

Tribhuvan University Faculty of Humanities and Social Science

CAR RENTAL PORTAL A PROJECT REPORT

Submitted to Department of Computer Application Danfe College

In partial fulfillment of the requirements for the Bachelors in Computer Application

Submitted by Shova Maharjan (6-2-920-14-2019) November 2024

Under the Supervision of

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SUPERVISOR'S RECOMMENDATION

I hereby recommend that this project was prepared under my supervision by SHOVA MAHARJAN entitled "CAR RENTAL PORTAL" in partial fulfillment of the requirements for the degree of Bachelor of Computer Application is recommended for the final evaluation.

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LETTER OF APPROVAL

This is to certify that this project was prepared by SHOVA MAHARJAN entitled " **CAR RENTAL PORTAL** " in partial fulfillment of the requirements for the degree of Bachelor in Computer Application has been evaluated. In our opinion, it is satisfactory in the scope and quality as a project for the required degree.

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ABSTRACT

Car Rental Portal is a web-based application that allows customers to rent vehicles for a specified period. This system provides a convenient and flexible way for customers to reserve, select, and rent vehicles. The system includes features such as vehicle search and selection, booking management and customer service. With the car rental portal, customers can browse through a range of vehicles, select their preferred one, and make a booking. The car rental portal helps businesses to manage their vehicle inventory and track rental bookings, and customer feedback. Overall, the car rental portal provides a streamlined and efficient process for renting vehicles, saving time and effort for both customers and businesses.

Keywords: Vehicles, Website, Customers, Booking

ACKNOWLEDGEMENT

Apart from the efforts of ourselves, the success of any project depends largely on the encouragement and guidelines of many others. We take this opportunity to express our gratitude to the people who have been instrumental in the successful completion of this project. We would like to show our greatest appreciation to **Mr. Tul Bahadur Rai & Mr. Deepak Thakur**. We are thankful for their tremendous support and help. We felt motivated and encouraged every time we attended project meetings. Without their encouragement and guidance, this project would not have materialized. Theguidance and support received from all the members who contributed and who are contributing to this project, was vital for the success of the project. We are grateful for their constant support and help.

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LIST OF ABBREVIATIONS

CRP: Car Rental Portal

DFD: Data Flow Diagram

ER: Entity Relationship

FR: Functional Requirement

HTML: Hypertext Markup Language

CSS: Cascading Style Sheets

PHP: Hypertext Preprocessor

SQL: Structured Query Language

UC: Use Case

UI: User Interface

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CHAPTER 1: INTRODUCTION

1.1 Introduction

A car rental portal is a website or online platform that allows customers to rent vehicles for a specific period of time. The portal provides an easy and convenient way for customers to search and book rental cars in one place. It usually includes a search function where customers can specify dates and times, as well as their preferred vehicle type and rental options. Customers can then compare prices and availability, choose their preferred car, and complete the booking online. Additionally, the portal offers secure payment options, allowing customers to pay for their rentals in advance or at the time of pickup, depending on their preference and the policies of the rental service.

A car rental portal aims to provide a user-friendly interface where customers can view the models, descriptions, and prices of different available cars. Users have the ability to register, log in, and access their rental plans. The administrator, meanwhile, can log in to manage car listings, adjust pricing, process payments, and oversee rental operations.

Overall, a car rental portal is a convenient and efficient way for customers to find, book, and pay for rental cars, simplifying the planning of their travel and transportation needs.

1.2 Problem Statement

For those who do not have private transport, finding a transportation facility is a nightmare. On many occasions such as weddings, vacations, home moving, tours, and several other occasions, we have encountered a big problem in trying to find a suitable and readily available means of transport that will suit the occasion. Hence we have felt the need for a car rental system to solve the issue.

There exist a number of solutions to the problem of finding cars for the purpose of traveling. Other than that there are a number of car hiring companies to avail their vehicles for hire. However, what I am suggesting is different from the already existing solutions. Car rental portal will be focused on customer satisfaction. The online rental system will be developed in such a way that it allows for the customers to select the specific car they want to use, when, and for what purpose. This will allow for flexibility on both the side of the customer and that of the business owner.

1.3 Objectives

The objective of this project are:-

- To offer a hassle-free way for customers to rent cars for a specific period, allowing them to travel comfortably and efficiently without the responsibilities of ownership.
- To provide a wide selection of vehicles, ensuring easy booking and return processes, maintaining vehicle safety and cleanliness, and delivering excellent customer service to enhance the overall rental experience.

1.4 Scope and Limitation

1.4.1 Scope of System

The scope of the system is defined on the basis of various functionalities provided by the system. The scope can be explained as:-

- Users can register and they can view and change their details.
- Users can make the reservation for specific period of time.
- General users as well as the company's staff will be able to use the system effectively.
- Anyone can view the website and can book if they have an account.
- Admin can modify the details of the website including car information, etc.

