CLINIC MANAGEMENT SYSTEM

by

Mukuntha Shri Suberamaniam

Dissertation Submitted In Partial Fulfillment Of
Final Year Project 2
The Requirement For The
Bachelor of Technology (Hons)
(Information and Communication Technology)

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CERTIFICATION OF APPROVAL

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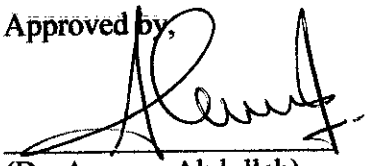
Approved by,



(Dr. Azween Abdullah)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

January 2008

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ABSTRACT

This report presented as Final Year Project 2 Final Draft Report. This report will discuss the development of Clinic Management System. This documentation will cover 6 major topics, which is the Introduction, Literature Review, Method, Results and Discussion, System Development and Conclusion.

The Introduction part for this report includes background of the project, problem statement, objectives and scope of study. Literature review will explain why this topic was chosen. It is consist of analytical and objective review towards this system.

Method will describe the steps that have been taken for the progress of this system, which includes project activities, research, data gathering and requirement analysis and definition. Results and Discussion consist of requirement analysis, process flow and system framework.

System Development introduces the sub-modules of the system and the functionalities. Lastly this report is concluded with the conclusion and references.

ACKNOWLEDGEMENT

I would like to take this opportunity to thank all parties involved my final year project to be a great educational session and a great success. I would also like to sincerely thank Dr. Azween for giving me a wonderful opportunity ad guidance to fulfill my final year project requirement. The guidance I received from him has helped me complete my project.

My heartfelt gratitude and appreciation is extended to my supervisor in Technodex Solution, Mr. Raymond Chan for his patience and continuous guidance which has given me a lot of knowledge. I found this knowledge very useful for my project development.

My acknowledgement would be incomplete without giving credit to UTP, especially Computer Science Department who has equipped students with essential skills for self-learning. Its well-rounded graduate philosophy has proven to be useful in the industry.

Finally, my appreciation goes to my friends and course mates who have helped me in more then one way to complete my final year project. Love, guidance and moral support for them will always be remembered and appreciated.

Thank you.

Mukuntha Shri Suberamaniam

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Abbreviations and Nomenclatures

- CMS: Clinic Management System
- UTP: Universiti Teknologi Petronas
- IIS: Internet Information Server
- VB: Visual Basic
- VS: Visual Studio

Part 1

INTRODUCTION

1.1 Background of the Project

Nowadays in a clinic, users as consumers can manage their clinic right from their seats. It has become a common phenomenon for clinics to adopt an automated system to manage their clinics. At present, the interest of users helps the designers to understand and improve in developing a system that increases the usability, speed, functionality and interactivity to compete with the others. Nowadays, even small clinics adopt a system to manage its activities in a cheaper, efficient and faster way. This is to provide better service to patients, and as a competitive advantage compared to other clinics in the same area. Basically, clinic management systems do not only give the facility to the patients but also give the benefits to the organization.

This Clinic Management System (CMS) project concentrates on developing an interactive clinic management system. The main functions in this system are managing patient details and appointments, managing medicine dispensary and stock, and managing staff details and schedules. This system manages data that has been registered into it, and allows actions such as add, update and delete. The system will be developed using Microsoft Visual Studio and SQL Server.

Clinic Management System aims to provide a user-friendly system that centralizes and efficiently manages the processes involved in a daily routine of a clinic. Besides managing patient details and appointments, this system also aims to provide with a scheduling engine for the clinic staff. This makes it more suitable for small clinics, where

its whole operation including human resource management can be integrated in this system.

1.2 Problem Statement.

Most of the clinics nowadays still practices the traditional way of storing patient details. Failing system is a time costly and inefficient. Some patients would have to wait far too long for their details to be collected and get their appointment with the doctor. It is also very common in failing system where the clinic card goes missing or misplaced. Other than being a waste of time for both doctor and patient, this problem will be an advantage for the clinic. Patients would prefer to go to other clinics where the management is more automated.

Therefore, it is more wise and appropriate to have a decent system that manages this entire problem so that a patient's visit to the clinic is smooth and fast.

1.3 Possible Solutions

Based from the discussion in the previous section about the current problems, there are some possible solutions and suggestions that can be put into consideration in developing the application which is by using Microsoft Visual Studio. Though Microsoft Visual Studio is still considerably new in system development, but this technique can be used to support the application to improve the problems stated before. Basic functions which will be needed are adding, updating and deleting records (for patients, staff and medicine stock) and tracking and managing appointments. Other functions are scheduling and reporting.

1.4 The Motivation

The motivation behind this project is to fulfill my current interest in helping the small clinics manage their operations as a whole, using an automated system in comparison to traditional styles. Besides helping the organization itself, using an automated system to manage a clinic, will also help sustain patients of a clinic. An automated system can help a clinic to provide satisfactory service, with fewer mistakes like loss of data, patient record or card.

1.5 Objectives

- To create a paperless system that manages data and information of patients, staff, appointments and medicine stock.
- To manage clinic staff working schedule,
- To create a system that centralizes information between the branches of a clinic.
- To learn a new system development tool which is called Microsoft Visual Studio.

1.6 The Benefits and Beneficiaries

The result of this system will give benefits to the beneficiaries as stated below. They are the clinic and the patients who will be directly on indirectly using the system.

1.6.1 The Clinic

Usage of the system will help to clinic to provide faster service to their patients, with fewer mistakes which involve time cost. Faster service will promote a clinics performance in terms of smooth operations of activities.

