**DIPLOMA IN INFORMATION TECHNOLOGY**

**PROJECT TITLE: DEVELOPMENT OF A PHARMACY MANAGEMENT SYSTEM**

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*A proposal submitted to the Department of information technology in the School of computing and informatics in partial fulfillment of the requirements for the award of Diploma in Information Technology Jomo Kenyatta University of Agriculture and Technology.*

*2025*

*This proposal is my original work and has not been presented for a degree in any other University*

*Signature.........................................Date............................................................*

This proposal has been submitted for examination with my approval as University Supervisor

Signature.......................................................... Date....................................................

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**INTRODUCTION**

Ultracare Pharmacy is a growing, mid-sized retail pharmacy located in the heart of Juja’s commercial district, serving a wide range of customers including students, working professionals, families, and senior citizens. Known for its accessibility and reliable customer service, Ultracare specializes in dispensing both prescription and over-the-counter (OTC) medicines, health supplements, personal care products, and basic medical supplies. The pharmacy plays a vital role in supporting the community’s healthcare needs and is frequented by clients from nearby clinics, learning institutions, and residential estates.

Despite its critical role in healthcare delivery, Ultracare Pharmacy currently operates with predominantly **manual systems**, which impact both efficiency and accuracy. The pharmacy opens daily at 7:30 AM. The pharmacist and two assistants begin the day by cleaning the counters and shelves, organizing medications by therapeutic class, and preparing the cash float for daily transactions. A handwritten sales and stock ledger is placed at the main counter alongside a prescription pad for manually recording drug dispensation.

Throughout the day (8:00 AM – 8:00 PM), walk-in customers bring prescriptions which are verified and filled manually. The pharmacist or assistant identifies medications by scanning shelf labels from memory, checks expiry dates visually, and records each sale in a sales notebook. Over-the-counter customers inquire about common medications, supplements, or health items, and the staff responds based on experience or by checking product information leaflets.

All payments are made in cash, M-Pesa, or bank transfer. A calculator is used to tally the totals, and customers are issued **manual handwritten receipts**. For prescription drugs, a copy of the prescription is stapled to the receipt and stored for compliance. In the case of bulk purchases—such as supply requests from nearby clinics, dispensaries, or health institutions—the order is logged into a “Medical Supply Requests” ledger. These orders are processed manually, and payments are typically made via cheque or bank transfer after an invoice is prepared using printed forms.

When new stock is delivered by pharmaceutical suppliers, the delivery notes are manually cross-checked with purchase orders. The pharmacist or procurement assistant verifies the drug names, quantities, batch numbers, and expiry dates. Upon verification, stock entries are updated in the manual stock register, and items are either shelved or stored in the temperature-controlled backroom.

At the end of the day, the cashier and pharmacist reconcile the sales ledger with cash in the drawer, verify prescriptions dispensed, and record a summary in the daily operations logbook. Expiring medicines, damaged stock, or customer complaints are also logged manually for future action.

**PROBLEM DEFINITION**

**Ultracare Pharmacy’s operations are heavily reliant on manual procedures, which introduce significant inefficiencies and risks across its daily workflow.** Each morning, staff prepare handwritten sales and inventory ledgers, arrange medication shelves, and set up the cash float for the day. Customer prescriptions are verified and recorded manually, while over-the-counter sales are tracked using notebooks and calculator-based transactions. This dependence on physical recordkeeping is not only time-consuming but also vulnerable to human errors such as inaccurate dosage entries, forgotten stock updates, or misplaced prescriptions. Throughout the day, pharmacy staff locate medications by memory or visual identification, check expiry dates by hand, and update stock levels manually after each transaction. Without a centralized inventory or prescription management system, this process results in delays, especially during peak hours or when handling complex medication orders.

Payment handling also remains fully manual. Staff use calculators to total bills, issue handwritten receipts, and record each transaction in physical ledgers. This method often leads to arithmetic errors, loss of receipts, and difficulties during end-of-day cash reconciliation, particularly when dealing with numerous transactions or multiple payment methods (cash, M-Pesa, bank transfers). For health institutions and clinics placing bulk or recurring orders, requests are logged in separate ledgers and coordinated by phone or email, with no integrated system for tracking order progress, stock fulfillment, or delivery schedules. This fragmented approach increases the chances of order duplication, delivery delays, and discrepancies in supplied quantities.

