The Development of Web-Based Health Center Management Information System at Puskesmas Pinarik Using Codeigniter Framework

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ABSTRACT

Information systems are one of the fields of science within the computer science family where technically it refers more to business processes and management of an application to the sustainability of business processes of institutions, industries or organizations. The need for information systems in the industrial world is increasing along with the development of technology which has very significantly grown, many models and technologies are offered to simplify the processes that take place in companies or in agencies to reduce and minimize errors and human-errors. This is also felt by a government agency in Batang Lubu Sutam District, where there is a Puskesmas that is still very overwhelmed in the administrative process because it has not utilized technology in managing the processes in the Puskesmas, both in terms of patient registration and other related processes. The need for a Management Information System is the right solution for the Pinarik Health Center to improve the quality of service and administrative systems at the Puskesmas. In addition to speeding up the administrative process, the existence of a Management Information System will make it easier for patients visiting because the entire process has been systemised. The Management Information System that will be built at the Pinarik Health Center will use a web-based platform using the MVC (Model View Controller) model with the CodeIgniter framework and MySQL as the database storage medium. It is hoped that with the Information Management System the administrative process of the Pinarik Health Center will be effective and efficient and provide convenience both for patients and for the Puskesmas itself in particular.

Keyword : Management Information System, Codeigniter, MySQL, Health Centre, Puskesmas, MVC

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1. INTRODUCTION

In an agency or organization, information technology is a very important requirement. The rapid development of information technology encourages agencies or organizations to follow and use information technology in business processes within the agency or organization. It is undeniable that information technology is very influential in improving the quality of an agency or organization in the field of health services (Maulana & Al-Khowarizmi, 2021). Sundari (2016) in his journal said that the use of electronic services (e-service) can provide positive benefits for public bodies. Public agencies can also easily provide services in various regions by utilizing the existing internet network. Puskesmas Pinarik is located in the Batang Lubu Sutam District, Padang Lawas Regency, North Sumatra. On a daily basis, Puskesmas Pinarik is quite crowded with patients seeking treatment. In the system that has been running so far, Puskesmas Pinarik is still doing data collection manually. Patients who come for treatment first must register with the employee on duty and then be given a queue number, then the patient gets an examination by the health worker on duty. In the service process, all data collected at Puskesmas Pinarik are still done manually, so it will take a long time to implement. Andrianto & Nursikuwagus (2017) stated that there were often cases where officers had to pile up several patient cards before being handed over to the intended polyclinic. This also causes time consuming, patients who should be able to check quickly, are hampered because they have to wait for patient cards to pile up first. Such a system is certainly detrimental to patients and also makes the image of the puskesmas bad in the eyes of the community.

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With the development of increasingly advanced technology, especially in the field of computerization, it encourages many agencies to be able to take advantage of information technology. Information systems are needed and play an important role for every large institution (Maulana et al., 2020)(Syahputra et al., 2017), one of which is the puskesmas. The Health Service Information System can increase the effectiveness and efficiency of services at the puskesmas (Syahriani, 2018). The health information system is one of the 6 building blocks or is the main component in a health system (Setiyadi & Hakam, 2015). The role of information systems is to help control and organize the activities of the subsystem ± subsystem within the organization so as to assist the organization in achieving its goals (Lipursari, 2013). Utilization of information technology is used to assist puskesmas employees in carrying out better business processes.

To overcome the existing problems, the authors conducted a study to build a management information system for health centers. This system will provide information on the patient’s medical record making it easier for employees to find patient medical record data, and make it easier for employees to analyze the patient’s medical history. This system is expected to improve service efficiency at the Pinarik Health Center. Therefore, the authors conducted research on the Development of a Web-Based Health Center Management Information System at the Puskesmas Pinarik Using Codeigniter Framework.

2. RESEARCH METHOD

The research material that will be used by the author in this research is Patient Data. And the analysis and design process is carried out using hardware and software that support the needs. The following are the hardware and software specifications used for this analysis and design process (Lubis et al, 2017).

