# Project Report: Project1-InventoryManagement

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# 1. Introduction

The Inventory Management System (IMS) aims to streamline the management of inventory-related tasks within an organization. This project involves creating a robust database and a user-friendly desktop application that enables users to manage suppliers, products, orders, and stock movements efficiently.

# 2. Objectives

* To develop a relational database that handles various inventory management tasks.
* To create a WPF application that provides an intuitive interface for users to interact with the database.
* To ensure data integrity and security through proper validation and user roles.

## 3. **Database Design**

## 3.1 Database Structure

The InventoryManagement database consists of the following tables:

1. **Suppliers** - Stores information about suppliers including contact details.
2. **PurchaseOrders** - Tracks orders placed with suppliers, including order status and total amount.
3. **PurchaseOrderDetails** - Contains details about products included in each purchase order.
4. **SalesOrders** - Manages customer orders, their status, and total amounts.
5. **SalesOrderDetails** - Details products associated with sales orders.
6. **Products** - Maintains product information including SKU, category, and pricing.
7. **StockMovements** - Records movements of stock (in, out, adjustments) for inventory tracking.
8. **Users** - Manages user accounts and roles (Admin, Manager, Staff).

**9) Categories** - Categorizes products for better organization.

## 3.2 Relationships

* Suppliers to PurchaseOrders: One-to-Many
* PurchaseOrders to PurchaseOrderDetails: One-to-Many
* SalesOrders to SalesOrderDetails: One-to-Many
* Products to PurchaseOrderDetails and SalesOrderDetails: One-to-Many
* Users to AuditLogs: One-to-Many

# 4. Application Development

## 4.1 Technology Stack

* **Frontend:** XAML
* **Backend:** C#
* **Database:** Microsoft SQL Server
* **Framework:** .NET Framework
* **Libraries:** Entity Framework for data access
* **Development Tools:** Visual Studio, SQL Server Management
* **Hashing :** BCrypt

## 4.2 Key Features

### 4.2.1 Admin Features

* **User Management:** Ability to add, update, and delete user accounts and assign roles.
* **Product Management:** Add, update, and delete products in the inventory.
* **Supplier Management:** Manage suppliers, including adding new suppliers and updating existing ones.
* **Role-Based Access Control:** Define permissions for different user roles to enhance security.

### 4.2.2 Manager Features

* **Sales Order Management:** Create, update, and view sales orders.
* **Stock Management:** Track stock movements and maintain accurate inventory levels.
* **Reporting:** Generate reports on sales, stock levels, and supplier performance.
* **Forecasting:** Analyze historical data to predict future stock requirements and trends.

### 4.2.3 Staff Features

* **Basic Inventory Management:** View products, suppliers, and stock movements.
* **Stock Movement Recording:** Input stock movements for products and update quantities.
* **Sales Order Processing:** Manage customer sales orders and update their statuses.

### 4.3 User Interface

The UI is designed to be intuitive, with separate tabs for managing:

* **Products**
* **Suppliers**
* **Sales Orders**
* **Stock Movements**

Each section allows for easy navigation and data manipulation.

# 5. Challenges Faced

* **Data Integrity:** Ensuring referential integrity between tables posed initial challenges, which were addressed through careful design of relationships.
* **User Experience:** Balancing functionality with ease of use required multiple iterations on the UI design.
* **Security:** Implementing secure user authentication and authorization was critical for protecting sensitive data.

# 6. Recommendations

* **User Training:** Conduct training sessions for users to maximize the system's potential.
* **Regular Backups:** Implement a backup strategy to prevent data loss.
* **Feedback Mechanism:** Establish a method for users to provide feedback for continuous improvement.
* **System Updates:** Regularly update the system to include new features and improvements based on user feedback

# 7.Testing

## Testing Strategies

* Manual testing for input validation and functionalities.

## Test Cases

* Ensure valid input handling.
* Verify correct operations for adding, viewing, and removing products, users and salesman details.

# 8.Challenges and Solutions

## Challenges

* Handling incorrect user inputs gracefully.

## Solutions

* Implemented robust input validation with prompts for re-entry.

# 9. Conclusion

The Inventory Management System successfully meets the project objectives by providing a comprehensive solution for managing inventory. The combination of a well-structured database and a user-friendly WPF application facilitates efficient operations within an organization. Future enhancements may include integration with external systems and advanced reporting features.