



Department of Computer Science and Engineering
Islamic University of Technology (IUT)
A subsidiary organ of OIC

Laboratory Report

CSE 4412: Data Communication and Networking Lab

Name : M M Nazmul Hossain
Student ID : 200042118
Section : 1
Semester : 4th
Academic Year : 2021-2022
Date of Submission : 04.04.2023
Lab No : 8

Title: Understanding the concept of VLAN and configuration of VLAN to multiple user groups in different locations.

Objective:

1. Understand VLAN
2. Configuration of VLAN

Devices Used In the Experiment: 9 PCs, 3 Switches

Theory:

VLAN Definition:

A VLAN, or Virtual Local Area Network, is a means of establishing logical networks within a physical network infrastructure.

VLANs allow us to generate several virtual networks within a single physical network infrastructure, allowing administrators to rather effectively manage and regulate network traffic.

Usage of VLAN:

Normally all the devices of the three different user groups would be connected to each other on the same physical network.

However, by establishing VLANs, we divide them into three distinct logical networks for each team. This can be achieved in the following way:

Three groups of users: Students, Faculties, Management

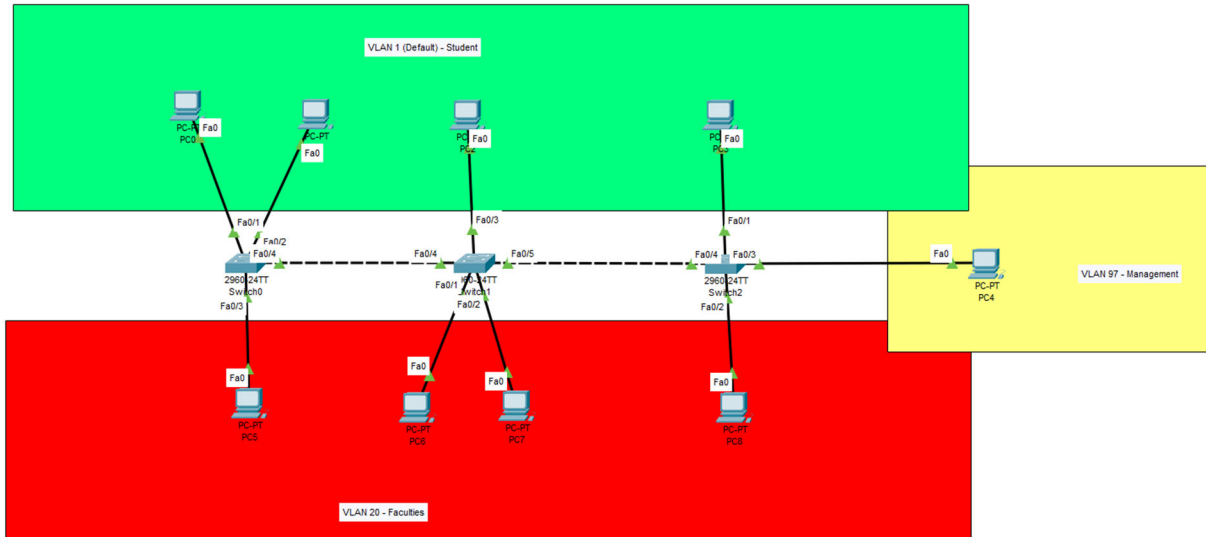
VLAN ID 1. This would include all the students.

VLAN ID 20. This would include all the faculties.

VLAN ID 97. This would include all the management staff.

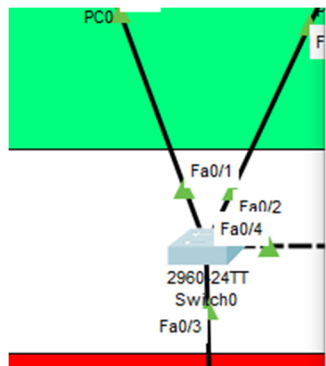
Using VLANs allows us to separate the data of each team from one another, enhancing security and lowering the possibility of illegal access. Additionally, we may use VLANs to apply various network regulations to every team, such as policies that give particular teams or apps priority when it comes to network traffic.