1. Hardware
   The hardware used in the analysis and design process of this system is the Acer Aspire E 15 laptop with the following specifications:
   - Processor: Intel® Core(TM) i3-6006U CPU @ 2.00GHz 2.00 GHz
   - RAM: 4.00 GB
   - System type: 64-bit Operating System, x64-based processor
   - Harddisk capacity: 500 GB

2. Software
   The software used in the process of analyzing and designing this system is as follows:
   1. Windows 10 as Operating System
   2. MySQL as DBMS
   3. PHP as web programming
   4. Codeigniter as Framework
   5. Notepad++, Sublime text as Text Editor
   6. Mozilla Firefox, Chrome as Web Browser

A. Data Collection Method
   In this research, data collection was carried out by means of observation with users, related to the overall purpose of the system to be built is using observation that researchers make observations or direct observations of the object of research to obtain accurate data in order to strengthen the results of the research (Maulana & Syahputra, 2017).

B. System Requirements Analysis
   System requirements analysis is carried out to identify what needs are needed in building a database of the system to be built (Maulana, 2016). The following is an analysis of the needs of the system to be built:
   - There are 3 users, namely: Admin, Medical Officer and Receptionist.
   a. Admin
   - Admin in this system has access to the following:
     1. Can login
     2. Can see patient data
     3. Can see the doctor's data
4. Can see the patient's medical record
5. Can see the dashboard
6. Can see polyclinic data
7. Can view disease data
8. Can input and manage polyclinic data
9. Can input and manage disease data
10. Can input and manage user data
11. Can input and manage doctor data
12. Can input and manage patient data

b. Medical Officer
Medics in this system have access to the following:
1. Can login
2. Can see the dashboard
3. Can see patient data
4. Can input the results of the examination of the patient
5. Can see the patient's medical record

a. Receptionist
Receptionist in this system has access to the following:
1. Can login
2. Can see the dashboard
3. Can see patient data
4. Can input and manage patient data
5. Can print patient treatment card
6. Can see the doctor’s data
7. Can see the patient’s medical record

C. Prototype Method
The prototype method is a simple software modeling method that allows users to have a basic overview and conduct initial testing of the program (Maulana & Al-Khowarizmi). Users often define software in general terms, making it difficult for developers to create features or algorithms that will be used efficiently. The prototype method provides facilities for developers and users to interact with each other during the manufacturing process so that developers can easily model the software to be made (Pressman 2012).

Fig 1. Prototype Method (Pressman, 2012)
D. Use Case Diagram

Use case diagram is a modeling to describe how the information system will be made. Use case diagrams describe an interaction between one or more actors and the information system that will be created (Rosa & Salahuddin, 2015). Use case diagrams describe the interaction between the actor and the system. In this system, there are three actors who will access the web-based puskesmas management information system at the Pinarik Health Center, namely the administrator, medical record officer, and receptionist. The actors who will access the web, the first process that must be done is login. Login is a must in this system, users will not be able to do other activities if they do not log in. For other activities such as adding patient data, adding user data, conducting examinations on patients and others, users can do according to their respective rights to the system. For example, the receptionist can add patient data and also print patient treatment cards. The medical record officer who records the results of the examination of the patient. For more details about the use case diagram design that has been made by the author can be seen in the following picture:

![Use case diagram](image)

Fig 1. Use case diagram

3. RESULT AND DISCUSSION

Based on the research that has been done, the following is the implementation of the development of a web-based puskesmas management information system at Puskesmas Pinarik.

a. Login page
In Fig 3, that figure show the login page of the system that requiring username and password given by administrator. From the picture above, it can be seen that this page functions to log users into the system, each user must enter the correct username and password to enter the system. If the username and password are entered correctly, the user will enter the system according to their respective access rights. The following is an implementation of the interface page for user login.

b. Patient menu page

This page contains patient data, information that has been registered on this web-based puskesmas management information system. The implementation of the patient menu page can be seen in the image below.

The picture above is a display page for the patient menu, the data displayed in the system is NIK, patient name, patient address and the patient’s date of birth. On the left side there is another menu available in the system. And above the patient data table on the left there is an add button to add new patient data.

c. User menu page
The picture above is an implementation view of the user menu page. On this page the user data displayed are username, user name, user address and level or user access rights to the system. On the left side there is another menu available in the system. And above the user data table on the left there is an add button to add new user data.

d. Doctor menu page

This page contains information about the personal data of doctors who work at Puskesmas Pinarik. The implementation of the doctor's menu page can be seen in the image below.

