IMPLEMENTAION OF RTSP,FTP,TCP/IP PROTOCOL

Report submitted to the SASTRA Deemed to be University

As the requirement for the course

CSE302: COMPUTER NETWORKS

Submitted by

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SASTRA

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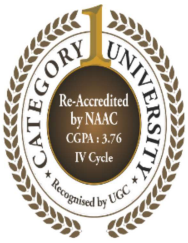

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Bonafide Certificate

This is to certify that the report titled "**IMPLEMENTAION OF RTSP,FTP,TCP/IP PROTOCOL**"submitted as a requirement for the course , **CSE302 : COMPUTER NETWORKS** for B.Tech. is a bonafide record of the work done by **Shri.PRAVEENKUMAR B(Reg.No: 224003081 , CSE)** during the academic year 2021-22, in the School of Computing

Project Based Work Viva voice held on _____

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ABSTRACT

The primary goal of this project is to integrate RTSP, FTP, and TCP/IP in the Group Conversation Application. In this project, the video and audio in the communication are streamed using the RTSP protocol, and the chat is encrypted using end to end encryption (AES Algorithm). Any sort of file up to 2GB can be sent in a chat using TCP/IP (i.e similar to whatapp). It is comparable to a group in which there is just one server and numerous clients. The chat's password is set up for login.These are features of this project.

KEYWORDS: RTSP,FTP,TCP/IP,Encryption,Decryption

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CHAPTER 1

1.1 INTRODUCTION

Chat application is a feature or a program on the Internet to communicate directly among Internet users who are online or who were equally using the internet.Implementing a chat server application provides a good opportunity for a beginner to design and implement a network based system. The design is very simple. It is implemented in Java,since is easy to program in, it precludes the need to deal with low level memory management and includes powerful libraries for sockets and threads.

AES 256 based message Encryption.

Live (webcam) Video/Audio Transmistion .

Supports File Transfer Upto 2 Gb.

All file format supported for File Transfer.

Uses TCP/IP Protocol for Message Transfer

1.2 RTSP PROTOCOL

RTSP:

Real Time Streaming Protocol (RTSP) is an application-level network communication system that transfers real-time data from multimedia to an endpoint device by communicating directly with the server streaming the data.

In the transport layer, RTP (Real-Time Protocol) is used to transmit the stream in real-time. The RTSP function is equivalent to the remote control of a streaming media server. IP cameras can use both TCP and UDP to transmit streaming content. However, it should be noted that UDP does not make any practical sense for this task.

FTP PROTOCOL

FTP:

File transfer protocol (FTP) is a way to download, upload, and transfer files from one location to another on the Internet and between computer systems. FTP enables the transfer of files back and forth between computers or through the cloud. Users require an Internet connection in order to execute FTP transfers.

TCP/IP PROTOCOL

TCP/IP:

TCP/IP stands for Transmission Control Protocol/Internet Protocol and is a suite of communication protocols used to interconnect network devices on the internet. TCP/IP is also used as a communications protocol in a private computer network (an intranet or extranet).TCP is connection-oriented, and a connection between client and server is established before data can be sent. The server must be listening (passive open) for connection requests from clients before a connection is established. Three-way handshake (active open), retransmission, and error detection adds to reliability but lengthens latency.

1.3 IMPLEMENTATION OF RTSP

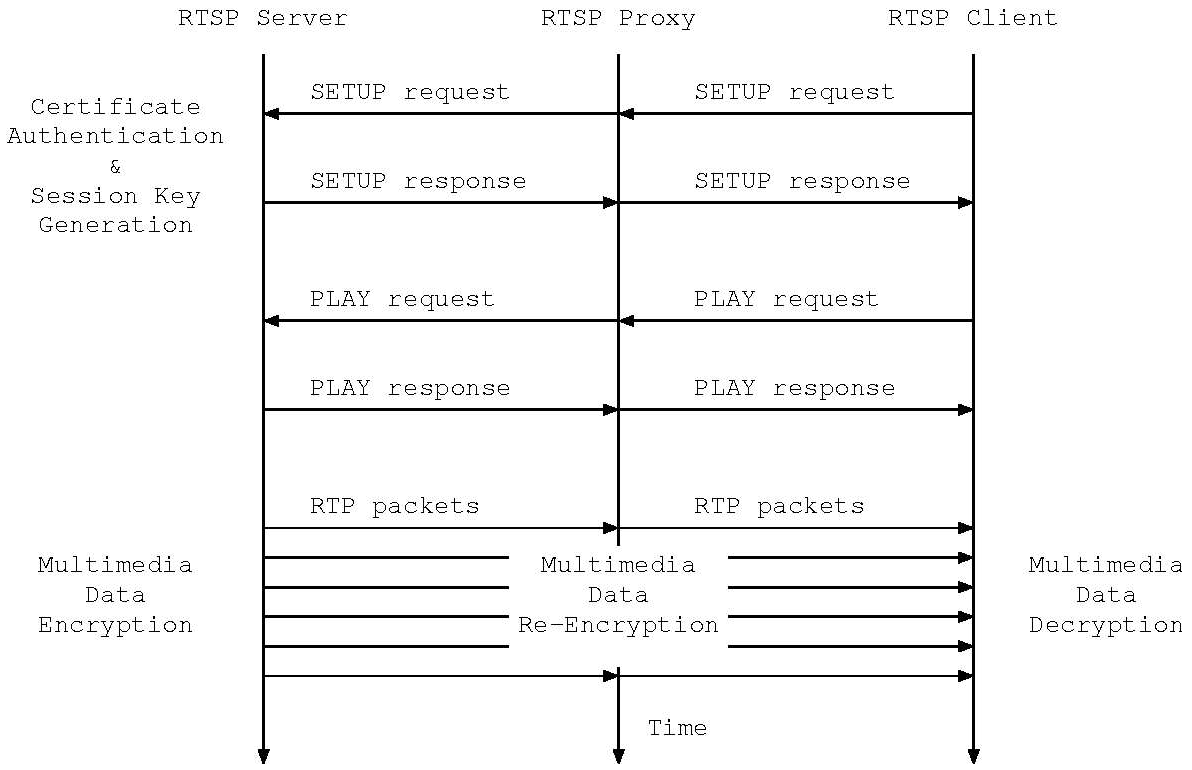
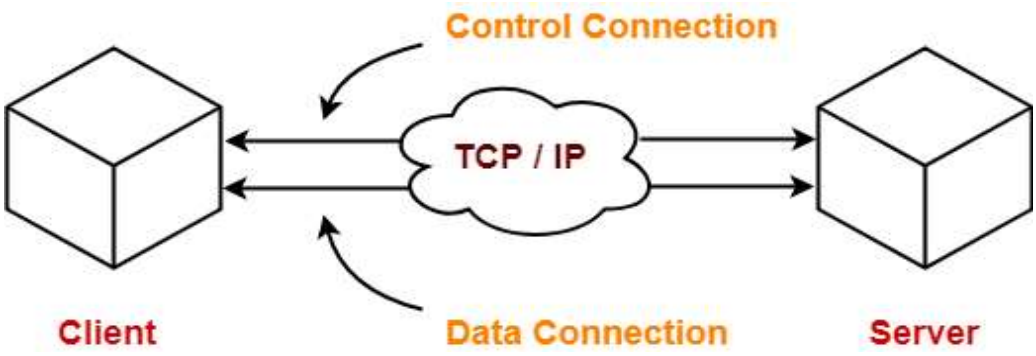


