SFWE 301 Team 9 FA24, University of Arizona

System ConOps and Requirements

Produced by Chase Hughes, Moamin Sami, William Young, Jaymz Wallen, 11/01/2024

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1   Document Revision History

Name	Date	Summary of Changes
Diana Saldana	08/21/24	Original Revision
Moamin Sami, Jaymz Wallen, Chase Hughes, William Young	10/18/2024	Added derived requirements for each system and crea system architecture diagrams
Moamin Sami, Jaymz Wallen, Chase Hughes, William Young	11/1/2024	Adjusted our diagrams and corrected an This should be the final versic

2   Project Overview

The Pharmacy Management System (PMS) is a comprehensive software solution designed to streamline and automate various operations within a pharmacy. It facilitates efficient inventory management, prescription processing, and sales tracking. The system ensures accurate dispensing of medications, manages patient records and provides inventory control capabilities to pharmacy managers. The PMS enhances overall customer service and safety, while providing an easy to use system for all pharmacy personnel. Additionally, it supports billing, reporting, and regulatory compliance, making it an essential tool for improving operational efficiency and reducing errors in a pharmacy setting.

3   Objectives

The objectives of a Pharmacy Management System include:

1. **Efficient Inventory Management**: To track and manage drug inventory levels, reducing waste, preventing stockouts, and ensuring timely reordering of medications.
2. **Accurate Prescription Handling**: To automate the process of prescription entry, validation, and dispensing, minimizing errors and ensuring the correct medication is provided to patients.
3. **Patient Safety and Care**: To monitor drug interactions, allergies, and contraindications, enhancing patient safety by preventing adverse drug reactions.

4. **Regulatory Compliance**: To ensure the pharmacy adheres to legal and regulatory requirements, including proper documentation, controlled substance management, and reporting.
5. **Streamlined Billing and Payments**: To facilitate accurate billing, insurance claims processing, and payment tracking, improving financial management and reducing administrative burden.
6. **Enhanced Customer Service**: To improve the customer experience by reducing wait times, providing clear medication instructions, and offering convenient services such as prescription refills and notifications.
7. **Comprehensive Reporting and Analytics**: To generate detailed reports and analytics on sales, inventory, and customer behavior, aiding in decision-making and strategic planning.
8. **Data Security and Privacy**: To protect sensitive patient and pharmacy data, ensuring compliance with data protection regulations and maintaining customer trust.

4 Stakeholders

- **Pharmacists**: The primary users who rely on the system to manage prescriptions, dispense medications, and oversee inventory.
- **Pharmacy Technicians**: Assist pharmacists by entering prescriptions, managing inventory, and handling other routine tasks within the system.
- **Patients/Customers**: End-users who receive services such as medication dispensing, refills, and consultations, benefiting from improved accuracy and efficiency.
- **Pharmacy Owners/Managers**: Oversee the overall operations, financial management, and regulatory compliance of the pharmacy, using the system for reporting and decision-making.
- **Healthcare Providers (Doctors, Nurses)**: Interact with the system indirectly by providing prescriptions and medical information that the pharmacy processes.
- **Regulatory Authorities**: Ensure that the pharmacy adheres to laws and regulations, often requiring access to reports and data generated by the system.
- **Insurance Companies**: Interact with the system for processing claims and verifying patient coverage, ensuring accurate billing and reimbursement.

5 Capabilities

5.1 Prescription Management

- **Prescription Management**
  - **Prescription Entry**: Pharmacists and technicians can easily enter and verify prescriptions, ensuring accurate medication dispensing.
  - **Electronic Prescription Processing**: Supports the receipt and processing of e-prescriptions from healthcare providers.
  - **Drug Interaction Alerts**: Automatically checks for potential drug interactions, allergies, and contraindications, ensuring patient safety.
- **Inventory Management**
  - **Stock Monitoring**: Real-time tracking of drug quantities, expiration dates, and stock levels to prevent shortages and overstocking.

