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Optimization of Financial Management at Idhotun Nasyi'in Islamic Boarding School using a Website Application

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Abstract

Idhotun Nasyi'in Islamic Boarding School faces challenges in financial management due to its manual reliance on Microsoft Excel, which is prone to data loss, input errors, and tracking difficulties. This research aims to design and build a web-based financial management application to address these issues. Developed using the System Development Life Cycle (SDLC) waterfall model with PHP and MySQL, the application features core functionalities such as income and expense management, transaction categorization, and real-time financial report generation in PDF format. Black box testing results indicate that the application functions effectively, simplifying the tasks of administrators and treasurers in monitoring cash flow. The implementation of this system is expected to enhance the accuracy, efficiency, and transparency of the boarding school's financial management.

Keywords: *Information System, Financial Management, Islamic Boarding School, Web Application, SDLC, PHP, MySQL*

1. Introduction

Islamic boarding schools (pondok pesantren) play an important role in advancing Indonesia, but many still face obstacles in administrative management, especially finances [1]. At Idhotun Nasyi'in Islamic Boarding School, financial management that is still manual using Microsoft Excel has proven to be inefficient, time-consuming, and vulnerable to input errors and data loss. As a result, the reporting process becomes slow and inaccurate, making it difficult for the management to make strategic decisions. Along with technological developments, pesantren are required to adopt systems that can support effective data management, especially financial information for revenue evaluation [2]. Manual data processing for various payments such as SPP (school fees), syahriah (monthly fees), and others takes significant time [3]. A web-based information system is recommended to make it easier for treasurers to carry out financial administration tasks [4]. Previous research has proven the success of web-based information systems in improving the effectiveness of financial management in various educational institutions [5]. This system is proven to simplify data processing and report preparation [2]. Therefore, this research aims to build a Website-Based Financial Management Application at Idhotun Nasyi'in Islamic Boarding School using the SDLC Waterfall method and PHP programming language [6] to create a more efficient and structured financial management system.

2. Researh Methodology

This type of research is software development that uses the System Development Life Cycle (SDLC) method with the waterfall model. The research stages carried out include:

1. System Requirements Analysis
   Designing the system workflow using a Flowchart. Next, the system modeling process is designed using Data Flow Diagram (DFD) Level 0 and Level 1. For the database structure, it is designed with a Conceptual Data Model (CDM) and Physical Data Model (PDM). Interface design is also carried out at this stage
2. System Design
   Designing the system workflow using a Flowchart. Next, the system modeling process is designed using Data Flow Diagram (DFD) Level 0 and Level 1. For the database structure, it is designed with a Conceptual Data Model (CDM) and Physical Data Model (PDM). Interface design is also carried out at this stage
3. Implementation
   Translating the design results into a website-based program using the PHP programming language and MySQL database
4. Testing

Performing functional testing of the system using the black box testing method to ensure all features run as expected. In addition, system usability testing is carried out by users using the System Usability Scale (SUS) questionnaire to measure the feasibility and ease of use of the application

2.1. System Development Life Cycle (SDLC)

This software development research uses the Software Development Life Cycle (SDLC) method with the Waterfall model. SDLC is a framework for designing and engineering systems, which includes the entire process from planning, creation, to deployment [7]. The stages include:

1. Requirement Analysis
2. System Design
3. Implementation
4. Integration & Testing
5. Operating & Maintenance (Banin, 2021).

This process forms a continuous cycle because the system will continue to evolve according to human needs and technological advancements [8].

2.2. Data Flow Diagram (DFD)

Data Flow Diagram (DFD) is a modeling tool for software analysis that describes all system functions and the data flow between its processes. DFD is useful for verifying whether the designed system has met user needs. Its structure is hierarchical, starting from the Context Diagram (DFD Level 0) which is a general representation of the system, showing its boundaries and interactions with external entities. The next level, DFD Level 1, is a decomposition of the Context Diagram that details the main processes into several more detailed processes, usually 4-6 processes. DFD components include four main symbols: External Entity (external party); Process (data processing activity); Data Store (storage) and Data Flow (data flow). The DFD for this research is as follows:

