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MEDICAL APPOINTMENT APPLICATION

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ABSTRACT

The current standard operating procedure in healthcare environment for patient registration and appointment scheduling are time consuming and somehow troublesome. Medical Appointment Application is a web-based mobile application develop for managing appointment-booking process for a few medical organizations, regardless of the type of service they schedule in Parit Raja and Batu Pahat area. The practices will have to sign up on the online appointments portal themselves and can view the appointment made by user, the patients. It will help user, the patients to book their appointment using the Medical Appointment application. Furthermore, Prototype Model is used to develop this system. As for the hardware and software used to develop this system is MySQL Database and programming language use is PHP and JavaScript. By developing this system, it will reduce the number of calls for an appointment and avoid the morning rush for an urgent appointment. Also, it will potentially reduce the need for extra reception staff, a significant reduction in labor. Furthermore, it helps user in time saving and avoiding the need to negotiate with the receptionist for a convenient appointment time. This technology can transform the current daunting appointment process and enable them to run more efficiently, effectively and profitably.

1. INTRODUCTION

The scheduling of appointments and reservations is an important task in the operations of all sized organizations, from companies and enterprise corporations, right down to service-based small businesses. While the manner of appointment-scheduling has evolved through the years, from taking appointments over the phone and recording them in a paper appointment book to utilizing an electronic calendar such as those offered by Google or Microsoft Outlook, the task itself remains tedious and time-consuming for organizations that continue to rely on these outdated and inefficient methods. Medical appointment is a meeting between a patient with a physician or doctor to get health advice or treatment for a symptom or condition. Appointments are strongly encouraged so that Medical Services staff may be sensitive to any time constraints.

It is also helpful if patients provide basic information about the reason of their intended visit (e.g., stomach pains, headache, travel assessment, pregnancy screening, and prescription refill). Patients can make appointments with their desire clinic or hospital 24/7 with the doctor of their choice, easing the pressure on the reception and the phone system. Medical Appointment is a web-based mobile application design to help in patient scheduling. Patient scheduling is an integral part of daily work for healthcare professionals, from family practices to large clinics, from physician offices to hospitals. Appointments need to be coordinated and medical support staff has to be constantly aware of all new patients and doctor's schedule.

The main problem addressed in this paper is how to overcome the constraints of the current manual medical appointment system. The major contributions are summarized as follows:

1. Design a Medical Appointment application that will gather a few medical practices in Batu Pahat and Parit Raja area that want to participate in one place.

2. Enable user to choose their desire medical practices and the suitable time to make an appointment using the Medical Appointment Application.

2. RELATED WORKS

The current standard operating procedure in the healthcare environment for patient registration and appointment scheduling are time consuming and somehow troublesome. It is prone to duplications, unnecessary visits and skipped follow ups. It is practically impossible to make a faultless appointment schedule, if done by hand. Most people have been frustrated by the queuing and waiting to see a doctor [1]. Furthermore, changes and correction are so often necessary to be done, that the chance of errors and duplications increases enormously. An interactive solution shall be done to overcome these constraints. The usage of a medical appointment application in our country has not yet been known compare to others country. This chapter is one of the methods to identify the problem and shortcoming that occurs in the existing system. The study was conducted by distinguishing what has been studied from what should be reviewed in order to improve the existing system.

2.1. Review on Similar System

A few researches have been done to identify and compare the similar system or application with the Medical Appointment Application. There are three comparative studies carried out to identify the similarities and differences of these application or systems with the system to be developed. Among system or application that has been selected are, DocAppointments.com.au, HealthEngine and Practo.

2.2. Existing Navigation Applications

There are a few numbers of existing medical appointment application in the Google Play markets such as DocAppointments.com.au, HealthEngine and Practo.

