OBJECT ORIENTED ANALYSIS & DESIGN **(OOA&D)**
110659

CAR RENTAL SYSTEM

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1. About Car Rental System

1.1 Document Conventions

- Main Headings: Normal
- Headings Font Size: 22
- Numbered Bullet Points

The Title Heading Font Size is 24px, Bold and Underlined. The Subheadings are all 22px, and 20px respectively, the paragraph font size is 14px throughout the document. This Report is written in Times New Roman font.

1.2 Introduction

Just like we've studied about a Graphical User Interface that acts as a middle-man between The User and The System, same can be said about these type of Softwares which are neither producer, or consumer, rather act as bridge between the two parties to make the communications easier and more scalable/expandable.

1.2.1 Basic Introduction

CAR RENTAL SYSTEM (CRS) is a web-based system for a company that rents out cars. This system enables the company to make their services available to the public through the internet and also keep records about their services.

The world has become a place where there is a lot of technological development; where every single thing done physically has been transformed into a computerized form. Nowadays, people's activities have been transformed into work done by computerized systems. One of which is the main target of this project is about Car Rental System. Not everyone can afford to buy a car when they do not need it on at least a daily basis. The system of renting cars exist back in the previous years when people rent cars for personal reasons. Car renting is essential to many peoples' plan

to travel or move from one place to another for business purposes, tour, and visit or holidays, for these reasons Car renting is very helpful.

The starting point of Car renting is unknown as said by Thomas Pretty; he also mentioned that many believe that Joe Saunders was the first man to start a Car renting company. According to Thomas Pretty, charges were calculated with the help of a mileage tracking device. Many people became interested in the Car rental business and hence got involved. Car renting became more popular as years pass by. Today Car renting services is found all over the world, especially in developed and developing countries. To make this service more popular and accessible to the public it has been transformed into a web-based system and connected to the internet where everyone can be able to have access to it. But like all other systems this has its limitations cause Car Renting, a physical quantity, can be made bounded from region to region to ensure the profits on both sides.

1.2.2 Purpose

Car Rental Management System is meant to be a platform between Car Owners and those who want the cars on rent.

The major issue that occurs and has occurred in Car Renting has been of trust and scams. Car Renting is something of a risky business, both ways. If the car owner is renting out his car to an unknown party he needs some assurances that his car is in safe hands who will handle it carefully, do not damage it and will return to him in rime, so that his hard earned car doesn’t become the center of a theft scene. The same way, the part that wants the car on rent needs some assurances as well that the car which is about to be in their possession for the next day or week is a registered vehicle with no criminal attachments so that they do not get pulled over midway while using it.

1.2.3 Need

Why do we need a Software for this business? Because, like in all other businesses, Softwares make the communication easier. Not every person that needs a car knows everyone that owns it and is willing to rent it. And not every person who owns a car is willing to rent it, without any assurances or trust.

1.2.4 Objectives

The main objectives of this project are:

· To develop a web-based system that will help manage the business transactions of car renting.

· To help in advertising the car rental services of a company, through the availability of the system online.

1.3 Project Working

1.3.1 Working Principle

The first step is signing up in the application to load the details into the system. A login ID (username) and password to manage your details. Once your system information is loaded, your customers can book from there.

Two, Payment. For the booking confirmations in the system, you need to fix a payment method. You can choose multiple payment options such as Credit/Debit Cards, Cash, UPI, Internet Banking. You can decide how you'd want the payment to proceed. Customers can check the availability of cars and get Price Codes for their bookings before choosing to pay it. It would be a flexible option for your customers with less effort needed from you.

View/Edit Reservation, In this option, your customers can view reservations present in the system with reservation codes (for security and customer privacy). If required, you can alter the vital details to ensure that the booking is appropriate.

Administration. Any updates, alterations, latest vehicles, added features, or any other personalization you want in your rental system can be easily managed online. You will have complete access to your system. There is no need to contact your IT staff/supplier whenever you plan to change some details in a car. You can just log in and do it yourself within a few seconds.

Working of a Car Rental Software. For the customer's side, an app-based Car Rental Software makes it easier for them to book a car at their convenience. Here is how the software works. Book A Car - open the app, search for a car, select the time duration and initiate booking. Upload License. Before the booking is

confirmed, Customers need to upload their valid Driver's license to make sure they are legally authorized to drive. Unlock the car, as soon as the booking is confirmed, customers will receive car details through an sms. At the pickup location, they can unlock their car via the rental app. Return the car, once the trip ends, customers can drive back the car to the same location and fend their trip.

Attractive features to of Car Rental Software. Today, the key to reaching out to a maximum number of customers is a mobile app or a web-based portal. However, just having an app isn't sufficient, some features need to be included for unmatched performance.

Flexibility - the software should be manageable and user friendly, it should be able to adapt to possible or future changes in its requirements.

Web and Mobile-centric - the car rental software must work flawlessly on ios to android mobile devices as well as the web.

Tailor-made, the demands and needs of a business are always a priority, keeping that in mind, the script should be designed in such a way that it must serve any requirement of the business without hampering you with the stress of alterations needed in the industry.

Highly Secure Software - the online world comes with multiple threats, make sure that you aren't revealing the data of your valuable customers, so the software should be backed with complete security systems, it will lock out hackers or technology misusers.

Responsive design - you app should provide ease of navigation to its users from any device, make sure that your customers face no trouble while surfing your web app, the responsive design will make your software product feasible for you to reach to a wide range of customers through a single application.

Payment Gateways - provide a secure payment system that offers your customers all the means to make your payments online and book your car rentals without facing any issue.

Multi-lingual support - your solution shall provide your customers with control to edit the app language as per their choice, offer both rtl and ltr version so they can customize the language.

All-day customer support system - the developers must always be available to help 24/7 in case your customers are stuck with design implementation to begin their services.

Conclusion - with the tracking application looking after all your managerial needs, it can be a good investment that can trigger the growth of the business. The Car Rental Management software leaves you with very little to fret about and hence there shouldn't be any second thoughts on making the purchase.

1.3.2 Project Scope

The scope of this project is as follows:

· The car rental system to keep detailed records of both the cars and the customers, the duration they rent a car as well as the type of car they rent.

· The system will be mainly designed for small a company that renders its car rental services to customers.

· The system will have the ability to generate and print invoices for each successful transaction.

1.3.3 Levels of Access

The system will have two levels of access:

· The administrator

· Customer, and

· Dealer

1.4 Project Uses

The major uses of this Project is to make sure a wider number of audience can get access to the perks of Car Renting. Because moving the Car Renting Transaction Processes Online makes sure that everyone knows about your services worldwide.

A Car Rental Business is one of the affordable ways to rent a car on a weekly or daily basis. Nowadays, everyone is interested in making Softwares like these, less initial investment. With the spike in travelers, the demand for Car Rental Software has increased. This business has the potential to become the next big thing in the automotive industry. Owning a car is no longer necessary, all thanks to the car rental business. People can rent a car for the days they want. Some Car Rental companies even provide a subscription based package where a customer can rent a car for more than 3 months. The car rental system is technologically advanced and easy to use both for you and the customers. There is no need for technical staff and just an app is sufficient.

1.4.1 Problem Statement

The problem with some of the current systems is that:

· Based on observations, some small companies already have a car rental system that is not a web-based application. This is a limitation that gives the capability to store customers' details, but at the same time they cannot make their services more available to the public through the internet, they rather make use of posters to

advertise their services to the public. These types of companies can overcome these problems by switching to the web-based application of their type of system.

· They also make use of phone call reservations which are also limited to many features as compared to a web-based system. For example, a customer may make a phone call reservation for a particular car, but when he/she comes to pick up the car, he/she might turn not to like the car; this could be because the customer could not see a sample picture of the car he/she wants to rent

1.4.2 Project Uses

This Project can be used in many application areas. Manly as an interface between Dealer and Customer, this can be implemented worldwide on a regional basis to ensure all areas have their dealers known.

2 Project Design

The project is designed based on one of the Modern System that do contain room for constant change in requirements, quick deployment of builds, and mainly follows the concept of the Spiral Model.

2.1 System and Software Design

Using the requirement definition as a foundation, the requirements are divided into software and hardware. This is called system design. Software design is the process of representing the functions of each software system in a manner that may readily be transformed into one or more computer programs. Use case diagrams, class diagrams, sequence diagrams, entity-relationship diagrams (ERD), and data dictionaries are used at this level to represent the system design.

2.1.1 Implementation and unit testing

During this stage, the software design is released as a set of programs. Unit testing involves verifying that each unit is working according to the specification of the customer.

