# **Exercise 6: Library Management System**

## **Understand Search Algorithms:**

### **Explain linear search and binary search algorithms**

**Linear Search**

Definition: Linear search is a straightforward searching algorithm that checks each element in a list one at a time until the desired element is found or the list ends.

Time Complexity:

* Best Case: O(1) (when the target is the first element)
* Average Case: O(n)
* Worst Case: O(n) (when the target is not in the list)

Use Cases:

* Useful for small or unsorted lists.
* Simple to implement.

**Binary Search**

Definition: Binary search is a more efficient searching algorithm that works on sorted lists. It repeatedly divides the search interval in half.

Time Complexity:

* Best Case: O(1) (when the middle element is the target)
* Average Case: O(log n)
* Worst Case: O(log n) (when the target is not present)

Use Cases:

* Ideal for large, sorted lists.
* More efficient than linear search for larger datasets.