Mini Project Report on

# Chat Application

**Submitted in partial fulfillment of the requirement for the award of the degree of**

**BACHELOR OF TECHNOLOGY**

**IN**

**COMPUTER SCIENCE & ENGINEERING**

**Submitted by:**

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**University Roll No:-2019637**

*Under the Mentorship of*

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**Professor**

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**Dehradun, Uttarakhand**
**July-2024**

Graphic Era Deemed to be University DEHRADUN

# CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the project report entitled **"Chat Application"** in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Computer Science and Engineering of the Graphic Era (Deemed to be University), Dehradun shall be carried out by the under the mentorship of **Dr. Promod Mehra**, **Professor** in Department of Computer Science and Engineering, Graphic Era (Deemed to be University), Dehradun.

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# Chapter 1

# Introduction

## 1.1 Introduction

The ‘Chat Application’ represents a Java-based project that enables real-time communication among users over a network. By utilizing Java Swing for the graphical user interface (GUI) and socket programming for network communication, this application showcases a practical implementation of client-server architecture. Its primary objective is to create an intuitive and efficient chat platform supporting seamless message exchange across multiple users. Through the integration of various Java technologies, the ‘Chat Application’ delivers a robust and user-friendly chatting experience.

## 1.2 Problem Statement

In today’s fast-paced digital landscape, effective communication remains a cornerstone of our daily lives. Whether connecting with friends, collaborating on projects, or coordinating with colleagues, chat applications play an indispensable role. This project aims to bridge the gap by developing a straightforward, cross-platform chat application that prioritizes reliability, efficiency, and user experience.

# Chapter 2

# Literature Survey

- **Early Chat Protocols:**
  - The journey of chat applications began with early internet protocols like IRC (Internet Relay Chat). IRC allowed users to engage in real-time text conversations across various channels. Developed in the late 1980s, it laid the groundwork for modern chat platforms.

- **Sophisticated Instant Messaging:**
  - As technology advanced, more sophisticated chat applications emerged. Platforms like ICQ and AIM (AOL Instant Messenger) gained popularity in the 1990s. They introduced features such as contact lists, presence indicators, and file sharing capabilities.

- **Mobile Era and Modern Apps:**
  - With the advent of smartphones, applications like WhatsApp, Telegram, and Signal became ubiquitous. These apps leverage advanced technologies, including end-to-end encryption, multimedia sharing, and cross-platform compatibility.

- **Java Swing for GUIs:**
  - Java Swing, part of Java's Standard Library, is widely used for creating graphical user interfaces (GUIs). Its flexibility and ease of use make it a popular choice for building desktop applications, including chat clients.

- **Socket Programming for Networking:**
  - Socket programming is fundamental for network communication. It enables applications to exchange data over a network using TCP or UDP. Java's standard libraries provide robust support for socket programming.

- **Building Contemporary Chat Apps:**
  - This project builds upon the principles of Java Swing and socket programming. By combining their strengths, it aims to create a user-friendly chat application that addresses existing limitations and ensures seamless real-time communication.

