Project Report

ON

Renbu App

Major Project (CA133)

Submitted to

Department of Computer Applications
Chitkara University, Punjab

Under the supervision of
Jsawinder Singh

Submitted by

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BCA A1
(Batch 2021-24)

CERTIFICATE

This is to certify that the report on software project titled “Renbu App” submitted by Arjun Bansal (2110992517) to the Department of Computer Applications, Chitkara University, Punjab in partial fulfillment for the completion of the course Major Project (CA133) in the fifth semester of Bachelor of Computer Applications is a Bona fide record of work carried out by the team under my supervision.

Date:

JASWINDER SINGH

Department of Computer Application

Chitkara University ,Rajpura ,Punjab

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Project Abstraction: Rental App for Cars

The project involves the development of a comprehensive rental application designed to facilitate the seamless renting of cars. Users can efficiently list their properties or vehicles for rent and engage in transparent communication with potential renters. The platform incorporates user-friendly features such as a robust search mechanism, secure transaction processing, and a review system to enhance trust within the community. The project aims to provide a convenient and trustworthy solution for individuals seeking temporary accommodations or transportation.

INTRODUCTION

In an era where flexibility and convenience are paramount, our Car Rental App emerges as the go-to solution for individuals seeking seamless and hassle-free mobility. Tailored exclusively for renting cars, this application facilitates a smooth exchange between car owners and renters, providing a diverse selection of vehicles to suit various needs. Whether it's a spontaneous road trip, a temporary replacement for daily commuting, or an opportunity to experience a different vehicle, our Car Rental App streamlines the booking process and ensures secure transactions. With an emphasis on real-time communication, users can engage in transparent dialogue, fostering trust between renters and car owners. Join us in redefining the way you access and enjoy temporary mobility, where every journey becomes a convenient and delightful experience.

Profile of problems assigned

Certainly, here are some potential problem statements use for your rental app project:

1. **User Accessibility:**
   Problem Statement: How to ensure a user-friendly interface that accommodates users with varying technological expertise for seamless navigation and interaction within the rental app?
2. **Listing Optimization:**

Problem Statement: How to optimize the listing process to encourage users to provide comprehensive details about their properties or items, enhancing the overall quality of the listings?

3. **Dynamic Search and Filters:**
   Problem Statement: How to design a dynamic and efficient search system with relevant filters to help users find the exact type of properties or items they are looking for?

System Requirements

a) Problem Statement

- **Problem:**
  - Users face challenges in finding and securing rentals efficiently, and trust and transparency issues persist within the rental community.

b) Function to be Provided

- **Functions:**
  1. **Listing Management:**
     - Users can list properties or items with detailed descriptions, images, and availability schedules.
  2. **Search and Filters:**
     - A dynamic search system with filters for location, price range, and property or item type.

c) Processing Environment: H/W, S/W.

- **Hardware:**
  - Servers to host the application.
  - Database servers for storing user data and listings.
- **Software:**
  - Front-end: Mobile app developed for iOS and Android platforms.
  - Back-end: Database management system, server-side scripting, and application logic.
  - Security protocols for data encryption.

d) Solution Strategy

- **Solution:**

- Develop a user-friendly mobile application with intuitive interfaces for both renters and providers.
- Implement a secure and efficient backend system for data storage, processing, and communication.

e) Acceptance Criteria

- **Acceptance Criteria:**
  - The mobile app should be responsive, providing a seamless experience on both iOS and Android devices.
  - The listing process must be straightforward, allowing users to easily upload comprehensive details and images.
  - The search and filter functionalities should provide accurate and relevant results.

2. Feasibility Analysis

- **Technical Feasibility:**
  - **Assessment:** Evaluate the technical aspects of implementing the rental app, including the development of a robust backend, secure payment integration, and scalable infrastructure.
  - **Criteria for Success:** Ensure that the technical requirements align with the capabilities of the development team and available resources.

- **Operational Feasibility:**
  - **Assessment:** Analyze the practicality of the app's operation, considering factors such as user adoption, user training needs, and ongoing maintenance.
  - **Criteria for Success:** Ensure that the app can be effectively utilized by both renters and providers with minimal operational challenges.

- **Economic Feasibility:**
  - **Assessment:** Evaluate the economic viability of the rental app, considering development costs, potential revenue streams, and return on investment.
  - **Criteria for Success:** Ensure that the benefits of the app outweigh the costs, providing a sustainable business model.

3. Project Plan

i. Team Structure

- **Roles:**
    1. Project Manager
    2. Front-end Developers (iOS and Android)
    3. Back-end Developers
    4. Database Administrators
    5. UI/UX Designers
    6. Quality Assurance/Testers
    7. Security Analyst
- **Responsibilities:**
    - Project Manager: Overall coordination, planning, and communication.
    - Developers: App development and programming.
    - Database Administrators: Database setup and management.
    - UI/UX Designers: Designing the user interface and experience.
    - Testers: Quality assurance and testing.
    - Security Analyst: Ensure the security of user data and transactions.

ii. Development Schedule

- **Phases:**

    1. **Planning (01-9-2023):**
        - Define requirements and finalize project plan.

    2. **Design (05-9-2023):**
        - UI/UX design, database design, and system architecture planning.

    3. **Development (01-10-2023):**
        - Front-end and back-end development, database implementation.

    4. **Testing (10-11-2023):**
        - Quality assurance, user testing, and debugging.

    5. **Report Submit(24-11-2023):**
        - Continuous improvement, updates, and support.

iii. Programming Languages And Development Tools

- **Front-end Development:**
  - Android Studio

Android Studio is the official integrated development environment (IDE) for Android app development. It is based on the IntelliJ IDEA IDE and is developed by Google. Android Studio provides a comprehensive set of tools for building Android apps, including code editing, debugging, performance profiling, and a variety of emulator or device deployment options.
Here are some key features and components of Android Studio:

1. **User Interface (UI):** Android Studio has a user-friendly interface with various panels for code editing, project navigation, and tool windows. The layout is designed to streamline the app development process.

2. **Code Editor:** Android Studio includes a powerful code editor that supports features like code completion, syntax highlighting, and code refactoring. It also supports multiple programming languages, including Java and Kotlin.

3. **Gradle Build System:** Android Studio uses the Gradle build system to automate the build process, manage project dependencies, and handle tasks such as compiling code, packaging resources, and generating APKs.

4. **Emulator:** Android Studio comes with an emulator that allows developers to test their apps on virtual devices with different Android versions and screen sizes. It helps in identifying and resolving compatibility issues.

  - Android: Flutter

Flutter is an open-source UI software development toolkit created by Google for building natively compiled applications for mobile, web, and desktop from a single codebase. Flutter was first announced in 2015 and has since gained popularity among developers for its ability

to create high-performance, visually appealing applications across different platforms.

Here are some key features and concepts associated with Flutter:

1. **Dart Programming Language:** Flutter uses Dart as its primary programming language. Dart is a modern, object-oriented language developed by Google. It is designed for building scalable and efficient applications.

2. **Single Codebase for Multiple Platforms:** One of the significant advantages of Flutter is the ability to write code once and run it on multiple platforms, including iOS, Android, web, and desktop. This is possible because Flutter uses a reactive framework that allows for a consistent user experience across different platforms.

3. **Widgets:** Flutter's UI is built using widgets, which are lightweight and customizable building blocks. Flutter provides a rich set of pre-designed widgets for common UI elements, and developers can also create their own custom widgets.

- **Back-end Development:**
  - Firebase

  Firebase is a comprehensive mobile and web application development platform provided by Google. It offers a wide range of services and tools that developers can use to build and scale applications quickly. Firebase is known for its ease of use, real-time data synchronization, and seamless integration with other Google Cloud services. Here are some key components and features of Firebase:

1. **Realtime Database:** Firebase's Realtime Database is a NoSQL cloud database that allows developers to store and synchronize data in real time. It uses a JSON data model and enables data to be updated in milliseconds across all connected devices.

