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Design of an Application-Based Sales Information System for Koperasi XYZ

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ABSTRACT
This study examines the development of an application-based sales information system for Koperasi XYZ to enhance operational efficiency, financial transparency, and decision-making. The cooperative's manual system presents challenges such as data loss, recording errors, and delays in financial reporting. The research employs a qualitative and quantitative approach, utilizing observation, interviews, and document analysis to identify system requirements. The system is developed using the waterfall model, covering requirements analysis, system design, implementation, testing, and maintenance. Key technologies include Java programming and MySQL database, ensuring stability and usability. Black-box testing is applied to validate system functionality, focusing on transaction accuracy, role-based access, and financial reporting efficiency. The findings indicate that the new system significantly improves transaction speed, data accuracy, and managerial decision-making. This digital transformation strengthens Koperasi XYZ's competitiveness, enabling better financial control, inventory management, and service quality, ensuring sustainable growth in the digital era.

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INTRODUCTION

The advancement of information and communication technology has brought fundamental changes in various aspects of life, including the business world and cooperative management (Laudon & Laudon, 2020). In the digital era, the utilization of technology in various business sectors has become an unavoidable necessity to improve organizational efficiency, effectiveness, and competitiveness. One of the most critical aspects of business operations is the sales system, which serves as the backbone for determining a business's success (Stair & Reynolds, 2021).

Cooperatives, as business entities oriented toward the welfare of their members, are also required to adapt to technological advancements. However, many cooperatives still use manual sales systems, recording transactions using handwritten notes or simple spreadsheets (Romney & Steinbart, 2021). Such manual systems have numerous

weaknesses, including the risk of data loss, duplicate records, and difficulties in transaction reconciliation. Consequently, decision-making processes are often delayed due to poorly organized data.

Several studies have indicated that implementing an application-based information system can improve an organization's operational efficiency and effectiveness (O'Brien & Marakas, 2019). An information system specifically designed to handle business transactions can assist cooperatives in managing sales, reducing recording errors, and accelerating financial reporting processes. As a result, cooperatives can be more responsive to their members' needs and enhance the quality of services provided (Turban et al., 2018).

Koperasi XYZ is one of the cooperatives that still applies a manual transaction recording system. Some common problems include difficulties in summarizing daily transactions, potential errors in data entry, and delays in preparing sales reports. The continued use of manual processes not only hampers operational efficiency but also impacts strategic decision-making by the cooperative's management (Pressman & Maxim, 2020). Additionally, the cooperative faces challenges in data integration. Sales data, inventory records, and financial reports are still managed separately, leading to frequent inconsistencies in information. For example, stock that should be recorded as depleted in the sales system may still appear as available due to the lack of real-time data updates (Dennis et al., 2018). This situation highlights the need for a more integrated information system to optimize the cooperative's operational management.

In the field of information technology, application-based systems have been widely used in various business sectors to enhance efficiency and data management accuracy (Laudon & Laudon, 2020). The implementation of an application-based sales information system allows cooperatives to monitor transactions in real-time, speed up reporting processes, and minimize data entry errors. This can improve transparency and accountability in cooperative management, ultimately fostering greater trust among cooperative members (Stair & Reynolds, 2021).

To develop this application-based sales information system, the waterfall model approach is used, encompassing the stages of communication, planning, design, coding, and testing (Pressman & Maxim, 2020). The waterfall model is chosen because of its systematic structure, which ensures that each development phase is carried out sequentially. This approach allows every aspect of the system to be well-designed and tested before being implemented in cooperative operations. To support the system's design, modeling is conducted using Unified Modeling Language (UML), Entity Relationship Diagram (ERD), and Logical Record Structure (LRS). UML is used to model cooperative business processes, while ERD helps design an efficient database structure (Dennis et al., 2018). This approach ensures that the developed system can function optimally in handling various sales transactions at Koperasi XYZ. Moreover, this system is developed using the Java programming language and MySQL database, implemented through localhost XAMPP. The choice of these technologies is based on their stability, flexibility, and compatibility with various platforms (Romney & Steinbart, 2021). As a result, the system can run optimally and be easily accessed by users.

