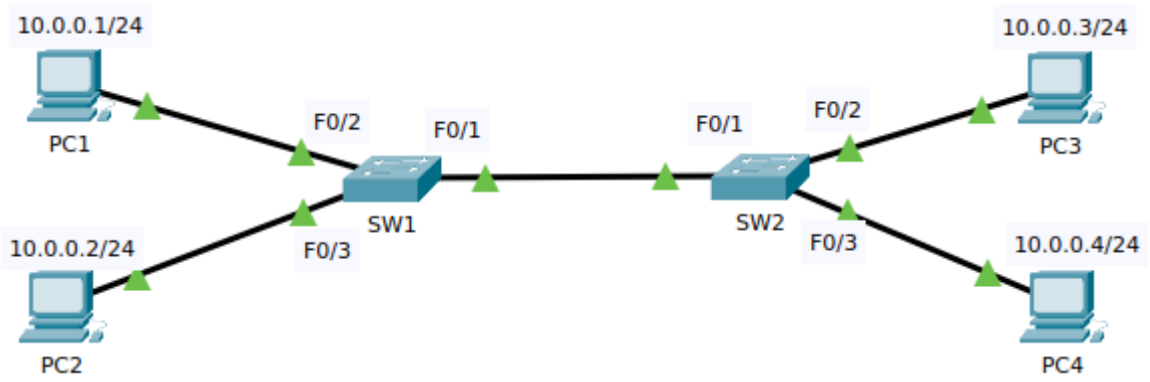
ACTIVITY 5 : VLAN configuration



1. Ping between the computers to test connectivity.

From PC1

```
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
C:\>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2. Assign PC1 and PC3 to VLAN1, and PC2 and PC4 to VLAN2.

```
SW1(config)#interface f0/2
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 1
SW1(config-if)#exit
SW1(config)#interface f0/3
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 2
```

% Access VLAN does not exist. Creating vlan 2
SW1(config-if)#

SW2(config)#interface f0/2
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 1
SW2(config-if)#exit
SW2(config)#interface f0/3
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 2
% Access VLAN does not exist. Creating vlan 2
SW2(config-if)#

3. Attempt to ping between PC1 and PC3, and then PC2 and PC4. Why does the ping between PC1 and PC3 work, but the ping between PC2 and PC4 doesn't?

- The ping between PC1 and PC3 work as they are in VLAN 1 which is native and forward packets.
- The ping between PC2 and PC4 doesn't because they need a trunk.

4. Configure the interfaces connecting SW1 and SW2 as trunk interfaces.

SW1(config)#interface f0/1
SW1(config-if)#switchport mode trunk
SW1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

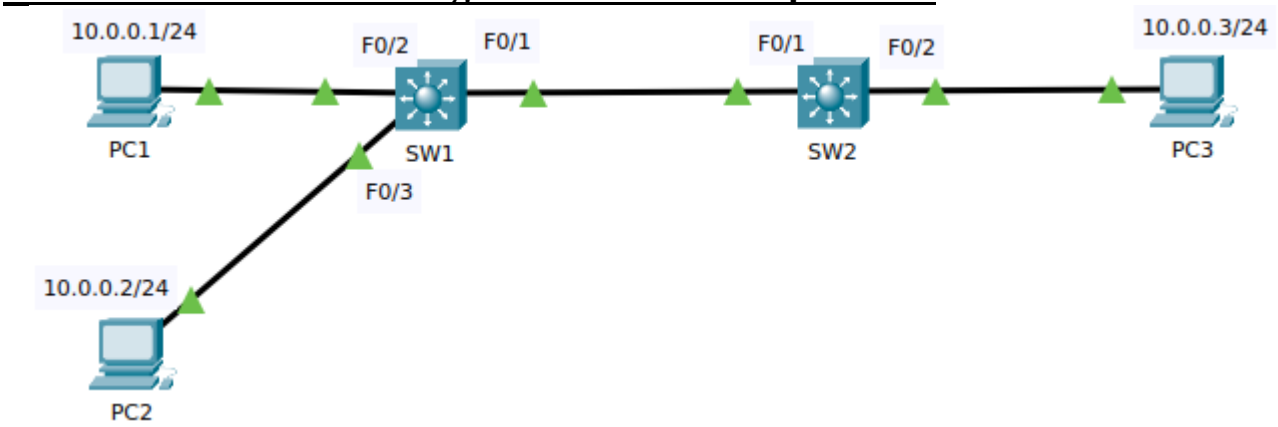
SW2(config)#interface f0/1
SW2(config-if)#switchport mode trunk
SW2(config-if)#

5. Ping between the computers again. Which pings fail, and which pings succeed?

The ping from PC2 to PC4 works :

