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DESIGN AND DEVELOPMENT OF A TICKET BOOKING APPLICATION USING EXTREME PROGRAMMING AT SERAYU LARANGAN

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Abstract

This research was conducted with the aim of developing a web-based tourist ticket booking service application system using the Extreme Programming (XP) development method that is able to facilitate the ticket transaction process both from the side of online buyers and tour managers at the counter. Serayu Larangan Tourism Village, Mrebet District, Purbalingga Regency has promising tourism potential. However, there is still no application that can support the running of the tourism business, such as in the process of selling and recording tickets. Therefore, a system is needed that can facilitate the management of the ticket sales and booking process and data collection of sales reports. This research begins with data collection carried out through the stages of observation, interviews, and literature studies. After the data is collected, system development is carried out using the Extreme Programming (XP) method which consists of four main stages which include planning, design, coding, and testing. From the results of system testing using the Black Box method for ten user features and fifteen admin features showed a 100% success rate. Then the results obtained from the User Acceptence Test (UAT) conducted by ten respondents showed an average percentage of acceptance rate of 87.6%.

Keywords: Serayu Larangan; Ticket booking; Extreme Programming

Abstrak

Penelitian ini dilakukan dengan tujuan untuk mengembangkan sebuah sistem aplikasi layanan pemesanan tiket wisata berbasis website dengan menggunakan metode pengembangan Extreme Programming (XP) yang mampu memfasilitasi proses transaksi tiket baik dari sisi pembeli secara online maupun pengelola wisata pada loket. Desa Wisata Serayu Larangan, Kecamatan Mrebet, Kabupaten Purbalingga memiliki potensi wisata yang menjanjikan. Akan tetapi masih belum ada aplikasi yang dapat mendukung berjalannya bisnis pariwisata, seperti pada proses penjualan dan pencatatan tiket. Oleh karena itu, dibutuhkan sebuah sistem yang dapat memudahkan pengelolaan proses penjualan dan pemesanan tiket serta pendataan laporan penjualan. Penelitian ini dimulai dengan pengumpulan data yang dilakukan melalui tahapan observasi, wawancara, dan studi literatur. Setelah data dikumpulkan pengembangan sistem dilakukan dengan metode Extreme Programming (XP) yang terdiri dari empat tahapan utama yang meliputi perencanaan, desain, coding, dan pengujian. Dari hasil pengujian sistem menggunakan metode Black Box untuk sepuluh fitur pengguna dan lima belas fitur admin menunjukkan tingkat keberhasilan 100%. Kemudian hasil yang diperoleh dari pengujian User Acceptence Test (UAT) *yang dilakukan oleh sepuluh responden menunjukkan nilai rata - rata persentase tingkat penerimaan sebesar 87,6%.*

Kata kunci: Serayu Larangan; Pemesanan tiket; Extreme Programming

INTRODUCTION

Serayu Larangan Village is located in Mrebet Subdistrict, Purbalingga Regency has natural beauty and springs that become tourist attractions. Where tourism itself can be a form of industry that can increase the income of an area and the standard of living of the surrounding community. Village tourism is a form of tourism that holds significant development potential and can positively contribute to the welfare of local communities(Budhi Pamungkas Gautama et al.,

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2020). The tourism sector possesses an extensive value chain, which has the potential to stimulate the emergence of new business opportunities that can be integrated to generate added value and better fulfill the expectations of tourists as consumers (Dumilah et al., 2021). In order to develop the potential of Serayu Larangan as a tourist village, there needs to be a collaborative effort between the village government, the community, tourism awareness groups (pokdarwis) and other related parties. And in an effort to develop a tourist village, it has many challenges. One of them is the challenge of facing the rapid development of science and information technology. To face these challenges, there are several efforts that can be made, one of which is the effort to digitize the tourism industry. Digitalization of the tourism industry itself is one of the steps in addressing the civilization of a digitally oriented society in meeting their needs for travel (Mumtaz & Karmilah, 2022).

Based on the interview conducted on May 20, 2023, with the head of Serayu Larangan Village, Mr. Fajar Prasetyo Utomo, S.Pd, it was found that there is currently no application available to support the tourism business operations, particularly in the areas of ticket sales and sales record-keeping, which are still carried out using conventional methods. This traditional approach to ticket booking presents challenges in terms of data management and recording effectiveness.