2. **Authentication:** Firebase Authentication provides a secure and easy-to-implement way for users to sign up, sign in, and manage their

authentication credentials. It supports various authentication methods, including email/password, social media logins, and anonymous authentication.

3. **Cloud Firestore:** Firestore is Firebase's next-generation NoSQL document database. It offers more powerful queries, automatic scaling, and real-time data synchronization. Firestore is often preferred for new projects over the older Realtime Database.

4. **Cloud Functions:** Firebase Cloud Functions allow developers to run server-side code in response to events triggered by Firebase features and HTTPS requests. It provides a way to extend the functionality of Firebase and execute custom logic.

- **Development Tools:**
  - Version Control: Git
  - Integrated Development Environment (IDE): Android Studio for Android
  - Collaboration: Slack, Trello for project management

System Requirement Specifications

1. Developing / Operating / Maintenance Environments

Developing Environment:

- **Development Environment:**
  - Integrated Development Environments (IDEs): Android Studio for Android.
  - Version Control: Git for source code management.
  - Collaboration Tools: Slack for team communication, Trello for project management.

Operating Environment:

- **Mobile Platforms:**
  - iOS: Compatible with iOS 12 and later.
  - Android: Compatible with Android 8.0 (Oreo) and later.

Maintenance Environment:

- **Support and Maintenance:**
  - Continuous monitoring and support for bug fixes.
  - Updates and enhancements based on user feedback and technology advancements.

Functional Requirements:

1. **User Registration and Authentication:**
   - Users should be able to register with valid credentials and authenticate securely.

2. **Car Listing Management:**
   - Car owners should be able to create, edit, and delete listings for their vehicles.
   - Details such as car specifications, images, availability, and pricing should be customizable.

3. **Search and Filtering:**
   - Renters should be able to search for available cars based on criteria such as location, car type, and rental duration.
   - The system must provide accurate and relevant search results.

Non-Functional Requirements:

1. **Security:**
   - The system must use secure authentication methods to protect user accounts.
   - Financial transactions must be encrypted and comply with industry security standards.

2. **Performance:**
   - The application should have low latency and respond quickly to user interactions.

- It must handle a scalable number of concurrent users and car listings.

3. **User Interface Design:**
   - The user interface should be intuitive, providing a seamless experience for both car owners and renters.
   - The design should be responsive and accessible on various devices.

4. **Reliability:**
   - The system should be available and reliable, with minimal downtime.
   - Transactional data should be stored securely to prevent data loss.

5. **Scalability:**
   - The system should be able to scale horizontally to accommodate a growing user base and increasing car listings.

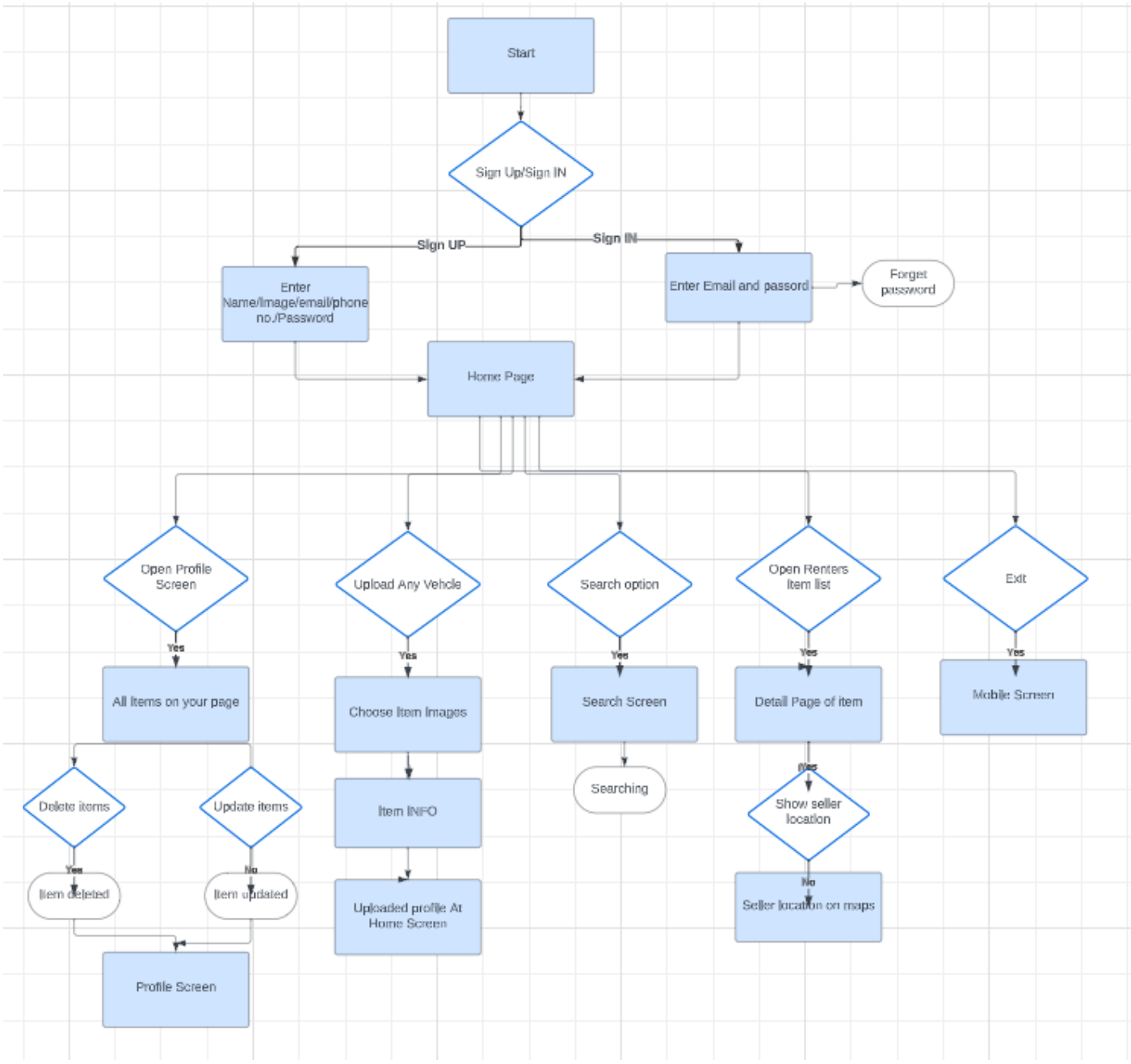
6. **Compliance:**
   - The application should comply with relevant data protection and privacy regulations.
   - Accessibility standards should be followed to ensure inclusivity.

7. **Documentation:**
   - Comprehensive documentation should be provided for users, administrators, and developers.
   - The system should include error handling and logging for debugging and monitoring purposes.

