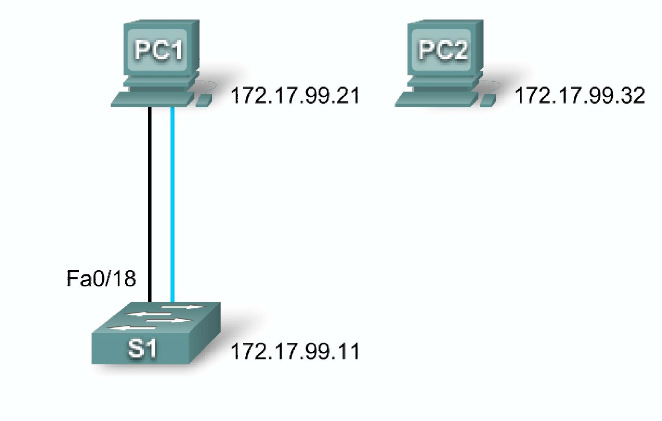
Lab 2.5.1: Basic Switch Configuration

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
PC1	**NIC**	172.17.99.21	255.255.255.0	172.17.99.1
PC2	**NIC**	172.17.99.32	255.255.255.0	172.17.99.1
S1	**VLAN99**	172.17.99.11	255.255.255.0	172.17.99.1

Learning Objectives

Upon completion of this lab, you will be able to:

- Cable a network according to the topology diagram
- Clear an existing configuration on a switch
- Examine and verify the default configuration
- Create a basic switch configuration, including a name and an IP address
- Configure passwords to ensure that access to the CLI is secured
- Configure switch port speed and duplex properties for an interface
- Configure basic switch port security
- Manage the MAC address table
- Assign static MAC addresses
- Add and move hosts on a switch

Scenario

In this lab, you will examine and configure a standalone LAN switch. Although a switch performs basic functions in its default out-of-the-box condition, there are a number of parameters that a network administrator should modify to ensure a secure and optimized LAN. This lab introduces you to the basics of switch configuration.

Task 1: Cable, Erase, and Reload the Switch

Step 1: Cable a network.

Cable a network that is similar to the one in the topology diagram. Create a console connection to the switch. If necessary, refer to Lab 1.3.1 on how to create a console connection.

You can use any current switch in your lab as long as it has the required interfaces shown in the topology. The output shown in this lab is from a 2960 switch. If you use other switches, the switch outputs and interface descriptions may appear different.

Note: PC2 is not initially connected to the switch. It is only used in Task 5.

Step 2: Clear the configuration on the switch.

Clear the configuration on the switch using the procedure in Appendix 1.

Task 2: Verify the Default Switch Configuration

Step 1: Enter privileged mode.

You can access all the switch commands in privileged mode. However, because many of the privileged commands configure operating parameters, privileged access should be password-protected to prevent unauthorized use. You will set passwords in Task 3.

The privileged EXEC command set includes those commands contained in user EXEC mode, as well as the **configure** command through which access to the remaining command modes are gained. Enter privileged EXEC mode by entering the **enable** command.

```
Switch>enable
Switch#
```

Notice that the prompt changed in the configuration to reflect privileged EXEC mode.

Step 2: Examine the current switch configuration.

Examine the current running configuration file.

```
Switch#show running-config
```

How many FastEthernet interfaces does the switch have? ________________________

How many Gigabit Ethernet interfaces does the switch have? ______________________

What is the range of values shown for the vty lines? ______________________________

Examine the current contents of NVRAM:

```
Switch#show startup-config
startup-config is not present
```

Why does the switch give this response?

____

Examine the characteristics of the virtual interface VLAN1:

```
Switch#show interface vlan1
```

Is there an IP address set on the switch? ____________________________________

What is the MAC address of this virtual switch interface? _______________________

Is this interface up? ____

Now view the IP properties of the interface:

```
Switch#show ip interface vlan1
```

What output do you see? ____

Step 3: Display Cisco IOS information.

Examine the following version information that the switch reports.

```
Switch#show version
```

What is the Cisco IOS version that the switch is running? _____________________

What is the system image filename? ____________________________________

What is the base MAC address of this switch? ______________________________

Step 4: Examine the FastEthernet interfaces.

Examine the default properties of the FastEthernet interface used by PC1.

```
Switch#show interface fastethernet 0/18
```

Is the interface up or down? _____________________________________

What event would make an interface go up? ________________________

What is the MAC address of the interface? ________________________

What is the speed and duplex setting of the interface? _______________

Step 5: Examine VLAN information.

Examine the default VLAN settings of the switch.

```
Switch#show vlan
```

What is the name of VLAN 1? _______________________________

Which ports are in this VLAN? _________________________

Is VLAN 1 active? ____

What type of VLAN is the default VLAN? _____________________________

Step 6 Examine flash memory.

Issue one of the following commands to examine the contents of the flash directory.

```
Switch#dir flash:
```

or

```
Switch#show flash
```

Which files or directories are found?

____

Files have a file extension, such as .bin, at the end of the filename. Directories do not have a file extension. To examine the files in a directory, issue the following command using the filename displayed in the output of the previous command:

```
Switch#dir flash:c2960-lanbase-mz.122-25.SEE3
```

The output should look similar to this:

```
Directory of flash:/c2960-lanbase-mz.122-25.SEE3/
    6  drwx      4480   Mar 1 1993 00:04:42 +00:00  html
  618  -rwx  4671175   Mar 1 1993 00:06:06 +00:00  c2960-lanbase-mz.122-25.SEE3.bin
  619  -rwx       457   Mar 1 1993 00:06:06 +00:00  info
32514048 bytes total (24804864 bytes free)
```

What is the name of the Cisco IOS image file? ____

Step 7: Examine the startup configuration file.

To view the contents of the startup configuration file, issue the **show startup-config** command in privileged EXEC mode.

```
Switch#show startup-config
startup-config is not present
```

Why does this message appear? ____

Let's make one configuration change to the switch and then save it. Type the following commands:

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#exit
S1#
```

To save the contents of the running configuration file to non-volatile RAM (NVRAM), issue the the command **copy running-config startup-config**.

```
Switch#copy running-config startup-config
Destination filename [startup-config]?  (enter)
Building configuration...
[OK]
```

Note: This command is easier to enter by using the **copy run start** abbreviation.

Now display the contents of NVRAM using the **show startup-config** command.

```
S1#show startup-config
Using 1170 out of 65536 bytes
!
version 12.2
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname S1
!
```

```
<output omitted>
```

The current configuration has been written to NVRAM.

Task 3: Create a Basic Switch Configuration

Step 1: Assign a name to the switch.

In the last step of the previous task, you configured the hostname. Here's a review of the commands used.

