Academic Year: 2023-24	**Semester:** V
Class/Branch: TE/DS	**Subject:** WCN

Experiment No. 08

1. **Aim**: To design and simulate VLANs on the switch/router using Cisco packet tracer/ GNS3.

2. **Software used**: CISCO Packet Tracer

3. **Theory**: –

Virtual LAN (VLAN) is a concept in which we can divide the devices logically on layer 2 (data link layer). Generally, layer 3 devices divide the broadcast domain but the broadcast domain can be divided by switches using the concept of VLAN.

A broadcast domain is a network segment in which if a device broadcast a packet then all the devices in the same broadcast domain will receive it. The devices in the same broadcast domain will receive all the broadcast packets but it is limited to switches only as routers don't forward out the broadcast packet. To forward out the packets to different VLAN (from one VLAN to another) or broadcast domains, inter Vlan routing is needed. Through VLAN, different small-size sub-networks are created which are comparatively easy to handle.

VLAN ranges:

- **VLAN 0, 4095:** These are reserved VLAN which cannot be seen or used.
- **VLAN 1:** It is the default VLAN of switches. By default, all switch ports are in VLAN. This VLAN can't be deleted or edit but can be used.
- **VLAN 2-1001:** This is a normal VLAN range. We can create, edit and delete these VLAN.
- **VLAN 1002-1005:** These are CISCO defaults for fddi and token rings. These VLAN can't be deleted.
- **Vlan 1006-4094:** This is the extended range of Vlan.

Configuration –

We can simply create VLANs by simply assigning the vlan-id and Vlan name.

```
#switch1(config)#vlan 2

#switch1(config-vlan)#vlan accounts
```

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Here, 2 is the Vlan I'd and accounts is the Vlan name. Now, we assign Vlan to the switch ports.e.g-

```
Switch(config)#int fa0/0

Switch(config-if)#switchport access

Switch(config-if)#switchport Vlan 2
```

Also, switchport range can be assigned to required vlans.

```
Switch(config)#int range fa0/0-2

Switch(config-if)#switchport access

Switch(config-if) #switchport Vlan 2
```
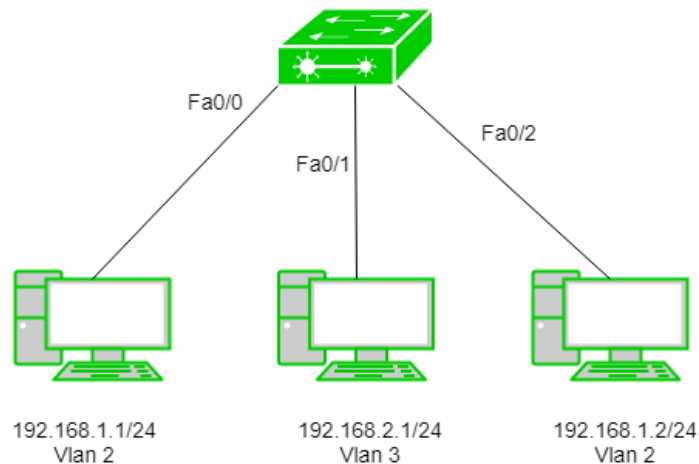
By this, switchport fa0/0, fa0/1, fa0-2 will be assigned Vlan 2.

Example –

Assigning IP address 192.168.1.1/24, 192.168.1.2/24 and 192.168.2.1/24 to the PC's. Now, we will create Vlan 2 and 3 on switch.

```
Switch(config)#vlan 2
Switch(config)#vlan 3
```

We have made VLANs but the most important part is to assign switch ports to the VLANs.

```
Switch(config)#int fa0/0
Switch(config-if)#switchport mode access
Switch(config-if) #switchport access Vlan 2

Switch(config)#int fa0/1
Switch(config-if)#switchport mode access
```

