

Design of Web-Based Badminton Court Reservation System for Graha Pancasila Pandeglang Using Laravel Framework

Adi Winata^{1*}, Umar Mansyuri², Rahadian Arief³

^{1,2,3} Universitas Bina Bangsa, Indonesia,

¹adiiwinata2003@gmail.com, ²umar.mansyuri@gmail.com, ³superbwx@gmail.com



*Corresponding Author

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ABSTRACT

The manual reservation system at Badminton Graha Pancasila Pandeglang often led to inefficiencies, including overlapping bookings, data recording errors, and difficulties in tracking payment history. These issues created the need for a structured, digital solution to manage reservations, user data, and transactions more effectively. This research aims to design and develop a web-based badminton court rental system that streamlines the booking process while enhancing accuracy and user convenience. The system was built using the Laravel framework and MySQL as its database, following the Waterfall development model. Black-box testing was used to validate all system functionalities. The core features include user registration with email verification, login, real-time court booking, cart and checkout process, digital payment integration using Midtrans, and booking history tracking. An admin dashboard was also implemented to monitor transactions, booking data, and user management. The testing results show that each feature works according to its functional requirements, with all tested cases returning successful results. The implementation of this system significantly improves operational efficiency, transparency, and user experience compared to the previous manual process. However, some limitations remain, such as the lack of real-time notifications and mobile optimization, which are recommended for future development. Overall, the system meets the research objectives and demonstrates the benefits of applying digital solutions to local sports facility management.

INTRODUCTION

The advancement of information technology has driven an urgent need for digital transformation in sports facility rental services. Manual reservation systems often result in inaccurate records, scheduling conflicts, and limited access to real-time information. These challenges are especially evident in medium-to-small scale facilities.

In Pandeglang, for instance, the badminton courts at Graha Pancasila still rely on a manual booking process. Users must visit the facility in person to check court availability and make reservations. This outdated approach often leads to overlapping bookings, data loss, and time inefficiency.

Several studies in Indonesia have attempted to resolve these issues through the development of web-based systems using Laravel. Ekastini and Akbar (2022) developed a web and Android-based badminton court rental system using the Extreme Programming method, which improved data accessibility and user reach.

(Sari et al., 2018) created a Laravel-based reservation system for campus facilities that helped streamline the booking flow and reduce manual logging, utilizing MySQL as the database.

(Wisnu Wardana & Saputra, 2023) developed a reservation system for Ramadhan Futsal using Laravel and the Rapid Application Development (RAD) model. Black-box testing confirmed that the system was responsive and user-friendly.

(Ratama et al., 2022) implemented a PHP–MySQL-based reservation system for multi-purpose sports halls. This helped reduce manual booking errors and improved administrative efficiency.

(Bahri et al., 2025) developed a badminton court reservation platform with user registration, scheduling, and payment features. While the system proved functional, further enhancements were needed in terms of data security and payment integration.

(Anwar et al., 2020) designed a Laravel-based sports field marketplace system that allowed users to search and book sports venues based on location and price, thereby connecting customers with multiple facility managers.

(Ardiman et al., 2024) built a Laravel system for a futsal rental facility, featuring real-time booking validation, automatic cost calculation, and user registration, which significantly improved operational performance.

Lastly, (Dede Aminudin Nurdinillah & Ade Sukendar, 2023) developed a web-based futsal reservation application with external payment integration. Although they used CodeIgniter, their work is relevant as it demonstrates the potential of integrating online payments into public facility rentals.

Based on these studies, Laravel has proven effective for building reservation systems thanks to its modular



structure, robust security, and seamless database integration. However, few systems have incorporated modern digital payment features such as Midtrans, especially for mid-scale public sports facilities.

This study aims to address that gap by designing a web-based badminton court reservation system for Graha Pancasila Pandeglang using Laravel, fully integrated with Midtrans. The system will facilitate real-time bookings, minimize scheduling errors, and support digital payments via QRIS, e-wallets, and bank transfers.

Through black-box testing, the system will be evaluated for functionality, efficiency, and user experience, with the goal of delivering a modern, reliable platform tailored to local sports facility needs.

LITERATURE REVIEW

The digital transformation of sports facility rental services, particularly court reservations, has become an urgent necessity to improve operational efficiency and user satisfaction. Manual booking systems often result in various issues, including inaccurate data entry, scheduling conflicts, and limited access to real-time information. In response to these challenges, numerous studies have explored technological solutions, particularly the implementation of web-based reservation systems using the Laravel framework.

