

Car Service Record System

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Abstract

Vehicle service workshops that rely on manual methods often face difficulties in managing operations efficiently. These challenges can negatively affect both workshop staff and customer satisfaction. To overcome these issues, a systematic and digital approach is proposed to replace the existing manual system. The method used is waterfall method to ensure the development process is fully successful. This project utilizes **Visual Studio Code** as the development environment and **XAMPP** as the local server platform to build a structured and organized car service recording system. The system is designed with a proper data hierarchy to streamline the management process. As a result, a complete and functional system has been successfully developed. The system addresses the core problems faced by the workshops and improves their operational efficiency. Overall, it facilitates better management of daily activities and enhances the service experience for customers.

1. Introduction

As the number of vehicle owners continues to rise, the need for efficient car repair and service management has become more crucial. However, many workshops still rely on manual processes for booking and record-keeping, which often results in issues such as misplaced documents, scheduling conflicts, and challenges in retrieving previous service records. . To solve these issues, a digital vehicle service recording system has been developed. This system makes the whole process more organized, from booking appointments to handling payments. It also includes helpful features like reminders for upcoming repairs and easy access to repair history, making workshop management smoother and more efficient.

The aim of the project is to develop a web-based system that allows users to easily make reservations and clear processes for car maintenance, see the latest service and also the price of the services. The objective of the project include:

- I. To design a structured and efficient system for data management and maintenance.
- II. To develop a user-friendly, easily accessible platform and easily understanding system to help a Workshop.
- III. To assess the effectiveness and user acceptance of the implemented car service recording system.

2. Literature Review

This section will discuss the web based system, technology used and comparison analysis. It will also discuss three similar existing systems.

2.1 Web Based System

A web-based system is a software application that users access through a web browser over the internet, without needing to install anything on their computer [1]. All the data and processing are handled on a central server, which means users can use the system from any device or location as long as they have an internet connection [2]. Web-based systems are often used for tasks like booking, managing records, or collaborating, and they make updates, maintenance, and security easier since everything is managed centrally on the server [1][3].

A web-based vehicle service management system offers many benefits that improve both customer experience and workshop operations. It allows customers to conveniently book services online from any device, providing flexibility and saving time. The system organizes all service records and receipts digitally, making it easy to access repair history and reducing the risk of lost paperwork. Automated reminders help customers keep track of upcoming maintenance, preventing missed appointments. For workshops, it streamlines workflows by managing bookings, payments, and inventory in one place, reducing manual errors and improving efficiency. Additionally, real-time updates and reports enable better decision-making and resource management, ultimately enhancing service quality and customer satisfaction. This digital approach also supports eco-friendly practices by minimizing paper use and promotes smooth communication between customers and service providers

2.2 Technology Used

The development of this system involves the use of several key technologies to ensure a functional and efficient web application. Visual Studio Code is utilized as the main tool for writing the programming code for the website's front-end. To manage and store the database, XAMPP is employed, providing a reliable local server environment. The front-end of the system is built using HTML, CSS, and JavaScript. These programming languages are chosen because they are highly suitable for creating interactive and well-structured web pages. HTML (Hypertext Markup Language) forms the basic structure of the website, while CSS and JavaScript add styling and dynamic features, respectively, making the system user-friendly and visually appealing.

2.3 Comparative Analysis

The table compares key features of three real-world workshop websites Jiffy Lube, Meineke, and Auto-Lab with the proposed system. While all three websites offer basic booking, mobile access (except Auto-Lab), and user-friendly interfaces, they lack important features such as automatic scheduling, notification alerts, vehicle data storage, activity recording, digital receipt storage, and multiple user roles. In contrast, the proposed system includes all these features, making it a more complete and efficient solution for managing vehicle services.

Table 1: Comparison of existing and proposed systems

Feature	Jiffy Lube	Meineke	Auto-Lab	Proposed System
Booking	✓	✓	✓	✓
Automatic scheduling	x	x	x	✓
Mobile access	✓	✓	x	✓
User interface	✓	✓	✓	✓
Notification alerts	x	x	x	✓
Vehicle data storage	x	x	x	✓
Vehicle activity recording	x	x	x	✓
Digital receipt storage	x	x	x	✓
Easy-to-understand system	✓	✓	✓	✓
Has 3 types of users	x	x	x	✓

3. Methodology

3.1 System Development Process

The methodology employed in this project follows the Waterfall Model, a linear and sequential software development approach where each phase must be completed before the next begins. The key phases include the Analysis phase, where requirements are gathered and analyzed to define the system's functionalities; the Design phase, which involves creating detailed system architecture and design specifications; the Implementation phase, where the actual coding and development of the system occur; and the Testing phase, which verifies the system's functionality and ensures it meets the specified requirements. This structured progression ensures clear documentation and minimizes overlap between phases, facilitating systematic project execution. Additionally, project planning is illustrated through a Gantt chart, which is organized by semesters and outlines the main tasks along with their allocated timeframes, providing a clear timeline for task completion and project milestones. This approach supports effective tracking and management of the project lifecycle.

3.2 System Requirement

The functional requirement table outlines the key modules of the system, each designed to fulfill specific roles to ensure smooth operation and user interaction. The Login module enables access for admins, mechanics, and customers, ensuring secure authentication. The Booking module allows customers to schedule services by selecting the date, time, and type of service needed. The Car module provides users the ability to add and edit vehicle details, while the History module lets users view their past service records, including dates, times, and prices. For administrative control, the Booking Approval module permits admins to approve or decline reservations, and the Mechanic Registration module enables admins to add new mechanics to the system. Reporting functionalities are covered by the Report module, which allows admins to monitor monthly services and generate printable reports, and the Mechanic Report module, which lets mechanics document daily service activities. Lastly, the Service Management module empowers admins to manage the range of services offered. Together, these modules define the system's core functional capabilities, supporting efficient service management and user engagement.

Table 2: Functional Requirement

No.	Modules	Description
1.	Login	Allow admin, mechanic and customer access the system
2.	Booking	Allow customer to make a booking and choose date, time and service
3.	Car	Allow user to add car and edit car details
4.	History	Allow user to observe their service history date time and price
5.	Booking Approval	Allow admin to approve or decline customer reservation
6.	Mechanic Registration	Allow admin to register new mechanic
7.	Report	Allow admin to observe monthly services and print the report
8.	Service Management	Allow admin to manage services
9.	Mechanic Report	Allow mechanic to mark daily service as a report

Table 3: Non-functional Requirement

No.	Requirement	Description
1.	Performance	The system should be running smoothly without crash
2.	Security	The system should be highly secured to protect the data from authorized access
3.	Usability	The system should be responsive across all devices including smartphones, tablets and desktops
4.	Reliability	The system should ensure the data is consistent and accurate to prevent data loss or corruption

4. System Analysis

4.1 Context Diagram

The context diagram of the Car Service Record System shows how the system interacts with three main external users: Admin, Customer, and Mechanic. Customers provide their login credentials, make service reservations, and submit car details, while receiving approval status, service history, and payment information from the system. Admins log in to manage reservations, view service history, and approve service requests. Mechanics also log in to view assigned service details, update completed services, and receive reservation information. The diagram highlights the system's role as a central hub for managing user authentication, booking services, tracking service history, and coordinating communication among all users.

