



Development of Coronavirus Disease Patient Registration Information System with Object Oriented System Approach

Riyanto¹, Mustar Aman^{*2}, Beby Tiara³, Nuri Wiyono⁴, Yunianto Agung Nugroho⁵

^{1,2,3,4,5}Information Systems Study Program, S'ITMIK Insan Pembangunan, Banten-Indonesia
Email : 1rizal_ariyanto@gmail.com, *2mustarstmik@gmail.com, 3bebytiara27@gmail.com,
4nwiyono.ip@gmail.com, 5yunianto.nugroho76@gmail.com

Abstract

The rapid development of Information and Communication Technology (ICT). Hospitals are health service institutions that provide complete individual health services that provide inpatient, outpatient, and emergency services. emergency. Until now, the registration system for Coronavirus patients at the Tangerang Regency Hospital has not been maximized and has not displayed inpatient rooms for Coronavirus patients. The problem that occurs in the Coronavirus patient registration system at the Tangerang Regency Hospital is that it is not yet computerized or web-based because the Coronavirus patient registration process is still using the Microsoft Excel application, patient data processing is still conventional and the list of Coronavirus patients has not been detailed, patients who have already registered, it turns out that there are no inpatient rooms available so that many Coronavirus patients are slow to be helped. The aim of the research is to build a fast and accurate Coronavirus patient registration system. The research method used is descriptive qualitative. Data collection techniques were carried out by means of observation, interviews, and literature study. The results of this study are in the form of software, namely a web-based Coronavirus patient registration system that can display detailed information on Coronavirus patient registration.

Keywords: Registration, Patient, object-oriented, Analysis, Coronavirus.

1. INTRODUCTION

Hospital is a health service institution that provides complete individual health services that provide inpatient, outpatient, and emergency services at hospitals in Tangerang Regency. However, user perceptions of registration constraints are also very high. These obstacles arise because hospitals have not been able to completely replace traditional methods by utilizing information technology in the registration of corona virus patients [1]. The use of technology for the registration of patients with the corona virus disease system by businesspeople can provide positive and negative values. This study explains that research on the risk perspective variable and consumer confidence in patient registration shows that there is a process of mutual influence between the two variables. This is indicated by the variable consumer perception of the risk posed by patient registration is quite high. Meanwhile, consumer confidence in patient registration tends to be low [2]. One of the influencing factors is that it still relies on conventional patient



registration methods [3]. So far, hospitals in Tangerang Regency carry out outpatient registration services at the same time as new patient registrations and at the same time as corona virus patients directly at the hospital, so sometimes patients have to wait their turn and queue to get their respective services[4]. Of course, this condition requires a lot of time for the patient and cannot predict when the treatment service will reach its destination poly[5]. The solution to this problem is the creation of a website-based corona virus patient registration system using the OOP concept. The formulation of the research problem is: 1) How is the corona virus patient registration information system that is currently running when viewed from the functions of planning (planning), organizing (organizing), mobilizing (implementing/directing), and controlling (supervision) at Tangerang Regency Hospital ? 2) How to design a web-based corona virus patient registration information system at the Tangerang Regency Hospital?. The purpose of this study was to simplify the registration of patients with coronavirus disease without having to come to the hospital with a queue to take a registration number, and to be able to immediately get medical services or immediate treatment at the destination hospital without being constrained by over-coronavirus patients at the hospital. The results of this study are in the form of software, namely a web-based corona virus patient registration system that can display detailed information on hospitals that are not overcrowded with corona virus patients and can display a map of the hospital's location.

The research that has been done previously by Wong. R and Bradley. H. E. Observation methods for Developing patient registration and medical records management system in Ethiopia. The result is a medical record management system with a simple computer database program to assist in finding patient information. It uses a quality improvement approach, which involves local hospital management, physicians and medical record staff and evaluates the impact of the new system on medical record accessibility and completeness, as well as changes in physician satisfaction with medical records and patient registration processes in hospitals [6].

The research that has been carried out by Wijaya, H.O. is the application of the Waterfall method in the mobile web-based Outpatient Patient Registration Information System with the Waterfall method, the results of the research are an Outpatient Registration Information System. The goal is to make it easier for patients in the registration process, make it easier for officers in terms of recording and also a web-based system to provide fast and accurate information without knowing the place and time [7].

