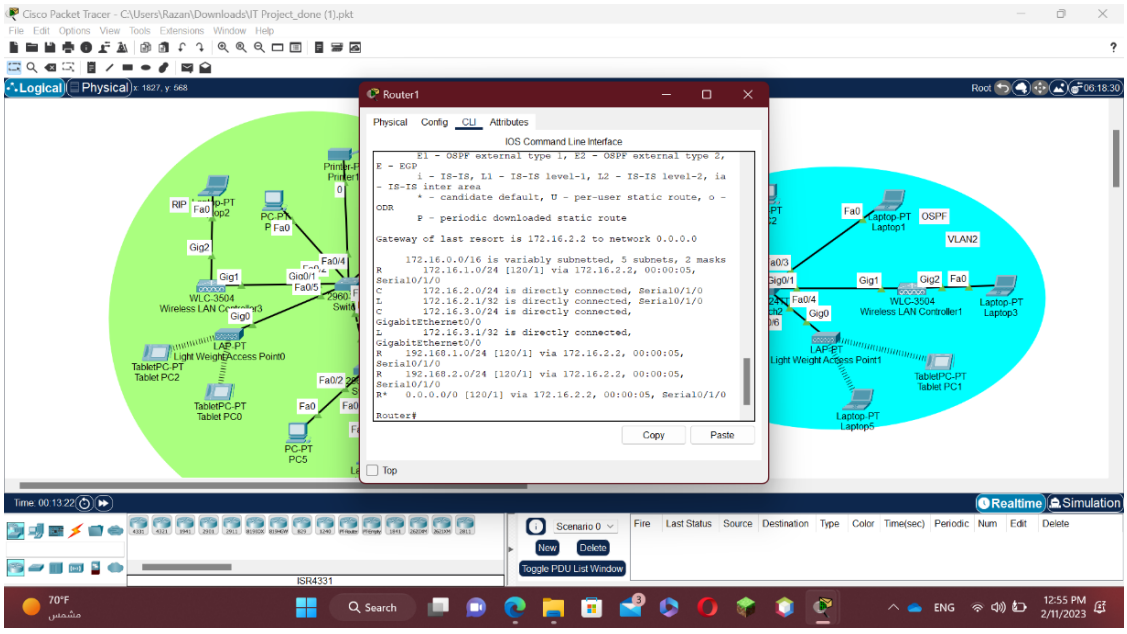
- **Router0 RIPv2 and OSPF Routing:**
  We configure RIP protocol router, and we used show ip protocols & show ip route commands.





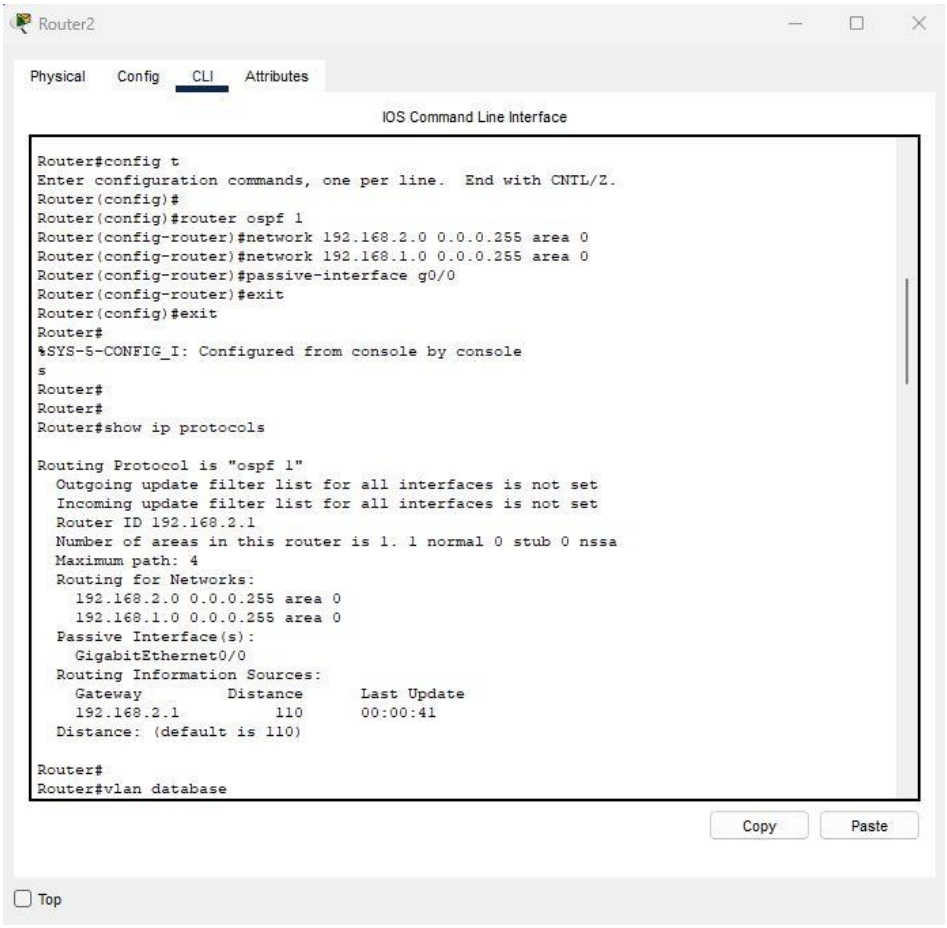
Router1 RIPv2 routing:



