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Analysis and Design of Management Information Systems and Services at Asri Sentra Clinic

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Abstract
This study aims to analyze and design an information system at the Asri Sentra Clinic located in the Mutiara Gading area, North Bekasi City, and to implement the design results in the form of a computer application. So that the time for administrative work in serving patients seeking treatment is faster and the data collection process becomes more organized. The system development method used in this research is waterfall. Meanwhile, system modeling uses object-oriented modeling or UML. The programming language used is PHP and MYSQL is used to create databases. The results of this study are expected to make services at the Dian Kasih Clinic faster, more reliable and well structured. Besides that, it can also help the clinic's performance in handling medical record data of patients who have been treated at the clinic.

Keywords : Administration, PHP, MYSQL, Patient Services, UML.

INTRODUCTION

Background

In addition to community health centers (Puskesmas), integrated health posts (Posyandu), and hospitals, clinics are healthcare facilities available to the general public, although the majority are privately owned. Despite this, some residents still use clinics as their primary healthcare facility.

These health efforts are carried out by emphasizing services for the wider community to achieve optimal health levels, without neglecting the quality of service to individuals. Clinics are one form of infrastructure and facilities needed by the community, in addition to hospitals. According to Health Regulation No. 9 of 2014, in Article 1 paragraph 1, it is explained that; clinics are health service facilities that organize individual health services that provide basic and/or specialist medical services. At the Dian Kasih clinic, when viewed from the Ministry of Health regulations, namely Article 2 paragraph 2, this clinic is included in the main clinic category, namely a mix between general and specialist clinics.

Every patient who visits the clinic will have their identity recorded. Then all complaints, diagnoses, medical actions taken by the doctor and what medication will be

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given to the patient will all be recorded by the administration department. Everything will be recorded in the patient's files which are often called the patient's medical record files. Explanation of Article 46 paragraph (1) of the Medical Practice Law, what is meant by medical records is a file containing notes and documents about the patient's identity, examinations, treatment, actions and other services that have been provided to the patient.

This research aims to develop an administrative information system for clinics to manage their service administration, thereby improving the efficiency of their administrative work. The database was created to address issues with systems that use a file-based approach. This clinic's service information system is solely for administrative processes within the clinic and online patient registration.

RESEARCH METHODS

System Analysis

The problem at the Asri Sentra Clinic is that the clinic still uses handwritten documents. Likewise, medical records are still processed manually, which often leads to errors in data collection, or even if there are no errors, processing the files still takes a long time because the data must be matched [4].

The presence of an information system at this clinic is expected to help resolve problems, particularly those related to clinic administration. The analysis method used is the SWOT (Smart, Opportunity, and Risk Assessment) method.*Strengh Weakness Opportunity Threats*). With this analysis, we will find several problems that are often encountered in the old system.

1. Strengths/Advantages: From a strengths and advantages perspective, this clinic is supported by competent medical staff, both doctors and nurses. Its medical equipment is quite good, well-maintained, and meets medical care standards. Furthermore, it is frequently visited by local residents and residents from other areas due to its affordable treatment costs.
2. Weakness: The weakness of this clinic is the lack of use of technology to facilitate the recording of patients who have received treatment along with their medical record data and drug prescriptions because the existing data is manual, therefore, if you want to update it, it takes a long time.

3. Opportunity: The clinic's high patient count can be maximized to attract more visitors. Another added value is its strategic location, situated on a busy highway and in a residential area with diverse economic conditions. Given these conditions, the clinic's management can seize this opportunity to further develop the clinic and become its primary choice before seeking treatment at the hospital.
4. Threats: In addition to the existence of PUSKESMAS as a public access to affordable health facilities, the emergence of new clinics as competitors requires clinic management to immediately fix existing deficiencies. Because if the clinic's condition is not improved and made more attractive, then public interest in going to Asri Sentra Clinic will decrease, resulting in the clinic being empty of visitors or patients who want treatment.

System Planning

The data collection method in this study used observation techniques and interviews with the clinic. The system modeling in this study used object orientation with the UML modeling language. UML is defined as a visual language for explaining, specifying, designing, modeling, and documenting aspects of all systems, for all types of software applications, hardware, and any operating system [5]. The programming language used is PHP with the Laravel framework and the database system uses MYSQL.

