**Dental Clinic Services System**

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**Chapter One**

**Project Proposal**

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**Chapter One: Introduction and Background**

The dental clinic is one of the important parts of our life. All of people have to go to the dental clinic when they get some problem with their teeth such as toothache, gum ache or teeth braces. It is like when we go to the hospital, but for the dental clinic it treats only problems with the teeth. In one, a clinic has many patients and many cases for treating. One of the common cases, for example, is the teeth braces which often require a long term treatment, possibly up to 4 years. The patient who has teeth braces has to make an appointment with the dentist around once a month.

The problem is patients often lose their appointment card and forget the appointment date, which may affect their health. They will have some trouble with their teeth, which sometimes can be very dangerous. In some cases, patients want to change their appointment date. They do not know exactly when the dentist is free because the dentist has his/her own schedule which contains all of the patient appointments. Besides the problems with appointments, patients may also want to know the total cost of their case.

To solve these problems, “The dental clinic website and mobile application” provides functions for patients, visitors, officers and dentists. For visitors who are interested in dental treatments, the website and mobile application provides information about dental treatment and estimated cost. Visitors can also interact with the dentist on the web. Visitors can consult with the dentist about some problem they are experiencing. This website and mobile application includes dentists schedule and also the appointment feature which allows visitors to make an appointment with a dentist online. For patients, the website and mobile application contains the reminder function for reminding them of upcoming appointments so that they do not miss the appointments. The same feature also sends out a notification when the schedule changes. It will notify about the appointment 1-2 days before the appointment date. The dental clinic website and application can also generate the QR code for each patient, which can be used to identify the patient and his/her appointment at the clinic. This streamlines the process of receiving patients and looking up appointments. At the same time, it relieves the problems of patients losing or forgetting to bring their appointment cards.

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**Chapter Two: Literature Review**

**2.1 Business review**

**2.1.1 Dental Clinic Services System**

Dental Clinic Service System is a system that provides services to customer of Dental Clinic(patient) such as dentist’s schedule, managing appointments and reminders, promotions, dental clinic’s information, consulting and follow up between a dentist and a patient. Customer can access both the web application and mobile application. At the dental clinic officer can manage dentist’s schedule, add advertisements, and identify patient with QR code. Dentists can have an interaction with customers through both applications, by giving consultation and following up their patients.

Examples of dental website and mobile application are shown below.

**2.1.1.1 Dental Clinic by Cosmetic Innovations, Inc**.

Dental Clinic is a patient’s guide to understanding all aspects of dentistry and its procedures. This application includes the most frequently asked dental questions answered by the top dental experts in each field, and overseen by NYC Cosmetic & General Dentist - Dr. Marc Lazare. This app includes:



Figure 1: Show all menu that customer can use.

As shown in Figure 1, when user open the application user can see all of these menu items that user can select to see information.



Figure 2: Show user interface after user select some menu

As shown in Figure 2, users can select to see the useful information such as ‘Best ways to minimize your pain, fear and anxiety’ • ‘All of the important information you should know about your children’s dental care’ • ‘Knowing what all of your options are when missing one or more teeth’ • ‘What you should know about teeth whitening’.

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### 2.1.1.2 Dr.Sunil Dental Clinic - Cosmetic, Oral & Implant Dentistry

The website for Dental Center in Bangkok which provides foreign customers with advertisement of the clinic including the information about the services provided to customers. Customers can fill the document form to make an appointment. Customers also can use the provided QR code to call, email, and visit the website of dental clinic. But this website is only for customers and has only some information of dental care. Dentists cannot interact with customers directly.



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Figure 3: Show website of Dr.Sunil Dental Center

Figure 4: Show the contact with Dr. Sunil

As shown in Figure 4, Customer can send their information to Dr. Sunil and wait for email to get an appointment.



Figure 5: Show the price rate

As shown in Figure 4, Customer can see the cost that they have to pay for each treatment.

**2.2 Technology Review**

**2.2.1 QR code**

**2.2.1.1 QR code**

QR code (quick response code) is a type of [2D barcode](http://searchmobilecomputing.techtarget.com/definition/2D-barcode) that is used to provide easy access to information through a [smartphone](http://searchmobilecomputing.techtarget.com/definition/smartphone).

