COMPUTER NETWORKS

LAB RECORD

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1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool

Fabrication of Cables

Objective: To practice the color code for different cables. Observe the Lan Tester and make the decision accordingly.

Theory: A twisted pair consists of two insulated conductor twisted together in the shape of a spiral. It can be shielded or unshielded. The unshielded twisted pair cables are very cheap and easy to install. But they are very badly affected by the electromagnetic noise interference. Twisting of wires will reduce the effect of noise or external interference. The induced emf into the two wires due to interference tends to cancel each other due to twisting. Number of twists per unit length will determine the quality of cable. More twists means better quality. There are 3 types of UTP cables:

1) Straight-through cable

2) Crossover cable

3) Roll-over cable A.

Straight-through cable

Straight-Through refers to cables that have the pin assignments on each end of the cable. In other words Pin 1 connector A goes to Pin 1 on connector B, Pin 2 to Pin 2 etc. Straight-Through wired cables are most commonly used to connect a host to client. When we talk about cat5e patch cables, the Straight-Through wired cat5e patch cable is used to connect computers, printers and other network client devices to the router switch or hub (the host device in this instance).

B. Crossover cable

Crossover wired cables (commonly called crossover cables) are very much like Straight-Through cables with the exception that TX and RX lines are crossed (they are at opposite positions on either end of the cable. Using the 568-B standard as an example below you will see that Pin 1 on connector A goes to Pin 3 on connector B. Pin 2 on connector A goes to Pin 6 on connector B etc. Crossover cables are most commonly used to connect two hosts directly.

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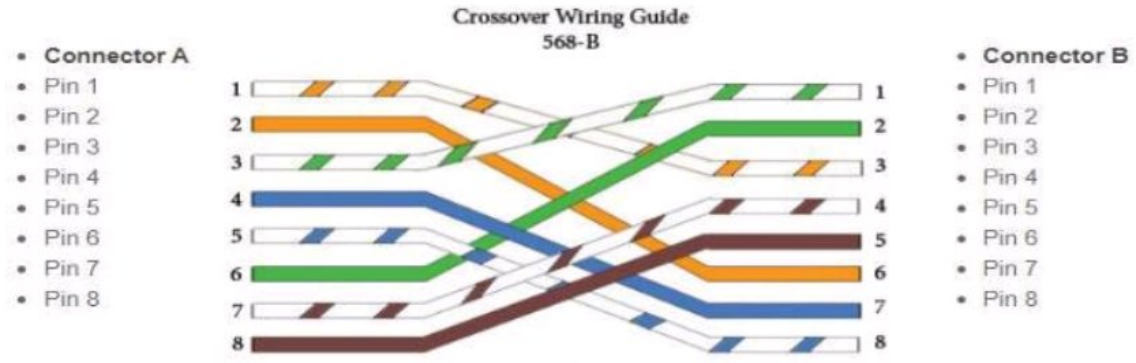
Examples would be connecting a computer directly to another computer, connecting a switch directly to another switch, or connecting a router to a router.

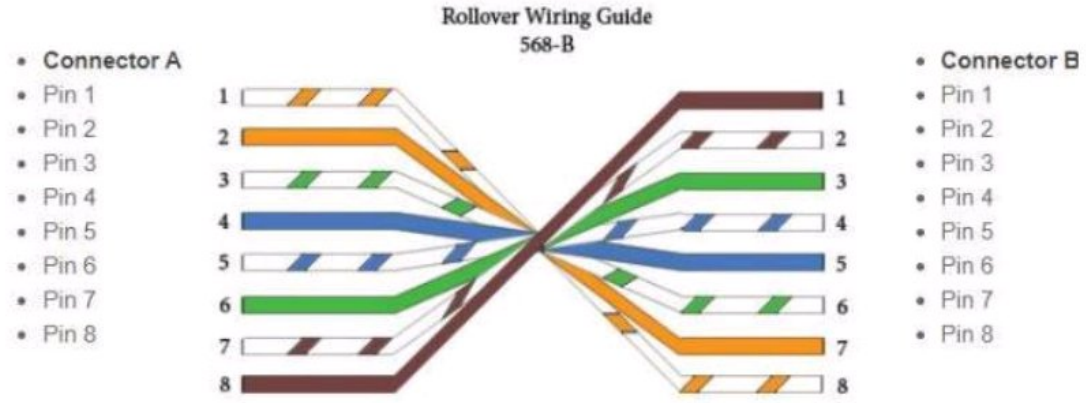
Note: While in the past when connecting two host devices directly a crossover cable was required. Now days most devices have auto sensing technology that detects the cable and device and crosses pairs when needed.

C. Roll-over cable

Rollover wired cables most commonly called rollover cables, have opposite Pin assignments on each end of the cable or in other words it is "rolled over". Pin 1 of connector A would be connected to Pin 8 of connector B. Pin 2 of connector A would be connected to Pin 7 of connector B and so on. Rollover cables, sometimes referred to as Yost cables are most commonly used to connect to a devices console port to make programming changes to the device. Unlike crossover and straight-wired cables, rollover cables are not intended to carry data but instead create an interface with the device.

Diagrams :





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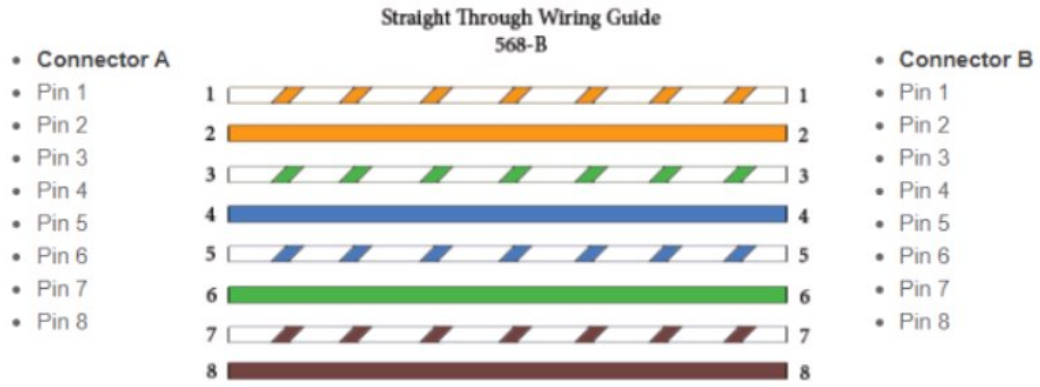
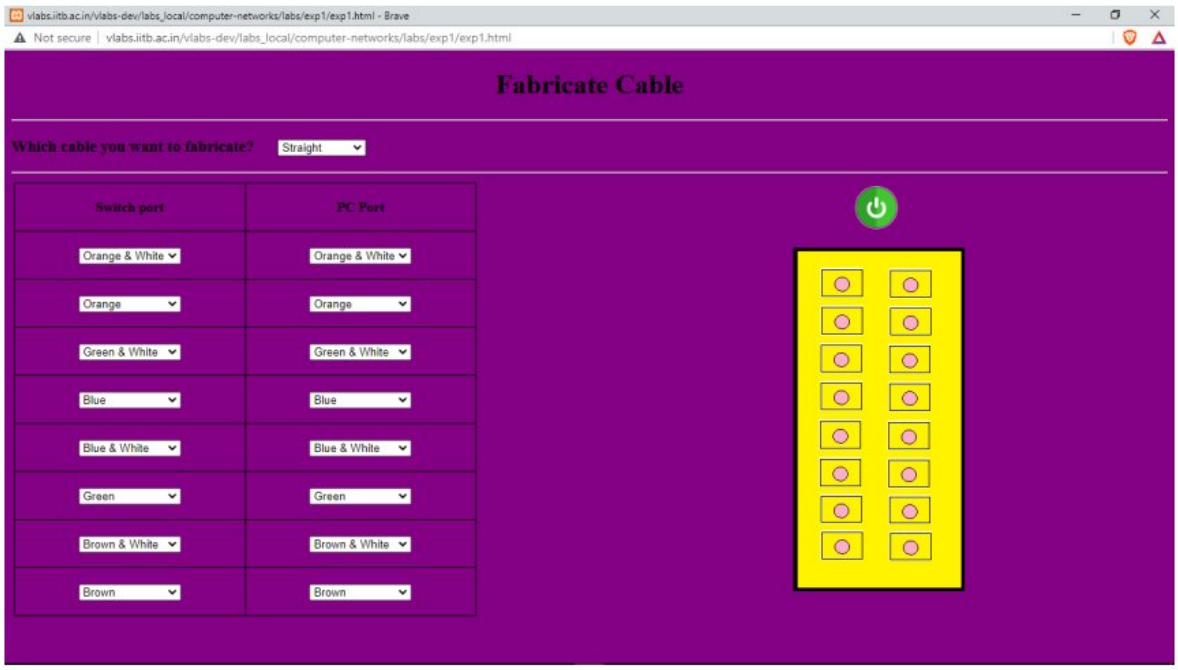


Results :



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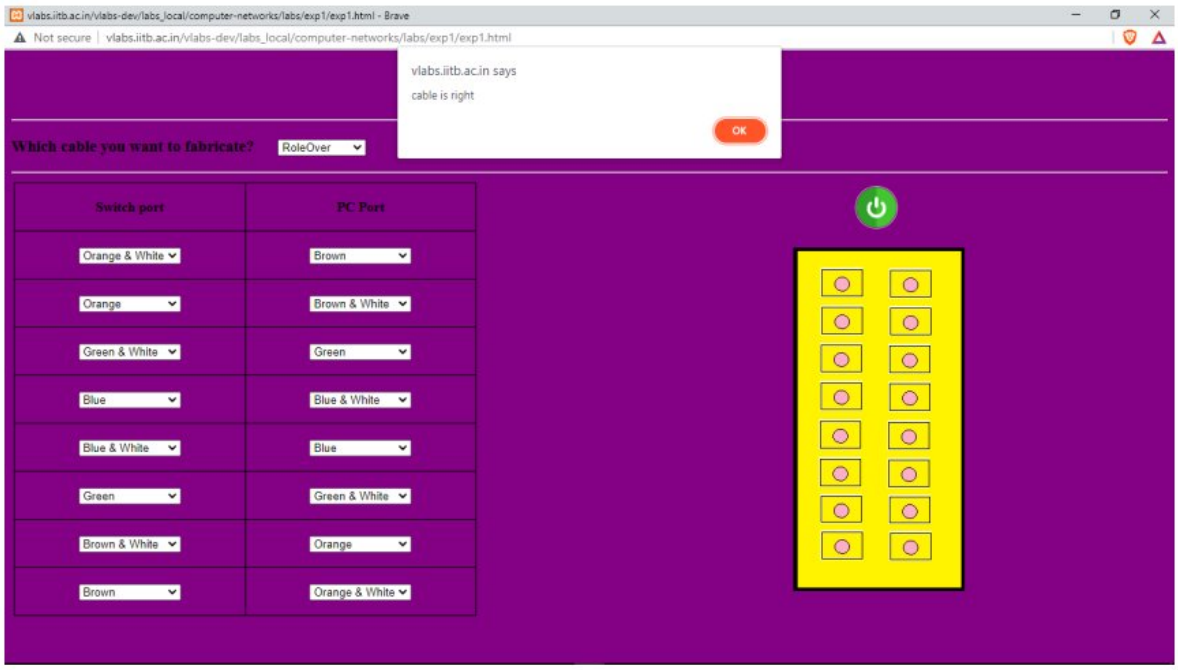

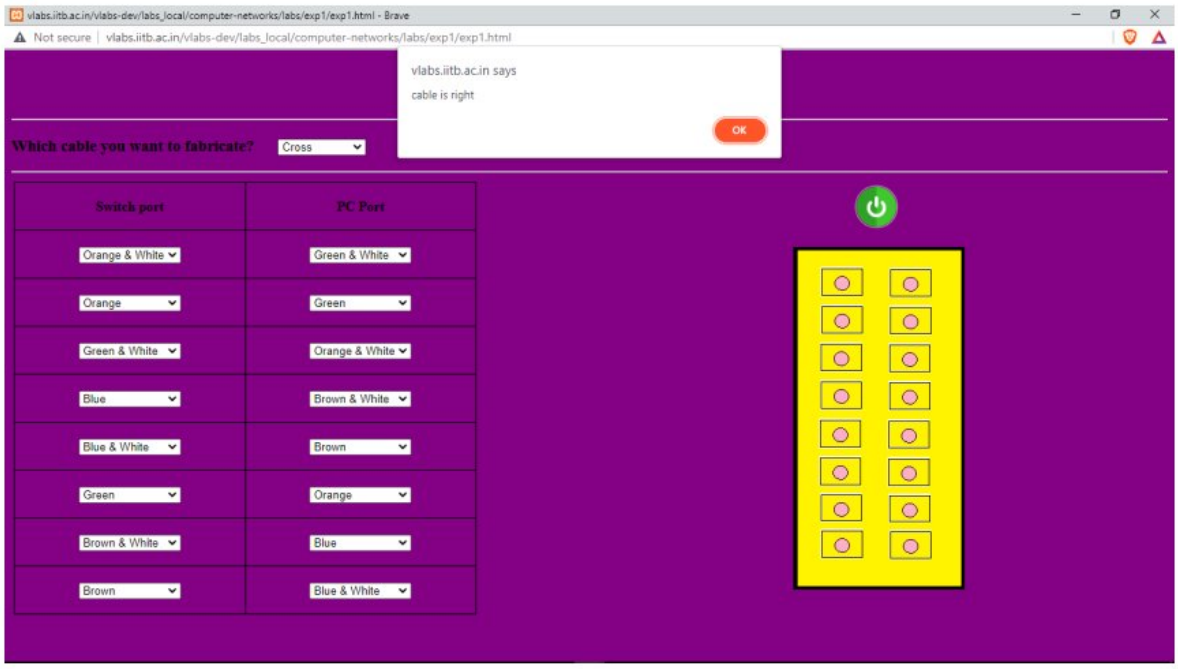

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2. Simulation of Peer to Peer Network (With Two PC's) :

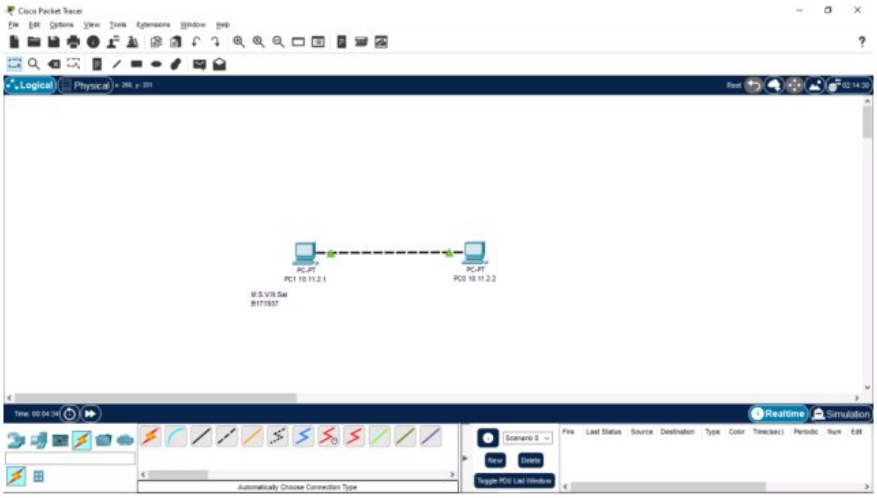
Objective:

To construct peer to peer topology with two pc's.

