TalkMeow - Report

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1 Introduction

TalkMeow is a web application with it's main purpose being a real-time chat app to connect with friends. What's unique about the app is that it was created from cat lovers to fellow cat lovers. To use the app you need to create an account. To enjoy the app to the fullest as a user, there is a manager and an admin who make sure your user experience is as positive and peaceful as it can be. Next sections will cover the functionality of each role on a deeper level and shed some light on the scope of possibilities and privileges each role has. Lastly, we will uncover how the app works from a more technical perspective.

2 Guest user functionality

This is the part of the app which is accessible by any client, without having to sign in or create a new account.

2.1 Navigation Bar

The navigation bar is simplified for users who are not logged in. It includes options:

- `Home`: Redirects to the home page of the application by clicking on the logo.

- `Login`: Takes the user to the login page to access their account.

- `Registration`: Directs users to the registration page to create a new account.

2.2 Home Page

For users who are not logged in, the home page serves as an introduction to the application.

- `Login Button`: A prompt for users to log in to access the chat functionality.

- `Registration Button`: An invitation for new users to register and create an account.

- `Back button`: A button that takes you to the page you visited previously. It is visible on all pages.

2.3 Login Page

The login page is essential for users to access their accounts.

- **Username/Email Field**: Users can enter either their username or email to identify their account.

- **Password Field**: A secure input field for users to enter their password.

- **Login Button**: A button to submit the entered credentials and attempt to log in.

- **Forgot Password Link**: A link directing users to the password reset page if they cannot remember their password.

- **Registration Link**: An option for new users to navigate to the registration page to create an account.

2.4 Registration Page

For users who don't have an account yet or indefinitely lost access to their account, this is a way for them to access chatting and other functionalities.

- **Username Field**: A field for users to enter a unique username for their account. Must follow a specified format requirement.

- **Email Field**: A field for users to provide a unique email address linked to the account for login and communication.

- **Password Field**: A secure input field for users to create a password, following specified format requirements.

- **Security Question**: A text field for users to type a security question in case of account recovery.

- **Security Answer Field**: A field for users to enter the answer to their security question. This answer will be asked for during the account recovery process.

- **Register Button**: A button to submit the registration form and create the account.

2.5 Password Reset Page

The password reset page is helpful to users who cannot recall their password. The process consists of 3 steps:

- **Email Field**: A field for users to enter the email address associated with their account to recognize the account for a password change. First step to account recovery.

- **Security Question Field**: Once the email is submitted, users are prompted to answer their security question.

- **New Password Field**: After authenticating the user trying to reset the password, a secure input field allows to create a new password, following specified format requirements.

3 Logged in user functionality

3.1 Navigation Bar

Once a user logs in, the navigation bar expands to include some new features.

- `Home`: Redirects to the home page of the application by clicking on the logo.

- `Search Bar`: Allows users to search for other users by their usernames to initiate conversations. After resizing to a mobile resolution, the search bar is hidden under the magnifier and is only visible after clicking on it. Pressing anywhere outside of the field hides the search bar under the magnifier again.

- `User profile`: Displays the user's current avatar, which can be clicked to access their profile.

- `Logout`: Provides the option to log out of the account (ends the user's session).

3.2 User Functionality

A signed-in user may view or alter their user data and create or resume conversations.

- `Profile Access`: Users can view their profile, which displays their avatar, username, email.

- `Edit Profile`: Users can update their username and change their password. Email address changes are not permitted.

- `Conversations`: Users can access all their past conversations and messages, with details like the last message and timestamp.

- `New Message Notifications`: Users receive alerts for unread messages, enabling them to stay updated on ongoing conversations despite not having the conversations page open.

- `Search Functionality`: Users can search for other users by their usernames to initiate new conversations or easily find the ongoing ones.

- `Message Sending`: Users can send messages in real-time to other users, with status updates (seen/sent) for each message.

3.2.1 Profile

Via profile page, a user can access and manage their profile.

- `View Profile Information`: Users can see their avatar, username, and email address displayed on their profile page. Password lookup is unavailable.

- `Change Username`: Users can update their username by entering a new one in the provided field, ensuring it remains unique and follows the specified username format.

- `Change Password`: Users can change their password by entering their current password followed by the new password in the specified fields. The new password has to follow a specified password format.

- `Profile Picture`: Users can view their current avatar, which can be changed if they choose to select a new one from the available options. To enter avatar selection mode, press the "Change Avatar" button. To confirm changes, press "Submit", otherwise, you may press "Change Avatar" again to disable the mode.

3.2.2 Conversations

User has can access to conversations with other users. along with details regarding the conversations/messages.

- **All Conversations Overview**: Users can view a list of all their past conversations, including the usernames of chat partners and the last message sent.

- **Unread Message Notifications**: Conversations containing unread messages are highlighted, allowing users to easily identify them.

- **Timestamp Information**: Each conversation displays the time of the last message sent or received, helping users track their communication history.

- **Accessing Specific Conversations**: Users can click on a conversation from the "All conversations" page or by looking up a user in the search bar to enter a specific chat with another user.

