Book2Shine: Web Portal Car Wash Booking System

Renz B. Dabas, Kenneth P. Saquin, John Lester Sabinosa & Gerals Quirante

A car wash station is a facility that provides cleaning services for various types of vehicles. This can be done manually or with equipment such as foam sprayers, pressure washers, and air dryers. Car wash stations are often located near highways and may also offer additional services such as car tinting, repair, and fueling. Some stations feature self-service options like the "*hulog 5*" system, while others provide full-service packages including washing, drying, and interior cleaning. In most cases, machines are used to simplify the washing process, ensuring thorough cleaning in areas staff may not easily reach.

Today's technological advancements have encouraged many business owners to adopt innovative systems (Faiz et al., 2024; Mishrif & Khan, 2023). Booking systems, once common only in hotels, resorts, restaurants, parking spaces, and similar establishments, are now increasingly used in service-oriented industries (Zahidi et al., 2024; Deputat et al., 2024). A booking system helps attract new customers, improve service efficiency, and enhance online visibility (Satghare, 2023).

This study aims to create a web portal booking system that benefits both car wash stations and vehicle owners. This system is designed to provide convenience by allowing car wash owners and customers to manage appointments through a single platform. Customers can select a preferred car wash station and book a service directly via the portal. A mobile-friendly version of the system further enhances accessibility, enabling users to book and manage their appointments anytime, anywhere. For business owners, it simplifies recordkeeping, payment management, and customer organization, while also expanding market reach through online engagement.

A web portal booking system acts as a "middleman" between car wash stations and customers, providing a centralized and efficient scheduling tool. This type of system has become increasingly popular due to its convenience for both service providers and clients. According to Aziz (2023), the purpose of implementing such applications is to allow customers to book car wash services through mobile devices. The car wash industry is rapidly expanding, and many customers prefer mobile-based service requests. To enhance reliability, booking systems often provide customized panels for customers, enabling access to a full range of services with a single click. Key features include 24/7 appointment scheduling, service customization, online payment, and user-friendly navigation. These systems save time, reduce manual labor, and provide secure storage of customer information. Customers value the convenience of booking services anytime and anywhere, which reflects the growing demand for digital solutions in the automotive industry (Veena et al., 2024; Mattola et al., 2025).

The study by Aziz (2023) shares similarities with the current research, as both focus on booking systems for car wash services. Both systems allow customers to schedule appointments anytime and from

different locations. However, Aziz's system is mobile app-based, whereas the present study focuses on developing a web-based booking portal.

Theoretical Framework

According to Hu and Gu (2013), the rise of the Internet has significantly transformed hotel operations, particularly in how reservations are made. Modern customers demand booking systems that are diversified, convenient, and tailored to individual needs. However, many hotels still face inefficiencies in managing reservations due to outdated or manual processes. Hu and Gu (2013) argue that designing an online hotel booking system based on the B/S (browser/server) model can address these challenges by providing functionalities such as registration, login, reservation management, and customer management. Implementing such a system improves the efficiency of hotel reservations, enabling real-time processing of bookings and reducing errors associated with manual management.

Similarly, Saito et al. (2019) highlight that the increasing reliance on online booking websites introduces additional challenges, such as last-minute cancellations and the need for overbooking strategies. Their study demonstrates that integrating big data from online booking platforms into hotel revenue management allows hotels to optimize room charges and overbooking levels. By combining a discrete choice model of customer behavior with a quantitative overbooking model, hotels can maximize expected sales while mitigating the risks of over- or under-booking. The findings suggest that leveraging online booking data not only improves operational efficiency but also supports strategic decision-making in hotel management.

Together, these studies emphasize the critical role of online booking systems in modern hotel operations. Both operational efficiency and revenue optimization can be significantly enhanced by adopting technologically advanced systems that automate reservations, manage customer interactions, and utilize data-driven decision-making for pricing and overbooking strategies.

In the study of Vrontis et al. (2022), hotels were found to face challenges in managing online bookings despite the availability of electronic services, which enhance information transparency, interactivity, and market comparisons. The research, conducted with guests of five-star hotels in Beirut, Lebanon, identified key factors influencing customers' intentions to book online, including perceived trust, perceived ease of use, and perceived risk. These findings indicate that even in digital booking environments, customers still require support during the reservation process. Based on this evidence, Vrontis et al. (2022) emphasized that hotels must adopt online booking systems that not only provide convenience but also foster trust and reduce perceived risks, thereby enhancing customer confidence and satisfaction.

Similarly, Jackson et al. (2021) demonstrated the practical benefits of implementing an online-based hotel information system at the University of Benin Guest House, Nigeria. Their system automated data entry, facilitated efficient communication, and enabled rapid retrieval of guest records. By employing PHP and MySQL and modeling the system with Unified Modeling Language (UML), the researchers showed how technology can streamline hotel operations, reduce errors, and improve service delivery. The implementation of such a system allowed for faster processing of reservations and more accurate tracking of guest information,

which ultimately supports both managerial decision-making and operational efficiency.

Together, these studies highlight the importance of adopting online booking and information systems in the hospitality sector. By integrating user-friendly, secure, and efficient technologies, hotels can enhance customer satisfaction, optimize operational processes, and strengthen their competitive advantage in increasingly digital markets.