1.4.2 Limitations

- In order to rent a vehicle, user must login to their own profile.
- As with all other online platform, there may be loss of data in the database due to some error.
- The system does not allow rent the same car for the same date. If such a consequence happened, the system will give error.

1.5 Development Methodology

Waterfall Model is used to develop this system. In waterfall model, each phase must be completed before next phase can begin and there is no overlapping in the phases. This means, output of previous phase works as input to another phase.

The Car Rental Portal is developed using waterfall model. The reason for choosing this approach is its simplicity. Likewise, we were accustomed with the objectives and intended course of action that were going to follow to make this project a reality. Hence, waterfall model seemed to be the best method to implement this project.

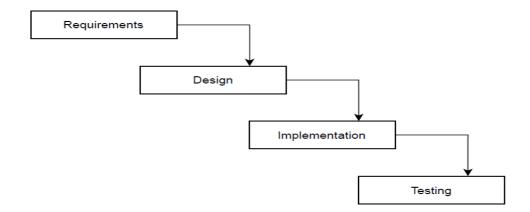


Figure 1.1 Waterfall Model of Car Rental Portal

1.6 Report Organization

Chapter 1 includes introduction of the system CAR RENTAL PORTAL with its problem of statement, objective and its scope and limitation.

Chapter 2 includes the background study of CAR RENTAL PORTAL and some literature review of other rental systems.

Chapter 3 includes the functional and non-functional requirements along with feasibility analysis and architectural design of the CAR RENTAL PORTAL.

Chapter 4 includes about the tools used in this system and the testing that are done.

Chapter 5 includes about the outcome of this system as well as the future recommendations for the CAR RENTAL PORTAL

CHAPTER 2: BACKGROUND STUDY AND LITERATURE REVIEW

2.1 Background Study

In our modern world, many people need cars for short periods, like vacations or business trips, but owning a car isn't always practical. This is where car rental services come in – they allow people to rent cars for specific durations, providing a convenient and affordable solution for their transportation needs.

Car rental services used to operate mainly through physical offices where you'd go and fill out paperwork to rent a car. But now, with the internet and smartphones, renting a car has become much easier. You can book a car online or through an app, making the whole process quicker and more accessible. A good car rental system solves many of these challenges. It helps customers easily book cars online, tracks vehicles in real-time, handles payments smoothly, and ensures clear communication between the rental agency and the customers. Moreover, it aids in managing the fleet effectively and keeping the cars safe and well-maintained. Essentially, a well-designed car rental system makes the whole process convenient and pleasant for both the rental company and the customers.

Understanding the changing needs of customers and the advancements in technology is crucial for the success of a car rental business. By creating a user-friendly, efficient car rental system, rental companies can meet these needs effectively. This background study sets the stage for developing a system that simplifies the car rental process, ensuring customer satisfaction and the growth of the business.

2.2 Literature Review

The advent of digital technologies has ushered in a transformative era for the transportation industry, bringing about significant shifts in how individuals access, utilize, and interact with vehicles. Among these advancements, car rental systems—particularly those operating through online platforms—have emerged as critical players in reshaping transportation paradigms and consumer experiences. A substantial body of literature has examined the multifaceted dimensions of these systems, providing insight into their impacts on urban mobility patterns, consumer preferences, technological progression, and the overarching dynamics of the transportation landscape.

In this evolving field, previous research by Smith highlights the growing trend among consumers to prioritize the flexibility and convenience offered by online car rental platforms, underscoring the diminishing role of traditional brick-and-mortar rental agencies. This shift has broad implications for market structures, with Johnson et al. exploring its economic effects. Their work reveals that online rental platforms not only expand the market reach for rental companies but also streamline operational costs, ultimately contributing to higher profitability and efficiency.

On the consumer behavior front, Brown and Wilson conducted a comprehensive study examining individuals' preferences and decision-making processes when choosing rental services. Their findings emphasize the importance of strategic factors such as competitive pricing, diverse vehicle options, and high-quality customer service in influencing consumer choices. Such insights underscore the critical role of effective management within online car rental platforms in meeting and adapting to customer expectations.

Moreover, research by Garcia et al. delves into the integration of mobile applications within car rental systems, emphasizing how user experience design enhances customer satisfaction. Their study demonstrates that features like intuitive interfaces, real-time booking functionalities, and easy navigation significantly contribute to higher user engagement and loyalty, thus marking a turning point in user-centered design for these platforms.

From a technological perspective, Chen et al. have explored the application of IoT devices within rental vehicles, facilitating features such as GPS tracking, remote diagnostics, and enhanced fleet management capabilities. These innovations not only improve operational efficiency but also bolster vehicle safety, addressing critical concerns around reliability and security. However, with such rapid advancements come challenges, as highlighted by Jones and Smith, who discuss the legal and regulatory obstacles faced by online car rental platforms. Issues such as insurance liabilities and compliance with local transportation laws present ongoing hurdles that require adaptive strategies and regulatory collaboration.

