# Inventory Management System

## 1. Understand the Problem

Data structures and algorithms are essential in managing large inventories because they allow efficient storage, retrieval, and manipulation of data. Without them, the system can become slow and inefficient as the amount of data grows.

Suitable data structures for inventory management include:

* Arrays or Lists: Simple but not optimal for search or update operations.
* HashMaps (Dictionaries): Allow fast access, updates, and deletions using product IDs as keys.
* Trees: Useful if sorting or range queries are required.

## 4. Analysis

If we use a HashMap to store products by their productId:

* Add Operation: O(1) average time complexity.
* Update Operation: O(1) average time complexity.
* Delete Operation: O(1) average time complexity.

To optimize operations:

* Use HashMap for constant-time access based on productId.
* Avoid using data structures like arrays for large datasets unless necessary.
* Maintain clean and consistent keys to prevent collisions or errors.