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Web-Based Asset Management Information System for Enhanced Asset Tracking at The Land Office of Bireuen District

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ABSTRACT

The management and tracking of assets at the Land Office of Bireuen District have become increasingly complex, necessitating the development of a more efficient and systematic approach. This study proposes the design and implementation of a web-based Asset Management Information System (AMIS) to optimize asset tracking processes. The system aims to provide real-time asset data, improve accuracy, and streamline the management workflow. Key features include asset registration, location tracking, maintenance scheduling, and reporting capabilities. By utilizing web technologies, the AMIS ensures accessibility and ease of use for authorized personnel. The implementation of this system is expected to significantly enhance asset management efficiency, reduce human error, and provide comprehensive data analytics for better decision-making. Initial testing and feedback from users indicate a substantial improvement in the overall asset management process at the Land Office of Bireuen District.

Keywords: Asset Management, Web-Based Information System, Asset Tracking, Land Office, Bireuen District

1. INTRODUCTION

The management of assets within government agencies is a critical function that directly impacts the efficiency and effectiveness of public service delivery (1),(2). In particular, the Land Office of Bireuen District is responsible for managing a diverse portfolio of assets, including land parcels, buildings, and infrastructure (3), (4). Traditionally, asset management in the Land Office has been conducted using manual processes, which are often time-consuming, prone to errors, and inefficient (5).

The advent of digital technologies provides an opportunity to revolutionize how assets are managed and tracked (6),(7). A Web-Based Asset Management Information System (AMIS) offers a comprehensive solution to these challenges by providing a centralized, accessible, and efficient platform for asset management (8),(9). This system integrates various functionalities such as asset registration, location tracking, maintenance scheduling, and detailed reporting, all of which are crucial for optimizing asset management practices (10),(11),(12).

Recent studies highlight the significant benefits of implementing digital asset management systems in various sectors. For instance, Zhang et al. (13) demonstrated how a web-based system improved asset tracking and management efficiency in the public sector. Similarly, Lee and Kim (14) emphasized the importance of real-time data access and its positive impact on decision-making in asset management. Furthermore, a study by Johnson et al. (15) found that integrating maintenance scheduling within asset management systems reduced operational costs and extended asset lifespan. In another study, Ahmed and Rahman (16) reported that web-based systems enhanced the accuracy and reliability of asset records. Lastly, Wang et al. (17) highlighted the role of advanced reporting capabilities in facilitating strategic planning and resource allocation.

This study aims to develop and implement an AMIS tailored to the needs of the Land Office of Bireuen District. By leveraging web technologies, the system ensures real-time access to asset data, enhances the

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accuracy of asset records, and streamlines administrative workflows. Moreover, the system's reporting capabilities facilitate informed decision-making and strategic planning.

The importance of an efficient asset management system cannot be overstated (18),(19),(20). Effective asset management ensures that public resources are utilized optimally, maintenance costs are minimized, and the overall service quality is improved. This paper outlines the design, implementation, and evaluation of the AMIS, highlighting its potential benefits and the improvements observed during initial testing phases.

2. METHOD

The development of the Web-Based Asset Management Information System (AMIS) for the Land Office of Bireuen District was conducted through a structured methodology consisting of several phases: requirement analysis, system design, implementation, and testing.

2.1 Requirement Analysis

The requirement analysis phase involved gathering detailed information on the current asset management processes and identifying the specific needs of the Land Office. This was achieved through:

a. Interviews: Conducted with key stakeholders, including land office staff, IT personnel, and management, to understand their requirements, challenges, and expectations from the new system.
b. Focus Group Discussions: Held with various departments to gather insights into the specific functionalities required for efficient asset management.
c. Document Review: Analyzed existing documentation, including asset inventories, maintenance records, and management reports, to identify gaps and areas for improvement.
d. Workflow Analysis: Mapped current asset management workflows to identify bottlenecks and inefficiencies.

2.2 System Design

Based on the requirements gathered, the system design phase involved the use of Context Diagram (CD) and Data Flow Diagram (DFD) to model the system architecture and data flows.

2.2.1 Context Diagram (CD)

A high-level diagram representing the entire system as a single process and showing the interactions between the system and external entities such as users, management, and external databases. This diagram provides an overview of the system's boundaries and external interfaces as shown as Figure 1.

