COMPUTER NETWORKS

LAB REPORT

ASSIGNMENT 6

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BCSE UG 3

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GROUP: A3

SUBMISSION: 18/11/2024

Problem Statement: Creating Networks using Cisco Packet Tracer Software

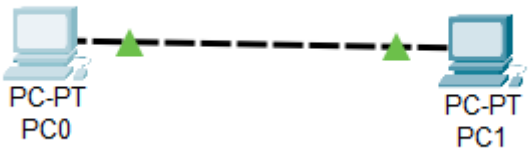
Cisco Packet Tracer Files at: https://github.com/Debjit-Dhar/Networks

PROBLEM 1:

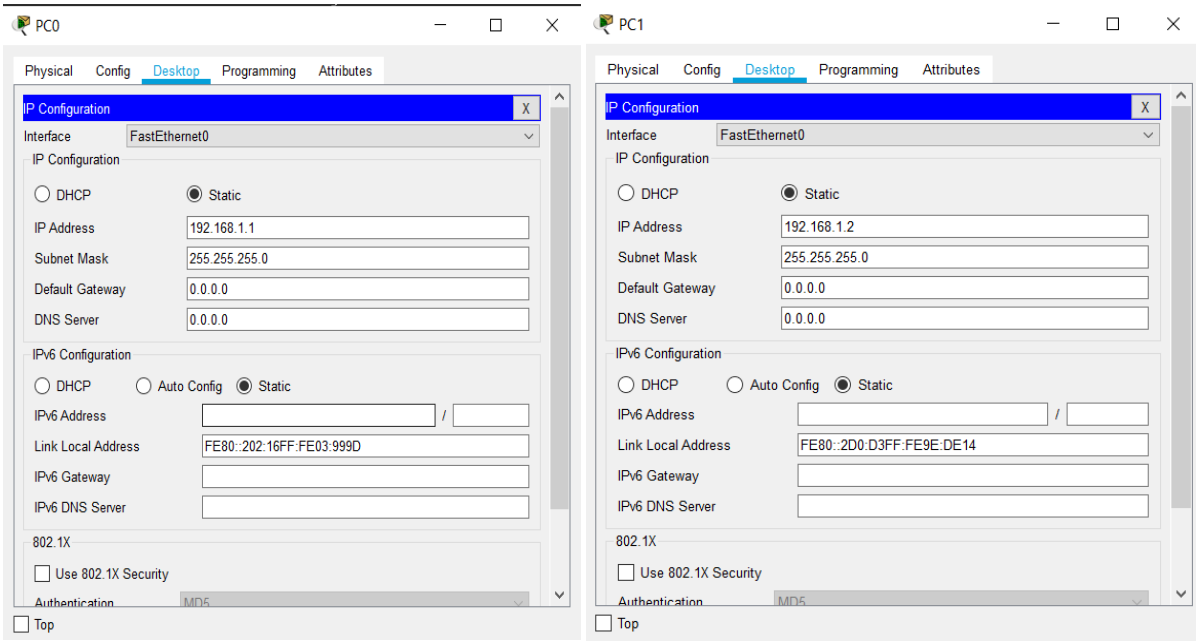
Connect two hosts back-to-back with a crossover cable. Assign IP addresses, and see whether they are able to ping each other.

SOLUTION:

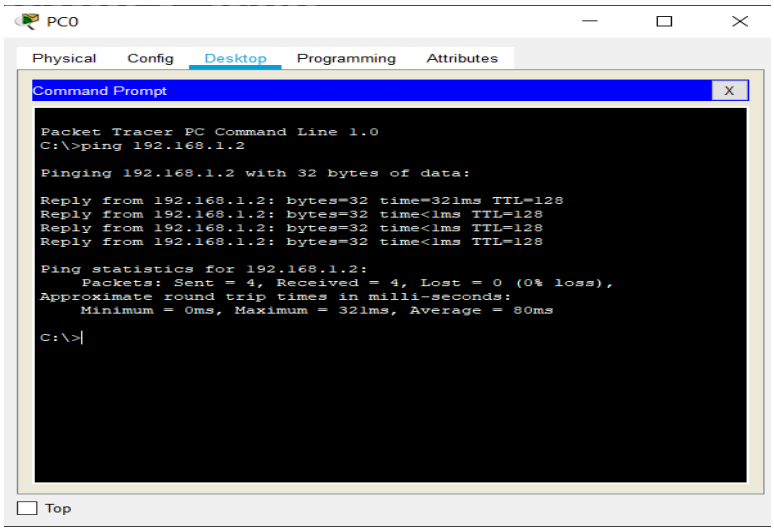
Open Cisco Packet Tracer and from the lower right select pc and add two such into the workspace and connect via the dotted line (copper crossover connection) using FastEthernet0 of both. The PCs are named as PC0 and PC1 respectively.



