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RENT-A-CAR

By

Narsimha Reddy Koripelli

B.TECH., JNTUH University, 2019

GRADUATE CAPSTONE SEMINAR PROJECT

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For the Degree of Master of Science,

With a Major in Computer Science

Governors State University
University Park, IL 60484

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Abstract

In today's world of the fastest means of communication, one can reach one’s destination quite easily. However, the challenge is getting last-mile connectivity when traveling locally. Uber and local transport are there, but it takes time. In such a scenario, one will surely miss the car. A simple solution for these challenges is a car rental service.

Easy Rides is a website that will help rent a car with a click. Here users are allowed to rent a car for the day or by the hour as per their requirements. This website also has a hosting functionality where users can host their cars. To do so, they must enroll their car in the car rent list and earn regular income.

There are three users on the website.

- Renter – Navigate to choose the car of their choice and book it by making an advance rental payment.
- Owner – They can list their car in the marketplace, view the booking details, and post rental ratings
- Admin - must keep track of all users, including the Renter, Owner, The listed cars, and their bookings.

After signing into the website, the user will land on the homepage. The homepage is made very interactive and user-friendly. In the homepage's navigation menu, users can select various sections that will direct them to the different pages having unique functionality.

The purpose of the Easy Rides service is to make last connectivity easy and economical. To develop the website, we use HTML, CSS, Bootstrap, jQuery, and JavaScript for the front end. We use Java, Hibernate, and Rest APIs for the backend. Moreover, for storing data, we are using the MySQL database.

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1. Project Description

Today getting last-mile connectivity of one's free will is a big issue. Also, the cost of ownership of a car has gone up very significantly. To solve this problem, we developed the Easy Rides application. Our platform allows car owners to list their cars for rent and earn extra income. It helps users search for and book cars for some time per their requirements from anywhere in the world. Based on the car selected and the booking period, the rent will be calculated, and the Customer can make the payment online. The application has a very simplistic and user-friendly design. This application effectively and efficiently automates manual procedures [4].

1.1 Competitive Information

Easy Rides application has a significant advantage for its users. This web application platform can be used by people anywhere using internet connectivity. This portal is developed as a web-based system to make its services and accessibility more popular. The booking history feature helps the users keep track of their bookings, and car owners also help track the revenue earned. The rentals can be booked for a short period for a few days or a week. The fleets of rental cars can be structured in many ways. They can be owned outright by the car owner, leased, or under a guaranteed buy-back program arranged directly through a manufacturer [6].

1.2 Relationship to Other websites/Projects

Easy Rides has the edge over its competitors by being fully automated, from selecting a car to booking it by making the payment. Also, a wide variety of cars on our platform gives customers many options. Our platform has an edge for car owners as well. They can be assured of the safety of their vehicle as our entire fleet is monitored via GPS tracking.

1.3 Assumptions and Dependencies

While developing this project, we had an assumption that the users (Car owners can customers) have a basic understanding of computer handling and they know how to use websites. For the Admin profile, the user should be acquainted with the workflow for Car Owner and Customer pages along with Admin-related activities. In case of replacements, the new person joining the role will be given proper transfer of knowledge sessions.

1.4 Future Enhancements

In future releases, we intend to introduce premium accounts for Customers and Car owners. In the Premium services, Customer members can view their drivability score, which will be calculated based on their driving via an AI program. Feedback will also be provided on how to improve the score. The Car Owner will be able to view the drivability score of the user booking the car and will have the option to decline the booking if unsatisfied with the scores. We will also develop a mobile application for this website, adding all the current features available in the web portal.

1.5 Definitions and Acronyms

- **HTML** (Hyper Text Markup Language) –. It is a markup language that is used to make web pages. In simple terms, HTML defines the structure of a web page and tells the browser how to show the contents.
- **CSS** (Cascading Style Sheets) – It is a design language. It narrates documents written in markup languages like HTML.
- **React JS** – It is an open-source frontend JavaScript library for developing creative and interactive UIs. It is available for free.

- **jQuery** – It is a JavaScript Library that is used to program via JavaScript.
- **CRUD** (Create, Read, Update, and Delete) – Basic CRUD activities are required in any website with a user management system. These activities are used for Database and RESTful APIs.
- **JDBC –** Java database connectivity.
- **JPA** – Java Persistence API.
- **Spring Boot** – Spring Boot is a microservice development framework.
- **Bootstrap** – Bootstrap is a framework used for styling the html template.

2. Project Technical Description

To do this project, we used the below tools:

- **Operating System** – Microsoft Windows 10
- **Database** – MYSQL Workbench
- **UI/Front End** – HTML, CSS, React JS
- **Backend** – Eclipse IDE for Java
- **Local Host Server** – Apache/Tomcat Server
- **Browser** – Google Chrome, Microsoft Edge
- **Documentation** – Microsoft Word and Microsoft Excel.

2.1. Application Architecture

- **Admin** – This user will be from Easy Rides. This user will be supreme among all the users in terms of access. The features available to the Car owners and Customers will also be available, like Add Cars, List of Car Owners, and List of Customers.
- **Car Owner** – The users in this profile can list their cars for rent. They can also view their booking history.
- **Customer** – The users in this profile can book the car for rental purposes. They can search for a car per their filter criteria and view their booking history.

