

WEB-BASED APPOINTMENT AND MANAGEMENT SYSTEM
FOR DELIN OPTICAL

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CHAPTER I

INTRODUCTION

Background of the Study

Appointment systems have marked significant advancements in different fields of professions or businesses, and are widely used by developed countries to improve quality of service. These systems are designed to streamline the process of scheduling an appointment system, whether in service industries, schools, and especially in healthcare settings. It generates a workflow avoiding the long queuing time that can minimize the average wait time of a patient (Huang, 2016). These systems have also not impacted on the patients' side but also improved the business operations eliminating the manual recording of each appointment schedule sometimes causing human errors (Akinode & Oloruntoba, 2017). However, appointment systems do not limit the scheduling of an appointment but also have real-time availability updates and automated reminders. Overall, the evolution of appointment systems has led to improved accessibility, convenience, and satisfaction for both service providers and users.

To further elaborate the advantages of using an appointment system in healthcare facilities especially in clinics, different studies have examined and utilized the appointment system. In a study conducted by Graham et al. (2020), patients missed many clinic appointments making the patient unable to meet their respective physicians. Also the answering phone calls that are related to appointments is time consuming. To resolve these challenges they have employed a patient portal to cater patient appointments, the results were beneficial to both patients and physicians as it shows that the majority says it saved them time when scheduling an appointment. In addition, related issues has been observed based on the study conducted by (Obulor & Eke, 2016), that there are instances where patients are not attended immediately due to a queue that is very long, and there are even cases where patients end up going home not being entertained on that day. And by implementing an appointment system patient waiting time is reduced and it to enhances that work efficiency and patient satisfaction. These studies showed the important role of the appointment

scheduling system in terms of healthcare as it enhances the experiences of both patient and clinic staff. Overall, it is highly observed from other studies that implanting such system will benefit each healthcare facilities workflow.

The Delin Optical Clinic a 30 years good quality eyecare provider in the province of Bukidnon, they offers different eyecare services such as eye check-ups, give prescriptions and different eyewear's. Despite the clinic's intention to provide services to its clients, they have also faced the challenges in effectively catering each client. This problem affects their business such as whenever there is a peek of customers during that certain hour of the day, they are unable to serve them that causes other clients to look for another optical clinic.

In response to the challenges that the clinic currently facing about the uncatered clients, this study aim to develop a Web-Based Appointment and Management System for the clinic that allows clients to schedule their visit within the clinic. The system to be developed will not only allow them to receive appointments but also allows them to store patient records, advertise their products and enables clients to ask inquiries 24/7. This enhancement will not only improve the clients experience but also helps the clinic to cater clients more efficiently.

Statement of the Problem

The Delin Optical Clinic has become well-known to the City of Valencia due to its populated location, resulting in a significant increase of demand for its services. Specifically, the proponents address the following problems:

- i. How can the clinic efficiently organize scheduled appointment and patient records without relying on manual system?
- ii. How can patients easily make and manage appointments without the need to visit the clinic and surely be entertained by clinic?
- iii. How can the clinic effectively manage upcoming appointments and easily organize when the patient will come to the clinic?
- iv. How can the clinic efficiently store, manage, and retrieve patient records

- v. How can the clinic owner quickly accommodate patient inquiry without patient needed to wait for response?

Objectives of the Study

This project aims to develop a web-based appointment system and patient record system for Delin Optical Clinic. Specifically this project aims to:

- i. To create a centralized database for Delin Optical Clinic to organize scheduled appointments and patient records.
- ii. To create a system that enables patient to view and schedule available appointment slot, as well as cancel or reschedule appointments.
- iii. To develop a system for Delin Optical Clinic to manage upcoming appointments. Include cancelling, rescheduling and accepting appointments
- iv. To create a system that allows Delin Optical Clinic to store and manage patient record through adding, editing, deleting and viewing of patient records.
- v. To implement a chat-bot within the system to accommodate patient inquiries

Scope and Limitation of the Study

This study focuses on developing a web-based appointment system and patient record system specifically personalized for Delin Optical Clinic. The scope includes designing and centralizing a database to organize data from scheduled appointments and patient records, enabling patients to view available slots and schedule appointments, and providing functionalities for patients to cancel and reschedule appointments. Additionally, the system will allow Delin Optical Clinic to view, receive, cancel, reschedule, and accept appointments, as well as manage and store patient records, including adding, viewing, deleting, and updating records. Furthermore, a chat-bot will also be implemented to handle patient inquiries related to the clinic.

Despite its benefits, this system has limitations. The chat-bot to be implemented will not allow user input but has only need to select a specific question that has a pre-

determined response that has been set by the admin. It will also require internet connectivity for the users to be able to access the system.

Significance of the Study

The following are the beneficiaries of the system including their benefits:

i. Clinic Staff

Workload in managing appointments will be reduced and minimizes the errors in scheduling. Also, they can easily access historical data of patients and improve data management.

ii. Patients

Benefits from enhanced convenience with the ability to schedule, reschedule, and cancel appointments online. This not only reduces the need for phone calls or in-person visits but also leads to reduced waiting times due to optimized appointment scheduling and improved clinic workflow.

iii. For Ophthalmologists

The implementation of the web-based appointment and patient record system provides easy navigation and search functionalities for patient records, thereby improving efficiency during consultations. Moreover, access to real-time appointment schedules enables better time management and contributes to the reduction of waiting times for patients.

iv. For Delin Optical Clinic

The implementation of this system leads to improved customer satisfaction through enhanced service delivery and reduced wait times. Moreover, it results in increased operational efficiency and cost savings by minimizing manual administrative tasks and reducing the risk of appointment scheduling errors.

CHAPTER II

REVIEW OF RELATED LITERATURE

Automated appointment scheduling and patient record systems have become indispensable tools for optical clinics to efficiently manage their operations. This technology harnesses algorithms and data analysis to monitor and analyze patient appointments and records. In this section, we delve into pertinent literature discussing the advantages and obstacles associated with employing automated appointment scheduling and patient record systems in optical clinics.

1. Appointment Systems

During these past years, the needs and developments of online appointment systems have increased. Appointment systems have not only been used in a single industry but have also been implemented in different fields and areas in our society. In the field of education, Bakolo et al. (2021) mentioned in their study that having an online appointment system makes the scheduling process easier for both students and lecturers. In the area of business and banking, Soini (2021) stated that through online appointments, the need for customers to meet with the company has increased significantly.

Moreover, appointment systems in healthcare settings have also evolved significantly in recent years due to the increasing demand for efficient patient management. Research by Luo et al. (2019) highlights the importance of appointment scheduling systems for optimizing clinic operations and improving patient satisfaction. Moreover, a study conducted by Zhao et al. (2017) stated that the integration of Web-based appointment systems in healthcare has shown positive outcomes, including reduced no-show rates, decreased staff labor, and improved patient satisfaction. However, adoption among providers is hindered by concerns about cost, flexibility, safety, and data integrity. Patient reluctance stems from past technology experiences and communication preferences. Addressing these concerns is crucial for the widespread acceptance and utilization of digital healthcare solutions. In summary, while web-based appointment systems offer significant benefits,

challenges remain in terms of provider adoption and patient acceptance. Future research should focus on addressing these concerns to facilitate the seamless integration of digital healthcare ecosystems.

2. Patient Record Management System

Patient record management systems play a crucial role in modern healthcare by efficiently storing, managing, and providing access to patient information. Several studies highlight the significance and benefits of these systems in enhancing patient care, decision-making, and overall healthcare service delivery. According to the study conducted by Bouyad et al. (2017), he emphasizes the importance of patient health record systems in revolutionizing health services, fostering patient-provider communication, and enhancing health outcomes while reducing costs. Efforts to improve data quality, integrity, and system functionality are crucial for the success of these systems. Additionally, according to the study of Tsai et al. (2020), the implementation of Electronic Health Record (EHR) significantly improves efficiency, streamlines the workflow, and reduces administrative burdens to enhance clinical documentation processes and improve staff satisfaction.

3. Benefits of Chat-bot in Patient Inquiries

Chat-bots have appeared to be a useful tool in healthcare, offering various benefits across different aspects of patient care. In a study conducted by Milne-Ives et al. (2020), chat-bots show effectiveness and usability in health care. A study was also conducted by Mittal et al. (2021), chat-bot has demonstrated itself as a good communication channel for both users and hospital staff, it has become effective for users as it provides important information about the hospital and also provides details of the availability of doctors with just one click. Based on studies by Milne-Ives et al. in 2020 and Mittal et al. in 2021, chat-bots are proving to be helpful in healthcare. They're effective and easy to use, providing valuable information to patients and facilitating communication between users and hospital staff. This suggests that chat-bots have the potential to improve patient care and streamline operations.

4. Related Studies (MIS)

Efficient management of appointments and patient records is crucial for the success of healthcare facilities, including optical clinics. Management Information Systems (MIS) play a vital role in facilitating the organization, storage, and retrieval of data, ultimately improving the overall efficiency and quality of healthcare services provided.

In the study of Omambia (2024), implementing technological tools such as Health Management Information System (HMIS) leverages the accessibility, efficiency and helps in providing equitable healthcare services for everyone. This study also concludes that this type of system also allows governments to improve access to quality health services through this kind of digital solution and strengthen their health information system and enable a healthier population and a more sustainable future for each individual. A Medical Record Management Information System was also implemented from the study of Widiyanto et al. (2020) with the use of a waterfall development model. By getting an overview of patient records from the manual management of patient records, they have made a correct and clear system design that helps them develop and carry out a system that makes the data collection and generation of reports much faster.

The literature review highlights the transformative potential of Automated Appointment Scheduling and Patient Record Systems in modernizing healthcare delivery within optical clinics like Delin. Online appointment systems have proven to streamline operations and enhance patient satisfaction across various sectors, including healthcare. Patient Record Management Systems, particularly Electronic Health Records, play a crucial role in improving clinical workflows and communication. For Delin Optical Clinic, implementing a tailored Appointment and Management System presents an opportunity to optimize workflows, improve patient experiences, foster sustainable growth, and ultimately enhanced operational efficiency and improved patient outcomes.

CHAPTER III

TECHNICAL BACKGROUND

In developing the project, the following technological tools will be used by the proponents to make the development of Appointment System and Management System possible.

1. PHP

The proponent will use PHP as the main programming language for the development of the system. PHP is a widely-used open-source server-side scripting language that is especially suited for web development. It is commonly used to run server-side programs such as data collection and processing and database management (Uzayr, 2022). So, the proponent will use it to handle the process of storing patients' records, making appointments, and other system functions and database interactions.

2. CodeIgniter Framework

CodeIgniter is a free and open-source software rapid development web framework, for use in building dynamic web sites with PHP. It provides a variety of libraries that can simplify development (Muqorobin & Rais, 2022).

The proponent will use CodeIgniter due to its lightweight nature, ease of learning, and robust set of features. Additionally, CodeIgniter's extensive documentation makes it an ideal choice for rapid development and long-term maintenance of the project.

3. XAMPP

XAMPP, is a lightweight Apache distribution designed for developers to easily set up a local web server for testing purposes. It comes bundled as a single extractable file containing all necessary components, including the Apache server, MySQL database, and PHP scripting language. Being cross-platform, XAMPP is compatible with Linux, Mac OS X, and Windows. Its similarity to real-world web server deployments makes transitioning from a local test server to a live server seamless.

In order to develop the system locally, XAMPP has been a huge help. It serves as a web server as well as a database server for developing the system. With the help of XAMPP, development has become more convenient for the developers.

4. HTML

HTML, short for Hypertext Mark-up Language, is a standard way to organize and style web content. It's like a set of building blocks for creating web pages, including elements like titles, headings, text, and links. Basically, HTML is what makes websites look and function the way they do.

The proponent will use HTML to organize the content and structure of each web page depending on its applicable layout. Including paragraphs, data tables, lists, and etc.

5. CSS

CSS, or Cascading Style Sheets, is utilized to customize and structure web pages. It allows for modifications such as changing font styles, colors, sizes, and spacing, dividing content into columns, and incorporating animations and decorative elements

The proponent will use CSS to design and enhance the layout of the user interface of the system and combines with the mark-up language which is HTML.

6. MySQL

MySQL is a relational database management system available as open source. Typically employed in web application development, it's often accessed through server-side scripting languages like PHP. Additionally, it can be interacted with directly using programming languages such as C, C++, Eiffel, Java, Perl, PHP, and Python. Queries to MySQL databases are conducted using a subset of SQL commands, a standardized language for managing relational databases.

The proponent will use MySQL as a relational database management system to store and manage data's that will be needed for the system, such as appointment schedules and patients records.

7. VS Code

Visual Studio Code is a great tool for writing, fixing, and organizing code. It has lots of features and add-ons for different programming languages. With Visual Studio Code, proponents can work on the system's code better, making fewer mistakes and getting more done. Using Visual Studio Code can make it easier to build and manage an appointment and management system because it keeps the code neat, works well, and is easy to use.

8. Bootstrap

It makes the development process much easier by providing variety of pre-built components and designs that can be easily customized and incorporates in the system's user interface, ensuring consistency across all pages. With the use of bootstrap the proponents can create a user-friendly and visually appealing interface that makes interacting with the system easier. Overall, Bootstrap is important for making an appointment and management system it makes the system look good and functional.

