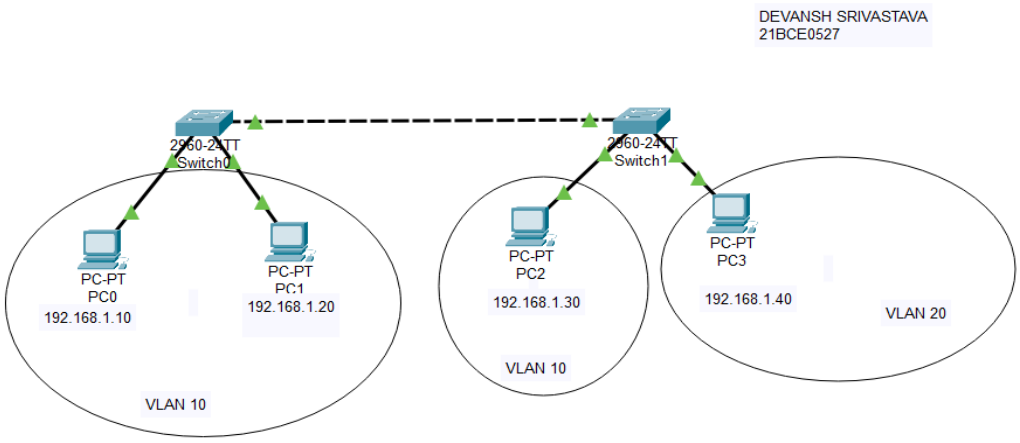
Name: Devansh Srivastava
Registration number: 21BCE0527

Network Training Programme

Module 7 and 8

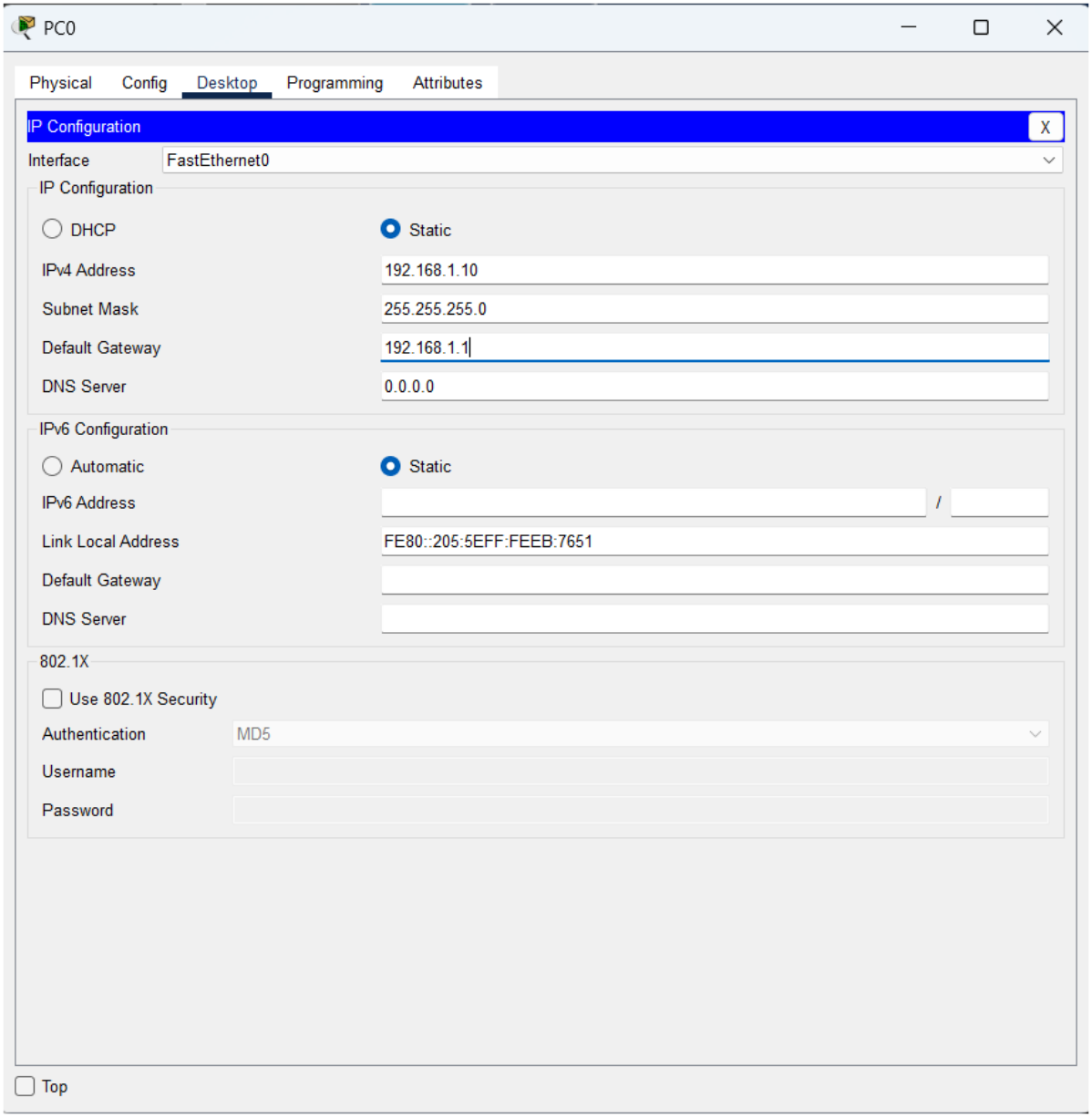
Q4-Q10 Set up trunk ports between switches and try ping between different VLANs.Change the native VLAN on a trunk port. Test for VLAN mismatches and troubleshootConfigure a management VLAN and assign an IP address for remote access. Test SSH or Telnet access to the switch.You have a Cisco switch and a VoIP phone that needs to be placed in a voice VLAN (VLAN 20). The data for the PC should remain in a separate VLAN (VLAN 10). Configure the switch port to support both voice and data traffic. You configured VLANs 10 and 20 on your switch and assigned ports to each VLAN. However, devices in VLAN 10 cannot communicate with devices in VLAN 20. Troubleshoot the issue.Try Inter VLAN routing with Router

