

COMPUTER NETWORKS

PRACTICAL -4

TITLE: Implement access control list in a network of an organization containing different departments.

SCENARIO:

There is an organization named CORPUS that has 6 different departments: Admin, HR, Support, Development, Testing and Design. IPv4 addressing scheme is used for assigning the IP address to the device. Each department has multiple employees, which have specific rights to communicate within the network. The details of the rights are as mentioned below:

The Admin Department can access all the devices in the organization. The Testing Department can only communicate with the Admin, HR and Development department. Only the head of the development department can communicate with the support department. Two members of the support department out of five members can contact the design department.

Implement the network in Cisco packet tracer, as per the requirement. As the number of the end devices are not mentioned in the requirement, you can take as per your requirement.

Help the admin to create the network and establish the connection between the devices.

PROCEDURE:

Networks Decided for all the departments are:

Admin: 192.168.1.0

HR: 192.168.2.0

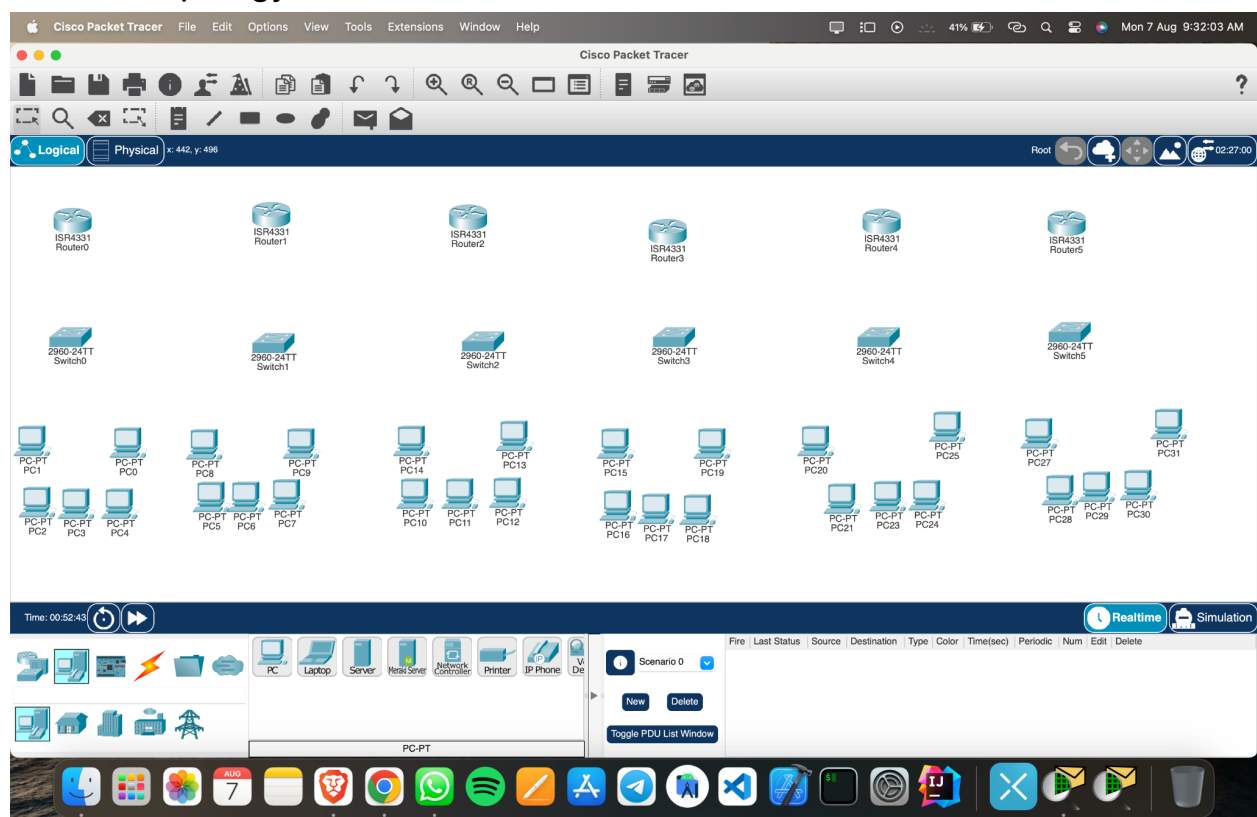
Support: 192.168.3.0

Development: 192.168.4.0

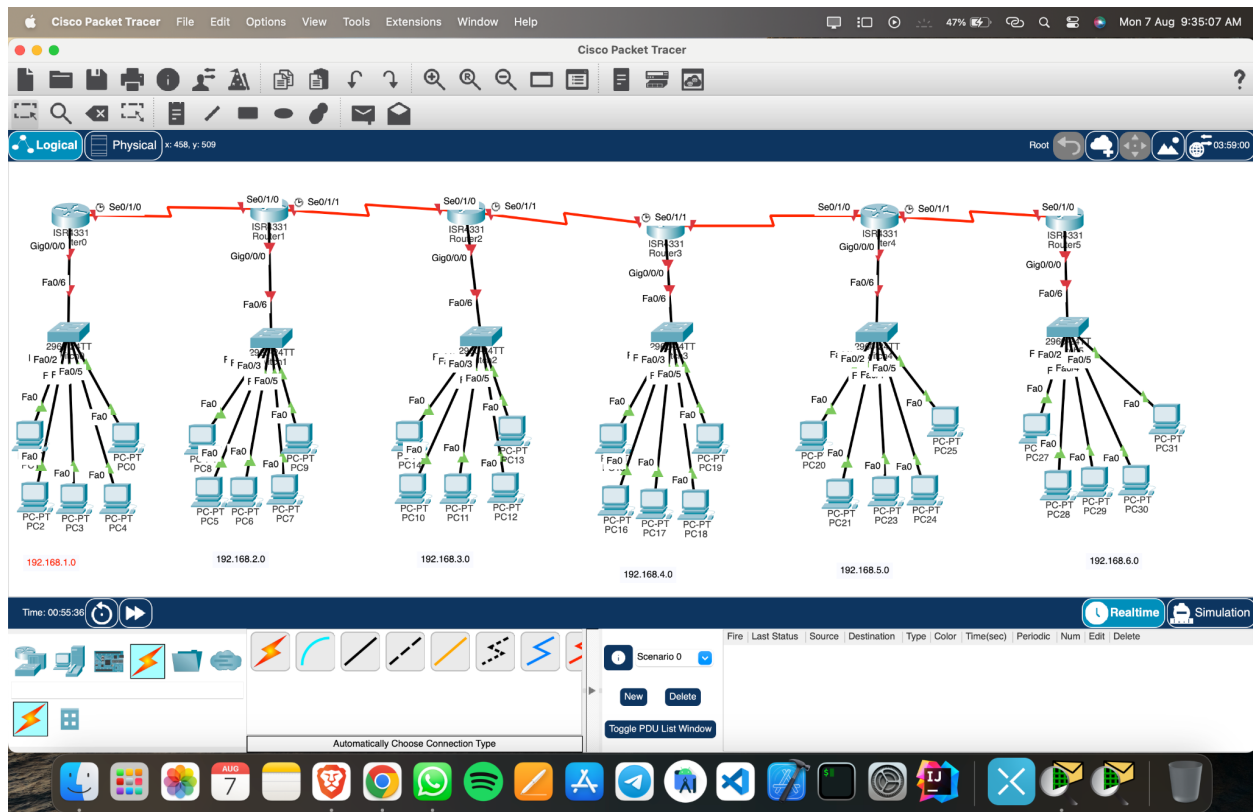
Testing: 192.168.5.0

Design: 192.168.6.0

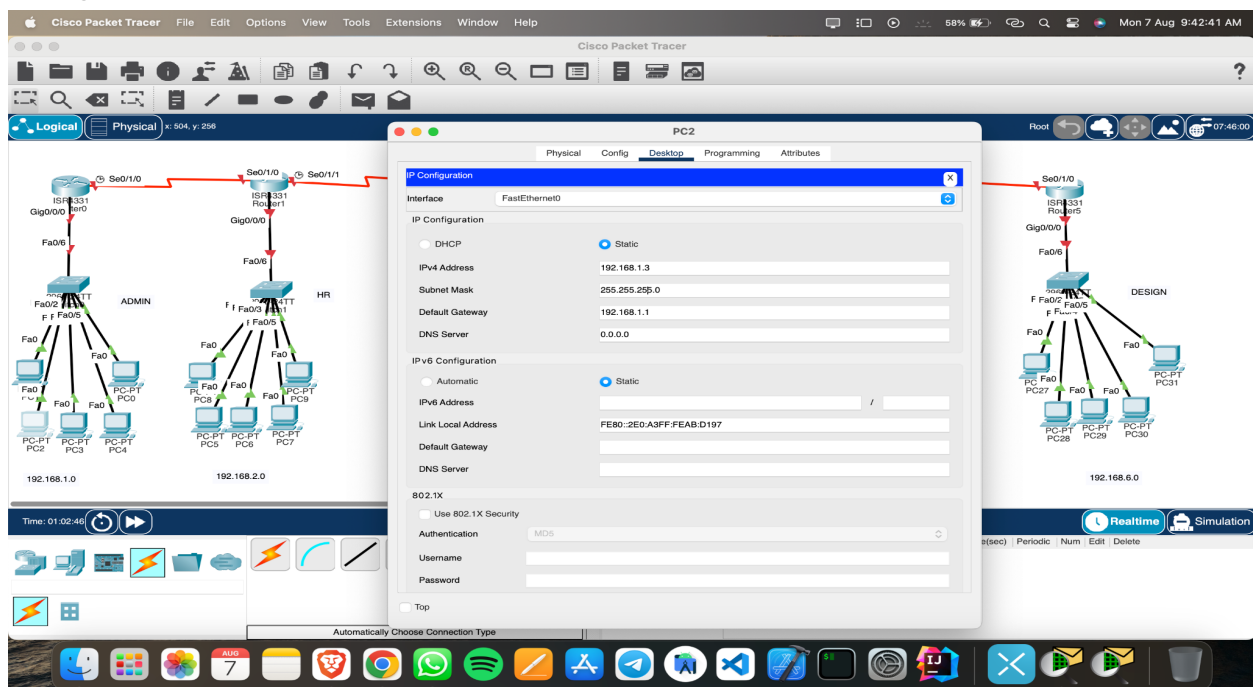
Created topology as shown below.