Fig 1.1 RTSP Model

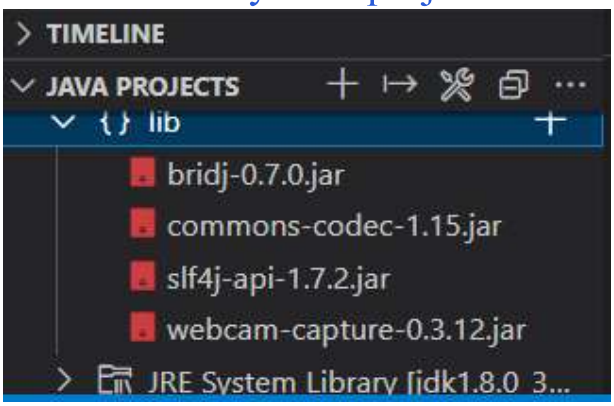
IMPLEMENTATION OF FTP



Pre-Requisites:

Include the Required Library in the lib folder

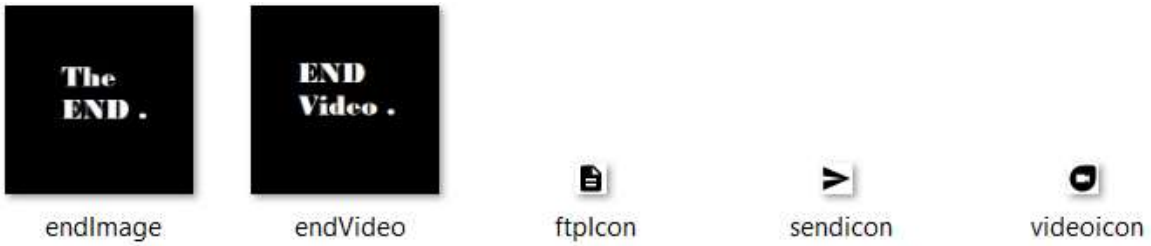
bit.ly/cnlibproject



IMG FOR THE ICONS:

bit.ly/cnimgproject

Save it as images in the Project folder



CHAPTER 2

SOURCE

CODE

2.1 SOURCE CODE FOR SERVER.JAVA

```
import java.net.Socket;
import java.net.SocketException;
import java.net.ServerSocket;
import java.util.ArrayList;
import java.util.Scanner;

import javax.swing.ImageIcon;

import java.io.DataInputStream;
import java.io.DataOutputStream;
import java.io.ObjectInputStream;
import java.io.ObjectOutputStream;

public class Server {
   final static int PORT = 2000;

   static ArrayList<Socket> chatClientList;
   static ArrayList<Socket> videoClientList;
   static ArrayList<ObjectOutputStream> audioClientList;
   static String ENCRYPTED_SECRET_STRING;

   public static void main(String[] args) {
      chatClientList = new ArrayList<Socket>();
      videoClientList = new ArrayList<Socket>();
      audioClientList = new ArrayList<ObjectOutputStream>();
      int connectedClients = 0;
      ServerSocket chatServerSocket, videoServerSocket, audioServerSocket;
      Scanner scan = new Scanner(System.in);
      System.out.print("Enter The Group Name :");
      String groupName = scan.nextLine();
      scan.close();
      try {

         chatServerSocket = new ServerSocket(PORT);
         videoServerSocket = new ServerSocket(PORT + 1);
         audioServerSocket = new ServerSocket(PORT + 2);
         new VideoServer(videoServerSocket).start();
         new AudioServer(audioServerSocket).start();
```

```
            System.out.println("Server Created with Port No: 2000 and Listening ...");

            while (true) {
                Socket client = chatServerSocket.accept();
                DataOutputStream dout = new DataOutputStream(client.getOutputStream());
                dout.writeUTF(groupName);
                connectedClients++;
                if (connectedClients == 1) {
                    dout.writeUTF("RequestSecretText");
                    ENCRYPTED_SECRET_STRING = new DataInputStream(client.getInputStream()).readUTF();
                } else {
                    dout.writeUTF(ENCRYPTED_SECRET_STRING);
                }
                System.out.println("Accecpted new Client into the Server ");
                // System.out.println("Total Number of Connected Client :" + connectedClients);
                Server.chatClientList.add(client);
                new ClientListenThread(client).start();
            }
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}

class ClientListenThread extends Thread {
    Socket s;

    ClientListenThread(Socket s) {
        this.s = s;
    }

    public void run() {
        try {
            DataInputStream din = new DataInputStream(s.getInputStream());
            while (true) {
                String str = din.readUTF();
                if (str.startsWith("END")) {
                    s.close();
                    break;
                } else if (str.startsWith("FILE_TRANS")) {
                    byte bytes[] = new byte[Integer.parseInt(str.split(":::")[2])];
                    din.readFully(bytes, 0, bytes.length);
                    for (Socket ss : Server.chatClientList) {
                        if (ss == s)
                            continue;
                        DataOutputStream dout = new DataOutputStream(ss.getOutputStream());
```

```
                    dout.writeUTF(str);
                    dout.write(bytes, 0, bytes.length);
                    dout.flush();
                }
                continue;
            }
            for (Socket s : Server.chatClientList) {
                DataOutputStream dout = new DataOutputStream(s.getOutputStream());
                dout.writeUTF(str);
            }
        }
    } catch (SocketException e) {
        System.out.println("Person Disconnected");
    } catch (Exception e) {
        e.printStackTrace();
    }
    int i = Server.chatClientList.indexOf(s);
    Server.chatClientList.remove(i);
  }
}

class VideoServer extends Thread {

  ServerSocket videoServerSocket;

  VideoServer(ServerSocket ss) {
    videoServerSocket = ss;
  }

  public void run() {

    while (true) {
      try {
        Socket socket = videoServerSocket.accept();
        Server.videoClientList.add(socket);
        new VideoStreamThread(socket).start();
      } catch (Exception e) {
        e.printStackTrace();
      }

    }
  }
}

class VideoStreamThread extends Thread {
  Socket s;
```

```
    VideoStreamThread(Socket socket) {
        s = socket;
    }

    public void run() {
        try {
            ImageIcon ic;
            ObjectInputStream oin = new ObjectInputStream(s.getInputStream());
            while (true) {
                ic = (ImageIcon) oin.readObject();
                if (ic != null && ic.getDescription() != null && ic.getDescription().equals("END")) {
                    System.out.println("end recevied");
                    s.close();
                    break;
                } else {

                    for (Socket c : Server.videoClientList) {
                        // if(c==s) continue;
                        ObjectOutputStream oout = new ObjectOutputStream(c.getOutputStream());
                        oout.writeObject(ic);
                        oout.flush();
                    }
                    if (ic != null && ic.getDescription() != null && ic.getDescription().equals("END_VIDEO")) {
                        oin = new ObjectInputStream(s.getInputStream());
                    }
                }
            }

        } catch (Exception e) {
            e.printStackTrace();
        }
        int i = Server.videoClientList.indexOf(s);
        Server.videoClientList.remove(i);
    }
}

class AudioServer extends Thread {
    ServerSocket audioServerSocket;

    AudioServer(ServerSocket ss) {
        audioServerSocket = ss;
    }

    public void run() {
        try {
```

```
            while (true) {
                Socket s = audioServerSocket.accept();
                ObjectOutputStream out = new ObjectOutputStream(s.getOutputStream());
                Server.audioClientList.add(out);
                new AudioStreamThread(s, out).start();
            }

        } catch (Exception e) {
            e.printStackTrace();
        }

    }
}

class AudioStreamThread extends Thread {
    Socket socket;
    private ObjectInputStream ois;
    private ObjectOutputStream out;

    AudioStreamThread(Socket s, ObjectOutputStream ot) {
        socket = s;
        out = ot;
    }

    public void run() {
        try {
            ois = new ObjectInputStream(socket.getInputStream());
            byte[] data = new byte[1024];
            while (true) {
                int dsize = ois.read(data);
                if (dsize == 1024) {
                    for (ObjectOutputStream oout : Server.audioClientList) {
                        oout.write(data, 0, dsize);
                        oout.reset();
                    }
                } else if (dsize == 512) {
                    System.out.println("[ SERVER ] : dsize-" + dsize + " Client Stopped.");
                    ois = new ObjectInputStream(socket.getInputStream());
                }

            }
        } catch (SocketException e) {
            System.out.println("Person Disconnected");
        } catch (Exception e) {
            System.out.println(e);
        }
```

```
        int i = Server.audioClientList.indexOf(out);
        Server.audioClientList.remove(i);

    }

}
```

