

SOFTWARE ENGINEERING LAB

PROJECT REPORT

On

Medical Inventory System

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ABSTRACT

This report provides an overview of a medical inventory system software, including its features, user interface, backend, benefits, and limitations. The software is designed to automate and streamline inventory management processes for healthcare providers. Its features include tracking inventory levels, expiration dates, lot numbers, and generating alerts for low inventory or expired items. The user interface is intuitive and user-friendly, allowing healthcare providers to easily manage inventory levels and track usage patterns. The backend of the software is designed to securely store and manage inventory data, providing healthcare providers with easy access to real-time inventory information

Keywords: MIMS, SRS, RAD Model, UML Diagrams, Implementation, Design, Database, UI, Backend, Frontend

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1. LIST OF ABBREVIATIONS

MIMS	Medical Inventory Management System
SRS	Software Requirement Specification
UI	User Interface
SDLC	Software Development Life Cycle
UML	Unified Modelling Language
DB	Database

2. INTRODUCTION

2.1. Background

The healthcare industry is constantly evolving, and efficient inventory management is a critical aspect of providing quality patient care. In the past, healthcare providers relied on manual methods to manage their inventory, which were often time-consuming, error-prone, and inefficient. However, with the advancement of technology, healthcare providers now have access to medical inventory system software that can streamline their inventory management processes.

2.2. Motivation

The medical industry deals with life and death situations every day. Therefore, it is essential to have an efficient and effective inventory management system to ensure that medical supplies and equipment are always available when needed. The purpose of this project report is to describe the development of a medical inventory system software.

2.3. Objectives

The objectives of this project are :-

1. The software should be able to automate processes such as ordering, receiving, storing, and tracking inventory levels.
2. It should also be user-friendly and provide real-time data to enable healthcare providers to make informed decisions about their inventory management.

2.4. Problem statement

To create a medical inventory system that provides some basic functionalities such as generate revenue, generate cheque to vendor, update inventory and high end functionalities like generating list of expired medicines and those medicines which have low stock.

2.5. Scope of Project

The scope of the medical inventory system software project will include the following:

- 1. Design:** The project team will design the user interface, database structure, and software architecture based on the requirements gathered from shop owner.
- 2. Development:** The project team will develop the software using tech stack MongoDB, Express, ReactJs and NodeJs. The development will include coding, testing, and debugging the software.
- 3. Recording Sales:** The software will record each sale made by shop owner in database, and that record will help us to calculate threshold stock, revenue, other important aspects of business.
- 4. Getting Expired Medicines:** Shop owner must be aware of the expired medicines in his/her inventory, and must replace those medicines.
- 5. Ordering Medicines :** The shop owner should get list of medicines which are less in amount and must order them if they are required.
- 6. Generating Revenue and Profit:** The project should generate revenue and profit after some period of time or by shop owner command.
- 7. Updating Inventory:** After a new supply, project should update the inventory with appropriate details.

The scope of the project will also include ensuring that the software is scalable and can be customized to meet the needs of different healthcare providers. The software will be designed to handle large amounts of data and to provide real-time data to enable healthcare providers to make informed decisions about their inventory management.

Overall, the scope of the project is to develop a medical inventory system software that can help healthcare providers manage their inventory efficiently and effectively, leading to cost savings, regulatory compliance, and improved patient care.

3. LITERATURE REVIEW

Efficient inventory management is a critical aspect of providing quality patient care. In the past, healthcare providers relied on manual methods to manage their inventory, which were often time-consuming, error-prone, and inefficient. However, with the advancement of technology, healthcare providers now have access to medical inventory system software that can streamline their inventory management processes.

- **Cost Saving:-** According to a study published in the Journal of Healthcare Information Management, using medical inventory system software can lead to significant cost savings for healthcare providers. The study found that implementing an inventory management system resulted in a 35% reduction in inventory costs and a 27% reduction in stock outs.
- **Time-Saving:-** Another study published in the Journal of Medical Systems found that using a medical inventory system software improved the efficiency of the inventory management process. The study found that the software reduced the time spent on inventory management tasks by 50% and reduced the number of errors in inventory tracking by 75%.

Overall, the literature suggests that using a medical inventory system software can lead to significant cost savings, improve the efficiency of the inventory management process, and help healthcare providers comply with regulatory requirements. The literature also highlights the importance of real-time data and accurate inventory tracking in improving patient care and safety.

4. REQUIREMENT ANALYSIS

4.1. Introduction

4.1.1. Purpose:

Medicine Inventory Management System facilitates the user(owner) of the software to manage the medicines in his/her inventory. It allows user to track where does the medicine is stored in the whole inventory. It also allows user to add new medicines and it's details and the vendor details.

4.1.2. Scope:

The scope of the project we are designing is mentioned in this section. Here we list the significant inclinations of our project and what area it gives importance to, and what area of inventory management it is not associated with.

Focuses on Inventory stock: There are lots of medicines stored in the inventory with variable expiry date for each of the medicine, Our system follow up all the expiry date with the present date and display an error or alert message when a medicine is about to expire.

Focuses on Newly arrived stock: Sometimes a new stock of medicines with different names and with new expiry date gets imported into the inventory and our system will enter the details into the database.

4.1.3. Definitions, Acronyms and Abbreviations:

- (i) SRS : Software Requirement Specifications
- (ii) WWW : World Wide Web
- (iii) GUI : Graphical User Interface
- (iv) MIMS : Medicine Inventory Management System
- (v) Threshold Stock: Threshold stock value means quantity of medicine purchased over a week.

4.1.4. References:

- (i) IEEE standard 830-1998 recommend practice for software requirements specifications – Description.
- (ii) IEEE software requirements specifications template

4.1.5. Overview:

The overview description provides interface requirements for a Medicine Inventory Management System, Product Perspective, Hardware Interfaces, Software Interfaces, Communication Interfaces, Memory Constraints, Product Functions, User Characteristics, and other constraints involved in the software and which are responsible for the working of the Medicine Inventory Management System.

4.2. Overall Description

4.2.1. Product Perspective:

- **Hardware Interfaces**

- 1. Hard Disk : The database connectivity requires a hardware configuration that is online. This makes it necessary to have a fast database system(such as RDBMS) running on high rpm hard disk permitting complete data redundancy and backup system to support the primary goal of reliability.
- 2. The system must interface with the standard output device, keyboard and mouse to interact with the software.

- **Software Interfaces**

Any database management software : MongoDB

For GUI and user interaction : Chrome Browser

4.2.2. Product Functions:-

- 1. Calculating average number of medicines sales over one week.
- 2. Generating medical items to be ordered.
- 3. Entering new supply details

4. Issuing and printing cheque for vendors.
5. Updating database of medicines with new medicine introduces.
6. Generating a code number for new medicines.
7. Getting inventory information about a particular medicine.
8. Generating a list of expired medicines and their vendors.
9. Case Receipt would be printed after every sale.
10. Generating revenue and profit.
11. Showing vendor-wise payments for given period.

4.2.3. User Characteristics:-

- The intended user of this software need not have specific knowledge as to what is the internal operation of the system. Thus the end user is at a high level of abstraction that allows easier, faster operation and reduces the knowledge requirement of end user.
- The product is absolutely user friendly, so the intended users can be the naïve users.
- The product does not expect the user to possess any technical background. Any person who know to use the mouse and keyboard can successfully use this product.

4.2.4. Constraints :-

- At the time of creating the new account or searching for a specific medicine the user(owner) will enter the details of the medicine like medicine name or serial no.
- At the time when the new stock arrives the user enters the details of the medicine like medicine name expiry date and vendor details.

4.3. Specific Requirements:-

4.3.1. External Interfaces:-

User Interface:- The immediate user interface would be a page with an alert message when a certain medicine is out of stock or else it is going to be expired soon. In the right corner, there

is a search bar in which the user(owner) can enter the details of the medicine like medicine name or serial no. and it will display the row and stack number in which the medicine is stored.

