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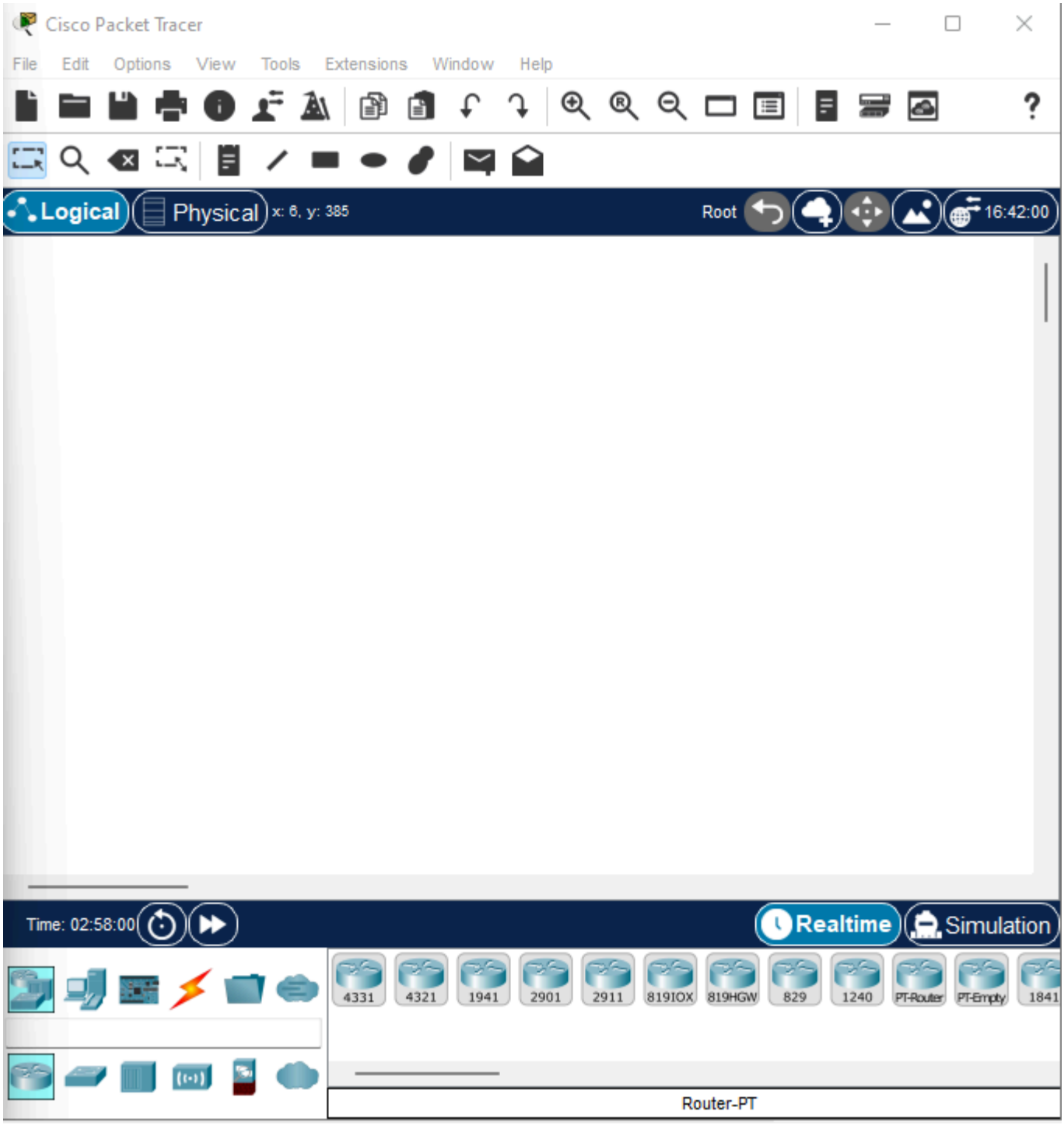
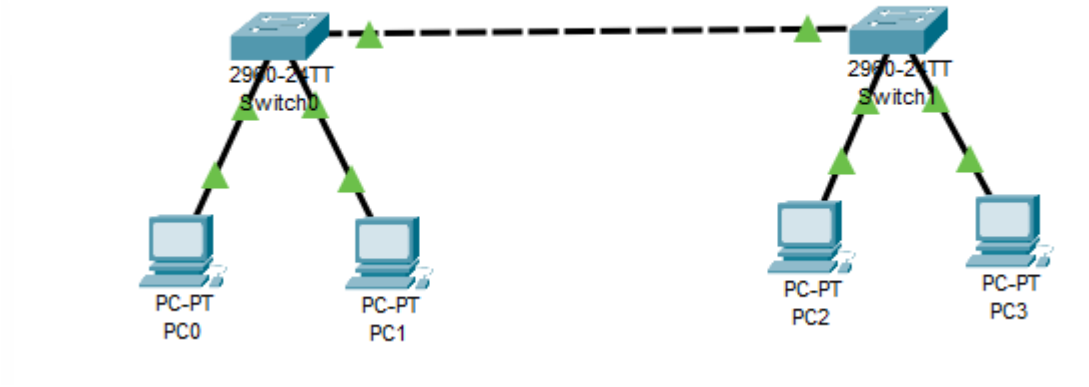
CSEC.744.01
Network Security
02/05/2024
Chapter 9: Networks Fundamentals

Start of Lab Exercise 9.01: Switch Configuration

Step 1o:


Cisco Packet Tracer
File Edit Options View Tools Extensions Window Help
Logical
Physical
x: 6, y: 385
Root
16:42:00
Time: 02:58:00
Realtime
Simulation
4331
4321
1941
2901
2911
819IOX
819HGW
829
1240
PT-Router
PT-Empty
1841
Router-PT

Step 2e:



Step 3e:

PC0

Physical | Config | Desktop | Programming | Attributes

Command Prompt

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

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::2E0:B0FF:FEAE:557A
   IPv6 Address.....: ::
   IPv4 Address.....: 10.1.0.100
   Subnet Mask.....: 255.255.0.0
   Default Gateway.....: ::
                                 0.0.0.0

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>
```

Step 3f:

PC1

Physical Config Desktop Programming Attributes

Command Prompt

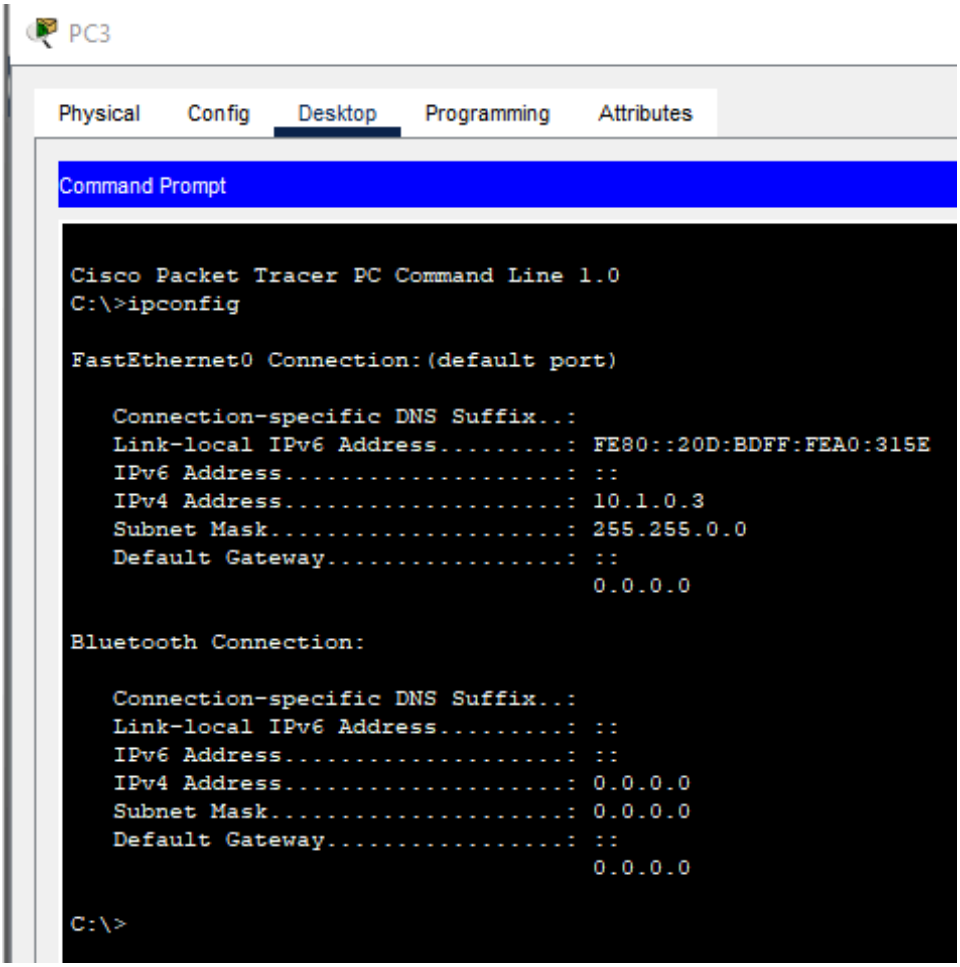
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::20C:CFFF:FE4A:C38D
   IPv6 Address.....: ::
   IPv4 Address.....: 10.1.0.1
   Subnet Mask.....: 255.255.0.0
   Default Gateway.....: ::
                                 0.0.0.0

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>
```

