A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDAGDAG TOOTH CARE CLINIC

A Capstone Project Presented to the

Faculty of the Institute of Computing

Davao del Norte State College

New Visayas, Panabo City

Razer A. Jr. Caluban

Richard P. Canja

Jake Deon C. Cerna

June 2022

ABSTRACT

This paper proposes a design of Web-based Dental Management system for Idagdag Tooth Care Clinic with SMS notification and Decision Support System. This design will facilitate booking appointments, storing records, and decision support for detecting tooth disease, as well as accessibility to a variety of users, including patients, dentists, and staff. In addition, the researchers used Waterfall Software Development Life Cycle (SDLC) model to portray the project development, which consist of the following five phases: initiation, planning, execution, control, and closeout. Testing is done by using prototype modelling and user experience in order to show the project sponsor how the system worked. The result shows that in the UEQ scales means and variance observe in the 25 sample, it shows positive results. In the attractiveness, pragmatic quality, and hedonic quality it respectively depicts 2.01, 1.96, and 1.79 which >0.08 that means it has positive evaluation. As a result, the project sponsor provided a valuable and agreeable proposal. This project will help every patient, staff, and dentist to easily create access and upload in the web system to avoid missing information and limit miscommunication between the patient and clinic management. The researchers recommend adding a dental chart for keeping track of patient teeth, payroll module for automated employee salaries, and inventory module for monitoring medical stocks. Moreover, this will ensure to enhance the proposed IS to perform more effectively in the dental clinic.

Keywords: Web-based Dental Management System, Waterfall Software Development Life Cycle, Decision Support System, UEQ

DAVAO DEL NORTE STATE COLLEGE
INSTITUTE OF COMPUTING

APPROVAL SHEET

In partial fulfillment of the requirements for the degree Bachelor of Science in Information Systems, this Capstone Project entitled **"A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDAGDAG TOOTH CARE CLINIC"**, prepared by **Jake Deon C. Cerna, Razer A. Caluban Jr., and Richard P. Canja** is hereby recommended for approval and acceptance.

JOVITO P. BOLACOY JR.
Project Adviser
Date Signed: 06/25/22

Approved by the Panel of Examiners

PAMELA GRACE L. DENILA
Panel Chairman
Date Signed: 06/20/22

IAN JAY T. PADIOS, MIT
Panel Member
Date Signed: 06/13/22

JOVANNE C. ALEJANDRINO
Panel Member
Date Signed: 06/20/22

Accepted as partial fulfillment of the requirements for the degree Bachelor of Science in Information Systems.

MARK VAN M. BULADACO, MIT
IC Dean

Address: Davao del Norte State College
Tadeco Road, New Visayas
Panabo City, Davao del Norte 8105

Website: www.dnsc.edu.ph
Email: president@dnsc.edu.ph
Email: www.facebook.com/daynorstatecollege

ACKNOWLEDGEMENT

We would like to offer our genuine gratitude and heartfelt appreciation to the individuals listed below, whose generous assistance and cooperation enabled us for the completion of the project.

To our project sponsor **Mr. Ryan Roy D. Idagdag, DMD,** for their accommodation, especially for allowing us to conduct our capstone project in their company.

To **Mr. Jovito P. Bolacoy Jr.,** our capstone adviser, for his inspiration, professional ideas, and unselfish help his willingness to offer ideas and direction has aided us in improving our endeavor.

To **Ms. Pamela Grace L. Denila**, **Mr. Jovanne C. Alejandrino,** and **Mr. Ian Jay T. Padios, MIT,** our panelist for the suggestion that aided in the improvement of work's quality.

To our family and friends namely: **Mrs. Jacquiline C. Cerna**, **Mrs. Pinky A. Caluban,** and **Mrs. Stephanie P. Canja** who supported us for completion of the project.

To our classmates, for their unwavering support and willingness to share their views and ideas to assist us in finishing our research and, most importantly; to the **Almighty Father**, for his unconditional love for giving us a sense of direction, and provision. Thank you for giving us strength to continue and enough knowledge to finish this project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I
INTRODUCTION

A. Company Overview

Idagdag Tooth Care Clinic began to serve dental services on August 25, 2014 when Dr. Roy D. Idagdag established the clinic. The said dental clinic is one of the Top 10 best clinics in dentist.hypeplace.ph here in Panabo City, based on honest reviews and social media popularity where they have 5.1 over 10 rating. They have been operating for seven years and receive a good reputation for having good services. It is located at 2nd floor, door 8, Dujali building, New Pandan, Panabo City. The dental clinic offers dental services such as General Dentistry, Orthodontics, and Prosthodontics.

Idagdag Tooth Care Clinic makes their patient safe while having surgery. All of the tools are sanitized first to avoid implications. The room is clean inside and outside. Because of Covid-19 Pandemic, they make sure that before entering the establishment, you are sanitized. They put sanitizer and a foot hub in front of the door. The Dental Clinic caters 10 to 15 patients per day. For every patient, it generally takes 20 to 40 minutes for minor surgery and 50 minutes for major surgery.

The Idagdag Tooth Care Clinic is still based on traditional methods for managing processes. They conduct it manually and record patient records in a form of paper-based management. The dental clinic has one staff only and has multiple jobs to do from cleaning, receiving calls, recording patient data, and assisting for surgery. Idagdag tooth care clinic makes sure you are well accommodated and give standard dental service here in Panabo City.

Mission

The clinic's mission is to exceed patients' expectations by providing great dental care while also creating trusting relationships with them. Thus, they are

enthusiastic about what they do, and they want their patients to have the assurance that they will receive the best dental care available.

Vision

Their vision is to deliver a dental experience that fosters a lasting relationship based on trust, confidence, high-quality work, and great patient care.

They also aim to break down any barrier that may be standing in the way of a patient's ability to keep a healthy smile. The Idagdag Tooth Care Clinic Team is always looking for innovative ways to break down these barriers so that every single one of their patients may have the smile they deserve.

B. Organization Structure

Organizational structure is a system that defines how certain tasks are directed in order to fulfill an organization's goal. Figure 1 illustrates the current organization structure the first level display the highest position, which is the owner, the second level on the left side display dentist, while on the right side, is the staff. The last level on the right side is the assistant, while on the right side is maintenance. Moreover, the employee divided according to their position.

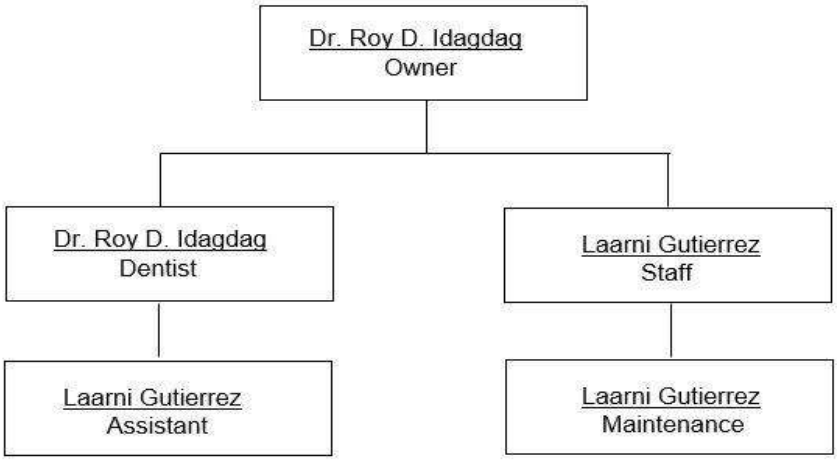


Figure 1. Organizational Structure

C. Problems Encountered

The Idagdag Tooth Care clinic is still in traditional process; it means patients must manually fill out their detailed registration form using the conventional process, and the information only saved in archives. The files will be put in the rack after registration, which will trigger issues such as taking longer to retrieve information, making mistakes when writing, or misplacing the files. Thanks to the growth of the internet, technology has changed many aspects of people's lives, and their everyday lives are becoming increasingly indivisible from the network. In addition, because of Covid-19 Pandemic the process needs to be fast to avoid long exposure outside, especially to the elderly and young children. For these reasons, the proposed system will lessen the time and work forces of both patients and dentist.

The problems encountered by Idagdag Tooth Care Clinic are:

- Paper-based transactions are inefficient and it involves money to buy papers.
- Patient sometime forgot they have schedule on that day.
- Limited space for handling patient records.
- There is inaccurate information and records finding can be time-consuming.

D. Existing Business Process

A business process is a series of linked operations that culminate in the delivery service and product to a customer. A business process is also defined as a collection of actions and tasks that, and when completed, will accomplish an organizational goal.

Figure 2 illustrates the existing process for reserving appointment first the patient need call the dental clinic to have an appointment. The staff will ask the name of the patient, tells what the dental clinic offers then asking the chief complaint of the patient, and lastly set an appointment schedule.

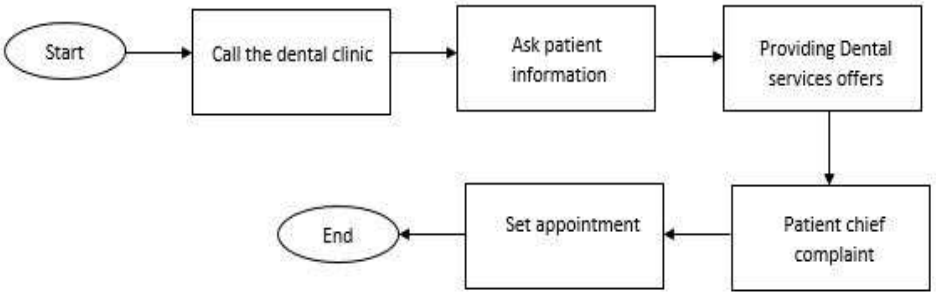


Figure 2. Reserving Appointment

Figure 3 illustrates the filling up patient information in the front desk area. The staff give dental card to the patient and fill the card for all information needed.

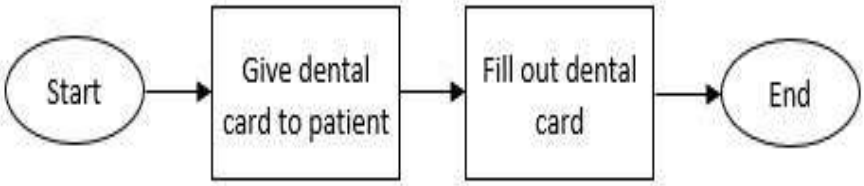


Figure 3. Filling up Patient Information

Figure 4 illustrates the payment process in the dental clinic. First, the patient must present the dental card in the staff to calculate the services been made so that the patient knows the total billing and lastly, record the transaction been made.

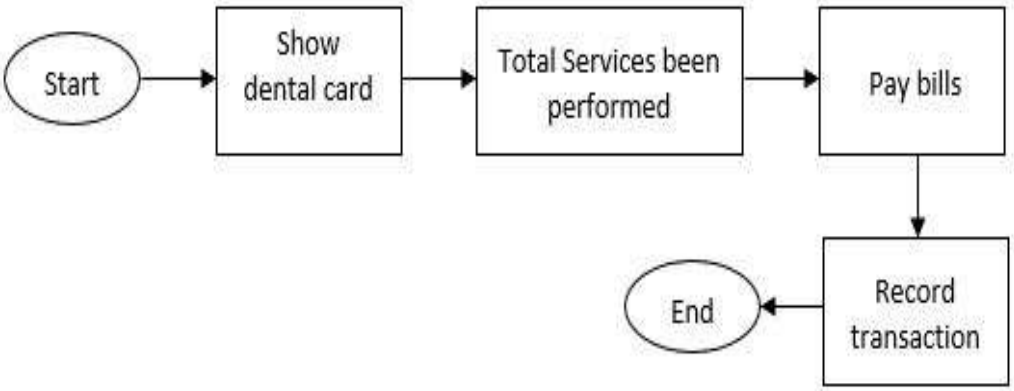


Figure 4. Payment

Figure 5 illustrates oral check-up of the dentist to the patient. First, the patient will present the dental card to the dentist to know what the complaints are. Then, an oral examination will take place. The patient will be asked some questions and have their oral conditions checked for further investigation. Lastly, the dentist will conclude what type of oral medication or treatment the patient will need.

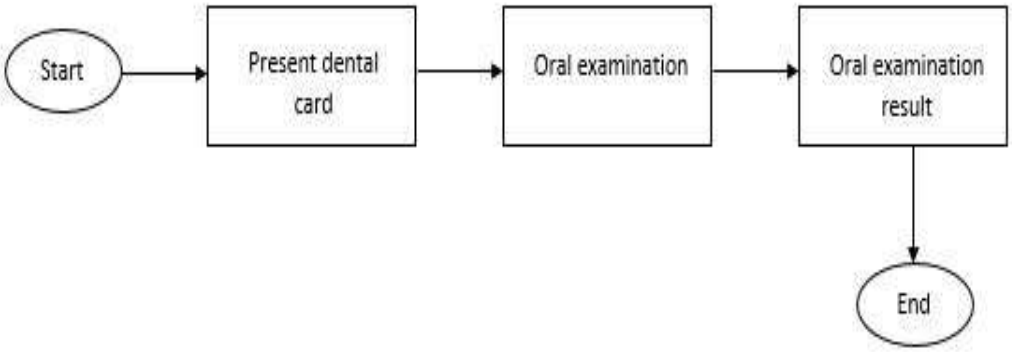


Figure 5. Oral Check-up

Figure 6 illustrates the Tooth Extraction process. First, the staff will check if the patient has an appointment. Second, the patient needs to fill-up necessary information in the form. Third, the patient gives the dental form to the dentist to see all the information. Fourth, the patient will receive an oral check if it is safe to proceed or not. Lastly, extraction of the tooth will take place.

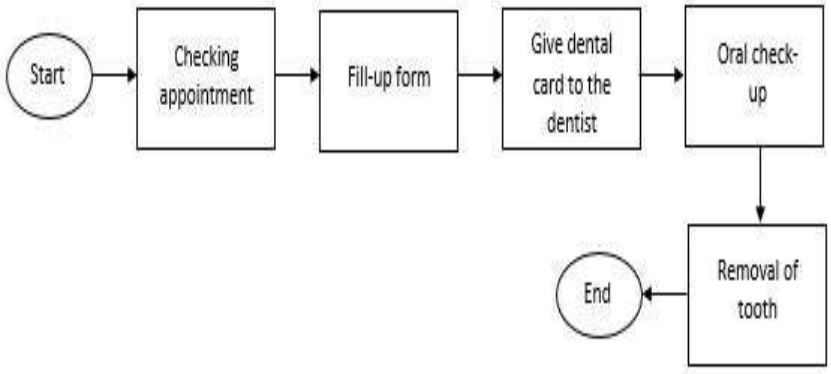


Figure 6. Tooth Extraction

Figure 7 illustrates the process of tooth cleaning. First, the staff will check if the patient has an appointment. Second, the patient needs to fill-up necessary information in the form. Third, the patient will give the dental form to the dentist to see all the information. Fourth, he/she will have an oral check to see if it is safe to proceed or not. Lastly, the cleaning of the tooth will take place.

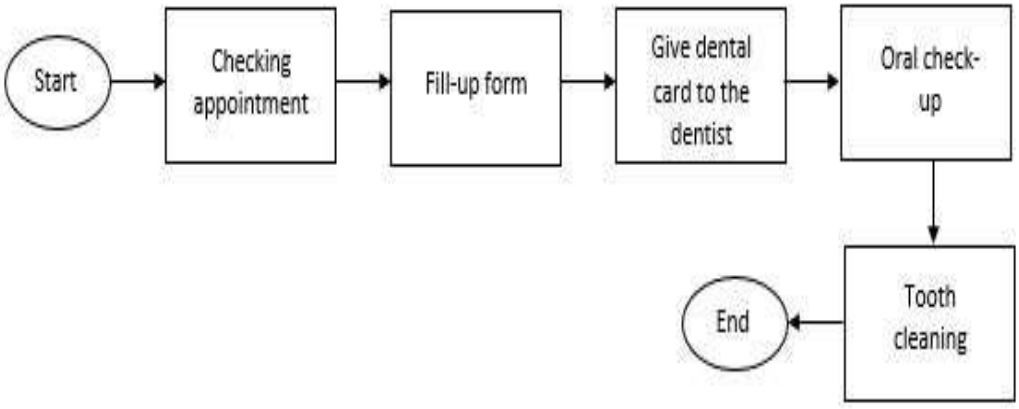


Figure 7. Tooth Cleaning

Figure 8 illustrates the implant process. First, the patient must make an appointment. Second, the patient needs to fill-up necessary information in the form. Third, the patient will give the dental form to the dentist to see all the information. Fourth, he/she will receive an oral check to know if it is safe to proceed or not. Lastly, the tooth implant will be conducted.

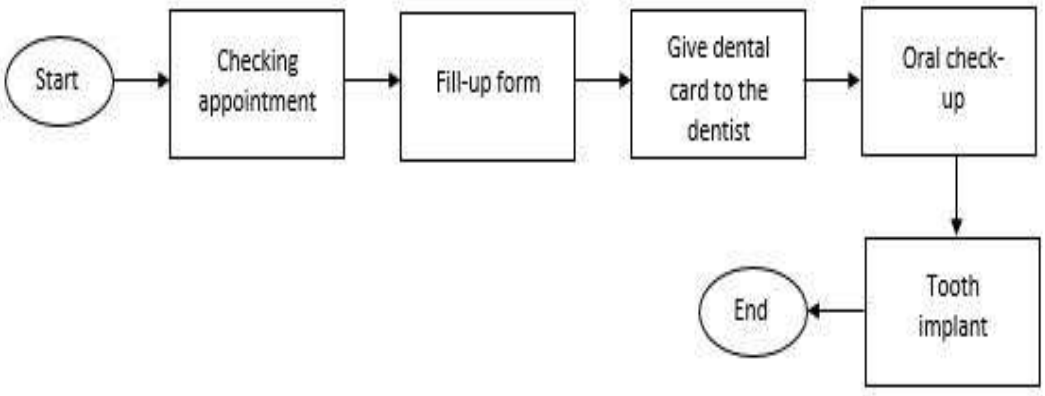


Figure 8. Implants

Figure 9 illustrates the Orthodontics process. First, the staff will check if the patient has an appointment. Second, the patient need to fill-up necessary information in the form. Third, the patient will give the dental form to the dentist to see all the information. Fourth, the patient will have an oral check to assess if it is safe to proceed or not. Lastly, the attaching braces will happen.

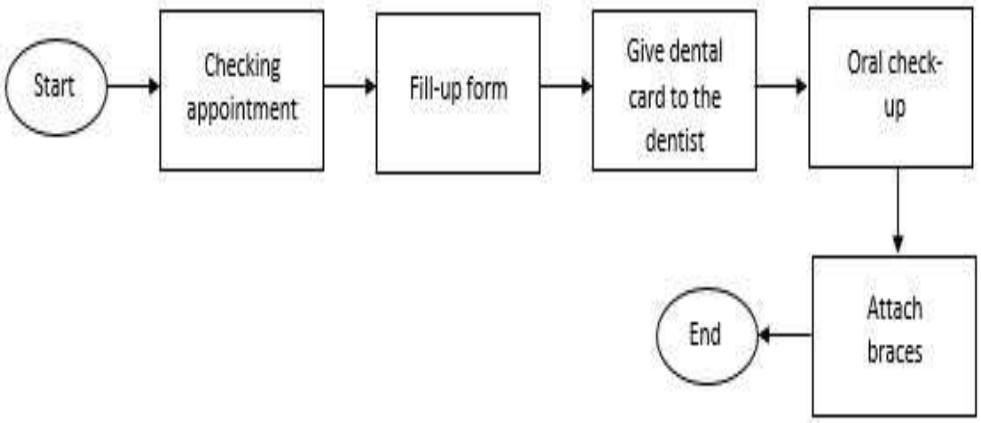


Figure 9. Orthodontics

Figure 10 illustrates the dentures process. First, the staff will check if the patient has an appointment. Second, the patient needs to fill-up necessary information in the form. Third, the patient will give the dental form to the dentist to see all the information. Fourth, after having an oral check, the dentist will decide if it is safe to proceed or not. Lastly, attachment for dentures will begin.

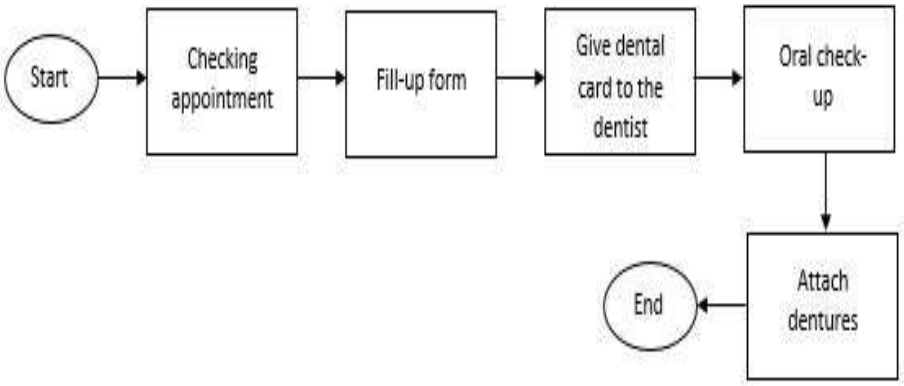


Figure 10. Dentures

E. Objectives of the Project

The main objectives of this project to create a Dental Information Management System with SMS Notification and Decision Support System for Idagdag Tooth Care Clinic.

Specific Objectives:

The project specifically aimed to:

1. Provide login and register page for patient, dental staff, and dentist.
2. Patient can view:
    2.1. Basic information.
    2.2. Appointments.
    2.3. Payments history.
3. Patient can manage to:
    3.1. Create appointments.
    3.2. Cancel appointments.
4. Dental staff can view:
    4.1. Number of patients and dentist appointments.
    4.2. Patient and dentist basic information.
    4.3. Patient and dentist appointments.
5. Dental staff can manage to:
    5.1. Cancel patient and dentist appointments.
    5.2. Edit patient and dentist basic information.
    5.3. Manipulate SMS settings notification.
6. Dentist can view:

6.1. Basic information.

6.2. Patient basic information.

6.3. Patient appointment.

6.4. Number of appointments.

7. Dentist can manage to:

7.1. Cancel and reschedule patient's appointments.

7.2. Add and edit patient medical records.

8. Analyze image to detect tooth disease and show results.

9. Generate billing.

10. Generate reports.

F. Scope and Limitations

The scope of this project is to design a Web-based Information Management System with SMS Notification and Decision Support System. This system focuses on keeping patient dental records, online viewing services, online scheduling, notifying them with SMS and Decision Support System. This system also generates reports according to the needs of the dentist and can view the previous and current patient records. Dental Information System with SMS Notification and Decision Support System is a web-based system that enables the staff at Idagdag Tooth Care Clinic to encode dental patient data and specific cases with the clinic.

The System is exclusively for Idagdag Tooth Care Clinic only. The system can cater for online reservation or appointments and for viewing services in the said clinic. Furthermore, the system doesn't cover medical inventory and monitoring. It only serves as an online transaction, web-based information management and notifying with SMS for the Idagdag Tooth Care Clinic.

People

The suggested Web-based Dental Information Management System with SMS Notification and Decision Support System will provide the following advantages.

Staff – increased process efficiency, accuracy, and information accessibility in a shorter period.

Dentist – accommodate more patients because of shorter time processes.

Patients – shorter waiting period for processes.

Data

Patient Medical Records – medical history and patient information from dental clinic staff.

Patient's Billing Information – all patient billing information is stored by the staff.

Dental card – dental card is given by the dentist.

Process

The Web-based Dental Information Management System with SMS Notification and Decision Support System includes the following activities:

1. Recording and retrieval of patient's general information and medical history.

2. Recording of dental diagnosis of patient.

3. Online Scheduling/Booking.

4. Automate the manual task of billing to ensure faster payment.

Technology

The Web-based Dental Information Management System with SMS Notification and Decision Support System using this technology to develop the proposed IS.

Software

MySQL Server – is a database management system that includes querying, networking, and great data structure, as well as the ability to integrate with a variety of platforms. In high demanding production applications, it can reliably and swiftly handle massive databases and it only serves in the proposed IS.

Microsoft Visual Studio- this used to create websites, web application, web services of the proposed IS.

Laravel- is a strong and easy-to-understand open-source PHP framework. Laravel reuses existing components from several frameworks to aid in the development of web applications. The resulting web application is more organized and practical.

Google Chrome- A computer application that displays and navigates across the web. This web browser is only used for organization activities.

G. Related Systems and Works

An increasing number of dental clinics are now using electronic information technologies. Electronic patient records (EPRs) are becoming more frequent as technology improves and becomes more useful. They provide not only excellent quality, but also patient safety [1]. The management system not only allows the clinic to improve patient care, but it also has the potential to increase the organization's profitability. Dentists would be able to increase operational control and thereby streamline processes dramatically [2]. Once a technology can handle a business process, many tasks can be automated, eliminating the need for manual labor. Clinic management system is one of the software programs available on the market that can assist a clinic's business processes [3].

Clinics have been storing data using common office software; however, these apps are subject to data integrity and redundancy loss. Clinics have also been using cell phones to alert patients about forthcoming appointments for quite some time, but there are still gaps when you consider that the majority of the time the notification technique is done by the health center receptionist [4]. When the notification to be displayed is sent via Short Message Service (SMS). Allowable

authority will send SMS from their phone, which will be displayed as a fresh notification on the monitor [5]. Since most people often use mobile phones, most companies use web-based systems that can be incorporated with SMS technology to make users who are familiar with SMS technology more convenient and it is easier to reach the users. It uses a structured communication protocol to exchange short text messages to a fixed line or mobile phone which is known as Simple Message Service Short Message Service Definition [6].

Personal decision support systems, group support systems, executive information systems, online analytical processing systems, data warehousing, and business intelligence are all areas of the information systems discipline that are focused on assisting and improving managerial decision-making [7]. A clinical DSS, on the other hand, is an information system that may provide users with individualized knowledge and information that has been intelligently filtered in order to improve their health and healthcare outcomes. They're not meant to replace a dentist's professional judgment and decision-making; rather, they're meant to help with diagnostic and treatment planning [8].

Also stated, A well-designed DSS is an interactive software-based system that assists decision makers in gathering meaningful information from raw data, documents, personal knowledge, and/or business models in order to identify and solve problems and make decisions [9].

The relevance of utilizing such systems to assist with management choices and business intelligence tools is emphasized [10]. Personal decision support systems, group decision support systems, executive information systems, online analytical processing systems, data warehousing, and corporate intelligence are all examples of decision support systems (DSS). DSS has evolved from a radical movement that revolutionized the way information systems were regarded in business to a mainstream commercial IT movement that all firms participate in throughout the course of its three-decade career. DSS has remained an important sub-field of IS research for many years [11].

Despite the advisory potential of some of these systems, most dental

professionals use some sort of information system and are involved with administrative responsibilities [8]. Its implementation to identify patients who are past due for testing, as well as the outcome of providing a targeted follow-up referral [12]. Clinical decision support systems can aid in the improvement of clinical outcomes as well as the adherence to evidence-based guidelines [8].

The capstone project aims to design an Information management system with SMS notification and Decision support system. In such a system, there is a significant risk of misplacing collected data and data redundancy in the form of paper records. To solve these limitations, a better system must be designed and implemented [13]. The Information Management System, which is made up of a central module and an information management site module, is a comprehensive system for transferring information inside a group [14].

The information details included patient personal information, treatment history, additional notes for the dental health of the patient, and appointment records of the patient by simply needing to insert some unique patient details [15]. Adoption of information technology has resulted in better reliability and accuracy of patient's data due to features and user interface design that ensures lesser errors in entering and reading data [16]. The goal of using notification [17] is to improve the quality of their services by offering patients/communities with relevant, timely, and targeted information by SMS [18].

Furthermore, the primary goal of clinical decision support systems (DSS) is to provide tools to help the clinicians as well as the patients to make better decisions [19]. Clinical decision support systems (CDSS) assist health care professionals (HCP) in reviewing huge volumes of data and making educated judgments in the course of their daily practice. CDSS are becoming increasingly relevant in the context of precision medicine, where healthcare providers must evaluate increasing volumes of data in order to construct precise patient profiles for tailored diagnosis, treatment, and outcome monitoring [20].

The systems also leverage embedded clinical knowledge to assist health professionals in analyzing patient data and making decisions about diagnosis,

prevention, and treatment of health problems, according to the researchers [21].

Also, a data mining technique that the researcher used is K-Nearest Neighbors or (K-NN), The k-Nearest Neighbors algorithm (or k-NN for short) is a nonparametric classification method [22], It frequently produces competitive results and has significant advantages over other data mining methods [23], and makes forecasts based on the outcome of the K nearest neighbors to that point. [24] Its role is to compute the decision boundary implicitly, but it is also possible to compute the decision explicitly [25]. In addition, the KNN algorithm can estimate complex target concepts locally and differently for each new instance to be classified, it has high generalization accuracy across many domains, it also learns quickly, and it is simple to understand [26].

In accordance with this, some dental clinics use this algorithm to determine whether there are pathological signs of dental diseases in the analyzed image [27]. Furthermore, the K-NN classifier is used to extract features. The KNN classification process works by determining the classification based on the value of its closest neighbors [28]. Furthermore, the study of a medical information text classification system realized by combining the KNN algorithm with the Ontology extraction method. They claim that high-precision relationship extraction is possible as long as the established ontology semantic network is perfect [29]. Also, other study proposed PCA and KNN classifier algorithms, feature selection of teeth images for dental color matching system using PCA and KNN algorithm. It has a learning process accuracy of 97.81 percent [30].

An efficient texture-based dental caries diagnostic system is proposed, using a KNN Classifier to differentiate caries and normal images. This system is used for image enhancement, adaptive thresholding, image segmentation, and feature extraction [31].

CHAPTER II
METHODOLOGY

This chapter discusses the methods and techniques that were used in designing and analyzing the capstone project and proposed IS. The purpose of this chapter is to explain all experimental measures and controls. The following are its sections and subsections.

A. Startup and Feasibility

A feasibility study is an important tool for determining if a business is viable. It defines and examines the factors that influence a startup's viability. A feasibility study for lean startups focuses on developing and approving the company idea, product-market fit, and a plan of action for adaptation. Budget and Summary, Operational Feasibility, and Technical Feasibility are all included in the startup and feasibility part.

Budget and Summary of the Capstone Project

A project budget and summary incudes a detailed estimate of all costs that are likely to be acquired before the project is completed. Table 1 depicts the summary of the schedule and budget of the capstone project, which contains the project phase, date started and end date ended, project task, man-days, and estimated cost of each task.

Table 1. Budget and Summary of the Capstone Project

PHASE	DATE STARTED	END DATE	Man-days	END DATE
INITIATION				
Select Project Team	Mar 2,2021	Mar 5,2021	3	₱ 1,000.00
Phase Total			**3**	**₱ 1,000.00**
PLANNING				
Analyzing concept paper	Mar 15,2021	Apr 23,2021	14	₱ 3,200.00
Phase Total			**14**	**₱ 3,200.00**

EXECUTION				
Executing project documentation	May 24,2021	Dec 23, 2021	76	₱ 6,000.00
Phase Total			**76**	**₱ 6,000.00**
CONTROL				
Project changes meeting	Jan 6,2021	Jan 17,2021	8	₱ 2,450.00
Phase Total			**8**	**₱ 2,450.00**
CLOSEOUT				
Presentation of Project to Project sponsor	Feb 21,2021	Feb21,2021	1	₱ 1,500.00
Gathering Requirements for Appendices	Feb 22,2022	Feb 23,2022	1	₱ 500.00
Closing meeting	Feb 24,2022	Feb 24,2022	1	₱ 500.00
Final Defense	Feb 28,2022	Feb 28,2022	1	₱ 1,500.00
Project Presentation	Mar 4,2022	Mar 4,2022	1	₱ 1,000.00
Phase Total			**5**	**₱ 5,000.00**
OVERALL TOTAL			**103**	**₱ 17,650.00**

Budget and Summary of the Proposed IS

A project budget and summary incudes a detailed estimated of all costs that are likely to be acquired before the project is completed. Table 2 depicts the summary of the schedule and budget of the proposed IS which contains the project phase, date started and end date ended, project task, man-days, and estimated cost of each task.

Table 2. Budget and Summary of the Proposed IS

PHASE	DATE STARTED	END DATE	MAN-DAYS	ESTIMATED COST
INITIATION				
Develop Project Charter	Jan 2,2023	Jan 9,2023	6	₱ 7,332.00
Phase Total			**6**	**₱ 7,332.00**

PLANNING				
Perform Primary Planning	Jan 10,2023	Jan 23,2023	10	₱ 12,220.00
Perform Supplementary Planning	Jan 24,2023	Feb 3,2023	9	₱ 10,998.00
Phase Total			**19**	**₱ 23,218.00**
EXECUTE				
Execute System Analysis	Feb 6,2023	Feb 21,2023	12	₱ 12,864
Purchasing Hardware and Software	Feb 22,2023	Feb 23,2023	2	₱ 2,144.00
Execute System Design	Feb 24,2023	Mar 23,2023	20	₱ 19,880.00
Implement System Coding	Apr 24,2023	Jun 15,2023	60	₱ 96,960.00
Test the Usability of the Web System	Jun 16,2023	Jun 30,2023	11	₱ 18,784.00
Announce the availability of the Web System	Jul 26,2023	Jul 26,2023	1	₱ 1,784.00
End User Training	Jul 27,2023	Jul 29,2023	3	₱ 8,952.00
Phase Total			**109**	**₱ 161,368.00**
CONTROL				
Manage Communications	Jun 30,2023	Jun 30,2023	1	₱ 1,222.00
Manage Changes	Jul 3,2023	Jul 5,2023	3	₱ 3,666.00
Manage Project Risks	Jul 6,2023	Jul 11,2023	4	₱ 4,888.00
Manage Maintenance	Jul 12,2023	Jul 18,2023	5	₱ 6,110.00
Phase Total			**13**	**₱ 15,886.00**

CLOSEOUT				
Confirm Project Completion	Jul 19,2023	Jul 19,2023	1	₱ 1,222.00
Conduct Post-Project Review	Jul 20,2023	Jul 20,2023	1	₱ 1,222.00
Signing Project Closure Documents	Jul 21,2023	Jul 21,2023	1	₱ 1,222.00
Phase Total			**3**	**₱ 3,666.00**
OVERALL TOTAL			**150**	**₱ 211,470.00**

Operational Feasibility of the Proposed IS

The operational feasibility was examined in this section. The suggested system design has no implications for the organization's present administration, and it does not necessitate the addition or elimination of personnel. It also does not necessitate changing a company's existing system. The suggested system architecture, on the other hand, does automate the present one, removing certain tedious manual procedures and connecting other helpful new functionalities to support customer service and decrease time-consuming activities. The commitment of an organization to operational feasibility is assessed and accepts the system as presented. This is perhaps the most difficult of the bunch. In order to determine the viability of the proposed project, it is important to examine its support. If management approves the request, the system is likely to be implemented and used. Fortunately, the proprietor of Idagdag Tooth Care Clinic has committed to the project and has shown his support. Table 3 depicts the operational requirements of the project, to design the proposed IS.