4.3.2. Functions:-

- Calculating Threshold Value: -**

- Shop owner want to follow Just in Time Philosophy
- Items in stock should be above in number than threshold value
- Threshold value is average number of medicines sales for one week for each part.
- Information about Number of medicines sales can be get through database

- Generating list of Items to buy:-**

- Generating the list which contains items which stock is below threshold value.
- That list contains
 1. Medical Description
 2. Quantity Required (Threshold Value of that medicine – Present stock)
 3. Details of the vendor who supply that medicine
- We get medical description and address of vendor from Medicine Database.
- We get quantity from Inventory.

- Updating Inventory :-**

- Updating the stocks of medicine when new medicine or new supply arrives.
- With stocks, there would also be entries of
 1. Batch Number
 2. Cost price
 3. Selling price
 4. Expiry Date
 5. Vendor Details

- Managing Payments to Vendor :-**

- System should print out cheque to the vendors for the items supplied.
- Made every time whenever there is a new supply.

- **Updating Database with new medicine :-**

- Software should be able to update the database, whenever shop owner met with new medicines.
- Software would allow attributes of medicines such as
 1. Medicine Name
 2. Vendors Details
 3. Cost Price
 4. Selling Price
 5. Expiry Date
 6. Quantity
- Code number should also be generated for new medicine so that shop owner would paste the code number in the rack where this medicine would be stored.

- **Getting stock of medicine :-**

- Shop owner would query about medicine using generic name or trade name.
- Software should be able to fulfill the query by displaying medicine's code number and the present quantity.

- **Generating list of expired medicines :-**

- Software should present list of expired medicines over shop owner command.
- Software should prepare vendor-wise list of the expired items.

- **Printing cash receipt :-**

- After every sale, shop owner enter code number of each medicine and the corresponding quantity sold.
- And, software will print out the cash receipt for customer.
- Inventory will also be updated.

- **Calculating revenue and profit: :-**

- The shop owner would define a period.
- For that every period, software will generate revenue and profit.
- And also show vendor-wise payments for the period.

4.3.3. Performance Requirements :-

Inventory management systems are designed to help individuals or organizations effectively manage inventory and business. Performance requirements for such systems will vary depending on the specific needs of the software user. However, some common performance requirements that are essential for this system to be effective are:

Speed: The system would work in real time environment, so it should be fast enough to display the row and stack number where the medicine is stored or else it will lead to major decrease in the sales of the dealer.

Accuracy: The system should accurately track expired medicines. Inaccurate data about expired medicines would be hazardous to life of patients.

Usability: The system should be user-friendly and easy to use. The shop owner or user should not find any difficulty in using this software.

4.3.4. Logical Database Requirements :-

The system should contain databases that include all the necessary information for the product to function according to the requirements. These include relations such as medicine details, expiry date and amount of medicine available.

We have used Non-Relational Database MongoDB for this Software to achieve accuracy, security and faster access to database.

1. **Medicine :-** The database should include document for medical supplies which contain medicine name, its rack number, expiry date, cost and sell price and vendor details.
2. **Transaction :-** The software should record transaction and store them in transaction document. We will use this data for generating revenue and profit.
3. **Vendor :-** The software should store the details of suppliers in vendor document.
4. **Reports :-** The database should support the generation of inventory reports, such as inventory levels, stock outs, and expiration dates. Reports should be customizable and easy to read.

5. **Data Integrity :-** The database should ensure data integrity, by using data validation rules, error handling procedures, and database backups to prevent data loss or corruption.

4.3.5. Design and Implementation Constraints:-

The design and implementation constraints for the medical inventory system software project must be carefully considered to ensure that the software meets the needs of healthcare providers, complies with regulatory requirements, and is cost-effective to develop and maintain.

- **Platform and technology constraints:-** The software is designed to run on specific platforms and technologies, such as web-based or client-server architecture.
- **User interface constraints:-** The software must have a user-friendly interface that is easy to use for healthcare professionals with varying levels of technical expertise.
- **Data management constraints:-** The software must be able to handle large amounts of data, ensure data integrity, and provide data security to protect sensitive information.
- **Performance constraints:-** The software must be able to handle high volumes of transactions, provide real-time updates, and generate reports quickly and accurately.
- **Budget constraints:-** The project must be completed within a specific budget, which may require making trade-offs between features, functionality, and development resources.

4.3.6. Non Functional Requirements:-

- **Usability:-** The software should have a user-friendly interface that is easy to navigate and understand, with clear instructions and help resources.
- **Reliability:-** The software should be reliable, with a low failure rate and minimal downtime, to ensure that shop owner can access inventory data when needed.
- **Security:-** The software should be secure, with appropriate user authentication, access control, and encryption measures to protect sensitive data from unauthorized access.
- **Scalability:-** The software should be designed to handle large volumes of data and support multiple users, with the ability to scale up or down as needed.

- **Performance:-** The software should have high performance, with fast response times, efficient data retrieval and processing, and minimal delays.
- **Flexibility:-** The software should be flexible, with the ability to adapt to changing business requirements, such as new inventory items or regulatory changes.
- **Maintainability:-** The software should be maintainable, with the ability to quickly diagnose and fix bugs, upgrade features, and apply security patches..

5. SYSTEM ARCHITECTURE AND METHODOLOGY

5.1. Software Development Life Cycle

The SDLC Model/Approach used is Rapid Application Development (RAD) Model. Since we applied the RAD approach for the development of Medicine Inventory Management System (MIMS) the following steps are followed:

5.1.1. Requirement Gathering :-

In this step, we would gather all the details about the specific requirements by the customer(user) which are needed to develop Medicine Inventory Management System(MIMS). We would identify the required features, such as the ability to add a specific medicine or update the stock and can be able to print cheque and receipt.

5.1.2. Prototyping :

Based on the requirements gathered, we would develop a prototype of the MIMS. The prototype would allow the user to do all the tasks which are specified in the requirement gathering phase.

5.1.3. Iterative Development :

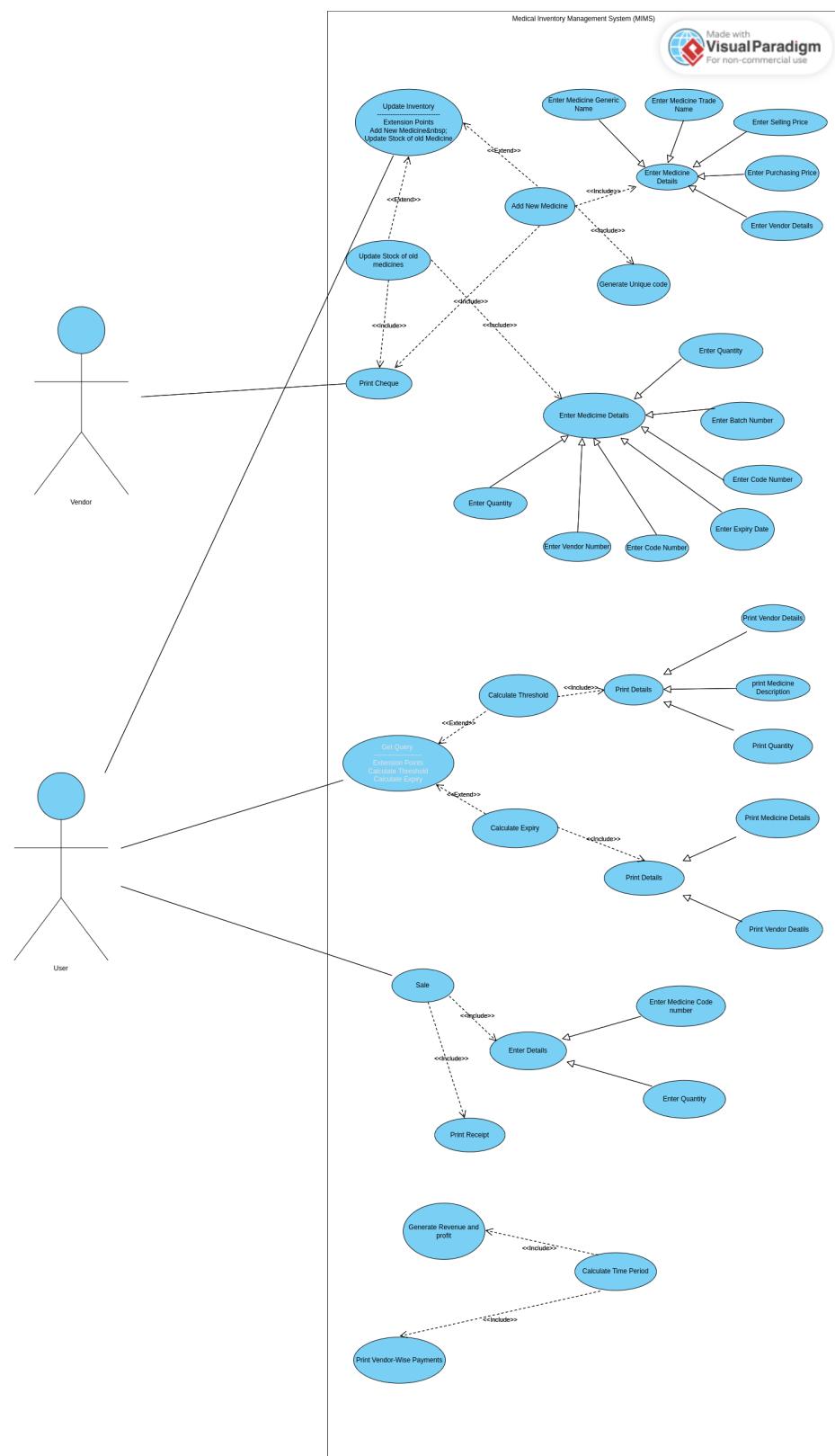
After providing a prototype to the customer and taking the feedback about the functionalities and the user interface. The MIMS software will be evolved by fixing the bugs that got encountered and by updating as per the requirements of the customer(user).

