MINISTERUL EDUCAȚIEI ȘI CERCETĂRII AL REPUBLICII MOLDOVA

Universitatea Tehnică a Moldovei

RAPORT

Lucrare de laborator nr. 4

la cursul ***„Rețele de calculatoare”***

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A verificat: **conf.univ. Victor Moraru**

Chișinău 2025

Obiective:

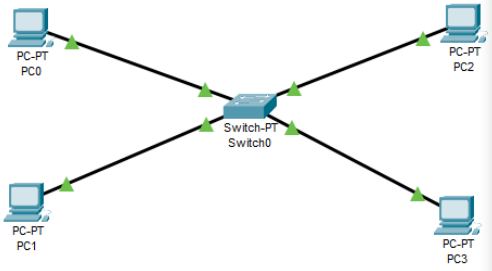
Cunoașterea noțiunii de rețelele locale virtuale (Virtual Local Area Networks – VLAN)?

Studierea tipurilor de legături în VLAN-uri (access, trunk)

Configurarea VLAN-urilor în Cisco IOS

Mersul lucrării:

1.



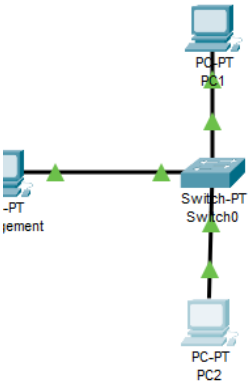
Physical Config CLI Attributes

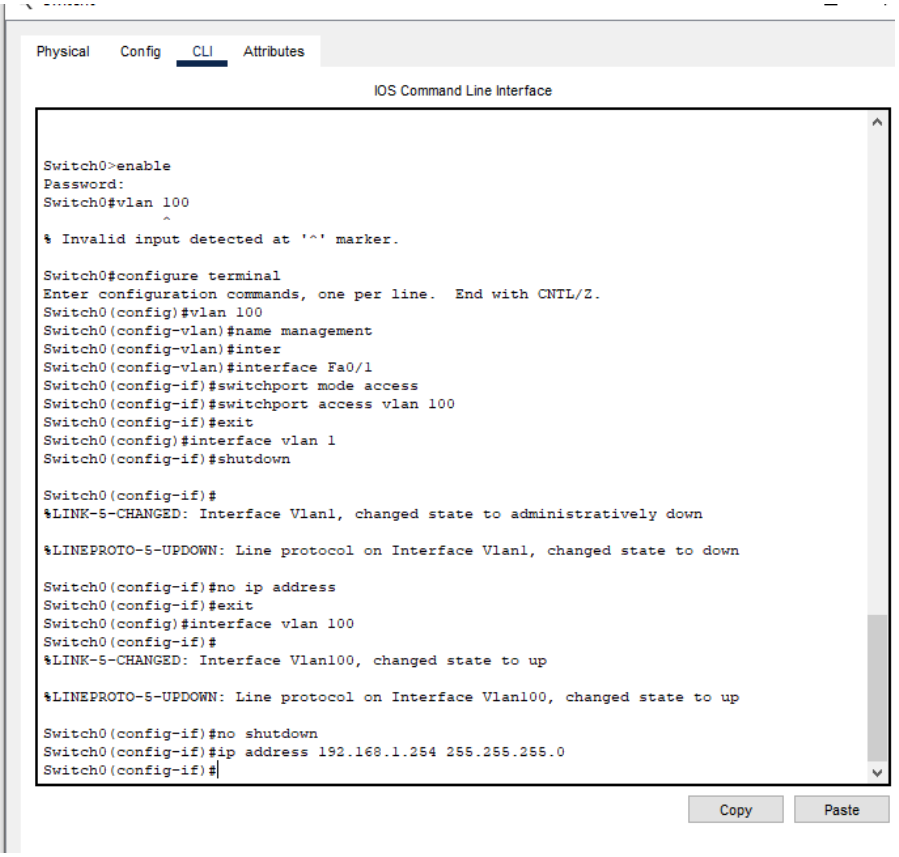
IOS Command Line Interface

```
Switch0>enable
Switch0#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa4/1, Fa5/1
10   zece                             active    Fa0/1, Fa2/1
20   douazeci                         active    Fa1/1, Fa3/1
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
Switch0#
%LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

Switch0#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Switch0#show running config
                   ^
% Invalid input detected at '^' marker.

Switch0#show running-config
Building configuration...

Current configuration : 745 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Switch0
!
!
!
no ip domain-lookup
!
!
!
```

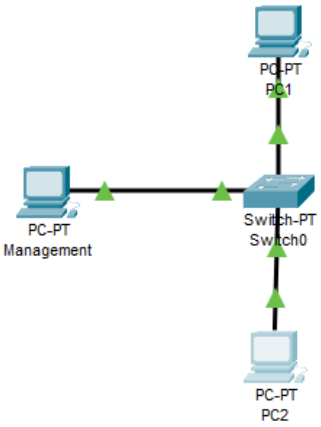
2.

