Department of Computer Science and Engineering

Islamic University of Technology (IUT)

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Lab Report 03

CSE 4412: Data Communication and Networking Lab

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Section: B(Even)

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Title: Understanding the basics of Variable Length Subnet Mask (VLSM) and VLANs and Inter-VLAN communication

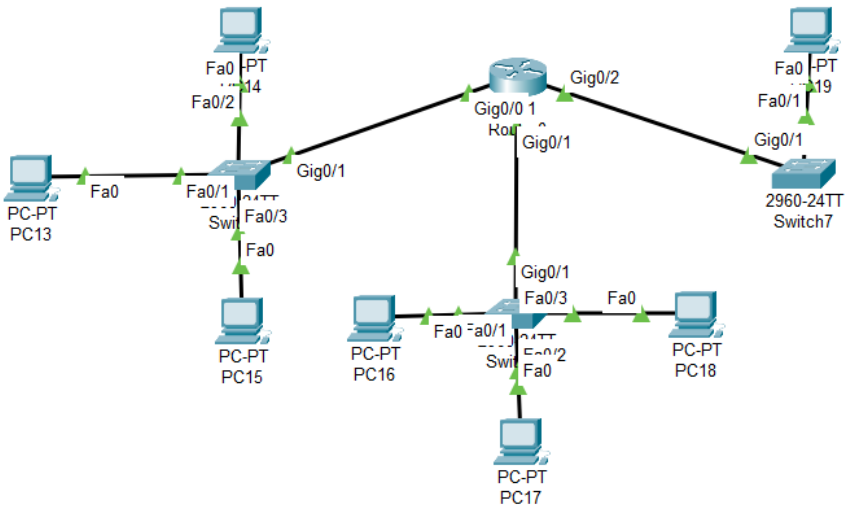
Objectives:

1. Define and describe the concept of VLAN
2. Describe the advantages of VLAN
3. Design and implement Inter-VLAN routing
4. Understand and implement VLSM

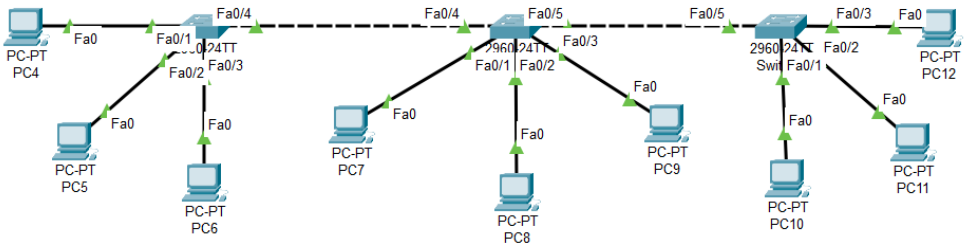
Diagram of the experiment:

(Provide screenshot of the final network topology. Make sure to label the network components.)

TASK #01:



TASK #02:



Working Procedure:

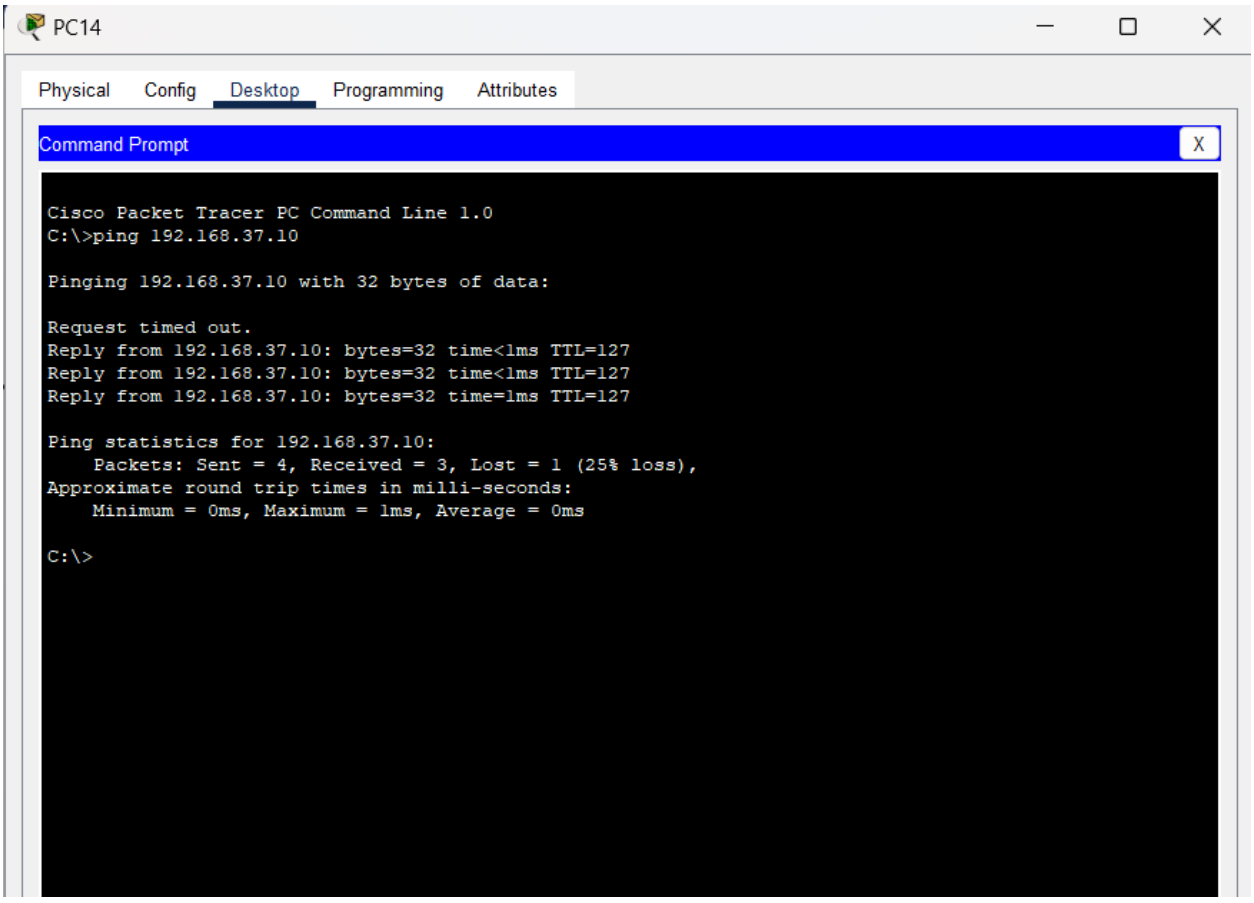
(Explain in brief how you completed the tasks. Provide necessary screenshots of used commands for each task.)

TASK #01:

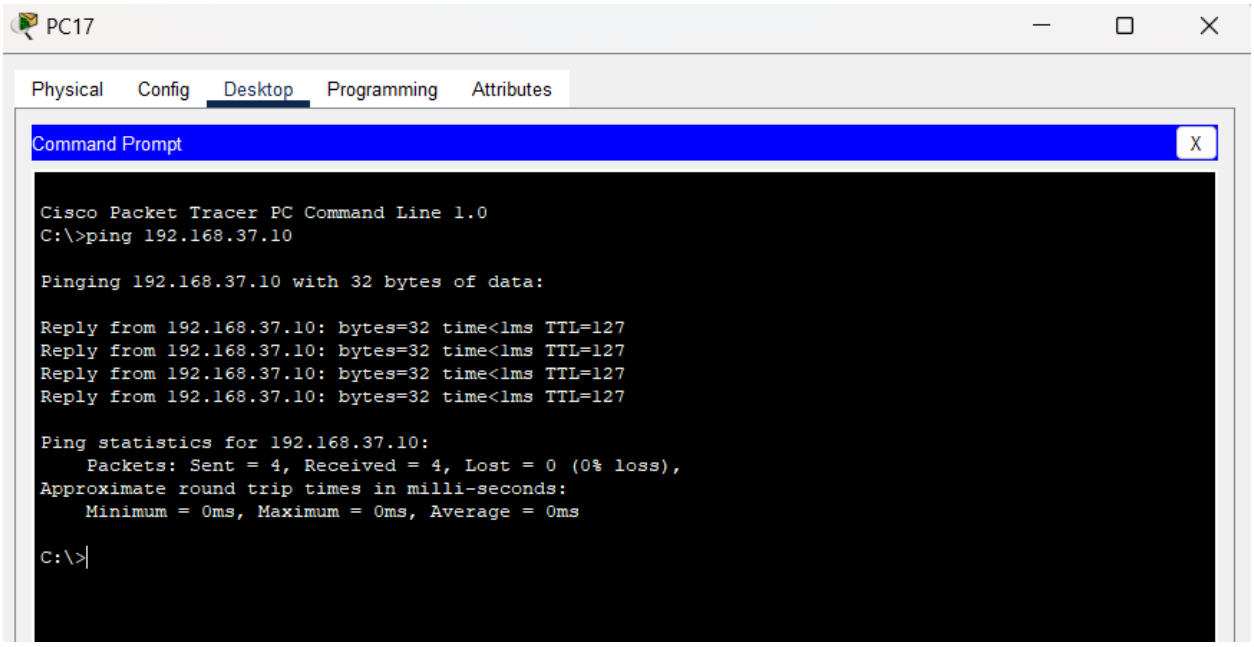
For adding another network to the existing topology, I gave the following commands as shown in the screenshot.

```
Router(config)#interface gig
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 192.168.17.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface gig
Router(config)#interface gigabitEthernet 0/1
Router(config-if)#ip address 192.168.27.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#wxit
                  ^
% Invalid input detected at '^' marker.

Router(config-if)#exit
Router(config)#interface gig
Router(config)#interface gigabitEthernet 0/2
Router(config-if)#ip address 192.168.37.1 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#exit
Router#
```

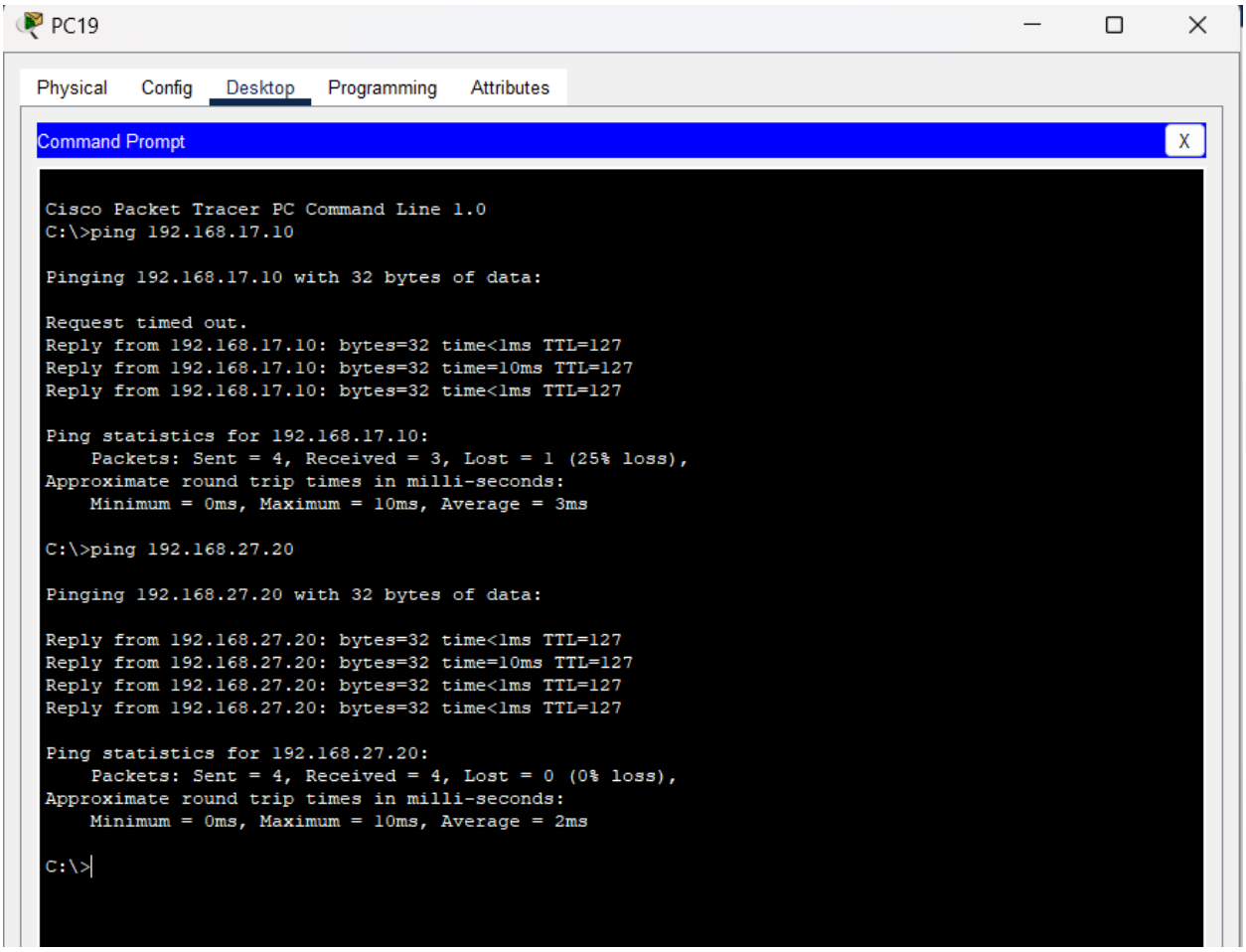
From a PC in the first network to the PC of the new network:



From a PC in the second network to the PC in the new network:



From a PC in the new network to PCs in the first and second network:



TASK #02:

For switch2:

First I configured the switch for the three VLANs and gave them names according to the given instructions. Then to allow access for communication I used the commands :

#interface Fast-Ethernet 0/4

#switchport mode trunk

(this command configures the interface as a trunk link)

#switchport trunk allowed vlan all.

```
Switch>
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name Students
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Teachers
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
```

```
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
                                                 Gig0/1, Gig0/2
10   Students                          active    Fa0/1
20   Teachers                          active    Fa0/2
30   Admin                             active    Fa0/3
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
10   enet  100010     1500  -      -      -        -    -        0      0
20   enet  100020     1500  -      -      -        -    -        0      0
30   enet  100030     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

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
```

```
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config-if)#interface fast
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fas
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interfa
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
```

For Switch 3:
Same as switch 2.

```
Switch(config)#vlan 10
Switch(config-vlan)#name Students
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Teachers
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
```

```
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                                 Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                                 Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                 Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                 Fa0/22, Fa0/23, Fa0/24, Gig0/1
                                                 Gig0/2
10   Students                          active    Fa0/1
20   Teachers                          active    Fa0/2
30   Admin                             active    Fa0/3
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
10   enet  100010     1500  -      -      -        -    -        0      0
20   enet  100020     1500  -      -      -        -    -        0      0
30   enet  100030     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

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------

Remote SPAN VLANs
------------------------------------------------------------------------------

Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------
```

```
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/5
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#exit
```

For Switch 4:

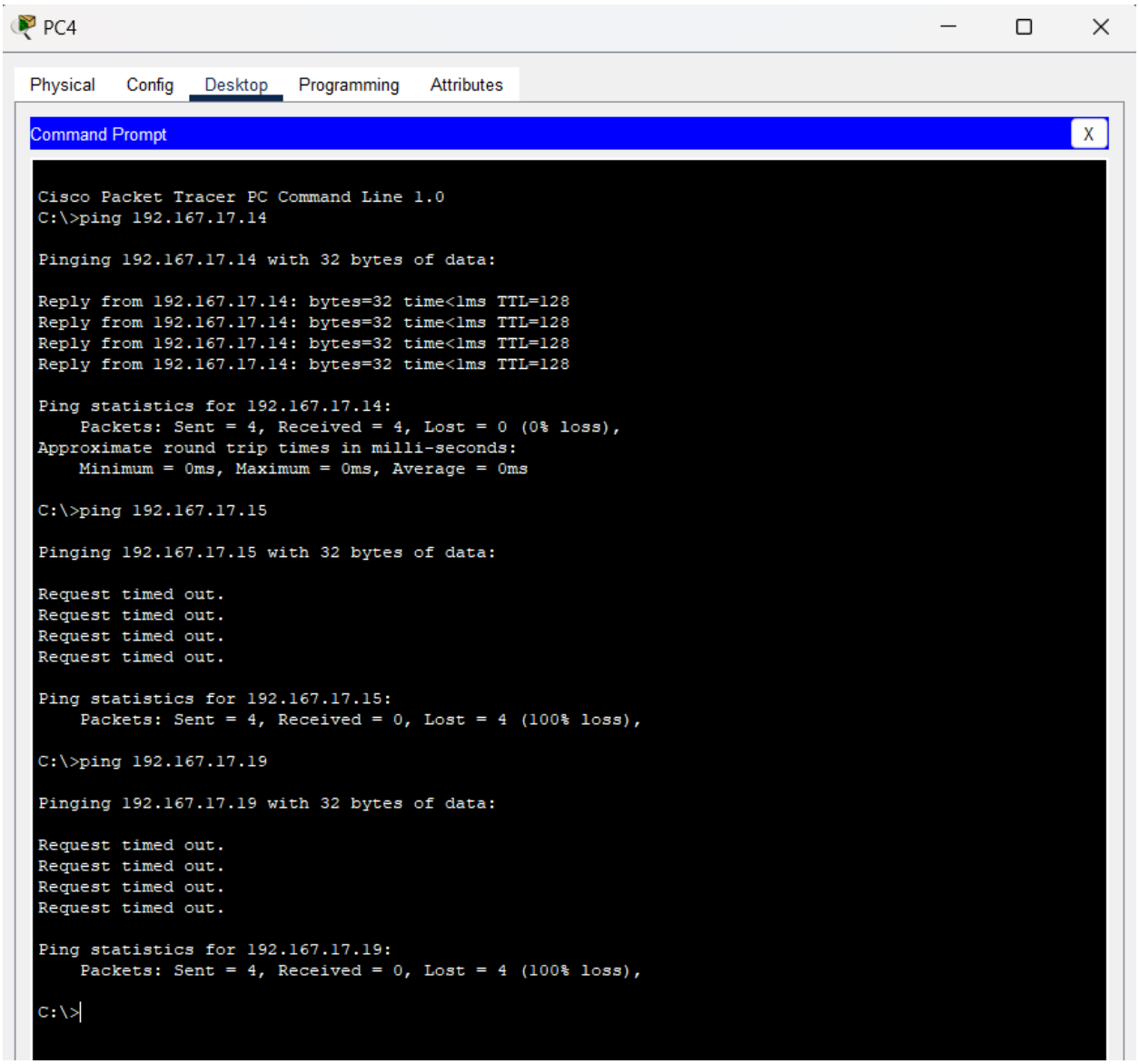
Same as Switch 2.

```
Switch(config)#vlan 10
Switch(config-vlan)#name Students
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Teachers
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
```