2.1.2 System Testing

The individual programs or units are integrated and tested as a complete system to ensure that the software requirements have been met as specified by the end-users. After testing has been completed, the software system is delivered to the customer.

2.2 Methodology

The Iterative Waterfall Model is the development methodology that has been used in this project to develop the CRS. This Model is derived from the evolution of the traditional Waterfall Model. It consists of five phases, which include; the Requirement and Definition, System and Software Design, Implementation and Testing, System testing, Operation, and maintenance. Each of these phases is repeated if an error is discovered, this enables the correction of errors before moving to the next phase. Figure below represents the Iterative Waterfall Model for this project, and each of the phases is explained accordingly.

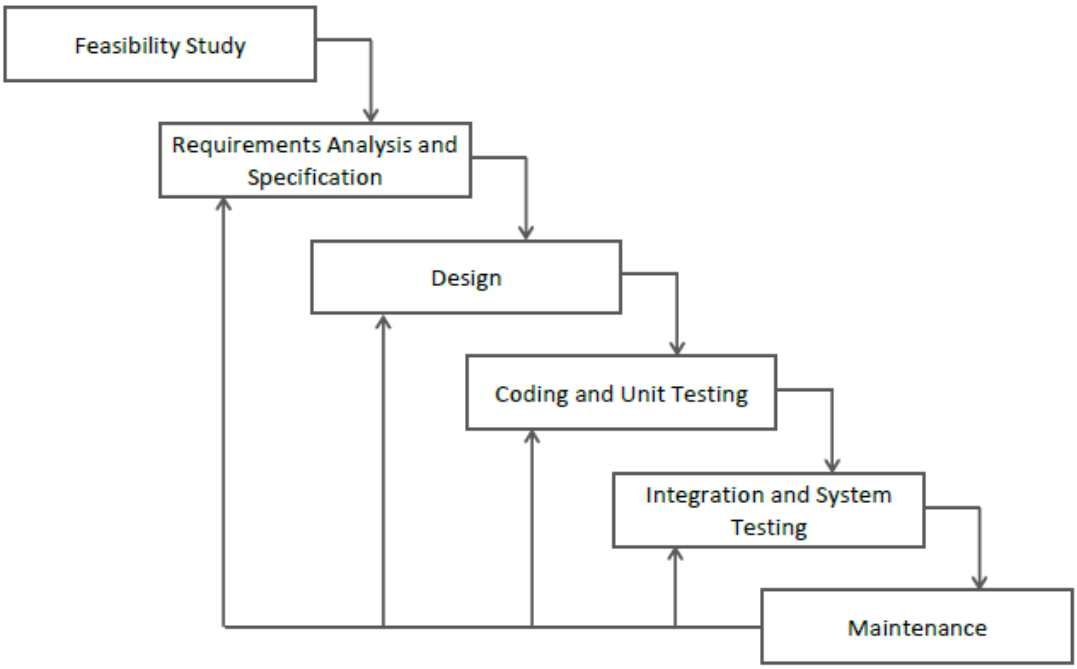


Figure 2: Iterative Waterfall Model

3 Project Diagrams

As instructed by the teacher, some of the Project Diagrams have been made using online Tool, the others have been drawn by pencil.

The Project Diagrams made using Online tool are:

- Use Case Diagram
- Activity Diagram
- State Chart Diagram
- Class Diagram

The diagrams that have been drawn by hand include:

- Collaboration Diagram
- Sequence Diagram
- All UML Diagrams

A Use Case Narration or Flow of Events is a written description of how users will perform tasks on your website. It outlines, from a user's point of view, a system's behavior as it responds to a request. Each use case is represented as a sequence of simple steps, beginning with a user's goal and ending when that goal is fulfilled.

The online Tool that we used is Online Visual Paradigm

https://www.visual-paradigm.com/solution/diagramming-tool-on-the-cloud/

3.1 Use Case Diagram

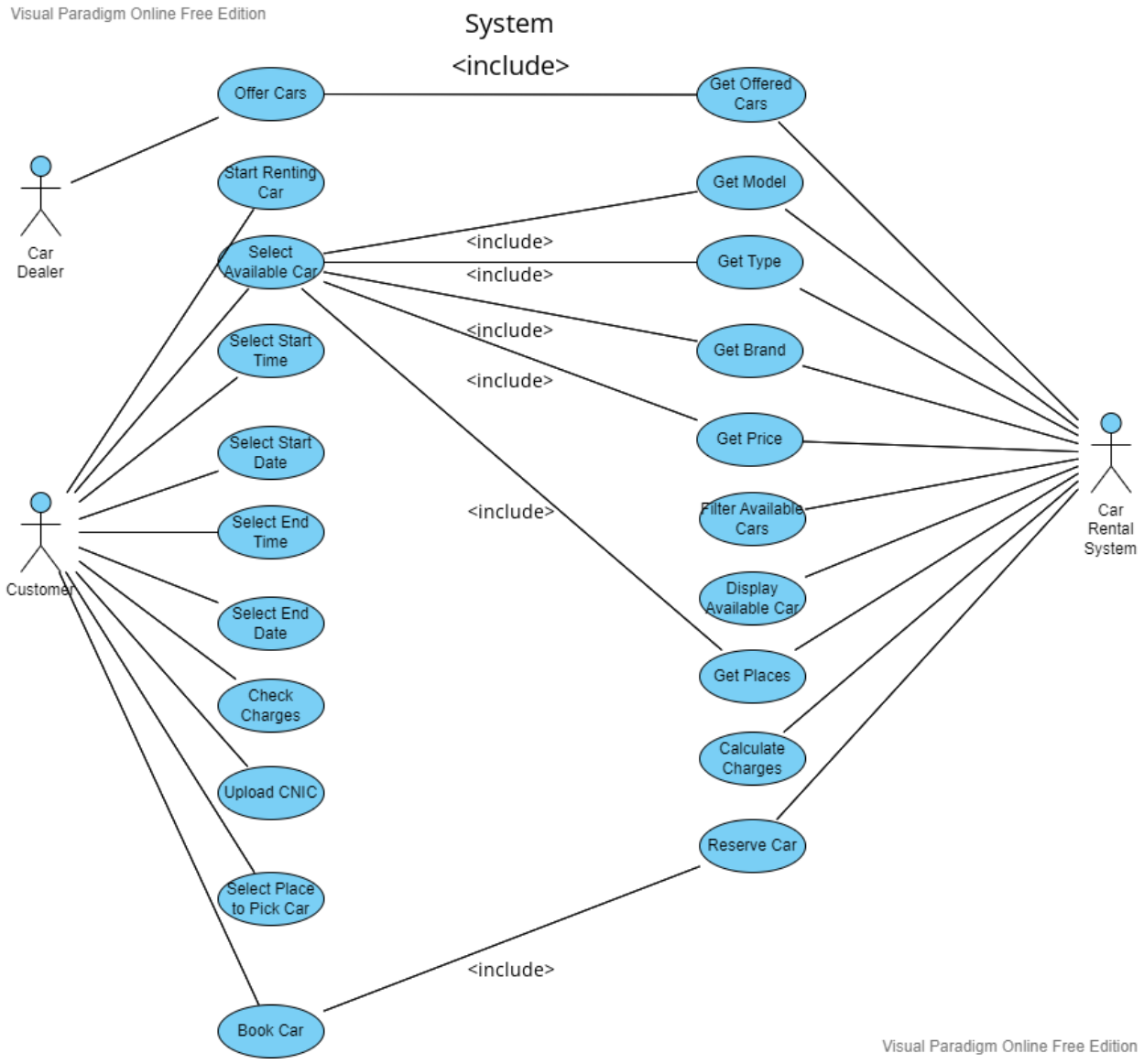
In this diagram admin is connected with the system which shows that what the dealer, System and Customer can access.

Our Project works on 3 Actors in Total.

- Car Dealers – Those people who own the cars and are putting them on for others to rent.
- Customers – The major audience of our Project. Those people that are looking for a car that they want to book.
- Car Rental System – The Management System or interface that keeps the record of all cars that are available, not available, newly added, or even those that are currently out on rent. This system works an interface between dealers and customers, whenever a customer selects the car, the system alerts the car dealer, and whenever a transaction occurs, the system keeps the record.

