



## Outpatient Information System Design At Al-Mira Medical Clinic

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**Abstract:** In the era of increasingly advanced globalization, currently technological developments are very sophisticated, especially computers which have now entered various aspects of existing activities, the advantages of using computers are characterized by speed, precision and accuracy as well as greater security of the data stored. So this can help an agency advance its business. AL-MIRA MEDICAL CLINIC is a part of the health unit aimed at serving public health located at Jalan Raya Nganjuk-Madiun, Karang Tengah Village, Bagor District, Nganjuk Regency. The author carried out analysis and design of a health service administration information system. Where sometimes errors occur in carrying out the data processing process in community services. These include the long process of searching for patient data, difficulties and requiring quite a long time in searching for patient medical record documents, existing documents stored not neatly and mixed up with other documents, errors often occur in calculating costs, difficulties in managing the availability of available medicines. Making the income report is a little late. To overcome this problem, a new computerized information system is needed. The author implements it using the Microsoft Visual Studio 2008 programming language and using the MySql database. The author hopes that the design of a computerized outpatient administration information system can help AL-MIRA MEDICAL CLINIC in overcoming frequently occurring problems.

**Keywords:** Analyze, Design, Outpatient

### INTRODUCTION

Information technology has entered almost all areas of human work. This is proven by the behavior of society where almost all of its activities are carried out inseparable from the role of information technology, whether in the form of activities involving an individual or an organization. With information technology, a computerized system can be created, where this system really supports ease, speed and accuracy in collecting, processing and storing important data and distribution needs. To achieve neat, fast, accurate and easy information arrangements, there must be facilities that can be used to support this. Therefore, it is necessary to have an information system in an agency or institution to facilitate and increase work productivity.

AL-MIRA MEDICAL CLINIC as an agency operating in the field of health services, requires an accurate and reliable information system, to improve services to patients

and the environment involved therein. In its operations, of course there are several problems. The absence of a computerized information system causes services to be less than optimal. By creating a computerized information system, it is hoped that it can speed up and simplify services, and is expected to be able to manage data accurately. The aim of this research is to find out and improve the existing system by replacing the manual system with a computerized information system. For this reason, the author wants to create a computerized information system and chose the title "ANALYSIS AND DESIGN OF AN OUTPATIENT INFORMATION SYSTEM AT THE AL-MIRA MEDICAL CLINIC USING OBJECT-ORIENTED METHODOLOGY".

The problems faced by AL-MIRA MEDICAL CLINIC:

- a. Cost calculation errors occur, resulting in less accurate income reports.
- b. The writing on prescriptions is difficult to read, patients often complain about the prescriptions given by doctors
- c. Patient data is increasing so it takes a long time to search for patient data.
- d. The storage area is united, making it difficult to search for patient medical record documents.
- e. Archive storage space is inadequate, resulting in documents being stored sloppy and mixed up.
- f. Summary of monthly income reports calculated manually from daily income has the effect of making income reports a little late.
- g. There are no drug stock reports, making it difficult to manage drug availability.

The purpose of writing this final assignment is as follows:

- a. Designing a health service administration information system using a database as a storage medium to make it easier to determine which patients have been registered or who have not been registered so that the data search process becomes faster.
- b. Designing a health service administration information system using a database as a storage medium to make it easier and faster to search for patient medical record data.
- c. Designing an information system using a database as a storage medium so that it doesn't take up too much space.
- d. Design an information system that can calculate costs automatically, to avoid admin staff errors in calculating payments.
- e. Designing an information system that can print prescription data with prescription printouts that can be more readable by patients.
- f. Designing a health service administration information system that can make it easier to manage drug availability.
- g. Create an information system with integrated data processing so that the process of making reports is fast and accurate, thereby helping the work of admin staff.

The solution to overcome the problems faced is:

- a. A computerized system was created which can calculate costs automatically, to avoid admin staff errors in calculating payments.
- b. A computerized system was created which can print prescription data with prescription printouts that can be more readable by patients.
- c. A computerized system was created to make it easier to determine which patients have been registered or who have not been registered so that the search process becomes faster.
- d. A computerized system was created to make it easier and faster to search for patient medical record data.
- e. Designing an information system using a database as a storage medium so that it doesn't take up too much space.
- f. Create an information system with integrated data processing so that the process of making reports is fast and accurate, thereby helping the work of admin staff.

- g. Provides reports that provide information on drug availability.

