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Design Information System of Hospital Beds (SIMPATI RS) in Tangerang City

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Abstract:

This research is motivated by the importance of the information systems that can provide information availability Hospital beds are very beneficial to the general public, especially patients who are in need of any information Hospital in Tangerang are still available beds for hospitalization. Community or the patient could only know that information in a way to come directly to the destination hospital and asked to part Inpatient Unit, or via the telephone service to the Hospital which will be answered by officers Inpatient Unit. If the distance of the patient to the hospital was far away, it could be after the patient arrived at the hospital, which originally contained information for inpatient beds that are still empty are occupied. Thus the information obtained is not accurate and relevant. The purpose of this study is to design a system that can provide fast, accurate and relevant and accessible online anytime and anywhere by the public regarding information Hospital beds in the city of Tangerang, especially inpatient class III. The method used is the method of data collection (by means of interviews, observation, and literature / literature review), SWOT analysis method, the method SDLC design, prototype method, and black box testing method for testing and coding using Code Igniter framework 2.0, jQuery, javascript and CSS to design the look that has been made in photoshop portable. This research resulted in the design of information systems Hospital beds that can provide accurate and relevant information as needed and have started to be implemented in Tangerang City Hospital. But the results are not real time because the response Hospital yet responsive to input patient data when there is incoming and out of the unit at the Hospital Inpatient Such.

Keywords — **Design, information systems, Hospital beds, inpatient**.

I. INTRODUCTION

In this era of globalization, the advancement of information technology is needed in accessing data and information quickly. In developed countries technology is something that supports human needs in carrying out daily activities.

Seeing the importance of technology in human life, it is necessary to have people, agencies or companies to create a sophisticated system in accordance with human needs. The need for information technology is certainly closely related to the role of the Information and Communication Agency (Infocom) in the Tangerang City area. The Infocom Service is authorized to organize regional affairs relating to communication and informatics.

Hospital is a company engaged in health services which includes emergency services, outpatient services (General Poly, Material Poly, Child Poly, Dental Poly, etc.), Hospitalization (Infection, Non Infection, Maternity, Isolation, etc.), Laboratory, Radiology, and so on. The service system at the Hospital is the most important part of one of the business processes in the Hospital. The better the services provided, the more people who believe to

seek treatment at the Hospital. Given the importance of information on the availability of beds for hospitalizations, an information system is needed that can provide information on the availability of hospital beds that are very useful for the general public, including hospital patients who are in need of information on which hospitals are still available for stays.

At present, the public or prospective patients can only find out the information by coming directly to the intended hospital and asking the receptionist, or through telephone service to the hospital to be answered by the receptionist. If the distance of the prospective patient to the hospital is far away, then it could be that after the patient arrives at the hospital, information that initially contained a bed for inpatient care that is still empty has been filled. Thus the information obtained is inaccurate and relevant.

Based on the above problems, the author will explain further in the form of scientific work in the form of Final Projects entitled The Formation of Information Systems Availability of Hospital Beds in the City of Tangerang.

II. Related Work

In order to make it easier to understand the material related to the writing of scientific articles, the writer presents it simply as follows.

A. Code Igniter

CodeIgniter is a framework used to create a web-based application that is compiled using the PHP language. In the CI there are several types of classes in the form of libraries and helper. Both function to help programmers (programmers) in developing the application. Codeigniter (CI) is an application development framework using PHP, a framework for working or creating programs using more systematic PHP. MVC is a basic concept that must be known before knowing Codeigniter. MVC stands for Model View Controller. MVC is actually a programming technique that separates business flow, data storage and application interfaces or simply separates design, data and processes.

CodeIgniter is an open source application in the form of a framework with an MVC model (Model, View, Controller) to build dynamic websites using PHP. CodeIgniter makes it easy for developers to create web applications quickly and easily compared to making them from scratch. CodeIgniter was first released on February 28, 2006. The last stable version is version 2.1.3.

The framework can simply be interpreted as a collection of functions / procedures and classes for certain purposes that are ready to be used so that it can more easily and accelerate the work of a programmer, without having to make a function or class from the beginning.

There are several reasons why using framework:

1. Speed up and simplify the development of a web application.
2. It is relatively easy in the maintenance process because there are certain patterns in a framework (provided the programmer follows the standard pattern).
3. Generally the framework provides commonly used facilities so that we do not need to build from scratch (eg validation, ORM, pagination, multiple databases, scaffolding, session settings, error handling, etc.
4. More free in development compared to CMS.

