

HACETTEPE UNIVERSITY
COMPUTER ENGINEERING DEPARTMENT
COMPUTER NETWORKS LABORATORY



EXPERIMENT

Virtual Local Area Networks (VLANs)

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Group No:12

AIM OF EXPERIMENT:

In this lab experiment, we created a VLAN using Switches. We saw the uses of Switch in Virtual Local Area Network using Cisco packet tracer.

DEFINITIONS AND EXPLANATIONS:

VLAN: Stands for "Virtual Local Area Network". A VLAN is a network created from one or more existing LANs. It enables groups of devices from multiple virtual networks to be combined into a single logical physical network. VLAN's advantages include helping with network efficiency by reducing traffic, making the system more secure by creating a virtual boundary around the unit and improving workspace distribution.

Switch: Switch is a network device which is used to enable the connection establishment and connection termination on the basis of need. Switch is operated on Data link layer.

VLAN Trunking: VLAN trunking enables the movement of traffic to different parts of the network configured as a VLAN. A trunk could be a point-to-point link between two network devices that carry quite one VLAN. With VLAN trunking, you'll be able to extend your configured VLAN across the whole network.

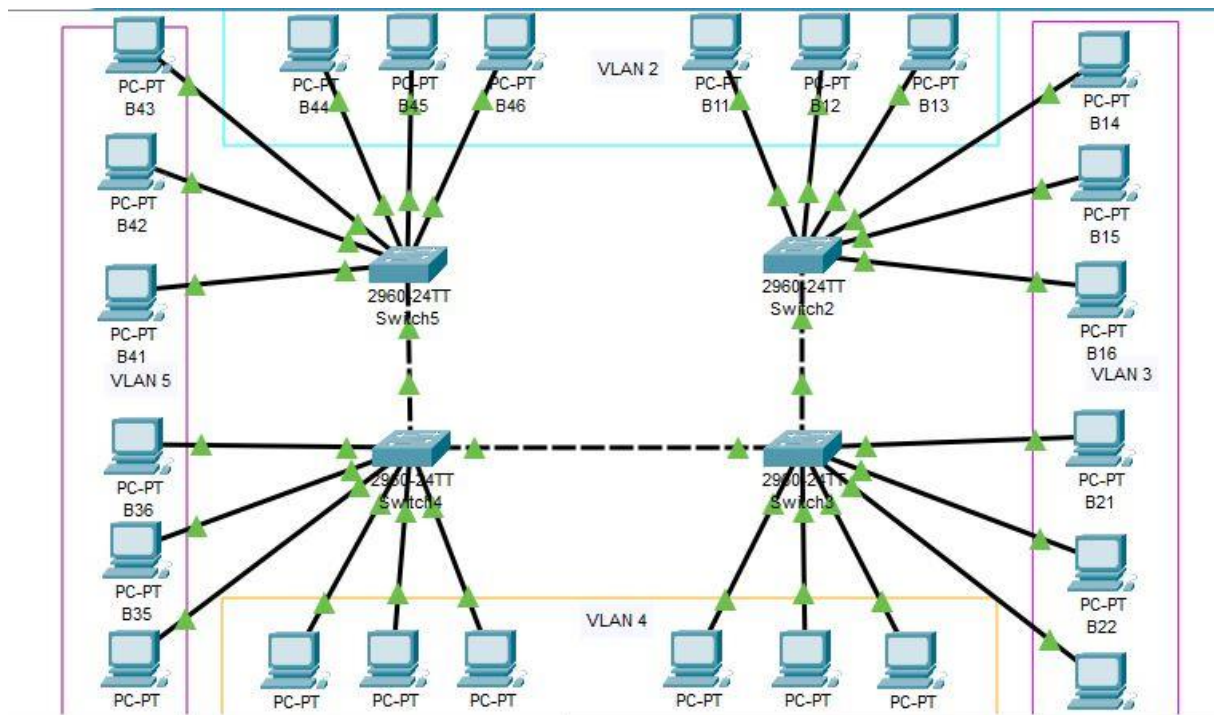
VLAN Tagging: VLAN Tagging, also referred to as Frame Tagging, may be a method developed by Cisco to assist identify packets travelling through trunk links. When an Ethernet frame traverses a trunk link, a special VLAN tag is added to the frame and sent across the trunk link.