- o **Automatic Reordering**: Generates purchase orders when stock falls below predefined levels, ensuring timely replenishment.
  - o **Batch and Lot Management**: Tracks medications by batch and lot numbers, facilitating recalls and expiration tracking.
- **Sales and Billing**
  - o **Point of Sale (POS)**: Integrated POS system for quick and accurate billing, including support for multiple payment methods.
  - o **Insurance Claim Processing**: Streamlines insurance billing, with automated claim generation and submission, and real-time status updates.
  - o **Discounts and Promotions**: Allows the application of discounts, loyalty programs, and promotional pricing.
- **Patient Management**
  - o **Patient Profiles**: Maintains comprehensive patient records, including personal details, medical history, and medication history.
  - o **Medication History**: Provides a detailed history of all medications dispensed to each patient, helping in monitoring and follow-up.
  - o **Refill Management**: Notifies patients of upcoming refills and allows for easy prescription renewals.
- **Reporting and Analytics**
  - o **Sales Reports**: Generates detailed sales reports, including daily, weekly, and monthly summaries.
  - o **Inventory Reports**: Provides insights into stock levels, turnover rates, and drug usage patterns.
  - o **Compliance Reports**: Generates reports required for regulatory compliance, such as controlled substance dispensing and inventory audits.
- **Regulatory Compliance**
  - o **Controlled Substances Management**: Tracks and manages controlled substances in compliance with legal requirements.
  - o **Audit Trails**: Maintains detailed logs of all transactions and changes within the system, supporting audits and investigations.
  - o **Data Security and Privacy**: Ensures compliance with data protection regulations (e.g., HIPAA) by securing patient data and limiting access.
- **User Management**
  - o **Role-Based Access Control (RBAC)**: Assigns roles and permissions to different users, ensuring that access to sensitive functions and data is restricted to authorized personnel.
  - o **User Activity Monitoring**: Tracks and logs user activities within the system, helping in identifying and addressing any unauthorized actions.
- **Integration Capabilities**
  - o **Third-Party Integration**: Integrates with other healthcare systems, such as Electronic Health Records (EHR), Laboratory Information Systems (LIS), and accounting software.
  - o **Pharmacy Network Integration**: Supports integration across multiple branches, enabling centralized management and reporting.

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- o **User Activity Monitoring**: Tracks and logs user activities within the system, helping in identifying and addressing any unauthorized actions.

6   System Architecture

## 6.1   Overview of the Pharmacy Management System Architecture

The system should be built on a client-server architecture, with a robust backend database supporting the application logic and a user-friendly graphical user interface (web-based or desktop application) for ease of use. To support future expansion and scalability to multi-pharmacy locations, the system *may* also include cloud-based options for scalability and remote access, ensuring continuous availability and easy maintenance.

