PHARMACY MANAGEMENT SYSTEM

Software Requirement Specification and Analysis

Group 2

BSSE 08th Batch

Institute of Information Technology

University Of Dhaka

PHARMACY MANAGEMENT SYSTEM

SUBMITTED TO

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LETTEROF TRANSMITTAL

22nd November 2017
Dr. Kazi Muheymin-Us-Sakib
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Subject: Submission of term report on "Pharmacy Management System"

Sir
With due respect, we are submitting the report on the above topic you have assigned to us. In this report, we have given our best effort albeit some shortcomings.

We earnestly hope that you would excuse our errors and oblige thereby.

Sincerely yours

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ABSTRACT

The study is made for Pharmacy Management System. The scope of the study is to analyse the existing small-scale pharmacy management system and to know its functions and drawbacks, and design the SRS of this system. The object of this study is to develop an SRS (Software Requirements Specification and Analysis) of Pharmacy Management System.

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CHAPTER 1: INTRODUCTION

This chapter is a part of our software requirement specification and analysis for the project "Pharmacy Management System". In this chapter, we focus on the intended audience for this project.

1.1 PURPOSE

This document briefly describes the Software Requirement Specification and Analysis of Pharmacy Management System. It contains functional, non-functional and supporting requirements and establishes a requirements baseline for the developing the system. The SRS holds the requirements are independent, uniquely numbered and organized by topic. The SRS serves as a platform to forward user requirements to the developer and provides a common reference point for both the developer team and the stakeholder community. The SRS will evolve over time as users and developers work together to validate, clarify and expand its contents.

1.2 INTENDED AUDIENCE

This SRS is intended for several audiences including the customers as well as the project managers, designers, developers, and testers.

- The customer will use this SRS to verify that the developer team has created a product that the customer finds acceptable.
- The project managers of the developer team will use this SRS to plan milestones and a delivery date, and ensure that the developing team is on the right track when developing the system.
- The designers will use this SRS as a basis for creating the system's design. The designers will continually refer back to this SRS to ensure that the system they are 0designing will fulfill the customer's demands.
- The developers will use this SRS as a basis for developing the system's functionality. The developers will link the requirements defined in this SRS to the software they create to ensure that they have created a software that will fulfill all of the customer's documented requirements.
- The testers will use this SRS to derive test plans and test cases for each documented requirement. When portions of the software are complete, the testers will run their tests on that software to ensure that the software fulfills the requirements documented in this SRS. The testers will again run their tests on the entire system when it is complete and ensure that all requirements documented in this SRS have been fulfilled.

1.3 CONCLUSION

This analysis of the audience helped us to focus on the users who will be using our analysis. This document will help each and every person related to this project to perceive the subject matter of the project.

CHAPTER 2: INCEPTION OF PMS

In this chapter, the Inception part of the SRS will be discussed briefly.

2.1 INTRODUCTION

The renowned genius Albert Einstein has said, “If I had an hour to solve a problem I’d spend 55 minutes thinking about the problem and 5 minutes thinking about the solution.” This means, it is more necessary to dig deep into the facts of the problem rather than jumping to providing a solution. Developing efficient software falls under the same jurisdiction.

Inception is the first phase of requirements engineering. It defines the scope and nature of the problem. The principal target of this stage is to create a basic understanding of the problem, identify the people involved and comprehend the nature of the solution via communication.

For a clear perception of the software requirements, a groundwork is established involving the following steps:

- Listing down the stakeholders
- Recognizing multiple viewpoints
- Working towards collaboration
- Breaking the ice and initiating communication

2.1.1 LISTING DOWN THE STAKEHOLDER

According to Sommerville and Sawyer [Som97], “Anyone who benefits in a direct or indirect way from the system which is being developed is a stakeholder.” This implies that stakeholders include the end users of the developed software as well as the people whose activities might be influenced by the tool. Towards the end of inception, the list of stakeholders is usually larger as every stakeholder is allowed to suggest one or more individuals who might be probable stakeholders for the given problem.

To identify stakeholders we consulted a number of small-scale pharmacies in Dhaka, Bangladesh and asked them the following questions:

- Who will be using the product?
- Whose work will this project affect?

We identified the following stakeholders for our project.

- Pharmacy owner
- Salesperson
- Shareholder
- Supplier
- Developer

2.1.2 Recognizing Multiple Viewpoints

The list of stakeholders will contribute to the input when requirements are elicited. Every stakeholder has different views of the system and achieves different benefits when the system is developed.

Pharmacy Owner's And Shareholder's Viewpoints

- User friendly
- Computer based system
- Minimum maintenance expenditure
- Multiple login system: admin and standard
- Strong authentication
- Error free system
- Salespersons database
- Salespersons working hours recorder
- Notification per sale (to admin only)
- Report of daily transaction history (admin only)
- Cash-memo system
- Expiry date tracker and notification (before 4 months of expiry date)
- Low stock alert
- Recommendation list for medicines having same component
- Search option
- Supplier's database
- Sorting drugs (and other products) with respect to companies and components
- Future support from developers

Salesperson's Viewpoints

- User friendly
- Smartphone based system
- Easy access
- Offline guidance
- Expiry date tracker and notification
- Cash memo system
- Recommendation list for medicines having same component
- Search option for drugs
- Sorting drugs (and other products) with respect to companies and components
- Internet browsing option

DEVELOPER'S VIEWPOINTS

- Easy to develop
- No ambiguous requirement
- Keeping it simple and user friendly
- Light weight

SUPPLIER'S VIEWPOINTS

- Get notification via SMS or email
- Less complicated system

2.1.3 WORKING TOWARDS COLLABORATION

Each of the stakeholder constituencies (and non-stakeholder constituency) contributes to the requirement engineering process. The greater the numbers of interactions with multiple stakeholders, the higher is the probability of inconsistency, conflicts and clashes of viewpoints. In such circumstances, requirement engineers finalize the requirements following some steps, which are listed below.

- Finding out the commonality and the conflicting points of stakeholders
- Categorizing stakeholders
- Listing down the requirements based on the stakeholder's priority points

COMMON POINTS

- User friendly
- Expiry date tracker and notification
- Low stock alert
- Cash memo system
- Recommendation list for medicines having same component
- Search option for drugs
- Sorting drugs (and other products) with respect to companies and components
- Supplier's database

CONFLICTING POINTS

- Device
- High security
- Budget
- Easy access

FINAL REQUIREMENTS

- User friendly system
- Strong authentication
- Expiry date tracker and notification
- Recommendation list for medicines having same component
- Search option for drug
- Sorting drugs (and other products) with respect to companies and components
- Multiple login system: admin and standard
- Salesperson working hours recorder
- Low stock alert
- Restrict access to functionality of the system based upon user roles

2.1.4 COMMUNICATION INITIATION

In requirements engineering, the involved individuals can be broadly divided into two clusters: the developers and the stakeholders. Coming from different backgrounds, it will be obvious that these two parties will have different points of views regarding the problem. The stakeholders have more knowledge on facing the problem. Meanwhile, the developers are experienced with providing computerized solutions. Thus, in order to obtain an efficient solution to the problem, it is important to 'loosen up' or 'break the ice' between the two groups.

Following the ideal guidelines of requirement engineering, some context free questions were asked. The context free questions help throwing light on the stakeholders of the project. The next set of questions includes the context itself so that a better understanding of the problem is obtained. The stakeholder is encouraged to voice out his/her opinions about an alternate solution and also provide recommendations to the developer's suggestions. The final set of questions focuses on the communication activity itself.

2.2 CONCLUSION

The intense hours of developing a software is fruitful only if the users are benefitted and satisfied. Jumping into coding, right after signing up for a project throws both the clients and the developers into the risks of failure. A successful project demands a better perception of the problem. The best and easiest way to sketch out the hints of a solution is to interact with those encountering the problem itself. This is where inception phase comes.

Inception phase has given us the opportunity to create a basic understanding of the problem and perceive an abstract idea of the nature of the solution. Direct interaction with the stakeholders made us come across core points of a solution and realize the effectiveness of communication between two parties. We believe that our groundwork will help us implement an efficient solution to the problem.

CHAPTER 3: ELICITATION OF PMS

After discussing on the Inception phase, we need to focus on the Elicitation phase. So this chapter specifies the Elicitation phase.

3.1 INTRODUCTION

The second phase of requirements engineering is elicitation. The main task of elicitation is to combine elements of problem solving, elaboration, negotiation and specification. Gathering information from stakeholders regarding the problem was not sufficient to design the software. The problems that arose, were encountered following the principles of elicitation.

3.2 ELICITING REQUIREMENTS

Stakeholders work together to identify the problems, propose elements of the solutions, negotiate different approaches and specify an initial set of solution requirements. This approach is sometimes called Facilitated Application Specification Technique (FAST). Elicitation has some sub-phases which are:

- Collaborative Requirements Gathering
- Quality Function Deployment
- Usage Scenario
- Elicitation Work Products

3.2.1 COLLABORATIVE REQUIREMENTS GATHERING

During inception, basic questions and answers established the scope of the problem. However, some problems persisted about the scope as the boundary of the system was ill defined and the customers have stated some unnecessary confusing detail. Also, customers/stakeholders do not have a proper understanding about the abilities of the computing environment which results in further discussion regarding the problem domain and product requirements. The requirements were put under re-evaluation by doing following tasks.

- Meetings were conducted with stakeholders (owners and salespersons) and we went into further investigation about their requirements and expectations
- They were inquired about the problems with the existing workflow

- The final requirement list was derived at the end of the meeting

3.2.2 Problem in the Scope

A number of problems were encountered in the course of preparing the software requirement specification and analysis of Pharmacy Management System.

Scopes

- Software was designed for small scale pharmacy
- Software was designed for one device
- Automation of managerial function of pharmacy

Limitations

- Software was not designed for distributed system
- High level security of data was not ensured
- Online purchase and online payment options were not included

3.2.3 Quality Function Deployment

Quality Function Deployment (QFD) is a quality management technique that translates the needs of the clients into technical requirements for the software. The prime concern of the QFD is customer satisfaction maximization. In order to ensure this, QFD enforces an understanding of what the customers describe as 'valuable' and then deploy these values throughout the engineering process.

QFD defines three types of requirements:

- Normal Requirements
- Expected Requirements
- Exciting Features

3.2.3.1 Normal Requirements

Normal requirements refer to the objectives and the goals that are stated for the product during the meeting with the stakeholders. The presence of these requirements ensures the satisfaction of the customers. The normal requirements for the project are stated below.

- Low storage alert
- Expiry date alert
- Recommendation list based on sales-frequency
- Daily transaction history
- Login system
- Customer's due table
- Employee's log information
- Inventory management
- Automation of financial activities

3.2.3.2 Expected Requirements

The requirements that are implicit to the system might not be brought up during the meeting because of their fundamental nature. Despite being not explicitly mentioned, their presence must be ensured. Otherwise, the product will leave customers dissatisfied. These requirements are called expected requirements and these are stated below.

- Error-free in terms of output
- More efficient than the existing workflow
- Authentication and authorization
- User-friendly
- Database (where information will be stored)

3.2.3.3 Exciting Features

The factors that go beyond the customer's expectations and prove to be satisfying when present are called exciting features. The exciting features are the so called 'wow factor' for our project.

- Notification message/email
- Recommendation list
- Graph generation based on monthly profit/loss
- Monthly transaction graph

3.2.4 USAGE SCENARIO

Pharmacy Management System (PMS) is an automated system for the following purposes:

- Authentication
- Stock Management
- Financial Management
- Information System
- Human Resources Management

3.2.4.1 AUTHENTICATON

When the user opens the software, options for sign in is displayed. These activities related to accessing the system fall under the category of authentication.

REGISTRATION/SIGN UP: DATA ENTRY

The first person to be registered into the system is the administrator. The information he/she has to enter at the time of registration includes: full name, username, contact number, email, present address, permanent address, password, NID, one backup question and its corresponding answer. The administrator has the sole authority to register salespersons and shareholders in the system. To enlist a salesperson to the system, the following data must be provided: full name, username, password, contact number, email, date of recruitment, salary, National ID (NID), present and permanent addresses. The following information must be given when registering a shareholder: full name, username, password, present and permanent addresses, contact number, email, National ID (NID), joining date,investment amount. It must be noted that the administrator himself/herself assigns the username and password for a shareholder/salesperson at the time of registration.

REGISTRATION/SIGN UP: VALIDITY CHECKING AND STORING INFORMATION

At the time of data entry, there would be a validity check. The password must contain minimum 8 characters and maximum 20 characters including at least one digit. The format of e-mail, password and contact number is verified at the time of input. Confirmation code of four digits is sent to valid phone number and email address. Before confirming

registration, the system asks for the code. Correct entry of code results in account creation. The registration information of the individual is stored in Database.

SIGN IN

When the user wants to "sign-in", he/she must undergo authentication. He/she enters his/her respective username and password. The entered data is matched with the corresponding data stored in Database. If entered data matches the stored data, the user gains access to the system. The first login time of a salesperson is recorded on a daily basis.

ACCOUNT RECOVERY

If the user fails to recall his/her password and/or username, he/she can directly choose the "account recovery" option. Otherwise, he/she can try five times. If the entered password is incorrect on the 5^{th} attempt, the user will be directed to the account recovery option. In case of the administrator, the system presents him/her of his/her previously saved backup questions. If the answers to the backup questions match with the answers stored in Database, a confirmation code is sent to the administrator's phone and email address. On the other hand, salespersons and shareholders are asked to enter their contact number and email address. If the contact number and the email address match with the contact number and email address stored in Database, the system sends the confirmation code to that number and/or email-address. Then, the system prompts the user to enter the confirmation code. The confirmation code is valid for 3 hours upon delivery. If the user enters the valid confirmation code within the given period, he/she then will be able reset his/her password and/or username.

SIGN OUT

When a user attempts to sign out, the system checks for unsaved data (active process), if there remains some unsaved data (active data). If the user is salesperson, the last logout time will be recorded every day.

3.2.4.2 STOCK MANAGEMENT

The stock of a pharmacy includes drugs, first aid products, refrigerated products, hygiene products and minimal medical tools. The following attributes of products will be stored in Database: product name, product ID or PID, product type, component, company name, cost

price, selling price, manufactured date, expiry date, discount, sales-frequency. Again, product will be stored by inventory details. The inventory would show which product is kept in which rack by the attribute, inventory ID. Products can be searched by the product name, company name and component name by salesperson and administrator. One of the most important issues in pharmacy management is to keep record of expiry dates of products. A carton of products whose expiry date will come in four months and another carton of the same product whose expiry date comes in a year can be in the stock. In order to reduce wastage, the pharmacy tries to sell the products whose expiry dates are nearer. For this reason, products are displayed by their expiry date.

Stock Reserve And Transaction Update

At the beginning, the administrator performs the task of updating the stock reserve. After salespersons are added to the system, they will update the stock upon receiving the products delivered by the supplier. The salesperson also updates the stock information after every sale. After every update, system will show pop-up for successful update.

Product Renewal And Exception

Products can also go missing (due to accidents, political conflicts, extortion, theft, natural disasters). The drop in stock will also be recorded in Database by salesperson. Again due to less demands and sales, expiry dates of the products in the stock may pass. In these circumstances, the salesperson will update the decrement and notify the administrator. Sometimes, supplier allows the return of expired products and provides new products in return or even may give products for free.

3.2.4.3 Financial Management

The business of a pharmacy starts with an initial investment or principal which will be stored in the system. The cash details are stored as assets, creditor's amount, debtor's amount and profit amount, expense amount, monthly sale, monthly investment. The daily transactions are handled by the salesperson. When a customer pays for a product, the salesperson updates the cash. The transaction information for product sale is stored by the following attributes: transaction ID or TID, product name, product ID or PID, quantity, date, username (of salesperson). The salesperson also notifies the administrator for paying the supplier. Administrator clears the dues with the cash in the shop and performs the update in the system.

An administrator will give the salespersons their salaries. Besides salaries, there are maintenance expenditures, for example, shop rent, electric bill, supplier payment. All these expenditures are treated as transaction which contain the following attributes: expenditure transaction id or ETID, expenditure transaction type or ET-type, expenditure transaction amount, username (salesperson when paying him/her), date and remarks.

The shareholders may desire to increment/decrement their shares in the business or withdraw their profits. The shareholder notifies the administrator for cash withdrawal. During profit withdrawal, share increment/decrement, the sum of money to be deducted/added is entered as transaction.

Sometimes, loss is incurred from political clashes, extortions, accidents, natural disaster. The salesperson sends notification to the administrator regarding the loss. The administrator keeps record of the amount of the losses in Database with the date of the incident.

3.2.4.4 INFORMATION SYSTEM

The salesperson cannot remember all the products that need to be delivered, which products have their expiry dates nearby, which supplier to contact for which product, how many products have gone missing due to unavoidable circumstances. The information management system assists and aids the salesperson in overcoming the problem of recalling everything.

The number of products in the stock decreases automatically after every sale. When the products reach a certain number or below (determined by the administrator), the database generates a low stock alert and notifies the salesperson and administrator. The salesperson sends request to supplier for products. The system shows whether the request has been sent successfully or not.

As stated before, Database keeps record of the expiry date of products. The administrator sets a time period before the expiry date for each product. When a product reaches the threshold, Database sends “expiry date alert” notifications to the salesperson and administrator.

Sometimes customers are unable to give full payment of purchased products. In these circumstances, a salesperson will enter customer data including: customer name, phone no, National ID, address, due amount, date of due occurrence and send a notification to administrator for the product sold with pending due. Database stores the customer details.

If customer returns product, loan of customer is updated. If there is no loan, new product will have to be purchased with same amount of money at least.

At times, individuals/customers want to sell products purchased from another pharmacy. The salesperson will seek the administrator's permission by sending a request. The pharmacy purchases the product checking the expiry date and updates the stock.

There are cases when a customer may be in need of a product that is unavailable. For such incidents, the salesperson sends message to the administrator over the software about the customer and the product in need. The administrator grants/denies the request for future purchase.

The pharmacy can also fall victim to extortion or accidents. The salesperson sends messages of the products lost in these cases to the administrator.

The information system also contains the daily transaction history, product sales-frequency, graph based on monthly profit/loss and monthly transaction graph. The administrator and the salesperson can see all the all these information and the shareholder can only see the monthly profit/loss graph and monthly transaction report if he/she wants.

3.2.4.5 Human Resources Management

The system supports three kind of users: Administration, Salesperson and Shareholder. Besides these individuals, every pharmacy has suppliers who provide products on demand. The administrator exercises the power to include or exclude individuals involved. He/she also has the ability to edit the individual's information. When adding salespersons, shareholders and suppliers to the system, the details of the individuals will be stored. These details include full name, address, email, contact number, National ID, recruitment date (for salesperson only), salary (for salesperson only), joining date(for shareholder only), investment amount (for shareholder only). Besides these information, company name, company email, company contact number, company address are stored in case of suppliers. All these data are entered by the administrator. When administrator removes anyone, information will be removed from Database and their access to the system will be denied onwards.

3.2.5 Elicitation Work Product

At first we have to know whether the output of the elicitation task may vary because of the dependency on the size of the system or the product to be built. Here, the elicitation work product includes the followingsteps.

- Making a statement of our requirements for the Pharmacy Management System

- Making a bounded statement of scope for our system
- Making a list of users and other stakeholders who participated in the requirements elicitation
- A set of usage scenarios that provide insight into the use of the system
- Description of the system's technical environment

CHAPTER 4: SCENARIO-BASED MODELING OF PMS

This chapter describes the Scenario-Based Model for the Pharmacy management System.

4.1 INTRODUCTION

When developing software, user satisfaction is given the highest priority. The effective method to identify the requirements to establish meaningful analysis and design model is by determining how end user and other actor wants to interact with the system. Thus, requirements modelling begins with scenario generation in the form of use cases, activity diagrams and swim lane diagrams.

4.2 DEFINITION OF USECASE

A Use Case captures a contract that describes the system behaviour under various conditions as the system responds to a request from one of its stakeholders. In essence, a Use Case tells a stylized story about how an end user interacts with the system under a specific set of circumstances. A Use Case diagram simply describes a story using corresponding actors who perform important roles in the story and makes the story understandable for the users.

The first step in writing a Use Case is to define that set of "actors" that will be involved in the story. Actors are the different people that use the system or product within the context of the function and behaviour that is to be described. Actors represent the roles that people play as the system operators. Every user has one or more goals when using the system.

PRIMARY ACTOR

Primary actors interact directly to achieve required system function and derive the intended benefit from the system. They work directly and frequently with the software.

SECONDARY ACTOR

Secondary actors support the system so that primary actors can do their work. They either produce or consume information.

4.3 Use Case Diagrams

Use case diagrams give the non-technical view of overall system.

4.3.1 Level – 0 Use Case Diagram – PMS

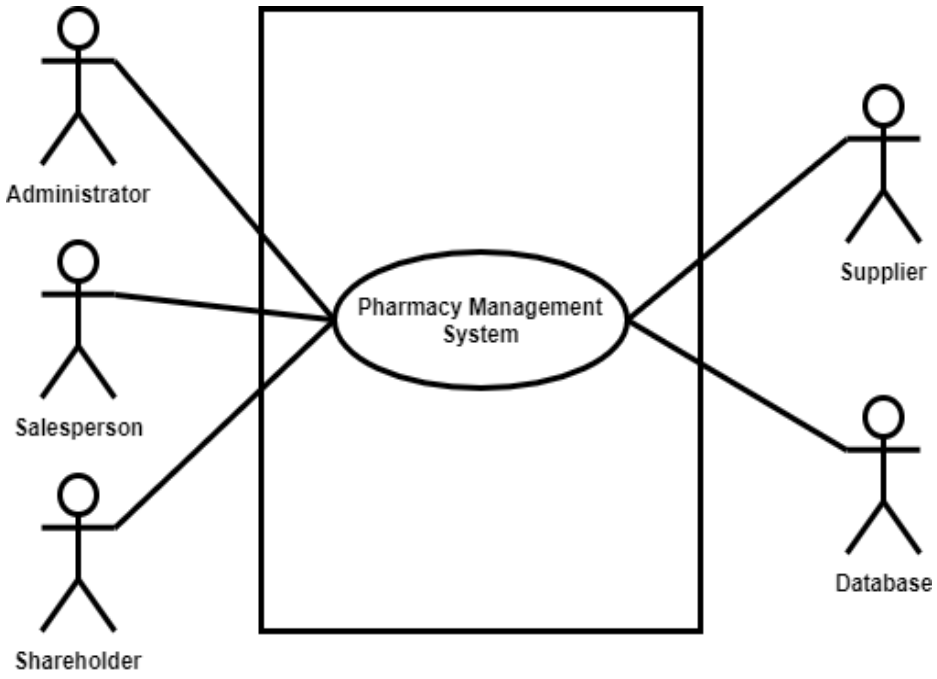


Figure – 1: Level 0 use case diagram – PMS.

Name: Pharmacy management system

ID: PMS – L – 0

Primary Actors: Administrator, Salesperson, Shareholder, Database

Secondary Actor: Supplier

Description Of Use Case Diagram Level – 0:

After analysing user story we found five actor who will directly use the system as a system operator. Primary actors are those who will play action and get reply from the system whereas secondary actors only produce or consume the information.

The actors of Pharmacy Management System are stated as follows.

- Administrator – Admin (Primary)
- Shareholder – SH (Primary)
- Salesperson – SP (Primary)
- Database – DB (Primary)
- Supplier (Secondary)

4.3.2 Level – 1 Use Case Diagram – Subsystem

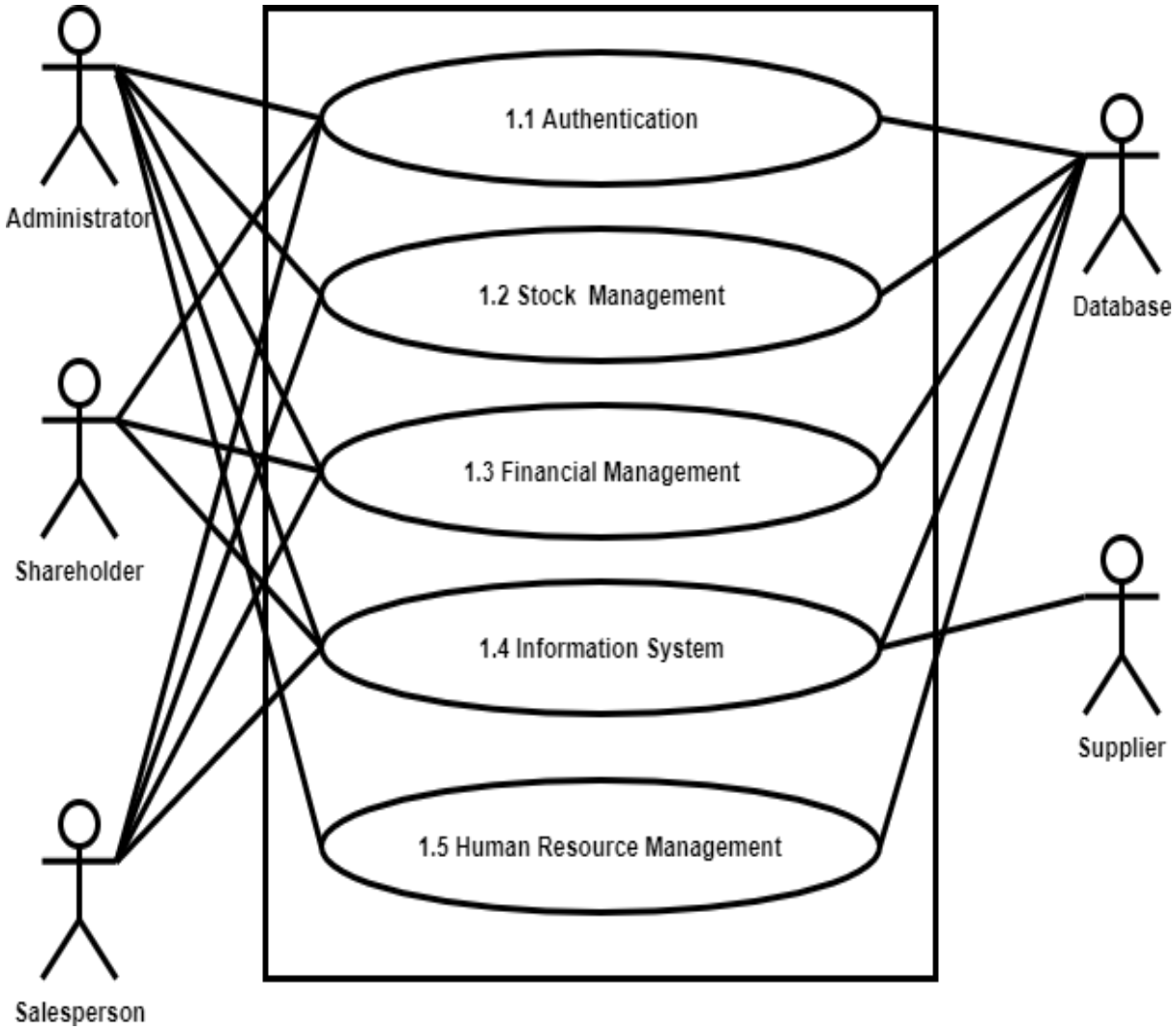


Figure – 2: Level 1 use case diagram – Subsystem.

Name: Subsystem of PMS

ID: PMS – L – 1

Primary Actors: Administrator, Salesperson, Shareholder, Database

Secondary Actor: Supplier

DESCRIPTION OF USE CASE DIAGRAM LEVEL – 1:

There are five subsystems in Pharmacy Management System.

- Authentication
- Stock Management
- Financial Management
- Information system
- Human Resource Management

4.3.3 LEVEL – 1.1 USE CASE DIAGRAM – AUTHENCATION

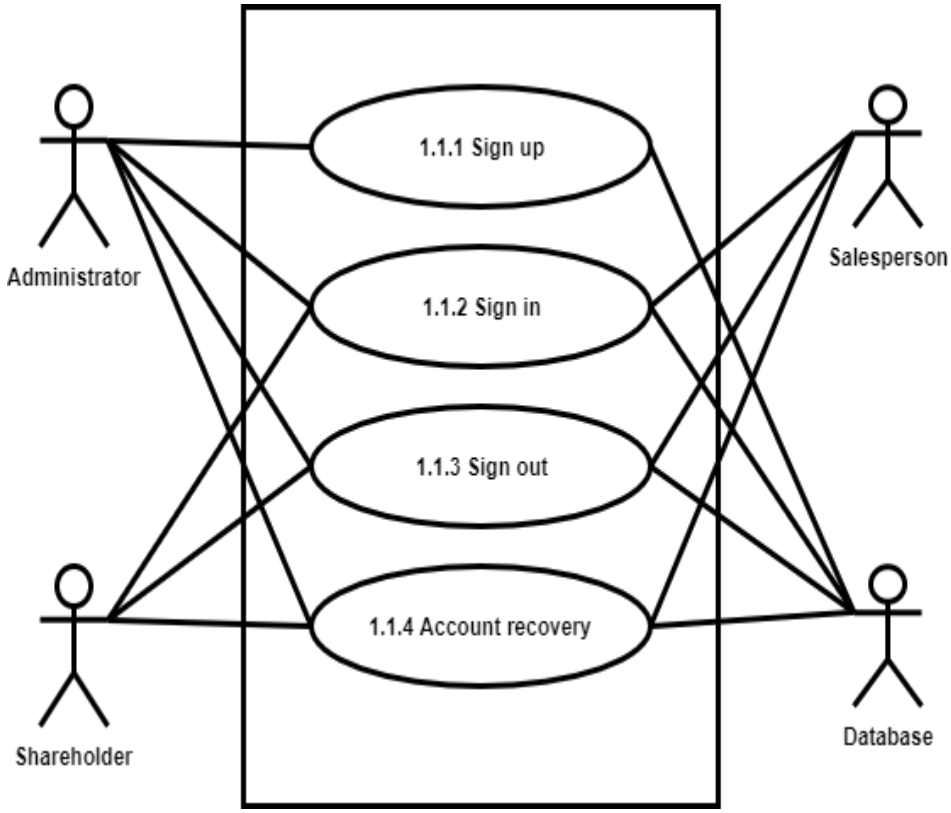


Figure – 3: Level 1.1 use case diagram – Authentication.

Name: Authentication of PMS

ID: PMS – L – 1.1

Primary Actors: Administrator, Salesperson, Shareholder, Database

Secondary Actor: N / A

Description Of Use Case Diagram Level – 1.1:

Authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be. The authentication subsystem of PMS can be divided into four parts. These are:

- Sign up
- Sign in
- Sign out
- Account recovery

4.3.4 Level – 1.1.1 Use Case Diagram – Sign Up

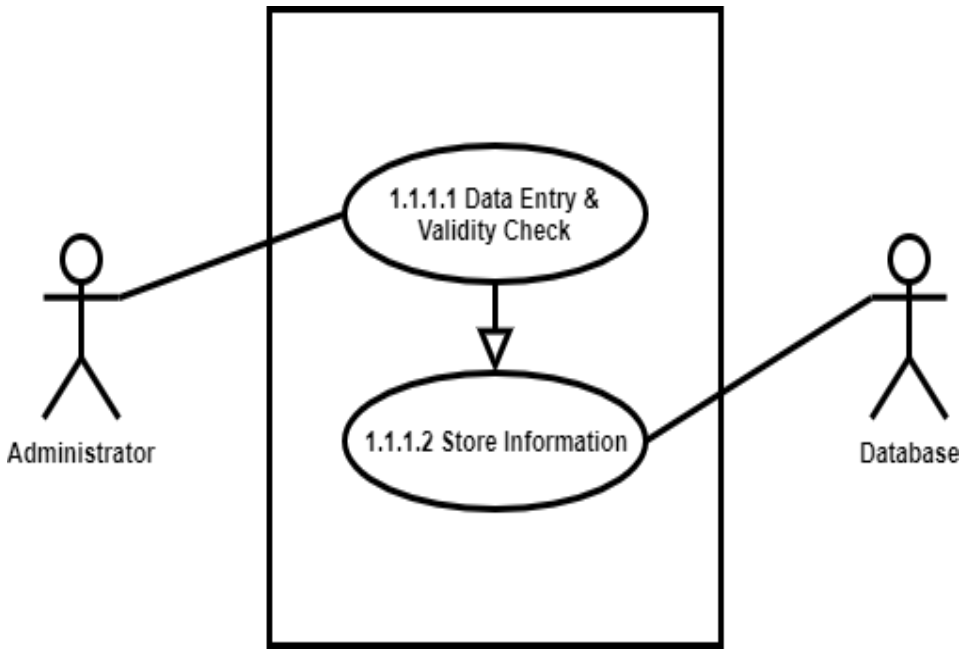


Figure – 4: Level 1.1.1 use case diagram – Sign up.

Name: Sign up

ID: PMS – L – 1.1.1

Primary Actors: Administrator, Database

Secondary Actor: N / A

Description Of Use Case Diagram Level – 1.1.1:

- **Primary Actors:** Administrator, Database
- **Secondary Actors:** Salesperson, shareholder

1.1.1.1 Data Entry and Validy Check

- **Primary Actor:** Administrator
- **Secondary Actor:** N / A

Administrator's Action / Reply:

- **Action:** Administrator will enter data during sign up.
- **Reply:** System will receive data and show whether the entered data is valid or not.

