



Department of Computer Science and Engineering
Islamic University of Technology (IUT)
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Laboratory Report

CSE 4412 : Data Communication and Networking Lab

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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:

1. CISCO Packet Tracer

Theory:

VLAN Definition:

A virtual LAN (VLAN) is a network that connects together a subset of devices. These devices within a subset are connected through a physical medium or LAN.

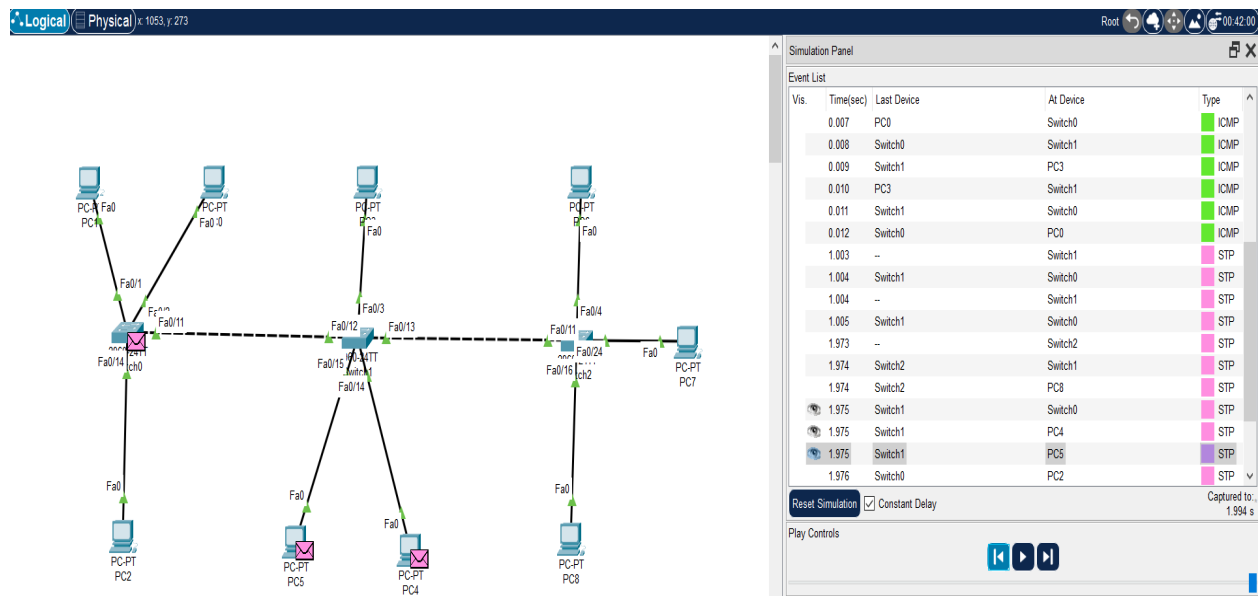
Usage of VLAN:

Explain the usage of VLAN with an example with three different user groups situated in three different levels of an office building.

Suppose, an office building with three different user groups situated in three different levels - IT, Human Resource and Finance. For the IT group, we can create IT VLAN. For the Human Resource group, we can create HR VLAN. For the Finance group, we can create Finance VLAN.

Using VLAN these groups can communicate with the devices within their own VLAN. Devices within the IT group can only communicate with other devices in the IT group. Same goes for Human Resource and Finance.

Diagram of the experiment:



Configuration of different Switches:

Commands for configuring VLAN:

To configure the VLAN I at first went to the CLI mode of a switch and then entered the following commands:

En → conf t → vlan 10 → name Student → exit.

After that I created another VLAN named Faculties in the same way.