The Research conducted by Nurus Sa'idah, quantitative methods and cross sectional design for Analysis of the Use of Online Registration System (E-Health) Based on Unified Theory Of Acceptance And Use Of Technology (UTAUT) and the results of this study are to optimize the application of the online registration system or E -Health[8]. Then the research that carried out the Wedding Organizer Information System using the Object Oriented System Approach in CV Pesta by Aman, M. and Suroso. Web-based software combined with object-oriented programming techniques. The result of this research is an application of the Wedding Organizer Information System using an Object Oriented System Approach to facilitate the rental data processing [9].

The research conducted by Chen.Y and You.H. "Selection and Research for Online Registration System's Database System. The results of this study are to show that the good

performance and high stability of the Online Registration System's lies in the choice of database system. The database clustering technology which has advantages such as concurrent processing, easy expansion, and high security is proposed to achieve the Online Registration System's database subsystem, and database cluster system framework design and also to explore the database load balancing of the cluster system, database replication technology heterogeneous [10]. The research conducted by the author is the Development Of Coronavirus Disease Patient Registration Information System With Object Oriented System Approach. The method used is qualitative and the research results are in the form of software, namely the Coronavirus Disease Patient Registration Information System web using the OOP concept.

2. METHODS

Research design is all the processes needed in planning and implementing research. The method used by the author in conducting research is descriptive qualitative method. Qualitative descriptive method aims to create a systematic, factual, and accurate description of the facts and characteristics of a particular research object. Descriptive method in carrying out research as a reference for research design and is a description of the initial planning until the research objectives are achieved. Researchers conducting research at hospitals have several stages as follows [11-12]:

a. Data collection

The study began by determining data needs and collecting data by direct observation to the field and conducting interviews with the owner to find out the system that was running. This data is in the form of observations, interviews, and literature studies.

b. Software Modeling

This stage is carried out to build software with a waterfall model consisting of analysis, design, code, and tests. At the analysis stage, it is used to describe functional and non-functional requirements. Functional requirements are the core of the activities carried out, such as processing registration data at the Hospital, while non-functional requirements are activities that support functional requirements such as software specifications. At the design stage, namely designing data structures, software structures, software interface displays, at the code stage the software design is translated into programming languages, at this stage the design of data processing applications is translated into code.

c. System Test

After translating the software design into a programming language, the system function testing is carried out on the results of the test analysis using Black Box Testing.

d. Results

At this stage the system that has been designed is ready to be used as a registration application to improve services to patients at the hospital. Before doing this step, the researcher observes the problems that occur, after that in determining the title to be discussed following the background and problem formulation.

2.1 Data Analysis Method

To analyze the data processing process of the Coronavirus disease patient registration system at the Hospital, the following steps will be carried out[13-14]:

a. Collecting research data, at this stage the researchers conducted interviews with the

Hospital, namely the Hospital Director. Asking what problems are being faced and collecting data related to the processes in the registration system, inputting and processing data for the Coronavirus disease patient.

- b. Analysis of the data collected, at this stage the researcher studies and analyzes the data obtained and the ongoing process to find out the overall picture of the pre-existing system.
- c. Identification of user needs for information, at this stage researchers analyze system requirements and propose systems with reference to processes that are already running. Based on the sequence of the previous stages at the Hospital.
- d. Identify the requirements for the application of the Coronavirus disease patient registration data processing system to be built along with the required hardware specifications.

2.2 Data Collection Method

In conducting this research, the data collection methods used are as follows [15-16]:

1. Interview Method.

Interviews with parties related to the research. The interview technique was carried out with structured interviews. In the interview, the researcher has prepared a list of questions related to the development of the corona virus patient registration system. The respondents in this interview were the head of the section and the registration officer. Questions to obtain data related to the current registration system, functional requirements, non-functional requirements, and users of the system to be developed.

2. Observation Method.

Observations for direct observation of organizational profiles and research objects. The observation technique was followed by structured observation by compiling a list of data requirements and data sources. The observation process was carried out to study the registration system, organizational goals and structure, business processes, availability of technology infrastructure, and information technology policies that already exist in the registration section of the Tangerang Regency Hospital.