1.1.1.2 Store Information

- **Primary Actor**: Database
- **Secondary Actors:** N / A

Database's Action / Reply

- **Acton:** Store valid data.
- **Reply:** Show data successfully stored or not.

Sign Up: Description

The system will hold 3 kinds of accounts. These are:

- Administrator
- Salesperson
- Shareholder

DATA ENTRY AND VALIDY CHECK

The owner will register himself / herself as the administrator of the system. The registration involves the entering of the following data.

- Full name
- User name
- Password
- Contact number
- Email
- Present Address
- Permanent Address
- NID
- Backup question and answer

The administrator will create account for the each of the salesperson. The following information of the salesperson will be stored.

- Full name
- User name
- Password
- Contact number
- Email
- Present address
- Permanent address
- Recruitment date
- Salary
- NID (National ID)

The administrator will also include shareholders in the system. The registration of the shareholder will include the following attributes.

- Full name
- User name
- Password

- Contact number
- Email
- Present address
- Permanent address
- NID (National ID)
- Joining date
- Investment amount

The password must contain minimum 8 characters and maximum 20 characters including at least a digit. Confirmation codes will be sent to the valid phone numbers and email addresses.

STORE INFORMATION

After validity check all the data will be stored in the database and every registered individual will be able to log in to the system.

4.3.5 LEVEL – 1.1.2 USE CASE DIAGRAM – SIGN IN / SIGN OUT

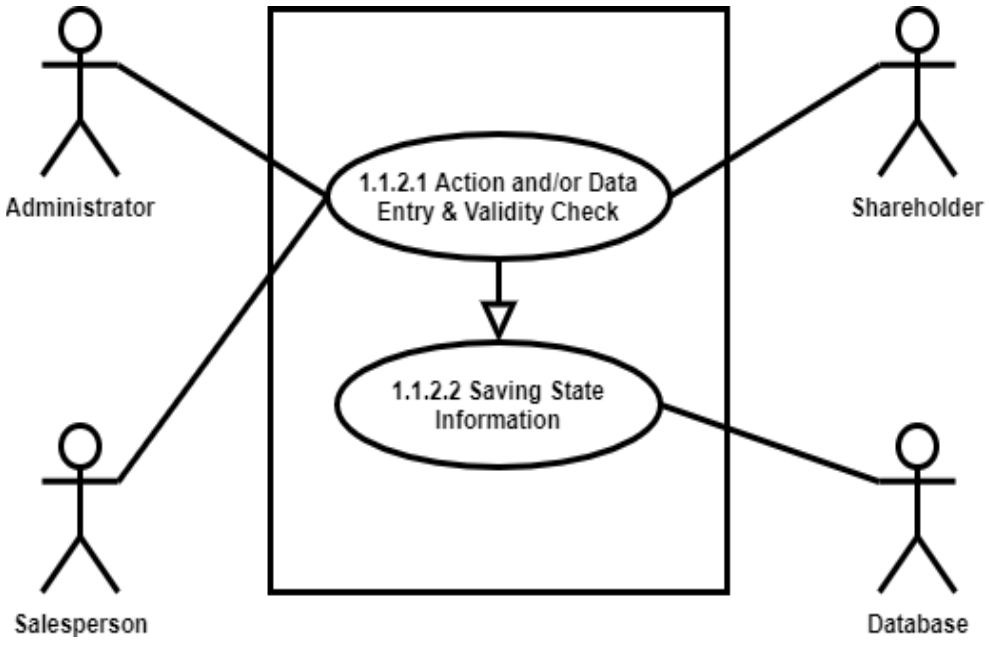


Figure – 5: Level 1.1.2 use case diagram – Sign in / Sign out

Name: Sign in / Sign out

ID: PMS – L – 1.1.2

Primary Actors: Administrator,Salesperson, Database

Secondary Actor: Shareholder

DESCRIPTION OF USE CASE DIAGRAM LEVEL – 1.1.2:

- **Primary Actor:** Administrator, Salesperson, Database
- **Secondary Actor:** Shareholder

1.1.2.1 ACTIONAND / OR DATA ENTRY& VALIDY CHECK

- **Primary Actor:** Administrator, Salesperson
- **Secondary Actor:** Shareholder

ACTION / REPLY:

- **Action:** User will enter whether he / she wants to sign in or sign out. If he / she wants to sign in the he / she should enter his / her username and password.
- **Reply:** System will receive data and show whether the entered data is valid or not and based on valid data the system will permit the user to sign in / out.

1.1.2.2 SAVE STATE INFORMATION

- **Primary Actor**: Database
- **Secondary Actors:** N / A

DATABASE'S ACTION / REPLY

- **Acton:**In case of logout shows prompt to user for unsaved data.
- **Reply:**Data will be saved if the user enters otherwise not.

SIGNIN / SIGN OUT: DESCRIPTION

The system will be displayed differently to the different type of the user upon signing in.

Data Entry

The user will enter his or her username and password. Correct input results in successful log in to the system.

Validity Check

Entered data will be checked with the data stored in the database.

Save State Information

In case of a salesperson, the first sign in time of a particular day will be saved in the database. During sign out time, active transaction / process will be displayed. The last sign out time will also be recorded. The running process will either be terminated or saved based on the user's choice.

4.3.6 Level – 1.1.2 Use Case Diagram – Account Recovery

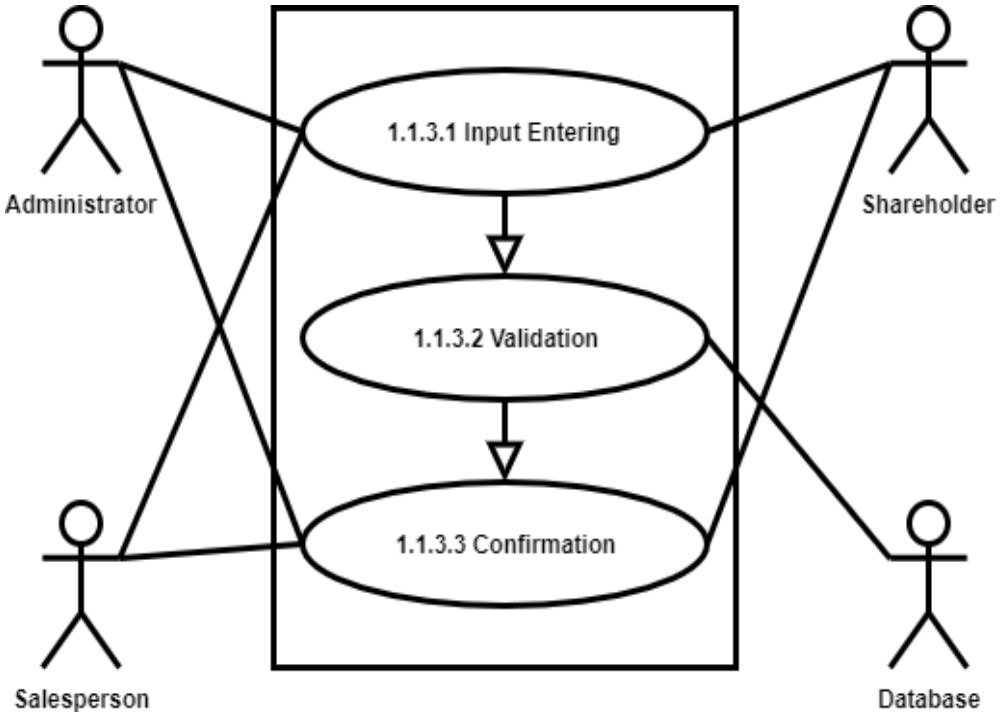


Figure – 6: Level 1.1.3 use case diagram – Account recovery.

Name: Sign in / Sign out

ID: PMS – L – 1.1.3

Primary Actors: Administrator,Salesperson, Shareholder, Database

Secondary Actor: N / A

DESCRIPTION OF USE CASE DIAGRAM LEVEL – 1.1.2:

- **Primary Actor:** Administrator, Salesperson, Shareholder, Database
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** The user will request for account recovery.
- **Reply:** The system will provide necessary steps to recover account.

1.1.3.1 INPUT ENTERING

- **Primary Actor:** Administrator, Salesperson, Shareholder
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** The user will request for account recovery.
- **Reply:** In case of administrator backup question will be displayed and other types of user will be asked to enter their valid contact number / email address.

1.1.3.2 VALIDATION

- **Primary Actor:** Database
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** Match the entered data with the database.
- **Reply:** Send confirmation code (to shareholder / salesperson) or authentication information (to administrator).

1.1.3.3 CONFIRMATION

- **Primary Actor:** Salesperson, Shareholder
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** User enters the confirmation code.
- **Reply:** Users will be allowed to reset their username and password.

4.3.7 LEVEL – 1.2 USE CASE DIAGRAM – STOCK MANAGEMENT

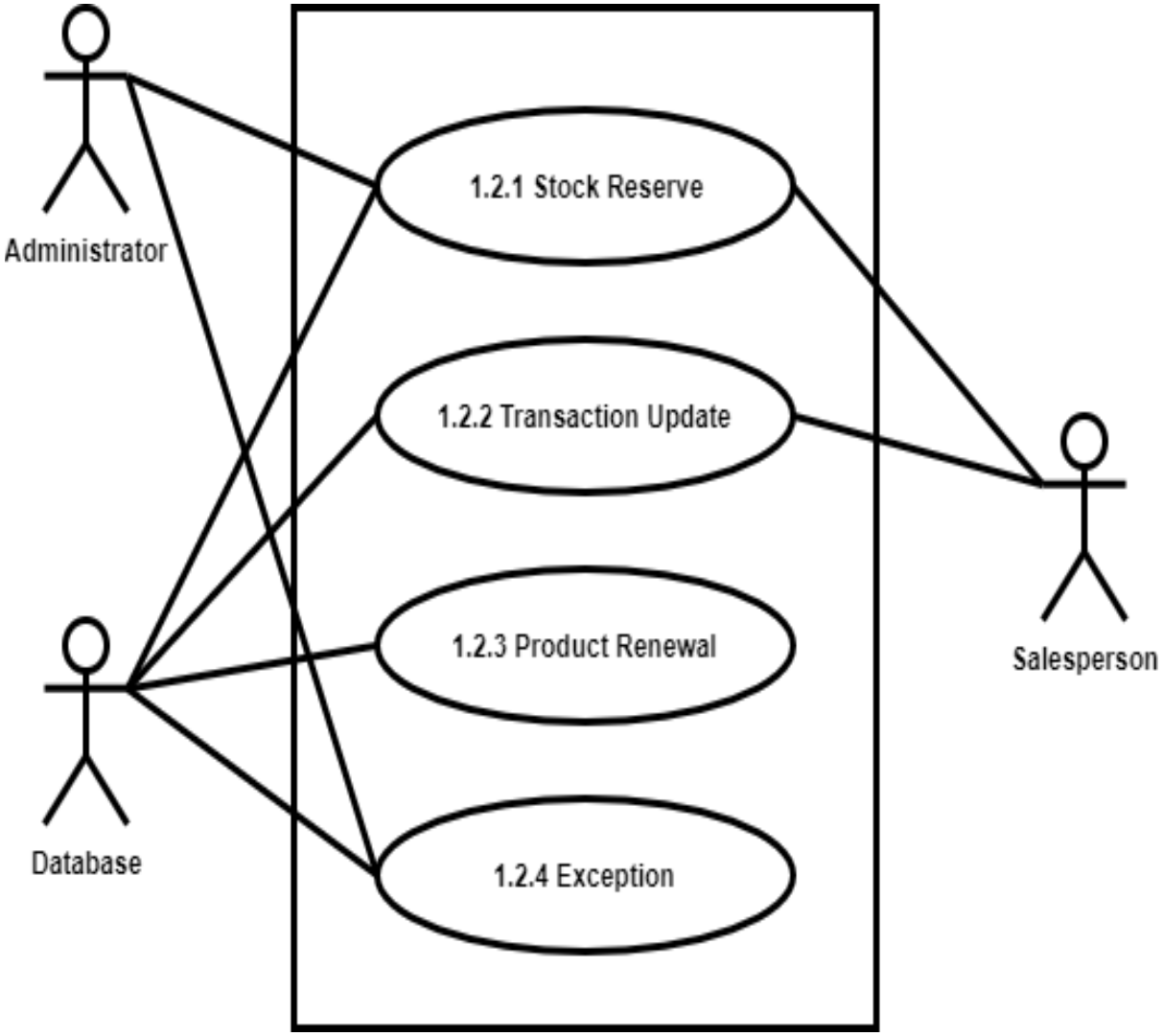


Figure – 7: Level 1.2 use case diagram – Stock management.

Name: Stock management

ID: PMS – L – 1.2

Primary Actors: Salesperson, Database

Secondary Actor: Administrator

Description Of Use Case Diagram Level – 1.2:

- **Primary Actor:** Salesperson, Database
- **Secondary Actor:** Administrator

1.2.1 Stock Reserve

- **Primary Actor:** Salesperson, Administrator
- **Secondary Actor:** Database

Action / Reply:

- **Action:** Administrator performs the initial update.
- **Reply:** Update successful or not.
- **Action:** Salesperson updates the stock upon supplier's delivery and regular transaction.
- **Reply:** Database will successfully update the stock upon supplier's delivery in the inventory and will show pop up.

1.2.2 Transaction Reserve

- **Primary Actor:** Salesperson
- **Secondary Actor:** Database

Action / Reply:

- **Action:** After every transaction salesperson will update the stock.
- **Reply:** System will update the database with the quantity of products and will show pop – up.

1.2.3 Product Renewal

- **Primary Actor:** Salesperson, Database
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** Database will check expiry date of product.
- **Reply:** If expire date has passed, the stock will be decremented in Database.

- **Action:** If supplier allows the return of the expired products and provides new products in return, salesperson performs the update.
- **Reply:** Database will be updated.

1.2.4 EXCEPTION

- **Primary Actor:** Salesperson
- **Secondary Actor:** Database

ACTION / REPLY:

- **Action:** Salesperson will check whether the pharmacy has encountered any loss or missing products.
- **Reply:** Salesperson will update the database.

- **Action:** If supplier provides free products and then salesperson will perform the update.
- **Reply:** Database will be updated.

STOCK MANAGEMENT: DESCRIPTION

Stock management is one of the core functions of the pharmacy management system. Automating this will greatly help all the individuals of the pharmacy management system.

The stock of pharmacy includes drugs, first aid products, minimal medical tools etc. The following attributes of the products will be stored in the database:

- product name
- product type
- component
- component's company name
- manufacturing date
- expiry date
- discount
- cost price

STOCK RESERVE

At the beginning of the business the owner will perform the initial stock update. Afterwards, the HR will update upon receiving the products delivered by the suppliers.

TRANSACTION UPDATE

When a customer buys product the stock decreases. This decrease will be tracked via update performed by salesperson after each sale.

PRODUCT RENEWAL

The database will keep record of expiry date of products. If the expiry date of unsold products passes then the no of products in the stock will be decremented. If a supplier exchanges fresh products for the expired ones, HR will perform the update.

EXCEPTION

Products can go missing due to accident, political conflict, extortion, theft, natural disasters etc. The salesperson will perform update for the missing products. If supplier provides free medicines for sale salesperson will update the stock.

4.3.8 LEVEL – 1.2 USE CASE DIAGRAM – FINANCIAL MANAGEMENT

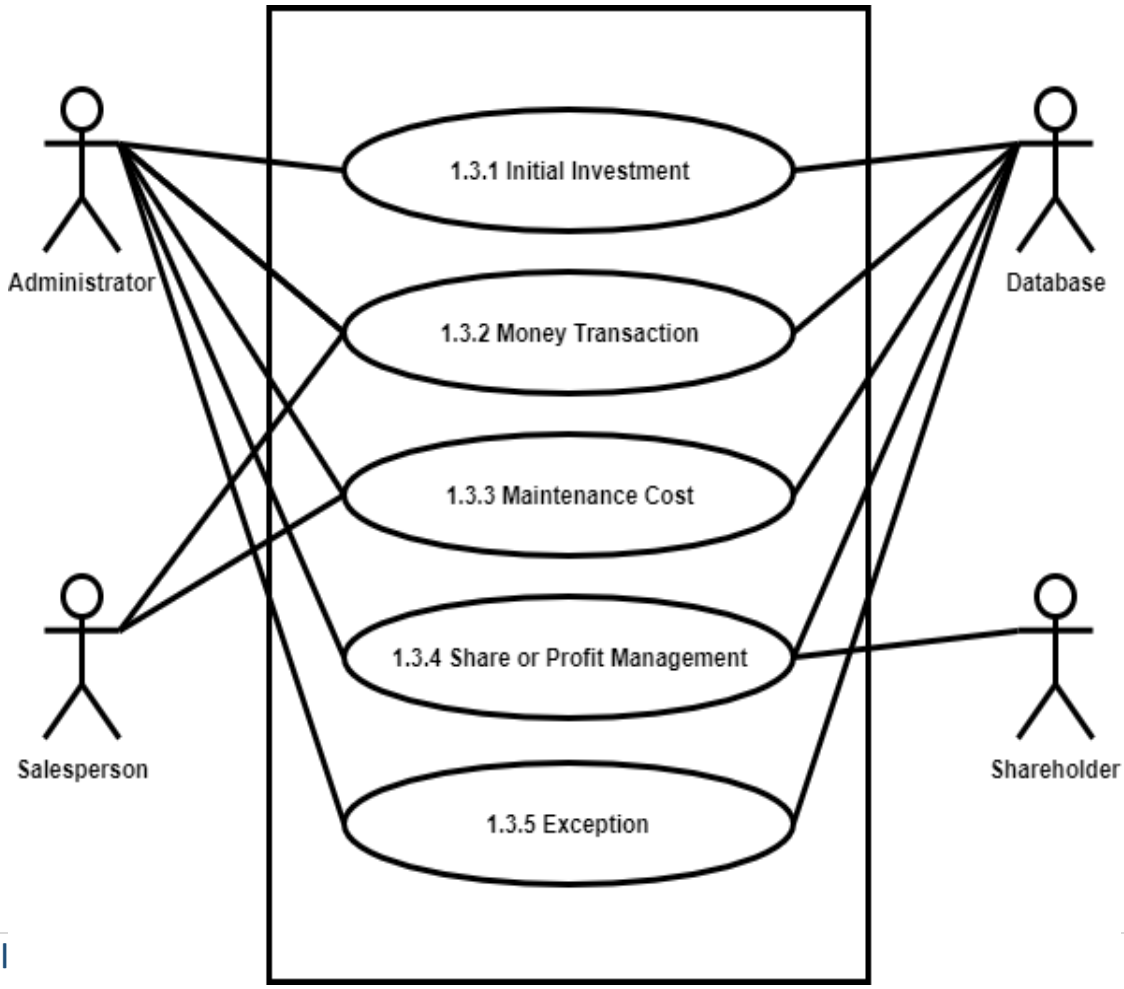


Figure – 8: Level 1.3 use case diagram – Financial management.

Name: Financial management

ID: PMS – L – 1.3

Primary Actors: Administrator, Salesperson, Database

Secondary Actor: Shareholder

1.3.1 Initial Investment

- **Primary Actor:** Administrator
- **Secondary Actor:** Database

Action / Reply:

- **Action:** Administrator enters his / her principal amount in the system at the start of the business.
- **Reply:** The system will record the principle in Database.

1.3.2 Money Transaction

- **Primary Actor:** Salesperson
- **Secondary Actor:** Database

Action / Reply:

- **Action:** The customer will pay to salesperson, salesperson will update cash.
- **Reply:** The system will update Database.

- **Action:** Salesperson will pay dues of the suppliers on behalf of the Administrator.
- **Reply:** System will record the expenditure in Database.

1.3.3 Maintenance Cost

- **Primary Actor:** Administrator, Database
- **Secondary Actor:** Salesperson

Action / Reply:

- **Action:**Administrator will pay Salesperson's salary.
- **Reply:** Database will be updated for the money withdrawal to pay Salesperson's salary.

- **Action:** Check whether the owner has paid shop rent.
- **Reply:** If the owner has paid, then the rent will be deducted from cash database.

- **Action:** Check if miscellaneous costs have been paid off.
- **Reply:** Costs will be deducted from cash database upon payment.

1.3.4 Share or Profit Management

- **Primary Actor:** Administrator, Database
- **Secondary Actor:** Shareholder

Action / Reply:

- **Action:** Owner withdraws profit/portion of investment for himself / shareholder.
- **Reply:** System will record deduction in Database.

- **Action:** Administrator / shareholder increases his / her shares in the business.
- **Reply:** System will record the increment in Database.

1.3.5 Exception

- **Primary Actor:** Administrator, Database
- **Secondary Actor:** Salesperson

ACTION / REPLY:

- **Action:** Administrator will enter date of loss incurred from extortion, political clashes etc.
- **Reply:** System will record this in Database.

FINANCIAL MANAGEMENT: DESCRIPTION

The most important part of a business is its finance management. We split it into the following:

INITIAL INVESTMENT

The administrator will enter his principal into the software. The database will record the investment.

MONEY TRANSACTION

Business is all about purchasing and selling. HR will receive money from the customer and pay dues to suppliers on behalf of the owner. While performing these tasks, database cash information will be updated.

MAINTENANCE COST

Administrator pays off Salesperson's salary, Database will be updated every time money withdrawn to pay off dues. The system will check if the Administrator has paid shop rent or not. When the Administrator pays the rental expenditure deducted from cash. A pharmacy store can have many costs – electric bill, internet bill, phone bill, water bill etc. Administrator will check if payment has been done. Upon payment, the database will update the cash information.

SHARE OR PROFIT MANAGEMENT

Administrator and shareholder may desire to increase / decrease their shares in the business or withdraw profit. The Administrator can withdraw or invest any time. A shareholder depends on the Administrator to behave these monetary tasks performed.

EXCEPTION

Loss can be incurred from political clashes, extortions, natural disaster etc. The monetary losses will be recorded in the database.

4.3.9 LEVEL – 1.4 USE CASE DIAGRAM – INFORMATION SYSTEM

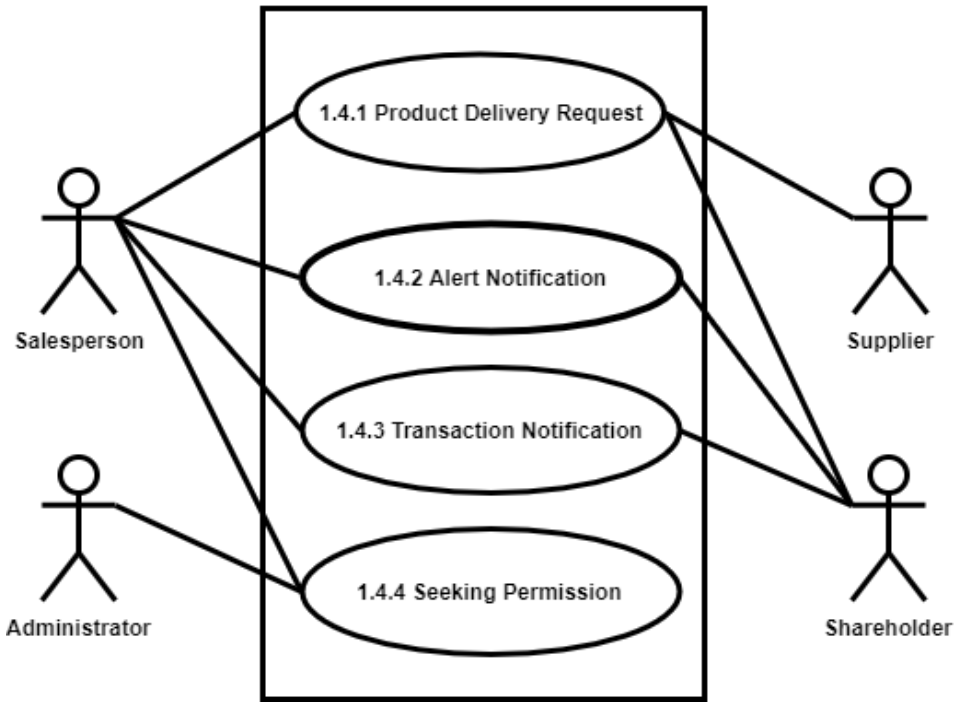


Figure – 9: Level 1.4 use case diagram – Information System.

Name: Information System

ID: PMS – L – 1.4

Primary Actors: Salesperson, Database

Secondary Actor: Administrator, Supplier

1.4.1 PRODUCT DELIVERY REQUEST

- **Primary Actor:** Salesperson
- **Secondary Actor:** Supplier

ACTION / REPLY:

- **Action:** Salesman will request for products to the supplier.
- **Reply:** System will show if the request has been successfully sent or not.

1.4.2 ALERT NOTIFICATION

- **Primary Actor:** Salesperson, Database
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** System will track the number of products in stock.
- **Reply:** System will send a low stock alert to the salesperson.

- **Action:** System will track the products whose expiry date will come In a few months (the number of months is determined by the administrator).
- **Reply:** System will send expiry date alerts to the salesperson.

1.4.3 TRANSACTION NOTIFICATION

- **Primary Actor:** Salesperson, Database
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** Transactions are conducted.
- **Reply:** System will show completion of the transaction.

1.4.4 SEEKING PERMISSION

- **Primary Actor:** Salesperson, Administrator
- **Secondary Actor:** N / A

ACTION / REPLY:

- **Action:** Salesperson will ping the owner for exceptional cases.
- **Reply:** Message will be sent to the owner.

- **Action:** Administrator will get a notification for permission.
- **Reply:** Permission will be given or denied.

INFORMATIONSYSTEM: DESCRIPTION

Exchange of information is a normal thing in day-to-day life. In pharmacy management, information is sent over the system in the form of notifications.

PRODUCT DELIVERY REQUEST

The salesperson will request the supplier for fresh products. The supplier will receive the request via text message from the system.

ALERT NOTIFICATION

Stock products decrease in number after the sales, these are recorded by Database. Database also records the expiry date of products. Database will send notifications to the salesperson of products that are low in stock. The number of remaining products for which the system will send notification is determined by the owner. Database also sends notifications to the salesperson for products whose expiry dates are approaching. The Administrator fixes the time before the expiry date based on which system will generate a notification.

TRANSACTION NOTIFICATION

In pharmacy, transactions occur on a regular basis. Each of these transactions is recorded by the database.

SEEKING PERMISSION

Sometimes customers are unable to give a full payment of purchased products. In these circumstances, a salesperson will enter customer data including customer name, contact no, NID, address and send a permission request for the customer's due. The administrator can accept or deny the request. If the administrator accepts the request, the customer can get the product with due pending.

Sometimes customers want to sell products brought from another pharmacy. The salesperson will seek the administrator's permission by sending a request to the administrator via the software. If administrator grants permission, pharmacy purchases the product checking the expiry date and updates the stock.

The pharmacy can fall victim to extortion, accidents. The salesperson will inform the administrator of these incidents via notification.

Sometimes a customer may be in need of a product that is not available in the pharmacy. For such cases, the salesperson will send permission request over the software. Administrator will grant / deny the purchases request.

4.3.10 Level – 1.5 Use Case Diagram – HRManagement

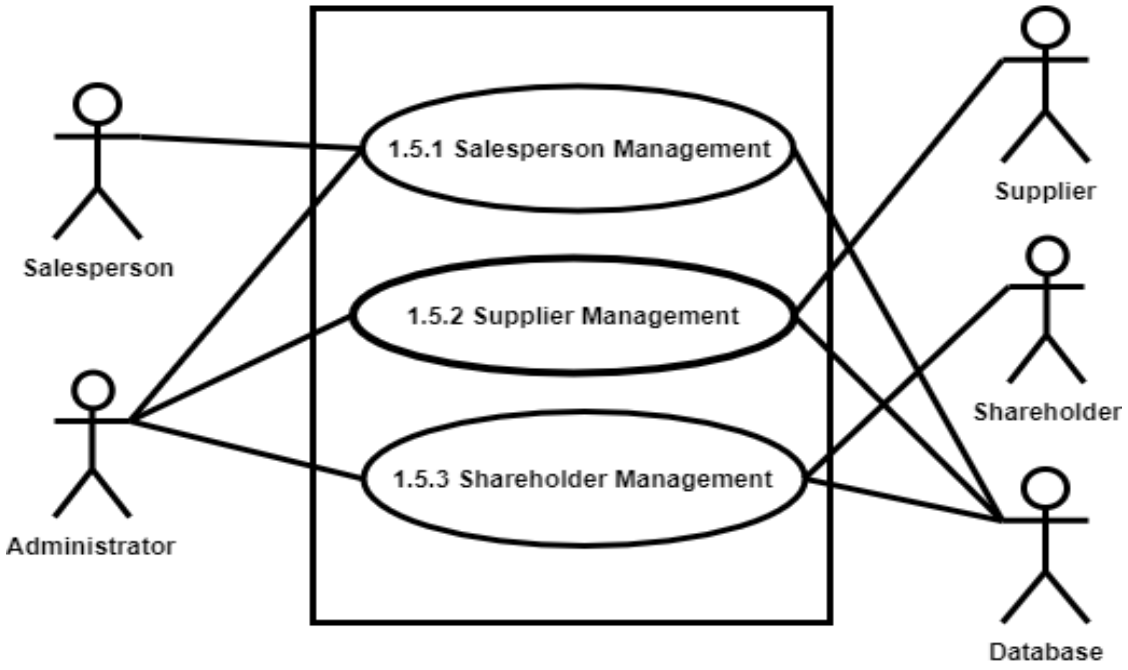


Figure – 10: Level 1.5 use case diagram – Human Resource Management.

Name: Human Resource Management

ID: PMS – L – 1.5

Primary Actors: Administrator, Database

Secondary Actor: Salesperson, Supplier, Shareholder

1.5.1 Salesperson Management

- **Primary Actor:** Administrator, Database
- **Secondary Actor:** Salesperson

ACTION / REPLY:

- **Action:** Administrator will include / exclude salesperson.
- **Reply:** The information will be stored / removed from the database.

1.5.2 SUPPLIER MANAGEMENT

- **Primary Actor:**Administrator, Database
- **Secondary Actor:**Supplier

ACTION / REPLY:

- **Action:** Administrator will include / exclude suppliers.
- **Reply:** The information will be stored / removed from the database.

1.5.3 SHAREHOLDER MANAGEMENT

- **Primary Actor:**Administrator, Database
- **Secondary Actor:**Shareholder

ACTION / REPLY:

- **Action:** Administrator will include / exclude shareholder.
- **Reply:** The information will be stored / removed from the database.

HRMANAGEMENT: DESCRIPTION

Aside from Administrator, a pharmacy has salesperson, suppliers, and shareholder. For effective administration, we are including human resource management as a software requirement.

The Administrator is the supreme power in a small sale business. His / her authority gives him / her the right to include or exclude individuals. When including salesperson, suppliers, shareholder's personal details of the individuals will be stored. Personal details name, contact number, address, email, investment (for shareholder), joining date, National Id. The administrator will enter all the information.

4.4 Activity Diagrams

Activity Diagram – 1: Authentication

Among the three types of users, only the Administrator is able to request for sign up. The three types of users are able to request for sign in and account recovery.

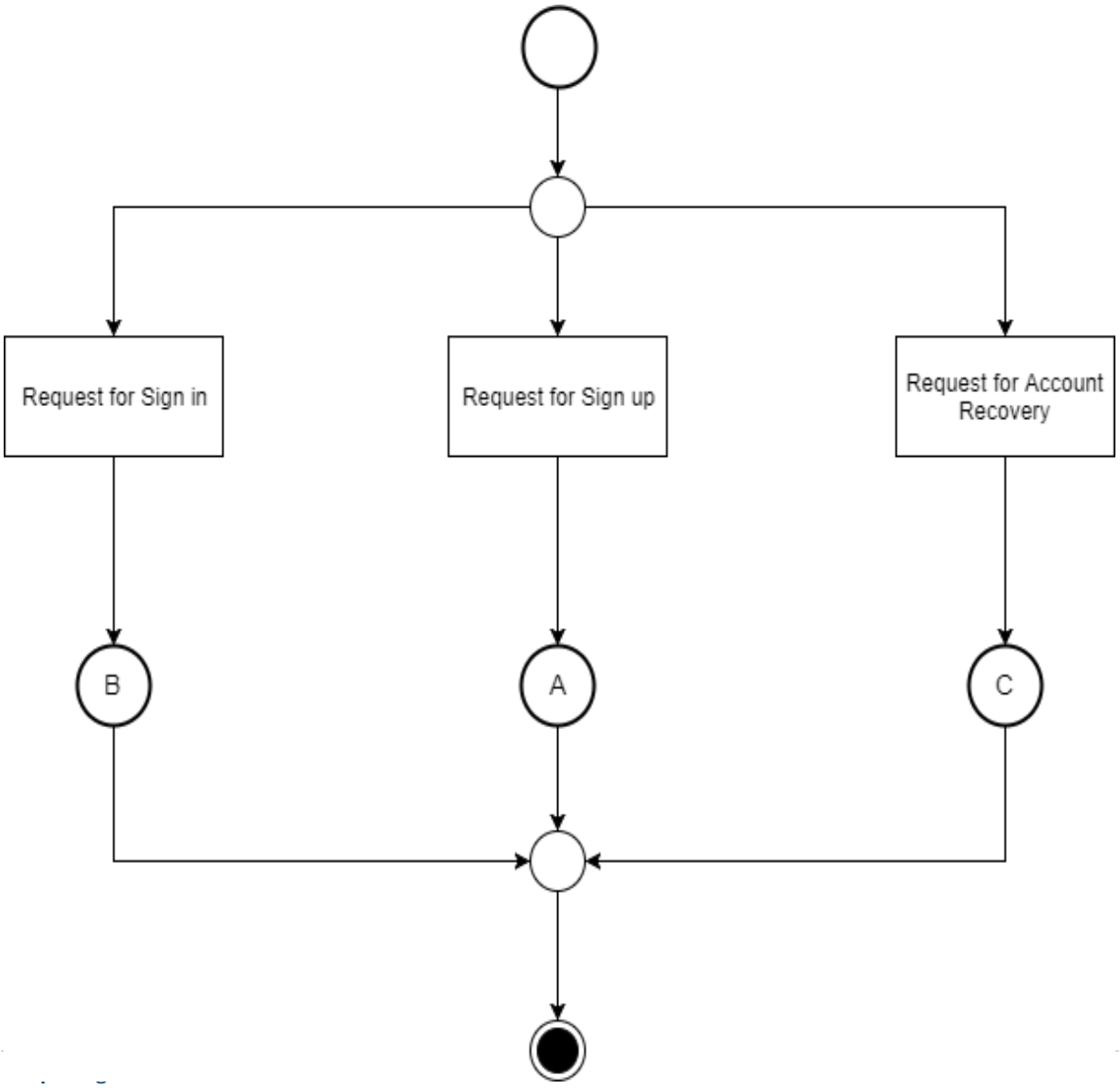


Figure – 11: Level 1 Activity diagram – Authentication.