(Rasikhah & Adriansyah, 2022) developed a court booking system using Laravel and the Waterfall methodology. Their system allowed users to check real-time availability and make reservations directly through the web. Testing results indicated a high level of system feasibility, with user satisfaction scores exceeding 89%. Similarly, (Dewantara et al., 2024) designed a reservation website for GOR Jaya Abadi, which significantly reduced booking errors and successfully met user needs. (Ardiman et al., 2024) also implemented Laravel for a futsal rental platform, incorporating automated time slot validation and fee calculations. The system improved operational efficiency and minimized scheduling overlaps.

In another study, (Sari et al., 2018) built a Laravel-based reservation platform for campus facilities, which effectively streamlined the booking process and minimized manual errors. Meanwhile, (Anwar et al., 2020) introduced a Laravel-based marketplace system that supports multiple sports venues, with filters for price and location, demonstrating Laravel's ability to manage multi-location integration. (Wisnu Wardana & Saputra, 2023) used the Rapid Application Development (RAD) approach to create a booking system for Ramadhan Futsal. Their system offered a responsive and user-friendly interface, delivering an intuitive user experience. Additionally, (Michael Randicha G.S & Yuwono Marta Dinata, 2020) developed a Laravel-based web platform that allowed users to check court availability remotely, eliminating the need for physical visits.

These studies collectively show that Laravel is a powerful and reliable framework for developing web-based reservation systems. It offers advantages such as modular architecture, secure data handling, user-friendly design, and robust database integration. However, most of these systems have focused solely on the booking mechanism without integrating digital payment gateways. There is still limited research that specifically combines Laravel with payment gateways like Midtrans, especially in the context of small-to-medium-scale public sports facility reservations.

Therefore, this research aims to address that gap by designing a web-based badminton court reservation system integrated with the Midtrans payment gateway. The system is intended to simplify the booking process, reduce scheduling errors, and support digital transactions via QRIS, e-wallets, and bank transfers. In addition, the system will undergo black-box testing to ensure optimal functionality and user experience.

METHOD

This study adopts a methodological approach based on the Waterfall system development model. The Waterfall model is recognized as a classical method in software development that follows a step-by-step and systematic workflow (Afandi, 2023). This approach is considered effective for projects with clearly defined requirements from the outset. Each stage ranging from requirements identification, system design, implementation, testing, to maintenance is carried out thoroughly and sequentially before proceeding to the next. Such an approach ensures that the resulting software solution is aligned with the initial problems and developed through a controlled and structured process. The sequence of these stages is illustrated in Figure 1, which outlines the methodological framework applied in this study.

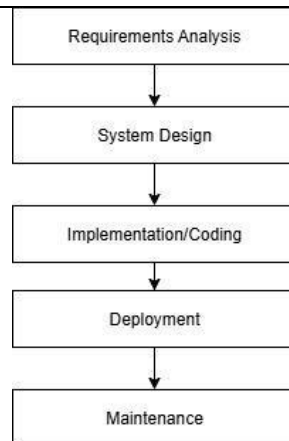


Figure 1. Waterfall Development Model

Explanation of the Waterfall Model in This Study

The figure above illustrates the Waterfall model applied in this research, outlining the five sequential stages followed in the development of the web-based badminton court reservation system at Graha Pancasila Pandeglang:

Requirements Analysis

At this stage, the researcher conducted interviews and direct observations to identify the problems in the manual booking system, such as overlapping reservations and delayed confirmations. Functional and non-functional requirements were documented to serve as the foundation for the next stages.

System Design

Based on the requirements, the system's architecture was designed using UML diagrams including use case diagrams and ERD. The choice of Laravel framework was made to ensure a modular, secure, and scalable web application. Midtrans was selected to support digital payment integration.

Implementation/Coding

The system was built using Laravel as the backend framework, MySQL as the database, and Blade templating for the user interface. Key features implemented include court schedule viewing, user registration and login, booking process, and online payments using Midtrans Snap API.

Deployment

After development and testing, the system was deployed to a live hosting environment with a custom domain and production database configuration. Uploads such as court images and payment proofs were stored in a secure public directory.

Maintenance

In this phase, the system is monitored for bugs, updated features, and payment gateway reliability. User feedback is collected for future improvements, ensuring the system remains relevant and user-friendly over time.

RESULT

This research successfully designed and developed a web-based badminton court reservation system for Graha Pancasila Pandeglang using the Laravel framework. The system features two main user roles: administrator and customer. It effectively addresses the problems found in the previous manual system, such as double bookings, slow confirmation, and lack of booking accessibility. The following section outlines the results of the system's architectural design, interface implementation, and functional testing.