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One of the key benefits of implementing this system is its ability to generate sales reports automatically and accurately. With an integrated information system, the cooperative can reduce transaction recording errors and accelerate financial reporting processes. This helps the cooperative's management make more precise and strategic decisions (O'Brien & Marakas, 2019). Additionally, the system will provide cooperative members with easier access to their transaction information. For instance, members can easily check their total purchases, view transaction history, and access cooperative financial reports transparently (Turban et al., 2018). This means that the system benefits not only the cooperative's management but also its members.

Implementing an application-based sales information system can also enhance the cooperative's competitiveness in the digital era. With a more modern and efficient system, the cooperative will be better prepared to face market competition. This system can also help the cooperative expand its business reach, whether through direct sales or via digital platforms (Laudon & Laudon, 2020). As part of the system's development, testing and evaluation will be conducted to ensure that the system operates according to the cooperative's needs. Various testing methods will be used, including functional testing, compatibility testing, and performance testing. This ensures that the final system performs optimally and meets user requirements (Pressman & Maxim, 2020). With the implementation of this application-based sales information system, Koperasi XYZ will be able to manage its business transactions more effectively and efficiently. The system will not only assist in sales recording but also in data analysis and decision-making processes. Through this technological application, the cooperative is expected to develop further and provide better services to its members (Stair & Reynolds, 2021).

Based on the discussion above, it can be concluded that the demand for application-based sales information systems is increasing in line with technological developments and operational efficiency requirements. Therefore, designing this system is a strategic step in improving the performance of Koperasi XYZ, as well as in supporting the cooperative's growth and sustainability in the digital era.

METHODS

This study employs a qualitative and quantitative approach to analyze the need for an application-based sales information system at Koperasi XYZ, located in Cijantung District, East Jakarta City. The qualitative approach is used to understand the challenges faced by the cooperative in its manual sales system, while the quantitative approach is applied to measure the effectiveness of the proposed information system through the collection and analysis of transactional data.

The data collection process utilizes three primary techniques: observation, interviews, and document analysis. Observations are conducted by directly examining the transaction recording process and financial reporting at the cooperative. Interviews are held with the cooperative's management, secretaries, and treasurers to gain insights into the challenges encountered in the manual system. Additionally, document analysis is carried out on relevant records, including financial reports and sales transaction logs.

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The development of the sales information system follows the waterfall methodology, which consists of five key stages: (1) requirements analysis, (2) system design, (3) implementation, (4) testing, and (5) maintenance. This model is chosen due to its structured and sequential nature, ensuring that each stage is completed and tested before proceeding to the next (Pressman & Maxim, 2020).

The requirements analysis phase is conducted to identify the essential features that the sales information system must incorporate. Based on interviews with cooperative stakeholders, the primary requirements include real-time transaction recording, automated reporting, inventory management, and role-based user access. Furthermore, the system should feature an intuitive user interface that can be easily operated by cooperative staff with minimal technical expertise.

The system design phase involves modeling using Unified Modeling Language (UML) to illustrate the system's workflow, while Entity Relationship Diagram (ERD) and Logical Record Structure (LRS) are used to develop the database structure. The system is built using Java as the programming language, and MySQL as the database, which is implemented through localhost XAMPP for data management and testing.

Following the design and development stages, the system undergoes implementation and testing using the black-box testing method. This testing approach ensures that all system functionalities operate according to the defined specifications. Cooperative staff are involved in the testing process as end-users, evaluating key features such as transaction recording, report generation, and role-based access control.

Once testing is completed, a comprehensive analysis and evaluation are conducted to assess the effectiveness of the newly implemented sales information system. The evaluation compares transaction recording speed and accuracy before and after system deployment. Additionally, transactional data recorded in the system is analyzed to measure the cooperative's operational efficiency post-implementation.