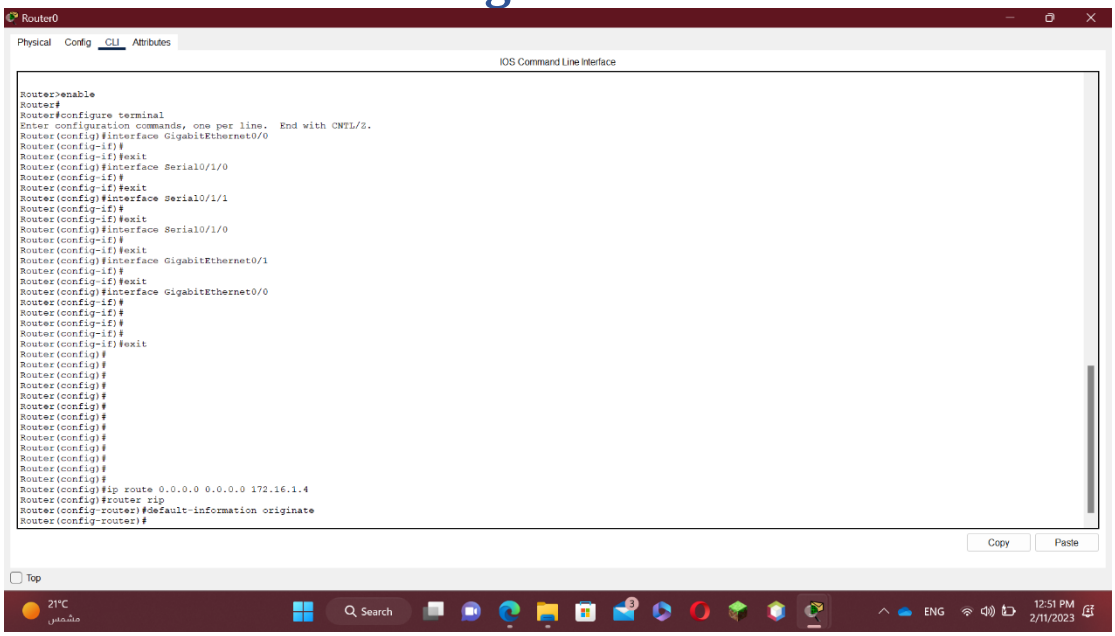


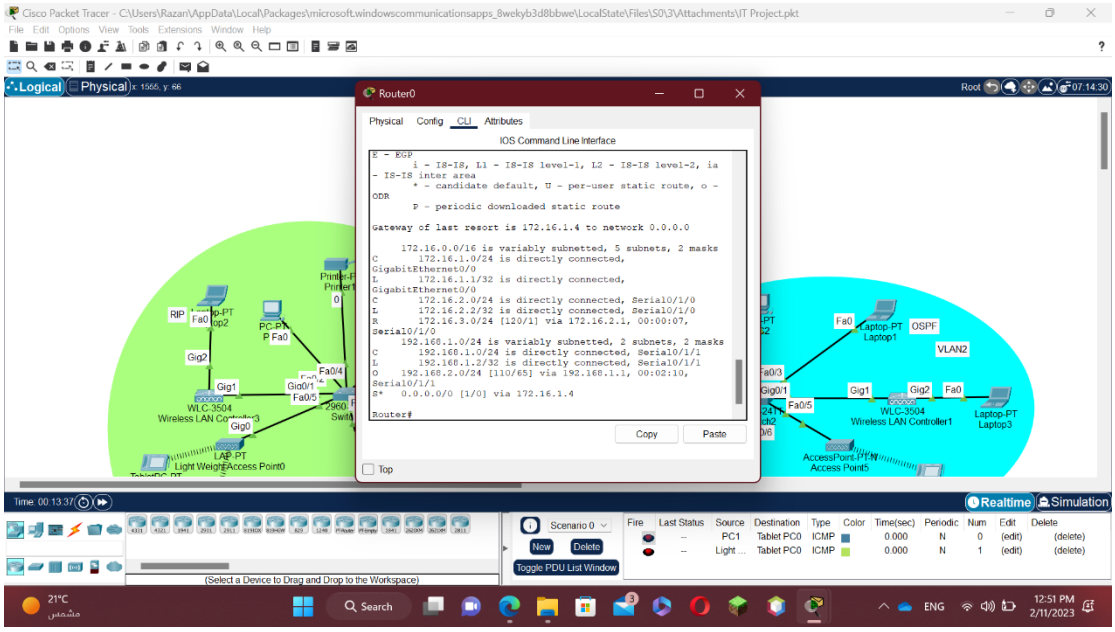
- **Router2 OSPF routing:**

  We configure OSPF router, and we used show ip protocols command.



