ASSIGNMENT-1

I. Create all the topologies discussed in class in Cisco Packet Tracer (CPT).
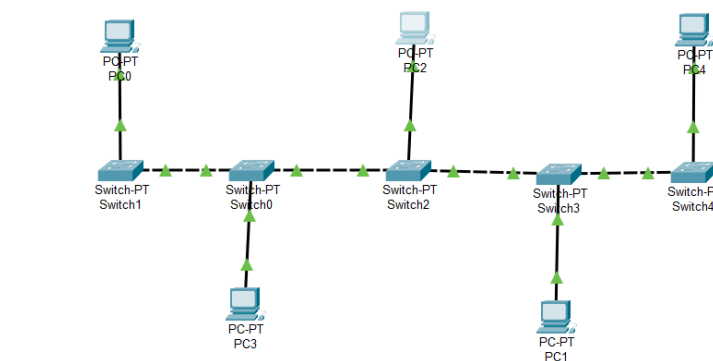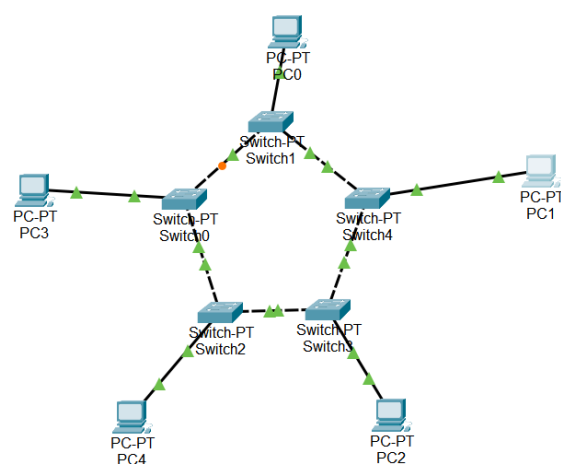
1. BUS

2. Ring

PC1

Physical | Config | **Desktop** | Programming | Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 220.16.10.9

Pinging 220.16.10.9 with 32 bytes of data:

Reply from 220.16.10.9: bytes=32 time<1ms TTL=128
Reply from 220.16.10.9: bytes=32 time<1ms TTL=128
Reply from 220.16.10.9: bytes=32 time=1ms TTL=128
Reply from 220.16.10.9: bytes=32 time<1ms TTL=128

Ping statistics for 220.16.10.9:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

3. Star

PC0

Physical | Config | **Desktop** | Programming | Attributes
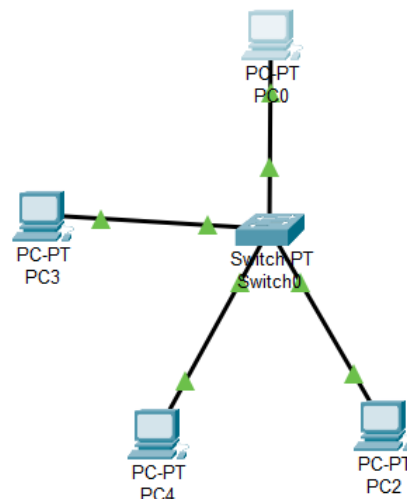
Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 220.16.10.7

Pinging 220.16.10.7 with 32 bytes of data:

Reply from 220.16.10.7: bytes=32 time=3ms TTL=128
Reply from 220.16.10.7: bytes=32 time<1ms TTL=128
Reply from 220.16.10.7: bytes=32 time<1ms TTL=128
Reply from 220.16.10.7: bytes=32 time<1ms TTL=128

