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# Design of a Cashier Application System for Use in Vehicle Spare Parts UMKM Based on Cloud Computing

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**Abstract**

This research aims to design and implement a Cloud computing-based cashier application system specifically designed to support UMKM operational systems in the vehicle spare parts sector. A system is a unit consisting of components or elements that are connected together to facilitate the flow of information, material or energy to achieve a goal. This system is expected to be able to increase the efficiency of transaction management, inventory and sales reports, as well as make it easier to access data in real time. Apart from that, this research also aims to make it easier for UMKMs to run their business. Cloud computing is part of the supporting media system that can be used to attract the interest of UMKM entrepreneurs, this can make it easier for them to become complex. Cloud computing is providing computing resources such as servers, data storage, networks and software via the Internet. Cloud computing, also called Cloud computing, is a combination of the use of computer technology ("Computing") and Internet-based development ("Cloud"). The result of this media is that UMKMs are increasingly developing and are motivated to always be active in an increasingly advanced and developing world.

***Keywords***: *System, Application System and Cloud Computing..*

## 1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in national economic growth. In Indonesia, the MSME sector encompasses the majority of businesses, including those engaged in the sale of vehicle spare parts. However, many of these MSMEs still manage transactions and bookkeeping manually, using simple applications without an integrated system. This can potentially lead to various problems, such as recording errors, difficulty tracking inventory, and the lack of accurate and timely financial reports. In today's digital era, the need for efficient and easy-to-use information systems is increasing, especially for MSMEs. One solution is the use of a cloud-based cashier application system. Cloud computing technology allows data to be stored and accessed online, allowing business owners to monitor transactions and inventory in real time from various devices and locations. Furthermore, this system also provides easy data backup, integration with cashier hardware, and ease of application updates without disrupting operations.

Cloud computing is a new paradigm that offers high-performance computing systems that are easily accessible to users and can be customized to their needs. In this context, cloud computing is a recent innovation that can improve work efficiency by providing secure data storage and assisting in the management of files and data.[1]

## 2. Theoritical Basic

### 2.1. Cashier Application System

A cashier application system is software designed to assist in the digital sales transaction process for goods or services. These applications are commonly used in retail stores, restaurants, and MSMEs to record transactions, calculate total purchases, print receipts, and perform financial reporting. Modern cashier systems are also integrated with stock management, sales tracking, and digital payment methods [2]

### 2.2. Micro, Small, and Medium Enterprises

Micro, Small, and Medium Enterprises (MSMEs) are productive businesses run by individuals, groups, households, or small businesses that meet micro-enterprise standards. Therefore, it can be concluded that MSMEs are businesses managed by people from the lower to upper middle class. Micro-enterprises are businesses managed by small families or individuals with limited resources. Furthermore, the definition of MSMEs was created through Law No. 9 of 1999 and due to increasingly dynamic developments, it was changed to Law No. 20 Article 1 of 2008 concerning Micro, Small and Medium Enterprises. [3]

### 2.3. Cloud Computing

Cloud computing technology has been able to overcome problems and provide service solutions. Cloud computing has become a solution and service, both to increase reliability, reduce computing costs, and provide strategic opportunities for health institutions to gain profits from the use of this technology Some of the advantages obtained from the perspective of cloud computing users are on-demand capacity, low cost of ownership, and flexible pricing, generating strong interest for investment from industry and government and also increasing in organizations and individuals, while from the perspective of cloud providers, the advantages include resource consolidation, uniform management, and effective operational costs. [4]

Cloud computing combines the use of network technology with internet-based development. Globally, cloud computing offers cost savings, increased storage capacity, ease of automation, flexibility, and enhanced data security. With its numerous benefits, cloud computing will undoubtedly be invaluable in the education sector. The ever-evolving nature of information technology offers innovative, dynamic, and economically beneficial solutions. It can address all the problems and challenges facing education. Cloud computing is transforming the way information technology services are provided and distributed, enabling educational institutions to easily access a wide range of educational and scientific information. Higher education institutions are expected to achieve optimal performance through the use of information technology. [5]