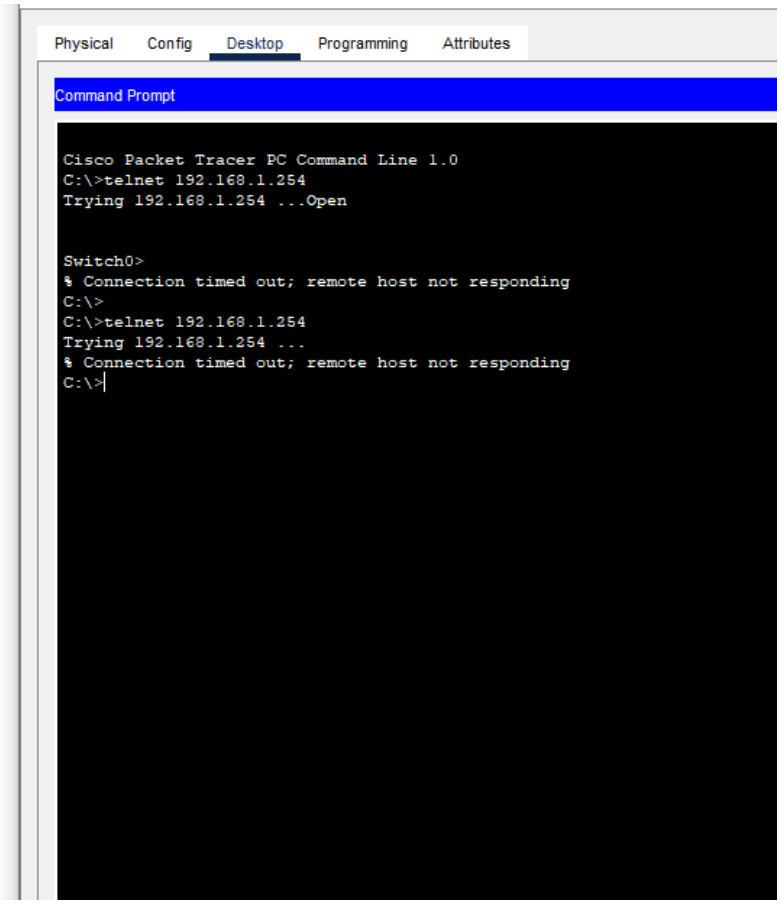
Configurarea vlan 100



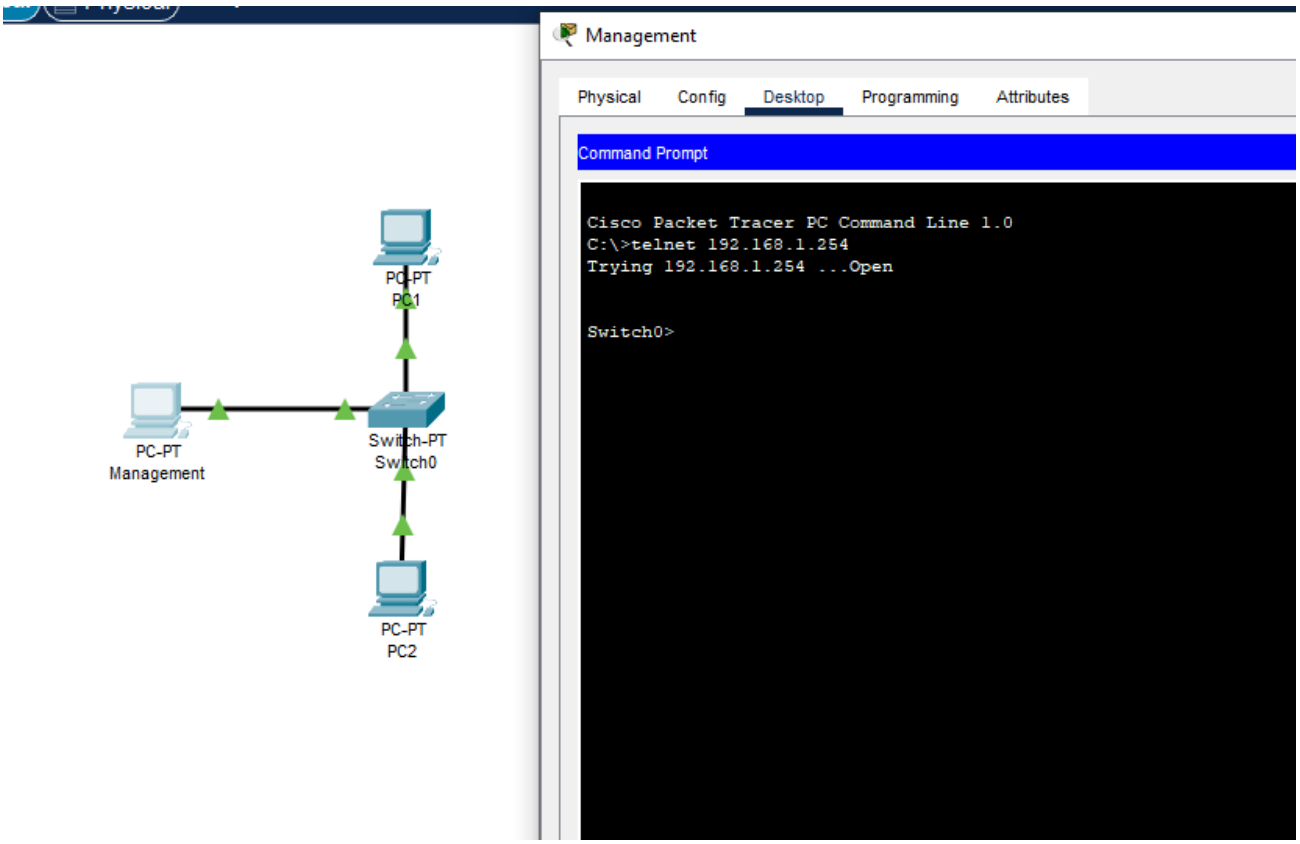


Testarea de pe PC2



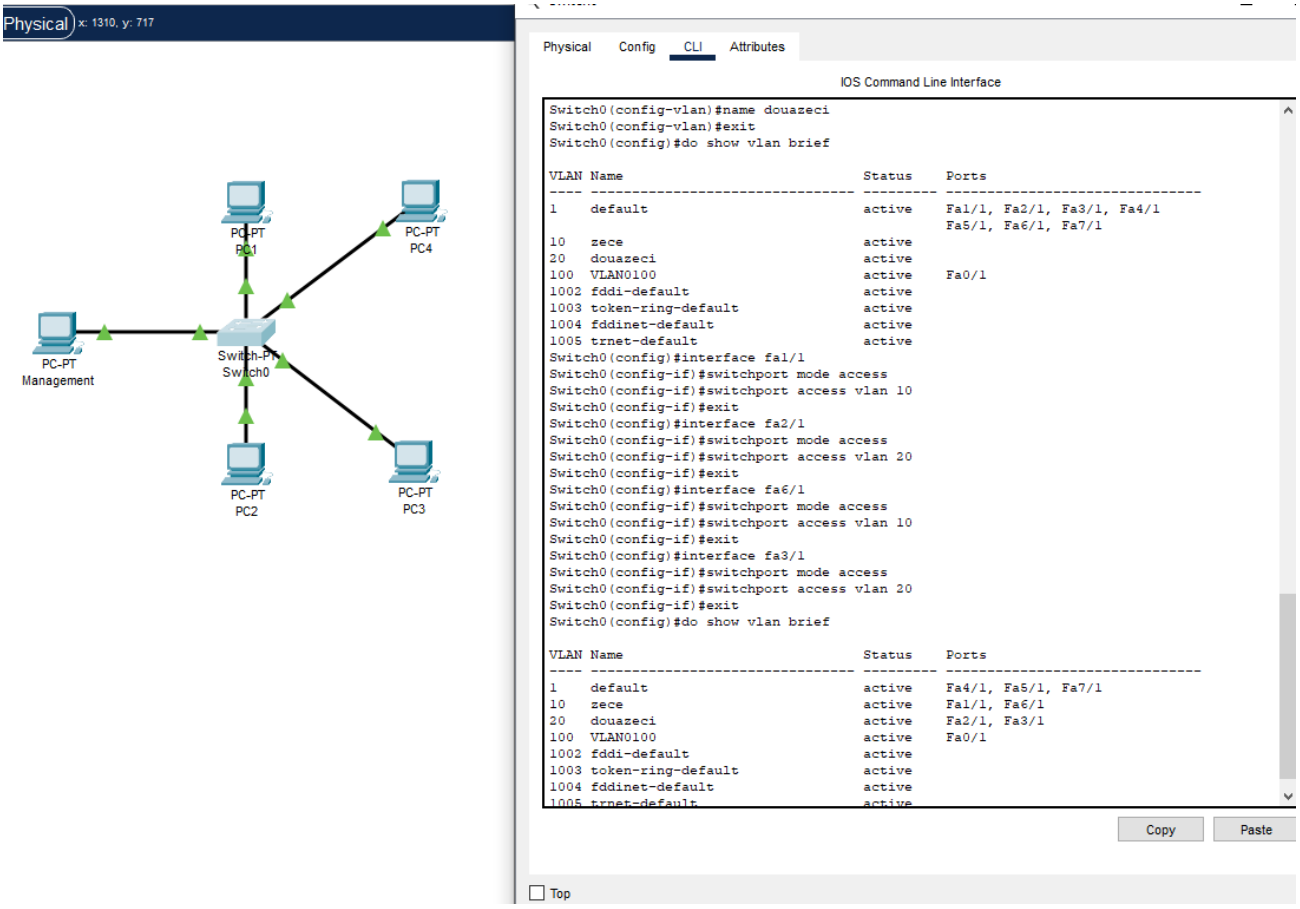


Accessul pe switch de pe PC Management este permis

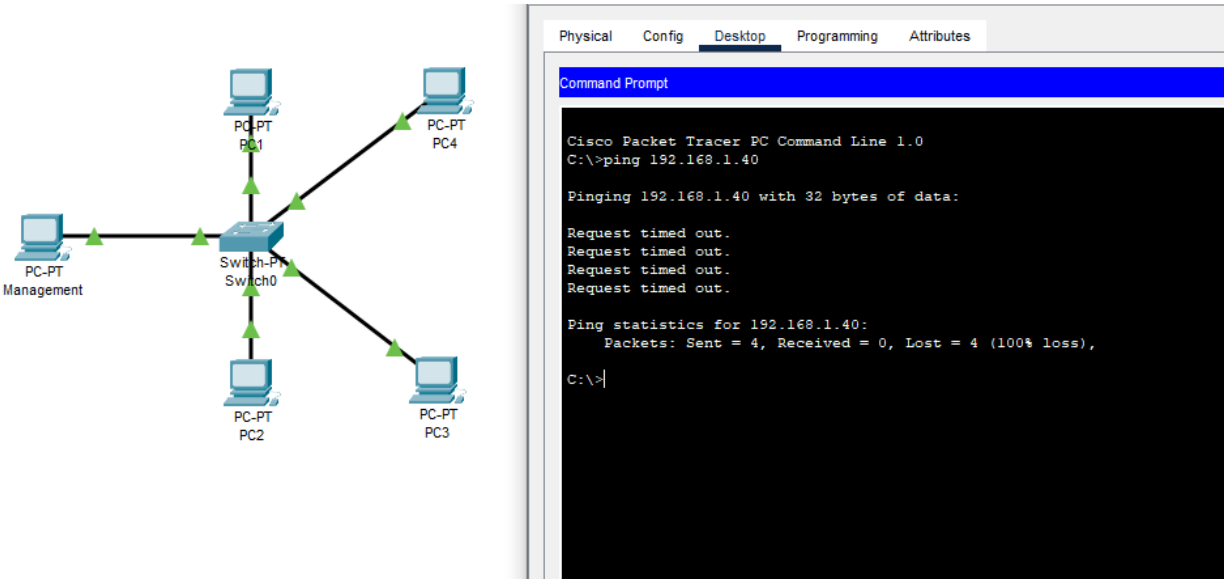


3.

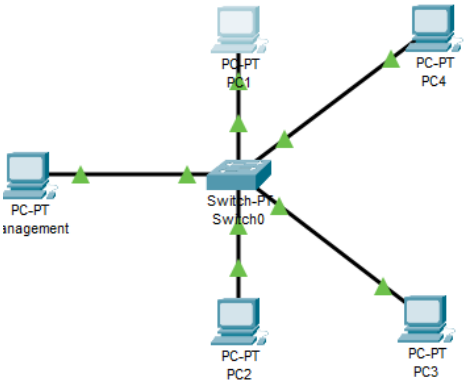
Configurarea vlan 10 si 20

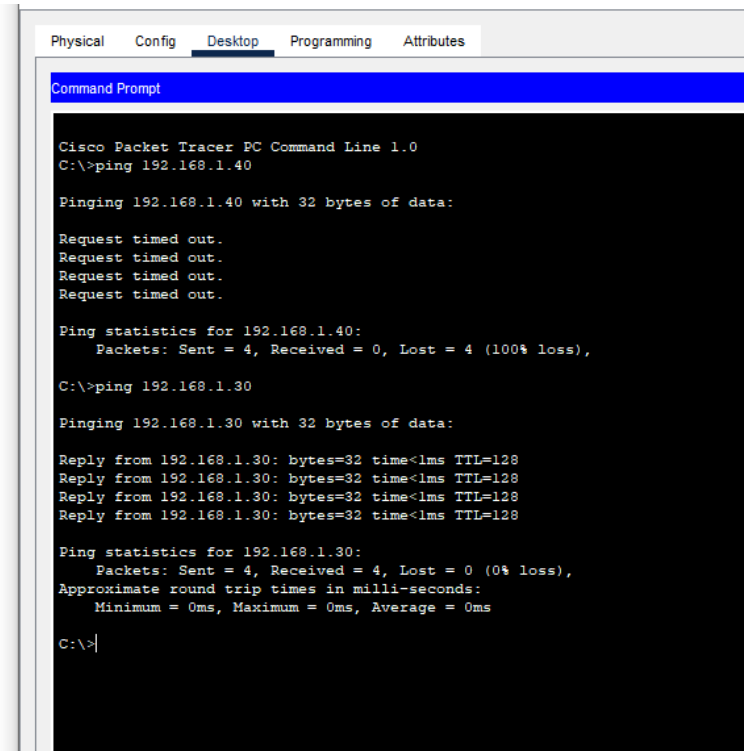


PC1 și PC4 nu pot comunica



