



Geographic Information System of Patient Development in Jayapura Hospital During Pandemic

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ABSTRACT

Jayapura is a city has population over 240,340 people (Source: Jayapura administration department 2021) and will be increasing in the number of patients in hospitals every year, it will have impact on all hospitals in Jayapura. With this condition, the level of patient development during pandemic and before pandemic will be known. Based on the results of data collection, it is possible to classify categories of disease and treatment in hospitals to choose the best hospital in handling disease and treating patients, especially during pandemic because health management is having difficulties because the medical team focuses more on pandemic patients. Therefore, it is necessary to have geographic information system to collect and provide information to public about the level of development of patients in hospitals, using the PIECES analysis method, designing using Unified Modeling Language (UML) method, using waterfall development method and using QGIS for software used. This research resulted the Geographic Information System for the development of patients in Jayapura City Hospital during Pandemic as means of information for patients in Jayapura.

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1. Introduction

The hospitals are providers of health services to support the implementation of public health efforts. According to Law no. 44 of 2009 concerning hospitals, Hospital is a health service institution to provides three complete individual health services, namely providing inpatient, outpatient, and emergency services [1].

Jayapura City is a city has population more than 240,340 people (Source: Jayapura administration department 2021) and will be increasing in the number of patients in hospitals every year, it will have impact on all hospitals in Jayapura. With this condition it will be known the level of patient development during pandemic and before pandemic. Based on the results of data collection, it is possible to classify categories of disease and treatment in hospitals to choose the best hospital in handling disease and treating patients, especially during pandemic because health management is having difficulties because the medical team focuses more on pandemic patients.

The purpose of this research is to support performance into geographic information system. Geographic information system is a component consisting of hardware, software, geographic data and human resources that work together effectively to enter, store, improve, update, manage, manipulate, integrate, analyze and display data in an information system based on geographical[2][3]. The geographic information system is expected to help the public to find out the level of development of patients in several regional hospitals in Jayapura during pandemic.

Therefore, it is necessary to have geographic information system to collect and provide information to public about the level of development of patients in hospitals, using PIECES analysis method, designing using Unified Modeling Language (UML) method, using waterfall development method and using QGIS on software. This research resulted Geographic Information System for the development of patients in Jayapura City Hospital during Pandemic period.

2. Methodology

Geographic Information System, its called GIS, it is a computer-based system used to store and manipulate geographic information. GIS is designed to collect, store, and analyze objects and phenomena based on geographic location as important or critical characteristic to be analyzed (Aronoff, 1989). GIS consists of four subsystems, they are: data input (input), data storage and retrieval, data manipulation and analysis, and data output [4][5]. Using maps from QGIS, Quantum GIS (QGIS) is an open source and cross-platform Geographic Information System (GIS) application to run on operating systems including Linux. QGIS also has the ability to work related commercial application packages. QGIS provides all the functionality and features needed by typical GIS user. Using plugins and core features it is possible to visualize (demonstrate) maps for later editing and printing as a complete map. Users can combine the analyze data, edited data and managed data [2][6].

2.1 Research Methodology

2.1.1 Data Collection Methods

Data collection methods used in this research are as follows:

1. Interview

Interview is a process of collecting data through question and answer process by meeting face to face with the relevant sources.

2. Observation

Observation is the process of collecting data by observing directly in the field. In this case, the researchers conducted direct observations and reviews on hospital in Jayapura City. Researchers made direct observations to the location of hospital related to taking the coordinates of Latitude-Longitude using mobile phones and Google Maps application.

3. Literature Study

Literature study is a way of collecting information from previous research. Several previous articles and journals related to the issues mentioned for reference and comparison. This research also uses several journals as references from different sources and years of manufacture, with minimum limit of 5 years before.

2.1.2 Analysis Methods

To identify the problem, it should be done analyse of performance, information, economy, security, efficiency, and service. This method is known as PIECES analysis (Performance, Information, Economic, Control, Efficiency, Service). With this PIECES analysis method will get some problems and finally the main problem can be determined [7]

2.1.3 Design Method

The design method used in this research is UML (Unified Modeling Language), it is one of the language standards in used in industrial field to define requirements, to make analysis & design, and to describe architecture in object-oriented programming [8]

2.1.4 Development Method

The development method used in this research is waterfall method. It is a method to suggests a systematic and sequential approach through the steps in SDLC (Software Development Life Cycle) to build software. SDLC is a software development cycle consisting of several steps. The steps in SDLC include requirements (needs analysis), analysis (system analysis), design, coding or implementation, testing, and maintenance [9]

2.1.5 Testing Method

In this research, black box testing will be used for the final test. In black box testing focuses on functionality and output system. Black box testing pays attention to system details, functions on the system, and the flow of the system created. The test method used is the black box testing method. This method is a test method to find out the functions of the application buttons., to know the desire input or output data, then to declare the system can passed [10].

