A Project Report

On

Pharmacy Billing System

Submitted in partial fulfillment of the requirement of PROJECT IV

BCA256CO

of

Bachelors of Computer Application

Submitted to

Purbanchal University

Biratnagar, Nepal

Submitted By

Krishna Acharya (342263)

Sarun Chapagain (342278)

Sneh Shrestha (342283)

KANTIPUR CITY COLLEGE

Putalisadak, Kathmandu

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Table of Contents

Abstract

The Pharmacy Billing System is a database-driven desktop application developed to automate and streamline the routine operations of a pharmacy. The system replaces traditional manual record-keeping with an efficient, accurate, and user-friendly computerized solution that centrally manages medicines, purchases, sales, customers, suppliers, and reports. The application is implemented using C# Windows Forms for the graphical user interface and SQL Server for secure and structured back-end data storage.

The system incorporates role-based access control for administrators and cashiers, ensuring secure and controlled usage. Key functionalities include medicine inventory management with active and inactive status handling, purchase management with automatic stock updates, sales processing with real-time stock validation, and comprehensive customer and supplier management. Advanced features such as sales and purchase reporting, inventory monitoring, low-stock alerts, expiry date tracking, and profit–loss analysis support effective decision-making.

Reports are presented through tabular formats and graphical visualizations to enhance data interpretation and analysis. The system also maintains complete transaction histories to ensure data integrity, traceability, and accountability. Overall, the Pharmacy Billing System enhances operational efficiency, reduces human errors, improves data accuracy, and provides a scalable and reliable platform for modern pharmacy management.

Acknowledgements

We are grateful in our humbleness and would like to acknowledge our regards to everyone who beyond us put these ideas together, well above all the simplicity and turning into something as strong as concrete. We would like to express our gratitude to the supervisor Mr. Aakash Rai, as well as the college administration for providing us with this amazing opportunity to do this wonderful project on the topic, **"Pharmacy Billing System"**, which encouraged us to do heaps of research where we got to learn many new things.

We would also like to thank our friends for their support and encouragement to continue doing this project.

ThankYou

Krishna Acharya (342263)

Sarun Chapagain (342278)

Sneh Shrestha (342283)

Preface

The Pharmacy Billing System is designed to provide an efficient, reliable, and user-friendly solution for managing the day-to-day operations of a pharmacy. With the increasing complexity of handling medicines, suppliers, customers, sales, and inventory, manual systems are prone to errors, data loss, and inefficiency. This project aims to overcome these challenges by introducing a computerized system that automates core pharmacy activities.

This system is developed using **C# Windows Forms** for the user interface and **SQL Server** for secure and structured data storage. It integrates key modules such as medicine management, purchase and sales processing, customer and supplier management, reporting, and inventory monitoring. Features like role-based login, real-time stock updates, expiry tracking, and detailed reports enhance accuracy and decision-making.

The Pharmacy Billing System not only simplifies routine tasks but also ensures data integrity, faster processing, and better control over inventory and finances. This project is intended for academic learning as well as practical application, demonstrating how database-driven desktop applications can effectively solve real-world business problems.

DECLARATION

We declare the project title “Pharmacy Billing System” submitted in partial fulfillment of Bachelors of Computer Application (BCA) is a record of original work carried out by us under the supervision of Mr. Aakash Rai and has not formed the basis of the award if any other degree or diploma, in this or any other Institution or University. In keeping with the ethical practice in reporting scientific information, due acknowledgment has been made wherever the findings of other have been cited.

Krishna Acharya (342263)

Sarun Chapagain (342278)

Sneh Shrestha (342283)

January, 2026

SUPERVISOR'S APPROVAL

This is to certify that the project entitled **Pharmacy Billing System** undertaken and demonstrated by Krishna Acharya (342263), Sarun Chapagain (342278), and Sneh Shrestha (342283) has been successfully completed under my supervision as a partial fulfillment of the requirements of the degree of Bachelors of Computer Application (BCA) IV semester under Purbanchal University. I, henceforth, approve this project to be awarded the certificate by the concerned authority.

During supervision, I found students hardworking, skilled and ready to undertake any professional work related to this field in future.

……..

Mr. Akash Rai

Project Supervisor

Date :1st Jan, 2026

CERTIFICATE FROM DEPARTMENT

Following the supervisor's Approval and examiners' Acceptance, the project entitled **"Pharmacy Billing System"** submitted by Krishna Acharya (342263), Sarun Chapagain (342278) and, Sneh Shrestha (342283) as a partial fulfillment of the requirements for the degree of Bachelors of Computer Application (BCA) IV semester under Purbanchal University, has been officially awarded by this certificate.

I wish the students all the best for the future endeavors.

…….

Saroj Pandey

Head of Department

Department of IT

Kantipur City College

Date: 1st Jan, 2026

1. Introduction

1.1 Overview

The Pharmacy Billing System is a database-driven desktop application developed to automate and simplify the daily operations of a pharmacy. The system replaces manual processes with a structured and centralized digital solution that ensures accuracy, consistency, and reliability of data. It is implemented using C# Windows Forms for the user interface and SQL Server as the back-end database, providing a secure and efficient environment for data storage and retrieval.

The system supports role-based access control, allowing administrators and cashiers to perform tasks according to their assigned privileges. Core functionalities include medicine inventory management, sales processing with automatic stock updates, customer and supplier management, and transaction history maintenance. The system also provides advanced features such as low-stock alerts, expiry date tracking, and profit–loss analysis to assist in effective inventory control and financial management.

Furthermore, the Pharmacy Billing System generates comprehensive sales, purchase, and inventory reports in both tabular and graphical formats. These reports help pharmacy owners and managers analyze performance, monitor stock levels, and make informed business decisions. By improving operational efficiency, reducing human errors, and enhancing data accuracy, the system provides a scalable and reliable platform for modern pharmacy management.

1.2 Problem Statement

- Manual record-keeping leads to errors and data inconsistency
- Inefficient inventory management and lack of real-time stock updates

- Difficulty in tracking expiry dates and generating accurate reports
- Ineffective management of customer and supplier information

1.3 Objective

- To manage and automate inventory, sales, and purchase history.
- To generate reports for decision-making

1.4 Features

- User Authentication and Role management
- Add, Update, Filter and, Search Medicines
- Sales Management and Inventory Monitoring
- Customer and Supplier Management
- Reports and Analytics

1.5 Motivation

- To automate pharmacy operations and reduce manual work
- To improve accuracy and efficiency in inventory, sales, and purchases
- To enable real-time stock and expiry tracking
- To support better decision-making through reports and analysis

1.6 Scope and Limitations

1.6.1 Scope

The Pharmacy Billing System automates daily pharmacy operations, including inventory, sales, purchases, and customer management. It provides real-time stock updates, expiry tracking, and detailing. The system reports to support decision-making can be expanded in the future to include online sales, multiple branches, and advanced analytic s.

1.6.2 Limitations

- Depends on proper computer hardware and SQL Server for operation
- Requires user training to avoid input errors
- No support for mobile access or online integration
- Limited to a single branch unless modified for multi-branch use
- Cannot automatically handle advanced analytic s without updates

1.7 Organization of the document

This document is organized into several chapters, each describing a specific aspect of the Pharmacy Billing System project.

