

# Use Case Document

## Library Book Loan System

### Document Information

- **Document Version:** 1.0
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  - **Project:** Library Book Loan Automation System
  - **Status:** Draft
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## 1. Introduction

### 1.1 Purpose

This document describes the use cases for the Library Book Loan System, detailing all interactions between actors and the system to fulfill business requirements.

### 1.2 Scope

The use cases cover the complete book loan process from initial request through final approval or rejection, including all validation steps and related activities.

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## 2. Actors

### 2.1 Primary Actors

- **Library Staff:** Personnel who process book loans and manage the system
- **Library Member:** Registered users who request book loans
- **System Administrator:** IT personnel who maintain and configure the system

### 2.2 Secondary Actors

- **Payment Gateway:** External system for processing fine payments
  - **Library Management System:** Core system containing book and member data
  - **Notification Service:** System for sending alerts and confirmations
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## 3. Use Case Overview

### 3.1 Use Case List

1. **UC-001:** Process Book Loan Request
  2. **UC-002:** Check Book Availability
  3. **UC-003:** Validate Member Membership
  4. **UC-004:** Verify Member Fines
  5. **UC-005:** Process Fine Payment
  6. **UC-006:** Issue Book Loan
  7. **UC-007:** Handle Loan Rejection
  8. **UC-008:** View Member Account Status
  9. **UC-009:** Update Book Inventory
  10. **UC-010:** Generate Loan Reports
  11. **UC-011:** Manage System Configuration
  12. **UC-012:** Handle Member Self-Service
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## 4. Detailed Use Cases

### UC-001: Process Book Loan Request

**Actor:** Library Staff **Goal:** Process a member's request to borrow a book **Preconditions:** System is operational, staff is authenticated **Postconditions:** Book is either issued or request is rejected with reason

#### Main Success Scenario:

1. Library Staff enters book identifier (ISBN, title, or catalog number)
2. System validates book availability
3. Library Staff enters member identifier
4. System validates member membership status
5. System checks member's outstanding fines
6. System processes loan approval
7. System updates book status to "Checked Out"
8. System creates loan record with due date
9. System displays loan confirmation
10. Library Staff provides book to member

#### Alternative Flows:

- **A1:** Book not available
  - 2a. System displays "Book not available" message
  - 2b. System suggests alternative copies or reservation option
  - 2c. Use case ends
- **A2:** Invalid membership
  - 4a. System displays "Invalid or expired membership" message
  - 4b. System provides membership renewal options
  - 4c. Use case ends
- **A3:** Excessive fines
  - 5a. System displays "Outstanding fines exceed \$10" message
  - 5b. System shows fine details and payment options
  - 5c. Staff can initiate payment process (UC-005)
  - 5d. Use case continues after payment or ends if payment declined

#### **Exception Flows:**

- **E1:** System error during processing
  - System displays error message
  - Staff can retry or escalate to administrator
- **E2:** Network connectivity issues
  - System switches to offline mode if available
  - Manual processing with later synchronization

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### **UC-002: Check Book Availability**

**Actor:** Library Staff, Library Member **Goal:** Verify if a requested book is available for loan **Preconditions:** Book identifier is provided **Postconditions:** Book availability status is determined

#### **Main Success Scenario:**

1. Actor enters book search criteria (ISBN, title, author)
2. System searches library inventory database
3. System retrieves book record and copy information
4. System checks status of all available copies
5. System displays availability status and location

6. If multiple copies exist, system shows count of available copies

### Alternative Flows:

- **A1:** Book not found
    - 2a. System displays "Book not found" message
    - 2b. System suggests similar titles or search alternatives
    - 2c. Use case ends
  - **A2:** All copies checked out
    - 4a. System displays "All copies currently checked out"
    - 4b. System shows expected return dates
    - 4c. System offers reservation option
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## UC-003: Validate Member Membership

**Actor:** Library Staff **Goal:** Verify that a member has valid borrowing privileges **Preconditions:** Member identifier is provided **Postconditions:** Member eligibility is determined