Below is the Use Case Diagram of one of our Transaction Form Booking.aspx that Display the available cars to the customers, allows them to select from one of

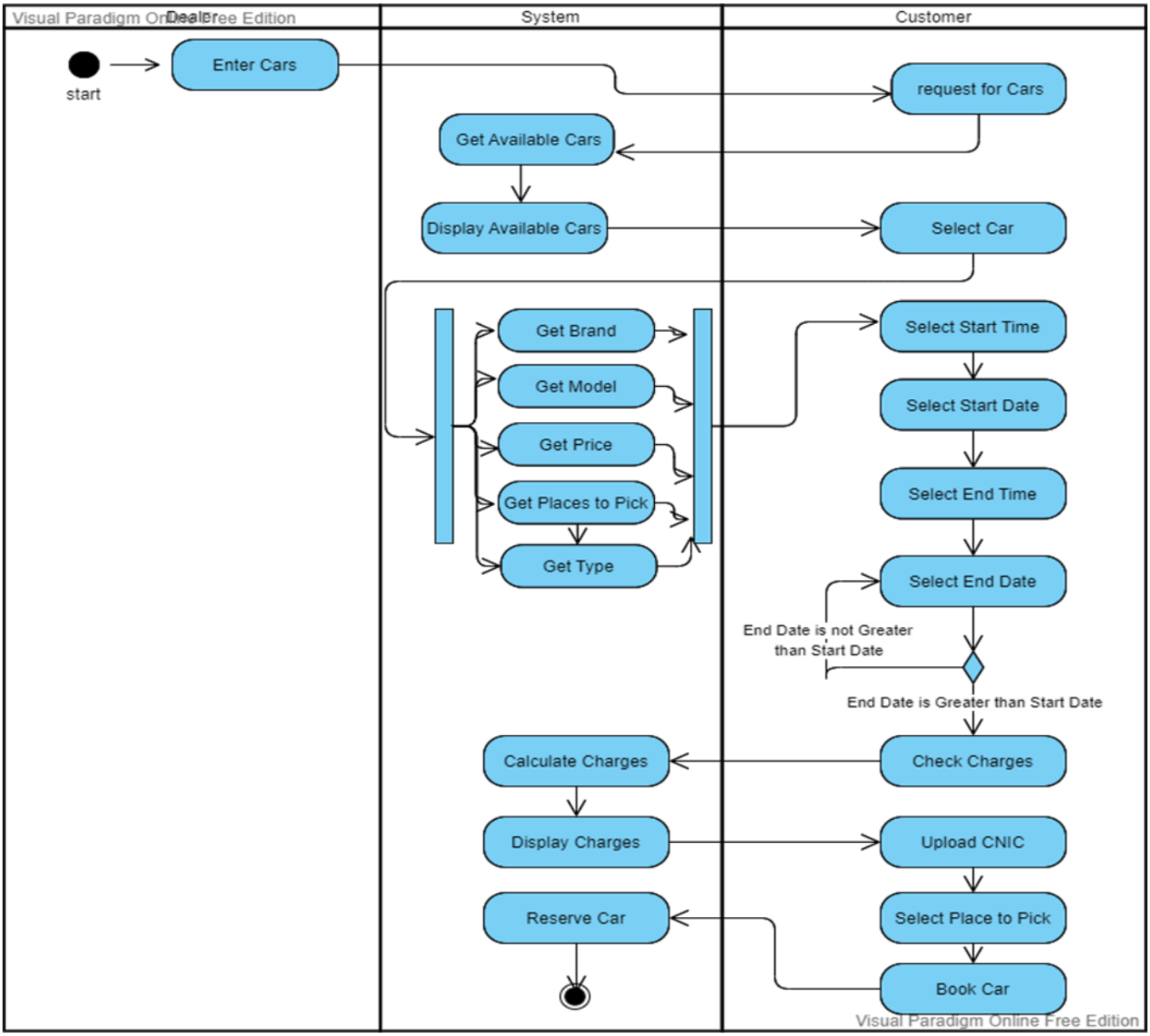
them, and then require them to enter the starting Time and Date/Day of car renting and Ending Time and Date. The same Form also requires the User to verify himself by uploading his CNIC, and venue or place from which he will pick the selected Car. The system will show all these options after a filtration process required on each step to ensure the specific cars available in a particular area are shown available to customers from that area only. After the booking is confirmed, the system Locks that car, generates the total Bill or charges on the customer.



3.2 Activity Diagram

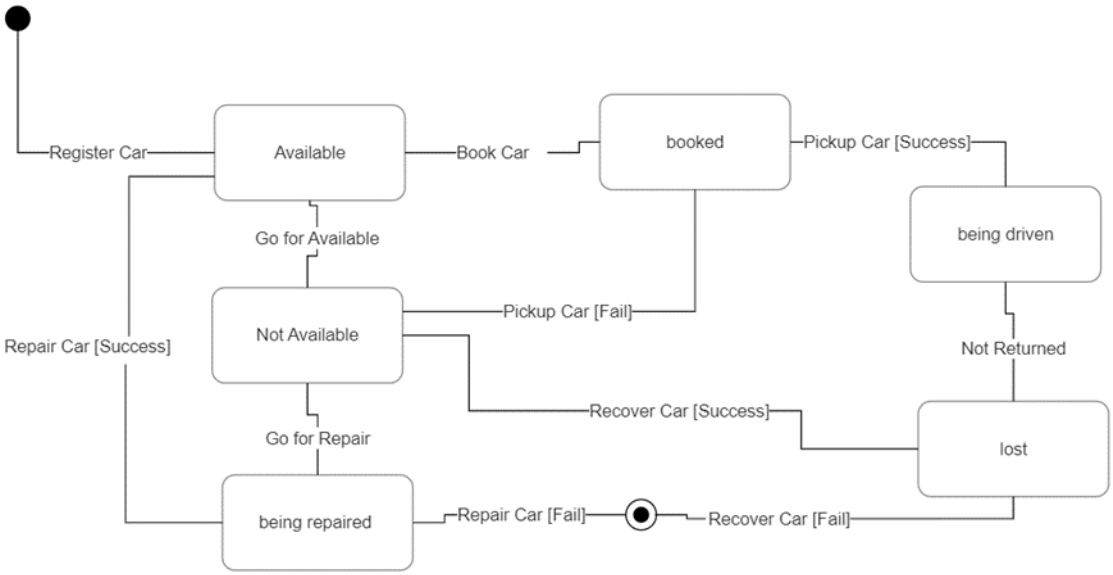
Advertisements. Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system.

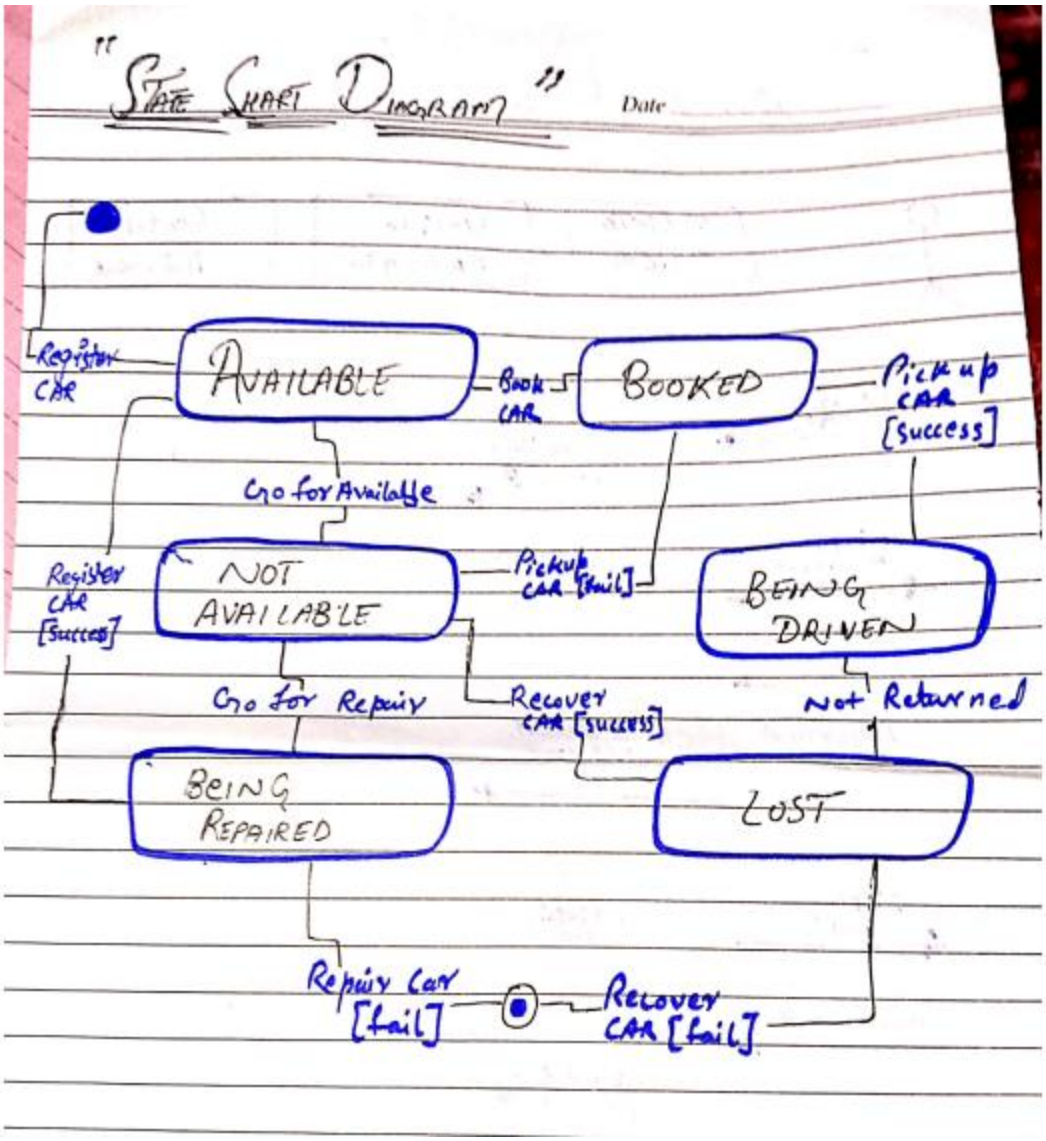
This diagram shows the how the admin, dealer, Customer is using or shows the behavior.