Similarly, Thosar et al. (2022) proposed a smart parking booking system designed to address the common issue of locating parking spaces in public areas, which often consumes significant customer time. Their system provides vehicle owners with an easy way to reserve parking slots online via a web portal. Through this application, users can view available parking spaces in real time and reserve a slot for a specific time period. Once booked, the slot is automatically marked as unavailable to others during that time. The system also incorporates convenient features such as cancellation options, allowing users to cancel reservations anytime, and a record-keeping function, enabling customers to view their previous parking details. By simplifying the process of finding and reserving parking spaces, the system enhances user convenience and reduces unnecessary delays in urban mobility.

Research Framework

Experimental Design

The study employed an experimental design to examine the relationship between the independent and dependent variables. The independent variable is the price of the car wash services offered, while the dependent variable is the number of bookings made through the system. The

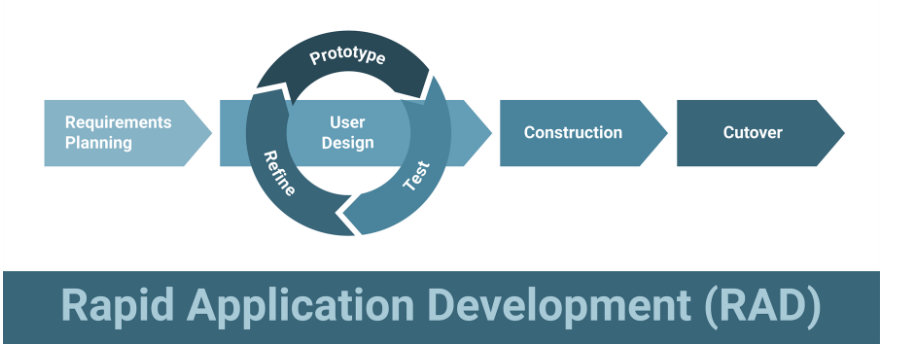
independent variable, service price, can be manipulated or adjusted during the experiment. Meanwhile, the dependent variable, the number of bookings, is measured to determine how it is influenced by changes in service pricing. This design allows the researchers to analyze the effect of pricing strategies on customer booking behavior in the web-portal system.

Procedures of Different Phases

The study adopted the Rapid Application Development (RAD) methodology, which was deemed the most appropriate for the study due to its flexibility and efficiency. RAD offers several advantages aligned with the system's objectives, such as accommodating changing requirements, enabling progress tracking, reducing iterative process time, and increasing productivity with fewer resources. Additionally, RAD minimizes development costs, enhances component reusability, and allows for faster prototyping and early feedback. These benefits make it highly suitable for developing the carwash booking system, ensuring timely completion while maintaining quality and adaptability.

Figure 1

Rapid Application Development



Requirements planning. In this phase, the researchers observed and collected data to identify existing problems and establish objectives for specific solutions. By analyzing the current system's flaws and limitations, they were able to determine what actions were necessary to overcome them. This included identifying appropriate materials, specifying their requirements, and defining system needs. Ultimately, the researchers outlined the problem, gathered relevant data, set clear objectives, analyzed software specifications, and developed a strategy to guide the User Design phase.

User design. During the User Design phase, users and researchers collaborated to create models representing all system inputs, processes, and outputs. This phase involved a series of interactive sessions where users could review, modify, and approve a working model of the system to ensure it met the specified requirements. The primary focus was on completing the logical design of the proposed system. Key considerations included the operating system, programming requirements, and security measures. Additionally, this phase incorporated the design of the user interface, enabling effective interaction and control of the system.

Construction. The Construction phase focused on completing the system's design, developing the software, and conducting rigorous testing. This ensured that the proposed system was functional, reliable, and aligned with user requirements. Importantly, clients were still encouraged to suggest modifications or request additional features during this stage to further enhance the system. Activities in this phase included software development, testing, and preparing the system for deployment.

Cutover. The Cutover phase served as the final stage of RAD. It involved training users to operate the system effectively and providing the necessary documentation for reference and support. This stage ensured a

smooth transition from development to actual use, equipping end-users with the knowledge and resources needed for successful system implementation.

Technical Framework

Software

The development of the system required several software tools and technologies, each serving a specific function:

Visual Studio Code (VS Code) – This integrated development environment (IDE) was used by the researchers to encode and manage the source code of the system. Its versatility and user-friendly features make it ideal for web-based development projects.

PHP – Selected as the primary programming language, PHP is highly effective in creating dynamic and interactive web-based systems, making it well-suited for the proposed carwash booking system.

Laravel Framework – An open-source PHP framework used for server-side coding. Laravel provides robust features such as routing, authentication, and scalability, enabling the researchers to build a secure and maintainable system.

XAMPP 8.0.3 – This local server environment allowed the researchers to develop and test the system offline. It provided a complete package of Apache, PHP, and MySQL, eliminating the need for constant internet access during development.

MySQL – A relational database management system (RDBMS) that stores and manages the system's data. MySQL was chosen due to its compatibility with PHP and Laravel, as well as its efficiency in handling structured queries for the booking system.