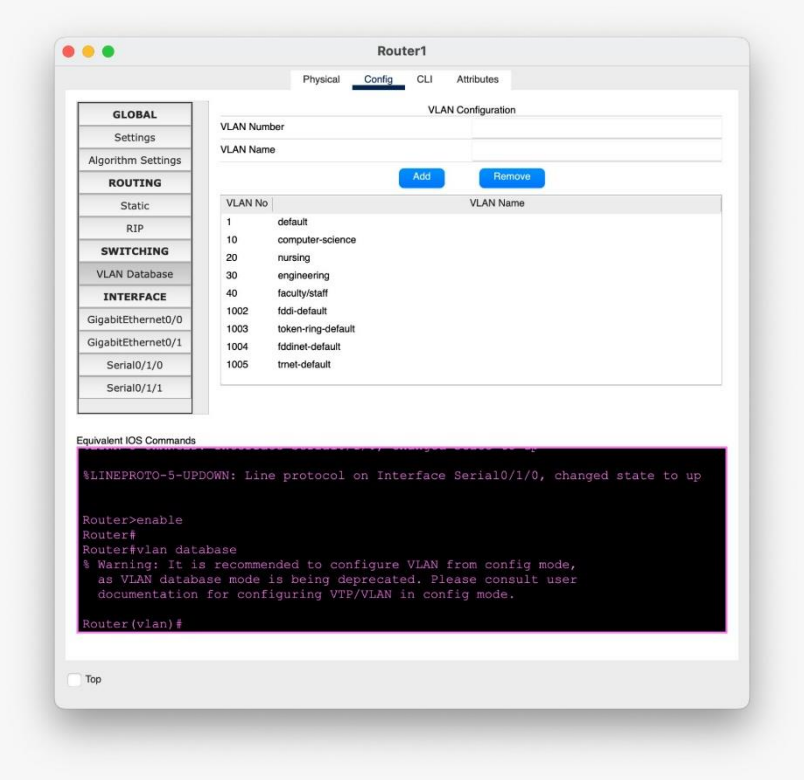
Default router0 configuration.