Table 3. Operational Feasibility

Role	Description	Daily Rate	Duration	Estimated Salary
Project Manager	Responsible for all project administration. The Project Manager manages all work, varying, traceability, reporting, communication, performance assessments, staffing and internal coordination with functional managers.	₱ 1,222.00	41	₱ 50,102.00
System Analyst	Responsible for data and analysis that assist project management in timing and budgeting projects. The analyst's information assists in evaluating and prioritizing new projects, assures smooth delivery and promotes objective project review.	₱ 1,072.00	14	₱ 15,008.00
System Designer	Responsible for creating a detailed blueprint and instructions those	₱ 994.00	20	₱ 19,880.00

	programmers can follow. The Requirements Specification, which was created by the System / Business Analyst, is the most important input document that the System Designer will employ.			
Web Developer	Programmer who specialized in or works on the creation of client-server World Wide Web applications.	₱ 1,616.00	65	₱ 105,040.00
Testing Specialist	The tester is in charge of inspecting the software created by the developers. They find and report bugs so that users may use programs without difficulty after they are released.	₱ 1,784.00	10	₱ 17,840.00

Technical Feasibility of the Proposed IS

Risk resources and technologies are included in the technical feasibility. For the successful execution of the projects, the management supplies the most up-to-date hardware and software. The project will be completed with the most up-to-

date technology and software. The system will run incredibly well with this latest hardware and software support.

Table 4 depicts the hardware needed for the proposed IS consisting of hardware, description, specification, monthly cost, duration, and estimated cost.

Table 4. Hardware

Hardware	Description	Specification	Monthly Cost	Duration	Estimated Cost
Computer unit	Storing and processing data.	**CPU**: Intel Core i5 **Operating System**: Microsoft Windows 10 Professional x64 **Memory**: 16 GB RAM **Storage**: 1 TB HDD **Graphics:** 2GB **Monitor**: 24" LCD Monitor Mouse/Keyboard: Genius	-	-	₱ 37,500.00
Printer	Printing receipts and dental card.	Laser Printer (Kyocera) **Max Print Resolution:** 600dpi **Printer features:** Auto Duplex Printing **Print speed:** 21ppm	-	-	₱ 9,000.00
Internet	Internet is a worldwide network that connects computer. People can share information and converse via the internet from	25MBPS (PLDT	₱ 1,699.00	3	₱ 5,097.00

	any location with an internet connection.				
Total Cost					**₱ 51,597.00**

Table 5 depicts the software needed for the proposed IS consisting of software, description, specification, monthly cost, duration, and estimated cost.

Table 5. Software

Software	Description	Specification	Monthly cost	Duration	Estimated cost
Web development tool	Developer allows creating, testing and debugging using this program.	Microsoft Visual Professional	₱ 1,240.00	2	₱ 2,480.00
Web framework	Provide a standardize method for developing and deploying web application on the internet.	Laravel	₱ 0.00	-	₱ 0.00
Webhosting	Online service that allows you to put website or web application on the internet.	**GoDaddy Ultimate** **CPU Memory:** 2 CPUs 1.5 GB **Max. files amount:** 250,00 **Bandwidth:** Unmetered **Storage:** 100GB	₱ 677.00	60	₱ 40,620.00

Data Management System	Software system that employs a standardized way for cataloging, accessing, and querying data. The DBMS organizes and manages incoming data and allows users and other programs to modify and extract it.	MySQL server	₱ 0.00	-	₱ 0.00
Browser	A computer application that displays and navigates across web pages using a graphical user interface.	Google Chrome	₱ 0.00	-	₱ 0.00
SMS API	Short Message Service, or Texting, is an acronym for Short Message Service. It's a technique to transmit text-only message between phones that can be up to 160 characters long.	iTextmo Bronze **Outgoing Sending Rate per minute:** 10-15 **Max Characters per SMS:** 300 **Max Message per day**: 250	₱ 299.00	3	₱ 897.00
Total Cost					**₱ 43,997.00**

B. Work Plan and Schedule Feasibility

A work plan is a written document that is used to keep a project on track. The purpose is to make a visual representation of the goal, objectives, responsibilities, and team member in charge of each section. Every member of your team should be included in the plan, and progress and status updated on a regular basis. The degree to which a deadline for a strategy, plan, project, or process is practical and feasible known as schedule feasibility.

This section discusses the Project Milestones and Deliverables, Work Breakdown Structure, WBS Dictionary, and Gantt chart.

B1. Capstone Project

This part of the document consists of Project Milestone and deliverables, WBS, Gantt chart, Project organization, and RACI chart discussed below that only focuses on capstone project documentation.

Project Milestones and Deliverables

During project planning, the project team establishes milestones in order to determine which project tasks should be completed. Each phase of the capstone project consists of milestones, deliverables, and dates that are shown in Table 6.

Table 6. Project Milestone and Deliverables

Project Phase	Milestones	Deliverables	Date
Initiation	Successfully create project team members.	The project team started to appoint roles, responsibility, and selecting other personnel.	Mar 25,2021
Planning	Approve proposed title.	The project team analyzed and planned the proposed title.	Apr 23,2021
Execution	Approve outline defense.	The project team executing documentations and gathering data.	Jul 1,2021
Control	Approve pre-final defense.	The project team is documenting chapter 3 and 4 and doing some polishing.	Jan 17,2022

Closeout	Presenting to the project owner.	The project team presents the project to the project owner.	Mar 4,2022
	Approve the final defense.	The project team has some revision to the documentation.	
	Public presentation	The project team does some refinishing of the documents and closes the project.	

Work Breakdown Structure of the Capstone Project

Work Breakdown Structure (WBS) a typical productivity tip for making work more manageable and approachable is to break it down into smaller task. The Work Breakdown Structure, which is one of the most essential project management papers, is the tool that employs this technique for projects. Figure 11 displays Work Breakdown Structure (WBS) of the capstone project, which indicates task made by the project team. There are five phases in WBS, which are the Initiation, Planning, Execution, Control, and Closeout. Each phase has its own task and subtask that will be performed by the project team.

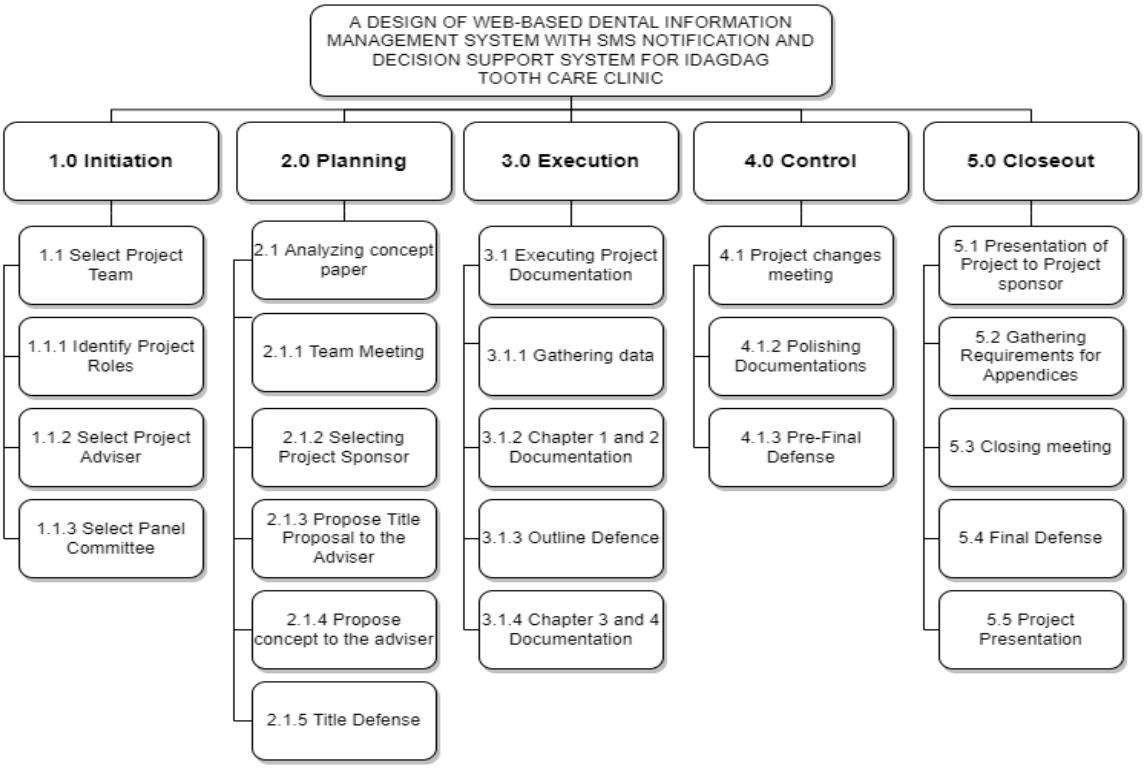


Figure 11. WBS Structure of the Capstone Project

WBS Dictionary of the Capstone Project

WBS dictionary is a document that contains specific information about each component of the work breakdown structure in the terms of deliverables, activities, and schedule. Table 7 shows the outline work of the Capstone Project in terms of deliverables and process phases that are appropriate for the organization and/or project; it also serves as a foundation for determining all steps/task, effort, cost, and accountability.

Table 7. WBS Dictionary of the Capstone Project

Task ID	Task Name	Task Owner	Start Date	End Date	Man-days	Estimated Cost
1.0	**INITIATION**					
1.1	**Select Project Team**					
1.1.1	Identify project roles	Jake Deon C. Cerna,	Mar 2,2021	Mar 2,2021	1	₱ 500.00

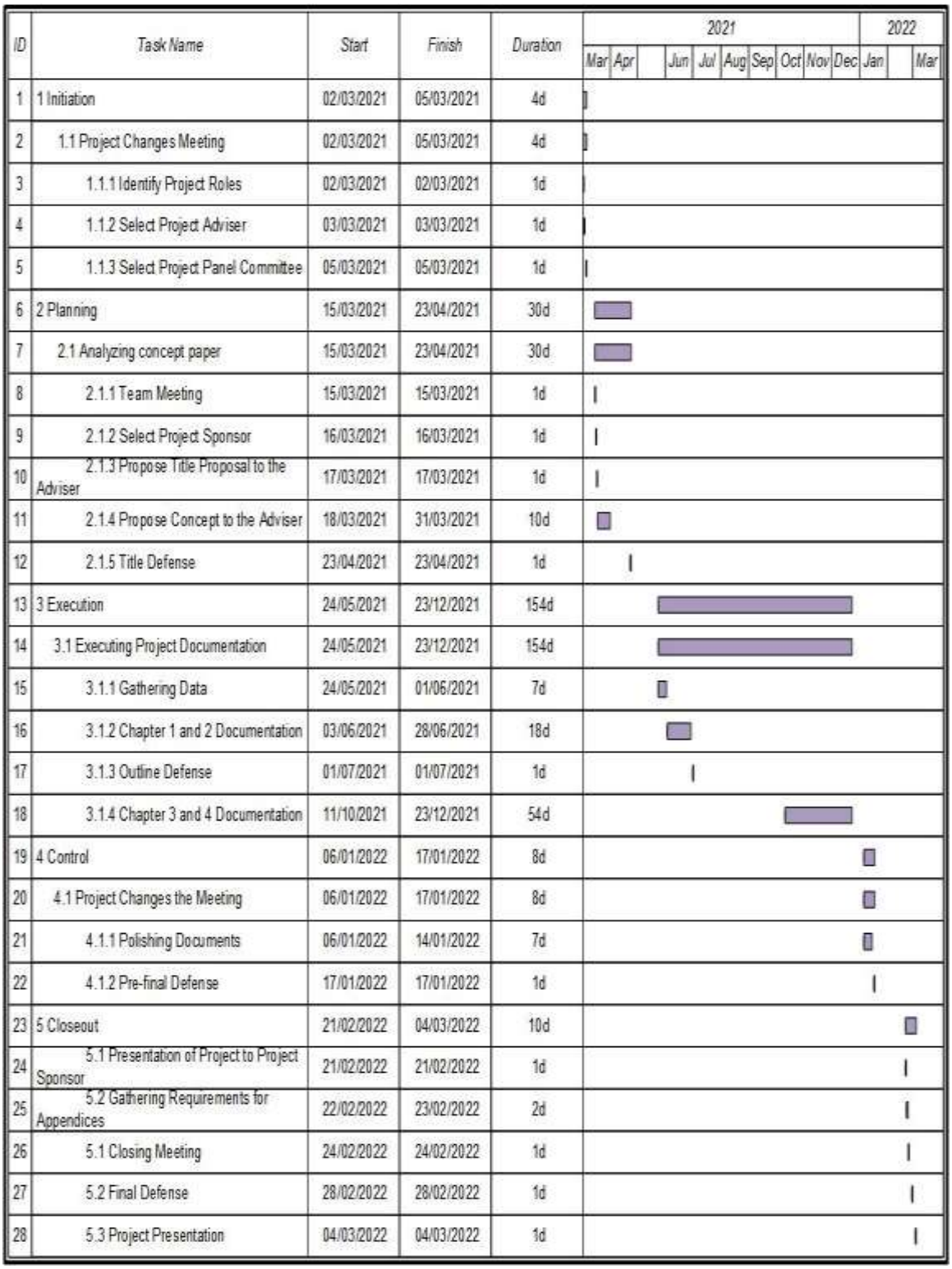
1.1.2	Select project adviser	Jake Deon C. Cerna,	Mar 3,2021	Mar 3,2021	1	₱ 0.00
1.1.3	Select project panel committee	Jake Deon C. Cerna,	Mar 5,2021	Mar 5,2021	1	₱ 500.00
2.0	**PLANNING**					
2.1	**Analyzing concept paper**					
2.1.1	Team meeting	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Mar 15,2021	Mar 15,2021	1	₱ 500.00
2.1.2	Select project sponsor	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Mar 16,2021	Mar 16,2021	1	₱ 200.00
2.1.3	Propose title proposal to the adviser	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Mar 17,2021	Mar 17,2021	1	₱ 200.00
2.1.4	Propose concept to the adviser	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Mar 18,2021	Mar 31,2021	10	₱ 300.00
2.1.5	Title defense	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Apr 23,2021	Apr 23,2021	1	₱ 2,000.00
3.0	**EXECUTION**					
3.1	**Executing project documentation**					
3.1.1	Gathering data	Jake Deon C.	May 24,2021	Jun 1,2021	7	₱ 500.00

		Cerna, Razer A. Caluban, Richard P. Canja				
3.1.2	Chapter 1 and 2 documentation	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Jun 3,2021	Jun 28,2021	18	₱ 1,000.00
3.1.3	Outline defense	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Jul 1,2021	Jul 1,2021	1	₱ 2,000.00
3.1.4	Chapter 3 and 4 documentation	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Oct 11,2021	Dec 23, 2021	54	₱ 2,500.00
4.0	**CONTROL**					
4.1	**Project changes meeting**					
4.1.2	Polishing documentations	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Jan 6,2022	Jan 14,2022	7	₱ 450.00
4.1.3	Pre-final defense	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Jan 17,2022	Jan 17,2022	1	₱ 2,000.00
5.0	**CLOSE OUT**					
5.1	**Presentation of Project-to-Project sponsor**	Jake Deon C. Cerna, Razer A. Caluban,	Feb 21,2022	Feb 21,2022	1	₱ 1,500.00

		Richard P. Canja				
5.2	**Gathering Requirements for Appendices**	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Feb 22,2022	Feb 23,2022	2	₱ 500.00
5.3	**Closing meeting**	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Feb 24,2022	Feb 24,2022	1	₱ 500.00
5.4	**Final Defense**	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Feb 28,2022	Feb 28,2022	1	₱ 1,500.00
5.5	**Project Presentation**	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja	Mar 4,2022	Mar 4,2022	1	₱ 1,000.00
Overall Total					**105**	**₱ 17,650.00**

Gantt chart of the Capstone Project

Gantt chart are diagram that show the progress of the project. When a project is broken down into smaller, more manageable chunks, more becomes more doable. Figure 12 displays the task name, start and end dates of various project parts, and durations of each task and subtasks. It does not include weekends and holidays; it serves resting days for the project team.



ID	Task Name	Start	Finish	Duration
1	1 Initiation	02/03/2021	05/03/2021	4d
2	1.1 Project Changes Meeting	02/03/2021	05/03/2021	4d
3	1.1.1 Identify Project Roles	02/03/2021	02/03/2021	1d
4	1.1.2 Select Project Adviser	03/03/2021	03/03/2021	1d
5	1.1.3 Select Project Panel Committee	05/03/2021	05/03/2021	1d
6	2 Planning	15/03/2021	23/04/2021	30d
7	2.1 Analyzing concept paper	15/03/2021	23/04/2021	30d
8	2.1.1 Team Meeting	15/03/2021	15/03/2021	1d
9	2.1.2 Select Project Sponsor	16/03/2021	16/03/2021	1d
10	2.1.3 Propose Title Proposal to the Adviser	17/03/2021	17/03/2021	1d
11	2.1.4 Propose Concept to the Adviser	18/03/2021	31/03/2021	10d
12	2.1.5 Title Defense	23/04/2021	23/04/2021	1d
13	3 Execution	24/05/2021	23/12/2021	154d
14	3.1 Executing Project Documentation	24/05/2021	23/12/2021	154d
15	3.1.1 Gathering Data	24/05/2021	01/06/2021	7d
16	3.1.2 Chapter 1 and 2 Documentation	03/06/2021	28/06/2021	18d
17	3.1.3 Outline Defense	01/07/2021	01/07/2021	1d
18	3.1.4 Chapter 3 and 4 Documentation	11/10/2021	23/12/2021	54d
19	4 Control	06/01/2022	17/01/2022	8d
20	4.1 Project Changes the Meeting	06/01/2022	17/01/2022	8d
21	4.1.1 Polishing Documents	06/01/2022	14/01/2022	7d
22	4.1.2 Pre-final Defense	17/01/2022	17/01/2022	1d
23	5 Closeout	21/02/2022	04/03/2022	10d
24	5.1 Presentation of Project to Project Sponsor	21/02/2022	21/02/2022	1d
25	5.2 Gathering Requirements for Appendices	22/02/2022	23/02/2022	2d
26	5.1 Closing Meeting	24/02/2022	24/02/2022	1d
27	5.2 Final Defense	28/02/2022	28/02/2022	1d
28	5.3 Project Presentation	04/03/2022	04/03/2022	1d

Figure 12. Gantt chart of the Capstone Project

Project Organization of the Capstone Project

A project organization chart depicts who is on your project team visually. It describes the organizational structure of the project, the hierarchical relationship between team members, and the job that each person plays. Figure 13 illustrates the structure of the project's organization wherein it displays the IS capstone adviser Prof. Jovito P. Bolacoy Jr., project manager- Jake Deon C. Cerna, system analyst - Razer A. Caluban Jr., and system designer- Richard P. Canja. The people listed below are involved in system implementation and are in charge of system execution.

Figure 13. Capstone Project Organizational Structure

RACI Chart

RACI chart is a matrix that plots all of an organization's activities or decision-making authority against all of its individuals or roles. Table 8 describes the people responsible, accountable, consulted, and informed for each activity or decision at the intersection of activity and role.

Table 8. RACI Table

Legends		
R	Responsible	Assigned to complete the given task
A	Accountable	Has the final decision-making and accountant. Only 1 person per task
C	Consulted	An Adviser, Stakeholder for decision making
I	Informed	Must be informed about the decision and action

Project Deliverables	Project Manager	System Analyst	System Designer	End-Users	Sponsor
Identify project roles	**R**	**A**	**A**	**I**	**I**
Select project adviser	R	**R**	**R**	**I**	**I**
Select project panel committee	**R**	**R**	**R**	**I**	**I**
Team meeting	**R**	**A**	**A**	**I**	**I**
Select project sponsor	**R**	**R**	**R**	**I**	**I**
Propose title proposal to the adviser	**R**	**R**	**R**	**I**	**I**
Propose concept to the adviser	**R**	**R**	**R**	**I**	**I**
Title defense	**R**	**R**	**R**	**I**	**I**
Gathering data	**R**	**A**	**A**	**I**	**I**
Chapter 1 and 2 documentation	**R**	**R**	**R**	**I**	**I**
Outline defense	**R**	**R**	**R**	**I**	**I**
Chapter 3 and 4 documentation	**R**	**R**	**R**	**I**	**I**
Polishing documentations	**R**	**R**	**R**	**I**	**I**
Pre-final defense	**R**	**R**	**R**	**I**	**I**
Presentation of Project-to-Project sponsor	**R**	**R**	**R**	**I**	**I**
Gathering Requirements for Appendices	**R**	**A**	**A**	**A**	**A**
Closing meeting	**R**	**A**	**A**	**A**	**A**
Final Defense	**R**	**R**	**R**	**I**	**I**
Project Presentation	**R**	**R**	**R**	**I**	**I**

B2. Proposed IS

This section of the document consists of work plan and schedule feasibility of the proposed information system, which will be discussed below.

Project Development Methodology

The waterfall model is a traditional model used in the system development life cycle to build a system in a linear and sequential manner. A phase cannot begin until the previous phase has been finished. This method is suitable for the project; it did not involve a lot of budget and the project has a small development period [32]. Figure 14 shows the Waterfall Software Development Life Cycle (SDLC) approach, which consists of five phases, which are, initiation, planning, execution, control, and closeout.

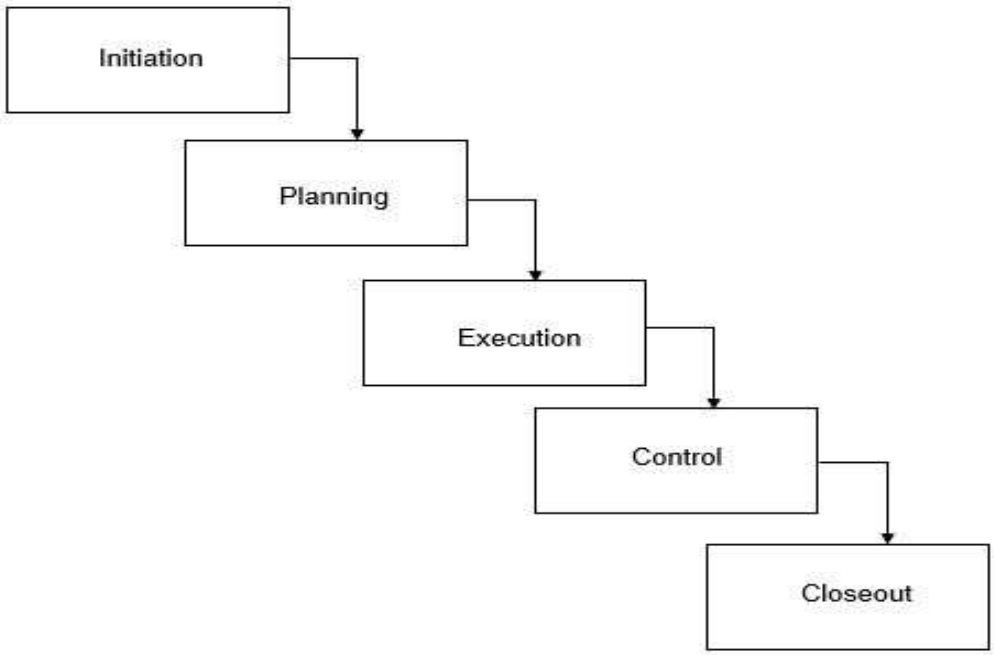


Figure 14. Waterfall Software Development Life Cycle (SDLC)

Integrated and Proposed New Processes

The following figures below show the integrated and new proceseses that the proposed system will offer after its implementation. Figure 15 shows the integrated proposed new processes flow chart for appointment; it shows the main

innovative features of the proposed IS. The proposed IS allows to notify patients for its upcoming schedules via sending SMS and generating bills.

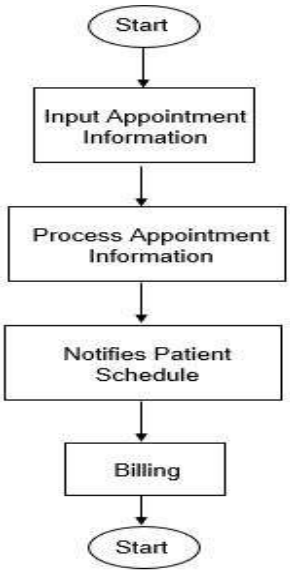


Figure 15. Appointment

Figure 16 shows Dentist to identify what dental illness patients have by collecting image to the affected area and run it through the system. As a result, smart, data-driven automation aids dentist in eliminating human error and significantly increasing the precision of the assessment finding.

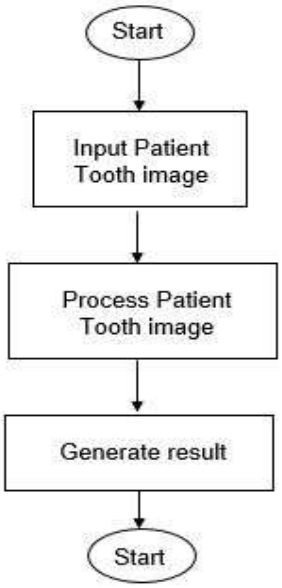


Figure 16. Detecting Tooth Disease

Project Proponents Organization Structure

A project organization chart depicts who is on your project team visually. It describes the organizational structure of the project, the hierarchical relationship between team members, and the job that each person plays. Figure 17 illustrates the structure of the project's proponent's organization wherein it displays project sponsor, which is Dr. Roy D. Idagdag, project manager, system analyst, and system designer the people listed below are involved in system implementation and are in charge of system execution, and the project sponsor of the project.

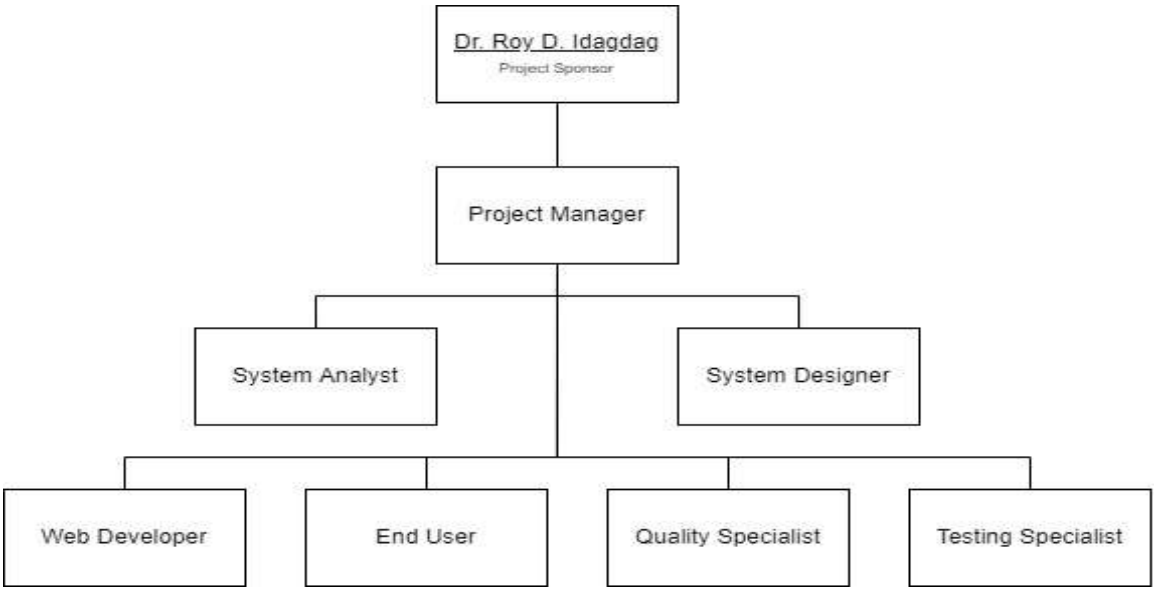


Figure 17. Project Proponents Organization Structure

Work Breakdown Structure for the Proposed IS

Work Breakdown Structure (WBS) a typical productivity tip for making work more manageable and approachable is to break it down into smaller task. The Work Breakdown Structure, which is one of the most essential project management papers, is the tool that employs this technique for projects. Figure 18 displays Work Breakdown Structure (WBS) of the proposed IS, which indicates task made by the project team. There are five phases in WBS, which are the Initiation, Planning, Execution, Control, and Closeout. Each phase has its own task and subtask that will be performed by the project team.

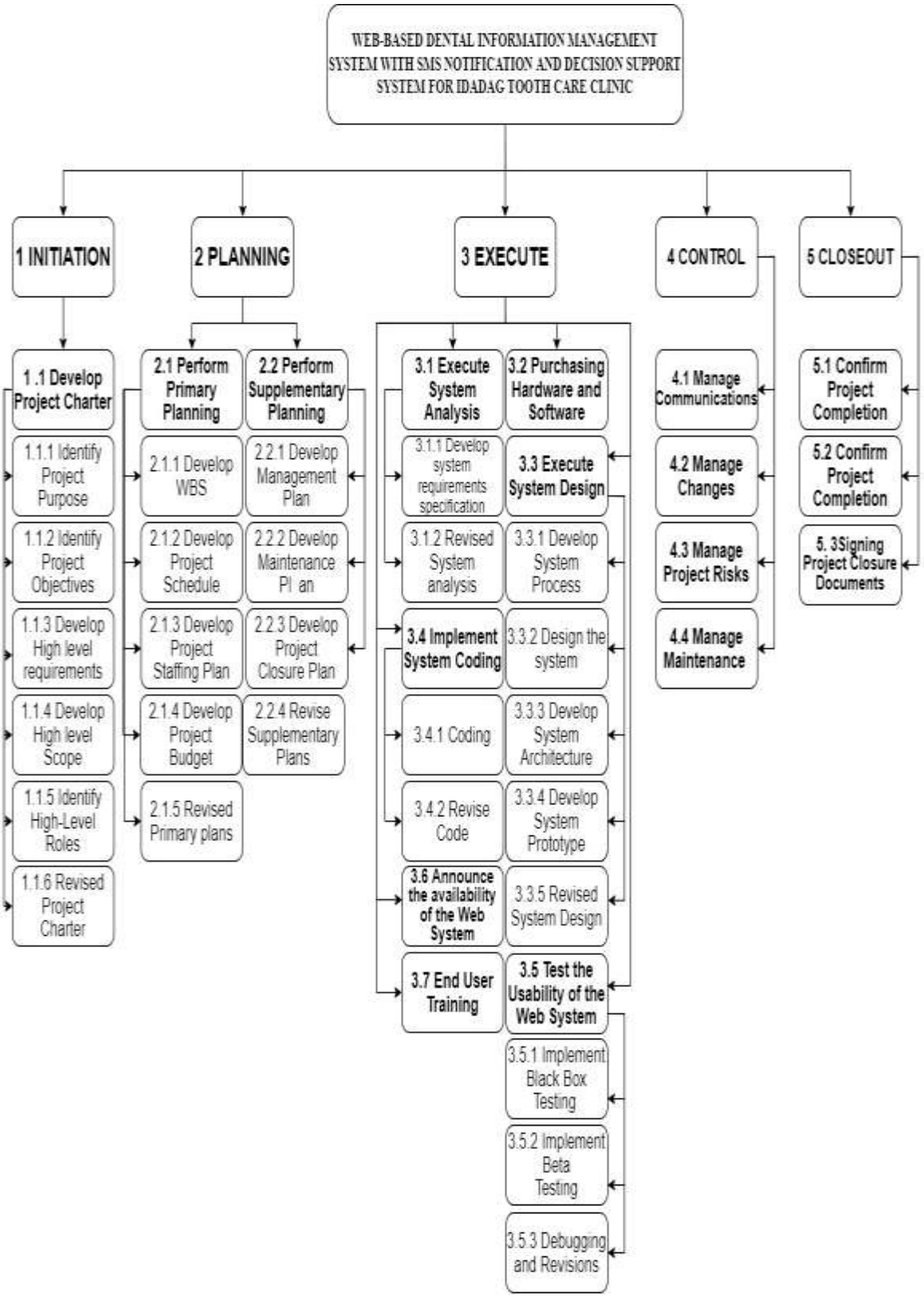


Figure 18. Work Breakdown Structure (WBS) of the proposed IS

WBS Dictionary of the Proposed IS

WBS dictionary is a document that contains specific information about each component of the work breakdown structure in the terms of deliverables, activities, and schedule. Table 9 depicts the task id, task name, task owner, start and end date, man-days, and estimated cost.

