

**University of Dhaka**  
**Department of Computer Science &  
Engineering**  
**CSE-3111: Computer Networking Lab**

**Project Name:**

**Bartabahok: A Fault-Tolerant Java Chat Application  
with Multimedia, Group Chat and Message Reliability  
Features**

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# 1. TITLE OF THE PROJECT PROPOSAL

**Project Title:** Bartabahok – Fault-Tolerant JavaFX Chat Application with Multimedia and SQLite Support

**Summary:** Bartabahok is a robust cross-platform chat application developed in Java using JavaFX and SQLite. It ensures reliable TCP communication with automatic retransmission, supports multiple concurrent message flows, and features a modern GUI with timestamps. The application allows text chat, file sharing (including images and documents), voice messages, emoji-based message reactions, and user tagging/mentioning. It supports both private and group chats, includes a user search bar, and uses SQLite for persistent chat and user data storage.

# 2. PROBLEM DOMAIN & MOTIVATION

Most desktop chat applications lack fault tolerance, offline message buffering, or user interaction features like reactions and voice messaging.

Bartabahok addresses these limitations by offering:

- A fault-tolerant network layer with automatic retransmission.
- Support for multimedia (files, images, voice).
- Real-time message reactions and tagging for better collaboration.
- A rich GUI interface using JavaFX with message timestamps.
- Group chat and mention system to organize communication efficiently.

### 3. OBJECTIVES / AIMS

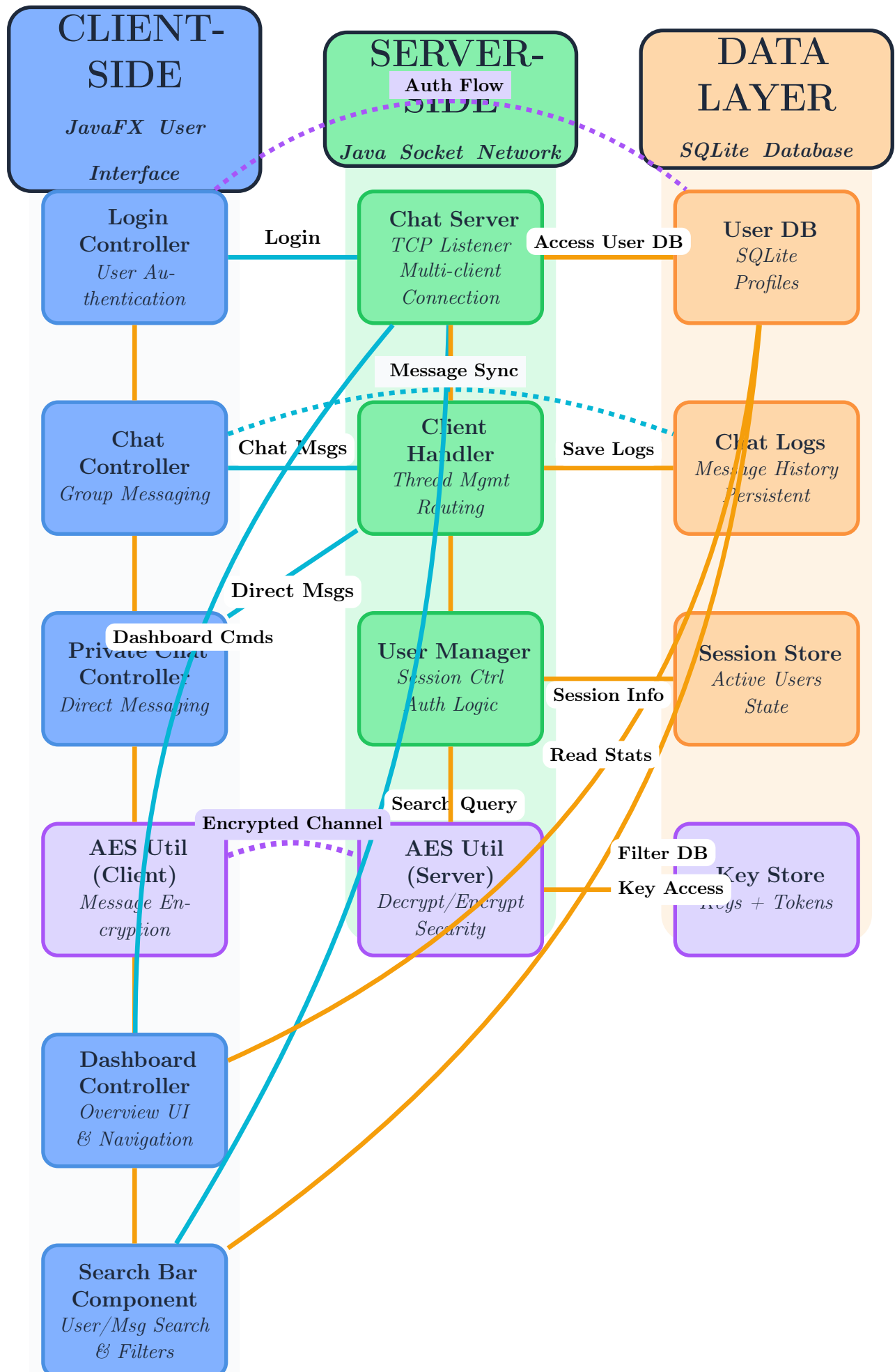
- **Reliable Messaging:** Ensure that all messages are delivered using retransmission if delivery fails.
- **Real-Time Timestamps:** Display sending and receiving times for each message.
- **Concurrent Communication:** Handle multiple chat threads via multithreading.
- **File Uploading:** Support sending of images, PDFs, documents, videos, and audio clips.
- **Group Chats:** Allow communication in named chat rooms with user join/leave capability.
- **Message Reactions:** Enable users to react to messages with emojis.
- **Tagging & Mentions:** Use @username syntax to notify or highlight users.
- **Voice Messages:** Record and send voice messages; allow playback in the chat interface.
- **Acknowledgment System:** Display delivery status for each message.
- **Search Users:** Integrate a search bar to filter users by name or group.
- **Persistent Storage:** Use SQLite to store messages, metadata, and user information.

