

Designing a Web-Based Digital Financial System for Islamic Boarding Schools with Payment Gateway Integration

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ABSTRACT

Financial management in Islamic boarding schools still faces various fundamental problems, particularly due to dependence on manual recording and simple applications. This management pattern often causes delays in report preparation, increases the potential for recording errors, and reduces transparency. This condition impacts the trust of students' guardians and stakeholders. In addition, the diversity of student guardians, including those from outside the region, further complicates the payment process due to limited access to remote transaction services. This situation highlights the urgency of developing a web-based digital financial system that can effectively integrate modern payment technology and adapt to the needs of Islamic boarding schools. This study aims to design and implement a digital financial system for Islamic boarding schools by integrating the Midtrans payment gateway to improve financial management's efficiency, transparency, and accountability. The method used is a model consisting of three main stages: data collection through observation and interviews with financial managers, system design using use case diagrams, activity diagrams, and class diagrams, and system testing with internal and external black box testing approaches. The system implementation utilizes the Laravel framework, MySQL database, and web-based interface with Login, Dashboard, student data, payment, and financial reporting features. The results show that the developed System can comprehensively address the financial management needs of Islamic boarding schools. External testing using a Likert scale questionnaire obtained a rating of Good-Very Good with an achievement of up to 86%, thus confirming the feasibility of the system implementation. This System has been proven to facilitate online payments, accelerate the report preparation process, and improve access to information for student guardians. Thus, a web-based digital financial system integrated with a payment gateway can be a strategic solution for enhancing the transparency and accountability of pesantren finances. Further research is recommended to strengthen data security, expand coverage to multiple pesantren, and conduct continuous testing on a broader scale.

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1. INTRODUCTION

Digital transformation has become an integral part of the governance of modern educational institutions, including Islamic boarding schools (pesantren), which are now required to adapt to financial administration systems that are efficient, transparent, and accountable. The use of computers in payment and educational processes, particularly in pesantren, has not yet been optimised. Financial management in many pesantren is carried out manually through conventional bookkeeping [1], leading to recording errors, delayed reporting, and a lack of transparency for stakeholders such as caregivers, administrators, and students' parents [2]. This challenge is further compounded by the unique financial structure of pesantren, which involves infaq, waqf, zakat, and student savings—funds that demand a more systematic approach to reporting and accountability. Therefore, digitalising pesantren financial systems through the development of a web-based

system integrated with a payment gateway is a strategic step toward improving the effectiveness, efficiency, and transparency of financial management in pesantren.

Several previous studies have addressed the implementation of digital financial systems in educational institutions; however, their focus remains limited to transaction and payment aspects without integrating a comprehensive financial reporting system. This limitation means that the systems developed have not fully met the needs of institutions with unique characteristics such as pesantren. Developing an integrated payment system thus becomes a strategic solution to enhance efficiency, transparency, and accountability in digital financial transactions [3]. Several studies indicate that payment gateway-based systems have been successfully implemented in schools and universities, but no adaptation has been tailored to the pesantren context. In pesantren, all online transactions must go through a payment gateway that accommodates religious and social fund management models involving infaq [4], waqf, and student savings. This reveals an explicit research gap—no digital financial system designed explicitly for pesantren still accounts for the complexity of their economic structures and the underlying religious values.

Recent literature further emphasises the importance of financial digitalisation in education. For instance, Susanto H (2023) [5] highlighted the effectiveness of web applications in increasing school fund transparency, while Munawarah M (2024) [6] demonstrated improved payment efficiency at Pondok Pesantren Nurul Hidayah through payment gateway integration. However, neither study has developed integrated reporting systems nor addressed the interoperability between financial units within pesantren. Consequently, these studies remain focused on single-payment aspects without linking them to real-time reporting and broader internal financial auditing systems. Furthermore, Khilmi N (2024) [7] found that implementing the SIMKEU application in large pesantren improved administrative efficiency; nevertheless, the system did not accommodate interoperability between financial units such as student cooperatives, business units, and treasurers. These findings indicate that there is still significant room for developing a system capable of unifying all aspects of pesantren finance within one integrated digital platform. This distinction underlies the novelty of the current study, which focuses on transactional efficiency and prioritises system integration and cross-unit transparency. In other words, there remains a problem—no existing digital solution integrates transaction, reporting, and internal auditing functions within pesantren financial management.

