**Course: Data Structure and Algorithms**

LAB Manual

PART A

(PART A: TO BE REFFERED BY STUDENTS)

**Experiment No.01**

**A.1 Aim:**

To study and implement concept of structure and array data structure

**A.2 Prerequisite:**

1. Knowledge of looping, functions and structures
2. Fundamental concepts of C\C++.

PART B

(PART B: TO BE COMPLETED BY STUDENTS)

***(Students must submit the soft copy as per following segments within two hours of the practical. The soft copy must be uploaded on the Blackboard or emailed to the concerned lab in charge faculties at the end of the practical in case the there is no Black board access available)***

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| --- | --- |
| Roll No. A073 | Name: Aryan Srivastava |
| Class: MCA FY | Batch: B3 |
| Date of Experiment: | Date of Submission: 21-07-2024 |
| Grade: | Time of Submission: |
| Date of Grading: |  |

**Task 1:**

**Problem Statement:**

Create structure to manage the books in “Library” with following data item and functions.

* + 1. Name of the book
    2. Author of the book
    3. Price of the book
    4. No. of copies

Implement following functions to perform operations

* 1. Read the data of 5 books
  2. Display the data of books
     + 1. Search the specified book in the library by name, if it is available or not, if available then display no of copies of the book.
       2. Search the specified book in the Library by Author Name, display all the books of the same author.
       3. Sort the list of books by its name.
       4. Issue a book and decrease the number of copies

Solution:

import java.util.\*;

class Book {

    private String name;

    private String author;

    private double price;

    private int copies;

    Book(String name, String author, double price, int copies) {

        this.name = name;

        this.author = author;

        this.price = price;

        this.copies = copies;

    }

    String getName() {

        return name;

    }

    String getAuthor() {

        return author;

    }

    int getCopies() {

        return copies;

    }

    void setCopies(int copies) {

        this.copies = copies;

    }

    void displayBook() {

        System.out.println("name: " + name);

        System.out.println("author: " + author);

        System.out.println("price: " + price);

        System.out.println("copies: " + copies);

    }

}

class Library {

    private ArrayList<Book> books;

    Library() {

        books = new ArrayList<>();

    }

    void addBook(Book book) {

        books.add(book);

    }

    void displayBooks() {

        for (Book book : books) {

            book.displayBook();

            System.out.println();

        }

    }

    void searchBookByName(String name) {

        for (Book book : books) {

            if (book.getName().equalsIgnoreCase(name)) {

                book.displayBook();

                return;

            }

        }

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

    }

   void searchBooksByAuthor(String author) {

        boolean found = false;

        for (Book book : books) {

            if (book.getAuthor().equalsIgnoreCase(author)) {

                if (!found) {

                    found = true;

                }

                book.displayBook();

                System.out.println();

            }

        }

        if (!found) {

            System.out.println("No books found");

        }

    }

void sortBooksByName() {

        for (int i = 0; i < books.size() - 1; i++) {

            for (int j = i + 1; j < books.size(); j++) {

                if (books.get(i).getName().compareTo(books.get(j).getName()) > 0) {

                    Book temp = books.get(i);

                    books.set(i, books.get(j));

                    books.set(j, temp);

                }

            }

        }

    }

   void issueBook(String name) {

        for (Book book : books) {

            if (book.getName().equalsIgnoreCase(name)) {

                if (book.getCopies() > 0) {

                    book.setCopies(book.getCopies() - 1);

                    System.out.println("book issued");

                } else {

                    System.out.println("no books available");

                }

                return;

            }

        }

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

    }

    public static void main(String[] args) {

        Library library = new Library();

        Scanner scanner = new Scanner(System.in);

        for (int i = 0; i < 2; i++) {

            System.out.println("Enter details for book " + (i + 1));

            System.out.print("Name: ");

            String name = scanner.nextLine();

            System.out.print("Author: ");

            String author = scanner.nextLine();

            System.out.print("Price: ");

            double price = scanner.nextDouble();

            System.out.print("Copies: ");

            int copies = scanner.nextInt();

            scanner.nextLine();

            Book book = new Book(name, author, price, copies);

            library.addBook(book);

        }

        System.out.println();

        System.out.println("books in the library: ");

        library.displayBooks();

        System.out.print("Enter the name of the book to search: ");

        String searchName = scanner.nextLine();

        library.searchBookByName(searchName);

        System.out.print("Enter the author name to search: ");

        String searchAuthor = scanner.nextLine();

        library.searchBooksByAuthor(searchAuthor);

        library.sortBooksByName();

        System.out.println("Books in the library after sorting:");

        library.displayBooks();

        System.out.print("Enter the name of the book to issue: ");

        String issueName = scanner.nextLine();

        library.issueBook(issueName);

        System.out.println("Books in the library after issuing:");

        library.displayBooks();

    }

}