3. Methods Literature study.

Methods Literature study is obtained by studying, researching, and reading books, journals related to the registration system.

2.3 System Approach Method

The system approach method used is an Object-Oriented approach that uses OOA (Object Oriented Analysis) and OOD (Object-Oriented Design) which are visualized with UML and include Use Case Diagrams, Sequence Diagrams, Class Diagrams, Activity Diagrams, and Deployment Diagram [17].

2.4 Basic Concepts of Object-Oriented Design and Analysis

The concept of object-oriented or object-oriented focuses on the creation of classes which are the blueprints of an object. This concept can divide the software into several objects that are interconnected and interact with each other. Some definitions related to the concept of object oriented are [18]:

1. Classes and Objects. Class can be interpreted as a general description (template, pattern or blueprint) that describes a set of similar objects. Physical objects such as tables or customers or conceptual objects such as text input areas or files.
2. Attributes, Methods and Messages. An attribute is something attached to an object that describes the properties of a class or object. An object encapsulates data (represented as a collection of attributes) and the algorithms that process that data. This algorithm is called an operation, method or service. Each operation that is encapsulated by an object provides a representation of one of the behaviors of that object.
3. An object interacts with other objects through messages. An object is asked to perform one of its operations by sending it a message. The receiving object responds to the message by selecting an operation that implements the message name, executing the operation, and returning a control function to the called object.
4. Encapsulation. A class encapsulates data and the operations that process that data. The data (attributes) that describe the class are closed by operations that manipulate that data. To access the class attribute values must go through an operation. This encapsulation concept supports information hiding. Internal implementation details of data and procedures are hidden from the outside world. This minimizes the effect when there is a change in the class.
5. Inheritance. Inheritance is the inheritance of properties from a class to a new class. Subclass Y is the inheritor of superclass X, so subclass Y inherits all attributes and operations owned by superclass X. This supports the concept of reuse. At each level of the class hierarchy, new attributes and operations can be added to classes that have been inherited from higher levels in the hierarchy. In inheritance also allows for overriding. Overriding occurs when inherited attributes and operations are modified to meet the specific requirements of the new class.
6. Polymorphism. Polymorphism allows a number of different operations to have the same name. This separates objects from other objects and makes each object more independent.

2.5 System Testing Method

The technique used in testing the proposed application system is the black box testing method, functional without testing the appearance and coding of the system. The purpose of testing is to find out the functions, inputs, outputs of the software in accordance with the required specifications. This test is carried out with the stages contained in the black box testing method with the aim that the system created is able to meet user needs[14].

3. RESULTS AND DISCUSSION

3.1 System Analysis

To analyze the system running in this study using the Unified Modeling Language (UML) to describe the current system procedures and processes, the patient comes to the hospital, then the patient does a Swab/PCR check at the hospital and if the patient is declared positive, then the patient registers to the Coronavirus disease patient registration section, before the Coronavirus disease patient registers, then the registration section informs the patient in advance of the availability of an inpatient room, if there is an inpatient room, the

Coronavirus disease patient can register and be ready to be treated , if there is no room availability, then the Coronavirus disease patient will be directed to register to another hospital that still has room availability.

The process of system analysis is to explain what the system must do to meet the information needs of users. System analysis will answer the questions of what will be done, who will use it, where and when the system will be used. The current system analysis activity is carried out with an object-oriented analysis approach for the system being designed, to focus on the functionality of the current system. Furthermore, the results of the analysis will be visualized and documented with the Unified Modeling Language (UML) through Use Case Diagrams, Activity Diagrams, Class Diagrams and Sequence Diagrams with the consideration that these diagrams are considered to represent the overall running system that can be understood by users[17-18].

3.1 Use Case Diagrams

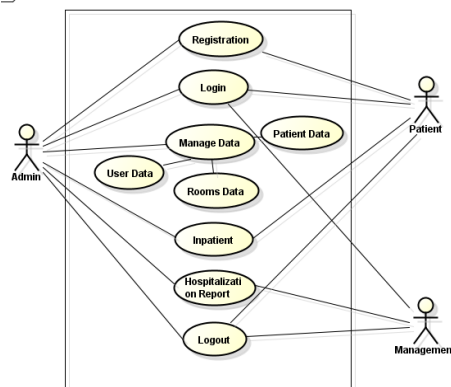


Figure 1. Use Case Process flow diagram of the developed system.