Diagram of the experiment:



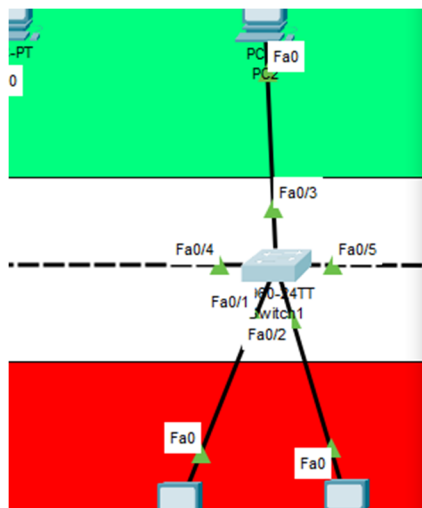
Configuration of different Switches:

Switch 0



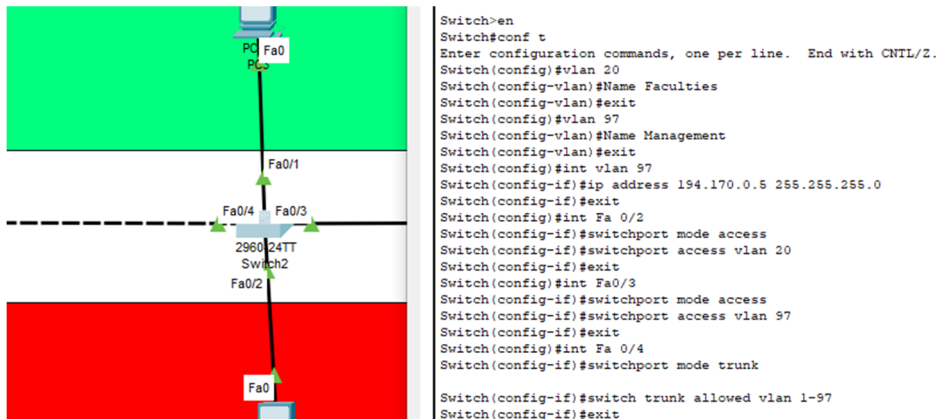
```
Switch>
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#VLAN 20
Switch(config-vlan)#Name Faculties
Switch(config-vlan)#exit
Switch(config)#VLAN 97
Switch(config-vlan)#Name Management
Switch(config-vlan)#exit
Switch(config)#int vlan 97
Switch(config-if)#ip address 194.170.0.3 255.255.255.0
Switch(config-if)#exit
Switch(config)#int Fa 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
```

Switch 1



```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 20
Switch(config-vlan)#Name Faculties
Switch(config-vlan)#exit
Switch(config)#vlan 97
Switch(config-vlan)#Name Management
Switch(config-vlan)#exit
Switch(config)#int vlan 97
Switch(config-if)#ip address 194.170.0.4 255.255.255.0
Switch(config-if)#exit
Switch(config)#int Fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#int Fa 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#int Fa0/4
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 1-97
```