Network Diagram

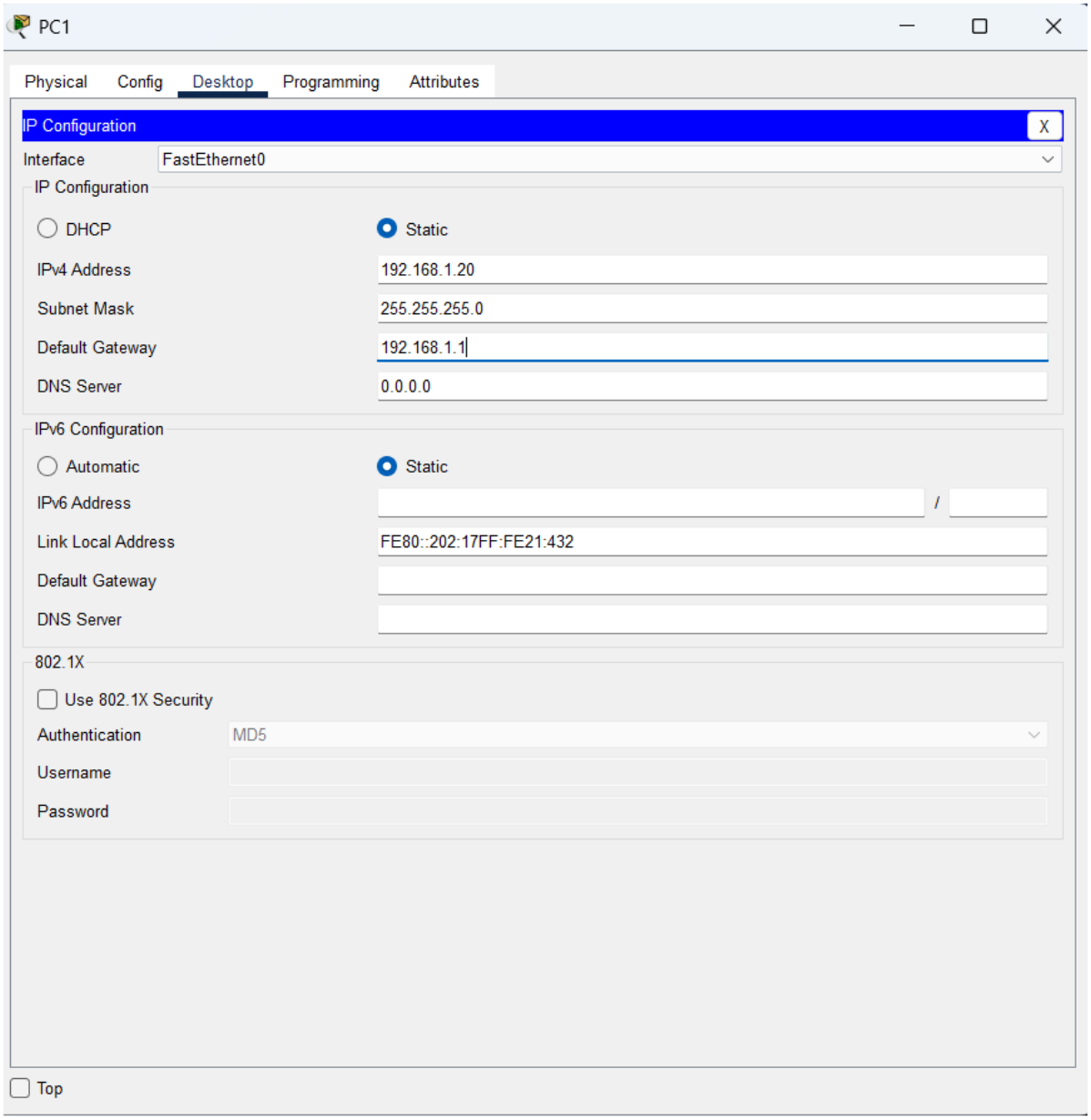


IP Address Configuration

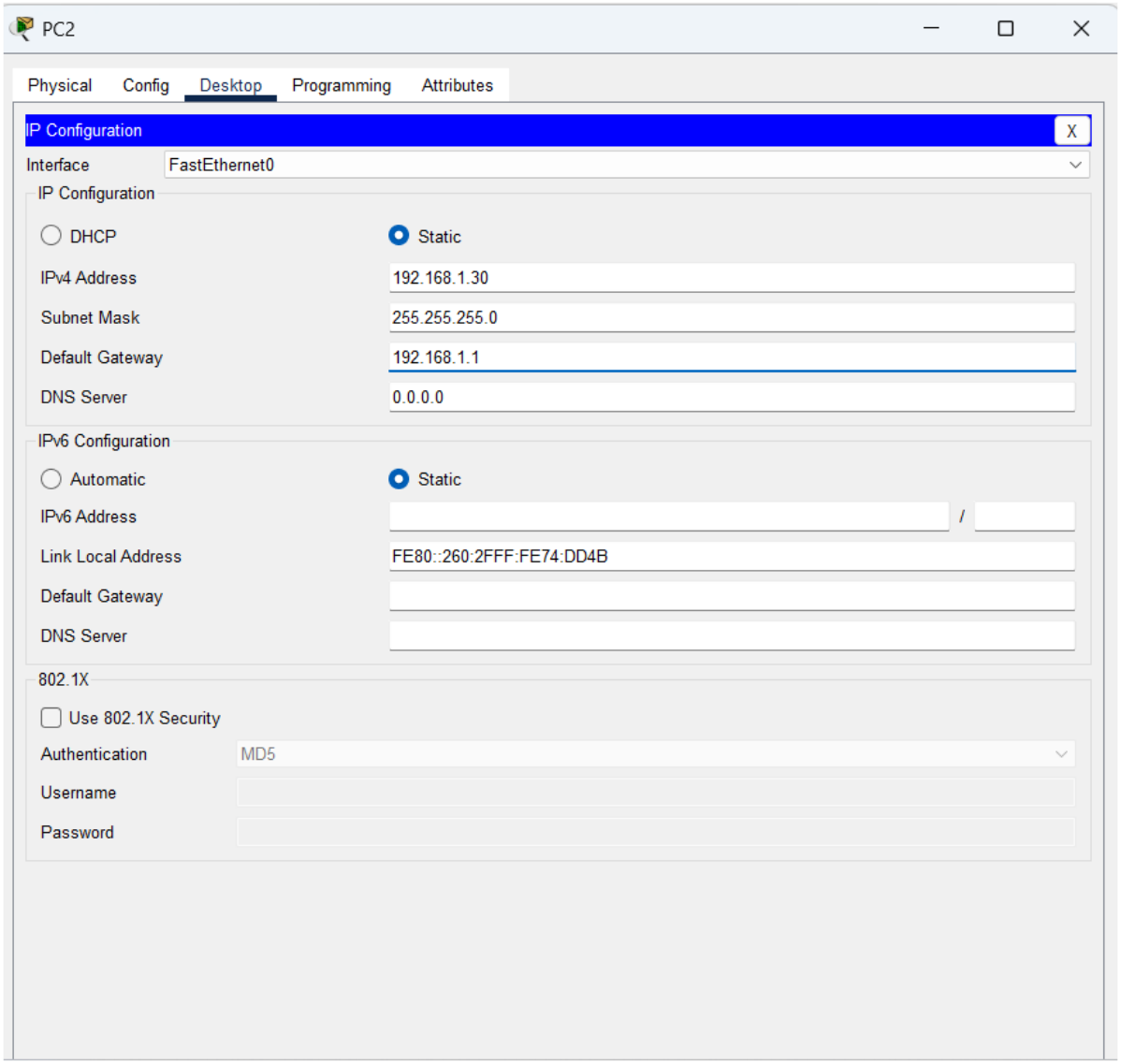
PC0


PC0
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::205:5EFF:FEEB:7651
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