Chapter 1: Introduction
This chapter introduces the project, its objectives, scope, problem statement, and overall overview of the Pharmacy Billing System.

Chapter 2: Literature Review / Existing System
This chapter discusses the existing manual or semi-automated pharmacy systems, their limitations, and the motivation for developing the proposed system.

Chapter 3: Methodology
This chapter explains the methods used to create the system using Iterative Waterfall Method.

Chapter 4: Requirement Analysis
This chapter explains the functional and non-functional requirements of the system, feasibility study, and system specifications.

Chapter 5: System Design
This chapter presents the system architecture, ER Diagram, Data Flow Diagrams (Level 0 and Level 1), and database design.

Chapter 6: Implementation

This chapter describes the technologies used, development environment, and implementation details of each module such as login, medicine management, purchase, sales, reports, and analytic s.

Chapter 7: Testing and Validation

This chapter explains the testing strategies used, test cases, error handling, and validation of system. This chapter concludes the project and suggests possible future improvements and enhancements.

References

This section lists all the books, websites, and tools referred to during the project.

Appendix

This section contains additional materials such as SQL scripts, code snippets, and user manual.

2. Literature Review

Pharmacy billing has traditionally relied on manual methods, such as paper-based records and handwritten invoices, to track medicines, purchases, sales, and customer information. These methods are simple and inexpensive but are prone to errors, data loss, redundancy, and inefficiency. As pharmacy operations grow in scale, manual systems become increasingly difficult to manage. Inaccurate stock tracking, expired medicines, and delayed report generation are common problems in traditional systems. These challenges can negatively impact both business performance and customer safety.

2.1 System 1: Desktop Based System(PMS)

2.1.1 Overview

Desktop-based systems are installed locally on pharmacy computers and handle all core functions such as inventory, sales, billing, reporting, and customer records. Many legacy pharmacies use this model due to simplicity and offline capability.

2.1.2 Key Features

- Patient/Customer database
- Inventory control (stock levels, expiry tracking)
- Sales and billing module
- Supplier & purchase order management
- Reporting (daily sales, stock report)

Pros:

✓ **Reliable offline usage** — doesn't require constant internet.
✓ **Fast performance** — direct access to local database.
✓ **Ownership of data** — all records stored on local servers.
✓ **Lower ongoing cost** — only initial purchase and installation.

Cons:

❌ **Limited accessibility** — only available on that machine/network.
❌ **Scalability issues** — hard to scale for multiple branches.
❌ **Maintenance burden** — updates and backups must be managed manually.
❌ **Security risks** — local systems can be vulnerable without proper IT support.

2.2 System 2: Web Based Pharmacy Management System

2.2.1 Overview

These systems run in browsers and typically store data on a central server (cloud or private). They support multiple users and devices.

2.2.2 Features

- Online access from any device
- Multi-user roles & permissions
- Real-time inventory synchronization
- Cloud database with backups
- Remote reporting and analytic s

Pros:

✅ **Remote access & multi-branch support**
✅ **Automatic updates & backups**
✅ **Scalable with user roles and levels**
✅ **Better integration** with e-prescriptions and third-party tools

Cons:

❌ **Internet dependency** — performance tied to network quality.
❌ **Ongoing subscription fees** (cloud hosting).
❌ **Data privacy concerns** if hosted externally.
❌ **Initial learning curve** for staff unfamiliar with web UI.

3. Methodology

The Pharmacy Billing System is developed using C# Windows Forms for the user interface and SQL Server for back-end database management. The project follows a systematic approach, starting with requirement analysis to identify the needs of the pharmacy. The database is designed to store information on medicines, purchases, sales, customers, and suppliers in a structured manner. The system is implemented with role-based access**,** allowing administrators and cashiers to perform tasks according to their privileges. Core functionalities like inventory management, sales processing, purchase handling, and report generation are developed and integrated for real-time operations. Finally, the system is tested for accuracy, usability, and reliability to ensure it meets the intended objectives and improves pharmacy efficiency.

3.1 System Development life Cycle

Iterative Waterfall Model

The **Iterative Waterfall Model** is an enhancement of the traditional Waterfall model, where each phase of the project is completed sequentially but allows for revisiting and refining previous phases as necessary. Unlike the traditional Waterfall model, which follows a rigid step-by-step process with no flexibility for going back, the Iterative Waterfall Model introduces an iterative approach that enables modifications and improvements to be made during or after each phase based on feedback and insights.

Phases of it are:

- **Requirements Gathering and Analysis:**
  In this phase, the system's requirements are collected and analyzed to understand user needs and define functional and non-functional specifications. As the project progresses, new requirements or changes may be incorporated, ensuring the project stays aligned with user expectations. In

this phase we gathered all related systems and their functions. We researched about the pharmacy systems their requirements, etc.

- **System Design:**

  The design phase focuses on creating the system architecture, user interfaces, and database schema s. The design can be adjusted as the project progresses, allowing the system to adapt based on feedback from the implementation and testing phases.In this phase we built the database schema s and instances, ER Diagrams, Data Flow Diagrams (DFD s), and User Interface layouts.

- **Development:**

  During development, developers write code based on the design specifications. Since the model is iterative, developers adjust the implementation after each cycle.

- **Testing**

  Testing ensures that the system works as expected and identifies bugs or issues. In the iterative model, testing is ongoing process, with each iteration undergoing testing and adjustments made based on the feedback to improve the system's quality.

  This phase includes fixing the bugs and issues that arises after completion of project. Since iterative model allows for continuous feedback, the system can be refined throughout its cycle to meet evolving user needs.

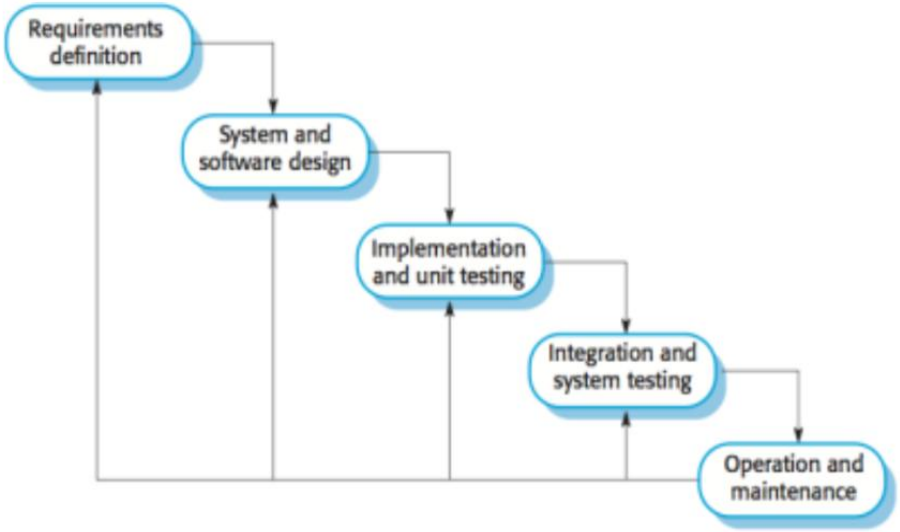


Figure 3.1 Iterative Waterfall Model

3.2 Technology and Tools used

- Development Environment**:** Visual Studio 2022 (IDE)

- Framework**:** .NET Framework

- Programming Language**:** C#

- Database File Type**:** SQL Server Database File

Visual Studio 2022

The Integrated Development Environment used for this project is **Visual Studio 2022**. Visual Studio offers features like, drag-and-drop UI designing, code refactoring. These tools help streamline the development process and ensure efficient project management.

