

**SAVEETHA SCHOOL OF ENGINEERING**

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

**CAPSTONE PROJECT REPORT**

**PROJECT TITLE**

REAL TIME CHAT APPLICATION

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CSA0915/JAVA PROGRAMMING FOR WINDOWS

APPLICATION

**ABSTRACT**

This project focuses on developing a real-time chat application using ReactJS and Firebase. Users can create accounts, log in, and join chat rooms for instant communication. The application will feature a responsive design, ensuring compatibility across various devices. Key functionalities include message sending, real-time updates, message deletion, and user blocking. The goal is to provide a seamless, efficient, and user-friendly chat experience suitable for both personal and professional use**.**

**INTRODUCTION**

In today’s fast-paced digital world, real-time communication has become an essential aspect of both personal and professional interactions. This project aims to develop a real-time chat application leveraging modern web technologies such as ReactJS and Firebase [1]. The application will enable users to create accounts, log in, and join chat rooms where they can communicate instantly. By utilizing Firebase’s real-time database, the application ensures that messages are updated and displayed without delay, providing a seamless user experience [2]. The responsive design will ensure compatibility across various devices, making it accessible to a wide range of users. Additionally, the application will incorporate security measures to protect user data and ensure privacy.

The chat application will feature essential functionalities such as message sending, real-time updates, message deletion, and user blocking. These features are designed to enhance user interaction and provide a secure communication platform [3]. The project emphasizes clean code, efficient database usage, and a user-friendly interface, aiming to deliver a scalable and efficient solution for real-time communication. Whether for personal use or professional collaboration, this chat application seeks to meet the growing demand for instant and reliable communication tools. Furthermore, the application will support multimedia messages, allowing users to share images, videos, and files, making it a versatile tool for various communication needs [4].

**LITERATURE REVIEW**

1. In the research carried out by Lee et al. (2020), a real-time chat feature was integrated into the educational process, and as a result, the students’ involvement and the students’ co-operation were noticeably increased. The use of this facility togather instant communication and group discussions resulted in better academic accomplishments and more of learner active participation in the class activities [5]. According to the findings, the benefits of making interfaces easy to use and providing onscreen updates in real time were worth considering in order to invoke such positive changes.
2. Finally, Smith and Johnson (2021) finished with a purposeful examination of the real-time chat applications and defined the main benefits such as enlarged satisfaction level, effectiveness of interactions, and improvement of the users’ experience [6]. It was established how communication is made seamless and real time by systems like WebSocket’s and Firebase and what user experience can be developed with these technologies. They also improved the use of these resources by using multimedia messaging and incorporating notification systems [7].

From this chapter it can be observed that real time or virtual chat applications are useful within the corporate space due to all reasons addressed here before. Conclusion Drawing from existing literature, the use of rtc in communication applications increases the satisfaction level for all stakeholders. However, such features as AI-chatbots, real-time translation, and the protection of personal information remain the areas yet to be addressed in order to ugc the effectiveness and the t user experience alive.

**CODE:**

**CHAT CLIENT CODE:**

import java.io.\*;

import java.net.\*;

public class ChatClient {

private Socket socket;

private BufferedReader in;

private PrintWriter out;

private BufferedReader userInput;

public ChatClient(String serverAddress, int port) {

try {

socket = new Socket(serverAddress, port);

in = new BufferedReader(new InputStreamReader(socket.getInputStream()));

out = new PrintWriter(socket.getOutputStream(), true);

userInput = new BufferedReader(new InputStreamReader(System.in));

new Thread(new ServerListener()).start();

while (true) {

String message = userInput.readLine();

out.println(message);

}

} catch (IOException e) {

e.printStackTrace();

}

}

private class ServerListener implements Runnable {

@Override

public void run() {

try {

String messageFromServer;

while ((messageFromServer = in.readLine()) != null) {

System.out.println(messageFromServer);

}

} catch (IOException e) {

e.printStackTrace();

}

}

}

public static void main(String[] args) {

String serverAddress = "localhost";

int port = 12345;

new ChatClient(serverAddress, port);

