



Pharmacy Management System for The Central Pharmacy - Pokunuwita

**A dissertation submitted for the Degree of Master of
Information Technology**

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2018



Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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Abstract

This project illustrates the designing and implementation of a web based Pharmacy management system for the Central Pharmacy – Pokunuwita. The primary aim of is to improve accuracy and enhance safety and efficiency in the pharmaceutical store by minimizing issues occur in day to day operations.

Currently they are using a manual system which is very hard in handling. Managing the stock with paper records based on the expiry dates and the quantity available in the stock are some major problems identified in the problem domain. The system intends to minimize the workload of the staff and increase the value of the business to gain the competitive advantages in the pharmaceutical industry.

The system allows different tasks for different users. They are administrator, cashier, data entry operator and normal user who can logging the system as different user roles to perform their functions separately. Administrator has all privileges of the system. Create users, generate reports for managerial decisions, manage employee attendance are some administrator tasks. In addition, the system will show a notification about expiry dates of drugs and stock ending details. It is easy to handle stock management through the software rather than working with paper records.

Customers are the main asset of the business. So, the system will help to reduce waiting time of the customers. They can check the availability of the items before they come to the pharmacy by using the search facility provided in the pharmacy web site.

The system is developed using Laravel which is open-source PHP web framework and MySQL database. Laravel supports the MVC architecture which is more efficient and attains perfect design for the system. CSS, Bootstrap, Java Script are some other technologies used to develop this system.

Acknowledgement

First and foremost, I would like to express my sincere gratitude to my supervisor Dr. K.L. Jayarathne for the continuous support he had gave me. His comments, encouragements, patience, enthusiasm, knowledge and guidance helped me in all the time of this project and writing of the thesis.

Besides my supervisor, I would like to thank the rest of my lecturers in the UCSC, who helped me to improve my knowledge and professional qualifications throughout this MIT program. I take this opportunity to respect them as well.

And also, the other staff members of the UCSC helped me in various ways. I am grateful for their contribution and support.

I would like to express my gratitude to the staff of The Library, UOC, where I am currently employed. There are various challenges when carrying out an individual project as an employee. I thankfully remembered them for their patience and support in overcoming numerous obstacles I have been facing through my Master programme.

In addition, I would like to thank my friends for helping me in various ways. When I had problems in my implementation stage my friends always provided the guidelines to overcome them. Without their guidance, the project could not have been successfully completed.

Finally, I must express my very profound gratitude to my mother and to my relations for providing me with unfailing support and continuous encouragement throughout my years of study and through the implementation of project and writing this thesis. This accomplishment would not have been possible without them.

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Chapter 01: Introduction

1.1 Project Background

Technology plays a major role in different fields and areas that affects all the aspect of human activities. Therefore, our societies get a lot of benefits from modern technology including the medical field. The Central Pharmacy is a pharmaceutical store which is situated in Pokunuwita area. At present, manual system is being utilized in the pharmacy. This usually leads to mistakes as the workload of the pharmacist increases. Pharmacy management system is designed to improve accuracy and to enhance safety and efficiency in the pharmacy. It is a computer-based system which helps not only to the pharmacist but also the customers. The system involves manual entry upon arrival of new batches of drugs and upon drug movement out of the pharmacy for a certain period, e.g. every month. It will also give report showing the list of products expiries after a specified date before the product eventually expires, the movement of drugs in and out of the pharmacy, the list of stock ending details. The SMS and email facility is available in the system. The customers can view the stock available details through the system and they can upload a prescription after creating an account. By logging to the system, they can view the status of their uploading.

1.2 Problem definition

Pharmacy management of The Central Pharmacy has kept paper record in filing cabinets. Managing a pharmacy with records on papers will be tedious and difficult to keep track of inventories with regards to the drugs in the store, expiry date, quantity of drugs available based on the categories and their functions. The pharmacist has to order drugs to replenish the already diminishing stock. In addition, ordering of drugs is being carried out manually. Significant amount of time is allocated for writing the order as the pharmacist needs to go through the stock balance and make rough estimate of the amount to order based on Figures. Drugs are not supposed to be used after they have expired.

In addition, the pharmacist has to manage employees and their details such as their personal information, employment details, and attendance manually.

In the aspect of customer, they need to physically be in pharmacy to purchase medicines and finding the relevant medicine according to prescription is a time-consuming task.

1.3 Motivation

The automated pharmacy management system can be used for the sake of ensuring effective and clear data saving and manipulating as well as neat work on the pharmacy medical products. Highly minimize time and resource by which, searching the medicine data, can get the data in quickest time. And almost the resources are wise used since most actions are done on the pharmacy system. Some of the resources minimized include paper, manpower and related thing. The other thing is for storing data's in secure way.

A summarized list of drugs dispensed to patient can be viewed for monitoring purposes. Also, PMS will be able to generate report on the list of drugs dispensed in the polyclinic for the given time period. And there is a message alert for the user if the stock holding quantity reaches a low level. Thus, the pharmacist will need to replenish the drugs.

1.4 Scope & Limitations

The scope of this project is limited to the activities of the Central Pharmacy which includes will improving health outcomes, enhance access and care in the surrounding communities and ensuring best use of resources, the use of a computer based management system for improving the efficiency of a pharmacy is needed and it is an essential part of any modern continuously evolving society.

Because now a day's Information and communication technology (ICT) plays a great role in different fields or areas including the Health care systems. This leads to various studies and researches being conducted to selected health care facilities. It is necessary to ensure a technologically appropriate, equitable, affordable, efficient and environmentally adaptable and consumer friendly system, designed to fully utilize the ICT for the maximum benefit in the health care industry.

The system will not be able to handle drug to drug interaction, contraindication and polypharmacy in a prescription; this implies that these services will be manually completed by the pharmacist.

1.5 Objectives

Pharmacy management system is a user-friendly application which reduces the burden and helps to manage all sections of pharmacy like medicine management and billing etc., which improve the processing efficiency.

The aim of this project is to develop a user-friendly application for the effective management of The Central Pharmacy which reduces the burden and helps to manage all sections of pharmacy like medicine, store and billing etc. It will be able to achieve the following objectives:

- Ensuring effective policing by providing statistics of the products in stock.
- Maintaining correct database by providing an option to update the products in stock.
- Improving the efficiency of the system by ensuring effective monitoring of services and activities.
- To provide optimal drug inventory management by monitoring the drug movement in the pharmacy.
- To display Relevant messages of stock which are ending soon, expiry dates.
- To ensure that there exists a level of restricted access based on functionality and role.
- To ensure that the system is user friendly.
- To be able to generate various reports according to the requirements.
- Fast searching of medicine.
- The automating tasks of maintaining of bills.
- Customer can search the availability of a particular product by viewing the website.
- To manage employee records.

1.6 Structure of the Theses

The chapter layout of this project is outlined in a sequential manner starting with Chapter one which consists of the Introduction, Motivation, Statement of the problem, Aims and objectives, Scope, Limitation, and Structure of the thesis.

Chapter two consist of background, brief descriptions of current system and proposed system, methods of gathering requirements, similar systems, tools and technologies that going to be used for the proposed system.

Chapter three deals with the analysis of the existing system under which description of the current system will be analyzed, problems of existing system, description of the proposed system and the advantages of the proposed system, system design and model diagrams.

Chapter four consists of implementation details, methodology use to develop the project, technology use, interface designs and some codes.

Chapter five describes about the importance of testing and test methods. Furthermore, it includes the test plan and test cases which are going to be tested. The results of the test cases may also include here.

Chapter six of this thesis has the information about project evaluation part. It mentions the importance of the evaluation for a project.

Chapter seven consists of conclusion of the project. It describes project achievements within the given time period, problems encounter when doing the project individually within short period of time and future enhancements for increase the quality of the project

Chapter 02: Background

2.1 Introduction

Due to the size and quality service of the pharmacy, the pharmacy has a large customer base. These customers tend to visit the pharmacy for services mostly when they close from work. At this period, the number of customers that patronize the pharmacy is on the increase, thereby making the workload of the pharmacists much more tedious. This case makes it difficult for the pharmacist to attend to customers in a short period. Meanwhile the pharmacist has to ensure satisfaction in services to keep their customers. The factors mentioned above, results in delay of the services being rendered to the customers, thereby slowing down sales and risk losing valuable customers in the long run.

2.2 Current System

At present, manual system is being utilized in The Central Pharmacy. It requires the pharmacist to manually monitor each drug that is available in the pharmacy. Pharmacy management has kept paper record in filing cabinets. Managing a very large pharmacy with records on papers will be tedious and difficult to keep track of inventories with regards to the drugs in the store, expiry date, quantity of drugs available based on the categories. This system also ensures that there exists a level of restricted access based on functionality and role. This system also provides optimal drug inventory management by monitoring the drug movement in the pharmacy. Significant amount of time is allocated for writing the order as the pharmacist needs to go through the stock balance and make rough estimate of the amount to order based on Figures. There is no billing facility. Every calculation is done manually. Employee details such as personal details, attendance, type of role is also done manually.

This implies that these services are manually completed by the pharmacist. This usually leads to mistakes as the workload of the pharmacist increases. It is hard to do with large number of employees.

2.3 Proposed System

The proposed project named “Pharmacy Management System”, is a client/server based application.

An interactive application for managing stock, billing, manage employees, generate reports etc. It helps in maintaining the records of medicine, the users and store details and also reduce the work of searching the records of the medicine. The main aim of this application is applying technology to reduce the human effort.

The project has been developed based on “Stock managing” and its “billing process” being presently used in the medical stores for storing and retrieving the available information in the store.

The user must get his username and password from the admin by providing the name, address, phone no, id proof. And can get the access to the application. Without the username and password, he cannot get access to the application.

Admin has almost all the permission to work with. The stock manager has permissions that less than the admin. Cashier has the permission of handling of billing. Every user has permission of mark their attendance and edit their profile data.

Anybody including the customer can search the availability of particular product through the system. It is good for the customers who don't want to waste their valuable time in queues for non-stock items. Customer can upload a prescription to the system after creating a customer-user account. Pharmacy users need to check the relevant details of the prescription and update the state. Customer can see it by logging to their account.

The reports can be generated through the system. After generated relevant report it can be download as a PDF or an Excel document.

Can insert data to the database directly, by uploading excel or csv.

SMS and email is available in the proposed system.

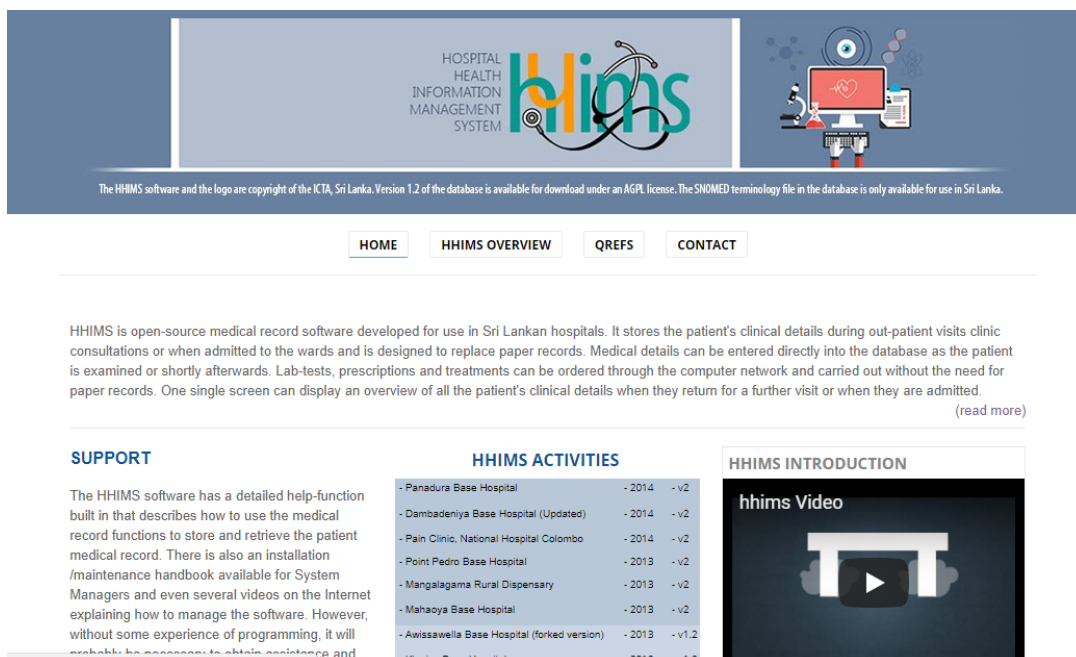
2.4 Analyses requirements

Collecting fact is the act of getting and gathering information from various sources in order to be able to compose the project. Data used for designing of the system were gathered through several means. Therefore, the method used in the design and collections of information from various sources are as follows:

- Studying the current manual system in detail and the organizational style.
- Knowing and understanding the input and output processes of the existing system.
- Held meetings with the manager of the Central Pharmacy to know the equipment needed, and the mode of operation of the old system.
- Make discussions with the current employees in the pharmacy and collect their opinions about the existing system they are working.
- And also discuss with the people who are living in this area about their problems when going to buy something from the pharmacy.
- Collecting and analyzing existing materials on the project topic, written by different experts.
- Analyzing the similar systems through the internet.

2.5 Similar Systems

- HHIMS.org



The HHIMS software and the logo are copyright of the ICTA, Sri Lanka. Version 1.2 of the database is available for download under an AGPL license. The SNOMED terminology file in the database is only available for use in Sri Lanka.

[HOME](#) [HHIMS OVERVIEW](#) [QREFS](#) [CONTACT](#)

HHIMS is open-source medical record software developed for use in Sri Lankan hospitals. It stores the patient's clinical details during out-patient visits clinic consultations or when admitted to the wards and is designed to replace paper records. Medical details can be entered directly into the database as the patient is examined or shortly afterwards. Lab-tests, prescriptions and treatments can be ordered through the computer network and carried out without the need for paper records. One single screen can display an overview of all the patient's clinical details when they return for a further visit or when they are admitted. [\(read more\)](#)

SUPPORT

The HHIMS software has a detailed help-function built in that describes how to use the medical record functions to store and retrieve the patient medical record. There is also an installation /maintenance handbook available for System Managers and even several videos on the Internet explaining how to manage the software. However, without some experience of programming, it will probably be necessary to obtain assistance and

HHIMS ACTIVITIES

- Panadura Base Hospital	- 2014	- v2
- Dambadeniya Base Hospital (Updated)	- 2014	- v2
- Pain Clinic, National Hospital Colombo	- 2014	- v2
- Point Pedro Base Hospital	- 2013	- v2
- Mangalagama Rural Dispensary	- 2013	- v2
- Mahaoya Base Hospital	- 2013	- v2
- Awissawella Base Hospital (forked version)	- 2013	- v1.2
- Kinniya Base Hospital	- 2012	- v1.2

HHIMS INTRODUCTION

hhims Video

Figure 1: hhims.org web site

HHIMS [1] is a Free and Open Source Hospital Health Information Management System designed for use in Sri Lanka government hospitals by ICTA (Information and Communication Technology Agency of Sri Lanka). It includes a patient record system, a

pharmacy management system and a laboratory information system. This system is designed to replace paper records.

There are many functionalities for this system in addition to pharmacy management such as patient management, clinic management, consultation, laboratory information management. This may not suitable for the Central Pharmacy Management System because it contains more additional functionalities like above. PMS for Central pharmacy has been developed for focusing on pharmacy functions management. But also, it has similarities such as drug maintenance, reports, notifications and logs.

- ScriptPro



Figure 2: ScriptPro Healthcare Solutions

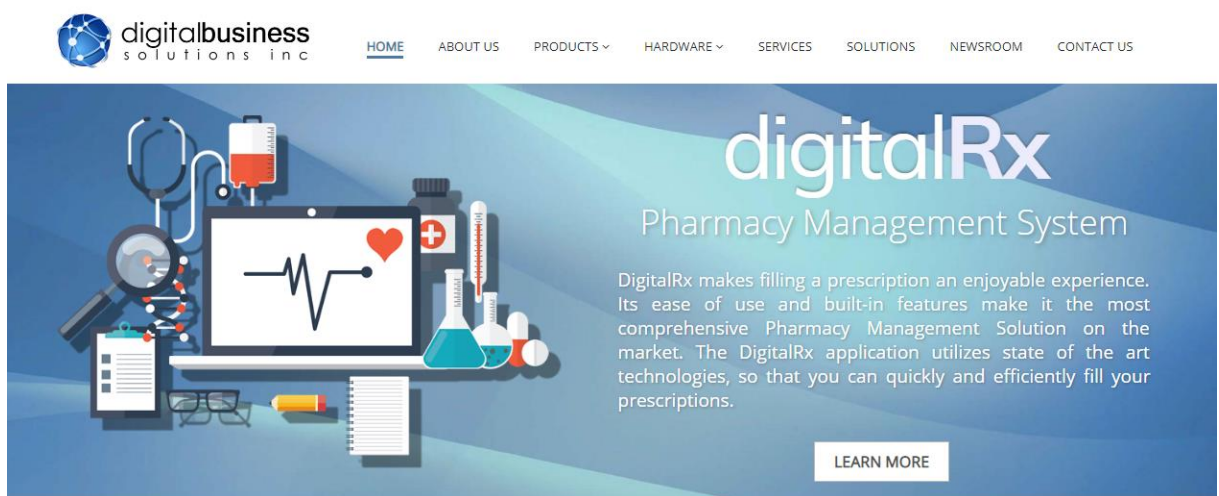
ScriptPro [2] is a technology company founded in 1994. Corporate headquarters are in the Kansas City area. ScriptPro's SP Central Pharmacy Management System allows a pharmacy to process, track, and dispense all prescriptions with the highest level of security, accuracy, and efficiency. Followings are some key features of it:

- Barcode driven workflow tools to manage high volumes of dispensing and promote safety at every step of the dispensing process
- Industry-leading drug database including visual drug verifications to minimize dispensing errors

- Inventory management controls to efficiently manage pharmacy inventory and minimize out-of-stock items
- Pharmacy reporting engine for monitoring financial and key performance indicators

ScriptPro pharmacy management system has some same functionalities with implemented PMS such as stock maintenance, out of stock management, report generating. And it has more additional functions rather than ScriptPro system such as upload prescriptions, search product availability on web, employee management.

- DigitalRX – Pharmacy Management System



COMPLETE PHARMACY MANAGEMENT SOFTWARE

Figure 3: DigitalRX pharmacy management system

It is an online pharmacy management system. The system will pre-load all physicians and drugs databases. It consists of many functionalities like mobile delivery, advanced search, notification system, add/edit prescriber from database, windows-based software, online billing, inventory control/re-order, various reports.

It has so many features to manage pharmacy operation. So, it is not suitable for medium size pharmacy. The implemented software has more additional functionalities such as prescription uploading facility for the customers, search product availability in stores, employee attendance management facility. Online billing facility is not including the implemented system but in the DigitalRX [3] system.

- State Pharmaceuticals Corporation (SPC)

SPC [4] has the facility to search product details such as price, supplier and description for the customers via their website. Implemented PMS also has this feature including quantity available detail too. It's an extra advantage in the PMS for customers to check the availability of a product before coming to the pharmacy. PMS can search product by its name or a product id, SPC system can search product only by name. Various reports can be generated in both systems.

The screenshot shows the website for the State Pharmaceuticals Corporation of Sri Lanka. The header includes the SPC logo and navigation links like 'HOME PAGE', 'ABOUT SPC', 'SPC SERVICES', 'OUR BRANCH NETWORK', 'SPC TEAM', 'MEDIA & GALLERY', 'PRODUCTS', 'TENDERS', 'FINANCE', 'CAREERS', and 'CONTACT US'. A search bar is present with the text 'SPC Product Search'. The main content area features a 'Products' section with a banner image of various medicines and a text box stating: 'We procure and supply drugs to the Health Ministry and to the private sector market through an open competitive tender procedure.' Below this is a table of products.

Item Code	Description	Unit	Supplier	W/S Price in Rs.	Retail Price in Rs.
3100500000	ABSORBENT COT.GAUZE BP 36** 100YDS SLS	100YD	SRIYA	2,450.00	2,820.00
3100600020	ABSORBENT COTTON GAUZE BP 36**6YDS	6YD	SRIYA	180	207
3100200011	ABSORBENT COTTON WOOL 100G	100G	ALIED	140	161
3100300013	ABSORBENT COTTON WOOL 200G	200G	ALIED	212	244
3100100012	ABSORBENT COTTON WOOL 50G	50G	ALIED	80	92
1831211040	ACARBOSE TABS 50MG(GLUCAR)(10X10)-R/S/29/08/1	100T	GMARK	1,500.00	1,725.00

Figure 4: SPC Sri Lanka

Chapter 03: Analysis and Design

3.1 Introduction

System is a collection of an interrelated components that works together to achieve a purpose. System analysis is referred to the systematic examination or detailed study of a system in order to identify problems of the system, and using the information gathered in the analysis stage to recommend improvements or solution to the system. System design is an abstract representation of a system component and their relationship and which describe the aggregated functionality and performance of the system. System design is also the overall plan or blueprint for how to obtain answer to the question being asked. The design specifies which of the various type of approach.

3.2 Analysis of Existing System

Before analyses the design of the proposed system, need to carefully highlight the problems of the existing system so as to avoid recurrence. This analysis serves as a pointer on how to embark on building the proposed system. The problems of the current system should be outlined.

Followings are some of the problems associated with the existing system;

- Significant amount of time is allocated for writing the order as the pharmacist needs to go through the stock balance and make rough estimate for the amount to order based on Figures.
- The state of drugs in stock is manually checked.
- Mistake of selling expired drugs to customers.
- Too much workload on employees
- Filing cabinet in the pharmacy with paper record.
- Employee records are handled manually by the manager.
- Billing function is done manually, so the probability of occurring errors is high.

3.3 Analysis of Proposed System

The proposed system shall focus on;

- Users of the system having access to the proposed system.
- Can control user operations. (Different permissions for different users)
- Ensuring effective policing by providing statistics of the drugs in stock.
- Improving the efficiency of the system by ensuring effective monitoring of services and activities.
- Generating report according to a purpose.
- Download reports as PDF or Excel type.
- Reducing the employees' workload.
- Efficiently handle the billing system.
- Convenience of recording employee details in an efficient manner.
- Customer can search stock available details of particular product.
- Customer can upload prescription to the system after registering only.

3.4 Requirements Definition

Preliminary investigation plays an important role in developing a satisfactory requirement. Its' as a result of thorough investigation of how the current or the

existing system works using the facts gathered at the preliminary investigation that leads to focusing on the possibility of replacing the existing system or improving upon the existing system. This task involves information gathering.

3.4.1 Functional requirements

Generate reports:

The pharmacy management system generates reports according to the purpose.

- Report on Medicines, products, companies, sells, inventory according to the time period, weekly, monthly, annually
- Income of the pharmacy (daily, monthly, annual)
- Employee details
- Attendance of every employees
- The reports can be downloaded as a Pdf or Excel file.

Store the necessary information of the products:

The PMS (Pharmacy Management System), stores the detail information about each product including the medicine. Since the information for each drug were required in some cases like the use of drugs, when use drugs and for whom is given.

User can import data to the database by using an excel or csv file. It is an additional advantage for the users, because it helps to insert large number of records at once to a table. Then time and effort of the user may save.

Searching facility:

This facility is provided for all including the customers. The PMS has easily searching of product, the behavior of the medicine, quantity remain etc. The searching process is based on the name of the given data or the “id” of the item.

Billing facility:

In this system, automated billing facility is provided. It can calculate total price automatically when entering the quantity of the product and “id”. It’s very accurate rather than manual calculations.

Upload prescription:

The customer can upload a prescription after register with the system. He can view his prescription status by logging to his profile. It will help to reduce waiting times in queues.

3.4.2 Non-Functional requirements

Portability:

Portability specifies the ease with which the software can be installed on all necessary platforms, and the platforms on which it is expected to run.

Reliability:

Reliability specifies the capability of the software to maintain its performance over time. Unreliable software fails frequently, and certain tasks are more sensitive to failure (for example, because they cannot be restarted, or because they must be run at a certain time).

Availability:

A system's availability, or "uptime," is the amount of time that it is operational and available for use. This is specified because some systems are designed with expected downtime for activities like database upgrades and backups.

Robustness:

A robust system is able to handle error conditions gracefully, without failure. This includes a tolerance of invalid data, software defects, and unexpected operating conditions.

Scalability:

Software that is scalable has the ability to handle a wide variety of system configuration sizes. The nonfunctional requirements should specify the ways in which the system may be expected to scale up (by increasing hardware capacity, adding machines, etc.).

Usability:

Ease-of-use requirements address the factors that constitute the capacity of the software to be understood, learned, and used by its intended users.

Efficiency:

Specifies how well the software utilizes scarce resources: CPU cycles, disk space, memory, bandwidth, etc.

3.5 System Design

System design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements through system modeling. One could see it as the application of systems theory to produce development. The design of the system should be user friendly. It is designed in such a way that employees will be able to navigate easily through the information supplied on the system. In other words, system design consists of design activities that produce system specifications satisfying the functional requirements that were developed in the system analysis process. System design specifies how the system will accomplish. System design is the structural implementation of the system analysis.

3.6 System Modelling

During the system requirements and design activity, systems may be modelled as a set of components and relationships between these components. These are normally illustrated graphically in a system architecture model that gives the reader an overview of the system organization. System modelling helps to give more detailed system specifications which are in form of graphical representations that can describe problem to be solved or the system that is to be developed. Because of the graphical representations used, models are often more understandable than detailed natural language description of the system requirements.

