SOFTWARE REQUIREMENT SPECIFICATION

FOR

CAR RENTAL SYSTEM

Under the Subject of

Software Engineering

(Semester – V)

Submitted by

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Academic Year
2023 – 24

L. J. Institute of Engineering & Technology, Ahmedabad (LJU)

L. J. INSTITUTE OF ENGINEERING AND TECHNOLOGY

TY-Department 2023 – 24

CERTIFICATE

Date:

This is to certify that the Software Engineering Work entitled "Car Rental System", carried out by the group of students mentioned below under my guidance is approved for the Degree of Bachelor of Engineering (Semester-V) of L. J. Institute of Engineering and Technology (LJU) during the academic year 2023-24.

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1. INTRODUCTION

1.1 Purpose

The primary objective of this project is to streamline and automate the vehicle rental and reservation process, eliminating the need for clients to invest time in making calls and waiting for vehicle availability. Leveraging the advancements in Information Technology and widespread internet access, our system aims to significantly enhance business processes and communication between car rental service providers and their customers. The evolution of technology has profoundly impacted various industries, and the car rental sector stands to benefit from the efficiencies and improvements that our solution brings to the forefront. Through innovative automation, we strive to create a seamless and time-efficient experience for both service providers and customers in the dynamic landscape of the car rental industry.

1.2 Scope

The project encompasses the development of a user-friendly Car Rental System, focusing on efficient inventory management for rental companies and a streamlined reservation process for users. Key features include inventory updating, reservation handling, robust security measures, and continuous web-based accessibility. The scope extends to both individual and corporate users, ensuring a versatile and secure platform.

1.3 Intended audience

The Car Rental System is an online platform that allows users to rent car for personal or business purposes. The system will be designed to provide users with an easy and convenient way to search for available cars, make bookings, and manage their rental experience. The system will be developed to cater to both individual and corporate users.

1.4 Overview

The Car Rental System is a comprehensive software project designed to optimize vehicle rental processes. It offers an intuitive interface for car rental companies to manage their inventory efficiently. Users can easily search for cars, view details, and make reservations, while the system ensures data security and legal compliance.

2. OVERALL DESCRIPTION

2.1 Problem Statement

The car rental industry faces inefficiencies in manual inventory management and outdated reservation processes. Users encounter difficulties in accessing a seamless and secure platform for reservations. This project aims to address these challenges by developing a modern Car Rental System that enhances inventory management for companies and provides users with a user-friendly, secure, and efficient reservation experience.

2.2 Existing System

Before the automation the system suffered from following DRAWBACKS:

- The current car rental system relies on manual inventory tracking and reservation processes, leading to errors, inefficiencies, and limited user accessibility.
- With reservations primarily made through phone calls or in-person visits, the lack of an online platform restricts real-time access to car availability information.
- Security vulnerabilities arise due to the absence of robust measures, and manual documentation practices result in inefficiencies. Additionally, the system lacks advanced reporting capabilities, hindering the ability to derive valuable insights.
- Transitioning to a modernized car rental system aims to address these drawbacks, offering automation, enhanced security, improved user experiences, and efficient business operations.

2.3 Proposed System

The CRS is proposed with the following,

- The CRMS is a comprehensive software solution designed to streamline the vehicle rental process for both customers and administrators.
- It features a user-friendly interface for customers to search, book, and manage rentals, while providing robust management tools for administrators to oversee the rental fleet and bookings.

- The system includes features such as user registration and login, vehicle search, booking management, secure payment processing, administrative dashboard, vehicle management, financial management, reporting and analytics, and user support.

2.4 Product Functions

Vehicle Inventory Management:

1) Addition of New Vehicles: The system allows car rental companies to seamlessly add new vehicles to their inventory, providing necessary details such as model, year, and availability status.
2) Updating Existing Details: Companies can efficiently update information about existing vehicles, ensuring accurate and up-to-date records.
3) Retiring Old Cars: The system facilitates the removal of outdated vehicles from the inventory, preventing users from making reservations for vehicles that are no longer in service.

Reservation System:

1) User-Friendly Interface: The reservation system features an intuitive interface for users to easily search for available cars, view detailed information, and initiate the reservation process.
2) Modifications and Cancellations: Users have the flexibility to modify reservation details or cancel bookings based on changing circumstances, enhancing overall user control and satisfaction.

Security Features:

1) Data Encryption: Utilizes robust encryption mechanisms to protect user data, ensuring that sensitive information, such as personal details and payment information, remains secure.
2) Legal and Regulatory Compliance: Adheres to data protection laws and online payment regulations to ensure compliance and build trust with users.

Reporting and Analytics:

1) Reservation Trends: Generates reports on reservation patterns, helping car rental companies understand demand trends and optimize their vehicle inventory accordingly.
2) Inventory Status: Provides analytics on the status of the vehicle inventory, helping companies make informed decisions on fleet management.

Web-Based Accessibility:

1) 24/7 Availability: The web-based platform ensures continuous accessibility for users, allowing them to interact with the system at any time, enhancing convenience and user satisfaction.
2) Temporary Server Issues: Anticipates and minimizes downtime due to temporary server issues, ensuring consistent availability.