Cloud computing is a technology that can help solve the problem of limited bandwidth and storage space. This technology combines basic economic principles with the allocation of computing resources. Cloud computing systems work by utilizing cloud servers and data storage systems in a physical location, but they are more virtual because they can be accessed from client computers. [6]

Cloud computing is a computing model in which processing, storage, software, and other services are provided as integrated virtual resources over a network, usually the Internet (Loudon and Loudon, 2012). Cloud computing resources can be accessed on demand from any device and any location connected to the Internet. [7]

Cloud computing is one of the technological developments currently widely used in digitalization. The use of digital-based information technology is now widespread, including in education, especially for teaching staff such as teachers and lecturers. This is a necessity for their activities, such as data processing, delivering materials, assigning assignments, and other activities. [8]

Cloud computing is a technology that uses the internet as a central server for managing user data and applications. Cloud computing makes it easier for users to run programs without having to install them first and allows them to access data and information via the internet. [9]

Cloud computing is a model for delivering computing services over a network, typically the Internet, that allows on-demand access to a variety of computing resources such as servers, storage, applications, and other services without requiring direct user management. This concept is an evolution of traditional computing models that rely on physical infrastructure and on-premises hardware. [10]

## 3. Analysis and Design

### 3.1. Research Framework

Based on these problems, the requirements analysis phase details functional requirements including real-time transaction recording features, stock management with automatic notifications, and periodic sales report generation as well as non-functional requirements such as system response time, data confidentiality assurance, and the ability of a multi-tenant model to separate data between MSMEs. The system design phase then formalizes the cloud architecture with Laravel as the backend framework, compiles isolated database schemas per tenant, designs intuitive user interface mock-ups, and establishes authentication, authorization, and end-to-end data encryption mechanisms.

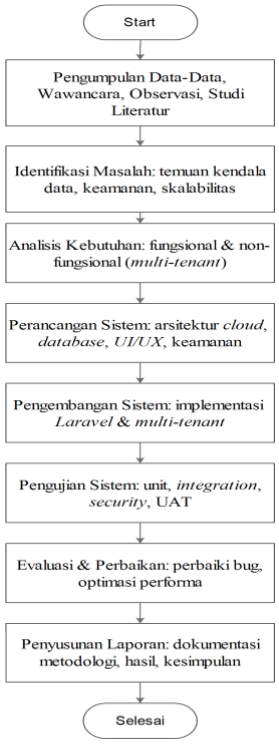


**Fig. 1:** Research Flow

The test results then enter the evaluation and improvement phase, where user feedback and bug findings are addressed through code

fixes, performance enhancements, and the development of technical documentation for the changes. Finally, in the report preparation phase, the entire methodology, development results, test findings, discussions, conclusions, and recommendations are comprehensively compiled before reaching the final stage. With this flow, the research is presented systematically and structured, ensuring each step is measurable to create an efficient, secure, and scalable cloud cashier application to support the growth of MSMEs in the automotive spare parts industry.

## 3.2 Problem Analysis

Before designing a new system, it's crucial to analyze the existing system (if any) to identify its strengths, weaknesses, and potential challenges for both users and the system itself. Existing systems often have shortcomings that can impact operational efficiency, such as slow transaction processing, errors in inventory recording, or difficulties with financial reporting. These manual systems typically require extensive user input, are prone to human error, and are inefficient in terms of maintenance and scalability. Desktop-based or Excel-based systems are also common, but the stored data is often vulnerable to loss and difficult to search or analyze. The following are common weaknesses of conventional, offline, cash register systems:

1. Limited Access
   Existing systems are often limited to a single device or location. This hinders flexibility in day-to-day operations, especially when there is more than one store location or if remote monitoring is required.
2. Difficulty in Maintenance
   Existing systems are often more difficult to update or maintain. Updates must be performed manually, which increases the potential risk of errors and impacts system availability.
3. Security Issues
   Many existing systems lack adequate protection for sensitive data, such as customer or transaction information. They lack encryption or robust access controls.
4. Limited Scalability
   Existing systems are unable to scale to meet the growing needs of MSMEs. Typically, as transaction volume increases, the system becomes slower and cannot adequately handle data surges.