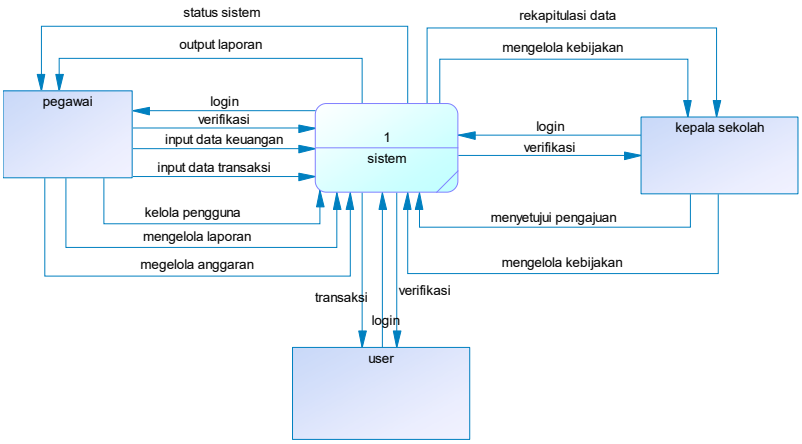

Fig. 1: DFD Level 0 Design

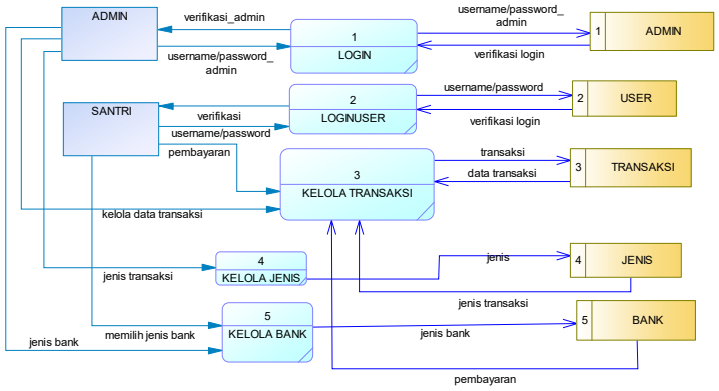

Fig. 2: DFD Level 1 Design

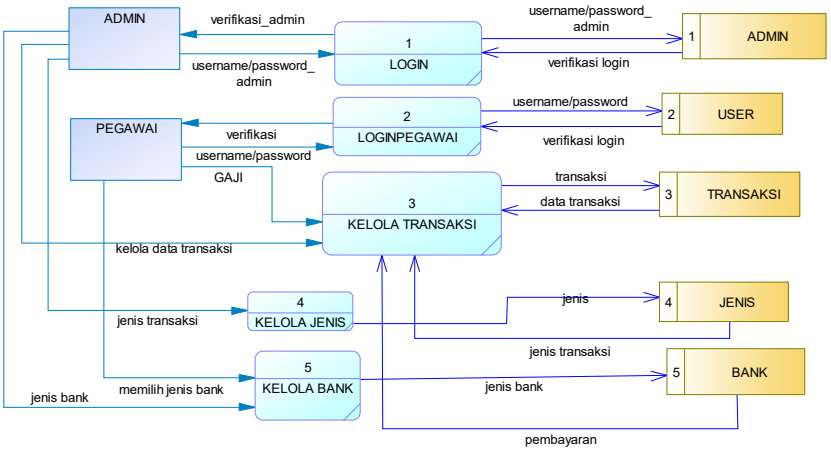

Fig. 3: DFD Level 1.1 Design

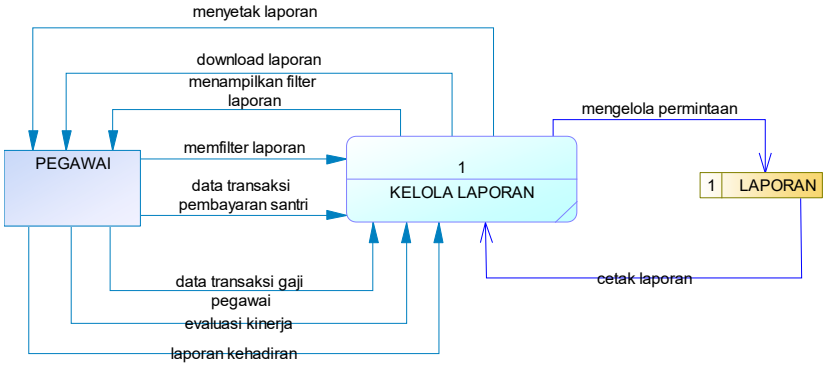

Fig.4: DFD Level l.2 Design

2.3. Database Management System (DBMS)

MySQL is an open-source Database Management System (DBMS) based on Structured Query Language (SQL). SQL is the standard language that forms the basis of database operations, allowing data manipulation such as data entry and selection to be done automatically and more easily. As a database server, MySQL has an advantage in query processing speed compared to other servers, which can be seen from how its optimizer executes SQL commands. Although it fundamentally uses command lines, MySQL management can be simplified with a graphical interface through applications like PHPMyAdmin. Its nature as open-source software also confirms that MySQL can be used for free [9]. This DBMS is a popular choice due to its efficiency, ease of use, and accessibility in data management. The following are the CDM (Conceptual Data Model) and PDM (Physical Data Model) in this research:

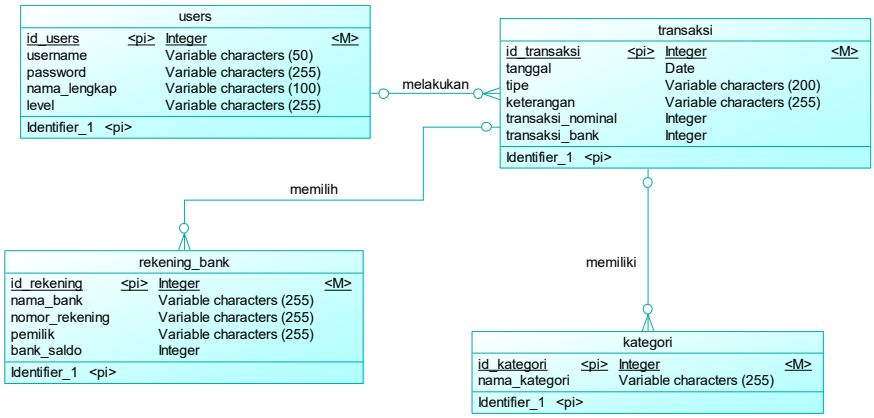

Fig. 5: Conceptual Data Model Database Design

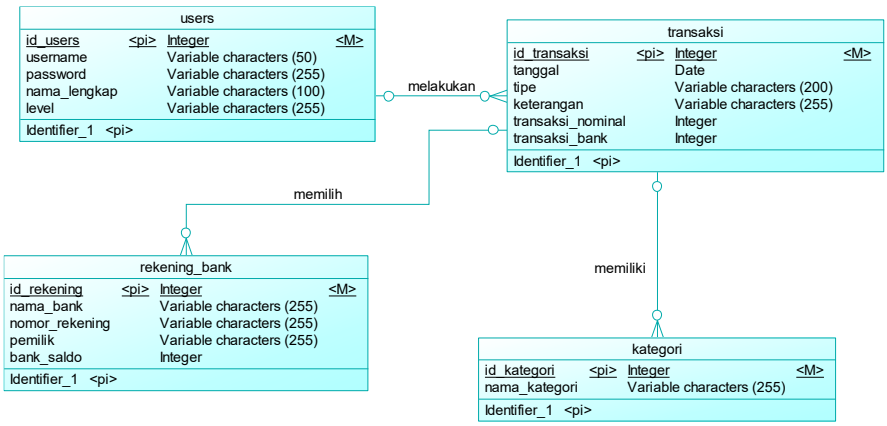

Fig. 6: Physical Data Model Database Design

2.4. PHP and MySQL

PHP (Hypertext Preprocessor) is a server-side scripting language designed specifically for web application development. This language is distributed with an open license similar to the GNU General Public License (GPL), making it open-source software that can be used freely (Margaretha & Nababan, 2020). In the website development ecosystem, PHP is often paired with MySQL, one of the most widely used database servers. SQL (Structured Query Language) is its main language for managing data. Its structure, consisting of tables, rows, and columns to store information in an organized manner, makes it an ideal pair for building powerful and efficient web applications [4].

3. Result and Discussion

This research produced a website-based financial management application for Idhotun Nasyi'in Islamic Boarding School, which aims to automate the process from financial recording to reporting. This application was developed to overcome the constraints of the previous manual system using Microsoft Excel, such as the risk of data loss and input errors. This system is designed to make it easier for admins and treasurers to monitor cash flow in real-time. The developed application interface consists of several main features:

1. Login Page
   A secure gateway for registered users .
2. Dashboard
   An information center that presents a summary of income, expense data, and financial transaction graphs.
3. Data Management
   A menu to manage transaction category data, transaction data, bank accounts, and user data.
4. Reporting
   A feature to create reports that can be filtered by date range and downloaded in PDF format.