All the login profiles have a few pages in common with them, like the Contact Us, Blogs, About Us, and FAQ pages.

- **Architecture Diagram**

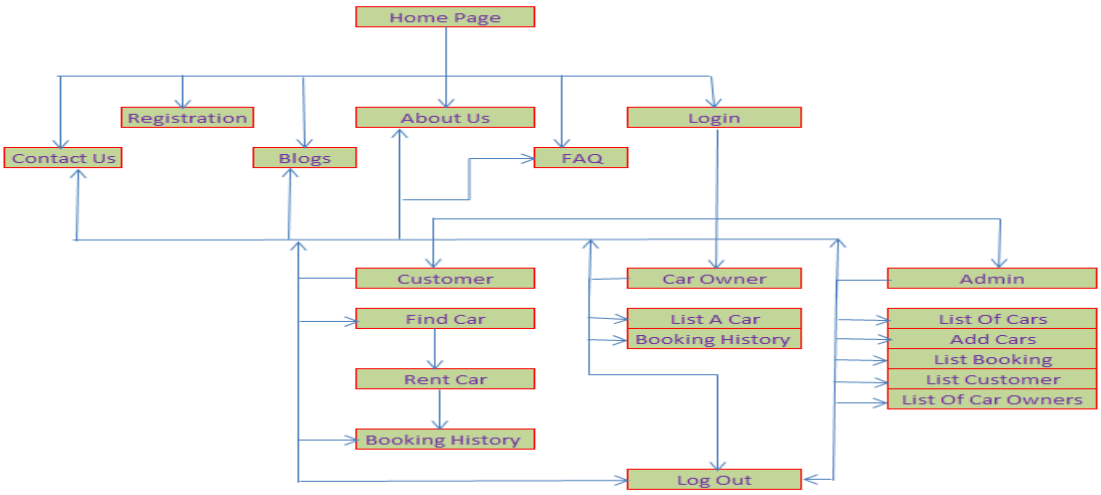

Figure 1 – Architecture Diagram

2.2 Application Information Flow

This application is a blend of three roles altogether. The car owner will be able to list the car for rental purposes via the car list page, while the Customer can book cars available for listing per the requirements. The Customer will explore the available car via the search option available on the Home Page, and once finalized; they can make the payment to book the car. The admin is the super user among all the roles.

2.3 Interaction with other Applications

Easy Rides web application displays the availability of cars to its audiences. We have added a Blog page where the car owner or Customer can share their travel experiences which will be helpful to others to prepare themselves. There is also an FAQ page, which helps the visitors to the portal to have answers to their basic questions.

2.4 Capabilities

- **User-Friendly Interface** – We have developed a straightforward but highly user-friendly UI for our users, irrespective of their roles.
- **Easy Onboarding Process** – We will have minimalist steps to finish the users' boarding process (Car Owner and Customer).
- **Better Search Results** – We have a diligent search that will fetch results based on the time and dates of the search and would suggest a better vehicle as per the availability.
- **Alerts** – Emails will be triggered to the customers based on their saved searches and bookings.
- **Variety of Cars** – We have a good fleet size of cars available for the customers.
- **Car Rent Feature** – The feature for Car Owner to rent their cars is an added advantage for people to earn some extra income from their cars parked idle in their parking.

2.5 Risk Assessment and Management

Appropriate risk assessment and management plans are in place.

- We have spent ample time in QA testing to identify all possible issues and bugs.
- We have added all viable sample scenarios during our testing.
- We have a 24*7 Admin available to handle any emergency.
- We have placed backup servers up 24*7, and the backups are created every 2 minutes at intervals.

3. Project Requirements

3.1 Identification of Requirements

<Easy_Rides_2022-1 Design-Capability – 000101>

The Page design should be user-friendly and responsive and should integrate with any devices it is being accessed from either be it a laptop, desktop, mobile, or tablet

<Easy_Rides_2022-1 Search-Capability – 000102>

The Customer search results should be fast based on the filters selected, and all possible car varieties should be displayed.

<Easy_Rides_2022-1 Registration-Capability – 000103>

The Customer and Car Owners should have convenient registration experience to perform the desired bookings/listings on the portal.

3.2 Operations, Administration, Maintenance and Provisioning (OAM&P)

All visitors to Easy Rides can view the available cars for rent on the Car Listing Page. They can search for the car as per their requirement from the search option available on the Home Page, and once they decide on the car and the time of requirement, they can make the payment and book the car. Similarly, we have the Car Owners page, which can be used to list the car for rental purposes. The Car owner, as per wish, can list and delist the car for rental purposes, and based on the hour of booking, the rent will be credited to the owners. The Admin can view all this information from the Admin login. All the data related to booking history and rentals are stored under the Customer or Car Owner profiles and in the database under specified tables. Regular backups are created to safeguard the website from any data losses.

3.3 Security and Fraud Prevention

The Security and Fraud prevention planning consists of the below steps.

