Software Requirements Specification

for

Car Rental System

Prepared by Ina Zenelaj

Andeta Mushi

Cristina Cala

Anxhela Koka

Erika Mejdi

Epoka University

Copyright © 1999 by Karl E. Wiegers. Permission is granted to use, modify, and distribute this document.

15/05/2024

Copyright © 1999 by Karl E. Wiegers. Permission is granted to use, modify, and distribute this document.

Table of Contents

Revision History

Name	Date	Reason For Changes	Version
Erika Mjedi	2024/05/01	Initial draft of the SRS document	0.1

Andeta Mushi	2024/05/08	Added detailed functional requirements	0.2
Cristina Cala	2024/05/10	Added security requirements and use case diagrams	0.3
Ina Zenelaj	2024/05/15	Updated nonfunctional requirements and glossary	0.4
Anxhela Koka	2024/05/18	Finalized the document for approval	0.5

1. Introduction

Every day more and more there is a need to be on the move and the way to make the movement even simpler is to use the car. Regardless of other alternative ways, the use of a personal car offers comfort, flexibility and above all you have the opportunity to move based on your needs, adapting to your schedules. Also, we notice that recently the number of tourists has increased in our country, and the majority of them are obviously looking for a safe trip, suitable to the schedules theirs and above all at a low cost, all the more so that most of them choose to visit Albania during the summer, when the movement becomes even more difficult by bus or even by car, by taxi, where we often hear cases where most of the companies, due to the influx, do not even have the opportunity to respond and provide the service, therefore the best way would be to rent a car. In recent years, this service has been provided even more popular among Albanians and foreigners, but this service is still lacking in our country, this is because most of the businesses are not known because they do not have a proper marketing. Most of them operate through an Instagram page, where there is a facility they are incomplete, and they need improvement. Most of these pages only show images of cars, and not very clear information about the schedule, prices, and often customers feel in difficulty and simply choose to give up.

Solution Proposed:

To improve the clients way of traveling, we offer an application called CarRentalSystem which allows the users to make a safe journey, and also allows them to reserve the car that they want. With this innovative application, customers can choose the car they prefer in a quick and simple way.Also, in this application, we offer all the information that users needs about the car, information about the type of car, the rental price, the dates of free to reserve the car etc. We think that in this way the work of the business and also of the client is simplified.

Purpose

This Software Requirements Specification (SSR) document presents the requirements needed for the development of a car rental system, called CarRentalSystem, version 1.0. The purpose of the document is to describe in detail the functions, features and limitations of the software. All this serves as a guide for the development of the software throughout its life cycle.
CarRentalSystem's main goal is to offer an efficient solution for managing car rental operations. Taking into account some of the main processes of this system, such as reservation management, car reservation, etc., this system aims to improve the experience of customers as well as improve efficiency.

Document Conventions

This SSR for documenting software requirements closely follows standard conventions. The requirements are organized in a hierarchical form, which provide overarching goals that are addressed in detailed specifications. Each stated requirement indicates its relative importance. The document must be legible and clear and to have these characteristics this document has followed specific standards such as:
Bold Text: This is used for titles of parts of the document and for important terms.
Italic Text: This is used throughout the document as it attracts attention in this way.
Numbered lists: They are used to number the steps and important points of the document.
Use of terms: Here, the terms will, should and can are used to present the priority of the mandatory, recommended and optional requirements that the document has.
Inheritance of priorities: This includes high-level requests that have detailed requests.

Intended Audience and Reading Suggestions

Intended Audience
CarRentalSystem SRS includes different actors in the project, which are:

- *Developers: To understand the functional and non-functional requirements, they should focus on the sections that include the functional requirements and operational actions of the system.*
- *Project Management: To manage the entire process of the system, managers should read the entire document, focusing more on the purpose, time and advantages of the system.*
- *Users: To better understand how the system works and what actions they need to execute, users should read the functional requirements sections and the car rental system usage descriptions.*
- *Testers: To test the functionality of the system, the testers must first read the functional requirements and the non-functional requirements which are detailed, the performance descriptions and the security descriptions.*

The SSR document is organized in parts so that it can be read by different types of readers, this provides relevant information based on the responsibilities of each of them.
To gain an understanding of the software's purpose, it is recommended to read the overview section.

Reading Suggestions:

-Introduction: Here the purpose is described in a summary way as well as the structure of the document.
-Product Scope: Here provides a detailed description of the software, its purpose and business relationship.
- Functional requirements - Here the functionality of the system is described in a specific and detailed manner.

-Non-functional requirements: In this part, a description of the performance, safety and quality characteristics of the car rental system is provided.
-Analysis models: This includes data flow diagrams, class diagrams and entity relationship diagrams.
-References: The necessary documents and standards of the system are listed here.