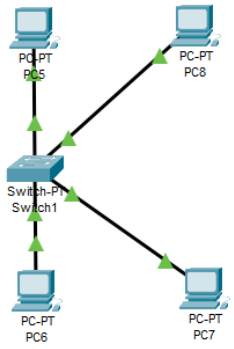
PC1 și PC3 pot comunica deoarece fac parte din aceeași rețea vlan

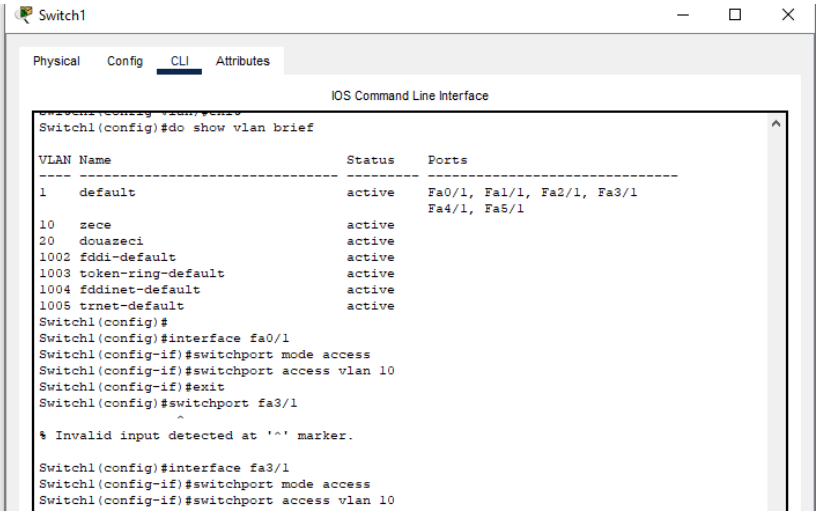




4.

Rețelele vlan 10 și 20 au fost create dar încă nu au statii ce le corespund

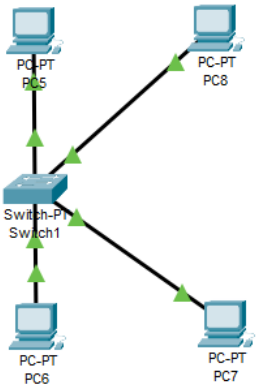


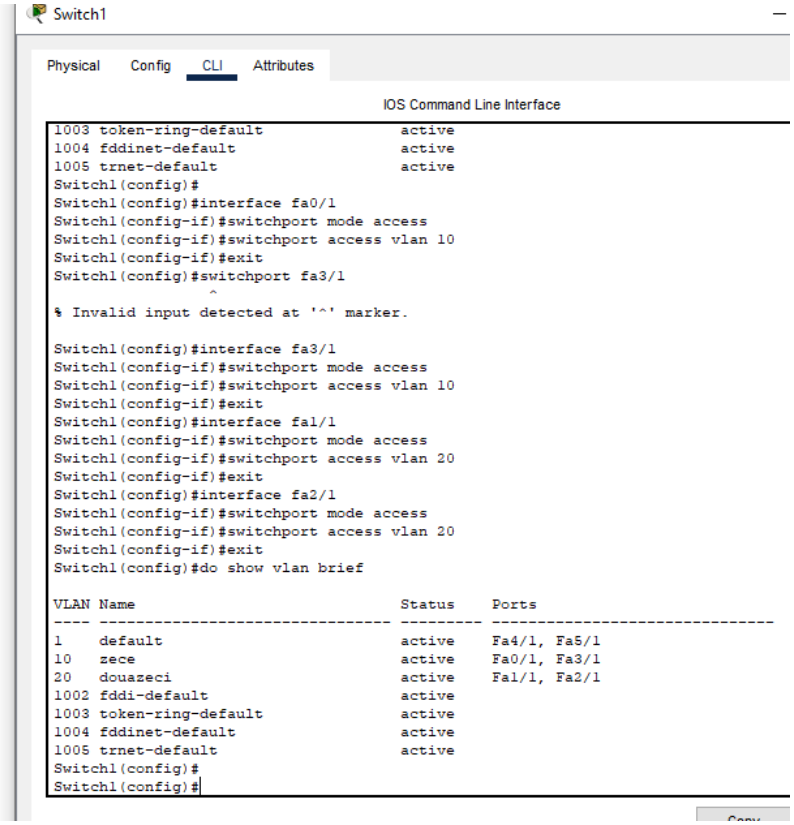


După adăugarea acestora, pentru

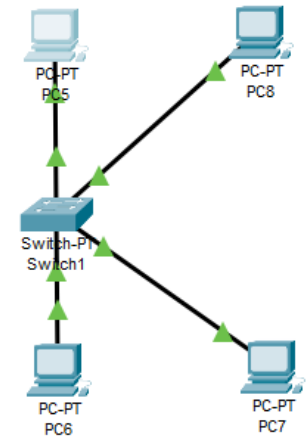
Vlan10 îi corespund Fa0/1 (PC5) și Fa3/1 (PC7)

