

CAR RENTAL MANAGEMENT SYSTEM

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Abstract

The rapid growth of tourism in the 21st century has increased the demand for flexible transportation options in Malaysian cities. Many tourists lack suitable transportation, and newly licensed drivers often want to experience car ownership but face financial barriers. To address these issues, this project introduces the Car Rental Management System, a web-based platform that connects vehicle owners with potential renters.

The system ensures security and reliability by allowing only licensed drivers aged 21 and above to register. It offers two main interfaces: one for car owners to list and promote their vehicles, and another for customers to browse and apply for rentals. Additionally, the platform includes a comprehensive management account to handle lease contracts and resolve issues, ensuring smooth operations.

A key feature of the Car Rental Management System is its vehicle screening process, which ensures that only well-maintained and reliable vehicles are available for rent. The platform provides detailed displays of each vehicle, including specifications, availability, and rental rates, making it easy for customers to find a vehicle that meets their needs. Direct communication channels between vehicle owners and renters

further enhance the user experience.

The Car Rental Management System is developed using PHP as the primary programming language, which is well-suited for creating dynamic web applications. The backend is supported by a MySQL database, ensuring effective data management and storage. By offering short-term car rentals, the system provides an affordable and convenient transportation solution, particularly benefiting tourists and new drivers in Malaysia. The project aims to bridge a significant gap in the car rental market by providing a user-friendly, secure, and efficient service that benefits both car owners and renters. This platform seeks to transform the car rental industry in Malaysia, making transportation more accessible and reliable for all users.

Key word: Car Rental Management System, tourism, transportation, web-based platform, PHP and MySQL

Introduction

The Car Rental Management System (CRMS) is an innovative web-based platform designed to address the growing need for flexible and affordable transportation solutions in Malaysia. In today's rapidly developing tourism industry, many travelers find themselves in new cities without suitable means of transportation. Additionally, newly licensed drivers often seek the experience of car ownership but face financial constraints that prevent them from purchasing a vehicle. The CRMS aims to bridge this gap by connecting vehicle owners with potential renters, providing a convenient, cost-effective, and secure solution for short-term car rentals.

The CRMS offers a dual interface system: one tailored for car owners and another for renters. Car owners can easily list and promote their vehicles on the platform, including detailed descriptions, photos, and availability schedules. Renters can browse

through the listings, apply filters to find vehicles that meet their specific needs, and directly contact the owners for bookings. This system is designed to ensure that only licensed drivers aged 21 and above can register, enhancing the security and reliability of the service.

The platform's key features include comprehensive vehicle screening, which ensures that only well-maintained and reliable vehicles are listed. Detailed vehicle displays provide potential renters with all necessary information to make informed decisions. Direct communication channels between owners and renters facilitate seamless transactions and quick resolution of any issues that may arise. Additionally, the CRMS includes a robust management account for administrators to handle lease contracts, monitor transactions, and enforce compliance with rental agreements.

By facilitating short-term rentals, the CRMS offers an affordable and convenient transportation solution, especially beneficial for tourists and new drivers in Malaysia. The system not only provides flexibility for renters but also presents an opportunity for car owners to generate income from their underutilized vehicles. The CRMS is poised to revolutionize the car rental market in Malaysia by offering a user-friendly, secure, and efficient service that caters to the needs of both car owners and renters.

The implementation of CRMS is grounded in a comprehensive understanding of the car rental industry's challenges and opportunities. The system incorporates best practices in web-based application development, data security, and user experience design to ensure a high level of service quality. Through continuous improvements and user feedback, the CRMS aims to set a new standard in the car rental industry, making transportation more accessible and hassle-free for everyone.

Methodology

The development of the Car Rental Management System employs an agile development methodology, which allows for continuous iteration and testing throughout the software development lifecycle. This approach is ideal for ensuring that the system remains flexible and responsive to user needs and requirements. The methodology is divided into several phases:

Analysis Phase:

This phase focuses on understanding and documenting the system requirements. Both functional and non-functional requirements are identified through consultations with stakeholders. Additionally, a review of existing car rental platforms is conducted to gather insights and benchmark best practices. This phase ensures that the developed platform aligns with the needs and expectations of its users.