5.1.4. Rapid Development :

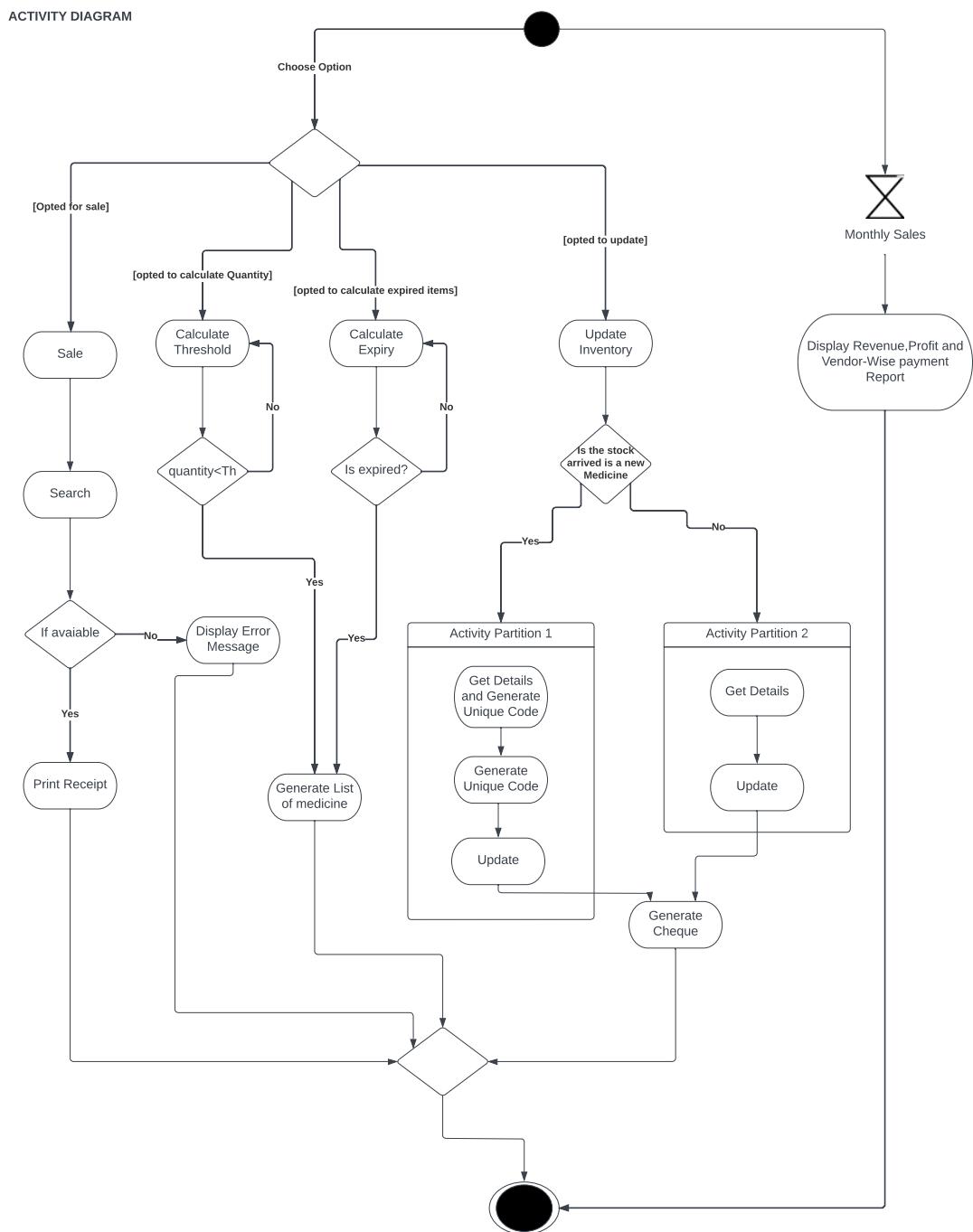
Once the development is complete, the MIMS software can be integrated with other systems used by the company and tested thoroughly to ensure that it meets all the requirements and the system is free of bugs and errors.