System Architecture and Design

The system architecture was designed based on two main user flows administrator and customer each with distinct processes and functionalities in the Graha Pancasila Pandeglang badminton court reservation system. This architecture ensures that users can perform their roles effectively and that the system can manage data in a structured.

a. Admin Process Flow

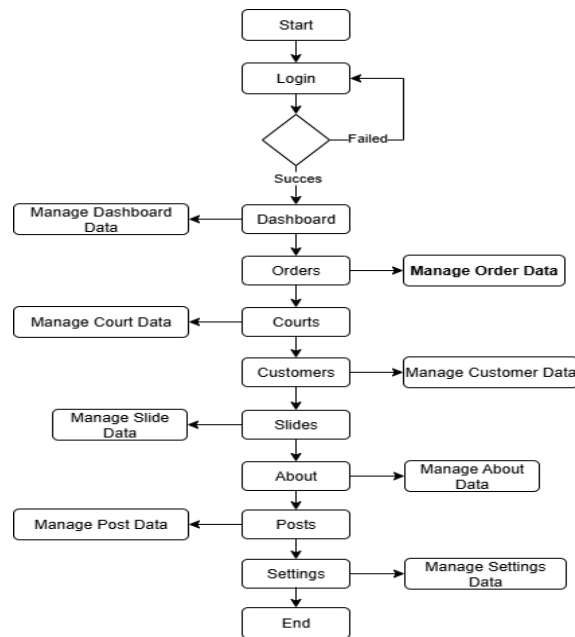


Figure 2. Admin Process Flow

Administrators are responsible for managing all system data. According to the admin flowchart, the process begins with a login. If authentication is successful, the admin is directed to the dashboard page, which provides access to various data management features. These include the dashboard, which displays a summary of system activity; orders, which allow administrators to view and verify customer bookings; and courts, where they can add and manage available court data. Additionally, the system enables management of customer records, banner slides on the homepage, blog or news posts, and the "About" section that contains information about Graha Pancasila. The settings menu is used to configure system preferences and payment details. The admin process concludes when data management is complete and the administrator logs out.

b. Customer Process Flow

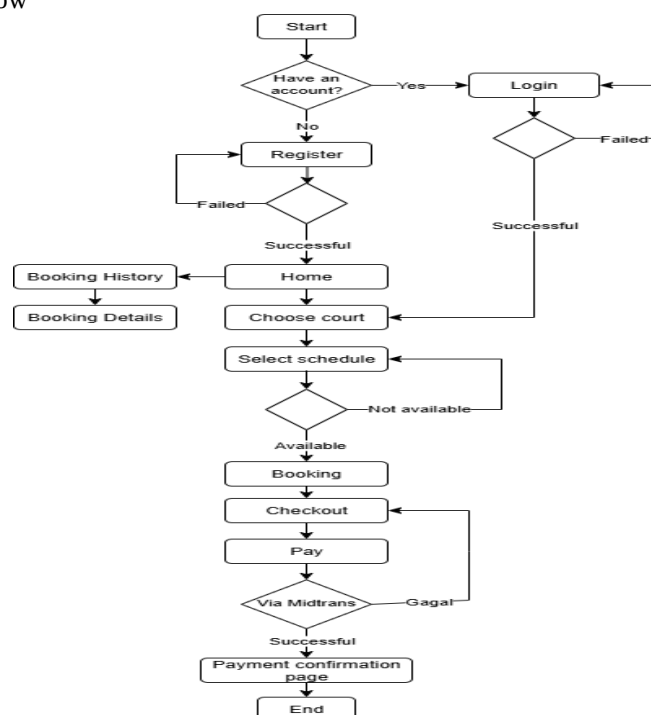


Figure 3. Customer Process Flow

Customers, as the primary users of the system, follow a user-friendly flow that begins on the home page, where they can log in or register if they are new. After logging in, users can browse general information, select a court, choose an available schedule, and proceed with booking and payment. The payment process is integrated with Midtrans Snap, ensuring secure transactions. Once the payment is successful, customers are redirected to a confirmation page and can also view their booking history and details.

c. Use Case Design

To illustrate the interactive relationship between users and the system, a Use Case Diagram (Figure 3) was created. This diagram presents two main actors involved in the system: the administrator and the customer, each with their respective roles and functions within the application.

