



## **Eyewear Shop Management System**

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**Abstract:** According to a report from the World Health Organization, approximately 2.2 billion people worldwide suffer from vision impairments. Wearing glasses is a common solution to correct refractive errors and prevent worsening eyesight. However, many optical stores still rely on manual sales and information management, leading to challenges such as data input errors and time-consuming tasks like migrating handwritten records to Excel files. The Eyewear Shop Management System has been developed as an alternative to address these issues. This web-based system follows a structured approach and the Waterfall model, utilizing PHP programming language, Visual Studio Code software, and MySQL as the database. The primary purpose of this system is to assist users in selling glasses and contact lenses by selecting inventory items such as lenses, frames, or contact lenses. Additionally, the system allows for inventory management and provides access to sales records. Overall, the implementation of this system will enable optical store workers to efficiently serve customers, manage inventory, and track sales.

**Keywords:** *Sales System, Management System, Inventory, Web-based System, Waterfall Model*

### **1. Introduction**

The eyes were the window to our human vision, but not everyone has perfect vision. A report by the World Health Organization states that globally, at least 2.2 billion people had near or distance vision impairments, most of which can be addressed through prevention and surgery [1]. One of the solutions in the treatment of refractive errors and avoiding a continuous increase in vision was to correct them by wearing glasses [2]. At the same time, the uninterrupted growth in the smart electronics industry brings with it risk and stress to the human eye from the blue light produced by electronics. Moreover, when people's eyes are overexposed to blue light it can cause photochemical damage to the eyes according to the research [3]. Wearing Anti-Blue Light Eyeglasses can be a good defense and relieve the stress on the eye and the eye strain caused by the blue light emitted by smart devices because it can block short wavelengths of light [4].

Hence, we can know the importance of correcting vision by wearing glasses. Furthermore, the global eyewear market is expected to continue to increase in value from 2020 to 2027 according to Statista Website [5], so the audience for eyewear will continue to grow in the future. In the project case

study from Mine Optical Centre, they are currently using manual methods to collect and record data to customize their customers' eyeglasses, which may become overwhelming as their audience grows due to market growth predictions. The existing system of making glasses will start with the optometrist. The optometrist will examine the customer's eyes and submit the prescription to the dispensing optician. The dispensing optician will serve the customer and assist him/her in selecting lenses and frames for the glasses. The dispensing optician will then fill in the customer's information, fill in the selected lenses and frames on a card, which will be kept in the cabinet, and save the information into an Excel file. The limitations in this process are the second input of information from the card to the computer and the time consumed to ensure error-free input. In addition, there were difficulties in tracking information from repeat customers, as the location of the card where the information was stored in the cabinet was difficult to find. Then, at the next restocking, it was difficult to accurately recall the hot sales from the frame names recorded in the sales records.

Therefore, an Eyewear Shop Management System will be developed to assist store owners. The web-based system will help staff and administrators also the owner to sell glasses or contact lenses to customers, register goods into inventory, manage inventory, and view the sales record. While in the sales stage the price will be calculated automatically and the staff and administrators will be permitted to give discounts to customers after the system has informed them of the price.

## **2. Related Work**

### **2.1 Study of Existing Progress**

Mine Optical Centre is an optical store located in Batu Pahat, Johor. It has been in operation for more than 10 years and has undergone a relocation during that time. The scope of business includes optometry services and matching customers with the right glasses or contact lens. These services are performed manually by employees and employers, i.e., the purchase of lenses and frames, and sales information are recorded on paper and then recorded electronically the information via Excel Software. When lenses and frames arrive at the store, the worker will record them in an Excel file. While the customers want to be fitted for eyeglasses, he/she needs to purchase lenses and frames. After the customer makes the purchase, the customer's information and the selected lenses and frames information, are transcribed from the hand record card into an electronic file, and need to follow up the new inventory information to the inventory file for lenses and frames, and create a sales record. The manual record card will collect the customer's name, Identity Card, phone number, address, eye data, and the lenses and frames matched for the production of the eyeglasses.

### **2.2 Web Technology Application**

The World Wide Web, also known as the Web, is an information system that allows visitors to access a collection of multimedia files stored on the Internet through a common protocol (HTTP) or other protocols. HTTP applies a data transfer protocol and assures the integrity of information is not corrupted or tampered with during transit [6]. This means that HTTP provides a reliable and fast transfer of information from the webserver to the browser interface of users around the world. The Web provides an intuitive interface that is graphically easy to access and allows developers to embed information such as images on web pages. In order to access a web page, the viewer needs to enter the URL domain name into a browser, i.e., chrome, etc., by using a smart device to access and browse the information provided by the web page.

In today's technologically advanced age, the Internet is widely accepted by many people, and according to a study by the International Telecommunication Union, half of the world's population or about 4 billion people are currently using the Internet as of the end of 2019 [7]. The development of web-based applications has also become popular and common. The Web system in this project is to provide the users with online access to the system, which facilitates direct access to the system without the need to download the software, which can be accessed directly through the browser

### 2.3 Transaction Processing System Application

Information systems can be defined as systems used to collect, process, store, analyze, and disseminate information for specific purposes [8]. Information systems can be categorized in a variety of ways, and the Transaction Processing System (TPS) falls into the category of information systems in a four levels hierarchy.

A Transaction Processing System is an Information Processing System used for business transactions and for keeping track of the activity within an organization. The TPS can assist Operational Manager to execute these activities [9]. TPS records and processes data generated from internal and external business transactions and stores these data in a database. In the proposed system, data generated such as daily basic sales of eyeglasses, registration of new arrivals of stock, invoice generation, sales reports, etc., will be processed and recorded.

### 2.4 Comparison of Existing Systems

To develop the proposed system, we discuss and study two existing systems on the market, namely Optical Shop Management POS System and Mobi Optical. The following Table 1 is the generated comparison table. In order to clarify the differences between these systems, the left side of the table shows the compared modules, the two columns in the middle show the studied system and the right side shows the proposed system which is the Eyewear Shop Management System.

**Table 1: System's Comparison**

Module	Optical Shop Management POS System	Mobi Optical	Eyewear Shop Management System
System Type	POS System	Android Application	Web-based Application
Registration and Login Module	Not Available	Not Available	Available, registered by the administrator with username and password
Stock Registration	Available	Available	Available
Sales Module	Available	Available	Available
Image Visualization	Not Available, unable to show lenses and frame image	Not Available, unable to show lenses and frame image	Available, show the lenses and frame image
Customer Invoice Module	Available	Available	Available
Report Generate Module	Not Available	Available	Available
Item Shortage Notification Module	Not Available	Not Available	Available, if out of stock or remain 1 the administrator will be notified
Sold Item in Chart View	Not Available	Not Available	Available

In summarize from table 1, the listed module from the system will be combined as one system which is Eyewear Shop Management System. Moreover, the system will add on some new modules such as login and registration, image visualization, item shortage notification, and sales items in a chart view.