## 3.3 Process Plan

A process design is a design that describes the system to be built. This process design can be used to determine the form of the system to be created. This process design will be created using UML and begins with the creation of a use case diagram.

1. Use Case Diagram

This Use Case Diagram shows the sequence of activities a user can perform, including opening the application, entering data, and processing the data to produce information. The diagram is shown below:


**Fig. 2:** *Use Case Diagram*

2. *Class Diagram*

*Class diagrams are used to display several classes and packages within the system/software being developed. Class diagrams provide a static diagram of the system/software and its relationships. Because the system is built using the tenancy concept, there are two domain levels within the system: the central domain and the tenant domain. Therefore, there are two forms of class diagrams. The following is a central domain class diagram for the system being built, as shown in the image below:*

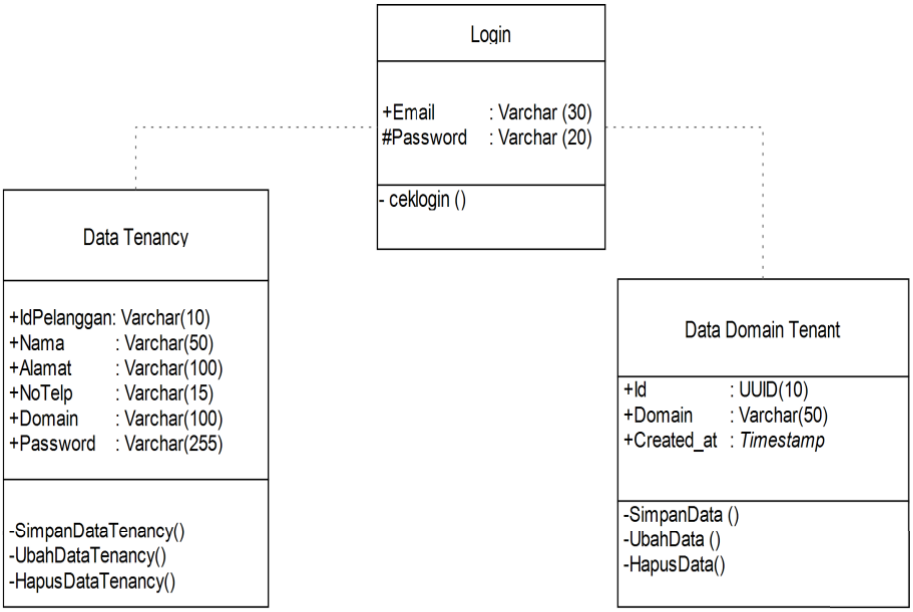


**Fig. 3:** *Class Diagram Domain Central*

## 4. Result and Discussion

### 4.1. Domain Central Interface Access Page

The Domain Central interface access page describes the initial displays that serve as the gateway for users to interact with the Domain Central system. This section includes a discussion of the homepage, which serves as a welcome page and provides initial information; the registration page, which allows new users (MSME owners) to register and create tenancy accounts; and the login page, which serves as the point for registered users (MSME owners and service administrators) to access their respective dashboards. These access pages are crucial in guiding users from unregistered or logged-in status to gaining full access to the features provided by Domain Central.

1. Homepage Appearance

The homepage serves as the main gateway or homepage of the cloud cashier application. This is the first view that potential users, visitors, or users who are not yet logged in will see. Below is a screenshot of the homepage.