Hardware

The implementation of the system required the use of personal computers or laptops. For the purpose of this study, the researchers provided two laptops to support the development and testing of the web-based booking system. The laptops served as both the development environment and the platform for initial implementation and evaluation.

Table 1

Hardware

x64-based processor	x64-based processor
RAM : 4.00 GB	CPU N3710
HDD 1TB	RAM (4.00 GB)

Requirement Analysis

The system requirements were gathered by analyzing the needs of both carwash owners and customers. The primary goal was to design a platform where customers could conveniently book services and locate the nearest available carwash in their area.

To ensure the system meets these needs, the researchers created a sample prototype to demonstrate its functionality. This allowed users to gain familiarity with the system and provided them with a practical background before full implementation.

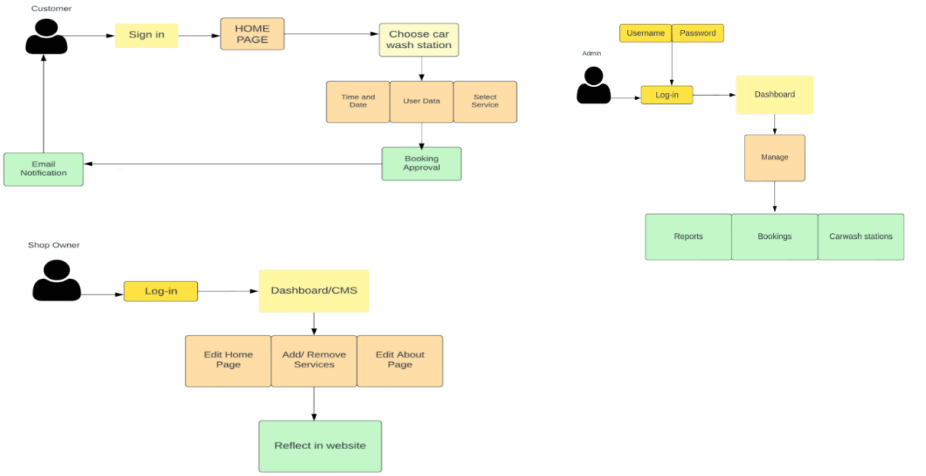
For development, the researchers utilized the following software tools: Visual Studio Code (VS Code) for source code encoding, PHP as the primary programming language, the Laravel framework for server-side development, XAMPP as the local server environment, and MySQL as the database management system.

Modelling

The Figure 2 displays the procedure for booking a customer through the web-portal carwash booking system.

Figure 2

Use case of the system for customer, shop owner, and admin



The Figure 2 illustrates the roles of different system users and the level of access they are granted. Customers can access the website after creating an account, which allows them to choose a preferred carwash station and proceed with booking their vehicle. Shop owners or carwash operators can access their own dashboard and Content Management System (CMS) to design their website, customize services, and manage customer bookings. Meanwhile, the administrator (admin) is granted full control over the system, with access to manage reports, bookings, and carwash stations.

Database Schema

Figure 3 presents the database schema diagram for the web-portal carwash booking system. It illustrates the UML diagram and the relationships among different entities in the proposed system for carwash

owners in Sariaya, Quezon. This schema provides a clear view of how the database tables are structured and interconnected, ensuring efficient storage, retrieval, and management of booking data.

