CLINIC APPOINTMENT SCHEDULING SYSTEM

A Software Project by

Jonas Rigor O. Docdoc

Jean M. Moring

Jandyl B. Vios

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APPROVAL SHEET

This thesis project entitled **Clinic Appointment Scheduling System** prepared and submitted by **Jonas Rigor Docdoc, Jean Moring and Jandyl Vios** in partial fulfillment of the requirements for the degree **Bachelor of Science in Information Technology** is hereby accepted.

Mrs. Regien B. Nakazato
Thesis Adviser

Mr. Jaymer Jayoma
Chair, Defense Panel

Mr. Takeyasu Nakazato
Panel Member

Mr. Giovanni Esma
Panel Member

Accepted and approved for the conferral of the degree **Bachelor of Science in Information Technology.**

Dr. Rolyn C. Daguil
Dean, CCIS

DEDICATION

We wholeheartedly dedicate this research to our family, friends and to all our instructors at the Caraga State University, Ampayon. A special feeling of gratitude to our loving parents whose words of encouragement and push for tenacity ring in our ears. To Mrs. Regien B. Nakazato, our thesis adviser, and above all, the Almighty God.

We also dedicate this research to our friends who have supported us throughout the process. We always appreciate all they have done

ACKNOWLEDGEMENT

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First and foremost, the researchers would like to extend their outmost gratitude to **Mrs. Regien B. Nakazato**, their thesis adviser, for guiding them throughout their thesis journey.

To their panel member **Mr. Takeyasu Nakazato, Mr. Giovanni Esma and Dr. Jaymer Jayoma,** who had played a major contribution in their thesis defense. The researchers wholeheartedly gave their gratitude to them.

To their **beloved family and relatives,** who had been a big part of this endeavor, for giving them the courage and support that they need.

To their **dearest friends**, who unselfishly helped and motivated them throughout the process, for the laughter that they've shared and for being so supportive and understanding.

And lastly, to our **Almighty God**, for the guidance, strength, power of mind, protection and skills and for giving them a healthy life. All of these,

Thank you so much!

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Clinics are known as a required facility in every institution. In every school, a clinic operates through the complete basic education curriculum. The school clinic offers its services to everyone inside the school premises that needs assistance if they are not feeling well. Unfortunately, due to the outbreak of COVID-19, the government have now issued precautionary measures, mandatory protocols and requirements for everyone. With these current restrictions, the number of students who are permitted to enter the school clinic is limited. The Clinic Appointment Scheduling System provides not only the use of highly computerized process that is more reliable in terms of handling records and information but also gives an opportunity to use technology in a better way so that it can be made useful and can take reasonable measures to ensure that social distancing are maintained at all times to limit the risk of transmission of the coronavirus.

There are several set of clinical system as well as laboratory tools system needed to manage the delivery of patient information thus enabling the personnel to effectively diagnose and treat patients like the EazyPres system (Solana, 2014), however the said system does not fit to the school clinic so as a solution the researchers would like to create a customized web-based record handling and scheduler system that would highly fit the needs of the school clinic. Thus, there is really a need to create a mechanism to help the school clinic personnel to have a record scheduler system, which helps the patient personal information and can take all the reasonable measures for COVID-19 outbreak.

The implementation of the Clinic Appointment Scheduling System is a great advantage to the personnel of the said clinic. The school will now have an asset, a steadfast working system. It can make the transaction more reliable, convenient and accessible that can help take precautionary measures to limit the risk of transmission of the coronavirus.

1.2 Statement of the Problem

Considering the evolving COVID-19 outbreak, the clinic must follow all government measures and restrictions for the safety and welfare of health services.

Hence, the researchers address the following problems:

a. The number of patients the clinic can accommodate during normal clinical hours has been limited for physical distancing and safety protocols.

b. Lack of patient's clinic appointment preferences - availability of time and day

1.3 Objectives of the Study

The researchers generally aimed to develop a Clinic Appointment Scheduling System for a campus clinic that maximized patient choice for clinic appointments while also ensuring patient safety during those consultations.

Specifically, this study has the following objectives:

a. To design and create a web and mobile application that allows patients to book an appointment with the clinic based on the patient's and clinic's availability.

b. To develop a system that can limit the number of patients seen during normal clinical hours.

c. To present the Web and Mobile Applications to the clinic and have them tested by clinic personnel.

1.4 Significance of the Study

The Clinic Appointment Scheduling System allows patients to conveniently and securely book their appointments, compared to the usual queuing method, the system could significantly increase patient's satisfaction with registration and reduce total time effectively. It gives more organized, efficient storage, retrieval, consistent, user-friendly and easy to access the daily transactions. Results of this study hopes to provide essential information that to the following:

Users. The study will help improve the operation through providing smooth and manageable system for them. It would be beneficial and favorable to them since it lessens their work and make them more productive and efficient in delivering services to patients.

Researcher. The study is of great help to enhance the skills and knowledge of the researcher in creating the system.

Future researcher. The system may also be useful for the future researchers for this may serve them as a guide for further related studies.

1.5 Scope and Limitation

The research context of the study focused on Clinic Appointment Scheduling System only. The study was conducted at CSU during regular first semester, Academic Year 2020-2021.

The system specifies the following scope:

1. The system allows the patient to register their detail online booking appointment base on their preferences until daily capacity is reached.

2. The system allows the authorized personnel/admin log in access the system and at the same time can also change his/her password for security purposes.

3. The system allows the admin to manage the information data of the patient.

4. The system does not include medical billings and any deals outside the school. All expenses other money related issues and concerns will not be handled by the system.

CHAPTER 2
REVIEW OF RELATED LITERATURE

2.1 Theoretical Framework

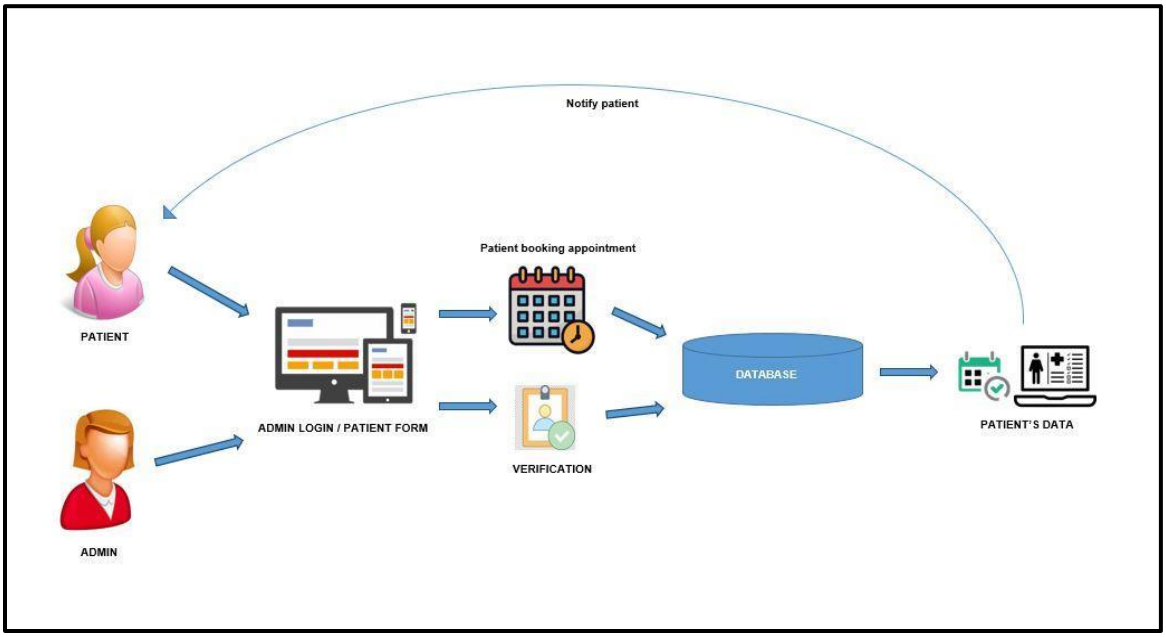

Figure 2-1-1. Current Implementation of the System

Figure 2-1-1 shows the concept flow of the study, it simply represents the functionalities of the system. The patient and the admin are the user of the system. Upon opening, the patient can easily make their appointments. In addition to that, patients can also provide additional information to the clinic personnel, making the doctor aware of their situation and giving the do the time to prepare necessary information for when the patient's arrives. For the admin, he/she will first verify his/her username and password. This ensures that only authorized personnel can access data of the system. The interface of the system will then be displayed to the admin where he/she can manage all patient's data record. When a patient is scheduled, he/she receives an appointment date and time. The

admin will be the one to approved schedules if the selected time for the appointment is available or not and then the patient will be notified.

2.2 Designing a web-based appointment scheduling system

The goal of appointment scheduling is to provide an optimal policy and achieve a good balance between patients' satisfaction and the performance of providers or clinics. In the real world, some factors will have influence on the performance of an appointment system, such as punctuality and urgency of patients, no-shows or cancellations, and service process. Thus, when developing a well-designed appointment system, the following main factors should be taken into consideration (Cayirli & Veral, 2021).

A smart appointment reservation system was proposed which helps in managing appointments and also provides platform for patient to cancel or reschedule appointment by integrating distributed clinical systems into a set of consistent and convenient services accessible via a web browser (S. Sri Gowthem, & K.P. Kaliyamurthie 2017).

2.3 Develop a mobile application appointment system

According to S. B. Choudhari1 et al., (2014), developing a mobile application appointment booking system will be very handy and will help patients to easily process of booking a doctor. The patient will book the appointment through his/her smart phone. The doctor, at the other end could easily determine the number of patients he has to attend whole day.

As stated by Choudhari, S., et al., (2016), to be able to facilitate effective service delivery in Tanzania, a mobile system for patient appointment is proposed where patients

need to download and install the application in their mobile phones, and then they can register on the application and receive username and password which can be used for login in the application. After login, patients need to select filtration type, and a list of doctors is displayed based on the selected filter. Then, the patient is required to select a desired doctor and his/her schedule is displayed, and finally the patient can make an appointment based on the doctor's free time slot.

2.5 Maximize Patients' Preferences

It has been shown that the accommodation of patients' preferences can help ensure quality of service provided by primary clinic physicians and increase clinics' revenues (O'hare and Corlett 2018). The no-show rate can also be reduced if patients' preferences are matched. The appointment scheduler is used to schedule the appointment for patients who undergoes treatment. The appointment is allotted by the scheduler based on the appointment time as requested by the patient. The appointment details are stored to the database. The appointment allotted can be rescheduled and deleted if required. (Oswal P., 2019).

The Ear, Nose, and Throat (ENT) outpatient clinic of Erasmus University Medical Center (Erasmus MC) in Rotterdam, the Netherlands is confronted with long waiting times for patients, overtime for doctors and nurses during clinic sessions, and peak workloads for its counter personnel. Research on outpatient clinics shows that waiting times are patients' main dissatisfaction with hospital services (Huang, 2016). According to doctors and personnel, overtime and peak workloads are potential threats for the quality of care and the quality of labor, because they increase stress and time pressure. This case study focuses on

outpatient scheduling as a means to solve these problems for the ENT outpatient clinic in Erasmus MC.

A patient's internal waiting time is the period between the scheduled starting time and the actual starting time of his consultation. Waiting time due to a patient's early arrival is extracted from the internal waiting time, since it is not a consequence of the appointment system (Cayirli and Veral, 2021).

2.5 Mobile apps vs Website: User preferences

On the internet's 30 most-visited mobile assets, browser and app visits are about even with apps holding a slight edge – which means that apps are used about as often as websites. This happens because most users start out using a website (or web app) before downloading a brand's native mobile app. Once a certain level of engagement has been built, users switch to the app for better user experience and speed. In other words, mobile websites are better for driving initial awareness and engagement – but latter funnel stages are best served by apps. (Benjamin Palestino, 2019).

2.6 Evaluation of User Experience in Mobile Applications

Mobile technologies have improved dramatically over the years which has allowed users to execute more functions when compared to previous models of mobile devices. Although there has been an increase in the effectiveness of mobile technology, it has come at the cost of usability. A well-designed and optimized user experience is important in a successful mobile application. A poor user experience can certainly contribute to application or product failure. The objectives of this research are to study and evaluate the user experience in mobile applications. Data for this research will be collected through observations and interviews. Both methods will help in evaluation of user experience. It is expected that the different methods proposed for evaluation of user experience will be helpful and serve as a source for enhancing knowledge regarding user experience in mobile applications. (Karima Moumane, Ali Idri, Alain Abran, 2016).

2.7 Why does your clinic needs a Mobile Application

Mobile application for the clinic is an assistant between the patient and the medical center. It simplifies communication with customers and helps to improve the quality of service. Such a service can provide different possibilities: from online recording to reception and transfer of the results of examinations to patients to collecting feedback on the quality of service.

According to the Akamai study, 52% of users claim that fast loading of pages affects their loyal attitude to the company. That is, half of the users will lose loyalty to the

clinic, which will provide them with a slow, low-quality application. In the healthcare integrated systems development, it is necessary to take into account not only the quality but also the specificity of the medical industry. (Andrew Ryzhokhin, 2017).

2.8 QR-based mobile payment application for Public Services Vehicles

The Mobile application was given to a third party, an expert in software testing, Martin Kabachia. The mobile application was also subject to rigorous quality assurance test which showed that software metric such as reliability, speed, scalability and accuracy were upheld. Results based on post-test indicated that there was a high user satisfaction on the solution on aspects such as usability and user experience. Post-Test was conducted by the researcher on various users. The test comprised of 40% (2) Female and 60% Male respondents a total of 5 respondents. (Irungu, A. N. , 2016).

