Website Based Registration and Payment Information Systems at Primadia Clinic Laboratory

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Abstract* — *Primadia Clinical Laboratory serves health checks for individuals and companies. The laboratory already has a patient registration and payment system, but patient registration and inspection information can only be done by visiting the laboratory. This research developed a website-based system that can be used laboratory officers, partner companies and individual patients. The development method used is Prototyping, analysis and design using UML, implemented with PHP, HTML programming language and MySQL database, and testing with black box texting. The result of the research is a web-based registration and payment information system that can be used to manage registration, payment and inspection data which can be accessed by laboratory officer and patient, both partner companies and individuals according to their needs.

Keywords—component; ***laboratory, prototyping, UML, HTML, PHP, MySQL***

I. INTRODUCTION

This section is the explanation of the background, problems formulation, and objectives of this research.

A. Background

Primadia Clinical Laboratory was established on February 10, 2000 in Jakarta. Primadia Clinical Laboratory has facilities and services that include laboratory examination, diagnostics facility, medical check up, home service, first aid training and vaccine. The business process in the registration of patients at the Primadia Clinical Laboratory begins with the patient registering by telephone to the customer service laboratory or directly to the laboratory. After registering, the admin will perform patient data input using the existing system and to know the cost of examination of the patient. After that, the patient is required to pay the examination fee before performing the examination in the lab. After the examination fee has been paid, the lab officer will prepare the need for inspection in the laboratory. After all is prepared, the officer will call the patient to undergo a laboratory examination. Then the results of the patient examination is given to the lab officer for the input into the system. After inputting and checking the conformity of the examination results, the lab officer prints the inspection result and submits it to the customer service, then the customer service that gives the results of direct examination to the patient. The use of the system at Primadia Clinical Laboratory, is good enough in dealing with patients individually, but in dealing with patients in large numbers or in dealing with an institution, the system used still has shortcomings. Primadia Clinical Laboratory takes a long time in inputting patient data that must be done one by one, also in the search results of the examination in large quantities. In preparing the report of inspection results of employees to an institution should also be done by searching all employee data that requires 8 seconds process for 1 patient name. Then for the collection of fees in the large number of examinations are done from the sum of each registration a patient name that takes a long time in searching all the data.

B. Problems Formulation

Based on the description of the background, it can be formulated problems, namely how to develop a website based registration and payment information on Primadia Clinic Laboratory that can be used by laboratory officers, partner companies and patients.

C. Research Objectives

The objectives of this research is to develop a website based registration and payment system that can be used by laboratory officer, partner company and individual patient.

II. RESEARCH METODOLOGY

A. Data Collection Method

- Observation Method : with this method researchers will make observations to Primadia Laboratory to see the work process running.
- Interview method that done to the lab staff to know the current system and the system that needed.

B. Metode Pengembangan Sistem

System development method that used is Prototyping Development Methodology. This method is a system development method with a fast development process and testing of the working model or prototype of new applications through the interaction process and repetitive that commonly used bt the information systems expert and business experts. With prototyping model, developers can make prototype first before developing the actual system. This model improves the application or system continuously to suit the needs of users [1].

At the stage of user needs analysis, developers and users conduct a discussion wherein the system users explain to developers about the system requirements that they need. At the stage of creating prototypes, developers create prototypes of systems that have been explained by users or system owners. At the stage of adjusting the prototype to the user need, the system began to be developed with a prototype already created.

The flow of research starts from a preliminary study conducted to obtain information about the research to be conducted, then it continued by collecting data and information that needed through literature study, research observation and interview. Furthermore, researchers do the formulation of problems and determine the objectives of research. After that, the researchers conducted a system analysis. In the analysis phase of system, researchers analyze the existing business process flow, system weaknesses, functional and non-functional requirements, and then proposed system or system to be developed. Furthermore, in making the prototype, researchers create in the mockup display form which is then reported to the laboratory. If there are apropriate with the needs of laboratory, researcher will continue to the design stage. But if there are not appropriate, researchers to revise again. At the system design stage, the researcher performs system design using the use case and activity diagram, database design using ERD and interface design using pre-made prototype. After that, researchers do the development with making the system using PHP and MySQL programming language for its data base. Then the researchers conduct a test whether the system can be run appropriate with user needs. If the system is already running, then the system is ready to be applied. The flow of this research can be seen in Figure 1.