In this research, The application is integrated with a payment gateway, a system that offers features such as encryption of personal and payment data, facilitation of communication between financial institutions, and authorization of payment transactions (Prasetyo & Sutopo, 2020). The application developed in this study utilizes Midtrans as a payment gateway. Midtrans is one of the largest payment gateways in Indonesia and is integrated with many payment methods, including credit cards, bank transfers, and digital wallets (Nurhayati & Setiawan, 2024).

The Extreme Programming (XP) method is applied because it emphasizes the coding process and offers a relatively straightforward development cycle. The stages of XP consist of four main phases: planning, design, coding, and testing(Kirana et al., 2022). to evaluate the system's feasibility and user acceptance, the User Acceptance Testing (UAT) method is employed. This method enables researchers to assess the level of user acceptance and the practical usability of the developed technology. It is hoped that this research can facilitate both tour managers and visitors to the Serayu Larangan Tourism Village in booking and managing tourist tickets digitally.

The system developed in this study demonstrates better performance compared to several previous studies. In the research titled "Application of Extreme Programming Method in the Design of Tourist Ticket Service Management System at Sunge Jingkem Sembilangan Tourist Site", the system could only be accessed by the admin for ticket management, and did not support independent online booking by users, limiting their flexibility in making transactions (Hermawansyah & Jamiludin, 2021). Meanwhile, the study "Web-Based Tourism Travel Ticket Booking Application Using Extreme Programming Method (Case Study: Sukabumi Regency)" produced a website that allowed users to access tourism information and book travel packages, but did not clearly explain the payment process or provide digital proof of transactions, which are essential for ensuring transaction security and efficiency (Alfarizi, 2021). The research titled "Development of Integrated Tourism Information System E-Ticket Mobile Using Extreme Programming Method", resulted in a system with a variety of features—9 main features in the mobile app and 21 in the information system. The system received positive feedback on layout clarity (94%), ease of understanding (92%), functionality (96%), and information completeness (94%), and achieved efficient processing with an average running time of 479 ms (Prayoga Bhiantara et al., 2021). However, it still lacked features that allow users to book tickets independently online.

In contrast, the system developed in this study offers novelty by providing independent online ticket booking integrated with a secure payment gateway, enabling users to complete transactions automatically, safely, and in real time. Furthermore, this system has been validated through User Acceptance Testing (UAT), showing high levels of acceptance across various aspects such as ease of use, reliability, efficiency, and overall user satisfaction.

RESEARCH METHODS

Extreme Programming (XP) is a software development methodology that incorporates analysis across multiple levels of the development process. These levels are simplified to enhance practicality and ease of use(Wongso, 2020). The XP methodology consists of four main stages: Planning, Design, Coding, and Testing (Purnama Sari & Wijanarko, 2020) .

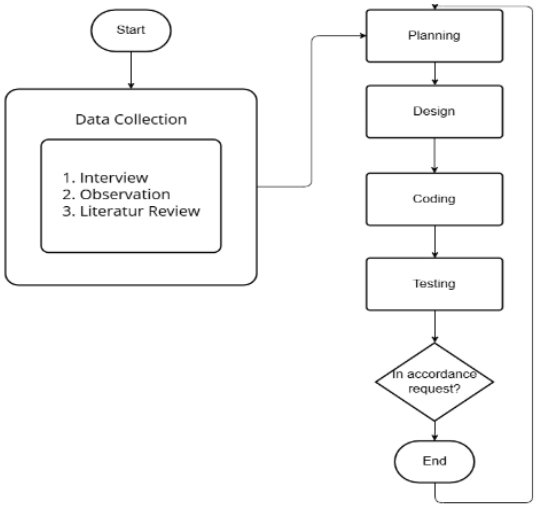

Figure 1. Research Flowchart

Data Collection

In this study, data collection was carried out using three primary methods: interviews, observations, and literature review. Interviews are a very useful data collection technique for obtaining in-depth data on complex or personal subjects (Romdona et al., n.d.). The interview was conducted with the Head of Serayu Larangan Village using questions to find out the current condition of tourism management. Some of the interview questions include: "What types of tourist attractions are currently available in Serayu Larangan Village?" and "What features and data do you think should be included in a ticket booking application?"

The Head of Village explained that only Ciputut River Tubing is currently operational, while Telaga Tuk Dandang and Situs Makam Pak Kasur are still inactive and require further management. Regarding application features, he emphasized the importance of online and offline ticket booking, easy payment methods, printable tickets, and automatic sales reporting to support smooth and organized operations.