CHAPTER IV

METHODOLOGY

1. Conceptual Framework

The IPO model presented outlines a structured approach for developing and evaluating the Appointment and Management system for Delin Optical Clinic. In its input phase, the focus lies on understanding the current procedures, guidelines, records, and stakeholders within the clinic. During the process phase, data will be gathered from diverse sources, like surveys and interviews to ensure thorough and accurate information collection. Finally, in the output phase, a system will be developed and implemented based on the insights gained from the input and process phases. This ensures that the system meets the expectations and needs of the patients, the owner, and the clinic itself.



Figure 1. Conceptual Framework using IPO

2. System Development Methodology

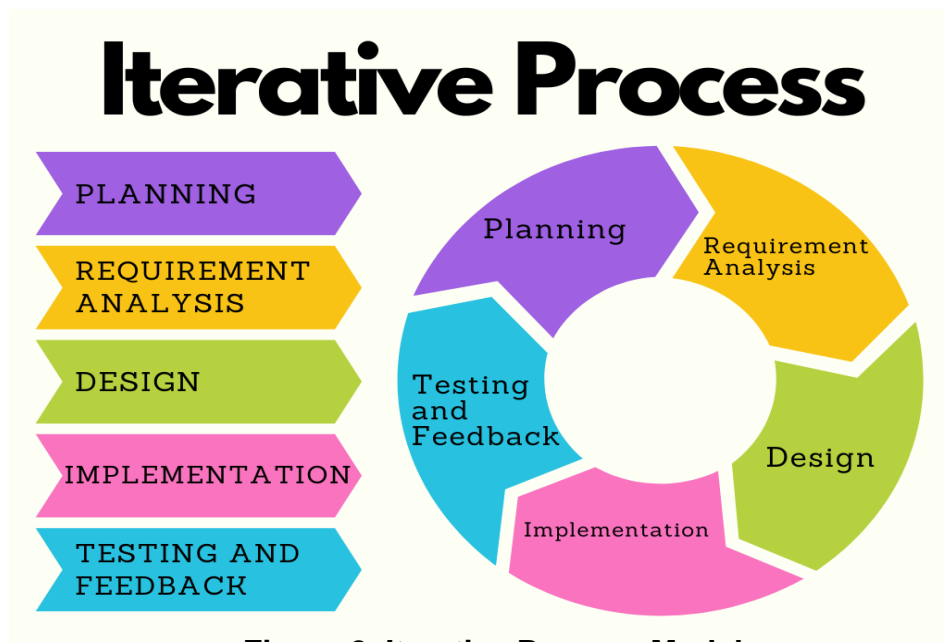


Figure 2. Iterative Process Model

The researcher determined that the most suitable process model for developing the Appointment and Management System of Delin Optical Clinic is the iterative process model. The Iterative process involves continually building, refining, and enhancing a project or product. The researcher views this model as beneficial for ensuring the system's functionality while also aiding in identifying areas for improvement and necessary fixes throughout the development process.

Sprint 1: Requirement Analysis and Initial System Setup

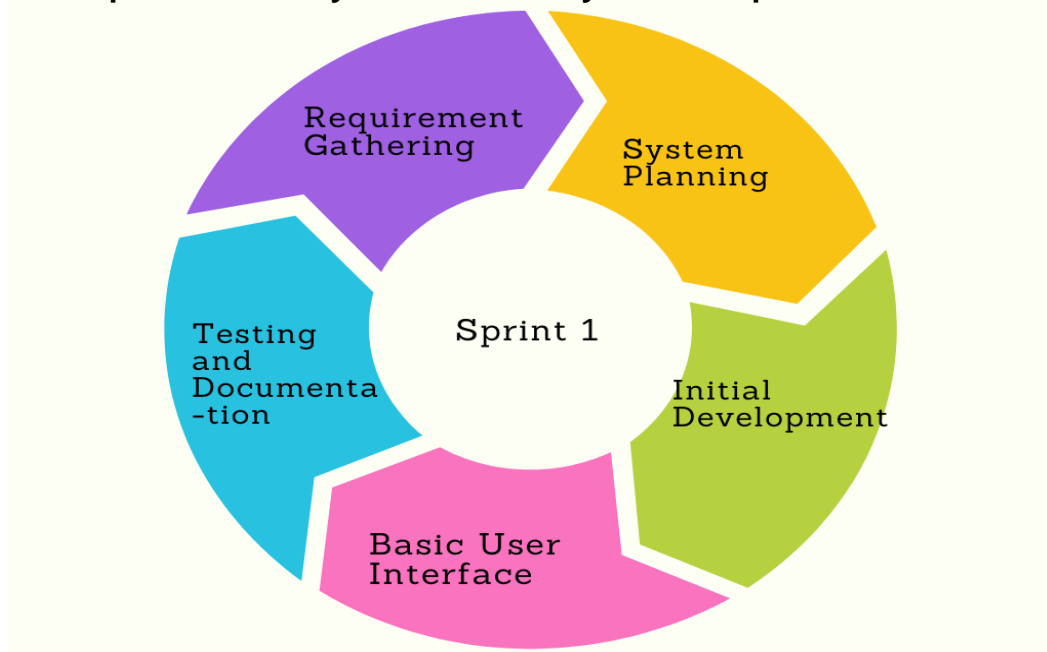


Figure 3. Sprint 1

- i. **Requirement Gathering** - Collect and analyze requirements for the appointment and management system from Delin Optical Clinic owners, staff, and patients.
- ii. **System Architecture and Planning** - Creating a detailed blueprint and plan for the system, which includes defining the database structure, designing the user interface, and outlining the workflows to ensure an effective system design.
- iii. **Initial System Development** - Building the core components and features of the system, such as implementing user authentication and security features.
- iv. **Basic User Interface Implementation**- Develop the initial user interface elements for login, registration, and basic navigation.
- v. **Basic Testing and Documentation** - Test the initial system functionalities for errors and bugs and resolve them before proceeding. Begin documenting the system design and development process, including user manuals and technical documentation.

Sprint 2: Feature Development and Integration Planning

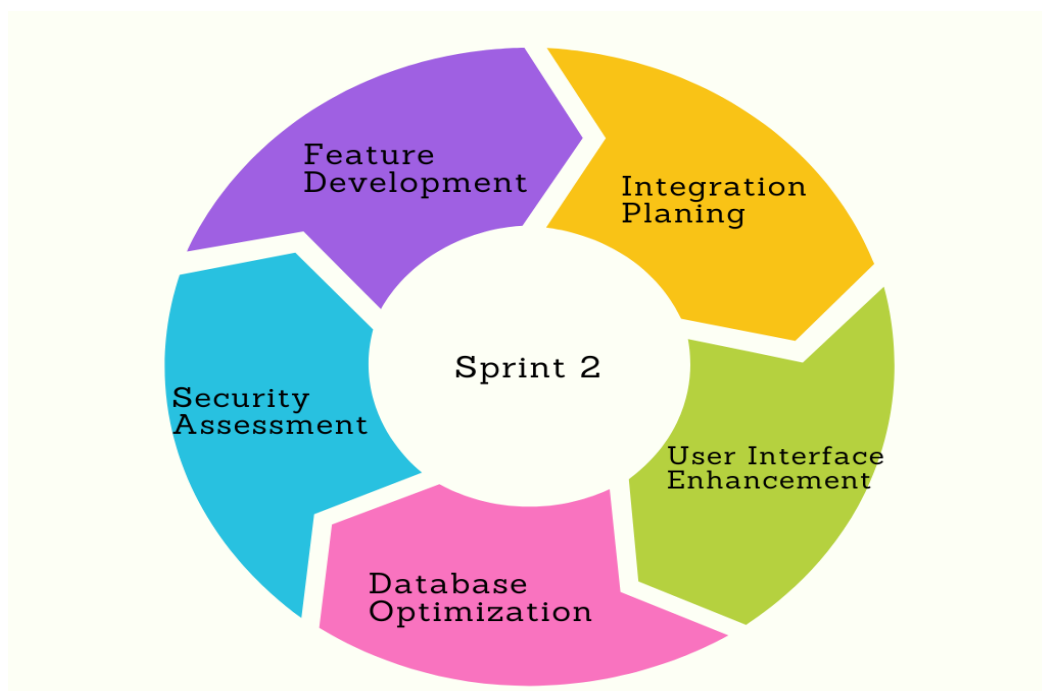


Figure 4. Sprint 2

- i. **Feature Development** - Extend the system functionality by developing additional features such as appointment scheduling and patient record management based on the requirements gathered in Sprint 1.

- ii. **Integration Planning** - Plan the how the newly developed features incorporate with existing system components. Ensure seamless communication and data exchange between different modules of the system.
- iii. **User Interface Enhancement** - Enhance the user interface design based on feedback gathered during Sprint 1 analysis and initial system development. Improve usability, accessibility, and overall user experience.
- iv. **Database Optimization** - Optimize the database structure and queries for improved performance and scalability. Enhance database configurations to ensure efficient data storage and retrieval.
- v. **Security Assessment** - Conduct a security assessment to identify potential vulnerabilities and implement necessary measures to enhance system security. Ensure compliance with industry standards and best practices for data protection.

Sprint 3: Frontend Design and Additional Feature Development

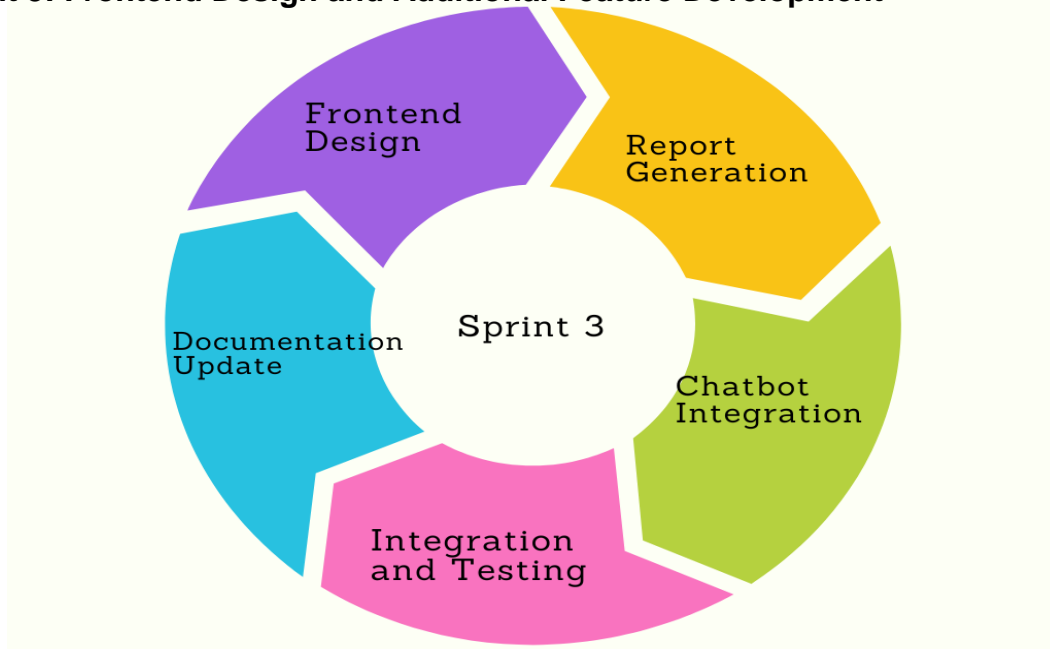


Figure 5. Sprint 3

- i. **Frontend Design** - Design and implement the remaining frontend interfaces for displaying appointments, creating a dashboard, and integrating a chatbot into the system. Focus on usability, accessibility, and visual appeal to enhance user experience.

- ii. **Report Generation** - Develop frontend components for generating various reports based on appointment data and patient information.
- iii. **Chatbot Integration and Development** - Integrate a chatbot frontend into the system to provide users with interactive assistance and support. Develop chatbot functionalities to handle common queries, appointment scheduling requests, and provide relevant information to users.
- iv. **Integration and Testing** - Integrate the developed frontend components with the existing backend logic, including the chatbot functionality. Conduct thorough testing to ensure seamless integration and functionality across all system features.
- v. **Documentation Update** - Update system documentation to include information on the newly developed frontend features, including the chatbot integration. Ensure that user manuals and technical documentation are up-to-date with the latest system functionalities.