Meanwhile, research by Fauzi S (2024) [8] on payment gateways in the transportation sector and Wirawan I (2024) [9] on web-based financial system design emphasised the benefits of regular financial reporting and monitoring. However, both studies remain sectoral and do not directly link payment gateway integration with the characteristics of pesantren-based educational institutions [10]. Based on this comprehensive review, the novelty of this study lies in integrating a pesantren financial system with a Laravel-based payment gateway developed contextually in accordance with the social, religious, and operational values of pesantren. This approach differs from previous studies, which tend to be generic and do not adapt to pesantren's organisational structures or distinctive values [11].

Considering the research gaps and limitations of prior studies, this research explicitly aims to design and develop a web-based digital financial system using the Laravel framework integrated with the Midtrans payment gateway to handle various pesantren financial transactions securely, efficiently, and transparently [12]. The primary goal of this study is to produce a system that not only accelerates payment and financial reporting processes but also aligns with the operational needs and religious values of pesantren, which emphasise the accountability of community funds. Furthermore, this research seeks to test the system's effectiveness, efficiency, and interoperability through functional testing and user satisfaction evaluations to ensure the resulting system is relevant to user needs in the pesantren environment [13]. Through comprehensive design and testing, this study is expected to make a significant contribution both theoretically—in advancing knowledge in digital information systems and financial management—and practically—as an innovative model for financial management in religious educational institutions, which have thus far seen limited adoption of integrated digital systems [14].

2. METHOD

This study uses a development model to build a website-based financial management system and payment gateway. This method consists of three main stages, namely:

1. Listen to Customers, the initial stage of input from users or consumers, researchers conducted observations and interviews with Islamic boarding schools, particularly treasurers and financial managers. The goal is

to identify real problems encountered in financial management, such as manual recording processes, recording delays, and financial reporting difficulties. Data collection techniques include:

- a. Direct observation of ongoing financial processes.
 - b. Interviews with financial managers to explore the needs and constraints of the old System.
2. Build/Revise *Mock-Up*. This stage includes system requirements analysis and interface design using several diagram models, namely:
- a. *Use a Use Case Diagram* to define actors and system functionality.
 - b. *Activity Diagram* to map the financial process flow.
 - c. A Class Diagram represents data structures and explains the relationships between entities in the System.

System implementation is carried out using:

- a. The PHP programming language is based on the Laravel framework,
- b. MySQL database management system, and
- c. Visual Studio Code is a development environment (text editor).

The system design is manifested as a user interface representing pages such as Login, Dashboard, student data, payment fees, and financial reports. The purpose of developing this System is to improve ease of use and operational efficiency and minimize potential errors during utilization. [1]

3. Customer Test *Mock-Up*. At this stage, an initial evaluation of the System is carried out through testing:
 - a. Internal Black Box Testing, to test the System's functionality based on input and output.
 - b. External Black Box Testing was used to determine user satisfaction through a Likert scale-based questionnaire (range 0–100%)
4. The results of this testing are presented in a table containing the application's functionality. If the testing succeeds, the application's functionality is declared to run well [2] This research methodology was developed through structured stages, with the implementation flow as described below:

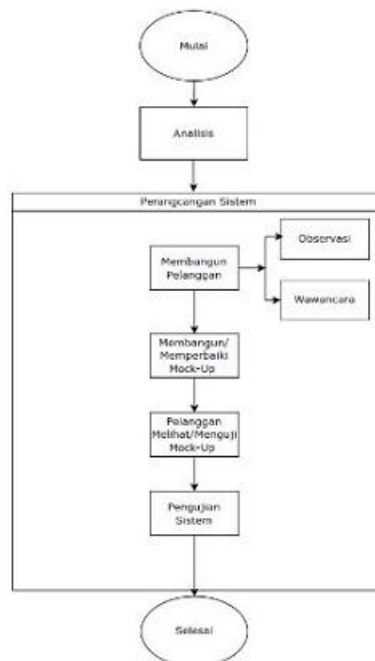


Figure 1. Research Framework

The analysis in this study is understood as formulating problems in the field, which are then used as a basis for conducting the survey. The first stage is data collection, which is carried out through interviews with authorities at the research site as the primary source of information. The second stage is system design, which develops a security system tailored to the User's needs to address existing problems. The third stage is testing, where, after the design is complete, the System is tested directly in the field using a questionnaire instrument to assess the suitability and effectiveness of the developed System [3].

