HITEC University Taxila

Department of Computer Science
Semester Project Design and Analysis of Algorithms

Project Title: Library Management System using Data Structures and Algorithms
Language/Tool: C++, Java
Program: BCS-4
Instructors: Dr. Muhammad Nazir, Dr. Mudassar Raza
Total Marks: 25

Overview: The Library Management System is a software solution intended to efficiently manage the procedures of a library. This project utilizes various data structures and algorithms to organize and maintain library resources, manage member records, and facilitate seamless borrowing and returning of books.

Key Scenarios:

1. **Book Management:**
    - Efficient storage and retrieval of book information using data structures such as arrays, linked lists, or hash tables.
    - Each book record includes details like title, author, ISBN, category, availability status, and location in the library.
2. **Member Management:**
    - Maintenance of member records using data structures like linked lists or hash tables.
    - Member information includes name, contact details, membership ID, and borrowing history.
3. **Borrowing and Returning:**
    - Implementation of data structures to manage the borrowing and returning process.
    - Availability tracking to ensure that a book is not borrowed when it's already checked out and to update availability status upon return.
4. **Search and Retrieval:**
    - Efficient searching algorithms integrated with data structures to enable users to find books by title, author, ISBN, or category.
    - Quick retrieval of book availability status and location within the library.
5. **Reservation System:**
    - Implementation of data structures to manage book reservations.

- Members can reserve books that are currently unavailable, and the system notifies them when the book becomes available.

6. **Fine Calculation:**
    - Data structures to keep track of due dates and calculate fines for late returns.
    - Automatic fine calculation based on predefined rules and configurable parameters.
7. **Administrative Functions:**
    - Administrative privileges to add, edit, or delete book records and member profiles.
    - Monitoring borrowing patterns and generating reports on library usage.

Project Objectives:

- Utilize data structures such as arrays, linked lists, hash tables, or trees to efficiently manage library resources and member records.
- Implement algorithms for searching, sorting, and managing library operations.
- Design an intuitive user interface for library staff and members to interact with the system seamlessly.
- Enhance code readability, maintainability, and efficiency through modular programming and appropriate use of data structures.

Evaluation Criteria:

- Implementation of Data Structures: 20%
- Efficiency of Search and Retrieval Operations: 15%
- User Interface Design: 15%
- Correctness of Borrowing and Returning Operations: 20%
- Error Handling and Exception Management: 10%
- Administrative Functions and Reports: 10%
- Comments and Documentation: 10%