

## DEVELOPMENT OF COVID-19 PATIENT DATA SUBMISSION APPLICATION AT RT/RW (SUBLOCAL/LOCAL AREA GOVERNMENTS) TO PUBLIC HEALTH CENTER BASED ON THE WEB

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### Abstract

Indonesia becomes one of the countries known with the highest positive cases of COVID-19 in the world. Every day there are new positive cases reported to the health facilities. Currently health facilities still use reporting data system for corona affected patient manually using files. This causes a lot of spaces used for storage or files which increases every day and affects the service that becomes slower. The purpose of this research is to build an application that makes it easier for RT/RW in submitting and reporting data, and there is no need for in-person meetings to provide COVID-19 patient data to local health facilities. The development of this application uses an object-oriented modeling approach (UML) using the waterfall method. The programming languages used are PHP and javascript with Bootstrap framework. The result of this research is a patient data reporting application that can facilitates health facilities in managing and increasing data validity to accelerate the handling of COVID-19 in Indonesia.

**Keywords:** application, COVID-19, data reporting, health facilities, development

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### Introduction

COVID-19 (*Coronavirus Disease*) is a disease caused by *Severe Acute Respiratory Syndrome Coronavirus 2* (SARS-COV-2). SARS-COV-2 is a type of coronavirus that has just been identified in humans. COVID-19 first appeared at an animal market in Wuhan City, capital of Hubei, Central China in December 2019. Coronavirus is a zoonotic disease (transmitted between animals and humans). There are two types of zoonotic coronavirus that have been known before, namely *Severe Acute Respiratory Syndrome* (SARS) which is transmitted from civets cat and *Middle East Respiratory Syndrome* (MERS) which is transmitted from camels ([Kementerian Kesehatan Republik Indonesia 2020](#)). Bats are the main natural *reservoir* of *alpha-coronaviruses* and *beta-coronaviruses*. SARS-COV-2 in the early stages of the COVID-19 outbreak had a 79,6% match with SARS-COV through a Whole Genome Sequencing

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(WGS). Through genetic analysis researchers from Duke University, Los Alamos National Laboratory and New York University confirmed that COVID-19 had infected pangolins before infecting humans. It is known that this virus gets the ability to infect humans through the exchange of important gene fragments of the corona virus that infects scaly mammals called pangolins (Anon 2020).

Southeast Asia is one of the regions with the largest rate of positive case growth in the world. As of July 30, 2021, the number of positive cases in the Southeast Asia was 7,016,394 cases. Indonesia is the country with the highest number of positive cases in Southeast Asia because the spread is fairly fast, for the period July 30, 2021, data obtained from the [worldometers.info/coronavirus](http://worldometers.info/coronavirus) website were 3,331,206 cases of positive patients, 2,686,170 cases of patients recovered, and 90,552 cases of patients died.

Public health center is a technical implementation unit of the district or city health office that is widely used by the people. During this pandemic, there are no guidelines related to the recapitulation of COVID-19 in several regions in Indonesia. Currently, the data is still reported manually by the relevant health facilities in the form of paper forms.

The purpose of this study is to help the delivery and reporting of data from RT/RW to the public health center without having to meet face-to-face. If we still use a manual delivery and reporting system, there is a higher risk compared to computerized systems. By using a computerized system, it will increase the speed, accuracy and security, as well as make it easier to search for data (Abdurrahman and Masripah 2017).

According to Jogyanto HM in *Pengenalan Komputer* (1999) said that "Computerized system are the use of computers as a tool in data processing activities that are carried out manually. The data is processed using a pre-programmed computer, this data processing starts with a data recorder until it reaches the printing of reports". According to (Nana Mulyana, 2004), "Computerized system is an electronic system that works automatically to process data quickly. Computerized system is a system that involves technology in achieving goals so that an activity can be implemented effectively (Mulyanto et al. 2018).

This development of COVID-19 patient data submission application is expected to be able to help health workers in the process of managing and reporting data that will make it easier for health facilities to obtain n information related to the patient data obtained from local RT/RW effectively.

## Method

### 1. Data Collection Method

In this study, the method used for data collection is by conducting observations, interviews and literature studies.

