Library Management System Documentation

**1. Introduction**

**1.1 Project Overview**

The Library Management System is a comprehensive software solution designed to streamline the operations of a modern library. Built using ASP.NET Core, this system facilitates efficient management of book checkouts, returns, and late return penalties. It also includes features for book searching and member management.

**1.2 Objectives**

* Automate book checkout and return processes
* Implement a penalty system for late returns
* Provide a user-friendly interface for both librarians and members
* Enable efficient book searching and inventory management
* Streamline member registration and management

**1.3 Scope**

This system covers:

* Book inventory management
* Member registration and management
* Book checkout and return processes
* Penalty calculation for late returns
* Book search functionality
* User authentication for librarians and members

**1.4 Target Audience**

* Librarians: For managing books, members, and transactions
* Library Members: For searching books, viewing borrowed items, and checking penalties
* System Administrators: For system maintenance and support

**2. System Architecture**

**2.1 Technology Stack**

* Backend: ASP.NET Core with C#
* Frontend: HTML, CSS, JavaScript
* Database: SQL Server
* ORM: Entity Framework Core
* Authentication: ASP.NET Core Identity

**2.2 Database Schema**

The database consists of the following main tables:

* Books
* Members
* Checkouts
* Returns
* Penalties



**3. User Guide**

**3.1 Librarian Interface**

**User Authentication**

* 1. Navigate to the login page
* 2. Enter your librarian credentials
* 3. Click "Login"

**Book Management**

* Add a new book: Navigate to "Books" > "Add New Book" and fill in the details
* Edit book details: Click on a book in the list and select "Edit"
* Remove a book: Click on a book and select "Remove"

**Member Management**

* Register a new member: Go to "Members" > "Add New Member"
* Edit member details: Select a member from the list and click "Edit"
* Deactivate a member: Select a member and click "Deactivate"

**Checkout and Return Process**

* Checkout:
* 1. Go to "Transactions" > "New Checkout"
* 2. Scan or enter book ID and member ID
* 3. Confirm checkout details and submit
* Return:
* 1. Go to "Transactions" > "Return Book"
* 2. Scan or enter book ID
* 3. Confirm return and process any applicable penalties

**Penalty Calculation**

Penalties are automatically calculated based on the number of days a book is overdue. The current rate is $0.50 per day.

**3.2 Member Portal**

**User Authentication**

* 1. Go to the member login page
* 2. Enter your membership ID and password
* 3. Click "Login"

**Viewing Borrowed Books**

* After logging in, your current borrowed books are displayed on the dashboard
* Click on a book for more details

**Checking Due Dates**

* Due dates are shown next to each borrowed book on your dashboard
* You can also view a calendar view of due dates in the "My Schedule" section

**Viewing Penalties**

* Any current penalties are displayed in the "My Penalties" section
* Click on a penalty for details on how it was calculated

**4. Features**

**4.1 Book Listing and Search**

* Advanced search options including title, author, genre, and ISBN
* Filtering by availability status
* Sorting options for search results

**4.2 User Authentication**

* Secure login for both librarians and members
* Password reset functionality
* Role-based access control

**4.3 Checkout System**

* Barcode scanning support for quick checkouts
* Automatic due date calculation
* Checkout limit enforcement based on member type

**4.4 Return System**

* Quick return process with barcode scanning
* Automatic penalty calculation for overdue books
* Integration with penalty system

**4.5 Penalty Calculation**

* Configurable penalty rates
* Automatic calculation based on return date
* Integration with member accounts for penalty tracking

**4.6 Member Management**

* Member registration with customizable fields
* Membership renewal process
* Borrowing history tracking

**5. Database Structure**

**5.1 Tables and Relationships**

* Books (Id, Title, Author, ISBN, PublicationYear, Available)
* Members (Id, Name, Email, MembershipType, JoinDate)
* Checkouts (Id, BookId, MemberId, CheckoutDate, DueDate)
* Returns (Id, CheckoutId, ReturnDate)
* Penalties (Id, CheckoutId, Amount, Paid)

**5.2 Key Fields**

* Books.Id: Primary key for Books table
* Members.Id: Primary key for Members table
* Checkouts.Id: Primary key for Checkouts table
* Returns.CheckoutId: Foreign key referencing Checkouts.Id
* Penalties.CheckoutId: Foreign key referencing Checkouts.Id

**6. Testing**

**6.1 Test Cases**

* Unit tests for core business logic
* Integration tests for API endpoints
* UI tests for critical user flows

**6.2 Test Results**

(Summary of test results would be included here, updated with each release)

**8. Deployment**

**6.1 Deployment Process**

* 1. Build the application: dotnet publish -c Release
* 2. Set up the production database
* 3. Configure the web server (IIS, Nginx, etc.)
* 4. Deploy the published files to the web server
* 5. Update connection strings and app settings for the production environment
* 6. Configure SSL certificate

**6.2 Server Requirements**

* Windows Server 2019 or later, or Linux server with .NET Core support
* 4GB RAM minimum, 8GB recommended
* 50GB storage minimum
* SQL Server 2019 or later

**7. Maintenance and Support**

**7.1 Troubleshooting Guide**

* Common Issues and Solutions
* Database connection errors
* Authentication failures
* Performance issues
* Logging and Monitoring
* Location of log files
* Setting up alerts

**7.2 Contact Information**

For technical support, please contact:

Email: support@librarysystem.com

Phone: +20 (111) 123-4567

**8. Future Enhancements**

* Integration with e-book platforms
* Mobile app for members
* Automated email reminders for due dates
* Integration with payment gateways for online penalty payments

**9. Version History**

**Version 1.0.0 (Current)**

* Initial release with core functionality

**Appendices**

**Glossary**

* Checkout: The process of a member borrowing a book
* Due Date: The date by which a borrowed book must be returned
* Penalty: A fine imposed for returning a book after its due date

**FAQs**

* 1. Q: How do I reset my password?

A: Click on the "Forgot Password" link on the login page and follow the instructions sent to your email.

* 2. Q: What happens if I lose a book?

A: Please report lost books to the library staff immediately. You may be charged a replacement fee.