2.9 OFFICE OF HEALTH SERVICES UNIT (CLINIC)

Schedule of availability of service *[applicable to all types of services delivered by the unit]:*

Monday to Friday (8:00 AM – 5:00 PM); No Noon Break

1. Medical Consultation

Bona fide Employee and Student of the university can be examined by the Health Professionals for their medical history and be recommended to that treatment or intervention is needed.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original)	MIS Office - CSU School ID
ii. CSU Employee: 1. Employee Valid ID (1 original)	Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
1. Approach Medical Personnel (Physician or Nurse)	1. Consult the patient regarding with his/her complaints	None	5 minutes	*Doctor/Nurse* Clinic

2. Inform Medical Personnel with Signs and Symptoms experienced	2. Actual examination of the patient	None	5 minutes	*Doctor/Nurse* Clinic
3. Receives appropriate Medicine	3. Giving of necessary Medicine	None	5 minutes	*Doctor/Nurse* Clinic
4. Advised accordingly to health education and discharge instructions	4. Provides necessary instructions and advise before discharging the patient	None	3 minutes	*Doctor/Nurse* Clinic
5. Client writes on the LOGBOOK for monitoring	5. Patient log to the medical Monitoring log book	None	2 minutes	*Patient* CSU Students/Employees
TOTAL:		**None**	**20 minutes**	

2. Blood Pressure Monitoring

Bonafide Employee and Student of the university has access to blood pressure taking and monitoring as well as health education on maintaining healthy blood pressure levels.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original)	MIS Office - CSU School ID
ii. CSU Employees: 1. Employee Valid ID (1 original)	Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
1. Approach Medical Personnel (Physician or Nurse)	1. Assessment	None	5 minutes	*Doctor/Nurse* Clinic
2. Wait while Blood Pressure is being taken	2. Blood Pressure reading to Patient	None	5 minutes	*Doctor/Nurse* Clinic
3. Listen accordingly to result of Blood Pressure Taken by The Medical Personnel	3. Inform the patient Regarding his/her blood pressure if it is within or	None	5 minutes	*Doctor/Nurse* Clinic

	beyond normal range			
4. Note health teaching and discharge instruction provided by Medical Personnel	4. Provide the necessary medication and/or Health Education/ Discharge instructions relating to his/ her condition	None	3 minutes	*Doctor/Nurse* Clinic
5. Client writes on the LOGBOOK for monitoring	5. Recording of blood pressure taken on the Logbook	None	2 minutes	*Patient* CSU Students/Employees
TOTAL:		**None**	**20 minutes**	

3. Wound Dressing

Bona fide Employees and Student of the university has access to wound cleansing and wound dressing that limit exposure to infection in general.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original)	MIS Office - CSU School ID
ii. CSU Employee: 1. Employee Valid ID (1 original)	Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
1. Approach Medical Personnel (Physician or Nurse)	1. Assessment of the condition of patient's injury/ wound	None	5 minutes	*Doctor/Nurse* Clinic
2. Sits on the wound dressing area	2. Conduct wound dressing Procedure to the patient	None	5 minutes	*Doctor/Nurse* Clinic
3. Advised accordingly to health education and discharge instructions	3. Giving of medicine and provide necessary instruction/advise to the patient before discharging out of the unit	None	5 minutes	*Doctor/Nurse* Clinic

4. Client writes on the LOGBOOK for monitoring	4. Patient filled-up the medical monitoring log and wound dressing log book	None	2 minutes	*Doctor/Nurse* Clinic
TOTAL:		**None**	**17 minutes**	

4. Nebulization

Bona fide Employees and Students of the university has access to nebulization during asthma attack or any other allergic reaction that inhibits airflow to respiratory system.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original) **ii. CSU Employees:** 1. Employee Valid ID (1 original)	MIS Office - CSU School ID Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
1. Approach Medical Personnel (Physician or Nurse)	1. Vital signs and medical history taking on the patient	None	5 minutes	*Doctor/Nurse* Clinic
2. Sits and takes nebulization medication	2. Giving medicine to the patient thru the	None	5 minutes	*Doctor/Nurse* Clinic

	nebulizing machine			
3. Wait for post nebulization assessment by the Medical Personnel	3. Post Nebulization Assessment	None	5 minutes	*Doctor/Nurse* Clinic
4. Receives appropriate Medicine	4. Provide OTC/ prescribed drugs when necessary	None	3 minutes	*Doctor/Nurse* Clinic
5. Advised accordingly to health education and discharge instructions	5. Provide Health education & discharge instructions	None	3 minutes	*Doctor/Nurse* Clinic
6.Client writes on the LOGBOOK for monitoring	6. Filled-up nebulization Log book	None	2 minutes	*Patient* CSU Student/Employees
TOTAL:		**None**	**23 minutes**	

5. [Dental Service] Oral Prophylaxis

Bona fide Employees and Student of the university has access to dental cleaning (oral prophylaxis) and health teaching to attain and maintain dental health.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
1. Enrolled Students: Validated School ID (1 original) **2. CSU Employees:** Employee's Valid ID (1 original) **3. Proof of Payment:** (Fee: Php. 150.00 - Php. 500.00)	MIS Office - CSU School ID Management Information Systems Cashier's Office

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
1. Fill up dental form	1. Provide dental form to Client	None	5 minutes	*Nurse* Clinic
2. Submit filled-up dental Form to the dentist	2. Record and note filled up form by the Client	Php. 150.00 to Php. 500.00	3 minutes	*Dentist* Clinic
3. Sits and converse with Dentist regarding dental concerns	3. Consultation of the patient Prior to the procedure	None	5 minutes	*Dentist* Clinic
4. Waits for the procedure to be done	4. Conduct procedure to the patient	None	30 minutes	*Dentist* Clinic

5. Advised accordingly to dental health and discharge instructions	5. Provide necessary instructions to the patient	None	3 minutes	*Dentist* Clinic
6. Client writes on the LOGBOOK for monitoring	6. Patient log to the Procedure log book	None	2 minutes	*Patient* CSU Student/Employees
TOTAL:		**Php. 150.00 to Php. 500.00**	**48 minutes**	

6. [Dental Service] Tooth Extraction

Bonafide Employees and Student of the university has access to tooth examination and tooth extraction with proper dental health teaching and medication.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
1. Enrolled Students: Validated School ID (1 original) **2. CSU Employee:** Employee Valid ID (1 original) **3. Proof of Payment:** (Fee: Php. 150.00 – Php. 500.00)	MIS Office - CSU School ID Management Information Systems Cashier's Office

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
1. Fill- up dental form	1. Provide dental form to Client	None	5 minutes	*Nurse* Clinic
2. Submit to the dentist accomplished dental form	2. Record and note filled up form by the Client	None	5 minutes	*Dentist* Clinic
3. Sits and converse with Dentist regarding dental concerns	3. Evaluation of the patient Prior to the procedure	None	5 minutes	*Dentist* Clinic
4. Waits for the procedure to be done	4. Conduct dental procedure	Php. 150.00 to	30 minutes	*Dentist* Clinic

		Php. 500.00		
5. Receives appropriate Medicine and advised accordingly to dental health and discharge instructions	5. Giving medicine to the patient and provide necessary instruction	None	3 minutes	*Dentist* Clinic
6. Client writes on the LOGBOOK for monitoring	6. Recording of medications and procedure given on the Medicine and Procedure logbook	None	2 minutes	*Patient* CSU Student/Employees

CHAPTER 3

METHODOLOGY

3.1 Concept of the Study

This chapter presents the Systems Development Life Cycle (SDLC) model. Figure 3.1 presents the Prototyping model and displays the specific steps and activities that the researchers performed to accomplish the project. Important phases that is essential to developers such as planning, analysis, design, prototyping and implementation.

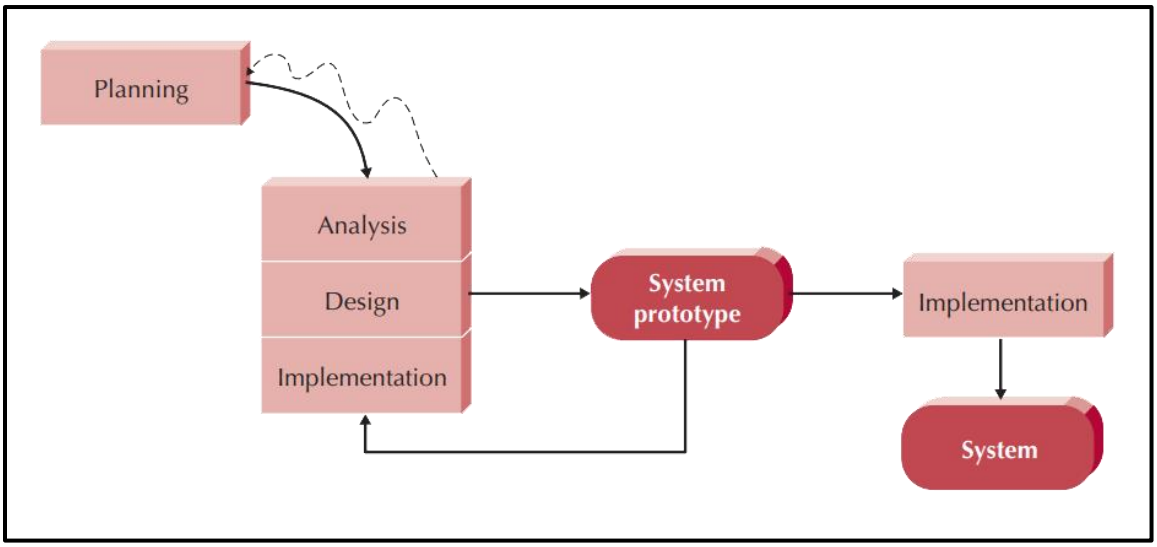

Figure 3-1-1. Prototyping Model

3.1.1 Planning Phase

The first stage is to plan the project properly. Initial requirements were identified and gathered. The researchers carefully analyzed problems that arises in today's modern generation and carefully planned what will be the title of study to achieved main goal. The objectives and goals of the system were defined clearly including the scope of the project. Time management is the foundation of conducting the project. Gantt chart were used to visualize the overall goal and the tasks required. After this, the risks of the system had been

identified and evaluated. The Gantt Chart in Table 1 helped the researchers to keep track on the things that must be done.

Table 3-1. Gantt Chart

	01-Apr-22				01-May-22			
1. PLANNING PHASE	1st	2nd	3rd	4th	1st	2nd	3rd	4th
1.1 Gather Information								
1.2 Define System Requirement								
2. ANALYSIS AND DESIGN PHASE								
2.1 Database Design								
2.2 User Interface Design								
2.3 System Interface Design								
3. Implementation Phase								
3.1 Build and Test Prototype								
3.2 Finalize System Design								
4. TEST AND FEEDBACK PHASE								
4.1 Test and Evaluate								

This work plan for developing the system is presented. This diagram depicts the development of the proposed system in a step-by-step manner. The work plan is divided into four sections. The planning stage comes first. In eight weeks, the researchers collected data and defined the system requirements during the Planning Phase. The second phase is that of analysis and design. The database design took seven weeks, while the user interface and system interface took six weeks. The third phase is that of implementation. In this phase, researchers develop and test a prototype in five weeks and complete the system design in four weeks.

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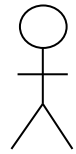
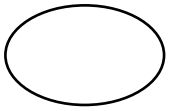
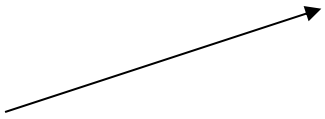
3.1.2 Analysis Phase

Gathering, identifying the tools used and analyzing user's requirement were made and conclusion are derived from the data and results collected. Use case diagram, sequence diagram, class diagram were present to give a visualization of how the system works.

3.1.2.1 Use Case Diagram

Table 3-2. Use Case Diagram Notation

ACTOR: • Is a person or system that derives benefit from and is external to the subject. • Is depicted as either a stick figure (default) or if a non-human. actor is involved, as a rectangle with <<actor>> in it (alternative) • Is labeled with its role.	 Actor / Role
USE CASE: ● Represents a major piece of system functionality ● Can extend another use case ● Can include another use case ● Is placed inside the system boundary	
A SUBJECT BOUNDARY: ● Includes the name of the subject inside or on top	
GENERALIZATION RELATIONSHIP: ● Represents a specialized use case to a more generalized one ● The arrow is drawn from the specialized use case to the base use case	
ASSOCIATION RELATIONSHIP ● Links an actor with the use case(s) which it interacts	 * *

This displays the diagrammatic presentation of the functionalities of system. The use case diagram presents the actors and the use case within the framework of the system.

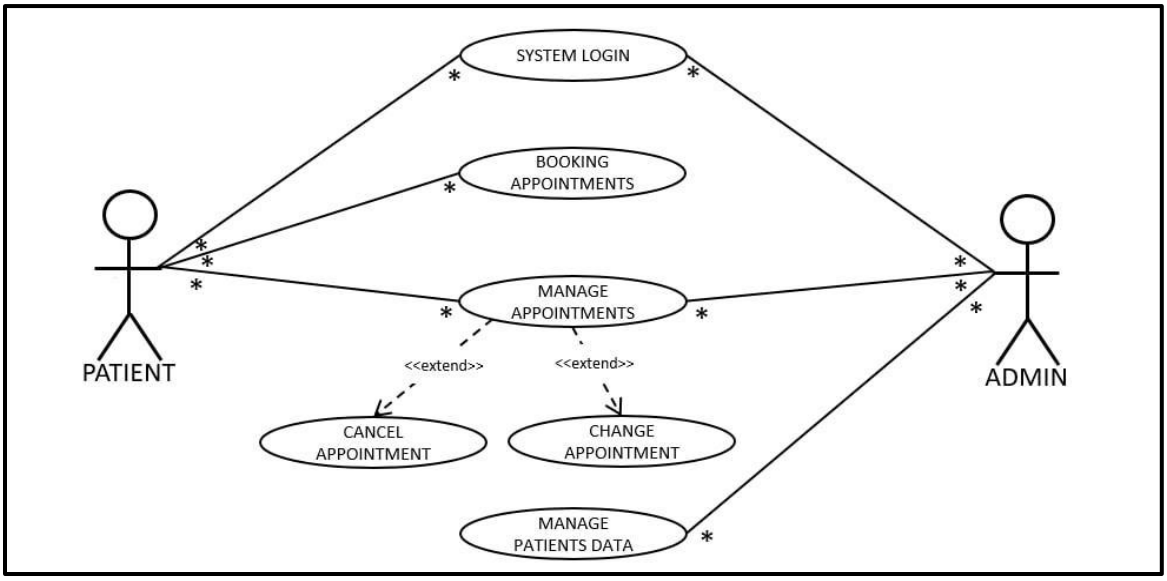
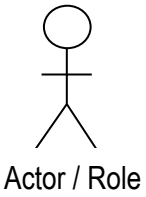


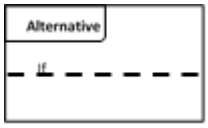
Figure 3-1-2. Use Case of Clinic Appointment Scheduling System

Figure 3-1-2 shows that the patient can log-in, book an appointment, manage appointments (cancel and change appointments). The admin will also log-in for security purposes and will be the one to manage patient's data.

3.1.2.2 Sequence Diagram

Table 3-3. Sequence Diagram Notation

ACTOR: ● Is a person or system that derives benefit from and is external to the subject. ● Is depicted as either a stick figure (default) or if a non-human. actor is involved, as a rectangle with <<actor>> in it (alternative) ● Is labeled with its role.	 Actor / Role
OBJECT NODE: ● Is used to represent an object that is connected to a set of Object Flows ● Is labeled by its class name.	