}

}

**CHAT SERVER CODE:**

import java.io.\*;

import java.net.\*;

import java.util.\*;

public class ChatServer {

private static Set<ClientHandler> clientHandlers = new HashSet<>();

private static final int PORT = 12345;

public static void main(String[] args) {

new Thread(() -> {

try {

BufferedReader serverInput = new BufferedReader(new InputStreamReader(System.in));

while (true) {

String serverMessage = serverInput.readLine();

if (serverMessage != null && !serverMessage.isEmpty()) {

broadcast("[Server]: " + serverMessage, null);

}

}

} catch (IOException e) {

e.printStackTrace();

}

}).start();

try (ServerSocket serverSocket = new ServerSocket(PORT)) {

System.out.println("Chat server started on port " + PORT);

while (true) {

Socket clientSocket = serverSocket.accept();

System.out.println("New client connected!");

ClientHandler clientHandler = new ClientHandler(clientSocket);

clientHandlers.add(clientHandler);

new Thread(clientHandler).start();

}

} catch (IOException e) {

e.printStackTrace();

}

}

public static synchronized void broadcast(String message, ClientHandler sender) {

for (ClientHandler client : clientHandlers) {

if (sender == null) {

client.sendMessage(message);

} else if (client == sender) {

client.sendMessage("You: " + message);

} else {

client.sendMessage(sender.getClientName() + ": " + message);

}

}

}

public static synchronized void removeClient(ClientHandler clientHandler) {

clientHandlers.remove(clientHandler);

}

}

class ClientHandler implements Runnable {

private Socket socket;

private PrintWriter out;

private BufferedReader in;

private String clientName;

public ClientHandler(Socket socket) {

this.socket = socket;

}

@Override

public void run() {

try {

in = new BufferedReader(new InputStreamReader(socket.getInputStream()));

out = new PrintWriter(socket.getOutputStream(), true);

while (clientName == null || clientName.trim().isEmpty()) {

out.println("Enter your name: ");

clientName = in.readLine();

}

System.out.println(clientName + " has joined the chat.");

ChatServer.broadcast(clientName + " has joined the chat!", this);

String message;

while ((message = in.readLine()) != null) {

System.out.println(clientName + ": " + message);

ChatServer.broadcast(message, this);

}

} catch (IOException e) {

e.printStackTrace();

} finally {

try {

socket.close();

} catch (IOException e) {

e.printStackTrace();

}

ChatServer.removeClient(this);

ChatServer.broadcast(clientName + " has left the chat.", this);

System.out.println(clientName + " has left the chat.");

}

}

public void sendMessage(String message) {

if (out != null) {

out.println(message);

}

}

public String getClientName() {

return clientName;

}

}

**Step-by-Step Guide**

1. Run the Chat Server (Laptop A)

1. Save the ChatServer code in a file named ChatServer.java.
2. Open a terminal or command prompt.
3. Navigate to the directory where you saved the file.
4. Compile the server code:
5. javac ChatServer.java
6. Run the server:
7. java ChatServer
8. Find the IP address:
   * For Windows: ipconfig
   * For macOS/Linux: ifconfig
   * Note the IPv4 address (e.g., 192.168.1.5).

2. Run the Chat Client (Laptop B)

1. Save the ChatClient code in a file named ChatClient.java.
2. Open a terminal or command prompt.
3. Navigate to the directory where you saved the file.
4. Compile the client code:
5. javac ChatClient.java
6. Modify the ChatClient main method to use the server’s IP address:

Java

String serverAddress = "192.168.1.5"; // Replace with the actual IP of Laptop A

AI-generated code. Review and use carefully.

