**Exercise 6: Library Management System**

**Scenario:**

You are developing a library management system where users can search for books by title or author.

**Understanding Search Algorithms:**

* **Linear Search:** This algorithm checks each element in the list one by one until the desired element is found or the list ends.
* **Binary Search:** This algorithm divides the search interval in half. If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half. Otherwise, narrow it to the upper half. Repeat until the value is found or the interval is empty. Note: This requires the list to be sorted.

**Analysis:**

* **Linear Search:**
  + Time Complexity: O(n) (where n is the number of books).
  + Space Complexity: O(1).
* **Binary Search:**
  + Time Complexity: O(log n) (where n is the number of books, assuming the list is sorted).
  + Space Complexity: O(1).

**Advantages of Binary Search over Linear Search:**

* Binary search is much faster than linear search, especially for large datasets, because it reduces the search interval by half each time.

**When to Use Each Algorithm:**

* **Linear Search:** Use when the dataset is small or unsorted, as it doesn't require sorting the dataset beforehand.
* **Binary Search:** Use when the dataset is large and sorted, as it significantly reduces the number of comparisons needed to find the target element.