Inventory management at Ultracare is equally constrained. Stock entries, expiry monitoring, and reorder alerts are maintained manually, making it difficult to track real-time stock levels, avoid overstocking or stockouts, or identify expiring medicines in time. These challenges are further complicated by staff-dependent tasks: functions like procurement, prescription verification, or bulk order processing are limited to a few senior personnel, which causes workflow delays when they are unavailable or overwhelmed. At the close of business, the pharmacist and cashier must manually reconcile the day’s cash with sales records, verify dispensed prescriptions, and review inventory changes — a process that is both labor-intensive and prone to oversight. These operational bottlenecks significantly affect Ultracare Pharmacy’s ability to deliver fast, safe, and reliable pharmaceutical services and leave it at a disadvantage compared to modern pharmacies using automated systems for accuracy, compliance, and efficiency

**PROPOSED SOLUTION**

To address the operational challenges facing Ultracare Pharmacy, we propose to design, develop, and implement a **customized Pharmacy Management System** that will automate critical workflows and enhance overall service delivery for both the physical and digital fronts. This solution will not only digitize the pharmacy’s internal operations but also introduce an **online pharmacy platform**, enabling customers to conveniently access medications and health products remotely.

For the physical store, we will build a **centralized digital system** to replace manual prescription logs, sales ledgers, and stock registers, allowing staff to manage prescriptions, track inventory, and process transactions more efficiently and accurately. A **prescription management module** will be developed to securely record, verify, and archive prescriptions digitally, improving traceability and regulatory compliance. To streamline payments, we will integrate a **Point-of-Sale (POS) system** that calculates totals, generates digital receipts, and supports various payment options including cash, M-Pesa, and bank transfers.

An advanced **inventory management module** will provide real-time updates of stock levels after every sale or delivery, and include features such as batch tracking, expiry alerts, and automatic restocking notifications. A **procurement module** will handle purchase orders, supplier tracking, and delivery verification, while a **bulk order management module** will allow staff to capture large orders, auto-generate invoices, and monitor payment statuses, particularly for clinics and institutions. To ensure accountability and security, we will implement **role-based access controls**, assigning different permissions based on staff roles.

In addition to automating the physical store, we propose to develop a **complementary online pharmacy platform**. This platform will allow customers to browse available medications, upload prescriptions, place orders, and choose delivery or in-store pickup options. It will include features such as real-time product availability, secure checkout via mobile money and bank transfers, and automated order tracking. This digital presence will improve accessibility for customers—especially those with mobility challenges or residing farther from the store—and expand Ultracare’s reach within and beyond Juja.

Lastly, we will integrate **automated reporting tools** to generate daily sales reports, reconcile cash and digital payments, and monitor stock movements, significantly reducing the administrative burden on staff. Overall, this end-to-end solution will modernize Ultracare Pharmacy’s operations, boost efficiency and compliance, and provide a professional and convenient experience for both in-person and online customers.

**OBJECTIVES**

1. To design a Pharmacy Management System
2. To test and evaluate the system for functionality
3. To deploy the system and provide documentation

### ****JUSTIFICATION****

This project is being undertaken to address the significant operational challenges currently faced by Ultracare Pharmacy, which relies on manual systems to manage prescriptions, sales, inventory, and supplier coordination. These traditional methods are time-consuming, error-prone, and increasingly unsustainable as customer demand and stock complexity grow. The lack of real-time tracking, digital recordkeeping, and automation poses risks to accuracy, compliance, and overall service quality.

By developing an automated **Pharmacy Management System** with both physical store automation and an online pharmacy platform the project aims to streamline daily operations, improve inventory control, ensure secure and accurate prescription handling, and enhance customer service. The system will reduce workload for staff, support better decision-making through real-time data for management, and provide customers with faster, safer, and more convenient access to pharmaceutical services.

Ultimately, this solution will replace the inefficient manual processes with a secure, scalable, and user-friendly digital platform, directly addressing the client’s needs while contributing to the digital transformation of pharmacy operations in the healthcare sector.

## ****METHODOLOGY****

This project will adopt the **Agile methodology**, which emphasizes iterative development, adaptability, and collaboration. The system will be built in short sprints, with each sprint delivering functional components that are tested and refined before progressing.