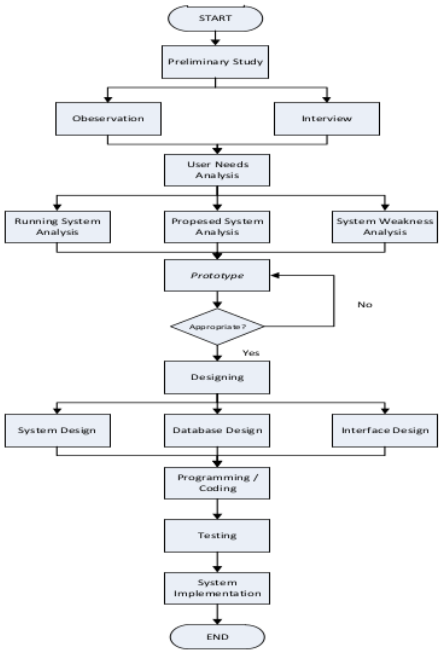

Fig. 1. Flow of Research

III. LITERATURE REVIEW

This section explains the basic concepts of information systems, laboratory, medical records, websites, HTML, PHP, MySQL, UML, databases, XAMPP, and black box testing.

A. *Basic Consepts of Information Systems*

The information system is a system within an organization that brings together daily transaction management, support operations, managerial and strategic activities of an organization and provides certain outside parties with the required reports [2].

B. *Laboratory*

Definition of clinic laboratory based on Regulation of Health Minister of Republic of Indonesia Number 411 Article 1, clinical laboratory is a health laboratory that conducts clinical specimen examination to obtain information about individual health especially to support disease diagnosis, disease recovery and health restoration [3].

C. *Medical Records*

A medical record is a collection of information about the identity, history, examination and notes of all activities of the health service over the patient from time to time. The purpose of the medical record is as the primary evidence that is able to justify the existence of patients with a clear identity and has received various checks and treatment at health care facilities with all the results and consequences costs, as well as health records documenting services provided by health workers, medical supporters and other personnel working in various health care facilities. Thus the recording helps decision making about therapy, action, and patient diagnosis. [4].

D. *Website*

A website or site may be defined as a collection of pages used to display text, still or motion images, sound animations and or all of them, both static and dynamic, forming a series of related buildings, each linked to page networks [5].

E. *HTML (Hyper Text Markup Language)*

HTML is a web programming language that has a certain syntax or rules in writing scripts or codes, so the browser can display information by reading the HTML codes. HTML is a collection of symbols or tags written in a file used to display pages in a web browser [6].

F. *PHP (Hypertext Preprocessor)*

PHP is a programming language used to translate lines of program code into machine code that can be understood by a server-side computer that can be added to HTML. PHP is called a server-side programming language because PHP is processed on a server computer and can be used for free and is open source [7].

G. *MySQL ((My Structure Query Language)*

MySQL is a software RDBMS or database server that can manage databases very quickly, can accommodate large amounts of data, accessible to multiple users and can perform a process synchronously or multi-threaded [8].

H. UML (Unified Modelling Language)

UML is a tool that can be used in graphical or graphical programming languages to visualize, specify, build and document from an object-based software development system.

Use Case or use case diagram is a modeling for the behavior system information that will be built. Use case describes an interaction between one or more actors with the information system to be created. Use case is used to find out what functions exist within an information system and who has the right to use those functions.

Activity diagrams describe the workflow or activity of a system or business process or menu available on the software. It should be noted that the activity diagram illustrates the activity of the system rather than what the actor does, so the activities that the system can perform.

Class diagrams describe the structure of the system in terms of defining the classes that will be created to build the system. Classes have what are called attributes and methods or operations. Attributes are the variables that the class has. Operations or methods are functions that belong to a class [9].

I. Database

The database can be defined as a set of interconnected data groups organized in such a way that it can be recovered quickly and easily. The main principle is data management. The main purpose of ease and speed in back retrieval of data. One of the most commonly used modeling for designing a relational data base is the Entity Relationship Diagram (ERD).

Entity Relationship Diagram (ERD) is a diagram to illustrate the conceptual design of the conceptual model of a relational database. ERD is also a relating image between one object and another object of the real-world object that is often known as the relationship between entities [10].

J. Black Box Testing

System testing method is done to test a newly built system to fit the user needs and has been implemented correctly. Testing is also done on the functions that exist in the application to run properly or still have errors or bugs that must be handled. This test method can be applied to any software testing [11]

IV. DISCUSSION

This section will describe Primadia Clinical Laboratory profiles, running system analysis, running system weakness, functional and non-functional system requirements analysis, system design with UML, activity diagram, database design with ERD, class diagram and table structure, interface design, system development results, and test results.