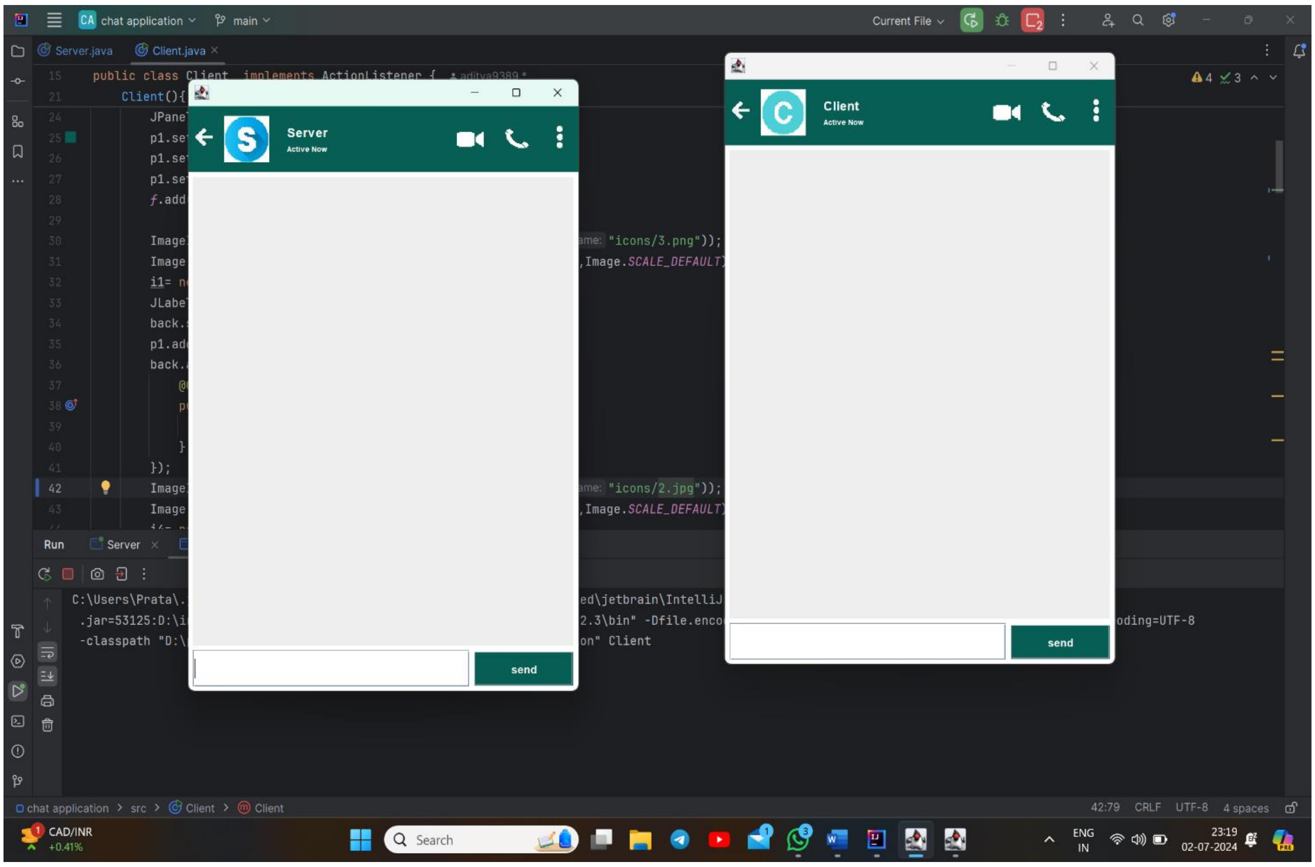
Chapter 3

# Methodology

The development of the Chat Application involved several key steps:

1) **GUI Design:**

The initial step was designing the graphical user interface (GUI) using Java Swing. The goal was to create an intuitive layout with input fields, message displays, and user controls.



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public class Client  implements ActionListener {
    Client(){
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        p1.se
        f.add

        Image                                   ame: "icons/3.png"));
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```