Design Phase:

In this phase, the system architecture is designed. Key activities include defining the system's architecture, database schema, algorithms, and user interfaces. The design phase aims to create a blueprint that guides the development process and ensures the system's objectives are met efficiently. Detailed diagrams such as context diagrams, activity diagrams, use case diagrams, and flowcharts are developed to visualize the system's structure and workflows.

Implementation Phase:

The implementation phase involves the actual coding and integration of the system components. Using PHP and MySQL, the development team writes and debugs the code to build the platform according to the design specifications. This phase is the most time-consuming, as it involves the development of all functional modules and the integration of system requirements identified during the analysis phase. During

this phase, defects and issues are identified and resolved to ensure a robust final product.

Testing Phase:

Testing is a critical phase where the system is evaluated to ensure it meets the required standards and performs as expected. Various types of testing, including unit testing, system testing, and usability testing, are conducted. The testing phase aims to identify and fix bugs, verify system functionality, and ensure a smooth user experience. Data collection for user requirements is achieved through questionnaires distributed to potential users, and the results are analyzed to inform system improvements.

Data Collection and User Feedback:

The system's user requirements and feedback are collected through structured questionnaires distributed to 20 respondents, including potential users like tourists and local residents. Additionally, usability testing is performed with 20 questionnaires, covering Likert scale questions and open-ended questions to gather comprehensive user feedback. The collected data is analyzed using descriptive statistics to evaluate the system's usability and overall user satisfaction.

Conclusion:

The agile methodology ensures that the Car Rental Management System is developed in a structured yet flexible manner, allowing for continuous improvements based on user feedback. This approach ensures that the final product is user-friendly, efficient, and meets the high-quality standards expected by the stakeholders.

Result and discussion

The car rental management system has been developed successfully and complete documentation has been completed. The Flask framework and MySQL database were used throughout the development process to ensure smooth operation of the platform across various computer systems. The interface design and front-end development is performed using the online editor Piskel, which facilitates the creation and animation of all ICONS and visual elements on the platform.

When users enter the platform, they will see the user interface. To get started, users need to register an account. This can be done by clicking the "Login" button, which directs them to the login screen. In the login screen, users can choose to log in to an existing account or create a new one. When creating an account, the user must fill in all the required fields. And the user password must be greater than eight characters, click the registration button to complete the registration, and then the user can log in with a new account, thus having full access to the platform's functions.

