Roll. No.: A12
Name: Sufiyan Khan
Class: TE (AI&DS) Batch: A1

Experiment No. 8

Aim:

To design and simulate VLANs on the switch using Cisco packettracer.

A. Theory:

VLAN Definition

Virtual local area networks have become crucial for organizations with complex networking systems. Organizations require solutions that allow them to scale their networks, segment them to increase security measures, and decrease network latency. While LAN is used to connect a group of devices such as computers and printers to a server via cables, VLANs allow multiple LANs and associated devices to communicate via wireless internet

- **Example of VLAN**

Scenario: Suppose you work for a medium-sized company that has various departments, including Sales, Marketing, HR, and IT. You want to set up VLANs to segregate network traffic for each department while sharing the same physical network infrastructure.

VLAN Configuration:

Sales VLAN (VLAN 10):

VLAN ID: 10

IP Range: 192.168.10.0/24

Purpose: Used for all devices in the Sales department.

Switch Ports: Ports connecting to Sales department computers, phones, and printers are configured to belong to VLAN 10.

Marketing VLAN (VLAN 20):

VLAN ID: 20

IP Range: 192.168.20.0/24

Purpose: Used for all devices in the Marketing department.

Switch Ports: Ports connecting to Marketing department computers, phones, and printers are configured to belong to VLAN 20.

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HR VLAN (VLAN 30):

VLAN ID: 30

IP Range: 192.168.30.0/24

Purpose: Used for all devices in the HR department.

Switch Ports: Ports connecting to HR department computers, phones, and printers are configured to belong to VLAN 30.

IT VLAN (VLAN 40):

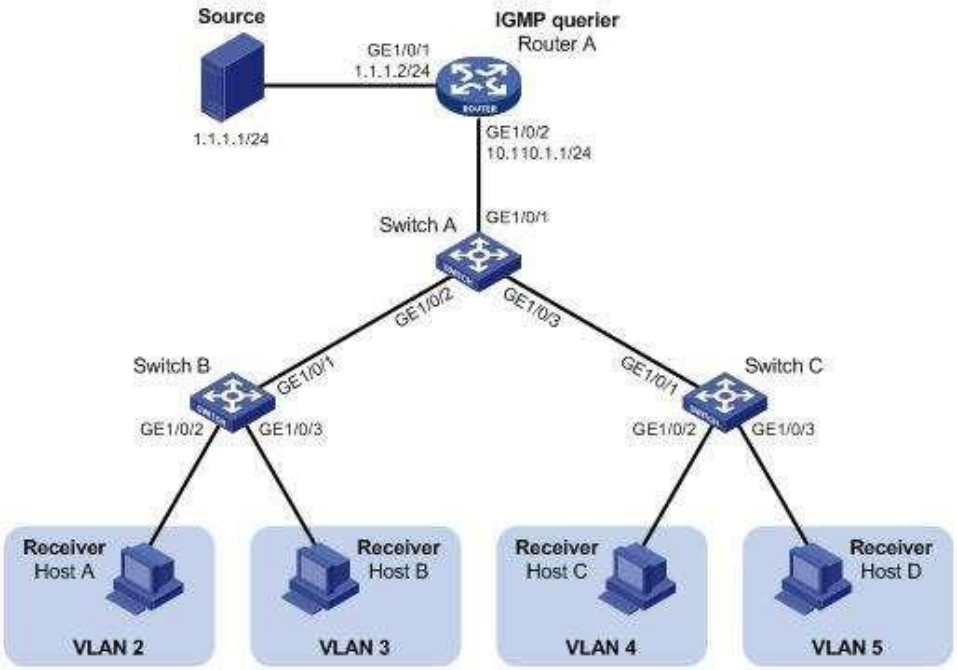
VLAN ID: 40

IP Range: 192.168.40.0/24

Purpose: Used for all devices in the IT department.

Switch Ports: Ports connecting to IT department computers, servers, and network equipment are configured to belong to VLAN 40.

- **VLAN Diagram**



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How VLAN works?

A Virtual Local Area Network (VLAN) is a way to split a single physical network into multiple virtual networks. Devices in the same VLAN can communicate easily, while devices in different VLANs are isolated unless a router or Layer 3 switch connects them. VLANs enhance security, reduce network congestion, and simplify network management. They work by tagging data packets with a VLAN identifier, which helps switches determine which devices belong to which VLAN and how to handle their traffic.

What are the differences between LAN and VLAN?

LAN	VLAN
LAN stands for Local Area Network.	VLAN stands for Virtual Local Area Network.
It work on a single broadcast domain.	It works on multiple broadcast domain.
It was developed in late 1970s.	It was developed in 2003.
The cost of Local Area Network is high.	The cost of a Virtual Local Area Network is less.
The latency of Local Area Network is high.	The latency of a Virtual Local Area Network is low.