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 .jar=53125:D:\i                                2.3\bin" -Dfile.enco                                    oding=UTF-8
 -classpath "D:\                                on" Client
```
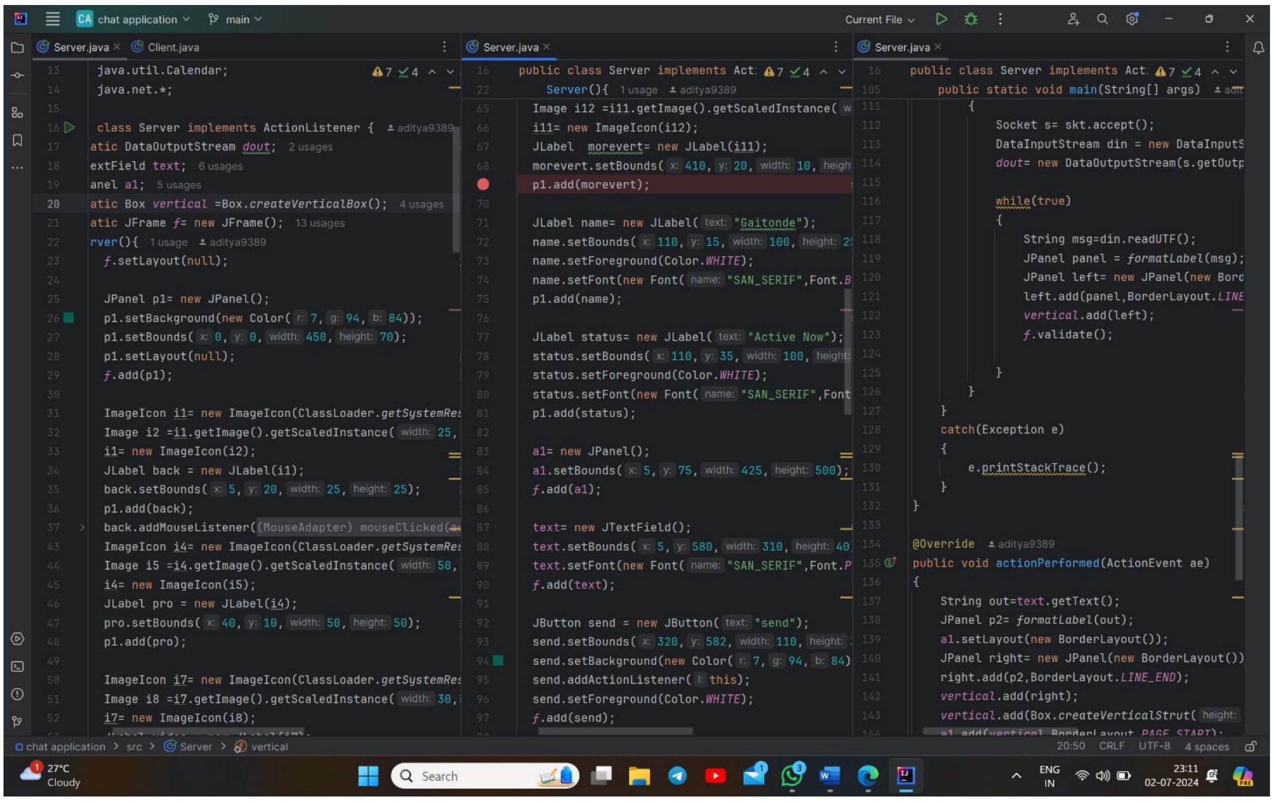

## 2) Client-Server Architecture:

Next, we implemented the client-server architecture. Socket programming facilitated communication between clients and the server. The server listened for incoming connections, while clients could connect, send messages, and receive responses.



```java
java.util.Calendar;
java.net.*;

class Server implements ActionListener {
atic DataOutputStream dout;
extField text;
anel a1;
atic Box vertical =Box.createVerticalBox();
atic JFrame f= new JFrame();
rver(){
  f.setLayout(null);

  JPanel p1= new JPanel();
  p1.setBackground(new Color(7, 94, 84));
  p1.setBounds(0, 0, 450, 70);
  p1.setLayout(null);
  f.add(p1);

  ImageIcon i1= new ImageIcon(ClassLoader.getSystemRes
  Image i2 =i1.getImage().getScaledInstance(25,
  i1= new ImageIcon(i2);
  JLabel back = new JLabel(i1);
  back.setBounds(5, 20, 25, 25);
  p1.add(back);
  back.addMouseListener((MouseAdapter) mouseClicked(
  ImageIcon i4= new ImageIcon(ClassLoader.getSystemRes
  Image i5 =i4.getImage().getScaledInstance(50,
  i4= new ImageIcon(i5);
  JLabel pro = new JLabel(i4);
  pro.setBounds(40, 10, 50, 50);
  p1.add(pro);

  ImageIcon i7= new ImageIcon(ClassLoader.getSystemRes
  Image i8 =i7.getImage().getScaledInstance(30,
  i7= new ImageIcon(i8);
```

```java
public class Server implements Act
    Server(){
    Image i12 =i11.getImage().getScaledInstance(
    i11= new ImageIcon(i12);
    JLabel  morevert= new JLabel(i11);
    morevert.setBounds(410, 20, 10,
    p1.add(morevert);