2.2 SOURCE CODE FOR CLIENT.JAVA:

```
    import javax.crypto.BadPaddingException;
    import javax.crypto.IllegalBlockSizeException;
    import javax.sound.sampled.AudioFormat;
    import javax.sound.sampled.AudioSystem;
    import javax.sound.sampled.DataLine;
    import javax.sound.sampled.SourceDataLine;
    import javax.sound.sampled.TargetDataLine;
    import javax.swing.*;
    import javax.swing.border.EmptyBorder;

    import java.net.*;
    import java.text.SimpleDateFormat;
    import java.util.Date;
    import java.awt.image.BufferedImage;
    //import javax.swing.event.*;
    import java.io.DataInputStream;
    import java.io.DataOutputStream;
    import java.io.File;
    import java.io.FileInputStream;
    import java.io.FileOutputStream;
    import java.io.ObjectInputStream;
    import java.io.ObjectOutputStream;
    import java.awt.event.*;
    import java.awt.*;
    import com.github.sarxos.webcam.*; // for geting webcam Videos

    class Client extends JFrame {
        static String IP_ADDRESS_STRING = "localhost";
        static int PORT = 2000;
        static String CURRENT_USER = "Client";
        static String PASSWORD = "1234"; // FOR TESTING PURPOSES
        static boolean isSetupDone;
        static boolean runCam;
        static Socket videoSocket;
        static Socket audioSocket;
        static JFrame videoFrame = new JFrame();
        static final int VIDEO_HEIGHT = 640, VIDEO_WIDTH = 480;
```

```
static Encryption enc = new Encryption();
static Decryption dec = new Decryption();
/**
 *
 */
private static final long serialVersionUID = 1L;
Socket clientSocket;
JLabel groupName;
JButton send, fileSend, videoStream;
JTextField msg;
JPanel chat;
JScrollPane scrollPane;
JFileChooser jfc;

static {
   loginInterface();
}

private static void loginInterface() {
   Client.isSetupDone = false;

   JLabel nameLabel, ipLabel, portLabel, passwordLabel;
   JTextField nameTextField, ipTextField, portTextField;
   JPasswordField passwordTextField;
   JButton connect;
   JFrame frame = new JFrame();
   frame.setTitle("Set-UP");

   nameLabel = new JLabel("         Name :");
   ipLabel = new JLabel("IP Address :");
   passwordLabel = new JLabel(" Password  :");
   portLabel = new JLabel("             Port :");
   nameTextField = new JTextField(15);
   ipTextField = new JTextField(15);
   portTextField = new JTextField(15);
   passwordTextField = new JPasswordField(15);
   connect = new JButton("Connect !");
   ipTextField.setText("localhost");
   portTextField.setText(PORT + "");

   Container contentPane = frame.getContentPane();
   SpringLayout layout = new SpringLayout();
   contentPane.setLayout(layout);
   contentPane.add(nameLabel);
   contentPane.add(nameTextField);
```

```
        contentPane.add(ipLabel);
        contentPane.add(ipTextField);
        contentPane.add(portLabel);
        contentPane.add(portTextField);
        contentPane.add(passwordLabel);
        contentPane.add(passwordTextField);
        contentPane.add(connect);

        // Name
        layout.putConstraint(SpringLayout.WEST, nameLabel, 5, SpringLayout.WEST,
contentPane);
        layout.putConstraint(SpringLayout.NORTH, nameLabel, 5, SpringLayout.NORTH,
contentPane);
        layout.putConstraint(SpringLayout.WEST, nameTextField, 5, SpringLayout.EAST,
nameLabel);
        layout.putConstraint(SpringLayout.NORTH, nameTextField, 5,
SpringLayout.NORTH, contentPane);
        // IP Address
        layout.putConstraint(SpringLayout.WEST, ipLabel, 5, SpringLayout.WEST,
contentPane);
        layout.putConstraint(SpringLayout.NORTH, ipLabel, 5, SpringLayout.SOUTH,
nameTextField);
        layout.putConstraint(SpringLayout.WEST, ipTextField, 5, SpringLayout.EAST,
ipLabel);
        layout.putConstraint(SpringLayout.NORTH, ipTextField, 5, SpringLayout.SOUTH,
nameTextField);
        // Port
        layout.putConstraint(SpringLayout.WEST, portLabel, 5, SpringLayout.WEST,
contentPane);
        layout.putConstraint(SpringLayout.NORTH, portLabel, 5, SpringLayout.SOUTH,
ipTextField);
        layout.putConstraint(SpringLayout.WEST, portTextField, 5, SpringLayout.EAST,
portLabel);
        layout.putConstraint(SpringLayout.NORTH, portTextField, 5, SpringLayout.SOUTH,
ipTextField);
        // Password
        layout.putConstraint(SpringLayout.WEST, passwordLabel, 5, SpringLayout.WEST,
contentPane);
        layout.putConstraint(SpringLayout.NORTH, passwordLabel, 5,
SpringLayout.SOUTH, portTextField);
        layout.putConstraint(SpringLayout.WEST, passwordTextField, 5,
SpringLayout.EAST, passwordLabel);
        layout.putConstraint(SpringLayout.NORTH, passwordTextField, 5,
SpringLayout.SOUTH, portTextField);
        // Connect Button
```

```
        layout.putConstraint(SpringLayout.WEST, connect, 5, SpringLayout.EAST,
portLabel);
        layout.putConstraint(SpringLayout.NORTH, connect, 5, SpringLayout.SOUTH,
passwordTextField);

        // Boundries
        layout.putConstraint(SpringLayout.EAST, contentPane, 5, SpringLayout.EAST,
portTextField);
        layout.putConstraint(SpringLayout.SOUTH, contentPane, 5, SpringLayout.SOUTH,
connect);
        frame.pack();
        frame.setVisible(true);
        frame.setLocationRelativeTo(null);
        frame.setDefaultCloseOperation(EXIT_ON_CLOSE);

        connect.addActionListener(
                e -> ConnectToServer(nameTextField, ipTextField, portTextField,
passwordTextField, frame));
        passwordTextField.addActionListener(
                e -> ConnectToServer(nameTextField, ipTextField, portTextField,
passwordTextField, frame));

    }

    private static void ConnectToServer(JTextField nameTextField, JTextField ipTextField,
JTextField portTextField,
            JPasswordField passwordTextField, JFrame frame) {
        if (nameTextField.getText().toString().isEmpty() ||
ipTextField.getText().toString().isEmpty()
                || new String(passwordTextField.getPassword()).isEmpty()
                || portTextField.getText().toString().isEmpty()) {
            String tPass = ((new String(passwordTextField.getPassword()).isEmpty()) ? "
Password Field" : "";
            String tName = (nameTextField.getText().toString().isEmpty()) ? "Name Field" : "";
            JOptionPane.showMessageDialog(null, tName + tPass + " cannot be Empty",
"Note",
                    JOptionPane.INFORMATION_MESSAGE);

        } else {
            // System.out.println("Vrtified ...");
            CURRENT_USER = nameTextField.getText().toString();
            IP_ADDRESS_STRING = ipTextField.getText().toString();
            PORT = Integer.parseInt(portTextField.getText().toString());
            PASSWORD = new String(passwordTextField.getPassword());
            Client.isSetupDone = true;
```

```
            frame.dispose();
        }
    }

    Client() {
        super("Chat Window:Client");
        setLayout(new BorderLayout());
        setUI();
        setSize(400, 550);
        setVisible(true);
        setDefaultCloseOperation(3);

        listeners();

    }

    private void listeners() {
        send.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                try {
                    if (msg.getText() == null || msg.getText().toString().trim().length() == 0) {
                    } else {
                        String content = msg.getText().toString();
                        msg.setText("");
                        DataOutputStream dout = new
DataOutputStream(clientSocket.getOutputStream());
                        dout.writeUTF(Client.CURRENT_USER + ":::" +
Client.enc.encrypt(content, Client.PASSWORD));
                    }
                } catch (Exception e1) {

                    e1.printStackTrace();
                }
            }
        });
        msg.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                try {
                    if (msg.getText() == null || msg.getText().toString().trim().length() == 0) {
                    } else {
                        String content = msg.getText().toString();
                        msg.setText("");
                        DataOutputStream dout = new
DataOutputStream(clientSocket.getOutputStream());
                        dout.writeUTF(Client.CURRENT_USER + ":::" +
```

```
Client.enc.encrypt(content, Client.PASSWORD));
                }
            } catch (Exception e1) {

                e1.printStackTrace();
            }
        }
    });
    addWindowListener(new WindowAdapter() {
        public void windowClosing(WindowEvent we) {
            try {
                DataOutputStream dout = new
DataOutputStream(clientSocket.getOutputStream()); // sendign
                dout.writeUTF("GRP_INFO" + ":::" + Client.CURRENT_USER + " left the
Chat.");
                dout.writeUTF("END");
                ObjectOutputStream oout = new
ObjectOutputStream(videoSocket.getOutputStream());
                oout.writeObject(new ImageIcon("images\\endImage.png", "END"));

            } catch (Exception e) {
                System.out.println(e);
            }
        }
    });
    fileSend.addActionListener(new ActionListener() {
        public void actionPerformed(ActionEvent ae) {
            try {
                jfc.showOpenDialog(null);
                if (jfc.getSelectedFile() != null) {
                    File file = jfc.getSelectedFile();
                    FileInputStream fis = new FileInputStream(file.getPath());
                    int fileLen = (int) file.length();
                    String transferINFO = "FILE_TRANS:::" + file.getName() + ":::" + fileLen
+ ":::"
                            + Client.CURRENT_USER;
                    DataOutputStream dos = new
DataOutputStream(clientSocket.getOutputStream());
                    dos.writeUTF(transferINFO);
                    byte b[] = new byte[fileLen];
                    fis.read(b, 0, b.length);
                    fis.close();
                    dos.write(b, 0, b.length);
                    dos.flush();
                    addMessages("GRP_INFO", "You Send A File");
```

```
                }
            } catch (Exception e) {
                e.printStackTrace();
            }
        }

    });

    videoStream.addActionListener(new ActionListener() {
        public void actionPerformed(ActionEvent e) {

            Webcam cam = Webcam.getDefault();
            Client.runCam = true;
            cam.setViewSize(new Dimension(Client.VIDEO_HEIGHT,
Client.VIDEO_WIDTH));
            try {
                ImageIcon ic = null;
                BufferedImage br = null;
                ObjectOutputStream vstream = new
ObjectOutputStream(Client.videoSocket.getOutputStream());
                cam.open();
                new VideoOutstreamThread(ic, br, vstream, cam).start();
                new AudioOutStreamThread().start();

            } catch (Exception exception) {
                exception.printStackTrace();
            }
            videoStreamStopUI();

        }
    });
  }

  void videoStreamStopUI() {
    JFrame stopFrame = new JFrame();
    stopFrame.setTitle("Pack()");
    stopFrame.setLayout(new FlowLayout());
    JButton stopButton = new JButton("Stop");
    stopFrame.add(stopButton);
    stopFrame.pack(); // calling the pack() method
    stopFrame.setDefaultCloseOperation(JFrame.DO_NOTHING_ON_CLOSE);
    stopFrame.setLocationRelativeTo(null);
    stopFrame.setVisible(true);
    stopButton.addActionListener(ae -> {
```

```
            Client.runCam = false;
            stopFrame.dispose();
        });
        stopFrame.addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent we) {
                Client.runCam = false;
                stopFrame.dispose();
            }
        });

    }

    private void setUI() {
        // initila UI setup
        groupName = new JLabel("Connecting...");

        send = new JButton();
        fileSend = new JButton();
        videoStream = new JButton();
        videoStream.setIcon(new ImageIcon("images\\videoicon.png"));
