

Scholarium

Modern Library Management System

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1 Abstract

Scholarium is a web-based library management system built using ASP.NET Core MVC. It facilitates efficient library operations through role-based authentication and authorization, providing different functionalities for Admins, Librarians, and Members. Members can request loans for books, and these requests are managed by Admins and Librarians who can approve or cancel them. The system applies penalties for overdue returns based on the number of days the member keeps the book after the return due date. Additionally, the system ensures streamlined processes for returning borrowed books.

Keywords: ASP.NET Core, MVC, EF Core, Library Management System

Contents

| | | |
|-----------|--|----------|
| 1 | Abstract | 1 |
| 2 | Introduction | 3 |
| 3 | System Overview | 3 |
| 3.1 | Purpose | 3 |
| 3.2 | Scope | 3 |
| 4 | System Features | 3 |
| 4.1 | Authentication and Authorization | 3 |
| 4.2 | Book Loan System | 3 |
| 4.2.1 | Loan Durations | 3 |
| 4.3 | Penalty System | 4 |
| 4.4 | Return System | 4 |
| 5 | System Architecture | 4 |
| 5.1 | MVC Pattern | 4 |
| 5.2 | Entity Framework Core | 4 |
| 6 | Database Schema | 4 |
| 7 | Sequence Diagram | 5 |
| 8 | Roles and Permissions | 5 |
| 9 | Penalties and Return System | 6 |
| 10 | User Interface Design | 6 |
| 11 | Future Enhancements | 7 |
| 12 | Conclusion | 7 |

2 Introduction

Scholarium is a library management system developed using ASP.NET Core MVC. It provides a role-based authentication and authorization system with three types of roles: Admin, Librarian, and Member. The system allows members to request loans for books, and these requests can be approved or canceled by an Admin or Librarian. Members can choose the duration for the loan—either 7, 15, or 30 days—and penalties are applied for late returns. The system also includes a return mechanism to manage borrowed books.

3 System Overview

3.1 Purpose

This document describes the architecture, functionality, and data management of Scholarium. It includes diagrams illustrating the database schema and the sequence of operations for borrowing and returning books. The purpose is to provide a clear understanding of how the system operates and its key features.

3.2 Scope

Scholarium is intended for libraries that need a digital system to manage book loans, user roles, and penalties for late returns. It focuses on maintaining efficiency in managing the library's books and users, ensuring that the process of lending books is well-controlled and penalties for overdue returns are automatically applied.

4 System Features

4.1 Authentication and Authorization

Scholarium uses ASP.NET Core Identity to manage users and roles. The system supports three roles with varying access levels:

- **Admin**
- **Librarian**
- **Member**

4.2 Book Loan System

Members can request to borrow books for different durations, and the request remains pending until it is processed by a Librarian.

4.2.1 Loan Durations

The member can select one of the following loan periods:

- 7 days
- 15 days
- 30 days

4.3 Penalty System

Late returns automatically incur penalties, calculated based on how many days the return is overdue. The penalty is applied to the member's account, and they are notified of the overdue status.

4.4 Return System

The member can return the book to avoid penalties. The system tracks return dates and due dates to enforce the timely return of books.

5 System Architecture

5.1 MVC Pattern

Scholarium follows the Model-View-Controller (MVC) design pattern. This separation of concerns ensures maintainability and scalability of the application. Each component has its defined responsibility:

- **Model:** Handles data and business logic (e.g., loan processing, penalties).
- **View:** Renders the user interface.
- **Controller:** Manages communication between the Model and View.

5.2 Entity Framework Core

Entity Framework Core is used to manage database interactions. It maps the database tables to C# classes and provides an abstraction layer for querying and managing data.

6 Database Schema

The database schema consists of several entities as follows:

- **Members:** Stores member details and their role in the library.
- **Authors:** Contains information about book authors.
- **Publishers:** Contains information about book publishers.
- **Librarians:** Stores librarian details.
- **Books:** Contains all relevant information about the books available for loan.
- **Loans:** Manages loan requests made by members and tracks the approval status.
- **Categories:** Categorizes books into different genres or types.

Below is an ERD diagram that represents the relationships between the main entities.