#### a. Observation

Made direct observations in the fields to obtain actual information and condition of the object being studied within a certain time.

b. Interview

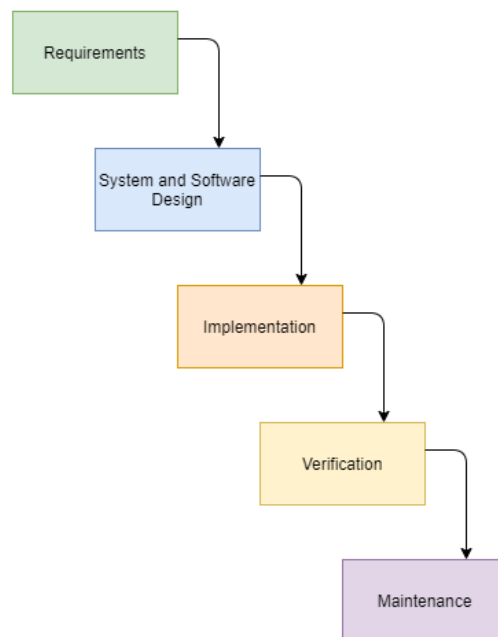
Asked how the process of collecting and processing data is still used in the research place. This interview has a type of “open-ended question” or a question that does not offer the respondent a list of alternative answers to get a broad answer.

c. Study of Literature

Read and reviewed literature books and scientific journals related to the research title used as comparisons to the previous research. Literature studies use various sources of information in collecting data to provide a detailed and in-depth picture of the response of an event.

## 2. System Developed Method

The system development method used in this study is the waterfall method. Waterfall model is a traditional model used for the development stage. This model is done sequentially from one point to another. This model takes a systematic and sequential approach starting from the level of system requirements and then goes to the analysis, design, coding, testing/verification, and maintenance stages (Firman et al. 2016). Waterfall model is also called the “Classic Life Cycle”, called waterfall because the stage diagram of the process is similar to a tiered waterfall (Zul 2017).



**Figure 1**  
**Waterfall Model**

a. Analysis

Writers conducted a complete requirement analysis, then analyzed and defined the needs that needed to be met by the program to be built, such as

reliability, weaknesses, constraints in the creation application. This can increase success in the application development process because researchers know what is needed to build an application system.

b. Design

In this stage the writers conducted the design of application using Microsoft Visual Studio Code as text editor by using PHP and JavaScript as the programming languages. The application design included admin login view, user login view, admin dashboard, user dashboard, report filling view for user, patient data management view, reporting view to the health facilities and agencies and patient verification data table view.

c. Coding

In this stage the writers began to build an application based on a requirement analysis. The writers built the program code using the PHP programming language. PHP is a simple script programming language used for processing HTML Forms inside web pages (Hastanti et al. 2015) and the Bootstrap framework which was accessed through the Chrome and XAMPP. XAMPP can help in creating database because it is integrated with MySQL.

d. Testing

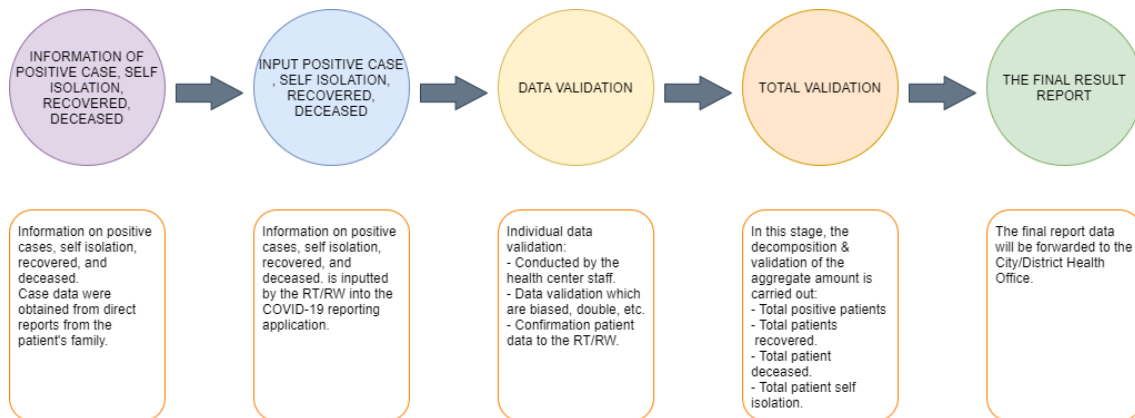
In this stage the system is thoroughly tested using the Black-box testing method to find out if the design that has been made can run as desired and to get the weaknesses of the application. On Black-box testing the software will be executed and tested for whether it has met the user requirements without having to disassemble the program listing (Salamah and Khasanah 2017). Black-box testing was conducted to find some errors; namely, (1) Missing or incorrect functions; (2) Errors in interface or display design; (3) Errors in data structures or external database access; (4) Performance errors; (5) Initialization and termination errors (Febiharsa 2019).

e. Maintenance

This stage the writers performed maintenance and repaired of errors that were not found at the testing stage. The writers should always ensure that the stated goals and results were achieved.