```
S1#configure terminal
S1(config)#hostname S1
S1(config)#exit
```

Step 2: Set the access passwords.

Enter config-line mode for the console. Set the login password to **cisco**. Also configure the vty lines 0 to 15 with the password **cisco**.

```
S1#configure terminal
Enter the configuration commands, one for each line. When you are finished,
return to global configuration mode by entering the exit command or pressing
Ctrl-Z.

S1(config)#line console 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#line vty 0 15
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#exit
```

Why is the **login** command required? ____

Step 3. Set the command mode passwords.

Set the enable secret password to class. This password protects access to privileged EXEC mode.

```
S1(config)#enable secret class
```

Step 4. Configure the Layer 3 address of the switch.

Before you can manage S1 remotely from PC1, you need to assign the switch an IP address. The default configuration on the switch is to have the management of the switch controlled through VLAN 1. However, a best practice for basic switch configuration is to change the management VLAN to a VLAN other than VLAN 1. The implications and reasoning behind this action are explained in the next chapter.

For management purposes, we will use VLAN 99. The selection of VLAN 99 is arbitrary and in no way implies you should always use VLAN 99.

First, you will create the new VLAN 99 on the switch. Then you will set the IP address of the switch to 172.17.99.11 with a subnet mask of 255.255.255.0 on the internal virtual interface VLAN 99.

```
S1(config)#vlan 99
S1(config-vlan)#exit
S1(config)#interface vlan99
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to down
```

```
S1(config-if)#ip address 172.17.99.11 255.255.255.0
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#
```

Notice that the VLAN 99 interface is in the down state even though you entered the command **no shutdown**. The interface is currently down because no switchports are assigned to VLAN 99.

Assign all user ports to VLAN 99.

```
S1(config)#interface range fa0/1 - 24
S1(config-if-range)#switchport access vlan 99
S1(config-if-range)#exit
S1(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up
```

It is beyond the scope of this lab to fully explore VLANs. This subject is discussed in greater detail in the next chapter. However, to establish connectivity between the host and the switch, the ports used by the host must be in the same VLAN as the switch. Notice in the above output that VLAN 1 interface goes down because none of the ports are assigned to VLAN 1. After a few seconds, VLAN 99 will come up because at least one port is now assigned to VLAN 99.

Step 5: Set the switch default gateway.

S1 is a Layer 2 switch, so it makes forwarding decisions based on the Layer 2 header. If multiple networks are connected to a switch, you need to specify how the switch forwards the internetwork frames, because the path must be determined at Layer 3. This is done by specifying a default gateway address that points to a router or Layer 3 switch. Although this activity does not include an external IP gateway, assume that you will eventually connect the LAN to a router for external access. Assuming that the LAN interface on the router is 172.17.99.1, set the default gateway for the switch.

```
S1(config)#ip default-gateway 172.17.99.1
S1(config)#exit
```

Step 6: Verify the management LANs settings.

Verify the interface settings on VLAN 99.

```
S1#show interface vlan 99
Vlan99 is up, line protocol is up
  Hardware is EtherSVI, address is 001b.5302.4ec1 (bia 001b.5302.4ec1)
  Internet address is 172.17.99.11/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:06, output 00:03:23, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     4 packets input, 1368 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     1 packets output, 64 bytes, 0 underruns
     0 output errors, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

What is the bandwidth on this interface? ______________________________

What are the VLAN states? VLAN99 is ______________ Line protocol is ______________

What is the queuing strategy? ____________________

Step 7: Configure the IP address and default gateway for PC1.

Set the IP address of PC1 to 172.17.99.21, with a subnet mask of 255.255.255.0. Configure a default gateway of 172.17.99.1. (If needed, refer to Lab 1.3.1 to configure the PC NIC.)

Step 8: Verify connectivity.

To verify the host and switch are correctly configured, ping the IP address of the switch (172.17.99.11) from PC1.

Was the ping successful? ________________________

If not, troubleshoot the switch and host configuration. Note that this may take a couple of tries for the pings to succeed.

Step 9: Configure the port speed and duplex settings for a FastEthernet interface.

Configure the duplex and speed settings on FastEthernet 0/18. Use the **end** command to return to privileged EXEC mode when finished.

```
S1#configure terminal
S1(config)#interface fastethernet 0/18
S1(config-if)#speed 100
S1(config-if)#duplex full
S1(config-if)#end
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/18, changed
state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to down
%LINK-3-UPDOWN: Interface FastEthernet0/18, changed state to down
%LINK-3-UPDOWN: Interface FastEthernet0/18, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/18, changed
state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan99, changed state to up
```

The line protocol for both interface FastEthernet 0/18 and interface VLAN 99 will temporarily go down.

The default on the Ethernet interface of the switch is auto-sensing, so it automatically negotiates optimal settings. You should set duplex and speed manually only if a port must operate at a certain speed and duplex mode. Manually configuring ports can lead to duplex mismatches, which can significantly degrade performance.

Verify the new duplex and speed settings on the FastEthernet interface.

```
S1#show interface fastethernet 0/18
FastEthernet0/18 is up, line protocol is up (connected)
  Hardware is FastEthernet, address is 001b.5302.4e92 (bia 001b.5302.4e92)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is 10/100BaseTX
  input flow-control is off, output flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     265 packets input, 52078 bytes, 0 no buffer
     Received 265 broadcasts (0 multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 32 multicast, 0 pause input
     0 input packets with dribble condition detected
     4109 packets output, 342112 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 PAUSE output
     0 output buffer failures, 0 output buffers swapped out
```

Step 10: Save the configuration.

You have completed the basic configuration of the switch. Now back up the running configuration file to NVRAM to ensure that the changes made will not be lost if the system is rebooted or loses power.

```
S1#copy running-config startup-config
Destination filename [startup-config]?[Enter] Building configuration...
[OK]
S1#
```

Step 11: Examine the startup configuration file.

To see the configuration that is stored in NVRAM, issue the **show startup-config** command from privileged EXEC mode.

```
S1#show startup-config
```

Are all the changes that were entered recorded in the file? _____________

Task 4: Managing the MAC Address Table

Step 1: Record the MAC addresses of the hosts.

Determine and record the Layer 2 (physical) addresses of the PC network interface cards using the following commands:

Start > Run > cmd > ipconfig /all

PC1: ____

PC2: ____

Step 2: Determine the MAC addresses that the switch has learned.