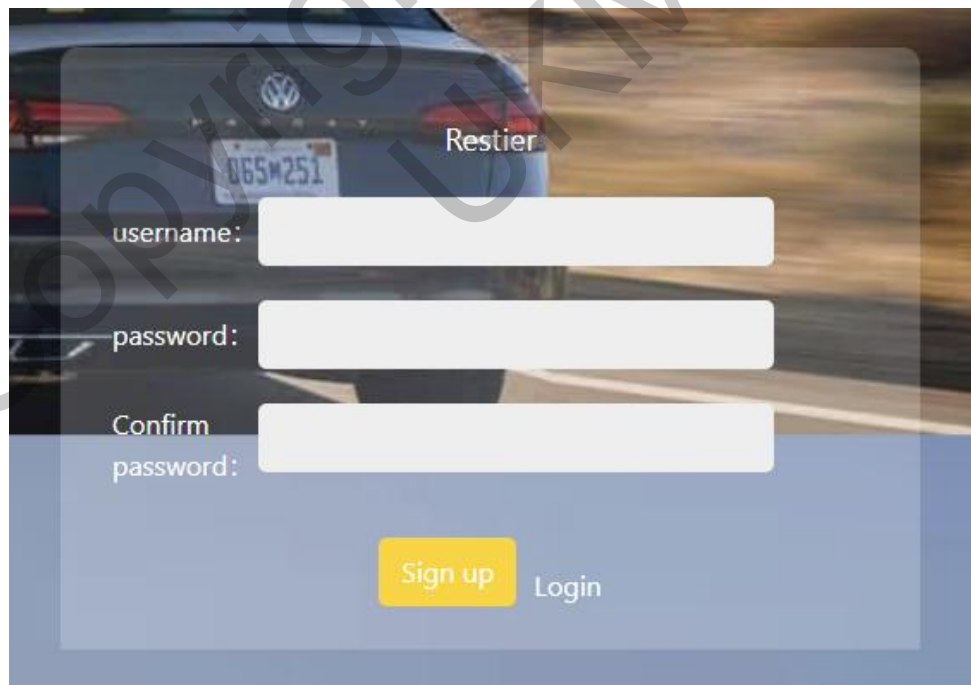


Figure 1 Registration Interface

Once the user has registered an account, the user will need to return to the login page. The login interface, shown in Figure 2, allows users to log in to the platform using the accounts and password they registered with.

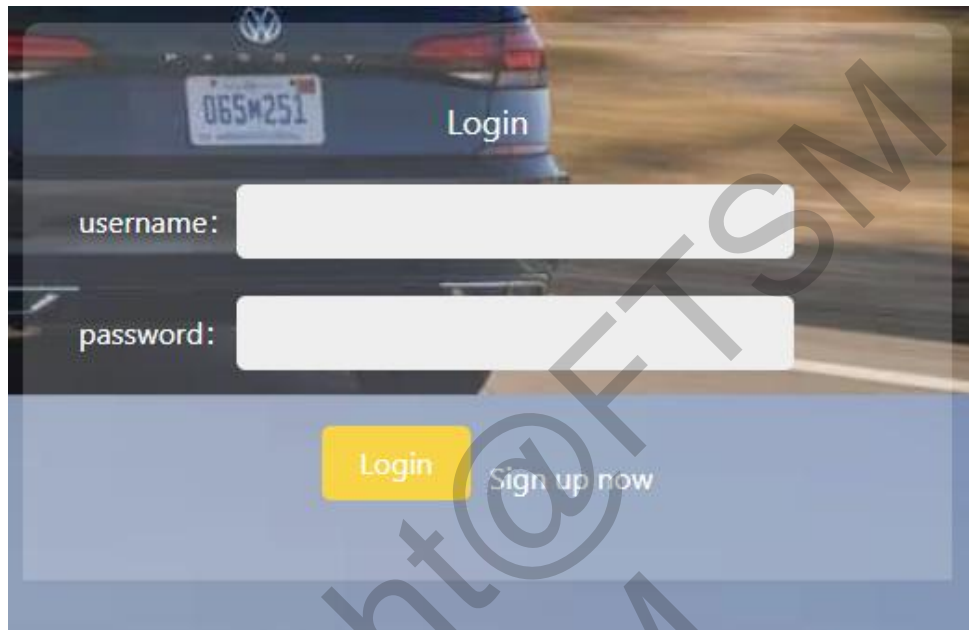


Figure 2 Login Interface

After the user logs in successfully, the platform will display the home page. As shown in Figure 3, the home page contains several buttons that represent different functions and modules that the user can choose to use. There are two main buttons on the interface, namely "Home page", "Car Rental", "Activity" and "Used Car". When users click the "Car Rental" button, they can select their desired vehicle and search for vehicles. When the user clicks the "Activity" button, all the offers offered by the site will be displayed, and when the user clicks the "Used Car" button, the site will display the used vehicles currently for sale for the user to select.

