SIKSHA 'O' ANUSANDHAN
DEEMED TO BE UNIVERSITY

Admission Batch: 2019-2020 **Session: 2020-2021**

End-Term Project Report

Computer Science Workshop 1 (CSE 2141)

Submitted by

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GROUP CHAT APPLICATION

Computer Science Workshop 2 (CSE 3141)

End-Term Project

PROBLEM STATEMENT

GUI based Chatting Application

It is an implementation of multithreaded server. It accepts connections from an arbitrary number of clients; any message sent from one client is broadcast to all clients. In addition to ServerSockets, it demonstrates the use of threads. Because there are interactions among clients, this server needs to keep track of all the clients it has at any one time.

Instruction for implementation:

• Design GUI based inter face for client server communication.

• Server window should contain at least four buttons (START, STOP, RESPOND and ONLINE USERS). The start and stop button to start and stop the server, respond button to respond the client and online user will display the number of clients connected to the server.

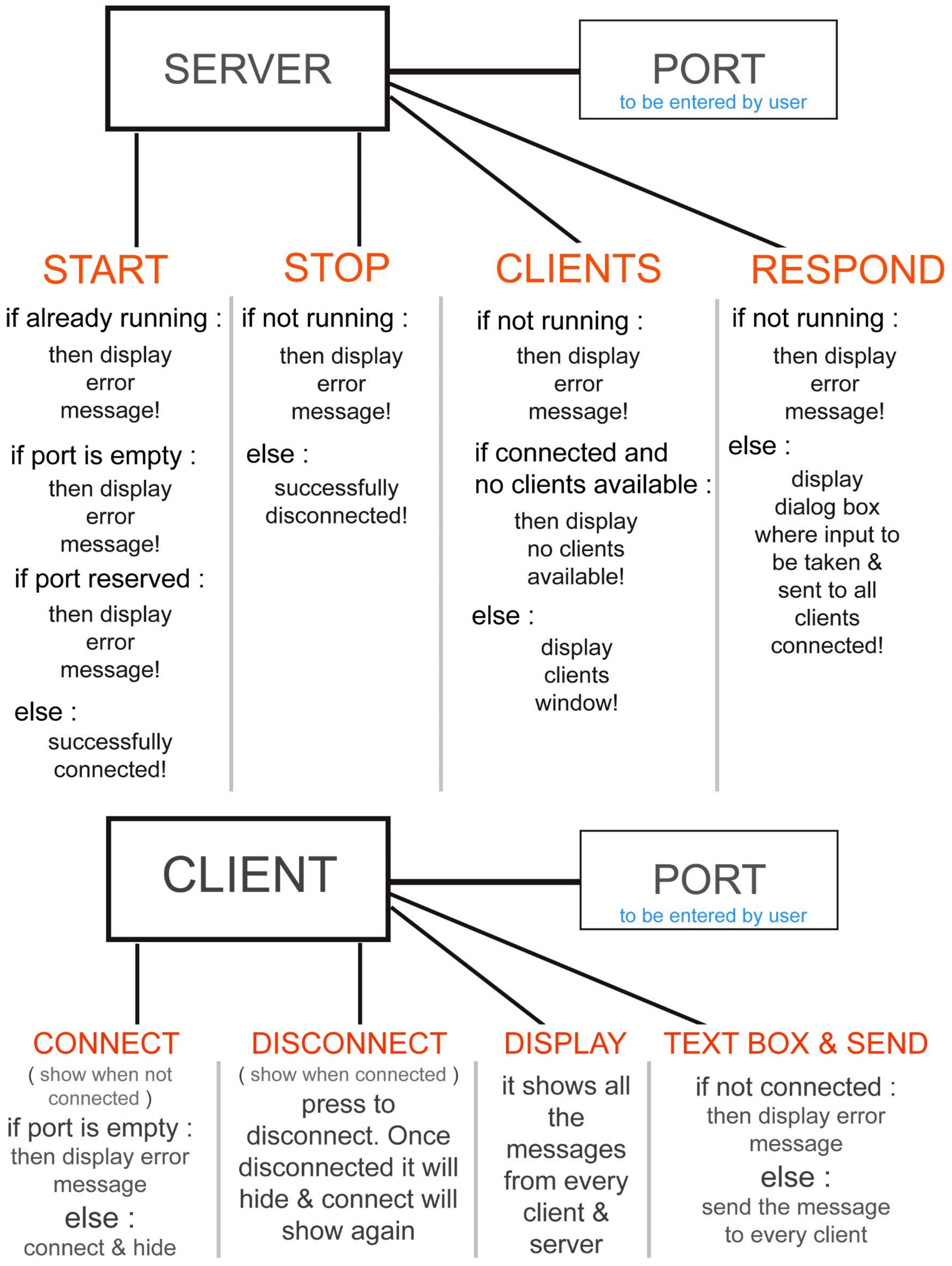
• Client window should contain at least three buttons (CONNECT, DISCONNECT, SEND). Connect and disconnect to establish and close connection with server. By clicking the send button client will send the message. Client windows must display the client names like client1, client2 etc. The messages should be displayed in the text area.