The user interface is designed to be intuitive and accessible, with clear navigation, customizable dashboards, and user-friendly forms. It currently supports only the English language functionality and is optimized for desktop devices, although it could should also be scalable to a multi-platform compatibility in the future allowing pharmacists and technicians to access the system on the go.
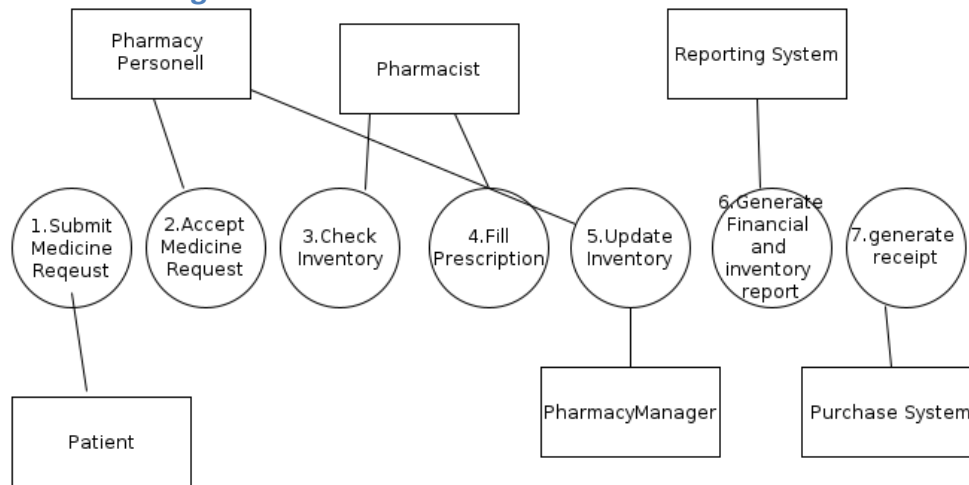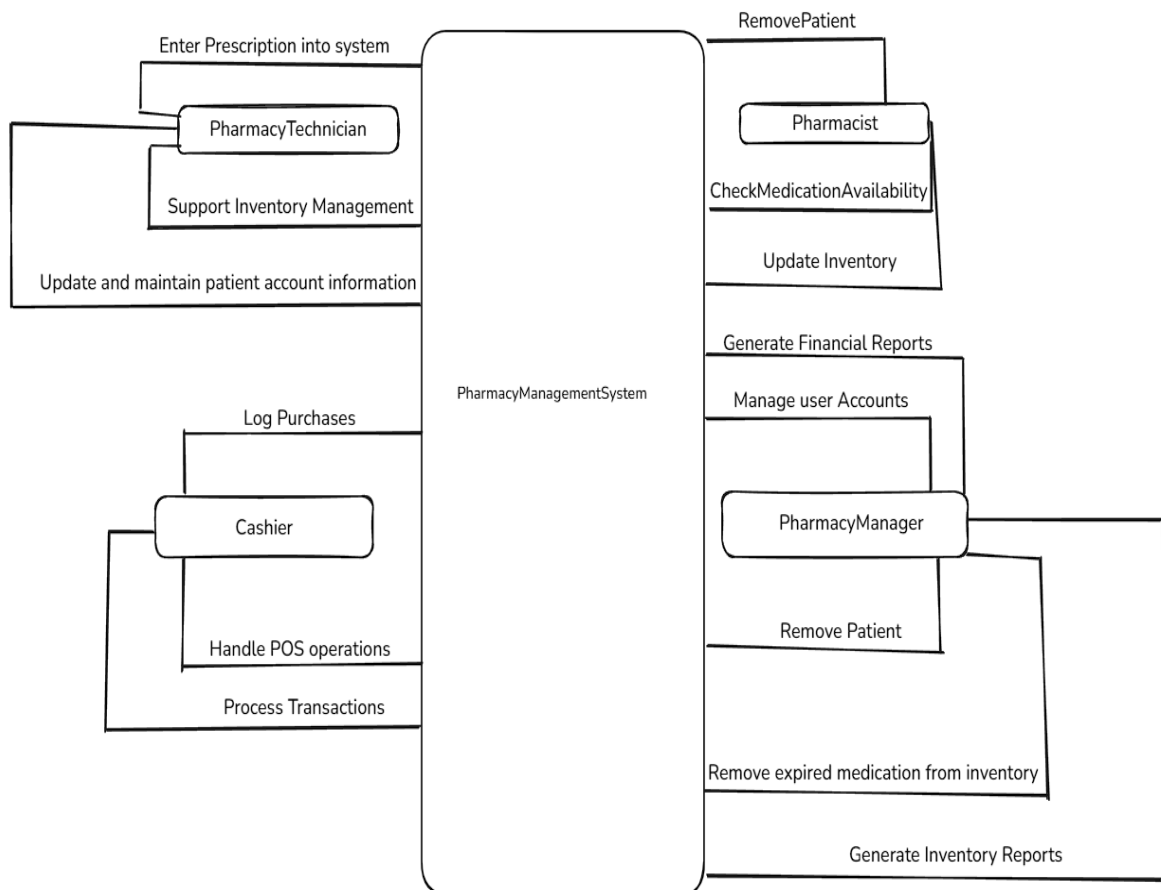
6.2   Use Case Diagram
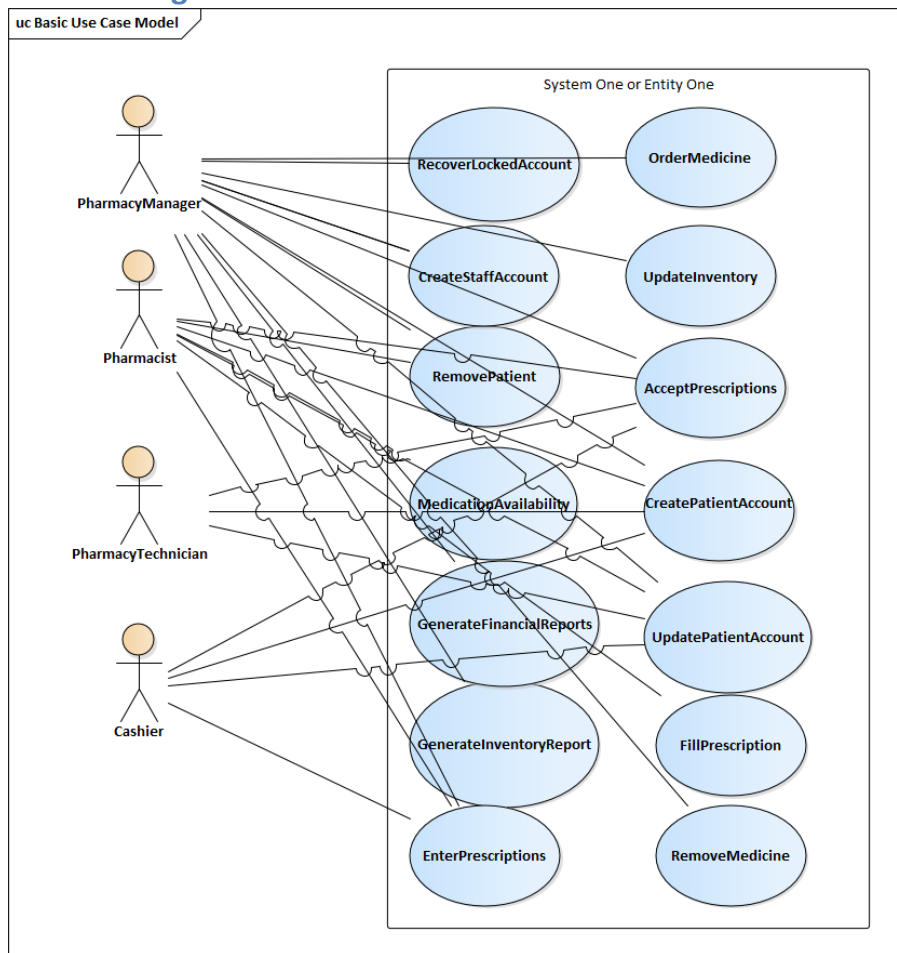
6.3   State Transition Diagram
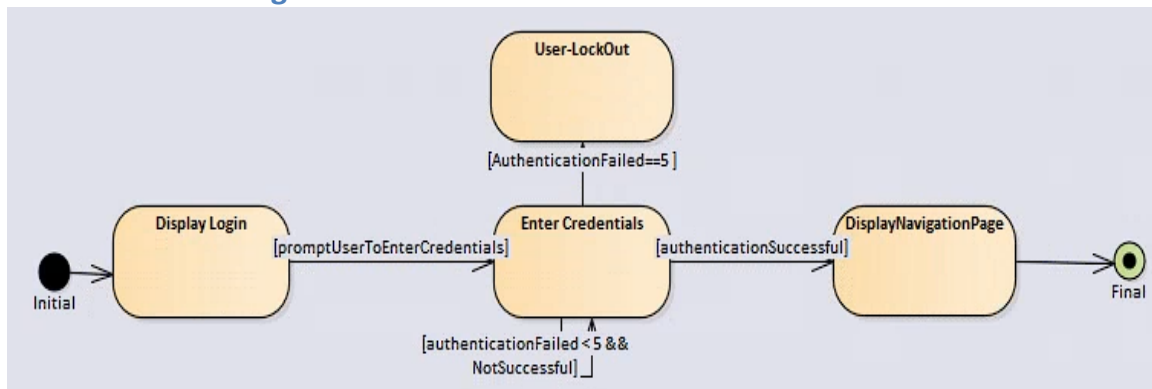
6.4 Data Flow Diagram