In this process, known as mobile tagging, the smartphone’s owner points the phone at a QR code and opens a [barcode reader](http://whatis.techtarget.com/definition/barcode-reader-POS-scanner-bar-code-reader-price-scanner) app which works in conjunction with the phone’s camera or webcam. The reader interprets the code, which typically contains a call to action such as an invitation to download a mobile application, a link to view a video or an [SMS](http://searchmobilecomputing.techtarget.com/definition/Short-Message-Service) message inviting the viewer to respond to a poll. The phone’s owner can choose to act upon the call to action or click cancel and ignore the invitation. The QR code can recognize the URL website. Normally the URL website is difficult to keep because it’s too long and some of it is too complex. For QR code just scanning an item with a QR code provides a link to the website of that item.[1]

**2.2.1.2 Zxing**

Zxing or Zebra Crossing is a library for generating and detecting QR code. The library is being developed by Google with many other contributors. In iPhoen, Zxing can works better than others QR Code library.[2]

**2.2.1.2 Alternative Technology**

QR code is quite similar to 2D barcode and RFID (Radio-frequency identification). Both of them contain information and can get to use the information easier and faster. A barcode is normally used more than QR code and RFID because it is easier to encoded and decoded and also the cost is cheaper.

**2.2.1.3 The selection of this technology**

The reason why we choose QR code technology is because it is now very popular and most people use a smartphone. It is easy to use and comfortable. Using a QR code for identification, patients do not need to bring their appoint card when they come to the clinic. And another reason for using QR code is that is it faster and more reliable than using appointment cards. Patients no need to have any program to read or create QR code because the system will provide QR code to them. We use Zxing to generate QR code about the appointment to patients.

**2.2.2 PhoneGap**

**2.2.2.1 PhoneGap**

PhoneGap is an application framework that enables us to develop Mobile Application easier and build natively installed applications using HTML, HTML5 and JavaScript. Phone Gap is a Hybrid Application for Mobile. We can build user interface using web traditional web development skill, and use the PhoneGap container to deploy to different Operating System including Apple iOS, Google Android, Windows Phone, BlackBerry, HP WebOS, Symbian, and Bada.[3]. And also can be distributed by the normal application market places(iTunes, Google App Market, Amazon Market, etc…)

**2.2.2.2 Alternative Technology**

Xcode and Titanium are integrated development environments (IDEs) that help create mobile applications which can be used on smartphones and tablets. Xcode includes a suite of development tools to build iOS mobile applications directly, while Titanium can create applications for many platforms, similarly to Phone Gap. It supports iOS, Android, and etc. The programming languages supported are JavaScript, HTML, CSS, Python, Ruby, and PHP.

**2.2.2.3 The selection of this technology**

For choosing PhoneGap to develop the application because it is an open source. We will create the mobile application by using HTML5, CSS, and JavaScript, all of which are supported by PhoneGap. And it can support 7 kinds of operating systems including iOS which is the mobile platform we have chosen for this project. PhoneGap will wrap the website to be the application. It contains the features that we have to use for this project such as camera function or database.

**2.2.3 HTML5**

**2.2.3.1 HTML5**

HTML5 is markup language used for creating websites. Evolved from the HTML standard, HTML5 has more features such as working with MAP system, and creating a graphic without flash. And HTML5 is supported by many operating systems on various devices such as Windows PC, MAC, iPhone, iPad, and Android-based mobile phones and tablets. It works with CSS and JavaScript and can be used not only to develop for the world wide web also but also to create mobile applications.

**2.2.3.2 Alternative Technology**

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**2.2.3.3 The selection of this technology**

HTML5 has been selected for this project because it is the newest version of the HTML and supported by PhoneGap along with CSS and JavaScript. It can be used to develop both the dental clinic website and the mobile application of dental clinic.

**2.2.4** MySQL Server

**2.2.4.1 MySQL** Server

## MySQL Server is a Rational database management system(RDBMS) that store data in separate tables.MySQL Server is a Open Source database that can use in many diffent platform and very fast, reliable, scalable, and easy to use. And also provides a high performance, multi threaded, and multiuser rational database management system. [4]

**2.2.4.2 Alternative Technology**

## SQLite is an in-process library that implements a [self-contained](http://www.sqlite.org/selfcontained.html). To use SQLite user no need to be installed before use, no need to setup SQLite Server, and can run on many Operating System such as OSX, Windows, Linux or Android. [[5]](http://www.sqlite.org/famous.html)

**2.2.4.3 The selection of this technology**

The dental clinic system needs to store and maintain patients information as well as the information of treatments and others. All data need to be stored in a database that enables secure and stable management of the information. To use MySQL Server because the database of dental clinic is very big instead of using SQLite which can contain fewer data and more suitable in a limited storage.

