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Case Study

Web-Based Education Development Contribution Payment Management Application at Islamic Junior High School YAPISMA

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Abstract
Education serves as a means for individuals to acquire both academic and non-academic knowledge, with institutions providing the environment for teaching and learning processes. Educational fees, such as the Education Development Contribution (SPP), are charged to individuals with the right to learn. However, many institutions, including the YAPISMA Islamic Junior High School, still manage these payments manually. The use of computer technology in data processing is essential to improve efficiency and accuracy. This research aims to develop a user-friendly web-based SPP payment management application for the YAPISMA Islamic Junior High School to enhance administrative processes and improve the quality of educational services and school financial management. The research methods include literature review, observation, and interviews with school administrative staff. The application development follows the Agile model, which encompasses the stages of initial planning, design, development, testing, implementation, review, deployment, and maintenance. The results of the study show that the web-based SPP payment system provides ease and efficiency in both payment processing and student data management, replacing manual methods and reducing errors in financial reporting. With the implementation of this application, significant improvements in administrative efficiency and the quality of educational services at the YAPISMA Islamic Junior High School are expected, and it could serve as a model for other schools.

Keywords: Computer technology; Efficiency; Payment; Web-based application.

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1. Introduction
Education is a means for every individual to acquire both academic and non-academic knowledge. In the field of education, institutions serve as a platform for carrying out the teaching and learning process. As this process is carried out, institutions impose education fees on individuals with the right to learn (Hidayat, 2024). With the advancement of technology, the use of computer technology has become increasingly important in optimizing data processing, whether for personal or institutional purposes.

The Education Development Contribution (SPP) refers to financial contributions aimed at supporting educational development within an educational institution (Manalu et al., n.d.). The main issue faced by

YAPISMA Islamic Junior High School is the use of manual recording methods in SPP payments, which require significant time and effort and are prone to errors. This highlights the need for a more efficient and accurate system to manage the financial administration process in educational institutions.

An information system is a set of organized procedures designed to collect, store, manage, and present information to various users within an organization or specific environment. The primary goal of an information system is to support decision-making processes, operational management, analysis, and monitoring within an organization (Firmansyah et al., 2024).

Although various information systems have been implemented in some schools, there are still shortcomings in terms of adapting technology to the specific context of each school. Many existing systems are either too complex or not user-friendly, making them difficult to implement effectively in schools with limited resources. Additionally, these systems often require high costs for implementation and maintenance, which poses a challenge for many small educational institutions. Therefore, there is a need for simpler and more affordable solutions that can be effectively implemented in schools like YAPISMA Islamic Junior High School.

This research proposes the development of a web-based SPP payment management application specifically designed to meet the needs of YAPISMA Islamic Junior High School. The application is expected to provide a more efficient, user-friendly, and affordable solution for managing SPP payments digitally. By utilizing this technology, the school can improve operational efficiency, reduce the risk of recording errors, and speed up administrative processes, ultimately enhancing the quality of educational services offered. The implementation of this application could also serve as a model for other schools in adopting information technology for their administrative management.

2. Literature Review

Basic Concepts and Technologies The development of a comprehensive software system involves several foundational concepts and technologies. This literature review examines various aspects including fundamental programming concepts, the role of PHP and JavaScript, the use of development environments like XAMPP and Visual Studio Code, and approaches to application testing and modeling.

Basic Programming Concepts Programming involves writing instructions in a programming language to execute tasks on a computer. Programs can be implemented across different types of software, from desktop applications to web-based platforms and system software. Understanding these basic concepts is essential for effective software development.

The Role of PHP PHP (Hypertext Preprocessor) is a widely-used server-side scripting language designed for web development. According to (Santoso, 2022), PHP processes scripts on the server, making it crucial for creating dynamic web pages and applications. It operates with servers like Apache and Nginx and is open-source, allowing for extensive customization and enhancement. PHP's flexibility and broad support make it a pivotal tool in web development.
The Role of JavaScript JavaScript, an interpretative and object-oriented language developed by Netscape, is integral for creating interactive and dynamic web applications (Syahputra, 2024). Unlike server-side languages, JavaScript runs on the client-side (browser), manipulating HTML and CSS to respond to user interactions. Its evolution to support server-side programming with Node.js further emphasizes its versatility and importance in modern web development.

Development environments like XAMPP and Visual Studio Code (VSC) play a significant role in the development process. XAMPP, as detailed by (Thamrin et al., 2023), provides a local server environment with Apache, MySQL, PHP, and Perl, enabling developers to build and test applications before deployment. VSC, developed by Microsoft, is a widely-used code editor known for its features and support for multiple programming languages (Kalua et al., 2024).Its lightweight design and extensibility make it an ideal tool for coding and debugging.