- We use fully encrypted data transfer between the web server and the web browser.
- We have placed firewalls and Anti spyware/malware software on all our servers.
- We regularly monitor the website for any suspicious things.
- We regularly install the necessary security/patch updates.
- We save all the sensitive data in encrypted form on our servers with very restricted access to users [7].

3.4 Release and Transition Plan

The release and Transition Plan consists of the below steps.

- Before the release and deployment, rigorous testing is done to identify any issues or bugs that need to be fixed.
- All the codes (Frontend, Backend, and DB) are well documented.
- A project Release/Transition checklist is prepared to monitor all the knowledge transfer done efficiently.
- Obtain feedback from all the users and upgrade the website accordingly.

4. Project Design Description

In the Easy Rides project, we used Waterfall Model for our software development life cycle. We developed this project using Eclipse IDE [3] for backend development using Java as the coding language and used Visual Studio Code[1] for writing the frontend codes using React JS [5]. For database development, we used Workbench to write scripts in MySQL [2]. Our application is developed to run on all the browsers available in the market currently.

A Customer can search for the car via Find Car or search options on the Home Page. Upon success, they can view their booking history as well. To make a booking, they need to register themselves.

The Car Owner can log in and list their car on the portal for rental purposes. They also have the option to unlist the car anytime as per their wish. A car owner can also view the booking history of their car.

Admin is the supreme user among the three profiles. Apart from Customer and Car Owner access, Admin has access to extra pages like Add Cars, List of Car Owners, and List of Customers. They also need to monitor all the posts and applications for inappropriate content.

All the login profiles have a few pages in common with them, like the Contact Us, Blogs, About Us, and FAQ pages. All the users can also view testimonials written by various users.

