

DARUL RIDZUAN CLINIC MANAGEMENT SYSTEM

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DECLARATION

I hereby declare that this thesis, submitted to Universiti Malaysia Sabah as partial fulfillment of the requirements for the degree of Bachelor of Computer Science with Honors (Software Engineering), has not been submitted to any other university for any degree. I also certify that the work describe herein is entirely my own, except for quotations and summaries sources of which have been duly acknowledged.

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24 JULY 2015

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ABSTRACT

Clinic Management System is a system that can help to improve the clinic's management. The objectives of the system are to develop a web-based system that can manage all the clinic resources in one system, to provide clinic with online registration and electronic patient record, to create system that can provide clinic with an appointment scheduler which can manage the doctor-patient appointment and to develop a medical certificate module that can produce computerized medical certificate. The scopes of the project include registration module, patient record module, medical certificate module, appointment module and medicine module. For this system, waterfall methodology is used. A few existing system has been reviewed so that comparison can be made and hence those comparisons can be used to make the Darul Ridzuan Clinic Management System better and more user friendly. This system is developed to overcome problems and weakness when using manual system. This system enables the doctors and clinic assistants to manage clinic daily activities such as record patient registration, treatment and diagnosis and etc. Time consuming; data duplication and storage capacity are the problems being facing by the user. Therefore, the clinic management system is developed to provide solutions and efficient ways to overcome the problems that occur in manual system.

ABSTRAK

Sistem pengurusan klinik adalah satu sistem yang boleh membantu dalam meningkatkan pengurusan sesebuah klinik. Objektif projek ini adalah untuk membangunkan sebuah sistem berasaskan web bagi mengurus sumber klinik di dalam satu sistem, menyediakan klinik dengan pendaftaran berkomputer dan penyimpanan rekod pesakit elektronik, mewujudkan sistem yang mengandungi penjadualan temujanji bagi menguruskan temujanji doktor dan pesakit serta membangunkan satu modul sijil perubatan yang boleh menghasilkan sijil perubatan berkomputer. Skop projek ini merangkumi modul pendaftaran, modul rekod pesakit, modul sijil perubatan, modul temujanji dan modul ubat-ubatan. Bagi menjalankan projek ini, metodologi air terjun digunakan untuk membina Sistem Pengurusan Klinik Darul Ridzuan. Sistem ini dibangunkan bagi mengatasi masalah dan kelemahan sistem manual sedia ada. Sistem ini membolehkan doktor dan pembantu klinik menguruskan aktiviti harian klinik seperti merekod pendaftaran pesakit, rawatan dan diagnosis dan lain-lain lagi. Tempoh pencarian maklumat yang memakan masa, pertindihan data dan kapasiti simpanan yang tidak mencukupi adalah masalah-masalah yang dihadapi oleh pengguna. Oleh yang demikian, sistem pengurusan klinik dibangunkan untuk menyediakan penyelesaian dan mengatasi masalah yang berlaku dalam sistem manual.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter is an introductory chapter in which it describes what this project is about and the reason it has been carried out. A clinic is a place where outpatients are given medical advice or treatment, especially of a specialist nature. Darul Ridzuan Clinic is a general out-patient clinic that provides general diagnoses and treatments without the need of an overnight stay. This clinic provide services such medical check up and consultations.

Darul Ridzuan Clinic was opened in 2006 and it has only one branch located in Teluk Intan, Perak. The clinic is open from 9 a.m. to 10 p.m every day. Darul Ridzuan Clinic has three sections. First section is patient registration, second is patient diagnosis and treatment and lastly is dispensary. The patient registration section is conducted by two staffs. The staffs are responsible to record patients registration such as name, IC number, contact number and other important data. Besides that, staffs are also responsible to update and rearrange the record file. The patient diagnosis and treatment is conducted by a doctor. The doctor is responsible to give treatment and consultation to the patients.

The dispensary section is conducted by two clinic dispensary staffs. The dispensary staffs are required to prepare the medicine as prescribed by the doctor before it is given to the patient, give the patient a copy of medical certificates which has been confirmed by a doctor, check the medicine stocks, and stacking medications. The dispensary section also play a role in collecting payments and completing transaction and responding to basic patient questions.

Currently, the patients' record are stored using paper card manual system. The patient information is manually written and indexed in the patient's medical card. The medical card is then passed to the doctor. After the patient meet the doctor, the doctor write the diagnosis information and treatment on the medical card. Once again, the medical is passing to the dispensary. Later, the patient will go to dispensary section to take medicine and do the payment.

