**Project Design Phase**

**Problem – Solution Fit Template**

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| **Date** | 30/06/2025 |
| **Team ID** | LTVIP2025TMID29347 |
| **Project Name** | Medical Inventory Management |
| **College name** | G Pullaiah College of Engineering and Technology |

**Problem – Solution Fit Template:**

**Problem:**

In many healthcare facilities, inventory management is still handled manually, leading to numerous operational inefficiencies and risks. The lack of an automated and centralized system creates several issues that negatively impact patient care and facility performance.

The primary problems faced include:

* **Stockouts of Critical Medicines and Supplies**: Essential drugs and equipment are often unavailable when needed most, putting patient lives at risk and disrupting medical procedures.
* **Overstocking and Expired Items**: Without real-time inventory tracking, facilities overstock supplies, many of which eventually expire, resulting in financial losses and wastage.
* **Human Errors**: Manual tracking increases the likelihood of data entry errors and incorrect inventory counts, leading to discrepancies and poor decision-making.
* **Inefficient Reporting**: The absence of automated reporting mechanisms delays procurement processes, making it difficult for management to respond quickly to shortages or overstock.
* **Compliance Issues**: Inadequate documentation and poor inventory control result in failure to meet regulatory and audit requirements, exposing the facility to legal and accreditation risks.

These challenges highlight the urgent need for a robust, automated Medical Inventory Management System that ensures accurate tracking, timely reporting, and compliance with healthcare standards.

**Proposed Solution:**

Develop a Medical Inventory Management System that:

* Provides real-time tracking of medicines and medical supplies.
* Sends automatic alerts for low stock and nearing expiration.
* Generates accurate reports for better planning and auditing.
* Offers user-friendly dashboards for inventory visibility.
* Integrates with procurement processes to enable timely reordering.

**Solution Architecture:**

The **Medical Inventory Management System** is architected as a multi-layered solution to ensure efficiency, scalability, and security across healthcare facilities. Each layer plays a critical role in the smooth functioning of the system.

**1. User Layer**

* **Description**: This is the front-facing interface of the system.
* **Users**: Admins, Inventory Managers, and Medical Staff.
* **Features**:
  + View and update stock levels.
  + Place medicine/equipment requests.
  + Receive low-stock or expiry alerts.
  + Accessible via **Web** or **Mobile App** for ease of use in different environments.

**2. Application Layer**

* **Description**: The core business logic resides here.
* **Responsibilities**:
  + Manages inventory operations (add/update/delete stock).
  + Handles user roles, permissions, and authentication.
  + Generates real-time reports and analytics.
  + Triggers system-wide notifications and alerts.

**3. Data Layer**

* **Description**: Centralized database system for reliable and consistent data storage.
* **Stored Data Includes**:
  + Medicine and equipment stock levels.
  + Expiry dates and batch details.
  + Procurement and transaction histories.
  + User activity logs.
* **Database**: Could be built using Salesforce’s built-in database system or external databases like MySQL or PostgreSQL, depending on integration.

**4. Integration Layer**

* **Description**: Facilitates connectivity with external systems.
* **Integrates With**:
  + **Suppliers** and **procurement platforms** for automatic restocking.
  + **Barcode/RFID Scanners** for quick check-in/check-out of inventory.
  + **Accounting and ERP tools** if extended.

**5. Notification Services**

* **Purpose**: Keeps users informed and proactive.
* **Alerts Sent For**:
  + Low stock warnings.
  + Upcoming or overdue expiries.
  + Order confirmations and delivery updates.
* **Channels**: SMS, Email, and In-App Notifications.

**6. Security Layer**

* **Functionality**:
  + Role-based access control (RBAC) to ensure only authorized users can access specific modules.
  + Data encryption and secure APIs for data protection.
  + Audit logs to maintain traceability.
  + Compliance with healthcare data regulations (e.g., HIPAA/GDPR, if applicable).

**Conclusion**

This multi-layered architecture provides a **scalable**, **secure**, and **user-friendly** solution to manage medical inventory. By addressing the operational needs of healthcare facilities and integrating with modern tools and standards, the system ensures timely availability of medical resources while minimizing losses and inefficiencies

