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Project Proposal:

Description:

The Smart Roommate Management Application is a web application designed to help roommates efficiently coordinate household responsibilities. Managing shared living spaces often becomes frustrated due to untracked chores, unclear expense divisions, and miscommunication regarding shared events. The inconvenience of keeping track of who is responsible for taking out the trash, washing dishes, or handling utility payments can lead to potential conflicts among roommates.

This application addresses these challenges by introducing an organized system that automates task assignments, provides transparent bill-splitting mechanisms, and ensures all roommates are aligned on schedules and house rules. By integrating automated reminders and a voting system, the application reduces misunderstandings and promotes harmonious co-living.

Core Features:

1. **Chore Assignment & Reminders**
   The first feature the application provides is a structured approach to managing household chores, ensuring that responsibilities are evenly distributed and completed on time. Users are able to create a list of tasks and assign them to specific roommates using a simple drag-and-drop interface. Each task needs to be setted a due date and priority level, helping roommates prioritize their responsibilities. Automated reminders will notify users of upcoming or overdue tasks, preventing missed duties. This feature efficiently minimizes conflicts caused by misunderstandings or forgetfulness, fostering a cleaner and more organized living space.
2. **Expense Splitting Calculator**
   Managing shared expenses can often lead to misunderstandings and disputes. The expense splitting calculator automates the process by allowing users to input expenses, assign payees, and automatically calculate owed amounts. Users can add bills such as rent, utilities, and groceries, specifying cost amount and payees. The application then tracks payments, notifying users of outstanding balances and or even facilitating direct settlements through integrated payment platforms like Venmo or PayPal. This feature provides a clear breakdown of contributions and reduces potential disagreements over financial responsibilities.

3. **Shared Calendar for Events**

   Sometimes it's really difficult to find a time when everyone is available. The shared calendar feature allows roommates to coordinate schedules, ensuring that all important events, such as cleaning days, bill due dates, or social gatherings, are visible to everyone. Users can create and edit events, set reminders, and send notifications to other roommates. And they can see when there is a time they can buy groceries or do cleaning. By centralizing all scheduling information in one accessible location, this feature helps prevent double bookings, and last-minute miscommunications. Additionally, integration with third-party calendar services, such as Google Calendar, allows roommates to sync their schedules effortlessly.
4. **Roommate Voting System**

   Decision-making in a shared living arrangement can be challenging, especially when it comes to house rules, purchases, or other joint decisions. The roommate voting system ensures a fair approach by allowing users to create polls on household matters. Roommates can propose changes, such as adjusting quiet hours, purchasing new furniture, or modifying the cleaning schedule, and others can cast their votes. The system tallies results and presents majority-based decisions, ensuring that all roommates have an equal say in household matters. This reduces conflicts and fosters a sense of collaboration and mutual respect among house members.

Dynamic Behavior:

The Smart Roommate Management App ensures dynamic behavior by allowing the front end to respond to user input events and web service updates in real-time. The interface will dynamically update as users interact with the system, enhancing usability and efficiency.

Chore Assignment & Reminders: When a user assigns a task, the front end immediately updates the chore list without requiring a page refresh. Users receive live notifications when chores are updated, completed, or reassigned.

Expense Splitting Calculator: As users input shared expenses, the system dynamically updates balances and displays real-time owed amounts. When payments are logged, the system updates all affected users' balances immediately.

Shared Calendar for Events: The calendar updates in real-time as roommates add or modify events. Integrated reminders and notifications ensure all users receive updates on important dates.

Roommate Voting System: As users vote on household decisions, the results update in real-time. This allows roommates to see changes immediately and prevents redundant voting attempts.

Client-Side and Server-Side Logic

Client-Side Logic:

1. Form Validation: When users enter expenses, chore assignments, or event details, client-side validation checks for missing fields, incorrect formats, and invalid inputs before allowing submission.
2. Auto-Completion & Error Correction: The app offers auto-complete suggestions for common tasks, frequent expenses, and event locations, minimizing manual input errors.
3. Filtering & Sorting: Users can filter and sort chores by urgency, expenses by amount, and events by date, making it easy to find relevant information quickly.
4. Interactive Visualizations: The expense-splitting tool dynamically updates owed amounts using JavaScript, displaying a clear breakdown of contributions in either a table or graphical format.

