

Java & DSA

Semester-IV (Batch-2023)

Inventory Management System



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Purpose:

The purpose of this project is to develop a simple and efficient Inventory Management System using Java and basic Data Structures. This project helps in:

- Managing products/items by storing their ID, name, quantity, and price.
- Performing basic operations like Add, Update, Search, Delete, and Display items.
- Gaining hands-on experience in Java programming and using HashMap for real-life use cases.
- Strengthening the concepts of Object-Oriented Programming (OOP) and DSA.
- Creating a resume-worthy project to showcase skills in college or job interviews.

Objectives

- To build a functional inventory system using Java and basic data structures like HashMap.
- To perform key inventory operations such as Add, Update, Delete, Search, and Display items.
- To apply Object-Oriented Programming (OOP) concepts like classes, objects, and constructors.
- To strengthen Data Structures and Algorithm (DSA) skills by implementing logical operations efficiently.
- To improve command-line interaction skills using Java's Scanner and console-based inputs.
- To create a mini-project that is resume-worthy, suitable for academic submissions, interviews, or internships.
- To lay the foundation for future upgrades, like adding GUI, database, or web-based interface.

Scope

• Basic Inventory Handling:

Allows users to add, update, search, delete, and view inventory items using a command-line interface.

- **Console-Based Operations:**

Entire system runs in terminal, helping students understand how back-end logic works without GUI distractions.

- **DSA Practice:**

Uses `HashMap` (from Java Collections Framework) to practice real-world use of data structures for fast access and storage.

- **Object-Oriented Programming:**

Demonstrates use of classes, objects, constructors, and encapsulation to manage inventory data.

- **Scalable Foundation:**

The current system can later be extended with:

- Database integration (MySQL, SQLite)
- GUI interface (JavaFX or Swing)
- Web interface using Spring Boot or JSP/Servlet
- Delete Student – Remove a student record with confirmation
- Update Marks – Modify the marks of an existing student
- GUI Dialogs – Use Whiptail to interact with the user in an intuitive way

Features and Functionality

Add Item

- Allows the user to add a new item by entering its ID, name, quantity, and price.
- Prevents duplicate entries by checking if the item ID already exists.

Update Quantity

- Lets the user update the quantity of an existing item using its unique ID.

Search Item

- Searches for an item in the inventory based on its ID and displays the details if found.

Delete Item

- Removes an item from the inventory using its ID.

Display All Items

- Displays all items currently stored in the inventory with their complete details.

Invalid Input Handling

- Handles invalid inputs and displays appropriate error messages.

Menu-Driven Interface

- Uses a simple command-line interface that repeatedly shows the menu until the user exits

Technology and Tools

Programming Language:

- Java (Core Java)

Data Structures Used:

- HashMap (from Java Collections Framework)
- Object-Oriented Programming concepts (Classes, Objects, Constructors)

Development Environment:

- Visual Studio Code (VS Code) or any Java IDE like IntelliJ IDEA or Eclipse

Compiler/Runtime:

- Java Development Kit (JDK 17 or later)

Input Method:

- Console-based input using Scanner class

Expected Outcome

The expected outcome of this project is a fully functional, console-based Inventory Management System that allows users to manage items efficiently. It should support operations like adding, updating, deleting, searching, and displaying items with proper input validation. The system will demonstrate practical use of core Java concepts such as object-oriented programming and HashMap from the Java Collections Framework. It will help users understand how real-world inventory systems work and serve as a solid addition to the student's portfolio or resume.

Advantages

This project provides hands-on experience with core Java and data structures, helping to strengthen programming logic and problem-solving skills. It improves understanding of object-oriented programming through practical implementation. The menu-driven approach makes the system user-friendly and easy to navigate. By managing real-time inventory tasks, the project mimics real-world scenarios, making it useful for both learning and showcasing in interviews. It also lays a strong foundation for building more advanced applications in the future.

Future Scope

- Add database connectivity (e.g., MySQL) for permanent data storage
- Implement a graphical user interface (GUI) using JavaFX or Swing
- Add user authentication (login/signup system) for data security
- Include category-wise item management (e.g., electronics, groceries)
- Generate reports like low-stock alerts or total inventory value
- Implement file handling to save and load inventory data locally

Conclusion

The **Inventory Management System** built in Java demonstrates the use of core **Data Structures** like **HashMap**, **ArrayList**, and **LinkedList** to efficiently manage products, stock, and sales. The system incorporates key algorithms like **binary search** for fast lookups and sorting. With a simple **CLI interface**, it provides a user-friendly way to add, update, and track inventory. This project serves as a great introduction to Java programming, **DSA**, and real-world business applications, laying the foundation for more advanced systems in the future.