ACTIVITY DIAGRAM – 1.1: SIGN UP

The administrator is the only actor for sign up activity diagram.

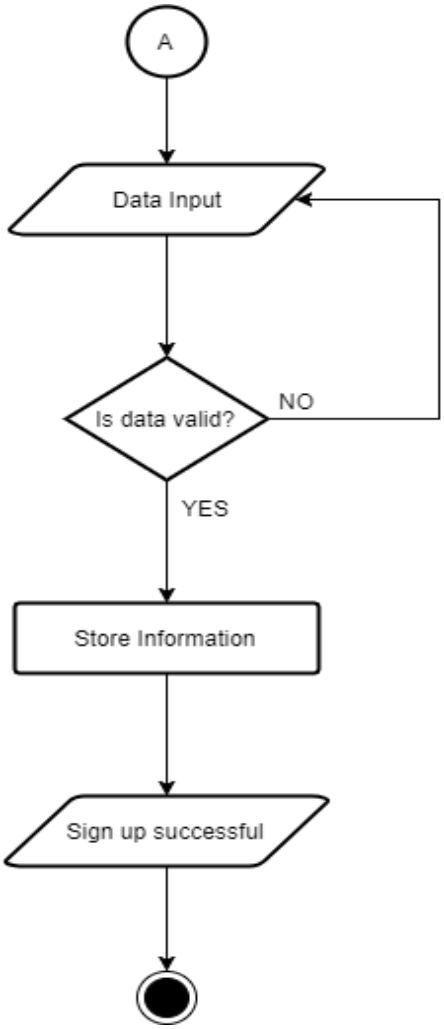


Figure – 12: Level 1.1 Activity diagram – Sign up.

ACTIVITY DIAGRAM – 1.2: SIGN IN

The three types of users can sign in through this process.

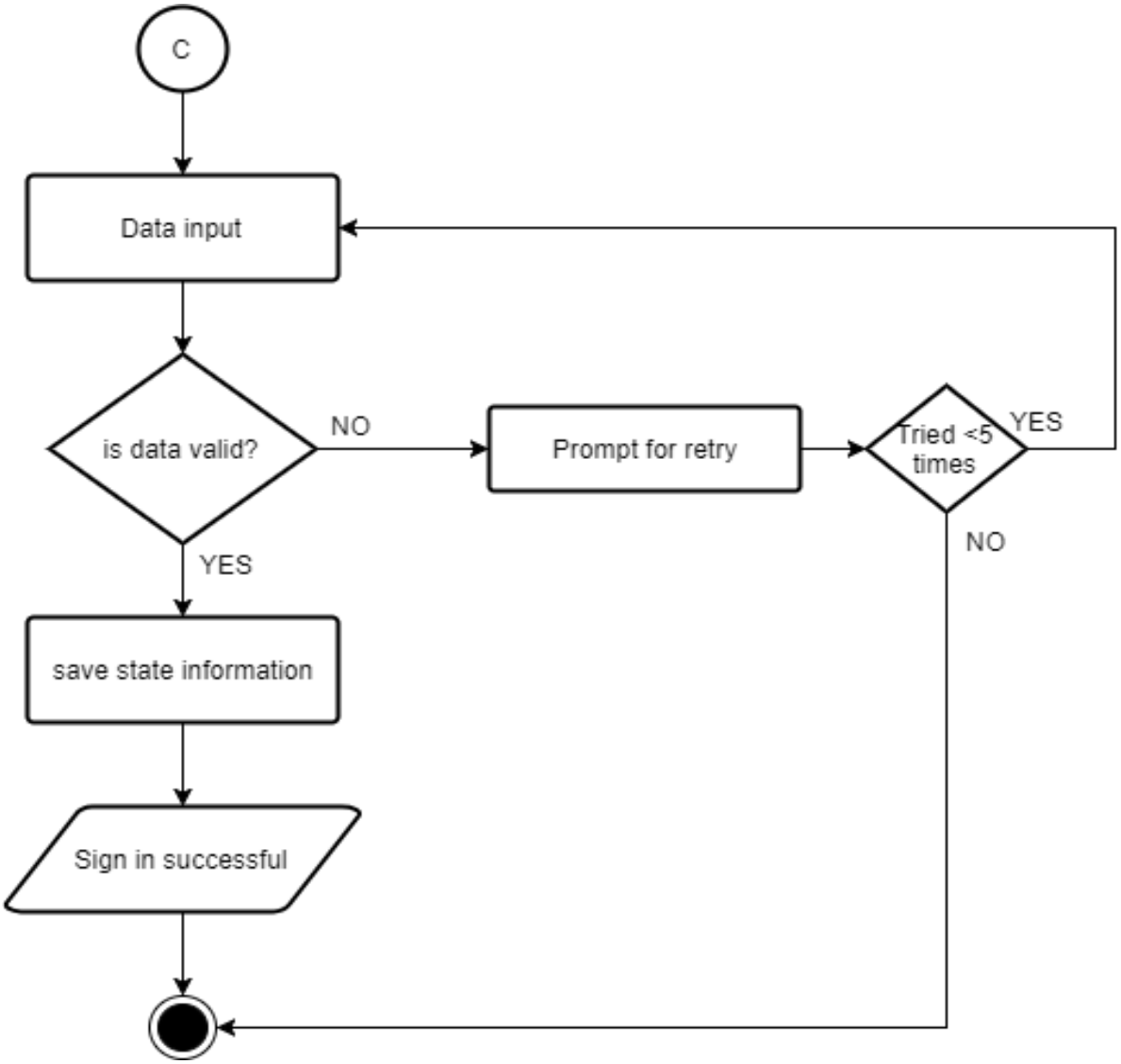


Figure – 13: Level 1.2 Activity diagram – Sign in.

ACTIVITY DIAGRAM – 1.3: ACCOUNT RECOVERY

The three types of users can recover their accounts through this process.

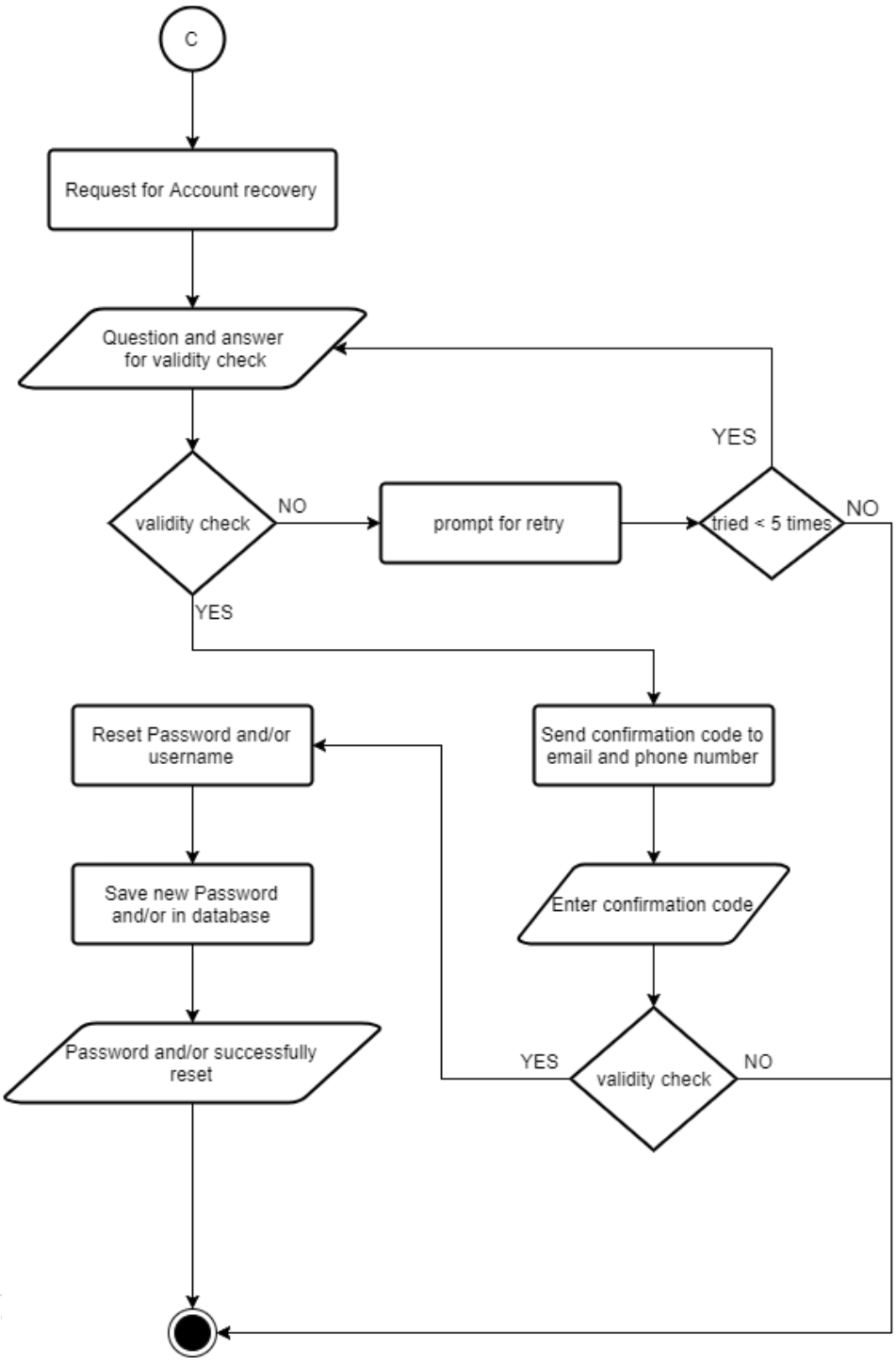


Figure – 14: Level 1.3 Activity diagram – Account recovery.

ACTIVITY DIAGRAM – 2: STOCK MANAGEMENT

The administrator and the salesperson are the main actor for stock management activities.

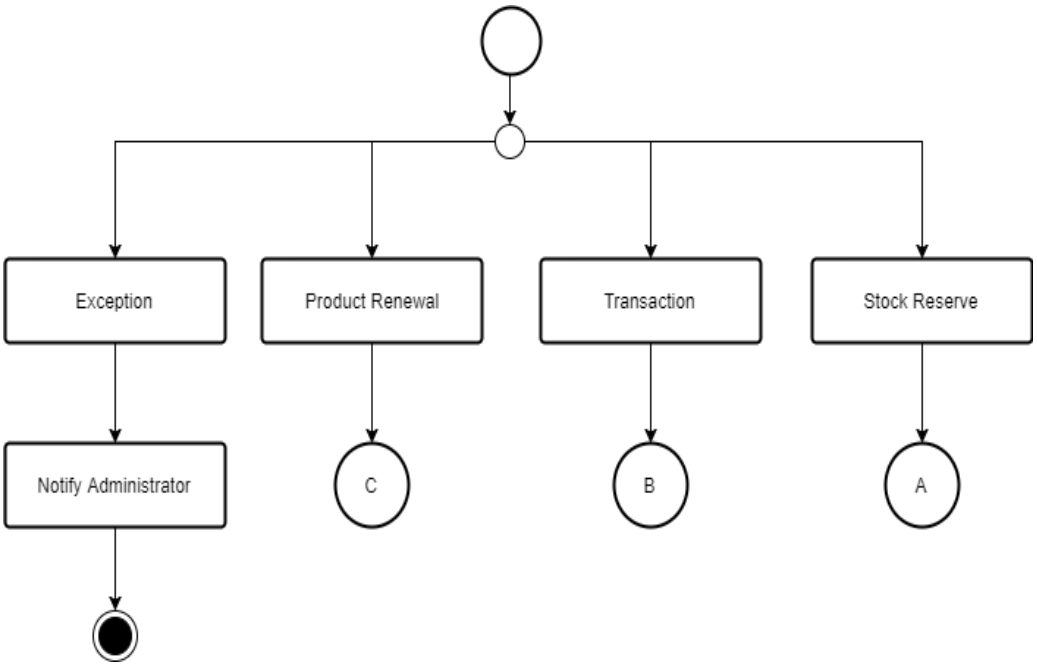


Figure – 15: Level 2 Activity diagram – Stock management.

ACTIVITY DIAGRAM – 2.1: STOCK RESERVATION

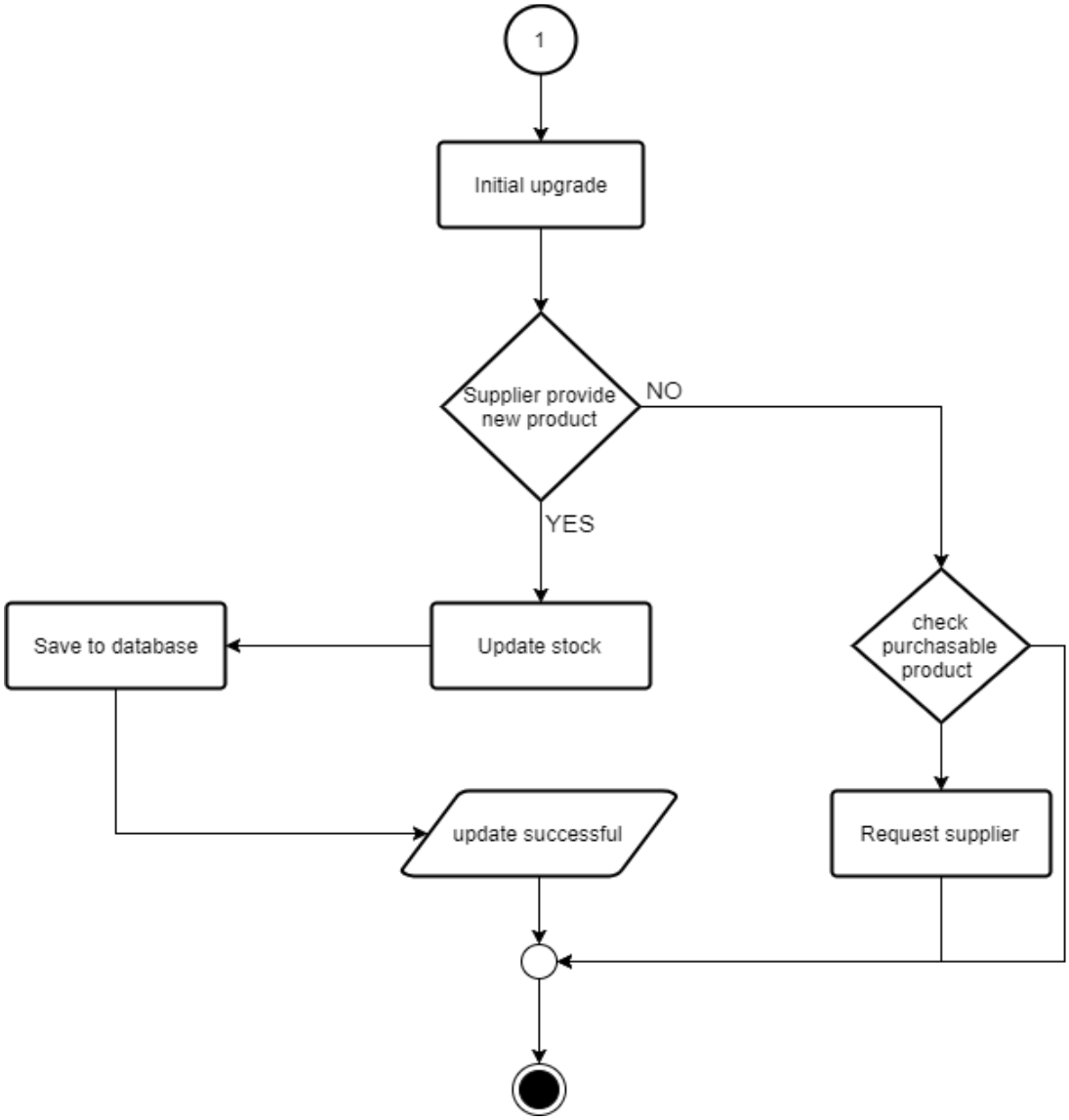


Figure – 16: Level 2.1 Activity diagram – Stock reservation.

ACTIVITY DIAGRAM – 2.2: TRANSACTION

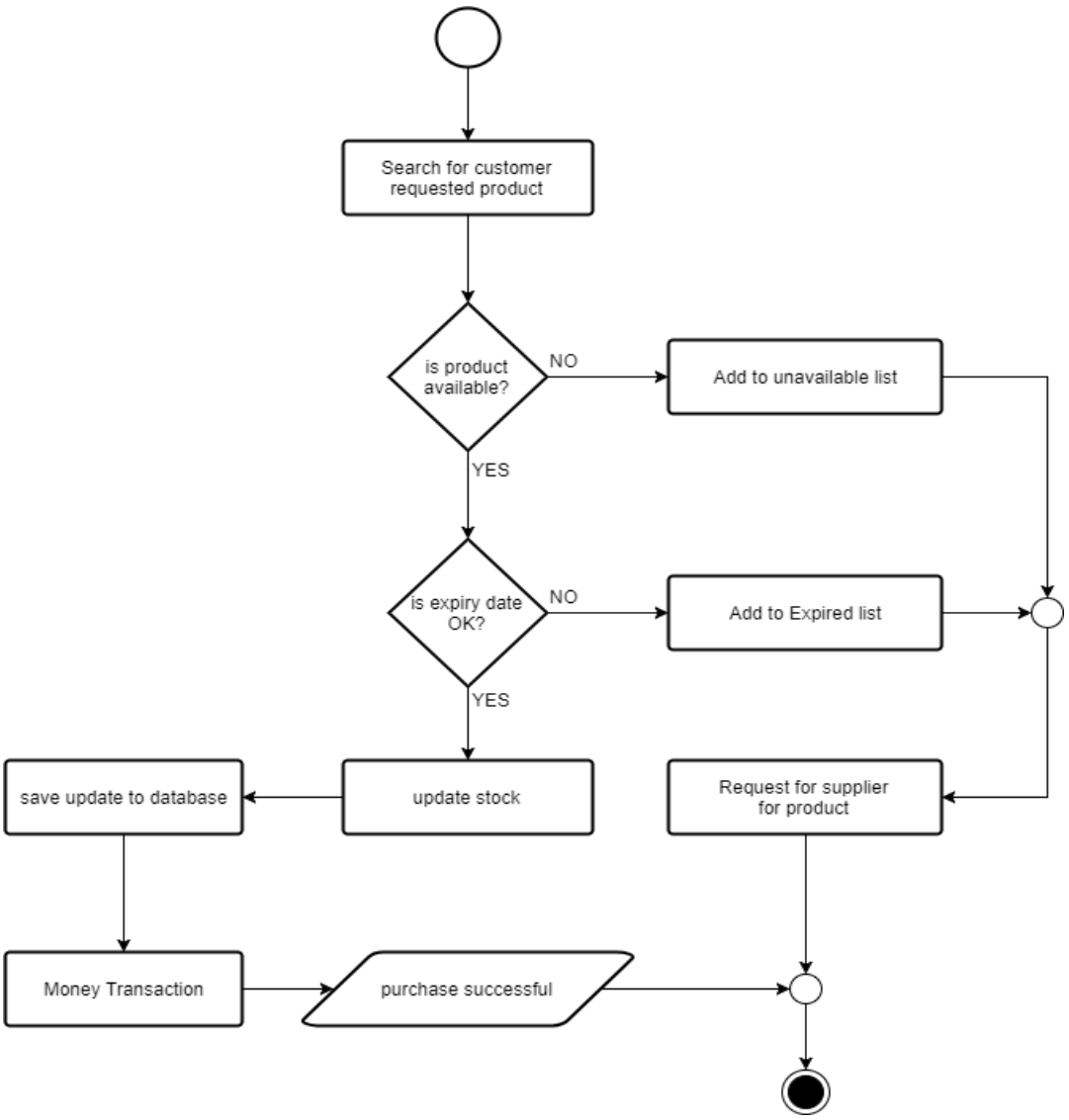


Figure – 17: Level 2.2 Activity diagram – Transaction (Product).

ACTIVITY DIAGRAM – 2.3: PRODUCT RENEWAL

The system will perform this work (automatically).

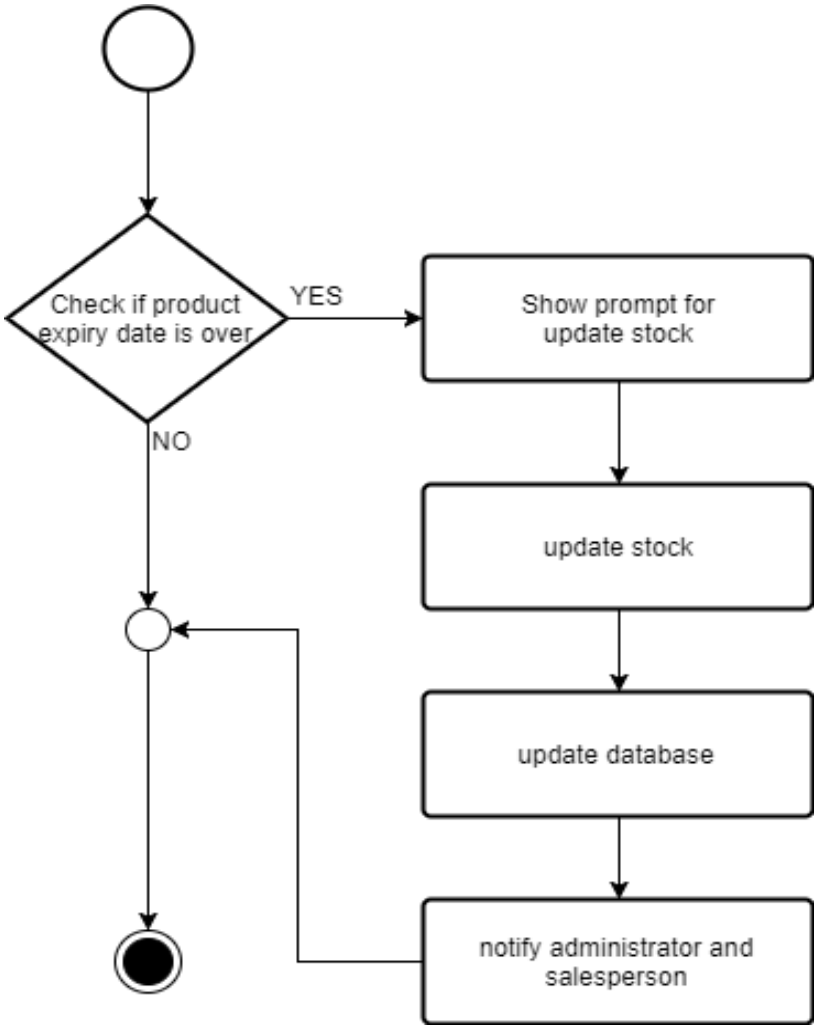


Figure – 18: Level 2.3 Activity diagram – Product renewal.

ACTIVITY DIAGRAM – 3: FINANCIAL MANAGEMENT

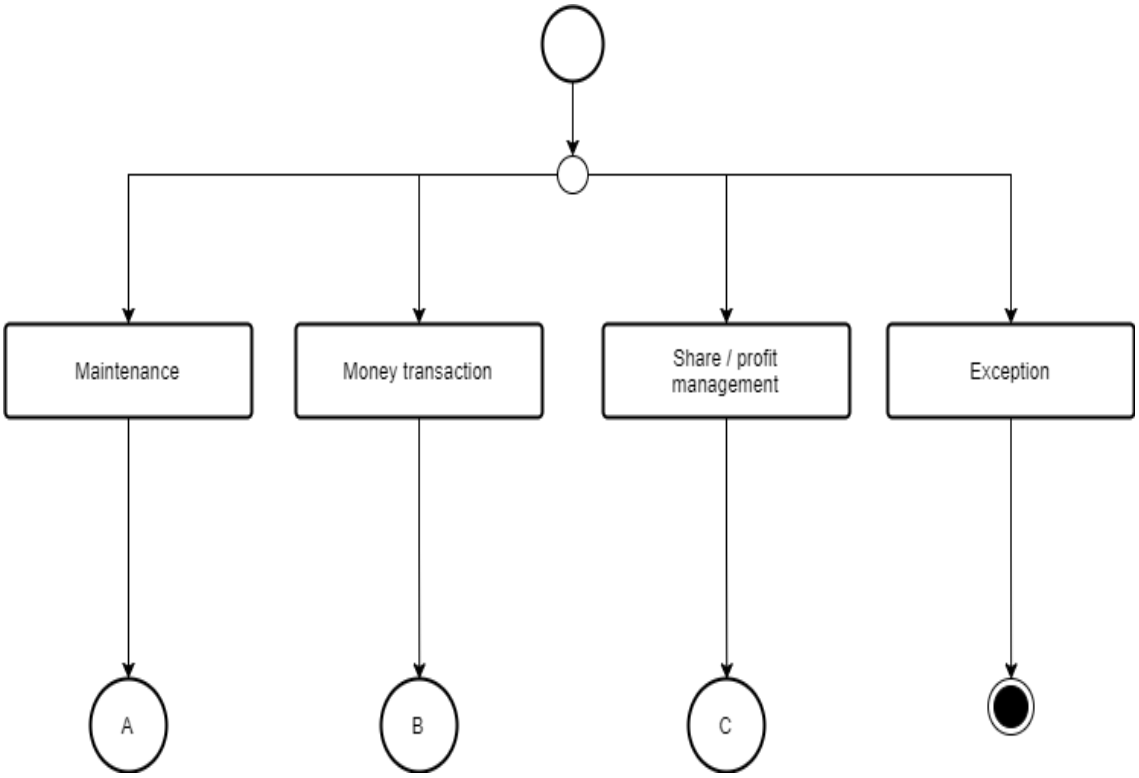


Figure – 19: Level 3 Activity diagram – Financial management.

ACTIVITY DIAGRAM – 3.1: MAINTENANCE

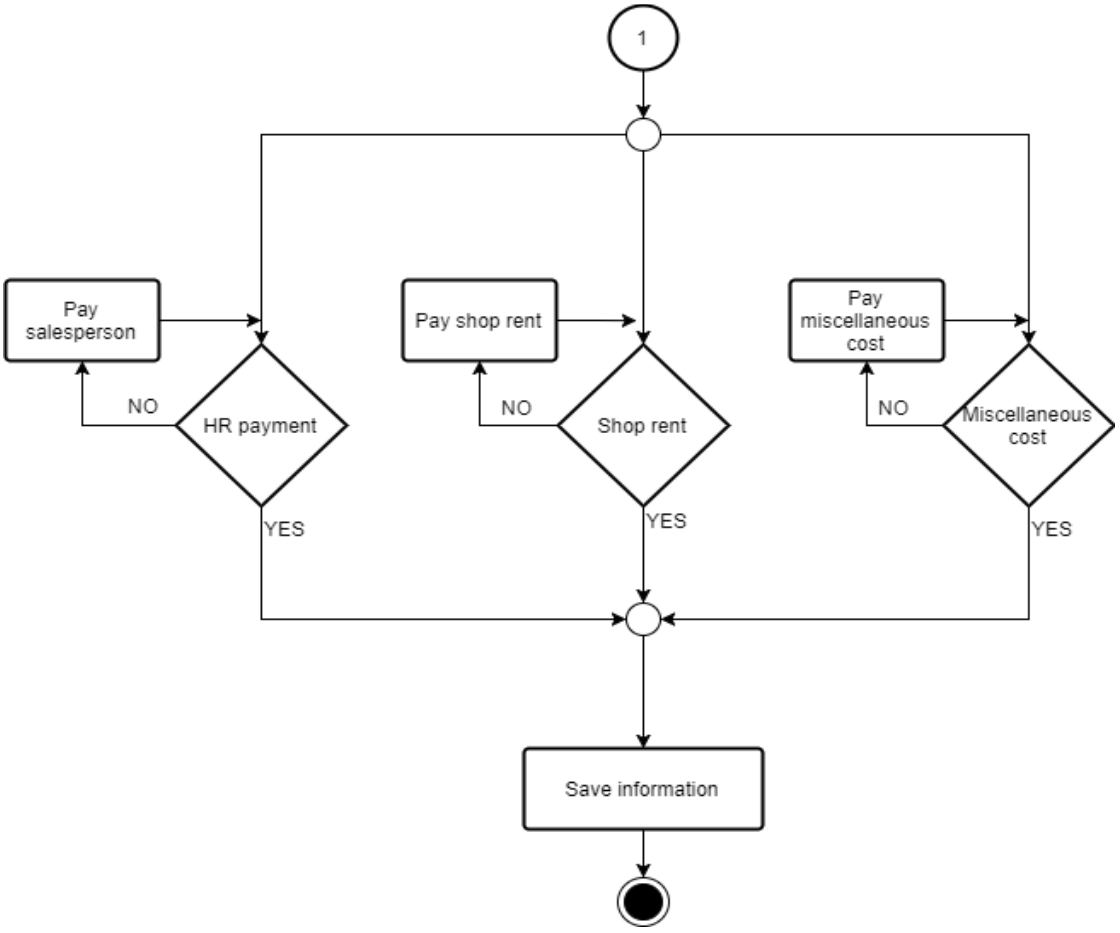


Figure – 20: Level 3.1 Activity diagram – Maintenance.

ACTIVITY DIAGRAM – 3.2: MONEY TRANSACTION

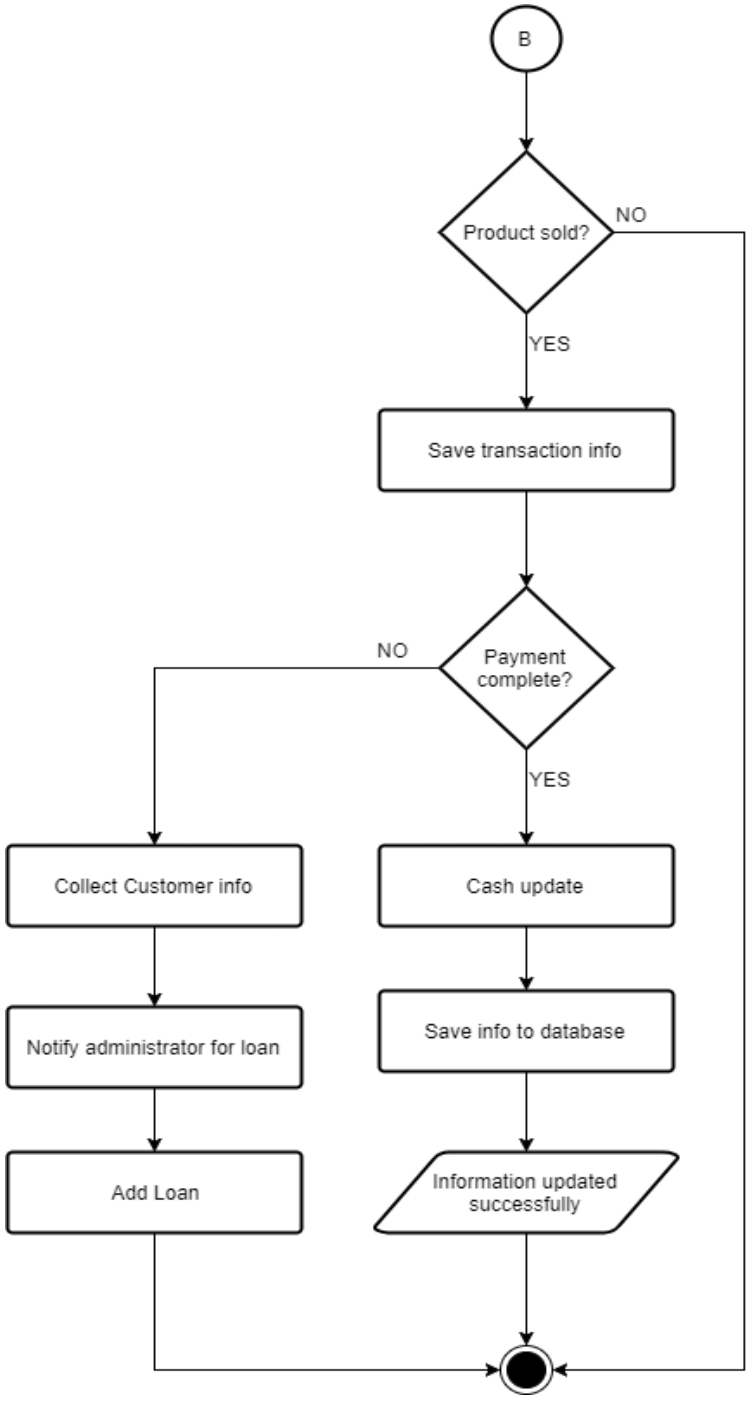


Figure – 21: Level 3.2 Activity diagram – Money transaction.

