Exercise – 1

1. Understanding the Problem

Why Data Structures and Algorithms are Essential: Efficiently handling user input involves using data structures that allow quick updates and retrieval of information. For inventory systems, this means efficiently managing how products are added, updated, or removed based on user commands

4. Analysis

Time Complexity Analysis:

- **Add Product:** O(1) average time complexity using HashMap for storing products.
- **Update Product:** O(1) average time complexity, as HashMap allows quick lookup and updating of the product.
- **Delete Product:** O(1) average time complexity due to efficient removal in HashMap.

Optimization:

- **HashMap Efficiency:** For managing a large inventory, HashMap provides efficient storage and retrieval, keeping operations fast.
- **Error Handling:** We can implement validation checks for user inputs to ensure data integrity and avoid errors