The two team members will begin by jointly gathering requirements through site visits, interviews, and questionnaires with Ultracare Pharmacy staff. They will then collaborate to **finalize the database design**, which will form the foundation of the system.

Once the database is complete, tasks will be divided:

**Member 1:** Backend development – server-side logic, database connectivity, business rules, and APIs.

**Member 2:** Frontend development – user interfaces for the POS system, dashboards, online pharmacy platform, and integration with backend APIs.

Regular check-ins will be held to track progress and resolve issues. At the end of each sprint, **Sprint Reviews** will be conducted to demonstrate completed features and collect feedback.

In the final phase, the system will be fully integrated and tested (functional, integration, and UAT). After deployment, the team will provide training, user manuals, and post-deployment support to ensure smooth operation.

### RESOURCES

### This project requires a combination of human, software, and physical resources to ensure successful design, development, testing, and deployment of the Bookshop Management System.

### **Human Resources**

* Project Developers (2): Responsible for gathering requirements, designing, developing, testing, and deploying the system. They will also provide user training and prepare system documentation.
* Supervisor: Provides academic and technical guidance, monitors project progress, and ensures adherence to academic standards.

Software Resources

**Software Tool Specification/Purpose**

1 Visual Studio Code Integrated Development Environment (IDE) for writing editing

code.

2. XAMPP Local server environment for hosting and testing the application.

MySQL Database management system for storing and retrieving data.

3 PHP Backend programming language for implementing server-side

logic.

4. HTML, CSS, Jaavscript Frontend technologies for designing user interfaces.

**Physical Resources**

**Item** **Item**

1.Laptop Minimum specifications: Intel Core i5 processor, 4GB RAM, 256GB

HDD, for system development and testing.

2. Flash Drive 16GB capacity for backing up project files and transferring data between

devices.

3. Internet Access Required for downloading libraries, software tools, and conducting research

during the development process.

### **Financial Resources**

A small budget will be required for internet access, printing documentation, and other incidental expenses.

##### **BUDGET**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **I**TEM | SPECIFICATION | QUANTITY | UNIT COST(KSH) | TOTAL COST(KSH) |
| Laptop | Intel Core i5, 4GB RAM, 256GB HDD (for development) | 1 | Available | 0 |
| Internet Access | For downloading libraries, tools, research (monthly) | 1 month | 1000 | 1000 |
| Flash Drive | |  | | --- | |  |  |  | | --- | | 16GB, for backups and file transfer | | 1 | 1200 | 1200 |
| XAMPP (free software) | Local server for hosting and testing | - | free | 0 |
| Visual Studio Code (free) | Code editor for writing and editing code | - | free | 0 |
| PHP/HTML/CSS/JS (free) | For frontend and backend development | - | free | 0 |
| Printing & Documentation | Printing user manuals and reports for submission | 30 pages | 10 | 300 |
| Total Estimated Cost |  |  |  | 3700 |

##### **PROJECT SCHEDULE**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Activity/Task | Expected Start Date | Expected End Date | Actual Start Date | Actual End Date | Duration  *(hrs)* | Deliverables |  |
| *1* | Project Identification | July 11, 2025 | July 17, 2025 |  |  | *20 hours* | Approved project topic |  |
| *2* | Proposal Writing | July 18, 2025 | July 24, 2025 |  |  | *40 hours* | Completed and approved proposal |  |
| *3* | Data Collection | July 25, 2025 | July 31, 2025 |  |  | *40 hours* | Collected user requirements |  |
| *4* | Data Analysis | August 1, 2025 | August 7, 2025 |  |  | *30 hours* | Refined system requirements |  |
| *5* | |  | | --- | |  |  |  | | --- | | System Design | | August 8, 2025 | August 14, 2025 |  |  | *50 hours* | System design documents & wireframes |  |
| *6* | System Development | August 15, 2025 | August 28, 2025 |  |  | *60 hours* | Developed and functional system |  |
| *7* | |  | | --- | |  |  |  | | --- | | Testing | | |  | | --- | |  |  |  | | --- | | August 29, 2025 | | September 4, 2025 |  |  | *30 hours* | Tested and bug-free system |  |
| *8* | |  | | --- | |  |  |  | | --- | | Deployment | | September 5, 2025 | September 11, 2025 |  |  | *20 hours* | Fully deployed and operational system |  |

