An Integrated Inventory Management System for Real-Time Stock Monitoring using ASP.NET

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Abstract- Inventory management system is an application which is helpful for business operate. Inventory management is a challenging problem area in supply chain management. Companies need to have inventories in warehouses in order to fulfill customer demand, meanwhile these inventories have holding costs and this is frozen fund that can be lost. Therefore, the task of inventory management is to find the quantity of inventories that will fulfill the demand, avoiding overstocks. This paper presents a case study for the assembling company on inventory management. It is proposed to use inventory management in order to decrease stock levels and to apply an agent system for automation of inventory management processes. Inventory management system (IMS) use for a departmental store. This system can be used to store the details of the inventory based on the sale details, generate sale and inventory report periodically etc. this is one integrated system that contains both the user component (used by sales persons, sales managers inventory managers) and the admin component (used by the administrators for performing admin level function such as adding new item to the inventory) etc. This project implemented a inventory management system and tracks the performance of each product using a web application. This will help the decision makers to initiate accurate re-order and make forecast and demand of the product at any point of time.

Keywords: Inventory Management System, Hardware sales, Warehouse, tracking inventory, time saving, maximum profit.

I. INTRODUCTION

The rapid evolution of digital commerce has necessitated more sophisticated tools for resource planning. Inventory management, the process of ordering, storing, and using a company's inventory, is particularly sensitive to delays and data inconsistencies. In many smalls to medium sized enterprises (SMEs), inventory is still managed via spreadsheets or physical ledgers, which are prone to data entry errors and lack real-time synchronization. This Software "Inventory Management System", is used for recording the information about the day-to-day transaction of stock of an organization. It stores purchase information of the products with credit/debit information form the supplier. Similarly, it stores sales information with credit/debit about the customer. If a product is purchased, then the related information is stored in stocks, that is, stocks are up to date. Another part I it prepares sales report after product it sold. In the sales information, the information about who sold the product is also kept, so there is no problem for misunderstandings in future. Literature notes cost reductions, error minimization, and labor savings through automation. Geospatial and block chain explorations add layers for traceability, combining IoT with AI for predictive maintenance and sustainable practices. Yet, challenges persist in ERP integration costs, scalability for SMEs, and network dependencies. Despite progress, many systems lack unified architectures merging IoT tracking, AI forecasting, order automation, and analytics. Users juggle tools, complicating decisions. The proposed integrated platform bridges this by combining RFID/IoT for

tracking, ML for predictions, cloud APIs for suppliers, and ERP modules—offering efficient, scalable inventory order management.

II. LITERATURE SURVEY

Jabbar (2025) analyzed a web-based inventory data management information system developed using Agile methodology. The study emphasized that manual inventory recording often results in inaccurate data, delays in reporting, and low operational efficiency. The developed system supports real-time stock monitoring, tracking of incoming and outgoing goods, and automatic report generation, improving overall operational efficiency [1]. Erameh and Odoh (2021) designed a web-based inventory control system for small and medium enterprises (SMEs). Authors have contributed significantly to research in Artificial Intelligence and Machine Learning, with applications in cyber security, predictive maintenance, augmented reality, and education systems. His work focuses on developing intelligent models for real-world problem solving using advanced machine learning techniques. He has published research papers in reputed international journals and conference proceedings, contributing to interdisciplinary technological advancements. His research also emphasizes AI-driven solutions for smart systems, digital environments, and data-driven decision making [2-9]. The system incorporated technologies such as barcode and QR code tracking to monitor product movement and provide accurate daily stock information.