PC2

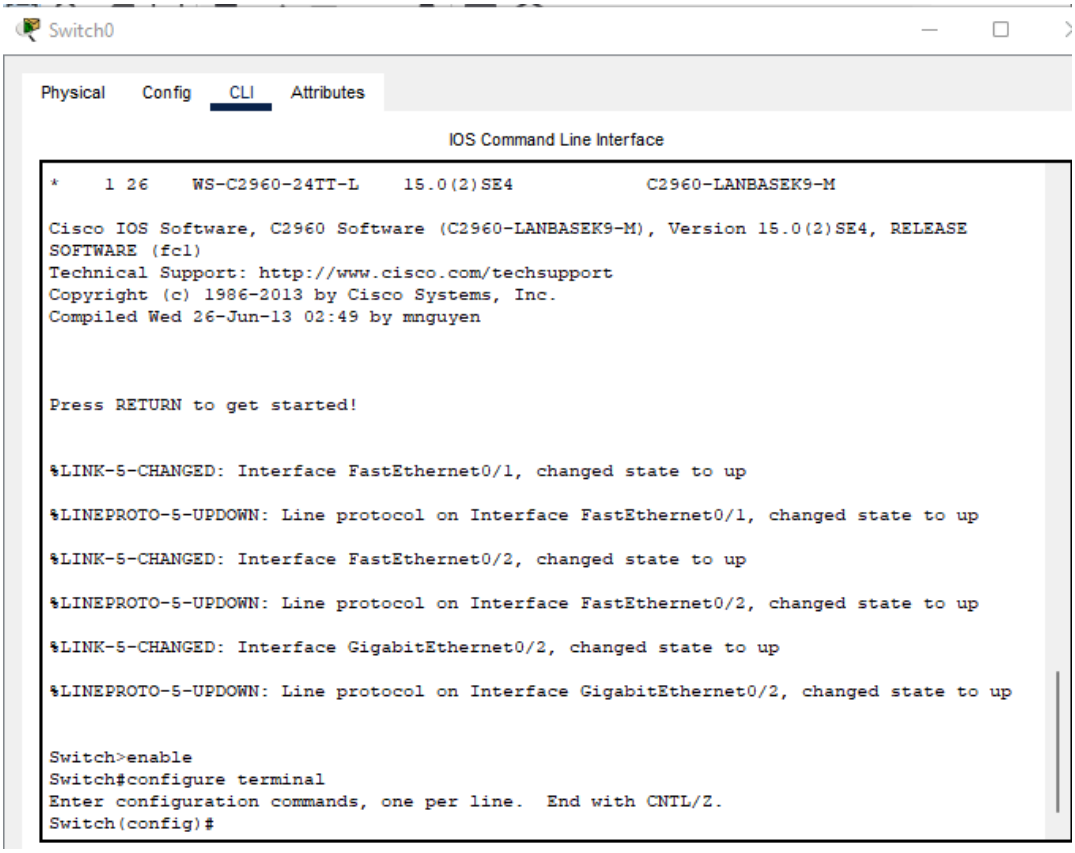
Physical Config Desktop Programming Attributes

Command Prompt

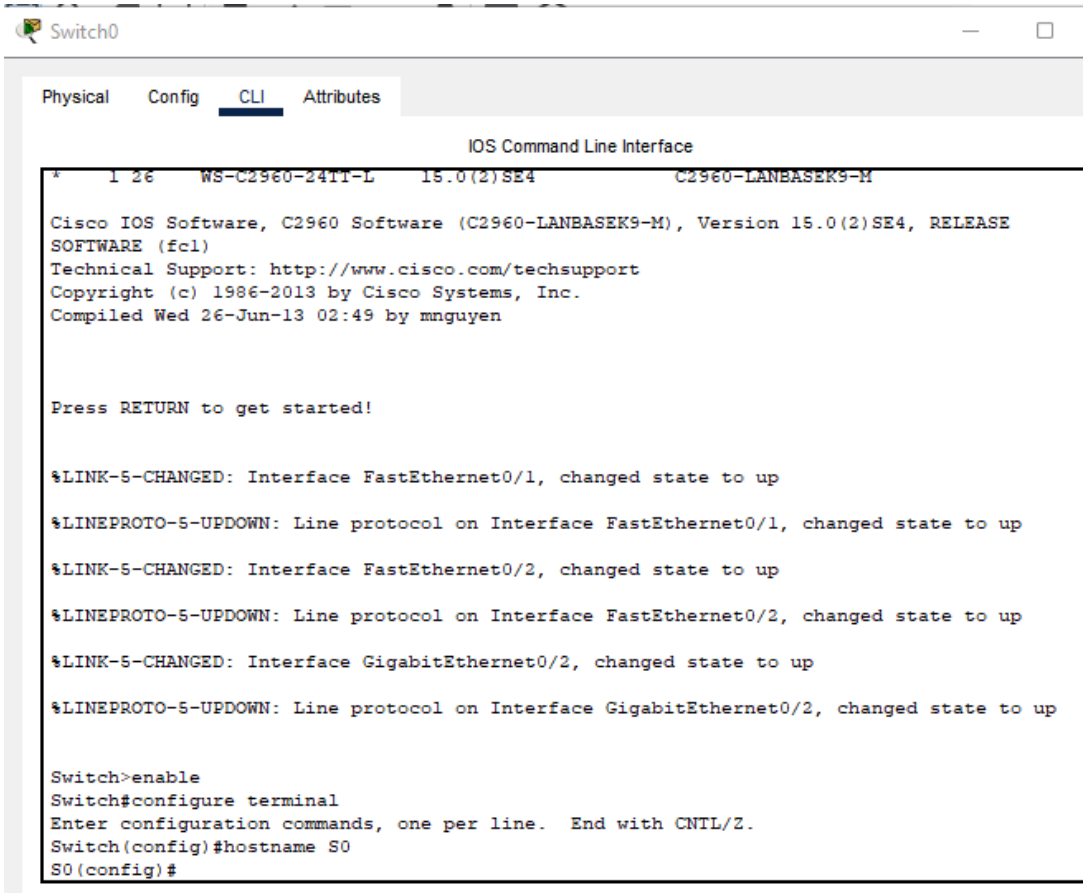
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::2D0:BCFF:FE37:3070
   IPv6 Address.....: ::
   IPv4 Address.....: 10.1.0.2
   Subnet Mask.....: 255.255.0.0
   Default Gateway.....: ::
                                 0.0.0.0