Looking ahead, researchers are increasingly focused on sustainable practices and the incorporation of electric and autonomous vehicles within rental fleets, as noted in recent studies. Such developments promise to shape a more environmentally responsible and technologically advanced future for the industry. In conclusion, the extensive literature surrounding car rental systems underscores their transformative impact on the transportation sector, signaling the need for continued innovation, strategic management, and regulatory responsiveness to ensure a sustainable, consumer-focused future for these platforms.

CHAPTER 3: SYSTEM ANALYSIS AND DESIGN

3.1 System Analysis

The system analysis is done by conducting requirement analysis, feasibility analysis, data modeling, and process modeling as follows:

3.1.1 Requirement Analysis

i. Functional Requirement

A functional requirement is an outline of the service that the Car Rental Portal must offer. Features the system must provide are refined into use case diagrams to best capture the functional requirements of the system.

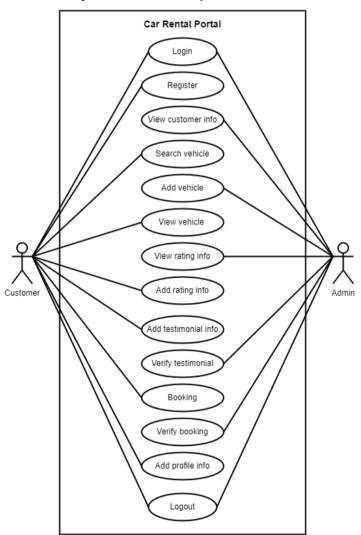


Figure 3.1: Use Case Diagram of Car Rental

The figure 3.1 is the use case diagram of Car Rental Portal. There are two actors, customer and admin. Customer shall register themselves into the system, after registration they shall login and logout, rent different vehicles, and rate the vehicles that they have rented. Similarly, the admin shall login and logout of the system, they

shall manage customers and vehicles.

ii. Non-Functional Requirements

a) Performance Requirement:

This system is designed for clean overall performance result. The performance of the Car Rental Portal will highly depend on the performance of the hardware and software components of the installed devices. Responses to view information shall take no longer than 5 seconds to appear on the screen.

b) Usability Requirement:

This system is very easy to use as it is written using basic HTML and PHP so that the usercan interact with the system easily to do the needed work. And its security feature makes it very secure and reliable.

c) Availability Requirement:

This project is a web-based application. Meaning any browsers (Microsoft Edge, Chrome etc.) can be used. Also, the system shall be operational 24hrs a day and 7 days a week.

d) Environmental Requirement:

The system shall require a localhost server, database server, and a web browser to run successfully.

e) Compatibility Requirement:

The system shall be compatible across all platforms under the required environment.

f) Security Requirement:

Every user shall have a unique Session while logging into the system. The user password shall be in encrypted format in the database

3.1.2 Feasibility Analysis

The feasibility analysis of Car Rental Portal is done by measuring the feasibilities, which are explained as follows:

i. Technical Feasibility

The system can be implemented in various technologies presently available and in all technologies that will be implemented in the future.

ii. Operational Feasibility

This project is feasible to operate. The current mode of operation provides adequate throughput and response. So this project is entirely operational and can be operated on anyplatform.

iii. Economic Feasibility

This system is quite simple and it does not require extra software and hardware. So, it is economically feasible.

iv. Schedule Feasibility

Schedule feasibility determines whether the planned project can be completed within the timeframe or deadline given.

