**Exercise 6: Library Management System**

**Book.java**

package librarymanagementsystem;

public class Book {

    private String bookId;

    private String title;

    private String author;

    public Book(String bookId, String title, String author) {

        this.bookId = bookId;

        this.title = title;

        this.author = author;

    }

    public String getBookId() { return bookId; }

    public String getTitle() { return title; }

    public String getAuthor() { return author; }

    @Override

    public String toString() {

        return "BookID: " + bookId + ", Title: " + title + ", Author: " + author;

    }

}

**BookSearch.java**

package librarymanagementsystem;

public class BookSearch {

    // Linear search by title

    public static Book linearSearch(Book[] books, String targetTitle) {

        for (Book book : books) {

            if (book.getTitle().equalsIgnoreCase(targetTitle)) {

                return book;

            }

        }

        return null;

    }

    // Binary search by title (array must be sorted by title)

    public static Book binarySearch(Book[] books, String targetTitle) {

        int left = 0, right = books.length - 1;

        while (left <= right) {

            int mid = left + (right - left) / 2;

            int cmp = books[mid].getTitle().compareToIgnoreCase(targetTitle);

            if (cmp == 0) {

                return books[mid];

            } else if (cmp < 0) {

                left = mid + 1;

            } else {

                right = mid - 1;

            }

        }

        return null;

    }

}

**Main.java**

package librarymanagementsystem;

import java.util.Arrays;

import java.util.Comparator;

public class Main {

    public static void main(String[] args) {

        Book[] books = {

            new Book("B1", "Java Programming", "James Gosling"),

            new Book("B2", "Data Structures", "Robert Lafore"),

            new Book("B3", "Algorithms", "Thomas Cormen"),

            new Book("B4", "Operating Systems", "Abraham Silberschatz")

        };

        // Linear Search

        String searchTitle = "Algorithms";

        Book found = BookSearch.linearSearch(books, searchTitle);

        System.out.println("\nLinear Search Result: " + (found != null ? found : "Not found"));

        // Sort books by title for binary search

        Arrays.sort(books, Comparator.comparing(Book::getTitle, String.CASE\_INSENSITIVE\_ORDER));

        // Binary Search

        found = BookSearch.binarySearch(books, searchTitle);

        System.out.println("\nBinary Search Result: " + (found != null ? found : "Not found"));

    }

}

