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Design of a Web-Based Tuition Fee Payment System with Payment Gateway (Case Study of SMA Negeri 1 Sosorgadong)

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Abstract

This research aims to design and develop a web-based tuition fee payment information system integrated with the Midtrans payment gateway at SMA Negeri 1 Sosorgadong. This system is designed to replace the manual payment process, which consumes a lot of time and effort, and is prone to errors in payment recording. With the implementation of this web-based system, it is expected to improve efficiency, reduce administrative errors, and make payment access easier for students or parents/guardians. The system is built using PHP with the CodeIgniter 4 (CI4) framework and MySQL as the database, and integrates the Midtrans payment gateway through the Snap method, which allows payments through various methods such as credit cards, bank transfers, and e-wallets. The result of this research is an application that facilitates online SPP payments with automatic digital payment receipts, making it easier for the school to manage payment data and generate financial reports in real-time. The system testing is conducted using the black-box testing method to ensure that all features work properly and meet user requirements. With the implementation of this system, it is hoped that the SPP payment process at SMA Negeri 1 Sosorgadong will become more efficient, transparent, and provide convenience for students, parents, and the school in managing financial administration.

Keywords

Information System, SPP Payment, Web, Payment Gateway, Midtrans, CodeIgniter 4, PHP, MySQL, Snap, Payment Automation, Financial Administration.

Introduction

With the rapid development of information technology, the school tuition fee (SPP) payment system in Indonesia, including at SMA Negeri 1 Sosorgadong, still relies on a manual system using physical payment cards paid directly at the cashier. This system causes several issues, such as lost payment cards, difficulties in payment verification, and confusion among parents

regarding payment status, billing, and due dates. Previous research shows that reliance on physical verification leads to errors and delays in administration.

Additionally, the treasurer's absence, who is responsible for offline SPP payments, worsens the situation as payments are entrusted to administrative staff who do not have direct access to transaction records. Without complete documentation, transactions are often poorly recorded, hindering payment tracking and financial management. The manual system also lacks transparency, with many transactions being lost or not properly recorded, causing misunderstandings between parents and the school.

To address these issues, an online SPP payment system integrated with a payment gateway is needed, allowing payments anytime and anywhere. This system will automatically record transactions, provide real-time notification features, and improve financial administration transparency. With this system, the payment process and SPP management are expected to be simplified and more efficient, reducing confusion regarding billing and arrears that need to be paid on time.

Methodology

The research method applied in this study is the Waterfall method.

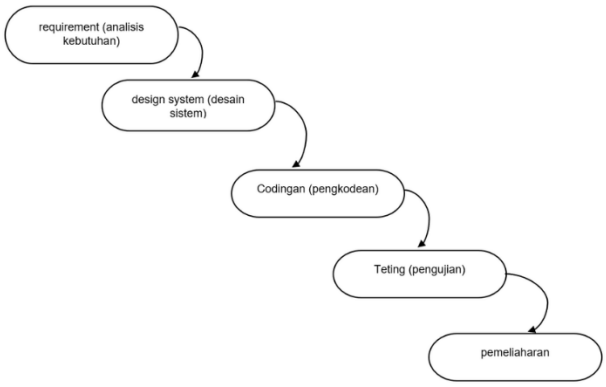

Figure 1. Waterfall

The Waterfall method is a traditional and structured software development methodology. It is a linear and sequential approach, where each phase of development is completed before the next phase begins. The methodology is called "Waterfall" because it flows downward through phases, like a waterfall, without going back to previous stages. Here's a brief overview of its phases:

a) Requirements Gathering
   This phase involves gathering all the system and user requirements before any design or development work begins. The goal is to understand exactly what the users need from the system.
b) System Design
   Once the requirements are understood, the system's architecture is designed. This includes both high-level design (overall system structure) and detailed design (designing specific components of the system).
c) Implementation

In this phase, the actual code for the system is written based on the design specifications created earlier. Developers build the software components and integrate them.

d) Verification (Testing)
After the software is built, it is tested to ensure that it meets the original requirements. This includes functional testing, integration testing, and system testing. If defects are found, they must be fixed before moving on.

e) Deployment (Release)
Once the system has been tested and validated, it is deployed to the production environment for use by the end-users.

f) Maintenance
After the system is deployed, maintenance begins. This includes fixing bugs, updating the system, or making improvements based on feedback. The system may require patches or new versions to maintain its functionality.