Connected all the PC's and servers with the respective switches and then with the respective Routers. To connect router to router I have added NIM2T in each router and connected them with serial DTE wire.



Assigned all the IP addresses to PC's and Routers.



After that I gave routing to all the routers using CLI.



The screenshot shows the CLI interface of a router named Router0. The interface has tabs for Physical, Config, CLI (selected), and Attributes. The main area displays the IOS Command Line Interface. The user has entered the following commands:

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#interface Serial0/1/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

Router(config-if)#router rip
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.1.0
Router(config-router)#network 192.168.3.0
Router(config-router)#network 192.168.4.0
Router(config-router)#network 192.168.5.0
Router(config-router)#network 192.168.6.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#network 50.0.0.0
Router(config-router)#
```

At the bottom of the CLI window, there are 'Copy' and 'Paste' buttons. Below the CLI window, there is a 'Top' button with a checkbox.

Now pinged all the computers from all the different networks from the admin department.



The screenshot shows a Cisco Packet Tracer PC Command Line window for a PC named PC0. The window has tabs for Physical, Config, Desktop, Programming, and Attributes, with Desktop selected. The Command Prompt shows the following output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=8ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=32ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 32ms, Average = 10ms

C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.3.3: bytes=32 time=32ms TTL=125
Reply from 192.168.3.3: bytes=32 time=2ms TTL=125
Reply from 192.168.3.3: bytes=32 time=89ms TTL=125

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 89ms, Average = 41ms

C:\>ping 192.168.4.3

Pinging 192.168.4.3 with 32 bytes of data:

Reply from 192.168.4.3: bytes=32 time=74ms TTL=124
Reply from 192.168.4.3: bytes=32 time=3ms TTL=124
Reply from 192.168.4.3: bytes=32 time=59ms TTL=124
Reply from 192.168.4.3: bytes=32 time=3ms TTL=124

Ping statistics for 192.168.4.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 74ms, Average = 34ms

C:\>ping 192.168.5.3

Pinging 192.168.5.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.5.3: bytes=32 time=95ms TTL=123
Reply from 192.168.5.3: bytes=32 time=92ms TTL=123
Reply from 192.168.5.3: bytes=32 time=80ms TTL=123

Ping statistics for 192.168.5.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 80ms, Maximum = 95ms, Average = 89ms

C:\>ping 192.168.6.3

Pinging 192.168.6.3 with 32 bytes of data:

Reply from 192.168.6.3: bytes=32 time=112ms TTL=122
Reply from 192.168.6.3: bytes=32 time=125ms TTL=122
Reply from 192.168.6.3: bytes=32 time=5ms TTL=122
Reply from 192.168.6.3: bytes=32 time=81ms TTL=122
```

At the bottom of the window, there is a checkbox labeled "Top" which is currently unchecked.