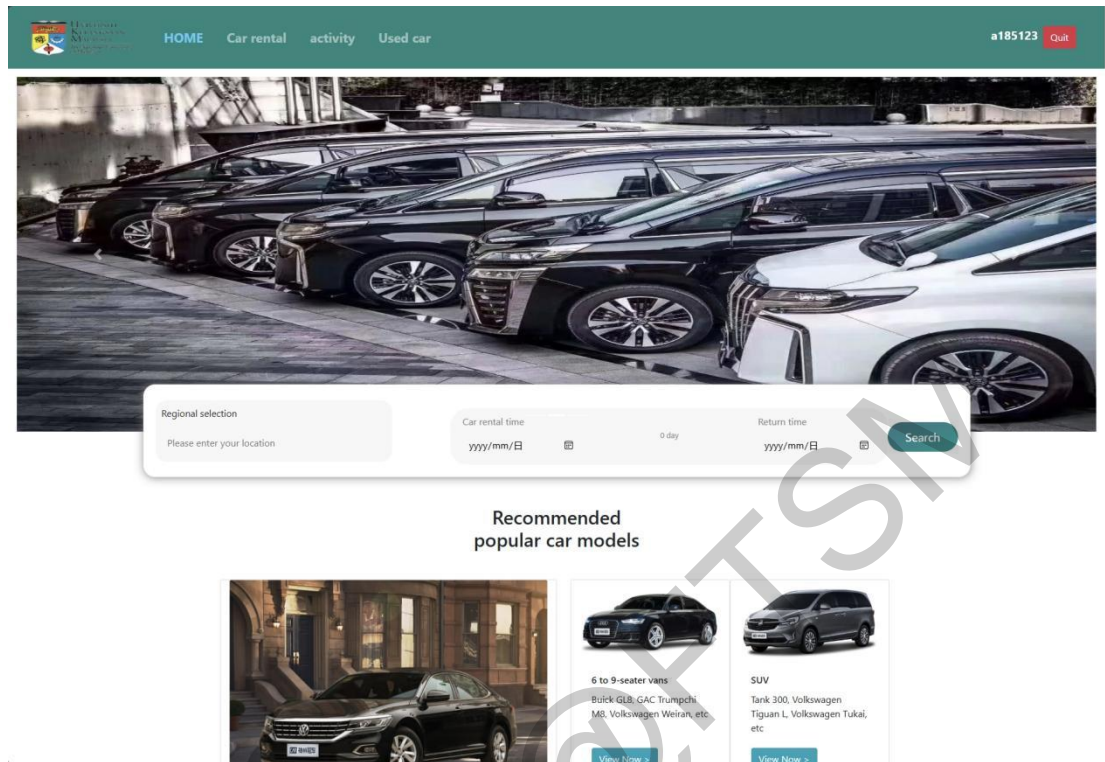


Figure 3 Homepage Interface

On the home page of the Car Rental management platform, users can select the vehicle they are interested in by clicking the "Car Rental" button. As shown in Figure 4, when the user clicks the button to enter the rental page, a map with a search address function and a function bar to search for a vehicle will be displayed. Users can search for locations or regions that interest them. The map function is designed to help users quickly find their address and surrounding information. When the user chooses a favorite vehicle, you can click on the vehicle to view the detailed information and introduction of the vehicle, including the driving distance of the vehicle, the life of the car and so on, which can facilitate customers to choose the right vehicle for their own.