The system development method uses the waterfall method, this model provides a systematic and sequential approach for application developers. The stages of this method are as follows:

- a. Data collection, namely collecting all the data needed in system design, data collection methods using interview, observation and literature study methods.
- b. System analysis, namely analyzing system requirements in the form of information scope, required functions, quality and performance of the system to be produced.
- c. System design, includes system design based on the results of analysis that has been carried out previously. This process focuses on system design in the form of UML modeling.
- d. Writing program code, the stage of writing system program code using the .NET programming language and MySQL DBMS.
- e. Application testing, namely testing the performance of each function used.
- f. Implementation, this stage can be said to be the final stage in system development, namely that the system can be used by users.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### Basic Concepts of Information Systems

An information system is a collection of information in a database that uses information technology models and media for use in making business decisions for an organization. In an organization, information is something that is important in supporting the decision-making process by management. This system utilizes computer hardware and software, manual procedures, management models and databases.

Information systems have components in the form of subsystems which are smaller elements that form the information system, namely:

- a. Input / Input Component  
Is data that is entered into an information system. Input from the information system is data that will be processed by the system. Data from information systems can come from outside the organization and from within the organization. The input process is data capture, data preparation and data entry.
- b. Output / Output Component  
The product of an information system is an output in the form of useful information using data contained in a database and processed using a certain model.
- c. Model Components  
The information produced by the system comes from data taken from a database which is processed through certain models.
- d. Technology Components  
Technology is an important component in information systems. Without supporting technology, the information system will not be able to produce timely information. Technology is used to receive input, run models, store and access data, produce output and help control the system as a whole.
- e. Database / Database Components  
A database is a collection of data that are interconnected with each other, the data is stored on computer hardware and used by software to manipulate it.
- f. Control Component

The control component is an important component and must be present in the information system. This component is used to guarantee that the information produced by the information system is accurate information. Information control systems can be classified as general control systems and application control systems. General controls are organizational controls, documentation controls, hardware controls, physical security controls, data security controls and communications controls. Meanwhile, application control can be classified as input control, process control and output control.

### System Analysis

System analysis is the decomposition of a complete information system into component parts which aims to identify and evaluate problems, opportunities, obstacles that occur and determine needs so that improvements can be proposed.

[1] System analysis can be interpreted as "A process to understand the existing system, by analyzing positions and job descriptions (business users), business processes (business processes), provisions and rules (business rules), problems and finding solutions (business problems and business solution), and company plans (business plans)".

[2] Systems analysis can be interpreted as "General systems theory which as a conceptual basis has the aim of improving various functions in the system that is running, designing or replacing the output that is being used, to achieve the same goal with another set of inputs (could be simpler and more interactive) or make some similar improvements. Based on several expert opinions expressed above, it can be concluded that system analysis is a system process which is generally used as a conceptual basis which has the aim of improving various functions in a particular system.

### Basic Object Oriented Concepts

UML is defined by other authors as "Unified Modeling Language (UML) is a widely used method for visualizing and documenting the software design of a system". [3] This is because UML provides a visual modeling language that allows system development to create blueprints in standard form, easy to understand and equipped with effective mechanisms.

### Visual Studio 2008

*Visual Basic .NET 2008* is one of the programming languages in Visual Studio .Net 2008. Several drastic changes were added to Visual Basic .NET 2008 starting from the control display, full support for OOP (Object Oriented Programming). Availability of GUI (Graphic Universal Interface) facilities as well as a more perfect database connection method than the introduction. [4]

### Mysql

MySQL including the Relational Database Management System (RDBMS) type. MySQL is a database system that uses a client server architecture centered around the server, MySQL. The server is the client program that actually manipulates the database. The client program doesn't do that directly. Instead, they communicate to the server via statements written in Structured Query Language (SQL). After Sun Microsystem was acquired by Oracle, there was a change in the license for MySQL, so there were several types, namely Enterprise Edition and Community Edition, but because of changes by Oracle, there were changes to Community Edition, there were a lot of feature changes with Enterprise Edition, the issue of speed was the difference, then documentation support was It's already difficult, even though MySQL References can still be downloaded, MySQL's popularity seems to be almost defeated by the existence of other RDBMS such as PostgreSQL, especially with the increasing use of NoSQL which MySQL itself does not yet provide support for, changes in development direction by Oracle itself have also given MySQL direction towards the Enterprise [5].

## Fishbond

"A visual tool to identify, explore and graphically depict in detail all the causes related to a problem" [3].

## Outpatient Definition

Outpatient care is medical service to a patient for the purposes of observation, diagnosis, treatment, rehabilitation and other health services, without requiring the patient to be hospitalized. The advantage is that patients do not need to pay for overnight stays (hospitalization).

## METHODS

### Problem Analysis

A manual system that is prone to human error and data storage that wastes space and is often mixed up, resulting in suboptimal AL-MIRA MEDICAL CLINIC services. So a computerized system is needed to overcome this.