Table 9. WBS Data Dictionary of the Proposed IS

Task ID	Task Name	Task Owner	Start Date	End Date	Man-days	Estimated Cost
1.0	**INITIATION**					
1.1	**Develop Project Charter**					
1.1.1	Identify Project Purpose	Project Manager	Jan 2,2023	Jan 2,2023	1	₱ 1,222.00
1.1.2	Identify Project Objectives	Project Manager	Jan 3,2023	Jan 3,2023	1	₱ 1,222.00
1.1.3	Develop High level requirements	Project Manager	Jan 4,2023	Jan 4,2023	1	₱ 1,222.00
1.1.4	Develop High level Scope	Project Manager	Jan 5,2023	Jan 5,2023	1	₱ 1,222.00
1.1.5	Identify High-Level Roles	Project Manager	Jan 6,2023	Jan 6,2023	1	₱ 1,222.00
1.1.6	Revised Project Charter	Project Manager	Jan 9,2023	Jan 9,2023	1	₱ 1,222.00
Phase Total					**6**	**₱ 7,322.00**
2.0	**PLANNING**					
2.1	**Perform Primary Planning**					
2.1.1	Develop WBS	Project Manager	Jan 10,2023	Jan 11,2023	2	₱ 2,444.00
2.1.2	Develop Project Schedule	Project Manager	Jan 12,2023	Jan13,2023	2	₱ 2,444.00
2.1.3	Develop Project Staffing Plan	Project Manager	Jan 16,2023	Jan 17,2023	2	₱ 2,444.00
2.1.4	Develop Project Budget	Project Manager	Jan 18,2023	Jan 19,2023	2	₱ 2,444.00
2.1.5	Revised Primary plans	Project Manager	Jan 20,2023	Jan 23,2023	2	₱ 2,444.00
2.2	**Perform Supplementary Planning**					

2.2.1	Develop Management Plan	Project Manager	Jan 24,2023	Jan 26,2023	3	₱ 3,666.00
2.2.2	Develop Maintenance Pl an	Project Manager	Jan 27,2023	Jan 30,2023	2	₱ 2,444.00
2.2.3	Develop Project Closure Plan	Project Manager	Jan 31,2023	Feb 1,2023	2	₱ 2,444.00
2.3.4	Revise Supplementary Plans	Project Manager	Feb 2,2023	Feb 3,2023	2	₱ 2,444.00
Phase Total					**19**	**₱ 23,218.00**
3.0	**EXECUTE**					
3.1	**Execute System Analysis**					
3.1.1	Develop system requirements specification	System Analyst	Feb 6,2023	Feb 17,2023	10	₱ 10,720.00
3.1.2	Revised System analysis	System Analyst	Feb 20,2023	Feb 21,2023	2	₱ 2,144.00
3.2	**Purchasing Hardware and Software**	System Analyst	Feb 22,2023	Feb 23,2023	2	₱ 2,144.00
3.3	**Execute System Design**					
3.3.1	Develop System Process	System Designer	Feb 24,2023	Feb 28,2023	3	₱ 2,982.00
3.3.2	Design the system	System Designer	Mar 1,2023	Mar 3,2023	3	₱ 2,982.00
3.3.3	Develop System Architecture	System Designer	Mar 6,2023	Mar 6,2023	1	₱ 994.00
3.3.5	Develop System Prototype	System Designer	Mar 7,2023	Mar 20,2023	10	₱ 9,940.00
3.3.6	Revised System Design	System Designer	Mar 21,2023	Mar 23,2023	3	₱ 2,982.00
3.4	**Implement System Coding**					
3.4.1	Coding	Web Developer	Mar 24,2023	Jun 1,2023	50	₱ 80,800.00
3.4.2	Revise Code	Web Developer	Jun 2,2023	Jun 15,2023	10	₱ 16,160.00

3.5	**Test the Usability of the Web System**					
3.5.1	Implement Black Box Testing	Testing Specialist	Jun 16,2023	Jun 20,2023	3	₱ 5,352.00
3.5.2	Implement Beta Testing	Testing Specialist	Jun 21,2023	Jun 23,2023	3	₱ 5,352.00
3.5.3	Debugging and Revisions	Web Developer	Jun 26,2023	Jun 30,2023	5	₱ 8,080.00
3.6	**Announce the availability of the Web System**	Testing Specialist	Jul 3,2023	Jul 3,2023	1	₱ 1,784.00
3.7	**End User Training**	Testing Specialist	Jul 4,2023	Jul 6,2023	**3**	₱ 8,952.00
Phase Total					**109**	**₱ 161,368.00**
4.0	**CONTROL**					
4.1	**Manage Communications**	Project Manager	Jul 7,2023	Jul 7,2023	1	₱ 1,222.00
4.2	**Manage Changes**	Project Manager	Jul 10,2023	Jul 12,2023	3	₱ 3,666.00
4.3	**Manage Project Risks**	Project Manager	Jul 13,2023	Jul 18,2023	4	₱ 4,888.00
4.4	**Manage Maintenance**	Project Manager	Jul 19,2023	Jul 25,2023	5	₱ 6,110.00
Phase Total					**13**	**₱ 15,886.00**
5.0	**CLOSEOUT**					
5.1	**Confirm Project Completion**	Project Manager	Jul 26,2023	Jul 26,2023	1	₱ 1,222.00
5.2	**Conduct Post-Project Review**	Project Manager	Jul 27,2023	Jul 27,2023	1	₱ 1,222.00
5.3	**Signing Project Closure Documents**	Project Manager	Jul 28,2023	Jul 28,2023	1	₱ 1,222.00
Phase Total					**3**	**₱ 3,666.00**
Overall Total					**150**	**₱ 211,470.00**

Gantt Chart of the Proposed IS

Gantt chart are diagram that show the progress of the project. When a project is broken down into smaller, more manageable chunks, more becomes

more doable. Figure 19 displays the task name, start and end dates of various project parts, and durations of each task and subtasks. The table does not include weekends and holidays; it serves resting days for the project team.

ID	Task Name	Start	Finish	Duration
1	1.0 Initiation	02/01/2023	05/01/2023	4d
2	1.1 Develop Project Charter	02/01/2023	05/01/2023	4d
3	2.0 Planning	10/01/2023	23/01/2023	10d
4	2.1 Perform Primary Planning	10/01/2023	23/01/2023	10d
5	2.2 Perform Supplementary Planning	24/01/2023	03/02/2023	9d
6	3.0 Execute	06/02/2023	06/07/2023	109d
7	3.1 Execute System Analysis	06/02/2023	21/02/2023	12d
8	3.2 Purchasing Hardware and Software	22/02/2023	23/02/2023	2d
9	3.3 Execute System Design	24/02/2023	23/03/2023	20d
10	3.4 Implement System Coding	24/03/2023	15/06/2023	60d
11	3.5 Test the Usability of the Web System	16/06/2023	30/06/2023	11d
12	3.6 Announcement the availability of the Web System	03/07/2023	03/07/2023	1d
13	3.7 End User Training	04/07/2023	06/07/2023	3d
14	4.0 Control	07/07/2023	25/07/2023	13d
15	4.1 Manage Communications	07/07/2023	07/07/2023	1d
16	4.2 Manage Changes	10/07/2023	12/07/2023	3d
17	4.3 Manage Project Risks	13/07/2023	18/07/2023	4d
18	4.4 Manage Maintenance	19/07/2023	25/07/2023	5d
19	5.0 Closeout	26/07/2023	28/07/2023	3d
20	5.1 Confirm Project Completion	26/07/2023	26/07/2023	1d
21	5.2 Conduct Post-Project Review	27/07/2023	27/07/2023	1d
22	5.3 Signing Project Closure Documents	28/07/2023	28/07/2023	1d

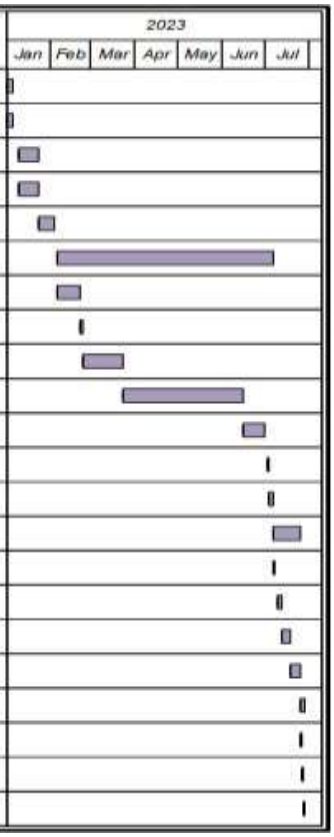


Figure 19. Gantt chart of the Proposed IS

C. Financial Plan and Economic Feasibility

A project financial plan, often known as a project budget, lists all of a project's costs. These expenses are then adjusted to fall within the project's budgetary constraints. A project that is technically and financially feasible but has a slim probability of becoming profitable is called economic feasibility. This refers to the project's ability to produce revenue. This section contains the following:

Budget Allocation and Schedule of the Proposed IS

Budgetary allocation are an important part of organization’s financial plan, or budget. They show how much money an organization is investing in department or program. Table 10 depicts budget allocation of the proposed project each

month. The monthly expenses specified in the WBS dictionary used to determine the budget allocation and timetable.

Table 10. Budget Allocation and Schedule of the Proposed IS

Year	Month	WBS Cost
2023	January	₱ 26,884.00
	February	₱ 114,268.00
	March	₱ 29,576.00
	April	₱ 32,320.00
	May	₱ 37,168.00
	June	₱ 36,560.00
	July	₱ 30,288.00
Total Cost		**₱ 307,064.00**

Initial Total Cost of Ownership of the Proposed IS

The idea of initial total costs of ownership is used to calculate the project's various expenses. It is made up of many sections that will cover the entire project.

Table 11 depicts the hardware cost need for the proposed IS consist of hardware, quantity, monthly cost, duration, and price cost.

Table 11. Hardware Cost

Hardware	Quantity	Monthly cost	Duration (Months)	Estimated Cost
Processor: Intel Core i5	1	-	-	₱ 20,000.00
Memory: 8GB	1	-	-	₱ 5,000.00
Storage: HDD 1TB	1	-	-	₱ 3,500.00
Graphics: 2GB	1	-	-	₱ 4,000.00
Monitor: LED 24 inch	1	-	-	₱ 5,000.00

Printer: Laser	1	-	-	₱ 9,000.00
Internet: PLDT(25 mbps)	1	₱ 1699.00	3	₱ 5,097.00
TOTAL COST				**₱ 51,597.00**

Table 12 depicts the software cost need for the proposed IS consist of software, quantity, monthly cost, duration, and estimated price.

Table 12. Software Cost

Software	Quantity	Monthly cost	Duration	Estimated Cost
Microsoft Visual Studio Professional 2019 Product Key For 1 PC, Lifetime	1	₱ 2,480.00	2	₱ 2,480.00
Webhosting: GoDaddy Ultimate	1	₱ 677.00	60	₱ 40,620.00
Laravel	1	Free	-	₱ 0.00
Google Chrome	1	Free	-	₱ 0.00
MySQL Server	1	Free	-	₱ 0.00
iTextmo API	1	₱ 299.00	3	₱ 897.00
TOTAL COST				**₱ 43,997.00**

Table 13 depicts the IT people cost need for the proposed IS consist of role, quantity, daily rate, duration, and estimated salary.

Table 13. IT People Cost

Role	Quantity	Daily Rate	Duration	Estimated Salary
Project Manager	1	₱ 1,222.00	41	₱ 50,102.00
System Analyst	1	₱ 1,072.00	14	₱ 15,008.00
System Designer	1	₱ 994.00	20	₱ 19,880.00
Web Developer	1	₱ 1,616.00	65	₱ 105,040.00
Testing Specialist	1	₱ 1,784.00	10	₱ 17,840.00
Total Cost				**₱ 207,870.00**

Table 14 depicts the training cost need for the proposed IS consist of training people, quantity, training cost, days, and total cost.

Table 14. Training Cost

Training People	Quantity	Training cost	Days	Total Cost
Patient	1	₱ 400.00	3	₱ 1,200.00
Dental Staff	1	₱ 400.00	3	₱ 1,200.00
Dentist	1	₱ 400.00	3	₱ 1,200.00
TOTAL COST				**₱ 3,600.00**

Table 15 depicts the summary cost that summarize all the cost for the development of the proposed IS.

Table 15. Summary Cost

Summary Cost	Total Cost
Technology Cost	₱ 95,594.00
Effort Cost	₱ 207,870.00

Training Cost	₱ 3,600.00
Total Cost Estimate	**₱ 307,064.00**

Financial Viability of the Proposed IS

The first step in determining the project's financial sustainability is to achieve the cost of executing clinical activities by regularly delivering their customers with their services. The total time spent multiplied by the hourly rate of the employees provides the cost of the activity in each activity.

Billing Department

Billing Process and Preparation of Sales Report

The billing procedure begins with the patient's and the recommended physician's basic information. The biller selects the tests and calculates the fee based on the patient's request. The table below is the financial viability for billing department.

Table 16 shows the current vs proposed, and the difference for time spent.

Table 16. Time Spent: Current vs Proposed

Billing Department	Current	Proposed	Difference
Billing Process	10 mins	5 mins	7 mins
Preparation of Sales Report	30 mins	5 mins	23 mins
Total	40 mins	10 mins	30 mins

Table 17 shows the expense using this calculation. The cost of the billing process could be roughly 8.33 per patient, since sales reports are produced once a day.

Table 17. Expenses: Current vs Proposed

Current		
	Cashier/Assistant	**Total**
Staff	₱ 50.00/hr	
Billing Process	10 mins	₱ 8.33
Preparation of Sales Report	30 mins	₱ 25
Total	**40 mins**	**₱ 33.33**

Table 18 shows the proposed using this calculation, the cost of the billing process could be roughly 2.5 per patient, since sales reports are produced once a day.

Table 18. Proposed

Proposed		
	Cashier/Assistant	**Total**
Staff	₱ 50.00/hr.	
Billing Process	₱ mins	₱2.5
Preparation of Sales Report	₱ mins	₱ 4.17
Total	**₱ mins**	**₱ 6.67**

Table 19 shows the result of current ₱ 33.33 compared to the proposed hourly rate total of 6.67. It has a big difference that can affect the Cashier/Assistant Department to lessen time.

Table 19. Difference of current vs proposed hourly rate

Current		
	Cashier/Assistant	
Staff	**₱ 50.00/hr.**	
	Current	
Billing Process	10 mins	₱ 8.33
Preparation of Sales Report	30 mins	₱ 25
Total	**40 mins**	**₱ 33.33**
Proposed		
	Proposed	
Billing Process	3 mins	₱ 2.5

Preparation of Sales Report	5 mins	₱ 4.17
Total	**8 mins**	**₱ 6.67**

Booking Process and Preparation of Booking Report

The booking process begins with the patient's accommodation and their appointment to the clinic. The staff checks for a preference slot if a slot is available.

Table 20 shows the current vs proposed time spent and its difference.

Table 20. Time Spent: Current vs Proposed

Booking Department	Current	Proposed	Difference
Booking Process	10 mins	2 mins	8 mins
Preparation of Book Report	25 mins	5 mins	20 mins
Total	35 mins	7 mins	28 mins

Table 21 shows using this calculation rate/per hour*current process, the cost of the billing process could be roughly 8.33, and booking reports is 25 per booking.

Table 21. Expenses: Current vs Proposed

Current		
	Cashier/Assistant	**Total**
Staff	P50.00/hr	
Booking Process	10 mins	₱ 8.33
Preparation of Book Report	25 mins	₱ 20.83
Total	**35 mins**	**₱ 29.17**

Table 22 shows using this calculation rate/per hour*current process, the cost of the billing process could be roughly 1.67 per patient, and the booking report is 4.17 per booking.

Table 22. Proposed

Proposed		
	Cashier/Assistant	**Total**
Staff	₱ 50.00/hr.	
Booking Process	2 mins	₱ 1.67
Preparation of Book Report	5 mins	₱ 4.17
Total	**7 mins**	**₱ 5.84**

Table 23 shows the result of current 29.17 pesos compared to the proposed hourly rate total was 5.84 pesos it has a big difference it can affect for Cashier/Assistant Department to lessen time.

Table 23. Difference of current vs proposed hourly rate

Current		
	Cashier/Assistant	
Staff	**₱ 50.00/hr.**	
	Current	
Billing Process	10 mins	₱ 8.33
Preparation of Sales Report	25 mins	₱ 20.83
Total	**35 mins**	**₱ 29.17**
Proposed		
Billing Process	2 mins	₱ 1.67
Preparation of Sales Report	5 mins	₱ 4.17
Total	**7 mins**	**₱ 5.84**

Cost and Benefits Description of the Proposed IS

Based on the identified activities, the team estimated the project cost. The benefits of the proposed system are assessed in terms of both tangible and

intangible benefits. The modifications cover the following costs and assure long-term use over a lengthy period.

Software or specifically, the operating system will have a five-year estimated life span and a total price of ₱ 43,997.00.

Hardware that is specifically composed of a computer that is used for the project has a total value ₱ 51,597.00.

The intangible benefits of the proposed system are at ₱ 49,094.00, and the tangible benefits are at ₱ 257,970.00 with a total value of ₱ **307,064.00.**

In addition, if the project is implemented, the dental clinic will profit from having more patients in the next few years since the business process will be effective and efficient.

D. Project Management Plan and Tracking

Project management helps in the planning and control of the entire development process by ensuring effective cost, schedule and technical performance. The project management plan and tracking section consists of Stakeholder Analysis, Project Charter, Project Organization, Roles and Responsibilities, Requirements and Change Management, Communication Management, and Project Metrics and Measurement

Stakeholder Analysis

Stakeholder analysis is the process of identifying individuals prior to the start of a project. Table 24 illustrates the stakeholder matrix which is a project management tool for analyzing project stakeholders and determining the activities required to match their interest with the project's goals.

Table 24. Stakeholders Analysis Matrix

Stakeholder Name	Contact Person *Phone, Email, Website, Address*	Impact *How much does the project impact them? (Low, Medium, High)*	Influence *How much influence do they have over the project? (Low, Medium, High)*	What is important to the stakeholder?	How could the stakeholder contribute to the project?	How could the stakeholder block the project?	Strategy for engaging the stakeholder
Owner/sponsor	Ryan Roy D. Idagdag Marifeidagdag0791@gmail.com 09299505286	High	High	Smooth Transaction	Decision Authority and funding	Unsatisfied	Weekly meetings
Staff	Laarni Gutierrez 09299505286	High	High	Manage owner meetings	Communicate to owner	None	Week meetings
Patient		High	High	Testing	Feedback	Not satisfied	

Project Charter of the Proposed IS

This section shows a project charter, a formal, usually short document, that explains the project in detail, including the goals, how it will be carried out, and who will be involved. It is an essential component of project planning because it is employed throughout the project lifecycle. Table 25 depicts the project charter: it holds the title, sponsor, start and finish date, budget information, project team, objectives, success criteria, and approach of the project.

Table 25. Project Charter

WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM	
Project Start Date:	Project Finish Date:
January 2,2023	July 28,2023
Project Sponsor:	IDAGDAG TOOTH CARE CLINIC
Proposed Budget:	₱ 307,064.00
Project Manager:	Jake Deon C. Cerna
System Designer:	Richard P. Canja

System Analyst:	Razer A Caluban Jr.
Project Objectives:	
The purpose of this project is to develop Web-based Dental Information System with SMS Notification and Decision Support that improves their transactions and provides online services to the patients so that they can access it anytime online.	
Main Project Success Criterion:	
The Web-based Dental Information System with SMS Notification should be implemented and accepted by the clients after the system is done.	
Approach:	
1. Web application that will help dentist easily transact reservations/bookings such as: Check-ups and Dental services. 2. System that provides accurate records and information for the customers. 3. System that sends SMS notification using SMS api that will remind the patients of the day and time of their transaction 4. Design a decision support system using K-Nearest Neighbors (KNN) algorithm to assist dentist for patient treatment. 5. Design a Prototype of Dental Information Management System with SMS Notification and Decision Support System	

Project Organization of the Proposed IS

A Project organization is a structure that makes is easier to coordinate and carry out project tasks. Figure 20 illustrates the structure of the project's organization. The people listed below are involved in system implementation and are in charge of system execution. The organization consist of people involves to the project such as; project sponsor, project manager, system analyst, system designer, web developer, web designer, quality specialist, testing specialist to make the system possible. In addition, the End users is part the organization.

Figure 20. Project Organization of the Proposed IS

Roles and Responsibilities of the Proposed IS

This section illustrates responsibilities pertain to the responsibilities and obligations of their specific job, as shown in the table below. Each team member is responsible for accomplishing various project tasks.

Project sponsor – the project sponsor support and defends the project as a worthwhile investment of organizational resources that will help the organization achieve its strategic goals.

Project manager - Responsible for all project administration. The Project Manager manages all work, varying, traceability, reporting, communication, performance assessments, staffing and internal co-ordination with functional managers.

System analyst - responsible for data and analysis that assist project management in timing and budgeting projects. The analyst's information assists in evaluating and prioritizing new projects, assures smooth delivery and promotes objective project review.

System designer - responsible to create a detailed blueprint and instructions those programmers can follow. The Requirements Specification, which was created by the System / Business Analyst, is the most important input document that the System Designer will employ.

Requirements and Change Management

During the project's Planning Phase, the Requirements and Change Management Plan is established. The project manager, project team, project sponsor, and any senior executives whose help is needed to carry out the plan are the intended audience. Figure 21 shows Requirements Change Management process that offers a method for monitoring the submission, management, assessment, categorization, and approval of any modifications to the project's baselines. The Project Manager will use the following steps to implement the project's change control process:

Phase #1: Identify the need for a change (Stakeholder)

The requestor will submit a completed change request form to the project manager.

Phase #2: Log change in the change request register (Project Manager) The project manager will keep a log of all change requests in the course of the project.

Phase #3: Evaluate the change (Project Manager, Project Team, Requestor) The project manager will assess the effect of the change to cost, risk, schedule, and scope.

Phase #4: Submit a change request to Change Control Board (CCB) (Project Manager) The project manager will submit the change request and evaluation to the Change Control Board (CCB) for review. Phase

#5: Change Control Board decision (CCB) The Project Manager will discuss the proposed change and decide whether or not it will be approved based on all submitted information Phase

#6: Implement change (Project Manager) If a change is approved by the CCB, the project manager will update the project documentation as necessary as well as ensure any changes are communicated to the team and stakeholders.

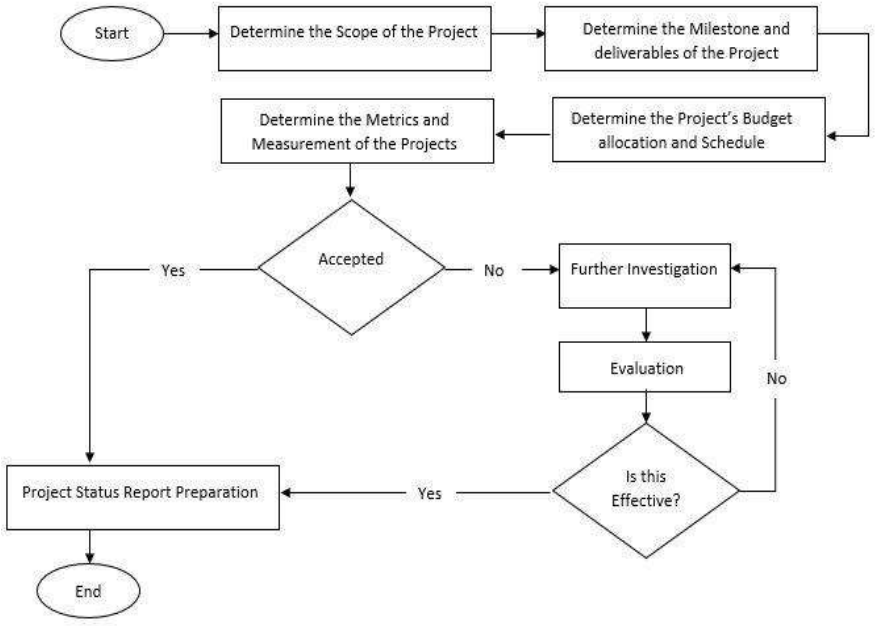


Figure 21. Requirements Management Process

Requirements Traceability Matrix

RTM stands for Requirement Traceability Matrix, and it is a document that connects user requirements to test cases. It is made up of essential parameters that aid in the project's success. The major goal of RTM is to ensure that the final project is defect-free and that it is clear to the client's needs. Table 26 depicts

requirements traceability matrix that holds requirements description, justification, requested by, and status.

Table 26. Requirements Traceability Matrix

Requirements Description	Justification	Requested by	Status
Login Page	Admins can use this method to gain access to password protected material	Analyst	Not yet started
Logout Link	We need to logout administrators for security reasons.	Analyst	Not yet started
Landing page	For a patient, this must be a starting point.	Manager	Not yet started

Communication Management

The communication management plan will lay out the project's communication strategy. This will serve as a communication guide throughout the project, and it will be effective as communication needs evolve. It will identify and categorize the responsibilities of the team members in order to implement communication. A communication matrix plotting the project's communication requirements and various kinds of communication is also included in this strategy. The Project Manager will be in charge of ensuring that this project's communications are effective.

Communication Flowchart

Communication flow chart shows the direction of communication flow based on how information is shared in an organization. Figure 22 depicts communication

chart. This flow chart diagram offers the project team with a foundation. However, when extra clarification is needed, occasions or events that fall beyond the communication chart can occur. The project manager will discuss communications with the sponsor of the project and decide how to proceed in certain scenarios.

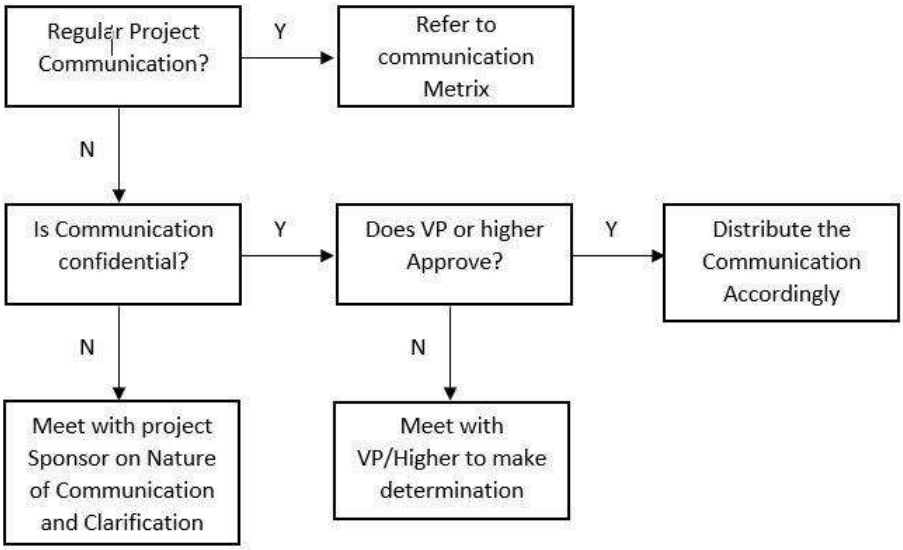


Figure 22. Communication Process

Communication Matrix

The communication matrix is a tool that shows how a person communicates .Table 27 depicts the communication requirements this will serve as a guide for the information to be sent, as well as who will convey it, when it will be communicated, and to whom it will be communicated. A project team directory is also given, including contact information for those project stakeholders that are directly participating.

Table 27. Communication Matrix

Communication Type	Description	Frequency	Format	Participants	Deliverables	Owner
Weekly Status Report	Project Status Email Summary	Weekly	Email	Project Sponsor, Team and Stakeholders	Status Report	Project Manager

Weekly Project Team Meeting	Action Register and Status Review Meeting	Weekly	In Person	Project Team	Updated Action Register	Project Manager
Project Monthly Review (PMR)	Present metrics and progress for teams and sponsors	Monthly	In Person	Project Sponsor, Team, and Stakeholders	Status and Metric Presentation	Project Manager
Project Gate Reviews	The project phase closes and the next phase starts	As Needed	In Person	Project Sponsor, Team, and Stakeholders	Phase completion report and phase kickoff	Project Manager
Technical Design Review	Review of any project-related technological concepts or work	As Needed	In Person	Project Team	Technical Design Package	Project Manager

Project Team Directory

This section contains members of the project team, their project roles, and communication information are all documented. Table 28 depicts the project team directory wherein it holds the name, title, email, and cellphone number of the project team.

Table 28. Project Team Directory

Name	Title	Email	Cellphone number
Jake Deon C. Cerna	Project Manager	cerna.jakedeon@dnsc.edu.ph	09914181173
Razer A. Caluban Jr.	System Analyst	caluban.razerjr@dnsc.edu.ph	09270889582
Richard P. Canja	System Designer	canja.richard@dnsc.edu.ph	09663521200

Project Metrics and Measurement

Project management metrics are an efficient approach to assess a project's progress. Measuring the progress of the project against particular criteria aids in the management process. Table 29 depicts project metrics and measurement wherein it holds metric name, definition, measure, and target. As a result to help track performance and make adjustments as needed.

Table 29. Project Metrics and Measurement

Metric	Definition	Measure	Target
Earned Value	Earned Value tells you how much the actual value is. It's based on work you've completed, not work you should have completed.	EV=Actual % Complete * Budget at Completion	Equal to project completed
Actual Cost	This is a measure that represents the actual costs of finishing all of the work that has been completed thus far.	AC= Total Costs	Less than or Equal to actual cost
Cost Variance	The difference between the actual cost incurred and the planned/budgeted cost at a certain point on a project.	CV = Earned Value – Actual Cost	Neutral = On planned cost
Schedule Variance	Indicates if the project is ahead of schedule or behind schedule.	SV= Earned Value – Planned Value	Neutral = On schedule Positive = Ahead of schedule
Estimate at Completion	The project manager can see the final project cost estimate using Estimate at Completion.	EAC= Budgeted at Completion / Cost Performance Index	Greater than 1
Budget at Completion	Budget at Completion is the total amount budgeted for the project	BAC= Budget cost of the Project	Equal to Budget at Completion

Variance at Completion	A forecast of the surplus or deficit in the budget.	VAC= Budgeted at Completion - Estimate at Completion	Neutral = On planned cost
Schedule Performance Index	Schedule Performance Index allows you to assess how well you're following the project planned schedule	SPI= Earned Value / Planned Value	Greater than 1 = Ahead of schedule Exactly 1 = On schedule
Cost Performance Index	The Cost Performance Index allows you to assess how the Project is progressing in terms of budget.	CPI= Earned Value / Actual Cost	Exactly 1 = On planned cost
Project Slippage	Is the amount of time a project is behind schedule in comparison to its initial schedule baseline.	PS = (Actual Project Duration – Planned Project Duration / Planned Project Duration) * 100	Identified ineffective planning process
Key Performance Indicator	Is a measurable statistic that show how well an organization is meeting key business goal	Schedule Variance	On planned Schedule

E. Risk Management Plan

When organizations start new projects, they start working on a system design in an area of ambiguity. In doing so, they take opportunities, which lead to a risk that plays a large role in any undertaking. Table 30 Risk management plan goal of the plan is to define a framework for identifying risks and developing methods to mitigate or avoid those risks in the project team.

Table 30. Risk Management Plan

No	Objectives of the Project	Issue	Risk	Type of Risk	Likelihood	Severity	Risk Factor	Proposed Action
1	Design a web application that will help dentist easily transact reservation/ bookings such as: Dental check-ups and Dental services.	User can't access the features.	Improper design	Technical	3	3	4	Contact Web developer to fixed the issues.
2	Design a system to provide accurate records and information for customer.	User can't access query.	Poor Data base design.	Technical	4	4	10	Contact Web developer to configure database.
3	Design a system that sends SMS notification using SMS Api that will remind the patients of the day and time of their transaction	Can't receive and send SMS notification	System fails.	Technical	4	4	7	Contact web developer to configure SMS API.
4	Design a decision support system using K-Nearest Neighbors (KNN) to	Inappropriate decision	Inaccurate result	Technical	4	5	8	Contact the web developer to configure errors.

	assist doctor for treatment.							
5	Design a Prototype of Web-Based Dental Information Management System with SMS Notification and Decision Support System.	Web prototype design interface is uneasy to navigate and inappropriate use of graphic and images.	Failure to design an efficient Prototype.	Technical	4	3	7	Contact system designer to improve the web prototype.

Take note of the legend below:

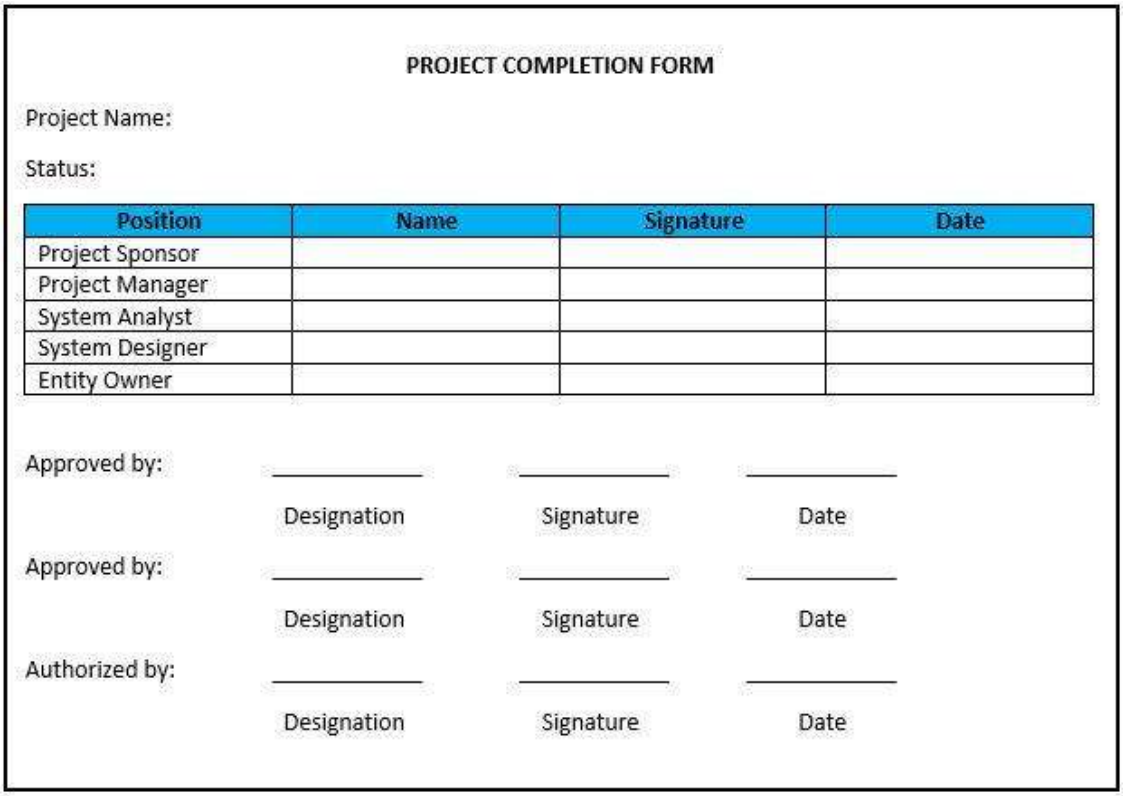
Severity	**Likelihood**	**Equivalent**
4- Major	4- Likelihood	10-16- High Risk
3- Moderate	3- Possible	6-9- Medium Risk
2- Minor	2- Unlikely	1-5- Low Risk
1- Negligible	1- Rare	

F. Project Closure Plan

The Closure plan of the Project addresses how resources will be released after completion or discontinuation of the project. The Closing phase of the project formally closes the project, releases resources of the project sponsor, and reports on the project progress.

