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HEALTH CARE SYSTEM APPLICATION (GOOD CARE) ANDROID-BASED AT PRIMARY HEALTH CARE (CASE STUDY AT CLINIC OF WIJAYA KUSUMA)

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ABSTRACT

The development of information systems is currently experiencing rapid growth, which we now recognize as the era of digitalization, one of which is in the field of health services. Primary healthcare is a type of medical health service that provides health services to individuals at the first level of health service. The problem that most often arises is related to the registration system which is still done manually by recording in the registration book, so that allowing the risk of errors and the process of data search. This research aims to create and develop the health service system applications at private primary healthcare level. This research method uses Field Observation, Library Research, Interviews, Study Research Literature (Research Literature Study), System Design, System Implementation and Testing. The application system doesn't show of from syntax errors, and functionally produces functions as expected. The health service system application created consists of a Login/Logout menu and Users (Administrator, Doctor and Cashier). Where each user has their own activity flow. The Login/Logout menu is for user entry and exit, the Administrator menu is used for patient data management, the Doctor menu is used to enter patient diagnosis and treatment results and the Cashier menu is used for drug and financing management.The health service system application (Good Care) has been tested and can be used so that it can increase the effectiveness and efficiency of health services at the independent doctor's practice at the Clinic of Wijaya Kusuma.

Keywords: android, application, good care, health service

Introduction

The development of technology and science is currently experiencing rapid growth which we now recognize as the era of digitalization.[1] The era of digitalization is an era that has experienced developments in the field of information technology. Almost all human activities today are inseparable from technology so that the development of information technology has an impact on improving the quality of service in society.[2] In this regard, we can say that the availability of information technology can help humans in inputting data, processing data even with complex data analysis and the result is in the form of information that is interrelated to form a single unit, namely the system.[3] The gap related to the implementation of digitalization in the health service system can be seen in research conducted on a *Posyandu* data recording system that there were 240 data on visits of children under five from the *Posyandu* which were used for system testing. The results of the research show that designing a *Posyandu* information system helps cadres to reduce repetitive data recording activities, can increase uniformity and measure reporting time by cadres, helps community health center officers to integrate *Posyandu* data which can be used for nutritional surveillance reporting, and stores *Posyandu* activity data in digital form.[4] Apart from that, it was also found that Awal Bros Batam Hospital had a problem regarding the long waiting time at registration for company and insurance patients, where patients who had registered online using a digital appointment and had a booking code still had to queue at the registration unit for around 2 to 45 minutes. this is a waste of time for the patient.[5] In this case, according to the concept of waste theory, it is any activity that does not provide additional value (non-value add) to the process.[6]

Kotlin is a programming language that is now known as a tool for developing smartphone applications, especially those based on Android. Besides JAVA, this programming language is also supported by Google and can be used with Android Studio.[7] These modern programming languages are rendered statically. The use of this programming language can run on the JVM or Java Virtual Machine platform. Kotlin also uses the LLVM compiler so it can compile to Java Script code.[8] The application of the Kotlin programming language is very effective because apart from having various easy-to-learn features, Kotlin is open source, uses a simpler programming language, can be compiled with Java and the system is integrated with Android Studio with faster upgrade speeds and automatic security that can be used in various kinds of platforms.[8] If asked why this research uses an Android or IOS based health service application system, not web based and the like via computer or laptop devices. This is because apart from making it easier for providers to carry out performance not only from the office but also at anytime, anywhere because the application can be downloaded via Play Store.[10] Meanwhile, if you use a device via a computer or laptop that is not based on Android or iOS, work flexibility will be reduced, which will impact performance effectiveness.[11]

Clinic of Wijaya Kusuma is a type of medical health service that provides health services to individuals/individuals at the level of first level health services.[12] The most common problem that arises is related to the register system which is still done manually by recording it in the registration book so that it allows the risk of errors occurring and the process of searching for visit data takes a long time. Referring to the problems above, efforts to improve better service for visits require a good, systemic and integrated data handling and processing in a developing service system, even at the level of independent health service practice.[13] This has advantages in facilitating the process of health services.[14] In relation to this background, the problem posed in this research is " Health Care System Application (Good Care) Android-Based at Primary Health Care (Case Study at Clinic of Wijaya Kusuma".