3.3 State Chart Diagram

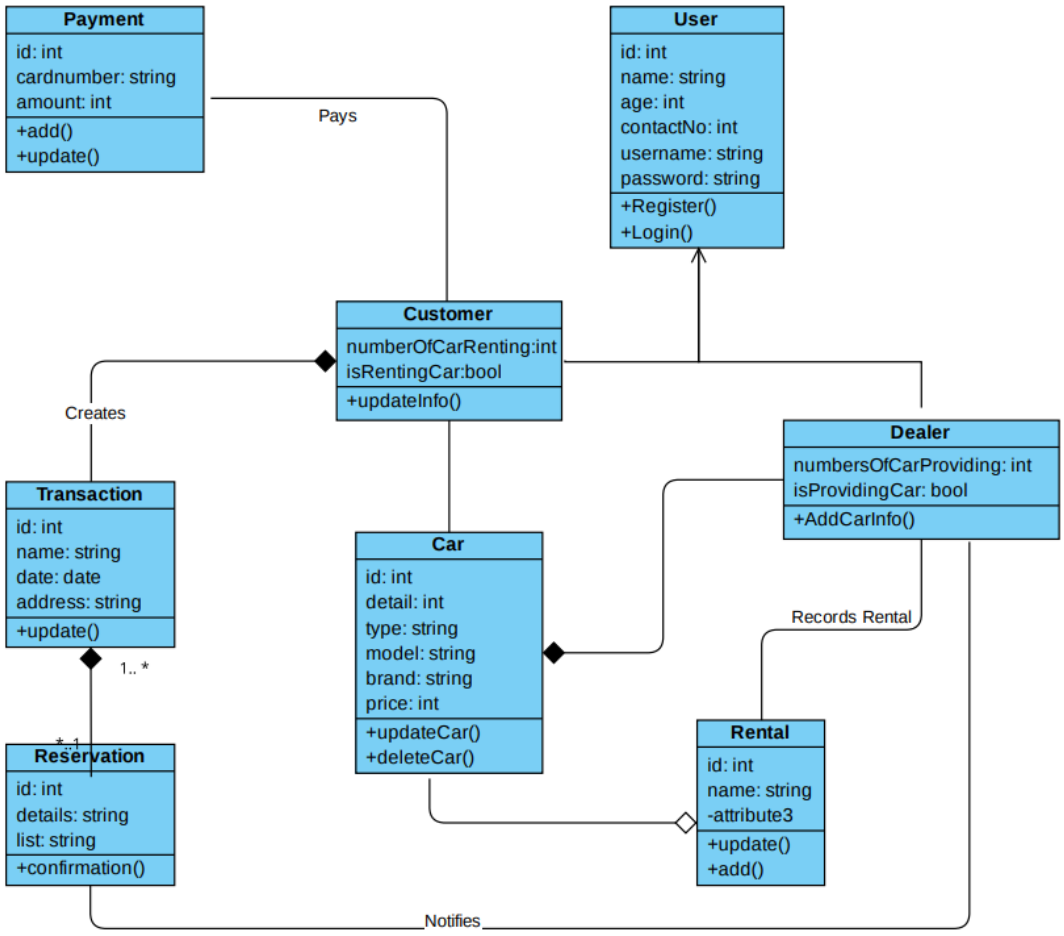
State chart diagram is one of the five UML diagrams used to model the dynamic nature of a system. They define different states of an object during its lifetime and these states are changed by events.


Register Car
Available
Book Car
booked
Pickup Car [Success]
being driven
Go for Available
Not Available
Pickup Car [Fail]
Repair Car [Success]
Not Returned
Recover Car [Success]
lost
Go for Repair
being repaired
Repair Car [Fail]
Recover Car [Fail]

