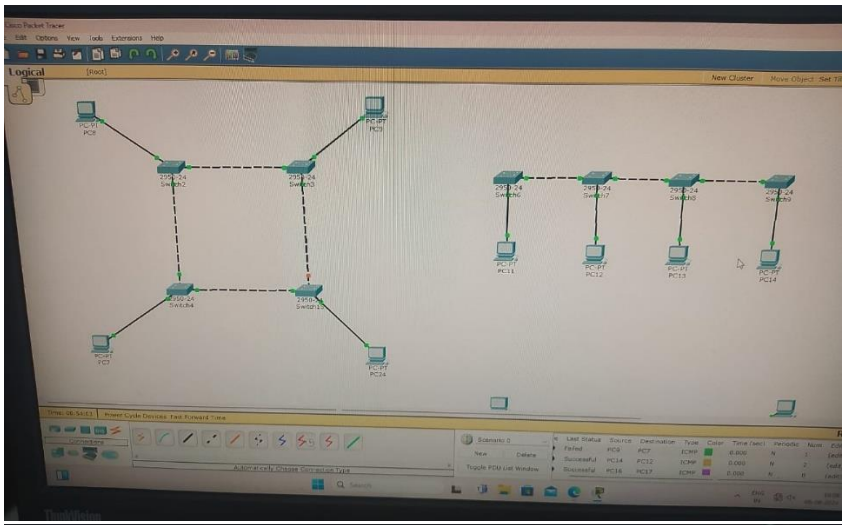
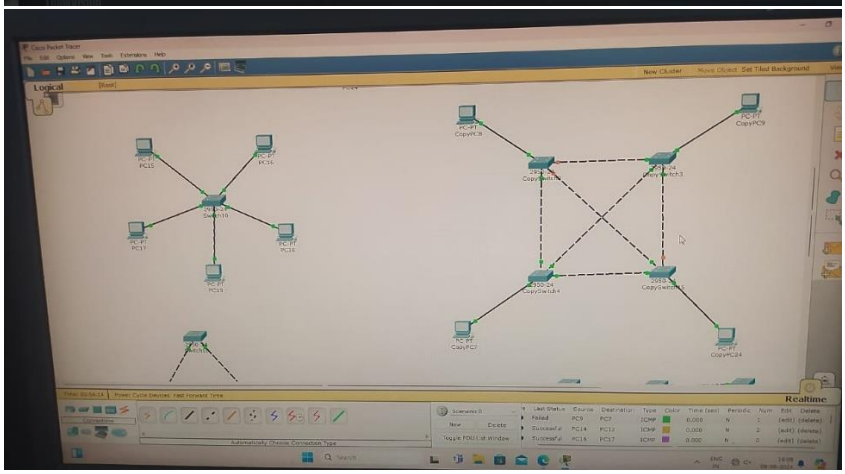
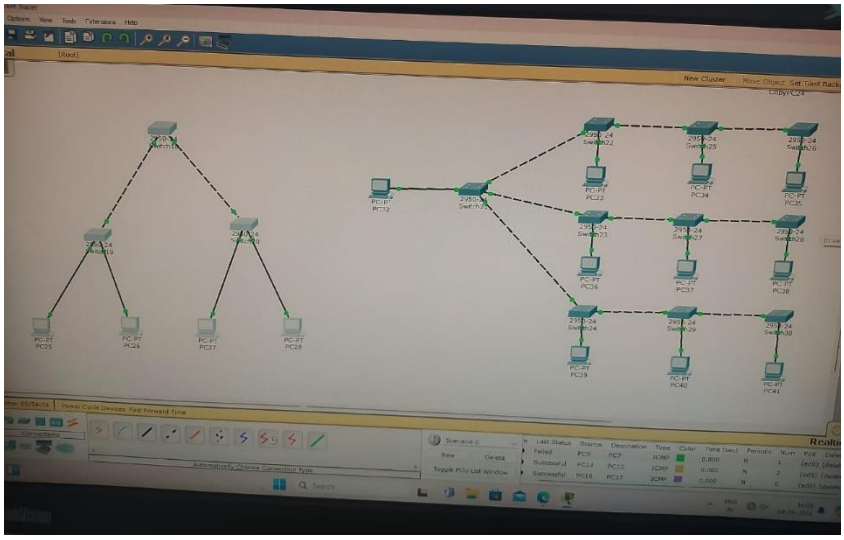
Name: Saanika Wani