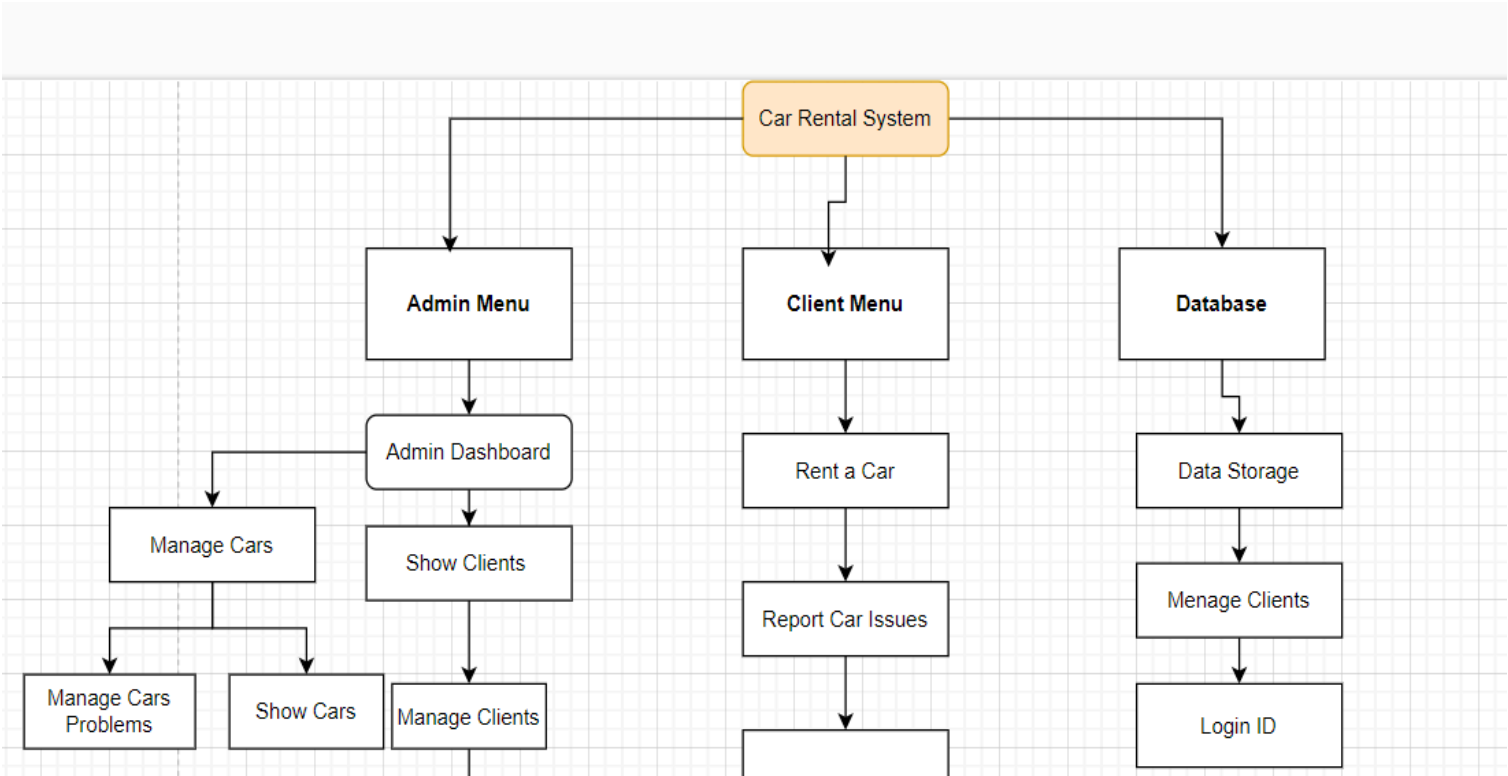
Product Scope

The CarRentalSystem was created to address the needs of car rental agencies and the needs of customers to receive a fast service. This is considered a software option, since the system offers a wide range of functions which include:
1. Management of reservations - Customers search for cars that are available, make reservations and can manage reservations.
2.Car inventory tracking - Managers can track car availability as well as schedules.
3. Customer management - The system saves customer profiles, booking history.
4. Car booking - Booking processes process payments smoothly.
By automating these processes, CarRentalSystem aims to improve efficiency and improve the customer experience.

2. Overall Description

Product Perspective

The car rental software system is created to consolidate and to make the process of renting cars easier for both customers and rental agencies.The origin of this system is not an a replacement ,but it is a new one for a rental agency.Our system's architecture offers an user-friendly interface , where it includes various features such as booking management, payment processing and also rental tracking. The system is designed with an modern technology which aim is ensuring reliability and efficiency by menageing datas and concerning with customer information.Also ,the system is



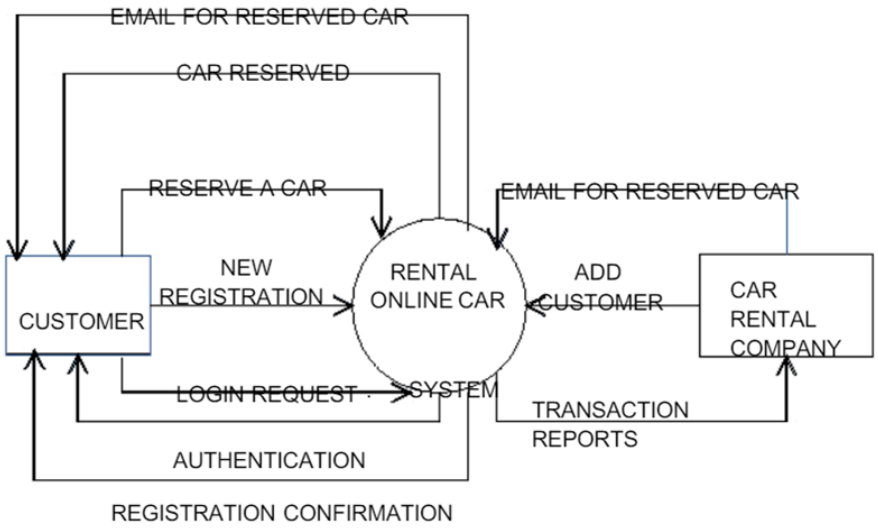
equipped with safeguard data,since security is one of the most important issue when designing a software system.

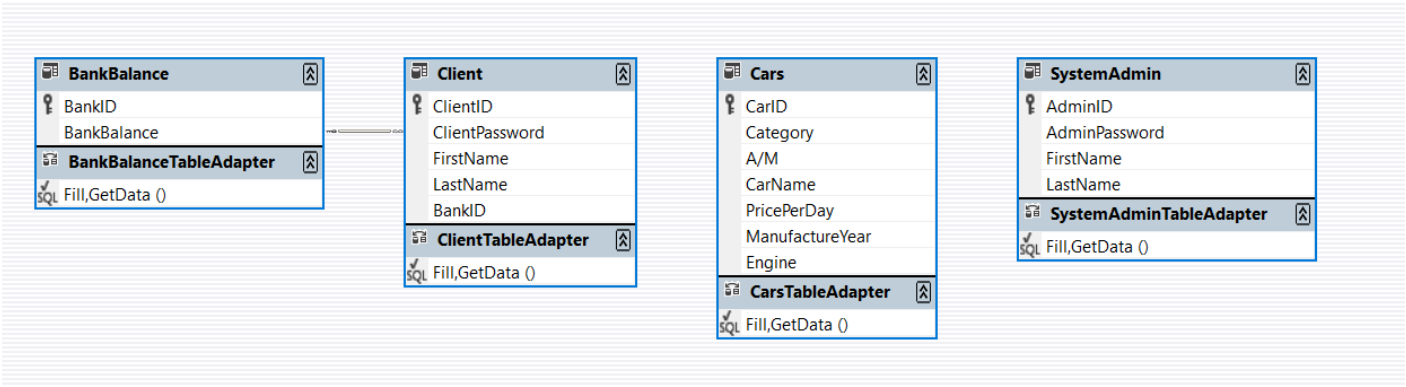
Product Functions

Cars and Reservation Management
This function is essential for managing cars and also managing their availability when customers need them. It includes tracking vehicle availability, status, and location, as well as managing customer reservations, bookings, modifications, and cancellations.

Customer and Financial Management
System function is to maintain and to keep track of customer profiles and by keeping their data it helps in data management.Connected directly to this we can say that by using that type of platform the management of rental transactions including here payment and returns are all recorded and can be well-organized.The features of that part include management of pricing, discounts, and promotions.

Maintenance & Reporting
The process of maintenance and repairing can be more easily done by using platform.Regard to our product the reports on business performance can be generated .





User Classes and Characteristics

Some user class that we can mention are:

Car Management:

● Inventory management: Keeps data for the model, year, mileage, condition, and location of all the rental cars as well as their availability.
● Pricing and Availability: Establishes rental prices according on demand, location, car type, and length of hire. Real-time updates are made to the availability status to account for reservations and refunds.
● Maintenance Scheduling: Keeps track of each vehicle's maintenance plans, which include routine servicing, repairs, and inspections to make sure the Ueet is kept in top shape.

Booking Management:

● Reservation Process: Leads customers through the steps of looking for cars that are available, choosing rental options (such as dates and hours of the rental, and pickup and drop-off locations), and Knalizing reservations.
● Availability checking: This method reserves a few chosen cars for the duration of the booking process in order to check the availability of cars based on the user's provided criteria and avoid duplicate booking.
● Reservation Lifecycle: Oversees all aspects of managing a reservation, including booking conFIrmation, modiKcation (such as altering the vehicle type or rental dates), cancellation, and processing of refunds.
● Review :Also in this section after the user close the lifecycle the user can leave feedback.

Client Management:

User Profiles: In the client management , administrators have access as well as control over detailed user profiles. This contains data including user contact information, rental history, preferences, and any special requests or customer notes.

Registration and Authentication: Administrators are able to manage the new client registration process. They have the ability to check user data, and accept or decline requests for new accounts. They can also help clients with account access and resolve issues linked to authentication.

Review Polls
Review polls are made and maintained by administrators to get input on rental experiences. They adapt the questions, analyze the answers, and apply what they know for continued growth. Reports and poll data combine to provide a full picture of client feedback and service improvements.

Manage Car Problems:
Administrators check and handle reported vehicle diXculties, including damage or mechanical issues. They delegate maintenance chores, monitor the status of resolutions, and guarantee that rental cars are kept in top shape.

Operating Environment

Hardware Platforms
In order to run the system is needed an hardware interface or as it's commonly called hardware infrastructure.Hardware infrastructure is commonly used in business enviroments.It includes some servers,workstations and also networking equipments.In order to support hardware infrastructure there exist some hardware requirement that are used for running system.The requirements support both client-side and server-side,ensuring easier operation for users who would access the system sometimes in different devices.