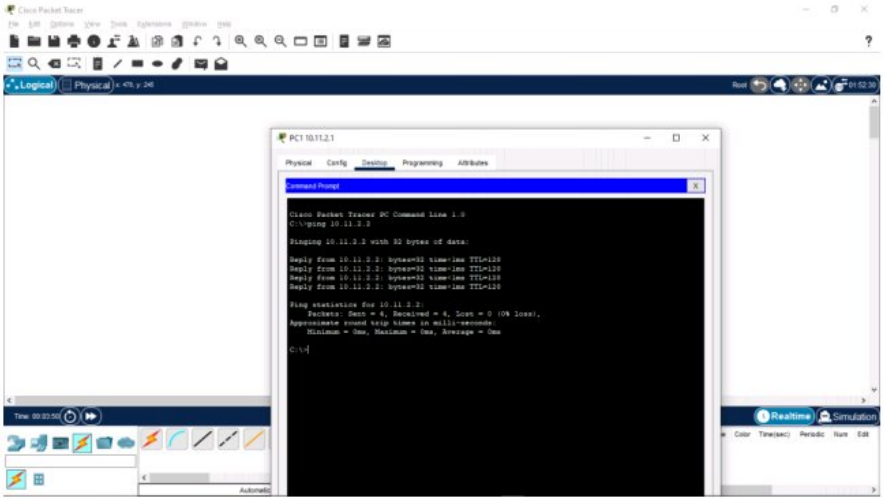
Theory:

Peer to peer is the relationship where the devices share the link equally. The examples are ring and mesh topologies. In peer to peer architecture every node is connected to other node directly. Every computer node is referred as peer. Every peer provides services to other peers as well as uses services of them. There is no central server present.

Simulation results:



Command used: ping 10.11.2.2



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3. Simulation of STAR TOPOLOGY USING HUB :

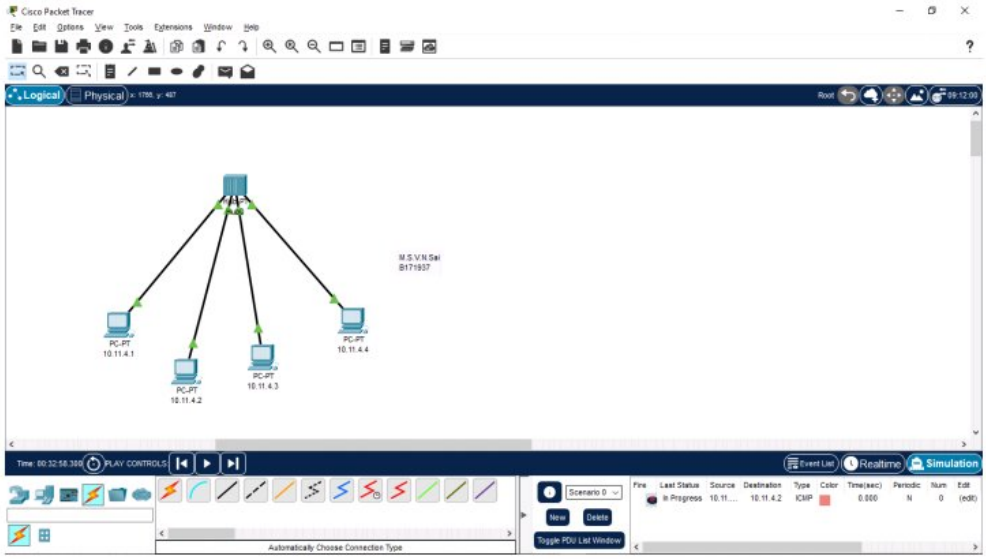
Objective:

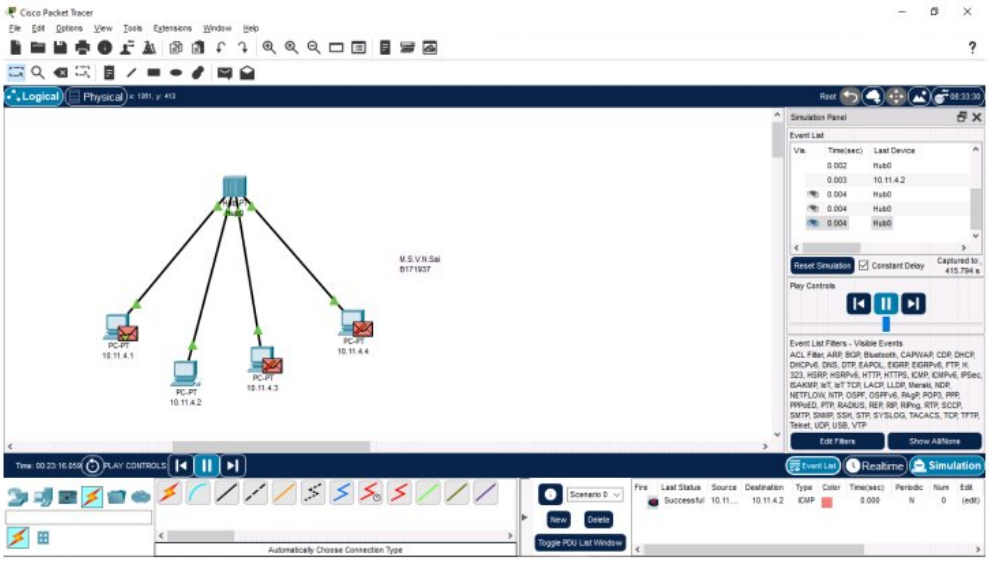
To construct star topology using hub.

Theory:

Star topology is a network topology in which each network component is physically connected to a central node such as a router, hub or switch. When the central node receives a packet from a connecting node, it can pass the packet on to other nodes in the network. A star topology is also known as a star network. A network hub is a node that broadcasts data to every computer or Ethernet based device connected to it. A device at the center of a star topology network. Hubs can be active (where they repeat signals set to them) or passive (where they do not repeat but merely split signals sent through them).

Simulation results:





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4. Simulation of STAR TOPOLOGY USING SWITCH

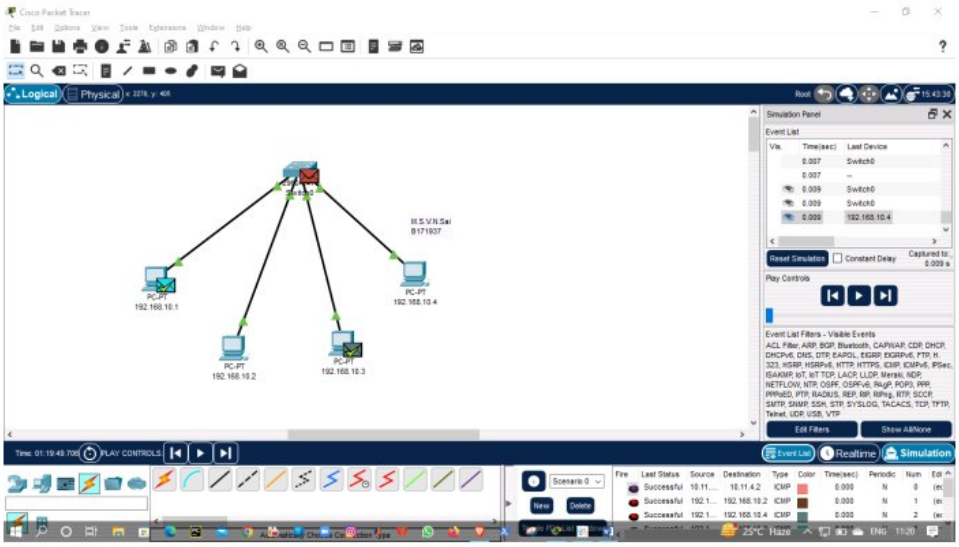
Objective:

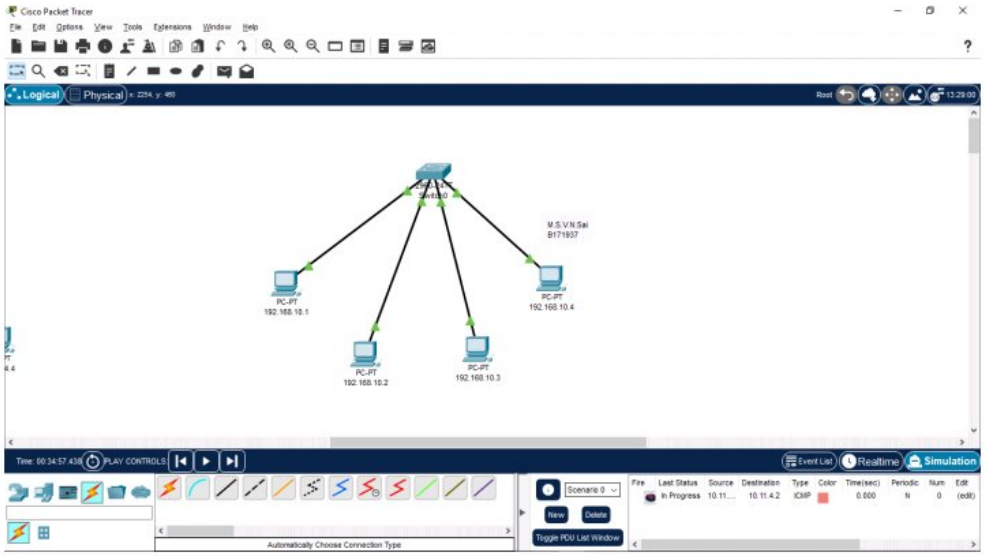
To construct star topology using switch.

Theory:

In a star topology all nodes indirectly connect to each other through one or more switches. The switch acts as a central point through which all communications are passed. Large networks using a star topology are usually controlled by one or more servers. Hence, the client-server model usually uses a star topology. Does unicasting, multicasting and broadcasting.

Simulation results:





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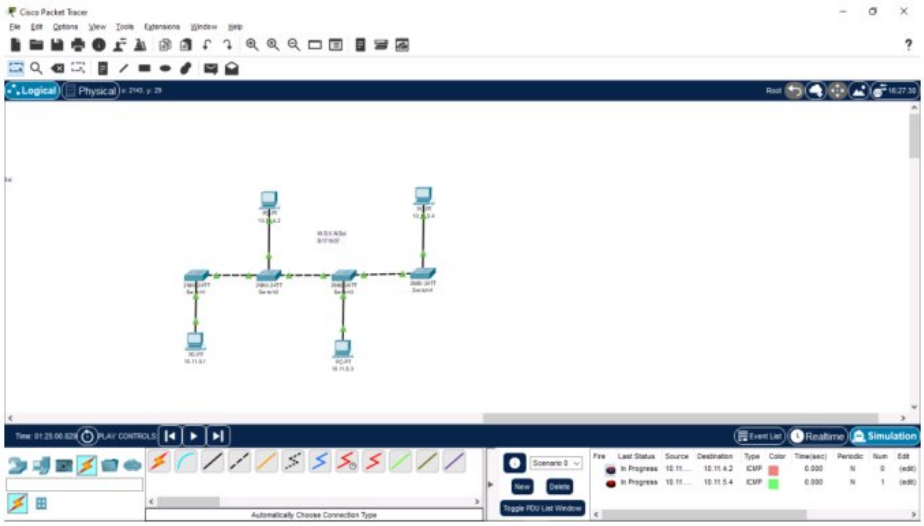
5. Simulation of BUS TOPOLOGY USING SWITCH

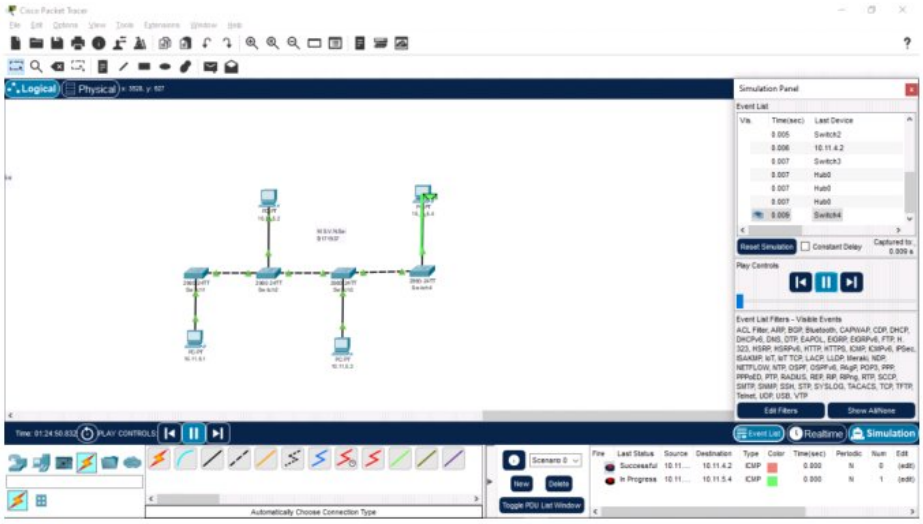
Objective: To construct bus topology using switch.