        send.setIcon(new ImageIcon("images\\sendicon.png"));
        fileSend.setIcon(new ImageIcon("images\\ftpicon.png"));
        fileSend.setToolTipText("File Transfer");
        videoStream.setToolTipText("Video Stream");
        send.setToolTipText("Send");
        msg = new JTextField(25);
        chat = new JPanel();
        scrollPane = new JScrollPane(chat);
        jfc = new JFileChooser();

        // NORTH
        JPanel top = new JPanel();
        top.setLayout(new FlowLayout(FlowLayout.CENTER));
        add(top, BorderLayout.NORTH);
        top.add(groupName);

        // CENTER
        add(scrollPane, BorderLayout.CENTER);
        // chat.setLayout(new BoxLayout(chat , BoxLayout.Y_AXIS));
        // scrollPane.setBorder(new EmptyBorder(10, 10, 10, 10));
        chat.setLayout(new BorderLayout());

        // SOUTH
        JPanel p1 = new JPanel(new BorderLayout());
        JPanel p2 = new JPanel(new BorderLayout());
```

```
        JPanel p3 = new JPanel(new BorderLayout());
        add(p1, BorderLayout.SOUTH);
        p1.add(p2, BorderLayout.CENTER);
        p1.add(send, BorderLayout.EAST);
        p1.setBorder(new EmptyBorder(10, 10, 10, 10));
        p2.add(p3, BorderLayout.CENTER);
        p2.add(fileSend, BorderLayout.EAST);
        p3.add(msg, BorderLayout.CENTER);
        p3.add(videoStream, BorderLayout.EAST);

    }

    private void handleFileTransfer(String fileName, String fileLen, String sender,
DataInputStream din) {
        try {
            File directory = new File("FTP Recieved");
            if (!directory.exists())
                directory.mkdir();
            int len = Integer.parseInt(fileLen);
            FileOutputStream fout = new FileOutputStream("FTP Recieved\\" + fileName);
            byte bytes[] = new byte[len];
            din.readFully(bytes, 0, bytes.length);
            fout.write(bytes, 0, bytes.length);
            fout.flush();
            fout.close();
            addMessages("GRP_INFO", fileName + " recieved from " + sender);

        } catch (Exception e) {
            e.printStackTrace();
        }

    }

    private void addMessages(String user, String msg) {
        // Adds Msg in panel Format to add to a chat window
        Color textColor, bgColor;
        FlowLayout layout = new FlowLayout();
        JPanel row = new JPanel();
        JLabel content = new JLabel(msg);
        JLabel sender = new JLabel(user + "                          ");
        JLabel time = new JLabel(getTime()); // Change to Actual Time
        JPanel message = new RoundedPanel();

        if (user.equals("GRP_INFO")) {
            time.setVisible(false);
```

```
            sender.setVisible(false);
            layout.setAlignment(FlowLayout.CENTER);
            textColor = new Color(255, 255, 255);
            bgColor = new Color(110, 103, 103);
        } else if (user.equals(Client.CURRENT_USER)) {
            layout.setAlignment(FlowLayout.RIGHT);
            textColor = new Color(255, 255, 255);
            bgColor = new Color(0, 132, 255);
        } else {
            layout.setAlignment(FlowLayout.LEFT);
            textColor = new Color(0, 0, 0);
            bgColor = new Color(197, 197, 197);
        }

        row.setLayout(layout);
        message.setLayout(new BoxLayout(message, BoxLayout.Y_AXIS));
        sender.setFont(new Font("Helvitica", Font.BOLD, 11));
        content.setFont(new Font("Helvitica", Font.PLAIN, 12));
        time.setFont(new Font("Helvitica", Font.PLAIN, 10));
        message.setBorder(new EmptyBorder(10, 10, 10, 10));

        message.setBackground(bgColor);
        sender.setForeground(textColor);
        content.setForeground(textColor);
        time.setForeground(textColor);

        message.add(sender);
        message.add(content);
        message.add(time);
        row.add(message);
        chat.add(row, BorderLayout.NORTH); // Adds msg to chat layout
        // chat.revalidate();

        JPanel newChat = new JPanel();
        newChat.setLayout(new BorderLayout());
        chat.add(newChat, BorderLayout.CENTER);
        chat = newChat;
        chat.revalidate();

        JScrollBar vertical = scrollPane.getVerticalScrollBar();
        vertical.setValue(vertical.getMaximum());
        JScrollBar vertica = scrollPane.getVerticalScrollBar();
        vertical.setValue(vertica.getMaximum());

    }
```

```
    private String getTime() {
        Date date = new Date();
        SimpleDateFormat formatter = new SimpleDateFormat("hh:mm a");
        return formatter.format(date);
    }

    public static void main(String[] args) {

        // System.out.println("Start");
        while (!Client.isSetupDone) {
            System.out.print("");
        }
        // Wait till u get all info

        Client client = new Client();

        try {
            client.clientSocket = new Socket(IP_ADDRESS_STRING, PORT);
            DataInputStream din = new DataInputStream(client.clientSocket.getInputStream());
            String groupName = din.readUTF();
            client.groupName.setText(groupName);
            DataOutputStream dout = new
DataOutputStream(client.clientSocket.getOutputStream());

            // Verification
            String request = din.readUTF();
            if (request.startsWith("RequestSecretText")) {
                dout.writeUTF(enc.encrypt(Client.PASSWORD, Client.PASSWORD));
            } else {
                try {
                    String str = dec.decrypt(request, Client.PASSWORD);
                    if (!str.equals(Client.PASSWORD)) {
                        JOptionPane.showMessageDialog(client, "You Have entred Wrong
Password", "Invalid Password",
                                JOptionPane.ERROR_MESSAGE);
                        System.exit(0);
                    }
                } catch (IllegalBlockSizeException | BadPaddingException e) {
                    client.dispose();
                    JOptionPane.showMessageDialog(client, "You Have entred Wrong Password",
"Invalid Password",
                            JOptionPane.ERROR_MESSAGE);
                    System.exit(0);
                } catch (Exception e) {
```

```
                e.printStackTrace();
            }
        }

        new ClientVideoStreamThread().start();
        new ClientAudioStreamThread().start();
        dout.writeUTF("GRP_INFO" + ":::" + Client.CURRENT_USER + " joined the
Chat.");
        while (true) {
            String response = din.readUTF();
            String[] str = response.split(":::");
            if (str[0].equals("FILE_TRANS")) {
                client.handleFileTransfer(str[1], str[2], str[3], din);
            } else if (str[0].equals("GRP_INFO"))
                client.addMessages(str[0], str[1]);
            else
                client.addMessages(str[0], Client.dec.decrypt(str[1], Client.PASSWORD));
        }

    } catch (java.net.ConnectException e) {
        client.groupName.setText("FAILED !");
        JOptionPane.showMessageDialog(client, "Server doesn't exist : Invalid IP Address",
"Server Not Found",
                JOptionPane.ERROR_MESSAGE);
        System.exit(0);
    } catch (java.io.EOFException e) {
        System.out.println("Ended");
    } catch (Exception e) {
        e.printStackTrace();
    }
  }
}

class ClientVideoStreamThread extends Thread {
  Socket videoSocket;

  public void run() {
    try {
        videoSocket = new Socket(Client.IP_ADDRESS_STRING, Client.PORT + 1);
        Client.videoSocket = videoSocket;

        JFrame videoFrame = Client.videoFrame;
        ImageIcon ic;
        JLabel videoFeed = new JLabel();
        // videoFrame.setLayout(null);
```

```
            videoFrame.setTitle("Client :" + Client.CURRENT_USER);
            videoFrame.add(videoFeed);
            videoFrame.setVisible(false);
            videoFrame.setSize(Client.VIDEO_HEIGHT, Client.VIDEO_WIDTH);
            videoFrame.setDefaultCloseOperation(JFrame.DO_NOTHING_ON_CLOSE);
            videoFrame.addWindowListener(new WindowAdapter() {
               public void windowClosing(WindowEvent e) {
                  videoFrame.setVisible(false);
               }
            });
            while (true) {
               ObjectInputStream oin = new
ObjectInputStream((videoSocket.getInputStream()));
               ic = (ImageIcon) oin.readObject();
               videoFeed.setIcon(ic);
               if (!videoFrame.isVisible())
                  videoFrame.setVisible(true);
               if (ic != null && ic.getDescription() != null &&
ic.getDescription().equals("END_VIDEO")) {
                  videoFrame.setVisible(false);
               }
            }

         } catch (java.io.EOFException e) {
            System.out.println("Ended");
         } catch (Exception e) {
            e.printStackTrace();
         }
      }
   }

   class VideoOutstreamThread extends Thread {
      ImageIcon ic;
      BufferedImage br;
      ObjectOutputStream stream;
      Webcam cam;

      VideoOutstreamThread(ImageIcon ic, BufferedImage br, ObjectOutputStream stream,
Webcam cam) {
         this.ic = ic;
         this.br = br;
         this.stream = stream;
         this.cam = cam;
      }
```

```
    public void run() {
        try {
            while (Client.runCam) {
                br = cam.getImage();
                ic = new ImageIcon(br);
                stream.writeObject(ic);
                stream.flush();
            }
            ic = new ImageIcon("images\\endVideo.png", "END_VIDEO");
            stream.writeObject(ic);
            stream.flush();
        } catch (Exception e) {
            e.printStackTrace();
        }

        cam.close();
    }
}

class ClientAudioStreamThread extends Thread {
    Socket audioSocket;
    ObjectInputStream ois;
    AudioFormat format;
    DataLine.Info info;
    SourceDataLine speakers;
    byte[] data;

    public void run() {
        try {
            audioSocket = new Socket(Client.IP_ADDRESS_STRING, Client.PORT + 2);
            Client.audioSocket = audioSocket;
            data = new byte[1024];
            format = new AudioFormat(48000.0f, 16, 2, true, false);
            info = new DataLine.Info(SourceDataLine.class, format);
            data = new byte[1024];

            speakers = (SourceDataLine) AudioSystem.getLine(info);
            speakers.open(format);
            speakers.start();
            ois = new ObjectInputStream(audioSocket.getInputStream());
            while (true) {
                int dsize = ois.read(data);
                if (dsize == 1024) {
                    speakers.write(data, 0, dsize);
                }
```

```
            }
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}

class AudioOutStreamThread extends Thread {
    private ObjectOutputStream oos;
    private AudioFormat format;
    private DataLine.Info info;
    private TargetDataLine microphone;
    private byte[] data;
    private int dsize;

    AudioOutStreamThread() {

    }

    public void run() {
        try {
            // Audio Stuff
            format = new AudioFormat(48000.0f, 16, 2, true, false);
            microphone = AudioSystem.getTargetDataLine(format);
            info = new DataLine.Info(TargetDataLine.class, format);
            data = new byte[1024];

            microphone = (TargetDataLine) AudioSystem.getLine(info);
            microphone.open(format);
            microphone.start();
            oos = new ObjectOutputStream(Client.audioSocket.getOutputStream());
            // read and send part
            while (Client.runCam) {
                dsize = microphone.read(data, 0, data.length);
                oos.write(data, 0, dsize);
                oos.reset();
            }
            System.out.println("[ Client ] : Attempting to stop ");
            oos.write(data, 0, 512);
            oos.flush();

        } catch (Exception e) {
            e.printStackTrace();
        }
        microphone.stop();
```

```
        microphone.close();
    }
}
```

