

Cloud Computing and Virtualization Lab

Presented by:
Saurabh Singhal
Assistant Professor

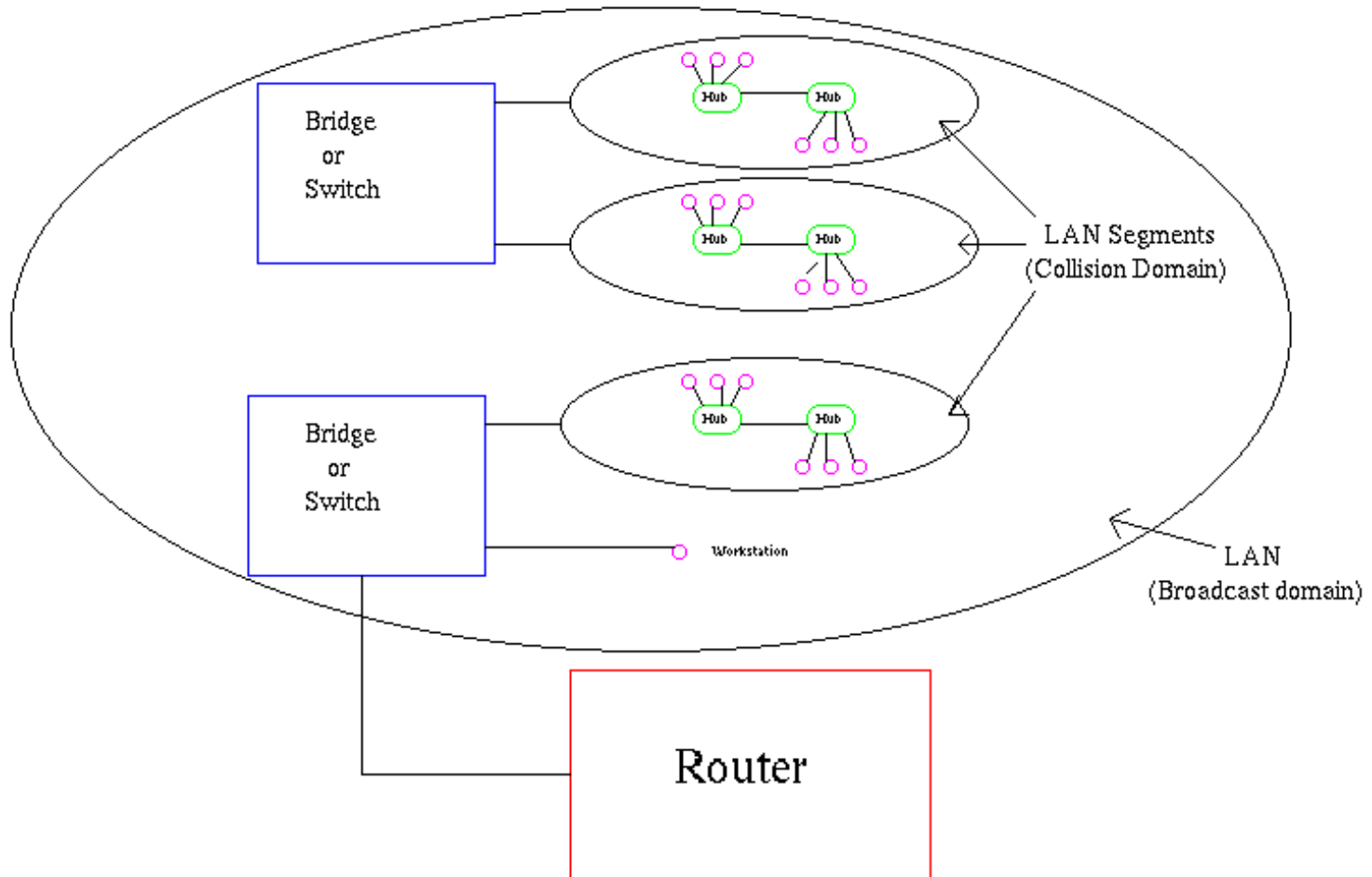
VLAN

- A virtual local area network (VLAN) is a logical group of workstations, servers and network devices that appear to be on the same LAN despite their geographical distribution.
- A VLAN allows a network of computers and users to communicate in a simulated environment as if they exist in a single LAN and are sharing a single broadcast and multicast domain.
- VLANs are implemented to achieve scalability, security and ease of network management and can quickly adapt to changes in network requirements and relocation of workstations and server nodes.

