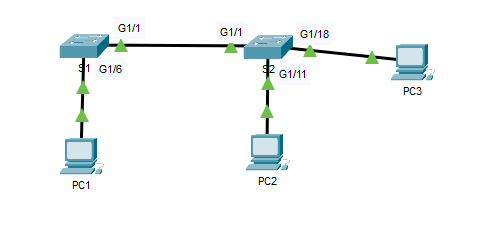
**Lab #2 - Configuring VLANs and Trunking Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Mark \_\_\_/66 Rack Letter: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

# Topology



**NOTE**: Switches in this lab are Gigabit switches so ports will begin with G (G1/1 🡪 G1/48). You can use the **SH IP INT BR** command to verify port names

# Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address** | **Subnet Mask** | **Default Gateway** |
| S1 | VLAN 1 | 192.168.1.11 | 255.255.255.0 | N/A |
| S2 | VLAN 1 | 192.168.1.12 | 255.255.255.0 | N/A |
| PC-1 | NIC | 192.168.1.5 | 255.255.255.0 | N/A |
| PC-2 | NIC | 192.168.1.6 | 255.255.255.0 | N/A |
| PC-3 | NIC | 192.168.1.7 | 255.255.255.0 | N/A |

# Objectives

**Part 1: Build the Network and Configure Basic Device Settings**

**Part 2: Create VLANs and Assign Switch Ports**

**Part 3: Maintain VLAN Port Assignments and the VLAN Database**

**Part 4: Configure an 802.1Q Trunk between the Switches**

# Background / Scenario

Modern switches use virtual local-area networks (VLANs) to improve network performance by separating large Layer 2 broadcast domains into smaller ones. VLANs can also be used as a security measure by controlling which hosts can communicate. In general, VLANs make it easier to design a network to support the goals of an organization.   
  
VLAN trunks are used to span VLANs across multiple devices. Trunks allow the traffic from multiple VLANS to travel over a single link, while keeping the VLAN identification and segmentation intact.   
  
In this lab, you will create VLANs on both switches in the topology, assign VLANs to switch access ports, verify that VLANs are working as expected, and then create a VLAN trunk between the two switches to allow hosts in the same VLAN to communicate through the trunk, regardless of which switch the host is attached to.   
  
**Note**: The switches used are Cisco 4900 Switches with Cisco IOS Release 15.0. Other switches and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and **output produced might vary** from what is shown in the labs. **Note**: Ensure that the switches have been erased and have no startup configurations. If you are unsure contact your instructor.

# Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings on the PC hosts and switches.

**Step 1: Cable the network as shown in the topology.**

Attach the devices as shown in the topology diagram, and cable as necessary.

**Step 2: Initialize and reload the switches as necessary.**

Switch 1 and 2>enable  
 Switch 1 and 2#erase startup-config  
 Switch 1 and 2#erase cat4000\_flash:  
 Switch 1 and 2#reload

**Step 3: Configure basic settings for each switch.**

1. Console into the switch and enter global configuration mode.
2. Use the following commands on **each switch** to setup basic configuration:

S1(config)#no ip domain lookup

S1(config)#service password-encryption

S1(config)#enable secret cisco

S1(config)#banner motd # Do Not Login without Permission #

S1(config)#line con 0

S1(config-line)#password cisco

S1(config-line)#login

S1(config-line)#logging synchronous

S1(config-line)#line vty 0 15

S1(config-line)#password cisco

S1(config-line)#logging synchronous

S1(config-line)#login

S1(config-line)#exit

What 5 main things do the above commands accomplish? /5

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1. Configure the hostname as shown in the topology.

Switch(config)#hostname vlan1

1. Configure the IP address listed in the Addressing Table for VLAN 1 on the switch.

Switch(config)#int vlan1

Switch(config)#ip address 192.168.1.11 255.255.255.0

Switch(config)#no shut

**Repeat Step 3 for Switch #2 using the Switch #2 hostname and IP address.**

**Step 4: Configure PC hosts.**

Refer to the Addressing Table for PC host address information.   
Statically configure each host (PC1, PC2, and PC3) with the IP information given.

**Step 5: Test connectivity.**

Verify that the PC hosts can ping one another.

Can PC-1 ping PC-2? \_\_\_\_\_\_\_\_\_

Can PC-1 ping PC-3? \_\_\_\_\_\_\_\_\_

Can PC-1 ping S1? \_\_\_\_\_\_\_\_\_

Can PC-3 ping S2? \_\_\_\_\_\_\_\_\_

Can S1 ping S2? \_\_\_\_\_\_\_\_\_

If you answered **no** to any of the above questions, why were the pings unsuccessful? /5

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Part 2: Create VLANs and Assign Switch Ports

In Part 2, you will create student, faculty, and management VLANs on both switches. You will then assign the VLANs to the appropriate interface. The **show vlan** command is used to verify your configuration settings.

