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# Web-based Savings and Payment Management Application with Payment Gateway Integration (Case Study of MI Islamiyah Pengatigan Rogojampi)

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**ABSTRACT**

The development of information technology encourages schools to improve the efficiency of administrative services, including in the management of student savings. At MI Islamiyah Pengatigan Rogojampi, recording savings is still done conventionally using a savings book, which risks causing recording errors, damage, and data loss. This research aims to design and develop a website-based student savings information system and mobile application, so that the process of recording and managing savings can be done more efficiently, accurately, and transparently. The system development uses the Research and Development (R&D) method with the System Development Life Cycle (SDLC) approach of the Waterfall model which includes the stages of analysis, design, implementation, testing, and maintenance. The system is also integrated with Mitrands Payment Gateway to support online deposit and withdrawal transactions. The test results show that the system runs according to user needs, increasing the speed of recording up to 50% more efficiently and reducing the recording error rate by 90%. In addition, 95% of users expressed satisfaction with the ease of access to balance information and savings history. In conclusion, this system has succeeded in increasing the effectiveness, accuracy, and transparency of student savings management and encouraging early understanding of financial literacy.

## INTRODUCTION

The development of information technology in the current digital era has had a significant impact in various fields of life, including the education sector. The utilization of technology is no longer limited to the learning process, but also extends to aspects of school administration to improve efficiency, accuracy, and transparency of services (Delima, 2024). One important innovation in the educational environment is the implementation of a digital-based student savings management system. Through this system, the process of recording transactions becomes more structured, well documented , and easily accessible by schools, students, and parents (Endraswari & Tou, 2022).

Education also plays a role in shaping the character of students, including instilling a culture of saving from an early age. Saving activities train students to be disciplined, responsible, and able to plan for future financial needs (Widiartin et al., 2021). At MI Islamiyah Pengatigan Rogojampi, the student savings program has been implemented as part of this character building. However, recording student savings is still done conventionally using a savings book, which risks recording errors, loss of data, and an inefficient recording process (Herdi Wijaya et al., 2023).

Meanwhile, financial technology (*fintech*) such as the Mitrands Payment Gateway is available to support digital financial transactions in the education environment (Prasetyo &

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Sutopo, 2020). Mitrands allows the deposit and withdrawal process to be carried out online, directly integrated with the school information system (Siahaan & Sianturi, 2024). However, at MI Islamiyah Pengatigan Rogojampi there is no website and mobile-based student savings system integrated with Mitrands services. This is the research gap, where the existing savings system still does not meet the needs of transparency, efficiency, and ease of access in real-time by the school, students, and student guardians.

Therefore, this research aims to design and develop a website and mobile-based student savings information system that is integrated with the Mitrands Payment Gateway service. This system is expected to increase the effectiveness, efficiency, and transparency of student savings management, as well as facilitate access to information for all related parties.

## RESEARCH METHODS

### Type of Research

This research uses the Research and Development (R&D) method, which is a research method that aims to develop a particular product and test its effectiveness (Kasri, 2024). The R&D method is usually used in the field of technology to produce system products or software-based applications (Hibatullah et al., 2024). In this research, the product developed is a website-based and mobile student savings information system implemented at MI Islamiyah Pengatigan Rogojampi. The stages of system development are carried out using the System Development Life Cycle (SDLC) Waterfall model, which includes the stages of needs analysis, system design, implementation, testing, and maintenance. In the initial stage, qualitative data collection was conducted through interviews, observations, and documentation studies to understand user needs and problems faced in the field. Technically, the system was developed using PHP and JavaScript programming languages, with a MySQL database managed using PHPMyAdmin. System design tools include Context Diagram (CD), Data Flow Diagram (DFD), and Entity Relationship Diagram (ERD). The development environment uses XAMPP as the local server and Visual Studio Code as the code editor. The system is also integrated with Mitrands Payment Gateway to support digital transactions, and tested using the Blackbox Testing method to ensure all functions run according to user needs.

### Data Collection Technique

1. **Observation**
   This research was conducted through direct observation at MI Islamiyah Pengatigan Rogojampi to review the management of the student savings system which is still done conventionally. This observation was carried out to identify various problems faced by the school in the process of recording, calculating, and storing student savings data. A thorough observation of the running system is carried out to find out the shortcomings that exist, so that the overall problem can be concluded and clearly defined (Suwarto et al., 2018).

