ADaMaS (Apelo Database Management System)

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SNTSDEV

By

|  |  |
| --- | --- |
| Dahinao, Earl Eufimeah | De Vera, Alfonzo Louise |
| Meltran, Patricia Anne | Pedrola, Janssen |
| Regalado, Guiler Marion |  |

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# Abstract

This paper contains the initial plan for the project development of Apelo Dental Clinic’s database management system for patients’ information. This contains initial analysis for the requirements, SWOT analysis for the clinic’s internal and external factors, processes from the current and proposed system, feasibility, and the current progress that the team have made so far.

Keyword : clinic database management system

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# Introduction

A pleasant smile is one of a person's most valuable qualities. It makes a significant impact as it is the first thing people notice. Most people's hearts are captivated by that of the unspoken language. To acquire and maintain one such smile, proper oral health is required. This should not be overlooked or ignored because it is the gateway towards the body's general wellness. Hence, effective dental hygiene is essential for maintaining a healthy grin.

Dentists are companions in dental health. Professionals have the training and license to work in dentistry facilities, hospitals, and medical clinics. They are acknowledged to conduct a thorough oral assessment of the patient and to formulate treatment options based on the results. Moreover, a dentist's primary responsibility is to provide high - quality patient care.

Most dental clinics are still associated with manual processes to manage their businesses, such as putting all their records in a desk drawer. Whenever it comes to maintaining and updating records, there is a lot of room for error. Keeping track of a dentist's performance and business is also difficult.

The researchers are challenged to develop a database management application for Apelo Dental Clinic since this clinic has no existing computerized system. This system will help to store patient information/records, medical history, mode of payment and other patient data. Database application will help them focus on the areas where they need to focus, saving time, and effort.)

## Project Context

The researchers have chosen Dr. Denroe Apelo of Apelo Dental Clinic as their client. It is located at Dr Arcadio Santos Ave, Parañaque City. The researchers chose this client since one of the researchers had been a patient and experienced the service firsthand and the current filing system was a bit outdated since the dental clinic used physical cards, however, upon talking to Dr. Denroe face to face, the researchers had agreed to create a system for the dental clinic that would hold the patient files like X-rays, tooth records, payment records, and other miscellaneous records.

## Statement of the Problem

The patient information is stored in an index card that is placed in a box, while patient’s files like radiographs and images are also placed in a separated box or storage which causes slow retrieval of information needed and sometimes the files get lost.

Hence, doctors consume longer time in making diagnosis because of delayed medical information from the patient, or less accurate diagnosis because of the lost records.

## Objectives

The main objective of this project is to develop a database management application for Apelo Dental Clinic so that patient information will not get lost and can be accessed quickly. This application should be available in PC and tablet where doctors in the operating room will have the tablet instead of accessing information via index card and other hard copy documents. Thus, the team must develop the following features:

* Develop a prototype for PC and tablet.
* Search bar for retrieval of patient records.
* Page for uploading information for new patient.
* Interactive teeth-numbering model system where doctors can check for a specific problem on a certain tooth.
* Page for payment information section

## Significance of the Project

## Apelo Dental Clinic's patients and employees will benefit from the project. This will make it easier to locate each individual patient in the clinic.

## Employees - Employees at Apelo Dental Clinic will directly benefit from this project because they will be the one to use the system once it is implemented. The project will also reduce their time spent on data administration, processing, and maintenance, allowing them to focus on their work and respond to any issues that arise.

## Patients - Once the project is completed, the clinic's patients will profit. Their data at the clinic will never be lost again, unlike the prior data management system, which had a high risk of losing patient data on paper.

## Future Developer - This project will assist future developers since it may be used as a reference for any similar or related projects.

## Scope and Limitations

This study aims to create an application that would assist the Apelo dental clinic in providing better services to its patients. This research looks at application elements including database administration for storing data and payment processing. The researchers will also provide a way for staff and doctors to log in. As well as the researchers will create tablet-based applications. The researchers will simply develop the application, not transfer existing patient data from the clinic's current data storage system, which is an index card. In addition, only doctors and staff have access to the app

# Review of Related Literature / Systems

This chapter will discuss the related studies and systems develop for dental clinic and other health care facilities.

Dental clinics around the Philippines are coping up with the technology to provide better services to their patients, however, most of the improvement are just limited to having the reach of dental clinic through social media like booking an appointment and having general inquiry. Storing of patient information in manual file system are still largely adapted by most dental clinics, hence, several problems such as loss patient data, redundant and slow retrieval of data happens that even branch to other problems [1]. Computerization in healthcare facility such as dental clinics provides electronic patient records which consists of basic information, data related to allergies, medical history, and other dental procedures with graphical representation of teeth model where pathological processes on each tooth are stored that can help doctors to have better diagnosis and prognosis [2].