LIFELINE ● Is a vertical dashed line that shows the existence of a object or actor overtime. ● Moving down the lifeline means that more time is passing.	
ALTERNATIVE FRAME ● Is used, it symbolizes a choice between two or more message sequence	
MESSAGE ● Show the information being sent between objects sequence diagrams shows the order of interactions or sequence and they do this by moving down the lifeline with each message	
RETURN MESSAGE ● Represented by dash line ● Is used when an object sends a message back	
Execution Occurrence ● Denotes when an object is sending or receiving messages	

Depicted above is the sequence diagram of the system which shows objects interactions arranged in time sequence. It displays the object and classes involved in the scenario and the sequence of messages exchange between the objects needed to carry out the functionality of the scenario.

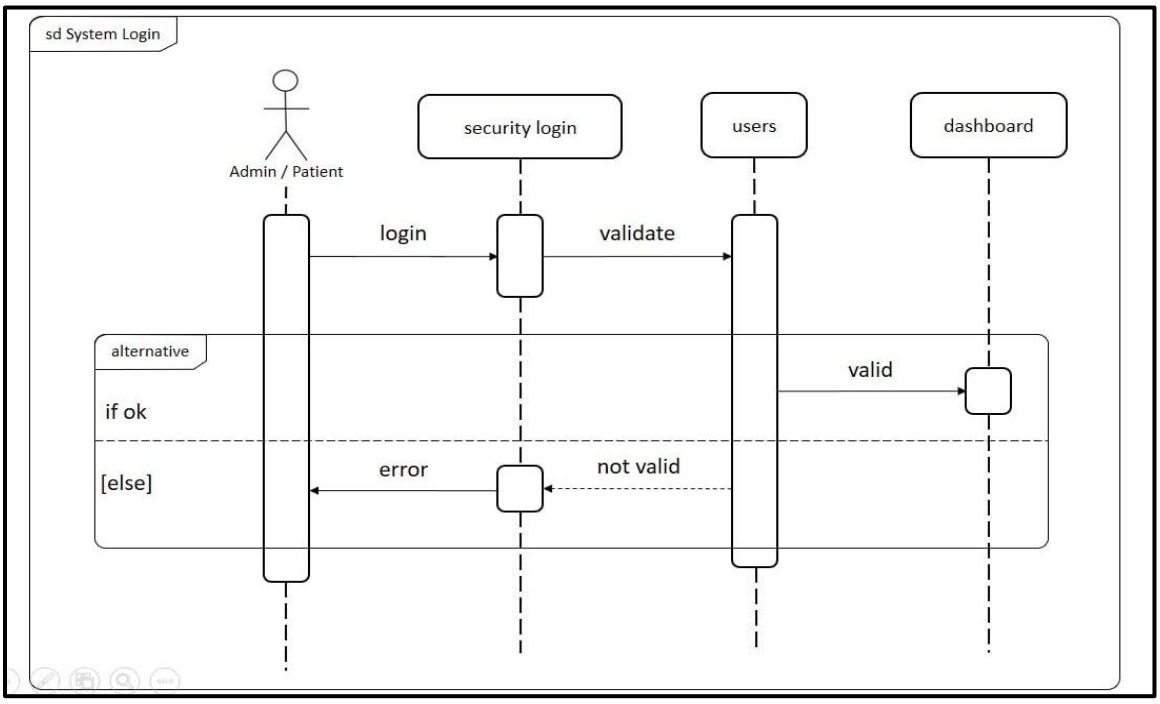


Figure 3-1-3. Sequence Diagram for System Login

Figure 3-1-3 shows that the patient and admin can log-in the system by entering his/her username and password for verification purposes. After validating the account, the admin enters the system dashboard. But, if the access was denied (invalid username or password), an error will occur and will need to input again his/her username and password. Only patients can create new accounts to the system.

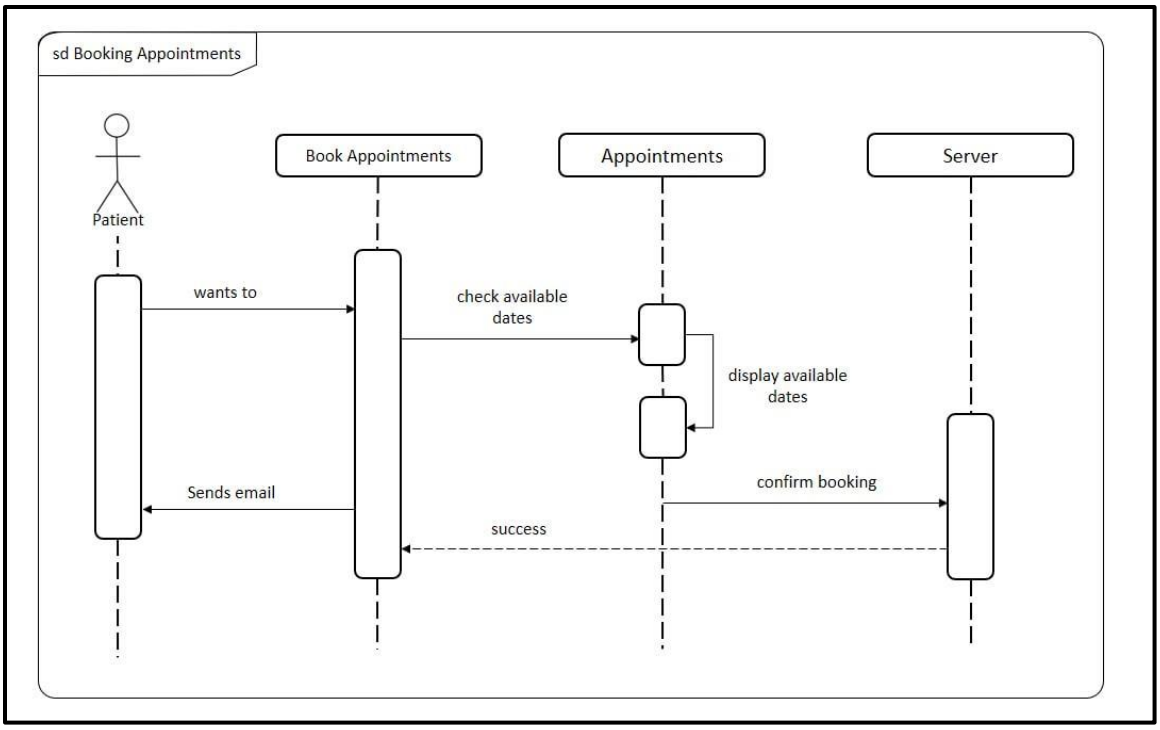


Figure 3-1-4. Sequence Diagram for Booking Appointments

Figure 3-1-4 shows that after the patient logs-in to the system, he/she can now schedule an appointment. The patient can check available dates for booking. After confirming, the patient will be notified via email.

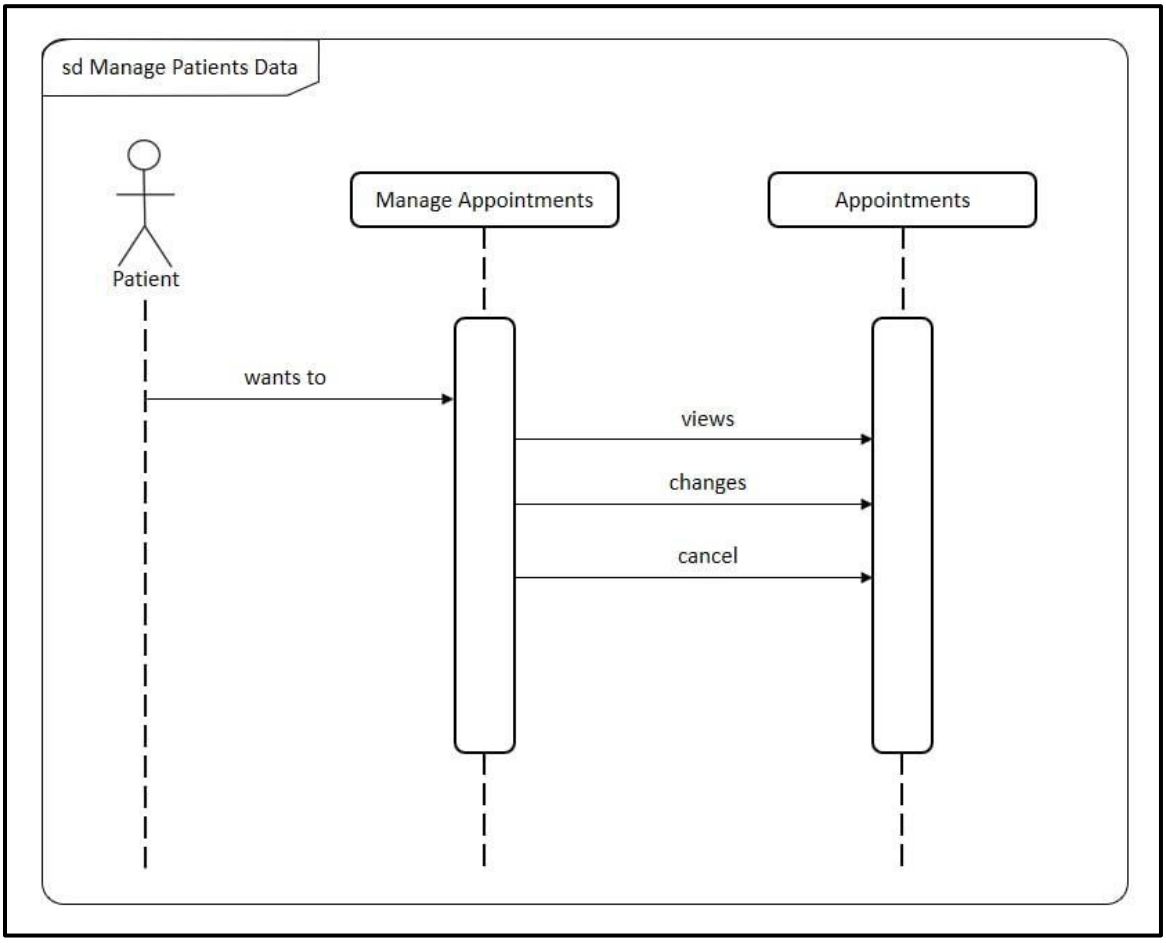
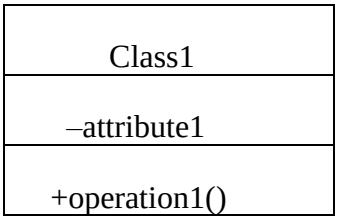


Figure 3-1-5. Sequence Diagram for Manage Patients Data

Figure 3-1-5 shows that the admin can manage patient's data where he/she can view, search, updates and disable patient's information.

3.1.2.3 Class Diagram

Table 3-4. Class Diagram Notation

CLASS ● Represents a kind of person, place, or thing about which the system will need to capture and store information ● Has a name typed in bold and centered in its top compartment ● Has a list of attributes in its middle compartment ● Has a list of operations in its bottom compartment ● Does not explicitly show operations that are available to all classes	
ATTRIBUTE ● Represents properties that describe the state of an object ● Can be derived from other attributes, shown by placing a slash before the attribute's name	attribute name /derived attribute name
OPERATION ● Represents the actions or functions that a class can perform ● Can be classified as a constructor, query, or update operation ● Includes parentheses that may contain parameters or information needed to perform the operation.	operation name ()
ASSOCIATION ● Represents a relationship between multiple classes, or a class and itself. ● Is labeled using a verb phrase or a role name, whichever better represents the relationship. ● Can exist between one or more classes. ● Contains multiplicity symbols, which represent the minimum and maximum times a class instance can be associated with the related class instance.	1..* 0..1 verb phrase

This table presents the class diagram of the system which describes the structure by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

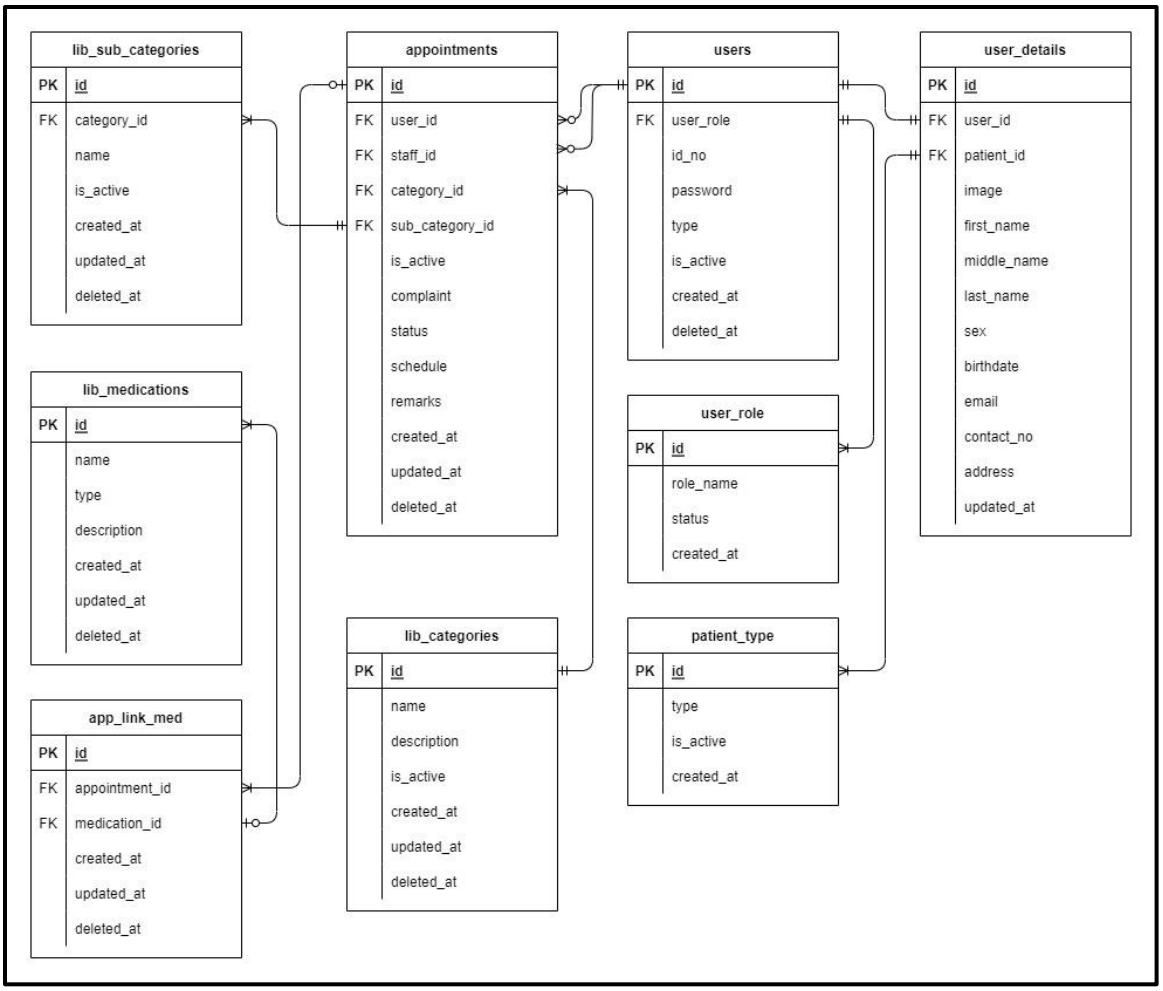


Figure 3-1-6. Class Diagram for Clinic Appointment Scheduling System

Figure 3-1-6 shows the proposed system's class diagram, which has different entities and relationships. It shows that a user has many attributes which have their own tables. Users have different authority based on their role description. As it shows, users and appointments have one-to-many relationships in which a user can make many appointments.