The system is the elements that are interconnected to form a unit or organization. The system is the relationship between the elements in a pattern to achieve certain goals.[15] The two basic principles of a system are: (1) elements, components or parts forming a system and (2) interconnection, namely the interrelationships between components in a certain pattern. Example: an organization consists of management and administration functions, products, services, groups and people.When one of these parts changes, it is possible that the entire system in the organization will also change (3).Meanwhile, the notion of an information system is a system within an organization that reconciles the needs of daily transaction processing that supports organizational operational functions that are managerial in nature with the strategic activities of an organization to be able to provide certain external parties with the necessary reports.[16]

Primary healthcare is a type of medical health service that provides health services to individuals/individuals at the first level health service level.[17] The problems that most often arise are related to the register system which is still done manual by recording it in the registration book so that it allows the risk of errors occurring and the process of searching for visit data takes a long time in searching for trace records through manual medical record data. Recording data and history (medical record) of the patient's health is very important.[18] The medical record contains notes and documents regarding the patient's identity, examination, treatment, action, and patient health services. The patient's medical record data can be used as a reference for further patient medical examinations. The medical records are processed and will then be useful for management to find out information.[19.] Referring to the problems above, efforts to improve better service for visits require a good, systemic and integrated data handling and processing in a developing service system, even at the level of independent health service practice.[20] To meet the needs for quality improvement and health services, it is necessary to support a system with supporting programs or applications, one of which is through an Android-based program or application, one of which is Kotlin. [21.]

Methods

This research method is Research and Development which is a research method used to produce certain products and test the effectiveness of these products. These two products can mean new products or modify existing products.[22] To achieve the accuracy and thoroughness of the data and information in this study, technically the research method are 1) Identification of Problems/Field Observations (Field Observation); 2) Data Collection; and 3) System Design.

The sample in this study were employees at the Clinic of Wijaya Kusuma including Administrators and Doctors.The sampling technique used purposive sampling technique. This research was conducted at Clinic of Wijaya Kusuma, Jl. Bromo Raya No. 6, Kadipiro, Surakarta with a research time allocation of 1 year of research until June 2021.The research entitled Health Care System Application (Good Care) Android-Based at Primary Health Care (Case Study at Clinic of Wijaya Kusuma) has 2 variables, namely the independent variable and the dependent variable. The independent variable in this research is the Health Care System Application (Good Care) and the dependent variable in this research is the Android-Based at Primary Health Care (Case Study at Clinic of Wijaya Kusuma).

Based on the theoretical framework that was prepared, the research tools or instruments were developed to collect data. The research tool or instrument used in this case is a questionnaire. The questionnaire was used as an interview guide to collect data from research subjects or respondents regarding the identity of respondents and analysis of problems in health services at Clinic of Wijaya Kusuma.[23] Collecting data in this study through primary data collection, namely by conducting direct interviews using questionnaires and secondary data owned by the Clinic of Wijaya Kusuma. In addition, researchers also used literature studies and research literature studies in the data collection process. Data research obtained directly through interviews with the health care system. There were 3 informants in this study consisting of an administrator and 2 doctors.There were related to registration, medical records, health services (management of medical records, examinations, prescribing and counseling), drug management and reporting of the service system at the Clinic of Wijaya Kusuma. This research uses document data analysis used in the service system and analysis of service system running in private primary healthcare.