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>
```


PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig
FastEthernet0 Connection:(default port)
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: FE80::20D:BDFF:FEA0:315E
IPv6 Address.....: ::
IPv4 Address.....: 10.1.0.3
Subnet Mask.....: 255.255.0.0
Default Gateway.....: ::
0.0.0.0
Bluetooth Connection:
Connection-specific DNS Suffix..:
Link-local IPv6 Address.....: ::
IPv6 Address.....: ::
IPv4 Address.....: 0.0.0.0
Subnet Mask.....: 0.0.0.0
Default Gateway.....: ::
0.0.0.0
C:\>

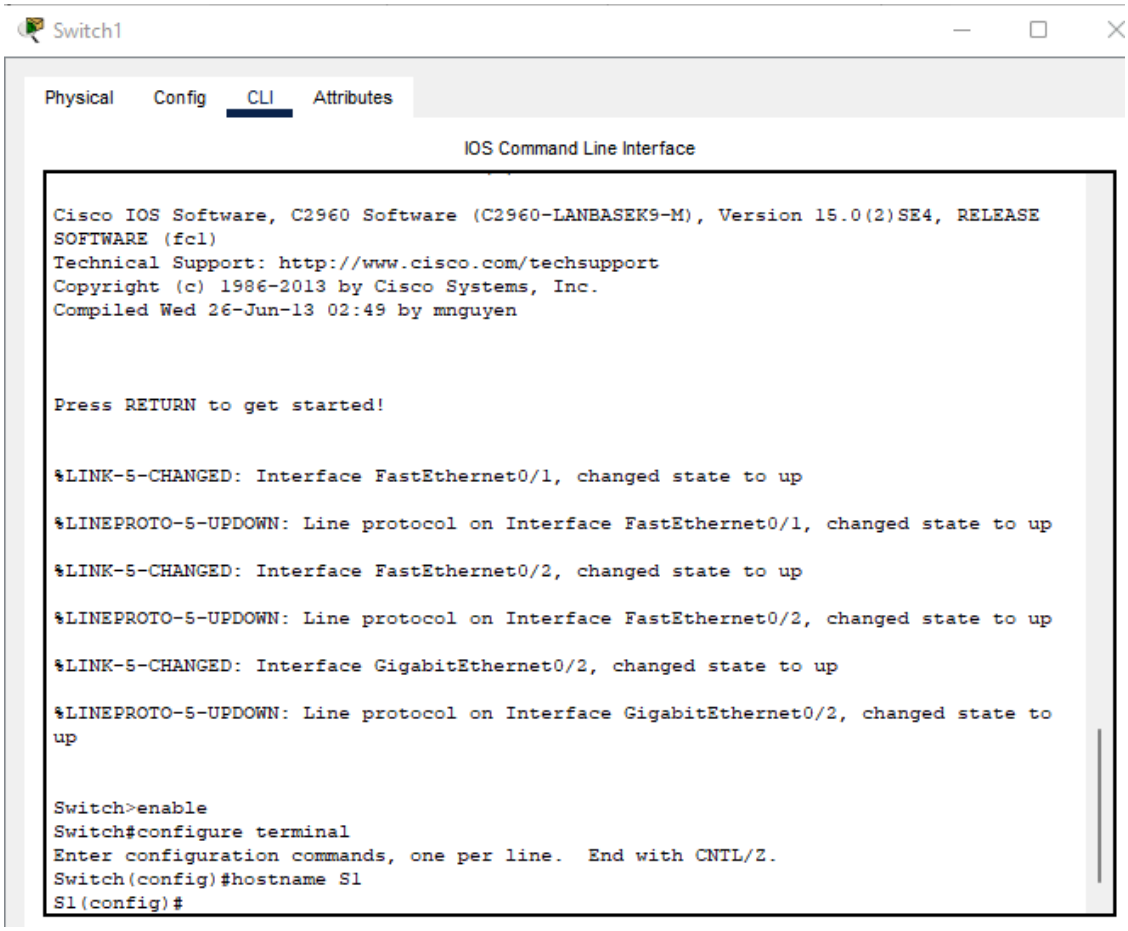
Step 4b:


Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
* 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 GigabitEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#

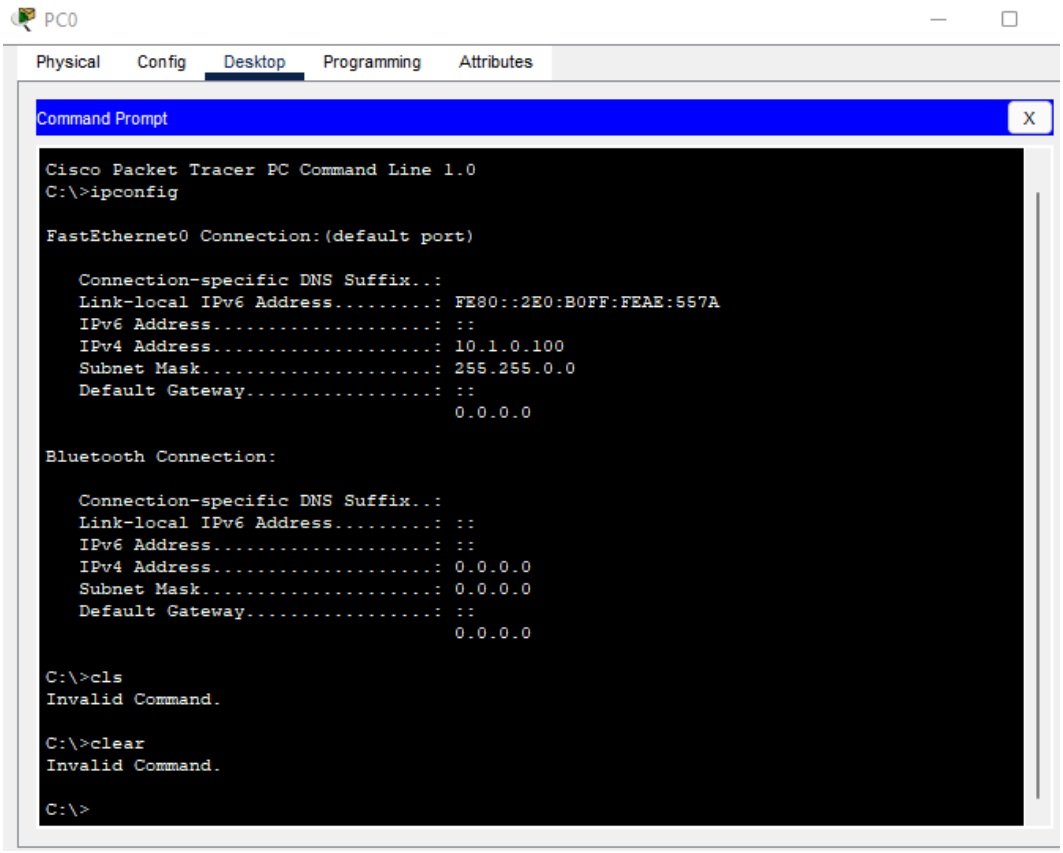
Step 4c:



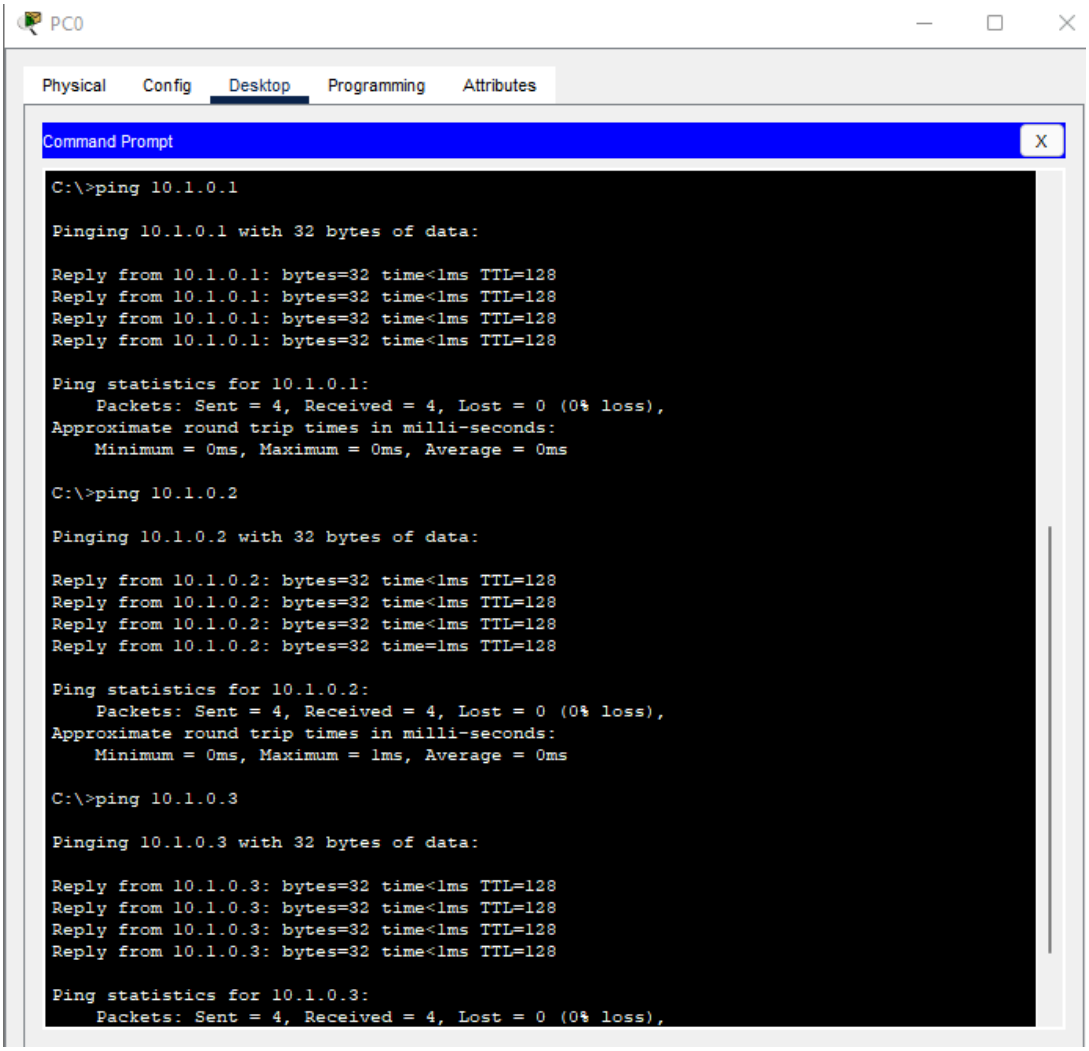
Step 4e:



Step 4f:



Step 4g:



PC1

Physical Config Desktop Programming Attributes

Command Prompt

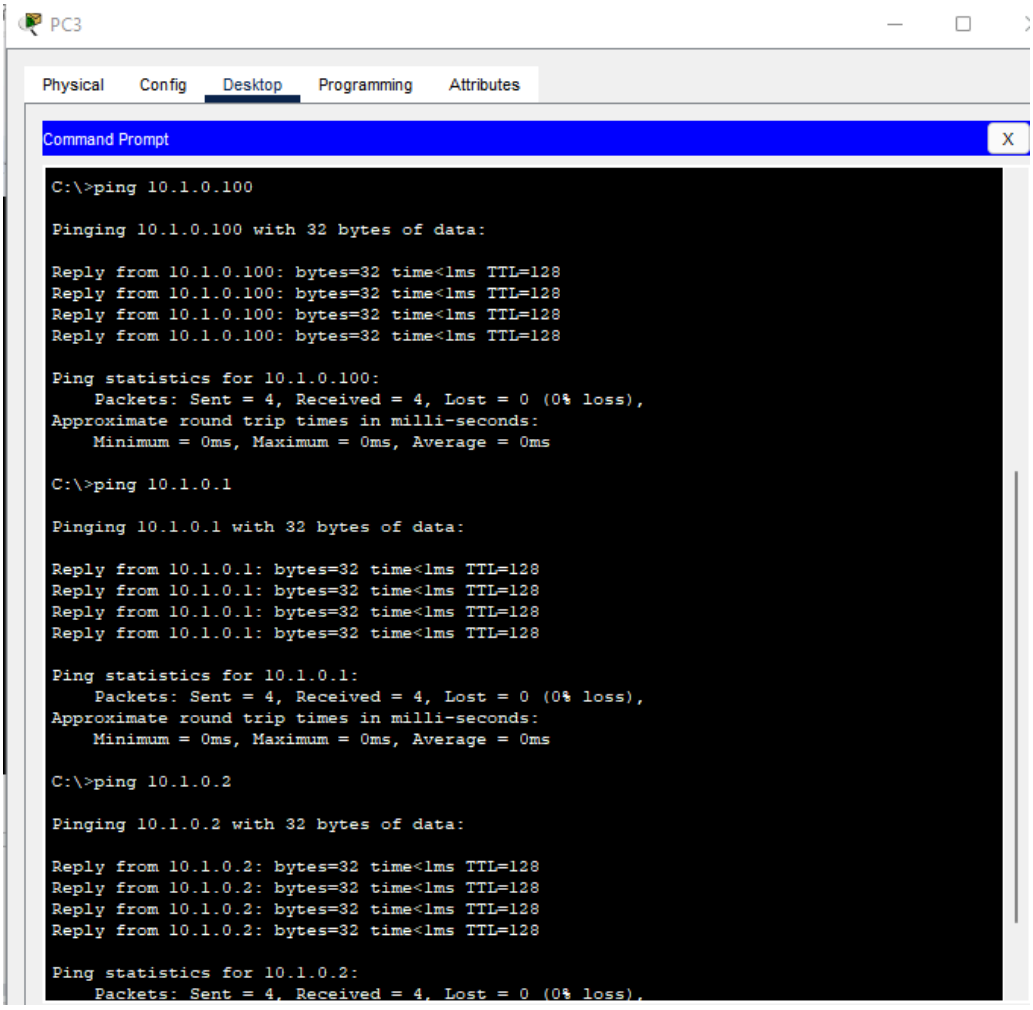
```
C:\>ping 10.1.0.100