3.1.3 Implementation Phase

3.1.3.1 Hardware Specification

This presents the hardware used in developing the system.

Table 3-5. Hardware Specification

Particular	**Specification**
Computer	Model CPU such as intel core i3.
	500 GB HDD
	8 GB RAM DDR3

The Hardware Requirements will be the outdoor tools that needs for the developing of this system workflow. The hard disk must have a capacity of 500 GB to secure and to decrease the system log while working the system. The server of this system also is intel core i3 for developing, it can use any desktop computer and mobile phone for the testing of the workflow system.

3.1.3.2 Software Specification

This presents the software used in developing the system.

Table 3-6. Software Specification

Categories	Specification
Operating System	Windows 10
	Laravel

Software Application	Visual Studio Code
	Android Studio
	Java
	Laragon, MYSQL Version 7.0
	Operating System Windows 7,8,10,11

Table 3-7. Plugins

Plugins	Google Email
	Laragon API
	Laravel Vue Json Package

The software requirements will be the tools used to implement this system services workflow. This is the following requirements that suitable for the development of the system, for the Database MYSQL version 7.0 which is a common database to carry data. Code editor can be change for both mobile and web development but we recommend Visual Studio Code for Laravel Vue in developing the web application and Android studio for java in developing the mobile application. For the operating system we highly recommend computer that has a high processor whether windows 7,8,10,11. Google email plugin is used in Gmail notifications.

CHAPTER 4

RESULTS AND DISCUSSIONS

This chapter presented the process undertaken to achieve and meet the main objective of the researcher.

4.1 Development of Web Application

4.1.1 User Interface

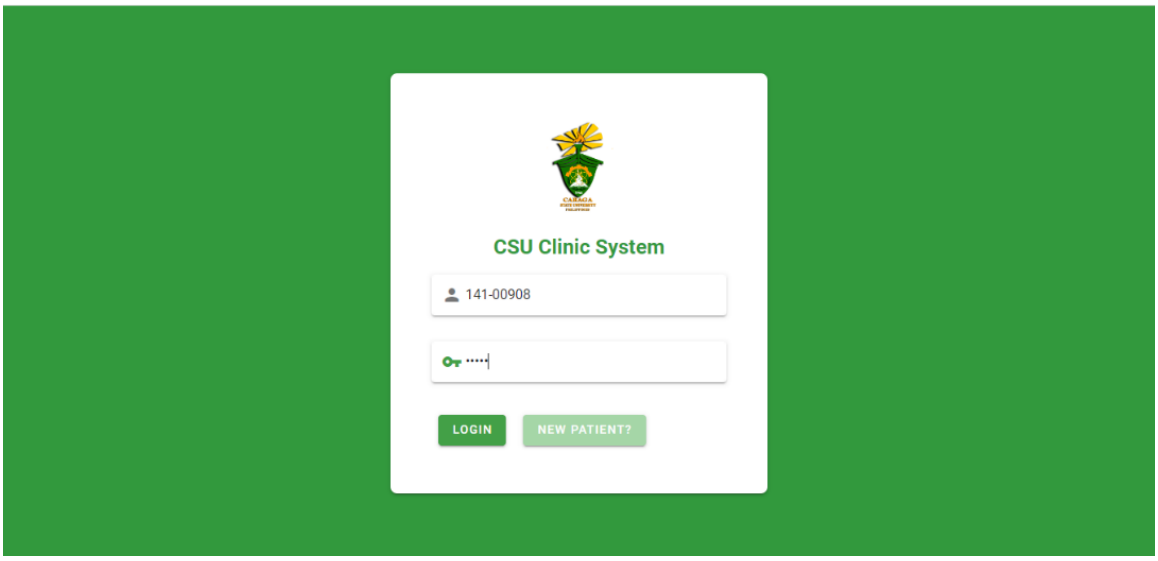


Figure 4-1-1. User Login

Figure 4-1-1 shows that the user/patient needs to login first by inputting his/her username and password for security purposes. Upon successful authentication the user is presented with the main dashboard listing the specific functions available to the user.

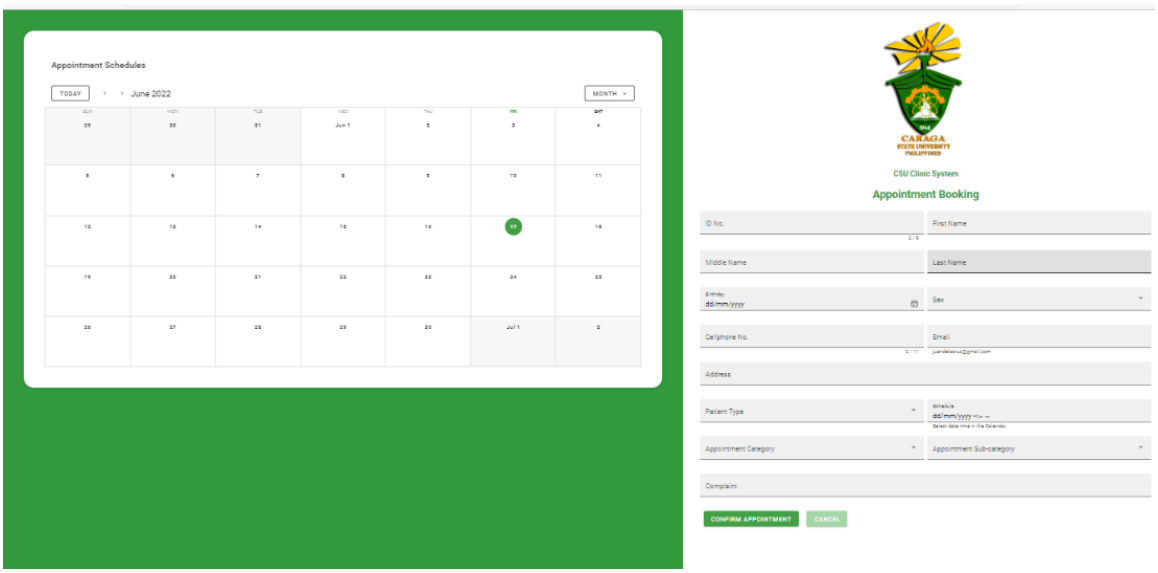


Figure 4-1-2. New User

Figure 4-1-2 shows that the patient needs to register and input their information before they can login to the system. Upon inputting personal information such as name, id, email, birthdate, address, contact number and email address user can also book appointment type (Dental or Medical), and the patient's ailment or complaint, and the appointment date and time.

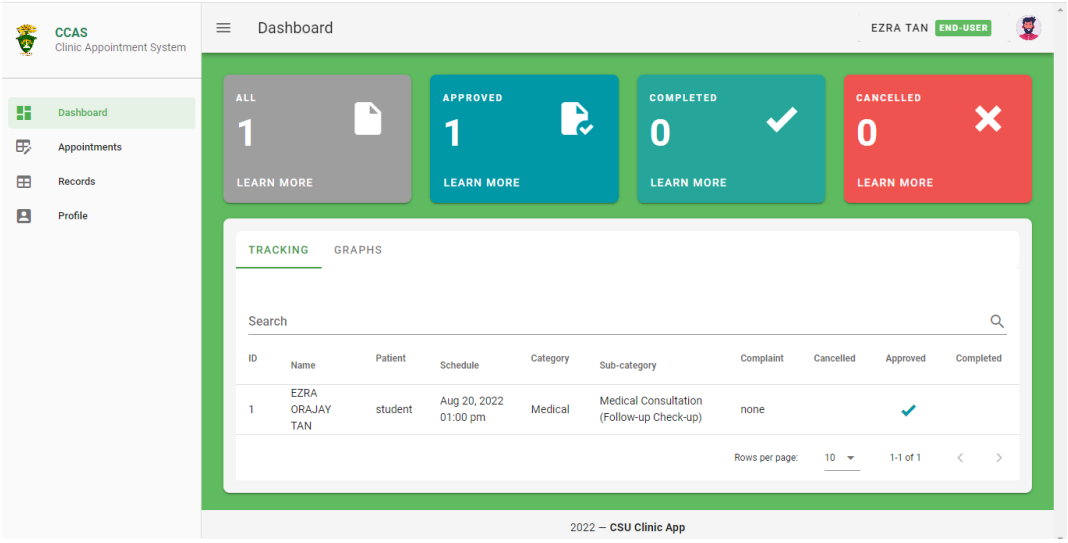


Figure 4-1-3. Dashboard (Patient)

Figure 4-1-3 displays the main screen where the patient can manage his/her appointments. The user can view Approved, Canceled and Completed appointments.

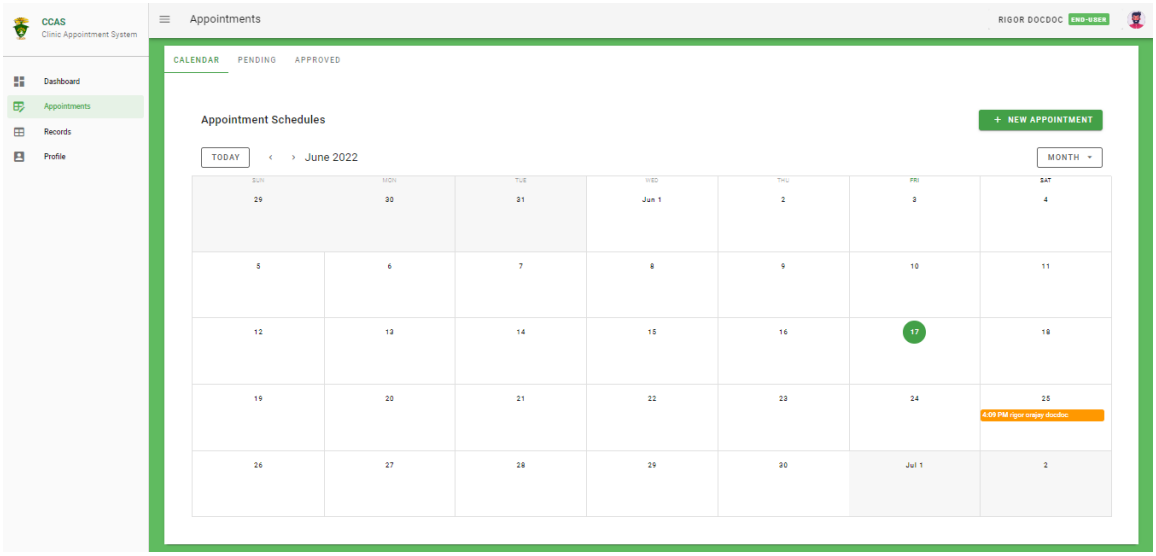


Figure 4-1-4. Appointment Schedules (Patient)

Figure 4-1-4 shows that a calendar will be seen that displays the days, weeks, and months of a particular year. The patients can browse available dates and can check other patients inputted schedules in the calendar before entering the time and date. Only 15 patients can make an appointment per day.

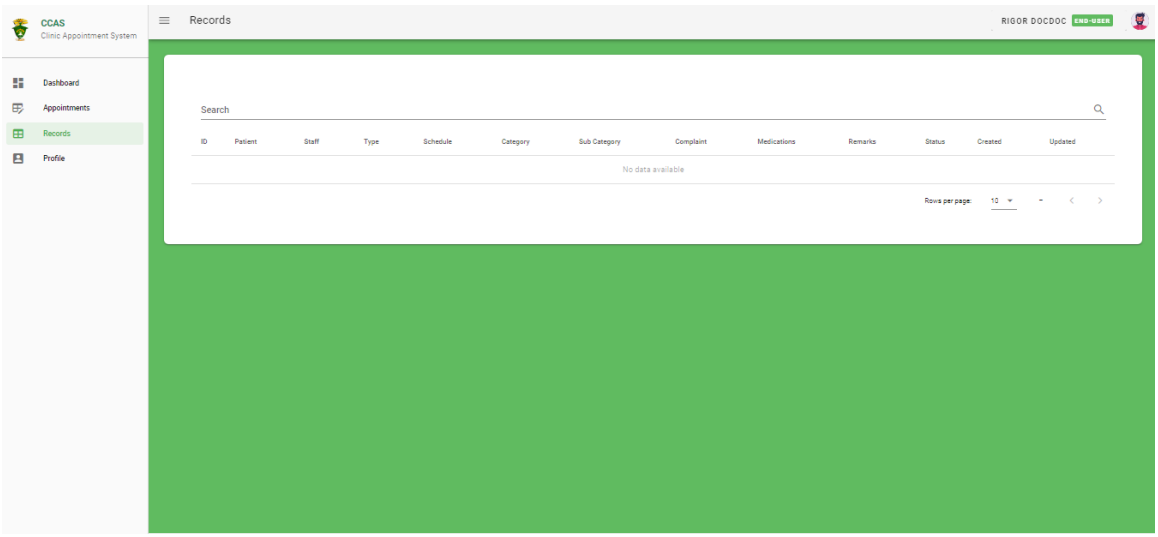


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Figure 4-1-5. Records

Figure 4-1-5 shows that the patient can view all the appointments completed and cancelled. In the Appointment Records, the user can track down all his/her transaction containing the details of appointment.