Explanation of Patern Design: MVC (Model, View, Controller) including:

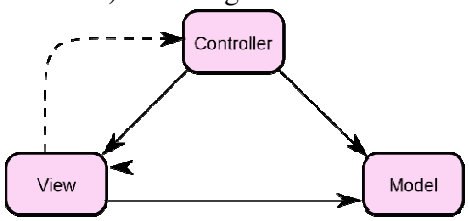

Fig 1. MVC Design

The View Controller model is a concept that is quite popular in the development of web applications, starting in the Small Talk programming language, MVC separates application development based on the main components that build an application such as data manipulation, user interfaces, and parts that control the application. There are 3 types of components that build an MVC pattern in an application, namely:

1. View, is the part that handles presentation logic. In a web application this section is

usually an HTML template file, which is set by the controller. View functions to receive and represent data to the user. This section does not have direct access to the model section.

2. Models, usually directly related to databases for manipulating data (insert, update, delete, search), handle the validation of the controller section, but cannot relate directly to the view section.
3. The controller, is the part that regulates the relationship between the part of the model and the part of view, the controller functions to receive requests and data from the user then determine what the application will process.

Using the MVC principle, an application can be developed in accordance with the ability of its developer, namely a programmer who handles parts of the model and controller, while the designer handles the view, so the use of the MVC architecture can improve maintanability and organization of the code. However, good communication is needed between programmers and designers in handling the variables that will be displayed.

There are several advantages of CodeIgniter (CI) compared to other PHP Frameworks:

1. Performance is very fast: one of the reasons for not using the framework is because its execution is slower than PHP from the scracth, but Codeigniter is very fast and maybe even Codeigniter is the fastest framework compared to other frameworks.
2. Almost zero configuration: of course to adjust the database and the flexibility of routing is still permitted to configure by changing some configuration files such as database.php or autoload.php, but to use codeigniter with standard settings, you only need to change a little just the file in the config folder.
3. Many communities: with the many CI communities, it is easier for us to interact with others, whether it's asking questions or the latest technology.
4. Very complete documentation: Each codeigniter installation package is accompanied by a very good and complete user guide to be used as a start, the language is easy to understand.

B. Mysql

MySQL According to Masria (2012: 185), explains that MySQL is a database management system software (database management system) or DBMS that is multithreaded and multi-user with around 6 million installations worldwide. MySQL AB makes MySQL available as free software under the GNU General Public License (GPL), but they also sell under commercial licenses for cases where its use is incompatible with GPL users. It is not the same as projects like Apache where software is developed by the general community and the copyright for the source code is owned by their respective authors. MySQL is owned and sponsored by a Swedish commercial company MySQL AB, which holds copyright almost all of its source code

According to Anhar (2010: 22), some advantages of MySQL:

1. MySQL can run stable on various operating systems such as Windows, Linux, FreeBSD, Mac OS X Server, Solaris and many more.
2. Open source. MySQL is distributed on an open source basis under the GNU General Public License (GPL) license.
3. Multi user. MySQL can be used by several users at the same time without having problems.
4. MySQL has a good speed in handling queries, in other words it can process more SQL per unit time.
5. In terms of secutiry or data security, MySQL has several layers of security such as the subnet mask level, host name, and user access permission with detailed licensing systems and encrypted passwords.
6. MySQL has an interface to various applications and programming languages using the API (Application Programming Interface) function.

III. RESEARCH METHOD

A. SWOT Analysis

SWOT analysis is a systematic identification of various factors to formulate the company's strategy. This analysis is based on the relationship or interaction between internal elements, towards external elements, namely:

1. Strength
   Strength in question is an advantage in the resources, skills and other capabilities that are relative to competitors and the market needs that are served by the company. For example in terms of technology owned and facilities owned.
2. Weakness
   The weaknesses in question can also be resources, skills and abilities that seriously hinder the effective performance of a company. For example, the level of employee skills and the low cost of promotion.
3. Opportunity
   Opportunities are the main favorable situation in the corporate environment, for example government policies and relatively high economic growth rates.
4. Treats
   Threats are the main unfavorable situation in a company's environment. For example, the rapid competition of healthcare providers.