As a supporting tool for the PHP programming language, this research uses XAMPP software. XAMPP is an easy-to-use web server that can serve more dynamic web page displays. In addition, XAMPP also functions as a stand-alone server (*localhost*) which consists of programs*Apache* HTTP server, MYSQL database and language interpreter written for PHP and Perl programming languages. Finally, for the software development model, this research uses the model*waterfall*or linear sequential.

The first step in this research was to analyze the problems experienced by the Diah Harapan Clinic. Because all work systems still use manual paperwork, there's a risk of files being lost or misplaced.

The second step is the system design, created to accommodate both the needs of the clinic's administrators and patient information services. Therefore, the system on the Home page uses*username*from staff emails and clinic patient emails and using keywords

or*password,*both staff and member email addresses, along with the creation of a database system. Based on the existing problems in this library, a data system needs to be created.

The third step is implementing the system to test it for the first time to see if it works correctly. Furthermore, testing is necessary to determine whether the system meets the clinic's expectations. The fourth step is conducting a trial run on the completed system. This aims to determine whether the system is operating as intended and according to plan, or whether it has not yet been achieved.

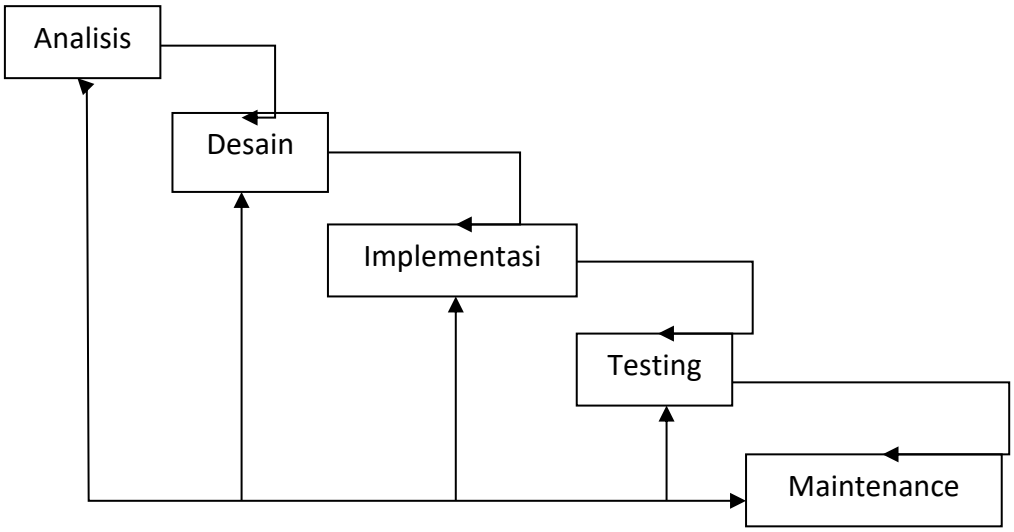

Figure 1. Information System Cycle, Waterfall Diagram.

DISCUSSION

The initial design stage involves creating the navigation structure. This structure is designed to illustrate how and in what order to use the application. This design simplifies the application development process. The navigation structure used in this study is a hierarchical navigation structure. This hierarchical navigation structure is a branching navigation structure, with the application consisting of a main page (*master page*) and supporting pages (*slave page*). The following navigation structure is depicted in Figure 2.