**Being a front-line dentist during the Covid-19 pandemic**

Being a dentist is already hard enough since you are making direct contact with a client amidst the pandemic, what’s worse is that the coronavirus could possibly spread to you even with proper precautions as it affects your respiratory system mainly. It is not easy being a dentist during a pandemic as it is also considered to be a front-line job since teeth health is important for everyone and with the tools a dentist uses, various patients from all around the vicinity, and being prepared to take risks even with proper precautions.

Tracing back to the origin of the origin of the coronavirus or once known as nCoV back in Wuhan, China, a worldwide pandemic could have easily been avoided during the early stages of the outbreak, however there had been reports that people have already traveled out of the country for various reasons. At first, doctors thought that it was only a worse case of pneumonia but after discovering that it was highly contagious and causes different severe symptoms to people, it was then declared as a pandemic by the World Health Organization (WHO) on March 2020.

Being a dentist and having to operate on your patient up close and face to face, it would be a huge risk on your health and career if ever you have caught the virus. Of course, you can always wear your own personal protective equipment that would at least minimize the risk of catching the virus. To increase your odds, make sure to thoroughly examine and screen your patients ahead of time before operating them face to face. If possible and to set your risk to the minimal, operate only on safe and immediate patients [3].

**Hybrid Appointment System**

Consultations with family doctors are a critical aspect of health policy. Accessing healthcare services is a difficult undertaking since it is a key barrier to receiving appropriate care and has a negative impact on service quality and the formation of a positive customer relationship. Considering current government policy health advocates' and patients' concerns about long wait times and patients' lack of ability to book appointments prior to seeing doctors, this paper investigated the perspectives of healthcare providers and patients in primary healthcare centers in Dubai on the need to implement a Hybrid Appointment System (HAS), which schedules patients' attendance by doctors based on their preferences, thereby reducing the system's wait time. [4]

Klinika is a user-friendly medical clinic management system that is perfect for healthcare workers who are on the go or who operate from many institutions. Its corresponding app may be downloaded on any mobile device, allowing you to access your medical patient record system from anywhere. Klinika's medical clinic management system software and mobile app allow you to operate across boundaries, across platforms, and across places. Klinika's revolutionary technology offers private practices healthcare record management solutions for improved diagnosis and treatment. [5]

# Methodology

This chapter explains the methodology used to collect and analyze data that is important to the research. The process will include data gathering and planning for the application's development. Appendix B contains the minutes of the meeting with the client and adviser.

**Data Gathering**

The researchers have set aside time and effort to schedule a face-to-face meeting with Apelo Dental Clinic to discuss the project idea. Following the discussion, the researchers and clients agree to create a database application to store patient information and payments. The researchers then examine Apelo Dental Clinic's present data storage to familiarize themselves with their database.

**Plan for Application Development**

The researchers will create the application using the Python programming language. The researchers will use My SQL in phpMyAdmin for the application's database because the capacity of this database is sufficient for the data of Apelo dental clinic's patients. Since the client requested a tablet-based application, the researchers will also do data synchronization from the PC to the tablet through Wi-Fi.

# Results and Discussion

## Current System

### Technical Background

Apelo Dental Clinic still uses physical storage and uses index cards for their patients. Patients queue up starting at 3 am to be given a number that would determine their place in line to be served. A secretary organizes the index card and other files like dental x-ray which she will hand to the doctor when it’s the patients turn in the operating room. Whenever a dentist needs to take pictures or videos, the dentists’ transfer and save it on iCloud.

A picture containing text

Description automatically generated

Figure Apelo Dental Clinic's file system for patient information

### List of Processes

|  |  |  |
| --- | --- | --- |
| Process ID | Process Name | Process Details |
| P001 | Patient number | Patient queues up as early as 3 am to be given a number |
| P002 | Client record | Client creates a new record with secretary or review old records |
| P003 | Dental work | Client is now assigned to a dentist to work on their teeth or other related problems |
| P004 | Payment | Client then pays charges to what they have been treated for |
| P005 | Client record storage | Secretary then stores new data from the client that would later on be reviewed or improved upon. |

Figure 2 List of Current System Processes

### Gap Analysis

#### SWOT Analysis

|  |  |
| --- | --- |
| Strengths | Weaknesses |
| ·        Affordable dental procedures.  ·        There are several doctors inside the operating area for customer treatment efficiency.  ·        Enough seats for the waiting area (around 10-16 capacity) | ·        Number-card-basis on serving customer queue  ·        Long queue of customers due to poor appointment system.  ·        Customer heads as early as 3 am to the dental clinic in order to be first in line  ·        Records of patients’ teeth and x-rays are stored physically in a file cabinet which has a high chance to be lost or destroyed. |
| Opportunities | Threats |
| ·        Owned and managed by a doctor with more than 20 years of experience.  ·        Along the main road of Paranaque for quick access.  ·        Strong word of mouth from clients  ·        Apelo Dental Clinic is standing for 10 years. | ·        Another dental clinic in the vicinity has active social media pages.  ·        Various dental clinics are starting to grow in the vicinity due to proper time management even though they offer a higher price. |

Figure 3 SWOT Analysis for Apelo Dental Clinic

#### Diagram Description automatically generatedFishbone Diagram

Figure Fishbone Diagram for Apelo Dental Clinic

## Proposed Solution

### Technical Background

As of now, Apelo Dental Clinic still uses dental cards and a physical storage system, but with the development of an application that will be used by the dental clinic would be implemented to increase efficiency, minimize risk of data loss, and create physical storage spaces.