ACTIVITY DIAGRAM – 3.3: SHARE / PROFIT MANAGEMENT

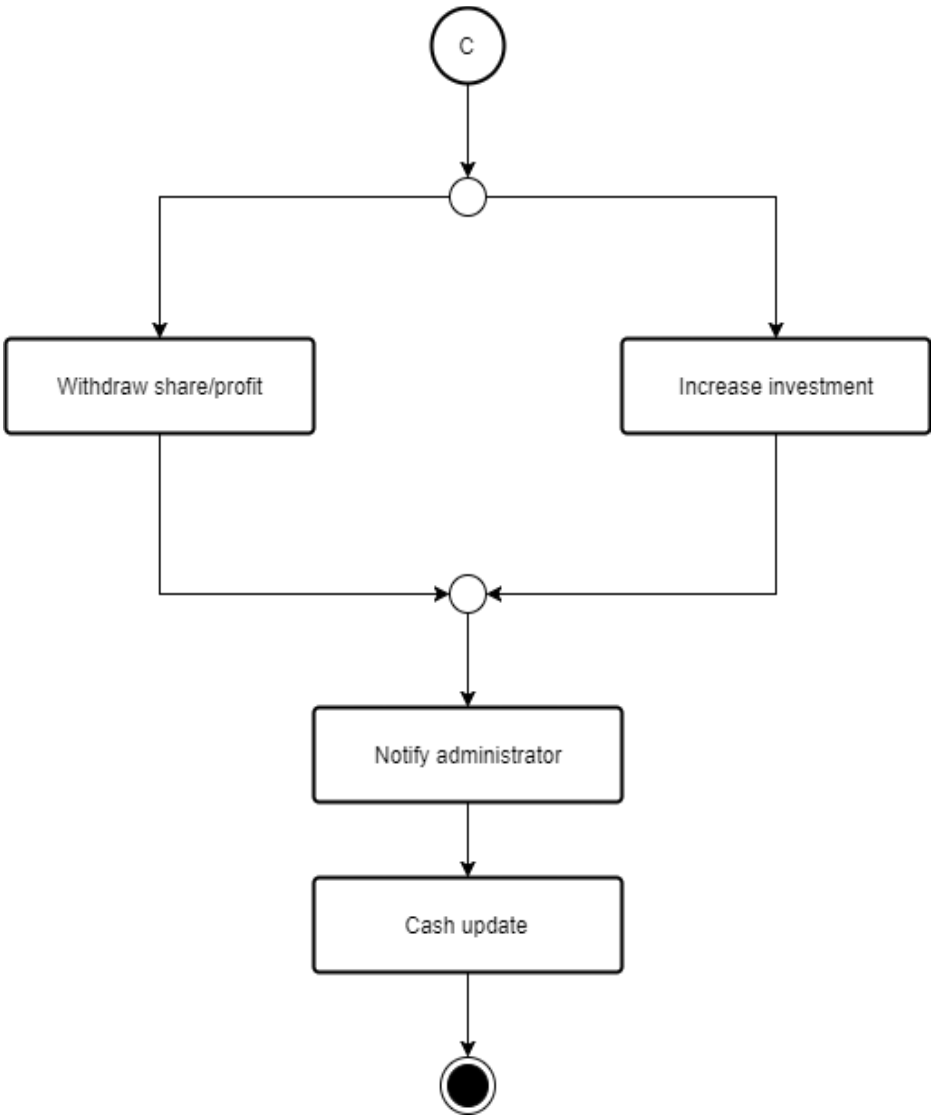


Figure – 22: Level 3.3 Activity diagram – Share / profit management.

ACTIVITY DIAGRAM – 4: NTIFICATION MANAGEMENT

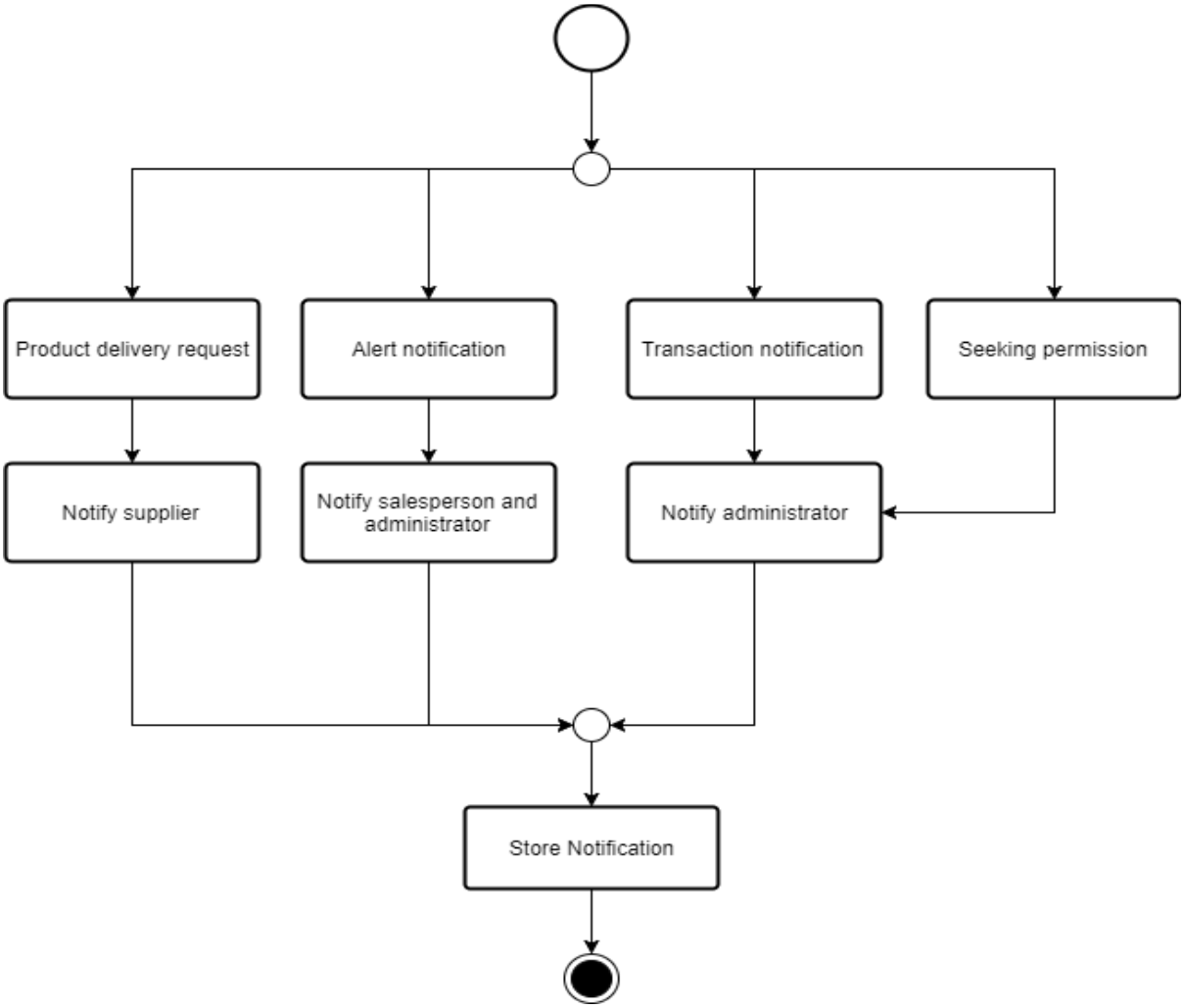


Figure – 23: Level 4 Activity diagram – Notification management.

ACTIVITY DIAGRAM – 5: HUMAN RESOURCE MANAGEMENT

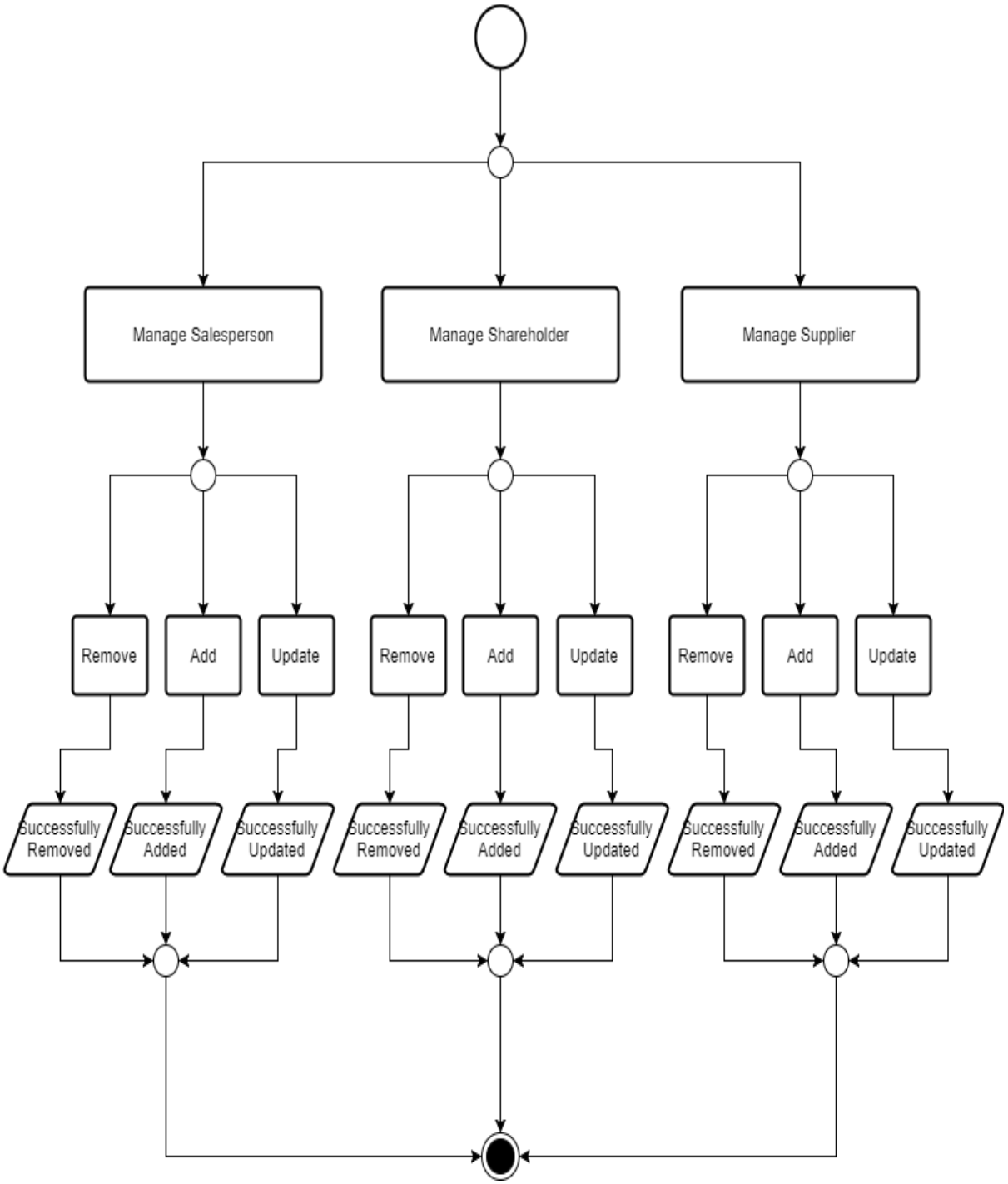


Figure – 24: Level 5 Activity diagram – Human resource management.

4.5 Swim Lane Diagrams

Swim Lane Diagram – 1: Sign Up

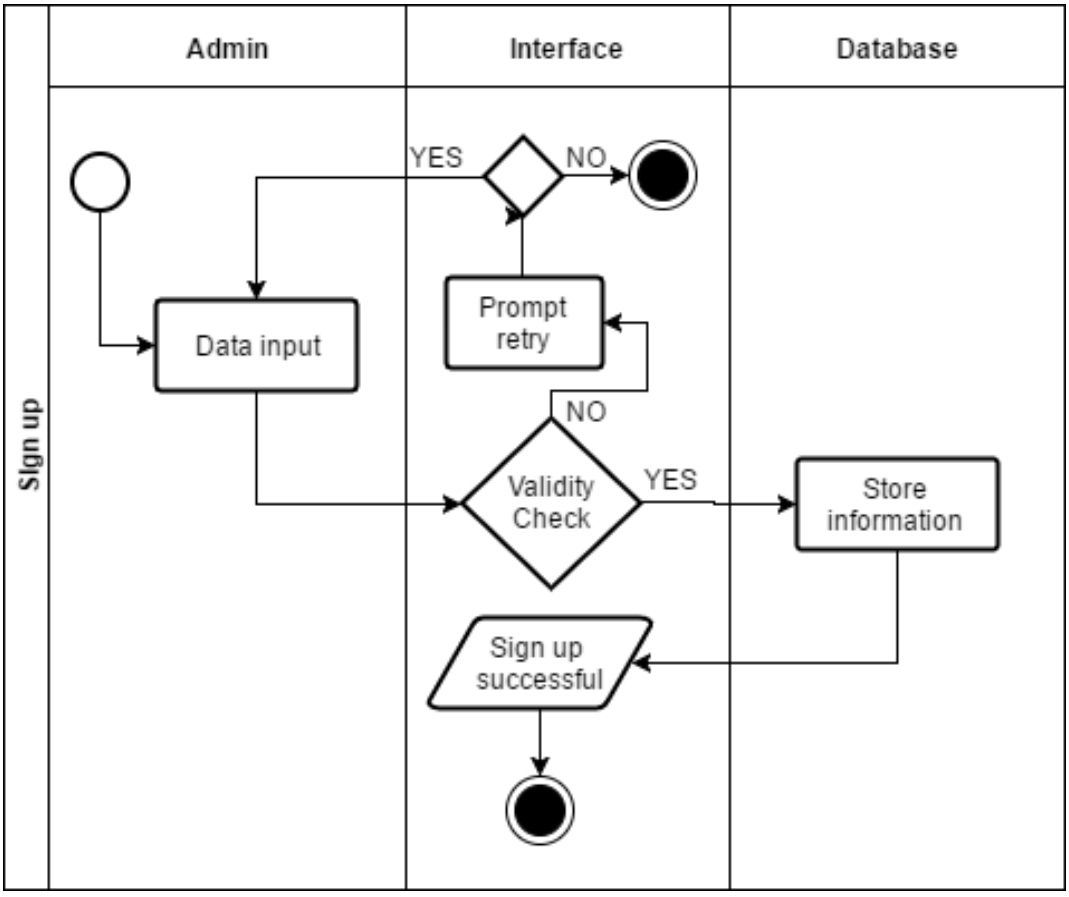


Figure – 25: Swim lane diagram – Sing up.

SWIM LANE DIAGRAM – 2: SIGN IN

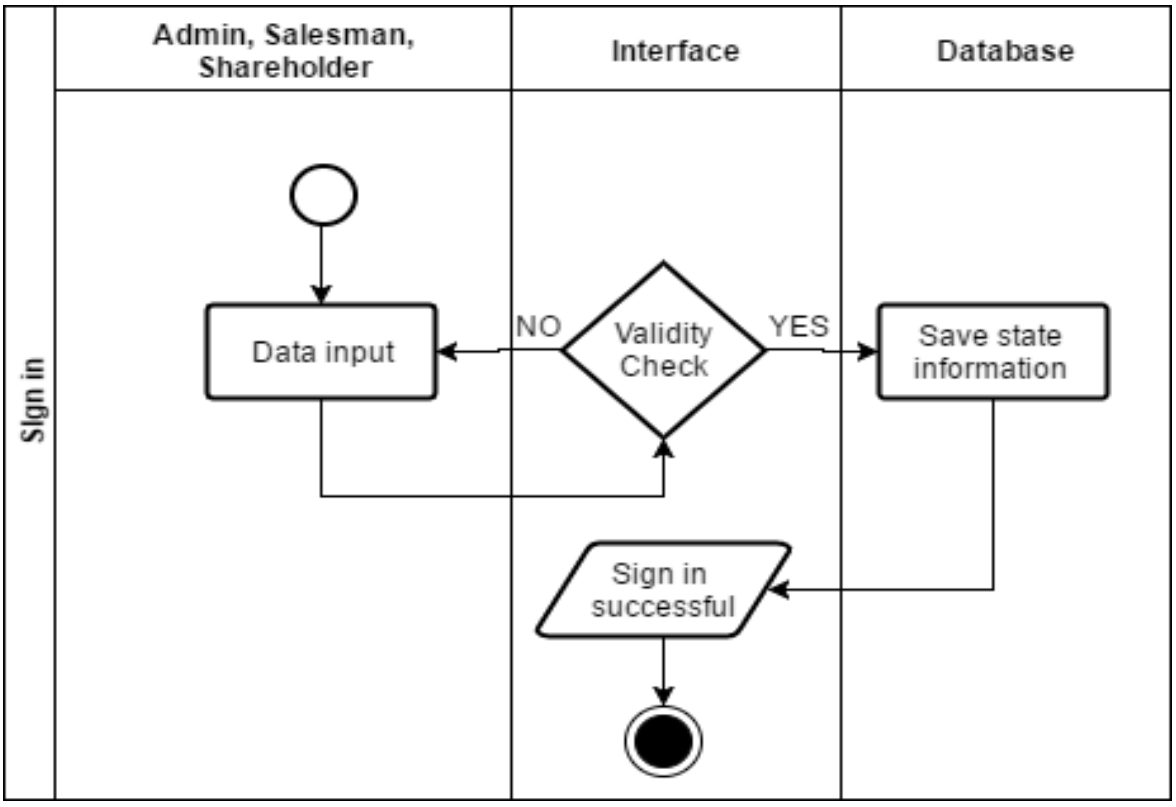


Figure – 26: Swim lane diagram – Sign in.

SWIM LANE DIAGRAM – 3: SIGN OUT

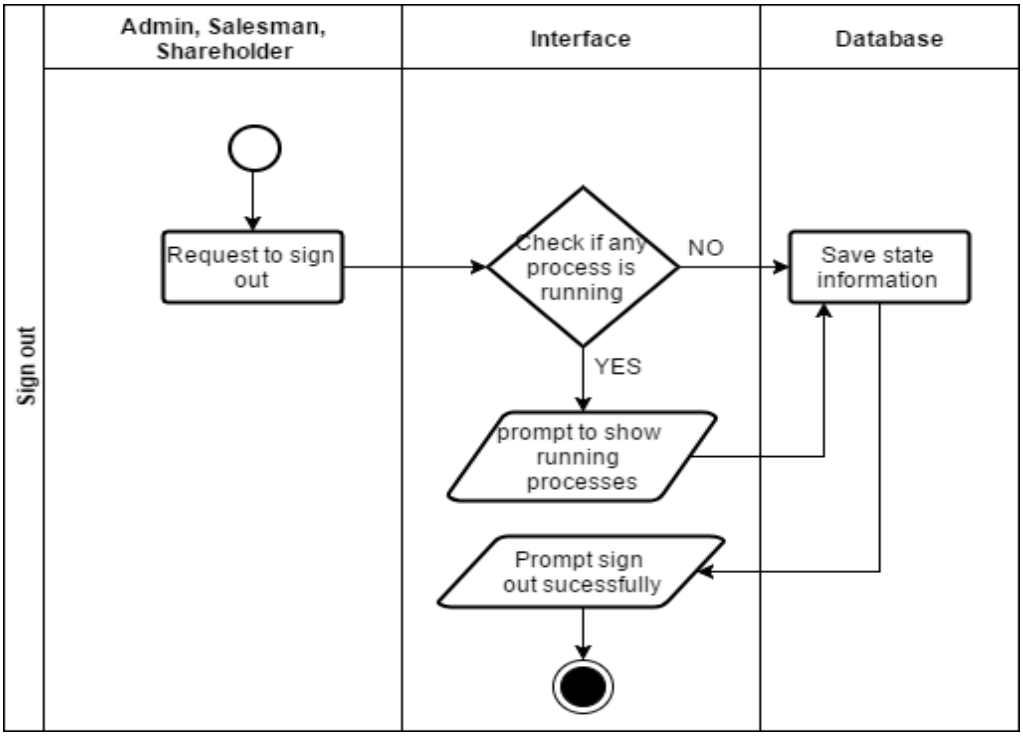


Figure – 27: Swim lane diagram – Sign out.

SWIM LANE DIAGRAM – 4: ACCOUNT RECOVERY

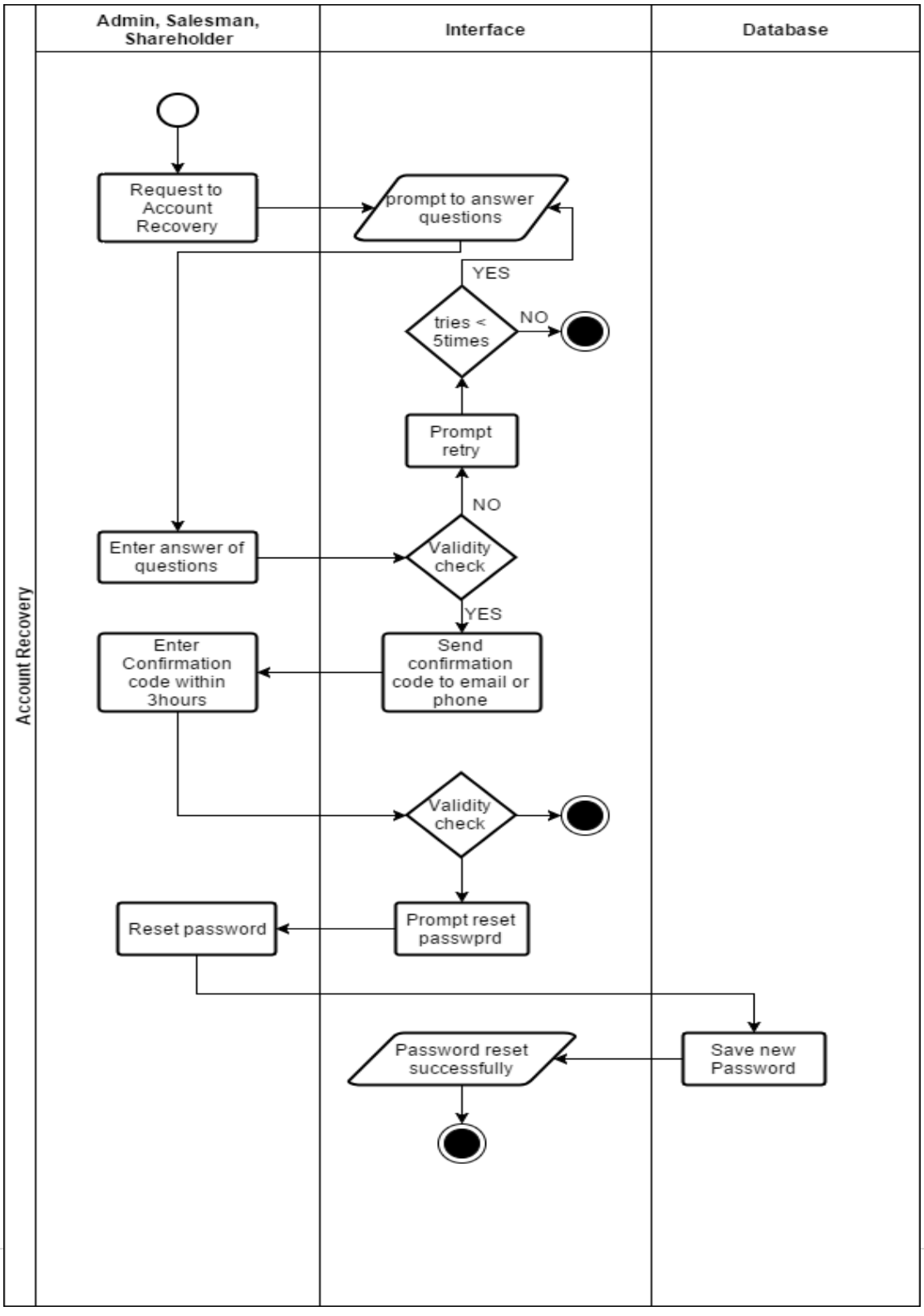


Figure – 28: Swim lane diagram – Account recovery.

SWIM LANE DIAGRAM – 5: STOCK RECOVERY

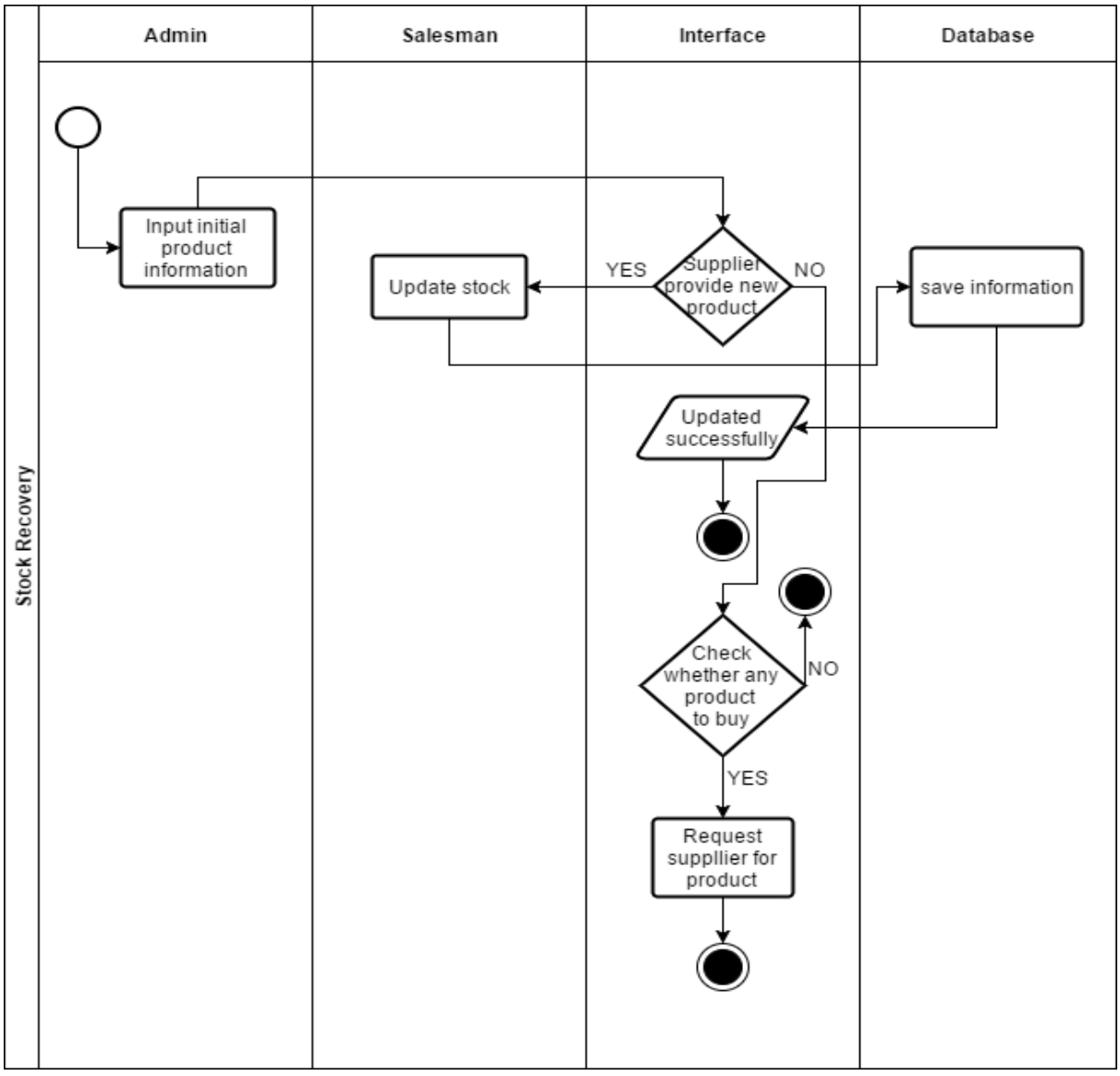


Figure – 29: Swim lane diagram – Stock recovery.

SWIM LANE DIAGRAM – 6: STOCK TRANSACTION

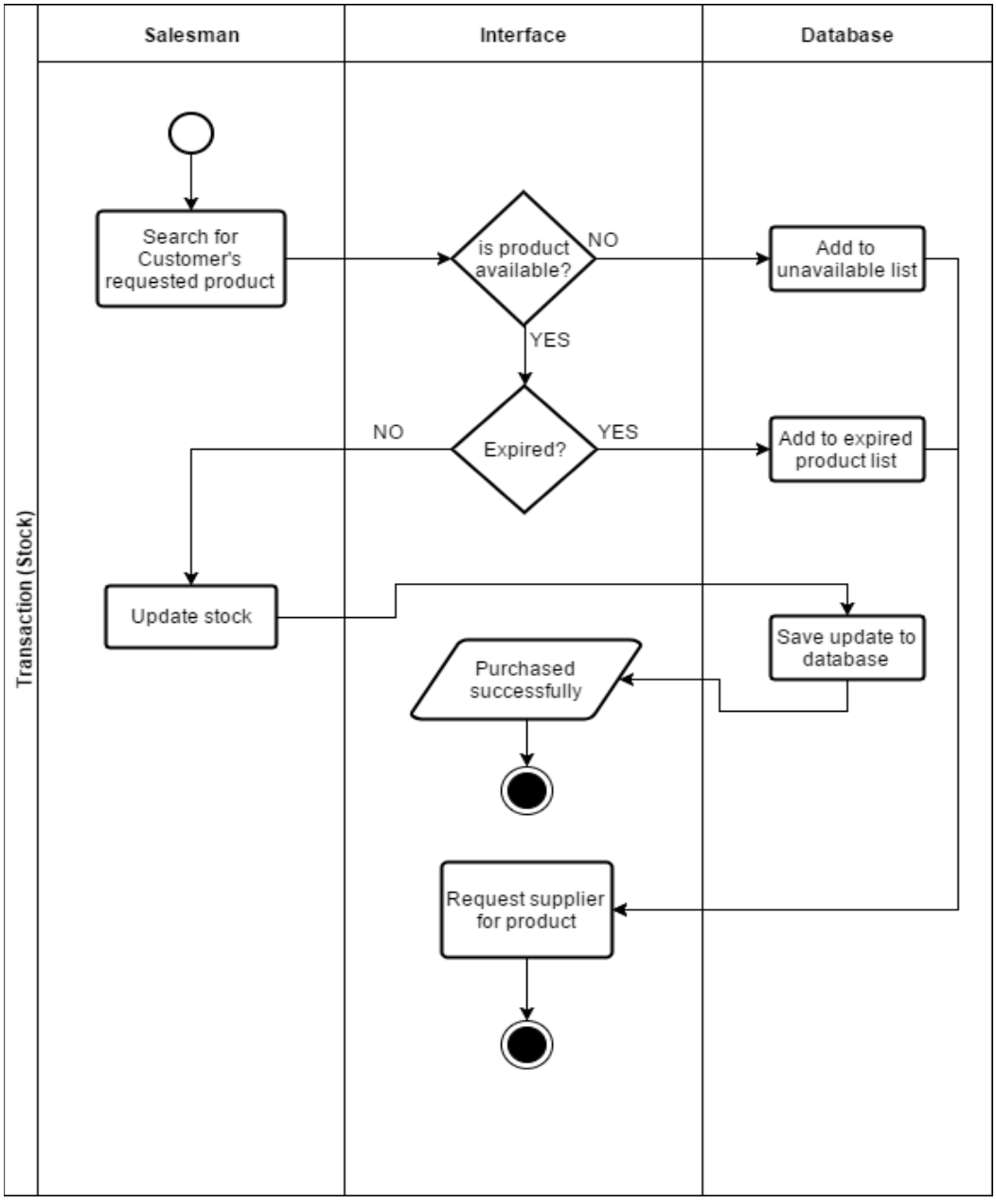


Figure – 30: Swim lane diagram – Stock transaction.