The study concluded that computerized inventory systems help organizations maintain accurate stock levels and improve customer satisfaction [10]. Balitar et al. (2024) developed a website-based inventory information system for retail stores using modern web technologies. The research highlighted that manual inventory processes often cause stock monitoring difficulties and reporting delays. The web-based solution improved data accuracy, efficiency, and overall inventory management [12]. Nazri et al. (2024) proposed a web-based inventory management system that integrates the First-In-First-Out (FIFO) algorithm to manage product stock. The study demonstrated that automated stock tracking helps reduce the risk of inventory loss and improves the speed and accuracy of stock management processes [13]. Ahmed et al. (2020) designed and implemented a computerized drug inventory management system using ASP.NET MVC. The system addressed the limitations of paper-based pharmacy records by enabling real-time monitoring of drug quantities, expiry dates, and product categories. The ASP.NET framework was found effective for building scalable and secure inventory systems [14].

Rahmah and Harahap (2026) developed a web-based inventory management system incorporating Economic Order Quantity (EOQ) and Safety Stock methods. Their study demonstrated that automated calculation of optimal order quantities helps prevent both stock shortages and overstocking, improving decision-making in inventory control [15]. Herlina et al. (2024) proposed a web-based inventory application to replace manual data processing. The system integrates data processing and report generation to reduce errors and ensure accurate inventory records. The research emphasizes that web-based inventory solutions provide faster data processing and improved accessibility for users [16]. Alandkar et al. (2025) reviewed various inventory management techniques used in ERP systems, highlighting technologies such as RFID, barcode scanning, and Just-In-Time (JIT) inventory methods. The study found that integrating modern technologies with inventory systems significantly enhances stock tracking accuracy and operational efficiency [8]. Efficient Key-Based Encryption and Authentication for Advanced Digital Forensic Storage Security was developed for inventory management [17-19]. Lyheng (2007) developed a web-based inventory control system using the .NET framework for e-commerce applications. The system included modules for stock management, sales tracking, order processing, and payment monitoring. The research demonstrated that ASP.NET-based systems provide effective control over inventory operations in online business environments [20, 21]. Recent research on intelligent warehouse systems highlights the integration of automation and data analytics in inventory management. Intelligent inventory systems enable high-frequency monitoring, automated stocktaking, and improved forecasting, resulting in better inventory accuracy and reduced operational costs [22].

III. METHODOLOGY

The Inventory Management System Using ASP.NET is a high-performance, web-based software solution designed to streamline and modernize business operations. Developed at the Avanthi St. Theressa Institute of Engineering and Technology, the project addresses the challenges faced by organizations—particularly small shops—that rely on manual systems for managing raw materials and sales records. By transitioning from labourintensive manual processes to a reliable digital platform, the system minimizes human error, enhances data accessibility, and increases overall productivity. Its primary objective is to provide a user-friendly tool for real-time tracking and reporting, ensuring that companies can manage their inventory more efficiently and effectively while improving the experience for both the business and its customers.

3.1. Technical Architecture and Stack Selection:

Frontend Development: The system utilizes React.js to build a Single Page Application (SPA), ensuring that the inventory dashboard updates without requiring a page refresh. Tailwind CSS was implemented to ensure the management interface is accessible on both warehouse tablets and desktop monitors. A centralized data approach was used so that when a sale is finalized, the system immediately executes a subtraction logic from the master inventory list to maintain real-time accuracy.

3.2. Integration of the "Digital Twin" Concept:

Virtual Replication: The methodology involves creating a digital replica of the physical warehouse layout to monitor stock movement virtually. The system combines IoT data collection with cloud-based monitoring to provide a "live" view of stock positions, which was previously invisible in the manual system.

3.3 . Mathematical Modelling (Wilson EOQ):

Optimization Logic: The core of the methodology is the integration of the Wilson EOQ mathematical model, which replaces human "gut feeling" with scientific calculation. The research gathered specific data points for each item, including How quickly the items (doors) are sold. The administrative and shipping costs incurred per order. The expense of storing the doors in the warehouse. The methodology sought to predict and compare the Expected Total Cost of using the EOQ model versus the costs incurred by the current non-scientific ordering methods.