### 3. Methodology

The System Development Methodology can refer through a framework to structure, plan, and control the development process of an Information System [10]. The use of a systems development methodology allows developers to understand and clarify how the overall process of a systems project should proceed and also facilitates the use of a systems development methodology to explain the specific development process to clients.

Other than that, the discussion of the analysis and design of the proposed system will be carried out before the development and implementation of the Eyewear Shop Management System. The analysis phase will involve acquiring and analyzing information, while the design will involve how to meet specific requirements and translate the requirements into a design for the system. Therefore, in the analysis phase, the requirements will be analyzed by using structured methods such as Context Diagrams, Data Flow Diagrams, and Entity-Relationship Diagrams. The design phase will involve Flowcharts, Database, and Interface Design.

#### 3.1 Waterfall Methodology

This part will discuss the methodology used in the development of this project system, the waterfall model, which can be described as a set of successive phases, where each step must be completed before the next phase begins. This model is applied because it is suitable for projects with clear and precise requirements, small-scale projects, easy to manage, simple to understand, and easy to use. In table 2 shows each step of the waterfall model which contains the tasks and the output of each of the steps.

**Table 2: Software development activities and their task**

Phase	Tasks	Output
Requirements Analysis	Collect the Requirements by Face-to-face Interview section Collect and analyze the information	User Requirements, Functional and Non-Functional Requirements Hardware and Software Requirements DFD ERD
System Design	Design the Flowchart of the System Design the Database Scheme and Data Dictionary Design the User Interface of the System	Flowchart Database User Interface
System Implementation	Implemented the develop of the Front-End and Back- End of the System Solving the Technical Difficulties	Proposed System
System Testing	Test the functionality of each component as well Test the System met with the Requirements Test the Database and Each Page is connected well Test the System without any errors that will make conflicts on the website	Tested System
System Deployment	Delivering the system to the end-user to test the functionality of the system Test system can run in the intended web environment	Deployed System
System Maintenance	Provide support and maintenance for the System Answering end-user questions Solve the system errors	Maintenance and Solve System Errors

### 3.2 Functional and Non-Functional Requirements

In this section, functional and non-functional requirements will be discussed. Functional requirements can be described as the modules that the system contains or must-have, which are the content that consists of requirements. While Non-functional requirements can be described as defining the quality attributes of the system, such as security, usability, etc. It can help to ensure the user experience as having a standard. The Functional and Non-Functional Requirements will be discussed in Table 3 and Table 4 below.

**Table 3: Functional Requirements**

Item	Modules	Functionalities
1	Registration and Login Module	The administrator can register staff accounts for employees to perform work-related operations. The administrator and staff can log in and log Out of their account by username and password
2	Customer Information Register Module	The administrator and staff can register customer information.
3	Stock Registration Module	The administrator and staff can register the new arrival items such as lenses, frames, and contact lens.
4	Sales Module	The administrator and staff can call the data from the customer and stock database and pair customers with glasses or contact lenses based on stock.
5	Customer Invoice Generate Module	The administrator and staff can print the invoice to the customer if the customer has ordered the glasses or contact lens.
6	Sales Report Generate Module	The administrator can generate the sales report based on the items ordered by customers stored in the database.
7	Item Shortage Notification Module	The system notifies administrators and staff when an item's minimum has been touched.

**Table 4: Non-Functional Requirements**

Item	Requirements	Descriptions
1	Operational	The system can be used in any web browser, whenever and wherever.
2	Security	The system will only be accessible by username and password.

### 3.3 Context Diagram

The contextual diagram in Figure 1 shows the interaction of the Eyewear Shop Management System. The diagram has two entities, which are the administrator and the staff. In this system, the admin can register the staff account, and both of them can access the system by inserting the username and password. Besides that, the administrator and staff can register the customer's information, and

register and manage the items such as lenses, frames, and contact lens in the stock. Afterward, they also can make the sale to the customers and print the invoice after the order is created. While the administrator will be able to create the staff account, view the sales records, and print the sales report.

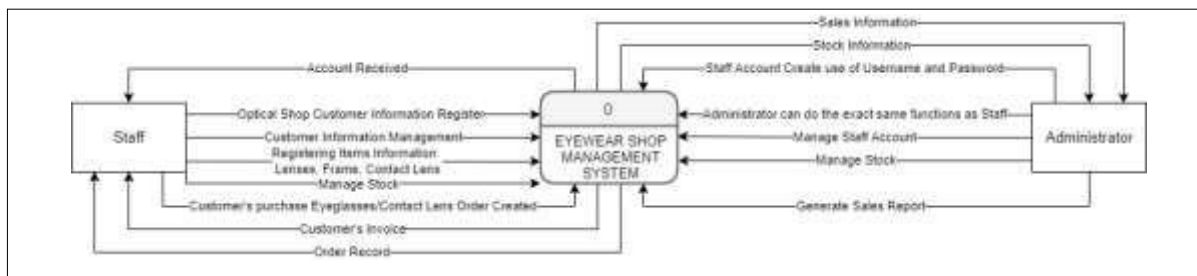


Figure 1: Context Diagram

### 3.4 Data Flow Diagram

This Data Flow Diagram Level 0 will provide more details in the process when compared with the context diagram shown in figure 1. It has 9 processes in figure 2, which are register, login, customer information register, items information register, glasses and contact lens order, stock management, staff account management, customer information management, and sales report generation. In addition, the diagram also shows 8 databases which are admin, staff, customer, lenses\_stock, frame\_stock, contact\_lens\_stock, glasses\_order, and contactlens\_order.