Ping statistics for 220.16.10.7:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 0ms
```

4. Tree

PC3

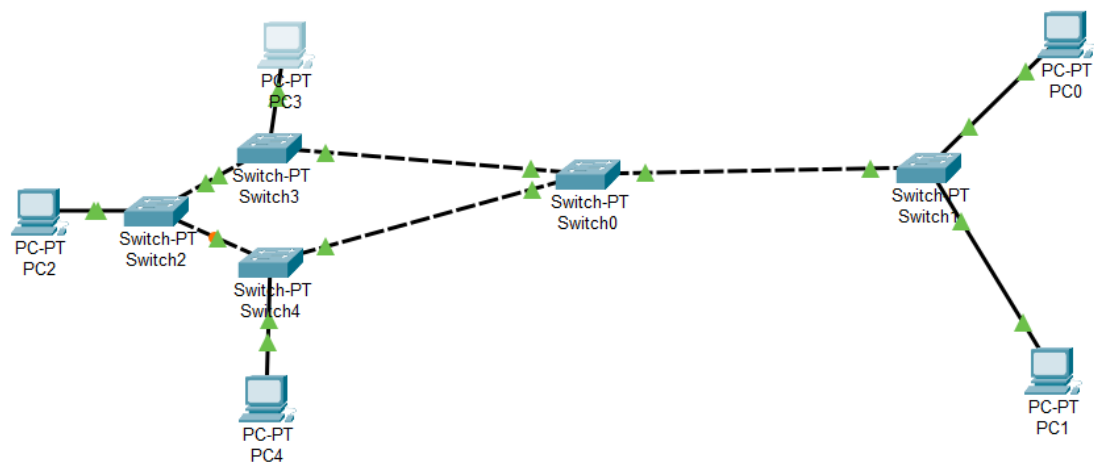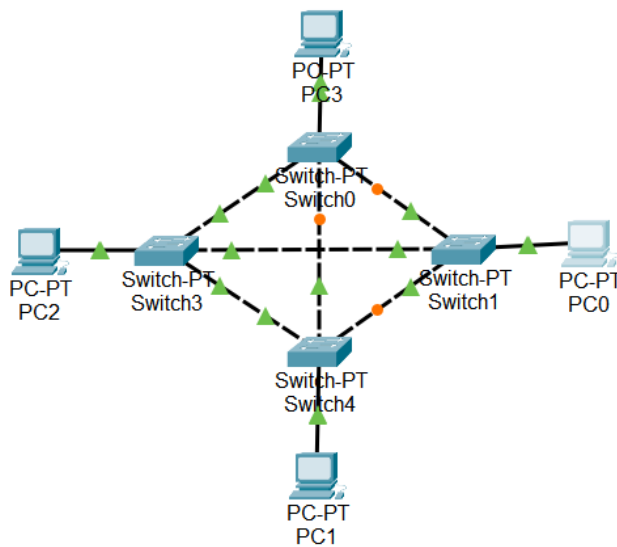Physical   Config   Desktop   Programming   Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 220.16.10.5

Pinging 220.16.10.5 with 32 bytes of data:

Reply from 220.16.10.5: bytes=32 time<1ms TTL=128
Reply from 220.16.10.5: bytes=32 time<1ms TTL=128
Reply from 220.16.10.5: bytes=32 time<1ms TTL=128
Reply from 220.16.10.5: bytes=32 time<1ms TTL=128

Ping statistics for 220.16.10.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

5. Mesh

Observation and Results:

In Cisco Packet Tracer, Bus topology connected all devices along a single line, making it simple but prone to collisions. Ring topology formed a closed loop, allowing orderly communication but risking complete failure if one device broke. Star topology linked devices to a central switch, offering easy expansion and reliability. Tree topology extended Star in a hierarchical structure, providing scalability but requiring careful management. Mesh topology connected every device to every other, offering high reliability but demanding more cables and complex setup.

Inference:

All network topologies — Bus, Ring, Star, Tree, and Mesh — were successfully designed, configured, and simulated in Cisco Packet Tracer. Each topology demonstrated expected operational behavior based on its structure, validating their theoretical characteristics.

ASSIGNMENT-2

II. Create 3 LAN networks connected via a single Router (CPT). Choose appropriate router, connection and configure it. Each LAN network is configured via Tree, Star and Ring topologies respectively.
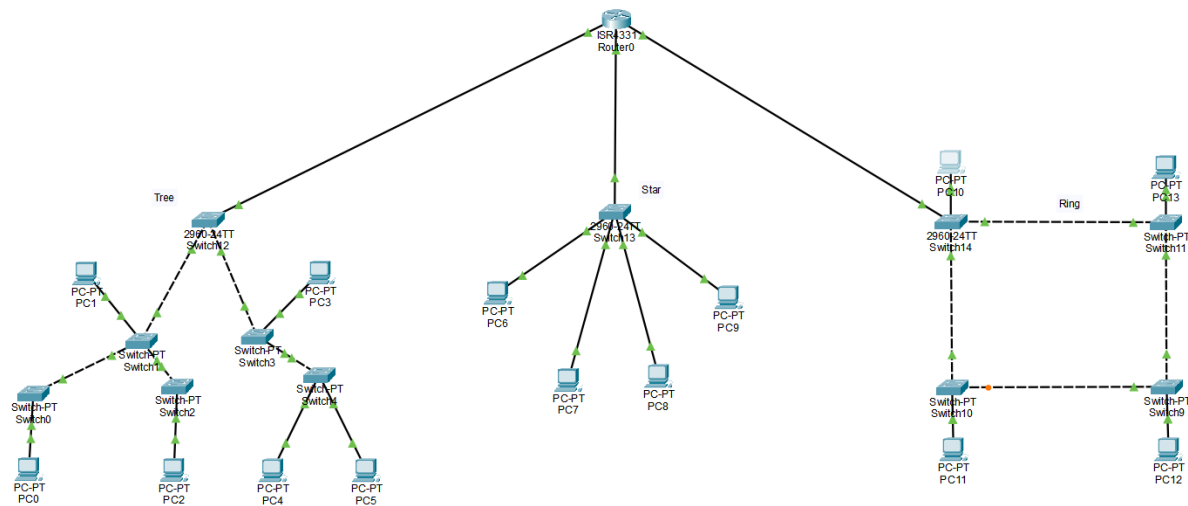
Router Config:

```
Device Name: Router0
Device Model: ISR4331
Hostname: Router

Port                   Link   VLAN   IP Address        IPv6 Address        MAC Address
GigabitEthernet0/0/0   Up     --     220.16.10.1/24    <not set>           000B.BE1B.5401
GigabitEthernet0/0/1   Up     --     220.16.11.1/24    <not set>           000B.BE1B.5402
GigabitEthernet0/0/2   Up     --     220.16.12.1/24    <not set>           000B.BE1B.5403
Vlan1                  Down   1      <not set>         <not set>           0001.9730.7EEB

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Router6
```

Tree to Star

PC0 to PC6

Star to Ring

PC7 to PC10

PC7

| Physical | Config | Desktop | Programming | Attributes |

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 220.16.12.15

Pinging 220.16.12.15 with 32 bytes of data:

Request timed out.
Reply from 220.16.12.15: bytes=32 time=14ms TTL=127
Reply from 220.16.12.15: bytes=32 time<1ms TTL=127
Reply from 220.16.12.15: bytes=32 time<1ms TTL=127

Ping statistics for 220.16.12.15:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 14ms, Average = 4ms

C:\>ping 220.16.12.15

Pinging 220.16.12.15 with 32 bytes of data:

Reply from 220.16.12.15: bytes=32 time<1ms TTL=127
Reply from 220.16.12.15: bytes=32 time<1ms TTL=127
Reply from 220.16.12.15: bytes=32 time<1ms TTL=127
Reply from 220.16.12.15: bytes=32 time=8ms TTL=127

Ping statistics for 220.16.12.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 2ms
```
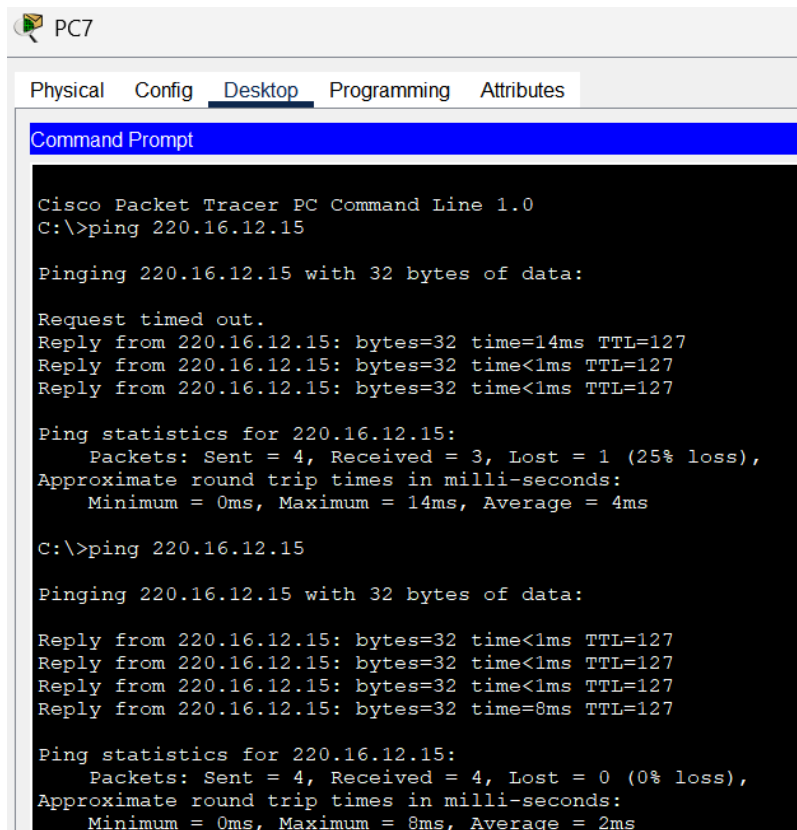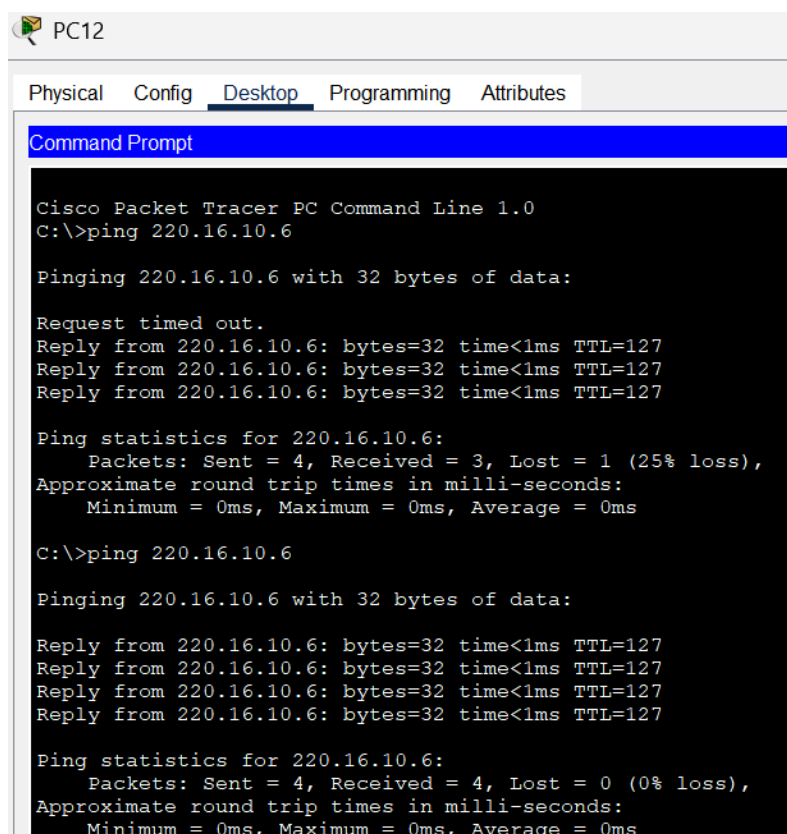
Ring to Tree