3.6.1 Data Flow Diagram

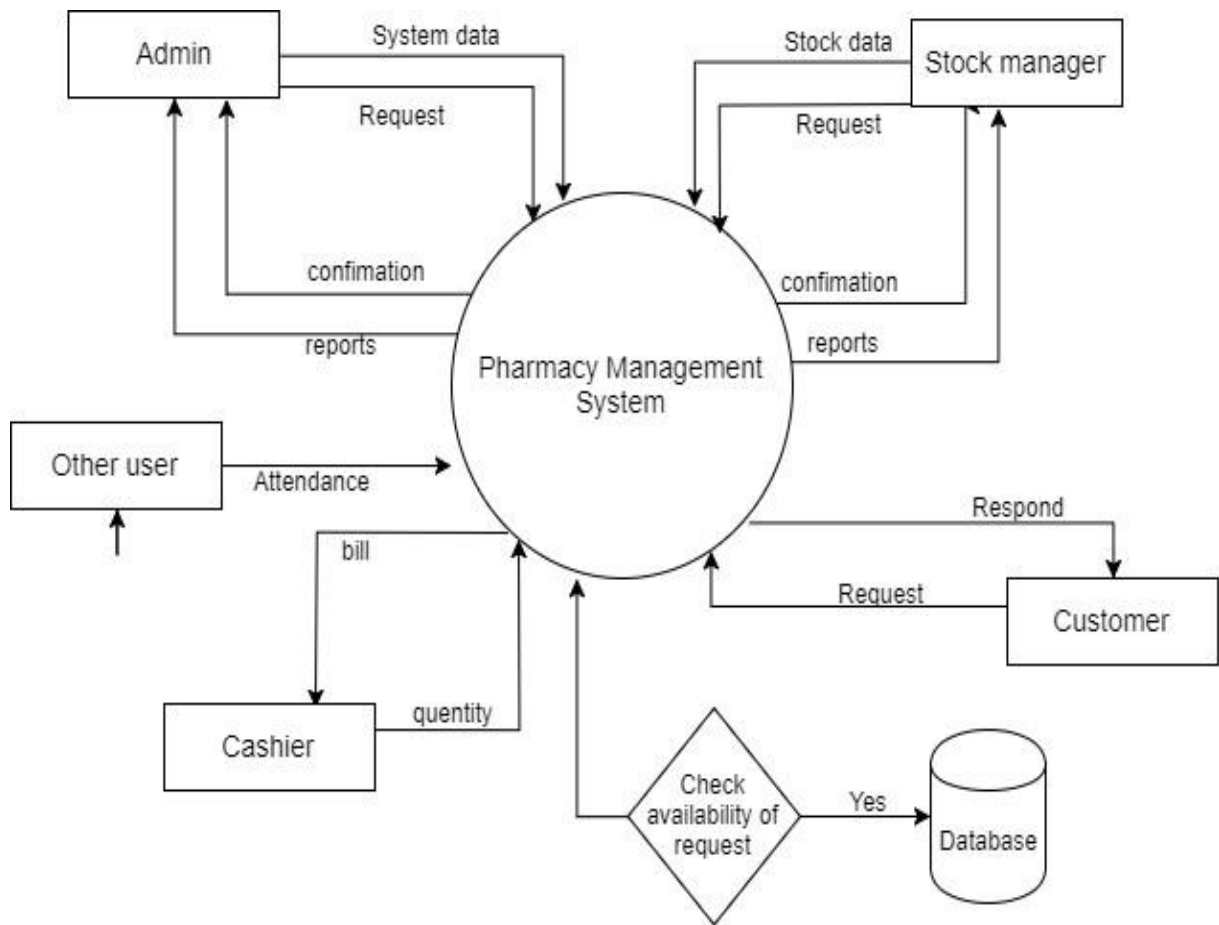


Figure 5: Data Flow Diagram (3.6.1)

3.6.2 Use Case Diagram

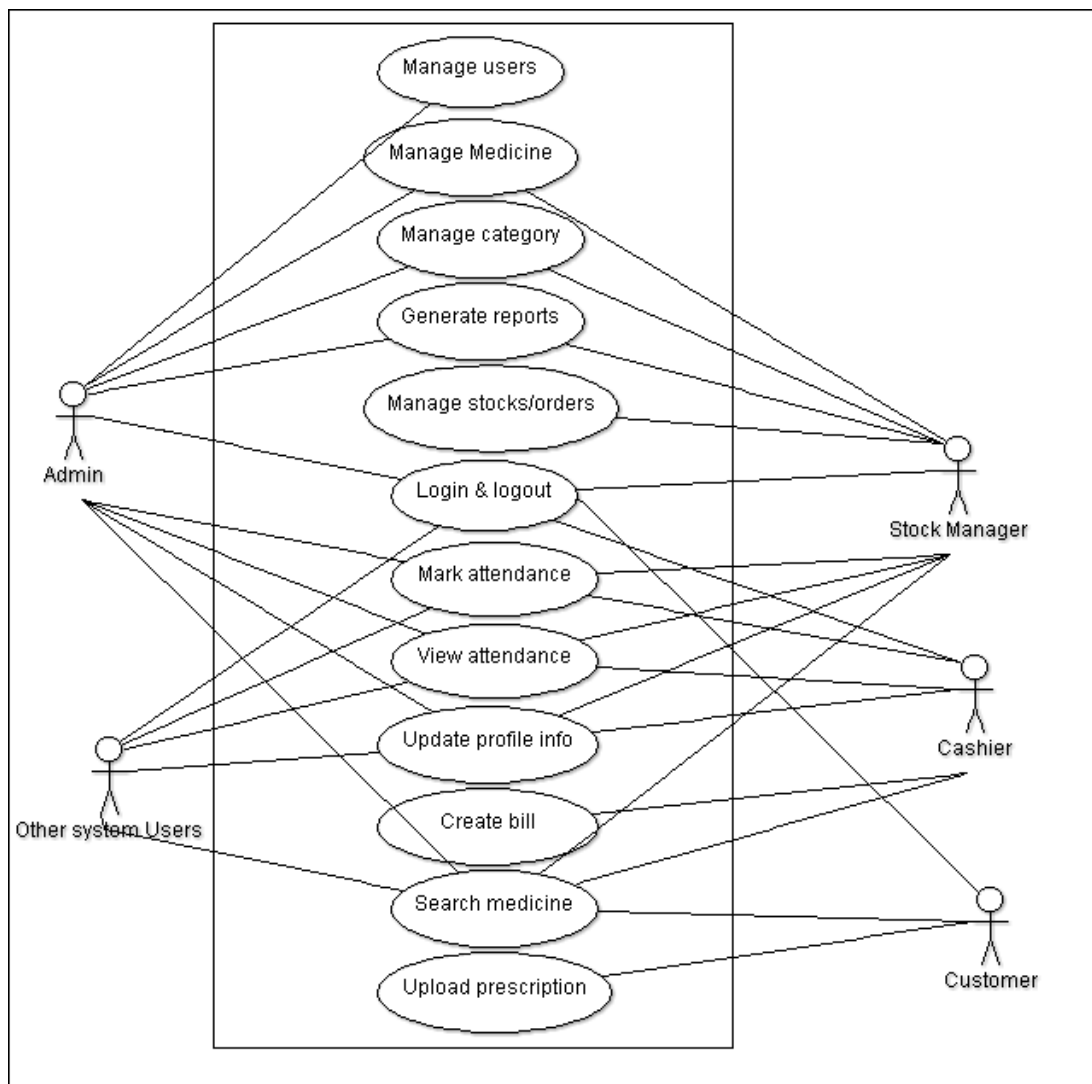


Figure 6: Use case diagram (3.6.2)

3.6.3 Use Case Narratives

Followings are the use case narratives for use cases in the system. (Appendix B)

Table 1: Use case narrative for Manage Users

Use Case ID	UID01
Name	Manage Users
Actors	Admin
Description	Administrator can create new user, delete user or update user details via 'User Management' interface
Pre-Conditions	Login as administrator
Successful Completion	<ol style="list-style-type: none"> 1. Login to the system 2. Go to User Management in side navigation 3. Then go to Users 4. System will display user detail table 5. Select the relevant action (create, edit, delete user) 6. System will show the relevant form. 7. Fill the required fields 8. Click submit button 9. If success action, system will not show error message
Alternatives	8 a) If the form submits with empty field it is shown error message
Post-Conditions	Information will be saved to the database

Table 2: Use case narrative for Manage Products

Use Case ID	UID02
Name	Manage Products
Actors	Admin, Data Entry Operator
Description	Administrator and data entry operator can create new product, delete product or update product details via 'Product Management' interface
Pre-Conditions	Login as administrator or Operator
Successful Completion	<ol style="list-style-type: none"> 1. Login to the system 2. Go to Product Management in side navigation

	<ol style="list-style-type: none"> 3. Then go to Product 4. System will display product detail table 5. Select the relevant action (create, edit, delete product) 6. System will show the relevant form. 7. Fill the required fields 8. Click submit button 9. If success action, system will not show error message
Alternatives	8 a) If the form submits with empty field it is shown error message
Post-Conditions	Information will be saved to the database

Table 3: Use case narrative for Manage Product Order

Use Case ID	UID03
Name	Manage Product Order
Actors	Admin, Data Entry Operator
Description	Administrator and data entry operator can create, delete or update product_order details via 'Product Order Management' interface
Pre-Conditions	Login as administrator or Operator
Successful Completion	<ol style="list-style-type: none"> 1. Login to the system 2. Go to Product Management in side navigation 3. Then go to Product Orders 4. System will display product order detail table 5. Select the relevant action (create, edit, delete product order) 6. System will show the relevant form. 7. Fill the required fields 8. Click submit button 9. If success action, system will not show error message
Alternatives	8 a) If the form order submits with empty field it is shown error message

3.6.4 Activity Diagrams

Activity diagram of Admin

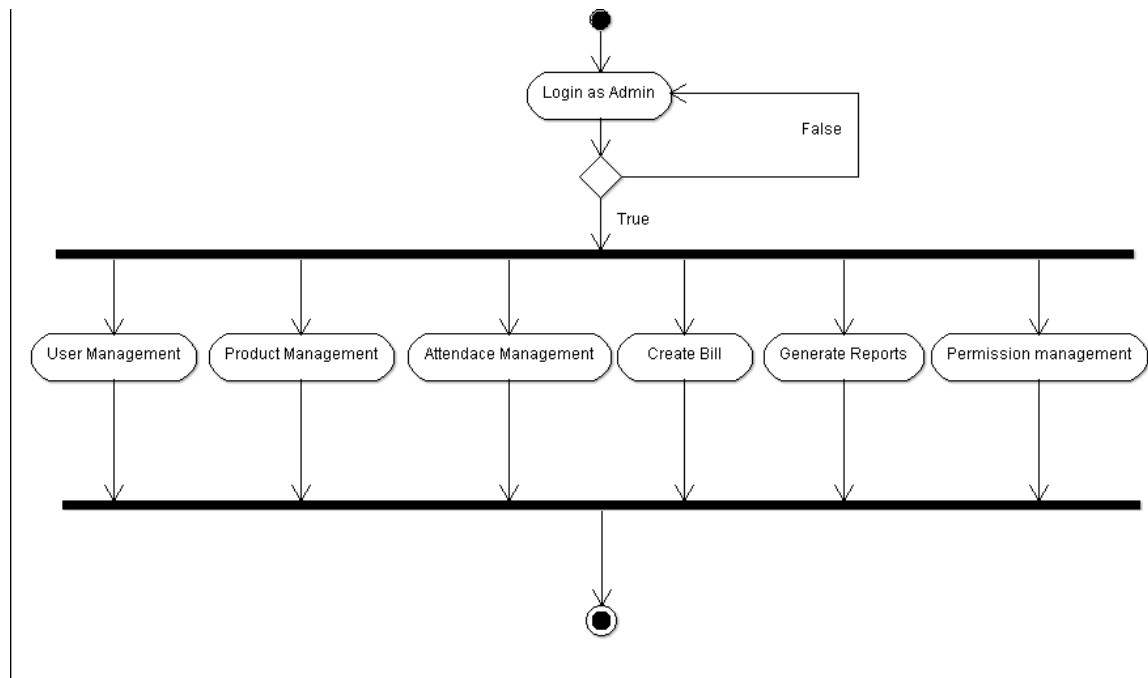


Figure 7: Activity diagram of Admin

Activity diagram of the Cashier

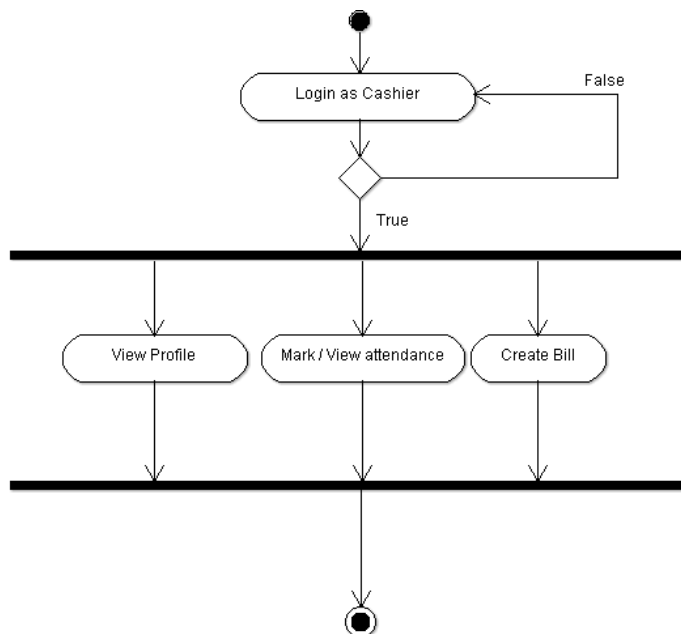


Figure 8; Activity diagram of the Cashier

Activity diagram of Data operator

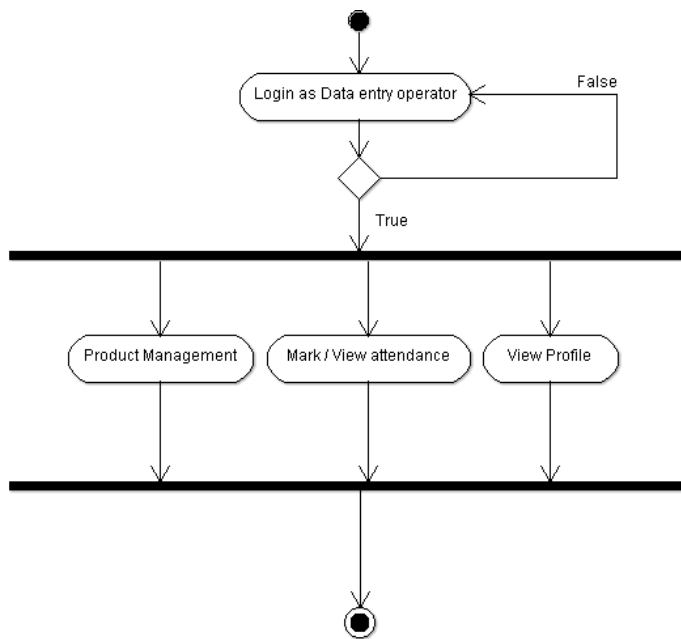


Figure 9: Activity diagram of operator

Activity diagram of Employee

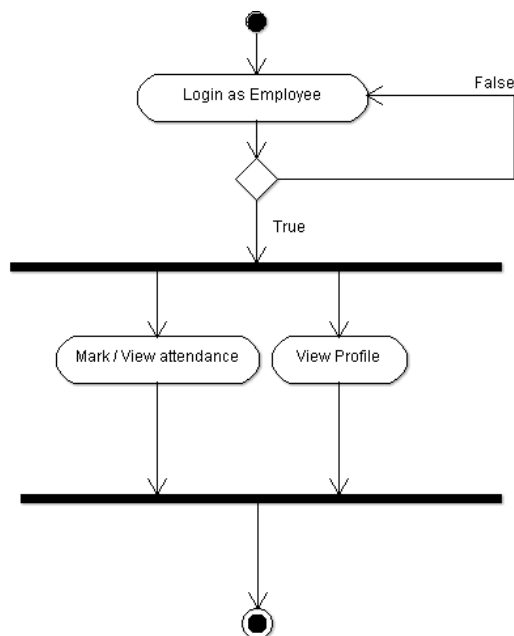


Figure 10: Activity diagram of Employee

3.6.5 Entity Diagram

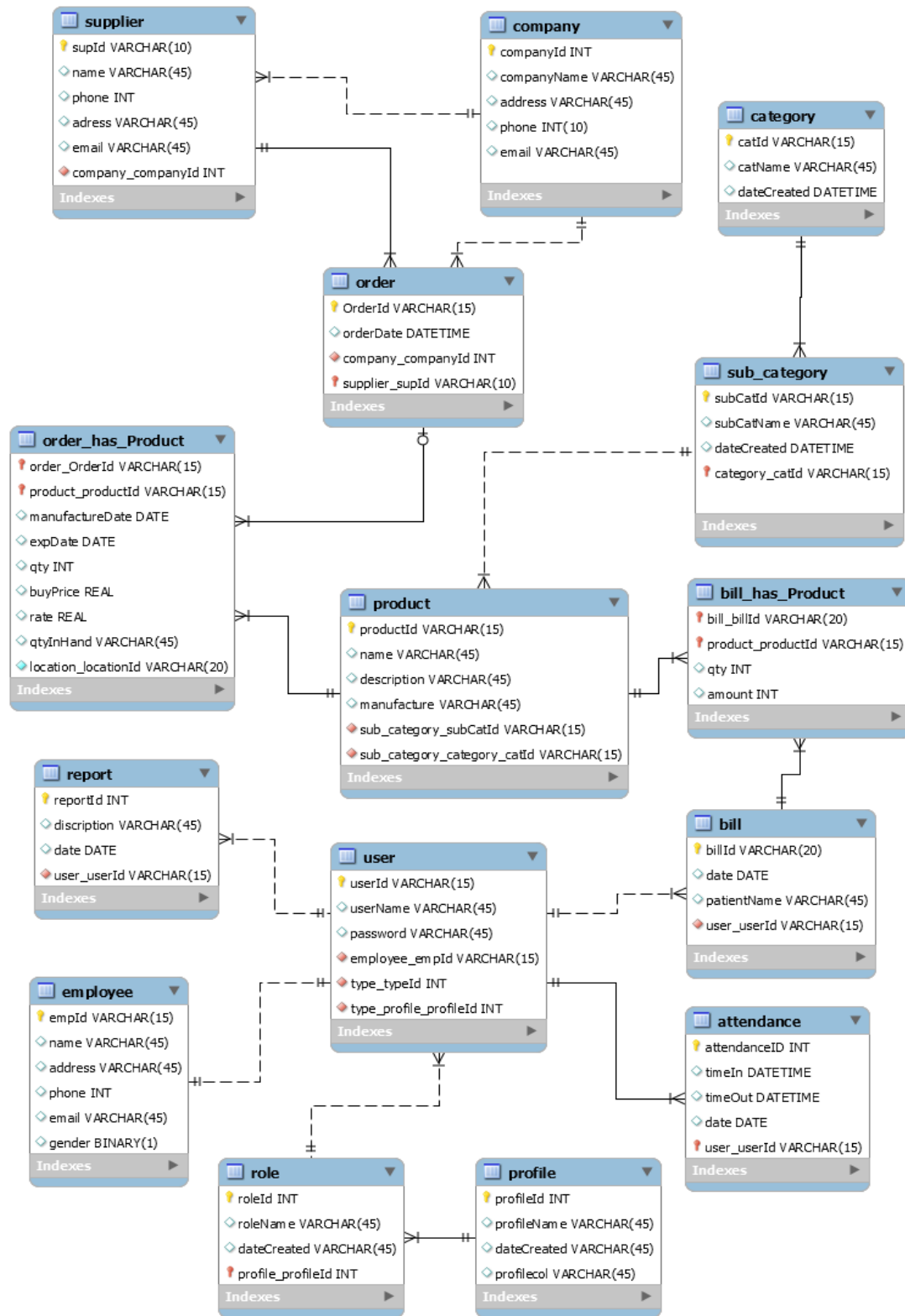


Figure 11: Entity diagram (3.7.4)

Chapter 04: Implementation

4.1 Introduction

This chapter focuses on the implementation part of the Pharmacy management system. The act of transforming the detailed design which mentioned in the design chapter, into a valid program in some programming language, together with all its supporting activities is referred to as implementation. The ultimate goal of most software projects is to produce a working program. There are some challenges faced by the developers while implementing the software.

4.2 Implementation Challenges

Code-reuse: Programming interfaces of present-day languages are very sophisticated and are equipped huge library functions. Still, to bring the cost down of end product, the organization management prefers to re-use the code, which was created earlier for some other software. There are huge issues faced by programmers for compatibility checks and deciding how much code to re-use.

Version Management: Every time a new software is issued to the customer, developers have to maintain version and configuration related documentation. This documentation needs to be highly accurate and available on time.

Target-Host: The software program, which is being developed in the organization, needs to be designed for host machines at the customers end. But at times, it is impossible to design a software that works on the target machines.

4.3 Implementation methodology

For implement of this project I have used waterfall method which is a sequential model, used to create different kinds of software, where project development is seen as flowing steadily downwards (like a waterfall) through the phases of software development requirements analysis, UI design, software implementation, project verification, and software maintenance.

4.3.1 The waterfall method

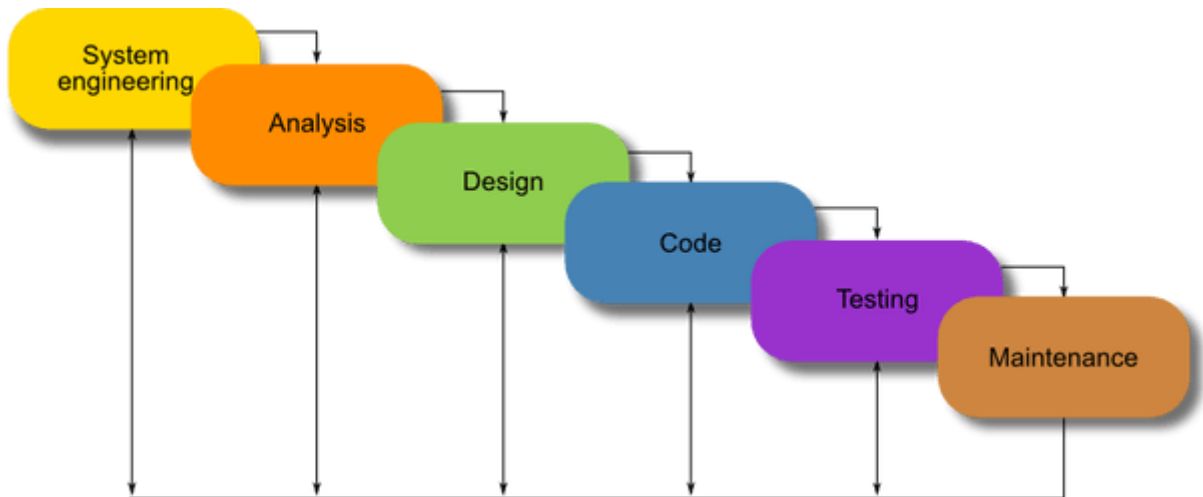


Figure 12: Waterfall method (4.3.1)

The diagram above is a system development life cycle that illustrates how the design of the project is broken down into five different phases, which are Project Planning, Requirement Gathering, Project Implementation and Interface Design, Implementation and System Testing, Maintenance and System Upgrading. The proposed Pharmacy Management System for The Central Pharmacy starts with project planning by determining the users of the system, aims and objectives of the project. After these, extensive research has done to determine how to design an effective system, as well as to review the current system. Then, the design is with an initial prototype of the system, and then refined it based on their suggestions. Phases of analysis, design and implementation are performed iteratively until users and designers agreed on a final system specification. At this point, the project could move to the final implementation phase.

4.4 Technology used

4.4.1 PHP (version 7 or above)

PHP is a powerful server – side scripting language designed for creating dynamic and interactive websites. It is perfectly suited for web development and can be embedded directly into the HTML code. It can be deployed on most web servers and on almost every operating system and platform free of charge.

Server support

PHP generally runs on a web server like apache.

Database support

PHP supports many databases like MySQL, Oracle, Solid, PostgreSQL, etc. Most popular used is MySQL.

4.4.2 Laravel Framework (5.5)

Laravel is a free, open-source PHP web framework, created by Taylor Otwell and intended for the development of web applications following the ‘model–view–controller’ (MVC) architectural pattern. Laravel framework is powered with many out of the box features including view templating, built in authentication, routing, database access, file management, caching, etc. [5]

4.4.2.1 MVC architecture

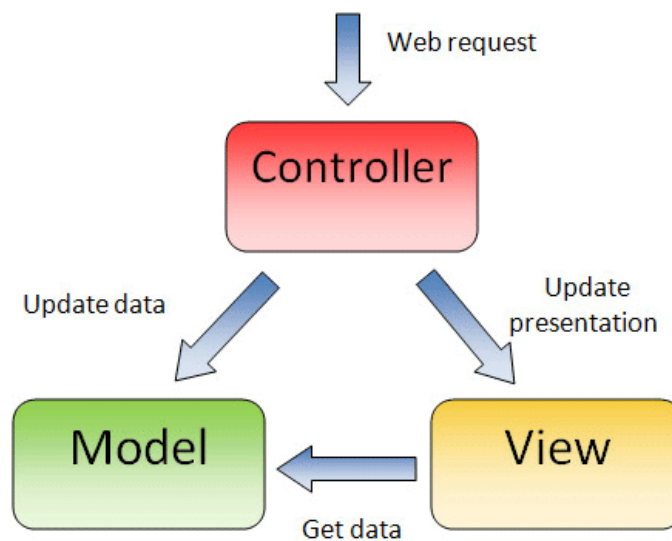


Figure 13: MVC architecture (4.4.2.1)

MVC represents Model, View, Controller. This methodology typically splits the architecture of the website into 3 distinct parts which are kept operationally separate but interact with each other to deliver all aspects of the website and the administration system. The main aim of the MVC architecture is to separate the business logic and application data from the presentation data to the user. Adhering to MVC architecture benefits you in attaining a perfect design for an enterprise web application.

The Model

The model is responsible for managing the data of the application. It responds to the request from the view and it also responds to instructions from the controller to update itself.