Sprint 4: System Finalization and Deployment

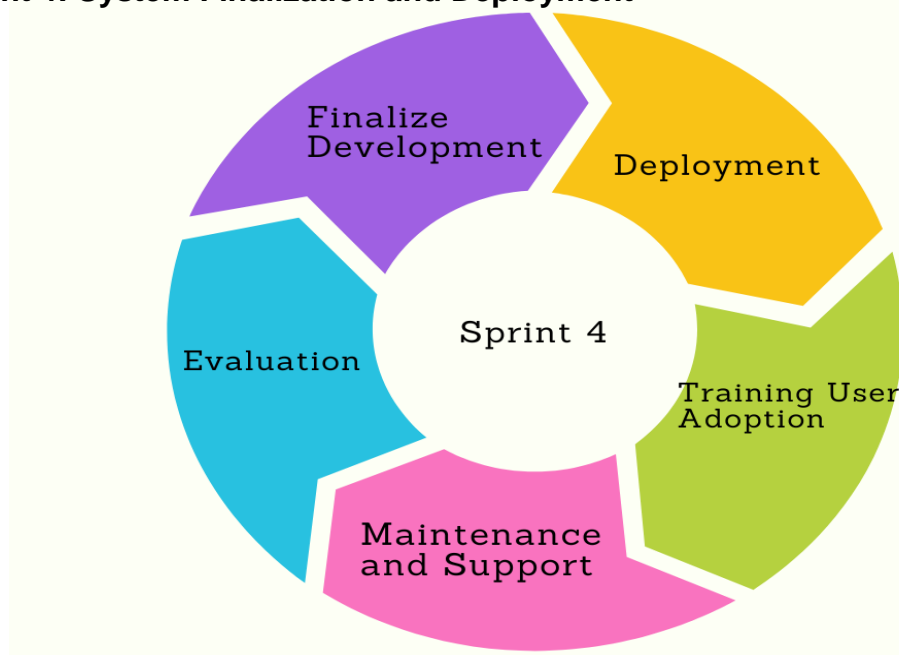


Figure 6. Sprint 4

- i. **Finalize development** - Finalize the development of the system and conduct final testing to ensure all features are working correctly.
- ii. **Deployment** - Deploy the system to a production environment, ensuring a smooth transition from the old system.

- iii. **Training and user adoption** - Provide training and support to users to ensure they can use the system effectively and adopt it into their daily workflows.
- iv. **Maintenance and support** - Provide ongoing maintenance and support for the system, addressing any issues that arise after deployment.
- v. **Evaluation** - Evaluate the effectiveness of the system and identify areas for improvement or enhancement.

3. System Analysis

i. Flowchart Diagram

Figures 7-11 in Appendix A shows the major processes of the Appointment and Management System of Delin Optical Clinic. The process begins with users/patients accessing the optical appointment and management system as shown in the figure 7, new users initiate the registration process by providing required personal information such as name, password, contact details, and other important details. Once the registration form is filled out, users submit the information for verification. If the provided information is incomplete or incorrect, an error prompt appears, guiding users to fill out the necessary fields accurately. Once all required fields are correctly filled, users' registration is confirmed, and they will be redirected to the user's dashboard.

In figure 8 Users/patients interact with the system through a chat-bot interface to inquire about various aspects such as available appointment slots, clinic hours, services offered, and general queries. Upon receiving a user inquiry, the chat-bot analyzes the query and provides relevant information based on predefined responses or by retrieving data from the system's database. If the chat-bot cannot provide a satisfactory answer, it prompts a fall-back message and ask if there are other questions.

Users/patients can schedule, reschedule, or cancel appointments through the optical appointment and management system. Upon accessing their account, users navigate to the appointment section where they can view available time slots, select their preferred date and time, and wait for the confirmation of the schedule before the appointment is confirmed as shown in the figure 9. For rescheduling or

cancellation, users navigate to their scheduled appointments, select the desired appointment, and choose the appropriate action. If rescheduling, users can then select a new date and time from the available options.

On the clinic staff side, the adding of patient record shows in the figure 10. Clinic staff members manage patient records through the system's administrative interface. Upon accessing the system, staff navigate to the patient management section where they can see the list of patient records and also edit and add new patient records. The staff will input the required patient information such as name, result of test and other details. Once the information is entered, it will be validated by the system and once all requirements are satisfied, the patient record will be added. We can also see in the figure 10 the editing of patient record that also requires input and system validation before update.

Lastly, in figure 11, the creating of prescription for the patients. Ophthalmologists are the only one who has this access, upon accessing the patient's record, the ophthalmologist navigates to the prescription section where they can input the prescription details. After the input the system will validate the input before the prescription is created.

ii. Use Case Diagram

In accordance with the specified functional requirements, Figure 12 in Appendix A depicts the use case diagram for the Delin optical clinic appointment and management system. This diagram provides a broad overview of how the system is utilized by both patients and clinic staff. To elaborate further, the use case diagram outlines the interactions between users and the system. It illustrates the various tasks and functionalities that users can execute through the system's interface. For example, patients may utilize the system to schedule appointments, view their medical history, or ask for inquiries. While, clinic staff might employ the system for tasks such as managing appointment schedules and updating patient records.

iii. Data Flow Diagram

The figure 13 in Appendix A shows the data flow diagram of how data flows within the Appointment and Management System of Delin Optical Clinic. The diagram shows how data from different modules to the system and vice versa.

4. System Requirement Specification

The system requirements specifications consist of functional, non-functional, software, and hardware requirements for the system to be developed. Together, these specifications provide a clear roadmap for the development process and ensure the system meets stakeholders' needs.

i. Functional Requirements

The optical clinic system requires secure user registration and authentication, allowing patients and clinic staff to create accounts and access the system with role-based permissions. It facilitates appointment management with online booking, modification, and cancellation features, complemented by automated appointment reminders. Patient records, including medical history and visit notes, are securely stored and accessible to patients, while ophthalmologist can manage prescriptions. The system delivers notifications for upcoming appointments and prescription renewals, along with staff alerts for schedule changes. Ensuring integration with existing healthcare software and providing user support through FAQs and customer service channels such as chatbot.

ii. Non-Functional Requirements

The optical clinic system must be fast, reliable, and secure. It should handle many users and appointments without slowing down. Patient information must be kept safe and private. The system needs to be easy for everyone to use, and it should always be available. It focuses on speed, reliability, and security, ensuring it works well for both patients and clinic staff.

iii. Other Functional Requirements

a. Software Requirements

For the patients to access the system, the following are identified as the minimum software requirements to run the system.

- Operating System on the desktop: any Microsoft Windows Operating System, Apple Mac OS Operating System, or Linux Operating System devices that support Web Browsers.

- Operating System for mobile: Android 5.0 and IOS 12 or any that supports Web Browsers
- Web Browsers: Preferably Google Chrome or any browsers available

b. Hardware Requirements

The system can be access through web and any hardware that has a capacity to run a web browser can effectively access the system. And for mobile users, any devices that supports and operating system Android 5.0 and IOS 12 or higher will also be able to access the website.

c. Input Requirements

- **Registration**
 - User Credentials
- **b. Appointment Scheduling**
 - Time and Date Schedule
- **c. Patient Record Management**
 - Patient Information
- **d. Clinic Inquiry**
 - Patient Question

d. Output Requirements

- **Registration**
 - Successful registration and access to the system
- **b. Appointment Scheduling**
 - Appointment Scheduled
- **c. Patient Record Management**
 - Created Patient Record
- **d. Clinic Inquiry**
 - System Response

6. System Design

i. Entity Relationship Diagram

An ERD is relationship between each entities within the database, the figure 14 in Appendix C is the ERD for Appointment and Management System that includes Users to store the client account, Appointments table to store all the scheduled appointments, Patients tale for storing patient records and results, Prescriptions table to enable Ophthals to assign prescriptions to their patients, Chat-bot table to answer users/client inquiries, and lastly, Eyewear table to store and display available products. This will help to identify the relationships between entities and data flow between them.

ii. User Interface

Figures 15-24 in Appendix D depicts the major interfaces required to achieve our specific objectives, figures 15 represents the registration interface, allowing user to create account within the system. Figure 16 shows the login interface for the users to enable them to access the system, users are redirected to the user dashboard as shown in figure 17 where they can navigate the different functionalities that the system offers such as scheduling appointment.

Figure 18 showcases the appointment list interface, providing users with an overview of their scheduled appointments. Pressing a specific appointment will display a more detailed appointment as shown in figure 19, figure 20 shows the form for scheduling an appointment. Figures 21-23 showcases the patient record list, detailed patient record, and adding new patient record.

Lastly, for figure 24 shows the chat-bot interface that enables patients/users to interact with an automated system for inquiries, assistance, supports.

7. Project Management

i. Project Gantt-Chart

In developing the Appointment and Management System of Delin Optical Clinic, the proponents will follow the timeline in appendix E figure 25.

Using the Agile Method, the proponents will start the planning and analysis from February 5, 2024 up to March 14, 2024. After the initial planning and analysis, the proponents will start developing its backend that will be divided into 2 parts that will start on March 15, 2024 up to April 30, 2024. During these phases, alpha testing will be conducted by the proponents to ensure that from time to time all components of codes are working. After backend developments, the proponents will start on working the frontend to ensure clients easy system interaction and will be allocated 7 weeks during the development. Another backend development will be conducted that will allocate 2 weeks to finish all necessary functionalities for the system. Lastly, a testing and deployment will be conducted by the proponents to ensure that the client will be able to efficiently use the system.

8. Testing Methodology

i. Alpha Testing

Executing the alpha testing will be done by the proponents, during the test, a comprehensive assessment will be done for both functional and non-functional requirements, inputs and outputs will also be observed if all data and information will be retrieved and displayed correctly. With these test, the proponents will be able to identify any major problems and issues of the system before it will proceed to the next phase of the testing and make necessary improvements and adjustments.

ii. Beta Testing

After the alpha testing is completed and satisfied, the testing will move on the next phase of testing, the beta testing. During this phase, the proponents will gather a group of users and allow them to have early access to the system, this includes the clinic staff, ophthalmologists, admin, and clinic clients. The test will help the proponents to collect feedbacks from different users who will actually use the system, and possibly discover new problems and issues that have not been seen during the first phase of the testing.

a. SUS Testing

System Usability Scale is usually used to evaluate the usability of a system. The survey will only consists of 10 questions and each question is scored on a 5 point Likert Scale, with scores ranging from 1-5 with 1 as “Strongly Disagree” and 5 as “Strongly Agree”. The ratings for each item are combined to get the score ranging from 0-100 with 0 as the lowest and 100 as the highest as shown in Figure 26 in appendix E.

The proponents will utilize the System Usability Scale to evaluate the usability of the system. By using SUS, the proponents will be able to gather the perceptions and feedbacks of the users regarding the efficiency, learnability, ease of use and overall usability of the system. With the quantitative survey questions, the proponents will be able to generate quantifiable measure that allows the proponents to assess how well the system meets the user’s expectations and requirements.