Roll no: 32568

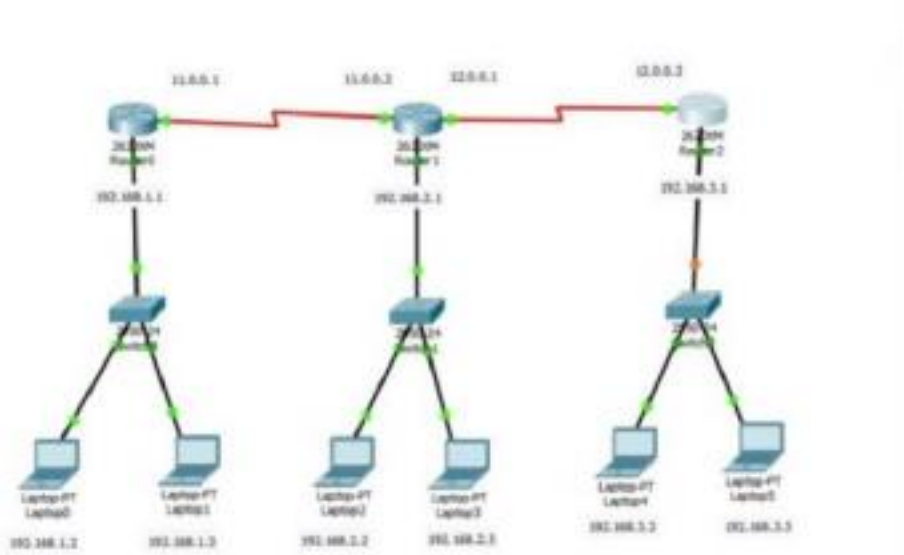
ASSIGNMENT 1(LA 1)







ASSIGNMENT 2 (LA 4)



ASSIGNMENT 3 (LA 5)

```
import java.util.Scanner;
class SimpleSubnetting {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        // Prompt for IP address input
        System.out.print("Enter the IP address (format: xxx.xxx.xxx.xxx): ");
        String ipAddress = sc.nextLine();

        // Prompt for subnet mask input
        System.out.print("Enter the number of subnet bits (1-30): ");
        int subnetBits = sc.nextInt();

        if (subnetBits < 1 || subnetBits > 30) {
```

```
            System.out.println("Subnet bits must be between 1 and 30.");
            sc.close();
            return; // Exit the program if invalid
        }

        // Calculate subnet mask
        int subnetMask = (int) (Math.pow(2, subnetBits) - 1) << (32 - subnetBits);
        String subnetMaskString = convertToDottedDecimal(subnetMask);

        // Calculate the number of host bits
        int hostBits = 32 - subnetBits;
        int numberOfHosts = (int) Math.pow(2, hostBits) - 2; // -2 for network and
broadcast addresses

        System.out.println("\nIP Address: " + ipAddress);
        System.out.println("Subnet Mask: " + subnetMaskString);
        System.out.println("Total number of hosts per subnet: " + numberOfHosts);

        sc.close();
    }

    // Function to convert a subnet mask integer to dotted decimal format
    public static String convertToDottedDecimal(int mask) {
        return ((mask >> 24) & 0xFF) + "." +
                ((mask >> 16) & 0xFF) + "." +
                ((mask >> 8) & 0xFF) + "." +
                (mask & 0xFF);
    }
}
```

ASSIGNMENT 4 (LA 6)

```
class NetworkDV:
    def __init__(self, num_nodes):
        self.num_nodes = num_nodes
        self.graph = [[float('inf')] * num_nodes for _ in range(num_nodes)]
        for i in range(num_nodes):
            self.graph[i][i] = 0  # Distance to itself is always 0

    def add_link(self, u, v, weight):
        # Add a link (edge) between u and v
        self.graph[u][v] = weight
        self.graph[v][u] = weight

    def bellman_ford(self, start):
        distances = [float('inf')] * self.num_nodes
        distances[start] = 0

        for _ in range(self.num_nodes - 1):
            for u in range(self.num_nodes):
                for v in range(self.num_nodes):
                    if self.graph[u][v] != float('inf'):
                        new_distance = distances[u] + self.graph[u][v]
                        if new_distance < distances[v]:
                            distances[v] = new_distance

        return distances



# Example usage
```

```
if __name__ == "__main__":
    network = NetworkDV(5)  # Create a network with 5 nodes (0 to 4)

    # Add links (edges) between nodes
    network.add_link(0, 1, 2)
    network.add_link(0, 2, 4)
    network.add_link(1, 2, 1)
    network.add_link(1, 3, 7)
    network.add_link(2, 3, 3)
    network.add_link(3, 4, 1)

    start_node = 0
    distances = network.bellman_ford(start_node)

    print(f"Shortest paths from node {start_node}:")
    for node, distance in enumerate(distances):
        print(f"Node {node} -> Distance {distance}")
```

ASSIGNMENT 5 (LA 7)