RESULTS AND DISCUSSION

Profile

Koperasi XYZ is a Primary Producer Cooperative specializing in the production and distribution of tempeh and tofu, located in Cijantung, East Jakarta. The cooperative was founded with the goal of empowering local tofu and tempeh producers by providing them with access to better production facilities, market networks, and financial support. Operating in an urban setting, Koperasi XYZ aims to preserve traditional tempeh and tofu production techniques while incorporating modern food safety and quality standards. The cooperative serves local soybean farmers, small-scale tofu and tempeh artisans, and micro-business owners in Cijantung and surrounding areas.

Business Process System Running

Koperasi XYZ, a Primary Producer Cooperative specializing in tempeh and tofu production and distribution, follows a structured business process to ensure efficient operations. Below are the key procedures currently in place for handling orders, payments, deliveries, and sales reporting.

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1. Order Processing
   Customers can place orders for tempeh and tofu either by visiting the cooperative directly or contacting the cooperative's sales team via phone or WhatsApp, which is managed by the cooperative secretary.
   a. The secretary checks stock availability with the warehouse operator.
   b. If stock is available, the secretary fills out an order form as proof of the customer's request.
   c. If stock is unavailable, the secretary notifies the customer and provides information on the next available restock date.
2. Payment Process
   a. For walk-in customers, payment is made directly at the cooperative, where the secretary issues a receipt as proof of transaction.
   b. After payment is completed, the logistics team or delivery driver prepares the order for immediate dispatch.
   c. For bulk orders, customers may opt for bank transfers or digital payments, and proof of payment must be sent to the cooperative secretary before processing the order.
3. Delivery Process
   a. If an order is placed via phone or WhatsApp, a delivery request is generated and assigned to the logistics team.
   b. Before dispatch, the secretary provides the delivery driver with two copies of the receipt—one for the customer and one for the cooperative's records.
   c. The driver delivers the tempeh and tofu to the customer's location and collects any outstanding payments if necessary.
4. Sales Reporting Process
   a. The secretary compiles daily sales records, including receipts, proof of transactions, and cash collected.
   b. These records are submitted to the cooperative treasurer, who then reconciles the total sales and prepares the official sales report.
   c. The final sales report is reviewed and submitted to the cooperative's leadership, ensuring transparency and accountability in financial operations.

The current sales system at Koperasi XYZ, which specializes in the production and distribution of tempeh and tofu in Cijantung, East Jakarta, has been operating effectively in managing order processing, payment transactions, deliveries, and sales bookkeeping. However, as the cooperative continues to grow, certain limitations in the existing system have become evident. These weaknesses include:

1. Manual Sales and Transaction Recording
   The cooperative still relies on handwritten records for sales and transactions, leading to potential duplicate entries, lost records, or human errors in data processing.
2. Lack of a Data Processing System
   There is no integrated system for managing, storing, and retrieving sales and inventory data efficiently, making it difficult to track stock levels and transaction histories.

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3. Absence of a Digital Interface for Real-Time Data Entry
   The current system does not have a user-friendly interface that allows for real-time transaction input, causing delays in updating inventory and financial records.
4. No Automated Cash Receipt Reports
   The cooperative does not have a system-generated report for tracking cash receipts and financial transactions, leading to inefficiencies in financial reporting and reconciliation.

By implementing this computerized sales system, Koperasi XYZ can streamline business operations, enhance financial transparency, and improve overall efficiency in tempeh and tofu production and sales management. This transformation will ensure sustainable growth and provide better service to cooperative members and customers in Cijantung, East Jakarta.

Entity Relationship Diagram

The Entity Relationship Diagram (ERD) is a conceptual model used to visually represent the structure of a database in a system. ERD illustrates the entities (data objects), attributes (data characteristics), and relationships between entities within a system, ensuring that data is well-organized and efficiently managed.