2.3 SOURCE CODE FOR ENCRYPTION.JAVA:

```
import java.nio.charset.StandardCharsets;
import java.security.AlgorithmParameters;
import java.security.SecureRandom;
import javax.crypto.Cipher;
import javax.crypto.SecretKey;
import javax.crypto.SecretKeyFactory;
import javax.crypto.spec.IvParameterSpec;
import javax.crypto.spec.PBEKeySpec;
import javax.crypto.spec.SecretKeySpec;
import org.apache.commons.codec.binary.Base64;
public class Encryption {
    public String encrypt(String word, String password) throws Exception {
        byte[] ivBytes;

        SecureRandom random = new SecureRandom();
        byte[] bytes = new byte[20];
        random.nextBytes(bytes);
        byte[] saltBytes = bytes;

        // Derive the key
        SecretKeyFactory factory =
SecretKeyFactory.getInstance("PBKDF2WithHmacSHA1");
        PBEKeySpec spec = new PBEKeySpec(password.toCharArray(), saltBytes, 1500,
256);
        SecretKey secretKey = factory.generateSecret(spec);
        SecretKeySpec secret = new SecretKeySpec(secretKey.getEncoded(), "AES");

        //encrypting the word
        Cipher cipher = Cipher.getInstance("AES/CBC/PKCS5Padding");
        cipher.init(Cipher.ENCRYPT_MODE, secret);
        AlgorithmParameters params = cipher.getParameters();
        ivBytes = params.getParameterSpec(IvParameterSpec.class).getIV();
        byte[] encryptedTextBytes =
cipher.doFinal(word.getBytes(StandardCharsets.UTF_8));
        //prepend salt and vi
        byte[] buffer = new byte[saltBytes.length + ivBytes.length +
encryptedTextBytes.length];
        System.arraycopy(saltBytes, 0, buffer, 0, saltBytes.length);
        System.arraycopy(ivBytes, 0, buffer, saltBytes.length, ivBytes.length);
        System.arraycopy(encryptedTextBytes, 0, buffer, saltBytes.length + ivBytes.length,
encryptedTextBytes.length);
```

```
        return new Base64().encodeToString(buffer);
    }
}
```