Next open PC0 and go to Desktop->IP Configuration. Set Ip address and subnet mask. Do the same for PC1.



Then go to PC0->Desktop->Command Prompt and ping 192.168.1.2



PROBLEM 2:

Create a LAN (named LAN-A) with 3 hosts using a hub. Ping each pair of nodes.

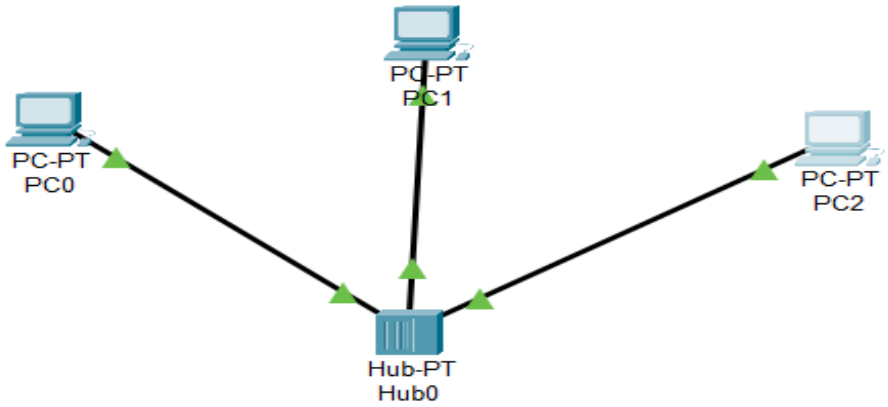
SOLUTION:

PC0->192.168.1.1/255.255.255.0,

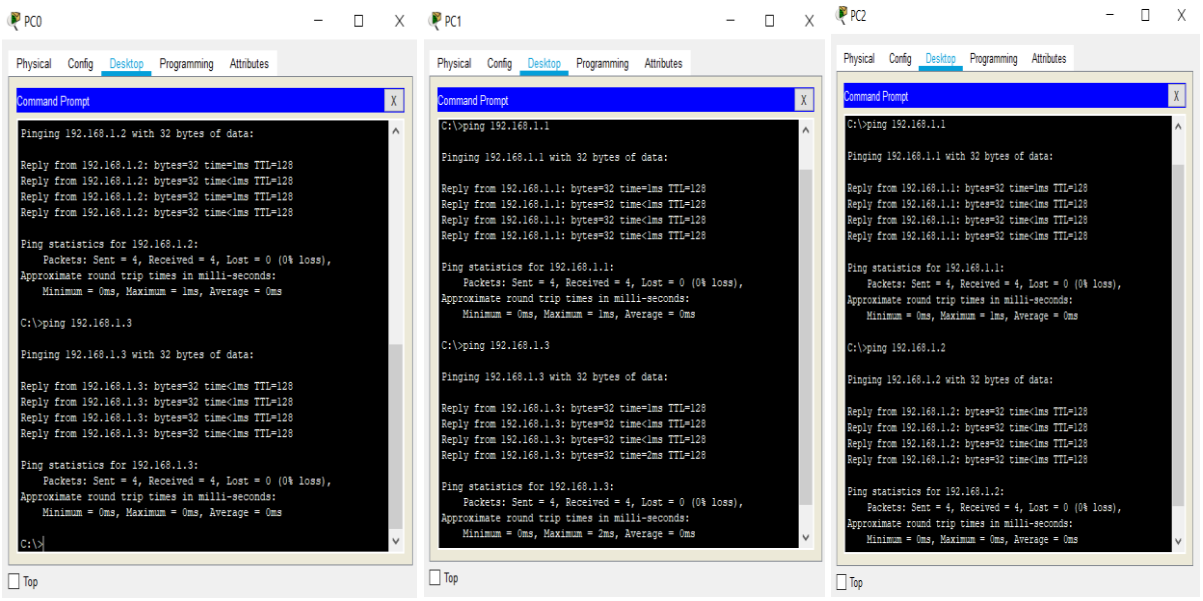
PC1->192.168.1.2/255.255.255.0,

PC2->192.168.1.3/255.255.255.0

All PCs connected to hub by copper straight cable.



Pinging every other pc from every pc.



PROBLEM 3:

Create a LAN (named LAN-B) with 3 hosts using a switch. Record contents of the ARP Table of end hosts and the MAC Forwarding Table of the switch. Ping each pair of nodes. Now record the contents of the ARP Table of end hosts and the MAC Forwarding Table of the switch again.