Theory:

A bus network is a network topology in which nodes are directly connected to a common half-duplex link called a bus. A host on a bus network is called a station. In a bus network, every station will receive all network traffic, and the traffic generated by each station has equal transmission priority. All nodes are connected to a Single Cable. If backbone cable is broken, Entire N/W fails. Easy to Install. Less Cabling is required.

Simulation results:





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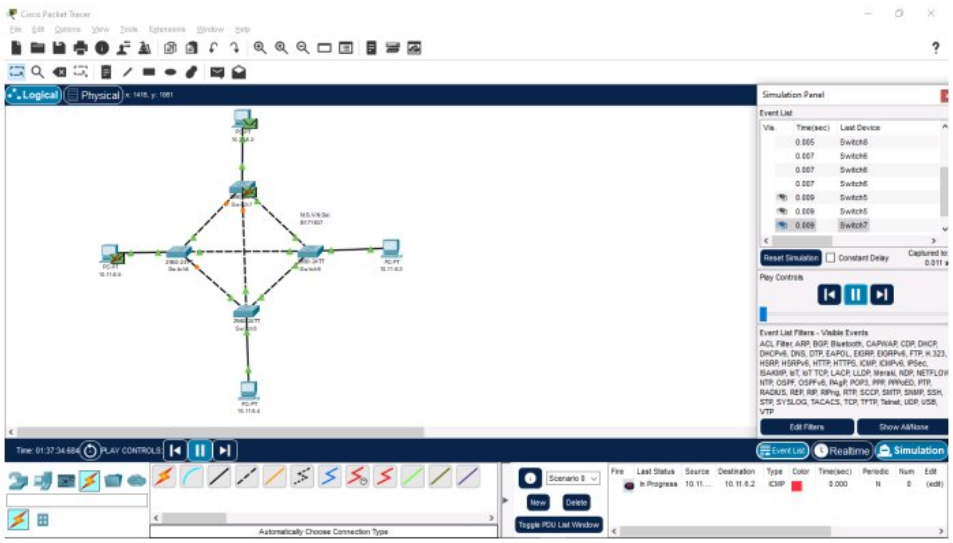
6. Simulation of MESH TOPOLOGY USING SWITCH

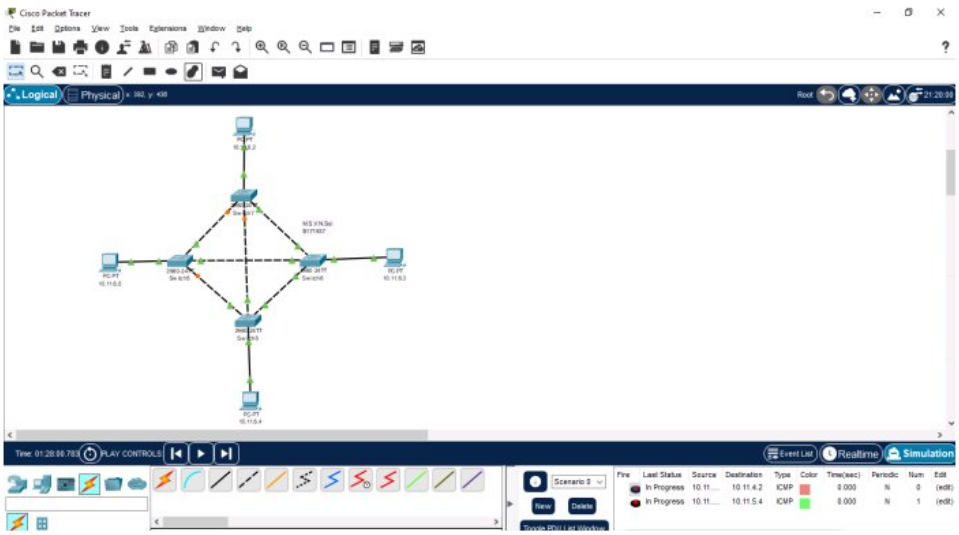
Objective: To construct mesh topology using switch.

Theory:

- Computers are interconnected.
- Dedicated Link between each Node.
- More Cabling is required.
- Highly Reliable Network.

Simulation results:





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7. Simulation of RING TOPOLOGY USING SWITCH

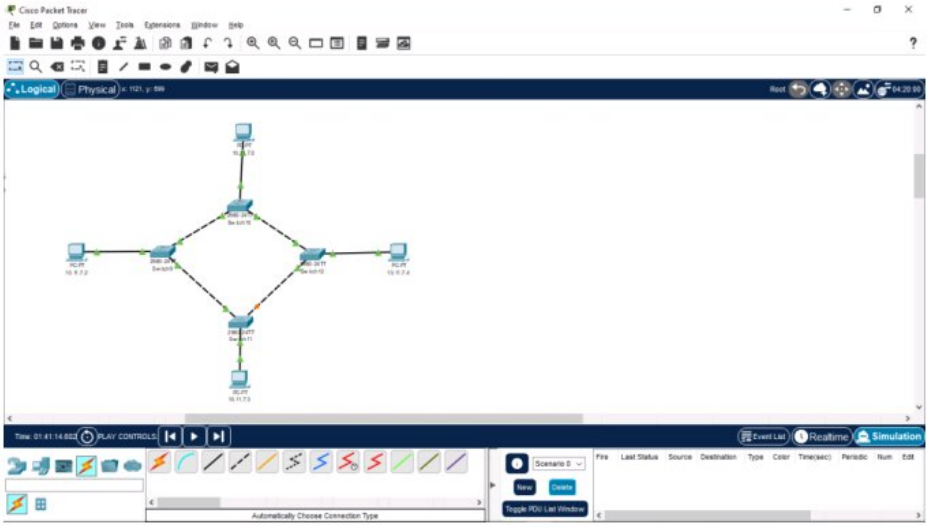
Objective: To construct ring topology using switch.

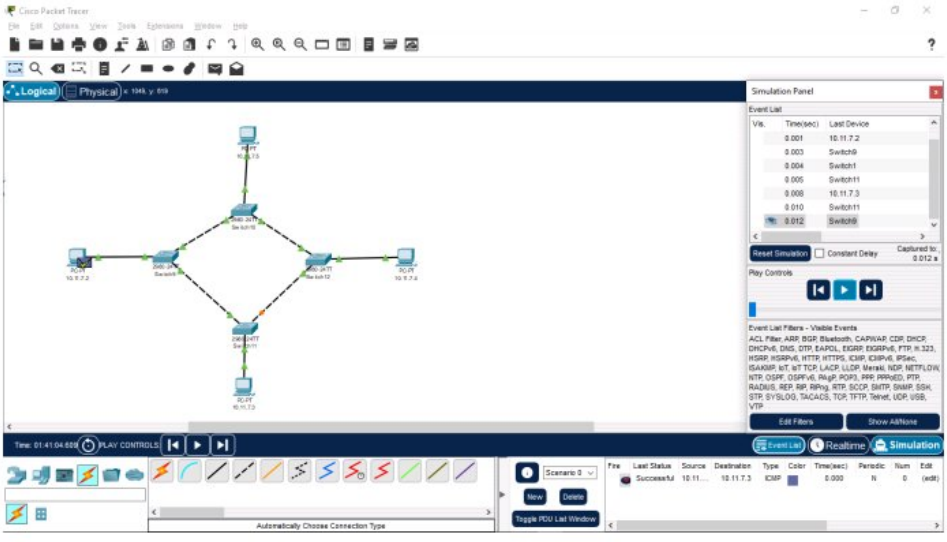
Theory:

Ring topology is a type of network topology in which each device is connected to two other devices on either side via an RJ-45 cable or coaxial cable. This forms a circular ring of connected devices which gives it its name.

Data is commonly transferred in one direction along the ring, known as a unidirectional ring. The data is forwarded from one device to the next, until it reaches the intended destination. In a bidirectional ring, data can travel in either direction.

Simulation results:





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8. Simulation of TREE TOPOLOGY USING SWITCH

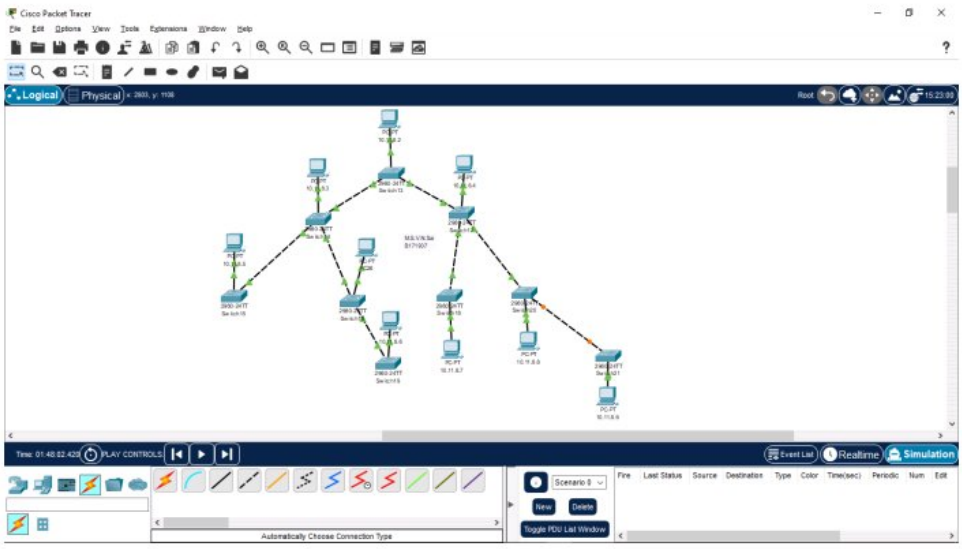
Objective: To construct tree topology using switch.

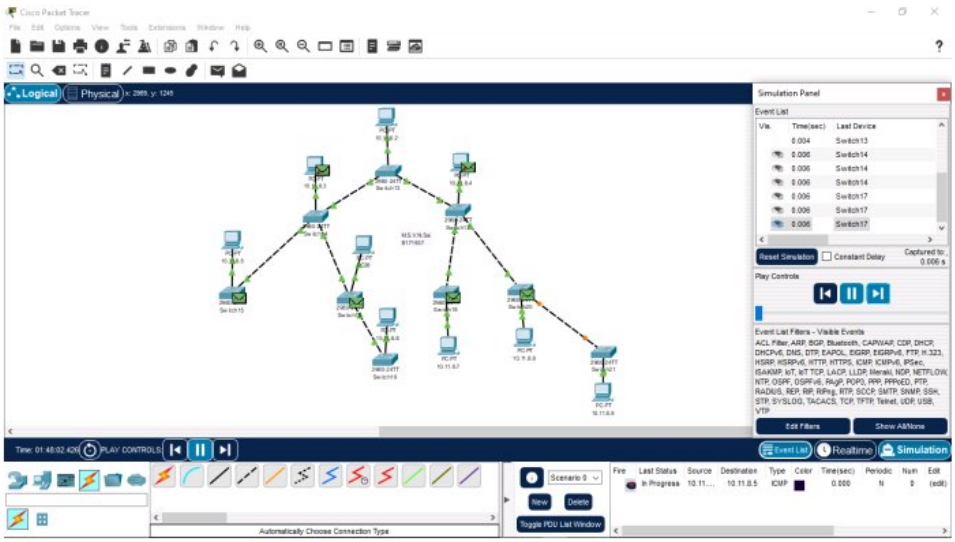
Theory:

A tree topology is a special type of structure where many connected elements are arranged like the branches of a tree. For example, tree topologies are frequently used to organize the computers in a corporate network, or the information in a database.

In a tree topology, there can be only one connection between any two connected nodes. Because any two nodes can have only one mutual connection, tree topologies create a natural parent and child hierarchy.

Simulation results:





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9. Configuring Switch and Assigning Hostname and Password to enable switch.

Objective: To configure switch and assign hostname and password.

Theory:

The switch is a network device that is used to segment the networks into different subnetworks called subnets or LAN segments. It is responsible for filtering and forwarding the packets between LAN segments based on the MAC address.