Notification and Communication:

1) Real-time Notifications: Sends real-time notifications to users, informing them of reservation confirmations, modifications, or cancellations.
2) User-Admin Communication: Facilitates seamless communication between users and administrators through the system, addressing queries and concerns promptly.

Payment Processing:

1) Secure Transactions: Integrates a secure online payment system, safeguarding financial transactions during the reservation process.
2) Efficient Payment Handling: Ensures efficiency in processing payments, contributing to a smooth and reliable user experience.

Search and Recommendation Engine:

1) Advanced Search Algorithms: Employs advanced algorithms for efficient and accurate car searches based on user preferences, availability, and historical data.
2) Personalized Recommendations: Offers personalized car recommendations to users, enhancing their experience and encouraging user engagement.

2.5 User Characteristics

Customers:

• Varying ages and backgrounds

• Different levels of experience with car rental services

• Different preferences for types of cars and rental rates

• May be accessing the system from different locations and devices

• May have varying language skills and accessibility needs

Rental agents (employees):

• Varying levels of experience with the car rental industry and company policies

• Familiarity with rental policies, procedures, and pricing

• May be handling multiple customer transactions at once

• Ability to communicate effectively with customers

• May have varying language skills and accessibility needs

Customer service representatives (employees):

• Varying levels of experience with the car rental industry and company policies

• Familiarity with customer service procedures and best practices

• Ability to handle customer inquiries and complaints in a professional manner

• Knowledge of the Car Rental System and how to troubleshoot common issues

• May have varying language skills and accessibility needs

Managers:

• Deep understanding of the car rental industry and company needs/goals

• Ability to analyse data and make informed decisions based on trends and patterns

• Ability to manage employee schedules and assign job responsibilities

• Familiarity with the Car Rental System and ability to train employees on its use

• May have varying language skills and accessibility need

2.6 Constraints

1. Technology: Availability of compatible technologies.

2. Regulations: Compliance with data privacy and payment processing laws.

3. Resources: Budget and time limitations.

4. Security: Implementation of robust security measures.

5. Scalability: Accommodating growth in user base.

6. Integration: Compatibility of third-party APIs.

7. User Experience: Designing an intuitive interface.

8. Geography: Localization and regional coverage considerations.

2.7 Assumption

Internet Connectivity:

- Users have reliable internet connectivity for system access.

User Compliance:

- Users adhere to system terms, providing accurate information during registration.

Vehicle Information Accuracy:

- Car rental companies provide accurate and timely vehicle details.

Legal and Regulatory Compliance:

- Car rental companies comply with data protection and online payment regulations.

Payment Gateway Integration:

- Successful integration with payment gateways for secure online transactions.

2.8 Dependencies

Third-Party Services:

- Relying on third-party services for features like payment processing and map integration.

Technological Infrastructure:

- Dependence on reliable technology infrastructure, including servers and databases.

User Authentication Services:

- Integration with external authentication services for secure user access.

Data Security Protocols:

- Successful implementation of robust data security measures, including encryption.

External APIs and Integrations:

- Integration with external APIs for enhanced functionalities.

User Training and Onboarding:

- Adequate training materials for a smooth transition to the new system.

Government Policies:

- Adherence to government policies impacting the car rental industry.

3. REQUIREMENT SPECIFICATION

3.1 Functional Requirements

These are statements of services the system should provide, how the system should react to particular inputs, and how the system should behave in particular situations. It specifies the application functionality that the developers must build into the product to enable users to accomplish their tasks.

3.1.1 Reservation:

- The system must allow the customer to register for reservation. Customer can view detail description of particular car. The system must notify on selection of unavailable cars while reservation.
- The system shall present an option for advanced search to limit the car search to specific categories of car search and allow customer to select specific car using different search category while reservation.
- The system must view list of available car during reservation. The system shall allow the customers to cancel reservation using reservation confirmation number.
- The system shall allow the employee to update reservation information. The system shall allow the employee to view reservations made by customers.
- The system shall presents information on protection products and their daily costs, and requests the customer to accept or decline regulation terms during reservation.
- The system must be able to provide a unique reservation conformation number for all successfully committed reservations.
- The system must be able to display reservation summary for successfully committed reservation.

3.1.2 Log in:

- The system should allow manager and employee to login to the system using their username and password.

- The system shall allow the manager to create new user account.
- The system shall allow manager to change account password.
- The system shall allow staff to change account password.
- The system shall allow staff to logout.
- The system shall allow manager to logout.

3.1.3 Cars:

- The system should allow staff to register new cars. The system shall allow staff to select cars in the list. The system shall allow customer to select cars in the list.

- The system shall allow staff to Search cars by specific record. The system shall allow customer staff to Search cars by specific record.

- The system shall allow staff to update information of the car in need of modification. The system shall allow staff to display all lists of car. The system shall allow staff to display all available car.

- The system shall allow customer to display all available car. The system shall allow staff to display all rented car. The system shall allow staff to display all off duty car.

3.1.4 Rent:

- The system shall allow staff to register customers into rental list. The system shall allow staff to update about customer rent record details in the rental list.

- The system shall be able to save all changes made on the customer rent list. The system shall allow staff to select customer rent record by specific search category.