5.2. Architecture/Algorithms Used for the Project

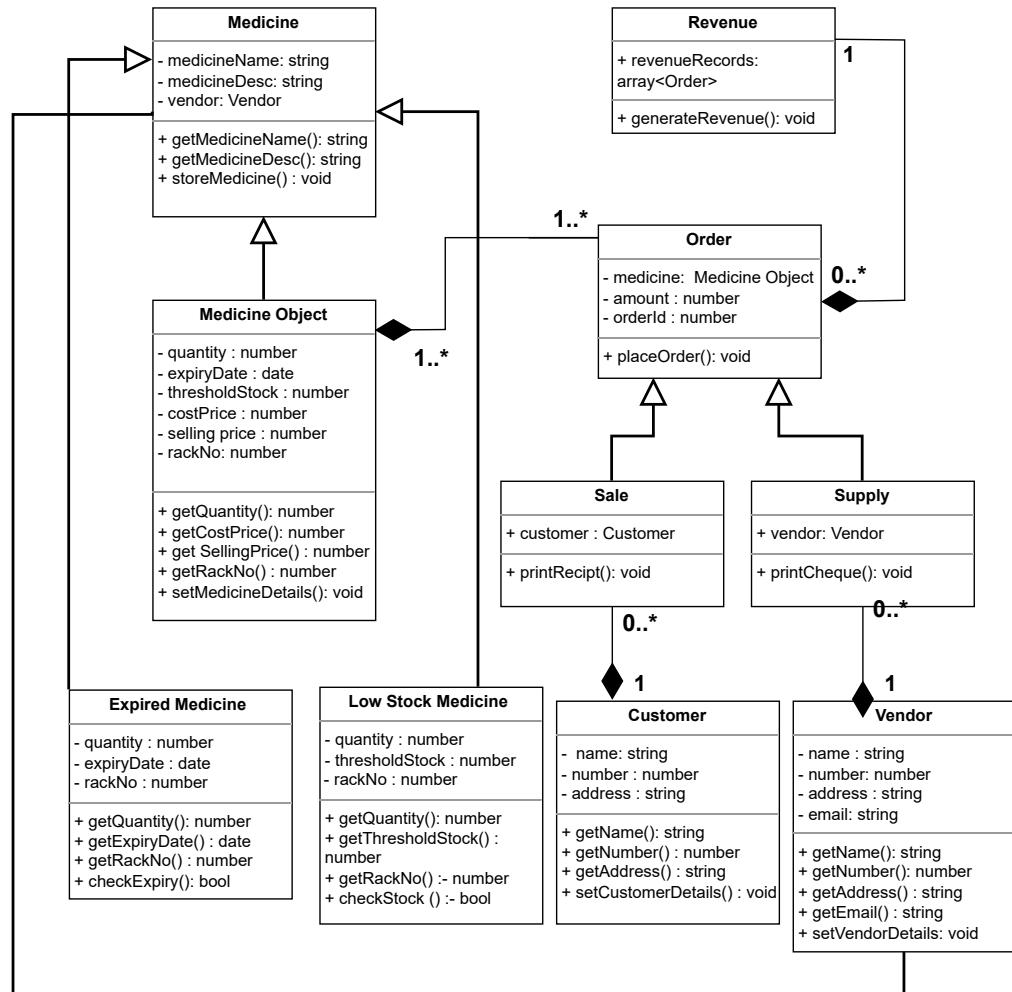
5.3. Use Case Diagram



5.4. Activity Diagram

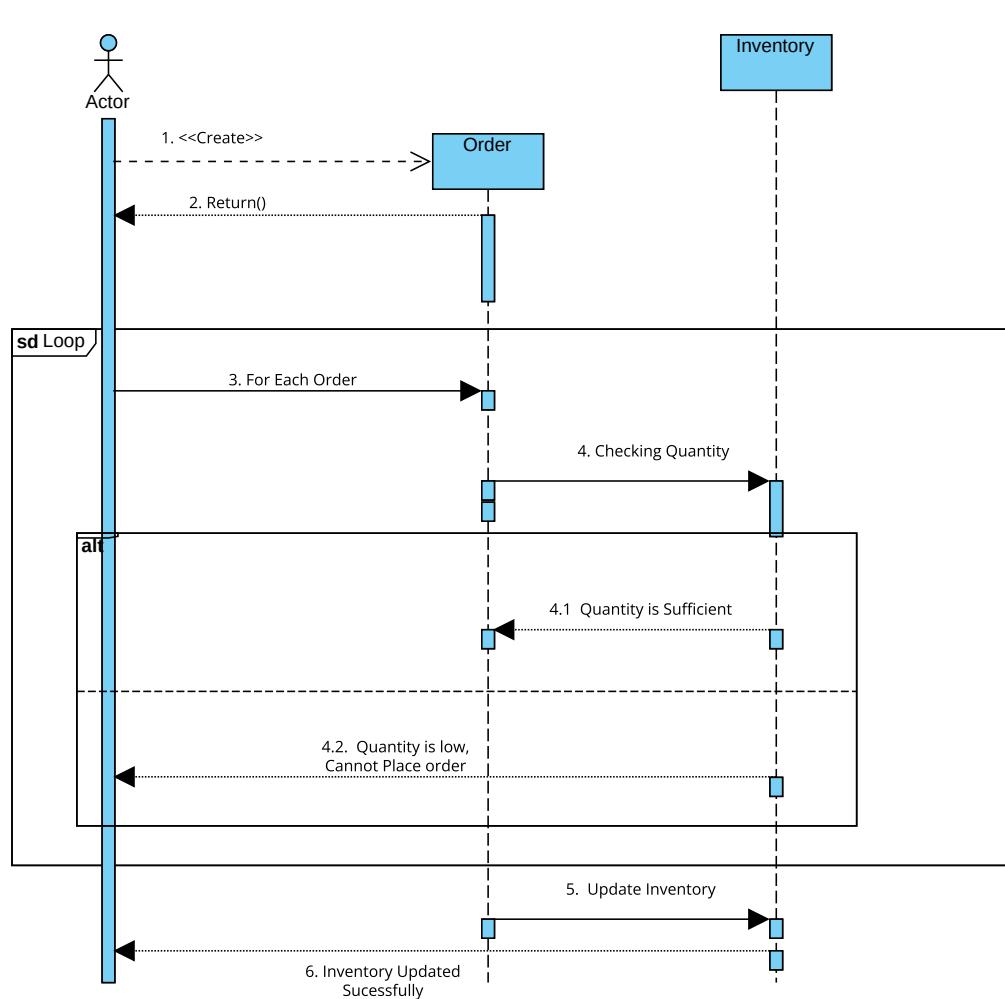


5.5. Class Diagram

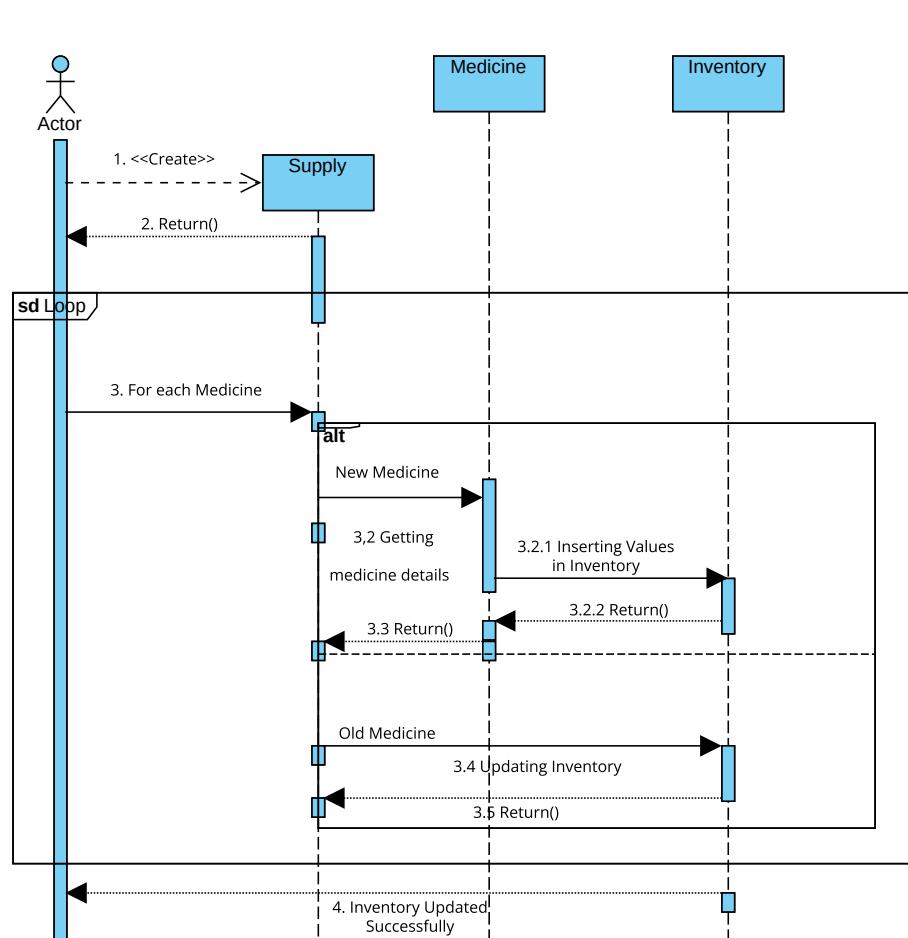


5.6. Sequence Diagram