• You can add more features and customize your chat application to make it more user friendly.

PROBEM ANALYSIS

- ✓ We want to create an application by which we can have group conversations between us.
- ✓ Each member will join a fixed port and they can all communicate with each other.
- ✓ We will be creating a server though which all interactions are going to take place. The server is going to manage this using multithreading concept.
- ✓ The server can also send responses to all its clients connected with it.
- ✓ A client will send a message and that will be visible to every other member connected to the server including the client itself.
- ✓ Now the Server and client windows are going to be GUI Based Window and will be using the Swing Framework of JAVA.

FLOW CHART



SERVER

PORT
to be entered by user

START

if already running :
then display error message!

if port is empty :
then display error message!

if port reserved :
then display error message!

else :
successfully connected!

STOP

if not running :
then display error message!

else :
successfully disconnected!

CLIENTS

if not running :
then display error message!

if connected and no clients available :
then display no clients available!

else :
display clients window!

RESPOND

if not running :
then display error message!

else :
display dialog box where input to be taken & sent to all clients connected!

CLIENT

PORT
to be entered by user

CONNECT
(show when not connected)

if port is empty :
then display error message

else :
connect & hide

DISCONNECT
(show when connected)

press to disconnect. Once disconnected it will hide & connect will show again

DISPLAY

it shows all the messages from every client & server

TEXT BOX & SEND

if not connected :
then display error message

else :
send the message to every client

CODING PART (JAVA)

// The Server program starts at Server.java

```java
import java.awt.EventQueue;

import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JOptionPane;

import java.awt.Font;
import javax.swing.SwingConstants;
import java.awt.Color;
import javax.swing.JSeparator;
import javax.swing.UIManager;
import javax.swing.JTextField;
import javax.swing.JButton;
import java.awt.event.ActionListener;
import java.net.ServerSocket;
import java.net.Socket;
import java.util.ArrayList;
import java.awt.event.ActionEvent;

public class Server {

    private JFrame frame;
    private JTextField textField;
    private boolean serverStatus;
    private ServerSocket listener;
    private static ArrayList<ClientHandler> clients;
    private ServerThread serverThread;

    /**
     * Launch the application.
     */
    public static void main(String[] args) {
        EventQueue.invokeLater(new Runnable() {
            public void run() {
                try {
                    Server window = new Server();
                    window.frame.setVisible(true);
                } catch (Exception e) {
                    e.printStackTrace();
                }
            }
        });
    }

    /**
     * Create the application.
     */
    public Server() {
        this.serverStatus=false;
        initialize();
    }

    /**
     * Initialize the contents of the frame.
     */
    private void initialize() {
        frame = new JFrame();
        frame.getContentPane().setBackground(Color.WHITE);
        frame.setBounds(100, 100, 535, 710);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.getContentPane().setLayout(null);
        frame.setTitle("SERVER");
        frame.setResizable(false);

        JLabel lblNewLabel = new JLabel("SERVER");

    lblNewLabel.setForeground(UIManager.getColor("Button.disab
ledForeground"));

    lblNewLabel.setHorizontalAlignment(SwingConstants.CENTER);
        lblNewLabel.setFont(new Font("Arial", Font.PLAIN,
50));
        lblNewLabel.setBounds(98, 10, 311, 81);
        frame.getContentPane().add(lblNewLabel);

        JSeparator separator = new JSeparator();
        separator.setBounds(20, 82, 480, 5);
        frame.getContentPane().add(separator);

        textField = new JTextField();

    textField.setHorizontalAlignment(SwingConstants.CENTER);
```

```
        textField.setFont(new Font("Tahoma", Font.PLAIN, 25));
        textField.setBounds(251, 115, 127, 42);
        frame.getContentPane().add(textField);
        textField.setColumns(10);

        JLabel lblNewLabel_1 = new JLabel("PORT");
        lblNewLabel_1.setFont(new Font("Arial", Font.PLAIN,
35));
        lblNewLabel_1.setBounds(135, 115, 104, 42);
        frame.getContentPane().add(lblNewLabel_1);

        JButton btnNewButton = new JButton("START");
        btnNewButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                if(serverStatus==true) {

    JOptionPane.showMessageDialog(null,"Server Already
Running!");
                }else {
                    if(textField.getText().trim().equals(""))
{

    JOptionPane.showMessageDialog(null,"Please Enter a
PORT!");
                        return;
                    }
                    try {
                        listener=new
ServerSocket(Integer.parseInt(textField.getText()));
                        clients=new ArrayList<>();
                        serverStatus=true;

                        serverThread=new
ServerThread(listener, clients);
                        serverThread.start();

    JOptionPane.showMessageDialog(null,"Server Started now at
PORT "+textField.getText());
                    }catch (Exception qqq) {

    JOptionPane.showMessageDialog(null,"Something already
running in this PORT!");
                    }
                }
            }
        });
        btnNewButton.setForeground(Color.WHITE);
        btnNewButton.setBackground(Color.DARK_GRAY);
        btnNewButton.setBorderPainted(false);
        btnNewButton.setFont(new Font("Arial", Font.PLAIN,
40));
        btnNewButton.setBounds(131, 186, 258, 81);
        frame.getContentPane().add(btnNewButton);

        JButton btnStop = new JButton("STOP");
        btnStop.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                if(serverStatus==false) {

    JOptionPane.showMessageDialog(null,"Server not running!");
                }else {
                    serverStatus=false;
                    try {
                        listener.close();
                        serverThread=null;
                    }catch (Exception ej) {
                        // TODO: handle exception
                    }
                }
            }
        });
        btnStop.setForeground(Color.WHITE);
        btnStop.setFont(new Font("Arial", Font.PLAIN, 40));
        btnStop.setBorderPainted(false);
        btnStop.setBackground(Color.DARK_GRAY);
        btnStop.setBounds(131, 288, 258, 81);
        frame.getContentPane().add(btnStop);

        JButton btnClients = new JButton("CLIENTS");
        btnClients.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                if(serverStatus==true) {
                    if(clients.size()==0) {

    JOptionPane.showMessageDialog(null,"No clients are
available right now!");
```

```
                    }else {
                        AllClients allClients=new
AllClients(clients);
                        allClients.setVisible(true);
                    }
                }else {

    JOptionPane.showMessageDialog(null,"Server not started");
                }
            }
        });
        btnClients.setForeground(Color.WHITE);
        btnClients.setFont(new Font("Arial", Font.PLAIN, 40));
        btnClients.setBorderPainted(false);
        btnClients.setBackground(Color.DARK_GRAY);
        btnClients.setBounds(131, 392, 258, 81);
        frame.getContentPane().add(btnClients);

        JSeparator separator_1 = new JSeparator();
        separator_1.setBounds(20, 606, 480, 5);
        frame.getContentPane().add(separator_1);

        JLabel lblNewLabel_2 = new JLabel("made by BISWAMOHAN
DWARI");
        lblNewLabel_2.setForeground(Color.GRAY);
        lblNewLabel_2.setFont(new Font("Arial", Font.PLAIN,
20));

    lblNewLabel_2.setHorizontalAlignment(SwingConstants.CENTER
);
        lblNewLabel_2.setBounds(46, 621, 431, 42);
        frame.getContentPane().add(lblNewLabel_2);

        JButton btnRespond = new JButton("RESPOND");
        btnRespond.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                if(serverStatus==false) {

    JOptionPane.showMessageDialog(null,"Server not started
yet!");
                    return;
                }else if(clients.size()==0) {
                    JOptionPane.showMessageDialog(null,"No 
clients Available now!");
                    return;
                }
                String 
msgString=JOptionPane.showInputDialog("Enter your response to 
all users!");
                if(msgString==null) return;
                for(ClientHandler crawl:clients) 
crawl.getOutputChannel().println("[SERVER] : "+msgString);
            }
        });
        btnRespond.setForeground(Color.WHITE);
        btnRespond.setFont(new Font("Arial", Font.PLAIN, 40));
        btnRespond.setBorderPainted(false);
        btnRespond.setBackground(Color.DARK_GRAY);
        btnRespond.setBounds(131, 493, 258, 81);
        frame.getContentPane().add(btnRespond);
    }
}
```