Hardware Requirements

Name of component	*Specification*
Processor	*Intel Xeon*
RAM	*128G*
Monitor	*15 Color Montior*
Hard Disk	*20G*
Keyboard	*104 keys*

Software Platforms
A user interface, a database management system for data integrity, and a backend server for inventory and reservation management comprise the strong ecosystem that makes up a vehicle rental software platform. By establishing connections with outside services like payment gateways and geolocation, built-in APIs improve functionality. Data security is ensured by scalability and performance improvements, which also promote quick system response. This platform, which is backed by development tools, facilitates effective development and offers clean lease operations and user experiences that can adapt to changing business needs.

Software Requirements

Name of component	Specification
Operating Systems	*Windows 10,Linux*
Languages	*Python*
Database	*My SQL Server*
Browser	*Mozilla,Google Chrome*
Web servers	*Apache*
Scripting Language Available	*Python*
Database JDBC Driver	*MySql*

Design and Implementation Constraints

Hardware Limitation *During the process of running and designing an car rental system,from the developer side should be thought some limitations options that can affect in their job .It is better to think all limitations before you start an software system creation.If we talk for the hardware section ,we can say that the developers should consider parts such as processing power,memory and storage capacity in order to have a better design for the system.Also timing requirements for real-time processing or some sensitive operations may cause limitation on architectural decisions or algorithm alternatives.For that reason,the developers have chosen the right hardware requirements in order to avoid such limitations.*

Specific Technology
Before starting the designing software system,one plan before is the choice of technologies that developers will choose.Their choice can be a factor for limitation of work and can make delays for the deadline of the project.There are a lot of options for the languages such as Python,Java,JavaScript)and tools for supporting this languages such as Visual Studio,IntelliJ IDEA.Also there was also the case where half of the team is proficient in Python ,meanwhile some of them preferred more Django web framework.

Specific Databases
While keeping recorded our data, firstly was needed a tool for creating a database ,where the management of datas is more organized and also offers more comfort for the administrators of system.However,the selection of database tool that will help in storing datas acted as an limitation for designing our system.For instance ,the car rental system for the moment will just deals with small amount of data and it is right choice to use the relational database such as MySQL,but if in

the future need to handle with large amounts of data ,our tool is not anymore suitable,but it will need PostgreSQL.

Communication Protocols
While facilitating the data exchange between user interfaces or external interfaces the main supporter would be communication protocols.The choice of an standardized protocol and the ensuring of them with various platforms was a limitation option for our developers.For our developers was a little bit complicated to make an interaction between payments gateways,mapping services etc.

User Documentation

For our rental car system before realizing the platform on web or in app store,would be created some user documentations in order to make their experience in our system more than perfect and also to offer them an user-friendly platform.

Tutorials
The first option as a guide document would be tutorials .These tutorials may be presented for the user as a video demonstration with some slideshows or step by step guides.Creating tutorials may help users to familiarize themselves with the software interface and also with its features.

Online helps
Online helps is directly connected to the users and its results can be better than in tutorials since the communication is done at once.Online helps can be difficult for the rental car agency since it will need more employ to offers the user the opportunity to understand better the system ,but can attract more clients from all ages.An interactive help like this may include pop-up messages,chats and guider who will assist users in performing specific tasks or accessing relevant information.

Assumptions and Dependencies

Development Environment
In SRS requirements it is assumed the environment of development that includes tools,programming languages framework based on the teams skills,but it may happen some changes such as toolchain updates that can affect in the system requirements and can cause delays in designing of software.For example ,firstly we decided to use as language the Java ,but after some updates and some analysis ,we was obligated to change the programming language chosen.

Operation Environment
At the beginning of the project, we first based on some existing structures and did not build it from scratch to save time.But sometimes ,using some software components reused from another project or third-party libraries and APIs it happens that this external these external dependencies are not available, accessible, or maintained and d could lead to implementation challenges by having impact on the system requirements and project timeline.In our case was not such problems since we was very careful with reused parts from other projects.

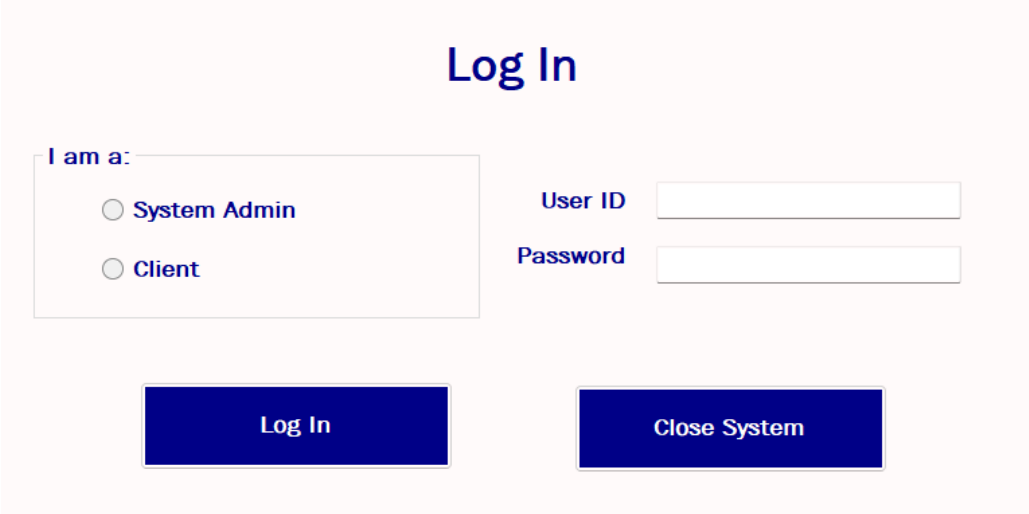
Budget and Resource Constraints
There exist assumptions where availability of budget and other resources for the development ,maintenance of our system is properly right,but there are also cases where changes in budget or in resource availability can cause feasibility on requirements,on project scope,on implementation and even can cause problems in timeline .

3. External Interface Requirements

User Interfaces

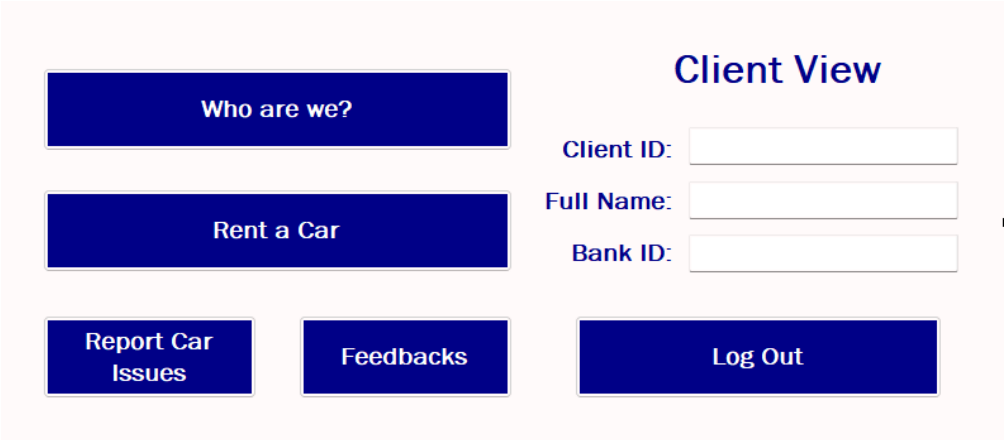
The user interface (UI) of the car rental system serves as a main point of interaction between users and the system. This system facilitates the use and access of users and meets their needs and preferences.
The main components of the user interface are:
1. Login screen - Here the user will log in to the system by entering credentials such as username and password.
2. Main Panel - After the user manages to log in, a panel will appear that presents the options based on the role of the user as (client or administrator).
3. Navigation menu - A navigation menu will be accessed from each screen allowing intuitive access to various functions and features.
4. Standard functions- This includes functions such as "Help", "Settings" and "Logout", these functions will be displayed in a visible way to have access as easily as possible.
5. Error message display standards - Clear error messages will inform and guide the system user to solve problems in an effective way, this results in increasing the usability of the system.