1.6.2 The Patients

Patients also benefit from this system because they do not need to spend a lot of time waiting for their details to be found. This means their experience at the clinic is better and faster.

1.7 Scope of Study

1.7.1 Business Processes

In this project, the author will be focusing on the business process relevant of a clinic. The author will need to understand and identify what are the activities involved in the operation of a clinic. The author also needs to identify and establish what main information that will need to appear in the system for the clinic use. All of this information is vital to the author for the development of the system.

1.7.2 Requirement of the System Application

The author also needs to understand the requirement of the system application. This component explains the details of how the client wants the system to be or how it should be applied. The author needs to know and understand the requirements in order to build the system correctly as requested by the client or user. This component lists down all features and functions as well as the design of the application as favored by the client of this project.

1.7.3 System Interface

The author has to study ways of designing an interface to increase its usability and interactivity. A good interface should be easy to use, navigate and simple without too

much complications such as unnecessary buttons. This component also plays the most important part in realizing one of the purposes of this project is to create a more interactive experience for the users.

Part 2
Literature Review

Computers are becoming more popular and integral to our daily life. It is not a new trend for users or customers to use the computers to enhance daily activities such as to simplifying tasks. The same scenario applies to clinics as well. In Malaysia, almost all organizations have already adopted computerized system to manage their everyday operations. However, the case is different for smaller range organizations, where the owners are hesitant towards the importance of adopting a computerized system to manage its daily operations. Small clinics which have 2 to 3 branches and lesser than 100 employees, usually do not have a computerized system to help its operations.

Besides that, it also obvious that most clinic management systems only concentrate on vital clinic operations such as patient data storage and retrieval, appointments management and medicine stock information. For this case, where small clinics are involved it is wise to include a section for management of staff information and working schedule. Then, the system will be able to manage the operations of a clinic as a whole, eliminating the necessity of having another system to manage the working schedule for staffs. However, this is only applicable for small clinics where the amount of information can be withheld by one system.

2.1 Microsoft Visual Studio

Microsoft Visual Studio is the main Integrated Development Environment (IDE) from Microsoft. It can be used to develop console and GUI applications along with Windows Forms applications, web sites, web applications, and web services in both native code as well as managed code for all platforms supported by Microsoft Windows, Windows Mobile, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It allows plug-ins to be added that enhance the functionality at almost every level - including adding support for source control systems (like Subversion and Visual SourceSafe) to adding new toolsets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

Visual Studio supports languages by means of language services, which allow any programming language to be supported (to varying degrees) by the code editor and debugger, provided a language-specific service has been authored. Built-in languages include C/C++ (via Visual C++), VB.NET (via Visual Basic .NET), and C# (via Visual C#). Support for other languages such as F#, Python, and Ruby among others has been made available via language services which are to be installed separately. It also supports XML/XSLT, HTML/XHTML, JavaScript and CSS. Language-specific versions of Visual Studio also exist which provide more limited language services to the user. These individual packages are called Microsoft Visual Basic, Visual J#, Visual C#, and Visual C++.

Extensibility

Visual Studio allows developers to write extensions for Visual Studio to extend its capabilities. These extensions "plug into" Visual Studio and extend its functionality. Extensions come in the form of macros, add-ins, and packages. Macros represent repeatable tasks and actions that developers can record programmatically for saving, replaying, and distributing. Macros, however, cannot be used to implement new commands or create tool windows. They are written using Visual Basic and are not

compiled. Add-Ins provide access to the Visual Studio object model and can interact with the IDE tools. Add-Ins can be used to implement new functionality and can add new tool windows. Add-Ins are plugged in to the IDE via COM and can be created in any COM-compliant languages. Packages are created using the Visual Studio SDK and provide the highest level of extensibility. It is used to create designers and other tools, as well as to integrate other programming languages. The Visual Studio SDK provides both unmanaged as well as a managed API to accomplish these tasks. However, the managed API isn't as comprehensive as the unmanaged one. Extensions are supported in the Standard (and higher) versions of Visual Studio 2005. Express Editions do not support hosting extensions.