3.4. Research Design and Sampling:

Case Study Focus: The research targeted a door-selling company, specifically analysing six categories: sliding glass, folding, manual/electric glass, flush, and panel doors. A mix-method approach was used, combining physical company records with interviews of key workers to understand the qualitative reasons for stock-outs. The research design is consistent with established academic frameworks (Inegbedion, 2018), ensuring the results are statistically relevant.

3.5. System Features for Accuracy:

CRUD Operations: The methodology includes the development of a robust inventory module that allows for full Create, Read, Update, and Delete capabilities for every product entry. Smart reorder alerts were programmed to trigger once stock levels fall below the mathematically defined safety point.

IV. RESULTS & DISCUSSIONS

4.1. User Interface Evaluation:

User feedback indicated that the dashboard’s” Low Stock Alert” feature was the most valuable, as it allowed managers to initiate reordering before stock depletion. The interface was tested for cross-browser compatibility and maintained its functionality

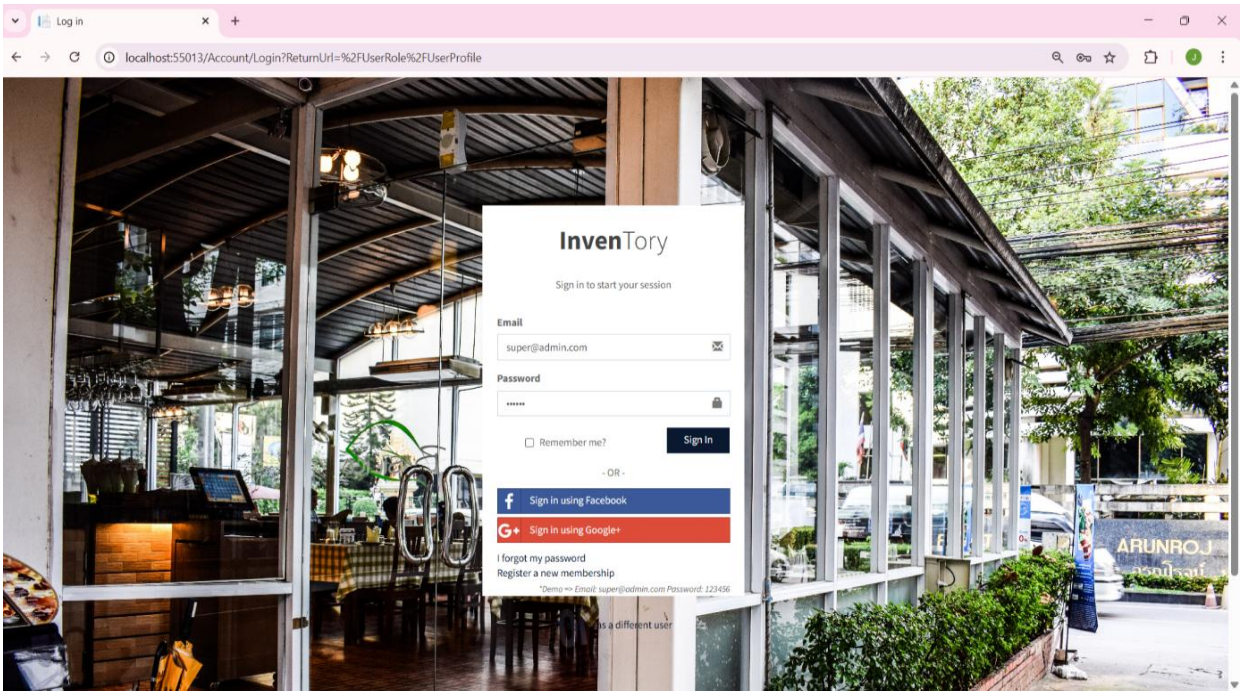

Fig: 1. Admin login page of inventory management system

4.2. Programming of Ims:

The inventory management system using the programming languages ASP.NET, Entity frame works, html, CSS, jQuery, Bootstrap, database: SQL server.