DIFFERENCES BETWEEN LAN AND VLAN:

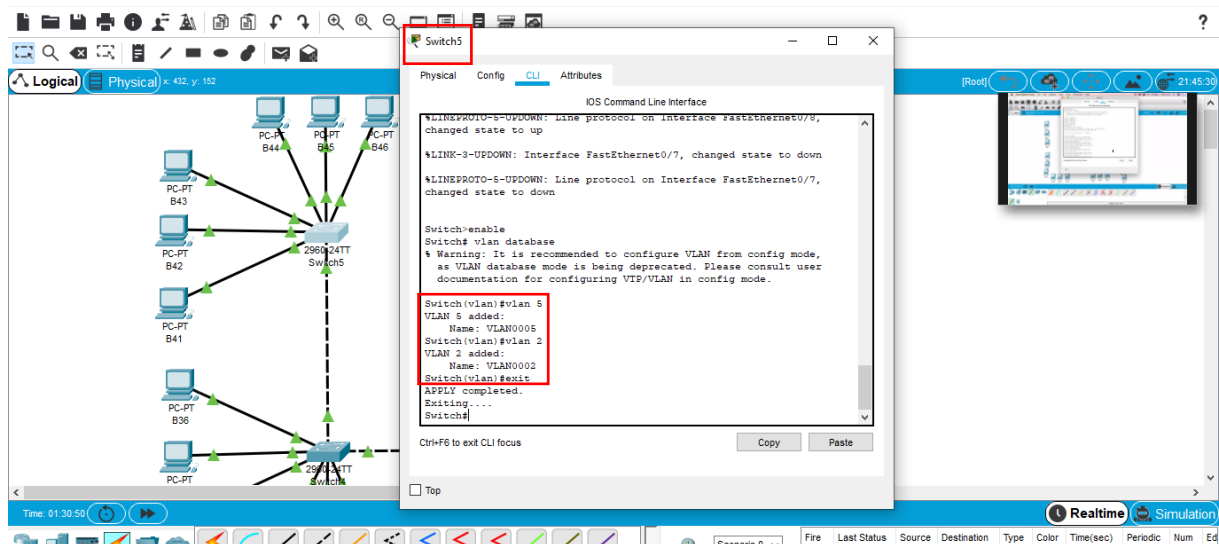
<u>LAN</u>	<u>VLAN</u>
LAN can be created with computer and hub or switches and is in a limited area.	VLAN can be created in a custom network from one or more LAN'S.
The latency is high.	The latency is lower.
The cost is high.	The cost is less.
In LAN the network packet can be advertised to every device.	In VLAN the network packet is sent to a broadcast domain.

PS: Because we are group 12 our IP addresses go like 10.12.xx.x .