1) *Firstly when the client will open the system it will be shown the userview,where it should make login with his/her User ID and password in cases where it is registered so he/she has an account on car rental system.Also it should choose if it is an admin or a client who has aim to take the service.*

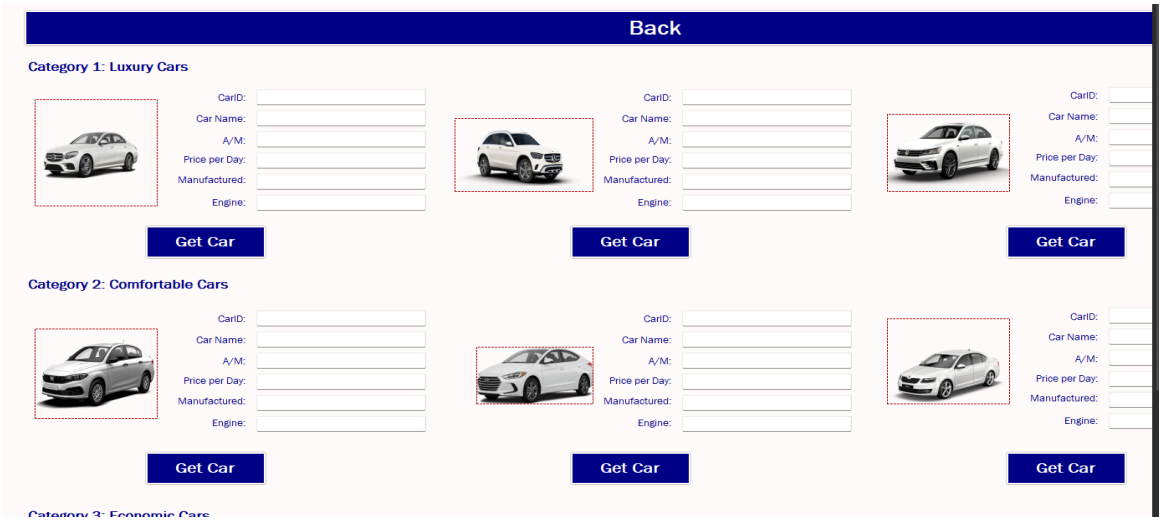


2) Next step is to enter in the client interface where are offered the features:

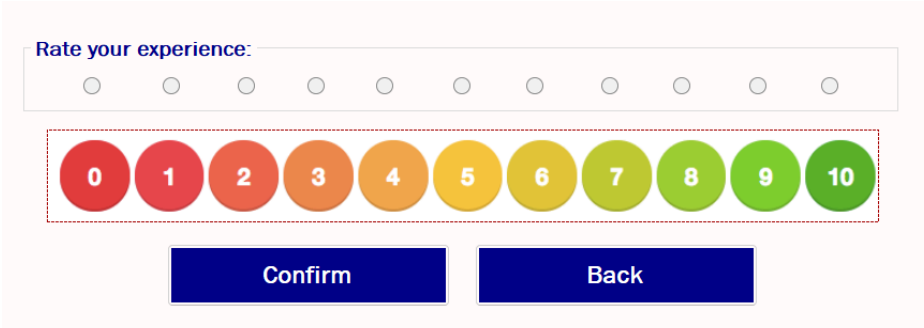
- *Who are we?-The client should enter if it is a student,a familiar or someone else as an option.*
- *Rent a car-By using this feature the client has the opportunity to choose the car that he/she finds suitable for their opportunities.*
- *Report Car Issues-In this case,the client can use it as an option if the car that they have used has any problem ,or the case where the client has made any damages on the car.*
- *Feedbacks-After the experience of the car has been taken for rent ,the clients can leave their review ,by scaling their opinion also.*
- *Bank Id:This option can be used after the client has chosen the car that will take for rent,by immediately making the payment by card.*



3)After clicking the option Rent a Car ,the other page that will be shown is the list of cars where it includes the car Id,car name,price per day,engine etc.Also the cars are separated into categories based on the filters selected by the client.



4)After clicking the feedback button the client can leave a review for the experience with the car rent.



3.2 Hardware Interfaces

The car rental system engages with different hardware components in order to function effectively. These components include servers, customer devices such as computers, smartphones and tablets that are used to enter the system, and finally the payment terminals which ensure the completion of transactions. The car rental system must include a wide range of hardware configurations in order to include the different preferences of users. Compatibility and integration with these hardware components results in a more reliable experience for the user, so we can say that these components are very important for the longevity of the system and for its performance.

Software Interfaces

The car rental system has a number of software components that provide efficient functionality. These components include:
1.Data Management System (DBMS): This component is used to store car inventory data, user data and car reservation data.
2. Operating systems: The CarRentalSystem application is compatible with different operating systems such as: Windows, Linux and macOS in such a way as to have the widest possible use.
3.Tools and libraries: These facilitate key functionalities such as payment processing, email notifications, all of which maximize system efficiency.
4. Integrated commercial components: New or additional features and services can be developed and integrated into the system, this is achieved through commercial components that meet specific business requirements as well as customer needs.
5.Also, for the most efficient data management, popular options such as MySQL and PostgreSQL are included.
The data that will be exchanged between the software components will be fully and accurately documented, describing in detail the purpose and nature of their communication. Well-defined APIs and protocols have also been created to facilitate communication between these components that this system contains, ensuring interoperability as the system develops and evolves even more.

Communications Interfaces

Communication is very important as it facilitates user interaction and system functionality. This includes:
1. Email notifications: This enables the notification for confirmation of the reservation, we can say that it plays an important role as it keeps the users updated and engaged during the entire car rental process.
2. Access to the web browser: The system will ensure that users have nothing and interact with the platform without any problem through the browser.
3. Communications with the web browser: As we know, the standard communication protocols are TCP/IP, which are used here to facilitate the exchange of data between client interfaces and applications from the server side, this enables secure communication on the Internet.
4. Communication Security and Encryption: Strong measures will be implemented to protect data, including encryption protocols, which protect data from unauthorized access and data breaches.
5. Synchronization mechanisms and data transmission rate: These will be implemented in order to ensure the most efficient communication between the different components of the system, in order to reduce the delay and increase the overall performance of the system.

4. System Features

Admin Features

- ***Show Clients***

1) In the admin view the administrators can manage the accounts and the profiles of the clients,by creating,updating or deleting them.

2) Stimulus/Response Sequences

Stimulus:Admin selects the "Show Clients" option.

Response:A list of clients is provided and also the options of adding ,editing or deleting accounts of clients

3) Functional Requirements

- ☐ *Admin can manage the user accounts by adding new profiles together with their specifications.*
- ☐ *Admin can edit the user profiles by adding more details,by updating their personal details or by changing something that is unnecessary.*
- ☐ *Admin can deactivate user profiles for some time or can either delete their account.*

- ***Manage Cars***

1) *By clicking this option the admins can manage the inventory of cars, by adding new vehicles, updating details, and removing cars from the list.*
2) *Stimulus/Response Sequences:*

- *Admin selects "Manage Cars".*
- *System displays a list of vehicles with options to add, edit, or remove vehicles.Also there would be an option to fulfill car id,engine,category,price per day even the manufacturer year.*

3) *Functional Requirements:*
    - *REQ-1: Admins can add new vehicles to the system, including details such as make, model, year, and category.*
    - *REQ-2: Admins can update vehicle details and availability status.*
    - *REQ-3: Admins can remove vehicles from the system or mark them as unavailable.*

- ***Manage Car Problems***

1)This feature is useful only for the admin interface,where by using this feature the admin can deal with reported issues and can try to solve them.