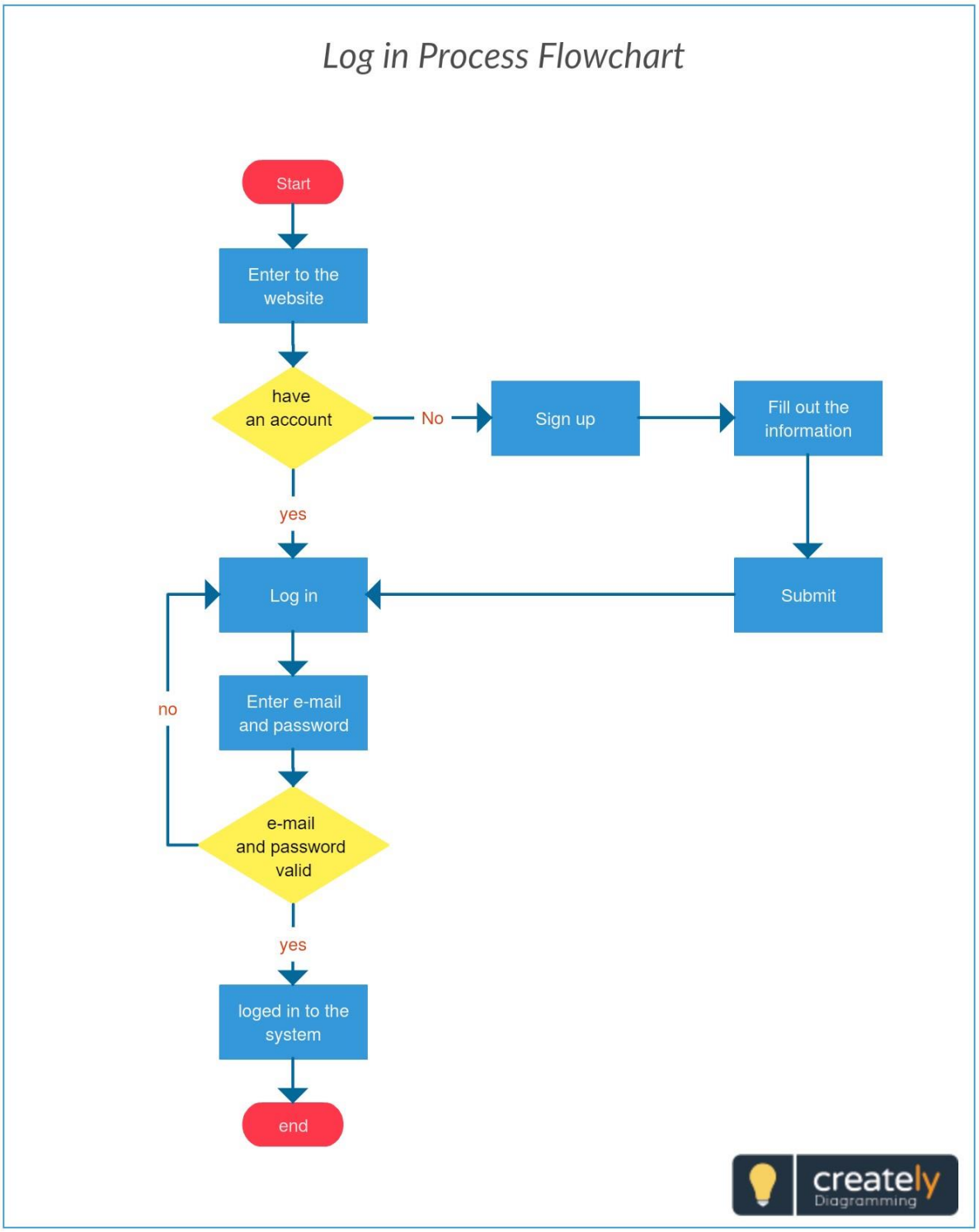
8. **Technology Stack:**
   - The application should be developed using technologies that align with industry best practices and support future scalability.

Design

- **Flow Chart**



Data flow diagram of Sign In and Sign Up page



Pseudocode

Algorithm for Rental App:

// Begin the process by authenticating the user.
Step 1: Begin the authentication process by authenticating the user with the rental app.

// The user is authenticated, now check for any existing rental reservations.
Step 2: Retrieve all the rental reservations of the user.

// Check if the user already has an active rental reservation.
Step 3: Check if there is an active rental reservation.
If yes, go to Step 8.
If no, proceed to Step 4.

// If the user does not have an active rental reservation, allow the user to search for available rentals.
Step 4: Search for available rentals.
This can be done by providing a list of rental options (cars, houses, apartments, etc.) to choose from.
The user can then filter their search by factors such as location, date, rental duration, and rental price.

// The user has selected a rental option and the next step is to make a rental reservation.
Step 5: The user can select the desired rental option and provide the necessary personal information to complete the rental reservation.

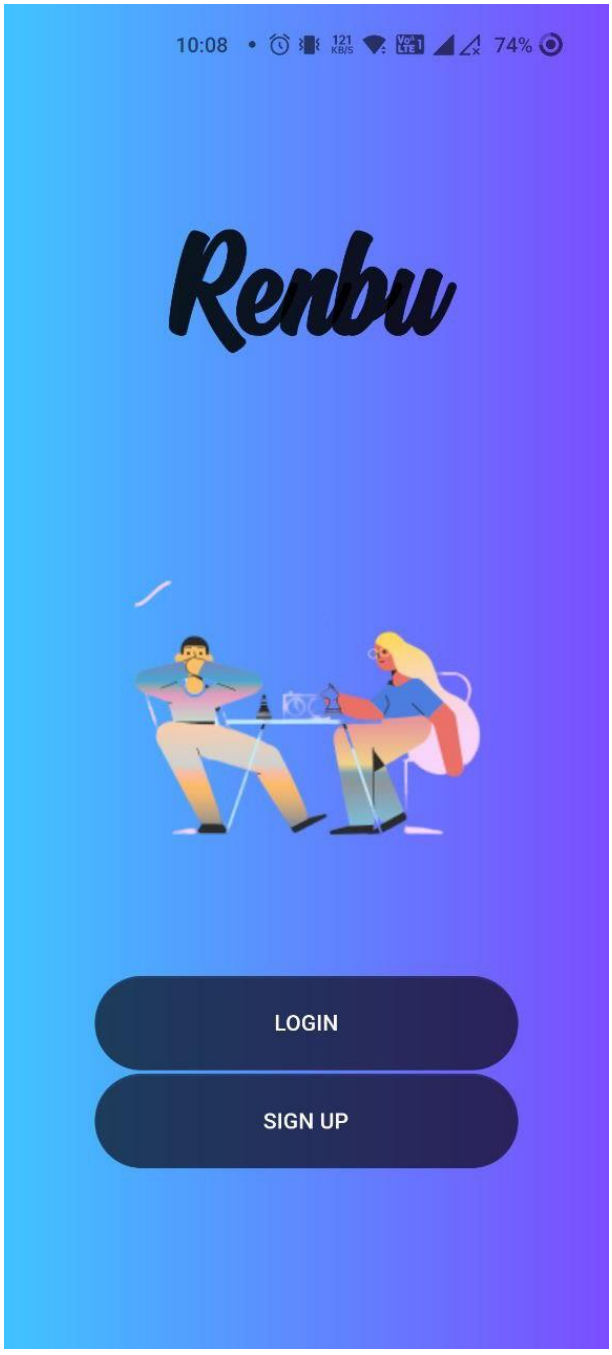
// After making the rental reservation, confirm the booking details with the user.
Step 6: Confirm the booking details with the user, such as the rental option, pick-up and drop-off dates, location, and any additional fees or discounts.

// The user can now proceed with their rental reservation, and the rental app will assist with any further questions or concerns.