Project Completion

Project Completion signifies that the project has been effectively implemented and accepted by the sponsor and entity owner. This Project will be presented to Project Sponsor and other stakeholders to decide whether the project is completed. To complete the project, the representatives of external, and internal teams fill out a Project Completion Form. Figure 23 shows the sample of the completion form of the project.



PROJECT COMPLETION FORM

Project Name:

Status:

Position	Name	Signature	Date
Project Sponsor			
Project Manager			
System Analyst			
System Designer			
Entity Owner			

Approved by: _____ _____ _____
Designation Signature Date

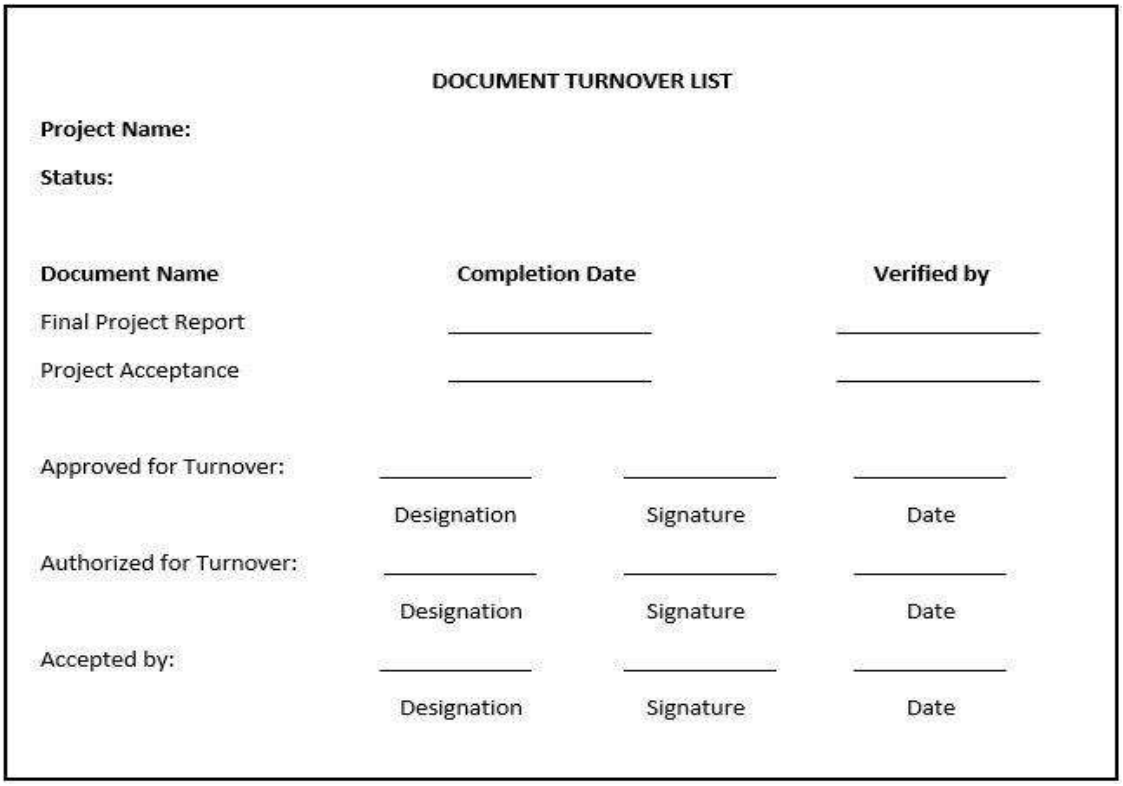
Approved by: _____ _____ _____
Designation Signature Date

Authorized by: _____ _____ _____
Designation Signature Date

Figure 23. Completion Form

Document Turnover

In order to offer precise information, a turnover document form has to be sent to a certain address. Figure 24 shows the sample of the Document Turnover form of the project. It should be filled and signed manually in hardcopy or softcopy.



DOCUMENT TURNOVER LIST

Project Name:

Status:

Document Name	**Completion Date**	**Verified by**
Final Project Report	_____	_____
Project Acceptance	_____	_____

Approved for Turnover:	_____	_____	_____
	Designation	Signature	Date
Authorized for Turnover:	_____	_____	_____
	Designation	Signature	Date
Accepted by:	_____	_____	_____
	Designation	Signature	Date

Figure 24. Document Turnover

CHAPTER III
RESULTS AND DISCUSSION

This section of the paper contains System Analysis, System Design, Software Testing Plan, System Deployment, Maintenance Plan of the proposed IS, and Discussion. The proponents in the succeeding discussion will explain all section thoroughly.

A. System Analysis

Systems analysis is the process of acquiring, interpreting, and analyzing factual evidence. The methods entail assessing defects and offering realistic recommendations for improving system performance. This requires researching business functions, gathering data sets, and comprehending in order to accomplish company objectives, information flow must be optimized by detecting bottlenecks and developing plans to reduce system defects.

System Requirements

Requirements analysis is a crucial step in determining if a system or software project will succeed. Functional and non-functional requirements are the two sorts of requirements in general.

Functional

- Patients will be reminded of the day and time of their transaction through SMS message.
- People would be able to easily transact reservations/bookings with the use of a web application.
- System will deliver accurate data and information to consumers.
- There will be a decision support system to aid dentists in patient care.

Non-functional

- SMS notification should be sent 1 day before the scheduled transaction.
- The privacy of information is under the protection of Republic Act 10173.

- The site shall load within 3 seconds.
- Any request should be done for only 6 seconds.
- The password viewable should never allow.
- All user's log is recorded in the database.
- The system shall handle 1000> users simultaneously.

Process Model: Use Case Diagram and Description

The use case diagram visually represents the interaction between the users and their current system. Figure 25 shows three actors: The Patient, the Dental Staff and the Dentist. The patient can make an appointment, select a dental procedure; the dental staff can add a new patient/dentist, update appointments and notify the patient if the appointment is confirmed while the dentist is assigned to operate the dental procedure.

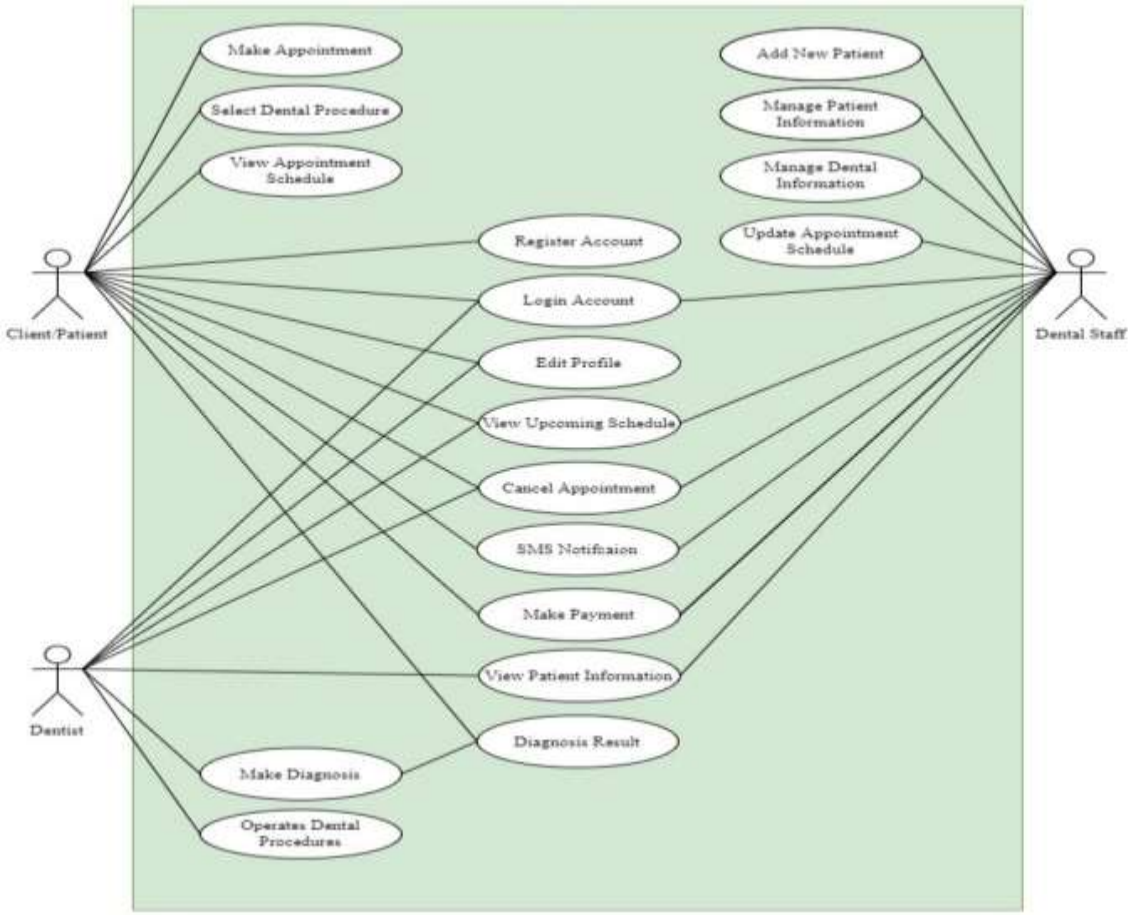


Figure 25. Use Case Diagram

Table 31. Use Case Description for Making an appointment

Use Case Name	Make an Appointment
Participating Actors	Initiated by Client Patient Communicate with Dental Staff Confirms by Dentist
Flow of Events	1. Patient Registration and System Login 2. Patient make an appointment and decides on a dental procedure. 3. Dental Staff will receive all appointments and all appointments will be given to the dentist by the dental staff. 4. The dentist will make a schedule for an appointment. 5. The patient will wait for the dentist to accept an appointment. 6. An SMS will be sent to the patient.
Entry Condition	The client patient will register and login into the web-based system.
Exit Condition	Dentists will confirm and notify client patients via SMS.
Quality Requirements	• The dentist will confirm within 12 hours, depending on the time that the client patient has to be scheduled.

Table 32. Use Case Description for SMS Notification

Use Case Name	SMS Notification
Participating Actors	Sending by Dental Staff Confirmed by Dentists Received by Client Patient
Flow of Events	1. Client Patient make an appointment. 2. Received by the dental staff and dentists confirm the appointment. 3. Client Patient received the schedule via SMS.
Entry Condition	Client Patient make an appointment.
Exit Condition	Client will received an SMS.
Quality Requirements	• The SMS notification will activate 30 seconds after the confirmation.

Table 33. Use Case Description for Operates Dental Procedure

Use Case Name	Operates Dental Procedure
Participating Actors	Initiated by Client Operate by Client
Flow of Events	1. Client walk-in into the clinic and show the staff what their appointment will be. 2. The dentist prepares, and then the client will do some check-ups. 3. The dentist will do the dental procedure and make diagnosis. 4. The client received the diagnosis

Entry Condition	Client walk-in into the clinic.
Exit Condition	If the operation will be done.
Quality Requirements	• The operation of the dental procedure depends on the kind of operation it is.

Table 34. Use Case Description for Patient Cancel Appointment

Use Case Name	Patient Cancel Appointment
Participating Actors	Cancel by Client Received by Dental Staff Confirmed by Dentist
Flow of Events	1. Client cancel the appointment. 2. Received by the Dental Staff. 3. Confirm by the Dentist. 4. Send SMS that the appointment has been cancelled.
Entry Condition	Client cancel the appointment.
Exit Condition	Send SMS that the appointment has been cancelled.
Quality Requirements	• The Patient will receive SMS notification and activated in 30 seconds after the confirmation. • The cancellation is will accept if the appointment 2 days before.

Table 35. Use Case Description for Dentist Cancel Appointment

Use Case Name	Dentist Cancel Appointment
Participating Actors	Cancel by Dentist Delivered by Dental Staff Received by Client Patient
Flow of Events	1. Dentist cancel the appointment. 2. Staff send an SMS to the client patient and reschedule. 3. Received by the Client and confirm. 4. Staff will wait the confirmation/responds of the client patient.
Entry Condition	Dentist will cancel an appointment
Exit Condition	Client will responds/confirms
Quality Requirements	• The cancellation of the appointment will be 2 days before that day. • SMS notification and activated in 30 seconds after the confirmation.

Process Model: Activity Diagram

An activity diagram is a behavioral diagram that portrays a system's behavior. The control flow from a start point to a finish point is depicted in Figure 26, which shows the numerous decision routes that exist while the activity is being performed. In addition, the activity diagram has three entities namely, patient, dentist, and dental staff.

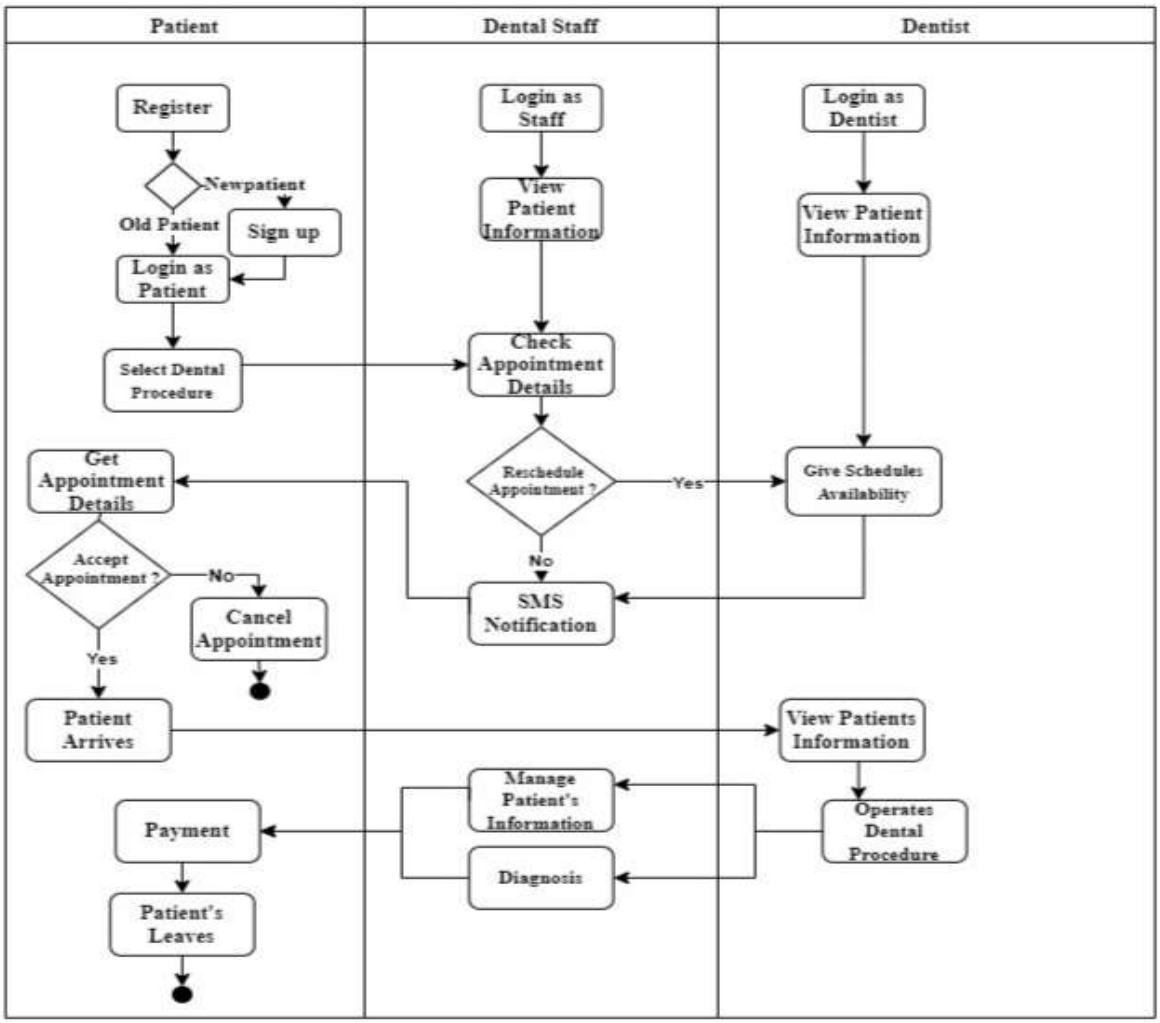


Figure 26. Activity Diagram

Data Model: Context Data Flow Diagram

The context-level data flow diagram of the proposed Dental Clinic system is shown in the figure below. Figure 27 depicts the proposed system's flow process as well as the interaction of elements. The proposed system's context level has

three entities: Patient, Dental Staff, and Dentist. The Patient will request an appointment, and the system will schedule it as well as receiving SMS notification. The Dental Staff will maintain the patients' and dentist's information as well as appointment data. The Dentist will go through the appointments, add dental procedures, and make a diagnosis.

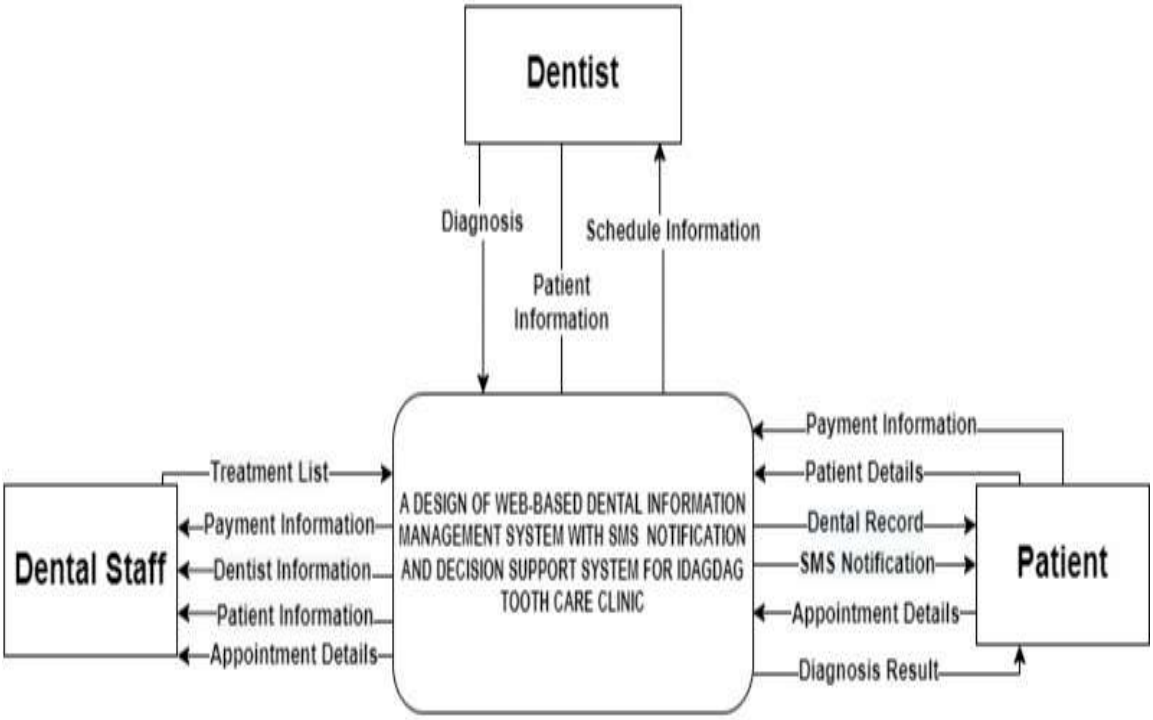


Figure 27. Context Data Flow Diagram

Data Model: Level 1 Data Flow Diagram

Data model are diagrams that show the entire system as a single process. A level 1 DFD list all of the major sub-process that make up the entire system. Figure 28 shows the level one data flow diagram, Patient can login to the system, book an appointment, Dental staff can get appointment and give schedule to the Dentist so that can be schedule, and send SMS notification. Patient arrives at the clinic, proceed to dental procedure and make a result of diagnosis. Patient receives the diagnosis and make payment.

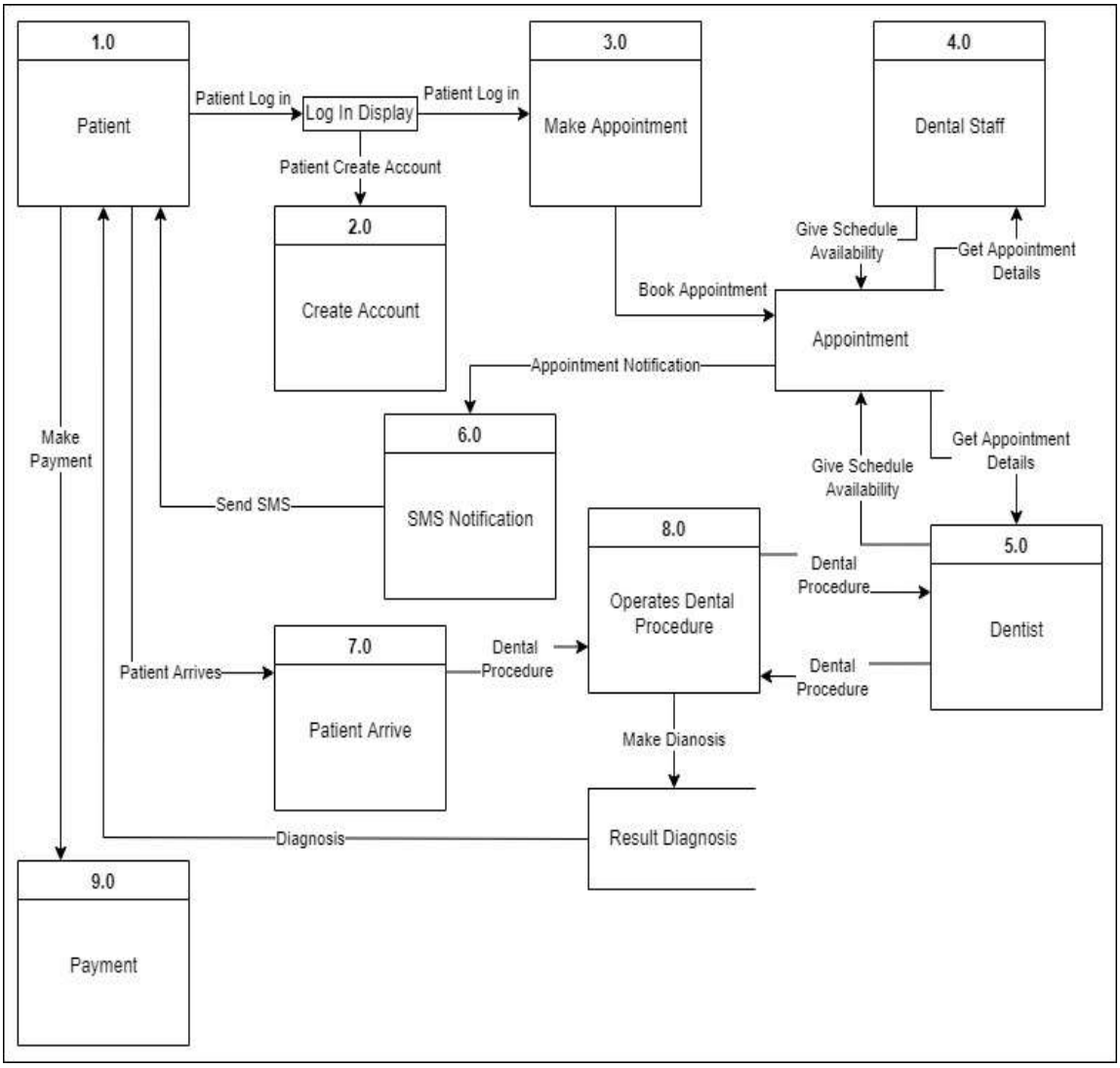


Figure 28. Level 1 Data Flow Diagram

B. System Design

Systems design is the process of establishing system features such as modules, architecture, components and their interfaces, and data for a system. It is the process of identifying, building, and implementing systems that meet a corporation's or organization's specific goals and objectives.

Database Design: Entity-Relationship Diagram

The Entity-relationship diagram (ERD) is a visual depiction of a conceptual database that is easy to understand entities, attributes, and relationships .Figure 29 shows the proposed system's entity connection diagram and the methods used to conduct transactions on a Dental Clinic.

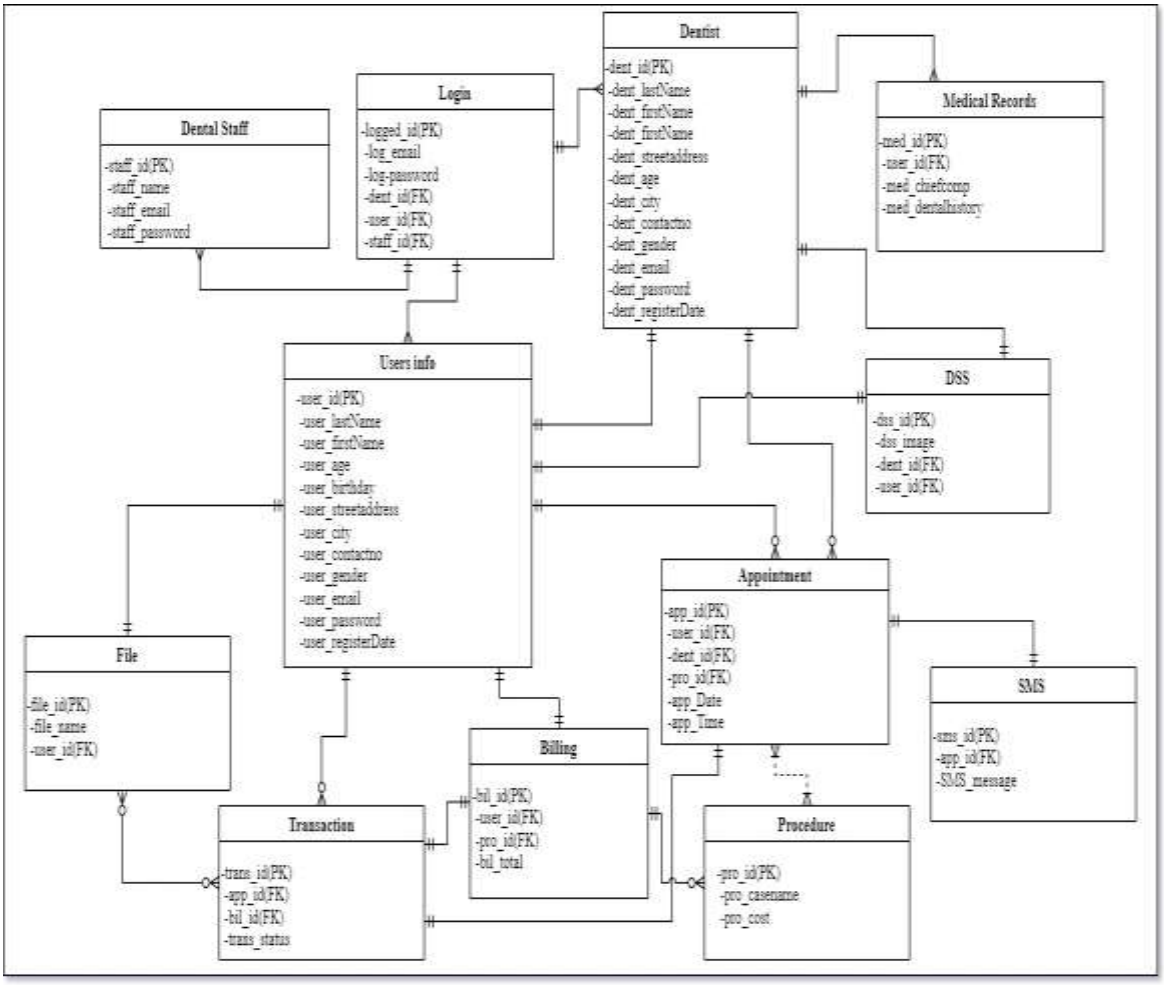


Figure 29. Entity-Relationship Diagram

Data Dictionary

A data dictionary is list of names, definitions, and properties for data pieces is a database, information system, or research project. It also encompasses the meanings and purposes of data items in the context of a project, as well as interpretation, acceptable interpretations, and representation. The data dictionary also defines the field names, data types, field length, constraints, and description.

The data dictionary of the proposed IS based on the ERD in Figure 36 is shown in the tables below:

Table 36. User Information

Users information				
Field Name	**Data Type**	**Field Length**	**Constraints**	**Description**
user_id	INT	11	PRIMARY KEY	user ID auto generated
user_firstname	VARCHAR	255	Null	User first name
user_lastname	VARCHAR	255	Null	User last name
user_age	INT	11	Null	User age
user_birthday	DATE	N/A	Null	User birthday
user_streetaddress	VARCHAR	255	Null	User street address
user_contact number	INT	11	Null	User contact number
user_gender	VARCHAR	255	Null	User gender
user_email	VARCHAR	255	Null	User email
user_password	VARCHAR	255	Null	User password

Table 37. Dentist

Dentist				
Field Name	**Data Type**	**Field Length**	**Constraints**	**Description**
dent_id	INT	11	PRIMARY KEY	Dentist ID auto increment
dent_firstname	INT	11	Null	Dentist first name
dent_lastname	INT	11	Null	Dentist last name
dent_age	INT	11	Null	Dentist age
dent_birthday	DATE	N/A	Null	Dentist birthday
dent_streetaddress	VARCHAR	255	Null	Dentist street address
dent _city	VARCHAR	255	Null	Dentist city
dent_contactnumber	INT	11	Null	Dentist contact number
dent_email	VARCHAR	255	Null	Dentist email
dent_password	VARCHAR	255	Null	Dentist password
dent_registereddate	TIMESTAMP	N/A	Null	Dentist regitered date
dent_schedule	DATE	N/A	Null	Dentist schedule

Table 38. Staff

Staff				
Field Name	**Data Type**	**Field Length**	**Constraints**	**Description**
staff_id	INT	11	PRIMARY KEY	Staff ID auto generated
staff_name	VARCHAR	255	Null	Staff name
staff_email	VARCHAR	255	Null	Staff email address
staff_password	VARCHAR	255	Null	Staff password

Table 39. Login

Login				
Field Name	**Data Type**	**Field Length**	**Constraints**	**Description**
logged_id	INT	11	PRIMARY KEY	Logged Data ID auto generated
dent_id	INT	11	FOREIN KEY	Dentist ID
user_id	INT	11	FOREIN KEY	User ID
staff_id	INT	11	FOREIN KEY	Staff ID
log_email	VARCHAR	255	Null	Login email
log_password	LONGTEXT	N/a	Null	Login password

Table 40. Appointment

Appointment				
Field Name	**Data Type**	**Field Length**	**Constraints**	**Description**
app_Id	INT	11	PRIMARY KEY	Appointment ID auto increment
dent_id	INT	11	FOREIN KEY	Appointment dentist_id
user_id	INT	11	FOREIN KEY	Appointment users_id
pro_id	INT	11	FOREIN KEY	Appointment dentalprocedure_id
app_date	Date	N/A	Null	Appointment date
app_time	VARCHAR	255	Null	Appointment time

Table 41. Procedure

Procedure				
Field Name	Data Type	Field Length	Constraints	Description
pro_id	INT	11	PRIMARY KEY	Procedure ID, auto increment
pro_casename	VARCHAR	255	Null	Procedure Casename
pro_cost	VARCHAR	255	Null	Procedure Cost

Table 42. Transaction

Transaction				
Field Name	Data Type	Field Length	Constraints	Description
trasn_Id	INT	11	PRIMARY KEY	Transaction ID, auto increment
Bil_id	INT	11	FOREIN KEY	Billing ID
app_id	INT	11	FOREIN KEY	Appointment ID
trans_status	VARCHAR	255	Null	Transaction status

Table 43. Medical Records

Medical Records				
Field Name	Data Type	Field Length	Constraints	Description
med_Id	INT	11	PRIMARY KEY	Medical ID, auto increment
user_id	INT	11	FOREIN KEY	User ID
med_cheifcomp	VARCHAR	255	Null	Medical Chief complaint
med_dentalhistory	VARCHAR	255	Null	Medical dental history

Table 44. DSS

DSS				
Field Name	Data Type	Field Length	Constraints	Description
dss_id	INT	11	PRIMARY KEY	DSS ID, auto increment
dent_id	INT	11	FOREIN KEY	Dentist ID
user_id	INT	11	FOREIN KEY	User ID
dss_image	BLOB	N/A	Null	DSS Image

Table 45. SMS

SMS				
Field Name	Data Type	Field Length	Constraints	Description
sms_Id	INT	11	PRIMARY KEY	SMS ID, auto increment
app_id	INT	11	FOREIN KEY	Appointment ID
sms_message	VARCHAR	255	Null	SMS message

Table 46. File

File				
Field Name	Data Type	Field Length	Constraints	Description
file_Id	INT	11	PRIMARY KEY	File ID, auto increment
user_id	INT	11	FOREIN KEY	User ID
file_name	VARCHAR	255	Null	File name

Table 47. Billing

Billing				
Field Name	Data Type	Field Length	Constraints	Description
bil_id	INT	11	PRIMARY KEY	billing ID, auto increment
user_id	INT	11	FOREIN KEY	User ID
pro_id	INT	11	FOREIN KEY	Procedure ID
bil_total	INT	255	Null	Total cost

System Architecture

System architecture is abstract, conceptual, global, and focused on achieving the system's mission and lifecycle principle. Figure 30 illustrates the system architecture for the proposed IS in Idagdag Dental Clinic. There are three users namely; patients, dental staff, dentist, wherein they can access their respective accounts and access different features in the proposed IS.

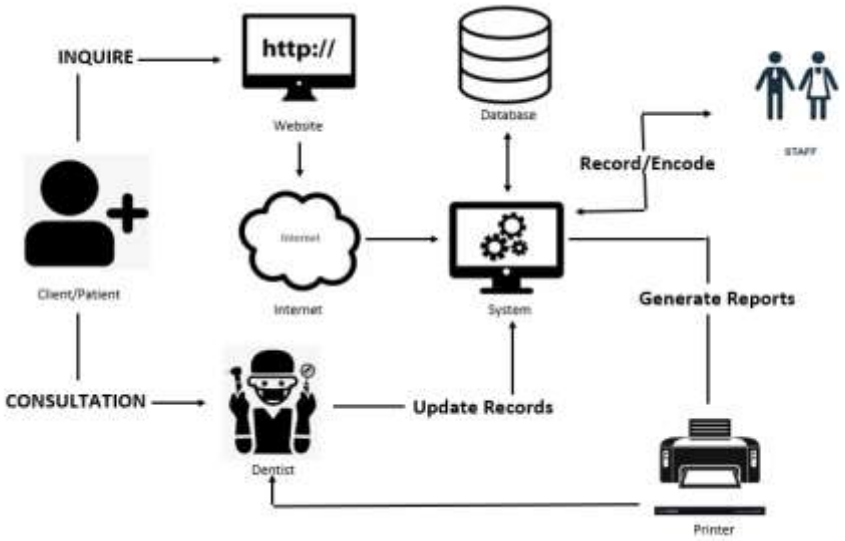


Figure 30. System Architecture

System User Interface

Presented below is a Dental Management System that provides clinic staff with high-efficiency management tools, computerized and systematic patient records, and detailed treatment records. In this proposed IS, innovative features such as, appointment and scheduling, SMS notification, and decision support is provided. This proposed IS will undoubtedly improve clinic services and make daily operations run smoothly. As a result, proponents provide user-friendly interface design so that users can't face difficulties while utilizing it.