**2.2.5 Architecture**

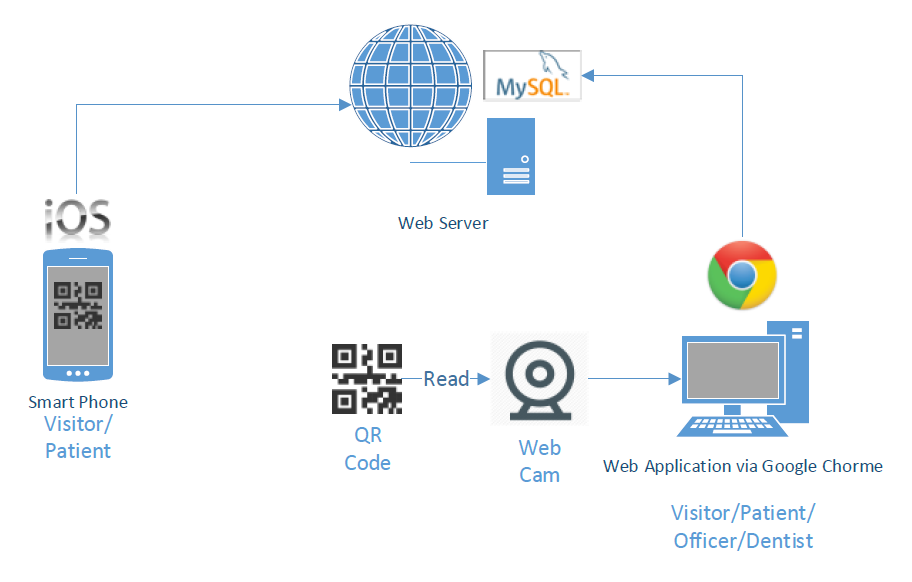


Figure 6: System Architecture

As shown in figure 6: Visitors and patients be able to use both Mobile Application and Web Application. Officer can use to manage the schedule, add information via Google chrome browser. And identify the patient by scan QR code via Web Cam. Dentist can manage their schedule and consulting with patients via Google chrome browser. The system will generate QR code for the patient and send to patients smart phone. The database of services system is stored in web server

**Chapter Three : Quality Standard**

**3.1 ISO29110 for Very Small Entity(VSE)**

ISO29110 is a guide applies to a Very Small Entity (SVE), enterprise, organisation, department or project up to 25 people, dedicate to software development. The Guide provides Project Management and Software Implementation process which integrate practices based on the selection of ISO/IEC 12207- System and Software Engineering - Software Life Cycle Processes and ISO/IEC 15289 Software Engineering - Software Life Cycle Process - guidelines for the content of software life cycle process information products(documentation) standard elements.

**3.1.1 Project Management Process**

The propose of the Project Management process is to establish and carry out in a systematic way the task of the software implementation project, which allows complying with the project’s objectives in the expected quality, time and cost.

**Selected process**

3.1.1.1 Project Planing Process

3.1.1.2 Project Plan Excution Process

3.1.1.3 Project Plan Assesment and Control Process

3.1.1.4 Project Closer Process

**3.1.2 Software Implementation process**

The purpose of the Software Implementation process is the systematic performance of the analysis, design, construction, integration and tests activities for new or modified software products according to the specified requirements.

**Selected process**

3.1.2.1 Software Implementation Initiation Process

3.1.2.2 Software Requirements Analysis Process

3.1.2.3 Software Architectural Design Process

3.1.2.4 Software Construction Process

3.1.2.5 Software Integration and Test Process

3.1.2.6 Software Delivery Process

**Chapter Four : Project Plan**

**4.1 Motivation**

Nowadays people in Thailand are more interested in dental care, and the number of dental clinics is increasing very fast, each with different number of patients. Dental clinics need to handle many patients and also many problems. Some of the typical examples are; patients forget about their appointment, patients do not have any knowledge about dental care, patients do not know the dentist schedule. Systems dedicated to serving dental care providers and patients will help solve these problems.

According to a recent research about mobile phone use, the number of smartphone users in 2013 increased by 29.1 percent from 2012 [6] and the number of people using mobile internet increased by 32 percent in 2013 [7]. People always use their phone to do many things such as entertainment, booking, shopping, communicating with others, accounting, and marketing.