## Result and Discussion

After the data collection was done, in this stage the current ongoing analysis in health facilities was explained, then the writers planned a proposed analysis of the reporting system that was designed using the waterfall method stage. Here is an ongoing analysis that currently running in the health facilities:



**Figure 2**  
**Ongoing Analysis of Patient Data Reporting**

### 3. System Functional Design

In this stage, a requirement analysis was obtained for the system to be designed using an object-oriented modeling (UML). Unified Modeling Language (UML) is a language that contains images/graphics for visualizing, specifying, building and documenting an Object-Oriented-based software development system (Mubarak 2019). UML is used to simplify problems to make them easy to understand. Specifically UML specify important steps in the development of decision analysis, design, and implementation in software systems (Nugroho and Rohimi 2020). UML usually consists of use case diagram, activity diagram, sequence diagram, and class diagram. By using UML, the writers could communicate the design effectively.

#### a) Use Case Diagram

Use case are a high-level pieces of functionality that the system will provide (Sari et al. 2016). The use of case diagram of patient data report used to illustrate behavior diagram. This diagram shows how all objects interact with each other in order to create a system. The system users involved are User and Admin, and can be seen in Figure 3.

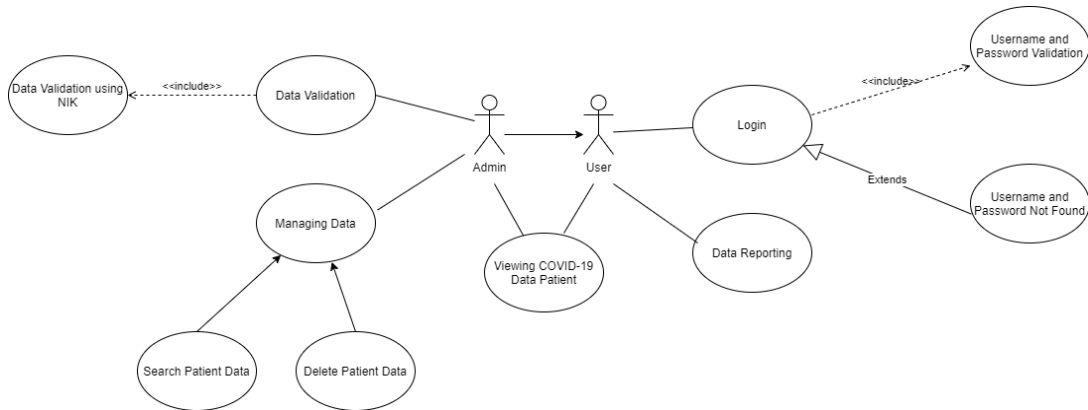
##### a. User Requirement Analysis

User can login to the application, input data, and view patient data contained in the system.

##### b. Admin Requirement Analysis

Admin can login to the application, managing incoming data from the user, changing report data, and validating report data.

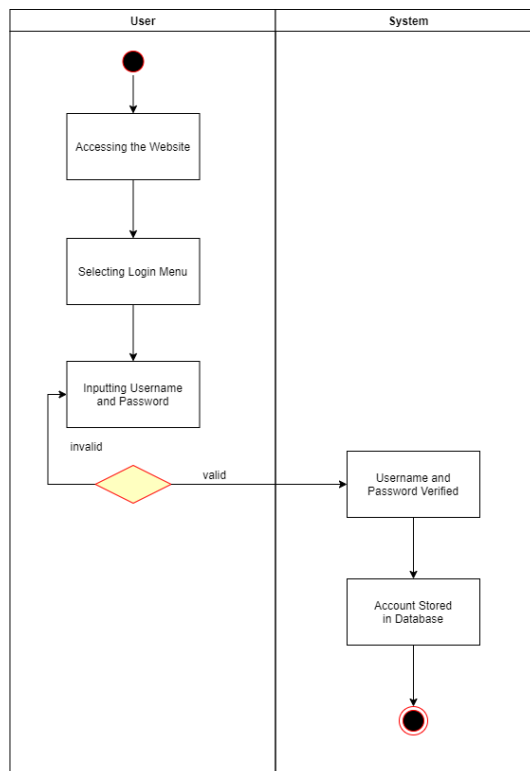
Development of Covid-19 Patient Data Submission Application at RT/RW (Sublocal/Local Area Governments) to Public Health Center Based on The Web



