### Requirements

#### **1. User Authentication and Management**

1. Users must be able to register an account with a username, email, and password.
2. Users must be able to log in using their credentials.
3. The system must validate the credentials and provide a JWT token for session management.
4. Passwords must be securely hashed before storing them in the database.

#### **2. Chat Functionality**

1. Users must be able to create chat sessions.
2. Users must be able to send and receive messages in real time within a chat session.
3. Chat sessions must support multiple participants.
4. The system must format and store all messages, including metadata such as timestamp, sender ID, and chat ID.

#### **3. Notification System**

1. Users must be notified of new messages in their chat sessions.
2. Notifications must be triggered by specific events, such as the addition of a new message.

#### **4. API Gateway**

1. The system must expose APIs for:
   1. User registration and login.
   2. Sending and retrieving chat messages.
   3. Receiving notifications.
2. The API Gateway must route requests to the appropriate service (e.g., User Service, Chat Service).

#### **5. Data Management**

1. The system must store user data, chat sessions, and messages in a database.
2. Data must be persisted using SQLite or a similar lightweight database.

#### **6. Middleware**

1. The middleware must validate JWT tokens for secured API endpoints.
2. Unauthorized or invalid requests must be rejected with appropriate error codes.