



Vivekanand Education Society's Institute Of Technology

Department Of Information Technology

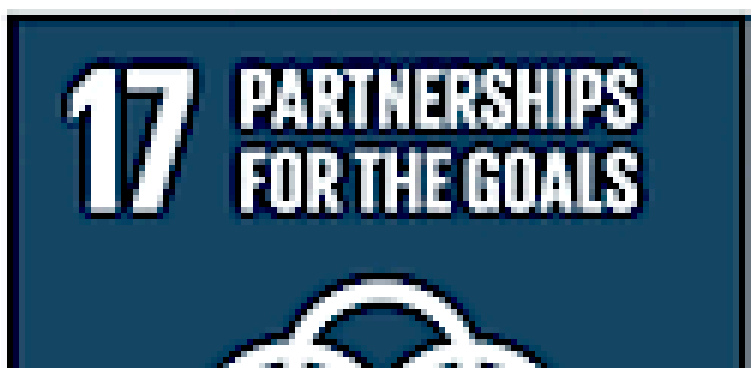
DSA mini Project
A.Y. 2025-26

Title: Pharmacy Inventory Management System

Domain: Data Structures and Algorithms

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Introduction to Project

The **Pharmacy Inventory Management System** is developed in **C language** as part of the **Data Structures and Algorithms (DSA)** course.

It simulates a **real-world pharmacy inventory** to efficiently handle stock, sales, and supplier orders using **Linked Lists, Stacks, and Queues**.

Enhanced Features:

- **AI-inspired Restock Suggestion** – warns when stock is running low
- **AI-inspired Demand Prediction** – identifies top-selling medicines to optimize stock management
- **AI-inspired Expiry Prediction** – alerts medicines expiring within 30 days



Problem Statement

Managing a pharmacy **manually** is **time-consuming** and **prone to errors**. It is difficult to track medicine stock, sales, expiry dates, and supplier orders efficiently.

Traditional methods lack automation, leading to:

- Delay in updating stock and sales records
- Risk of selling expired medicines
- Difficulty in identifying low-stock medicines
- No predictive insights for restocking or expiry
- Manual systems cannot predict which medicines have high demand, leading to overstock or stockouts.

Hence, a computerized system using **Data Structures and AI-inspired analysis** is required to ensure **accuracy, speed, and smart decision-making** in pharmacy management.



Objectives of the project

- Efficiently manage medicine stock and records
- Track expiry dates to prevent sale of expired medicines
- Handle customer sales and maintain transaction history
- Manage supplier orders using FIFO (Queue) structure
- Implement Linked List, Stack, and Queue for data organization
- Include **AI-inspired** features for:
 - Smart restock suggestion when stock is low
 - Predicting medicines nearing expiry
 - Predict top-selling medicines based on sales data to plan inventory restocking efficiently.



Scope Of The Project

- Efficiently manage and update medicine inventory
- Track expiry dates to minimize wastage
- Record customer sales and generate reports
- Handle supplier orders using **Queue (FIFO)** mechanism
- Use **Linked List, Stack, and Queue** for dynamic data handling
- Include **AI-inspired features** for:
 - Smart restock suggestions when stock is low
 - Predicting medicines nearing expiry
 - Demand Prediction to identify top-selling medicines and assist in inventory planning.
- Extendable for billing, notifications, and database integration



Requirements of the system (Hardware, software)

Hardware:

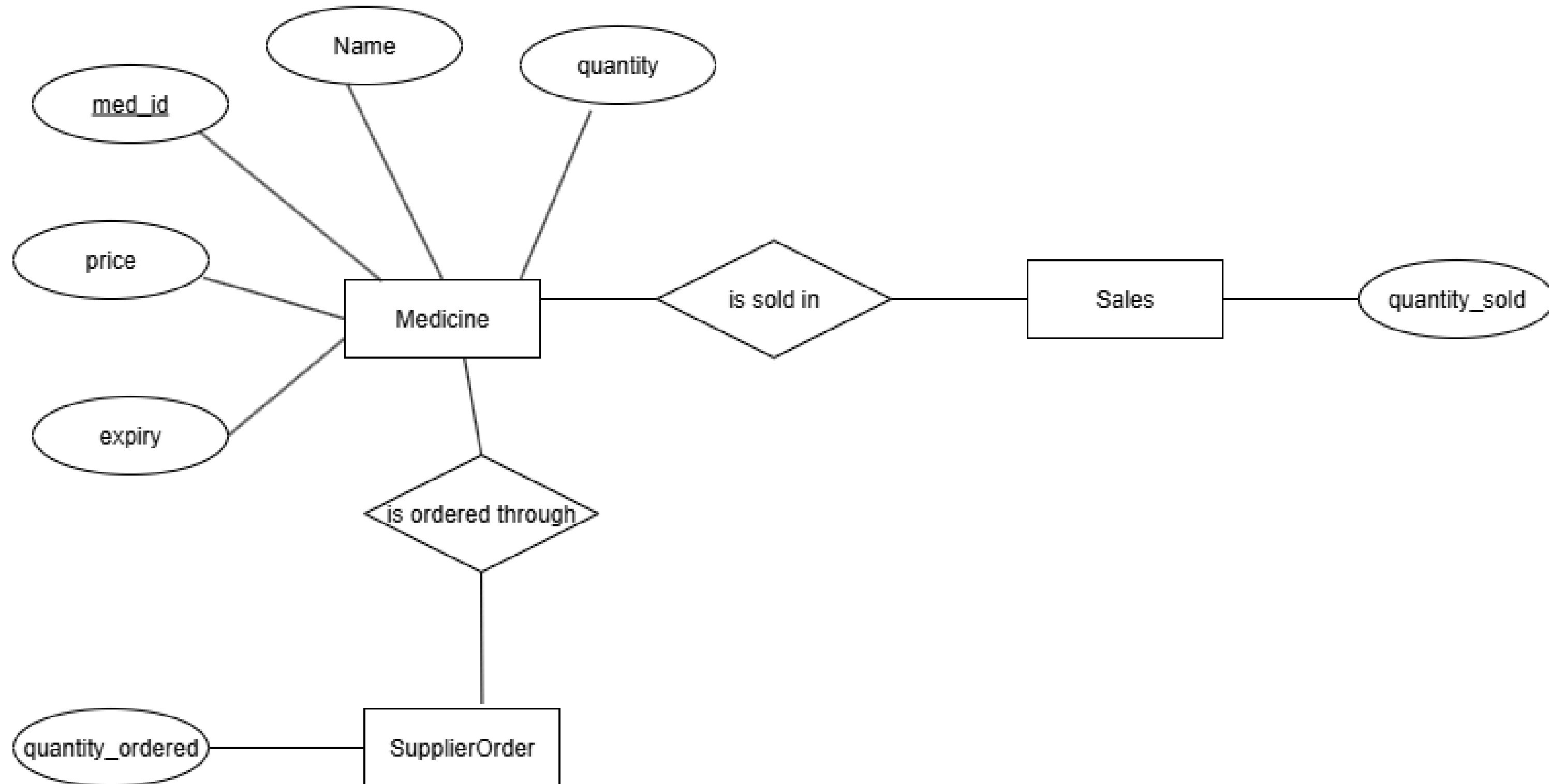
- Intel i3 (or higher) processor ,2 GB RAM ,200 MB disk space
- Standard keyboard and mouse