1. Create Account and Login

Figure 31 shows the login page of the Patient, Dentist and Staff.

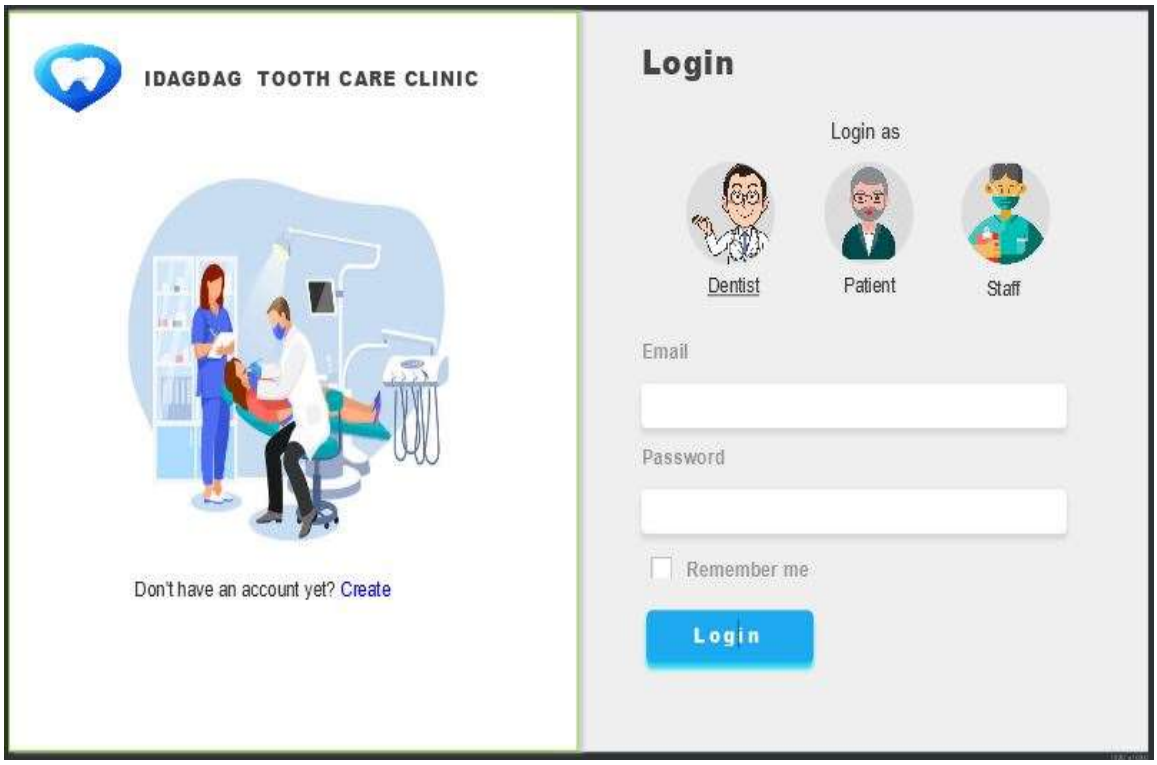


Figure 31. Login

Figure 32 shows the create account page for Patient, Dentist and Staff.

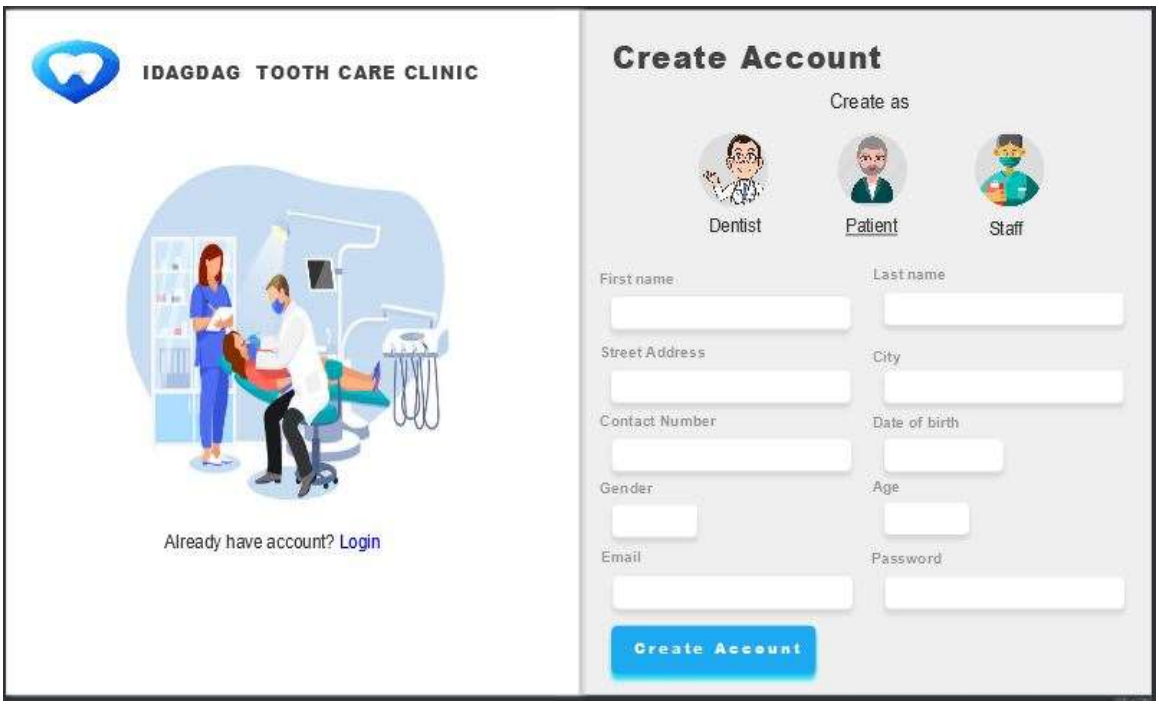


Figure 32. Create Account

2. User

Figure 33 show Information of the patients such as upcoming appointments, past appointments, medical records, and diagnosis.

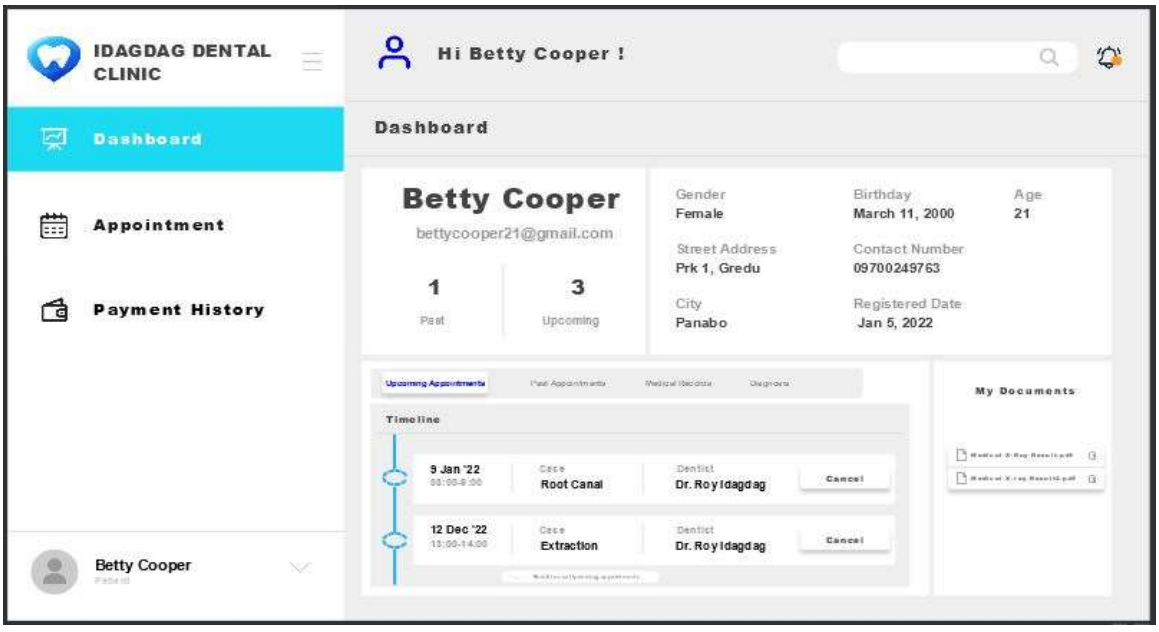


Figure 33. Dashboard

Figure 34 show the patient can set appointment and cancel appointment.

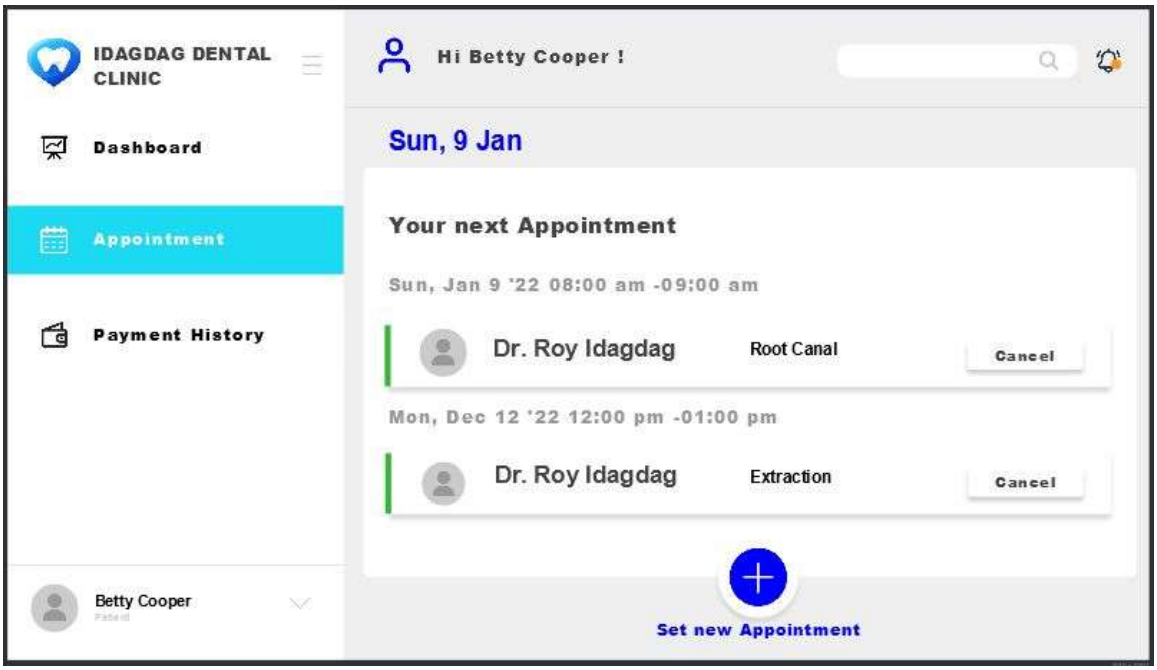


Figure 34. Appointment

Figure 33 shows the step 1 of setting the appointment which one select Case.

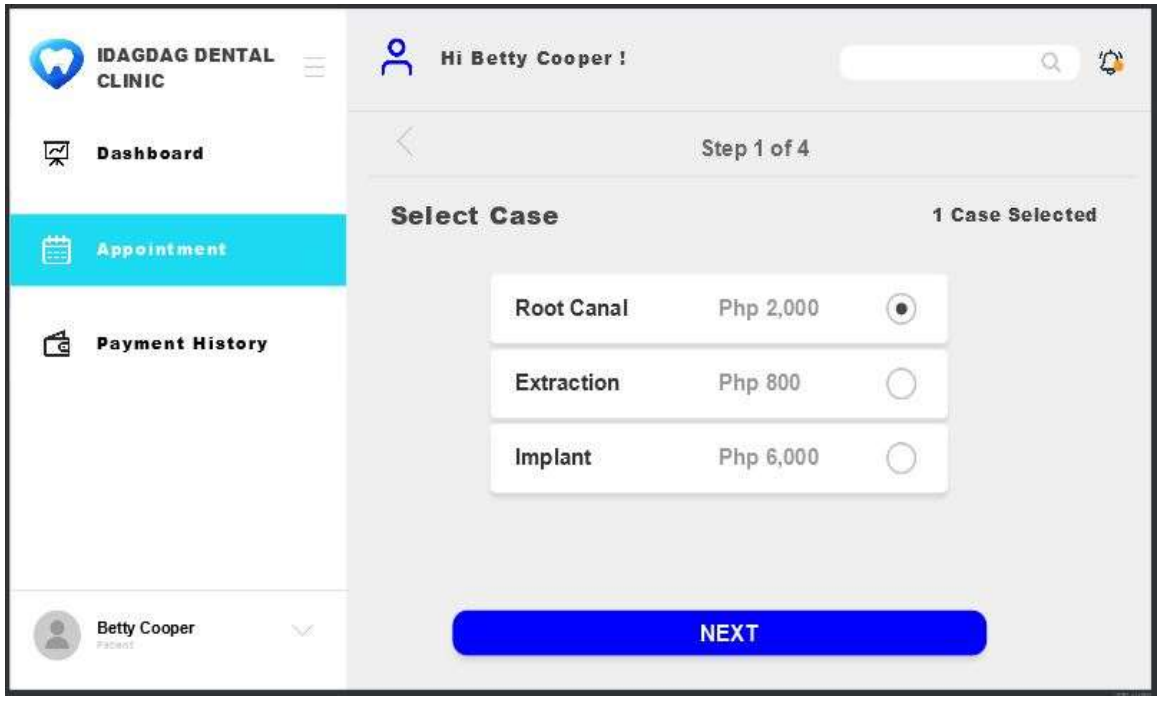


Figure 35. Select Case

Figure 36 shows the step 2 to select the patient's desired dentist**.**

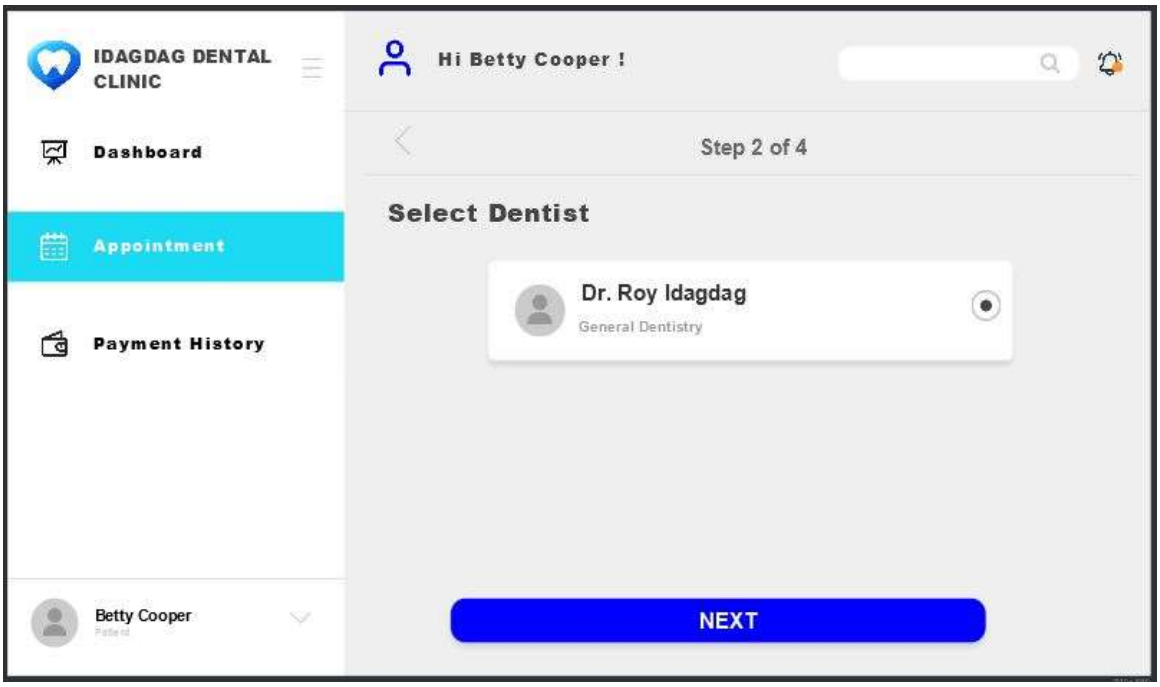


Figure 36. Select Dentist

Figure 37 shows the step 3 to Select the time and date the patient want.

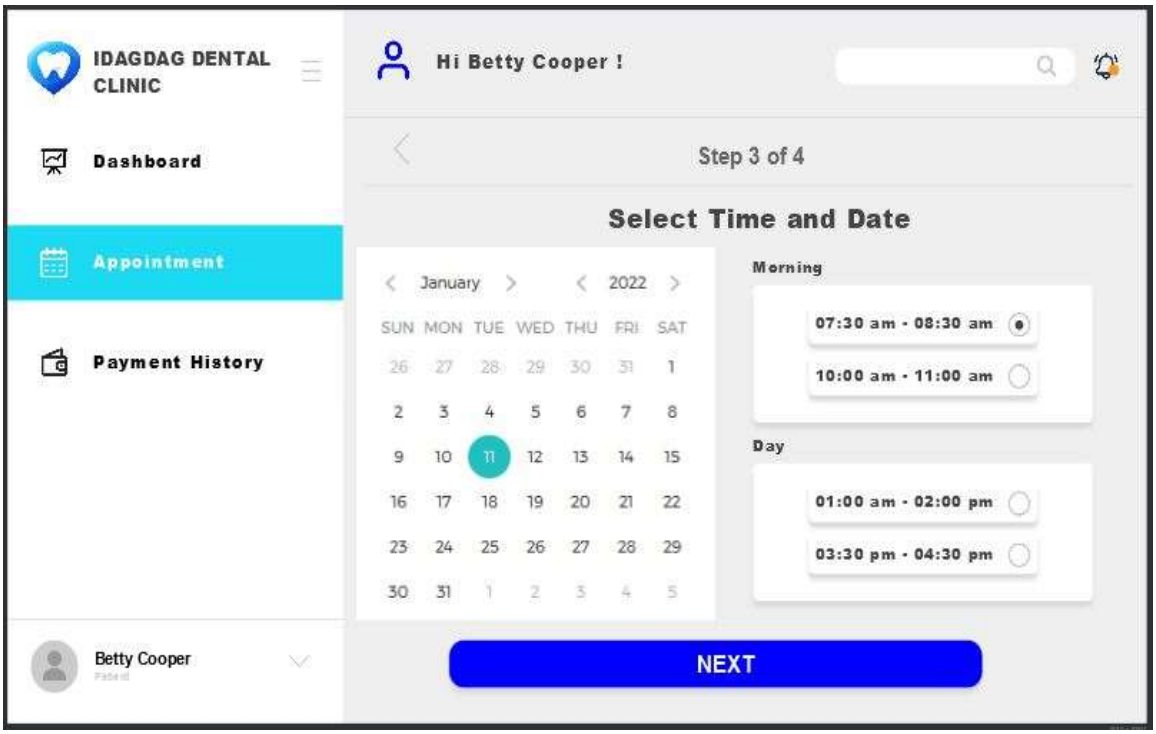


Figure 37. Select Time and Date

Figure 38 shows the last step that user can see the summary of their appointment.

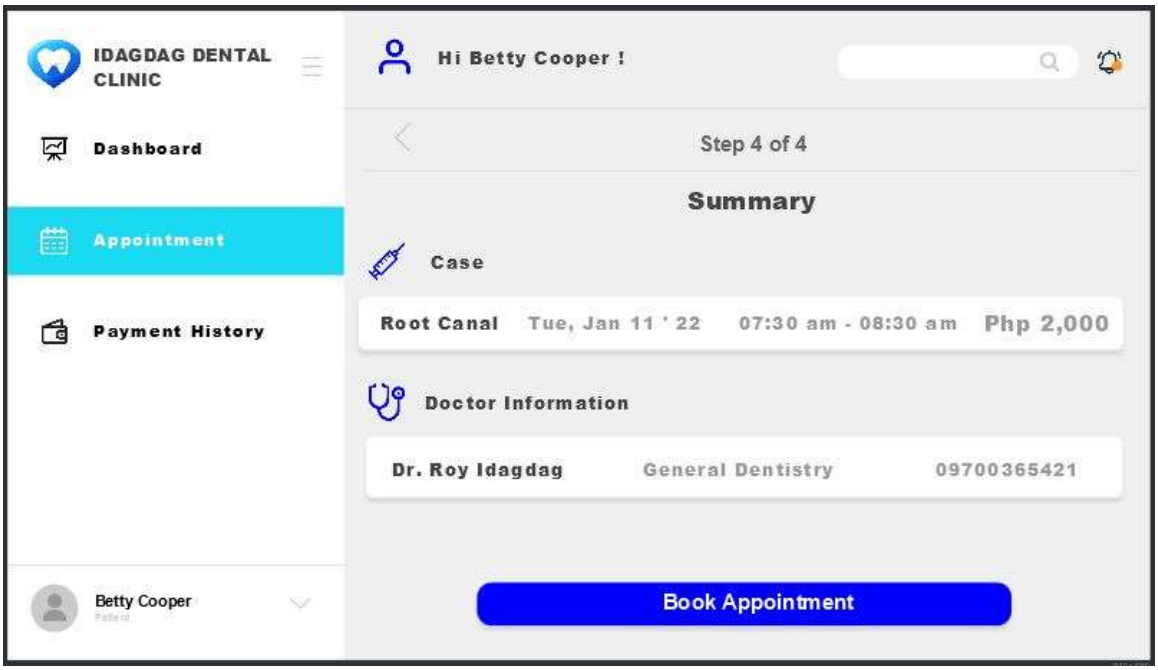


Figure 38. Appointment Summary

Figure 39 shows that the patient can see the payment history whether it is paid or not.

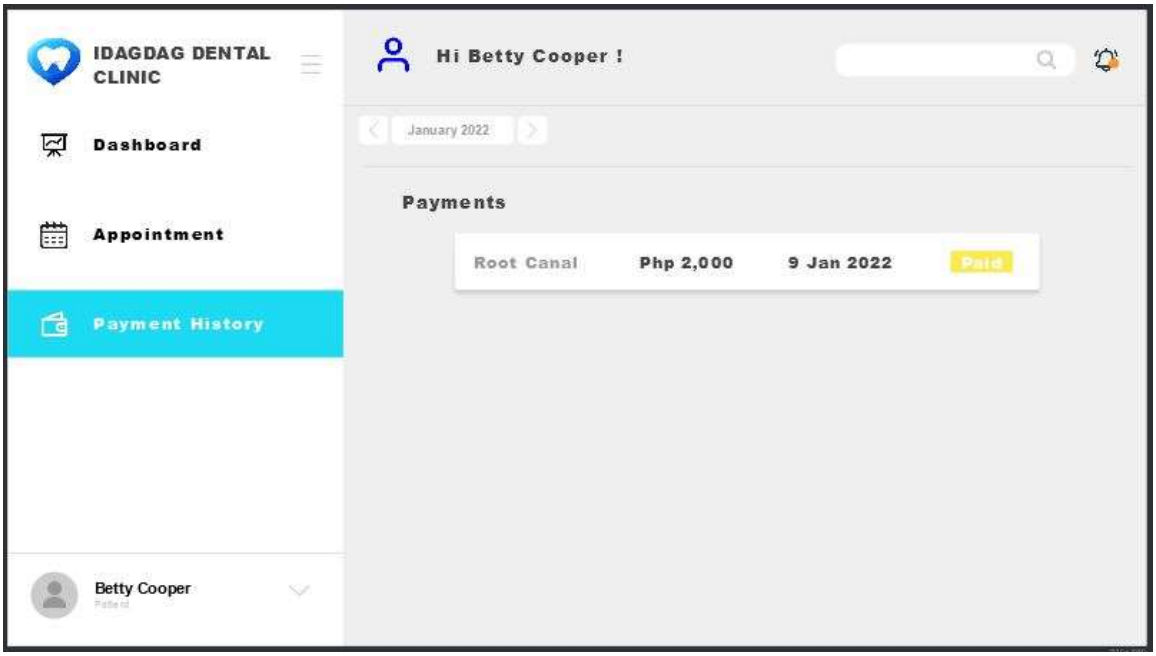


Figure 39. Payment History

3. Dentist

Figure 40 shows the overview where the dentist can see numbers of approval, appointment, and number of patients.

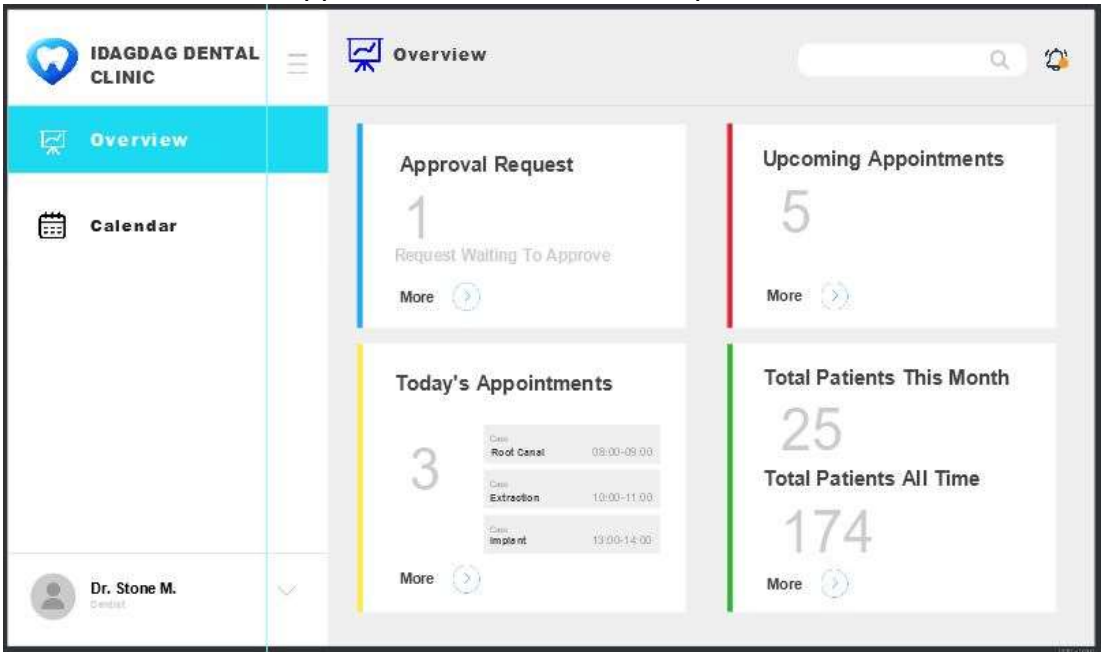


Figure 40. Overview

Figure 41 shows the function that Dentists can view available appointments on.

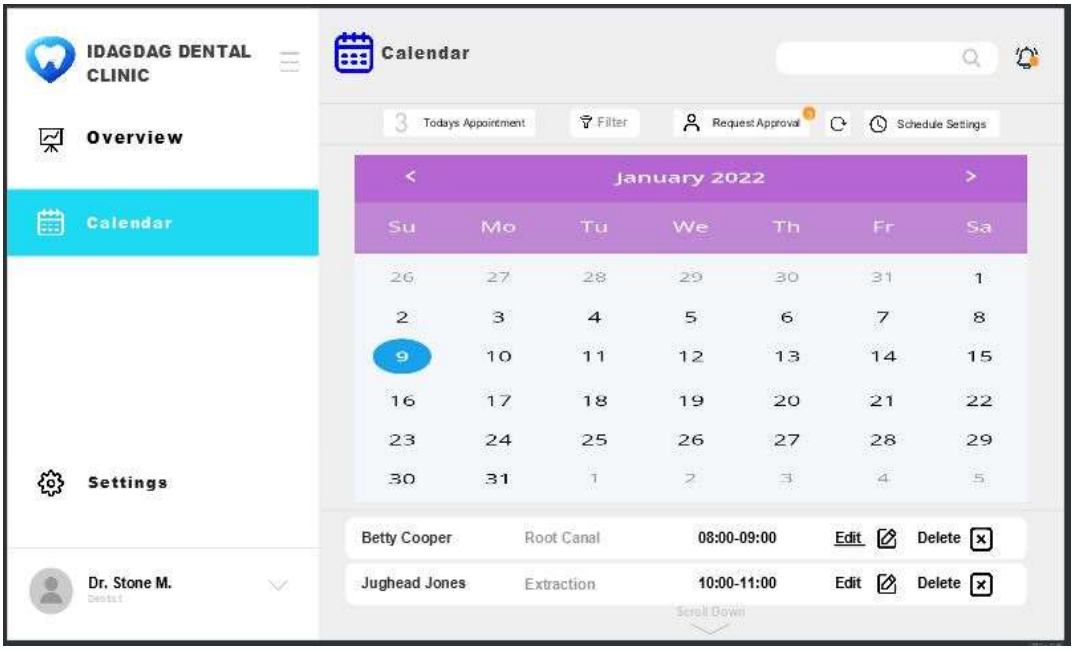


Figure 41. Calendar

Figure 42 shows that Dentist can approve patient appointment.

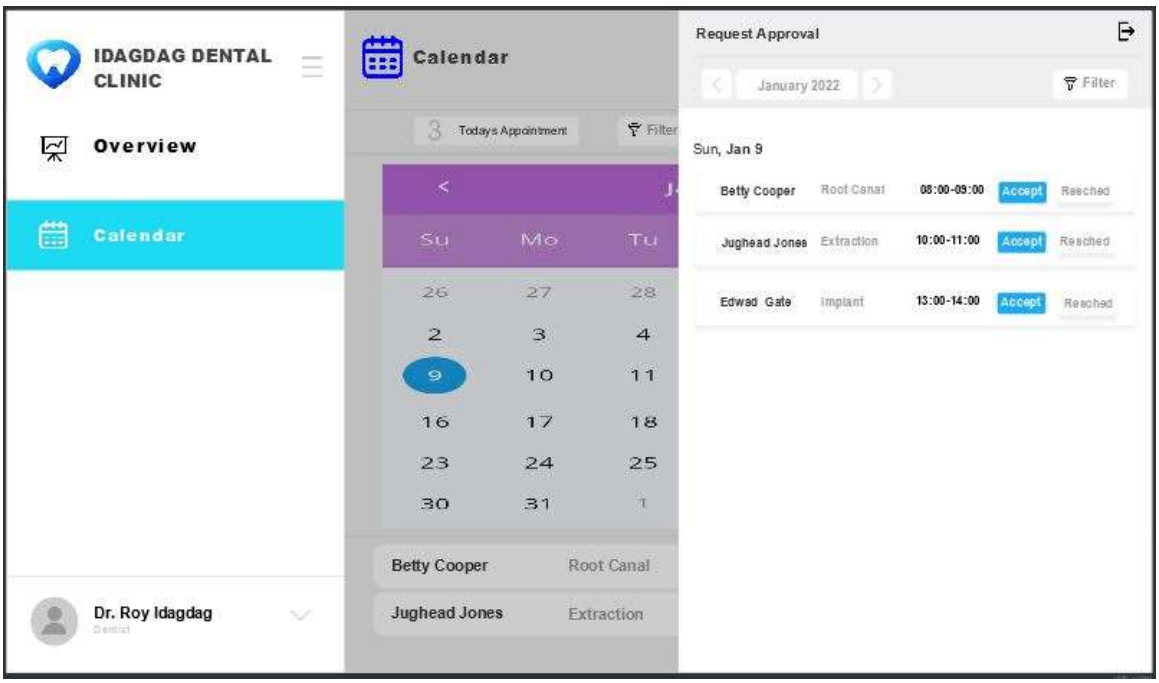


Figure 42. Appointment Approval

Figure 43 shows that Dentist can select time availability**.**

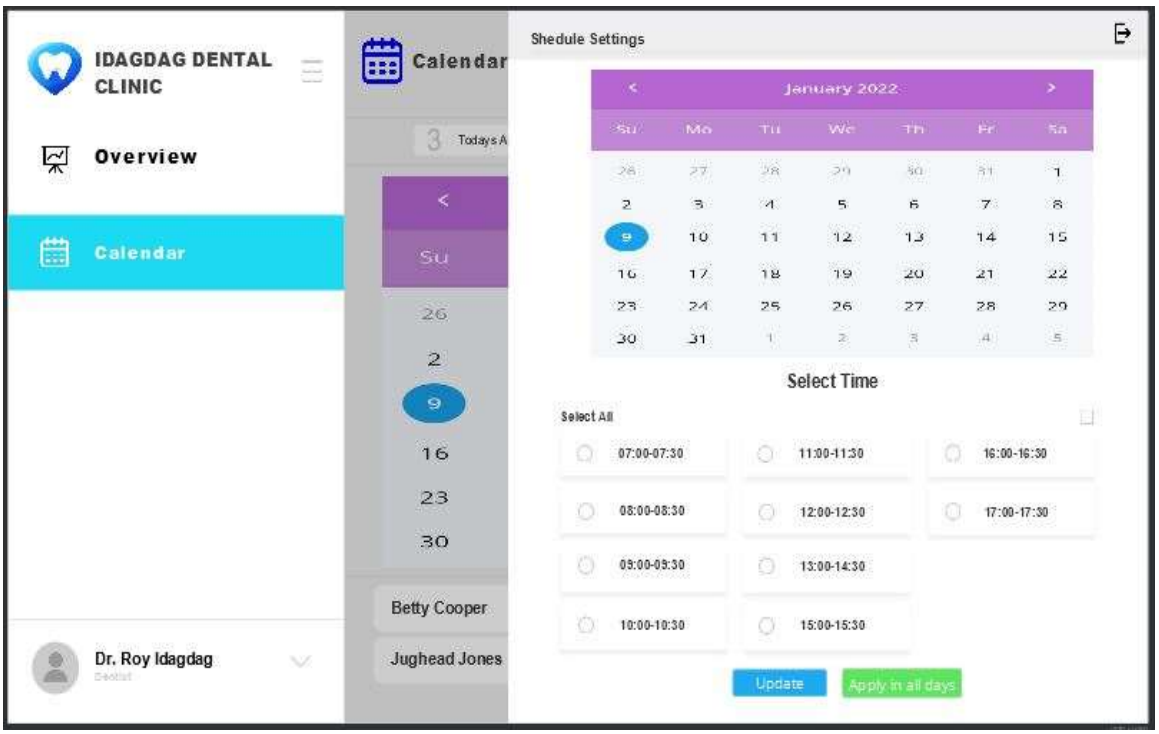


Figure 43. Schedule Settings

Figure 44 shows that Dentist can reschedule patients' appointments.