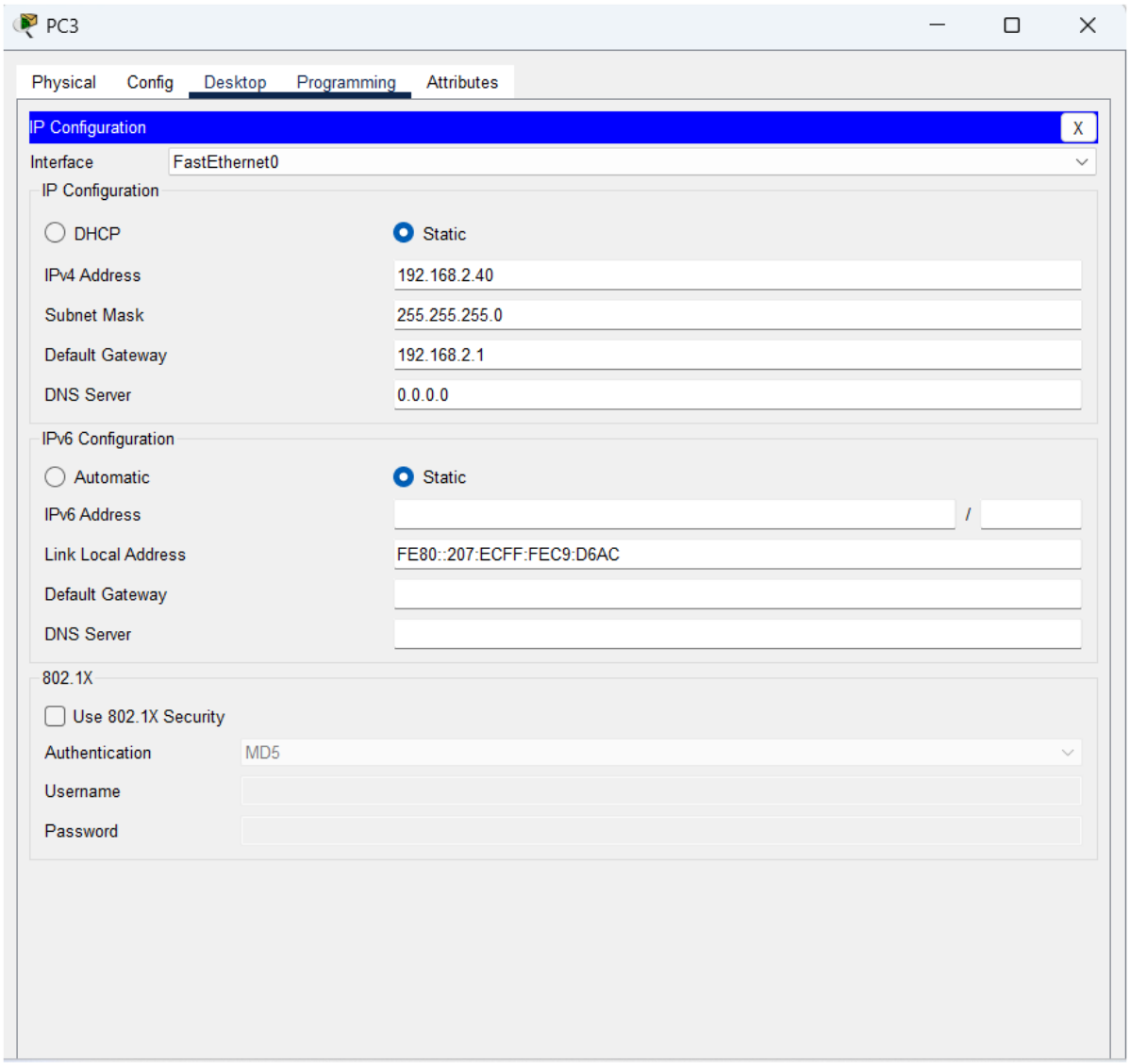
PC1


PC1
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.20
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::202:17FF:FE21:432
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