3. RESULTS AND DISCUSSION

The development of this System began with a needs analysis phase to gain a comprehensive understanding of the features and functions that must be available in the pesantren digital financial System. The results of this analysis formed the basis for designing a system that meets the needs of users, including administrators, treasurers, and student guardians—the design phase aimed to simplify the implementation process and support system development in the next phase. Therefore, the design was modeled using *Use Case*, *Activity*, and *Class Diagrams*. Specifically, Use Case Diagrams were used to describe the services or features available in the System while illustrating the actors interacting with these features, as shown in Figure 2:

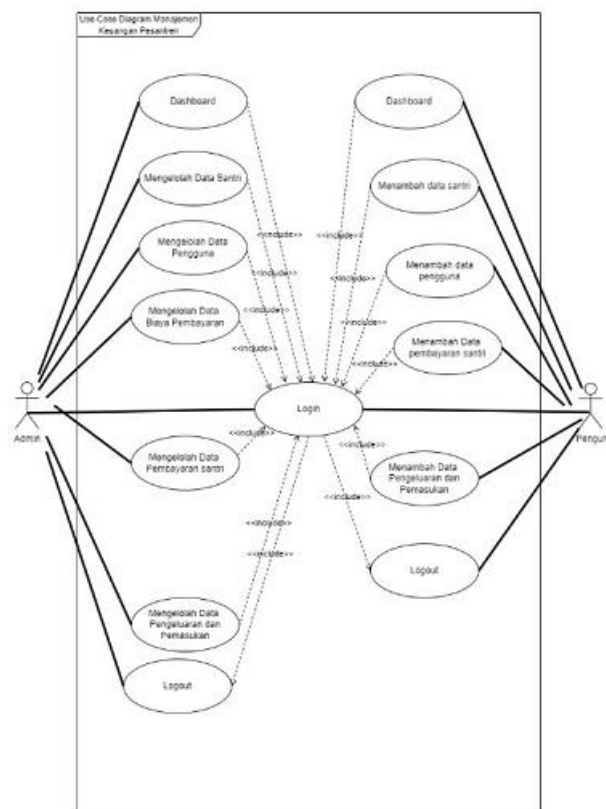


Figure 2. Use Case Diagram

Figure 2. It shows a use case diagram illustrating that the System's primary User is the administrator, who has full authority to manage data on the System. Meanwhile, the research stages, which include concept development and case resolution, are explained in detail in the methodology section.

Table 1. Flow Use Case Diagram

Use Case	Pesantren Financial Management
Participating Actor	Admin, Management
Flow of Events	1. The User logs into the System. 2. The System displays the Dashboard. 3. The Admin can access and manage data on students, users, payment fees, student payments, expenses, and income. 4. The administrator can add data on students, users, student payments, expenses, and income. 5. The User logs out of the System.
Alternative Condition	1. The User enters incorrect data during Login. 2. The System displays an error notification and asks the User to log in again.
Entry Condition	The User opens the system page and selects the Login menu.
Exit Condition	The User completes the <i>activity</i> according to their access rights and logs out.

The flow of user activities in accessing the System is illustrated through an *activity* diagram that visualizes the stages of interaction between the Admin as a user and the System. One of the main activities shown is the login process, which serves as the initial gateway to access all system features.



Figure 3. Admin Login Process

Figure 3. Performing Login *Activity* Diagram: The diagram illustrates the Admin and System interaction during the login process. The System first displays the login form, which the Admin fills out with a username and password. The System then validates the input; if fields are missing or credentials are incorrect, the process returns to the Admin for correction. The system will display the dashboard page if all data is valid, and the process will end.