Observational methods were employed to examine activities and tourist attractions in Serayu Village. Observation, in this context, refers to the systematic examination of objects or subjects relevant to the research problems (Pujiyanto, 2021). From the observation, it was found that the site lacked a structured ticketing system, and all transactions were done manually without any digital records, highlighting the need for a more efficient and modern solution.

Planning

The first step in system development is to identify the system requirements by analyzing the issues observed in the research subject through interviews and observations. This section outlines the functional requirements for all user types, including both administrators and end users. The selection of the website as a ticket booking system is because the website will make it easier for users to search and access the system without having to download the application first. Website technology can process data into meaningful information by identifying, collecting, managing, and providing it for shared access (Wahyudin & Rahayu, 2020).

Design

This stage involves the execution of the previously completed planning phase by modeling or designing the system to be developed. An entity relationship diagram (ERD) is used for database modeling, and the Unified Modeling Language (UML) is used for system and architecture modeling (Halim, 2021).

Coding

This stage involves implementing the previously designed system. The implementation is carried out using the PHP programming language and the Laravel framework. This programming language is designed for web development and is a server-side script programming language (Rina Noviana, 2022). The Laravel framework is a free and open source PHP web framework, Laravel was created by Mr. Taylor Otwell and is intended for developing website applications by following the model - view - controller (MVC) architectural pattern (Herdiyatmoko, 2022).

Testing

The testing was conducted using Black Box Testing and User Acceptance Testing (UAT) methods. Black Box testing is a method of testing the functionality of the application system (Umiringsih et al., 2022). This method strategically prioritizes the assessment of software functionality, purposefully setting aside the underlying structure of the program code (Samdono et al., 2024).

User Acceptance Testing (UAT) in this study was conducted on 10 respondents consisting of the Village Head, members of POKDARWIS (Tourism Awareness Group), and the general public. The Village Head and POKDARWIS members were chosen because they are tourism managers who are directly involved in the administrative and operational aspects of tourism activities in Serayu Larangan Village. Meanwhile, the general public

was chosen as representatives of end-users who will use the online ticket booking feature of the system independently. This combination of respondents was chosen to obtain comprehensive feedback from both the manager and user perspectives, so that the system developed truly meets the needs of all parties involved in the digitization of ticket bookings in tourist villages.

UAT is performed to verify that the developed software fulfills user needs and expectations prior to its official launch (Hartono & Muin, 2025). The items in the questionnaire were created based on key aspects of system usability, which consist of five essential quality components listed in Table 4.3 (Wijaya et al., 2021):

Table 1. UAT Questionnaire Based on Usability

Components	No.	Question
Learnability	Q1	Is the system easy to understand?
	Q2	Are the features of the system user-friendly?
Efficiency	Q3	Is the system efficient for online ticket sales?
	Q4	Is the system easy to implement?
Memorability	Q5	Does the system effectively manage online sales processes?
	Q6	Can the system help in expanding sales?
Errors	Q7	Are errors within the system handled appropriately?
	Q8	Do all the features of the system function correctly?
Satisfaction	Q9	Does the system have an appealing interface?
	Q10	Is the overall user experience satisfactory?

The formula to calculate the weighting in User Acceptance Testing (UAT) is as follows (Wijaya et al., 2021):

$$Qn = \sum_{i=1}^{5} F(i) * Scale(i) \quad (1)$$

$$P = \left(\frac{Total\ Qn}{N}\right) / 5 * 100\% \quad (2)$$

In this study, Qn indicates the question number, where n is between 1 and 10. The symbol F indicates the frequency of answers given by respondents for each question. Scale refers to the Likert scale used to measure the level of respondent agreement in this study has 5 scales. P means the percentage of respondents who chose each rating scale option. And N is the total number of respondents who participated in the survey.

The Likert scale is a psychometric scale commonly used in questionnaires and is the most widely used scale in survey research (Wijaya et al., 2021). The range of Likert scale values is shown in Table 4 below:

Table 2. Likert scale

Score	Scale	Information	code
0% -19,9%	1	Strongly Disagree	STS
20% -39,9%	2	Disagree	TS
40% -59,9%	3	Neutral	RG
60% -79,9%	4	Agree	S
80% -100%	5	Strongly Agree	SS

RESULTS AND DISCUSSION

Use Case Diagram

In the design phase, a Use Case Diagram and an Entity Relationship Diagram (ERD) were developed to model the system and database structure, ensuring that the design met user needs and functional requirements.