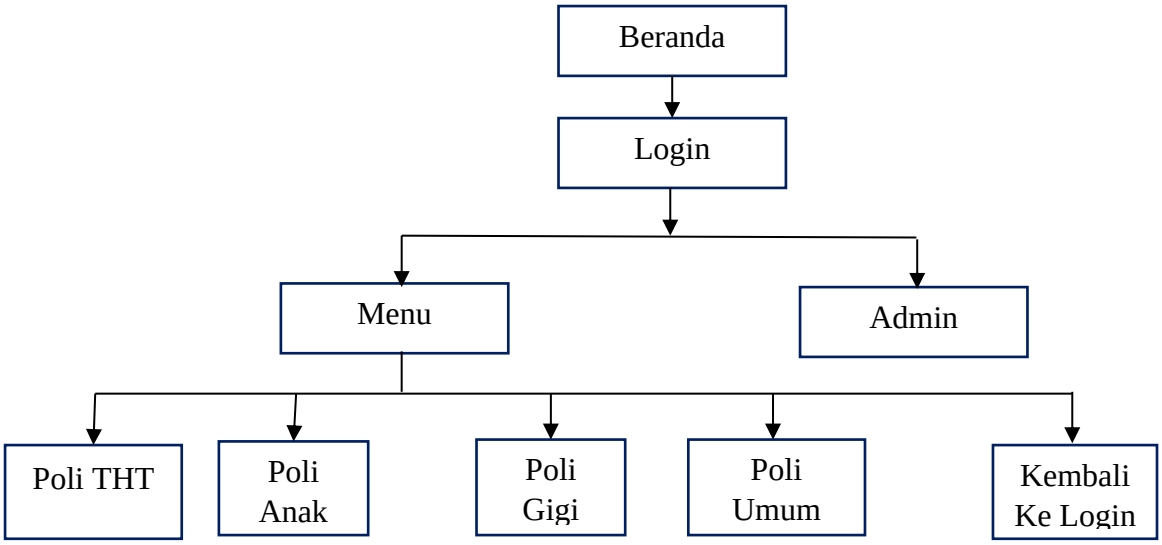

Figure 2. Application Hierarchy Navigation Structure

Figure 2 shows the navigation structure that illustrates the application's workflow. The homepage is the first page encountered by both clinic administration staff and patients before entering the login page. Afterward, the patient is on the login page, which leads to the menu page for patients or visitors, or the admin page for internal clinic users. The login page contains a code.*username* And *password*to act as security so that users, such as admin staff, can directly enter the admin room, and patients or visitors as clinic patients can directly access the menu page. The difference between the patient menu and the admin menu is that the admin menu contains buttons for executing patient data for further processing, for example, deleting it, adding information labels, entering it into the system database, and so on.

On the menu page, there are menu options where patients can choose their treatment schedule from each clinic, and there's a back menu. Each menu item selected by the user will move to the next page. The clinical information system modeling uses an object-oriented approach, with UML as its modeling language. The information system built in this library is desktop-based and uses the operating system.*Microsoft windows*10. The UML diagram used in this research is a diagram*use-case.*This UML diagram was created to simplify the problems commonly faced by Dian Kasih Clinic.

