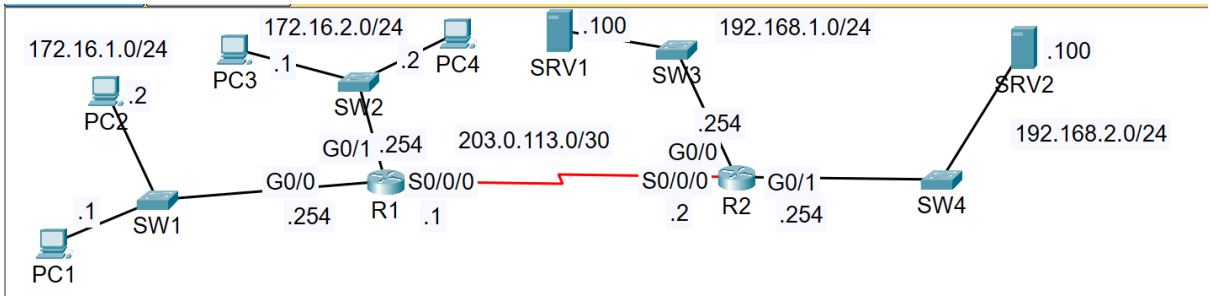
Network Topology:

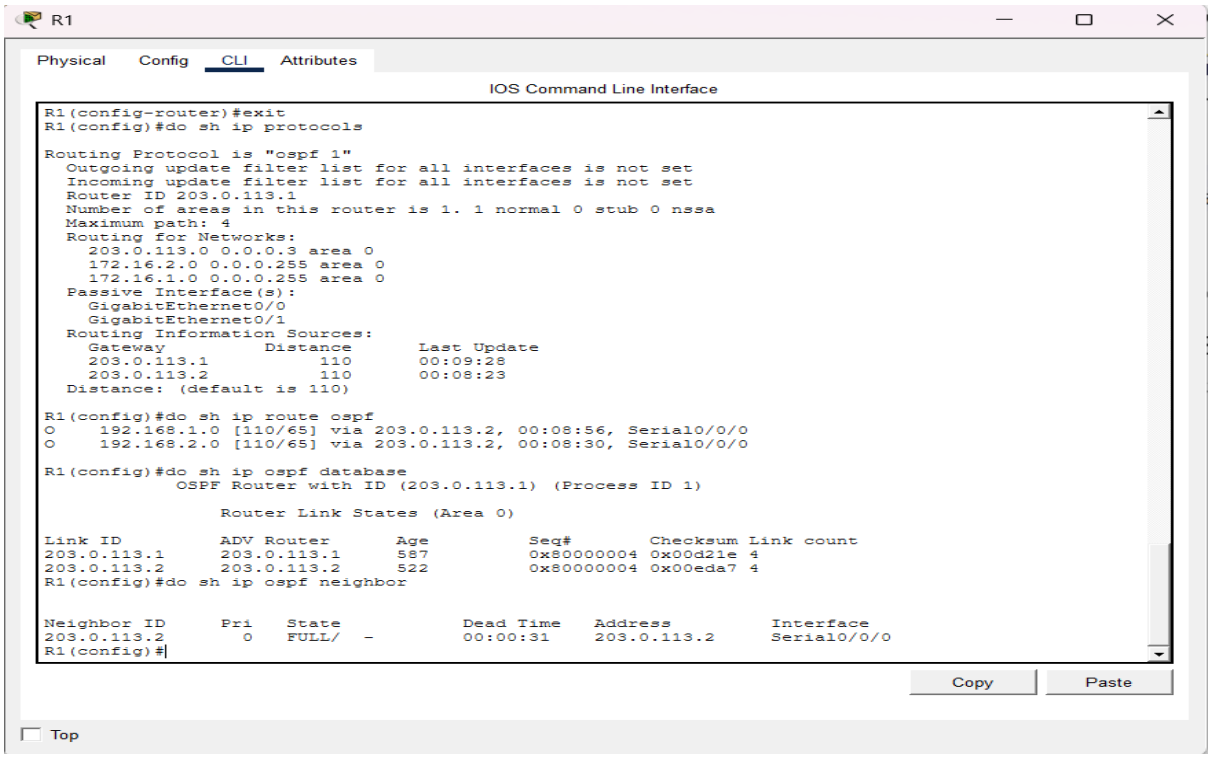


Instructions and actions:

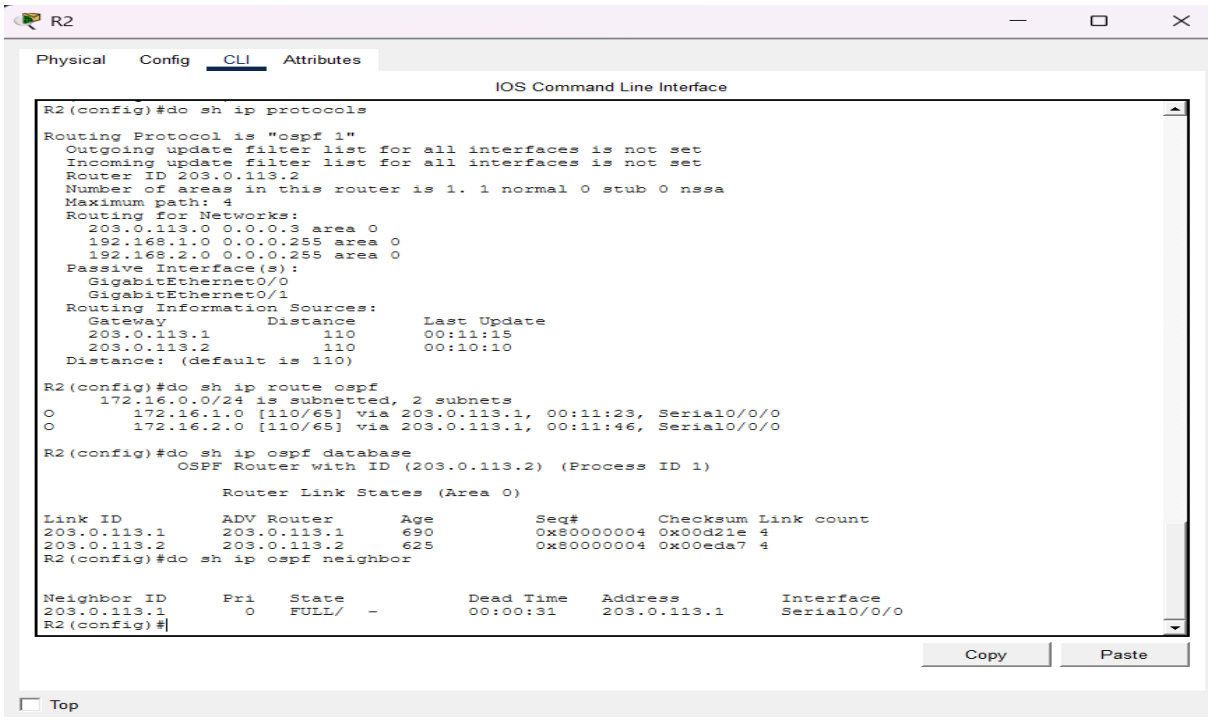
1. Configure OSPF on R1 and R2 to allow full connectivity between the PCs and servers.

   Configured

   R1 CLI:



   R2 CLI:



All the end hosts are able to ping each other.

2. Configure standard numbered ACLs on R1 and standard named ACLs on R2 such that –
   (a)Only PC1 and PC3 can access 192.168.1.0/24
   (b)Hosts in 172.16.2.0/24 can't access 192.168.2.0/24
   (c)172.16.1.0/24 can't access 172.16.2.0/24
   (d)172.16.2.0/24 can't access 172.16.1.0/24

   Condition (a) on R2 CLI:

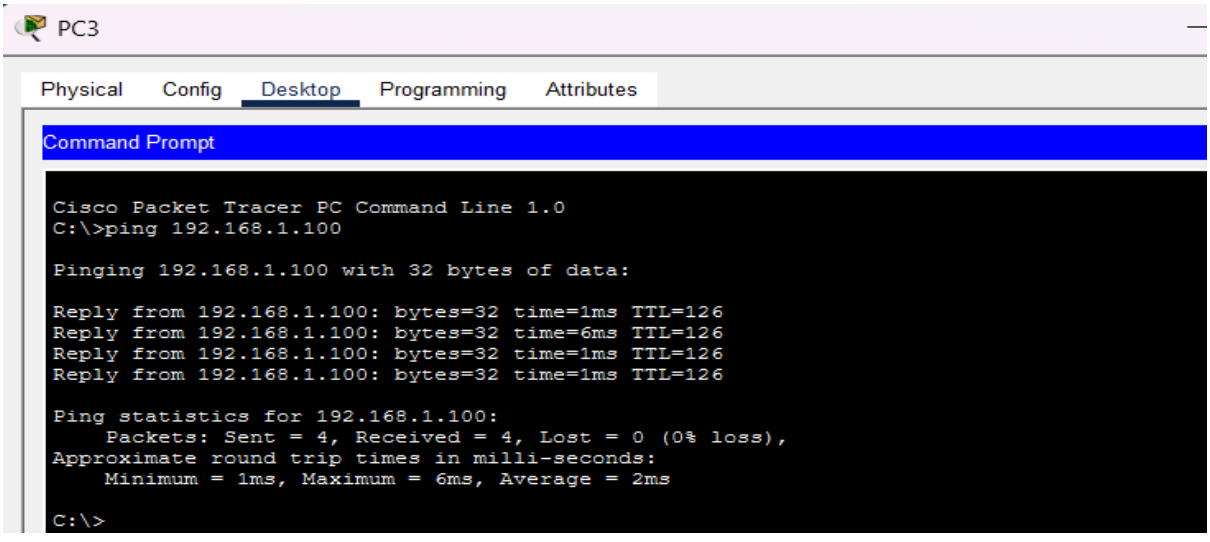
```
R2(config)#ip access-list standard R2_access
R2(config-std-nacl)#10 permit 172.16.1.1
R2(config-std-nacl)#20 permit 172.16.2.1
R2(config-std-nacl)#int g0/0
R2(config-if)#exit
R2(config)#ip access-list standard R2_access
R2(config-std-nacl)#no 10 permit 172.16.1.1
R2(config-std-nacl)#no 20 permit 172.16.2.1
R2(config-std-nacl)#10 permit ?
  A.B.C.D  Address to match
  any      Any source host
  host     A single host address
R2(config-std-nacl)#10 permit 172.16.1.1 ?
  A.B.C.D  Wildcard bits
  <cr>
R2(config-std-nacl)#10 permit 172.16.1.1 0.0.0.0
R2(config-std-nacl)#20 permit 172.16.2.1 0.0.0.0
R2(config-std-nacl)#int g0/0
R2(config-if)#ip access-group R2_access out
R2(config-if)#do sh run | section access_list
R2(config-if)#exit
```

   Only PC1 and PC3 can access the given network.

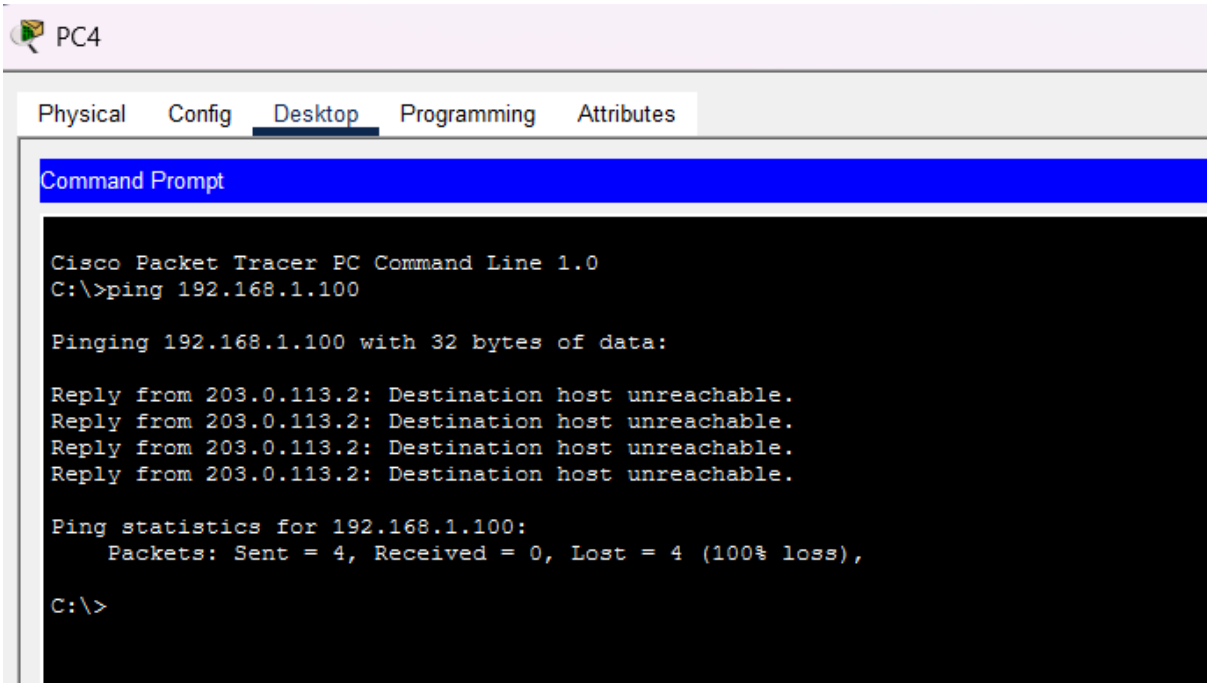
   PC1:

```
C:\>ping 192.168.1.100

Pinging 192.168.1.100 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.100: bytes=32 time=1ms TTL=126
Reply from 192.168.1.100: bytes=32 time=1ms TTL=126
Reply from 192.168.1.100: bytes=32 time=6ms TTL=126

Ping statistics for 192.168.1.100:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 6ms, Average = 2ms
```