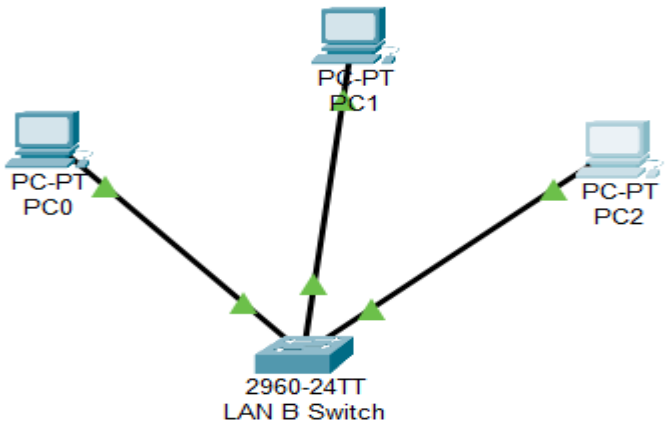
SOLUTION:

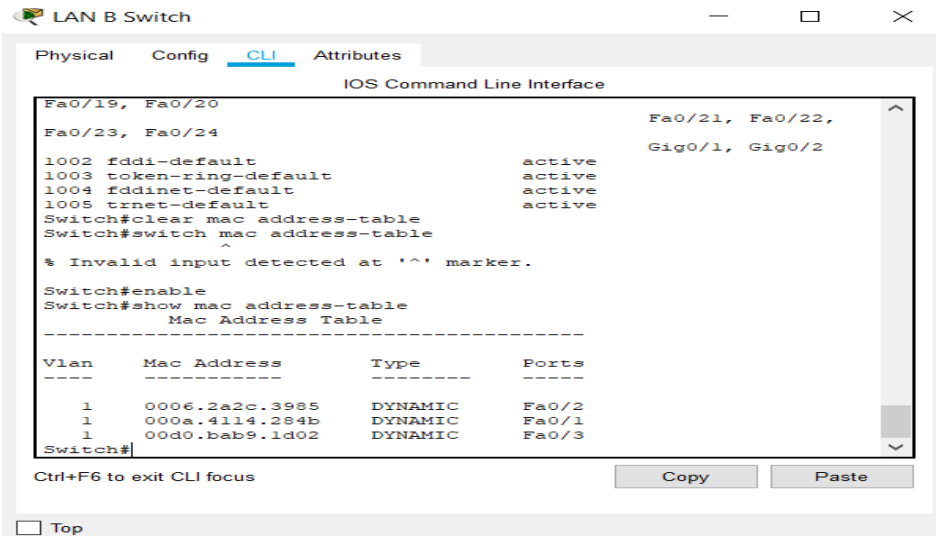
PC 0->192.168.3.1/255.255.255.0

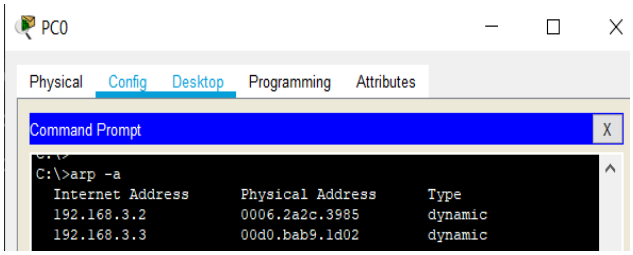
PC 1->192.168.3.2/255.255.255.0

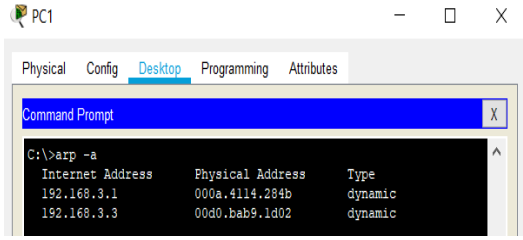
PC 1->192.168.3.3/255.255.255.0

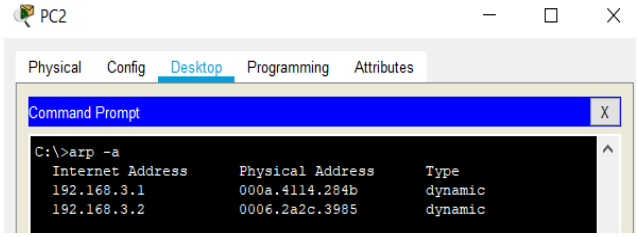
Use the 2960 switch and name it LAN B. Before pinging the arp tables of the hosts and the mac address table of the switch is empty. Now, ping each pair of hosts. The mac address table is observed in cli of switch and the arp tables through command prompts of respective hosts




LAN B Switch
Physical
Config
CLI
Attributes
IOS Command Line Interface
Fa0/19, Fa0/20
Fa0/21, Fa0/22,
Fa0/23, Fa0/24
Gig0/1, Gig0/2
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active
Switch#clear mac address-table
Switch#switch mac address-table
% Invalid input detected at '^' marker.
Switch#enable
Switch#show mac address-table
Mac Address Table
Vlan Mac Address Type Ports
1 0006.2a2c.3985 DYNAMIC Fa0/2
1 000a.4114.284b DYNAMIC Fa0/1
1 00d0.bab9.1d02 DYNAMIC Fa0/3
Switch#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top


PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
C:\>arp -a
Internet Address Physical Address Type
192.168.3.2 0006.2a2c.3985 dynamic
192.168.3.3 00d0.bab9.1d02 dynamic


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
C:\>arp -a
Internet Address Physical Address Type
192.168.3.1 000a.4114.284b dynamic
192.168.3.3 00d0.bab9.1d02 dynamic

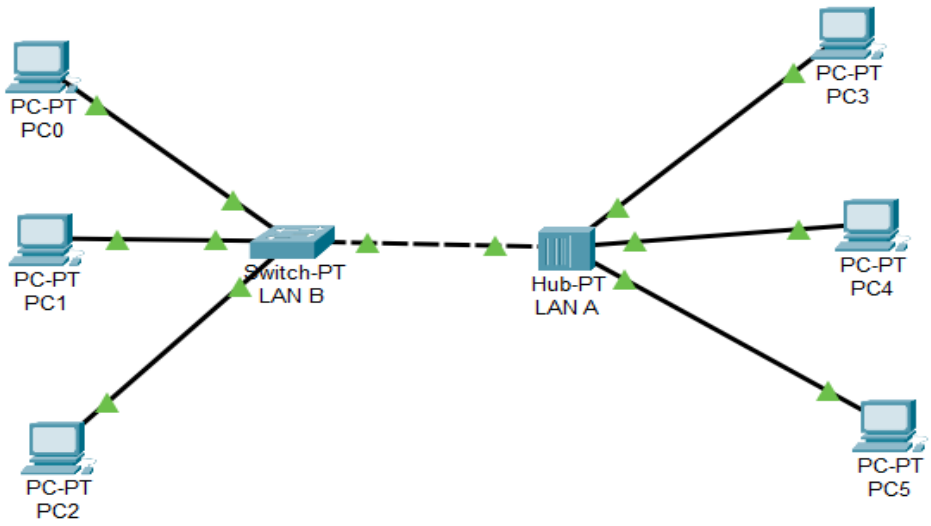

PC2
Physical
Config
Desktop
Programming
Attributes
Command Prompt
C:\>arp -a
Internet Address Physical Address Type
192.168.3.1 000a.4114.284b dynamic
192.168.3.2 0006.2a2c.3985 dynamic

PROBLEM 4:

Connect LAN-A and LAN-B by connecting the hub and switch using a crossover cable. Ping between each pair of hosts of LAN-A and LAN-B. Now record the contents of the ARP Table of end hosts and the MAC Forwarding Table of the switch again.

SOLUTION:

LAN B contains the switch that is connected to Hub of LAN A via the copper crossover cable.



The following messages show that the network has been configured correctly.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC1	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC0	PC5	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC1	PC3	ICMP		0.000	N	2	(edit)	(delete)

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC5	PC2	ICMP		0.000	N	3	(edit)	(delete)
	Successful	PC3	PC2	ICMP		0.000	N	4	(edit)	(delete)
	Successful	PC4	PC1	ICMP		0.000	N	5	(edit)	(delete)

PROBLEM 5:

Create a LAN (named JU-Main) with three hosts connected via a layer-2 switch (Cisco 2950 switch PC-LAB1-Switch). Connect the switch to a router (Cisco 1818). Assign IP addresses to all the hosts and the router interface connected to this LAN from network 192.168.148.0/24. Configure the

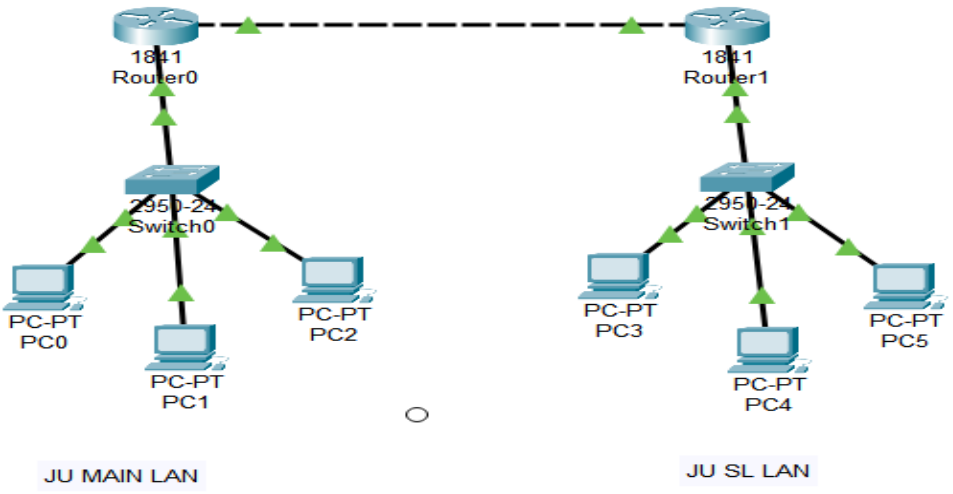
default gateway of each host as the IP address of the interface of the router which is connected to the LAN.