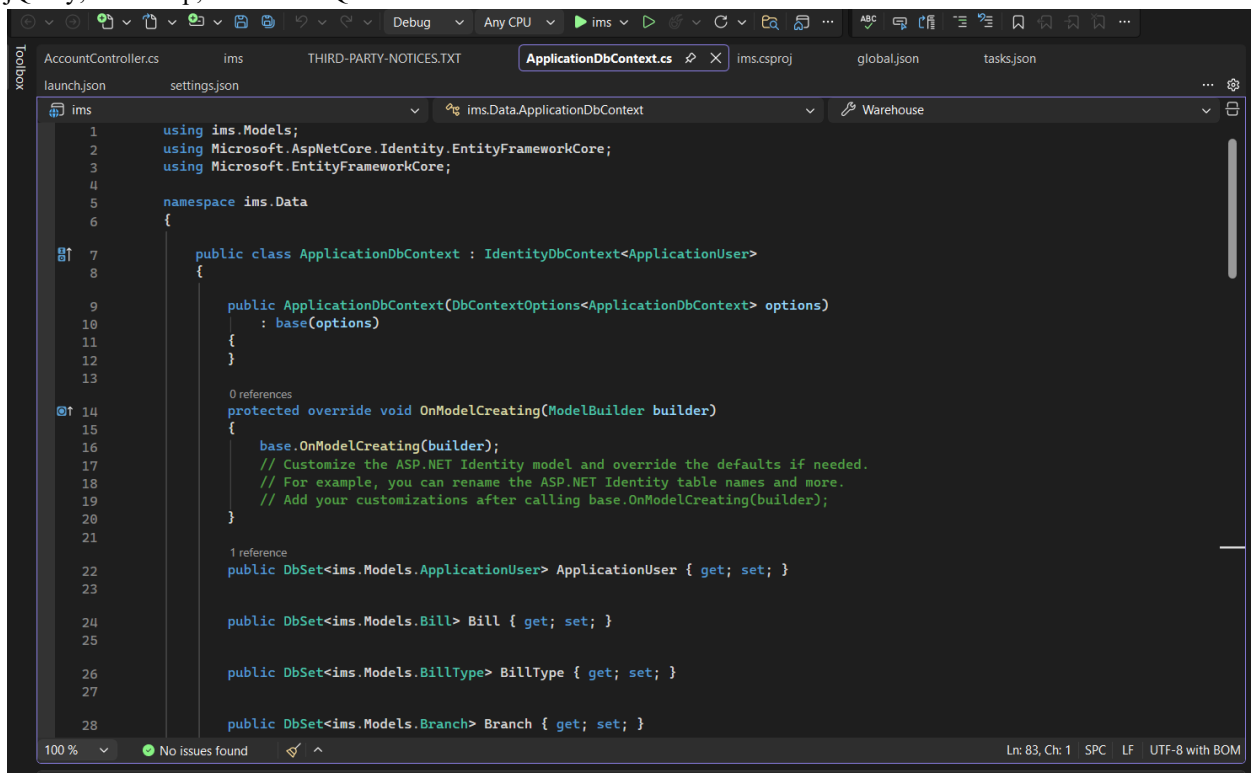

Fig:2. ApplicationDB Context

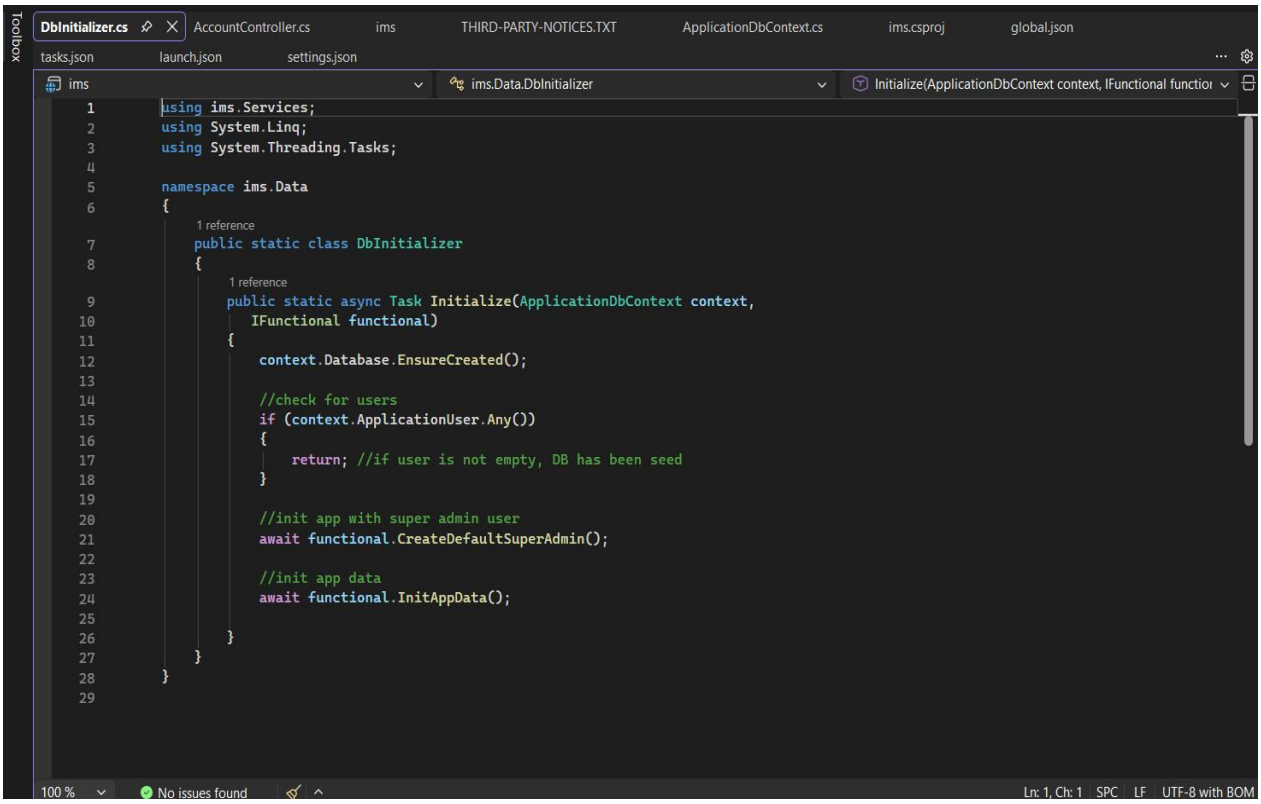

Fig: 3. Data DB Initializer

4.3. Admin Dashboard:

The inventory management system dashboard is the data about products, customers, sales and products. Show from the above Figure.