Testing is a critical aspect of software development. Black box testing focuses on evaluating a system's

functionality based on inputs and outputs without knowledge of its internal workings (Mustika, 2024).In contrast, white box testing examines the internal code and structure of the software to ensure correctness (Никаноров et al., 2018).

Unified Modeling Language (UML) provides standardized methods for documenting and designing software systems. UML includes various diagrams such as Use Case Diagrams, which describe interactions between users and the system; Class Diagrams, which represent system architecture; Activity Diagrams, which illustrate workflows; and Sequence Diagrams, which model interactions among objects in a specific sequence (Informasi et al., 2023).

Entity Relationship Diagrams (ERD) are essential for representing data models in databases. ERD illustrates entities, attributes, and relationships, with key types including One to One, One to Many, and Many to Many relationships (Farhan & Handayani, 2024). Logical Record Structure (LRS) further helps in modeling database systems using diagrams to represent record types and relationships (Nurkholifah et al., 2023).

3. Design

The data collection methods utilized in this study include observation, interviews, and literature review.
Observation was conducted to understand the SPP (school fees) payment process in the administrative office of SMPI YAPISMA. This technique provided insights into how the payment process operates, identified potential issues, and highlighted areas for improvement. By directly observing the procedures, the researcher was able to gain a detailed understanding of the current system's workflow and challenges.

Interviews were carried out with school administrative staff to gather their perspectives and experiences related to the SPP payment process. These interviews aimed to capture their expectations and insights regarding the implementation of a web-based application, providing valuable feedback on what features and functionalities might be most beneficial.
Additionally, a literature review was performed to support the research. This involved gathering and analyzing academic journals and references on web application development, SPP payment management, and information technology in education. The literature review provided a theoretical foundation and context for the study, helping to inform the development process and validate findings.

The Agile development model was chosen for developing the web-based SPP payment management application. Agile is a framework known for its iterative and incremental approach to software development, emphasizing collaboration and flexibility throughout the project lifecycle (Sopandi et al., 2024).

Initially, the project focused on planning by identifying core requirements and defining the key features needed for the application. This stage set the groundwork for the subsequent phases.

During the design phase, the application's structure was developed, including the user interface layout, database design, and the selection of appropriate technologies such as programming languages and frameworks.

The development phase followed, where the design was translated into a working application. This involved coding and assembling various modules and features according to the design specifications.

Testing was then carried out to ensure that the application's functionality met the requirements and integrated well with other components. This phase was crucial for verifying the system's performance and reliability.

Upon successful testing, the application was deployed to a production environment. This deployment phase marked the transition from development to making the application available for actual use.

After deployment, a review phase was implemented to gather user feedback and identify areas for further improvement. This step was important for assessing the application's effectiveness and user satisfaction.

Following the review, the application was officially launched to the public, completing the initial rollout. Ongoing maintenance was planned to monitor the application's performance, address any issues reported by users, and update the system as needed to fix bugs or introduce new features.

4. Results

The school fee payment application is designed to streamline the management of school fees through a structured interface that accommodates various user roles and functionalities.

Administrators have the ability to update student data, including making changes to existing student information. This feature ensures that student data remains accurate and up-to-date. Additionally, administrators can view student payment reports, which aid in monitoring and analyzing payment statuses and ensure that all transactions are properly recorded. Overall, the Admin Page is designed to provide comprehensive control and visibility over the school fee payment process, making it easier for administrators to manage data and reports efficiently.