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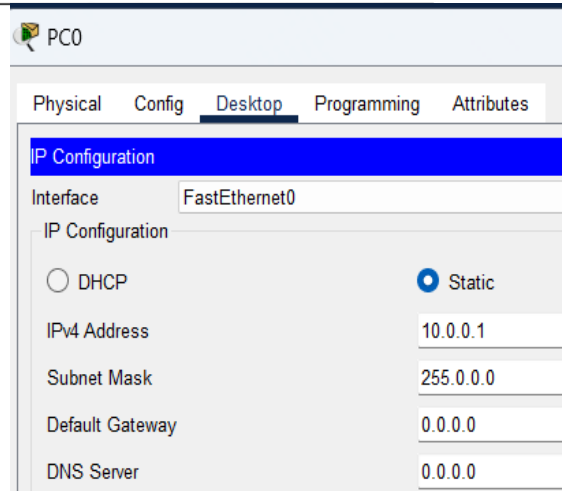
```
Switch(config-if) #switchport access
Vlan 3


Switch(config)#int fa0/2

Switch(config-if)#switchport mode
access

Switch(config-if) #switchport access
Vlan 2
```

As seen, we have assigned Vlan 2 to fa0/0, fa0/2, and Vlan 3 to fa0/1.

PC0

| Physical | Config | Desktop | Programming | Attributes |

IP Configuration

| Interface | FastEthernet0 |

IP Configuration

○ DHCP   ● Static

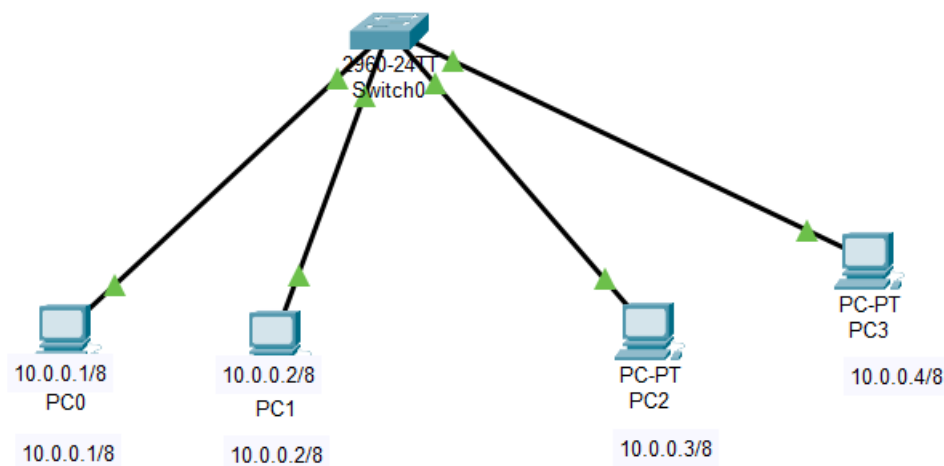| IPv4 Address | 10.0.0.1 |
Subnet Mask	255.0.0.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

Procedure:

Figure: Initial Network Architecture (No VLAN)

STEP:1 PC Configurations

For our **VLAN Configuration example**, we will set our PC IP addresses as below.

These ip addresses will be required at the end of this configuration example to test our configuration.

In the above network diagram, we have 4 PC with 10.0.0.1, 10.0.0.2, 10.0.0.3, 10.0.0.4 respectively.

PC 0 to PC 3 are computers (end devices) and a Switch in this network.

Black strong lines are Copper Straight-Through cables which use to connect different types of devices.

Before VLAN Setup

```
PC0                                                    —    □    ✕

  Physical    Config    Desktop    Programming    Attributes

  Command Prompt                                                    X

  Cisco Packet Tracer PC Command Line 1.0
  C:\>ping 10.0.0.2

  Pinging 10.0.0.2 with 32 bytes of data:

  Reply from 10.0.0.2: bytes=32 time=2ms TTL=128
  Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

  Ping statistics for 10.0.0.2:
      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum = 2ms, Average = 0ms

  C:\>ping 10.0.0.3

  Pinging 10.0.0.3 with 32 bytes of data:

  Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.3: bytes=32 time=1ms TTL=128

  Ping statistics for 10.0.0.3:
      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum = 1ms, Average = 0ms

  C:\>ping 10.0.0.4

  Pinging 10.0.0.4 with 32 bytes of data:

  Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
  Reply from 10.0.0.4: bytes=32 time<1ms TTL=128

  Ping statistics for 10.0.0.4:
      Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum = 0ms, Average = 0ms

  C:\>

  ☐ Top
```