The View

It means presentation of data in a particular format, triggered by a controller's decision to present the data. They are script-based templating systems like JSP, ASP, PHP and very easy to integrate with AJAX technology.

The Controller

The controller is responsible for responding to the user input and perform interactions on the data model objects. The controller receives the input, it validates the input and then performs the business operation that modifies the state of the data model.

4.4.2.2 Laravel Features

Database Access

Database migrations enable you to easily design and modify a database in a platform-independent way. The migrations can then be run against any of the database types that Laravel supports (MySQL, PostgreSQL, MSSQL, and SQLite). Laravel's Active Record implementation is called Eloquent. Interacting with a database in an object-oriented way is the modern standard. With Eloquent, we can create, retrieve, update, and delete the database records without needing to write a single line of SQL. In addition to this, Eloquent provides powerful relationship management and it can even handle pagination automatically.

Command Line Tool

Laravel also ships with a command-line interface tool called Artisan. With Artisan, a developer can interact with their application to trigger actions such as running database migrations, executing unit tests, and schedule a job. Another beauty of Artisan is that, it is completely extensible so that can add a new command to perform any type of functionality that we'd like.

Routing

Laravel allows to organize all website URLs through routers. If we want to change the link of some website or API, we need to change it at one file and the website should work as expected.

View Template Engine

The Blade templating engine cleans up views by providing aesthetically pleasing replacements for inline PHP and by including powerful new features.

Job Scheduling

Introduced in Laravel 5.0, is an addition to the Artisan that allows programmatic scheduling of periodically executed tasks. Internally, Scheduler relies on the cron daemon to run a single Artisan job that, in turn, executes the configured tasks.

File System

There is a file system abstraction layer that allows local file systems and cloud-based storage services provided by Amazon S3 and Rackspace Cloud to be used transparently and in the same way.

4.4.3 HTML

Hypertext Markup Language (HTML) is the standard markup language for creating web pages and web applications.

HTML consists of a series of short codes typed into a text-file by the site author — these are the tags. The text is then saved as a html file, and viewed through a browser, like Internet Explorer or Netscape Navigator. This browser reads the file and translates the text into a visible form, hopefully rendering the page as the author had intended. Writing your own HTML entails using tags correctly to create your vision. You can use anything from a rudimentary text-editor to a powerful graphical editor to create HTML pages.

The purpose of web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page.

4.4.4 Java Script

“JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.”

4.4.5 CSS

“Cascading Style Sheets, fondly referred to as CSS, is a simple design language intended to simplify the process of making web pages presentable.

CSS handles the look and feel part of a web page. Using CSS, you can control the color of the text, the style of fonts, the spacing between paragraphs, how columns are sized and laid out, what background images or colors are used, layout designs, variations in display for different devices and screen sizes as well as a variety of other effects.”

4.4.6 MySQL

“MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). SQL is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use.”

Reasons for use MySQL,

- MySQL is released under an open-source license. So, you have nothing to pay to use it.
- MySQL is a very powerful program in its own right. It handles a large subset of the functionality of the most expensive and powerful database packages.
- MySQL uses a standard form of the well-known SQL data language.
- MySQL works on many operating systems and with many languages including PHP, PERL, C, C++, JAVA, etc.
- MySQL works very quickly and works well even with large data sets.
- MySQL is very friendly to PHP, the most appreciated language for web development.
- MySQL supports large databases, up to 50 million rows or more in a table. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes (TB).
- MySQL is customizable. The open-source GPL license allows programmers to modify the MySQL software to fit their own specific environments.

4.4.7 Bootstrap (version 4)

“Bootstrap is an open source toolkit for developing with HTML, CSS, and JS. Quickly prototype your ideas or build your entire app with our Sass variables and mixins, responsive grid system, extensive prebuilt components, and powerful plugins built on jQuery.”

4.5 Interface Design

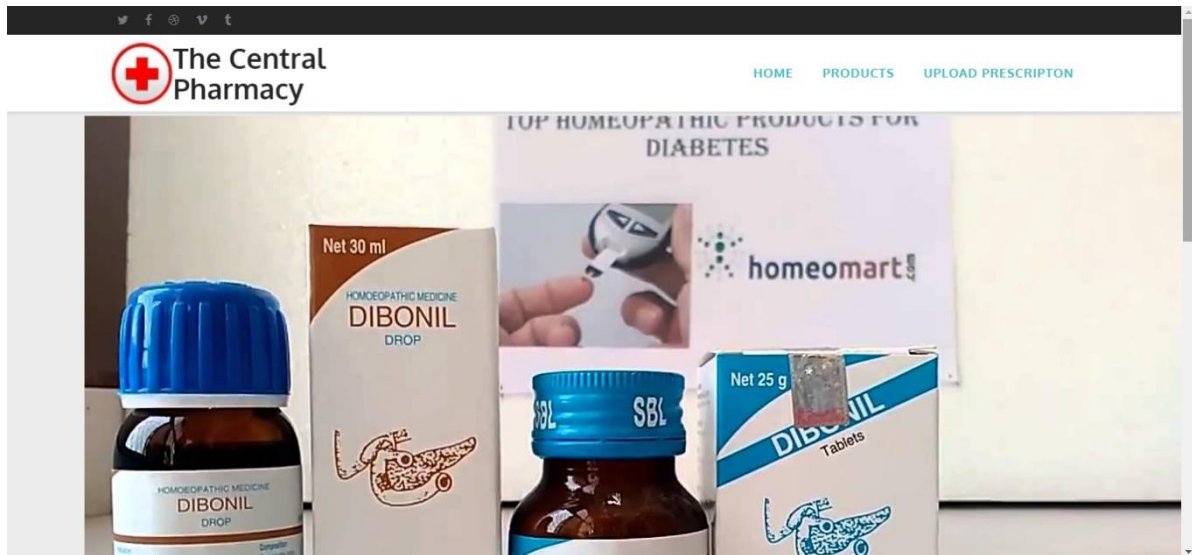


Figure 14: Home page

Customer can search products in the pharmacy by using the given search bar in “Home/ Product”

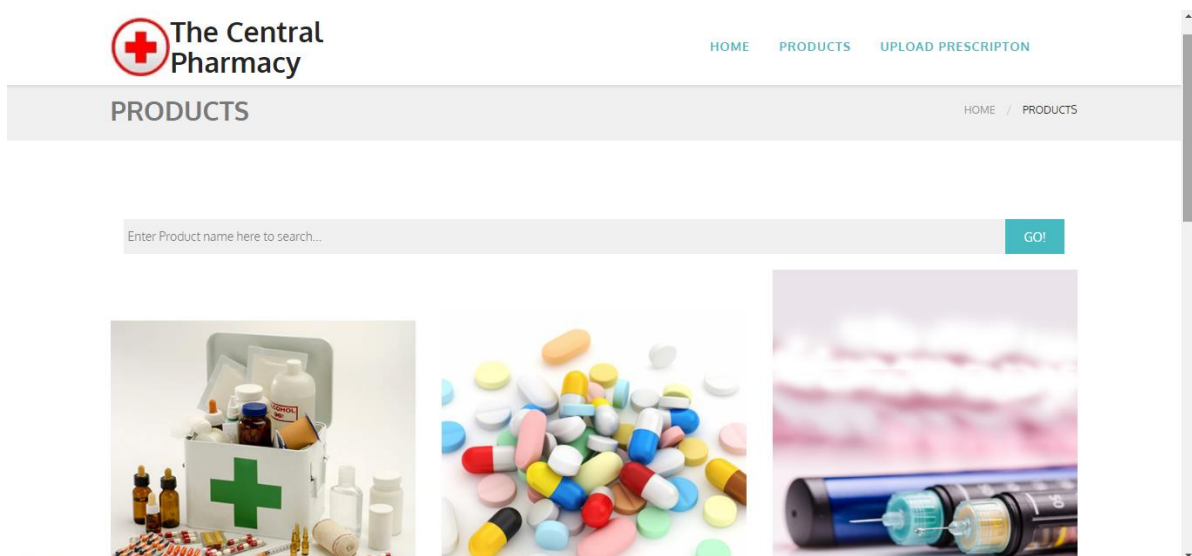


Figure 15: Product tab

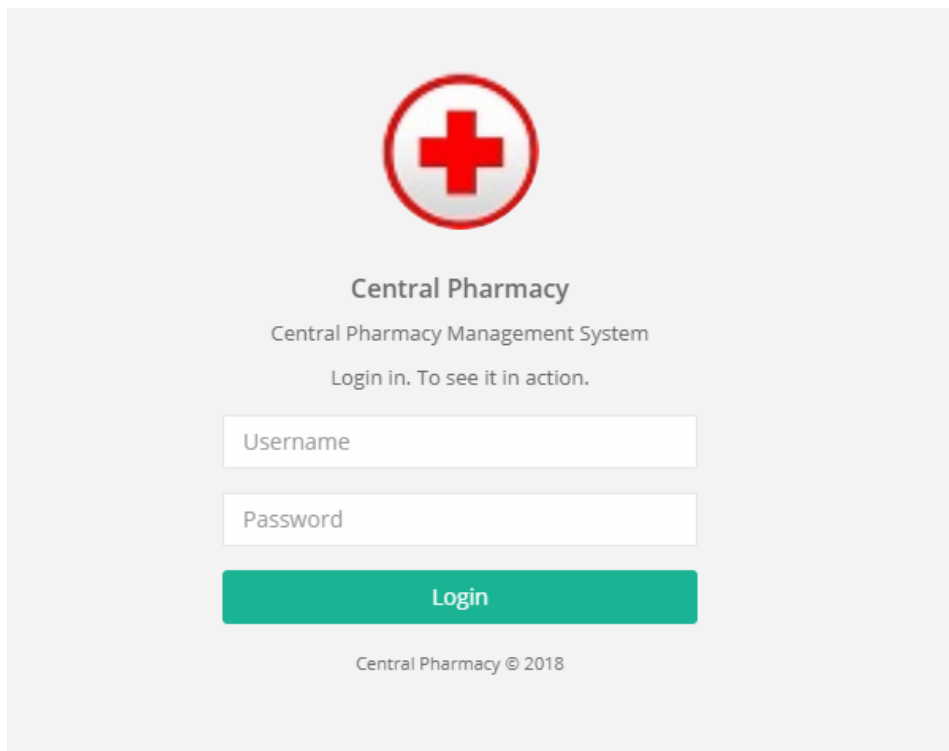


Figure 16: System login – Pharmacy staff

The system mainly has four user roles.

- Administrator
- Cashier
- Data entry operator
- Other employee

Admin can handle user permissions. System accessibility is changed according to their user role. They are given different user names and passwords to log in to the system.

Other than that, the customer has another login.

(See Appendix C)

Chapter 05: Testing and Evaluation

5.1 Introduction

Software testing is a process that ensures the quality of the product to its stakeholders with information about the quality of the product or service under test.

The testing process has two goals

- To demonstrate to the developer and the customer that the software meets its requirements.
- To discover situations in which the behavior of the software is incorrect, undesirable, or does not conform to its specification.

5.2 Testing stages

5.2.1 Unit testing

This is a type of testing which is done by software developers in which the smallest testable module of an application - like functions, procedures or interfaces - are tested to ascertain if they are fit to use.

5.2.2 Integration testing

This involves testing how well the various modules and components are integrated within the developed software. The integration is checked both ways that is top-down as well as bottom-up, so as to bring out the design, construction and architectural defects in the software. It's at this stage that most of the basic design flaws of the software will become obvious. The various interfaces will also be tested for defects at this stage.

5.2.3 Sub-System and System Testing

This stage focuses on validating and analyzing that the software and all its sub-systems comply with the requirements as specified by the client. It's at this stage the software is tested as a whole.

5.3 Test Plan

The software test plan is designed to prescribe the scope, approach, resources and schedule of testing activities. The plan identifies items to be tested, features to be tested, the types of testing to be performed and schedule required to complete testing.

5.3.1 Process of test plan

- Identify the requirements to be tested.
- Identify the expected results for each test.
- Perform the test.
- Note down the test data, test cases used during the testing process.

Table 4: Test plan

Test Area	Test Cases	Status
1. Login	Login01	True
	Login02	True
	Login03	True
	Login04	True
2. Add Category details	Category01	True
	Category02	True
3. Add Subcategory details	Subcategory01	True
	Subcategory02	True
4. Add Employee details	Employee01	True
	Employee02	True
5. Add Order details	Order01	True
	Order02	True

6. Notification	Notification01	True
7. Customer Search	CustomerSearch01	True
	CustomerSearch02	True
8. Search	Search01	True
	Search02	True
9. Upload Prescription	UploadPrescription01	True
	UploadPrescription02	True
10. Bill	Bill01	True
11. Upload Excel/Csv sheet	Excel01	True
	Excel02	True
	Excel03	True
	Excel04	True

5.4 Test Cases

(See Appendix E)

5.5 Evaluation

Evaluation is a process that critically examines a programme. It involves collecting and analyzing information about a program's activities, characteristics and outcomes. Its purpose is to make judgments about a programme, to improve its effectiveness, and/or to inform programming decisions (Patton, 1987).

5.6 Evaluation plan

To have a successful evaluation of the project, it is essential to apply correct methodology. There are several methods of perform an evaluation. For this project I have used a questioner to gather user evaluation of this system. The system has two types of basic users, customers and

the pharmacy staff members. The system was demonstrated to the system users and their feedback was gathered using the following questionnaire. This questionnaire is focused on few key areas, concept, performance, functionality, interfaces and usefulness of the system.

(The questionnaire – Appendix G)

5.7 Evaluation Report

Analysis of Q1 to Q4.

Idea of manually handled system on point of customers view.

Result - It's very clearly shown that the customers do not have good intention of manually handled system.

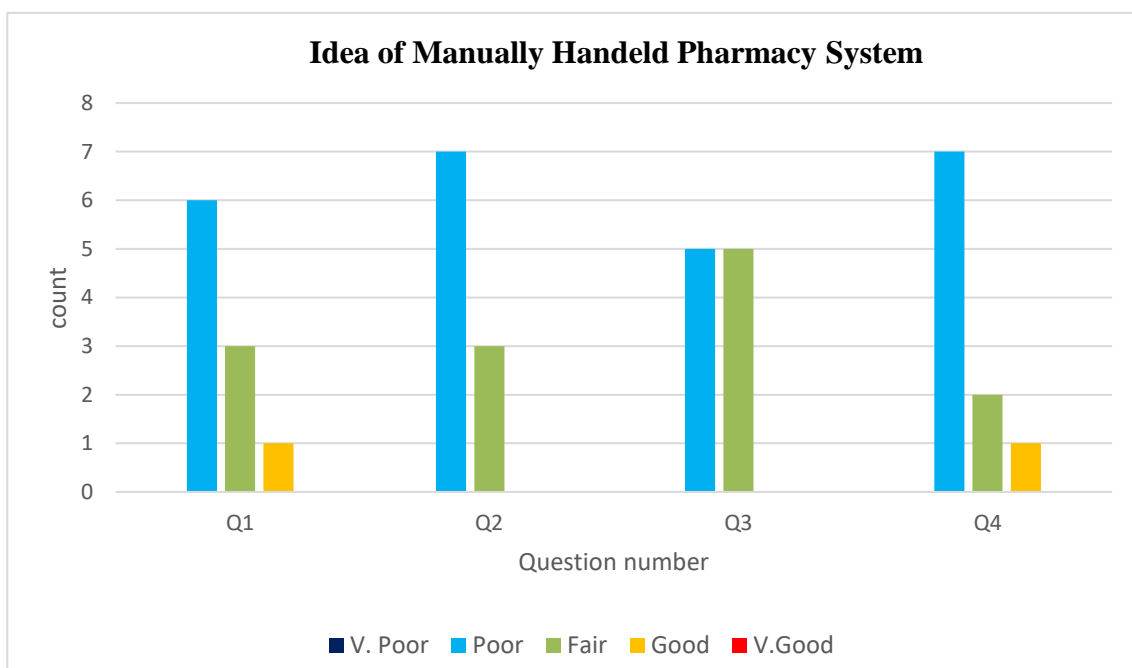


Figure 17: Idea of Manual Pharmacy System

Analysis of Q05 & Q06.

Idea of the computerized pharmacy management system.

Result - Most of them like to have a computerize PMS.

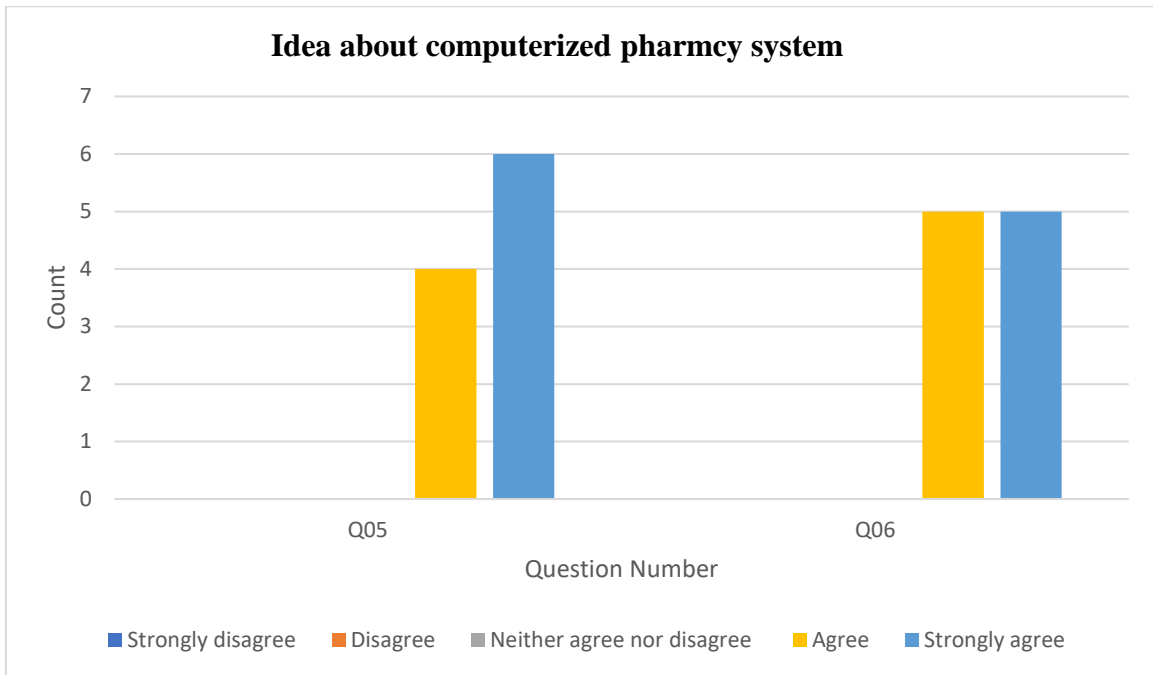


Figure 18: Idea of computerized pharmacy system

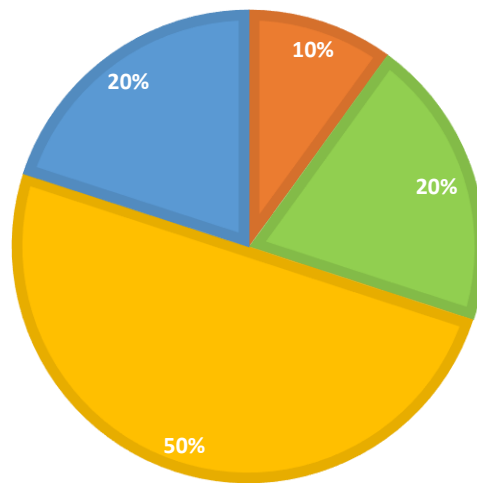
Analysis of Q07

Result - Computer knowledge of the system users is positive.

Table 5: Results of Q07

	Count
Never	0
Seldom	1
2 to 4 times a month	2
Weekly	5
Daily	2
Total	10

How Often Do The Pharmacy Employees Use The Computer?



■ Never ■ Seldom ■ 2 to 4 times a month ■ Weekly ■ Daily

Figure 19: Computer ability of users

Computer ability of employees according to their age.

Result – The age of using computer mostly is 20 -40.

Table 6: Computer ability according to age

	20 - 30	31 - 40	41 - 50	51 - 60	Total
Never					0
Seldom				1	1
2 to 4 times a month		1	1		2
Weekly	3	2			5
Daily		1	1		2
Total	3	4	2	1	10

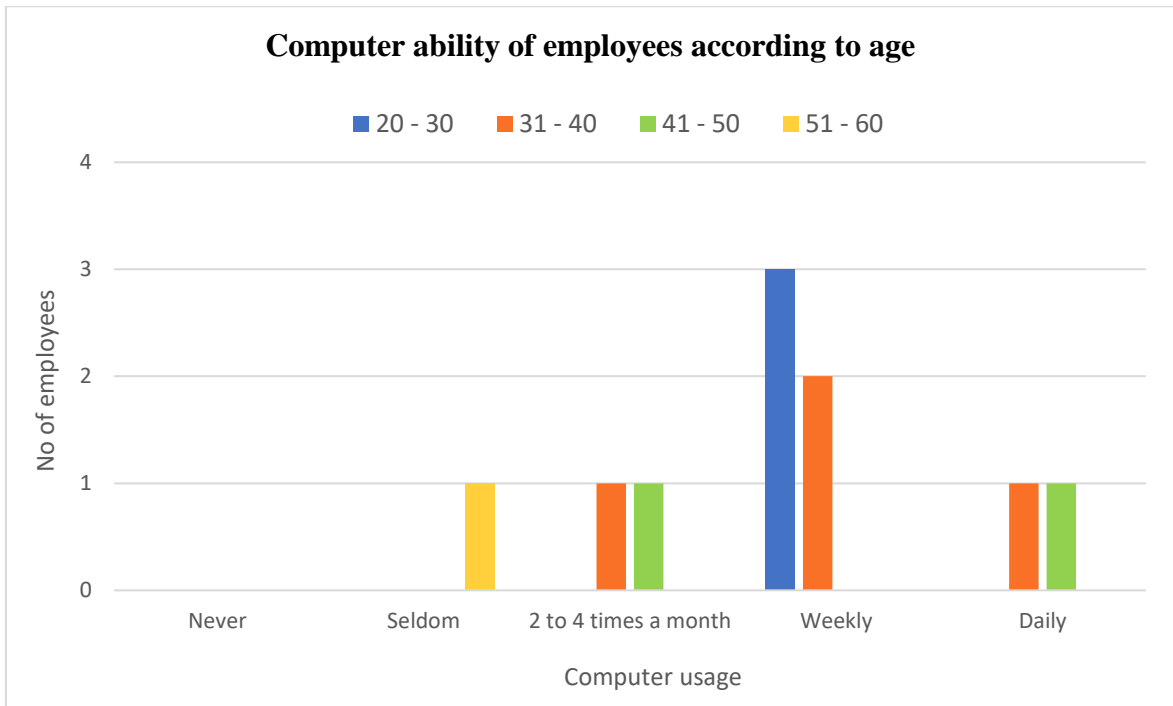


Figure 20: Computer ability according to age

How often do the pharmacy employees use the Internet?

Result –Everybody use the internet at least one time. Most people use the it daily or weekly. There is one seldom user here.

Table 7: Ability of use Internet

	Count
Never	0
Seldom	1
2 to 4 times a month	0
Weekly	4
Daily	5

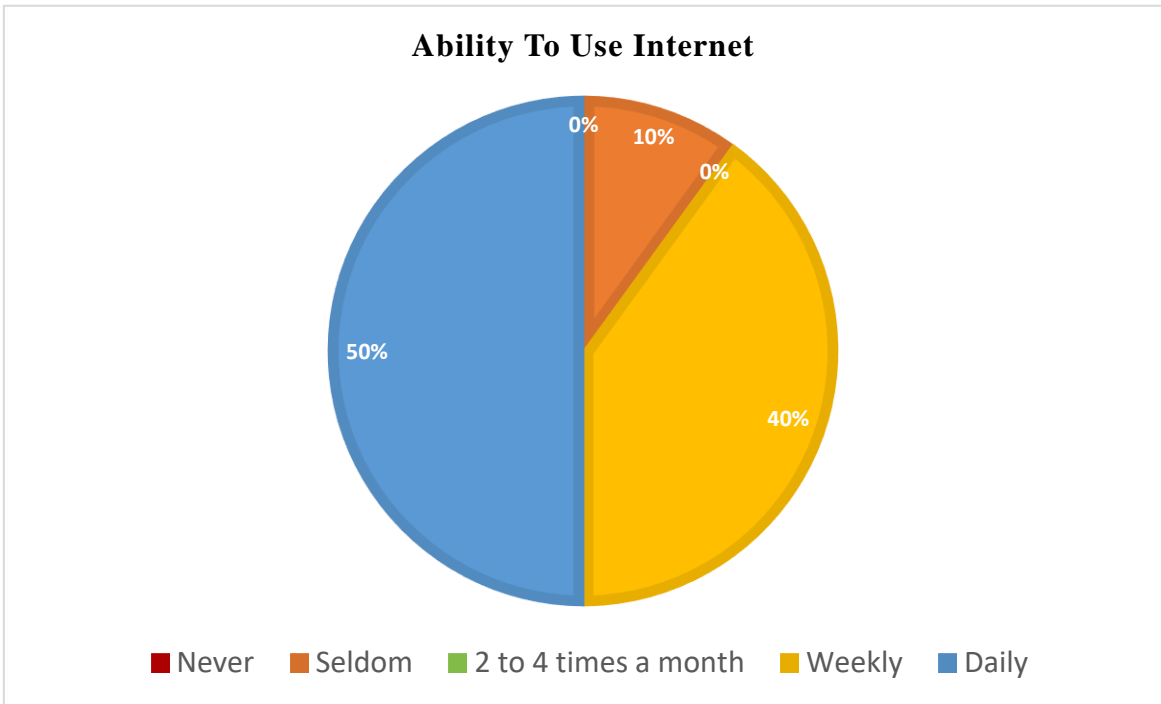


Figure 21: Ability of use Internet

Keyboard typing ability of pharmacy employees?