3.2 Activity Diagrams

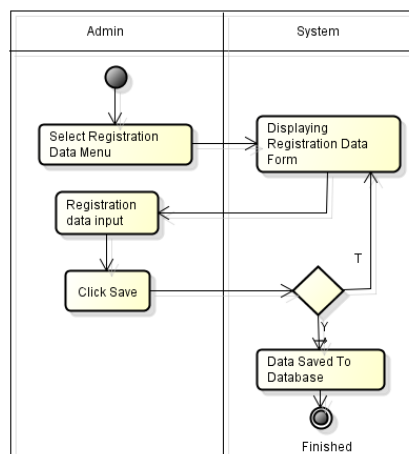


Figure 2. Activity Diagrams Registration process for patient coronavirus deseaser.

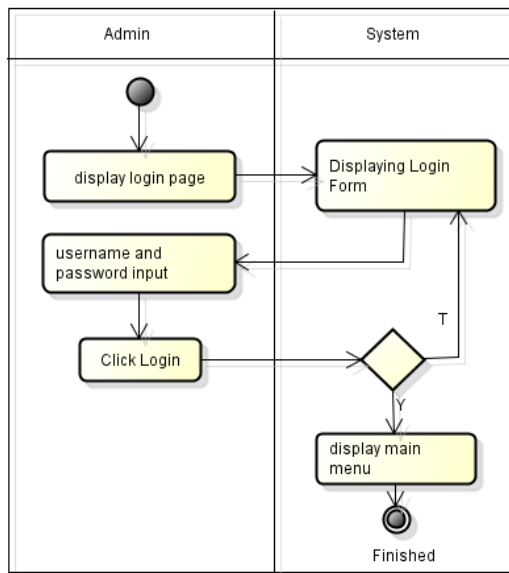


Figure 3. Activity Diagram for the login process on the designed system

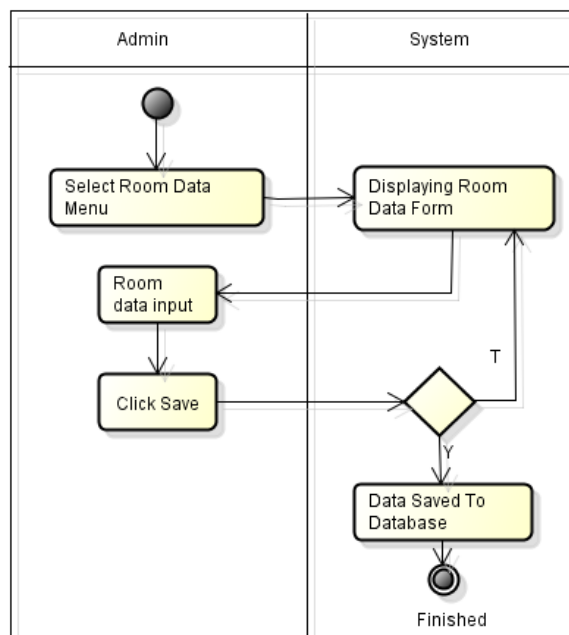


Figure 4. Activity Diagram for room data input process flow

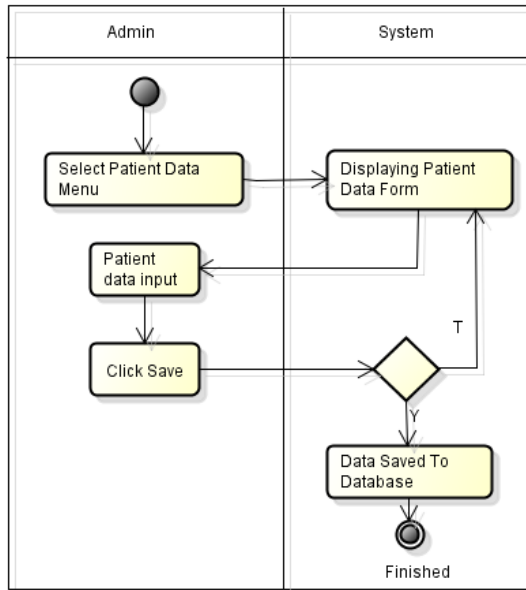


Figure 5. Activity Diagram for patient data input process flow.