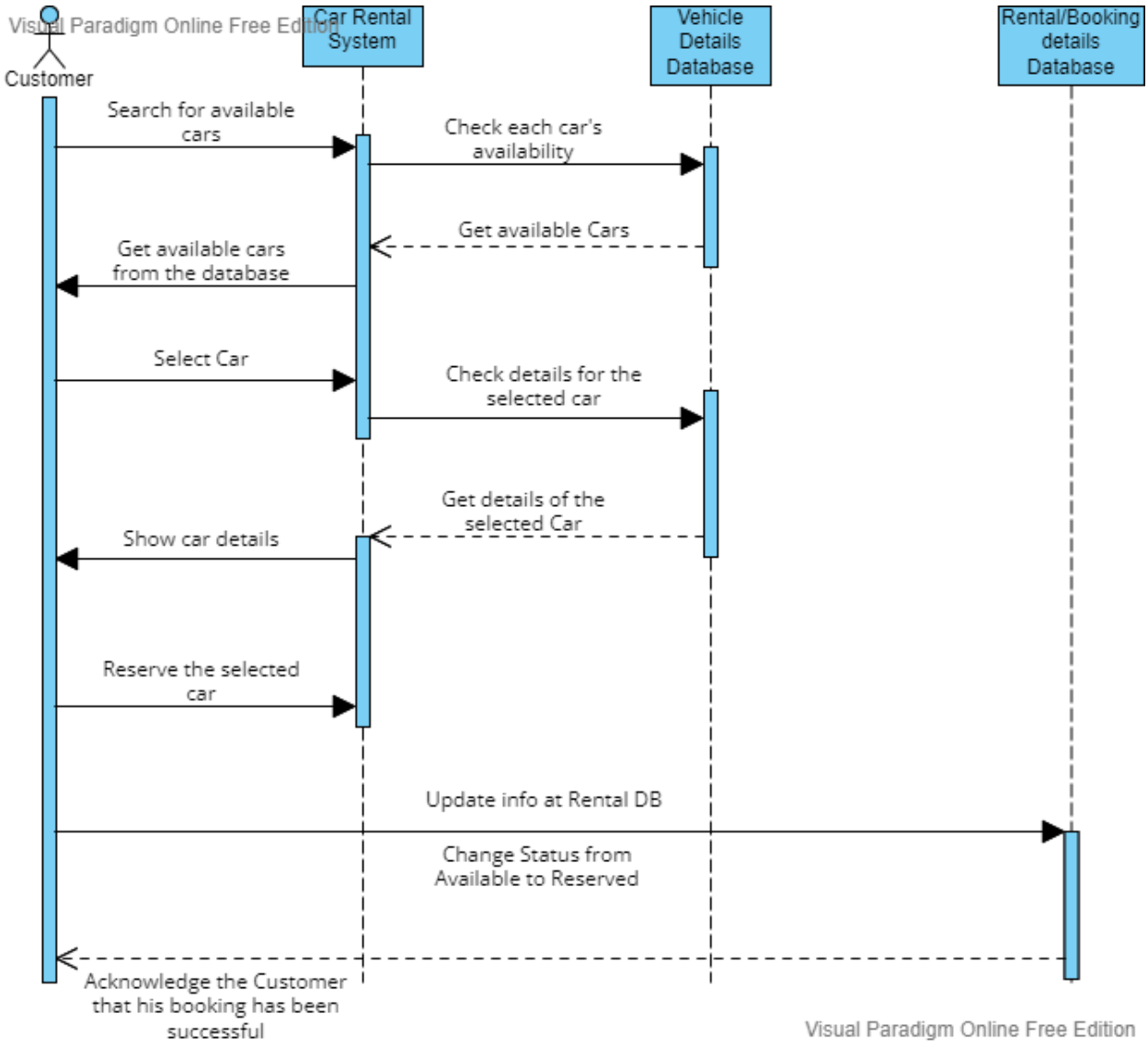


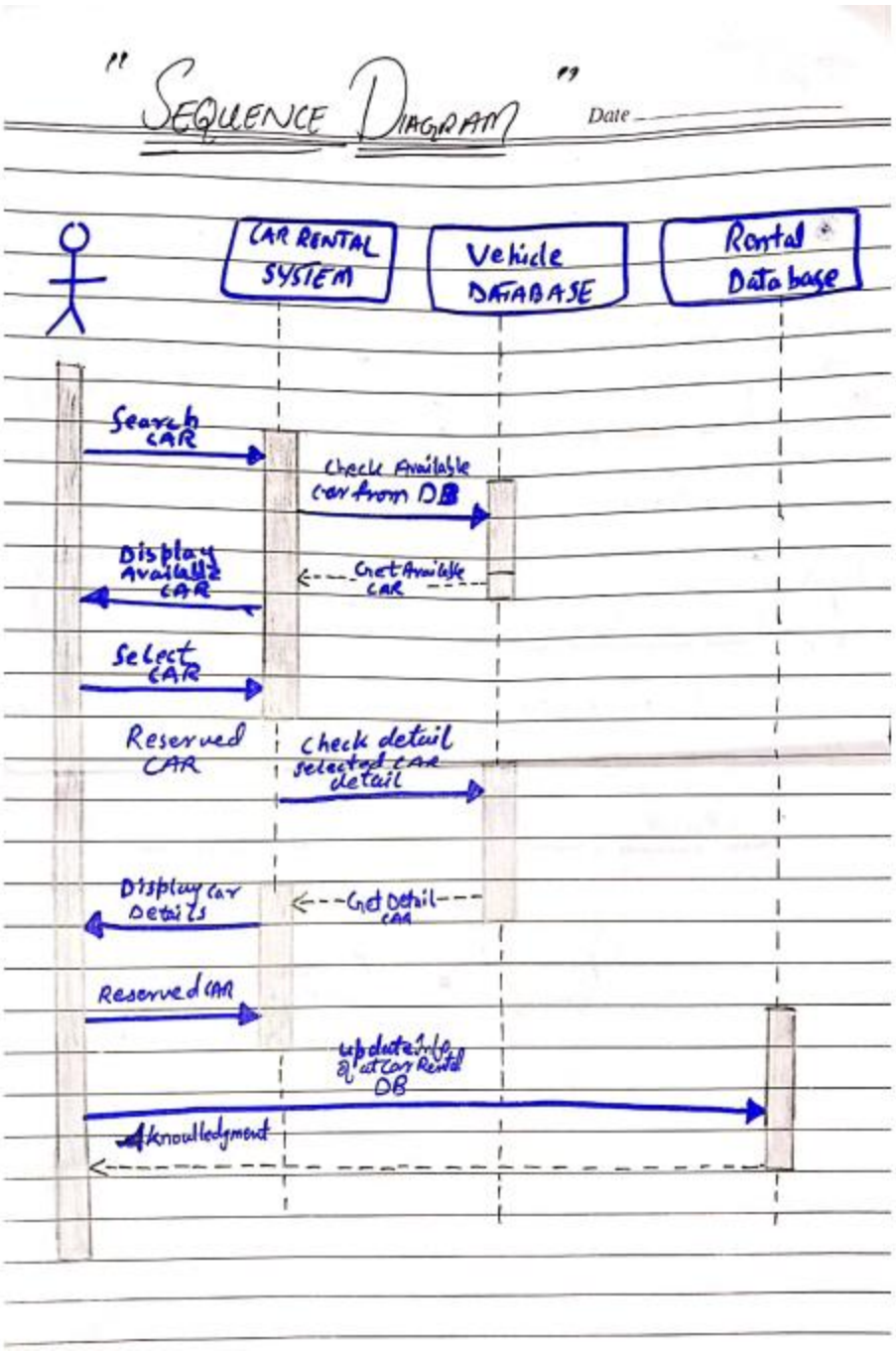
3.4 Class Diagram

Class diagrams are the main building block in object-oriented modeling. They are used to show the different objects in a system, their attributes, their operations and the relationships among them.



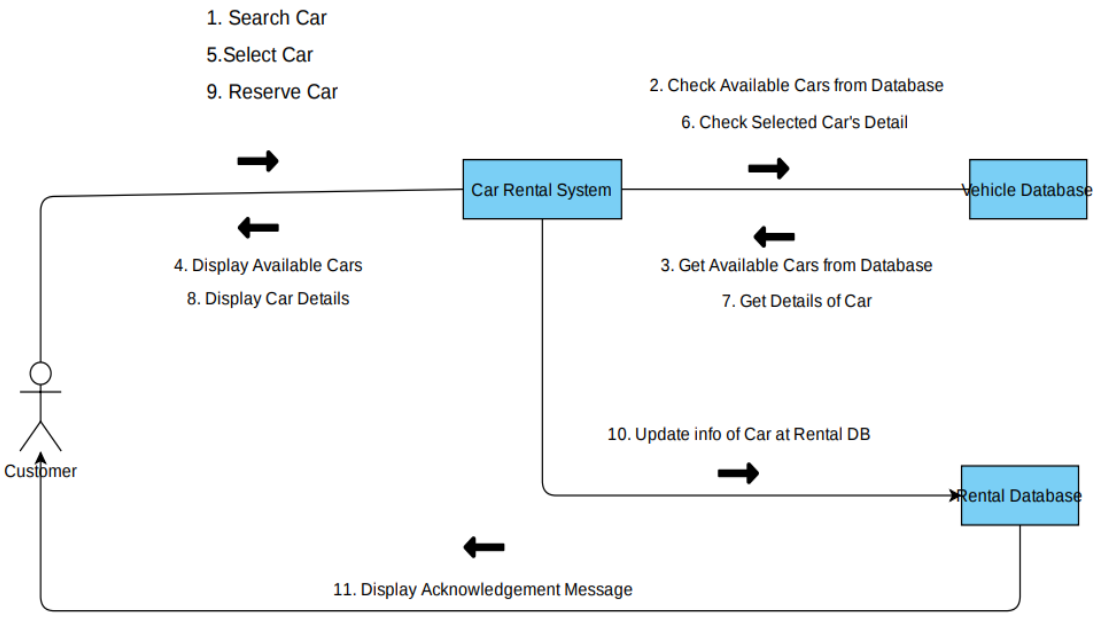
3.5 Sequence Diagram


Visual Paradigm Online Free Edition
Customer
Car Rental System
Vehicle Details Database
Rental/Booking details Database
Search for available cars
Check each car's availability
Get available Cars
Get available cars from the database
Select Car
Check details for the selected car
Get details of the selected Car
Show car details
Reserve the selected car
Update info at Rental DB
Change Status from Available to Reserved
Acknowledge the Customer that his booking has been successful
Visual Paradigm Online Free Edition



3.6 Collaboration Diagram

A collaboration diagram describes a pattern of interaction among objects; it shows the objects participating in the interaction by their links to each other and the messages that they send to each other.



3.7 Use Case Narration

Flow of Events	Actor Actions	System Response
	1- User searches for available cars 5- User selects a car from the given List.	2- The system check each car's availability 3- Get those Cars in the database with the status "Available"

	8- User reserves the selected Car 11- User selects a payment method	4- Display available cars to the user 6- System gets the details of the Selected car 7- Display details of the selected Car 9- System changes status from Available to Reserved in the Rental Database 10- System Acknowledges the customer that the reservation has been successful

4.0 Software Development Tools:

Visual studio 2019 (MVC)

The frontend is created in MVC 5

SQL 2019

SQL 2019 is used for database

Microsoft Word

Microsoft word are used for report

Somee.com

Somee can be used for deployment the project

Creately.com

Creately.com can be used for making UML Diagrams

Visual Paradigm

VisualParadigm.com can also be used for making UML Diagrams

GitHub

github.com can be used for saving your project states

Ngrok

Ngrok is used to live the Project onto web

4.1 Project Forms (Proposed)

RENT A CAR

Select the number of Cars you want

For for 1 - selected range, the form on the next page will be on loop.