- The system shall allow staff to search rent record of customers using specific categories. The system shall allow staff to display customers, who rent cars.

- The system shall allow staff to display all customers rent record. The system must provide printable summary for successful committed rent.

3.2 Hardware and software used

3.2.1 Server-side:

Hardware Requirements:

- Processor: Intel® Xeon® processor 3500 series
- HDD: Minimum 500GB Disk Space
- RAM: Minimum 16GB

Software Requirements:

- OS: Windows 8.1, Linux

Database:

- SQL Server 2014 (SQL14)

3.2.2 Client -side:

- Hardware Requirements
    - Processor: Intel Dual Core
    - HDD: Minimum 80GB Disk Space
    - RAM: Minimum 1GB
- Software Requirements
    - OS: Windows 7, Linux

3.3 Non-Functional Requirements

3.3.1 Usability:

- The system provides a help and support menu in all interfaces for the user to interact with the system.
- The user can use the system by reading help and support.

3.3.2 Security:

- The system provides username and password to prevent the system from unauthorized access. The staffs' password must be greater than eight characters.

- The subsystem should provide a high level of security and integrity of the data held by the system, only authorized personnel of the company can gain access to the company's secured page on the system; and only users with valid password and username can login to view user's page.

3.3.3 Availability:

- The system should always be available for access at 24 hours, 7 days a week. Also in the occurrence of any major system malfunctioning, the system should be available in 1 to 2 working days, so that business process is not severely affected.

3.3.4 Error handling:

- Error should be considerably minimized and an appropriate error message that guides the user to recover from an error should be provided.

- Validation of user's input is highly essential. Also the standard time taken to recover from an error should be 15 to 20 seconds.

3.3.5 Easy to use:

- Considered the level of knowledge possessed by the users of this system, a simple but quality user interface should be developed to make it easy to understand and required less training.

3.4 Performance Requirements

3.4.1 Response Time:

- It's essential that the system respond quickly to user actions, such as searching for available cars, making a reservation, or processing a payment.

- The response time should be measured in seconds or milliseconds, and it should be consistently fast even during periods of high traffic.

3.4.2 Scalability:

- This requirement ensures that the software can handle increasing traffic and demand.
- The system should be designed to scale up or down as needed to meet changing requirements.
- It's important to consider factors such as hardware capacity, network bandwidth, and database performance when designing a scalable system.

3.4.3 Reliability:

- This requirement ensures that the software is reliable and available at all times. Downtime or system failures can result in lost business and customer dissatisfaction.
- The system should be designed with redundancy, failover mechanisms, and backup and recovery procedures to minimize the risk of downtime.

3.4.4 User Experience:

- This requirement ensures that the software is easy to use and navigate.
- The system should have an intuitive interface, well-designed workflows, and clear feedback to user actions. It's important to conduct user testing and gather feedback to ensure that the system meets user needs and expectations.

3.4.5 Resource Utilization:

- This requirement ensures that the software uses hardware resources efficiently.
- The system should be optimized to use CPU and memory resources effectively, minimizing the hardware requirements and costs. It's important to monitor resource

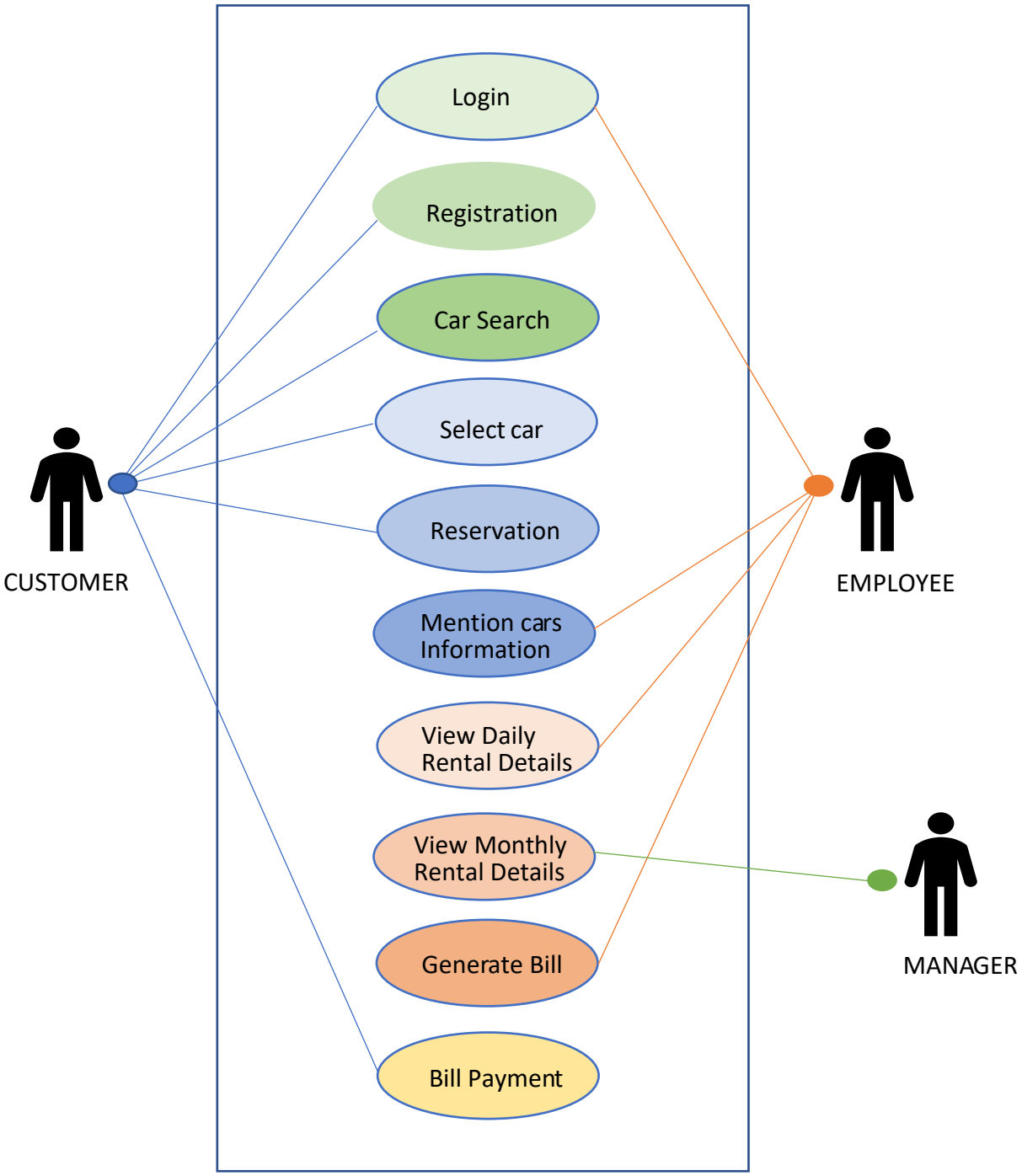
usage and optimize the system for peak performance.