Internal / Eksternal		Kekuatan *(Strength – S)*	Kelemahan *(Weakness – W)*
		1 Adanya dukungan dari pihak manajemen untuk pengembangan teknologi informasi di Rumah Sakit Mata Cicendo dengan memenuhan kebutuhan teknologi informasi (sarana dan pelatihan) dalam anggaran keuangan 2 Arah pelayanan yang berbasis di bidang teknologi informasi 3 Tersedianya fasilitas teknologi informasi yang memadai memungkinkan pelayanan dapat diatasi dengan menggunakan *'Computerized System'* 4 Semua unit – unit komputer sudah terhubung dalam suatu jaringan LAN 5 Tersedianya modul - modul SIM-RS yang dapat membantu dalam proses pengolahan data yang diperlukan	1 Akses jaringan internet masih terbatas dan relatif lambat 2 Kurangnya pemanfaatan pelayanan teknologi informasi yang telah dikembangkan sebelumnya 3 Penggunaan SIM-RS yang belum menyeluruh di semua unit (dikarenakan faktor pengembangan modular dan penyesuaian anggaran) 4 Keterbatasan kewenangan dalam pengelolaan sumber (dana dan fasilitas manajan) 5 Jumlah sumber daya manusia yang berbasis kompetensi teknologi informasi belum memadai 6 Belum adanya *job description* yang jelas untuk para pegawai divisi IT
Peluang *(Opportunity – O)*	1 Perkembangan teknologi informasi yang semakin pesat memungkinkan untuk mengembangkan SIM-RS sebagai sarana untuk memberikan *Comaited to Service Excellence* (C2SE) 2 Adanya software open source sehingga menyebabkan berkurangnya dana terhadap penyediaan software yang dibutuhkan untuk pengembangan TI di Rumah Sakit Mata Cicendo 3 Adanya kebijakan pemerintah untuk pengembangan TI di rumah sakit agar siap memasuki pasar global 4 Tuntutan masyarakat terhadap pelayanan kesehatan yang berbasiskan TI	**Stategi SO :** 1 Meningkatkan produktivitas dengan meminimalkan biaya operasional pengembangan teknologi informasi 2 Meningkatkan kepuasan kepada pemakai dengan memenuhi kebutuhan pemakai akan jenis data dan aplikasi 3 Meningkatkan pemanfaatan teknologi informasi yang ada 4 Meningkatkan sumber daya manusia	**Strategi WO :** 1 Meningkatkan produktivitas dengan meminimalkan biaya operasional pengembangan teknologi informasi 2 Meningkatkan kepuasan kepada pemakai dengan memenuhi kebutuhan pemakai akan jenis data dan aplikasi 3 Meningkatkan kehandalan operasional 4 Meningkatkan pemanfaatan teknologi informasi yang ada 5 Meningkatkan sumber daya manusia 6 Meningkatkan kesiapan sumber daya teknologi informasi 7 Memperbaiki *job description*
Ancaman *(Treat – T)*	1 Semakin banyaknya rumah sakit yang memberikan layanan kesehatan mata lewat akses internet 2 Tuntutan masyarakat terhadap mutu pelayanan yang diberikan oleh rumah sakit 3 Munculnya teknolog – teknologi baru yang dikembangkan oleh rumah sakit mata swasta misal adanya fasilitas *telemedicine* 4 Saingan dari konsultan – konsultan TI yang berkeinginan untuk membuat SIMRS yang dapat memberikan *commited to service excellence* (C2SE)	**Strategi ST :** 1 Meningkatkan produktivitas dengan meminimalkan biaya operasional pengembangan teknologi informasi 2 Meningkatkan kepuasan kepada pemakai dengan memenuhi kebutuhan pemakai akan jenis data dan aplikasi 3 Meningkatkan kehandalan operasional 4 Meningkatkan pemanfaatan teknologi informasi yang ada 5 Meningkatkan kesiapan sumber daya teknologi informasi	**Strategi WT** 1 Meningkatkan kepuasan kepada pemakai dengan memenuhi kebutuhan pemakai akan jenis data dan aplikasi 2 Meningkatkan kehandalan operasional 3 Meningkatkan pemanfaatan teknologi informasi yang ada 4 Meningkatkan sumber daya manusia 5 Meningkatkan kesiapan sumber daya teknologi informasi 6 Memperbaiki *job description*