2.2.1. DocAppointments.com.au

DocAppointments.com.au originated from Australia. It is the first fully-integrated, automatic and real time online appointment booking system in Australia. The system available on a website and on IOS and Android phones. Users will have a 24-hours-a-day access to the appointments

online and on their IOS devices and Android devices. Also, the system allows users to choose their own appointment time from a wider range of available time nominate by the administrator [2]. Other than that, users can also choose the doctors that are available to make an appointment with. Users can select the 'current location' option to find the nearest Doctor's Practice, or search the list to locate the local Practices. Furthermore, the system also allows users to choose their preferred doctor that is available. User has the access to cancel their appointment. Once the appointment is made, the details will be saved automatically on users' calendar which includes the practice's address and phone number [3]. The disadvantage of the system is it needs the medical practices to download it software which will cost the practices money as it is not free.

2.2.2. HealthEngine

HealthEngine is Australia's largest online booking system and health marketplace. HealthEngine helps people to find and book health appointment anywhere and anytime. The application helps user to find available doctor, dentist, physiotherapist and other medical practices and help them to book the appointment online [4]. HealthEngine available on a website and Android and IOS application. It provides a quick easy search service for health practitioners and health practices in Australia. The application also provides user with the function of finding the nearby medical practices and the directions to them. The drawback of this application is it does not require user registration; thus, user have to fill in their information for every appointment scheduling.

2.2.3. Practo

Practo is a healthcare app that enable user to find medical practices and book an instant appointment and also do an online consultation with doctors. Also, user can post medical questions and get answers from the experts available. The application also allow user to take private online consultation sessions with the doctor of their choice.

Other than that, the application allow user to view previously booked appointments and save their appointments and their favorite doctors. Furthermore, the application has a navigation feature which will help user to find the practices' locations. The application also allow user to choose a convenient time slot for them to make an appointment [5]. The disadvantage of this application is it does not display the availability days of a particular doctor in a particular hospital.

3. SYSTEM METHODOLOGY

This chapter will define about the type of methodology that will be used in the development of Medical Appointment Application. The methodology model that will be used in the application is prototype model. The Prototyping Model is a systems development method in which a prototype, an early approximation of a final system is built, tested, and then reworked as necessary until an acceptable prototype is finally achieved from which the complete system or product can now be developed. This model works best in scenarios where not all of the project requirements are known in detail ahead of time. It is an iterative and trial-and-error process [6].

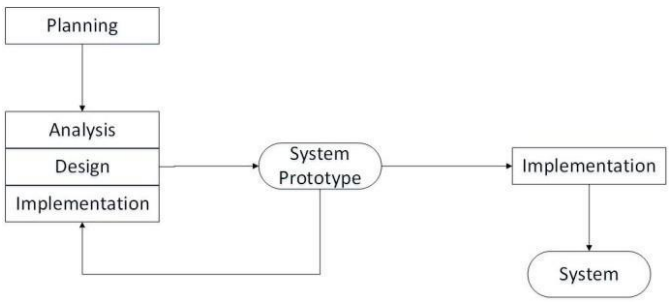

Figure 1: System life cycle in prototype model

3.1. Planning Phase

The planning phase is the first phase in the Prototype Model. In this phase, every planning in the development of a project is done. One of the activities involved in this phase is determining the project title. The chosen project title is developing a Medical Appointment Application. The application build shall follow the main objective of the project, developing a web-based mobile application that will gathers all medical practices in one place, helping user to choose their desire practices to make a medical appointment. The project scope and the work plan schedule need to be done first before developing the application.

Furthermore, the planning phase also examines more closely the requirements and the problems of the available systems and applications to improve the application that will be developed. Also, the significance of project is identified to visual the values available in the application. The Gantt chart is also provided in this phase to make sure the development of the project run smoothly.

3.2. Analysis Phase

In the analysis phase, the literature review has been done to differentiate the developed application with the existing systems and applications. The existing systems and applications that have been review are the manual medical appointment system, DocAppointments.com.au, HealthEngine and Practo. The purposes of the research are to improve the developed application and to details out the functions that can be built in the developed application. Other than that, this phase is an analyzing phase and techniques of collecting information and data such as through interview and research.