    JLabel name= new JLabel("Gaitonde");
    name.setBounds(110, 15, 100,
    name.setForeground(Color.WHITE);
    name.setFont(new Font("SAN_SERIF",Font.B
    p1.add(name);

    JLabel status= new JLabel("Active Now");
    status.setBounds(110, 35, 100,
    status.setForeground(Color.WHITE);
    status.setFont(new Font("SAN_SERIF",Font
    p1.add(status);

    a1= new JPanel();
    a1.setBounds(5, 75, 425, 500);
    f.add(a1);

    text= new JTextField();
    text.setBounds(5, 580, 310, 40
    text.setFont(new Font("SAN_SERIF",Font.P
    f.add(text);

    JButton send = new JButton("send");
    send.setBounds(320, 582, 110,
    send.setBackground(new Color(7, 94, 84)
    send.addActionListener(this);
    send.setForeground(Color.WHITE);
    f.add(send);
```

```java
public class Server implements Act
    public static void main(String[] args)
        {
            Socket s= skt.accept();
            DataInputStream din = new DataInputS
            dout= new DataOutputStream(s.getOutp

            while(true)
            {
                String msg=din.readUTF();
                JPanel panel = formatLabel(msg);
                JPanel left= new JPanel(new Bord
                left.add(panel,BorderLayout.LINE
                vertical.add(left);
                f.validate();

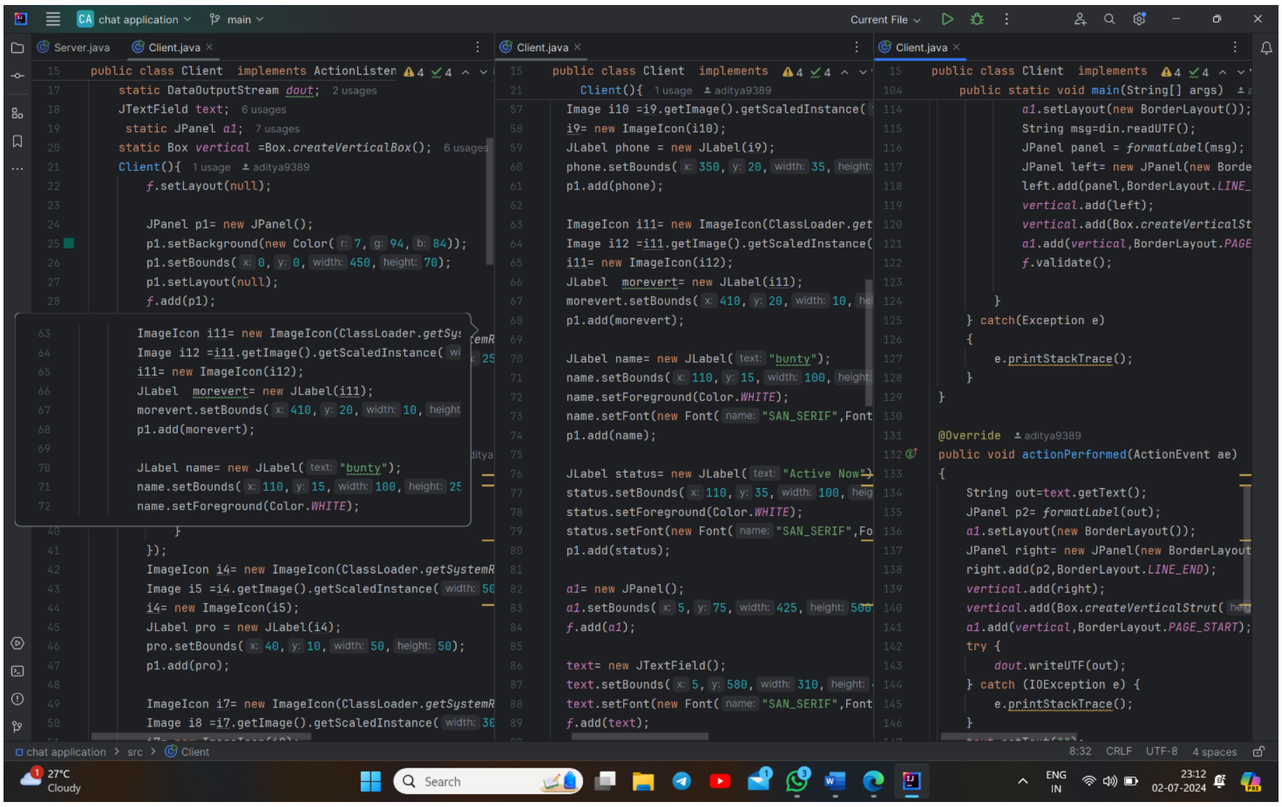
            }
        }
    }
    catch(Exception e)
    {
        e.printStackTrace();
    }
}