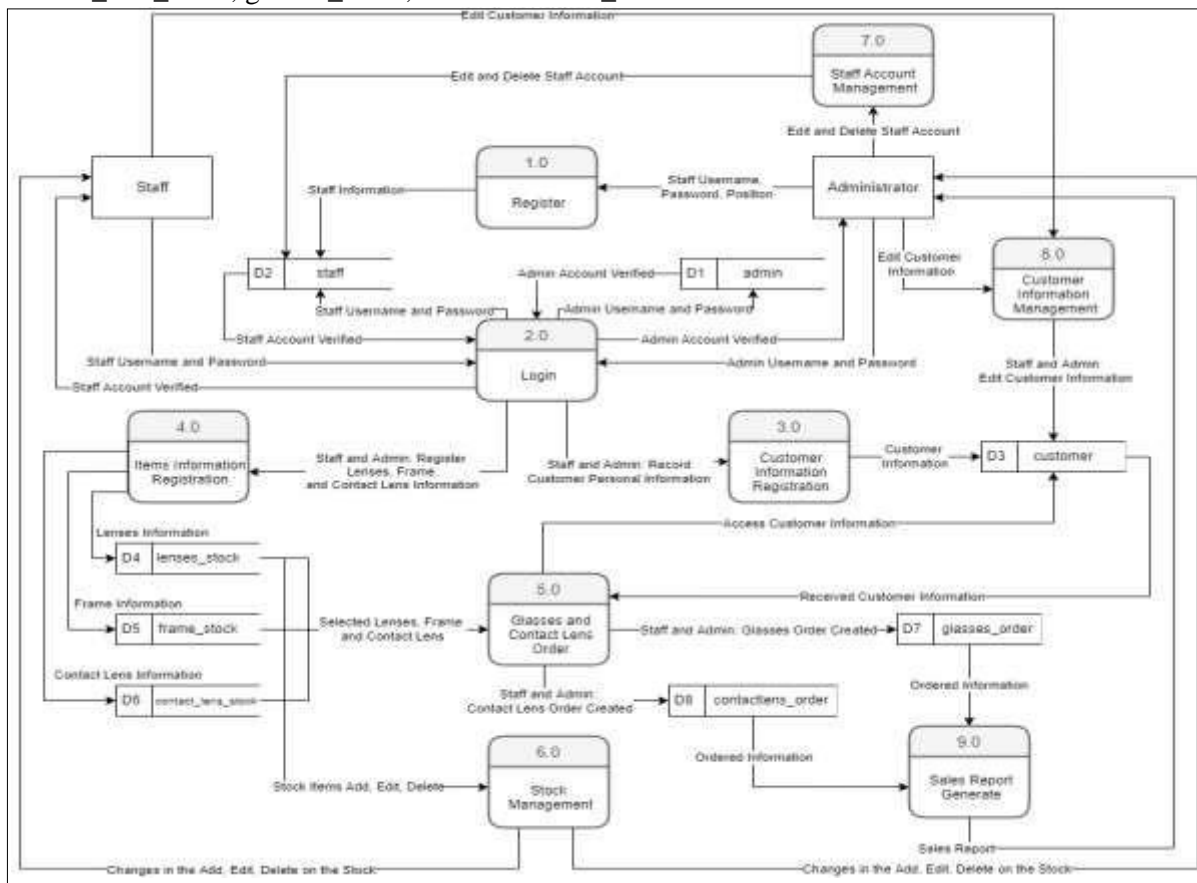
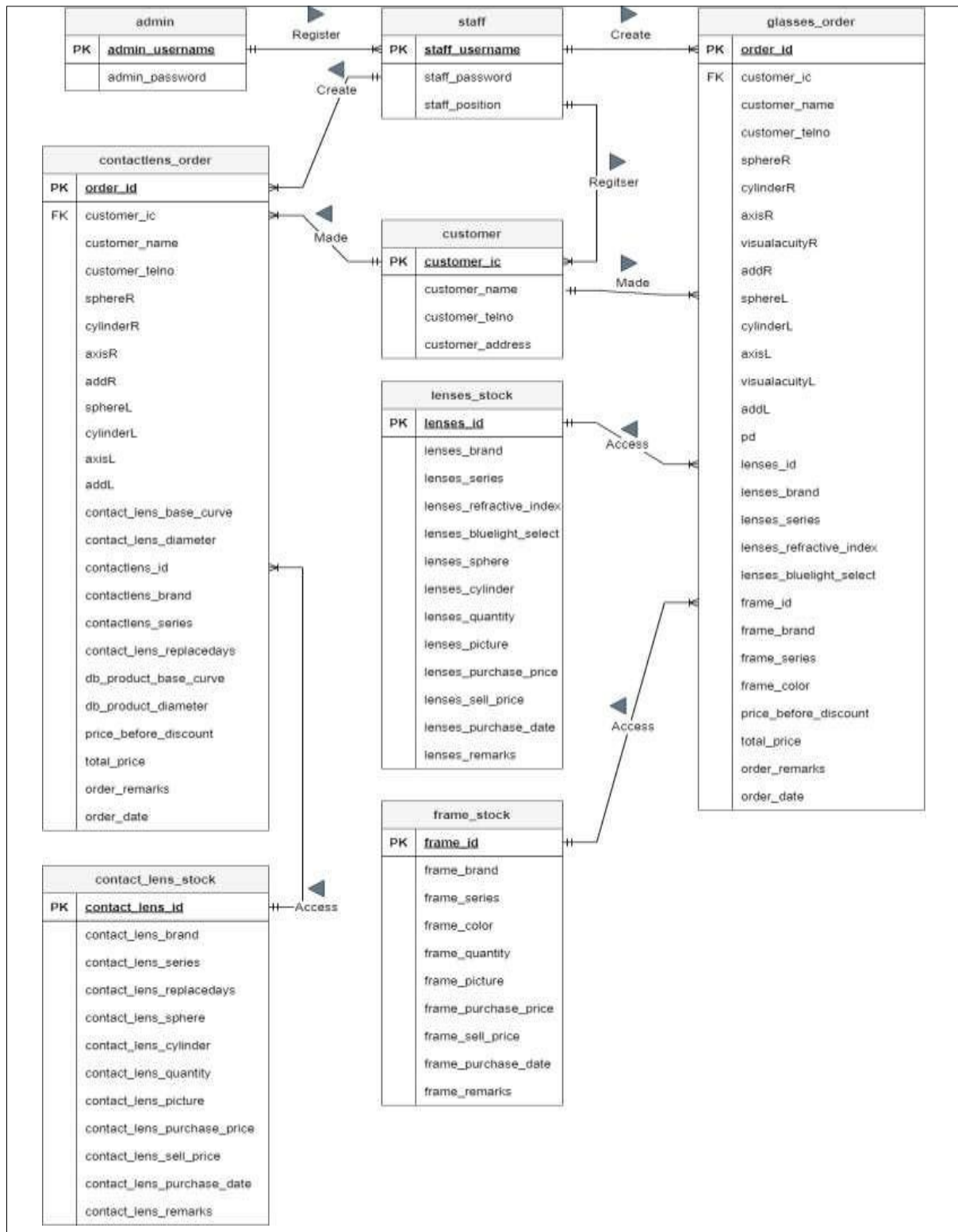


Figure 2: Data Flow Diagram Level 0

### 3.5 Entity Relationship Diagram

An entity Relationship Diagram is a graphical representation used to show the relationships between different sets of entities stored in the system's database. Figure 3 shows the ERD for the Eyewear Shop Management System. It has 8 entities in the design of the system database that will be used there are admin, staff, customer, lenses\_stock, frame\_stock, contact\_lens\_stock, glasses\_order, and contactlens\_order. While for the design of the system will write most of the information into

contactlens\_order and glasses\_order again as a backup to avoid another database having an error or



problem that might lead to the data being missed.