3.4.6 Performance Monitoring:

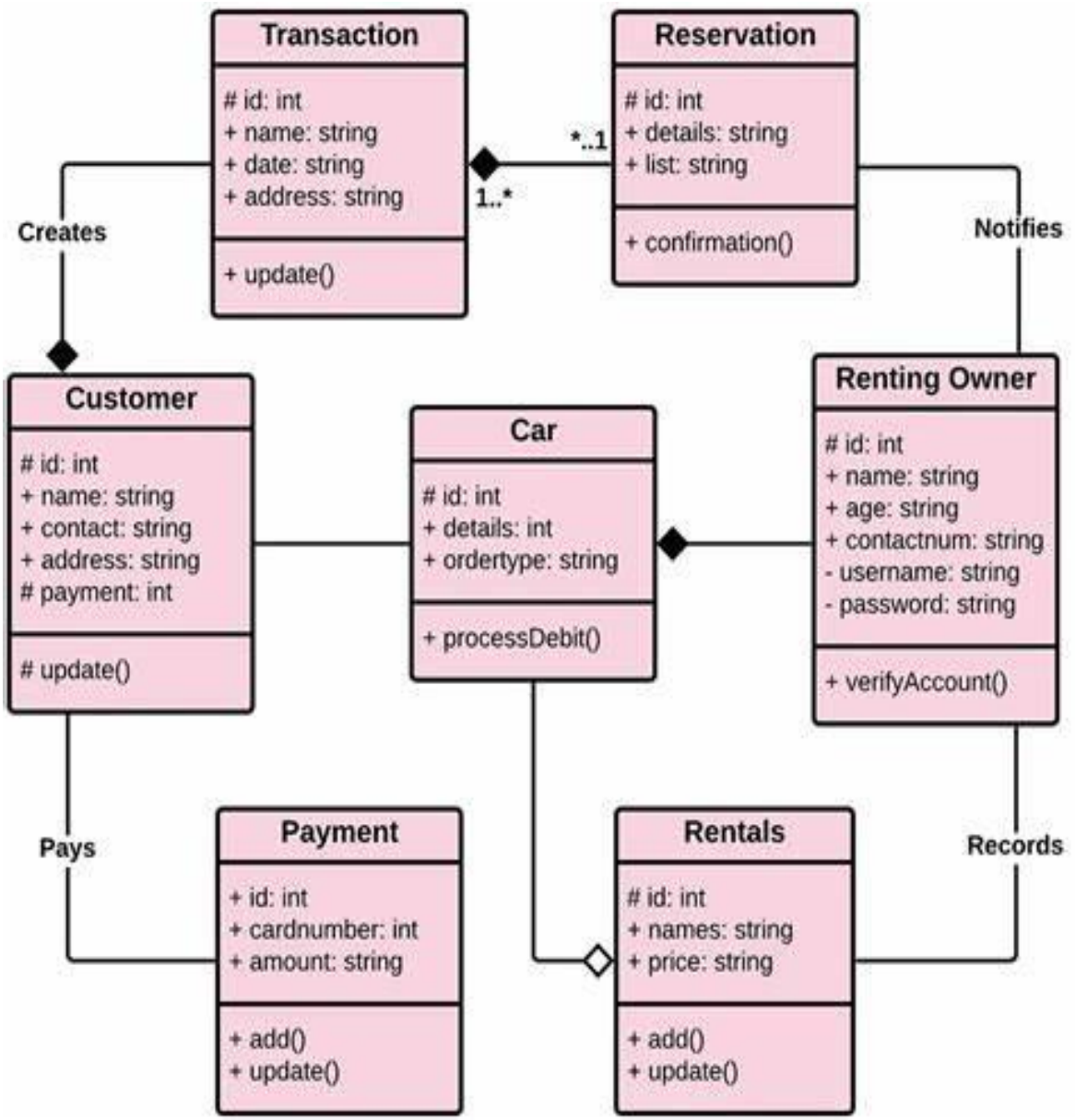
- This requirement ensures that the software is continuously monitored for performance issues and errors.
- The system should log system metrics, analyse user feedback, and implement alerts for critical issues. It's important to conduct regular performance testing and optimization to maintain the system's high performance.