This research was carried out after obtaining an ethical clearance letter from the Ethics Committee of LPPM Kusuma Husada University Surakarta with Number: 62/UKH.L.02/EC/IX/2020 and research permits from the competent authority prospective respondents who became research respondents were then asked to sign a consent form to become research respondents or with informed consent. The contents of the informed consent include: 1) an explanation of the aims and objectives of the research; 2) an explanation that research has benefits and does not harm respondents; 3) the researcher's statement will maintain the confidentiality of the

respondent and 4) the respondent has the right to withdraw from the research at any time without affecting the life of the responden.

Results

The system is a combination of elements that are interconnected and carry out a process or structure and function as a single organizational unit in achieving goals.[24] So that when applied to health services, it can be defined as an activity consisting of various components that are interconnected and form a single unit to achieve goals in health services, one of which is to achieve the effectiveness and efficiency of health services. [25]

"For the registration section, there is only 1 person and the registration method currently used is still manual, where the patient comes directly to the clinic to receive treatment from a doctor. Our duties here start from patient registration, data management, health financing, and data reporting." (IF01)

"Regarding the system, we still use conventional methods. Even though currently the number of patients who have come here has reached more than two thousand. It would be very helpful if the clinic had a service data management system." (IF02)

Clinic of Wijaya Kusuma is a first level health service facility in the private sector. Based on research results, the Wijaya Kusuma Clinic has 1 administrator and 3 doctors who work alternately. The health service system at Clinic of Wijaya Kusuma consist of input, process and output system. It still uses manual methods starting from registration, searching and storing patient data, types of services, drug prescribing, financing, and visit reports. However, in the case of each service system there is still work that is not actually its main function. So that with the design research on the design of a health service system application in an Android-based independent doctor's practice, it is hoped that it will be able to answer the constraints faced so far by the independent doctor's practice health service system at Clinic of Wijaya Kusuma. The results of this study were named Good Care which is an application for an independent medical practice health service system at Clinic of Wijaya Kusuma and can also be generally used in other independent medical practice health service systems.

Document analysis is an activity of gathering information about the documents used in a system. The purpose of document analysis is to know and understand what documents are involved and flow in an ongoing system. The documents used in the health service system at Clinic of Wijaya Kusuma are as follows 1) Registration Documents; 2) Patient Data; 3) Medical records; 4) Drug report out; 5) Daily Registration Report; 6) Recipe Report

After analyzing the system that is running, there are several things that become problems. The weaknesses of the current system are as follows. Storage of archives that require a lot of space. Searching for data at the pharmacy currently requires a long time because it is still

in archive form. The preparation of reports is often not in accordance with the allotted time because they have to look for the necessary archives The general design identifies the system components to be designed in detail. The following is a system design (application) of the health service system at Clinic of Wijaya Kusuma.

The use case diagram design stage was created with the aim of knowing the interactions and activities between the Administrator, Doctor and Cashier sections with the system, which starts from the initial login process to completion. The use case diagram from the results of the research analysis on the Design System (Application) of Health Services in independent doctor practices at Clinic of Wijaya Kusuma is as follows:

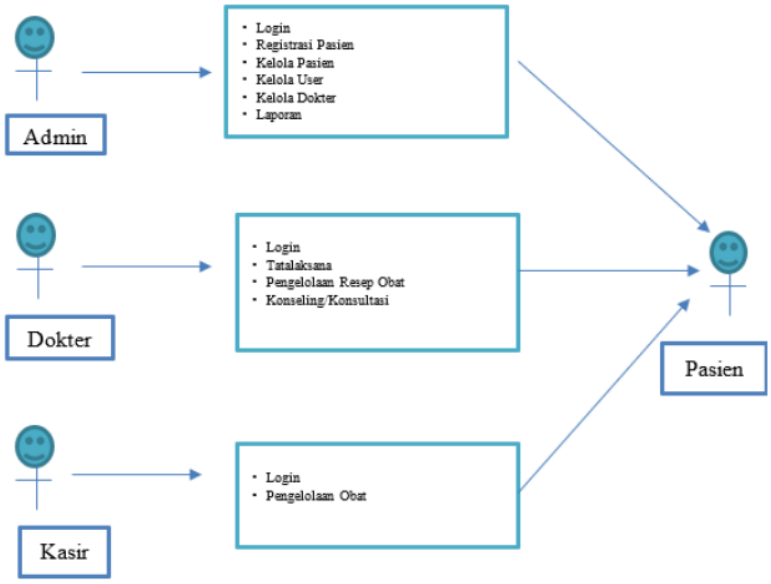

Figure 1. Use case diagram of the Design System (Application) of Health Services at Clinic of Wijaya Kusuma