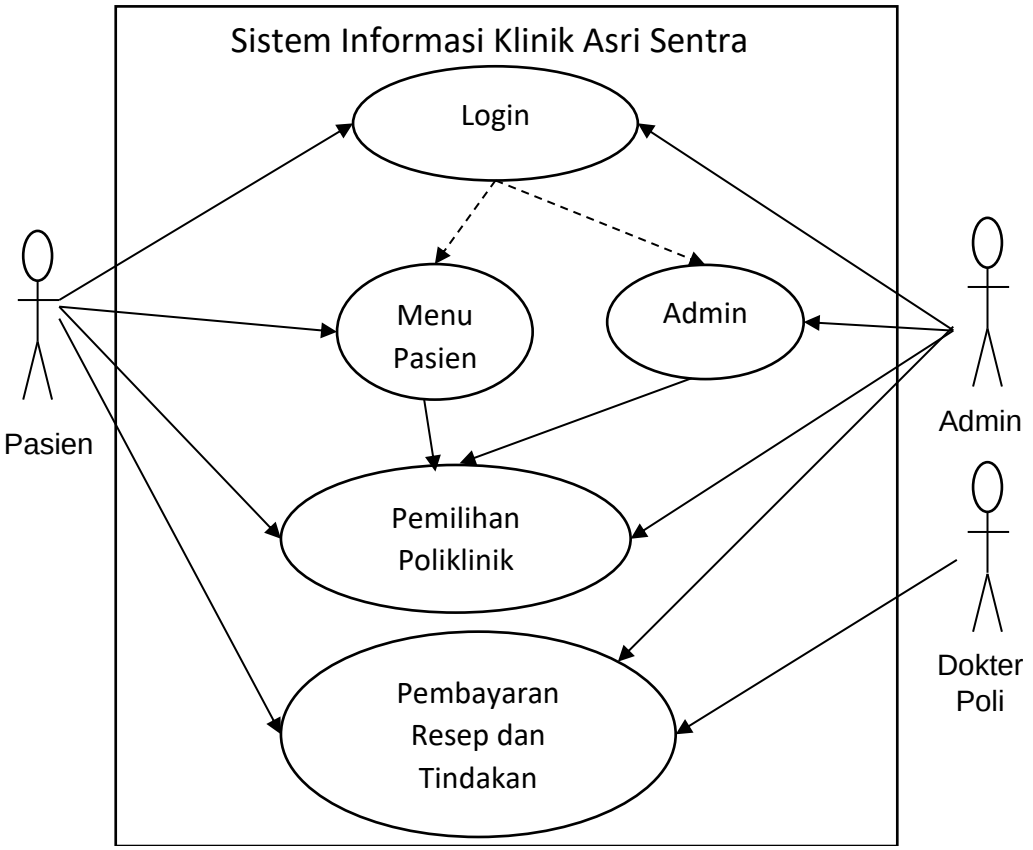

Figure 3. Use Case Diagram of the Asri Sentra Clinic Information

Based on this, the information system was made easier to understand and operate by the clinic's internal staff to support activities at the Asri Sentra Clinic. Figure 3 illustrates the diagram below.*use-case*clinical information system.

Diagram *use-case*, explains the overall depiction of the system, including the sequence of actions that work on the system and the actors and humans who carry it out. In Figure 3, in the diagram*use-case*There are two actors: the admin and the existing patient. Upon accessing the home page, clinic staff will automatically be logged in.

On the login page, both admin staff and old patients who have been treated at the clinic, who have been given*password* And *username*The email address will be entered into a different section. While existing patients will be logged into the patient menu page, administrative staff will be logged into the admin page, allowing them to change patient data in each clinic's clinic.