Part 3

METHOD

3.1 Project Activities

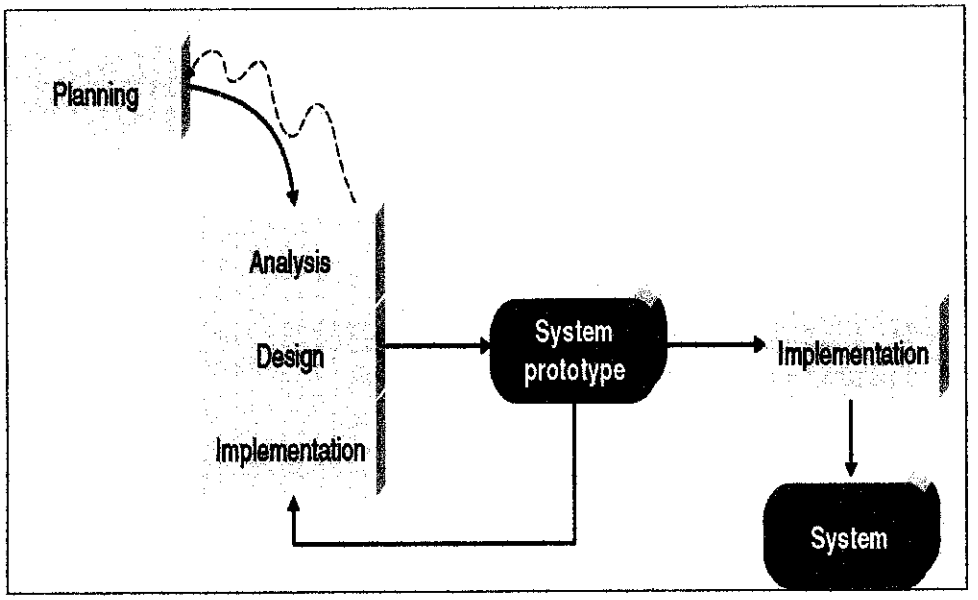

Figure 1: Prototyping Based Method

The method that will be used in order to develop this project is prototyping. A prototyping based method involves analysis, design and implementation concurrently, and all these three phases are performed repeatedly in a cycle until the system is completed as shown in the figure above. Prototyping can give the author the clearer picture and assist in identifying any problems with the efficacy of earlier design, requirements analysis and coding activities. Besides, it may extract better ideas for the improvement of the system. On the other hand, prototyping-based methodology also is able to do backtracking in the cycle of the system development and the fact that this

model combines both linear and iterative approach which is implemented in the Waterfall model and Prototyping model respectively.

The application of these methods allows the analysis and design to be performed at basic levels and immediately initiate workings on a system prototype that impose a minimal amount of features. The first prototype is normally the early part of the system that will be encountered by the user. This will later be presented to the users and project sponsors who will give comments that will be used to re-analyze, re-design and re-implement the second prototype that possess more of the remaining features. This procedure continues in a cycle until the analysts, users, and sponsor agree that the prototype encompass enough functionality to be applied in the organization. After the prototype which is now acknowledged as the system has been installed, improvements take place until it is fully accepted as the new system.

I chose this method because it suits my way of working. I prefer to see quick results, which encourages me to work even more. Besides that, the first prototype that I come up with may give me a clearer picture of the system, and this may extract better ideas for the improvement of the system. The key advantage of this method is that it very quickly provides a system that can interact; even if it is not functioning fully. Prototyping is a very good way of quickly refining real requirements. Rather than attempting to understand a system specification on paper, I prefer to interact with the prototype to better understand what it can and cannot do.

With prototyping, fewer changes are needed after implementation. End users will also be brought into involvement. Users will know what to expect during the implementation of the system. Prototyping also provides an enhanced communication with the user or analyst. Prototyping makes it easier to determine user requirements because it provides hands-on experience to the user prior to implementation phase. Prototyping also may reduce the development costs. This system will be developed on **Visual Studio.Net 2005** platform using **VB.net** scripts with **MySQL** database and **Internet Information Services (IIS)** web server.

3.2 Data-gathering

3.2.1 Observation

Based on my personal experience and visits to few clinics in Teluk Intan to study the flow of a clinic management work, I managed to grasp the main activities which are involved in a clinic. First of all, when a patient arrives, the staff identifies the patient, as new or existing patient. A new patient has to fill in a form which includes personal details. An existing patient should already have a card in the clinic which has information of patient medical history, as well as records of medicine prescriptions.

The second phase will be registering for an appointment and waiting for their turn to meet the doctor. Once the patient has been checked by the doctor, the doctor passes the medicine prescription to the staff. The staff will then disperse the medicine to the patient accordingly.

Last but not least, the cost of medicine and service will be calculated and charged to the patient. After the patient pays, the record of the patient will be updated and stored in the clinic again.

I also collected related forms, such as Patient Form, Appointment Form/Card, Medicine Prescription and bill. These forms helped me to design the interface of the system.

3.2.2 Interview

Besides that, I am planning to interview the admin regarding their management problems. This might give me a few more ideas to enhance my system. Different clinics might have different way of handling their patients. I plan to study each method and weigh the pros and cons of each method. After that, I may come up with a combination of every method, so that the easiest method with the least redundancy can be achieved.

Part 4
RESULT AND DISCUSSION

4.1 Requirements definition and analysis

This stage serves the purpose of identifying problems, objectives and also the scope. The system's services, constraints and goals are established by consultation with system users. Users' observations are normally based on their own experience dealing with security department. They are then defined in details and serve as a system specification. During this phase, the functional and non-functional requirements were identified. Functional requirements are associated with specific functions, tasks or behaviors the system must support, while non-functional requirements are constraints on various attributes of these functions or tasks.

Functional requirements of the system:

- To enable user to record patient details and information that can be accessed with the use of search function.
- To record staff details and information.
- To record and organize appointments of patients.
- To keep track of medicine stock in the clinic.
- To transfer patient appointment from one clinic branch to another.

Non-functional requirements of the system:

- Able to response in good timely manner when the event is triggered
- Easy and understandable navigation
- User friendly interface

4.2 Process Flow

Below is the overall process flow for Clinic Management System.

1. User (clinic staff) login into the system.
2. New staffs will be given a user id and password, and when they first login, the system will prompt the user to change password.
3. Then user can perform function such as adding patients, adding new staffs, recording appointments, medicine record, and dispensary.
4. Doctors can also login into the system and disperse medicine upon check-up through the dispensary page which can immediately be viewed by the clinic staffs in order to disperse the medicine.

The graphical representation of process flow can be depicted in the figures below.