2. **Interview**
   Interviews were conducted directly with the principal and treasurer of MI Islamiyah Pengatigan Rogojampi to explore information about constraints in managing student savings and their expectations of a more modern and efficient system. This method aims to obtain in-depth data from those directly involved in the research location (Sasmito et al., 2025).

3. **Literature Study**
   Researchers conducted a literature study by examining various sources such as books, journals, articles, the internet, and other references relevant to the topic of Designing Java-Based Student Savings Applications (Irfan & Yuliana, 2022). In general, literature study is an activity to deepen, review, and identify knowledge from various literature or previous research results related to the problem under study, so that it can become a foundation in the preparation of the system being developed (Aditia et al., 2022).

4. **Document Analysis**
   Data collection is done through documents in the form of student savings books, financial reports, and school policies related to savings management. This step aims to ensure that the system designed is in accordance with the procedures and rules that apply in schools (Damayanti et al., 2021).

## System Development Method

This research uses the System Development Life Cycle (SDLC) method of the Waterfall model, this approach was chosen because it is able to minimize errors, maintain system quality, and ensure the development process is directed and easy to manage (Abdul Wahid, 2020). The Waterfall method is one of the models in the System Development Life Cycle (SDLC) which emphasizes the completion of each stage sequentially before proceeding to the next stage. This pattern allows full focus on each phase because parallel work rarely occurs (Amijoyo & Hauzeni, 2024). The stages in the SDLC include planning, analysis, design, development, implementation, testing, and maintenance, all of which form a structured and systematic software system workflow (Nia Silfiyanti et al., 2020).

**Figure 1.** SDLC *System Development Life Cycle*

This system development applies the System Development Life Cycle (SDLC) method which includes the following stages :

1. **Planning**
   At this stage, researchers begin by exploring the various needs and scope of the system to be developed. Based on observations at MI Islamiyah Pengatigan Rogojampi, it was found that the management of student savings is still done conventionally so that it is less efficient and prone to recording errors. From these findings, researchers formulated a solution in the form of designing a website-based and mobile savings system so that it can be accessed easily by the school anytime and anywhere.

2. **Analysis**
   After the general needs were identified, researchers continued with data collection in the field through direct observation, interviews with school officials, and documentation studies related to the ongoing student savings process. From the results of this analysis, researchers gained an in-depth understanding of the savings recording process, the obstacles faced, and the main features that must be available in the system to make the process more effective and efficient.

3. **Design**
   Based on the results of the analysis, researchers began to design the system in detail. This design includes creating a database structure to store student savings data in an organized manner, designing a user interface (UI/UX) so that the system is easy to use, and creating

diagrams such as Context Diagram, Data Flow Diagram (DFD), and Entity Relationship Diagram (ERD). This stage ensures that the flow of the system is clear, structured, and meets the needs of the school.

4. **Implementation**
   After the design was completed, researchers developed the system according to the design using the PHP programming language and MySQL database. At this stage, the main features such as recording savings deposits, generating financial transaction reports, and managing user access rights began to be built and tested internally to function properly according to plan.

5. **Testing**
   The system that has been developed is then tested to ensure all features run correctly. Researchers used the Black Box Testing method which focuses on testing system functions without seeing the program code directly. Through this test, it is ensured that the system can be operated properly by users such as teachers, homeroom teachers, and school operators, and there are no malfunctions that can interfere with usage.

6. **Maintenance**
   After the system was declared fit for use, the researchers handed over the system to the school to be implemented by the principal, teachers, homeroom teachers, student guardians, and students. This stage also includes regular system monitoring and maintenance activities to ensure the system continues to run optimally, accurately, and easily used by all parties involved in the student savings process.