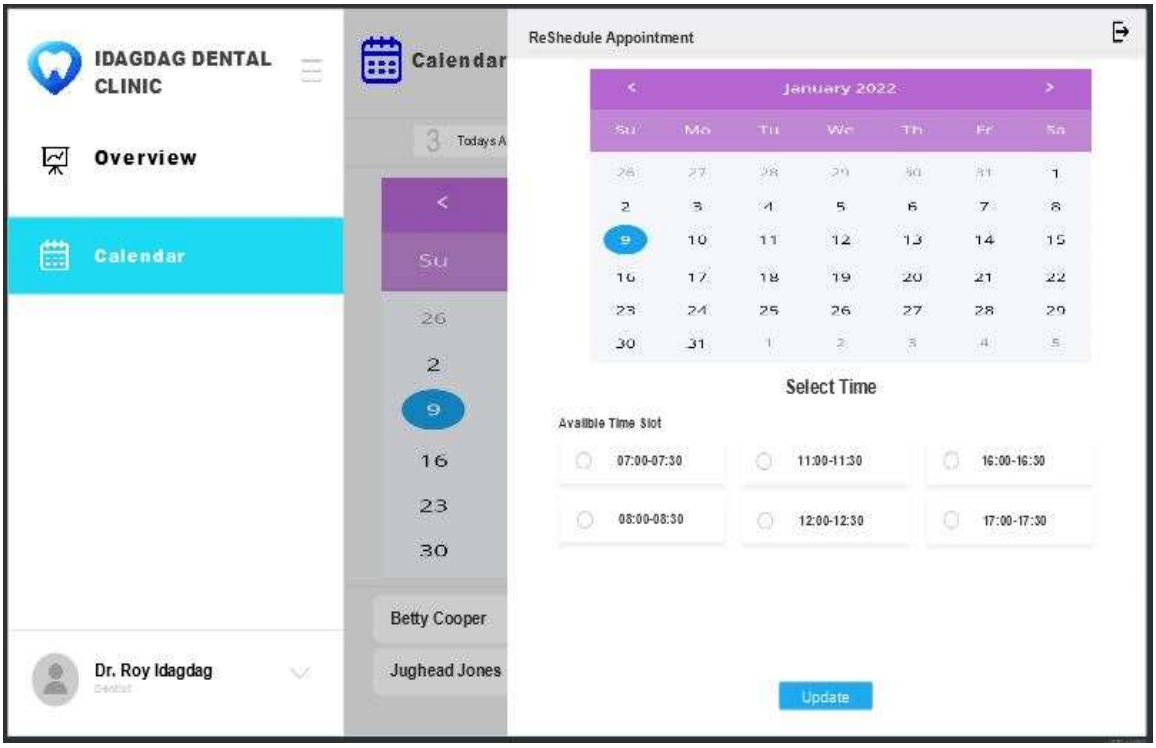


Figure 44. Reschedule

Figure 45 shows that Dentist can view patient basic information.

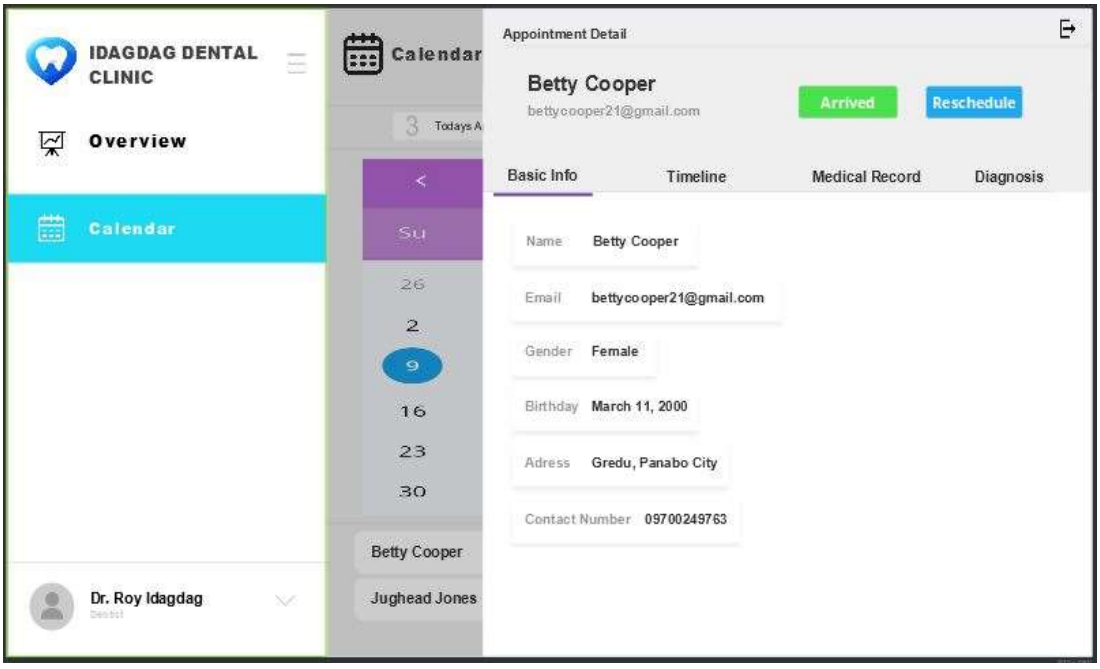


Figure 45. Patient basic information

Figure 46 shows that Dentist can view appointment timeline.

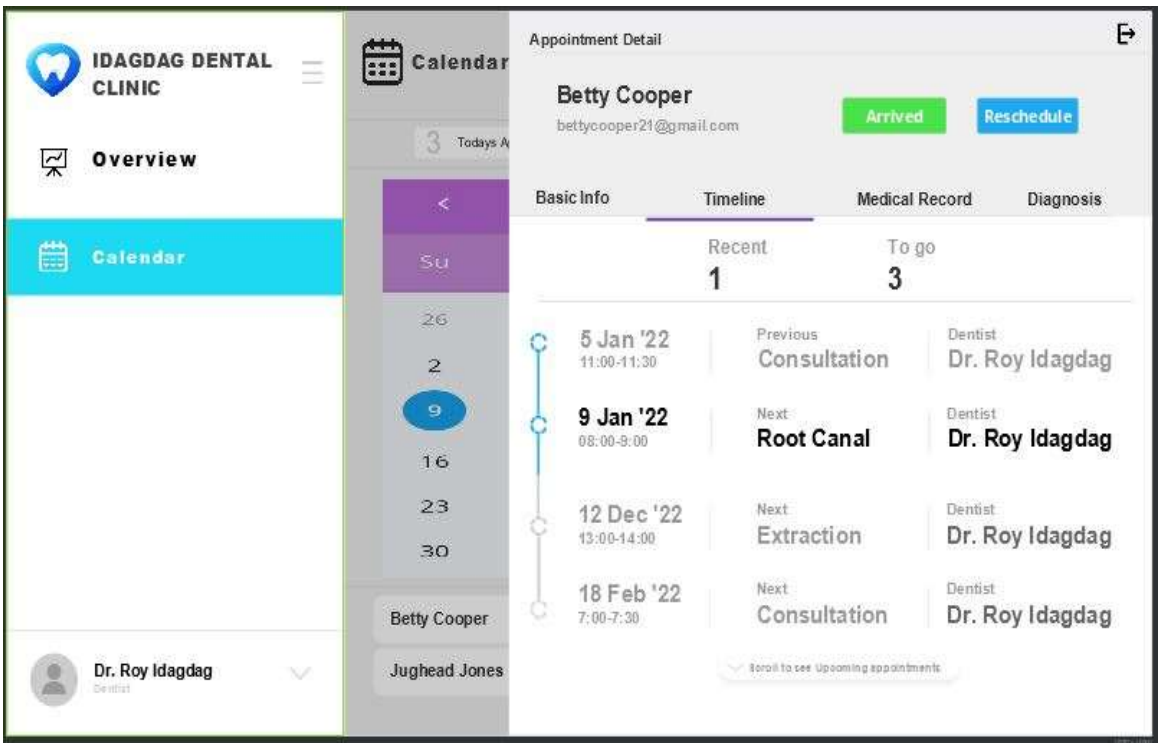


Figure 46. Patient Timeline

Figure 47 shows that Dentists can view and add medical records of the patients.

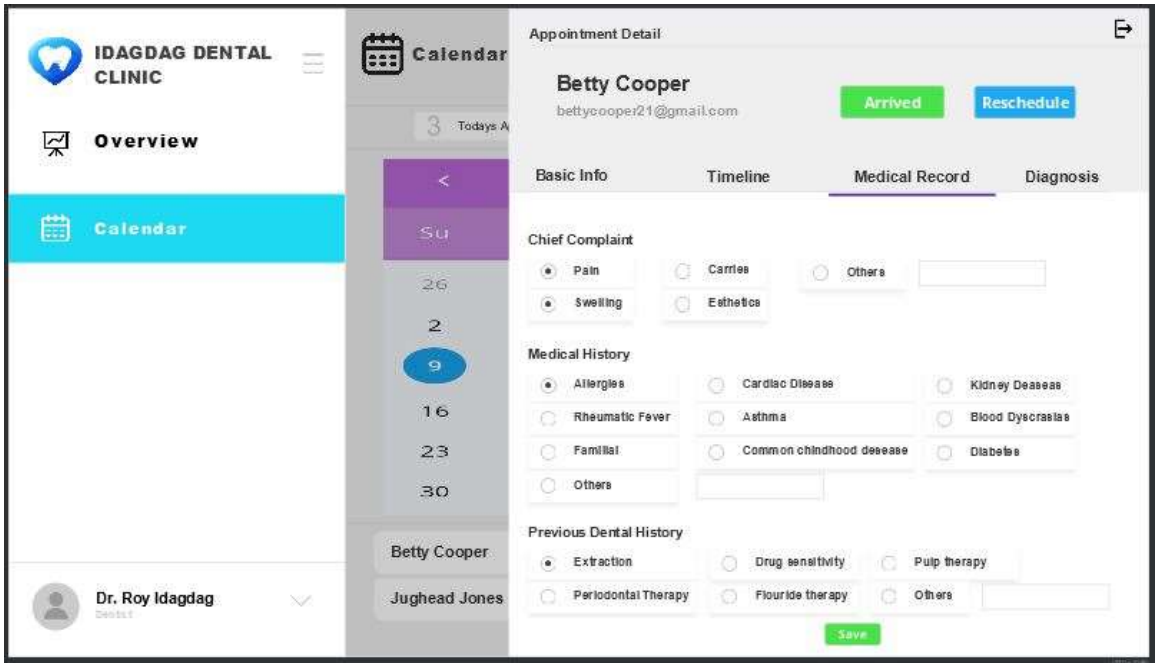


Figure 47. Patient Medical record

Figure 48 shows that Dentist can run diagnosis to see what dental disease patient have.

Figure 48. Patient Diagnosis

4. Dental Staff

Figure 49 shows that Staff able to view all patients registered in the system.

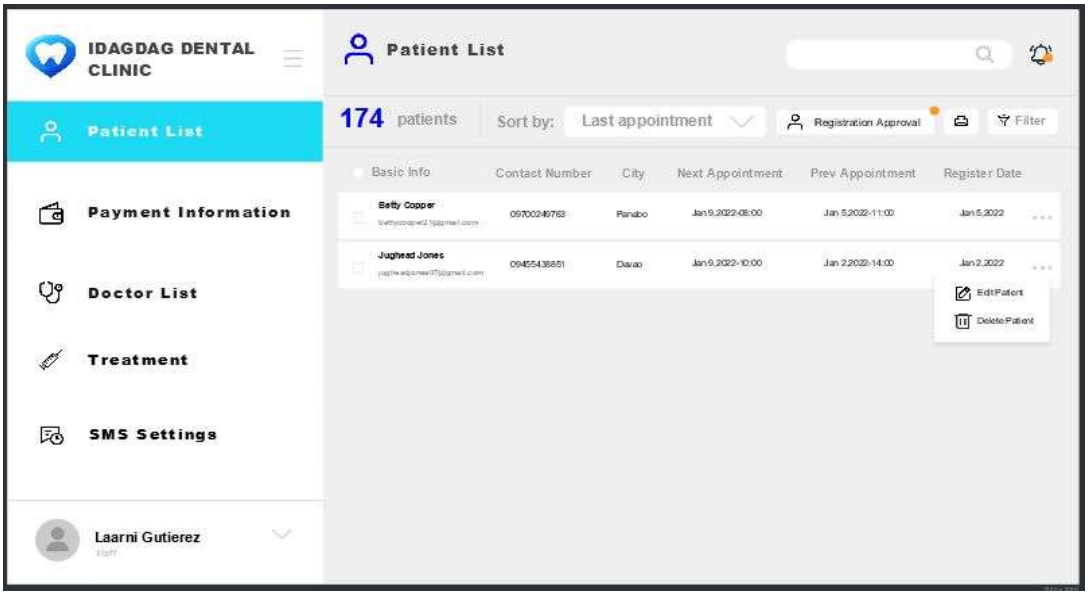


Figure 49. Patient list

Figure 50 shows that Staff can approve or decline account registration.

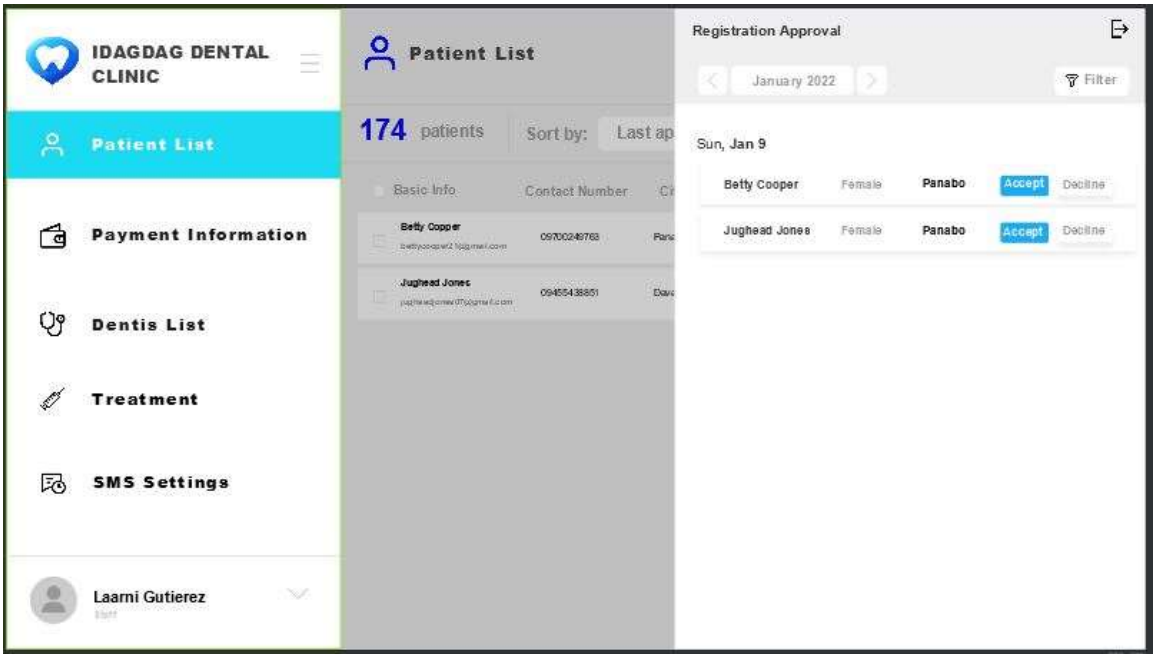


Figure 50. Patients Approval

Figure 51 shows that the Staff can view appointments and have power to cancel them.

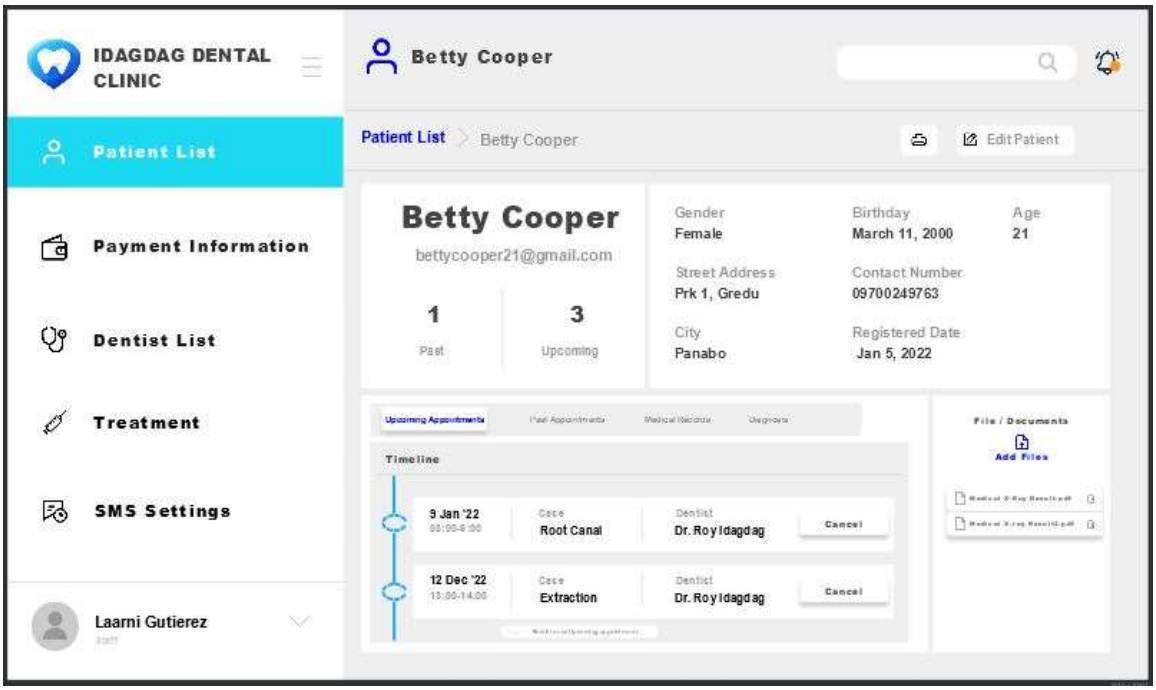


Figure 51. Patient Upcoming appointments

Figure 52 shows that the Staff is able to view patient past appointments.

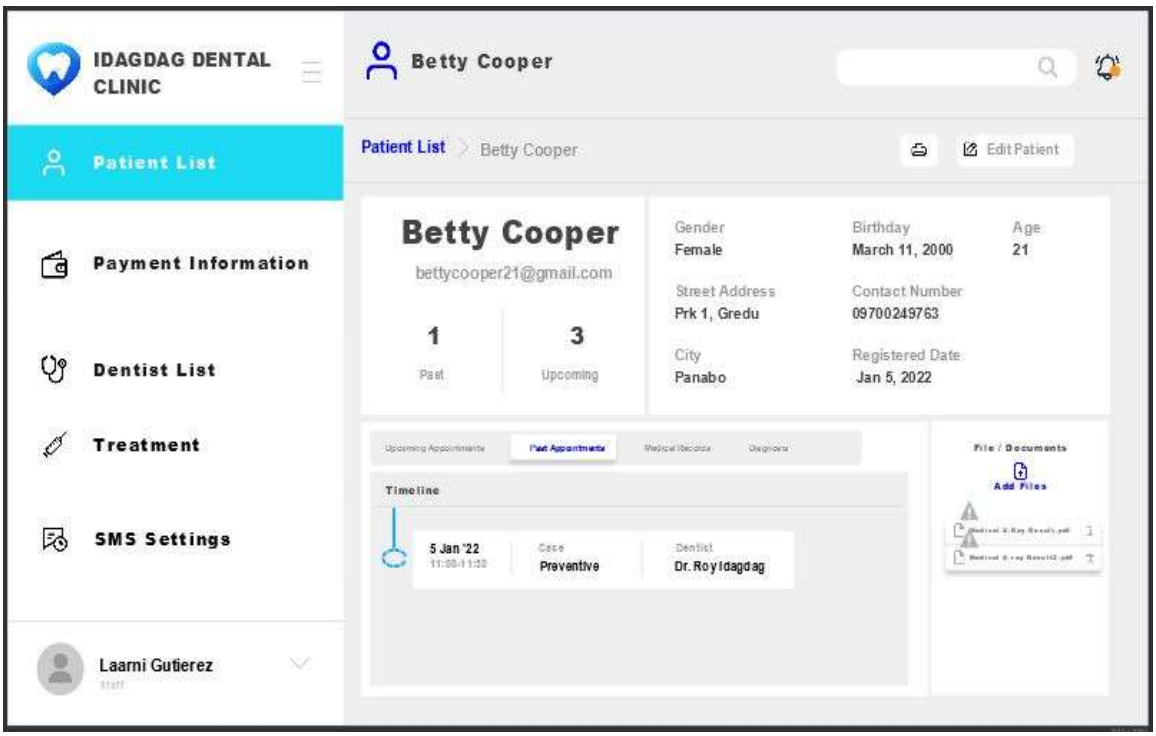


Figure 52. Patient past appointment

Figure 53 shows that the Staff is able to view Medical History of the patients but cannot modify it.

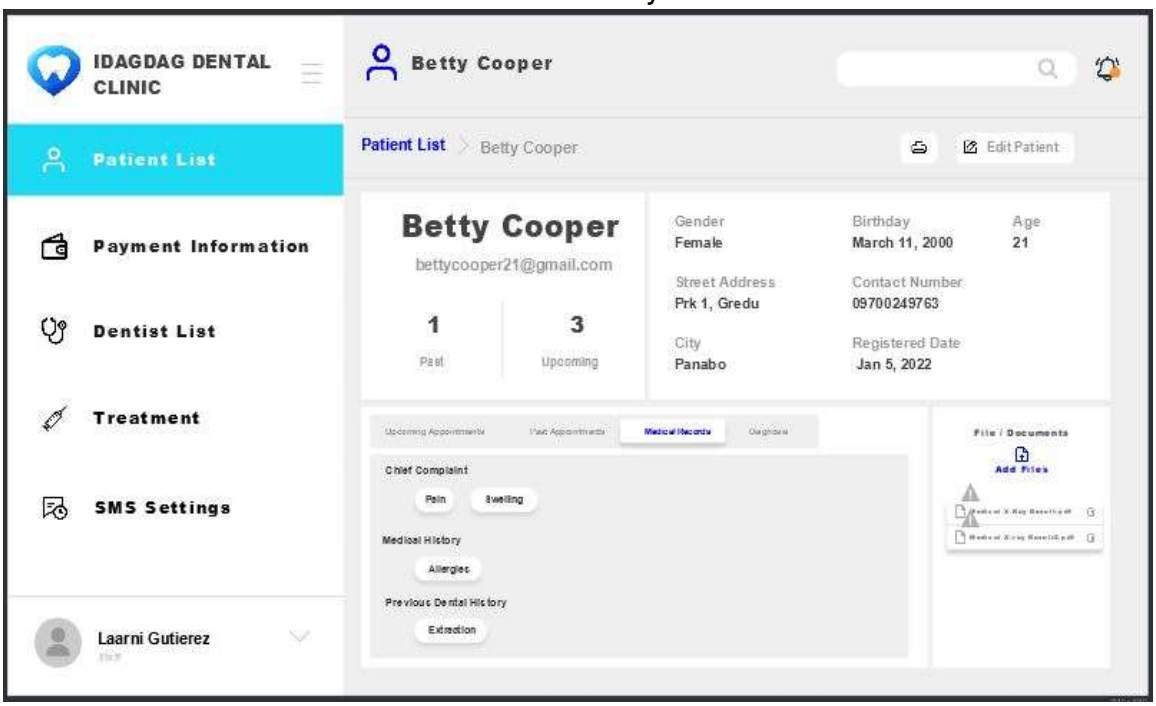


Figure 53. Patient Medical Record

Figure 54 shows that the Staff is able to view patient diagnosis.

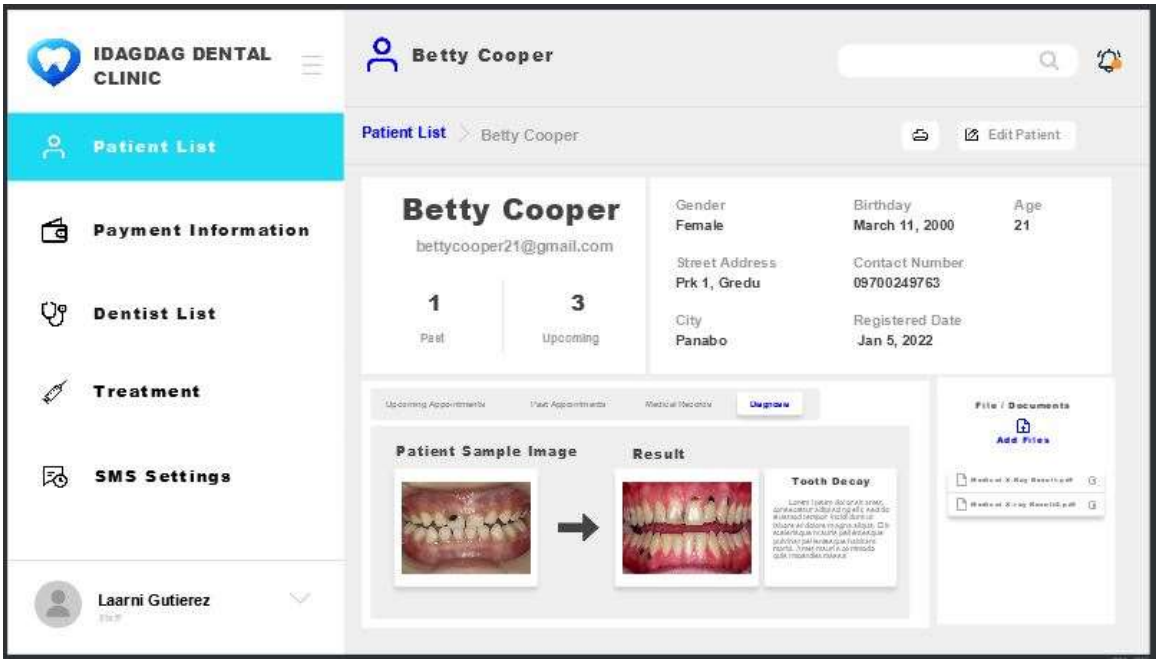


Figure 54. Patient Diagnosis

Figure 55 shows that the Staff is able to view all pending patient payments.

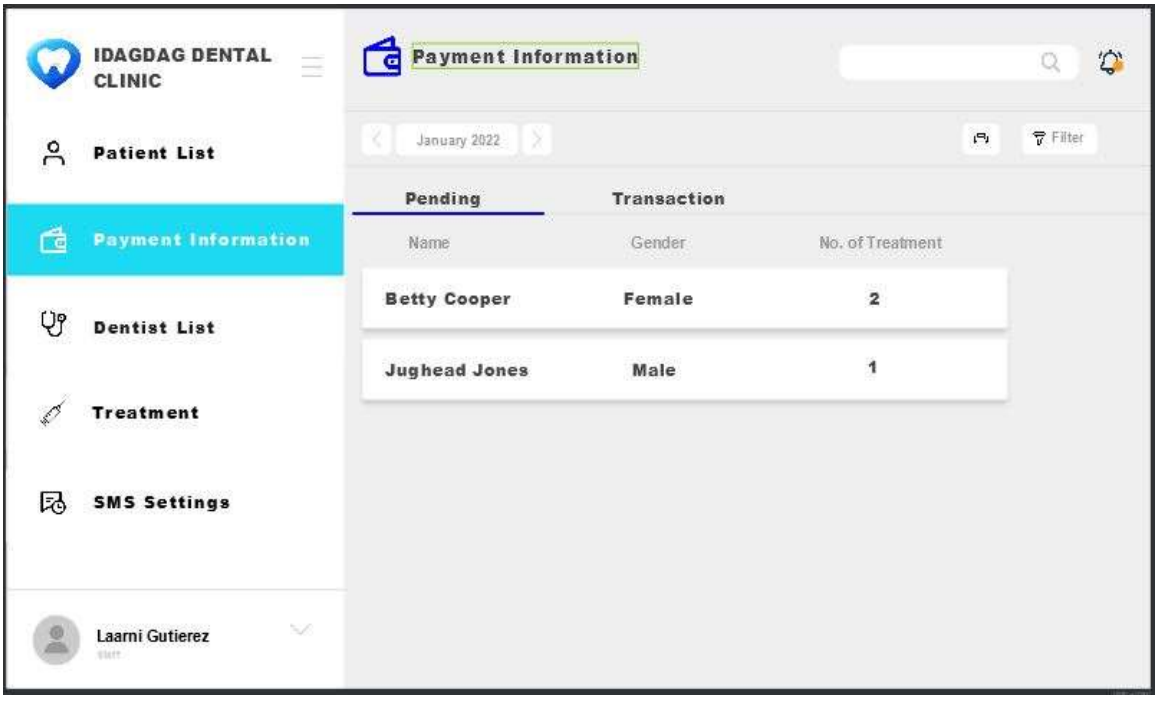


Figure 55. Pending Payment by patient

Figure 56 that the Staff can select patients pending treatment to be payed.

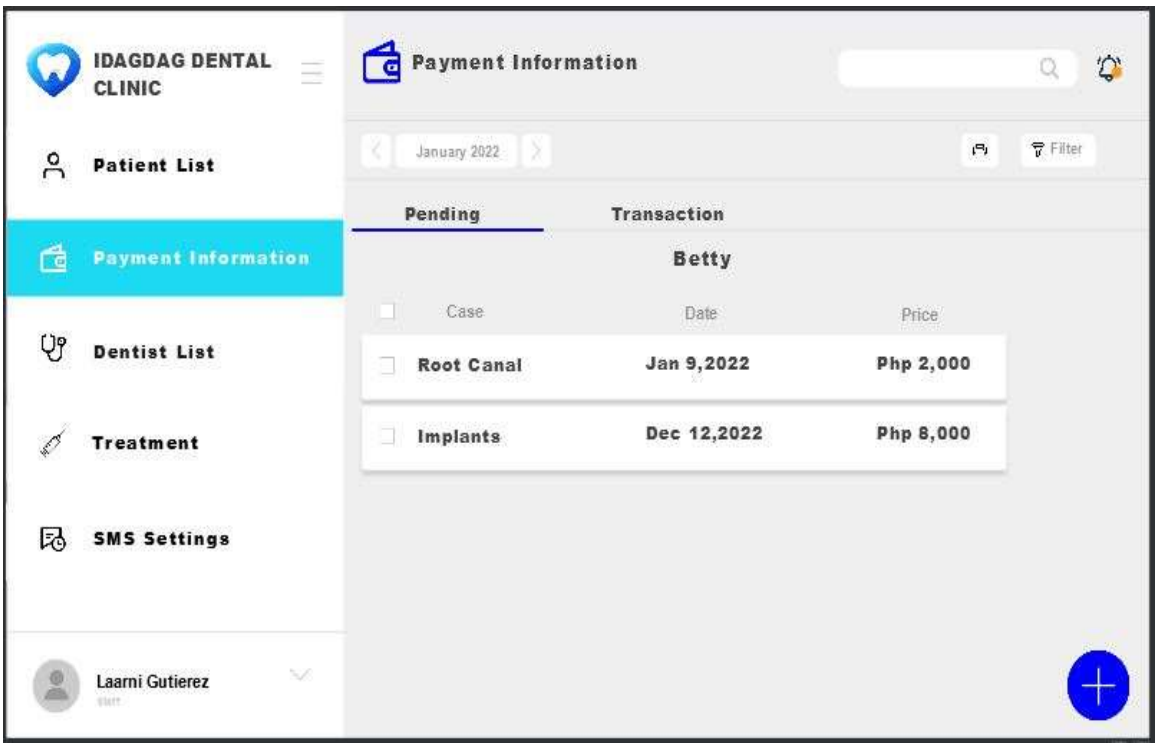


Figure 56. Pending treatments to pay

Figure 57 shows that the Staff can add payments.

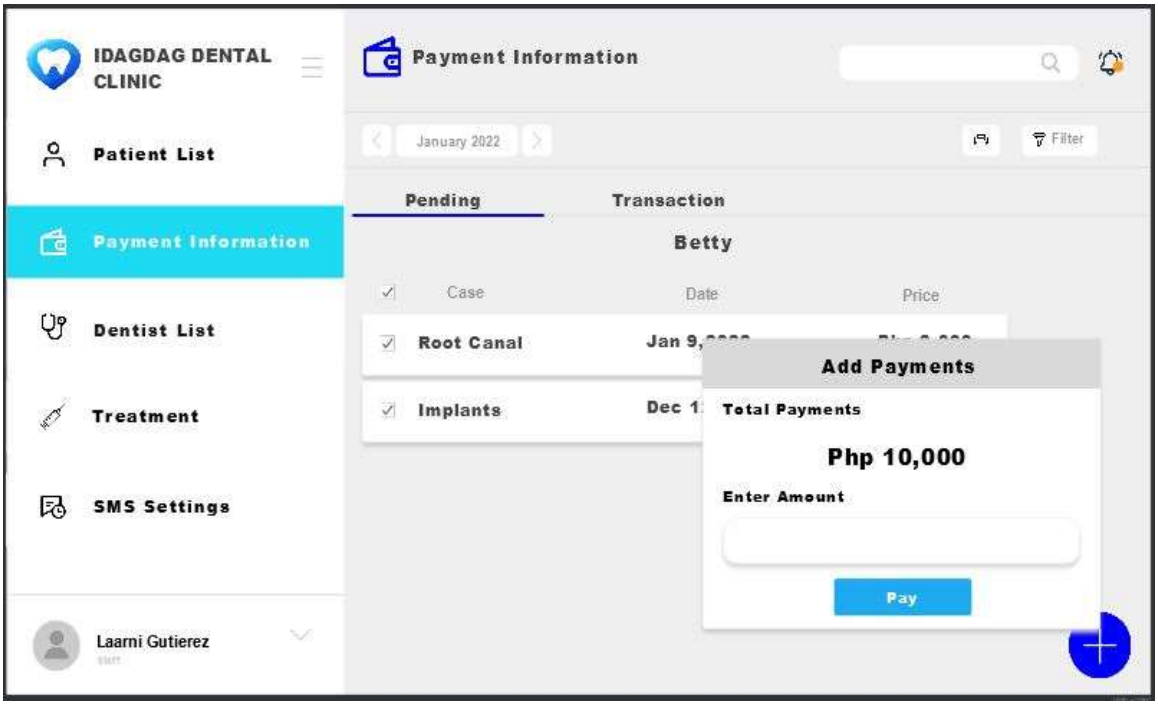


Figure 58. Add payments

Figure 58 shows that the Staff can view all transactions made.