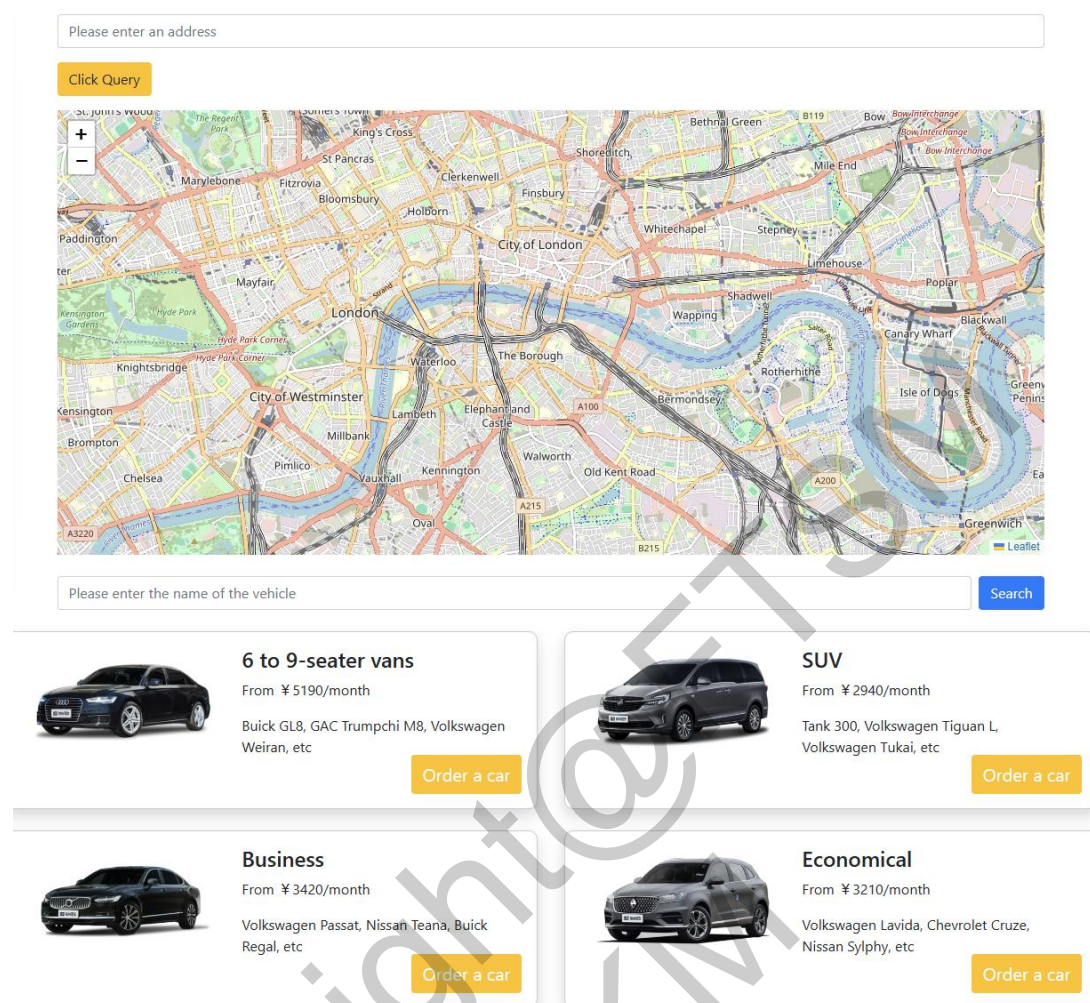


Figure 4 Selecting a region and type of car

When the user selects a vehicle, the platform will display all the information about that vehicle. As shown in Figure 5, the restaurant list contains details for each restaurant, including vehicle name, description, color, production date, and rental price. For example, after the user selects a commercial vehicle, the platform will display the details of the vehicle, vehicle name, introduction, color, production date and rental price, etc.

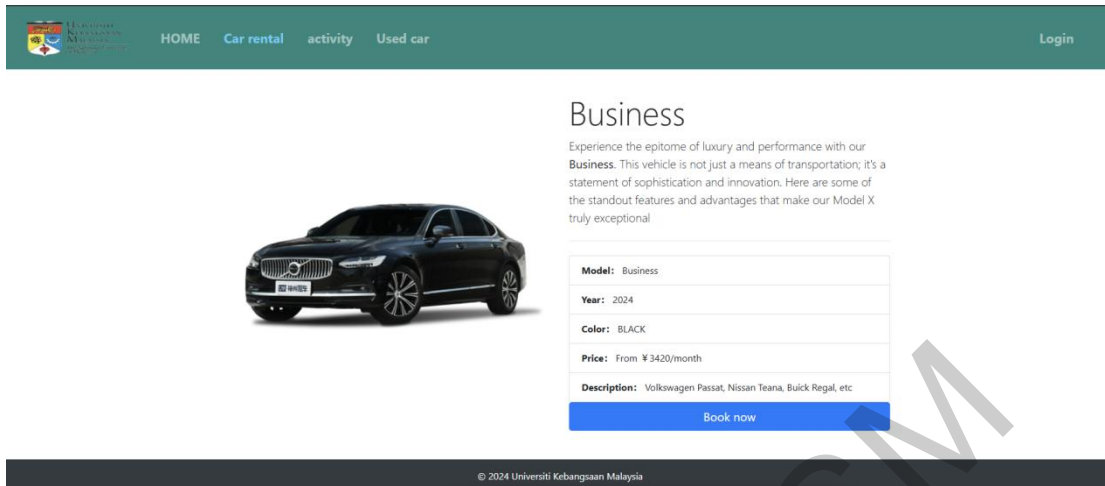


Figure 5 Selecting a car

When the user clicks the activity button, the user will see all the activities and offers of the website, such as spring offers, one-time payment offers, and preferential rental of vehicles from a certain location to a certain location and some discount activities. The purpose of the page is to let customers have a good consumption experience, help users save costs, and make the website more in line with customer needs and welcomed by customers.

