Android-based Application of Reservation System at Dharmarini Health Center

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ABSTRACT
Technology is also one of the tools to help improve services for various agencies, especially in services at the Puskesmas Dharma Rini Temanggung. With the occurrence of the Covid-19 case which resulted in several regulations when waiting in queues such as keeping a distance and not making a crowd, this application will be very helpful for the community. This application will discuss the meaning of polyclinics, order queues and can monitor queues. With this feature it will be very helpful to reduce the occurrence of excessive crowds because patients do not have to wait for queues in the waiting room. This application was built using Android Studio, Firebase as a database, NodeJS, Kotlin, Visual Studio Code, and React JS. This application is made in order to make it easier for patients to make reservations and help select poly according to their complaints and also more efficiently to avoid excessive crowds.

General Terms
Android Studio, Kotlin, VS Code, Firebase, Node JS, React JS.

Keywords
Android Studio, Reservation, Mobile Application, Health Care.

1. INTRODUCTION

Puskesmas Dharma Rini Temanggung is one such clinic that aims at public health. With the development of this era, technology has also become one of the tools to help improve services for various agencies, especially in services at health center. On March 12, 2020, the World Health Organization (WHO) stated that the outbreak of corona virus disease (COVID-19) [1], resulted in several rules when waiting in queues such as maintaining distance and not creating crowds, this application will be very helpful to the public. Given that smartphones are widely used among reproductive-age people of all socioeconomic backgrounds [2], that's why researcher thought of making this application. This application will discuss the meaning of check-up, queue order and can monitor queues. With this feature, it will be very helpful to reduce the occurrence of excessive crowds because patients do not need to wait for queues in the waiting room. Therefore, researcher built an application that can make reservations online and users can also see information about Puskesmas Dharma Rini Temanggung. This application is built with Kotlin programming language, Kotlin is a new programming language representing an alternative to Java; they both target the same JVM and can safely coexist in the same application. Kotlin is advertised as capable to solve several known limitations of Java. Recent surveys show that Kotlin achieved a relevant diffusion among Java developers [3]. This application uses firebase as a database, Firebase Realtime Database is a NoSQL cloud-based database that syncs data across all clients in realtime, and provides offline functionality. Data is stored in the Realtime database as JSON, and all connected clients share one instance, automatically receiving updates with the newest data [4]. In the development of this application there is also a website for admin to manage patients who make reservations online, the website is built using the Node JS programming language with the React JS framework. ReactJS is an open-source library that is utilized for building up the UIs explicitly for single-page applications [5]. That way the data entered by the patient will appear on the admin website so that the admin will more easily manage the data.

2. RESEARCH AND METHOD

This research designs several functions that aim to carry out its use, the design is visualized in the architecture diagram in Figure 1.

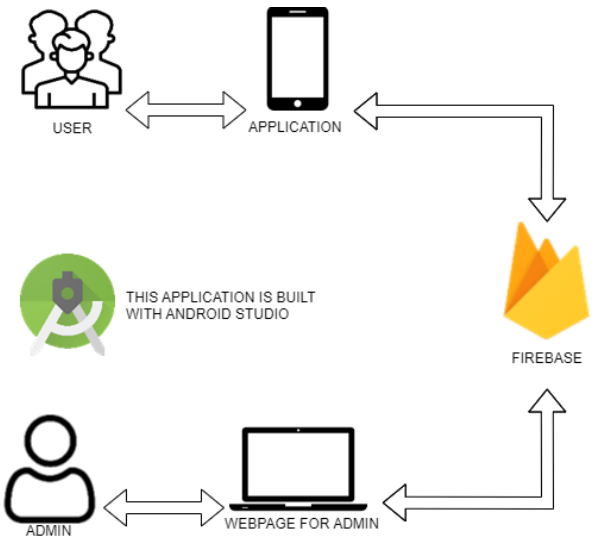

Figure 1. Architecture Diagram

Figure 1 is an architectural design model on the Puskesmas Dharma Rini Temanggung application. Figure 1 explains that based on the analysis conducted, the application becomes 2, namely for the patient as a user and for the health center as an admin. The application and web admin will be connected to Firebase in order to retrieve data stored with the database. Data on the website and mobile application can be stored in the database through the Application Programming Interface (API). The term Application Programming Interface (or API) consists of a software interface with the purpose of facilitating the communication between different components or systems [6]. The Firebase Realtime Database is a NoSQL cloud-based database that syncs data across all clients in realtime, and provides offline functionality. Data is stored in the Realtime database as JSON, and all connected clients share one instance, automatically receiving updates with the newest data [7]. To ensure usability and accessibility, the proposed database has a well-defined structure and organisation [8].

