**Exercise 6: Library Management System**

**Code:**

import java.util.Arrays;

import java.util.Comparator;

class Book {

    int bookId;

    String title;

    String author;

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

        this.bookId = bookId;

        this.title = title;

        this.author = author;

    }

    @Override

    public String toString() {

        return "Book ID: " + bookId + ", Title: " + title + ", Author: " + author;

    }

}

public class LibraryManagementSystem {

    // Linear search by title

    public static Book linearSearchByTitle(Book[] books, String title) {

        for (Book book : books) {

            if (book.title.equalsIgnoreCase(title)) {

                return book;

            }

        }

        return null;

    }

    // Binary search by title (assumes books are sorted by title)

    public static Book binarySearchByTitle(Book[] books, String title) {

        int low = 0, high = books.length - 1;

        while (low <= high) {

            int mid = (low + high) / 2;

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

            if (cmp == 0) {

                return books[mid];

            } else if (cmp < 0) {

                low = mid + 1;

            } else {

                high = mid - 1;

            }

        }

        return null;

    }

    public static void main(String[] args) {

        Book[] books = {

            new Book(1, "Java Programming", "James Gosling"),

            new Book(2, "Data Structures", "Robert Lafore"),

            new Book(3, "Operating Systems", "Abraham Silberschatz"),

            new Book(4, "Computer Networks", "Andrew Tanenbaum"),

            new Book(5, "Algorithms", "Thomas Cormen")

        };

        // Linear search

        System.out.println("Linear Search for 'Data Structures':");

        Book foundBook = linearSearchByTitle(books, "Data Structures");

        if (foundBook != null) {

            System.out.println("Found: " + foundBook);

        } else {

            System.out.println("Book not found.");

        }

        // Sort books by title for binary search

        Arrays.sort(books, Comparator.comparing(b -> b.title.toLowerCase()));

        // Binary search

        System.out.println("\nBinary Search for 'Data Structures':");

        Book foundBookBinary = binarySearchByTitle(books, "Data Structures");

        if (foundBookBinary != null) {

            System.out.println("Found: " + foundBookBinary);

        } else {

            System.out.println("Book not found.");

        }

    }

}

**Output:**