3.1.3 Object modeling using Class and Object Diagrams

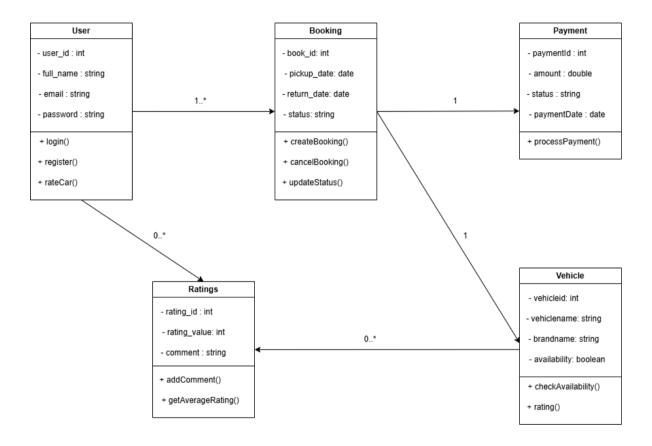


Figure 3.2: Class Diagram of Car Rental Portal

3.1.4 Dynamic Modeling using State and Sequence Diagrams

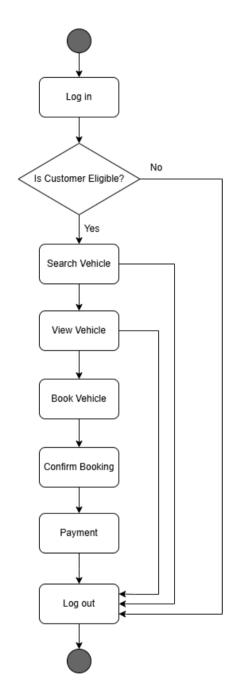


Figure 3.3: State Diagram of Car Rental Portal

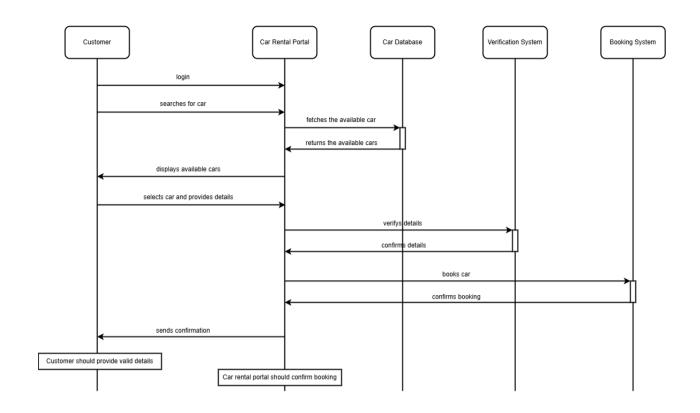


Figure 3.4: Sequence Diagram of Car Rental Portal

3.1.5 Process modeling using Activity Diagram

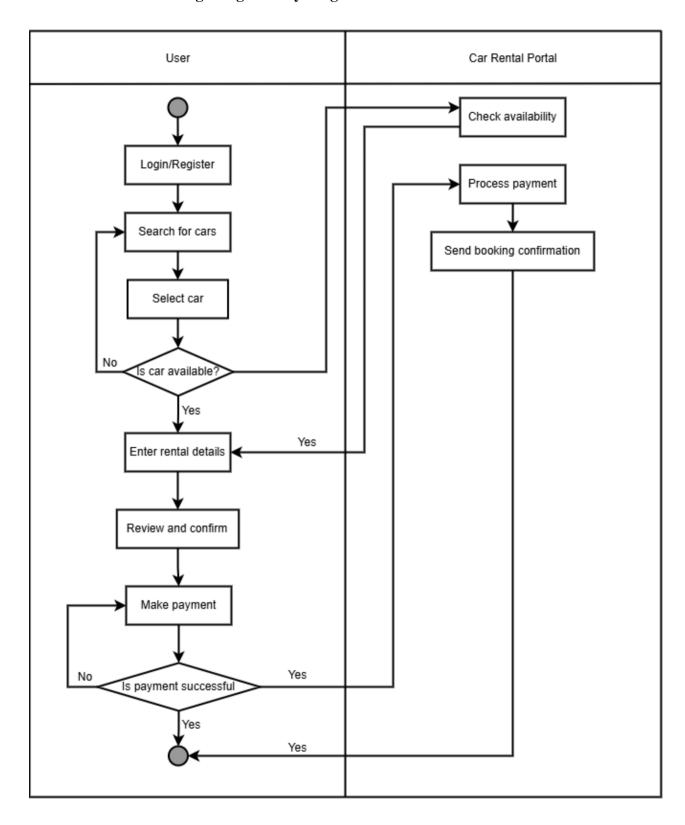
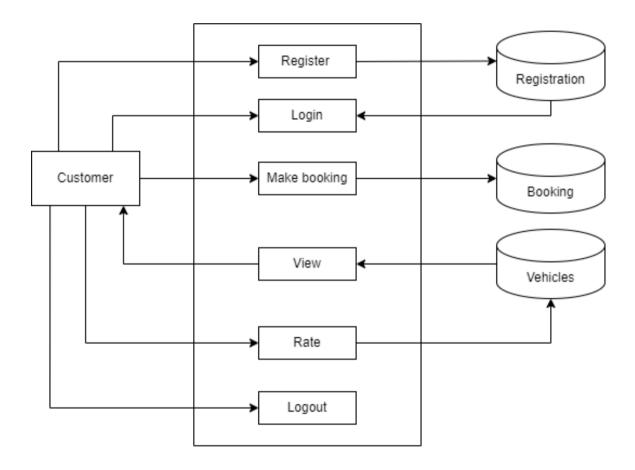


Figure 3.5: Activity Diagram of Car Rental Portal

3.2 System Design

The figure 3.6 represents the architectural design of the system Car Rental Portal. There are two modules in this system Customer and admin. Customer shall register themselves into the system by filling up the necessary details and those details are saved in the users table of the database. After registration they shall login to the system and they shall view the vehicles and rate the vehicles rented saved in the ratings table in the database. Similarly, admin shall login to the system, manage vehicles and view the review given by customer as they have access to the database.