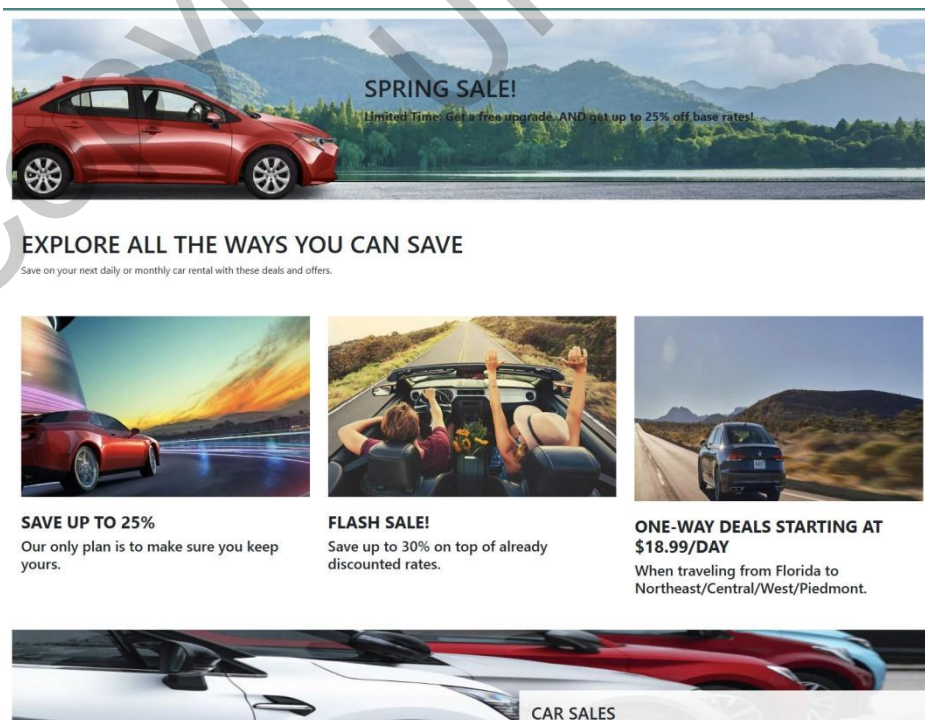


Figure 6 Activity Interface

After the customer clicks the used car button, the interface will jump to the page in Figure 7, showing a series of currently sold used vehicles, as well as vehicle introduction and contact information of the owner. If the customer wants to buy his own means of transportation and does not want to spend too much money, the customer can contact the contact information of the owner in the vehicle introduction, and carry out further communication and understanding to purchase the vehicle.