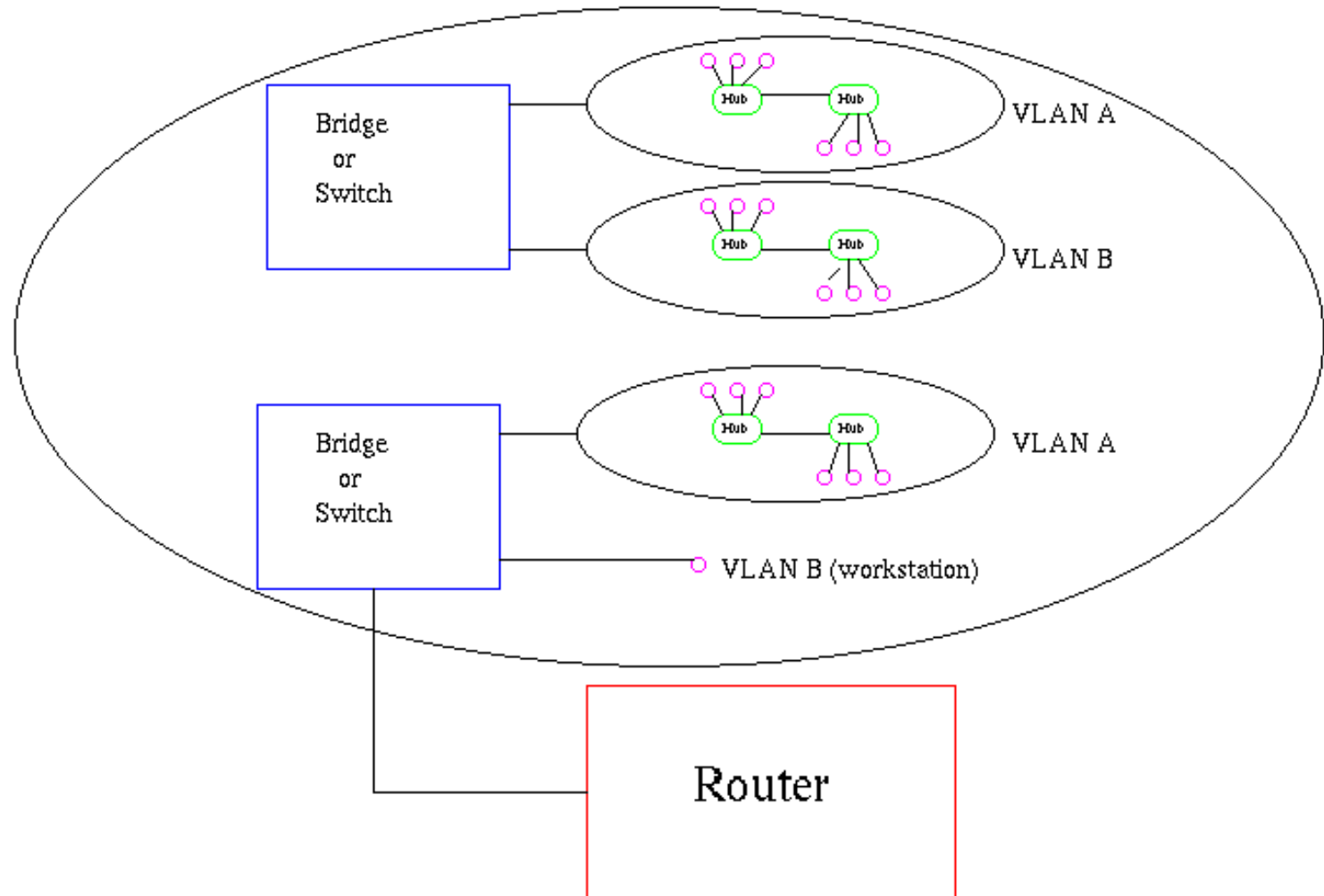
VLAN

- A VLAN allows several networks to work virtually as one LAN.
- One of the most beneficial elements of a VLAN is that it removes latency in the network, which saves network resources and increases network efficiency.
- In addition, VLANs are created to provide segmentation and assist in issues like security, network management and scalability.
- Traffic patterns can also easily be controlled by using VLANs

VLAN



VLAN



Why use VLAN's?

- VLAN's offer a number of advantages over traditional LAN's. They are:
 - Performance
 - Formation of Virtual Workgroups
 - Simplified Administration
 - Reduced Cost
 - Security –Due to logical separation.
 - Broadcast Traffic

VLAN: Disadvantage

- High risk of virus issues because one infected system may spread a virus through the whole logical network
- Equipment limitations in very large networks because additional routers might be needed to control the workload
- More effective at controlling latency than a WAN, but less efficient than a LAN

VLAN: Type

- There are several ways in which VLAN membership can be defined, here we divide VLAN solutions into four general types:
 - Port grouping
 - MAC-layer grouping
 - Network-layer grouping
 - IP multicast grouping

VLAN: Types of Connections

- Devices on a VLAN can be connected in three ways based on whether the connected devices are VLAN-aware or VLAN-unaware.
 - Trunk Link
 - Access Link
 - Hybrid Link

