**Inventory Management System Project Report**

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**Introduction**

The Inventory Management System is a comprehensive software solution designed to streamline and automate inventory-related operations for a business. This system is developed in C++ and utilizes various data structures for efficient storage and retrieval of product information. The project encompasses features for inventory management, order processing, and user interaction.

**Key Features**

**1. Inventory Management**

The system employs a variety of data structures to manage the inventory efficiently. The core data structures include:

Hash Table: Used for storing products based on their names. The hash function ensures quick access to product information.

Linked List: Implemented as a singly linked list, it is used for handling collisions in the hash table.

AVL Tree: This balanced binary search tree is employed to maintain a sorted order of products. It ensures quick retrieval and insertion operations.

**2. User and Manager Interfaces**

The system provides separate interfaces for users and managers

User Interface:

Users can add products to their shopping cart, remove items, and proceed to checkout.

The user interface is interactive and easy to navigate.

Users have the option to exit the system.

Manager Interface:

Managers can perform various inventory-related tasks such as adding, updating, and deleting products.

Sorting functionality is available for managers to view the inventory in sorted order.

The manager interface provides an exit option to return to the main menu.

**3. Sorting Algorithm**

The system implements the QuickSort algorithm to efficiently sort the inventory based on stock levels. This sorting functionality provides managers with a quick overview of product availability.

**Implementation Details**

**1. Inventory Management**

The inventory is managed through a combination of a hash table and linked lists. Each product is stored in the hash table, and collisions are handled using linked lists. This ensures efficient retrieval and storage of product information.

**2. AVL Tree**

The AVL tree is employed to maintain a sorted order of products based on their names. This allows for efficient searching and insertion operations.

**3. Sorting**

The QuickSort algorithm is implemented to sort the inventory based on the stock levels of the products. This algorithm ensures a fast and reliable sorting process.

**Usage Instructions**

The Inventory Management System is designed to be user-friendly. Users and managers can navigate through the menus using simple numeric inputs. The system provides clear instructions for each functionality, making it accessible for users with varying levels of technical expertise.

**Conclusion**

The Inventory Management System is a robust and efficient solution for businesses to manage their inventory seamlessly. The combination of hash tables, linked lists, AVL trees, and sorting algorithms ensures optimal performance for various operations. The user and manager interfaces enhance the overall usability of the system, making it a valuable asset for businesses seeking an organized and streamlined inventory management process.