INTERFACES OF APP

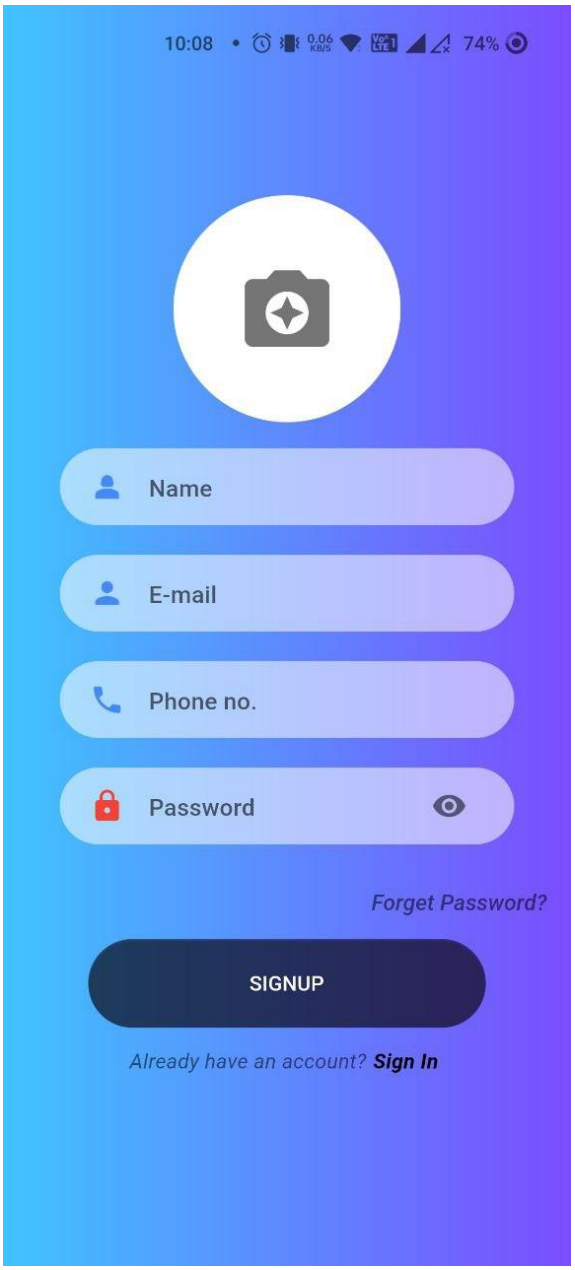
Splash Screen

A splash screen is a brief, visually engaging introduction that appears when launching a software application or mobile app. It typically features the app's logo, provides a loading indication, and creates a positive initial experience for users. The splash screen is short-lived and serves as a visual cue that the app is actively loading before transitioning to its main interface.



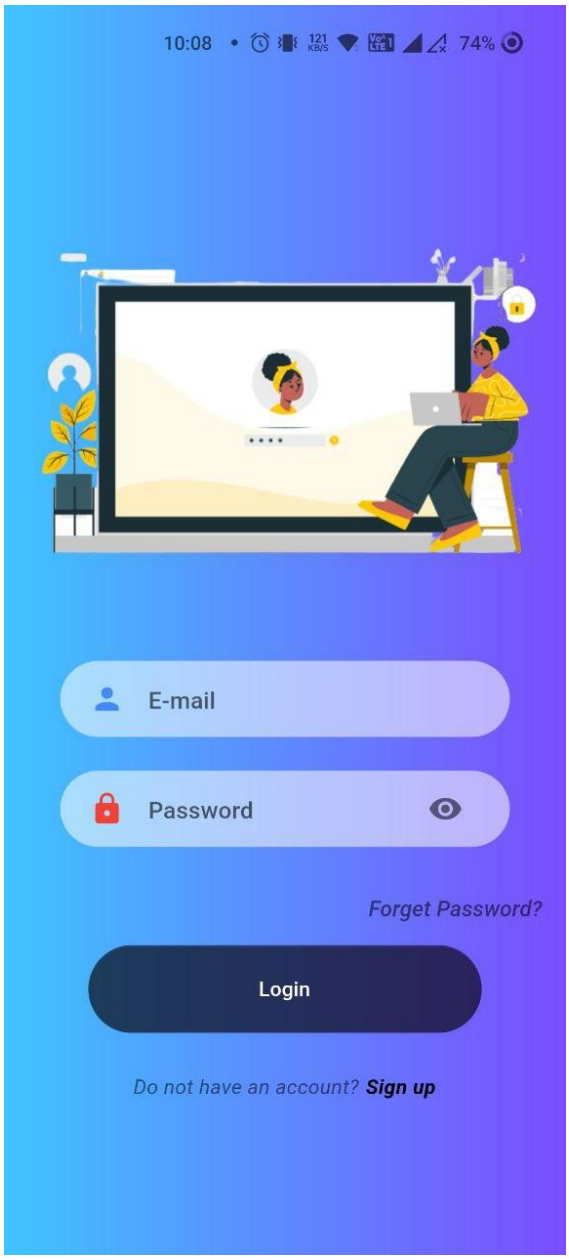
Welcome Screen

A welcome page is the initial screen users encounter when accessing a website or mobile app. It typically features a clean design with key elements such as a logo, navigation options, and a central area for login and sign-up options. The welcome page aims to provide a positive first impression, often incorporating engaging visuals, a concise tagline, and calls-to-action to encourage users to either log in or sign up. It serves as a user-friendly entry point, setting the tone for the overall user experience and guiding visitors to explore further.



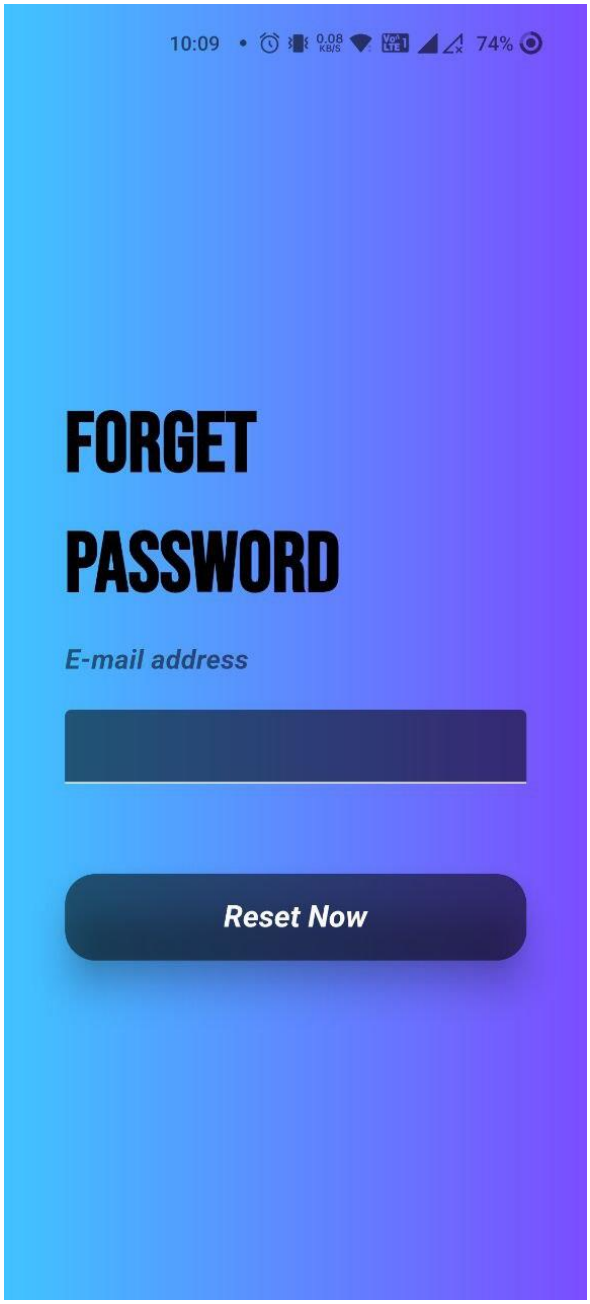
Sign In Page

A sign-in page is the entry point for users who already have an account on a website or app. It typically includes fields for entering a username or email and a password, along with a sign-in button. The page's purpose is to authenticate users and grant access to personalized content or services. Security features such as password encryption is included. The sign-in page is a fundamental element of user access control, ensuring a secure and seamless login process.