2.1 Data Collection Procedure

In this study researcher obtained data from Puskesmas Dharma Rini Temanggung. Researcher took data with 2 methods, namely primary and secondary. Primary is done by directly meeting the agency while secondary data is obtained indirectly. The way researcher get data using primary means that is by direct observation at Puskesmas Dharma Rini Temanggung and secondary is to conduct research online. In secondary data researcher look for data on the vision and mission of Puskesmas Dharma Rini Temanggung by looking through the official website of Puskesmas Dharma Rini Temanggung. The results of the research at Puskesmas Dharma Rini Temanggung that researcher get in the form of some information that is in every part of the service there is a waiting room respectively, Puskesmas Dharma Rini Temanggung also has social activities such as posyandu toddlers, posbindu, posyandu elderly (elderly school), screaniing uks (1 year 2 times), mental screening (once a year), pregnant women's classes (in each village), services available at Puskesmas Dharma Rini Temanggung laboratory room, eye examination room, lung examination room, MCH room, delivery room, and dental examination room.

2.2 System Design Logic

2.2.1 Context Diagram

Context Diagram is a diagram that illustrates how the data documentation process works. The Context Diagram consists of a circle of data sources transformation process, and data destinations that receive or send data directly from the transformation process.

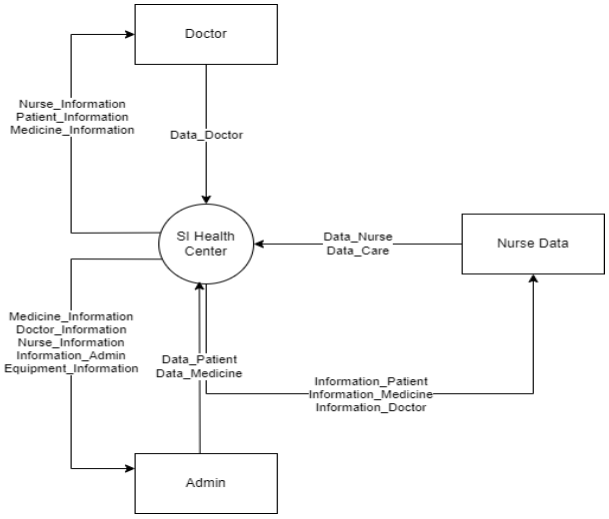

Figure 2. Context Diagram

Context Diagram is a type of diagram used in system modeling to describe the system as a whole in an external context. The Context Diagram shows the relationship between the system being studied and the external entities that interact with the system.

2.2.2 Data Flow Diagram

Figure 3 is a DFD, Data Flow Diagram (DFD) is a graphical representation of the flow of data in an information system. DFDs are used to describe how data is processed in the system, how data enters the system, how data is stored and processed, and how data is removed from the system.

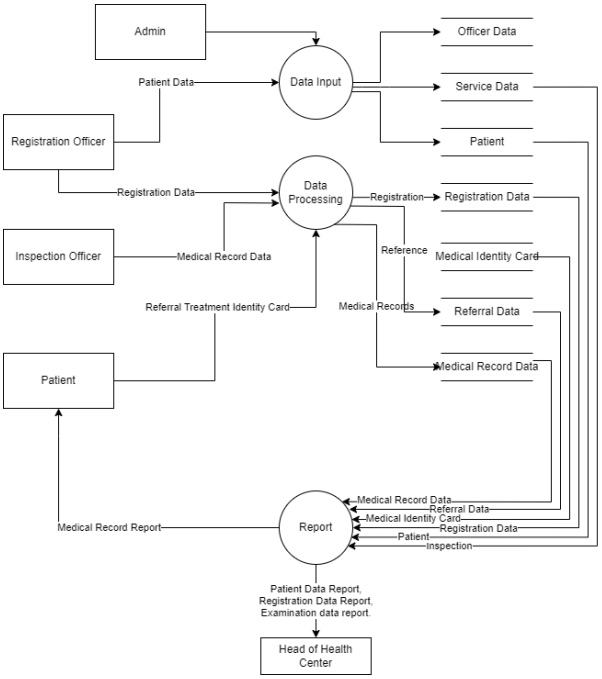

Figure 3. Data Flow Diagram

A DFD is defined as a diagraph together with a binary relation, called the precedence relation [9]. DFD uses graphical symbols to represent these components and the relationships between them. Common symbols used in the DFD that the author uses include:

- Circle Symbol to represent Process.
- Arrow Symbol to represent Data Flow.
- Rectangle Symbol to represent Data Storage.
- Square Symbol to represent External Entities.