Display the MAC addresses using the **show mac-address-table** command in privileged EXEC mode.

```
S1#show mac-address-table
```

How many dynamic addresses are there? _____________________________

How many MAC addresses are there in total? ___________________________

Does the dynamic MAC address match the PC1 MAC address? _____________________

Step 3: List the show mac-address-table options.

```
S1#show mac-address-table ?
```

How many options are available for the **show mac-address-table** command? ________

Show only the MAC addresses from the table that were learned dynamically.

```
S1#show mac-address-table address dynamic
```

How many dynamic addresses are there? _________________

View the MAC address entry for PC1.

```
S1#show mac-address-table address <PC1 MAC here>
```

Step 4: Clear the MAC address table.

To remove the existing MAC addresses, use the **clear mac-address-table** command from privileged EXEC mode.

```
S1#clear mac-address-table dynamic
```

Step 5: Verify the results.

Verify that the MAC address table was cleared.

```
S1#show mac-address-table
```

How many static MAC addresses are there? ___________________________________

How many dynamic addresses are there? _____________________________________

Step 6: Examine the MAC table again.

More than likely, an application running on your PC1 has already sent a frame out the NIC to S1. Look at the MAC address table again in privileged EXEC mode to see if S1 has relearned the MAC address for PC1.

```
S1#show mac-address-table
```

How many dynamic addresses are there? ________________________________

Why did this change from the last display? ____

____

If S1 has not yet relearned the MAC address for PC1, ping the VLAN 99 IP address of the switch from PC1 and then repeat Step 6.

Step 7: Set up a static MAC address.

To specify which ports a host can connect to, one option is to create a static mapping of the host MAC address to a port.

Set up a static MAC address on FastEthernet interface 0/18 using the address that was recorded for PC1 in Step 1 of this task. The MAC address **00e0.2917.1884** is used as an example only. You must use the MAC address of your PC1, which is different than the one given here as an example.

```
S1(config)#mac-address-table static 00e0.2917.1884 vlan 99 interface
fastethernet 0/18
```

Step 8: Verify the results.

Verify the MAC address table entries.

```
S1#show mac-address-table
```

How many total MAC addresses are there? ____

How many static addresses are there? ____

Step 10: Remove the static MAC entry.

To complete the next task, it will be necessary to remove the static MAC address table entry. Enter configuration mode and remove the command by putting a **no** in front of the command string.

Note: The MAC address 00e0.2917.1884 is used in the example only. Use the MAC address for your PC1.

```
S1(config)#no mac-address-table static 00e0.2917.1884 vlan 99 interface
fastethernet 0/18
```

Step 10: Verify the results.

Verify that the static MAC address has been cleared.

```
S1#show mac-address-table
```

How many total static MAC addresses are there? _________________________________

Task 5 Configuring Port Security

Step 1: Configure a second host.

A second host is needed for this task. Set the IP address of PC2 to 172.17.99.32, with a subnet mask of 255.255.255.0 and a default gateway of 172.17.99.1. Do not connect this PC to the switch yet.

Step 2: Verify connectivity.

Verify that PC1 and the switch are still correctly configured by pinging the VLAN 99 IP address of the switch from the host.

Were the pings successful? _______________________________________

If the answer is no, troubleshoot the host and switch configurations.

Step 3: Copy the host MAC addresses.

Write down the MAC addresses from Task 4, Step 1.

PC1____

PC2____

Step 4: Determine which MAC addresses that the switch has learned.

Display the learned MAC addresses using the **show mac-address-table** command in privileged EXEC mode.

```
S1#show mac-address-table
```

How many dynamic addresses are there? ________________________________

Does the MAC address entry match the PC1 MAC address? ____________________

Step 5: List the port security options.

Explore the options for setting port security on interface FastEthernet 0/18.

```
S1# configure terminal
S1(config)#interface fastethernet 0/18
S1(config-if)#switchport port-security ?
  aging         Port-security aging commands
  mac-address   Secure mac address
  maximum       Max secure addresses
  violation     Security violation mode
  <cr>

S1(config-if)#switchport port-security
```

Step 6: Configure port security on an access port.

Configure switch port FastEthernet 0/18 to accept only two devices, to learn the MAC addresses of those devices dynamically, and to block traffic from invalid hosts if a violation occurs.

```
S1(config-if)#switchport mode access
S1(config-if)#switchport port-security
S1(config-if)#switchport port-security maximum 2
S1(config-if)#switchport port-security mac-address sticky
S1(config-if)#switchport port-security violation protect
S1(config-if)#end
```

Step 7: Verify the results.

Show the port security settings.

```
S1#show port-security
```

How many secure addresses are allowed on FastEthernet 0/18?_________________

What is the security action for this port? ___________________________________

Step 8: Examine the running configuration file.

```
S1#show running-config
```

Are there statements listed that directly reflect the security implementation of the running configuration?

____

Step 9: Modify the post security settings on a port.

On interface FastEthernet 0/18, change the port security maximum MAC address count to 1 and to shut down if a violation occurs.

```
S1(config-if)#switchport port-security maximum 1
S1(config-if)#switchport port-security violation shutdown
```

Step 10: Verify the results.

Show the port security settings.

```
S1#show port-security
```

Have the port security settings changed to reflect the modifications in Step 9? ___________

Ping the VLAN 99 address of the switch from PC1 to verify connectivity and to refresh the MAC address table. You should now see the MAC address for PC1 "stuck" to the running configuration.

```
S1#show run
Building configuration...

<output omitted>
!
interface FastEthernet0/18
 switchport access vlan 99
 switchport mode access
 switchport port-security
 switchport port-security mac-address sticky
 switchport port-security mac-address sticky 00e0.2917.1884
 speed 100
 duplex full
!
<output omitted>
```

Step 11: Introduce a rogue host.

Disconnect PC1 and connect PC2 to port FastEthernet 0/18. Ping the VLAN 99 address 172.17.99.11 from the new host. Wait for the amber link light to turn green. Once it turns green, it should almost immediately turn off.

Record any observations: ____

____

Step 12: Show port configuration information.

To see the configuration information for just FastEthernet port 0/18, issue the following command in privileged EXEC mode:

```
S1#show interface fastethernet 0/18
```

What is the state of this interface?

FastEthernet0/18 is ______________ Line protocol is _______________

Step 13: Reactivate the port.

If a security violation occurs and the port is shut down, you can use the **no shutdown** command to reactivate it. However, as long as the rogue host is attached to FastEthernet 0/18, any traffic from the host disables the port. Reconnect PC1 to FastEthernet 0/18, and enter the following commands on the switch:

```
S1# configure terminal
```

```
S1(config)#interface fastethernet 0/18
S1(config-if)# no shutdown
S1(config-if)#exit
```

Note: Some IOS version may require a manual **shutdown** command before entering the **no shutdown** command.