In the context of Koperasi XYZ's application-based sales information system, the ERD serves as a blueprint for designing the database structure that will store sales transactions, customer information, product inventory, financial records, and user roles. This model helps in identifying how different components interact, reducing data redundancy, and ensuring data integrity.

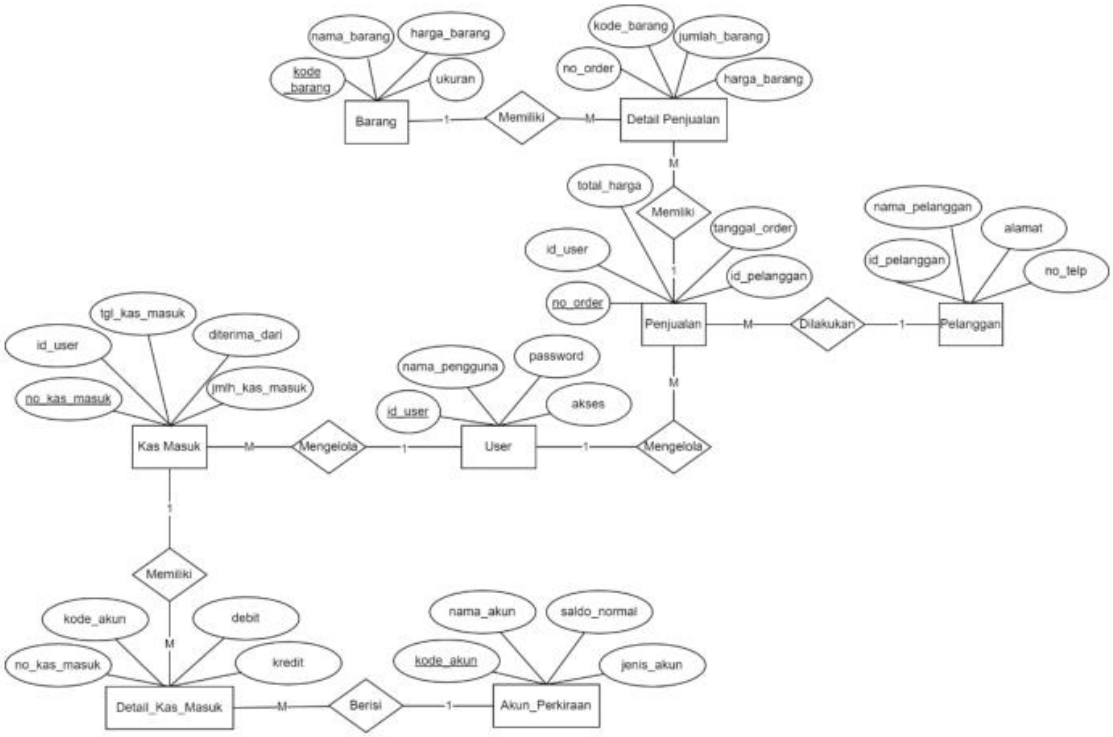

Figure 1. Entity Relationship Diagram

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The Entity Relationship Diagram (ERD) in the provided image illustrates the database structure for a sales information system. Below is a brief description of its key components and relationships:

1. Entities and Attributes
   a. Barang (Product/Item): Contains attributes such as kode_barang, nama_barang, harga_barang, and ukuran, representing product details.
   b. Detail Penjualan (Sales Details): Stores sales-related data, including no_order, jumlah_barang, harga_barang, and total_harga.
   c. Penjualan (Sales): Tracks sales transactions with attributes like no_order, tanggal_order, and id_pelanggan.
   d. Pelanggan (Customer): Holds customer details such as id_pelanggan, nama_pelanggan, alamat, and no_telp.
   e. User: Manages system users with attributes like id_user, nama_pengguna, password, and akses.
   f. Kas Masuk (Cash Inflow): Contains records of financial transactions, including no_kas_masuk, tgl_kas_masuk, dterima_dari, and jmlh_kas_masuk.
   g. Detail Kas Masuk (Cash Inflow Details): Links cash transactions to specific accounts using attributes like kode_akun, debit, and kredit.
   h. Akun Perkiraan (Account Chart): Stores account-related data, including kode_akun, nama_akun, saldo_normal, and jenis_akun.
2. Relationships
   a. Barang is associated with Detail Penjualan, which tracks sold items.
   b. Penjualan is linked to Pelanggan, showing which customer made a purchase.
   c. User manages and oversees both Penjualan and Kas Masuk, indicating administrative control.
   d. Kas Masuk records financial transactions and connects to Detail Kas Masuk, which further categorizes transactions into specific Akun Perkiraan.
3. Cardinality
   a. One Pelanggan can place multiple Penjualan (One-to-Many).
   b. One Penjualan can have multiple Detail Penjualan records (One-to-Many).
   c. One Kas Masuk can have multiple Detail Kas Masuk entries (One-to-Many).
   d. One Akun Perkiraan can be linked to multiple Detail Kas Masuk transactions (One-to-Many).

Logical Record Structure

The Logical Record Structure (LRS) is a conceptual framework used to define how data is logically stored, organized, and accessed within a database system. LRS represents the data entities, attributes, and relationships that are essential for system operations, ensuring efficient data retrieval, storage, and management. In the sales information system for Koperasi XYZ, the LRS plays a crucial role in structuring records related to sales transactions, customers, inventory, financial transactions, and user management.

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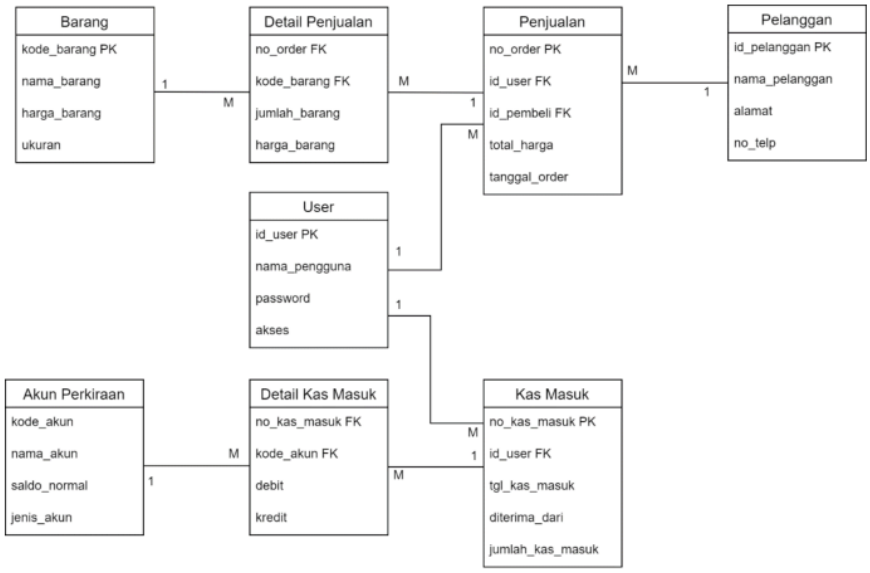

Figure 2. Logical Record Structure

Class Diagram

A Class Diagram is a fundamental component of Object-Oriented Modeling, used to represent the structure of a system by defining its classes, attributes, methods, and relationships. It serves as a blueprint for system development, illustrating how different components interact within a software application.