Class diagrams are a type of diagram in the Unified Modeling Language (UML) which are used to display groups/classes and the packages available in a system to be built. So that this diagram is able to provide an overview of the system and its relationships with other systems. Below is the design of the Health Care System Application (Good Care) Android-Based at Primary Health Care (Case Study at Clinic of Wijaya Kusuma) which is described in the Class Diagram as follows:

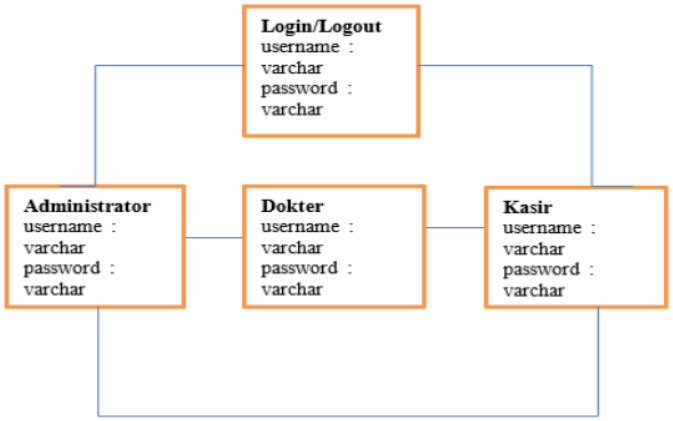

Figure 2. Class Diagram Design System Design (Application) of Health Services at Clinic of Wijaya Kusuma

The use of activity diagrams in this research is an example of the functions in a system and emphasizes the flow of control between objects. The following are some activity diagrams in the design research of the Design System (Application) of Health Services at the Clinic of Wijaya Kusuma which can be described as follows.

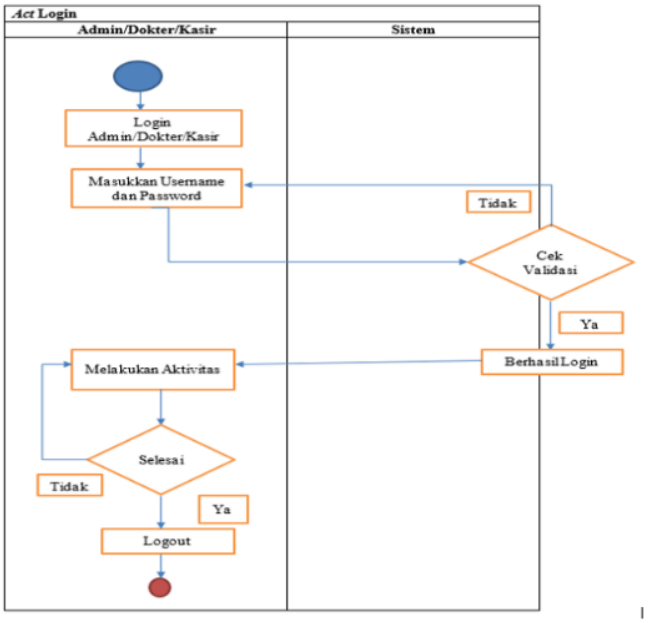

Figure 3. Login Activity Diagram Design System Design (Application) Health Services at Clinic of Wijaya Kusuma

Figure 3 is an activity diagram of the login diagram for the Design System (Application) of Health Services by the administration, doctor or android-based cashier. After successfully logging in, the admin, doctor or cashier will carry out activities according to the use case diagram. Furthermore, the system will display the main page of each user if successfully logged in.

