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**CSE 4412**  
**Data Communication and Networking Lab**  
**Lab-03 Report**

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**Program** : B.Sc. in Software Engineering  
**Semester** : Summer 2022-2023 ( 4<sup>th</sup> )  
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## Task-01

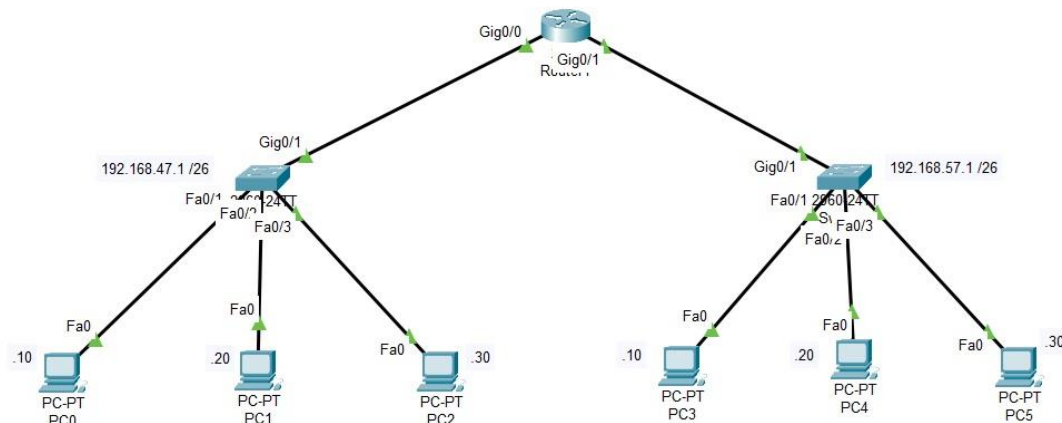


Fig 1.1: Topology

### Step 1: Set the IP Address

As I can connect a maximum of 37 (last 2 digits of my ID) hosts per network, in the last octet of the Subnet we will need 5 bits for the host address ( $2^6=64$ ), and the first 2 bits of the last octet will be part of the network address.

**Subnet:** 255.255.255.192

**IP range of the first subnetwork:** 192.168.47.1 – 192.168.47.64

**Default gateway of subnetwork 1<sup>st</sup> subnetwork:** 192.168.47.1

**IP range of the second subnetwork:** 192.168.57.1 – 192.168.57.64

**Default gateway of subnetwork 2<sup>nd</sup> subnetwork:** 192.168.57.1

The screenshots of two PCs of each network are given below:

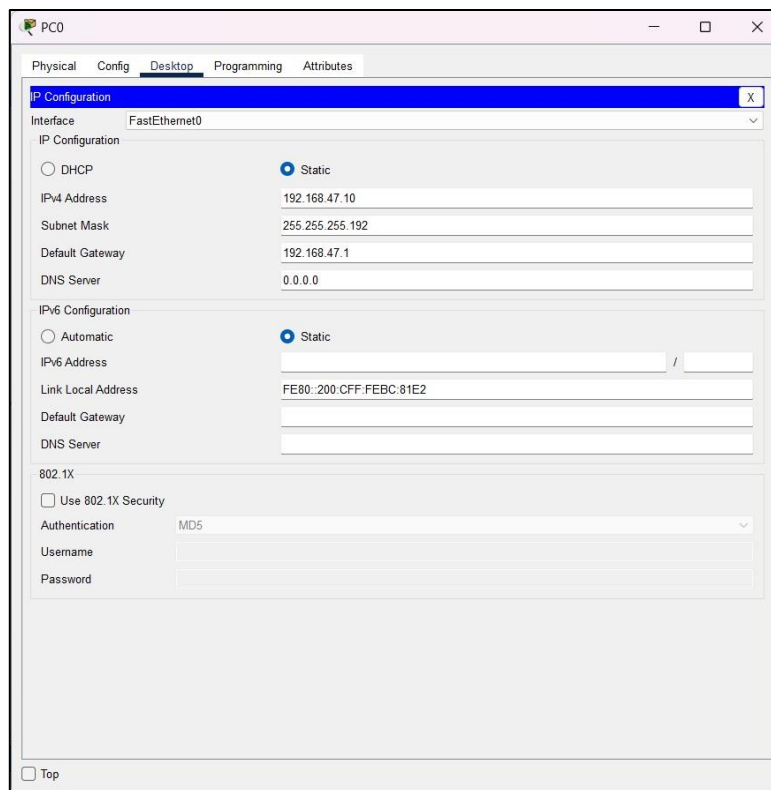


Fig 1.2: IP Address of PC0

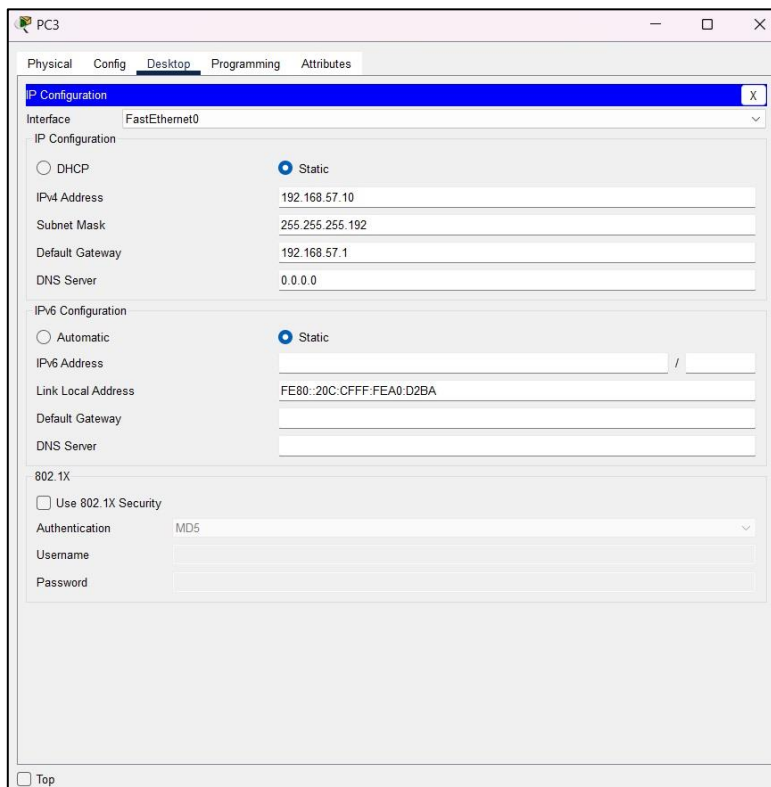


Fig 1.3: IP Address of PC3

## Step 2: Router Configuration

To configure the router, I clicked on the router and went to CLI. Then used the following commands:

```
Router# enable
Router# config t
Router(config)# interface gigabitEthernet 0/0
Router(config-if)# ip address 196.168.47.1 255.255.255.192
Router(config-if)# no shutdown
Router(config-if)# exit

Router(config)# interface gigabitEthernet 0/1
Router(config-if)# ip address 196.168.57.1 255.255.255.192
Router(config-if)# no shutdown
Router(config-if)# exit
```

Here is the screenshot of the commands:

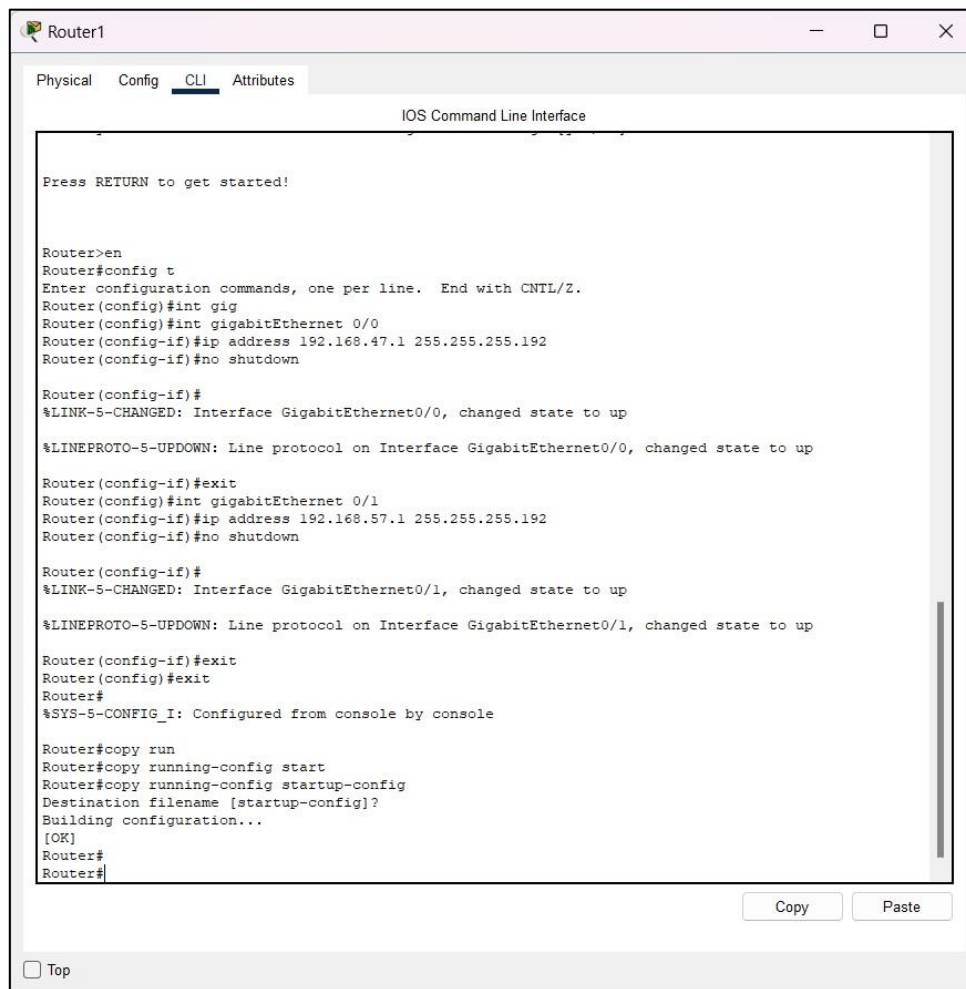


Fig 1.4: Router configuration

### Step 3: Using the ping command from the Terminal

To ping, I clicked on PC0, went to Desktop, then Command Prompt. In the command prompt, I wrote:

```
Ping 192.168.57.10
```

Here is the screenshot of this step:

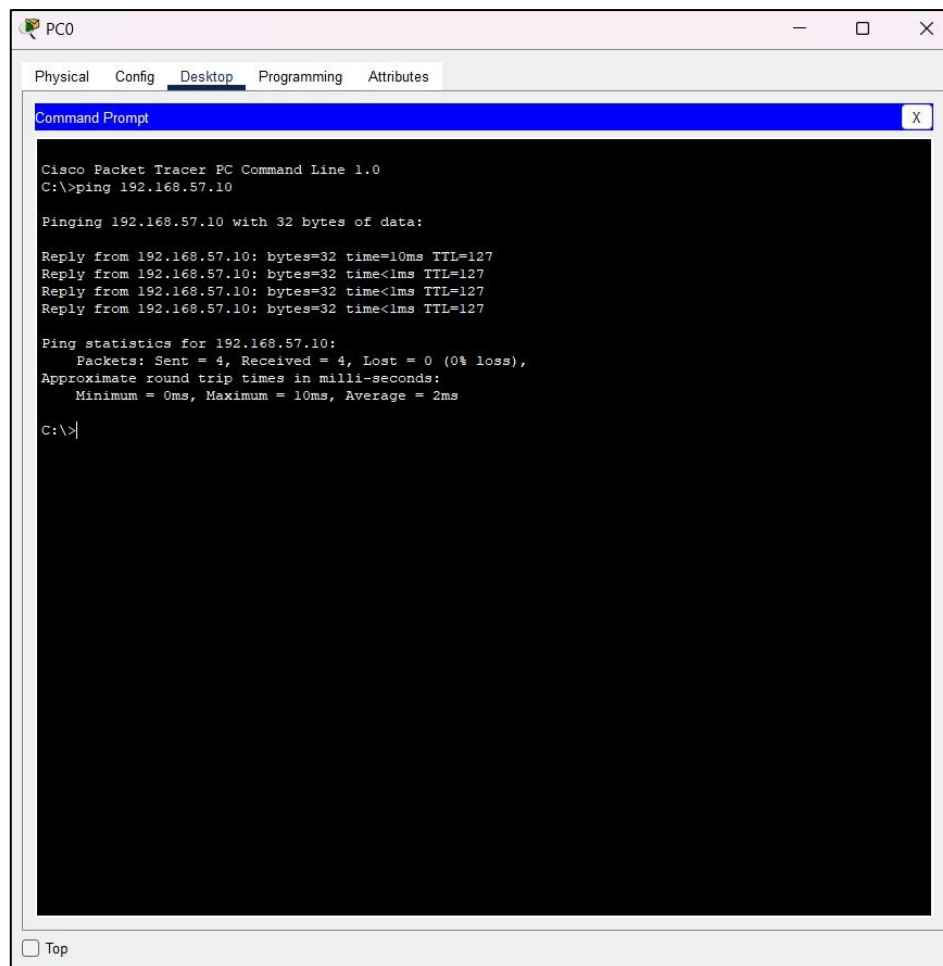


Fig 1.5: Command Prompt of PC0

We can see that 4 packets were sent, 4 packets were received, and 0 packets were lost.