SWIM LANE DIAGRAM – 7: PRODUCT RENEWAL

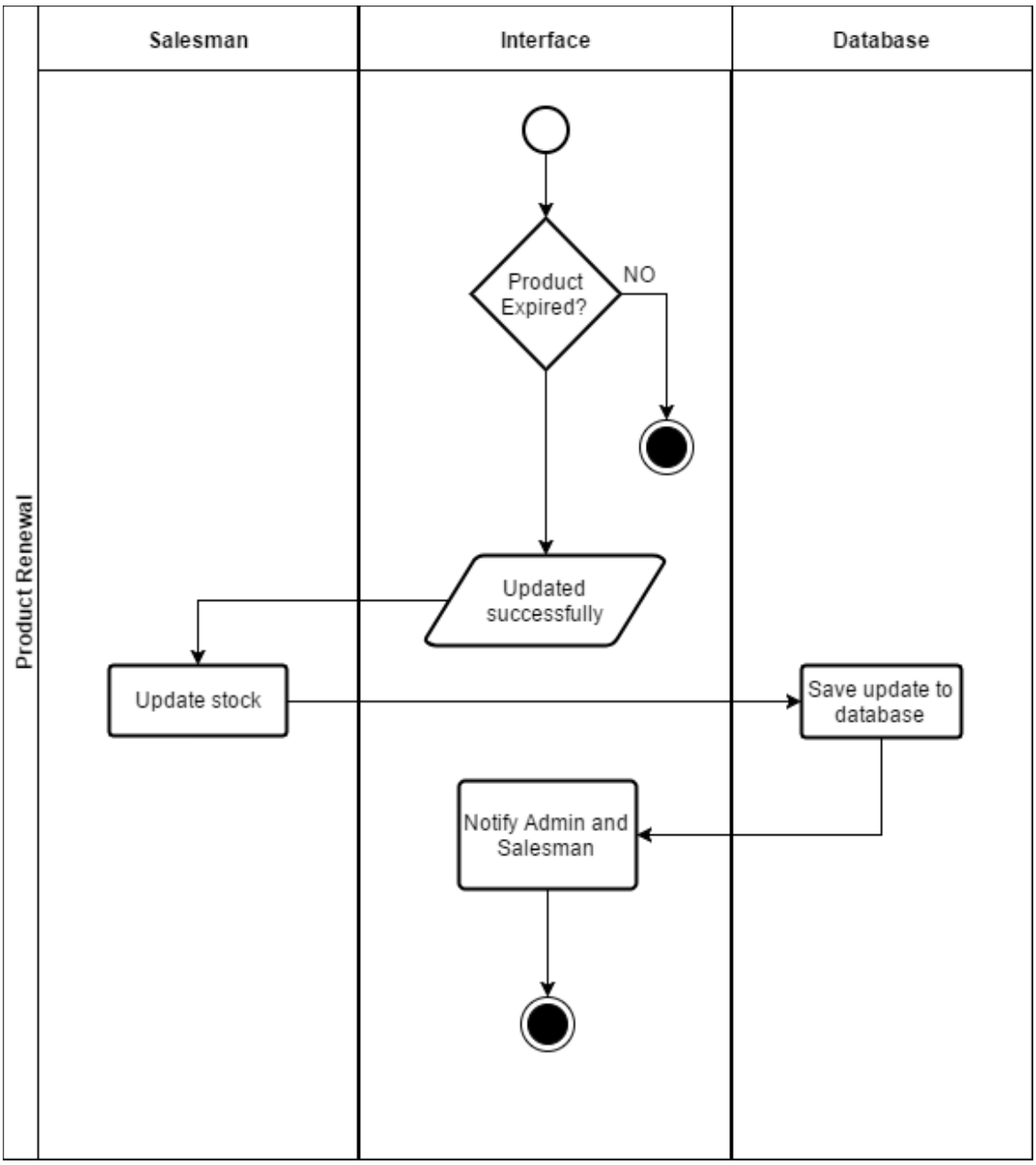


Figure – 31: Swim lane diagram – Product renewal.

SWIM LANE DIAGRAM – 8: MONEY TRANSACTION

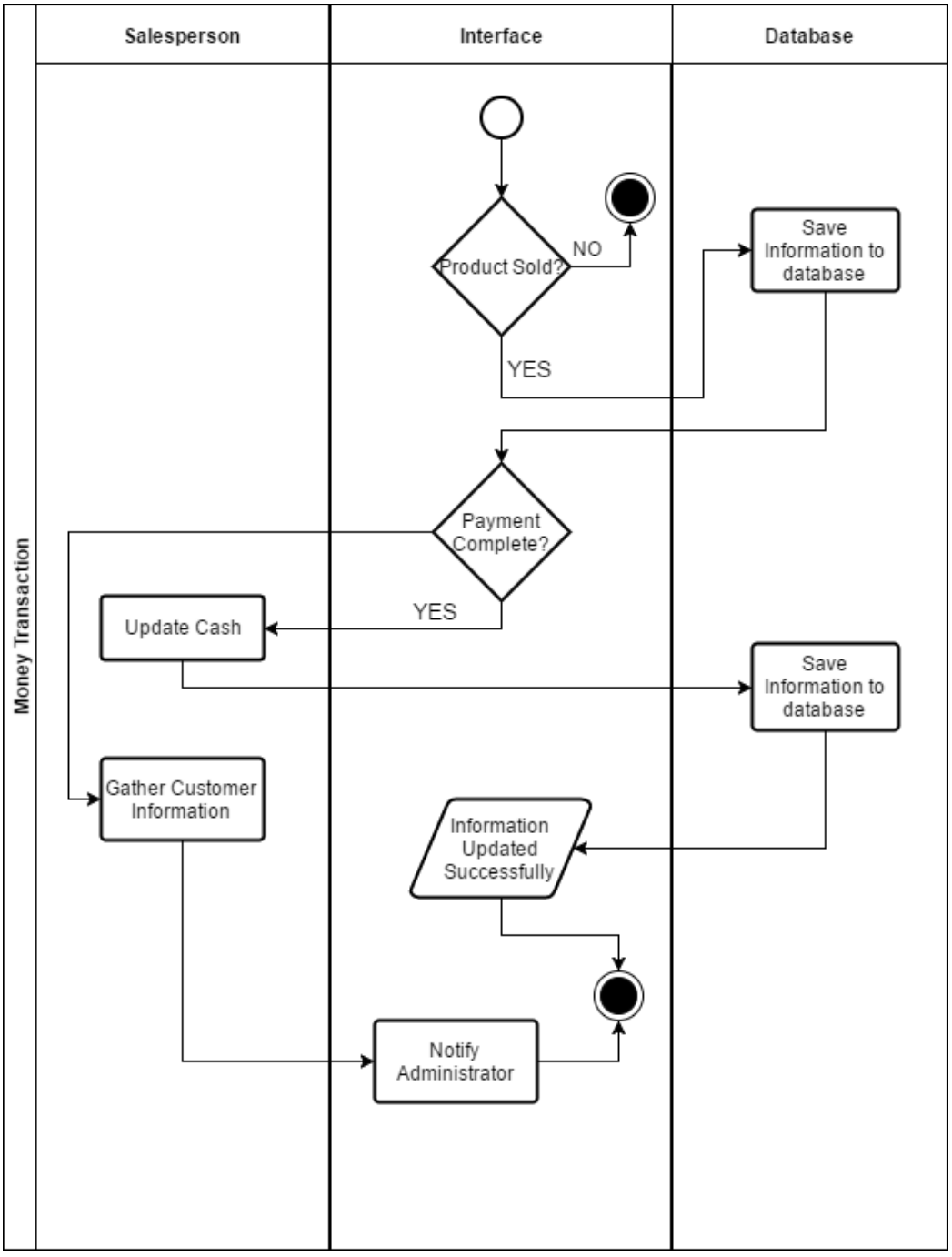


Figure – 32: Swim lane diagram – Money transaction.

SWIM LANE DIAGRAM – 9: SHARE AND PROFIT MANAGEMENT

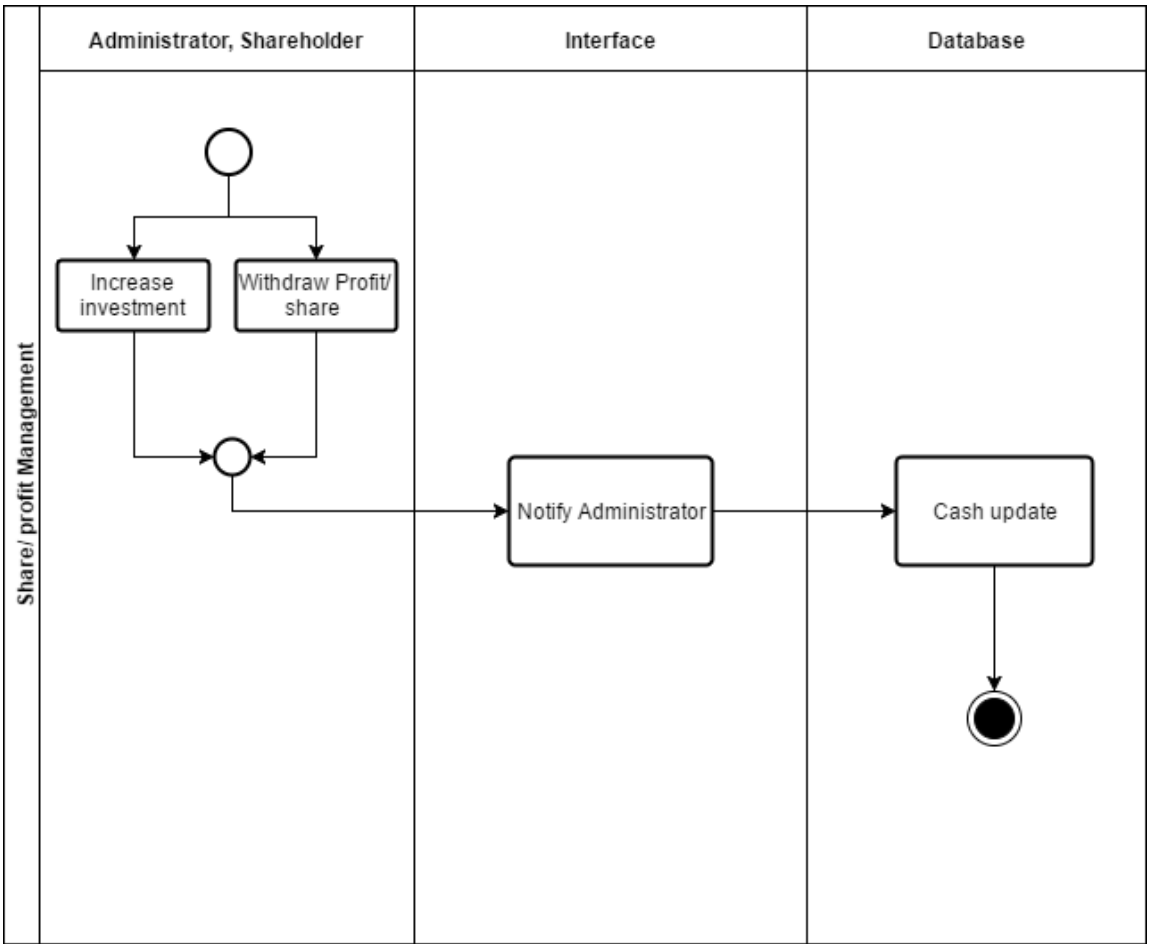


Figure – 33: Swim lane diagram – Share and profit management.

SWIM LANE DIAGRAM – 10: MAINTENANCE

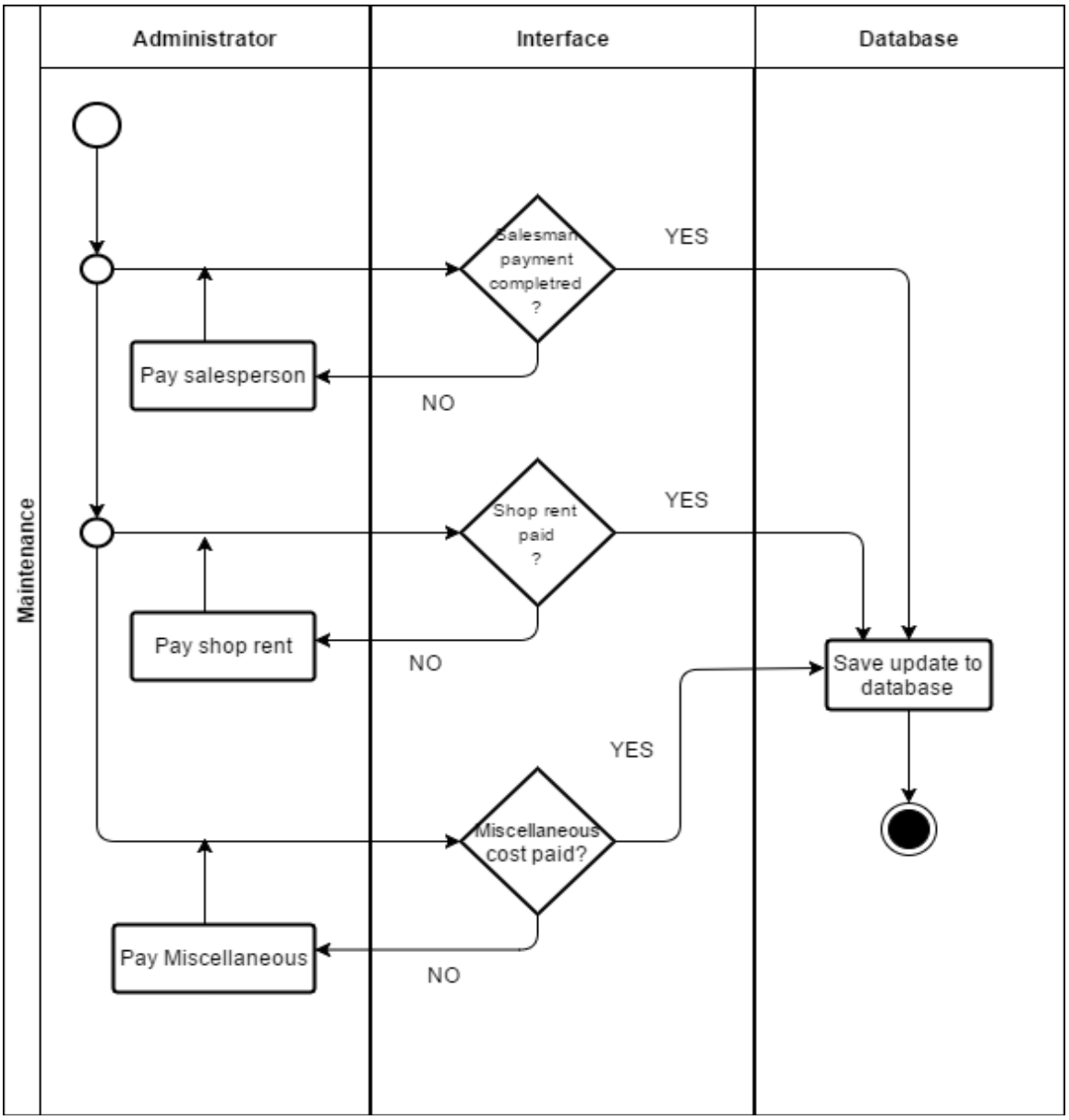


Figure – 34: Swim lane diagram – Maintenance.

SWIM LANE DIAGRAM – 11: NOTIFICATION

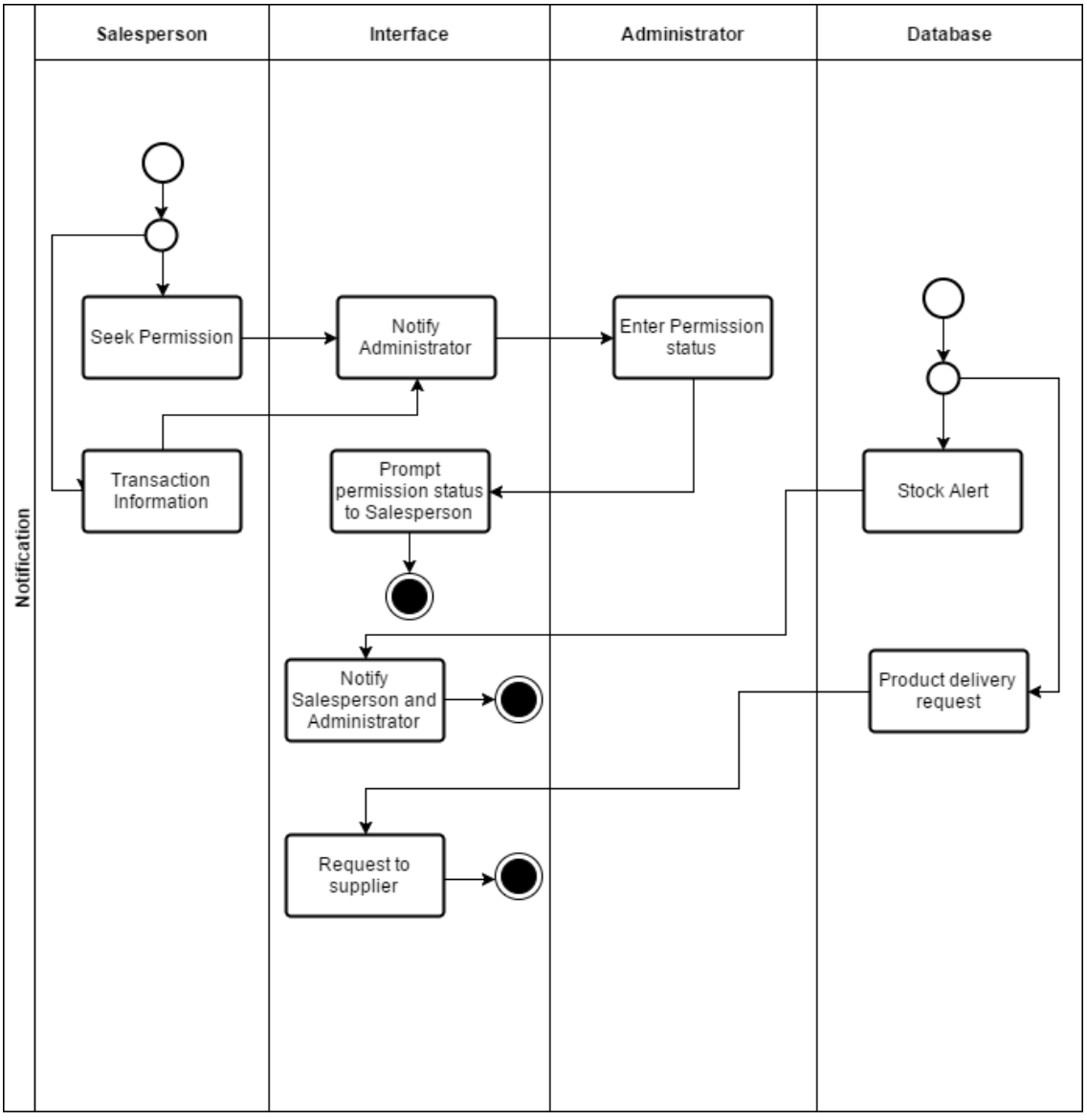


Figure – 35: Swim lane diagram – Notification.

SWIM LANE DIAGRAM – 12: HRMANAGEMENT

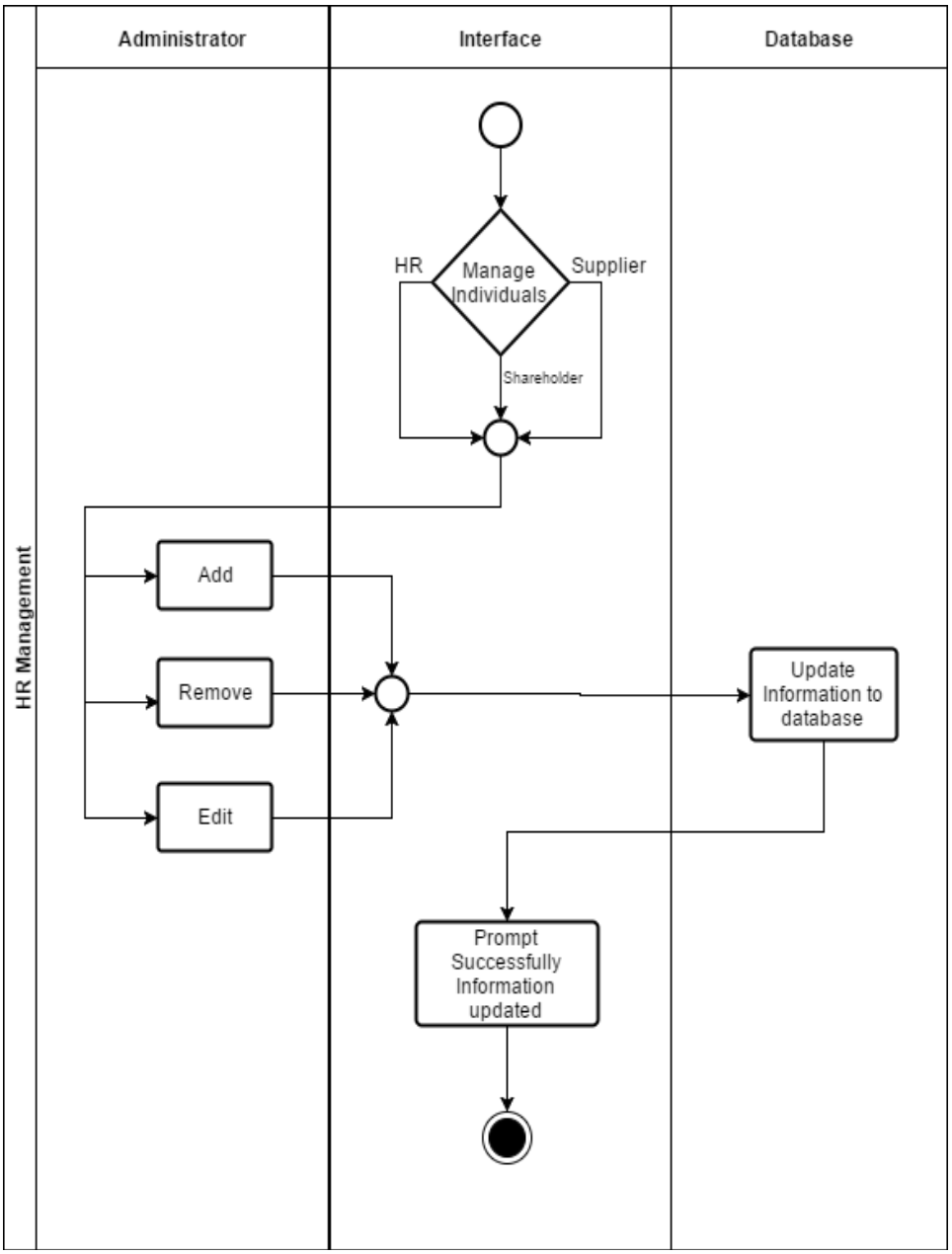


Figure – 36: Swim lane diagram – Human resource management

CHAPTER 5: DATA BASED MODELING OF PMS

This chapter describes the Scenario Based Model for the Pharmacy management System.

5.1 INTRODUCTION

Sometimes software requirements include the necessity to create, extend or interact with a database or complex data structures need to be constructed and manipulated. The software team chooses to create data models as a part of overall requirements modelling. The entity-relationship diagram (ERD) defines all data objects that are processed within the system, the relationships between the data objects and the information about how the data objects are entered, stored, transformed and produced within the system.

5.2 DATA OBJECTS

A data object is a representation of composite information that must be understood by the software. Here, composite information means an information that has a number of different properties or attributes. A data object can be an external entity, a thing, an occurrence, a role, an organizational unit, a place or a structure.

5.2.1 NOUN IDENTIFICATION

We identified all the nouns whether they are in problem space or in solution space from our usage scenario.

Table 1: Noun Identification for Data Modelling

Serial Number	Noun	Problem/Solution Space	Attributes
1	user	s	11, 12, 13, 14, 15, 23
2	Software	p	
3	signup/registration	s	
4	sign in	s	
5	account recovery	s	
6	system	s	
7	authentication	s	
8	owner	s	

9	administrator	s	11, 12, 13, 14, 15, 16
10	information	p	
11	Full name	s	
12	username	s	
13	email	s	
14	present address	s	
15	password	s	
16	backup-question and answer	s	
17	authority	p	
18	salesperson	s	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
19	shareholder	s	32, 33, 34, 35, 36, 37, 38, 39, 40
20	data	p	
21	Full name	s	
22	username	s	
23	contact number	s	
24	email	s	
25	present address	s	
26	permanent address	s	
27	password	s	
28	date of recruitment	s	
29	salary	s	
30	national id	s	
31	date of birth	s	
32	Full name	s	
33	username	s	
34	password	s	
35	contact number	s	
36	email	s	
37	present address	s	
38	permanent address	s	
39	national id	s	
40	investment	s	
41	validity check	s	
42	characters	s	
43	number	s	
44	format	p	
45	confirmation code	s	
46	digits	s	
47	correct entry	p	
48	account creation	s	
49	individual	p	
50	Database	s	
51	log in time	s	

52	first login time	s	
53	daily basis	p	
54	five times	s	
55	three hours	s	
56	sign out	s	
57	unsaved data	s	
58	log out time	s	
59	stock	s	
60	pharmacy	p	
61	drugs	s	
62	first aid products	s	
63	hygiene products	s	
64	medical tools	s	
65	attributes	p	
66	products	s	67, 68, 69, 70, 71, 72, 73, 74, 75, 76
67	product name	s	
68	product id/PID	s	
69	product type/P-type	s	
70	component	s	
71	company name	s	
72	cost price	s	
73	manufactured date	s	
74	expiry date	s	
75	discount	s	
76	sale frequency	s	
77	carton	p	
78	stock reserve	s	
79	supplier	s	135, 136, 137, 138, 139, 140, 141, 142
80	Sale	s	
81	update	s	
82	pop-up	p	
83	accidents	p	
84	political conflicts	p	
85	extortion	p	
86	theft	p	
87	natural disaster	p	
88	drop	p	
89	demands	p	
90	expired products	s	
91	business	p	
92	investment	s	
93	daily transaction	s	
94	transaction information	s	95, 96, 97, 98, 99, 100

95	transaction id/TID	s	
96	product name	s	
97	product id/PID	s	
98	quantity	s	
99	Date	s	
100	username	s	
101	maintenance expenditures	s	104, 105, 106, 107, 108, 109
102	shop rent	s	
103	electric bill	s	
104	expenditure transaction id/ETID	s	
105	expenditure transaction type/ET-type	s	
106	expenditure transaction amount	s	
107	username(salesperson when paying him/her)	s	
108	Date	s	
109	remarks	s	
110	profits	s	
111	cash withdrawal	s	
112	Loss	s	
113	notification	s	156-159
114	record	s	150,152-155
115	date of incident	s	
116	customer	s	125, 126, 127, 128, 149, 150, 151
117	deal/contract	p	
118	Information Management System	s	
119	Purchase	s	
120	Certain number	s	
121	System/interface	s	
122	Low stock alert	s	
123	Request	s	
124	Full Payment	p	
125	Customer name	s	
126	Contact no	s	
127	national id/NID	s	
128	customer address	s	
129	pending due	s	
130	permission	p	
131	messages	s	
132	daily transaction history	s	
133	monthly profit/loss graph	s	
134	monthly transaction graph	s	
135	supplier name	s	
136	supplier address	s	

137	supplier contact no	s	
138	joining date	s	
139	company name	s	
140	company email	s	
141	company contact number	s	
142	company address	s	
143	company	s	139, 140, 141, 142
144	cash details	s	145, 146, 147, 148
145	debtor's amount	s	
146	creditor's amount	s	
147	assets	s	
148	profit	s	
149	due amount	s	
150	date of occurrence	s	
151	due product name	s	
152	Record ID	s	
153	record type	s	
154	Record Amount	s	
155	Record remarks	s	
156	Notification ID	s	
157	Notification Sender Username	s	
158	Notification Recipient Username	s	
159	Notification Message	s	
160	inventory	s	163
161	Log	s	118, 51
162	Low storage	s	
163	Inventory ID	S	

5.2.2 Potential Data Objects

- **User**: 11-15, 23
- **Administrator**: 11-16
- **Salesperson**: 21-31
- **Shareholder**: 32-40
- **Supplier**: 135-142

- **Customer**: 125-128, 149-151
- **Product**: 67-76
- **Maintenance expenditures**: 104-109
- **Transaction Information**: 95-100
- **Company**: 139-142
- **Cash details**: 145-148
- **Record:** 150, 152-155
- **Notification:** 156-159
- **Log:** 118, 51
- **Inventory:**163

5.2.3 Analysis For Final Data Object

- Administrator, Salesperson, Shareholders are all users of PMS and thus have common attributes stored as data object **User.**
- Recruitment date and salary is kept stored in **Salesperson.**
- Investment and joining date is stored in **Shareholder**.
- **Company** stores company information such as name, email, address, contact number.
- **Company** has **Products** and **Suppliers.**
- **Products** holds all the product information including expiry dates and discounts.
- **Transaction information** contains transaction details including product name, date and username of salesperson conducting the transaction.
- **Maintenance expenditures** consists of maintenance expenditure information and also includes username of recipient of cash when salesperson's salary is being paid.
- **Customer** holds the information of customers who have taken a product with payment pending.
- **Cash details** keep record of assets, debtor's amount, creditor's amount and profit.
- **Record** keeps record ID, record type, record date of occurrence, record amount, record remarks.
- **Notification** keeps notification Sender Username, notification Recipient Username, notification Message, notification id.
- **Log** stores log in and log out session of salesperson**.**
- **Inventory** has products.

5.2.4 FINAL DATA OBJECTS

Table 2: Final Data Objects

1	User: Username, Full name, Password, Email, Present address, Contact number, National ID(NID), Permanent address
2	Administrator: Backup question, Answer
3	Salesperson: Date of recruitment, Salary
4	Shareholder:Investment amount, Joining date
5	Product: Product name,Product ID, Product type(P-type), Component name,Cost price, Manufactured date, Expiry date, Discount, Sales frequency
6	Supplier: Supplier name, National ID(NID), Supplier address, Supplier contact number, Joining date
7	Transaction: Transaction ID(TID), Product name, Product ID, quantity, date
8	Customer: Customer name, Contact number, Customer address, National ID(NID), Due amount, Customer ID
9	Log: Date,Type, Time
10	Record: Record ID(RID), Record type, Record date of occurrence, Record amount, Record remarks
11	Notification: Notification sender username, Notification recipient username, Notification message, Notification ID
12	Inventory: Inventory ID, Product name, Product quantity
13	Company: Company name, Company address, Email, Phone number
14	Loan: loan ID, Amount

5.3 Data Object Relations

Data objects are connected to one another in the ways stated below.