Server-Side Logic:

1. Data Management: The backend manages chore assignments, expenses, and event records in MongoDB, allowing users to add, update, delete, and retrieve data efficiently.
2. Business Logic Execution: The system ensures fair expense distribution based on user inputs, helping roommates split costs accurately.
3. Secure Authentication: JWT authentication controls user access, preventing unauthorized modifications.
4. Request Handling & API Responses: The backend processes incoming HTTP requests, validates input data, and returns structured JSON responses to update the frontend dynamically.

Multi-User Support & Data Persistence

The Smart Roommate App supports multiple users while ensuring their sessions remain separate and do not interfere with one another. It uses JWT authentication to maintain secure, stateful user sessions, allowing each roommate to log in individually and keep their actions—such as updating chores, adding expenses, and scheduling events—specific to their account. MongoDB stores user-specific data persistently, ensuring seamless access and modification without data loss. The backend, built with Node.js and Express.js, efficiently handles multiple concurrent requests without session conflicts, while WebSockets enable real-time updates so that any changes made by one roommate are instantly visible to others. These features work together to provide a seamless, organized, and conflict-free shared living experience.

Asynchronous Frontend-Backend Communication

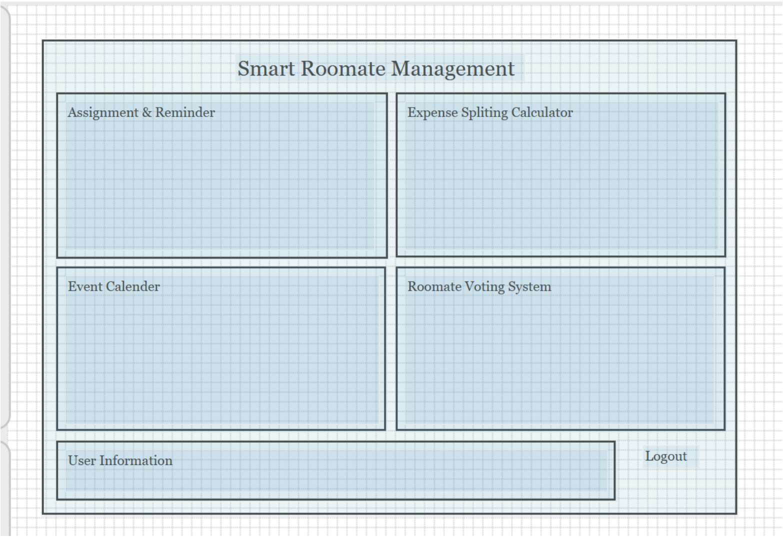
The Smart Roommate App enables seamless coordination between the frontend and backend through an asynchronous communication model using JSON-based API requests. When a user takes an action—such as adding a new expense, updating a chore assignment, or scheduling an event—the frontend, built with JavaScript, sends an asynchronous request to the backend. In a PHP-based backend, this request undergoes validation, business logic execution, and database updates as needed. Once processing is complete, a structured JSON response is generated and sent back to the frontend, providing users with real-time feedback on their actions. The frontend then processes this response, dynamically updating the UI without requiring a full page reload. This setup enhances performance, improves the user experience, and eliminates unnecessary page refreshes, ensuring a highly responsive application.

Single Unit

To maintain a unified and cohesive experience, all components of the app are seamlessly integrated through a structured execution flow. The frontend features an intuitive navigation system that allows users to explore various functionalities without manually changing URLs or encountering fragmented interactions. Every user action follows a logical sequence, ensuring smooth navigation and efficient task completion. Additionally, asynchronous backend communication preserves application state across sessions, allowing returning users to access and manage their data effortlessly. The API-driven structure supports modular and scalable development, making it easy to expand the system in the future while ensuring a fluid and well-organized user experience.

