

PB_05_Kushagra Suryawanshi

Batch: B1 T.Y. B.Tech

CNL_2

VLAN Implementation

Aim: Design and configure a virtual LAN using Packet Tracer.

Objectives:

1. To understand the concept of VLAN and implement it using packet tracer.

Theory

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II Theory

- 1. Packet Tracer:**
It is a cross platform visual simulation tool designed by CISCO systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of CISCO routers and switches using a simulated command interface.
- 2. Packet Tracer key features:**
 - Customize single/multuser activities.
 - Unlimited devices
 - E-learning
 - Visualizing networks
 - Real time mode and simulation mode.
 - Interactive environment.
 - Self paced.
 - Supports majority of networking protocols.
 - Cross platform compatibility.
- 3. Packet Tracer Workspaces:**
 - i) Logical workspace - allows users to build logical network topologies by placing, connecting and clustering virtual network devices.

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ii) Physical workspace - provides a graphical physical dimension of the logical network, giving a sense of scale and placement in real environment.

4. What is VLAN?

→ Virtual LAN or VLAN is any broadcast domain that is partitioned and isolated in a computer networks of the data link layer.

5. Collision domain:

→ A collision domain is a network segment connected by a shared medium or through repeaters where simultaneous data transmissions collide with one other.

6. Broadcast domain:

→ A broadcast domain is a logical division of a computer network, in which all nodes can reach each other by broadcast at the data link layer. It can be within same LAN segment or bridged to others.

7. collision domain and broadcast domain in networking devices (Hub, switch and Router)

A) collision domain :: happen often in Hub environment.

Each port on a hub is in the same collision domain

Each port on a bridge, switch or router is in a separate collision domain.

B) Broadcast domain :: All ports on a hub or switch are

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by default in the same broadcast division.

All ports on a router are in different broadcast domains and routers don't forward broadcasts from one domain to another domain.

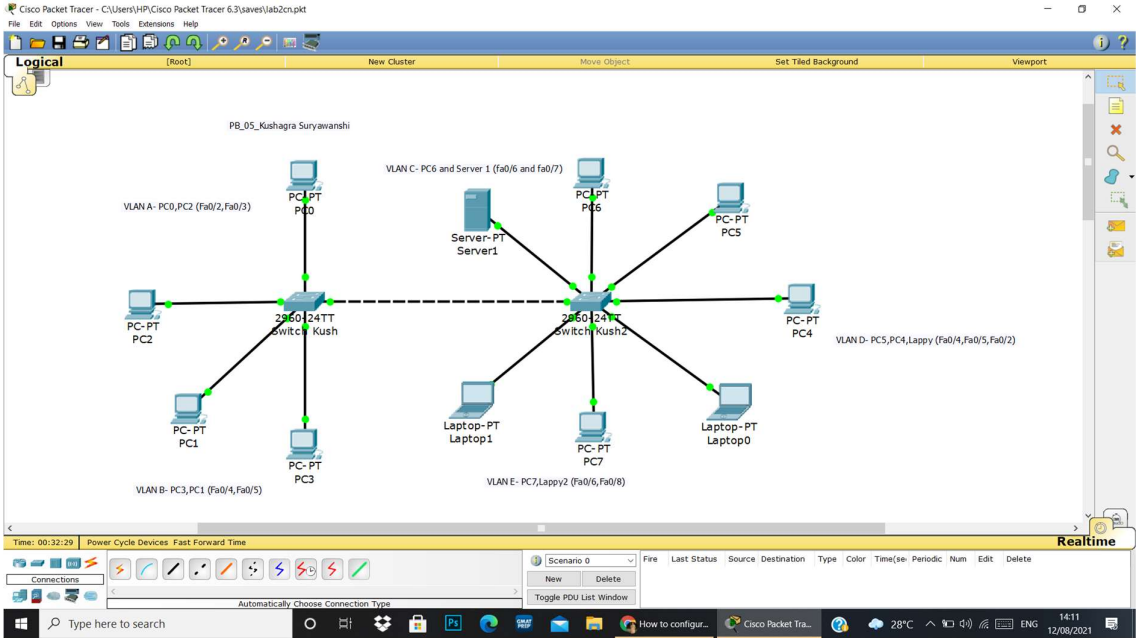
8. Access port and trunk port:

An access port transports traffic to and from only the specified VLAN allotted to it.

A trunk port is a specific type of port on a network switch that allows data to flow across a network node for multiple virtual local area networks or VLANs.

Design Screenshot:

I have created 5 VLANs over 2 switches. PANEL A and B are associated with Switch Kush and PANEL C, D and E are associated with Switch Kush 2. The VLAN communication devices have been shown the images (notes) and also explained further.