6.5 Context Diagram

7   System Requirements

7.1   General System Requirements

7.1.1   Info Storage
The system shall store basic pharmacy information, including name, website, address, owner, phone number and working hours.

7.1.2   GUI
The system shall provide an easy-to-use graphical user interface (GUI) for all interactions between the pharmacy system and the pharmacy staff.

7.1.3   User Types
The system shall support the following user types: pharmacy manager, pharmacist, pharmacist technician, cashier, patients (patients do not have log in capability).

7.1.4   Patient Accounts
The system shall allow all pharmacy personnel to create and/or update patient accounts and store the following patient information: name, date of birth, address, phone number, email address and insurance information.

7.1.5   Patient Deletion
The system shall allow only a pharmacist or pharmacy manager to remove a patient from the system.

7.2   User Log-In Requirements

7.2.1   Account creation
The system shall allow only the pharmacy manager to create new pharmacy staff user accounts.

7.2.2   User Log In
The system shall allow the user to log in using the pharmacy manager-created user account.

7.2.3   Create Password
The system shall require that the user create a unique password the first time they are logging into the system.

7.2.4   Change Password
The system shall allow an authorized user to change the password on their user account.

7.2.5   User Authentication
The system shall provide user authentication upon sign on for all pharmacy staff including managers, pharmacists, pharmacy technicians and cashiers.

7.2.6   User Lock Out
The system shall lock-out any user that attempts to log in without proper authentication after 5 sequential attempts.

7.2.7   Lock Out Recovery
The system shall only allow the pharmacy manager to recover/unlock a locked-out account for a given user.

7.3   Prescription System Requirements

7.3.1   Accept Prescriptions
The system shall allow all pharmacy personnel to accept and enter prescriptions into the system that are brought directly to the pharmacy by patients.

7.3.2   Manual Prescription Entry
The system shall allow pharmacy staff to manually enter prescriptions received from a doctor's office via telephone.

7.3.3   Medication Availability
The system shall allow only pharmacists to check the availability of medications in inventory prior to filling the prescriptions.

7.3.4   Filling Prescriptions
The system shall allow only pharmacists to fill a prescription.

7.3.5   Prescription Tracking
The system shall keep track of all prescriptions filled/picked up for a given patient and make it available to all pharmacy personnel.

7.3.6   Activity Log
The system will keep an activity log (i.e., pharmacist name, prescription number, patient name, date, time, type and quantity of drugs) for all prescriptions filled.

7.3.7   Expired Medicine
The system shall display a warning and prevent filling and/or sale of expired medicines.

7.4   Inventory Control System Requirements

7.4.1   Inventory Tracking
The system shall update the inventory when a pharmacists fills a prescription.

7.4.2   Low Stock
The system shall notify the pharmacy manager about medicines with low stock (less than 120 doses / tablets of a specified medicine).

7.4.3   New Med Orders
The system shall allow only the pharmacy manager to order new medicines when quantities run low.

7.4.4   New Supply Received
The system shall update the inventory of prescription medicines whenever new medications are received from a distributor.

7.4.5   Update Inventory
The system shall allow the pharmacy manager to update the inventory when new medicines are distributed / sold.

7.4.6   Expired Meds Notification
The system shall notify the pharmacy manager about expired medicines or medicines that will expire within 30 days.

7.4.7   Remove Inventory
The system shall allow the pharmacy manager to remove inventory from the system when medications have expired and record the removal in an activity log.

