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Web-Based Material Inventory Information System For ALAR Welding Workshop

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Abstract

The ALAR welding workshop is a welding industry that welds various types of metal using various methods and techniques. Material inventory is crucial in this business. Currently, material inventory recording is still done manually, resulting in frequent data errors, information delays, and difficulties in tracking inventory, as it is still manually calculated. Given these issues, the author designed and built a web-based material inventory information system to help manage material stock effectively and accurately. This system replaces error-prone manual processes and improves operational efficiency at the ALAR welding workshop. The method used in this study is the waterfall method because it has a step-by-step design process, namely needs analysis, system design, implementation, testing, and system maintenance. The research results show that the developed information system can facilitate workshop staff in recording, monitoring, and reporting material inventory in real time. This system also improves data accuracy, time efficiency, and supports owners in making faster decisions in the material procurement process, because it is supported by actual and well-documented data. Therefore, this web-based inventory information system can be an effective solution for material management at the ALAR Welding Workshop.

Keywords: *Information System, Inventory, Welding Workshop, Web, Waterfall*

1. Introduction

Various types of small and medium business sectors that are needed by the community and can be said to be rare are welding workshops. Welding workshops are a type of business that operates in the field of metal welding in various ways such as electric welding, carbide welding, arrogant welding, lathe welding, acetylene welding, and welding that uses the help of robotic welding machines or lasers. [1]. Welding workshops play an important role in meeting the market needs of the community for services for making, repairing and modifying metal structures. Welding workshops are one of the welding industries for various types of metals with various methods and certain techniques. Examples of some welding results that exist in the community are making house fences, canopies, door or window trails, nameplates, building frames and others [2]. Each manufacture certainly requires material goods to be in accordance with consumer desires. The use and supply of these material goods greatly influence the sustainability and operation of existing welding. The owner of a welding shop must know, calculate, and record the availability of raw materials such as iron, pipes, welding wire, metal plates, and other materials. This is necessary to ensure smooth production and customer service. Owners need data processing to track inventory, including existing goods, incoming goods, and outgoing goods

ALAR welding workshop in managing its material inventory is still done manually, which is recorded only using a regular ledger. Calculation of material stock is still calculated manually, one by one, making it difficult, slowing down employee performance and often making mistakes in calculating inventory, both remaining goods, goods to be used (outgoing goods) and incoming goods, namely goods that the owner will order from suppliers for operational needs. Recording that

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only uses a ledger is very vulnerable, such as lost books, damaged books, errors in recording stock so that the empty material has an impact on project delays and decreased customer satisfaction.

Therefore, it is necessary to use computer-based information technology to help process data on material inventory in the ALAR welding workshop. Advances in computer and information technology, we can easily access news, knowledge, and information from various fields, accelerate the process of developing new ideas, and increase productivity in various fields related to daily life. Therefore, in this era of globalization, the use of computers and information is becoming increasingly important and strategic in shaping and changing various aspects of human life[3]. The role of information technology is very important in supporting the operational activities of a business. The use of this technology must also be accompanied by the existence of intelligent human resources who can keep up with the changing times [4]. Nowadays, technological dependence is not only owned by certain groups but almost all groups need information technology to develop and operate their businesses.[5]. The web, a global network that connects millions of computers around the world, has become important in searching for information. To help deal with the problems that occur in the ALAR welding workshop, the author helps to create a web-based material inventory information system to help, simplify and control the inventory of goods in the ALAR welding workshop. Currently, many businesses have used web-based systems to provide convenience to both consumers and their own businesses. The web is a software application used to retrieve and present web information sourcess.[6]. With the material inventory information system in the ALAR welding workshop, the stock management process is carried out efficiently, accurately and can be accessed in real time, producing automatic stock reports and helping in decision making in purchasing goods. It is hoped that this system will increase operational efficiency, reduce data recording errors, and provide data transparency in managing material inventory data.