Examples of DFDs can be high-level DFDs that describe the overall data flow in the system or more detailed level DFDs that show processes and data flow at a more detailed level.

2.2.3 Unified Modelling Language

in Figure 4 is UML, One widely used tool in process modelling is the Unified Modeling Language (UML) [10]. Use case diagram modeling explains the benefits of the system when viewed from the point of view of people outside the system or actors. This diagram shows the functionality of a system from how the system interacts with the outside world. The use case diagram design that occurs in the mobile-based health center reservation system is as below:

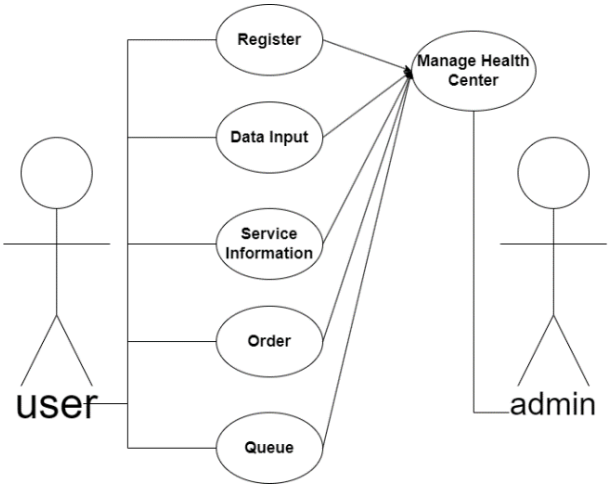

Figure 4. Use Case Diagram

Explanation of the use case diagram contained in Figure 4 as below:

1. Admin is an actor who has full access rights to data. Admins can change, add and delete data.
2. Users are actors who only have access rights to ask questions.

The UML is applicable to anyone involved in the production, deployment, and maintenance of software [11]. In Figure 5 is the booking activity diagram. UML activity diagrams are flowcharts that model sequential and concurrent behavior. Although the UML community widely adopts such diagrams, there is no standard approach to verify the presence of deadlock and nondeterministic behavior in activity diagrams. [12]. There are four steps of UML reuse, i.e. portrayal, recovery, adjustment and consolidation [13]

2.2.4 Activity Diagram

Activity diagram of health center reservations describes the activities of guests in interacting with the reservation system. In this section the guest is the main controller of the reservation, namely the registration guest, after registration the guest can see the examination list according to his complaint. After that guests can place an order and monitor the queue.

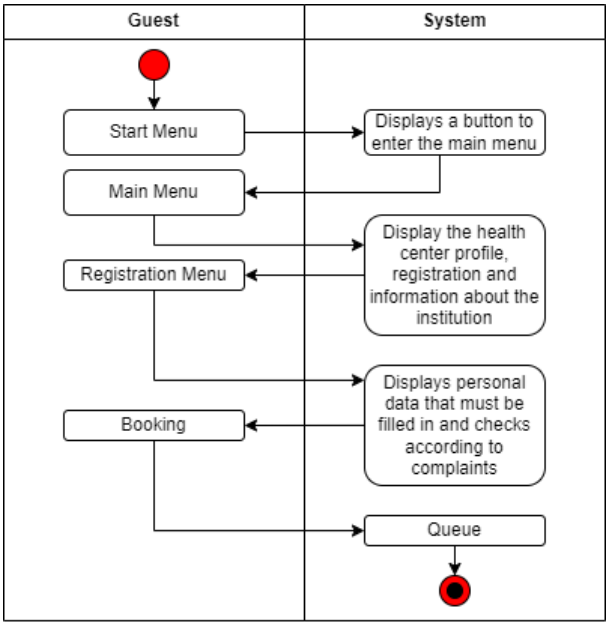

Figure 5. Activity Diagram

2.3 Interface Design

The interface of this application is built using whimsical and figma. The design design aims to provide a view at the time of making the application and the web.