Figure 3

Database schema diagram for web portal carwash booking system

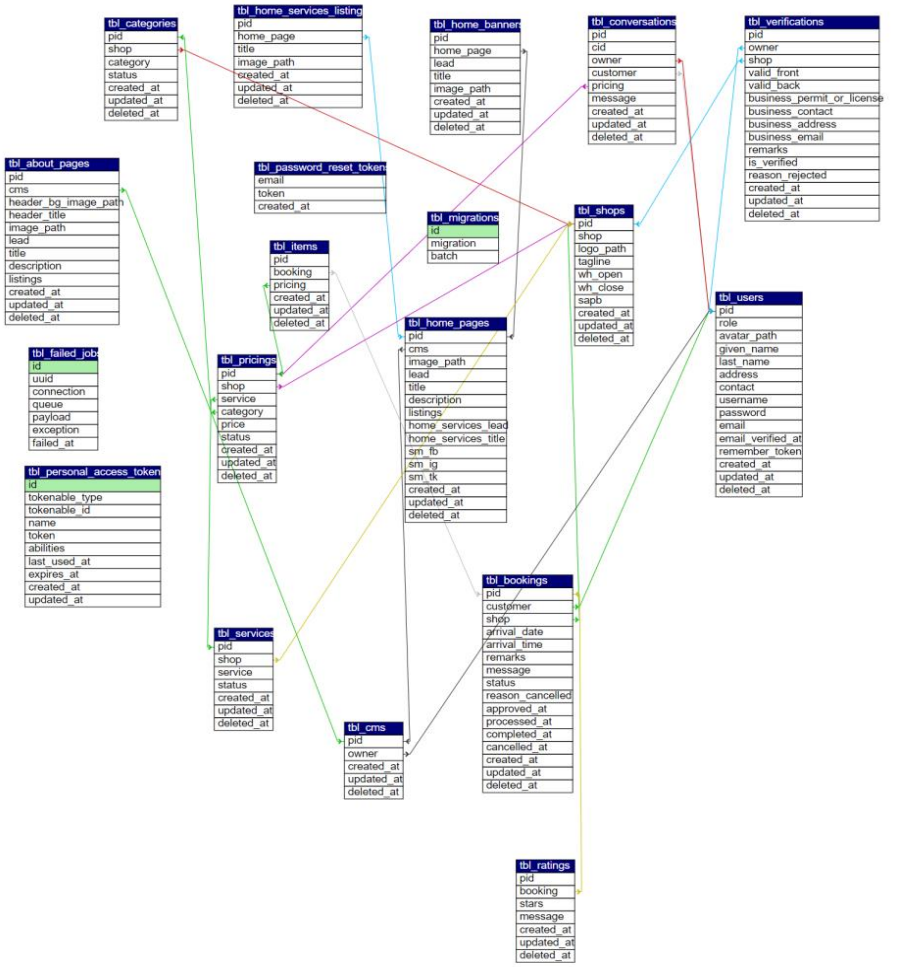


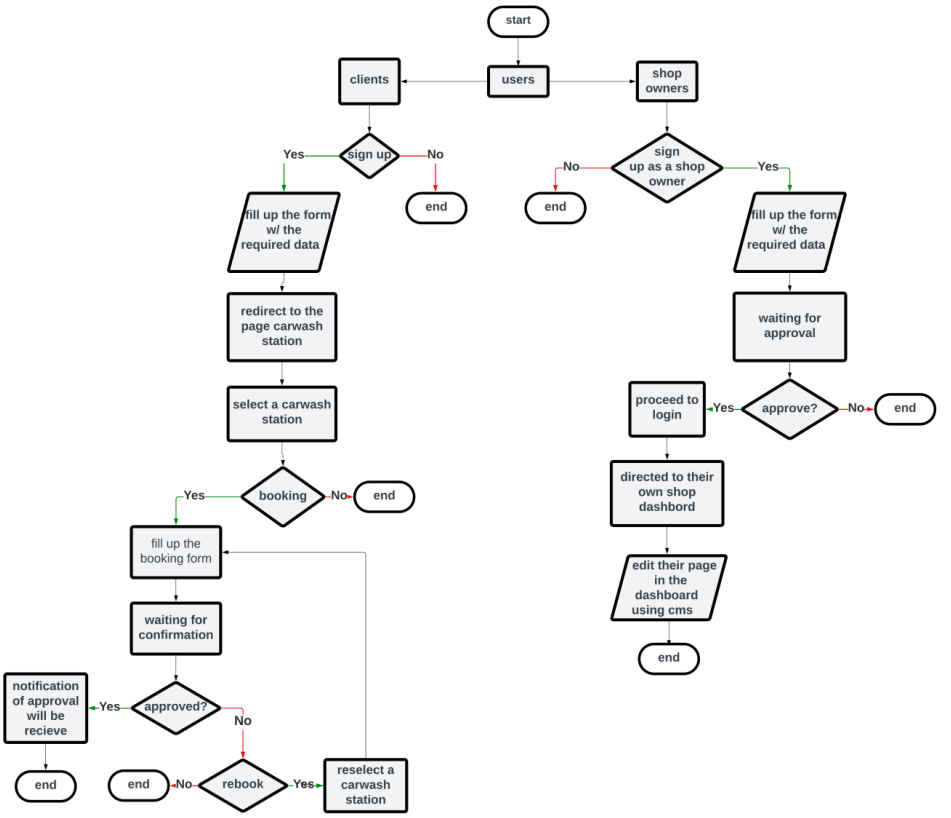
Figure 3 illustrates the UML diagram and relationship of each entity in the web portal booking system for carwash. It gives an idea on how the

tables relates to one another. It also displays the main structure of the system.

Flow Chart

Figure 4

Data flow diagram of Book2Shine web portal carwash booking system



The flowchart diagram illustrates the overall process of how customers interact with the web portal and carwash stations, including the step-by-step booking process.

System Design

Log-in page for customers/admin. This is the initial page displayed to both customers and administrators. To access the system, users must provide their username and password. The username serves as a unique identifier for each user, while the password ensures account security and protects user information.

