CS 361 Computer Networks Lab

Assignment 7

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Questions:

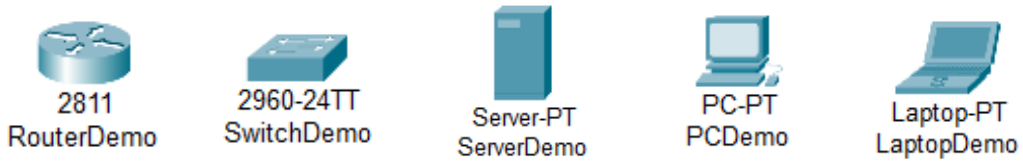
1. Define and differentiate between a server and a router.

Server	Router
Provides specific services or resources to clients.	Directs data traffic between devices and networks.
Handles and fulfills requests from client computers.	Routes data packets between devices and networks.
File storage, web hosting, email processing, database management, etc.	Data packet routing, network address translation (NAT), firewall, etc.
Typically, has more powerful processing capabilities.	Focused on efficient data routing, less emphasis on processing power.
Connected to the network to serve clients.	Connected to the network to serve clients.
Primarily communicates with client devices.	Primarily communicates with other routers and devices on different networks.
Primarily communicates with other routers and devices on different networks.	Primarily communicates with other routers and devices on different networks.

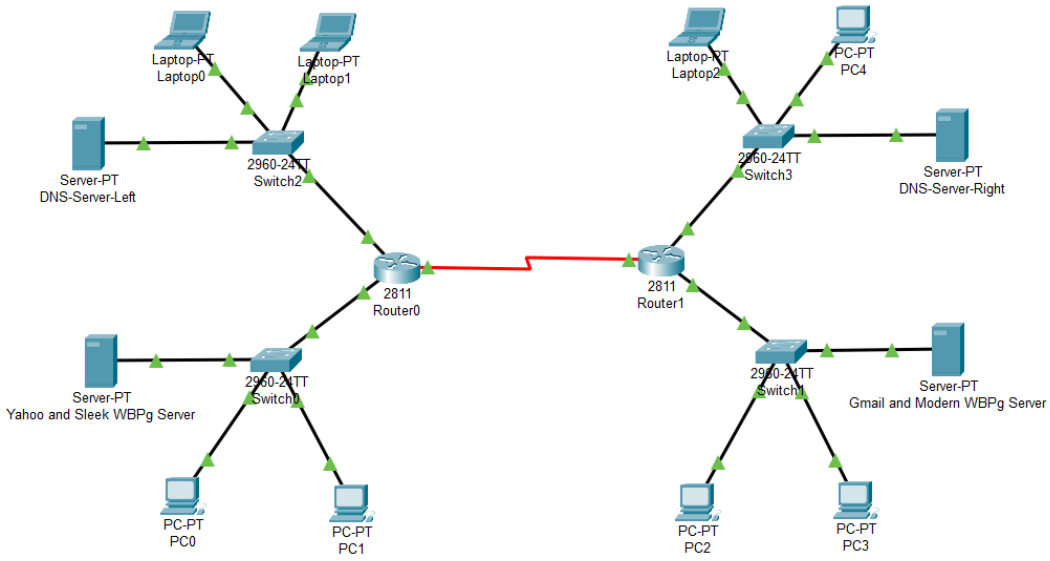
Manages data storage, retrieval, and processing for specific applications.	Manages the routing of data packets based on network addresses.
Typically located within the internal network.	Positioned at the boundary between different networks.
May have security measures tailored to specific services (e.g., authentication, access control).	Includes features such as firewall settings, network address translation (NAT), and virtual private network (VPN) support.
Manages requests from clients and allocates resources accordingly.	Controls the flow of data packets, optimizing the path for efficient transmission
Can be scaled based on the demand for specific services.	Scalable to accommodate growing network traffic and additional connected devices.

1. Make a complex network (as discussed in lab) with multiple PCs, servers (HTTP and Mail), switches and routers. Each server may be in a different subnet. Demonstrate transfer of emails between two different domains (e.g., Gmail and Yahoo). Also show the response of HTTP request from a PC that is in different subnet from the HTTP server.

Components used:



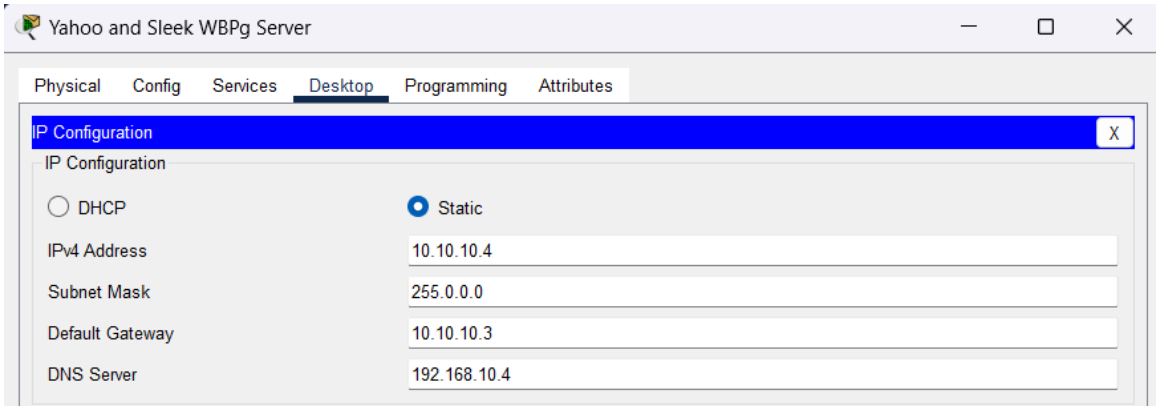
Network Diagram:

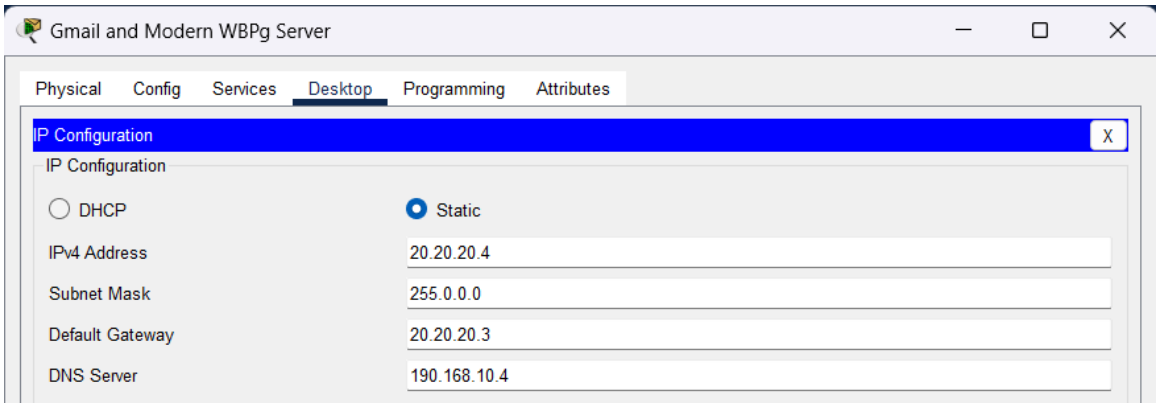


From the diagram, we can see that there are 2 web domains – Gmail and Yahoo, and 2 webpages – Sleek Webpage, and Modern Webpage (these are the names of the webpages). Yahoo and Sleek Webpage is hosted as a service on the left web server, Gmail and Modern Webpage is hosted as a service on the right web server.

Steps:

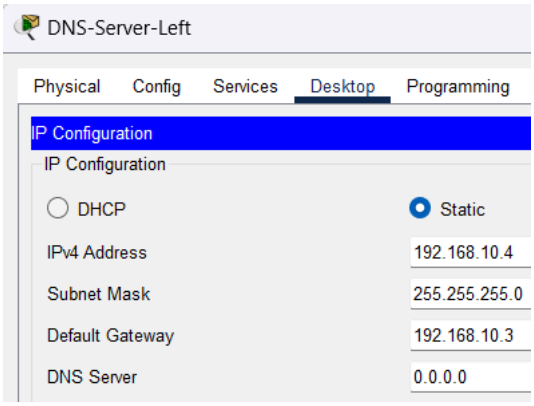
The IP addresses of the end devices are set initially, along with the default gateways. The same is done for the Web servers and DNS servers. An example of the webservers is shown:

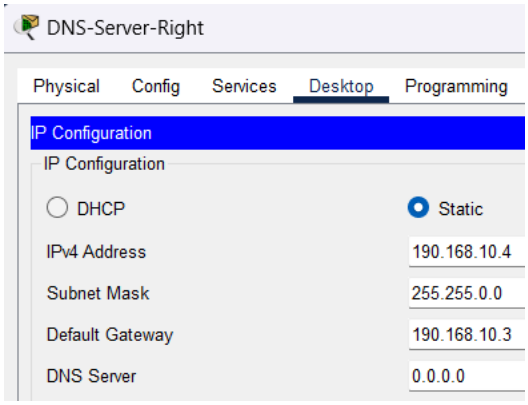




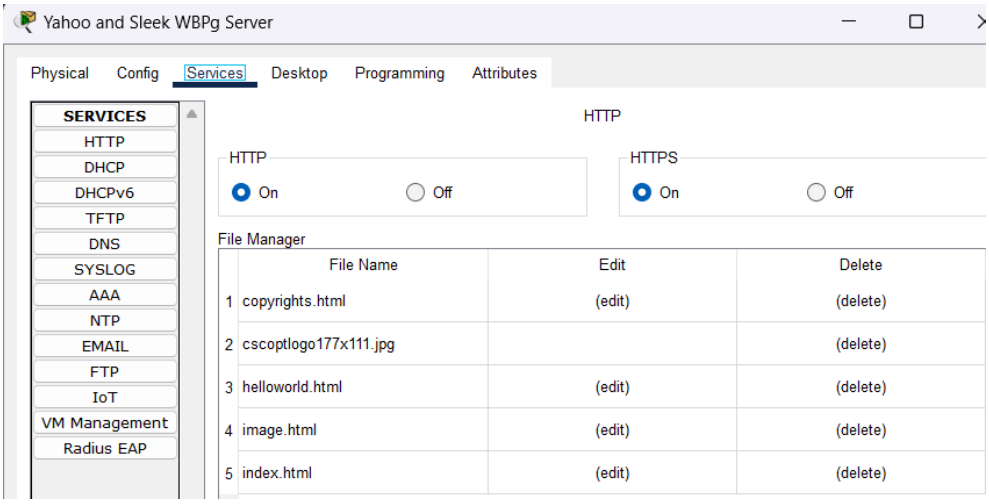
Note **Yahoo and Sleek WBPg server has the IP of the left DNS** and similarly **Gmail and Modern WBPg server has the IP of the right DNS.**