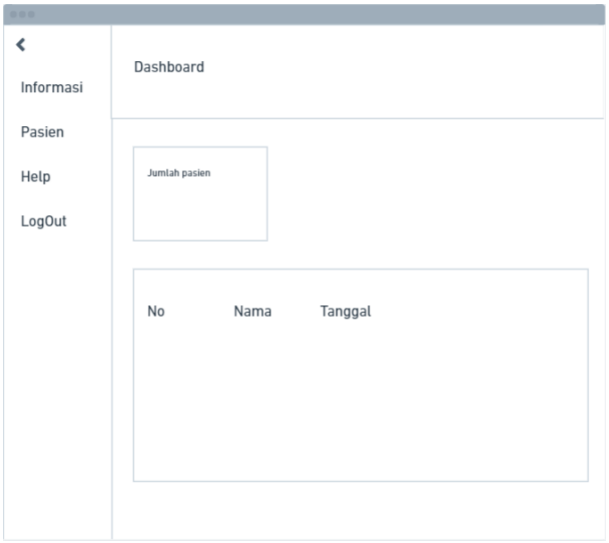

Figure 6. Wireframes Website

The application interface has several views such as the health center profile, treatment registration, and information about the health center.

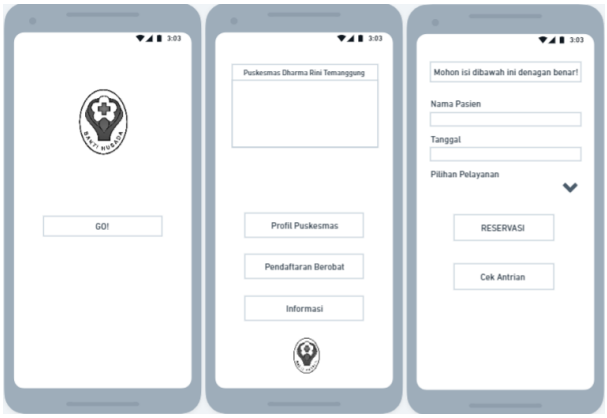

Figure 7. Wireframes Mobile Application

3. RESULT AND DISCUSSION

3.1 Assumptions

This application is intended for patients who want to seek treatment at Puskesmas Dharma Rini Temanggung in order to make reservations via online with a smartphone. Users of this application can also view the puskesmas operational schedule and service availability.

3.2 Hypothesis

With the mobile-based health center application, it will make it easier for patients to make reservations and will reduce the quota in the waiting room so that there is no queue that is too tight.

3.3 Feature

The following are some of the features available to patients and puskesmas admins listed in the features table.

Table 1. List of Feature

No	Actor	Description
1.	Patient	Health center profile, registration, information, check-ups
2.	Admin	admin login page, dashboard page, add data page, list patient, information.

3.4 Run an Experiment

Pembangunan aplikasi ini di bangun setelah wareframe berhasil dibuat, aplikasi ini dibangun dengan menggunakan Android Studio dengan bahasa pemrograman kotlin. Sedangkan website untuk admin menggunakan NodeJS dan ReactJS. The construction of this application is built after the wareframe is successfully created, this application is built using Android Studio with Kotlin programming language. While the website for the admin uses NodeJS and ReactJS. Testing is done by demoing the application with several users with the aim of getting criticism and suggestions.

3.5 Implementations

Here are the results of the application and web admin.

3.5.1 Login Page

On the login page of this web admin, the admin is expected to fill in the registered email and password.

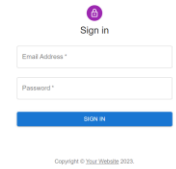

Figure 8. Login Page

3.5.2 Admin Dashboard Page

After logging in, the main page will appear containing a list of new patients, and on the left side there are options (dashboard, patient, help, logout).

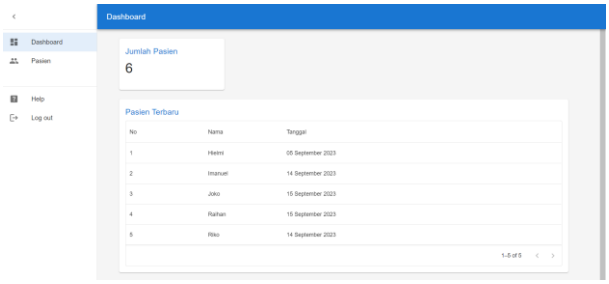

Figure 9. Admin Dasboard Page

3.5.3 Patient Page

The Patient page contains a list of patients, on this page the admin can edit when an error occurs when the patient enters the data.

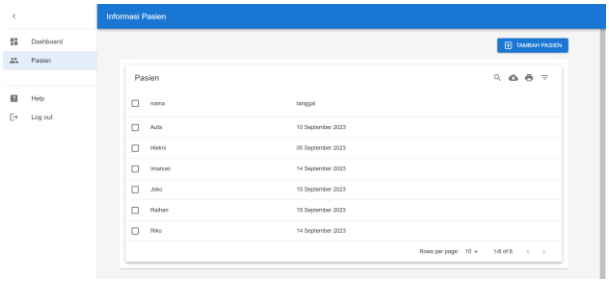

Figure 10. Patient Page

3.5.4 Help Page

On the help page there is information and vision and mission about the health center.