Patient Registration Activity Diagram

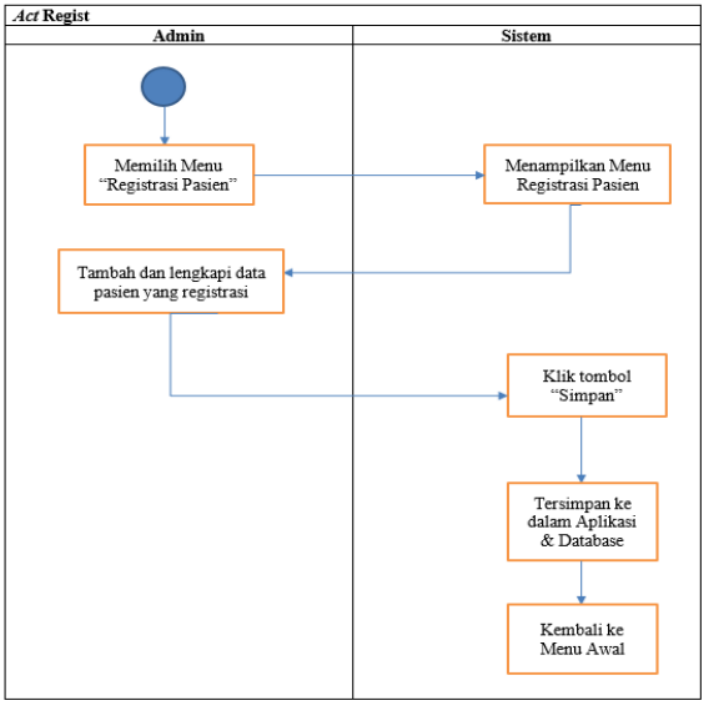

Figure 4. Patient Registration Activity Diagram Design System Design (Application) Health Services at Clinic of Wijaya Kusuma

Figure 4 is an activity diagram for patient registration for the Health Service Design System (Application) carried out by the administration section. The administration section logs in to be able to add a list of new patients who need health services at the Clinic of Wijaya Kusuma. After successfully logging in, the administration section fills in and completes patient data to obtain a medical record number. Furthermore, if it is finished, it can be continued by saving data and automatically patient data will be stored in the application and database.

Doctor Activity Diagram

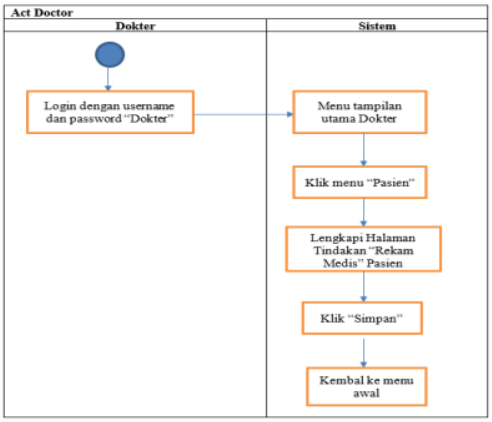

Figure 5. Activity Diagram of Doctor's Management Design System Design (Application) of Health Services at at Clinic of Wijaya Kusuma

Figure 5 is an activity diagram of the doctor's management of the Health Service Design System (Application) carried out by the doctor. The doctor logs into the system using the specified username and password. Next, the doctor adds what management is done to the patient.