ACL:

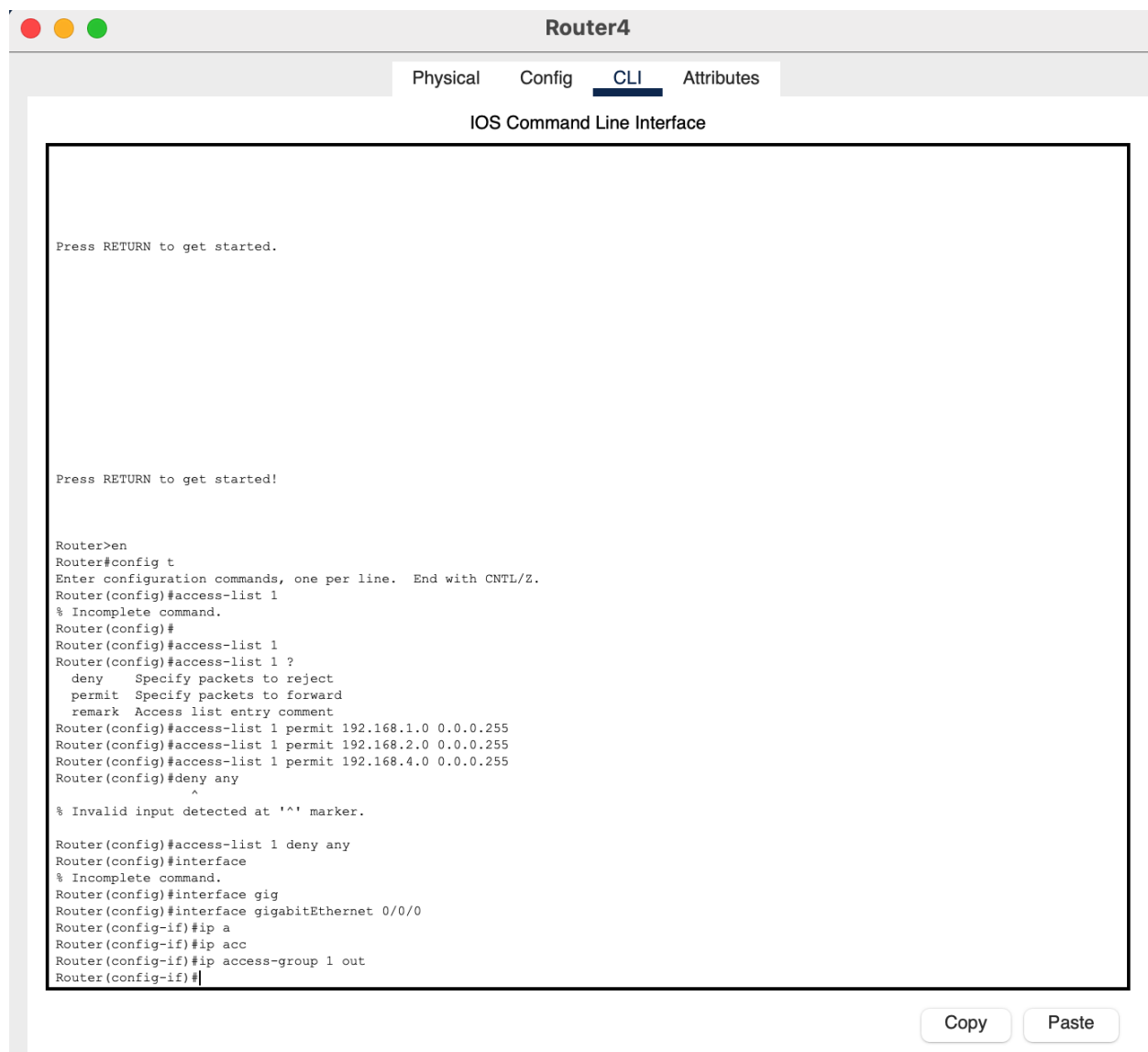
ACL=Access Control List. There are two types of ACL.

1. Standard ACL(1-99)
2. Extended ACL(100-199)

In this scenario I used Standard ACL.

PROVIDING ACCESS RIGHTS:

Creating an access list for the Testing Department. It can Access Admin HR and Development.