7.5   Reporting System Requirements

7.5.1   Transaction logging
The system shall log all transactions, such as logins, logouts, purchases, and inventory updates.

7.5.2   Financial Reports
The system shall allow pharmacy managers to generate financial reports and statistics for a specified period.

7.5.3   Inventory Reports
The system shall allow pharmacy managers to generate inventory reports for a specified period of time.

7.6   Purchasing System Requirements

7.6.1   Process Prescription Purchases
The system shall allow the pharmacy staff to process prescription items for purchase via manual input from the GUI.

7.6.2   POS Signature
The system shall require that customers sign (does not have to be electronic signature) for all prescription medications distributed at the point of sale.

7.6.3   Non-Prescription Sales
The system shall support the sale / processing of non-prescription items for purchase by Pharmacy staff via manual input.

7.6.4   Purchase Receipts
The system shall generate and print receipts for the entire customer purchase (including non-prescription items).

7.6.5   Payment Types

The system shall support multiple payment methods, including cash, debit, and credit cards.

8   Software Requirements Specification

8.1   Front End Requirements

8.1.1   Display Information

The system shall display pharmacy information (e.g., phone number, operating hours, owner) on the main navigation page.

8.1.2   Login

The system shall display a login window to users allowing them to enter their email and password.

8.1.2.1   Submit Button

The system shall let the user click a submit button after they enter their email and password.

8.1.3   Hide Password

The system shall hide the password when entered into the Login password field.

8.1.4   Failed Authentication Attempts

The system shall display failed authentication attempts in the format "Wrong password. Attempts Remaining: (total number of attempts left)" to the user.

8.1.5   Password Recovery

The system shall redirect the user to the recovery page when their account is locked.

8.1.6   Main Navigation Page

The system shall provide a main navigation page post-login for ease of access.

8.1.6.1   Contents

The system shall provide a main navigation page that includes a prescription check, calendar for the pharmacy, and any deals going on for items within the store as well as a sign up for new customers.

8.1.7   Display Image and Name

The system shall display an image of the medicine and its name on-screen for pharmacist confirmation.

8.1.8   Create Profile

The system shall display a create account option when an employee is logged in.

8.1.9   Delete Profile

The system shall display a delete account option when a pharmacy manager or pharmacist is logged in.

8.1.10   Edit Profile

The system shall provide an "Edit Profile" option to pharmacy staff accessible from the manage account page.

8.1.11   Manage My Account

The system shall display a manage my account option allowing authenticated users to change their password, and info.

8.1.11.1   Edit Visible Profile Info

The system shall let the user update their first and last names and profile pictures.

8.1.12   Modify System View

The system shall allow pharmacy managers to modify system information from the interface.

8.1.12.1   Edit System Information

The system shall allow pharmacy managers to modify system information from the interface, such as storage information, expiration dates, employee schedules, and employee roles.

8.1.13   Unlock Accounts

The system shall allow pharmacy managers to enter their login credentials into the account recovery page to unlock accounts.

8.1.14   Manage Inventory

The system shall provide the option to manage inventory when the pharmacy manager is authenticated.

8.1.15   Fill Prescription

The system shall display a fill prescription option to authenticated pharmacists.

8.1.16   Create Prescription

The system shall display a 'create prescription' option for authenticated employees.

8.1.17   Notifications

The system shall display a notifications bar.

8.1.17.1   Notification Types

The system shall display medicine, email, text, and call alerts to the notification bar.

8.2   Back End Requirements

8.2.1   Prescription Storage

The system shall store prescription objects with the following fields: Medicine name, type, quantity, ID number, expiration date, patient, and pharmacist.

8.2.1.1   Prescription Search

Prescriptions shall be searchable by ID number.

8.2.1.2   Prescription Expiration

The system shall close a prescription if the current date passes the expiration date.

8.2.2   Account Storage

The system shall store account objects with the following fields: Name, username, password, birthdate, email, profile type/authorization, prescriptions.