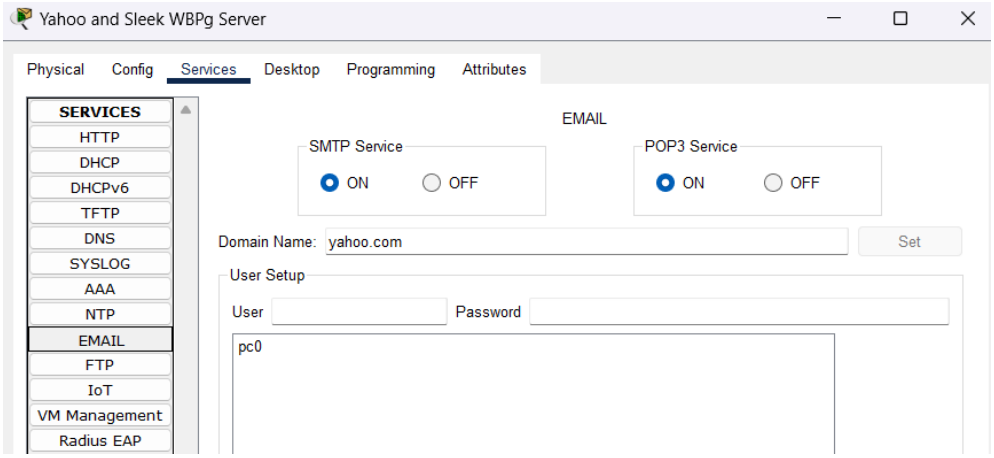
The DNS servers are configured as well:



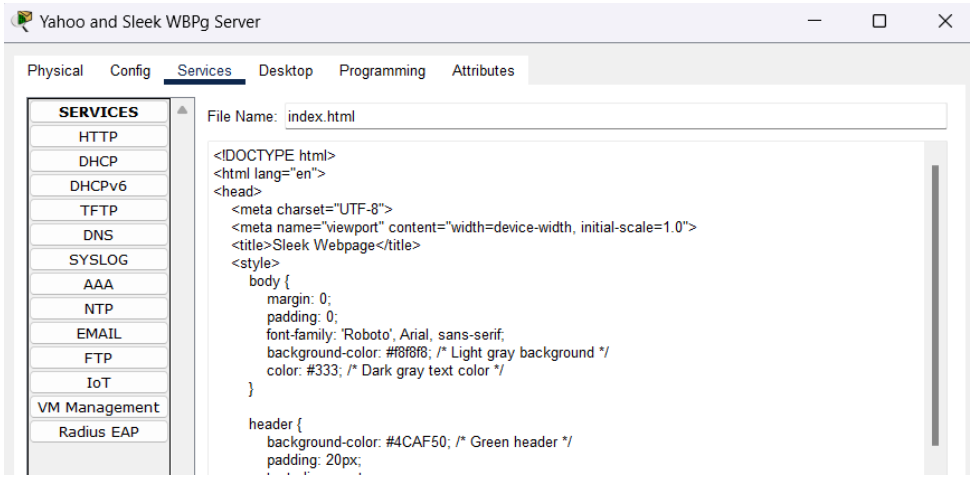


The webpage and the email domain are hosted for the **Yahoo and Sleek WBPg server** of the network.