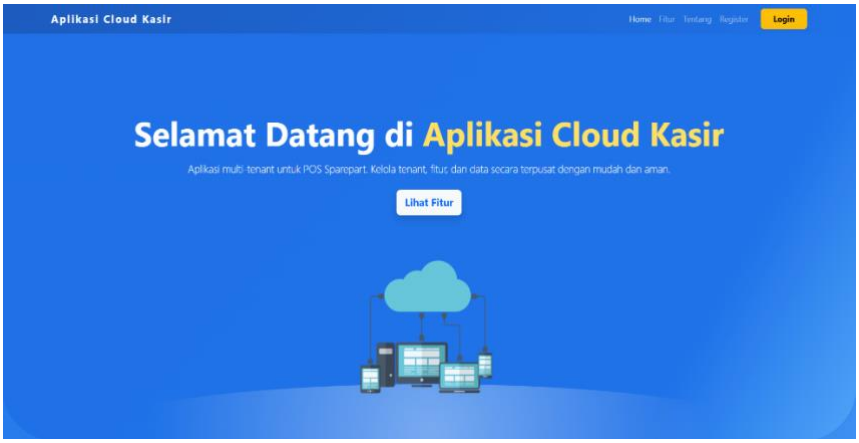


**Fig. 4:** *Homepage*

2. Tampilan Halaman Register

Halaman ini berfungsi sebagai titik di mana *Owner* atau pemilik UMKM dapat membuat akun *tenancy* baru di dalam sistem *multi tenant*. Berikut adalah tampilan dari halaman register.

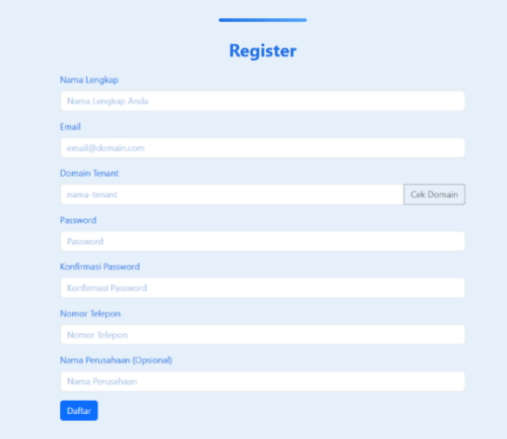


**Fig. 5:** Register Page

3. Login Page View

Based on the activity diagram, this login page is likely used by at least two primary user types: Owners (MSME owners) to access their tenancy dashboard, and service administrators to access the central administration dashboard. There may also be a separate login point, or the same login point but leading to a different dashboard, for cashiers who will use the POS application at the MSME level, although the owner/admin diagram indicates a centralized login. On the login page, users are prompted to enter their credentials, typically an email address and password that match their registered data. Below is a screenshot of the login page.

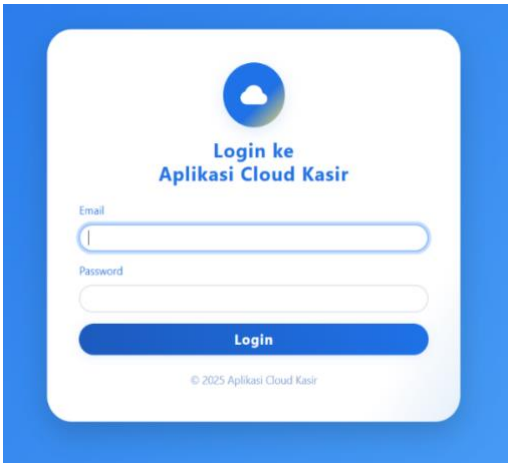


**Fig. 6:** Login Page View

4. User/Owner Dashboard Page View

The User Dashboard page, or in this context, more specifically the tenancy dashboard accessed by the owner (MSME owner), serves as the main control center after the owner successfully logs in to the central domain system. This page presents a summary of important information relevant to their MSME tenancy or account within the cloud cashier application platform. This dashboard display includes widgets or panels that display tenancy status, important announcements from the service provider, or shortcuts to their account management features. Below is a view of the owner dashboard page.

