Data Structures and Algorithms

Exercise 6:

Library Management System

This project implements a Library Management System using Java to search books by title. It demonstrates linear and binary search algorithms and compares their efficiency in different scenarios. Here's a detailed explanation:

Step 1: Understand Search Algorithms

- **Linear Search**: Scans each item in order; works on **unsorted** data.

  - Time Complexity: *O(n)*

- **Binary Search**: Divides search space in half each time; requires **sorted** data.

  - Time Complexity: *O(log n)*

Step 2: Setup

- *Book* class with *bookId*, *title*, and *author*.

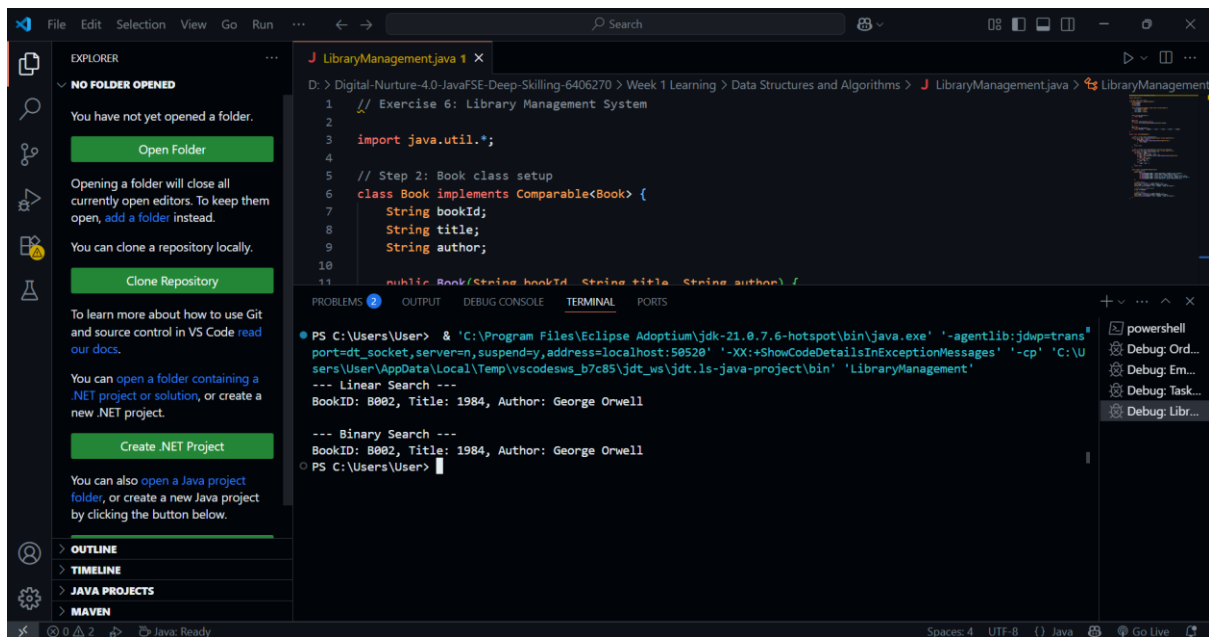
Step 3: Implementation

- *linearSearch()* - direct search through array.

- *binarySearch()* - binary search on sorted array.

- Books are stored in an array and sorted before binary search.

Step 4: Time Complexity Analysis

Search Type	Time Complexity	Requirement
Linear Search	O(n)	Unsorted list
Binary Search	O(log n)	Sorted list

- Use **Linear Search** for small or unsorted data.

- Use **Binary Search** for large, sorted datasets to improve performance.

Output