TCP Client:

```
import java.net.*;
import java.io.*;


public class TCPClient {
    public static void main(String[] args) {
        try {
            // Connect to the server running on localhost, port 5000
            Socket client = new Socket("localhost", 5000);
            System.out.println("Client is connected");


            // Input stream to read data from the server
            BufferedReader br = new BufferedReader(new
InputStreamReader(client.getInputStream()));
            // Output stream to send data to the server
            PrintWriter out = new PrintWriter(client.getOutputStream(), true);
            BufferedReader userInput = new BufferedReader(new
InputStreamReader(System.in));


            new Thread(() -> {
                String serverData;
                try {
                    while ((serverData = br.readLine()) != null) {
                        System.out.println("Data from server: " + serverData);
                    }
                } catch (IOException e) {
                    System.out.println("Server disconnected.");
                }
```

```
        }).start();

        String message;
        while (true) {
            System.out.print("Enter message to send to server (or 'exit' to quit): ");
            message = userInput.readLine();
            if ("exit".equalsIgnoreCase(message)) {
                break;                }
            out.println(message);  // Send the message to the server
        }

        br.close();
        out.close();
        client.close();
    } catch (IOException e) {
        System.err.println("Connection error: " + e.getMessage());
    }
  }
}
```

TCP Server

```
import java.net.*;
import java.io.*;
import java.util.*;

public class TCPServer {
  public static void main(String[] args) {
    ServerSocket ss = null;
    Socket server = null;
```

```
        PrintWriter pw = null;
        Scanner sc = new Scanner(System.in);

        try {
            ss = new ServerSocket(5000);  // Create server socket on port 5000
            System.out.println("Waiting for client...");
            server = ss.accept();  // Wait for the client to connect
            System.out.println("Client connected");

            pw = new PrintWriter(server.getOutputStream(), true);  // Auto-flush enabled

            BufferedReader br = new BufferedReader(new
InputStreamReader(server.getInputStream()));
            new Thread(() -> {
                String clientMessage;
                try {
                    while ((clientMessage = br.readLine()) != null) {
                        System.out.println("Message from client: " + clientMessage);  // Print
client messages
                    }
                } catch (IOException e) {
                    System.err.println("Client disconnected.");
                }
            }).start();

            String data;

            while (true) {
                System.out.println("Enter data (type 'exit' to quit):");
```

```
            data = sc.nextLine();
            if ("exit".equalsIgnoreCase(data)) {
                break;  // Exit the loop if the user types "exit"
            }
            pw.println(data);  // Send data to client
        }

    } catch (IOException e) {
        System.err.println("Error: " + e.getMessage());
    } finally {

        try {
            if (pw != null) pw.close();
            if (server != null) server.close();
            if (ss != null) ss.close();
            sc.close();
        } catch (IOException e) {
            System.err.println("Error closing resources: " + e.getMessage());
        }
    }
  }
}
```

UDP Client

```
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;
import java.util.Scanner;
```

```
public class UDPClient {
    public static void main(String[] args) {
        DatagramSocket socket = null;
        Scanner sc = new Scanner(System.in);

        try {
            // Create a DatagramSocket
            socket = new DatagramSocket();
            InetAddress serverAddress = InetAddress.getByName("localhost");

            byte[] sendBuffer;
            byte[] receiveBuffer = new byte[1024];

            while (true) {
                System.out.print("Enter message to send to server (or 'exit' to quit): ");
                String message = sc.nextLine();
                sendBuffer = message.getBytes();

                // Send the message to the server
                DatagramPacket sendPacket = new DatagramPacket(sendBuffer,
sendBuffer.length, serverAddress, 5000);
                socket.send(sendPacket);

                if ("exit".equalsIgnoreCase(message.trim())) {
                    System.out.println("Client is exiting.");
                    break;  // Exit the loop if the user types "exit"
                }

                // Prepare to receive the response from the server
```

```
            DatagramPacket receivePacket = new DatagramPacket(receiveBuffer,
receiveBuffer.length);
            socket.receive(receivePacket); // Blocking call to receive data
            String receivedResponse = new String(receivePacket.getData(), 0,
receivePacket.getLength());


            System.out.println("Response from server: " + receivedResponse);
        }


    } catch (Exception e) {
        System.err.println("Error: " + e.getMessage());
    } finally {
        if (socket != null && !socket.isClosed()) {
            socket.close();  // Close the socket when done
        }
        sc.close();
    }
  }
}
```