The area in developing the system consists of the user in clinic which is the doctor and the staff. Basically there are no such system practiced in the clinic. Currently, manual paper-based system is the only solutions in managing the clinic's daily works and it caused a lot of problems to the user. The clinic management system will help out the user in clinic in managing the clinic's daily works.

1.2 Problem Background

Interviews were conducted in early of October 2014 to find out the problems experienced by the clinic users. The interview involves staff and doctor. Based on the interview with the staffs, the manual paper-based system has caused problems to the staffs and doctors. The current system brings a lot of inconvenient to the staff when they have difficulties to search and maintain the data. Every day, there are many activities and records need to be manage by the doctor and clinic staff. The manual paper-based system means all the works and records are performed by using hand written and filling system. The process of searching patients' info is slow and very time consuming. Therefore, it takes a lot of time to serve the patients when the staff searching the files as they need to look one by one.

Based on the current system, a form is used to register new patients. The patients gets the treatment and all the treatment data is recorded in the patient's form. Later, the form is kept in the files. A lot of space is needed to store all the files. Patients' records are exposed to miss location when keep in the file.

The difficulties of the current system is also affected the doctor. It can be troublesome for the staff to capture patients' data from the doctor and sometimes misscommunications happen. Furthermore, the doctor found it is difficult to view patients treatment record. Current manual system is time consuming for the doctor to check the list of medicine that had been taken by the patients from last treatment. In addition, the doctor and staff has been facing problems with the paper-based appointment system. With the increase in the number of patients visiting, it has become difficult to manage the appointment system manually. It is tedious to record the appointments by pen and paper. And also it is difficult to manage huge number of patient database.

Besides that, the doctor found that the current practices of producing medical certificate are time consuming, costly and inefficient. The previous medical certificate system relied heavily on the doctor and it is simply a handwritten note

which stated what was wrong with the patient and how long it is expected that they should be absent from work or school.

1.3 Problem Statements

- i. Manual paper-based system is the only solution in managing Darul Ridzuan Clinic daily works.
- ii. Clinic staff need to write down the patient information and index the patient's medical card manually.
- iii. Clinic staff need to record the appointment by write down the appointment in the log book manually.
- iv. Doctor have to produce medical certificate by writting down the diagnosis and the leave duration manually.

1.4 Objectives

Darul Ridzuan Clinic Management System is developed to replace the current manual paper-based system into a web-based system. Based on the problem, the following objectives have been identified.

- i. To computerised manual procedures in order to manage the clinic activity in one system.
- ii. To provide clinic with computerized registration and electronic patient record.
- iii. To create system that can provide clinic with an appointment scheduler which can manage the appointment.
- iv. To develop a medical certificate module that can produce computerized medical certificate.

1.5 Project Scope

The scope of the project can be divided into two main categories that are user scope and system scope. The user scope is the people who will use the final product of the project. The system scope is about what content of the product the can be used by the user.

1.5.1 User Scope

The user of this system will be the staff, doctor and admin. The staff will use this system to capture and manage all the patients data. The important information needed to be include in this system are patients details, appointment information, treatment information, patient treatment history, and others important information.

The doctor will use this system to record the consultation session and treatment as well as setting the patient appointment date based on the doctor's schedule availability.

The admin for this system is the owner of this clinic, Dr. Ramadhan bin Muhammad. He holds the highest level of access and have full control over the system. The admin is responsible for setting up the access level of other users.

1.5.2 System Scope

The system scope is divided into 5 modules. The details of the modules is shown in figure 1.1

