**Software Requirement Specification (SRS) for Library Management System**

**1. Introduction**

**1.1 Purpose**

The Library Management System aims to streamline library operations, including the issuance, return, and management of books. The system supports efficient tracking of issued books, available copies, overdue fines, and catalog details for library members.

**1.2 Scope**

The software allows librarians to manage book inventories and members to borrow and return books within specified limits. Key features include:

- Book catalog management (adding, searching, and displaying books).

- Issuance and return of books.

- Tracking of book copies and overdue fines.

**1.3 Definitions, Acronyms, and Abbreviations**

- Book : A collection of BookCopy objects representing copies of the book.

- BookCopy : A single physical copy of a book, identified by a unique copyId .

- IssuedBook : A record associating a Book , BookCopy , and issueDate for a particular member.

- Member : A library member who can issue and return books.

- Catalog : A collection of books managed by the library.

**2. Functional Requirements**

**2.1 Book Management**

- Add Books : Admins can add books to the catalog with a unique bookId , title, and the number of copies.

- View Book Details : For each book, display its ID, title, total copies, issued copies, and available copies.

- Search Book : Search for a book by its title.

**2.2 Book Issuance**

- A member can issue a book if:

- The number of books they have issued is less than their maxBooks limit.

- Copies of the requested book are available.

- A book copy is marked as issued when successfully borrowed.

**2.3 Book Return**

- A member can return a book they have issued.

- The system calculates overdue fines if the book is returned after the allowed maxDays .

- Fine = (daysOverdue - maxDays) \* Rs 100 .

- The returned copy is marked as available.

**2.4 Member Management**

- Members can:

- View books they have issued.

- Check the number of books currently issued to them.

**2.5 Catalog Management**

- Display all books in the catalog with their details.

**3. System Features**

**3.1 Member Class**

**Attributes:**

name : Name of the member.

maxBooks : Maximum books allowed for issuance.

maxDays : Maximum days allowed before fines apply.

issuedBooks : List of books issued to the member.

**- Methods :**

issueBook(Book book, Date issueDate) : Issues a book to the member.

returnBook(Book book, BookCopy copy) : Returns a book and calculates fines if applicable.

getIssuedCopyById(int copyId) : Finds a specific issued copy by its ID.

displayIssuedBooks() : Displays details of issued books.

**3.2 Book Class**

**- Attributes :**

bookId : Unique identifier.

bookTitle : Title of the book.

copies : List of BookCopy objects.

**- Methods :**

issueCopy() : Marks an available copy as issued.

returnCopy(BookCopy copy) : Marks a copy as available.

getIssuedCopiesCount() : Returns the count of issued copies.

getAvailableCopiesCount() : Returns the count of available copies.

getBookDetails() : Displays all book details.

**3.3 BookCopy Class**

**- Attributes :**

copyId : Unique identifier for the copy.

isIssued : Boolean flag for issuance status.

**3.4 BookCatalog Class**

**- Attributes :**

myBooks : List of Book objects in the catalog.

**- Methods :**

addBook(int bookId, String bookTitle, int totalCopies) : Adds a new book to the catalog.

searchBook(String bookTitle) : Searches for a book by title.

DisplayAllBooks() : Displays details of all books.

**3.5 IssuedBook Class**

**- Attributes :**

book : Reference to the Book object.

copy : Reference to the specific BookCopy .

issueDate : The date of issuance.

**4. Sample Use Cases**

**Use Case 1: Issuing a Book**

1. A member requests a book by its title.

2. The system checks for the availability of a copy and the member’s issuance limit.

3. If conditions are met, the book is issued, and its status is updated.

**Use Case 2: Returning a Book**

1. A member returns a book copy.

2. The system checks the issueDate and calculates fines if overdue.

3. The copy is marked as available and removed from the member's issued list.

**Use Case 3: Viewing Catalog**

1. Admin or member views the catalog.

2. The system displays all books with details such as total copies, issued copies, and available copies.