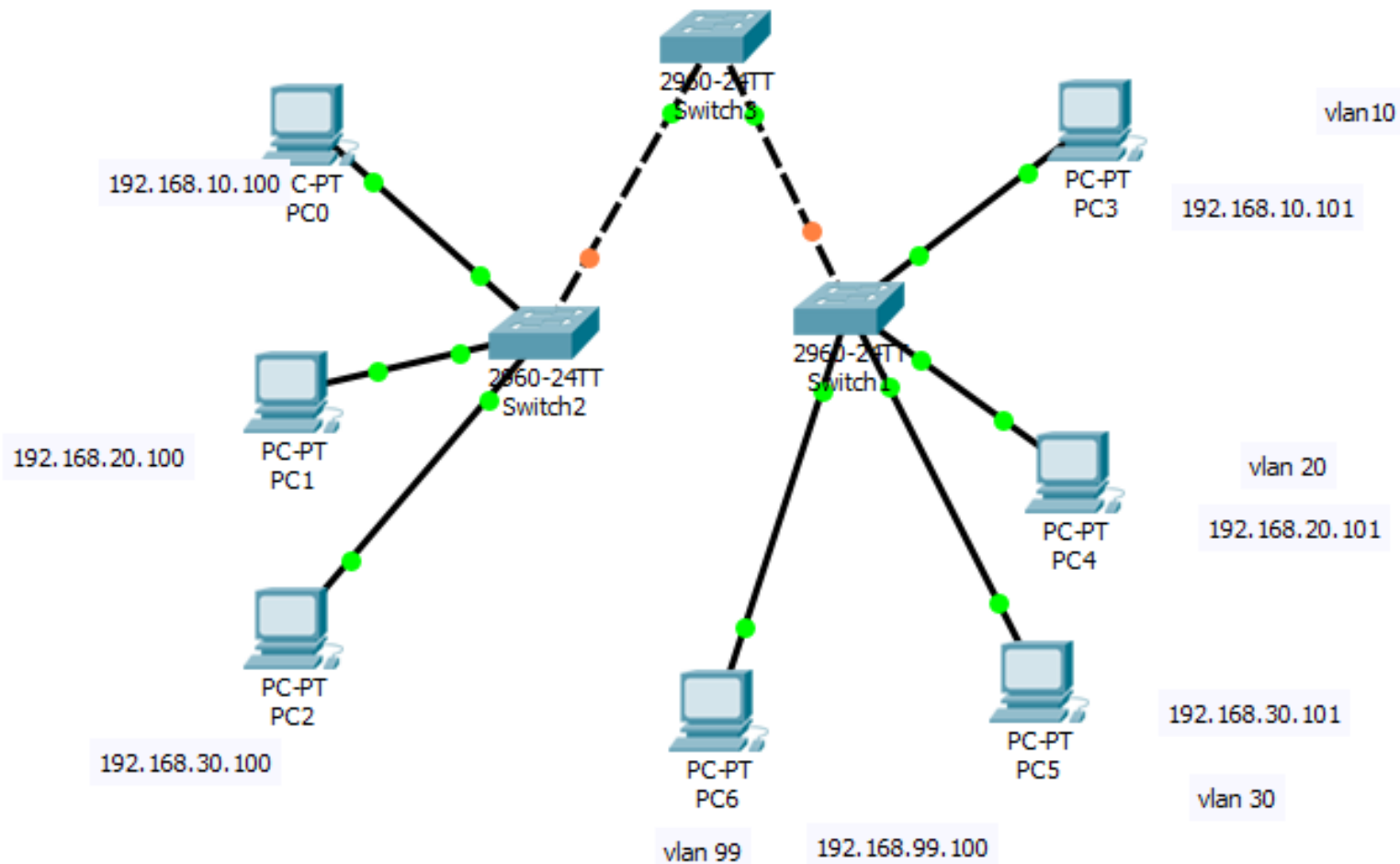
Summary

- VLAN's allows the formation of virtual workgroups, better security, improved performance, simplified administration, and reduced costs.
- VLAN's are formed by the logical segmentation of a network and can be classified into Layer1, 2, 3 and higher layers.
- Only Layer 1 and 2 are specified in the draft standard 802.1Q.
- Tagging and the filtering database allow a bridge to determine the source and destination VLAN for received data.
- VLAN's if implemented effectively, show considerable promise in future networking solutions.

To Create VLAN

- Make Connection as:
- **From Switch0:**
 - Switch0-
fastethernet0/0
 - Switch1-
fastethernet0/0
- **From Switch0:**
 - Switch0-
fastethernet0/1
 - Switch2-
fastethernet0/0
- Make Connection as:
- **From Switch2:**
 - PC3 to fastethernet0/6
 - PC4 to fastethernet0/11
 - PC5 to fastethernet0/18
 - PC6 to fastethernet0/24
- **Repeat same connection form Switch1 to PC1, PC2, PC3.**
- Wait for connection to get up

To Create VLAN



Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	↔ Up	1	--	000C.852A.6001
FastEthernet0/2	Down	1	--	000C.852A.6002