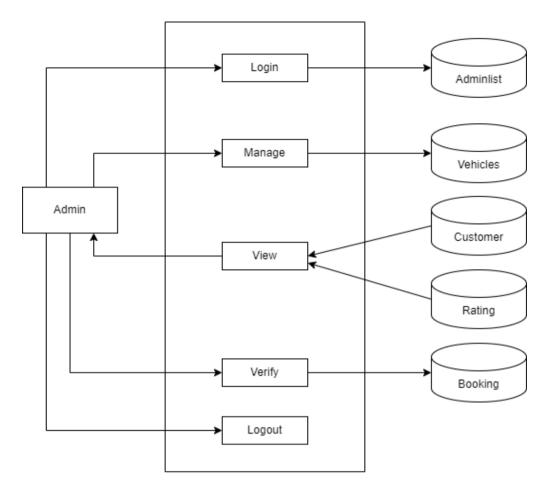


Figure 3.6: Architectural Design of Car Rental Portal

3.2.1 Refinement of class, object, state, sequence and activity diagram Class Diagram

The class diagram represents a car rental system where a user can make multiple booking records, each associated with a vehicle and a payment. The user can rate the vehicle, leaving multiple ratings with comments and scores. Each booking is linked to a single payment and can involve one or more vehicle records over time. The vehicle class includes methods to check availability and display ratings, ensuring that users have up-to-date information when making bookings.

State Diagram

The diagram shows the various states a customer goes through when using the car rental portal. It starts with the customer logging in, followed by a check on eligibility. If eligible, the customer can search for, view, and book a vehicle, then confirm the booking and proceed to payment. After payment, the customer can log out. The flow also includes potential loops,

allowing the customer to perform multiple searches or view different vehicles. This diagram illustrates the sequential states and decision points involved in the booking process.

Sequence Diagram

The diagram represents the interactions between a customer, the car rental portal, car database, verification system, and booking system. It begins with the customer logging in and searching for a car, followed by the portal retrieving available cars from the database. After the customer selects a car and submits booking details, the verification system checks the details. Upon verification, the booking system confirms the reservation, and the customer receives a booking confirmation. This diagram outlines the step-by-step communication between components during the car rental process.

Activity Diagram

The activity diagram illustrates the car booking process in a car rental portal, showing interactions between the User and the Car Rental Portal. The user begins by logging in or registering, then searches for available cars and selects a desired car. The portal checks the car's availability; if available, the user enters rental details, reviews, and confirms the booking. The user then makes a payment, which the portal processes. If payment is successful, the portal sends a booking confirmation to the user, completing the process. If the car is unavailable or payment fails, the user is prompted to take corrective actions, such as reselecting a car or retrying payment.

3.2.2 Deployment Diagram

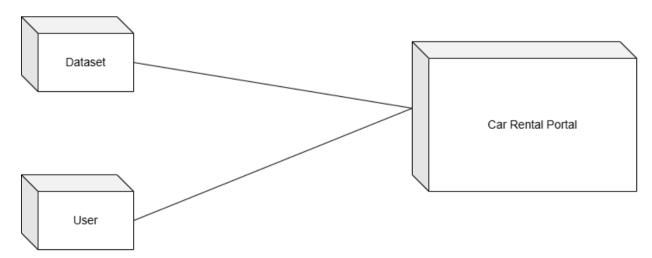


Figure 3.7: Deployment Diagram of Car Rental Portal

3.3 Algorithm Details

The Car Rental Portal makes the use of Rating Algorithm (RA) for vehicle recommendation. Rating is a technique that uses to rank the vehicle in the proposed system.

This technique is used in to show the popularity of vehicle among the customers.

Rating Algorithm (RA) shows the most rated vehicle which can be rated by the customer on the scale of five. Customers are given rights to rate vehicle according to their choice, and then every time different customers choose to rate a vehicle and then average rating is generated and shown in the vehicle.

Steps in the Rating algorithm are:

Step 1: Start

Step 2: Create database to store rating.

Step 3: Implement your ranking algorithm as part of your database query in each vehicle.

Step 4: Run a job that calculates 'ranking' for each vehicle and updates that field in your database.

Step5: Fetch the rating details into each vehicle.

Step 6: Then simply query your data and recommend by ranking.

Step 7: End

We can calculate the average rating by adding all individual scores, divide by the number of individual responses, and we have our average rating. The rating is rounded to nearest tenth.