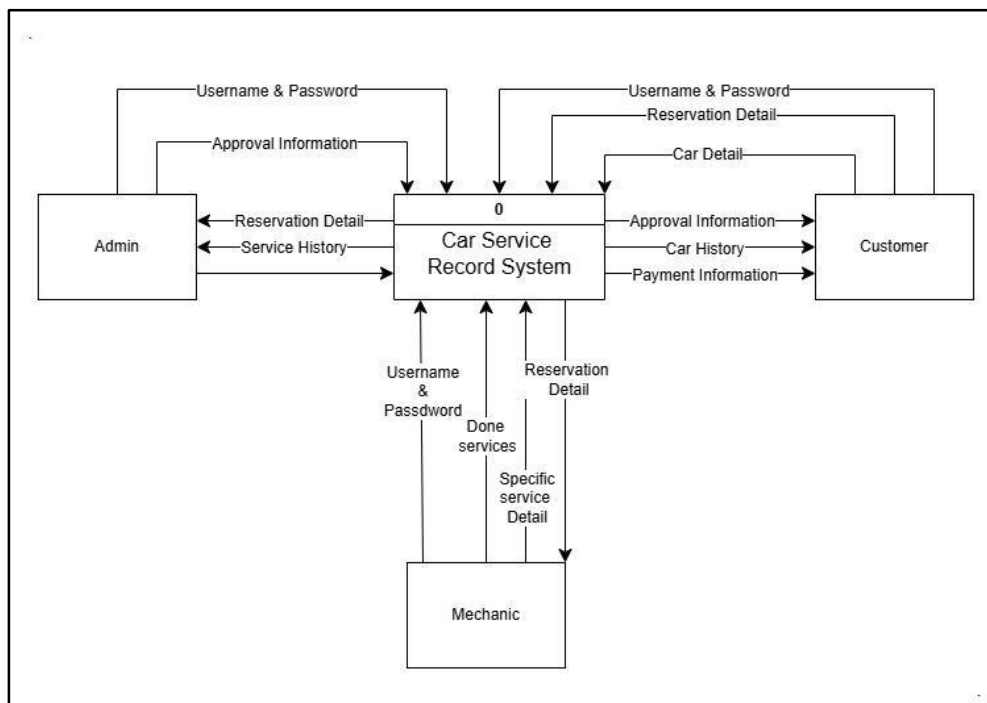


Figure1: Context Diagram

4.2 Entity Relationship Diagram

The Car Service System ERD illustrates the relationships between key entities such as users, vehicles, services, service packages, and bookings. Users can register and own multiple vehicles, each linked to a specific car brand and model. Bookings are made by users for their vehicles and can include individual services or detailed service packages. Each service package contains multiple allowing for clear tracking of service history and user interactions. This structure supports efficient management of car servicing operations. The illustration are shown in Appendix A Entity relationship diagram.

4.3 Flowchart

This section will show 3 flowchart, first is the administrator begins by logging in and undergoing an authorization check; if authorization fails, they are returned to the login screen. Upon successful authorization, the administrator reaches the homepage, from which they can navigate to four main functions: Reservation, Mechanic Reservation, Car Service Management, and Report. In the Reservation section, the administrator can make approvals. For Mechanic Reservation, they can register new mechanics. Car Service Management allows the administrator to manage car brands, car models, and service details; if a specific brand, model, or service detail is not found, the administrator has options to edit or add new entries for each. Finally, the Report section enables the administrator to print reports. From any of these functions, the administrator can choose to log out, ending their session, or return to the homepage. The flowchart is shown in appendix B admin flowchart. Customer flowchart begins with user authentication, directing new users to register before logging in, while existing users proceed directly to login and authorization. Upon successful authorization, users land on the homepage, where they have three main options: making a reservation, managing cars, or checking notifications. The reservation process involves choosing a date, time, and service, followed by confirmation. Car management allows users to add new vehicles by providing details like plate number, brand, model, and color, or view existing car history. Notifications can be viewed if present. Finally, users can choose to log out, ending their session, or return to the homepage to continue using the system. The mechanics flowchart begins with the mechanic logging in and undergoing an authorization check; if authorization fails, they are redirected back to the login page. Upon successful authorization, the mechanic reaches the homepage. From the homepage, the mechanic has two primary options: to manage Reservations or Reports. If they select Reservations, they can view a "Monthly car" overview. If they choose Reports, they are directed to "Make a report." After completing either task, the mechanic can then choose to log out, which ends their session, or return to the homepage to perform other actions. Both customer and mechanics flowchart are shown in appendix C customer and mechanics flowchart.

4.4 User Interphase Design

This phase will show the user interface (UI) design for the car service record system, showcasing several key screens that facilitate interaction for different user roles. Figure 2 presents the central Login page, serving as the entry point for all users. Upon successful login, customers are directed to the Customer Dashboard (Figure 3), providing an overview of their past and pending reservations. The system further enables customers to manage their bookings via the Customer Booking screen (Figure 4) and view their registered vehicles on the Customer Car page (Figure 5). For administrative oversight, Figure 6 displays the Admin Dashboard, which allows for the management and approval of new reservations. Finally, Figure 7 illustrates the Mechanic Dashboard, offering a monthly schedule view to help mechanics track and manage their assigned tasks.

