

Functional Requirements Document

Library Book Loan System

Document Information

- **Document Version:** 1.0
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 - **Project:** Library Book Loan Automation System
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1. Executive Summary

The Library Book Loan System is an automated solution designed to streamline the book borrowing process in public libraries. The system validates book availability, member eligibility, and financial standing before approving loan requests.

2. System Overview

2.1 Purpose

To automate the book loan process by implementing a three-tier validation system that ensures efficient resource management and member compliance.

2.2 Scope

The system covers the complete book loan workflow from initial request to final approval or rejection, including inventory management, membership validation, and financial verification.

3. Functional Requirements

3.1 Book Inventory Management (FR-001)

FR-001.1 Book Availability Check

- **Requirement:** The system SHALL verify if the requested book is available in the library's inventory
- **Input:** Book identifier (ISBN, title, or catalog number)
- **Output:** Availability status (Available/Checked Out/Reserved/Not Found)
- **Business Rule:** Only books with status "Available" can proceed to the next validation step

FR-001.2 Inventory Status Updates

- **Requirement:** The system SHALL update book status in real-time when loans are processed
- **Trigger:** Upon successful loan approval
- **Action:** Change book status from "Available" to "Checked Out"

FR-001.3 Multiple Copy Handling

- **Requirement:** The system SHALL handle multiple copies of the same book
- **Logic:** If any copy is available, the book is considered available for loan
- **Action:** Assign a specific copy to the borrower upon approval

3.2 Member Validation (FR-002)

FR-002.1 Membership Verification

- **Requirement:** The system SHALL verify that the borrower has a valid library membership
- **Input:** Member ID or identification credentials
- **Output:** Membership status (Valid/Expired/Suspended/Not Found)
- **Business Rule:** Only members with "Valid" status can proceed to fine verification

FR-002.2 Membership Expiry Check

- **Requirement:** The system SHALL check membership expiration dates
- **Logic:** Current date must be within the membership validity period
- **Action:** Reject loan request if membership is expired

FR-002.3 Member Profile Access

- **Requirement:** The system SHALL retrieve member profile information
- **Data:** Name, contact information, membership type, registration date
- **Purpose:** Display member details for verification and record keeping

3.3 Fine Management (FR-003)

FR-003.1 Outstanding Fine Verification

- **Requirement:** The system SHALL check if the member has outstanding fines exceeding \$10
- **Input:** Member ID
- **Output:** Fine amount and status (Under Limit/Exceeds Limit)

- **Business Rule:** Members with fines \leq \$10 can borrow books; fines $>$ \$10 require payment

FR-003.2 Fine Calculation

- **Requirement:** The system SHALL calculate current outstanding fines
- **Components:** Overdue fees, damage fees, lost book fees, processing fees
- **Logic:** Sum all unpaid fines associated with the member account

FR-003.3 Payment Processing Integration

- **Requirement:** The system SHALL integrate with payment processing for fine payments
- **Action:** Allow members to pay fines before borrowing
- **Update:** Clear paid fines from member account immediately

3.4 Loan Processing (FR-004)

FR-004.1 Loan Approval Workflow

- **Requirement:** The system SHALL process loans only when all conditions are met
- **Conditions:**
 1. Book is available
 2. Member has valid membership
 3. Outstanding fines \leq \$10
- **Action:** Issue book loan with due date and terms

FR-004.2 Loan Record Creation

- **Requirement:** The system SHALL create a loan record for approved transactions
- **Data:** Member ID, Book ID, Loan Date, Due Date, Status
- **Storage:** Maintain loan history for reporting and tracking

FR-004.3 Due Date Calculation

- **Requirement:** The system SHALL calculate and assign due dates for loans
- **Logic:** Standard loan period (configurable, default 14 days)
- **Consideration:** Account for library holidays and closure days

3.5 Rejection Handling (FR-005)

FR-005.1 Rejection Notifications

- **Requirement:** The system SHALL provide clear rejection reasons
- **Messages:** Specific error messages for each validation failure
- **Examples:** "Book not available", "Membership expired", "Outstanding fines exceed limit"

FR-005.2 Resolution Guidance

- **Requirement:** The system SHALL provide guidance for resolving rejection reasons
 - **Actions:** Suggest next steps (renew membership, pay fines, reserve book)
 - **Integration:** Link to relevant system functions for resolution
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4. Business Rules

BR-001: Fine Threshold

- Outstanding fines must not exceed \$10.00 for loan approval
- Exact amount of \$10.00 is considered acceptable

BR-002: Membership Validity

- Only active memberships allow borrowing privileges
- Suspended memberships require administrative clearance

BR-003: Book Availability

- Books must be physically available in the library
- Reserved books are not available for immediate loan

BR-004: Sequential Validation

- All three validation steps must be completed in sequence
 - Failure at any step terminates the process
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5. User Interactions

5.1 Library Staff Interface

- Input book and member identifiers
- View validation results at each step
- Process loan approvals and rejections
- Handle payment processing for fines

5.2 Member Self-Service Interface

- Check book availability
 - View personal account status
 - Pay outstanding fines
 - Receive loan confirmation or rejection notices
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6. Integration Requirements

6.1 Library Management System

- Real-time inventory synchronization
- Member database integration
- Financial system connectivity

6.2 Payment Gateway

- Credit card processing
- Cash payment recording
- Receipt generation

6.3 Notification System

- Email notifications for loan confirmations
 - SMS alerts for due dates
 - System alerts for staff
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7. Data Requirements

7.1 Book Data

- Unique identifiers (ISBN, catalog number)
- Title, author, publication details
- Copy numbers and status
- Location information

7.2 Member Data

- Member ID and personal information

- Membership type and expiration
- Contact details
- Borrowing history

7.3 Financial Data

- Fine amounts and types
 - Payment history
 - Outstanding balances
 - Transaction records
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8. Validation Rules Summary

1. **Book Availability:** Must be "Available" status
 2. **Membership Status:** Must be "Valid" and not expired
 3. **Fine Limit:** Outstanding fines \leq \$10.00
 4. **Sequential Processing:** Each validation must pass before proceeding
 5. **All Conditions Met:** Book issued only when all three validations pass
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9. Success Criteria

- System successfully validates all three conditions in sequence
 - Accurate real-time inventory updates
 - Proper handling of edge cases and error conditions
 - Integration with existing library systems
 - User-friendly interface for staff and members
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This document serves as the foundation for system design and development of the Library Book Loan Automation System.