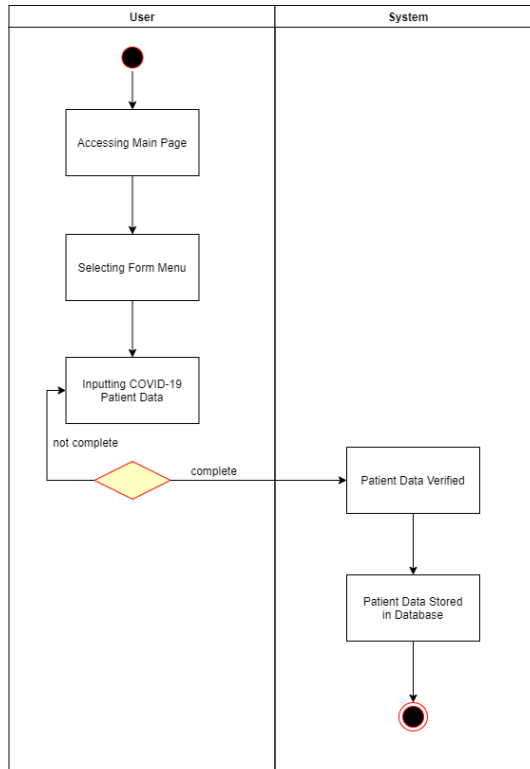
**Figure 3**  
The propose of Use case diagram of patient data reporting system

b) Activity Diagram

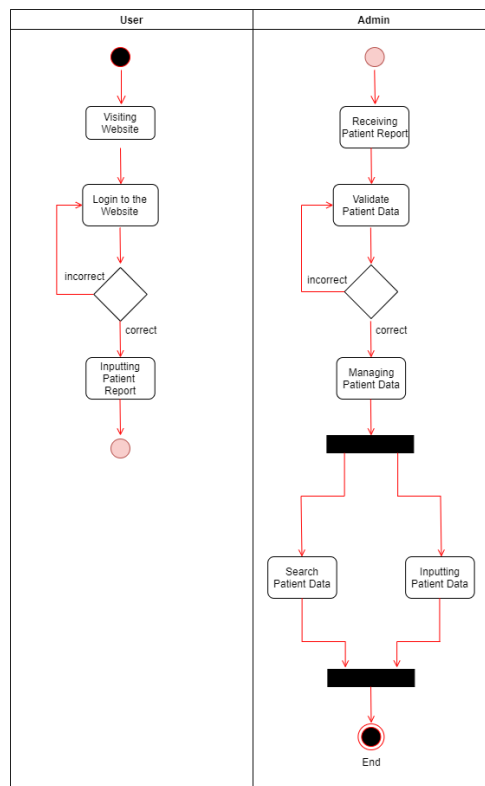
Activity diagrams focus on the activities that occur that are related in a single process (Herliana and Rasyid 2016). Activity diagrams are good for modeling ongoing analysis on the system. Activity diagram shows the flow of processes that are interconnected like a chain. Here is a picture of the activity diagram using swimlane mode.