Figure 5

Login page for customers

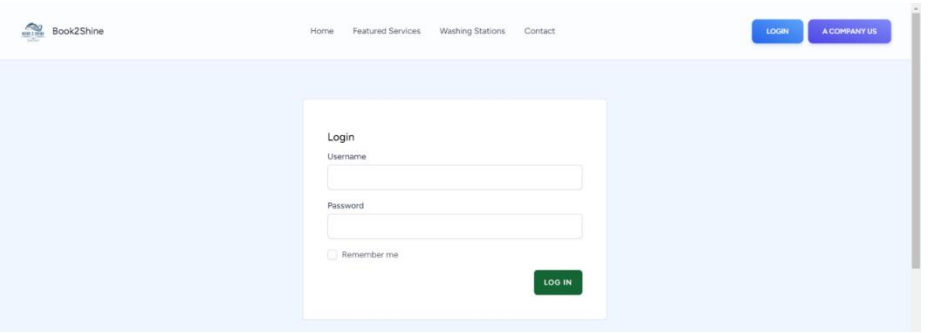
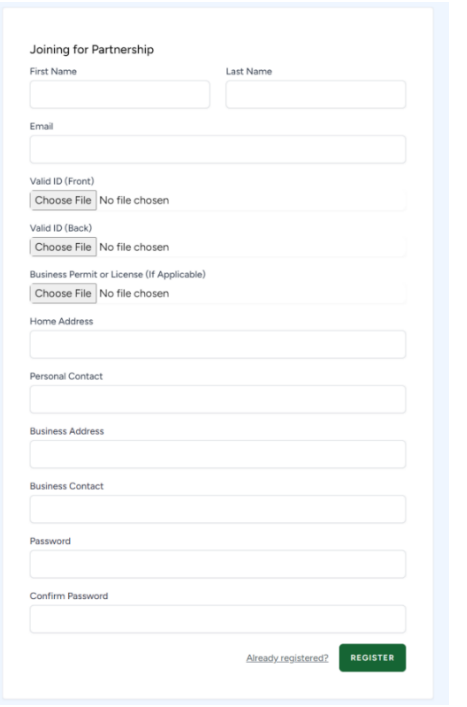


Figure 6

Register form for carwash owner



Home page of client. The home page serves as the front-end interface of the proposed system, providing users with easy navigation and access to key features. It includes the following menu options:

Home/About Us – Provides an overview of the system and information about the carwash services.

Featured Services – Highlights the main services offered by participating carwash stations.

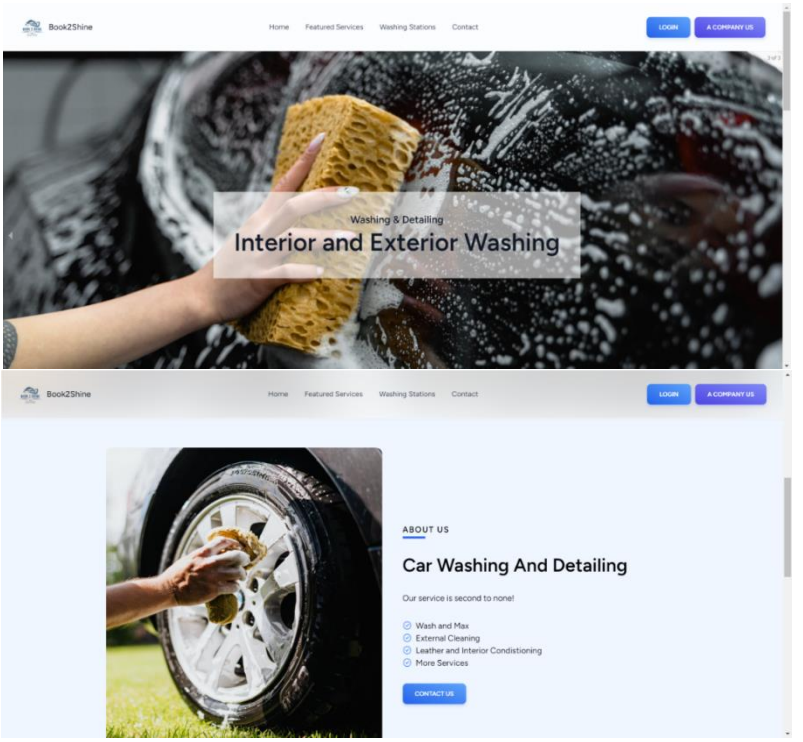
Washing Station – Allows customers to browse and select available carwash stations.

Contact – Displays contact information and channels for customer support or inquiries.

This page is designed to be user-friendly, ensuring that clients can quickly access essential functions of the booking system.

Figure 7

Home page



Visit the Book2Shine web portal, then go to car wash stations to choose the preferred stations to book an appointment.

Figure 8

Making an appointment

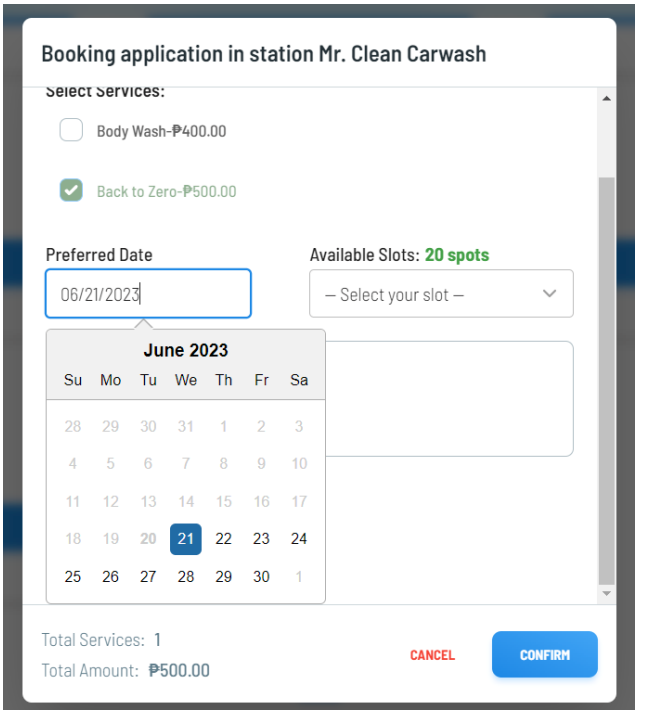


Figure 8 illustrates the appointment-making process, showing how the system allows customers to select their preferred date and time for a carwash service.