CAR RENTAL SYSTEM

Registration / Booking Form

Date 20
M T W T F S S

Booking Form

Car type	Bus / Hi-Roof / Car	System
Car Brand	Toyota / Honda / BMW	
Car Model	1	
Car Id	27	
Car Price (Initial)	2000.	

Registration

Start Time (HH:MM)	12:00	User
Select AM / PM	PM	
Start Date	DD /MM /YYYY	
End Time (HH:MM)		
Select AM/PM		
End date		

Date 20
M T W T F S S

Payment

Total Fees [2000] Initial

[500 x Days / hours] Added

Upload Image of CNIC [Choose file]

Venue to Pick [City : Karachi ▼]

- Kisangi
- Defence
- NNZ
- Tong Road

[Booking Confirm]

4.2 Project Forms (Final)

This Project consists of a Total of 7 forms.

1- Login Form - A Login page for registered users. (Login ID identifies dealers and customers)

2- Registration Form - A Registration form for new users.

3- Home Page - Welcome to CRS

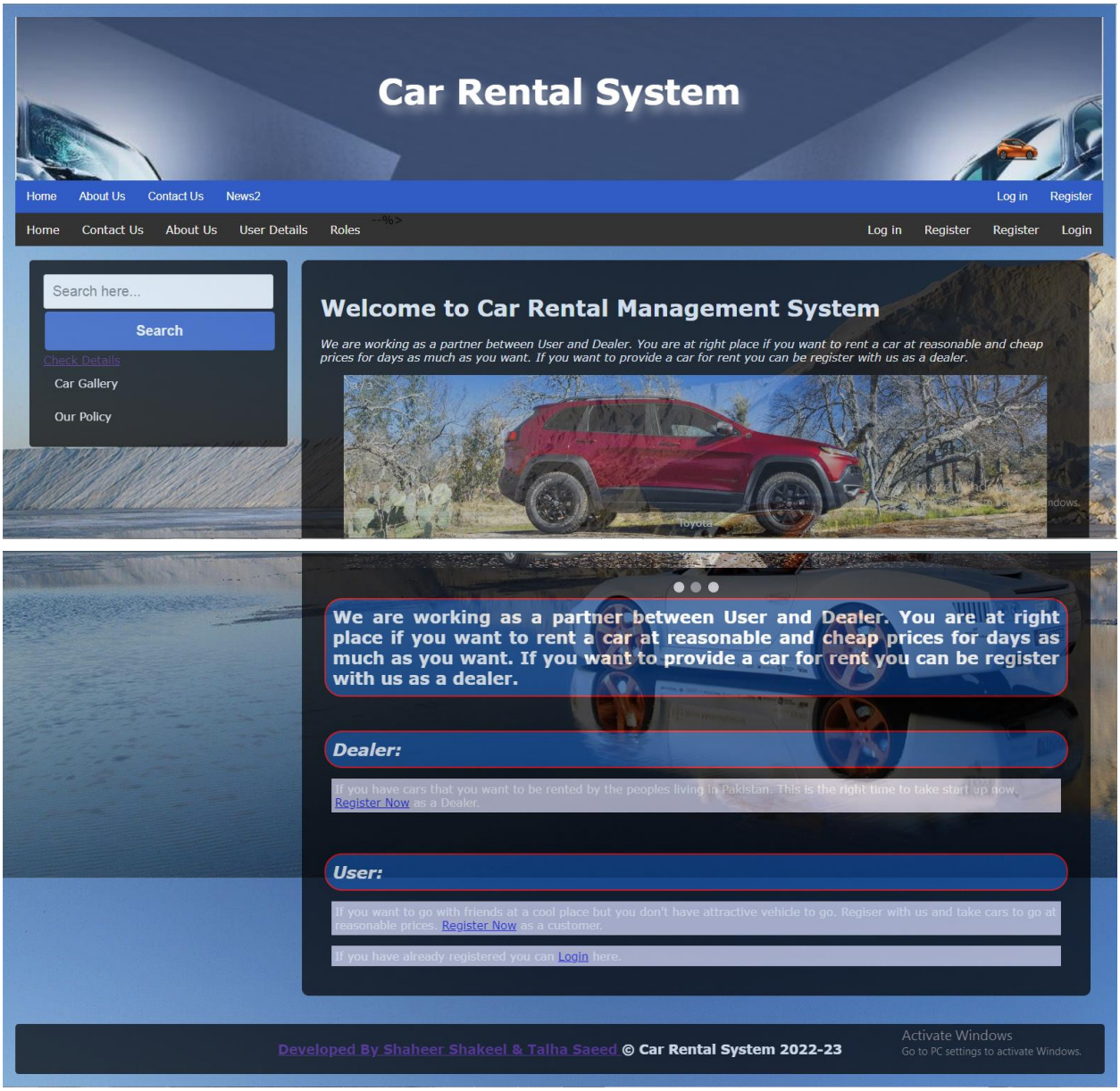
4- Car Details Form - Dealer(Add a New car, Remove an existing car, check status) : CarType, CarNumber, Model, Condition

5- Rent Form - Customer (Rent a new car) : RentDate, EndDate, Charges

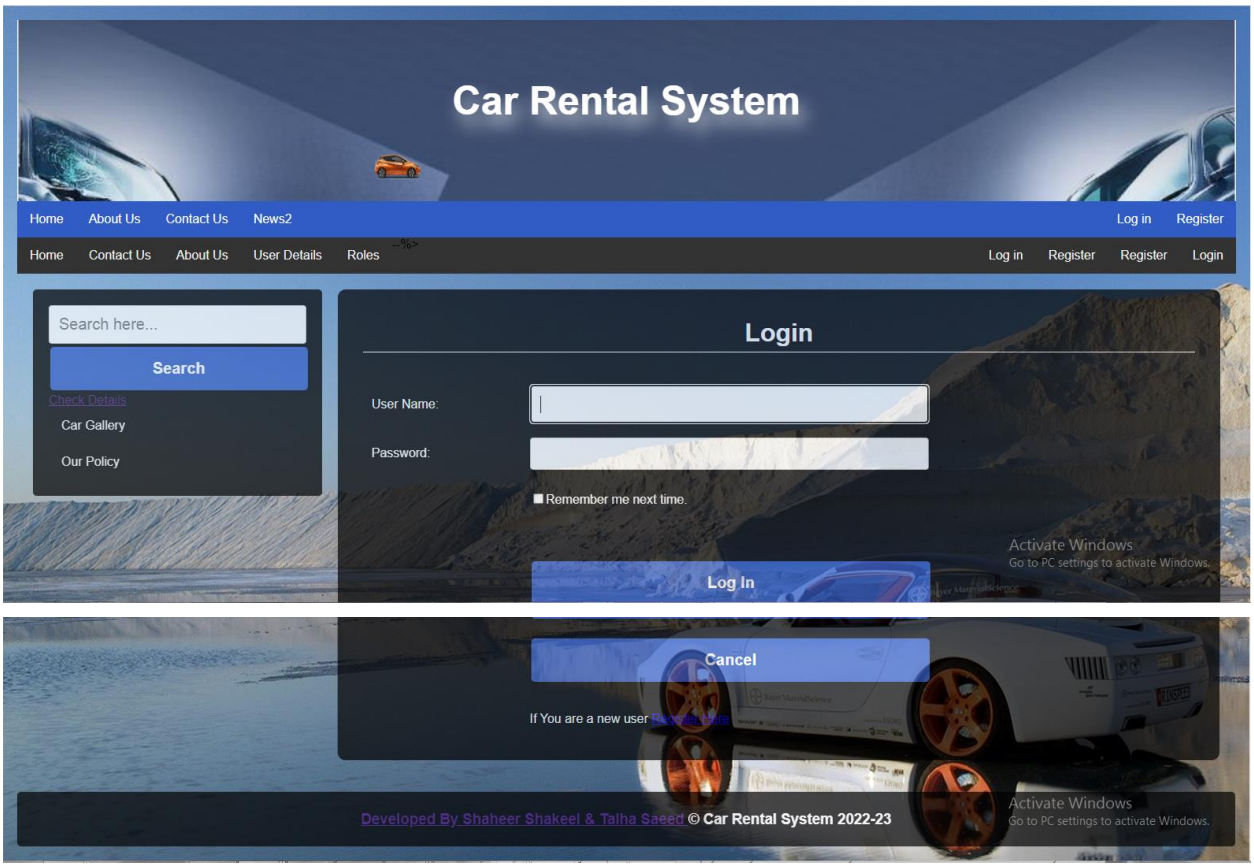
6- Return Car Form - Administrator : after the customer returns car, administrator confirms the completion of a transaction