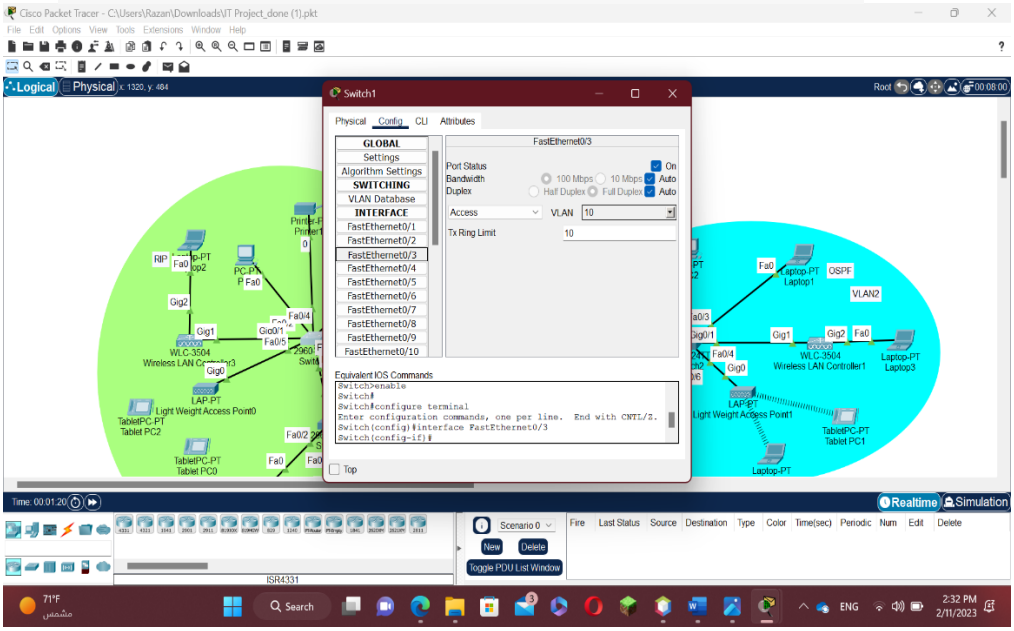




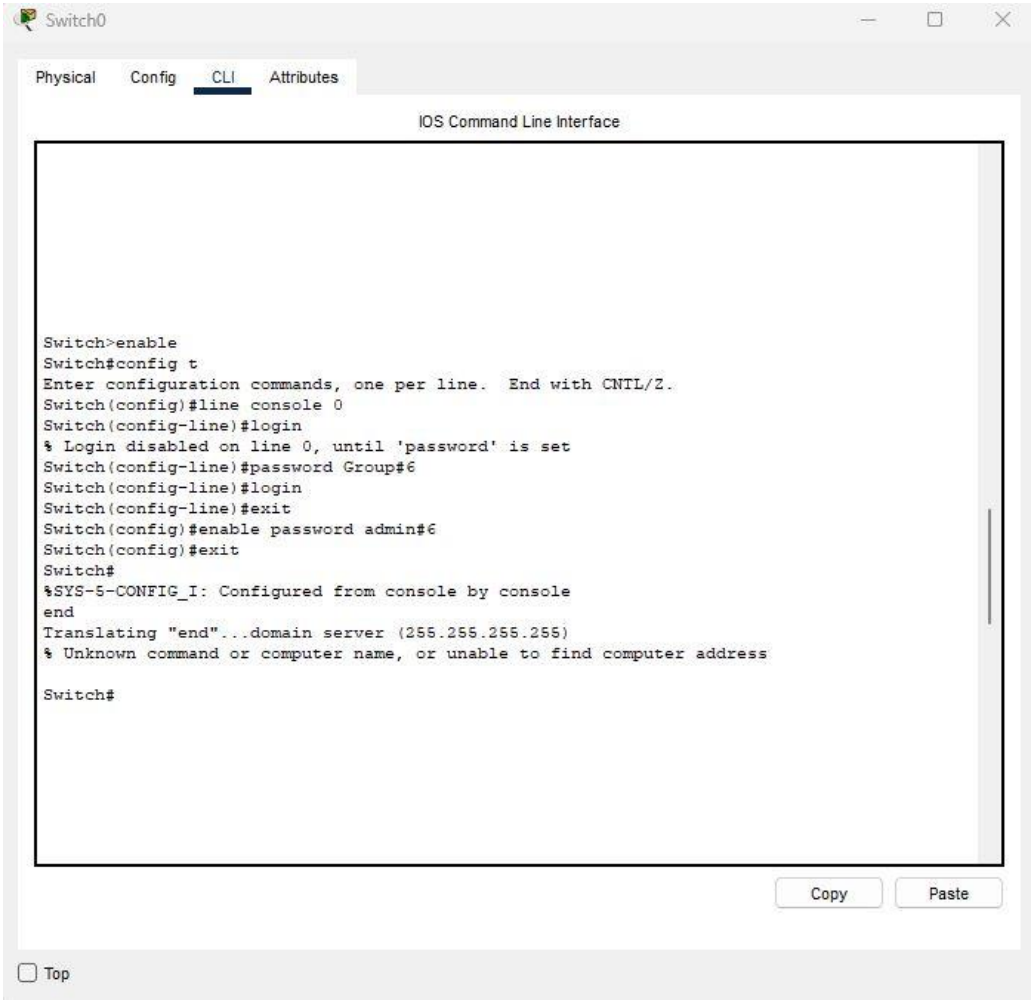
VLANs Configuration

- We configured 4 VLANs: nursing – computer science – engineering – faculty/Staff, then we use VLAN brief command.

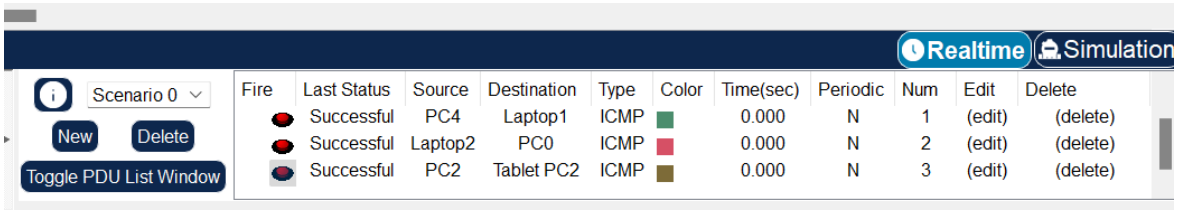




Console Cable Configuration



Check connection between all networks and VLANs.



Conclusion

Finally, after we create, set up and configure the VLAN network including switches, routers, and so many other devices. Also configuring the OSPF and RIPv2 in routers, now the whole university building can communicate with each other directly. So, a connection test will work between any two sites even from deferent VLAN, and we will finally acquire the wanted result and goals.

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