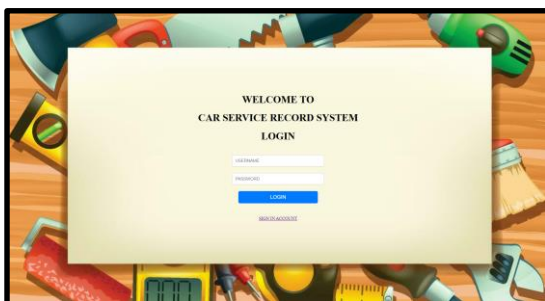


Figure 2: Login

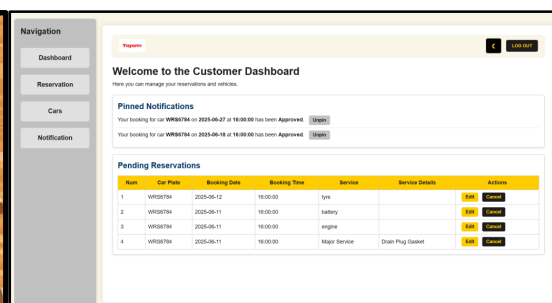


Figure 3: Customer Dashboard



Figure 4: Customer Booking

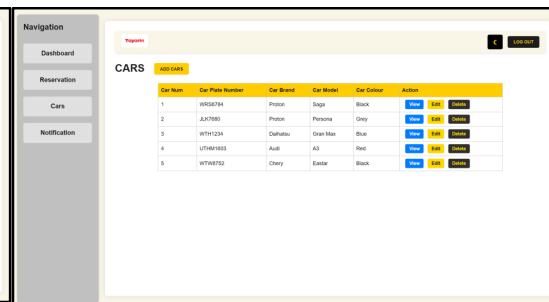


Figure 5: Customer Car

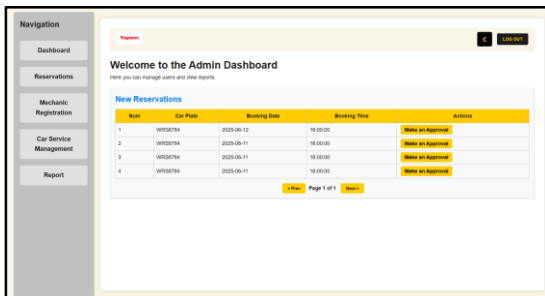


Figure 6: Admin Dashboard

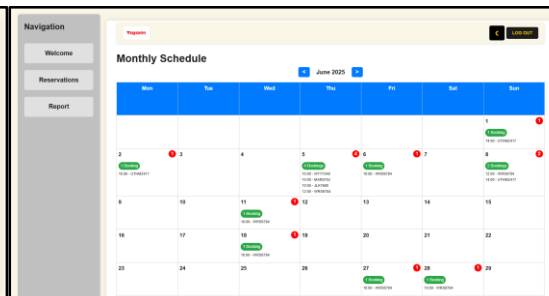


Figure 7: Mechanic Dashboard

5. Implementation and testing

This section discusses the implementation and testing of the Car Service Records System. The system implementation and testing phase are crucial in the development process since it enables us to evaluate whether the system's features fulfill the user's requirement. Additionally, coordinating the system flow is essential so that the modules in the design and analysis phase can function optimally. To ensure the project functions well once the design is implemented, the Car service record system is developed and tested as intended in this section.

5.1 System Implementation

This section will discuss system implementation of every single page in the car service report system. In (Figure 8) it shows the customer dashboard with a pinned notification and pending reservation table. Customer reservation page in (Figure 9) shows a monthly calendar for customers to pick an available date and choose a service to make a reservation. Customer car in (Figure 10) shows the table for customers' cars. In (Figure 11) show the customer edit car form. Customer car service history is shown in (Figure 12) and the last module for customers is in (Figure 13) which is a notification in a table with a notified button and pin button. (Figure 14) shows the first administrator module which is reservation approval with an accept and decline button. Page for Edit car brand and admin service management are shown in (Figure 15) and (Figure 16). In (Figure 17) is a monthly report for administrators with a search bar and print button. In (Figure 18) and (Figure 19) shows the mechanic's daily and monthly schedule. Lastly, a mechanic daily report as shown in (Figure 20).