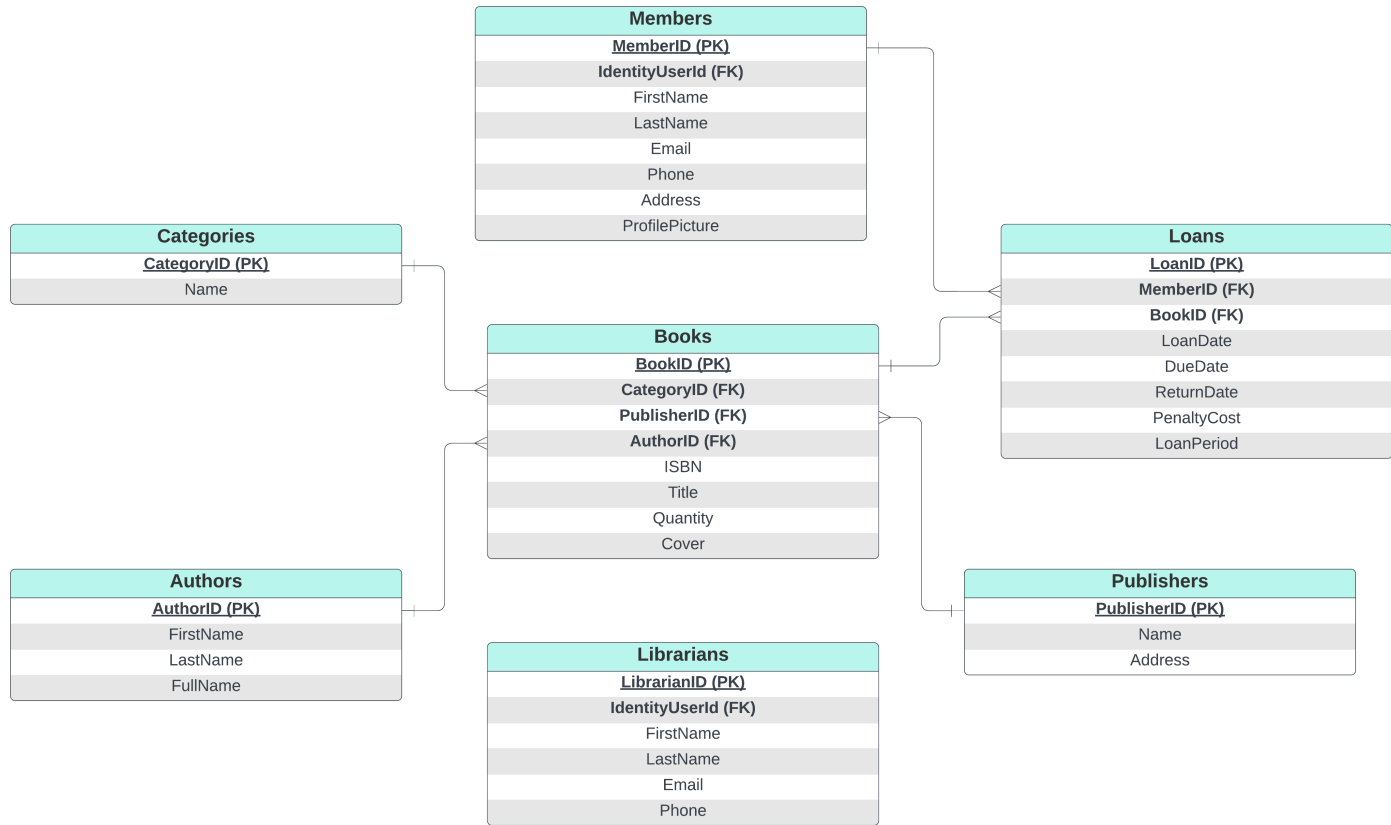


Figure 1: ERD - Database Schema for Scholarium

7 Sequence Diagram

The following sequence diagram represents the process of a member requesting a book loan and the subsequent steps that are followed for approval, rejection, and return.

8 Roles and Permissions

Scholarium defines three roles:

- **Admin:** Manages the overall system, including admin dashboard, promoting the user to be a librarian, demoting a librarian to be a member, adding books to the inventory, and viewing member penalties.
- **Librarian:** Approves or rejects book loan requests, processes book returns, and monitors book availability, adding books to the inventory, and viewing member penalties.
- **Member:** Can request to borrow books and return them by the due date, Browse books, View and edit his profile, and View his own loans.