.Net

The proposed project will be developed using the **.NET Framework**, a powerful software development platform created by Microsoft. It provides a controlled environment for developing and running applications, especially Windows-based programs.

C#

The proposed project will be developed using C# (C-Sharp) programming language. C# is a modern, object-oriented, and type-safe programming language developed by Microsoft. It provides rich libraries and built-in functionalities. The language's robust features like exception handling, collections, and file handling help in efficient application development and maintenance**.**

SQL Server Database File

The Database File Type indicates the format in which the database stores its data. In SQL Server, the file contains all the database objects, including tables, indexes, and schema information. This file allows the database engine to efficiently store, retrieve, and manage data for applications.

3.2 Assignment of Roles and Responsibilities

Table 3.2: Assignment of Roles and Responsibilities

Member name	**Roles and responsibility**
Krishna Acharya	Code, Documentation, Presentation
Sarun Chapagain	Code, Documentation, Presentation
Sneh Shrestha	Code, Documentation, Presentation

4. System Analysis

4.1 Requirement Analysis

Table 4.1: Requirement Analysis

Requirement ID	**Description**
R001	To allow the user to add, update, and delete medicine records.
R002	To manage inventory from suppliers with automatic stock updates.
R003	To process sales transactions and generate bills.
R004	To maintain customer records with auto-fill functionality.
R005	To maintain supplier records and track purchase history.
R006	To generate sales, purchase, inventory, and profit-loss reports.
R007	To provide real-time inventory monitoring, including low-stock alerts and expiry tracking.
R008	To allow role-based login for administrators and cashiers.
R009	To store data security in a SQL Server database.
R010	To ensure fast response time for all operations.
R011	To provide a user-friendly and intuitive interface.
R012	To maintain reliability and data integrity.
R013	To provide backup and recovery options for the database.

4.2 Functional Requirement

Table 4.2: Functional Requirement

Requirement ID	Description
FR001	The system shall allow users to add new medicine records with details such as name, category, price, quantity, expiry date, and status (active/inactive).
FR002	The system shall allow users to update existing medicine records without affecting historical sales or purchase data.
FR003	The system shall restrict permanent deletion of medicines that are linked to sales or purchase records and instead allow marking them as inactive.
FR004	The system shall record medicine purchases from suppliers and automatically update inventory quantities.
FR005	The system shall add new medicines to the inventory automatically if they do not already exist during purchase.
FR006	The system shall automatically deduct sold quantities from inventory while preventing sales when stock is insufficient.
FR007	The system shall maintain customer records and auto-fill customer details based on phone number selection.
FR008	The system shall store and manage supplier information and link suppliers to purchase histories.
FR009	The system shall generate detailed sales reports including invoice number, date, customer details, medicines sold, and payment method.
FR010	The system shall generate purchase reports with supplier, medicine, quantity, and total cost details.
FR011	The system shall generate inventory reports showing current stock levels, expiry dates, and active/inactive medicine status
FR012	The system shall generate profit and loss reports by comparing total sales revenue with total purchase cost.

FR013	The system shall monitor inventory in real time and display alerts for low stock and near-expiry medicines.
FR014	The system shall support role-based login for administrators and cashiers with controlled access to features.
FR015	The system shall securely store all data in a SQL Server database with enforced data integrity constraints.
FR016	The system shall provide backup and restore functionality to recover data in case of system failure.

4.3 Feasibility Study

4.3.1 Economic Feasibility

The proposed system is economically feasible as it uses cost-effective and widely available technologies. The application is developed using **C# Windows Forms** and **Microsoft SQL Server**, both of which are available in free or academic versions. No additional licensing or third-party software costs are required. The system reduces manual labor, paperwork, and human errors, thereby minimizing operational costs over time. Improved inventory management helps reduce medicine wastage due to expiry, resulting in financial savings. Overall, the benefits of automation outweigh the minimal development and maintenance costs, making the system economically viable.

4.3.2 Technical Feasibility

The system is technically feasible because it is built using proven and reliable technologies. C# Windows Forms provides a stable and user-friendly interface, while SQL Server ensures secure and efficient data storage. The required hardware (standard computers) and software tools are commonly available. The system integrates database operations, reporting, and analytic s effectively. Developers with basic knowledge of C#, SQL, and Windows-based applications

can easily implement and maintain the system. Hence, there are no significant technical constraints.

4.3.3 Schedule Feasibility

The project is schedule-feasible as it can be developed within the academic time frame. The system is modular, allowing development in phases such as login, medicine management, sales, purchases, reports, and analytic s. Each module can be tested independently, ensuring timely completion. Given proper planning and adherence to milestones, the project can be completed within the allotted semester or project duration without risk of delay.

The Pharmacy Billing System has been developed according to the schedule mentioned below:

10 Jul – 24 Jul: Planning and Research

Identified objectives and functional requirements for the Pharmacy Billing System. Researched existing pharmacy management system to understand essential features such as medicine details, stocks, billing system, reports and analytic s.

24 Jul – 1 Aug: Design

Designed the system structure including basic wire frames of the Admin and Pharmacy dashboards. Created ER diagrams and DFD s to define data flow and table relationships for inventory, billing, sales and medicine records.

1 Aug – 24 Sept: Development

Developed the Pharmacy Billing System using C# Windows Forms in Visual Studio 2022. Implemented admin and user login, check-in/check-out functionality, admin panel, sales tracking and inventory system. Performed debugging and internal testing to ensure each module worked as intended.

24 Jul– 25 Oct: Documentation

Created comprehensive documentation of the system including system overview,

instructions for use, form descriptions, features, database structure, and testing procedures with encountered issues and solutions.

1 Aug – 24 Sept: Testing

The system was tested was tested for bugs and errors as it was being developed. Each time new function was added the system was tested for errors and made ensure the system ran properly.

15 Oct– 25 Oct: Maintenance and Support

Addressed minor bugs reported during testing. Optimized database queries and UI responsiveness. Performed post-implementation support and verified application stability.

4.3.3.1 Gantt Chart

Fig.3.3.1 Gantt Chart

5. System Design

5.1 System architecture

The Pharmacy Billing System is developed using a two-tier architecture, consisting of the Presentation Layer and the Data Access Layer. This architectural approach ensures a clear separation between the user interface and data handling logic, improving system maintainability, performance, and scalability.

The Presentation Layer, developed using Windows Forms (.NET Framework), provides an interactive graphical user interface for administrators and cashiers to operate the system. It includes the following core modules:

- **Login Interface** for authenticating users and enforcing role-based access
- **Dashboard** displaying key information such as stock status and alerts
- **Medicine Management Forms** for adding, updating, searching, and activating/inactivating medicines
- **Purchase Management Interface** for recording supplier-wise purchases
- **Sales Management Interface** for billing, payment handling, and receipt generation
- **Customer and Supplier Management Forms** for maintaining detailed records
- **Report and Analytic s Interface** for viewing sales, purchase, inventory, and profit–loss reports

This layer uses standard controls such as Text Box, Button, Combo Box, DateTimePicker, and DataGridView to capture input and display data. It is responsible for handling user interactions, performing basic input validation, and sending requests to the back-end for further processing.

