Project Title: CREATING VIRTUAL LANS

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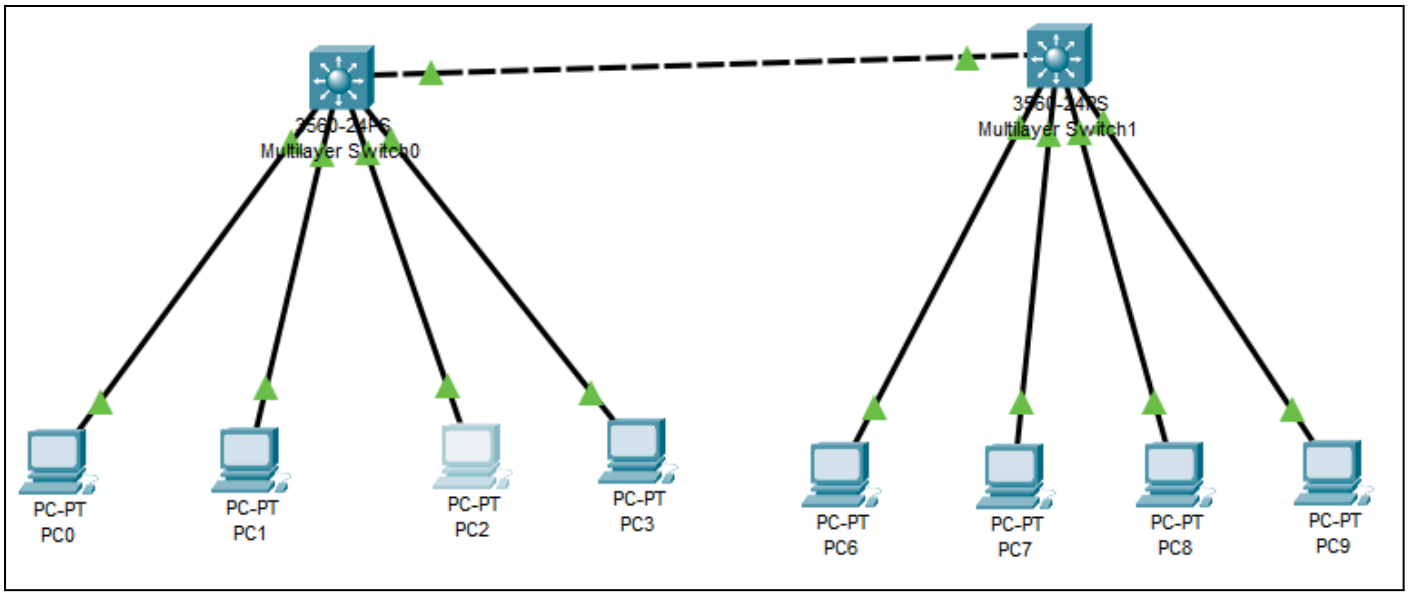
Introduction

To build a small switched network to practice VLAN segmentation and trunking. Two multilayer switches host 4 PCs each. Hosts are split into VLAN2 and VLAN3; the inter-switch link carries both VLANs via trunk.



Objective

- Create VLANs and assign access ports.
- Configure an 802.1Q trunk between switches.
- Verify same-VLAN connectivity across switches.
- Verify different-VLAN isolation.

Theoretical Background

- VLANs create separate Layer-2 broadcast domains on the same physical switch. Ports in different VLANs don’t communicate without Layer-3 routing.
- Trunk tags frames so multiple VLANs can traverse one physical link between switches.
- Switch Virtual Interface gives a VLAN a Layer-3 address on the switch for management/gateway.

Testing Results & Analysis

verify connectivity among all Hosts

```
Pinging 192.168.1.2 with 32 bytes of data:

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

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.254

Pinging 192.168.1.254 with 32 bytes of data:

Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
```

display the existent VLans to show the default VLan 1 with all Ports assigned to it.

```
Switch>enable
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
                                                 Gig0/1, Gig0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0
 --More--
```

