Description Document – Assignment 3

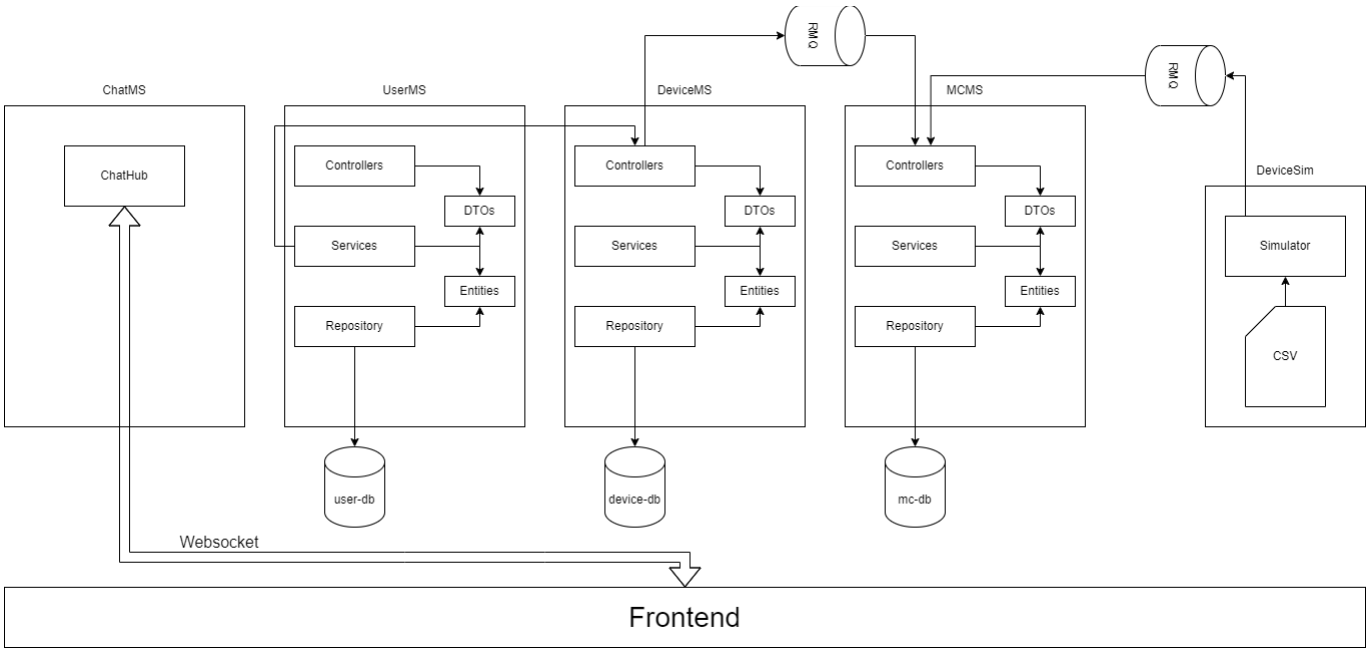
1. **Conceptual Architecture of the distributed system**

   This assignment is on the implementation of a Chat Management System (ChatMS), which introduces real-time communication features to the application. The new components include a SignalR-based backend and Angular-based frontend components to enable live messaging between users and an admin.