## System Design

### 1. Context Diagram

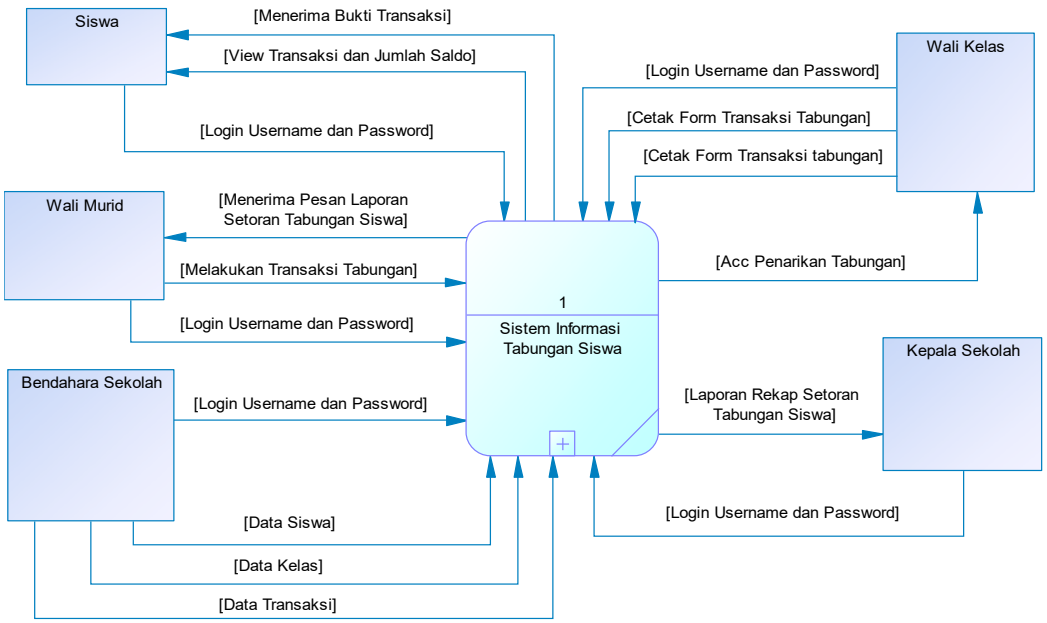


**Figure 2.** Context Diagram

Context diagram is the highest level diagram that shows the outline data flow between the system and external entities. This diagram is the initial basis before being developed into a Data Flow Diagram (DFD) (Rachman et al., 2025). Context diagram of the Student Savings Information System at MI Islamiyah Pengatigan shows the relationship between the system and related parties outside the system. This diagram only displays external interactions without explaining the details of the processes in the system (Arifin, 2023). In this student savings system there are five entities that can be seen in Figure 2.

The context diagram of the student savings information system at MI Islamiyah Pengatigan Rogojampi illustrates the relationship between the system and five main external entities, namely students, student guardians, school treasurers, homeroom teachers, and school principals. Students interact with the system to view savings balances and transaction history that has been done through the mobile application, so that students can find out the progress of their savings independently. Student guardians make savings deposits to the system, either through transfers or direct payments, then receive information in the form of transaction status notifications as proof of successfully processed deposits. The school treasurer plays an important role in the system by recording and verifying each deposit and withdrawal transaction, and receives output in the form of a complete transaction report and recap of student savings data used for school financial administration. Homeroom teachers access information on the balance and savings history of students in their class for the purposes of monitoring and fostering students' savings habits. Meanwhile, the principal receives system output in the form of a recapitulation report of all student savings in the school as material for evaluating the savings program as a whole. The entire data exchange process aims to support the management of student savings that is more effective, efficient, accurate, and easily monitored by all parties involved.

## 2. Entity Relationship Diagram (ERD)

Entity Relationship Diagram (ERD) serves as a database design tool by describing entities, attributes, and relationships between these entities. ERD helps create the right table structure (Safitri, 2022). ERD plays a role in visualizing data structures and relationships between entities, using various symbols and certain notations as a means of representation (Rifqi Hakim et al., 2023). Figure 3 and Figure 4 show the complete conceptual and physical data model of the student savings system.