Fig 2. Analysis SWOT

B. System Design Method

Network or computer network history begins with the system design method used in this study is SDLC (System Development Life Cycle) with the following stages:

1. Planning
   The planning stage is the initial stage of developing a system that defines estimates of resource requirements such as: physical devices, methods, and budgets that are still common. In this stage steps are also taken: defining problems, determining system objectives, identifying system constraints and making feasibility studies.
2. Analysis
   The analysis phase is the research phase of the system that runs with the aim of designing a new system by using tools or tools UML (Unified Modeling Language) with Visual Paradigm software, namely a language based on graphics or images, visualizing, building OO-based software (Object Orientied) through the Use Case Diagram, Sequence Diagrams, and Activity Diagrams which are carried out through 4 stages, namely: (1) Survey of the running system, (2) Analysis of survey findings, (3) Identification of information needs using elicitation tools through 4 stages, namely stage 1 covers all system requirements, stage 2 performs grouping needs using the MDI (Mandatory, Desirable, Inessential) method, then stage 3 with TOE (Technical, Operational and Economic) and final stage, (4) Identification of system requirements . The results of the analysis are then made a report for input into the design of the proposed system.
3. Design (Design)
   The design phase is the stage in determining the process of data needed by the new system with the aim of meeting the needs of users with UML tools with Visual Paradigm software to make Use Case Diagrams, Class Diagrams, and Activity Diagrams. The design process will translate requirements requirements into a software design that can be estimated before coding is made. This process focuses on data structures using MySQL, Photoshop CS3

Portable for designing interfaces, interface representations using Notepad ++ 5.7, and procedural details. This stage will produce a document called software requirements. This document will be used to carry out system-making activities. The steps taken are to prepare a detailed system design, identify alternative system configurations and prepare proposed implementation.

4. Implementation (Implementation)
   The implementation stage is where the system design is formed into a coding program that is ready to be operated. The steps are to prepare physical facilities and personnel, and carry out simulations.
5. Maintenance (Maintenance)
   After implementing the new system, the next step that needs to be done is the use or use, system audit, safeguarding, repairing and developing the system.

C. Design System in Use Case Diagram

The following is a patient use case diagram to go to the doctor in the hospital to register as an inpatient.

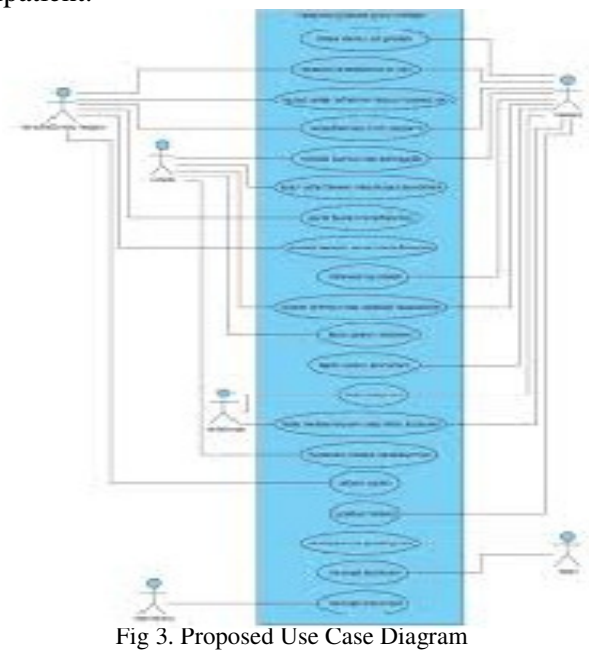

Fig 3. Proposed Use Case Diagram

1. Name Use case: Treatmen
   Actor: Patien
   Scenario: Patients who are sick go to the doctor
2. Name Use case: Inpatient Referral Letter
   Actor: Doctor
   Scenario: The doctor gives an inpatient referral letter to patients who need hospitalization
3. Name of Use Case: Asking for information on the availability of hospital hospitalization beds as referred to
   Actor: Patient
   Scenario: After receiving an inpatient referral letter from the doctor, the patient immediately asks for information on the availability of hospital hospitalizations according to the referral to the Inpatient Unit Officer.
4. Name Use Case: Check data
   Actor: Inpatient Unit Officer
   Scenario: Inpatient Unit staff check the availability of inpatient beds that are referred to are still empty or not.
5. Use Case Name: Provide Information
   Actor: Inpatient Unit Officer
   Scenario: Officers provide information to patient
6. Use Case Name: Register
   Actor: Patient
   Scenario: After information is received and information on the desired inpatient bed is still available, then patients who need inpatient treatment can register as inpatients according to the doctor's referral to the officer
7. Name Use Case: Record / process patient data in and patient out
   Actor: Inpatient Unit Officer

Scenario: The officer enters patient data Based on figure 3 if the patient does not get the information needed or the patient wants to be hospitalized at another hospital, the patient will seek information from another hospital.