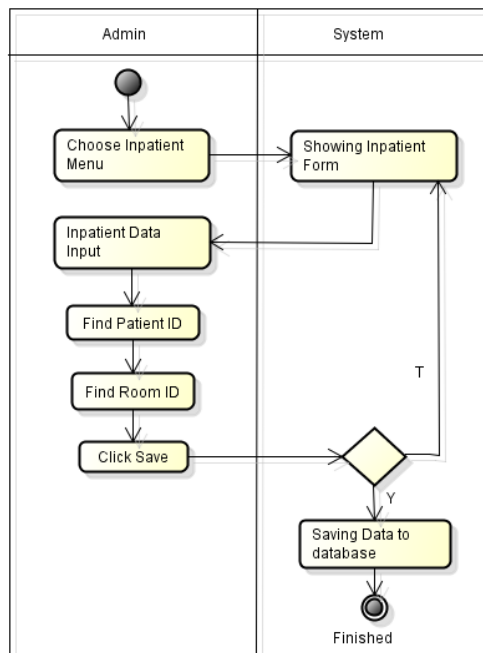


Figure 6. Activity Diagram for Inpatient coronavirus patient process flow.

3.3 Sequence Diagrams

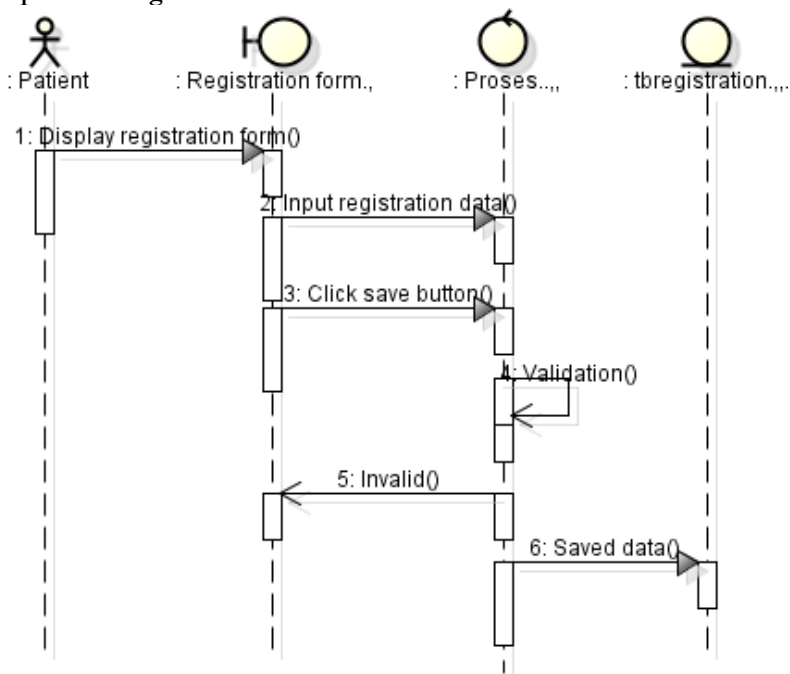


Figure 7. Sequence diagram of the registration process for coronavirus patients of the developed system

