**Exercise 6: Library Management System**

**1. Understand Search Algorithms:**

* **Linear Search:**
  + Checks each element one by one until the target is found or the list ends.
  + Does not require the data to be sorted.
  + Simple to implement and works on any dataset.
* **Binary Search:**
  + Works on sorted data only.
  + Repeatedly divides the search interval in half to locate the target.
  + Much faster than linear search for large, sorted datasets.

**4. Analysis:**

* **Time Complexity Comparison:**
  + **Linear Search:** O(n) in worst case; best case O(1) if target is at the beginning.
  + **Binary Search:** O(log n) in worst and average cases; best case O(1) if the target is at the middle.
* **When to Use Each Algorithm:**
  + **Linear Search:** Use when the dataset is small or unsorted.
  + **Binary Search:** Use when the dataset is large and sorted for better performance.
  + If book records are frequently updated or not maintained in order, linear search may be more practical.
  + For systems with a static, sorted catalog, binary search is ideal for fast lookups.