FastEthernet0/3	Down	1	--	000C.852A.6003
FastEthernet0/4	Down	1	--	000C.852A.6004
FastEthernet0/5	Down	1	--	000C.852A.6005
FastEthernet0/6	↔ Up	1	--	000C.852A.6006
FastEthernet0/7	Down	1	--	000C.852A.6007
FastEthernet0/8	Down	1	--	000C.852A.6008
FastEthernet0/9	Down	1	--	000C.852A.6009
FastEthernet0/10	Down	1	--	000C.852A.600A
FastEthernet0/11	↔ Up	1	--	000C.852A.600B
FastEthernet0/12	Down	1	--	000C.852A.600C
FastEthernet0/13	Down	1	--	000C.852A.600D
FastEthernet0/14	Down	1	--	000C.852A.600E
FastEthernet0/15	Down	1	--	000C.852A.600F
FastEthernet0/16	Down	1	--	000C.852A.6010
FastEthernet0/17	Down	1	--	000C.852A.6011
FastEthernet0/18	↔ Up	1	--	000C.852A.6012
FastEthernet0/19	Down	1	--	000C.852A.6013
FastEthernet0/20	Down	1	--	000C.852A.6014
FastEthernet0/21	Down	1	--	000C.852A.6015
FastEthernet0/22	Down	1	--	000C.852A.6016
FastEthernet0/23	Down	1	--	000C.852A.6017
FastEthernet0/24	Down	1	--	000C.852A.6018
GigabitEthernet0/1	Down	1	--	000C.852A.6019
GigabitEthernet0/2	Down	1	--	000C.852A.601A
Vlan1	Down	1	<not set>	0040.0BDC.D193
Hostname: Switch				
Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet				