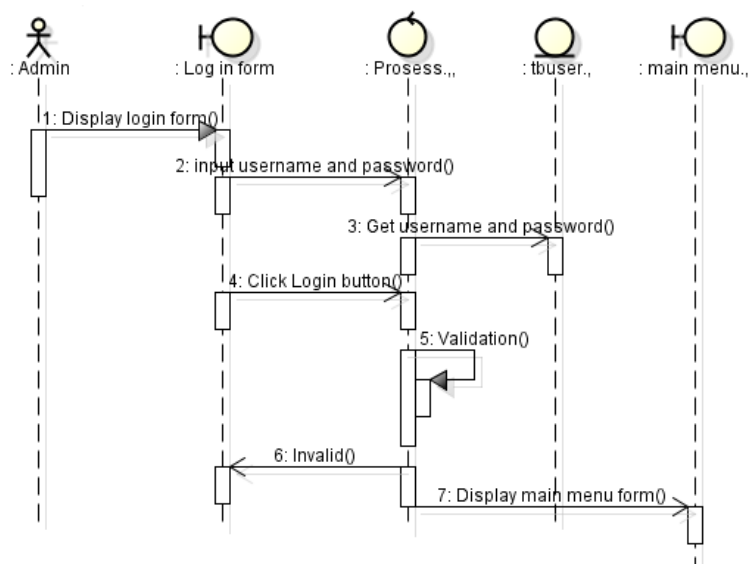


Figure 8. Sequence diagram for Login process of the developed system

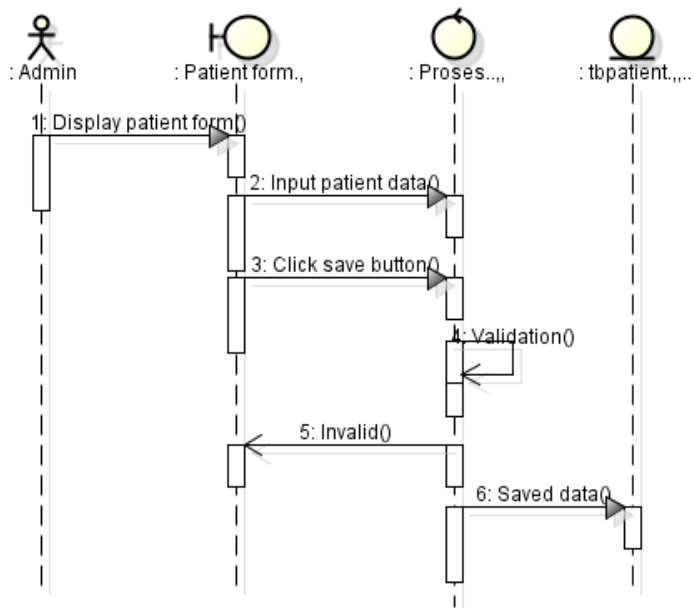


Figure 9. Sequence diagram for patient data input process flow.