Pinging 10.1.0.100 with 32 bytes of data:

Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.1.0.2

Pinging 10.1.0.2 with 32 bytes of data:

Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.1.0.3

Pinging 10.1.0.3 with 32 bytes of data:

Reply from 10.1.0.3: bytes=32 time<1ms TTL=128
Reply from 10.1.0.3: bytes=32 time<1ms TTL=128
Reply from 10.1.0.3: bytes=32 time<1ms TTL=128
Reply from 10.1.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.3:
```

PC2

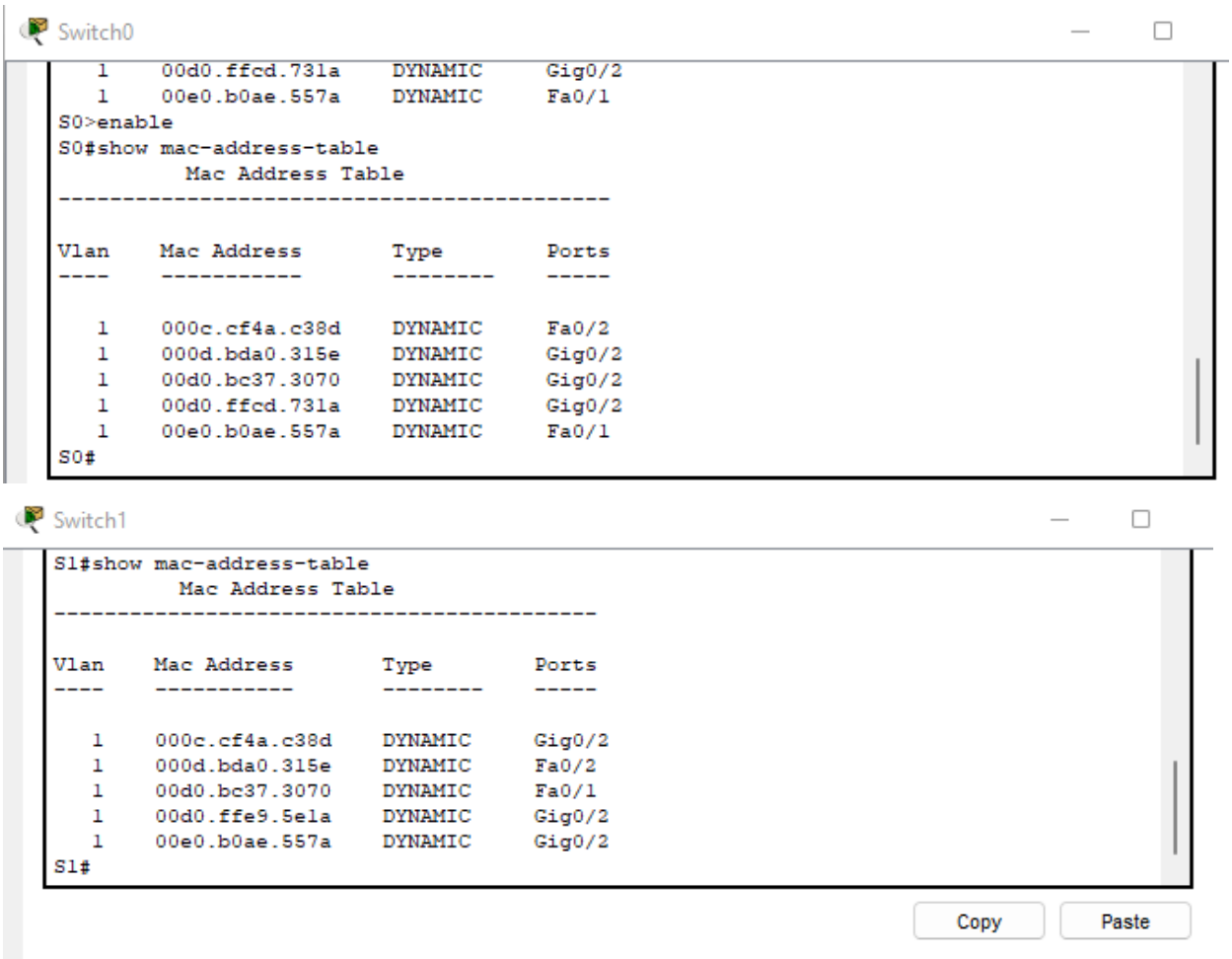
Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 10.1.0.100

Pinging 10.1.0.100 with 32 bytes of data:

Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.1.0.1

Pinging 10.1.0.1 with 32 bytes of data:

Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time=1ms TTL=128
Reply from 10.1.0.1: bytes=32 time=3ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 1ms

C:\>ping 10.1.0.3

Pinging 10.1.0.3 with 32 bytes of data:

Reply from 10.1.0.3: bytes=32 time<1ms TTL=128
Reply from 10.1.0.3: bytes=32 time<1ms TTL=128
Reply from 10.1.0.3: bytes=32 time=3ms TTL=128
Reply from 10.1.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.3:
```


PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
C:\>ping 10.1.0.100
Pinging 10.1.0.100 with 32 bytes of data:
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Ping statistics for 10.1.0.100:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 10.1.0.1
Pinging 10.1.0.1 with 32 bytes of data:
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Ping statistics for 10.1.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>ping 10.1.0.2
Pinging 10.1.0.2 with 32 bytes of data:
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Reply from 10.1.0.2: bytes=32 time<1ms TTL=128
Ping statistics for 10.1.0.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Step 4h:


Switch0
1 00d0.ffcd.731a DYNAMIC Gig0/2
1 00e0.b0ae.557a DYNAMIC Fa0/1
S0>enable
S0#show mac-address-table
Mac Address Table
Vlan Mac Address Type Ports
1 000c.cf4a.c38d DYNAMIC Fa0/2
1 000d.bda0.315e DYNAMIC Gig0/2
1 00d0.bc37.3070 DYNAMIC Gig0/2
1 00d0.ffcd.731a DYNAMIC Gig0/2
1 00e0.b0ae.557a DYNAMIC Fa0/1
S0#
Switch1
S1#show mac-address-table
Mac Address Table
Vlan Mac Address Type Ports
1 000c.cf4a.c38d DYNAMIC Gig0/2
1 000d.bda0.315e DYNAMIC Fa0/2
1 00d0.bc37.3070 DYNAMIC Fa0/1
1 00d0.ffe9.5e1a DYNAMIC Gig0/2
1 00e0.b0ae.557a DYNAMIC Gig0/2
S1#
Copy
Paste

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
   Connection-specific DNS Suffix..:
   Physical Address.................: 00E0.B0AE.557A
   Link-local IPv6 Address.........: FE80::2E0:B0FF:FEAE:557A
   IPv6 Address....................: ::
   IPv4 Address....................: 10.1.0.100
```

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

```
   1    000c.cf4a.c38d    DYNAMIC     Fa0/2
   1    000d.bda0.315e    DYNAMIC     Gig0/2
   1    00d0.bc37.3070    DYNAMIC     Gig0/2
   1    00d0.ffcd.731a    DYNAMIC     Gig0/2
   1    00e0.b0ae.557a    DYNAMIC     Fa0/1
```

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
   Connection-specific DNS Suffix..:
   Physical Address.................: 000C.CF4A.C38D
   Link-local IPv6 Address.........: FE80::20C:CFFF:FE4A:C38D
   IPv6 Address....................: ::
```