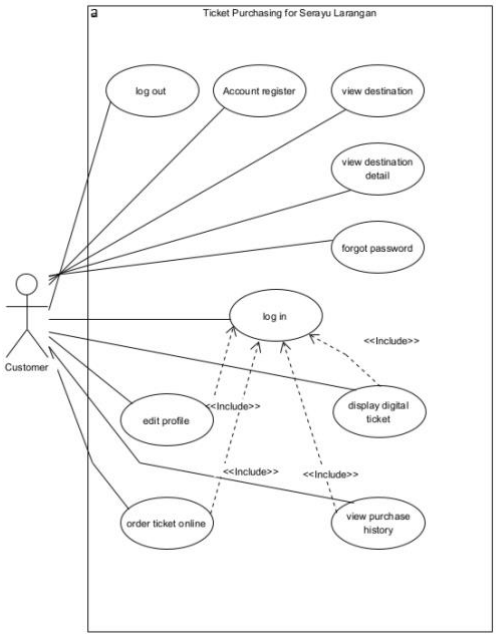

Figure 2. Use Case for customer

The customer use case diagram in Figure 2 shows what customers can do when interacting with the system. Use case diagrams are utilized to comprehend all of the system's features and who is able to utilize them (Taufan et al., 2022). To book a ticket, they need to register and log in first. Once logged in, they can explore a list of tourist destinations, view detailed information about each place, and book tickets by selecting the desired date and number of tickets. Customers can also check their purchase history, access digital tickets, update their profile information, reset forgotten passwords, and log out of the system.

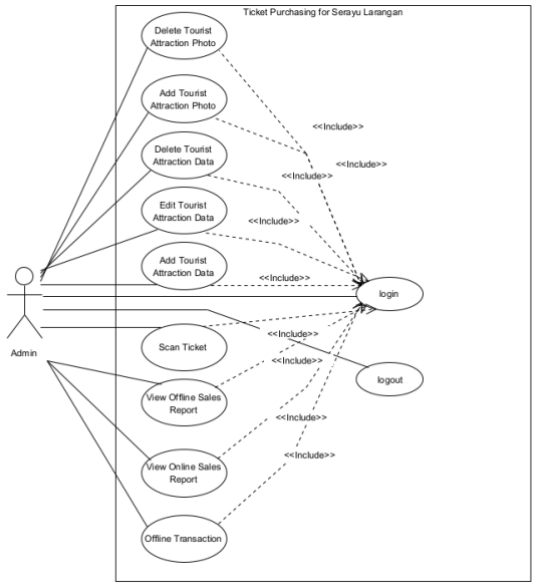

Figure 3. Use Case for admin

Figure 3 shows the use case diagram for administrators, which shows the operations that are specific to admins.

Entity Relationship Diagram

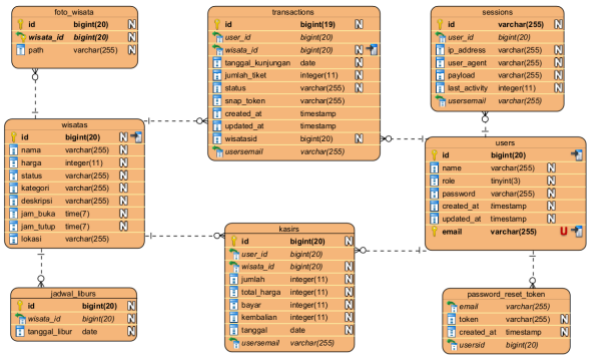

Figure 4. Entity Relationship Diagram

An Entity Relationship Diagram (ERD) is a model used to explain the relationships between data in a database, based on fundamental data entities and the connections between them (Dony Oscar & Minarto, 2020). In Figure 4, the ERD consists of 8 tables that store different but related data. These include tables for user data, transactions, and tourist ticket information.

The developed tourism ticket booking system consists of several core entities that are interconnected, namely: wisatas, foto_wisata, jadwal_libur, kasirs, transactions, users, sessions, and password_reset_token. Each entity is designed with attributes relevant to support the system's operational flow, covering both administrative and end-user needs.