Flow Chart of the Whole System

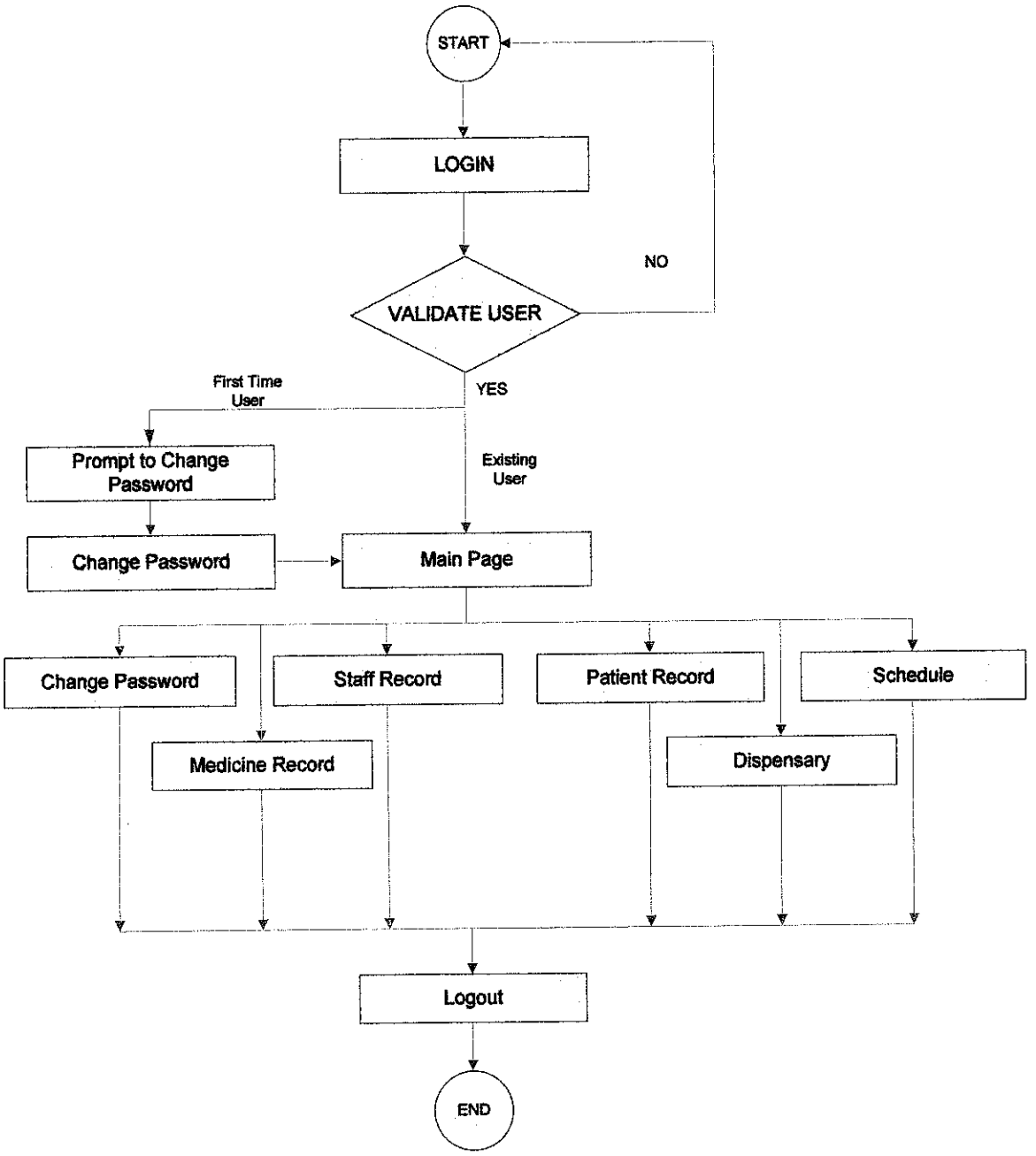

Figure 2: System Flowchart

System Framework

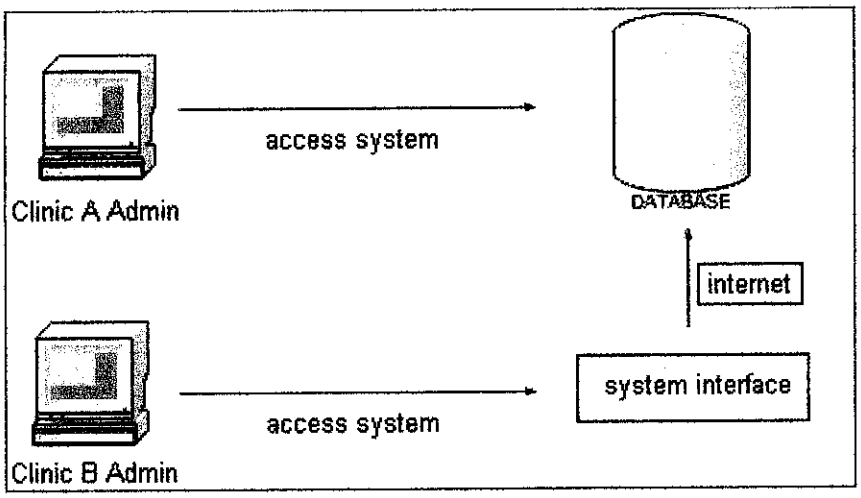

Figure 3: System Framework

Part 5

SYSTEM DEVELOPMENT

The findings from the results and discussion are applied to be developed into a working system. The system is divided into sub modules.

5.1 User Login

The login is meant to allow authorized users into the system. Staff ID and password as input text fields are the main components of this sub module for login.