### 4. PROJECT FEATURES

- **JavaFX GUI:** Responsive interface with scrollable chat, reactions, mentions, and voice controls.
- **Reliable TCP Socket Layer:** Retransmit undelivered messages until acknowledged.
- **Multimedia Support:** Upload/download images, videos, documents, and voice messages.
- **Voice Messaging:** Record using microphone and send/play audio snippets inside chat.
- **Emoji Reactions:** Users can react to any message using preset emojis.
- **@Mentions & Tagging:** Highlight or notify specific users using @username syntax.
- **Group Chat Rooms:** Real-time communication in multiple concurrent chat groups.
- **Search Bar:** Filter users and groups dynamically by name.
- **Message Timestamps & Status:** Show time of send/receive with delivery status.
- **Data Persistence:** SQLite handles user records, chat history, files, and voice logs.



## 5. BLOCK DIAGRAM / SYSTEM FLOW



## 6. TOOLS & TECHNOLOGIES

- **Java 17:** Programming language for backend logic.
- **JavaFX:** GUI toolkit for desktop interfaces.
- **SQLite:** Lightweight relational database.
- **javax.sound.sampled:** For voice recording/playback.
- **java.net:** Socket programming for chat protocols.
- **Multithreading:** Used for simultaneous communication and audio recording.
- **Maven/Gradle:** Dependency management.
- **JUnit:** Testing modules (retransmission, DB, UI).

## 7. FUTURE ENHANCEMENTS

- Full encryption using AES or TLS sockets.
- Cross-device mobile app version (Flutter or Kotlin).
- Push notifications for offline messages.
- Voice/video calling via WebRTC.
- Admin-controlled chat rooms.

## 8. CONCLUSION

Bartabahok aims to be a fully-featured, fault-tolerant, desktop chat application with strong user interactivity. Features like retransmission, concurrent messaging, voice communication, and emoji reactions enhance real-time collaboration. Tagging and group chat improve the messaging experience for teams or social use. With JavaFX and SQLite, this system is powerful yet lightweight — built with extensibility, user experience, and reliability in mind.