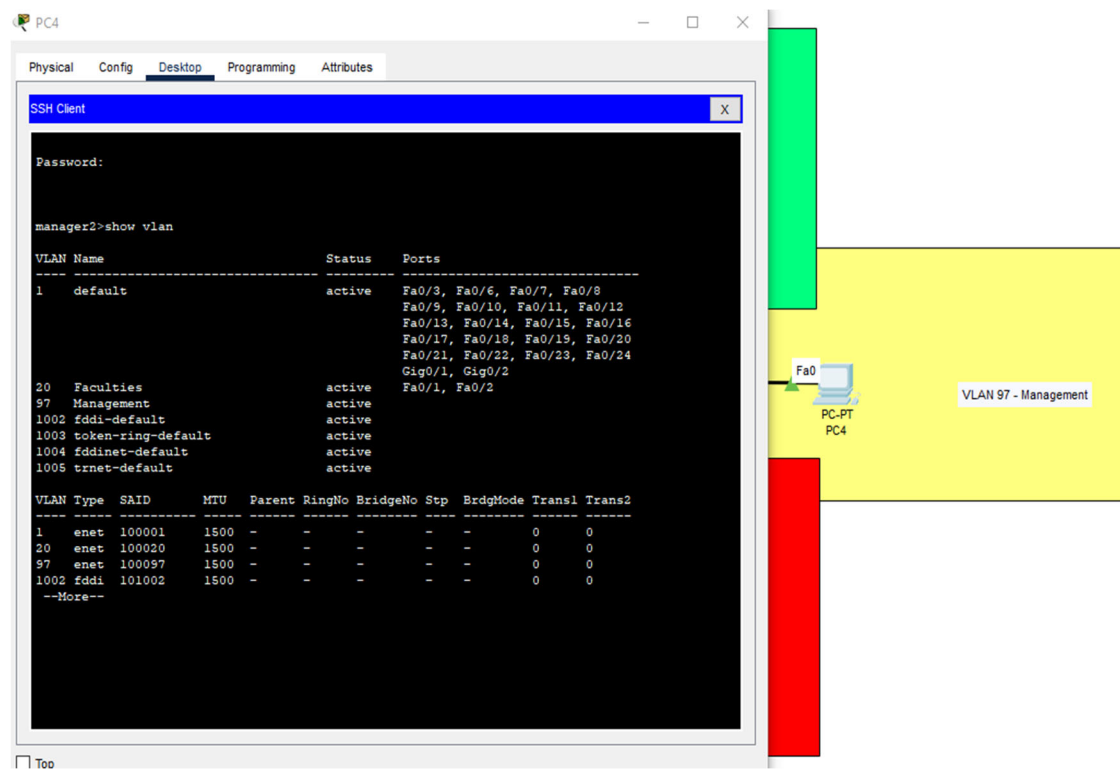
Switch 3



Additionally, to enable the remote access feature for the management PC at VLAN 97. At each switch, a hostname and domain name is set, which allows us to generate an RSA crypto key. Creating a username and a password at the switch, ssh version 2 is enabled at each switch. After setting a password for each switch, we configure an IP address of the management network in the interface of the VLAN at each switch. Finally, we can remotely access the configuration at each switch from the Management PC as seen below:

```

hostname <hostname>
ip domain-name <name>
crypto key generate rsa
ip ssh version 2
line vty 0 15
transport input ssh
enable secret <password>
line console 0
password <password>
login
exit
line vty 0 15
password <password>
login
exit
  
```

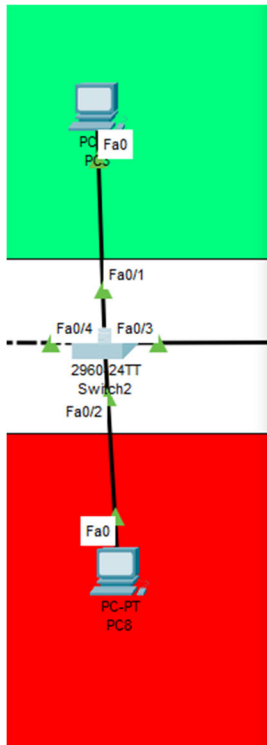


“for testing purposes, all the passwords are manager”

Observation:

Switch 2

Show vlan



```
Switch>
Switch>show vlan

VLAN Name                Status    Ports
-----
1    default                active    Fa0/1, 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
20   Faculties              active    Fa0/2
97   Management             active    Fa0/3
1002 fddi-default          active
1003 token-ring-default   active
1004 fddinet-default      active
1005 trnet-default        active

VLAN Type  SAID      MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
-----
1    enet    100001    1500  -     -     -     -   -         0       0
20   enet    100020    1500  -     -     -     -   -         0       0
97   enet    100097    1500  -     -     -     -   -         0       0
1002 fddi    101002    1500  -     -     -     -   -         0       0
1003 tr     101003    1500  -     -     -     -   -         0       0
1004 fdnet  101004    1500  -     -     -     -   ieee      0       0
1005 trnet  101005    1500  -     -     -     -   ibm       0       0

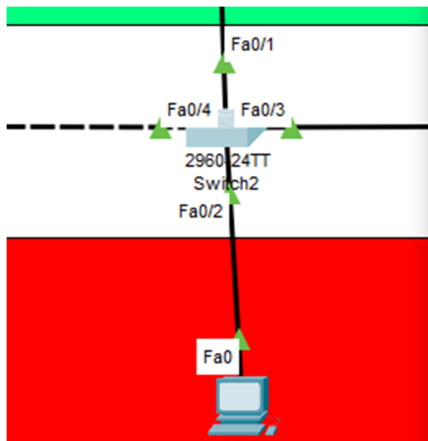
VLAN Type  SAID      MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
-----

Remote SPAN VLANs
-----

Primary Secondary Type      Ports
-----

Switch>
```

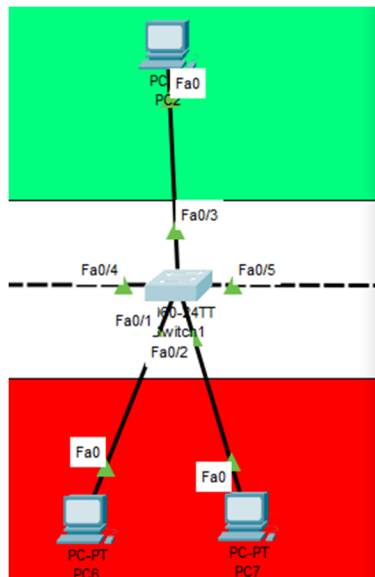
Show running-config



```
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
!
interface FastEthernet0/2
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/3
switchport access vlan 97
switchport mode access
!
interface FastEthernet0/4
switchport trunk allowed vlan 1-97
switchport mode trunk
!
interface FastEthernet0/5
,
```

Switch 1

Show vlan

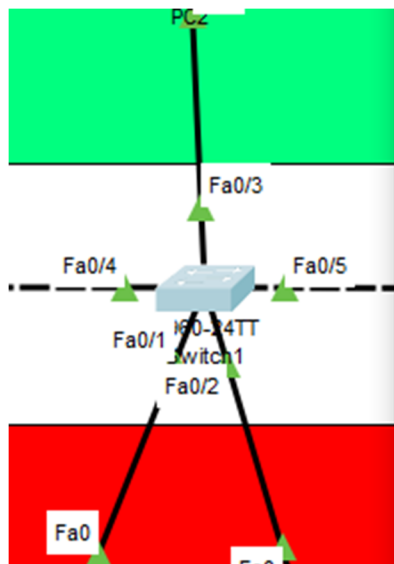


Switch>show vlan

VLAN	Name	Status	Ports
1	default	active	Fa0/3, 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 Fa0/1, Fa0/2
20	Faculties	active	
97	Management	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	-	0	0
97	enet	100097	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0
1003	tr	101003	1500	-	-	-	-	-	0	0
1004	fdnet	101004	1500	-	-	-	ieee	-	0	0
1005	trnet	101005	1500	-	-	-	ibm	-	0	0

Show running-config



```

spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/2
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet0/3
!
interface FastEthernet0/4
 switchport trunk allowed vlan 1-97
 switchport mode trunk
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!

```

It may be noted that Switch 0 doesn't need a trunk port, so it doesn't have one.

Challenges:

While everything covered in class was simple to implement and understand, trying to implement the virtual terminal for the remote access feature was a mammoth task. Since it wasn't covered in class yet it was alluded to in the image provided for the lab task. It was difficult to understand what was asked of us from simply a jpg image.