2. Research Methodology

In this study, the author uses the waterfall method with a software engineering approach. This approach is used to analyze user needs, design systems, implement applications in material inventory information systems. The waterfall method is a software development model that is carried out sequentially. The waterfall method was chosen because it is structured, systematic and has a clear workflow, and has characteristics that are in accordance with system needs [7]. The waterfall method is often also called a linear sequential model (sequential linear) or life flow (classic life cycle).[8]. The tools used by the author in system development are Unifield Modeling Language (UML), the stages carried out by the author according to the stages in the waterfall method (System Development Life Cycle) are as follows.

2.1. Needs Analysis

The author identified problems that occurred in the ALAR welding workshop, such as remaining stock, incoming goods, outgoing goods, material purchases, and so on. After identifying the problems, the author also identified what needs would be required by users by conducting interviews and observations with users and the owner of the ALAR welding workshop.

2.2. System Design

After analyzing the system requirements, the author designed the system flow, database, and interface. The system structure was created using an ERD (Entity Relationship Diagram) tool. System design is the stage of translating the system into software. In designing the system, the author used UML tools. In UML, there are

several diagrams used by the author, including use case diagrams and class diagrams. The author also created an interface design tailored to the needs of users and owners.

2.3. Implementation

After designing the system, both database design and interface design, the author carries out the next stage according to the stages in the waterfall stage, namely the implementation stage. The author created a web-based application design for material inventory at this implementation stage. At this stage, the system design is realized into a program or design results into a specific programming language. System development by implementation means building a system using a web-based programming language such as PHP, MySQL database, HTML, Bootstrap or JavaScript [9].

2.4. System Testing

At this stage, the author conducts testing using black box testing. Testing ensures that all functions in the system run as required and are error-free. Testing is conducted to identify errors or deficiencies in the software being created. The testing phase is a crucial step in the waterfall method. Without a thorough testing process, the resulting system can contain numerous errors that have the potential to disrupt and cause the system to be less efficient.

2.5 Maintenance

After the system is implemented, monitoring and fixing of potential bugs are carried out, as well as the development of additional features according to user needs. The maintenance phase is the stage of system refinement based on user feedback.

3. Result and Discussion

After conducting a needs analysis and system design, a web-based information system was built to assist in managing material inventory at the ALAR Welding Workshop. The web-based material inventory information system created by the author is designed to assist in managing the availability of material stock digitally/computerized, efficiently, and accurately. The author created several modules in designing this system, such as recording incoming and outgoing materials, stock monitoring, supplier recording, and automatic report generation. This system can later be accessed via mobile via a web browser, making it more flexible to use anytime and from any device.

3.1. Initial needs analysis

An initial needs analysis needs to be conducted to determine what system requirements are needed by the user and what the system must do. In this needs analysis stage, the author conducted interviews with the owner of the ALAR welding workshop and employees. Interviews need to be conducted to find out the problems of the process flow constraints from incoming goods, outgoing goods, remaining material goods (stock goods) and reports. With this interview, the author can understand the ongoing business process, find out the problems. In addition to interviews, the author also conducted observations, observations were carried out to observe, see, and know the data processing process and material inventory transactions that occur at the ALAR welding workshop. In this stage, the author analyzed the needs based on the operating system. The author also analyzed several documents in the ALAR welding workshop, both input documents and output documents that are used, so that they can compile features and functions that are in accordance with the needs of material inventory at the ALAR welding workshop.

3.2. System Requirements Design

System requirements design is the process of converting the results of the requirements analysis into a system architecture, database structure, interface design, and a system workflow plan that will be used in the implementation phase [10]. At this stage, the author designs the system to be created based on functional requirements. In the system requirements design stage, the system requirements are designed using UML tools, namely use case diagrams, and database designs using Entity Relationship Diagrams (ERDs) and Logical Record Structures (LRS).

a) Usecase Diagram

Use case diagrams illustrate the interactions between users (actors) and the system according to the functions provided. Understanding the user's overall business process and determining user access rights in the system [11]. The admin acts as a player who has access permission to manage incoming and outgoing goods data according to various processes, such as adding, editing, and deleting data. To access the system, the admin must log in. Each admin has a unique login and password. The admin consists of a workshop admin and a warehouse admin, both of whom have access to perform data transactions such as inputting master data, conducting transactions, and creating reports.