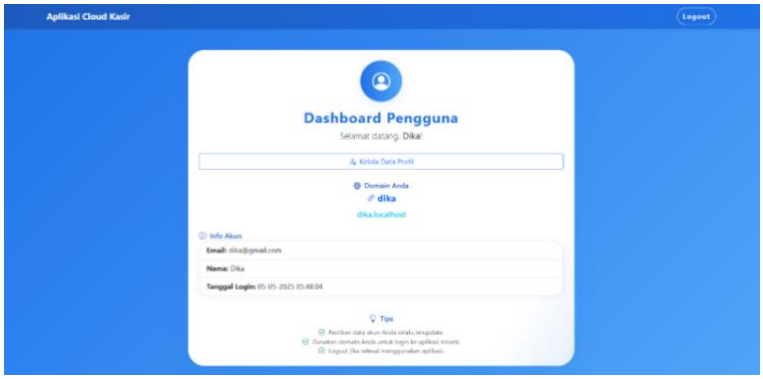


**Fig. 7:** User/Owner Dashboard Page View

## 5. Admin Dashboard Page View

The Admin Dashboard page is a dedicated interface designed for service administrators after successfully logging into the central domain system. Unlike the user dashboard, the admin dashboard provides a broader system-wide view and control, encompassing all registered tenants. This page displays insights or summaries of the overall system health, such as the total number of active tenants, aggregated cloud resource usage statistics, critical activity logs, and notifications related to server status and security.

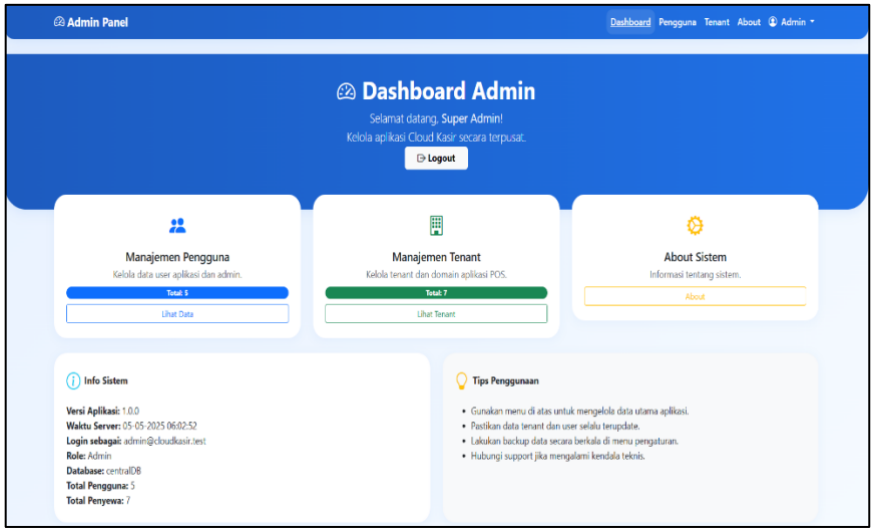


**Fig. 8:** Admin Dashboard Page View

### 4.2 Tenant Interface Page (UI/UX)

A cloud-based cashier application for MSMEs selling automotive spare parts must have a simple, responsive, and easy-to-use interface for both cashiers and administrators. The designed interface must support ease of transaction recording, product data management, and customer management, thereby minimizing operational errors and speeding up the in-store service process.

1. Login Page

The login page is the main gateway for users to access the cloud-based cashier application system. On this page, users are required to enter a username and password, and select a tenant (the MSME they are registered with) to authenticate themselves into the system. The login form consists of input fields for the username and password, as well as a login button to process authentication. Additionally, additional features, such as a forgotten password, are available to assist users experiencing difficulties accessing their accounts. This login system ensures greater data security, as each MSME tenant will have its own data space within the cloud-based multi-tenant system, and only verified users will be able to access the application's features. The following is a design for the login page:

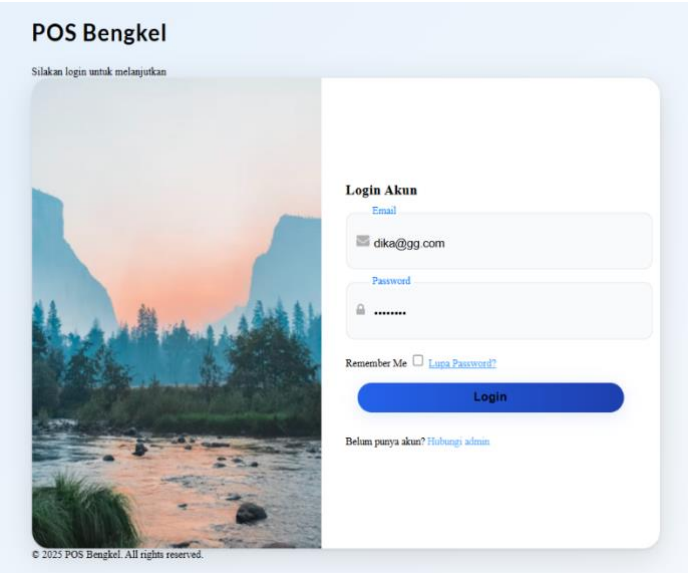


**Fig. 9:** Login Page Design

2. Dashboard Page

The dashboard page is the main display users will see after successfully logging into the cashier application system. The dashboard serves as an information center that displays a summary of important data and provides quick access to the application's main features. The dashboard menu layout is as follows:

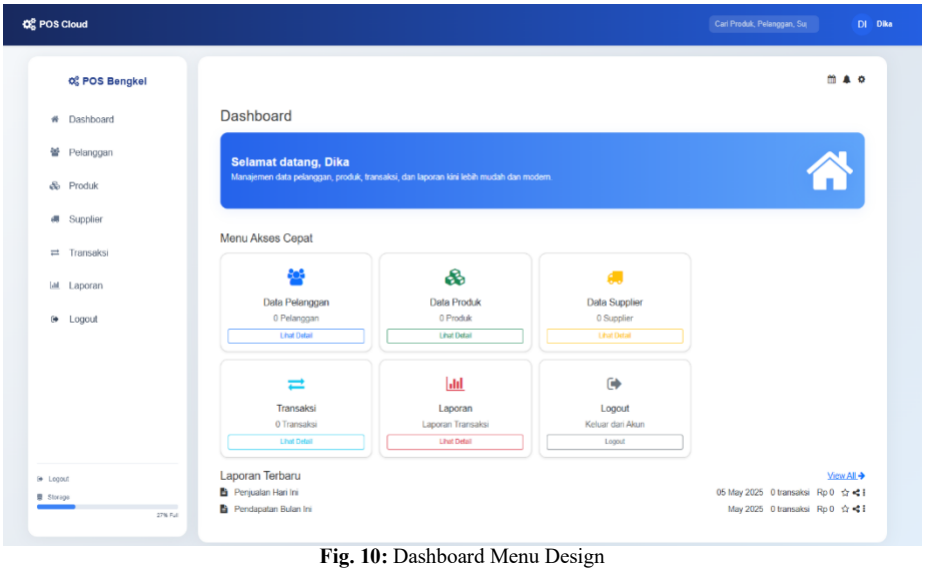


**Fig. 10:** Dashboard Menu Design

3. Product Data Page

The product data page manages all vehicle spare part product information available in the store. On this page, users with admin access can add, edit, and delete product data directly through the cloud-based system. On this page, users with admin access can:

a. Add new items by filling in details such as the spare part name, code or barcode, category, purchase price, selling price, and initial stock, then save the data directly to the cloud database.
b. Edit product data by updating product information (e.g., changing the price or description) through the edit form, so changes are recorded in real time in the system.
c. Delete items by removing items that are no longer for sale with a single click, and the system will automatically adjust stock and transaction history.

All CRUD (Create, Read, Update, Delete) operations are executed through a responsive interface integrated with a cloud backend, so your spare part data is always up-to-date, secure, and accessible anytime, anywhere.

