**Exercise 6: Library Management System**

**Linear Search**

It is the simplest searching technique where each element in the list or array is checked one by one until the target element is found or the end of the list is reached. It works on both sorted and unsorted data, which makes it flexible, but it can be inefficient for large datasets because it may require checking every single element.

**Binary Search**

It is a much faster method, but it requires the data to be sorted in advance. It works by repeatedly dividing the list in half and checking the middle element. If the target is equal to the middle element, the search is successful. If the target is smaller, it continues in the left half if larger, it continues in the right half. This divide-and-conquer strategy makes binary search very efficient, especially for large datasets. However, because it needs sorted data, it may not be suitable for lists that change frequently unless sorting is handled efficiently.

**Time Complexity Comparison**

* **Linear Search**: O(n)
* **Binary Search**: O(log n)

**Use Linear Search**:

* When the book list is small.
* When the books are not sorted.
* When changes happen frequently (as sorting repeatedly may be inefficient).

**Use Binary Search**:

* When the book list is large.
* When the list can be kept sorted.
* When you need fast search performance and the cost of sorting is acceptable.