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LAN	VLAN
The devices which are used in LAN are: Hubs, Routers and switch.	The devices which are used in VLAN are: Bridges and switch.
They use standard Ethernet protocols.	They used ISP and VTP standard protocols.
Connection ranges up to 2 miles.	Connection has a similar range.

What are the advantages of VLAN?

1. Improved Security: VLANs create network segmentation, isolating groups of devices. This isolation enhances security by preventing unauthorized access and reducing the attack surface. For example, guest devices can be in a separate VLAN, isolated from the main corporate network.
2. Traffic Isolation: VLANs limit broadcast and multicast traffic to devices within the same VLAN. This reduces unnecessary traffic on the network and enhances overall network performance.
3. Flexibility: VLANs allow for dynamic and logical network reconfiguration without changing physical cabling. This flexibility simplifies network management, reduces downtime, and lowers maintenance costs.
4. Resource Optimization: VLANs enable efficient resource allocation by grouping devices with similar traffic patterns and requirements. This helps optimize network resources such as bandwidth and switches.
5. Simplified Management: Network administrators can manage VLANs based on their organizational structure, making it easier to control access, prioritize traffic, and troubleshoot network issues.

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B. Program:

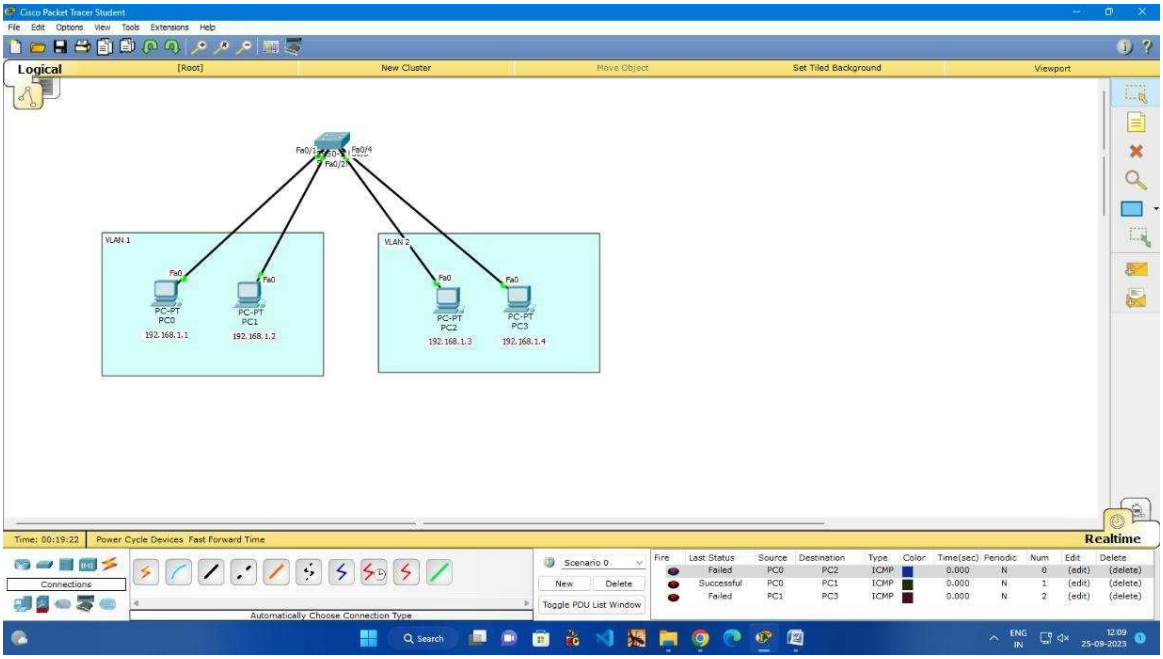
```
Switch(config)#do enable
Switch#configure t
Switch(config)#vlan 2
Switch(config-vlan)#name purchase
Switch(config-vlan)#vlan 3
Switch(config-vlan)#name sales
Switch(config-vlan)#exit
Switch(config)#exit

Switch#show vlan brief

Switch(config-if)#interface fastEthernet 0/1
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fastEthernet 0/2
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fastEthernet 0/3
Switch(config-if)#switchport access vlan 3
Switch(config-if)#interface fastEthernet 0/4
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#exit

Switch#show vlan brief
```