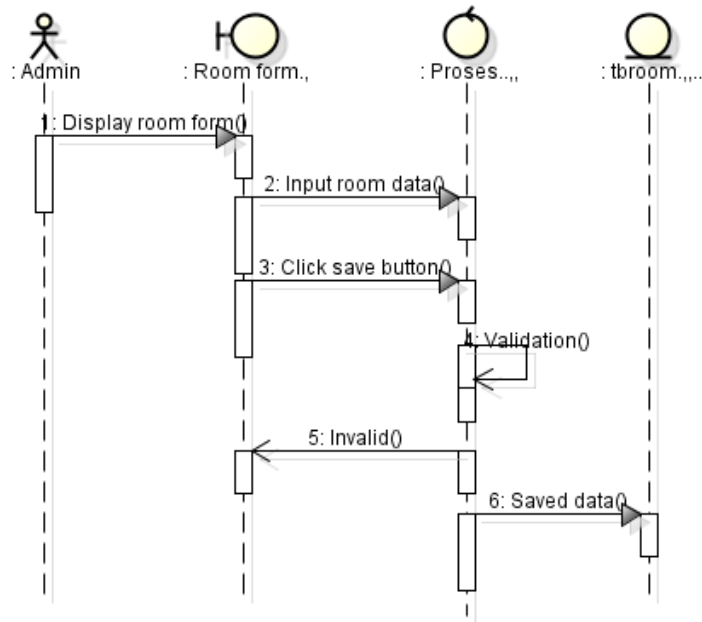


Figure 10. Sequence diagrams for room data input process flow

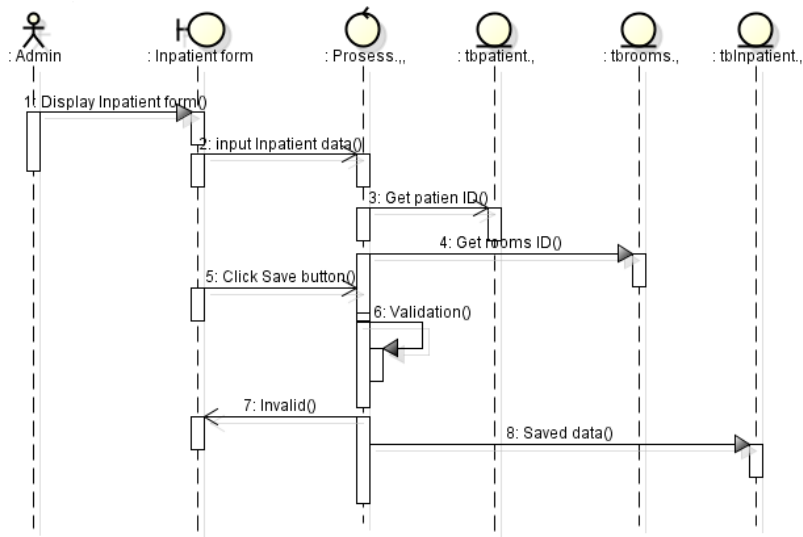


Figure 11. Sequence diagram for Inpatient coronavirus patient process flow.

3.4 Class Diagrams

Class Diagram displays several classes that exist in this system and provides an overview of the system and the relationships in it. There are subsets of classes, namely the attributes and operations in a class. The following is a class diagram for the designed sales system application.[19]

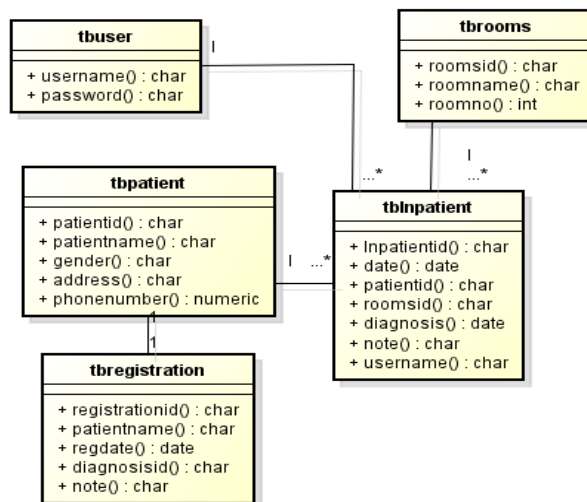
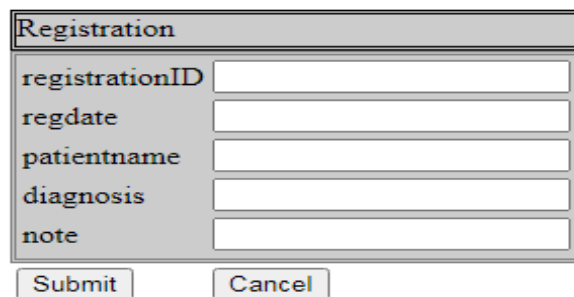


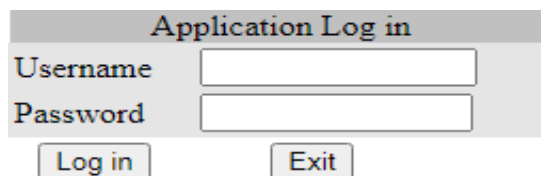
Figure 12. The class diagram is a database of the coronavirus patient registration information system to store all data from the system that was built

3.5 Input Design



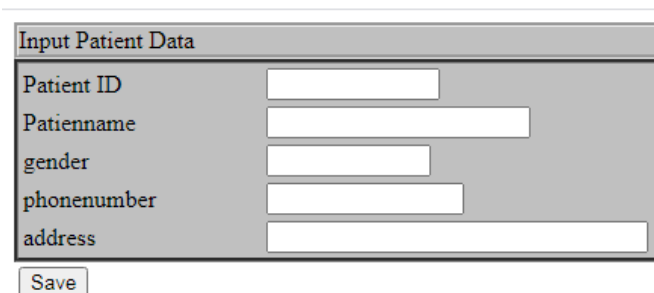
The registration form is titled "Registration" and contains five input fields: "registrationID", "regdate", "patientname", "diagnosis", and "note". Below the fields are two buttons: "Submit" and "Cancel".