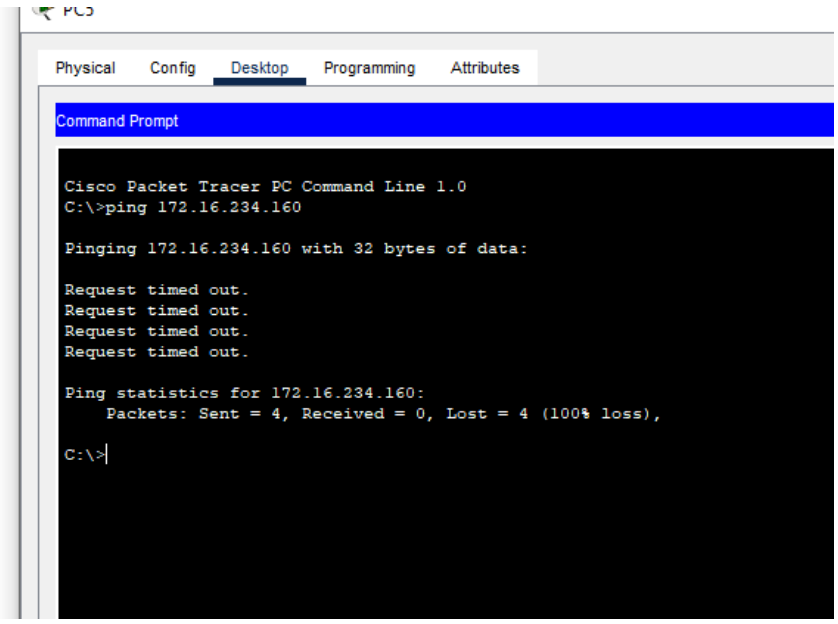
Vlan20 îi corespund Fa1/1 (PC6) și Fa2/1 (PC8)





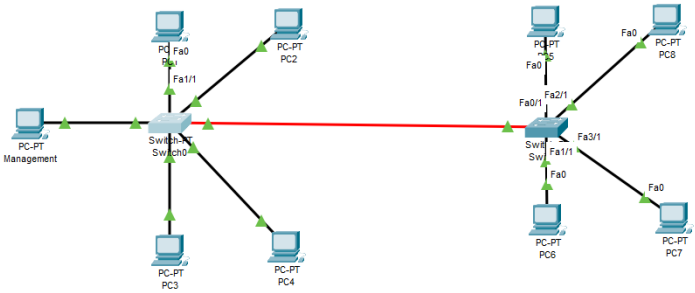
Legătura între PC5 și PC8 nu poate fi efectuată:

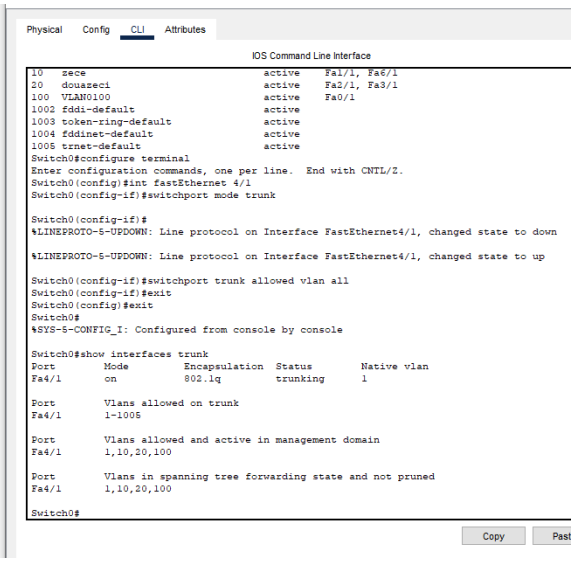




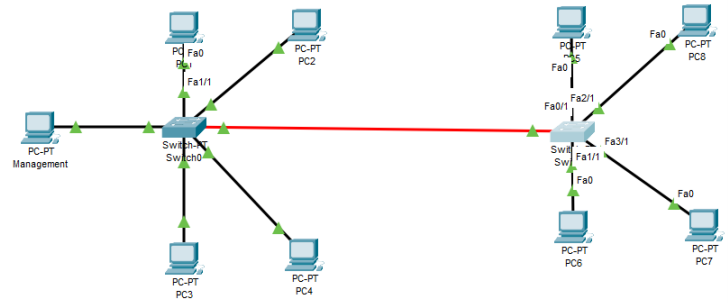
5.

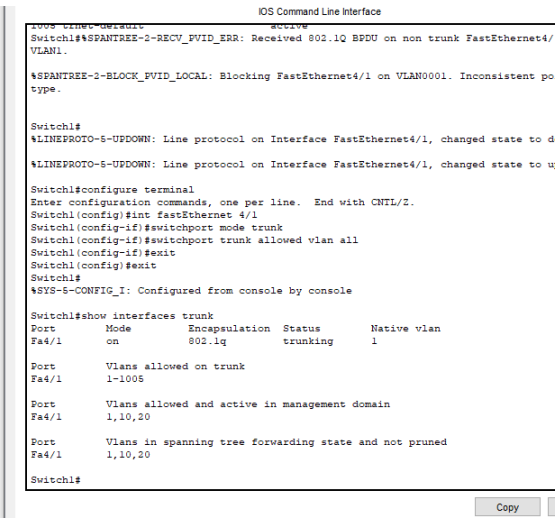
Switch-urile au fost conectate prin cablu fibra, iar switch0 a fost configurat în mod trunk, acesta include și Vlan 100