UDP Server

```
import java.net.DatagramPacket;
import java.net.DatagramSocket;
import java.net.InetAddress;

public class UDPServer {
   public static void main(String[] args) {
      DatagramSocket socket = null;
      try {
```

```
        // Create a DatagramSocket to listen on port 5000
        socket = new DatagramSocket(5000);
        System.out.println("UDP Server is running...");

        byte[] receiveBuffer = new byte[1024];

        while (true) {
            // Prepare to receive data from client
            DatagramPacket receivePacket = new DatagramPacket(receiveBuffer,
receiveBuffer.length);
            socket.receive(receivePacket); // Blocking call to receive the packet
            String receivedData = new String(receivePacket.getData(), 0,
receivePacket.getLength());

            System.out.println("Data received from client: " + receivedData);

            if ("exit".equalsIgnoreCase(receivedData.trim())) {
                System.out.println("Server shutting down.");
                break;  // Exit the loop if the client sends "exit"
            }

            // Sending a response back to client
            String response = "Server received: " + receivedData;
            byte[] sendBuffer = response.getBytes();
            InetAddress clientAddress = receivePacket.getAddress();
            int clientPort = receivePacket.getPort();

            DatagramPacket sendPacket = new DatagramPacket(sendBuffer,
sendBuffer.length, clientAddress, clientPort);
            socket.send(sendPacket);  // Send the response to the client
```

```
            }

        } catch (Exception e) {
            System.err.println("Error: " + e.getMessage());
        } finally {
            if (socket != null && !socket.isClosed()) {
                socket.close();  // Close the socket when done
            }
        }
    }
}
```

ASSIGNMENT 6 (LA 8)

TCP client

```
import java.io.*;
import java.net.*;

public class TCPClient {
    public static void main(String[] args) {
        Socket socket = null;
        PrintWriter out = null;
        BufferedReader in = null;

        try {
            // Connect to the server at localhost on port 5000
            socket = new Socket("localhost", 5000);
            System.out.println("Connected to the server.");
```

```
            // Setup input and output streams
            out = new PrintWriter(socket.getOutputStream(), true);
            in = new BufferedReader(new InputStreamReader(socket.getInputStream()));

            // Read the greeting from the server
            String serverMessage = in.readLine();
            System.out.println("Received from server: " + serverMessage);

            // Respond back to the server
            out.println("Hello from the client!");

        } catch (IOException e) {
            e.printStackTrace();
        } finally {
            // Close resources
            try {
                if (in != null) in.close();
                if (out != null) out.close();
                if (socket != null) socket.close();
            } catch (IOException e) {
                e.printStackTrace();
            }
        }
    }
}
```

TCP server

```
import java.io.*;
import java.net.*;
```

```
public class TCPServer {
    public static void main(String[] args) {
        ServerSocket serverSocket = null;
        Socket clientSocket = null;
        PrintWriter out = null;
        BufferedReader in = null;

        try {
            // Create a server socket listening on port 5000
            serverSocket = new ServerSocket(5000);
            System.out.println("Server is listening on port 5000...");

            // Accept a client connection
            clientSocket = serverSocket.accept();
            System.out.println("Client connected.");

            // Setup input and output streams
            out = new PrintWriter(clientSocket.getOutputStream(), true);
            in = new BufferedReader(new
InputStreamReader(clientSocket.getInputStream()));

            // Greet the client
            out.println("Hello from the server!");

            // Read the message from the client
            String clientMessage = in.readLine();
            System.out.println("Received from client: " + clientMessage);
```

```
        } catch (IOException e) {
            e.printStackTrace();
        } finally {
            // Close resources
            try {
                if (in != null) in.close();
                if (out != null) out.close();
                if (clientSocket != null) clientSocket.close();
                if (serverSocket != null) serverSocket.close();
            } catch (IOException e) {
                e.printStackTrace();
            }
        }
    }
}
```

ASSIGNMENT 7 (LA 9)

UDP Client

```
import java.io.*;
import java.net.*;

public class UDPClient {
    public static void main(String[] args) {
        DatagramSocket socket = null;
        try {
            socket = new DatagramSocket();
            InetAddress serverAddress = InetAddress.getByName("localhost");

            // Change the file name to send different types of files
```