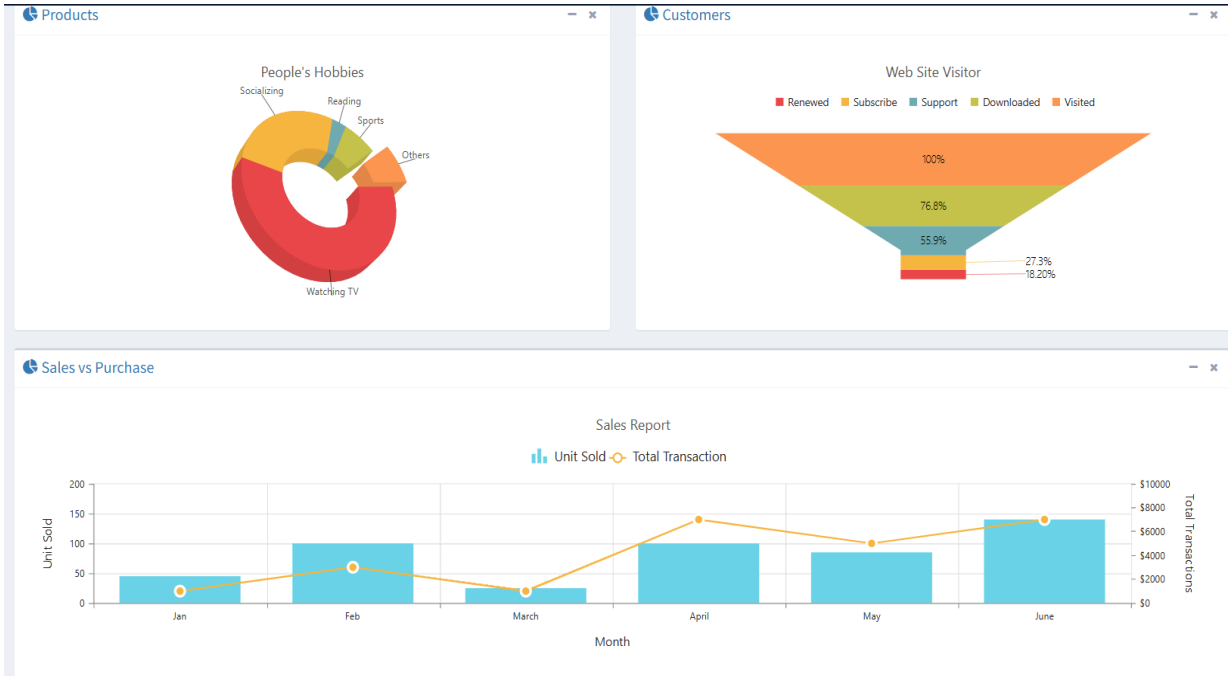

Fig:5. Dashboard for products, sales, customers

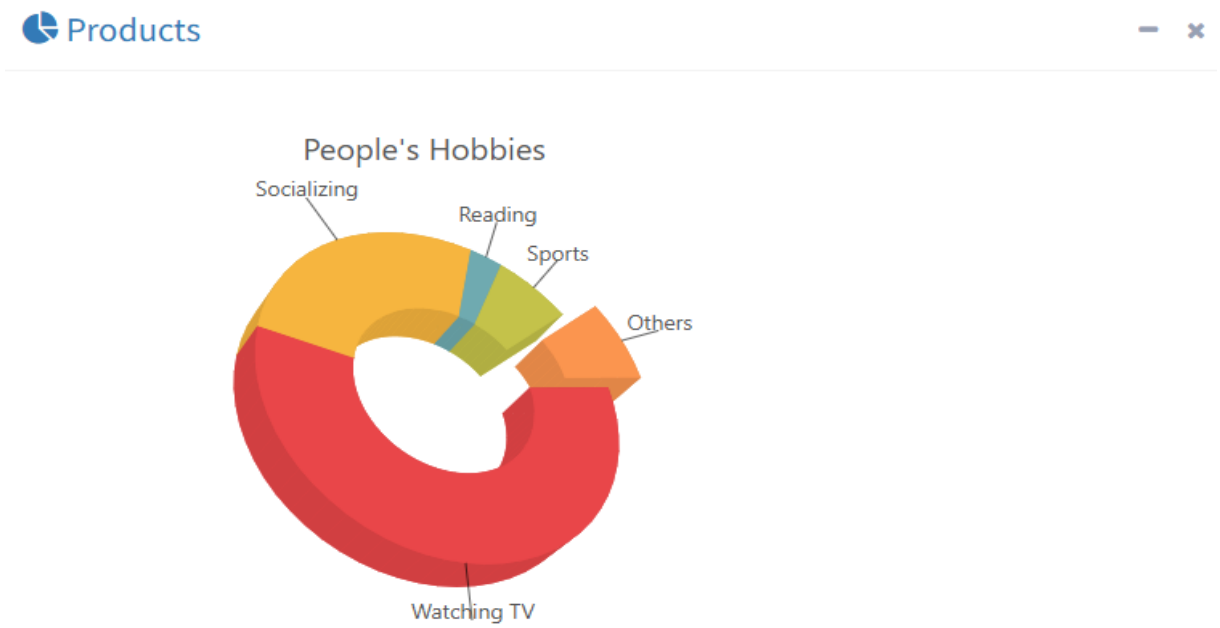

Fig:6. Products for Analysis

4.4. Discussions:

Compared to manual entry, the automated system reduced the time required for weekly inventory audits by approximately 75%. The centralization of data eliminated discrepancies between warehouse records and sales records, which was a frequent issue in the previous manual setup.