In addition, such systems for dental clinics may improve the quality of services provided to their patients. For instance, most dental clinics rely on appointment cards to receive patients and keep track of their appointments. When patients arrive at the dental clinic, they have to provide their appointment card at the reception desk and the officer would have to look up the patient chart, which usually takes time. By integrating smartphones and QR codes into the workflow, our system can identify appointments faster and reduce the work of officer. For the dental clinic, QR codes is more suitable than barcodes because QR codes can be stored in and read from smartphones as well as traditional paper-based cards.

**4.2 Aim and Objective**

The aim of this project is to develop a website and a mobile application that can help patients make appointments with dentists more easily and manage their appointments more efficiently. The system should support the management of the appointment schedule for both dentists and patients, remind patients about an upcoming appointment, provide dentists schedule to the visitors who want to make an appointment, reduce the time and work of dental clinic officers. The system will make sure that each patient has an appointment, gets proper consult from a dentist and also provide useful knowledge about dental treatment and dental care.

Objectives

1. To develop a web application and mobile application for dental clinic
2. Web application and mobile application provided to patients and visitor can be able to use services from dental clinic which are

2.1 Reserve a time to get an appointment.

2.2 Remind the patient before an appointment’s time.

2.3 Consult and follow up with the dentist.

2.4 View dental clinic’s information, dental care’s details, cost, and promotions.

1. Officer can manage dental clinic’s schedule via web application.
2. Dentist can manage their schedule and consult with patients via web application.
3. Facilitate officer to manage the queues of patient.

**4.4 Deliverables and Limits**

**4.4.1 Deliverables**

The dental clinic system, the final product will consist of

* 4.4.1.1 **Software systemWeb service**

The web service that supports the sending appointment information, generating for each appointment information to become QR code, authentication and authorization patients by reading QR code via Webcam,

* **Web application**

The dental web application is a website that supports dental clinics with which have many patients. To solve the patient’s problems discussed in 4.1

* **Mobile application**

The dental mobile application is an application for smartphones on the IOS operating system that supports dental clinics which have many patients. To solve the patient’s problems discussed in 4.1 the mobile application supports the patients and visitors to perform the following tasks

**Documentation**

• Project Proposal

• Project Plan

• Software Requirement Specification

• Software Design Document

• Testing Documents

-- Test Plan

-- Unit Test Document

-- System Test Document

• Traceability Record

**4.4.2 Limits**

- Web application can run on Google chrome only.

- Mobile devices (smartphones, and tablet) should use the iOS7 or newer version for better performance in application.

- Mobile devices (smartphones, and tablet) should support Edge, Wifi and 3G.

- Internet connection is required.

Without Internet Access, user cannot receive the QR code from clinic.

\*(QR code contain an appointment information) - Without internet connection mobile application provide only clinic’s information, promotion, and cost of dental care.

**4.5 Future work**

- Available on other operating system platform for example; Android and Windows Mobile.

- Use other technologies to make the officer more comfortable by using RFID. Officer no need to use a camera to scan QR code, just use RFID to verify the patient.

**4.6 Schedule and Milestone**

This section presents the schedule and milestones that cover all the activities to be undertaken in the project. According to the current plan, the project will be completed by September, 2014.

**Pregress 1**

* Feature1: Provide dentist’s schedule to manage
* Feature2: Appointment reminder.

**Progress 2**

* Feature3: A dental clinic information, promotion, and cost of dental care.
* Feature4: Identify patient by QR code.

**Progress 3**

* Feature5: Dental care consulting and following up.

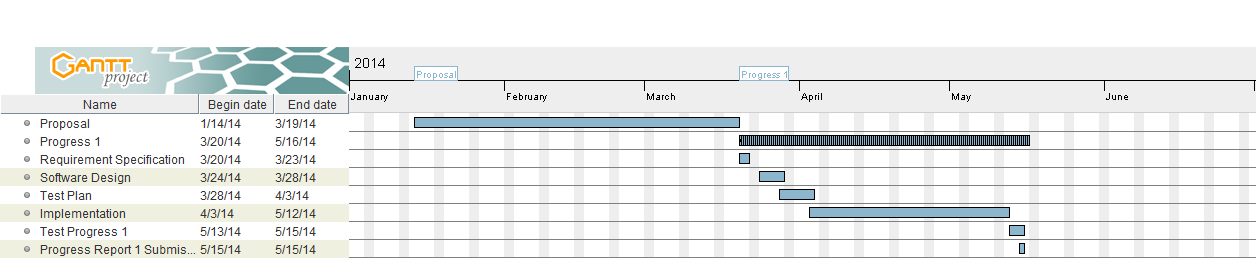


Figure 7: Milestone of Proposal and Progress 1

As a figure 7 the proposal stage starts around January until middle of March. Progress 1 start around middle March until middle May