Step 14: Cleanup

Unless directed otherwise, clear the configuration on the switches, turn off the power to the host computer and switches, and remove and store the cables.

Appendix 1

Erasing and Reloading the Switch

For the majority of the labs in Exploration 3, it is necessary to start with an unconfigured switch. Using a switch with an existing configuration may produce unpredictable results. These instructions show you how to prepare the switch prior to starting the lab. These instructions are for the 2960 switch; however, the procedure for the 2900 and 2950 switches is the same.

Step 1: Enter privileged EXEC mode by typing the enable command.

If prompted for a password, enter **class**. If that does not work, ask the instructor.

```
Switch>enable
```

Step 2: Remove the VLAN database information file.

```
Switch#delete flash:vlan.dat
Delete filename [vlan.dat]?[Enter]
Delete flash:vlan.dat? [confirm] [Enter]
```

If there is no VLAN file, this message is displayed:

```
%Error deleting flash:vlan.dat (No such file or directory)
```

Step 3: Remove the switch startup configuration file from NVRAM.

```
Switch#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue? [confirm]
```

```
Press Enter to confirm.
```

The response should be:

```
Erase of nvram: complete
```

Step 4: Check that the VLAN information was deleted.

Verify that the VLAN configuration was deleted in Step 2 using the **show vlan** command.

If the VLAN information was successfully deleted in Step 2, go to Step 5 and restart the switch using the **reload** command.

If previous VLAN configuration information is still present (other than the default management VLAN 1), you must power-cycle the switch (hardware restart) instead of issuing the **reload** command. To power-cycle the switch, remove the power cord from the back of the switch or unplug it, and then plug it back in.

Step 5: Restart the software.

Note: This step is not necessary if the switch was restarted using the power-cycle method.

At the privileged EXEC mode prompt, enter the **reload** command.

```
Switch(config)#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm] [Enter]
```

The first line of the response will be:

```
Reload requested by console.
```

After the switch has reloaded, the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

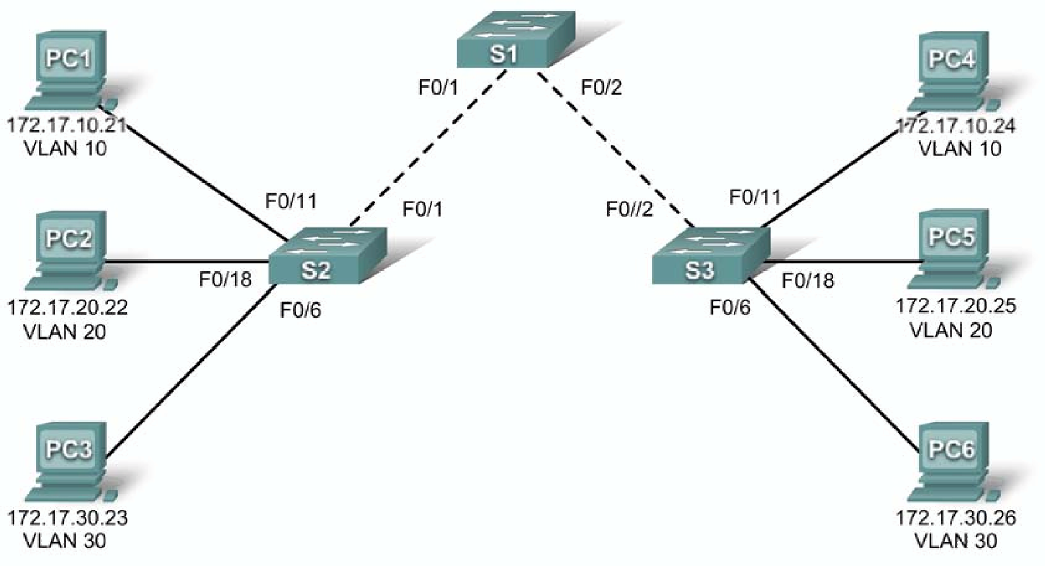
Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started! [Enter]
```

Lab 3.5.1: Basic VLAN Configuration

Topology Diagram



Addressing Table

Device (Hostname)	Interface	IP Address	Subnet Mask	Default Gateway
S1	**VLAN 99**	172.17.99.11	255.255.255.0	N/A
S2	**VLAN 99**	172.17.99.12	255.255.255.0	N/A
S3	**VLAN 99**	172.17.99.13	255.255.255.0	N/A
PC1	**NIC**	172.17.10.21	255.255.255.0	172.17.10.1
PC2	**NIC**	172.17.20.22	255.255.255.0	172.17.20.1
PC3	**NIC**	172.17.30.23	255.255.255.0	172.17.30.1
PC4	**NIC**	172.17.10.24	255.255.255.0	172.17.10.1
PC5	**NIC**	172.17.20.25	255.255.255.0	172.17.20.1
PC6	**NIC**	172.17.30.26	255.255.255.0	172.17.30.1

Initial Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Learning Objectives

Upon completion of this lab, you will be able to:

- Cable a network according to the topology diagram
- Erase the startup configuration and reload a switch to the default state
- Perform basic configuration tasks on a switch
- Create VLANs
- Assign switch ports to a VLAN
- Add, move, and change ports
- Verify VLAN configuration
- Enable trunking on inter-switch connections
- Verify trunk configuration
- Save the VLAN configuration

Task 1: Prepare the Network

Step 1: Cable a network that is similar to the one in the topology diagram.

You can use any current switch in your lab as long as it has the required interfaces shown in the topology.

Note: If you use 2900 or 2950 switches, the outputs may appear different. Also, certain commands may be different or unavailable.

Step 2: Clear any existing configurations on the switches, and initialize all ports in the shutdown state.

If necessary, refer to Lab 2.5.1, Appendix 1, for the procedure to clear switch configurations.

It is a good practice to disable any unused ports on the switches by putting them in shutdown. Disable all ports on the switches:

```
Switch#config term
Switch(config)#interface range fa0/1-24
Switch(config-if-range)#shutdown
Switch(config-if-range)#interface range gi0/1-2
Switch(config-if-range)#shutdown
```

Task 2: Perform Basic Switch Configurations

Step 1: Configure the switches according to the following guidelines.

- Configure the switch hostname.
- Disable DNS lookup.
- Configure an EXEC mode password of **class**.
- Configure a password of **cisco** for console connections.
- Configure a password of **cisco** for vty connections.

Step 2: Re-enable the user ports on S2 and S3.