**Figure 4**  
Activity diagram login user



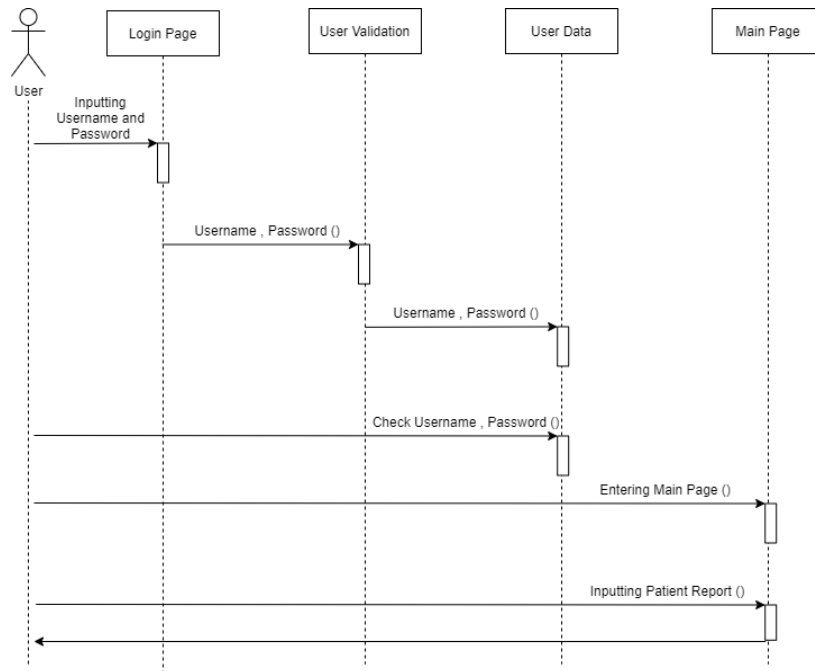
**Figure 5**  
Activity diagram user patient data input



**Figure 6**  
Activity diagram admin patient data validation

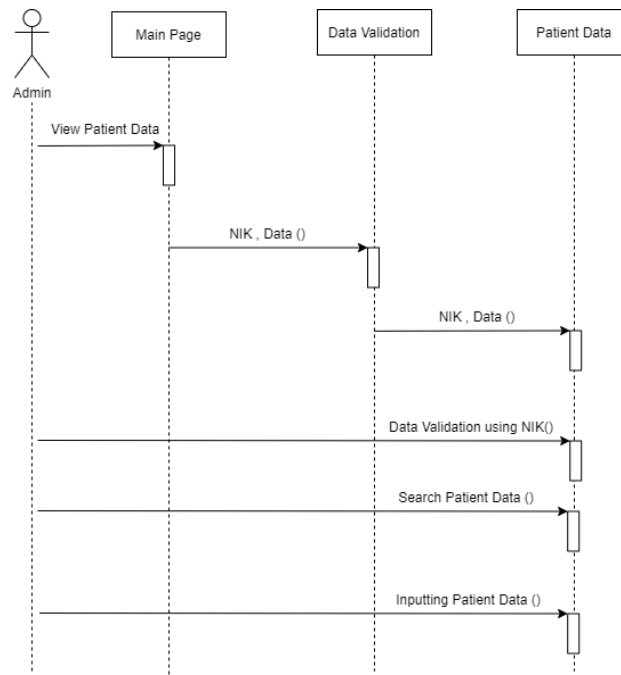
c) Sequence Diagram

Sequence diagrams illustrate dynamic collaboration between a number of objects (Andrianto 2017). The sequence diagram for reporting patient data is used to describe the interaction diagram. This diagram shows the interaction of objects arranged in a certain time sequence (Azwanti 2017). The sequence diagram for the patient data reporting system can be seen in the following pictures:



**Figure 7**  
**Sequence diagram user patient report**



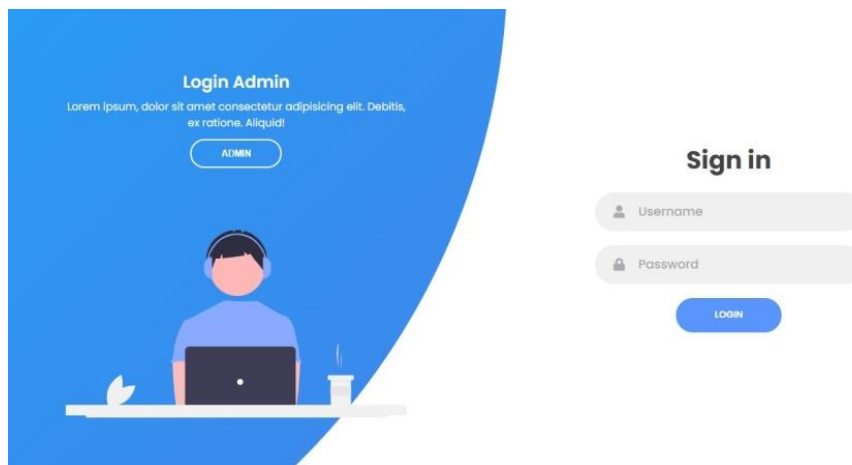


**Figure 8**  
Sequence diagram admin data validation

#### 4. System Implementation

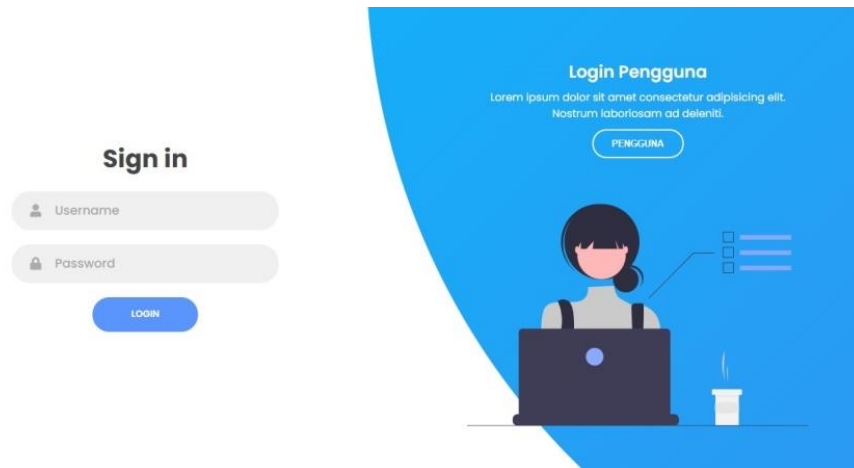
##### a) Login Page

There are two login pages on the system that have been created, which are the user login page and the admin login page. Users or admins need to enter their username and password in their respective login pages in order to enter the patient data reporting application system.



**Figure 9**  
Login page admin

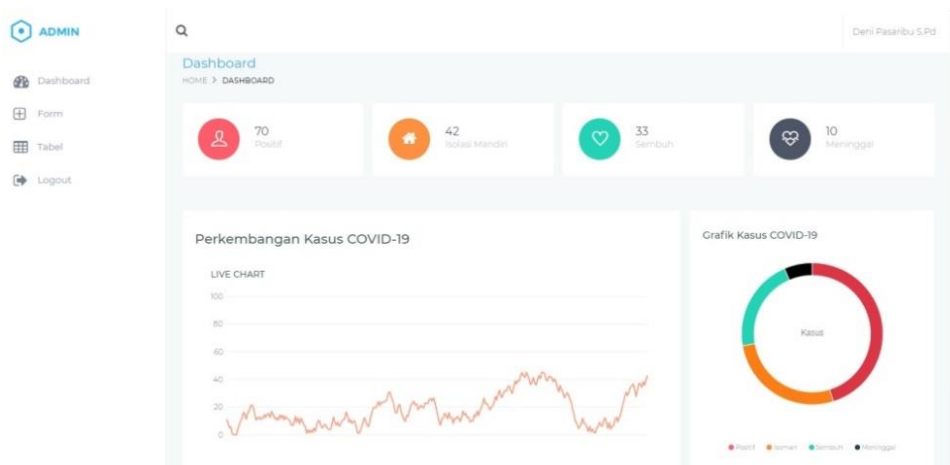
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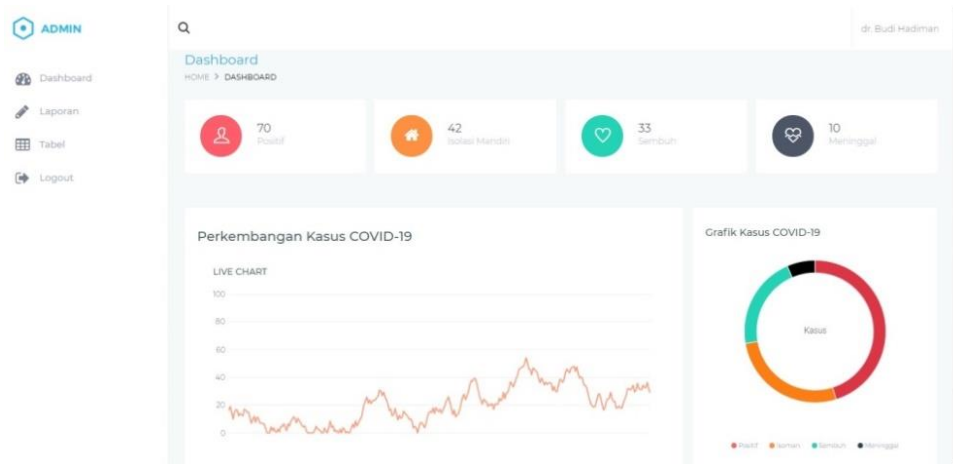
**Figure 10**  
**Login page user**

## b) Dashboard Page

On the main page there is some information that can be seen such as patient data, live chart of cases Progress, and COVID-19 cases Chart. There is a difference between user and admin in the sidebar. For users there is a form button to input patient data, while for admin there is a report button to report patient data to the central health facility (Health Services).