D. Design System in Sequence Diagram

The following is a diagram of the patient's treatment to the doctor at the hospital to register as an inpatient.

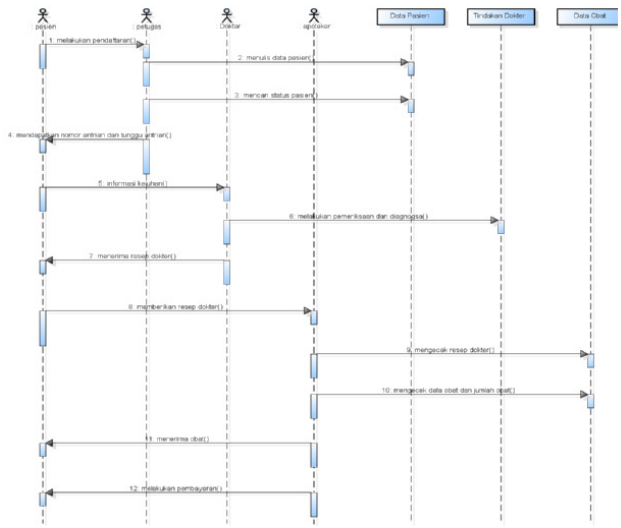

Fig 4. Sequence Diagram

Based on the figure 4 the current sequence diagram 1 is:

1. 3 actors who carry out activities, namely patients, doctors, and inpatient unit officers.
2. 9 messages and 1 self message which is a sequence of system activities.
3. 1 lifeline is another hospital.
4. 1 entity lifeline, namely the database of inpatient care.

Based on figure 4 if the patient does not get the information needed or the patient wants to be hospitalized at another hospital, the patient will seek information from another hospital. Next below is the continuation of the sequence diagram.

IV. RESULT AND DISCUSSION

A. Implementation System SIMPATI RS

This study produced a bed information application for several hospitals in TangerangCity that had the feature of viewing empty rooms online, seeing doctor's schedules,and change empty room information through the web system. The following is the initial menu display in Simpati RS.

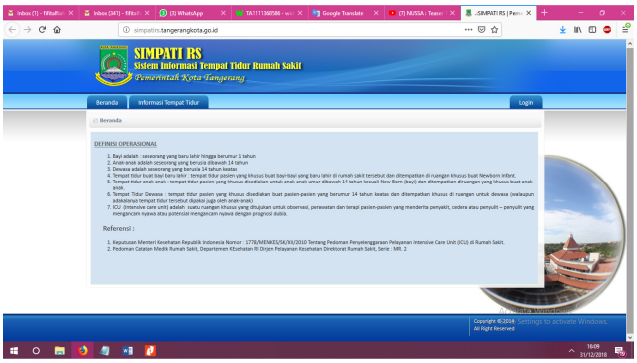

Fig 5. Home of system SIMPATI RSTangerang City

The login menu display is used so that we get access to run menus in the main menu. This is done so that people cannot access this system application. So that the confidentiality menu form is maintained properly. Equipped with the first level of user level, the user can access all menus in the system.