Result – Most of them have good typing ability. No one is bad for use key board.

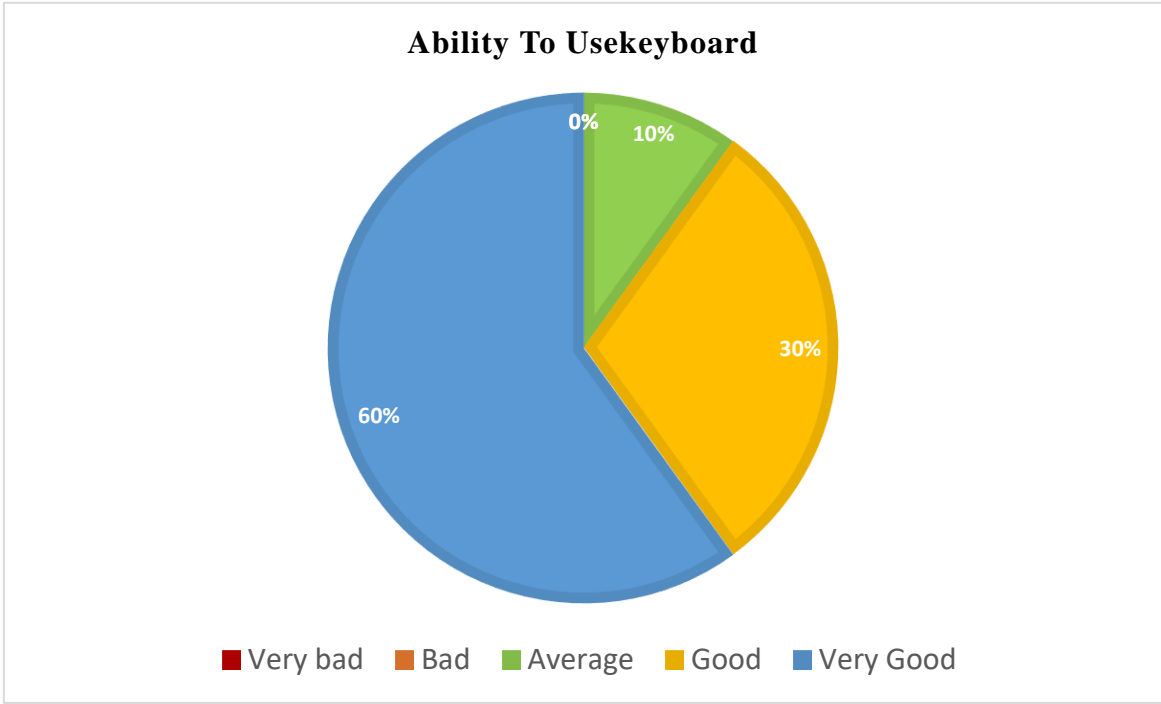


Figure 22: Typing ability

Hardware knowledge of employees.

Result -Overall knowledge of computer hardware is good of the employees.

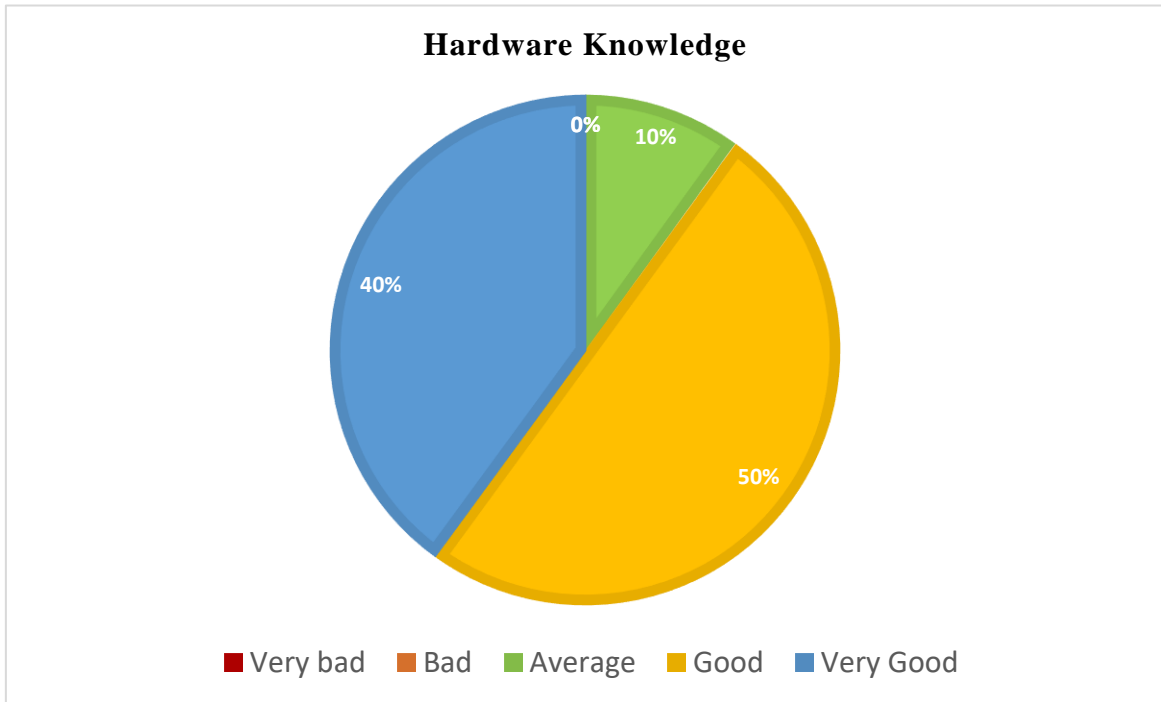


Figure 23: Hardware of knowledge

Analysis of Q11 to Q20 about the system.

Result – Overall feedback of the system is good.

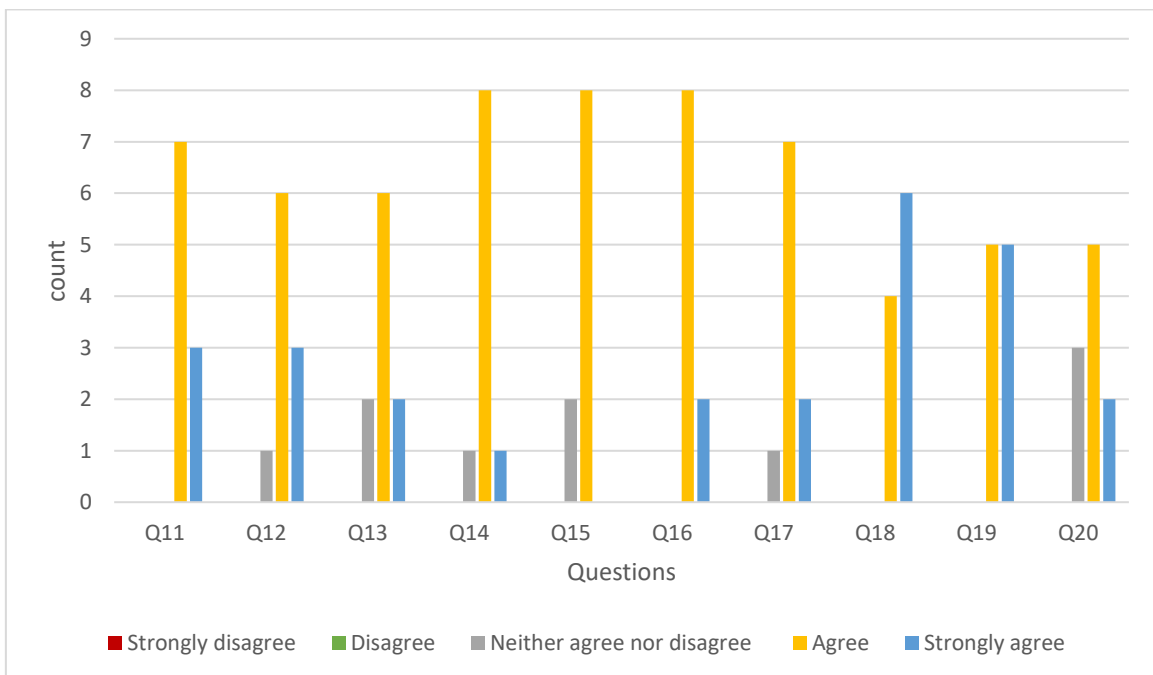


Figure 24: Analysis chart of Q11 to q20

User friendliness of whole system

Result – The system is user friendly according to the results.

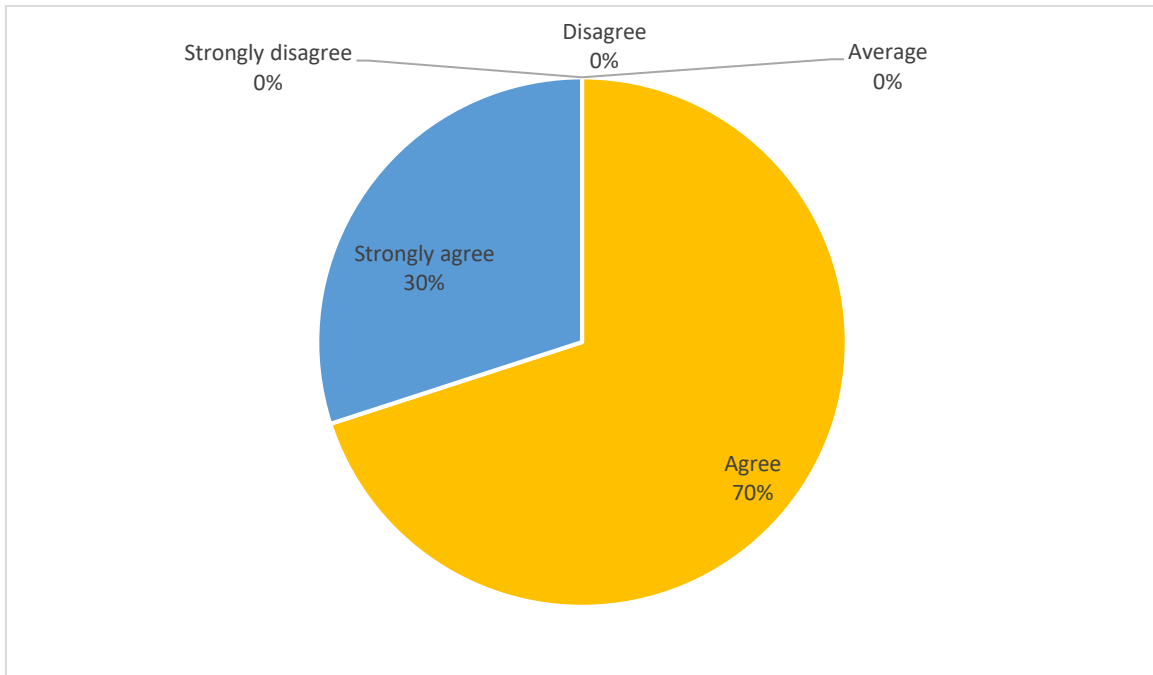


Figure 25: Use friendliness of the system

Q12. It is easy to work with computerized system rather than manual system

Result – Most of are agree with the easiness of the computerized system and few of them have average idea of it.

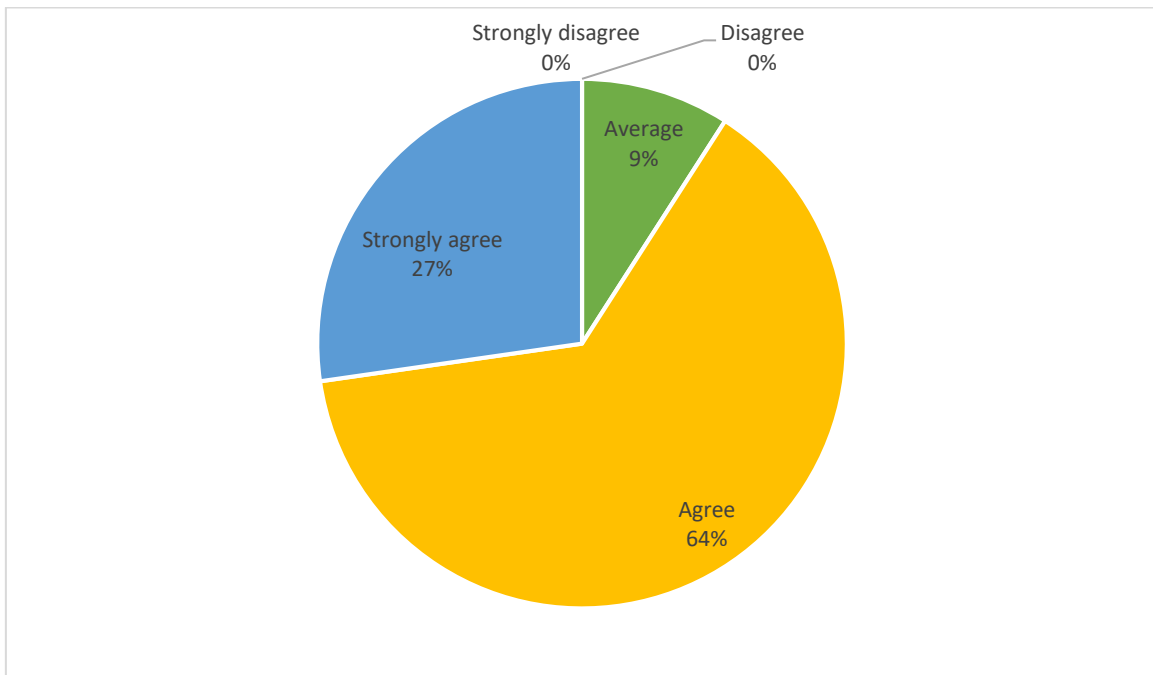


Figure 26: Analysis of Q12

Q13. Can work with the system without any others help

Result – Working with the system is easy for most of them without any help. 20% of them need some guide or help.

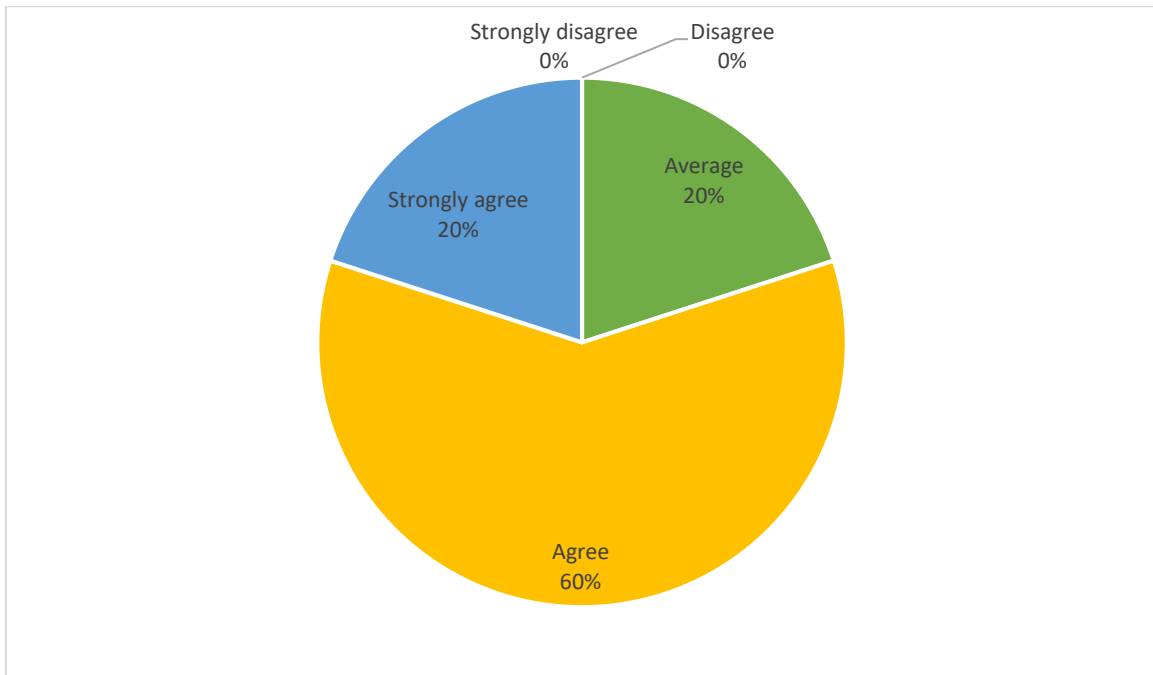


Figure 27: Analysis of Q13

Q14. System functionalities are easy to understand.

Result – System functionalities are well understood.

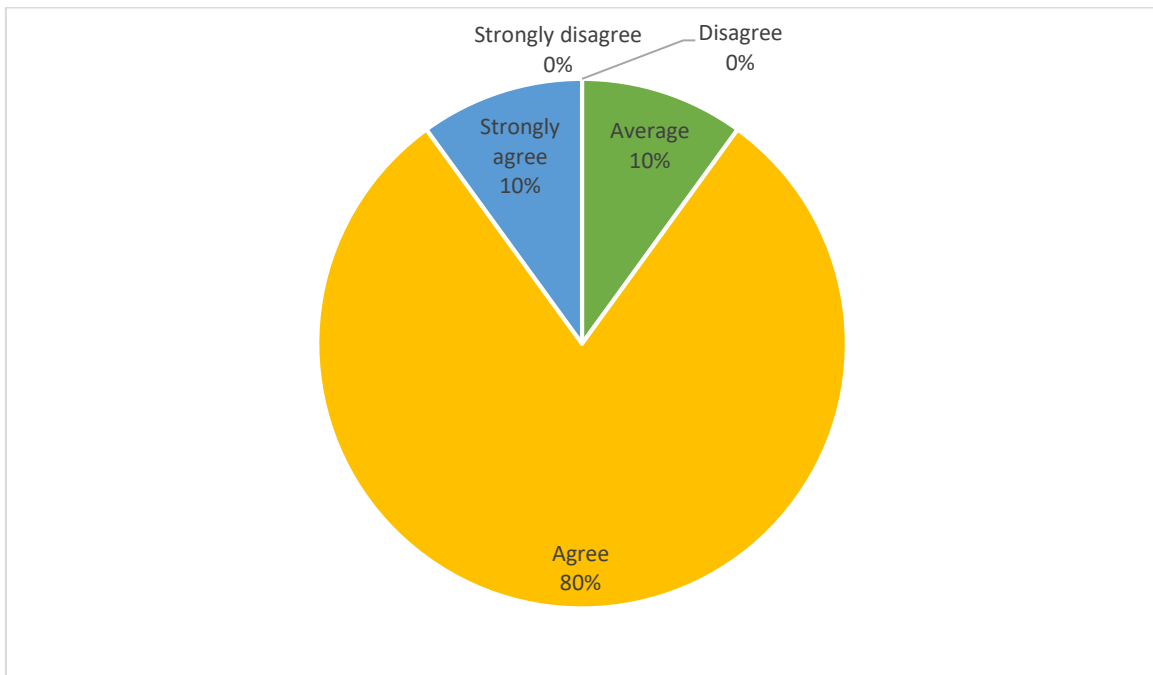


Figure 28: System functionality

Q15. System provided relevant error messages when needed

Result – Showing error messages when needed is good in the system.

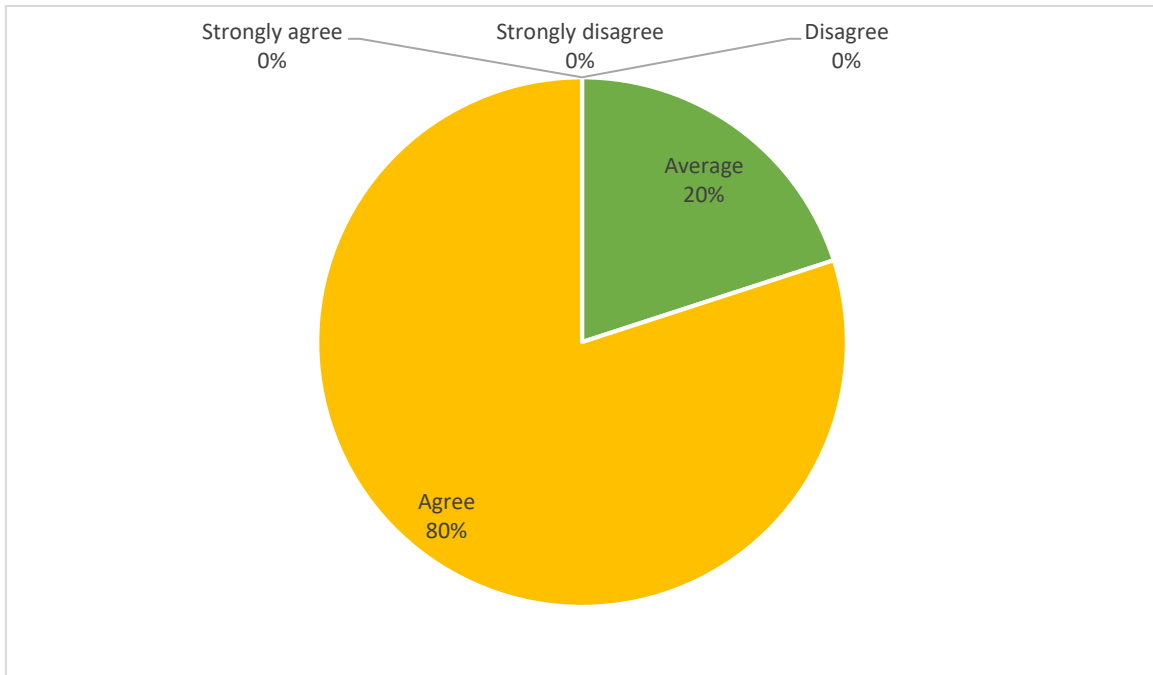


Figure 29: Error message showing

Q16. Interface design is user friendly

Result – The system has user friendly interfaces.