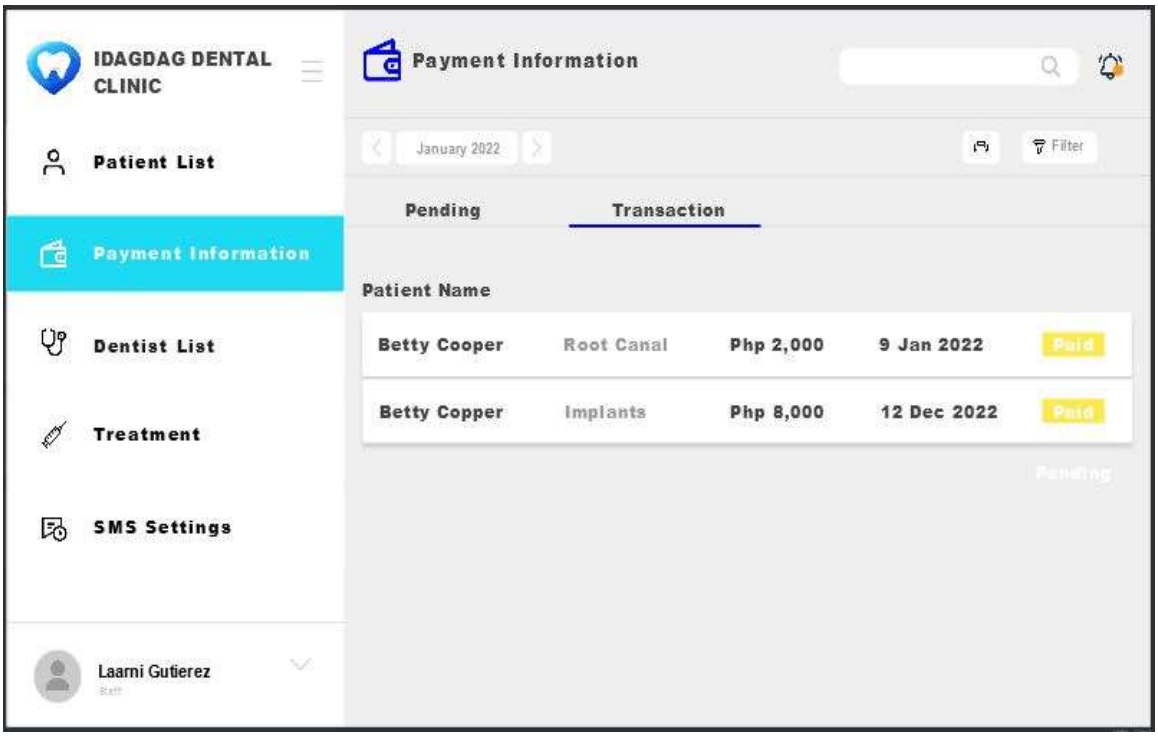


Figure 58. Transaction

Figure 59 shows that the Staff can view list of dentists registered.

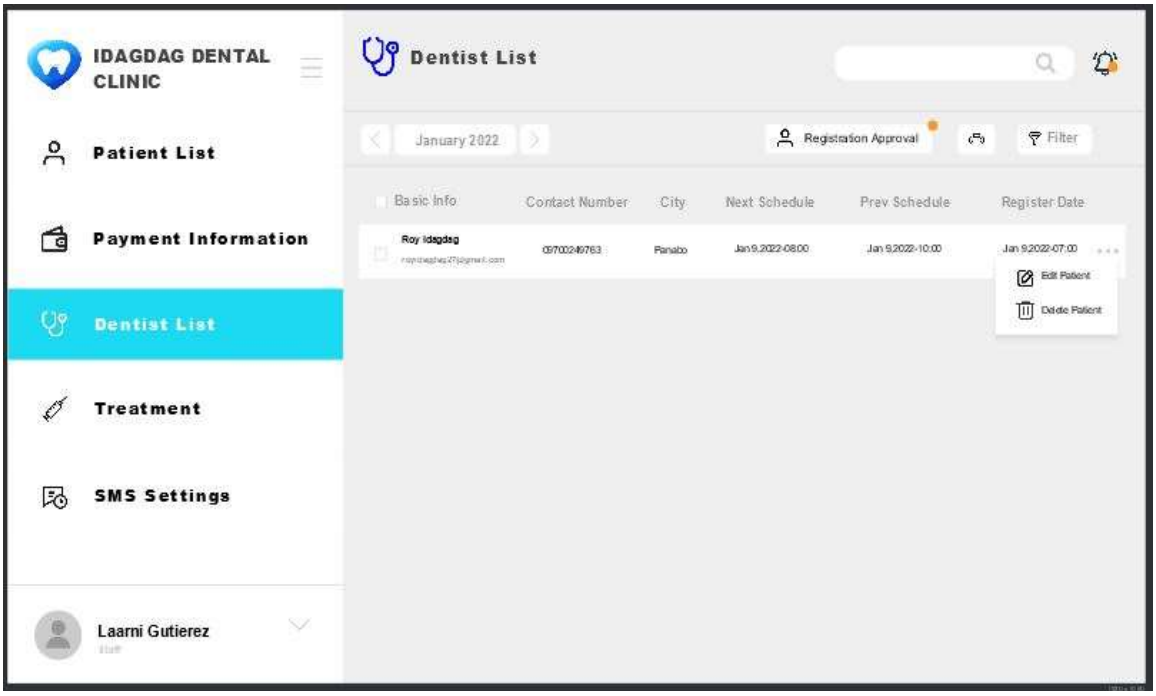


Figure 59. Dentist list

Figure 60 shows that the Staff can accept or decline dentist registration.

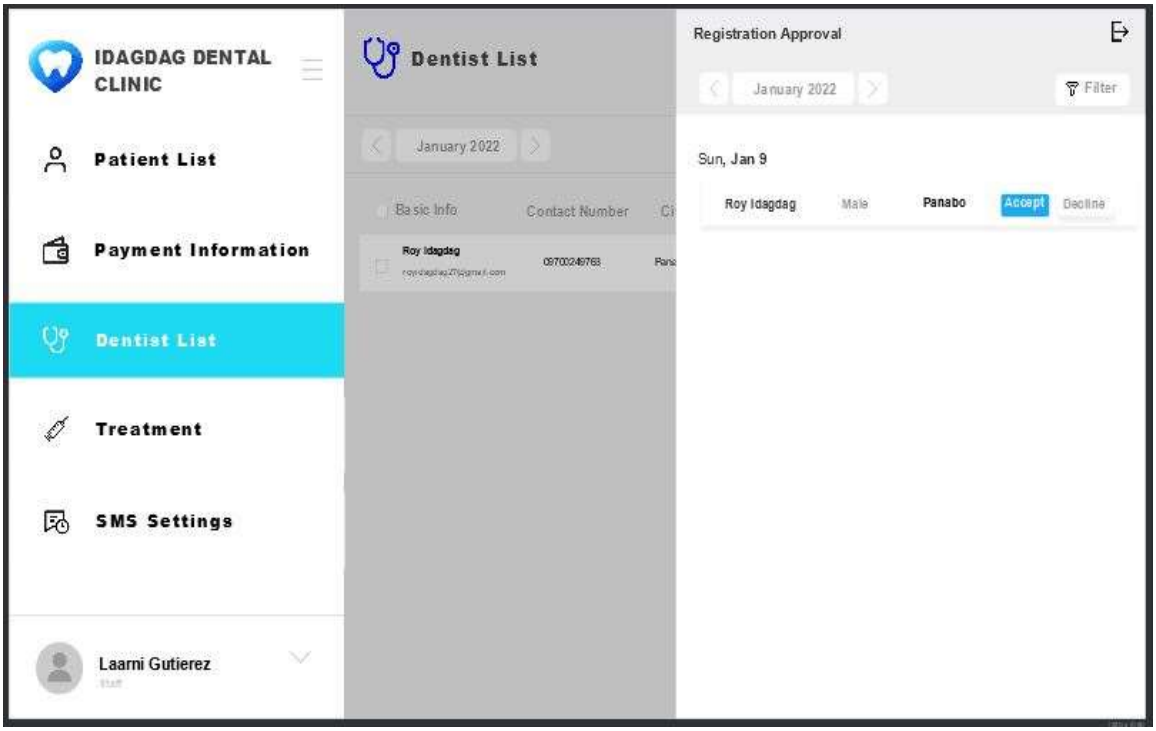


Figure 60. Dentist registration approval

Figure 61 shows that the Staff can view a dentist's upcoming appointments and can cancel it.

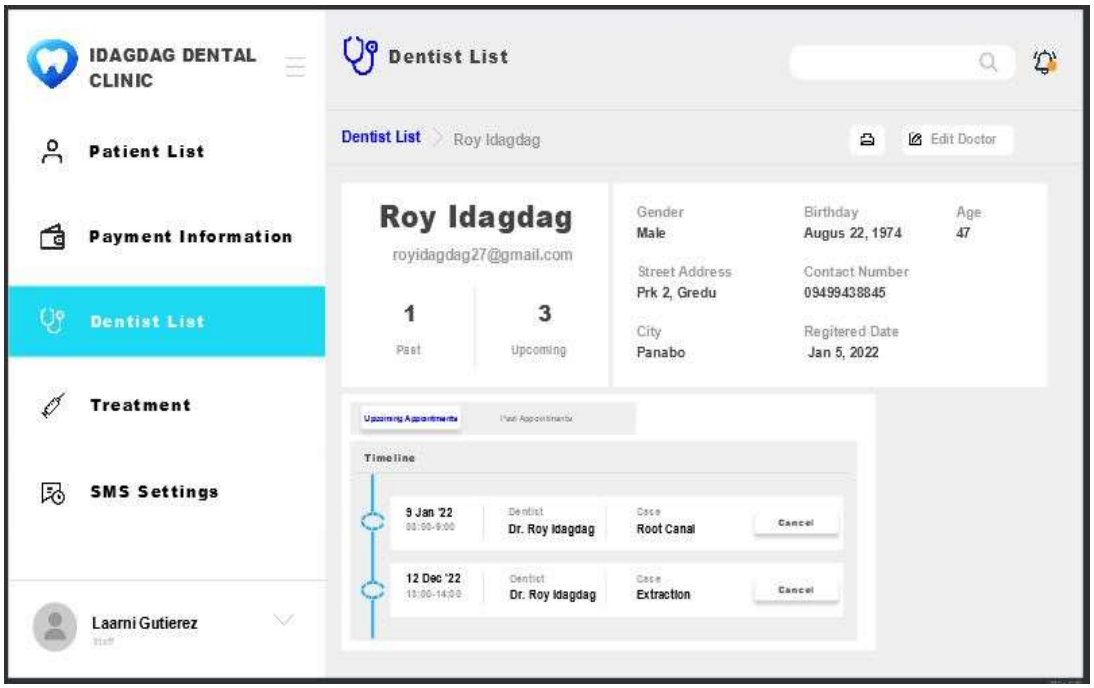


Figure 61. Upcoming appointments

Figure 62 shows that the Staff can view past appointments.

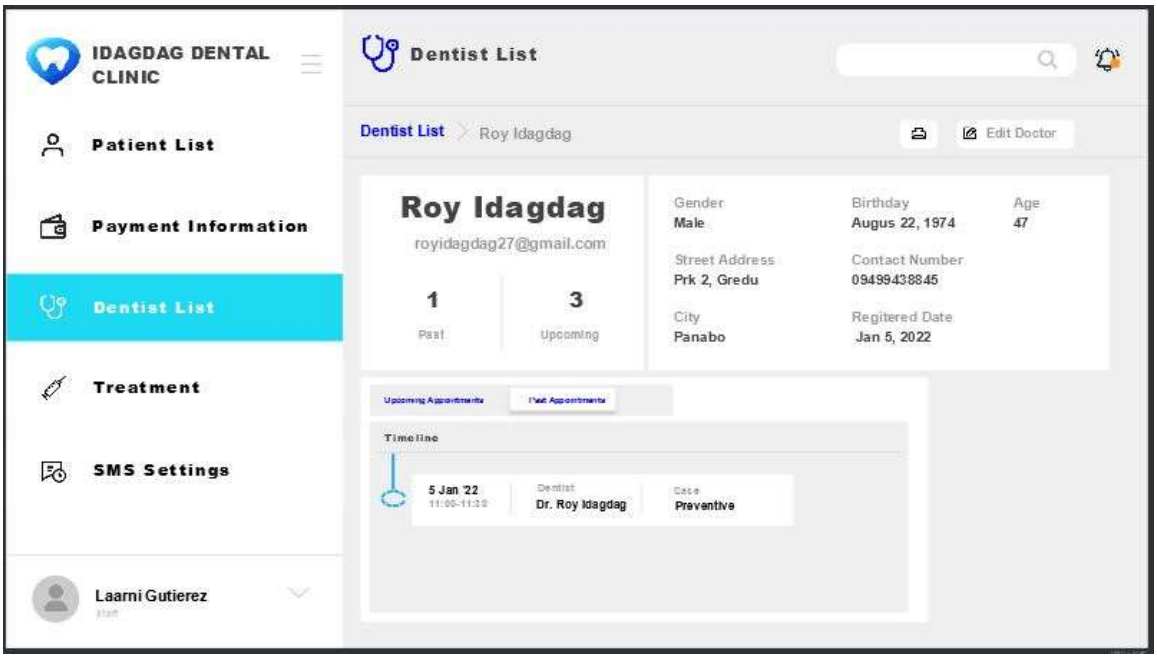


Figure 62. Dentist past appointments

Figure 63 shows that the Staff can view treatment table.

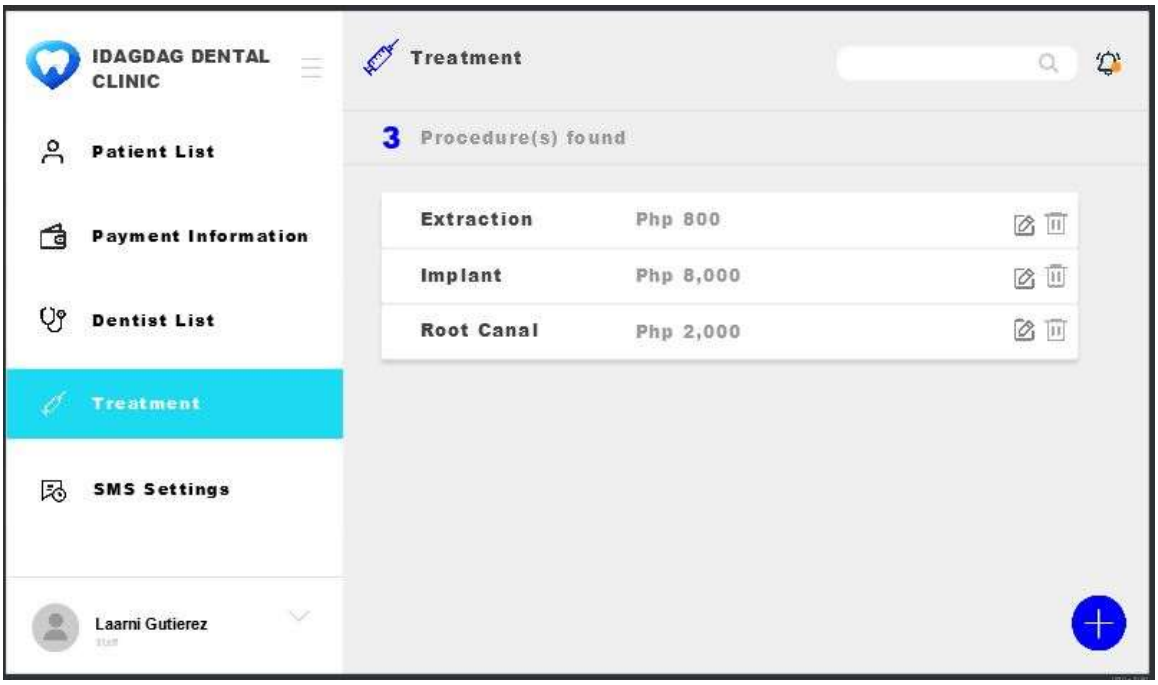


Figure 63. Treatment

Figure 64 shows that Staff can add procedures and amount.

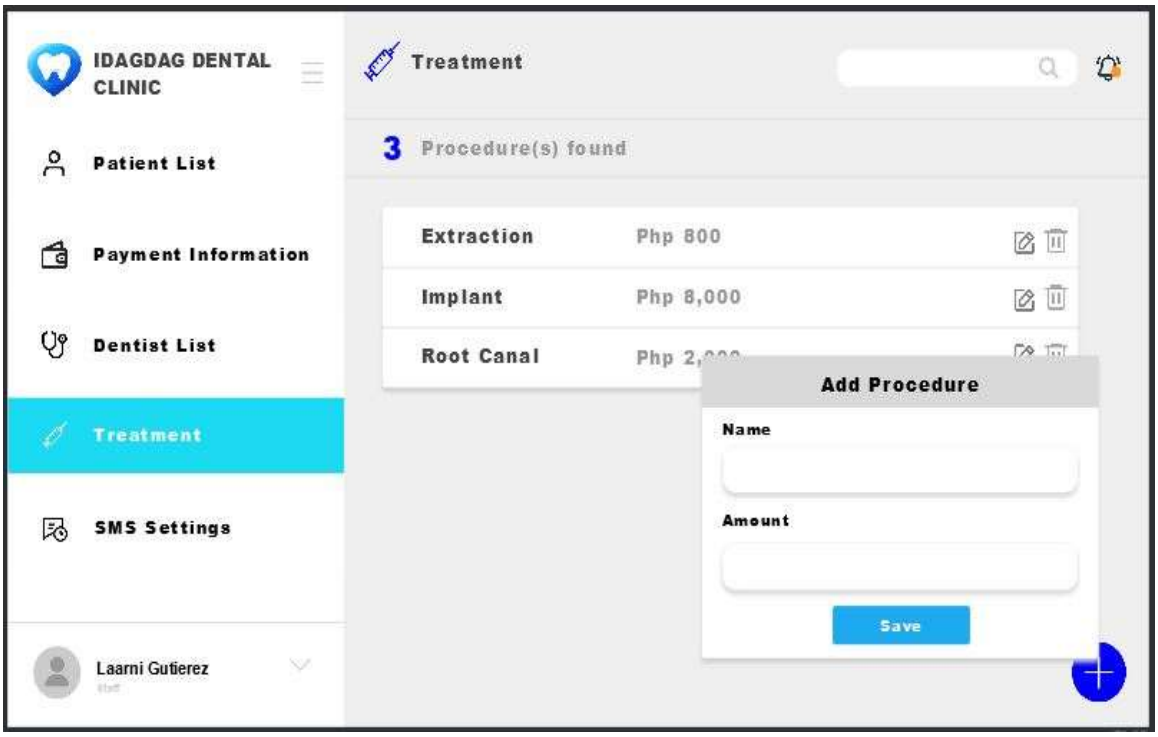


Figure 64. Add procedure

Figure 65 shows that the Staff can edit the procedure, name and amount.

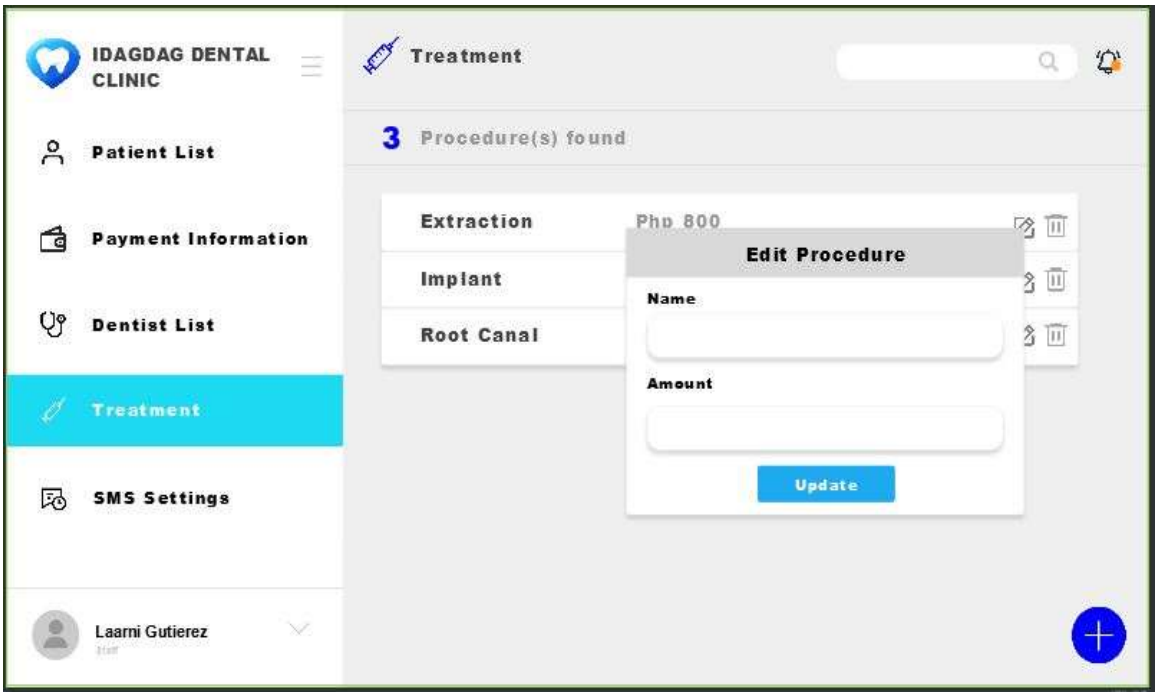


Figure 65. Edit procedure

Figure 66 shows that Staff can modify SMS notification settings.

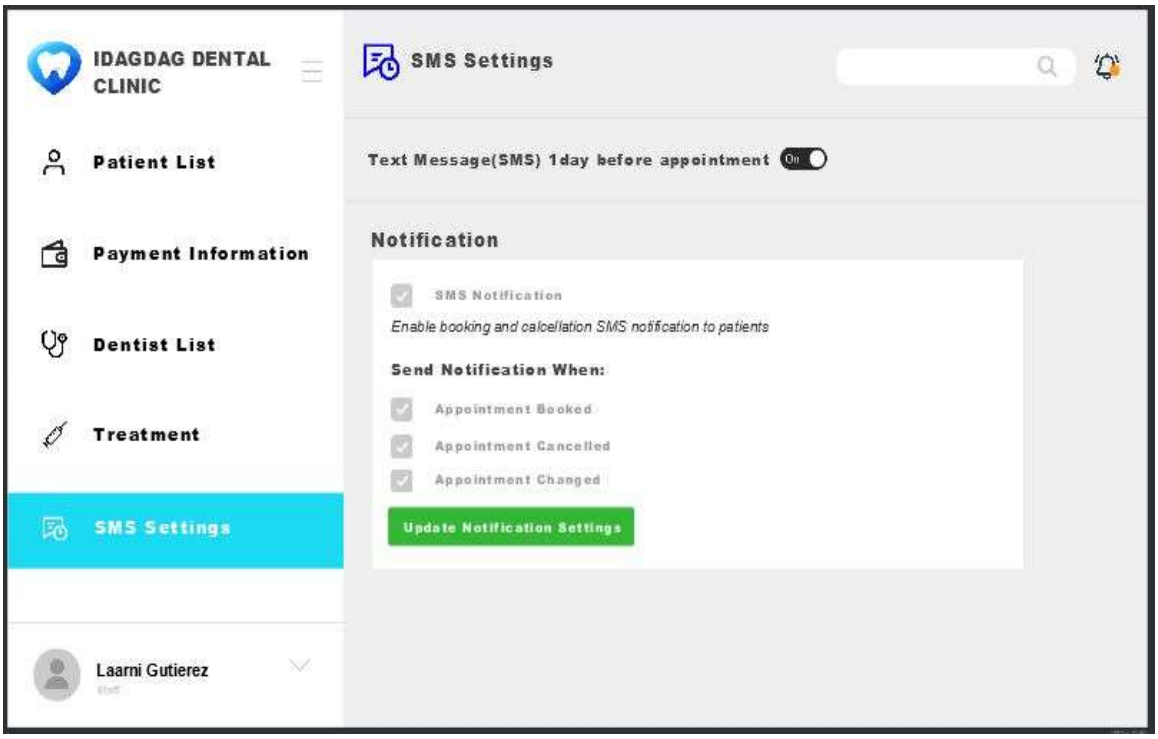


Figure 66. SMS settings

C. Software Testing Plan

A test plan is a detailed document that outlines how a team will evaluate a software product before it is released to the public. The plan frequently includes the testing objectives, techniques, criteria, and deliverables, as well as the basic methodology for reviewing the program. It may also give directions to a team on how to assess a product or feature in the most effective way.

Software Testing Tools and Methods

The project team recommend using Black Box Testing and beta testing which is most effective and powerful techniques used.

Black Box Testing is a software testing approach that involves testing the functions of software applications without having knowledge of the internal code structure, implementation details, or internal routes. Black Box Testing is a type of software testing that focuses on the input and output of software applications and

is based purely on software requirements and specifications. Behavioral testing is another term for it. Figure 67 shows the system's needs and specifications are assessed first. To see if SUT processes valid inputs are successful, the tester selects legitimate inputs (positive test scenario). In addition, certain faulty inputs are generated (negative test scenario) to ensure that the SUT can detect them. For each of those inputs, the tester determines predicted outcomes. With the chosen inputs, the software tester creates test cases. The test cases are then carried out. The software tester compares the actual outputs to the predicted outputs. If there are any flaws, they are corrected and retested.

Figure 67. Black Box Testing

Beta Testing is a type of Acceptance Testing that adds value to a product by validating it for functionality, usability, reliability, and compatibility by the end-user (intended real user). Figure 68 shows the End-user feedback contributes to the product's success by improving its quality. This also aids in the decision-making process when it comes to investing in future items or improvising with the same product. Beta Testing cannot be a regulated activity because it takes place at the end user's end.

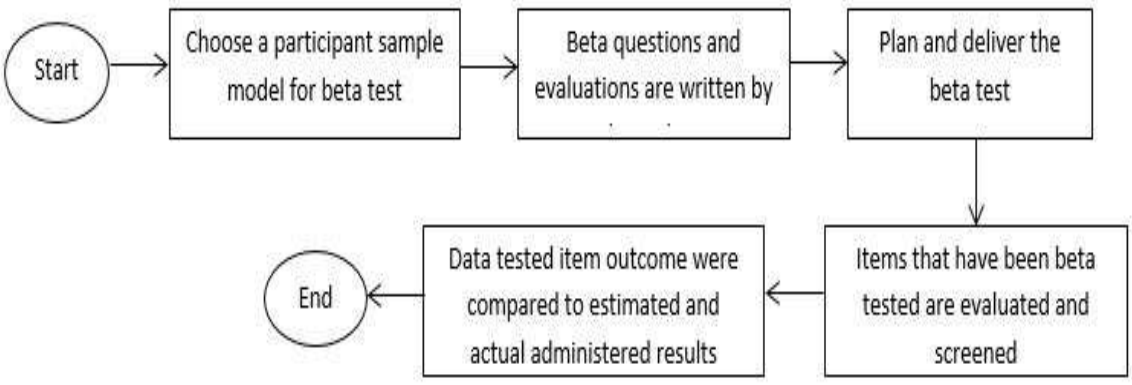


Figure 68. Beta testing

User Experience Design Testing Results

User experience testing is a set of procedures aiming at figuring out how users arrive at their reported user experiences. It essentially describes how and why they did what they did in order to accomplish their result, as well as how those outcomes informed their view of a certain product design. We collected 25 samples from random people and the result are given below.

Table 48 shows the data is being transformed and the order of positive and negative terms for an item are categorized. Value -3 represent most negative, -2 for high negative, -1 for negative, 0 for neutral, 1 for positive feedback, 2 for highly recognized, and 3 for positive feedback.

Table 48. Transformed Data

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
3	2	3	2	2	3	3	3	3	3	2	3	1	2	3	0	2	0	0	0	0	1	2	3	3	3
2	3	2	2	2	3	1	0	3	2	2	3	3	3	2	2	2	3	3	2	3	2	2	2	2	-2
2	1	2	2	2	1	2	1	2	2	1	2	3	3	3	3	3	3	2	2	2	2	1	1	1	1
3	2	1	2	1	1	1	1	2	2	1	1	1	2	2	2	2	0	2	2	0	2	1	2	1	3
2	1	2	1	0	2	1	3	2	0	1	2	1	1	0	1	2	1	2	2	1	2	2	1	1	0
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2	0	2	3	2	3	1	2	3	2	3	2	3	2	3	2	3	3	3	2	2	2	2	1	1	1
3	2	1	2	3	3	1	3	2	3	1	3	3	2	1	2	2	2	2	2	3	3	1	1	1	1
3	3	3	2	3	1	2	1	3	1	1	3	3	3	3	3	2	2	3	3	2	3	2	3	3	3
3	1	1	3	2	2	1	2	2	2	3	3	2	3	2	1	0	3	4	4	2	2	2	3	3	3
3	1	0	1	2	2	2	2	2	3	0	0	0	0	1	2	1	2	1	2	3	3	2	3	2	2
0	1	2	0	3	2	3	2	3	2	1	2	1	2	2	2	1	2	2	1	2	2	2	1	1	3
2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
1	2	3	3	2	3	2	3	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	-1
1	0	2	3	2	3	3	1	3	0	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	-3
1	2	0	2	3	3	2	0	3	1	2	2	3	3	3	2	3	3	3	1	2	3	3	3	3	3
1	1	1	2	0	3	-2	2	3	3	2	3	0	1	1	2	2	-2	2	3	1	2	3	0	0	1
3	0	3	3	1	3	2	-1	3	1	1	2	1	2	1	3	1	-1	1	3	1	2	3	3	3	0
2	1	0	3	3	3	1	2	3	1	1	3	3	2	1	2	2	2	2	2	2	3	3	2	3	2
-1	2	1	0	0	3	2	1	3	3	2	2	1	2	3	2	2	1	3	3	2	2	2	2	2	3
3	2	3	3	0	3	2	-1	3	3	2	3	1	3	1	2	2	1	3	3	2	2	1	0	2	2
2	3	2	3	2	3	3	2	3	3	0	1	1	1	2	2	2	2	2	3	2	2	2	2	2	2
3	1	3	1	1	3	2	0	3	3	2	3	3	2	3	2	3	3	2	3	3	2	2	2	2	-2
2	2	2	2	2	3	1	2	3	3	2	3	3	2	-2	2	2	0	2	3	3	3	3	1	3	0
3	1	2	2	2	3	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2	2

Table 49 shows the mean and variance of the 6 means of the UEQ scale. Attractiveness has a mean of 2.013 and it shows a positive evaluation with a standard deviation of 0.37 which falls under more or less neutral evaluation. Perspicuity has a mean of 1.830 and a standard deviation of 0.45; both represent more or less evaluation. Efficiency means has mean of 2.250, a standard deviation of 0.40 that show a more or less neutral evaluation. Dependability means has mean of 1.790, a standard deviation of 0.39 that both shows more or less neutral evaluation. Stimulation means has a mean of 1.840, s standard deviation of 0.58 that both shows more or less neutral evaluation. Novelty mean has mean of 1.730, a standard deviation of 0.50 both shows more or less neutral evaluation.

Table 49. UEQ Scales (Mean and Variance)

UEQ Scales (Means and Variance)		
Attractiveness	2.013	0.37
Perspicuity	1.830	0.45
Efficiency	2.250	0.40
Dependability	1.790	0.39
Stimulation	1.840	0.58
Novelty	1.730	0.50

Table 50 validates the Pragmatic and Hedonic qualities. Pragmatic quality describes task related characteristics and the Hedonic result describes non-task related quality aspects. The UEQ scales are divided into two categories: pragmatic quality (perspicuity, Efficiency, Dependability) and hedonic quality (Stimulation, originality).

Table 50. Pragmatic and Hedonic Quality

Pragmatic and Hedonic Quality	
Attractiveness	2.01
Pragmatic Quality	1,96
Hedonic Quality	1.79

Review and Audit Plan

In this section, it shows the Review and Audit plan which includes the Audit process, Audit program, and schedule.

Audit Process

An audit is a sequence of actions used to examine certain corporate activities.

i. Audit Planning

The scope, time, and direction of the audit are all determined by the Associate in Nursing audit strategy, which also serves as a guide for the development of the more specific audit plan.

Project Manager. The project manager is in charge of planning, coordinating, and guiding the completion of a project for an organization, ensuring that it is completed on time, on budget, and within scope. He must be an excellent communicator because he is also responsible for keeping the team organized and communicating with stakeholders about the project management status.

System Analyst. The system analyst is in charge of examining the architecture of an information system based on the needs of the users. He defines and prioritizes user needs, collects data and facts, analyzes and solves problems, and is in charge of system evaluation.

System Designer. By acquiring the technical specifications given by the system analyst, the system designer collaborates with the system analyst to determine the viability of a conceptual design. She is in charge of designing the information system's user interface or prototype, as well as ensuring that the system's design is user-friendly and accessible to users.

Audit Scope

The audit team, in order to acquire the material used in this report, as well as to obtain their concerns and suggestions, undertook interviews and preliminary phases. This is necessary to know how the project objectives can be implemented.

1. See if the processes in place to achieve the goals are being followed.
2. Examine the organization's operations to see if they are accomplishing its objectives.
3. Examine the organization's operational and financial information, as well, as how it is reported.

Audit Objectives

The audit objectives' major goal is to assess the organization's ability to implement the suggested system design, which will be utilized to improve operational performance based on their operational standards.