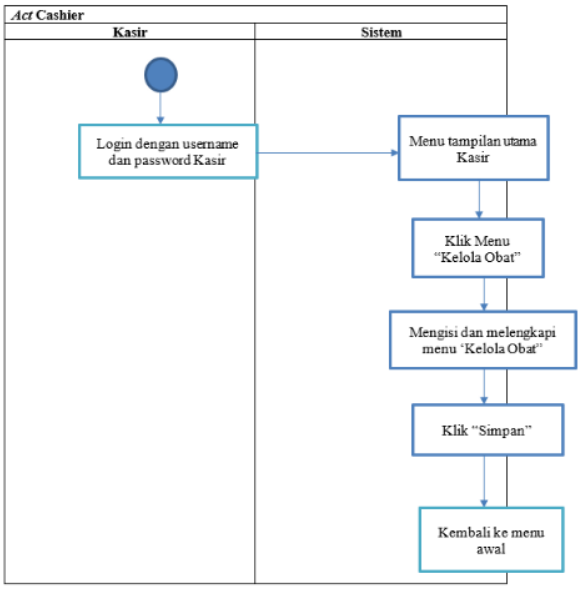

Figure 6. Cashier Activity Diagram for the Design System (Application) of Health Services at Clinic of Wijaya Kusuma

Figure 6 is an activity diagram for the cashier's design of the Design System (Application) for Health Services carried out by the Cashier section. The cashier section logs into the system to manage drugs that have been prescribed by doctors along with details of the costs of health services that patients get.

Sequence Diagram is a type of diagram in the Unified Modeling Language (UML) which describes the interaction of objects based on the steps that must be carried out in order to get results according to the use case diagram or is a response from a stimulus to produce a certain output.

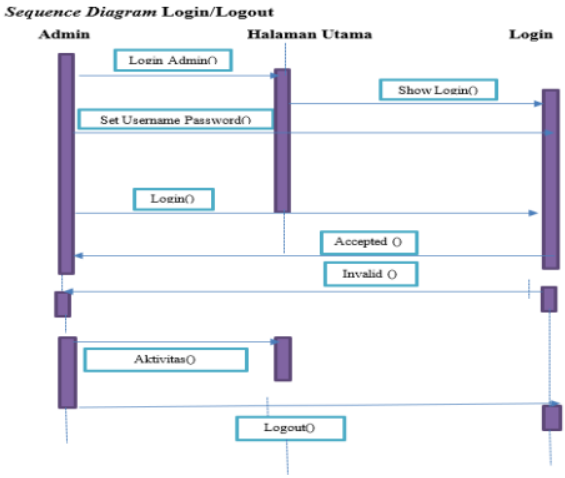

Figure 7. Admin Login Sequence Diagram Design System Design (Application) Health Services at Independent Doctor Practices at the Clinic of Wijaya Kusuma

Physician Management Sequence Diagram

Figure 8. Sequence Diagram of Physician Management System Design (Application) Health Services at the Clinic of Wijaya Kusuma

Database design in design research Design System (Application) Health Services at the Clinic of Wijaya Kusuma uses the Kotlin programming language via MySQL which is a SQL database management system software (English: database management system) or DBMS which has multi-groove and multi-user properties. [26]

Interface design aims to show the form of the application system that will be built later based on the system structure that has been made. The design of this interface includes the design of the menu structure (main page of the application system), design of input (login form, user), design of activities (Patient Registration, Patient Management, User Management, Doctor Management, Management, Drug Prescription Management, Counseling/Consulting and Management Drugs), output design (report form: patient data, outpatient data and drug data).

Process design in a system is carried out to facilitate the flow of data in the program. Making it easier for someone in making the system so that the system can be easily understood by people who use the system. [12]

System testing is an important part of the application development cycle. Testing is carried out to ensure function and quality and to identify weaknesses in using the application. The purpose of this testing is to ensure that the application being built can be used and is of good quality. This application system testing use Black-Box Testing. [27] Black box testing does not need to know what is actually going on in the system or application, what is tested is the input and output. With the various inputs given, does the system or application provide the expected output or not.

Black box testing focuses on the functional requirements of the application system. Thus, black box testing allows software engineers to obtain a set of input conditions that fully utilize all functional requirements for a program.[28] Black box testing is not an alternative to the white-box technique, but is a complementary approach that is more likely to be able to uncover classes of errors than the white-box method.[29] Black box testing attempts to find errors in the following categories: Incorrect or missing functions, Interface error, Error in data structure or external database access, Performance error, Initialization and termination errors.