// Now this Server.java needs three java files...

// 1. ClientHandler.java

```
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.io.PrintWriter;
import java.net.Socket;
import java.util.ArrayList;
import java.util.Date;
import java.util.Random;

public class ClientHandler extends Thread{
    private Socket client;
    private String nameString;
    private BufferedReader in;
    private PrintWriter out;
    private ArrayList<ClientHandler> clients;

    public boolean isAvailable() {
```

```java
        return !client.isClosed();
    }

    public PrintWriter getOutputChannel() {
        return this.out;
    }

    public ClientHandler(Socket
clientSocket,ArrayList<ClientHandler> clients) throws
Exception{
        this.client=clientSocket;
        this.in=new BufferedReader(new
InputStreamReader(client.getInputStream()));
        this.out=new
PrintWriter(client.getOutputStream(),true);
        this.clients=clients;
        Random random=new Random();
        this.nameString=((char)(65+random.nextInt(25)))+""
                +((char)(97+random.nextInt(25)))+""
                +((char)(97+random.nextInt(25)))+""
                +((char)(97+random.nextInt(25)))+""
                +((char)(97+random.nextInt(25)));
    }

    public String getIPAdressString() {
        return client.getInetAddress().toString();
    }

    public String getNameString() {
        return this.nameString;
    }

    public String getTimeOfJoining() {
        return new Date().toString();
    }

    public void outToAll(String msg) {
        for(ClientHandler crawl:clients)
crawl.out.println(msg);
    }

    @Override
    public void run() {
        try {
            while(true) {
                String requestString=in.readLine();
                if(requestString!=null) {
//                      System.out.println(requestString);    //
To print what the client has sent
                    outToAll(getNameString()+" :
"+requestString);
                }
//              out.println("Gotcha!");     // use this in
debugging
            }
        } catch (Exception e) {
            // TODO: handle exception
        } finally {
            out.close();
            try {
                in.close();
            } catch (IOException e) {
                // TODO Auto-generated catch block
                e.printStackTrace();
            }
        }
    }
}
```