8.2.2.1   Account Types

The system shall differentiate between pharmacist, patient, pharmacist technician, pharmacist manager, and cashier profile types.

8.2.2.2   Patient Account

Patient Accounts shall store data for doctor, medical conditions, patient history, and not contain data for passwords and job role.

8.2.2.3   Employee Account

Employee accounts shall include job title, and password.

8.2.2.4   Pharmacist Account

Pharmacist accounts shall store licenses, certifications and license status.

8.2.2.5   Track failed attempts

The system shall track failed attempts, incrementing it when a login fails and resetting it when successful.

8.2.2.6   Failed Password Lock

The system shall lock an account after five failed attempts.

8.2.2.7   Authentication

The system shall authenticate users by comparing provided password with account password.

8.2.2.8   Create Accounts

The system shall only allow employee accounts to be created when the pharmacy manager has been authenticated.

8.2.2.9   Force Password Change

The system shall track if a password has expired and force users to change their password after an account is created.

8.2.3   Access Log Storage

The system shall store a log of system access activities.

8.2.3.1   Access Log Information

Access logs shall store data such as employee name, ID, patient name, date and timestamps, prescription, drug quantity.

8.2.3.2   Access Change Information

Access logs shall store data such as prescription and amount changed.

8.3   Prescription Processing Requirements

8.3.1   Prescription Creation

The system shall allow authenticated employees to create prescription objects such as patient name, contact details, medical history and medication name, dose and quantity.

8.3.2   Prescription Fill
The system shall allow for the filling of prescription orders, modifying the inventory for the medicine and notifying the pharmacist and the customer that the prescription was filled.

8.3.3   Prescription Linkage
The system shall associate prescription(s) with patient accounts.

8.3.4   Daily Active Prescription File
The system shall generate a daily active prescription file for managers, prioritizing expired and near-expired prescriptions.

8.3.5   Non-Expired Prescription Validation
The system shall only issue non-expired medication when filling prescriptions.

8.3.6   E-Prescription Creation
The system shall create prescription objects from e-prescriptions issued by healthcare providers.

8.3.7   Pharmacist Fulfillment Restriction
The system shall not allow pharmacists to fill or create prescriptions for their own account.

8.3.8   Prescription Activity Log
The system shall store an activity log for all prescriptions.

8.3.8.1   *Prescription Cancelled Activity Log*
The system shall update the activity log when a prescription is canceled.

8.3.8.2   *Prescription Filled Activity Log*
The system shall update the activity log when a prescription is filled.

8.3.8.3   *Prescription Create Activity Log*
The system shall update the activity log when a prescription is created.

8.3.8.4   *Prescription Deleted Activity Log*
The system shall update the activity log when a prescription is deleted.

8.3.9   Hospital Prescription Request
The system shall allow local doctors/hospitals to put in prescription request.

8.3.10   Patient Insurance Verification
The system shall verify patient insurance information before processing a prescription.

8.3.11   Drug Interaction Test
The system shall perform real-time drug interaction checks when creating or filling a prescription.

8.4   Inventory Control Requirements

8.4.1   Inventory Change Notifications
The System shall notify managers and pharmacists of inventory changes through the desktop application.

8.4.2 Automatic Inventory Updates
 The inventory shall update automatically when prescriptions are filled.

8.4.3 Low stock
The system shall show a low-stock alert for the pharmacy manager when the stock of any medicine falls below 120 doses/tablets.

8.4.4 Inventory Visibility
The system shall only display inventory to managers and pharmacists.

8.4.5 Manual Inventory Updates
Only managers shall have the ability to manually update inventory.

8.4.6 New Medicine Orders
The pharmacy manager shall place new medicine orders when the stock falls below the low-stock threshold.

8.4.7 New Supply Recieved
The system shall automatically update the inventory with new medicine quantity upon confirmation of received medicine from distributor.

8.4.8 Expired Medication Notification
The System shall generate alerts for pharmacy managers at least 30 days before medicine expiration date.

