Requirement Document: Real-Time Chat Application with Role-Based Access

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Project Title

Real-Time Chat Application

Prepared By

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1. Objective

To create a **real-time chat application** with role-based access, allowing users to securely log in, join chat rooms, and exchange messages in real time. This project serves as a foundational exercise to understand technologies and concepts required for the upcoming **eAuction module** development.

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2. Project Scope

The application will include:

1. **Authentication**: User sign-up, login, and role-based access.
2. **Chat Rooms**: Creation, deletion (Admin only), and joining rooms.
3. **Real-Time Messaging**: Send and receive messages instantly.
4. **User Management**: Track active users in each chat room.
5. **Frontend Interface**: React-based UI for easy interaction.

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3. Functional Requirements

3.1 User Authentication

- Users should be able to:
  - ➢ Sign up with a username, email, and password.
  - ➢ Log in with their credentials.
  - ➢ Be assigned roles (Admin or Member) during sign-up.
- Authentication should use **JWT tokens** for security.
- Passwords must be securely stored using **bcrypt**.

3.2 Role-Based Access Control

- **Admin Role**:
    - Create and delete chat rooms.
    - View all chat rooms.
- **Member Role**:
    - View and join existing chat rooms.
    - Send and receive messages.

3.3 Real-Time Messaging

- Users in the same chat room should see messages updated in real time.
- Messages should include:
    - Username of the sender.
    - Timestamp of when the message was sent.
- Notify users when someone joins or leaves the chat room.

3.4 Chat Room Management

- Admin can:
    - Create chat rooms with unique names.
    - Delete chat rooms (only if no users are active in the room).
- Members can:
    - View available chat rooms.
    - Join and leave chat rooms.

3.5 User Interface

- **Homepage**:
    - Show login/signup forms.
- **Dashboard**:
    - Display list of available chat rooms.
    - Highlight active chat rooms.
- **Chat Room**:
    - Display real-time messages and active participants.

- Allow sending messages via an input box.

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4. Non-Functional Requirements

- The application should be responsive.
- The system should handle at least **15 concurrent users** without performance issues.
- Real-time updates must have minimal latency.

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5. Technical Requirements

5.1 Frontend

- **React.js, Typescript** for building the user interface.
- **CSS Frameworks**: TailwindCSS or Bootstrap for styling.

5.2 Backend

- **Node.js** with **Express.js** for server-side logic.
- **Socket.IO** for real-time communication.

5.3 Database

- **MongoDB** to store:
    - User data (username, email, password, role).
    - Chat room details.
    - Chat messages (message content, sender, timestamp).

5.4 Authentication

- **JWT** for secure login sessions.
- **bcrypt** for password hashing.

5.5 Deployment

- Deploy the application on **Vercel** for live access.

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6. Deliverables

1. Fully functional real-time chat application.
2. Source code on GitHub with proper documentation.
3. Deployment link (Heroku/Render).
4. Presentation demonstrating application features.

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7. Milestones

Day	Task	Responsibility
Day 1	Set up project structure, environment, and tools	All Team Members
Day 2	Implement user authentication and database schema	Backend Team
Day 3	Integrate WebSockets for real-time messaging	Backend Team
Day 4	Develop the frontend interface and integrate with backend APIs	Frontend Team
Day 5	Test application features and fix bugs	All Team Members
Day 6	Deploy the application and conduct a final review	Deployment Lead
Day 7	Present the application to stakeholders	All Team Members

8. Expected Outcome

- hands-on experience with **real-time systems, WebSockets, authentication, and database management**.
- A strong foundation for building the **eAuction module**.

9. Appendix

Resources

- Socket.IO Documentation
- React Official Website
- MongoDB Documentation

Approval

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