### Main Success Scenario:

1. Staff enters member ID or scans member card
2. System retrieves member record from database
3. System checks membership status (Active/Expired/Suspended)
4. System verifies membership expiration date
5. System confirms member is in good standing
6. System displays member information and status

### Alternative Flows:

- **A1:** Member not found
  - 2a. System displays "Member not found" message
  - 2b. System suggests membership registration
  - 2c. Use case ends
- **A2:** Expired membership
  - 4a. System displays "Membership expired on [date]"
  - 4b. System provides renewal options and procedures
  - 4c. Use case ends

- **A3:** Suspended membership
    - 3a. System displays "Membership suspended" with reason
    - 3b. System shows steps required for reactivation
    - 3c. Use case ends
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## UC-004: Verify Member Fines

**Actor:** Library Staff **Goal:** Check if member's outstanding fines are within acceptable limits **Preconditions:** Valid member record exists **Postconditions:** Fine status is determined and displayed

### Main Success Scenario:

1. System retrieves member's fine history
2. System calculates total outstanding fines
3. System checks if total exceeds \$10 threshold
4. System displays fine details and total amount
5. System confirms member is eligible to borrow (fines  $\leq$  \$10)

### Alternative Flows:

- **A1:** Fines exceed \$10
    - 3a. System displays "Outstanding fines exceed limit: \$[amount]"
    - 3b. System shows itemized fine breakdown
    - 3c. System offers payment options
    - 3d. Use case ends or continues to UC-005
  - **A2:** No outstanding fines
    - 2a. System displays "No outstanding fines"
    - 2b. System confirms member is eligible to borrow
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## UC-005: Process Fine Payment

**Actor:** Library Staff, Library Member **Goal:** Process payment for outstanding library fines **Preconditions:** Member has outstanding fines **Postconditions:** Fines are paid and member account is updated

### Main Success Scenario:

1. System displays fine details and total amount
2. Actor selects payment method (cash, card, online)

3. System processes payment through appropriate gateway
4. Payment is confirmed and receipt is generated
5. System updates member account to reflect payment
6. System clears paid fines from outstanding balance
7. System confirms member is now eligible to borrow

**Alternative Flows:**

- **A1:** Payment declined
    - 3a. System displays "Payment declined" message
    - 3b. System suggests alternative payment methods
    - 3c. Actor can retry or cancel payment
  - **A2:** Partial payment
    - 1a. Actor chooses to pay partial amount
    - 1b. System processes partial payment
    - 1c. System updates remaining balance
    - 1d. System confirms if remaining balance allows borrowing
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**UC-006: Issue Book Loan**

**Actor:** Library Staff **Goal:** Complete the book loan process and create loan record **Preconditions:** All validations passed (book available, member valid, fines acceptable) **Postconditions:** Book is issued and loan record is created

**Main Success Scenario:**

1. System confirms all validation requirements are met
2. System calculates due date based on loan period
3. System creates new loan record with details
4. System updates book status to "Checked Out"
5. System assigns book copy to member
6. System generates loan confirmation with due date
7. System updates member's borrowing history
8. System sends confirmation notification if configured

**Alternative Flows:**

- **A1:** System error during loan creation
    - 3a. System displays error message
    - 3b. System rolls back any partial changes
    - 3c. Staff can retry the process
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## **UC-007: Handle Loan Rejection**

**Actor:** Library Staff **Goal:** Properly handle and communicate loan rejection reasons **Preconditions:** One or more validation steps have failed **Postconditions:** Rejection reason is communicated and resolution options provided

### **Main Success Scenario:**

1. System identifies specific rejection reason
2. System displays clear rejection message
3. System provides specific resolution steps
4. System offers alternative options if available
5. Staff communicates rejection and options to member
6. System logs rejection for reporting purposes

### **Alternative Flows:**

- **A1:** Multiple rejection reasons
    - 2a. System displays all applicable rejection reasons
    - 2b. System prioritizes resolution steps
    - 2c. System provides comprehensive resolution plan
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## **UC-008: View Member Account Status**

**Actor:** Library Staff, Library Member **Goal:** Review complete member account information **Preconditions:** Member exists in system **Postconditions:** Account status is displayed