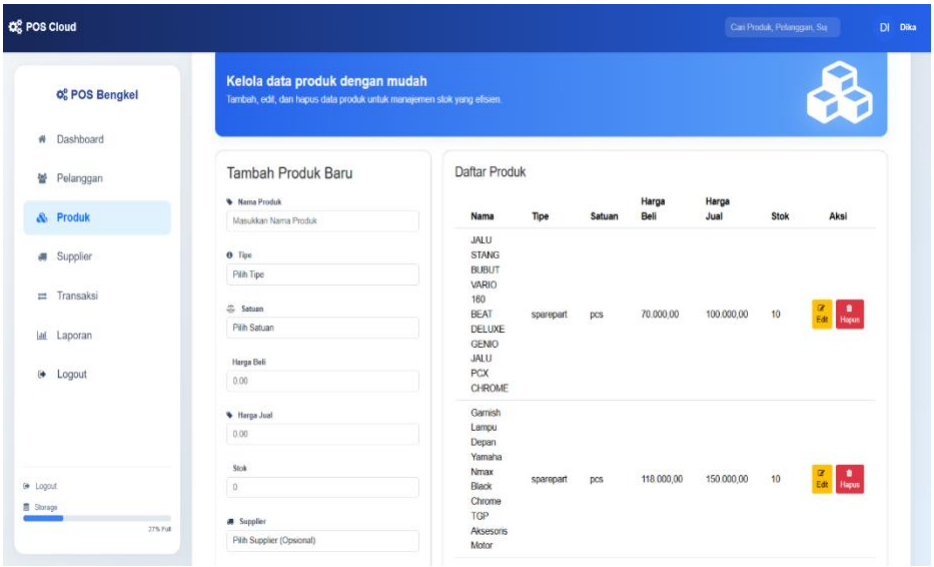


**Fig. 11:** Product Data Page Design

4. Supplier Data Page

The supplier data page records and manages information on all vehicle spare part suppliers partnering with the store. Organized supplier data allows the store to easily reorder products, communicate, and maintain good relationships with suppliers. With supplier data stored digitally and cloud-based, administrative processes are faster, more accurate, and more secure. Each MSME tenant can manage their own supplier list without interfering with other tenants, thanks to the multi-tenant concept implemented in this system.

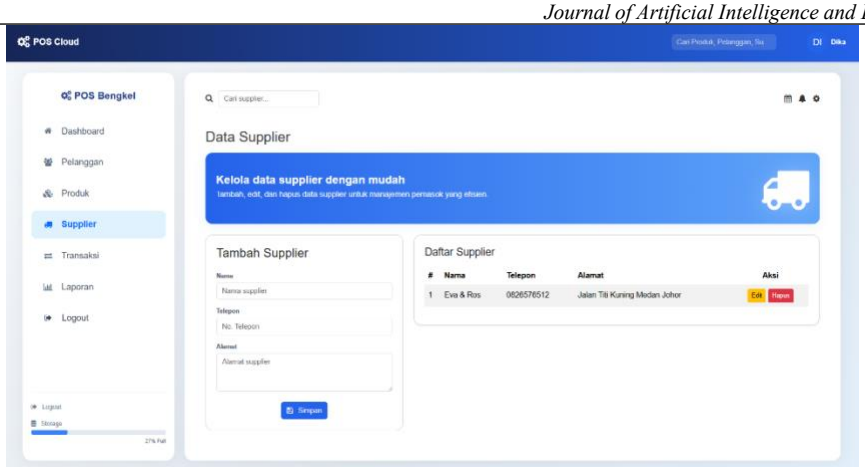


**Fig. 12:** Supplier Data Page

5. Customer Data Page

The customer data page is used to store and manage information about customers who make transactions at the store. With organized customer data, the store can provide more personalized service, track purchase history, and streamline communication for promotions or after-sales service. This page is designed with a table displaying the entire list of customers registered with the store. Admins can search or filter data by name, phone number, or address to simplify customer data management. There are also options for adding new customer data, editing customer data, and deleting irrelevant customer data.