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

```
   1    000c.cf4a.c38d    DYNAMIC     Fa0/2
   1    000d.bda0.315e    DYNAMIC     Gig0/2
   1    00d0.bc37.3070    DYNAMIC     Gig0/2
   1    00d0.ffcd.731a    DYNAMIC     Gig0/2
   1    00e0.b0ae.557a    DYNAMIC     Fa0/1
```

PC2

Physical Config Desktop Programming Attributes

Command Prompt

```
FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Physical Address.................: 00D0.BC37.3070
   Link-local IPv6 Address.........: FE80::2D0:BCFF:FE37:3070
```

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

```
   1    000c.cf4a.c38d    DYNAMIC     Fa0/2
   1    000d.bda0.315e    DYNAMIC     Gig0/2
   1    00d0.bc37.3070    DYNAMIC     Gig0/2
   1    00d0.ffcd.731a    DYNAMIC     Gig0/2
   1    00e0.b0ae.557a    DYNAMIC     Fa0/1
S0>show interface g0/2
```

PC3

Physical Config Desktop Programming Attributes

Command Prompt

```
FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Physical Address.................: 000D.BDA0.315E
   Link-local IPv6 Address.........: FE80::20D:BDFF:FEA0:315E
```

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

```
   1    000c.cf4a.c38d    DYNAMIC     Fa0/2
   1    000d.bda0.315e    DYNAMIC     Gig0/2
   1    00d0.bc37.3070    DYNAMIC     Gig0/2
   1    00d0.ffcd.731a    DYNAMIC     Gig0/2
   1    00e0.b0ae.557a    DYNAMIC     Fa0/1
S0>show interface g0/2
GigabitEthernet0/2 is up, line protocol is up (connected)
```

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

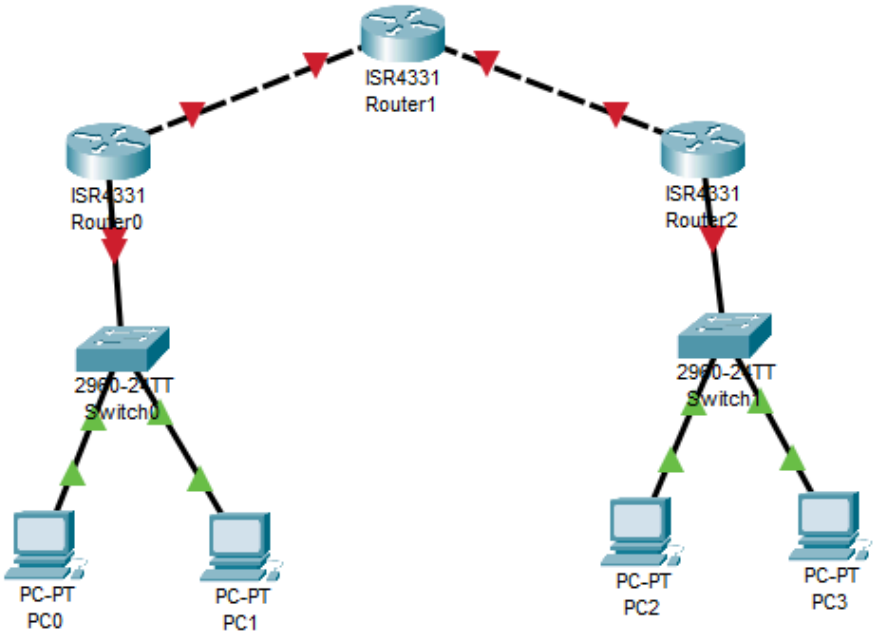
```
S0>enable
S0#show interface g0/2
GigabitEthernet0/2 is up, line protocol is up (connected)
  Hardware is Lance, address is 00d0.ffe9.5ela (bia 00d0.ffe9.5ela)
 BW 1000000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
```

Switch1

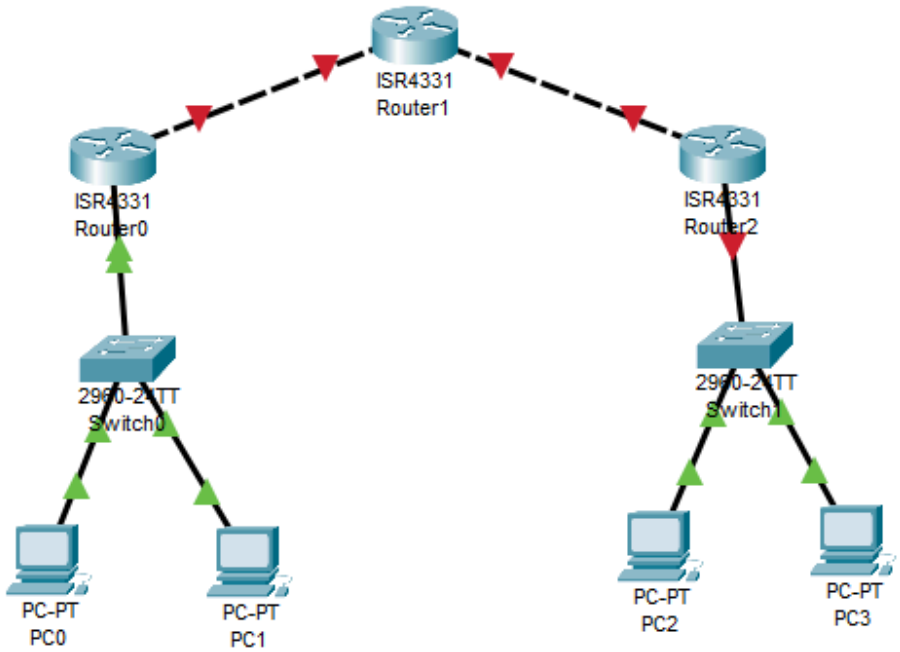
```
   1    00d0.ffe9.5ela    DYNAMIC     Gig0/2
S1#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    000c.cf4a.c38d    DYNAMIC     Gig0/2
   1    000d.bda0.315e    DYNAMIC     Fa0/2
   1    00d0.bc37.3070    DYNAMIC     Fa0/1
   1    00d0.ffe9.5ela    DYNAMIC     Gig0/2
   1    00e0.b0ae.557a    DYNAMIC     Gig0/2
S1#
```

Start of Lab Exercise 9.02: Router Configuration

Step 1f:



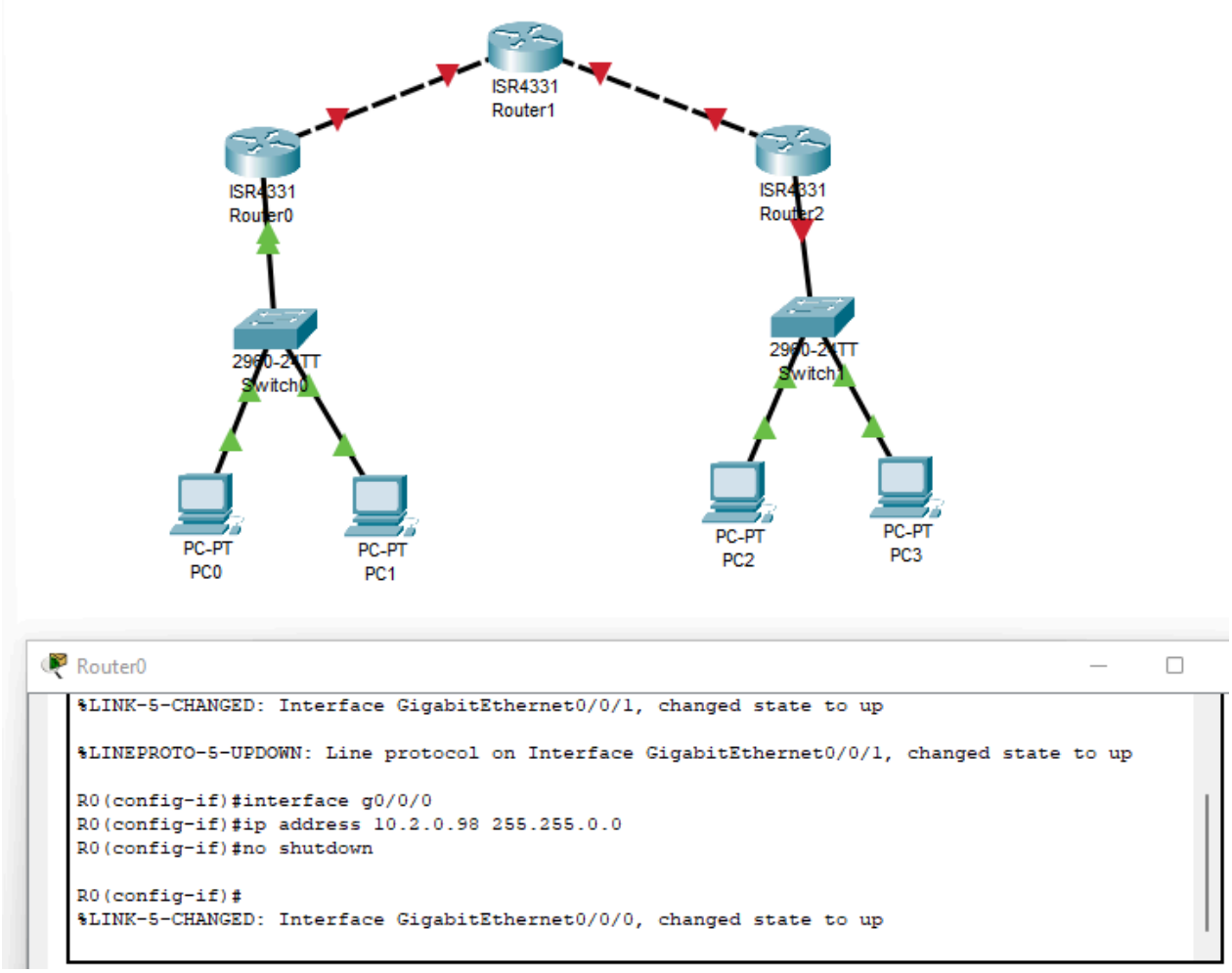
Step 2g:



Router0

```
R0(config)#interface GigabitEthernet0/0/1
R0(config)#interface GigabitEthernet0/0/1
R0(config-if)#ip address 10.1.0.99 255.255.0.0
R0(config-if)#no shutdown

R0(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up

R0(config-if)#
```

2i:



Step 3a:

- To configure the Router 1, I first went to it's CLI and then types **enable** to go into privileged mode. Then, I typed **configure terminal** to configure the router. I used **int g/0/0/1** command to change the interface configuration to the g/0/0/1 interface and gave it its corresponding IP address and netmask, followed by the **no shut** command to bring up the interface. Finally, changed the interface to g/0/0/0 and did the same thing to finish off the interface configuration for Router 1.

Step 3b:

- On Router 2, I configured the hostname and the interfaces, g0/0/1 and g0/0/0, same way I configured Router 1.

Step 3c:

- For each PC, I went to the config tab and gave its corresponding default gateway IP address in the settings under GLOBAL.

Step 3d:

- To make sure that each PC is able to reach its default gateway, I used the command prompt in each PC and pinged its default gateway. The result was a success and the each PC got reply from its gateways.

Step 3e:

- When i typed the **show ip route** to see each router's routing table, I found that "Router0 only knows about the 10.1.0.0/16 and 10.2.0.0/16 networks. Router1 only knows about the 10.2.0.0/16 and 10.3.0.0/16 networks. Router2 only knows about the 10.3.0.0/16 and 10.4.0.0/16 networks. The C in the routing table means that the network is directly connected. Each routing table also has an L for a local route for each router interface's IP address."

Step 3f:

- When I tried to ping 10.4.0.3 from 10.1.0.100, I got a reply from the default gateway of PC0 that the destination host is unreachable. This is because the Router 0 checked its routing table to see if it could find the network 10.4.0.0/16, and it could not find it. Therefore, the router sent a destination host unreachable reply to PC0.

- To fix the issue, I had to tell Router 0 to take the 10.2.0.99 gateway to reach the destination network. I used the commands **ip route 10.3.0.0 255.255.0.0 10.2.0.99**, and **ip route 10.4.0.0 255.255.0.0 10.2.0.99.** When I checked the routing table of the router again with the **show ip route command** it showed the new routing entries with S. It's for static routing for both the 10.3.0.0/16 and 10.4.0.0/16 networks.

Step 3g:

- When I tried to ping the destination, 10.4.0.3 from 10.1.0.100, I get a request timed out because router 1 does not know about the routing destination of either network of 10.4.0.0./16 and 10.1.0.0/16.
- I fixed that by adding a static route to the router 1 for both 10.1.0.0 and 10.4.0.0 network through 10.2.0.98 and 10.3.0.99 gateways.

Step 3h:

- I tried to send pings from PC0 to PC3. However, it did not work. The thing is that the request from PC0 reached PC3. However, since router 2 doesn't know how to route the reply to the PC0 from PC3, PC0 showed me the request timed out.

Step 3i:

- In order to fix the issue in step 3h and allow full routing to work, I had to configure router 2 to have a special type of static route, a default static route. I have added an entry to its routing table to make it reach any network it needs to go through the 10.3.0.98 gateway. I have used the **ip route 0.0.0.0 0.0.0.0 10.3.0.98** command to do so.

Step 3j:

- I pinged PC3 from PC0 again, and it was a success. The reason is that all the routers knew where to send the request and reply when I ping PC3 from PC0.

Step 3k:

- To see how many hops and when they are, I used **tracert 10.4.0.3** command. Which traces the route including all router interfaces to the destination, PC3. There was four hopes and the first 3 hopes were the gateways of the networks 10.1.0.0, 10.2.0.0, and 10.3.0.0. The last hop was the destination IP address.

Step 4a:

Router0

```
R0>enable
R0#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R0(config)#no ip route 10.3.0.0 255.255.0.0
R0(config)#no ip route 10.4.0.0 255.255.0.0
R0(config)#
```

Step 4b:

Router1

```
R1>enable
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#no ip route 10.1.0.0 255.255.0.0
R1(config)#no ip route 10.4.0.0 255.255.0.0
R1(config)#
```

Step 4c:

Router2

```
R2>enable
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#no ip route 0.0.0.0 0.0.0.0
R2(config)#
```

Step 4d:

Router0

```
R0(config)#
R0(config)#
R0(config)#
R0(config)#router ospf 1
R0(config-router)#
```

Router1

```
R1(config)#
R1(config)#
R1(config)#
R1(config)#router ospf 1
R1(config-router)#
```

Router2

```
R2(config)#
R2(config)#router ospf 1
R2(config-router)#
```

Step 4e:

Router0

```
R0(config)#
R0(config)#
R0(config)#router ospf 1
R0(config-router)#network 10.0.0.0 0.255.255.255 area 0
R0(config-router)#
```

Router1

```
R1(config)#
R1(config)#
R1(config)#router ospf 1
R1(config-router)#network 10.0.0.0 0.255.255.255 area 0
R1(config-router)#
```

Router2

```
R2(config)#router ospf 1
R2(config-router)#network 10.0.0.0 0.255.255.255 area 0
R2(config-router)#
```

Step 4f:

Router0

```
R0(config)#
R0(config)#
R0(config)#router ospf 1
R0(config-router)#network 10.0.0.0 0.255.255.255 area 0
R0(config-router)#
04:28:06: %OSPF-5-ADJCHG: Process 1, Nbr 10.3.0.98 on GigabitEthernet0/0/0 from
LOADING to FULL, Loading Done
```

Copy Paste

Router1

```
R1(config-router)#network 10.0.0.0 0.255.255.255 area 0
R1(config-router)#
04:27:27: %OSPF-5-ADJCHG: Process 1, Nbr 10.2.0.98 on GigabitEthernet0/0/1 from
LOADING to FULL, Loading Done

04:27:44: %OSPF-5-ADJCHG: Process 1, Nbr 10.4.0.99 on GigabitEthernet0/0/0 from
LOADING to FULL, Loading Done
```

Copy Paste

Router2

```
R2(config)#router ospf 1
R2(config-router)#network 10.0.0.0 0.255.255.255 area 0
R2(config-router)#
04:27:36: %OSPF-5-ADJCHG: Process 1, Nbr 10.3.0.98 on GigabitEthernet0/0/1 from
LOADING to FULL, Loading Done
```

Step 4g:

```
C:\>ping 10.1.0.1

Pinging 10.1.0.1 with 32 bytes of data:

Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128
Reply from 10.1.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.4.0.2

Pinging 10.4.0.2 with 32 bytes of data:

Reply from 10.4.0.2: bytes=32 time<1ms TTL=125
Reply from 10.4.0.2: bytes=32 time<1ms TTL=125
Reply from 10.4.0.2: bytes=32 time<1ms TTL=125
Reply from 10.4.0.2: bytes=32 time<1ms TTL=125

Ping statistics for 10.4.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.4.0.3

Pinging 10.4.0.3 with 32 bytes of data:

Reply from 10.4.0.3: bytes=32 time<1ms TTL=125
Reply from 10.4.0.3: bytes=32 time<1ms TTL=125
Reply from 10.4.0.3: bytes=32 time<1ms TTL=125
Reply from 10.4.0.3: bytes=32 time<1ms TTL=125

Ping statistics for 10.4.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

```
C:\>ping 10.1.0.100

Pinging 10.1.0.100 with 32 bytes of data:

Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128
Reply from 10.1.0.100: bytes=32 time<1ms TTL=128

Ping statistics for 10.1.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.4.0.2

Pinging 10.4.0.2 with 32 bytes of data:

Reply from 10.4.0.2: bytes=32 time<1ms TTL=125
Reply from 10.4.0.2: bytes=32 time=10ms TTL=125
Reply from 10.4.0.2: bytes=32 time<1ms TTL=125
Reply from 10.4.0.2: bytes=32 time<1ms TTL=125

Ping statistics for 10.4.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 2ms

C:\>ping 10.4.0.3

Pinging 10.4.0.3 with 32 bytes of data:

Reply from 10.4.0.3: bytes=32 time=1ms TTL=125
Reply from 10.4.0.3: bytes=32 time<1ms TTL=125
Reply from 10.4.0.3: bytes=32 time<1ms TTL=125
Reply from 10.4.0.3: bytes=32 time=8ms TTL=125