The Data Access Layer is implemented using Microsoft SQL Server Local DB, with the database file named **PharmacyDb.**. This layer manages all database-related operations, including:

- CRUD operations on medicines, customers, suppliers, purchases, and sales
- Automatic stock updates during purchase and sales transactions
- User authentication and role management
- Expiry date tracking and low-stock monitoring
- Transaction logging and data consistency management

Database interaction is handled using ADO.NET components, such as SqlConnection, SqlCommand, SqlDataAdapter, and DataTable, ensuring secure and efficient communication between the application and the database. The primary database tables include:

- **Users** – Stores login credentials and role information
- **Medicines** – Contains medicine details such as name, category, batch, expiry date, quantity, and price
- **Suppliers** – Stores supplier information and purchase history
- **Customers** – Maintains customer details and sales history
- **Purchases** – Records purchase transactions and stock additions
- **Sales** – Sell Medicines to the cutomers
- **Sale Details**- Stores sale transactions and billing details

This architecture ensures reliable performance, secure data management, and efficient handling of pharmacy operations.

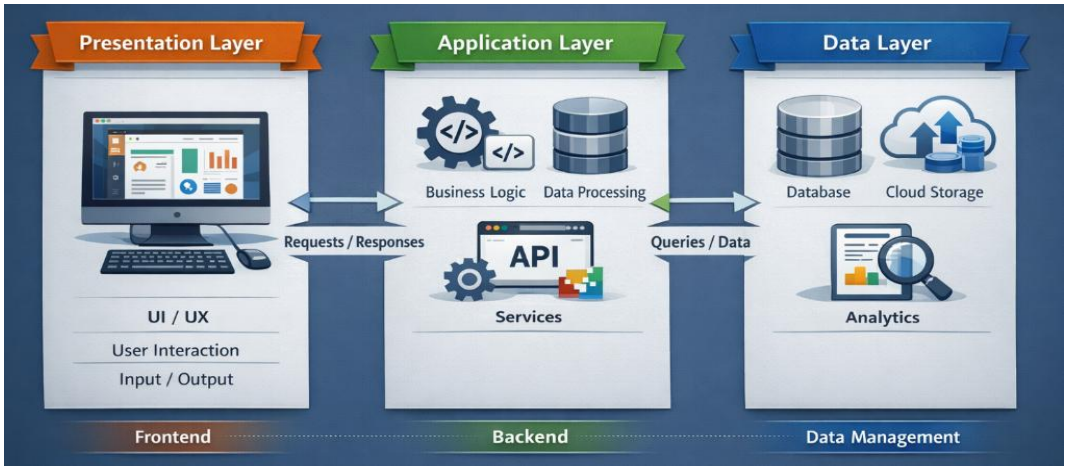


Fig 5.1 Tier Technology

5.2 Procedure Oriented

5.2.1 Context Level (Level 0) DFD

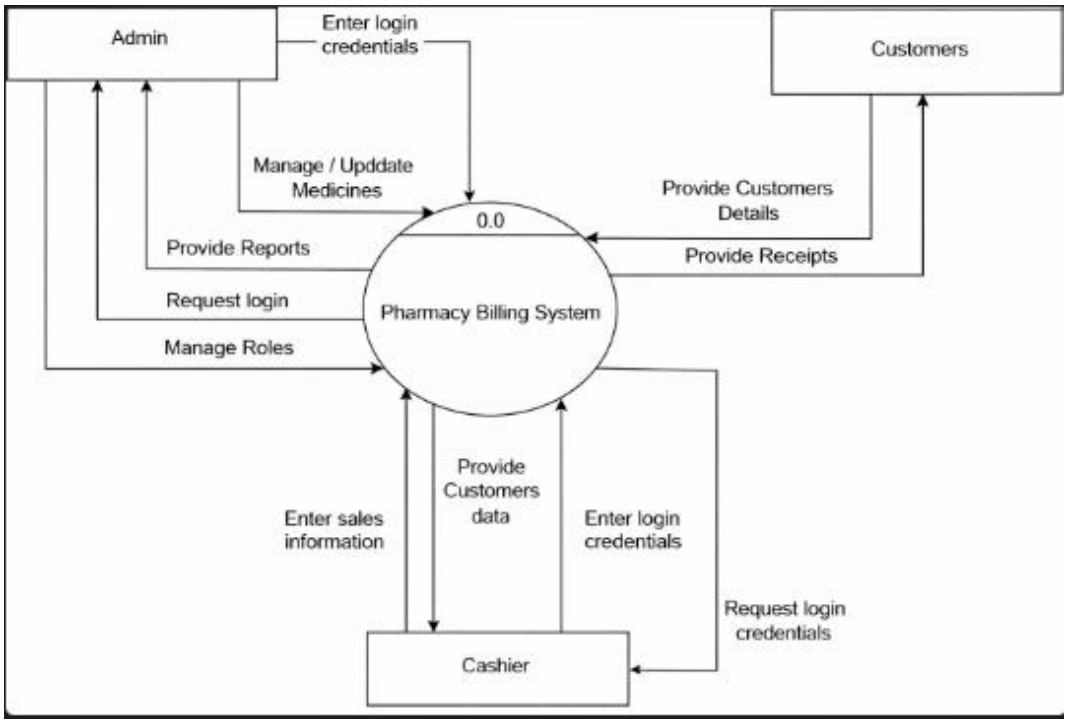


Fig 5.2.1 Context level Data Flow Diagram (DFD)