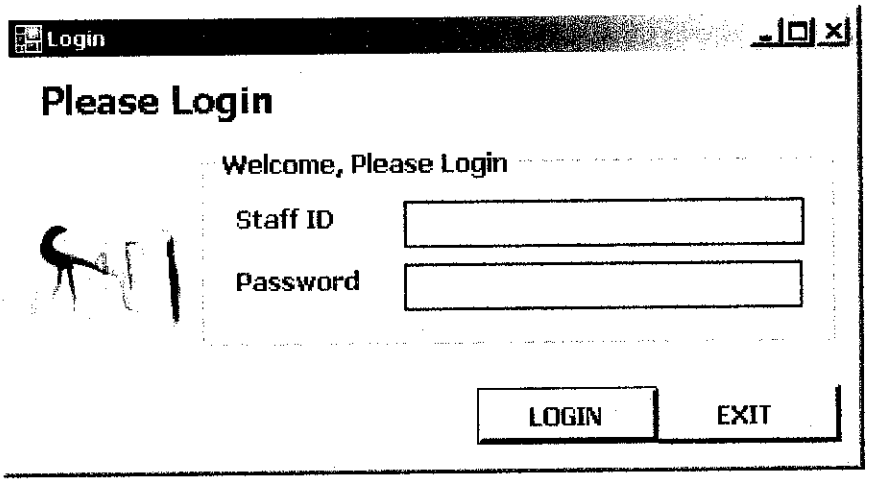

Figure 4: User Login

5.2 Appointment

The appointment sub-module is used to record appointment made by patients though front desk, calls and e-mails. The patient name and appointment fix time is keyed in and the patient will be placed under queue to meet the doctor.

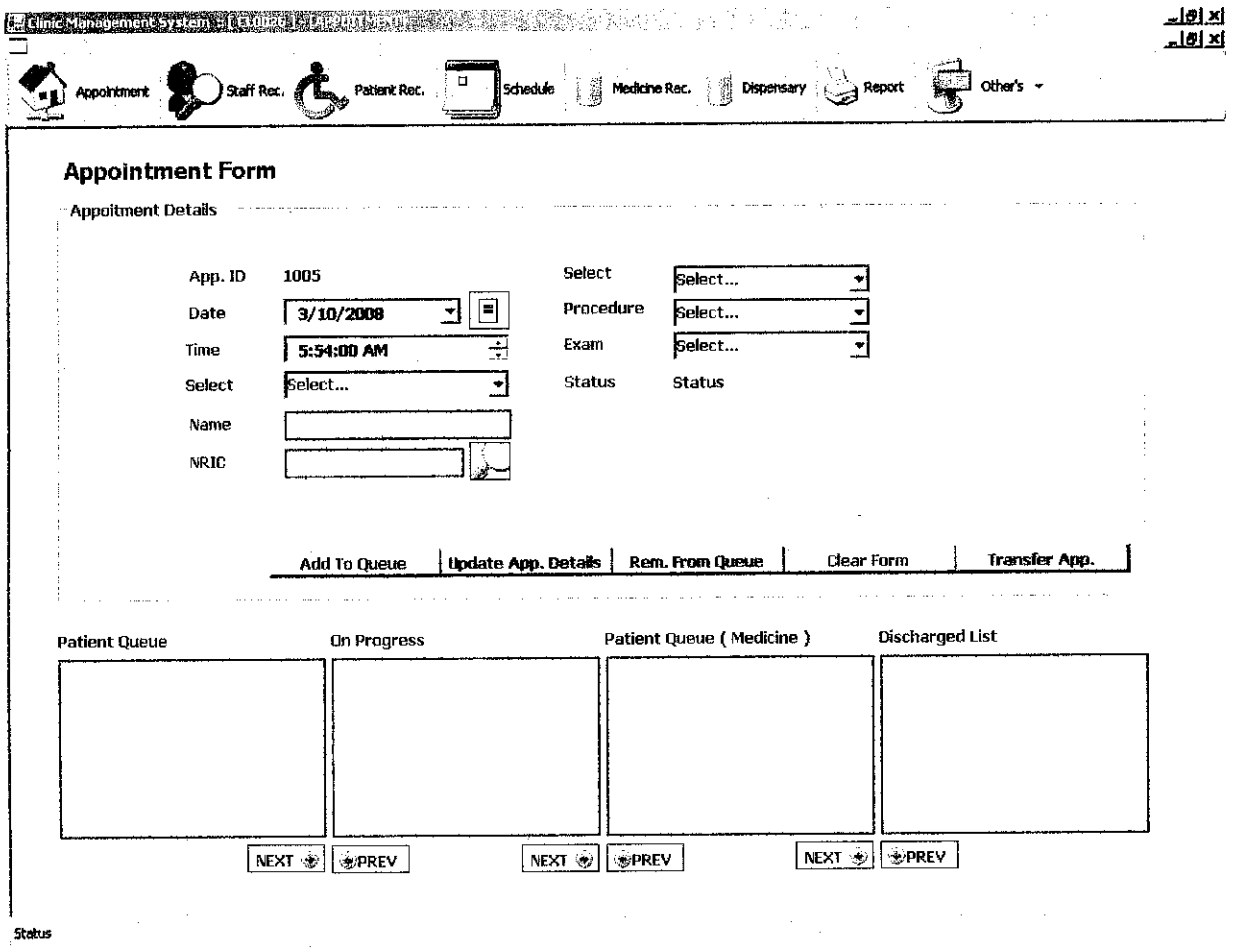

Figure 5: Appointment

5.3 Staff Details

The staff details sub-module is used to key in, record, search and update staff details. Fields including name, age, address, contact number etc.