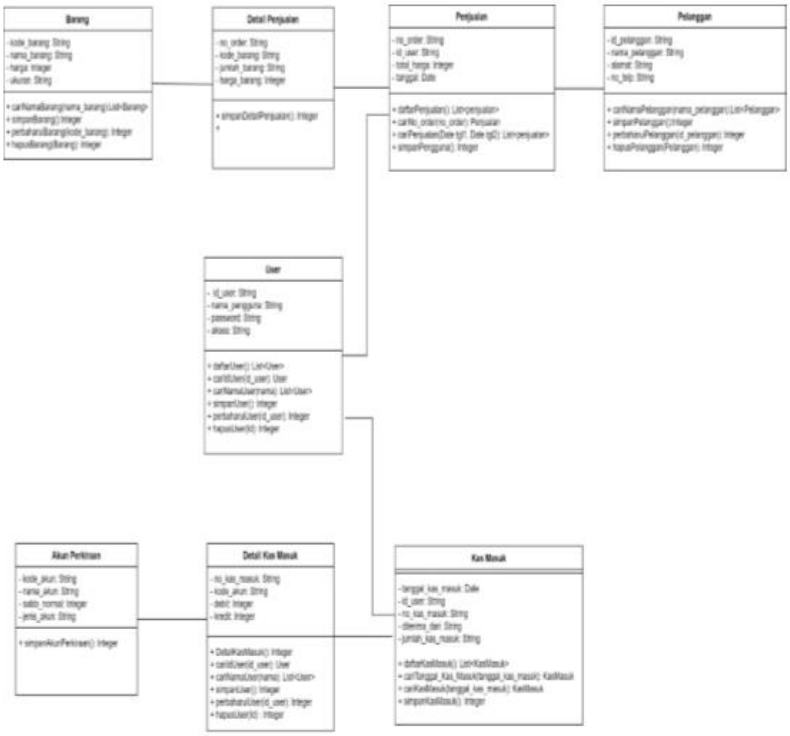

Figure 3. Class Diagram

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Sequance Diagram

A Sequence Diagram is a key component of Unified Modeling Language (UML) that visually represents the flow of interactions between system components over time. It describes how objects and actors communicate with one another through a series of messages and events to accomplish a specific process within a system.

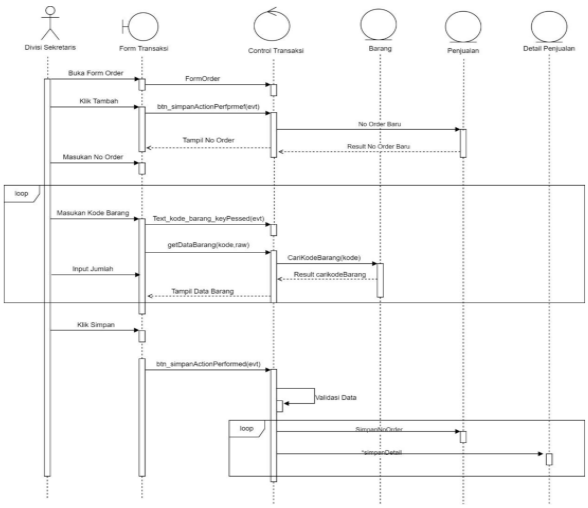

Figure 4. Sequance Diagram

Component Diagram

A Component Diagram is a vital part of Unified Modeling Language (UML) that visually represents the structural organization of a system's components and their dependencies. It illustrates how different software modules, databases, and external interfaces interact within the system architecture.

