**Inventory Management System**

**Why Data Structures And Algorithms Are Essential**

In an inventory system, efficient storage and retrieval of product information is essential as the dataset can grow very large. Using the right data structures improves speed and minimizes memory usage.

For this problem the data structure we are going to be using will be HashMap as it has O(1) for most of its operations. In Hashmap we are going to be storing the products object as the value and productId as the key value.

**Analysis And Optimization**

| Operation | Time Complexity | Notes |
| --- | --- | --- |
| Add product | O(1) | Constant time insertion |
| Update product | O(1) | Direct access via productId |
| Delete product | O(1) | Removal of Product using key |

The main optimization that we can do is using a ConcurrentHashMap to allow for multiple threads to access and modify the map concurrently. This allows for thread-safe execution.