### Business Process Analysis

#### a. Patient Registration Process

Patients register with Admin Staff. If the patient arrives for the first time, the Admin Staff will input the patient's data and print the patient's treatment card. If the patient is an old patient, then the patient submits his/her medical card for registration entry by the Admin Staff.

#### b. Patient Examination Process

The doctor asks about the patient's complaints. Doctor examines patient. The doctor takes action according to the patient's needs. Then the doctor enters the patient's medical record. If the patient needs medicine, the doctor enters the prescription.

#### c. Process for Making a Certificate

If the patient requires a certificate, the doctor will print a certificate according to the examination results.

#### d. Payment Process

Admin staff prepares medication according to prescription. Admin staff explains recipes and cost details. The patient pays. The admin staff prints the receipt, then hands over the receipt, medicine, prescription and medical card to the patient.

#### e. Process for Making Income Reports

All master data and transactions have automatically been accumulated in report form. Admin Staff prints the required reports.



## Activity Diagram

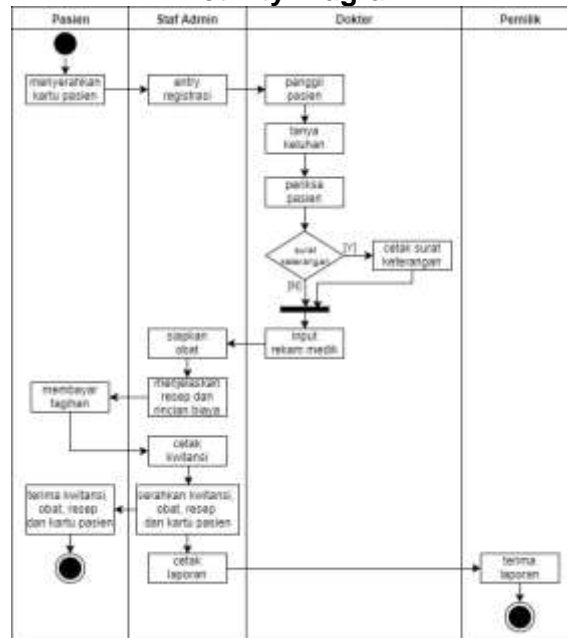


Figure 1. Activity Diagram

The following is an activity diagram for the system designed for detailed explanation in point 3.2. Business Process Analysis.

## Use Case Diagram

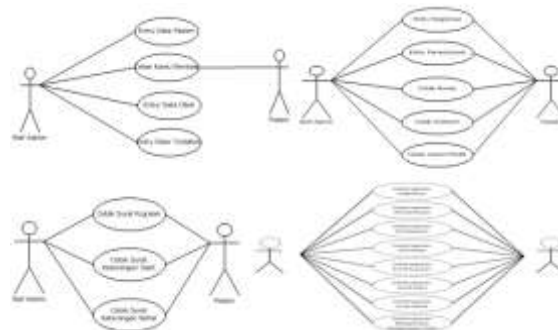


Figure 2. Use Case Diagram

The following is an activity diagram for the designed system. Describes things done by 4 actors, namely patients, admin staff, doctors and owners. Use Case Diagram explains the input-output carried out per pair of actors.

## Class Diagram Design

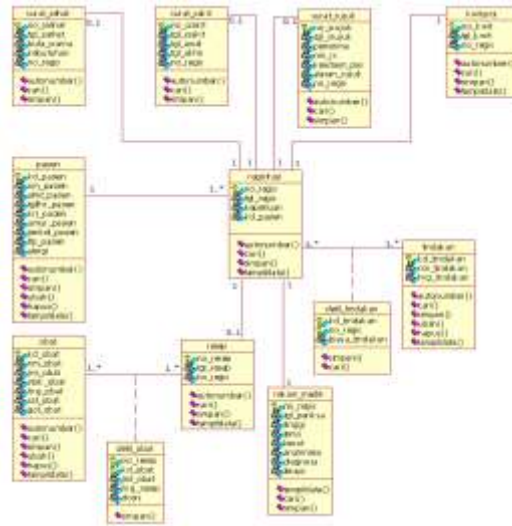


Figure 3. Class Diagram

Class Diagrams explain the tables used in the designed system. Shows which tables are related.

## RESULT AND DISCUSSION

### Form Master

The screenshot shows the 'Entry Data Pasien' form with the following fields:
 

- Data Pasien**: Kode Pasien (00000000), Nama Pasien (Azzahra Ramadhani), Alamat (Dk. Karangprogo, Ngablak).
- Tanggal Lahir**: 10/07/2019
- Jenis Kelamin**: Wanita
- No. Telepon**: 08071342812
- Alergi**: Tidak Ada
- Pekerjaan**: (empty)

 Action buttons include: CANCEL, SIMPAN, HAPUS, BATAL, and BELLUKA.