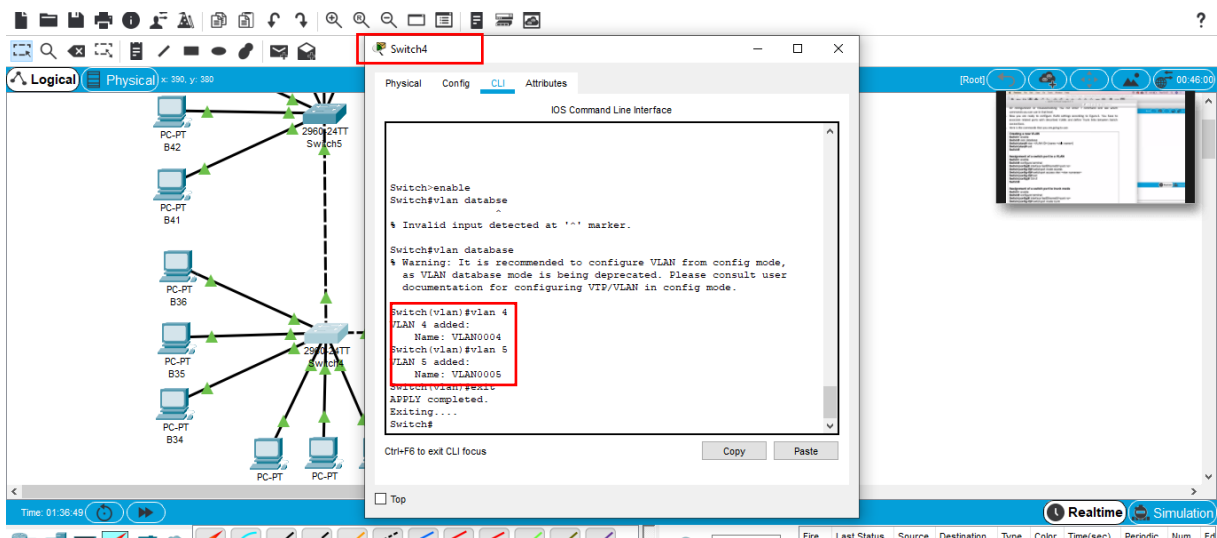
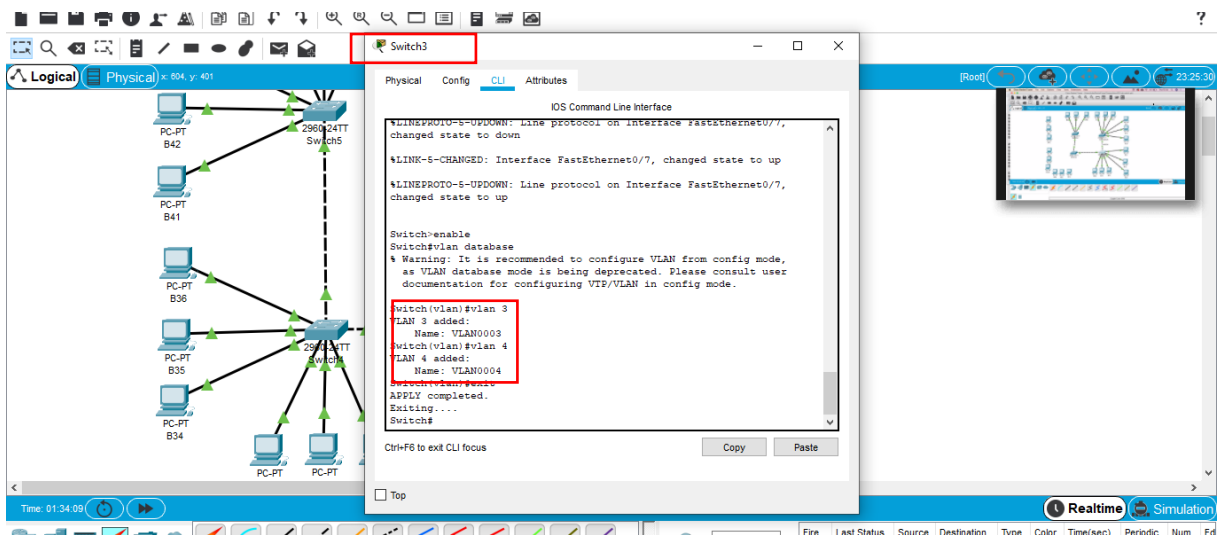
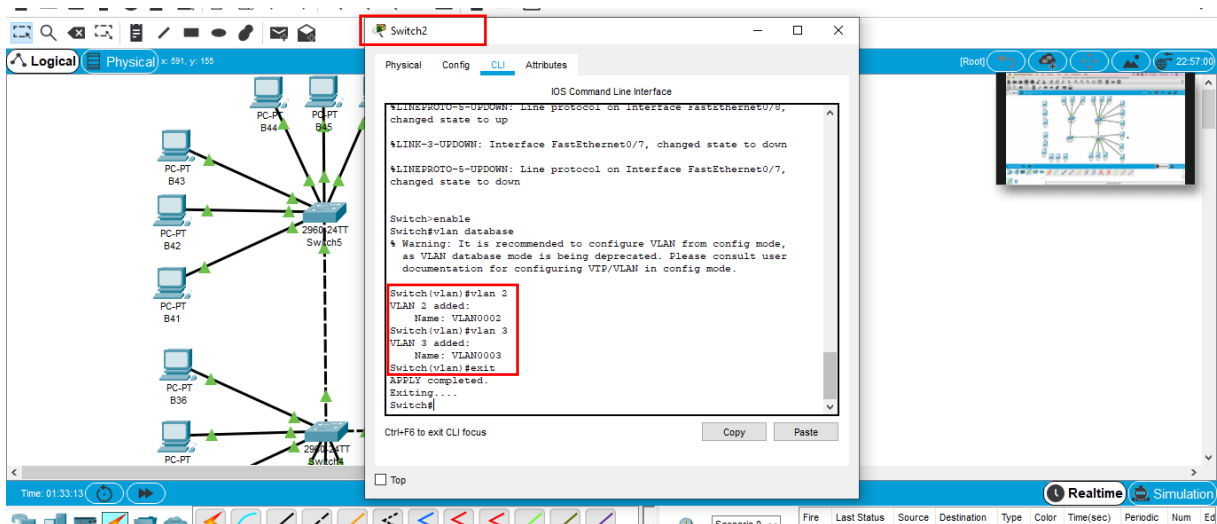
STEPS TAKEN:



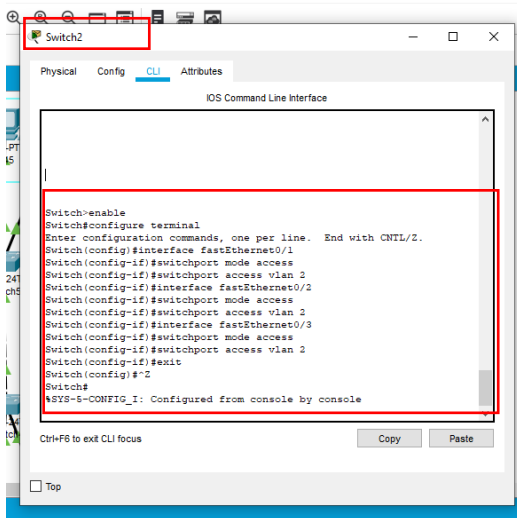
Topology



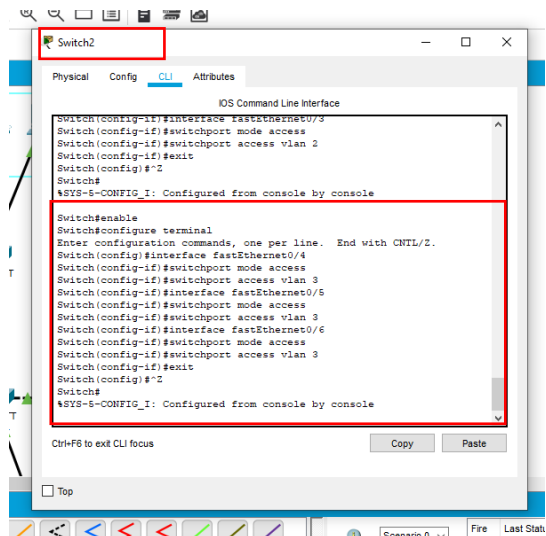
Switch5 connected to VLAN2 and VLAN5.