4. DIAGRAMS

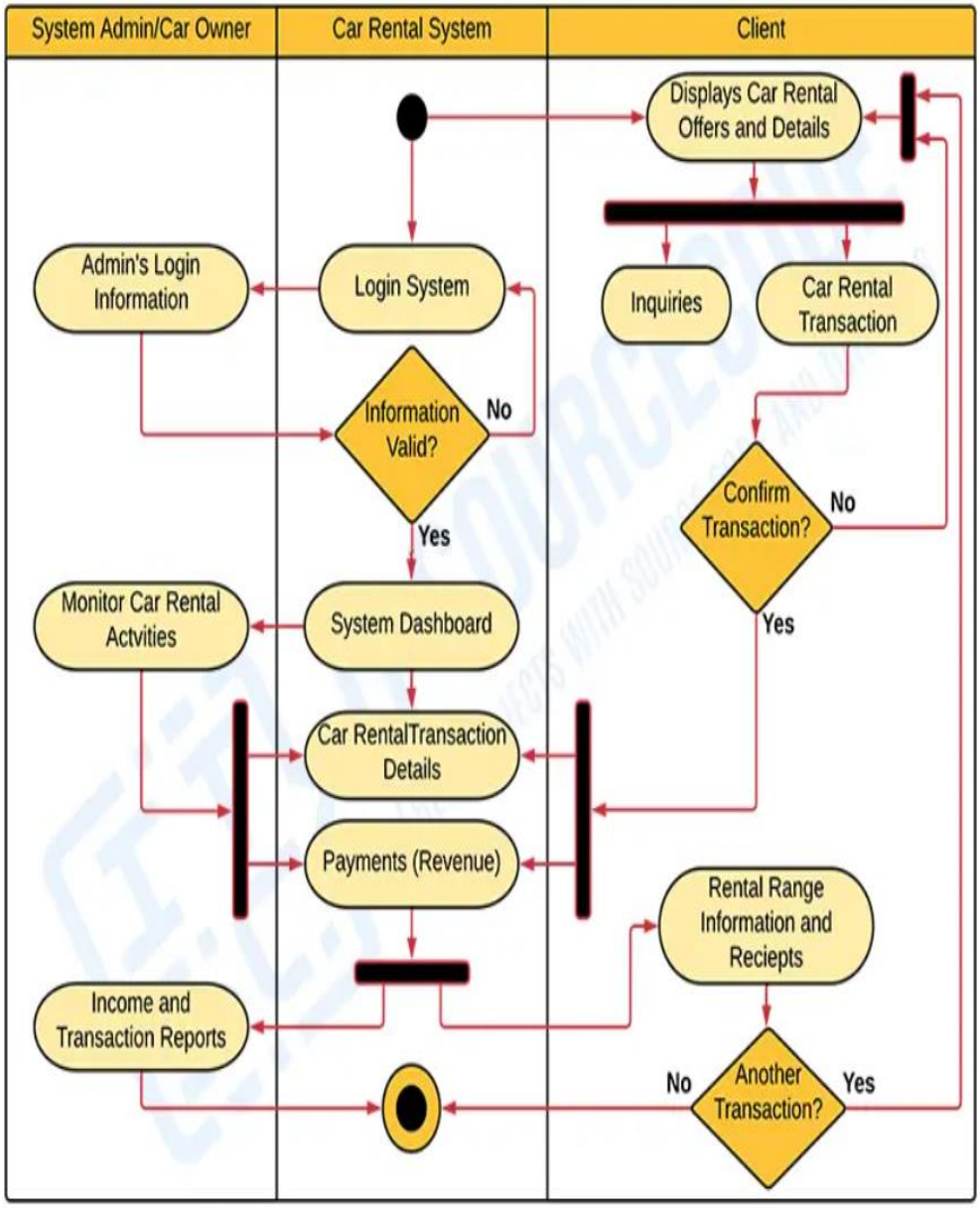
4.1 Use Case Diagram