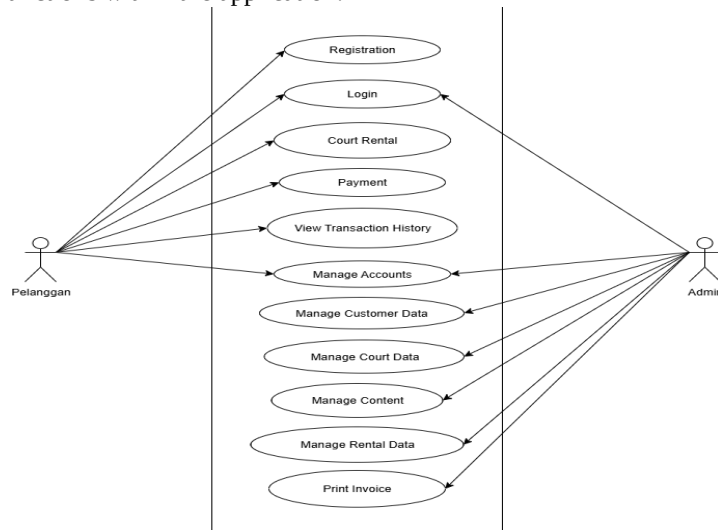


Figure 4. Use Case Diagram

d. Login and Registration Activity Diagram Design

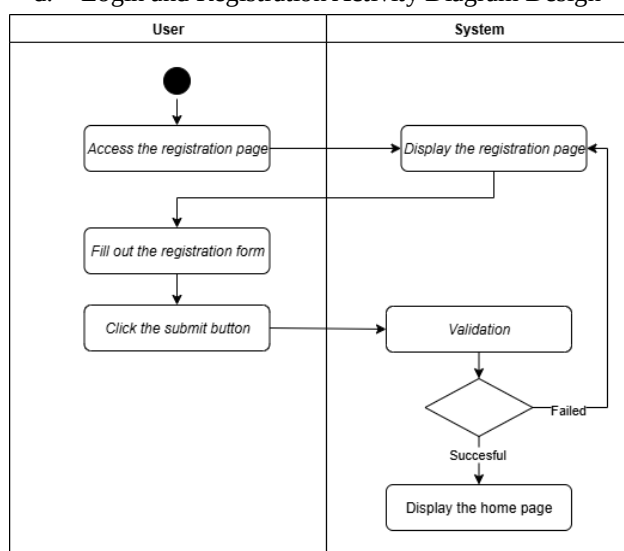


Figure 5. Admin/User Login Activity

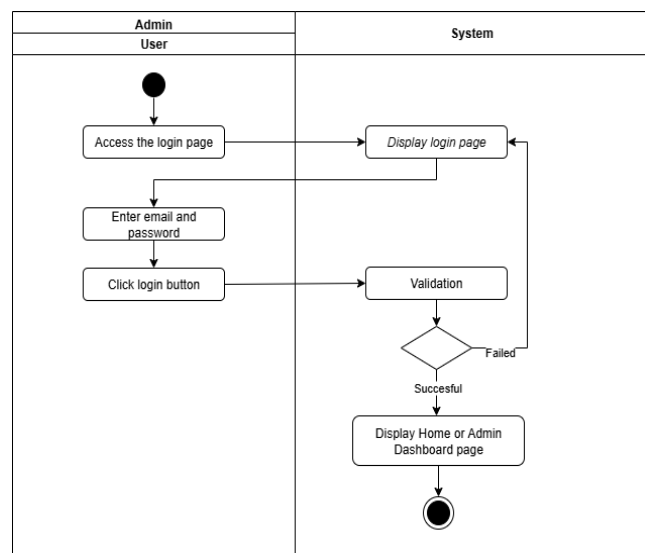


Figure 6. User Registration Activity

Figure 5 illustrates the login flow for both admin and users. The process begins by accessing the login page, followed by entering an email and password. If the credentials are successfully validated, the system directs the user to the admin dashboard or home page. If the validation fails, the user remains on the login page.

Figure 6 describes the registration process for new users. Users access the registration page, fill out the form, and the system validates the submitted data. Upon successful validation, users are redirected to the home page; otherwise, they are prompted to repeat the registration process.