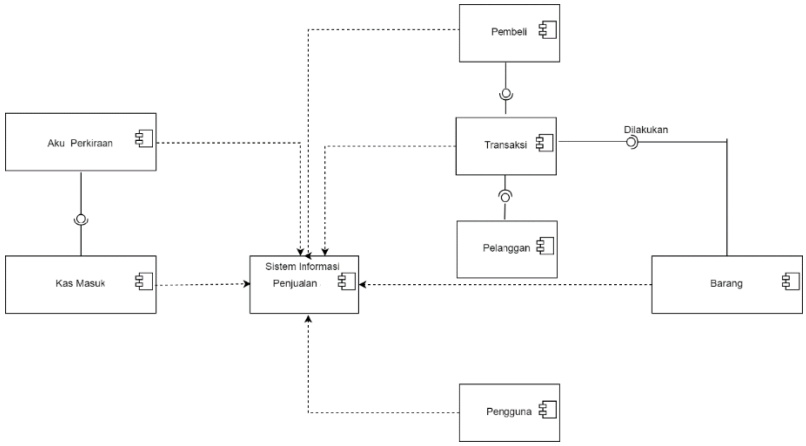

Figure 5. Component Diagram

Deployment Diagram

A Deployment Diagram is a key component of Unified Modeling Language (UML) that visually represents the physical architecture of a system, showing how hardware and software components interact within a network environment. It provides a clear overview of how system components are deployed across servers, databases, and client devices.

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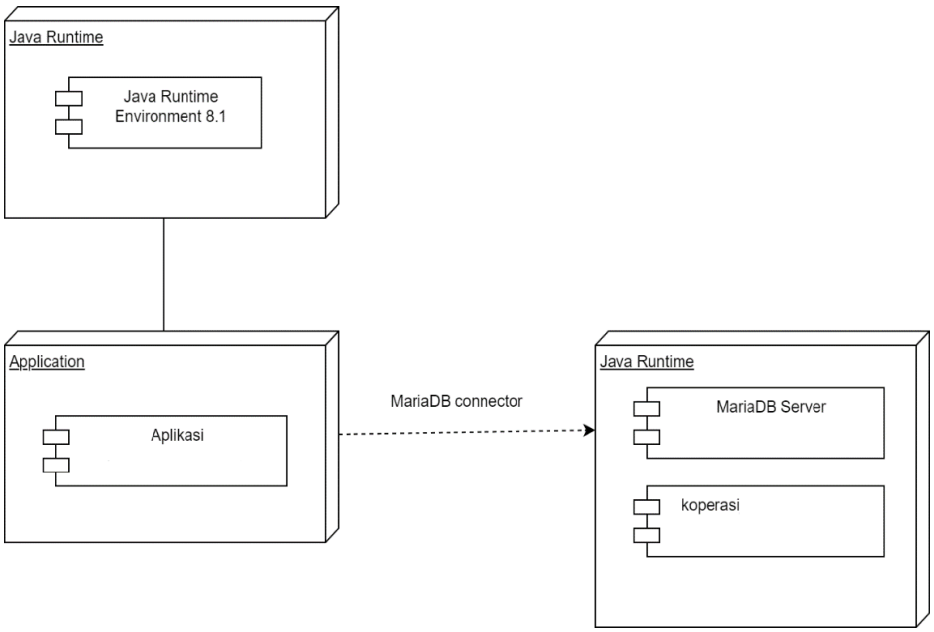

Figure 6. Deployment Diagram

Blackbox Testing

Blackbox Testing is a software testing method that evaluates a system's functionality without examining its internal code structure, implementation details, or logic. This technique focuses on input-output validation, ensuring that the system meets user requirements and functions correctly according to its specifications

Table 1. Blackbox Testing Login Form

No	Test Scenario	Test Case	Expected Result	Test Result	Conclusion
1	User ID and Password are not entered, then click Login	User ID: (empty) Password: (empty)	The system will deny access and display the message "Incorrect user ID or Password"	As expected	Valid
2	User ID is entered, but password is not entered, then click Login	User ID: User1 Password: (empty)	The system will deny access and display the message "Incorrect user ID or Password"	As expected	Valid
3	User ID is not entered (empty), but password is entered, then click Login	User ID: (empty) Password: 12345678	The system will deny access and display the message "Incorrect user ID or Password"	As expected	Valid

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4	Enter either an incorrect User ID or Password, then click Login	User ID: User1 (Correct) Password: 123456 (Incorrect)	The system will deny access and display the message "Incorrect user ID or Password"	As expected	Valid
5	Enter the correct User ID and Password, then click Login	User ID: User1 (Correct) Password: 12345678 (Correct)	The system will grant Login access and display the Main Menu Form	As expected	Valid