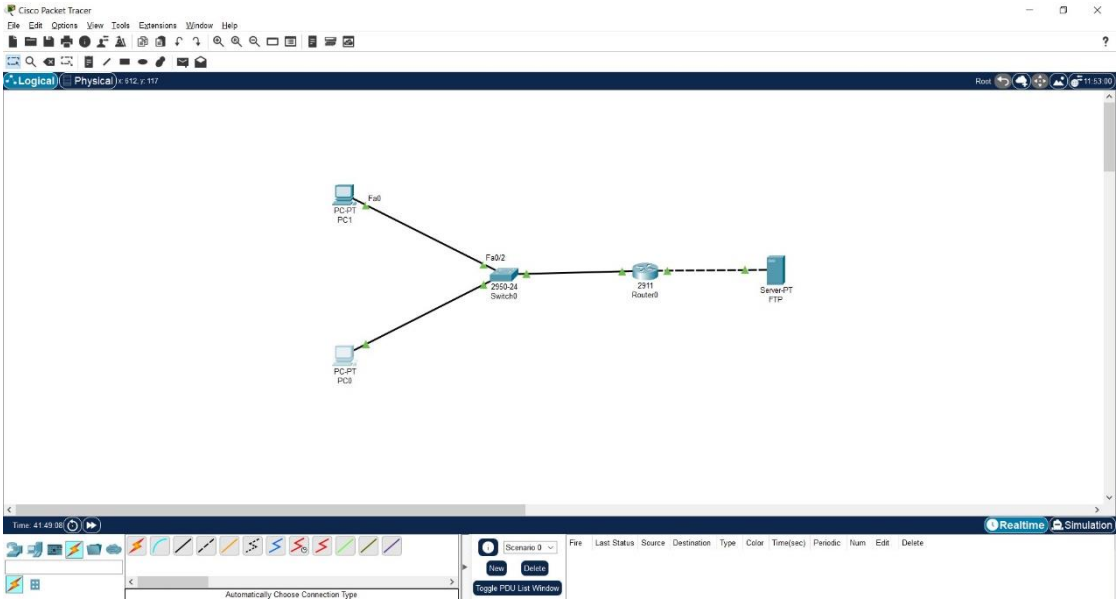
```
            String filePath = "D:\\Saanu\\Academics\\TE\\CN
LAB\\Assignment9\\File.txt"; // Specify the path to your file
            File file = new File(filePath);
            byte[] sendData = new byte[(int) file.length()];

            FileInputStream fis = new FileInputStream(file);
            fis.read(sendData);
            fis.close();

            DatagramPacket sendPacket = new DatagramPacket(sendData,
sendData.length, serverAddress, 9876);
            socket.send(sendPacket);

            System.out.println("File sent: " + file.getName());
        } catch (IOException e) {
            e.printStackTrace();
        } finally {
            if (socket != null && !socket.isClosed()) {
                socket.close();
            }
        }
    }
}
```