**Step 1: Create VLANs on the switches.**

1. Create the VLANs on S1.

S1(config)# **vlan 10**

S1(config-vlan)# **name Student**

S1(config-vlan)# **vlan 20**

S1(config-vlan)# **name Faculty**

S1(config-vlan)# **vlan 99**

S1(config-vlan)# **name Management**

S1(config-vlan)# **end**

1. **Create the same VLANs on S2.**
2. Issue the **show vlan** command to view the list of VLANs on S1.

S1# **show vlan**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/6, G1/7, G1/8

G1/9, G1/10, G1/11, G1/12

G1/13, G1/14, G1/15, G1/16

G1/17, G1/18, G1/19, G1/20

G1/21, G1/22, G1/23, G1/24

G1/1, G1/2

10 Student active

20 Faculty active

99 Management active

* 1. fddi-default act/unsup
  2. token-ring-default act/unsup
  3. fddinet-default act/unsup
  4. trnet-default act/unsup

What is the default VLAN? \_\_\_\_\_\_\_\_\_\_\_ /1

What ports are assigned to the default VLAN? /2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Step 2: Assign VLANs to the correct switch interfaces.**

1. Assign VLANs to the interfaces on S1.
   1. Assign PC-A to the Student VLAN.

S1(config)# **interface g1/6**

S1(config-if)# **switchport mode access**

S1(config-if)# **switchport access vlan 10**

S1(config-if)# **exit**

* 1. Move the switch IP address VLAN 99.

S1(config)# **interface vlan 1**

S1(config-if)# **no ip address**

S1(config-if)# **interface vlan 99**

S1(config-if)# **ip address 192.168.1.11 255.255.255.0**

S1(config-if)# **end**

1. Issue the **show vlan** **brief** command and verify that the VLANs are assigned to the correct interfaces.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/7, G1/8, G1/9

G1/10, G1/11, G1/12, G1/13

G1/14, G1/15, G1/16, G1/17

G1/18, G1/19, G1/20, G1/21 G1/22, G1/23, G1/24, G1/1

G1/2

10 Student active G1/6

20 Faculty active

99 Management active

1. fddi-default act/unsup
2. token-ring-default act/unsup
3. fddinet-default act/unsup
4. trnet-default act/unsup

c. Issue the **show ip interface brief** command.

S1# **show ip interface brief**

Interface IP-Address OK? Method Status Protocol

Vlan1 unassigned YES unset up up

Vlan99 192.168.1.11 YES manual up down

GistEthernet0/1 unassigned YES unset up up

What is the status of VLAN 99? Why? /2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Remove the IP address for VLAN 1 on S2.
2. Configure an IP address for VLAN 99 on S2 according to the Addressing Table.
3. Use the **show vlan brief** command to verify that the VLANs are assigned to the correct interfaces.

S2# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/6, G1/7, G1/8

G1/9, G1/10, G1/12, G1/13

G1/14, G1/15, G1/16, G1/17

G1/19, G1/20, G1/21, G1/22

G1/23, G1/24, G1/1, G1/2

10 Student active G1/11

20 Faculty active G1/18

99 Management active

* 1. fddi-default act/unsup
  2. token-ring-default act/unsup
  3. fddinet-default act/unsup
  4. trnet-default act/unsup

Is PC-1 able to ping PC-2? Why? /2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is S1 able to ping S2? Why? /2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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|  |  |

# Part 3: Maintain VLAN Port Assignments and the VLAN Database

In Part 3, you will change VLAN assignments to ports and remove VLANs from the VLAN database.

**Step 1: Assign a VLAN to multiple interfaces.**

1. On S1, assign interfaces G1/11 – 24 to VLAN 10.

S1(config)# **interface range g1/11-24**

S1(config-if-range)# **switchport mode access**

S1(config-if-range)# **switchport access vlan 10**

S1(config-if-range)# **end**

1. Issue the **show vlan brief** command to verify VLAN assignments.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

* 1. default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/7, G1/8, G1/9

G1/10, G1/1, G1/2

10 Student active G1/6, G1/11, G1/12, G1/13

G1/14, G1/15, G1/16, G1/17

G1/18, G1/19, G1/20, G1/21

G1/22, G1/23, G1/24

20 Faculty active

99 Management active

* 1. fddi-default act/unsup
  2. token-ring-default act/unsup
  3. fddinet-default act/unsup
  4. trnet-default act/unsup