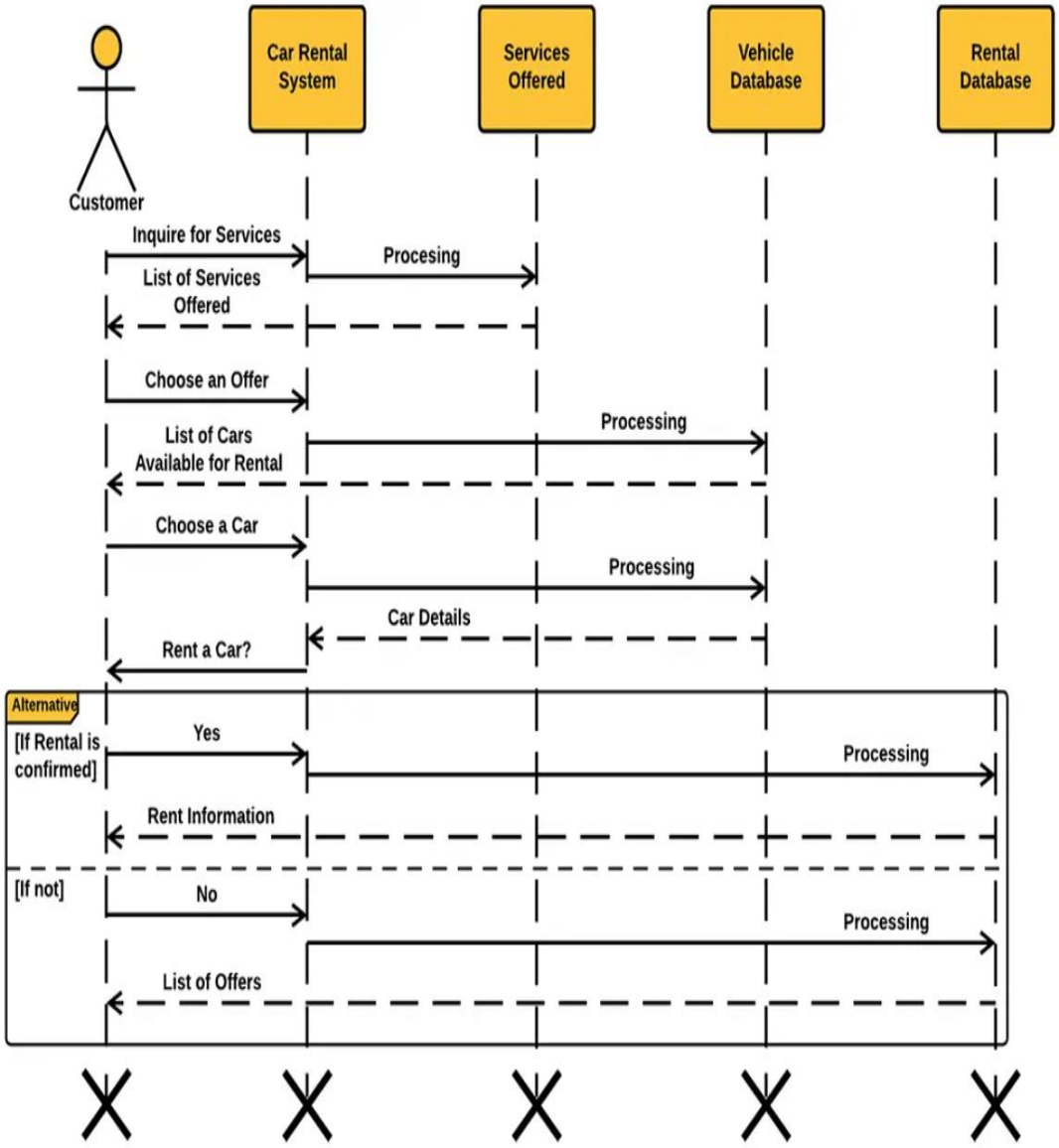
4.2 System Interface Diagram (Class diagram)