Figure 4. Master Form

Master Form is the patient data entry form. Patients who are not yet registered must be registered first and then have their medical card printed, where every time they want to have their health checked they must bring the card.

### Transaction Form

The screenshot shows the 'Entry Data Registrasi' form with the following fields:
 

- Data Registrasi**: Nomor Registrasi (00000000), Tanggal Registrasi (10/07/2019).
- Data Pasien**: Kode Pasien (00000000), Nama Pasien (Azzahra Ramadhani), Alamat (Dk. Karangprogo, Ngablak).
- Jenis Kelamin**: Wanita
- No. Telepon**: 08071342812
- Alergi**: Tidak Ada
- Pekerjaan**: (empty)

 Action buttons include: CANCEL, SIMPAN, HAPUS, BATAL, and BELLUKA.

Figure 5. Transaction Form

*Transaction From* is a registration data entry form, which is entered after a patient registers to be examined. Patients must be registered and have a medical card to be able to enter their registration data, which will then be entered into the doctor's examination queue.

### System Printout

- a. Registration Report  
Is a collection of registration data of incoming patients.
- b. Inspection Report  
It is a collection of examination data carried out by doctors on patients.
- c. Income Report  
Is a collection of income data from AL-MIRA MEDICAL CLINIC transactions.
- d. Drug Stock Report  
This is a recapitulation of drug stock data held by AL-MIRA MEDICAL CLINIC.
- e. Reference Letter Report  
Is a collection of data on referral letters issued by doctors if medical treatment cannot be carried out at the AL-MIRA MEDICAL CLINIC.
- f. Sick Note Report  
Is a collection of data on patient illness certificates issued by doctors after an examination.
- g. Healthy letter report  
Is a collection of data on patient health certificates issued by doctors after an examination.
- h. Drug Dispensing Report  
Is a collection of data on medicines that have been given to patients.

No. No. Pendaftaran	Tgl. Pendaftaran	Tgl. Pemeriksaan	Nama Pendaftaran	Jenis Pendaftaran	Biaya Pendaftaran	Total Biaya
1	01/01/2023	01/01/2023	AL-MIRA	10,000	10,000,000	10,000,000
2	02/01/2023	02/01/2023	AL-MIRA	10,000	10,000,000	10,000,000
3	03/01/2023	03/01/2023	AL-MIRA	10,000	10,000,000	10,000,000
Total Pendaftaran				10,000	10,000,000	10,000,000

Figure 6. Income Report

The following displays the income report for Al-Mira Medical Clinic. This makes it easier for admin staff because all transactions are stored in the database, so income reports do not need to be done manually, just print the report according to the desired time period.

No.	Nama Obat	Nama Obat	Jenis Obat	Stok Obat	Harga Obat
1	0001	Amoxicillin 3 mg (tablets)	Tablet	50	5,000
2	0002	Clonidine 0.1 mg (tablets)	Tablet	50	45,000
3	0003	Clonidine 0.2 mg (tablets)	Tablet	50	7,500
4	0004	Clonidine 0.3 mg (tablets)	Tablet	50	4,000
5	0005	Clonidine 0.4 mg (tablets)	Tablet	50	3,500
6	0006	Clonidine 0.5 mg (tablets)	Tablet	50	13,000
7	0007	Clonidine 0.6 mg (tablets)	Tablet	50	40,000
Jumlah Total Obat				300	100,000



Figure 7. Drug Stock Report

The following displays the Al-Mira Medical Clinic's drug stock report. This makes it easier for admin staff to monitor drug availability. So you can immediately find out which medicines need to be restocked.

## CONCLUSIONS

- a. By implementing a computerized system, cost calculation errors are minimized so that the data is more accurate.
- b. With the implementation of computerized systems, Prescriptions can be printed so they are easier for patients to read.
- c. By implementing a computerized system, it can make it easier to search for patient data in identifying new patients who have not been registered or old patients who have been registered because patient data has been stored in the database.
- d. By implementing a computerized system, the resulting data will be stored in a database, making it faster to search patient medical records.
- e. By implementing a computerized system, all existing data will be stored in one storage, namely a database, so that it is neat and does not take up a lot of storage space.
- f. By implementing a computerized system, monthly income reports are calculated automatically so they can be reported on time.
- g. With the implementation of a computerized system, Managing the availability of medicines at the AL-MIRA MEDICAL CLINIC becomes easier because medicine stock reports are provided.

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