1. Reassign G1/11 and G0/21 to VLAN 20.

S1(config)# **interface range g1/11, g1/21**

S1(config-if-range)# **switchport access vlan 20**

S1(config-if-range)# **end**

1. Verify that VLAN assignments are correct.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

* 1. default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/7, G1/8, G1/9

G1/10, G1/1, G1/2

10 Student active G1/6, G1/12, G1/13, G1/14

G1/15, G1/16, G1/17, G1/18

G1/19, G1/20, G1/22, G1/23

G1/24

20 Faculty active G1/11, G1/21

99 Management active

* 1. fddi-default act/unsup
  2. token-ring-default act/unsup
  3. fddinet-default act/unsup
  4. trnet-default act/unsup

**Step 2: Remove a VLAN assignment from an interface.**

1. Use the **no** **switchport access vlan** command to remove the VLAN 10 assignment to G0/24.

S1(config)# **interface g1/24**

S1(config-if)# **no switchport access vlan**

S1(config-if)# **end**

1. Verify that the VLAN change was made.

Which VLAN is G0/24 now associated with? /1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/7, G1/8, G1/9

G1/10, G1/24, G1/1, G1/2

10 Student active G1/6, G1/12, G1/13, G1/14

G1/15, G1/16, G1/17, G1/18

G1/19, G1/20, G1/22, G1/23

20 Faculty active G1/11, G1/21

99 Management active

* 1. fddi-default act/unsup
  2. token-ring-default act/unsup
  3. fddinet-default act/unsup
  4. trnet-default act/unsup
  5. **Step 3: Remove a VLAN ID from the VLAN database.**

1. Add VLAN 30 to interface G0/24 without issuing the VLAN command.

S1(config)# **interface g1/24**

S1(config-if)# **switchport access vlan 30**

% Access VLAN does not exist. Creating vlan 30

S1(config-if)#end

1. Verify that the new VLAN is displayed in the VLAN table.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active G1/1, G1/2, G1/3, G1/4

G1/5, G1/6, G1/7, G1/8

G1/9, G1/10, G1/1, G1/2

10 Student active G1/12, G1/13, G1/14, G1/15

G1/16, G1/17, G1/18, G1/19

G1/20, G1/22, G1/23

20 Faculty active G1/11, G1/21

30 VLAN0030 active G1/24

99 Management active

* 1. fddi-default act/unsup
  2. token-ring-default act/unsup
  3. fddinet-default act/unsup 1005 trnet-default act/unsup

What is the default name of VLAN 30? /1

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1. Use the **no vlan 30** command to remove VLAN 30 from the VLAN database.

S1(config)# **no vlan 30**

S1(config)# **end**

1. Issue the **show vlan brief** command. (Remember G1/24 was assigned to VLAN 30)

S1# **show vlan brief**

After deleting VLAN 30, what VLAN is port G1/24 assigned to? What happens to the traffic destined to the host attached to G1/24? /2

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1. Issue the **no switchport access vlan** command on interface G0/24.

S1(config)# **interface g1/24**

S1(config-if)# **no switchport access vlan**

S1(config-if)# **end**

1. Issue the **show vlan brief** command to determine the VLAN assignment for G0/24.   
     
   To which VLAN is G1/24 assigned? /2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   
**Note**: Before removing a VLAN from the database, it is recommended that you reassign all the ports assigned to that VLAN.

Why should you reassign a port to another VLAN before removing the VLAN from the VLAN database? /3

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# Part 4: Configure an 802.1Q Trunk Between the Switches

In Part 4, you will configure interface G1/1 to use the Dynamic Trunking Protocol (DTP) to allow it to negotiate the trunk mode. After this has been accomplished and verified, you will disable DTP on interface G1/1 and manually configure it as a trunk.

**Step 1: Use DTP to initiate trunking on G1/1.**

The default DTP mode of a 4948 switch port is dynamic auto. This allows the interface to convert the link to a trunk if the neighboring interface is set to trunk or dynamic desirable mode.

a. Set G1/1 on S1 to negotiate trunk mode.

S1(config)# **interface g1/1**

S1(config-if)# **switchport mode dynamic desirable**

S1(config-if)# **end**

b. Issue the **show vlan brief** command on S1 and S2. Interface G1/1 is no longer assigned to VLAN 1. Trunked interfaces are not listed in the VLAN table.