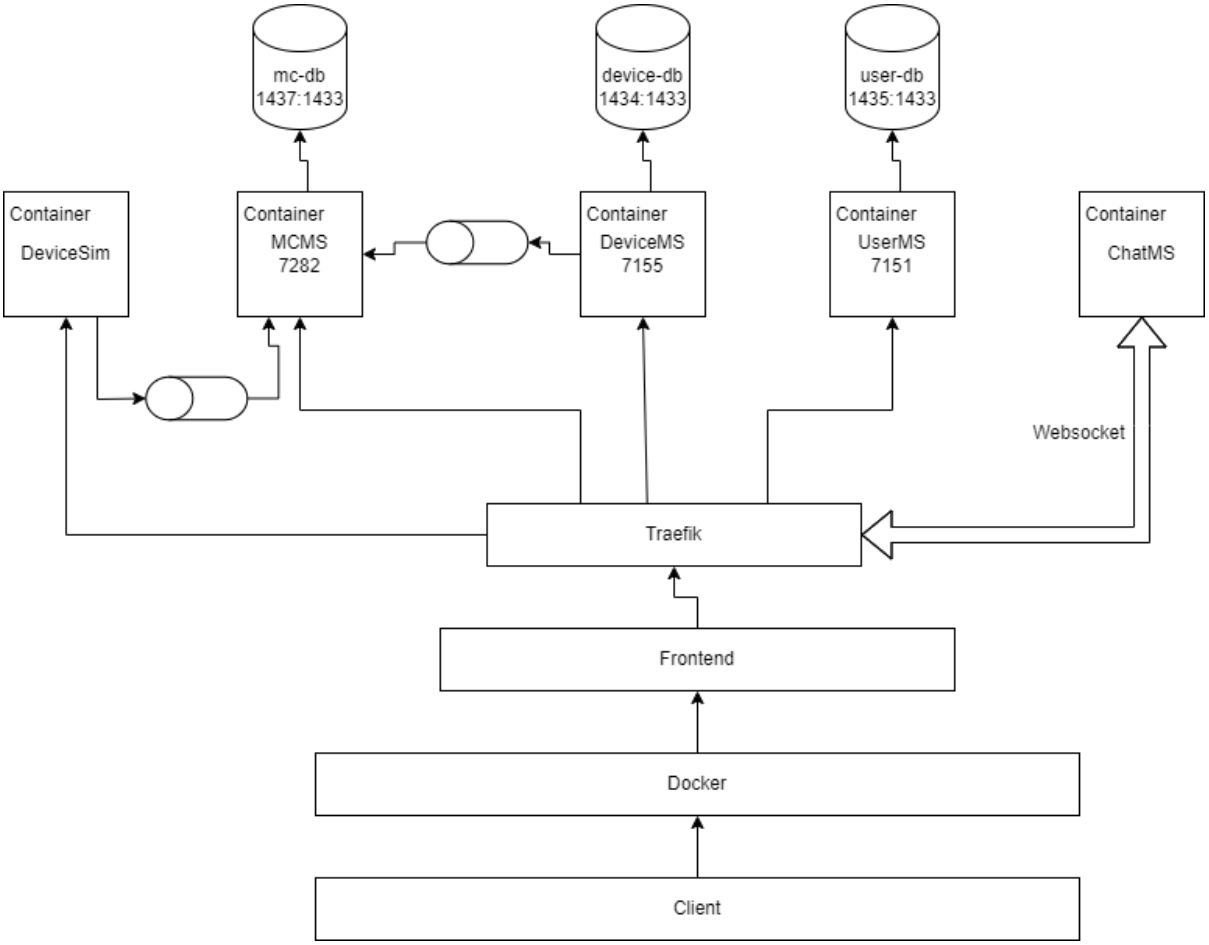
   The ChatMS backend is implemented using ASP.NET Core SignalR to handle real-time messaging, connection management, and user status tracking. SignalR acts as the communication hub, supporting functionalities such as sending and receiving messages, delivering typing notifications, and tracking when messages are marked as "seen." The backend dynamically maintains a list of connected users. SignalR also notifies the admin when users connect or disconnect, and it clears sessions for inactive users to prevent old data from being displayed.

   The frontend components are developed using Angular and TypeScript to provide a dynamic user interface for the chat system. Admin users can select a connected user to initiate or switch between conversations. When switching conversations, previous chat messages are cleared for a clean experience. The frontend tracks the "seen" status of messages for each user individually, displaying real-time updates and indexing them. Functionalities like typing notifications and message updates are displayed live.

   The integration between the SignalR backend and the Angular frontend relies on JSON-based data exchange over persistent WebSocket connections. SignalR handles the bi-directional flow of data for chat messages, user updates, and events, with minimal latency and reliable communication. The frontend dynamically updates the list of connected users, displays their messages, and manages state changes such as typing activity and message statuses.



2. **UML Deployment Diagram**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ChatMS
Websocket
Traefik
Frontend
Docker
Client