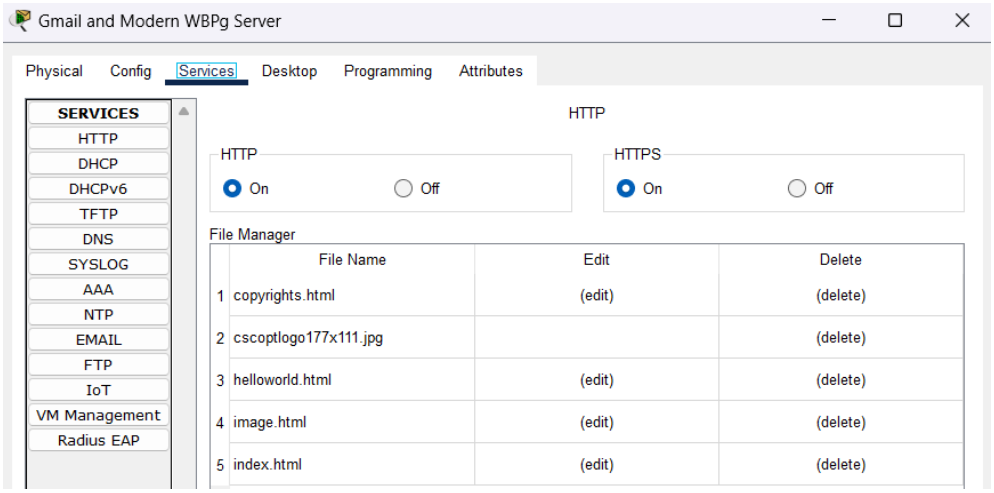


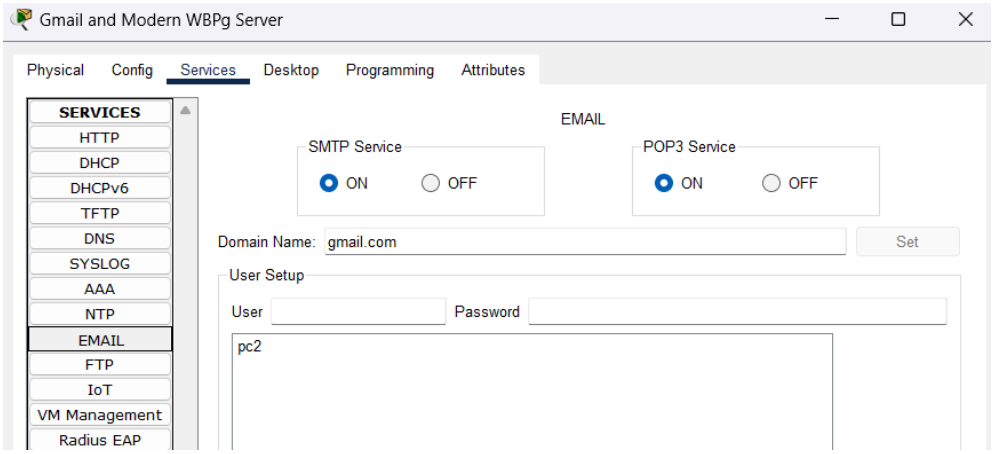


A snippet of the **Sleek Webpage** code has been shown below:

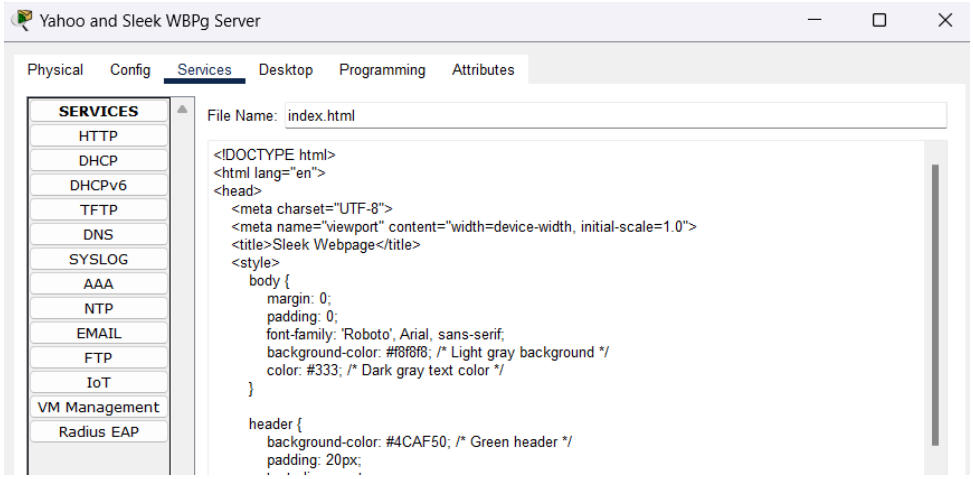


The webpage and the email domain are hosted for the **Gmail and Modern WBPg server** of the network.