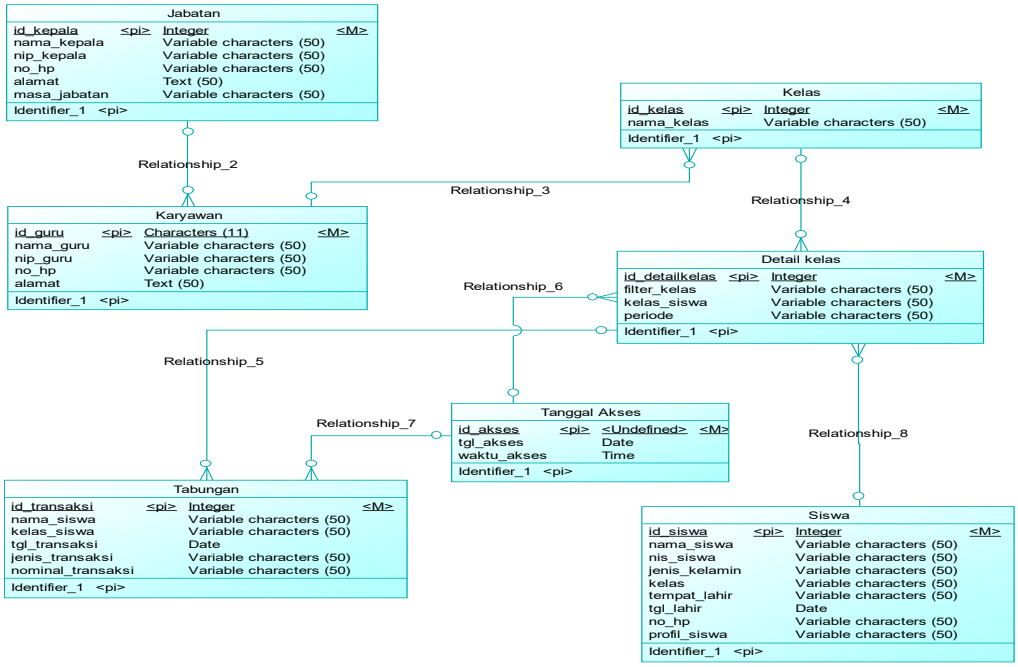


**Figure 3.** Conceptual Data Model

This ERD diagram illustrates 7 main entities in the student savings information system at MI Islamiyah Pengatigan Rogojampi, namely Head, Position, Employee, Class, Class Detail, Student, Savings, and Access Date. The Head entity stores principal data which is linked to the Jabatan entity to explain the position held. The Jabatan entity also relates to Employees which contains data on teachers or school employees. Furthermore, the Class entity stores class data that is linked to Class Detail to explain the details of the class and learning period. The Class Detail entity is linked to Student which stores students' personal data such as identity, class, and

contact. Each student can make savings transactions that are recorded in the Savings entity, containing data on the type of transaction, nominal, and transaction date. In addition, the system records employee login activities through the Access Date entity. Relationships between entities show the relationship of data in a structured manner to facilitate the management of student savings, monitoring transactions, and accessing system user data effectively and efficiently.