PC2

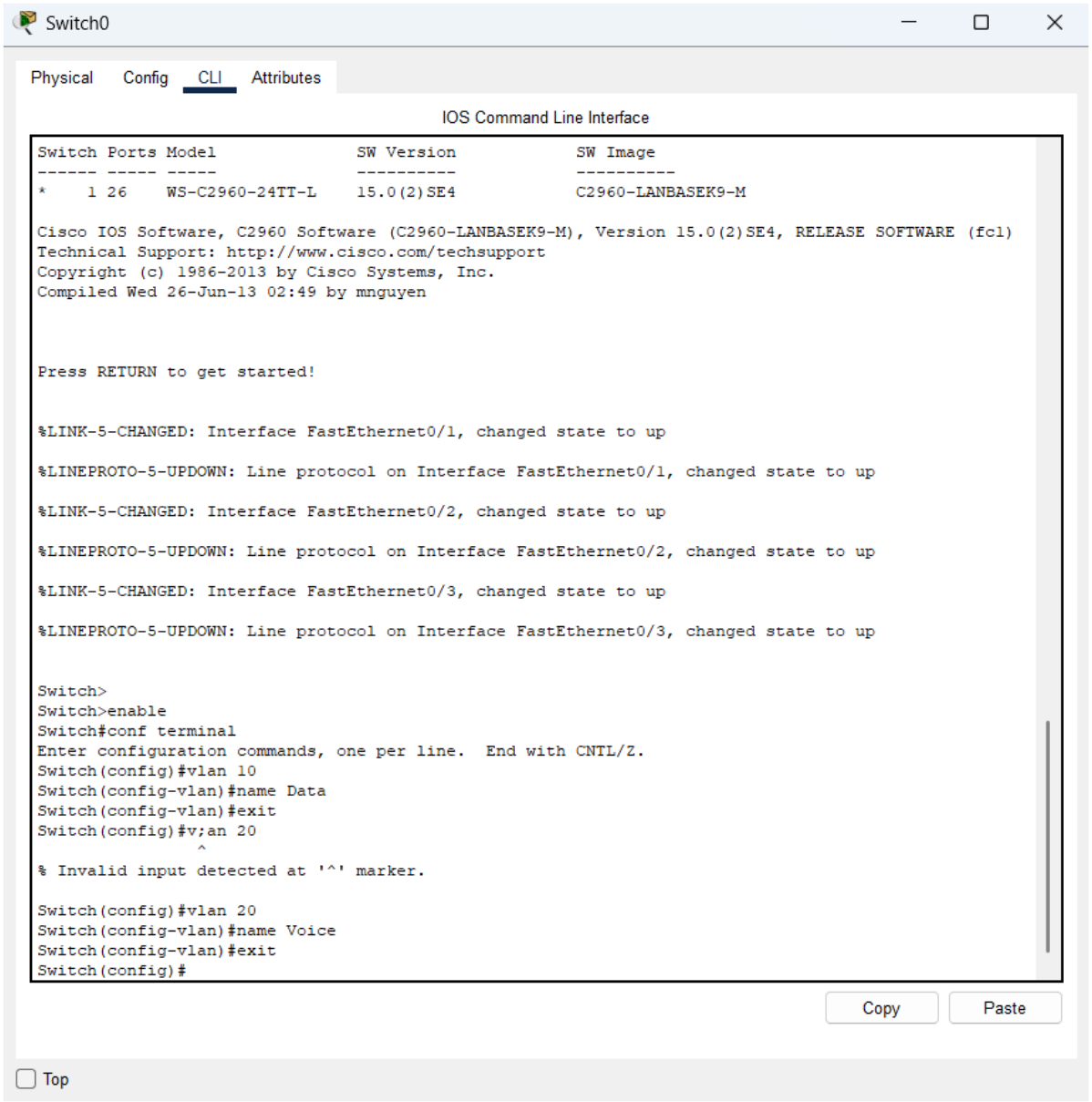

PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.30
Subnet Mask
255.255.255.0
Default Gateway
192.168.1.1
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::260:2FFF:FE74:DD4B
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password

PC3



Create VLANs on switches:

Switch 0


Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Switch Ports Model SW Version SW Image
------ ----- ----- ---------- ----------
* 1 26 WS-C2960-24TT-L 15.0(2)SE4 C2960-LANBASEK9-M
Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2013 by Cisco Systems, Inc.
Compiled Wed 26-Jun-13 02:49 by mnguyen
Press RETURN to get started!
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up
Switch>
Switch>enable
Switch#conf terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name Data
Switch(config-vlan)#exit
Switch(config)#v;an 20
^
% Invalid input detected at '^' marker.
Switch(config)#vlan 20
Switch(config-vlan)#name Voice
Switch(config-vlan)#exit
Switch(config)#
Copy
Paste
Top

```
Switch>enable
Switch#show vlan brief

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
10   Data                             active
20   Voice                            active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
Switch#
```

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Top

Switch 1

Switch1

Physical Config CLI Attributes

IOS Command Line Interface

```
Top Assembly Revision Number    : A0
Version ID                      : V02
CLEI Code Number                : COM3L00BRA
Hardware Board Revision Number  : 0x01

Switch Ports Model              SW Version            SW Image
------ ----- -----              ----------            ----------
*    1 26    WS-C2960-24TT-L    15.0(2)SE4            C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)
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Compiled Wed 26-Jun-13 02:49 by mnguyen



Press RETURN to get started!


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

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

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up


Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name Data
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Voice
Switch(config-vlan)#exit
Switch(config)#
```

Copy Paste

Top

```
Switch>
Switch>enable
Switch#show vlan brief

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
10   Data                              active
20   Voice                             active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch#
```

Copy Paste

Top

Assign PC ports to VLANs

Switch 0:

```
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet0/1
Switch(config-if)#swit
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
```

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Top

Switch 1:

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#show vlan brief
                ^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#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, Gig0/1, Gig0/2
10   Data                              active    Fa0/1
20   Voice                             active    Fa0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch#
```

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Top

Trunk Port Configuration

Switch0:

```
Switch(config-if)#exit
Switch(config)#interface fastEthernet0/3
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

Switch(config-if)#exit
Switch(config)#interface fastEthernet0/4
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#show interfaces trunk
                ^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show interfaces trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/3       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/3       1-1005

Port        Vlans allowed and active in management domain
Fa0/3       1,10,20

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/3       1,10,20

Switch#
```

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Top

Switch1:

```
Switch(config)#interface fastEthernet0/24
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show interfaces trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/24      on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/24      1-1005

Port        Vlans allowed and active in management domain
Fa0/24      1,10,20

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/24      1,10,20

Switch#
```

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Top

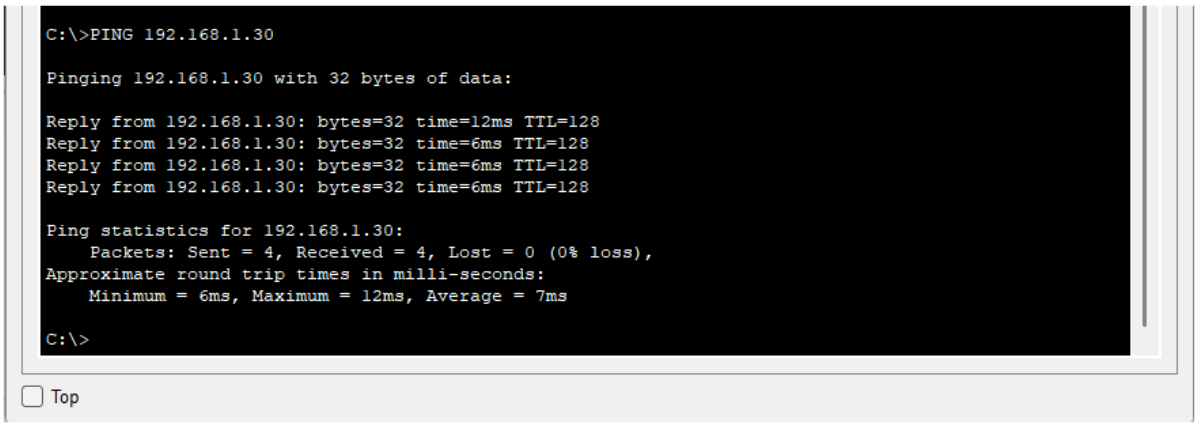
Test intra-VLAN connectivity

Pinging from PC0 to PC2 (same VLAN10)

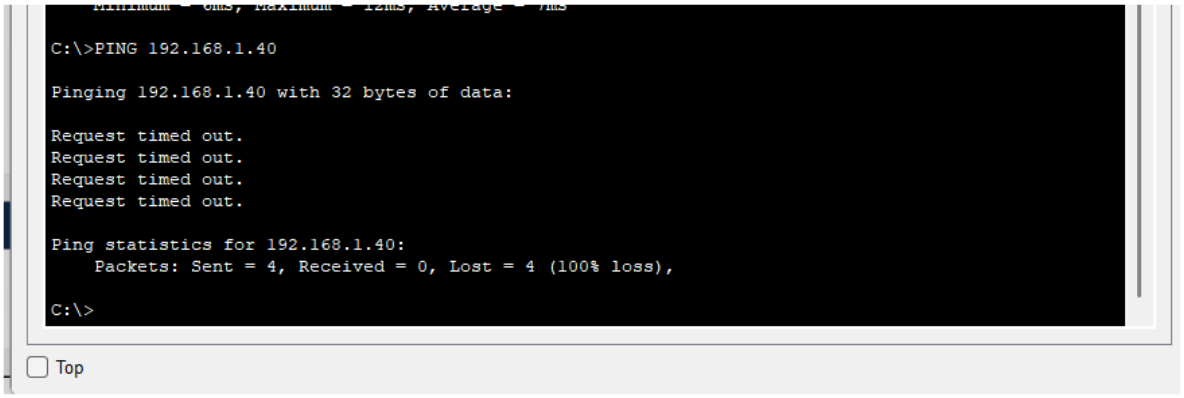
```
^C
C:\>ping 192.168.1.30