User Interface Design:

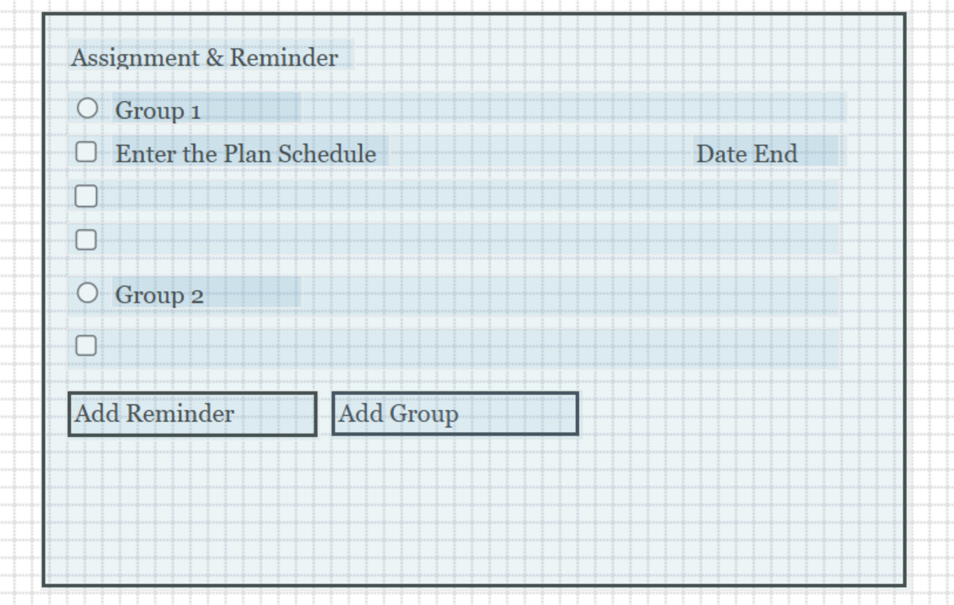
Main Page:



After Login the user can see four main functions and by clicking them the user can enter function page.

At the bottom is the user account information and user can add their roommates.

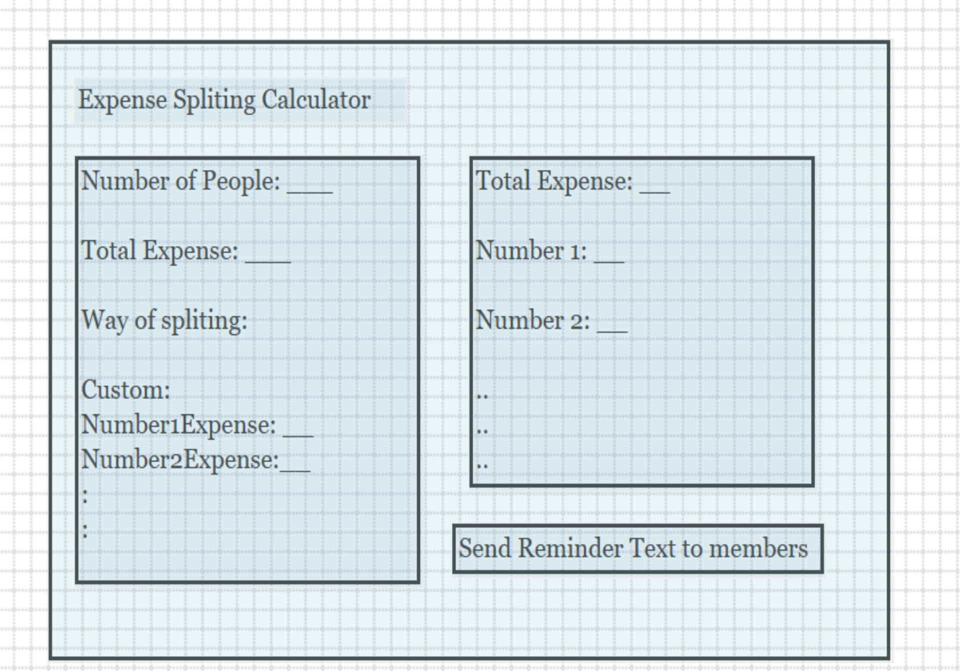
Function 1: Assignment and Reminder:



The assignment function is similar to the reminders in Apple. Users can add their assignment or create groups via the button at bottom.

