The Borrowing and Monitoring Medical Equipment Application in Hospital and Laboratory

Yudha Pradana

Department of Medical Electronics Technology, Vocational Program, Universitas Muhammadiyah Yogyakarta
Jln. Brawijaya, Kasihan, Bantul-DIY, Indonesia 55183
Phone. (0274) 387656, Fax (0274) 387646
Email: yudha.pradana.vok20@mail.umy.ac.id

ARTICLE INFO

ABSTRACT

Good management of medical equipment in hospitals is mandatory, with the aim of ensuring that it is always well monitored. The management of this medical equipment is usually done manually by filling in forms and assisted by word and number processing software carried out by electromedical staff. With so many medical devices in hospitals and so few electromedical personnel, plus data collection is still carried out manually, it will not be easy to find information on the management of these devices, and it will take a long time. Research on Borrowing and Monitoring Medical Devices in Hospital and Laboratory Applications is a web application that was built using PHP and XAMPP coding as a database. This application aims to make it easier for users to borrow and monitor medical equipment in hospitals and laboratories. In this application, users can borrow medical equipment online and monitor the condition of the borrowed medical equipment. Apart from that, this application is also equipped with a notification feature to remind users about the due date for returning borrowed medical equipment. Hopefully, this application can increase efficiency and effectiveness in managing medical equipment in hospitals and laboratories.

Keywords: Applications, PHP, MySQL, Bootstrap.

ABSTRAK

Pengelolaan peralatan kesehatan yang baik di rumah sakit merupakan hal wajib yang harus dilakukan dengan tujuan agar peralatan kesehatan selalu terpantau dengan baik. Pengelolaan peralatan kesehatan ini biasanya dilakukan secara manual dengan mengisi formulir dan dibantu perangkat lunak pengolah kata dan angka yang dilakukan oleh tenaga elektromedis. Dengan begitu banyak alat kesehatan di rumah sakit dan sedikitnya tenaga elektromedis ditambah dengan masih dilakukannya pendataan secara manual akan menyulitkan mengetahui informasi pengelolaan alat-alat tersebut dan akan membutuhkan waktu yang lama. Penelitian Borrowing and Monitoring Medical Devices Application in Hospital and Laboratory merupakan sebuah aplikasi web yang dibangun dengan menggunakan coding PHP dan XAMPP sebagai database. Aplikasi ini bertujuan untuk memudahkan pengguna dalam meminjam dan memonitor alat-alat medis di rumah sakit dan laboratorium. Dalam aplikasi ini, pengguna dapat melakukan peminjaman alat medis secara online dan memonitor kondisi alat medis yang dipinjam. Selain itu, aplikasi ini juga dilengkapi dengan fitur notifikasi untuk mengingatkan pengguna tentang jatuh tempo pengembalian alat medis yang dipinjam. Dengan adanya aplikasi ini, diharapkan dapat meningkatkan efisiensi dan efektivitas dalam pengelolaan alat medis di rumah sakit dan laboratorium.

Kata Kunci: Aplikasi, PHP, MySQL, Bootstrap.

1. INTRODUCTION

Now, organizing medical services is very important in clinics, hospitals, or health centers. Health equipment plays a very important role, so health equipment must be stored, secured, and maintained in an efficient manner so that its benefits are maintained, prepared, and utilized. To make this happen, support efforts are carried out in an organized, reasonable manner and must be reported. Apart from that, equipment activities must be in accordance with SOP (Standard Operational Procedure) [1][2].

According to the Ministry of Health No.371/Menkes/SK/III/2007, explains that electromedics are members of medical personnel whose main task is to ensure the provision of health services, especially so that health equipment is used with a level of accuracy, safety, and quality that meets standards [3].

The inspection of clinical equipment is essential to guarantee that the device meets value, safety, and quality standards. The standards set by the Ministry of Health ensure that medical equipment is fit for use. Efforts are made to maintain the quality of health supplies and medical devices so that they meet usability, safety, and quality standards [4].

