Detailed Design Document: ChatSphere

About ChatSphere:

ChatSphere is a messaging application designed for seamless communication between users. It allows users to create private chats, add contacts, and send messages in real-time. With features like Notification and Video Calling, users can stay connected and engaged effortlessly. ChatSphere ensures a user-friendly interface for an intuitive messaging experience.

1. Introduction

1.1 Purpose

This document aims to present a comprehensive overview of ChatSphere's design and architecture, encompassing features, functionality, and technical specifications.

1.2 Scope

ChatSphere, as a chatting app, endeavors to provide users with a dynamic platform for real-time communication, fostering seamless conversations, multimedia sharing, and interactive features to enhance the overall chatting experience.

1.3 Objectives

- ❖ Make it easy for users to chat by creating a simple and friendly interface in ChatSphere.
- ❖ Keep user information safe with strong security measures.
- ❖ Allow ChatSphere to grow and handle more users in the future.
- ❖ Let users work together by making it easy to share and collaborate on chats and activities..

2. System Overview

2.1 System Architecture

ChatSphere employs a client-server architecture with a responsive web-based front end for user interactions and a robust back-end server handling core logic, ensuring an efficient and dynamic chatting experience.

2.2 Key Features

- User registration and authentication
- Real-Time Chatting
- Notification System
- Video Calling
- Emoticons and Stickers

2.4 Technologies Used

- Front-end: React
- Back-end: Express
- Database: MongoDB
- Authentication: JWT
- Additional tools/libraries as needed.

3. Database Design

3.1 Entity-Relationship Diagram

User Entity:

- *UserID (Primary Key):* Unique identifier.
- *Username:* User's chosen name.
- *Email:* User's contact address.
- *Password:* Secure authentication.

Message:

- *Id (Primary Key):* Unique identifier..
- *SenderID:* Sender's UserID.
- *Data:* Message content.
- *SenderID:* Sender's UserID.

Friends:

- *Id(Primary Key):* Unique identifier.
- *UserID (Foreign Key):* Owner of the contact.
- *FriendId(Foreign Key):* UserID of the contact.

4. API Details

- **User Authentication and Authorization:**
  - `/api/auth/register`: Register a new user.
  - `/api/auth/login`: Log in an existing user.
  - `/api/auth/logout`: Log out the current user.
  - `/api/auth/reset-password`: Reset user password.
- **User Profile:**
  - `/api/users/{userId}`: Retrieve user profile information.
  - `/api/users/{userId}/update`: Update user profile information.
- **Messaging:**
  - `/api/messages/send`: Send a new message.
  - `/api/messages/{messageId}`: Retrieve a specific message.
  - `/api/messages/{userId}/inbox`: Retrieve the inbox of a user.
  - `/api/messages/{userId}/outbox`: Retrieve the outbox of a user.
  - `/api/messages/{messageId}/delete`: Delete a specific message.
- **Contacts:**
  - `/api/contacts/add`: Add a new contact.
  - `/api/contacts/{contactId}/remove`: Remove a contact.
  - `/api/contacts/{userId}/list`: List all contacts of a user.

5. Deployment Process

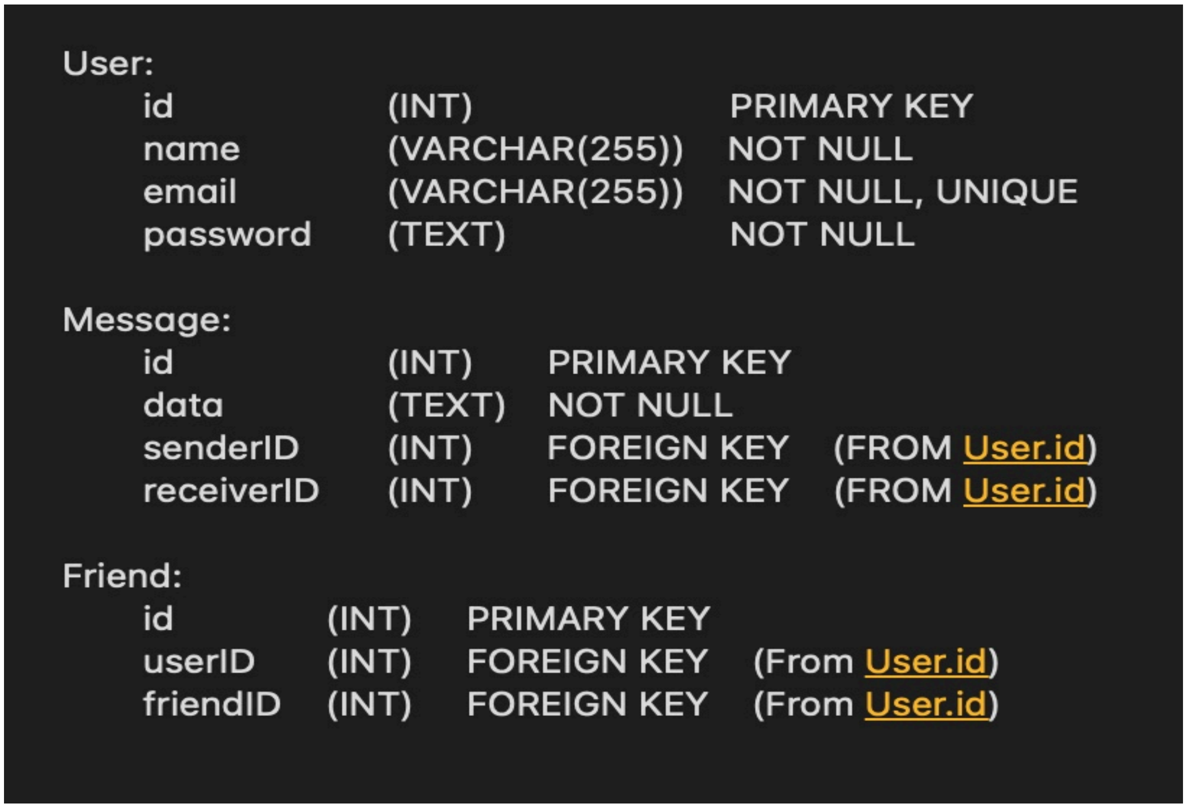
Pre-Deployment Tasks:

- Code Review: Ensure that all code changes are reviewed by team members to maintain code quality and identify any potential issues.
- Testing: Conduct thorough testing of the application to ensure it functions correctly in different environments. This includes unit tests, integration tests, and end-to-end tests.
- Environment Setup: Prepare the deployment environment, including configuring servers, setting up databases, and ensuring necessary dependencies are installed.

Deployment Steps:

- **Build Artifacts:** Generate production-ready artifacts for deployment. This may involve compiling front-end code, bundling dependencies, and preparing server-side code.
- **Configure Servers:** Set up servers to host the application. This includes provisioning virtual machines or containers, configuring network settings, and installing required software.
- **Deploy Code:** Deploy the application code to the servers. This can be done manually by copying files or using automated deployment tools like Vercel, AWS CodeDeploy, or Jenkins.
- **Configure Services:** Configure any additional services required for the application to run, such as databases, caching systems, and messaging queues. Ensure that configurations match the production environment.

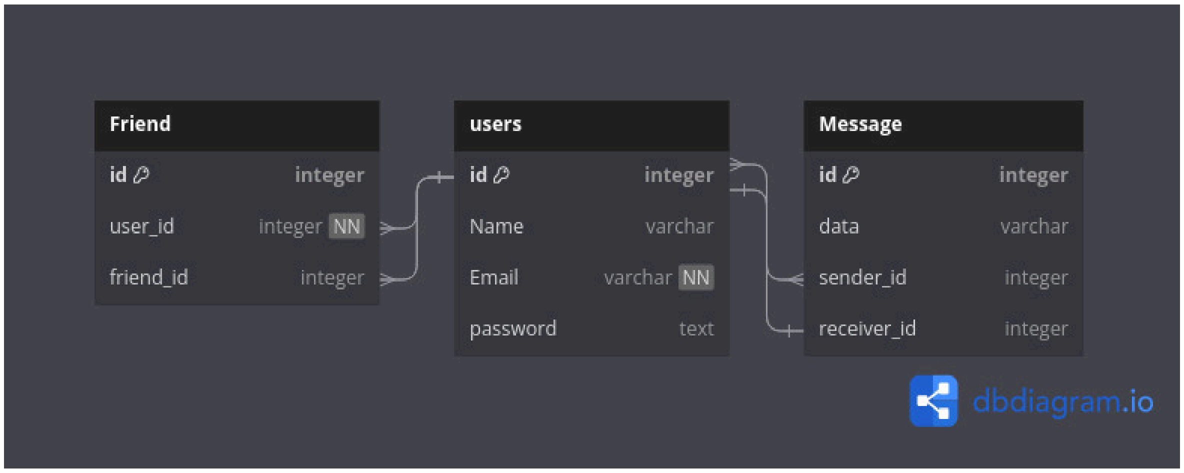
4. Database Diagram



```
User:
      id            (INT)                 PRIMARY KEY
      name          (VARCHAR(255))        NOT NULL
      email         (VARCHAR(255))        NOT NULL, UNIQUE
      password      (TEXT)                NOT NULL

Message:
      id            (INT)      PRIMARY KEY
      data          (TEXT)     NOT NULL
      senderID      (INT)      FOREIGN KEY    (FROM User.id)
      receiverID    (INT)      FOREIGN KEY    (FROM User.id)

Friend:
      id          (INT)    PRIMARY KEY
      userID      (INT)    FOREIGN KEY    (From User.id)
      friendID    (INT)    FOREIGN KEY    (From User.id)
```