5.2.2 Level 1 DFD

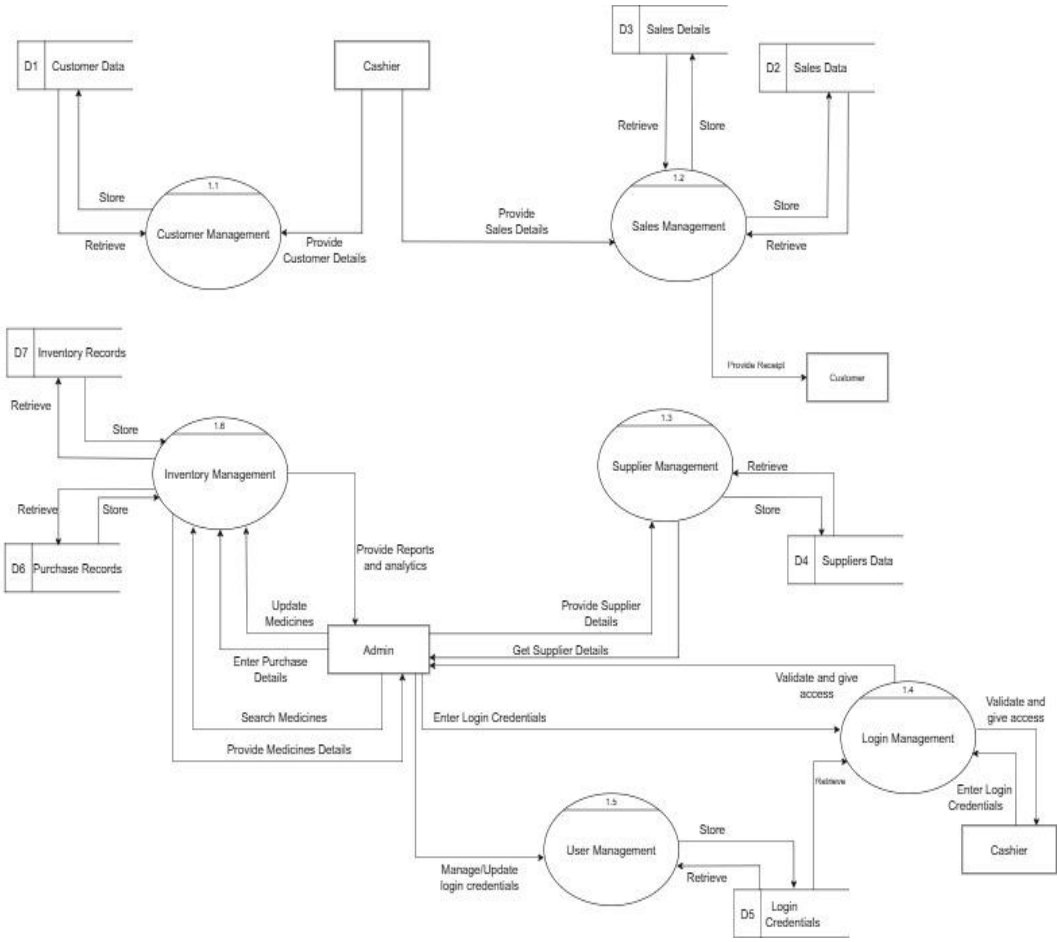


Fig 5.2.2 Level 1 DFD

5.2.3 Use Case Diagram

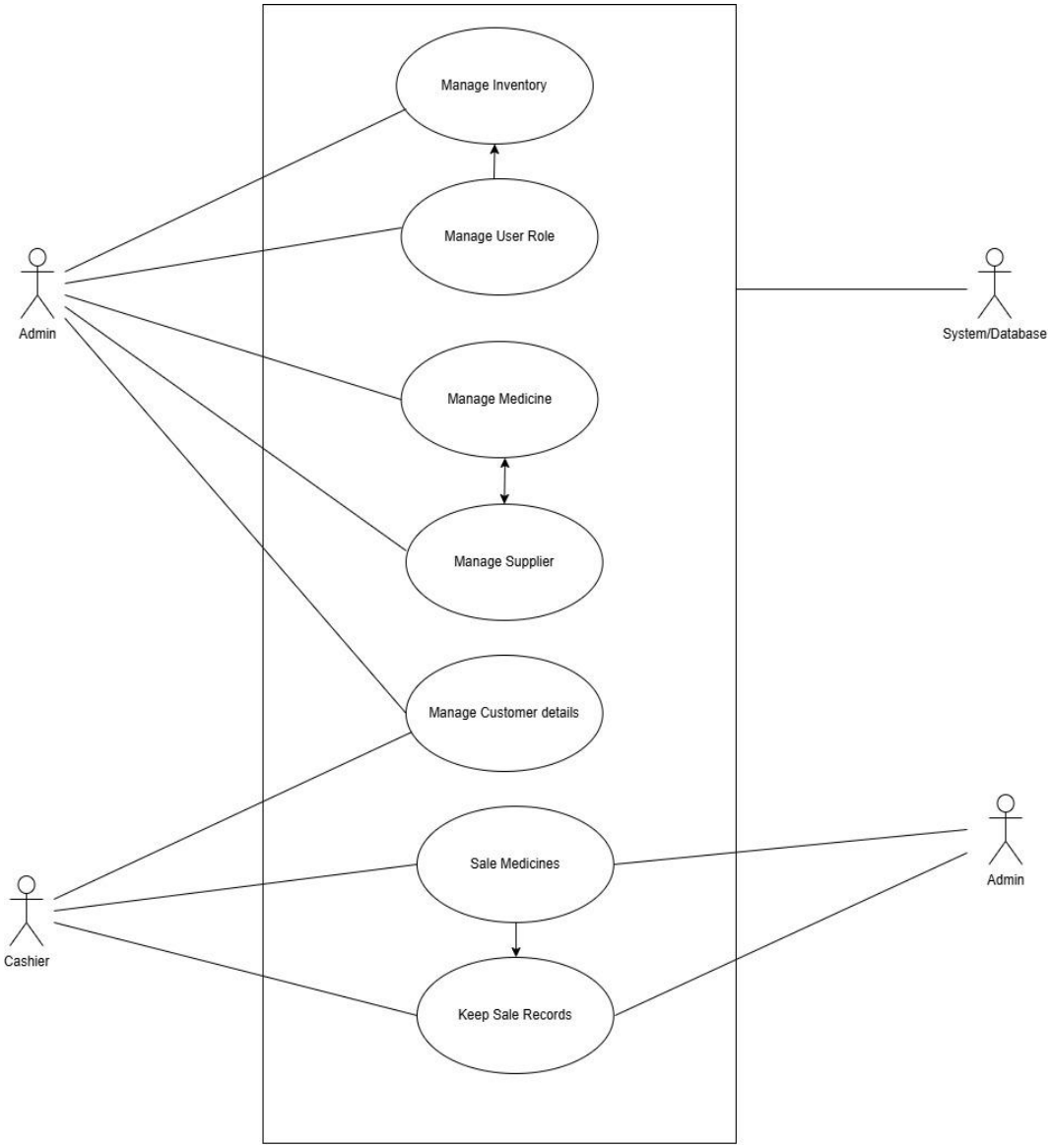


Fig 5.2.3: Use Case Diagrams

5.3 Database Design

5.3.1 ER Diagram

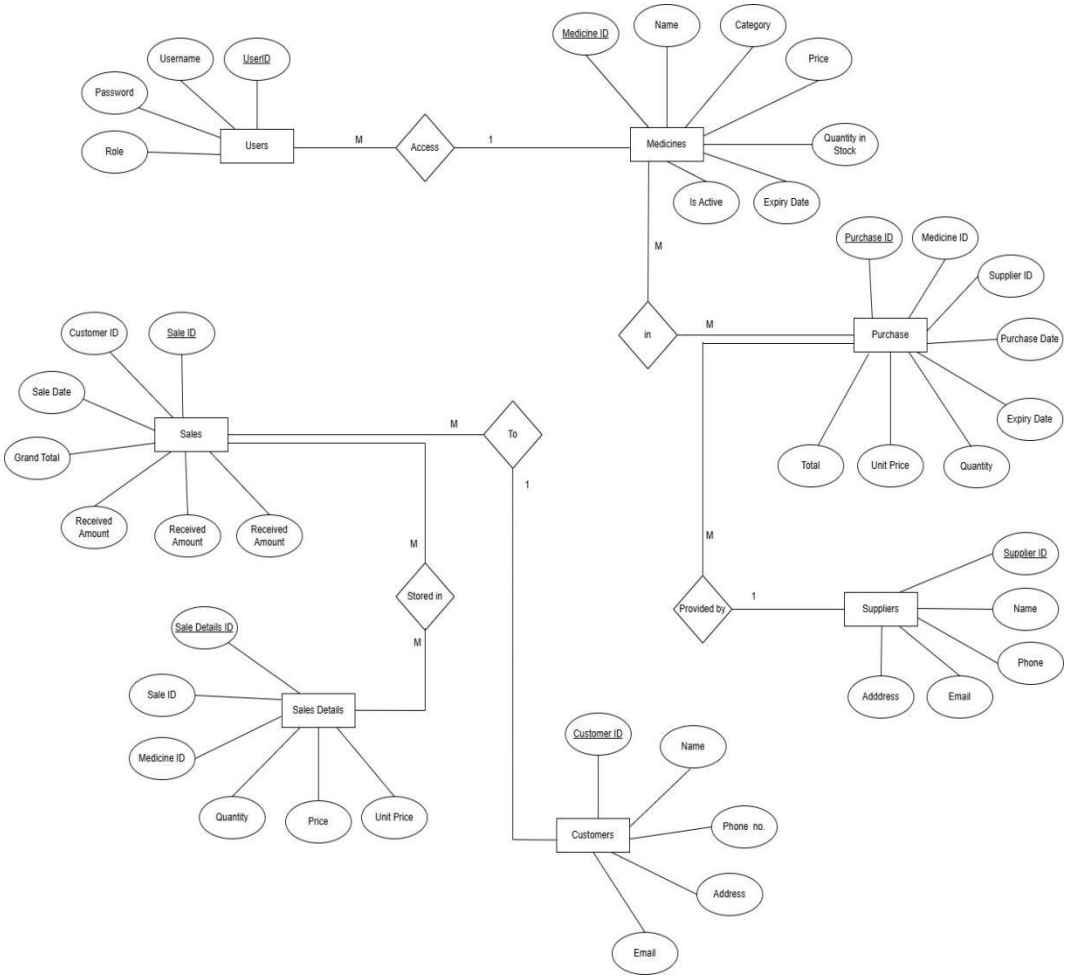


Fig 5.3.1 ER Diagram

5.3.2 Data Dictionary

Table 5.3.2.1: Medicine

Field Name	Data Type	Field Size	Primary/ Foreign Key	Nullable	Unique	Description
Medcine ID	int		P	NotNull	Y	Id of Medicine
Name	nvarchar	100		NotNull		Name of Medicine
Category	nvarchar	50		Null		Type of Medicine
Price	decimal	(10,2)		NotNull		Price of Medicine
Quantity in Stock	int			Not Null		Quantity of Medicine
Expiry Date	date			Null		Date of Expiry
Is Active	bit			Null		Availability of Medicine

Table 5.3.2.2: Customers

Field Name	Data Type	Field Size	Nullable	Unique	Description
Customer ID	int		Not Null	Y	Id of customer
Name	nvarchar	100	Not Null		Name of customer
Phone	nvarchar	15	Null		Phone number of customer

Address	nvarchar	225	Null		Address of customer
Email	nvarchar	50	Null		Email of customer

Table 5.3.2.3: Users

Field Name	Data Type	Field Size	Primary/Foreign Key	Nullable	Unique	Description
User ID	int		P	Not Null	Y	Id of user
User Name	nvarchar	50		Not Null		Username of user
Password	nvarchar	255		Not Null		Password
Role	nvarchar	20		Not Null		Role of User

Table 5.3.2.4: Purchase

Field Name	Data Type	Field Size	Primary/Foreign Key	Nullable	Unique	Description
Purchase ID	int		P	Not Null	Y	ID of Purchase
Medicine ID	int		F	Null	Y	ID of Medicine
Suppier ID	int		F	Null	Y	ID of Supplier
Purchase Date	date			Not Null		Date of Purchase
Expiry Date	date			Not Null		Date of Expiry
Unit Price	decimal	(10,2)		Not Null		Unit price of Medicine

Quantity	int			Not Null		Quantity of Medicine
Total Price	decimal	(21,2)		Null		Total Price of Medicine

Table 5.3.2.5: Sales

Field Name	Data Type	Field Size	Primary/ Foreign Key	Nullable	Unique	Description
Sale ID	int		P	Not Null	Y	ID of sale
Customer ID	int		F	Not Null	Y	ID of Customer
Sale Date	datetime			Null		Date of sale
Grand Total	decimal	(18,2)		Null		Total Amount
Received Amount	decimal	(18,2)		Null		Received Amount
Return Amount	decimal	(18,2)		Null		Amount that is returned
Payment Method	nvarchar	50		Null		Method of Payment

Table 5.3.2.6: Sales Details

Field Name	Data Type	Field Size	Primary/ Foreign Key	Nullable	Unique	Description
Sale Detail ID	int		P	Not Null	Y	ID of Sale Details
Sale ID	int		F	Not Null	Y	ID of Sale
Medicie ID	int		F	Not Null	Y	ID of Medicine
Quantity	int			Not Null		Quantity of medicine
Uiit Price	decimal	(10,2)		Not Null		Price of Medicine
Total Price	decimal	(10,2)		Not Null		Total Price of Medicine

Table 5.3.2.7: Suppliers

Field Name	Data Type	Field Size	Primary/ Foreign Key	Nullable	Unique	Description
Supplier ID	int		P	Not Null	Y	ID of Supplier
Name	nvarchar	100		Not Null		Name of Supplier
Phone	nvarchar	15		Null		Phone number of Supplier
Email	nvarchar	100		Null		Email of Supplier

Address	nvarchar	255		Null		Address of Supplier

6. System Development and Implementation

6.1 Programming platform