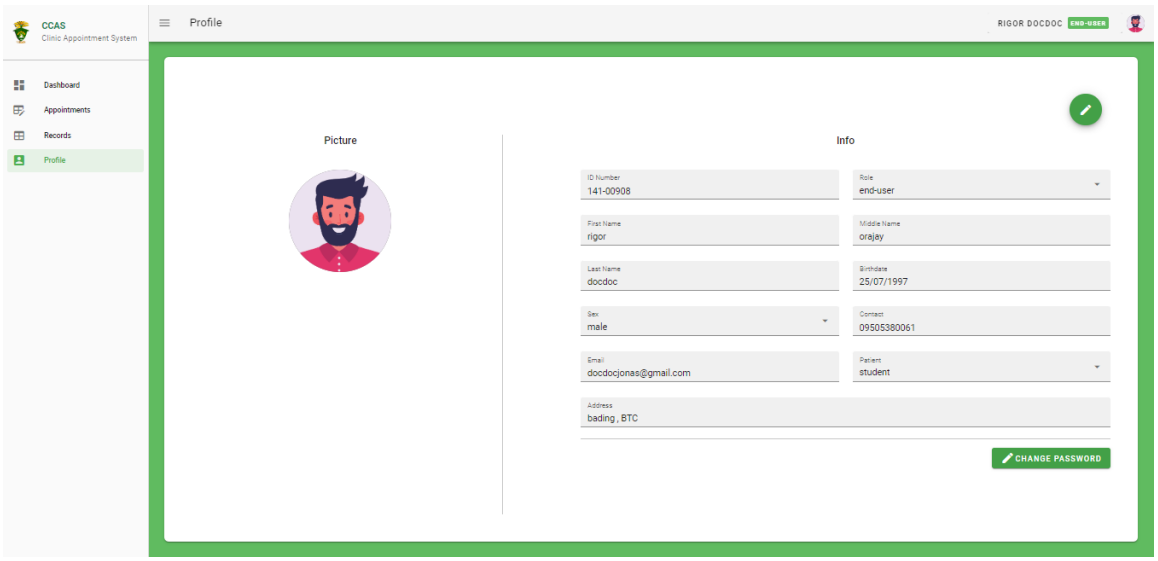

Figure 4-1-6. Profile details

Figure 4-1-6 shows the information of the user: id-number, name, birthdate, sex, address, contact. The user can edit his profile picture and account password.

4.1.2 Admin

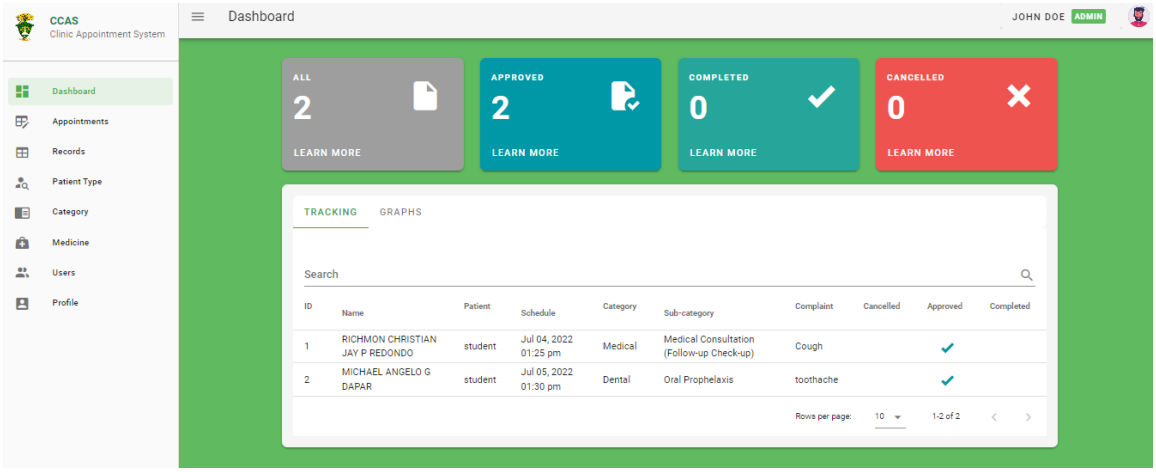

Figure 4-1-7. Dashboard (Admin)

Figure 4-1-7 shows all the appointment records, users name and patient-type, category and medicine. The admin can view and approve or cancel the pending schedules.

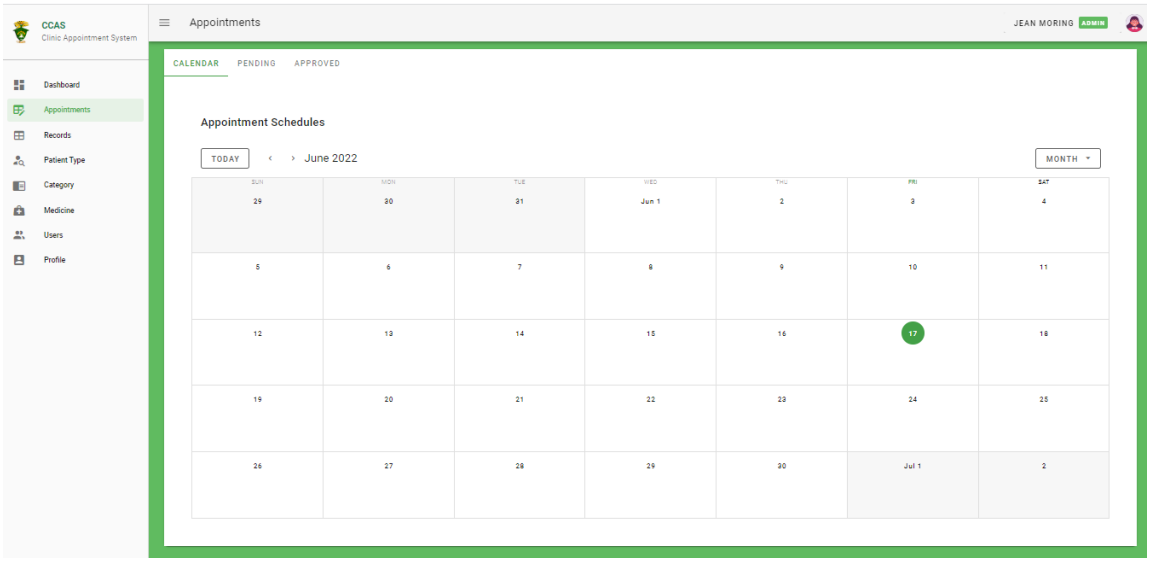

Figure 4-1-8. Appointment Schedules (Admin)

Figure 4-1-8 displays a calendar that shows the time and date that are already set. The admin can browse available dates and can check other patients' inputted schedules in the calendar. Only 15 patients can make an appointment per day.

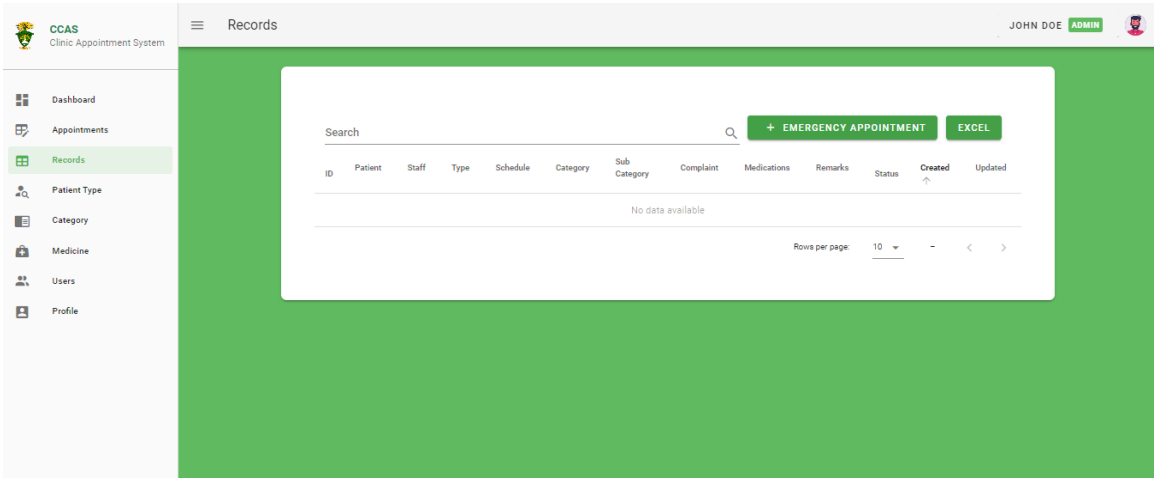

Figure 4-1-9. Records (Admin)

Figure 4-1-9 shows that the admin can view all the appointments completed and cancelled. In the Appointment Records, the user can track down all his/her transaction containing the details of appointment. The records can be exported as spreadsheet file.

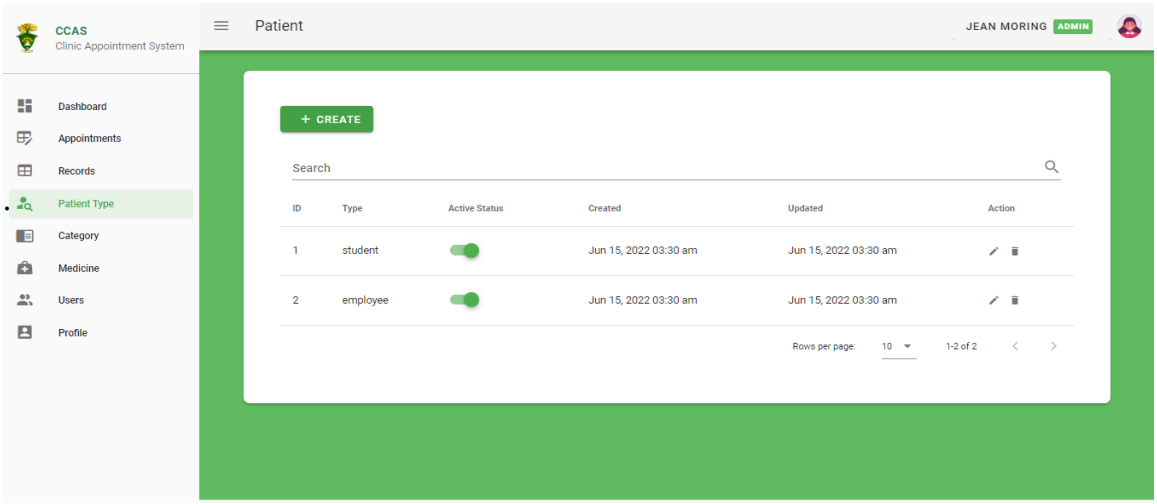

Figure 4-1-10. Patient-type

Figure 4-1-10 shows that the admin can check the patient's type whether a student or an employee.

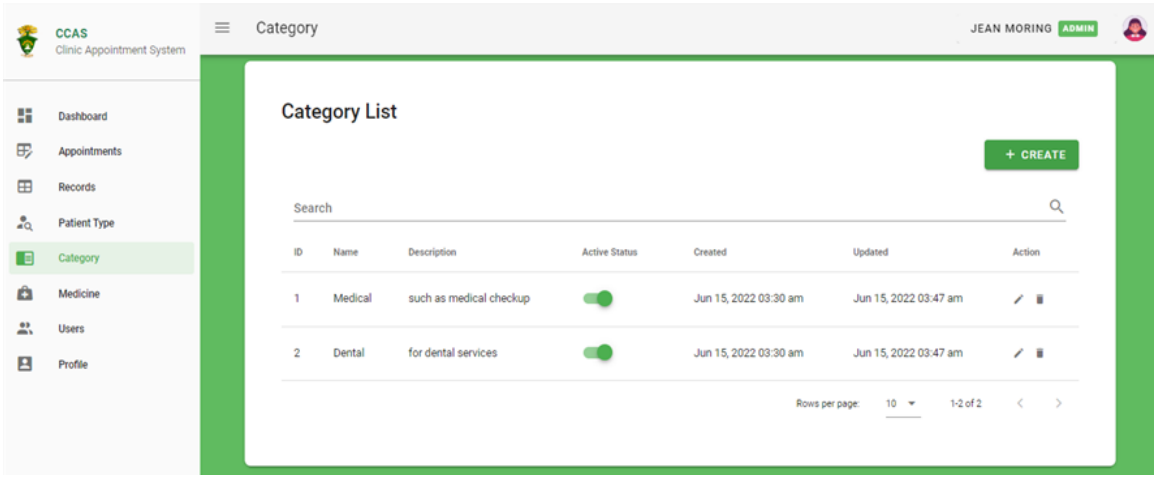

Figure 4-1-11. Category List

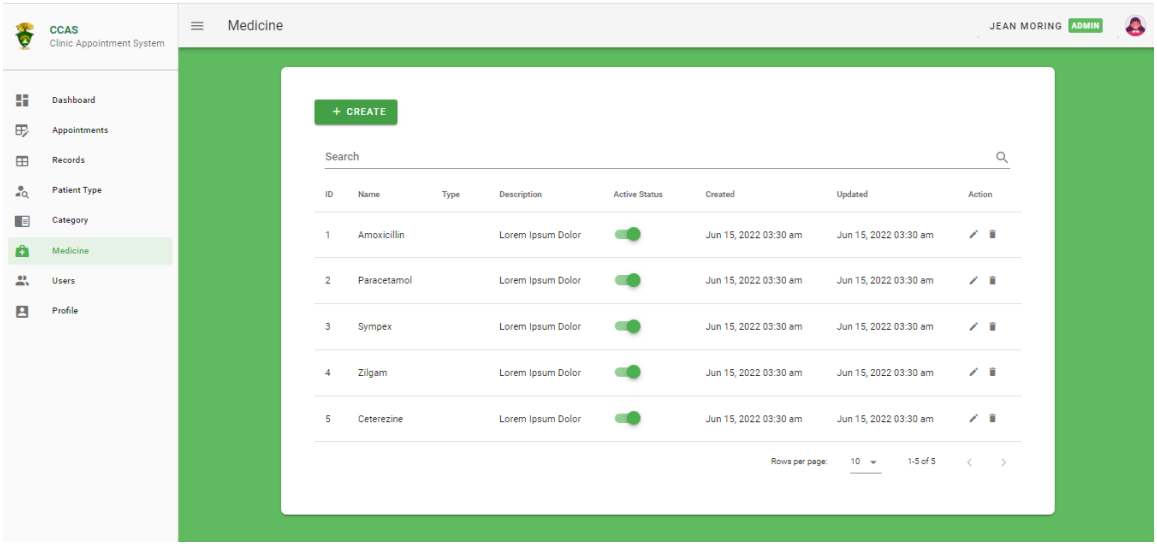

Figure 4-1-12. Sub-Category List

Figure 4-1-11 and Figure 4-1-12 displays the patient's preferred category is shown in this diagram. The two types of categories are dental and medical. Sub-category as description of patient’s complaints.