Software:

- Language: C
- Operating System: Windows / Linux
- Compiler: GCC / Turbo C / Code::Blocks



ER diagram of the proposed system





Data Structure And Concepts Used

- **Arrays:** Store and handle simple, fixed-size records such as basic medicine details.
- **Linked List:** Provides dynamic memory management for medicines, allowing easy insertion and deletion.
- **Stack:** Records sales following the LIFO (Last In, First Out) principle.
- **Queue:** Manages supplier orders to ensure FIFO (First In, First Out) processing.
- **Time Library & AI-inspired Functions:** Check expiry dates, suggest restocking, and analyze sales trends for demand prediction.



Algorithm Explanation

- Add / Manage Medicines: Insert, update, delete using **Linked List**
- Display / Search: Traverse list to show or find medicine records
- Sales Management: Record sales using **Stack (LIFO)** and update inventory
- Supplier Orders: Manage using **Queue (FIFO)**
- Expiry & Reports: Check expiry dates and generate inventory reports
- **AI-inspired Features:** Smart restock suggestions and predict medicines nearing expiry, analyze sales data using **stack** history to identify top 3 most sold medicines.



Time and Space Complexity

1) Time Complexity:

- Record Sale, Add Supplier Order $\rightarrow O(1)$
- Add / Search / Update / Delete / Sell / Check Expiry / Generate Report $\rightarrow O(n)$
- AI Features (Restock Suggestion / Expiry Prediction) $\rightarrow O(n)$
- AI-inspired Demand Prediction $\rightarrow O(s^2)$

2) Space Complexity:

- Medicines List $\rightarrow O(n)$
- Sales Stack $\rightarrow O(s)$
- Supplier Orders Queue $\rightarrow O(q)$
- AI Features $\rightarrow O(1)$
- Total $\rightarrow O(n + s + q)$

Where: $n \rightarrow$ Number of medicines in inventory

$s \rightarrow$ Number of sales recorded

$q \rightarrow$ Number of pending supplier orders



Frontend

- Console-based, menu-driven system
- Provides easy text-based interaction for the user
- Displays clear options for all inventory operations
- Designed for simplicity, accuracy, and efficient use of DSA concepts

--- Pharmacy Management System ---

1. Add Medicine
2. Display Medicines
3. Search Medicine
4. Update Medicine
5. Delete Medicine
6. Sell Medicine
7. Check Expiry
8. Generate Report
9. Display Sales
10. Add Supplier Order
11. Display Orders
12. AI: Predict Expiry Soon
13. AI: Demand Prediction (Top Selling)
14. Exit

Enter Choice:



Future Scope

- Database integration (MySQL/SQLite) for permanent storage
- Graphical User Interface for ease of use
- Auto-generate supplier orders based on AI restock alerts
- Integration with SMS/email notification system



Conclusion

- Implemented a Pharmacy Inventory System using C and DSA concepts.
- Managed medicines with Linked List, sales with Stack, and supplier orders with Queue.
- Provided functionalities: add, update, delete, search, sell, expiry check, and reports.
- Improved efficiency and reduced manual errors in inventory management.
- Can be extended with billing, alerts, and database/API integration.



References

- Data Structures Using C – Reema Thareja
- GeeksforGeeks: <https://www.geeksforgeeks.org> – Linked List, Stack, Queue implementation in C
- Stack Overflow: <https://stackoverflow.com>