Findings

1.1. System Design Analysis

System design analysis refers to the process of evaluating the architecture, components, and processes of a system to ensure that it meets the defined requirements and objectives. This phase plays a crucial role in shaping how the system will function once it is implemented. It involves making decisions about how to structure the system, what technologies to use, and how components will interact to ensure efficiency, scalability, and user satisfaction.

1.2. Use Case Diagram

A use case shows the interaction relationships between actors and use cases within a system, aiming to determine how actors interact with the system.

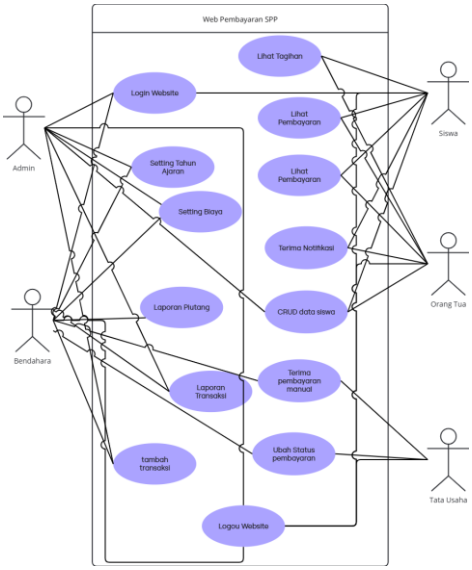

Figure 2 Usecase Diagram

No.	Actor	Description
1	Admin	An actor with user level 1 or full access rights to all features designed and created in the system.
2	Treasurer	An actor with user level 1 or specific access rights to certain features designed and created in the system.
3	Officer	An actor with user level 2 or specific access rights to certain features designed and created in the system.
4	Student	An actor with user level 3 or specific access rights to certain features designed and created in the system.
5	Parent	An actor with user level 3 or specific access rights to certain features designed and created in the system.

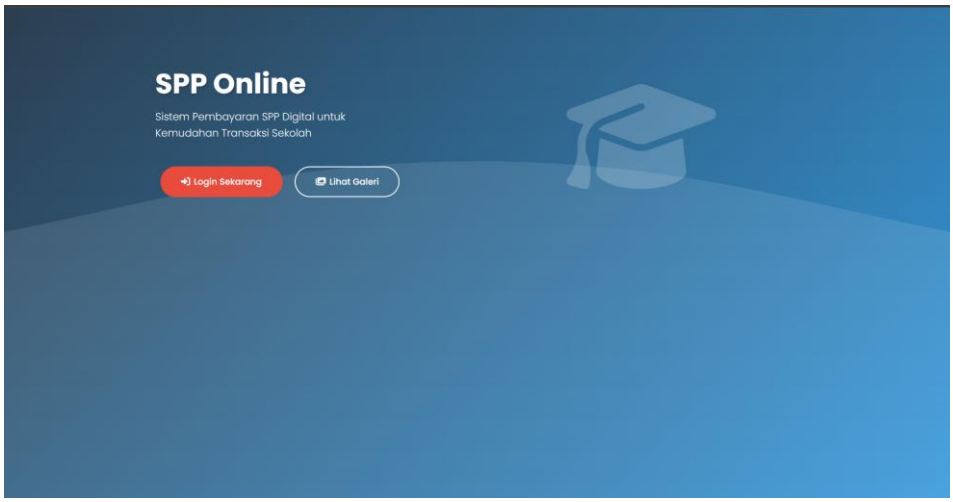

Figure 3 Landing Page

A landing page is a web page that serves as the entry point for visitors, typically designed with a specific goal in mind, such as capturing leads, promoting a product, or encouraging a specific action. Unlike a homepage that provides a broad overview of a website, a landing page is focused, targeted, and designed to drive visitors toward completing a particular goal.