A. Primadia Clinical Laboratory Profiles

Primadia Clinical Laboratory has facilities and services, including laboratory examination, diagnostics facility, medical check up, home service, first aid training and vaccine. Laboratory examination consists of complete / routine hematology, blood chemistry, drugs / urinalysis, papsmear, microbiology, and allergy test. The diagnostic facility consists of X-Ray, Treadmill, Audiometer, Spirometry, ECG, and Ultrasound. Medical check up consists of Personal, Company, Annual, Recruitment, Pre-marital, and Student / Community.

Primadia Clinical Laboratory has many national, private and foreign partner companies that entrust their employee checkup, such as oil & mining companies, construction companies, insurance companies, industry, hotels & travel and pharmaceuticals & chemicals. Primadia Clinical Laboratory also has some supporting documents or certificates as proof of accurate diagnosis and good facilities, as well as competent human resources in the field.

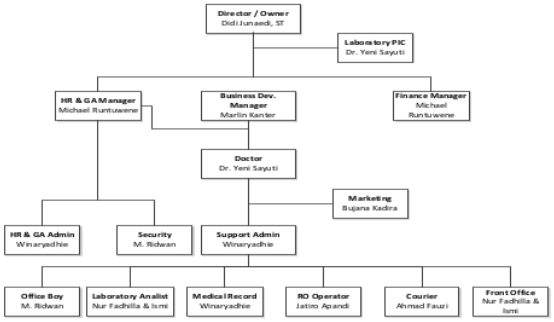

Fig. 2. Organizational Chart of Primadia Clinical Laboratory

B. Running System Analysis

Analysis of the system running aims to know the business processes that have been applied by the company, with understanding the process flow, so that researchers can know the weaknesses and advantages in the system applied. The explanation of business processes use case that run on Primadia Clinic Laboratory, as follows:

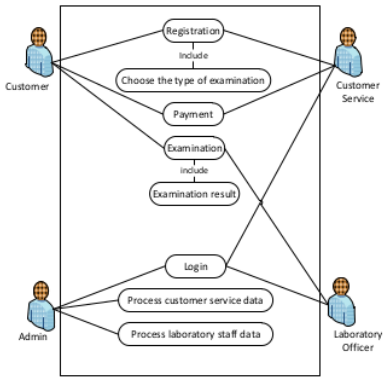

Fig. 3. Use Case Diagram of Current System

C. The Weakness of Running System

The system at Primadia Clinical Laboratory that has been running, has weaknesses are:

- Input data of registration only done by customer service. The registration process takes a long time, because the patient is required to fill the identity on

the registration form first which is then in the input by customer service into the system to do data storage.

- Queue is conduct manually. After the patient does the registration with filling in the identity data and the type of inspection, the queue number is given by the customer service by submit the queue number directly to the patient and then recorded by the customer service.
- There is no patient data grouping. Primadia Clinic Laboratory also treats patients in an institution (company). But in the existing information system there is no grouping of patient data based on the partner company. Customer service takes about 8-10 seconds to search for patient data which then complied into one bulk to be given to companies that require the results of employee examination. If a partner company requests a large number of employee data, customer service takes longer to prepare the report to a partner company

D. Functional and Non-Functional System Requirements Analysis

The system functional requirements are described in Table 1 and the non-functional requirements are described in Table 2.

TABLE I. SYSTEM FUNCTIONAL REQUIREMENTS

User	Functional Requirements
Patient	1. Online reservation 2. Look the examination results (in website & print out) 3. Look the billing details
Customer Service	1. Patient registration confirmation. 2. Searching the group of patient data 3. Payment information in website 4. Exasmtination results information in website 5. Print the examination results.
Laboratory staff (Admin)	1. Calculation of reagent usage in examination 2. Examination result input 3. Recapitulation of laboraty examination resul and history.

TABLE II. SYSTEM NON FUNGTIONAL REQUIREMENTS

Component	Description
Hardware	Windows 8.1 Enterprise with the ardware specification : • 64-bit Operating system • Processor 2CPUs, ~1.0Ghz • RAM 6,00 GB • Hard disk (HDD) with minimum capacity 1 GB • VGA • Input tools (Keyboard & Mouse) • Process tools (CPU, RAM, VGA Card • Data storage tools (Harddisk) • Output tools (Monitor & Printer)
Software	• 8.1 Enterprise Operating System • XAMPP for Windows version 5.6.14 • Adobe Dreamweaver CS 6 versi 12.0

E. System Design

System design is illustrated by use case diagram and activity diagram. Based on the solution of the system proposed by the researcher, then made use case diagram identified based on the actor i.e customer (patient), customer service, lab officer and admin. The activities of the actors that can be performed in the new system created in the use case diagram for the proposed system are illustrated in Figure 4.