An example let's say we received the following responses:

Customer 1: 3 star for vehicleid 30

Customer 2: 4 star for vehicleid 30

Total scores = 7 and total responses = 2, the calculation becomes:

Average rating = total scores/total responses

$$= 7/2 = 3.5$$

In this way, we calculate the average rating.

The Payment Algorithm (PA) in the Car Rental Portal manages each step of the payment process, from calculating the total rental cost to verifying payments. The algorithm factors in several key variables to determine the final amount, such as rental duration, vehicle type, applicable discounts, additional fees (like insurance or late return charges), and tax. It ensures that payments are handled securely, with accuracy and efficiency.

The Searching Algorithm (SA) enables users to search for vehicles based on factors such as vehicle name, location, availability, vehicle type, price range, customer ratings, and additional preferences (e.g., fuel type, transmission type). The algorithm processes these inputs and ranks the results based on relevance, allowing customers to find the most suitable vehicle with minimal effort.

CHAPTER 4: IMPLEMENTATION AND TESTING

4.1 Implementation

The tools and techniques used to implement the system and the implementation details of various modules of Car Rental Portal are as follows:

4.1.1 Tools Used (CASE tools, Programming languages, Database platforms)

The tools used for the implementation of Car Rental Portal are listed below:

Draw.io

Draw.io is an online diagram editor constructed around google drive. Using draw.io we have been capable of creating UML diagrams, entity relations diagrams, and plenty more. One of the benefits of draw.io is that it stores the information in google drive, consequently, there's no need for an extra third party.

HTML CSS & JavaScript

HTML, CSS, and JavaScript were used for the front-end development. HTML was used for the webpage elements. CSS was used to provide its styling to the components. JavaScript was used for client-side validations and adding dynamic components to the website.

PHP

PHP is a server-side scripting language that is embedded in HTML. It is included with some of the famous databases, which include MySQL, and its usage has helped us add, delete, and modify elements inside our database via PHP. Using PHP, we had been capable of limiting customers to get entry to a few pages of our website.

MySQL

MySQL is presently the most famous database management system software used for dealing with relational databases. It was used along with PHP scripts for developing our database structure. It became extensively utilized to carry out numerous activities like insertion, deletion, and update of the records saved in the database.

Visual Studio Code

Visual Studio Code is a lightweight but powerful source code editor which runs on computer systems and is available for Windows, MacOS, and Linux.

4.1.2 Implementation Details of Modules

The major functional modules of Car Rental Portal and their implementation is shown in the figure below:

1. Signup Module:

This module is used to register the new customer into the system. Here customer has to fill up all the necessary details about themselves to get registered. These data gathered are first validated and then stored into the database using SQL query. After the registration the registered customer shall log into the system by providing email and password which is identical to the email and password stored into the database.

\$insert = mysqli_query(\$connection, "INSERT INTO `users`(full_name ,email, password,
gender, birth_date, phoneno, city, address) VALUES('\$full_name','\$email','\$password',
'\$gender','\$birth_date', '\$phone', '\$city', '\$address')");

2. Vehicle Management Module:

This module is used to entry new vehicles in the database. Here admin has to fill up all the necessary details about the vehicles. These data gathered are first validated and then stored into the database using SQL query.

\$sql = "INSERT INTO `crud` (vehiclename, brandname, vehicleno, vehicleimages,
vehicleavailability, priceperday, mileage, seatcapacity) VALUES
('\$vehiclename','\$brandname','\$vehicleno','\$vehicleimages','Available','\$priceperday',
'\$mileage','\$seatcapacity')";

3. Booking Management Module:

This module is used for the manipulation of booking details which include booking vehicles. Admin has the full access to the database so only, they can cancel any booking of any customer as pleased or as instructed.

\$insert_query = "INSERT INTO booking (bookingnumber, user_id, vehicleid, fromlocation, tolocation, pickup_date, return_date, triptype, status) VALUES ('\$bookingnumber', '\$user_id', '\$vehicleid', '\$fromlocation', '\$tolocation', '\$pickup_date', '\$return_date', '\$triptype', \$status)";

4.2 Testing

The testing section is accomplished to affirm and validate the Car Rental Portal. The Car Rental Portal is examined to test if the final system can work in keeping with what we have been waiting for and is free from any programming and logical errors. It additionally makes sure whether or not all of the systems and requirements are met or not.

4.2.1 Test Cases for Unit Testing

Unit testing is a software program development method in which the smallest testable components of an application, known as units, are individually and independently scrutinized for correct operation. Below are the numerous tables for distinctive test cases:

Table 4.1: Test Case 001-Login

Pre-conditions: The user has a valid email and password						
Dependencies: Sign-Up Module						
S.N.	Test Steps	Input	Expected Result	Actual Result		
1	Navigate to login page		Login page should open	As Expected i.e.Customer is navigated to login page of system		
2	Correct email and password	Customer must login successfully	Customer logged into the system	As Expected i.e. Customer was able to access the services provided by the system		
3	Incorrect email but correct password	Customer must not login	Customer was not logged into the system	Customer was not able to access the services provided by the system		
4	Correct email but incorrect password	Customer must not login	Customer was not logged into the system	Customer was not able to access the services provided by the system		

Post-conditions:

Customer is validated with database and successfully login to Car Rental Portal. The account session details are logged into the database.