The wisatas entity serves as the central data point for tourist attractions. It stores key information such as name, price, opening and closing hours, category, status, description, and location. This entity has one-to-many relationships with several others. It is linked to foto_wisata, which holds multiple photos for each tourist site, and to jadwal_libur, which records the non-operational (holiday) dates of the attractions.

For transaction purposes, wisatas is also related to the kasirs and transactions entities. kasirs records ticket sales conducted directly by staff at the location, while transactions logs online ticket bookings made by users. Both entities capture essential data such as the number of tickets, total amount, payment, and transaction date.

The users entity stores information about all system users, including admins, staff, and regular customers. It includes attributes such as name, role, email, and password. A one-to-many relationship exists between users and both kasirs and transactions, since one user may perform multiple transactions. Additionally, users is connected to sessions, which tracks login activities, and to password_reset_tokens, which supports password reset functionality.

Overall, the relationships among entities are designed to support full system integration covering ticket booking, tourist site data management, user authentication, and secure transaction handling. This well-structured ERD enables the tourism ticketing system to function efficiently, in real time, and with high usability for both administrators and users.

Result Implementation

This stage delivers the final output of the development process in the form of web interface pages. Each page showcases the functionalities that were designed and developed during the coding

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phase, including the login page, tourist attraction management, ticket booking, and ticket scanning. The resulting interface demonstrates that the system is ready for use based on user needs.

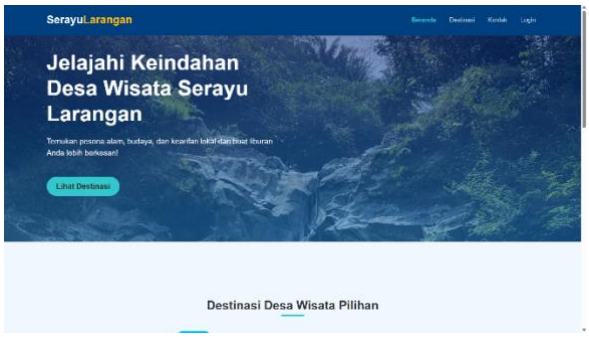

Figure 5. Home Page

Figure 5 is the home page, which is the first page we will see when we first access the website.

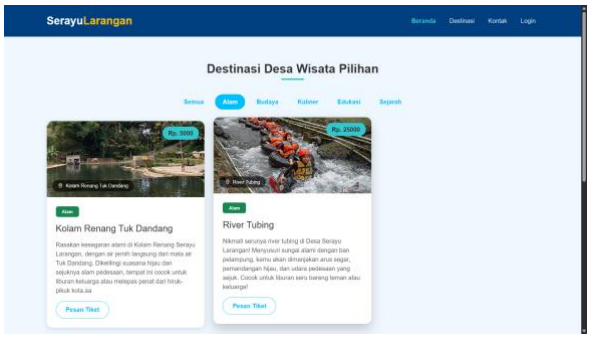

Figure 6. Tourist destination page

Figure 6 displays a list of tourist attractions available in Serayu Larangan village, with brief information and photos of tourist attractions available.

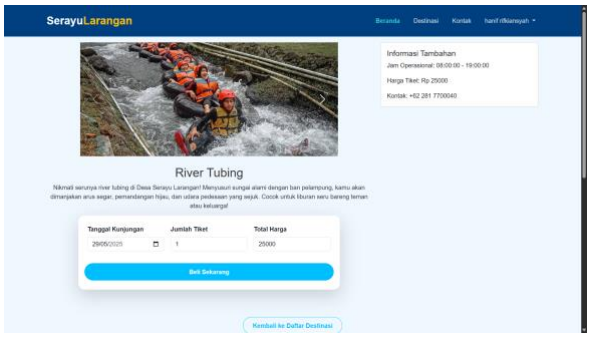

Figure 7. Tour details page

Figure 7 is a page that contains information related to the selected tour. This page also functions as a tour ticket booking page.

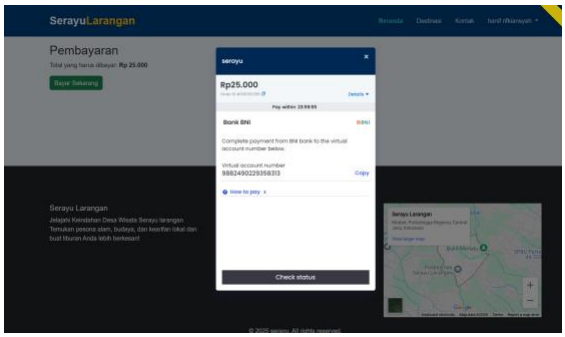

Figure 8. payment display

Figure 8 displays the payment options, allowing prospective buyers to select their preferred payment method. Payment has been integrated with the payment gateway to enable real-time transactions.