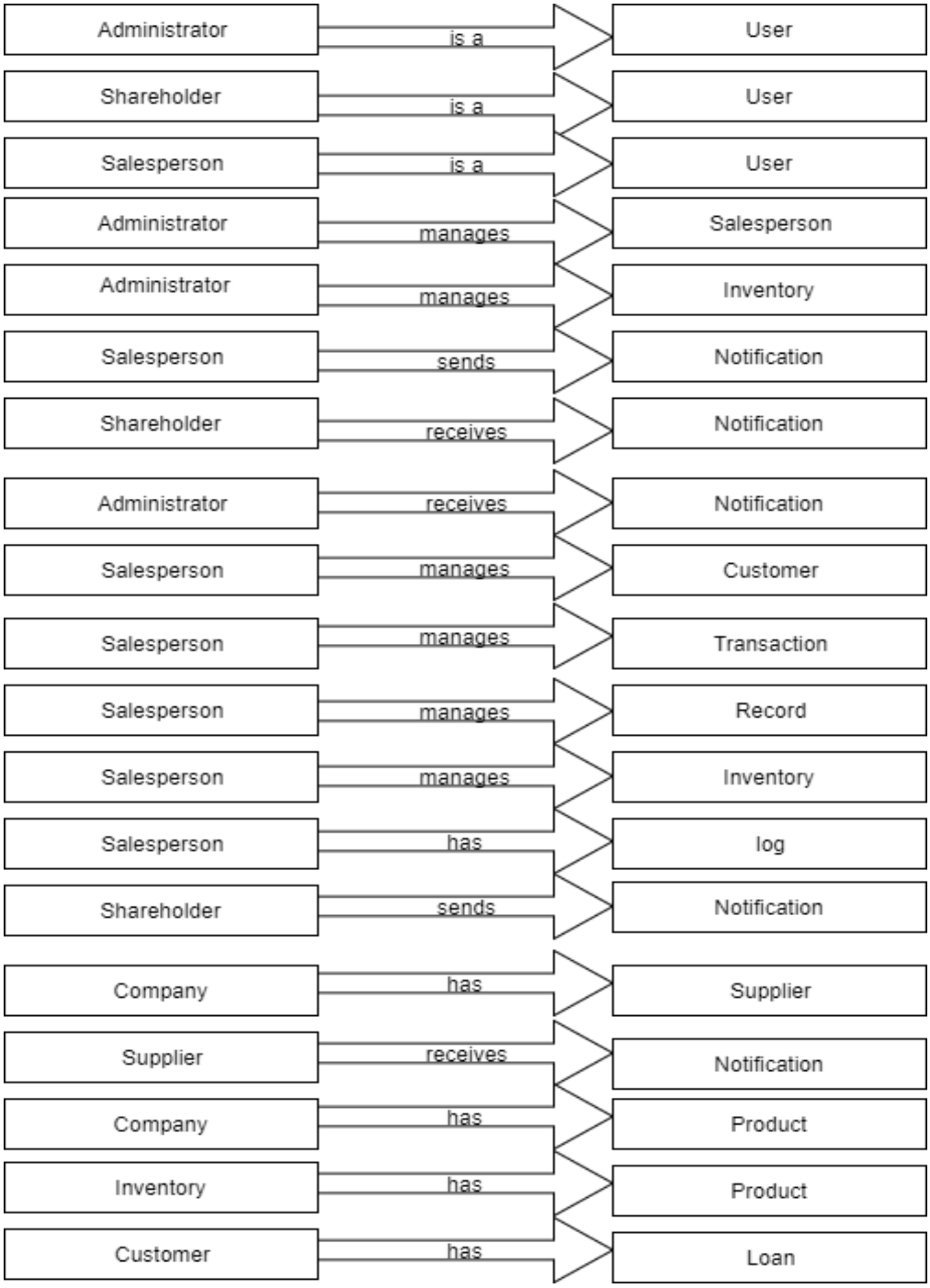


Figure – 37: Relationship between data objects

5.4 Entity Relationship Diagram

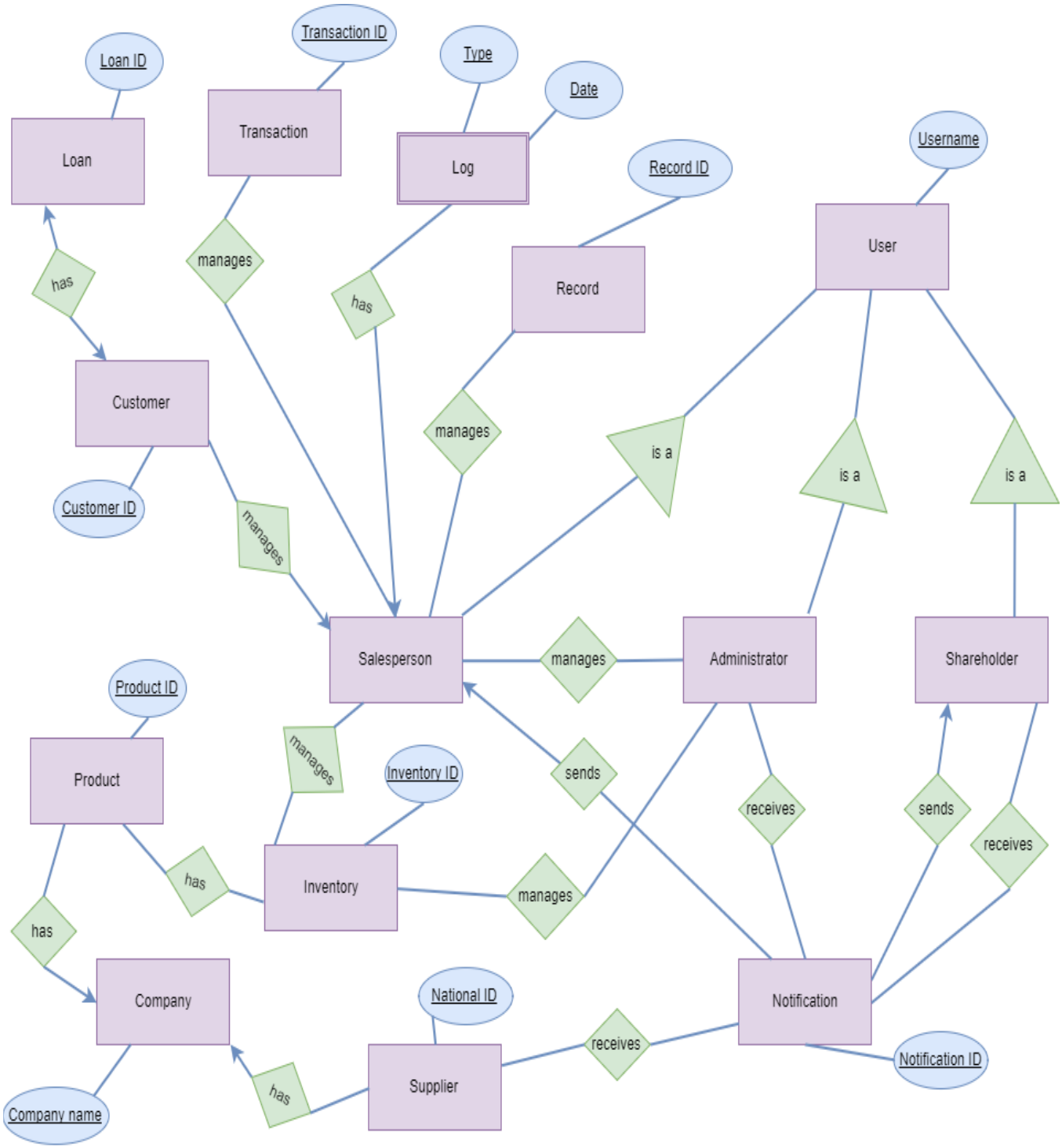


Figure – 38: Entity Relationship of Pharmacy Management System

5.5 SCHEMA DIAGRAM

A schema is the structure behind data organization. In a schema diagram, all database tables are designated with unique columns and special features, e.g. primary keys, foreign keys.

Table 3: Schema table of User data object

	USER	
Attributes	**Type**	**Size**
Username	VARCHAR	40
Full name	VARCHAR	25
Password	VARCHAR	8-15
Email	VARCHAR	50
Present address	VARCHAR	100
Permanent address	VARCHAR	100
Contact number	VARCHAR	11
National ID	VARCHAR	20

Table 4: Schema table of Administrator data object

	ADMINISTRATOR	
Attributes	**Type**	**Size**
Username	VARCHAR	40
Backup question	VARCHAR	50
Answer	VARCHAR	50

Table 5: Schema table of Salesperson data object

	SALESPERSON	
Attributes	**Type**	**Size**
Username	VARCHAR	40
Date of recruitment	VARCHAR	20
Salary	NUMBER	18

Table 6: Schema table of Shareholder data object

	SHAREHOLDER	
Attributes	**Type**	**Size**
Username	VARCHAR	40
Investment amount	NUMBER	18
Joining date	VARCHAR	20

Table 7: Schema table of Supplier data object

	SUPPLIER	
Attributes	**Type**	**Size**
Supplier name	VARCHAR	80
Joining date	VARCHAR	20
Supplier contact number	VARCHAR	11
Supplier address	VARCHAR	200
Company name	VARCHAR	50
National ID	VARCHAR	20

Table 8: Schema table of Customer data object

	CUSTOMER	
Attributes	**Type**	**Size**
Customer name	VARCHAR	80
Due amount	NUMBER	18
Contact number	VARCHAR	11
Customer address	VARCHAR	200
National ID	VARCHAR	25
Customer ID	VARCHAR	20

Table 9: Schema table of Transaction data object

	TRANSACTION	
Attributes	**Type**	**Size**
Transaction ID	VARCHAR	80
Product Name	VARCHAR	30
Product ID	VARCHAR	20
Quantity	NUMBER	18
Transaction Date	VARCHAR	20
Username	VARCHAR	20

Table 10: Schema table of Record data object

	RECORD	
Attributes	**Type**	**Size**
Record ID	VARCHAR	20
Record type	VARCHAR	20
Record date of occurrence	VARCHAR	20
Record loan amount	NUMBER	18
Record remarks	VARCHAR	100

Table 11: Schema table of Notification data object

	NOTIFICATION	
Attributes	**Type**	**Size**
Notification sender username	VARCHAR	80
Notification recipient username	VARCHAR	80
NotificationID	VARCHAR	20
Notification message	VARCHAR	100

Table 12: Schema table of Loan data object

	LOAN	
Attributes	**Type**	**Size**
LoanID	VARCHAR	20
Customer ID(Foreign key)	VARCHAR	20
Due amount	VARCHAR	20

Table 13: Schema table of Log data object

	LOG	
Attributes	**Type**	**Size**
Date	DATE	20
Username	VARCHAR	20
Type	VARCHAR	8
Time	VARCHAR	20

Table 14: Schema table of Product data object

	PRODUCT	
Attributes	**Type**	**Size**
Product name	VARCHAR	20
Product ID	VARCHAR	20
Product type	VARCHAR	20
Component	VARCHAR	20
Company name	VARCHAR	20
Cost price	VARCHAR	20
Manufactured date	VARCHAR	20
Expiry date	VARCHAR	20
Discount	VARCHAR	20
Sales frequency	VARCHAR	20

Table 15: Schema table of Company data object

	COMPANY	
Attributes	**Type**	**Size**
Company name	VARCHAR	20
Company address	VARCHAR	100
Email	VARCHAR	50
Phone number	VARCHAR	20

Table 16: Schema table of Inventory data object

	INVENTORY	
Attributes	**Type**	**Size**
Inventory id	VARCHAR	20
Product name	VARCHAR	100
Product quantity	VARCHAR	50

CHAPTER 6: CLASS-BASED MODELING OF PMS

This chapter describes the Class Based Model for the Pharmacy Management System.

6.1 INTRODUCTION

Class-based methods for requirements modelling use common concepts of object oriented programming to craft an impression of an application that can be understood by nontechnical stakeholders. As the requirements model is refined and expanded, it evolves into a specification that can be used by software engineers in the creation of the software design. Class-based modelling represents:

1. The objects the system will manipulate
2. The operations (methods or services) that will be applied for effective manipulation
3. The relationships between the objects
4. The collaborations that occur between the classes

6.2 IDENTIFYING ANALYSIS CLASSES

Classes are identified by underlining each noun or noun phrase and plotting it into a simple table. If the class (noun) is required to implement a solution, then it becomes a part of the solution space. Otherwise if the noun is used only to describe a solution, it is regarded as a part of the problem space. Once all the nouns have been isolated, General classification and Selection is done.

6.2.1 GENERAL CLASSIFICATION

Nouns belonging to the solution space should exhibit any of the following criteria to be considered as a class. The 7 general characteristics are stated below.

1. ***External entities***: Other systems, devices, people that produce or consume information to be used by a computer-based system
2. ***Things***: Reports, displays, letters, signals that are a part of the information domain for the problem.
3. ***Events***: Actions or transfers (a property transfer or the completion of a series of robot movements) that occur within the context of system operation.
4. ***Roles***: Responsibilities played by the people who interact with the system.
5. ***Organizational units****:* Divisions, groups, teams that are relevant to an application.

6. *Places*: Platform that establishes the context of the problem and overall function of the system.
7. *Structures*: Something that defines a class of objects or related classes of objects.

Table 17: Nouns with general classification

Serial number	Noun	General Classification
1	User	4, 5, 7
2	sign up/registration	3,5
3	sign in	3
4	account recovery	3
5	Interface	4, 6
6	authentication	3
7	administrator	4, 5
8	fullname (administrator)	
9	username (administrator)	
10	email (administrator)	
11	present address (administrator)	
12	password (administrator)	
13	backup-question	
14	Salesperson	4, 5
15	Shareholder	4, 5
16	fullname (salesperson)	
17	username (salesperson)	
18	contact number (salesperson)	
19	email (salesperson)	
20	present address (salesperson)	
21	permanent address (salesperson)	
22	password (salesperson)	
23	date of recruitment (salesperson)	
24	salary (salesperson)	
25	national id/NID (salesperson)	
26	date of birth (salesperson)	
27	fullname (shareholder)	
28	username (shareholder)	
29	password (shareholder)	
30	contact number (shareholder)	
31	email (shareholder)	
31	present address (shareholder)	
32	permanent address (shareholder)	
33	national id/NID (shareholder)	
34	investment amount(shareholder)	
35	validity check	3

36	Characters	
37	phone number	
38	confirmation code	
39	Digits	
40	account creation	3
41	Database	1, 2, 6
42	log in	3
43	first login time	
44	five times	
45	three hours	
46	sign out	3
47	unsaved data	
48	log out time	
49	Stock	
50	Drugs	2
51	first aid products	2
52	hygiene products	2
53	medical tools	2
54	Products	2
55	product name	
56	product id/PID	
57	product type/P-type	
58	component	
59	company name	
60	cost price	
61	manufactured date	
62	expiry date	
63	discount	
64	sale frequency	
65	inventory	
66	stock reserve	3
67	supplier	1, 4, 5
68	sale	
69	update	3
70	expired products	2
71	investment	
72	daily transaction	3
73	transaction information	
74	transaction id/TID	
75	product name	
76	product id/PID	
77	quantity	
78	date	
79	username	

80	maintenance expenditures	3
81	shop rent	
82	electric bill	
83	expenditure transaction id/ETID	
84	expenditure transaction type/ET-type	
85	expenditure transaction amount	
86	username(salesperson when paying him/her)	
87	date	
88	remarks	
89	profits	
90	cash withdrawal	3
91	loss	
92	notification	3
93	record	2
94	date of incident	
95	customer	1
96	Information Management System	
97	Purchase	3
98	no. of months for notification of products expiring	
99	System/interface	2
100	Low stock alert	3
101	Request	3
102	Customer name	
103	Contact no	
104	national id/NID	
105	customer address	
106	pending due	
107	messages	3
108	daily transaction history	2
109	monthly profit/loss graph	2
110	monthly transaction graph	2
111	supplier name	
112	supplier address	
113	supplier contact no	
114	joining date	
115	company name	
116	company email	
117	company contact number	
118	company address	
119	company	1
120	cash details	2
121	debtor's amount	
122	creditor's amount	
123	assets	

124	profit	
125	due amount	
126	date of due occurrence	
127	due product name	
128	corresponding answer	

Note: sh=Shareholder, sp= Salesperson

6.2.2 SELECTION CRITERIA

Classes that fulfilled at least 3 characteristics of general classification are again reconsidered by six Selection Criteria. The six characteristics for the selection criteria are:

1. ***Retained information***: The potential class will be useful during analysis only if information about it must be remembered so that the system can function.
2. ***Needed services***: The potential class must have a set of identifiable operations that can change the value of its attributes in some way.
3. ***Multiple attributes***: During requirement analysis, the focus should be on "major" information; a class with a single attribute may, in fact, be useful during design, but is probably better represented as an attribute of another class during the analysis activity.
4. ***Common attributes***: A set of attributes can be defined for the potential class and these attributes apply to all instances of the class.
5. ***Common operations***: A set of operations can be defined for the potential class and these operations apply to all instances of the class.
6. ***Essential requirements***: External entities that appear in the problem space and produce or consume information essential to the operation of any solution for the system will almost always be defined as classes in the requirements model.

To be considered a legitimate class for inclusion in the requirements model, a potential object should satisfy all (or almost all) of these characteristics. The decision for inclusion of potential classes in the analysis model is somewhat subjective, and later evaluation may cause an object to be discarded or reinstated.

Table 18: Selection Criterion of nouns

Serial Number	Noun	Selection Criterion
1	User	1, 2, 3, 4, 5, 6
2	Sign Up	3, 4, 5
3	Sign In	3, 4, 5
4	Sign Out	3, 4, 5
5	Account Recovery	4, 5
6	Interface	2, 3, 4, 5, 6
7	Authentication	3, 4, 5
8	Salesperson	1, 2, 3, 4, 5, 6
9	Shareholder	1, 2, 3, 4, 5, 6
10	Validity Check	4, 5
11	Database	6
12	Product	1, 2, 3, 4, 5
13	Company	1, 2, 3, 4, 5, 6
14	Supplier	1, 2, 3, 4, 5, 6
15	Daily Transaction	1, 3, 4, 5
16	Maintenance expenditures	1, 3, 4, 5
17	Notification	3, 4, 5
18	Customer	1, 2, 3, 4, 5, 6
19	Alert	3, 4, 5
20	Record	1, 3, 4, 5
21	Graph	1, 3, 4, 5
22	Cash Details	1, 2, 3

6.2.3 Associating Nouns With Verbs

We now identify the nouns and verbs associated with the potential classes to better find out the attributes and methods of each class.

Table 19: Associate Noun and Verb Identification

No	Class Name	Nouns	Verbs
1	User	username, fullname, email, password, contact no, present address	sign in, sign out, account recovery, send notification, view cash details, cash management
2	Admin	back up question and answer, investment	adds/removes/edits salesperson, supplier and shareholder, manages product, manages maintenance expenditure, invests/withdraws/views cash, views transaction information, views customer information, grants/rejects permission, receives

			notification, pays salary, views loan table
3	Sign Up	username, fullname, email, password, contact no, present address, permanent address, back up question and answer, date of recruitment, NID, date of birth, investment	data entry,validity check
4	Sign In	user name,password	match data,record login time
5	Sign Out	N/A	check running process, store last logout time
6	Account Recovery	N/A	ask questions, matches answer, sends confirmation code
7	System/interface	N/A	automate processes, communicate with actors
8	Authentication	N/A	select actions
9	Salesperson	spusername, spfullname, spemail, sppassword,spcontact no, sppresent address, spNID,sp date of recruitment, spsalary, spdate of birth	account recovery, sign in, sign out, manage customers, creates/views transaction information, manages product, notifies admin, sends request to suppliers, manages loan table, manages cash details
10	Shareholder	shusername, shfullname, shemail, shpassword, shcontact no, shpresent address, shNID,sp join date, sh investment	account recovery, sign in, sign out, invest cash, views cash details, withdraw cash
11	Validity Check	N/A	validity check
12	Database	N/A	stores/provides information
13	Product	product name, product id, product type, component, company name, cost price, selling price, manufacturing date, expiry date	N/A
14	Company	company name, company email, company number, company address	N/A
15	Supplier	supplier name, supplier address, supplier contact no, supplier joining date, supplier company name	receives notification
16	Product Transaction	transaction id, product name, product id, quantity, date, username of salesperson	N/A
17	Maintenance expenditure	exp. transaction id, exp. product name, exp. product id, exp. quantity, exp. date, exp. exp. username of salesperson, remarks	N/A
18	Notification	notification type, notification message, senders user name	N/A
19	Customer	customer name, customer NID,	N/A

		customer contact no, customer address, customer due amount	
20	Alert	type, message, senders user name, receivers user name	N/A
21	Record	record id, record type, date of occurrence, amount, remarks	N/A
22	Graph	graph type, time span, profit, sale frequency, cash details, product group	N/A
23	Cash Details	assets, debtor's amount, creditor's amount, profit	N/A

6.2.4 Class Responsilities

User:

- Receiving notifications
- Signing out from the system
- Recovering own account
- Viewing system summary

Administrator:

- HR Management
- Cash Management
- Product Management
- Notification Management
- Maintenance Expenditure Management

Salesperson:

- Customer Management
- Product Management
- Transaction Management
- Notification Management
- Receives salary

Shareholder:

- Notification Management
- Viewing Graph

Supplier:

- Receiving notifications
- Delivering products
- Receiving payment
- Editing company information

Customer:

- Purchasing products
- Loan management

Product:

- Storing information
- Updating sale-frequency
- Updating price
- Updating quantity

Notification:

- Notifying users

Alert:

- Notify about low stock
- Notify about expiry date

Record:

- Storing information

Sign up:

- Signing up new users

Account recovery:

- Recovering account

Sign In:

- Authenticating users

Sign Out:

- Recording log information

System:

- Expiry date checking
- Low storage checking

Interface:

- Processing user-entered data
- Showing graph
- Creating administrator workspace
- Creating transaction management workspace
- Showing transaction information
- Showing notifications

Validity check:

- Check validity of entered data

Database:

- Stores and provides data

Daily transaction:

N/A

Maintenance expenditures:

- Pays shoprent
- Pays salary

Graph:

- Displaying system summary

Cash details:

- Storing and supplying cash details

6.2.5 POTENTIAL CLASSES

Table 20: User

User	
Attributes	Methods
Username fullName password email presentAddress permanentAddress contactNumber	signIn() signOut() accountRecovery() sendNotification() receiveNotification() viewCashDetails()

Table 21: UserSignUp

UserSignUp	
Attributes	Methods
Username fullName password email presentAddress permanentAddress contactNumber NID	User() validityCheck() getGivenInformation() toString()

Table 22: AdministratorSignUp

AdministratorSignUp	
Attributes	Methods
backUpQuestion correspondingAnswer	toString()

Table 23: SalespersonSignUp

SalespersonSignUp	
Attributes	Methods
dateOfRectruitment salary	toString()

Table 24: ShareholderSignUp

ShareholderSignUp	
Attributes	Methods
joiningDate investmentAmount	toString()

Table 25: UserSignIn

UserSignIn	
Attributes	Methods
Username Password	validityCheck() recordLogInformation() toString()

Table 26: UserSignOut

UserSignOut	
Attributes	Methods
	checkActiveProcess() recordLogInformation()

Table 27: Administrator

Administrator	
Attributes	Methods
Username fullName password email presentAddress permanentAddress contactNumber backUpQuestion correspondingAnswer	signIn() signOut() accountRecovery() addUser() removeUser() editUser() addProduct() removeProduct() editProduct() manageExpenditure() manageCash() viewCashDetails() viewTransactionDetails() viewCustomerInformation() grantPermission() receiveNotification() paySalary() viewgraph()

Table 28: Salesperson

Salesperson	
Attributes	Methods
Username fullName password email presentAddress permanentAddress contactNumber NID recruitmentDay	signIn() signOut() accountRecovery() manageCustomer() manageLoan() createTransactionInformation() viewTransactionInformation() notifyAdministrator() notifySupplier() manageProduct() manageCash() searchProduct() sellProduct() addProduct() removeProduct() editProduct() viewGraph()

Table 29: Shareholder

Shareholder	
Attributes	Methods
Username fullName password email presentAddress permanentAddress contactNumber NID joiningDate investmentAmount	signIn() signOut() accountRecovery() viewCashDetails() notifyAdministrator() manageCash() viewGraph()

Table 30: Product

Product	
Attributes	Methods
productName productID/PID productType component company costPrice sellingPrice manufacturingDate expiryDate discount saleFrequency quantity	increaseQuantity() decreaseQuantity() increasePrice() decreasePrice()

Table 31: Company

Company	
Attributes	Methods
companyName companyEmail companyContactNumber companyAddress	

Table 32: Supplier

Supplier

Attributes	Methods
supplierName supplierAddress supplierContactNumber supplierJoiningDate supplierCompanyName supplierEmail	receiveNotification()

Table 33: Customer

Customer	
Attributes	Methods
customerName customerNID customerContactNumber customerAddress customerDueAmount customerID	decreaseDueAmount() increaseDueAmount()

Table 34: UserAccountRecovery

UserAccountRecovery	
Attributes	Methods
	isMatched() sendConfirmationCode() askQuestionAndGetAnswer()

Table 35: ProductDetails

ProductDetails	
Attributes	Methods
productName productQuantity productID	getProductName() setProductName() getProductQuantity() setProductQuantity() getproductID() setproductID() toString()

Table 36: ProductTransaction

ProductTransaction	
Attributes	Methods
ProductDetails ProductAmount transactionID transactionDate username (salesperson)	getProductDetails() setProductDetails() getProductAmount() setProductAmount() getTransactionID() getTransactionID() getTransactionDate() getUserName() setUsername() toString()

Table 37: Notification

Notification	
Attributes	Methods
notificationUserName notificationSenderUserName notificationMessage notificationID	getNotificationUserName() setNotificationUserName() getNotificationSenderUserName() setNotificationSenderUserName() getNotificationMessage() setNotificationMessage() getNotificationID() setNotificationID() toString()

Table 38: Alert

Alert	
Attributes	Methods
alertType alertMesasge alertMessageSenderUsername alertMessageRecepientUsername	notifyAdministrator() notifySupplier() sendLowStockAlert() sendExpiryDateAndAlert() toString()

Table 39: Record

Record	
Attributes	Methods
recordID recordType recordDateOfOccurrence recordAmount recordRemarks	getRecordID() getRecordType() getDateOfOccurence() getRecordAmount() getRecordRemarks() toString()

Table 40: Graph

Graph	
Attributes	Methods
graphType timeSpan profit saleFrequency CashDetails productComponent	

Note:
The system should generate 5 types of graphs.

1. Depending on sales frequency, **product component pie chart**
2. Depending on product component, **sales frequency pie chart**
3. Depending on product component, **profit pie chart**
4. Depending on timespan, **timespan-profit x-y graph**
5. **Cash detail bar diagram** showing assets, liabilities and owner's equity
6. **Debtor's amount graph** and**TRIAL BALANCE**

Table 41: CashDetails

CashDetails	
Attributes	Methods
assets debtorAmount creditorAmount profitAmount	getAssets() setAssets() getDebtorAmount() setDebtorAmount() getCreditorAmount() setCreditorAmount() getProfitAmount() setProfitAmount() toString()

Table 42: HRManagementDatabase

HRManagementDatabase	
Attributes	Methods
	addSalespersonInformation() removeSalespersonInformation() updateSalespersonInformation() getSalespersonInformation() addShareholderInformation() removeShareholderInformation() updateShareholderInformation() getShareholderInformation() addSupplierInformation() removeSupplierInformation() updateSupplierInformation() getSupplierInformation() addCustomerInformation() removeCustomerInformation() updateCustomerInformation() getCustomerInformation()

Table 43: ProductManagementDatabase

ProductManagementDatabase	
Attributes	Methods
	addProduct() removeProduct() updateProduct() addProductToExpiryDateList() removeProductFromExpiryDateList() addProductToLowStorageList() removeProductFromLowStorageList() searchProductByName() searchProductByCompany() searchProductByComponent() getAllProducts()

Table 44: TransactionManagementDatabase

TransactionManagementDatabase	
Attributes	Methods
	addTransaction() deleteTransaction() getAllTransaction()

Table 45: MaiantenanceExpenditure

MaintenanceExpenditure	
Attributes	Methods
expenditureTransactionID expenditureTransactionAmount expenditureTransactionDate expenditureTransactionRemarks username (Salespeson)	addMaintenanceExpenditureTransaction() addSalespersonSalaryTransaction() viewSalespersonSalaryTransaction() toString()

Table 46: RecordManagementDatabase

RecordManagementDatabase	
Attributes	Methods
	addLoan() editLoan() removeLoan() addMissingProductRecord() addProfitRecord() addLoginSession() addLoginAndLogoutTime() editLoginAndLogoutTime() addAccidentOrMissingRecords()

6.2.6 SELECTED CLASSES

Registration

Table 47: Registration

Attributes	Methods
N/A	administratorSignUp() salespersonSignUp() shareholderSignUp() addSupplier() addCustomer()
Responsibilities	**Collaborative classes**
1. Signing up new users 2. Recovering Account	Administrator, Salesperson, Shareholder, Supplier, Customer

Note: After installation of device administratorSignUp() method will be called by the system. The administrator will register salespersons and shareholders via salespersonSignUp() and shareholderSignUp() methods. Suppliers will be included in the system by the administrator upon calling addSupplier() method. Administrator and salespersons can include customer by addCustomer() method.

Authentication

Table 48: Authentication

Attributes	Methods
	checkValidity() checkActiveProcess() recordLogInformation() recoverUserAccount()
Responsibilities	**Collaborative Classes**
Authenticating users	HRManagementDatabase,User
Recording log information	Record, RecordManagementDatabase,User

Note: The system invokes checkValididty() of Authentication class when the entered username and the email needs to be matched with the username and the password within HRManagementDatabase. If the user is salesperson, his/her first login time for that respective day will be recorded in RecordManagementDatabase.

During sign out, the system will call checkActiveProcess() which will show if there are any running process. The last logout time will be recorded everyday by RecordManagementDatabase.

For recovering account, recoverUserAccount() method will be invoked.

User

Table 49: User

Attributes	Methods

username fullName password email presentAddress permanentAddress NID	User(): constructor recoverAccount() signOut() getUsername() setUsername() getFullName() setFullName() getPassword() setPassword() getEmail() setEmail() getPresentAddress() setPresentAddress() getPermanentAddress() setPermanentAddress() getNID() setNID() viewSystemInformation() receiveNotification()
Responsibilities	**Collaborative Class**
Receiving notifications	Notification, RecordManagementDatabase, Record
Signs out from the system	Authentication
Recovers own account	Authentication,HRManagementDatabase
Views system summary	System, Graph

Note: When recoverAccount() method will be called, recoverUserAccount() of Registration will be invoked and signOut() method will be called when user wants to exit the system.

Administrator

Table 50: Administrator

Attributes	**Methods**

backUpQuestion correspondingAnswer	addSalesperson() removeSalesperson() editSalesperson() addShareholder() removeShareholder() editShareholder() addSupplier() removeSupplier() editSupplier() addShareholderInvestment() withdrawShareholderCash() viewTransaction() manageProduct() manageNotifications() payMaintenanceExpenditure()
Responsibilities	**Collaborative Classes**
HR Management	Registration, HRManagementDatabase
Cash Management	TransactionManagementDatabase, CashDetails
Product Management	Product, ProductManagementDatabase
Notification Management	RecordManagementDatabase
Manage Maintenance Expenditure	TransactionManagementDatabase, CashDetails

Note: When Administrator class calls addSalesperson() method, SalespersonSignUp() method of Registration class will be invoked. The information found from salespersonSignUp() will be stored in HRManagementDatabase. When removeSalesperson() method is called, salesperson information will be removed from HRManagementDatabase. When editSalesperson() method is called, salesperson information will be edited.

When Administrator class calls addShareholder() method, shareholderSignUp() method of Registration class will be invoked. The information found from shareholderSignUp() will be stored in HRManagement database. When removeSalesperson() method is called , salesperson information will be removed from HRManagementDatabase. When editShareholder() method is called, shareholder information will be edited.

When Administrator class calls addSupplier() method, addSupplier() method of Registrationclass will be invoked. The information found from addSupplier() will be stored in HRManagementDatabase. When removeSupplier() method is called, supplier information will be removed from HRManagementDatabase. When editSupplier() method is called, supplier information will be edited.

When addShareholderInvestment() method is called, updateShareholderInformation() of HRManagementDatabase and increaseAssets() of CashDetails will be invoked. The increment will be done via respective methods.

When withdrawShareholderCash() method is called, updateShareholderInformation() method of HRManagementDatabase and decreaseAssets() method of CashDetails() will be invoked. The decrement will be done via respective methods.

When payMaintenanceExpenditure() method is called, updateExpenseAmount() method of cashDetails will be invoked.

When manageNotification() method is called, notification details from RecordManagementDatabase will be displayed.

When viewRecord() method is called, all the tables of RecordManagementDatabase will be displayed such as notification records, loan records, missing product records, salesperson log information will be updated.

Salesperson

Table 51: Salesperson

Attributes	**Methods**
spRecritmentDay spSalary	addCustomer() deleteCustomer() updateCustomerInformation() searchbyProductName() searchbyCompanyName() searchbyComponentName() initiateTransaction() returnProductBack() addLoan() deleteLoan() updateLoan() addProduct() removeProduct() updateProduct() updateCash() notifyAdministrator() notifySupplier() getMonthlyPayment()
Responsibilities	**Collaborative Classes**
Notification Management	Notification, RecordManagementDatabase
Product Management	Product, ProductManagementDatabase
Customer Management	Customer, HRManagementDatabase
Transaction management	TransactionManagementDatabase
Receives salary	TransactionManagementDatabase

Note: When addCustomer() method is called, addCustomerInformation() of HRManagementDatabase is invoked and customer information is stored.

When deleteCustomer() method is called, removeCustomerInformation() of HRManagementDatabase is invoked and customer information is removed.

If due payment of customer changes, updateCustomerInformation() method of Salesperson class will call updateCustomerInformation() method of HRManagementDatabase and information is updated.

When initiateTransaction() method is invoked, the product requested by the customer is searched by name (via search By CompanyName() method) , company name (via search ByCompanyName() method), component name(via searchByComponent() method). If product is available and there is no due payment, updateProduct() method is called. If customer is unable to give full payment, addLoan() method is also called.

When notifyAdministrator() method is called, the notification will be added to the notification table within the RecordManagementDatabase. Administrator will be able to see the notification messages via the manageNotification() method. When notifySupplier() method is called, message will be sent to the supplier's contact no and/ or email address.

Shareholder

Table 52: Shareholder

Attributes	**Methods**
joiningDate investmentAmount	withdrawCashOrInvest() viewCashInformation()
Responsibilities	**Collaborative Classes**
Notification Management	Notification, RecordManagementDatabase
Viewing Graph	Graph, RecordManagementDatabase

When withdrawCashOrInvest() method is called, addNotification() method of RecordManagementDatabase is invoked. The action (withdraw/invest) is included with the amount notification. The administrator view the notification via manageNotification() method. When viewCashInformation() method is invoked shareholder can see cash information, graphs.