The information obtained from the analysis will be the guideline in developing the Medical Appointment application. Other than that, a flowchart was drawn to get the general idea of the application's process. Also, the Data Flow Diagram (DFD) and the Use-Case Diagram which show how the process works in the application. The outcome forms the analysis phase is important as it is going to be used in the next phase, Design Phase.

3.3. Design Phase

In design phase, the database and the interface of the application will be designed based on the modules that have been identified. The database of the application was build based on the Data Flow Diagram (DFD) and the Use- Case Diagram. phpMyadmin software is used in the design and development of the Medical Appointment application. The interface of the application is design through Bootstrap. The outcome of the interface design will be used as a guide in developing the application in the implementation phase.

3.4. Implementation Phase

Prototype is a way in finding out the feedbacks of the proposed application. For the implementation phase, it is to determine how well the application process is. The application will be tested and if there is a problem occurs later during application testing, the process of fixing the problem will be held so that the application will satisfied the user. The testing will be done by the user and the administrator of the Medical Appointment application, which is the medical practices involved as to make sure the developed application will not have any errors and deficiency. In addition, this phase is also about documentation of the project, fixing errors and making improvements to the application.

4. ANALYSIS AND SYSTEM DESIGN

Analysis and system design of Medical Appointment application are from various points of view. It is to ensure the application meet the requirements. In the analysis phase, the problem has been identified and serve as a benchmark in developing a good quality application. Also, research on the equivalent systems and applications has been completed in analysis phase. System design is needed to clarify in more details about the progress of the system flow in order to build an application that suited user requirements and system. In the design phase, the system is divided into two parts, database design and system application design. Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD) are built to represent the database design used in the developed system. In addition, this chapter also describes the Flow Chart, Diagram Context, Data Flow Diagram (DFD), Entity Relationship Diagram (ERD) and system design. Implementation of this chapter is very important to ensure system development process meet the requirements of users and the objectives of the project. All figures shown in Figure 1, 2, and 3.

4.1. Context Diagram(CD)

Analysis of system requirements is to analyze the application develop for the purpose of obtaining a more comprehensive understanding of the system environment developed. The process of analysing the needs of the system is divided into three which is flowchart, data flow diagram (DFD) and entity relationship diagram (ERD).

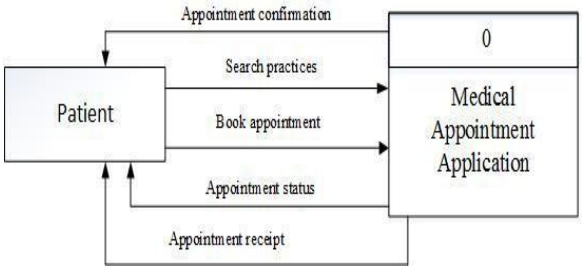

Figure 2: Context Diagram of the application

There are two entities involve which is Patient and the application itself.

4.2. Data Flow Diagram (DFD)

Data Flow Diagram (DFD) is a technique that represents the flow of data entities and relationships in a system. It shows the details of a context. It aims to explain the function of ta system more specifically.

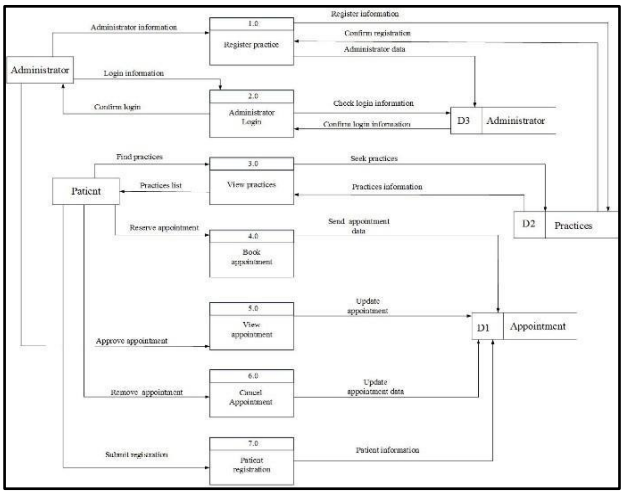

Figure 3: Data Flow Diagram Level 0

4.3. System Design and Interface

The design of a system is very important and need to be emphasized during the design development process.