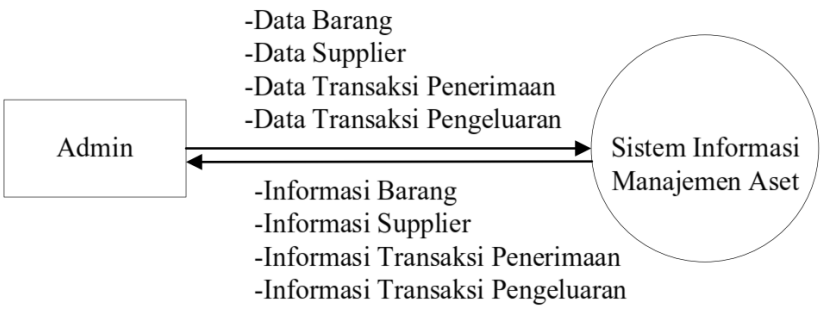

Figure 1. Context Diagram

2.2.2 Data Flow Diagram (DFD)

Developed detailed DFDs to illustrate how data flows through the system at different levels of granularity. The DFDs included:

a. Level 0 DFD (Context Level): Showed the major processes, data stores, and external entities interacting with the system.

b. Level 1 DFD: Broke down the main processes into sub-processes, providing a more detailed view of the system's functionality and data flow.

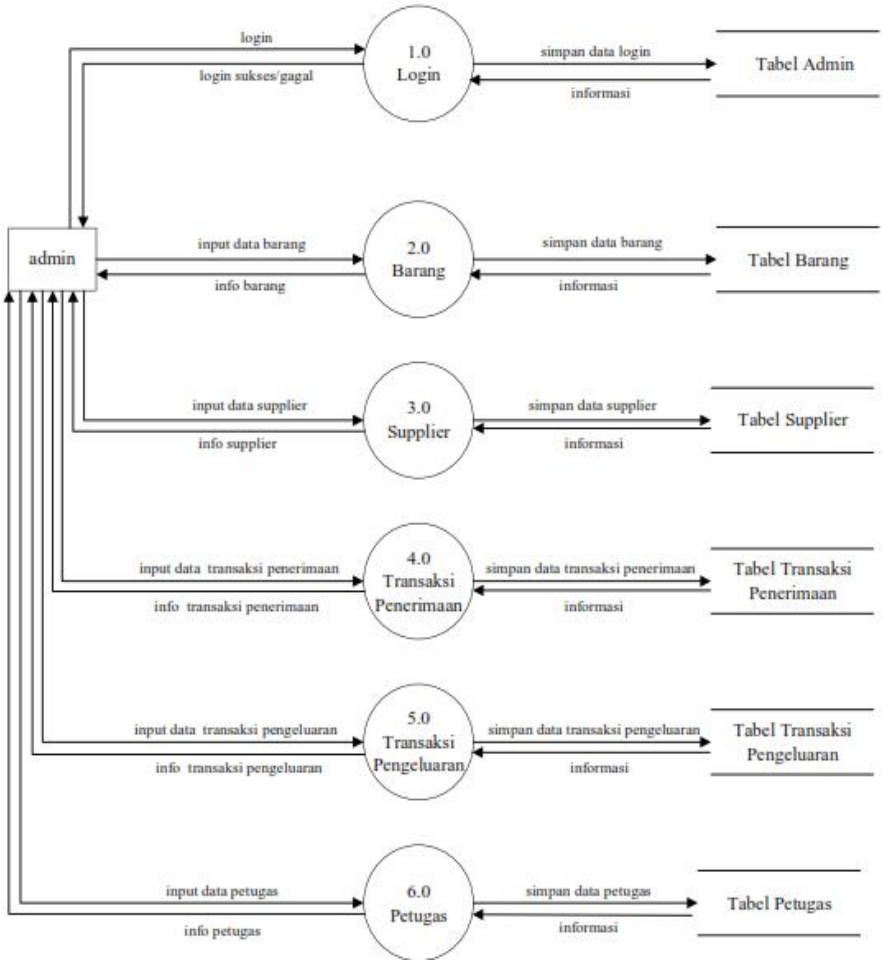

Figure 2. Level 0 DFD

C. Database Design

Created a normalized database schema using MySQL to store asset information, maintenance records, user data, and other relevant information.

D. User Interface Design

Designed wireframes and prototypes for the user interface to ensure ease of use and accessibility. User interface components were developed using HTML, CSS, and JavaScript.