7- Feedback Form - Optional

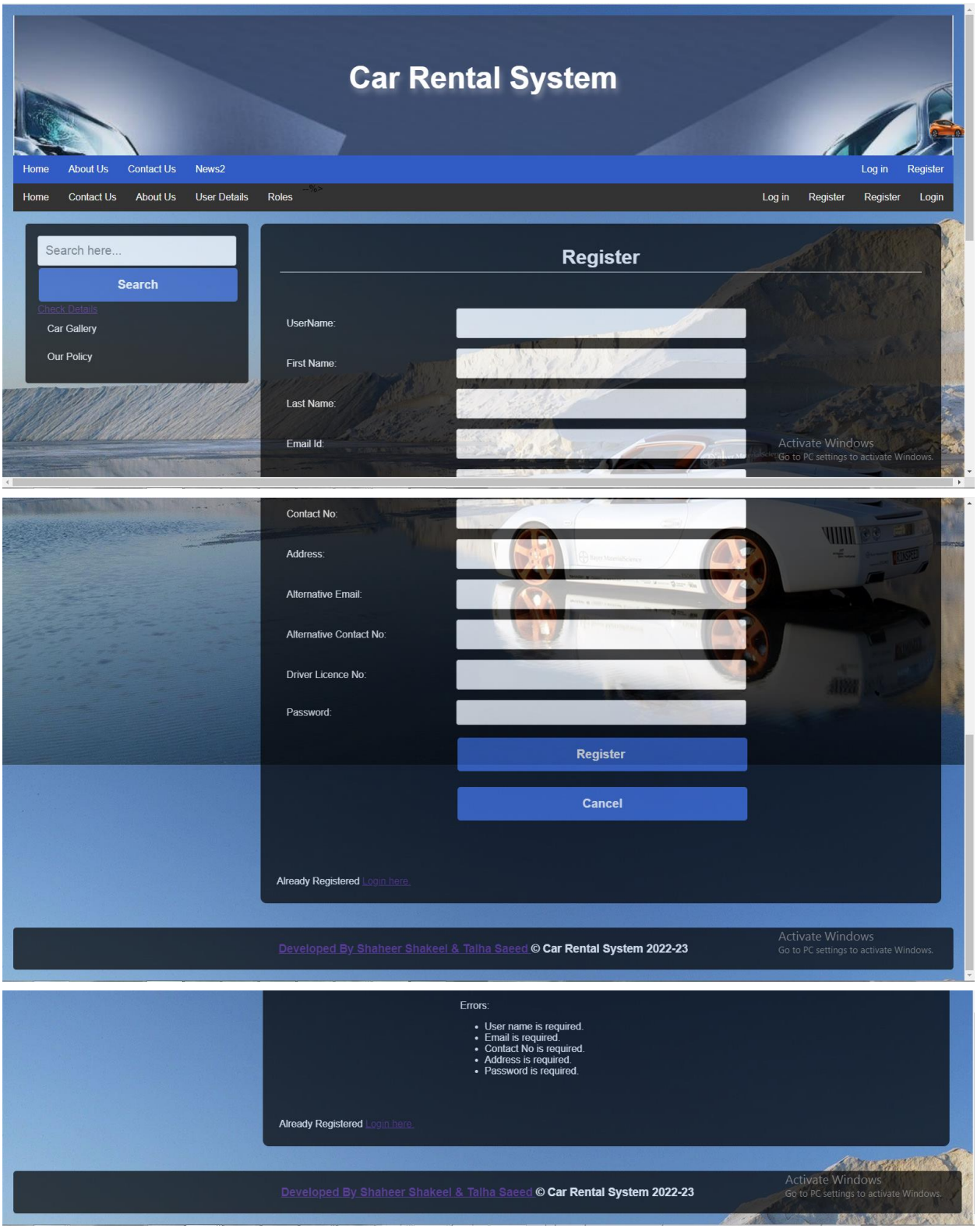
4.2.1 Home Page



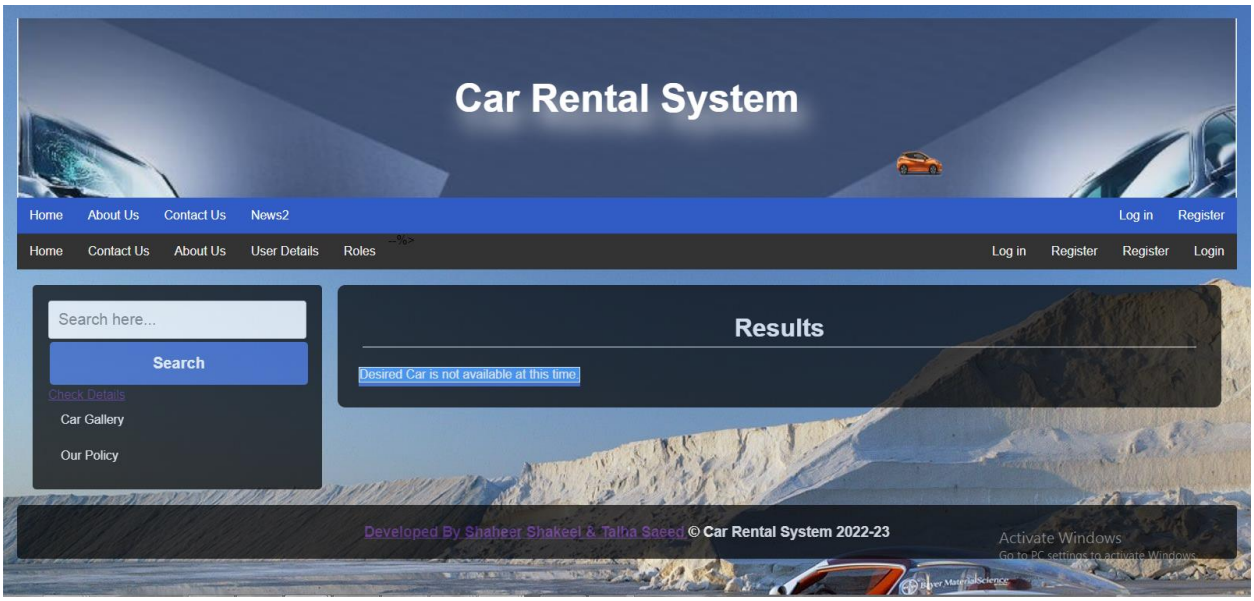
4.2.2 Login Form (Old User)