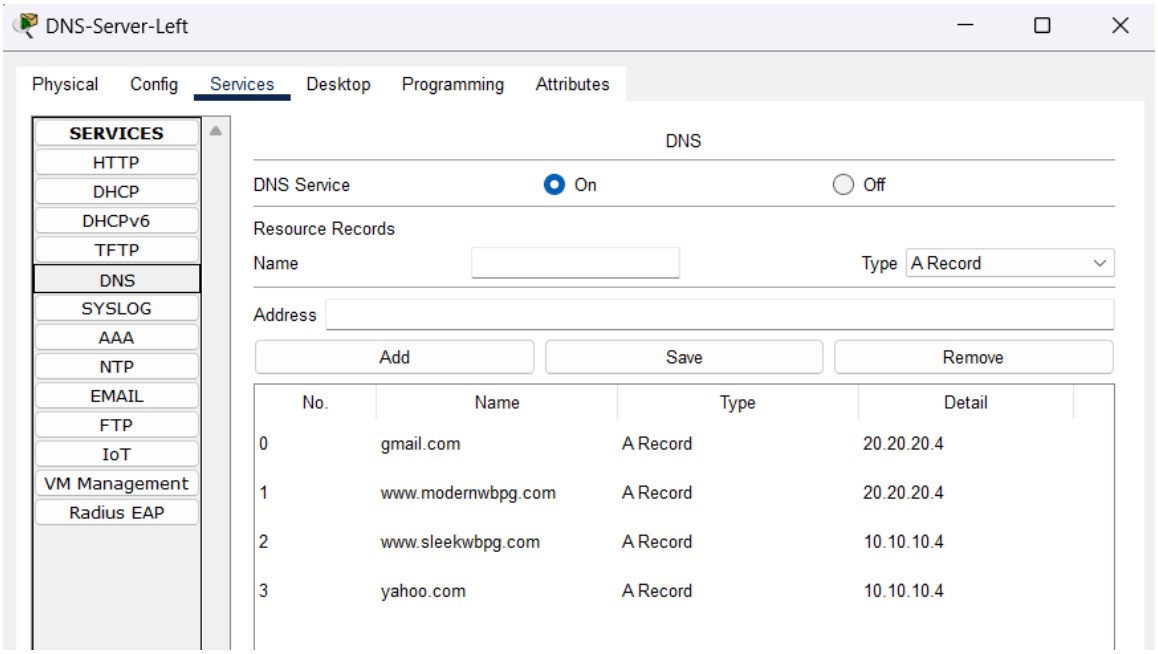


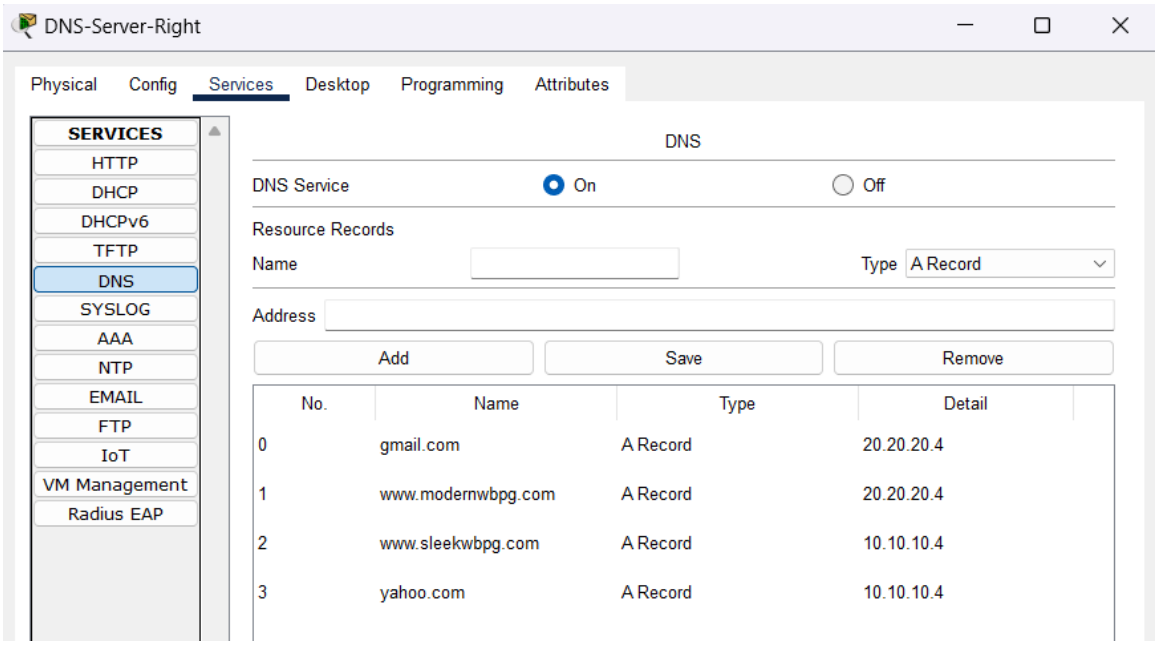


A snippet of the **Modern Webpage** code has been shown below:



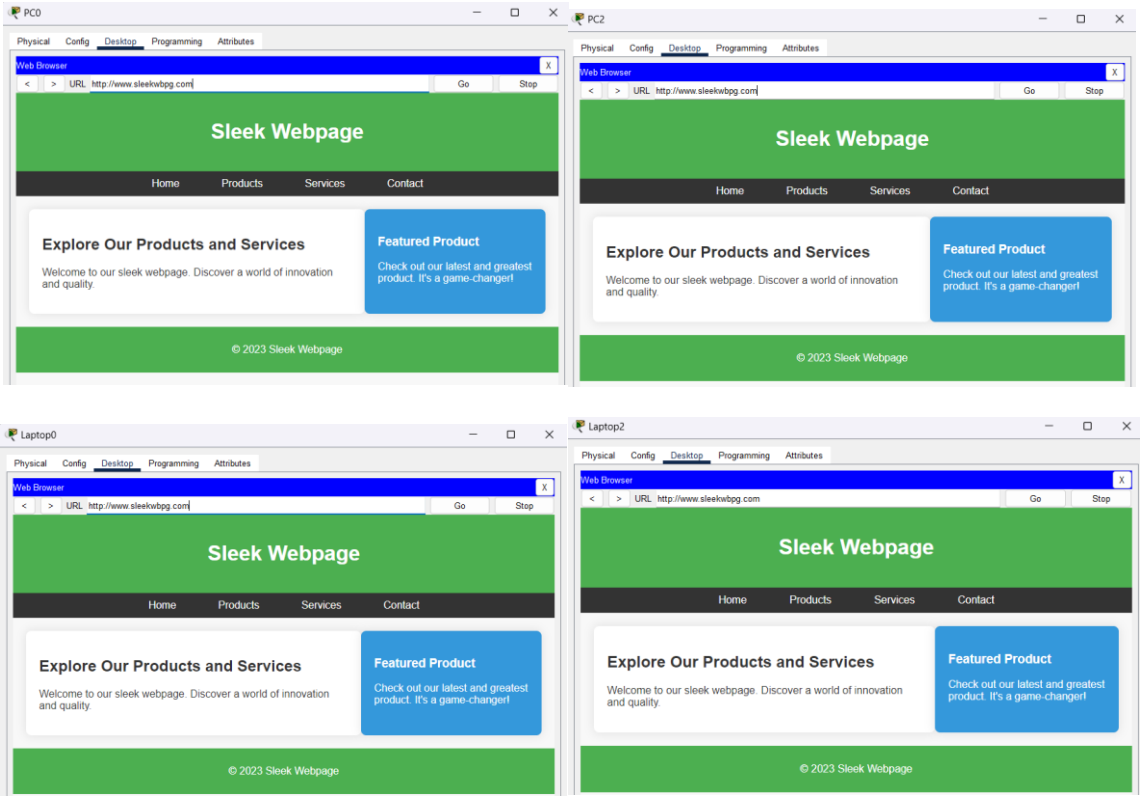
The left and right DNS Servers have been set to access the webpage and the email domains.



