Library Management System

1. Understand the Problem:

* Efficient data structures and algorithms are crucial for handling large inventories because they help in optimizing performance, reduce complexity, and enhance scalability.
* For an inventory management system, there are two data structures that will be suitable: ArrayList which are good for dynamic arrays where elements can be accessed by index; and; HashMap which are ideal for key-value pairs, allowing fast retrieval, insertion, and deletion based on unique keys.

1. Setup:

* A class “Book” with attributes like “bookId”, “title”, and “author” was created.

1. Implementation:

* Linear search to find books by title was implemented.
* Binary search to find books by title was implemented assuming the list is sorted).

1. Analysis:

* Time Complexity for linear search is O(n) and for binary search, time complexity is O(log n) due to its divide-and-conquer approach.
* Linear search is used for small datasets or unsorted arrays. On the other hand, binary search is used for large datasets with sorted input.