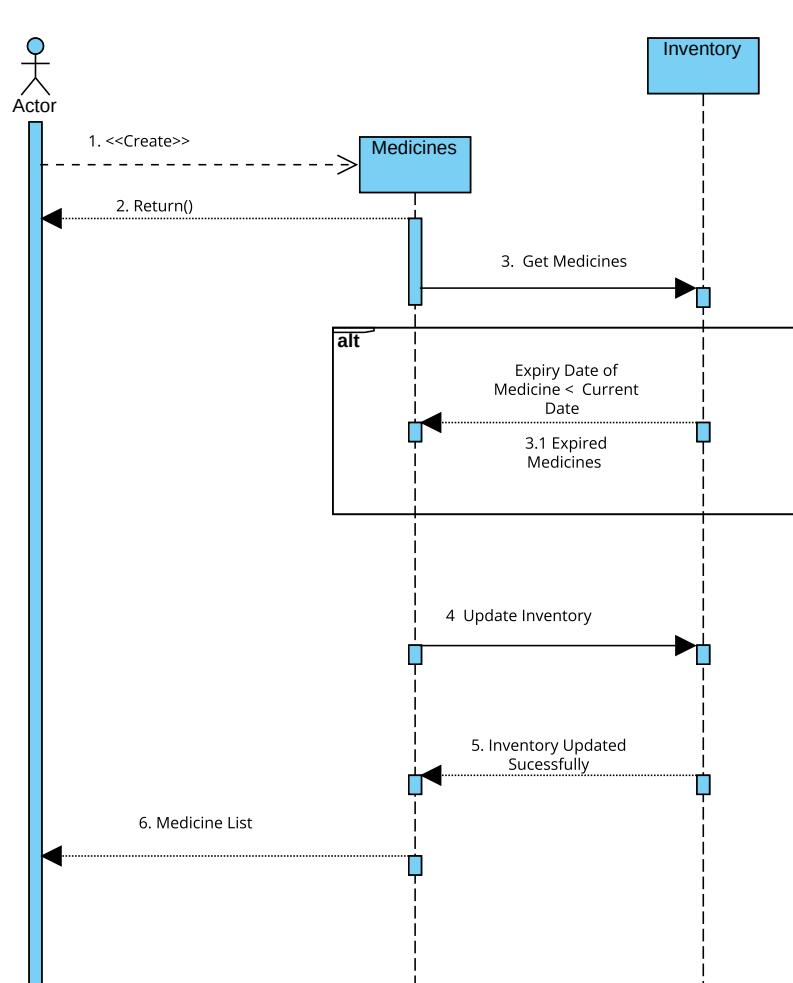
5.6.1. New Sale



5.6.2. New Supply

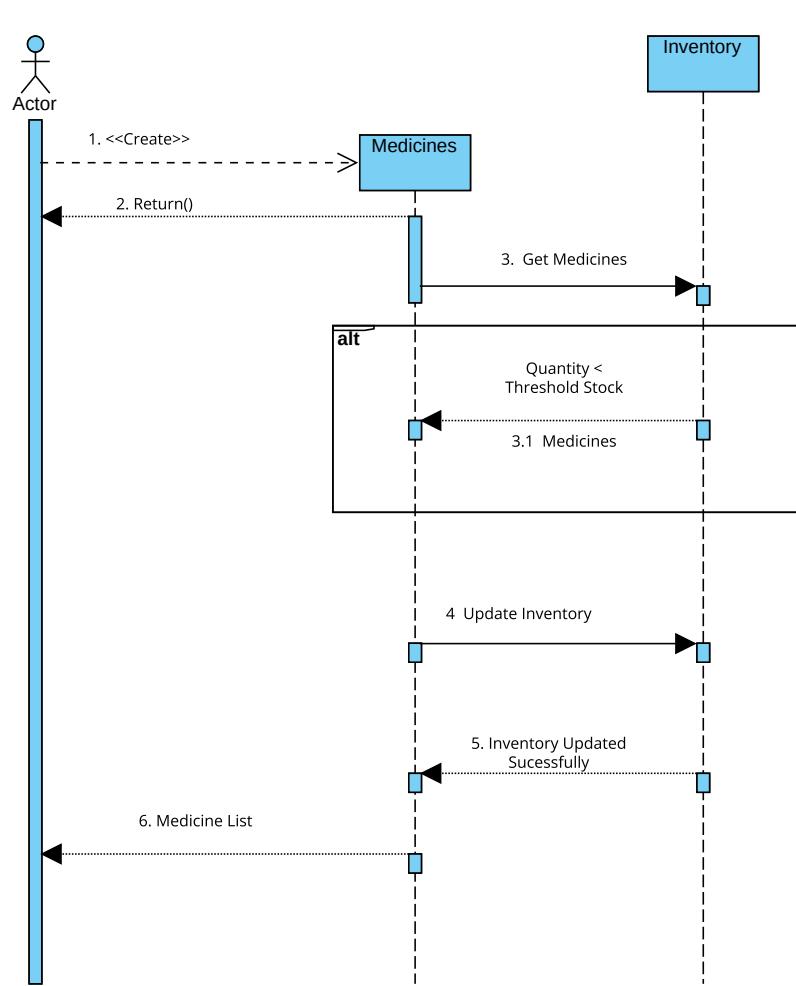


5.6.3. Getting Expired Medicines



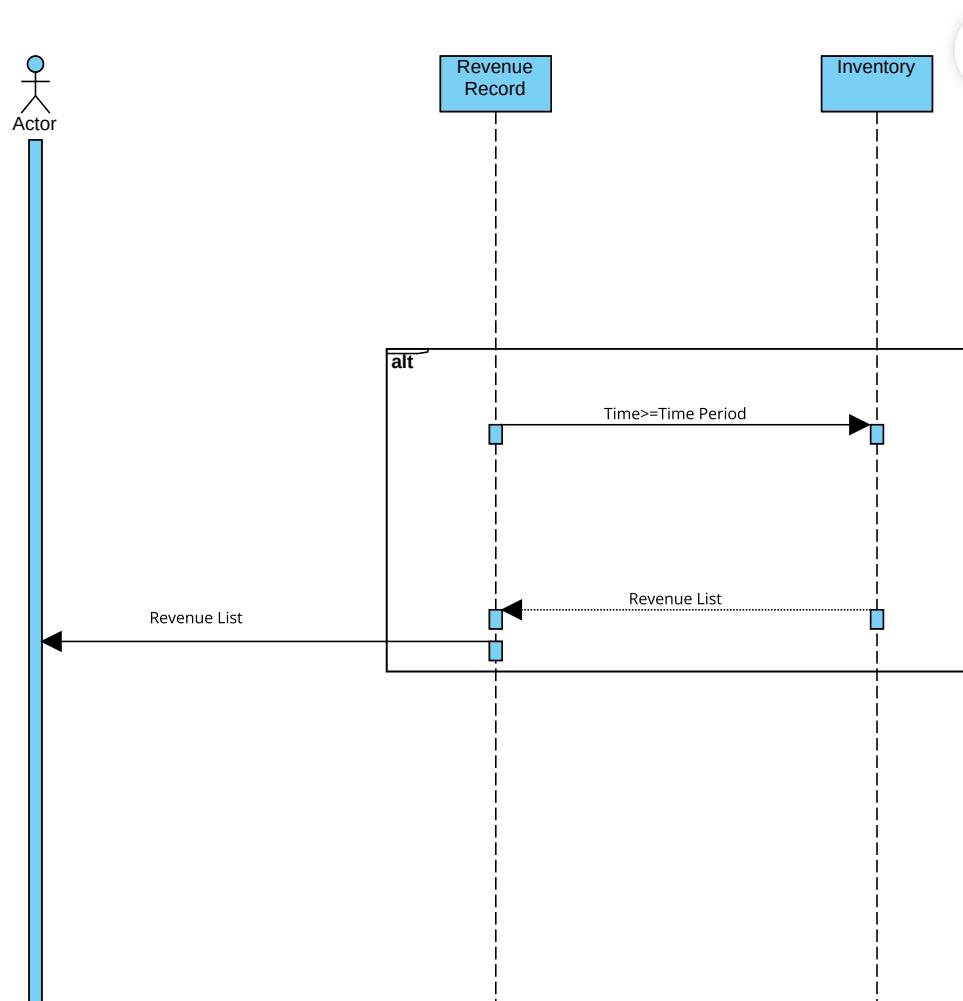
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Visual Paradigm
For non-commercial use

