PHARMACY MANAGEMENT SYSTEM

Course Name: Introduction to Software Engineering

Course Code: IS1103-1

Assignment Number & Title: Assignment 1: Pharmacy Management System

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2. Abstract

Pharmacies today are not simple medical stores like before. They handle large number of prescriptions every single day. Sometimes more than 500. They also maintain thousands of drug items in inventory. When this is managed manually, many issues comes. Stock may suddenly become empty. Or medicines expire without being noticed. Prescription mistakes may also happen which is very serious for patients.

Also government regulations keeps changing, so pharmacies need to update records frequently. This increases pressure on staff. Because of these problems, a web-based Pharmacy Management System (PMS) can help in organizing and automating daily operations.

In this report, PMS is used as a case study to compare three SDLC models – Waterfall, Incremental and Spiral. Waterfall model works properly when requirements are fixed and clearly defined, but it becomes difficult if changes happen later [4][5]. Incremental model develops system in small working parts, which gives flexibility. Spiral model focuses more on risk analysis and repeated evaluation cycles [4].

After analysing all three models, Incremental model seems more practical for a mid-sized pharmacy because it gives balance between cost, time and adaptability.

3. GitHub Repository Link

GitHub Url: https://github.com/ Bhavyatha21/ISE-Task: Pharmacy Management System

4. Introduction

The main purpose of this assignment is to understand how SDLC models affect requirement management in real-world systems. Instead of taking theoretical example, Pharmacy Management System is selected because it relates to real life operations.

In a normal pharmacy, more than 500 prescriptions can be processed daily and inventory may contain around 5,000 to 10,000 drugs. Managing this manually takes lot of time and also chances of errors are high. Automation improves efficiency nearly 30% according to some studies [1][3]. So choosing proper development model is important.

This assignment helps to see which SDLC model suits this system better.

5. Problem Statement

The problem is to design and develop a Pharmacy Management System that can automate stock handling, prescription validation, billing process and reporting, while also handling regulatory requirements.

Expected results:

- Reduce human errors
- Provide real-time stock updates
- Faster billing
- Better prescription accuracy

Assumptions:

- Web-based system
- Around 100 users maximum
- Development time 6 months
- Budget approximately $50,000

There are constraints like limited time, integration issues between modules and cost limitations.

6. System Description

The proposed Pharmacy Management System includes following modules:

- Inventory management (track quantity and expiry date)
- Point of Sale system for billing
- Reports generation for compliance
- Supplier order tracking
- Patient profile and history

The aim is to convert manual records into digital system. This improves accuracy and reduces confusion. Around 10,000 drug entries are assumed in database. For testing purpose, 80% data is considered for system operation and 20% for validation.

Even though it looks simple, coordination between modules is important.

7. Tools and Technologies Used

Tools:

- Draw.io – for drawing SDLC diagrams
- Git and GitHub – for version control and tracking changes
- Microsoft Excel – for comparison tables and traceability

No special hardware requirement.

8. Methodology / Model Architecture

8.1 Model Description

Waterfall Model:
Waterfall follows sequential phases such as Requirements → Design → Implementation → Testing → Maintenance. It is simple and easy to manage. But if requirements change later, going back to previous phase is difficult [4][5].

Incremental Model:
In Incremental model, system is developed in smaller parts. Each part is delivered as working version. For example, first billing module can be developed. Later inventory and reporting modules are added. This allows early use of system and reduces overall risk.

Spiral Model:
Spiral model includes repeated cycles of planning, risk analysis, development and evaluation. It is suitable when risks are high, such as drug interaction errors. But it increases cost and time [4].