Sign Up Page

A sign-up page is a web or app screen where users provide required information to create an account. It typically includes input fields for details like username, email, and password, along with a sign-up button. The page is designed to be user-friendly, guiding individuals through the registration process and often incorporating validation checks for data accuracy. The sign-up page is a crucial component of user onboarding, enabling individuals to access personalized features and services within the platform.

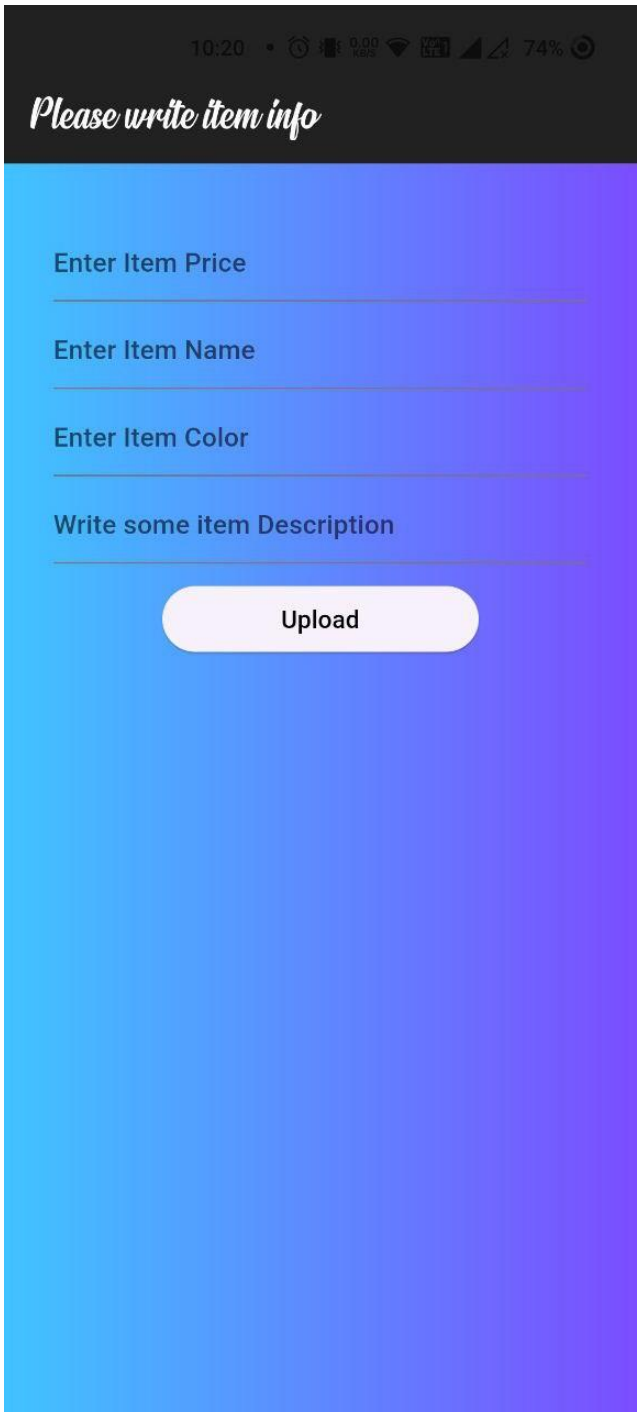


Forget Password

The "Forgot Password" feature in rental app provides users with a secure and convenient way to regain access to their accounts if they forget their password. Users can initiate the process by entering their registered email address, and the app will send them a secure link or code to reset their password, ensuring a seamless and user-friendly experience .

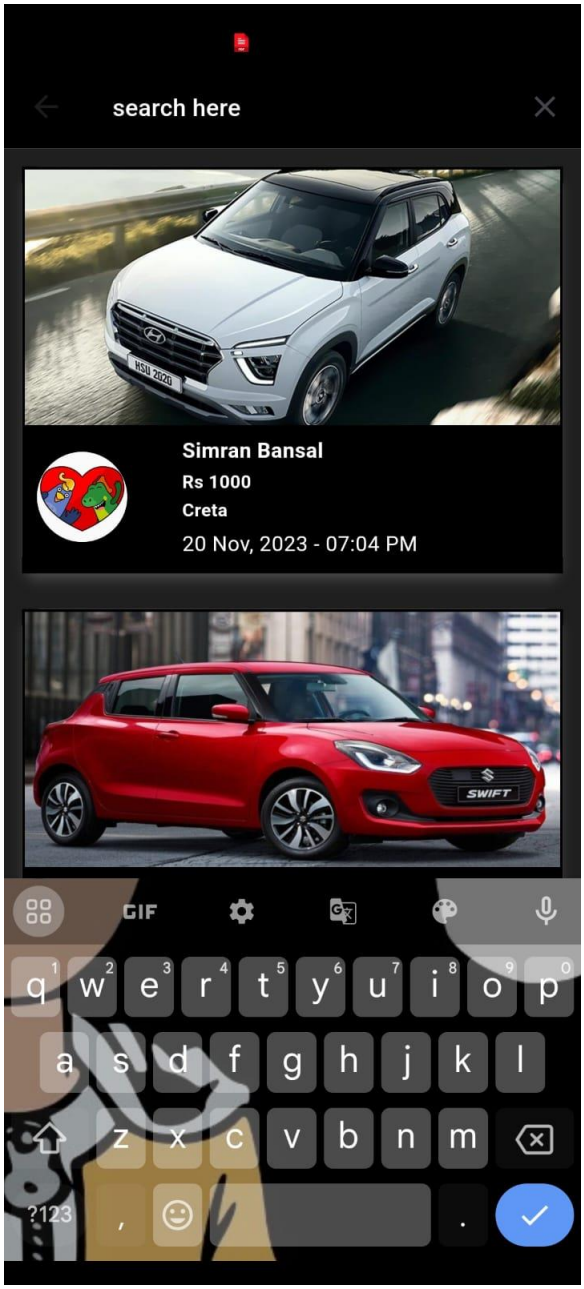
Upload Pictures to rent

The "Upload Pictures to Rent" feature in the app allows users to effortlessly add images of their rental listings. Users can enhance their listing by uploading pictures of the property or item they are offering for rent. This feature is designed to make the rental listings more visually appealing and informative for potential renters, contributing to a better overall user experience.



Item Info Page

The "Item Info" page in the app provides detailed information about a rental item or property. It includes key details such as the item's description, specifications, rental terms, and pricing. Users can easily access essential information to make informed decisions about renting the item. This page is designed for clarity and efficiency, presenting relevant details in a concise and user-friendly format to enhance the overall rental experience.



Search Bar

The search bar in your app allows users to quickly find specific items or properties by entering relevant keywords. It provides a streamlined and efficient way for users to explore and discover rental options based on their preferences, helping them locate what they need with ease.