**Switch1
Table**

Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	↔ Up	1	--	00D0.FF80.3A01
FastEthernet0/2	Down	1	--	00D0.FF80.3A02
FastEthernet0/3	Down	1	--	00D0.FF80.3A03
FastEthernet0/4	Down	1	--	00D0.FF80.3A04
FastEthernet0/5	Down	1	--	00D0.FF80.3A05
FastEthernet0/6	↔ Up	1	--	00D0.FF80.3A06
FastEthernet0/7	Down	1	--	00D0.FF80.3A07
FastEthernet0/8	Down	1	--	00D0.FF80.3A08
FastEthernet0/9	Down	1	--	00D0.FF80.3A09
FastEthernet0/10	Down	1	--	00D0.FF80.3A0A
FastEthernet0/11	↔ Up	1	--	00D0.FF80.3A0B
FastEthernet0/12	Down	1	--	00D0.FF80.3A0C
FastEthernet0/13	Down	1	--	00D0.FF80.3A0D
FastEthernet0/14	Down	1	--	00D0.FF80.3A0E
FastEthernet0/15	Down	1	--	00D0.FF80.3A0F
FastEthernet0/16	Down	1	--	00D0.FF80.3A10
FastEthernet0/17	Down	1	--	00D0.FF80.3A11
FastEthernet0/18	↔ Up	1	--	00D0.FF80.3A12
FastEthernet0/19	Down	1	--	00D0.FF80.3A13
FastEthernet0/20	Down	1	--	00D0.FF80.3A14
FastEthernet0/21	Down	1	--	00D0.FF80.3A15
FastEthernet0/22	Down	1	--	00D0.FF80.3A16
FastEthernet0/23	Down	1	--	00D0.FF80.3A17
FastEthernet0/24	↔ Up	1	--	00D0.FF80.3A18
GigabitEthernet0/1	Down	1	--	00D0.FF80.3A19
GigabitEthernet0/2	Down	1	--	00D0.FF80.3A1A
Vlan1	Down	1	<not set>	0002.4A62.86B5

Hostname: Switch

**Switch2
Table**

To Create VLAN

- Click on Switch0 and select CLI tab
 - Type
 - enable
 - configure terminal
 - vlan 99
 - name admin
 - exit
 - vlan 10
 - name Lab-1
 - exit
- vlan 20
- name Lab-2
- exit
- vlan 30
- name Lab-3
- exit
- ctrl+z
- Copy running-config startup-config
- Press enter
- show vlan brief



Physical

Config

CLI

Attributes

IOS Command Line Interface

```
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)#vlan 99
Switch(config-vlan)#name mngnt
Switch(config-vlan)#exit
Switch(config)#vlan 10
Switch(config-vlan)#name Lab-1
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Lab-2
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name Lab-3
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration
```