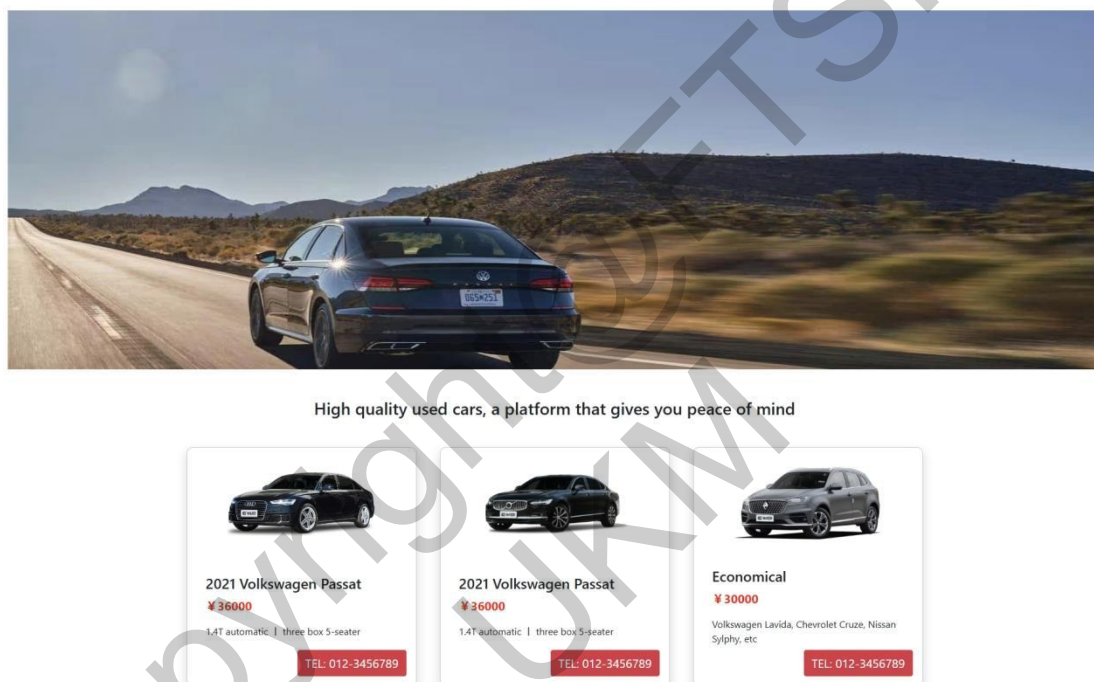


Figure 7 Used Car Interface

This is the interface of the website administrator, as shown in Figure 8, the administrator can delete some customer accounts that are not trustworthy, so as to achieve the role of managing the atmosphere of the website; Figure 9 is the interface of managing rental vehicles, the administrator can manage rental vehicles, if the vehicle information does not conform to the facts, the administrator can delete it, and at the same time can add the function of rental vehicle information. Figure 10 shows the used vehicle management interface, which has the same function as the page for

managing rental vehicles, and the administrator can add and remove operations

User >		
username	password	operation
zhangsan	e10ad:3949ba59bbe56e05720f883e	delete user
a185123	68c43dc5fb7a8fa52d4c4a4008f9876	delete user
abc	d0b0ab711c3ab8f514db9a6d85de100a	delete user

Figure 8 User management






Car rental information					
Information addition					
Pic	Title	Price	Introduce	Operation	
	2021 Volkswagen Passat	From ¥ 3000/month	1.4T automatic three box 5-seater	delete	
	Economical	From ¥ 3210/month	Volkswagen Lavida, Chevrolet Cruze, Nissan Sylphy, etc.	delete	
	Business	From ¥ 3420/month	Volkswagen Passat, Nissan Teana, Buick Regal, etc.	delete	
	SUV	From ¥ 2940/month	Tank 300, Volkswagen Tiguan L, Volkswagen Tukai, etc.	delete	
	6 to 9-seater vans	From ¥ 5190/month	Buick GL8, GAC Trumpchi M8, Volkswagen Weiran, etc.	delete	

Figure 9 Car rental management




Used Car information						
Information addition						
Pic	Title	Price	Introduce	Tel	Operation	
	Economical	¥ 30000	Volkswagen Lavida, Chevrolet Cruze, Nissan Sylphy, etc.	012-3456789	delete	
	2021 Volkswagen Passat	¥ 36000	1.4T automatic three box 5-seater	012-3456789	delete	
	2021 Volkswagen Passat	¥ 36000	1.4T automatic three box 5-seater	012-3456789	delete	

Figure 10 Used car management

The platform also offers a user center feature, where users can view their reservations and review their history, and can change their passwords. As shown in Figure 11, once a user is logged in, they can go to the "user Center" page, where they can see message notifications that allow the user to receive order information in a timely manner. Users can also upload rental or second-hand vehicle information to rent and sell. At the same time, the customer's own details can be displayed, such as name, gender, age, region, hobbies, contact information and personal biography.

