

DESIGN OF AN INVENTORY INFORMATION SYSTEM FOR LABORATORY SUPPLIES

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ABSTRACT

Data is inaccurate because it does not have a relevant data repository, data can be lost or damaged, inefficient data search and technicians cannot know for sure the amount of stock available. Based on some of the research above, the inventory information system for Laboratory goods in the Information Technology Study Program will be designed and built based on a website using the Laravel framework. The system development method used is the Incremental model. Incremental models are the result of a combination of elements from the waterfall model that are applied repeatedly, or it can be called a combination of the waterfall model and the Prototype Model. During testing, many errors were found in the system. Testing was carried out 4 times with a total of 164 test cases. In the first test, 98 bugs were found which were then reported to the programmer to be fixed. In the second test, 40 errors were found, in the third test, 19 errors were found, and in the last test conducted by the examiner, 0 bugs were found. The design of the Laboratory Goods Inventory Information System (SIMBA) begins with analyzing the weaknesses of the old system using the PIECES method. Then proceed with conducting a system requirements analysis and system feasibility analysis. After the analysis phase, it is continued with the design stage which begins with the UML design method.

Keywords: SIMBA, Laravel, Analytics, Items, Loans

I. INTRODUCTION

The role of information technology continues to be utilized to this day in facilitating daily activities. The role of technology in the field of computerization is one of the fields most widely used and in demand by organizations or companies. The field of computerization certainly makes it easier to collect data and store it, such as an inventory information system. However, the role and function of inventory has not been evident in several educational institutions in Indonesia [1]. The definition of inventory itself is the activity of recording goods and processing inventory data owned by an organization. If inventory management is carried out properly, it will certainly provide great benefits for the smooth running and success of an organization's activities, such as in certain agencies.

The Information Technology Study Program (PSTI) is one of the study programs at the Faculty of Engineering, University of Lambung Mangkurat which was officially established in 2014 in accordance with the organizer's Decree No.541/E/0/2014 [2]. The purpose of the establishment of the Information Technology Study Program is as a manifestation of the active role of Lambung Mangkurat University in the field of computers and information technology which needs to build a scientific foundation within the Lambung Mangkurat University environment. To support and support the process of lecture activities, the ULM Information Technology Study Program has 3 laboratories including the Computer Network Laboratory (Jarkom), Software Engineering Laboratory (RPL), Basic Computer Laboratory.

In addition to providing tools and materials to be used during practicum in certain subjects, the management of the Laboratory in the Information Technology Study Program also provides permission for students who wish to borrow tools and materials, especially the tools and materials in the Computer Network Laboratory of the Technology Study Program. However, as the process of borrowing activities by students goes on, the items in the Computer Network Laboratory continue to decrease, especially for Arduino tools and materials.

The Laravel framework is built with the concept of MVC (Model-Controller-View), which is a software approach that separates applications based on application components such as data manipulation, controllers and user interfaces [3]. In addition, the advantage possessed by the Laravel framework is that Laravel provides a very light layout template and artisan tools are available. Based on the percentage results, the most widely used framework by developers in designing and building an application is Laravel. The Laravel framework is ranked as the second most used by developers [4], [5].

Based on some of the research above, the inventory information system for Laboratory goods in the

Information Technology Study Program will be designed and built based on a website using the Laravel framework. The Laravel framework is used because it is easy to use, expressive syntax, lightweight layout and has many features that help developers make applications faster [6]. Based on these considerations, a Group Project report (PK) was prepared with the title "Design of Laboratory Goods Inventory Information System in the Information Technology Study Program". With the existence of an inventory information system for Laboratory goods in the Information Technology Study Program, it is hoped that it can help and facilitate the process of collecting data on goods, managing borrowing of goods and returns that will be carried out by students later.

A. *Research Objectives*

Designing and building an inventory information system for laboratory goods in the Information Technology Study Program which can assist in the process of inventorying goods in the Information Technology Study Program. Improving the quality of the data collection process and borrowing goods in the Information Technology Study Program. Reducing the use of paper in collecting data on goods, borrowing and returning goods

B. *Problem Limitation*

The limitations of the problem in this study are as follows:

1. A website-based inventory information system.
2. The inventory information system for laboratory goods in the Information Technology Study Program was built for the process of collecting data, borrowing and returning goods used and carried out by students and lecturers in the Technology Study Program.
3. The data used is data that comes from the results of data collection directly at the Information Technology Study Program Laboratory.