Table 2. Blackbox testing of Estimated Accounts

No	Test Scenario	Test Case	Expected Result	Test Result	Conclusion
1	All fields are left empty, then click [Save]	Account Code: (empty) Account Name: (empty) Normal Balance: (empty) Account Type: (empty)	The system will deny access and display the message "Some fields are still empty, please complete them first"	As expected	Valid
2	One field is left empty, then click [Save]	Account Code: 11111 Account Name: (empty) Normal Balance: Debit Account Type: Asset	The system will deny access and display the message "Some fields are still empty, please complete them first"	As expected	Valid
3	All fields are filled, but Account Code is	Account Code: A1111	The system will deny and display the message "[Account_Code] is not valid!	As expected	Valid

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No	Test Scenario	Test Case	Expected Result	Test Result	Conclusion
	not entered in the correct format, then click [Save]	Account Name: Euis Normal Balance: Debit Account Type: Asset	The format must be 5-digit numbers only!"		
4	All fields are filled, but Account Name is not entered in the correct format, then click [Save]	Account Code: 11111 Account Name: Euis21 Normal Balance: Debit Account Type: Asset	The system will deny and display the message "[Account_Name] is not valid! The format must only allow alphabets and spaces!"	As expected	Valid
5	All fields are filled with the correct format, then click [Save]	Account Code: 1111 Account Name: Euis Normal Balance: Debit Account Type: Asset	The system will display the message "Account data has been successfully saved"	As expected	Valid

Table 3. Blackbox Testing User

No	Test Scenario	Test Case	Expected Result	Test Result	Conclusion
1		User ID: (empty)	The system will deny access and display the	As expected	Valid

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No	Test Scenario	Test Case	Expected Result	Test Result	Conclusion
	All fields are left empty, then click [Save]	Username: (empty) Password: (empty) Access: (empty)	message "Some fields are still empty, please complete them first"		
2	One field is left empty, then click [Save]	User ID: Euis123 Username: (empty) Password: 1234567 Access: Treasurer	The system will deny access and display the message "Some fields are still empty, please complete them first"	As expected	Valid
3	All fields are filled, but User ID is not entered in the correct format, then click [Save]	User ID: 123 Username: Euis Password: 1234567 Access: Treasurer	The system will deny and display the message "[User_ID] is not valid! The format must only allow alphabets, numbers, dots, and underscores!"	As expected	Valid
4	All fields are filled, but Username is not entered in the correct format, then click [Save]	User ID: Euis123 Username: Euis123 Password: 1234567 Access: Treasurer	The system will deny and display the message "[Username] is not valid! The format must only allow alphabets and spaces!"	As expected	Valid
5	All fields are filled with the correct format, then click [Save]	User ID: Euis123 Username: Euis Password: 1234567 Access: Treasurer	The system will display the message "User data has been successfully saved"	As expected	Valid

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CONCLUSION

The study explores the implementation of an application-based sales information system for Koperasi XYZ to address inefficiencies in manual transaction recording. The research highlights the limitations of the existing system, including data loss, recording errors, and slow financial reporting, which hinder decision-making and operational effectiveness. By adopting an automated system, the cooperative aims to streamline business operations, improve financial transparency, and enhance service quality. The proposed system incorporates key features such as real-time transaction recording, automated sales reporting, and inventory management. It is designed using the waterfall model, with development stages including system analysis, design, coding, testing, and maintenance. Key technologies used include Java programming and MySQL database, ensuring stability and compatibility. Testing and evaluation methods, including black-box testing, confirm that the system meets functional requirements and user needs. The system improves transaction efficiency, minimizes errors, and accelerates financial reporting, thereby enhancing managerial decision-making. Implementing this digital sales system is a strategic step toward modernizing Koperasi XYZ's operations. It not only boosts competitiveness in the digital era but also ensures sustainable growth by offering better service to cooperative members and customers. This transformation marks a crucial step in optimizing cooperative management and aligning with evolving business demands.

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