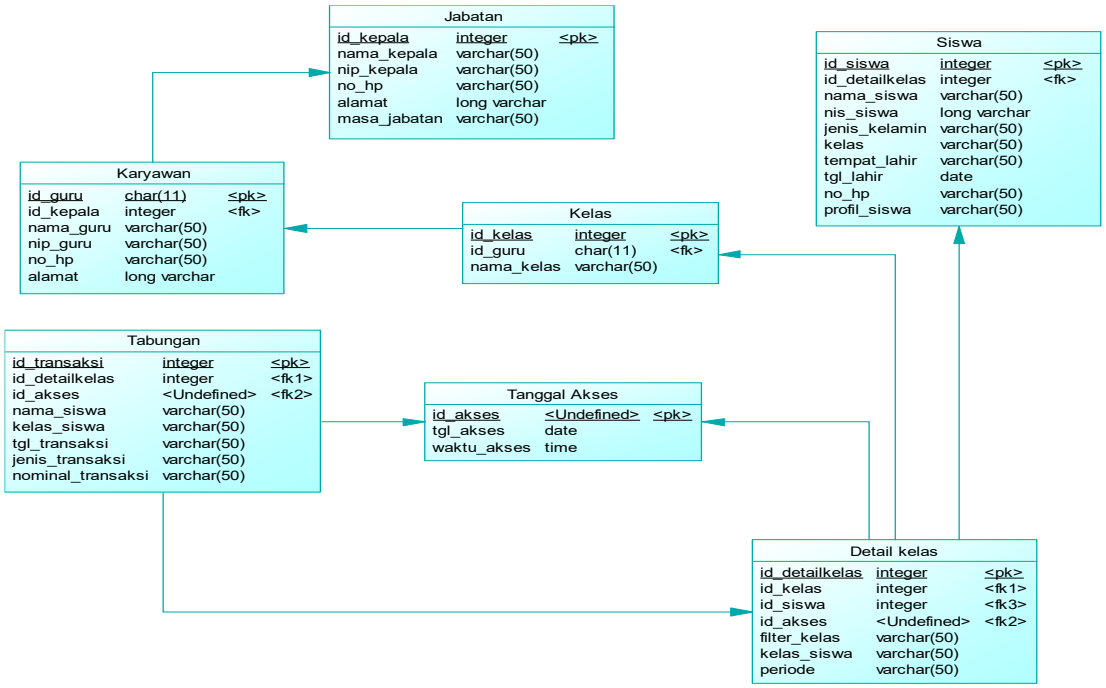


**Figure 4.** Physical Data Model

This Physical Data Model (PDM) consists of 7 main entities namely Position, Employee, Class, Class Detail, Student, Savings, and Access Date. The Jabatan entity stores employee position data with attributes such as ID, head name, tenure, and cellphone number. This entity is related to Employee which stores teacher data, such as teacher ID, name, NIP, address, and cellphone number. The Class entity contains class information that is linked to Class Details to record more details about the class, period, and class filter. The Class Detail entity is linked to the Student entity that stores complete student data, including NIS, name, gender, address, date of birth, cellphone number, and student profile. The Savings entity records student transactions which include transaction ID, student ID, class detail ID, transaction type, date, and transaction amount. Meanwhile, the Access Date entity records the system login history by employees by storing the access ID, date, and time of access. Relationships between entities are made to maintain data integrity and facilitate the process of recording student savings and system activities in an integrated manner.

## RESULTS AND DISCUSSION

Website and Mobile-based Student Savings Information System at MI Islamiyah Pengatigan Rogojampi is designed to facilitate the management of student savings digitally. The system consists of a website platform used by admins and school officials, as well as a mobile application that can be accessed by students and guardians. The main features include user login, savings information dashboard, deposit and withdrawal transaction recording, and printable recapitulation reports. The test results show that all system features run well and according to user needs. The process of recording transactions is faster, more organized, and easier to access than the previous manual method. The implementation of this system can reduce daily savings recording time by 50% more efficiently, from an average of 60 minutes per day to only about 30 minutes. In addition, the system is able to minimize the potential for recording errors that

previously often occurred in the manual process. Based on the results of interviews with the school, teachers stated that the process of recapitulating student savings balances became easier and more organized. As many as 95% of users (teachers and student guardians) expressed satisfaction with the ease of access to balance information and transaction history through the mobile application. Guardians also found it helpful to be able to monitor their children's savings balances in real-time without having to come directly to the school. Overall, the implementation of this system improves efficiency, accuracy, and transparency in the management of student savings, and supports the digitization of financial services in the school environment.

## Display Design

### 1. Website View

a. Login Page Display

Figure 5 shows the login page of the web-based student savings system. Users enter their username and password for access. There is a school logo at the top. After the data is filled in correctly, the user presses the Login button to enter according to their respective roles in the system.