Pinging 192.168.1.30 with 32 bytes of data:

Reply from 192.168.1.30: bytes=32 time=6ms TTL=128
Reply from 192.168.1.30: bytes=32 time=6ms TTL=128
Reply from 192.168.1.30: bytes=32 time=6ms TTL=128
Reply from 192.168.1.30: bytes=32 time=6ms TTL=128

Ping statistics for 192.168.1.30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 6ms, Average = 6ms

C:\>
```

Top

PC1 to PC2



PC0 TO PC3(Different VLAN)



Native VLAN Configuration

Switch 0:

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#exit
Switch(config)#exit
Switch#show interfaces fastEthernet 0/3 switchport
Name: Fa0/3
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 99 (Inactive)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
 --More--
```

Copy

Create a VLAN mismatch scenario

Switch 1:

```
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet0/24
Switch(config-if)#switchport trunk native vlan 88
Switch(config-if)#exit
Switch(config)#show interfaces fastEthernet0/24 switchport
               ^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#show interfaces fastEthernet0/24 switchport
Name: Fa0/24
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 88 (Inactive)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false

Switch#show log
Syslog logging: enabled (0 messages dropped, 0 messages rate-limited,
          0 flushes, 0 overruns, xml disabled, filtering disabled)

No Active Message Discriminator.
```

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Top

Correcting VLAN

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/24
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#exit
Switch(config)#show interfaces fastEthernet0/24 switchport
                ^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#show interfaces fastEthernet0/24 switchport
Name: Fa0/24
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 99 (Inactive)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false

Switch#
```

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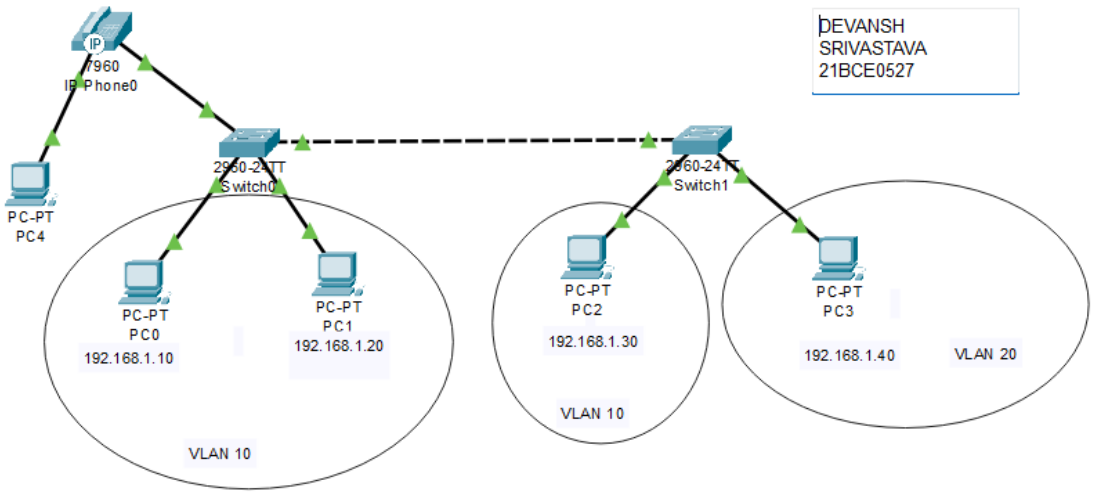
Top

VOICE IP PHONE



Voice VLAN Configuration

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#switchport voice vlan 20
Switch(config-if)#exit
Switch(config)#exit
Switch#show interfaces fastEthernet 0/4 switchport
Name: Fa0/4
Switchport: Enabled
Administrative Mode: static access
Operational Mode: down
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 10 (Data)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: 20
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false

Switch#
```

Management VLAN Configuration

```
Switch(config)#vlan 30
Switch(config-vlan)#
%LINK-5-CHANGED: Interface Vlan30, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan30, changed state to up

Switch(config-vlan)#name Management
Switch(config-vlan)#exit
Switch(config)#interface fastEthernet 0/5


Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/5
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
Switch(config-if)#exit


Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show interfaces fastEthernet 0/5 switchport
Name: Fa0/5
Switchport: Enabled
Administrative Mode: static access
Operational Mode: down
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 30 (Management)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
```

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```
Access Mode VLAN: 30 (Management)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: All
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Unknown unicast blocked: disabled
Unknown multicast blocked: disabled

Switch#show interface vlan 30
Vlan30 is up, line protocol is up
  Hardware is CPU Interface, address is 0030.f244.3801 (bia 0030.f244.3801)
  Internet address is 192.168.30.1/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000000 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 21:40:21, output never, 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
     1682 packets input, 530955 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
     563859 packets output, 0 bytes, 0 underruns
     0 output errors, 23 interface resets
     0 output buffer failures, 0 output buffers swapped out

Switch#
```

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Top

Configure SSH access on Switch1

```
Switch(config)#ip ssh version 2
Please create RSA keys (of at least 768 bits size) to enable SSH v2.
Switch(config)#hostnme switchl
               ^
% Invalid input detected at '^' marker.