**Figure 3: Entity Relationship Diagram**

### 3.6 Flowchart Diagram

Figure 4 shows the flowchart of the staff part of the Eyewear Shop Management System. The flowchart of the staff section will start with the login process, after which the employees will be able to start their work process in the optical store. The staff will be able to sell glasses and contact lenses to customers via the ordering module and select items from the pre-registered inventory of lenses, frames, and contact lenses. For first-time customers, employees will need to register their customer information

before they start selling. In addition, customer information can be managed, and invoices can be checked and printed after they have placed their orders. In the end, the staff can log out of their accounts

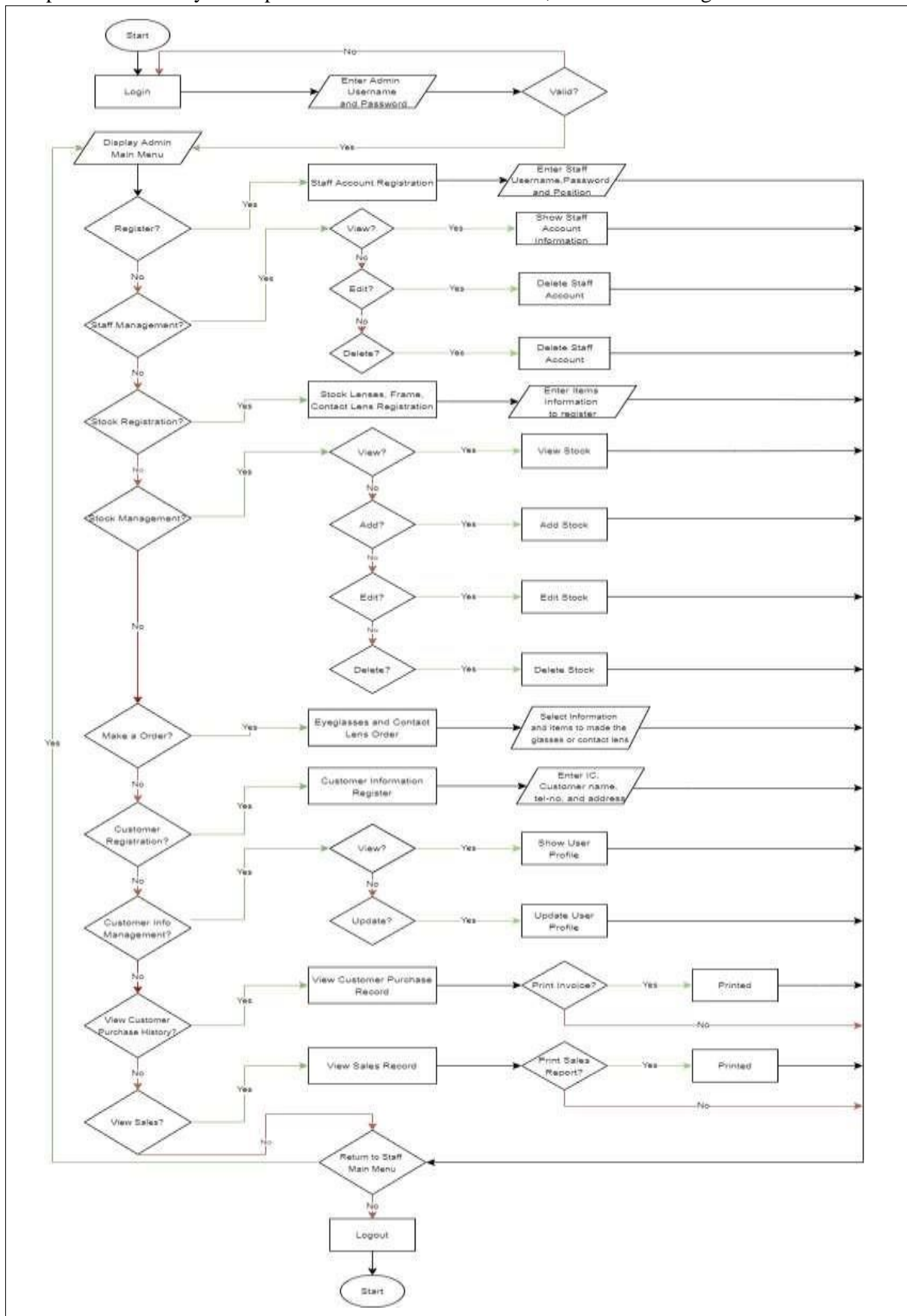


Figure 4: Staff Flowchart



Figure 5 shows the flowchart of the administrator section. After logging in to the account, the administrator will be able to register employees with their accounts and will also have access to view, modify and delete accounts. In addition, the administrator will have exactly the same modules as the employees to serve the customers who visit the optical store. Besides that, the administrator will have a different module from the employees in that he will be able to view sales and print reports. Finally, managers will be able to log out of their accounts.