2) Stimulus/Response Sequences:

- *Admin logs into the system and click to the "Manage Car Problems" section.*
- *System displays a dashboard with a list of reported issues.*
- *Admin selects an issue to view detailed information and updates the issue status.*
- *Admin can choose if the problem can wait or not.*
- *System notifies the user who reported the problem with new status.*

3) Functional Requirements:

- *REQ-1: The system allows admins to view a list of all reported car issues with needed information such as date reported and type of issue.*
- *REQ-3: Admins must be able to view detailed information associated with precise information,time and also with photos.*
- *REQ-4: Admins must be able to update the status of an issue (e.g. problem can wait,problem can not wait).*

- ***Review Polls***

1) *By using this feature administrators have the opportunity to view, analyze user reviews and feedback through visual tools such as pie charts.*

2) *Stimulus/Response Sequences:*

- *Admin click to the "Review Polls' ' section.*
- *System displays a dashboard with user feedback summaries and visual analytics.*
- *System generates a pie chart illustrating the distribution of user feedback ratings or responses.*

3) *Functional Requirements:*

- *REQ-1: The system must allow admins to have a view of a summary of user feedback and reviews.*
- *REQ-2: The system must display feedback results using visual tools such as pie charts for easier analysis.*
- *REQ-3: Admins must be able to click on segments of the pie chart to drill down into detailed feedback for that segment.*

User Features:

Rent Car

1) This feature is offered only for client view.By using this feature users can search for available cars, view details, and complete the rental process.

2) Stimulus/Response Sequences:

- *Client firstly logs into the system and clicksto the "Rent a Car" section.*
- *System displays a list of available cars ,where you have option to put some filters such as ,category of cars,price,availability od dates.*
- *Client selects a car from the list to view detailed information,which includes car name,car Id,price per day or engine.*
- *Client confirms the car selection and enters personal and payment details..*

3) Functional Requirements:

- *REQ-1: Clients must be able to access the "Rent a Car" section after logging in.*
- *REQ-2: The system must display a list of available cars based on the filters*
- *REQ-3: Clients must be able to view detailed information about each car, including make, model, features, pricing, and availability.*
- *REQ-4: Users must be able to select a car and proceed to the rental confirmation step.*
- *REQ-5: The system must prompt users to enter personal details and bank id.*
- *REQ-6: The system must allow clients to enter payment details securely, supporting multiple payment methods.*

Report Car Issue

1)This future is an optional one for the client view section.By using this feature users are allowed to report issues or problems encountered with rental cars..

2)Stimulus/Response Sequences:

- *User logs into the system and clicks to the "Report an Issue" section.*
- *System displays a form for the user to enter details about the issue.*
- *User fills out the form, providing a description, selecting the issue category, and optionally uploading photos.*
- *User submits the issue report.*
- *System notifies the admin about the reported issue.*
- *Users receive updates on the status of the reported issue.*

3)Functional Requirements:

- *REQ-1: Users must be able to access the "Report an Issue" section after logging in.*
- *REQ-2: The system must show a form for users to describe the issue with a detailed description and also the date of the issue.*
- *REQ-3: The system must send a confirmation email or SMS to the user with the tracking number and details of the reported issue.*
- *REQ-4: Users must be able to view the status of their reported issues through their account dashboard, including updates and resolution details.*

Feedbacks

1)This option is only available for the client view section.Users can share their experience through a visual mechanism of rating their experience for their car rental history.

Stimulus/Response Sequences:

- *User logs into the system and clicks to the "Feedback" section.*
- *System displays a feedback form where the user can rate their experience on a scale from 1 to 10.*
- *User submits the feedback form.*
- *System acknowledges receipt of the feedback and stores it in the database.*
- *Admins can review and analyze the feedback through their review polls part.*

3) Functional Requirements:

- *REQ-1: Users must be able to access the "Feedback" section after logging in.*
- *REQ-2: The system must provide a feedback form that includes a scale for users to rate their experience from 1 to 10.*
- *REQ-3: The form must allow users to select specific aspects of their experience to rate, such as vehicle condition, customer service, and overall satisfaction.*

5. Other Nonfunctional Requirements

As the term implies, non-functional requirements are those that don't immediately relate to the particular services the system provides to its consumers. They might have to do with qualities of emergent systems including response time, store occupancy, and dependability. As an alternative, they could specify limitations on how the system is implemented, like the I/O device's capabilities or the data representations utilised in system interfaces.Performance, security, and availability are examples of non-functional requirements that typically define or limit the features of the system as a whole.

Performance Requirements

The performance requirements are very important as it ensures the rental car system to function effectively. Here are described the specified performance measurements that the system must fulfill in order to achieve the operational needs.

1.Response time: *There should be a minimum of 10 seconds of response time from the system for each command that the user performs. A high performance rate and quick response time are required from the system for processing user input. Typically, tasks requiring high complexity should take 50 seconds to complete, while simpler tasks should take 20 to 25 seconds.*

2.Concurrent users: *The rental car system must accept a minimum of 10,000 users simultaneously, in order not to affect the performance of the system. This number is provided in the case of periods such as festive seasons or different events. Taking into account this number, the system ensures to maintain its performance, preventing slow service.*

3.Data Processing:
-Group processes: including overnight data reconciliation and system backups should be completed within 2 hours. Having a correct data processing system is ready for the next day to work, this makes the system up to date and provide users with accurate information.
-Real-time processing: This includes updating the status and availability of the vehicle which as a process should change within 2 seconds.This is important as system users will always have access to current information.

4.Transaction throughput:
-Rental transactions: This system should at least process at least 400 transactions per minute. All this ensures the system to handle a large number of transactions, which is very important in the event of an increase in customer activity.
-Payment processing: These should be processed within 4 seconds as fast payment processing is important to gain user satisfaction and reliability. Slow payments always lead to frustration and abandoned transactions, so it is important that the system provides a efficient processing of these transactions.

5.Load testing and Scalability:
-Load testing: The rental car system should be tested by loading it with maximum loads to help the system identify possible performance bottlenecks and make the system withstand unexpected increases.
-Scalability: The system must support vertical and horizontal scaling to withstand the loads that may occur. Horizontal scaling allows the system to increase the number of servers to help reduce load, while vertical scaling deals with improving existing hardware.

Safety Requirements

1.Vehicle Safety-*The system should ensure that the cars that are rented are in good condition, it should inform the customers about the cars that are not rented for some issues until it is resolved.*

All this ensures the safety of the customers as it allows the rental of cars that are in good condition to be used.

2.Emergency Protocols-*This system should provide clear information about situations such as vehicle breakdowns and vehicle accidents. This results in increased security and customer confidence.*

3.Data Integrety-*The system must have a backup copy of the data and must provide integrity checks so that the data is not stolen. This protects the system and makes the system provide accurate and available information.*

4.Compliance with Safety Regulations-*The system must be in compliance with the car safety regulations in the way that all vehicles that meet the safety criteria. This makes the system comply with legal standards, reducing risks for users and avoiding legal consequences.*

Security Requirements

Security must be primary for this system, as data protection must be ensured, in this way the user's trust is gained. In this section, we have described in detail the security measures and protocols that must be implemented in order to ensure the protection of the system from unauthorized access, from data breaches or other threats.

