Data structures are fundamental building blocks for organizing and managing data efficiently.

Algorithms provide a systematic way to perform operations on these data structures.

In inventory management, we deal with various tasks like adding, updating, and deleting products. Proper data structures and algorithms help optimize these tasks.

**Suitable Data Structures:**

For inventory management, consider the following data structures:

**ArrayList (Dynamic Array):** Suitable for scenarios where the number of products is known in advance and doesn’t change frequently. Provides fast random access.

**HashMap (or Dictionary):** Ideal for scenarios where quick look-up by product ID is essential. It associates each product with a unique key (product ID).

**LinkedList:** Useful if frequent insertions and deletions are expected.

**TreeMap (or Balanced Binary Search Tree):** Suitable for maintaining products in sorted order (e.g., by product name or price).

1. **Implementation:**

*(Available in InventoryManagementSystem.java file.)*

1. **Analysis:**
   * **Time Complexity:**
     + Adding a product: O(1) (for HashMap), O(n) (for ArrayList if resizing is needed).
     + Updating a product: O(1) (for HashMap), O(n) (for ArrayList if searching is needed).
     + Deleting a product: O(1) (for HashMap), O(n) (for ArrayList if searching is needed).
   * **Optimization:**
     + Consider using proper hashing functions for HashMap to minimize collisions.
     + Use appropriate indexing or sorting techniques for other data structures.