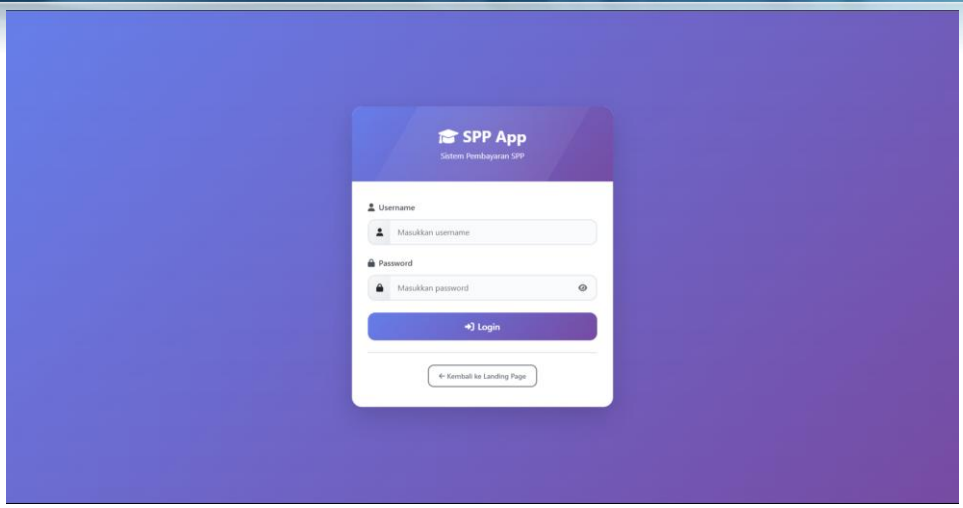

Figure 4 Login Page

A **login page** is a web page where users enter their credentials (such as a username and password) to access a secure area of a website or application. It acts as a gateway to protected content and services, ensuring that only authorized users can access certain resources. Login pages are typically found on websites or apps that require user authentication before granting access to private or sensitive data.

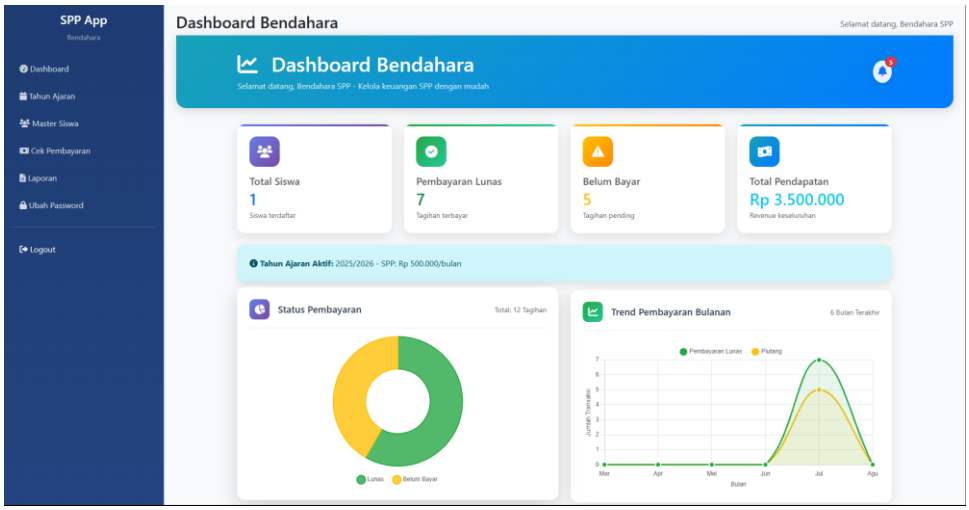

Figure 5 Dashboard

A dashboard is a user interface that visually presents key data and metrics in an easily digestible format, typically through charts, graphs, tables, and other visual elements. Dashboards are used in various contexts, from business analytics to system monitoring, and they are designed to provide a high-level overview of important information that helps users make informed decisions quickly.