Figure 11. Help Page

3.5.5 App Start Page and Home Page

The app's home page only contains a "go!" button to move to the main page. The main page contains the puskesmas profile, registration and information.

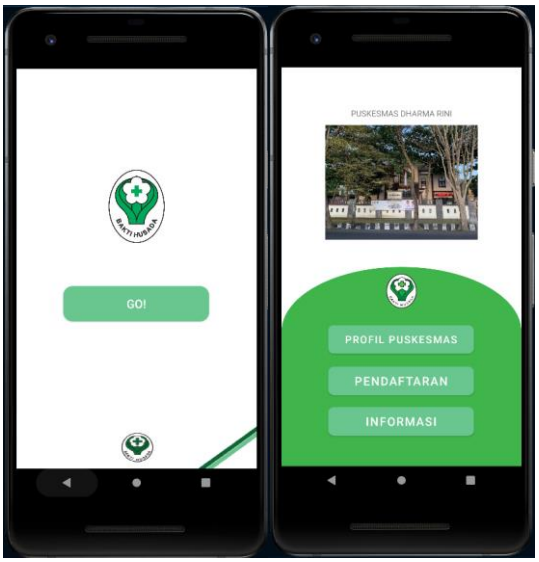

Figure 12. App Start Page and Home Page

3.5.6 Health Center Profile Page and Information Page

The puskesmas profile page contains the vision, mission and values of Puskesmas Dharma Rini Temanggung. While the Information page contains the address, operating hours and other information.

Figure 13. Health Center Profile Page and Information Page

3.5.7 Registration Page

On the registration page, patients are expected to enter their name, reservation date, and check-up selection. Patients can check the queue on the queue button.

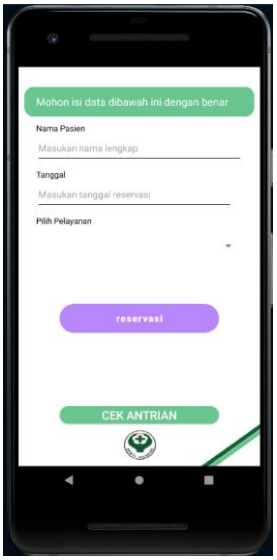

Figure 14. Registration Page

3.6 Discussion of Result

After the application is successfully created, then the next stage is testing the application to ensure that the application is suitable for use. This application testing is done using Black Box Testing, an open-source continuous black-box testing application for RESTful web APIs. It takes advantage of the API specification to automatically generate tests, but also makes use of a new DSL named Test Specification Language (TSL), to create rich test cases [14].

Table 2. Website Admin Testing

No	Page	Testing	Status
1	Login Page	Can log in by entering email and password	Succeed
2	Admin Dashboard Page	Displays the number of patients along with data in the form of names and dates of examination	Succeed
3	Patient Page	Display patient information	Succeed
4	Help Page	Displays examination procedures as well as the vision and mission of the health center.	Succeed

4/4 x 100% = 100%

Table 3. Mobile User Testing

No	Page	Testing	Status
1	App Start Page	Can click the Go Button	Succeed
2	Home Page	The puskesmas profile, registration, and information menus can be easily visited via the buttons provided.	Succeed
3	Health Center Profile Page	Display the puskesmas profile	Succeed
4	Information Page	Display the puskesmas information	Succeed
5	Registration Page	reservations can be made by filling in the data then clicking the reservation button	Succeed

4. **5/5 x 100% = 100%**

Based on testing website applications for admins and mobile applications for users, it can be concluded that 4 pages on the website can function with a 100% success rate. Then on the mobile page has a 100% success rate for its 5 pages. So that the results of system testing can be declared "**Successful**"

5. CONCLUSION

Based on this research it can be concluded that this application makes it easier and faster for users to make reservations, users can monitor queues from the application using a smartphone, this can reduce queuing capacity in the waiting room. This health center application explains the examination menu so that no errors occur during registration and there is an Information menu that contains information about Dharma Rini Temanggung Health Center. Admin is also assisted by the existence of an admin website to facilitate the CRUD (Create, Read, Update, Delete) of the required data. In addition concept of mobile applications for patients with web applications for admins able to display data changes in real time. real time [15]. With this research, it is hoped that it will make it easier for patients to make reservations, queues and reduce errors when making reservations because they are already available on the information menu.

6. REFERENCES

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