### **Main Success Scenario:**

1. Actor enters member identifier
2. System retrieves comprehensive member information
3. System displays membership details and status
4. System shows current loans and due dates

5. System displays fine history and outstanding amounts
  6. System shows borrowing history and statistics
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### **UC-009: Update Book Inventory**

**Actor:** Library Staff, System Administrator **Goal:** Maintain accurate book inventory information

**Preconditions:** System access and appropriate permissions **Postconditions:** Inventory is updated and synchronized

#### **Main Success Scenario:**

1. Actor selects inventory update function
  2. System displays current inventory status
  3. Actor makes necessary updates (new books, status changes, etc.)
  4. System validates inventory changes
  5. System updates database and synchronizes with other systems
  6. System confirms updates and displays updated inventory
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### **UC-010: Generate Loan Reports**

**Actor:** Library Staff, System Administrator **Goal:** Generate reports on loan activities and statistics

**Preconditions:** Sufficient data exists for reporting **Postconditions:** Report is generated and accessible

#### **Main Success Scenario:**

1. Actor selects report type and parameters
  2. System retrieves relevant data from database
  3. System processes and formats report data
  4. System generates report in requested format
  5. System displays or exports report
  6. System logs report generation for audit purposes
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### **UC-011: Manage System Configuration**

**Actor:** System Administrator **Goal:** Configure system parameters and settings **Preconditions:**

Administrative access and appropriate permissions **Postconditions:** System configuration is updated

#### **Main Success Scenario:**



1. Administrator accesses system configuration
  2. System displays current configuration settings
  3. Administrator modifies settings as needed
  4. System validates configuration changes
  5. System applies changes and updates all affected components
  6. System confirms configuration updates
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## **UC-012: Handle Member Self-Service**

**Actor:** Library Member **Goal:** Allow members to check their account and perform basic functions

**Preconditions:** Member authentication and system access **Postconditions:** Member completes self-service tasks

### **Main Success Scenario:**

1. Member logs into self-service portal
  2. System displays member dashboard
  3. Member selects desired function (check account, pay fines, etc.)
  4. System processes member request
  5. System displays results and updates account if applicable
  6. System logs member activity
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## **5. Use Case Relationships**

### **5.1 Include Relationships**

- **UC-001** includes **UC-002**, **UC-003**, **UC-004**
- **UC-001** may include **UC-005**, **UC-006**, **UC-007**
- **UC-005** includes payment processing validation
- **UC-006** includes inventory update functionality

### **5.2 Extend Relationships**

- **UC-002** extends with reservation functionality
- **UC-003** extends with membership renewal options
- **UC-004** extends with detailed fine breakdown
- **UC-008** extends with borrowing history analysis

## 5.3 Generalization Relationships

- **UC-008** generalizes staff and member account viewing
  - **UC-009** generalizes various inventory operations
  - **UC-010** generalizes different report types
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## 6. Business Rules Applied

### 6.1 Validation Sequence

- Book availability must be checked first
- Member validation follows book availability
- Fine verification is performed last
- All conditions must be met for loan approval

### 6.2 Fine Threshold

- \$10.00 is the maximum allowable outstanding fine amount
- Exact \$10.00 is acceptable for borrowing
- Payment reduces outstanding balance immediately

### 6.3 Membership Requirements

- Only active, non-expired memberships allow borrowing
  - Suspended memberships require administrative clearance
  - Expired memberships can be renewed during the process
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## 7. Exception Handling

### 7.1 System Exceptions

- Network connectivity issues
- Database unavailability
- External system failures
- Hardware malfunctions

### 7.2 Business Exceptions

- Invalid data input

- Conflicting reservation requests
  - Simultaneous loan attempts
  - Policy violations
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## **8. Performance Considerations**

### **8.1 Response Time Requirements**

- Use case completion within specified time limits
- Real-time validation and feedback
- Efficient database queries and updates

### **8.2 Concurrent Usage**

- Multiple staff processing loans simultaneously
  - Member self-service concurrent with staff operations
  - System performance under peak load conditions
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*This use case document provides comprehensive coverage of all system interactions and serves as the foundation for system design and testing.*