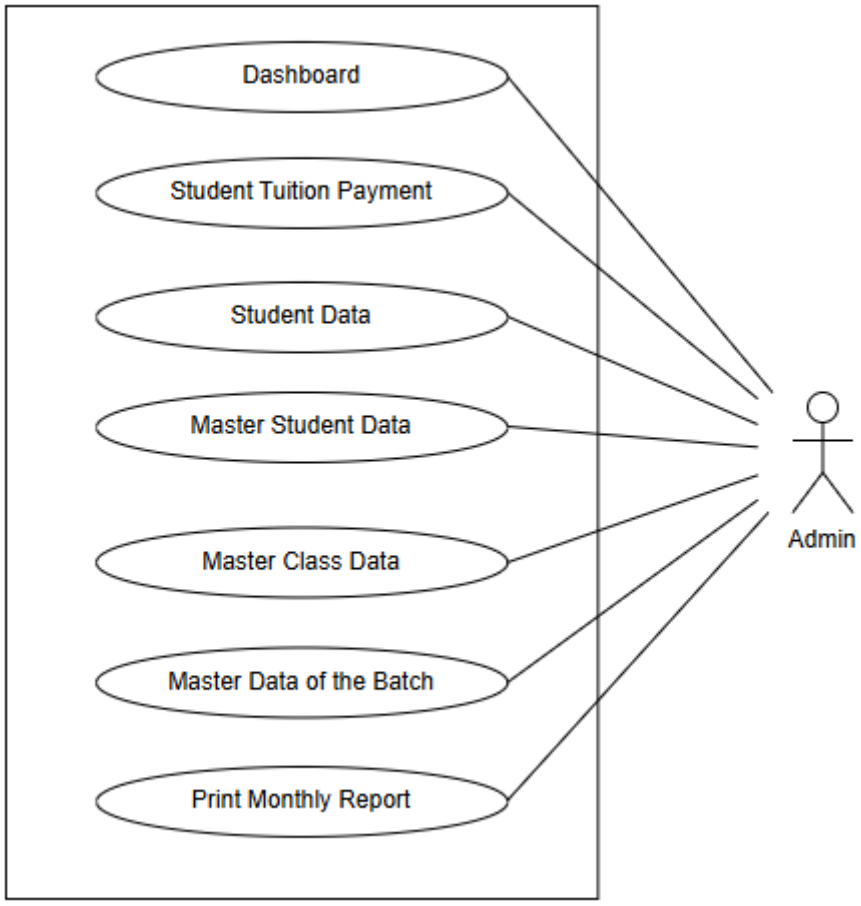

Figure 1. Usecase diagram of the payment admin

Database Design

The development of the school fee payment system requires several designs, including database design, software architecture design, and interface design for the system to be created.

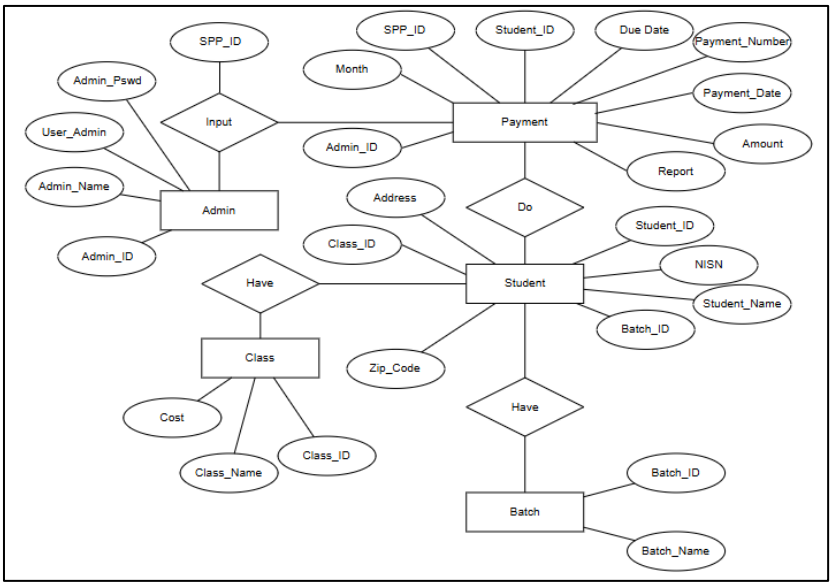

Figure 2. Entity Relationship Diagram

Activity Diagram

Activity diagrams offer a graphical representation of the various tasks and actions within a system or process. They assist stakeholders in visualizing, documenting, and evaluating the flow of activities, thereby facilitating a better understanding of the system's operations and processes.