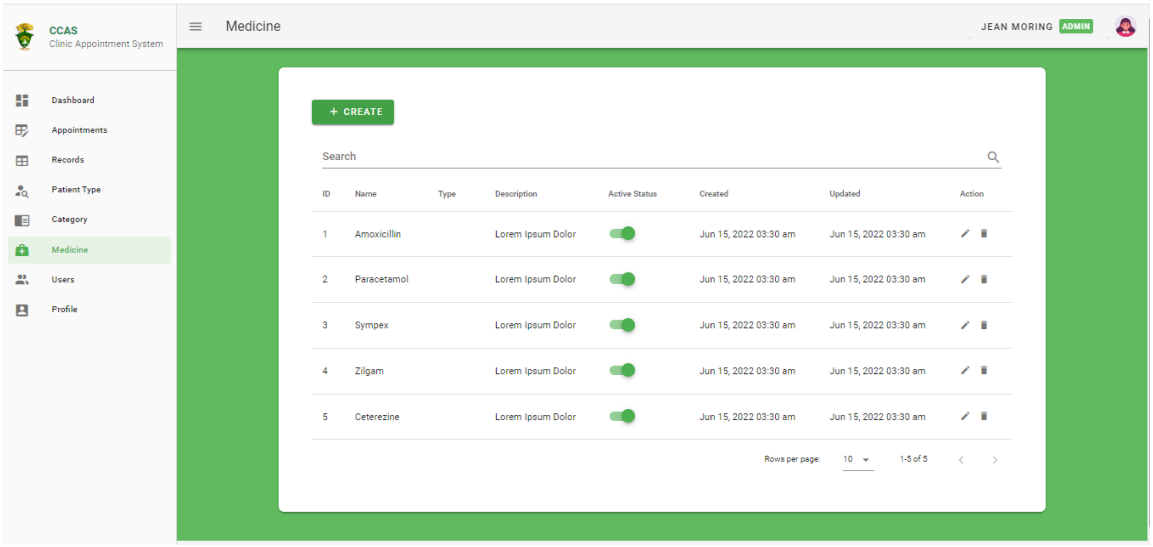

Figure 4-1-13. Medicine List

Figure 4-1-13 shows that the admin can select the medication prescribed by the clinic. The purpose of this function is to remind patients of their first-aid medicines so they don't forget to take their clinic-prescribed medications.

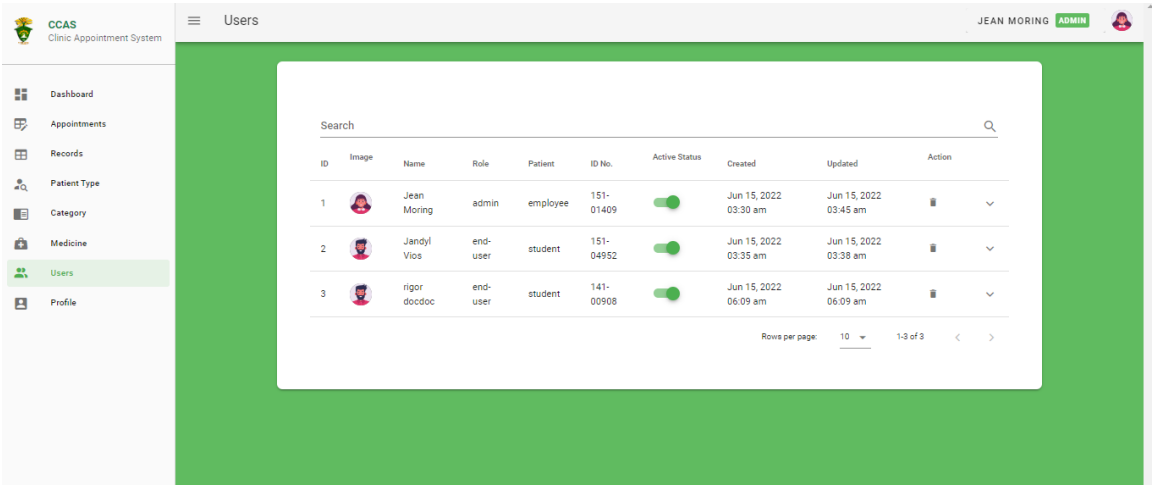

Figure 4-1-14. Users

Figure 4-1-14 shows that the admin can see all the patients' schedule, their information and their role.

4.2 Mobile Application Development

4.2.1 Login / Registration (Patient side)

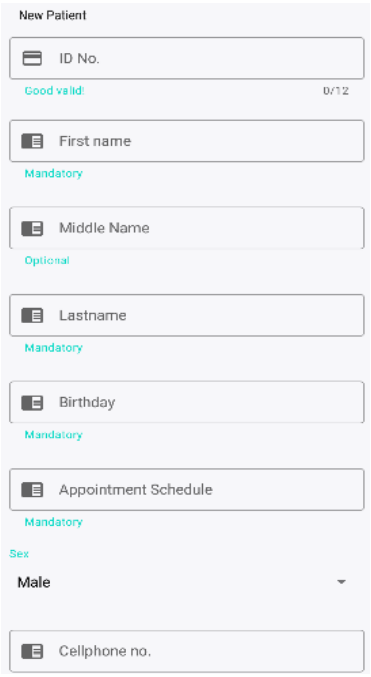

Figure 4-2-1. Mobile App New User

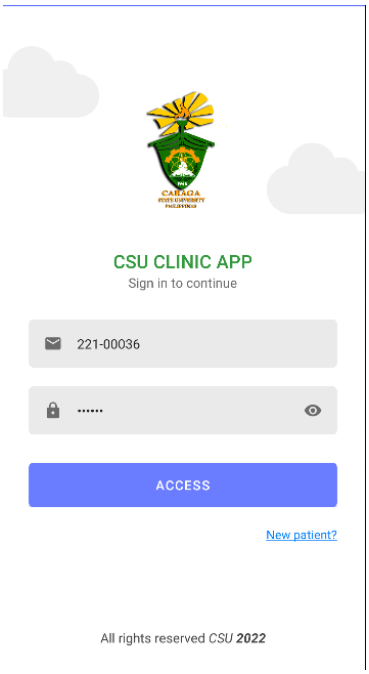

Figure 4-2-2. Mobile App User Login

Figure 4-2-1 shows the account registration phase. The user will provide the information required and at the same time the user can book an appointment in this phase. The user's id number will be set as username and an email will be received by the user confirming the account is already created.

Figure 4-2-2 shows the login and register phase of the mobile application. User requires username and password to login. If the account is verified then the user can access the application. If the account is not verified then the user will proceed to New Patient? Button to register.

4.2.2 Dashboard / Main screen (Patient side)

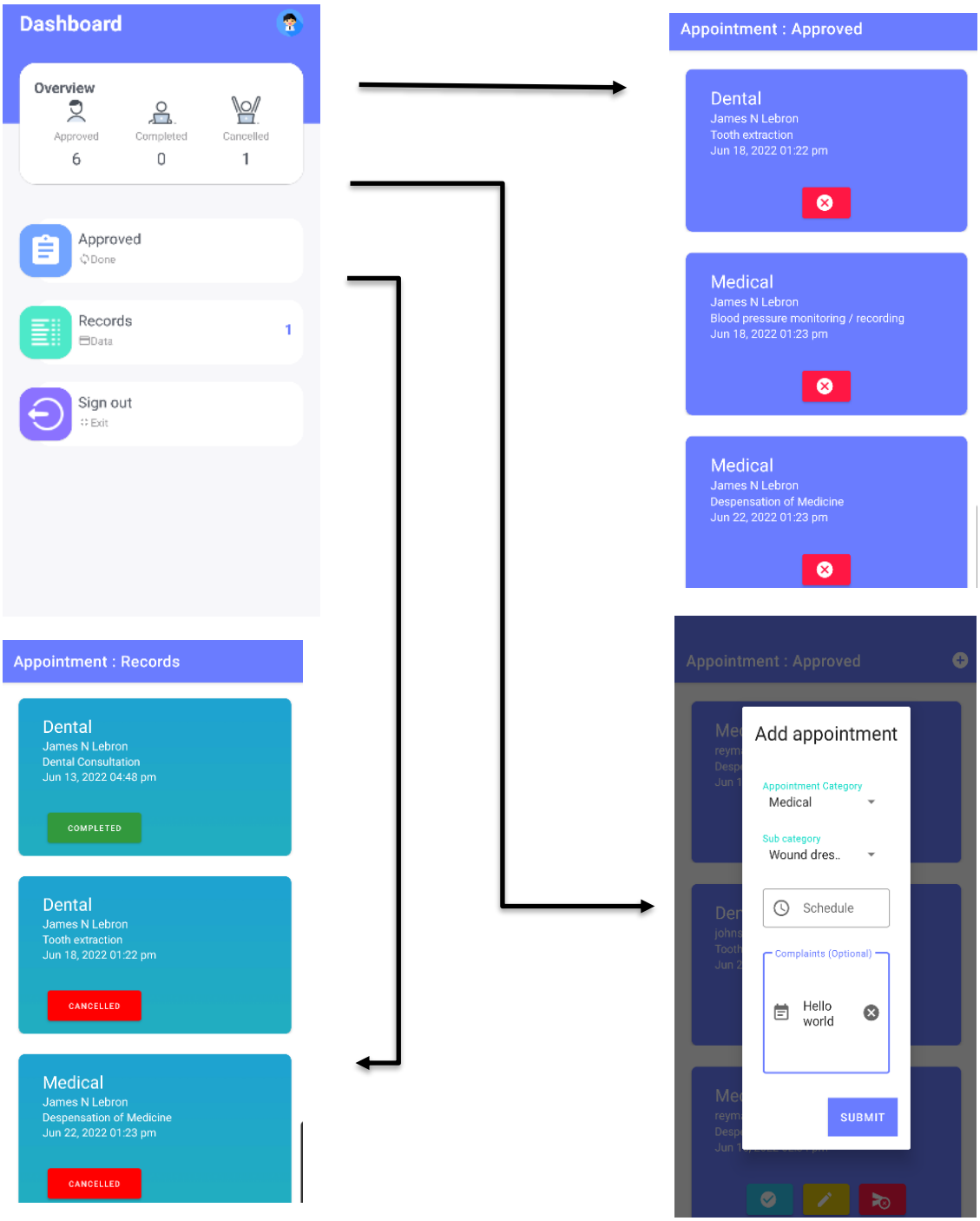

Figure 4-2-3. Mobile App Dashboard (Patient)

i. Dashboard: The user will be directed in the dashboard after logging into their account. The Approved, Records, and Sign out features are all displayed on the dashboard. The user can view and transact appointments by pressing the icon for each function.

ii. Add appointment: The patient can add appointment, which contains appointment type (Dental or Medical), and the patient's ailment or complaint, and the appointment date and time. An email will be received by the patient containing the details of appointment and confirming the appointment is granted.

iii. Approved: The patient can see the approved appointment. An email will be received by the patient containing the details of appointment and confirming the appointment is granted. In this phase the user still has an option to cancel the appointment by clicking the red x button.

Iv. The patient can view all the appointments completed and cancelled. In the Appointment Records, the user can track down all his/her transaction containing the details of appointment. The records can be exported as .xlsx format.

4.2.3 Admin side

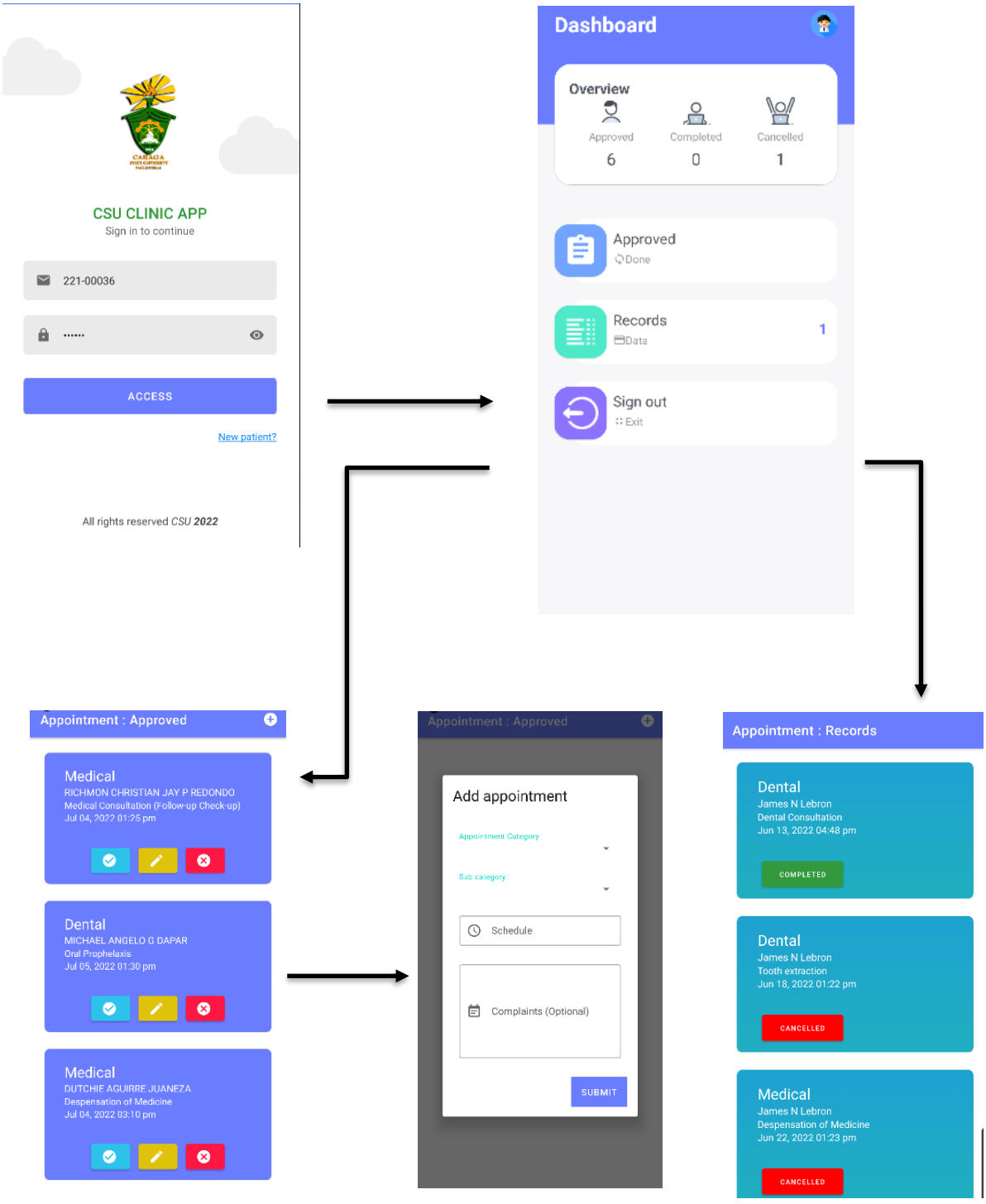

Figure 4-2-4. Mobile App Dashboard (Admin)

i. Dashboard: The admin can view the authorized, records, and sign out phases from the admin dashboard.

ii. Approved Appointments: The admin can view and alter approved appointments of the patient. Before the admin can complete the appointment, a remark is required with the medication prescribed by the clinic. In this phase the admin still has an option to cancel the appointment with reasonable remarks.

iii. Add appointment: Admin can make appointment with patients request, which contains appointment type (Dental or Medical), and the patient's ailment or complaint, and the appointment date and time.

iv. Records: Admin can view all of the patients completed and cancelled appointments, also the admin can view the details of the previous transactions of patients including the name, date, category and description of the transaction. For the admin to easily identify the records the cancelled appointments are highlighted with red while completed appointments are highlighted with green. The records can be exported as .xlsx format by clicking the excel format.

