**NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY**

**B.E / BS PROGRAMME OF USMAN INSTITUTE OF TECHNOLOGY**

**SOFTWARE ENGINEERING DEPARTMENT**

**Spring 2024**

**SE-312 Software Construction and Development**

**Project Summary Report**

Semester: 6th

* **Project Title: “LIBRARY MANAGEMENT SYSTEM”**
* **Team Members:**

|  |  |
| --- | --- |
| **Name** | **Responsibility/Task Assigned** |
| M.Asim (21B-034-SE) | Frontend, Database and Documentation |
| Hafiz M. Osaid Ahmed (21B-213-SE) | Frontend and Backend |
| Huzaifa khalid (21B-018-SE) | Database and Backend |
| Sheroz Akhter (20B-078-SE) | Backend and Documentaation |

**Project Description:**

The Library Management System project aims to create a robust platform to manage library operations, including book inventory, member information, and transaction processing. The purpose of this project is to streamline the management tasks in a library setting, reducing manual errors and increasing efficiency. The project addresses common challenges in library management, such as tracking book loans, managing member records, and ensuring accurate data processing.

**Problem Statement:**

Libraries often face issues with manual record-keeping, leading to data inaccuracies and inefficiencies. The need for a centralized system that can manage various library operations seamlessly is critical.

**Objectives:**

* Develop a user-friendly interface for library staff to manage books, members, and transactions.
* Implement secure authentication for different user roles.
* Ensure data integrity and reliability in record-keeping.
* Facilitate easy access to library resources for members.

**Scope:**

The system includes modules for book management, member management, transaction management, and user authentication. It focuses on providing a seamless user experience while maintaining data security.

**Constraints/Limitations:**

* Limited to small to medium-sized libraries.
* Requires a computer system with Java Runtime Environment (JRE) installed.
* Basic authentication mechanism that can be enhanced for larger deployments.

**Frontend Languages/Framework/Libraries:**

**Java Swing:** The primary framework used for the graphical user interface (GUI). It provides a set of 'lightweight' (all-Java language) components that work the same on all platforms.

**Reason for Choice:**

* **Cross-Platform Compatibility:** Java Swing allows the application to run on any platform that supports Java.
* **Rich Set of Components:** Provides a variety of GUI components to build a user interface.
* **Ease of Use:** Swing simplifies the creation of windows, buttons, and other elements.

**Backend Languages/Framework/Libraries:**

**Java:** Used for backend logic, including handling user input, processing data, and managing the application flow.

**JDBC (Java Database Connectivity):** For database connectivity and operations.

**Reason for Choice:**

* **Robust and Secure:** Java offers robust features and security mechanisms suitable for application development.
* **Database Management:** JDBC provides a reliable way to connect to databases, execute queries, and manage data efficiently.
* **Object-Oriented:** Facilitates code reusability and modularity.

**The Best/Unique Feature of your Project:**

The unique feature of this Library Management System is its comprehensive management panels for books, members, and transactions. Each panel is designed with a user-friendly interface, providing:

* **Intuitive Data Entry Forms:** For adding and updating records.
* **Efficient Data Retrieval**: Allows quick search and filtering of records.
* **Real-time Updates:** Ensures that changes are reflected instantly across the system.

**Significance:**

* **Enhanced Usability:** Simplifies the user experience for library staff, making daily operations more efficient.
* **Integrated Management**: Combines multiple aspects of library management into a single platform, reducing the need for separate tools.
* **Improved Accuracy:** Automated data handling minimizes human errors, ensuring more reliable records.

This feature significantly adds value to the project by making it a comprehensive solution for library management, capable of handling complex tasks with ease.

**Project and Lab Topics Synchronization:**

**Creating Classes:**

 You have defined multiple classes (“LibraryManagementSystem”, “Book”, “Member”, “Transaction”) and used methods within these classes to perform actions.

**Good Code:**

 Ensure that your classes are well-organized and follow good code practices such as proper naming conventions and method documentation.

**Fundamental principles of OOP:**

* Apply encapsulation by using private fields and providing public getter and setter methods in your Book, Member, and Transaction classes.
* Consider if there are opportunities to use inheritance or interfaces to reduce code duplication.

**Fault tolerance in Java:**

 Used exception handling (try-catch blocks) for SQL operations. Ensure all potential exceptions are handled gracefully.

 Add user-friendly error messages and logging for debugging purposes.

**Java Swing’s:**

* Used Swing components (“JFrame”, “JPanel”, “JButton”, “JTable”, etc.) to create your GUI.
* Enhance your UI by adding more Swing components and improving the layout and design.
* Used GridBagLayout, BorderLayout, and other layout managers to organize your components.