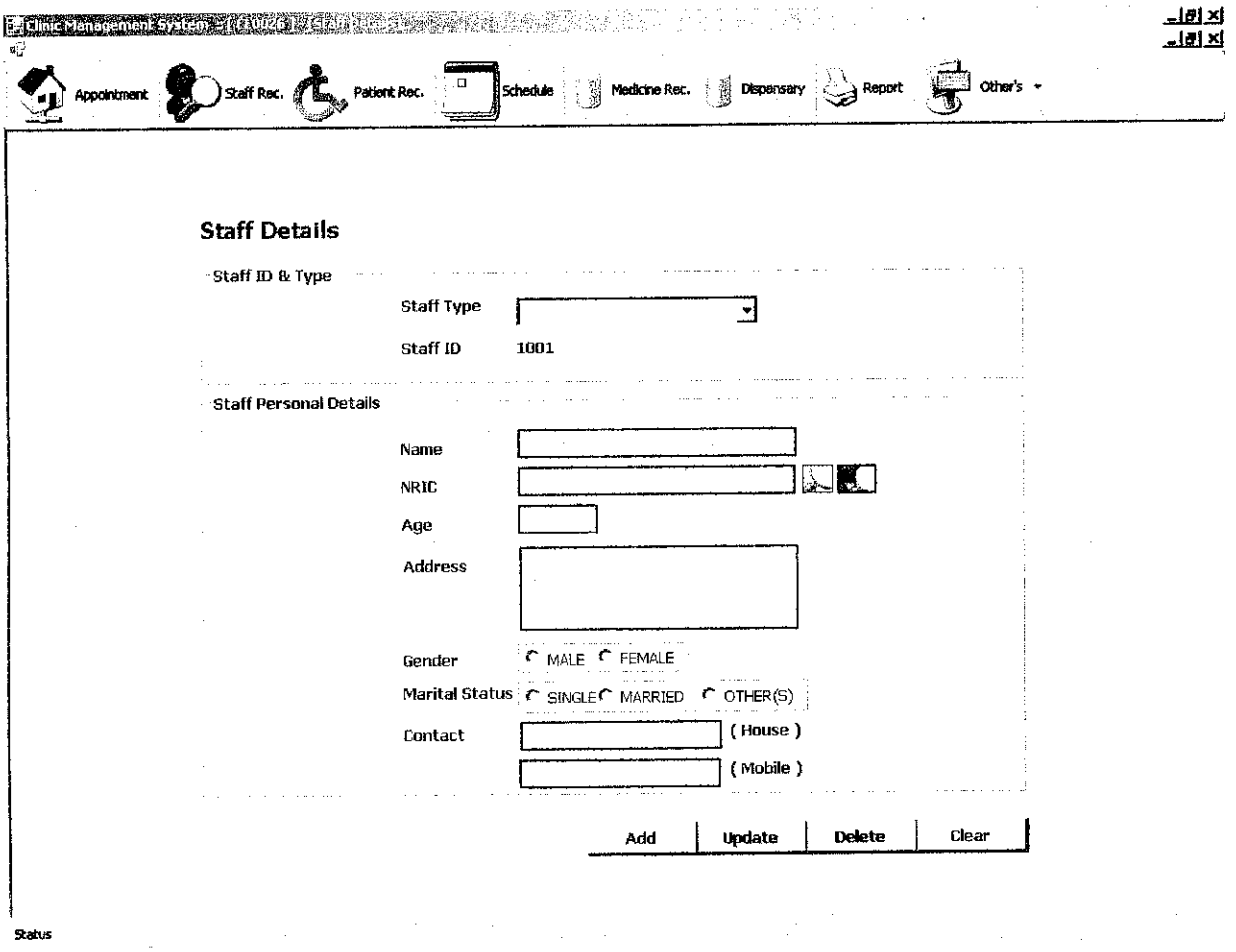

Figure 6: Staff Details

5.4 Patient Details

The patient details sub-module is used to key in, record, search and update staff details. Fields including name, age, address, contact number etc.