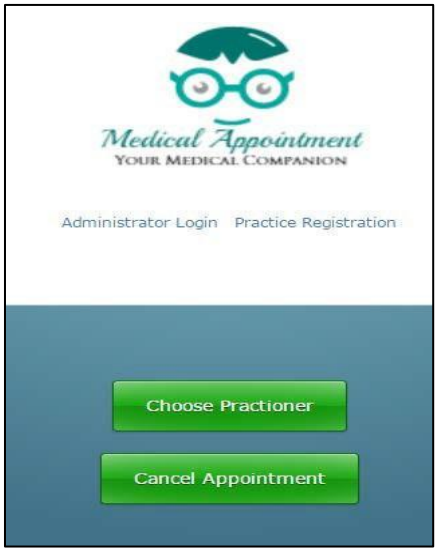

Figure 4: Design interface for Main Page of the application

Figure 4 shows the main page of the Medical Appointment application. User, the patient needs to choose practitioner, or the option cancel the appointment that they have made. As for administrator, they can login by clicking on the link on top right. For new practice that wishes to register, they can click on the Register link on top right. Figure 5 shows the cancellation page.

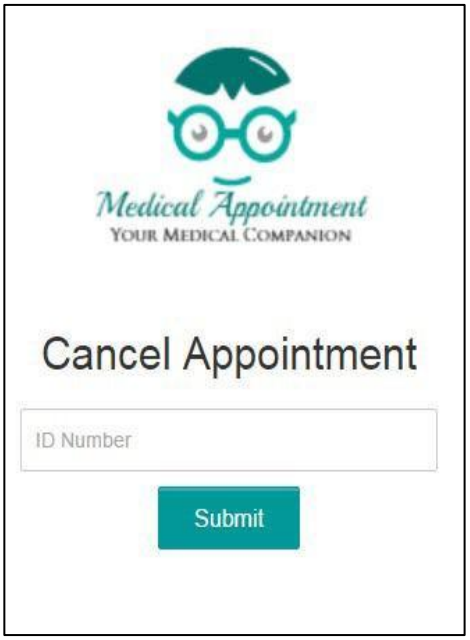

Figure 5: Appointment cancellation page

Figure 6 shows the practice list available which user can pick.

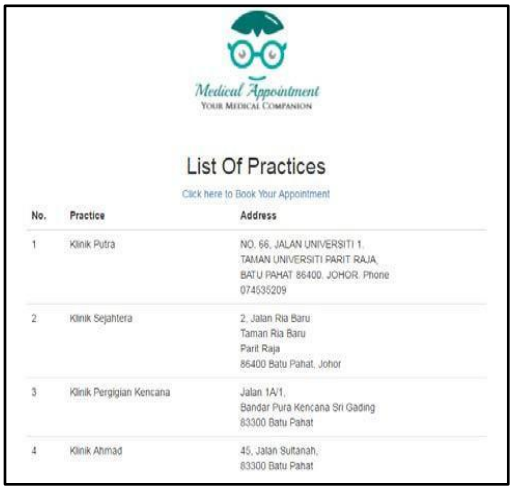

Figure 6: Practice list available

Figure 7 shows the appointment form that patient needs to fill in.

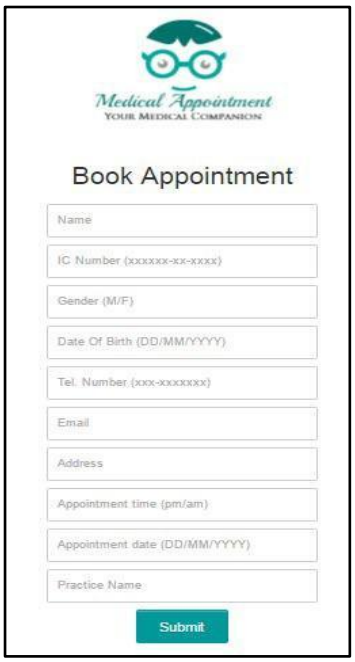

Figure 7: Appointment form

Afterward, user can print their appointment details as in Figure 8.