Figure 9

Shop owner dashboard pending bookings

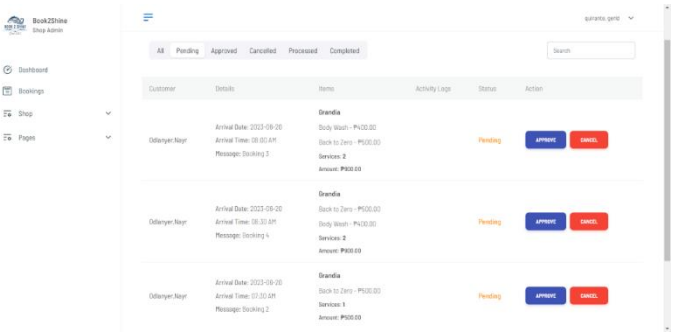


Figure 9 shows the shop owner dashboard, where the shop owner can approve pending bookings. Meanwhile, Figure 10 displays the approved bookings. Once the shop owner approves an appointment, the system sends an email notification to the customer containing their booking details.

Figure 10

Approved Bookings

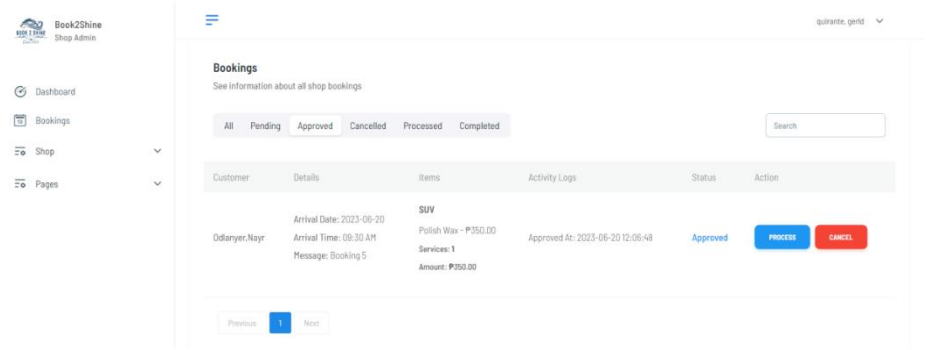


Figure 11

Completed bookings

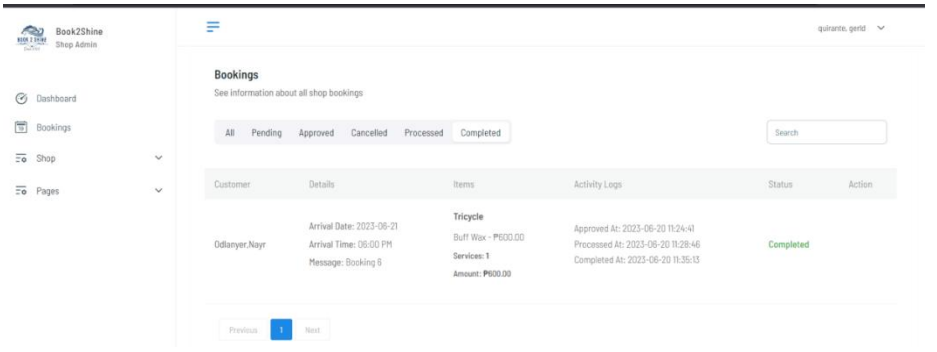
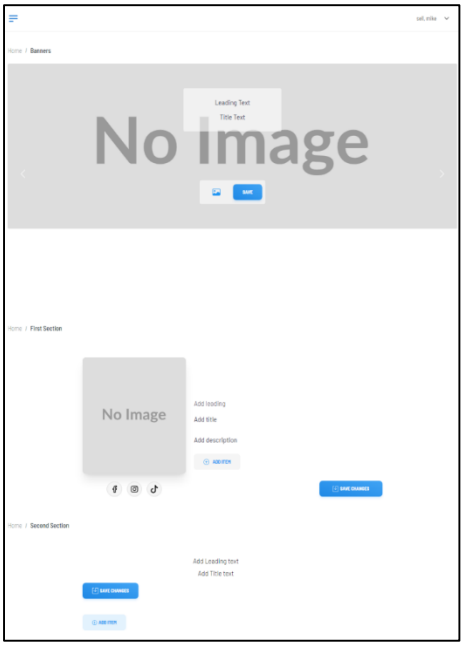


Figure 11 shows the complete bookings accessible to the shop owner.