The picture above is the implementation display to the doctor menu page. On this page, the data displayed is the name of the doctor, the poly where the doctor is assigned and there are buttons to change the data and delete data. On the left side there are other menus available in the system. And above the user data table on the left there is an add button to add new doctor data.

e. Patient check-up

This page is a page for examining patients, medical officers input the results of the examination into the system. The inspection page can be seen in the image below.
The picture above is an implementation of the patient examination page. On this page the medical officer must fill in all the available fields, the patient’s name, the patient’s gender, the patient’s blood group here is available according to the patient’s data that has been selected. The medical officer fills in the fields for the patient’s blood pressure, the symptoms experienced by the patient, the diagnosis of the results of the examination of the patient or the disease suffered by the patient, as well as recommendations for drugs for the patient. If all the data on the results of the examination have been filled in, press the save button to save the data on the results of the examination of the patient.

**Testing**

The system that has been created submits to the user for testing. This web-based puskesmas management information system was tested to find possible errors in the system creation. Testing is carried out using the black-box method, namely by entering the correct value and the wrong value, after that the output will be seen whether the results are as expected or not. Testing using the Black Box testing method is carried out only observing the results of execution through test data without knowing what happens in the detailed process, but only knowing the input and output. This test was conducted using Google Chrome as a web browser. The process of testing the first prototype can be seen in the table below.

<table>
<thead>
<tr>
<th>Test Cases</th>
<th>Input Values</th>
<th>Testing Scenarios</th>
<th>Expected Results</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify login</td>
<td>Correct</td>
<td>Username and password textbox is filled correctly</td>
<td>Enter user start page</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>Username and password textbox is filled incorrectly</td>
<td>Displays the message &quot;Your username or password is wrong&quot;</td>
<td>Success</td>
</tr>
<tr>
<td>Adding patient data</td>
<td>Correct</td>
<td>All fields are filled completely</td>
<td>Data successfully added</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>Each field is not filled</td>
<td>Display the message &quot;please fill out this field&quot;</td>
<td>Success</td>
</tr>
<tr>
<td>Changing patient data</td>
<td>Correct</td>
<td>All fields are filled completely</td>
<td>Data changed successfully</td>
<td>Success</td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>Each field is not filled</td>
<td>Display message &quot;please fill out this field&quot;</td>
<td>Success</td>
</tr>
</tbody>
</table>
### Deleting patient data

<table>
<thead>
<tr>
<th>Correct</th>
<th>Click the delete button on the data to be deleted</th>
<th>Confirmation “are you sure want to delete the data”</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect</td>
<td>Select cancel in the confirmation window</td>
<td>Cancel to delete data</td>
<td>Success</td>
</tr>
<tr>
<td>Correct</td>
<td>Select Ok in the confirmation window</td>
<td>Data deleted successfully</td>
<td>Success</td>
</tr>
</tbody>
</table>

### Adding user data

<table>
<thead>
<tr>
<th>Correct</th>
<th>All fields are filled completely</th>
<th>Data successfully added</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect</td>
<td>Each field is not filled</td>
<td>Display the message “please fill out this field”</td>
<td>Success</td>
</tr>
</tbody>
</table>

### Changing user data

<table>
<thead>
<tr>
<th>Correct</th>
<th>All fields are filled completely</th>
<th>Data changed successfully</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect</td>
<td>Each field is not filled</td>
<td>Display message “please fill out this field”</td>
<td>Success</td>
</tr>
</tbody>
</table>

### Deleting user data

<table>
<thead>
<tr>
<th>Correct</th>
<th>Click the delete button on the data to be deleted</th>
<th>Confirmation “are you sure want to delete the data”</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect</td>
<td>Select cancel in the confirmation window</td>
<td>Cancel to delete data</td>
<td>Success</td>
</tr>
</tbody>
</table>

## 4. CONCLUSION

Based Health Center Management Information Systems at Puskesmas Pinarik, the authors can draw the following conclusions:

1. Successfully deploy a Web-Based Health Centre Management Information System at Pinarik’s Puskesmas
2. A web-based health center management information system has been built using the CodeIgniter framework.
3. This web-based puskesmas management information system has been tested by black-box testing.

## REFERENCES