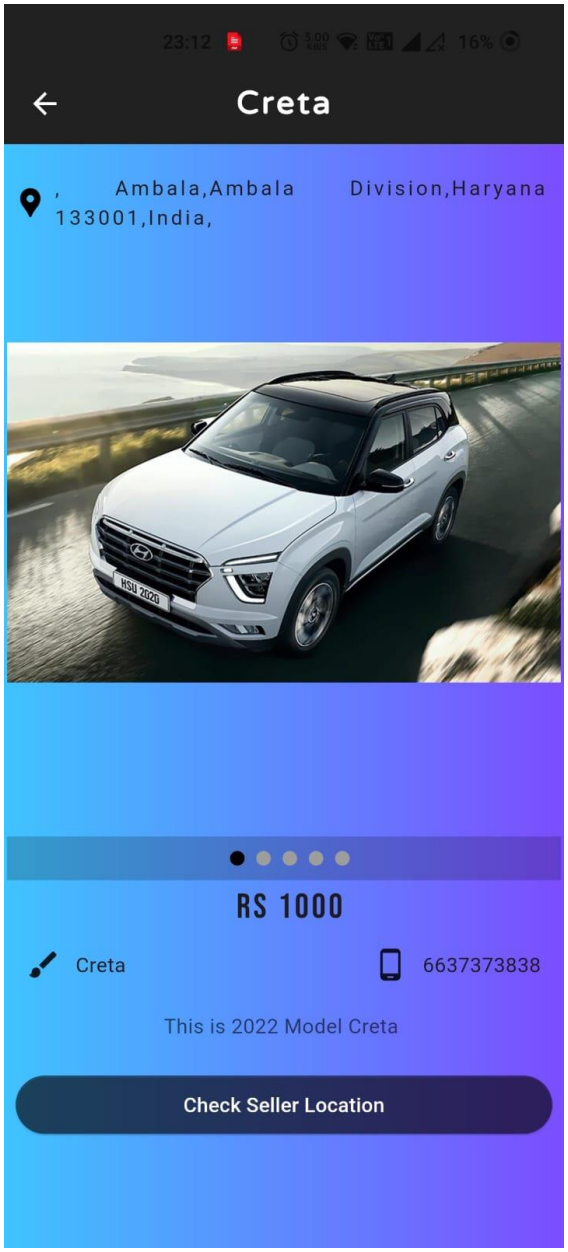
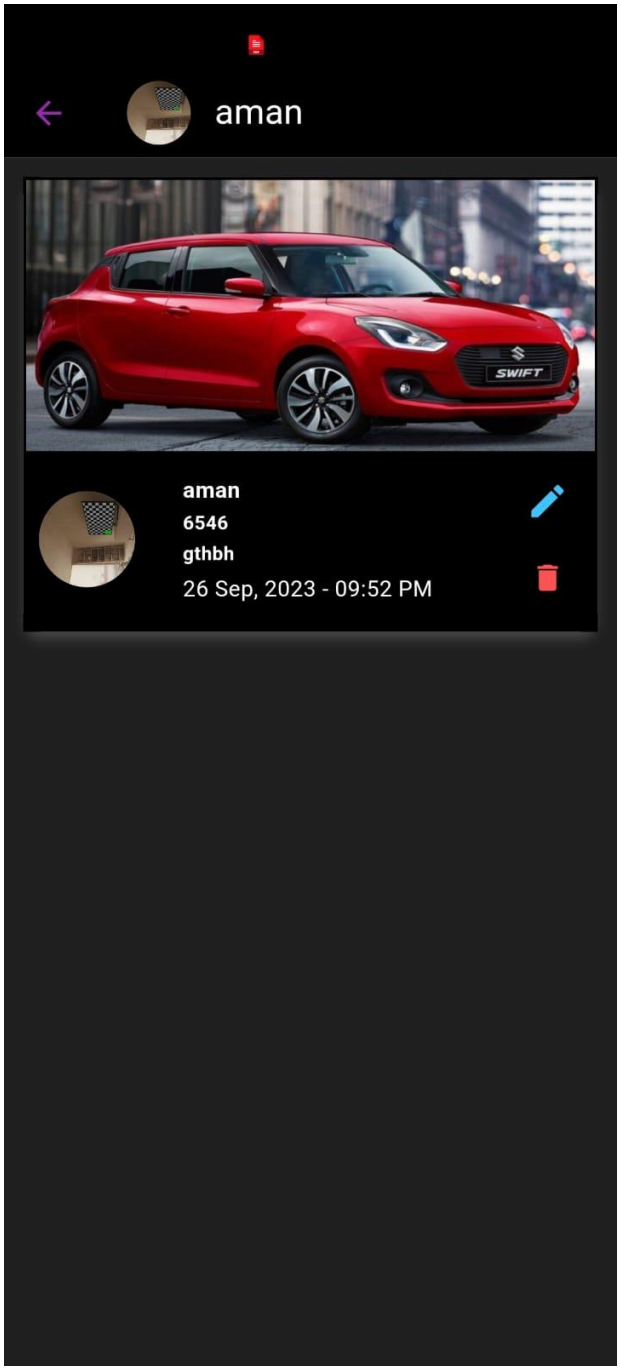


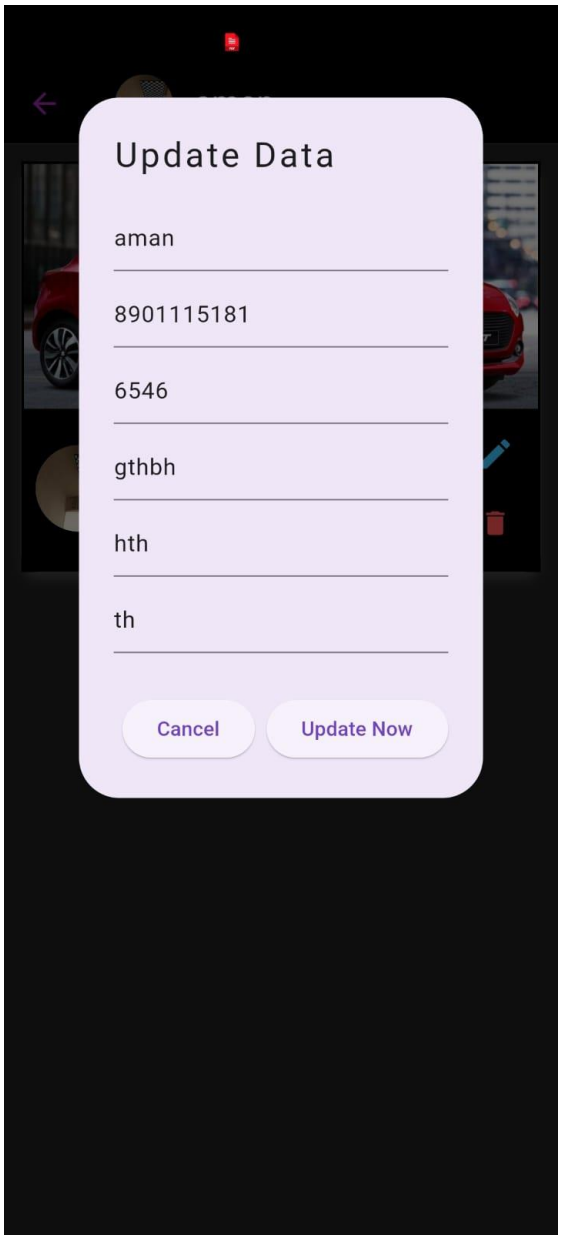
Image Slider

An image slider is a visual component in the app that displays a series of images in a dynamic, rotating manner. It enhances the user interface by showcasing multiple pictures in a single space, often used to highlight key features, promotions, or a gallery of images. The image slider adds a visually engaging element to your app, providing users with a dynamic and interactive way to view content.