1.Authentication:
-User name and password - The system must require a user name and password for all users who want to enter the system in order to prevent unauthorized access. The required credentials are the first method of defense to protect the system. requesting the name and password ensures that the authenticated user has access to the system and can perform actions within this system.
-Password complexity - Passwords must contain a minimum of 8 characters, including combinations of letters, numbers and special characters such as (?!~{}-&%|>).
To increase security, complex passwords should be used as they are more difficult to find, in this way the risk of cyber attacks is reduced.

2.Multi-Factor Authentication (MFA):
-Authentication method-This includes SMS-based codes. Having these methods ensures that system users choose safe options for their needs.

3.Data Encryption:
-Data encryption in transit - The data transmitted between the server and the client must be stored and encrypted by standard protocols such as SSL and TLS. This ensures that the data is unreadable by unauthorized access and ensures data protection. personal and payments made by the user.

4.Access Control:
Role-based Access Control - Using role-based access allows users to access actions and data related only to their roles. This reduces security risk by not allowing access to functionality based on user roles.

5.Monitoring :
-Monitoring of activities - This includes attempts to enter the system and access data. Continuous monitoring helps to find out if the data can be hacked. This testing helps the system to take quick measures in case the activities will occur. of hacking.

Software Quality Attributes

1.Availability: *is very important, so the system must be accessible 24 hours a day, every day of the week. This makes the user accessible at any time, increasing his confidence in using this system.*

2.Maintainability: *The system must have updates and maintenance with a minimum time of no more than 1 hour update. The maintenance process is very important as it reduces service interruption and ensures availability and effective functionality.*

3.Usability: *The user interface should be easy to use, thus increasing user satisfaction and reducing the need for user training.*

4.Testability: *By testing the codes and functionality of the system, it is possible to ensure the stability and reliability of the system, in this way the number of system performance errors can be reduced.*

Taking into account all these attributes, the system manages to have a high quality of the services it offers, this brings reliability for users, clients but also for administrators. All these make the performance of the system effective and ensure the long-term success of the system.

Business Rules

The rental car system must always provide information in case of situations such as vehicle breakdown, vehicle accident. All this makes the performance of the system excellent.

1.Data integrity: *Using this method, the system has an effective solution to have backup data and in this way data theft is prevented. This is very important for the operational continuity of the system.*

2.Eligibility for rental: *The user must have a driver's license to reserve and pay for the car. This maintains legal compliance and avoids the possibility of fraud or misuse of the car.*

3.Reservation and cancellation policies: *Customers can cancel car reservations but at least 24 hours in advance to avoid cancellation fees. This helps in managing the availability of cars, and reduces the loss of money.*

4.Customer feedback: *The system provides reviews so that the customer leaves comments for the service. In this way, it is possible to understand what are the shortcomings of the application and what it should offer, this is something positive as the system improves by increasing the quality of the service.*

5.Offers and discounts: *The rules for offers during festive periods or different events must be applied. These offers must be communicated to users and customers, all this increases the commitment and satisfaction of the customer and we can also say that the number of sales increases.*

6. Other Requirements

Database Requirements:

- *Data storage - The system must have a relational database in order to ensure the storage of data that includes customers, cars, reservations and transactions.*
- *Reservations: Reservations are required to be made every day, because in this way available data is ensured.*
- *Performance: The database must accept access from multiple users at the same time.*
- *Security: Users' private data such as passwords and payments must be encrypted in the database in order to be protected from hacking.*

Legal Requirements:

- *Data protection: The system must deal with important regulations such as GDPR (General Data Protection Regulation).*
- *Transaction records: The system must store transaction data for at least five years to comply with financial regulations.*

Internatinalization Requirements:

- *Language inclusion: The system includes many foreign languages such as English, French and Spanish.*
- *Date and currency formats: The system adapts to the local currency and date formats based on user settings.*
- *Characters: The system includes a large number of characters and symbols based on different languages.*

Reuse Objectives:

- *Modular design: The system is built with a modular architecture so that the reuse of components is easy.*
- *Documentation: This system is equipped with a documentation that shows the use of the system, in this way it will be easy to reuse the software components.*
- *Code reuse: Codes are clearly written, well defined and documented, this allows the system to be reusable for its future development.*

Appendix A: Glossary

- ***General Terms***

The Software Requirements Specification (SRS) is a comprehensive document that outlines the functional and non-functional requirements of the software system that needs to be produced.

- ***Functions of Users***

Admin (Administrator): *The user with the most power in the system, in charge of overseeing clientele, automobile rentals, comments, and general upkeep of the system.*

Client (User)*: A person who uses the system to rent cars, give comments, and report problems.*

- ***Operational Components***

Rent a Car: *A function that lets users look for, pick, and reserve vehicles using the database.submit an Issue: A function that lets customers submit concerns or problems with cars they've hired.*

Manage Car Issues*: This capability allows administrators to monitor, control, and fix reported vehicle problems.*

Feedback: *A function that lets consumers rate and discuss their rentals*

- ***Features of the system***

Dashboard: *A part of the user interface showing a summary of important data, including cars that are available, problems that have been reported, and summaries of customer input.*

Form: *A component of an interface that lets users enter information, like search parameters, problem descriptions, or evaluations of their comments.*

- ***Technical Terms***

Database: *An organized set of electronically stored data that the system uses to manage user, rental, vehicle, problem, and feedback information.*

Short Message Service (SMS): *A text messaging app for sending brief messages to mobile phones.*

ID (Identifier): *A special number given for identification purposes to an object, such as a user, vehicle, or problem.*

- ***Feedback and Reporting***

Rating*: An estimated number, usually between 1 and 10, that customers offer to indicate how they felt about their experience.*

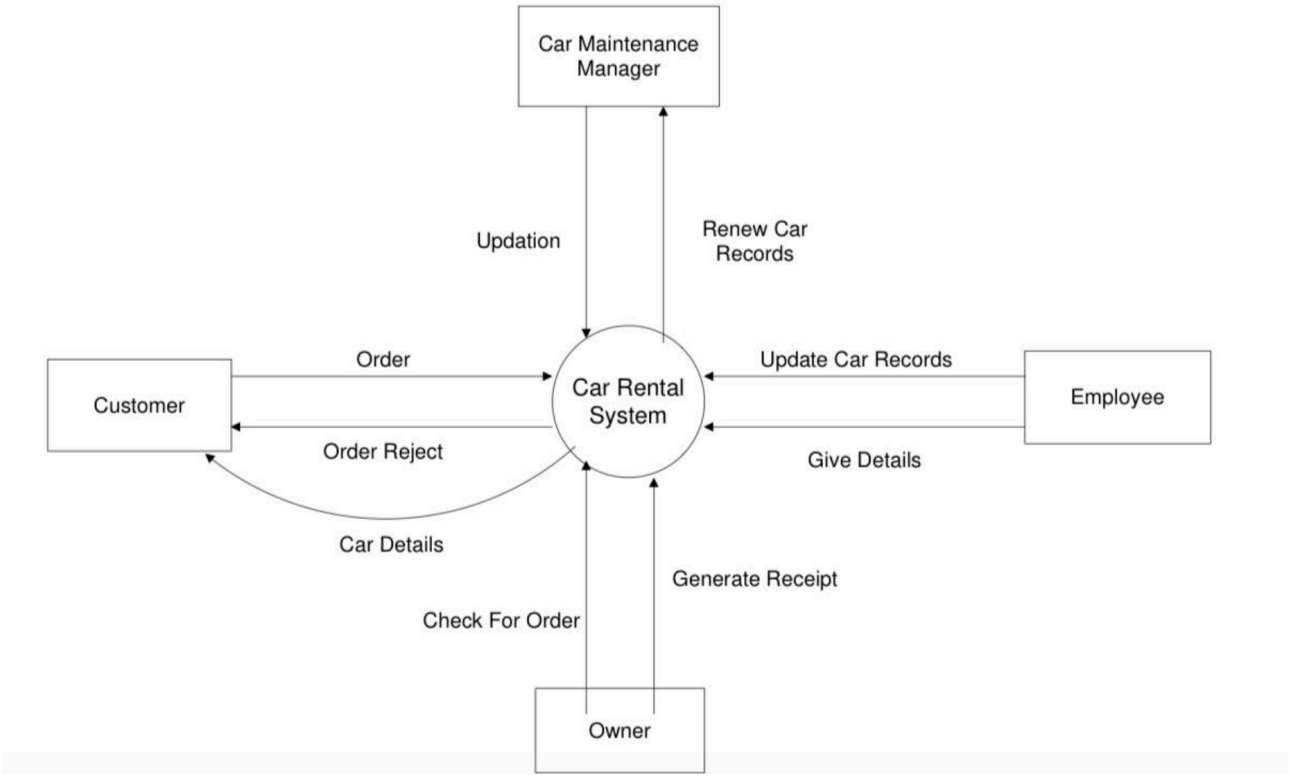
Issue Category*: A grouping of difficulties that have been documented, like electrical, mechanical, or aesthetic problems.*