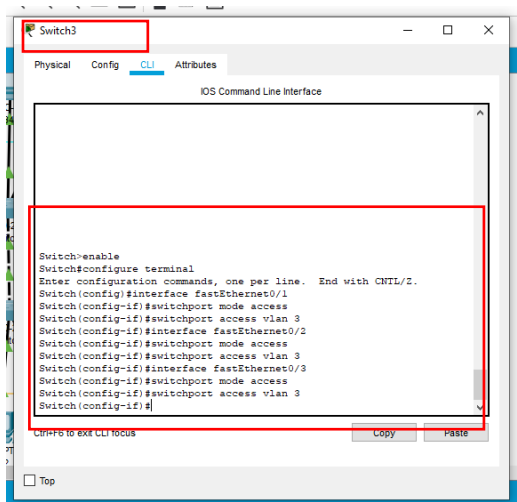
Assignment of a switch port to a VLAN.



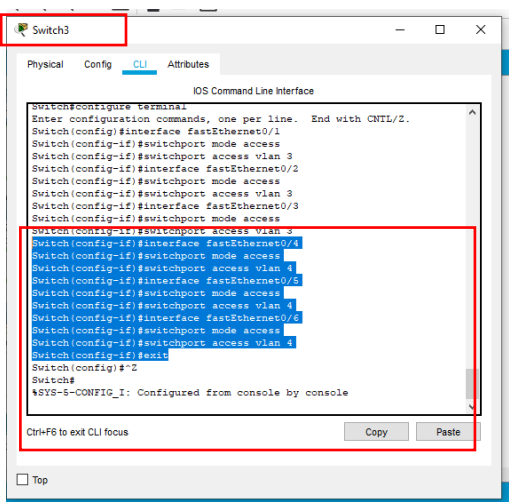
Switch2 assigned to VLAN2.



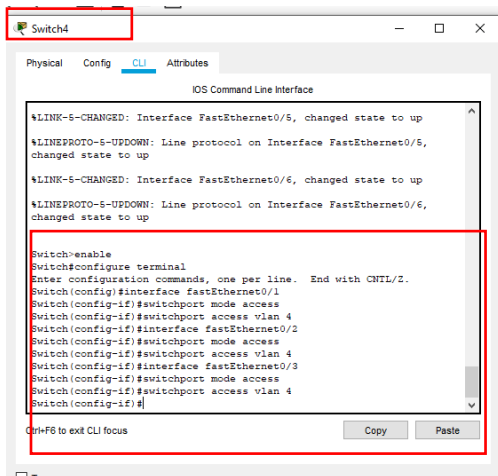
Switch2 assigned to VLAN3.



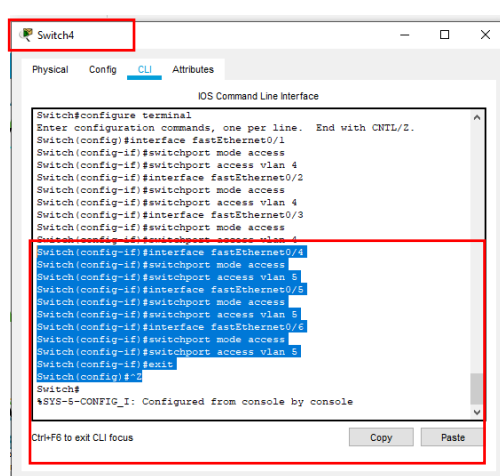
Switch3 assigned to VLAN3.



Switch3 assigned to VLAN4.



Switch4 assigned to VLAN4.



Switch4 assigned to VLAN5.

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#interface fastEthernet0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#interface fastEthernet0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#
```

Switch5 assigned to VLAN5.