Create another LAN (named JU-SL) with three hosts connected via a layer-2 switch (Cisco 2950 switch PC-LAB2-Switch). Connect this switch to another router (Cisco 1818). Assign IP addresses to all the hosts and the router interface connected to this LAN from network 192.168.149.0/24.

Configure the default gateway of each host as the IP address of the interface of the router which is connected to the LAN. Connect the two routers through appropriate WAN interfaces. Assign IP addresses to the WAN interfaces from network 192.168.150.0/24. Add static route in both of the routers to route packets between two LANs.

SOLUTION:

Steps- Firstly give ip addresses to all pcs. Then give ips to both ports of both routers and turn them on. Next configure the default gateway of each pc. Then configure the static routing and next hop of both routers.



The LAN has been correctly configured as shown by these communications.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC3	ICMP		0.000	N	7	(edit)	(delete)
	Successful	Router0	PC3	ICMP		0.000	N	8	(edit)	(delete)
	Successful	PC4	Router0	ICMP		0.000	N	9	(edit)	(delete)

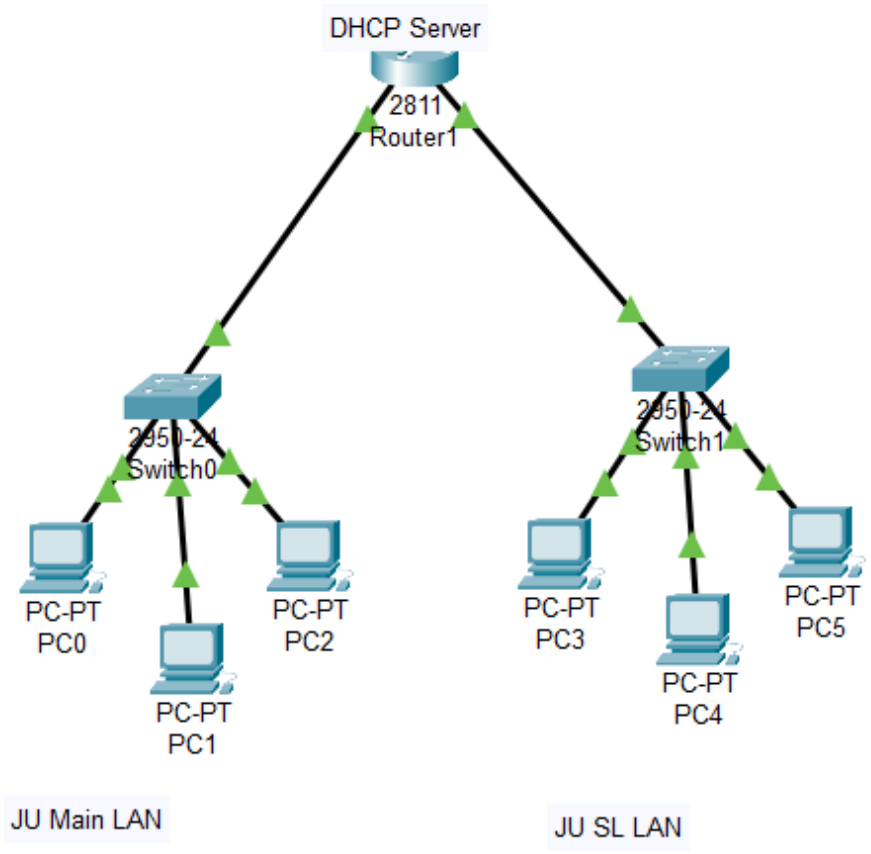
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC1	ICMP		0.000	N	10	(edit)	(delete)
	Successful	Router0	Router1	ICMP		0.000	N	11	(edit)	(delete)
	Successful	PC4	PC0	ICMP		0.000	N	12	(edit)	(delete)

PROBLEM 6:

Add servers to the individual LANs (in problem 5) and configure them as a DHCP server. Configure the hosts in the individual LAN to obtain IP addresses and address of the default gateway via this DHCP server.

SOLUTION:

First make the network like this(routers of the individual lans not required anymore). The DHCP Server(a router is connected to both JU Main and JU SL Lan).