**Figure 11**  
**User dashboard page**



**Figure 12**  
**Admin dashboard page**

c) Form Page

Users can report the patient data they have to the public health center on this page. Users must input the name, ID card number, gender, phone number, born date, age, job, address and the status about tracing contact.

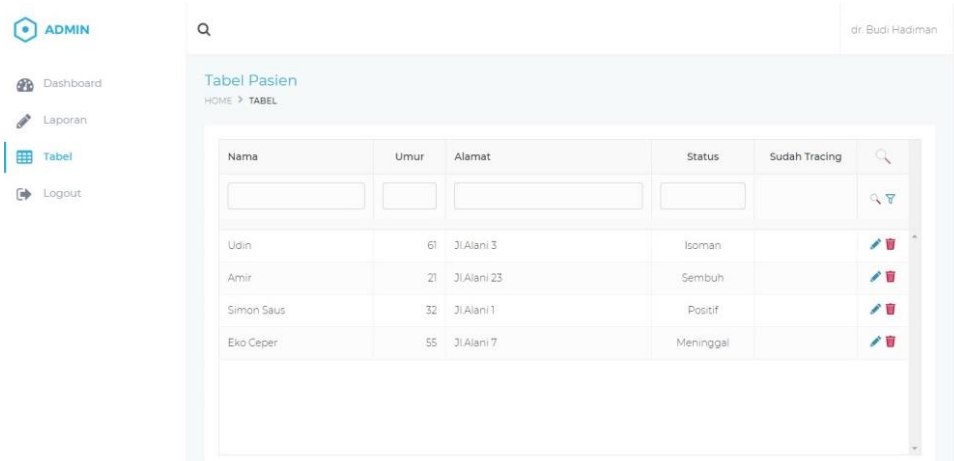
The screenshot shows a 'Form' page for reporting patient data. The sidebar includes 'ADMIN', 'Dashboard', 'Form', 'Tabel', and 'Logout'. The main form area is titled 'Form' and includes the following fields: 'Nama Lengkap Pasien\*' (text input), 'NIK\*' (text input), 'Jenis kelamin\*' (radio buttons for 'Laki-Laki' and 'Perempuan'), 'No Telepon Pasien\*' (text input), 'Tanggal Lahir\*' (date picker), 'Umur' (text input), 'Pekerjaan\*' (text input), 'Alamat Lengkap\*' (text input), 'RT\*' (text input), and 'RW' (text input). At the bottom, there is a question: 'Apakah sudah ada kontak dari Puskesmas/Salgas terdekat untuk mengecek tracing/kontak erat?' with radio buttons for 'Sudah' and 'Belum'. A 'Submit' button is located at the bottom right.

**Figure 13**  
**User form page**

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### d) Validation Page

On this page there is a table containing patient data received from the user. Admin rechecks and validates patient data so that there is no double or incomplete data.