PC3 — □ ✕

Physical   Config   Desktop   Programming   Attributes

Command Prompt   X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time<lms TTL=128
Reply from 10.0.0.1: bytes=32 time<lms TTL=128
Reply from 10.0.0.1: bytes=32 time<lms TTL=128
Reply from 10.0.0.1: bytes=32 time<lms TTL=128

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<lms TTL=128
Reply from 10.0.0.2: bytes=32 time<lms TTL=128
Reply from 10.0.0.2: bytes=32 time=lms TTL=128
Reply from 10.0.0.2: bytes=32 time<lms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<lms TTL=128
Reply from 10.0.0.3: bytes=32 time<lms TTL=128
Reply from 10.0.0.3: bytes=32 time<lms TTL=128
Reply from 10.0.0.3: bytes=32 time<lms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

☐ Top

PC 0 and PC 3 is able to connect with PC 1, PC 2, PC 0 / PC 3 before configuring VLAN.
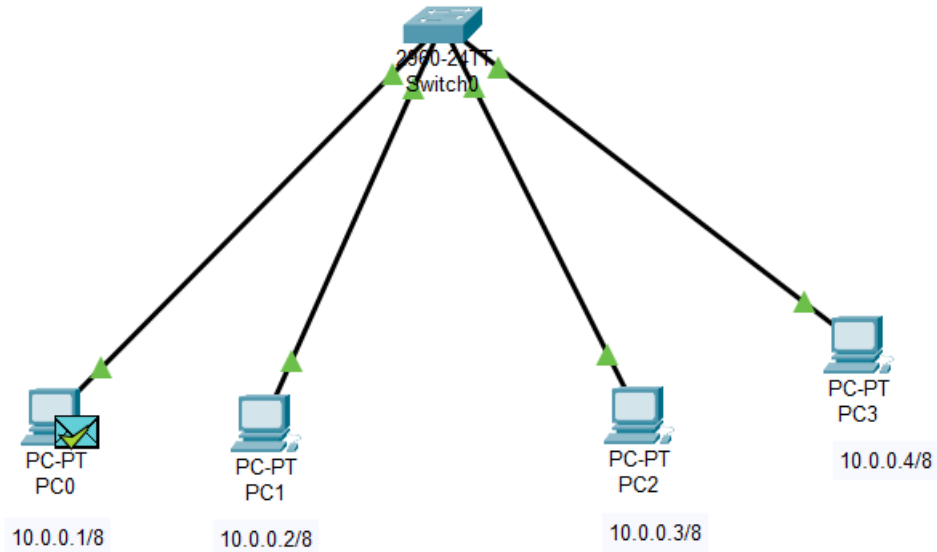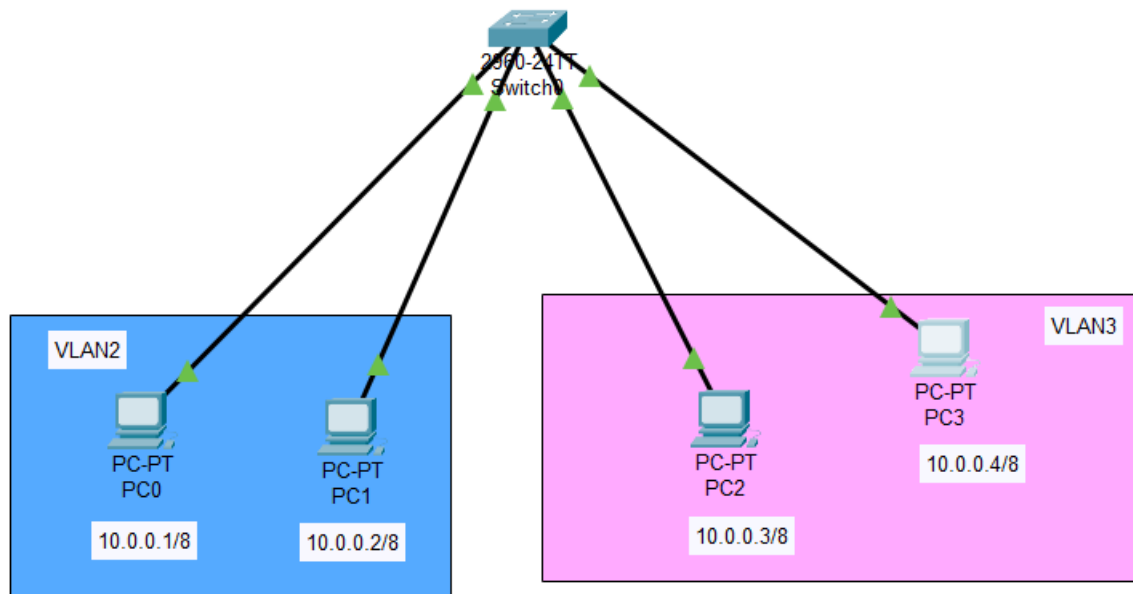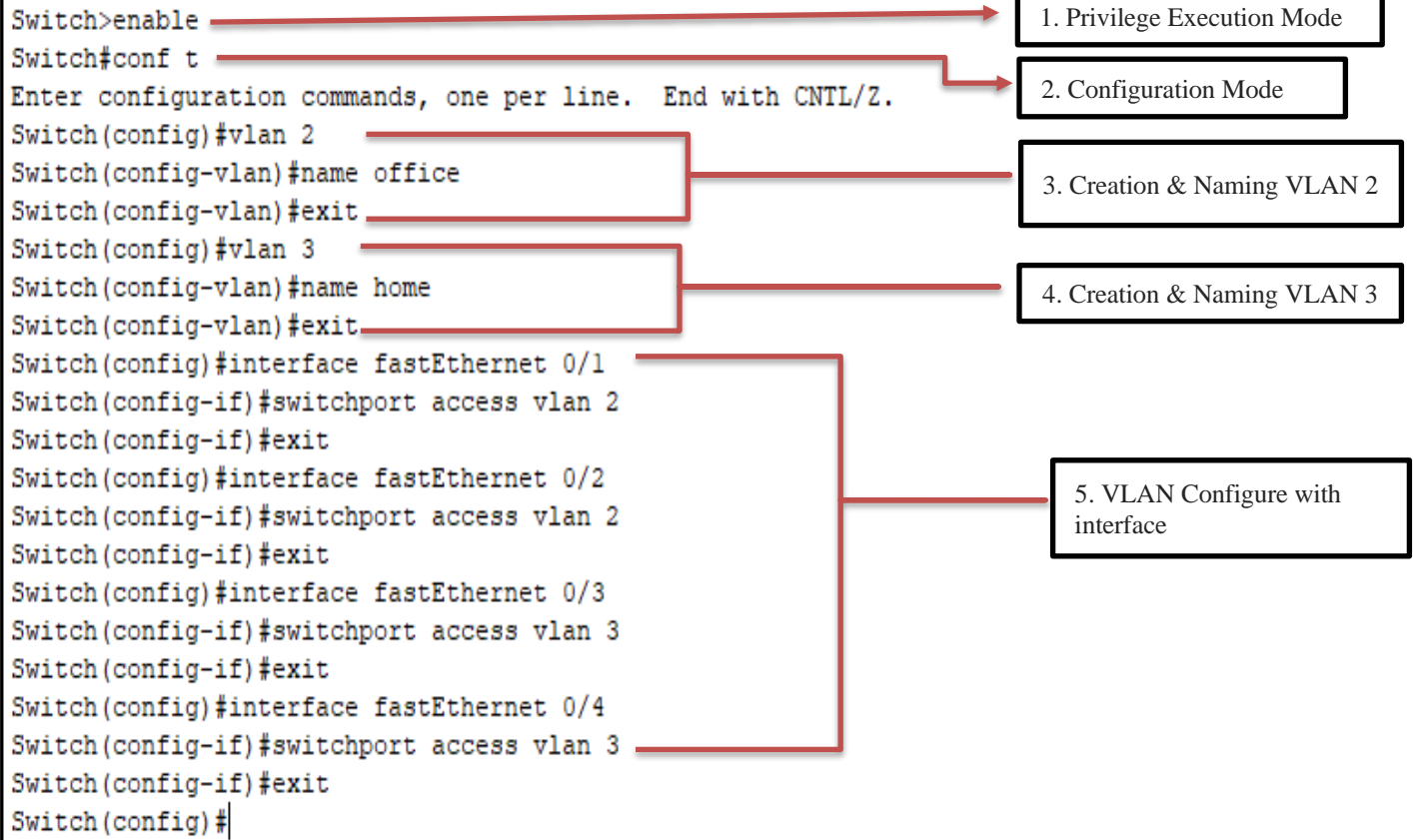
Fig: Simulation output before VLAN configuration

STEP 2: VLAN CONFIGURATION ON SWITCH

Click on Switch then click on CLI.