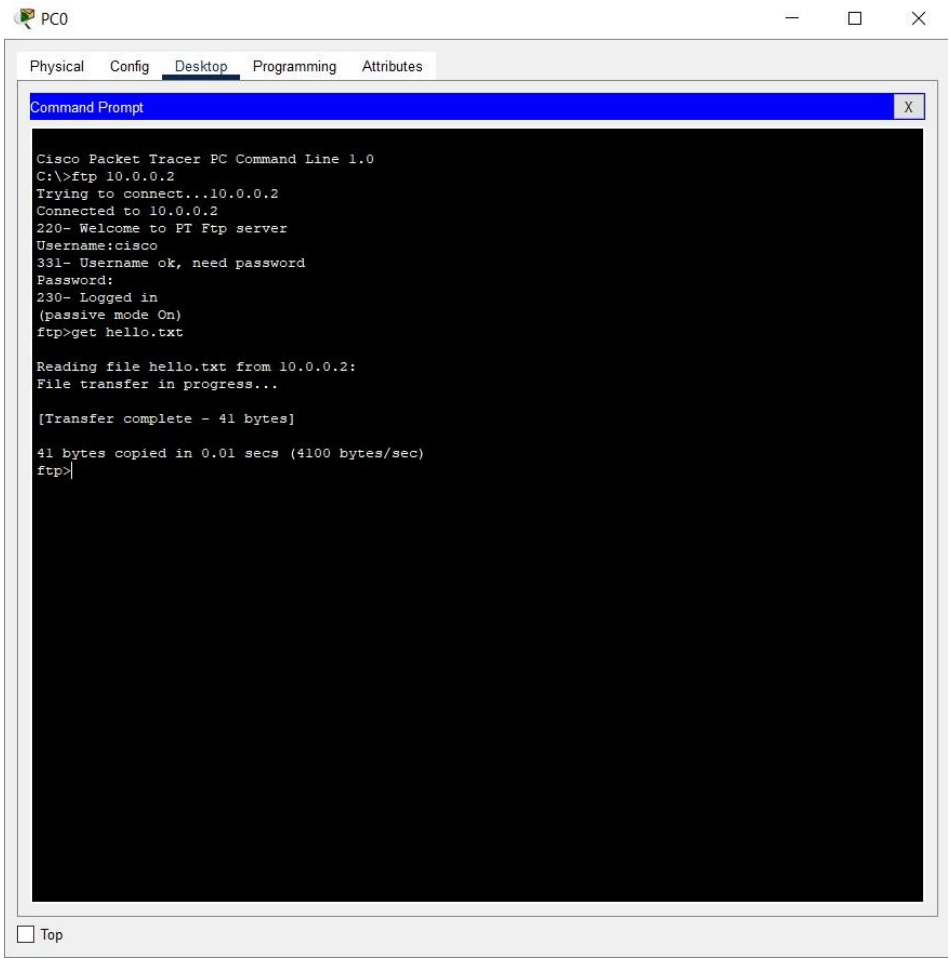
UDP Server

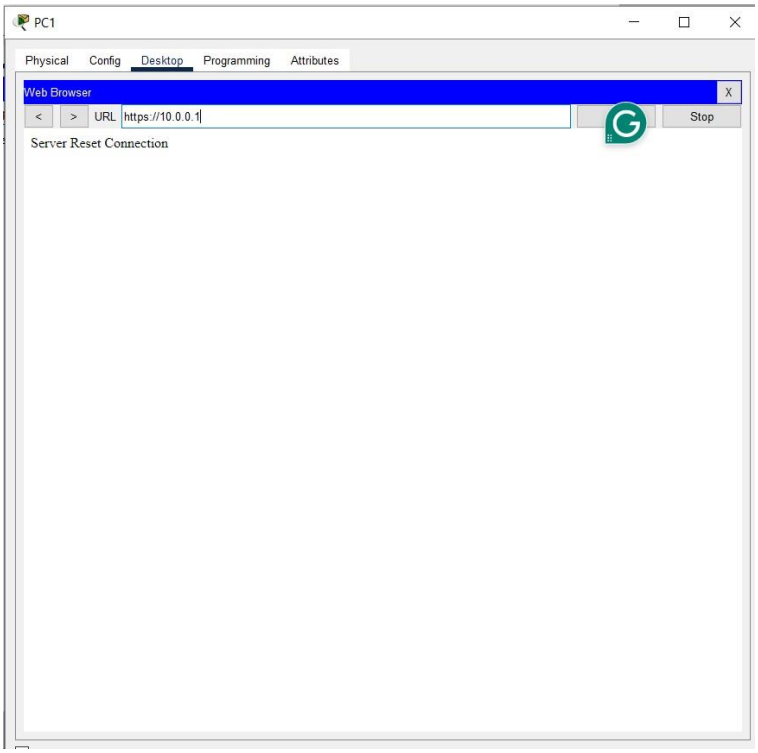
```
import java.io.*;
import java.net.*;

public class UDPServer {
```

```
    public static void main(String[] args) {
        DatagramSocket socket = null;
        try {
            socket = new DatagramSocket(9876);
            byte[] receiveData = new byte[1024];

            System.out.println("Server is running...");

            while (true) {
                DatagramPacket receivePacket = new DatagramPacket(receiveData,
receiveData.length);
                socket.receive(receivePacket);

                String fileName = "received_file";
                FileOutputStream fos = new FileOutputStream(fileName);
                fos.write(receivePacket.getData(), 0, receivePacket.getLength());
                fos.close();

                System.out.println("File received: " + fileName);
            }
        } catch (IOException e) {
            e.printStackTrace();
        } finally {
            if (socket != null && !socket.isClosed()) {
                socket.close();
            }
        }
    }
}
```

ASSIGNMENT 8 (LA 11)