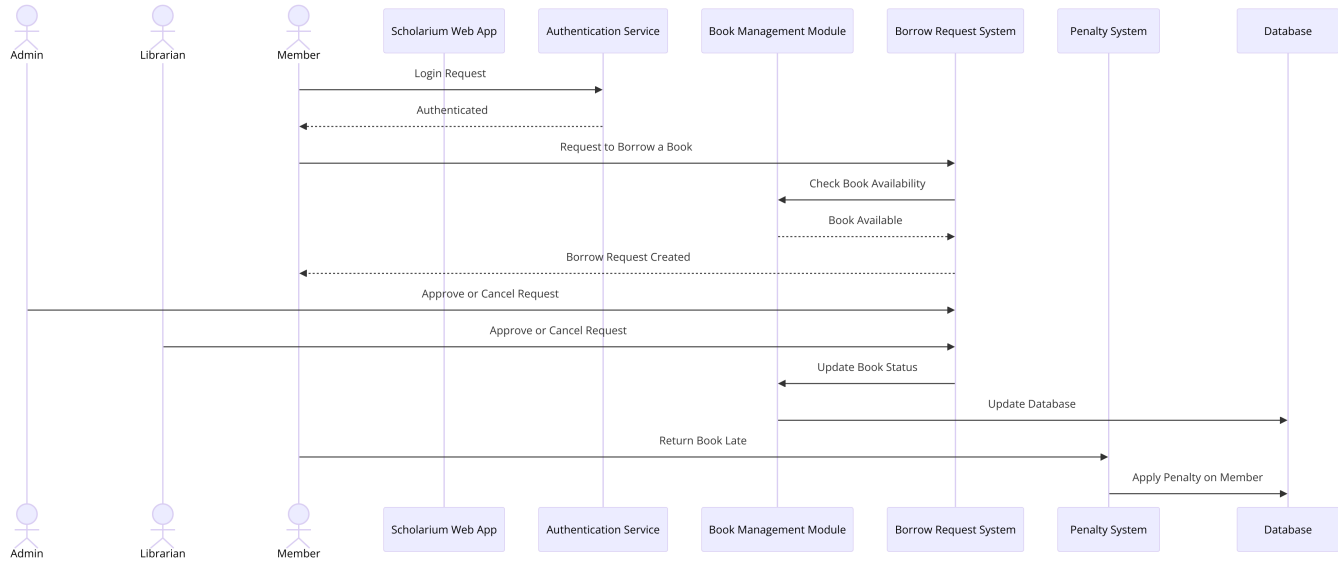


Figure 2: Sequence Diagram for Book Loan Request Process

9 Penalties and Return System

Penalties are calculated based on the duration of the delay. If the book is returned after the loan period expires, a penalty fee is applied. The system automatically calculates and applies these penalties.

10 User Interface Design

The user interface of Scholarium is designed to be intuitive and user-friendly. It includes:

- **Dashboard:** A central hub for Admins and Librarians to view pending requests, available books, and overall library statistics.
- **Member Portal:** A section for members to view their current loans, request new loans, and check penalty statuses.
- **Manage Books:** A page for adding, editing, and deleting book entries in the library's collection. It also includes options for categorizing books and associating them with authors and publishers.
- **Manage Loans:** A section for viewing and approving pending loan requests, tracking ongoing loans, and monitoring overdue books. Librarians can also monitor penalties for late returns.
- **Manage Members:** A page to manage member accounts, including viewing member details, updating information, and handling account suspensions or deletions.

11 Future Enhancements

Future updates to Scholarium may include:

- Integration with external book APIs.
- Enhanced reporting features for Admins and Librarians.
- Book recommendation system for members based on past loaned books

12 Conclusion

Scholarium offers a comprehensive solution for managing library operations, focusing on book loans, penalties, and user roles. It ensures that library staff can handle book borrowing and returning efficiently, and the automated penalty system encourages timely returns.

The system's design promotes a seamless user experience by allowing members to request loans easily and select their preferred borrowing duration—7, 15, or 30 days—while providing librarians and administrators with the necessary tools to manage these requests effectively. By integrating role-based authorization, Scholarium enhances security and accountability, ensuring that each user interacts with the system according to their designated role, whether as an admin, librarian, or member.

Moreover, the ability to manage various entities, including books, authors, publishers, and categories, offers a holistic view of library resources. This interconnectedness not only simplifies tracking and reporting but also aids in maintaining an organized and accessible library catalog.

The system also includes features to manage penalties for late returns, thus encouraging members to adhere to their loan agreements and fostering a sense of responsibility within the library community. This proactive approach to managing loans and penalties ultimately enhances the overall efficiency of library operations.

In conclusion, Scholarium stands as an effective library management system, blending user-friendly interfaces with robust backend functionalities. It not only meets the current needs of library operations but also lays a strong foundation for future enhancements, ensuring that libraries can adapt to evolving user requirements and technological advancements.