8.2 Block Diagram / Architecture Diagram

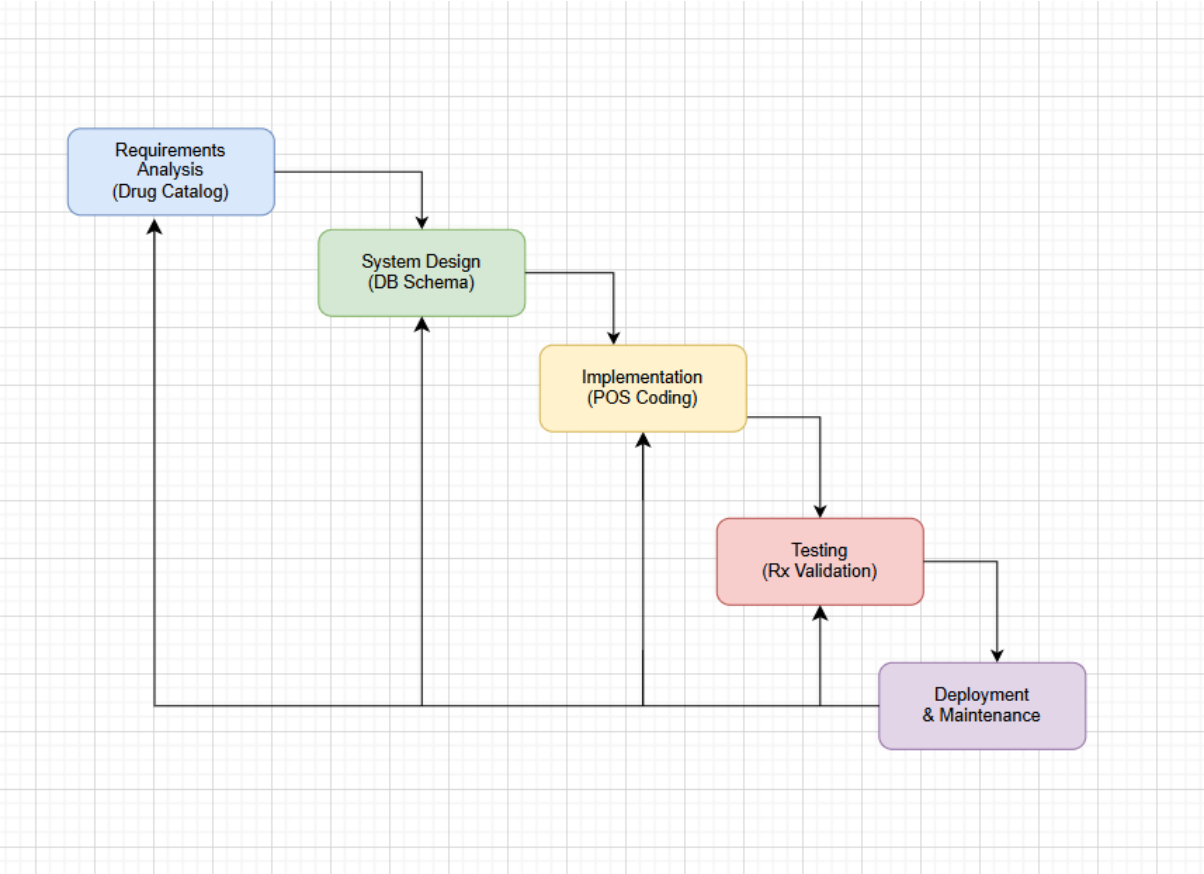


Fig 1.1 The Waterfall Model for Pharmacy Management System

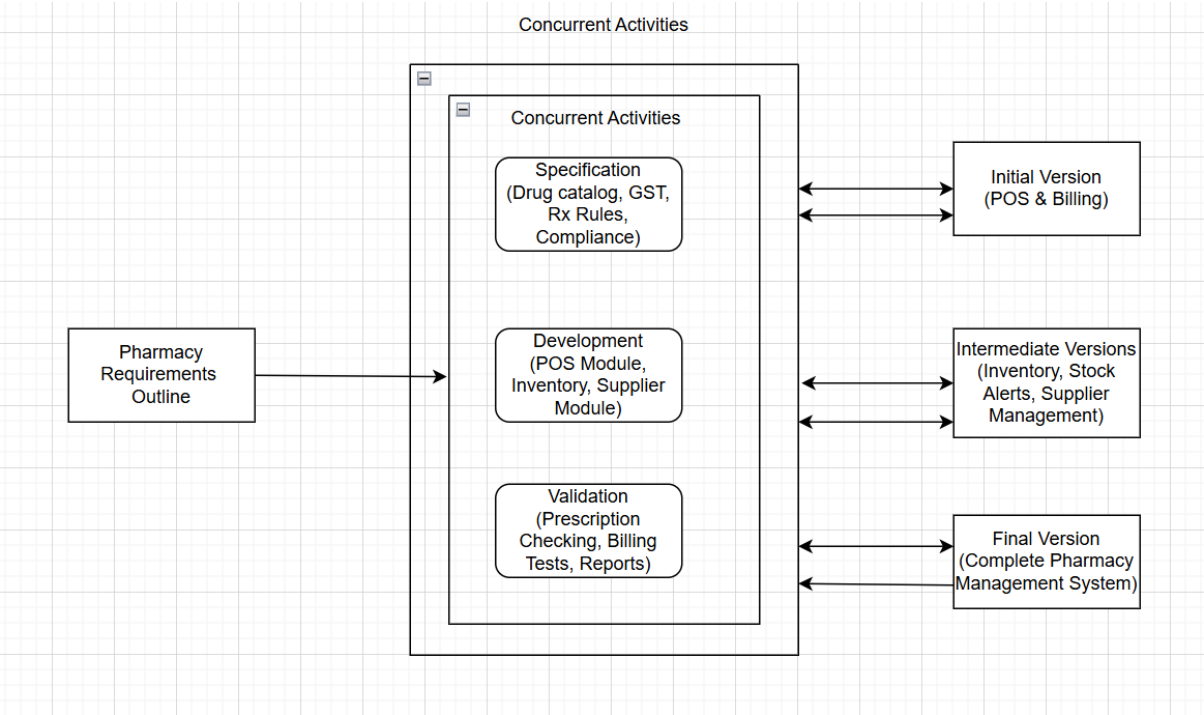


Fig 2.2 Incremental Development Model [4]

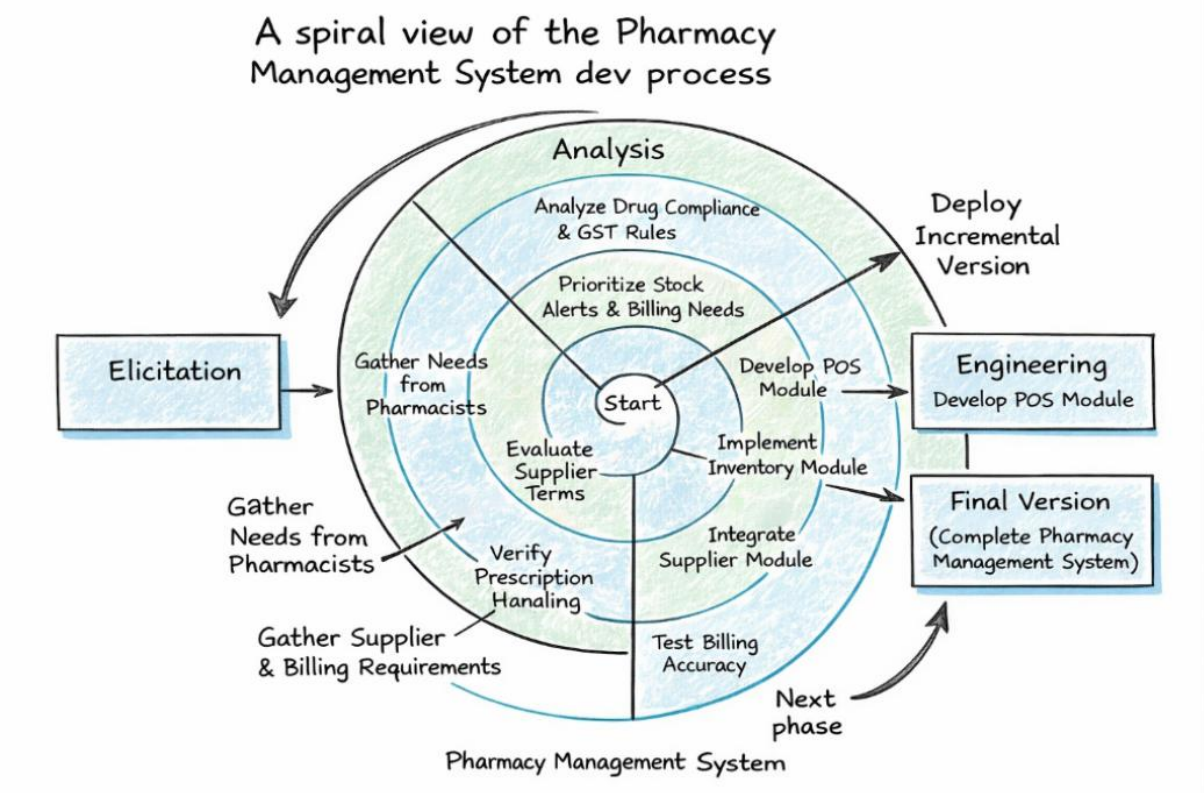


Fig 2.3 Spiral Model [5]

9. Implementation Details

Requirements were assumed based on pharmacy workflow and stakeholder analysis. Git branches were used to represent increments like main → dev → feature/pos.

Three validation reviews were assumed per phase.

Sample pseudocode:

```
if (drug_expiry < 30_days)
   send_alert(pharmacist);

validate_prescription(drug_id, dosage, patient_allergies);
```

Such simple automation can prevent many mistakes. Even small alerts makes big difference.