II. THEORETICAL BASIS

A. *Item Inventory*

Inventory of goods is the activity of recording available goods in a company or agency to produce a complete list of incoming and outgoing goods. Inventory of goods will produce information related to the existence of goods and this information can be used as a means to control and supervise goods. Inventory of goods is carried out as a means of effective monitoring of goods that are in an agency [7].

B. *Information System*

An information system is an organized combination of people, hardware, software, communications networks and data resources that collects, transforms and disseminates information in an organization [8].

C. *PHP*

PHP is an acronym for Hypertext Preprocessor, which is a code-based programming language (script) that is used to process data and send it back to a web browser into HTML code [9].

D. *JavaScript*

JavaScript is a programming language with object-oriented (OO) capabilities. Syntactically, the core JavaScript language resembles C, C++, and Java, with programming constructs such as if statements, while loops, and the `&&` operator [10].

E. *SDLC Incremental*

SLDC (Software Development Life Cycle, System Development Life Cycle) or Systems Life Cycle, the Incremental model is the result of a combination of elements from the waterfall model that is applied repeatedly, or it can be called a combination of the waterfall model and the Prototype Model.

F. *Laravel framework*

A framework is a collection of scripts that contains a collection of functions with the aim of helping programmers or development solve programming problems, such as variables, connecting to databases, calling files and so on. By using a framework, making applications can be done more quickly because the program code is not made from scratch [11].

G. *Database*

Database is a collection of logically interconnected data and descriptions of the data, designed to meet the information needs of an organization. Database is a large data repository that can be used by many users and depart-

ments. All data is integrated with a minimum amount of duplication. The database is no longer held by one department, but is shared across all departments of the company. The database itself holds not only the organization's operational data but also the representation of that data [12].

H. MySQL

MySQL is a system, like Oracle, DB2, SQL Server, and PostgreSQL. These products enable users to access and manipulate data in their databases, protect data from duplication and inconsistencies, and maintain metadata requirements to define the data stored [13].

I. PHPMysqlAdmin

PHPMysqlAdmin is a MySQL client in the form of a web application and is generally available on PHP servers such as XAMPP and other commercial servers [14].

J. Black box Testing

Black box testing is a type of testing which treats software whose internal performance is unknown. Black box testing uses a complementary approach that allows greater ability to reveal classes of errors than the white box method [20]. Black box focuses more on the functional specifications of the software.

III. SYSTEM PLANNING

A. System Requirements Analysis

At this stage of the system requirements analysis, the author formulates what is needed when the proposed system will be built and implemented. This analysis is divided into several parts, namely as follows:

1. Software Requirements

- StarUML for creating use case diagrams and activity diagrams.
- Visual Paradigm for creating activity diagrams.
- Adobe XD to create interface designs.
- PowerDesigner for designing databases.
- Visual Studio Code as a text editor when building the system.
- PHPMysqlAdmin to create databases.
- PHP Programming Language with Laravel Framework.
- XAMPP as a server.
- Web Browser to open the system.

2. Information Needs

- Information on total laboratory items in the Information Technology Study Program.
- Information on the number of laboratory items in the loan process.
- Information on the number of laboratory items that have been returned.
- Information on student data that is borrowing goods.
- Information on student data that has returned goods.
- Information on student data that is late in returning goods.
- Detailed information on goods.

B. System Development Model

The system development method used is the Incremental model. Incremental models are the result of a combination of elements from the waterfall model that are applied repeatedly, or it can be called a combination of the waterfall model and the Prototype Model. The Incremental Model is a system development method in software that is broken down into several functions or parts so that the development is done in stages [15].

C. Database Design

The design phase starts with creating a conceptual data model of the instance with implementation details such as the target DBMS. CDM in Laboratory Goods Inventory Information System in the Department of Information Technology (SIMBA).

D. Prototype Flow

Website-based information technology laboratory information system business process design can be seen in the following figure.