// 2. ServerThread.java

```
import java.io.IOException;
import java.net.ServerSocket;
import java.net.Socket;
import java.util.ArrayList;

public class ServerThread extends Thread{
    private ServerSocket listener;
    private ArrayList<ClientHandler> clients;

    public ServerThread(ServerSocket
listener,ArrayList<ClientHandler> clients) {
        this.listener=listener;
        this.clients=clients;
    }
    public void run() {
        while(true) {
            System.out.println("[SERVER] Waiting for client 
connection...");
            Socket client=null;
            try {
                client = listener.accept();
            } catch (IOException e1) {
                // TODO Auto-generated catch block
            }
            System.out.println("[SERVER] Connected to 
client...");
            ClientHandler clientThread=null;
            try {
                clientThread = new 
ClientHandler(client,clients);
            } catch (Exception e) {
                // TODO Auto-generated catch block
            }
            clients.add(clientThread);
            clientThread.start();
        }
    }

}
```

// 3. AllClients.java

```
import java.awt.BorderLayout;
import java.awt.EventQueue;
import java.util.ArrayList;

import javax.swing.DefaultListModel;
import javax.swing.JFrame;
import javax.swing.JPanel;
import javax.swing.border.EmptyBorder;
import javax.swing.JList;
import java.awt.Font;

public class AllClients extends JFrame {

    private JPanel contentPane;
```

```java
    private ArrayList<ClientHandler> clients;

    /**
     * Launch the application.
     */
    public static void main(String[] args) {
        EventQueue.invokeLater(new Runnable() {
            public void run() {
                try {
                    AllClients frame = new AllClients(null);
                    frame.setVisible(true);
                } catch (Exception e) {
                    e.printStackTrace();
                }
            }
        });
    }

    /**
     * Create the frame.
     */
    public AllClients(ArrayList<ClientHandler> clients) {
        this.clients=clients;
        setDefaultCloseOperation(JFrame.DISPOSE_ON_CLOSE);
        setBounds(100, 100, 878, 606);
        contentPane = new JPanel();
        contentPane.setBorder(new EmptyBorder(5, 5, 5, 5));
        setContentPane(contentPane);
        contentPane.setLayout(null);
        setTitle("Available Clients...");

        JList list = new JList();
        list.setFont(new Font("Arial", Font.PLAIN, 25));
        list.setBounds(10, 10, 844, 549);
        contentPane.add(list);

        DefaultListModel<String> model=new
DefaultListModel<>();
        list.setModel(model);

        for(ClientHandler client : clients)
```

```java
            if(client.isAvailable())
model.addElement(client.getIPAdressString()+" : 
"+client.getNameString()+" : "
                    +client.getTimeOfJoining());
    }
}
```

// This is all the Server program.