The screenshot shows a Cisco Router CLI interface titled "Router4". The interface has tabs for "Physical", "Config", "CLI", and "Attributes", with "CLI" selected. Below the tabs is the "IOS Command Line Interface". The terminal output shows the following commands and responses:

```
Press RETURN to get started.

Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#access-list 1
% Incomplete command.
Router(config)#
Router(config)#access-list 1
Router(config)#access-list 1 ?
    deny      Specify packets to reject
    permit    Specify packets to forward
    remark    Access list entry comment
Router(config)#access-list 1 permit 192.168.1.0 0.0.0.255
Router(config)#access-list 1 permit 192.168.2.0 0.0.0.255
Router(config)#access-list 1 permit 192.168.4.0 0.0.0.255
Router(config)#deny any
      ^
% Invalid input detected at '^' marker.

Router(config)#access-list 1 deny any
Router(config)#interface
% Incomplete command.
Router(config)#interface gig
Router(config)#interface gigabitEthernet 0/0/0
Router(config-if)#ip a
Router(config-if)#ip acc
Router(config-if)#ip access-group 1 out
Router(config-if)#
```

At the bottom right of the terminal window, there are two buttons: "Copy" and "Paste".

PC21

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.2: bytes=32 time=4ms TTL=123
Reply from 192.168.1.2: bytes=32 time=76ms TTL=123
Reply from 192.168.1.2: bytes=32 time=32ms TTL=123

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 76ms, Average = 37ms

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=52ms TTL=124
Reply from 192.168.2.2: bytes=32 time=33ms TTL=124
Reply from 192.168.2.2: bytes=32 time=98ms TTL=124
Reply from 192.168.2.2: bytes=32 time=75ms TTL=124

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 33ms, Maximum = 98ms, Average = 64ms

C:\>ping 192.168.3.3

Pinging 192.168.3.3 with 32 bytes of data:

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

Ping statistics for 192.168.3.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.2: bytes=32 time=55ms TTL=126
Reply from 192.168.4.2: bytes=32 time=47ms TTL=126
Reply from 192.168.4.2: bytes=32 time=35ms TTL=126
Reply from 192.168.4.2: bytes=32 time=1ms TTL=126

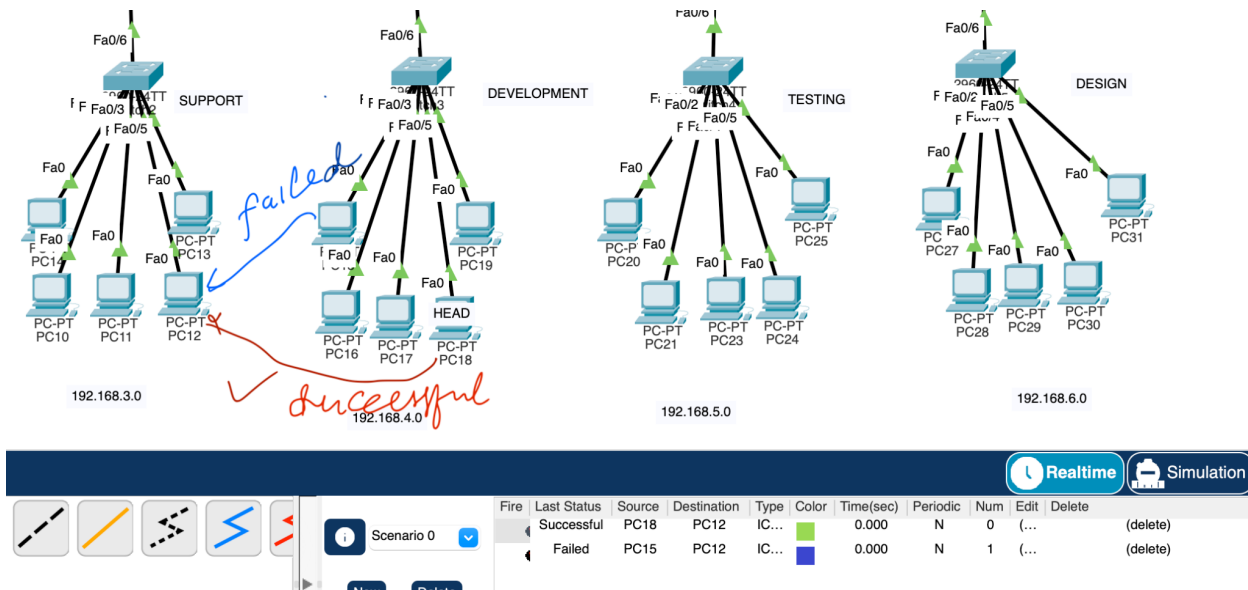
Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 55ms, Average = 34ms