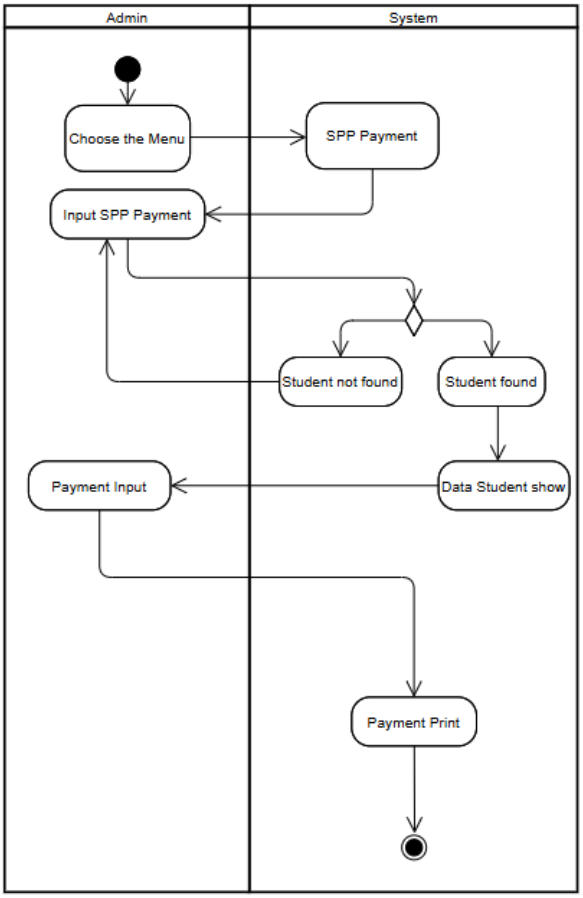

Figure 3. Payment Activity Diagram

The activity diagram for the payment process illustrates how the system handles payments, depicting the logic and flow involved. It shows how the system verifies whether a student is registered in the system and, if so, proceeds to generate a payment invoice to be provided to the student. This visual representation

helps in understanding the sequence of actions and decisions taken by the system during the payment process.

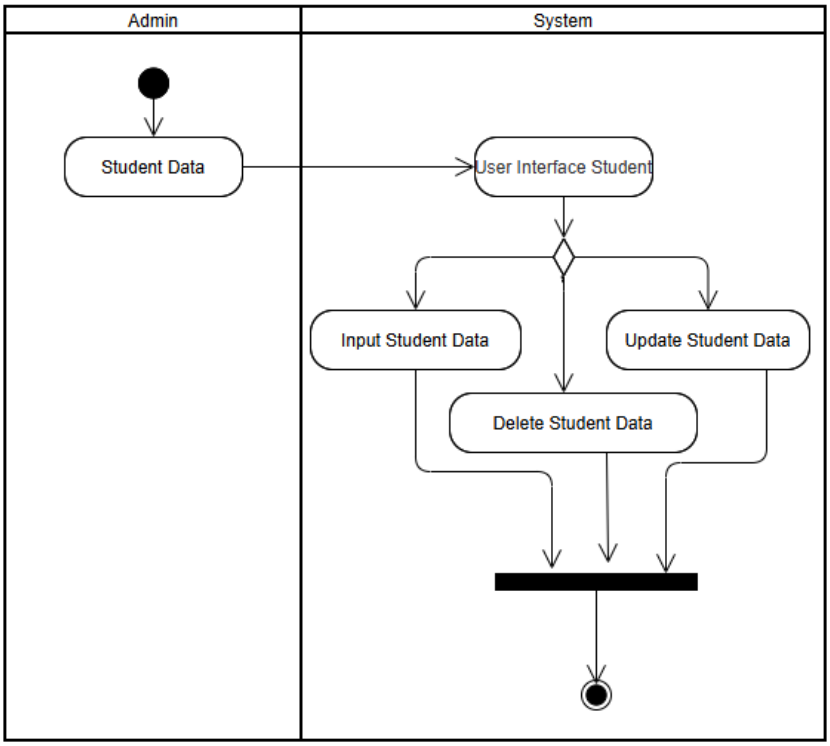

Figure 4. Student Data Management

The activity diagram for student data management is designed for use by administrators and illustrates how they can manage student information within the system. This diagram provides a visual representation of the processes involved in managing student data. It shows how administrators can input new student records into the system, delete existing records, and update or modify existing student information. By following this diagram, administrators can ensure that student data is accurately maintained and managed, facilitating efficient and effective data management operations.

5. Discussion

a) User Interface Design

User Interface Design (UI Design) is the process of designing the interface for software or applications to ensure that it is easy to use and effectively meets the needs of the users. UI Design focuses on the visual and interactive aspects of the interface that directly interact with the user. The goal is to create an intuitive and efficient.