@Override
public void actionPerformed(ActionEvent ae)
{
    String out=text.getText();
    JPanel p2= formatLabel(out);
    a1.setLayout(new BorderLayout());
    JPanel right= new JPanel(new BorderLayout())
    right.add(p2,BorderLayout.LINE_END);
    vertical.add(right);
    vertical.add(Box.createVerticalStrut(
```

## 3) Client Management:

To handle multiple clients concurrently, we designed the server to use multithreading.

Each client operated independently, ensuring efficient communication.



```
public class Client  implements ActionListen
    static DataOutputStream dout;  2 usages
    JTextField text;  6 usages
     static JPanel a1;  7 usages
    static Box vertical =Box.createVerticalBox();  6 usages
    Client(){  1 usage  aditya9389
        f.setLayout(null);

        JPanel p1= new JPanel();
        p1.setBackground(new Color( r: 7, g: 94, b: 84));
        p1.setBounds( x: 0, y: 0, width: 450, height: 70);
        p1.setLayout(null);
        f.add(p1);
```

```
        ImageIcon i11= new ImageIcon(ClassLoader.getSys
        Image i12 =i11.getImage().getScaledInstance( wi
        i11= new ImageIcon(i12);
        JLabel  morevert= new JLabel(i11);
        morevert.setBounds( x: 410, y: 20, width: 10, height
        p1.add(morevert);

        JLabel name= new JLabel( text: "bunty");
        name.setBounds( x: 110, y: 15, width: 100, height: 25
        name.setForeground(Color.WHITE);
```

```
            }
        });
        ImageIcon i4= new ImageIcon(ClassLoader.getSystemR
        Image i5 =i4.getImage().getScaledInstance( width: 50
        i4= new ImageIcon(i5);
        JLabel pro = new JLabel(i4);
        pro.setBounds( x: 40, y: 10, width: 50, height: 50);
        p1.add(pro);

        ImageIcon i7= new ImageIcon(ClassLoader.getSystemR
        Image i8 =i7.getImage().getScaledInstance( width: 30
```

```
public class Client  implements
  Client(){  1 usage  aditya9389
    Image i10 =i9.getImage().getScaledInstance(
    i9= new ImageIcon(i10);
    JLabel phone = new JLabel(i9);
    phone.setBounds( x: 350, y: 20, width: 35, height:
    p1.add(phone);

    ImageIcon i11= new ImageIcon(ClassLoader.get
    Image i12 =i11.getImage().getScaledInstance(
    i11= new ImageIcon(i12);
    JLabel  morevert= new JLabel(i11);
    morevert.setBounds( x: 410, y: 20, width: 10, hei
    p1.add(morevert);

    JLabel name= new JLabel( text: "bunty");
    name.setBounds( x: 110, y: 15, width: 100, height:
    name.setForeground(Color.WHITE);
    name.setFont(new Font( name: "SAN_SERIF",Font
    p1.add(name);

    JLabel status= new JLabel( text: "Active Now")
    status.setBounds( x: 110, y: 35, width: 100, heig
    status.setForeground(Color.WHITE);
    status.setFont(new Font( name: "SAN_SERIF",Fo
    p1.add(status);

    a1= new JPanel();
    a1.setBounds( x: 5, y: 75, width: 425, height: 500
    f.add(a1);