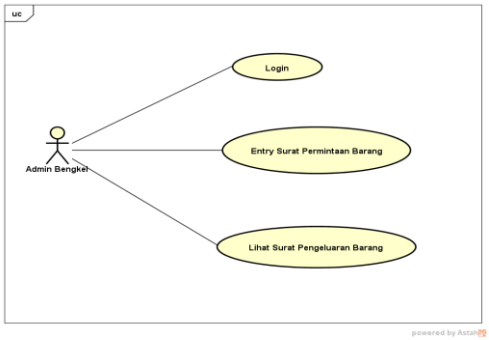

Figure 1. Workshop Admin Usecase Diagram

The workshop admin use case diagram shows the actor who plays the role of the workshop admin. The workshop admin has login access to enter the system. The workshop admin can also enter goods request letters (from the workshop to the warehouse) and view goods release letters (proof that the goods have left the warehouse).

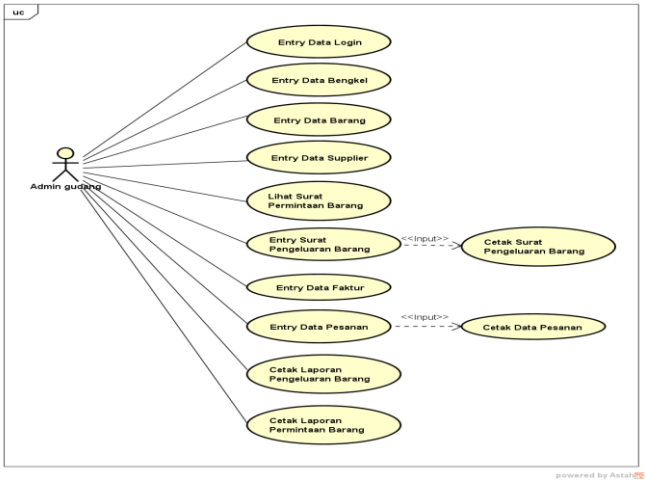

Figure 2. Warehouse Admin Usecase Diagram

In the Warehouse Admin use case diagram, actors play a crucial role in the system because they can perform various activities within the system. The actor in the image above is the Warehouse Admin. Warehouse Admins can log in to gain access to the system. They can also input data on workshops, goods, suppliers, invoices, and orders. They can also view product requests and generate various correspondence as needed, including printing reports.

b) Database Design

In this database design, the author designed a table structure design from the relationships between existing data so that they can be connected and related to each other, the goal is to ensure data integrity and data processing efficiency. Database design is a basic factor or foundation needed in a system. The design of the system proposed by the author uses an Entity Relationship Diagram (ERD) and table relationships. This design is done to provide an overview of the database that will be proposed and describe the structure of the database design created. This ERD diagram reflects the existing system and the system that will be created by the author [12]. The following is the ERD design created by the author

From this ERD diagram, we can see the relationship between one entity and another, except for the user entity. The ERD will then be reprocessed to form a Logical Record Structure (LRS) as the basis for a table in the next stage. Below is the LRD generated by the author.