4.3 Email Notification

The user will receive an email confirming whether their appointment has been authorized, updated, or canceled. Upon registering as a new patient, the user will receive an email confirmation with account credentials, including an ID number for the username and a randomly generated string for the password.

Figure 4-3-1. New patient

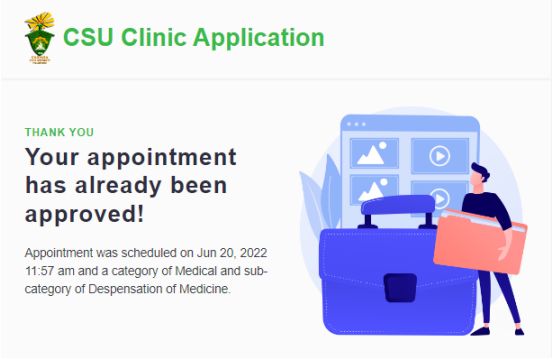

Figure 4-3-2. Approved appointment

Figure 4-3-3. Updated appointment

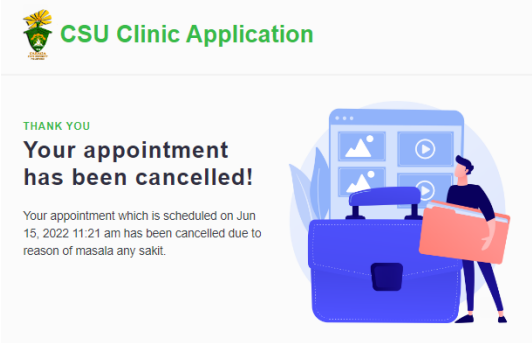

Figure 4-3-4. Cancelled

4.4 Functionality Test

The test was conducted to determine if all the Web and Mobile application functionalities worked as expected. Table 4.3.1-4 illustrated the test results. The Web and Mobile application functions were subjected to repetitive test and results registered in the table. The functionality test was majorly conducted to ensure the key objectives of the study are met. The web and mobile application were given to a third party, a school nurse in Caraga State University clinic.

Table 4-1. Web App Functionality Test Results (Patient)

Test Case Name: Functionality Test (Web Application) Test Date: June 22, 2022 Tested by: Florence Jones Noelle R. Acosta					
Module Tested	Description of Test Conducted	Expected Behaviour	Observed Behaviour	Error	Verdict
Registration	Confirm whether registration is carried out	The application registers users and stores the user information into a database	The application registers users and stores the user information into a database	None	Ok
Login	Confirm whether only registered users has access	User is first verified before granting access to the system	User is first verified before granting access to the system	None	Ok
Appointment booking	Confirm whether the booking of patients is stored into the database	i. The application displays the calendar with the dates of patient bookings and stores new appointment ii. User can make appointment containing appointment type	The application displays the calendar with the dates of patient bookings and stores new appointment ii. User can make appointment containing appointment type (Dental or Medical), and the	None	Ok

		(Dental or Medical), and the patient's ailment or complaint, and the appointment date and time. iii. Application restricts time 8:00am – 11am and 1pm – 4pm. An error message will pop up if the user will make appointment outside the restricted time.	patient's ailment or complaint, and the appointment date and time. iii. Application restricts time 8:00am – 11am and 1pm – 4pm. An error message will pop up if the user will make appointment outside the restricted time.		
Records	Checking of records	The users can view the records and can export the file ii. The records will be exported as .xlsx file format	The users can view the records and can export the file ii. The records will be exported as .xlsx file format	None	Ok

Table 4-2. Web App Functionality Test Results (Admin)

Test Case Name: Functionality Test Web Application Test Date: June 22, 2022 Tested by: Florence Jones Noelle R. Acosta					
Module Tested	Description of Test Conducted	Expected Behaviour	Observed Behaviour	Error	Verdict
Login	Confirm whether only registered users has access	User is first verified before granting access to the system	User is first verified before granting access to the system	None	Ok
Appointment booking	Confirm whether the booking of patients is stored into the database	i. The application displays the calendar with the dates of patient bookings and stores new appointment ii. Admin can make appointment with patient request.	The application displays the calendar with the dates of patient bookings and stores new appointment ii. Admin can make appointment with patient request.	None	Ok
Records	Checking of records	The application will display all the completed and cancelled records. ii. The records can be exported as .xlsx file format s	The application will display all the completed and cancelled records. ii. The records can be exported as .xlsx file format	None	Ok

Table 4-3. Mobile App Functionality Test Results (Patient)

Test Case Name: Functionality Test Mobile Application Test Date: June 22, 2022 Tested by: Florence Jones Noelle R. Acosta					
Module Tested	Description of Test Conducted	Expected Behaviour	Observed Behaviour	Error	Verdict
Registration	Confirm whether registration is carried out	The application registers users and stores the user information into a database	The application registers users and stores the user information into a database	None	Ok
Login	Confirm whether only registered users has access	User is first verified before granting access to the system	User is first verified before granting access to the system	None	Ok
Appointment booking	Confirm whether the booking of patients is stored into the database	i. User can make appointment containing appointment type (Dental or Medical), and the patient's ailment or complaint, and the appointment date and time. ii. Application restricts time 8:00am – 11am and 1pm – 4pm. An error message will pop up if the user will make appointment outside the restricted time.	i. User can make appointment containing appointment type (Dental or Medical), and the patient's ailment or complaint, and the appointment date and time. ii. Application restricts time 8:00am – 11am and 1pm – 4pm. An error message will pop up if the user will make appointment outside the restricted time.	None	Ok
Records	Checking of records	The application will display all the completed and cancelled records.	The application displays all the completed and cancelled records.	None	Ok

Table 4-4. Mobile App Functionality Test Results (Admin)

Test Case Name: Functionality Test Mobile Application Test Date: June 22, 2022 Tested by: Florence Jones Noelle R. Acosta					
Module Tested	Description of Test Conducted	Expected Behaviour	Observed Behaviour	Error	Verdict
Registration	Confirm whether registration is carried out	The application registers users and stores the user information into a database	The application registers users and stores the user information into a database	None	Ok
Login Admin and Patient side	Confirm whether only registered users has access	User is first verified before granting access to the system	User is first verified before granting access to the system	None	Ok
Appointment booking	Confirm whether the booking of patients is stored into the database	Admin can make appointment with patient request	Admin can make appointment with patient request	None	Ok
Records	Checking of records	The application will display all the completed and cancelled records.	The application displays all the completed and cancelled records.	None	Ok

4.5 User Experience

Post-test survey was conducted by the researcher on various users in Caraga State University.

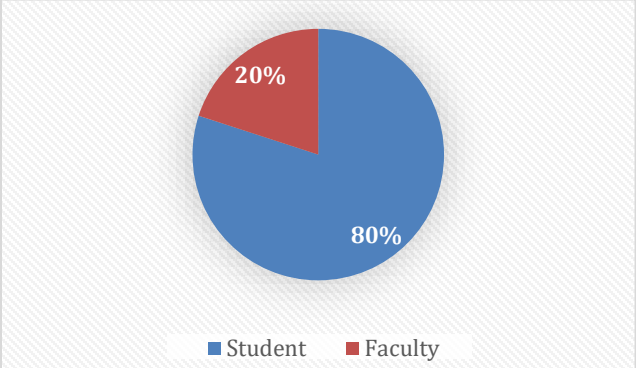

Figure 4-5-1. Patient-type distribution

Figure 4-5-1 above shows the user experience, usability and acceptance response from the users who carried out the test. 4 students (80%) and 1 faculty (20%) a total of 5 respondents.

Table 4-5. User experience survey

Screen		1	2	3	4	5	
Characters on the computer screen	Hard to read	0	0	0	0	100%	Easy to read
Highlighting on the screen	unhelpful	0	0	20%	0	80%	helpful
Screen layouts were helpful	never	0	0	0	0	100%	always
Sequence of screen	Confusing	0	0	0	0	100%	clear
Ease of use							
How easy to use the application	Very hard to use		0	0	40%	60%	Very easy to use
Acceptance	Yes						No
Would you use this application	✓						
Would you recommend this app	✓						

Table 4-5 shows the user experience using ISO 9241 and ISO 25062 standards.

1. Ease of Use

60% of the respondents felt that it was very easy to use the mobile application while 40% felt it was easy to use the application. This is illustrated in Table 9.

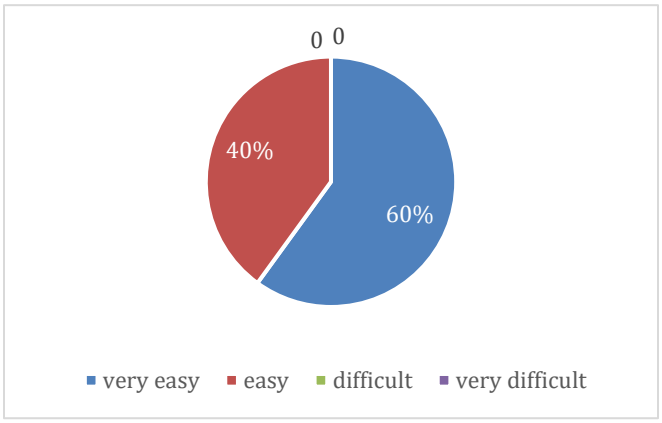

Figure 4-5-2. Ease of use

2. Acceptance

From the survey conducted by the research 80% of the respondents would want to use the solution. Figure 4.11 illustrates the findings on how users felt in terms of user experience and usability of the application.

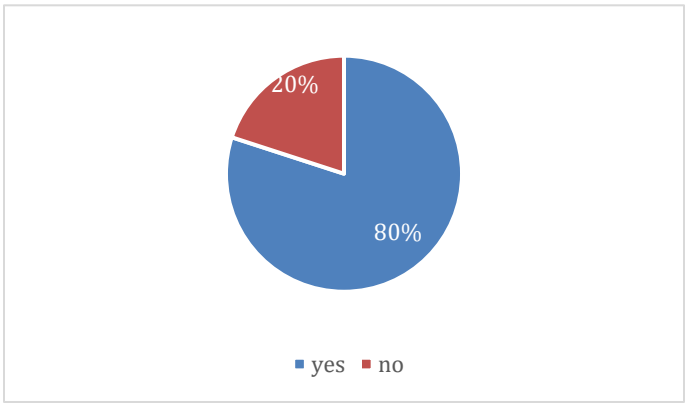

Figure 4-5-3. Acceptance

4.6 Test Conclusion

Based on the results gathered, the researchers and the clinic personnel determined that the system functionalities are all working properly to meet the clinic's scheduling system objectives. There were no errors found in the functionality test and clinics personnel's verdict on all test is approved. 60% of respondents voted that the application is very easy to use and 40% voted that the application is easy to use. 100% of respondents consider to use the application. Questionnaire on screen user experience will be use in updating purposes.

CHAPTER 5

SUMMARY, CONCLUSION AND RECCOMENDATIONS

5.1 Summary

The researchers designed a web and mobile application for the Caraga State University clinic appointment scheduling system. The construction of this system seeks to meet the study's objectives, which include clinic appointment scheduling that allows patient to book an appointment with their preferred time, limit the number of patients seen in the clinical hours.

The researchers obtained data from the CSU clinic in order to construct the Clinic Appointment Scheduling system. In addition, the researcher searched Google Scholar for another existing system that has been used by another researcher.

When it comes to system effectiveness testing, it allows the user to fully evaluate the system in order to establish its performance. The researcher conducted a test in the CSU clinic.

5.2 Conclusions

Based on the results gathered, the researchers and the clinic personnel determined that the web and mobile system design and functionalities are all working properly to meet the clinic’s scheduling system objectives. First, patients should be able to schedule appointments based on their preferred time and the clinic's availability. By displaying the calendar during the booking process, the patient can view the dates and times that have

already been reserved; the patient can now input his/her available time. Secondly, to limit the number of patients seen in the clinical hours. The system can only accept a maximum of 15 person per day with enough time interval for each patient arrival. Finally, the system will be presented to the clinic for a functional test. There were no errors found in the functionality test and clinics personnel's verdict on all test is approved. 60% of respondents voted that the application is very easy to use and 40% voted that the application is easy to use. 100% of respondents consider to use the application.

The researchers concluded that the system functionalities will improve the clinic's scheduling system through a methodical procedure based on the study's findings. When the designed system is used, scheduling issues caused by COVID-19 are readily resolved by the system. In terms of student and faculty appointment schedules, using a fully computerized procedure is more trustworthy.

5.3 Recommendations

Based on the results gathered, the system is open for further development and enhancement in terms of improvement and the researchers recommend the full implementation of the system. Considering its features of the system the following recommendations are:

1. The researcher recommend the system will be integrated with the MIS of CSU to ease the login process of the system.

2. Researcher recommend to include the report of the inventory of released medicines prescribed by the doctor.

3. To include the availability of the doctor on the displayed calendar for appointment booking.

REFERENCES

Cayirli & Veral (2021). Appointment Scheduling system. https://digitalcommons.cwu.edu/cgi/viewcontent.cgi?undergrad_hontheses

Dr. Cross, (2020). COVID 19: Keep On Keeping Your Distance. https://www.healthychildren.org/English/health-issues/conditions/COVID-19/Pages/Social-Distancing-Why-Keeping-Your-Distance-Helps-Keep-Others-Safe.aspx

Huang, (2016). Pre-Hospital Emergency Care Council Council http://www.phecit.i.e/Images/ PHECC/ Publications %20and%20 Media/ Exams/ NQEMT%20Examination%20Handbook%208th%20Edition.pdf

Oswal P., (2019). Outpatient Appointment Scheduling. https://preserve.lib.lehigh.edu/islandora/object/preserve%3Abp-7256324

O'hare and Corlett (2018). Automated Scheduling System. https://www.sciencedirect.com/science/article/pii/S1877050915035942

S. Sri Gowthem, & K.P. Kaliyamurthie (2017). Online Medical Appointment System. https://riunet.upv.es/bitstream/handle/10251/88831/CARA%20-%20Sistema%20de%20cita%20online%20para%20una%20consulta%20m%C3%A9dica.pdf?sequence=1

Solana, N. (2014). Patient Record System. https://www.slideshare.net/gaithramaha/g7-patient-record-system

WHO; World Health Organization, (2019). COVID 19 Social distancing. https://www.physio-pedia.com/Social_Distancing

Mohammad Awni Mahmoud et al. (May 2021) Evaluation of User Experience in Mobile https://www.researchgate.net/publication/351935442

Benjamin Palestino, (July 2019). Mobile apps vs Website: User preferences. https://digitalmarketing.temple.edu/bpalestino/2019/07/17/mobile-apps-vs-mobile-websites-user-preferences/

Andrew Ryzhokhin (2017) Chief Executive Officer Why does your clinic need a mobile application? https://ardas-it.com/why-does-your-clinic-need-a-mobile-application

Onteng Cheng (2019) Medication dispensing technology gives patients better access to key oral and self-injectable therapies, while opening a new potential revenue stream for doctors' practices. https://www.mckesson.com/Resources/Medication-Dispensing/ https://www.pinterest.ph/ontingcheng/clinic-app/

Gunther Eysenbach Published online (April 2017). Web-Based Medical Appointment Systems: A Systematic Review.https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC5425771/

Sanjana (2019) Benefits of an Online Appointment Management System in Healthcare. Industry https://mocdoc.in/blog/benefits-of-an-online-appointment-management-system-in-healthcare-industry.