```
C:\>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4: bytes=32 time<1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=12ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 6ms
```

ACTIVITY 6 : VLAN Configuration Trunk Encapsulation



1. Ping between the PCs to test connectivity.
From PC1

```
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2. Assign PC2 and PC3 to VLAN 2.

```
SW1(config)#interface f0/3
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 2
% Access VLAN does not exist. Creating vlan 2

SW2(config)#interface f0/2
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 2
% Access VLAN does not exist. Creating vlan 2
```

3. Create a trunk between SW1 and SW2.

```
SW2(config)#interface f0/1
SW2(config-if)#switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to
"trunk" mode.
```

---> Does not work as it’s a layer 3 switch, we need an encapsulation before the trunking.

```
SW2(config-if)#switchport trunk encapsulation dot1q
SW2(config-if)#switchport mode trunk
SW2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
```

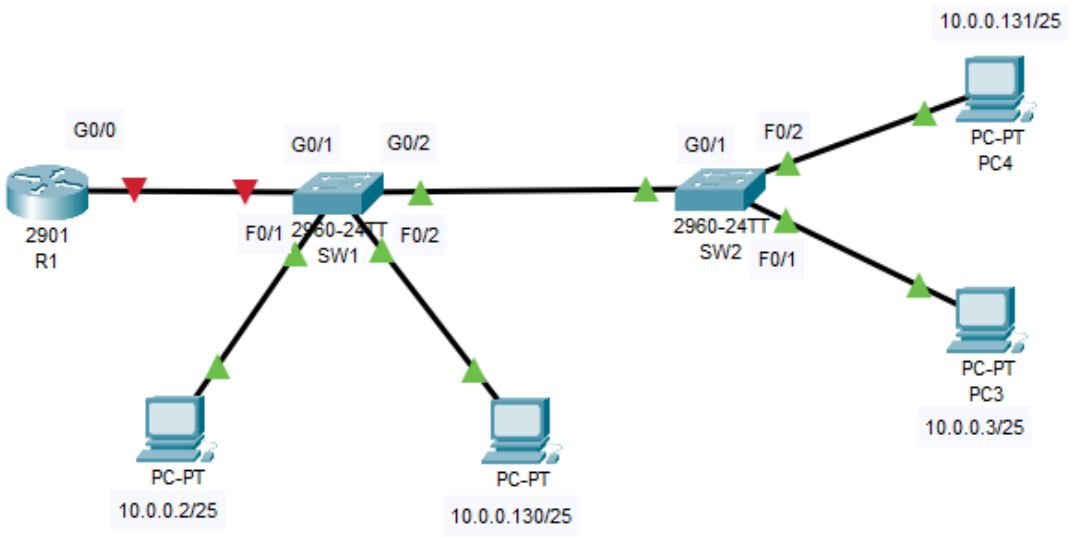
- Let’s do the same thing in SW1:

```
SW1(config)#interface f0/1
SW1(config-if)#switchport trunk encapsulation dot1q
SW1(config-if)#switchport mode trunk
```

4. Ping between the PCs to test connectivity.

```
C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

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

Ping statistics for 10.0.0.1:
    Packets: Sent = 3, Received = 0, Lost = 3 (100% loss),

Control-C
^C
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

ACTIVITY 7 : Inter-VLAN Routing (ROAS)



1. Ping between the PCs. Which pings succeed?

PC1 can ping PC3. PC2 can ping PC4

2. Assign PC1 and PC3 to VLAN 13, and PC2 and PC4 to VLAN 24.

```
SW1(config)#interface f0/1
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 13
% Access VLAN does not exist. Creating vlan 13
SW1(config-if)#exit
SW1(config)#interface f0/2
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 24
% Access VLAN does not exist. Creating vlan 24

SW2(config)#interface f0/1
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 13
% Access VLAN does not exist. Creating vlan 13
SW2(config-if)#exit
```

```
SW2(config)#interface f0/2
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 24
% Access VLAN does not exist. Creating vlan 24
```

3. Create a trunk link between SW1 and SW2.

