Project Report: Library Management System

1. Introduction

Purpose of the Utility: The purpose of this utility is to create a Library Management System. It allows users to manage a collection of books by adding, displaying, searching, borrowing, and returning books.

Scope and Objectives: The utility aims to provide essential functionalities for a library management system, allowing efficient book management. The objectives include facilitating easy book addition, retrieval, and borrowing for library users.

Project Overview: This project involves developing a Library Management System in C. The system uses a simple book database with book title, author, publication year, and available copies. Users can perform various operations through a menu-driven command-line interface.

2. Utility Design and Implementation

Functionality and Specifications: The utility provides the following functionalities:

- Add Book: Users can add a new book to the library database, providing the book's title, author, publication year, and the number of copies available.
- Display Books: All books in the library are displayed, showing book title, author, publication year, and available copies.
- Search Book: Users can search for a specific book by entering the book's title.
- Borrow Book: Users can borrow a book by providing the book's title, and the number of available copies decreases by one.
- Return Book: Users can return a book by providing the book's title, and the number of available copies increases by one.

Input/Output Requirements: User inputs are taken through the command line, and the utility provides output messages on the command line, displaying results and interactions with the user.

Command-Line Options: The utility presents a menu-driven command-line interface with six options (1-6) to perform specific actions related to book management.

Expected Behavior: The utility should handle user inputs gracefully, providing informative error messages for incorrect inputs. It should accurately perform the requested actions, ensuring proper book addition, display, search, borrowing, and returning.

Modularization and Code Organization: The utility is organized into separate functions, each handling a specific aspect of the Library Management System. Functions are modularized to promote code reusability and maintainability.

Error Handling and Documentation: The utility includes proper error handling mechanisms, managing cases like memory allocation failure or invalid user inputs. Comments and documentation are provided to explain the purpose and functionality of each function.

3. Version Control and Repository Setup

Version Control System Selection: The project uses Git as the version control system to track changes, manage code collaboration, and facilitate code review.

Repository Initialization: A Git repository is initialized to maintain the project's source code, allowing for easy version tracking and collaboration among team members.

Code Management and Collaboration: The Git repository is utilized to manage code changes, review contributions from team members, and merge updates into the main branch.

4. Dependencies and System Requirements

The utility is implemented in C and requires a standard C compiler to build and run. There are no external dependencies, making it compatible with most systems that support C.

5. Usage Instructions

Compilation and Execution: To compile the utility, users need to use a C compiler (e.g., GCC) and run the compilation command. The compiled executable can be executed from the command line to interact with the Library Management System.

Utility Features and Menu Options: The utility presents a menu-driven interface where users can select options (1-6) to perform various operations:

1. **Add Book:** Allows the user to add a new book to the library database, providing book details.

2. **Display Books:** Shows all books in the library, listing book title, author, publication year, and available copies.
3. **Search Book:** Enables the user to search for a specific book by entering the book's title.
4. **Borrow Book:** Allows the user to borrow a book by providing the book's title.
5. **Return Book:** Enables the user to return a book by providing the book's title.
6. **Exit:** Allows the user to exit the Library Management System.

Functionality: Users can add a book by providing its details. They can view all books in the library, search for a specific book, borrow a book (decreasing available copies), and return a book (increasing available copies).

6. License

The Library Management System is distributed under an open-source license (e.g., GNU General Public License) to promote sharing and collaboration within the open-source community. The license ensures that users have the freedom to use, modify, and distribute the utility while providing proper attribution to the original authors.

Please note that this project report is a general outline based on the provided code for a Library Management System. Depending on the actual implementation, additional details and sections may be added to make the report more comprehensive and specific to the project. The utility can be further enhanced with additional features, data persistence, and error handling to make it more robust and user-friendly.