   PC3:



Others:

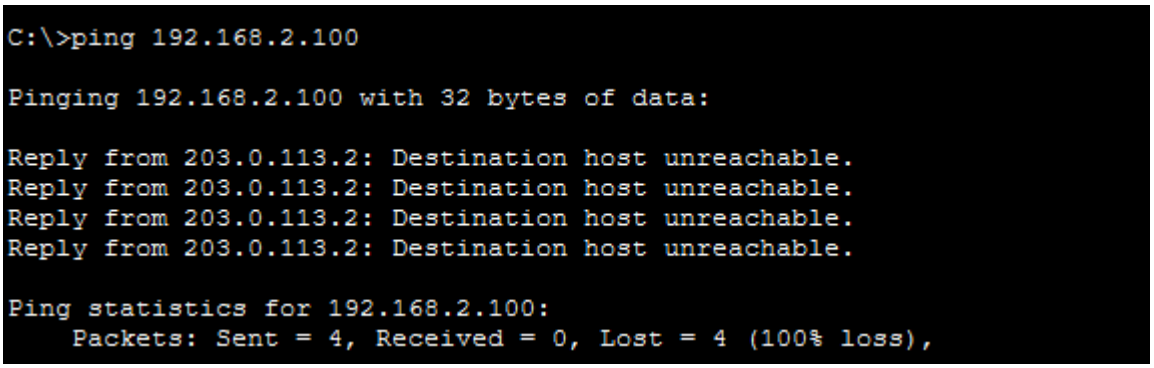


Condition (b) on R2 CLI:

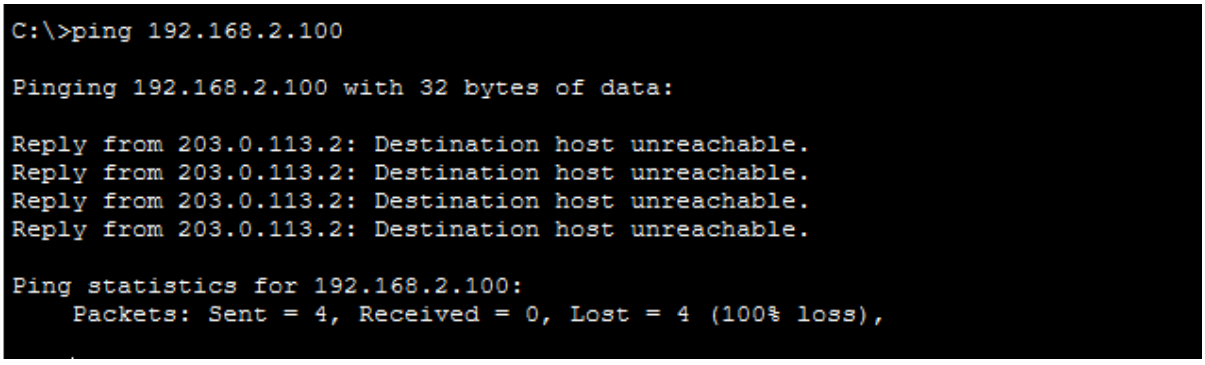
```
R2(config)#ip access-list standard R2_access_2
R2(config-std-nacl)#10 deny 172.16.2.0 0.0.0.255
R2(config-std-nacl)#20 permit any
R2(config-std-nacl)#int g0/1
R2(config-if)#ip access-group R2_access_2 out
R2(config-if)#do sh run
```