// Next page – Client Program

// The Server program starts at Client.java

```java
import java.awt.EventQueue;

import javax.swing.JFrame;
import javax.swing.JLabel;
import java.awt.Font;
import java.awt.Color;
import javax.swing.JTextField;
import javax.swing.SwingConstants;
import javax.swing.DefaultListModel;
import javax.swing.JButton;
import java.awt.event.ActionListener;
import java.io.PrintWriter;
import java.net.Socket;
import java.util.Scanner;
import java.awt.event.ActionEvent;
import javax.swing.JList;
import javax.swing.JOptionPane;

import java.awt.SystemColor;

public class Client {

	private JFrame frame;
	private JTextField textField;
	private JTextField textField_1;
	private boolean status=false;
	private Socket socket;
	private PrintWriter out;

	/**
	 * Launch the application.
	 */
	public static void main(String[] args) {
		EventQueue.invokeLater(new Runnable() {
			public void run() {
				try {
					Client window = new Client();
					window.frame.setVisible(true);
				} catch (Exception e) {
					e.printStackTrace();
				}
			}
		});
	}

	/**
	 * Create the application.
	 */
	public Client() {
		initialize();
	}

	/**
	 * Initialize the contents of the frame.
	 */
	private void initialize() {
		frame = new JFrame();
		frame.setTitle("Client");
		frame.getContentPane().setBackground(Color.WHITE);
		frame.setBounds(100, 100, 541, 768);
		frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
		frame.getContentPane().setLayout(null);
		frame.setResizable(false);

		textField = new JTextField();
		textField.setFont(new Font("Arial", Font.PLAIN, 25));
		textField.setHorizontalAlignment(SwingConstants.CENTER);
		textField.setBounds(389, 10, 128, 39);
		frame.getContentPane().add(textField);
		textField.setColumns(10);

		JLabel lblNewLabel_1 = new JLabel("PORT");
		lblNewLabel_1.setHorizontalAlignment(SwingConstants.CENTER);
		lblNewLabel_1.setFont(new Font("Arial", Font.PLAIN, 20));
		lblNewLabel_1.setBounds(313, 10, 66, 39);
		frame.getContentPane().add(lblNewLabel_1);

		JList list = new JList();
		list.setFont(new Font("Arial", Font.PLAIN, 25));
		list.setBackground(SystemColor.menu);
		list.setBounds(10, 59, 507, 599);
		frame.getContentPane().add(list);
		DefaultListModel<String> model=new DefaultListModel<>();
		list.setModel(model);


		JButton btnNewButton = new JButton("CONNECT");
		JButton btnDisconnect = new JButton("DISCONNECT");


		// for connect button
		btnNewButton.addActionListener(new ActionListener() {
			public void actionPerformed(ActionEvent e) {
				if(textField.getText().trim().equals("")) {
					JOptionPane.showMessageDialog(null,"Enter the 
PORT!");
```

```
                        return;
                    }
                    try {
                        socket=new
Socket("localhost",Integer.parseInt(textField.getText()));
                        ServerConnection serverConnection=new
ServerConnection(socket,model);
                        out=new
PrintWriter(socket.getOutputStream(),true);
                        serverConnection.start();

                    } catch (Exception e2) {
                        JOptionPane.showMessageDialog(null,"Error
Connecting to the PORT "+textField.getText());
                        return;
                    }
                    status=true;
                    JOptionPane.showMessageDialog(null,"Connected to
PORT "+textField.getText());
                    btnNewButton.setVisible(false);
                    btnDisconnect.setVisible(true);
                }
            });
            btnNewButton.setBackground(Color.DARK_GRAY);
            btnNewButton.setForeground(Color.WHITE);
            btnNewButton.setBorderPainted(false);
            btnNewButton.setFont(new Font("Arial", Font.PLAIN, 15));
            btnNewButton.setBounds(10, 10, 128, 39);
            frame.getContentPane().add(btnNewButton);

            // for disconnect button
            btnDisconnect.addActionListener(new ActionListener() {
                public void actionPerformed(ActionEvent e) {
                    status=false;
                    try {
                        socket.close();
                    }catch(Exception e1) {

                    }
                    JOptionPane.showMessageDialog(null,"Disconnected
Successfully!");
                    btnDisconnect.setVisible(false);
                    btnNewButton.setVisible(true);
                }
            });
            btnDisconnect.setForeground(Color.WHITE);
            btnDisconnect.setFont(new Font("Arial", Font.PLAIN, 15));
            btnDisconnect.setBorderPainted(false);
            btnDisconnect.setBackground(Color.DARK_GRAY);
```

```
        btnDisconnect.setVisible(false);
        btnDisconnect.setBounds(148, 10, 155, 39);
        frame.getContentPane().add(btnDisconnect);

        textField_1 = new JTextField();
        textField_1.setFont(new Font("Arial", Font.PLAIN, 20));
        textField_1.setBounds(10, 668, 431, 53);
        frame.getContentPane().add(textField_1);
        textField_1.setColumns(10);

        JButton btnNewButton_1 = new JButton(">");
        btnNewButton_1.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                if(status==false) {
                    JOptionPane.showMessageDialog(null,"Hey!
Connect First!");
                }else {
                    if(!textField_1.getText().trim().equals(""))
                    out.println(textField_1.getText());
                }
            }
        });
        btnNewButton_1.setForeground(Color.WHITE);
        btnNewButton_1.setFont(new Font("Arial", Font.PLAIN, 45));
        btnNewButton_1.setBorderPainted(false);
        btnNewButton_1.setBackground(Color.DARK_GRAY);
        btnNewButton_1.setBounds(451, 668, 66, 55);
        frame.getContentPane().add(btnNewButton_1);
    }
}
```

// This Client.java needs a java file

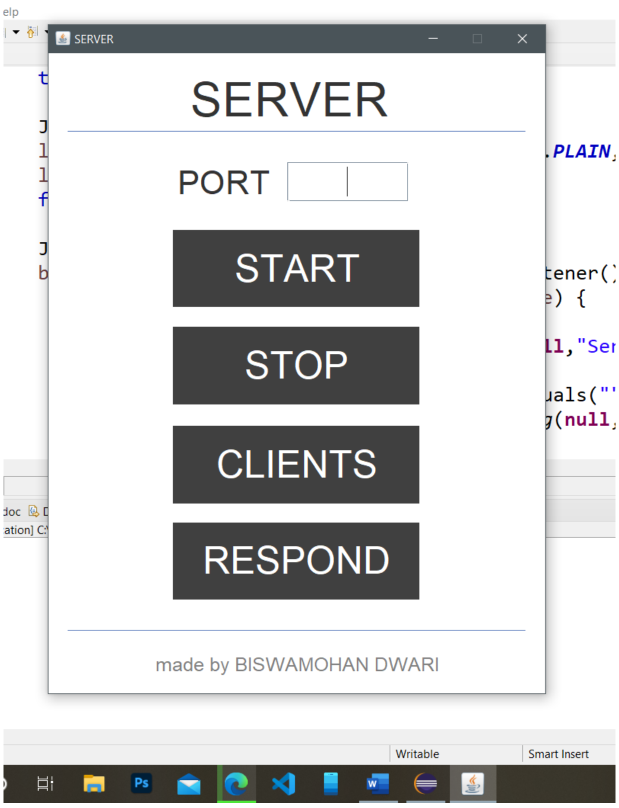
// ServerConnection.java

```
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.net.Socket;

import javax.swing.DefaultListModel;

public class ServerConnection extends Thread{
    private Socket server;
    private BufferedReader in;
    private DefaultListModel<String> list;
```