    text= new JTextField();
    text.setBounds( x: 5, y: 580, width: 310, height:
    text.setFont(new Font( name: "SAN_SERIF",Font
    f.add(text);
```

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public class Client  implements
    public static void main(String[] args)
                a1.setLayout(new BorderLayout());
                String msg=din.readUTF();
                JPanel panel = formatLabel(msg);
                JPanel left= new JPanel(new Borde
                left.add(panel,BorderLayout.LINE_
                vertical.add(left);
                vertical.add(Box.createVerticalSt
                a1.add(vertical,BorderLayout.PAGE
                f.validate();

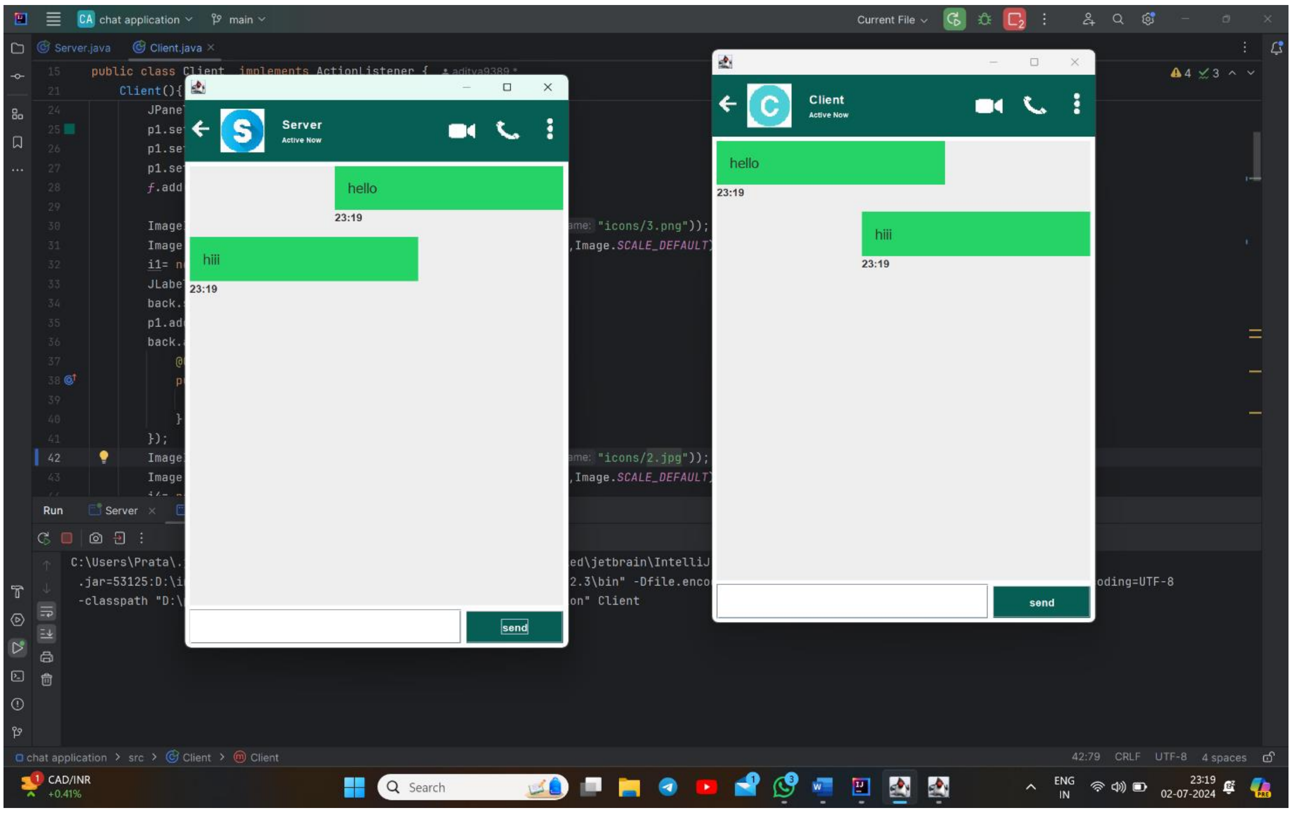
            }
        } catch(Exception e)
        {
            e.printStackTrace();
        }
}

@Override  aditya9389
public void actionPerformed(ActionEvent ae)
{
    String out=text.getText();
    JPanel p2= formatLabel(out);
    a1.setLayout(new BorderLayout());
    JPanel right= new JPanel(new BorderLayout
    right.add(p2,BorderLayout.LINE_END);
    vertical.add(right);
    vertical.add(Box.createVerticalStrut( heig
    a1.add(vertical,BorderLayout.PAGE_START);
    try {
        dout.writeUTF(out);
    } catch (IOException e) {
        e.printStackTrace();
    }
```

## 4) Message Broadcasting:

When any client sent a message, the server broadcasted it to all connected clients.