S1# **show vlan brief**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active G1/2, G1/3, G1/4, G1/5

G1/7, G1/8, G1/9, G1/10

G1/24, G1/1, G1/2

10 Student active G1/6, G1/12, G1/13, G1/14

G1/15, G1/16, G1/17, G1/18

G1/19, G1/20, G1/22, G1/23

20 Faculty active G1/11, G1/21

99 Management active

1. fddi-default act/unsup
2. token-ring-default act/unsup
3. fddinet-default act/unsup
4. trnet-default act/unsup

c. Issue the **show interfaces trunk** command to view trunked interfaces. Notice that the mode on S1 is set to desirable, and the mode on S2 is set to auto.

S1# **show interfaces trunk**

Port Mode Encapsulation Status Native vlan

G1/1 desirable 802.1q trunking 1

Port Vlans allowed on trunk

G1/1 1-4094

Port Vlans allowed and active in management domain

G1/1 1,10,20,99

Port Vlans in spanning tree forwarding state and not pruned

G1/1 1,10,20,99

S2# **show interfaces trunk**

Port Mode Encapsulation Status Native vlan

G1/1 auto 802.1q trunking 1

Port Vlans allowed on trunk

G1/1 1-4094

Port Vlans allowed and active in management domain

G1/1 1,10,20,99

Port Vlans in spanning tree forwarding state and not pruned

G1/1 1,10,20,99

**Note**: By default, all VLANs are allowed on a trunk. The **switchport trunk** command allows you to control what VLANs have access to the trunk. For this lab, keep the default settings which allows all VLANs to traverse G1/1.

d. Verify that VLAN traffic is traveling over trunk interface G1/1.

Can S1 ping S2? \_\_\_\_\_\_\_\_\_\_\_

Can PC-1 ping PC-2? \_\_\_\_\_\_\_\_\_\_\_

Can PC-2 ping PC-3? \_\_\_\_\_\_\_\_\_\_\_

Can PC-1 ping S1? \_\_\_\_\_\_\_\_\_\_\_

If you answered no to any of the above questions, explain below. /4

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**Step 2: Manually configure trunk interface G1/1.**

The **switchport mode trunk** command is used to manually configure a port as a trunk. This command should be issued on both ends of the link.

1. Change the switchport mode on interface G1/1 to force trunking. **Make sure to do this on both switches**.

S1(config)# **interface g1/1**

S1(config)# **switchport trunk encapsulation dot1q**

S1(config-if)# **switchport mode trunk**

S2(config)# **interface g1/1**

S2(config-if)# **switchport trunk encapsulation dot1q**

S2(config-if)# **switchport mode trunk**

1. Issue the **show interfaces trunk** command to view the trunk mode. Notice that the mode changed from **desirable** to **on**.

S2# **show interfaces trunk**

Port Mode Encapsulation Status Native vlan

G1/1 on 802.1q trunking 99

Port Vlans allowed on trunk

G1/1 1-4094

Port Vlans allowed and active in management domain

G1/1 1,10,20,99

Port Vlans in spanning tree forwarding state and not pruned

G1/1 1,10,20,99

Why might you want to manually configure an interface to trunk mode instead of using DTP? /2

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**Step 3: a) Move PC2 and PC3 to VLAN 10**

**b) Perform your ping tests again**

Can S1 ping S2? \_\_\_\_\_\_\_\_\_\_\_

Can PC-1 ping PC-2? \_\_\_\_\_\_\_\_\_\_\_

Can PC-2 ping PC-3? \_\_\_\_\_\_\_\_\_\_\_

Can PC-1 ping S1? \_\_\_\_\_\_\_\_\_\_\_

Why are you now able to ping from PC to PC?, Why can’t you ping from PC to Switch? .. explain below. /4

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**\*\*\* SHOW YOUR PROFESSOR YOUR COMPLETED SETUP AT THIS POINT \*\*\***

**\*\*\* SHOW YOUR PROFESSOR YOUR COMPLETED SETUP AT THIS POINT \*\*\***

# Part 5: Delete the VLAN Database and Cleanup

In Part 5, you will delete the Configuration and VLAN Database from the switch. It is necessary to do this when initializing a switch back to its default settings.

**Step 1:**

Switch 1 and 2>enable  
Switch 1 and 2#erase startup-config  
Switch 1 and 2#erase cat4000\_flash:  
Switch 1 and 2#reload

Step 2: Place you cabling back in it’s original location and turn off the Switches/Routers

**Marking Rubric**

Cabling \_\_\_\_ /6

Switch Setup \_\_\_\_/6

VLAN Setup \_\_\_\_/6

All Pingable \_\_\_\_/5

Rack Cleanup \_\_\_\_/5

Total Marks \_\_\_\_\_ /66