## Task-02

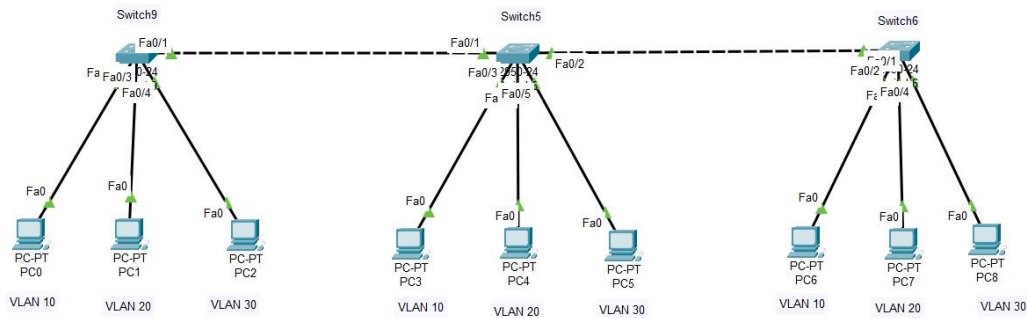


Fig 2.1: Topology

### Step 1: Configuring Switches

At first, I configured 3 VLANs with VLAN IDs 10, 20, and 30 inside the switch and assigned appropriate names. To do this, I have used the following commands:

```
Switch> enable
Switch# config t
Switch(config)# vlan 10
Switch(config-vlan)# name student
Switch(config-vlan)# exit
Switch(config)# vlan 20
Switch(config-vlan)# name teacher
Switch(config-vlan)# exit
Switch(config)# vlan 30
Switch(config-vlan)# name admin
Switch(config-vlan)# exit
```

Then I configured the Interfaces belonging to each VLAN. For that, I used the following commands:

```
Switch(config)# interface fastEthernet 0/2
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 10
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface fastEthernet 0/3
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 20
Switch(config-if)# no shutdown
Switch(config-if)# exit
```

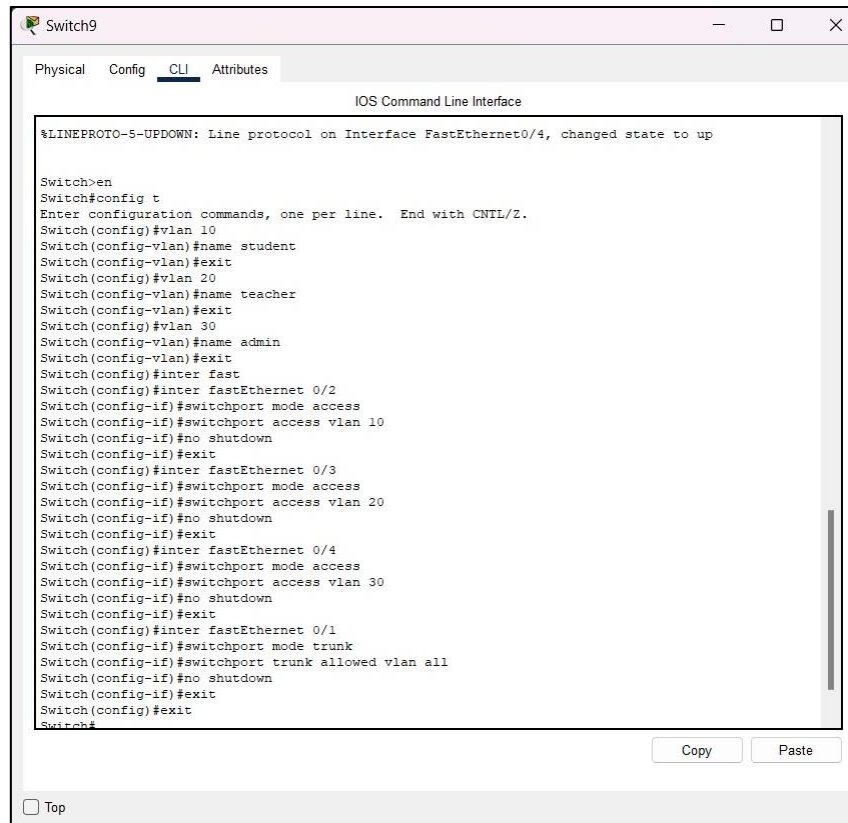
```
Switch(config)# interface fastEthernet 0/4
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 30
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface fastEthernet 0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan all
Switch(config-if)# no shutdown
Switch(config-if)# exit
```