C:\>
```

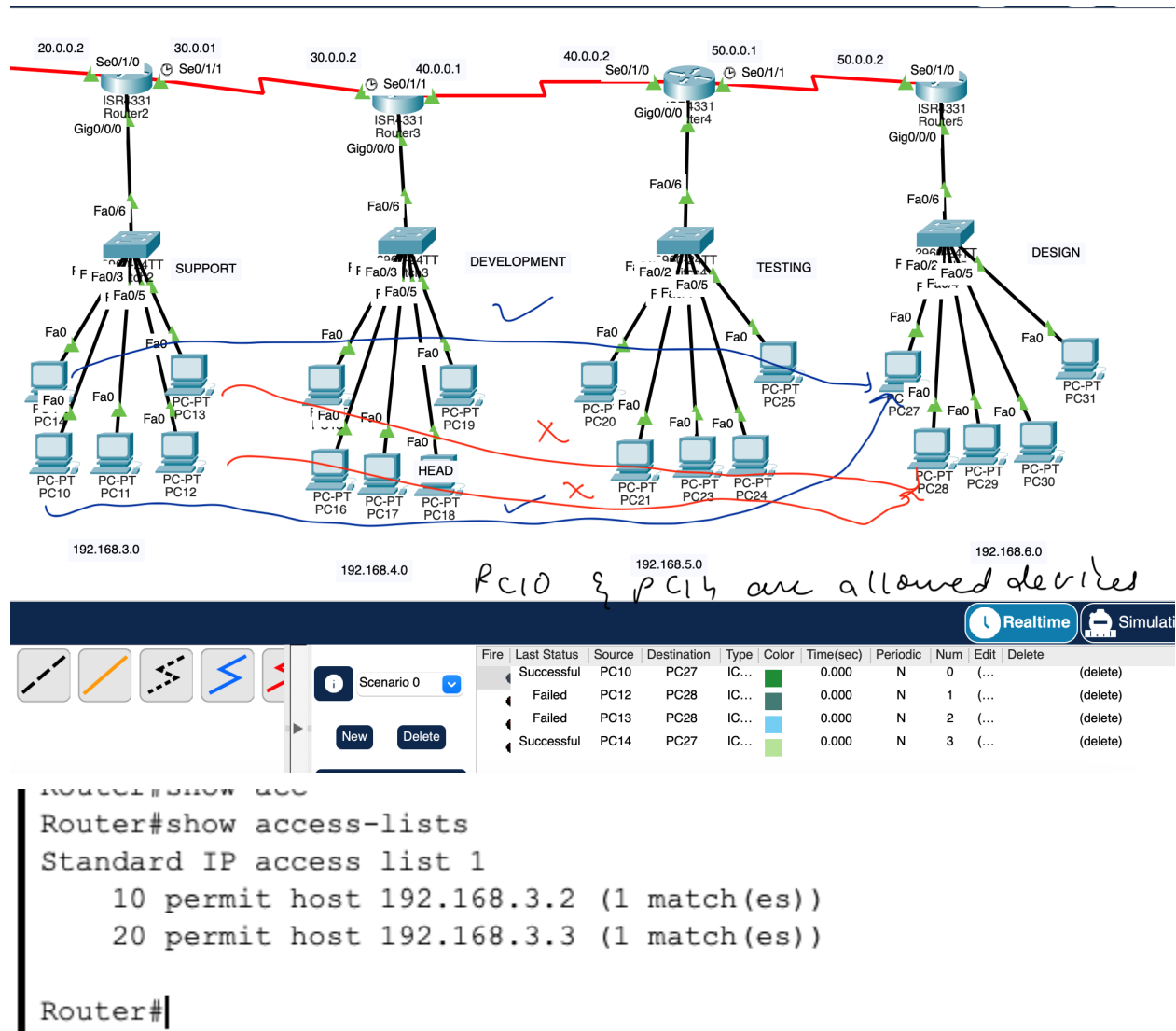
☐ Top

We can see that it can only access permitted departments.

Similarly implemented for the support department as we can see only the head of the development department can access no other can access.



Similarly only two members of the support department can access the Design Department.



CONCLUSION: Learned how to implement the ACL and how to restrict other unauthorized users from accessing the departments.