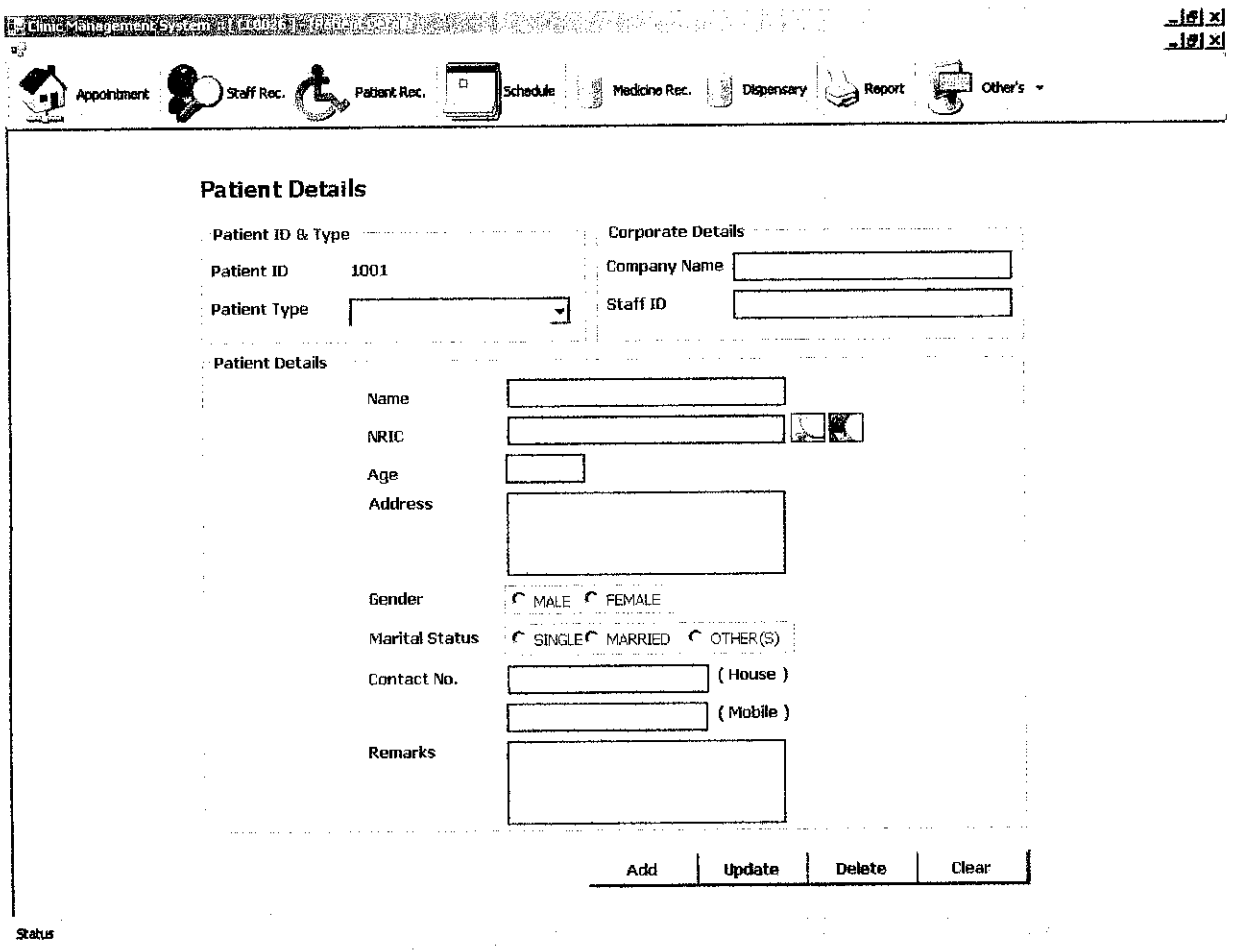

Figure 7: Patient Details

5.5 Staff Schedule

Staff schedule sub-module is used to assign shifts to staff. The week and date is selected, and the designated shift will be assigned to a particular staff. Shifts that are assigned can be viewed in the table according to the week selected.