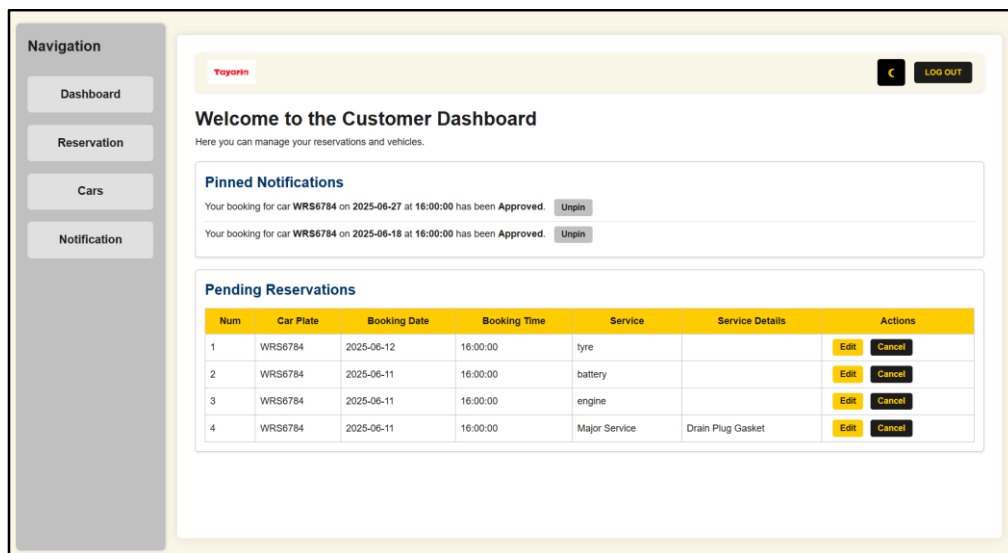


Figure 8: Customer Dashboard

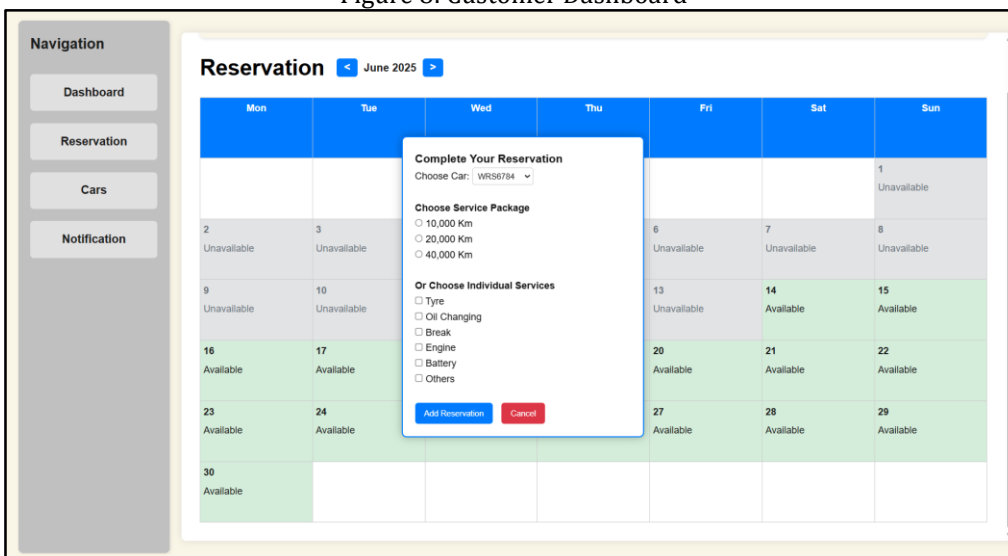


Figure 9: Customer Reservation

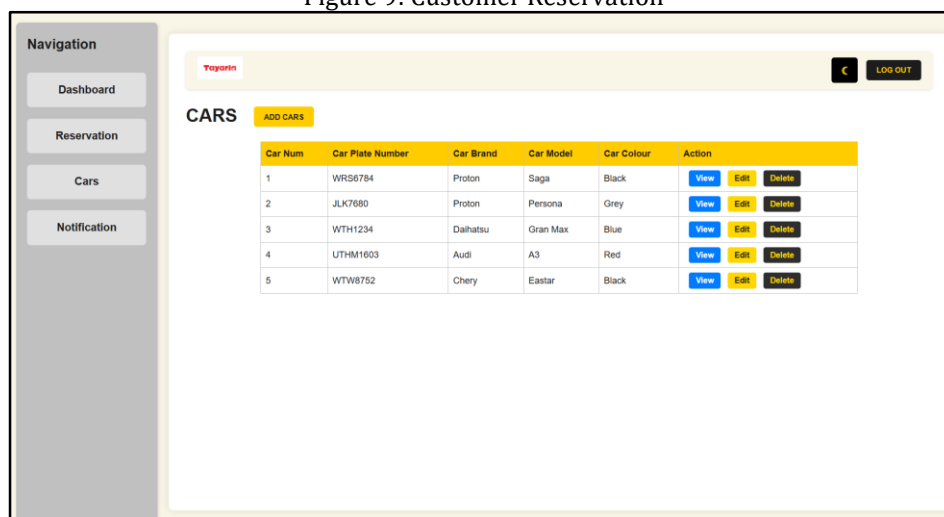


Figure 10: Customer Car

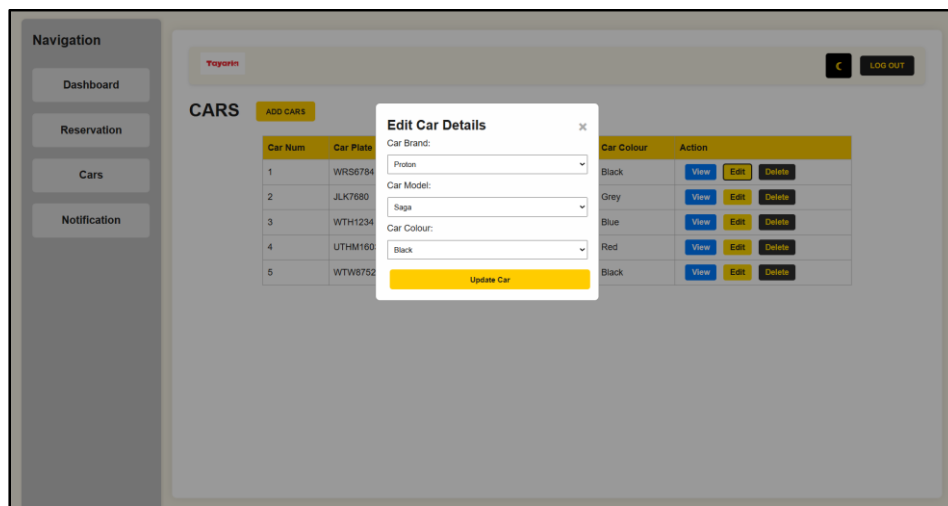


Figure 11: Customer Edit Car

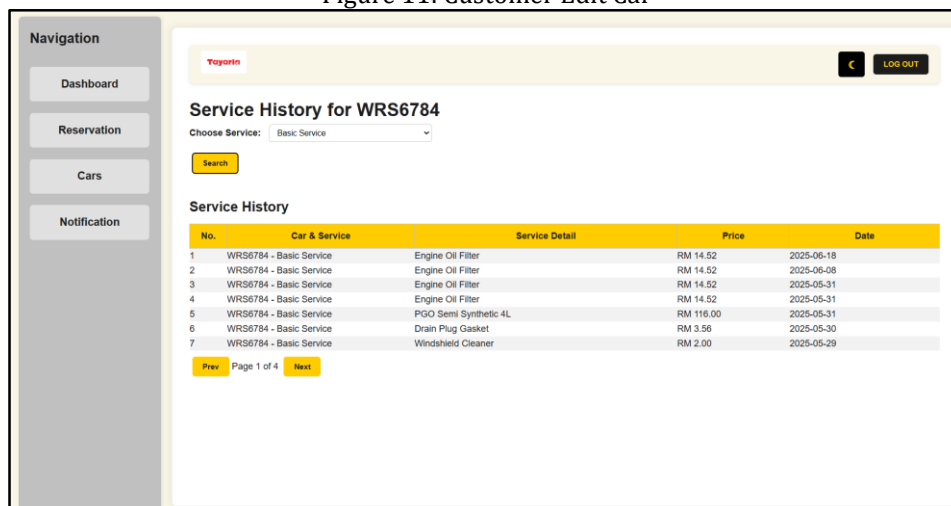


Figure 12: Customer Car Service History

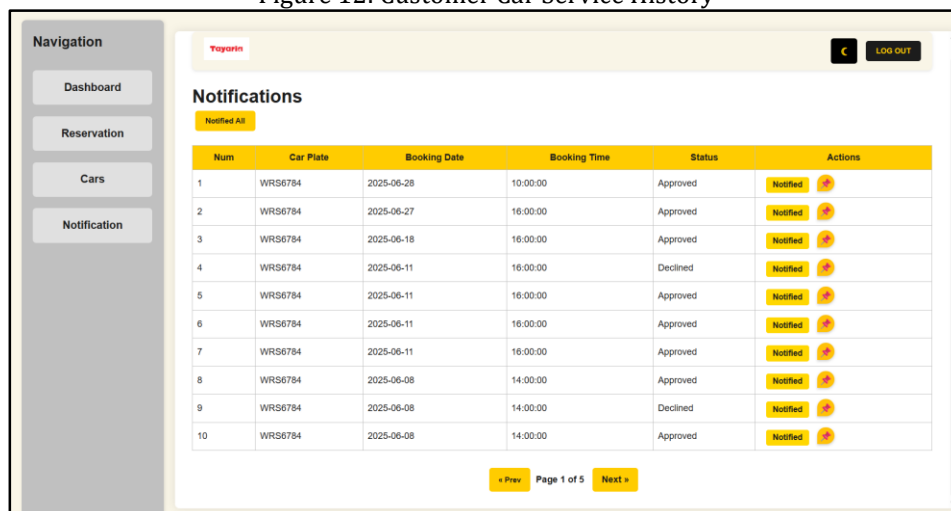


Figure 13: Customer Notification

Reservation Approval							
Services	Service Details	Car	Date	Estimated Time	Time	Status	Action
Major Service	Windshield Cleaner	UTHM1603	2025-06-29	8 hours	10:00:00	Pending	<button>Approve</button> <button>Decline</button>
Major Service	N95 Cabin Filter	UTHM1603	2025-06-29	8 hours	10:00:00	Pending	<button>Approve</button> <button>Decline</button>
Major Service	Brake Fluid	UTHM1603	2025-06-29	8 hours	10:00:00	Pending	<button>Approve</button> <button>Decline</button>
Major Service	Engine Air Filter	UTHM1603	2025-06-29	8 hours	10:00:00	Pending	<button>Approve</button> <button>Decline</button>
Major Service	Drain Plug Gasket	UTHM1603	2025-06-29	8 hours	10:00:00	Pending	<button>Approve</button> <button>Decline</button>
Major Service	PGO Semi Synthetic 4L	UTHM1603	2025-06-29	8 hours	10:00:00	Declined	<button>Approve</button> <button>Decline</button>
Major Service	Engine Oil Filter	UTHM1603	2025-06-29	8 hours	10:00:00	Declined	<button>Approve</button> <button>Decline</button>
Major Service	Windshield Cleaner	JLK7680	2025-06-29	8 hours	10:00:00	Approved	<button>Approve</button> <button>Decline</button>
Major Service	N95 Cabin Filter	JLK7680	2025-06-29	8 hours	10:00:00	Approved	<button>Approve</button> <button>Decline</button>
Major Service	Brake Fluid	JLK7680	2025-06-29	8 hours	10:00:00	Approved	<button>Approve</button> <button>Decline</button>
Major Service	Engine Air Filter	JLK7680	2025-06-29	8 hours	10:00:00	Approved	<button>Approve</button> <button>Decline</button>
Major Service	Drain Plug Gasket	JLK7680	2025-06-29	8 hours	10:00:00	Approved	<button>Approve</button> <button>Decline</button>
Major Service	PGO Semi Synthetic 4L	JLK7680	2025-06-29	8 hours	10:00:00	Approved	<button>Approve</button> <button>Decline</button>

Figure 14: Administrator Reservation Approval

Navigation

Dashboard

Reservations

Mechanic Registration

Car Service Management

Report

Yogorin

Car Brand

Car Model

Service Detail

C

LOG OUT

Car Brands Management

Add New Car Brand

Brand Name:

Add Brand

Existing Car Brands

Search car brands:

Search

Reset

num	Brand Name	Actions	
1	Alfa Romeo	Edit	Delete
2	Audi	Edit	Delete
3	BMW	Edit	Delete
4	BYD	Edit	Delete
5	CAM	Edit	Delete
6	Chery	Edit	Delete
7	Chevrolet	Edit	Delete
8	Citroen	Edit	Delete
9	Daihatsu	Edit	Delete
10	Ducati	Edit	Delete

« Prev

Page 1 of 5

Next »

Figure 15: Admin Car Brand Edit page

Navigation

Dashboard

Reservations

Mechanic Registration

Car Service Management

Report

Tyoparin

Car Brand

Car Model

Service Detail

C

LOG OUT

