**Library Management System**

**Understand Search Algorithms**

**Linear Search:**

* Linear search is a straightforward method where each element in the list is checked sequentially until the desired element is found or the list ends.
* **Time Complexity:** O(n), where n is the number of elements in the list.
* **Use Case:** Works well with small or unsorted datasets.

**Binary Search:**

* Binary search is an efficient algorithm that works on sorted lists by repeatedly dividing the search interval in half. It compares the target value to the middle element and decides which half to continue searching in.
* **Time Complexity:** O(log n), where n is the number of elements in the list.
* **Use Case:** Ideal for large, sorted datasets.

**Analysis**

**Time Complexity:**

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

**Comparison and Use Cases:**

* **Linear Search:**
  + **Pros:** Simple to implement, does not require sorted data.
  + **Cons:** Inefficient for large datasets.
  + **Use When:** The list is small or unsorted.
* **Binary Search:**
  + **Pros:** Much faster for large datasets as it significantly reduces the number of comparisons.
  + **Cons:** Requires sorted data.
  + **Use When:** The list is large and sorted, or when sorting can be done efficiently.