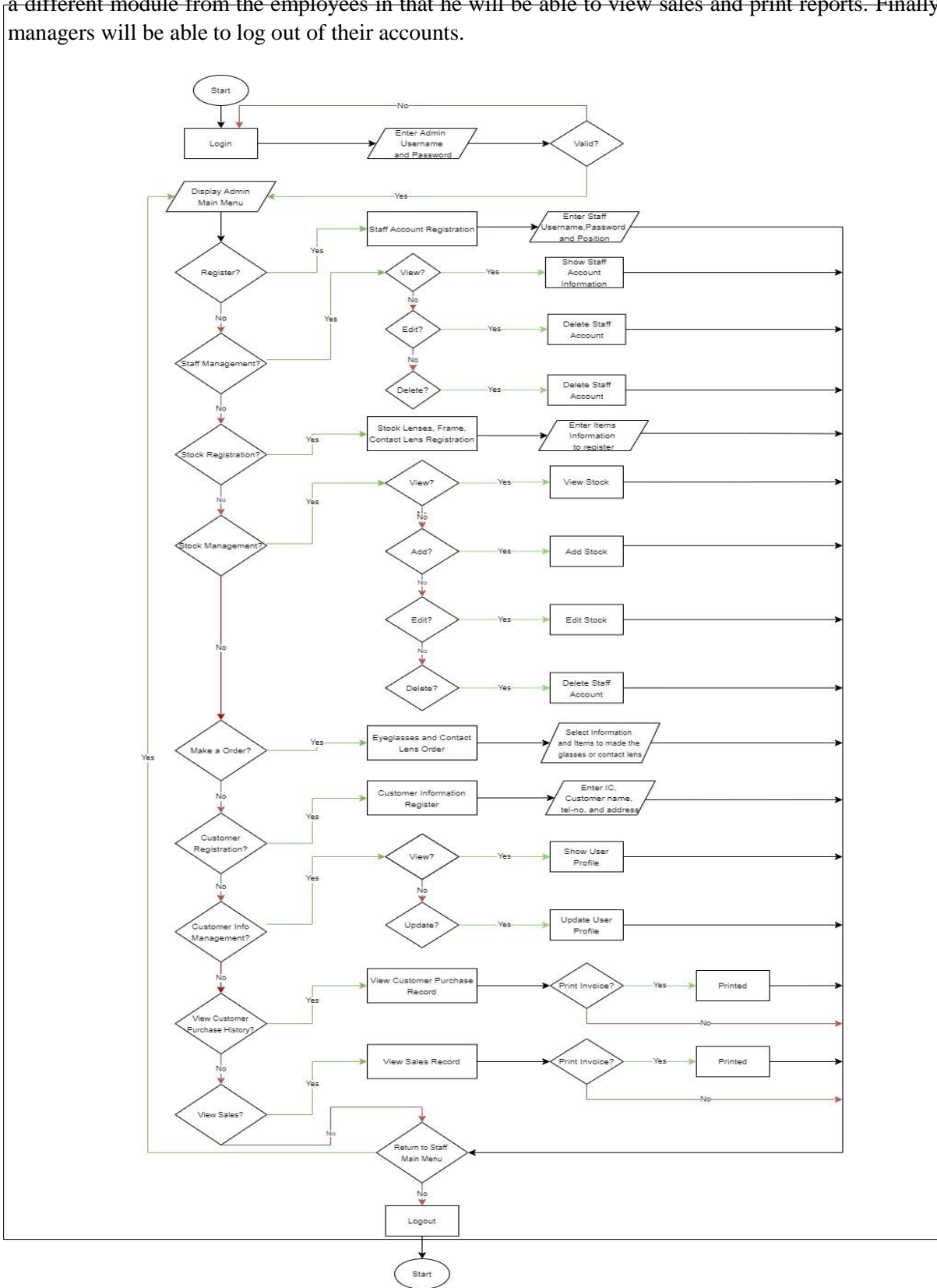


Figure 5: Admin Flowchart

#### 4. Result and Discussion

In this session, the main objective is to deliver a functional, useable, and function well system. With the summary of the above sections, the results of the development and testing of the system will be presented in this section.

##### 4.1 System Development

This system aims to assist the optical shop employee and employer to sell and manage the glasses and contact lens. The users of this system will be divided into two categories, they are staff and administrators. Meanwhile, the system user proxy refers to both staff and admin.

##### 4.1.1 Users Interface

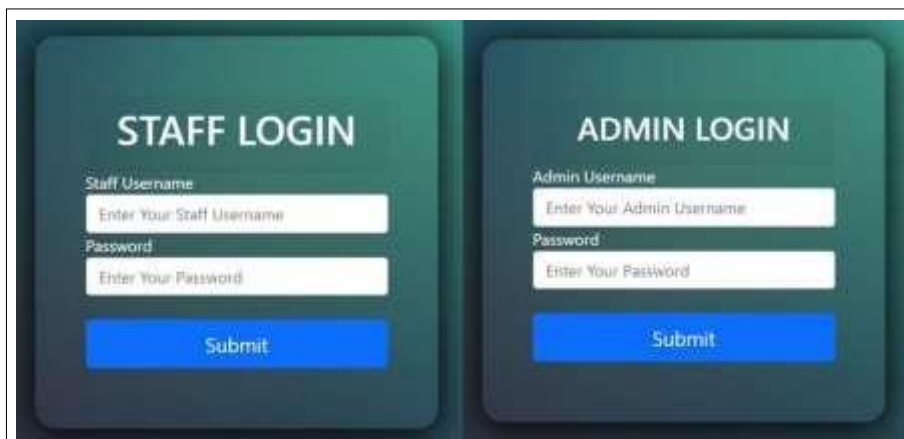


Figure 6: Partial of the User’s Login Page

Figure 6 will show some parts of the staff and admin login page. In order to login into the Eyewear Shop Management System, the users need to insert their unique username and password, if the username or password is incorrect or blank will notify them, it is correct will enable them to get into the system.

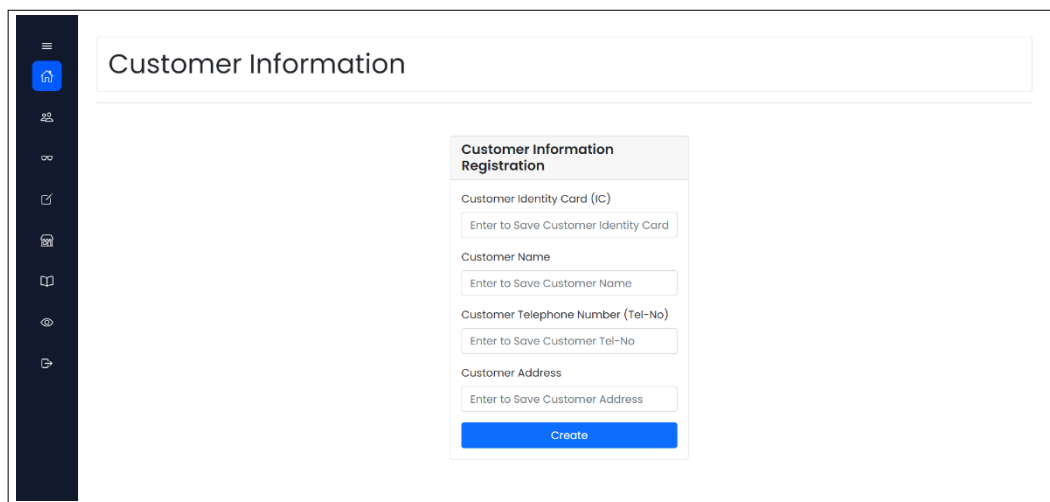


Figure 7: Customer Information Register Page

In figure 7, shows the customer information register interface for new customers. This function will only be used by first-time customers that never purchased something in the store. If the customer already purchased something previously and will not need to register again

**Figure 8: Lenses Information Register Page**

Figure 8 will use to register lenses information to the stock, this is one of the components to make glasses. This lenses registration module will be used by staff and administrators to register lenses information, it requires several information to register the lenses. While the frame and contact lens also need to register information to the store, there have their own information need to be inserted.