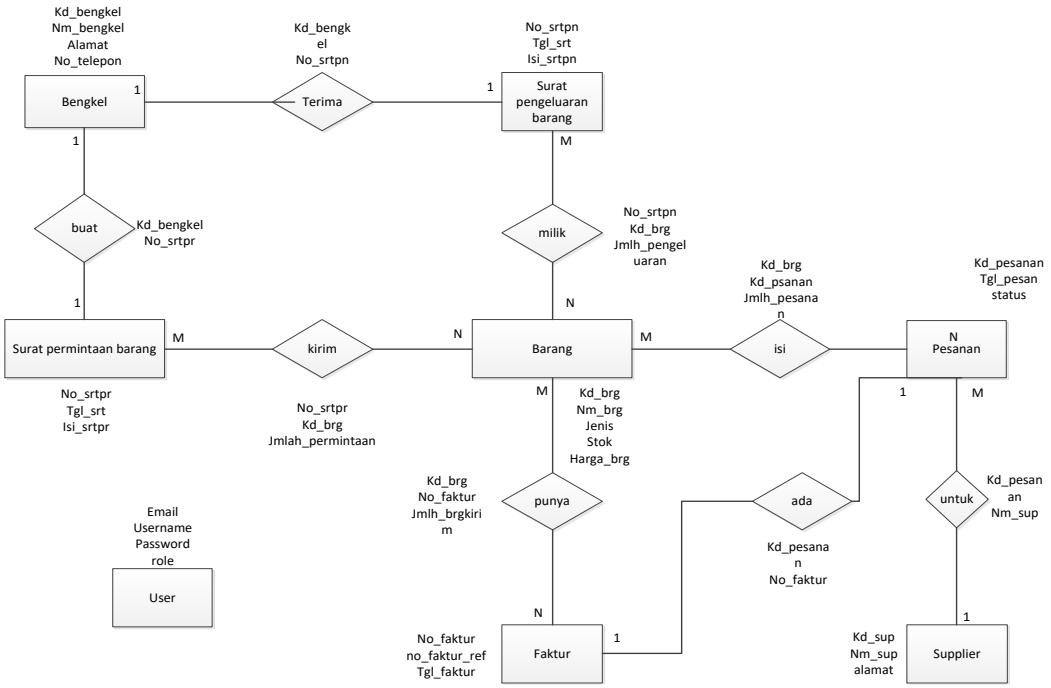

Figure 3. Entity Relationship Diagram (ERD)

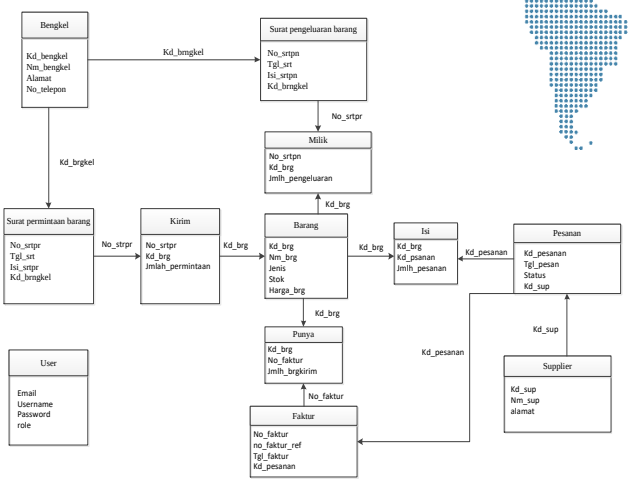

Figure 4. Logical Record Structure (LRS)

3.3. Implementation

The implementation phase is the process of converting the design created in the previous phase into actual program code that can be executed by users through a user interface. This interface can connect system components. At this stage, it is expected that the web-based user interface can be used and accessed by workshop and warehouse administrators to manage material inventory.

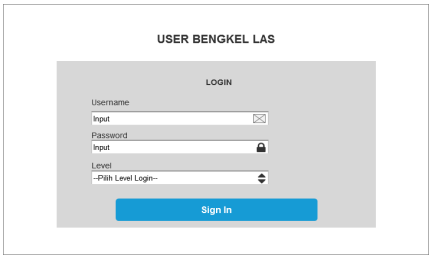

Figure 5. User Login Interface View

Each admin has a login, whether warehouse admin or workshop admin, the login is used by the admin to be able to enter and have access rights to the system.