- **Real-Time Message Loading**: New messages are loaded in real-time using web sockets, ensuring users receive updates instantly without refreshing the page.

- **Message Status Indicators**: Users can see whether their messages have been delivered (SENT) or read (SEEN) by the recipient.

- **Sending Messages**: Users can compose and send new messages in specific conversations using the "send" button. Messages will only be sent if the input is not empty.

3.2.3 Search Other Users

Signed-in users have the ability to search for other users to initiate conversations through anywhere in the application.

- **Search Bar**: Users can enter usernames in a search bar located in the navigation area to find other users.

- **Search Results**: The search results display a list of matching usernames, allowing users to click on a username to initiate a conversation.

- **Responsive Design**: The search functionality adapts for mobile resolutions, ensuring accessibility and ease of use on different devices, all while maintaining the user-friendly experience.

- **Direct Navigation**: Upon selecting a user from the search results, users are redirected to the chat interface for that specific user, facilitating immediate communication.

3.3 Manager Functionality

Manager is a user of a higher role with access to specific functionalities in addition to standard user actions.

3.3.1 Add avatars

Managers have the ability to add new avatars to the system by selecting attributes from a given list corresponding to the image, uploading the image, and providing the source of that image.

3.3.2 View avatars

Managers can access a dedicated page to view and filter all available avatars, reviewing their attributes and ensuring they meet quality standards.

3.4 Admin Functionality

As the highest rank among all users, admins have extensive control and responsibilities within the application:

- `Access to All Pages`: Admins can access any page available to managers and regular users, ensuring comprehensive oversight of the application.

- `User Management`: Admins can view all users, their statuses, their ban strikes and their interaction histories, enabling effective monitoring of user activity.

- `Ban Functionality`: Admins have the authority to temporarily or permanently ban users based on inappropriate behavior or violations of community guidelines.

- `Moderation Tools`: Admins can review and take action on messages flagged as inappropriate, ensuring a safe and respectful environment for all users.

3.4.1 Suspicious Messages

Admins can manage messages flagged for inappropriate content:

- `View Suspicious Messages`: Admins can access a dedicated page that lists all messages containing words marked as inappropriate.

- `Sender Information`: Each message displays the username of the sender for accountability.

- `Approval or Rejection`: Admins can approve messages to allow them in the conversation or mark them as inappropriate, which updates their status accordingly.

3.4.2 Banned Users

Admins manage users who have been banned:

- `View Banned Users`: Admins can see a list of all users who have been banned at least once, along with their ban history.

- `Ban Details`: For each banned user, admins can view the reasons for their bans, along with the start and end times of each ban.

- `Unban Functionality`: Admins have the ability to unban users, restoring their access based on updated evaluations of their behavior and the magnitude of their rule violation.

3.4.3 Users

Admins have comprehensive oversight of all users in the application:

- `View All Users`: Admins can access a complete list of all users, including their usernames, statuses, and ban strikes.

- `Inappropriate Messages Review`: Admins can click on a user to view all inappropriate messages they have sent since their last ban.

- `Ban Users`: Admins can issue new bans by entering a reason and specifying a ban end time, thereby managing user behavior effectively.

4 Behind the Scenes...

The development of TalkMeow involved several key technologies and architectural decisions to ensure a robust and efficient application.

- `Programming Languages and Frameworks`:
  - The application was developed using **Java 21** with **Spring Boot** for backend functionalities.
  - We utilized **Thymeleaf** for server-side rendering of HTML templates, allowing for dynamic content generation.
  - For the frontend, we employed **JavaScript** without any additional libraries, ensuring a lightweight implementation.
  - Custom styling was implemented using **CSS**.

- `Database Management`:
  - The primary database is an **Azure PostgreSQL** database for reliable data storage.
  - A **Docker PostgreSQL failover database** was configured to ensure continuity in case of connection issues with Azure.

- `Data Access and Management`:
  - We adopted the **MVC (Model-View-Controller)** architectural pattern within Spring Boot to separate concerns.
  - The application uses **JPA (Java Persistence API)** with **Hibernate** for seamless database interactions.
  - Data access is managed through repositories wrapped in services, providing better control over user actions and data integrity.

- `Real-Time Features`:
  - To facilitate real-time message updates, we implemented **WebSockets**, enabling instant communication between users.

- `Docker Configuration`:
  - A **docker-compose.yml** file was created to manage the Docker failover database setup, ensuring easy deployment and management of the database services.

- `Sensitive Data Handling`:
  - To securely store sensitive data, we used a **.env** file with environmental variables.
  - These variables are injected into `application.properties` and `DataSourceConfig` to facilitate switching between databases in case of failures.

- `Security Features`:
  - For user authentication and security, we integrated **Spring Boot Security**, ensuring a secure login process and protecting user data.

- `Testing Framework`:
  - For testing the application, we utilized **JUnit**, which helped ensure that all components function correctly and maintained high code quality throughout development.

*All necessary screenshots of the application can be found in the Screenshot folder, having subfolders named after the corresponding section. MV stands for mobile view.