Black box testing tends to be applied during the final stage of testing, because black box testing pays attention to the control structure so attention focuses on the information domain.[30] The following testing of the health service system uses test data in the form of input data from the Clinic of Wijaya Kusuma. Based on the Black-Box Testing results with the sample test cases above, it can be concluded that the application system from syntax errors and functionally issues functions as expected and Good Care application has been tested and can be used in primary healthcare.

After the system design is created and tested via Black Box Test with no problems, the system runs according to its function, the application can be used. The following are several explanations related to the page display and users of the Good Care application.

Table 1. Main Page Description

Form Menu	Description
Sign-in	Sub menu to enter the application
Username	Sub menu to change the user login to the application
Password	Sub menu to provide user entry code into the application

Table 1 is an explanation of the main page display which consists of Sign-in, Username and Password to enter the Good Care application system.

Table 2. User Description

Form Menu	Description
Doctor	Sub menu to enter add, change, and delete data for the Doctor section
Cashier	Sub menu to enter add, change, and delete data for the Cashier section
Admin	Sub menu to enter add, change, and delete data in the Admin section

Table 2 is an explanation of each User function in the Good Care application system.

The main page form appears when the program is started. This Good Care application can be accessed and downloaded via the Play Store as below:

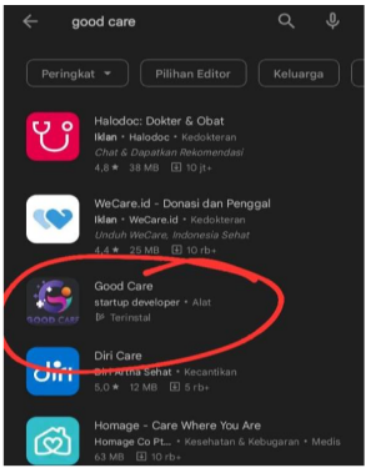

Figure 9. Good Care Application at Play Store

Login Form

This form appears when someone wants to access private data. This can be seen in the following image:

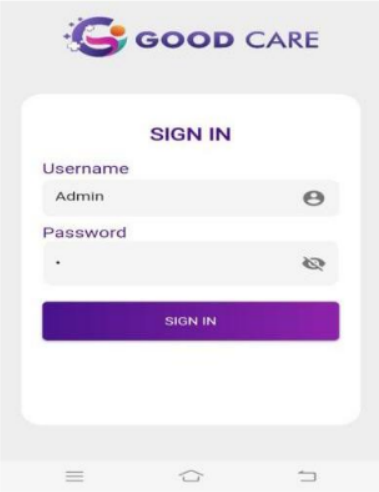

Figure 10. Main Page Good Care Application

Administrative Data Forms

The Administration menu contains Admin data which is displayed on several menus that function for patient registration, patient management, users and doctors.

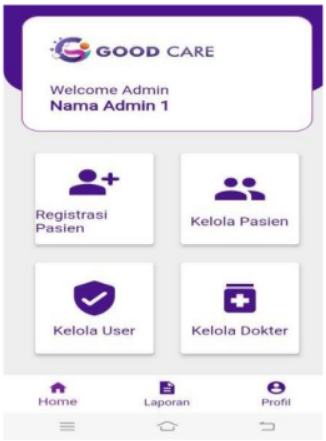

Figure 11. Administrative Data Management

Doctor Data Form

The Doctor menu contains Doctor data displayed in several management menus that function for patient actions, diagnostic results, patient categories (BPJS/General), action costs, and drug prescriptions.

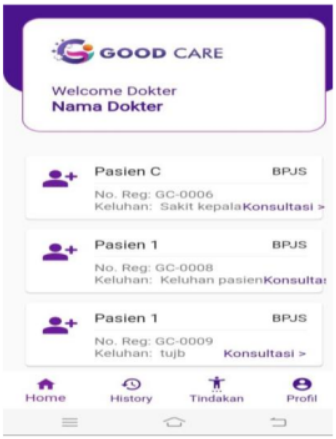

Figure 12. Doctor Data Management

Cashier Data Form

The cashier menu contains cashier data and data on the prices of available medicines according to the drugs prescribed by the doctor at the clinic.