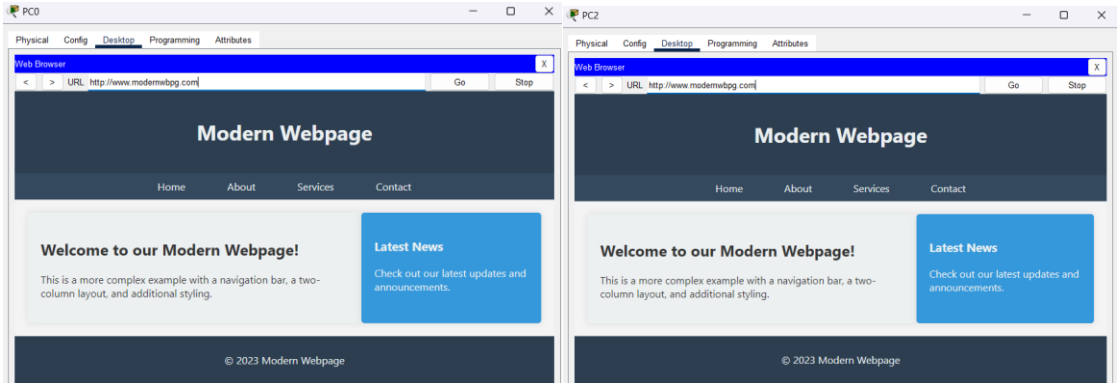


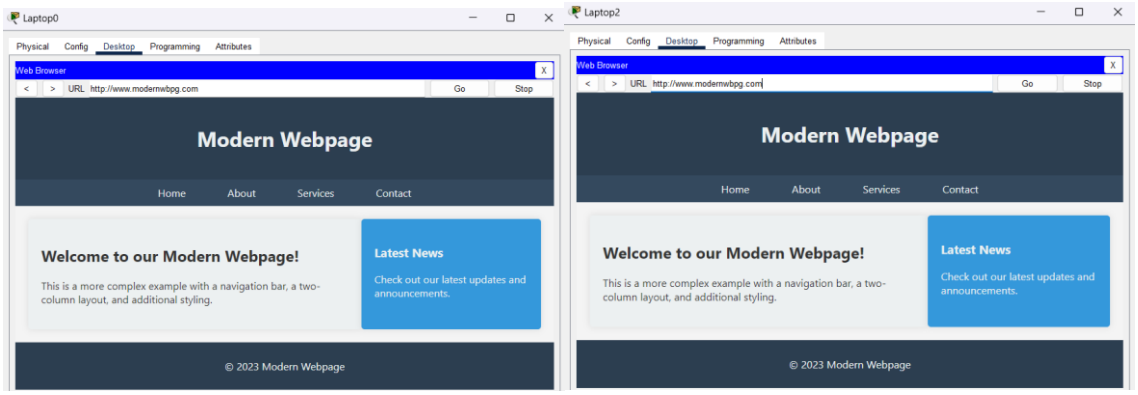
Accessing the webpages from different end devices:

Accessing the Sleek Webpage from end devices from all 4 ends of the network, from PC0, PC2, Laptop0 and Laptop2, which covers all ends of the networks.



Accessing the Modern Webpage from end devices from all 4 ends of the network, from PC0, PC2, Laptop0 and Laptop2, which covers all ends of the networks.





