Exercise 6: Library Management System

1. Understanding Search Algorithms:

Searching is a fundamental operation in computer science used to retrieve data from a collection.

Two common search algorithms are Linear Search and Binary Search.

Linear Search:

- Also known as sequential search.

- It checks each element one-by-one until the target is found or the list ends.

- It does not require sorted data.

- It works well on small or unsorted datasets.

Pros:

- Simple and easy to implement.

- Can be used on any list (sorted or unsorted).

Cons:

- Inefficient for large datasets as it scans all elements.

Binary Search:

- A more efficient algorithm that divides the list into halves to locate the target.

- Requires the list to be sorted in advance.

- Works by comparing the middle element with the target and discarding half of the search space.

Pros:

- Very efficient on large, sorted datasets.

- Time complexity is significantly lower than linear search.

Cons:

- Cannot be used unless the list is sorted.

- More complex to implement.