Encryption:*Data is coded in order to prevent unwanted access through the use of security and privacy encryption.*

Authentication.:*The process of confirming a user's identity before allowing them to use the system*

Appendix B: Analysis Models

Data Flow Diagram

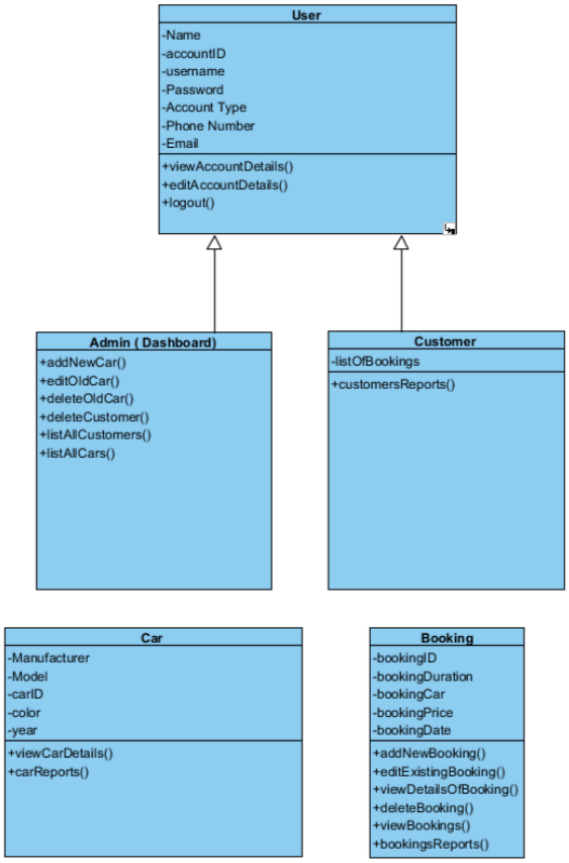


- *An order is submitted by the client.*
- *Orders are submitted by Customers, who are information sources.*

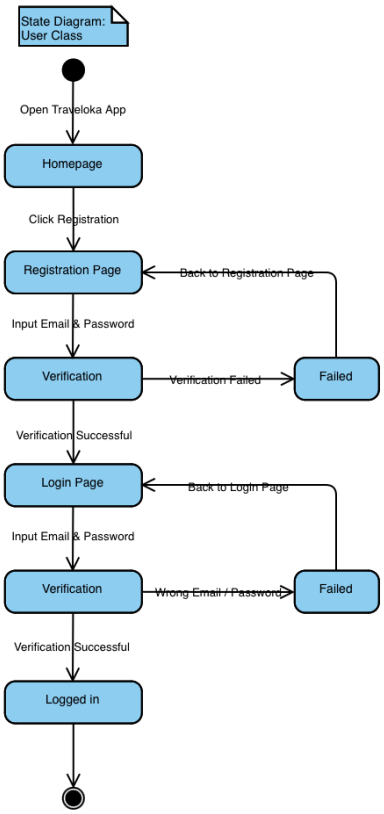
- *A data flow for invoices is then sent out by the system.*
- *Staff members input data into the car rental system and update vehicle records.*
- *The system provides information regarding cars to the car maintenance manager, who then updates the updated records.*
- *After checking for orders, the owner creates a report.*
- *This is a high-level perspective of the data entering and leaving the system.*

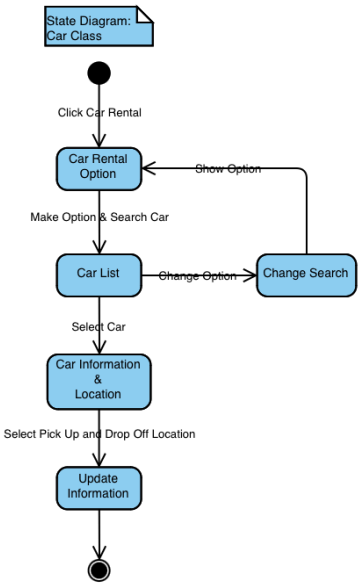
Class Diagram

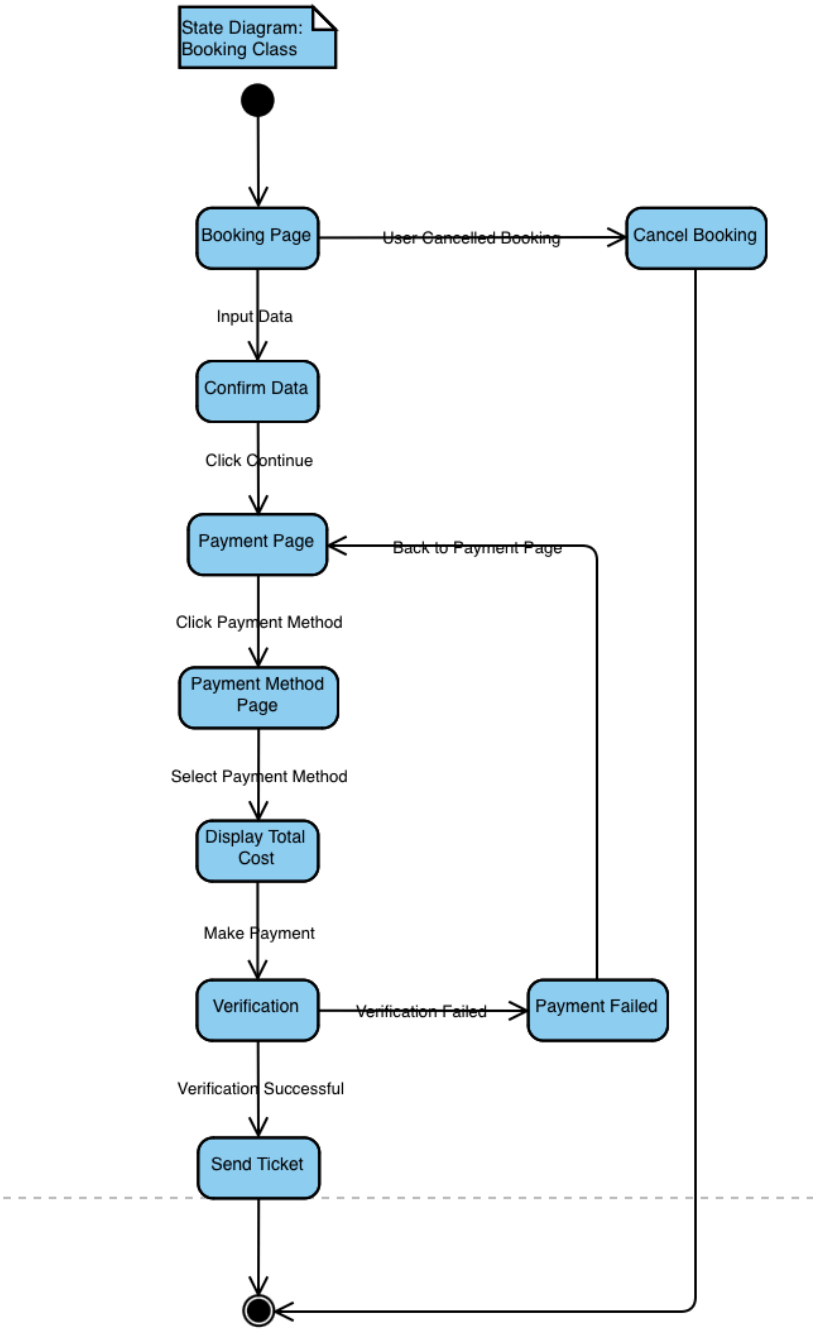
A class diagram displays an object's classes, characteristics, methods, and relationships with other objects to depict the system's static structure.