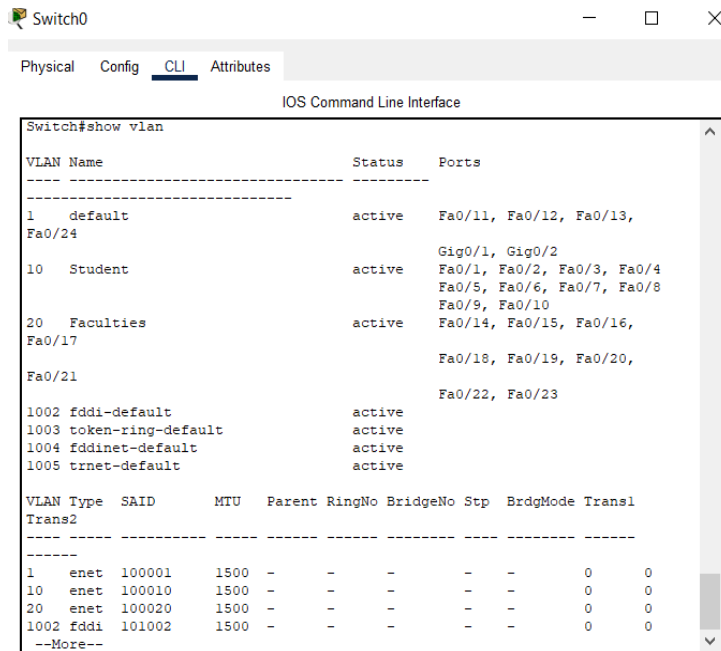
```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface
Switch#show vlan
VLAN Name                Status Ports
-----
1    default                active Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                   Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                   Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                   Fa0/13, Fa0/14, Fa0/15,
                                   Fa0/16
                                   Fa0/17, Fa0/18, Fa0/19,
                                   Fa0/21, Fa0/22, Fa0/23,
                                   Fa0/24
                                   Gig0/1, Gig0/2
10   Student                active
20   Faculties              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    BrgdMode Transl
-----
1    enet   1000001  1500   -      -      -      -      -      0      0
10   enet   1000010  1500   -      -      -      -      -      0      0
20   enet   1000020  1500   -      -      -      -      -      0      0
--More--
```

```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface
VLAN Type  SAID      MTU    Parent RingNo BridgeNo Stp    BrgdMode Transl
-----
Trans2
Remote SPAN VLANs
-----
Primary Secondary Type      Ports
-----
Switch#
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range fa0/1-10
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport mode access vlan 10
^
% Invalid input detected at '^' marker.
Switch(config-if-range)#switchport access vlan 10
Switch(config-if-range)#exit
Switch(config)#interface range fa0/14-23
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#exit
Switch(config)#exit
Switch#show vlan
```

Then I assigned ports to the the VLAN with the following commands:

Conf t → interface range fa0/1-10 → switchport mode access → switchport access vlan 10 → exit.

Similarly, I assigned the interfaces fa0/14 to fa0/23 to VLAN 20.



```
Switch0
Physical Config CLI Attributes
IOS Command Line Interface
Switch#show vlan
VLAN Name                Status    Ports
-----
1    default                active    Fa0/11, Fa0/12, Fa0/13,
Fa0/24
10   Student                active    Gig0/1, Gig0/2
Fa0/1, Fa0/2, Fa0/3, Fa0/4
Fa0/5, Fa0/6, Fa0/7, Fa0/8
Fa0/9, Fa0/10
20   Faculties              active    Fa0/14, Fa0/15, Fa0/16,
Fa0/17
Fa0/18, Fa0/19, Fa0/20,
Fa0/21
Fa0/22, Fa0/23
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 Transl
Trans2
-----
1    enet  100001   1500   -      -      -      -      -      0      0
10   enet  100010   1500   -      -      -      -      -      0      0
20   enet  100020   1500   -      -      -      -      -      0      0
1002 fddi  101002   1500   -      -      -      -      -      0      0
--More--
```

After that I assigned IP addresses to the PCs. All the PCs belonging to the Students VLAN were under the network address 192.162.10.0 and the PCs belonging to the Students VLAN were under the network address 192.162.20.0 .

I configured the other 2 switches in the same way. In switch 2 there were 3 VLANS including the Management VLAN.

After that I configured the ports which were connecting switches among themselves and set their mode as trunk:

En → conf t → interface fa0/11 → switchport mode trunk → switchport trunk allowed vlan 10-20 → exit

```

Switch0
Physical Config CLI Attributes
IOS Command Line Interface
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Transl
Trans2
-----
Remote SPAN VLANs
-----
Primary Secondary Type Ports
-----
Switch#
Switch#
Switch#
Switch#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-5-CONFIG_I: Configured from console by console
Switch#
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fa0/11
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10-20
Switch(config-if)#exit
Switch(config)#exit
Switch#

```

```

Switch0
Physical Config CLI Attributes
IOS Command Line Interface
interface FastEthernet0/11
switchport trunk allowed vlan 10-20
switchport mode trunk
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/15
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/16
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/17
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/18
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/19
--More--

```

To see the configuration of all the ports including trunk, I entered the following command:
Show running-config

Observation:

The screenshots of *show vlan* command in two switches are shown below:

```

Switch0
Physical Config CLI Attributes
IOS Command Line Interface
Switch#show vlan
VLAN Name                Status Ports
-----
1 default                 active Fa0/12, Fa0/13, Fa0/24,
Gig0/1
10 Student                active Fa0/1, Fa0/2, Fa0/3, Fa0/4
Fa0/5, Fa0/6, Fa0/7, Fa0/8
Fa0/9, Fa0/10
20 Faculties              active Fa0/14, Fa0/15, Fa0/16,
Fa0/17 Fa0/18, Fa0/19, Fa0/20,
Fa0/21 Fa0/22, Fa0/23
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 Transl
Trans2
-----
1 enet 100001 1500 - - - - - 0 0
10 enet 100010 1500 - - - - - 0 0
20 enet 100020 1500 - - - - - 0 0
1002 fddi 101002 1500 - - - - - 0 0
--More--

```

```

Switch1
Physical Config CLI Attributes
IOS Command Line Interface
Switch#show vlan
VLAN Name                Status Ports
-----
1 default                 active Fa0/11, Fa0/24, Gig0/1,
Gig0/2
10 Student                active Fa0/1, Fa0/2, Fa0/3, Fa0/4
Fa0/5, Fa0/6, Fa0/7, Fa0/8
Fa0/9, Fa0/10
20 Faculties              active Fa0/14, Fa0/15, Fa0/16,
Fa0/17 Fa0/18, Fa0/19, Fa0/20,
Fa0/21 Fa0/22, Fa0/23
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 Transl
Trans2
-----
1 enet 100001 1500 - - - - - 0 0
10 enet 100010 1500 - - - - - 0 0
20 enet 100020 1500 - - - - - 0 0
1002 fddi 101002 1500 - - - - - 0 0
1003 tr 101003 1500 - - - - - 0 0
--More--

```

Switch2

Physical Config CLI Attributes

IOS Command Line Interface

```
Switch2#show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/12, Fa0/13, Gig0/1, Gig0/2
10	Student	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10
20	Faculties	active	Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21
97	Management	active	Fa0/22, Fa0/23, Fa0/24
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	Transl
1	enet	100001	1500	-	-	-	-	0	0
10	enet	100010	1500	-	-	-	-	0	0
20	enet	100020	1500	-	-	-	-	0	0
97	enet	100097	1500	-	-	-	-	0	0

--More--

To see the interface with trunk access I used *show running-config*

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

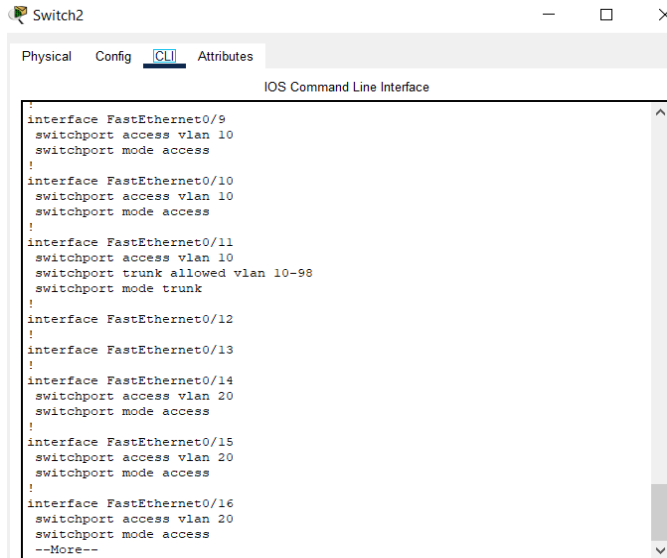
```
switchport mode access
!
interface FastEthernet0/5
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/6
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/7
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/8
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/9
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/10
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/11
switchport trunk allowed vlan 10-98
switchport mode trunk
!
```

Switch1

Physical Config CLI Attributes

IOS Command Line Interface

```
switchport mode access
!
interface FastEthernet0/9
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/10
switchport access vlan 10
switchport mode access
!
interface FastEthernet0/11
!
interface FastEthernet0/12
switchport trunk allowed vlan 10-98
switchport mode trunk
!
interface FastEthernet0/13
switchport trunk allowed vlan 10-98
switchport mode trunk
!
interface FastEthernet0/14
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/15
switchport access vlan 20
switchport mode access
!
interface FastEthernet0/16
--More--
```



Challenges:

In this task, I faced difficulties while configuring the switches as there were too many commands for three different switches.