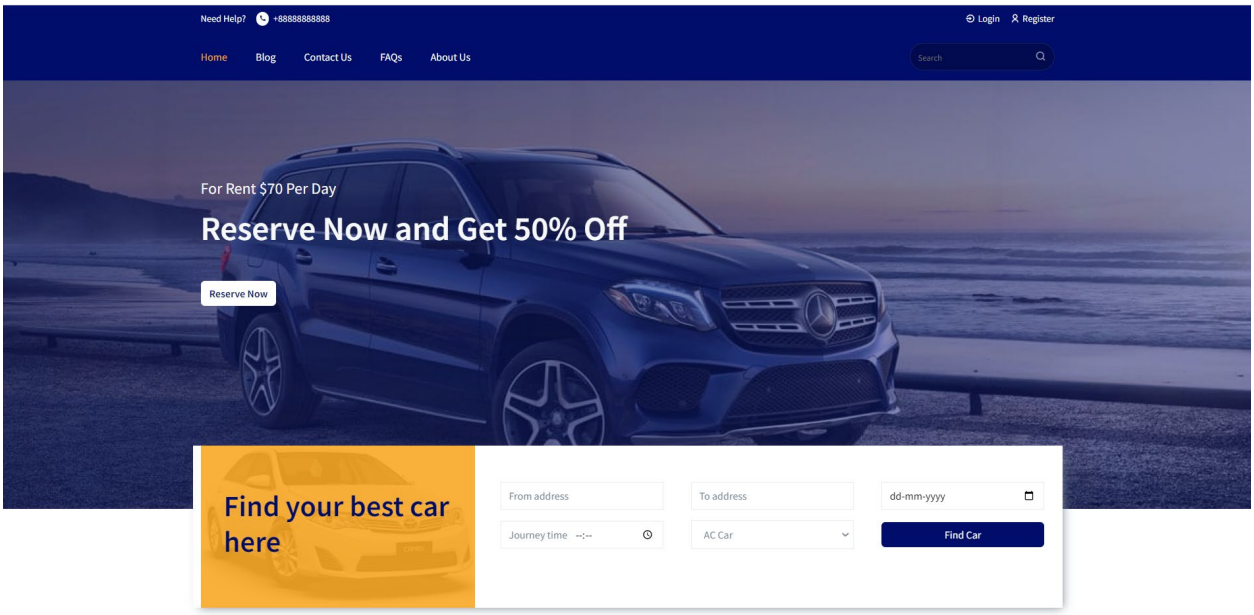

Figure 2 – Home Page

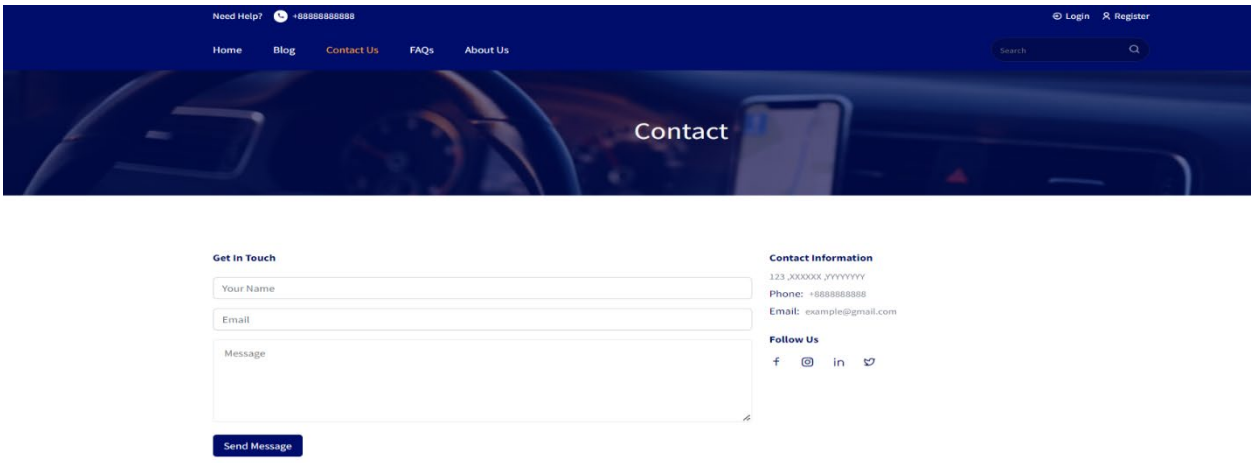

Figure 3 – Contact us Page

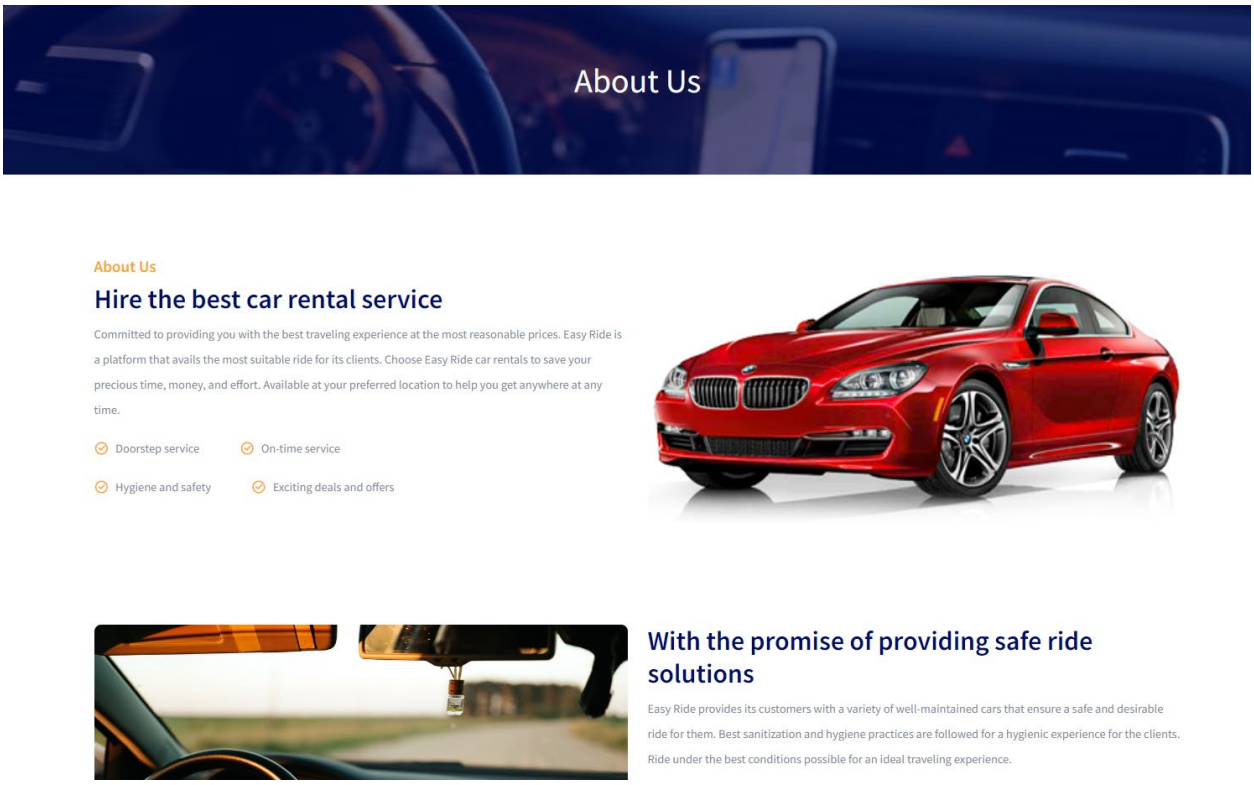

Figure 4 – About Us

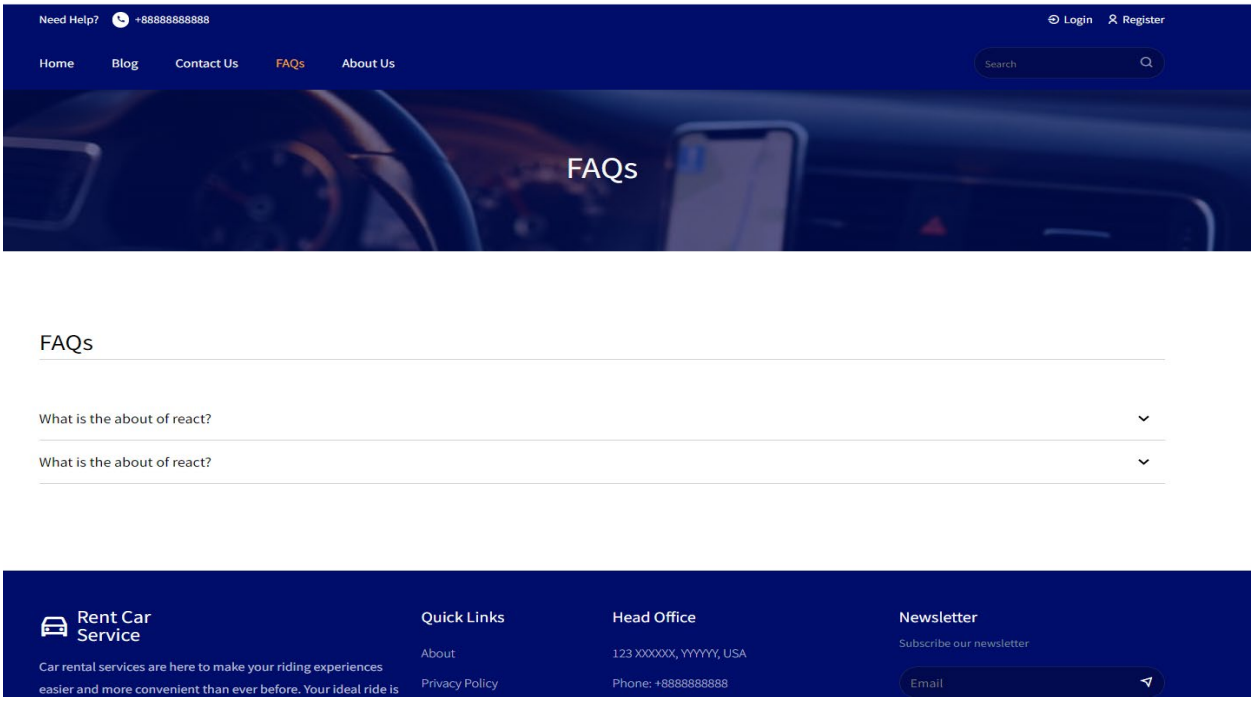

Figure 5 – FAQ Page

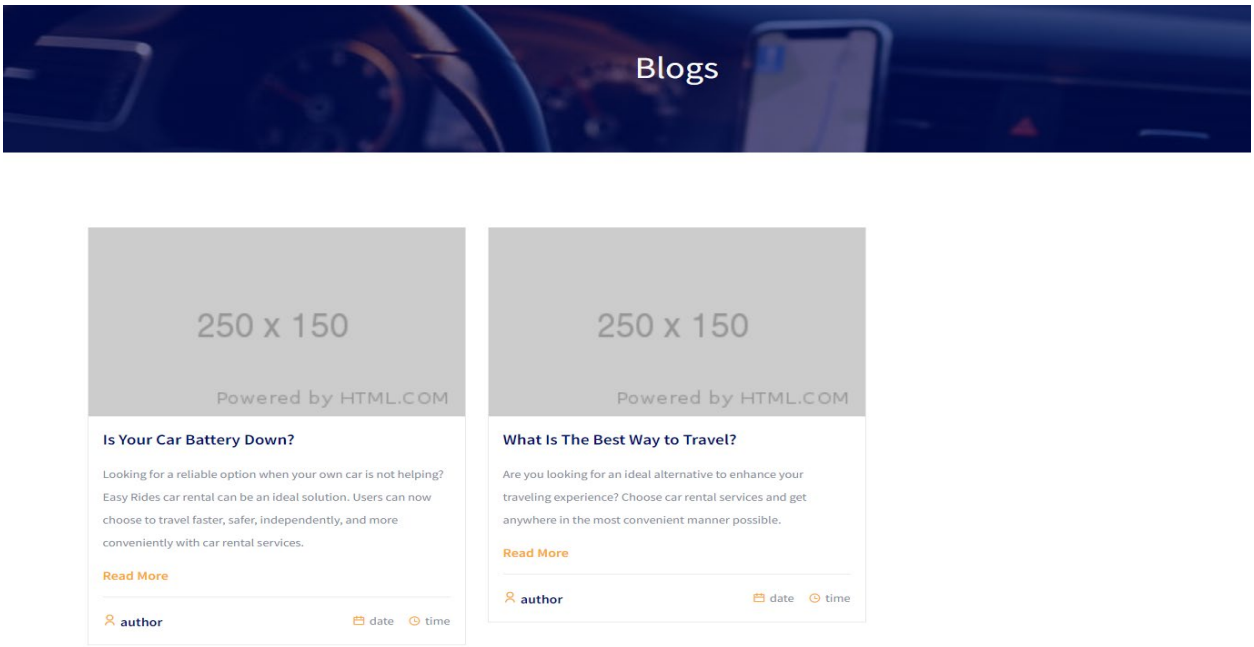

Figure 6 – Blogs Page

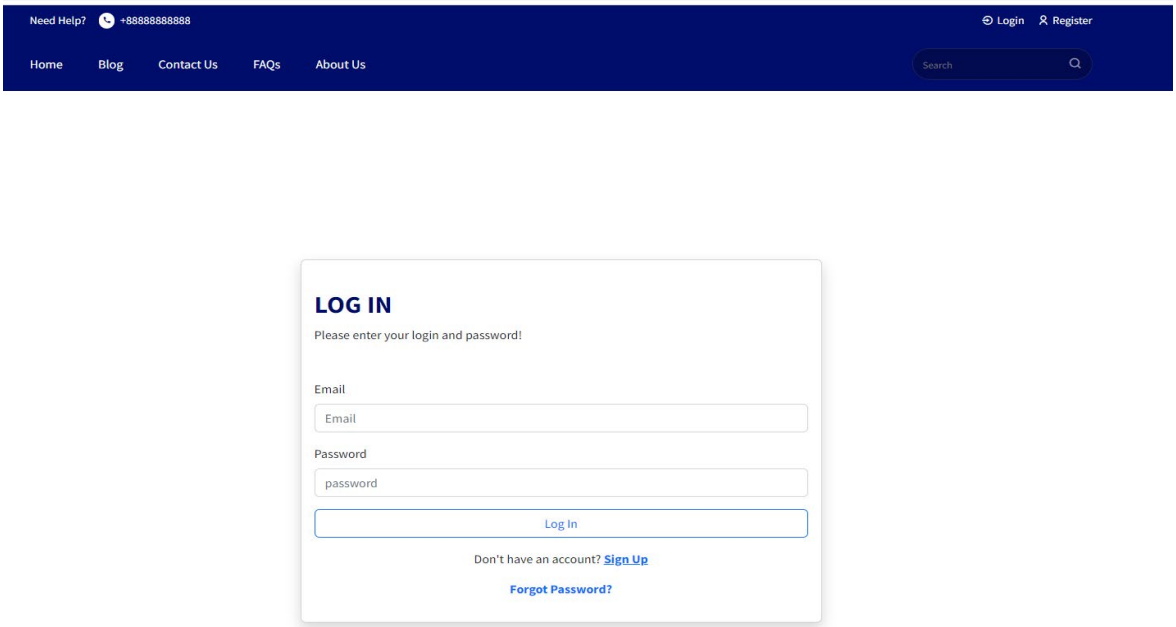

Figure 7 – Login Page

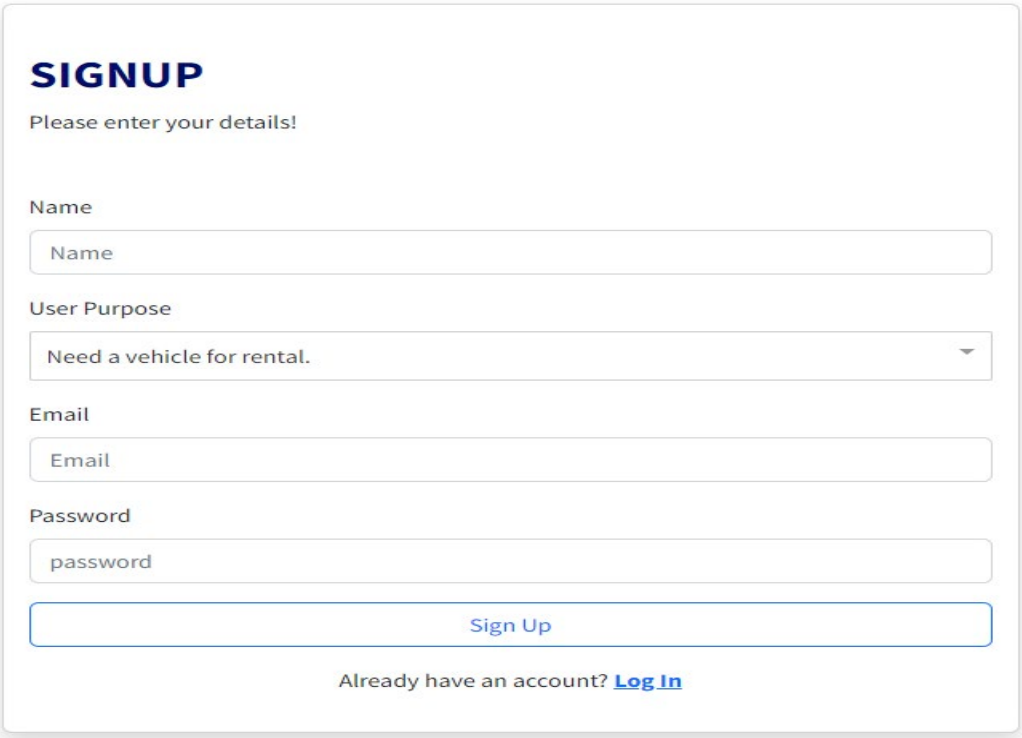

Figure 8 – Sign Up

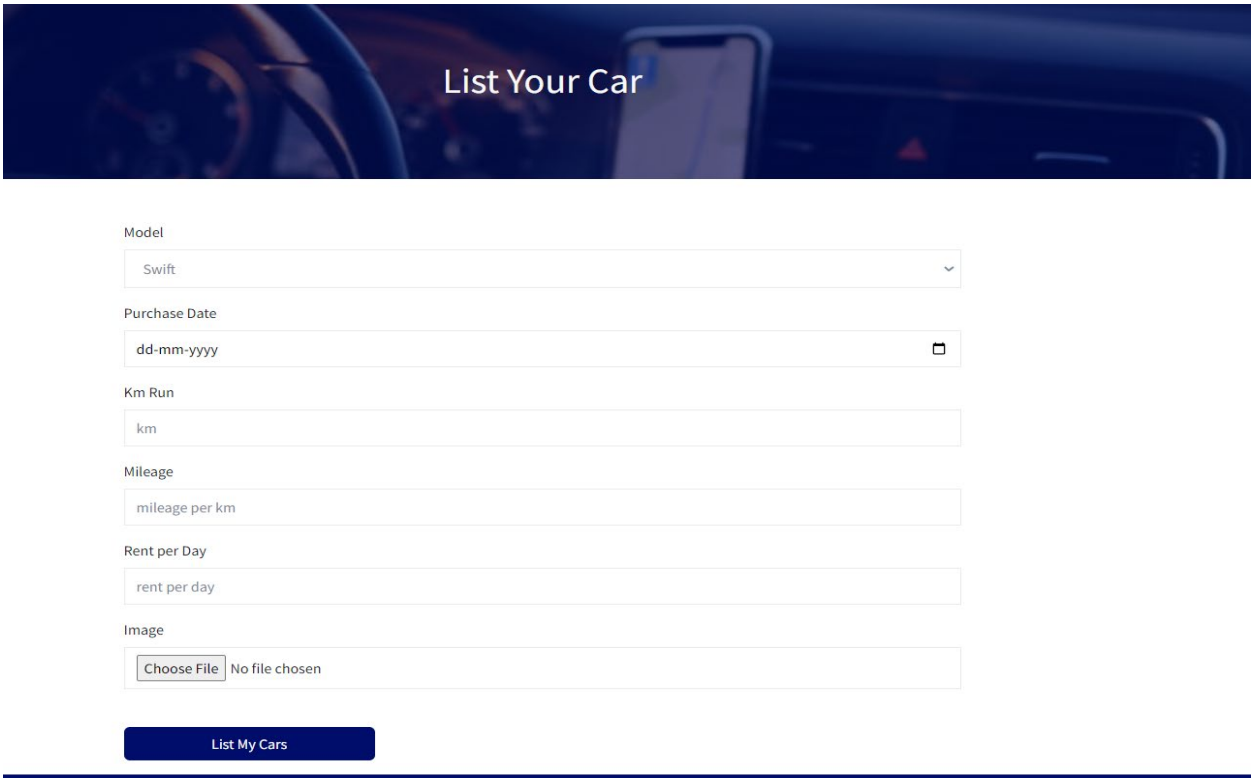

Figure 9 – Post Car Page

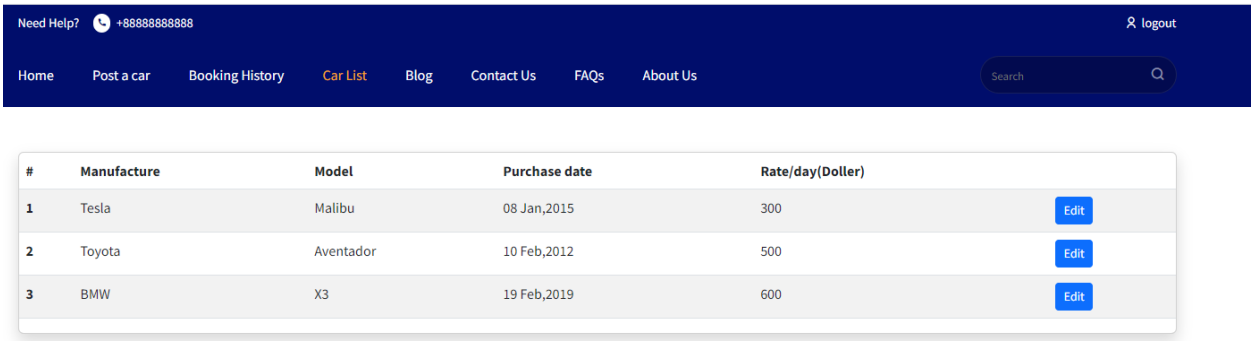