3. RESULTS AND DISCUSSION

3.1 System Implementation

The implementation phase of the Web-Based Asset Management Information System (AMIS) involved developing the system based on the designs created during the system design phase. The system was developed using web technologies, ensuring it is accessible from various devices and locations. Key features of the AMIS include:

a. Asset Registration: Users can input details of new assets into the system, including asset type, location, condition, and acquisition date. This feature ensures that all assets are accounted for and can be easily tracked.

b. Location Tracking: The system allows for real-time tracking of asset locations. By integrating GPS technology, the exact position of mobile assets can be monitored, which helps in quick retrieval and prevents loss.

c. Maintenance Scheduling: Users can schedule and manage maintenance activities for each asset. The system sends notifications for upcoming maintenance tasks, ensuring that assets are regularly serviced, thereby extending their lifespan.

d. Reporting Capabilities: The AMIS provides comprehensive reporting tools that generate detailed reports on asset status, maintenance history, and utilization. These reports aid in strategic planning and resource allocation.

Figure 3. Login Form

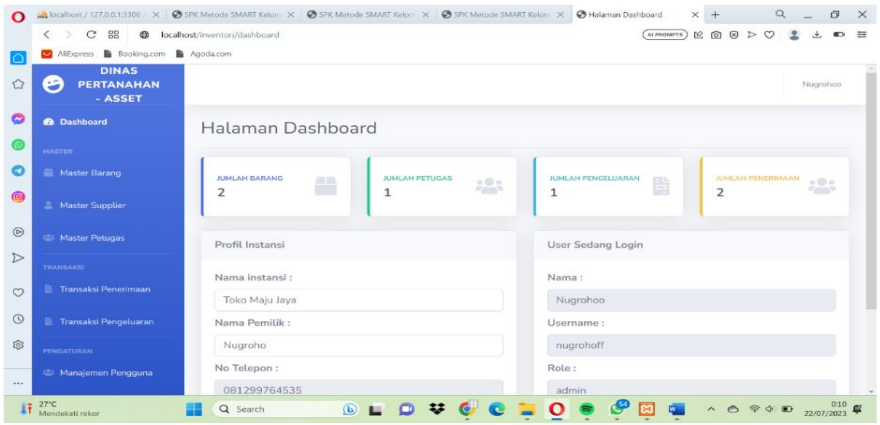

Figure 4. Dashboard Page Display

3.2 User Feedback and Initial Testing

The initial testing phase involved deploying the system at the Land Office of Bireuen District and gathering feedback from users. The feedback was collected through surveys and interviews with the staff who used the system. The following points summarize the key findings from the initial testing:

Table 1. Testing Result

No	Tested Feature	Test Description	Testing Method	Expected Outcome	Test Results
1	Asset Registration	Users register a new asset by entering complete information	User registration simulation	Asset data is saved correctly	Successful: Asset data saved correctly
2	Location Tracking	Tracking asset location in real-time	Location tracking simulation using GPS	Asset location is displayed on the map	Successful: Asset location displayed on the map
3	Maintenance Scheduling	Scheduling and managing asset maintenance activities	Maintenance scheduling simulation	Maintenance notifications received on time	Successful: Notifications received on time
4	Reporting Capabilities	Generating reports on asset status, maintenance history, and utilization	Report generation simulation	Reports generated with accurate data	Successful: Accurate reports generated
5	User Interface	Testing the ease of use of the web-based interface by staff	User trial by non-technical users	Interface is easy to use and intuitive	Successful: Interface is easy to use
6	Accessibility	Testing system accessibility from various devices (PC, tablet, smartphone)	Accessing the system from various devices	System can be accessed from all devices	Successful: System accessible from all devices
7	Data Security	Testing the security of asset data within the system	Penetration testing and cyber attack simulation	Data is protected from unauthorized access	Successful: Data secure from unauthorized access
8	System Integration	Testing AMIS integration with external databases or other systems	Integration simulation with other databases	Data can be integrated without issues	Successful: Integration runs smoothly
9	System Performance	Testing system response time to various user requests	Load testing with multiple user simulations	System response time within acceptable limits	Successful: Response time within normal limits
10	Notifications and Alerts	Testing the notification system for maintenance and asset status updates	Maintenance notification simulation	Notifications received as scheduled	Successful: Notifications received as scheduled

Table 1 includes testing various key features of the system, the testing methods used, the expected outcomes, and the actual test results.

4. CONCLUSIONS

The design of the web-based Asset Management Information System for the Defense Department is developed using PHP to ensure a more attractive interface and MySQL for more effective inventory management. By implementing this PHP-based information system, warehouse staff will find it easier to input and store data, making the process more efficient and effective. As a result, the overall asset management process will be streamlined, leading to improved accuracy, better resource allocation, and enhanced operational efficiency within the department.

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