CHAPTER VII

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APPENDICES

APPENDIX A

Flowcharts

Process 1

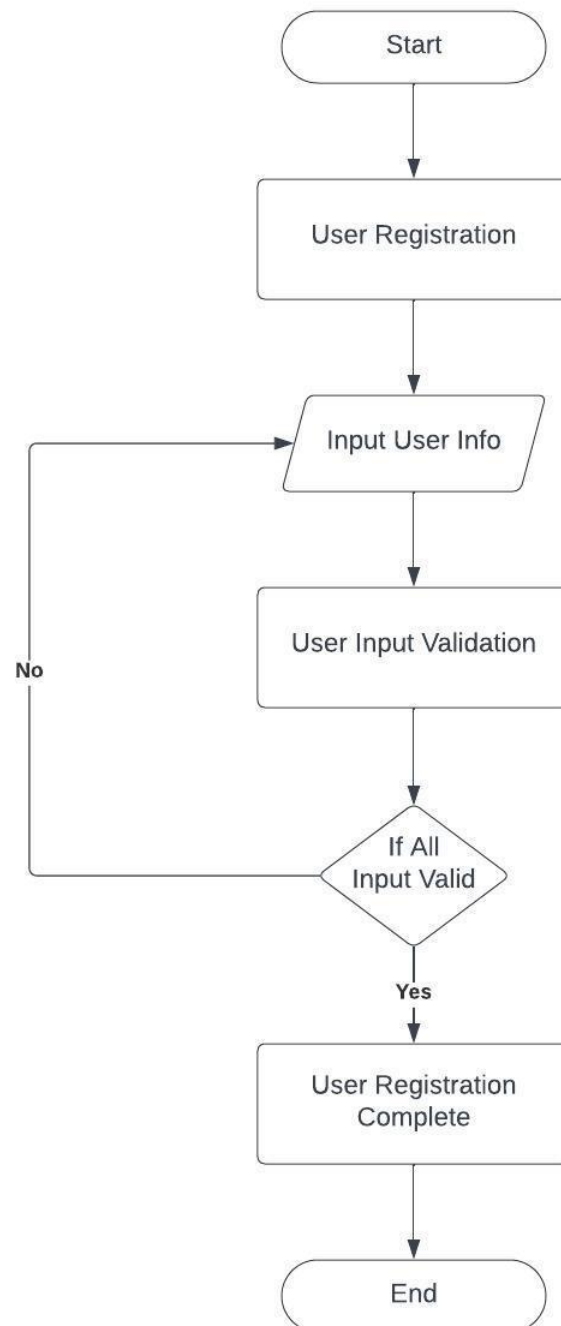


Figure 7. User Registration

Process 2

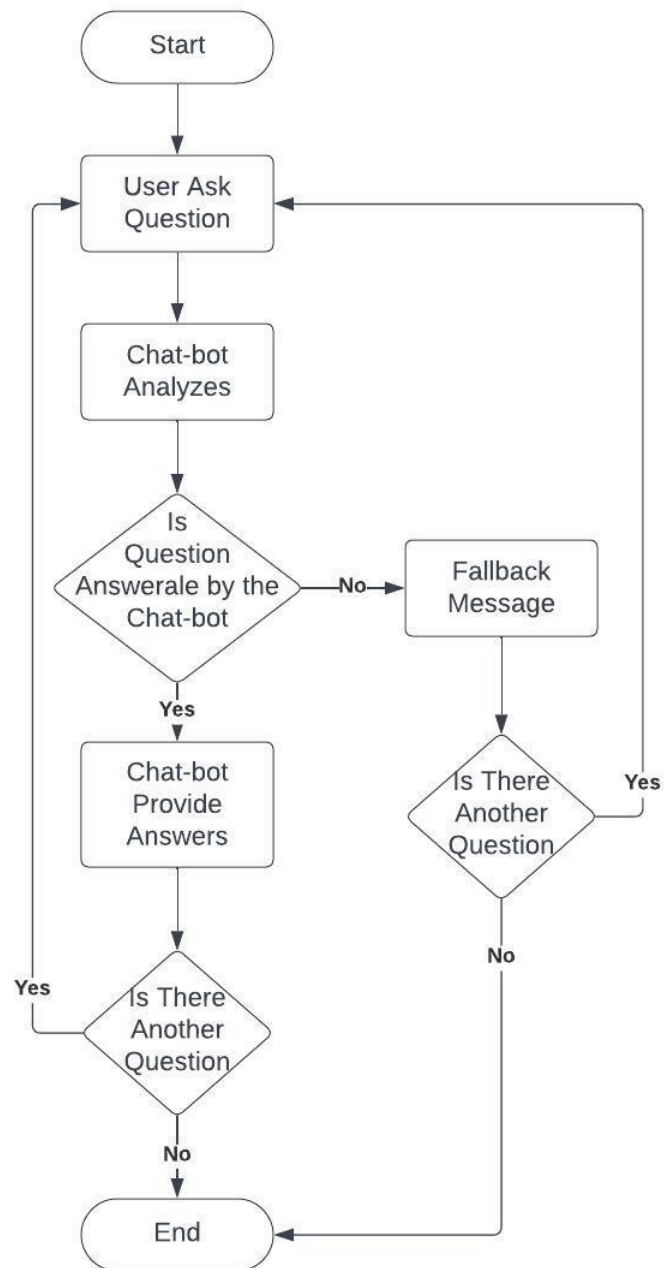


Figure 8. User Chat-bot Inquiry

Process 3

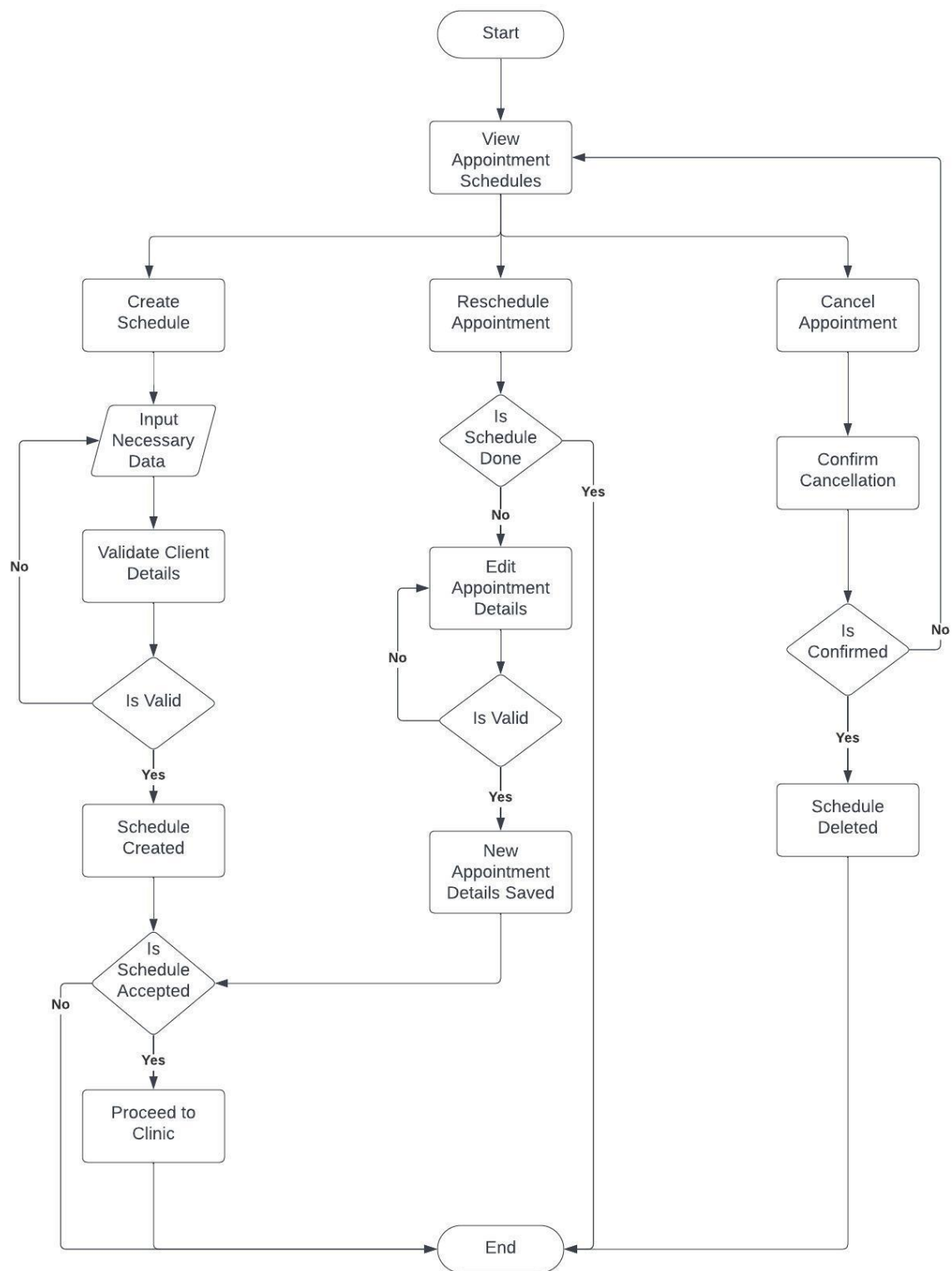


Figure 9. User Appointment

Process 4

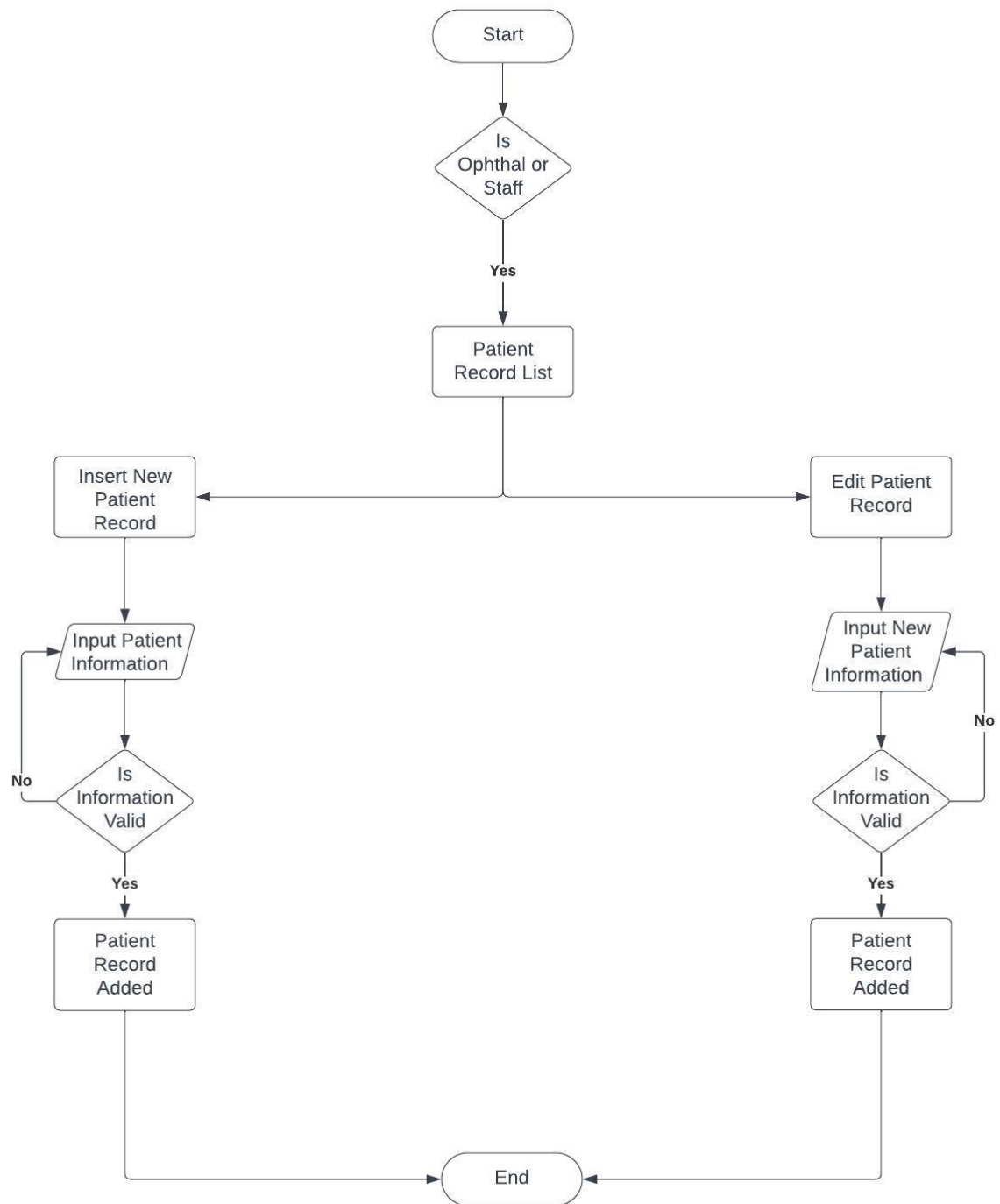


Figure 10. Patient Record

Process 5

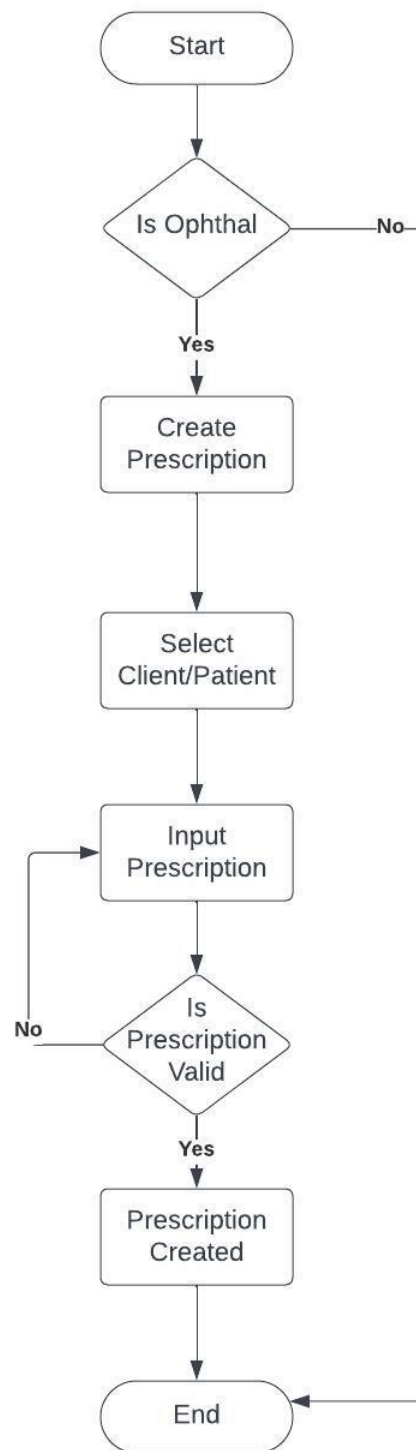


Figure 11. Creating Prescription

APPENDIX A

Use Case Diagram

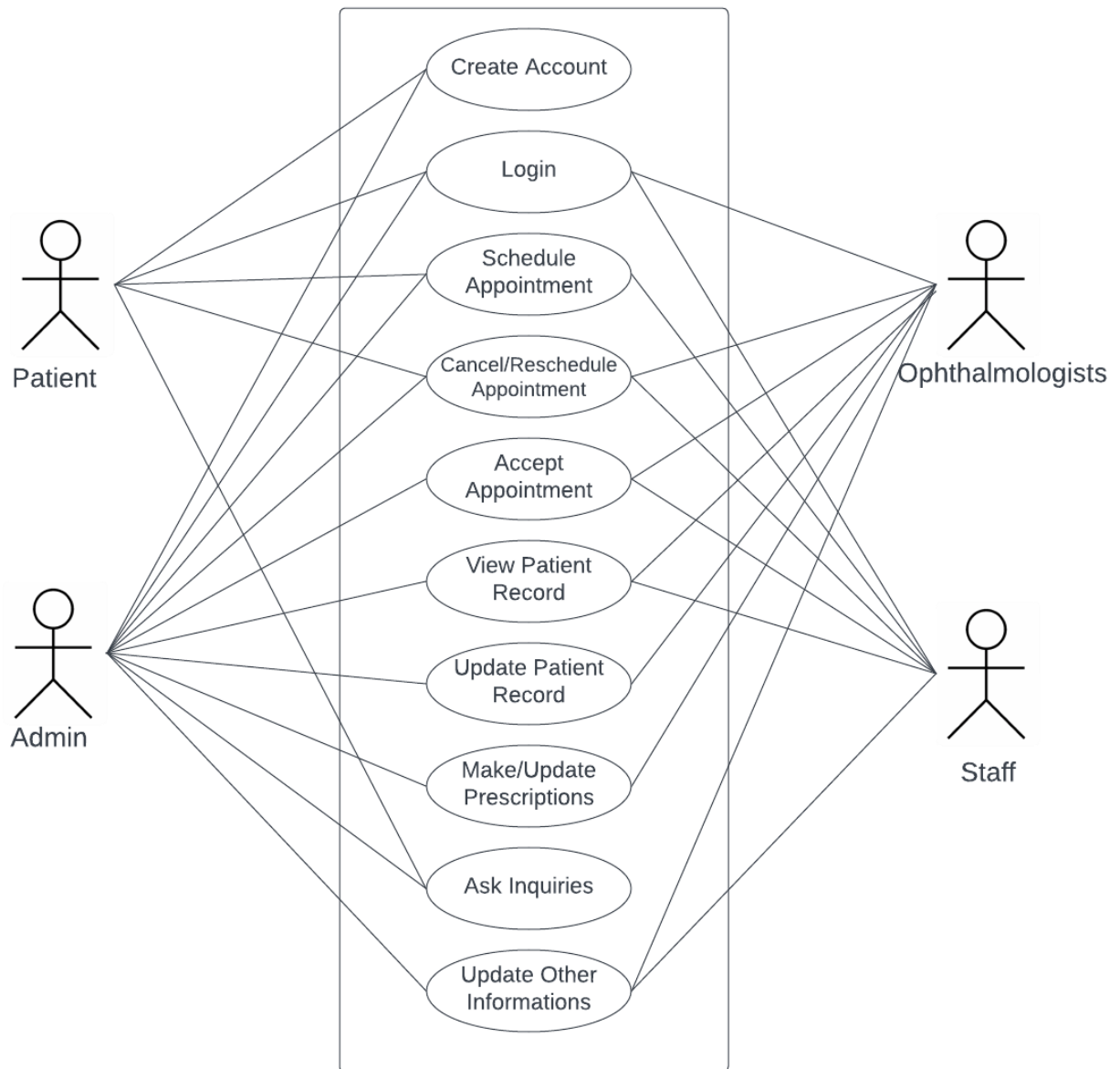


Figure 12. Use Case Diagram

Data Flow Diagram

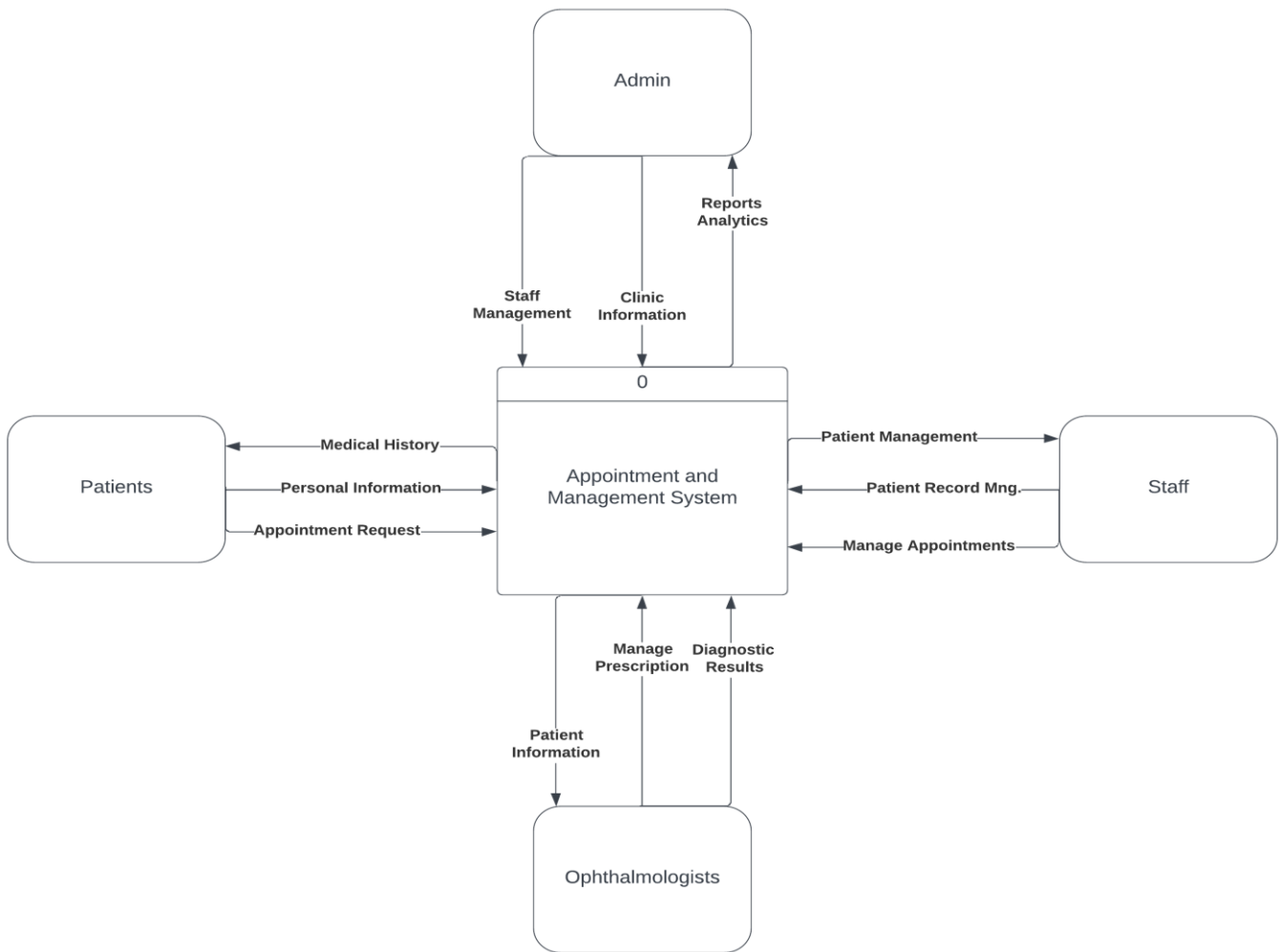


Figure 13. Data Flow Diagram

APPENDIX B

Table 1: *User Registration*

| Requirement no.1 | Register |
|-------------------------|---|
| Priority | High |
| Purpose | To enable users to register to the system using their own information and credentials. |
| Input | Users will input their basic information such as complete name, age, gender, username and password. |
| Operations | After submitting, the system will validate the user's inputted credentials if they are all valid. |
| Output | There will be different output depends on the user input, if there are credentials that are not valid, there will be an error to be displayed. If there is no error, the system will redirect the user to the user's dashboard. |

Table 2: *User Login*

| Requirement no.2 | Login |
|-------------------------|---|
| Priority | High |
| Purpose | To enable users to access the system using their account credentials. |
| Input | Users will input both username and password they used during registration. |
| Operations | After submitting, the system will check if both username and password matches to any registered account |

| | |
|---------------|---|
| Output | There will be different output depends on the user input, if the credentials are incorrect, a message will be displayed to notify the user. If both username and password matches to an account, the user will be redirected to the user's dashboard. |
|---------------|---|

Table 3: *Scheduling Appointment*

| Requirement no.3 | Schedule Appointment |
|-------------------------|--|
| Priority | High |
| Purpose | To enable users to schedule an appointment to the clinic. |
| Input | Users will input few information of himself/herself and select an available schedule. |
| Operations | After submitting, the system will check if the information are valid and store the schedule to the system. |
| Output | Upon finishing up scheduling, there will be different outputs. If some of the information are invalid, a message will be displayed to notify the user. If the information are valid and the schedule is available, the appointment will be displayed and notify to both patient and staff. |

Table 4: *Rescheduling Appointment*

| Requirement no.4 | Reschedule Appointment |
|-------------------------|---|
| Priority | Medium |
| Purpose | To enable users to reschedule an appointment to the clinic if they are unavailable to the first schedule. |

| | |
|-------------------|---|
| Input | Users will select a new time and date of the appointment. |
| Operations | After submitting, the system will check if the new time and date is available. |
| Output | Upon finishing up rescheduling, there will be different outputs. If the new selected time and date is unavailable, a message will display to notify the user. If the selected new time and date is available, a new time and date will display. |

Table 5: *Cancellation of Appointment*

| Requirement no.5 | Cancel Appointment |
|-------------------------|--|
| Priority | High |
| Purpose | To enable users to cancel their schedule appointment with the clinic. |
| Input | Users will have to input the reason of cancelling the appointment. |
| Operations | After submitting, the system will notify the staff or users for the cancellation of the appointment, they system will then remove the said appointment to the list of upcoming appointments. |
| Output | Upon submitting the cancellation form, the system will display a message that the appointment is successfully cancelled. |

Table 6: *Accepting of Appointment*

| Requirement no.6 | Accept Appointment |
|-------------------------|---------------------------|
| Priority | High |

| | |
|-------------------|---|
| Purpose | To enable ophthal or staff to accept the appointments being scheduled by the patients. |
| Input | User will not input anything but will only accept selected appointment schedules. |
| Operations | The user will select the specific appointment to accept, then the will display confirmation. |
| Output | The system will display a confirmation dialog, if the accepting is cancelled, then the message will be closed. If the user confirm the accepting of schedule, then it will display a message and a notification to the scheduler. |