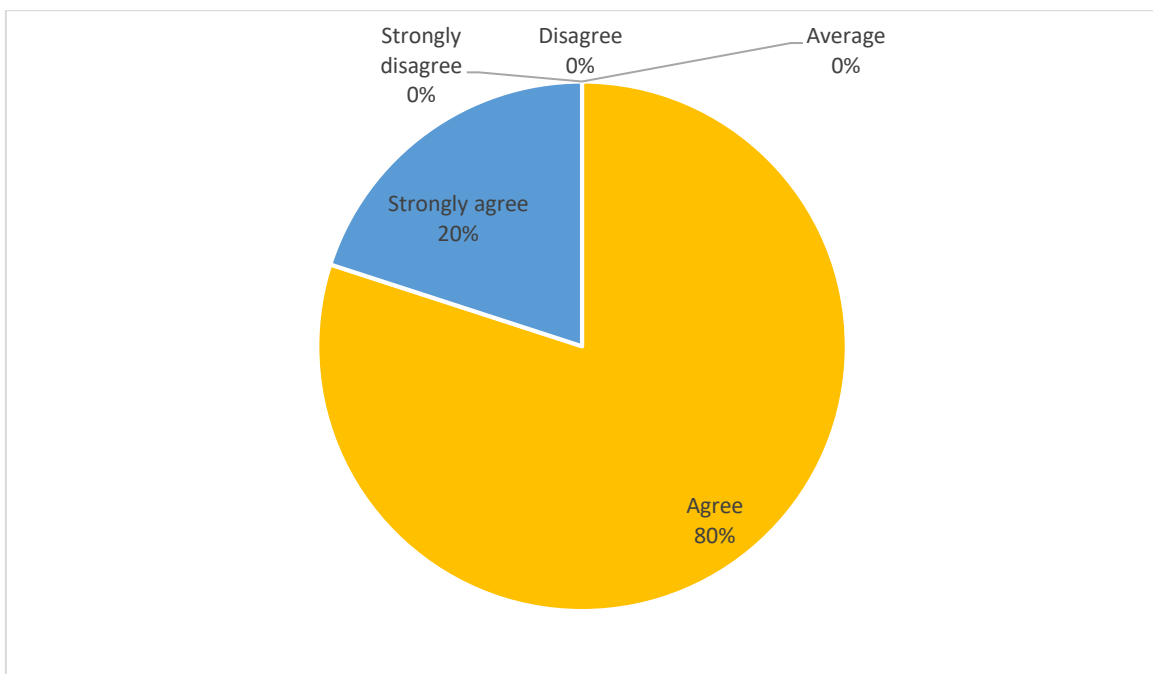


Figure 30: User interfaces

Q17. Can quickly search products

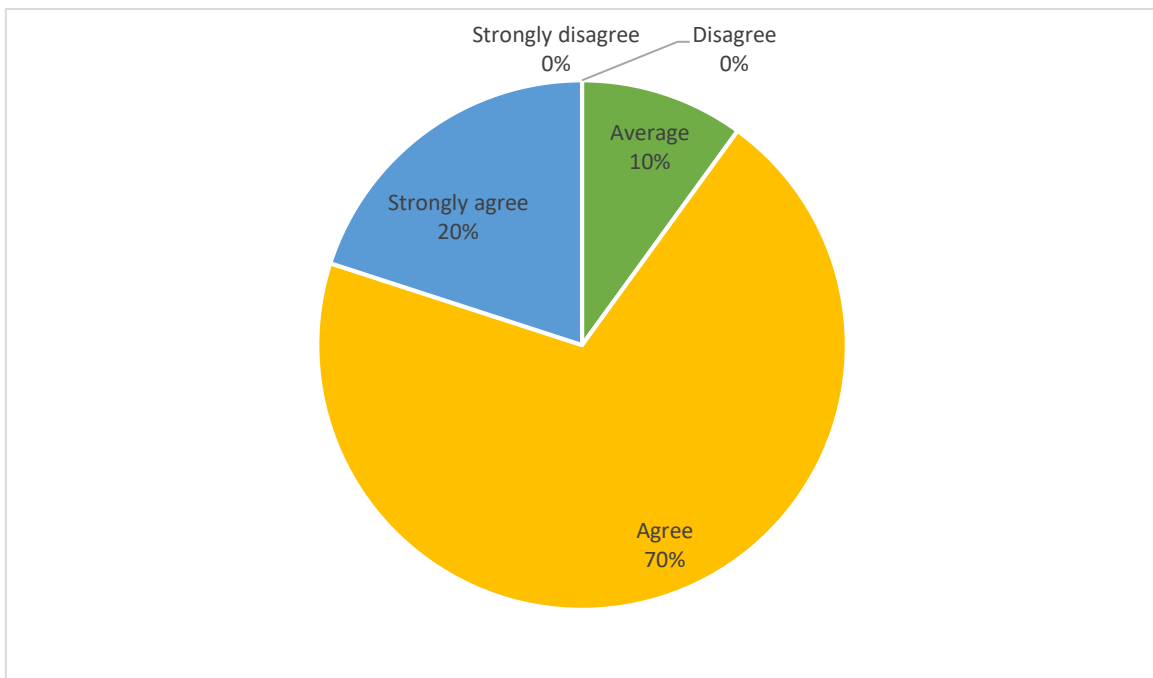


Figure 31: Searching option

Q18. Report generation is easy to handle

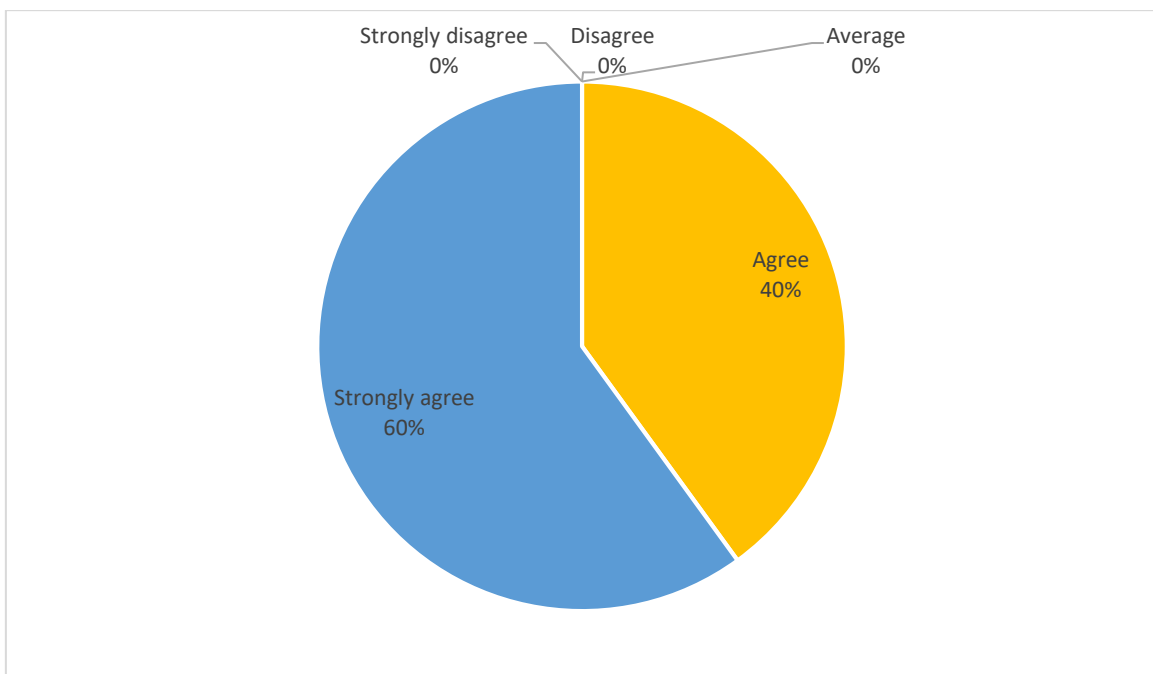


Figure 32: Report generation of the system

Q19. Easy to find stock details quickly

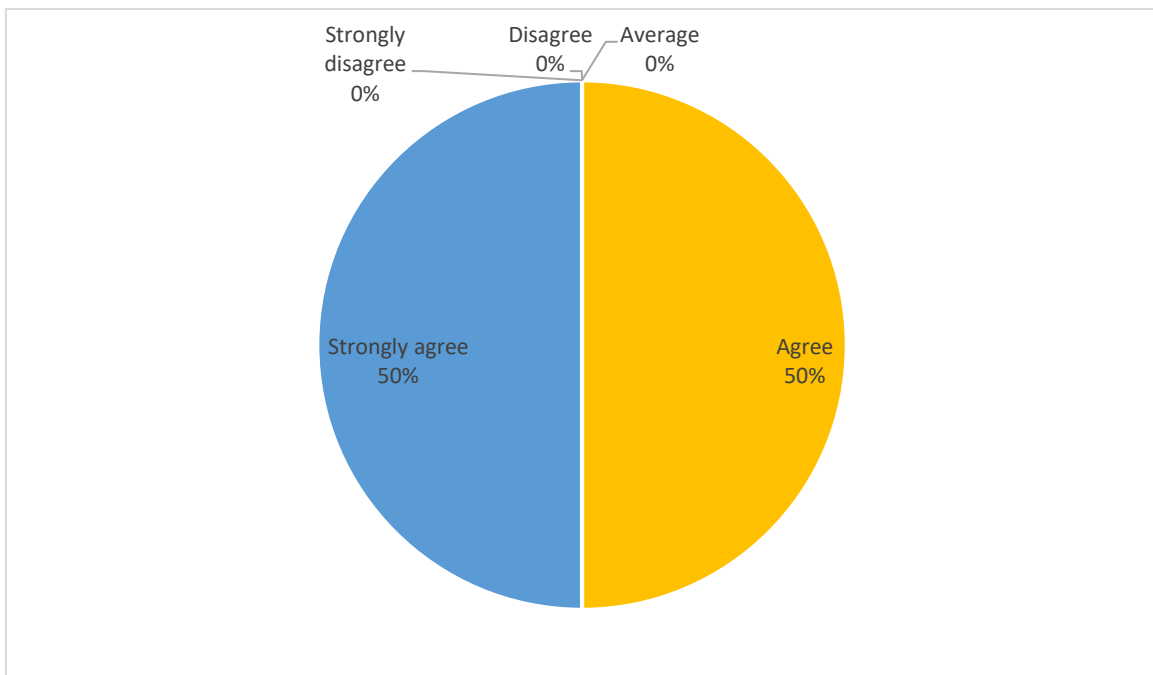


Figure 33: Finding stock details

Q20. Pharmacy income will increase

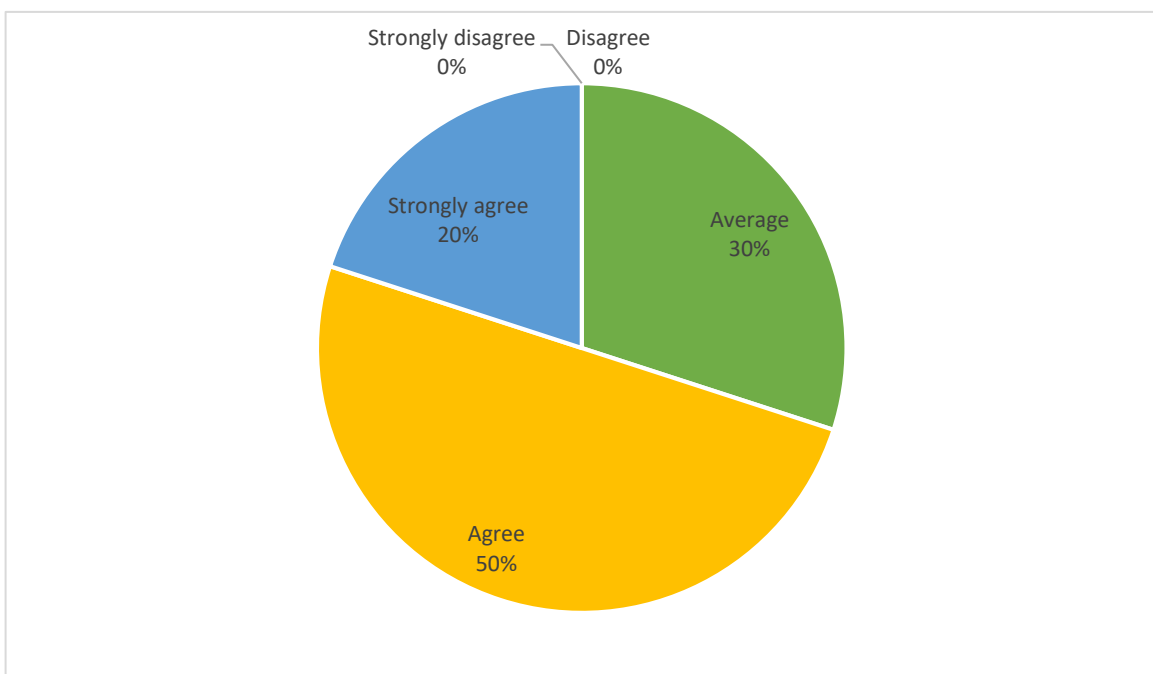


Figure 34: Affecting of the income

Chapter 06: Conclusion

6.1 Achievements

Today management is one of the most essential features of all form. Management provides sophistication to perform any kind of task in a particular form. This is pharmacy management system; it is used to manage most pharmacy related activities in the pharmacy. The primary aim of it is to improve accuracy and enhance safety and efficiency in the pharmaceutical store. In this system the pharmacist can manage stock details accurately and efficient manner without using papers. And also administrator will get notifications about expiry dates about medicine and out of stock details for a particular drug. System will automatically generate the bill for particular transaction. Every employee work in the pharmacy can mark their attendance by logging to the system. Customers can check the availability of a medicine or item before coming to the pharmaceutical store. User friendly interfaces are uses in this system, so the staff of the pharmacy can easily work with them.

6.2 Lessons Learnt

The basic achievement of doing this project is, can improve my programming knowledge. The reason of selecting Laravel is, to learn new technology for developing the web based systems. Because it is valuable for my career life and also help to increase the value of the degree. So the total part of project can be mentioned as a big lesson learnt as a learner of Laravel.

How to deal with people, how to write reports are some other things that learnt.

6.3 Problems Encountered

- Difficult to learn new technologies within the given short period of time

As I said earlier, every and each simple thing regarding the framework had to learn. Within the given time period it was difficult to do.

- Continuous communication with the client

It is difficult to maintain continuous communication with the client. Because we both are busy with our careers and sometimes he had migrated when I tried to contact him.

6.4 Future Developments

The pharmacy industry is unfavorably affected by a wide range of problems such as serious social conflicts on miss-use of drugs, quality issues and government initiatives on drugs. Quality issues have a prominent effect on pharmaceutical trade.

Suggestions for further development also include the expansion of the functionalities and techniques in order to address competitiveness of the current system.

- Develop mobile application for the system
- Integrate payment gateway to purchase directly by paying online rather than cash on delivery method.
- Generate more reports
- Online ordering facility

References

- [1] HHIMS.org, 2005. [Online]. Available: <http://www.hhims.org/>.
- [2] ScriptPro, "ScriptPro Pharmacy Management Software," ScriptPro, [Online]. Available: <https://www.scriptpro.com/Products/Pharmacy-Management-Software/>.
- [3] Digital-RX, "Digitalrx: Pharmacy Management System," Digital Business Solutions, [Online]. Available: <http://www.digital-rx.com/Home/digitalrx>.
- [4] S. P. C. Sri Lanka, "State Pharmaceuticals Corporation of Sri Lanka," State Pharmaceuticals Corporation of Sri Lanka, [Online]. Available: <http://www.spc.lk/index.php>.

Appendix A: System Documentation

The system documentation includes the necessary hardware and software requirements to run the system accurately. It provides step by step guidance to how to install the system properly. Follow the steps according to the given order in the following images.

Step1: Install the XAMPP server

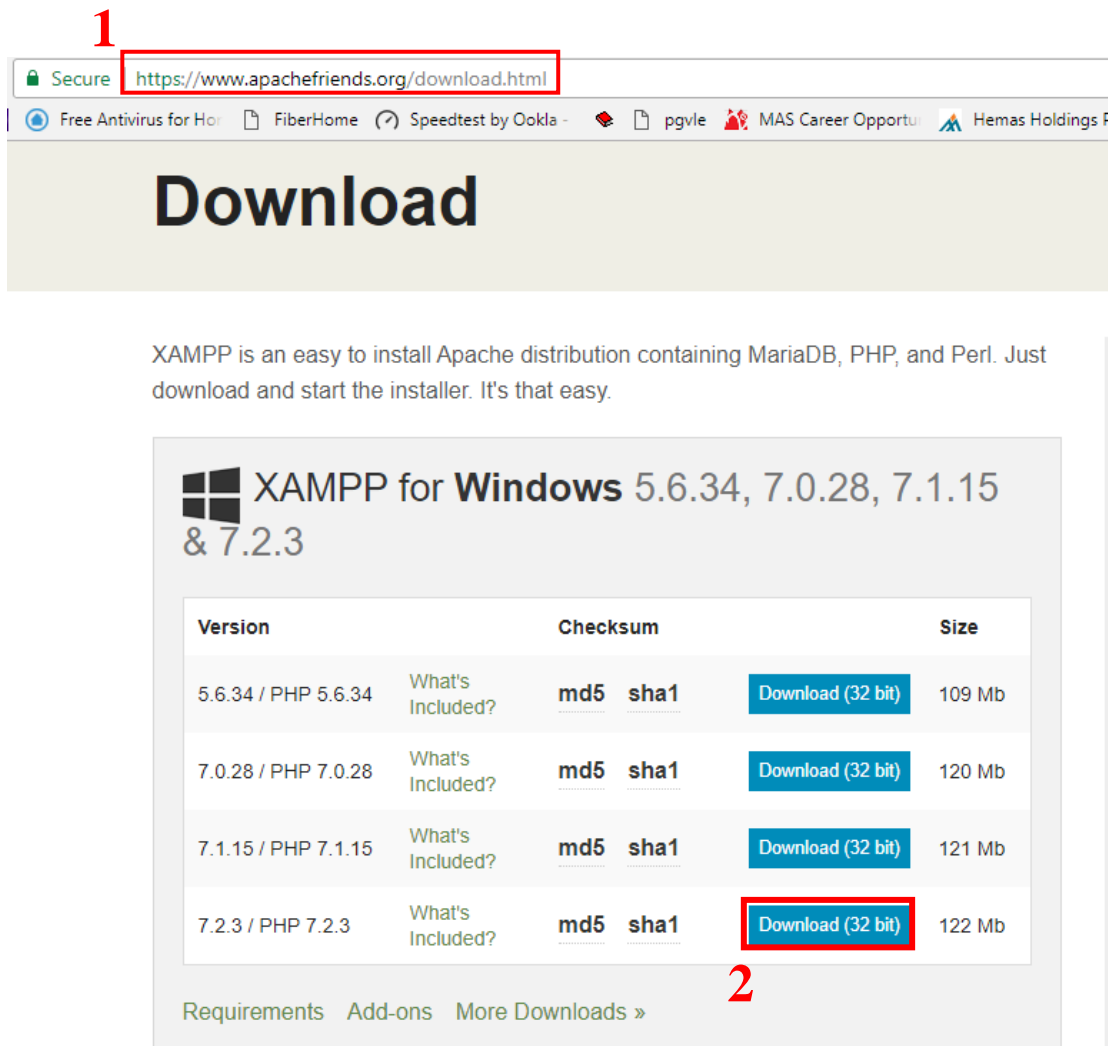


Figure 35: download XAMPP

- 1: Go to <https://www.apachefriends.org/download.html> site.
- 2: Download latest version of XAMPP for windows.
- 3: Downloading XAMPP
- 4: Downloaded successfully. Then open the setup.

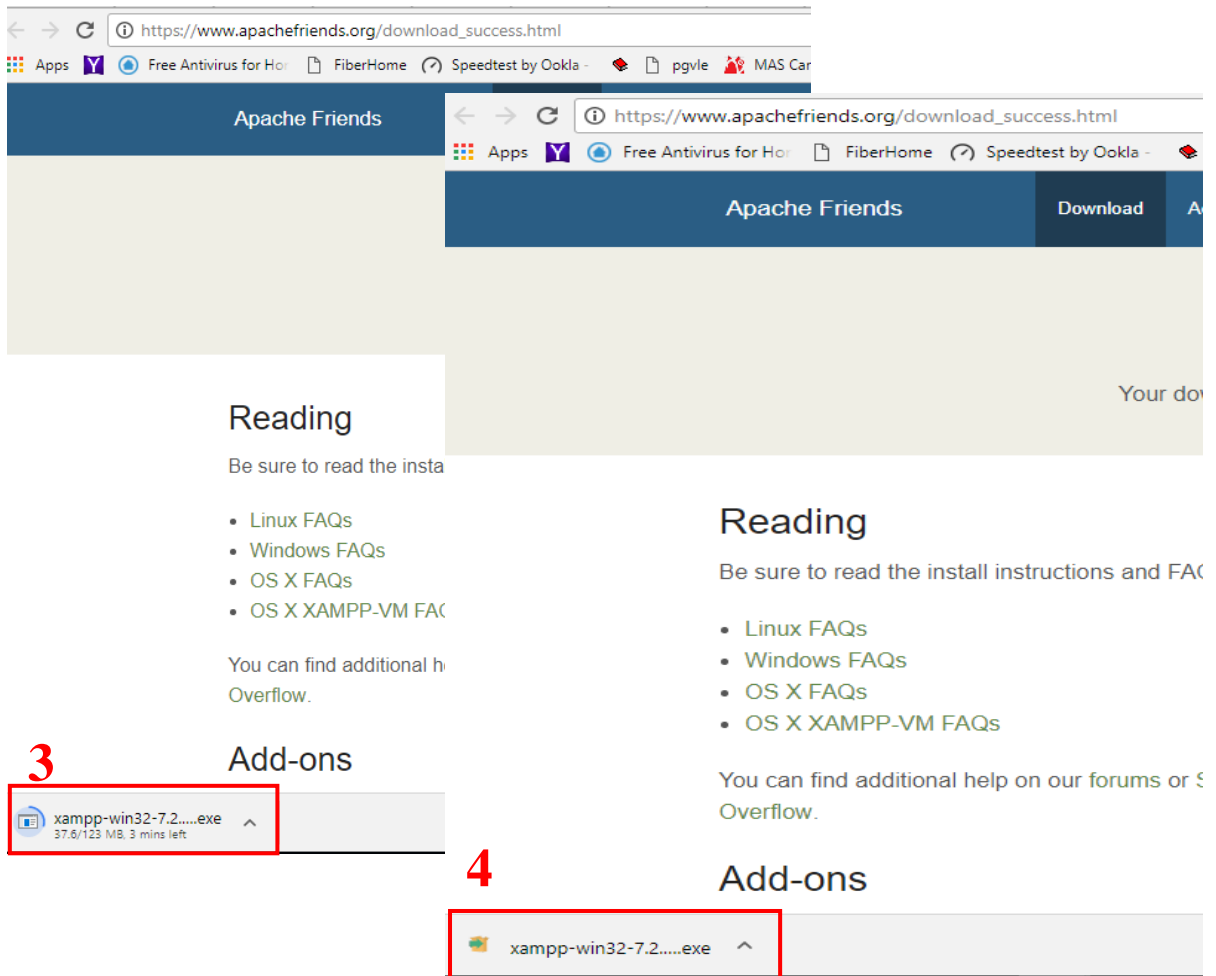


Figure 36: XAMPP download complete

5: Run the setup.

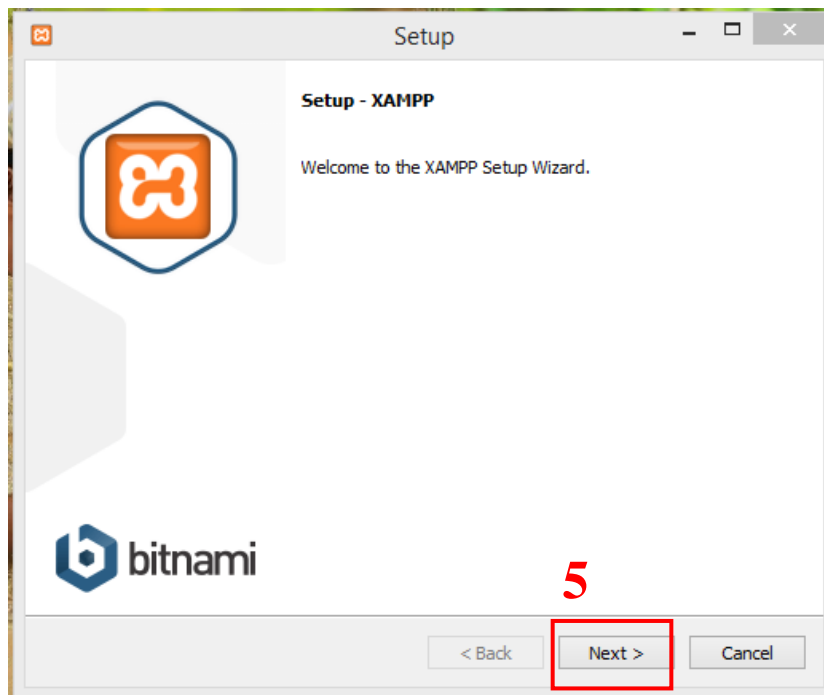


Figure 37: Run XAMPP setup

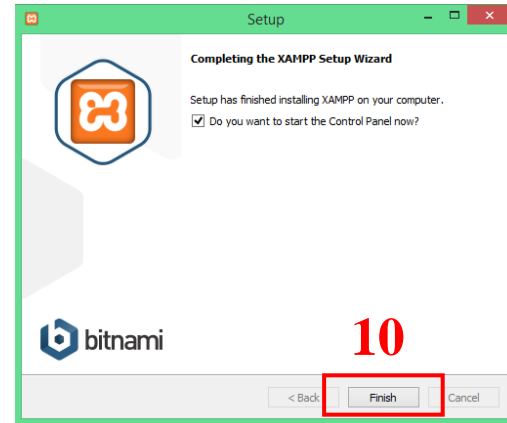
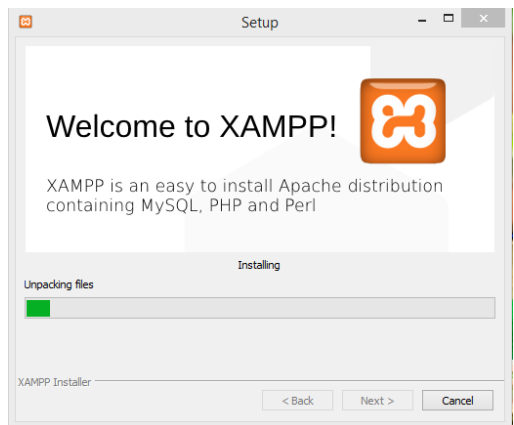
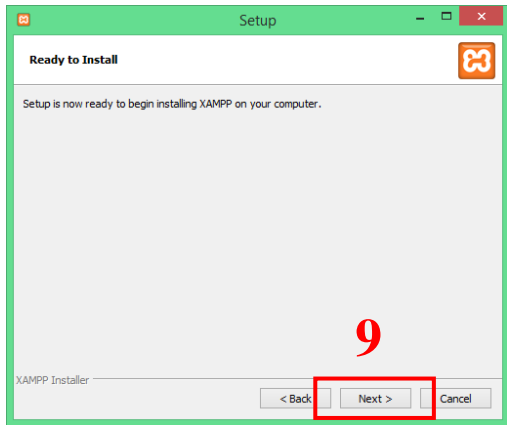
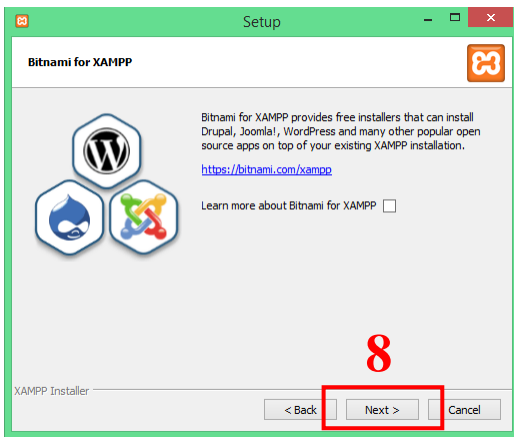
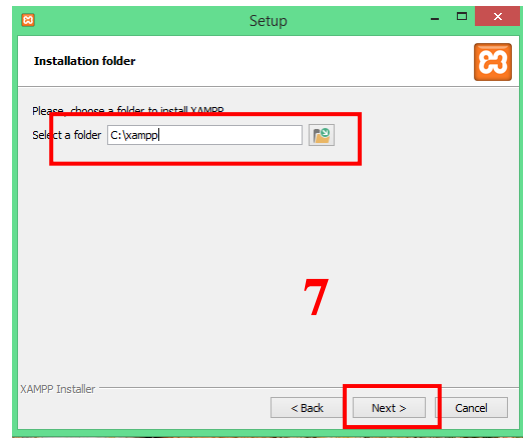
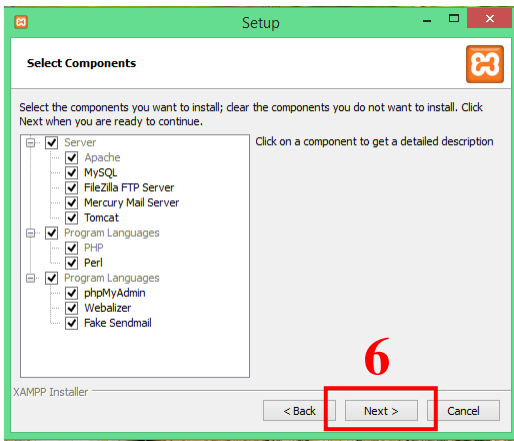


Figure 38: XAMPP setup steps

6: Select components

7: Select location to install and go next. (Better to keep its default position in C:/)

8,9: Running the setup

10: Finished. Installation completed. Now you can start the XAMPP server.

Step2: Import the Database

11: To start double click on XAMPP icon on the task bar.