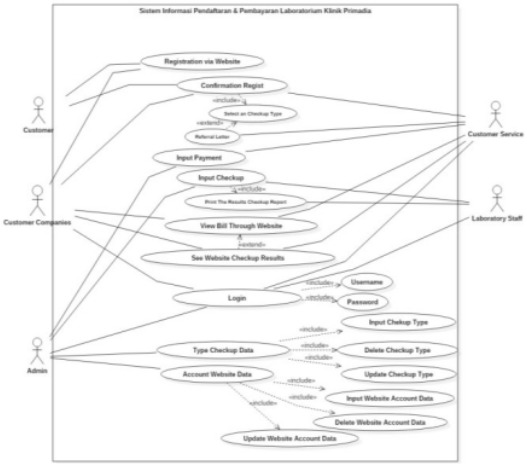

Fig. 4. Use Case Diagram of Proposed System

Figure 5 is an activity diagram for examination of individual customers in the laboratory. Customer register on the website, then come to the laboratory to conduct the examination. Before performing the inspection, the customer confirms the arrival to the laboratory officer and pays the examination fee that has been determined. After payment, the customer checks in the examination room. The lab officer then reports the results of the examination to be submitted to the customer.

Fig. 5. Activity Diagram of Individual Customer Examination

Figure 6 is an activity diagram for examination of customer from company partner in laboratory. Partner companies register their employees who will conduct examination at Primadia Clinical Laboratory. Then the company's employees come to the Primadia Clinical

Laboratory and confirm the arrival to the officers in the laboratory. The laboratory officer conduct the examination company employees and sends examination invoices to the company. After that the partner company pays the employee checks with the transfer method. Then the partner company to confirm the payment has been made. Employee examination results can be viewed on the website and sent via laboratory courier.

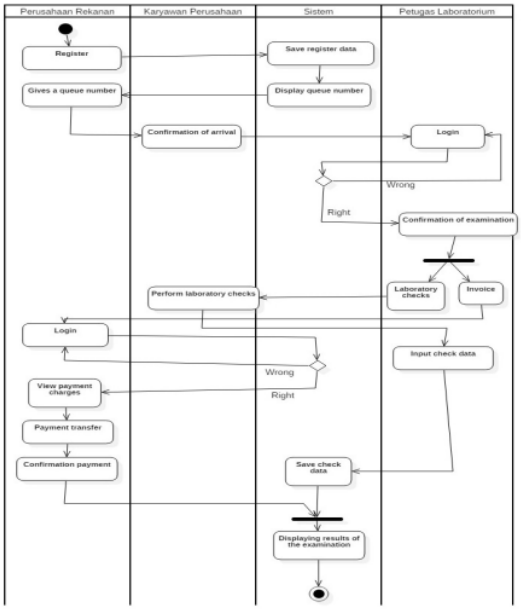

Fig. 6. Activity Diagram of Partner Company Examination

F. Database Design

In designing the database, the researcher performs a design consisting of conceptual level design using Entity Relationship Diagran, logic level with class diagram, and physical level with table structure.

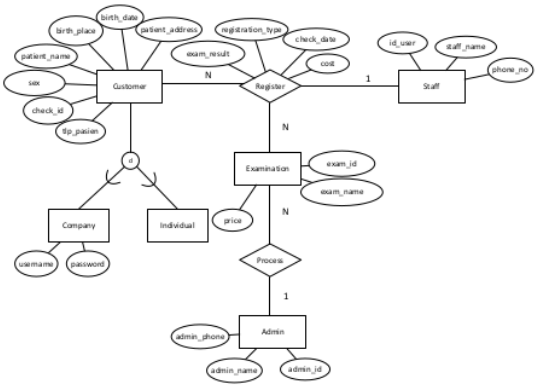

Fig. 7. Entity Relationship Diagram

In the design of the database at the physical level, the researcher describes the structure of the table related to the design of data storage to be implemented in the system, such as field names, data types, size and description of each field.