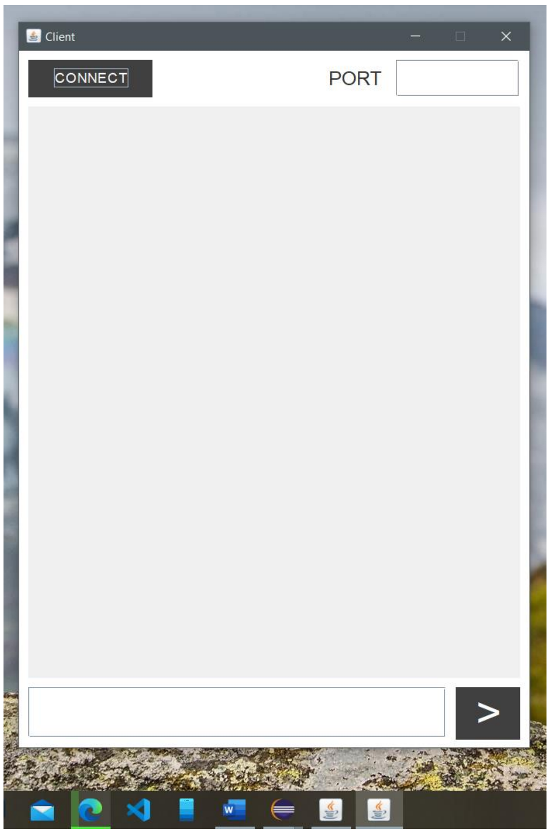
```java
	public ServerConnection(Socket s,DefaultListModel<String> model)
throws Exception{
		this.server=s;
		this.list=model;
		this.in=new BufferedReader(new
InputStreamReader(server.getInputStream()));
	}

	public void run() {
		try {
			while(true) {
				String reString=in.readLine();
				if(reString==null) break;
				list.addElement(reString);
			}
		} catch (Exception e) {
			// TODO: handle exception
		} finally {
			try {
				in.close();
			} catch (IOException e) {
				// TODO Auto-generated catch block
				e.printStackTrace();
			}
		}

	}
}
```