- Visual Studio 2022:

  The project is developed using **Visual Studio 2022**, a powerful Integrated Development Environment (IDE). It provides essential tools like **IntelliSense** for code suggestions, **drag-and-drop UI design** for user interfaces, **code tools**, **integrated Git support** for version control. These features enhance productivity and ensure a smoother development life cycle.

- C# Programming Language:

  The application is built using C#, a modern and object-oriented language developed by Microsoft. C# offers extensive libraries, strong type safety, and built-in functionalities like:

  - **Exception handling** for managing runtime errors gracefully
  - **Collections** for managing data in memory
  - **File handling** for reading and writing to files
  - **Database connectivity** for interacting with inventory databases

7. Tools and Debugging

7.1 Tools used in Testing

Table 7.1: Tools used in testing

S.N.	Tools	Specifications
1	ASUS X415	11th i5 processor, 8 GB RAM,256 SSD
2.	Dell Inspiron 3501	11th i5 processor, 8 GB RAM,256 SSD
3.	Acer Aspire 3	13th intel core 3, 8 GB RAM,256 SSD

7.2 Test Cases

Table 7.2: Test Cases

S.N	Test Case Description	Test Case Data	Expected Result	Actual Result	Status
T01	Login with valid credentials	ID: admin Password: right pass	Login successfully and redirected to dashboard	Login successfully and redirected to dashboard	Pass
T02	Login with invalid credentials	ID: admin Password: wrongpass	Error message	Error message	Pass
T03	Add new medicine record	Medicine Name, Category, Quantity, Price, Expiry Date	Medicine added successfully to database	Medicine added successfully to database	Pass
T04	Update existing	Updated price and	Medicine	Medicine	Pass

	medicine details	quantity	details should be updated	details should be updated	
T05	Record purchase transaction	Supplier name, medicine, quantity, purchase price	Purchase should be saved and stock should increase	Purchase should be saved and stock should increase	Pass
T06	Process sales transaction	Medicine, quantity, payment method	Sale should be completed and stock should decrease	Sale should be completed and stock should decrease	Pass
T07	Prevent sale when stock is insufficient	Quantity greater than available stock	System should block sale and show warning	System should block sale and show warning	Pass
T08	Generate sales report	Date range	Sales report should be displayed correctly	Sales report should be displayed correctly	Pass
T09	Add medicine with missing required fields	Medicine Name = Paracetamol, Quantity = (empty), Price = 50	System should display validation error and prevent saving	System should display validation error and prevent saving	Fail

8. Conclusion

The Pharmacy Billing System successfully automates and streamlines the daily operations of a pharmacy. It efficiently manages medicines, purchases, sales, customers, and suppliers while providing real-time inventory tracking, low-stock alerts, and expiry monitoring. The system reduces manual errors, improves data accuracy, and saves time for pharmacy staff.