Linda R. LaGanga, Stephen R. Lawrence (January 2012) Appointment Overbooking in Health Care Clinics to Improve Patient Service and Clinic Performance. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1937-5956.2011.01308.x

Wali M. Hussein, Payam and Salim, Mohammad and Ahmed, Bilal (2019). A Prototype Mobile Application for Clinic Appointment Reminder and Scheduling System in Erbil City. International Journal of Advanced Science and Technology, 28 (1). pp. 17-24. ISSN 20054238 http://eprints.tiu.edu.iq/266/

Yeo Symey, Suresh Sankaranarayanan , Siti Nurafifah binti Sait. July – (August 2013). Application of Smart Technologies for Mobile Patient Appointment System https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.380.6164&rep=rep1&type=pdf

Akinode,John Lekan , Oloruntoba S.A (December 2017). Design and Implementation of a Patient Appointment and Scheduling System https://www.researchgate.net/profile/Akinode-John-Lekan/publication/332864696_Design_and_Implementation_of_a_Patient_Appointment_and_Scheduling_System/links/5ccdf7c2a6fdccc9dd8d4628/Design-and-Implementation-of-a-Patient-Appointment-and-Scheduling-System.pdf

Karima Moumane, Ali Idri, Alain Abran (March 2016). Usability evaluation of mobile applications using ISO 9241 and ISO 25062 standards | SpringerPlus | Full Text (springeropen.com)

Irungu, A. N. (2016). QR-based mobile payment application for public Service Vehicle (Thesis). Strathmore University. http://su-plus.strathmore.edu/handle/11071/4881

APPENDICES

Appendix A. Data Dictionary

Table 1. Appointments

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	user_id	INT(11)		No	*None*
3	staff_id	INT(11)		Yes	*NULL*
4	category_id	INT(11)		No	*None*
5	sub_category_id	INT(11)		No	*None*
6	schedule	DATETIME		No	*None*
7	complaint	MEDIUMTEXT		Yes	*NULL*
8	remarks	MEDIUMTEXT		Yes	*NULL*
9	status	VARCHAR(255)		No	*None*
10	is_active	SMALLINT(6)		No	*None*
11	created_at	TIMESTAMP		Yes	*NULL*
12	updated_at	TIMESTAMP		Yes	*NULL*
13	deleted_at	TIMESTAMP		Yes	*NULL*

Table 2. App_link_meds

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	appointment_id	INT(11)		No	*None*
3	medication_id	INT(11)		No	*None*
4	created_at	TIMESTAMP		Yes	*NULL*
5	updated_at	TIMESTAMP		Yes	*NULL*

Table 3. Lib_categories

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	name	VARCHAR(255)		No	*None*
3	description	MEDIUMTEXT		No	*None*
4	is_active	SMALLINT(6)		No	*None*
5	created_at	TIMESTAMP		Yes	*NULL*
6	updated_at	TIMESTAMP		Yes	*NULL*
7	deleted_at	TIMESTAMP		Yes	*NULL*

Table 4. Lib_medications

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	name	VARCHAR(255)		No	*None*
3	type	VARCHAR(255)		Yes	*NULL*
4	description	MEDIUMTEXT		Yes	*NULL*
5	is_active	SMALLINT(6)		No	‘0’
6	created_at	TIMESTAMP		Yes	*NULL*
7	updated_at	TIMESTAMP		Yes	*NULL*
8	deleted_at	TIMESTAMP		Yes	*NULL*

Table 5. Lib_sub_categories

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	category_id	INT(11)		No	*None*
3	name	VARCHAR(255)		No	*None*
4	is_active	SMALLINT(6)		No	*None*
5	created_at	TIMESTAMP		Yes	*NULL*
6	updated_at	TIMESTAMP		Yes	*NULL*

7	deleted_at	TIMESTAMP		Yes	*NULL*

Table 6. Patient_types

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	type	VARCHAR(255)		No	*None*
3	is_active	SMALLINT(6)		No	*None*
4	created_at	TIMESTAMP		Yes	*NULL*
5	updated_at	TIMESTAMP		Yes	*NULL*
6	deleted_at	TIMESTAMP		Yes	*NULL*

Table 7. Users

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	user_role	INT(11)		No	*None*
3	type	SMALLINT(6)		No	‘1’
4	id_no	VARCHAR(255)		Yes	*NULL*
5	password	VARCHAR(255)		No	*None*
6	is_active	SMALLINT(6)		No	*None*
7	remember_token	VARCHAR(100)		Yes	*NULL*
8	created_at	TIMESTAMP		Yes	*NULL*
9	updated_at	TIMESTAMP		Yes	*NULL*
10	deleted_at	TIMESTAMP		Yes	*NULL*

Table 8. User_details

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	user_id	INT(11)		No	*None*
3	patient_id	INT(11)		Yes	*NULL*
4	image	VARCHAR(255)		Yes	*NULL*
5	first_name	VARCHAR(255)		No	*None*
6	middle_name	VARCHAR(255)		Yes	*NULL*
7	last_name	VARCHAR(255)		No	*None*
8	sex	VARCHAR(255)		No	*None*
9	birthdate	DATE		No	*None*
10	email	VARCHAR(255)		No	*None*
11	contact_no	VARCHAR(255)		Yes	*NULL*
12	address	VARCHAR(255)		No	*None*
13	created_at	TIMESTAMP		Yes	*NULL*
14	updated_at	TIMESTAMP		Yes	*NULL*

Table 9. User_roles

#	Name	Type (Length)	Attributes	Null	Default
1	id	BIGINT(20)	UNSIGNED, AUTO_INCREMENT	No	*None*
2	role_name	VARCHAR(255)		No	*None*
3	status	VARCHAR(255)		No	*None*
4	created_at	TIMESTAMP		Yes	*NULL*
5	updated_at	TIMESTAMP		Yes	*NULL*

Appendix B. User Experience Questionnaire

User experience using ISO 9241 and ISO 25062 standards.

Screen		1	2	3	4	5	
Characters on the computer screen	Hard to read	x	x	x	x	x	Easy to read
Highlighting on the screen	unhelpful	x	x	x	x	x	helpful
Screen layouts were helpful	never	x	x	x	x	x	always
Sequence of screen	Confusing	x	x	x	x	x	clear
Ease of use							
How easy to use the application	Very hard to use	x	x	x	x	x	Very easy to use
Acceptance	Yes						No
Would you use this application	x						x
Would you recommend this app	x						x

Appendix C. CLINIC SERVICE FLOW

Schedule of availability of service *[applicable to all types of services delivered by the unit]:*

Monday to Friday (8:00 AM – 5:00 PM); No Noon Break

1. Medical Consultation

Bona fide Employee and Student of the university can be examined by the Health Professionals for their medical history and be recommended to that treatment or intervention is needed.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original)	MIS Office - CSU School ID
ii. CSU Employee: 1. Employee Valid ID (1 original)	Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
6. Approach Medical Personnel (Physician or Nurse)	1. Consult the patient regarding with his/her complaints	None	5 minutes	*Doctor/Nurse* Clinic
7. Inform Medical Personnel	2. Actual examination	None	5 minutes	*Doctor/Nurse* Clinic

with Signs and Symptoms experienced	of the patient			
8. Receives appropriate Medicine	3. Giving of necessary Medicine	None	5 minutes	*Doctor/Nurse* Clinic
9. Advised accordingly to health education and discharge instructions	4. Provides necessary instructions and advise before discharging the patient	None	3 minutes	*Doctor/Nurse* Clinic
10. Client writes on the LOGBOOK for monitoring	5. Patient log to the medical Monitoring log book	None	2 minutes	*Patient* CSU Students/Employees
TOTAL:		**None**	**20 inutes**	

2. Blood Pressure Monitoring

Bonafide Employee and Student of the university has access to blood pressure taking and monitoring as well as health education on maintaining healthy blood pressure levels.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees
CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original)	MIS Office - CSU School ID

ii. CSU Employees: 1. Employee Valid ID (1 original)			Management Information Systems	
CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
6. Approach Medical Personnel (Physician or Nurse)	1. Assessment	None	5 minutes	*Doctor/Nurse* Clinic
7. Wait while Blood Pressure is being taken	2. Blood Pressure reading to Patient	None	5 minutes	*Doctor/Nurse* Clinic
8. Listen accordingly to result of Blood Pressure Taken by The Medical Personnel	3. Inform the patient Regarding his/her blood pressure if it is within or beyond normal range	None	5 minutes	*Doctor/Nurse* Clinic
9. Note health teaching and discharge instruction provided by Medical Personnel	4. Provide the necessary medication and/or Health Education/ Discharge instructions relating to his/ her condition	None	3 minutes	*Doctor/Nurse* Clinic
10. Client writes on the LOGBOOK for monitoring	5. Recording of blood pressure taken on the Logbook	None	2 minutes	*Patient* CSU Students/Employees
TOTAL:		**None**	**20 inutes**	

3. Wound Dressing

Bona fide Employees and Student of the university has access to wound cleansing and wound dressing that limit exposure to infection in general.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original) **ii. CSU Employee:** 1. Employee Valid ID (1 original)	MIS Office - CSU School ID Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
5. Approach Medical Personnel (Physician or Nurse)	1. Assessment of the condition of patient's injury/ wound	None	5 minutes	*Doctor/Nurse* Clinic
6. Sits on the wound dressing area	2. Conduct wound dressing Procedure to the patient	None	5 minutes	*Doctor/Nurse* Clinic
7. Advised accordingly to health education and discharge instructions	3. Giving of medicine and provide necessary instruction/advise to the patient before discharging out of the unit	None	5 minutes	*Doctor/Nurse* Clinic
8. Client writes on the LOGBOOK	4. Patient filled-up the medical monitoring log and	None	2 minutes	*Doctor/Nurse* Clinic

for monitoring	wound dressing log book			
TOTAL:		**None**	**17 inutes**	

4. Nebulization

Bona fide Employees and Students of the university has access to nebulization during asthma attack or any other allergic reaction that inhibits airflow to respiratory system.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
i. Enrolled Students: 1. Validated School ID (1 original) **ii. CSU Employees:** 1. Employee Valid ID (1 original)	MIS Office - CSU School ID Management Information Systems

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
6. Approach Medical Personnel (Physician or Nurse)	1. Vital signs and medical history taking on the patient	None	5 minutes	*Doctor/Nurse* Clinic
7. Sits and takes nebulization medication	2. Giving medicine to the patient thru the nebulizing machine	None	5 minutes	*Doctor/Nurse* Clinic

8. Wait for post nebulization assessment by the Medical Personnel	3. Post Nebulization Assessment	None	5 minutes	*Doctor/Nurse* Clinic
9. Receives appropriate Medicine	4. Provide OTC/ prescribed drugs when necessary	None	3 minutes	*Doctor/Nurse* Clinic
10. Advised accordingly to health education and discharge instructions	5. Provide Health education & discharge instructions	None	3 minutes	*Doctor/Nurse* Clinic
6.Client writes on the LOGBOOK for monitoring	6. Filled-up nebulization Log book	None	2 minutes	*Patient* CSU Student/Employees
TOTAL:		**None**	**23 inutes**	

5. [Dental Service] Oral Prophylaxis

Bona fide Employees and Student of the university has access to dental cleaning (oral prophylaxis) and health teaching to attain and maintain dental health.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
1. Enrolled Students: Validated School ID (1 original) **2. CSU Employees:** Employee's Valid ID (1 original)	MIS Office - CSU School ID Management Information Systems

3. Proof of Payment: (Fee: Php. 150.00 - Php. 500.00)			Cashier's Office	
CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
3. Fill up dental form	1. Provide dental form to Client	None	5 minutes	*Nurse* Clinic
4. Submit filled-up dental Form to the dentist	2. Record and note filled up form by the Client	Php. 150.00 to Php. 500.00	3 minutes	*Dentist* Clinic
7. Sits and converse with Dentist regarding dental concerns	3. Consultation of the patient Prior to the procedure	None	5 minutes	*Dentist* Clinic
8. Waits for the procedure to be done	4. Conduct procedure to the patient	None	30 minutes	*Dentist* Clinic
9. Advised accordingly to dental health and discharge instructions	5. Provide necessary instructions to the patient	None	3 minutes	*Dentist* Clinic
10. Client writes on the LOGBOOK for monitoring	6. Patient log to the Procedure log book	None	2 minutes	*Patient* CSU Student/Employees
TOTAL:		**Php. 150.00 to Php. 500.00**	**48 inutes**	

6. [Dental Service] Tooth Extraction

Bonafide Employees and Student of the university has access to tooth examination and tooth extraction with proper dental health teaching and medication.

Office or Division:	Office of the Health Services Unit (Clinic)
Classification:	Simple
Type of Transaction:	G2C - Government to Citizen
Who may avail:	All bona fide students of Caraga State University and Employees

CHECKLIST OF REQUIREMENTS	**WHERE TO SECURE**
1. Enrolled Students: Validated School ID (1 original) **2. CSU Employee:** Employee Valid ID (1 original) **3. Proof of Payment:** (Fee: Php. 150.00 – Php. 500.00)	MIS Office - CSU School ID Management Information Systems Cashier's Office

CLIENT STEPS	**AGENCY ACTION**	**FEES TO BE PAID**	**PROCESSING TIME**	**PERSON RESPONSIBLE**
7. Fill- up dental form	1. Provide dental form to Client	None	5 minutes	*Nurse* Clinic
8. Submit to the dentist accomplished dental form	2. Record and note filled up form by the Client	None	5 minutes	*Dentist* Clinic
9. Sits and converse with Dentist regarding dental concerns	3. Evaluation of the patient Prior to the procedure	None	5 minutes	*Dentist* Clinic
10. Waits for the procedure to be done	4. Conduct dental procedure	Php. 150.00	30 minutes	*Dentist* Clinic

		to Php. 500.00		
11. Receives appropriate Medicine and advised accordingly to dental health and discharge instructions	5. Giving medicine to the patient and provide necessary instruction	None	3 minutes	*Dentist* Clinic
12. Client writes on the LOGBOOK for monitoring	6. Recording of medications and procedure given on the Medicine and Procedure logbook	None	2 minutes	*Patient* CSU Student/Employees