```
SW1(config)#interface g0/2
SW1(config-if)#switchport mode trunk

SW2(config)#interface g0/1
SW2(config-if)#switchport mode trunk
```

4. Configure inter-VLAN routing by using subinterfaces on R1's G0/0 interface. Use an address of 10.0.0.1/25 for VLAN 13 and 10.0.0.129/25 for VLAN 24.

```
R1(config)#interface g0/0
R1(config-if)#no shutdown
R1(config-if)#interface g0/0.13
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.13, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.13, changed state to up
R1(config-subif)#encapsulation dot1Q 13
R1(config-subif)#ip address 10.0.0.1 255.255.255.128
R1(config-subif)#exit
R1(config)#interface g0/0.24
R1(config-subif)#
R1(config-subif)#encapsulation dot1q 24
R1(config-subif)#ip address 10.0.0.129 255.255.255.128

SW1(config)#interface g0/1
SW1(config-if)#switchport mode trunk
```

5. Test connectivity by pinging between PCs.

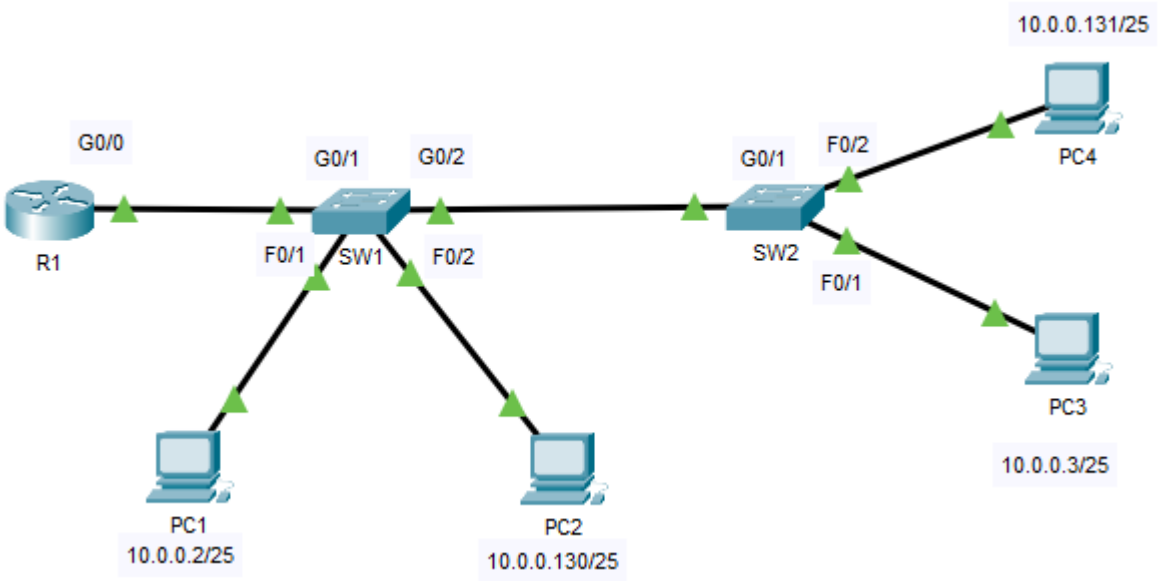
PC1 can now ping PC2 and PC4.

```
C:\>ping 10.0.0.131

Pinging 10.0.0.131 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.131: bytes=32 time<1ms TTL=127
Reply from 10.0.0.131: bytes=32 time<1ms TTL=127
Reply from 10.0.0.131: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.131:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.0.0.130