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Config
Desktop
Programming
Attributes
Web Browser
X
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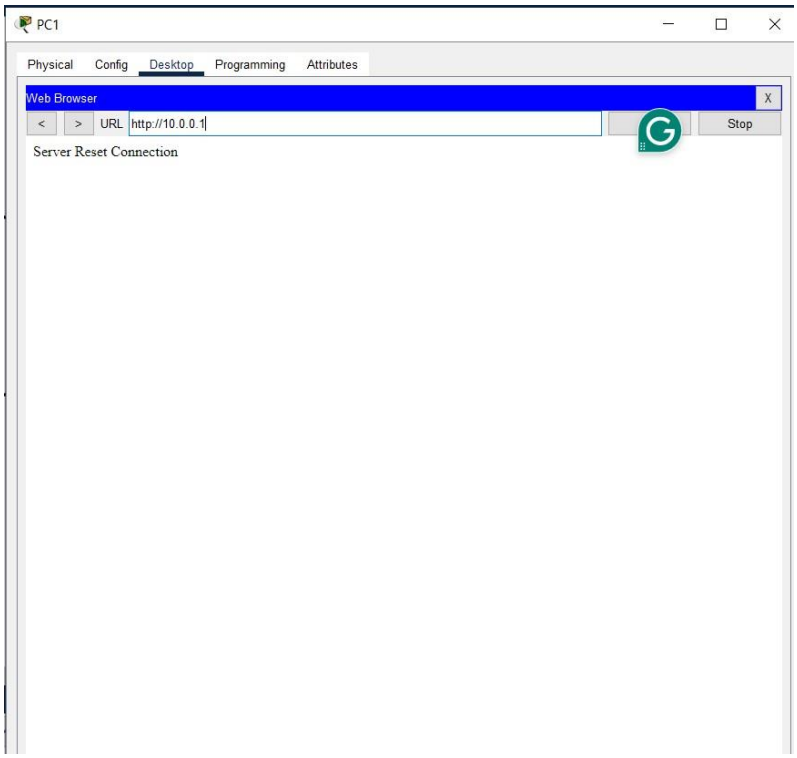
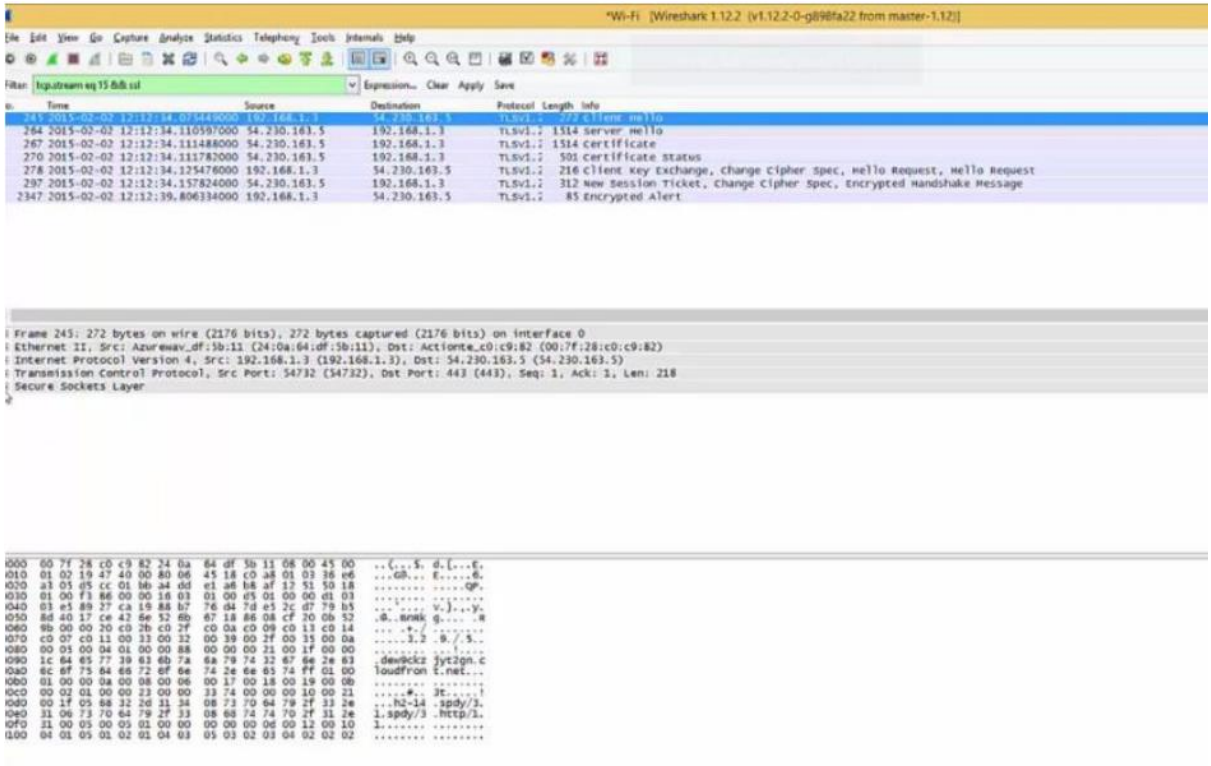
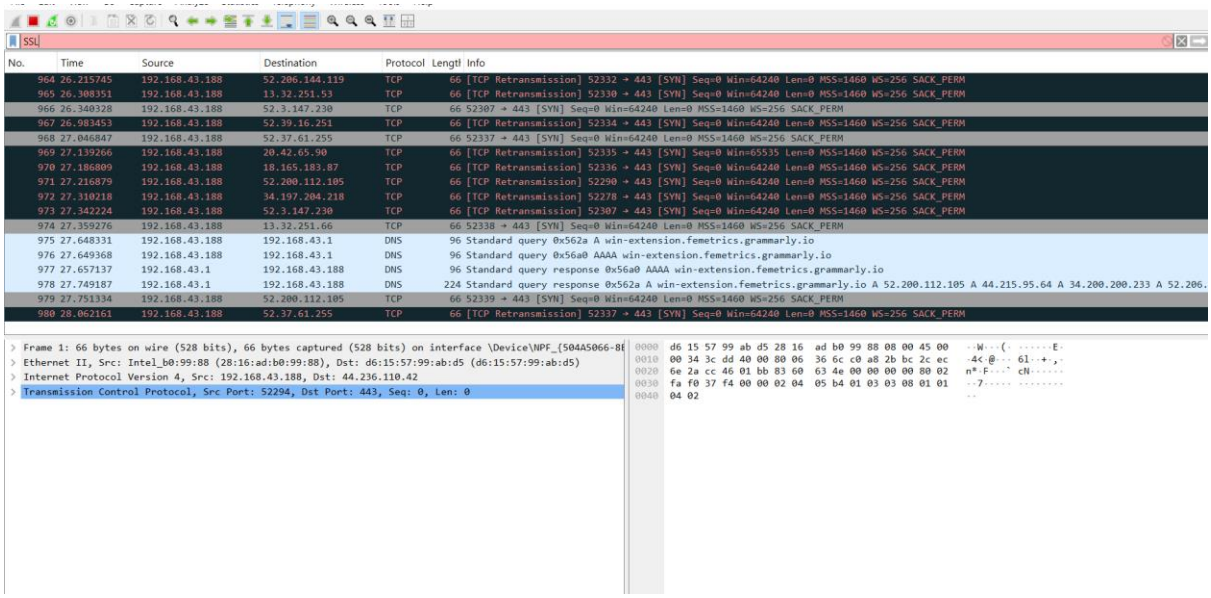
>
URL
https://10.0.0.1
Stop
Server Reset Connection