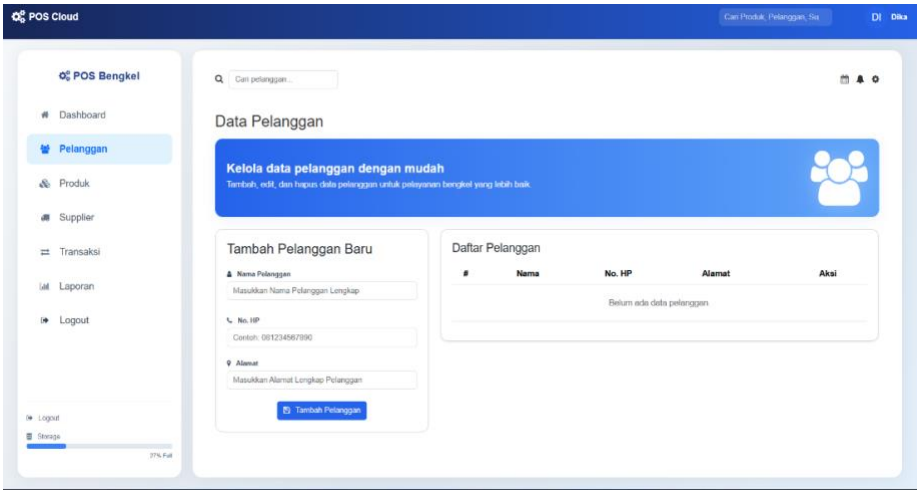


**Fig. 13:** Customer Data Page

6. Transaction Data Page

The transaction data page records and manages all sales transactions occurring in the store. This page allows admins and cashiers to track sales history, manage payments, and monitor transaction status, whether they are completed or still in progress.

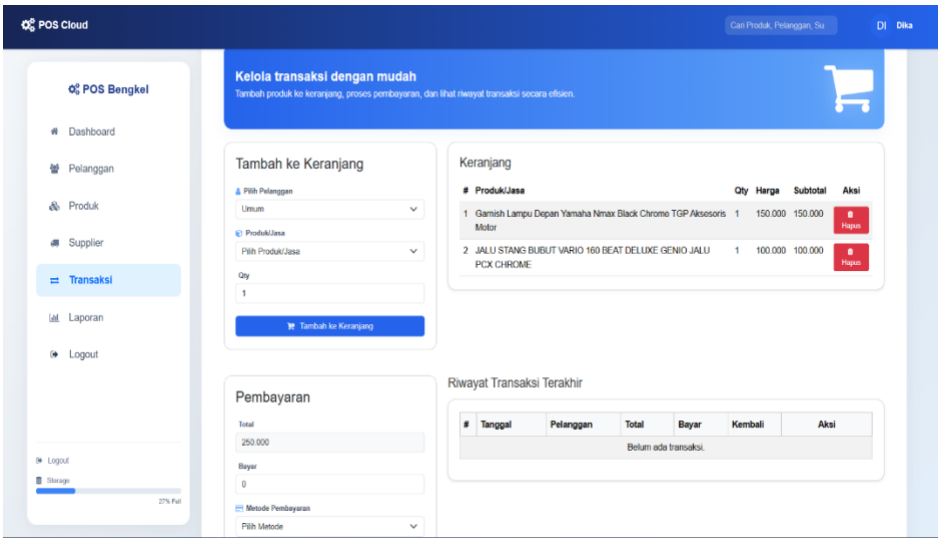


**Fig. 14:** Transaction Data Page

## 5. Conclusion

Based on the analysis and design conducted, as well as the implementation of a prototype cashier application system for MSMEs selling automotive spare parts based on cloud computing, several conclusions can be drawn:

1. Regarding the problem formulation regarding data security and integrity, this study has designed an approach to utilize cloud computing-based storage, which is expected to improve the security and integrity of MSME transaction and inventory data compared to conventional systems. This aligns with the research objective of designing a data security system that ensures data confidentiality and integrity. With a multi-tenancy and multi-database application concept, each MSME will use a separate database, thereby improving application performance and data integrity, as confirmed by the results of the attached questionnaire.
2. Regarding implementation challenges, this study has implicitly identified challenges through the prototype design and implementation process and developed a solution framework through a cloud-based architecture and designed features. This fulfills the research objective of identifying challenges and developing strategic solutions to address them in the context of cloud computing. 3. Based on the results of research on the features required for operational efficiency and effectiveness, this research has successfully identified and designed the main features required by spare part MSMEs, such as recording sales transactions, managing product data (stock), creating simple sales reports, and managing user data (owners and cashiers), in accordance with the problem limitations and research objectives in designing features that support operational efficiency.

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