Ctrl+F6 to exit CLI focus

Copy

Paste

IOS Command Line Interface

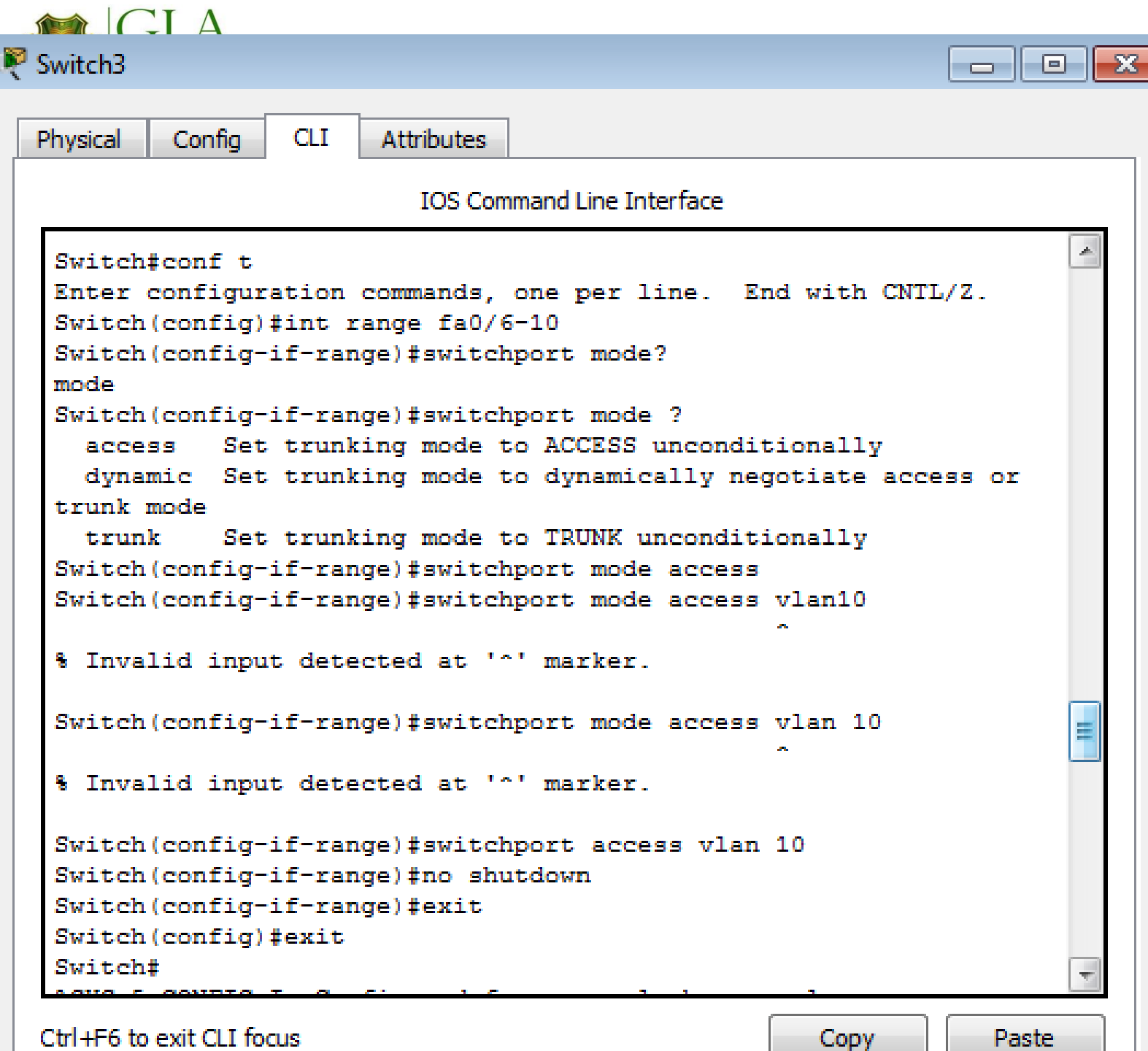
Switch#show vlan brief

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
10 Lab-1	active	
20 Lab-2	active	
30 Lab-3	active	
99 mngnt	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	

Ctrl+F6 to exit CLI focus

To Create VLAN

- Type
 - conf t
 - int range fa0/6-10
 - switchport mode ?
 - switchport mode access
 - switchport access vlan 10
 - no shutdown
- int range fa0/11-17
 - switchport mode access
 - switchport access vlan 20
- int range fa0/18-23
 - switchport mode access
 - switchport access vlan 30
- int fa0/24
 - switchport mode access
 - switchport access vlan 99
- End
- show vlan brief



IOS Command Line Interface

```
Switch#show vlan brief
```

VLAN Name	Status	Ports
-----	-----	
1 default	active	Fa0/2, Fa0/3,
Fa0/4, Fa0/5		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 Lab-1	active	Fa0/6, Fa0/7,
Fa0/8, Fa0/9		Fa0/10
20 Lab-2	active	
30 Lab-3	active	
99 mngnt	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	