e. Court Booking and Payment Data Design

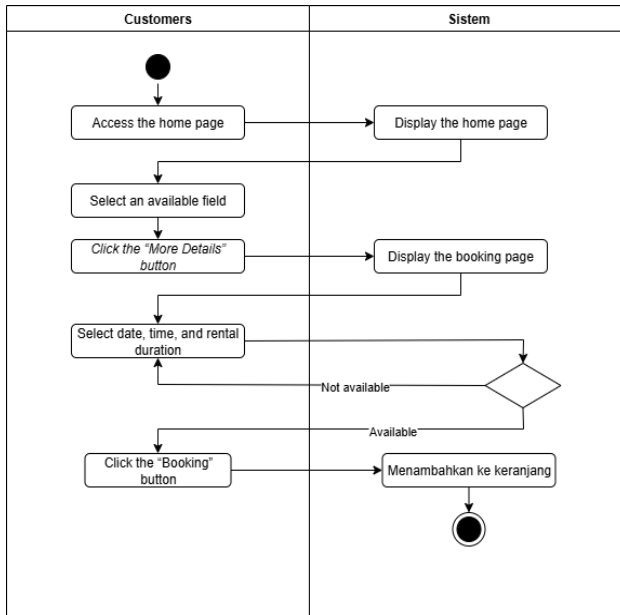


Figure 7. Court Booking Flow

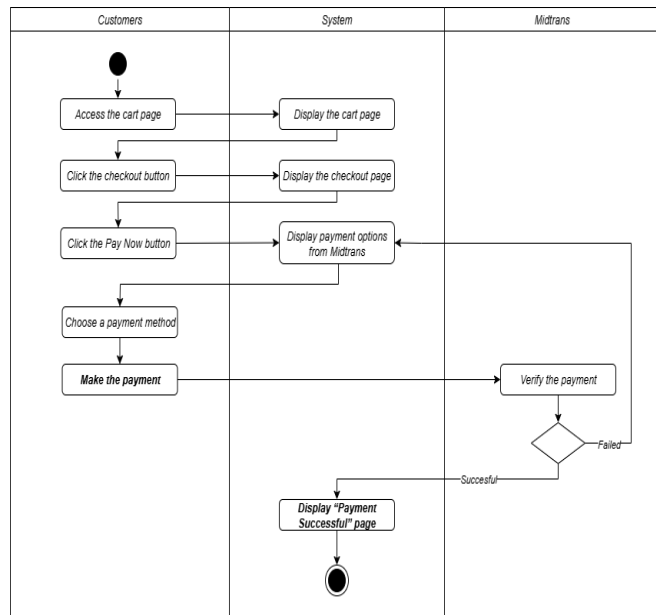


Figure 8. Payment Flow via Midtrans

Figure 7 describes the field booking flow from the customer's perspective. The process starts from the home page where the customer selects an available field and sets the desired date, time, and rental duration. The system checks the availability of the selected schedule. If available, the booking is added to the cart; if not, the customer is prompted to choose a different time.

Figure 8 illustrates the payment process carried out by the customer through the system using Midtrans as the payment gateway. The customer accesses the cart, proceeds to checkout, and selects a payment method. After completing the payment, Midtrans verifies the transaction. If the payment is successful, the system displays a "Payment Successful" page. If the verification fails, the process is terminated.

DISCUSSION

Implementations Testing

Home View

The Home View serves as the homepage of the Badminton Graha Pancasila Pandeglang web-based rental system, displayed when users first access the site. It features a clean and visually appealing layout with a prominent banner and bold title to reflect the facility's identity. The top navigation bar includes links to Home, Blog, About Us, as well as Register and Login buttons for easy access to system features.

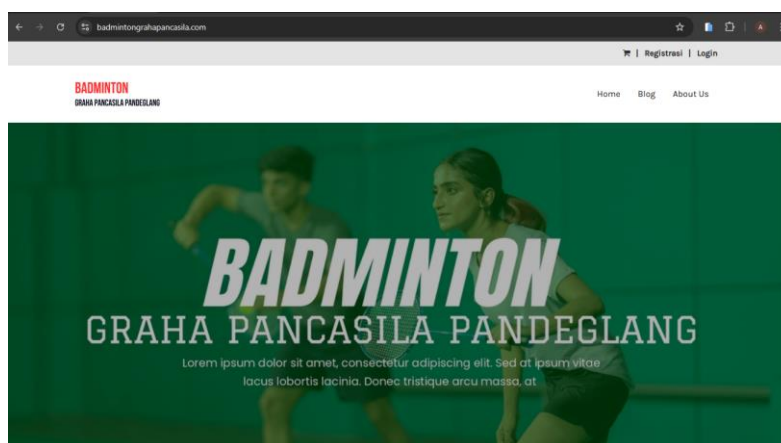


Figure 9. Home View

Login and Register Account

New users can create an account by filling out the registration form, which includes full name, email address, phone number, and password with confirmation. After submitting the form by clicking the “Register” button, the system will send a verification email to the registered email address if the data is valid.

Figure 10. Register View

The user must open the email and click the “Verify Now” button to activate their account. This verification step is required to confirm the validity of the registered email address and to ensure secure access to the system. If the button does not work, the user can alternatively copy and paste the provided link into their browser, which will redirect them to the login page. Once the account is verified, the user can log in and begin using the system's features.

Figure 11. Email verification View

Registered users can log in by entering their email address and password through the login interface. The system will then verify the credentials to ensure they match the registered account information. Upon successful authentication, the system will redirect the user to the home page, where they can access available features such as court booking, payment processing, and account management. If the login fails due to incorrect credentials, the user will remain on the login page and be prompted to try again.