```
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Ctrl+F6 to exit CLI focus
```

Switch5 assigned to VLAN2.

Assignment of a switch port to trunk mode

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/1
Switch(config-if)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/8
Switch(config-if)#switchport mode trunk
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8,
changed state to down
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8,
changed state to up
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Ctrl+F6 to exit CLI focus
```

Switch 2 trunk mode(switch3).

```
%SPANTREE-2-RECV_PVID_ERR: Received 802.1Q BPDU on non trunk
FastEthernet0/8 VLAN1.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking FastEthernet0/8 on VLAN0001.
Inconsistent port type.

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

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/8
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Ctrl+F6 to exit CLI focus
```

Switch3 trunk mode(switch2).

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/8
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/7
Switch(config-if)#switchport mode trunk
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to down
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/7,
changed state to up
Switch(config-if)#exit
Switch(config)#

Ctrl+F6 to exit CLI focus
```

Switch3 trunk mode(switch4).

```
%SPANTREE-2-RECV_PVID_ERR: Received 802.1Q BPDU on non trunk
FastEthernet0/7 VLAN1.

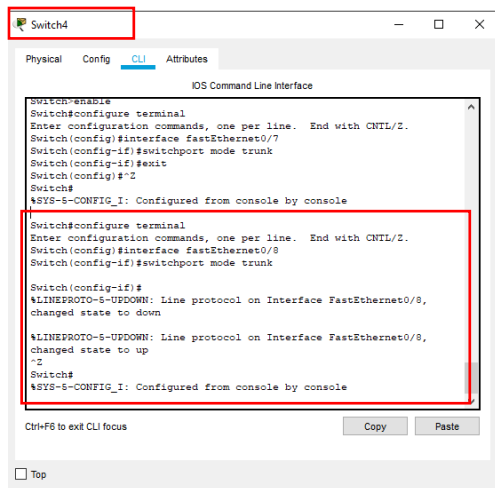
%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking FastEthernet0/7 on VLAN0001.
Inconsistent port type.