**Figure 9: Glasses Sales Page**

Figure 9 shows the glasses sales page. This glasses sales module will be used by staff and administrators to serve the customer and make the glasses order by retrieving from the lenses and frame stock and it will also require the customer information when creating the order. In addition, it needs the users to input the customer's eye prescription when making the glasses order. While the contact lens sales same as the glasses sales, the difference is the required data of the prescriptions, and no need to pair lenses and frame, only the contact lens is needed.

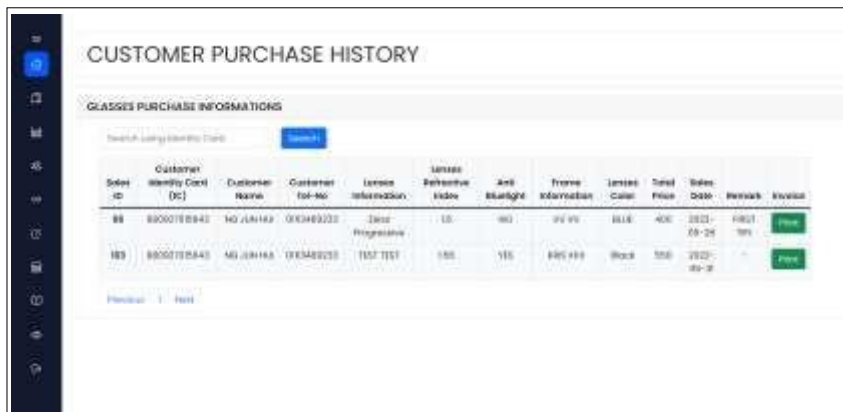


Figure 10: Customer Purchase History



Figure 11: Customer Purchase History – Print Invoice

Figure 10 will be used to show the customer purchase history after the customer has purchased the glasses or the contact lens. After clicking the print button, the staff and admin can print and download the invoice and give it to the customer as shown in figure 11.

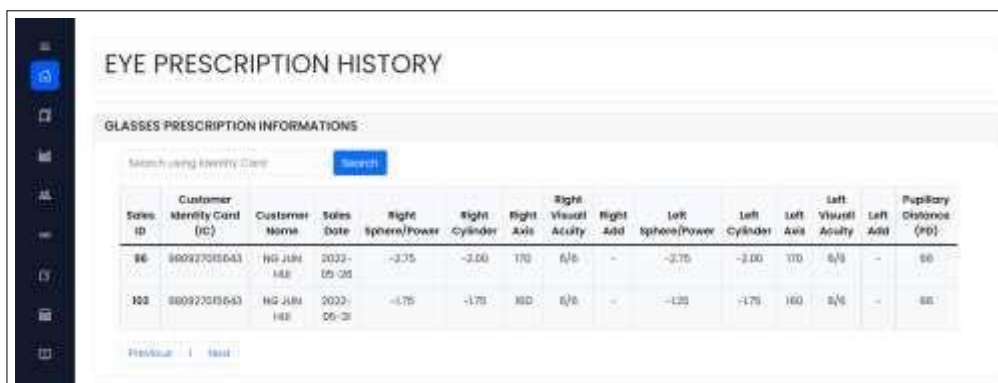
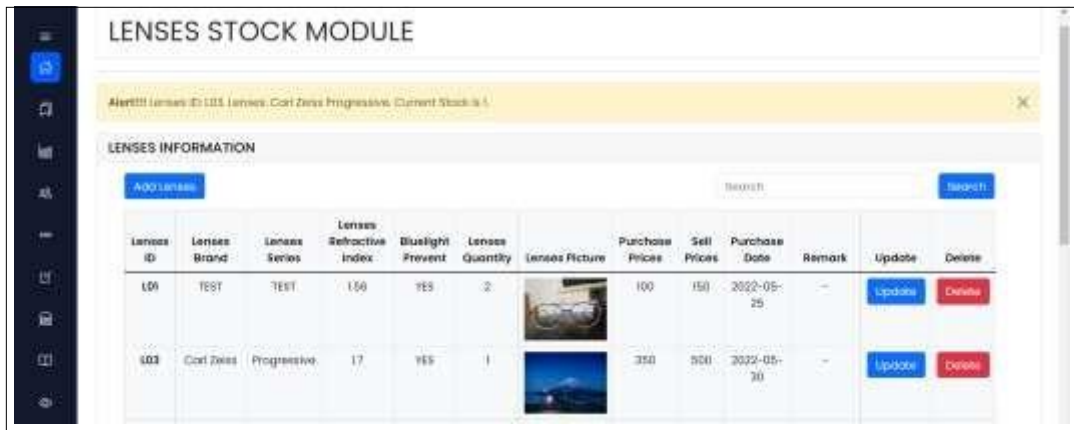


Figure 12: Glasses Prescription

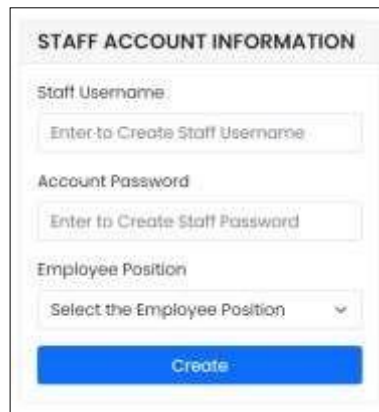
Figure 12 shows the module that will be used to display glasses or contact lens prescriptions. The staff and admin can use these data to inquire whether the customer vision is increased or not.



**Figure 13: Lenses Stock Management**

Figure 13 shows lenses stock management module that will be used to display and perform the Create, Read, Update, Delete (CRUD) Operations. Same as figure 13, some of the modules also can perform CRUD Operations which are ‘frame, contact lens management’, ‘customer information management’, and ‘staff account management’ modules.

4.1.2 Admin Unique Interface



**Figure 14: Staff Account Registration**

Figure 14 only be accessible by the admin to create the staff account to let them execute their task. Other than that, the admin does not need to create accounts because the accounts will be embedded directly into the database and also, it does not have any way to create admin accounts other than inserting data directly into the database.