4.3 Activity Diagram

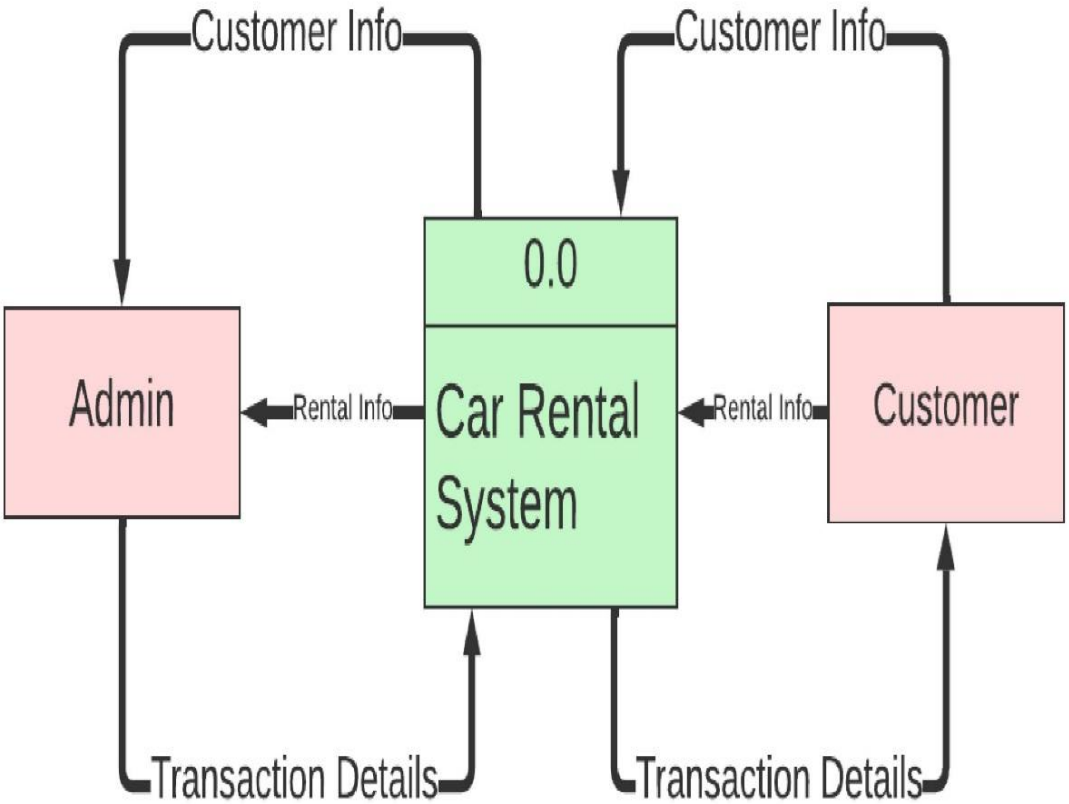


4.4 Sequence Diagram

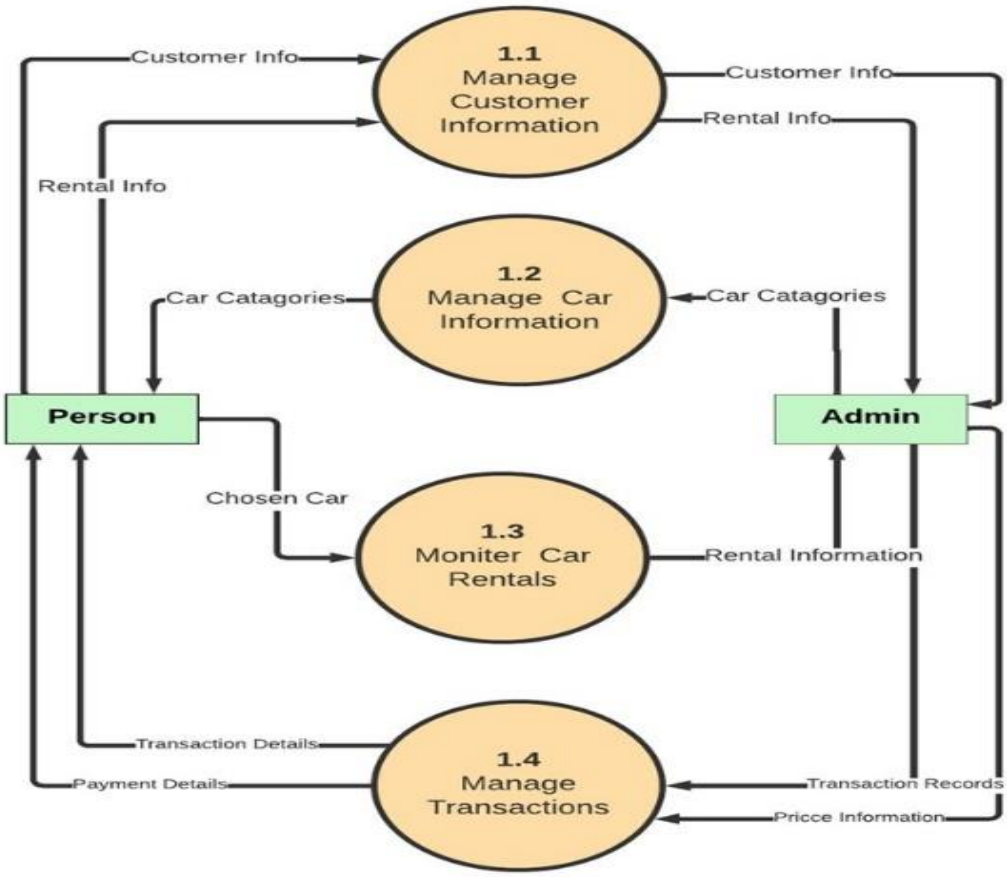


4.5 Data Flow Diagram

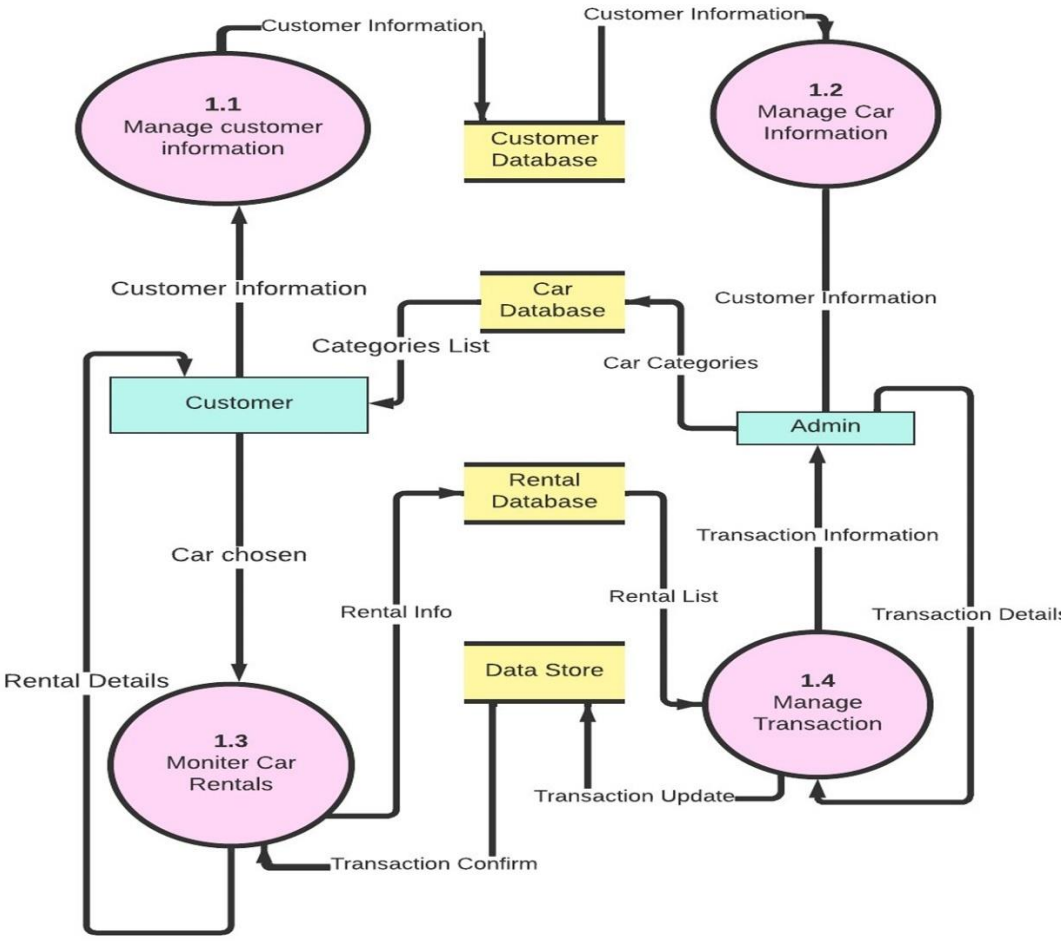
4.5.1 Level 0 DFD



4.5.2 Level-1 DFD



4.5.3 Level-2 DFD



5. CONCLUSION

In conclusion, the Car Rental System project represents a significant leap towards modernizing and optimizing the car rental industry. By seamlessly integrating advanced software engineering principles with user-centric functionalities, the system aims to revolutionize the way car rental companies manage their inventory and users make reservations.

The project not only addresses the limitations of the existing manual systems, such as inefficient inventory management and cumbersome reservation processes but also introduces cutting-edge features like secure payment processing, advanced analytics, and personalized recommendations. The commitment to data security, legal compliance, and user accessibility positions the system as a reliable and trustworthy platform for both car rental companies and users alike.

As we move forward, the continuous commitment to innovation, adaptability, and user satisfaction remains at the core of the Car Rental System. The project anticipates not only meeting but exceeding the evolving needs of the car rental industry, setting new standards for efficiency, security, and user experience. The journey from conceptualization to implementation embodies a fusion of technological prowess and a keen understanding of industry dynamics, promising a future-ready solution for a dynamic and competitive market.

6. SCOPE OF THE PROJECT

The scope of the Car Rental System project encompasses the development of a comprehensive and user-friendly online platform. This platform aims to automate and enhance various aspects of the car rental process, catering to both individual and corporate users. The project will include:

User-Friendly Interface:

Develop an intuitive interface for users to easily search, view details, and make reservations for available cars.