PC12 to PC1

PC12

| Physical | Config | Desktop | Programming | Attributes |

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 220.16.10.6

Pinging 220.16.10.6 with 32 bytes of data:

Request timed out.
Reply from 220.16.10.6: bytes=32 time<1ms TTL=127
Reply from 220.16.10.6: bytes=32 time<1ms TTL=127
Reply from 220.16.10.6: bytes=32 time<1ms TTL=127

Ping statistics for 220.16.10.6:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 220.16.10.6

Pinging 220.16.10.6 with 32 bytes of data:

Reply from 220.16.10.6: bytes=32 time<1ms TTL=127
Reply from 220.16.10.6: bytes=32 time<1ms TTL=127
Reply from 220.16.10.6: bytes=32 time<1ms TTL=127
Reply from 220.16.10.6: bytes=32 time<1ms TTL=127

Ping statistics for 220.16.10.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Observation and Results:
In the second assignment, three different LAN networks were configured using Tree, Star, and Ring topologies respectively, and were connected via a single router. In the first case, the Tree topology LAN (PC0 to PC6) was successfully connected to a Star topology LAN. The router efficiently managed communication between the two different structures. In the second case, the Star topology LAN (PC7 to PC10) was linked with a Ring topology LAN, and seamless data transfer was observed through the router. In the third case, a Ring topology LAN (PC12 to PC1) communicated with a Tree topology LAN through the same router, demonstrating successful inter-topology connectivity. The router acted as the bridge, handling traffic routing and addressing between the diverse network designs.

Inference:
This assignment highlights that a single router can efficiently manage multiple LANs with different internal topologies, maintaining clear and effective communication. The Tree, Star, and Ring networks, despite having distinct structures, could coexist and interact through proper router configuration. It also showed that routers are crucial for expanding networks that consist of heterogeneous topologies. Overall, the task emphasized that network design can flexibly incorporate different models based on specific requirements, with routers enabling their interconnection and management.