PC1
Physical
Config
Desktop
Programming
Attributes
Web Browser
X
<
>
URL
http://10.0.0.1
Stop
Server Reset Connection

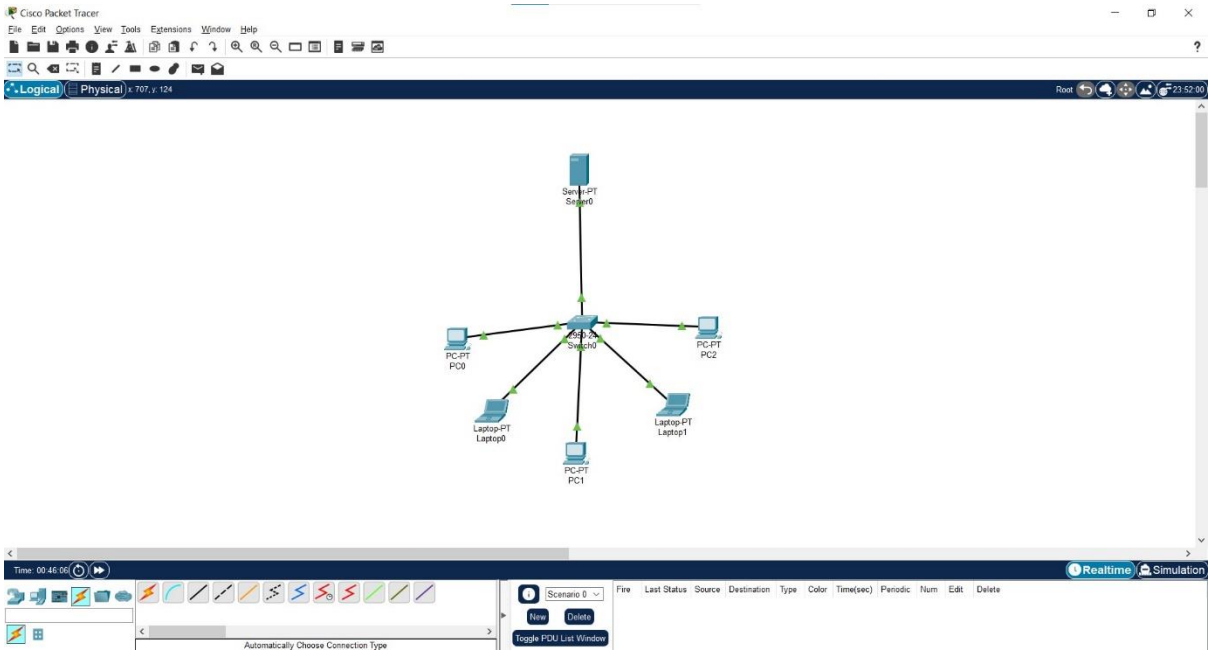
ASSIGNMENT 9 (LA 12)



ASSIGNMENT 10 (LA 14)



ASSIGNMENT 11 (LA 15)



ASSIGNMENT 12 (LA 16)

```
import java.net.InetAddress;
import java.util.Scanner;

public class DNS
{

    public static void main(String[] args) throws Exception {
        Scanner scanner = new Scanner(System.in);

        System.out.println("1. IP to URL\n2. URL to IP");
        int choice = scanner.nextInt();
        scanner.nextLine();

        switch (choice) {
            case 1:
                System.out.println("Enter the IP address: ");
                String ip = scanner.nextLine();
                InetAddress inetAddressIP = InetAddress.getByName(ip);
                System.out.println("The URL associated with the IP address " + ip +
" is: " + inetAddressIP.getHostName());
                break;

            case 2:
                System.out.println("Enter the URL: ");
                String url = scanner.nextLine();
                InetAddress inetAddressURL = InetAddress.getByName(url);
                System.out.println("The IP address associated with the URL " + url +
" is: " + inetAddressURL.getHostAddress());
```

```
                break;

            default:
                System.out.println("Invalid choice! Please enter '1' or '2'.");
        }

        scanner.close();
    }
}
```