**Exercise 6: Library Management System**

**Understanding Search Algorithms:**

* **Linear Search**: Simple but inefficient for large datasets (O(n)).
* **Binary Search:** Efficient for sorted datasets, reducing search space by half each time (O(log n)).

**Analysis:**

**Time Complexity Comparison:**

* **Linear Search**
  + **Best Case**: O(1) (when the target element is the middle element)
  + **Average Case**: O(log n)
  + **Worst Case**: O(log n)
* **Binary Search**
  + **Best Case**: O(1) (when the target element is the first element)
  + **Average Case**: O(n) (when the target element is in the middle)
  + **Worst Case**: O(n) (when the target element is the last element or not present)

**When to Use Each Algorithm**

* **Linear Search:**
  + Suitable for small datasets.
  + Useful when the dataset is not sorted.
  + Simpler to implement.
* **Binary Search:**
  + Preferred for large datasets where fast search performance is required.
  + Requires the dataset to be sorted.
  + More efficient for frequent search operations.