Figure 39: XAMPP in task bar

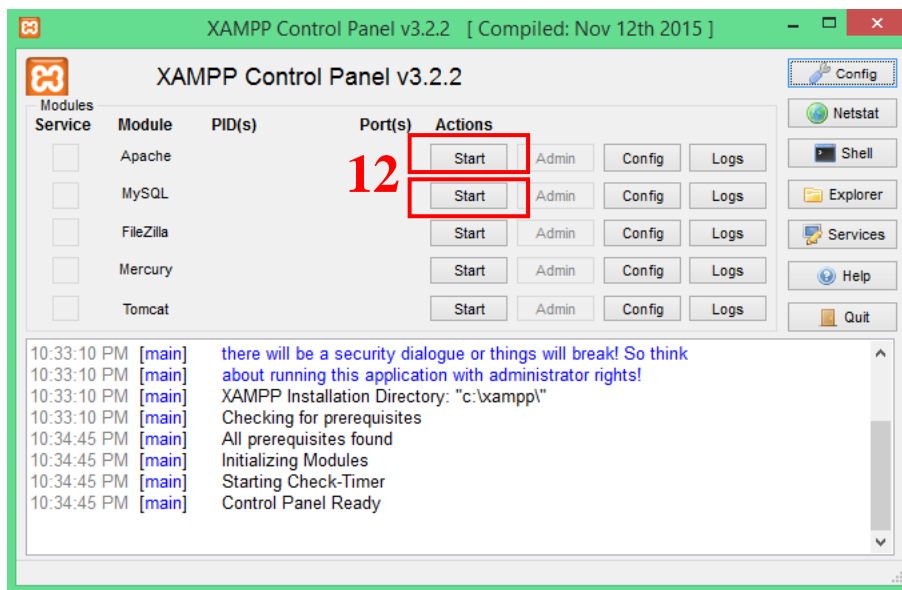


Figure 40: Start services in XAMPP

12: Start the services

13: After starts it looks green.

14: Now go to MySQL Admin

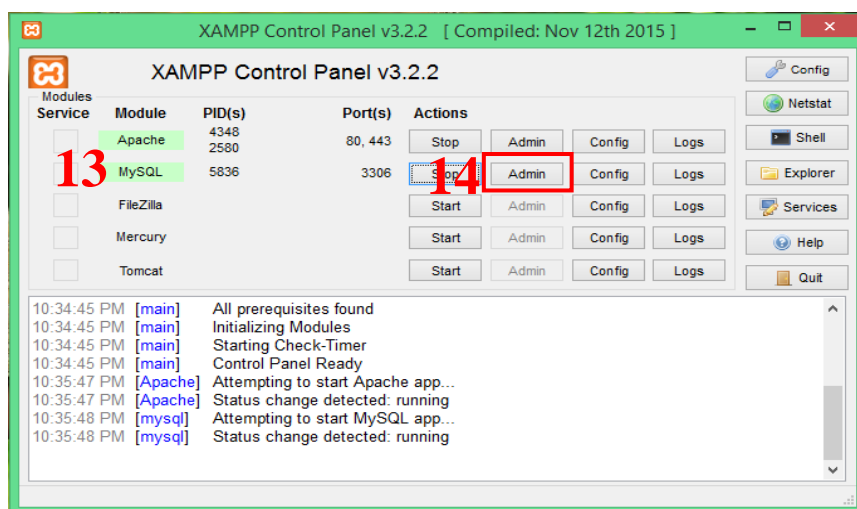


Figure 41: Open MySQL Administrator

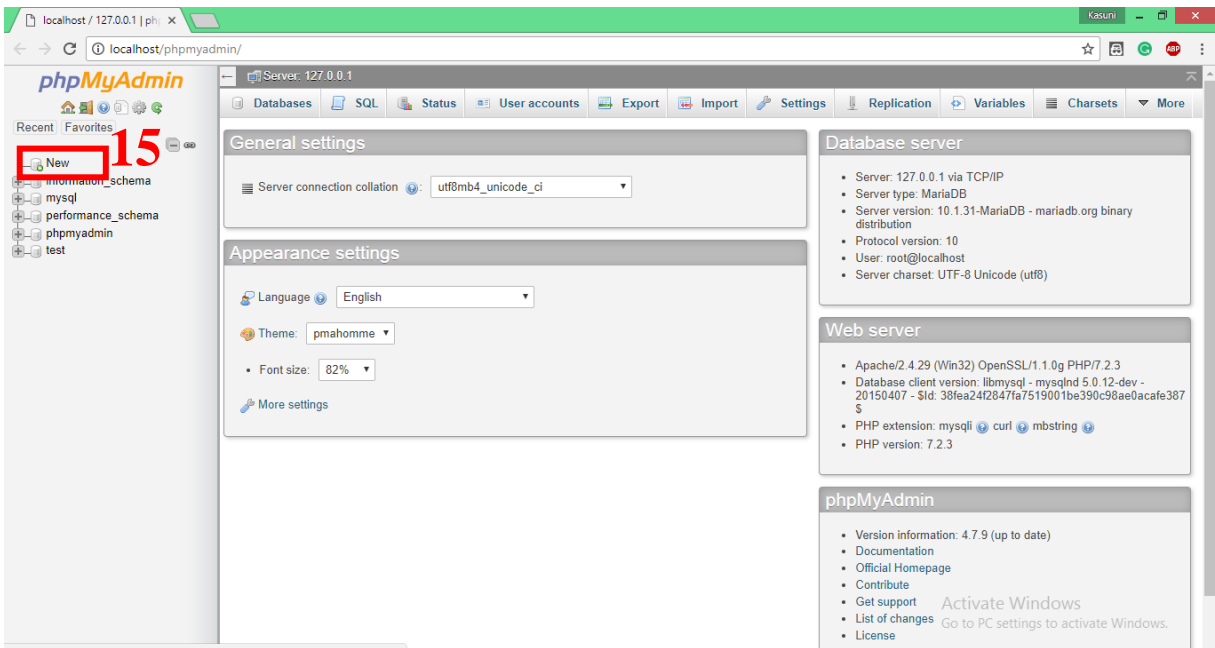


Figure 42: phpMyAdmin open

15: To create a new database click on new button.

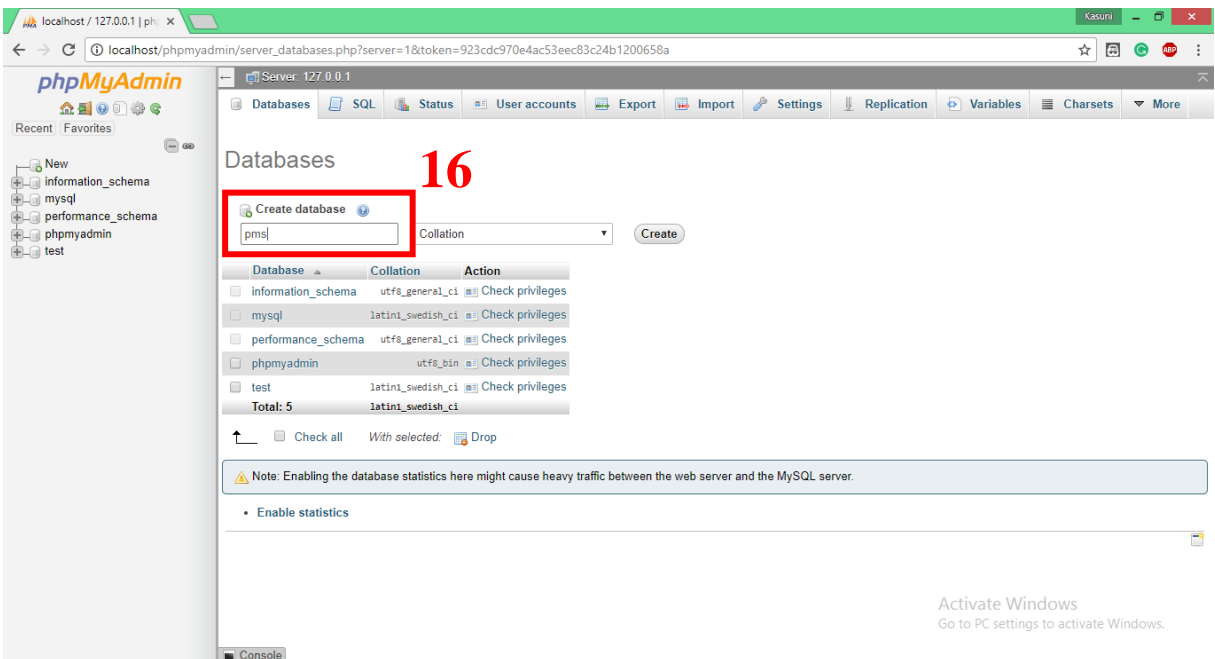
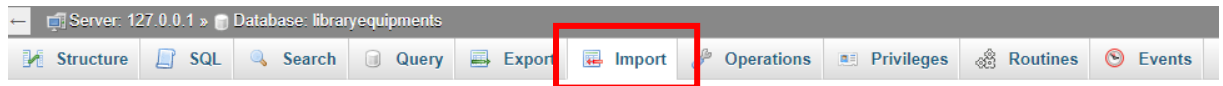


Figure 43: Create new database

16: Type Database name as “pms” and click create.

17: Go to ‘import’ and choose database file (pms.sql) from your computer. Then click ‘Go’ button on the bottom of the page.



Importing into the database "libraryequipments"

File to import:

17

File may be compressed (gzip, bzip2, zip) or uncompressed.
 A compressed file's name must end in `[format].[compression]`. Example: `.sql.zip`

Browse your computer: pms.sql (Max: 2,048KiB)

You may also drag and drop a file on any page.

Character set of the file:

Figure 44: Import database

Step3: Place the project folder

18: Go to "C:\xampp\htdocs" and paste your project folder.

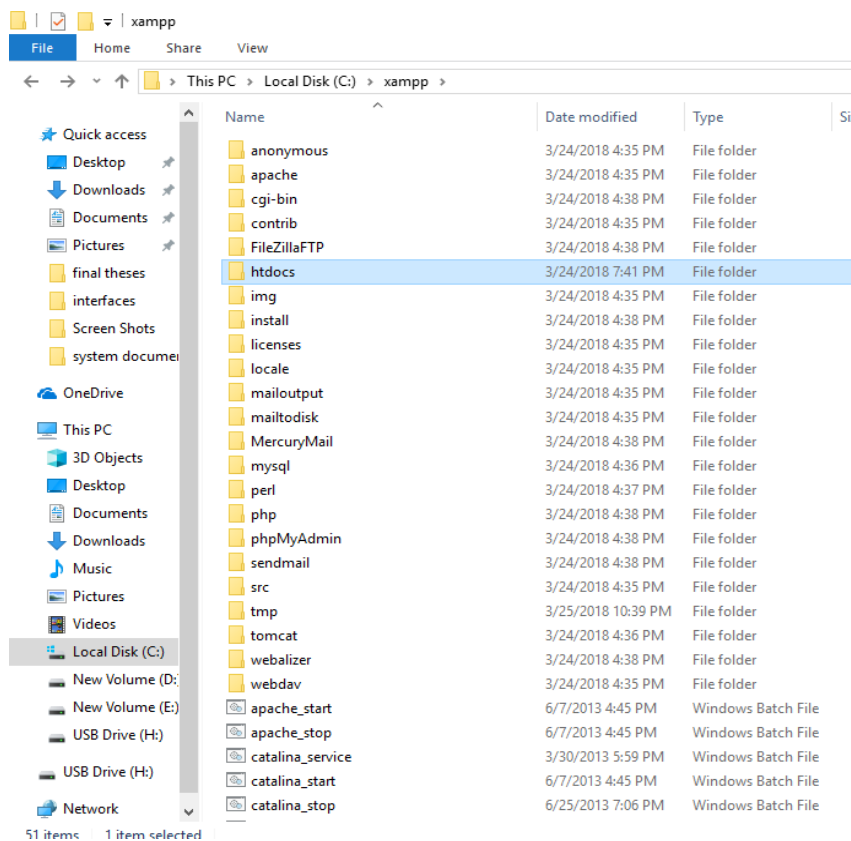


Figure 45: Paste project folder in to htdocs

Step4: Run the project in your browser

19: Go to your web browser and type <http://127.0.0.1/pms/> or <http://localhost/pms/>

Appendix B: Design Documentation

Use case Narratives

Table 8: Use case narrative for Manage Categories

Use Case ID	UID04
Name	Manage Categories
Actors	Admin, Data Entry Operator
Description	Administrator and data entry operator can create, delete or update category details via 'Category Management' interface
Pre-Conditions	Login as administrator or Operator
Successful Completion	<ol style="list-style-type: none">1. Login to the system2. Go to Product Management in side navigation3. Then go to Categories4. System will display category detail table5. Select the relevant action (create, edit, delete category)6. System will show the relevant form.7. Fill the required fields8. Click submit button9. If success action, system will not show error message
Alternatives	<ol style="list-style-type: none">8 a) If the form submits with empty field it is shown error message

Table 9: Use case narrative for Manage Subcategories

Use Case ID	UID05
Name	Manage Subcategories
Actors	Admin, Data Entry Operator
Description	Administrator and data entry operator can create, delete or update subcategory details via 'Subcategories Management' interface

Pre-Conditions	Login as administrator or Operator
Successful Completion	<ol style="list-style-type: none"> 1. Login to the system 2. Go to Product Management in side navigation 3. Then go to Subcategories 4. System will display subcategory detail table 5. Select the relevant action (create, edit, delete subcategory) 6. System will show the relevant form. 7. Fill the required fields 8. Click submit button 9. If success action, system will not show error message
Alternatives	8 a) If the form submits with empty field it is shown error message

Table 10: Use case narrative for Generate Reports

Use Case ID	UID06
Name	Generate Reports
Actors	Admin
Description	Administrator can generate the reports to analyze the information
Pre-Conditions	Login as administrator
Successful Completion	<ol style="list-style-type: none"> 1. Login to the system 2. Go to Reports in side navigation 3. Select the relevant report type 4. System will display the selected report
Alternatives	7 a) Some graphs are displayed

Table 11: Use case narrative for Mark Attendance

Use Case ID	UID07
Name	Mark Attendance
Actors	All employees
Description	All employees in the pharmacy including the admin can mark & view their daily attendance
Pre-Conditions	Login to the system
Successful Completion	4 Login to the system 5 Go to attendance in side navigation 6 Mark attendance (sign in / sign out)
Alternatives	3 a) View attendance

Table 12: Use case narrative for Create Bill

Use Case ID	UID08
Name	Create Bill
Actors	Admin, Cashier
Description	Create a bill for purchased order
Pre-Conditions	Login to the system Purchased product
Successful Completion	1. Login to the system 2. Go to 'Billing' in side navigation 3. Select quantity of particular product 4. Click Add button 5. Print the bill
Alternatives	4 a) Bill is created automatically

Table 13: Use case narrative for Upload Prescription

Use Case ID	UID09
Name	Upload Prescription
Actors	Customer
Description	Customer can upload prescriptions
Pre-Conditions	Go to the web site
Successful Completion	<ol style="list-style-type: none"> 1. Log in to the system. 2. Go to prescription upload tab. 3. Upload the prescription as an image type 4. Click the submit button
Alternatives	<ol style="list-style-type: none"> 1 <ol style="list-style-type: none"> a) If not registered yet click signup button to create an account. b) Fill the form given and submit it. c) Then the system asks to confirm the email address that you provided. d) After confirming email system will logged you in. e) Confirm email address given by logging to the email account. 4 <ol style="list-style-type: none"> a) If the form submits with empty field it is shown error message
Post-Conditions	<p>Information will be saved to the database including the prescription</p> <p>Prescription status is display in the system.</p>

Table 14: Use case narrative for Search products via the web site

Use Case ID	UID10
Name	Search products via the web site
Actors	Customer
Description	Customer can search product by using the search bar provided in the web site
Pre-Conditions	Go to the web site
Successful Completion	<ol style="list-style-type: none"> 1. Go to the website 2. Then go to Product tab

	<ol style="list-style-type: none">3. Enter product name in the given search bar4. Click the search button
Alternatives	<ol style="list-style-type: none">4 a) If the given name is not in the database system will display none.
Post-Conditions	System will display the relevant product details if available

Appendix C: User Documents

User Interfaces

Administer View

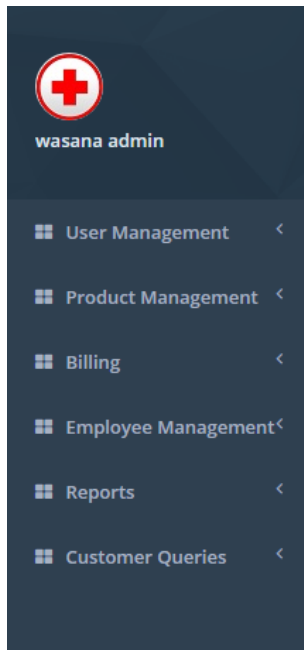


Figure 46: Admin sidebar

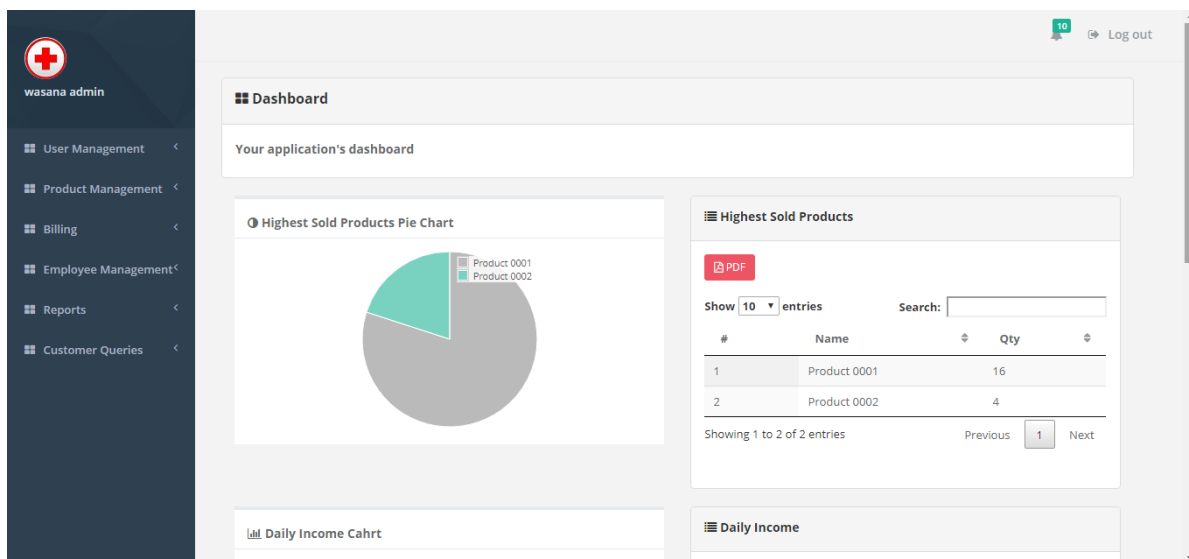


Figure 47: System dashboard

Create, Edit, View and delete functions can be done.

As an example, "User" details interface is given.

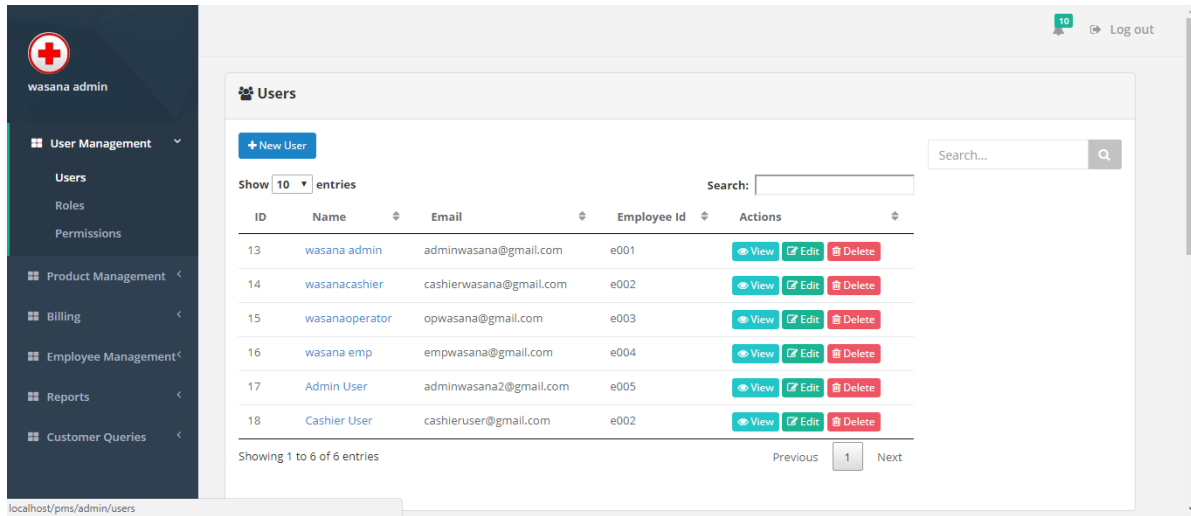


Figure 30: Users

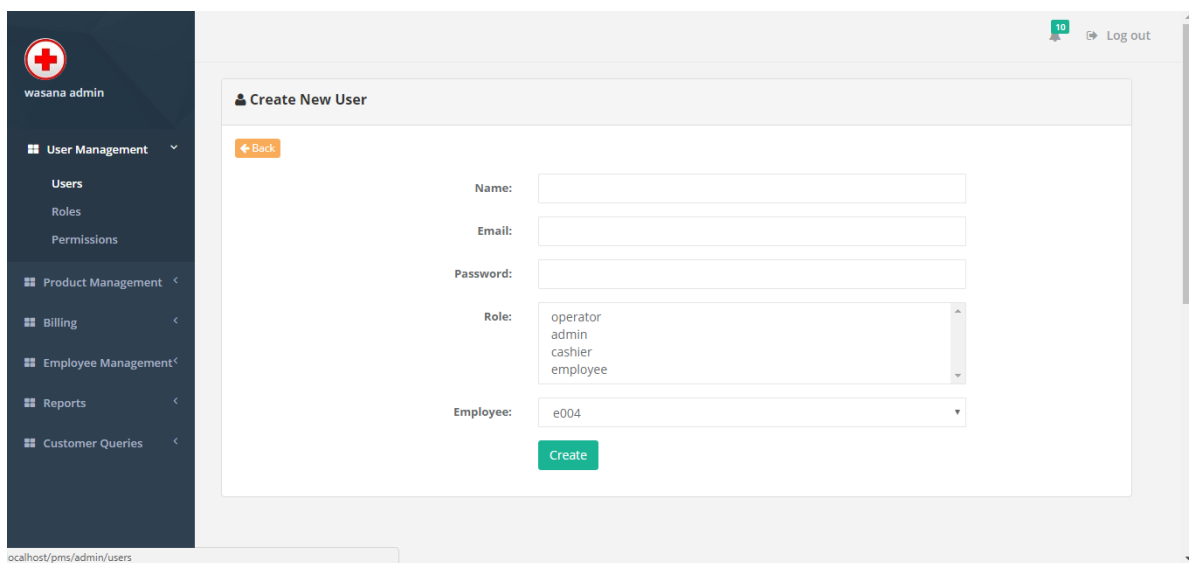


Figure 31: Create user

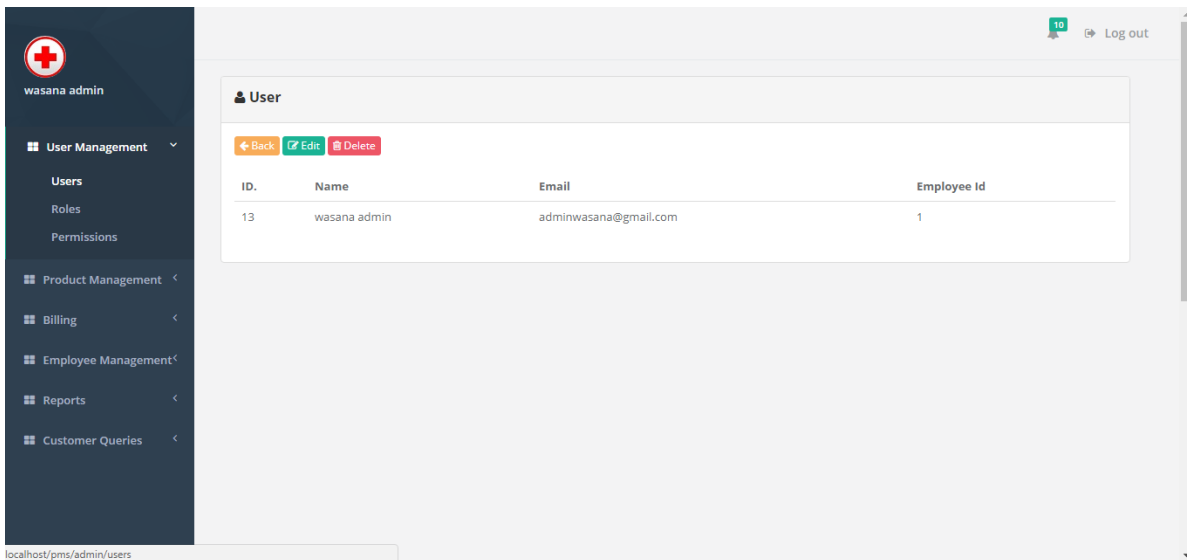


Figure 48: View user

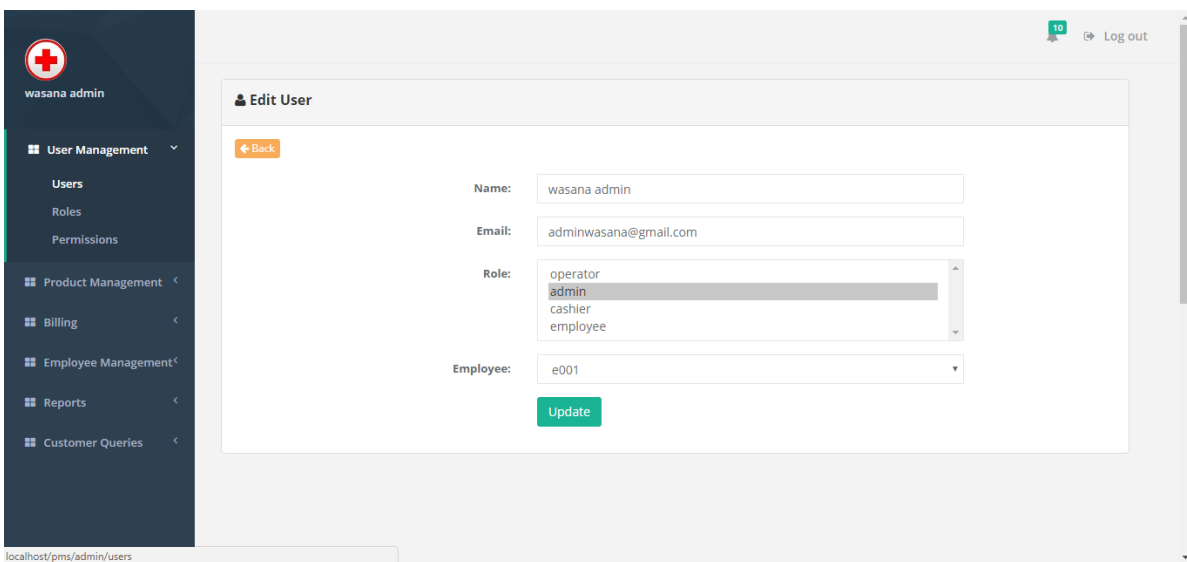


Figure 49: Edit user

Admin can give difference permissions to difference users. Following table displays the types of permissions.