The Laboratory Section of Amikom University Yogyakarta is a work unit tasked with providing technical services related to laboratory infrastructure and facilities. To describe old systems in analysis sessions or new systems in design sessions, the tool used to model the proposed system is called Flow of Documents, or (FOD). The business process analysis is carried out using a flow of documents or information that shows system procedures in a logical and flowing manner. The report is in the laboratory section of Amikom University Yogyakarta [5][6][7].

An application called "Medical Device Recording Data System that Supports Electromedical Tasks in Medical Device Management" was previously the subject of research. While "medical device information system design" and the PHP programming language are the superior features of this application, however in this research, there is no real-time goods lending system that can be used on mobile devices such as cell phones. Therefore, the author wants to add a lending feature to the application and expand it to be used as an inventory system or loan recorder [8][9][10][11][12][13].

The research by Mulyono, Supriyanto, and Agung S. Nugroho regarding software entitled "Medical Device Recording Information System that Supports Electromedical Tasks in Medical Equipment Management." This application was created using PHP as a programming language with a MySQL information base, and the data modeling system was tested using Enterprise Architect to create activity, use cases, and sequence diagrams. The testing is carried out in 2 ways, namely white box testing (testing the code when changing the equipment status) and black box testing (testing the entire system when running). The results of the testing show that the program that has been created successfully meets expectations. This is proven by the fact that all menus in the application function well. However, this data system has several advantages. Initially, the system is able to present equipment inventory data in real-time. However, several limitations need to be considered. This system does not include a tool lending system and graphics. Thus, further development can be focused on expanding the system's functionality to include the equipment lending aspect in order to increase the usability and value of this data system [14][15][16][17][18][19].

The research regarding software entitled "The Information System for Borrowing and Returning Medical Records with Barcodes and WhatsApp Notifications at the Wijaya Kusuma Lumajang Hospital". In previous research, it was identified that the management of medical records at the Wijaya Kusuma Lumajang Hospital was not running optimally [20][21][22][23].

This situation is proven by the absence of the use of a tracking system ("tracer") as an alternative for data removed from medical record shelves and the limitation of the use of expedition books only in the case of borrowing medical record data for inpatients. This research was carried out with the main aim of designing and improving a data system that manages the process of borrowing and returning medical record files in hospitals. In this case, the system is designed to be website-based, using barcode technology and WhatsApp notifications. This system has the ability to create patient identification labels, track ("tracer") files, and produce complete reports regarding borrowing and returning medical record files. The approach used in research procedures is a system development approach with a prototype approach.

In this process, the various methods of collecting qualitative information, such as interviews, observation, documentation, and brainstorming stages, are used. The various stages in the prototyping methodology include analysis of user needs, construction of an initial prototype, adjustment of the prototype to suit user preferences, development of a new system, testing of the system, further adjustments based on user input, and finally, system implementation. As a result of

this research, a website-based data system was formed that manages the process of borrowing and returning medical record files.

2. RESEARCH METHODS

The method used in this research consists of a database, UI (User Interface) design, and data collection system planning.

2.1. Database System Design

In designing a database creation system, we have to make sure to identify the type of data that will be stored, such as information on medical equipment, loans, and users, and pay attention to the relationships between data, such as equipment borrowed by users at a certain time. This design uses the XAMPP application.
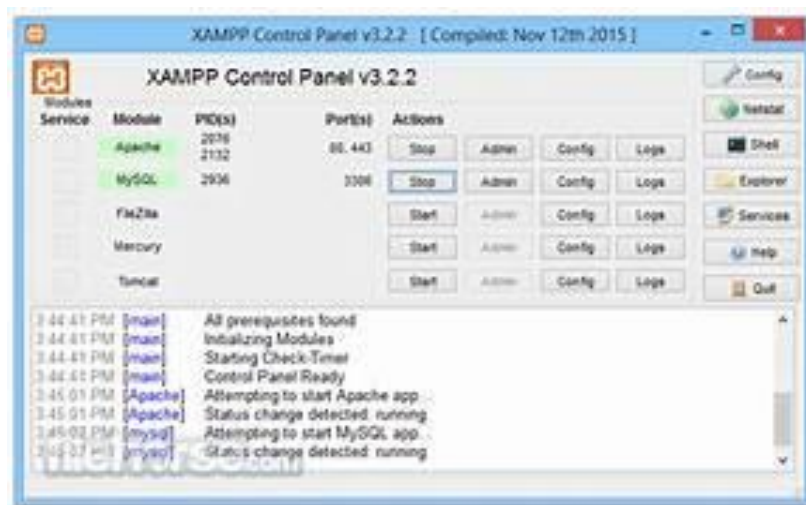