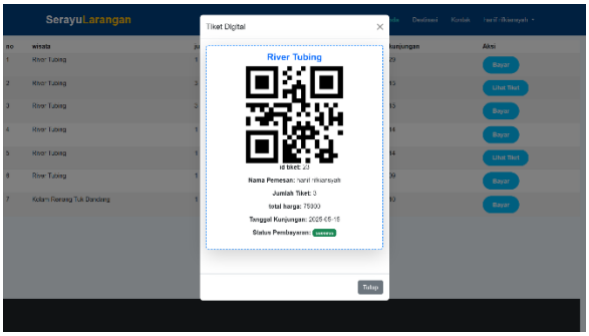

Figure 9. Purchase history page

Figure 9 displays a list of tickets that have been purchased. Here users can also see digital tickets that can be used for access to tourist attractions.

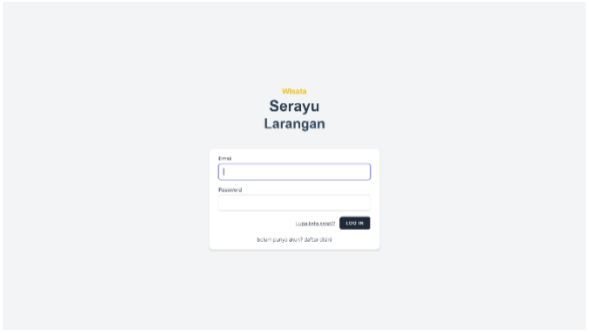

Figure 10. Login Page

Figure 10 shows the login page of the website-based tourist ticket booking application. This page serves as the main access point for user to enter the system securely.

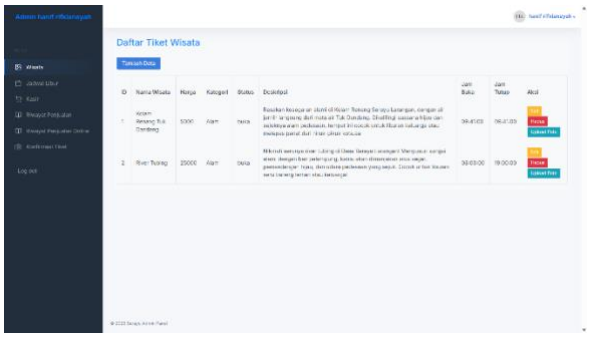

Figure 11. Ticket data management page

Figure 11 is a page for managing tourism and ticket data starting from adding, editing and deleting data.

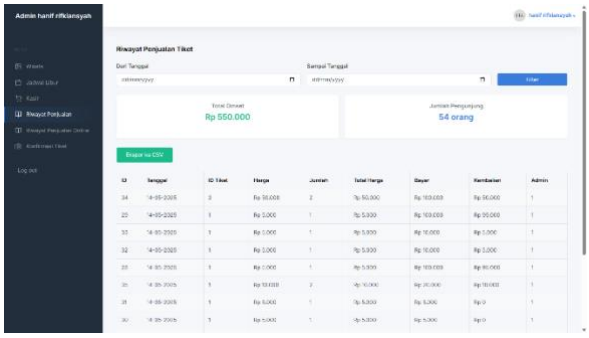

Figure 12. Transaction list page

Figure 12 contains data on ticket transactions that have occurred. On this page, the admin can filter data and export data to CSV format.

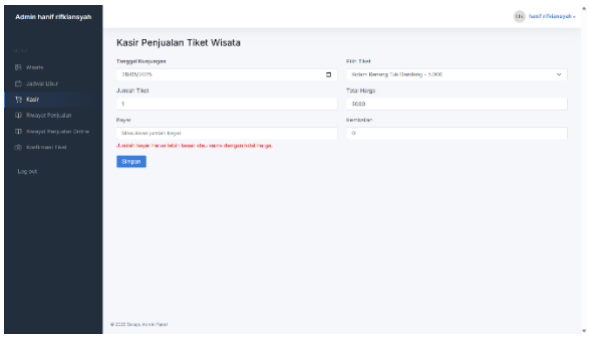

Figure 13. Cashier page

Figure 13 displays the cashier page used by administrators to process offline ticket transactions. This page allows quick input of visitor data and ticket quantities, streamlining sales at the ticket counter.