Service Packages and Management

Service Packages

Package Name	Description	Actions	
10,000 Km	Basic Service: Recommended every 6 months or 10,000 Km.	Edit	Delete
20,000 Km	Full Service: Recommended annually or every 12 months or 20,000 Km.	Edit	Delete
40,000 Km	Major Service: Recommended every 24 months or 40,000 Km.	Edit	Delete

Service Detail Management

Add New Service Detail

Package Name	Service Detail Description	Price	Actions	
10,000 Km	Drain Plug Gasket	3.56	Edit	Delete
10,000 Km	Engine Oil Filter	14.52	Edit	Delete
10,000 Km	PGO Semi Synthetic 4L	116.00	Edit	Delete
10,000 Km	Windshield Cleaner	2.00	Edit	Delete
20,000 Km	Drain Plug Gasket	3.56	Edit	Delete
20,000 Km	Engine Air Filter	14.52	Edit	Delete
20,000 Km	Engine Oil Filter	14.52	Edit	Delete
20,000 Km	N95 Cabin Filter	59.00	Edit	Delete

Figure 16: Admin Service Management

Navigation

- Dashboard
- Reservations
- Mechanic Registration
- Car Service Management
- Report

Report for May 2025

Previous Month Next Month Rows per page: 10 ▾ Next

Username Car Plate Service Description Search

No.	Username	Car Plate	Service	Service Detail	Service Price (RM)	Booking Date
1	pelanggan1	WRS6784	Major Service	Engine Oil Filter	14.52	2025-05-31
2	pelanggan1	WRS6784	Major Service	Engine Oil Filter	14.52	2025-05-31
3	pelanggan1	WRS6784	Major Service	PGO Semi Synthetic 4L	116.00	2025-05-31
4	pelanggan1	JLK7680	Basic Service	PGO Semi Synthetic 4L	116.00	2025-05-31
5	pelanggan1	JLK7680	Basic Service	Drain Plug Gasket	3.56	2025-05-31
6	pelanggan1	JLK7680	Basic Service	Engine Air Filter	20.57	2025-05-31
7	pelanggan1	JLK7680	Basic Service	Brake Fluid	48.20	2025-05-31
8	pelanggan1	JLK7680	Basic Service	N95 Cabin Filter	59.00	2025-05-31
9	pelanggan1	JLK7680	Basic Service	Windshield Cleaner	2.00	2025-05-31
10	pelanggan1	JLK7680	Basic Service	Unknown detail	0.00	2025-05-31

Total Price (RM): 394.37

Figure 17: Admin Monthly Report

Navigation

- Welcome
- Reservations
- Report

Daily Schedule for 11 Jun 2025

Select Date: 11/06/2025

08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
		MARET62 WRS6784		JLK7680 JLK7680		WRS6784		WRS6784 WRS6784 WRS6784		

Figure 18: Mechanic Dashboard

Navigation

- Welcome
- Reservations
- Report

Monthly Schedule

< June 2025 >

Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1 1 Booking 14:00 - UTHM2417
2 1 Booking 10:00 - UTHM2417	3 1	4	5 2 Booking 10:00 - WTT7549 12:00 - WRS6784	6 1 Booking 10:00 - WRS6784	7 1	8 2 Booking 12:00 - WRS6784 14:00 - UTHM2417
9	10	11 1 Booking 10:00 - MARET62 10:00 - WRS6784 12:00 - JLK7680	12 1 Booking 10:00 - WRS6784	13 1	14	15
16	17	18 1 Booking 10:00 - WRS6784	19 1	20	21	22
23	24	25	26	27 1 Booking 10:00 - WRS6784	28 1 10:00 - WRS6784 10:00 - JLK7680	29 2 Booking 10:00 - UTHM1003 12:00 - JLK7680

Figure 19: Mechanic Monthly Schedule

Figure 20:Mechanic Daily Report

5.2 System Functionality

The system testing encompasses two types of testing which are functional testing and user acceptance.