Commands used:

switch>enable

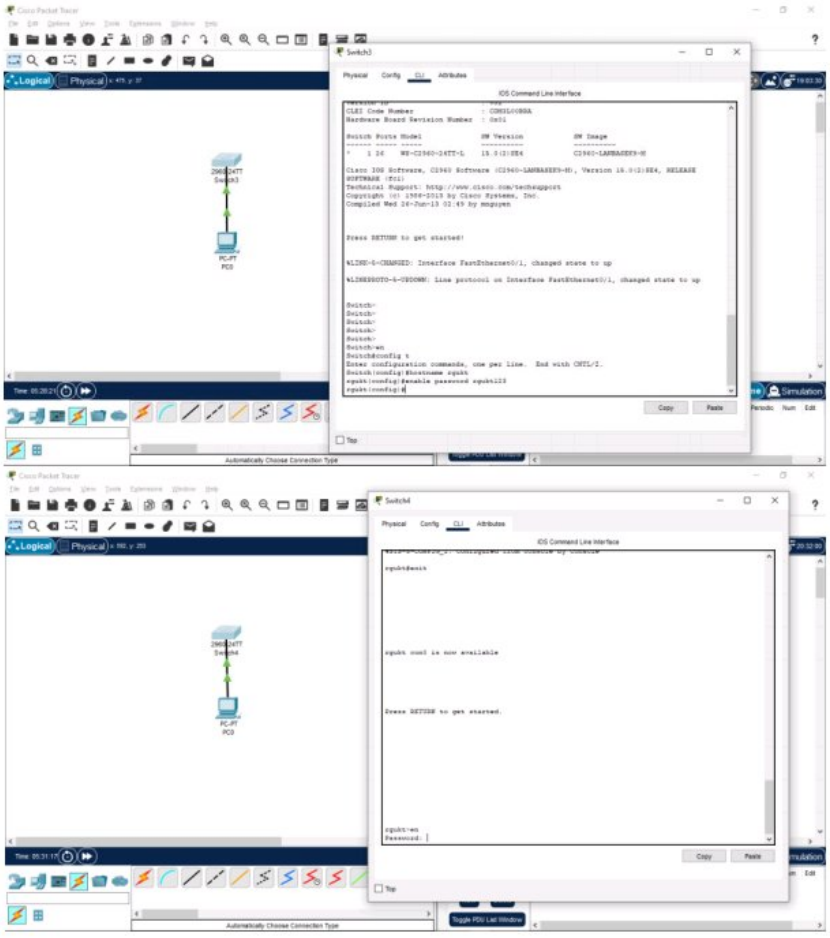
switch#configure terminal

switch(config)#hostname RGUKT

RGUKT(config)#enable password rgukt123

RGUKT(config)#enable secret password rgukt123

Simulation results:



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10. Configuring Router and assigning Hostname and Password to router.

Objective: To configure router and assign hostname and password.

Theory:

A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet

Commands used:

router>enable

router#configure terminal

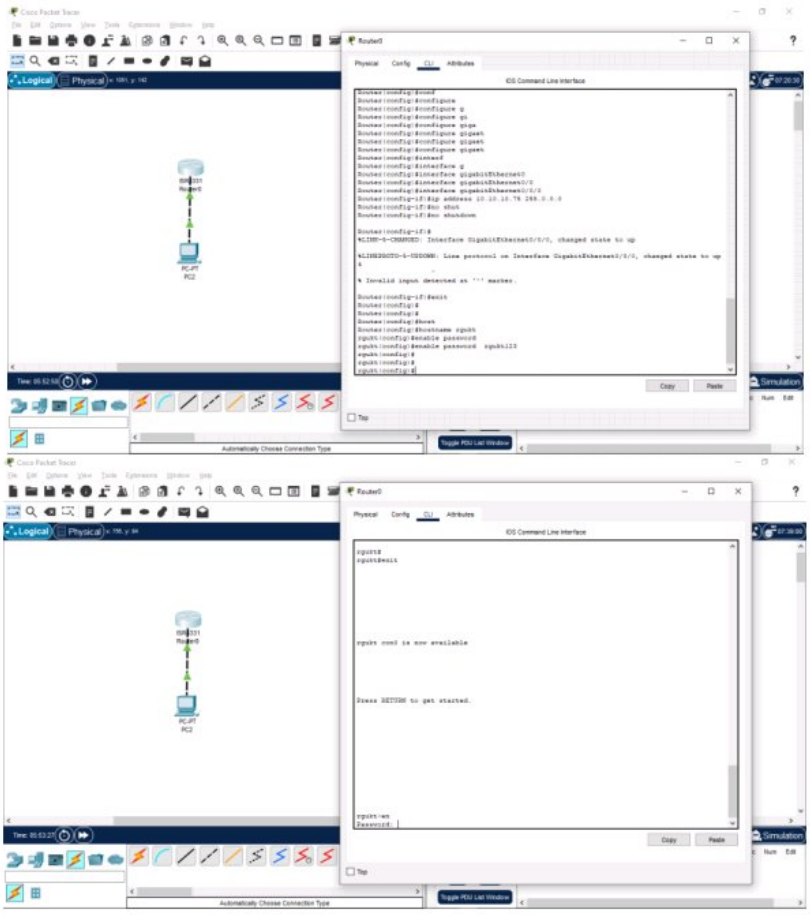
router(config)#interface gigaethernet0/0/0

RGUKT(config-if)#ip address 10.10.10.75 255.0.0.0

RGUKT(config-if)no shut

router(config)#hostname rgukt

rgukt(config)#enable password rgukt123



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11. DCHP Server Configuration through Router using packet tracer software.

Objective: To configure DHCP server through Router.

Theory:

Dynamic Host Configuration Protocol (DHCP). Network management protocol used on Internet Protocol (IP) networks for automatically assigning IP addresses and other communication parameters to devices connected to the network.

Commands used during the simulation:

CLI Commands:

Configure Router:

Router>enable

Router#config terminal

Router(config)#interface gig0/0/0

Router(config-if)#IP address 10.10.10.1 255.0.0.0

Router(config-if)#no shutdown

Router(config-if)#exit

Configure DHCP Server and DNS on the router and Default Gateway:

Router(config)#ip DHCP pool MyNetwork

Router(dhcp-config)#network 10.0.0.0 255.0.0.0

Router(dhcp-config)#default-router 10.10.10.1

Router(dhcp-config)#dns-server 10.10.10.20

Router(dhcp-config)#exit

Router(config)#exit

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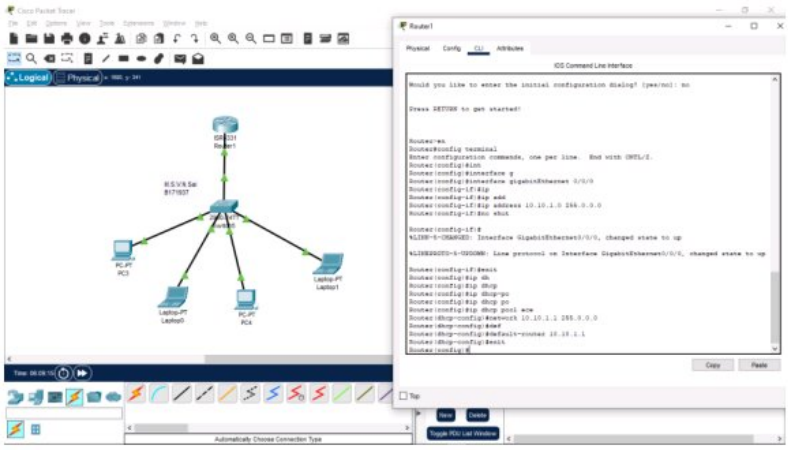
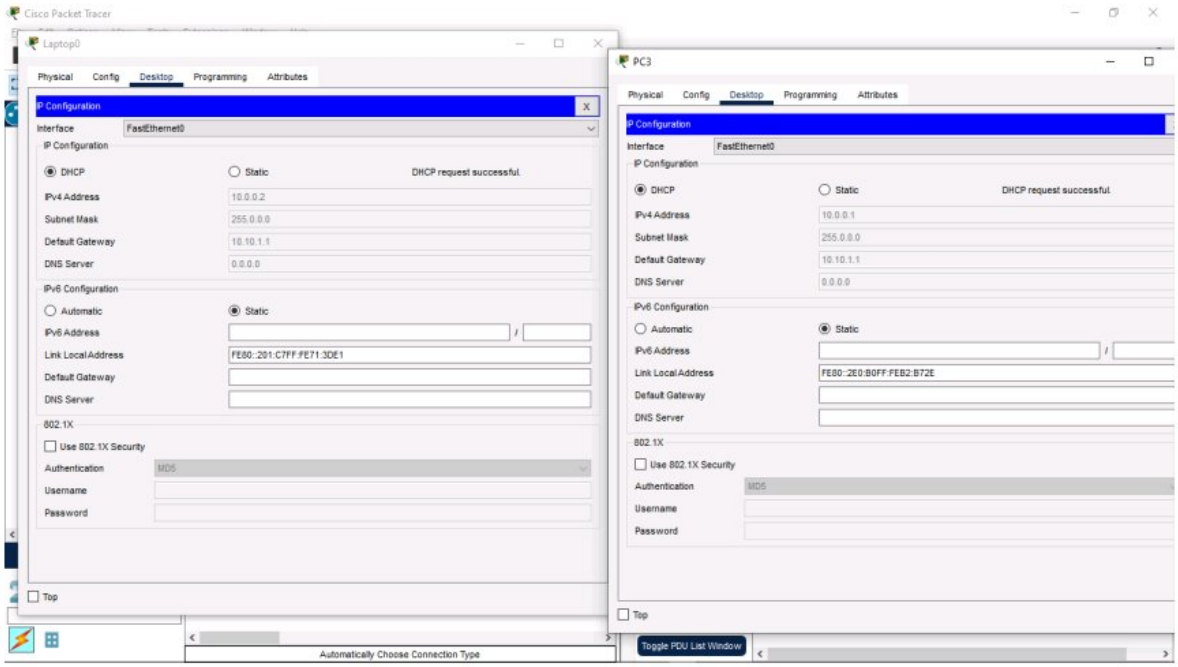
Simulation Results :





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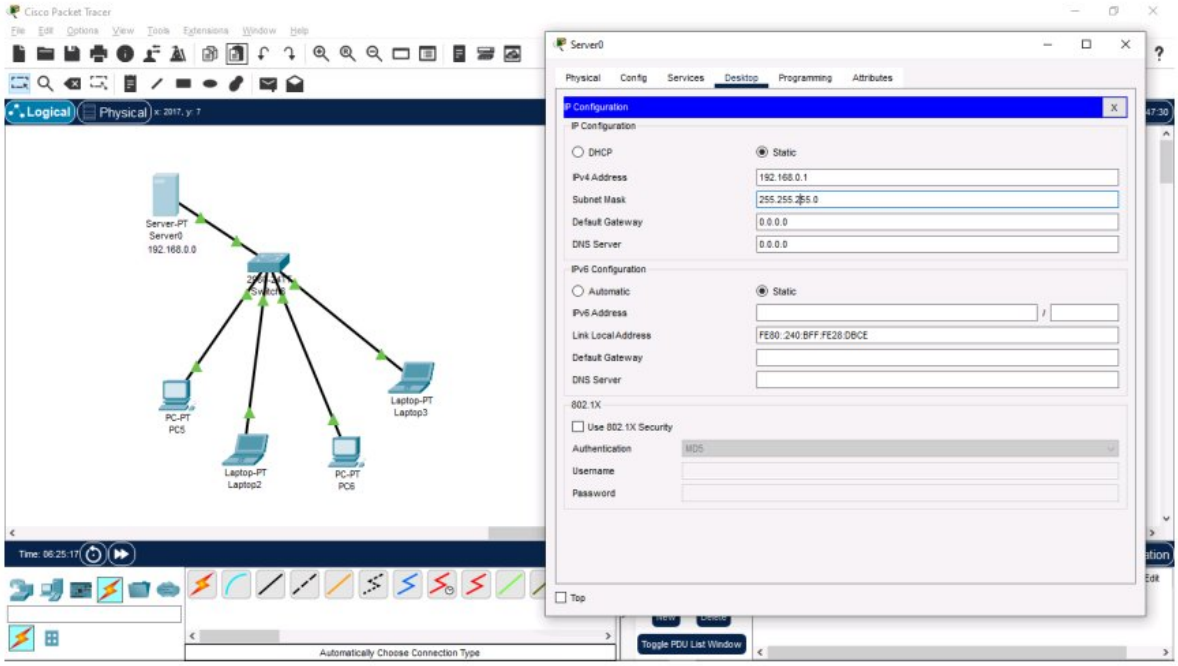
12. DCHP Server Configuration through server using packet tracer software.