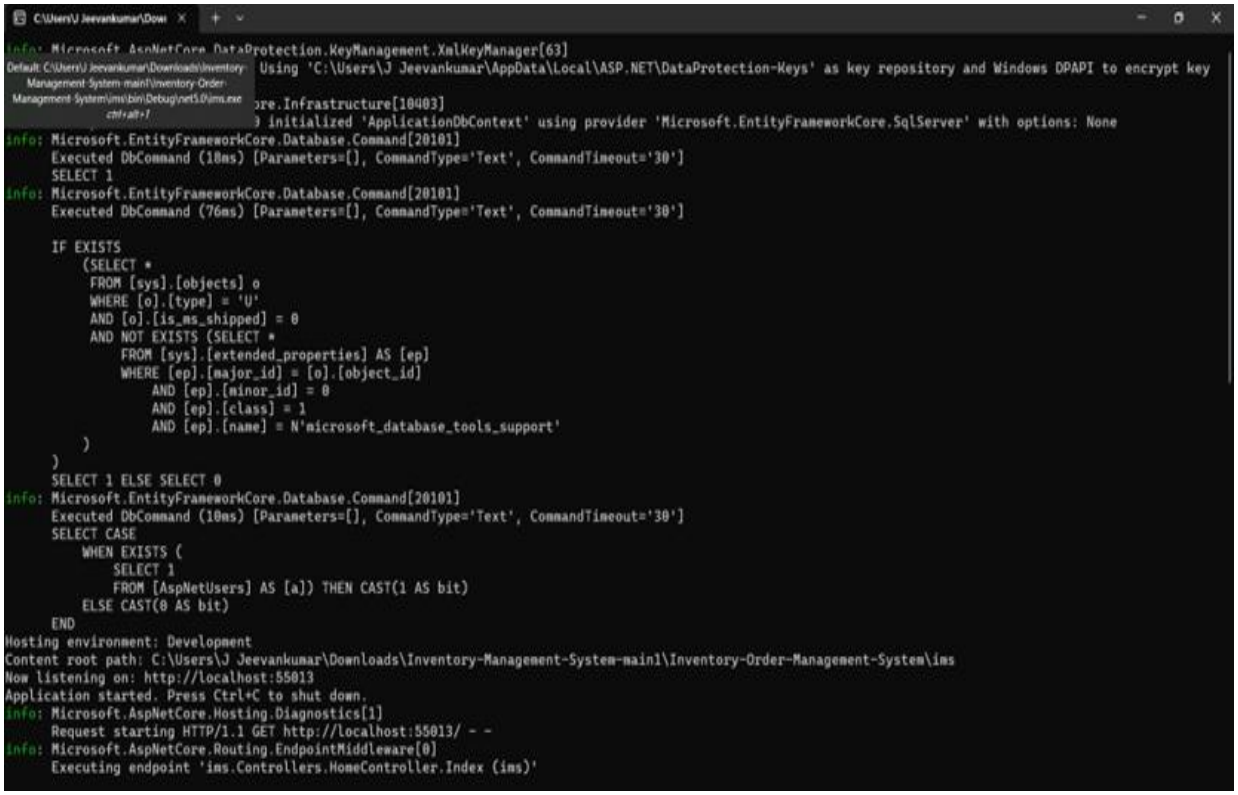

Fig:7. Command prompt of execution program

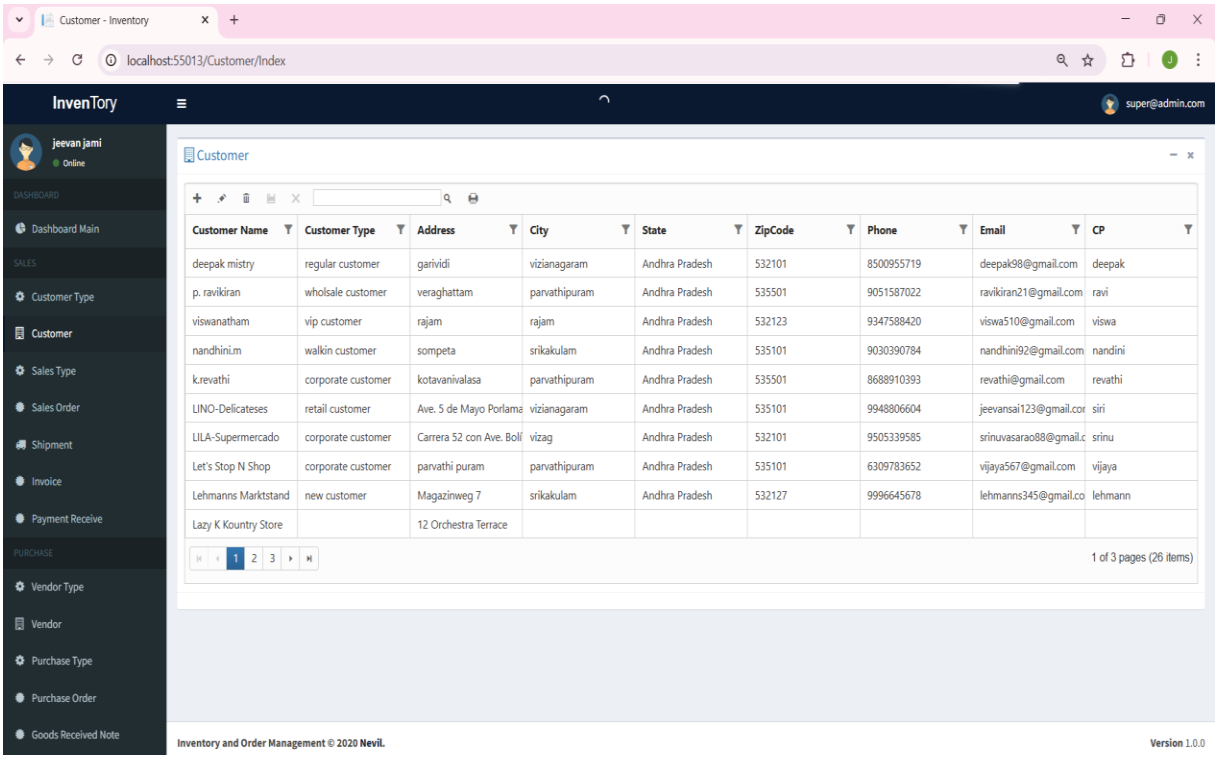

Fig: 8. Customer details

V. CONCLUSION

The" Inventory Management System using ASP.NET" successfully demonstrates how modern web technologies can be harnessed to solve traditional business problems. By providing a secure, scalable, and efficient platform for tracking resources, the system reduces overhead costs and minimizes errors. Future enhancements could include the integration of Barcode/QR code scanning for faster data entry and the implementation of Machine Learning algorithms to predict demand patterns based on historical sales data. It has been a great pleasure for me to work on this exciting and challenging project. This project proved good for me as it provided practical knowledge of not only programming in PHP and MySQL web-based application. It also provides knowledge about the latest technology used in developing web enabled application and client server technology that will be great demand in future. This will provide better opportunities and guidance in future in developing projects independently. Some new features like charts, pipes, day to day sale can be added to the existing system as per requirements. This project can be further customized and used other shops and stock managements. Our project can be used in any shops and used for billing and keeping records of the products as well. It is best way to keep the information and data regarding products, vendor, customers for future aspects and saving time.

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