Initial Analysis: Functional and Non-Functional Requirements of the System

Functional Requirements:

1. **User Registration and Authentication:**
   - creation and login via username and password
   - security of credentials using hashing techniques
2. **Creation and Management of Chat Groups:**
   - group creation, assignment of unique names, and management of members
   - addition, removal, and promotion of members (admin/user)
3. **Real-Time Messaging:**
   - sending and receiving messages, including text, emojis, and files (images, documents)
   - push notifications for new messages, with preview and sender's name
4. **Concurrency Management:**
   - support for simultaneous connections without performance degradation
   - session management and accurate distribution of messages

Non-Functional Requirements:

1. **Scalability:**
   - support for a growing number of users, groups, and messages without loss of performance
2. **Performance:**
   - maximum response time for messages: ≤ 200 ms
   - file attachment loading time: ≤ 2 seconds for files up to 10 MB
3. **Reliability:**
   - system availability ≥ 99.9% (maximum of 8.76 hours of annual downtime)
   - fault tolerance and regular backups
4. **Security:**
   - end-to-end encryption of communications
5. **Usability:**
   - simple and intuitive interface, initial loading ≤ 2 seconds
   - support for modern browsers and desktops (Windows, macOS, Linux)

Business Requirements: The goal of the project is to provide a group chat platform that promotes communication and real-time collaborative work. The system will be free but may generate revenue through premium features or advertising.