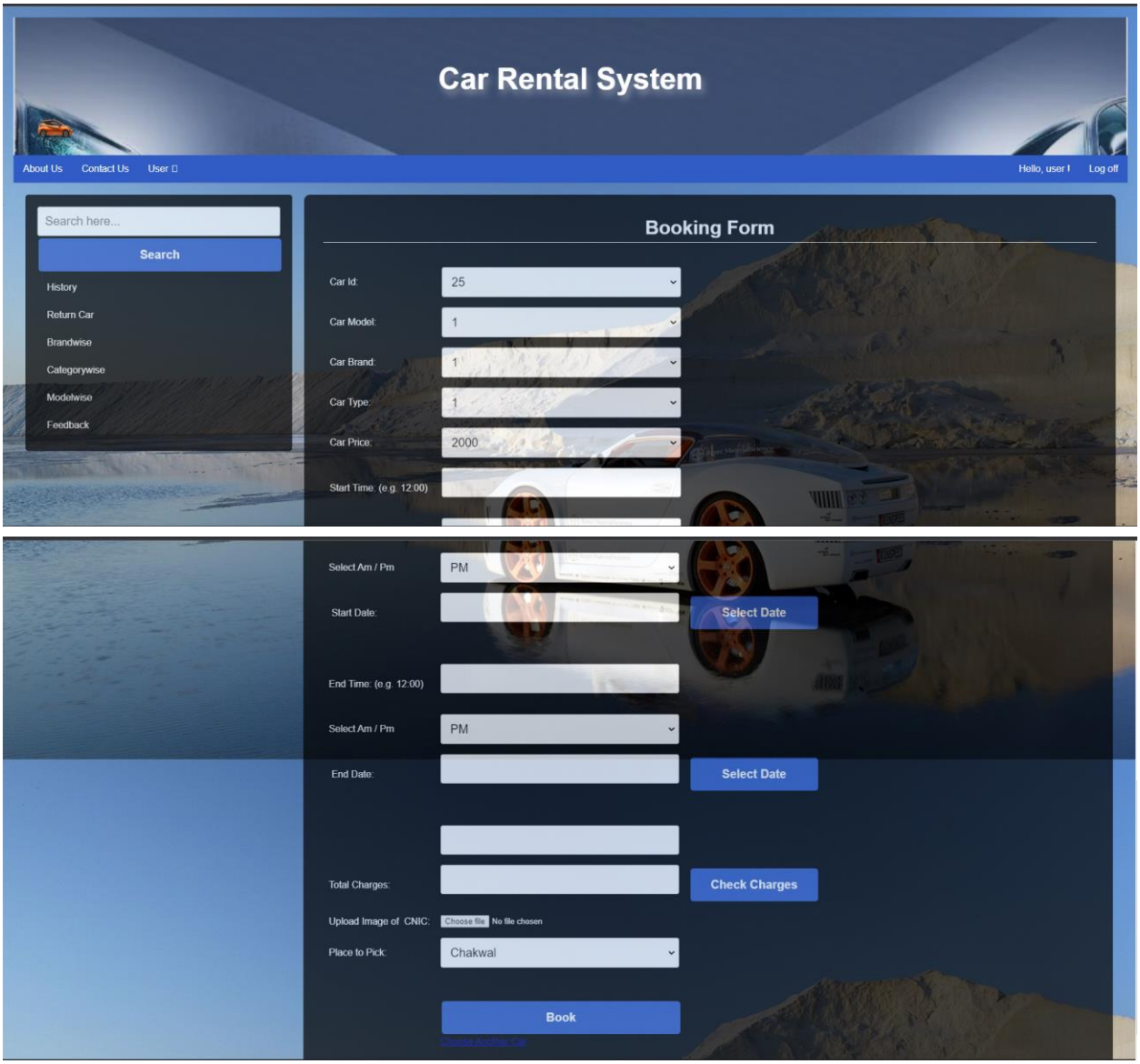
4.2.3 Register Form (New User)


Car Rental System
Home
About Us
Contact Us
News2
Log in
Register
Home
Contact Us
About Us
User Details
Roles
Log in
Register
Register
Login
Search here...
Search
Check Details
Car Gallery
Our Policy
Register
UserName:
First Name:
Last Name:
Email Id:
Contact No:
Address:
Alternative Email:
Alternative Contact No:
Driver Licence No:
Password:
Register
Cancel
Already Registered Login here.
Developed By Shaheer Shakeel & Talha Saeed © Car Rental System 2022-23
Activate Windows
Go to PC settings to activate Windows.
Errors:
User name is required.
Email is required.
Contact No is required.
Address is required.
Password is required.
Already Registered Login here.
Developed By Shaheer Shakeel & Talha Saeed © Car Rental System 2022-23
Activate Windows
Go to PC settings to activate Windows.

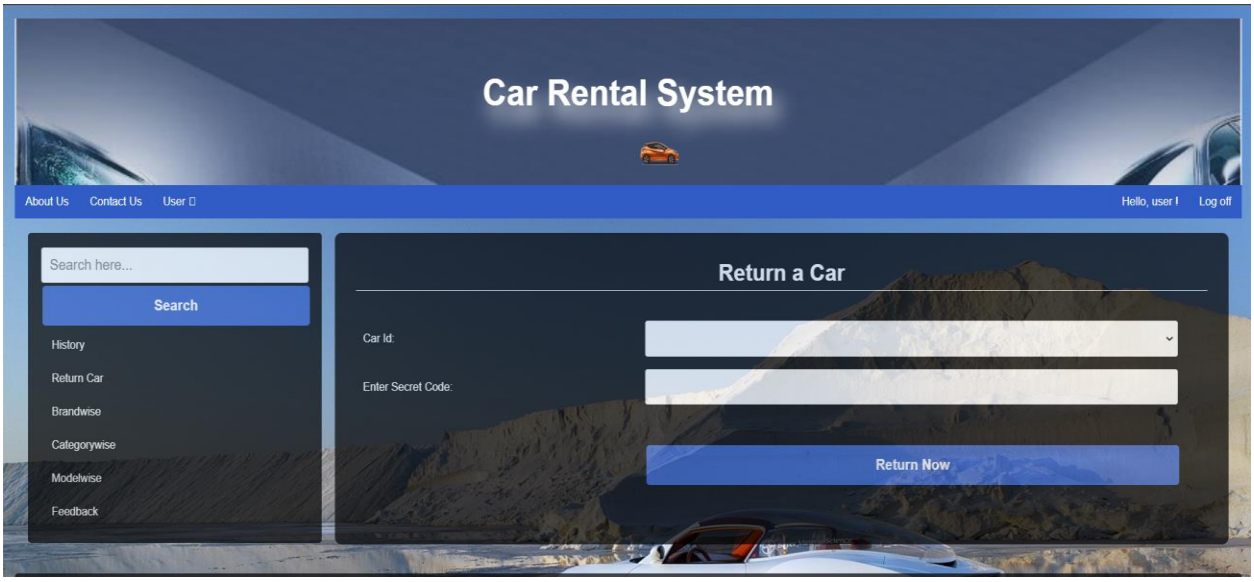
4.2.4 Search



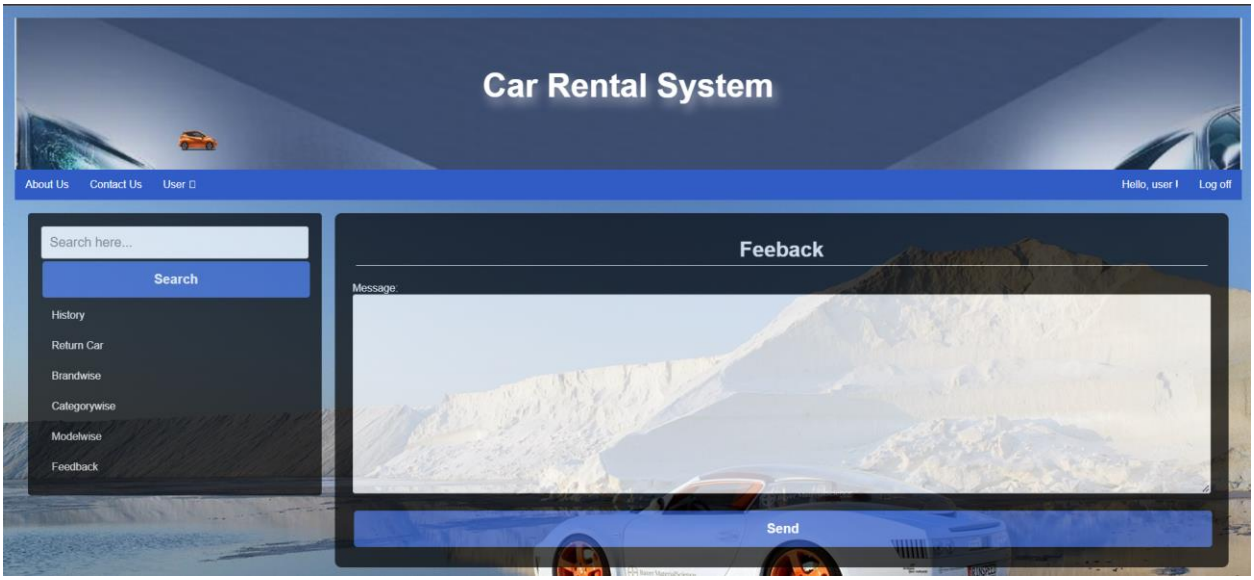
4.2.5 Booking Form (Our main Transaction Form)



4.2.6 Return Car Form (Admin)



4.2.7 Feedback Form



These attached screenshots are from customer view only if you want to see admin and dealer view. we are providing login credentials Below

5.0 Login Credentials:

ADMIN:

Username: admin

Password: admin

Customer:

Username: user

Password: codegainer

Dealer:

Username: dealer

Password: dealer

Accountant:

Username: Accountant

Password: accountant

6.0 Website Link:

https://github.com/ShaheerShakeel/OOAD-Project--Car-Rental-System/tree/main

(GitHub File Link)

http://rentacar.somee.com

(Website Link)