ID	Name	Label	Actions
1	category management	category.management	View Edit Delete
2	sub category management	subcategory.management	View Edit Delete
3	All Permission	permission.all	View Edit Delete
4	Billing Management	billing.management	View Edit Delete
5	User Management	user.management	View Edit Delete
6	Company Management	company.management	View Edit Delete
7	employee managemen	employee.managemen	View Edit Delete

Figure 50: Permissions

Can upload data from an excel or csv data sheet to the table.

And also the table data can download as excel or csv format.

#	Category Id	Category Name	Actions
1	cat001	Category001	View Edit Delete
2	cat002	Category002	View Edit Delete
3	cat003	Category003	View Edit Delete
4	cat004	Category004	View Edit Delete
5	cat005	Category005	View Edit Delete
6	cat006	Category006	View Edit Delete
8	cat007	Category007	View Edit Delete
9	cat008	Category008	View Edit Delete
10	cat009	Category009	View Edit Delete
11	cat010	Category010	View Edit Delete

Figure 51: Category table

Admin can view the attendance of every employee in the table.

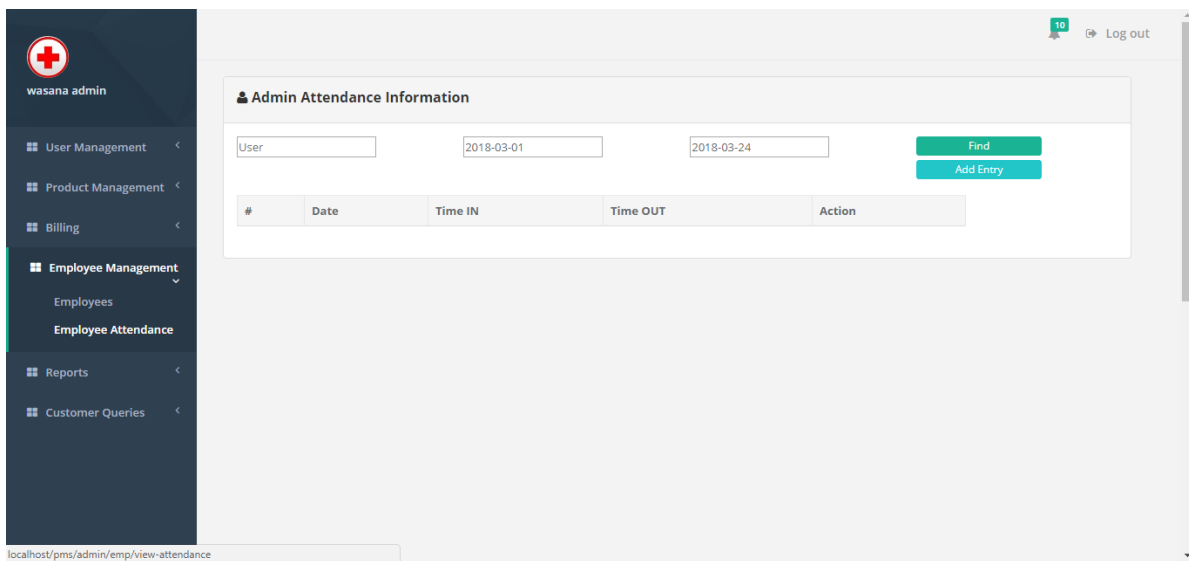


Figure 52: Admin manage attendance

When quantity < 100 then is categorized as law quantity drug.

Report can download as PDF.

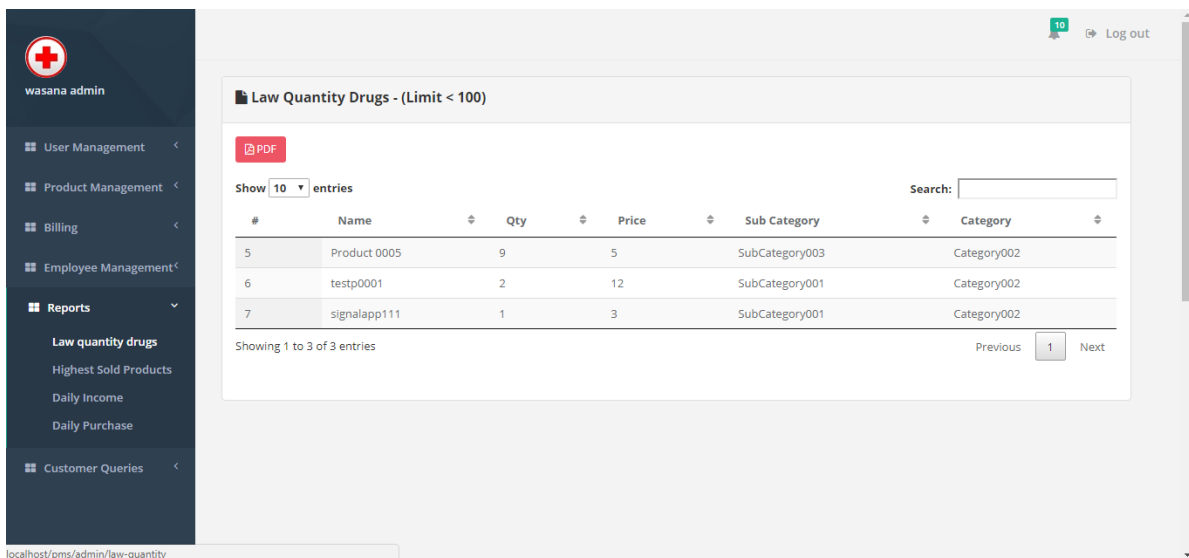


Figure 53: Law quantity drug table

Excel or csv upload interface.

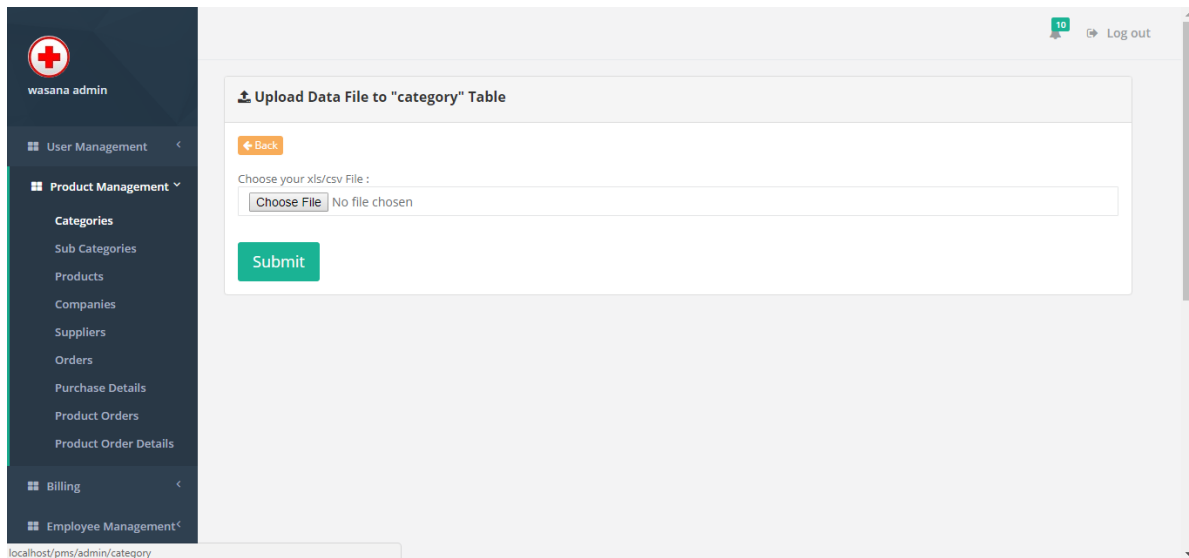


Figure 54: Upload excel form

Automatically Generated bill.

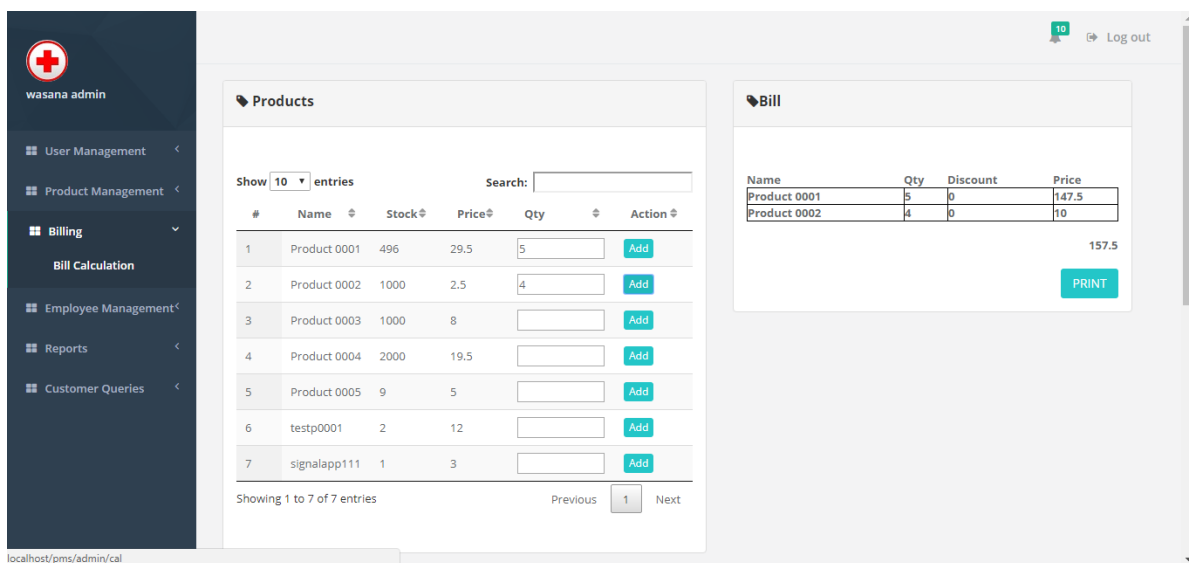


Figure 55: Bill

Low quantity drugs and expire date near items are shown here as notification. Only admin can see.

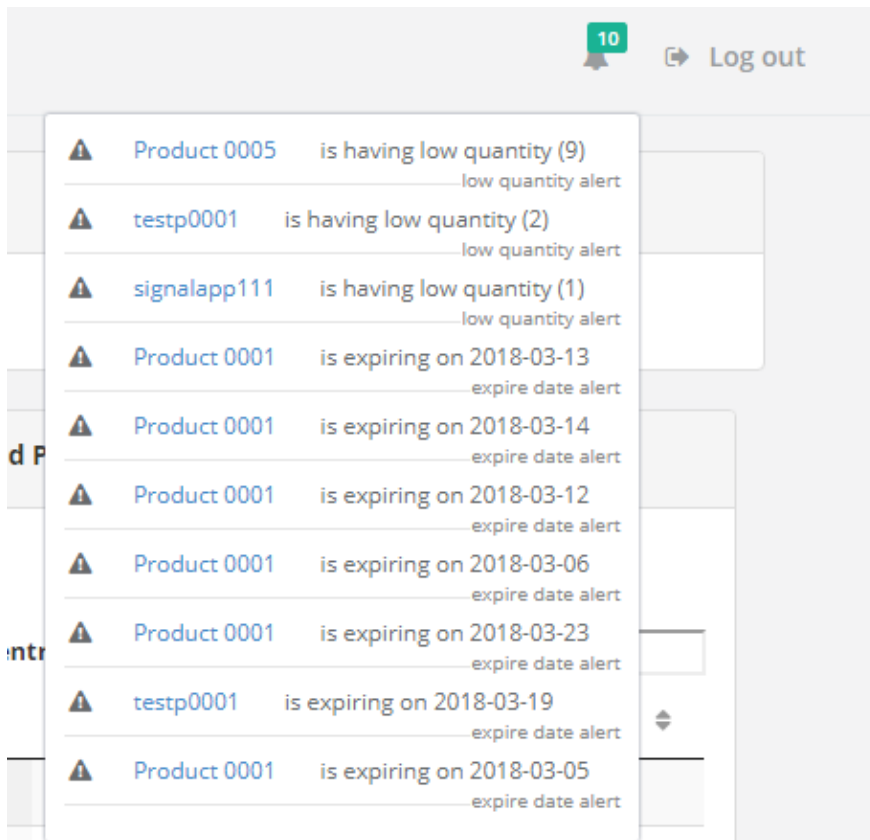


Figure 56: Notification

Cashier View

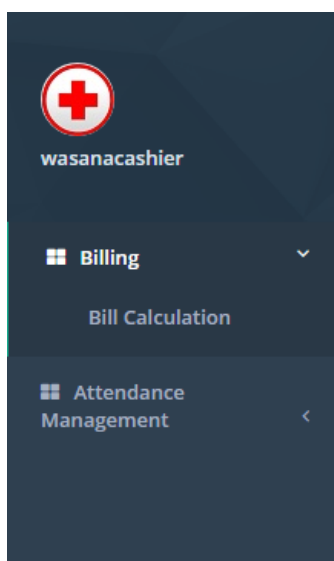


Figure 58: Cashier side navbar

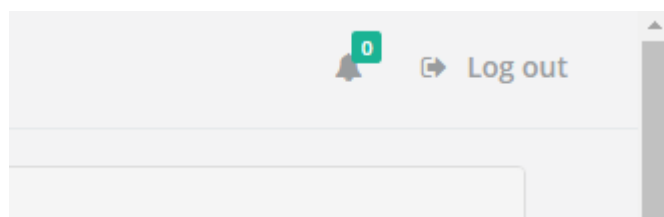


Figure 57: Cashier notifications

Data entry operator view

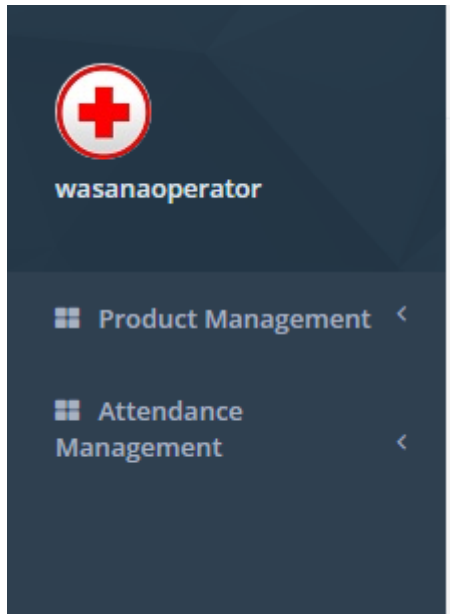


Figure 60: Operator side navbar

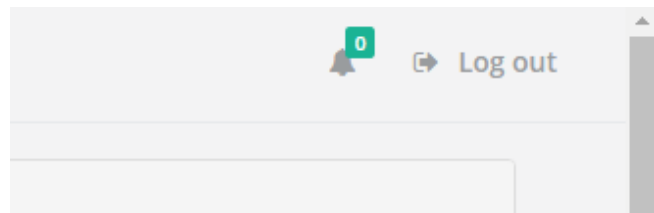


Figure 59: Operator notification

Other employee view

Other employees except admin, cashier, data entry operator can only mark and see their attendance.