```
S2(config)#interface range fa0/6, fa0/11, fa0/18
S2(config-if-range)#switchport mode access
```

```
S2(config-if-range)#no shutdown

S3(config)#interface range fa0/6, fa0/11, fa0/18
S3(config-if-range)#switchport mode access
S3(config-if-range)#no shutdown
```

Task 3: Configure and Activate Ethernet Interfaces

Step 1: Configure the PCs.

You can complete this lab using only two PCs by simply changing the IP addressing for the two PCs specific to a test you want to conduct. For example, if you want to test connectivity between PC1 and PC2, then configure the IP addresses for those PCs by referring to the addressing table at the beginning of the lab. Alternatively, you can configure all six PCs with the IP addresses and default gateways.

Task 4: Configure VLANs on the Switch

Step 1: Create VLANs on switch S1.

Use the **vlan** *vlan-id* command in global configuration mode to add a VLAN to switch S1. There are four VLANS configured for this lab: VLAN 10 (faculty/staff); VLAN 20 (students); VLAN 30 (guest); and VLAN 99 (management). After you create the VLAN, you will be in vlan configuration mode, where you can assign a name to the VLAN with the **name** *vlan name* command.

```
S1(config)#vlan 10
S1(config-vlan)#name faculty/staff
S1(config-vlan)#vlan 20
S1(config-vlan)#name students
S1(config-vlan)#vlan 30
S1(config-vlan)#name guest
S1(config-vlan)#vlan 99
S1(config-vlan)#name management
S1(config-vlan)#end
S1#
```

Step 2: Verify that the VLANs have been created on S1.

Use the **show vlan brief** command to verify that the VLANs have been created.

```
S1#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -----------------------------
1    default                          active    Fa0/1, Fa0/2, 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, Gi0/1
                                                Gi0/2
10   faculty/staff                    active
20   students                         active
30   guest                            active
99   management                       active
```

Step 3: Configure and name VLANs on switches S2 and S3.

Create and name VLANs 10, 20, 30, and 99 on S2 and S3 using the commands from Step 1. Verify the correct configuration with the **show vlan brief** command.

What ports are currently assigned to the four VLANs you have created?

____

Step 4: Assign switch ports to VLANs on S2 and S3.

Refer to the port assignment table on page 1. Ports are assigned to VLANs in interface configuration mode, using the **switchport access vlan** *vlan-id* command. You can assign each port individually or you can use the **interface range** command to simplify this task, as shown here. The commands are shown for S3 only, but you should configure both S2 and S3 similarly. Save your configuration when done.

```
S3(config)#interface range fa0/6-10
S3(config-if-range)#switchport access vlan 30
S3(config-if-range)#interface range fa0/11-17
S3(config-if-range)#switchport access vlan 10
S3(config-if-range)#interface range fa0/18-24
S3(config-if-range)#switchport access vlan 20
S3(config-if-range)#end
S3#copy running-config startup-config
Destination filename [startup-config]? [enter]
Building configuration...
[OK]
```

Step 5: Determine which ports have been added.

Use the **show vlan id** *vlan-number* command on S2 to see which ports are assigned to VLAN 10.

Which ports are assigned to VLAN 10?

____

Note: The **show vlan name** *vlan-name* displays the same output.

You can also view VLAN assignment information using the **show interfaces** *interface* **switchport** command.

Step 6: Assign the management VLAN.

A management VLAN is any VLAN that you configure to access the management capabilities of a switch. VLAN 1 serves as the management VLAN if you did not specifically define another VLAN. You assign the management VLAN an IP address and subnet mask. A switch can be managed via HTTP, Telnet, SSH, or SNMP. Because the out-of-the-box configuration of a Cisco switch has VLAN 1 as the default VLAN, VLAN 1 is a bad choice as the management VLAN. You do not want an arbitrary user who is connecting to a switch to default to the management VLAN. Recall that you configured the management VLAN as VLAN 99 earlier in this lab.

From interface configuration mode, use the **ip address** command to assign the management IP address to the switches.

```
S1(config)#interface vlan 99
S1(config-if)#ip address 172.17.99.11 255.255.255.0
S1(config-if)#no shutdown

S2(config)#interface vlan 99
S2(config-if)#ip address 172.17.99.12 255.255.255.0
S2(config-if)#no shutdown

S3(config)#interface vlan 99
S3(config-if)#ip address 172.17.99.13 255.255.255.0
```

```
S3(config-if)#no shutdown
```

Assigning a management address allows IP communication between the switches, and also allows any host connected to a port assigned to VLAN 99 to connect to the switches. Because VLAN 99 is configured as the management VLAN, any ports assigned to this VLAN are considered management ports and should be secured to control which devices can connect to these ports.

Step 7: **Configure trunking and the native VLAN for the trunking ports on all switches.**

Trunks are connections between the switches that allow the switches to exchange information for all VLANS. By default, a trunk port belongs to all VLANs, as opposed to an access port, which can only belong to a single VLAN. If the switch supports both ISL and 802.1Q VLAN encapsulation, the trunks must specify which method is being used. Because the 2960 switch only supports 802.1Q trunking, it is not specified in this lab.

A native VLAN is assigned to an 802.1Q trunk port. In the topology, the native VLAN is VLAN 99. An 802.1Q trunk port supports traffic coming from many VLANs (tagged traffic) as well as traffic that does not come from a VLAN (untagged traffic). The 802.1Q trunk port places untagged traffic on the native VLAN. Untagged traffic is generated by a computer attached to a switch port that is configured with the native VLAN. One of the IEEE 802.1Q specifications for Native VLANs is to maintain backward compatibility with untagged traffic common to legacy LAN scenarios. For the purposes of this lab, a native VLAN serves as a common identifier on opposing ends of a trunk link. It is a best practice to use a VLAN other than VLAN 1 as the native VLAN.

Use the **interface range** command in global configuration mode to simplify configuring trunking.

```
S1(config)#interface range fa0/1-5
S1(config-if-range)#switchport mode trunk
S1(config-if-range)#switchport trunk native vlan 99
S1(config-if-range)#no shutdown
S1(config-if-range)#end
```

```
S2(config)# interface range fa0/1-5
S2(config-if-range)#switchport mode trunk
S2(config-if-range)#switchport trunk native vlan 99
S2(config-if-range)#no shutdown
S2(config-if-range)#end
```

```
S3(config)# interface range fa0/1-5
S3(config-if-range)#switchport mode trunk
S3(config-if-range)#switchport trunk native vlan 99
S3(config-if-range)#no shutdown
S3(config-if-range)#end
```

Verify that the trunks have been configured with the **show interface trunk** command.

```
S1#show interface 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       1-4094
Fa0/2       1-4094

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       1,10,20,30,99
Fa0/2       1,10,20,30,99
```

Step 8: Verify that the switches can communicate.

From S1, ping the management address on both S2 and S3.