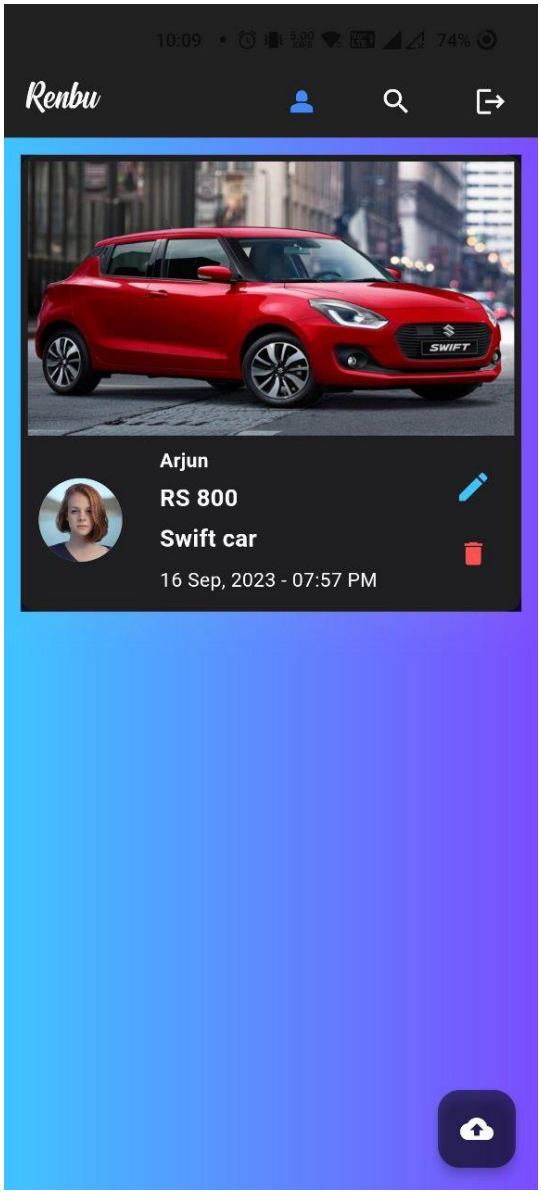
Profile Screen

The profile screen in your app is the user's personal space, displaying information such as their username, profile picture, and any additional details they've provided. Users can typically edit their profile information, view their rental history, and manage account settings. This screen serves as a centralized hub for users to customize and review their app-related information, enhancing the overall user experience.



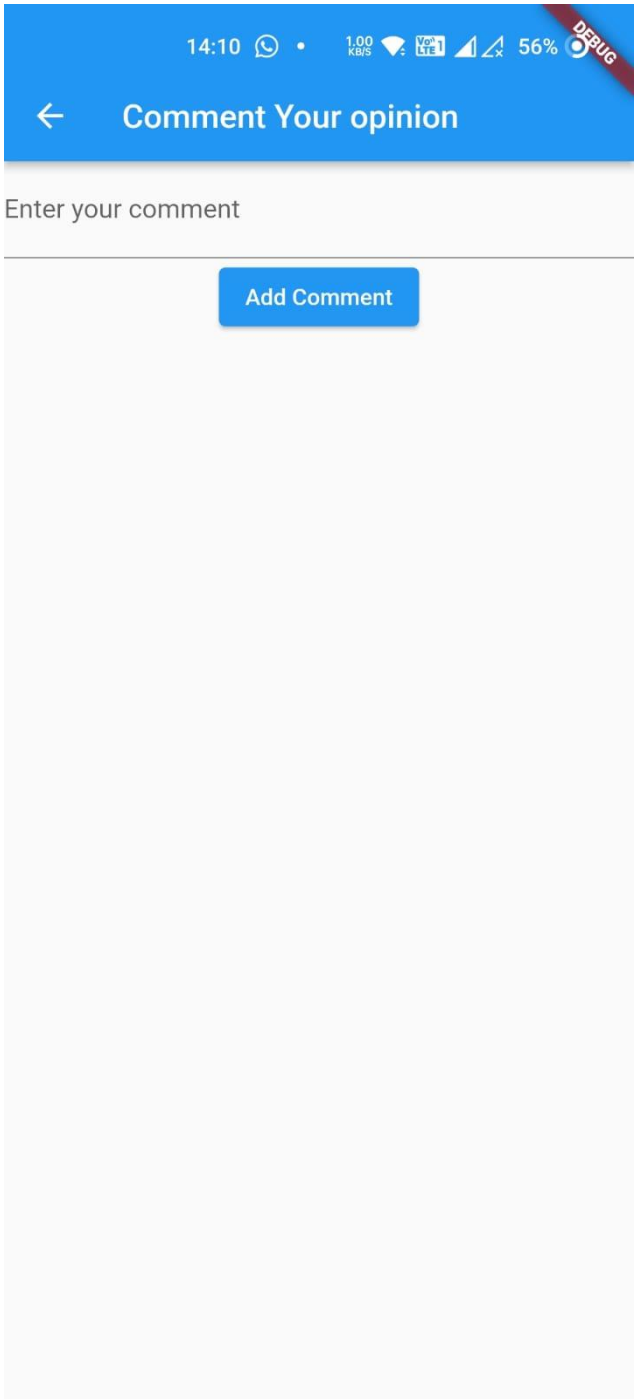
Update data

Update Data refers to the process of modifying or refreshing information in a system or database. In the context of your rental app, updating data could involve users making changes to their profiles, modifying rental listings, or editing any relevant information within the application. This feature ensures that the app's data remains accurate and reflects the latest user preferences, listings, or other



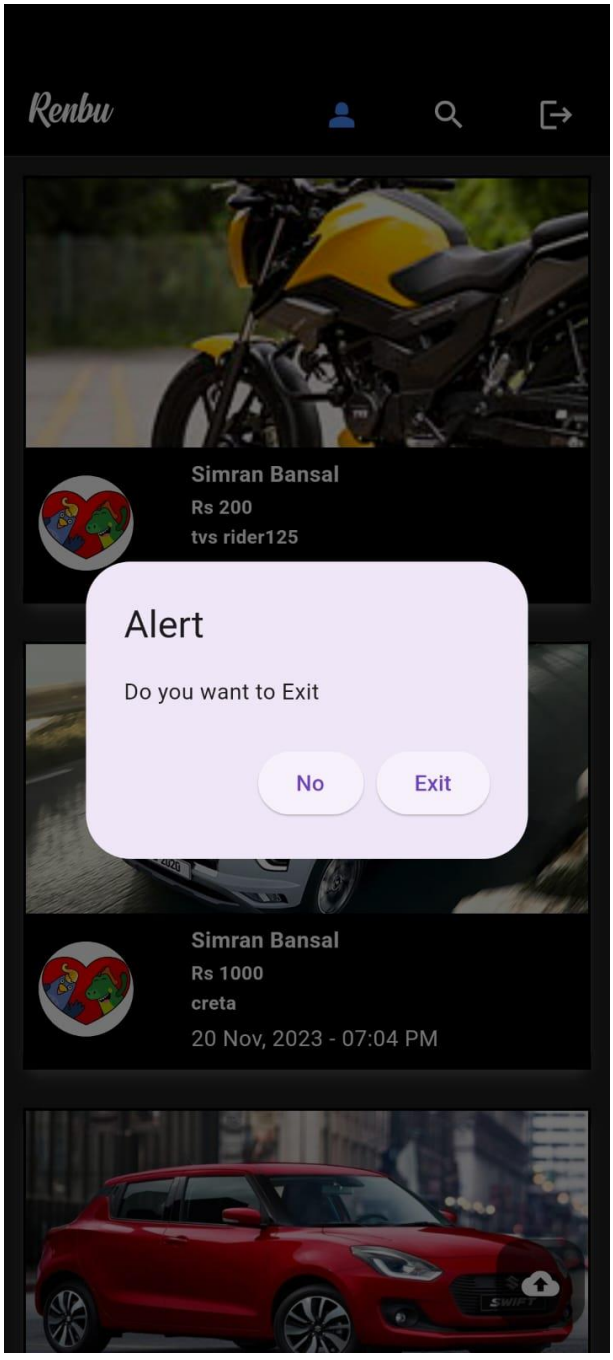
Home Screen

The home screen of your app is the primary interface users encounter upon launching the application. It serves as the central hub where users can access key features and navigate to various sections. Typically, the home screen includes elements such as a search bar, featured or recommended listings, and quick links to essential functionalities like profile, search, and categories. The design aims to provide an intuitive and engaging user experience, offering a snapshot of the app's offerings and encouraging users to explore further.



Comment Section

A "comment section" is an interactive space on websites or apps where users can share opinions, provide feedback, and engage in discussions related to specific content. It fosters community building, user-generated content, and enhances engagement, though challenges like moderation and spam management may arise.