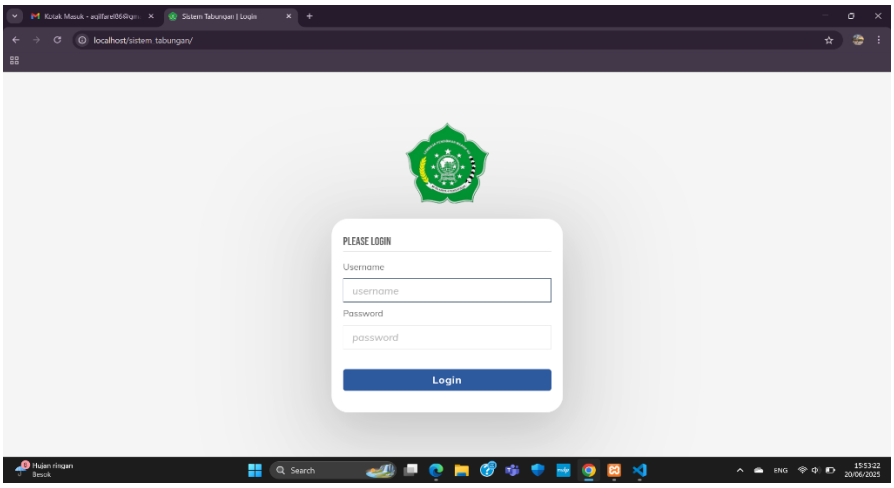


**Figure 5.** Website Login Page

b. Dashboard Page Display

Figure 6 shows the system dashboard with the Treasurer user. This page displays summary data such as Final Balance, Total Deposits, Total Withdrawals, Today's Deposits and Withdrawals, and Total Number of Customers.

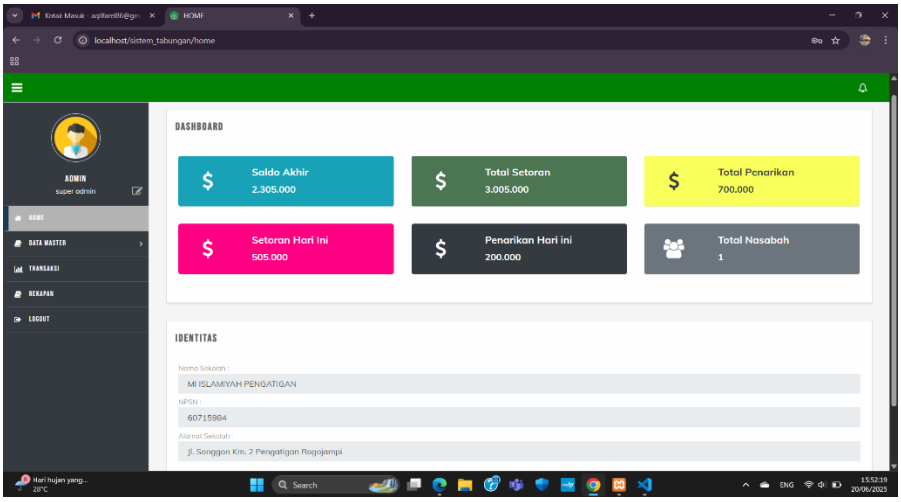

**Figure 6.** Dashboard Page

c. Mitrands Payment Display

Figure 7 and 8 shows the display of the student savings deposit page, where the guardian makes payments via QRIS. The system displays a QR code to be scanned, a status check button, and a payment deadline. The display is still in test mode (TEST).