5.3 Functional Testing

This section will discuss module plans and the description for every module, for administrator, customer and mechanic. It starts with a login module for all users, Registration module for customer and administrator, car module for customers. It also discusses notification for administrator and customer, mechanic registration for administrator module. Administrators can also manage car brand, car model and service detail management. Report module for administrator and mechanic. Mechanics can observe the daily report and monthly report.

Table 4: Functional testing

Module	Description
Login	Admin, customer, mechanic can redirect to their dashboard
Reservation	Customer can make reservation and admin can approve the reservation
Car	Customer can add car, edit car detail and view all car service history
Notification	Customer can view notification approval from admin, admin can get notification for new car reservation request
mechanic registration	Admin can register new mechanic
Car Brand	Admin can add new car brand, admin also can edit and delete existing car brand
Car model	Admin can add new car model, admin also can edit and delete existing car model
Service detail management	Admin can add service detail, service package and service package detail, admin also can edit or delete the existing service
Report	Admin can observe monthly report and can print the report. Mechanic can mark as done every service for a day
Mechanic daily schedule	Show mechanic daily booked service
Mechanic monthly schedule	Mechanic can observe monthly booked service

5.4 User Acceptance Testing

In this section I will show the respondent from my user. I already made 3 questionnaires using google form to get users satisfied with my system. The first section is for customer satisfaction testing, 10 respondents have already answered my form and the result will be shown in 5.4.1 Customer acceptance testing. The result for administrator is only 1 respondent because my system only has one administrator and the owner of the workshop has already answered the administrator acceptance testing and the result will be shown in 5.4.2 section. Lastly, i made the form for mechanic acceptance testing and I ask some mechanics to answer the questionnaire. I got 3 respondents for this section and the result will be shown in 5.4.3 mechanics acceptance testing.

5.4.1 Customer Acceptance Testing

This is customer acceptance testing. I give 5 questions to 10 respondent. 5 are very satisfied and 1 is very unsatisfied. The blue, red, yellow and green colour is a question I ask from 1 to 4 and the last question is an opinion question to improve the system. Some respondents give an opinion such as, make a better design, simple but nice design and lastly add a push notification.

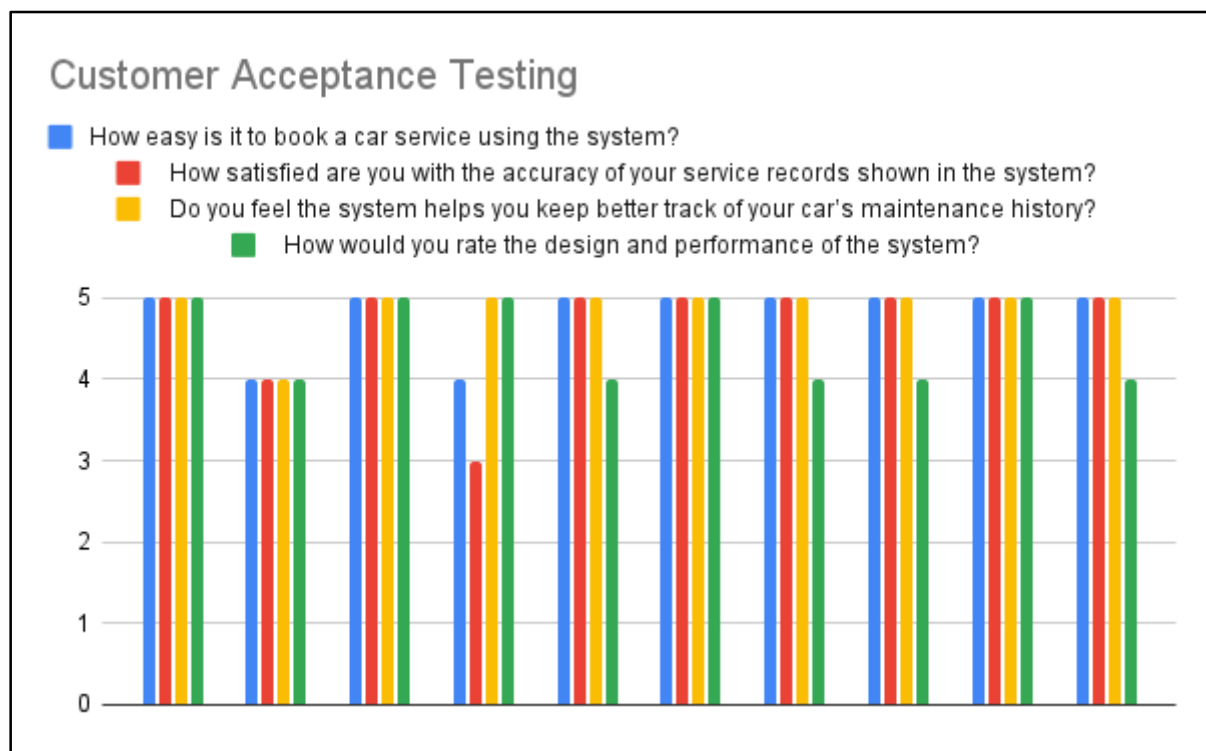


Figure 21: Customer Acceptance Testing

5.4.2 Administrator Acceptance Testing

This is an admin acceptance testing. I give 5 questions to the workshop owner. 5 is very satisfied and 1 is very unsatisfied. The blue, red, yellow and green colour is a question I ask from 1 to 4 and the last question is Do you have any suggestions or issues you'd like to report? The answer is no issue and this is a good system.