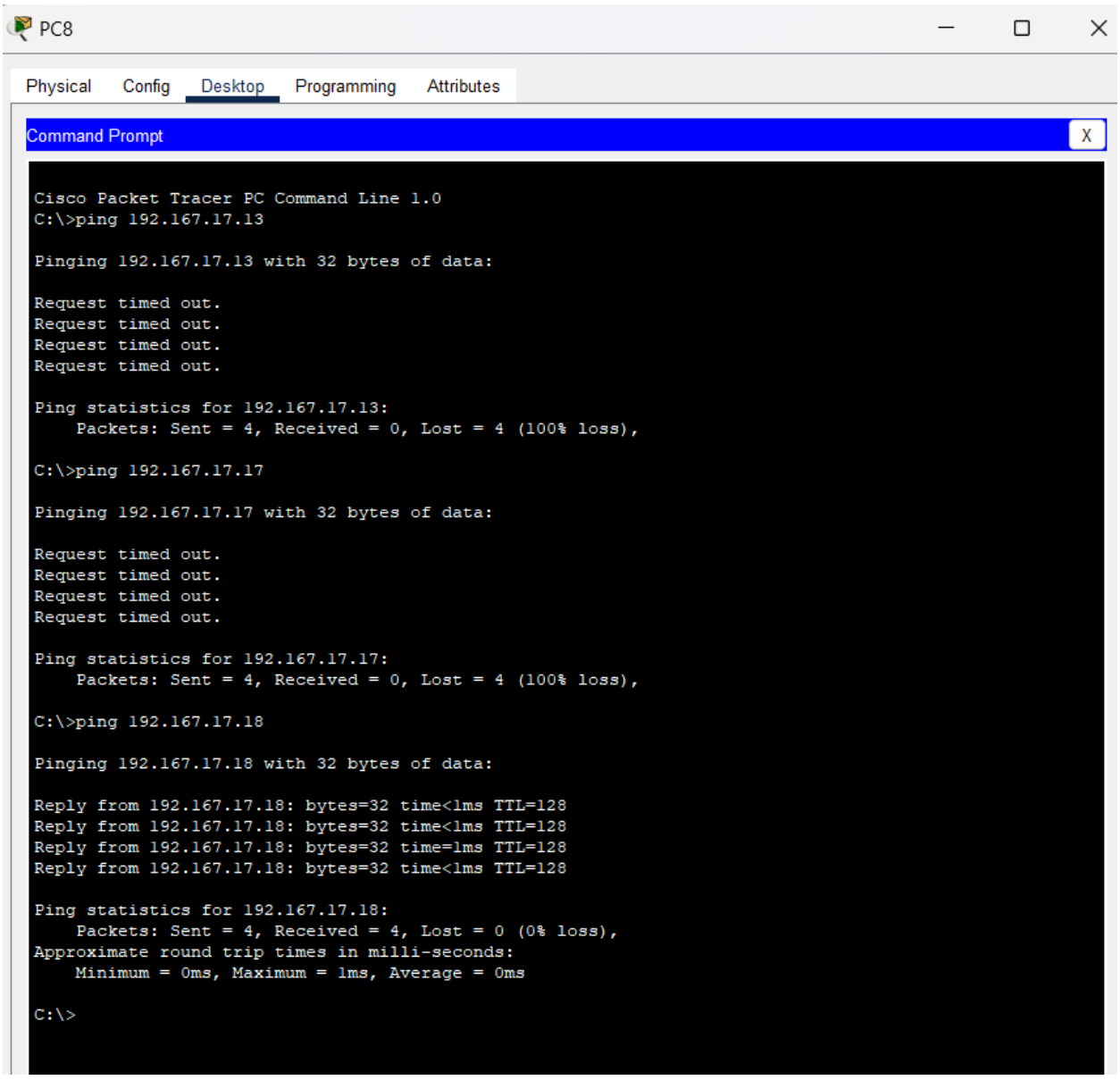
```
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/4, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
10   Students                          active    Fa0/1
20   Teachers                          active    Fa0/2
30   Admin                             active    Fa0/3
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
10   enet  100010     1500  -      -      -        -    -        0      0
20   enet  100020     1500  -      -      -        -    -        0      0
30   enet  100030     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

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------

Remote SPAN VLANs
------------------------------------------------------------------------------

Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------
```

```
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fast
Switch(config)#interface fastEthernet 0/5
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
```