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```
Switch>enable
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name office
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name home
Switch(config-vlan)#exit
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#
```

1. Privilege Execution Mode
2. Configuration Mode
3. Creation & Naming VLAN 2
4. Creation & Naming VLAN 3
5. VLAN Configure with interface

STEP 3: CHECKING VLAN CONFIGURATION

```
Switch>en
Switch#show vlan br
Switch#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                Gig0/1, Gig0/2
2    office                           active    Fa0/1, Fa0/2
3    home                             active    Fa0/3, Fa0/4
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
```

STEP 5: DATA TRANSMISSION

Ping from PCO to PC1 is Successful as both are in VLAN 2, the rest gets failed.

Ping from PC3 to PC2 is Successful as both are in VLAN 3, the rest gets failed.

PC0 — □ ✕

Physical   Config   Desktop   Programming   Attributes

Command Prompt   X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

☐ Top

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

To Delete Configuration of a Cisco Route / Switches?

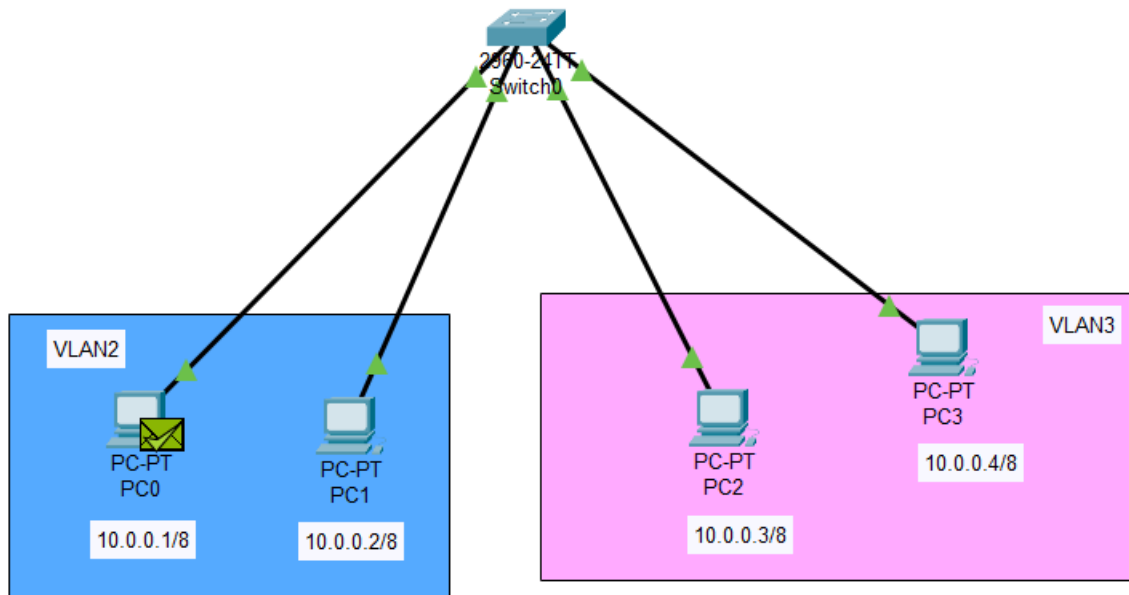**Switch#** `write erase`

Switch# `delete vlan.dat`

Switch# `reload`

OUTPUT:

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Fig: Simulation output after VLAN configuration PC0 to PC1

Fig: Simulation output after VLAN configuration PC0 to PC3

CONCLUSION:

We have successfully designed and simulated the environment for VLAN on the switch using Cisco packet tracer.