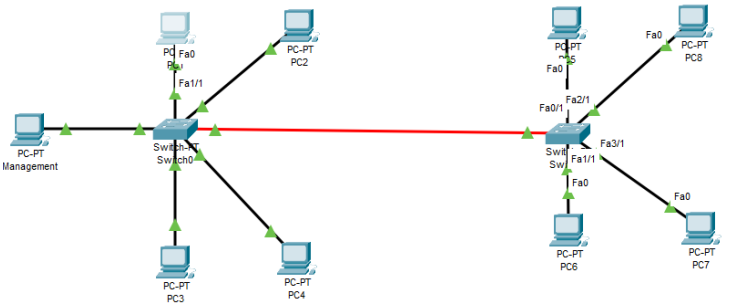


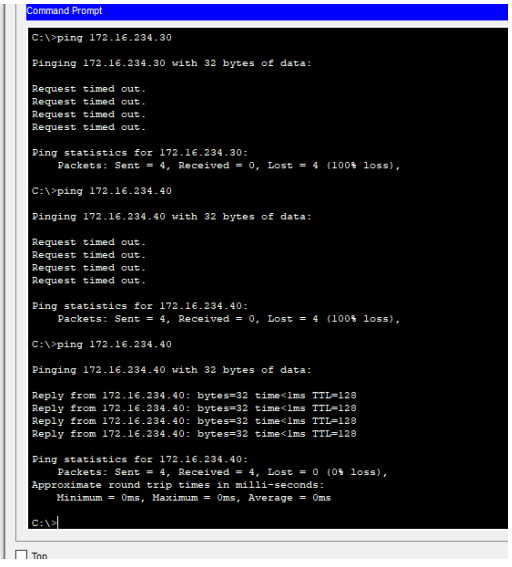
Configurarea switch1



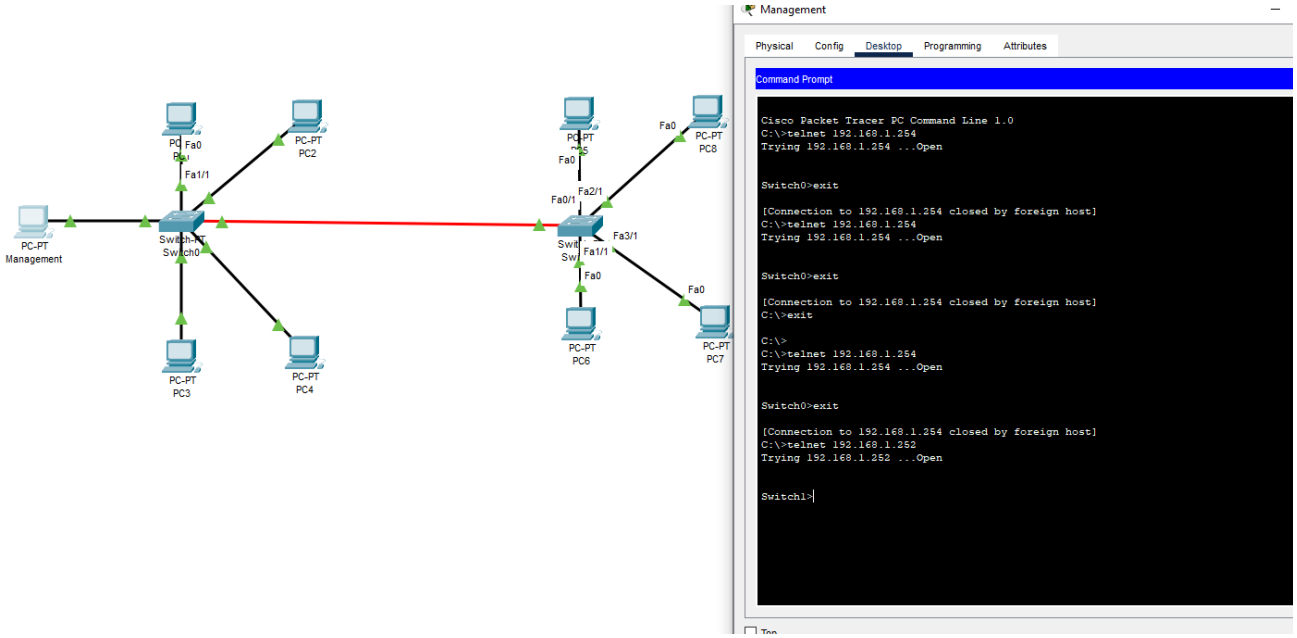


Conexiunea dintre PC1 și PC7

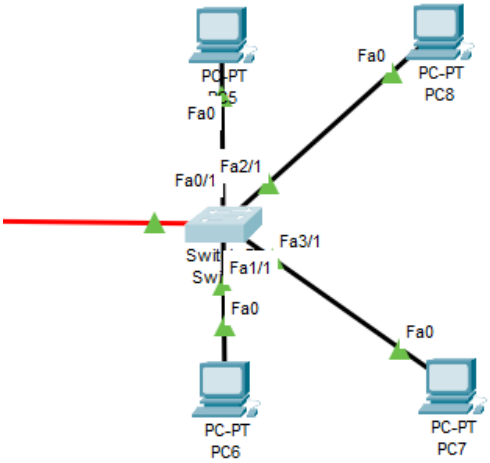




6. Conectarea la switch1 de pe stația Management



Configurația acesuia



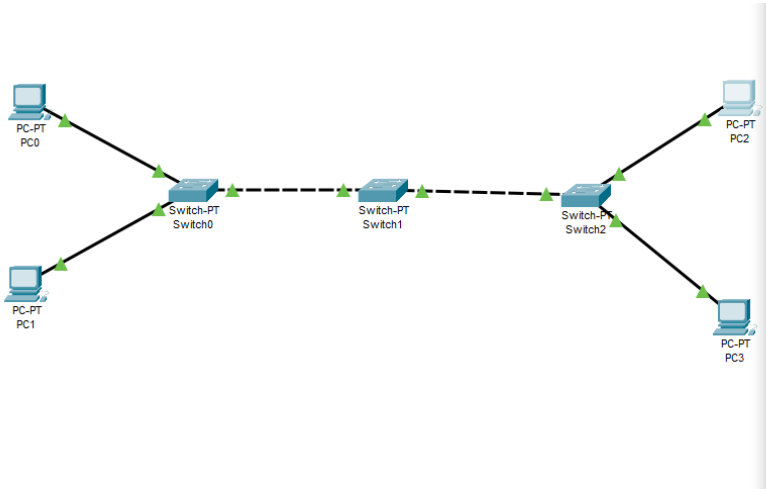
Physical Config CLI Attributes

IOS Command Line Interface

```
Switch1(config)#do show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------
1    default                           active    Fa5/1
10   zece                              active    Fa0/1, Fa3/1
20   douazeci                          active    Fa1/1, Fa2/1
100  management                        active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch1(config)#interface Fa0/1
Switch1(config-if)#switchport mode access
Switch1(config-if)#switchport access vlan 100
Switch1(config-if)#exit
Switch1(config)#do show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------
1    default                           active    Fa5/1
10   zece                              active    Fa3/1
20   douazeci                          active    Fa1/1, Fa2/1
100  management                        active    Fa0/1
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch1(config)#
Switch1(config)#interface vlan 100
Switch1(config-if)#ip address 192.168.1.252 255.255.255.0
Switch1(config-if)#exit
Switch1(config)#exit
Switch1#
%SYS-5-CONFIG_I: Configured from console by console

Switch1#exit
```

7.