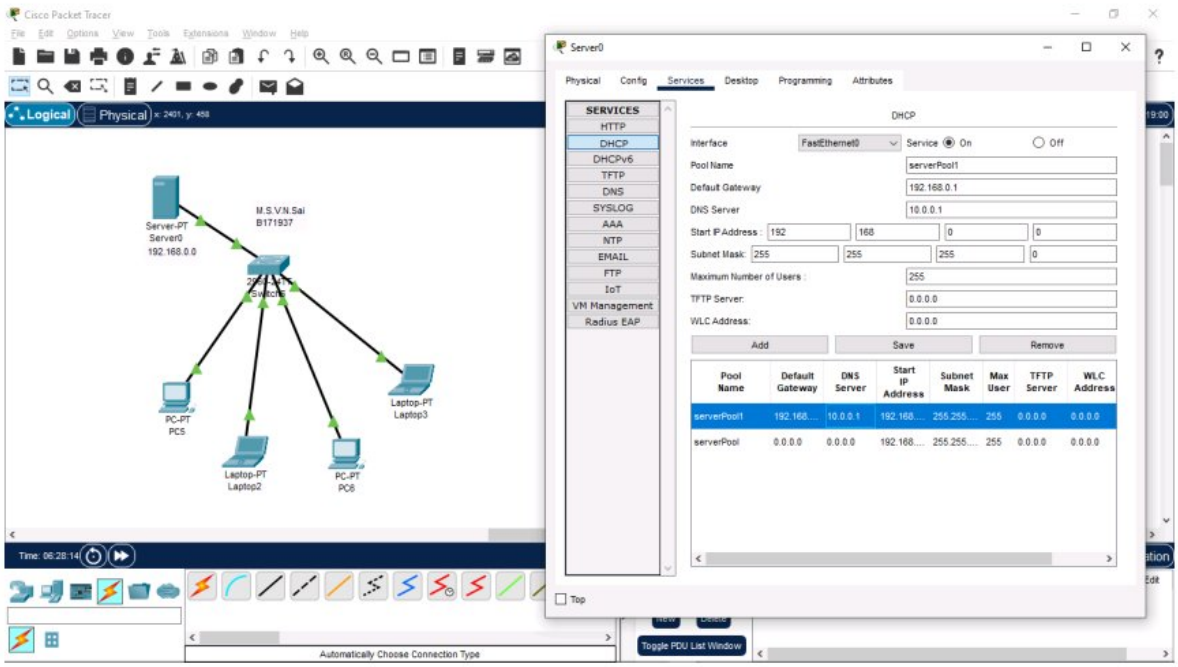
Objective: To configure DHCP service through server.

Theory: Dynamic Host Configuration Protocol (DHCP). Network management protocol used on Internet Protocol (IP) networks for automatically assigning IP addresses and other communication parameters to devices connected to the network.

Configuring Server:



DHCP configuration in server:



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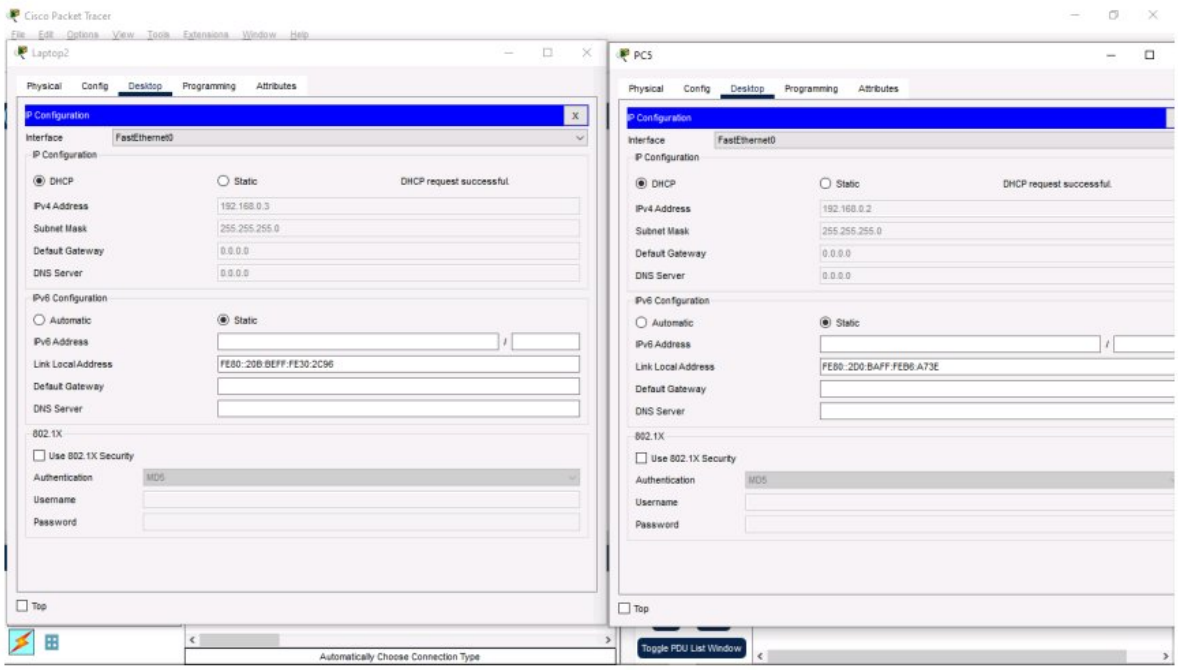
Results:



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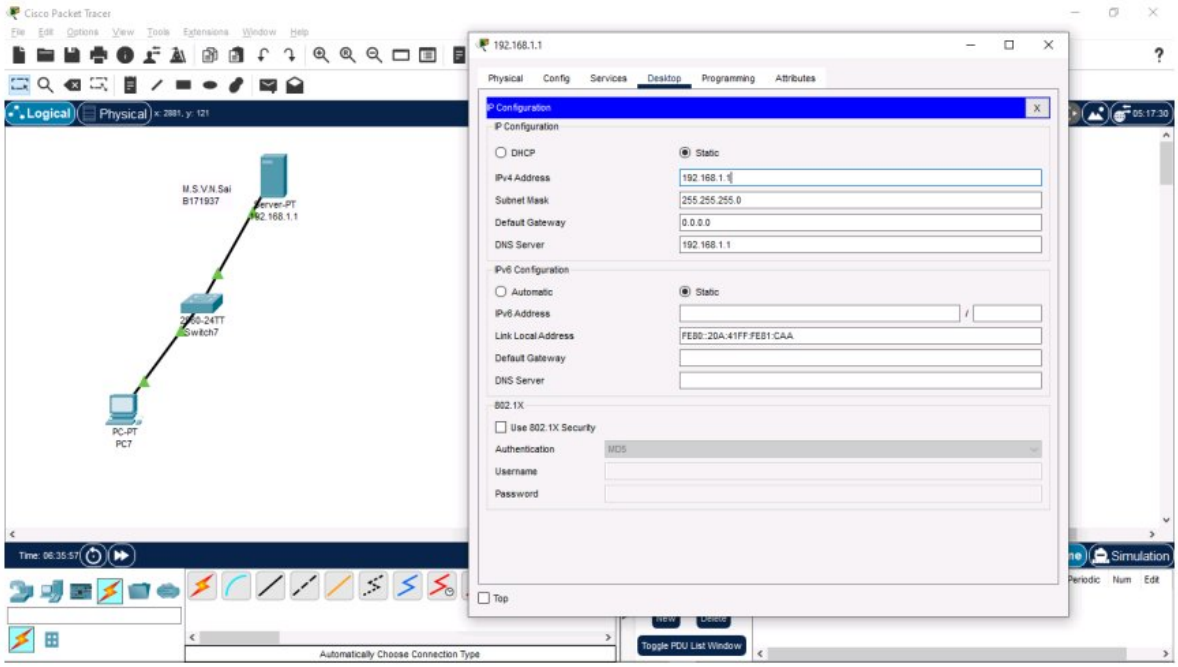
13. DNS Server Configuration using packet tracer software.

Objective: To configure DNS server in packet tracer.

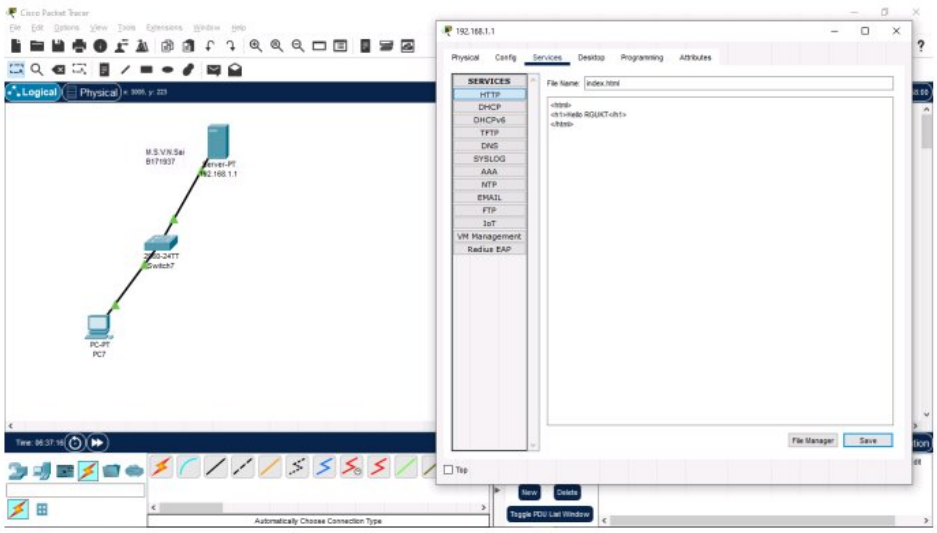
Theory:

The domain name system (DNS) is the phonebook of the internet. When user type domain names such as 'google.com' or 'rgukt.ac.in' into web browsers, DNS is responsible for finding the correct IP address for those sites. Browsers then use those addresses to communicate with the origin servers or CDN edge servers to access website information. This all happens thanks to DNS servers: machine dedicated to answering DNS queries.

i. Configuring Server: Assigning IP to server



ii. Making a website: In services > HTTP> edit content in html format.



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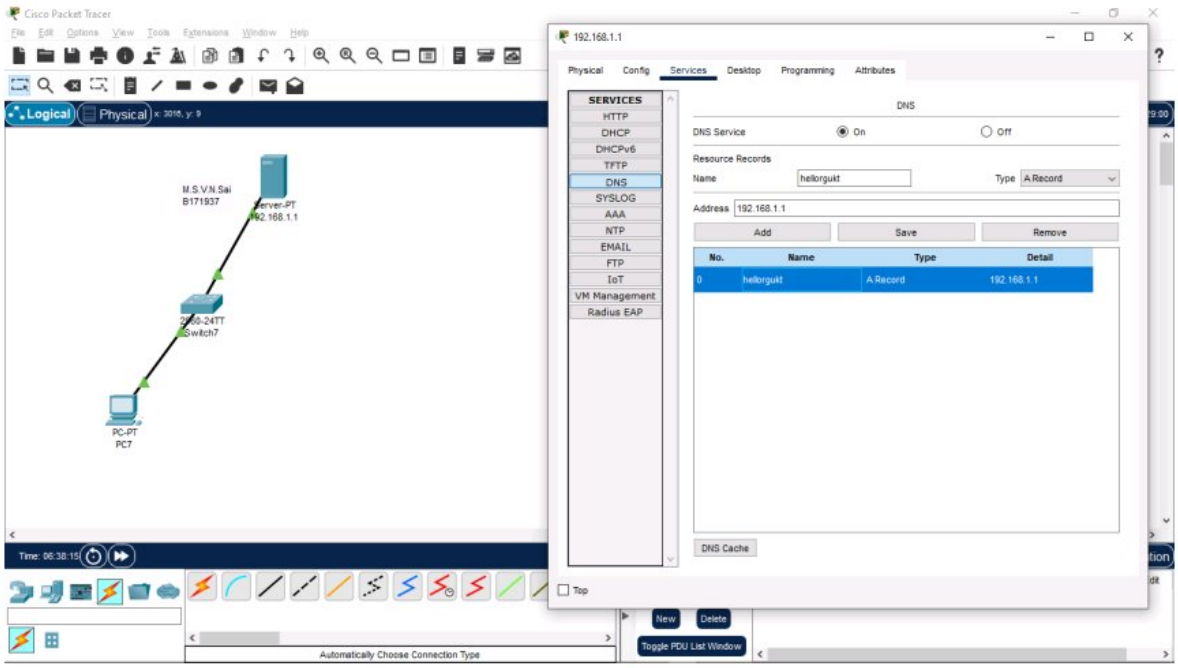
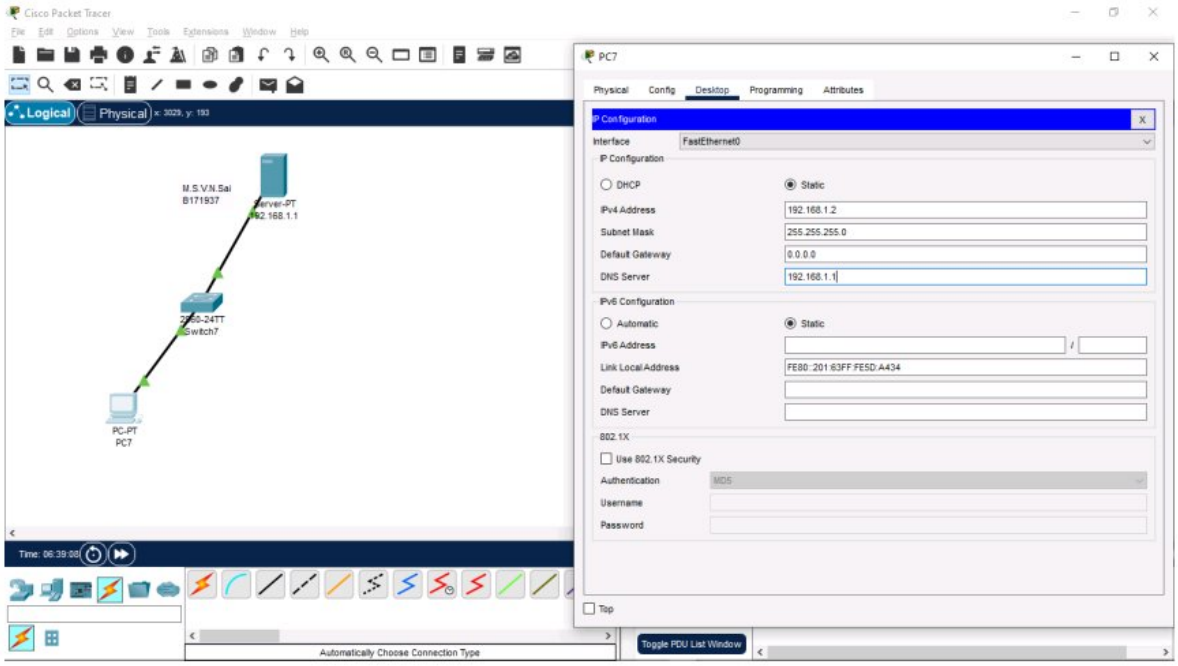
iii. DNS Configuration: In DNS > set name and IP address and click add.



