Development of application Information System in Rhee District

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Abstract. Management of patient data at the Technical Implementation Unit of the Community Health Center (UPT. Puskesmas) of Rhee Sumbawa District has not been fully computerized. The need for the development of an Information System to store medical records (history) of patient data. The research aims to develop information systems with descriptive research methods. For software development methods using Waterfall Models and built with Microsoft Visual Studio C# software and databases stored in Microsoft SQL Server software. Software testing uses Black Box Testing, which is testing software in functional terms. The results of research into digital data technology products that function to enter, change, delete data and minimize the time to find the data needed to improve the effectiveness and efficiency of data management.

1. Introduction

The Technical Implementation Unit of the Community Health Center (UPT. Puskesmas) is a functional organization that organizes health efforts that are comprehensive, integrated, equitable, acceptable and affordable to the community, which is to achieve the highest degree of public health through health efforts, as stated in Regulation of the Minister of Health of the Republic of Indonesia Number 75 of 2014 concerning Community Health Centers (Puskesmas), namely the need for good and quality health services by health providers, therefore demands high performance from the health providers themselves [1] [2]. The same goes for UPT. Rhee District Health Center, by being the only health center in Rhee District, Sumbawa Regency, thus UPT. The Rhee District Health Center must serve patients readily and professionally. Until now, the system in processing patient data has not been fully computerized, the process of recording patient data by officers still uses application office software namely Microsoft Excel while for medical record data it still uses manual books as a medium to record patient conditions. Reviewing these conditions, the data and information management has not been effective and efficient. As often happens is when a patient who has previously registered, requires medical records or medical history. Because it is still manual in managing data, it makes it takes a relatively long time to find the data in a pile of books that are used to store the data of previous examinations and find out what drug dosages have been given for the treatment of these patients.
Based on these problems, then designed an information system which is a collection of computer devices (hardware and software as well as brainware), which has organized procedures and rules for managing and storing patient medical record data. The information system was built with a descriptive research method. This method has a problem-solving procedure that is investigated by describing the state of the subject or object being studied at the present time based on the facts that appear or as they are [3]. In software development using Waterfall Models and programming languages used based on Desktop with Microsoft Visual Studio C# software and Microsoft SQL Server software as a data storage medium [4] [5]. Using desktop programming because it's on UPT. Rhee sub-district health center has hardware and computer network limitations [6], with the system to be used stand-alone, desktop-based programming is used. The information system will be a digital data technology product that functions to enter, change, delete data and minimize the time to find the data needed so that it can improve the effectiveness and efficiency of managing patient medical record data. Before being submitted to the UPT. Rhee District Health Center, testing software using Black Box Testing [7], software testing is done to determine the quality of the system in terms of functional.

2. Methods

Using descriptive research methods and software development methods used are Waterfall Models. This method is one method of software development that generally defines what is needed in making software [8]. The stages of developing the waterfall method are as follows:

![Software Development Method with Waterfall Models](image)

Based on Figure 1, there are five stages in software development, namely:

a. Communication is an important step because it involves gathering information about the needs of consumers or users.

b. Planning, is a step to determine the plan for working on the software which includes technical tasks to be performed, the risks that might occur, the resources needed, the results to be made, and the work schedule.

c. Modeling, is the process of translating requirements into a software design that can be estimated before coding is made. This process focuses on the design of data structures, software architecture, interface representation, and procedural details (algorithms).

d. Construction, is the process of making code (code generation). Coding is the translation of design in a language that can be understood by computers. After the coding is complete the testing will be carried out. The purpose of testing is to find errors in the system and then repair them.

e. Deployment, is the stage of handing the system to the user for use and covers periodic maintenance.

3. Results and Discussion

The results of research in developing the system are as follows:
3.1. Communication

This step begins with communication, the results of communication conducted by researchers to the leadership of the UPT. Rhee Sub-District Health Center so there are some needs that are needed such as the form for recording patient identity and medical record data that is recorded in the patient history book. And the information obtained by the leadership's desire to implement an information system built by researchers.

3.2. Planning

Establish a plan for the use of data and technology in research. There are data that are used, including: Organizational Structure, Patient registration data, Patient examination result data, Laboratory data, Patient type data, Drug data, Officer data and Doctor's Practice schedule. Whereas the technology plan uses Microsoft Visual Studio C# software tools and the database is stored in the Microsoft SQL Server database management system software.

3.3. Modeling

In the Development of Puskesmas Information Systems at UPT. Rhee District Health Center, researchers made a system design with object-oriented design using Unified Modeling Language (UML) [9] [10]. Following are the results of the information system model that has been built:

a) Use Case Diagram

Used to describe an interaction between one or more actors with the information system to be created. Next is the use case for the information system that was built:

![Use Case Diagram](image)

Fig. 2. Use Case Diagram

b) Activity Diagram

Activity diagram illustrates the workflow (work flow) of a system or business process or menu that is in the software. Next is the design activity diagram on the information system for the data input process:
c) **Sequence Diagram**
Sequence diagram illustrates the behaviour of objects in the Use Case by describing the life time of objects and messages sent and received between objects:

```
admin
1. Fill username & password
2. Checking username & password
3. wrong username & password
4. Message: wrong username & password
```

```
login form
```

```
database
2. Checking username & password
3. wrong username & password
```

```
main menu form
1. Showing main menu
```

**Fig. 4. Sequence Diagram**

d) **Class Diagram**
Describe the structure of the system in terms of defining the classes that will be created to build the system. Classes have what are called attributes and methods or operations. The following is a class diagram design in the information system:
3.4. Construction

a) Construction Results Login Page, Main Menu, Input Data and Report Menu on the System:
b) Testing The Results of Construction

In testing, the Black Box Testing [11] method is used to check the input and output to determine whether the output is as expected. Following this information system testing process:

Table 1. System Testing

| No | Examination          | Goals                        | Indicator                      | Test Result |
|----|----------------------|------------------------------|--------------------------------|-------------|
| 1  | Database Connection  | Run the Program              | Access can be done             | Succeed     |
| 2  | Login                | Check the login menu process | Enter the system main view     | Succeed     |
| 3  | Menu operation       | Check the operation of the menu by inputting each menu | Display the menu input by the admin | Succeed |
| 4  | Menu Operation       | Check the Report             | Display data in the form of pdf | Succeed     |
| 5  | Log Out              | Check the system exit process| Log Out of the System          | Succeed     |

3.5. Deployment

The last stage is the handover of the system to UPT. Rhee District Health Center, to be used and can be done by the system maintenance admin.

4. Conclusion

Development of Puskesmas Information Systems at UPT. Desktop based Rhee District Health Center has been successfully built using Microsoft Visual Studio C# software tools with Microsoft SQL Server as a data storage medium. The system can carry out processes to enter, change, delete data and minimize time searching for data, print reports, view doctor's practice schedules, see information systems. It is hoped that the results of research will be a solution in increasing the effectiveness and efficiency of data management at UPT. District Health Center.

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