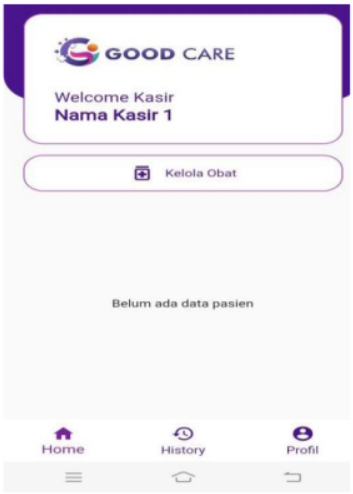

Figure 13. Cashier Data Management

Discussion

Implementation the Clinic of Wijaya Kusuma health care system prototype using a system/programming language or application that supports Android, namely Kotlin. The Kotlin programming language is based on the Java Virtual Machine (JVM). Kotlin is a pragmatic programming language for Android that combines object oriented (OO) and functional languages. In addition, Kotlin is an interoperability programming language that makes the language combined

in projects with Java programming.[31]. This programming language can be used in the development of desktop, web and backend based applications.[7]

There are several things in implementing monitoring and controlling this application, namely, this information system application can be active if the server is active, the appearance of application uses Indonesian, except for certain parts that the author considers to use a foreign language better, the Clinic of Wijaya Kusuma health service system is limited to User Management (Administration, Doctors and Cashiers), Patient Data (Registration), Medical Records (Medical Records), Prescriptions, Actions / Management (Health Services) and Reports (reports).

The Good Care application was created and developed for the purpose of utilization in the health service system at the first level health service, especially in private (non-government) health services such as private clinics or private doctor's practices, where the existing health service system is simpler, not as complex advanced or referral level health service system, namely hospitals. One of the weaknesses of the Good Care Application is that it is not yet integrated into the government's electronic medical record system. However, this could be a second choice. Currently BPJS Health has implemented online registration, and the Ministry of Health has also mandated the use of Electronic Medical Records (EMR) in Primary Health Care Facilities (FKTP) with the same purpose and function. However, the implementation of EMR has not yet reached the realm of primary health care facilities in the private sector and its implementation is still being monitored and evaluated. The advantage of EMR is of course because it is a program from the government, especially the Ministry of Health, which has been integrated more widely and tiered, or in other words, the system is more complex.[32]

Even though the health service system at the Wijaya Kusuma Clinic already meets the health service system components in the form of input, process and output. However, the existing system has shortcomings in terms of utilizing digitalization of the health service system, including online patient registration from home to minimize queues, patient data management, health financing and reporting systems. Apart from that, the fulfillment of human resources is still lacking so additional human resources are needed that have been adjusted to their competencies. Based on the explanation above, it is found that this research is limited to utilization of digitalization for health service applications system in private sector of primary health care.

Conclusion

Based on the research that has been carried out through the use of the Android-based Kotlin programming language to produce a health service system application in the practice of independent doctors at the Clinic of Wijaya Kusuma, it can be concluded that 1) The

implementation of Good Care application at the Clinic of Wijaya Kusuma can minimize data processing errors and facilitate operational reporting, 2) The Administrative Section does not need to recapitulate documents and reports from the main book because it has been integrated in the system from the patient registration process to getting the medicine and 3) Doctors do not experience difficulties in the process of providing health services to patients if the Administration section is unable to attend because they can enter the system via the user username and password. Based on the process of designing a health service system in the practice of independent doctors at the Android-based Clinic of Wijaya Kusuma, there are several suggestions that can be used as material for consideration for further research in designing an integrated health care system with patients and a health service system with the pharmacy department operationally.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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