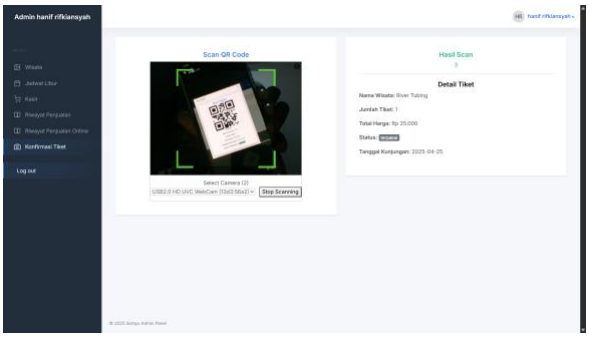

Figure 14. Scan ticket page

Figure 14 shows the ticket scanning page, which allows admins to verify ticket validity by scanning the QR code. This feature helps ensure that only valid tickets are used for entry, improving security and check-in efficiency.

Black box testing

Table 3. Visitor Feature Black box Testing

No.	Scenario	Expeted Result	result
1	Account Registration	Account is successfully created	**success**
2	Login	Redirected to the main page	**Success**
3	View Destination List	The list of destinations is displayed	**Success**
4	View Destination Details	Destination details are displayed, including photo, description, location, price, and more.	**Success**
5	Book Ticket Online	Transaction is successful, confirmation appears	**Success**
6	View Ticket Purchase History	A list of previously booked tickets is displayed	**Success**
7	Display Digital Ticket	Digital ticket/QR code appears	**Success**
8	Edit Profile Data	Data is updated according to input	**Success**
9	Reset Forgotten Password	User receives reset email and can successfully	**Success**

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		set a new password	
10	Logout	Redirected back to the login page	**Success**

Table 3 presents the results of Black Box Testing conducted on the visitor feature of the ticket booking system. Each test scenario is designed to evaluate whether the system functionality matches the expected results from the user's perspective.

Table 4. Admin Feature Testing

No.	Scenario	Expected Result	Result
1	Login	Redirected to the admin dashboard	**Success**
2	Add Destination	The new destination is saved and appears in the list	**Success**
3	Edit Destination Data	Changes are saved and reflected in the list	**Success**
4	Delete Destination Data	The destination is deleted from the list	**Success**
5	Ticket Sales (Offline Mode)	The transaction is saved, and an offline ticket is generated	**Success**
6	View Offline Sales Report	The daily/monthly report is displayed completely	**Success**
7	Export Offline Report to CSV	The CSV file is automatically downloaded	**Success**
8	Filter Offline Sales by Date	Data displayed matches the inputted date range	**Success**
9	View Online Sales Report	The Daily/monthly report is displayed completely	**Success**
10	Export Online Report to CSV	The CSV file is automatically downloaded	**Success**
11	Filter Online Sales by Date	Data displayed matches the inputted date range	**Success**
12	Scan Digital Ticket	Validation successful and ticket status changes to "Used"	**success**
13	Logout	Redirected back to the login page	**success**
14	Add Destination Photo	The Photo is saved and appears in the list	**success**
15	Delete Destination Photo	The Photo is deleted from the list	**success**

Table 4 shows the results of Black Box Testing on the admin features. Each tested scenario produced the expected outcome, indicating that all core admin functionalities are working correctly. Based on the results shown in Tables 3 and 4, all tested scenarios for visitor and admin features successfully produced the expected output. Out of a total of 25 test scenarios (10 for visitors and 15 for admins), all 25 tests were successful, resulting in a 100% success rate. This indicates that the core functionality of the system meets the functional requirements and operates correctly from the perspective of visitors and admins.