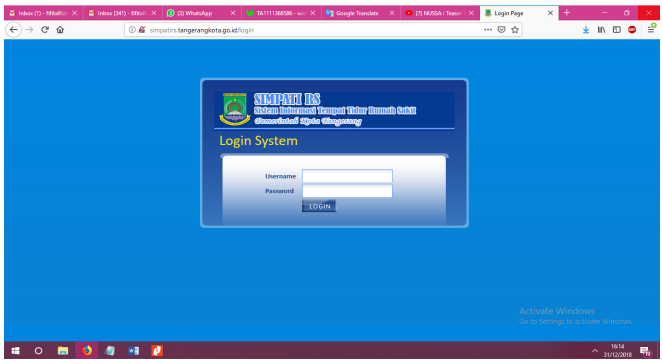

Fig 6. Login system SIMPATI RSTangerang City

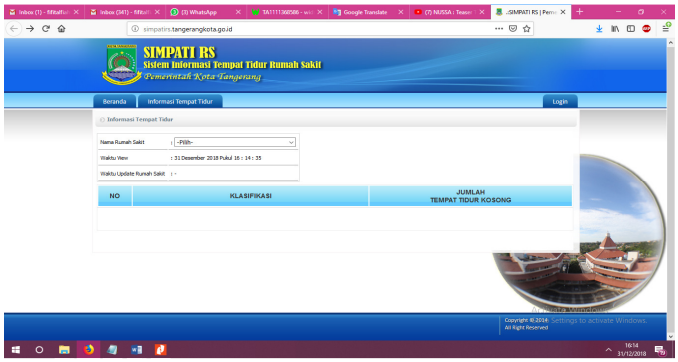

Fig 7. Display of hospital bed selection

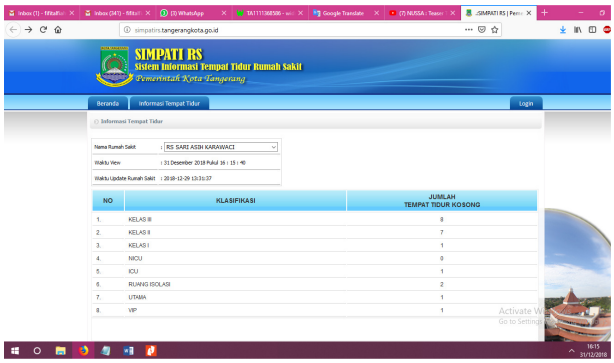

Fig 8. Display of the availability of hospital beds from various classes of rooms

B. *Testing*

Testing with the black box testing method is done by giving a number of inputs to the program. The input is then processed according to its functional requirements to see whether the application program can produce output according to what is desired and according to the basic functions of the program. This test is also done to find errors in:

1. Missing / missing function
2. Interface error
3. Error in data structure / database access
4. Performance error
5. Installation error and final destination

The following are black box testing tables that have been tested by the author:

No	Skenario Pengujian	Test Case	Hasil Yang Diharapkan	Hasil Pengujian	Kesimpulan
1.	Mengosongkan Username dan Password, lalu langsung klik tombol login		Sistem akan menolak akses login dan menampilkan pesan "maaf anda belum memasukan username dan password"		Valid
2.	Hanya mengisi Username dan mengosongkan Password, lalu klik tombol login		Sistem akan menolak akses login dan menampilkan pesan "Maaf anda belum memasukan Username dan Password!!"		Valid
3.	Hanya mengisi Password dan mengosongkan Username, Lalu langsung Klik tombol login		Sistem akan menolak akses login dan menampilkan "Maaf anda belum memasukan Username dan Password!!"		Valid
4	Mengisikan dengan salah satu benar dan salah satu salah kemudian klik Login		Sistem akan menolakk akses login dan menampilkan pesan "user name yang kamu masukan salah"		Valid
5	Mengisikan username dan password dengan benar lalu klik Login		Sistem menerima akses login dan masuk ke menu Home	Sesuai harapan 	valid

Fig 9. Blackbox testing System SIMPATI

V. CONCLUSIONS

1. This hospital bed information system that is running in the city of Tangerang is not yet right and accurate because the community or prospective patients can only find out the information by coming directly to the designated hospital then asking the receptionist, or through telephone services to the hospital which will be answered by receptionist. If the distance of the prospective patient to the hospital is far away, then it could be that after the patient arrives at the hospital, information that initially contained a bed for hospitalization that is still empty has been filled by other patients. Thus the information obtained is inaccurate and relevant.

2. Seen in CHAPTER III testing section, the author has tested the form form. If one field is empty, then when storing data, the system will display an error message that the field cannot be filled. Then, each Hospital admin changes the quota data and bed information data, then the data will be recorded in history data, and the system records the time of data changes. In addition, when a public user is opening a Bedside Information menu page in the public section, the system will automatically refresh

the Information Bed menu page every 30 seconds. Thus, the data displayed will always be real time.

3. The system that has been created by this author can be used and used by all the people of Tangerang City or even people outside the city to find information on the availability of hospital beds in the city of Tangerang especially in class III hospitalization.

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