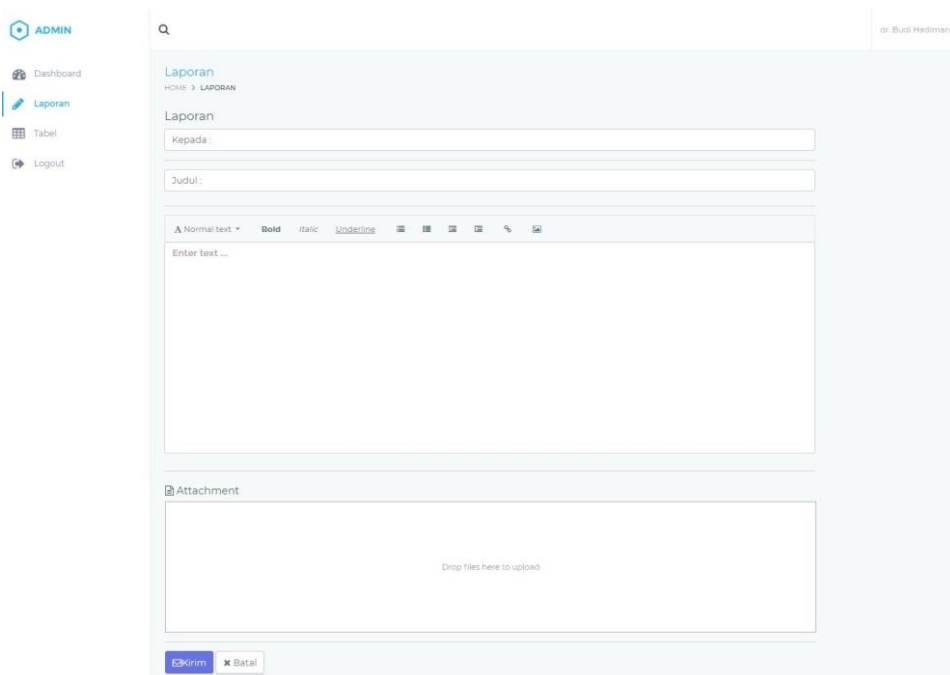
The screenshot shows the 'Tabel Pasien' (Patient Table) page in an admin interface. The page has a sidebar with navigation options: Dashboard, Laporan, Tabel (selected), and Logout. The main content area displays a table with the following data:

Nama	Umur	Alamat	Status	Sudah Tracing
Udin	61	Jl. Alani 3	Isoman	
Amir	21	Jl. Alani 23	Sembuh	
Simon Saus	32	Jl. Alani 1	Positif	
Eko Ceper	55	Jl. Alani 7	Meninggal	

**Figure 14**  
**Admin validation page**

### e) Report Page

All patient data that has been rechecked and re-validated by the admin will be forwarded to the center Health Facility in the form of a report.



The screenshot shows the 'Laporan' (Report) page in the admin interface. The page has a sidebar with navigation options: Dashboard, Laporan (selected), Tabel, and Logout. The main content area contains a form for generating a report with the following fields and options:

- Kepada:** A text input field for the recipient.
- Judul:** A text input field for the report title.
- Text Editor:** A rich text editor with options for Normal text, Bold, Italic, Underline, and a toolbar with icons for text alignment, bulleted list, numbered list, link, unlink, and undo.
- Attachment:** A section for uploading files, with a placeholder text 'Drop files here to upload'.
- Buttons:** 'Kirim' (Send) and 'Batal' (Cancel) buttons at the bottom.

**Figure 15**  
**Admin report page**

## 5. System Test

System testing is done with the Black-box method.

**Table 1**  
**Black-box Testing**

No	Input Data	Expectations	Observation result	Information
1	Empty login data, then click login.	The system will display "Please fill in username and password".	according to expectations	Valid
2	Fill in one of the login data, then click login.	The system will display "Please fill in username or password".	according to expectations	Valid
3	Fill in all login data, but one or the entire login data is incorrect, then click login.	The system will display "username or password is wrong".	according to expectations	Valid
4	Fill in all login data correctly, then click login.	The system will continue to the main page.	according to expectations	Valid
5	Fill in the patient data form by the user but the data is wrong.	The system will display "Please complete the data correctly!"	according to expectations	Valid
6	Fill in the patient data form by the user correctly.	The system will forward the data that has been inputted to the patient table.	according to expectations	Valid
7	The admin rechecks or validates the patient table but the data does not match, and then clicks the "X" button.	The system will mark the data provided that does not match.	according to expectations	Valid
8	The admin rechecks or validates the patient table, then clicks the "✓" button.	The system will mark the data provided which matches.	according to expectations	Valid
9	Admin clicks send report without inserting file to attachment.	The system will display "Please enter an attachment file!"	according to expectations	Valid
10	Admin clicks send report by entering file attachment.	The system will display "Your report has been sent!"	according to expectations	Valid

**Conclusion**

Based on the stages of research that has been carried out, the writers concludes: 1). The system that is used at local health facilities still uses a manual system, causing many shortcomings. Among them, reporting is still using files which causes the accumulation of documents so that officers will find it difficult to track the required

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data. 2). The writers create a computerized reporting application that makes it easier for RT/RW in reporting patient data so that they do not need to come directly to local health facilities, and make it easier for health facility staff to manage structured patient data. 3). The report data received is processed by the local health facility, then forwarded directly to the central health facility as an effort to increase the validity of the data and accelerate the response to COVID-19.

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