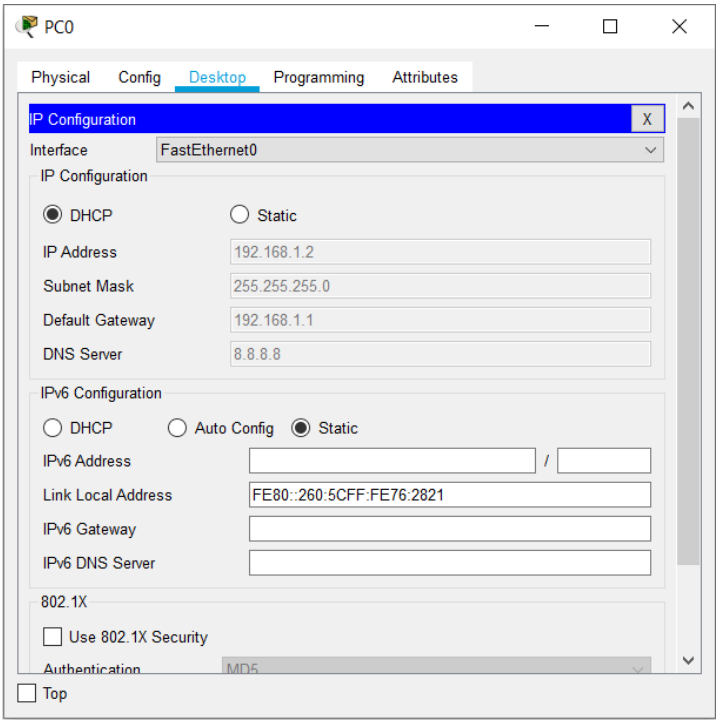


Next go to the cli of the router and type the commands as shown below.

```
Router>enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#host
% Incomplete command.
Router(config)#
Router(config)#
Router(config)#hostname dhcp-server
dhcp-server(config)#int f0/0
dhcp-server(config-if)#ip add 192.168.1.1 255.255.255.0
dhcp-server(config-if)#no sh

dhcp-server(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

dhcp-server(config-if)#
dhcp-server(config-if)#int f0/1
dhcp-server(config-if)#ip add 192.168.2.1 255.255.255.0
dhcp-server(config-if)#no sh

dhcp-server(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

dhcp-server(config-if)#
dhcp-server(config-if)#exit
dhcp-server(config)#do sh ip int br
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        192.168.1.1     YES manual up                    up
FastEthernet0/1        192.168.2.1     YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
dhcp-server(config)#
dhcp-server(config)#ip dhcp excluded-address 192.168.1.1
dhcp-server(config)#ip dhcp excluded-address 192.168.2.1
dhcp-server(config)#
dhcp-server(config)#
dhcp-server(config)#ip dhcp pool 192.168.1.1
dhcp-server(dhcp-config)#net
% Incomplete command.
dhcp-server(dhcp-config)#network 192.168.1.1 255.255.255.0
dhcp-server(dhcp-config)#default-router 192.168.1.1
dhcp-server(dhcp-config)#dnc-server 8.8.8.8
                         ^
% Invalid input detected at '^' marker.

dhcp-server(dhcp-config)#dns server 8.8.8.8
                           ^
% Invalid input detected at '^' marker.
```

```
dhcp-server(dhcp-config)#dns-server 8.8.8.8
dhcp-server(dhcp-config)#exit
dhcp-server(config)#ip dhcp pool 192.168.2.1
dhcp-server(dhcp-config)#
dhcp-server(dhcp-config)#network 192.168.2.0 255.255.255.0
dhcp-server(dhcp-config)#
dhcp-server(dhcp-config)#default-router 192.168.2.1
dhcp-server(dhcp-config)#
dhcp-server(dhcp-config)#dns-server 8.8.8.8
dhcp-server(dhcp-config)#exit
dhcp-server(config)#
```

Then go to each of the individual pcs and set the ip configurations to dhcp mode.



The dhcp server has been correctly configured as seen by the successful communications shown below.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC2	PC5	ICMP		0.000	N	6	(edit)	(delete)
	Successful	PC1	Router1	ICMP		0.000	N	7	(edit)	(delete)
	Successful	PC4	PC2	ICMP		0.000	N	8	(edit)	(delete)

PROBLEM 7:

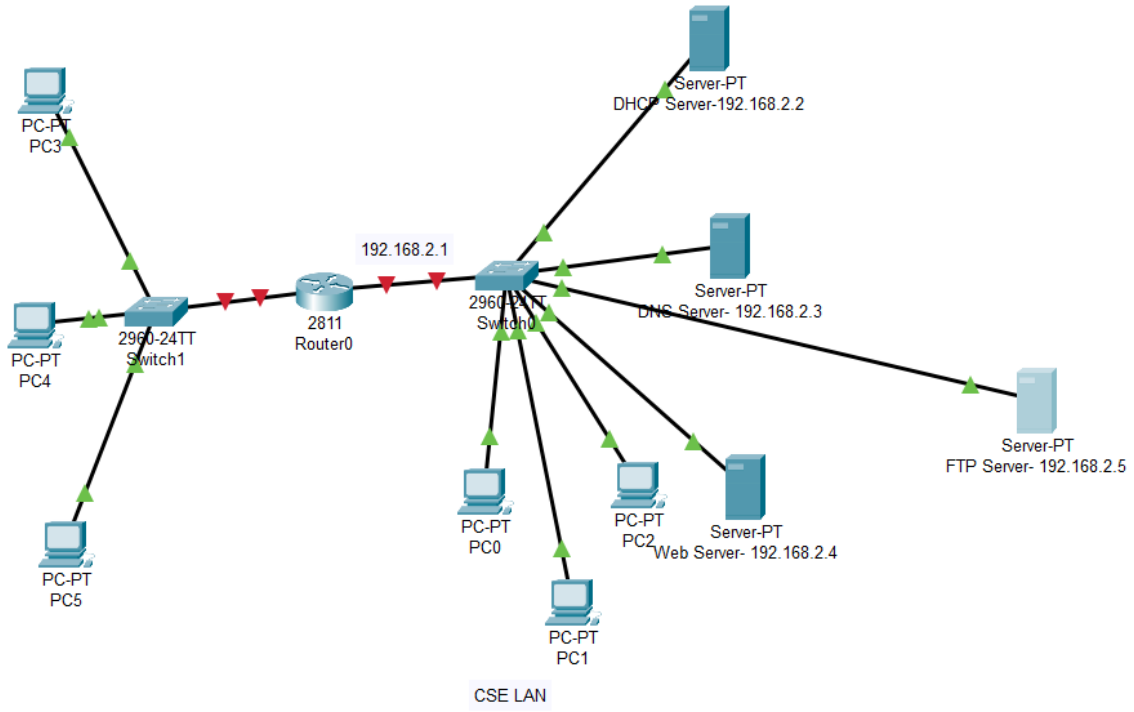
Create a LAN (CSE) with three hosts connected via a layer-2 switch (Cisco 2950 switch CSE-Switch). Also add a web server and a ftp server to this LAN. The hosts dynamically get their IP addresses from a local DHCP server. Servers are assigned fixed IP addresses. Configure the individual hosts to use the local DNS server for name resolution. Add a Domain Name Server (DNS) to this LAN. Create appropriate records in the DNS server for the individual servers in the LAN. The domain name of the LAN is cse.myuniv.edu. Configure the individual hosts to use the local DNS server for name resolution.

SOLUTION:

Here it is easier to configure the default gateway using a router. Hence I used a router and the left part of the network which is simply connected but not configured. Configuring would have required the same steps as described in 5.

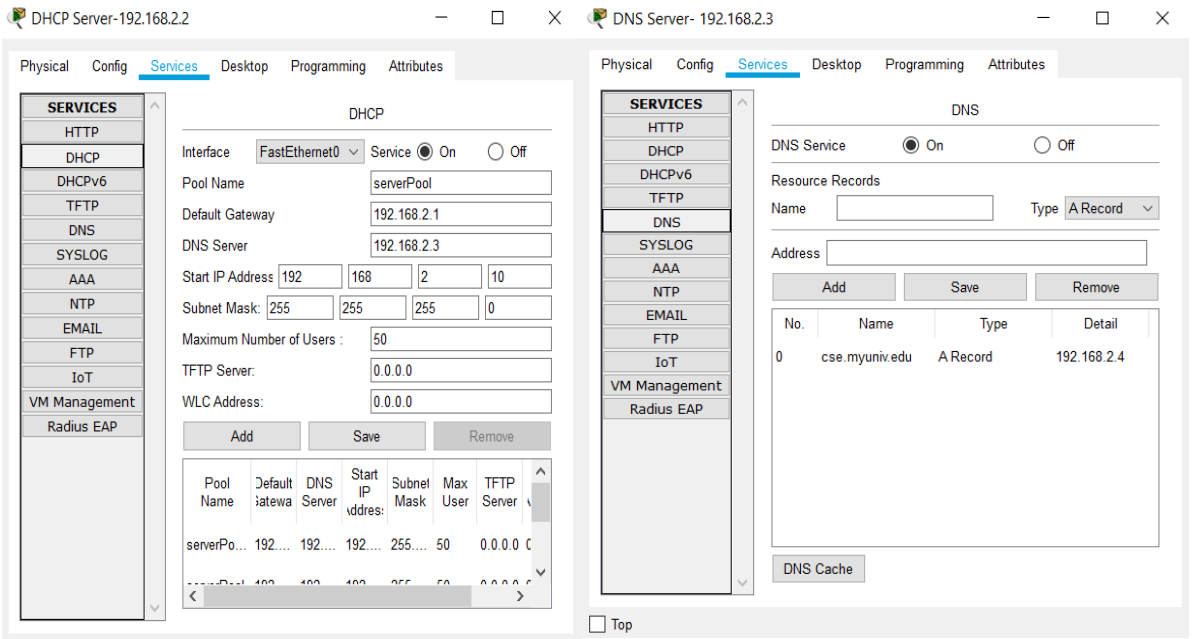
Next the right hand switch is connected to three pcs and the servers(DHCP, DNS, Web and FTP).