5.6.4. Medicines with Low Stock



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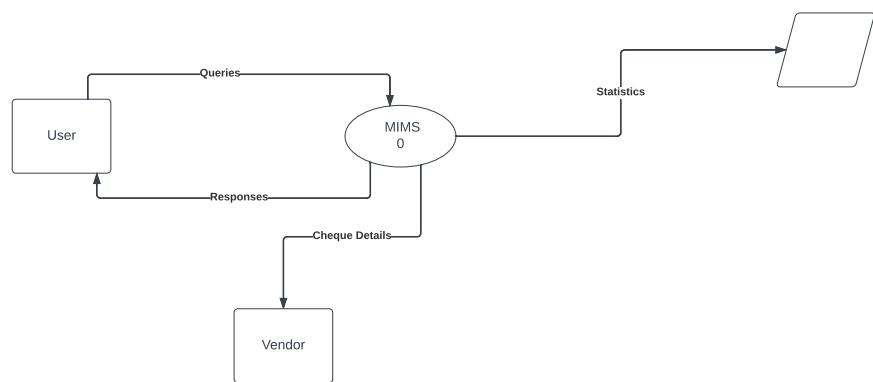
5.6.5. Revenue



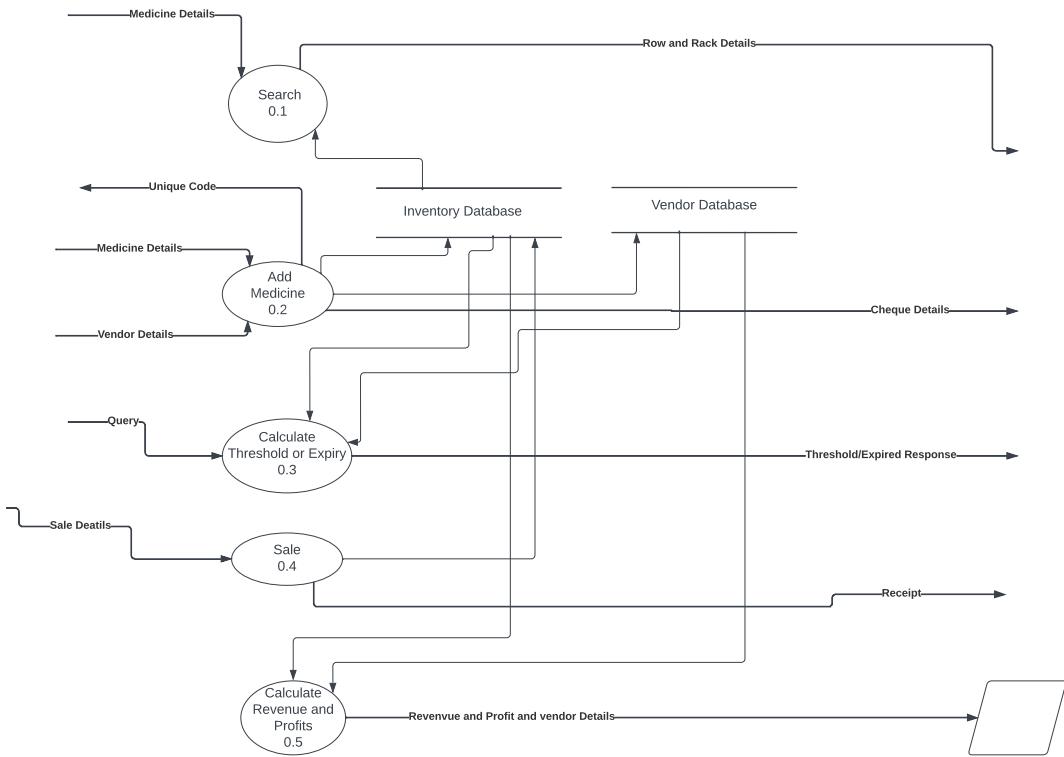
Made with
Visual Paradigm
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5.7. Data Flow Diagram

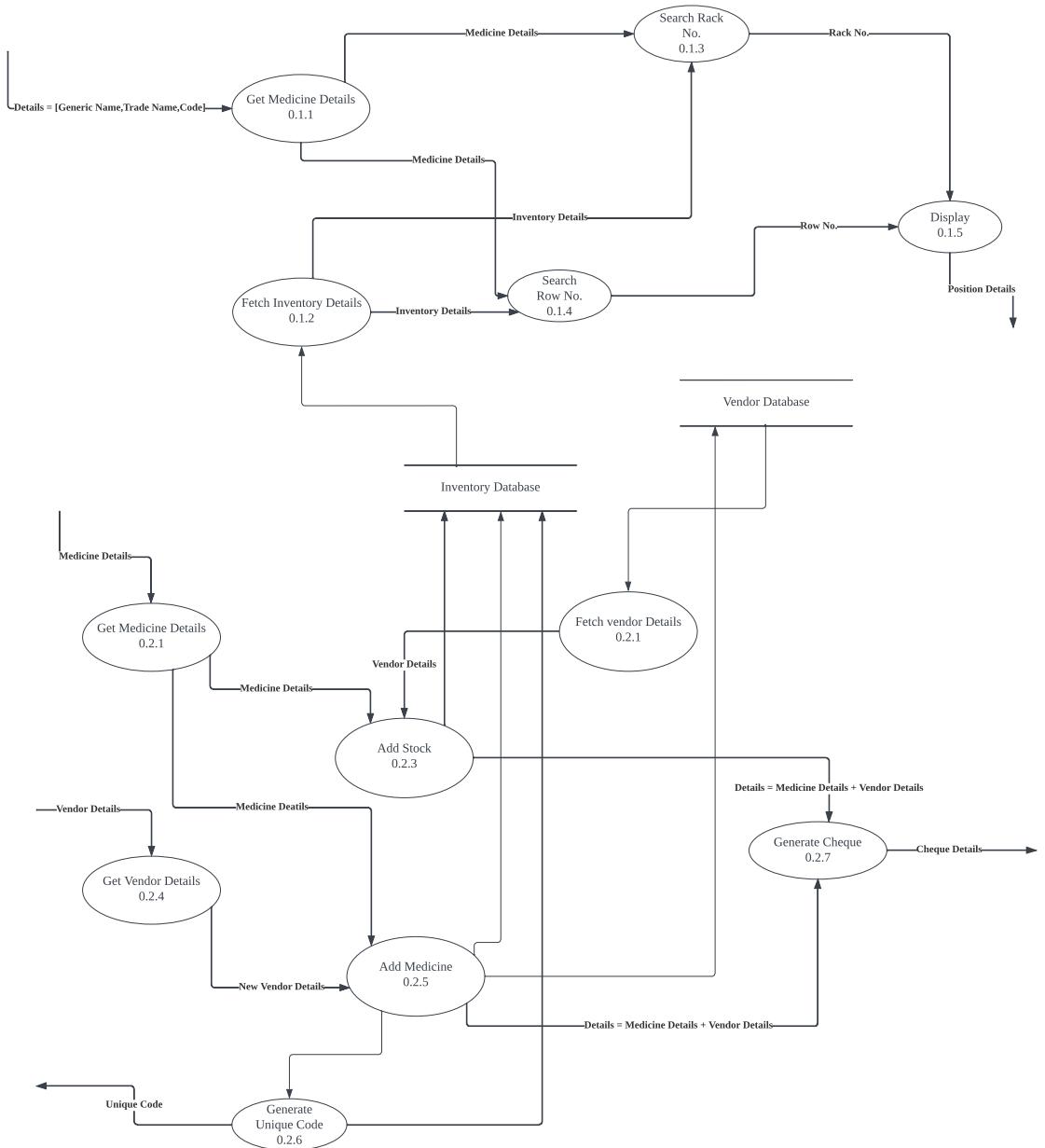
CONTEXT DIAGRAM OR DATA FLOW DIAGRAM LEVEL - 0