Figure 1. The XAMPP Application

Next, design a database structure by creating tables such as "Medical Equipment" for equipment details, "Loans" for loan records with information such as loan ID, user ID, equipment ID, loan date, and estimated return date, and "Users" for information about users such as name, position, and contact information, which are displayed in the following image:
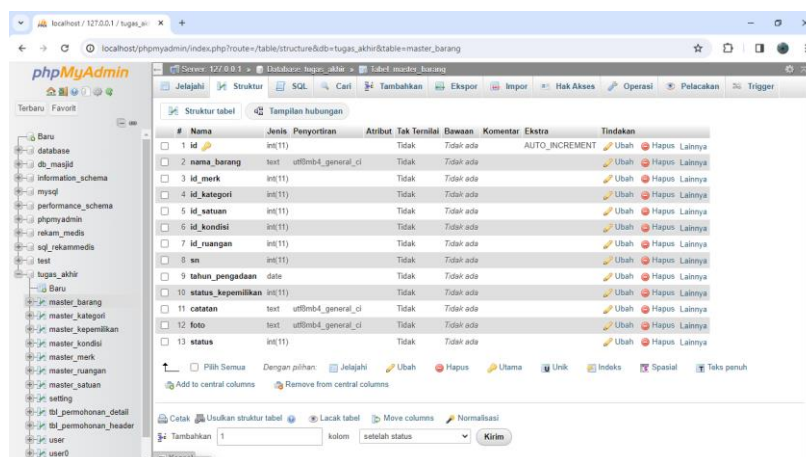

Figure 2. The Image of XAMPP id Table

Be sure to assign a primary key to each table and link the tables using foreign keys, such that the equipment ID in the Loans table refers to the equipment ID in the Medical Equipment table. After that, implement the database structure that has been designed in MySQL using XAMPP

with SQL commands such as CREATE TABLE. Continue by developing an application that connects to the MySQL database using a programming language such as PHP, Python, or Java, as shown in the following image:

```php
<?php

// Deklarasi variabel
$servername = "localhost";
$database = "my_database";
$username = "root";
$password = "";

// Buat objek mysqli
$conn = new mysqli($servername, $username, $password, $database);

// Cek koneksi
if ($conn->connect_error) {
  die("Connection failed: " . $conn->connect_error);
}

// Koneksi berhasil
echo "Koneksi berhasil";

?>
```

Figure 3. The Coding Connecting to The Database

Make sure the application can add, delete, and update data in database tables according to application needs. Next, test the application to ensure the desired functionality is achieved and carry out optimizations if necessary, such as using indexes on columns that are often used for data searches. The discussion above can be seen from the following image:
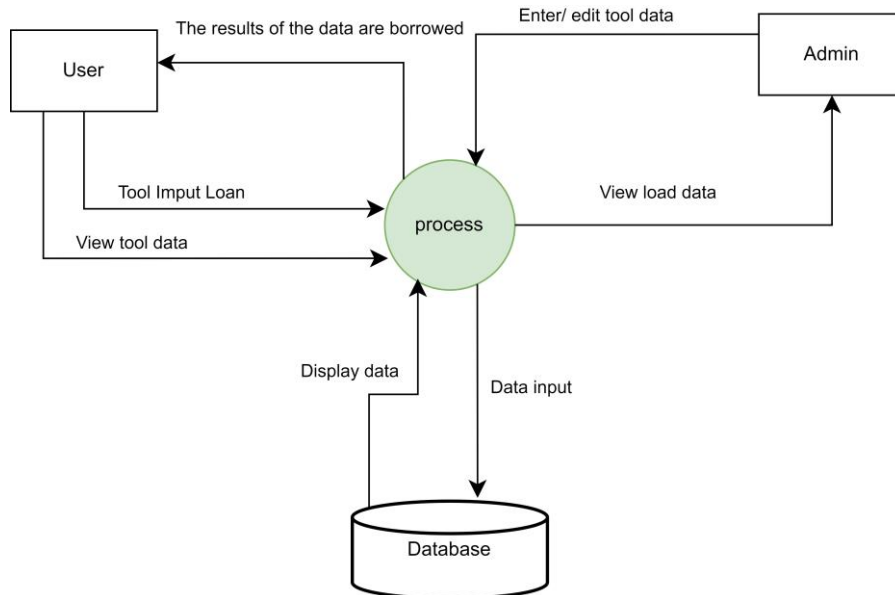
Figure 4. The Process Flowchart