**Figure 15: Glasses Report Generate**

MINE OPTICAL CENTRE										
Sales Report: 2022-05-25 to 2022-05-28										
Order ID	Lenses ID	Frame ID	Lenses Info	Refractive	Anti Blueight	Frame Info	Color	Before Discount	Final Price	Sales Date
96	L10	F03	Zeiss Progressive	1.6	NO	VV VV	BLUE	722	400	2022-05-26

Figure 16: Print PDF Filter Data Function

MINE OPTICAL CENTRE										
Sales Report										
Order ID	Lenses ID	Frame ID	Lenses Info	Refractive	Anti Blueight	Frame Info	Color	Before Discount	Final Price	Sales Date
96	L10	F03	Zeiss Progressive	1.6	NO	VV VV	BLUE	722	400	2022-05-26
103	L01	F01	TEST TEST	1.56	YES	KRIS XXX	Black	650	550	2022-05-31

Figure 17: Print All PDF Data Function

	A	B	C	D	E	F	G	H	I	J	K
1	Order ID	Lenses ID	Frame ID	Lenses Info	Lenses Ref	Lenses Ant	Frame Info	Frame Col	Price Befo	Final Price	Sales Date
2	96	L10	F03	Zeiss Progr	1.6	NO	VV VV	BLUE	722	400	05/26/2022

Figure 18: Print CSV Filter Data Function

	A	B	C	D	E	F	G	H	I	J	K
1	Order ID	Lenses ID	Frame ID	Lenses Info	Lenses Ref	Lenses Ant	Frame Info	Frame Col	Price Befo	Final Price	Sales Date
2	96	L10	F03	Zeiss Progr	1.6	NO	VV VV	BLUE	722	400	05/26/2022
3	103	L01	F01	TEST TEST	1.56	YES	KRIS XXX	Black	650	550	05/31/2022

Figure 19: Print All CSV Data Function

Once the sales are created, the sales report module will be able to let the administrator inquire about the current sales of the glasses or the contact lens. In figure 15, the print all PDF and print all CSV button will allow the administrator to print all the data which means will not limit to the range of the date. After that, the filter of start and end dates will allow the administrator to print the report based on the customized date. Figures 16 and 17 will show PDF prints, while Figures 18 and 19 will be used to show CSV prints.

#### 4.2 Functional Testing

In this section, functional testing is a common testing process within software development. It is used to ensure that each module of the system meets the functional requirements in section 3, table 3: Functional Requirements. This testing will involve test cases, expected outputs, and actual outputs. The test cases are described as testing situations, which will affect whether the actual output performance fulfills the expected output or not. The following tables will discuss the functional testing plan.

Table 5: Test Plan for Staff Account Registration Function

Item	Test Cases	Expected Output	Actual Result
1	Admin register staff account with accurate and complete information	Registration successful and display register successful message	As Expected
2	Admin register staff account with blank information	Registration failure and display of request completion message	As Expected
3	Admin register staff account with an existing username	Registration failure and display a message username has been taken	As Expected

**Table 6: Test Plan for Admin and Staff Login Function**

Item	Test Cases	Expected Output	Actual Result
1	Admin and staff login with an accurate username and correct password	Login successful and display login successful message, and will be directed to admin index page	As Expected
2	Admin and staff login with a blank or incorrect username and password	Login failure, display incorrect username, password, or blank message	As Expected

**Table 7: Test Plan for Customer Information Registration Function**

Item	Test Cases	Expected Output	Actual Result
1	Admin and staff register customer information with an accurate and complete insertion	Registration successful and display register successful message	As Expected
2	Admin and staff register customer information with blank information	Registration failure and display of request completion message	As Expected
3	Admin and staff register customer information with an existing identity card	Registration failure and display a message this person already our member	As Expected

**Table 8: Test Plan for Stock Registration Function (Lenses, Frame, Contact Lens)**

Item	Test Cases	Expected Output	Actual Result
1	Admin and staff register the items to the stock with an accurate and complete information	Registration successful and display items register successful message	As Expected
2	Admin and staff register the items to the stock with a blank information	Registration failure and display of request completion message	As Expected
3	Admin and staff register the items to the stock with the ID of an existing item	Registration failure and display a message this ID already exists	As Expected

**Table 9: Test Plan for Sales History Function (Glasses, Contact Lens)**

Item	Test Cases	Expected Output	Actual Result
1	Admin and staff can print or download the invoice after sales are created	Print or Download Invoice Successfully	As Expected
2	Admin and staff can search sales history by inserting Sales ID or Customer IC	Sales History Searching Successful	As Expected

**Table 10: Test Plan for Sales Report Generate Function (Glasses, Contact Lens)**

Item	Test Cases	Expected Output	Actual Result
1	Admin can print or download all the sales reports in PDF or CSV Format after sales are created	Print or Download All Sales Report Successfully	As Expected
2	Admin can print or download selected sales reports based on sales date in PDF or CSV Format after sales are created	Print or Download Selected Sales Report Successfully	As Expected
3	Admin and staff can search sales history by inserting Sales ID or Customer IC	Sales History Searching Successful	As Expected

**Table 11: Test Plan for Staff Account Management Function**

Item	Test Cases	Expected Output	Actual Result
1	Admin can carry out CRUD operations to staff account information	Staff Account Information can be through add, view, update, and delete operations to make changes and will display the message	As Expected
2	Admin can search staff account information by inserting either staff account username or position	Staff Information Searching Successful	As Expected

**Table 12: Test Plan for Customer Information Management Function**

Item	Test Cases	Expected Output	Actual Result
1	Admin and staff carry out CRUD operations to customer information	Customer Information can be through add, view, update, and delete operations to make changes and will display the message	As Expected
2	Admin and staff delete customers who have already purchased something from the store.	Failure to delete customer information and display a message unable to delete because has been purchased in the store	As Expected
3	Admin and staff can search customer information by inserting either identity card, customer name, or address	Customer Information Searching Successful	As Expected