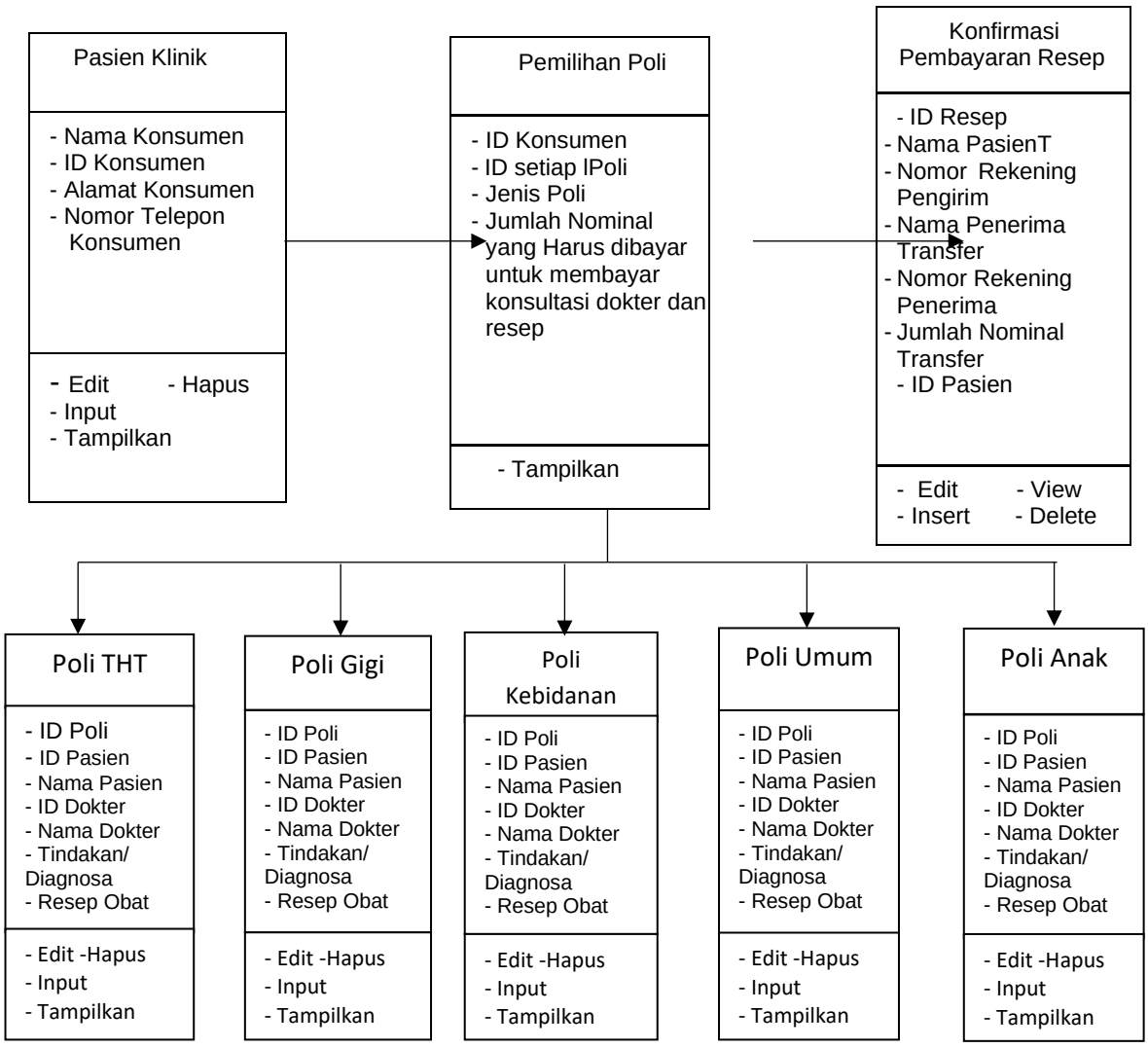

Figure 4. Class Diagram of the Asri Sentra Clinic Information System.

Meanwhile, to depict the existing data structure, this writing uses a class diagram (*class diagram*). This data structure explains the hierarchical arrangement and flow of data from one party to another.

The data structure is divided into two class diagram images, where the diagram is in the form of*superclass* And *subclass*. *Subclass*consists of four departments, namely ENT polyclinic, dental polyclinic, pediatric polyclinic and general polyclinic. In each of them*subclass*has complete command execution and can be corrected directly. These commands are input, edit, delete, and display. Meanwhile, for the structure*superclass*, the command execution only has the display command, because the complete command is already in*subclass*. *Superclass*only accepts input information from*subclass*. Explanation in Figure 4, the structure for conducting patient examinations in four sections, namely the

ENT polyclinic, children's polyclinic, dental polyclinic and general polyclinic, which are included in the structure*subclass*. All four are connected by a poly selection structure that acts as a generalization data structure flow. Meanwhile, the poly selection itself is included in the structure*superclass*and this structure is included in the main class structure. All data structures in the structure run sequentially in a linear or associative manner.