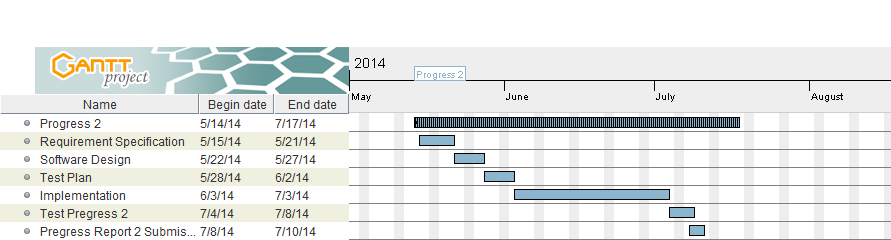


Figure 8: Milestone of Progress 2

As a figure 8 progress start around middle May until middle July.

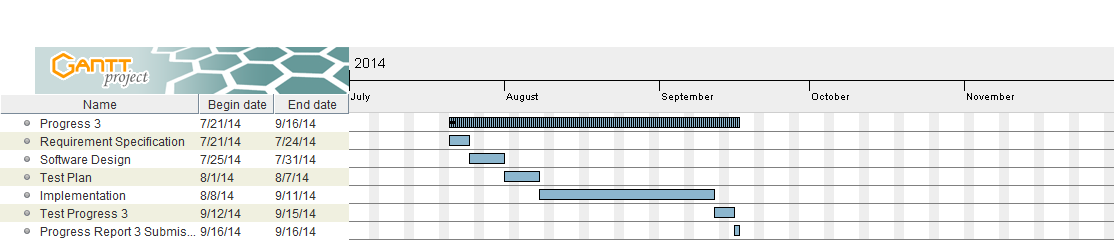


Figure 9: Milestone of Progress 3

As a figure 8 progress start around middle August until middle September.

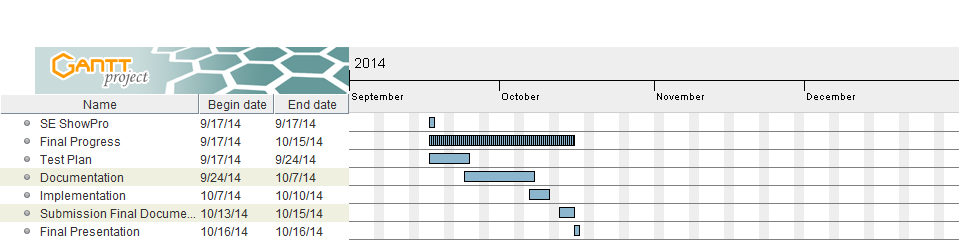


Figure 10: Milestone of SE ShowPro and Final Progress

As a figure 10 SE ShowPro is around middle September. Final progress is around middle September until middle November.

**Chapter five : References**

[1] <http://searchengineland.com/what-is-a-qr-code-and-why-do-you-need-one-27588>

[2] http://www.quora.com/What-is-the-best-QR-decoder-library-for-the-iPhone

[3] <http://phonegap.com/about/features>

[4] <http://dev.mysql.com/doc/refman/4.1/en/what-is-mysql.html>

[5] http://[sqlite.org/‎](http://www.sqlite.org/famous.html)

[6] <http://www.atimedesign.com/webdesign/%E0%B8%A7%E0%B8%87%E0%B8%81%E0%B8%B2%E0%B8%A3%E0%B8%AA%E0%B8%A1%E0%B8%B2%E0%B8%A3%E0%B9%8C%E0%B8%97%E0%B9%82%E0%B8%9F%E0%B8%99%E0%B9%84%E0%B8%97%E0%B8%A2%E0%B8%81%E0%B8%B1%E0%B8%9A%E0%B9%80%E0%B8%A7/>

[7] <http://thumbsup.in.th/2013/04/increase-mobile-users-push-web-responsive-design/>