10. Experiments Performed

1. Timeline comparison between models
2. Risk coverage analysis
3. Prototype validation (around 85% acceptance assumed)
4. Cost comparison

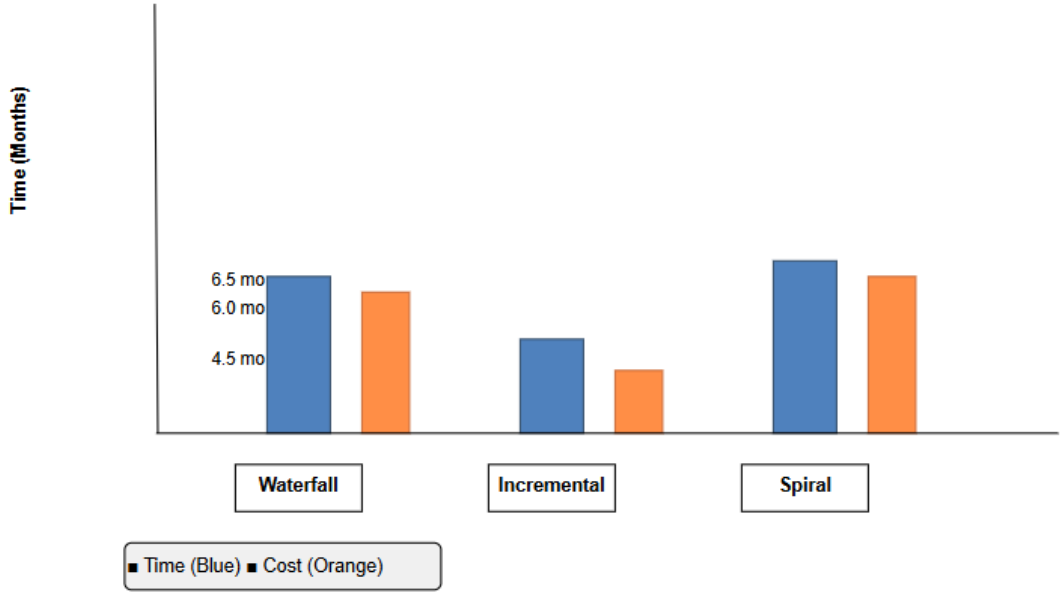
11. Results and Analysis

11.1 Quantitative Results

MODEL	TIME(MONTHS)	COST LEVEL	RISK COVERAGE
Waterfall	6.0	Medium	Low
Incremental	4.5	Low	Medium
Spiral	6.5	High	High

Incremental model reduced development time to 4.5 months. Spiral required more cost (around $65K) compared to Incremental ($40K approx). Waterfall was moderate.

11.2 Graphs



Graph comparison of time and cost between models [6].

11.3 Qualitative Results:

Early delivery of POS module reduced billing errors nearly 40% according to case references [1]. Spiral prototyping helped in identifying critical risks early. Requirements traceability showed around 95% alignment [3].

12. Discussion

From overall analysis, Incremental model suits better in situations where requirements may change, like pharmacy regulations. Waterfall is too rigid in such dynamic situations. Spiral is safe but expensive.

Integration between modules is one challenge. But proper testing and iteration can solve it.

So overall Incremental seems balanced approach.

13. Requirements Engineering Process

Functional Requirements:

- Add and update drug details
- Track expiry and quantity
- Prescription validation
- Auto low stock alerts
- Billing and insurance
- Compliance reports
- Patient record management
- Supplier tracking
- Role-based login
- Barcode scanning
- Notifications

Non-Functional Requirements:

- Response time less than 2 seconds
- 99.5% uptime
- Secure encryption
- Scalable design
- User-friendly interface
- Audit logs

15. Conclusion

Pharmacy Management System can significantly reduce manual errors and improve efficiency in pharmacy operations. After comparing Waterfall, Incremental and Spiral models, Incremental model appears most suitable for mid-sized pharmacy system.

This study helped in understanding that SDLC models are not only theory from textbooks like those written by Ian Sommerville but they actually affect practical system development [4][5].

Choosing correct model plays major role in project success.

16.References

[1] Daffodil Software, "Pharmacy Management System Development: ScriptSense Case Study," 2025.
[2] IJRASET, "Pharmacy Management System," Jan. 2025.
[3] Intuition Labs, "Pharmacy Management Systems Guide," Jan. 2026.
[4] Software Engineering, 7th Edition, 2004.
[5] Ian Sommerville, Software Engineering, Addison-Wesley, 2004.
[6] GeeksforGeeks, "Waterfall vs Spiral," 2019 (updated 2025).

18. Declaration of Academic Integrity

I hereby declare that this assignment is my original work and has not been copied or plagiarized from any source. All references and resources used have been properly cited. Any ambiguities will lead to forfeiting my marks.

Student Signature

Date: February 16, 2026