



Green University of Bangladesh

*Department of Computer Science and Engineering (CSE)
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Enhanced Chat Application

*Course Title: Data Communication Lab
Course Code: CSE 308
Section: D1 (223)*

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<u>Lab Project Status</u>	
Marks:	Signature:
Comments:	Date:

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0.1 Project Title

Enhanced Chat Application

0.2 Project Overview

The *Enhanced Chat Application* is a Java-based client-server messaging system designed to enable real-time communication in a local network. It features group messaging, private chats, file sharing, rich text formatting, and system notifications.

The application focuses on usability, extensibility, and performance. It incorporates both essential and advanced features that make it a modern solution for collaborative communication.

0.3 Objectives

- Develop a real-time chat application using Java.
- Implement group chat and private messaging functionality.
- Allow image and document file sharing with preview.
- Enable rich text formatting (bold, italic).
- Maintain a live list of online users.
- Ensure graceful error handling and UI responsiveness.

0.4 Key Features

- **Group Chat:** Allows all users to communicate together.
- **Private Messaging:** One-to-one user communication.
- **File Sharing:** Supports images and documents up to 10MB.
- **Rich Text Formatting:** Bold and italic styling in messages.
- **Real-Time User List:** Automatically updates user status.
- **Image Thumbnails:** Displays image previews in chat.
- **Interactive File Links:** Easy download of shared files.
- **System Notifications:** Alerts for important events.

0.5 Technical Specifications

Specification	Details
Server Port	5000
Max File Size	10MB
Supported Image Types	jpg, jpeg, png, gif, bmp
Downloads Directory	downloads/
Server File Storage	server_files/
Technology Stack	Java (Swing, Socket Programming)

0.6 Project Architecture

```
src/  
|-- client/           # Client-side implementation  
|-- handlers/         # Server message and client handlers  
|-- models/           # Data models (Message class)  
|-- ui/               # User interface components  
|-- components/       # Reusable UI elements  
|-- utils/            # Utility classes and configuration
```

0.7 Installation & Usage

Running the Server

```
javac src/MainServer.java  
java src.MainServer
```

Launching the Client

```
javac src/Main.java  
java src.Main
```

Steps to Use

1. Enter your username on startup.
2. Use the main window to send group messages.
3. Double-click a user from the list for private chat.
4. Use the paperclip button to attach and share files.
5. Format messages using the B (Bold) and I (Italic) buttons.

0.8 Error Handling & Validation

- Automatic reconnection on connection loss.
- File size validation before upload.
- Duplicate username prevention.
- Graceful termination of client connections.

0.9 Challenges & Solutions

Challenge	Solution
File handling over network	Implemented chunk-based transfer with buffering
Real-time synchronization	Used threading and event listeners
UI responsiveness	Utilized background threads and Swing-Worker

0.10 Conclusion

The *Enhanced Chat Application* successfully provides a robust and user-friendly platform for real-time communication. It combines essential messaging functionalities with advanced features like file sharing and formatted text, offering a comprehensive experience.

The modular structure and use of Java's networking and GUI capabilities make it an excellent academic and practical project. Future upgrades can include message encryption, media calling, and persistent storage using databases.

0.11 Future Work

- Implement SSL/TLS encryption for secure communication.
- Store chat history using a database.
- Add support for emojis and user avatars.
- Introduce voice and video calling.
- Enable cloud-based file storage.

0.12 Team Members

- **Ammar Bin Anwar Fuad** – Team Lead, Client-side Developer
- **Sakibul Hasan** – Server-side Developer
- **Anisur Rahaman Maruf** – UI/UX Developer
- **Nusrat Jahan Borsha** – QA & Documentation

0.13 References

- Oracle Java Documentation
- Java Socket Programming Tutorials
- Stack Overflow Discussions
- Java Swing and AWT Guides