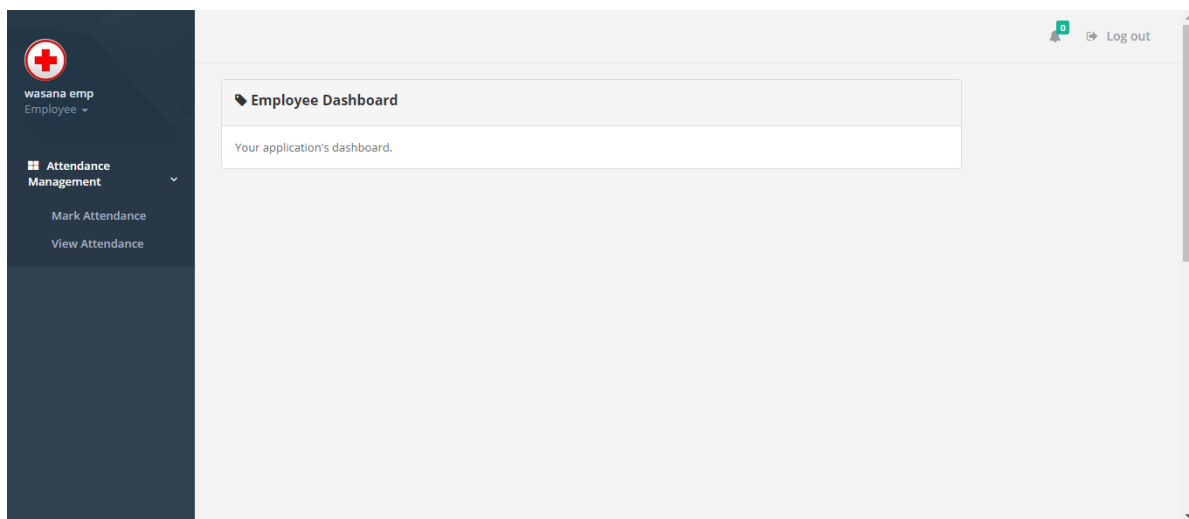


Figure 61: Employee side navbar

Appendix D: Report generation

Low quantity drug

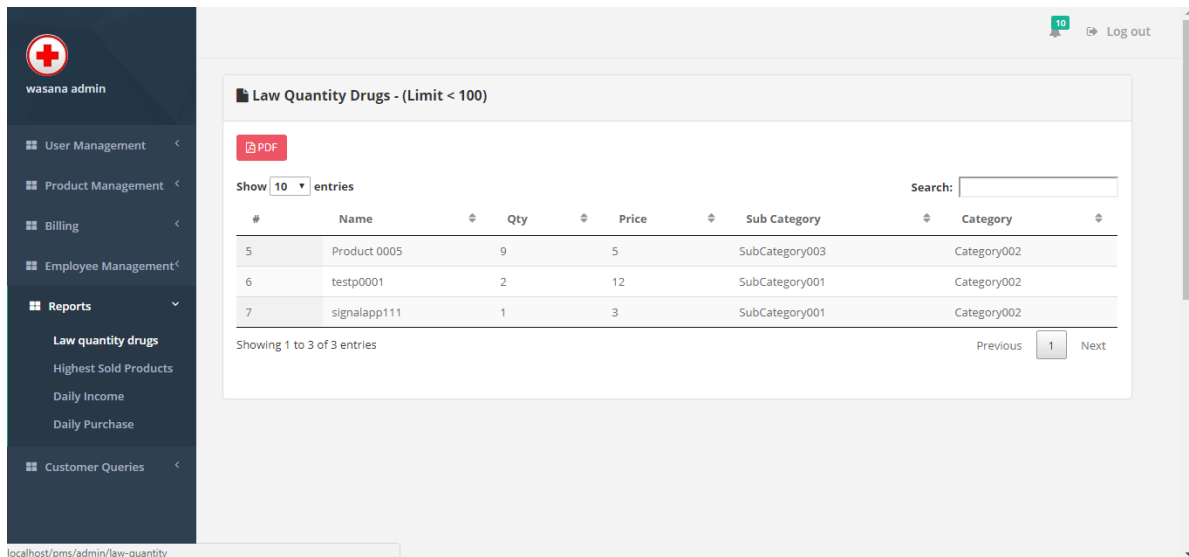


Figure 62: Low quantity Drug

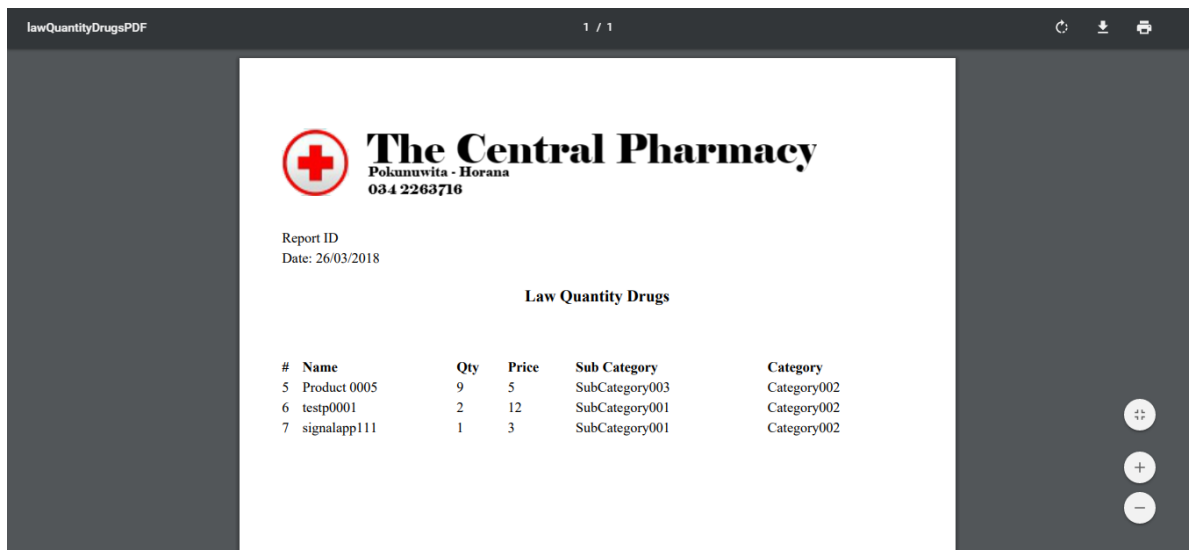


Figure 63: Low quantity drug pdf

Highest sold product

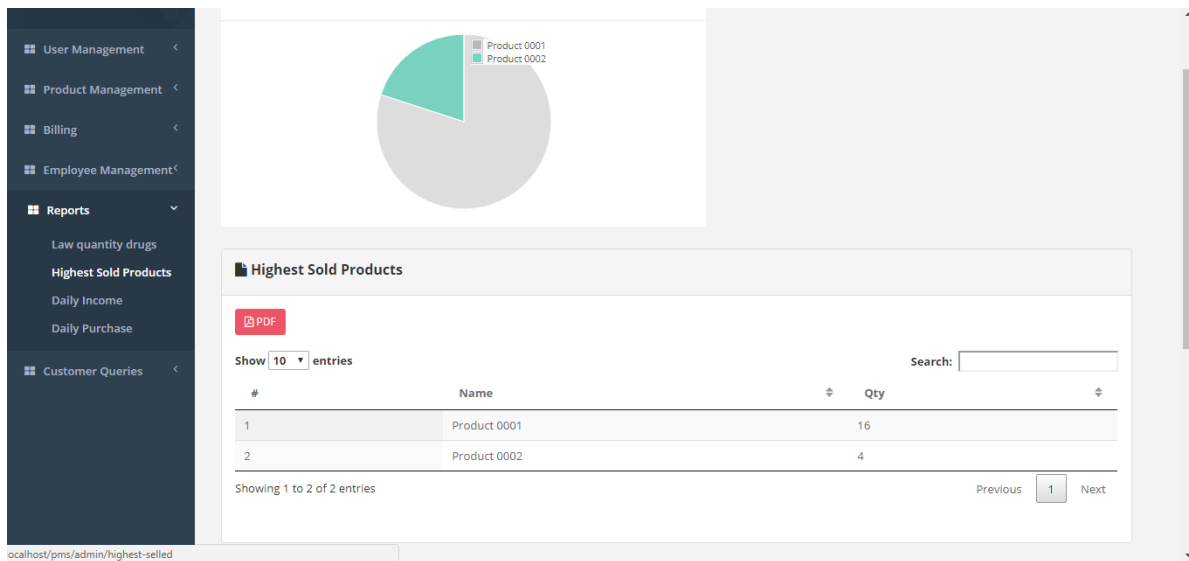


Figure 64: Highest sold product

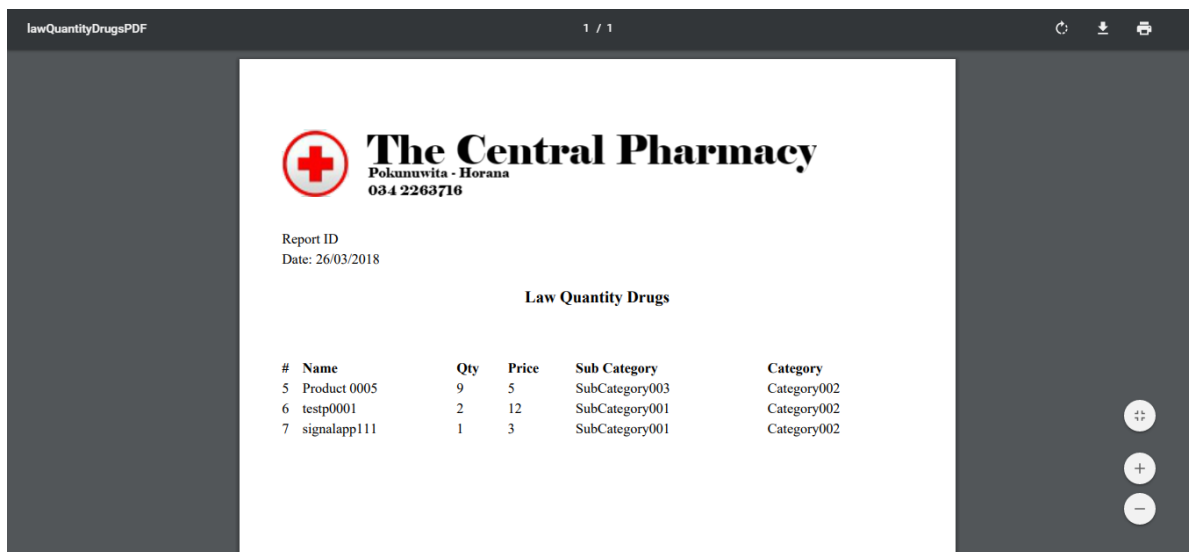


Figure 65: Highest sold product pdf

Daily income

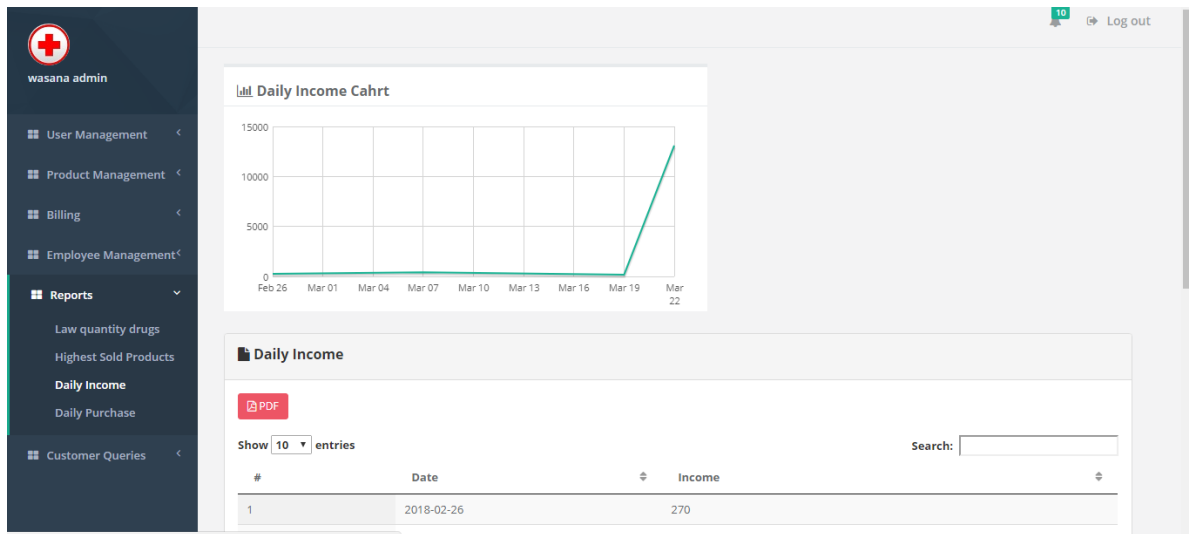


Figure 66: Daily income

Daily purchase

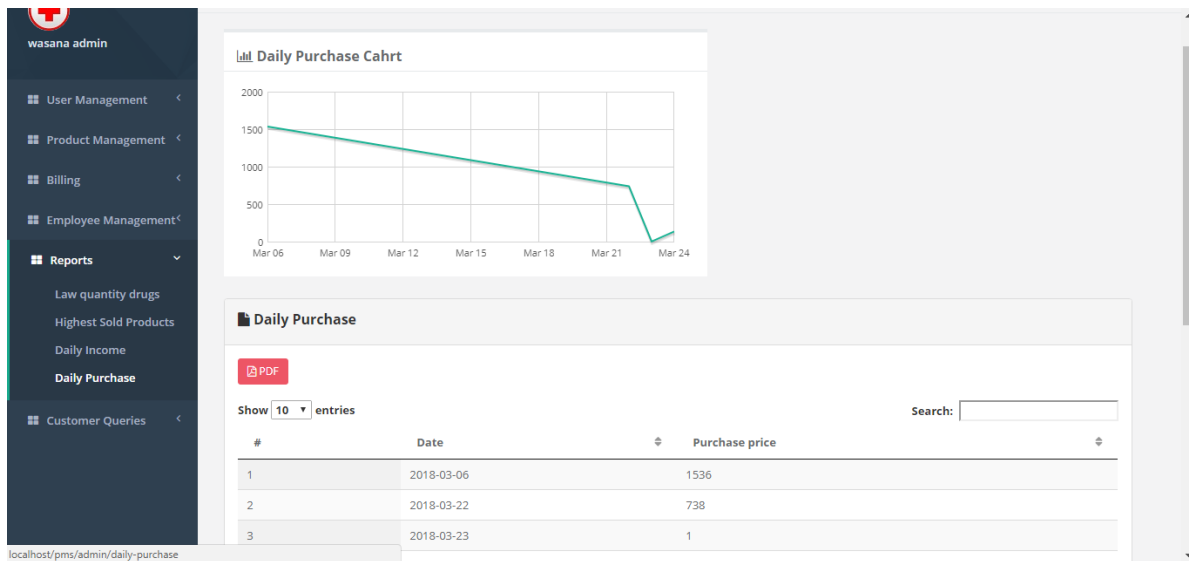


Figure 67: Daily purchase

Appendix E: Test Cases

Login

Test Case ID: Login01

Test Title: Login01 - Login with valid username and password

Test Priority (Low/Medium/High): High

Purpose: To verify login with valid username and password

Table 15: Test case - Login01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to login page		Load the login form	True
2	Give valid user name	Username: username is an email of the user eg: adminwasana@gmail.com		
3	Give valid password	Password: 1qaz2wsx		
4	Click Login button		User should be able to login	True

Test Case ID: Login02

Test Title: Login02 - Login with invalid username and valid password

Test Priority (Low/Medium/High): High

Purpose: To verify login with invalid username and valid password

Table 16: Test case - Login 02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to login page		Load the login form	True
2	Give invalid user name	Username: user123		
3	Give valid password	Password: 1qaz2wsx		
4	Click Login button		System will show an error message.	True

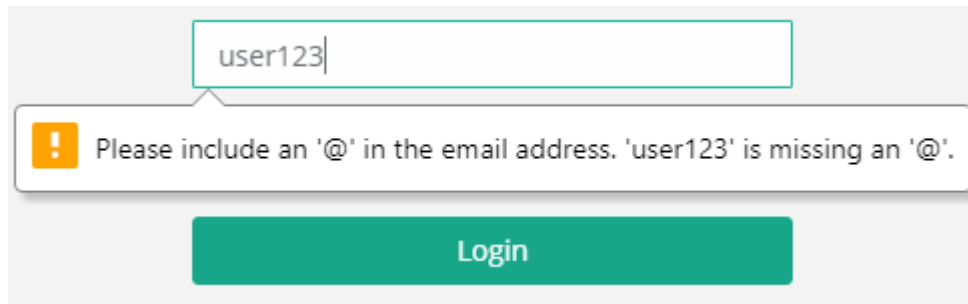


Figure 68: Error message - Login2

Test Case ID: Login03

Test Title: Login03 - Login with valid username and invalid password

Test Priority (Low/Medium/High): High

Purpose: To verify login with valid username and invalid password

Table 17: Test case - Login03

Step	Description	Test Data	Expected Results	Actual Results
1	Go to login page		Load the login form	True
2	Give valid user name	Username: username is an email of the user eg:		

		adminwasana@gmail.com		
3	Give invalid password	Password: user123456		
4	Click Login button		System must redirect to login page	True

Test Case ID: Login04

Test Title: Login04 - Login with invalid username and invalid password

Test Priority (Low/Medium/High): High

Purpose: To verify login with invalid username and invalid password

Table 18: Test case - Login04

Step	Description	Test Data	Expected Results	Actual Results
1	Go to login page		Load the login form	True
2	Give invalid user name	Username: username is an email of the user eg: adminwasana@gmail.com		
3	Give invalid password	Password: user123456		
4	Click Login button		System must redirect to login page and show an error message	True

Add Category details

Test Case ID: Category01

Test Title: Category01 – Add a category successfully

Test Priority (Low/Medium/High): High

Purpose: To verify adding a category successfully

Table 19: Test case - Category01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Category'		Load the 'Add new category' form	True
2	Fill the form correctly	According to given data in form		
3	Click submit button		System should send data to the database without any error	True

Test Case ID: Category02

Test Title: Category02 – Submitted form with empty field

Test Priority (Low/Medium/High): High

Purpose: To verify submitting form with invalid data/ empty required field

Table 20: Test case - Category02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Category'		Load the 'Add new category' form	True
2	Submit the form with empty field	empty field		
3	Click submit button		System should redirect the page with relevant	True

			error message 'Required field'	
--	--	--	-----------------------------------	--

Add Subcategory details

Test Case ID: Subcategory01

Test Title: Subcategory01– Add a subcategory successfully

Test Priority (Low/Medium/High): High

Purpose: To verify adding a subcategory successfully

Table 21: Test case - Subcategory01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Subcategory'		Load the 'Add new Subcategory' form	True
2	Fill the form correctly	According to given data in form		
3	Click submit button		System should send data to the database without any error	True

Test Case ID: Subcategory02

Test Title: Subcategory02 – Submitted form with empty field

Test Priority (Low/Medium/High): High

Purpose: To verify submitting form with empty field

Table 22: Test case - Subcategory02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Subcategory'		Load the 'Add new Subcategory' form	True
2	Fill the form with error format or empty required field	Submit form with empty field		
3	Click submit button		System should display relevant error message 'Required field'	True

Add new employee

Test Case ID: Employee01

Test Title: Employee01– Add new employee successfully

Test Priority (Low/Medium/High): High

Purpose: To verify adding new employee successfully

Table 23: Test case - Employee01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Employee'		Load the 'Add new Employee' form	True
2	Fill the form correctly	As mention test data in the form		
3	Click submit button		System should upload new employee details without any error	True

Test Case ID: Employee02

Test Title: Employee02– Add new employee without filling the form correctly

Test Priority (Low/Medium/High): High

Purpose: To verify adding new employee without filling the form correctly

Table 24: Test case - Employee02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Employee'		Load the 'Add new Employee' form	True
2	Fill the form with error format or empty required field	Empty required field		
3	Click submit button		System should redirect the page with relevant error message 'Required field'	True

Add new order

Test Case ID: Order01

Test Title: Order01– Add new order successfully

Test Priority (Low/Medium/High): High

Purpose: To verify adding new order successfully

Table 25: Test case - Order01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Order'		Load the 'Add new Order' form	True

2	Fill the form correctly	Fill the form with correct data		
3	Click submit button		System should upload new Order details without any error	True

Test Case ID: Order02

Test Title: Order02– Add new order without filling the form correctly

Test Priority (Low/Medium/High): High

Purpose: To verify adding new order without filling the form correctly

Table 26: Test case - Order02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Add Order'		Load the 'Add new Employee' form	True
2	Fill the form with error format or empty required field	Empty field of 'Order_ID' and duplicate IDs		
3	Click submit button		System should redirect the page with relevant error message 'Required field' 'Duplicate ID'	True

Notification

Test Case ID: Notification01

Test Title: Notification01– Successfully display notifications

Test Priority (Low/Medium/High): High

Purpose: To verify of displaying the notification successfully

Table 27: Test case - Notification01

Step	Description	Test Data	Expected Results	Actual Results
1	Login as admin		Successfully log in to the system	True
2	See the notifications	Change the particular data: Low quantity, Near date for Expiry date	Notifications should display on top right hand side of the system. Admin can be able to click on notification icon. In notification information related to particular product such as expiry date, Stock details should be mentioned.	True

Customer Search

Test Case ID: CustomerSearch01

Test Title: CustomerSearch01– Successfully search data

Test Priority (Low/Medium/High): High

Purpose: To verify search with valid input through the web

Table 28: Test case - CustomerSearch01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to web site. Here is a facility to search drugs		Load the site	True

2	Type valid input in search bar provided	'Product0001'	System should display search results with the price	
---	---	---------------	---	--

Test Case ID: CustomerSearch02

Test Title: CustomerSearch02– Customer search fails

Test Priority (Low/Medium/High): High

Purpose: To verify search with invalid input through the web

Table 29: Test case - CustomerSearch02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to web site. Here is a facility to search drugs		Load the site	True
2	Type invalid input in search bar provided	Invalid drug name	System should not display any product	True

Search as user

Test Case ID: Search01

Test Title: Search01– Successfully search data as a user

Test Priority (Low/Medium/High): High

Purpose: To verify search with valid input

Table 30: Test case - Search01

Step	Description	Test Data	Expected Results	Actual Results
1	Login to the system		Successfully log in to the system	True

2	Search with valid input	Product 001	Should display data with price, quantity, and other relevant information	True
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Test Case ID: Search02

Test Title: Search02– Fail to search data as a user

Test Priority (Low/Medium/High): High

Purpose: To verify search with invalid input

Table 31: Test case - Search02

Step	Description	Test Data	Expected Results	Actual Results
1	Login to the system		Successfully log in to the system	True
2	Search with invalid input	Invalid name	System should display nothing	True

Upload Prescription

Test Case ID: UploadPrescription01

Test Title: UploadPrescription01– Successfully upload the prescription

Test Priority (Low/Medium/High): High

Purpose: To verify uploading of prescription

Table 32: Test case - UploadPrescription01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Upload prescription' on home page			

2	Upload valid document	Fill form correctly	Upload with out an error	True
---	-----------------------	---------------------	--------------------------	------

Test Case ID: UploadPrescription02

Test Title: UploadPrescription02– Upload invalid prescription format

Test Priority (Low/Medium/High): High

Purpose: To verify uploading of prescription form incorrectly

Table 33: Test case - UploadPrescription02

Step	Description	Test Data	Expected Results	Actual Results
1	Go to ‘Upload prescription’ on home page			
2	Upload invalid document	Invalid form data	System redirects	True

Create Bill

Test Case ID: Bill01

Test Title: Bill01– Generate bill correctly

Test Priority (Low/Medium/High): High

Purpose: To verify creating bill correctly

Table 34: Test case - Bill01

Step	Description	Test Data	Expected Results	Actual Results
1	Create a bill	Use some items to check the bill (Qty*UnitPrice)	Correct bill with sub total	True

Upload Excel sheet

Test Case ID: Excel01

Test Title: Excel01– Upload excel correctly

Test Priority (Low/Medium/High): High

Purpose: To verify upload data correctly to the table

Table 35: Test case-Excel01

Step	Description	Test Data	Expected Results	Actual Results
1	Go to ‘Upload Excel’ page			
2	Upload valid document type	Correct file types are xls,xlsx, csv	Enter data correctly and show success message	True

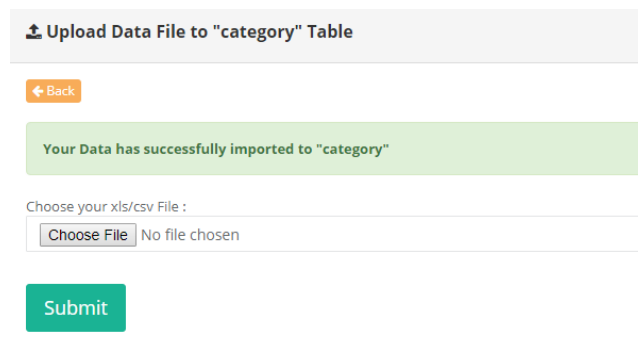


Figure 69: Upload excel success message

Test Case ID: Excel02

Test Title: Excel02– Upload excel incorrectly

Test Priority (Low/Medium/High): High

Purpose: To verify no file uploaded error confirmation

Table 36: Test case- Excel02

Step	Description	Test Data	Expected Results	Actual Results
------	-------------	-----------	------------------	----------------

1	Go to 'Upload Excel' page			
2	Submit without uploading a file	Submit without any file uploading	System should show error message	True

The screenshot shows a web interface for uploading a data file. At the top, there is a header 'Upload Data File to "category" Table'. Below it is an orange 'Back' button. A red error message box states 'The file field is required.'. Underneath, there is a label 'Choose your xls/csv File :' followed by a file selection area containing a 'Choose File' button and the text 'No file chosen'. At the bottom of the form is a green 'Submit' button.

Figure 70: Excel file not import error

Test Case ID: Excel03

Test Title: Excel03– Upload invalid file format

Test Priority (Low/Medium/High): High

Purpose: To verify invalid type of file uploading

Table 37: Test case- Excel03

Step	Description	Test Data	Expected Results	Actual Results
1	Go to 'Upload Excel' page			
2	Upload invalid document type	Submit with invalid type of file	System should show error message	True

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File is a docx file..! Please upload a valid xls/csv file..!

Choose your xls/csv File :

No file chosen

Figure 71: Invalid file type

Appendix F: Sample Codes

Database Connection code

DB_CONNECTION=mysql

DB_HOST=127.0.0.1

DB_PORT=3306

DB_DATABASE=pms

DB_USERNAME=root

DB_PASSWORD=

Category Management details code

Route for Category

```
Route::resource('admin/category', 'Admin\\CategoryController');
```

Controller for display Category details

```
public function index(Request $request)
{
    $keyword = $request->get('search');
    $perPage = 25;
    if (!empty($keyword)) {
        $category = Category::where('category_id', 'LIKE', "%$keyword%")
            ->orWhere('category_name', 'LIKE', "%$keyword%")
            ->paginate($perPage);
    } else {
        $category = Category::paginate($perPage);
    }
    return view('admin.category.index', compact('category'));
}
```

```
}
```

View Category interface (Category.blade.php)

```
@extends('layouts.app')
@section('sidebar')
@include('admin.sidebar')
@endsection
@section('content')
<div class="container">
  <div class="row">
    <div class="col-md-11">
      <div class="panel panel-default">
        <div class="panel-heading"><h3><b><i class="fa fa-fa fa-tag"></i>
Category</b></h3></div>
        <div class="panel-body">
          <form method="get" action="{{ url('admin/uploadexcel') }}">
            <input type="hidden" name="tbname" value="category">
            <a href="{{ url('/admin/category/create') }}" class="btn btn-success btn-
xs" title="Add New Category">
              <i class="fa fa-plus" aria-hidden="true"></i> Add New
            </a>
            <button type="submit" class="btn btn-primary btn-xs" >
              <i class="fa fa-upload" aria-hidden="true"></i> Upload Excel
            </button>
            <a href="{{
url('admin/downloadexcel',['type'=>'xlsx','tbname'=>'category']) }}" class="btn btn-info btn-
xs" >
              <i class="fa fa-download" aria-hidden="true"></i> Download Excel
            </a>
```

```

        <a href="{{
url('admin/downloadexcel',['type'=>'csv','tname'=>'category']) }}" class="btn btn-warning
btn-xs" >
        <i class="fa fa-download" aria-hidden="true"></i> Download csv
    </a>
</form>
<form method="GET" action="{{ url('/admin/category') }}" accept-
charset="UTF-8" class="navbar-form navbar-right" role="search">
    <div class="input-group">
        <input type="text" class="form-control" name="search"
placeholder="Search..." value="{{ request('search') }}">
        <span class="input-group-btn">
            <button class="btn btn-default" type="submit">
                <i class="fa fa-search"></i>
            </button>
        </span>
    </div>
</form>
<br/>
<br/>
<div class="table-responsive">
    <table class="table table-borderless">
        <thead>
            <tr>
                <th>#</th><th>Category Id</th><th>Category
Name</th><th>Actions</th>
            </tr>
        </thead>
        <tbody>
            @foreach($category as $item)
                <tr>
                    <td>{{ $item->id }}</td>

```


Call Edit category (in controller)

```
public function edit($id)
{
    $category = Category::findOrFail($id);
    return view('admin.category.edit', compact('category'));
}
```

Category edit form (edit.blade.php)

```
<div class="container">
    <div class="row">
        <div class="col-md-11">
            <div class="panel panel-default">
                <div class="panel-heading"><h3><b><i class="fa fa-fa fa-tag"></i> Edit
Category (# {{ $category->category_id }})</b></h3></div>
                <div class="panel-body">
                    <a href="{{ url('/admin/category') }}" title="Back"><button class="btn btn-
warning btn-xs"><i class="fa fa-arrow-left" aria-hidden="true"></i> Back</button></a>
                    <br />
                    <br />
                    @if ($errors->any())
                        <ul class="alert alert-danger">
                            @foreach ($errors->all() as $error)
                                <li>{{ $error }}</li>
                            @endforeach
                        </ul>
                    @endif
                    <form method="POST" action="{{ url('/admin/category/' . $category->id)
}}" accept-charset="UTF-8" class="form-horizontal" enctype="multipart/form-data">
                        {{ method_field('PATCH') }}
                        {{ csrf_field() }}
```

```

        @include ('admin.category.form', ['submitButtonText' => 'Update'])
    </form>
</div>
</div>
</div>
</div>
</div>

```

Update product (in controller)

```

public function update(Request $request, $id)
{
    $this->validate($request, [
        'category_id' => 'required|min:1',
        'category_name' => 'required|min:1'
    ]);
    $requestData = $request->all();
    $category = Category::findOrFail($id);
    $category->update($requestData);
    return redirect('admin/category')->with('flash_message', 'Category updated!');
}

```

Call Add new product form (in controller)

```

public function create()
{
    return view('admin.category.create');
}

```

Create new Product form (create.blade.php)

```

<div class="container">
  <div class="row">
    <div class="col-md-11">
      <div class="panel panel-default">
        <div class="panel-heading"><h3><b><i class="fa fa-fa fa-tag"></i> Create
New Category</b></h3></div>
        <div class="panel-body">
          <a href="{{ url('/admin/category') }}" title="Back"><button class="btn btn-
warning btn-xs"><i class="fa fa-arrow-left" aria-hidden="true"></i> Back</button></a>
          <br />
          <br />
          @if ($errors->any())
            <ul class="alert alert-danger">
              @foreach ($errors->all() as $error)
                <li>{{ $error }}</li>
              @endforeach
            </ul>
          @endif
          <form method="POST" action="{{ url('/admin/category') }}" accept-
charset="UTF-8" class="form-horizontal" enctype="multipart/form-data">
            {{ csrf_field() }}
            @include ('admin.category.form')
          </form>
        </div>
      </div>
    </div>
  </div>
</div>

```

Insert new category details to category table (contrller)

```

public function store(Request $request)
{
    $requestData = $request->all();
    $id = $requestData['category_id'];
    $query = "select * from categories where category_id='$id'";
    $validate = DB::select($query);
    if(sizeof($validate) > 0){
        $request->session()->flash('alert-danger', 'duplicate category id!');
        return view('admin.category.create');
        die();
    }
    $model = Category::create($requestData);
    return redirect('admin/category')->with('flash_message', 'Category added!');
}

```


Appendix G: User Evaluation

Questionnaire

01. Personal information:

Name (Opt): Age:

Designation: Company/ Role (opt):.....

Gender: Male
 Female

Marital status: Single
 Married

02. what do you think about following factors regarding the pharmacy which has a manually handled system? (customer point of view)

		(a)	(b)	(c)	(d)	(e)
	Factors	Very poor	Poor	Fair	Good	Very good
Q1	Time taken to know a particular drug is out of stock					
Q2	Time taken to estimate the price for the prescription					
Q3	Time for generating the bill					
Q4	Time taken to be served (to buy medicine or other product)					

03. Indicate whether you agree with the following statements.

		(a)	(b)	(c)	(d)	(e)
	Statements	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Q05	Computerized system is suitable for a pharmacy					
Q06	It helps to reduce waiting time in queues					

04. Answer the following questions: (to know employee's computer ability)

Q07. How often do you use the computer?

- a. Never use a computer
- b. Seldom
- c. Use computer 2 to 4 times a month
- d. Use computer weekly
- e. Use computer daily

Q08. How often do you use Internet?

- a. Never used
- b. Seldom
- c. Use 2 to 4 times a month
- d. Use weekly
- e. Use Daily

Q09. How is your keyboard typing ability?

- a. Very bad
- b. Bad
- c. Average
- d. Good
- e. Very good

Q10. How about hardware knowledge of you?

- a. Very bad
- b. Bad
- c. Average
- d. Good
- e. Very good

05. Following questions are regarding this system.

		(a)	(b)	(c)	(d)	(e)
	Factors	Strongly disagree	Disagree	Average	Agree	Strongly agree
Q11	Whole System is user friendly					
Q12	It is easy to work with computerized system rather than manual system					

Q13	Can work with the system without any others help					
Q14	System functionalities are easy to understand					
Q15	System provided relevant error messages when needed					
Q16	Interface design is user friendly					
Q17	Can quickly search products					
Q18	Report generation is easy to handle					
Q19	Easy to find stock details quickly					
Q20	Pharmacy income will increase					

Evaluation Results

	(a)	(b)	(c)	(d)	(e)
Q01		6	3	1	
Q02		7	3		
Q03		5	5		
Q04		7	2	1	
Q05				4	6
Q06				5	5
Q07		1	2	5	2
Q08		1		4	5
Q09			1	3	6
Q10			1	5	4
Q11				7	3
Q12			1	6	3
Q13			2	6	2
Q14			1	8	1
Q15			2	8	
Q16				8	2
Q17			1	7	2
Q18				4	6
Q19				5	5
Q20			3	5	2