Alert Boxes

An "alert box" is a pop-up window in a user interface that delivers important information or prompts the user for action. It typically contains a brief message and may include buttons for the user to respond, such as "OK" or "Cancel." Alert boxes are commonly used to convey critical messages, confirmations, or warnings in a concise and attention-grabbing manner.

Test Plan

1. Functional Tests:

- **User Registration and Login:**
    1. Verify that users can successfully register with valid information.
    2. Ensure users can log in with correct credentials.

- **Listing Management:**
    1. Test the creation of new listings with various types of products.
    2. Verify that users can update listing details.
    3. Confirm users can successfully delete their listings.

- **Search and Browse:**
    1. Test search functionality with various queries.
    2. Verify that search results display relevant listings.
    3. Confirm users can browse through listings by category.

2. Performance Tests:

- **Listing Load Time:**
  Measure the time it takes to load listings under different scenarios (low and high traffic).

- **Search Response Time:**
  Test the response time for search queries with various loads.

3. Stress Tests:

- **Listing Management Stress Test:**
  Simulate a high volume of concurrent users creating, updating, and deleting listings.
- **Search and Browse Stress Test:**
  Simulate heavy search traffic to assess the system's response under high load.

4. Security Tests:

- **Authentication Security:**
  Test the robustness of the login system against common security threats (e.g., brute force attacks).
- **Data Encryption:**
  Verify that sensitive user data, including passwords, is properly encrypted.

5. Compatibility Tests:

- **Browser Compatibility:**
  Test the application on different web browsers to ensure consistent functionality.
- **Device Compatibility:**
  Verify that the app works seamlessly on various devices (iOS and Android).

Test Cases

Test Case ID	Test Case Description	Expected Result	Actual Result	Pass/Fail
TC001	User registration with valid credentials	User is registered successfully	As Expected	Pass
TC002	User login with correct username and password	User is logged in successfully	As Expected	Pass

Test Case ID	Test Case Description	Expected Result	Actual Result	Pass/Fail
TC003	Car owner creates a new car listing	Car listing is created successfully	As Expected	Pass
TC004	Renter searches for available cars	Relevant car listings are displayed	As Expected	Pass
TC005	Renter books a car for a specific date	Booking is confirmed, and owner is notified	As Expected	Pass
TC006	Messaging between car owner and renter	Messages are sent and received successfully	As Expected	Pass
TC007	Update data	Data is updated	As Expected	Pass
TC009	Car owner edits an existing car listing	Changes are saved successfully	As Expected	Pass
TC010	Renter filters car search results by location	Only cars in the specified location are displayed	As Expected	Pass
TC011	Renter filters car search results by type	Only cars of the selected type are displayed	As Expected	Pass
TC012	Car owner receives booking request notification	Notification is received promptly	As Expected	Pass
TC014	User resets password through the "Forget Password"	Password is successfully reset	As Expected	Pass
TC015	User logs out of the application	User is logged out successfully	As Expected	Pass
TC016	Car owner deletes an existing car listing	Listing is removed successfully	As Expected	Pass
TC018	Car owner responds to a booking request	Renter is notified of the response	As Expected	Pass
TC020	User attempts to register with an existing email	App prompts user that email is already in use	As Expected	Pass

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Test Plan

Test Phase	Description	Test Cases	Expected Completion Date	Assigned To
Unit Testing	Testing individual components and functions	TC009, TC015, TC018, TC023, TC027	11/24/2023	Tester 1
Integration Testing	Verifying interactions between integrated components	TC012, TC016, TC021, TC024, TC028	11/24/2023	Tester 1
System Testing	Testing the complete system end-to-end	TC017, TC019, TC025, TC029, TC030	11/24/2023	Tester 1
User Acceptance Test	Ensuring the app meets user expectations	Select a subset of representative test cases from above	11/24/2023	End Use

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B ug Report

Bug ID	Description	Severity	Status	Reported By	Date Reported	Assigned To	Date Assigned	Date Resolved
B001	User unable to log in with correct credentials	High	Open	Tester 1	10/10/2023	Developer 1	1/11/2023	1/11/2023
B002	Car listing does not display after creation	Medium	In Progress	Tester 2	14/10/2023	Developer 1	7/11/2023	4/11/2023
B003	Booking confirmation message not sent	High	Closed	Tester 3	17/10/2023	Developer 1	9/11/2023	4/11/2023
B004	Car availability calendar not updating	Medium	In Progress	Tester 1	18/10/2023	Developer 1	10/11/2023	4/11/2023
B005	User receives multiple notifications for a booking	High	Open	Tester 3	20/10/2023	Developer 1	15/11/2023	9/11/2023
B006	Images not displaying correctly in car listing	Low	Closed	Tester 2	22/10/2023	Developer 1	18/11/2023	9/11/2023
B007	Inconsistent application behaviour during weak password registration	Medium	Open	Tester 1	25/10/2023	Developer 1	19/11/2023	18/11/2023
B008	Feedback without a rating not properly recorded	Low	In Progress	Tester 3	29/10/2023	Developer 1	22/11/2023	18/11/2023

Implementation / Conversion Plan

1. Rollout Phases:

- **Phase 1 - Internal Testing:**
  - Conduct rigorous testing with a closed group of internal users.
  - Identify and address any critical issues or bugs.

- **Phase 2 - Beta Release:**
  - Release the app to a limited group of external users.
  - Gather feedback on user experience and identify areas for improvement.

- **Phase 3 - Full Deployment:**
  Roll out the app to the entire user base.

Project Legacy

a. Current Status of Project

The current status of the rental app project is at the final stages of development, with successful completion of major functionalities. Key achievements include:

- **User Authentication and Profiles:**
  Implementation of secure user authentication and user profiles.
- **Listing Management:**
  Users can create, update, and delete listings for properties and items.
- **Performance Optimization:**
  Ongoing optimization is required to ensure the app's responsiveness and scalability, especially as the user base expands.
- **Security Measures:**
  Continuous monitoring and reinforcement of security measures to safeguard user data.

b. Remaining Areas of Concern

Despite the progress, there are a few areas of concern that need attention:

User Feedback Integration:

Enhancing the system based on user feedback and addressing any additional features or improvements suggested by the user community.

Messaging System:

Test sending and receiving messages between buyers and sellers. Verify the real-time nature of the messaging system.

c. Technical and Managerial Lessons Learned

Technical Lessons:

1. **Scalability is Crucial:**
   The importance of designing a scalable architecture to accommodate a growing user base without compromising performance.
2. **Continuous Testing is Key:**
   The significance of continuous testing throughout development to identify and resolve issues early in the process.
3. **User Experience Matters:**
   Prioritizing a user-friendly interface and intuitive design to enhance user experience and engagement.

d. Future Recommendations

Looking forward, several recommendations are proposed for the future development and enhancement of the rental app:

1. **Feature Expansion:**
   Explore opportunities for additional features such as real-time notifications, advanced search filters, and integration with third-party services.
2. **Marketing and Community Building:**
   Implement marketing strategies to increase user adoption and build a strong community around the app.
3. **Data Analytics and Insights:**
   Integrate analytics tools to gather insights into user behavior, enabling data-driven decision-making for future updates.
4. **AI and Predictive Features:**

Consider implementing AI-driven features for personalized recommendations and predictive analysis to enhance the overall user experience.

5. **Internationalization:**
   Plan for international expansion by accommodating different languages, currencies, and regional preferences.
6. **Sustainability Initiatives:**
   Explore opportunities for sustainability initiatives, such as partnerships with eco-friendly services or features that promote responsible consumption.
7. **Regular Security Audits:**
   Conduct regular security audits to identify and address potential vulnerabilities in the system.

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