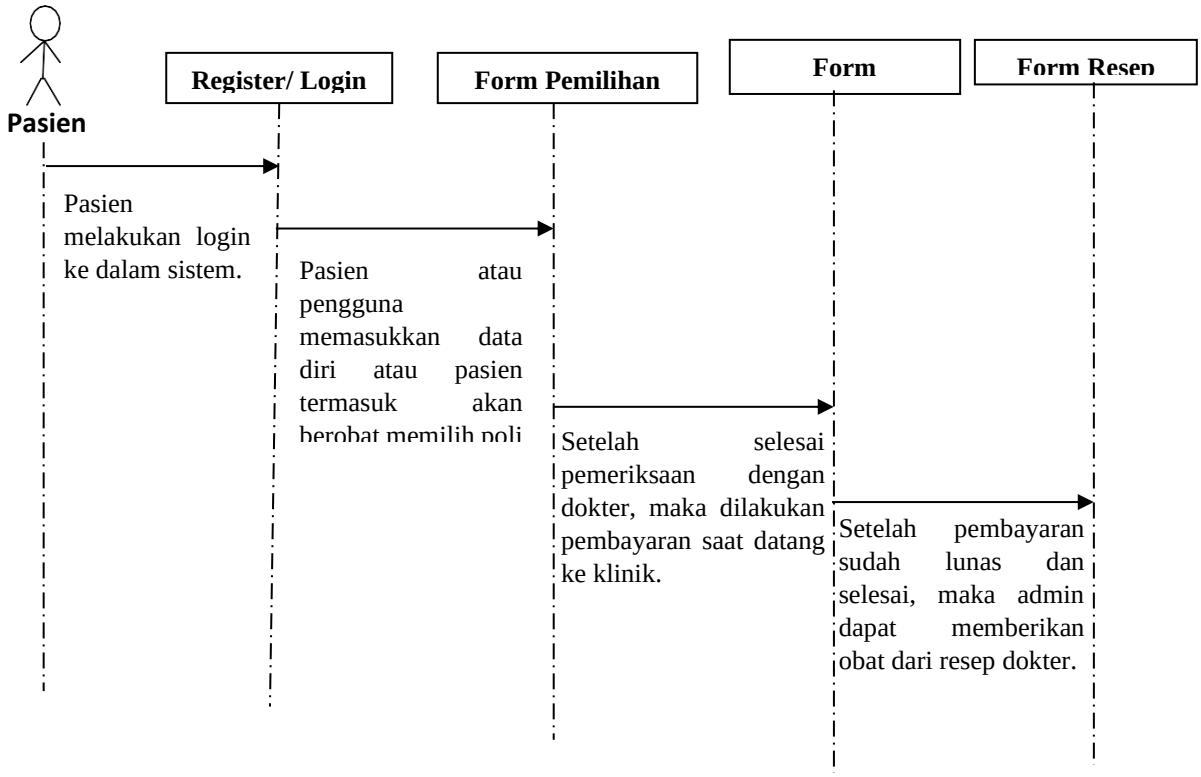

Figure 5. Sequence Diagram For Users/Patient.

In general, a sequence diagram describes the overall working order of a system from start to finish, which is explained by consisting of a vertical dimension, namely time, and a horizontal dimension, namely interactions with related objects. With this sequence diagram, we can see the sequence of what an actor or human must go through, namely a patient who will be treated at the Asri Sentra clinic, when entering the clinic's management information system.

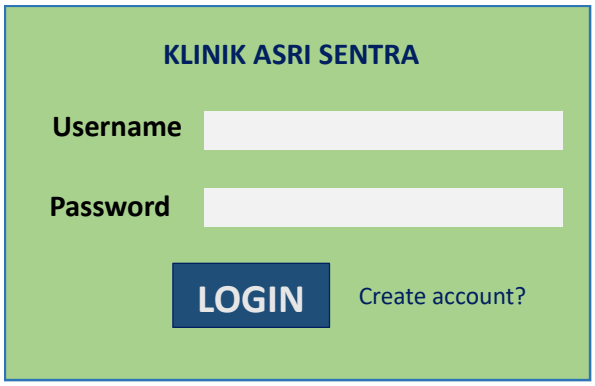

Figure 6. Login Menu Display

In the login menu display, namely Figure 6, there are two bar columns that must be filled in correctly, namely*username* And *password*. Then there is one button, namely the log in button, which will lead to the next display, namely a special menu display for patients or a special menu display for admins. Meanwhile, in the menu display for admins, in figure 7, there are 5 bar columns containing patient data. In the bar column; Name, address, telephone number and treatment polyclinic, are immediately filled in automatically because they have been filled in by the patient concerned. Meanwhile, in the bar column, the patient ID is the input that is the admin's right and must be filled in by the admin, because the patient menu does not have a bar column for this input, as can be seen in figure 8.