Figure 12

Illustration Content Management System



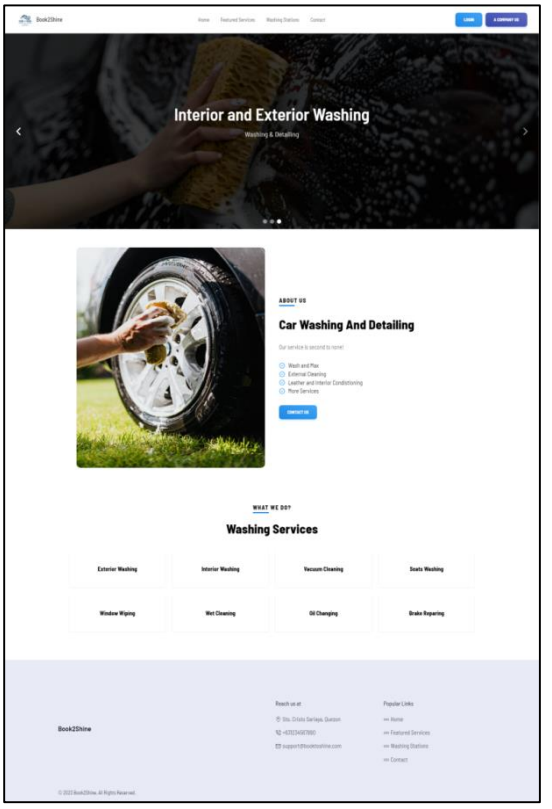


Figure 13

The developed system

Development

Creating an online platform that enables customers to conveniently book carwash services at their preferred time is the primary objective of developing a web-portal carwash booking system. This system offers several advantages over traditional appointment methods, such as phone calls or in-person visits, by saving time, reducing manual errors, and providing a more efficient service experience.

The design process typically begins with the development of a user-friendly interface that allows customers to easily navigate through the portal. The interface should clearly present information about the carwash station's available services, pricing options, and additional offerings.

Customers can book an appointment by selecting their preferred date and time through the integrated booking system. To enhance usability, the system must display real-time availability, ensuring that customers can choose from up-to-date options without scheduling conflicts. This functionality improves customer satisfaction while also streamlining operations for carwash owners.

Testing

Table 2
Test case

Test Case	Precondition	Test Steps	Test Data	Expected Result
Verify log-in with credentials	Admin should have an internet connection	1. Launch the URL 2. Enter valid username 3. Enter valid password 4. Click log-in	Username: renz@gmail.com Password: password	Admin is successfully log-in
Verify log-in with credentials	Admin should have an internet connection	1. Launch the URL 2. Enter invalid username 3. Enter valid password 4. Click log-in	Username: renz@gmail.com Password: password	Admin failed to log-in "invalid username"

Deployment and Maintenance

The study adopted a comprehensive testing approach, including functional testing, to validate the usability, reliability, and responsiveness of the web portal across different browsers and devices.

Deployment: Before going online, the researchers conducted manual testing of the booking system to immediately identify and correct any system errors, ensuring that all features work as intended. Once verified, the system was hosted online, allowing registered carwash owners to explore and understand its functionalities. Future customers will also be able to access the system through the web portal.

Maintenance: Maintaining a robust and efficient web portal requires ongoing effort. Administrators will have to generate regular reports to monitor system usage, track customer engagement, and identify potential issues. Updates will have to be performed periodically to improve functionality, add new features, and enhance user experience for both customers and carwash owners. The system will provide customers with booking confirmations and all relevant service information, while also communicating the availability of services and facilities clearly to users.

Review and Evaluation

The modernization of online booking software has simplified the appointment process for customers. The system allows users to specify their booking requirements, including location, preferred time, vehicle type, and access to star ratings and reviews. This flexibility enhances the customer experience and ensures the booking process aligns with company policies and procedures.

With rapid technological advancement, many booking systems are emerging to serve different business sectors. Implementing an online

booking system provides carwash stations with a competitive advantage, particularly those with larger operations, as it enables them to advertise online and reach a wider audience. Traditional booking methods often result in errors and inefficiencies, which this system aims to minimize.

The researchers designed and implemented the web-portal carwash booking system to help carwash owners adopt the latest technology and efficiently serve customers requiring quick service. The system also functions as a platform for carwash owners to advertise their services, attract new clients, and increase revenue. Customers benefit from a free, convenient, and accessible booking experience, enabling them to schedule appointments via mobile devices at any time, without the hassle of phone calls or in-person visits.

The Book2Shine, web portal car wash booking system, was developed using PHP and the Laravel Framework. The system serves as a platform for online advertising and includes a Content Management System (CMS) that allows shop owners to upload, edit, and manage their own websites.

Based on surveys conducted with respondents and IT experts, the system complies with ISO 2510 standards, demonstrating its adherence to established quality and usability benchmarks. Some respondents commented that the system has a clear and modern design, and that it is easy to access and navigate. These positive comments provided the researchers with a sense of satisfaction and reassurance that the system met user expectations.

Testing and validation results were also analyzed, providing insight into the system's performance and functionality. In addition to interpreting these results in relation to the study's objectives, the research focused on maintaining key system features, including the content management system,

shop owner websites, and the main website. These components ensure the system remains functional, user-friendly, and effective in supporting both carwash owners and customers.

