Phase 2: Requirement Analysis

2.1 Objectives

- Identify and document the functional and non-functional requirements of the system.
- Understand user needs (administrators, pharmacists, doctors, and inventory staff).
- Define system constraints, data requirements, and integration points.

2.2 Stakeholders

- **Hospital Administration** – Manage overall inventory and approve orders.
- **Pharmacy Staff** – Handle item requests, dispensing, and stock updates.
- **Procurement Department** – Manage suppliers and purchase orders.
- **IT Department** – Maintain and support the system.

2.3 Functional Requirements

1. **User Management**
    - Role-based access control (Admin, Pharmacist, Supplier).
2. **Inventory Control**
    - Add, update, and delete medical items.
    - Track batch numbers, expiry dates, and stock levels.
    - Generate low-stock alerts and expiry warnings.
3. **Procurement Management**
    - Create and approve purchase requests.
    - Manage supplier details and order history.
4. **Billing & Transactions**
    - Record item usage and billing for departments.
5. **Reports & Analytics**
    - Generate inventory, purchase, and usage reports.
6. **Audit Trail**
    - Maintain logs of all inventory activities.

2.4 Non-Functional Requirements

- **Performance:** System must handle concurrent users efficiently.
- **Security:** Use secure authentication, data encryption, and backups.
- **Scalability:** Should accommodate more users and departments.
- **Usability:** Simple, intuitive UI for medical staff.

2.5 System Requirements

- **Frontend:** HTML, CSS, JavaScript, or Angular/React.
- **Backend:** Node.js / Django / Laravel / Java Spring.
- **Database:** MySQL / PostgreSQL / MongoDB.
- **Server:** Cloud-hosted or on-premises server.

Phase 3: Project Design

3.1 System Architecture

- **Client-Server Architecture**
    - **Frontend:** User interfaces for staff and admins.
    - **Backend:** RESTful API for data management.
    - **Database:** Centralized inventory database.

3.2 Database Design

Key Tables:

- users (user_id, name, role, email, password_hash)
- items (item_id, name, category, batch_no, expiry_date, quantity, reorder_level)
- suppliers (supplier_id, name, contact_info)
- purchase_orders (po_id, supplier_id, date, status)
- transactions (txn_id, item_id, quantity, type, date)
- audit_log (log_id, user_id, action, timestamp)

3.3 UI/UX Design

- **Dashboard:** Overview of stock, alerts, and reports.
- **Forms:** For adding/updating inventory items and suppliers.
- **Reports Page:** Filter and export reports (PDF/Excel).
- **Alerts:** Real-time notifications for low stock and expirations.

3.4 Data Flow Diagram (DFD)

- **Level 0:** Inventory Management System
- **Level 1:** Subsystems for User Management, Inventory, Procurement, Reports

3.5 Security Design

- Role-based access control.
- Secure login with hashed passwords.
- Data encryption during transmission (HTTPS).

Phase 4: Project Development

4.1 Development Environment Setup

- Configure IDE (VS Code / PyCharm / IntelliJ).
- Set up database and backend framework.
- Version control with GitHub/GitLab.

4.2 Frontend Development

- Build responsive user interfaces.
- Integrate real-time validation and alert notifications.
- Implement dashboards and reporting views.

4.3 Backend Development

- Implement API endpoints:
    - /api/items – CRUD operations for inventory items.
    - /api/orders – Manage purchase orders.
    - /api/reports – Generate inventory reports.

- Integrate authentication and access control middleware.
- Handle database operations securely.

4.4 Database Implementation

- Create and populate tables.
- Define relationships and constraints.
- Write stored procedures or triggers for stock updates and audit logging.

4.5 Integration and Testing

- Integrate frontend with backend APIs.
- Conduct unit testing, integration testing, and system testing.
- Verify functionalities: stock alerts, order management, and reporting.

4.6 Documentation

- Prepare user manual and technical documentation.
- Include API references and deployment instructions.