Green University of Bangladesh

Department of Computer Science and Engineering (CSE)

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Group Chat Application Using Java

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Chapter 1

Introduction

1.1 Overview

The project is a simple chat application that allows users to communicate over a network. It consists of both client and server components implemented in Java, with a JavaFX-based GUI. The server component manages incoming client connections using multithreading, allowing multiple clients to connect simultaneously. Each client is handled by a ClientHandler, which facilitates message exchange between clients via the server. The client GUI provides a text input field for sending messages, supports emoji selection, and displays incoming messages in real-time. Users can also send images by attaching them from their local filesystem. Overall, the project demonstrates basic client-server communication and GUI development in Java, providing a foundation for more advanced chat applications.

1.2 Motivation

The motivation behind this project stems from the desire to develop a practical understanding of network programming and GUI development using JavaFX. By creating a chat application, I aimed to explore socket programming concepts, such as client-server communication and handling multiple connections concurrently. Additionally, implementing features like real-time messaging, image sharing, and emoji support provided opportunities to delve into more complex aspects of software development, enhancing my skills in both Java programming and user interface design. Moreover, the project served as a platform to apply theoretical knowledge in a hands-on, practical context, fostering a deeper understanding of networked applications.

1.3 Problem Definition

1.3.1 Problem Statement

The problem addressed by this project is the need for a simple, yet functional chat application that allows users to communicate in real-time over a network. The application should support text messaging, image sharing, and emoji usage while ensuring secure and efficient communication between multiple clients and a central server. The goal is to create an intuitive and user-friendly interface for seamless interaction, facilitating smooth communication and collaboration among users in various settings.

1.3.2 Complex Engineering Problem

This project lies in designing and implementing a robust client-server architecture capable of handling concurrent connections while ensuring secure and efficient communication. Additionally, integrating features like real-time messaging, image sharing, and emoji support necessitates careful consideration of data synchronization, error handling, and user interface design. Balancing these technical requirements to create a seamless and user-friendly chat application poses a significant engineering challenge.

Table 1.1: Complex Engineering Problem Steps

Name of the P Attributess	**Explain how to address**
P1: Depth of knowledge required	Java Socket programming for client-server communication, JavaFX for GUI, multi-threading, data streams for input/output, event handling, and basic understanding of image handling and text formatting.
P2: Range of conflicting requirements	Real-time messaging functionality, which demands low-latency communication, and the need for robust error handling to ensure stability and graceful degradation in case of network failures or client disconnections.
P3: Depth of analysis required	Implements a simple chat application with a server and client components using JavaFX. It establishes socket communication for real-time messaging and includes features like sending text messages and displaying images with emoji support.
P4: Familiarity of issues	A simple chat application with a JavaFX GUI. It employs client-server architecture, socket programming, threading, and JavaFX UI components. Features include text and image transmission, user authentication, and emoji support.

1.4 Design Goals/Objectives

The goal of this project is to develop a robust and user-friendly chat application that facilitates real-time communication between multiple clients and a central server. The primary objectives include creating a seamless user experience through a modern and intuitive graphical interface, implementing a client-server architecture that supports concurrent connections, enabling message exchange with support for text and image transmission, and integrating features like emoji support to enhance communication expressiveness. Additionally, the application should ensure data security and reliability by implementing error handling mechanisms and incorporating best practices in network programming.

1.5 Application

The application is a simple chat system implemented in JavaFX. It comprises a server component and a client component. The server allows multiple clients to connect concurrently, handling incoming messages and distributing them to all connected clients. Clients can log in with a username, send text messages, and even choose from a selection of emojis to enhance their messages. The interface is intuitive, featuring real-time message updates and a visually appealing emoji picker. Additionally, the application supports sending images. Overall, "EChat" offers a user-friendly platform for seamless communication between multiple users in a networked environment.