End hosts in 172.16.2.0/24 can’t access 192.168.2.0 but others can.

PC3:



PC4:



Others:

```
C:\>ping 192.168.2.100

Pinging 192.168.2.100 with 32 bytes of data:

Reply from 192.168.2.100: bytes=32 time=1ms TTL=126
Reply from 192.168.2.100: bytes=32 time=2ms TTL=126
Reply from 192.168.2.100: bytes=32 time=7ms TTL=126
Reply from 192.168.2.100: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.2.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 7ms, Average = 2ms
```

Condition (c) on R1 CLI:

```
R1>en
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#access-list ?
  <1-99>     IP standard access list
  <100-199>  IP extended access list
R1(config)#access-list 1 deny 172.16.1.0 0.0.0.255
R1(config)#access-list 1 permit any
R1(config)#int g0/1
R1(config-if)#ip access-group 1 out
```

PC1:

```
C:\>ping 172.16.2.1

Pinging 172.16.2.1 with 32 bytes of data:

Reply from 172.16.1.254: Destination host unreachable.
Reply from 172.16.1.254: Destination host unreachable.
Reply from 172.16.1.254: Destination host unreachable.
Reply from 172.16.1.254: Destination host unreachable.

Ping statistics for 172.16.2.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

PC2:

```
C:\>ping 172.16.2.2

Pinging 172.16.2.2 with 32 bytes of data:

Reply from 172.16.1.254: Destination host unreachable.
Reply from 172.16.1.254: Destination host unreachable.
Reply from 172.16.1.254: Destination host unreachable.
Reply from 172.16.1.254: Destination host unreachable.

Ping statistics for 172.16.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

SRV1:

```
C:\>ping 172.16.2.1

Pinging 172.16.2.1 with 32 bytes of data:

Reply from 172.16.2.1: bytes=32 time=1ms TTL=126
Reply from 172.16.2.1: bytes=32 time=7ms TTL=126
Reply from 172.16.2.1: bytes=32 time=6ms TTL=126
Reply from 172.16.2.1: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 7ms, Average = 3ms
```

SRV2 (because of condition (b))*:

```
C:\>ping 172.16.2.2

Pinging 172.16.2.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 172.16.2.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Condition (d) on R1 CLI:

```
R1(config)#access-list 2 deny 172.16.2.0 0.0.0.255
R1(config)#access-list 2 permit any
R1(config)#int g0/0
R1(config-if)#access-group 2 out
                ^
% Invalid input detected at '^' marker.

R1(config-if)#ip access-group 2 out
R1(config-if)#
```

Now, PC3 and PC4:

```
C:\>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:

Reply from 172.16.2.254: Destination host unreachable.
Reply from 172.16.2.254: Destination host unreachable.
Reply from 172.16.2.254: Destination host unreachable.
Reply from 172.16.2.254: Destination host unreachable.

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

SRV1:

```
C:\>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:

Reply from 172.16.1.1: bytes=32 time=1ms TTL=126
Reply from 172.16.1.1: bytes=32 time=1ms TTL=126
Reply from 172.16.1.1: bytes=32 time=1ms TTL=126
Reply from 172.16.1.1: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

SRV2:

```
C:\>ping 172.16.1.2

Pinging 172.16.1.2 with 32 bytes of data:

Reply from 172.16.1.2: bytes=32 time=1ms TTL=126
Reply from 172.16.1.2: bytes=32 time=1ms TTL=126
Reply from 172.16.1.2: bytes=32 time=1ms TTL=126
Reply from 172.16.1.2: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```