Fa0/1 and 2 removed

```
VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    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
2    VLAN2                             active    Fa0/1, Fa0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

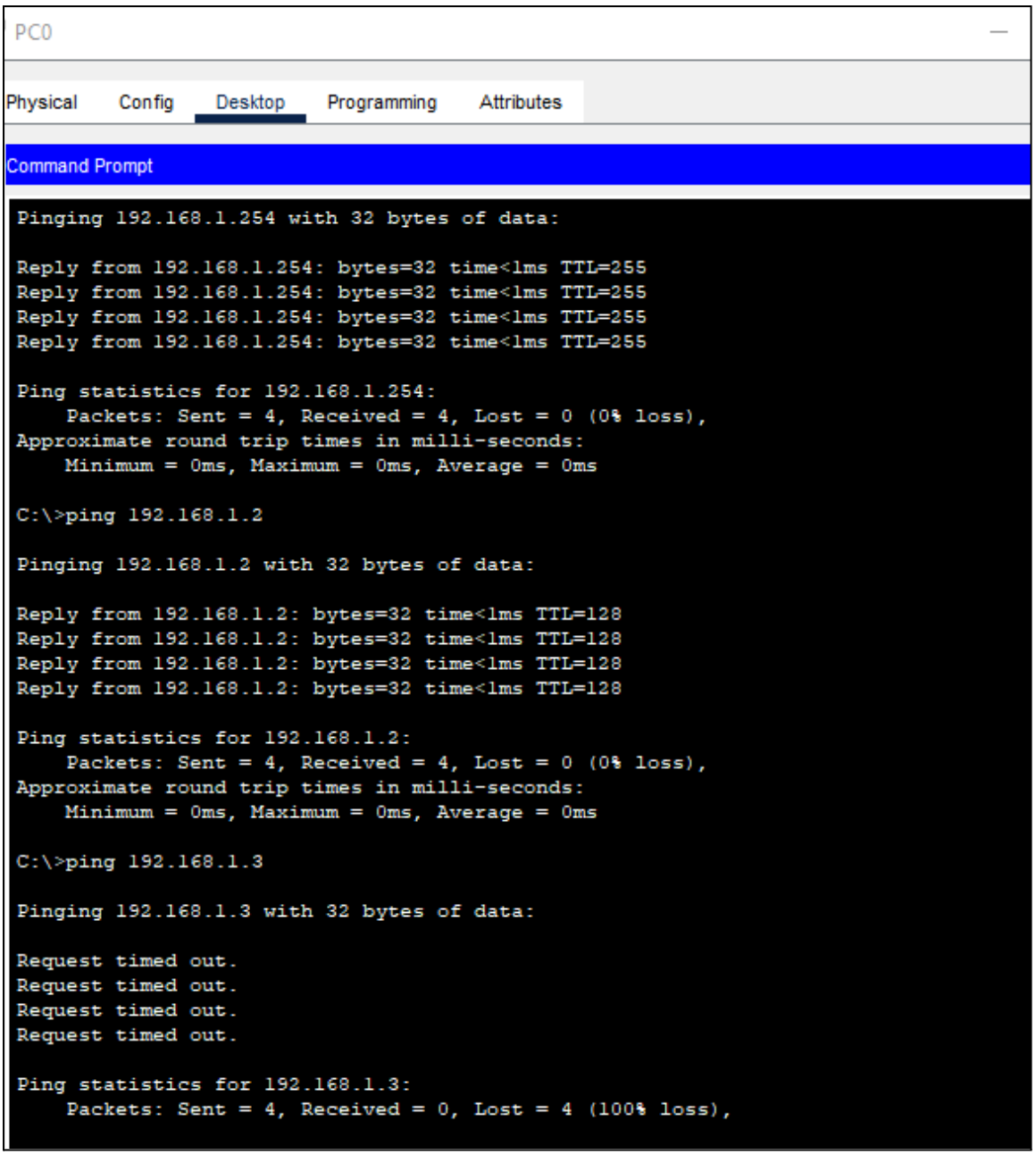
Create VLAN3 on Switch1 to include HOST3 and HOST4 on ports F0/3 and F0/4 respectively