Figure 13. Display of the registration form on the designed software



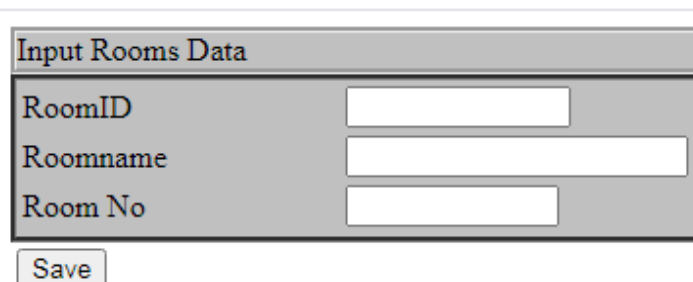
The login form is titled "Application Log in" and contains two input fields: "Username" and "Password". Below the fields are two buttons: "Log in" and "Exit".

Figure 14. Login display of the developed coronavirus patient registration system.



The patient data input form is titled "Input Patient Data" and contains five input fields: "Patient ID", "Patiename", "gender", "phonenummer", and "address". Below the fields is a "Save" button.

Figure 15. Display of the patient data input process from the developed system



The room data input form is titled "Input Rooms Data" and contains three input fields: "RoomID", "Roomname", and "Room No". Below the fields is a "Save" button.

Figure 16. Display of room data input process from the developed system

INPUT INPATIENT DATA			
Inpatient ID		Date	
Patient ID		Find	
Patient Name			
Diagnosis		Note	
RoomId	RoomName	RoomNo	
Save			

Figure 17. Display of the coronavirus patient data input process for inpatients from the developed system

3.6 Output Design

Hospitalization Report

inpatientID	I01	date	21/05/20
PatientID	PS 01	PhoneNumber	+6281234564322
PatientName	Johanes		

No	roomID	diagnosis	Note	username
1	R001	tasteless	light handling	D001
2	R001	hard to breathe	special handling	D001

Tangerang, 2021 August 25

Dept



Charles

Figure 18. output display of the results of the developed coronavirus patient registration information system

3.7 Black Box Testing

Black Box Testing will be carried out in a way that is relatively contrary to existing requirements and ensures the system can handle all inappropriate inputs. Therefore, the user can only enter the correct data into the system. This test attempts to find errors for example, such as [12]:

- Incorrect or missing functions are present in the software.
- Error in software interface.
- Error in data structure or external database access in software.
- Problems in software performance.
- Software initialization and termination errors.

The following is a Black Box Testing table used in testing software, namely:

Table 1. Black Box Testing Results

Testing Scenario	Test Case	Expected results	Test result	Conclusion
Add Patient Data	Enter all patient data then, click the 'Button' add patient.	Patient Data Added Successfully	In accordance	Normal
Delete Patient Data	Click on the patient you want to delete then, click on the 'Delete' button	Patient Data Deleted Successfully	In accordance	Normal
Patient Data Update	Click on the Patient data that you want to update then, click the Update button	Patient Data Successfully updated	In accordance	Normal

4. CONCLUSION

Based on the discussion of the research results that have been discussed above, the Development of Coronavirus Disease Patient Registration Information System With Object Oriented System Approach research in hospitals in Tangerang Regency can be concluded as follows:

1. Digital transformation by hospitals, with a focus on ESDM. The results showed that there was an interaction of individual and organizational factors in shaping the intentions of hospital professionals in using the registration system. The results showed that the main determinant of intention to use the corona virus patient registration system was the normative factor and then the individual factor.
2. The corona virus patient registration information system can be a solution in overcoming problems in the registration circulation because the corona virus patient registration information system can be accessed anytime and anywhere, making it easier for users to register and get hospital information that is not overpatient.
3. Model analysis, design, and implementation of web-based software for the development of a corona virus patient registration information system at hospitals in Tangerang Regency can make it easier for users to register and get the right hospital information and immediately get patient treatment quickly using analytical methods and systems design approach to object-oriented systems.
4. The results of the test are to find out the functions, inputs, outputs of the software in accordance with the required specifications. This test is carried out with the stages contained in the black box testing method with the aim that the system created can meet user needs.

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