Table 4.2: Test Case 002-Insert Vehicles

Pre-conditions: Admin is logged into Car Rental Portal

Dependencies: Login Module

Step	Test Steps	Input	Expected Result	Actual Result
1	Navigate to admin page			As Expected i.e.Admin is navigated to admin pageof system.
2	Provide all required information	Vehicle Name= Hyundai i10 Brand Name= Hyundai Vehicle Reg. Number= Ba 12 Pa 1290 Price Per Day= 3000 Mileage= 20 Seat Capacity=5	Credential can be entered	As Expected
3	Data Insertion	Click on the create button		As Expected i.e. Admin can add the vehicle to the system

Post-conditions:

The event is successfully inserted to database.

4.2.2 Test Cases for System Testing

System Testing is a form of software testing that is executed on a complete integrated system to assess the compliance of the system with the corresponding requirements.

Table 4.3: Test Case 003-System

S.N.	Test Case	Input	Expected Outcome	Output
	Check with	Email:shilu@gmail.com	Successful	Opens dashboard of
1	login	Password: shilu123	login	Car Rental Portal
2	Check with Customer Register	If required fields are filled with defined data type	Successful entry of new customer	Inserted data into database in registeration table
3	Check with delete, edit customer	Search user_id. Click edit or delete button	Must be edited or deleted	Edit or delete customer in database
4	Check with vehicle entry	If required fields are filled with defined datatype	Successful entry	Inserted data into database in vehicle table
5	Check with delete, edit vehicles	Search vehicleid. Click edit or delete button	Must be edited or deleted	Edit or delete vehicle in database
6	Check with booking	If required fields are filled with defined data type	Successful booking	Inserted data into database in booking table
7	Check with cancel booking	Search book_id. Click delete or cancel button	Must be cancelled	Delete booking details from database
5	Check with logout	Click logout button	Successfully logout	Redirect to login

CHAPTER 5: CONCLUSION AND FUTURE RECOMMENDATIONS

5.1 Lesson Learnt

This project has helped to learn how to develop web-based car rental portals and implement them across various platforms. It helped to learn how to host a web application locally on a host computer. It helped to learn how a customer can search vehicle and rent the vehicle online. It helped to learn how to do pair programming and finish the project within the schedule. It helped to know how to implement theoretical knowledge gained from various subjects in practical life. This project has helped to gain great skills for project management and software development.

5.2 Conclusion

Car rental business has emersed with new goodies compared to the past experience where every activity concerning car rental businesses is limited to a physical location only. Even though the physical location has not been totally eradicated the nature of functions and how these functions are achieved has been reshaped by the power of internet. Nowadays, customers can reserve cars online, rent car online, and have the car brought to their door step once the customer is a registered member or go to the office to pick the car.

The wed based car rental system has offered an advantage to both customers as well as Car Rental Company to efficiently and effectively manage the business and satisfies customer's need at the click of a button.

5.3 Future Recommendations

The possible improvements the can be made for the Car Rental Portal in clude:

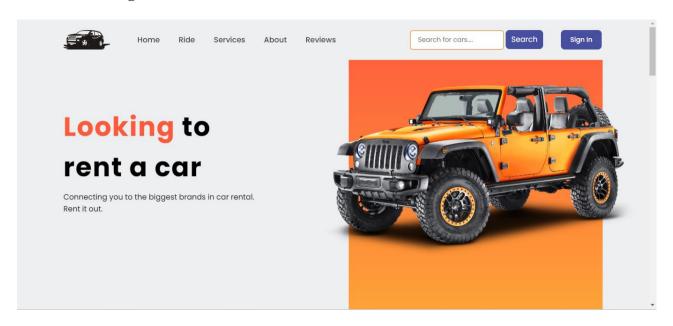
- Making the graphical user interface friendlier and more functional in the next development.
- Adding online payment System.