System Evaluation

This section presents the results of the survey conducted involving a total of 45 respondents. The researchers used Raosoft to determine the appropriate sample size and employed a random sampling method to distribute the questionnaires. The questionnaire was designed based on ISO 2510 standards and evaluated the system across several key aspects, including functionality, maintainability, security, compatibility, reliability, performance efficiency, portability, and usability. These criteria provided a comprehensive assessment of the system's quality and performance from the perspective of end-users. The study employed a Four-Point Likert Scale to gather respondents' feedback, with the following categories: strongly agree, agree, disagree, and strongly disagree. Respondents selected one option for each questionnaire item based on their level of agreement.

Table 3

Summary of system evaluation

Criteria	Weighted Mean	Interpretation
Functionality	3.56	Strongly Agree
Usability	3.60	Strongly Agree
Security	3.55	Strongly Agree
Maintainability	3.46	Strongly Agree
Portability	3.62	Strongly Agree
Reliability	3.66	Strongly Agree
Compatibility	3.44	Strongly Agree
Performance Efficiency	3.53	Strongly Agree
Average	**3.56**	**Strongly Agree**

Table 3 presents the weighted mean results for each criterion based on ISO 2510, collected from 45 respondents. The overall system evaluation yielded an average weighted mean of 3.56, indicating that respondents rated the system as outstanding across the evaluated aspects: functional suitability, usability, security, maintainability, portability, reliability, compatibility, and performance efficiency. This suggests that the system is capable of performing its intended functions effectively.

Functional suitability: The system demonstrates strong functionality and is considered suitable for its purpose. Respondents agreed that the developed system could serve as a future business tool for carwash owners in Sariaya, with an average weighted mean of 3.56 and a remark of Strongly Agree.

Usability: The system is easy to operate, even for respondents with limited technical knowledge. Users reported that the interface is user-friendly and intuitive, with an average weighted mean of 3.60 and a remark of Strongly Agree.

Security: Respondents agreed that their data are secure within the system. The security features were rated highly, with an average weighted mean of 3.55 and a remark of Strongly Agree.

Maintainability: The system can be effectively maintained in the future, with respondents confirming its ease of updates and modifications. The average weighted mean for maintainability is 3.46, with a remark of Strongly Agree.

Portability: The system is accessible across different devices, including desktops and mobile phones. Respondents agreed on its

versatility, with an average weighted mean of 3.62 and a remark of Strongly Agree.

Reliability: The system provides accurate and consistent information, demonstrating high reliability. Respondents agreed on its dependability, with an average weighted mean of 3.66 and a remark of Strongly Agree.

Compatibility: The system performs well on various devices and platforms, with respondents confirming its responsiveness on both mobile phones and desktops. The average weighted mean is 3.44, with a remark of Strongly Agree.

Performance efficiency: The system can handle multiple users efficiently, demonstrating satisfactory performance under load. The average weighted mean is 3.53, with a remark of Strongly Agree.

Overall, the evaluation results indicate that the Book2Shine Web Portal Carwash Booking System meets ISO 2510 standards and is highly effective, user-friendly, and reliable for both customers and carwash owners.

Economic feasibility. An economic feasibility analysis was conducted using a cost-benefit approach to determine whether the expected advantages of the system outweigh its projected costs. Evaluating the website in terms of costs and benefits provides a precise comparison of its overall value. Feedback collected through the ISO 2510 questionnaire-based survey also contributed to assessing the system's economic feasibility and functionality, confirming that the benefits of implementing the system justify the investment.

Technological feasibility. Upon successful development of the system, feedback indicated that it has a clear and modern design, is easy to use and understand, and is accessible across multiple devices. These attributes demonstrate that the system meets the technological requirements necessary for effective deployment.

Operational feasibility. The developed system was found to be operationally feasible, as it is designed to be intuitive and easy to use. Survey results showed that both customers and carwash owners were satisfied with the system, and only a brief demonstration was needed for users to learn its functions. This confirms that the system can be efficiently adopted in real-world operations.

Conclusion

The Book2Shine web portal carwash booking system is fully functional, allowing both carwash owners and customers to operate the system easily and efficiently, without bugs or errors. The system streamlines the process of booking appointments, reducing the effort and time required by customers to schedule vehicle cleaning services. It also ensures a smooth and organized flow of transactions across all carwash stations listed on the portal.

This web portal is designed to provide vehicle owners with convenient access to book appointments at their preferred carwash stations, allowing them to select locations closest to their current position. The system was developed using PHP and the Laravel Framework, providing a robust and scalable platform for online booking.

The system includes a Content Management System (CMS) for carwash owners, enabling them to customize their own websites easily. Shop owners can upload photos, edit text for banners, update their "About Us" section, and add social media links such as Facebook, Instagram, and TikTok. The CMS was designed to be intuitive and user-friendly, serving not only as a management tool but also as a medium for online advertisement to attract more customers.

After rigorous testing and evaluation, the system was found to comply with ISO/IEC 2510 standards, meeting criteria in functional suitability, maintainability, security, usability, portability, compatibility, reliability, and performance efficiency. These results indicate that the system is a viable alternative to traditional carwash booking methods, providing enhanced service delivery and improved customer assistance.

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