Figure 10 – Car List

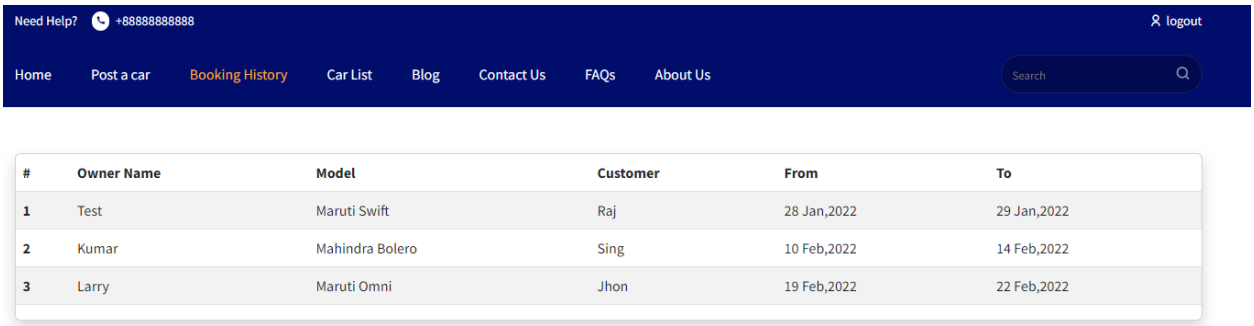

Figure 11 – Booking History

5. Internal/external Interface Impacts and Specification

The application is planned and prepared as per the identified requirement. Primary requirements about the system are required for the portal's complete fledge and continuous running. The developers were able to develop this simple yet elegant application due to their regular interaction with various users and the constant improvement made during the development process as per the feedback obtained by them.