Pinging 10.0.0.130 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.130:
    Packets: Sent = 3, Received = 2, Lost = 1 (34% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC2 can ping PC1 and PC3.

```
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=127
Reply from 10.0.0.2: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.2:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.3: bytes=32 time<1ms TTL=127
Reply from 10.0.0.3: bytes=32 time<1ms TTL=127
Reply from 10.0.0.3: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

ACTIVITY 8: Inter-VLAN Routing (ROAS) Troubleshooting 1



VLAN 13: PC1, PC3 and VLAN 24: PC2, PC4
After configuring inter-VLAN routing, computers in different VLANs are still unable to communicate. There is one misconfiguration. Troubleshoot the problem and fix it. You have successfully completed the lab when all PCs can ping each other, without changing VLAN membership.

- The ping between PC1 and PC3 works.
- PC1 cannot ping PC2 and PC4.
- The ping between PC2 and PC4 works.
- PC2 cannot ping PC1 and PC3.
- PC3 cannot ping PC4.

-> Here, the VLAN works, maybe the problem is the router. Let's find out.

- The two IP addresses on G0/0 of the router are correct after ip interface brief

R1#show interface g0/0.13
GigabitEthernet0/0.13 is up, line protocol is up (connected)
Hardware is PQUICC_FEC, address is 0040.0bed.ae01 (bia 0040.0bed.ae01)
Internet address is 10.0.0.1/25

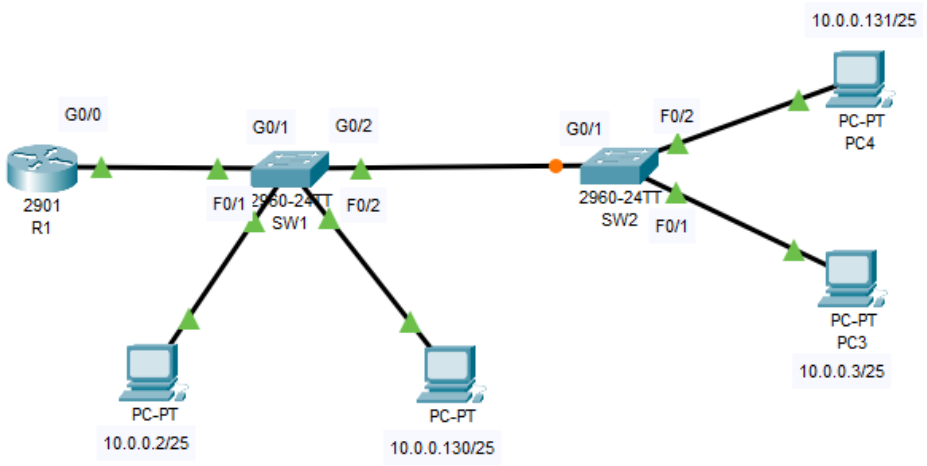
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation 802.1Q Virtual LAN, Vlan ID 13
ARP type: ARPA, ARP Timeout 04:00:00,
Last clearing of "show interface" counters never
R1#show interface g0/0.24
GigabitEthernet0/0.24 is up, line protocol is up (connected)
Hardware is PQUICC_FEC, address is 0040.0bed.ae01 (bia 0040.0bed.ae01)
Internet address is 10.0.0.129/25
MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation 802.1Q Virtual LAN, Vlan ID 14
ARP type: ARPA, ARP Timeout 04:00:00,
Last clearing of "show interface" counters never

➔ The VLAN number for G0/0.24 is incorrect. Let's correct it

R1(config)#interface g0/0.24
R1(config-subif)#encapsulation dot1q 24

➔ Now all PCs can ping one another.

ACTIVITY 9: Inter-VLAN Routing (ROAS) Troubleshooting 2



VLAN 13: PC1, PC3 and VLAN 24: PC2, PC4
PC1's user has reported that they are unable to communicate with other PCs on the network. There is one misconfiguration per networking device. Troubleshoot the problems and fix them. You have successfully completed the lab when all PC1 can ping each other PC in the network.

- None of the PCs can ping one another. So, the VLAN doesn't work. Let's find if the VLANs are not misconfigured.

```
SW1#show vlan brief

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
12   VLAN0012                          active    Fa0/1
13   VLAN0013                          active
24   VLAN0024                          active    Fa0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

- We see that in SW1, the VLAN 13 is not on F0/1. Let's correct it.

SW1(config)#interface f0/1

SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 13
- Even after this, the PCs still can't ping one another. Let's see for SW2.
The VLANs are correct on SW2. Let's see the trunk on SW2.
SW2#show interfaces trunk

➔ As we can see it, there is no trunk on SW2. So, let's make one on G0/1

SW2(config)#interface g0/1
SW2(config-if)#switchport mode trunk

➔ Now, PC1 and PC3 can ping but cannot ping PC2 and PC4. The same, PC2 and PC4 can ping but not to PC1 and PC3. So, the problem is with gateway.