Figure 12. Login View

Viewing and Selecting a Court

The Home page displays a structured list of courts available for rent within the system. Each court is presented with its name information. The layout allows users to easily browse and compare available options. A “More Details” feature is provided for each court, enabling users to access more detailed information and proceed to the booking page if desired.

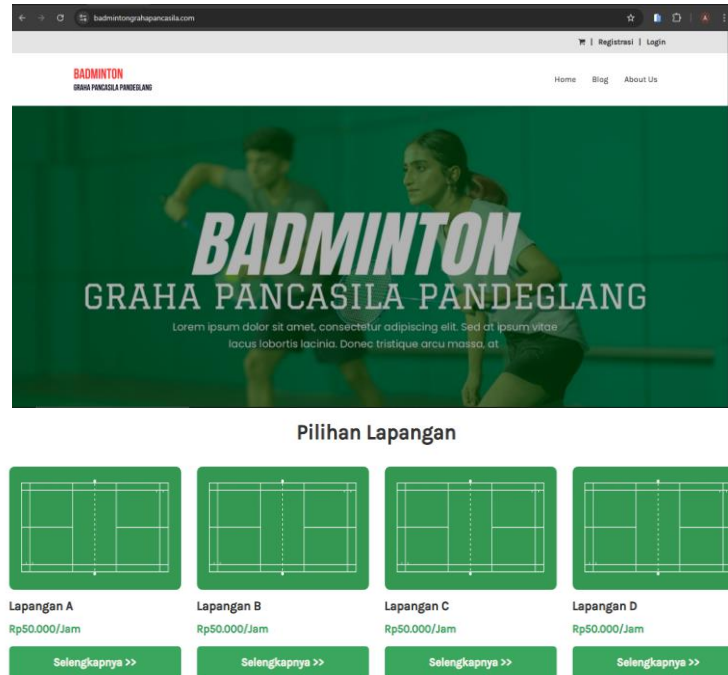


Figure 13. Viewing and Selecting a Court

Crear Booking

The Court Detail View provides users with comprehensive information about the selected court and offers a booking interface. This view enables users to choose a booking date, select an available time slot, and determine the rental duration based on their needs. The layout is designed to support an efficient and user-friendly reservation process by reflecting real-time availability. This feature ensures users can make informed decisions when scheduling their court rentals.

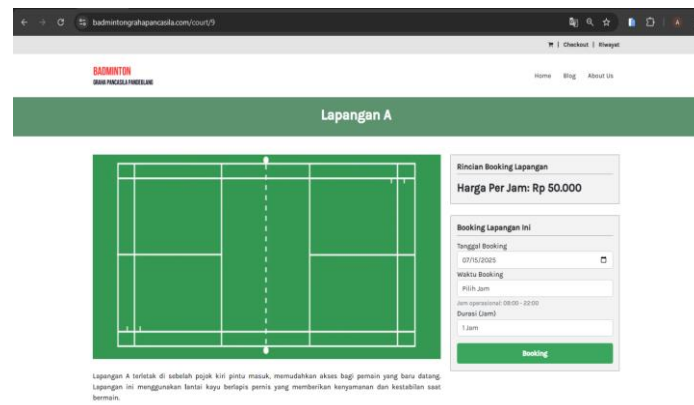


Figure 14. Court Detail View

After clicking the “Book” button, the system will successfully save the reservation to the cart. The user can then proceed to the cart menu by clicking the cart icon at the top right corner and selecting the “Checkout” button to continue to the payment process.

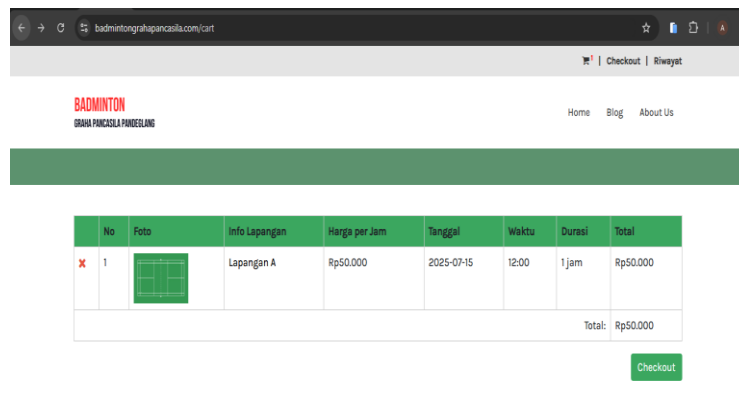


Figure 15. Cart View

Payment

After clicking the “Checkout” button, the user will be redirected to the payment page to complete the transaction.