2.4 SOURCE CODE FOR DECRYPTION.JAVA:

```
import java.nio.ByteBuffer;
import javax.crypto.BadPaddingException;
import javax.crypto.Cipher;
import javax.crypto.IllegalBlockSizeException;
import javax.crypto.SecretKey;
import javax.crypto.SecretKeyFactory;
import javax.crypto.spec.IvParameterSpec;
import javax.crypto.spec.PBEKeySpec;
import javax.crypto.spec.SecretKeySpec;
import org.apache.commons.codec.binary.Base64;

public class Decryption {


    public String decrypt(String encryptedText, String password) throws Exception {
        Cipher cipher = Cipher.getInstance("AES/CBC/PKCS5Padding");
        //strip off the salt and iv
        ByteBuffer buffer = ByteBuffer.wrap(new Base64().decode(encryptedText));
        byte[] saltBytes = new byte[20];
        buffer.get(saltBytes, 0, saltBytes.length);
        byte[] ivBytes1 = new byte[cipher.getBlockSize()];
        buffer.get(ivBytes1, 0, ivBytes1.length);
        byte[] encryptedTextBytes = new byte[buffer.capacity() - saltBytes.length -
ivBytes1.length];

        buffer.get(encryptedTextBytes);
        // Deriving the key
        SecretKeyFactory factory =
SecretKeyFactory.getInstance("PBKDF2WithHmacSHA1");
        PBEKeySpec spec = new PBEKeySpec(password.toCharArray(), saltBytes, 1500,
256);//65556
        SecretKey secretKey = factory.generateSecret(spec);
        SecretKeySpec secret = new SecretKeySpec(secretKey.getEncoded(), "AES");
        cipher.init(Cipher.DECRYPT_MODE, secret, new IvParameterSpec(ivBytes1));
        byte[] decryptedTextBytes = null;
        try {
            decryptedTextBytes = cipher.doFinal(encryptedTextBytes);
        } catch (IllegalBlockSizeException e) {
            throw e;
        } catch (BadPaddingException e) {
            throw e;
```

```
        }

        return new String(decryptedTextBytes);
    }
}
```