Application testing was carried out using the black box testing method, and the results showed that all features function well. Usability assessment using the System Usability Scale (SUS) filled out by 10 respondents obtained a score of 85.6%, which falls into the "Excellent" category. Furthermore, accuracy testing by comparing 140 transaction data points between the system and manual data showed an accuracy rate of 98.57%. These results prove that the developed application is capable of improving accuracy, efficiency, and transparency in the boarding school's financial management. The following is the interface for each feature on the website:

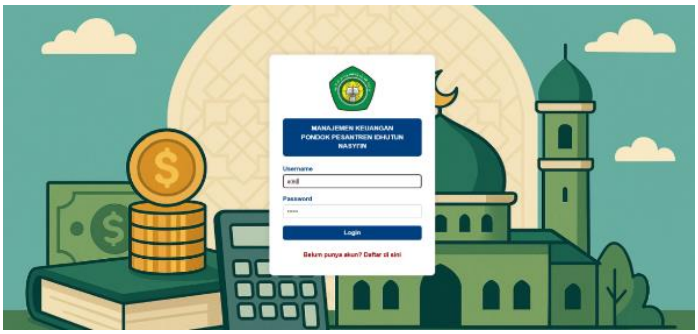

Fig. 7: Login Page

Fig. 8: Dashboard Page

Fig. 9: Category and Transaction Data Page

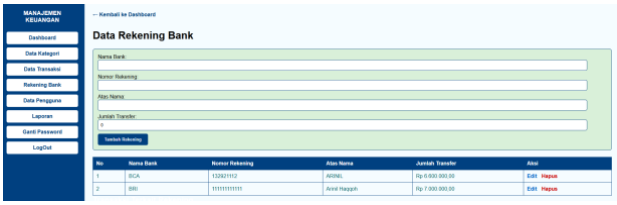

Fig. 10: Bank Account Page

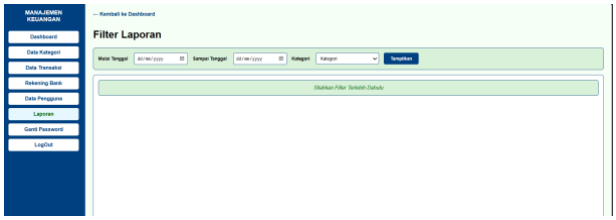

Fig. 11: Report Page

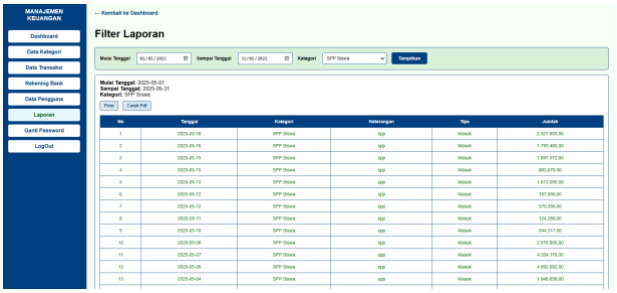

Fig. 12: Report Filter Feature

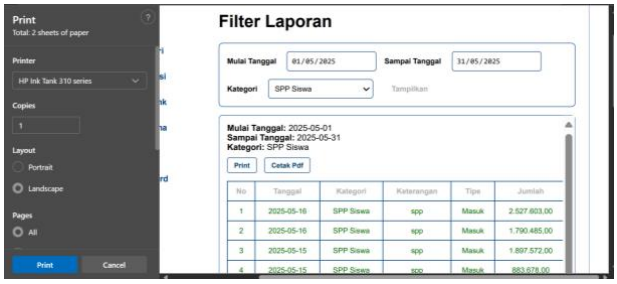

Fig. 13: Print Report Feature

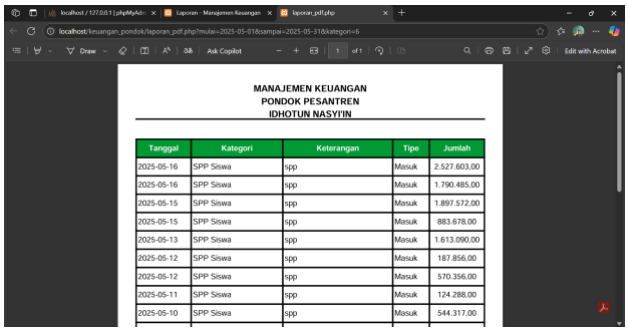

Fig. 14: Print Report Result Preview

4. Conclusion

Based on the research results, the web-based financial management application developed for Idhotun Nasyi'in Islamic Boarding School as a solution to manual recording errors can function well. This digital system is designed to be simple and efficient to improve the accuracy and transparency of fund management. Its main features include recording income and expenses, user management, and creating filterable PDF reports. With an intuitive and user-friendly interface, this application is easy to operate even by administrators with technical limitations, supported by training and guides. The System Usability Scale (SUS) results, filled out by 10 respondents, obtained a score of 85.6%, and accuracy testing with 140 transaction data points between the system and manual data showed an accuracy rate of 98.57%.

5. Suggestions

For future development, it is recommended to add an automatic notification feature for routine payments. A mobile application version also needs to be created to increase user flexibility and accessibility. In addition, data security can be strengthened with two-factor authentication. Support, continuous training, and integration with other systems at the boarding school are also very important to create an integrated information ecosystem.

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