8.4.8.1 Near Expiration Display
The System shall display medicine name and expiration date.

8.4.9 Expired Inventory
The System shall allow pharmacy managers to remove expired medicines from inventory and log details of removal In activity log.

8.4.10 Inventory Location
The system shall track the physical location of the inventory within the pharmacy, updated by an employee.

8.4.11 Inventory Discrepancies
The system shall track and report on inventory discrepancies identified during physical counts.

8.4.12 Units of Measure
The system shall support multiple units of measure for each product (e.g., individual units, boxes, cases).

8.4.13 Medication Hierarchy
The system shall prioritize medication that has a closer expiration date than medication that has a longer shelf life for filling prescriptions.

8.4.14 Inventory Change Justification
The system shall require a justification for a pharmacist to make changes (add, remove) to inventory.

8.5 Pharmacy Report Generation

8.5.1 Login Tracking
The system shall track user logins and logouts

8.5.2 Inventory Tracking
The system shall track inventory changes.

8.5.3 Transaction Tracking
The system shall track all transactions.

8.5.4 Statistical Analysis
The system shall perform statistical analysis on the financial, usage, and inventory data.

8.5.5 Restrict Access
The system shall restrict report access to pharmacy managers.

8.5.6 Daily Inventory Report
The System shall generate a spreadsheet of inventory changes at the end of each business day, including sold items, items that were added to inventory, and items that are running low.

8.5.6.1 Spreadsheet Info
The spreadsheet shall include future mail orders placed by the pharmacy.

8.5.7 Daily Patient Report
The system shall generate a daily spreadsheet of patient changes.

8.5.8 Daily Financial Report
The System shall automatically generate a comprehensive daily spreadsheet report capturing all financial changes within the organization's accounts and transactions over the previous 24-hour period.

8.5.9 Real Time Logging
The system shall log all timestamps for all transactions, logins, logouts, and inventory updates for auditing purposes.

8.5.10 Logging Display
The system shall provide an interface for pharmacy managers to access and review the transaction logs via the desktop application.

8.5.10.1 Select Date Range
The system shall allow pharmacy managers to select a date range when generating reports.

8.5.11 Non-Prescription Item Tracking
The System shall track all non-prescription items, such as in store items, food, and drinks that are for sale. This includes inventory, expiration date, and next shipment date.

8.5.12 Client Interactions
The System shall maintain a comprehensive record of all interactions between the organization and its clients across all channels, such as communications and items bought by that customer.

8.5.13 Purchase Tracking
The System shall track all purchases.

8.6 Non-Functional Requirements

8.6.1 Password Encryption
User passwords shall be encrypted using 64-bit encryption.

8.6.2 Software Language
Software shall be written using Java.

8.6.3 Databasing
Software shall use MySql databases.

8.6.4 Secondary Authentication
System shall have secondary authentication for manager, tech, and pharmacist accounts.

8.6.5 Accessibility
The system shall be available 24/7; aside from scheduled maintenances.

8.6.6 Network System
The system shall be on a closed network system, only accessible on-site.

8.6.7 Search Strategy
Hashmap shall be implemented to search for objects.

8.6.8 Password Complexity
The system shall enforce a minimum password complexity requiring at least 8 characters, including at least one uppercase letter, lowercase letter, number, and special character.

8.6.9 TimeOut
The system shall automatically log out users and send them to log-in page after 15 minutes of inactivity.

9 Change Requests

9.1 Change Request Template
Date:

Team Number:

Project Name:

Title of Change: Enter a descriptive phrase for reference

Documents Affected (check all that apply):

	Doc Type	Revision	Document / File Name

	SRS		
	Source Code		
	Test Procedures		

Description of Change: What is it that needs to be changed?

Need for Change: Why must this change be made?

Impact: How will this change impact your project if it is, or is not implemented?

Substantiation: What have you done to verify that this change will work?

Approvals:

_____

Team Leader Signature

_____

Instructor Signature