Table 7: *Viewing of Appointment*

| Requirement no.7 | View Upcoming Appointments |
|-------------------------|---|
| Priority | Medium |
| Purpose | To allow all users to view their upcoming appointments. |
| Input | User will not input anything but will only select the specific days, weeks or months and the system will display the upcoming appointments. |
| Operations | The user will view all upcoming appointments. The system will display the appointments. |
| Output | The system will automatically display the appointments to the selected days, weeks or months. |

Table 8: *Adding Patient Record*

| Requirement no.8 | Add New Patient Record |
|-------------------------|-------------------------------|
|-------------------------|-------------------------------|

| | |
|-------------------|---|
| Priority | High |
| Purpose | To enable ophthal or staff to add and store patient record to the system. |
| Input | User will have to input the patient results of the test. |
| Operations | After submitting, the system will validate all the information being inputted by the user. |
| Output | There will be different output depends on the user decision. If the information is invalid, the system will deny the adding of record and display a message. If the information inputted are all valid, then the patient record is added to the system. |

Table 9: *Editing Patient Record*

| Requirement no.9 | Edit Patient Record |
|-------------------------|---|
| Priority | Medium |
| Purpose | To enable ophthal or staff edit the recorded patient records. |
| Input | User will have to input new information of the specific patient selected. |
| Operations | The user will select the specific patient record to edit, then the system will update the patient record |
| Output | There will be different output depends on the user decision. If the new information is invalid, the system will deny the updating of record and display a message. If the new information inputted are all valid, then the patient record is updated. |

Table 10: *Deleting Patient Record*

| Requirement no.10 | Delete Patient Record |
|--------------------------|--|
| Priority | Medium |
| Purpose | To enable users to delete a specific patient record. |
| Input | Users will not have to input anything, but will only select a specific record to delete. |
| Operations | The user will select the specific patient record to delete, then the system will delete the patient record. |
| Output | There will be different output depends on the user decision. If the deletion is cancelled, the dialog box will closed. If the deletion is confirmed, the system will delete the record and display a notification. |

Table 11: *Searching Patient Record*

| Requirement no.11 | Search Patient Records |
|--------------------------|---|
| Priority | Medium |
| Purpose | To allow users to search existing patient records. |
| Input | Users will input a specific name of a patient. |
| Operations | The user will search a specific name, then the system will display the patient that matches the name the staff/ophtal searches. |
| Output | The output depends on the input of the user. If the name being searched does not exist, it will display a “no record found” |

| | |
|--|---|
| | message. If the searched message matches to any record, the system will list the record of the patient/s. |
|--|---|

Table 12: *Making Patient Prescription*

| Requirement no.12 | Make Patient Prescription |
|--------------------------|--|
| Priority | High |
| Purpose | To enable ophthal to make a prescription to the patient. |
| Input | User will have to input his/her prescriptions to his/her patient. |
| Operations | The user will select the specific patient and make prescription. The system will validate the input. |
| Output | There will be different output depends on the user decision. If the inputted prescriptions are invalid, the system will display a message. If the inputted prescriptions are valid, the system will add the prescription to that specific patient. |

Table 13: *Editing Patient Prescription*

| Requirement no.13 | Edit Patient Prescription |
|--------------------------|---|
| Priority | Medium |
| Purpose | To enable ophthal to edit the prescription of the patient. |
| Input | User will have to input new prescriptions to his/her patient. |
| Operations | The user will select the specific patient and edit previous prescription. The system will validate the input. |

| | |
|---------------|---|
| Output | There will be different output depends on the user decision. If the new inputted prescriptions are invalid, the system will display a message. If the new inputted prescriptions are valid, the system will update the prescription of that specific patient. |
|---------------|---|