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

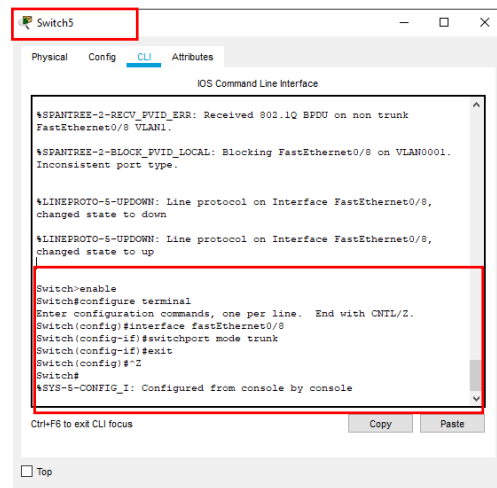
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/7
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Ctrl+F6 to exit CLI focus
```

Switch4 trunk mode(switch3).

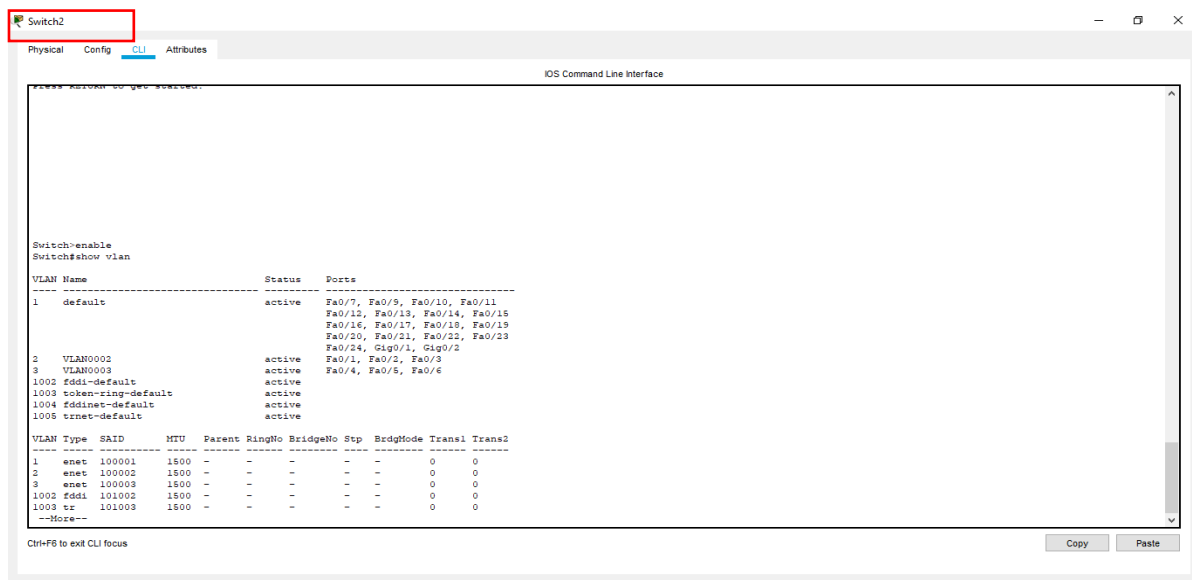


Switch4 trunk mode (switch5).

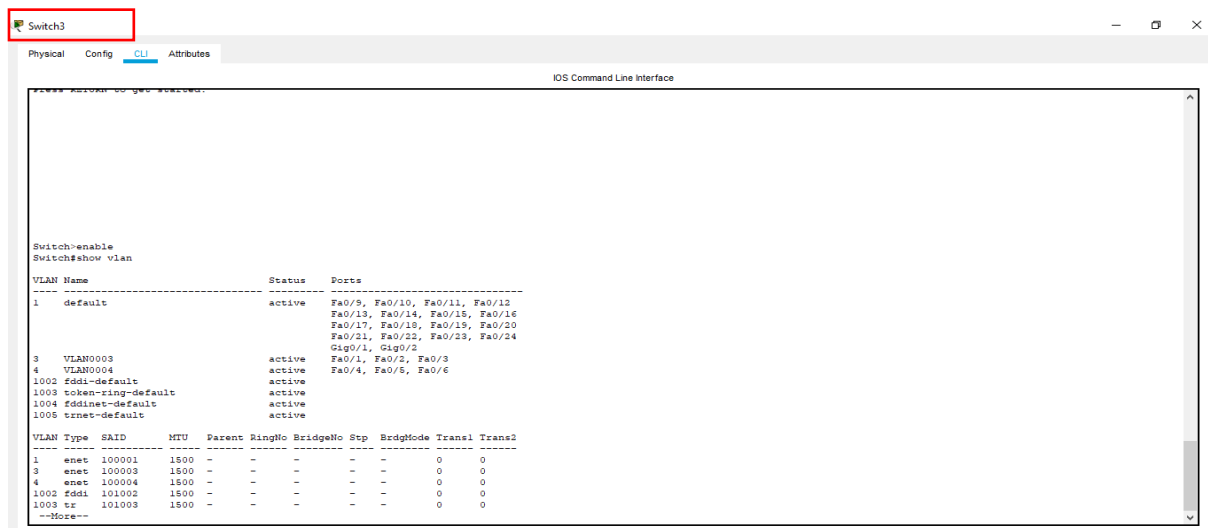


Switch5 trunk mode (switch4).

Displaying VLAN interface table



Switch 2 interface table



Switch 3 interface table

Switch4

Physical Config CLI Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG-I: Configured from console by console
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/8
Switch(config-if)#switchport mode trunk
Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/8, changed state to up
^Z
Switch#
%SYS-5-CONFIG-I: Configured from console by console
Switch#show vlan
```