2.5 SOURCE CODE FOR ROUNDEDPANEL.JAVA:

```
import javax.swing.*;
import java.awt.*;

public class RoundedPanel extends JPanel {

   RoundedPanel() {
     super();
     setOpaque(false);
   }

   /**
    *
    */
   private static final long serialVersionUID = 1L;
   /** Stroke size. it is recommended to set it to 1 for better view */
   protected int strokeSize = 1;
   /** Color of shadow */
   protected Color shadowColor = Color.black;
   /** Sets if it drops shadow */
   protected boolean shady = true;
   /** Sets if it has an High Quality view */
   protected boolean highQuality = true;
   /** Double values for Horizontal and Vertical radius of corner arcs */
   protected Dimension arcs = new Dimension(20, 20);
   /** Distance between shadow border and opaque panel border */
   protected int shadowGap = 1;
   /** The offset of shadow. */
   protected int shadowOffset = 1;
   /** The transparency value of shadow. ( 0 - 255) */
   protected int shadowAlpha = 150;


   @Override
   protected void paintComponent(Graphics g) {
      super.paintComponent(g);
      int width = getWidth();
      int height = getHeight();
      int shadowGap = this.shadowGap;
      Color shadowColorA = new Color(shadowColor.getRed(), shadowColor.getGreen(),
```

```
shadowColor.getBlue(),
                shadowAlpha);
        Graphics2D graphics = (Graphics2D) g;

        // Sets antialiasing if HQ.
        if (highQuality) {
            graphics.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);
        }

        // Draws shadow borders if any.
        if (shady) {
            graphics.setColor(shadowColorA);
            graphics.fillRoundRect(shadowOffset, // X position
                    shadowOffset, // Y position
                    width - strokeSize - shadowOffset, // width
                    height - strokeSize - shadowOffset, // height
                    arcs.width, arcs.height);// arc Dimension
        } else {
            shadowGap = 1;
        }

        // Draws the rounded opaque panel with borders.
        graphics.setColor(getBackground());
        graphics.fillRoundRect(0, 0, width - shadowGap, height - shadowGap, arcs.width,
arcs.height);
        graphics.setColor(getForeground());
        graphics.setStroke(new BasicStroke(strokeSize));
        graphics.drawRoundRect(0, 0, width - shadowGap, height - shadowGap, arcs.width,
arcs.height);

        // Sets strokes to default, is better.
        graphics.setStroke(new BasicStroke());
    }
}
```