2.2 System Design

In this research, system design includes process design, database design, interface design and structure design.

2.2.1 Process Design

The design of this process using Use Case Diagrams and Class Diagrams.

1 Use Case Diagram

Use Case Diagram is the interaction between the user relationship with the system[11]. Use Case Diagram can be seen as follows:

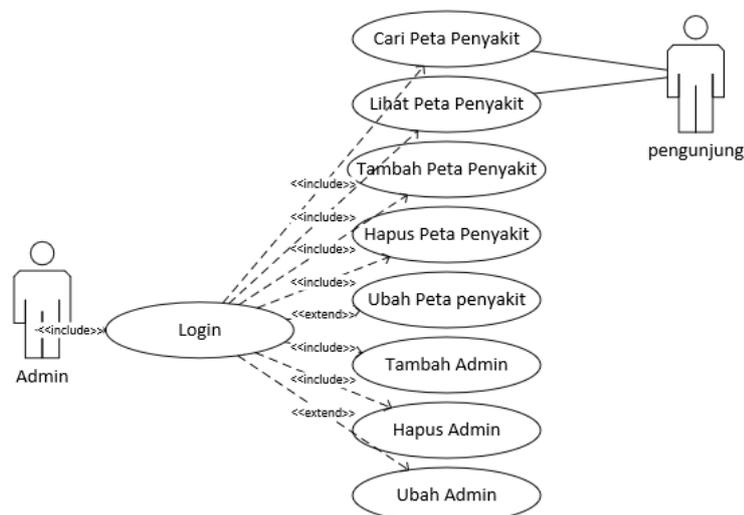


Figure 1 Use Case Diagram of Admin

Figure 1 shows Admin must be logged in to be able to add, to change, to delete admin data and maps. Visitor, it is patients in hospitals, it can view and find information on patient progress without having to log in.

2 Class Diagram

Class diagram Describes the structure of the system in terms of defining the classes that will be made to build the system [12]. Class Diagram can be seen as follows:

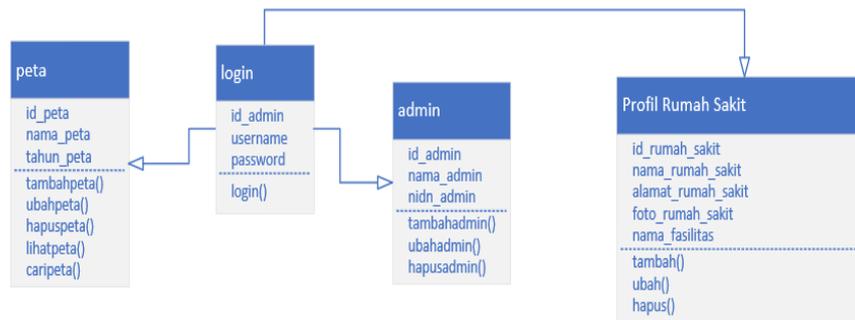


Figure 2 Class Diagram

Figure 2 shows that the Class Login has an association relationship with multiplicity of one and zero connected to the Map and Admin classes.

2.2.2 DataBase Design

The design of database on this system is designed using table relations. Table relations describe the relationship between tables in database. The table relations proposed in this system can be seen in the following figure.

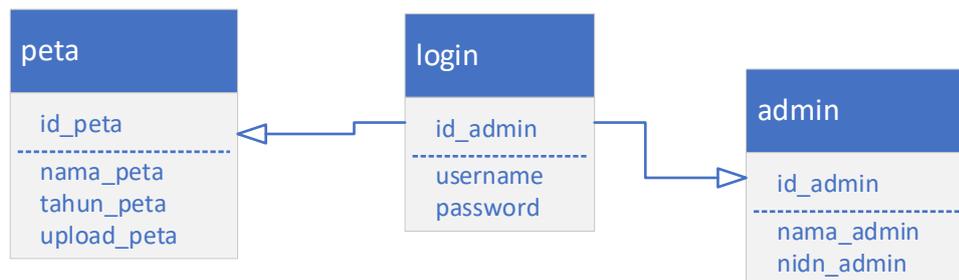


Figure 3 Table Relation

On figure 3 explains the table relation, there is relationship between tb_peta table which has id_peta attribute as the primary key and tb_login table which has id_admin attribute as the foreign key. The relationship between tb_admin table which has id_admin attribute as the primary key and tb_login table which has id_admin attribute as the foreign key.