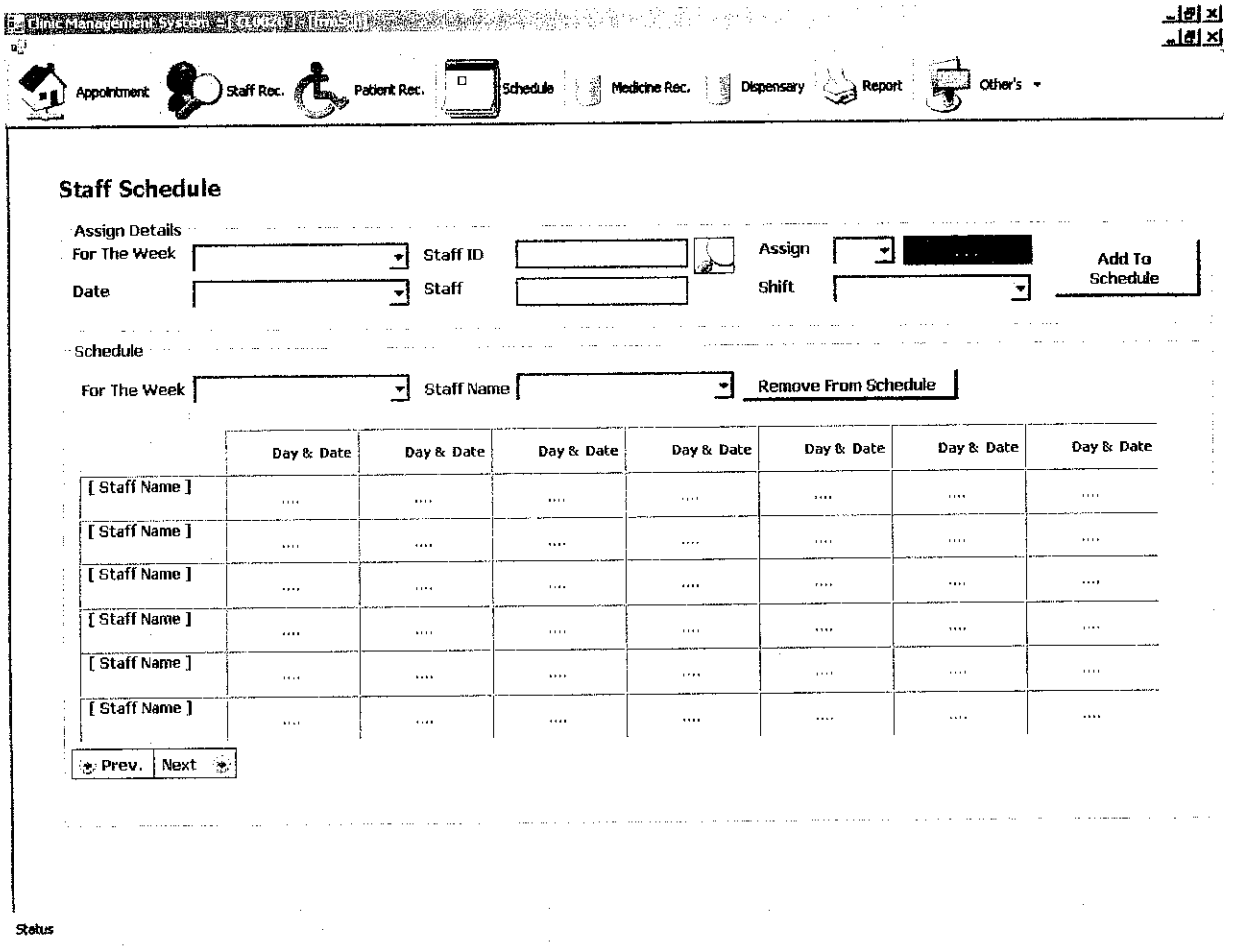

Figure 8: Staff Schedule

5.6 Medicine

The medicine sub-module is used to key in, record, search and update medicine record. Fields including medicine name, supplier, quantity etc.

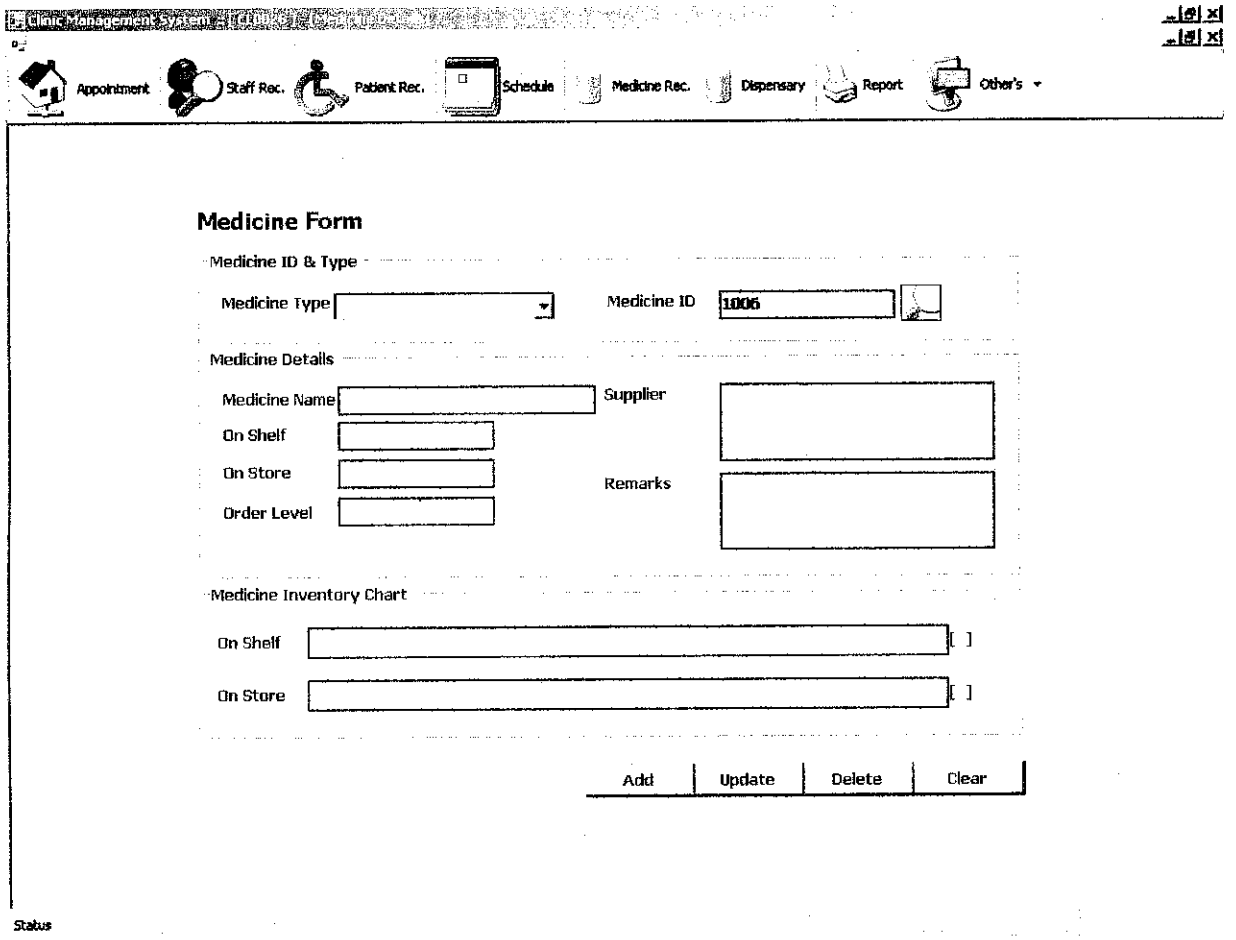

Figure 9: Medicine

Part 6

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

Clinic Management System is developed to manage activities of a clinic as a whole, including patients, staffs, medicines and appointments. This was done by implementing studies on the internet as well as observations at clinics. Objective values such as the interactivity and usability of existing systems were defined as a foundation point to be expanded to reach the primary goals of this project, which is to improve those values.

6.2 RECOMMENDATIONS

- The system can be enhanced by using scanner to identify and locate patient details from the MyKad. This will increase the system response time.
- The medicine stock sub module can be attached to an alarm that warns user when the medicine stock is almost fininshing.

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