Vehicle Inventory Management:

Implement a robust system for car rental companies to efficiently manage their inventory, including adding new cars, updating information, and retiring old vehicles.

Reservation System:

Create a streamlined reservation process allowing users to select pick-up and drop-off locations, choose rental periods, and make, modify, or cancel reservations.

Security Measures:

Implement advanced security protocols, including data encryption and compliance with legal and regulatory requirements, to ensure the confidentiality and integrity of user information.

Web-Based Accessibility:

Develop a web-based platform accessible 24/7, providing users with the flexibility to interact with the system at their convenience.

Reporting and Analytics:

Integrate reporting tools to generate insights into reservation trends, inventory status, and user behavior for informed decision-making.

Notification and Communication:

Implement real-time notifications for users and effective communication channels between users and administrators.

Admin Panel:

Create a centralized admin panel for car rental companies to monitor reservations, manage inventory, and access analytical reports.

User Support:

Provide a comprehensive user support system, including FAQs and helpdesk features, to assist users with queries or issues.

Payment Processing:

Integrate secure online payment gateways to facilitate efficient and safe transaction processing during the reservation.

Search and Recommendation Engine:

Implement advanced search algorithms and recommendation engines to enhance the user experience with personalized car suggestions.

Documentation Management:

Digitize and manage rental agreements, customer details, and other documentation for increased efficiency.

The project's scope is designed to revolutionize the car rental industry by automating processes, improving user experiences, and ensuring a secure and accessible platform for both car rental companies and users.