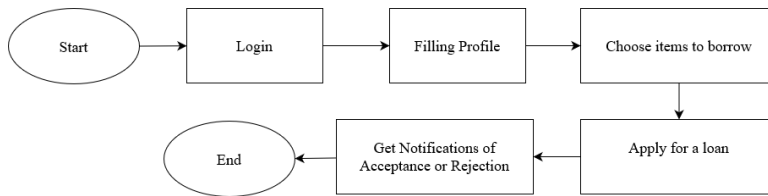


Figure. 2. Flowchart of borrowing goods in the goods inventory information system

Figure 3 shows the main processes in the proposed system, namely borrowing goods between the user, system and admin. In general, the description of the process that takes place on this system is, first the user opens the system, then logs in by entering the username (nim) and password (nim). The user data has been added by the admin before and has been stored in the database. If the user already has an account, he can enter the system, but if he doesn't have an account because the admin hasn't entered his data into the system, then he can meet the admin to ask for an account. When the user has successfully logged in, on the initial appearance of the system, the user will be directed to the profile page to fill in the bio. The admin will receive a notification regarding the application for borrowing laboratory items made by the user. After the application for borrowing goods has been responded to by the admin (approved or rejected), the user will receive a notification of the response to the application for borrowing laboratory goods from the admin. If the application for borrowing laboratory goods is approved by the admin, the system will change the status on the lending process page to "approved", and the user can continue the process of borrowing goods by taking the goods with the lab assistant or with the admin himself then uploading photos of the goods in the system as proof of borrowing goods laboratory in the Technology Study Program. However, if the loan application is rejected by the admin, the system will change the status on the page for the process of borrowing goods to "rejected", so that the user cannot continue the process of borrowing laboratory goods at the Information Technology Study Program.

IV. IMPLEMENTATION AND TESTING

A. Interface Implementation

- 1) Admin Page
 - a. Login Page

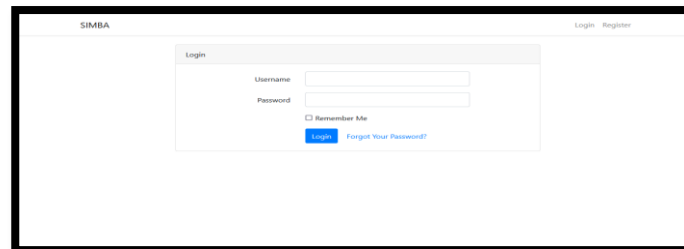


Figure. 3. Login page display

On this page, there is a "login" form that must be filled in in order to enter the Admin "Dashboard" page. You will be asked to enter your NIP or username and password. Log in can only be done by users who have Admin status in the Information Technology Study Program.

- b. Return Items Page

On the "Returns" page, there is an activity of returning goods by scanning the barcode contained in each item with the aim that the admin can find out the details of the items borrowed by the user (student). Admin will scan with the help of a scan tool to read the barcode code of the item.

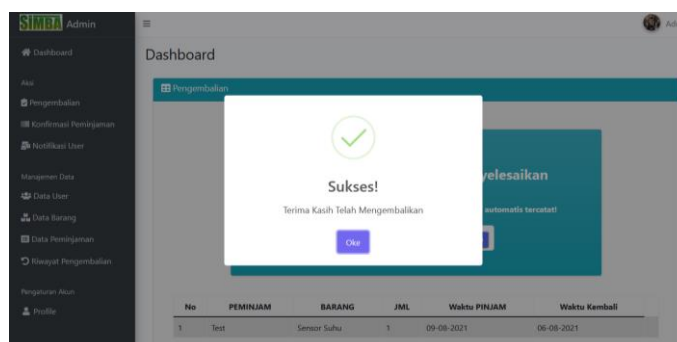


Figure. 4. Display Return Successful

If the scan is successful, in other words, the barcode code is read, information (notification) will display successful returns. And automatically, it will display a loan information table, including the name of the borrower, the name of the item, the number of items borrowed, the time of borrowing and the time of borrowing. Next is to upload a photo of the returned item (optional) on the "Return History" page by the admin. After uploading photos, Admin can click the "Save" button.

c. Loan Confirmation

The "Confirmation of Loans" page displays a table as well as a description of the name of the item, the borrower, the number of items, the duration of the loan, the status and actions of saving and notes. For the "Borrow Duration" section, the admin can change the loan and return dates previously inputted by the user (student). On the "Dashboard" page there is a task that says "Unprocessed Total", if you click "Further", the Admin will go to the "Loan Confirmation" page.