```
S1#ping 172.17.99.12
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.17.99.12, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/9 ms
S1#ping 172.17.99.13
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.17.99.13, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/1 ms
```

Step 9: Ping several hosts from PC2.

Ping from host PC2 to host PC1 (172.17.10.21). Is the ping attempt successful? _________

Ping from host PC2 to the switch VLAN 99 IP address 172.17.99.12. Is the ping attempt successful?

____

Because these hosts are on different subnets and in different VLANs, they cannot communicate without a Layer 3 device to route between the separate subnetworks.

Ping from host PC2 to host PC5. Is the ping attempt successful? _________

Because PC2 is in the same VLAN and the same subnet as PC5, the ping is successful

Step 10: Move PC1 into the same VLAN as PC2.

The port connected to PC2 (S2 Fa0/18) is assigned to VLAN 20, and the port connected to PC1 (S2 Fa0/11) is assigned to VLAN 10. Reassign the S2 Fa0/11 port to VLAN 20. You do not need to first remove a port from a VLAN to change its VLAN membership. After you reassign a port to a new VLAN, that port is automatically removed from its previous VLAN.

```
S2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
S2(config)#interface fastethernet 0/11
S2(config-if)#switchport access vlan 20
S2(config-if)#end
```

Ping from host PC2 to host PC1. Is the ping attempt successful? _________

Even though the ports used by PC1 and PC2 are in the same VLAN, they are still in different subnetworks, so they cannot communicate directly.

Step 11: Change the IP address and network on PC1.

Change the IP address on PC1 to 172.17.20.21. The subnet mask and default gateway can remain the same. Once again, ping from host PC2 to host PC1, using the newly assigned IP address.

Is the ping attempt successful? _________

Why was this attempt successful?

____

Task 5: Document the Switch Configurations

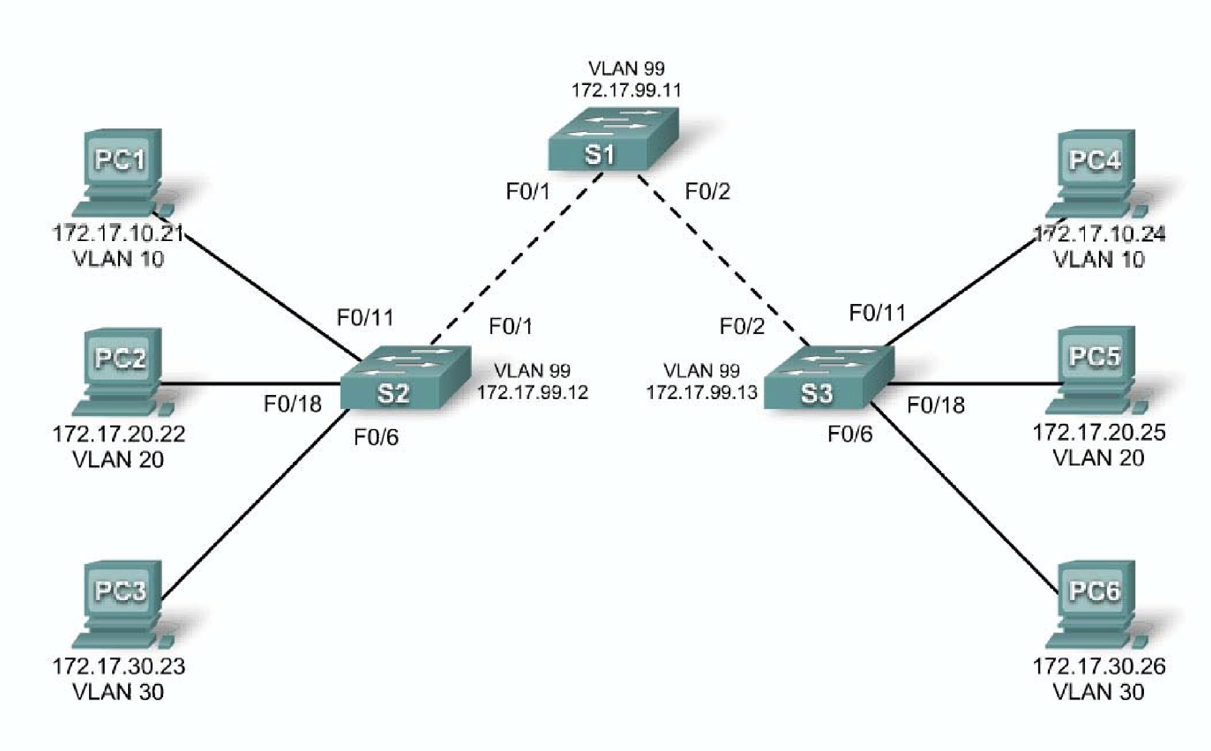
On each switch, capture the running configuration to a text file and save it for future reference.

Task 6: Clean Up

Erase the configurations and reload the switches. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

Lab 4.4.1: Basic VTP Configuration

Topology Diagram



Addressing Table

Device (Hostname)	Interface	IP Address	Subnet Mask	Default Gateway
S1	**VLAN 99**	172.17.99.11	255.255.255.0	N/A
S2	**VLAN 99**	172.17.99.12	255.255.255.0	N/A
S3	**VLAN 99**	172.17.99.13	255.255.255.0	N/A
PC1	**NIC**	172.17.10.21	255.255.255.0	172.17.10.1
PC2	**NIC**	172.17.20.22	255.255.255.0	172.17.20.1
PC3	**NIC**	172.17.30.23	255.255.255.0	172.17.30.1
PC4	**NIC**	172.17.10.24	255.255.255.0	172.17.10.1
PC5	**NIC**	172.17.20.25	255.255.255.0	172.17.20.1
PC6	**NIC**	172.17.30.26	255.255.255.0	172.17.30.1

Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Learning Objectives

Upon completion of this lab, you will be able to:

- Cable a network according to the topology diagram
- Erase the startup configuration and reload a switch to the default state
- Perform basic configuration tasks on a switch
- Configure VLAN Trunking Protocol (VTP) on all switches
- Enable trunking on inter-switch connections
- Verify trunk configuration
- Modify VTP modes and observe the impact
- Create VLANs on the VTP server, and distribute this VLAN information to switches in the network
- Explain the differences in operation between VTP transparent mode, server mode, and client mode
- Assign switch ports to the VLANs
- Save the VLAN configuration
- Enable VTP pruning on the network
- Explain how pruning reduces unnecessary broadcast traffic on the LAN

Task 1: Prepare the Network

Step 1: Cable a network that is similar to the one in the topology diagram.

You can use any current switch in your lab as long as it has the required interfaces shown in the topology. The output shown in this lab is based on 2960 switches. Other switch types may produce different output. If you are using older switches, then some commands may be different or unavailable.

You will notice in the Addressing Table that the PCs have been configured with a default gateway IP address. This would be the IP address of the local router which is not included in this lab scenario. The default gateway, the router would be needed for PCs in different VLANS to be able to communicate. This is discussed in a later chapter.

Set up console connections to all three switches.

Step 2: Clear any existing configurations on the switches.

If necessary, refer to Lab 2.5.1, Appendix 1, for the procedure to clear switch configurations and VLANs. Use the **show vlan** command to confirm that only default VLANs exist and that all ports are assigned to VLAN 1.