Supplier

Table 53: Supplier

Attributes	**Methods**
supplierName supplierJoiningDate	getSupplierName() setSupplierName()

supplierContactNumber supplierAddress companyName companyEmail	getSupplierJoiningDate() setSupplierJoiningDate() getSupplierContactNumber() setSupplierContactNumber() getSupplierAddress() setSupplierAddress() getCompanyName() getCompanyEmail() toString() receiveProductRequest() receivePayment() deliverProduct() changeCompanyInformation() confirmAdministrator()
Responsibilities	**Collaborative Classes**
Receiving Notifications	Notifications, RecordManagementDatabase
Delivering Products	ProductManagementDatabase
Receiving payment	TransactionManagementDatabase, CashDetails
Editing company information	HRManagementDatabase

Customer

Table 54: Customer

Attributes	**Methods**
customerName customerContactNumber customerAddress customerNID customerDueAmount	getCustomerName() setCustomerName() getCustomerContactNumber() setCustomerContactNumber() getCustomerAddress() setCustomerAddress() getCustomerDueAmount() setCustomerDueAmount() increaseDueAmount() decreaseDueAmount() toString()
Responsibilities	**Collaborative Classes**
Purchasing Products	Salesperson, RecordManagementDatabase, Record
Loan Management	RecordManagementDatabase

Product

Table 55: Product

Attributes	**Methods**
productName productID	getProductName() setProductName()

productType productComponent productCostPrice productSellingPrice productManufacturingDate productExpiryDate productDiscount productSalesFrequency productQuantity companyName	getProductID() setProductID() getProductType() setProductType() getProductComponent() setProductComponent() getProductCostPrice() getProductCostPrice() getProductSellingPrice() setProductSellingPrice() getProductManufacturingDate() setProductManufacturingDate() getProductExpiryDate() setProductExpiryDate() getProductDiscount() setProductDiscount() getProductSalesFrequency() setProductSalesFrequency() getProductQuantity() setProductQuantity() getCompanyName() increaseQuantity() decreaseQuantity() updateSaleFrequency() increasePrice() decreasePrice() toString()
Responsibilities	**Collaborative Classes**
Storing Information	ProductManagementDatabase
Updating sale-frequency	ProductManagementDatabase
Price updating	ProductManagementDatabase
Quantity updating	ProductManagementDatabase

Notification

Table 56: Notification

Attributes	**Methods**
notificationUsername notificationSenderUsername	getNotificationUsername() setNotificationUsername()

notificationRecepientUserName notificationMessage notificationID	getNotificationSenderUsername() setNotificationSenderUsername() getNotificationRecepientUsername() setNotificationRecepientUsername() getNotificationMessage() setNotificationMessage() getNotificationID() setNotificationID() notifyAdministrator() notifySupplier() sendLowStockAlert() sendExpiryDateAndAlert() toString()
Responsibilities	**Collaborative Classes**
Notifying Users	Notifications, Administrator, Supplier, ProductManagementDatabase
Notify about low stock	Salesperson
notify about expiry date	Salesperson

Record

Table 57: Record

Attributes	**Methods**
recordID recordType recordDateOfOccurrence recordAmount recordRemarks	getRecordID() getRecordType() getDateOfOccurence() getRecordAmount() getRecordRemarks() toString()
Responsibilities	**Collaborative Classes**
Storing Information	Record, RecordManagementDatabase

Graph

Table 58: Graph

Attributes	**Methods**
graphType timeSpan	viewSystemInformation()

profit saleFrequency CashDetails productComponent	
Responsibilities	**Collaborative Classes**
Displaying system summary	System

CashDetails

Table 59: CashDetails

Attributes	**Methods**
Assets debtorAmount creditorAmount profitAmount expenseAmount monthlySale monthlyInvestment	getAssets() setAssets() getDebtorAmount() setDebtorAmount() getCreditorAmount() setCreditorAmount() getProfitAmount() setProfitAmount() getMonthlyProfit() getYearlyProfit() increaseAssets() decreaseAssets() toString()
Responsibilities	**Collaborative Classes**
Storing and supplying monetary information	TransactionManagementDatabase

HRManagementDatabase

Table 60: HRManagementDatabase

Attributes	**Methods**
	addAdministratorInformation()

	updateAdministratorInformation() getAdministratorInformation() addSalespersonInformation() removeSalespersonInformation() updateSalespersonInformation() getSalespersonInformation() addShareholderInformation() removeShareholderInformation() updateShareholderInformation() getShareholderInformation() addSupplierInformation() removeSupplierInformation() updateSupplierInformation() getSupplierInformation() addCustomerInformation() removeCustomerInformation() updateCustomerInformation() getCustomerInformation() storeConfirmationCode() getConfirmationCode()
Responsibilities	**Collaborative Classes**
Storing all information related to HR and providing system with necessary information	Salesperson, Shareholder, Supplier, Customer,Administrator

ProductManagementDatabase

Table 61: ProductManagementDatabase

Attributes	**Methods**
	addProduct()

	removeProduct() updateProduct() addProductToExpiryDateList() removeProductFromExpiryDateList() addProductToLowStorageList() removeProductFromLowStorageList() searchProductByName() searchProductByCompany() searchProductByComponent() getAllProducts() addProductToExpiredProduct() removeProductFromExpiredProduct() addProductToLowStorageList() removeProductFromLowStorageList()
Responsibilities	**Collaborative Classes**
Updating product information	Product, ProductManagementDatabase

TransactionManagementDatabase

Table 62: TransactionManagementDatabase

Attributes	**Methods**
	addTransaction() updateTransaction() deleteTransaction() getAllTransaction() addMaintenanceExpenditureTransaction() getMaintenanceExpenditureTransaction() addSalespersonSalaryTransaction() getSalespersonSalaryTransaction() viewSalespersonSalaryTransaction()
Responsibilities	**Collaborative Classes**
Storing and displaying transaction	TransactionManagementDatabase

RecordManagementDatabase

Table 63: RecordManagementDatabase

Attributes	**Methods**
	addLoan()

	editLoan() removeLoan() addMissingProductRecord() addProfitRecord() addLoginSession() addLogoutSession() editLogoutSession() addAccidentOrMissingRecords() addNotification() getNotification() getRecordInformation()
Responsibilities	**Collaborative Classes**
Storing and displaying records	Notifications, Records, RecordManagementDatabase

System

Table 64: System

Attributes	**Methods**
joiningDate investmentAmount	signIn() checkExpiryDate() checkLowStorage() calculateProfitInformation() viewSystemSummary() notifySuppier()
Responsibilities	**Collaborative Classes**
Expiry Date Checking	RecordManagementDatabase, ProductManagementDatabase, Product
LowStorageChecking	RecordManagementDatabase,Product ProductManagementDatabase

Once a day, the checkExpiryDate() method gets called. The method goes through the product table of ProductManagementDatabase and surveys for products whose expiry dates will come within the time limit fixed by the administrator. If it finds products which have reached the time limit, it will send a notification to RecordManagementDatabase.

Once a day, the checkLowStorage() method gets called. The method goes through the product table of ProductManagementDatabase and surveys for products whose quantity which has reached or exceeded the limit. It will send a notification to RecordManagementDatabase.

When viewCashInformation() method of Shareholder, System will show graphs and transactions.

When a product is sold, System will generate a corresponding transaction.

Interface

Table 65: Interface

Attributes	**Methods**
	processEnteredData() showGraph() createAdministratorWorkspace() createTransactionManagementWorkspace() showTransactionInformation() showNotification()
Responsibilities	**Collaborative Classes**
Processing user-entered data	(Implementer dependent)
Showing Graph	
Creating Administrator Workspace	
Creating Transaction Management Workspace	
Showing Transaction Information	
Showing Notifications	

6.2.7 CLASS COLLABORATION DIAGRAM

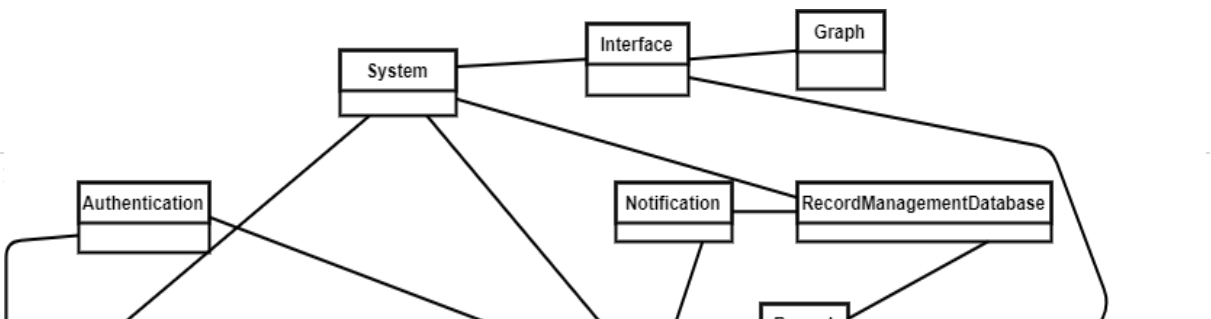


Figure – 39: Class collaboration diagram of Pharmacy Management System

CHAPTER7: BEHAVIOURALMODELING OF PMS

The behavioural model indicates how software will respond to external events or stimuli. This chapter throws light on the ways PMS interacts.

7.1 State Transition

In the context of behavioural modelling to different characterization of states must be considered and these are:

- The state of each class as the system performs its functions.
- The state of the system observed from the outside as the system performs its functions.

7.1.1 Event Identification

State diagram represents active states for each class the events (triggers). For this we identified all the events, their initiators and collaborators.

Table 66: Event Identification

Event	Primary object	Collaborator	Methods
Registers administrator	Registration	HRmanagementDatabase	Registration: administratorSignUp() HRmanagementDatabase: addAdministratorInformation()
Registers salesperson	Registration	Administrator, HRManagamentDatabase	Registration: salespersonSignUp() Administrator: addSalesperson() HRManagementDatabase: addSalespersonInformation()
Registers shareholder	Registration	Administrator, HRManagementDatabase	Registration: shareholderSignUp() Administrator: addShareholder() HRManagementDatabase: addShareholderInformation()
Adds suppliers	Registration	Administrator, HRManagementDatabase	Registration: addSupplier() Administrator: addSupplier() HRManagementDatabase: addSupplierInformation()
Adds customers	Registration	Salasperson, HRManagementDatabase	Registration: addSupplier() Salesperson: addCustomer() HRManagementDatabase: addCustomerInformation()
Signs out from system	User	Authentication	User: signOut() Authentication: checkActiveProcess()
Views system information	User	System	User: viewSystemInformation() System: ViewSystemSummary()
Receives notifications	User	RecordManagementDatabase	User: receiveNotofication() RecordManagementDatabase: getNotofication()

Store functional user's information	HRManagementDatabase		HRManagementDatabase: addAdministratorInformation() addSalespersonInformation() addShareholderInformation()
Updates functional user's information	HRManagementDatabase		HRManagementDatabase: updateAdministratorInformation() updateSalespersonInformation() updateShareholderInformation()
Remove functional user's information from database	HRManagementDatabase		HRManagementDatabase: removeAdministratorInformation() removeSalespersonInformation() removeShareholderInformation()
Store nonfunctional-user's information	HRManagementDatabase		HRManagementDatabase: addSupplierInformation() addCustomerInformation()
Updates non nonfunctional-user's information	HRManagementDatabase		HRManagementDatabase: updateSupplierInformation() updateCustomerInformation()
Remove nonfunctional user's information from database	HRManagementDatabase		HRManagementDatabase: removeSupplierInformation() removeCustomerInformation()
Provides functional user's information	HRManagementDatabase		HRManagementDatabase: getAdministratorInformation() getAdministratorInformation() getAdministratorInformation() getAdministratorInformation() getConfirmationCode()
Provides non nonfunctional-user's information	HRManagementDatabase		HRManagementDatabase: getSupplierInformation() getCustomerInformation()
Signs out from system	User	Authentication	User: signOut() Authentication: checkActiveProcess()
Views system information	User	System	User: viewSystemInformation() System: ViewSystemSummary()
Receives notifications	User	RecordManagementDatabase	User: receiveNotofication() RecordManagementDatabase: getNotofication()
Checks validity	Authentication	HRManagementDatabase	Authentication: checkValidity() HRManagementDatabase: getAdministratorInformation() getShareholderInformation() getSalespersonInformation()
Stores first log in time	Authentication	RecordManagementDatabase	Authentication: recordLogInformation() RecordManagementDatabase: addLoginSession()
Records last log out time	Authentication	RecordManagementDatabase	Authentication: recordLogInformation() RecordManagementDatabase: addLogoutSession() editLogoutSession ()
Allows to retry at wrong username and password	Authentication		
Prompts for notifying about unsaved data or process	Authentication		Authentication: checkActiveProcess()
Allows to recover account	Authentication		Authentication: recoverUserAccount()
Matches answer with stored one in database	Authentication	HRManagementDatabase	HRManagementDatabase: getAdministratorInformation() getShareholderInformation() getSalespersonInformation()
Sends confirmation code	Authentication	HRManagementDatabase	HRManagementDatabase:

			storeConfirmationCode()
Checks confirmation code	Authentication	HRManagementDatabase	HRManagementDatabase: getConfirmationCode()
Change account information	Authentication	HRManagementDatabase	HRManagementDatabase: updateAdministratorInformation() updateSalespersonInformation() updateShareholderInformation()
Manage product list	ProductManagementDatabase		ProductManagementDatabase: addProduct() removeProduct() updateProduct()
Manage expire date over product list	ProductManagementDatabase		ProductManagementDatabase: addProductToExpireDateList() removeProductFromExpireDateList () getProductFromExpireDaeList ()
Manage low stock list	ProductManagementDatabase		ProductManagementDatabase: addProductToLowStockList() removeProductFromLowStockList () getProductFromLowStockList ()
Search product by name	ProductManagementDatabase		ProductManagementDatabase: searchProductByName()
Search product by company	ProductManagementDatabase		ProductManagementDatabase: searchProductByCompany()
Search product by component	ProductManagementDatabase		ProductManagementDatabase: searchProductByComponent()
Provide product information	ProductManagementDatabase		ProductManagementDatabase: getAllProduct()
Store Recommended product	Product Management Database		Product Management Database: updateRecomendationList()
Provide Recommendation information	Product Management Database		Product Management Database: getRecommendationListInformation()
Notify administrator	Notification	Administrator	Notification: notifyAdministrator()
Notify supplier	Notification	Supplier	Notification: notifySupplier() Supplier: receiveProductRequest()
Send low stock alert	Notification	Salesperson	Notification: sendLowStockAlert()
Send expiry date alert	Notification	Salesperson	Notification: sendExpiredateAlert()
Store loan information	RecordManagementDatabase		RecordManagementDatabase: addLoan()
Update loan	RecordManagementDatabase		RecordManagementDatabase: editLoan()
Remove loan information	RecordManagementDatabase		RecordManagementDatabase: removeLoan()
Store missing products information	RecordManagementDatabase		RecordManagementDatabase: addMissingProductReord() addAccidentOrMissingRecord()
Store log out session	RecordManagementDatabase		RecordManagementDatabase: addLogoutSession()
Update log out session	RecordManagementDatabase		RecordManagementDatabase: editLogoutSession()
Store profit information	RecordManagementDatabase		RecordManagementDatabase: addProfitRecord()
Store Notifications	RecordManagementDatabase		RecordManagementDatabase: addNotification()
Provide notification	RecordManagementDatabase		RecordManagementDatabase: getNotification()
Provide information of assets	CashDetails		CashDetails: getAssets()
Provide information of monthly profit	CashDetails		CashDetails: getMonthlyProfit()
Provide information of yearly profit	CashDetails		CashDetails: getYearlyProfit()

Increase assets	CashDetails		CashDetails: increaseAssets()
Decrease assets	CashDetails		CashDetails: decreaseAssets()
Store transaction information	TransactionManagementDatabase		TransactionManagementDatabase: addTransaction()
Edits transaction information	TransactionManagementDatabase		TransactionManagementDatabase: updateTransactiion()
ProvideTransactionInformation	TransactionManagementDatabase		TransactionManagementDatabase: getAllTransaction() getSalespersonSalaryTransaction() getMaintenanceExpenditureTransaction()
Store maintenance transaction	TransactionManagementDatabase		TransactionManagementDatabase: addMaintenanceExpenditureTransaction()
Remove transaction	TransactionManagementDatabase		TransactionManagementDatabase: deleteTransaction()
Store transaction information	TransactionManagementDatabase		TransactionManagementDatabase: addTransaction()
ProvideTransactionInformation	TransactionManagementDatabase		TransactionManagementDatabase: getAllTransaction() getSalespersonSalaryTransaction() getMaintenanceExpenditureTransaction()
Store maintenance transaction	TransactionManagementDatabase		TransactionManagementDatabase: addMaintenanceExpenditureTransaction()
Receives notifications	User	RecordManagementDatabase	User: receiveNotofication() RecordManagementDatabase: getNotofication()
Includes salesperson	Administrator	Registration	Administrator: addSalesperson() Registraion: salespersonSIgnUp()
Excludes salesperson	Administrator	HRManagementDatabase	Administrator: removeSalesperson() HRManagementDatabase: removeSalespersonInformation()
Edits salesperson's Information	Administrator	HRManagementDatabase	Administrator: editSalesperson() HRManagementDatabase: updateSalespersonInformation()
Edits salesperson's Information	Administrator	HRManagementDatabase	Administrator: editSalesperson() HRManagementDatabase: updateSalespersonInformation()
Includes suppliers	Administrator	Registration	Administrator: addSupplier() Registraion: addSupplier()
Excludes salesperson	Administrator	HRManagementDatabase	Administrator: removeSupplier() HRManagementDatabase: removeSupplierInformation
Edits supplier's Information	Administrator	HRManagementDatabase	Administrator: editSupplier() HRManagementDatabase: updateSupplierInformation()
Includes shareholder	Administrator	Registration	Administrator: addShareholder() Registraion: shareholderSIgnUp()
Excludes shareholder	Administrator	HRManagementDatabase	Administrator: removeShareholder() HRManagementDatabase: removeShareholderInformation()
Edits shareholder 's Information	Administrator	HRManagementDatabase	Administrator: editShareholder()

			HRManagementDatabase: updateShareholderInformation()
Adds shareholder's investment	Administrator	HRManagementDatabase, CashDetails,	Administrator: addShareholderInvestment() HRManagementDatabase: updateShareholderInformation() CashDetails: increaseAsset()
Withdraws shareholder's investment	Administrator	HRManagementDatabase, CashDetails, TransactionManagementDatabase	Administrator: withdrawShareholderInvestment() HRManagementDatabase: updateShareholderInformation() CashDetails: decreaseAsset() TransactionManagementDatabase: addMaintenanceTransactionInformation()
Views transaction summery	Administrator	TransactionManagementDatabase	Administrator: viewTransaction() TransactionManagementDatabase: getAllTransaction()
Add Products	Administrator	ProductManagementDatabase	Administrator: manageProduct() ProductManagementDatabase: addProduct()
Remove product	Administrator	ProductManagementDatabase	Administrator: manageProduct() ProductManagementDatabase: removeProduct()
Add fixed time for expire date alert	Administrator		
Update Product	Administrator	ProductManagementDatabase	Administrator: manageProduct() ProductManagementDatabase: updateProduct()
Grants permission	Administrator	RecordManagementDatabase	Administrator: manageNotification() RecordManagement: getRecordInformation() addNotification()
Pays salary	Administrator	TransactionManagementDatabase, CashDetails	Administrator: payMaintenanceExpenditure() TransactionManagementDatabase: addSalespersonSalaryTransaction() CashDetails: decreaseAsset()
Pays maintenance expenditure	Administrator	TransactionManagementDatabase, CashDetails	Administrator: payMaintenanceExpenditure() TransactionManagementDatabase: addMaintenanceAndExpenditureTransaction() CashDetails: decreaseAsset()
Withdraw cash	Shareholder	RecordManagementDatabase	Shareholder: withdrawCashOrInvest() RecordManagementDatabase: addNotification()
Invest Cash	Shareholder	RecordManagementDatabase	Shareholder: withdrawCashOrInvest() RecordManagementDatabase: addNotification()
Adds new customers	Salesperson	Registration	Salesperson: addCustomer() Registration: addCustomer()

Remove customers	Salesperson	HRManagementDatabase	Salesperson: deleteCustomer() HRManagementDatabase: removeCustomerInformation()
Edit customer information	Salesperson	HRManagementDatabase	Salesperson: updateCustomerInformation() HRManagementDatabase: updateCustomerInformation()
Search product by name	Salesperson	ProductManagementDatabase	Salesperson: searchProuctByName() ProductManagementDatabase: searchProuctByName()
Add Products	Administrator	ProductManagementDatabase	Administrator: manageProduct() ProductManagementDatabase: addProduct()
Remove product	Administrator	ProductManagementDatabase	Administrator: manageProduct() ProductManagementDatabase: removeProduct()
Add fixed time for expire date alert	Administrator		
Update Product	Administrator	ProductManagementDatabase	Administrator: manageProduct() ProductManagementDatabase: updateProduct()
Grants permission	Administrator	RecordManagementDatabase	Administrator: manageNotification() RecordManagement: getRecordInformation() addNotification()
Pays salary	Administrator	TransactionManagementDatabase, CashDetails	Administrator: payMaintenanceExpenditure() TransactionManagementDatabase: addSalespersonSalaryTransaction() CashDetails: decreaseAsset()
Pays maintenance expenditure	Administrator	TransactionManagementDatabase, CashDetails	Administrator: payMaintenanceExpenditure() TransactionManagementDatabase: addMaintenanceAndExpenditureTransaction() CashDetails: decreaseAsset()
Adds new customers	Salesperson	Registration	Salesperson: addCustomer() Registration: addCustomer()
Remove customers	Salesperson	HRManagementDatabase	Salesperson: deleteCustomer() HRManagementDatabase: removeCustomerInformation()
Edit customer information	Salesperson	HRManagementDatabase	Salesperson: updateCustomerInformation() HRManagementDatabase: updateCustomerInformation()
Search product by name	Salesperson	ProductManagementDatabase	Salesperson: searchProductByName() ProductManagementDatabase: searchProductByName()
Search product by company name	Salesperson	ProductManagementDatabase	Salesperson: searchProductByCompany() ProductManagementDatabase searchProductByCompany()
Search product by component name	Salesperson	ProductManagementDatabase	Salesperson: searchProductByComponent() ProductManagementDatabase: searchProductByComponent()

Manage transactions	Salesperson	TransactionManagementDatabase	Salesperson: initiateTransaction() TransactionManagementDatabase: addTransaction()
Return product back	Salesperson	TransactionManagementDatabase	Salesperson: ReturnProductBack() TransactionManagementDatabase: updateTransaction()
Updates customer's loan	Salesperson	RecordManagementDatabase	Salesperson: updateCustomerLoan() RecordManagementDatabase: editLoan()
Adds customer's loan	Salesperson	RecordManagementDatabase	Salesperson: addCustomerLoan() RecordManagementDatabase: addLoan()
Remove customer's loan	Salesperson	RecordManagementDatabase	Salesperson: deleteCustomerLoan() RecordManagementDatabase: removeLoan()
Adds new products	Salesperson	ProductManagementDatabase	Salesperson: addProduct() ProductManagementDatabase: addProduct()
Updates product Information	Salesperson	ProductManagementDatabase	Salesperson: updateProduct() ProductManagementDatabase: updateProduct()
Removes product	Salesperson	ProductManagementDatabase	Salesperson: removeProduct() ProductManagementDatabase: removeProduct()
Updates cash	Salesperson	CashDetails	Salesperson: updateCash() CashDetails: increaseAsset() decreaseAsset()
Notifies Administrator	Salesperson	RecordManagementDatabase	Salesperson: notifyAdministrator() RecordManagementDatabase: addNotification()
Notifies Supplier	Salesperson	RecordManagementDatabase	Salesperson: notifySupplier() RecordManagementDatabase: addNotification()
Gets monthly payment	Salesperson		Salesperson: getMonthlyPayment()
Receive payment from customer	Salesperson	Customer, HRManagementDatabase	Salesperson: editCustomerLoan() HRManagementDatabase: getCustomerInformation()
Manage customer recommendation	Salesperson	ProductManagementDatabase,	Salesperson: manageRecommendation() ProductManagementDatabase: addProductToRecomendationList() UpdateRecomendationList() getRecomentationListInformation()
Due	Customer	RecordManagementDatabase	Customer: increaseDueAmount() RecordManagementDatabase: addLoan() editLoan()
Pay for previous due	Customer	RecordManagementDatabase, CashDetails	Customer: decreaseDueAmount() RecordManagementDatabase: editLoan() removeLoan()

			CashDetails: updateDaptorAmount()
Recommend for product	Customer	ProductManagementDatabase	Customer: recommendForProduct() ProductManagementDatabase: addProductToRecomendationList()
Return product	Customer		Customer: returnProductBack()
Update sale frequency	Product	ProductManagementDatabase	Product: updateSaleFrequency() ProductManagementDatabase: updateProduct ()
Increase quantity	Product	ProductManagementDatabase	Product: increaseQuantity() ProductManagementDatabase: updateProduct ()
Decrease quantity	Product	ProductManagementDatabase	Product: decreaseQuantity() ProductManagementDatabase: updateProduct ()
Increase price	Product	ProductManagementDatabase	Product: increasePrice() ProductManagementDatabase: updateProduct ()
Decrease price	Product	ProductManagementDatabase	Product: decreasePrice() ProductManagementDatabase: updateProduct ()
Notify administrator	Notification	Administrator	Notification: notifyAdministrator()
Notify supplier	Notification	Supplier	Notification: notifySupplier() Supplier: receiveProductRequest()
Send low stock alert	Notification	Salesperson	Notification: sendLowStockAlert()
Send expiry date alert	Notification	Salesperson	Notification: sendExpiredateAlert()

7.1.2 STATE TRANSITION DIAGRAM

The state transitions of PMS are represented by diagrams in the following section:

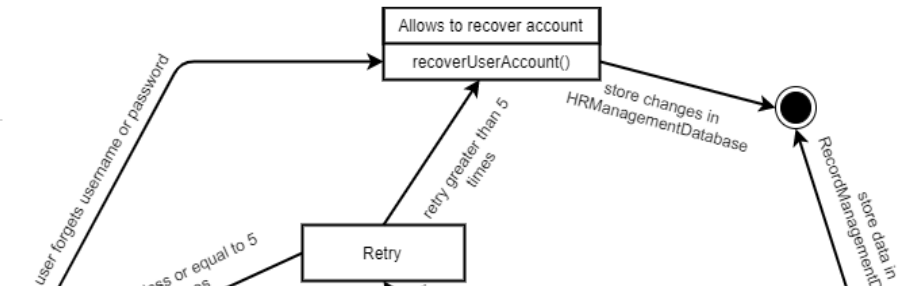


Figure – 40: State transition diagram – Authentication

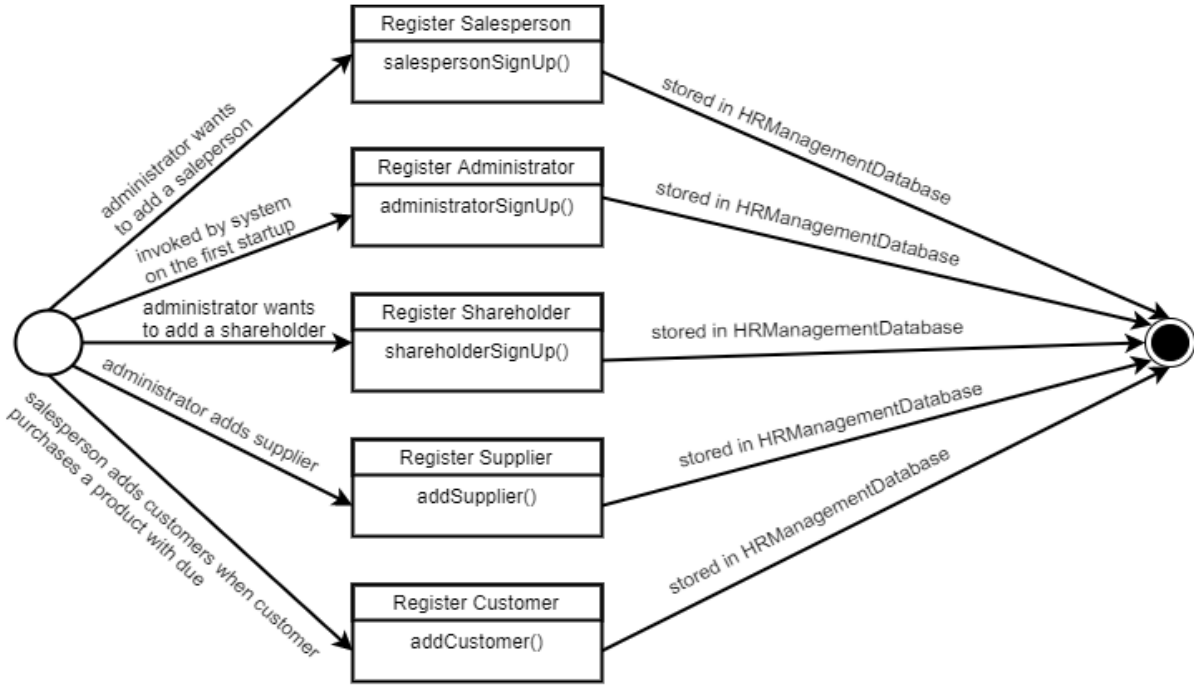


Figure – 41: State transition diagram – Registration

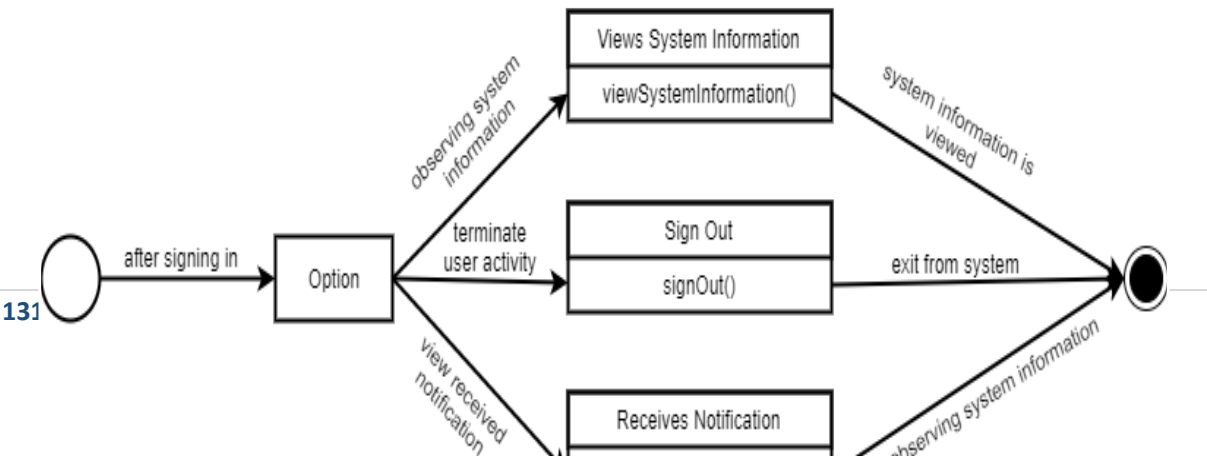


Figure – 42: State transition diagram – User

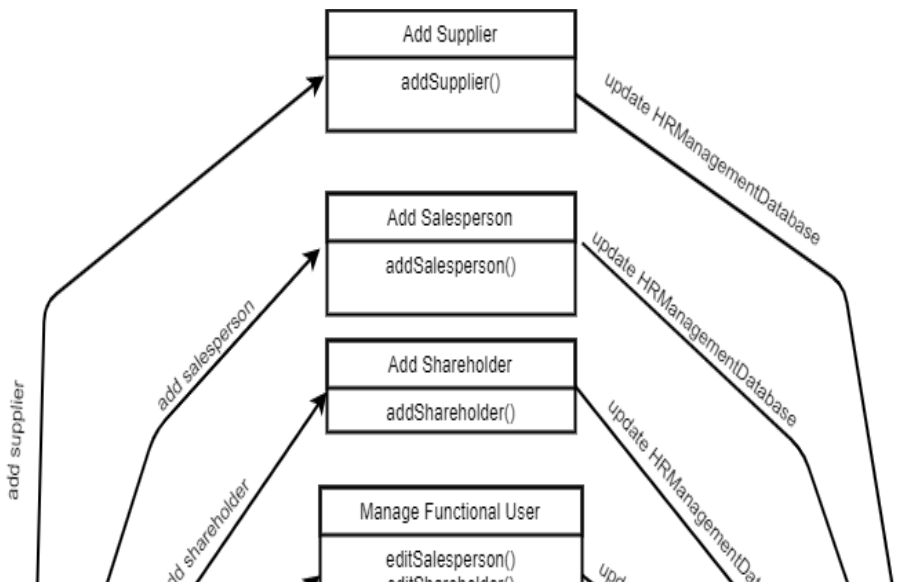


Figure – 42: State transition diagram – Authentication

Figure – 42: State transition diagram – Admin

Figure – 43: State transition diagram – Administrator

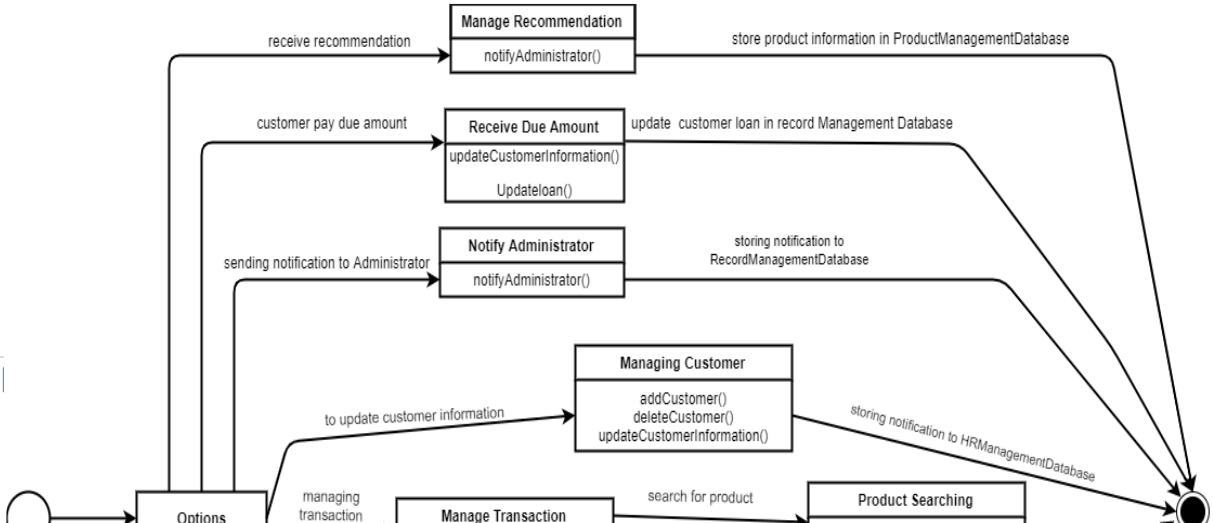


Figure – 44: State transition diagram – Salesperson

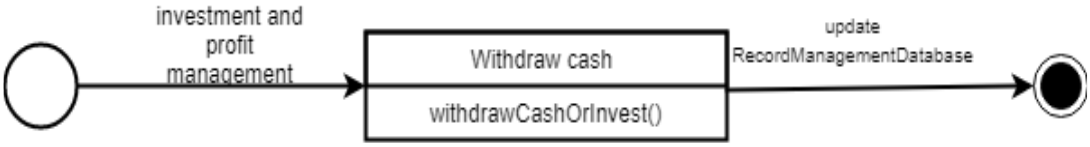


Figure – 45: State transition diagram – Shareholder

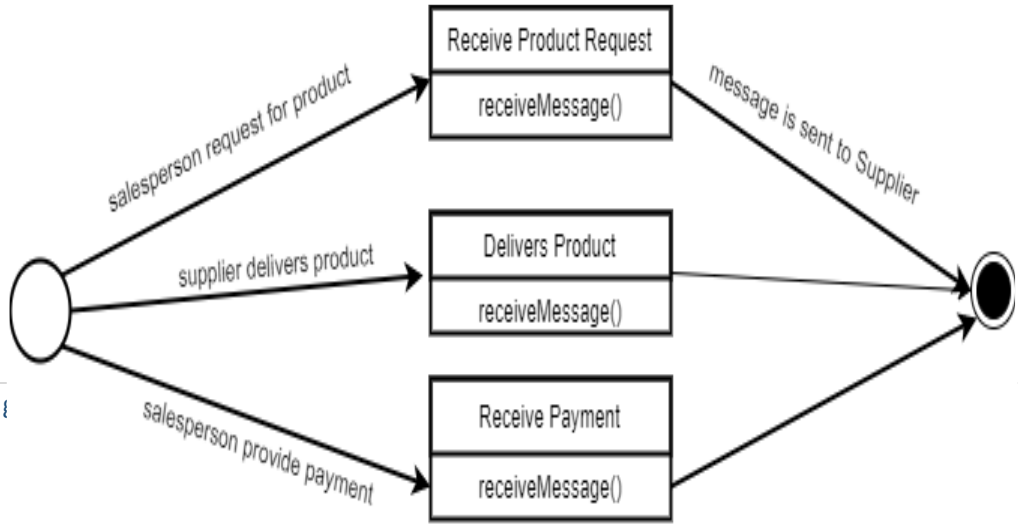


Figure – 46: State transition diagram – Supplier

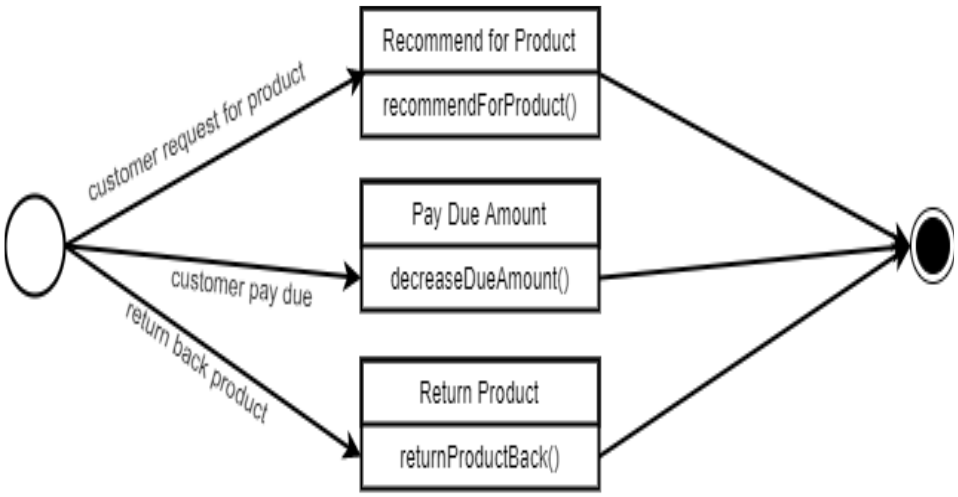


Figure – 47: State transition diagram – Customer

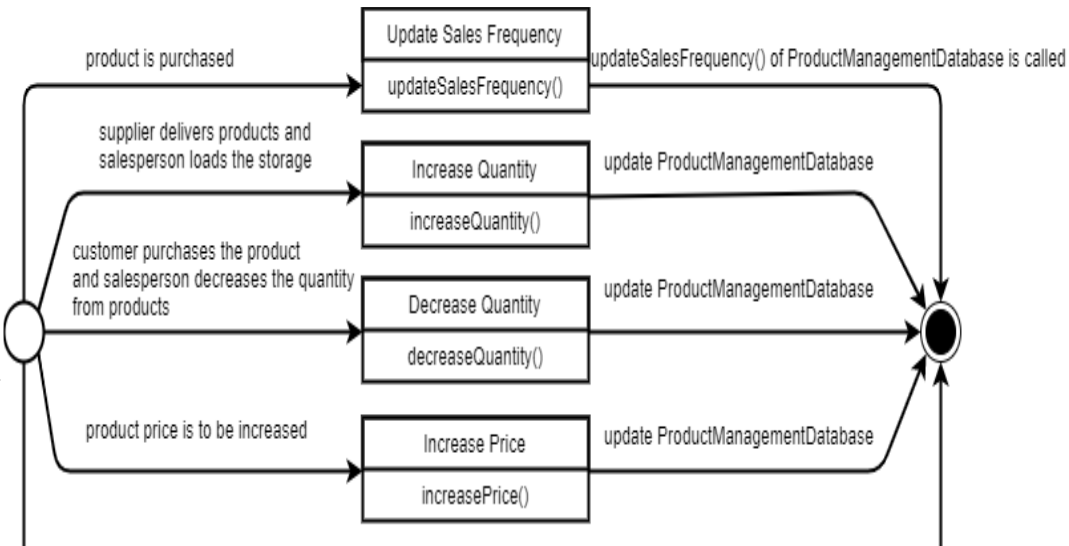


Figure – 48: State transition diagram – Product

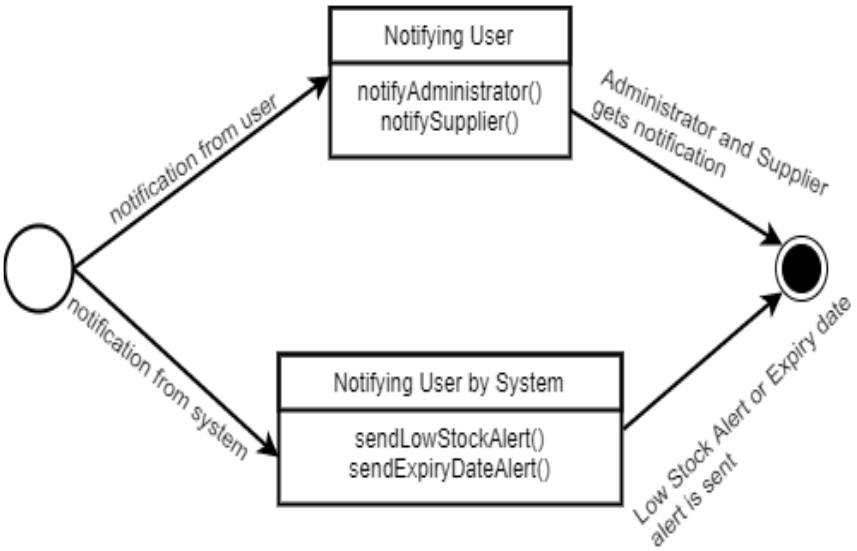
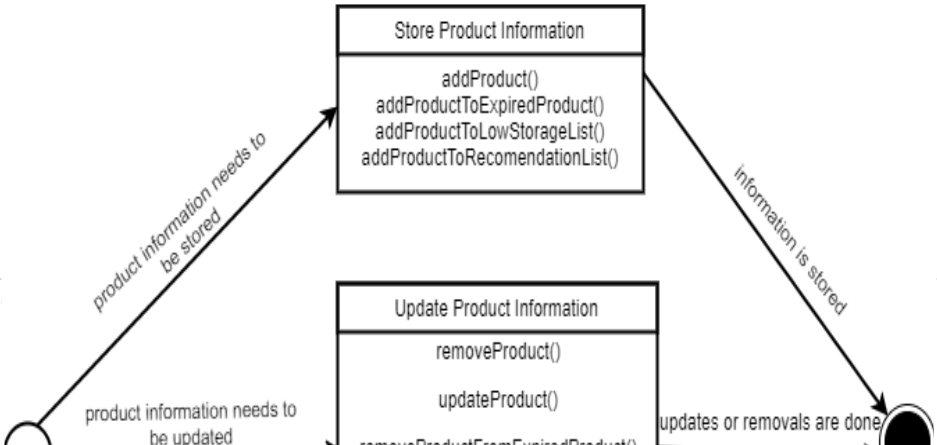


Figure – 49: State transition diagram – Notification



PMD

Figure – 39: State transition diagram – Authentication

Figure – 48: State transition diagram – Authentication

Figure – 50: State transition diagram – ProductManagementDatabase

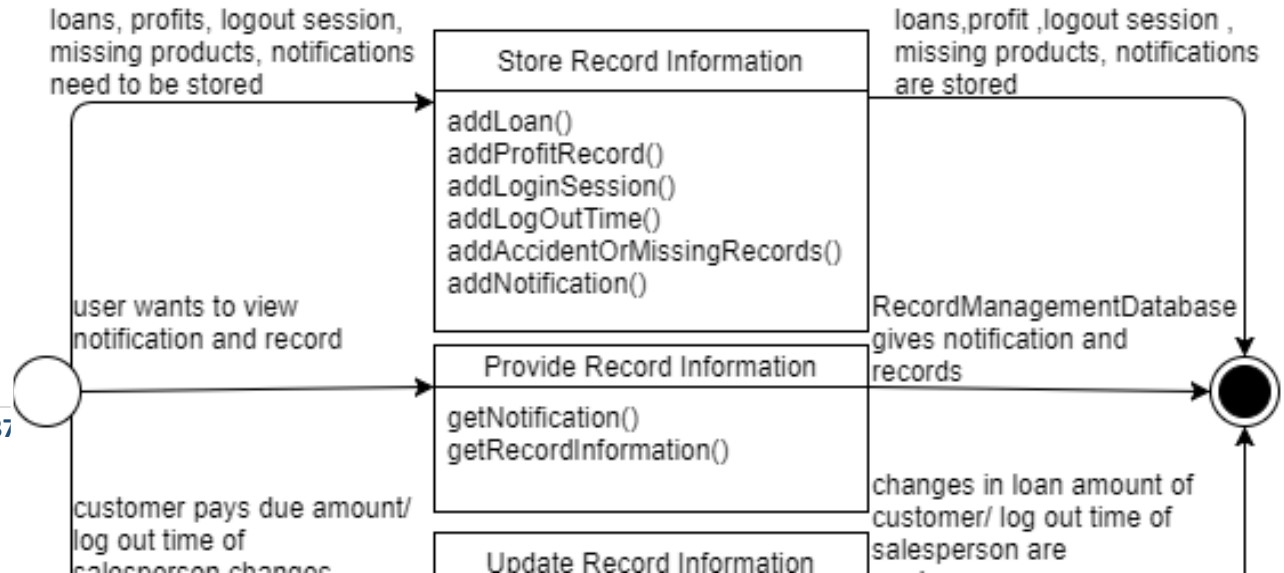


Figure – 49: State transition diagram – Authentication

Figure – 51: State transition diagram – RecordManagementDatabase

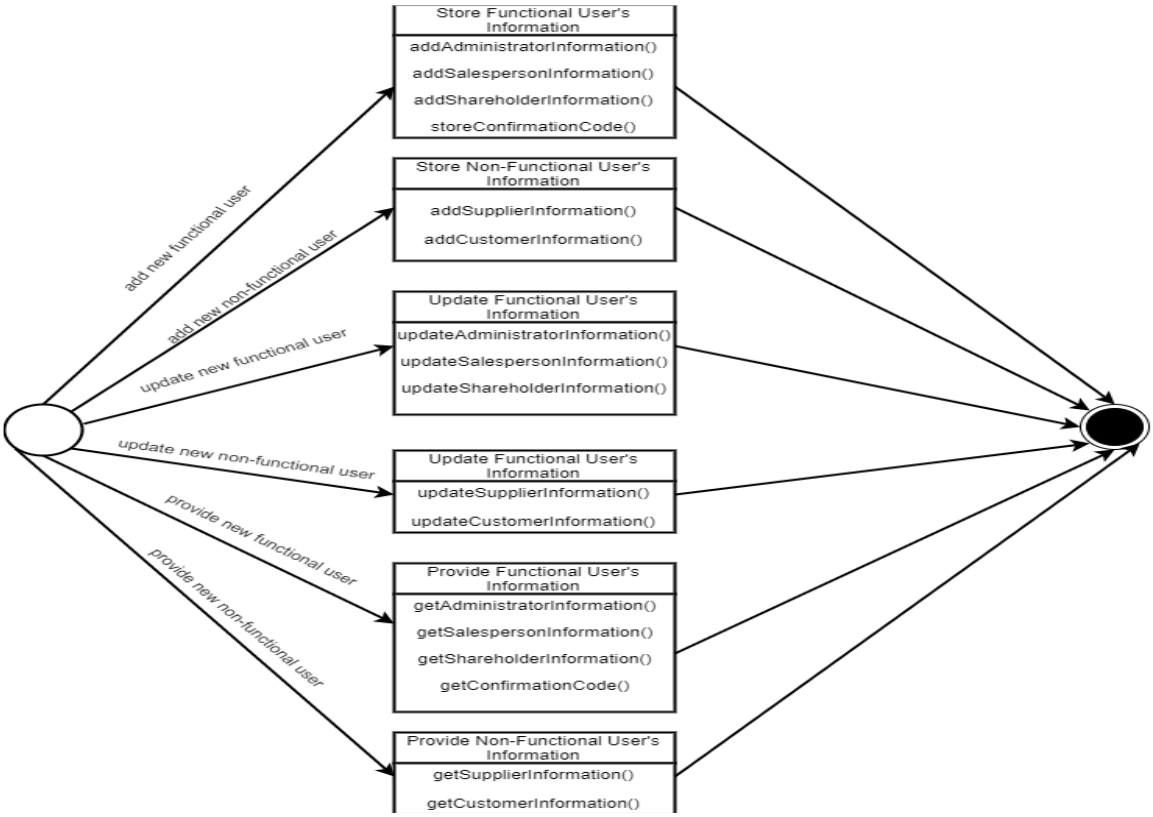


Figure – 52: State transition diagram – HRManagementDatabase

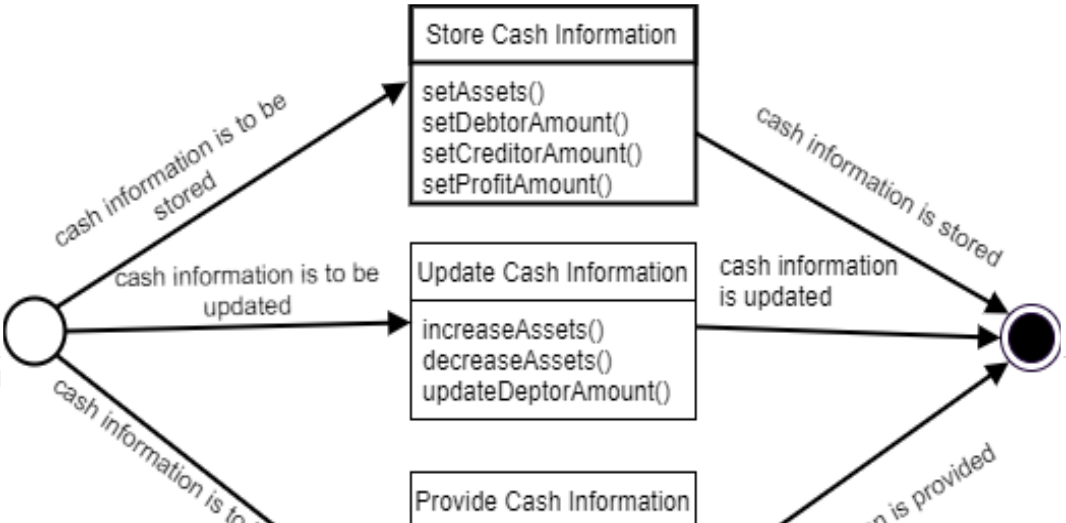


Figure – 53: State transition diagram – CashDetails

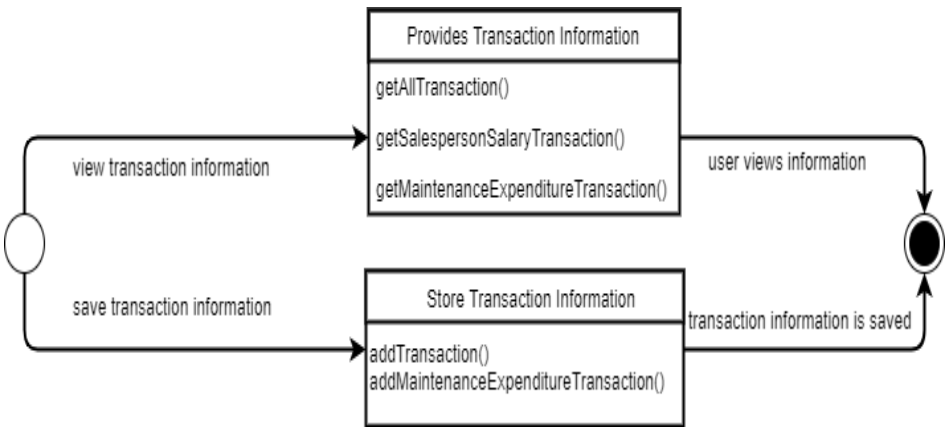


Figure – 54:State transition diagram – TransactionManagementDatabase

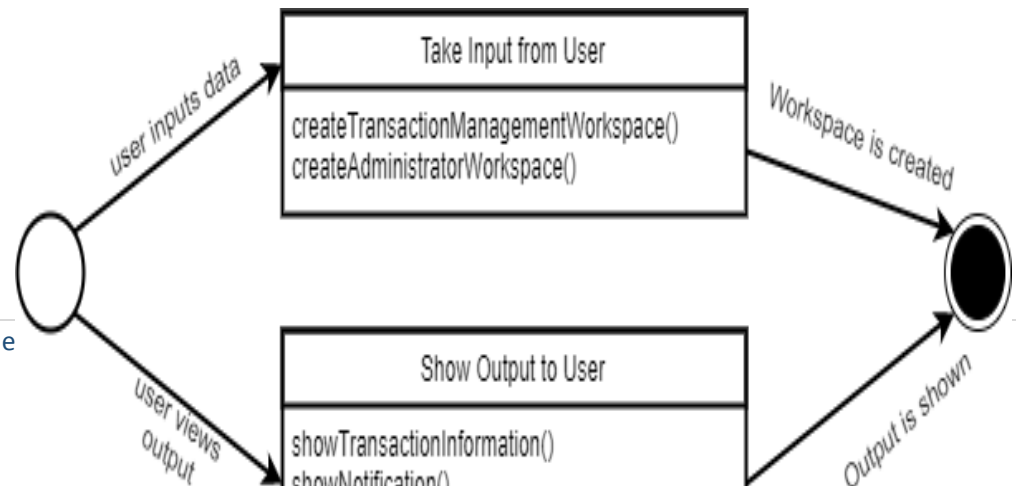


Figure – 39: State transition diagram – Authentication

Figure – 53: State transition diagram – Authentication

Figure – 55: State transition diagram – Interface

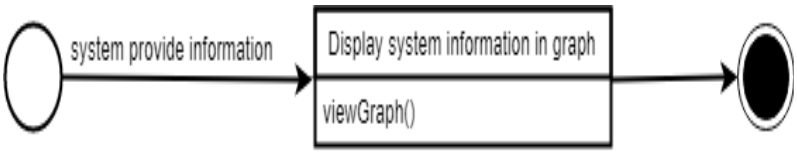


Figure – 56: State transition diagram – Graph

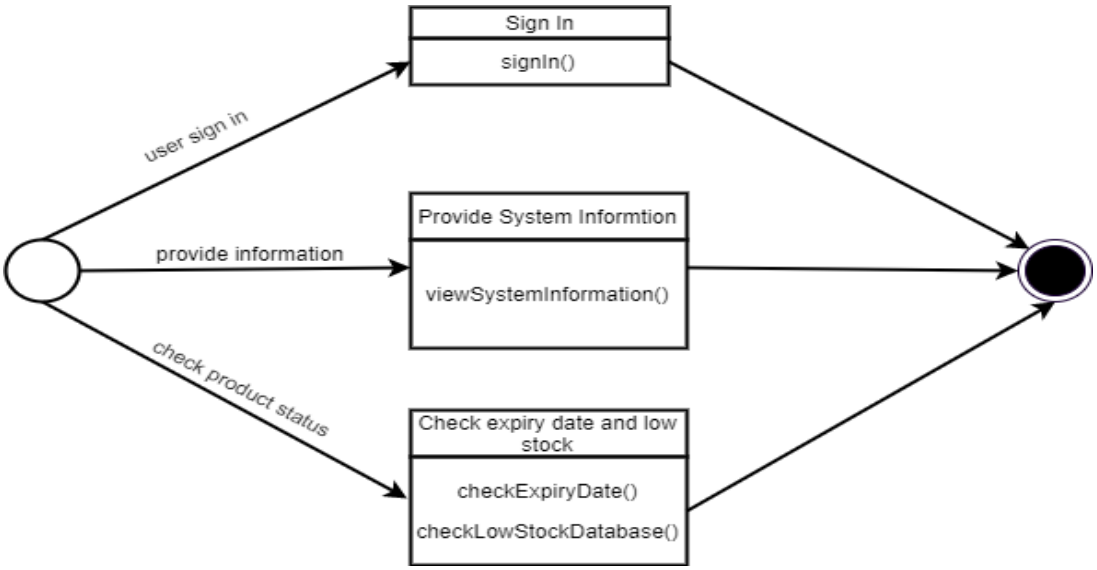


Figure – 57: State transition diagram – System

7.1.3 SEQUENCE DIAGRAM

The second type of behavioural representation, called a sequence diagram in UML, indicates how events cause transactions from object to object.

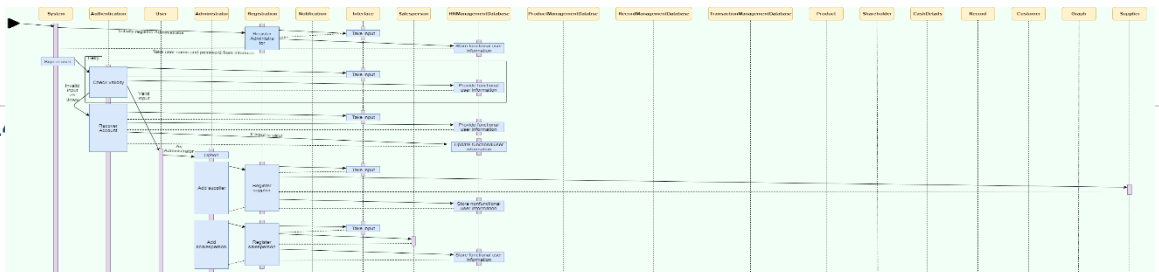


Figure – 58: Sequence diagram PMS

CHAPTER8: CONCLUSION

We are pleased to submit the final SRS report on Pharmacy Management System. From this, the readers will get a clear and easy view of the overall system of small-scale pharmacies. This SRS document can be used effectively to maintain the software development cycle. It will be very easy to conduct the whole project using this SRS. Hopefully, this document can also help our junior BSSE batch students. We tried

our best to remove all dependencies and make an effective and fully designed SRS. We believe that the reader will find it in order.

CHAPTER9: REFERENCE

- Pressman, Roger S. Software Engineering: A Practitioner's Approach (7th Edition)

APPENDIX

Existing workflow:

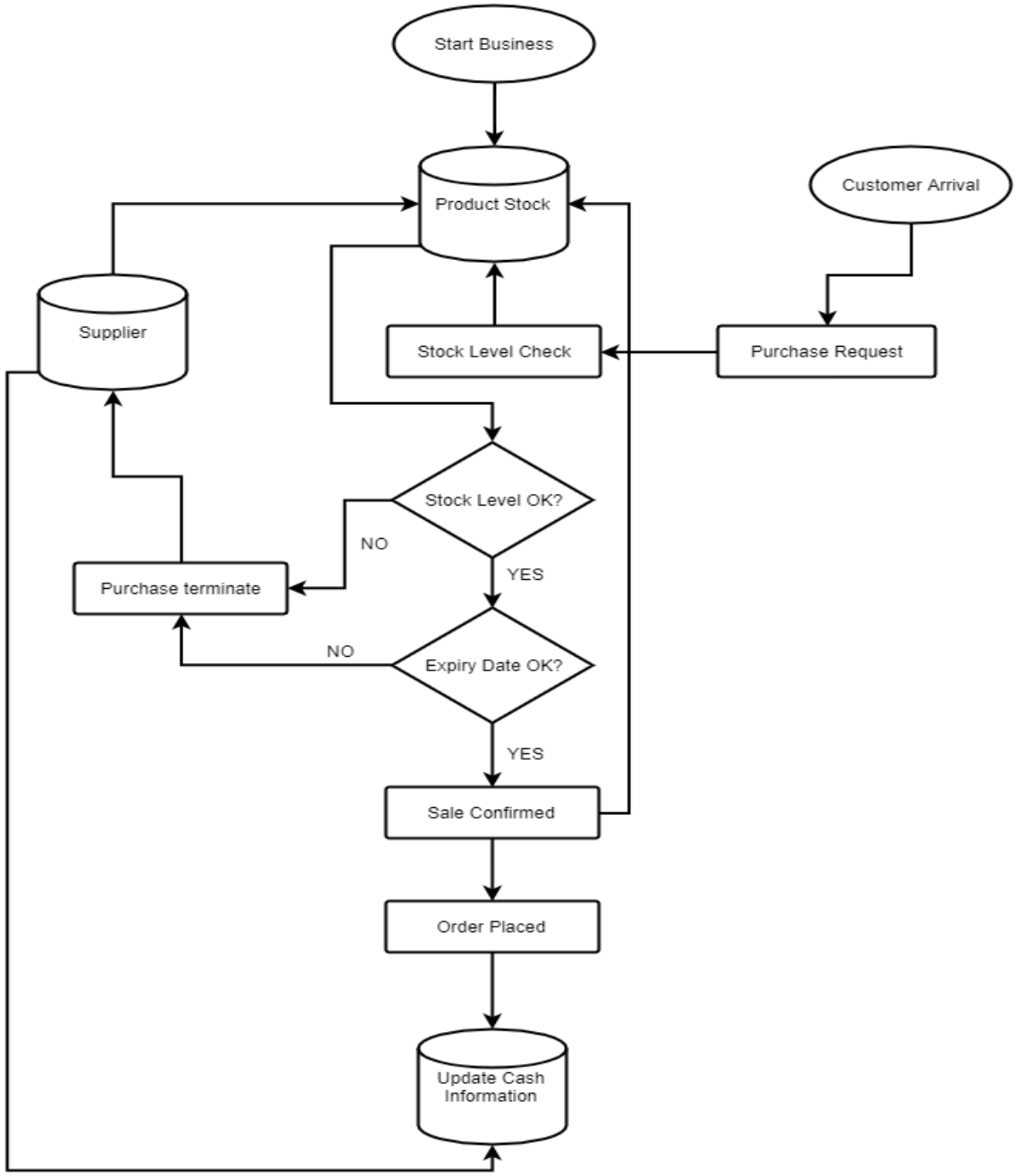
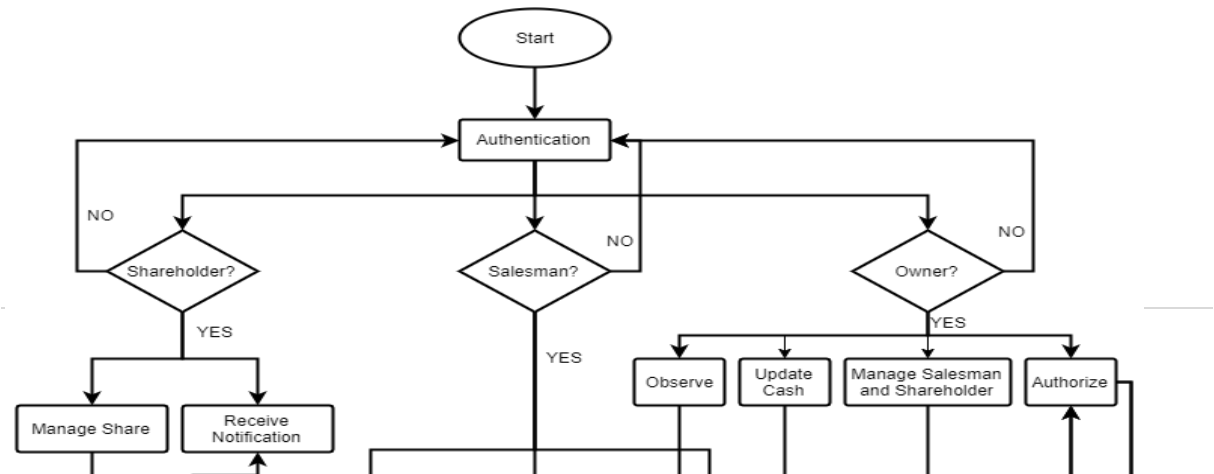


Figure – 59: Existing workflow diagram

Proposed workflow:



Meeting Details			Attendance					
Meeting no.	**Date and Time**	**Activities /Decisions**	**BSSE 0802**	**BSSE 0811**	**BSSE 0817**	**BSSE 0825**	**BSSE 0832**	**BSSE0842**
01	13th July,2017	1.Creating group on social sites	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**

Figure – 60: Proposed workflow diagram of PMS

		2.Informal discussion						
02	16th July,2017	1.Brainstorming the strategies to 2.approach the stakeholders	**Y**	**Y**	**Y**	**N**	**Y**	**Y**
03	17th July,2017	1.Questionnaire assessment 2.Forming a draft questionnaire	**Y**	**Y**	**Y**	**Y**	**Y**	**N**
04	18th July,2017	1.Finalizing the questionnaire 2.Interviewing the stakeholders next day	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
05	19th July,2017	1.Subgroup formation 2.Allocating tasks to the subgroups Interviewing the stakeholders	**Y**	**N**	**Y**	**Y**	**Y**	**Y**
06	24thJuly,2017	1.Discussion on report formation 2.Data analysis 3.Identifying the conflicts and commonalities	**N**	**Y**	**Y**	**Y**	**Y**	**Y**
07	30th July,2017	1.Flow chart design	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
08	31st July,2017	1.Preparing QFD	**Y**	**N**	**Y**	**Y**	**Y**	**Y**
09	7th Aug, 2017	1.Modifying the flow chart and QFD based on the supervisor's feedback.	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
10	16th Sep,2017	1.Defining the subsystems and their activities 2.Designing activity diagrams	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
11	19th Sep,2017	1.Designing the use cases	**Y**	**N**	**Y**	**Y**	**Y**	**Y**
12	24th Sep,2017	1.Designing swim lane diagrams	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
13	10th Oct,2017	1.Preparing the story	**Y**	**Y**	**Y**	**Y**	**Y**	**N**
14	12th Oct,2017	1.Modifying the story based on supervisors feedback.	**N**	**Y**	**Y**	**Y**	**Y**	**N**
15	15th Oct,2017	1.Grammatical parsing in the story to identify verbs and nouns.	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
16	17th Oct,2017	1.Classifying the nouns into problem and solution space.	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
17	18th Oct,2017	1.Designing the data-based model	**Y**	**Y**	**Y**	**Y**	**Y**	**N**
18	19th Oct,2017	1.Finding the relationship between data objects.	**Y**	**N**	**Y**	**Y**	**Y**	**Y**
19	20th Oct,2017	1.Designing relational schema/table	**Y**	**Y**	**N**	**Y**	**Y**	**Y**
20	26th Oct,2017	1.Class based modeling	**Y**	**Y**	**Y**	**N**	**Y**	**Y**
21	27th Oct,2017	(part 1)	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
22	1st Nov,2017	1.Reviewing the feedback for part 1	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
23	2nd Nov,2017	1.Class based modeling (part 2 and part 3)	**Y**	**Y**	**Y**	**Y**	**N**	**Y**
24	4th Nov,2017	1.Analyzing and defining general classifications	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**

25	5th Nov,2017	1.Defining selected classes	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
26	6th Nov,2017		**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
27	7th Nov,2017	1.Event identification	**Y**	**Y**	**Y**	**Y**	**Y**	**N**
28	8th Nov,2017		**Y**	**N**	**Y**	**Y**	**Y**	**Y**
29	10th Nov,2017 (online)	1.State transition diagram	**N**	**N**	**Y**	**Y**	**Y**	**N**
30	11thNov,2017		**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
31	12thNov,2017		**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
32	13thNov,2017	1.Sequence diagram	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
33	14thNov,2017	1.Modifying sequence diagram	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**