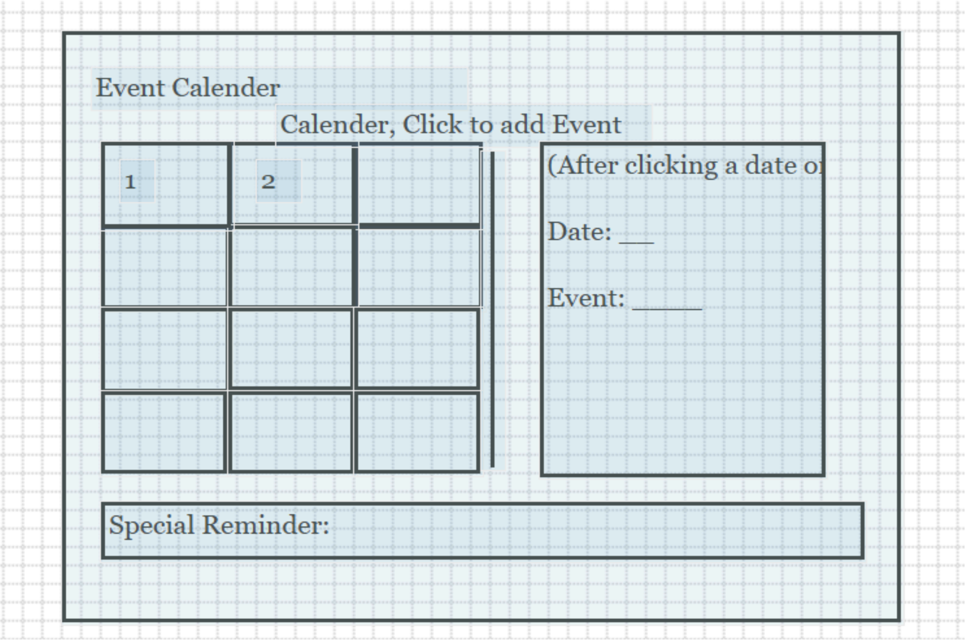
By clicking the tab user can edit the text and adjust the date. When clicking the box the assignment will be deleted

Function 2: Expense Splitting calculator:



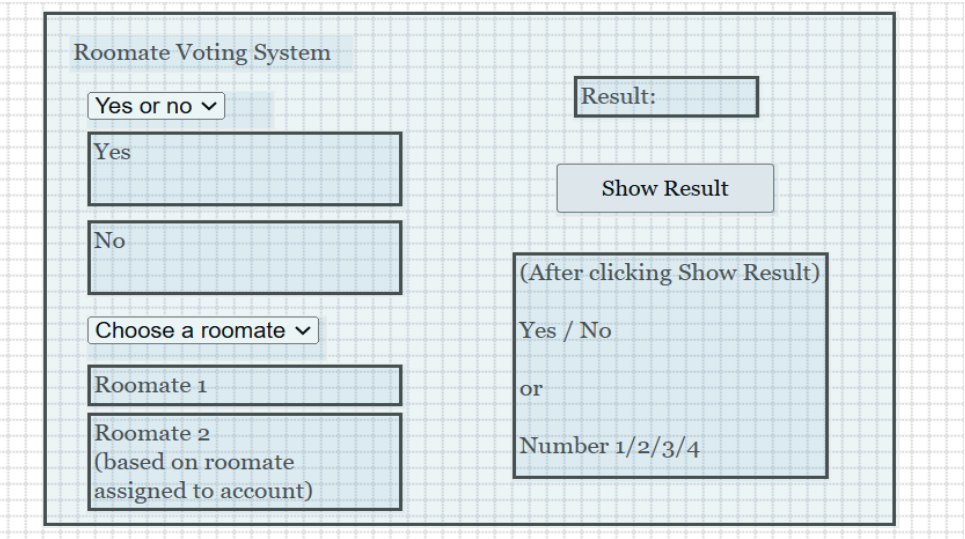
The function 2 is for each member to know the amount of money they should pay (eg utility bills). By putting the related info to the left the web will calculate the expense for each member (members are added at bottom of main page)

Function 3: Event Calendar:



The left side is a calendar that can scroll down and up to see different dates. After clicking a date, the right side will show the corresponding date and the user can edit the event of that day. At the bottom there are special events that will be highlighted for users to use.

Function 4: Roommate voting system:



The drop selection has three modes: Yes or No, Choose a roommate and Customize.

After selecting a mode and finishing voting, click Show Result and the user can see the result on the right.

The Main Page organizes four core functions in a structured layout, ensuring intuitive navigation. The Assignment & Reminder feature simplifies task management with checkboxes and editable fields, enhancing flexibility. The Expense Splitting Calculator allows accurate cost distribution with customizable inputs and a reminder system for transparency. The Event Calendar enables seamless scheduling with a scrollable interface and highlighted special events. The Roommate Voting System supports multiple voting modes with clear result displays, improving decision-making. Overall, the design streamlines interactions, making roommate management effortless and efficient.