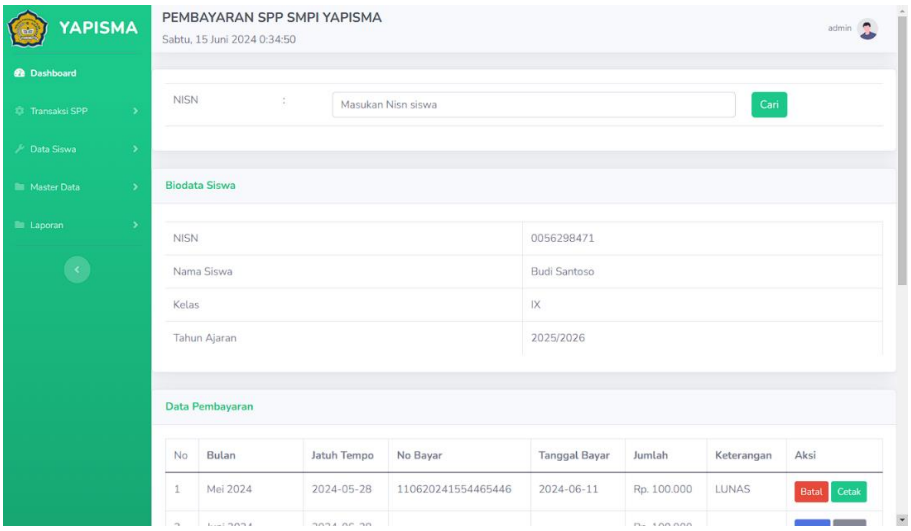

Figure 5. Payment Page

The transaction page is used for processing school fee payments. The process begins by searching for the student using their NISN (student identification number) in the search bar. If the entered NISN is correct, the student's biodata will be displayed. However, if the NISN is incorrect, a message stating "Data not found" will appear. Once the student's data is correctly displayed, there are two buttons available: "Pay" and "Holiday." The "Pay" button is used to process the school fee payment. After the payment is completed, the status will change to "PAID." The "Holiday" button is used to record months of holidays, such as year-end vacations. Once the payment is processed, the action column will change to show two buttons: "Cancel" and "Print." The "Cancel" button is used to cancel the payment, while the "Print" button is used to print the payment receipt for the student.

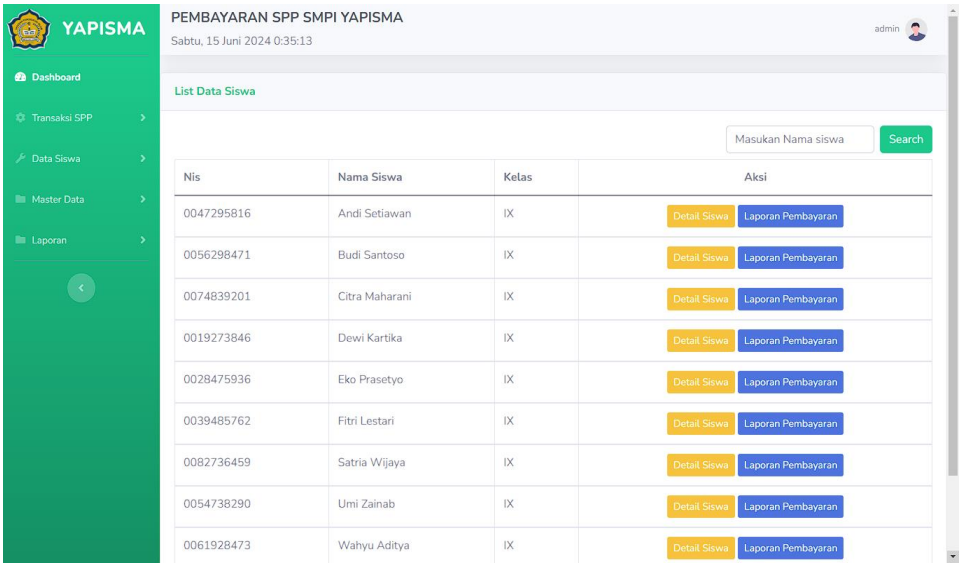

Figure 6. Student Data Page

b) Hardware and Software Specifications

Tabel 1. Hardware and Software Specifications

Kebutuhan	Keterangan
Operating System	Windows 10 64-bit
Processor	AMD Ryzen 5 3500U
***Installed Memory* (RAM)**	8GB RAM
SSD	256GB
Web Browser	*Google Chrome, Mozila Firefox*
programming language	PHP, Java Script
Code Editor	*Visual Studio Code*
Modul Server	PHP MyAdmin
Server Web	XAMPP
Database	Mysql

These hardware and software specifications collectively ensure the efficient operation, security, and reliability of the school fee payment system, enabling administrators to interact with the system effectively.

6. Conclusion

It is concluded that the school fee payment system is designed to facilitate the payment and record-keeping of students' fees, replacing the old method that relied on manual bookkeeping. The application offers faster time efficiency and aids in managing school fee payments. Additionally, the web-based school fee payment application helps reduce errors in financial report generation.

Several improvements are recommended for the development of the school fee management system, including adding features such as SMS integration or notifications to parents, and enabling online payments through mobile banking or e-wallets to simplify the payment process. It is also advised to enhance data security by implementing higher information security standards, such as data encryption to protect student information. Furthermore, improving the user interface with a more intuitive and user-friendly design is essential to enhance the user experience.

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