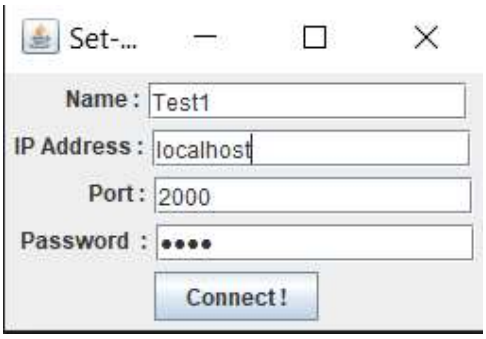
CHAPTER 3

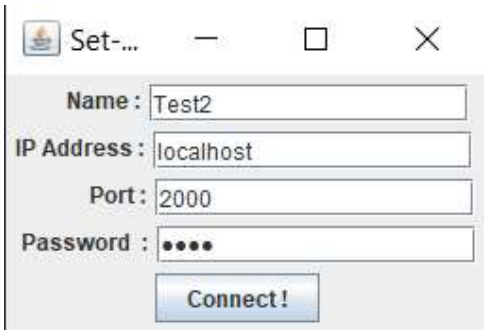
SNAPSHOTS OF THE OUTPUT'S

3.1 SERVER

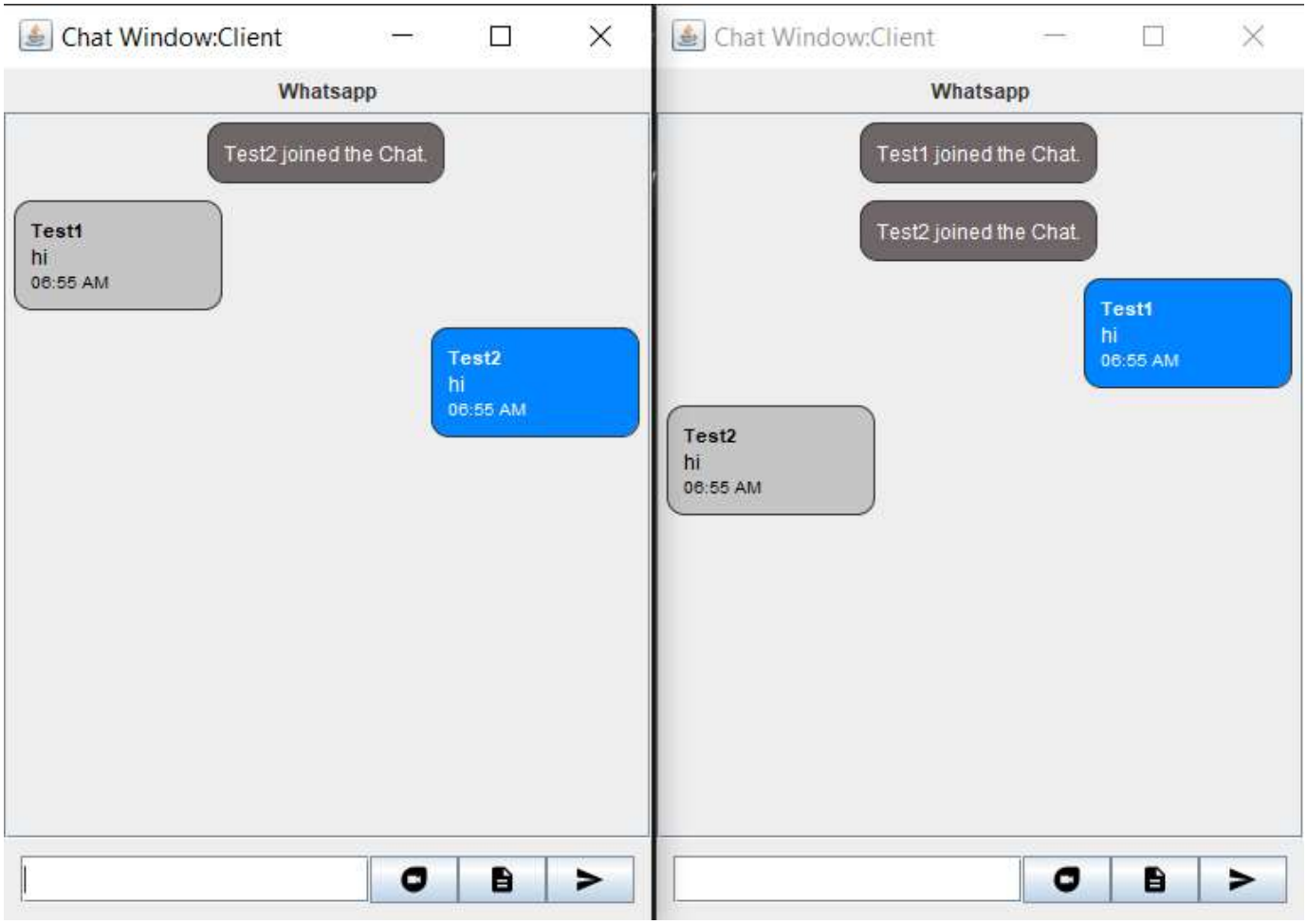
3.1.1 INITIALIZE

3.2 CLIENT





3.3 MULTICHAT



3.4 FILE SEND AND RECEIVED