The system's architectural design describes the structure, behavior, and additional viewpoints, along with analyses of the system. This system was developed using the three-tier architectural approach. The first tier is the interface, such as a web browser, through which the users interact with the website. The second or middle tier is the application logic that transmits data or information between the first and second levels. The third tier includes the database management system, which is responsible for storing and retrieving the data as and when needed.

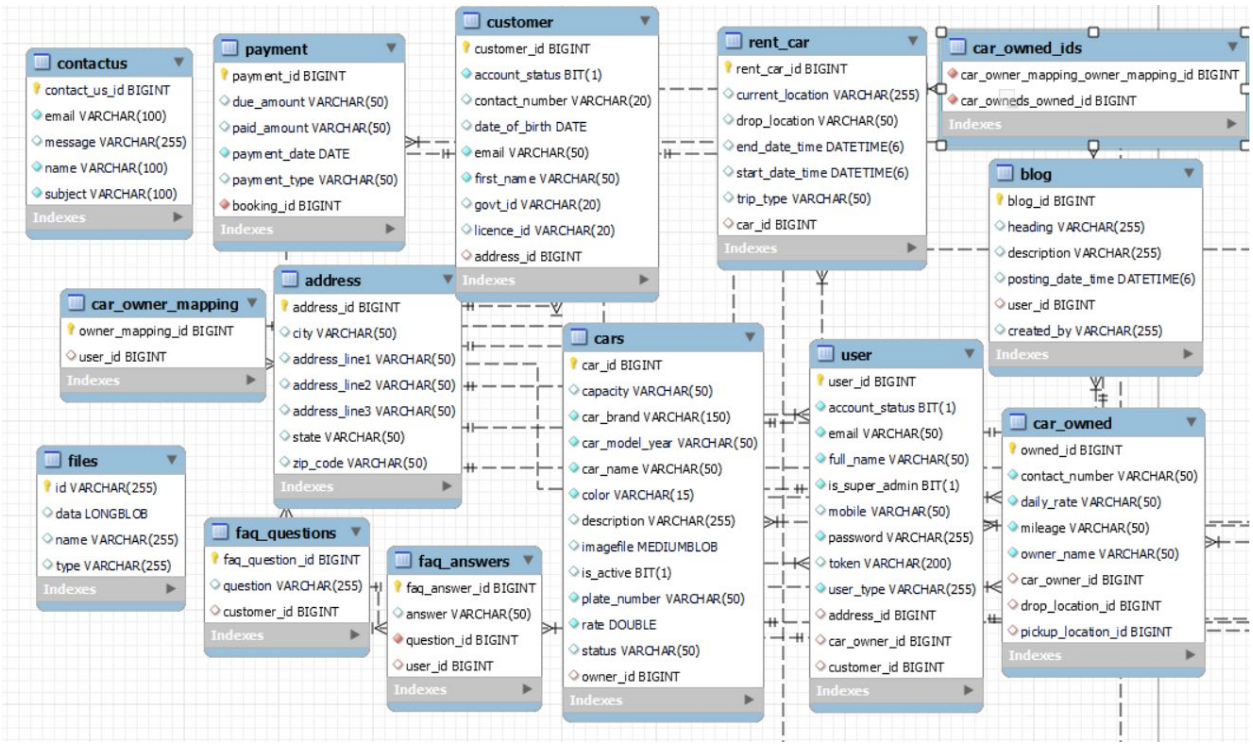

Figure 12 – EER Diagram of database

6. Design Units Impacts

6.1 Functional Area A/Design Unit A

6.1.1 Impacts

This design workflow method for the car owner, Customer, and Admin is designed to influence the operational and client requirements. Authentication and data updates, user information updates, backup, and recovery (in case of requirements) are all part of the administration process.

6.1.2 Requirements

Admin has the feature to add new models of cars on the portal. Also need to authenticate the information provided by the Car Owner or Customer. Data safety is the highest priority, and a data backup process should be implemented.

7. Acknowledgments

We express our sincere gratitude to Dr. Xin Chen Assistant Professor in department of computer science, Governors state university, for the contributions to the completion of this project. It was a great learning experience. We want to take this opportunity to express our appreciation to all the group members for their cooperation and input, without whom the project would not have been successful.

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