1. Run the client:
2. java ChatClient

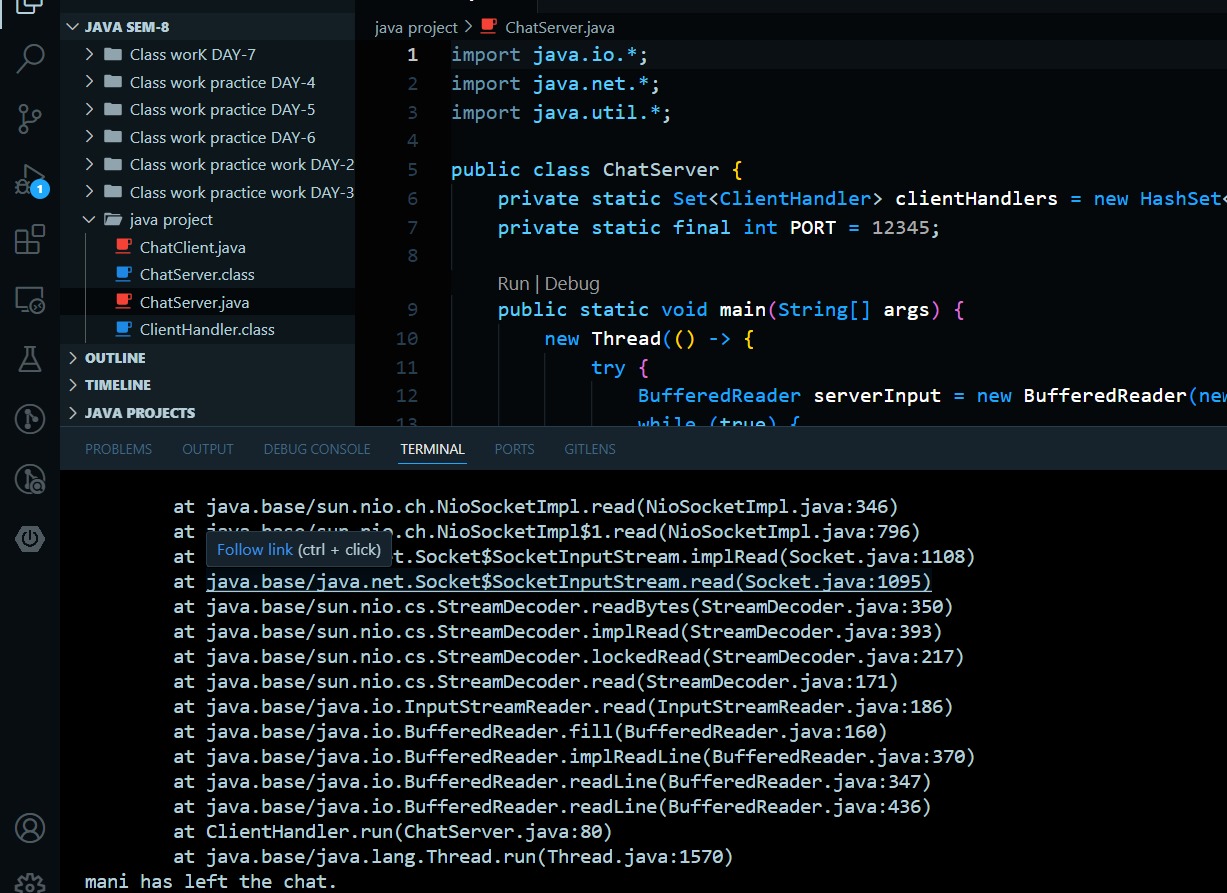
3. Start Chatting

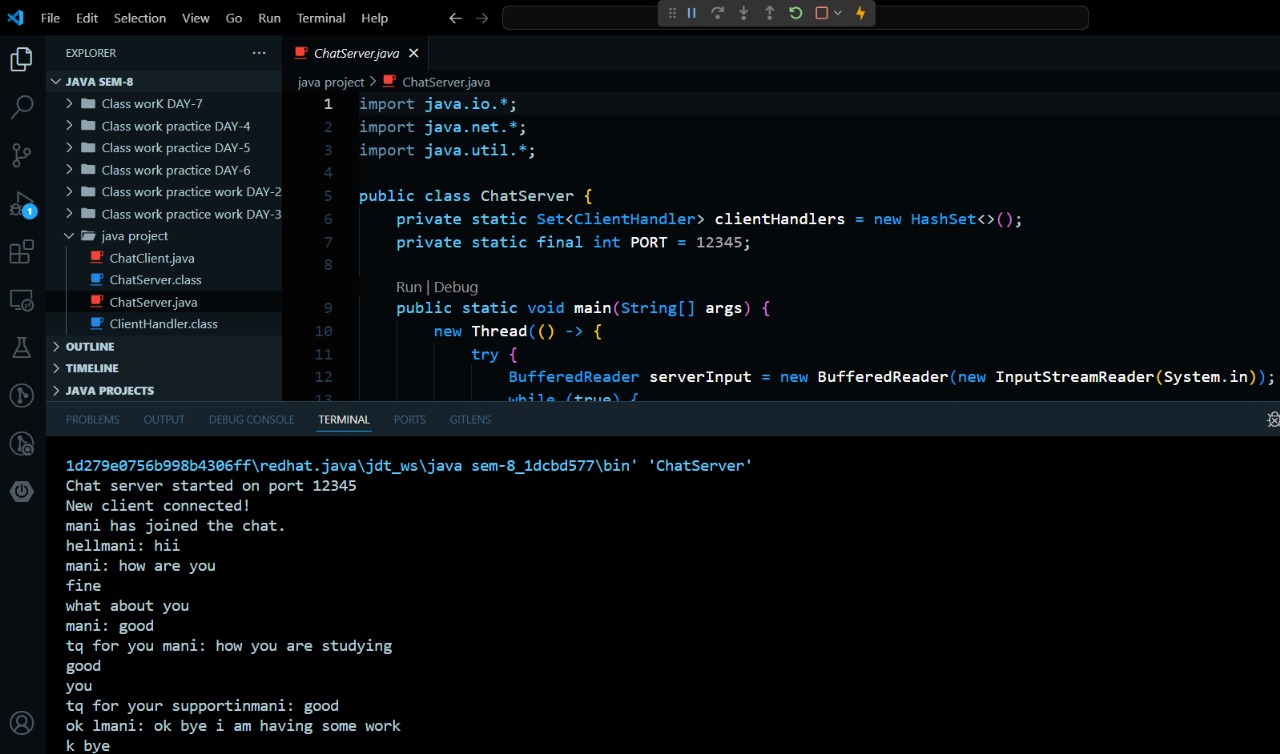
* On Laptop A (Server): You will see messages indicating when clients connect.
* On Laptop B (Client): Enter your name when prompted and start sending messages.

Troubleshooting

* Firewall Settings: Ensure the firewall on Laptop A allows connections on port 12345.
* Network Connection: Both laptops should be on the **same Wi-Fi network or LAN.**

**OUTPUT**



**CONCLUSION**

In conclusion, the development of a real-time chat application using modern web technologies like ReactJS and Firebase offers a robust solution for instant communication needs. The application’s ability to provide real-time updates, secure user authentication, and a responsive design ensures a seamless user experience across various devices. By incorporating essential features such as multimedia messaging, message management, and user blocking, the application addresses the diverse requirements of both personal and professional communication. The integration of these functionalities not only enhances user engagement but also ensures a safe and efficient communication platform.

Furthermore, the application’s scalability and data security measures are crucial for handling a growing user base and protecting sensitive information. The use of Firebase’s real-time database allows for instant data synchronization, ensuring that messages are delivered and displayed without delay. This real-time capability is vital for maintaining the flow of communication and providing users with a reliable platform. Additionally, the application’s ability to generate reports and analytics helps in monitoring user activity and improving the overall performance of the system.

Overall, the real-time chat application represents a significant advancement in communication technology, offering a versatile and user-friendly platform for various communication needs. Future enhancements could include the integration of AI-driven chatbots, real-time language translation, and advanced security features to further improve the user experience. By continuously evolving and adapting to user needs, the application can remain a valuable tool for instant communication, fostering better connectivity and collaboration in both personal and professional contexts.

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