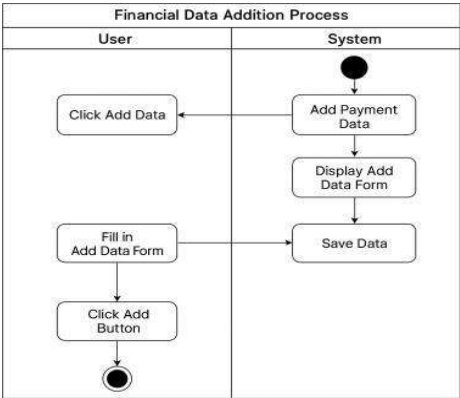


Figure 4. Financial Data Addition Process

Figure 4 presents an *activity* diagram of the *Financial Data Addition Process*, illustrating the User and System interaction. The flow begins when the User clicks the *Add Data* button, after which the System displays the input form while initiating a new payment entry. Once the form is filled in and the *Add* button is pressed, the System permanently saves the data. This diagram represents a straightforward mechanism for adding financial data within the System.

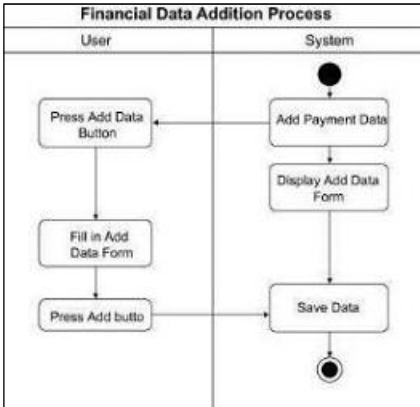


Figure 5. Financial Data Editing Process

Figure 5. Financial Data Addition Process Activity Diagram: This diagram illustrates the user-system interaction when adding financial data. When the User presses the Add Data Button, the System responds by adding payment data and displaying the form. The User fills in the form and presses the Add Button, after which the System saves the data and ends the proc

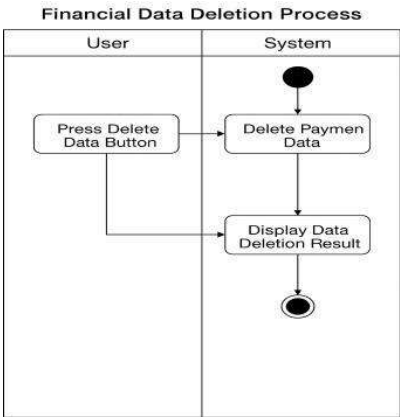


Figure 6. Financial Data Deletion

Process *Activity* Diagram: This diagram explains the User and system interaction in deleting financial data. The process begins when the User presses the Delete Data Button. The System then acts to delete payment data and displays the Data Deletion Result. Finally, the process ends. The swimlane structure makes it clear which steps are carried out by the User and which are handled automatically by the

Class diagram displays and explains a system's structure through its attributes, operations, and relationships among the objects within it. In this study, the class diagram of the Pesantren financial System illustrates the data structure of the main entities, namely Admin, Student, Management, Finance, Income, and Expenditure. Each entity has attributes representing its identity and its relationships with other entities, showing the systematic and structured interconnection of financial data with users.