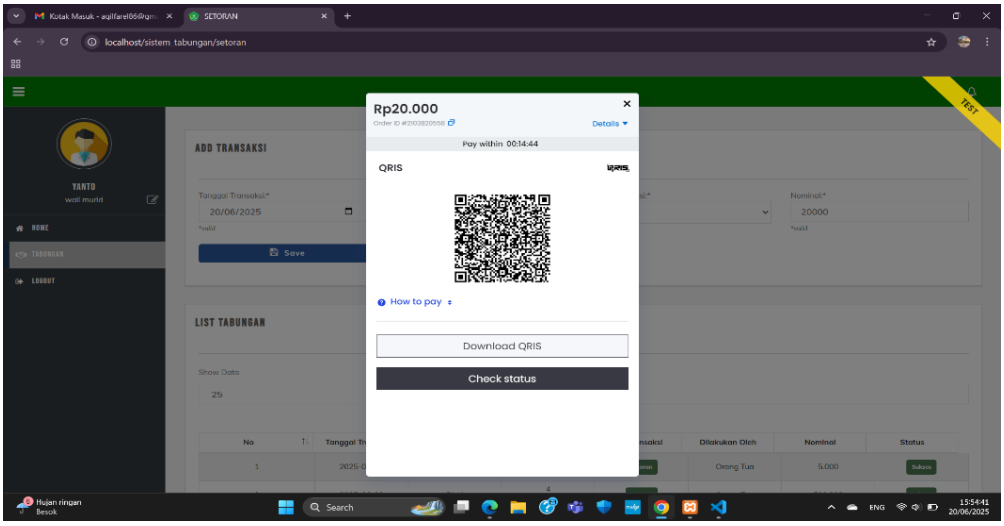


**Figure 7.** Payment Gateway Deposit Page

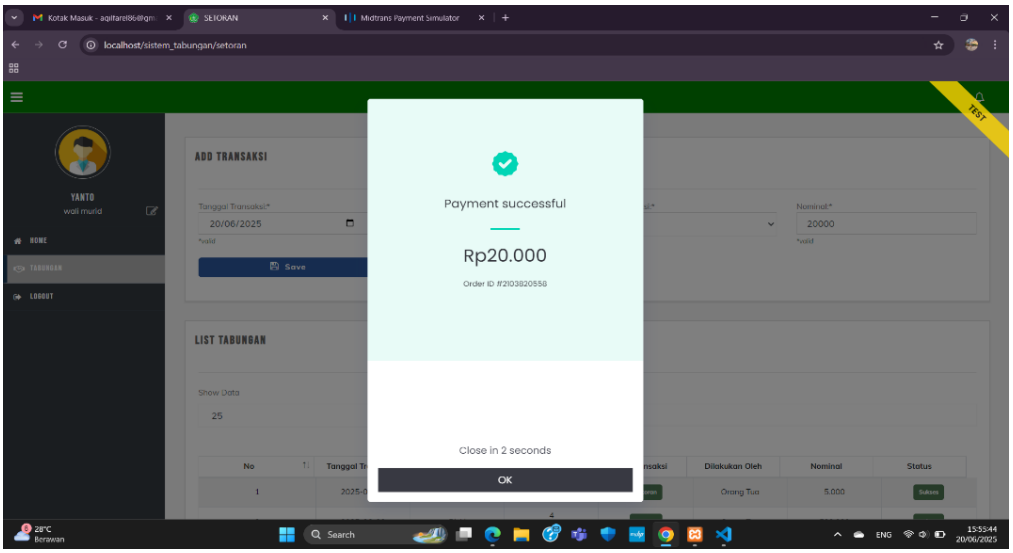


**Figure 8.** Successful Deposit Page

d. Transaction Data Display

Figure 9 shows the Transaction List page on the student savings system. The treasurer can view the complete transaction history, including date, name, class, transaction type, nominal, and status. Data is displayed in tabular form, can be filtered, edited, deleted, or downloaded as needed.

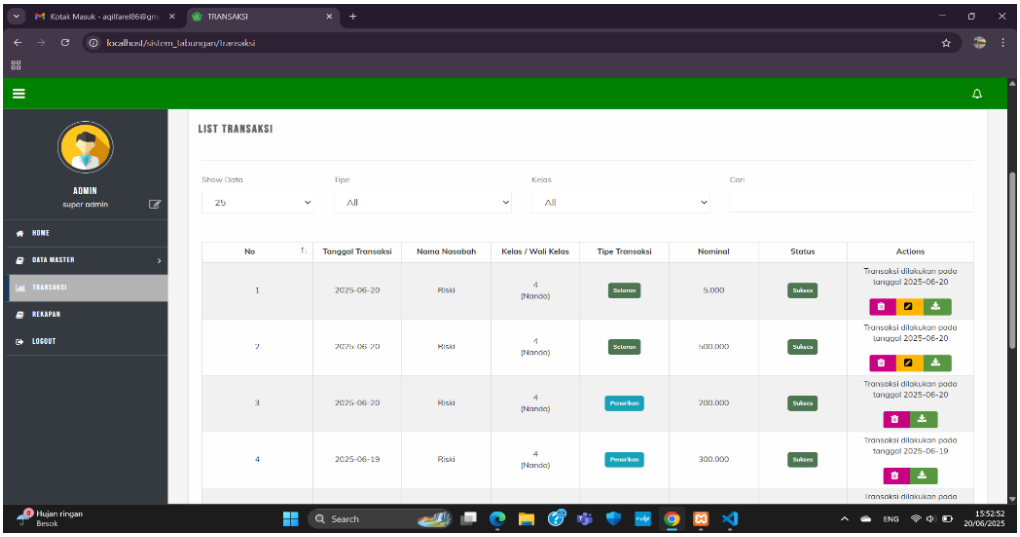


**Figure 9.** Transaction List Page

## 2. Mobile Application Display

a. Login Page Display

Figure 10 shows the login page of the MI Islamiyah Pengatigan student savings mobile application. Before being able to access the system, users must first enter a username and password. This page also displays the school logo in the center as an institutional identity.