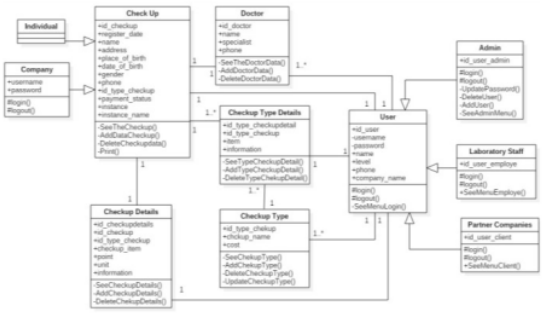

Fig. 8. Class Diagram

G. Interface Design

This stage is the design of interface of Registration and Payment Information System application at Primadia Clinic Laboratory using balsamiq software that consist of interface design of main page, registration page, queue number page, login page, admin start page, examination data page, company data page, input page of examination result, doctor's data page, user data page, inspection data page, partner company's start page, employee company's examination data page, and employee examination result page.

H. Interface Design and Testing Scenario

In the implementation phase, researchers use PHP programming language. The design of test scenarios is made in the table consisting of requirements, test systems and expected results.

I. Network Design

In network design, researchers explain the network that used. Primadia Clinical Laboratory has two computer devices and one server. The network is designed using a star topology, wherein each computer is connected directly to the server.

J. Implementaion Results

Figures 9, 10 and 11 are examples of the results of the implementation of Website Based Registration and Payment Information Systems at Primadia Clinic Laboratory.

Figure 9 is the main page view that can be accessed by all users according to the needs. The menu of *Login Perusahaan* (company login menu) is used for partner company, menu of *Login Admin* (admin login menu) is used for admin, menu of *Daftar Perusahaan* (examination registration menu) is used to perform check registration, and contact menu only contains contact information of Primadia Clinic Laboratory contact.

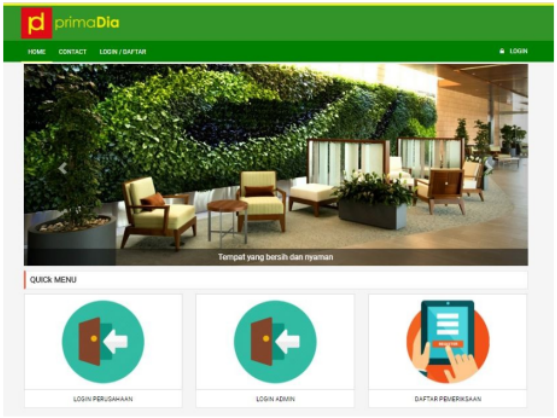

Fig. 9. Main Page

Figure 10 is a page that provides information according to success of registration with providing a queue or ticket number to be stored by the patient. After the patient comes to the lab, the patient is required to inform the ticket number to the lab, in order to process the type of inspection and payment.

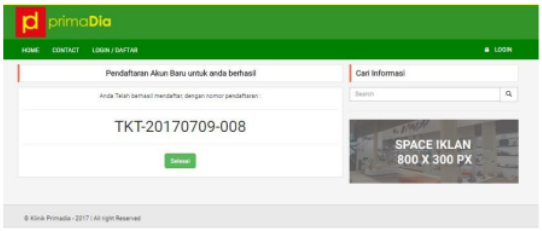

Fig. 10. Queue Number Page

Figure 11 is the page that lab officers use to input the results of the examination. The results of examination that have been entered will be integrated directly with employee examination data from the partner companies.

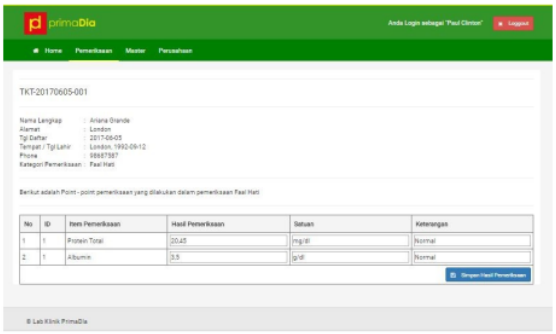

Fig. 11. Page of Examination Results Input

K. System Testing Results

Testing of Registration and Payment Information System at Primadia Clinical Laboratory is done in accordance with the test scenario that has been designed and the results are presented in tabular form which includes requirement, test system, expected result, and test result. From all the test scenarios, the results are as expected.

L. Conclusion

Based on the results of research in the development of Registration and Payment Information System at Primadia Clinical Laboratory, the researchers concluded as follows:

- Registration and Payment Information System at Primadia Clinic Laboratory has been successfully built using prototyping method using PHP and MySQL programming language for database.
- Systems that built can be used to register, pay, process data of examination types and partner companies.
- The system can create a patient queue number to perform examination in laboratory.
- The system can create a new account for a partner company, which is used to view the results of company's employee examination and invoices.

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