Switch(config)#hostname switchl
switchl(config)#ip domain-name exam.com
switchl(config)#crypto key generate rsa
The name for the keys will be: switchl.exam.com
Choose the size of the key modulus in the range of 360 to 4096 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

switchl(config)#ip ssh version 2
*Mar 1 3:9:35.609: %SSH-5-ENABLED: SSH 2 has been enabled
switchl(config)#username admincisco secret ciscol
ERROR: Can not have both a user password and a user secret.
Please choose one or the other.
switchl(config)#username admin secret ciscol
switchl(config)#line vty 0 15
switchl(config-line)#login local
switchl(config-line)#transport input ssh
switchl(config-line)#exit
switchl(config)#exit
switchl#
%SYS-5-CONFIG_I: Configured from console by console

switchl#write memory
Building configuration...
[OK]
switchl#
```

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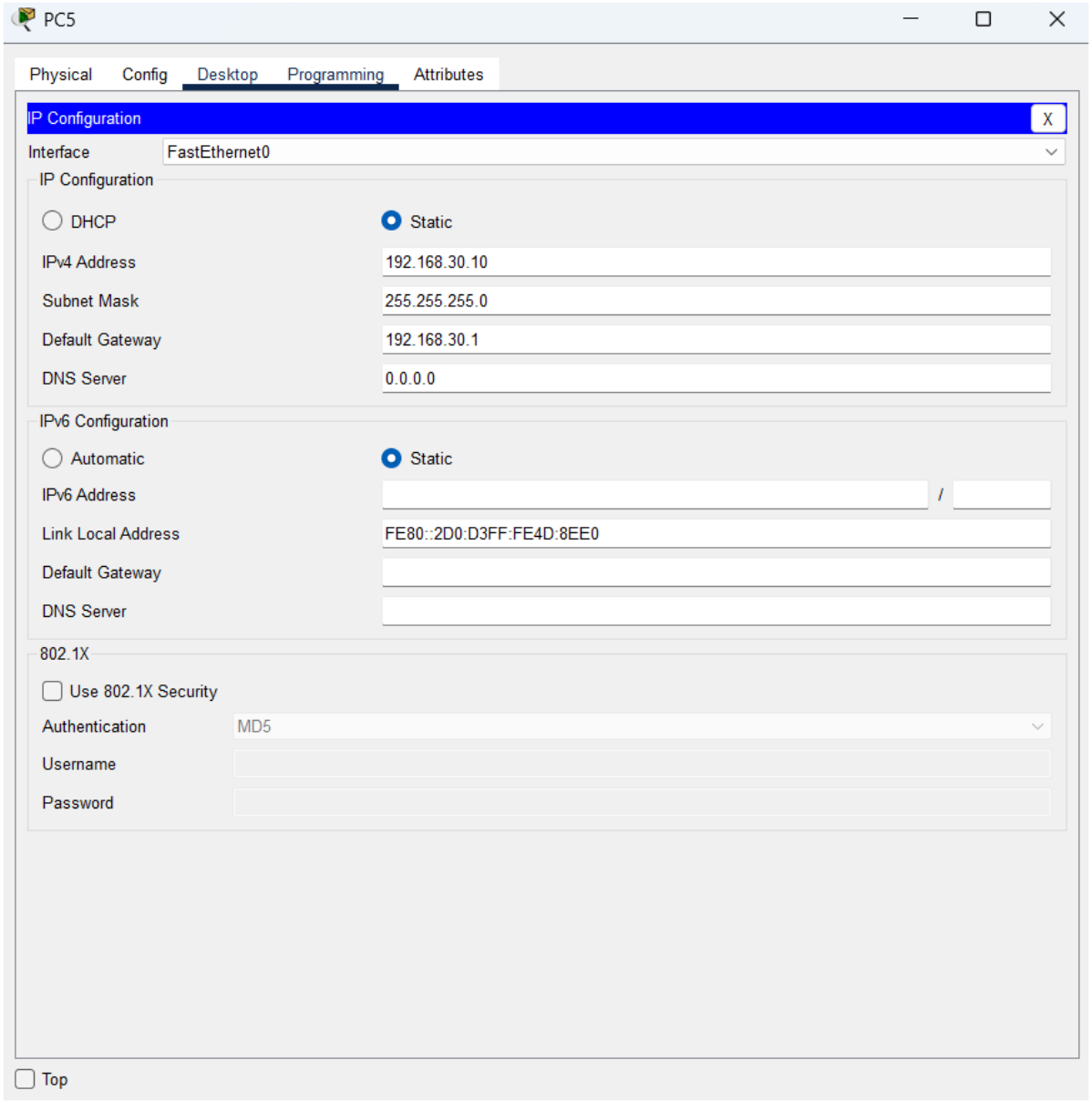
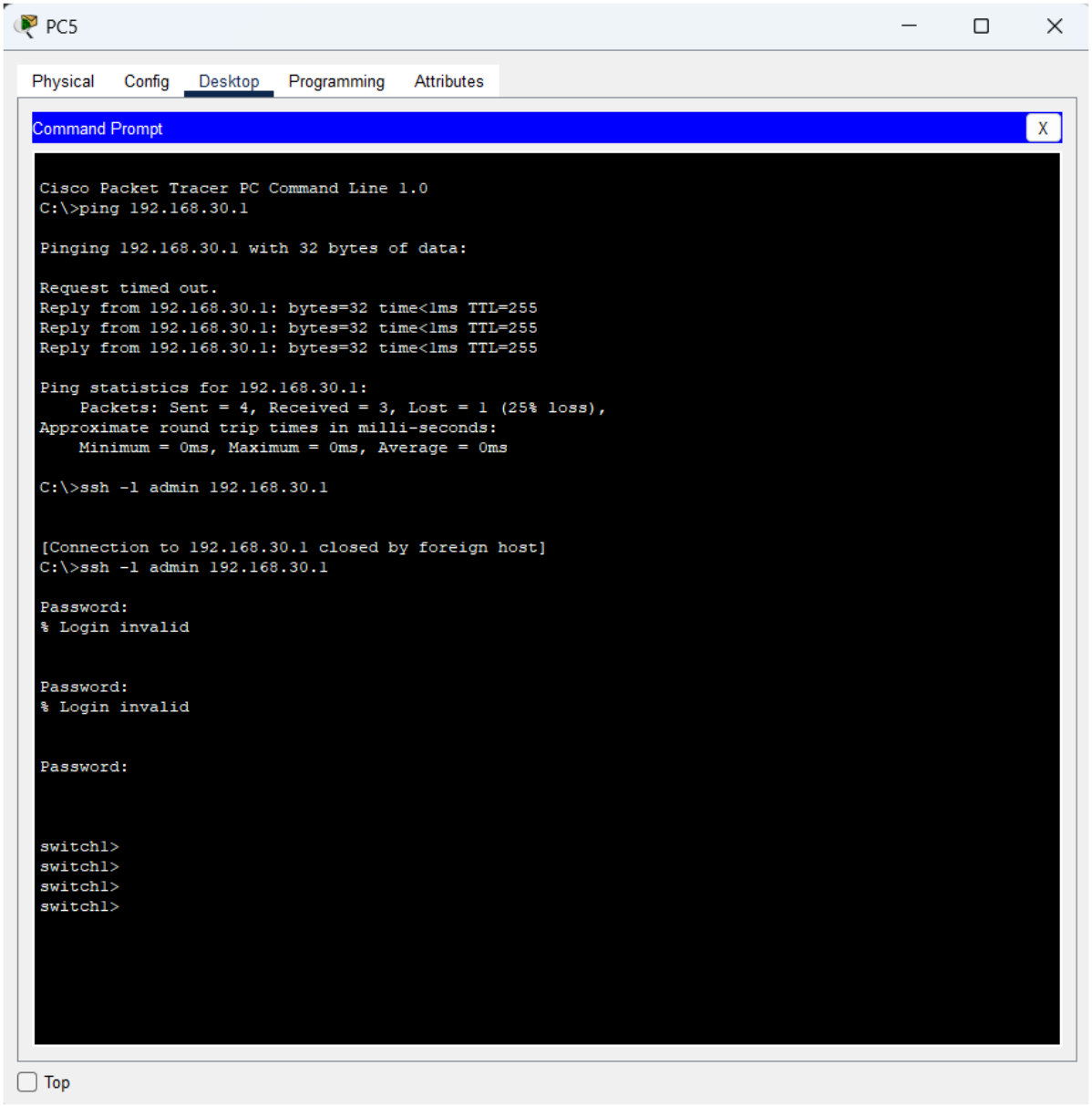
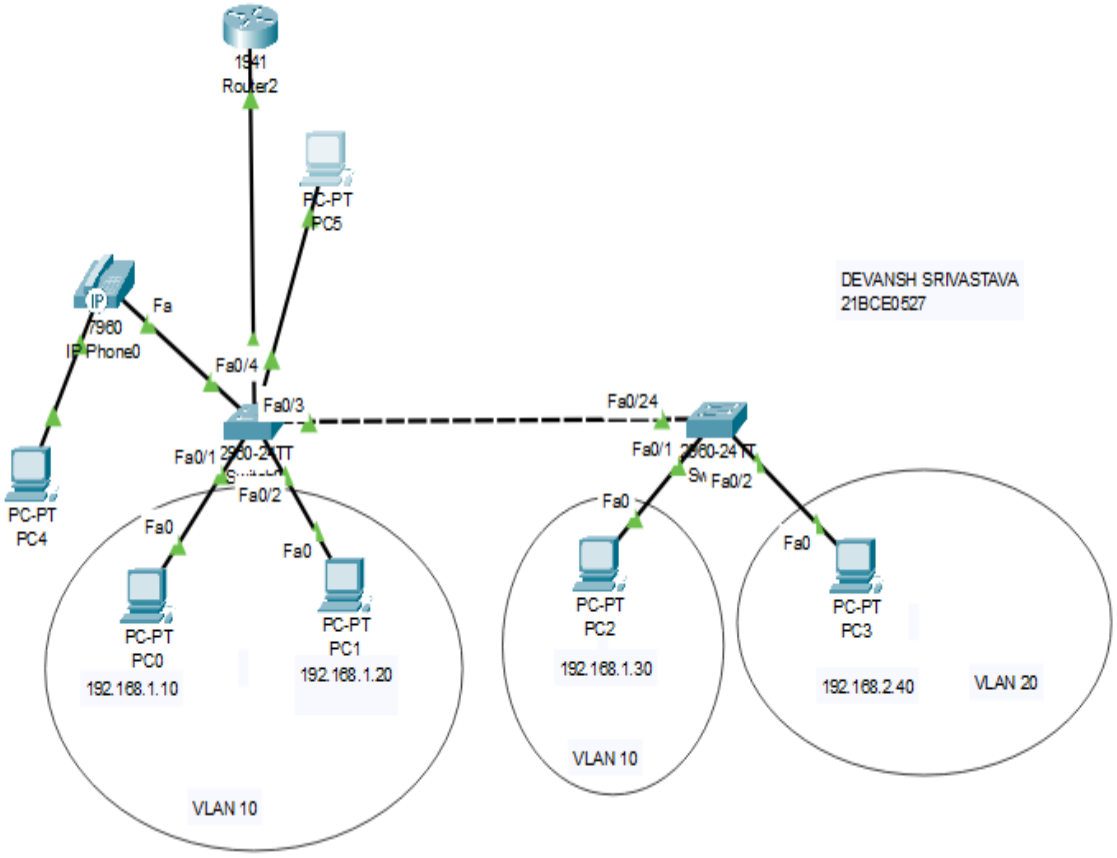
Top

New PC5 for management VLAN30




PC5
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.30.1
Pinging 192.168.30.1 with 32 bytes of data:
Request timed out.
Reply from 192.168.30.1: bytes=32 time<1ms TTL=255
Reply from 192.168.30.1: bytes=32 time<1ms TTL=255
Reply from 192.168.30.1: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.30.1:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ssh -l admin 192.168.30.1
[Connection to 192.168.30.1 closed by foreign host]
C:\>ssh -l admin 192.168.30.1
Password:
% Login invalid
Password:
% Login invalid
Password:
switch1>
switch1>
switch1>
switch1>
Top

Inter-VLAN Routing Configuration