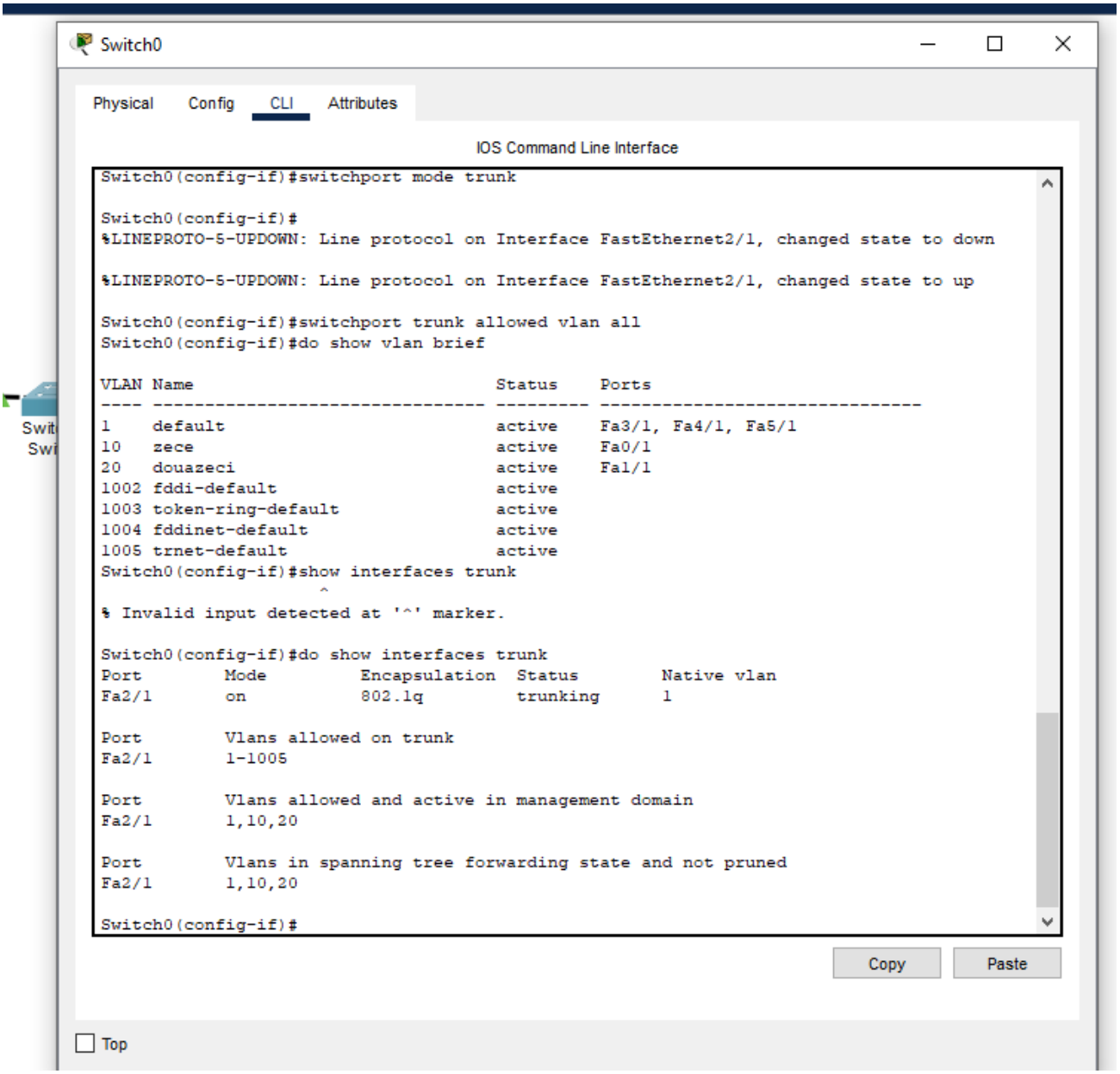
Inițial există legătură între PC1 - PC3 și PC1 – PC2



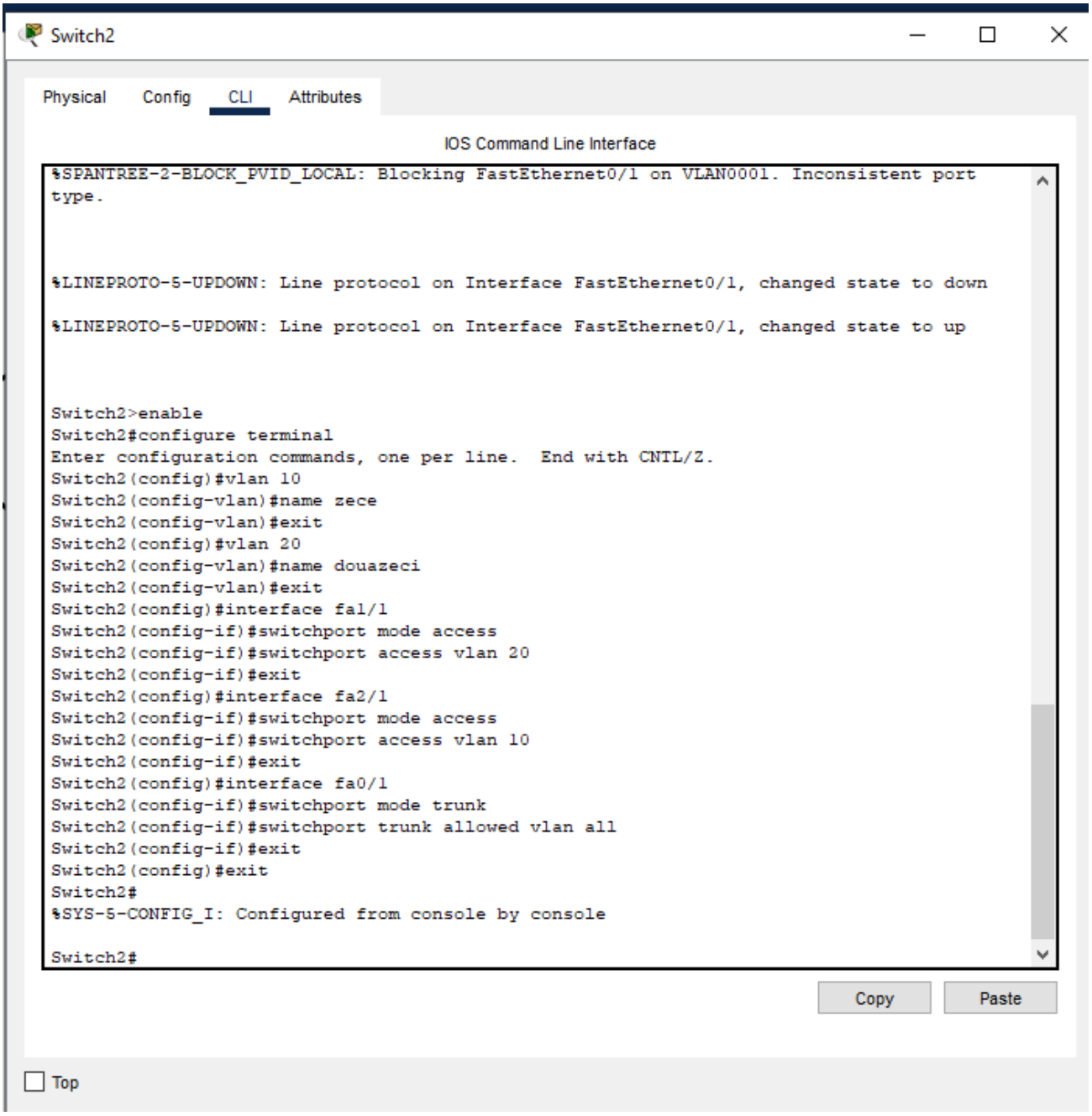
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
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
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