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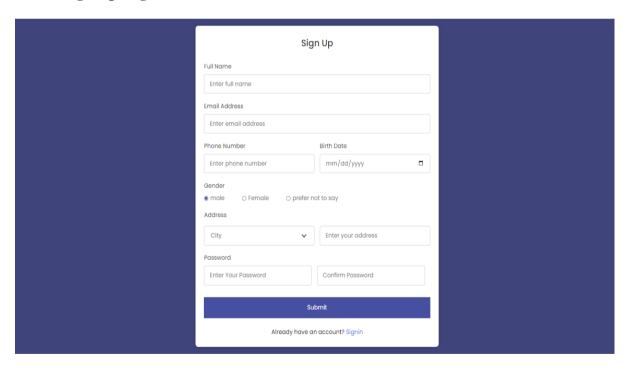
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APPENDICES

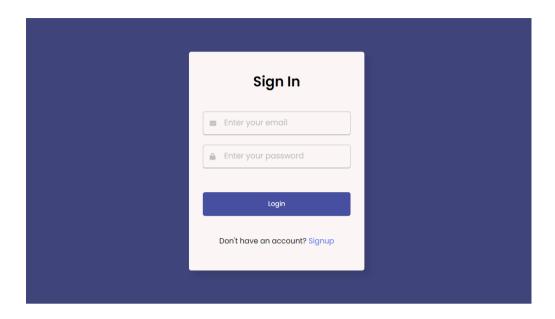
1. Home Page



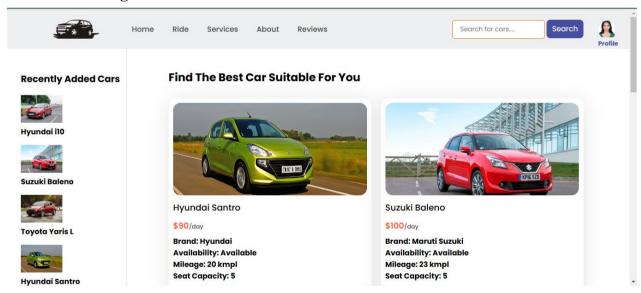
2. Sign Up Page



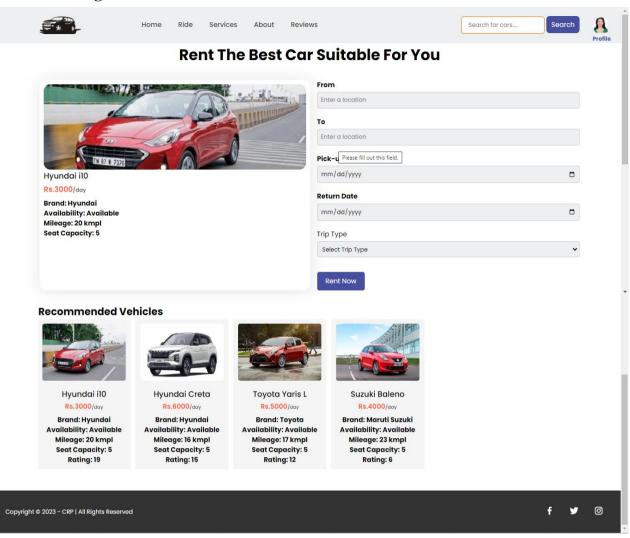
3. Signin Page



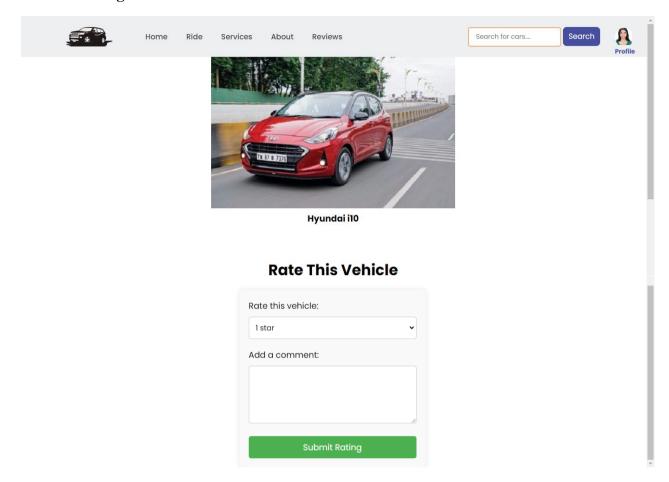
4. Service Page



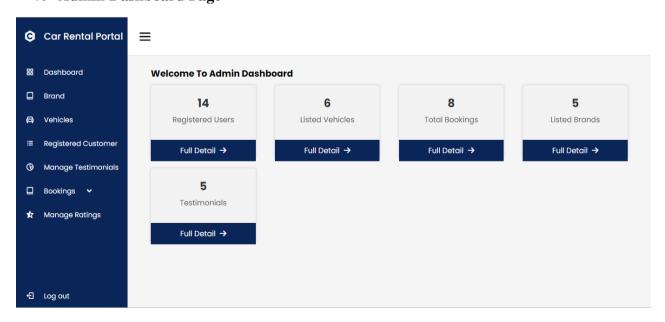
5. Rent Page



6. Rate Page



7. Admin Dashboard Page



8. Manage Vehicle Page