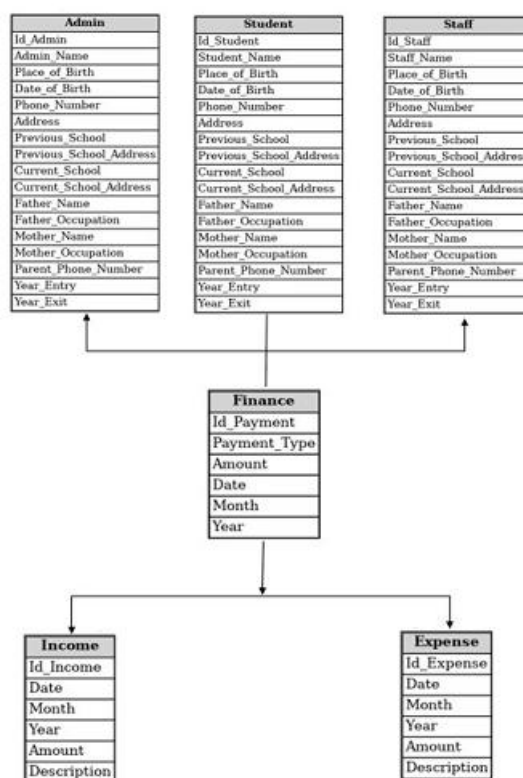


Figure 7. Class Diagram

Figure 7 illustrates a Class Diagram comprising six main classes: Admin, Student, Staff, Finance, Income, and Expense. The first three classes store personal identity, family, and educational history data. The Finance class serves as the center of financial transactions connected to Admin, students, and staff, and branches into the Income class for recording revenues and the Expense class for expenditures. This diagram represents an integrated system for managing member data and financial information.

3.1. Data Collection Results

The data collection process in this study was carried out through observation and interviews to gain a comprehensive understanding of the financial System implemented at the Islamic Boarding School. Observations were used to directly examine the institution's mechanisms of recording, managing, and reporting finances. Meanwhile, interviews were conducted with relevant parties such as treasurers, administrators, and students involved in financial administration to gather more in-depth information. The data obtained through these two methods were then systematically analyzed to identify strengths, weaknesses, and the development needs of the pesantren's financial System. The results of this analysis are presented in the following section.

Table 2. Summary of Observation and Interview Results

Aspect	Current Condition	Main Problem
Payment Method	Cash on site	Impractical, time-consuming
Financial Recording	Manual in books	Prone to errors and data loss
Financial Reporting	Manual	Slow preparation and less accurate
Access to Payment Information	Not available online	Parents must come in person to check bills

3.2. System Analysis and Design

The system analysis and design stage includes identifying hardware and software requirements and developing system models illustrated through the Use Case Diagram, *Activity* Diagram, and Class Diagram. This step aims to simplify the implementation process while ensuring that the developed System aligns with user needs, thereby supporting Pesantren's financial management in a more effective, efficient, and structured manner.

Table 3. Hardware and Software Requirements

Category	Specification / Software
Hardware	Intel(R) Celeron(R) N4020 CPU @ 1.10GHz
	RAM 8 GB
	SSD 250 GB
	Windows 11 Home Single Language
Software	XAMPP 8.2.12
	Laravel 10
	Google Chrome

3.3. Implementation

The following presents implementing the financial management system design developed for the Islamic Boarding School (Pondok Pesantren).



Figure 8. Login Page

Figure 8 shows the web-based application login page with a simple user interface design. The login form consists of two input fields, email address and password, and is equipped with a green button labeled "Login."



Figure 9. Dashboard Page

Figure 9 displays the Dashboard interface of the Pesantren Financial Management application. On the left side, a navigation panel contains several menus, including Home, Student Data, User Data, Payment Data, Payments, and related menus.

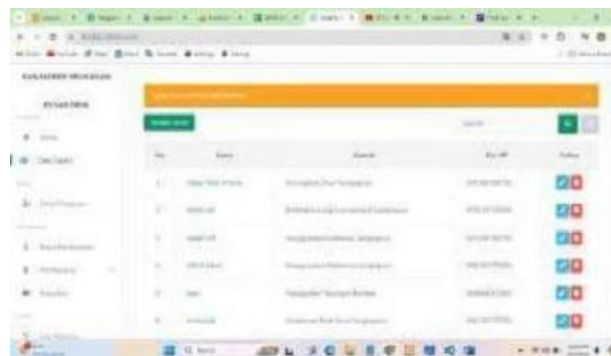


Figure 10. Student Data Page

Figure 10. shows the Student Data page in the Pesantren Financial Management application. This page is an interface to add, search, update, and delete student data. Student information is displayed in a table containing name, address, and phone number.