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

Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

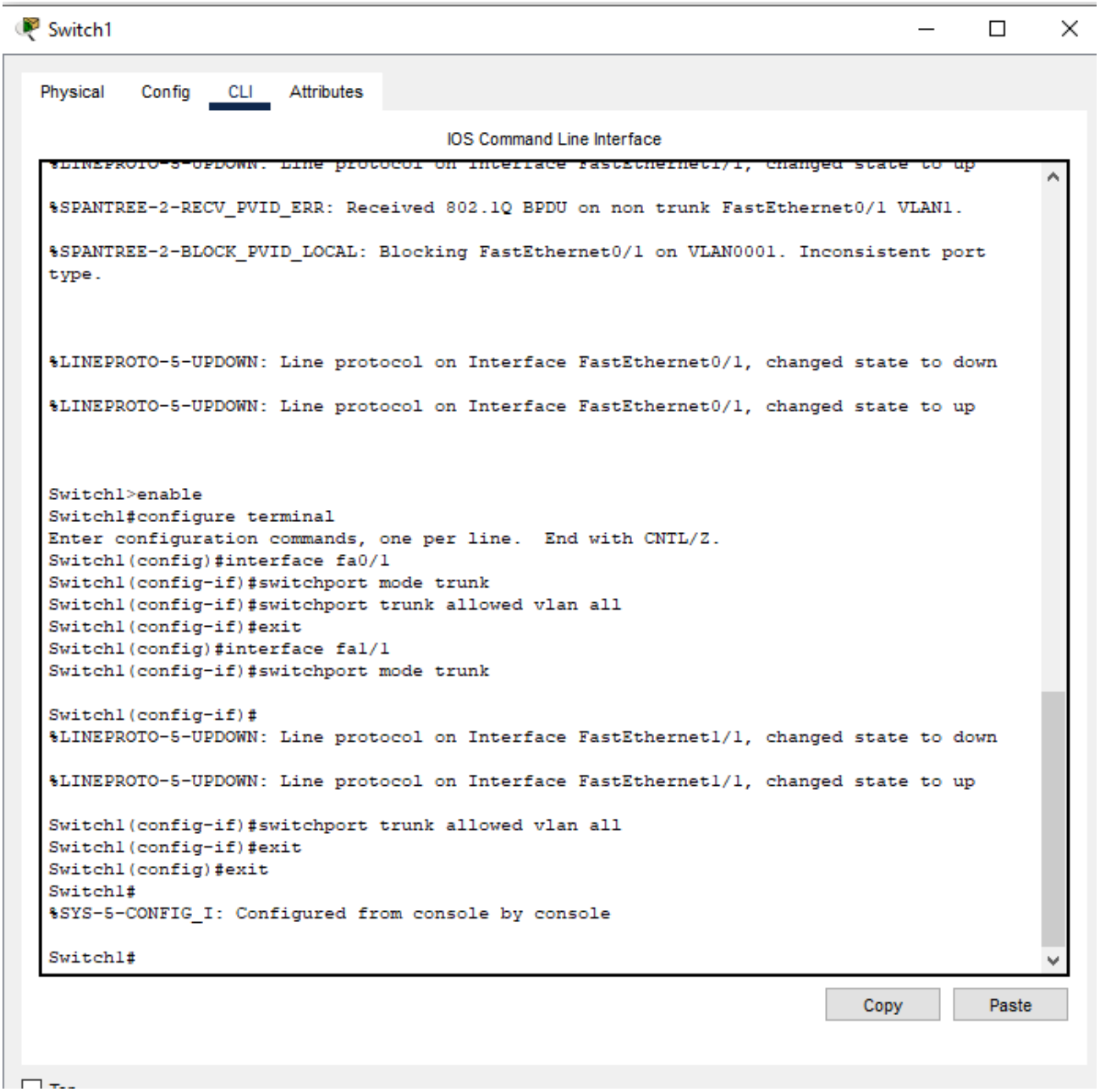
Configurarea switch0



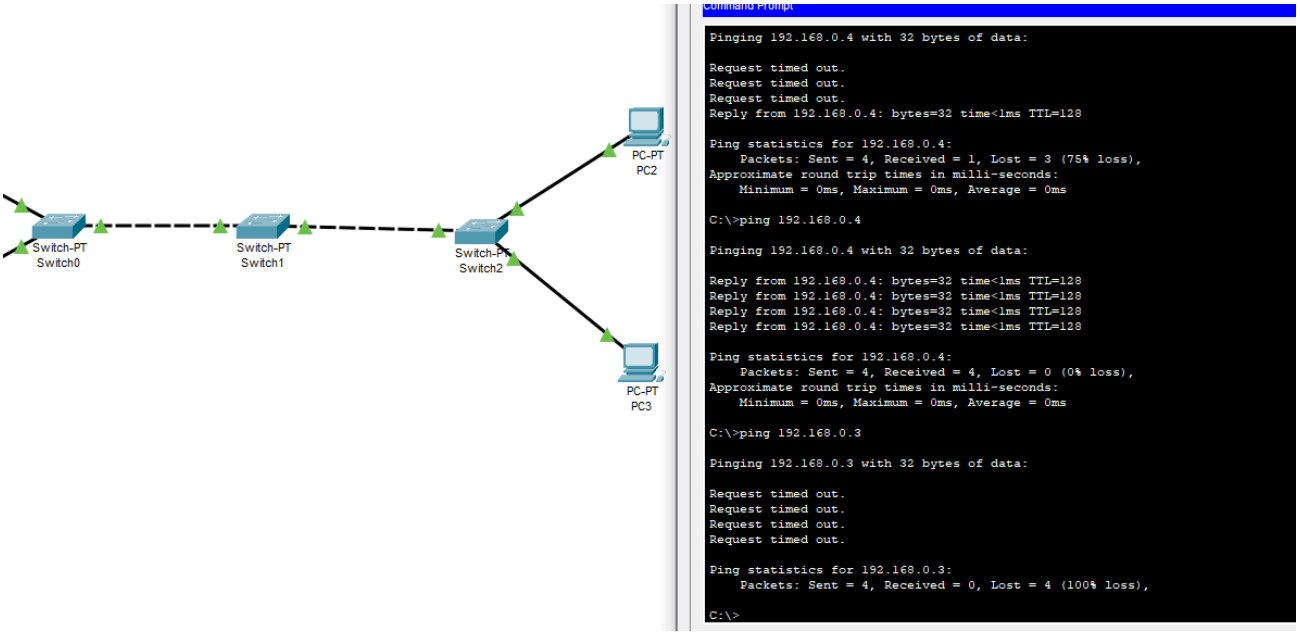
Configurarea switch2



Configurarea switch1

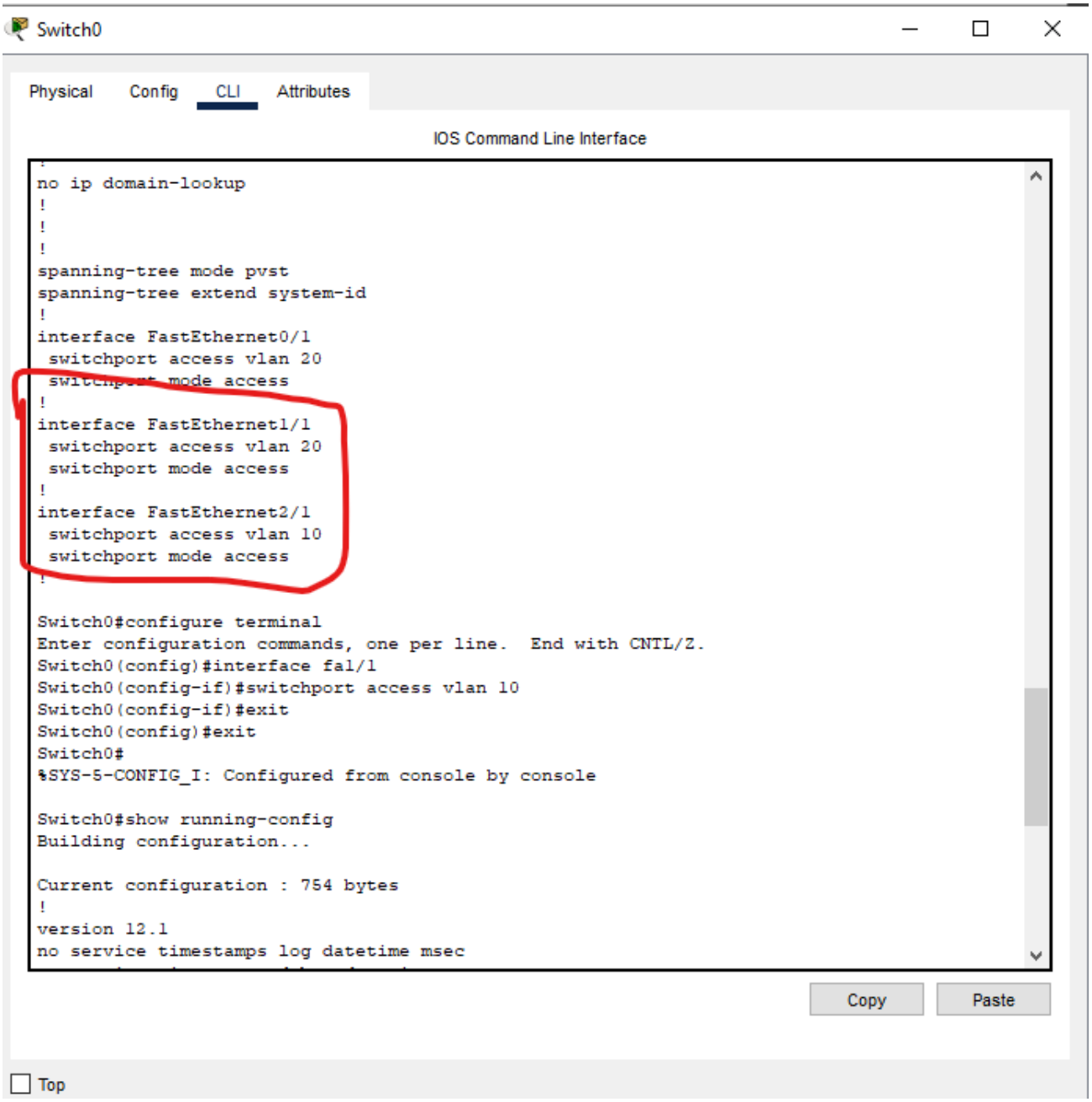


PC0 și PC3 sunt în aceeași rețea Vlan, deci pot comunica între ele, pe cand PC0 și PC4 nu pot