```
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,Fa0/20
                                                Fa0/21, Fa0/22, Fa0/23,Fa0/24
                                                Gig1/1, Gig1/2
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
```

Step 3: Disable all ports by using the shutdown command.

Repeat these commands for each switch in the topology.

```
Switch(config)#interface range fa0/1-24
Switch(config-if-range)#shutdown
Switch(config-if-range)#interface range gi0/1-2
Switch(config-if-range)#shutdown
```

Task 2: Perform Basic Switch Configurations

Step 1: Complete basic configuration of switches S1, S2, and S3.

Configure the S1, S2, and S3 switches according to the following guidelines and save all your configurations:

- Configure the switch hostname as indicated on the topology.
- Disable DNS lookup.
- Configure an EXEC mode password of **class**.
- Configure a password of **cisco** for console connections.
- Configure a password of **cisco** for vty connections.

(Output for S1 shown)

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname S1
S1(config)#enable secret class
S1(config)#no ip domain-lookup
S1(config)#line console 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#line vty 0 15
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#end
%SYS-5-CONFIG_I: Configured from console by console
S1#copy running-config startup-config
Destination filename [startup-config]?
```

```
Building configuration...
[OK]
```

Step 2: Re-enable the user ports on S2 and S3.

Configure the user ports in access mode. Refer to the topology diagram to determine which ports are connected to end-user devices.

```
S2(config)#interface fa0/6
S2(config-if)#switchport mode access
S2(config-if)#no shutdown
S2(config-if)#interface fa0/11
S2(config-if)#switchport mode access
S2(config-if)#no shutdown
S2(config-if)#interface fa0/18
S2(config-if)#switchport mode access
S2(config-if)#no shutdown

S3(config)#interface fa0/6
S3(config-if)#switchport mode access
S3(config-if)#no shutdown
S3(config-if)#interface fa0/11
S3(config-if)#switchport mode access
S3(config-if)#no shutdown
S3(config-if)#interface fa0/18
S3(config-if)#switchport mode access
S3(config-if)#no shutdown
```

Step 3: Re-enable the trunk ports on S1, S2 and S3

```
S1(config)#interface fa0/1
S1(config-if)#no shutdown
S1(config)#interface fa0/2
S1(config-if)#no shutdown

S2(config)#interface fa0/1
S2(config-if)#no shutdown

S3(config)#interface fa0/2
S3(config-if)#no shutdown
```

Task 3: Configure the Ethernet Interfaces on the Host PCs

Configure the Ethernet interfaces of PC1, PC2, PC3, PC4, PC5, and PC6 with the IP addresses and default gateways indicated in the addressing table at the beginning of the lab.

Verify that PC1 can ping PC4, PC2 can ping PC5, and that PC3 can ping PC6.

Task 4: Configure VTP on the Switches

VTP allows the network administrator to control the instances of VLANs on the network by creating VTP domains. Within each VTP domain, one or more switches are configured as VTP servers. VLANs are then created on the VTP server and pushed to the other switches in the domain. Common VTP configuration tasks are setting the operating mode, domain, and password. In this lab, you will be using S1 as the VTP server, with S2 and S3 configured as VTP clients or in VTP transparent mode.

Step 1: Check the current VTP settings on the three switches.

```
S1#show vtp status

VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Server
VTP Domain Name                 :
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x57 0xCD 0x40 0x65 0x63 0x59 0x47 0xBD
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
Local updater ID is 0.0.0.0 (no valid interface found)
```

```
S2#show vtp status

VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Server
VTP Domain Name                 :
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x57 0xCD 0x40 0x65 0x63 0x59 0x47 0xBD
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
Local updater ID is 0.0.0.0 (no valid interface found)
```

```
S3#show vtp status

VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Server
VTP Domain Name                 :
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x57 0xCD 0x40 0x65 0x63 0x59 0x47 0xBD
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
```

Note that all three switches are in server mode. Server mode is the default VTP mode for most Catalyst switches.

Step 2: Configure the operating mode, domain name, and VTP password on all three switches.

Set the VTP domain name to **Lab4** and the VTP password to **cisco** on all three switches**.** Configure S1 in server mode, S2 in client mode, and S3 in transparent mode.

```
S1(config)#vtp mode server
Device mode already VTP SERVER.
S1(config)#vtp domain Lab4
Changing VTP domain name from NULL to Lab4
S1(config)#vtp password cisco
```

```
Setting device VLAN database password to cisco
S1(config)#end

S2(config)#vtp mode client
Setting device to VTP CLIENT mode
S2(config)#vtp domain Lab4
Changing VTP domain name from NULL to Lab4
S2(config)#vtp password cisco
Setting device VLAN database password to cisco
S2(config)#end

S3(config)#vtp mode transparent
Setting device to VTP TRANSPARENT mode.
S3(config)#vtp domain Lab4
Changing VTP domain name from NULL to Lab4
S3(config)#vtp password cisco
Setting device VLAN database password to cisco
S3(config)#end
```

Note: The VTP domain name can be learned by a client switch from a server switch, but only if the client switch domain is in the null state. It does not learn a new name if one has been previously set. For that reason, it is good practice to manually configure the domain name on all switches to ensure that the domain name is configured correctly. Switches in different VTP domains do not exchange VLAN information.

Step 3: Configure trunking and the native VLAN for the trunking ports on all three switches.

Use the **interface range** command in global configuration mode to simplify this task.

```
S1(config)#interface range fa0/1-5
S1(config-if-range)#switchport mode trunk
S1(config-if-range)#switchport trunk native vlan 99
S1(config-if-range)#no shutdown
S1(config-if-range)#end

S2(config)# interface range fa0/1-5
S2(config-if-range)#switchport mode trunk
S2(config-if-range)#switchport trunk native vlan 99
S2(config-if-range)#no shutdown
S2(config-if-range)#end

S3(config)# interface range fa0/1-5
S3(config-if-range)#switchport mode trunk
S3(config-if-range)#switchport trunk native vlan 99
S3(config-if-range)#no shutdown
S3(config-if-range)#end
```

Step 4: Configure port security on the S2 and S3 access layer switches.