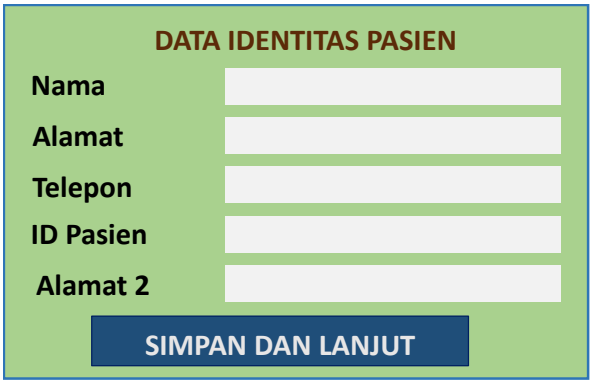

Figure 7. Display of the Patient Data Entry Form in the Admin Menu

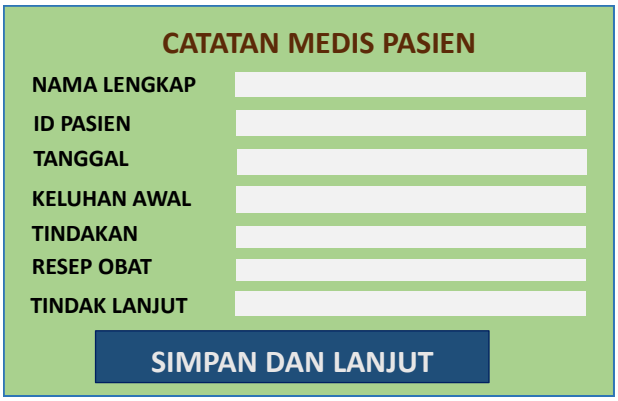

Figure 8. Patient Medical Form Display in the Admin Menu

Testing

System testing needs to be conducted to find errors that may still occur in the application and to determine whether the program created is in accordance with the stated objectives. At this testing stage, the method is used.*Black Box*This test is performed during login verification. This is because the login process is one of the most crucial aspects of the system, considering that all administrative processes in the clinical information system begin with the login process. Furthermore, the login process is the first security gateway for the clinical information system, when users enter the system.

Table 1. Trial Login into the System

Cases and Test Results (Normal Data)			
Input Data	**Hope**	**Observation**	**Conclusion**
Username: Admin1234 Password: Admin3456	Listed in the text box are the name and keywords.	Can fill in unit login registration in accordance Which expected	Accepted
Cases and Test Results (Incorrect Data)			
Input Data	**Hope**	**Observation**	**Conclusion**
Username: any Password: any	Unable to login and displays message “Name” and password “incorrect”	User cannot login And displays the message “name” and keyword “wrong:	Accepted

In addition to black box testing of the login system, security testing was also conducted on the patient registration form in the admin menu. This was intended, among other things, to verify the security of the system's data, particularly data that will be entered into the clinic's information system database.

Based on the test results listed in Tables 1 and 2, the login verification and patient form data entry using the Black Box method were successful, and the results were considered acceptable. It can be concluded that the clinical information system is secure, at least, and can be used effectively.

Table 2. Patient Data Entry Trial

Cases and Test Results (Normal Data)			
Input Data	**Hope**	**Observation**	**Conclusion**
Patient Name: As per Address: As per Phone No.: As per	Listed in the text box are name, address and telephone number.	Can fill in unit login registration in accordance Which expected	Accepted
Cases and Test Results (Incorrect Data)			
Input Data	**Hope**	**Observation**	**Conclusion**
Patient Name: Any Address: Any Telephone No.: Any	Unable to login and displays the message "Name", "Address, and "Phone No." are incorrect.	User cannot login And displays the message "name" and keyword "wrong:	Accepted

Figure 9. Display if the username or password is incorrect.

CONCLUSION AND SUGGESTIONS

Conclusion

This research resulted in the design and implementation of an information system test at the Asri Sentra Clinic. The information system developed in this study significantly assists in the clinic's administrative activities, making the clinic's performance more effective and efficient, both in managing its internal management and in serving its visitors. The system was built using the PHP programming language with a MySQL database and was built on the Microsoft Windows operating system.*windows* 10.

Suggestion

The application that has been created can only be run on the operating

system*windows*. At the next opportunity, it can be developed so that this information system can be developed on other platforms besides the operating system.*windows*and on the Android system so it can be accessed via smartphone. Furthermore, this application can only be operated by visitors or existing patients who have previously been treated at the clinic. New visitors or patients must first go to the clinic to register.*username* And *password*This is another opportunity to further refine the Asri Sentra Clinic information system.

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