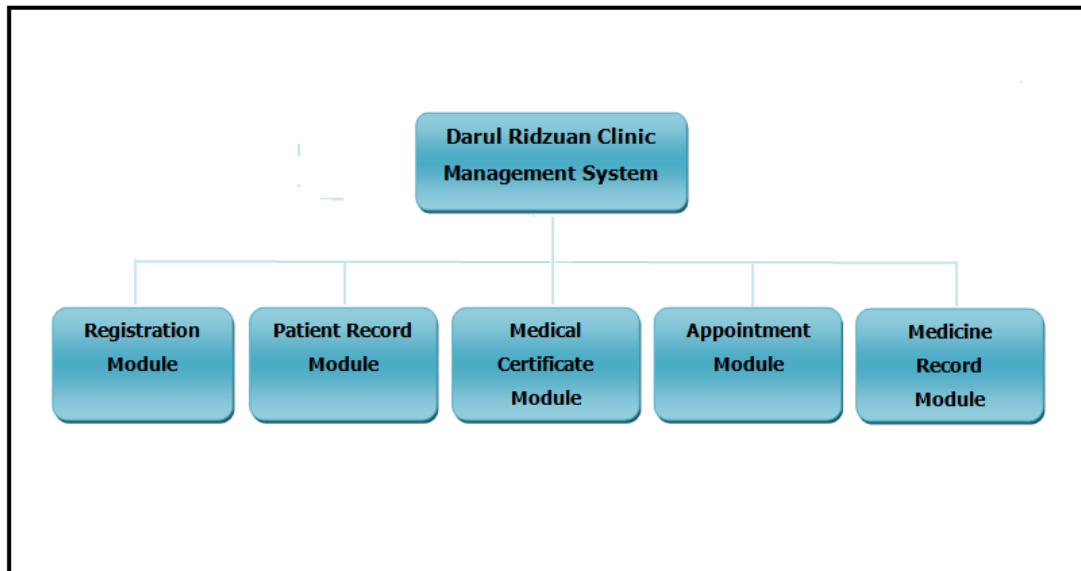


Figure 1.1 : System Scope Modules

I. Registration

- Staff Registration

The admin register the staff and doctor. Admin will key in the staff and doctor information details such as full name, IC number and other important data. Once the registration is done, staff and doctor can use their name and IC number to login to the system.

- Patient Registration

The clinic staffs register the patient. The staff will key in the patient information details such as full name, IC number and other important data.

II. Patient Record

This module will save all the patient information and treatment record. The patient information will be save in the database. Users (doctor and Registration Staff) can search the information about the patients easily from this module. The searching process can be done either by patient's name or by the IC number.

III. Medical Certificate

This module allows doctors to create the medical certificate to the patients. Medical certificate will be generated automatically and can be printed to give to the patient. The reasons of getting medical certificate can also be stored in the system.

IV. Appointment

Appointment module help the doctor view their appointment schedule for further treatment and staff can remind the doctor regarding on the appointment. Based on user requirement, the appointment time has been set as below:

Day: Everyday

Time: 10.00 AM – 11.30 AM (Morning)

3.00 PM – 5.00 PM (Evening)

V. Medicine Record

This module helps the staff to maintain medicine records and stock of medications in the dispensary. Admin are responsible to add new medicine stock and the staffs are responsible to update the medicine stock. Based on the user requirements, the re-order level is set when the quantity of medicine in stock is less than 50.

1.6 Project Significance

In the process of developing this system, there are many things that need to be considered. As this system is meant to be used by clinic staff and the doctor, there are many benefits that can be achieved by both users.

I. Enables the clinic staff to work efficiently.

Staff can easily record and search the patients information into the system. This system will also make sure that there is in data redundancy. The time consuming for viewing the information needed will be less if compared to the current system. This may help the clinic staff to perform more efficiency.

II. Enables the doctor to work efficiently.

This system will make sure that the process of capturing data from the doctor be easier. The doctor just need to key in the treatment and suitable medication that they have given to the patients. The data will directly send to the dispensary section for medicine. Furthermore, the doctor can view the past treatment that the patients done. The doctors can also check the list of medicine that had been taken by the patients from the last treatment. All these information are important for the doctor to make sure that the patients get the better treatment.

1.7 Organization of the report

This project contains 7 chapters which are introduction, literature review, methodology, system analysis and design, implementation, testing and conclusion.

Chapter 1: Introduction

This chapter is the introduction to the project that gives the general overview of this project and it being includes the reviewing the content of the chapter (introduction), problem background, problem statement, objectives, project scope and also organization of the report.

Chapter 2: Literature Review

This chapter reviews and compare existing system or software currently being used that related to the project. By doing this, it help to identify the strength and weakness of the existing system and consider the features that can be apply in the project.

Chapter 3: Methodology

This chapter describes about the methodology for this project to develop the project in term of the techniques, methods to be used, equipments and also advanced technologies. This chapter also explained about the software and hardware requirements as well as its operating system and data model for this system.

Chapter 4: System Analysis and Design

This chapter reviews the system analysis and design which include Data Flow Diagram (DFD), Entity Relationship Diagram (ERD), database design and interface design. This chapter will give the basic overview and idea on how the system will work.

REFERENCES

Gall, M.D., Borg, W.R., & Gall, J.P. (1996). Education research: An introduction (6th ed.). White Plains, NY: Longman

Goetschalckx, M. (2011). Supply Chain Engineering. International Series in Operation Research & Management Science

Hart, C.(1998). Doing a literature review: Releasing the social science research imagination, London:Sage.

Jack T.Marchewka, Information Technology Project Management, Third Edition, John Wisely and Sons, 2010.

Laudon, K. C. & Laudon, J. P. (1997). Essentials of Management Information Systems: Organisation and Technology. Englewood Cliffs, NJ: Prentice-Hall International Inc.

Sommerville, I. (2007). Software Engineering International Computer Science Series. UK: Addison-Wesley.