```
switch1(config)#
switch1(config)#
switch1(config)#
switch1(config)#
switch1(config)#
switch1(config)#
switch1(config)#interface fastEthernet0/6
switch1(config-if)#switchport mode trunk
switch1(config-if)#switchport trunk allowed vlan 10,20,30
switch1(config-if)#exit
switch1(config)#
```

Copy Paste

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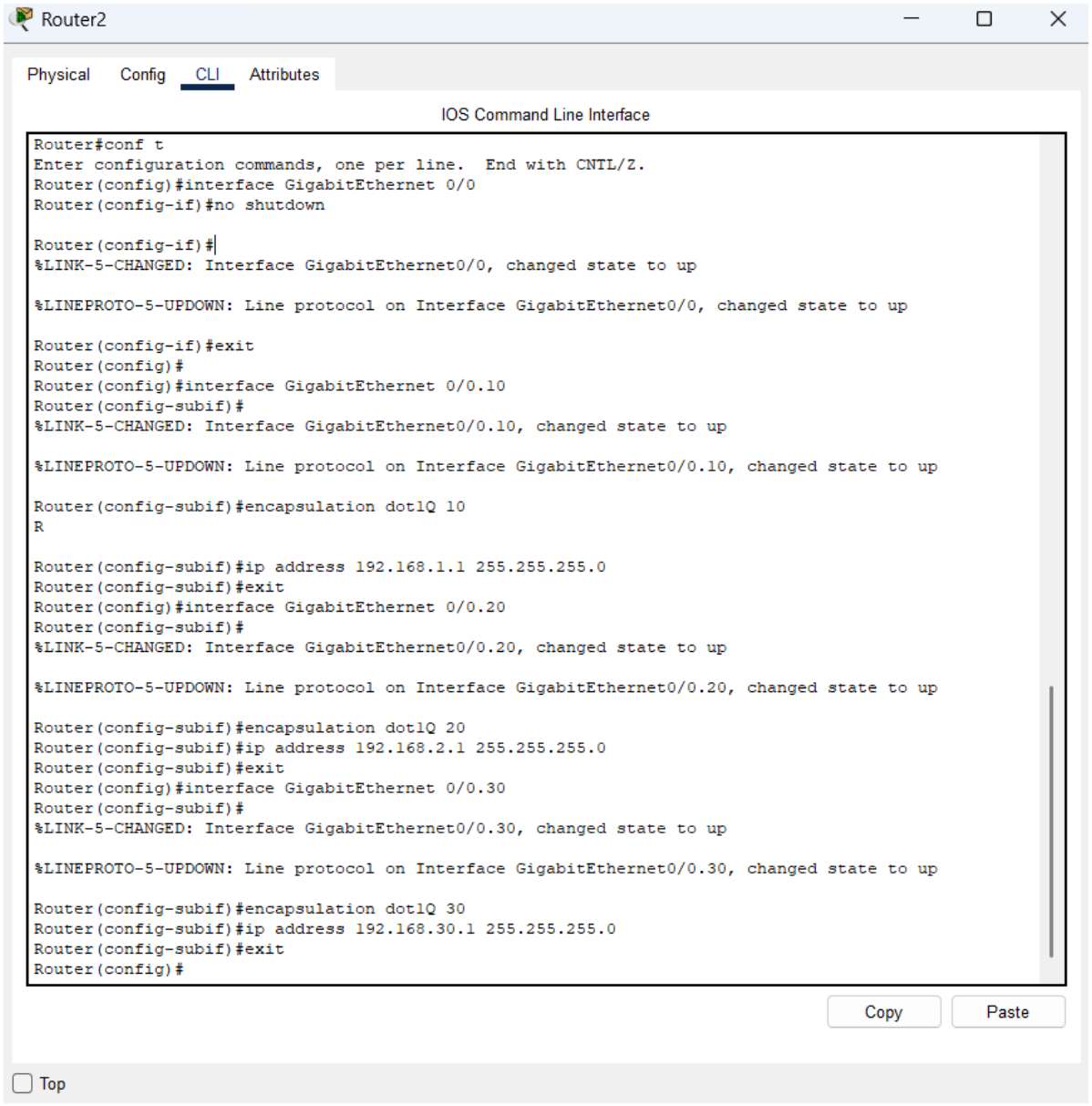
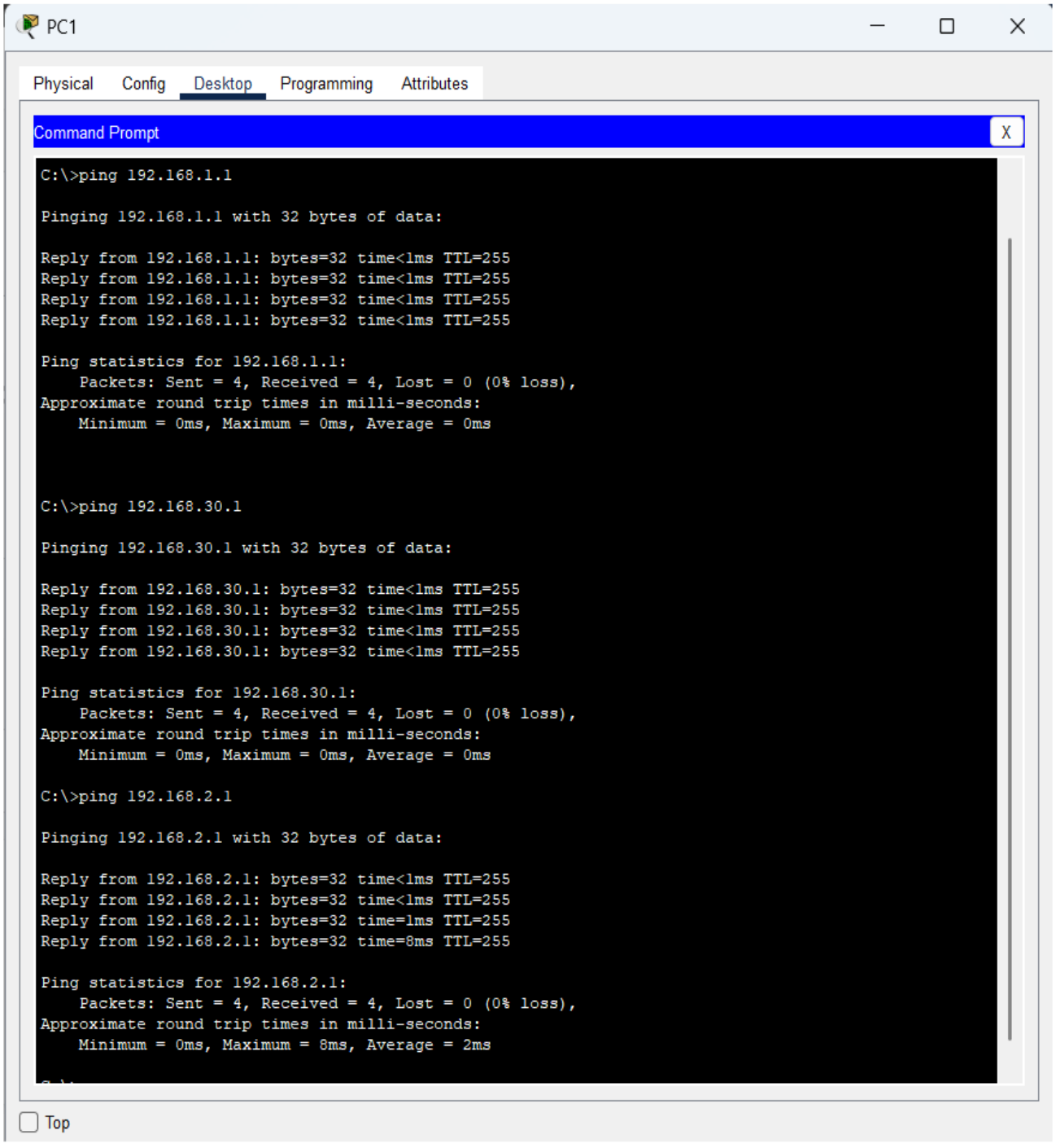
Router configuration



PC1



Inter-VLAN Routing Successful

KEY LEARNINGS:

VLAN Configuration:

1. VLANs segment a network into logical broadcast domains
2. Each VLAN requires a unique ID and can be named for easy identification
3. Ports must be explicitly assigned to VLANs (except for VLAN 1 which is the default)

Trunk Configuration:

1. Trunk ports carry traffic from multiple VLANs
2. Trunks use 802.1Q tagging to identify VLAN traffic
3. Native VLAN traffic is untagged on trunk ports

Inter-VLAN Routing:

1. Router-on-a-stick approach uses router sub-interfaces for each VLAN
2. Each sub-interface requires the encapsulation dot1q command with the appropriate VLAN ID
3. Each VLAN needs its own subnet and the router sub-interface acts as the default gateway