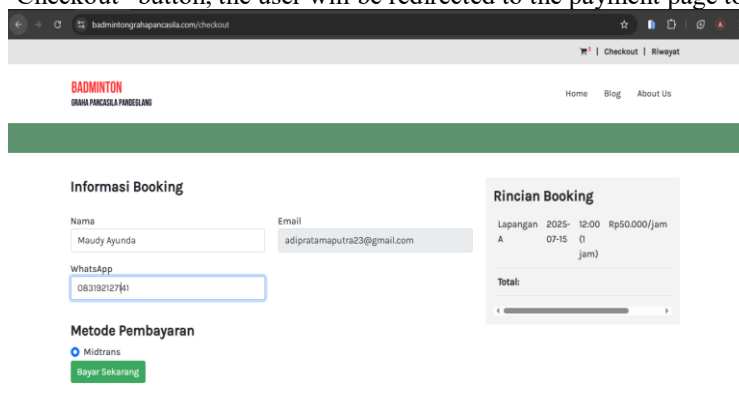


Figure 16. Checkout View

The Payment View serves as the interface where users finalize their court rental transaction. This view displays a payment form that includes essential user details such as name (editable), email (non-editable), and WhatsApp number for confirmation purposes. On the right side, a booking summary panel presents key information including the selected court, booking date and time, duration, hourly rate, and total cost. Once the form is completed and verified, users may proceed by clicking the “Pay Now” button, which triggers a pop-up showing the available payment methods. This layout ensures a clear, secure, and efficient payment process.

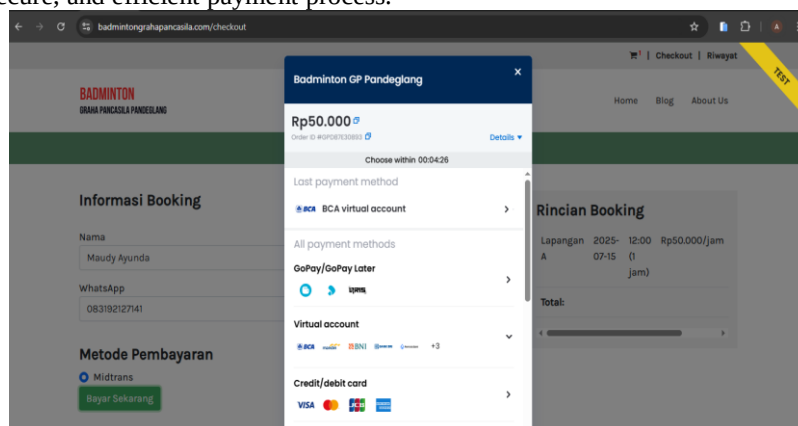


Figure 17. Payment Method Midtrans View

After completing the payment and the transaction is successful, the user will be redirected to the payment confirmation page. This page displays detailed information about the transaction, including the Order ID, Transaction ID, payment status, payment method, total amount paid, and the transaction date.

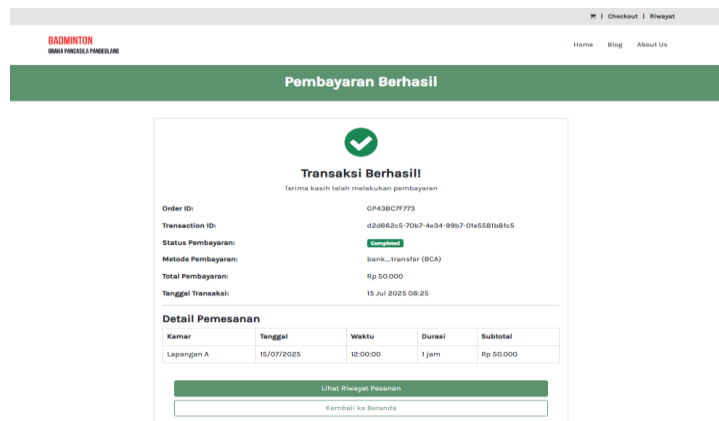


Figure 18. payment confirmation page.

Booking History View

The Booking History View displays a record of the user's past court rental transactions. This table includes key information such as Order ID, payment status, payment method, transaction date and time, total amount paid, and a "Detail" button for viewing further information. The interface also features pagination and a search bar to help users filter and manage their bookings efficiently. This view enhances transparency and allows users to easily track and review their transaction history.