Configure ports fa0/6, fa0/11, and fa0/18 so that they allow only a single host and learn the MAC address of the host dynamically.

```
S2(config)#interface fa0/6
S2(config-if)#switchport port-security
S2(config-if)#switchport port-security maximum 1
S2(config-if)#switchport port-security mac-address sticky
S2(config-if)#interface fa0/11
S2(config-if)#switchport port-security
```

```
S2(config-if)#switchport port-security maximum 1
S2(config-if)#switchport port-security mac-address sticky
S2(config-if)#interface fa0/18
S2(config-if)#switchport port-security
S2(config-if)#switchport port-security maximum 1
S2(config-if)#switchport port-security mac-address sticky
S2(config-if)#end

S3(config)#interface fa0/6
S3(config-if)#switchport port-security
S3(config-if)#switchport port-security maximum 1
S3(config-if)#switchport port-security mac-address sticky
S3(config-if)#interface fa0/11
S3(config-if)#switchport port-security
S3(config-if)#switchport port-security maximum 1
S3(config-if)#switchport port-security mac-address sticky
S3(config-if)#interface fa0/18
S3(config-if)#switchport port-security
S3(config-if)#switchport port-security maximum 1
S3(config-if)#switchport port-security mac-address sticky
S3(config-if)#end
```

Step 5: Configure VLANs on the VTP server.

There are four additional VLANS required in this lab:

- VLAN 99 (management)
- VLAN 10 (faculty/staff)
- VLAN 20 (students)
- VLAN 30 (guest)

Configure these on the VTP server.

```
S1(config)#vlan 99
S1(config-vlan)#name management
S1(config-vlan)#exit
S1(config)#vlan 10
S1(config-vlan)#name faculty/staff
S1(config-vlan)#exit
S1(config)#vlan 20
S1(config-vlan)#name students
S1(config-vlan)#exit
S1(config)#vlan 30
S1(config-vlan)#name guest
S1(config-vlan)#exit
```

Verify that the VLANs have been created on S1 with the **show vlan brief** command.

Step 6: Check if the VLANs created on S1 have been distributed to S2 and S3.

Use the **show vlan brief** command on S2 and S3 to determine if the VTP server has pushed its VLAN configuration to all the switches.

```
S2#show vlan brief

VLAN Name                             Status    Ports
```

```
---- -------------------------------- --------- -----------------------------
1    default                          active    Fa0/1, Fa0/2, 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, Gi0/1
                                                Gi0/2
10   faculty/staff                    active
20   students                         active
30   guest                            active
99   management                       active

S3#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -----------------------------
1    default                          active    Fa0/1, Fa0/2, 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, Gi0/1
                                                Gi0/2
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
```

Are the same VLANs configured on all switches? ______________________

Explain why S2 and S3 have different VLAN configurations at this point. ________________________

____

____

Step 7: Create a new VLAN on switch 2 and 3.

```
S2(config)#vlan 88
%VTP VLAN configuration not allowed when device is in CLIENT mode.

S3(config)#vlan 88
S3(config-vlan)#name test
S3(config-vlan)#
```

Why are you prevented from creating a new VLAN on S2 but not S3? __________________________

____

Delete VLAN 88 from S3.

```
S3(config)#no vlan 88
```

Step 8: Manually configure VLANs.

Configure the four VLANs identified in Step 5 on switch S3.

```
S3(config)#vlan 99
S3(config-vlan)#name management
S3(config-vlan)#exit
S3(config)#vlan 10
S3(config-vlan)#name faculty/staff
S3(config-vlan)#exit
S3(config)#vlan 20
S3(config-vlan)#name students
S3(config-vlan)#exit
S3(config)#vlan 30
S3(config-vlan)#name guest
S3(config-vlan)#exit
```

Here you see one of the advantages of VTP. Manual configuration is tedious and error prone, and any error introduced here could prevent intra-VLAN communication. In addition, these types of errors can be difficult to troubleshoot.

Step 9: Configure the management interface address on all three switches.

```
S1(config)#interface vlan 99
S1(config-if)#ip address 172.17.99.11 255.255.255.0
S1(config-if)#no shutdown
```

```
S2(config)#interface vlan 99
S2(config-if)#ip address 172.17.99.12 255.255.255.0
S2(config-if)#no shutdown
```

```
S3(config)#interface vlan 99
S3(config-if)#ip address 172.17.99.13 255.255.255.0
S3(config-if)#no shutdown
```

Verify that the switches are correctly configured by pinging between them. From S1, ping the management interface on S2 and S3. From S2, ping the management interface on S3.

Were the pings successful? ____

If not, troubleshoot the switch configurations and try again.

Step 10: Assign switch ports to VLANs.

Refer to the port assignment table at the beginning of the lab to assign ports to the VLANs. Use the **interface range** command to simplify this task. Port assignments are not configured through VTP. Port assignments must be configured on each switch manually or dynamically using a VMPS server. The commands are shown for S3 only, but both S2 and S1 switches should be similarly configured. Save the configuration when you are done.

```
S3(config)#interface range fa0/6-10
S3(config-if-range)#switchport access vlan 30
S3(config-if-range)#interface range fa0/11-17
S3(config-if-range)#switchport access vlan 10
S3(config-if-range)#interface range fa0/18-24
S3(config-if-range)#switchport access vlan 20
S3(config-if-range)#end
S3#copy running-config startup-config
Destination filename [startup-config]? [enter]
Building configuration...
[OK]
```

```
S3#
```

Task 5: Configure VTP Pruning on the Switches

VTP pruning allows a VTP server to suppress IP broadcast traffic for specific VLANs to switches that do not have any ports in that VLAN. By default, all unknown unicasts and broadcasts in a VLAN are flooded over the entire VLAN. All switches in the network receive all broadcasts, even in situations in which few users are connected in that VLAN. VTP pruning is used to eliminate or prune this unnecessary traffic. Pruning saves LAN bandwidth because broadcasts do not have to be sent to switches that do not need them.

Pruning is configured on the server switch with the **vtp pruning** command in global configuration mode. The configuration is pushed to client switches.

Confirm VTP pruning configuration on each switch using the **show vtp status** command. VTP pruning mode should be enabled on each switch.

```
S1#show vtp status
VTP Version                     : 2
Configuration Revision          : 17
Maximum VLANs supported locally : 255
Number of existing VLANs        : 9
VTP Operating Mode              : Server
VTP Domain Name                 : Lab4
VTP Pruning Mode                : Enabled
<output omitted>
```

Task 6: Clean Up

Erase the configurations and reload the switches. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.