Ping statistics for 10.4.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

```
C:\>ping 10.1.0.100

Pinging 10.1.0.100 with 32 bytes of data:

Reply from 10.1.0.100: bytes=32 time<1ms TTL=125
Reply from 10.1.0.100: bytes=32 time<1ms TTL=125
Reply from 10.1.0.100: bytes=32 time=1ms TTL=125
Reply from 10.1.0.100: bytes=32 time<1ms TTL=125

Ping statistics for 10.1.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 10.1.0.1

Pinging 10.1.0.1 with 32 bytes of data:

Reply from 10.1.0.1: bytes=32 time<1ms TTL=125
Reply from 10.1.0.1: bytes=32 time<1ms TTL=125
Reply from 10.1.0.1: bytes=32 time<1ms TTL=125
Reply from 10.1.0.1: bytes=32 time<1ms TTL=125

Ping statistics for 10.1.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.4.0.3

Pinging 10.4.0.3 with 32 bytes of data:

Reply from 10.4.0.3: bytes=32 time<1ms TTL=128
Reply from 10.4.0.3: bytes=32 time<1ms TTL=128
Reply from 10.4.0.3: bytes=32 time<1ms TTL=128
Reply from 10.4.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.4.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

```
C:\>ping 10.1.0.100

Pinging 10.1.0.100 with 32 bytes of data:

Reply from 10.1.0.100: bytes=32 time<1ms TTL=125
Reply from 10.1.0.100: bytes=32 time<1ms TTL=125
Reply from 10.1.0.100: bytes=32 time<1ms TTL=125
Reply from 10.1.0.100: bytes=32 time<1ms TTL=125

Ping statistics for 10.1.0.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.1.0.1

Pinging 10.1.0.1 with 32 bytes of data:

Reply from 10.1.0.1: bytes=32 time<1ms TTL=125
Reply from 10.1.0.1: bytes=32 time<1ms TTL=125
Reply from 10.1.0.1: bytes=32 time<1ms TTL=125
Reply from 10.1.0.1: bytes=32 time<1ms TTL=125

Ping statistics for 10.1.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 10.4.0.2

Pinging 10.4.0.2 with 32 bytes of data:

Reply from 10.4.0.2: bytes=32 time<1ms TTL=128
Reply from 10.4.0.2: bytes=32 time<1ms TTL=128
Reply from 10.4.0.2: bytes=32 time<1ms TTL=128
Reply from 10.4.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.4.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
```

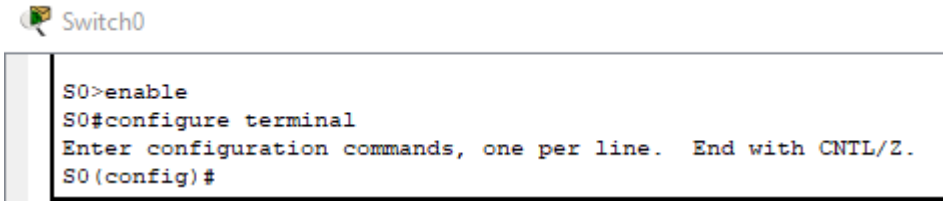
Step 4h:

PC0

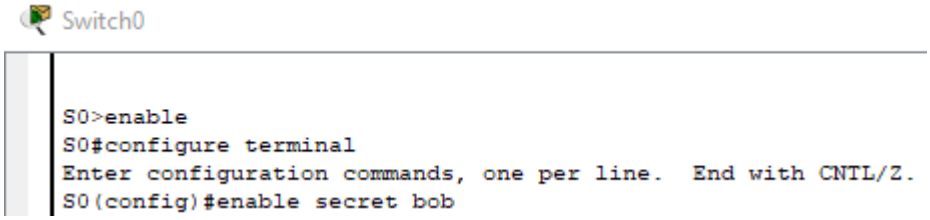
```
C:\>tracert 10.4.0.3

Tracing route to 10.4.0.3 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      10.1.0.99
  2    0 ms      0 ms      1 ms      10.2.0.99
  3    0 ms      0 ms      0 ms      10.3.0.99
  4    0 ms      0 ms      0 ms      10.4.0.3

Trace complete.

C:\>
```

Start of Lab Exercise 9.03: Passwords and SSH

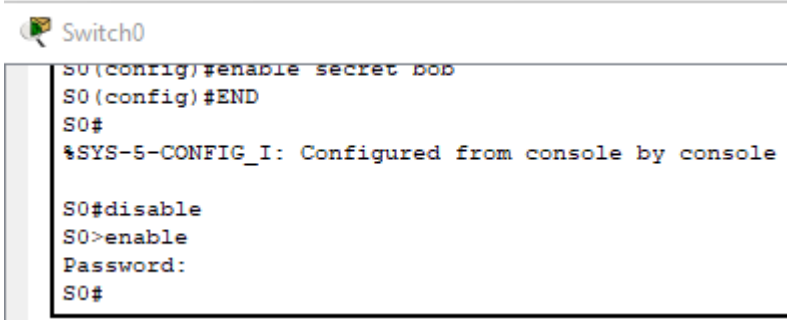
Step 1a:



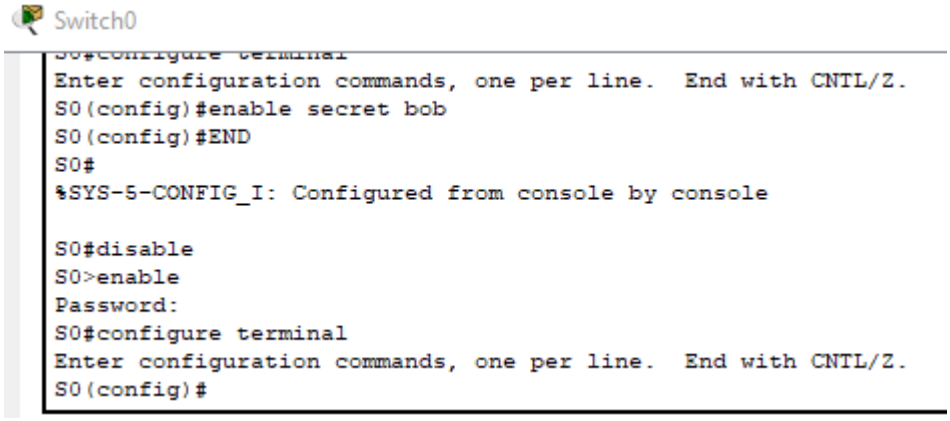
Step 1b:



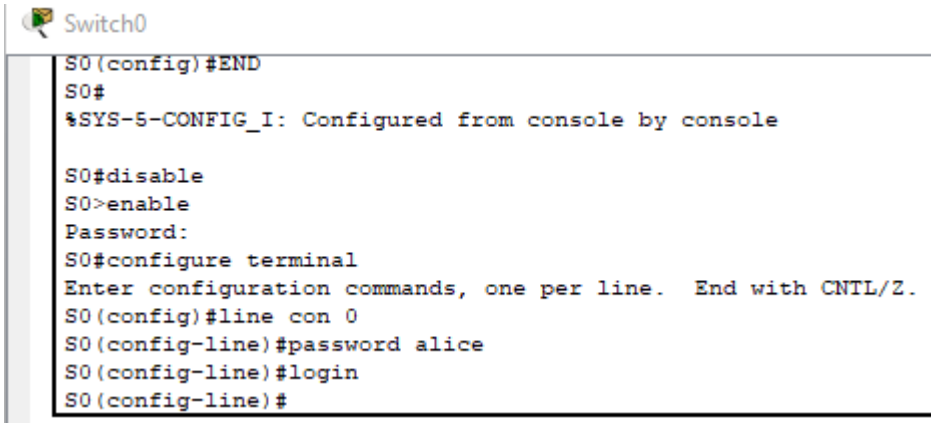
Step 1c:



Step 2a:



Step 2b:



Step 2c:

Switch0

```
Enter configuration commands, one per line.  End with CNTL/Z.
S0(config)#line con 0
S0(config-line)#password alice
S0(config-line)#login
S0(config-line)#END
S0#
%SYS-5-CONFIG_I: Configured from console by console

S0#exit
```

Step 2d:

Switch0

```
User Access Verification

Password:

S0>
```

Step 3a:

Switch0

```
User Access Verification

Password:

S0>enable
Password:
S0#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
S0(config)#username jonathan password weissman
S0(config)#line con 0
S0(config-line)#login local
S0(config-line)#no password
S0(config-line)#
```

Step 3b:

Switch0

```
S0(config-line)#login local
S0(config-line)#no password
S0(config-line)#END
S0#
%SYS-5-CONFIG_I: Configured from console by console

S0#exit
```

Step 3c:

Switch0

```
User Access Verification

Username: jonathan
Password:

S0>
```

Step 3d:

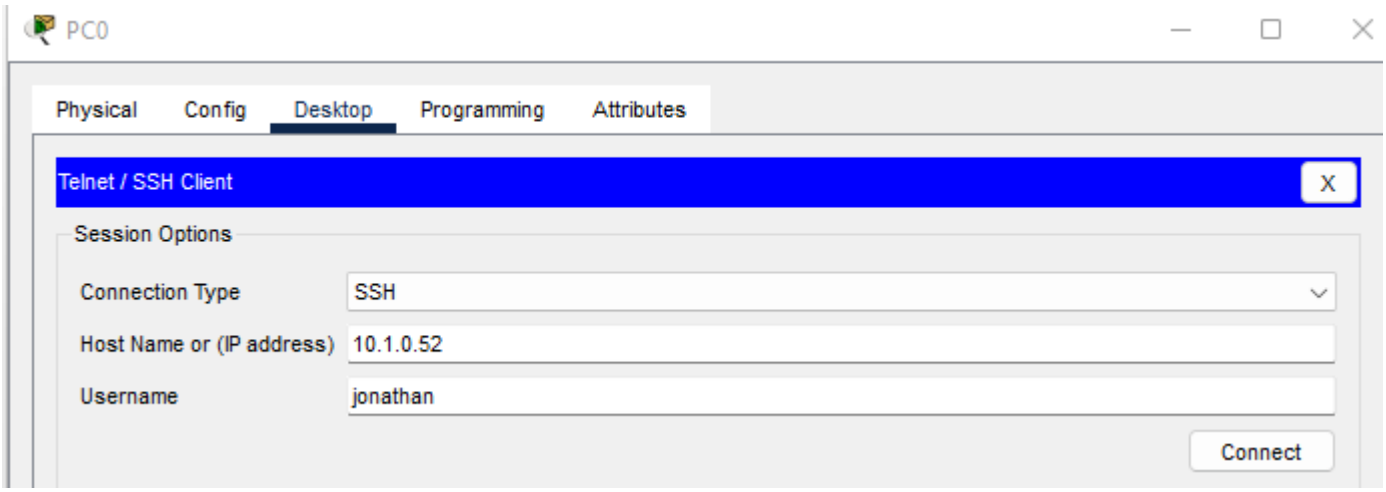
Note: This step is not in the book. Mistake in the book!

Step 4b:

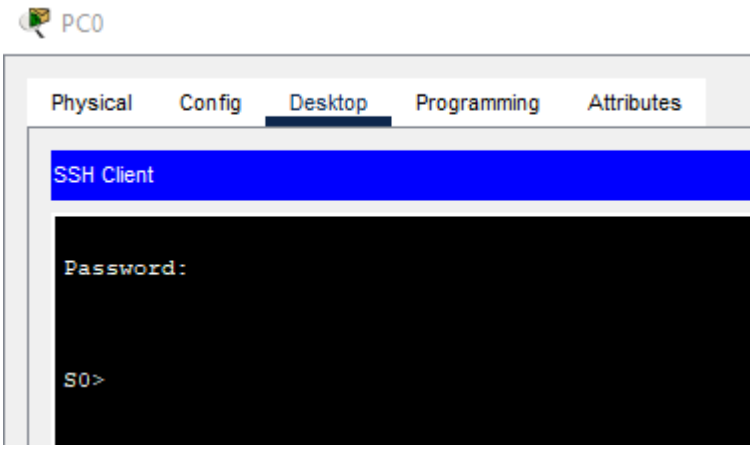
Switch0

```
S0(config)#ip default-gateway 10.1.0.99
S0(config)#hostname S0
S0(config)#ip domain-name weissman.edu
S0(config)#crypto key generate rsa
The name for the keys will be: S0.weissman.edu
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]: 2048
% Generating 2048 bit RSA keys, keys will be non-exportable...[OK]

S0(config)#ip ssh version 2
*Mar 1 10:40:28.263: %SSH-5-ENABLED: SSH 1.99 has been enabled
S0(config)#line vty 0 15
S0(config-line)#login local
S0(config-line)#transport input ssh
S0(config-line)#
```

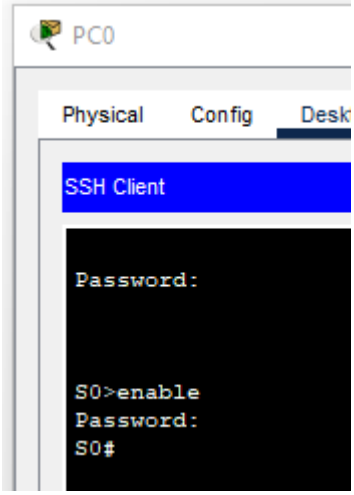
Step 4c:



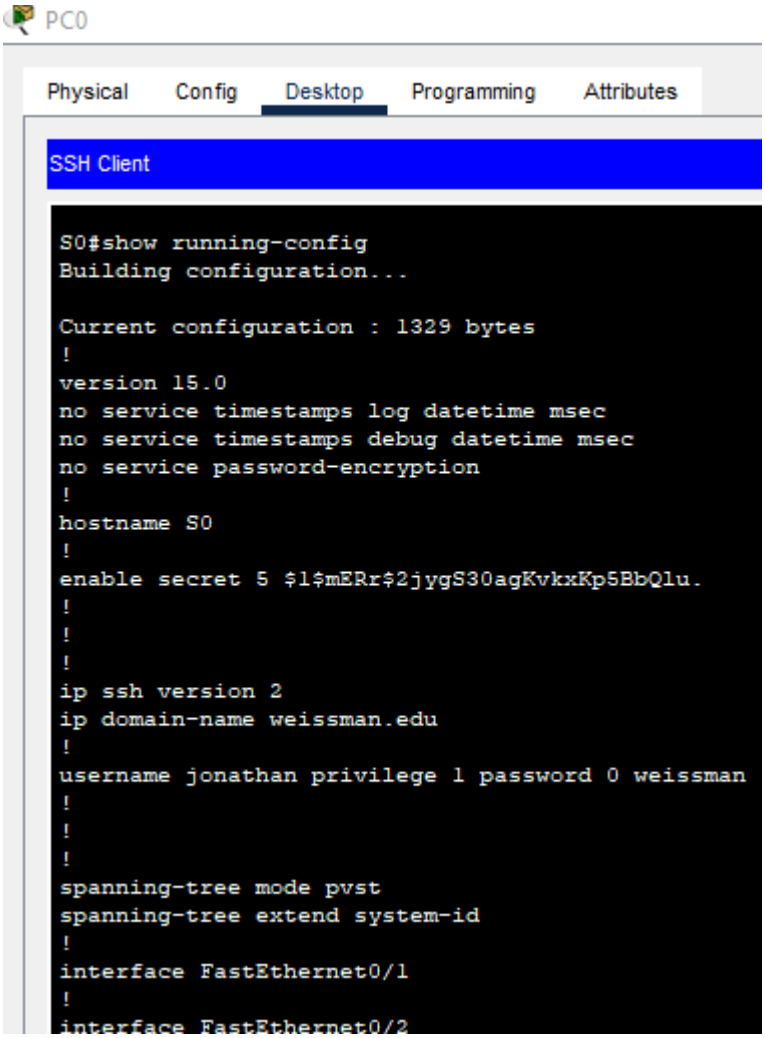
Step 4d:



Step 4e:



Step 4f:



```
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 10.1.0.52 255.255.0.0
!
ip default-gateway 10.1.0.99
!
!
!
!
line con 0
 login local
!
line vty 0 4
 login local
 transport input ssh
line vty 5 15
 login local
 transport input ssh
!
!
!
!
end


S0#
```

Step 4g:

PC0

```
 login local
 transport input ssh
!
!
!
!
end


S0# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S0#
```

Step 4h:

PC0

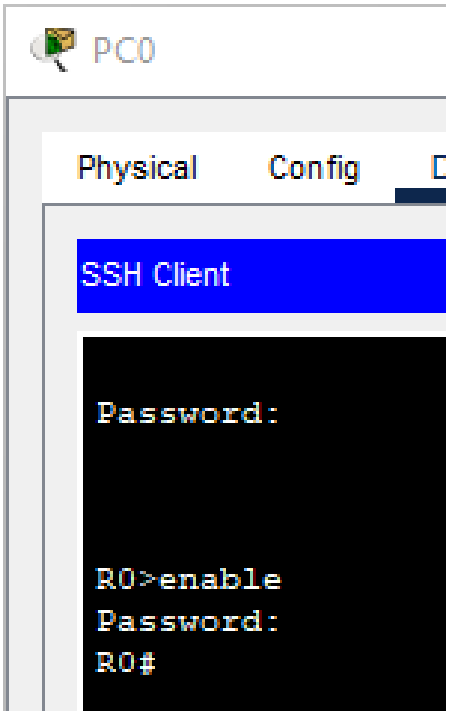
```


S0# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
S0#show ip ssh
SSH Enabled - version 2.0
Authentication timeout: 120 secs; Authentication retries: 3
S0#
```

Step 4i:

PC0

```
Destination filename [startup-config]?
Building configuration...
[OK]
S0#show ip ssh
SSH Enabled - version 2.0
Authentication timeout: 120 secs; Authentication retries: 3
S0#show ssh
Connection      Version Mode Encryption                  Hmac        State
Username
0               1.99    IN   aes128-cbc      hmac-sha1     Session Started
jonathan
0               1.99    OUT  aes128-cbc      hmac-sha1     Session Started
jonathan
%No SSHv1 server connections running.
S0#
```

Step 4j:



Lab Analysis:

1) Yes
2) No
3) Saving resources
4) If the topology is big, then it is tedious and time consuming to statically configure each interface of a router with a IP address.
5) Two types of passwords. One to ssh into the switch or router and one to enable privilege mode.

Key Term Quiz:

1) SAT
2) Next hop
3) SSH
4) Hashed
5) Routing table