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

Data structures and algorithms are vital in dealing with large inventories because they are the ones that organize and regulate the data with great efficiency. The type of data structure has a direct impact on the speed of the operations for example searching, adding, updating, and deleting the elements.

Discuss the types of data structures suitable for this problem.

Data Structure Considerations:

* ArrayList: Good for maintaining a list of items. Provides fast access to elements via indexing but has slower insertion and deletion operations if the list needs to be resized or elements shifted.
* HashMap: Ideal for storing key-value pairs, where each product can be accessed via a unique identifier (key). It offers constant time complexity for add, update, and delete operations if hash collisions are minimal.

We are using a HashMap is suitable for this scenario because it allows quick access, addition, and removal of products based on their unique productId.

Time Complexity Analysis:

* Adding a Product: O(1) in average cases because inserting into a HashMap is generally constant time.
* Updating a Product: O(1) since it involves replacing the value at a specific key.
* Deleting a Product: O(1) as it involves removing the key-value pair from the map.

Optimization Considerations:

* Reducing Hash Collisions: Use a good hash function and ensure the initial capacity of the HashMap is appropriate for the expected number of entries to minimize collisions.
* Memory Management: Regularly clear out or compress the data to free up memory.