Table 14: *Deleting Patient Prescription*

| Requirement no.14 | Delete Patient Prescription |
|--------------------------|---|
| Priority | Low |
| Purpose | To enable ophthal to delete a prescription of the patient. |
| Input | User will not input anything, but will only have to select a specific patient with a prescription to delete. |
| Operations | The user will select the specific patient with a prescription. The system will delete the prescription. |
| Output | There will be different output depends on the user decision. If the deletion is cancelled, the dialog box will be closed. If the deletion is confirmed, the prescription will be deleted. |

Table 15: *Asking Inquiries*

| Requirement no.15 | Ask Inquiries |
|--------------------------|---|
| Priority | Medium |
| Purpose | To allow users to ask inquiries about the optical services rates, products and other information. |
| Input | User will have to input his/her inquiry about the clinic. |

| | |
|-------------------|--|
| Operations | The user will input an inquiry. The system will provide an answer to the inquiry. |
| Output | There will be different output depends on the user inquiry. If the user inquiry is not valid or not about the clinic, the system will not answer the user inquiry. If the user inquiry is valid and has to do with the clinic, the system will provide a response. |

Table 16: *Adding Inquiries*

| Requirement no.16 | Add Inquiry Response |
|--------------------------|---|
| Priority | Medium |
| Purpose | To allow staff to add response to the chat-bot inquiry of the system. |
| Input | User will have to input additional response to a specific question. |
| Operations | The user will add a response. System will validate the input. |
| Output | There will be different output depends on the user input. If the inputted response are invalid, the system will display a message. If the inputted response are valid, the system will add the response to that specific patient. |

Table 17: *Editing Inquiries*

| Requirement no.17 | Edit Inquiry Response |
|--------------------------|---|
| Priority | Medium |
| Purpose | To allow staff to edit existing response to the chat-bot inquiry of the system. |

| | |
|-------------------|--|
| Input | User will have to input new response to a specific question. |
| Operations | The user will edit a response. System will validate the input. |
| Output | There will be different output depends on the user input. If the new inputted response is invalid, the system will display a message. If the new inputted response are valid, the system will update the response to that specific question. |

Table 18: *Receiving Notifications*

| Requirement no.18 | Receive Notifications |
|--------------------------|---|
| Priority | High |
| Purpose | To enable users to receive notifications. |
| Input | Users does not have to input anything. |
| Operations | The system will send a notification if there are important event such as rescheduled appointment. |
| Output | The user will receive a notification from the system with the details all about the notification. |

Table 19: *Editing Optical Information*

| Requirement no.19 | Edit Optical Information |
|--------------------------|---|
| Priority | Medium |
| Purpose | To allow staff to edit some information displayed about the optical within the system |

| | |
|-------------------|--|
| Input | User will have to input new information about the clinic. |
| Operations | The user will edit information. System will validate the input. |
| Output | There will be different output depends on the user input. If the new inputted information is invalid, the system will display a message. If the new inputted information is valid, the system will update the information. |

APPENDIX C

Entity Relation Diagram

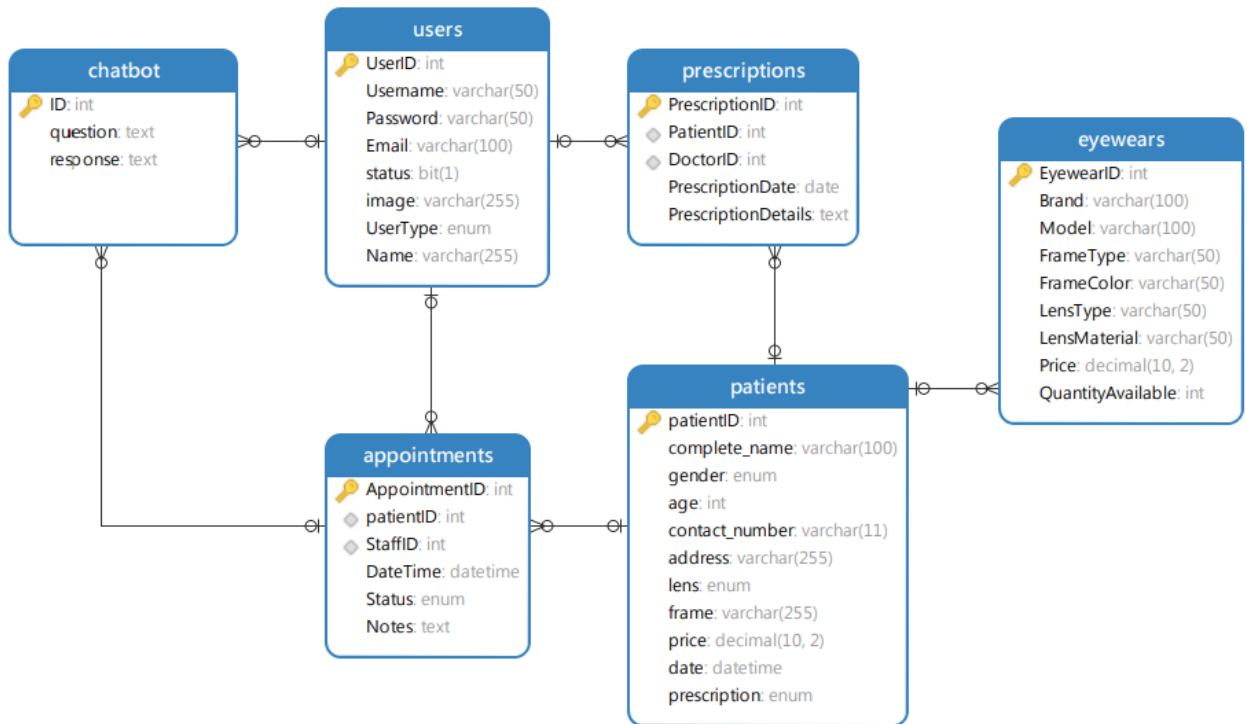
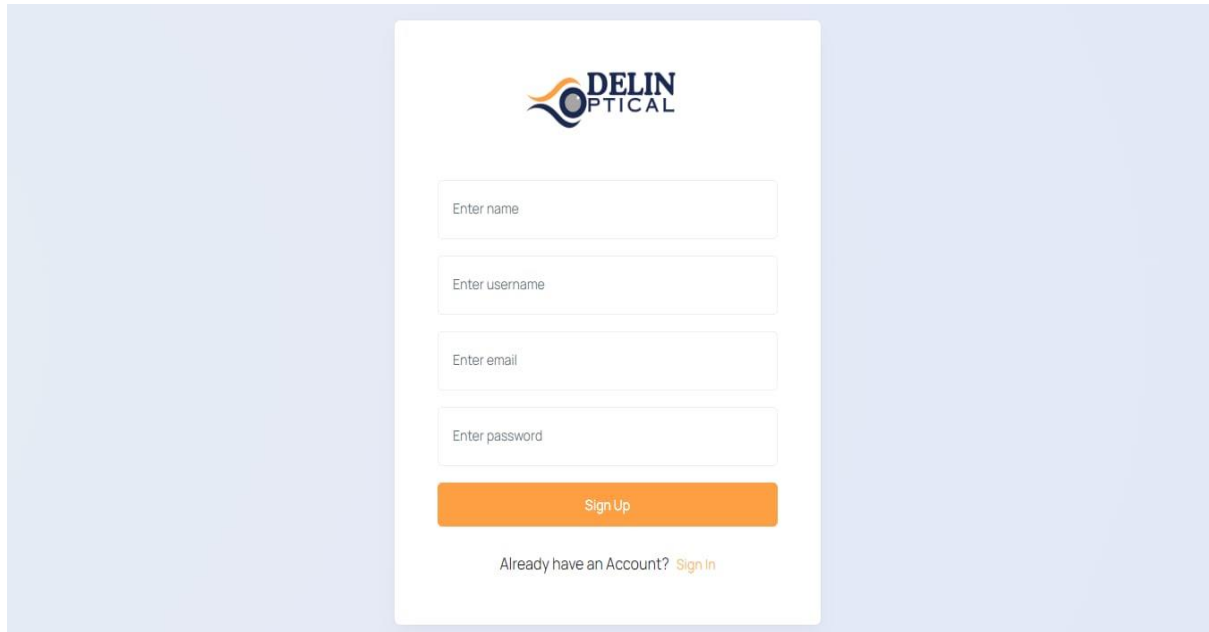


Figure 14. Entity Relation Diagram

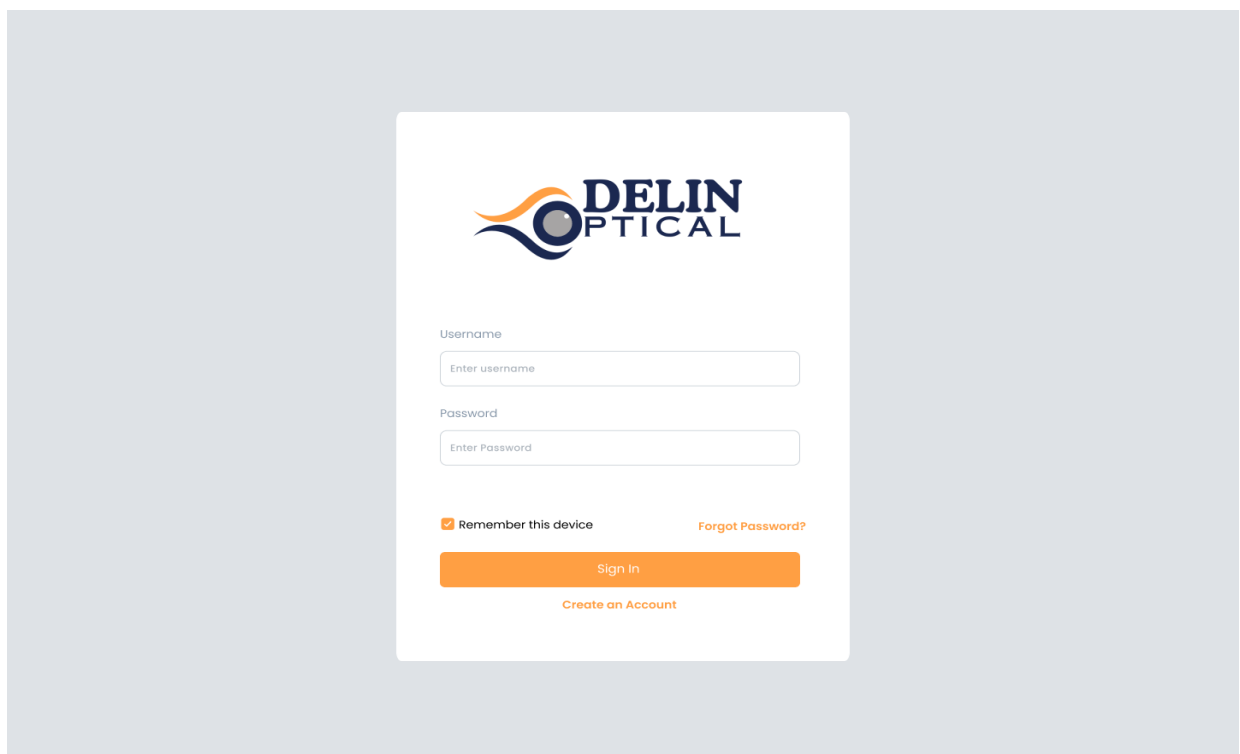
APPENDIX D

User Interface



The registration interface features the DELIN OPTICAL logo at the top. Below the logo are four input fields: 'Enter name', 'Enter username', 'Enter email', and 'Enter password'. An orange 'Sign Up' button is positioned below the password field. At the bottom, there is a link that reads 'Already have an Account? Sign in'.

Figure 15. User Registration Interface



The login interface features the DELIN OPTICAL logo at the top. Below the logo are two input fields: 'Username' with a placeholder 'Enter username' and 'Password' with a placeholder 'Enter Password'. Below the password field is a checkbox labeled 'Remember this device' and a link 'Forgot Password?'. An orange 'Sign in' button is positioned below the password field. At the bottom, there is a link that reads 'Create an Account'.

