Que1. Explain why data structures and algorithms are essential in handling large inventories?

Ans: Data structures and algorithms are essential in handling large inventories:

* Data structures and algorithms provide a systematic approach to problem-solving. They enable programmers to break down complex problems into smaller, more manageable components, allowing for step-by-step analysis and efficient implementation.
* Efficient resource utilization is essential in software development. Data structures and algorithms help manage memory and computational resources effectively.

Que2. Discuss the types of data structures suitable for this problem.

Ans: In this problem we have to store different objects of Product class, hence we can use:

1. ArrayList
2. HashMap
3. LinkedList

Que3. Analyse the time complexity of each operation (add, update, delete) in your chosen data structure?

Ans: I have chosen HashMap and the time complexity of each function is as follows:

1. Add: The time complexity of this function is O(1) as adds the object to the last place of the list.
2. Update: The time complexity of this function is O(1) if we know the index of every object as we can just manipulate the value at that index, but if we don’t know the index searching can take O(n) or O(logn).
3. Delete: The time complexity of this function is O(n) as it first removes the product at that index and then shifts all subsequent elements one position to the left to fill the gap left by the removed element

Que4. Discuss how you can optimize these operations?

Ans: One of the possible ways of optimising these operations is to use a HashMap, as updating and deleting in a HashMap takes O(1) time complexity.