iv. Configure IP in PC:



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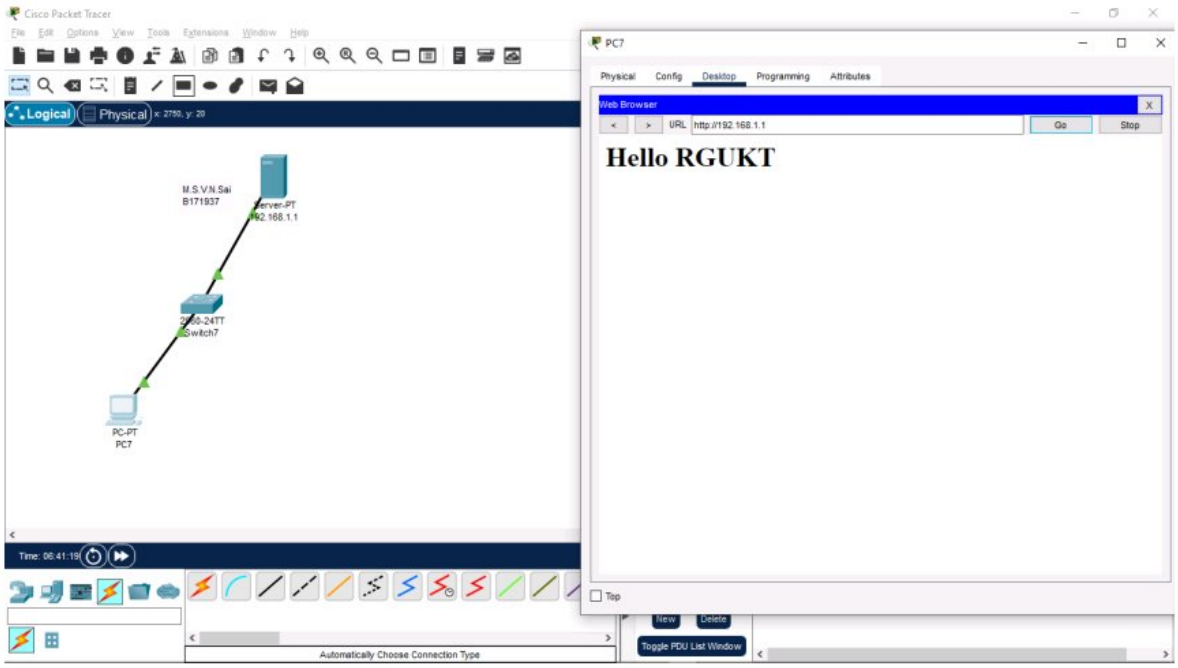
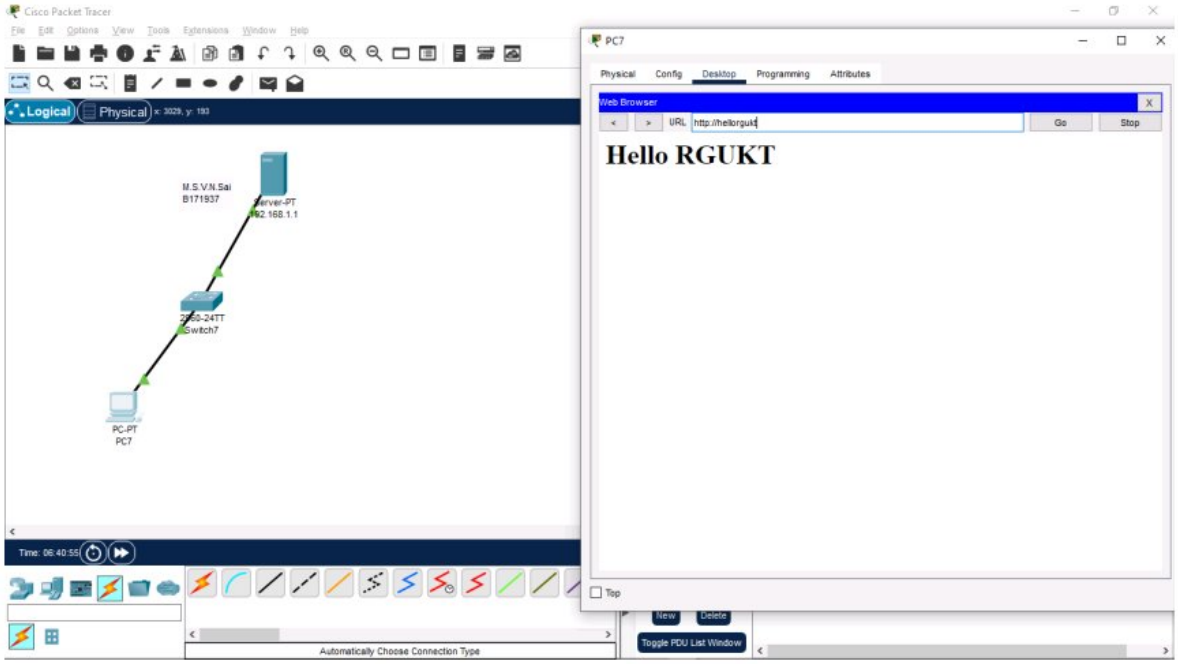
Results: Go to browser in PC -> enter the domain name





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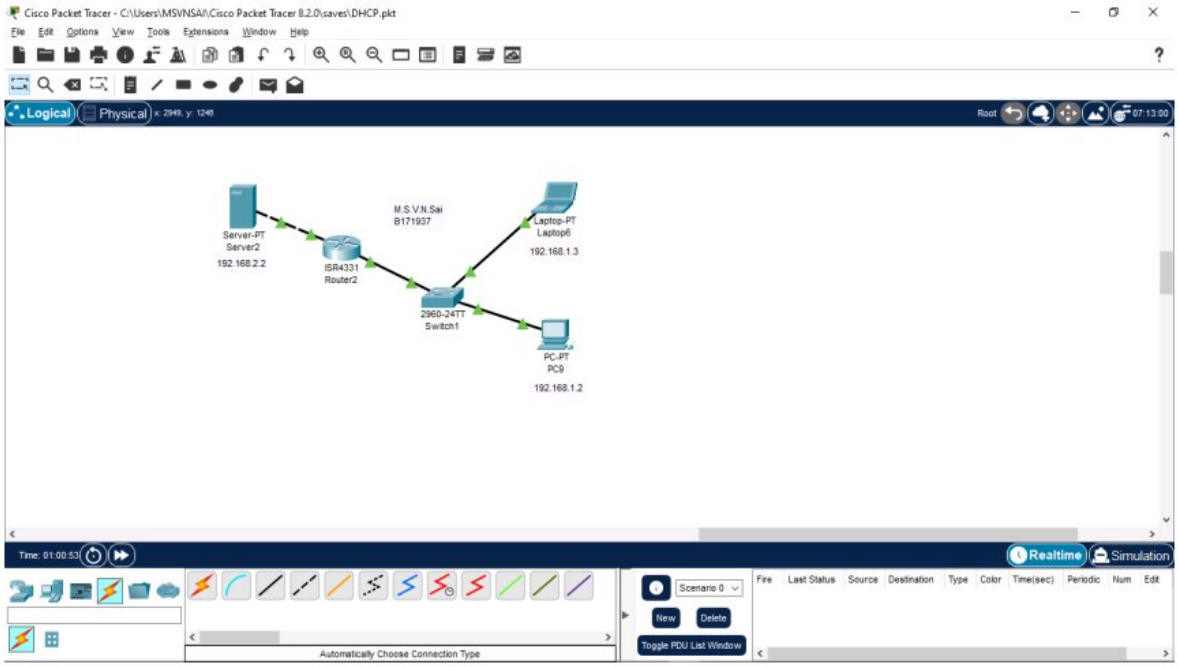
14. Configuration of E-mail server using packet tracer software.

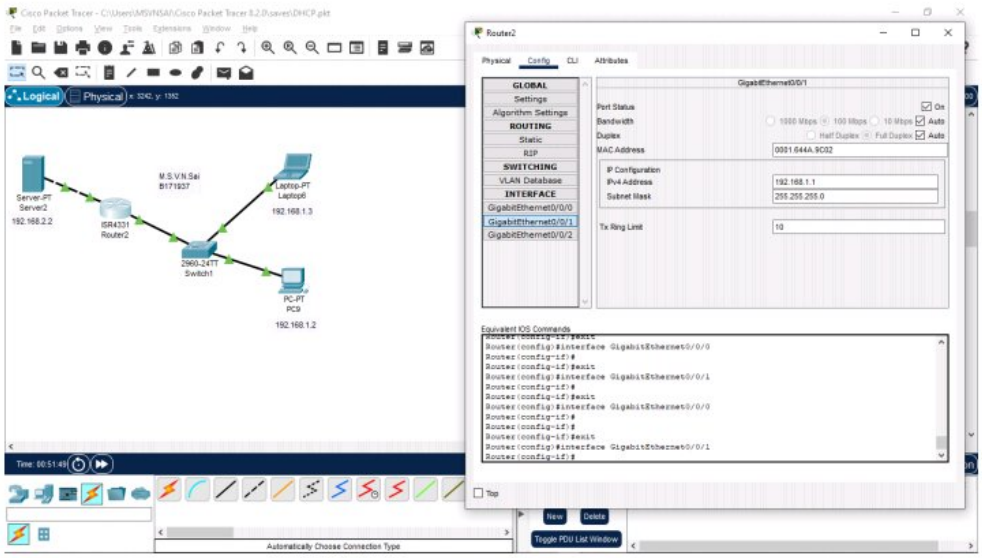
Objective: To configure E-mail server in packet tracer.

Theory:

An email server, such as Gmail stores and sends email messages to email clients on request. We often send and receive emails on our mobile devices or computers. Have you ever imagined how this happens? Well, whenever you compose and send an email to another person, the message you send first goes to a mail server. It's the mail server which then sends the email when it is requested from the email client (e.g Gmail App) of the recipient's device.



Configuring Router to PCs:



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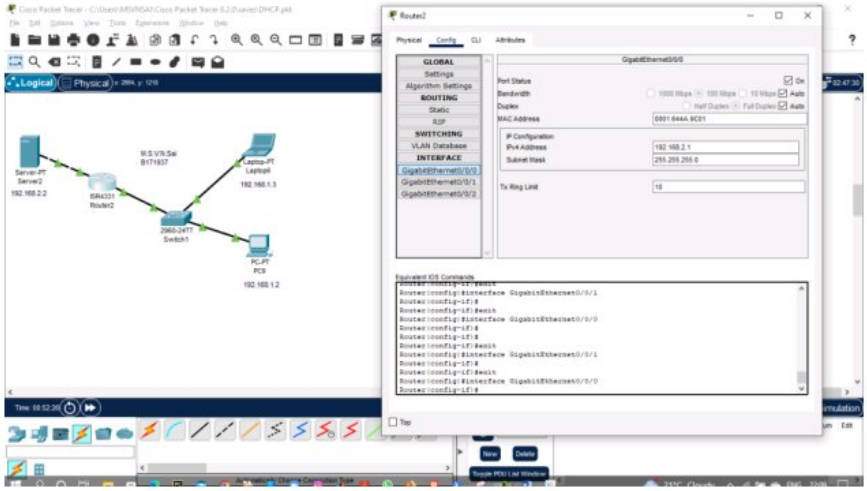
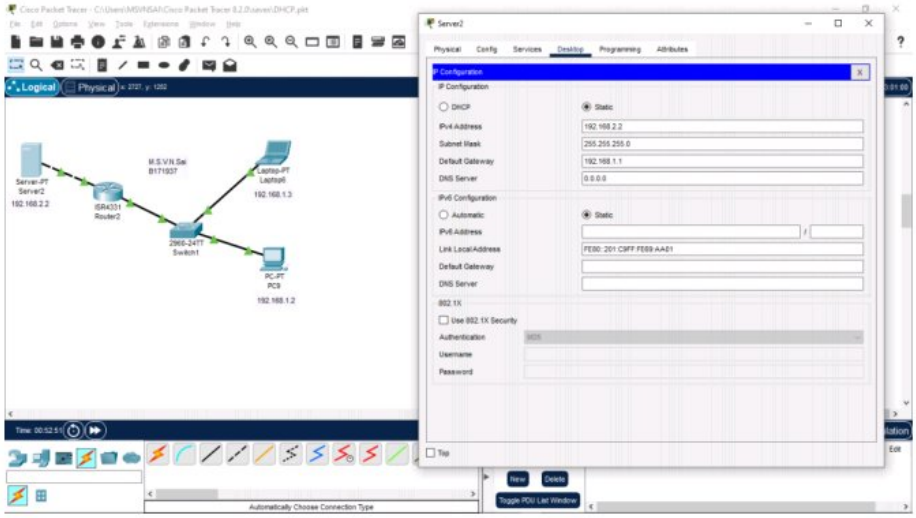
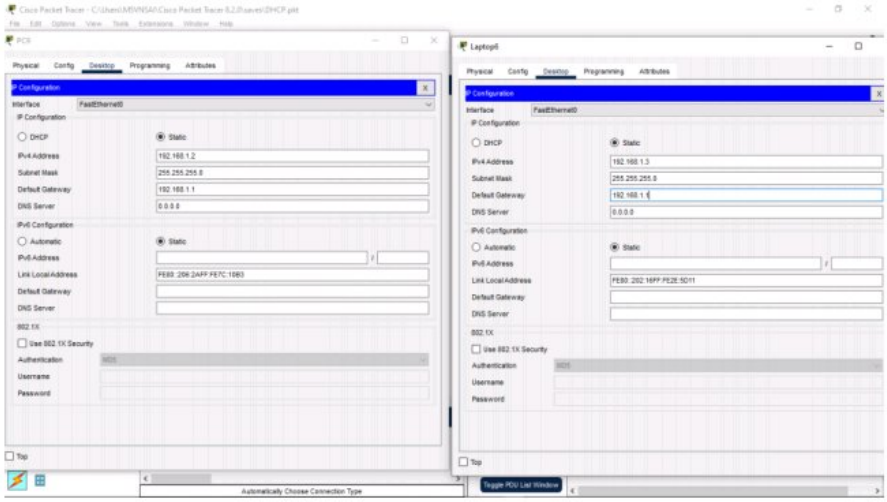
Configuring Router to Server:



Configuring Server:



Configuring PCs:



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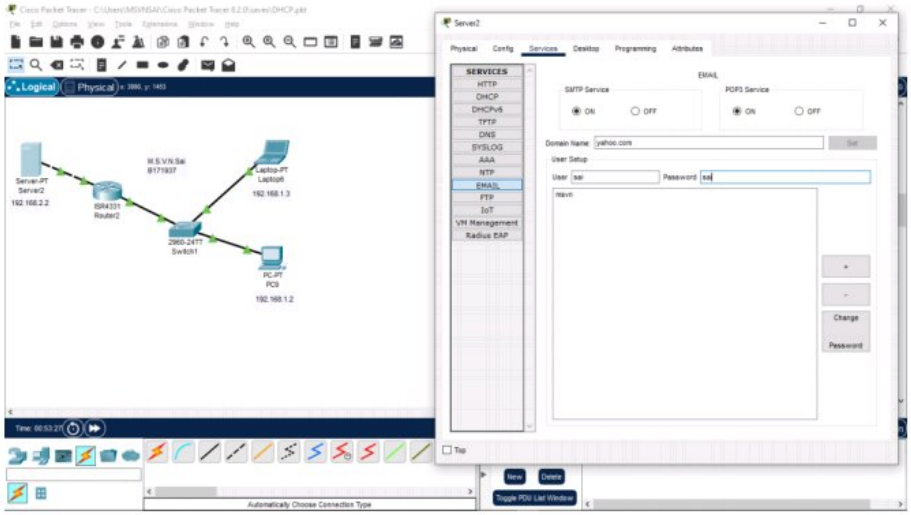
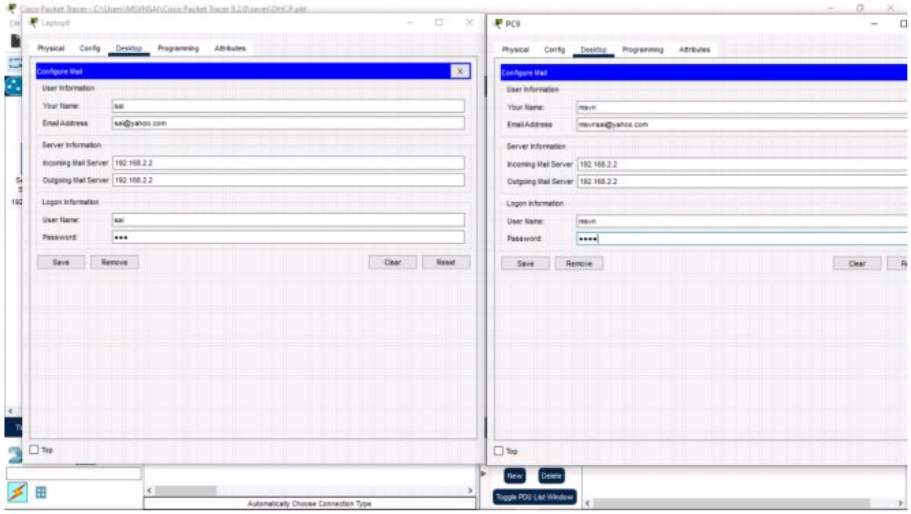
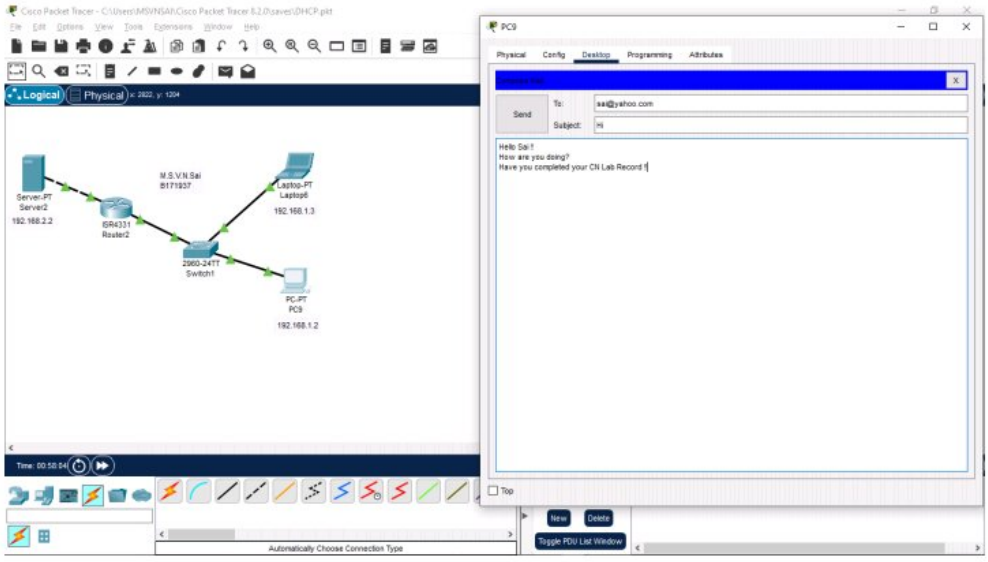
Configuring mail-services in server: Add domain name & users in email services.



Creating email IDs in PCs: Desktop > Email > Configure Mail > click Save



Compose an E-mail:



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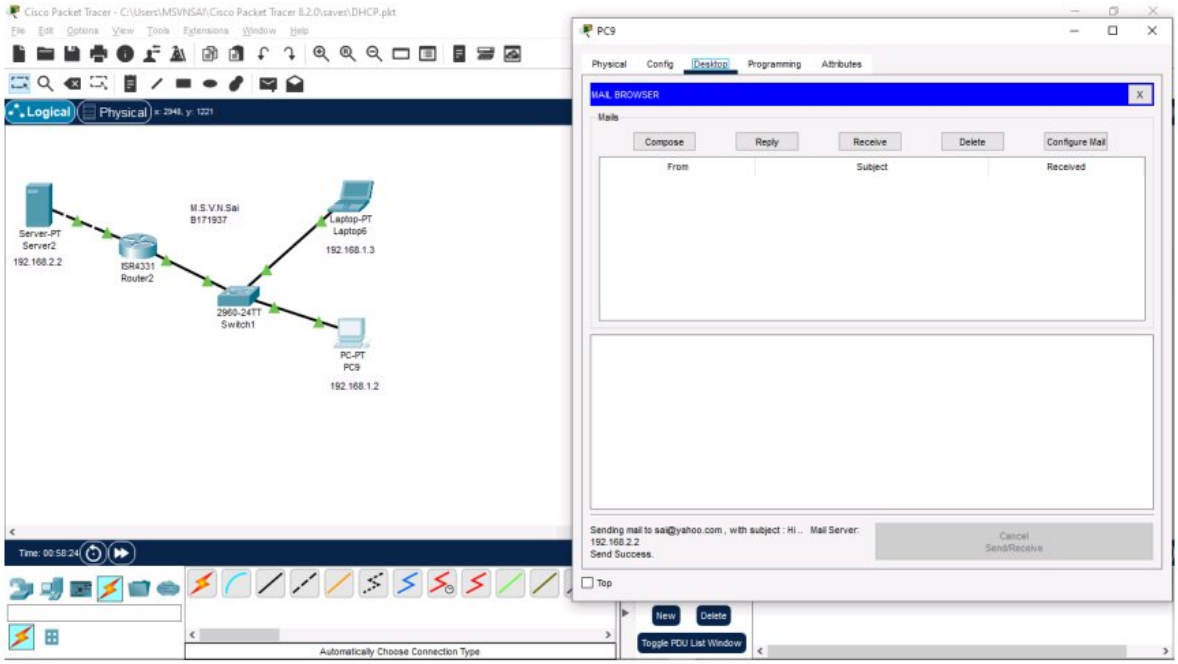
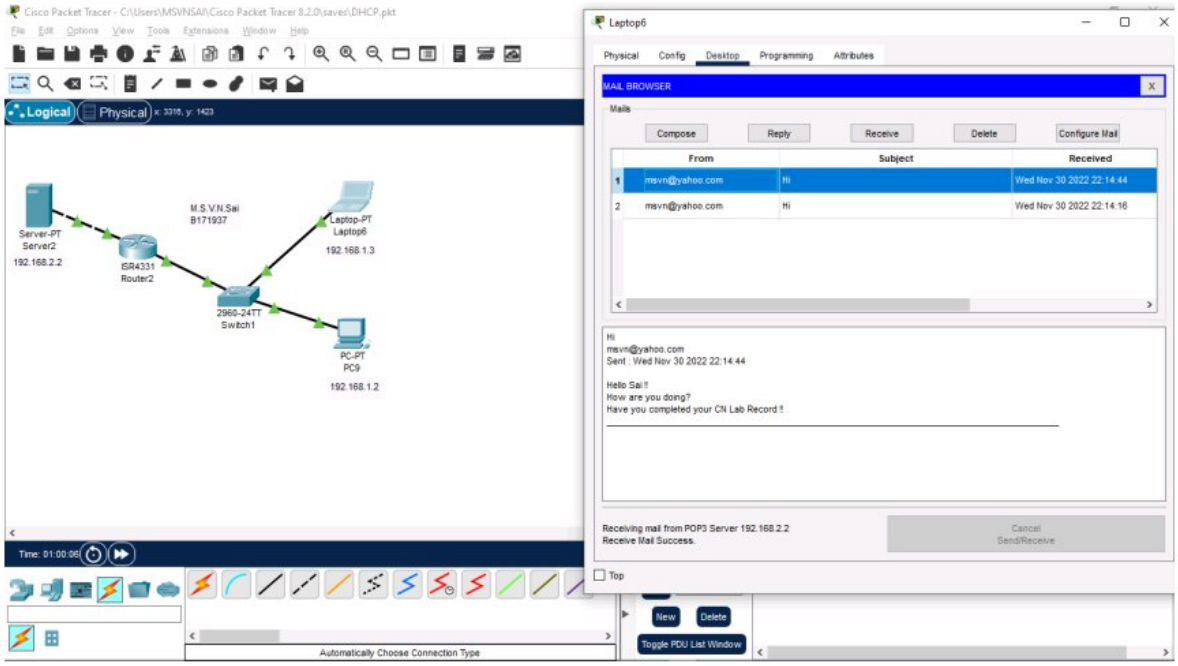
Results:

Mail sent successfully by msvn@yahoo.com



Received by sai@yahoo.com



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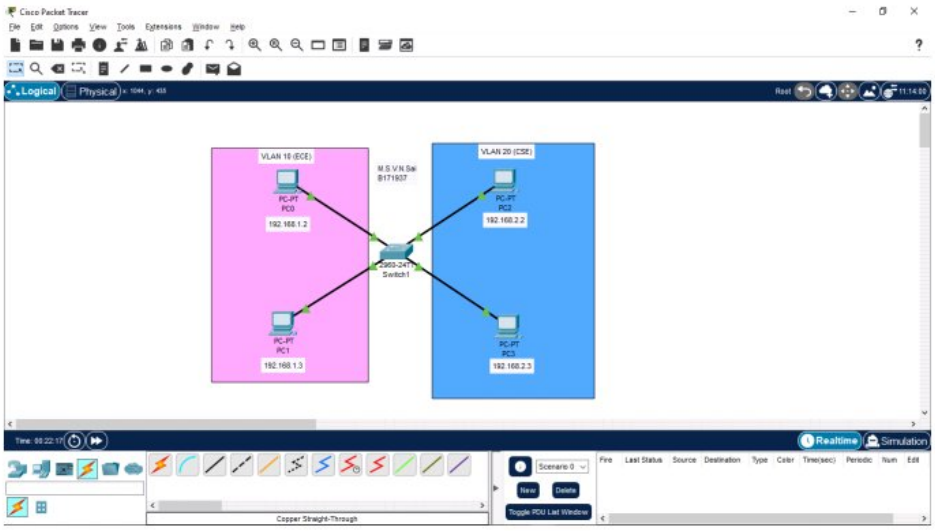
15. VLAN Configuration using packet tracer software

Objective: Creating a VLAN using packet tracer

Theory:

A Virtual LAN (VLAN) is simply a logical LAN, just as its name suggests. VLANs have similar characteristics with those of physical LANs, only that with VLANs, you can logically group hosts even if they are physically located on separate LAN segments. We treat each VLAN as a separate subnet or broadcast domain. For this reason, to move packets from one VLAN to another, we have to use a router or a layer 3 switch. VLANs are configured on switches by placing some interfaces into one broadcast domain and some interfaces into another. For this tutorial, we'll configure 2 VLANs on a switch. We'll then proceed and configure a router to enable communication between the two VLANs.