CLI code (for Switch Kush 2, similar code for switch Kush):

```
1002 fddi 101002 1500 - - - - 0 0
1003 tr 101003 1500 - - - - 0 0
1004 fdnet 101004 1500 - - - iece - 0 0
1005 trnet 101005 1500 - - - ibm - 0 0
```

Remote SPAN VLANs

Primary Secondary Type Ports

Switch#

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Switch con0 is now available

Press RETURN to get started.

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down

%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up

Switch>enable

Switch#show vlan

VLAN Name	Status	Ports

1 default	active	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, Fa0/20, Fa0/21 Fa0/22, Fa0/23, Fa0/24, Gig0/1

Gig0/2

1002 fddi-default	act/unsup
1003 token-ring-default	act/unsup
1004 fddinet-default	act/unsup
1005 trnet-default	act/unsup

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

1	enet	100001	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

Remote SPAN VLANs

Primary	Secondary	Type	Ports
---------	-----------	------	-------

Switch#vlan database

% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.

Switch(vlan)#vlan ?

<1-1005> ISL VLAN index

Switch(vlan)#vlan vlan 30 ?

% Unrecognized command

Switch(vlan)#vlan 30 ?

name Ascii name of the VLAN

<cr>

Switch(vlan)#vlan 30 name PANELC

VLAN 30 added:

Name: PANELC

Switch(vlan)#vlan 40 name PANELD

VLAN 40 added:

Name: PANELD

Switch(vlan)#vlan 50 name PANELE

VLAN 50 added:

Name: PANELE

Switch(vlan)#exit

APPLY completed.

Exiting....

Switch#show vlan

VLAN Name	Status	Ports

1 default	active	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, Fa0/20, Fa0/21 Fa0/22, Fa0/23, Fa0/24, Gig0/1 Gig0/2
30 PANELC	active	
40 PANELD	active	
50 PANELE	active	
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2

1	enet	100001	1500	-	-	-	-	-	0	0
30	enet	100030	1500	-	-	-	-	-	0	0
40	enet	100040	1500	-	-	-	-	-	0	0
50	enet	100050	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

Remote SPAN VLANs

Primary	Secondary	Type	Ports
---------	-----------	------	-------

Switch#conig

Translating "conig"...domain server (255.255.255.255)

% Unknown command or computer name, or unable to find computer address

Switch#config term

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#int fa0/2

Switch(config-if)#switchport mode access

Switch(config-if)#switchport access vlan 30

Switch(config-if)#int fa0/4

Switch(config-if)#switchport mode access

Switch(config-if)#switchport access vlan 30

Switch(config-if)#int fa0/5

Switch(config-if)#switchport mode access

```
Switch(config-if)#switchport access vlan 30
Switch(config-if)#int fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
Switch(config-if)#int fa0/7
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
Switch(config-if)#int fa0/6
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 50
Switch(config-if)#int fa0/8
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 50
Switch(config-if)#int fa0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access trunk
```

^

% Invalid input detected at '^' marker.

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

```
Switch(config-if)#
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