The hardware will be developed in code using a computer and a mobile device that will then be tested and used on mobile phones, tablets, and computers. The main functions will be created using various coding languages as well as the design and overall look of the application. For software, the researchers will use Visual Studio Code, Notepad++, Jupyter, GitHub. For the peopleware, the required staff as well as the owner will be taught about the application to avoid errors and confusion. For the network, the researchers would like the files, pictures, videos, and other documents to be transferred via WIFI, Bluetooth, USB, and even downloading through internet storages such as Google Drive and iCloud.

### Feasibility

**Operational feasibility**

Apelo Dental Clinic's (ADC) patient information are stored in the index card that are filed in a box. As the team propose to Doctor Denroe the initial plan to implement a website with the main feature to address the appointment system, he declines to it due to the reason that there's no fix time for each patient's procedure. He rather suggests having a database for patient's information due to several problems that the traditional file system is causing. Hence, the support of the management to the project is certain.

Soon as the clinic will transition from index card file system to computerized, there would be a need for testing and brief training for navigation and how-tos of the system.

The secretary and staff in payment section has the knowledge of using computer programs, while the doctors have no problem in transitioning to tablet-based information retrieval as they all agreed in implementing the application and are using smartphones.

Documentation will also be available to the development of the application so that the future IT who will maintain the program will not have a hard time to make modifications on it.

**Economic Feasibility**

ADC's facility is already equipped with desktop computer, Wi-Fi and printer which are the initial hardware equipment needed for the project. However, the tablets which are the alternative for index card are still needed to be canvas for estimated price, nevertheless, Doc Denroe was already informed about the possible cost as the idea of tablets are suggested by him.

There will be no need for any software subscription for the development of the system as the language for development will be open-source and the database will be RDBMS of phpMyAdmin via XAMPP.

Although the development of the project will not assure to increase the profit of the clinic, customers’ and employees' satisfaction for faster waiting time due to fast retrieval of information and paperless transaction will outweigh the cost of the project development.

**Technical Feasibility**

Tablet is the only hardware that the clinic lacks for the initial assessment of hardware requirements, nonetheless, tablet can be easily purchased today with lower specifications that can support the program to be installed. Since RDBMS is the database needed for the application, the future needs for memory capacity of the program are more likely to be contained in free database software as they offer large memory capacity in terms of clinic-size database.

### Requirements Analysis

#### Product Backlog / User Stories

|  |  |
| --- | --- |
| Users | Story |
| Doctor 1 | “As the doctor, I want to see my patient’s information easily and search them according to their name”. |
| Doctor 2 | “As a doctor, I want to take pictures of the before and after the results of the procedure and upload it on the database”. |
| Doctor 3 | “As a doctor, I want to know if my patients were able to pay the bills in the time said”. |
| Doctor 4 | “As a doctor, I want to know the procedure I have to do to my patient’s teeth”. |
| Secretary | “As the secretary, I want to search the information of the patient to see if they have a record in the clinic. I also want to send the patient’s information to the doctors ”. |

Figure 5 User stories

#### User Classes and Characteristics

*Insert a table here with two columns: Roles and Description*

|  |  |
| --- | --- |
| Roles | Description |
| Doctor | This user can upload pictures and see the information of the patients in the database. They can also see if the patient pays the bill in the time said. |
| Secretary | This user will oversee database modifications and will have the ability to Add, Delete, Update, and Edit existing entries in the Content Manager. This user should be familiar with how the system operates or, even better, have prior understanding of how database systems function. |

Figure 6 Roles and Description

#### Release Plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 3rd week of June 2022 | 2nd week of August 2022 | 3rd week of August 2022 | 4th week …… | 1st week of March 2023 |
| Release of prototype for application program. | Start of Application development | Continuous delivery of MVP (Minimum Viable Product) | Client, Adviser and Consultant Meeting. Product modifications | Release of Final Web Application in SCSPROJ. |

Figure 7 Release plan for Application

# Conclusion

The group had their 1st meeting with their client where initial plan and the features are discussed. There will still be ongoing requirement analysis for the hardware, software, network, and other important components for the development of the project. At the end of this paper, prototype for the application in PC and tablet are aimed to be achieved.

# References

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## Appendix A: Teams Meetings

1st Meeting with the client:

A group of people wearing masks

Description automatically generated with medium confidence

Figure 1st Meeting with the Client

Minutes:

* Implementation of database management application for patient’s information instead of web development for appointment system.
* Using tablets in-place of index card.
* Schedule and frequency of meeting with the development team and the client.
* Some business processes.
* General overview for timeframe from release of prototype, product development and full implementation of the software to be developed.