```
VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    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
2    VLAN2                             active    Fa0/1, Fa0/2
3    VLAN3                             active    Fa0/3, Fa0/4
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to down
```

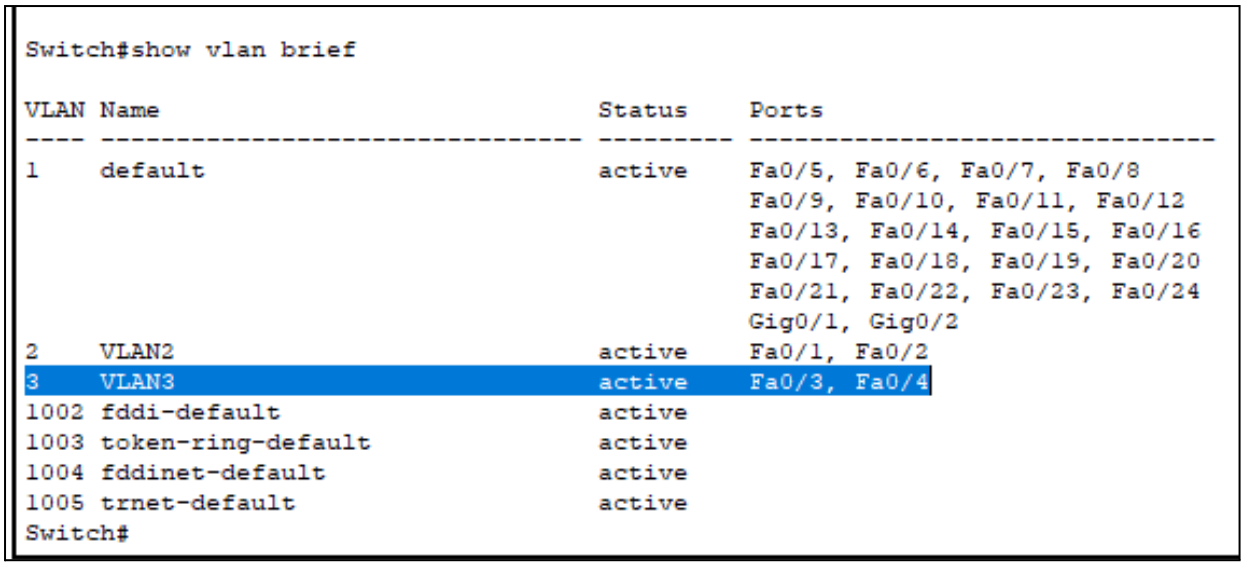
F0/1 and F0/2 have been removed from Vlan 1 and assigned to Vlan 2

```
VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    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
2    VLAN2                             active    Fa0/1, Fa0/2
3    VLAN3                             active    Fa0/3, Fa0/4
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch#
```

Pc1 and 2 are reachable. Pc1 and 3 are unreachable.



Create VLAN3 on Switch2 to include HOST3 and HOST4 on ports F0/3 and F0/4 respectively



configure encapsulation on the Gi0/1 port of both Switch.

```
     2357 packets output, 263570 bytes, 0 underruns

Switch#show int trunk
Port        Mode         Encapsulation  Status        Native vlan
Gig0/1      on           802.1q         trunking      1

Port        Vlans allowed on trunk
Gig0/1      1-1005

Port        Vlans allowed and active in management domain
Gig0/1      1,2,3

Port        Vlans in spanning tree forwarding state and not pruned
Gig0/1      1,2,3

Switch#
```

show vlan: trunk port has been removed from VLAN1

```
Switch#
Switch#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    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
                                                Gig0/2
2    VLAN2                            active    Fa0/1, Fa0/2
3    VLAN3                            active    Fa0/3, Fa0/4
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
2    enet  100002     1500  -      -      -        -    -        0      0
3    enet  100003     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
 --More--
```

Testing in VLAN2

```
Pinging 192.168.1.254 with 32 bytes of data:

Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
Reply from 192.168.1.254: bytes=32 time<1ms TTL=255
Reply from 192.168.1.254: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.8

Pinging 192.168.1.8 with 32 bytes of data:

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

Ping statistics for 192.168.1.8:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time=6ms TTL=128
Reply from 192.168.1.5: bytes=32 time=17ms TTL=128
Reply from 192.168.1.5: bytes=32 time=4ms TTL=128
Reply from 192.168.1.5: bytes=32 time=12ms TTL=128

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 17ms, Average = 9ms
```

Testing in VLAN3

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.8

Pinging 192.168.1.8 with 32 bytes of data:

Reply from 192.168.1.8: bytes=32 time<1ms TTL=128
Reply from 192.168.1.8: bytes=32 time<1ms TTL=128
Reply from 192.168.1.8: bytes=32 time<1ms TTL=128
Reply from 192.168.1.8: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.5

Pinging 192.168.1.5 with 32 bytes of data:

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

Ping statistics for 192.168.1.5:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Conclusions

- VLAN segmentation worked as designed: hosts in the same VLAN communicate locally and across the trunk; hosts in different VLANs are isolated.
- The trunk on Gi0/1 successfully carried VLANs 2 and 3 between switches.
- Optional SVI allowed management/gateway pings without enabling inter-VLAN routing.
- Replies within the same VLAN confirm correct access-port assignment and a working trunk. Timeouts between VLAN2 and VLAN3 confirm Layer-2 isolation with no L3 routing.

Reflection

This project reinforced the difference between Layer-2 segmentation and Layer-3 routing.

Next step would be enabling inter-VLAN routing to allow controlled communication between VLANs.