```
Switch#
```


Switch Kush2

Physical Config CLI

Press RETURN to get started.

%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up
 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up
 %LINK-5-CHANGED: Interface FastEthernet0/7, changed state to up
 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7, changed state to up
 %LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up
 %LINK-5-CHANGED: Interface FastEthernet0/8, changed state to down
 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down
 %LINK-5-CHANGED: Interface FastEthernet0/8, changed state to up
 %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up

Switch>enable
Switch#show vlan

VLAN Name	Status	Ports
1 default	active	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, Fa0/20, Fa0/21 Fa0/22, Fa0/23, Fa0/24, Gig0/1 Gig0/2
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Transl	Trans2
1	enst	100001	1500	-	-	-	-	0	0
30	enst	100030	1500	-	-	-	-	0	0
40	enst	100040	1500	-	-	-	-	0	0
50	enst	100050	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

Switch Kush2

Physical Config CLI

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Transl	Trans2
1	enst	100001	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

Remote SPAN VLANs

Primary	Secondary	Type	Ports
Switch#vlan database			
% Warning: It is recommended to configure VLAN from config mode, as VLAN database mode is being deprecated. Please consult user documentation for configuring VTP/VLAN in config mode.			
Switch(vlan)#vlan ?			
<1-1005> ISL VLAN index			
Switch(vlan)#vlan vlan 30 ?			
% Unrecognized command			
Switch(vlan)#vlan 30 ?			
name Ascii name of the VLAN			
<0>			
Switch(vlan)#vlan 30 name PANELC			
VLAN 30 added:			
Name: PANELC			
Switch(vlan)#vlan 40 name PANELD			
VLAN 40 added:			
Name: PANELD			
Switch(vlan)#vlan 50 name PANELE			
VLAN 50 added:			
Name: PANELE			
Switch(vlan)#exit			
APPLY completed.			
Exiting...			
Switch#show vlan			

VLAN Name	Status	Ports
1 default	active	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, Fa0/20, Fa0/21 Fa0/22, Fa0/23, Fa0/24, Gig0/1 Gig0/2
30 PANELC	active	
40 PANELD	active	
50 PANELE	active	
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	

Switch Kush2

Physical Config CLI

1003 token-ring-default	act/unsup
1004 fddinet-default	act/unsup
1005 trnet-default	act/unsup

VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Transl	Trans2
1	enst	100001	1500	-	-	-	-	0	0
30	enst	100030	1500	-	-	-	-	0	0
40	enst	100040	1500	-	-	-	-	0	0
50	enst	100050	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

Remote SPAN VLANs

Primary	Secondary	Type	Ports
Switch#config			
Translating "config"...domain server (255.255.255.255)			
% Unknown command or computer name, or unable to find computer address			
Switch#config term			
Enter configuration commands, one per line. End with CNTL/Z.			
Switch(config)#int fa0/2			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 30			
Switch(config-if)#int fa0/4			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 30			
Switch(config-if)#int fa0/5			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 30			
Switch(config-if)#int fa0/3			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 40			
Switch(config-if)#int fa0/7			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 40			
Switch(config-if)#int fa0/6			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 50			
Switch(config-if)#int fa0/8			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access vlan 50			
Switch(config-if)#int fa0/1			
Switch(config-if)#switchport mode trunk			
Switch(config-if)#switchport mode access			
Switch(config-if)#switchport access trunk			
^			
% Invalid input detected at '^' marker.			
Switch(config-if)#exit			
Switch(config)#int fa0/1			
Switch(config-if)#switchport mode trunk			
Switch(config-if)#			
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down			
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up			
Switch#			
%SIS-5-CONFIG_I: Configured from console by console			
Switch con0 is now available			
Press RETURN to get started.			

IC

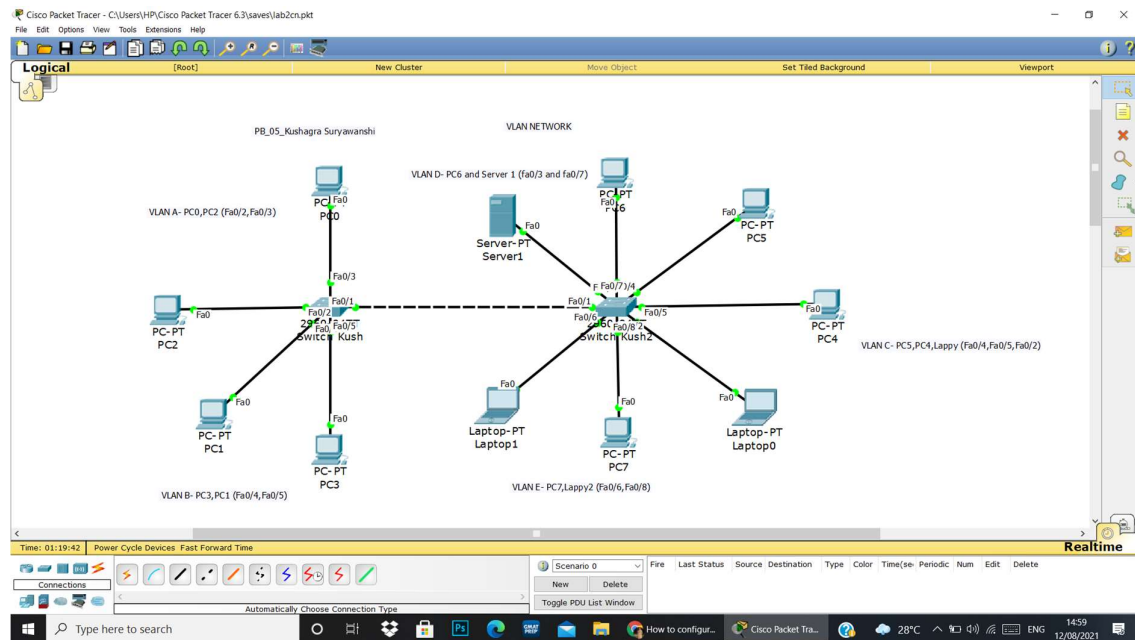
Steps followed for the Configuration:

1. Create the desired network by connecting various devices.
2. Decide the devices that you want to group together in a VLAN.
3. In the CLI section of switch, check the VLAN database and create a (many more can be created) new VLAN with a non-existing VLANID and Name.

4. Configure the terminals: Interface the ports in access or trunk mode.
5. Use the ping command to check the connectivity of different devices.
6. Follow the same steps to configure the other switch.

OUTPUT SCREENSHOTS:

DESIGN:



USING CLI:

```

Switch KUSH
Physical Config CLI
IOS Command Line Interface

Switch(vlan)#vlan 10 ?
Name ASCII name of the VLAN
size
Switch(vlan)#vlan 10 name FANELA
VLAN 10 modified:
Name: FANELA
Switch(vlan)#vlan 20 name FANELB
VLAN 20 modified:
Name: FANELB
Switch(vlan)#exit
APPLY completed.
Exiting...
Switch#show vlan

VLAN Name                Status    Ports
-----
1    default                active    Fa0/2, Fa0/3, 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
10   FANELA                 active    Fa0/4
20   FANELB                 active    Fa0/1
1002 fddi-default         act/unsup
1003 token-ring-default   act/unsup
1004 fddinet-default       act/unsup
1005 trnet-default         act/unsup

VLAN Type SAID          MTU   Parent RingNo BridgeNo Stp     BdgMode Trans1 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
1004 fddinet  101004  1500   -     -     -     lsm   0      0
1005 trnet  101005  1500   -     -     -     lsm   0      0

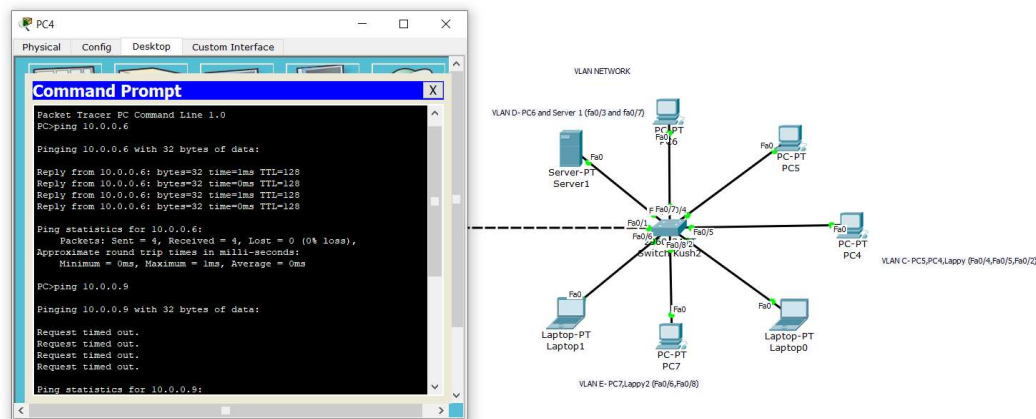
Remote SPAN VLANs
-----

Primary Secondary Type      Ports
-----
Switch#showconfig terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#int s2switchport access vlan 10switchport access vian 10switchport access vian 10
Switch(config-if)#int s2switchport mode access switchport access vian 10switchport mode access switchport mode access vian 20switchport mode access vian 20switchport access vian 20
Switch(config-if)#int s2switchport access vian 10switchport mode trunk

```

USING PING COMMAND:

Here PC4 is able to communicate with PC5 since they are in the same VLAN but is not able to connect with Laptop 1 since they are in different VLAN.



Students Observation:

- Devices in a VLAN can communicate with each other but not with devices that are not a part of the given VLAN.
- To interface switches we need to use the trunk mode whereas devices are connected in access mode.
- VLAN database has some existing entries where VLAN 1 is the default VLAN.
- We can also use config settings of a switch to create VLANs without coding in the CLI.

FAQS:

FAQS.

1. What is the need for VLAN?

→ A VLAN allows different computers and devices to be connected virtually to each other as if they were in LAN sharing a single broadcast domain. They improve network security.

2. Which switching technology reduces the size of a broadcast domain?

→ VLAN reduces the size of a broadcast domain. VLANs break up broadcast domains in layer 2 switched internetworks.

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3. Which protocols are used to configure trunking on a switch?

→ 802.1Q and 19h are used to configure trunking on a port.

4. What is the difference between ^{access}VLAN and Trunk mode?

→ Access mode:

- connection on a switch that transmits data to and from a specific LAN.
- by default an access port carries only VLAN.
- VLAN tags are not carried.

→ Trunk mode:

- can transmit data from multiple VLANs.
- by default, a trunk interface can carry traffic for all VLANs.
- VLAN tags are carried.

5. List different network simulator tools like Cisco Packet Tracer.

→ The simulators are:

- CBT Nuggets
- Ready Tech
- CloudShare
- Practice Labs
- AWS self-paced labs
- KASM workspaces.

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