With secure role-based access, reliable database management, and detailed reporting features, the system supports informed decision-making and enhances overall operational efficiency. It provides a scalable and user-friendly solution suitable for modern pharmacy management, ensuring both accuracy and convenience in day-to-day operations.

References

1. GeeksforGeeks. *C# Tutorial*. GeeksforGeeks Access:(2024, December 16). **https://www.geeksforgeeks.org/csharp-programming-language/**

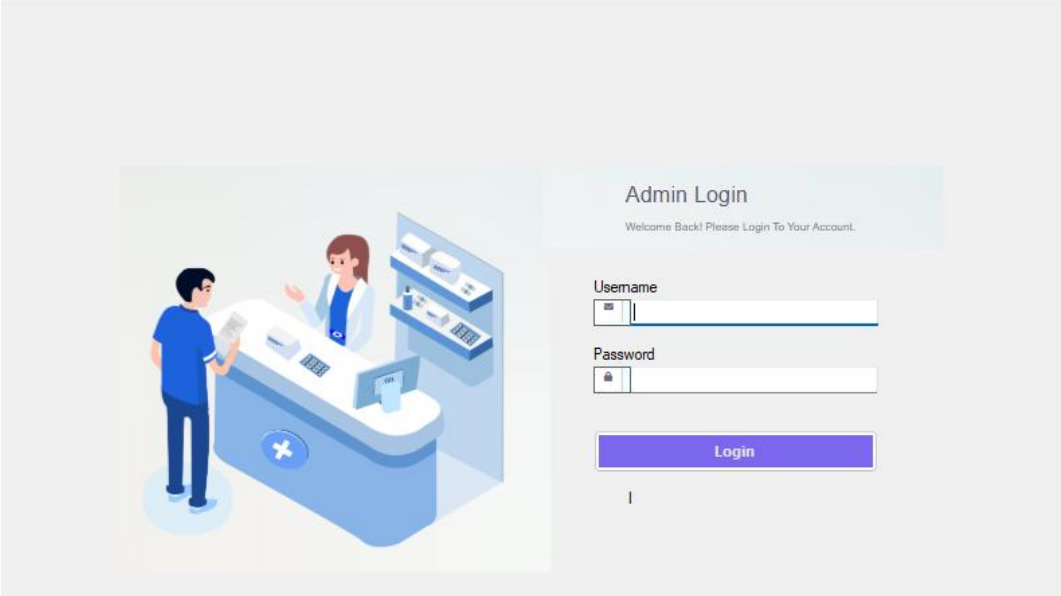
2. Microsoft Learn. (n.d.). *Windows Forms Overview*. **https://learn.microsoft.com/en-us/dotnet/desktop/winforms/**

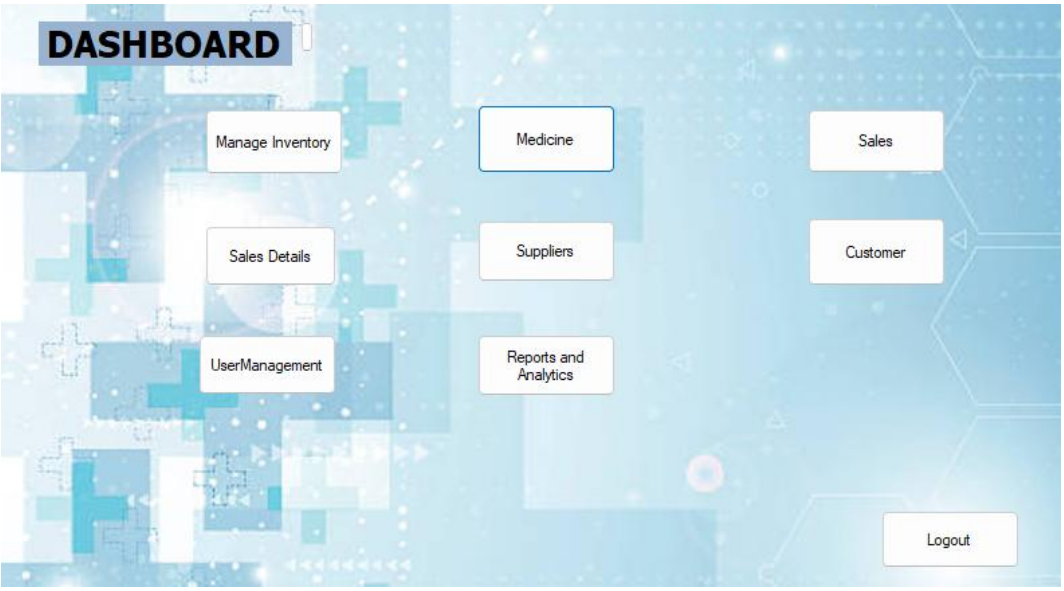
3. Microsoft Learn. (n.d.). *Connect to SQL Server LocalDB*. **https://learn.microsoft.com/en-us/sql/database-engine/configure-windows/sql-server-express-localdb**

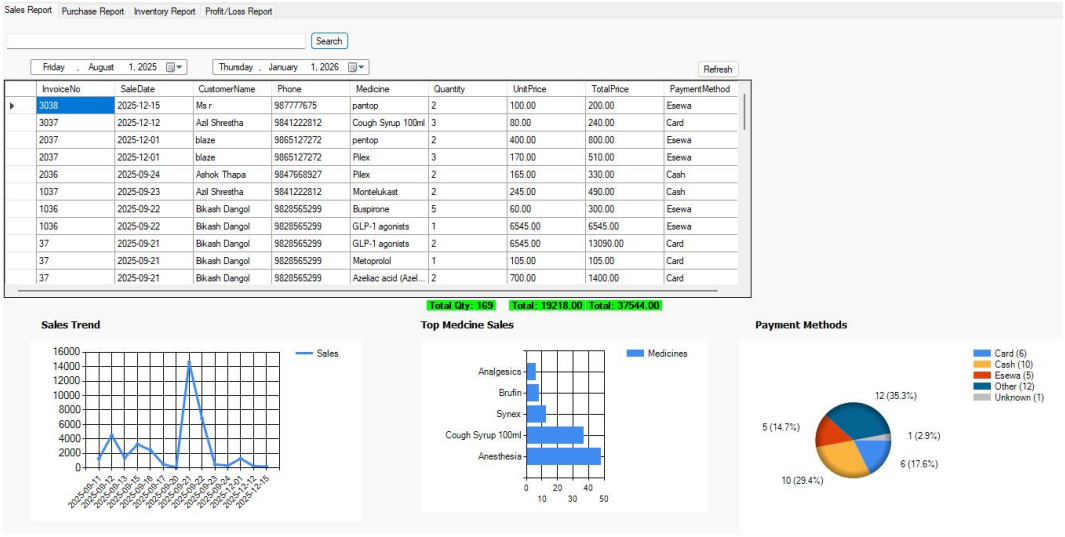
4. C# Corner. (n.d.). *Using SQL Server LocalDB with Windows Forms in C#.* https://www.c-sharpcorner.com/article/connect-to-localdb-in-windows-forms-application/