###### 

###### **GANTT CHART**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Activities | Duration(days) | 20 | 30 | 40 | 50 | 60 |
| Project Identification | 7 days |  |  |  |  |  |
| Proposal Writing | 7 days |  |  |  |  |  |
| Data Collection | 7 days |  |  |  |  |  |
| Data Analysis | 7 days |  |  |  |  |  |
| System Design | 7 days |  |  |  |  |  |
| System Development | 7 days |  |  |  |  |  |
| |  | | --- | | Testing | | 7 days |  |  |  |  |  |
| |  | | --- | | Deployment | | 7 days |  |  |  |  |  |

## ****CHAPTER TWO****

### ****DESCRIPTION OF THE PROBLEM DOMAIN****

Pharmacies are key to healthcare delivery, but many, like Ultracare Pharmacy, still depend on manual processes to manage prescriptions, sales, and inventory. Staff record transactions and stock updates in handwritten ledgers, which is time-consuming and prone to errors such as incorrect dosage entries, misplaced records, and delayed stock updates. This often leads to inefficiencies like stockouts, unnoticed expired drugs, and slow customer service.Payment handling is also manual, relying on calculators and handwritten receipts, making daily cash reconciliation difficult. Bulk orders from clinics and institutions are recorded separately, leading to delays, duplication, and challenges in tracking order status. Overall, these outdated methods affect accuracy, customer satisfaction, and the pharmacy’s ability to compete with automated pharmacies.A computerized Pharmacy Management System is needed to centralize operations such as prescription handling, inventory control, sales processing, and reporting. This will reduce human errors, provide real-time updates on stock levels, send expiry alerts, and speed up service. For Ultracare Pharmacy, adopting an automated system is essential for efficiency, accuracy, and better customer service.

### ****TARGET POPULATION****

The primary target population for the Pharmacy Management System comprises the staff of Ultracare Pharmacy, including pharmacists, pharmacy assistants, cashiers, and procurement personnel. Pharmacists and assistants will use the system to handle prescriptions, manage sales, and update inventory in real-time, while cashiers will use the integrated Point-of-Sale (POS) module to process payments and generate receipts. Procurement staff will rely on the system for supplier management, purchase orders, and monitoring stock levels and expiry dates.Secondary users include customers—both walk-in and online—who will benefit from faster, more accurate service and easy access to products, as well as pharmaceutical suppliers who will interact indirectly when fulfilling digital purchase orders. This target population was selected because the system is designed to streamline pharmacy operations at all levels, improving efficiency for staff while enhancing service quality for customers and suppliers.

### ****DATA COLLECTION****

### ****Analysis of collected data****

To understand the operational challenges faced by Ultracare Pharmacy, data was collected using four primary methods: **interviews, observations, questionnaires, and document review**.

* **Interviews:** One-on-one discussions were conducted with the pharmacist, pharmacy assistants, cashiers, and procurement staff to gather detailed insights into daily workflows and challenges.
* **Observations:** Direct observation of pharmacy operations was carried out at different times of the day to capture how prescriptions, sales, and inventory processes were handled in real-time.
* **Questionnaires:** Structured questionnaires were distributed to both staff and customers to obtain broad feedback regarding service efficiency, accuracy, and overall satisfaction.
* **Document Review:** Existing sales ledgers, inventory records, and prescription logs were examined to identify inconsistencies, inefficiencies, and risks associated with manual record-keeping.

**Findings**

After analyzing the collected data, we identified the following key points:

**1. Frequent Errors in Manual Prescription and Inventory Updates**

Because all records are written by hand, there is a high chance of human error when entering prescription details or updating inventory levels. For example, incorrect dosage entries or forgetting to record sold items can occur. These errors compromise patient safety and make it difficult to maintain accurate stock levels.

**2. Long Customer Wait Times**

Customers often have to wait longer, especially during busy hours, because staff must search for medicines manually and calculate prices using calculators. This slow process frustrates customers and reduces the pharmacy’s ability to serve more people efficiently.

**3. Lack of Real-Time Inventory Tracking**

Stock updates are only done at the end of the day in the manual system. This means the pharmacy staff may unknowingly sell out-of-stock medicines or fail to reorder in time. As a result, stockouts and expired medicines on shelves become more common.