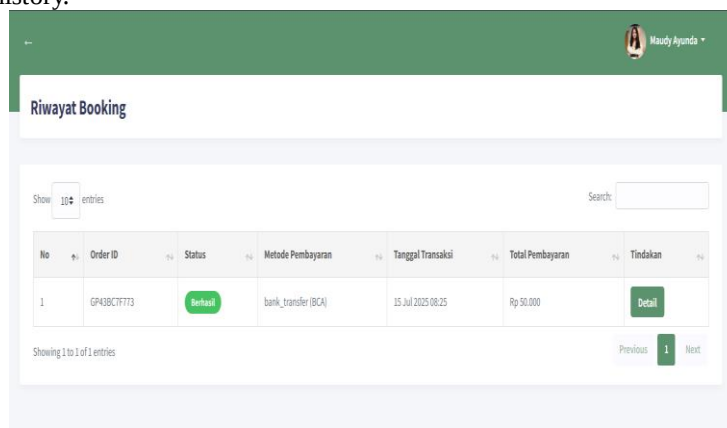


Figure 19. Booking History View

Admin View

The Admin Dashboard View serves as the control center for administrators within the Badminton Graha Pancasila Pandeglang court rental system. It presents key summaries and statistics, including the number of completed bookings, pending bookings, active users, pending users, and total courts available.

Below the dashboard metrics, a Booking History table displays detailed transaction data such as Order ID, payment method, transaction date, total payment, and action buttons like "Detail" and "Delete." This layout allows administrators to efficiently monitor system activity and perform administrative tasks with ease.

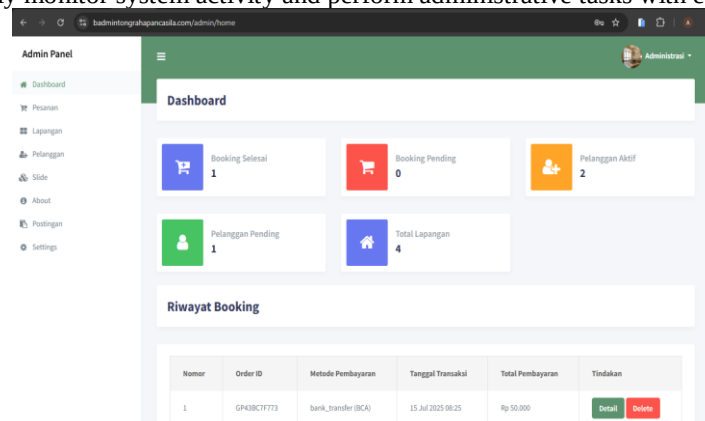


Figure 20. Admin Dashboard View

Testing Results

After completing the design and implementation phases, the system was tested to ensure that all booking and payment features functioned correctly and without error. The testing process applied two methods, one of which was Black Box Testing, focusing on verifying system behavior based on user input and expected output without examining the internal code.

The table below presents a summary of the testing results for core features, such as user registration, login, court booking, payment, and booking history access

Table 1. Testing Results

No	Tested Feature	Input Description	Expected Output	Status
1	User Login	Email and password	User logs in successfully and is redirected to the home page	Success
2	Account Registration	Full name, email, password, and confirmation	System sends a verification email. User clicks "Verify Now" or opens the provided link to activate the account and log in	Success
3	Court Booking	Selected court, date, time, and duration	Booking is saved to the cart and listed in the booking history	Success
4	Checkout & Payment	Valid booking data and selected payment method	Payment is processed successfully; status updates to "Paid"	Success
5	Booking History Access	Logged-in user accesses the history page	Displays a list of completed bookings with full transaction details	Success
6	Payment Confirmation Page	Completed payment	Shows Order ID, Transaction ID, payment method, status, total, and date	Success
7	Admin Dashboard Access	Admin logs into the system	Displays statistics: completed bookings, pending bookings, users, and recent transactions	Success

CONCLUSION

The research successfully designed and implemented a web-based badminton court reservation system for Graha Pancasila Pandeglang using the Laravel framework. This system addresses the limitations of the previous manual method, including inefficiencies in booking, overlapping reservations, and lack of transaction traceability.

Through the use of structured methodologies such as the Waterfall model and black-box testing, all core functionalities such as user registration, login, court booking, and payment via Midtrans—have been validated and performed successfully. The integration of digital payments provides convenience for users and simplifies transaction verification for administrators.

However, this system still has limitations, such as the absence of real-time chat between users and admins, and limited support for mobile optimization. Future developments may include the integration of a responsive mobile app, notification systems, and booking cancellation features.

This research demonstrates the benefit of digital transformation in local sports facility management. The application can be further expanded for use in other similar institutions to enhance service efficiency, transparency, and user satisfaction.

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