In this way, the platform not only provides users with rich vehicle information and services, but also provides users with convenient account management functions, and improves the overall user experience.

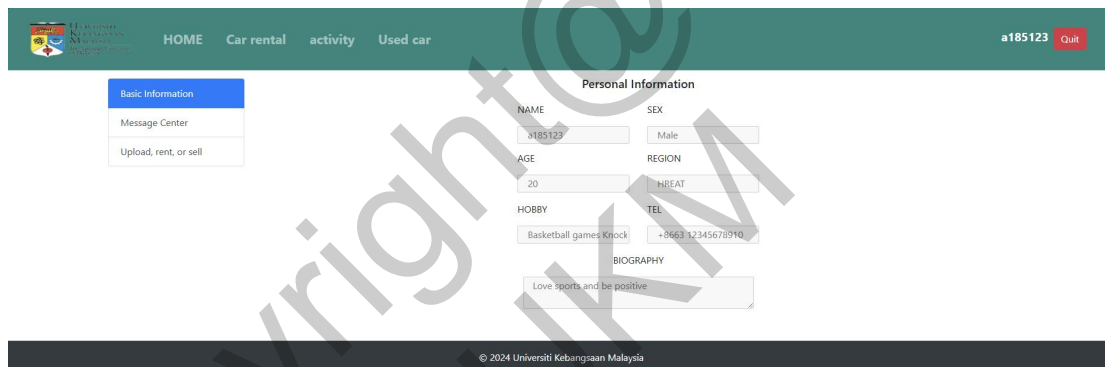


Figure 10 User center

Usability Testing is a method of evaluating the usability of a car rental website by observing the interaction between real users and the system. It involves identifying and solving the problems encountered by users during their interaction with the website in order to improve the user experience and satisfaction of the product.

Table 1 Usability Testing

ID	Question	Description	Score
U001	Is it easy to navigate?	Whether the operating system is easy for users to use each part of the function?	85/100

U002	Whether these features are easy to use and understand	Whether the viewing and publishing of car's information is convenient for users to use	80/100
U003	Whether the system effectively provides help to users	Whether the user effectively provides help when encountering difficulties	80/100
U004	Is it appropriate in the user interface	This includes the aesthetic aspects of the system, such as typography, layout, color, etc	80/100
U005	Whether the system is efficient and responsive	Includes the response speed of the system, such as page jump, user login speed, etc	90/100

Conclusion

The Car Rental Management System (CRMS) has been initially developed and meticulously documented to embody a comprehensive and user-centric solution for the Malaysian car rental market. Using Flask framework and MySQL database, the system ensures seamless operation in different computing environments. The interface design assisted by the online editor Piskel enhances the visual appeal and functionality of the platform.

The project addresses key transportation challenges faced by tourists and newly licensed drivers, providing a flexible and affordable alternative to car ownership. Dual interface design for both owners and renters ensures an intuitive and efficient user experience. Owners can easily list and promote their cars, while renters can browse

detailed vehicle information, apply filters, and communicate directly with owners.

The platform emphasizes safety and reliability by restricting the registration of licensed drivers aged 21 and over. Comprehensive vehicle screening procedures and detailed displays ensure that only well-maintained vehicles are available for rental. This, combined with direct communication channels and well-managed accounts, enhances user trust and satisfaction.

Throughout the development process, the project adhered to an agile approach that supported continuous iteration and responsiveness to user feedback. This approach ensures that the end product is closely aligned with user needs and industry standards. All stages, including analysis, design, implementation and testing, are meticulously executed to achieve a high quality system.

Usability test results show that users are satisfied with the navigation, functional accessibility and efficiency of the platform. The system not only meets the functional requirements, but also provides a good and efficient user experience.

In short, by providing user-friendly, safe and efficient services, CRMS is poised to revolutionize the car rental industry in Malaysia. It fills a gap in the car rental market and makes transportation more convenient and reliable for all users. The platform proves the effective application of modern web development practices, providing a powerful and scalable solution for the car rental industry.

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