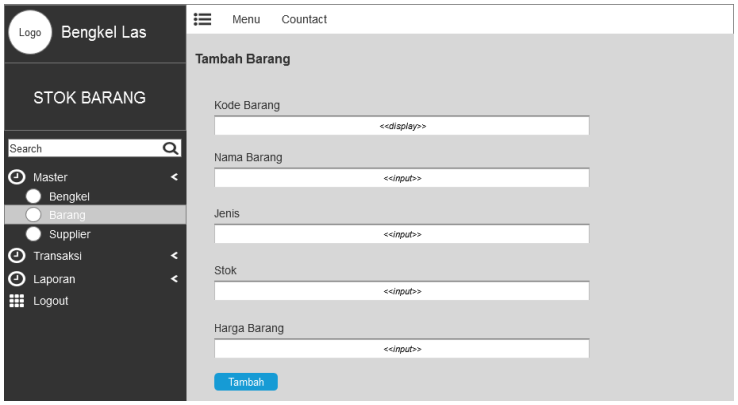

Figure 6. Display of the goods data interface

Warehouse Admins can input item data if new items are added. Admins can edit item data. Once entered, the data is saved and recorded in the database. Admins can edit and delete data as needed.

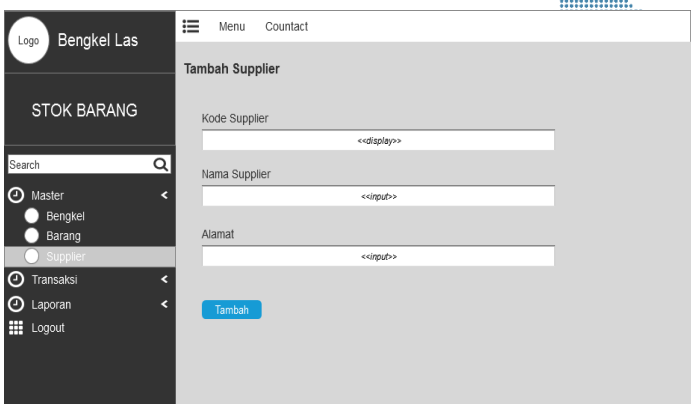

Figure 7. Supplier interface view

Warehouse Admins can input supplier data if there are new suppliers. Admins can also edit supplier data. Once entered, the data is saved and recorded in the database. Admins can edit and delete data as needed

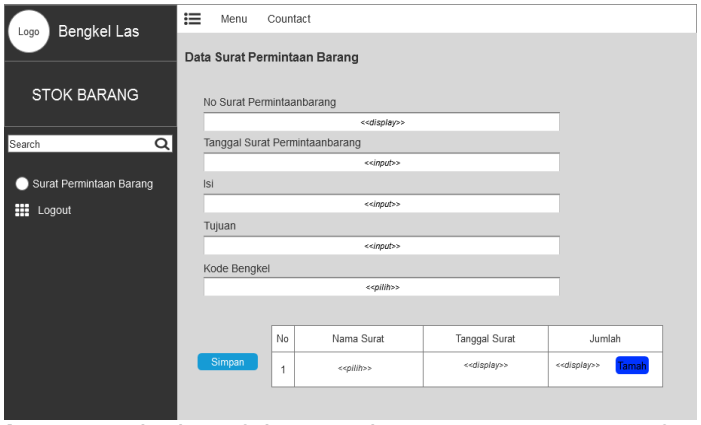

Figure 8. Display of the Goods Request Letter Interface

The workshop admin will create a goods request letter to the warehouse through this system by inputting the necessary data if the workshop's stock is running low. This letter will then be sent and reviewed by the warehouse admin as proof of the goods request from the workshop admin. The Warehouse Admin will create a goods release order based on the goods request from the workshop admin. The goods request will be adjusted to the availability of goods in the Warehouse system. Stock calculations are performed automatically.