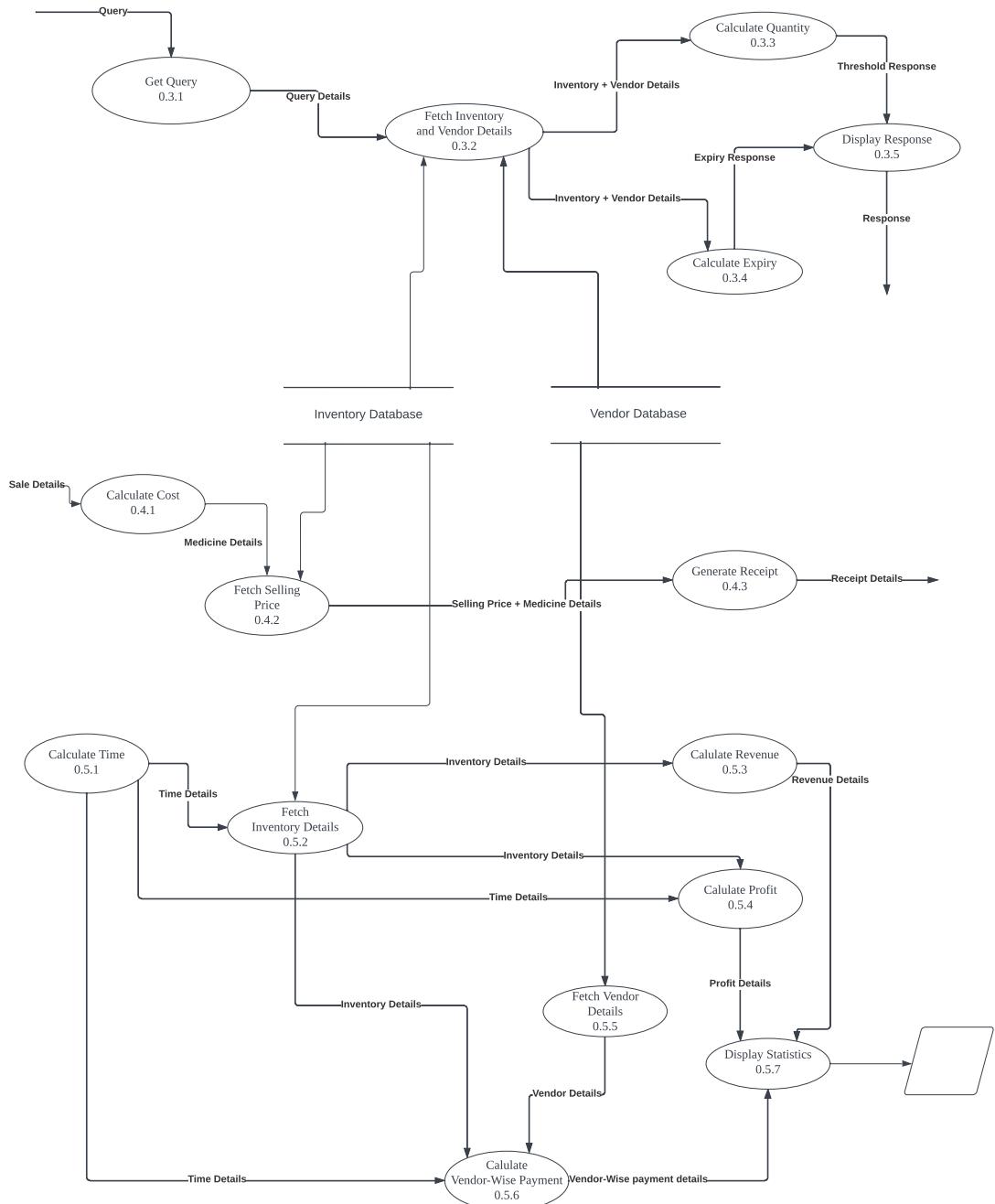
DATA FLOW DIAGRAM LEVEL - 1



DATA FLOW DIAGRAM LEVEL-2

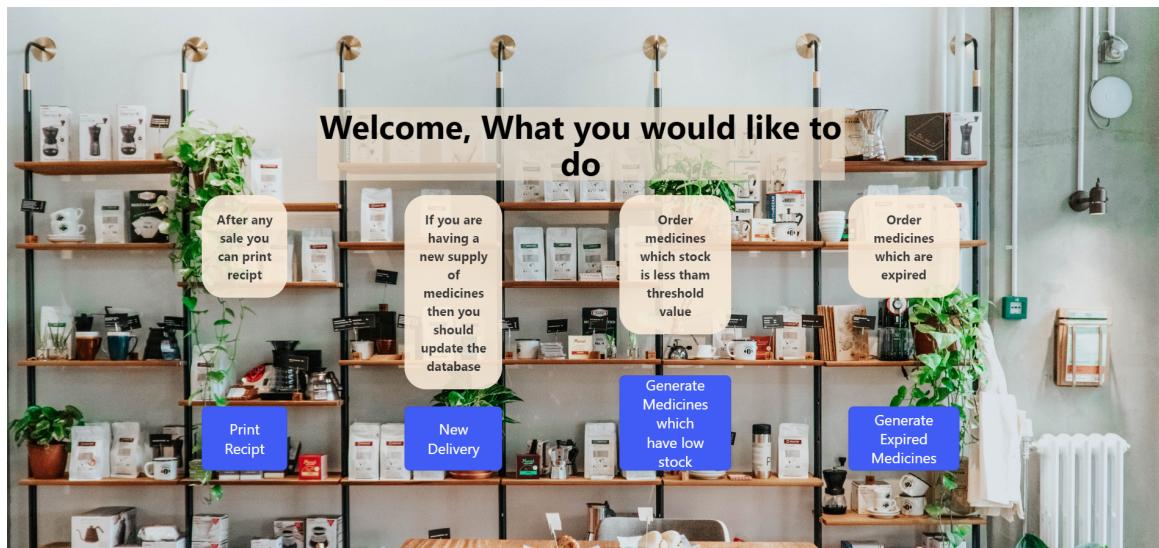


DATA FLOW DIAGRAM LEVEL - 2

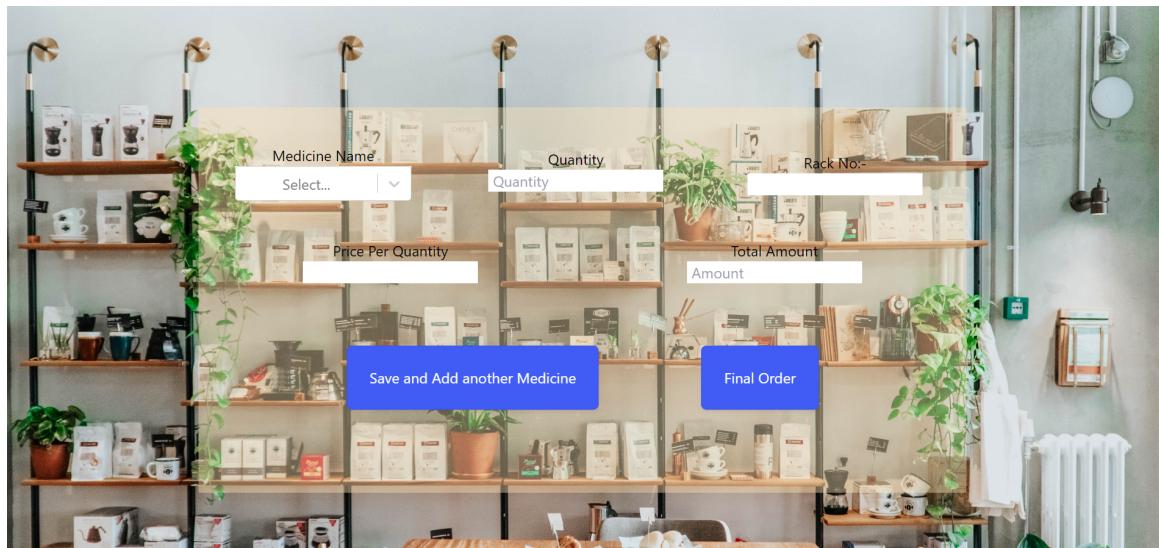


6. IMPLEMENTATION DETAILS

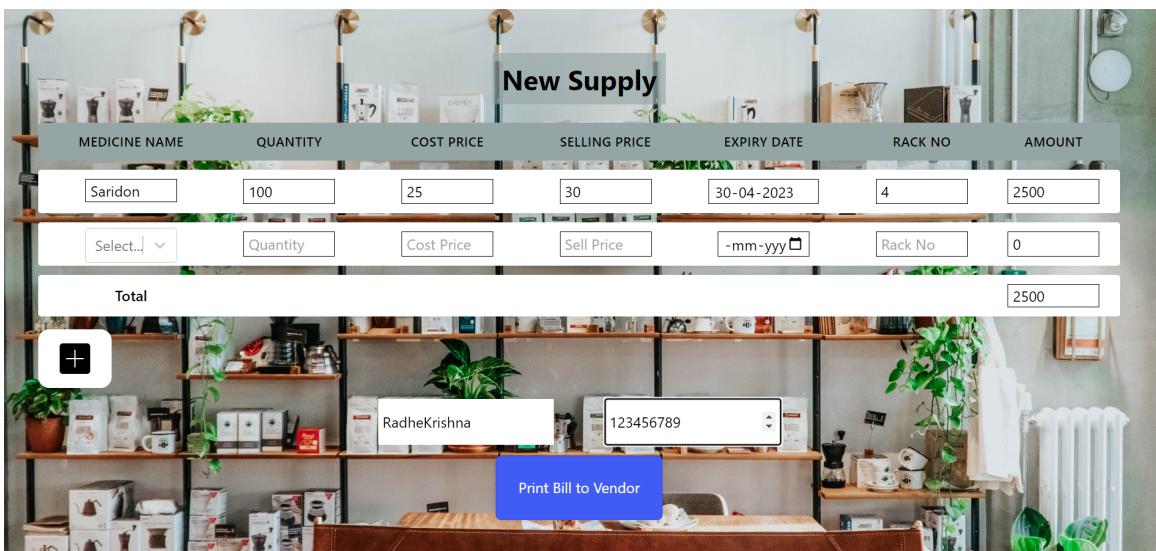
6.1. Home Page



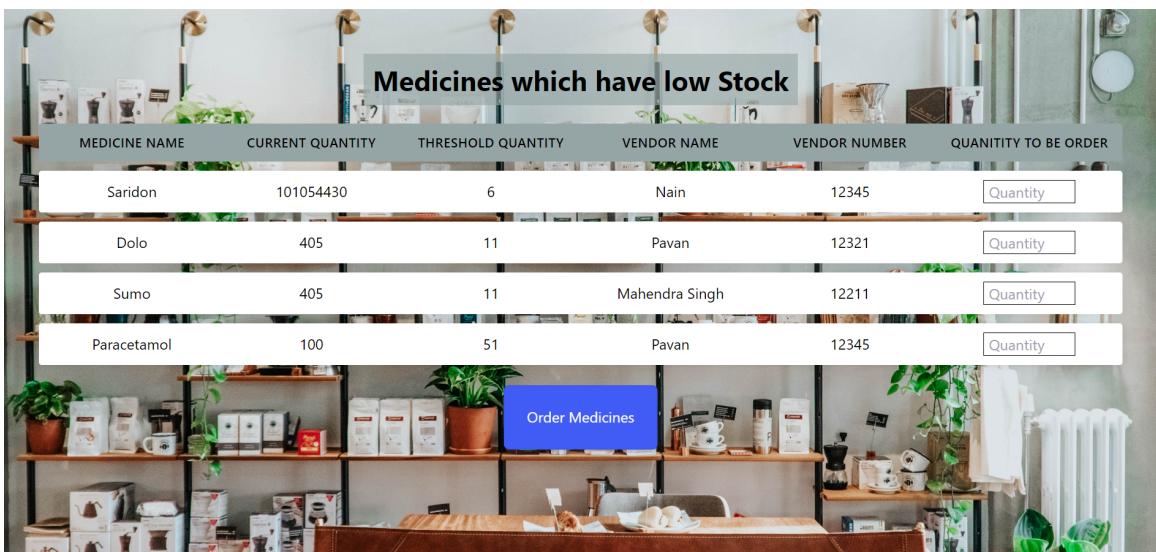
6.2. New Sale



6.3. New Supply



6.4. Low Stock Medicines



6.5. Expired Medicines

MEDICINE NAME	CURRENT QUANTITY	EXPIRY DATE	THRESHOLD STOCK	VENDOR NAME	VENDOR NUMBER	QUANTITY TO BE ORDER
Saridon	101054430	Sun Apr 23 2023	6	Nain	12345	<input type="button" value="Quantity"/>
Dolo	405	Sat Apr 22 2023	11	Pavan	12321	<input type="button" value="Quantity"/>
Sumo	405	Sun Apr 16 2023	11	Mahendra Singh	12211	<input type="button" value="Quantity"/>
Paracetamol	100	Sun Apr 30 2023	51	Pavan	12345	<input type="button" value="Quantity"/>

[Order Medicines](#)

7. RESULTS AND DISCUSSIONS

7.1. Results

The results of the medical inventory system software project are highly dependent on the specific goals and objectives of the project, as well as the scope of the project and the resources available. However, here are some potential results and discussions that could be relevant for the project:

1. **Improved inventory management:-** The medical inventory system software could help shop owners better manage their inventory of medical supplies, equipment, and medications. This could result in fewer stock outs, reduced waste, and improved patient care.
2. **Increased efficiency:-** The software could automate many of the manual inventory management tasks that healthcare providers currently perform, such as tracking expiration dates and reordering supplies. This could result in significant time savings and increased productivity.
3. **Enhanced data visibility:-** The software could provide healthcare providers with real-time visibility into inventory levels, usage patterns, and other key metrics. This could enable better decision-making and more proactive inventory management.
4. **Improved patient safety:-** The software could help healthcare providers track expiration dates, lot numbers, and other critical information for medical supplies and medications. This could help prevent patients from being given expired or recalled products, which could pose a risk to their health.
5. **Better financial management:-** The software could help healthcare providers better track the costs of their inventory, identify opportunities for cost savings, and reduce waste. This could result in improved financial performance and profitability.