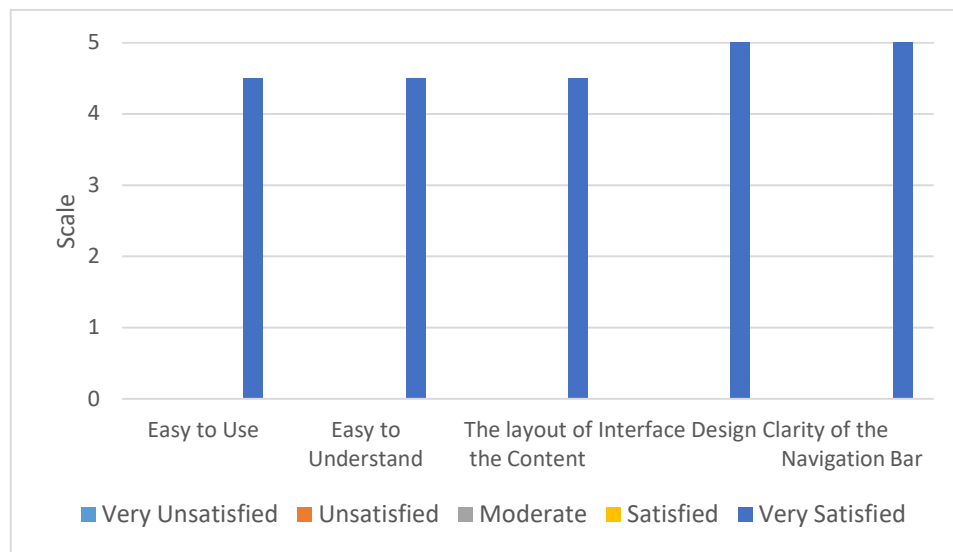


**Table 13: Test Plan for Stock Management Function (Lenses, Frame, Contact Lens)**

No	Test Cases	Expected Output	Actual Result
1	Admin and staff carry out CRUD operations to stock management	Stock Items Information can be through add, view, update, and delete operations to make the change and will display the message	As Expected
2	Admin and staff can search stock item information by inserting either Item ID, Brand, or Series	Stock Items Information Searching Successful	As Expected
3	On Admin Side when inventory item quantity is less than or equal to 1	Admin Side will be notified of the ID, Brand, Series, and Current Quantity of the inventory item, when the quantity is less than or equal to 1	As Expected

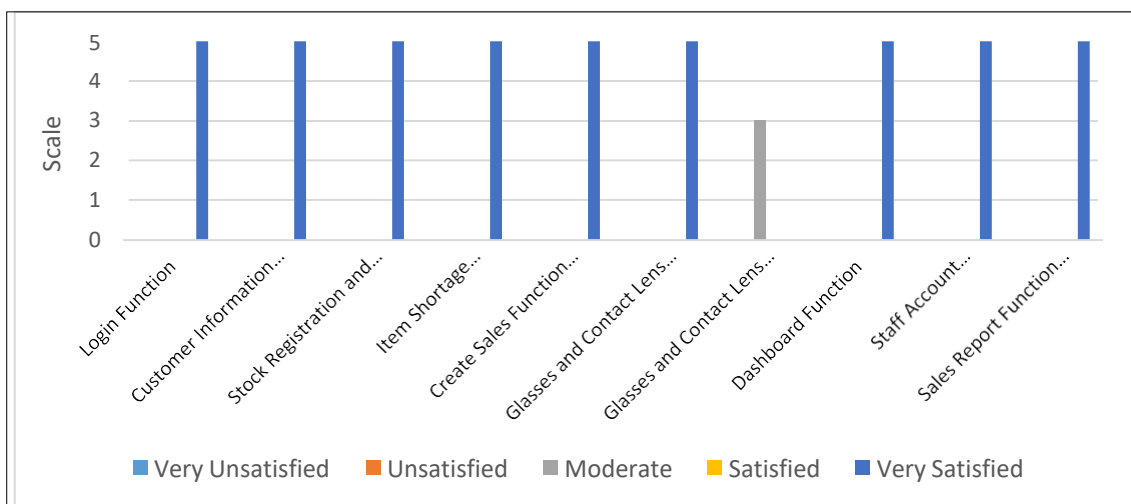
### 4.3 User Acceptance Testing

The User Acceptance Testing is a test process to gather feedback from the end-user is accepts the proposed system Eyewear Shop Management System or not. During this testing process, Kelvin Wong, Branch Manager of i-Optique Optometry, joined and helped to test the system, he used two different components namely Staff and Admin modules. The result will be transformed from the questionnaire into a chart view, which will display in Figures 20 and 21.



**Figure 20: Overall User Interface Evaluation**

In figure 20 we have received and gained feedback regarding the user interface evaluation. During the evaluation of the staff user interface, the respondent answered 4 of 5 in the first 3 columns, while the admin user interfaces all answered 5 of 5. As a result, the overall user interface evaluation received positive feedback and can conclude that the respondent was satisfied with the user interface experience.



**Figure 21: System Features Evaluation for Admin and Staff**

In figure 21 system features evaluation, the respondent answered 5 of 5 scales in the 9/10 questions and 3 of 5 scales in 1 question. For the eye prescription module for eyeglasses and contact lens, the respondent felt that customer invoices were not detailed enough. At a certain degree, the respondent still recognized and accepted most of the functionality of the modules and feel very satisfied with that.

### 5. Conclusion

In conclusion, the developed Eyewear Shop Management System can become an alternative or replacement option for optical shops besides manual operation. This system will provide employees and employers with a more convenient way to register new arrivals items into inventory, place orders for customers, print invoices, manage inventory, and view sales reports. Due to its web properties, the system can be viewed on multiple smart devices such as computers and smartphones, which might make it convenient for the users when producing the order. Furthermore, although the project had achieved its stated objectives, there is still space for improvement. The suggested improvements by Branch Manager Kelvin Wong were that the system could enhance the details of invoice documentation, re-design the glasses, and contact lens eye prescription table to make it simpler and more visible, and contact lens sales modules need to add a contact lens prescription data table.

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### References

- [1] World Health Organization (WHO), World report on vision, 2019.
- [2] National Eye Institute, Refractive Errors, 2021.
- [3] Ouyang, X., Yang, J., Hong, Z., Wu, Y., Xie, Y., & Wang, G, Mechanisms of blue light-induced eye hazard and protective measures: A review. *Biomedicine & Pharmacotherapy*, 130, 110577, 2020.
- [4] Ide, T., Toda, I., Miki, E., & Tsubota, K, Effect of blue light–reducing eye glasses on critical flicker frequency. *The Asia-Pacific Journal of Ophthalmology*, 4(2), 80-85, 2015.
- [5] Statista, Value of the eyewear market worldwide from 2020 to 2027, 2021.

- [6] Gourley, D., Totty, B., Sayer, M., Aggarwal, A., & Reddy, S, HTTP: the definitive guide. " O'Reilly Media, Inc.", 2002.
- [7] International Telecommunication Union (ITU), Measuring digital development. Facts and figures 2020, 2020.
- [8] Rainer, R. K., & Prince, B. Introduction to information systems, John Wiley & Sons, 2021.
- [9] Laudon, Kenneth C. & Laudon, Jane P., Management Information System: Managing the Digital Firm, 2014.
- [10] Centers for Medicare & Medicaid Services (CMS), SELECTING A DEVELOPMENT APPROACH, 2005.