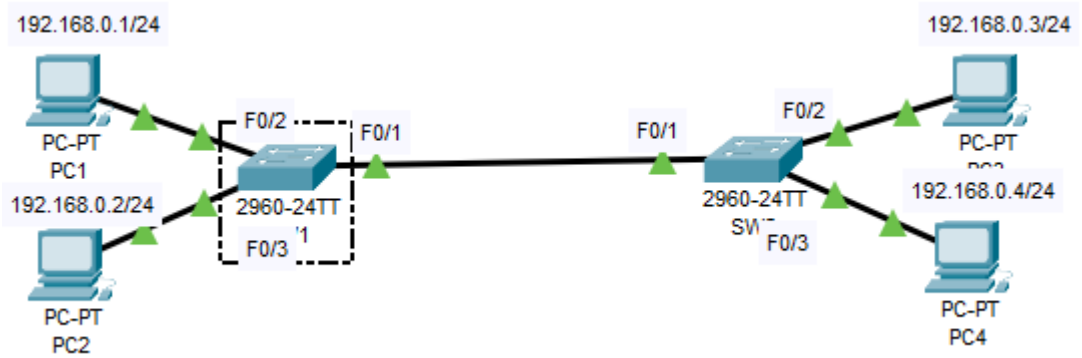
```
R1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet0/0.13  10.0.0.11       YES manual up                    up
GigabitEthernet0/0.24  10.0.0.129      YES manual up                    up
GigabitEthernet0/1     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
```

➔ As we can see the IP address on g0/0.13 is incorrect. Let's correct it.

R1(config)#interface g0/0.13
R1(config-subif)#ip address 10.0.0.1 255.255.255.128

➔ Now, the PCs can ping one another.

ACTIVITY 12: Naming VLANs



1. Set the host names of the switches to SW1 and SW2, respectively.
Switch(config)#hostname SW1

Switch(config)#hostname SW2

2. Create two VLANs on each switch, with the following names: VLAN 13 - Name: Management
VLAN 24 - Name: Engineering
SW1(config)#vlan 13
SW1(config-vlan)#name Management
SW1(config-vlan)#exit
SW1(config)#vlan 24
SW1(config-vlan)#name Engineering

SW2(config)#vlan 13
SW2(config-vlan)#name Management
SW2(config-vlan)#exit
SW2(config)#vlan 24
SW2(config-vlan)#name Engineering

3. Place PC1 and PC3 into VLAN 13, and PC2 and PC4 into VLAN 24.
SW1(config)#interface f0/2
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 13

SW1(config-if)#interface f0/3
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 24

SW2(config)#interface f0/2
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 13
SW2(config-if)#interface f0/3
SW2(config-if)#switchport mode access
SW2(config-if)#switchport access vlan 24

4. Configure a trunk link between SW1 and SW2.
SW1(config)#interface f0/1
SW1(config-if)#switchport mode trunk

SW2(config)#interface f0/1
SW2(config-if)#switchport mode trunk

5. Save the running configuration of the switches.
SW1#wr
Building configuration...
[OK]

SW2#wr
Building configuration...
[OK]

6. Test that PCs in the same VLAN can ping each other.
PC1 can ping PC3 but not PC2 nor PC4.

```
C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

Reply from 192.168.0.3: bytes=32 time=12ms TTL=128
Reply from 192.168.0.3: bytes=32 time=1ms TTL=128
Reply from 192.168.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.3:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 4ms

Control-C
^C
C:\>ping 192.168.0.4

Pinging 192.168.0.4 with 32 bytes of data:

Request timed out.
Request timed out.

Ping statistics for 192.168.0.4:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),
```

PC2 can ping PC4 but not PC1 nor PC3.

```
C:\>ping 192.168.0.4

Pinging 192.168.0.4 with 32 bytes of data:

Reply from 192.168.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.4:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

Control-C
^C
C:\>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:

Request timed out.
Request timed out.

Ping statistics for 192.168.0.1:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),

Control-C
^C
C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

Request timed out.
Request timed out.

Ping statistics for 192.168.0.3:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),
```