After this initial setup, set the ip addresses of the servers as usual and also include the dns server and default gateway correctly.

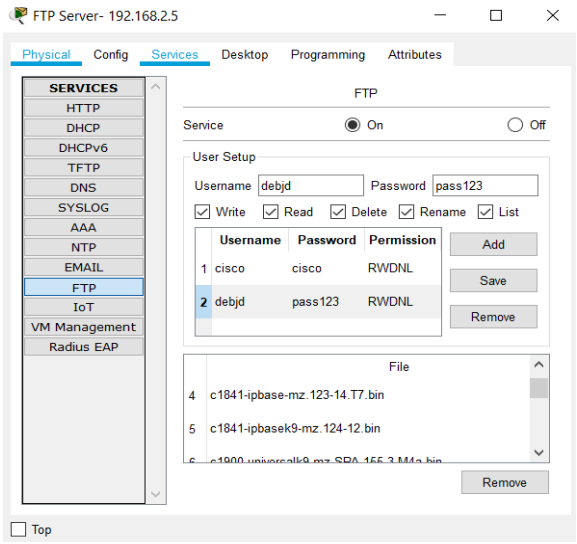


The DHCP and DNS servers have been set up as follows.

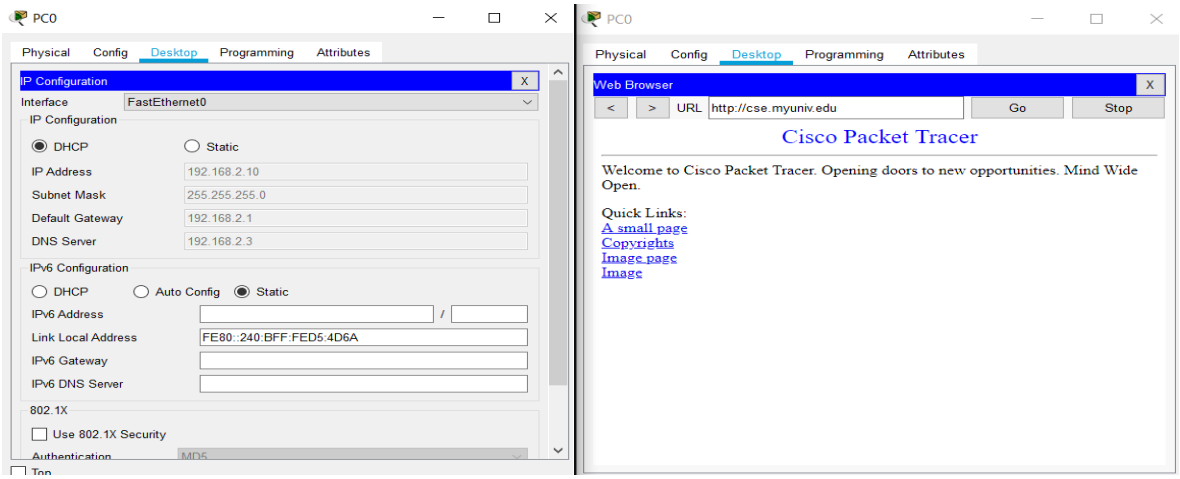
The Web Server is kept at default setting since the http and https are set by default.

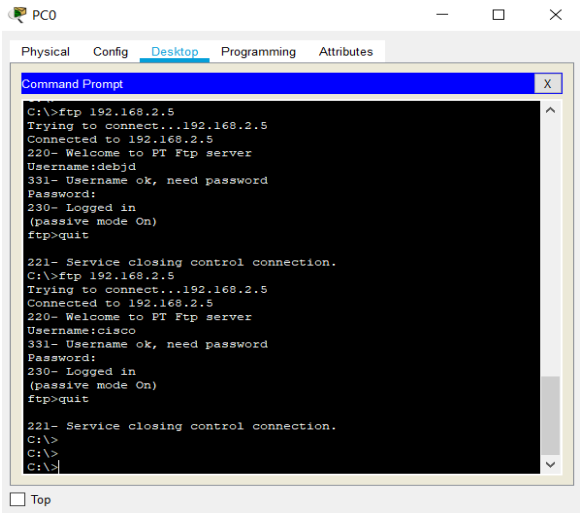


Next, configure the FTP server and add a new username and password if required. I have added debjd as username and password as pass123. All the permissions are enabled.



The working of all the servers have been shown from PC0.





COMMENTS

This assignment has greatly enhanced my understanding of the configuration of routers, switches, hubs and servers. I have also learnt how to implement a real-time simulation for the same. Furthermore, this implementation also highlighted the usage of Cisco Packet Tracer and how it can be used to create a virtual network.

I would like to express my heartfelt thanks to my teachers Dr Sarbani Roy and Dr Nandini Mukherjee for their guidance and support throughout this journey. Their encouragement has played a key role in helping me better comprehend these concepts.