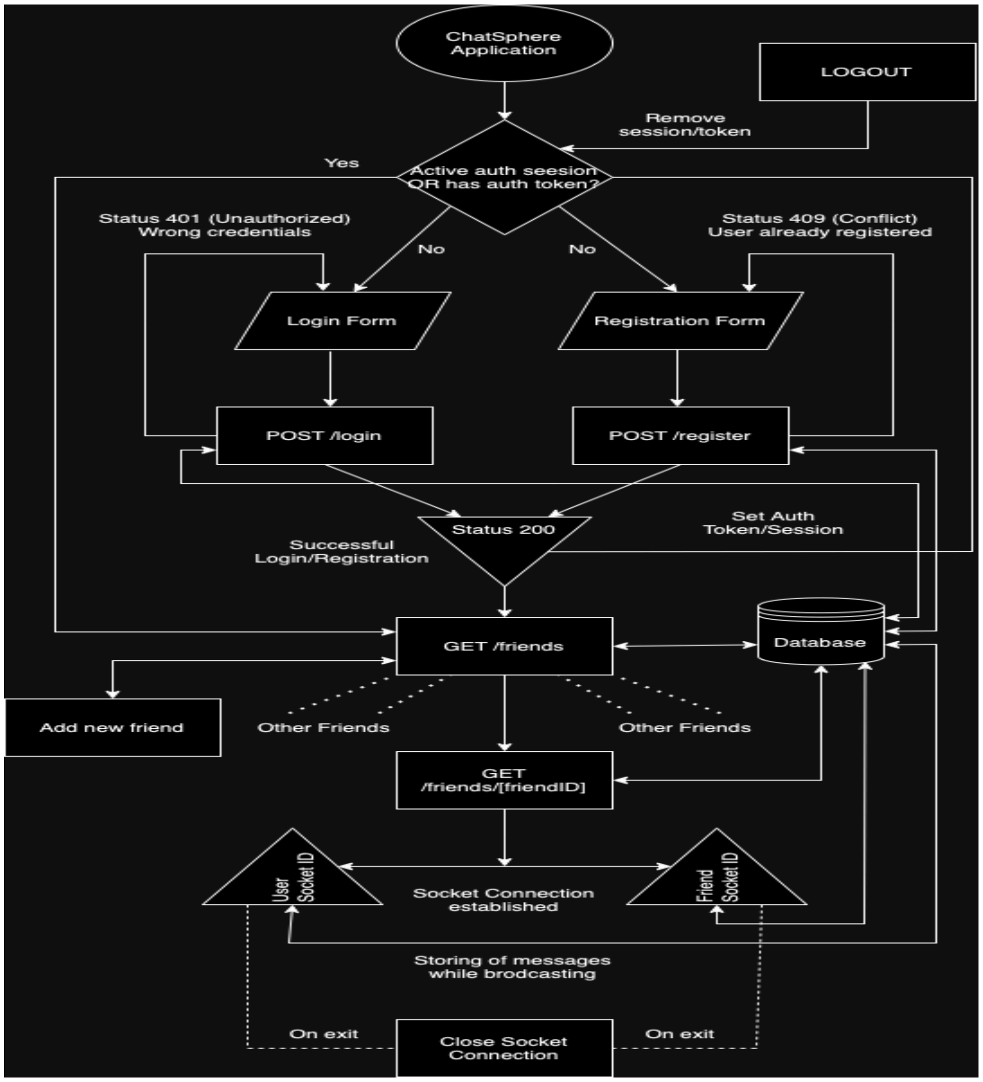


Friend	
id	integer
user_id	integer NN
friend_id	integer

users	
id	integer
Name	varchar
Email	varchar NN
password	text

Message	
id	integer
data	varchar
sender_id	integer
receiver_id	integer

5. Flow Diagram


ChatSphere Application
LOGOUT
Remove session/token
Yes
Active auth session OR has auth token?
Status 401 (Unauthorized) Wrong credentials
Status 409 (Conflict) User already registered
No
No
Login Form
Registration Form
POST /login
POST /register
Status 200
Set Auth Token/Session
Successful Login/Registration
GET /friends
Database
Add new friend
Other Friends
Other Friends
GET /friends/[friendID]
User Socket ID
Socket Connection established
Friend Socket ID
Storing of messages while brodcasting
On exit
Close Socket Connection
On exit