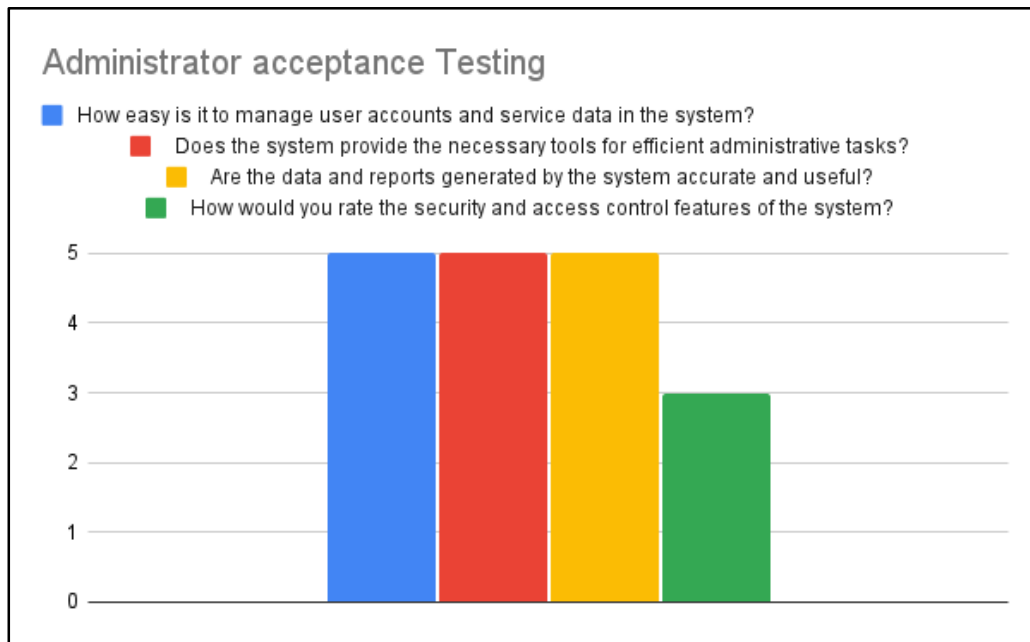


Figure 21: Administrator Acceptance Testing

5.4.3 Mechanics Acceptance Testing

This is mechanics acceptance testing. I give 5 questions to 3 workshop mechanics. 5 is very satisfied and 1 is very unsatisfied. The blue, red, yellow and green colour is a question I ask from 1 to 4 and the last question is Please share any feedback to help improve your experience with the system. Some mechanics answer that it's a good system and systematic for their duty.

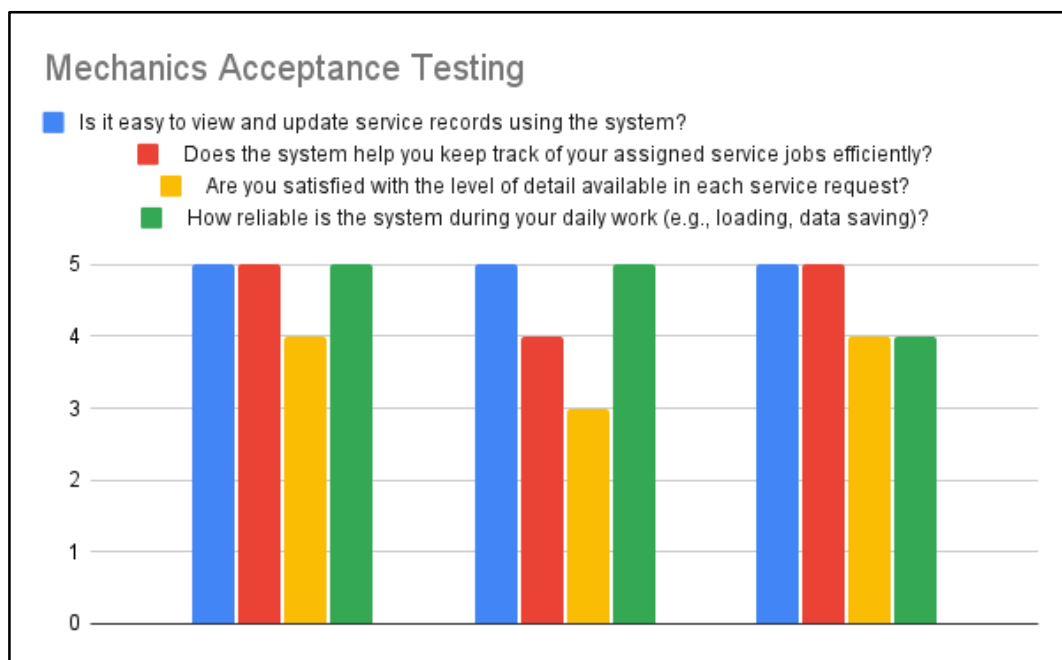


Figure 21: Mechanics Acceptance Testing

6. Conclusion

This project successfully developed a web-based Car Service Record System, achieving its objectives of transforming manual workshop methods into a systematic digital process by designing a more systematic data management and maintenance system, developing a user-friendly and accessible platform for workshops, and demonstrating its effectiveness and user acceptance in streamlining operations and enhancing daily activities. While the system significantly improves efficiency by digitizing bookings, record-keeping, and reminders, a current limitation is the absence of an online payment method, with transactions still requiring manual processing. Future development should prioritize integrating an online payment module to offer a complete digital experience and further streamline the service process. The system was developed using Visual Studio Code for the front-end and XAMPP for database management. It offers more comprehensive features, including automatic scheduling, notification alerts, vehicle data storage, activity recording, digital receipt storage, and multiple user roles, compared to existing workshop systems. The development followed the Waterfall Model, and its functional modules cover Login, Booking, Car management, History, Booking Approval, Mechanic Registration, Report, Service Management, and Mechanic Report. User acceptance testing confirmed overall satisfaction among customers, administrators, and mechanics regarding its ease of use, data accuracy, and efficiency.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

*The authors confirm contribution to the paper as follows: **study conception and design:** Muhammad Imran bin Hairol Rizal, Dr Nurul Aswa Binti Omar; **data collection:** Dr Nurul Aswa Binti Omar; **analysis and interpretation of results:** Muhammad Imran bin Hairol Rizal, Dr Nurul Aswa Binti Omar; **draft manuscript preparation:** Dr Nurul Aswa Binti Omar. All authors reviewed the results and approved the final version of the manuscript.*

An author name can appear multiple times, and each author name must appear at least once. For single authors, use the following wording:

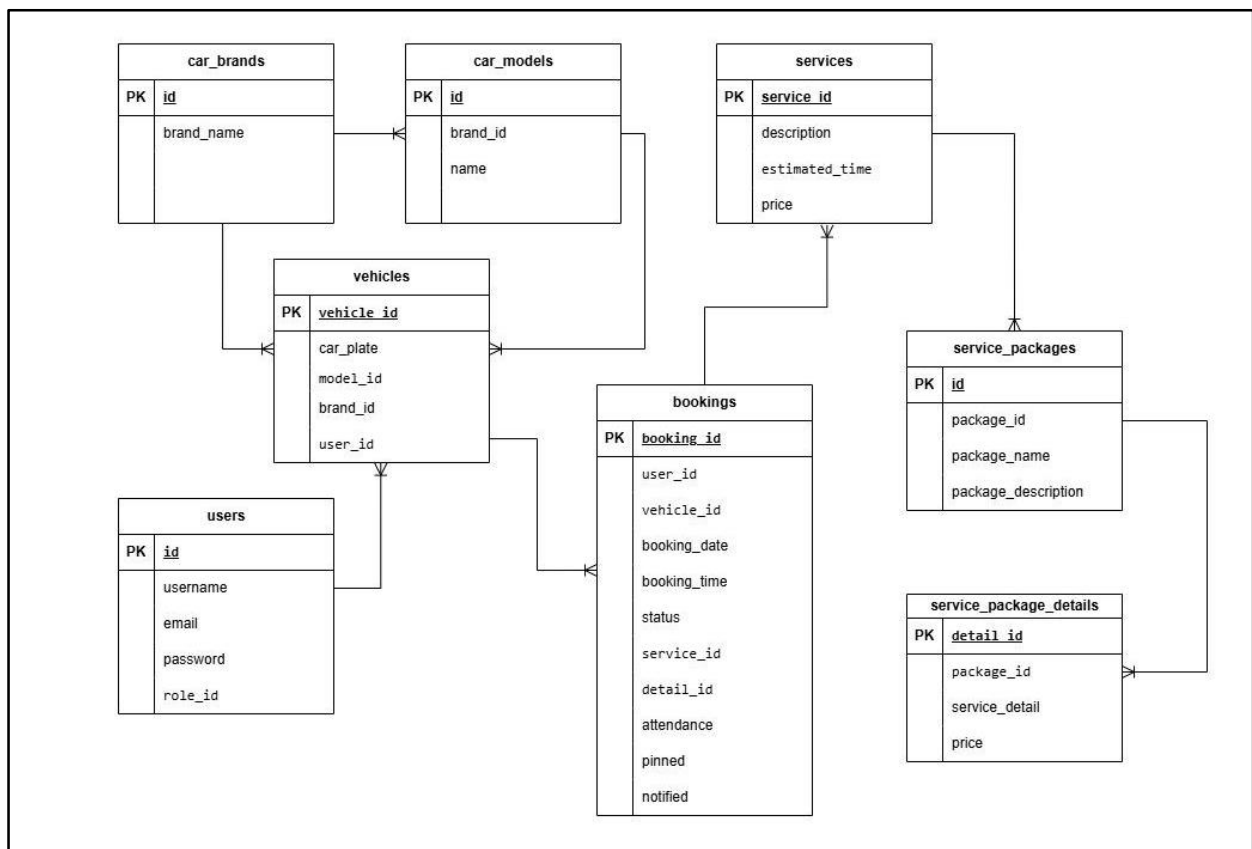
The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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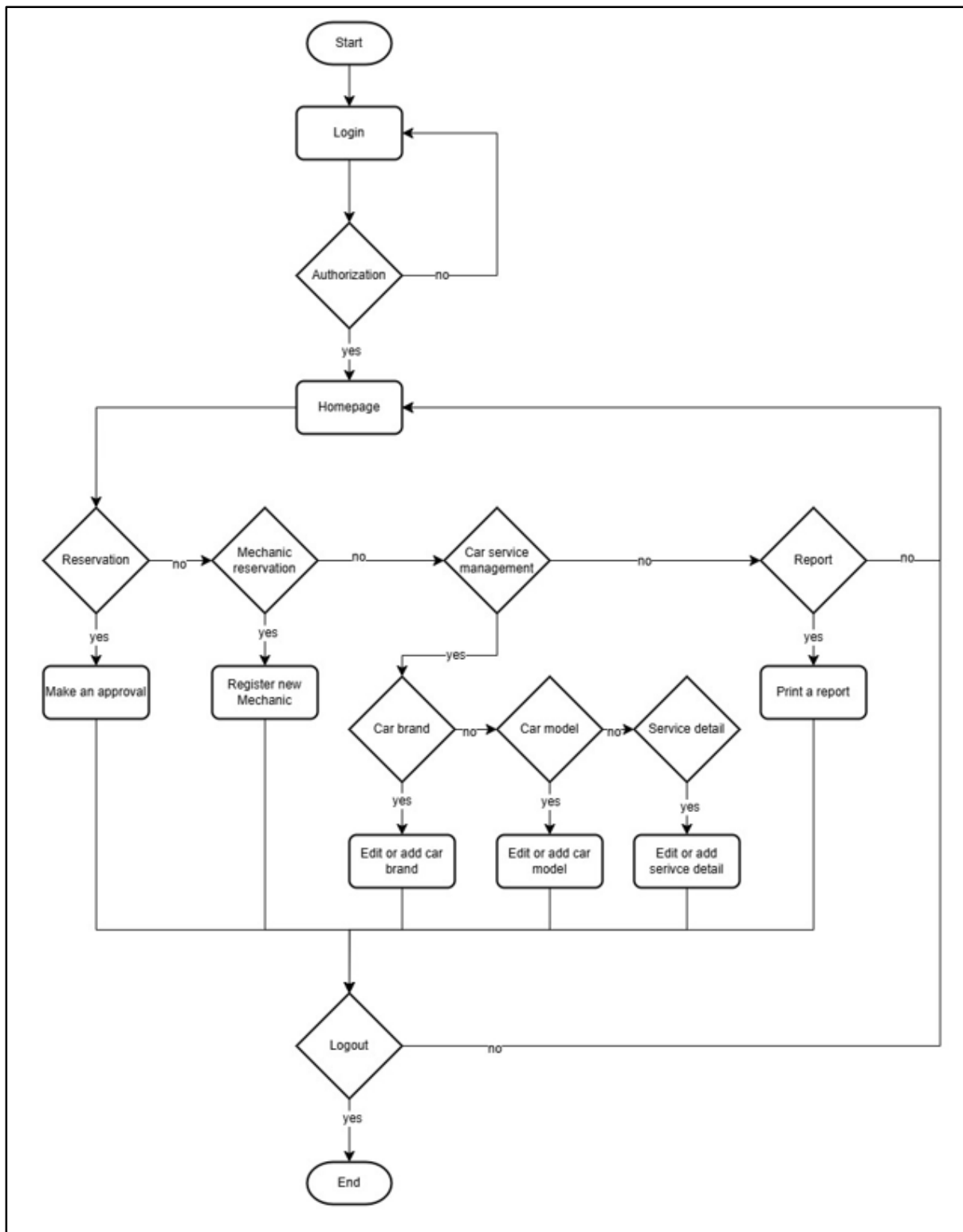
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Appendix A: Entity Relationship Diagram



Appendix B: Admin Flowchart



Appendix C: Customer and Mechanic Flowchart