6. **Shop Owner Satisfaction** The software could improve the user experience for healthcare providers, making it easier and more efficient to manage inventory. This could result in increased job satisfaction and better employee retention.

7.2. Drawbacks

1. **High implementation costs:-** Developing and implementing a custom medical inventory system software can be expensive, particularly for smaller healthcare providers with limited resources.
2. **User adoption challenges:-** Healthcare providers may be resistant to adopting a new inventory management system, particularly if it requires changes to existing workflows or processes.
3. **Maintenance and support requirements:-** The medical inventory system software will require ongoing maintenance and support, which can add to the total cost of ownership.
4. **Integration challenges:-** The software may face challenges in integrating with existing healthcare systems, such as electronic medical record systems and pharmacy systems.
5. **Training requirements:-** Healthcare providers may require extensive training to effectively use the new system, which can add to the total cost of ownership.
6. **Data privacy and security risks:-** The medical inventory system software will need to comply with strict data privacy and security regulations, particularly if it contains sensitive patient information. employee retention.

8. CONCLUSION

In conclusion, the medical inventory system software project has the potential to deliver significant benefits for healthcare providers, patients, and the broader healthcare industry. By automating and streamlining inventory management processes, the software could improve efficiency, reduce waste, enhance data visibility, improve patient safety, and enable better decision-making.

However, there are also potential drawbacks to consider, such as high implementation costs, user adoption challenges, and technical limitations. To ensure the success of the project, it will be important to carefully plan and manage the implementation process, provide adequate training and support to healthcare providers, and monitor the system's performance and effectiveness over time.

Overall, the medical inventory system software project represents an important opportunity to improve the quality of care and reduce costs in the healthcare industry. With careful planning and execution, the project has the potential to make a significant positive impact on the industry and the patients it serves.

References

Fundamentals of Software Engineering