VLAN Name	Status	Ports
1 default	active	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
4 VLAN0004	active	Fa0/1, Fa0/2, Fa0/3
5 VLAN0005	active	Fa0/4, Fa0/5, Fa0/6
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
4 enet	100004	1500	-	-	-	-	-	0	0
5 enet	100005	1500	-	-	-	-	-	0	0
1002 fddi	101002	1500	-	-	-	-	-	0	0
1003 tr	101003	1500	-	-	-	-	-	0	0

Ctrl+F8 to exit CLI focus

Copy Paste

Switch 4 interface table

Switch5

Physical Config CLI Attributes

IOS Command Line Interface

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

Switch#enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet0/8
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#^Z
Switch#
%SYS-5-CONFIG-I: Configured from console by console
^Z
Switch#show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/7, 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 VLAN0002	active	Fa0/4, Fa0/5, Fa0/6
5 VLAN0005	active	Fa0/1, Fa0/2, Fa0/3
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

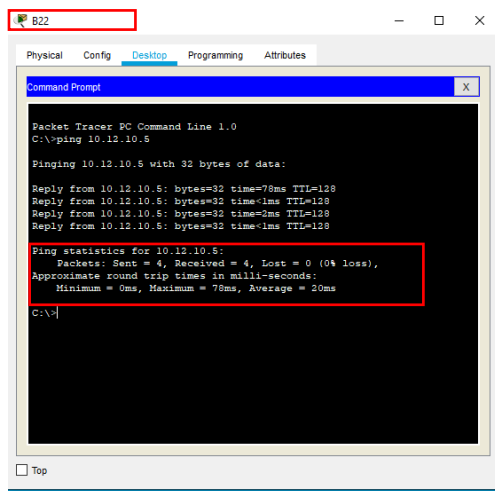
VLAN Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1 enet	100001	1500	-	-	-	-	-	0	0
2 enet	100002	1500	-	-	-	-	-	0	0
5 enet	100005	1500	-	-	-	-	-	0	0
1002 fddi	101002	1500	-	-	-	-	-	0	0
1003 tr	101003	1500	-	-	-	-	-	0	0

Ctrl+F8 to exit CLI focus

Copy Paste

Switch 5 interface table

Sending Ping



```
Packet Tracer PC Command Line 1.0
C:\>ping 10.12.10.5

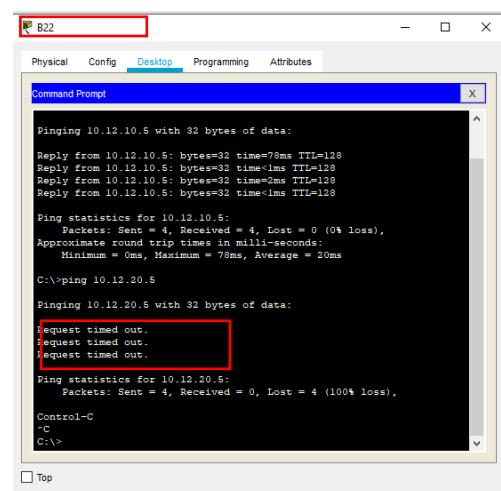
Pinging 10.12.10.5 with 32 bytes of data:

Reply from 10.12.10.5: bytes=32 time=78ms TTL=128
Reply from 10.12.10.5: bytes=32 time<1ms TTL=128
Reply from 10.12.10.5: bytes=32 time=2ms TTL=128
Reply from 10.12.10.5: bytes=32 time<1ms TTL=128

Ping statistics for 10.12.10.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 78ms, Average = 20ms
C:\>
```

B22→B15

B22→B15 ping worked because both of them are in VLAN3.



```
Packet Tracer PC Command Line 1.0
C:\>ping 10.12.20.5

Pinging 10.12.20.5 with 32 bytes of data:

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

Ping statistics for 10.12.20.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>
```

B22→B25 Timeout

B22→B25 Timeout because both of them are connected to switch3 but B22 is in VLAN3 while B25 is in VLAN4.