1. Determine whether the project is on track to meet its objectives.
2. To analyze and measure the project's progress toward its goals.
3. To confirm the state and accomplishments of the project report within a particular time frame, as well as the final report preparations

Audit Schedule

An audit schedule is used to keep track of which parts of the project should be examined. Table 51 depicts the the audit team will begun the project's five phases, by January 2023 and be completed by the last week of July 2023.

Table 51. Audit Schedule

Task	January	February	March	April	May	June	July
Initiation	X						
Planning	X	X					
Execute		X	X	X	X	X	X
Control						X	X
Closeout							X

ii. Audit Execution

The final stage is the execution. The Internal Audit personnel conducts fieldwork after the audit has been scheduled. Regular status meetings keep clients informed about the audit process. As audit observations, possible results, and suggestions are found, we discuss them with the client. Figure 69 depicts the audit engagement's execution phase aids the team in managing, analyzing information, documenting activities, and dealing with clients. By the end of this audit engagement, it strives to satisfy the client by delivering the right value of the audit that they requested, and it will also be a big satisfaction for the team because the plan was executed correctly, resulting in a successful audit engagement.

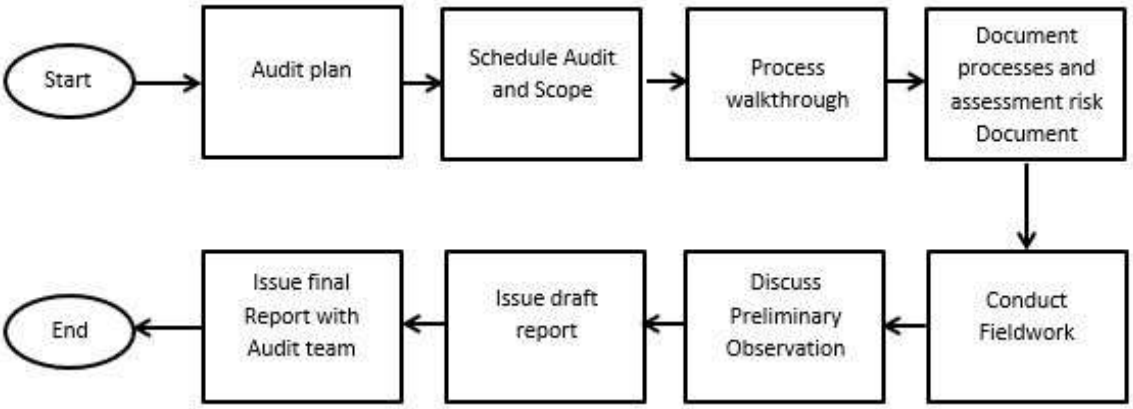


Figure 69. Audit Execution

iii. Audit Reporting

The audit report is vital for businesses such as banks, creditors, and other financial institutions that require financial statements from a company before lending money to it; nevertheless, in our case, we must audit the project that we will submit to the clinic that we have chosen. Audit reporting can provide a detailed review of an organization's financial status, provide additional perspective for dental clinic administrators and staff, improve credit rating, which in turn provides trustworthiness for the clinic's processes and services, and evaluate internal

controls, all of which can assist the clinic in determining where they need to focus in order to resolve financial issues. This is shown in Table 52.

Table 52. Audit Reporting

Audit Title	**WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDADAG TOOTH CARE CLINIC AUDIT REPORT**
Audit Date	January 2,2023 - July 28,2023
Project Budget	₱ 307,064.00
Department	Idagdag Dental Clinic
Auditors	Jake Deon C. Cerna, Razer A. Caluban, Richard P. Canja
Audit Objectives	The audit objectives' major goal is to assess the organization's ability to implement the suggested system design, which will be utilized to improve operational performance based on their operational standards. 1. Determine whether the project is on track to meet its objectives. 2. Analyze and measure the project's progress toward its goals. 3. Confirm the state and accomplishments of the project report within a particular time frame, as well as the final report preparations.
Audit Scope	The audit team in order to acquire the material used in this report, as well as to obtain their concerns and suggestions so that we could establish how to implement our project objectives undertook interviews and preliminary phases. 1. See if the processes in place to achieve the goals are being followed. 2. Examine the organization's operations to see if they are accomplishing its objectives. 3. Examine the organization's operational and financial information, as well as how it is reported.
Personnel Interviewed	Idagdag Tooth Care Clinic dentist and staff.

iv. Audit Tracking

It aims to help the audit project manager as well as the audit team to interconnect the development with each other by making the process of tracking

and reporting the issue and the possible solution for it. This is expected to improve the operations. Table 53 shows the issue title, likelihood, severity, and risk factor.

Table 53. Audit Issue Tracking

No.	Issue Title	Likelihood	Severity	Risk Factor
1.	Poor and insufficient quality of designs	possible	Moderate	Medium Risk
2.	Design Inconsistencies	possible	Moderate	Medium Risk
3.	The system can't effectively monitor queries	possible	Possible	Medium Risk
4.	Inappropriate headings to organize the structure of the content	Unlikely	Minor	Low Risk
5.	The system can't effectively track queries	Likely	Minor	High Risk
6.	Inappropriate performance of SVM because the algorithm is not suitable	possible	Moderate	Medium Risk
7.	Confusing navigation controls.	possible	Moderate	Medium Risk
8.	Lack of preparedness among the project team	Unlikely	Minor	Low Risk

Audit Program

The audit program is a thorough plan of the audit work to be done. Laying out the method to be followed in verifying each item in the financial statement and estimating the time is necessary. Table 46 shows an audit program that consists of completion date, function, details, auditee, and auditor.

Audit Program
IDAGDAG TOOTH CARE CLINIC

Audit Scope:

The audit team in order to acquire the material used in this report, as well as to obtain their concerns and suggestions, undertook interviews and preliminary phases. This is necessary in order to determine how the project objectives can be implemented.

1. To see if the processes in place to achieve the goals are being followed.
2. Examine the organization's operations to see if they are accomplishing its objectives.
3. Examine the organization's operational and financial information, as well as how it is reported, and preparations of the final report.

Audit Leader:

Jake Deon C. Cerna (Project Manager)

Audit Member:

Razer A. Caluban Jr. (System Analysts)
Richard P. Canja (System Designer)

Auditors:

LAP I.T SOLUTIONS INC.

Audit Date:

Table 54 depicts the audit program of the project that includes completion date, process, details, auditee, and auditor.

Table 54. Audit Program

January 2023				
Completion Date	**Function/Process/Area**	**Details**	**Auditee**	**Auditor**
Jan 9,2023	**Initiation**			
Jan 9,2023	Develop Project Charter			
Jan 2,2023		Identify Project Purpose	Project Manager	LAP I.T SOLUTIONS INC.
Jan 3,2023		Identify Project Objectives	Project Manager	LAP I.T SOLUTIONS INC.
Jan 4,2023		Develop High level requirements	Project Manager	LAP I.T SOLUTIONS INC.
Jan 5,2023		Develop High level Scope	Project Manager	LAP I.T SOLUTIONS INC.
Jan 6,2023		Identify High-Level Roles	Project Manager	LAP I.T SOLUTIONS INC.
Jan 9,2023		Revised Project Charter	Project Manager	LAP I.T SOLUTIONS INC.
Jan 23,2023	Perform Primary Planning			
Jan 11,2023		Develop WBS	Project Manager	LAP I.T SOLUTIONS INC.
Jan 13,2023		Develop Project Schedule	Project Manager	LAP I.T SOLUTIONS INC.
Jan 17,2023		Develop Project Staffing Plan	Project Manager	LAP I.T SOLUTIONS INC.
Jan 19,2023		Develop Project Budget	Project Manager	LAP I.T SOLUTIONS INC.

Jan 23,2023		Revised Primary plans	Project Manager	LAP I.T SOLUTIONS INC.
Feb 3,2023	Perform Supplementary Planning			
Jan 26,2023		Develop Management Plan	Project Manager	LAP I.T SOLUTIONS INC.
Jan 30,2023		Develop Maintenance Plan	Project Manager	LAP I.T SOLUTIONS INC.
February 2023				
Feb 1,2023		Develop Project Closure Plan	Project Manager	LAP I.T SOLUTIONS INC.
Feb 3,2023		Revise Supplementary Plans	Project Manager	LAP I.T SOLUTIONS INC.
Jul 6,2023	**Execute**			
Feb 17,2023	Execute System Analysis			
Feb 17,2023		Develop system requirements specification	System Analyst	LAP I.T SOLUTIONS INC.
Feb 21,2023		Revised System analysis	System Analyst	LAP I.T SOLUTIONS INC.
Feb 23,2023	Purchasing Hardware and Software		System Analyst	LAP I.T SOLUTIONS INC.
Mar 23,2023	Execute System Design			
Feb 28,2023		Develop System Process	System Designer	LAP I.T SOLUTIONS INC.
March 2023				
Mar 3,2023		Design the system	System Designer	LAP I.T SOLUTIONS INC.
Mar 6,2023		Develop System Architecture	System Designer	LAP I.T SOLUTIONS INC.

Mar 20,2023		Develop System Prototype	System Designer	LAP I.T SOLUTIONS INC.
Mar 23,2023		Revised System Design	System Designer	LAP I.T SOLUTIONS INC.
April 2023				
Jun 1,2023	**Implement System Coding**			
Jun 1,2023		Coding	Web Developer	LAP I.T SOLUTIONS INC.
Jun 15,2023		Revise Code	Web Developer	LAP I.T SOLUTIONS INC.
June 2023				
Jun 23,2023	Test the Usability of the Web System			
Jun 20,2023		Implement Black Box Testing	Test Specialist	LAP I.T SOLUTIONS INC.
Jun 23,2023		Implement Beta Testing	Test Specialist	LAP I.T SOLUTIONS INC.
		Debugging	Web Developer	LAP I.T SOLUTIONS INC.
Jul 3,2023	Announce the availability of the Web System		Test Specialist	LAP I.T SOLUTIONS INC.
Jul 6,2023	End User Training		Test Specialist	LAP I.T SOLUTIONS INC.
Jul 25,2023	**CONTROL**			
Jul 7,2023	Manage Communications		Project Manager	LAP I.T SOLUTIONS INC.
July 2023				

Jul 12,2023	Manage Changes		Project Manager	LAP I.T SOLUTIONS INC.
Jul 18,2023	Manage Project Risks		Project Manager	LAP I.T SOLUTIONS INC.
Jul 25,2023	Manage Maintenance		Project Manager	LAP I.T SOLUTIONS INC.
Jul 28,2023	**Closeout**			
Jul 26,2023	Confirm Project Completion		Project Manager	LAP I.T SOLUTIONS INC.
Jul 27,2023	Conduct Post-Project Review		Project Manager	LAP I.T SOLUTIONS INC.
Jul 28,2023	Signing Project Closure Documents		Project Manager	LAP I.T SOLUTIONS INC.

v. Project Reviews

Table 55 depicts the Project Review. It is usually on the project process and execution. It focuses on learning and documenting lessons that may be used to the current project and future projects to enhance procedures.

Table 55. Project Reviews

Reviews	**Description**
Joint customer-project	Joint Review should perform in order to know customer/users demand to the system.
Management Progress	Review conducted to established communication between stakeholder and project team.
Developer peer	During a peer review, the code is examined for potential enhancements and to ensure that the business requirements are satisfied. A meeting is arranged if necessary, to discuss any concerns that arise because of the review process.
Quality assurance audit	Evaluate the effectiveness of Internal Audit's assurance and advisory services to the board of directors, senior

	management, and other interested parties. It also complies with the Standards and expresses a judgment on whether the Internal Audit activity complies with all of them.
Customer conduct reviews and audit	Reviewing customer experience is a great help to create healthy environment between costumer to give more good quality services because of the feedback given and to improve more.

D. System Deployment and Maintenance Plan of the Proposed IS

This section of the document describes the System Deployment plan and Maintenance plan that will be utilized.

System Deployment Plan

The system deployment plan is a comprehensive implementation strategy that considers the people, procedures, and technology that must be in place for the system to be installed correctly, embraced by the user community, and the system's benefits to be achieved **.**Table 56 depicts the deployment plan of the system that includes the task, start date, and finish date.

Table 56. Deployment Plan

Deployment Plan		
Task	**Start Date**	**Finish date**
Confirm completion of user training at board meeting.	Jun 30,2023	Jun 30,2023
Stand up the production environment	Jul 3,2023	Jul 3,2023
Run deployment wizard	Jul 3,2023	Jul 3,2023
Check error log & resolve any issues manually if needed.	Jul 6,2023	Jul 11,2023
Complete manual configuration items.	Jul 12,2023	Jul 18,2023
Review production.	Jul 20,2023	Jul 20,2023
Go / no go call.	Jul 21,2023	Jul 21,2023

Maintenance Plan

A maintenance plan is a document that outlines the work that must be done to keep assets in a facility in good working order. Table 57 explains a maintenance plan to control failure caused by machines that have decided to stop operating. This will help to keep the system running well.

Table 57. Maintenance Plan

Task	**Frequency**	**By**	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Cleaning Equipment	Daily	Staff	X	X	X	X	X	X	X	X	X	X	X	X
Maintaining Internet	Monthly	Staff	X	X	X	X	X	X	X	X	X	X	X	X
Checking Database	Quarterly	IT Staff			X			X			X			X
Update Software	Annually	Staff	X											
Improve UI	Annually	IT Staff						X						
Renewing Third-party software	Annually	Staff	X											
Get User feed back	Quarterly	Staff/IT Staff			X			X			X			X

E. Discussion

One of the objectives of the proposed IS is online booking to allow customers to make their reservation at a time that is most convenient for them. They can make their reservation at any time of the day or night, regardless of whether it is within business hours or not. The next objective is recording patients' information. The system has developed a method to keep data accurately in-check and track patients' progress over time. It helps ensure it is correct and readable. It also reduces the risk of lots of paperwork and is cost effective. Then, next is an SMS notification. SMS is used to send notification about the patient's schedule.

The benefit of the work includes the availability to get information quickly and a reduction in the number of patients who are not alerted due to inadequate internet connectivity. This is the reason why it is included in the project's objectives. Next is the support for the decision. The system can provide possible dental disease by analyzing images, which is helpful to both dentist and patient. Last objective is designing a prototype. A prototype's most crucial benefit is that it simulates the real and future system. It can assist in attracting sponsors to invest in the proposed IS system prior to devoting any implementation efforts. The project's advisers and sponsors check all of these objectives. Also by the help of the internet, some similar works were found that inspired ideas; free tools that are available were also utilized and made significant contributions to the accomplishment of this proposed IS.

CHAPTER IV
CONCLUSION AND RECOMMENDATION

This chapter includes the findings of the previous chapter's data analysis. In addition, the project sponsor and project team have made various comments about the proposed information system.

Conclusion

The project team designed a dental management system for Idagdag tooth care clinic with SMS and decision support system that will help every patient, staff, and dentist to easily create, access and upload in the web system. This enables the clinic to avoid missing information and limit miscommunication between the patient and clinic management. It also allows a client/patient to make an appointment with a dentist. Aside from giving all the patients, staff and dentist simple access to appointments, they are also allowed to edit information, payments and schedules. In addition, the dentist can also detect tooth diseases of the patients by taking a picture and uploading it on the system by using K-nearest neighbor (KNN), an algorithm for accurate examination.

Also, the project team designed models, data model, process model, and user interface for the Dental Management System, all of which undoubtedly provide relevant information, concepts, and methodologies to the IT professionals who will implement and develop these proposed designs, as well as other researchers who are interested in this project. Therefore, this proves that the entire general objective of this proposed IS has been met as discussed above.

Recommendation

Every business faces concerns and challenges; and the proposed information system strives to reduce employee burdens by increasing productivity and saving time and money while providing accurate information.

Based on the results of the project, the researchers recommend the following:

1. Dental charts are highly suggested for both the dentist and patient to have in order to keep track of their teeth. This is used to identify problems and develop treatment plans. Dentists can track changes in the teeth to discover problems early and prevent them from worsening.

2. The proponents suggest that the future researchers incorporate a payroll module as an additional feature because it will save time by simply checking the salaries of the employees in the system.

3. Adding an inventory module to monitor stock levels and receive automatic alerts when it is time to reorder is also recommended. This is raised so that the clinic will always have the most vital supplies, such as medicines on hand.

References:

[1] M. C. B. DentISt : Dental Information System 2 . 0Balsita, “DentISt : Dental Information System 2 . 0,” *Dent. Dent. Inf. Syst. 2 . 0*, no. April, pp. 1–113, 2012.

[2] P. Dhanore, A. shaik, P. Ramtekkar, and A. Professor, “Dental Clinic Management System-A New Approach.” [Online]. Available: www.ijcset.net.

[3] B. Ang Hwee Kwan and U. Tunku Abdul Rahman, “CLINIC MANAGEMENT SYSTEM A PROPOSAL SUBMITTED TO,” 2015.

[4] M. G. P. Miranda, “Dental Advisories and Sms Notification System Utilizing Predictive Analytics,” *Int. J. Adv. Res. Comput. Sci.*, vol. 10, no. 2, pp. 46–48, 2019, doi: 10.26483/ijarcs.v10i2.6382.

[5] P. Vamsikrishna, S. D. Kumar, S. R. Hussain, and K. R. Naidu, “Raspberry PI controlled SMS-Update-Notification (Sun) system,” *Proc. 2015 IEEE Int. Conf. Electr. Comput. Commun. Technol. ICECCT 2015*, pp. 2–5, 2015, doi: 10.1109/ICECCT.2015.7226113.

[6] S. Z. Ahmad *et al.*, “GRAB Tutor Management System with SMS Notification,” vol. 16, no. 2, 2021.

[7] D. Arnott, G. Pervan, P. O. Donnell, and G. Dodson, “An Analysis of Decision Support Systems Research : Preliminary Results,” *Decis. Support an Uncertain Complex World IFIP TC8/WG8.3 Int. Conf. 2004*, no. April, pp. 25–38, 2000.

[8] W. P. Goh, X. Tao, J. Zhang, and J. Yong, “Decision support systems for adoption in dental clinics: A survey,” *Knowledge-Based Syst.*, vol. 104, pp. 195–206, 2016, doi: 10.1016/j.knosys.2016.04.022.

[9] K. Vikram and F. R. Karjodkar, “Decision Support Systems in Dental Decision Making: An Introduction,” *J. Evid. Based. Dent. Pract.*, vol. 9, no. 2, pp. 73–76, 2009, doi: 10.1016/j.jebdp.2009.03.003.

[10] M. Omidvar and F. Bordbar, “Advanced decision support systems for managers,” *Eur. Online J. Nat. Soc. Sci.*, vol. 2, no. 3, pp. 700–708, 2013, [Online]. Available: www.european-science.com.

[11] D. Arnott and G. Pervan, “A critical analysis of decision support systems research,” *J. Inf. Technol.*, vol. 20, no. 2, pp. 67–87, 2005, doi: 10.1057/palgrave.jit.2000035.

[12] K. L. MacLaughlin *et al.*, “Impact of Patient Reminders on Papanicolaou Test Completion for High-Risk Patients Identified by a Clinical Decision Support System,” *J. Women’s Heal.*, vol. 27, no. 5, pp. 569–574, 2018, doi: 10.1089/jwh.2017.6667.

[13] S. Jain, R. Garg, V. Bhosle, and L. Sah, “Smart university-student information management system,” *Proc. 2017 Int. Conf. Smart Technol.*

Smart Nation, SmartTechCon 2017, pp. 1183–1188, 2018, doi: 10.1109/SmartTechCon.2017.8358555.

[14] R. Fan, H. Xu, and Y. Zhao, "Design and Implementation of Information Management System for Rice," *J. Phys. Conf. Ser.*, vol. 1302, no. 2, pp. 56–58, 2019, doi: 10.1088/1742-6596/1302/2/022008.

[15] K. K. O. K. Hong, T. Report, S. In, F. Of, T. H. E. Bachelor, and S. Engineering, "Online dental Management system," 2014.

[16] Y. E. O. Y. E. N. Ping and C. Science, "CLINICAL MANAGEMENT SYSTEM (CMS) This project is submitted in partial fulfillment of," 2004.

[17] M. J. C. Samonte, R. C. D. Mullen, S. C. M. B. Endaya, and P. C. T. Huang, "Development of online hospital document management with SMS notification system," *ACM Int. Conf. Proceeding Ser.*, pp. 150–154, 2018, doi: 10.1145/3268808.3268824.

[18] R. Gustriansyah, N. Suhandi, and A. Sanmorino, "The architecture of e-notification utilizes short message service to improve community health centers services," *Int. J. Eng. Adv. Technol.*, vol. 8, no. 4, pp. 1364–1370, 2019.

[19] M. Braun, P. Hummel, S. Beck, and P. Dabrock, "Primer on an ethics of AI-based decision support systems in the clinic," *J. Med. Ethics*, pp. 1–8, 2020, doi: 10.1136/medethics-2019-105860.

[20] S. Dramburg, M. Marchante Fernández, E. Potapova, and P. M. Matricardi, "The Potential of Clinical Decision Support Systems for Prevention, Diagnosis, and Monitoring of Allergic Diseases," *Front. Immunol.*, vol. 11, no. September, 2020, doi: 10.3389/fimmu.2020.02116.

[21] E. A. Mendonça, "Clinical Decision Support Systems: Perspectives in Dentistry," *J. Dent. Educ.*, vol. 68, no. 6, pp. 589–597, 2004, doi: 10.1002/j.0022-0337.2004.68.6.tb03777.x.

[22] P. Tamijeselvy, S. Sangavi, T. Suvetha, and T. Umashankari, "Web usage mining using Improved KNN Algorithm," vol. 0869, no. 2, pp. 140–145, 2016.

[23] D. A. Adeniyi, Z. Wei, and Y. Yongquan, "Automated web usage data mining and recommendation system using K-Nearest Neighbor (KNN) classification method," *Appl. Comput. Informatics*, vol. 12, no. 1, pp. 90–108, 2016, doi: 10.1016/j.aci.2014.10.001.

[24] M. Paul, S. K. Vishwakarma, and A. Verma, "Analysis of Soil Behaviour and Prediction of Crop Yield Using Data Mining Approach," *Proc. - 2015 Int. Conf. Comput. Intell. Commun. Networks, CICN 2015*, pp. 766–771, 2016, doi: 10.1109/CICN.2015.156.

[25] S. Sharma, J. Agrawal, S. Agarwal, and S. Sharma, "Machine learning techniques for data mining: A survey," *2013 IEEE Int. Conf. Comput. Intell. Comput. Res. IEEE ICCIC 2013*, no. I, 2013, doi:

10.1109/ICCIC.2013.6724149

[26] N. Al Nuaimi, “Data mining approaches for predicting demand for healthcare services in Abu Dhabi,” *2014 10th Int. Conf. Innov. Inf. Technol. IIT 2014*, pp. 42–47, 2014, doi: 10.1109/INNOVATIONS.2014.6987559.

[27] S. Divakaran, K. Vasanth, D. Suja, and V. Swedha, “Classification of Digital Dental X-ray Images Using Machine Learning,” *Proc. 2021 IEEE 7th Int. Conf. Bio Signals, Images Instrumentation, ICBSII 2021*, pp. 14–16, 2021, doi: 10.1109/ICBSII51839.2021.9445171.

[28] Y. Jusman, R. I. Tamarena, S. Puspita, E. Saleh, and S. N. A. M. Kanafiah, “Analysis of Features Extraction Performance to Differentiate of Dental Caries Types Using Gray Level Co-occurrence Matrix Algorithm,” *Proc. - 10th IEEE Int. Conf. Control Syst. Comput. Eng. ICCSCE 2020*, no. August, pp. 148–152, 2020, doi: 10.1109/ICCSCE50387.2020.9204937.

[29] S. Cao *et al.*, “Clinical Decision Support System Based on KNN/Ontology Extraction Method,” *ACM Int. Conf. Proceeding Ser.*, pp. 56–62, 2020, doi: 10.1145/3432291.3432305.

[30] . J., R. Sigit, and Z. Arief, “Tooth Color Detection Using PCA and KNN Classifier Algorithm Based on Color Moment,” *Emit. Int. J. Eng. Technol.*, vol. 5, no. 1, pp. 139–153, 2017, doi: 10.24003/emitter.v5i1.171.

[31] V. Geetha and K. S. Aprameya, “Dental Caries Diagnosis in X-ray Images Using KNN Classifier,” *Indian J. Sci. Technol.*, vol. 12, no. 4, pp. 1–5, 2019, doi: 10.17485/ijst/2019/v12i4/139880.

[32] What is a work Breakdown Structure? – Project Business Technology Resources. (20220. Retrieved 30 April 2022, from https://www.adeaca.com/blog/faq-items/what-is-a-work-breakdownstructure

Appendices

Letter to the Organization

DAVAO DEL NORTE STATE COLLEGE
Institute of Computing

February 28, 2021

RYAN ROY D. IDAGDAG, DMD
Owner
IDAGDAG TOOTH CARE CLINIC
2nd Floor, Dujali Bldg., New Pandan, Panabo City, Davao del Norte

Dear Sir/ Madam,

Greetings of peace and prosperity!

The undersigned is the BSIS 3rd Year students of the Davao del Norte State College. As part of the BSIS program curriculum, we need to create a Capstone Project, which requires us to plan, design, develop, and deploy IT or IS project proposal as solutions and innovate our chosen business organization's transaction.

In connection, the undersigned would like to ask permission from your office to conduct a preliminary environmental scanning to help us assess the feasibility of providing a software solution as our Capstone Project in your organization.

If given your approval, we will be subjected to defense and present the proposal to a Panel of Experts. Suppose we successfully prove the feasibility and significance of the project; we will have to continually communicate with you and other project stakeholders to ensure a satisfactory quality of IT or IS project proposal and provide IT or IS solutions that will merit your business needs.

We are looking forward to your positive response.

Thank you, and more power.

Sincerely yours,

Jake Deon C. Cerna
Student

Richard P. Canja
Student

Razel A. Cañiban Jr.
Student

4/12/22

Noted by:

MARK VAN M. BULADACO, MIT
Instructor, IS Capstone Project
OIC-Dean, IC

Address: Davao del Norte State College
Tadeco Road, New Visayas
Panabo City, Davao del Norte, 8105

Website: www.dnsc.edu.ph
Email: president@dnsc.edu.ph
Facebook Page: www.facebook.com/davaodelnortestatecollege

DAVAO DEL NORTE STATE COLLEGE

INSTITUTE OF COMPUTING

PRESENTATION

CERTIFICATE

This is to certify that **JAKE DEON C. CERNA, RAZER A. CALUBAN JR., AND RICHARD P. CANJA**, students of Davao del Norte State College, have completely presented their capstone project entitled **"A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDAGDAG TOOTH CARE CLINIC"** on **April 19, 2022**

Given this 5th Day of May, 2022 at 2nd floor, door 8, Dujali building. New Pandan, Panabo City

Ryan Roy D. Idagdag, DMD

PROJECT SPONSOR

DAVAO DEL NORTE STATE COLLEGE

INSTITUTE OF COMPUTING

GRAMMARIAN

CERTIFICATE

This is to certify that the undersigned has reviewed and went through all pages of the capstone project entitled **"A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDADAG TOOTH CARE CLINIC"** by **Jake Deon C. Cerna, Razer A. Caluban Jr., and Richard P. Canja,** aligned with the set of structural rules that govern the composition of sentences, phrases and words in the English language.

Signed on the **22nd** day of **June 2022** at **Maryknoll College of Panabo City Inc.**

KIMBERLY G. MABOLOC, LPT

GRAMMARIAN

DAVAO DEL NORTE STATE COLLEGE

INSTITUTE OF COMPUTING

RECOMMENDATION FOR OUTLINE DEFENSE

In partial fulfillment of the requirements for the degree Bachelor of Science in Information Systems, this Capstone Project entitled:

A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDADAG TOOTH CARE CLINIC

has been prepared and submitted by **Cerna, Jake Deon C., Caluban, Razer Jr A., Canja, Richard P.** is recommended for **OUTLINE DEFENSE.**

4/12/22

Jovito P. Bolacoy Jr.
Adviser

Date Signed:

Address: Davao del Norte StateCollege
Tadeco Road, New Visayas
Panabo City, Davao del Norte 8105

Tel. No.: (084) 628-6341
Website: www.dnsc.edu.ph
Email: president@dnsc.edu.ph

DAVAO DEL NORTE STATE COLLEGE
INSTITUTE OF COMPUTING

RECOMMENDATION FOR PRE-FINAL DEFENSE

In partial fulfillment of the requirements for the degree Bachelor of Science in Information Systems, this Capstone Project entitled:

A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDADAG TOOTH CARE CLINIC

has been prepared and submitted by **Cerna, Jake Deon C., Caluban, Razer Jr A., Canja, Richard P.** is recommended for **PRE-FINAL DEFENSE.**

1/12/22

Jovito P. Bolacoy Jr.
Adviser

Date Signed:

Address: Davao del Norte State College
Tadeco Road, New Visayas
Panabo City, Davao del Norte 8105

Tel. No.: (084) 628-6041
Website: www.dnsc.edu.ph
Email: president@dnsc.edu.ph

DAVAO DEL NORTE STATE COLLEGE

INSTITUTE OF COMPUTING

RECOMMENDATION FOR FINAL DEFENSE

In partial fulfillment of the requirements for the degree Bachelor of Science in Information Systems, this Capstone Project entitled:

A DESIGN OF WEB-BASED DENTAL INFORMATION MANAGEMENT SYSTEM WITH SMS NOTIFICATION AND DECISION SUPPORT SYSTEM FOR IDADAG TOOTH CARE CLINIC

has been prepared and submitted by **Cerna, Jake Deon C., Caluban, Razer Jr A., Canja, Richard P.** is recommended for **FINAL DEFENSE.**

5/16/22

Jovito P. Bolacoy Jr.
Adviser

Date Signed:

Address: Davao del Norte StateCollege
Tadeco Road, New Visayas
Panabo City, Davao del Norte 8105

Tel. No.: (084) 628-6341
Website: www.dnsc.edu.ph
Email: president@dnsc.edu.ph

Republic of the Philippines

DAVAO DEL NORTE STATE COLLEGE
DAVAO ORIENTAL STATE UNIVERSITY

Certificate of Participation

This certificate is proudly presented to

JAKE DEON C. CERNA, RAZER A. CALUBAN JR., RICHARD P. CANJA, JOVITO P. BOLACOY JR.

for an excellent oral presentation during the BINHI 2022: 1st Joint Research Colloquium for ITE Capstone Projects of DNSC and DOrSU BSIT and BSIS Students *held on June 2, 2022 via online platform.*

Given this 2nd day of June 2022.

MARK IVAN BULADACO
Dean, DNSC Institute of Computing

LANIE B. LAUREANO
BSIT Program Head, DOrSU


COMM_DORSU_Cindy Lazco
ESHS01_CERNA
BSHS01_Caluban Razer Jr
ESHS-06_Jayme, Lyka P...
BSHS-05 - Ching, Hozoca ...
Danver Palmiano
ESHS-06_LOPEZ RAFFY
ESHS-06_Vetshell May Ban...
ESHS-05_Discaya
DNSC PIO_Randy
DNSC PIO_Randy
BSHS03_Abanid, Jhoana C...
REACTOR_Ian Val Delos Re...
ESHS-01_CANJA, RICHARD,...
ESHS-07 CABAYA
ESHS-02 - NALZARO
D
ESHS-08 DELUVINO
ESHS-08_SANDIAN
ESHS-02_OCLARIT
ESHS02-TORING, HERMENE
DNSC_IAN JAY P...
DNSC_IAN JAY PADIOS
REACTOR MJAborde...
DNSC_IC_RJ Sua...
DNSC_IC_RJ Suasin

Curriculum Vitae

Jake Deon C. Cerna

Prk.1 Manay, Panabo City, Davao Del Norte

Email Address: cerna.jakedeon@dnsc.edu.ph

09700249763

PERSONAL INFORMATION

Date of Birth:	December 21, 1999
Place of Birth:	Manay, Panabo City, Davao del Norte
Civil Status:	Single
Mother:	Jacquiline Cerna
Father:	Dionesio Cerna
Language Dialect:	Filipino/Cebuano

EDUCATIONAL ATTAINMENT

Senior High:	Panabo National High School
	Brgy. Gredu, Panabo City
Junior High:	Panabo National High School
	Brgy. Gredu, Panabo City
Elementary:	Valentine N. Daquio Elementary School
	Manay, Panabo City

Richard P. Canja

Prk. 4 Barangay Tibungol, Panabo City, Davao del Norte

Email Address: canja.richard@dnsc.edu.ph

09663521200

PERSONAL INFORMATION

Date of Birth:	March 1, 1997
Place of Birth:	Panabo City, Davao del Norte
Civil Status:	Single
Mother:	Stepanie Canja
Father:	Roberto Canja
Language Dialect:	Filipino/Cebuano

EDUCATIONAL ATTAINMENT

High School:	A.O. Florendo National High School
	Barangay A.O. Florendo , Panabo City
Elementary:	A.O. Florendo Elementary School
	Barangay A.O Florendo, Panabo City

Razer A. Caluban Jr.

Prk 2-b,Brgy. Sto. Nino, Davao del Norte

Email Address: caluban.razerjr@dnsc.edu.ph

09270889582

PERSONAL INFORMATION

Date of Birth:	March 21, 2000
Place of Birth:	Davao City, Davao del Sur
Civil Status:	Single
Mother:	Pinky I. Caluban
Father:	Razer E. Caluban Sr.
Language Dialect:	Filipino/Cebuano

EDUCATIONAL ATTAINMENT

Senior High:	Panabo National Senior High School
	Panabo City, Davao del Norte
Junior High:	Panabo National High School
	Panabo City, Davao del Norte
Elementary:	San Francisco Elementary School
	Panabo City, Davao del Norte

Untitled

by Mark Van Buladaco

General metrics

72,769	10,573	819	42 min 17 sec	1 hr 21 min
characters	words	sentences	reading time	speaking time

Score

This text scores better than 72% of all texts checked by Grammarly

Writing Issues

609	256	353
Issues left	Critical	Advanced

Plagiarism

2	24
%	sources

2% of your text matches 24 sources on the web or in archives of academic publications

Untitled

by Mark Van Buladaco

General metrics

43,082	6,130	585	24 min 31 sec	47 min 9 sec
characters	words	sentences	reading time	speaking time

Score

59

This text scores better than 59% of all texts checked by Grammarly

Writing Issues

398	199	199
Issues left	Critical	Advanced

Plagiarism

3	17
%	sources

3% of your text matches 17 sources on the web or in archives of academic publications