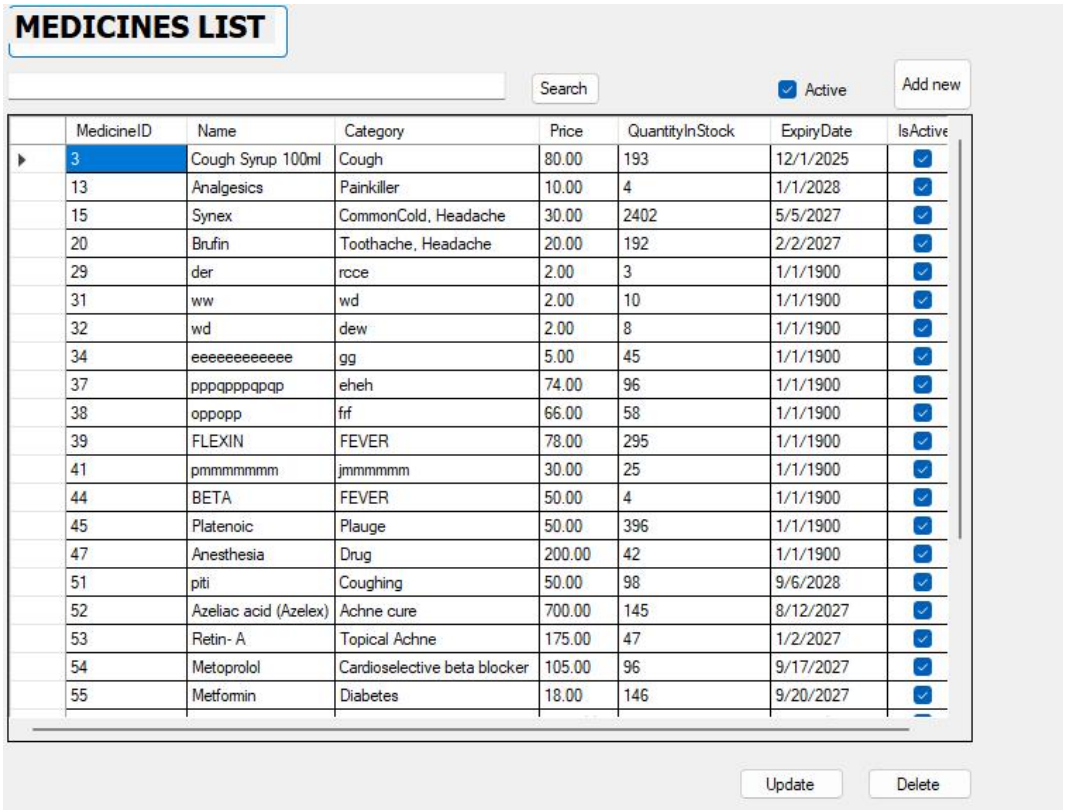
5. TutorialsTeacher. (n.d.). *ADO.NET Tutorial*. https://www.tutorialsteacher.com/ado.net/

Appendix


Admin Login
Welcome Back! Please Login To Your Account.
Username
Password
Login


DASHBOARD
Manage Inventory
Medicine
Sales
Sales Details
Suppliers
Customer
UserManagement
Reports and Analytics
Logout


Sales Report
Purchase Report
Inventory Report
Profit/Loss Report
Search
Friday , August 1, 2025
Thursday , January 1, 2026
Refresh
InvoiceNo SaleDate CustomerName Phone Medicine Quantity UnitPrice TotalPrice PaymentMethod
3038 2025-12-15 Ms r 987777675 pantop 2 100.00 200.00 Esewa
3037 2025-12-12 Azil Shrestha 9841222812 Cough Syrup 100ml 3 80.00 240.00 Card
2037 2025-12-01 blaze 9865127272 pentop 2 400.00 800.00 Esewa
2037 2025-12-01 blaze 9865127272 Pilex 3 170.00 510.00 Esewa
2036 2025-09-24 Ashok Thapa 9847668927 Pilex 2 165.00 330.00 Cash
1037 2025-09-23 Azil Shrestha 9841222812 Montelukast 2 245.00 490.00 Cash
1036 2025-09-22 Bikash Dangol 9828565299 Buspirone 5 60.00 300.00 Esewa
1036 2025-09-22 Bikash Dangol 9828565299 GLP-1 agonists 1 6545.00 6545.00 Esewa
37 2025-09-21 Bikash Dangol 9828565299 GLP-1 agonists 2 6545.00 13090.00 Card
37 2025-09-21 Bikash Dangol 9828565299 Metoprolol 1 105.00 105.00 Card
37 2025-09-21 Bikash Dangol 9828565299 Azeliac acid (Azel... 2 700.00 1400.00 Card
Total Qty: 169
Total: 19218.00
Total: 37544.00
Sales Trend
Sales
Top Medcine Sales
Medicines
Analgesics
Brufin
Synex
Cough Syrup 100ml
Anesthesia
Payment Methods
Card (6)
Cash (10)
Esewa (5)
Other (12)
Unknown (1)
12 (35.3%)
5 (14.7%)
1 (2.9%)
6 (17.6%)
10 (29.4%)


MEDICINES LIST
Search
Active
Add new
MedicineID Name Category Price QuantityInStock ExpiryDate IsActive
3 Cough Syrup 100ml Cough 80.00 193 12/1/2025
13 Analgesics Painkiller 10.00 4 1/1/2028
15 Synex CommonCold, Headache 30.00 2402 5/5/2027
20 Brufin Toothache, Headache 20.00 192 2/2/2027
29 der rcce 2.00 3 1/1/1900
31 ww wd 2.00 10 1/1/1900
32 wd dew 2.00 8 1/1/1900
34 eeeeeeeeeee gg 5.00 45 1/1/1900
37 pppqpppqpqp eheh 74.00 96 1/1/1900
38 oppopp frf 66.00 58 1/1/1900
39 FLEXIN FEVER 78.00 295 1/1/1900
41 pmmmmmmm jmmmmm 30.00 25 1/1/1900
44 BETA FEVER 50.00 4 1/1/1900
45 Platenoic Plauge 50.00 396 1/1/1900
47 Anesthesia Drug 200.00 42 1/1/1900
51 piti Coughing 50.00 98 9/6/2028
52 Azeliac acid (Azelex) Achne cure 700.00 145 8/12/2027
53 Retin- A Topical Achne 175.00 47 1/2/2027
54 Metoprolol Cardioselective beta blocker 105.00 96 9/17/2027
55 Metformin Diabetes 18.00 146 9/20/2027
Update
Delete