This way I have configured the interfaces. For Switch6, the commands are exactly same as Switch9. There is a bit of difference in Switch5.

```
Switch(config)# interface fastEthernet 0/3
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 10
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface fastEthernet 0/4
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 20
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface fastEthernet 0/5
Switch(config-if)# switchport mode access
Switch(config-if)# switchport access vlan 30
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface fastEthernet 0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan all
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface fastEthernet 0/2
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk allowed vlan all
Switch(config-if)# no shutdown
Switch(config-if)# exit
```

As Switch5 has 2 trunk connections that's why the changes in the command.

Here are the screenshots of the three switches:

The screenshot shows a window titled 'Switch9' with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the 'IOS Command Line Interface'. The text shows a message about a line protocol change on FastEthernet0/4, followed by a series of configuration commands for VLANs and interfaces. At the bottom, there are 'Copy' and 'Paste' buttons and a 'Top' link.

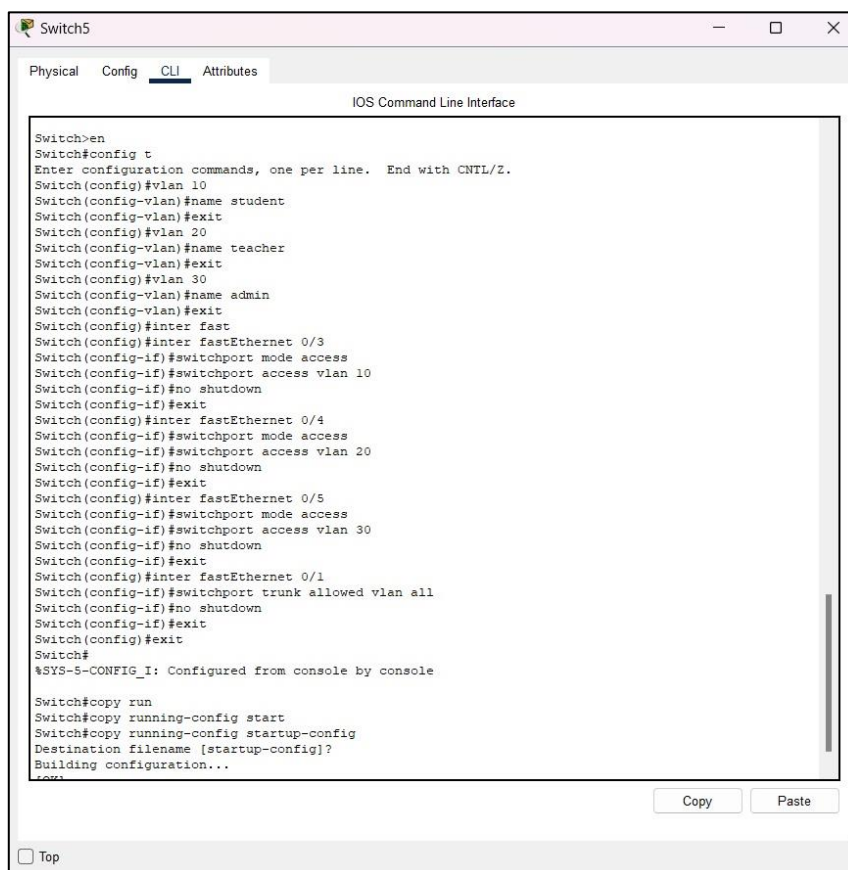
```
Switch9
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name student
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name teacher
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name admin
Switch(config-vlan)#exit
Switch(config)#inter fast
Switch(config)#inter fastEthernet 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#exit
Switch#

Copy Paste
Top
```