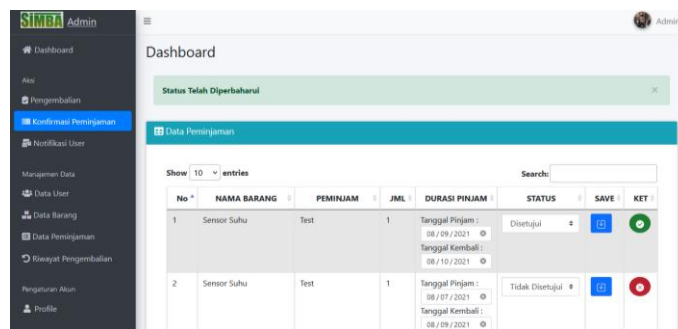


Figure. 5. Loan Confirmation Page

2) User Page

a. List Loan Page

The "List of Borrow" page displays a list of items that have been previously added to the list of items to borrow. On this page the user can determine the number of items to be borrowed, the borrowed date and the return date. If the user is sure of the item being borrowed, the user can click on the borrow icon to submit an item loan application.

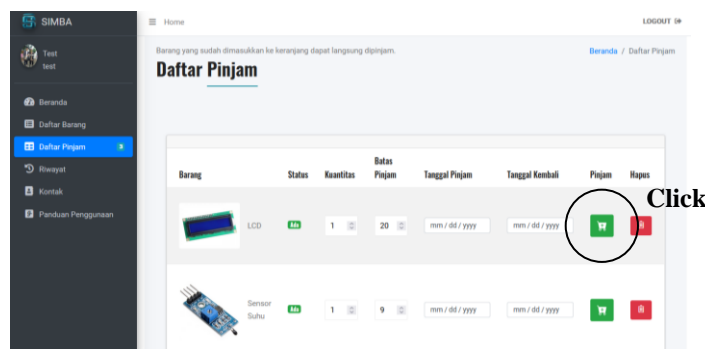


Figure. 6. Item List View

B. Installation Manual

Log in to the cpanel provided by the agency, then Enter the MySQL® Database section to create an account and add permission to access the database. When finished adding accounts to access the database, return to the main control panel menu, then access the PHPMyAdmin menu. Then look for the table that was previously registered and import the database file that has been provided in the Information System that was created.

After finishing configuring the database, now return to the control panel main menu then enter the File Manager section. In this menu select the \public_HTML folder and upload the System Application Files. Then return to the

File Manager and unrar the uploaded file, configure the database by editing the database.PHP file in the public_HTML/application/config/ folder by replacing 'database' with the table name in PHPMyAdmin and changing 'username' and 'password' be according to the one in step number 2. The system installation stage is complete.

C. System Maintenance

There are two stages of system maintenance for this project. The first stage is when the system has been installed and used by agencies, to ensure that when the system is used it can run smoothly without any problems the first time it is used. The second stage is carried out around 3 - 4 months after the system is used. These two stages aim to ensure that the applied application runs according to the objectives in solving problems that exist in the Borrowing and Return of Laboratory Items in the Information Technology Study Program. In addition, the two stages are also useful to find out whether the application needs to be repaired or refined. These two stages are also a form of evaluation and monitoring so that the Laboratory Goods Inventory Information System (SIMBA) can be operated and run optimally and in accordance with agency expectations.

D. Testing Stage

Black Box testing is done by testing all the functions in the system. Then the results of the test are entered into a table containing the columns Test Case ID, Test Scenario, Test Case, Pre-Condition, Test Steps, Test Data, Expected Results, Post Condition, Actual Results, Status (Success/Fail).

During testing, many errors were found in the system. Testing was carried out 4 times with a total of 164 test cases. In the first test, 98 bugs were found which were then reported to the programmer to be fixed. In the second test, 40 errors were found, in the third test, 19 errors were found, and in the last test conducted by the examiner, 0 bugs were found. The following details the number of testcases in each test.

V. CONCLUSION

Based on the results of the design and manufacture of a group project entitled "Design of Laboratory Goods Inventory Information System in the Information Technology Study Program" that has been carried out, it can be concluded that in designing a Laboratory Goods Inventory Information System (SIMBA) begins with analyzing the weaknesses of the old system, namely by using the PIECES method. Then proceed with conducting a system requirements analysis and system feasibility analysis. After the analysis phase, it is continued with the design stage which begins with the UML design method. Then do the database design and system interface design.

After the analysis and design stages, the next stage is system implementation using the Laravel framework with the PHP programming language and MySQL database. Where the results are obtained, this system can facilitate the application for borrowing and returning laboratory items in the Information Technology Study Program. As well as the data - the data can be archived properly because this system already uses a database. Then proceed with system testing carried out using the Black Box Testing method to test the system that has been designed. The goal with testing this system is to check the system, whether the system that has been designed and built is in accordance with the expectations and results of the analysis phase.

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