C. Output and findings:



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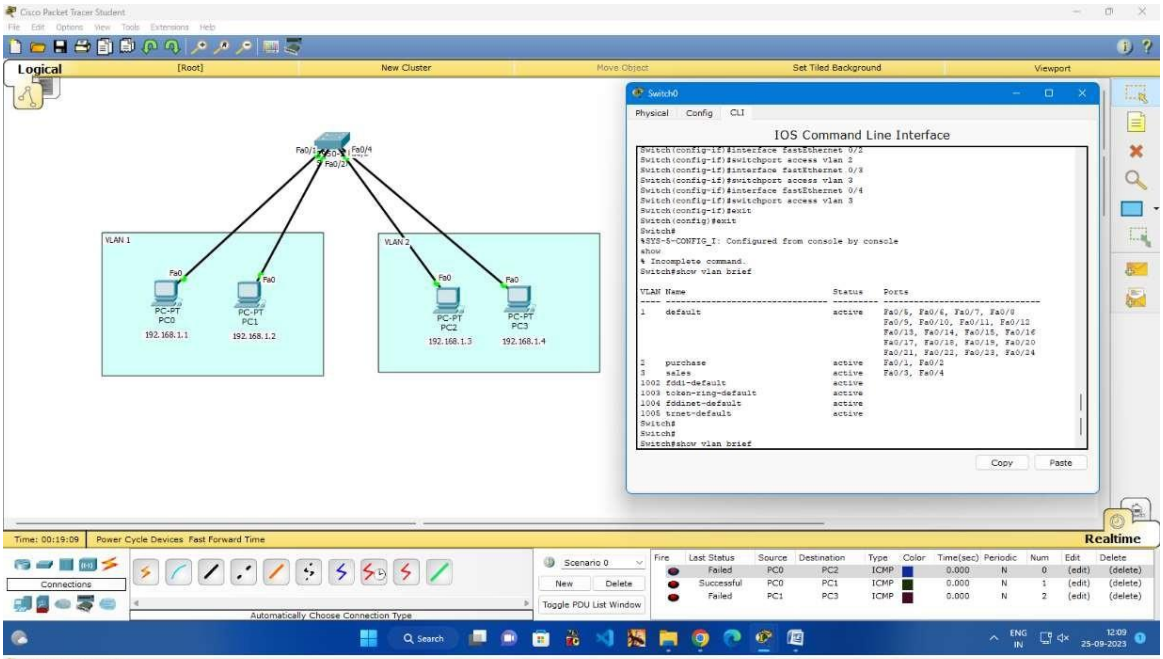

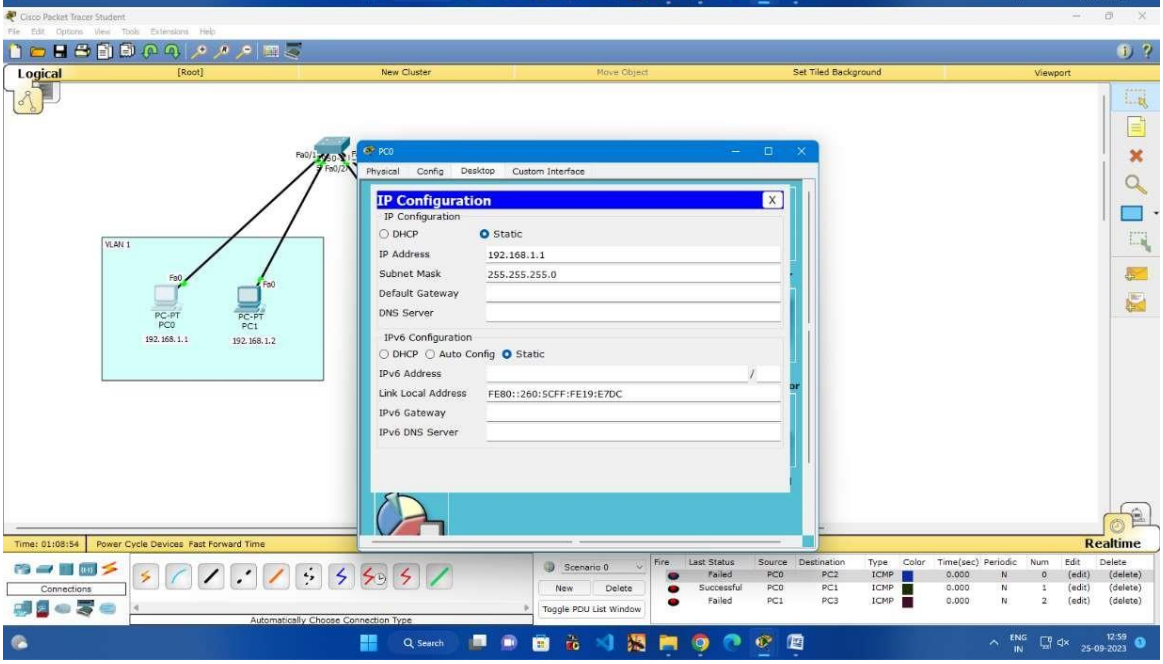

D. Conclusion

Hence, we have successfully implemented VLANs in Cisco Packet Tracer.