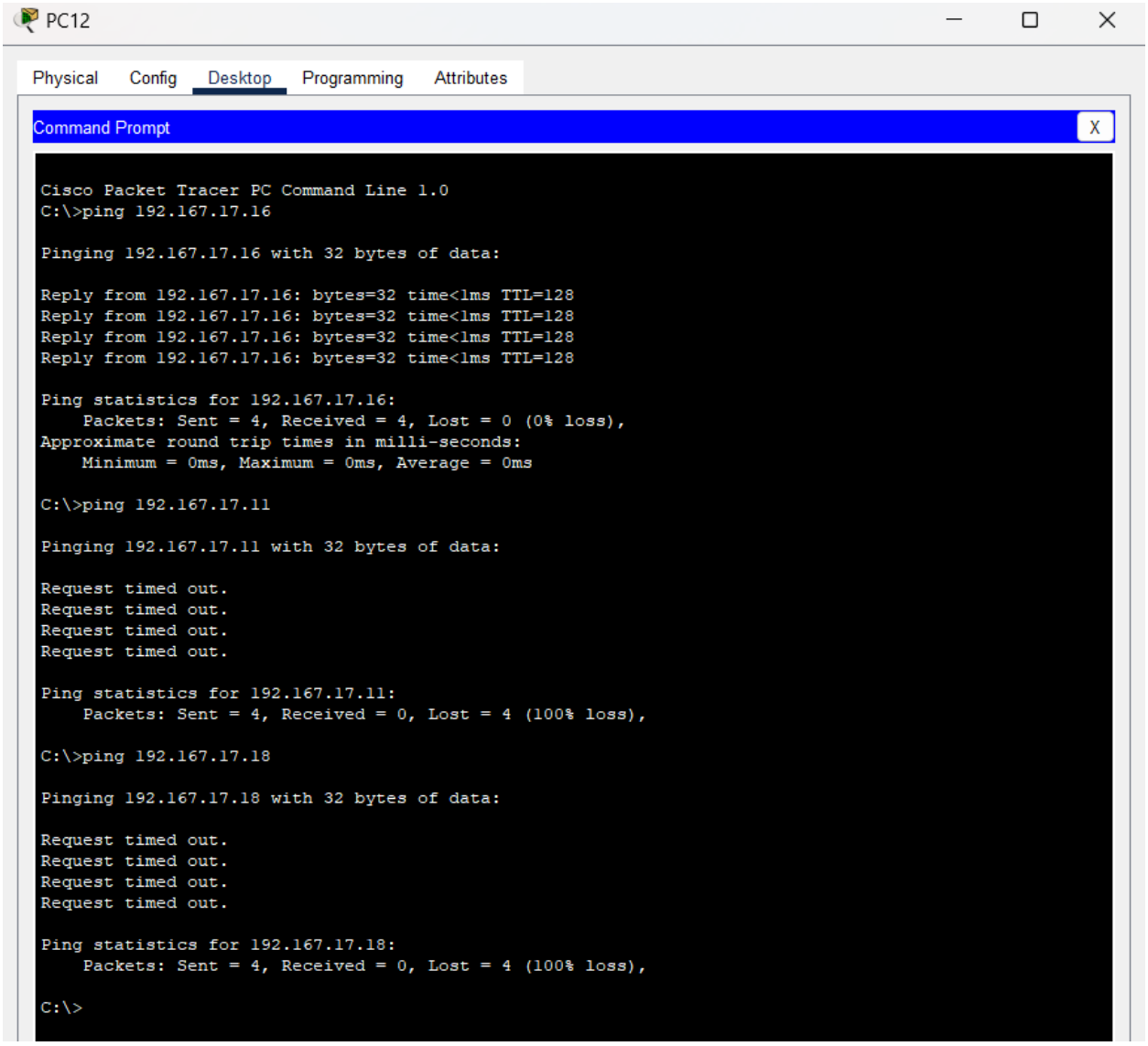
From a PC of VLAN 10 to other PC of VLAN 10 and other VLANS:



From a PC of VLAN 20 to other PC of VLAN 20 and other VLANS:



From a PC of VLAN 30 to other PC of VLAN 30 and other VLANS:



Questions (Answer to the point):

1. How many host bits are needed in the largest required subnet?
   Ans: example:
   Let, host amount is 21. So the bits needed are 5 as 2^5=32 and 2^4=16.
2. How many VLANs need to be configured to each of the switches?
   Ans: The amount of VLANs that are given.
3. Which interfaces need Access Link?
   Ans: Ethernet ports
4. Which interfaces need Trunk Link?

Ans: Two switches or switch to router

5. After configuring VLAN, what will happen if we broadcast?
   Ans: After configuring VLANs, broadcasts are confined to the specific VLAN, limiting their impact to devices within that VLAN.

Challenges (if any):

It was kind of hard to keep track of all the configurations of the switches.