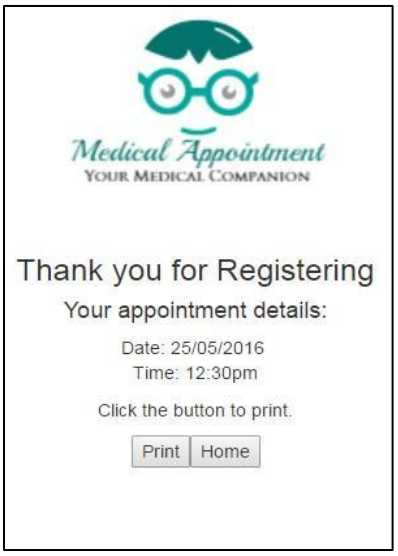

Figure 8: Print Appointment Details

Figure 9 shows the login page of administrator. If they are not a member, they can click on the "Register Now" link that will bring them to the registration page as in Figure 10.

Figure 9: Admin login

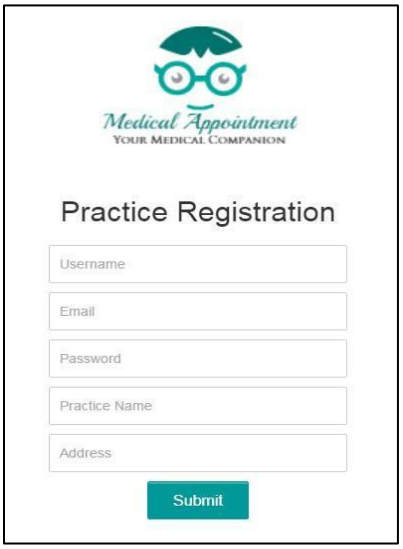

Figure 10: Practice registration

In Figure 11, it shows practice's administrator can view, update and delete the appointment list.

Figure 11: List of appointment

5. IMPLEMENTATION AND TESTING

Testing is done to make sure the system works smoothly. Table 1 shows the testing done to Medical Appointment application.

Table 1: Testing done on the system application

Module Tested	Expected Result	Final Result
Login Module	Allow administrator to enter username and password	Success
Practice Registration Module	Allow administrator to enter the information needed	Success
Practices List	Shows the list of practices for users to choose	Success
Appointment Booking Module	Allow user to fill in the appointment form	Success
Administrator Appointment Approval Module	Allow administrator to make approval on the requested appointment time	Success

6. CONCLUSION

Medical Appointment application is a web-based mobile application designs to help in patient scheduling with practices in Batu Pahat and Parit Raja area. Based on the developed application, some of the advantages has been identified. The application has gather some medical practices in Batu Pahat and Parit Raja area. User, the patient can easily book their appointment with the practice they wanted avoiding a long queue at the clinic.

During the analysis and development of the Medical Appointment Application, there are some drawbacks that has been identified. The application is unable to allow practices' administrators to show the unavailable appointment time. It only allows user, the patient to fill in the appointment form without knowing which appointment time is available for them.

The constraints that has been faced during the project development is time management and learning to build application using Android platform. Due to improper time management, the developed application is not of a top-notch quality. Besides that, learning to build the application using the Android platform is a difficult task for a first timer with lack of knowledge as a lot needs to be learned. However, these constraints do not hamper the development of this application and the disadvantages can be improved in the future.

Medical Appointment application has the potential to be improved in the future. There are proposals that have been put forward and serve as a guide for improvement of this system. Some of these proposals are to make the practices' administrators able to display the available appointment time for the user to choose and to make an email notification or any sort of notification for appointment rejection. Besides that, it is

suggested to make the application interface more interesting and creatives.

In summary, Medical Appointment application has successfully achieved it objectives drawn at the starting point of project planning. The application is built to gather any medical practices that want to participate in the application, specifically practices in Batu Pahat and Parit Raja area. Also, it is to help the patient in avoiding any difficulties in appointment booking with these practices.

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