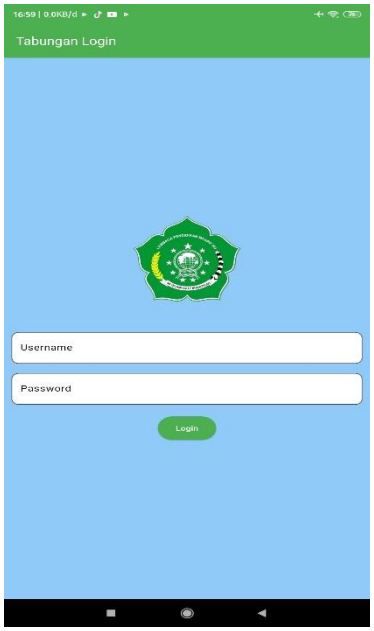


**Figure 10.** Mobile Application Login Page

b. Transaction History Display

Figure 11 shows the dashboard page of the student savings mobile application. At the top there is student profile data such as name, address, class, homeroom teacher, parent's name, and WhatsApp number. Below that is the savings transaction history section, which displays deposit and withdrawal activities along with the date and time of execution. Each transaction is marked with a different color to distinguish its type (deposit and withdrawal).

**Figure 11.** Transaction History Page

## Blackbox Testing Results

System testing uses the Blackbox method, which is a testing approach that evaluates application functions without seeing or analyzing the source code directly. The focus of this test lies on providing input and observing the output of each feature, to ensure that all menus operate according to user needs. This testing process has an important role in ensuring that the system functions properly and is easy to operate by admins, officers, students, and student guardians. The results of testing all features in the system are presented below.

**Table 1.** Blackbox Testing Page

| No | Feature | Test Scenario | Expected Output | Status |
|---|---|---|---|---|
| 1 | Login | User enters correct username and password | Enter the dashboard according to the user role | Successful |
| 2 | List Menu Display | The user successfully logs in and is directed to the dashboard | The main menu appears according to the role (admin, treasurer, etc.) | Successful |
| 3 | Add Mitrands Transaction | Students/guardians make a deposit through the mitrands payment gateway | Transaction is automatically recorded after successful payment | Successful |
| 4 | Failed Mitrands Transaction | The student/guardian makes a payment but fails (insufficient balance /dropped connection) | Failure notification appears, transaction is not recorded | Successful |
| 5 | Check Payment Status | The system checks the transaction status of the partners automatically | Payment status appears in the transaction history | Successful |
| 6 | Recap Report | Admin opens the report and selects a specific period | The report appears according to the filter and can be printed | Successful |
| 7 | Logout | User presses the logout button | The system exits and returns to the login page | Successful |

## CONCLUSIONS AND SUGGESTIONS

Based on the results of development and testing that has been carried out, it can be concluded that the Website and Mobile-Based Student Savings Information System at MI Islamiyah Pengatigan Rogojampi was successfully designed and implemented according to user needs. This system makes it easier for schools to manage student savings data in a more organized, fast, and easily accessible manner. With features such as user login, dashboard, transaction recording, customer data management, user management, and presentation of recapitulation reports, the savings administration process becomes more effective and transparent. In addition, the mobile application allows students and guardians to monitor their balance and savings history in real-time. With this system, savings management becomes more accurate, secure, and supports the digitization of services in the school environment. In order for this student savings information system to continue to grow, it is recommended to add automatic notification features, improve login security with double authentication, and consider integration with local digital payment services (e-wallets). The school also needs to provide short training to users and conduct regular system maintenance so that usage remains optimal and as needed. For long-term development, this system can be adapted and implemented in other madrasahs or schools to expand the benefits of digitizing education financial administration, and it is recommended to conduct regular data security audits to maintain the confidentiality and integrity of transaction information.

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