2.2. UI Design (User Interface)

In this research, the user interface (UI) of the proposed application is designed for hospital and laboratory environments.The design process involves the stage of gathering information related to user needs, which becomes the basis for the development of sketches, wireframes, and interactive prototypes. Prototype testing is done with potential users to get valuable feedback in improving the UI design. This emphasizes the importance of design consistency, choosing a color

palette that is appropriate to the medical context, a typeface that is easy to read, and using symbols or icons that users can easily understand.

This system uses barcode technology and WhatsApp notifications as an integral part. The main function of the system is to make it easier to track the movement of medical record files and overcome obstacles that arise during the process of borrowing and returning medical record files. It is hoped that the implementation of this system will have a positive impact on increasing the efficiency and accuracy of medical record file management at the Wijaya Kusuma Lumajang Hospital. This application is very good, and from this research, the author wants to create an application with a lending system that focuses on borrowing medical equipment in hospitals.

By looking at some of the research above, the author tried to design a system for monitoring and lending medical equipment, which can be accessed using mobile or desktop, which uses Notepad++ as a coding method, MySQL as a database, and Bootstrap coding as an interface design. The author wants to build an application that can practically borrow tools, complete with data reports and graphs for borrowing tools.

3. RESULTS AND DISCUSSION

In this final assignment research, the author carried out testing by collecting data by entering the equipment data and testing it using the black box method. Data was collected by collecting equipment data and entering it directly into the application, including equipment name, equipment placement, equipment category, serial number, equipment, and image capture equipment.

3.1. The Application Testing Results

From this research, the author has carried out direct testing and obtained the following results:

Table 1. The Experiment Data Testing Results

No.	The Functional System	The Output Generated
1.	The user login	A notification appears if the username or password does not match: "Incorrect Username/Password."
2.	The users access data menu tool	The system can display relevant menu
3.	The Admin Menu access master	The system can display the menu master and can perform add, edit, and delete function
4.	The Admin and the user access menu sheet report	The system can display menu report sheets and make input borrowing

Table 1 shows the test with input data. The information systems have diverse functionality to meet user needs. This functionality can be grouped into several categories, such as login functionality, menu access functionality, and data input functionality. The login functionality aims to ensure that only users who have valid accounts can access the system. If the username or password does not match, the system will display an error notification.

The menu access functionality aims to allow users to access data or features appropriate to their role. For example, users with the admin role can access the master menu to manage master data, while users with the regular user role can only access the equipment data menu. The data input functionality aims to allow users to enter new data into the system. For example, admins can enter data for new equipment, while regular users can enter data for borrowing equipment.

4. CONCLUSION

Based on the results of the research, it can be concluded that:
a. This information system has succeeded in creating a database with MySQL, creating a UI (user interface) using Bootstrap with the PHP programming language, creating server and client computers, and creating different access rights with admin levels.
b. This web-based information system can be used to manage medical device data in the form of adding, updating, deleting, and searching for data as needed.
c. The admin access rights have full control over all pages except the damage report page, while users (the equipment users) only have a small part.

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