Fig 2.2: Switch9 configuration

The screenshot shows a window titled 'Switch5' with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the 'IOS Command Line Interface'. The text shows configuration commands for VLANs and interfaces, followed by a confirmation message and a 'copy run' command. At the bottom, there are 'Copy' and 'Paste' buttons and a 'Top' link.

```
Switch5
Physical Config CLI Attributes
IOS Command Line Interface

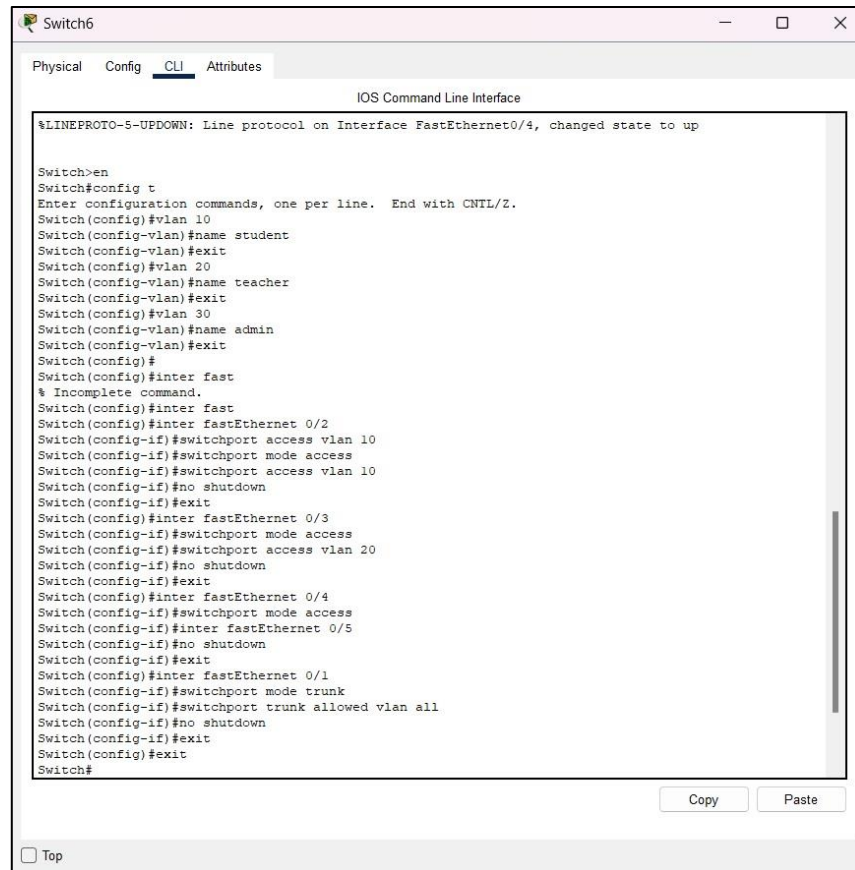
Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name student
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name teacher
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name admin
Switch(config-vlan)#exit
Switch(config)#inter fast
Switch(config)#inter fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/1
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#copy run
Switch#copy running-config start
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...

Copy Paste
Top
```

Fig 2.3: Switch5 configuration





```
Switch6
Physical Config CLI Attributes
IOS Command Line Interface
$LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name student
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name teacher
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name admin
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#inter fast
% Incomplete command.
Switch(config)#inter fast
Switch(config)#inter fastEthernet 0/2
Switch(config-if)#switchport access vlan 10
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/4
Switch(config-if)#switchport mode access
Switch(config-if)#inter fastEthernet 0/5
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#inter fastEthernet 0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#exit
Switch#
```

Fig 2.4: Switch6 configuration

## Step 2: Setting Up IPs

As my ID's last 2 digits are 37, IP addresses have started from 192.167.47.1.

But for all the VLAN 10 hosts, I have set their IP address with the last digit 2, for VLAN 20 hosts, last digit is 3, and for VLAN 30 hosts, last digit is 4.

VLAN 10 host's IP address:

1. PC0: 192.167.47.2
2. PC3: 192.167.47.12
3. PC6: 192.167.47.22

VLAN 20 host's IP address:

1. PC0: 192.167.47.3
2. PC3: 192.167.47.13
3. PC6: 192.167.47.23

VLAN 30 host's IP address:

1. PC0: 192.167.47.4
2. PC3: 192.167.47.14
3. PC6: 192.167.47.24

Here are the screenshots:

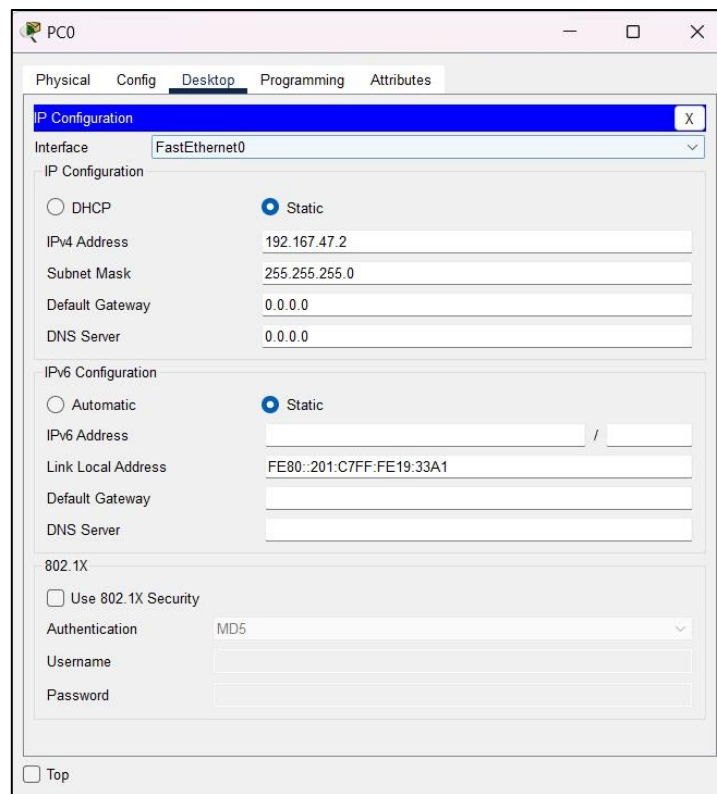


Fig 2.5: IP Address of PC0

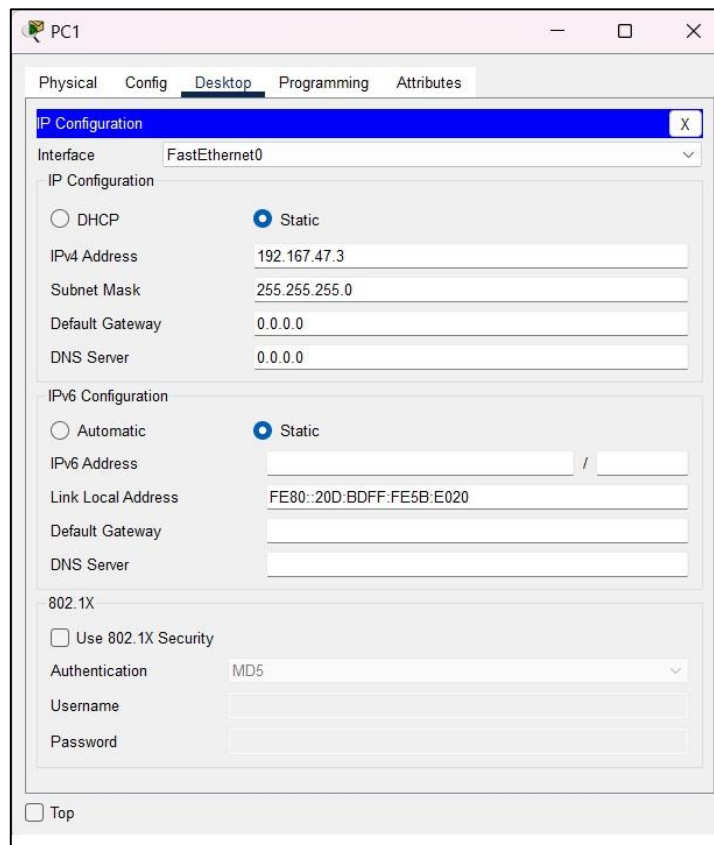


Fig 2.6: IP Address of PC1

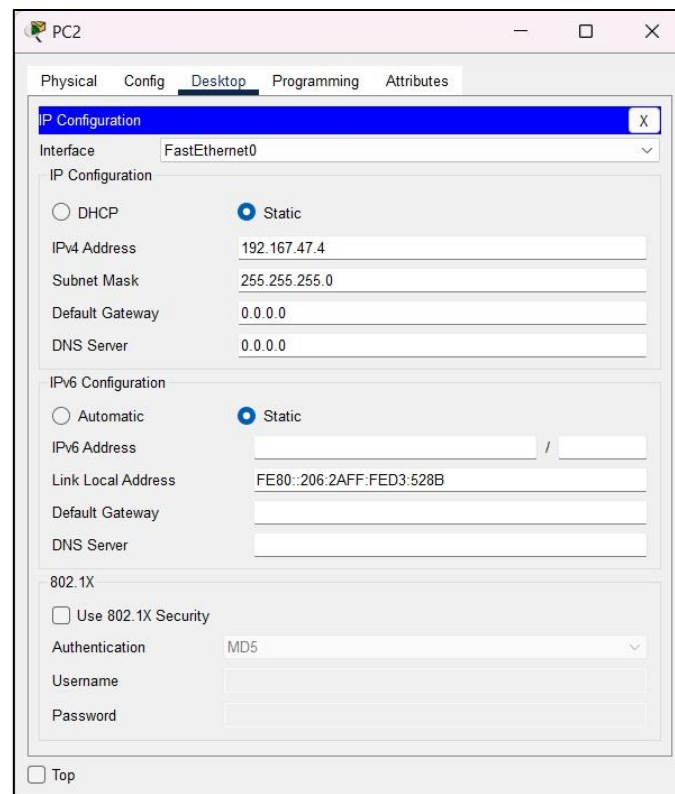


Fig 2.6: IP Address of PC2

### Step 3: Using the ping command from the Terminal

To ping, I clicked on PC0, went to Desktop, then Command Prompt. In the command prompt, I wrote:

```
Ping 192.167.47.12
```

We saw that 4 packets were sent, 4 packets were received, 0 packets were lost as they are on VLAN 10.

But when I sent a ping to PC6 using this:

```
Ping 192.167.47.24
```

We saw that, 4 packets were sent, 0 packets were received, 4 packets were lost as they are on different VLANs.

Here is the screenshot of the command prompt of PC0:

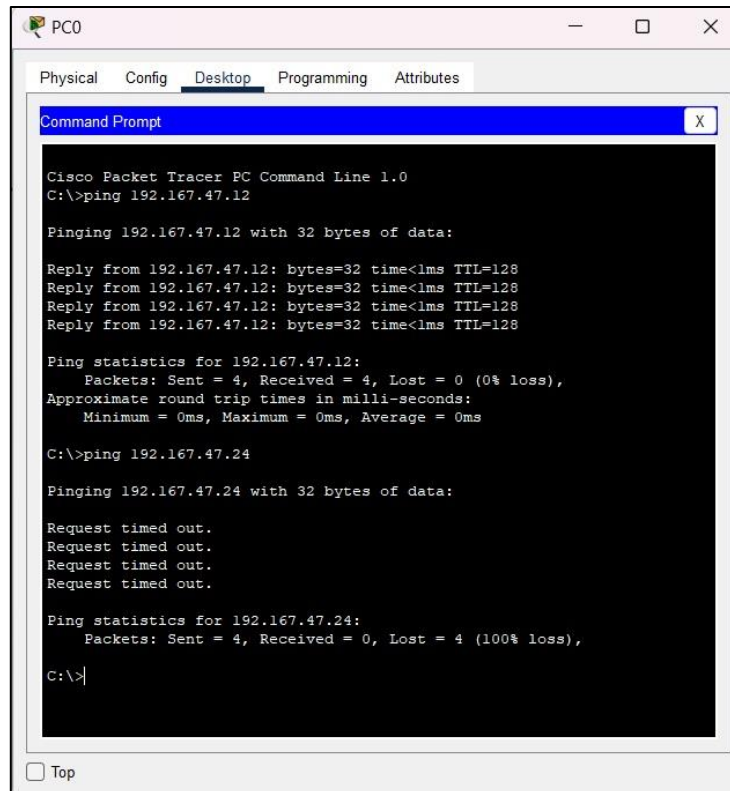


Fig 2.7: Command Prompt of PC0

### Questions (Answer to the point):

1. How many host bits are needed in the largest required subnet?  
**Ans:** 6 bits.
2. How many VLANs need to be configured to each of the switches?  
**Ans:** 3 VLANs.
3. Which interfaces need Access Link?  
**Ans:** Interfaces that are connected with PCs.
4. Which interfaces need Trunk Link?  
**Ans:** Interfaces that are connected with another switch.
5. After configuring VLAN, what will happen if we broadcast?  
**Ans:** After configuring VLANs, broadcast traffic will only be forwarded within the same VLAN, limiting its scope.

### Challenges (if any):

No challenge faced.