Commands used:

Switch>en
Switch#config terminal.
Switch(config)#vlan 10
Switch(config-vlan)#name ece
Switch(config-vlan)#vlan 20
Switch(config-vlan)#name cse
Switch(config-vlan)#int range fa0/1-2
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan10
Switch(config-if-range)#int range fa0/3-4
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 20

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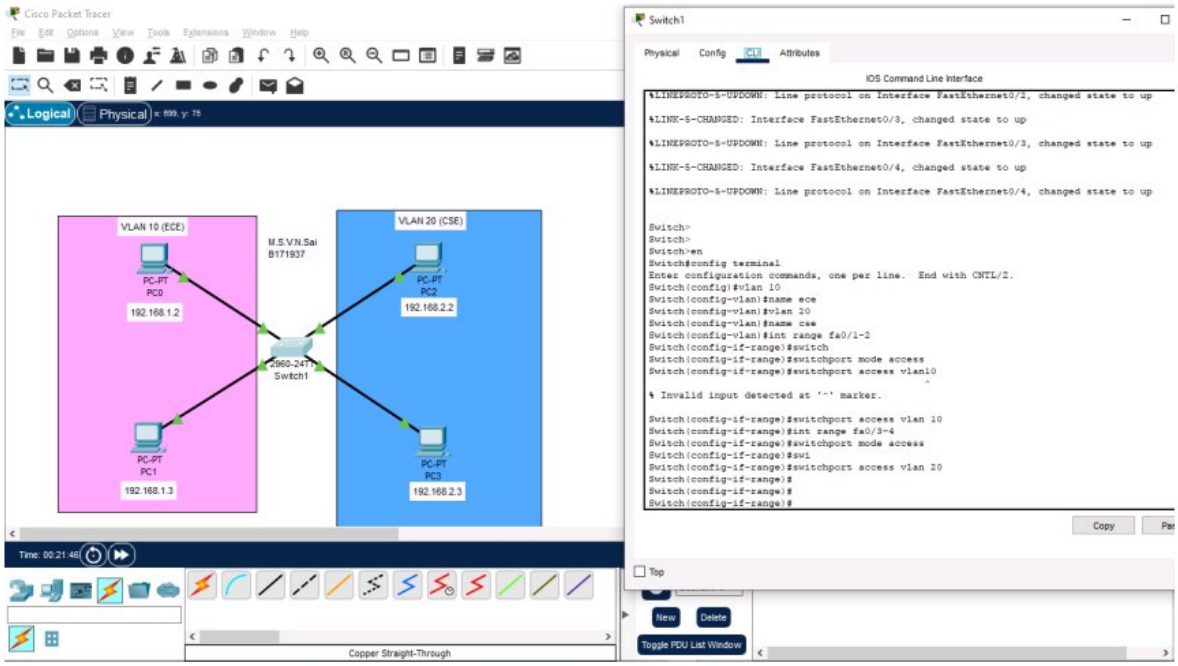
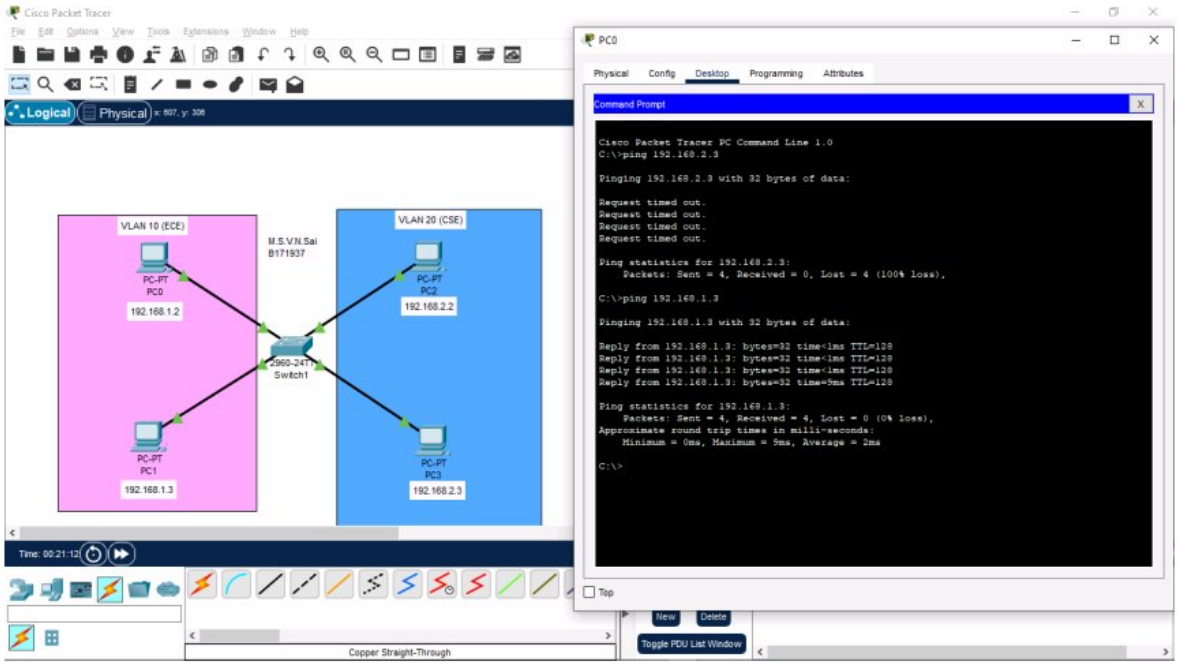
Creating a VLAN:



Simulation result:



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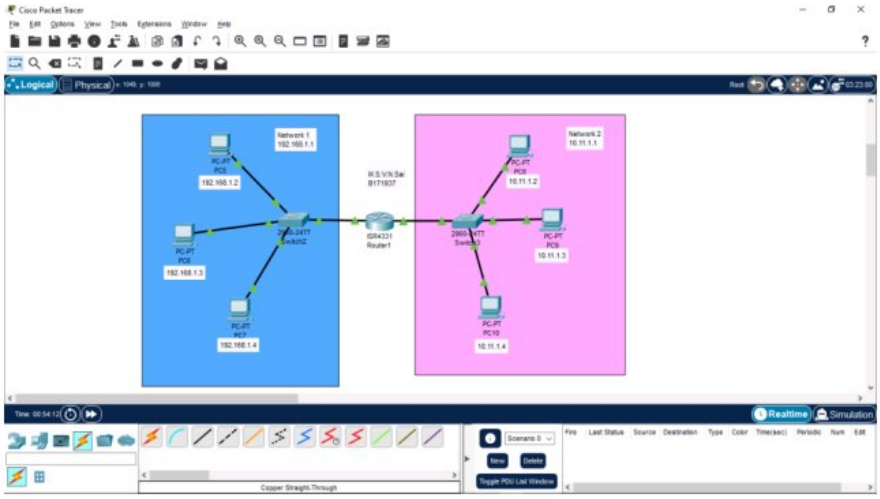
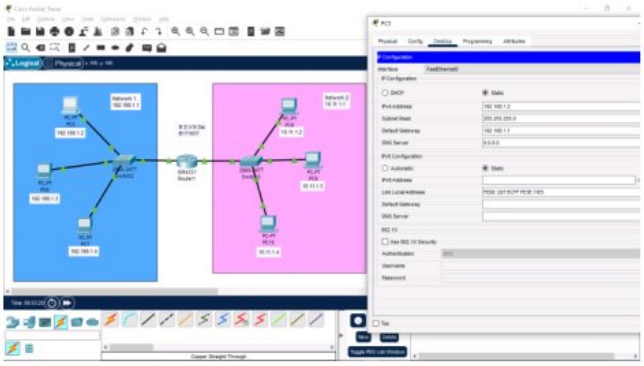
16. Connecting two different LANs in packet tracer software.

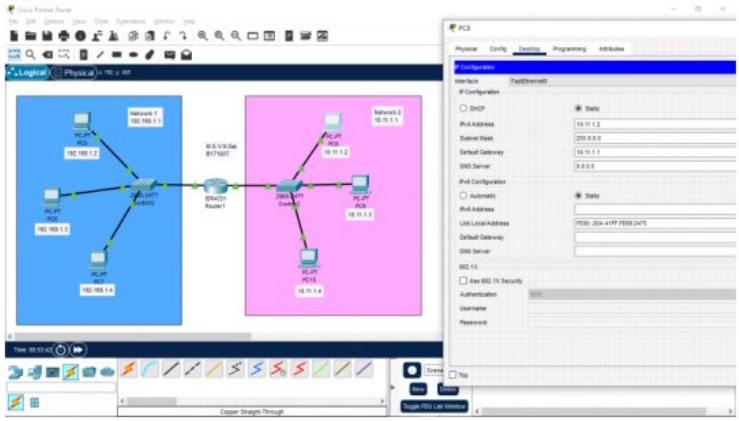
Objective: Connecting two Local Area Networks using router.



Configuring network 1 PC:



Configuring network 1 PC:



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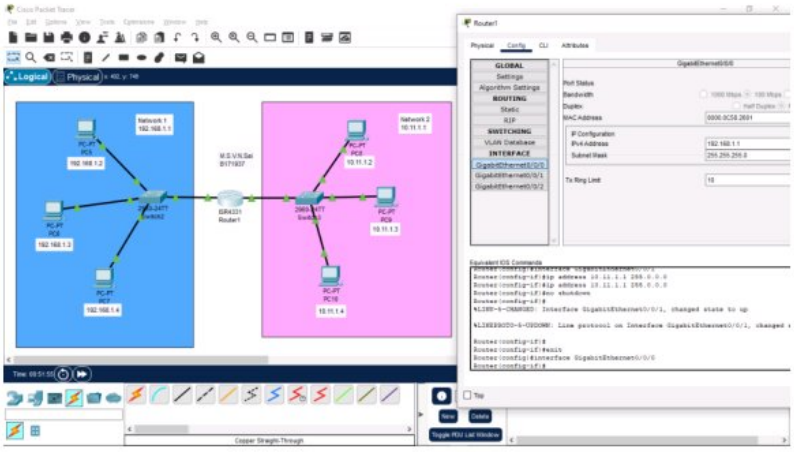
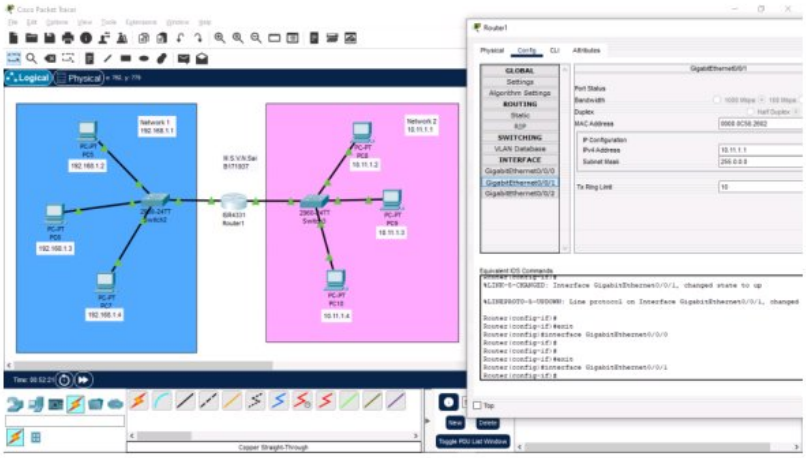
Configuring Router:

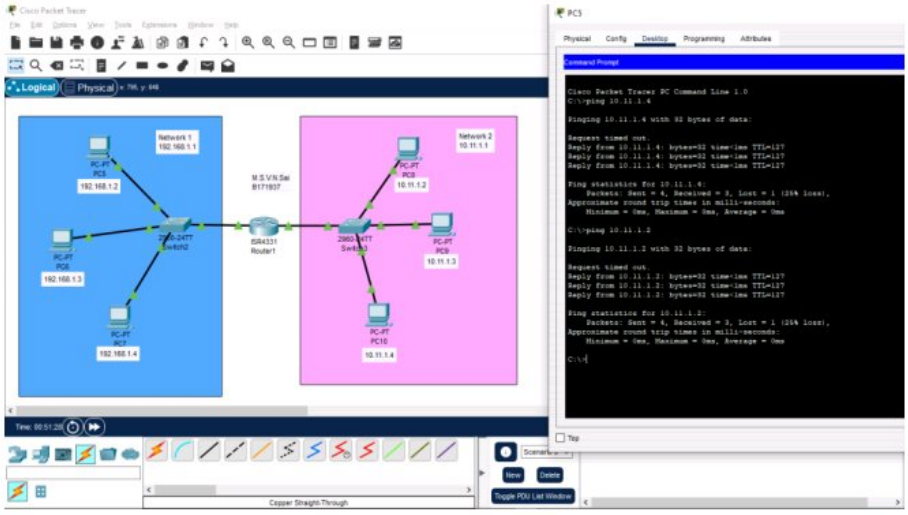
Network-1:



Network-2:



Result:



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