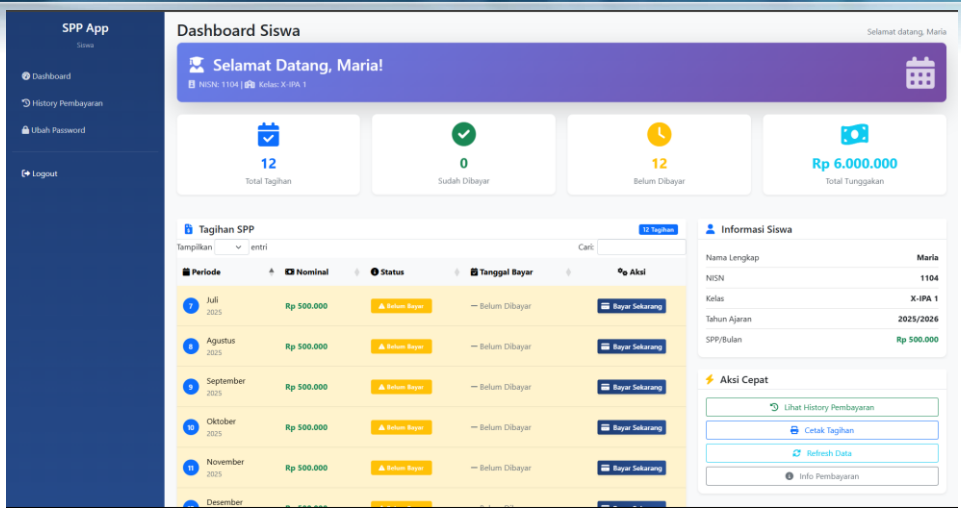

Figure 6 Billing Page

A Billing Page is a page on a website or application that displays information related to the bills that need to be paid by the user. This page is typically used by customers, service users, or members to view the status of their payments, bill details, and other payment-related information.

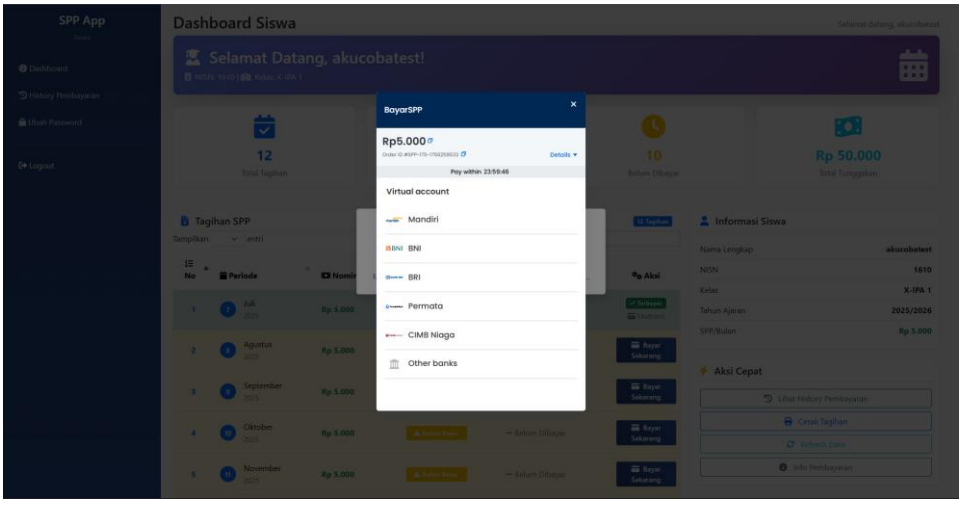

Figure 7 Payment Page

A Payment Page is a web page designed for users to complete their payment transactions for products or services. It is often integrated with various payment gateways and provides a secure and straightforward process for users to finalize their purchases or settle outstanding bills.