**4. Difficulties in Bulk Order Management**

Bulk orders from clinics and institutions are recorded separately from daily sales. This leads to duplicated entries or missing information, making it hard to track which orders have been delivered or paid for. It also causes delays in fulfilling these large orders.

### ****REVIEW OF EXISTING AND SIMILAR SYSTEMS****

**a) Pharmcare by Futuresoft Technologies (Kenya)**

Tailored for retail pharmacies to manage pharmaceutical and non-pharmaceutical stocks, track expiry dates, and automate reorder alerts.

**Features:** Batch traceability, first-expiry-first-out handling, accounting modules, automatic backup, and user access control.

**b) JiPharm Pharmacy Software (Richcom Solutions, Kenya)**

Cloud-based and desktop versions, integrated with Lipa Na M-Pesa for mobile payments.

**Core modules:** Drug management and issuance, supplier/customer management, auto invoicing, auto VAT calculation, barcode scanner/POS, promotions, and HR modules.

**Features offered by existing systems:**

**Pharmcare:** Real-time inventory tracking, expiry alerts, reorder automation, and integrated accounting and reporting modules.

**JiPharm:** End-to-end operations including drug issuance, barcode-based POS, mobile payments, auto pricing and VAT, customer promotions, and multi-user access control.

**Drawbacks and limitations:**

**Pharmcare:** Desktop-based model may not easily support remote access or online ordering. Bulk order tracking and customer-facing interfaces are not well supported.

**JiPharm:** Licensing and subscription costs can be high for small pharmacies, and the broad HR modules may be unnecessary.

**How the proposed Ultracare PMS improves on these solutions:**

**Local Customization:** Specifically designed to handle Ultracare’s workflows, including bulk order tracking and local payment methods (M-Pesa).

**Integrated Modules:** Combines prescription handling, inventory, supplier management, POS, and online ordering into one platform, ensuring seamless data flow.

### ****FEASIBILITY STUDY****

1. **Technical Feasibility**

The study commenced with an assessment of the technical requirements and resources needed for the development of the system. The evaluation revealed that the project successfully utilized open-source technologies such as PHP, JavaScript, and MySQL, which aligned well with the development tools available, including Visual Studio Code. The development team already had sufficient expertise to manage full-stack development, and the project did not require any specialized hardware or proprietary software. This established that the system was technically achievable with the resources that were accessible.

1. **Economic Feasibility**

The financial assessment showed that the Pharmacy Management System required only a small monetary investment. Since the development was carried out using free and open-source tools and platforms, most of the costs were related to time and effort rather than direct financial expenditure. Furthermore, the long-term benefits—such as increased operational efficiency, reduced paperwork, better inventory control, and improved coordination with suppliers—far outweighed the minimal initial setup costs. This confirmed that implementing the system was well justified from a cost-benefit perspective.

1. **Operational Feasibility**

The operational review confirmed that the system was well-suited for day-to-day pharmacy activities. Its user-friendly interface allowed staff to adapt quickly with minimal training, making the transition from manual to automated processes smooth and effective. Because the development team engaged pharmacy staff throughout the design and testing stages, user requirements were fully addressed, which increased acceptance and confidence in the system. Additionally, the system was seamlessly integrated into existing workflows, replacing manual ledgers with automated processes that improved efficiency and reduced errors.

1. **Schedule Feasibility**

The project timeline was carefully planned and successfully adhered to using the Agile methodology. Development was carried out in short, manageable sprints, each producing functional components that were tested and refined before moving forward. The team worked collaboratively at every stage, which ensured that tasks were completed on time without compromising quality. By dividing responsibilities between backend and frontend development and synchronizing progress regularly, the system was completed and deployed within the original timeframe, demonstrating that the project was fully achievable within the set schedule

**e) Legal and Ethical Feasibility**

The evaluation also established that the Pharmacy Management System complied with all relevant legal and ethical standards. Sensitive data such as patient prescriptions and customer information was handled securely through user authentication, role-based access controls, and data encryption. The system maintained strict confidentiality and adhered to data protection guidelines, ensuring that only authorized personnel could access critical information. By incorporating these measures, the system promoted ethical handling of patient data and met all regulatory requirements.

INTRODUC