Snapshot of input and output

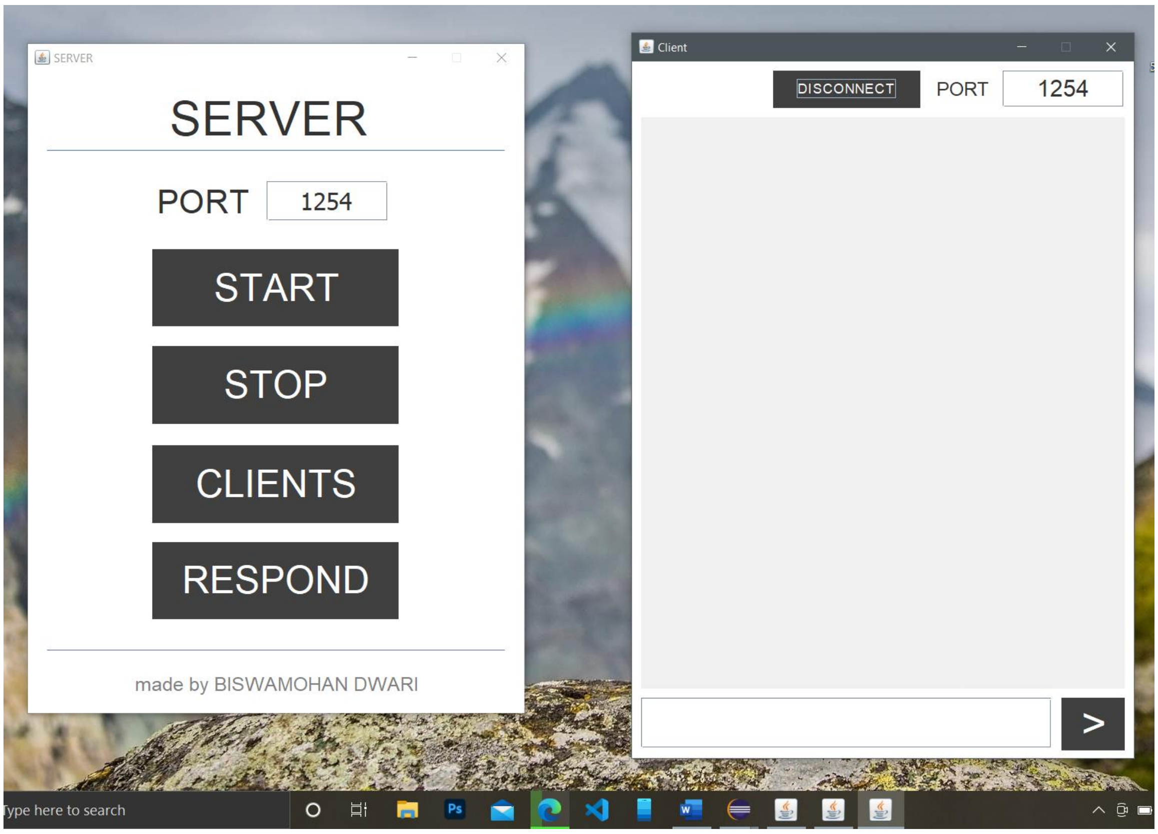
// Server Window



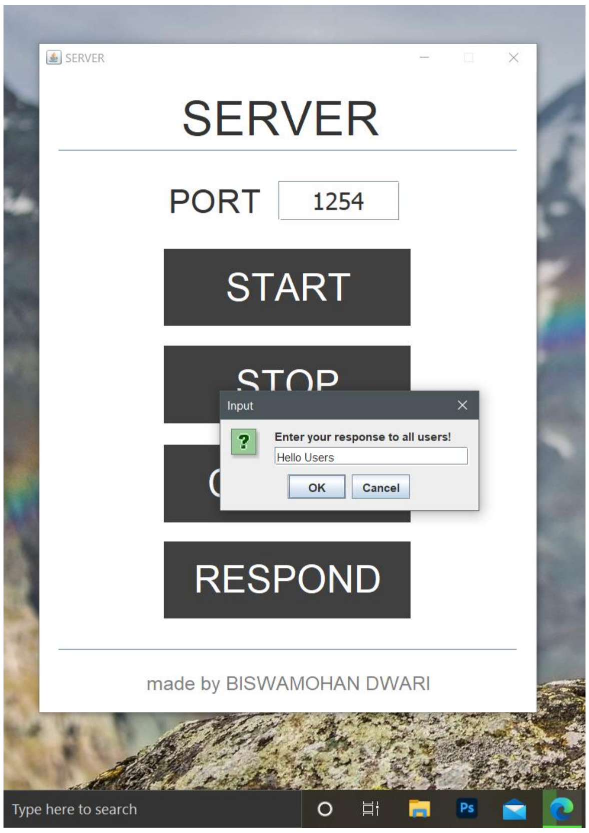
// Client Window



// Server and Client Connected



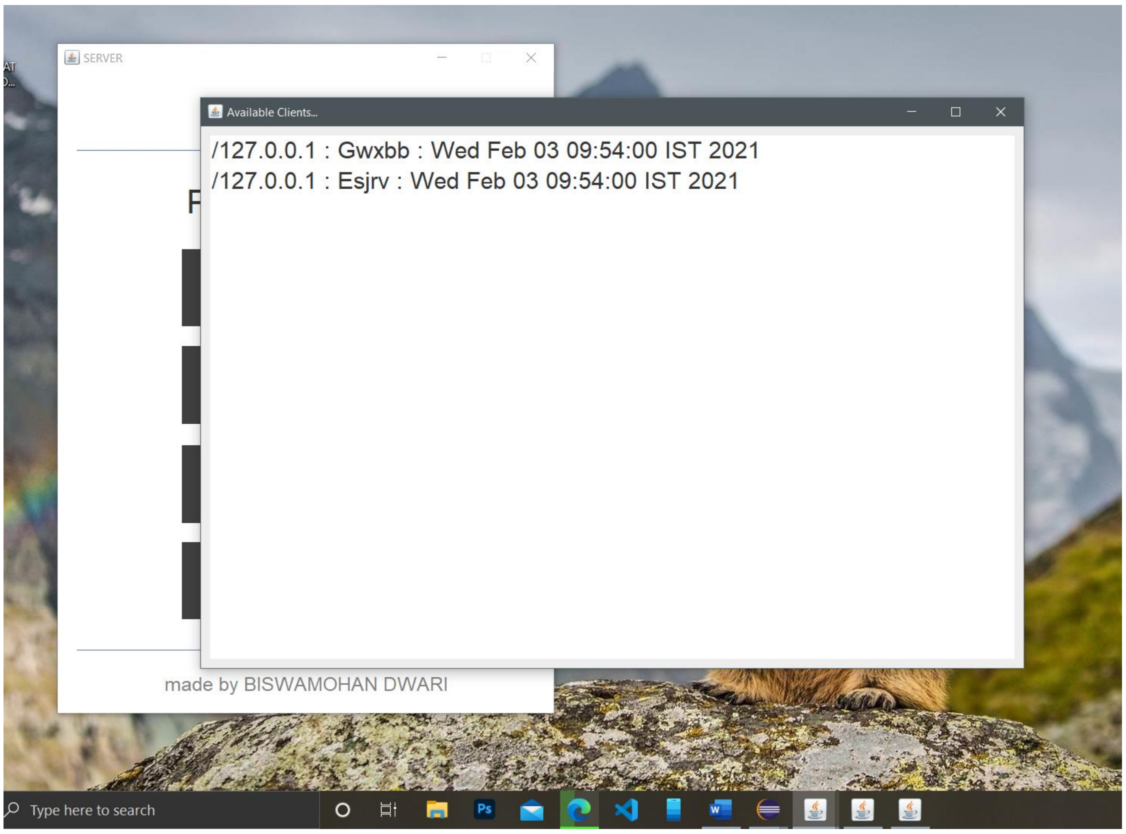
// Server sending responses



Enter your response to all users!

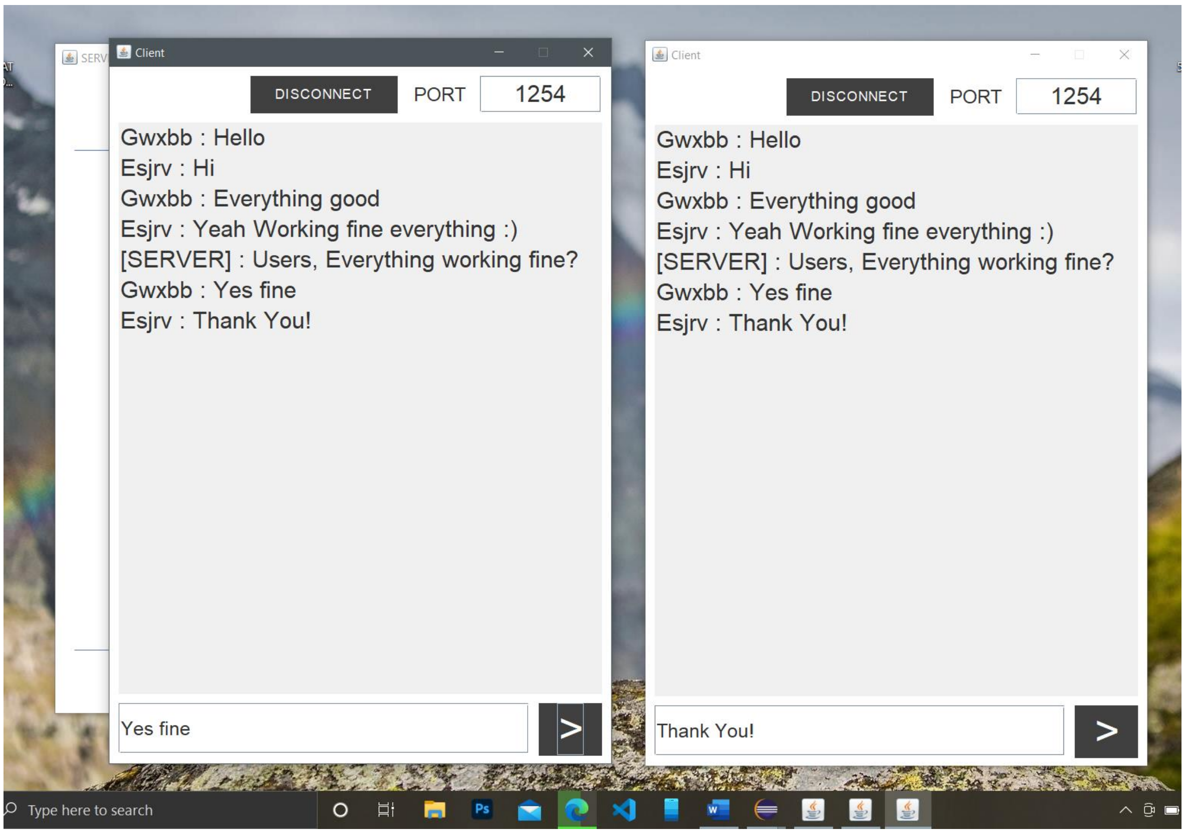
Hello Users

// Server Showing All Available Clients...



```
/127.0.0.1 : Gwxbb : Wed Feb 03 09:54:00 IST 2021
/127.0.0.1 : Esjrv : Wed Feb 03 09:54:00 IST 2021
```

// Two Clients talking with each other and server sending message...



```
Gwxbb : Hello
Esjrv : Hi
Gwxbb : Everything good
Esjrv : Yeah Working fine everything :)
[SERVER] : Users, Everything working fine?
Gwxbb : Yes fine
Esjrv : Thank You!
```

Yes fine

```
Gwxbb : Hello
Esjrv : Hi
Gwxbb : Everything good
Esjrv : Yeah Working fine everything :)
[SERVER] : Users, Everything working fine?
Gwxbb : Yes fine
Esjrv : Thank You!
```

Thank You!

// notice that the clients are given username randomly by sever...

Author : BISWAMOHAN DWARI

Dt : 02/03/2021

THANK YOU