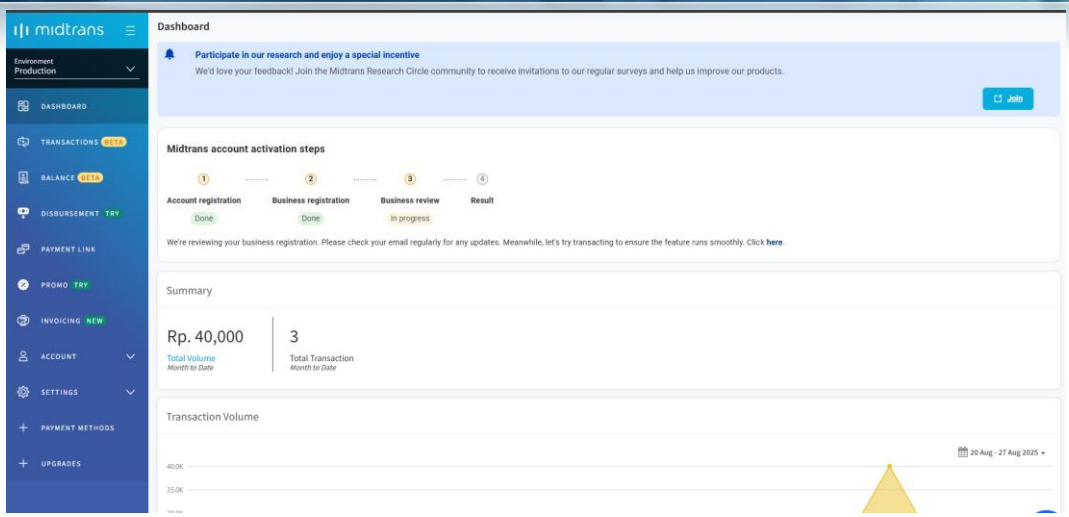

Figure 8 Payment Gateway Page

A Payment Gateway Page is a crucial part of an online transaction process that allows users to securely complete their payments through third-party services. This page serves as an interface between the merchant's website or application and the payment processor (e.g., PayPal, Stripe, Midtrans, etc.), enabling users to pay for products or services using different payment methods like credit/debit cards, e-wallets, or bank transfers.

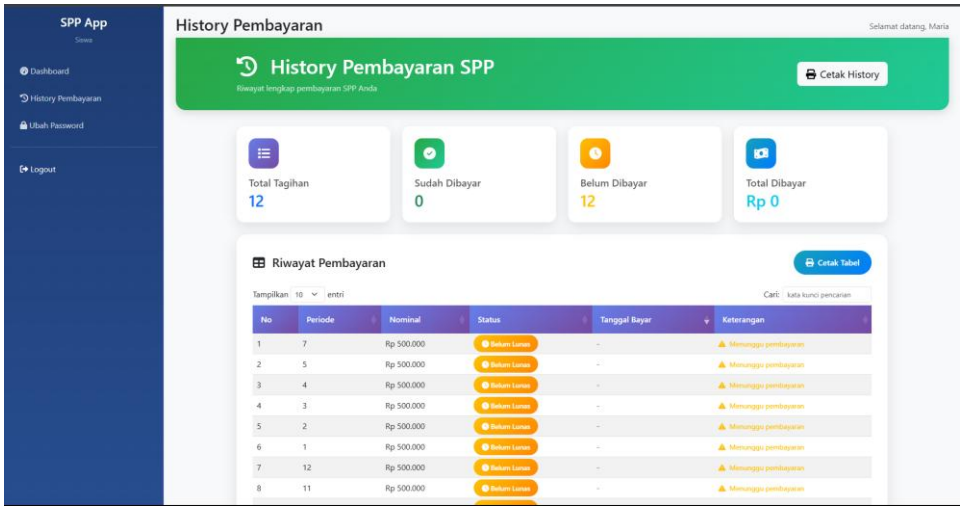

Figure 9 payment History Page

A **Payment History Page** is a page in a website or application that allows users to view a record of all their past transactions and payments. This page is useful for customers, clients, or users who want to track their payment history, check the status of past transactions, or view any receipts or invoices for completed payments.

Conclusion

Based on the research and development of the web-based school fee payment system with Midtrans payment gateway integration at SMA Negeri 1 Sosorgadong, it can be concluded that all stages of the system development were successfully completed and met the intended

objectives. The process, starting with needs analysis, system design, implementation, and testing, demonstrates that the system operates efficiently, effectively, and securely. The use of Midtrans as the payment gateway offers a modern, flexible solution that is easily accessible to students, parents, and the school. Payment methods supported, such as credit cards, bank transfers, and e-wallets, provide users with various options for online payment.

The system effectively replaced the manual payment process, which previously consumed a lot of time, effort, and was prone to errors. With this web-based system, all parties involved in the school fee payment process can enjoy convenience and comfort. Additionally, the integration with Midtrans enables fast, secure transactions and provides digital payment receipts that are accessible anytime. The system also facilitates the school in managing and monitoring fee payments in real-time, making it easier to compile financial reports with transparency and accuracy.

Testing with black-box methodology confirmed that all features functioned as expected, and the system performed well on various devices and platforms. The system is ready for full production use by SMA Negeri 1 Sosorgadong. With ongoing maintenance and improvements, the system has significant potential for future development. Possible future enhancements include automatic payment notifications, integration with the school's academic system, and support for additional flexible payment methods. Overall, this system significantly improves operational efficiency and provides convenience for students and parents while supporting transparency and accuracy in financial reporting.

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