User Acceptance test

Table 5. Respondents' Answer Summary

Question	Frequency of Scale					Total
	STS	TS	RG	S	SS	
Q1	0	0	0	5	5	10
Q2	0	0	0	3	7	10
Q3	0	0	0	6	4	10
Q4	0	0	0	6	4	10
Q5	0	0	0	6	4	10
Q6	0	0	1	5	4	10
Q7	0	0	1	7	2	10
Q8	0	0	0	6	4	10
Q9	0	0	0	6	4	10
Q10	0	0	0	8	2	10

Table 5 shows a recapitulation of the answers from 10 respondents to 10 user acceptance test questions given in the form of a Likert scale, namely: sts (strongly disagree), ts (disagree), rg (undecided), s (agree), and ss (strongly agree). Each row represents one question (Q1–Q10), with the number of frequencies of answers from each scale.

Table 6. average and percentage answer value

Q	STS x1	TS x2	RG x3	S x4	SS x5	sum	avg	%
Aspects of Learnability								
Q1	0	0	0	20	25	45	4.5	90%
Q2	0	0	0	12	35	47	4.7	94%
Aspects of Efficiency								
Q3	0	0	0	24	20	44	4.4	88%
Q4	0	0	0	24	20	44	4.4	88%
Aspects of Memorability								
Q5	0	0	0	24	20	44	4.4	88%
Q6	0	0	3	20	20	43	4.4	86%
Aspects of Errors								
Q7	0	0	3	28	10	41	4.1	82%
Q8	0	0	0	24	20	44	4.4	88%
Aspects of Satisfaction								
Q9	0	0	0	24	20	44	4.4	88%
Q10	0	0	0	32	10	42	4.2	84%

Table 6 shows the weighted score calculation for each question (Q1–Q10) based on respondents' answers using a Likert scale: STS (Strongly Disagree = x1), TS (Disagree = x2), RG (Neutral = x3), S (Agree = x4), and SS (Strongly Agree = x5). The values in each row represent the total score contribution from each scale option. The "sum" column is the sum of all scores for that question., and the "avg" column shows the average score, indicating the overall tendency of respondent agreement. Higher averages reflect greater agreement or satisfaction. The way to calculate the average is by summing up the answers in the maximum number of answers section.

Table 6 shows that most testers found the system easy to understand (90%) and its features easy to use (94%), indicating a high level of learnability with an average score of 92%. Additionally, 88% of users considered the system efficient for online ticket sales and easy to implement, suggesting it can effectively support operational processes. The table also reveals that 88% of respondents felt the system was easy to remember and effective in managing the online sales process, while 86% agreed that it helps expand ticket sales—indicating that users can reuse the system without needing to relearn it. In terms of error handling, 82% of users rated it as adequate, and 88% reported that all features functioned properly, reflecting the system's relative stability. Lastly, the satisfaction aspect shows that 88% of testers found the interface visually appealing and 84% were satisfied with the overall user experience, indicating a high level of user satisfaction with both the design and performance of the system.

CONCLUSIONS AND SUGGESTIONS

Conclusion

This research successfully produced a website-based tourist ticket booking application. The results of the Black Box test on 10 main user features showed a 100% success rate, with all test scenarios being completed by five testers without any obstacles. This indicates that all functional system requirements have been met properly. In addition, testing of 15 administrative features also showed the same results, namely a 100% success rate, indicating that the system management features run smoothly and stably.

User Acceptance Testing (UAT) involving 10 respondents from users, developers, and tourism managers showed an average acceptance rate of 87.6%. These results indicate that this application is easy to use, by user the needs, and is feasible to be implemented widely. Based on the five usability aspects tested, Learnability showed an average value of 92%, indicating that the system is easy to understand and the features are easy to use. Efficiency scored 88%, reflecting that the system is efficient for use in online ticket sales. Memorability recorded a value of 87%, indicating that users can return to using the system without having to relearn it. Error Handling shows the stability of the system with a value of 85%, where the features run well and error handling is quite appropriate. Satisfaction gets a value of 86%, which describes an attractive interface and a satisfying user experience. Overall, this application has met the goal of developing a functional, reliable, and well-received web-based tourist ticket booking system for users.

Suggestion

Although this website-based tourist ticket booking application has been successfully developed to support the ticket sales process in Serayu Larangan Village, there are still some things that need to be improved. Some suggestions for future development include adding new features,

improving the appearance to be more attractive and easy to use on various devices, and making it easily accessible and comfortable for users of all age groups. The reporting feature also needs to be improved so that it can present sales data and visitor statistics visually. Finally, the application needs to be tested on a larger scale to ensure that the system is truly ready for use in the real world. With these improvements, this application is expected to be the right choice.

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