Figure 16. Login Interface

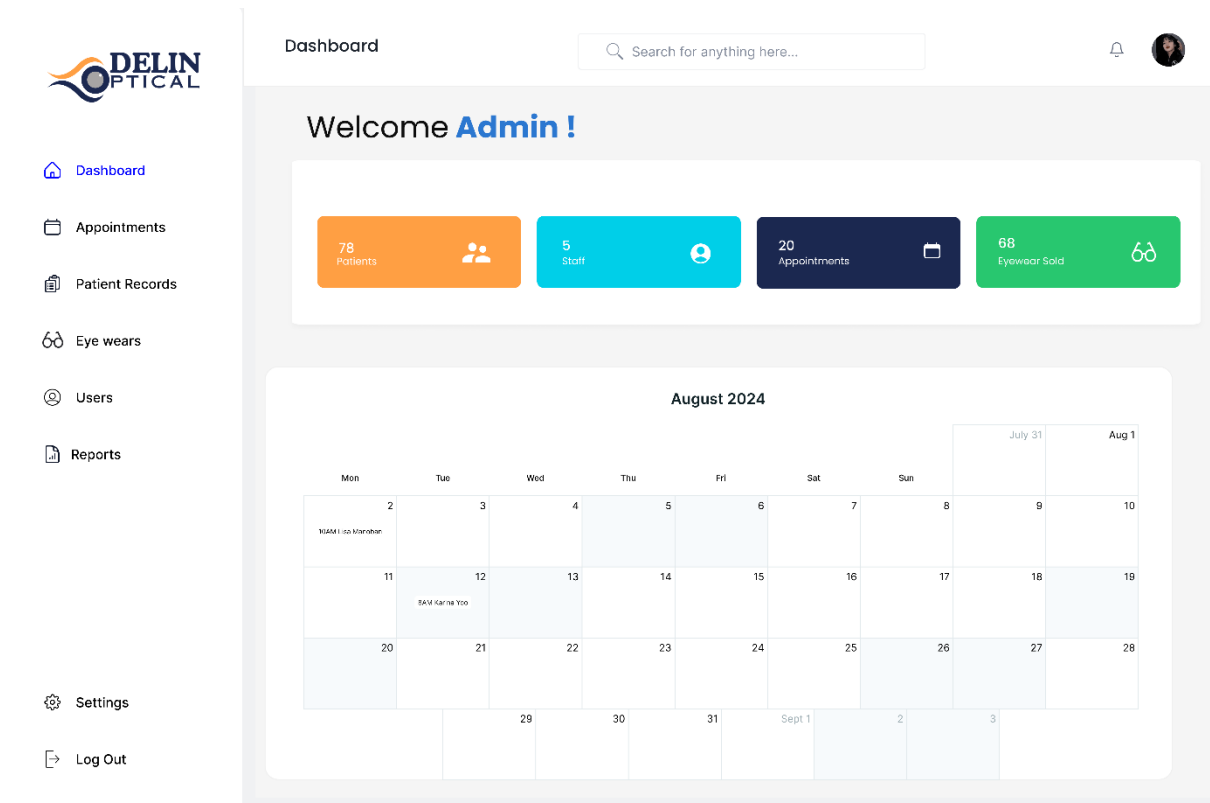


Figure 17. Dashboard Interface

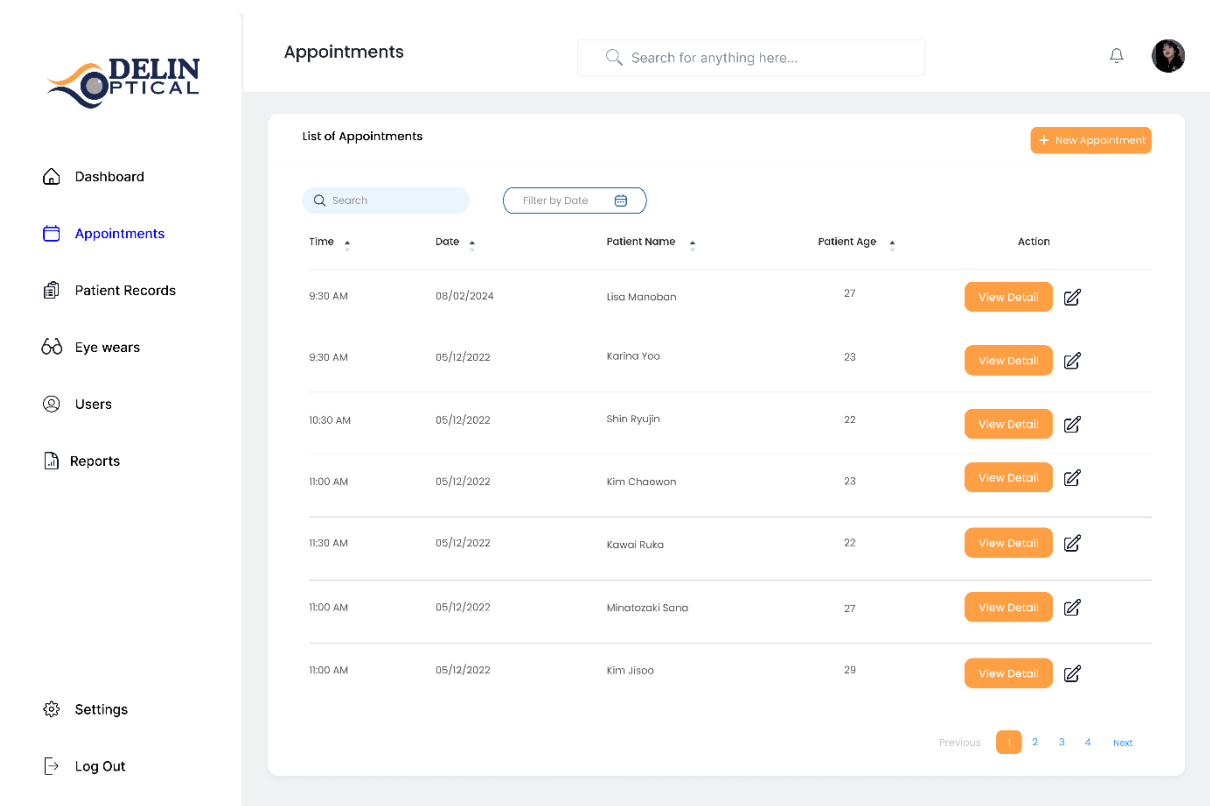


Figure 18. Appointment List

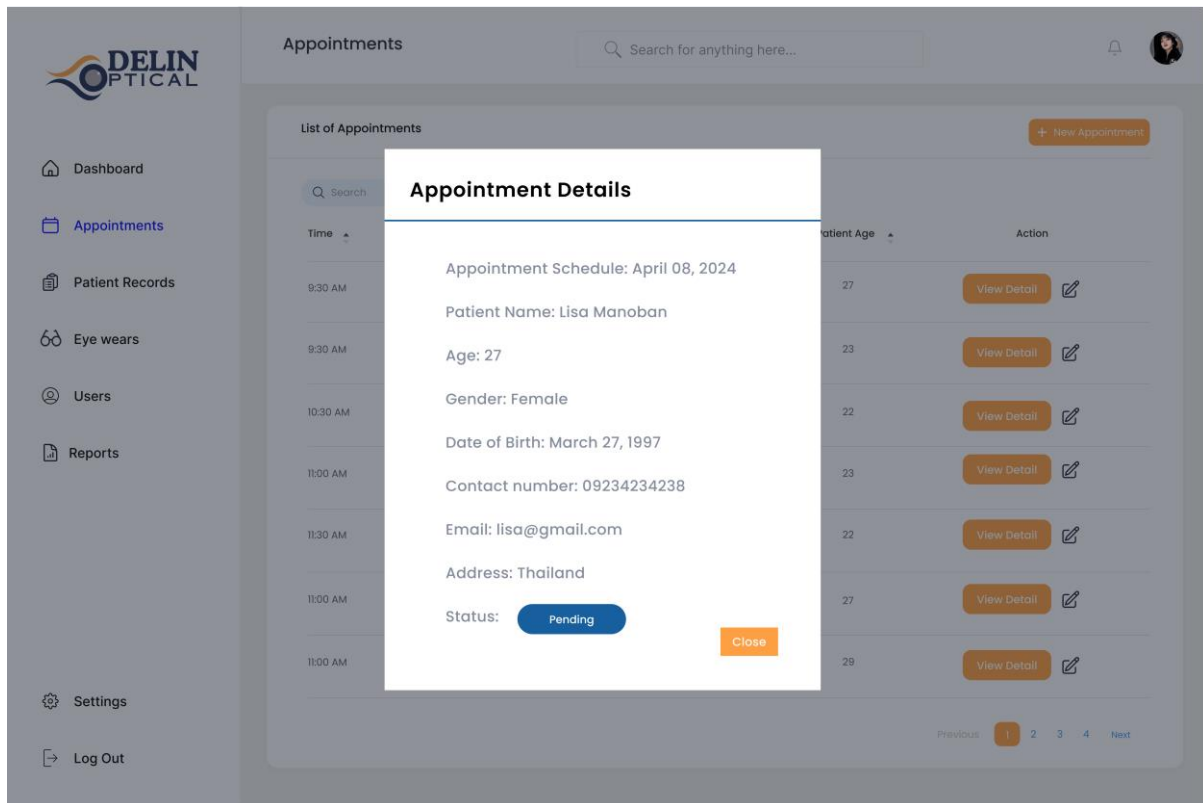


Figure 19. Appointment Details

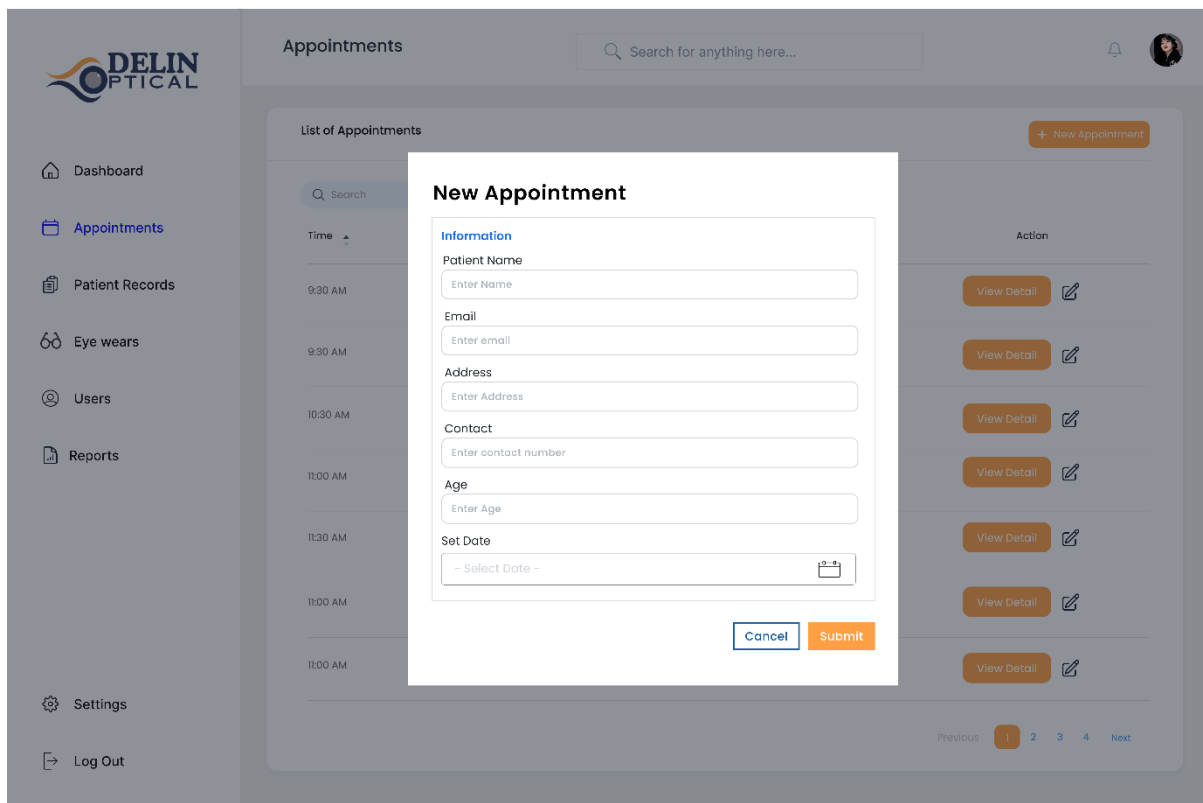


Figure 20. Scheduling Appointment

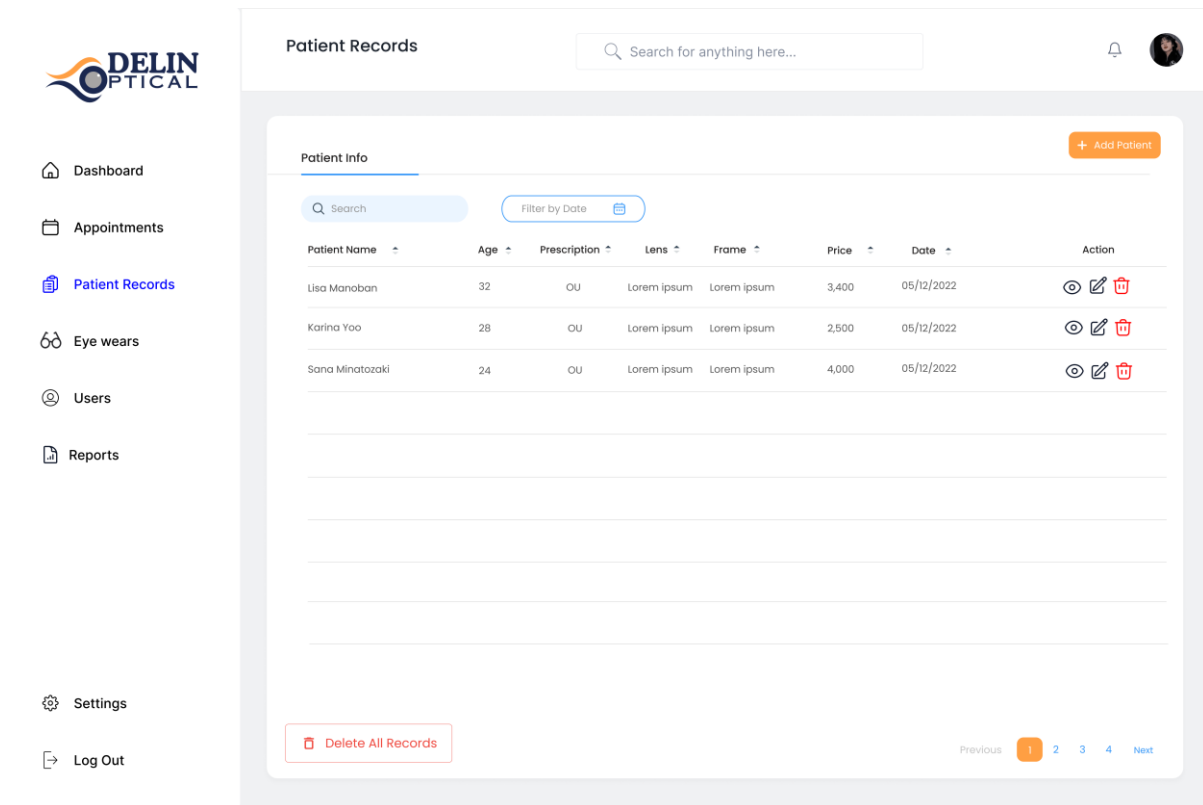


Figure 21. Patient Record List

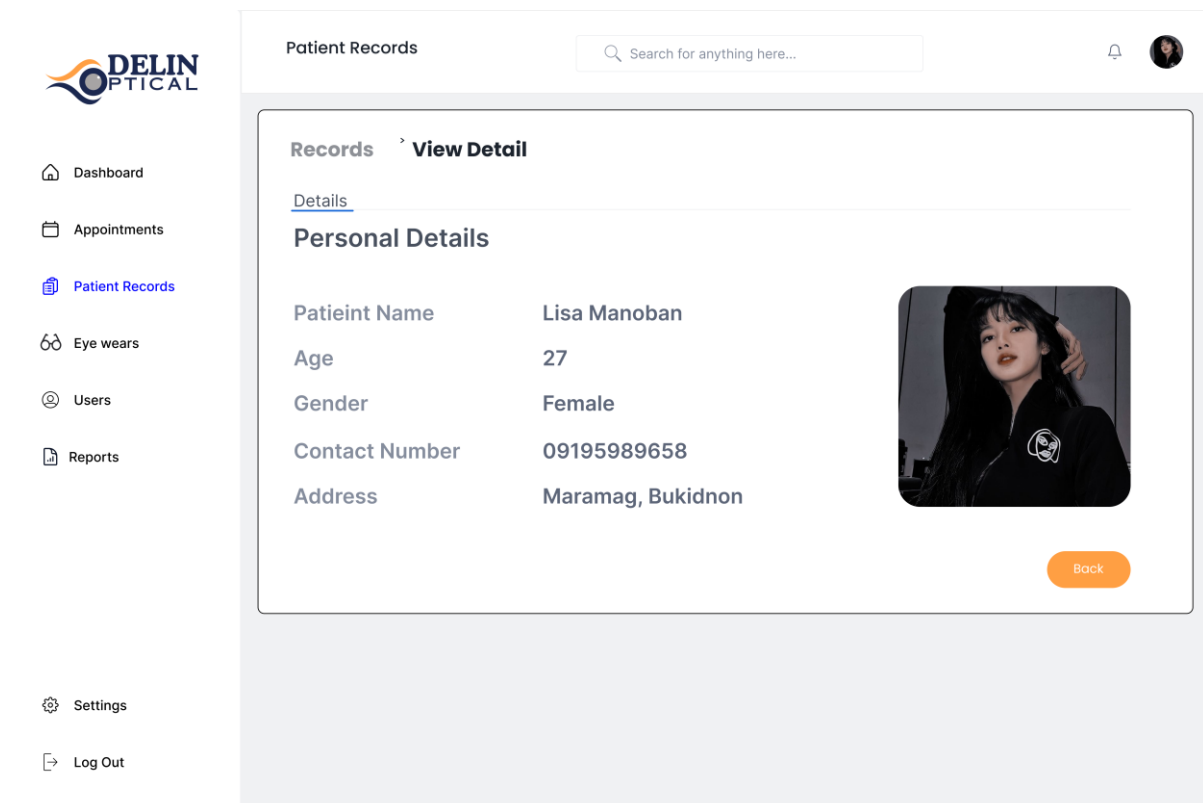


Figure 22. Patient Record Details

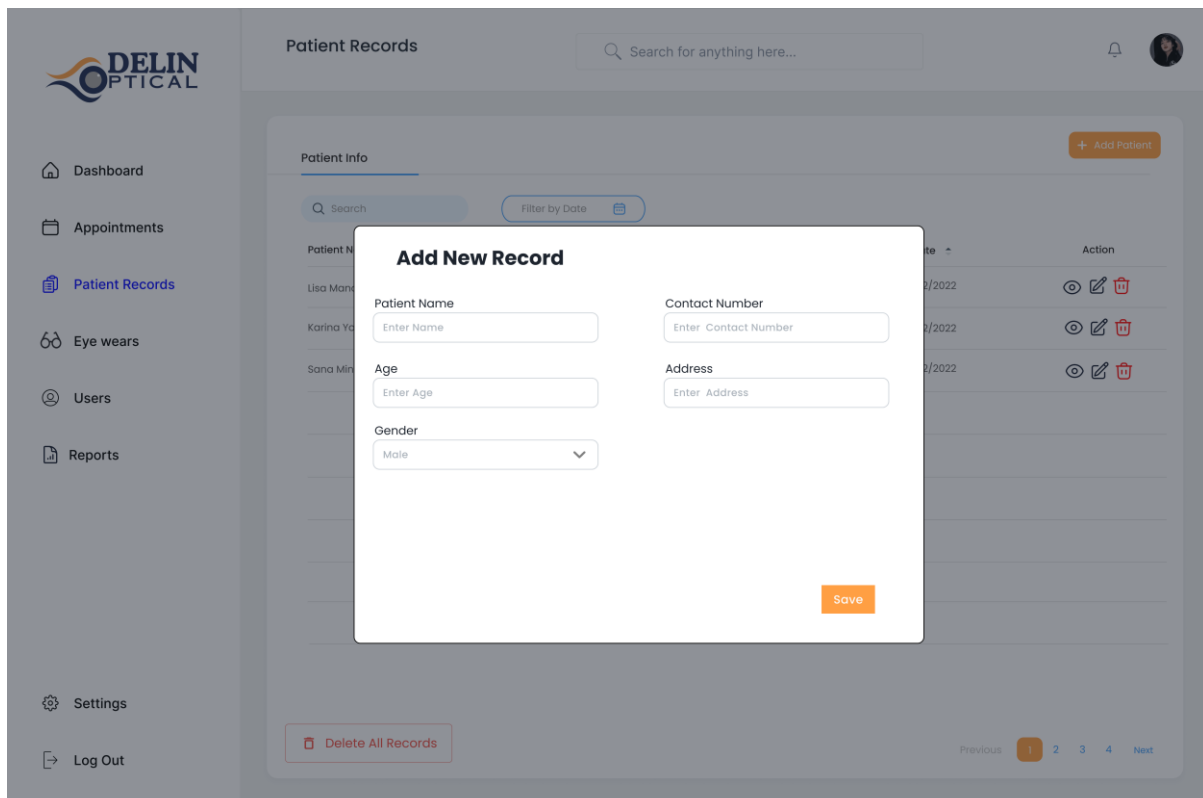


Figure 23. Adding Patient Record

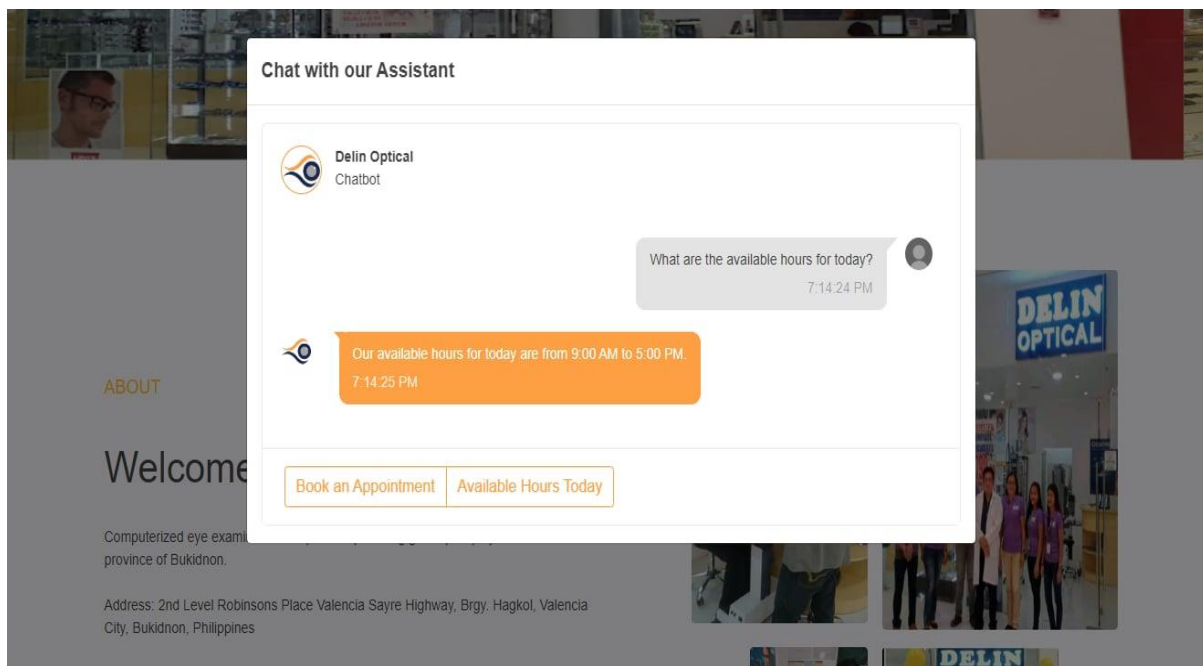


Figure 24. Chat-bot

APPENDIX E

Project Gantt-Chart



Figure 25. Project Gantt-Chart

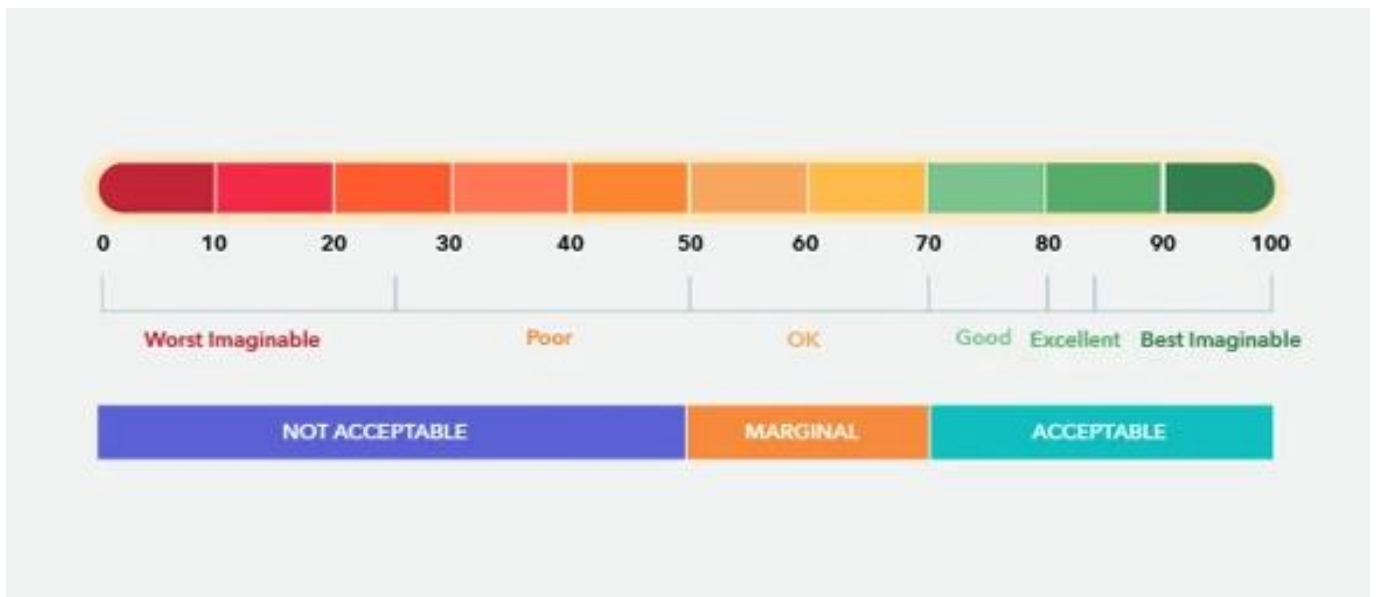


Figure 26: System Usability Scale Scoring

| | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. I think I would like to use this tool frequently. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. I found the tool unnecessarily complex. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. I thought the tool was easy to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. I think that I would need the support of a technical person to be able to use this system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. I found the various functions in this tool were well integrated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. I thought there was too much inconsistency in this tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. I would imagine that most people would learn to use this tool very quickly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. I found the tool very cumbersome to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. I felt very confident using the tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. I needed to learn a lot of things before I could get going with this tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Table 20: System Usability Scale Questionnaire

Documentation

