**Exercise 6: Library Management System**

**1. Understand Search Algorithms**

**Linear Search:**

* **Description:** It checks each element in the list sequentially until the desired element is found or the end of the list is reached.
* **Time Complexity:** O(n), where n is the number of elements in the list.

**Binary Search:**

* **Description:** It divides the list into halves repeatedly, comparing the target value to the middle element of the list. The search continues in the half where the target might be, effectively reducing the search space by half each time.
* **Time Complexity:** O(log n), where n is the number of elements in the list. Note that binary search requires the list to be sorted.

**4. Analysis**

**Time Complexity Comparison:**

* **Linear Search:** O(n)
  + **Use Case:** Suitable for small datasets or unsorted lists.
* **Binary Search:** O(log n)
  + **Use Case:** Suitable for large, sorted datasets.

**When to Use Each Algorithm:**

* **Linear Search:** Use when the list is unsorted or small. It doesn’t require sorting and is straightforward to implement.
* **Binary Search:** Use when the list is large and sorted. It’s more efficient than linear search due to its logarithmic time complexity, but it requires sorting the list first if it isn't already sorted.