Ctrl+F6 to exit CLI focus

Copy

Paste

IOS Command Line Interface

```
Switch(config)#
Switch(config)#int range fa0/11-17
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20
Switch(config-if-range)#int range fa0/18-23
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 30
Switch(config-if-range)#int fa0/24
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 99
Switch(config-if)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

```
Switch#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/2, Fa0/3, Fa0/4, Fa0/5
10	Lab-1	active	Gig0/1, Gig0/2, Fa0/6, Fa0/7, Fa0/8, Fa0/9

To Create VLAN

- Type
 - configure terminal int range fa0/1-2
 - switchport mode trunk
 - switchport trunk native vlan 99
 - end

```
Switch#configure terminal
```

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

```
Switch(config)#int range fa0/1-2
```

```
Switch(config-if-range)#switchport mode trunk
```

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

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,  
changed state to down
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,  
changed state to up
```

```
Switch(config-if-range)#switchport trunk native vlan 99
```

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

- Type
 - Show int trunk

Switch3

Physical Config CLI Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console

Switch#show
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/2 (99), with Switch FastEthernet0/2 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
FastEthernet0/1 (99), with Switch FastEthernet0/1 (1).
int trunk
Port          Mode          Encapsulation  Status      Native vlan
Fa0/1         on            802.1q         trunking    99
Fa0/2         on            802.1q         trunking    99

Port          Vlans allowed on trunk
Fa0/1         1-1005
Fa0/2         1-1005

Port          Vlans allowed and active in management domain
Fa0/1         1,10,20,30,99
Fa0/2         1,10,20,30,99

Port          Vlans in spanning tree forwarding state and not
pruned
Fa0/1         10,20,30
Fa0/2         none
```

Ctrl+F6 to exit CLI focus

Copy Paste

To Create VLAN

- Click on Switch1 and type
 - en
 - show vlan brief

IOS Command Line Interface

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	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

Switch#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/1 (1), with Switch FastEthernet0/1 (99).

To Create VLAN

- Type
 - configure terminal
 - int fa0/1
 - switchport mode trunk
 - switchport trunk native vlan 99
 - end
 - conf t
 - int range fa0/6-10
 - switchport mode access
 - Switchport access vlan 10
 - int range fa0/11-17
 - Switchport mode access
 - Switchport access vlan 20
 - int range fa0/18-23
 - switchport mode access
 - switchport access vlan 30
 - end
 - conf t
 - int fa0/23
 - switchport mode access
 - switchport access vlan 99

IOS Command Line Interface

Switch#show vlan brief

VLAN Name	Status	Ports
1 default	active	Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/24, Gig0/1, Gig0/2
10 VLAN0010	active	Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10
20 VLAN0020	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17
30 VLAN0030	active	Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22
99 VLAN0099	active	Fa0/23
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

Switch#

To Create VLAN

- Click on Switch2 and type
 - en
 - show vlan brief


IOS Command Line Interface

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	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

Switch#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/1 (1), with Switch FastEthernet0/1 (99).

To Create VLAN

- Type
 - configure terminal
 - int fa0/2
 - switchport mode trunk
 - switchport trunk native vlan 99
 - end
 - int range fa0/6-10
 - switchport mode access
 - switchport access vlan 10
 - int range fa0/11-17
 - switchport mode access
 - switchport access vlan 20
 - int range fa0/18-23
 - switchport mode access
 - switchport access vlan 30
 - End
 - conf t
 - int fa0/23
 - switchport mode access
 - switchport access vlan 99

Switch1

PhysicalConfigCLIAttributes

IOS Command Line Interface

```
Switch#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/3, Fa0/4, Fa0/5, Fa0/24, Gig0/1, Gig0/2
10 VLAN0010	active	Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10
20 VLAN0020	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17
30 VLAN0030	active	Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22
99 VLAN0099	active	Fa0/23
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

```
Switch#
```