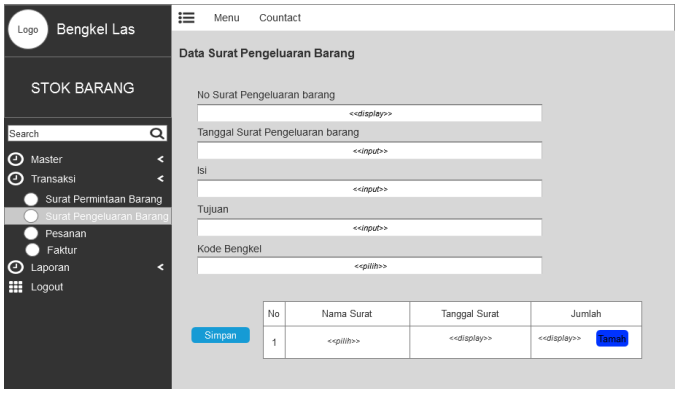

Figure 9. Display of the Goods Release Letter Interface

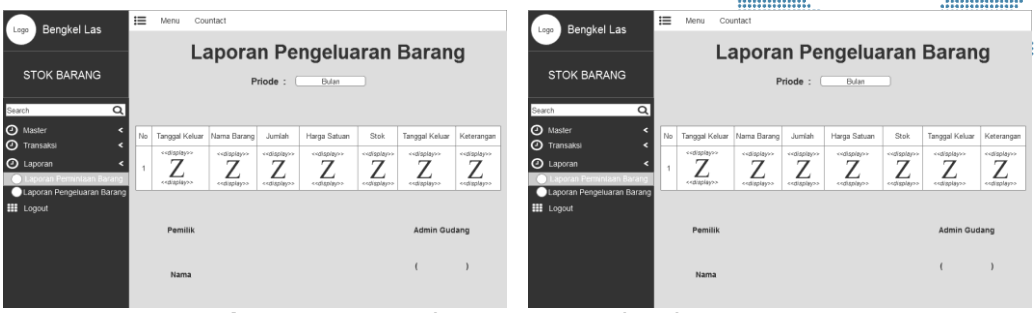

Figure 10. Goods Request and Release Report

The warehouse admin or workshop admin will then generate reports according to the required requirements. Reports are typically generated monthly, with the specified period specified. Reports are automatically generated based on the transaction data.

3.4. System Testing

At the system testing stage, the author uses black box testing to test each existing function according to user needs, based on the input and output produced without paying attention to the code structure.

Table 1. black box testing

No	Test Module	Input provided	Corresponding output	Status
1	User Login	Valid username and password	Enter the dashboard	succeed
2	Add Items	Item code, item name, type, stock, item price	Data storage to database Can edit and delete	succeed
3	Add Supplier	Supplier code, name, address	Saving data to a database Can edit and delete	succeed
4	Goods Request Letter Data	The workshop admin adds items, if requests are met	Stock data is visible	succeed
7	Data on goods release letter	Warehouse admin issues goods based on request	Stock is visible when goods are issued. There is a stock notification if the goods requested exceed the remaining stock.	succeed
9	Expenditure and Demand Reports for goods	The date period is selected	The output layer is displayed on the layer. The PDF/Excel file has been successfully generated.	succeed

Based on black-box testing, all key features of the ALAR Welding Workshop's material inventory information system functioned properly and as expected. This testing ensured the system was ready for use in a real-world operational environment. Implementation and testing results demonstrated that this web-based material inventory information system functioned well and met user needs. All key features functioned as intended, such as recording incoming and outgoing stock, minimum stock notifications, and automatic reports.

3.5. System Maintenance

After the material inventory information system at the ALAR Welding Workshop has been successfully implemented and used, the system still requires maintenance to maintain its performance, reliability, and suitability to operational needs, which can change over time. Benefits of this maintenance include correcting errors, conducting regular maintenance, and adapting to needs.

4. Conclusion

Based on the results of research conducted by the author on the web-based material inventory information system at the ALAR welding workshop, namely with this system the stock management process can be measured and makes it easier for the admin to find out the stock of material, the notification of remaining stock both for the warehouse admin and the workshop admin will be very helpful in maintaining workshop operations, the required reports can be made immediately without having to wait a long time, because the report creation only includes the reporting period according to needs.

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