This enabled group communication seamlessly.



Server window:

hello 23:19

hiii 23:19

Client window:

hello 23:19

hiii 23:19

## 5) Testing and Debugging:

Rigorous testing was essential to ensure reliability and performance. We simulated various scenarios, identifying and resolving any bugs.

[https://github.com/aditya9389/Projects/tree/74a6167228172165da86775f73d182354fda46dd/chat%20application](https://github.com/aditya9389/Projects/tree/74a6167228172165da86775f73d182354fda46dd/chat%20application) is the link for actual code that is uploaded on github.

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# Chapter 4

## Result and Discussion

The development of the "Chat Application" for a client involved the successful implementation of a robust and user-friendly platform for real-time communication. This section discusses the key results and insights gained from the project.

### Results:

1) **User-Friendly Interface:**

   The application boasts a clean, intuitive GUI built with Java Swing. Users can effortlessly send and receive messages via a simple text input field and message display area. User controls for connecting, sending messages, and disconnecting enhance usability.

2) **Efficient Real-Time Communication:**

   The application excels at real-time message exchange between clients and the server. Messages flow almost instantly, minimizing delays and ensuring a seamless chat experience.

3) **Robust Client-Server Architecture:**

   Our server, powered by Java socket programming, listens for incoming client connections and manages message broadcasting. Each client can connect, send messages, and receive broadcasts. The multithreaded design supports multiple clients concurrently.

4) **Scalability and Stability:**

   The server’s multithreaded approach efficiently handles numerous client connections. Rigorous testing with simultaneous clients demonstrated stable performance without significant delays or crashes.

5) **Reliability Assurance:**

Extensive testing covered various scenarios, including network interruptions and client disconnections. The server gracefully manages client reconnects, ensuring uninterrupted service availability.

## Discussion:

1) **User-Friendly Design:**

The application's intuitive GUI enhances user experience, allowing seamless conversations without technical hurdles.

2) **Efficient Communication:**

Leveraging socket programming ensures efficient network communication. TCP/IP protocols guarantee reliable message delivery between clients and the server.

3) **Multithreading Benefits:**

The multithreaded server design adeptly handles concurrent clients. Each client connection operates in a separate thread, improving responsiveness.

4) **Scalability Considerations:**

While the current setup accommodates multiple clients, further optimization (e.g., load balancing) could enhance scalability for larger user bases.

5) **Enhancement Opportunities:**

Security: Implementing encryption would bolster data privacy during message transmission.

Features: Consider adding file sharing, user authentication, and message history functionalities.

User Experience: Refine the GUI, introduce emoji support, notifications, and customizable themes.

# Chapter 5

## Conclusion and Future Work

In conclusion, the ‘Chat Application’ project achieved its goals by delivering a dependable and efficient real-time communication platform. The lessons learned during development underscore opportunities for future enhancements, including security, additional features, and scalability.

In summary, the ‘Chat Application’ project successfully showcases the practical application of Java Swing and socket programming in creating a real-time communication tool. While the current implementation is robust, there are clear opportunities for future enhancements:

**Enhanced Security**:

Implementing encryption for message transmission would bolster privacy and data security.

**Additional Features**:

Consider adding functionalities like file sharing, user authentication, and message history to compete with existing chat platforms.

**Improved Scalability**:

Optimizing the server to handle even more concurrent users without compromising performance is a key area for growth.

## Need of Project:-

In today’s interconnected world, real-time communication tools play a vital role in both personal and professional contexts. This project aims to meet the demand for a straightforward yet efficient chat application that can seamlessly operate across diverse network environments. By harnessing Java’s capabilities, the project delivers a dependable communication platform, essential for scenarios like remote work, online communities, and customer support

# Chapter 6

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