3. Result and Finding

3.1. Main Page Display

Main page is page the first display on website accessed. This page will display map image containing dots, lines and colors from the hospital in Jayapura City. There is map named textbox, a map_year combo box and a map search button. The main page design can be seen in Figure 4.

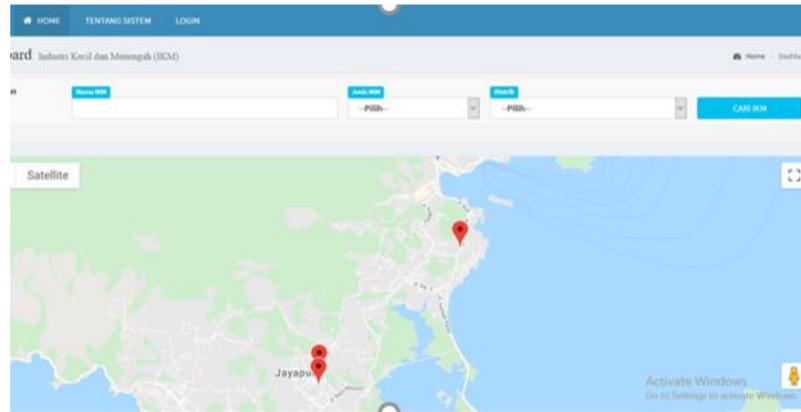


Figure 4 Main Page Display

3.2. Login Page Display

The login page is the login page used by admin to enter the admin page. The design of the login page can be seen in Figure 5.

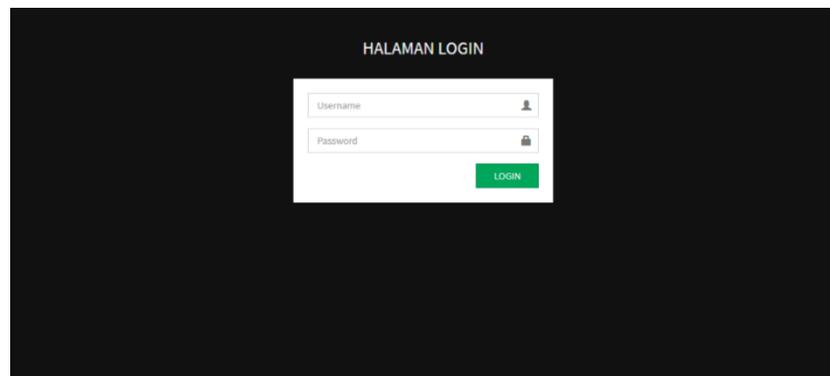


Figure 5 Login Page Display

3.3. Admin Main Page display

The main page admin is the first page after admin login. This page will display several tool boxes, first is the toolbox to view, to add, to change and to delete admin, the second is the map tool box to view, to add, to change and to delete map. The design of the main admin page display can be seen in Figure 6.

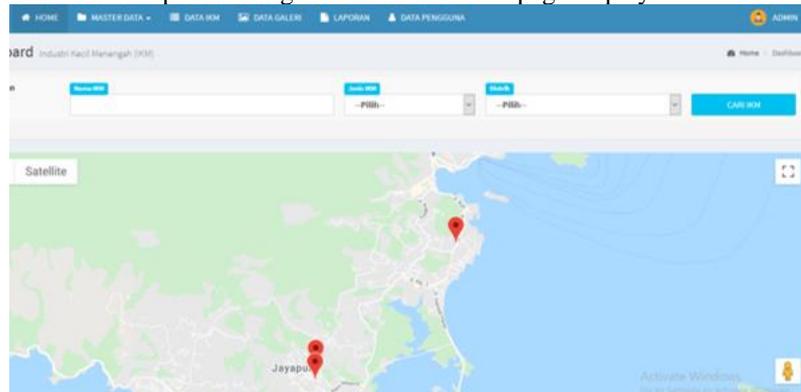


Figure 6 Main Page Display of Admin

4. Conclusions

Based on the results of the discussion of Geographic Information System research on the Development of hospital during Pandemic Period, the conclusions that can be drawn are as follows:

1. Geographic Information System as the results of patient progress information can be used as a benchmark for hospitals in Jayapura City to solve the problem of increasing disease during pandemic
2. As a place of development information to help public to find out the level of development of the disease level in Jayapura City during pandemic, the information provided to the Hospital is no longer private but general information.
3. Patients can find out the services and facilities available in all hospitals in Jayapura City

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