State diagram


State Diagram:
User Class
Open Traveloka App
Homepage
Click Registration
Registration Page
Back to Registration Page
Input Email & Password
Verification
Verification Failed
Failed
Verification Successful
Login Page
Back to Login Page
Input Email & Password
Verification
Wrong Email / Password
Failed
Verification Successful
Logged in

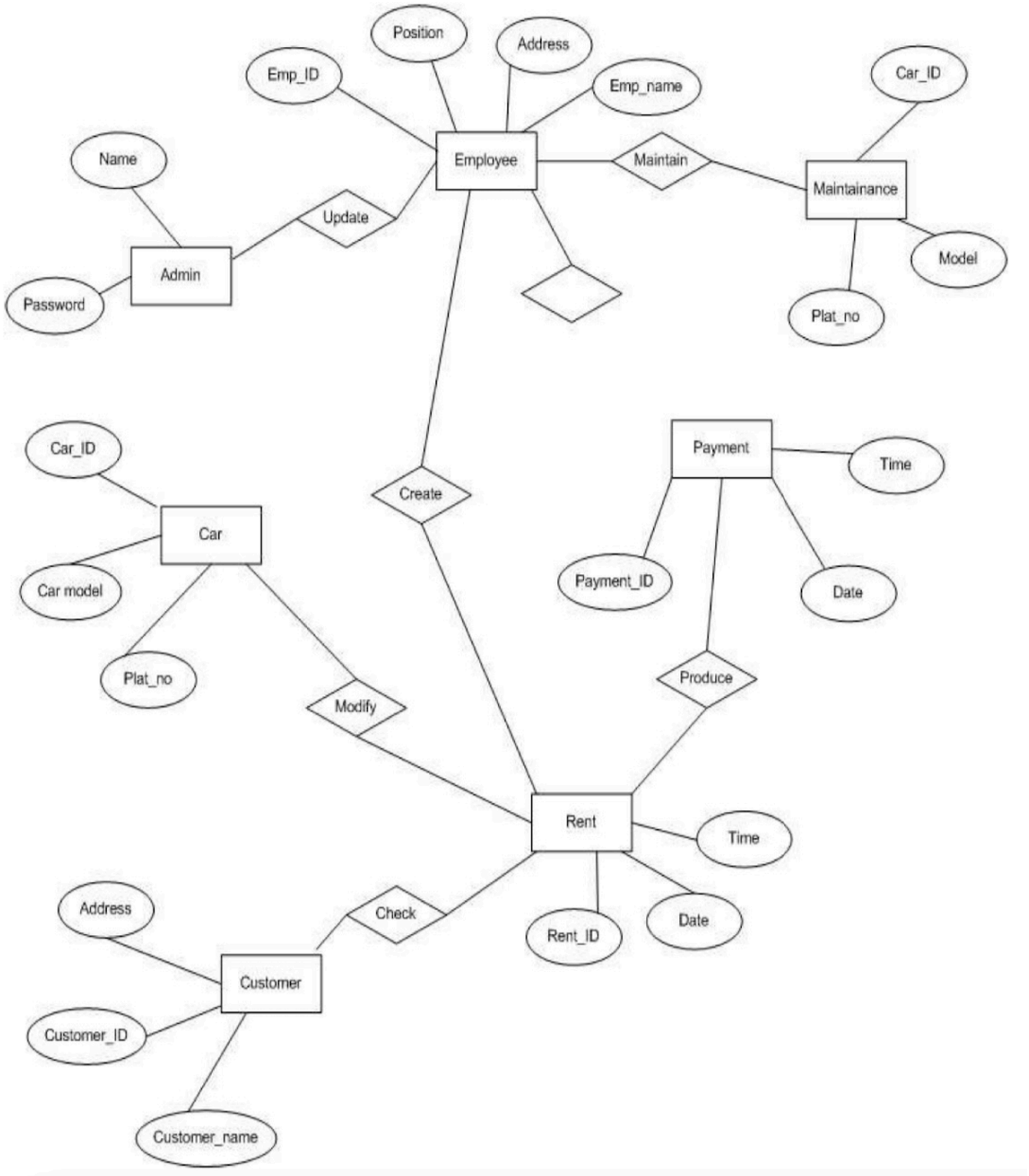

State Diagram:
Car Class
Click Car Rental
Car Rental Option
Show Option
Make Option & Search Car
Car List
Change Option
Change Search
Select Car
Car Information & Location
Select Pick Up and Drop Off Location
Update Information



Entity Relationship Diagram

The relationship between entities, cardinality, and their qualities is explained by the entity relationship diagram. An entity-relationship model, or ER model, is a type of data model that can be used to abstractly describe the data or information components of a business domain or the requirements of its processes. This type of model is best suited for eventual implementation in a relational database.

Things, or entities, and the possible relationships between them make up the core of ER models. We give an entity's description along with all of its properties here. describing the name of the entity, its attributes, and its domain, as well as its business definition.



Entities

1.Employee-*It is the responsibility of this entity to maintain the employee database.*
2.Customer- *In order to identify the consumer, Attribute keeps track of their personal information in a database.*
3.Car-*This entity maintains the vehicle's database information.*
4.Reservation- *This retains data regarding a customer's reservations.*

5.Rent- *This keeps track of payments and the vehicle's rental details.*
6.Maintenance- *This inspects and replaces as needed.*
7.Payment-*This results in payment and vehicle rental.*

Appendix C: To Be Determined List

REQ-1 i Manage Car Problems:

- *The system should allow administrators to set criterias and deadlines for resolving each reported issue.*
- *TBD: Specific criteria for setting priorities and deadlines need to be defined.*

REQ-2 Rent Car:

- *In the Client menu ,the system must allow clients to enter payment details in a secure way, being supported by multiple payment methods.*
- *TBD: Specific payment methods to be supported need to be identified (e.g., credit cards, PayPal, etc.).*

REQ-3 Manage Car Problems:

- *The system must provide an dashboard for communicating directly with users regarding their reported issues if further information is needed.*
- *TBD: Details of the communication interface and protocols need to be determined.*

REQ-4 in Feedback:

- *Admins must be have the notification option where can get new feedback submissions.*
- *TBD: The notification method and frequency need to be defined.*

REQ-5 Feedback:

- *The system must generate summary reports of feedback trends ,and also should create pie charts,table for the summary of reported issues by analyzing them automatically.*
- *TBD: The specific metrics and frequency of the summary reports need to be detailed.*

REQ-6 in Report Car Issue:

- *Users must be able to view the status of their reported issues through their account dashboard, including updates and resolution details.*
- *TBD: The specific status updates and resolution details to be displayed need to be outlined.*

REQ-7 Security Considerations:

- *The system must have encryption methods for sensitive data, such as payment information and personal details.*
- *TBD: The encryption standards and technologies to be used need to be selected*