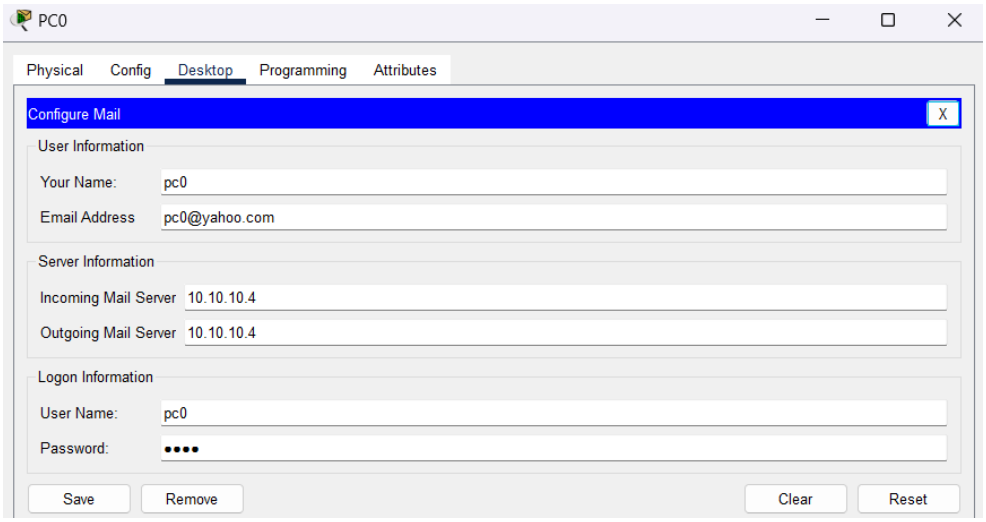
From here we can see that the webpages are accessible from all the end devices, and not with their IP but with the domain names, hence bringing the DNS into use.

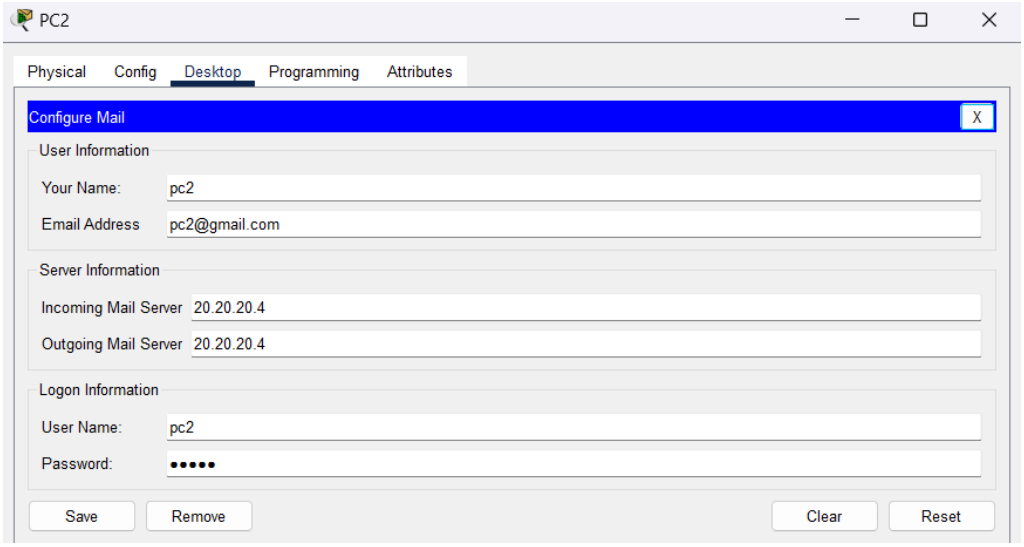
Sending mails but from one domain to another:

Note from the previous images we have seen, that the **DNS-Server-Left** and the **DNS-Server-Right** have all the domain names listed, for the email services as well.

The **Yahoo and Sleek WBPg** server have the Yahoo mail hosted as a service, and one user added – PC0, similarly the **Gmail and Modern WBPg** server has the Gmail hosted as a service, and one user added – PC2. So email if successfully sent from PC0 to PC2, then connection has been established successfully.

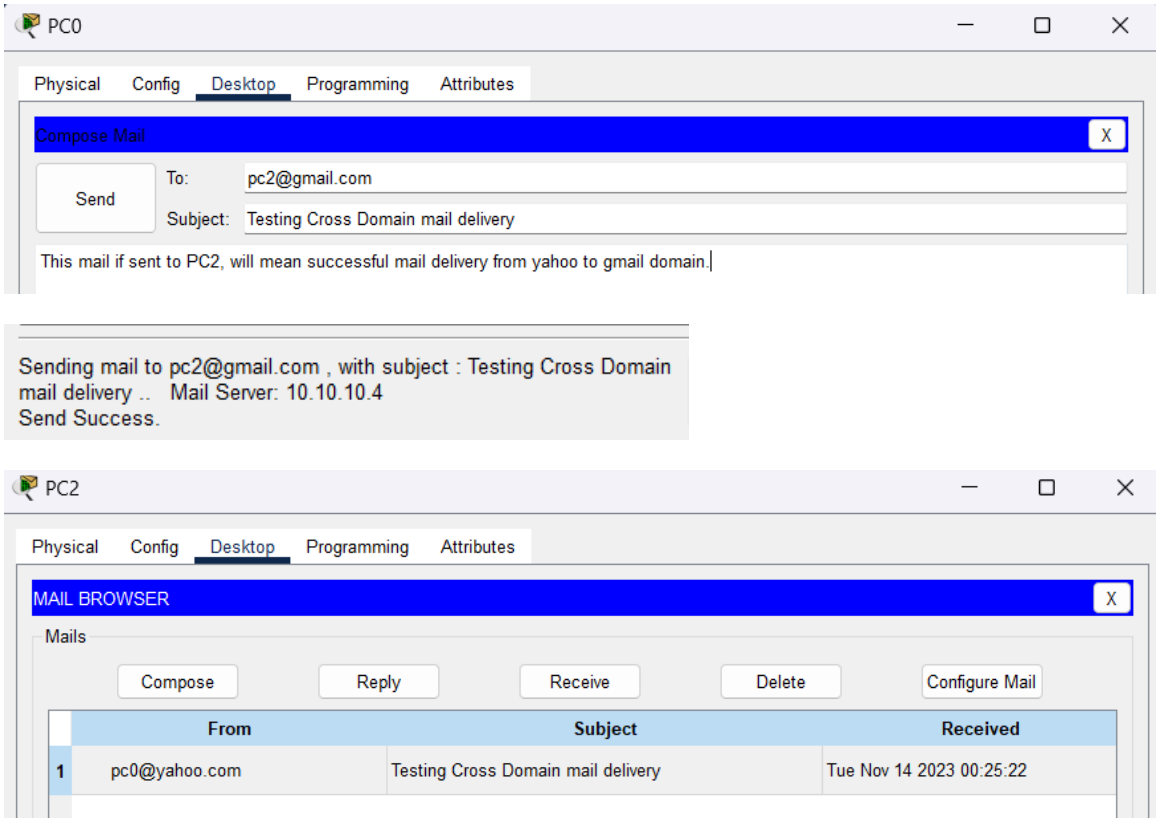
Configuring PC0 and PC2 mail services on the device:



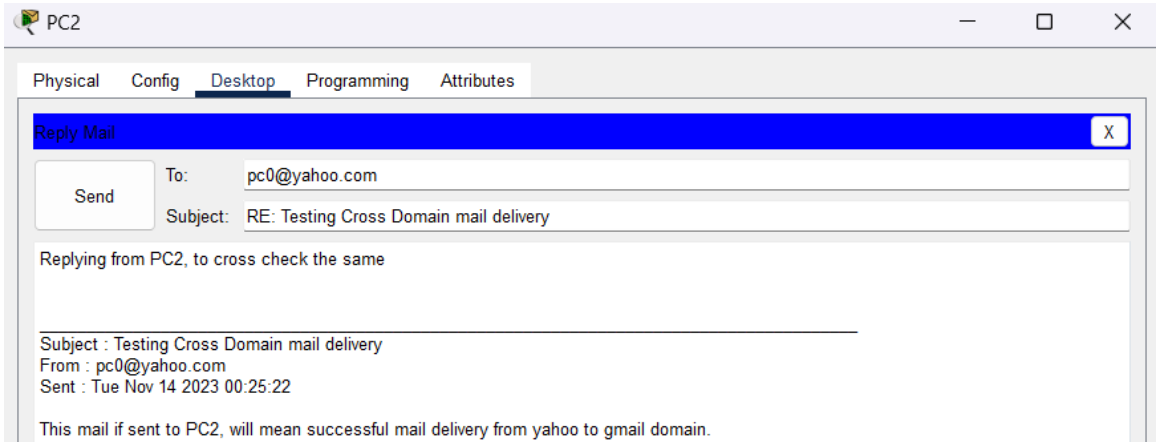


PC0 has mail belonging to **yahoo.com**, and **incoming-outgoing mail server** with the IP of the **Yahoo and Sleek WBPg server.** Similarly, **PC2 PC0** has mail belonging to **gmail.com**, and **incoming-outgoing mail server** with the IP of the **Gmail and Modern WBPg server.**

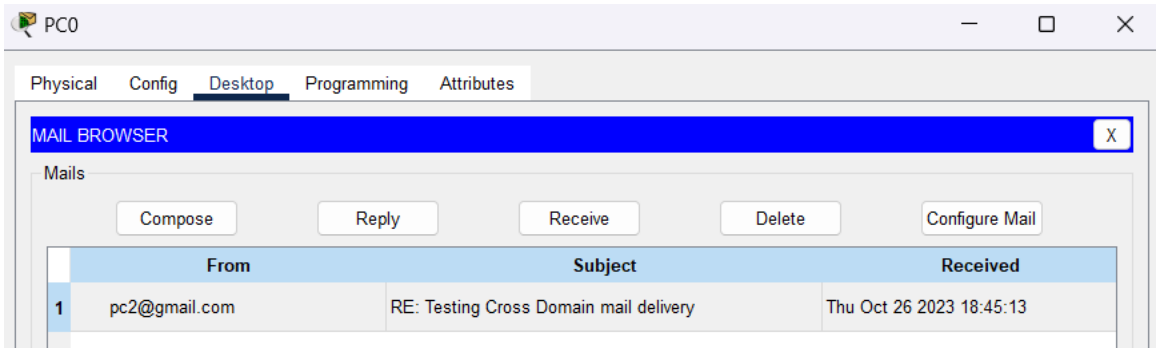
Sending email from PC0 to PC2:



Reply to the same mail from PC2 to PC0:



Sending mail to pc0@yahoo.com , with subject : RE: Testing Cross Domain mail delivery .. Mail Server: 20.20.20.4
Send Success.



Therefore, we can see that mails were successfully sent and received across different domains. This shows that connection was rightly established and DNS was configured properly as well.