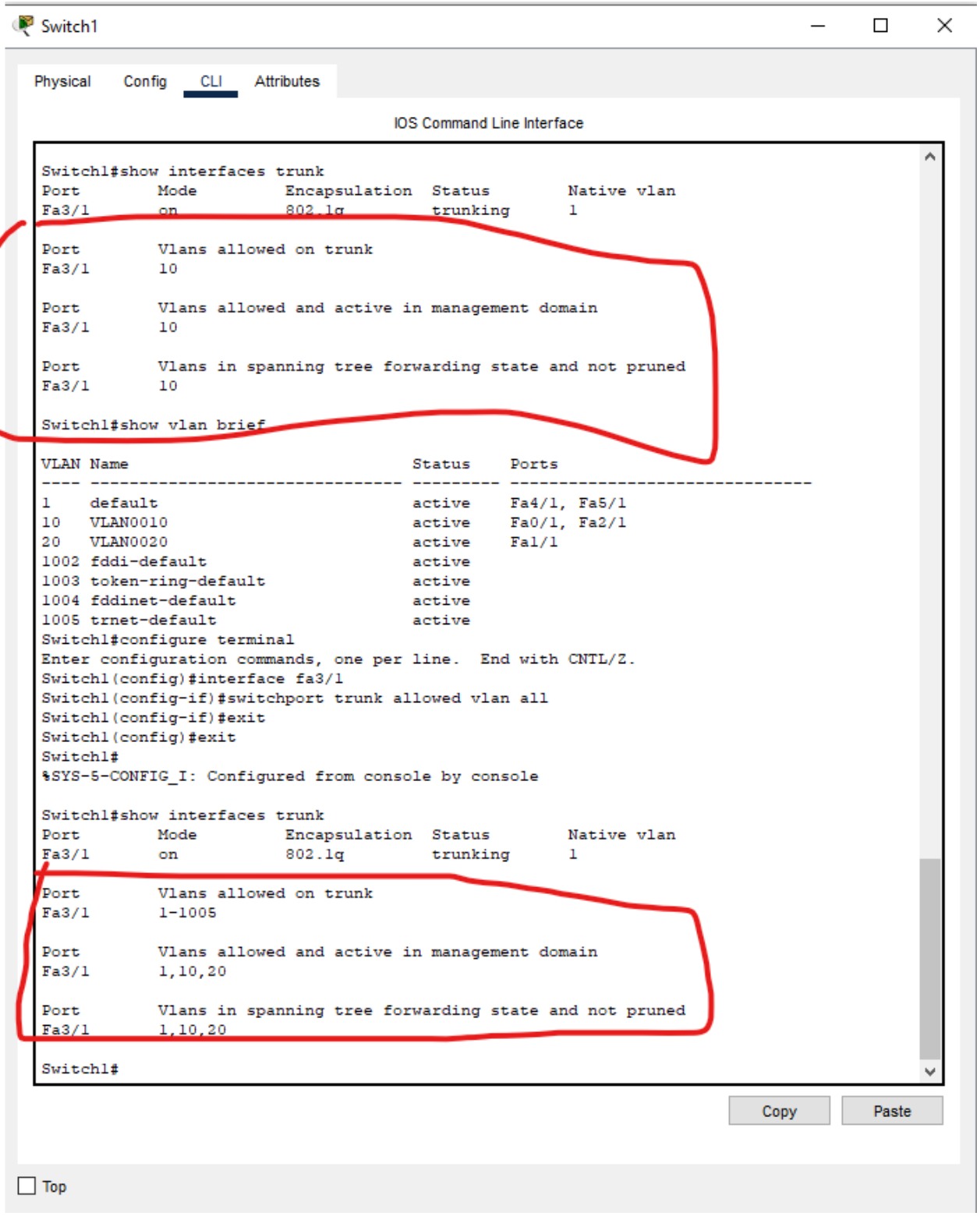


8.

PC0 nu era configurat în mod access, iar PC1 aparținea rețelei Vlan 20, deci comunicarea între ele era imposibilă.



Switch 1 nu a fost configurat să permită toate rețelele vlan în trunk, deci comunicarea între PC2 și PC4 care aparțin vlan 20 nu era posibilă.


Switch1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Switch1#show interfaces trunk
Port Mode Encapsulation Status Native vlan
Fa3/1 on 802.1q trunking 1
Port Vlans allowed on trunk
Fa3/1 10
Port Vlans allowed and active in management domain
Fa3/1 10
Port Vlans in spanning tree forwarding state and not pruned
Fa3/1 10
Switch1#show vlan brief
VLAN Name Status Ports
1 default active Fa4/1, Fa5/1
10 VLAN0010 active Fa0/1, Fa2/1
20 VLAN0020 active Fa1/1
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active
Switch1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch1(config)#interface fa3/1
Switch1(config-if)#switchport trunk allowed vlan all
Switch1(config-if)#exit
Switch1(config)#exit
Switch1#
%SYS-5-CONFIG_I: Configured from console by console
Switch1#show interfaces trunk
Port Mode Encapsulation Status Native vlan
Fa3/1 on 802.1q trunking 1
Port Vlans allowed on trunk
Fa3/1 1-1005
Port Vlans allowed and active in management domain
Fa3/1 1,10,20
Port Vlans in spanning tree forwarding state and not pruned
Fa3/1 1,10,20
Switch1#
Copy
Paste
Top

Concluzii:

În urma realizării acestor exerciții, am dobândit cunoștințe esențiale despre configurarea rețelelor virtuale VLAN și administrarea acestora prin legături de tip trunk în Packet Tracer.

Am observat modul în care VLAN-urile permit segmentarea logică a rețelei, oferind izolare la nivelul 2 și reducerea traficului de broadcast. Configurarea legăturilor de tip trunk a fost esențială pentru a permite comunicația între VLAN-uri pe multiple switch-uri, utilizând protocolul 802.1Q.

Prin analiza arborelui de acoperire (Spanning Tree Protocol - STP), am înțeles rolul său în prevenirea buclelor de rețea. Am observat cum anumite porturi sunt plasate în stare blocată pentru a menține topologia fără bucle și cum acest arbore se modifică atunci când schimbăm switch-ul rădăcină.

Am utilizat comenzi precum: ping pentru testarea conectivității între stații, show interfaces trunk pentru a verifica configurarea trunk-urilor, show vlan brief pentru vizualizarea VLAN-urilor configurate.

Prin depanarea problemelor de conectivitate, am identificat erori frecvente, precum porturi care nu sunt asignate corect unui VLAN sau VLAN-uri care nu sunt permise pe un trunk.

Am configurat VLAN-ul de management (VLAN 100), atribuind o adresă IP switch-ului, permițând astfel administrarea la distanță prin Telnet. Aceasta este o practică importantă pentru gestionarea eficientă a rețelelor mari.