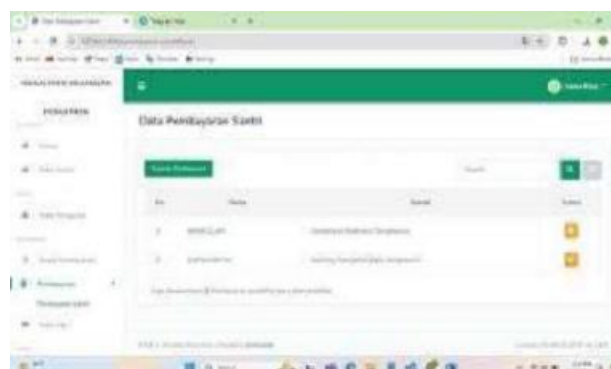


Figure 11. Student Payment Data Page

Figure 11 shows the Student Payment Data page in the Pesantren Financial Management application. This page functions as an interface for adding, searching, and deleting student payment records. The data is displayed in a table containing numbers, names, and student addresses.



Figure 12. Student Syariah/SPP Page

Figure 12 displays the Student Syariah/SPP page in the Pesantren Financial Management application. This page serves as a tool for periodically recording and monitoring students' monthly tuition (SPP) payments. The information is presented as a list of students accompanied by payment columns from January to December. External testing was carried out to evaluate the feasibility of the Pesantren Financial Management website from the perspective of end users. The method used was black box testing, focusing primarily on ease of use, operational challenges, and the overall feasibility of system implementation.

Table 4. External Testing Results (Black Box Testing)

No	Question	Test Results			
		SB	B	C	KB
1.	Is this website easy to understand?	1	2	0	0
2.	Are there any difficulties when operating the website? mengoperasikan website ini	0	3	0	0
3.	Is this website feasible to use? digunakan	0	2	1	0

Table 4 explains the results of the website's external testing based on three main questions. Most respondents rated the System in the "Good" category, although there is still feedback for improvements in feasibility and ease of use. Before calculating the main formula, it is necessary to determine the interval value first. The calculation is as follows:

$$I = \frac{100}{\text{Likert score total}} = \frac{100}{5} = 20$$

$I = 100 / \text{total Likert score}$

$I = 100 / 5 = 20$

Thus, the interval distance is 20%

A precise evaluation reference is required to ensure the testing results can be interpreted more systematically. Therefore, each score's categories and percentage ranges are classified objectively and presented as an interval score percentage table.

A precise evaluation reference is required to interpret the test results more systematically. Therefore, the categories and percentage ranges of each score are classified objectively and presented in an interval score percentage table.

Table 5. Interval Score Percentage

No	Description	Score Range
1	Very Poor	0% – 19.99%
2	Poor	20% – 39.99%
3	Fair	40% – 59.99%
4	Good	60% – 79.99%
5	Very Good	80% – 100%

Table 5. Presents the assessment categories based on interval score percentages, from *Very Poor* to *Very Good*. The score ranges are divided into five percentage levels, making it easier to interpret the testing results.

Tabel 6. Conclusion of External Testing Results

Pertanyaan	SB (x5)	B (x4)	C (x3)	KB (x2)	SKB (x1)	Total Skor	Persentase	Kategori
1	1×5=5	2×4=8	0×3=0	0×2=0	0×1=0	13	86%	Sangat Baik
2	0×5=0	3×4=12	0×3=0	0×2=0	0×1=0	12	80%	Sangat Baik
3	0×5=0	2×4=8	1×3=3	0×2=0	0×1=0	11	73%	Baik

Based on the external testing results, the highest percentage was obtained in the first question, with an achievement of **86%**, which falls into the *Very Good* category. Meanwhile, the lowest percentage was found in the third question, with a score of **73%**, which is categorized as *Good*.

4. CONCLUSION

This study successfully developed a web-based digital financial system for Islamic boarding schools by integrating the Midtrans payment gateway to address the inefficiencies and lack of transparency in manual financial management. The testing results showed an achievement rate of 86% (Good–Very Good category), indicating that the system is practical and feasible for use. Compared to previous studies that focused only on payment, this research contributes by integrating payment and financial reporting systems in real-time, thereby enhancing transparency and accountability. Future development can focus on improving data security, expanding implementation to multiple boarding schools, and conducting large-scale trials as a national model for pesantren financial digitalisation.

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