Online Library Management System

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Online Library Management System PROJECT REPORT

This Report Presented in Partial Fulfillment of the course **CSE312: Database Management System Lab in the Computer Science and Engineering Department**

DAFFODIL INTERNATIONAL UNIVERSITY

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DECLARATION

We hereby declare that this lab project has been done by us under the supervision of, Shumaiya Akter Shammi , lecturer, Department of Computer Science and Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere as lab projects.

Submitted To:

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COURSE & PROGRAM OUTCOME

The following course have course outcomes as following:.

Table 1: Course Outcome Statements

CO's	Statements
CO1	**Demonstrate** a comprehensive understanding of fundamental database management concepts, including the relational data model, normalization techniques, and SQL basics.
CO2	**Design, implement** and optimize relational databases, incorporating advanced SQL queries, indexing techniques and query optimization strategies.
CO3	Understand and **Analyze** security measures, distributed database architectures and emerging trends in database management, demonstrating an understanding of the broader context and challenges in the field.

Table 2: Mapping of CO, PO, Blooms, KP and CEP

CO	PO	Blooms	KP	CEP
CO1	PO1	C2,A2, P2	K2, K3,K4,K8	EP1, EP4
CO2	PO3	C3, A3, P3	K2,K3,K4, K6, K8	EP1, EP2,EP7
CO3	PO5	C3	K6	EP4

The mapping justification of this table is provided in section **4.3.1**, **4.3.2** and **4.3.3**.

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Chapter 1

Introduction

This chapter provides an overview of the Online Library Management System project, outlining its background, motivation, objectives, feasibility, gap analysis, and the expected outcomes.

1.1 Introduction

Managing books and records in traditional library systems can be tedious and error-prone. The Online Library Management System is developed to simplify library operations through a centralized, digital database. It allows users to borrow, return, and track books efficiently.

1.2 Motivation

The main motivation behind this project is to reduce the manual workload of librarians and improve accessibility for students. In modern education, digital resources save time and enhance learning. Therefore, creating a robust digital library system can significantly improve the user experience.

1.3 Objectives

i. Automate library book management (add, update, issue, return).
ii. Track issued books with due and expiry dates.
iii. Link students and books using unique identifiers.
iv. Ensure data is securely stored in a relational database.

1.4 Feasibility Study

Existing systems like Koha and LibSys are complex and not always student-friendly. Our system focuses on a clean UI with Django and uses SQLite for simplicity. It is ideal for small institutions or universities.

1.5 Gap Analysis

Many open-source systems are bulky, costly, or hard to customize. Our system fills the gap by being lightweight, customizable, and easy to deploy.

1.6 Project Outcome

The developed system provides a student-admin interface, book management, and issue/return modules with database integration and a clean, responsive frontend.

Chapter 2

Proposed Methodology/Architecture

Requirement Analysis & Design Specification

2.1.1 Overview
The system is built using Python (Django), SQLite, and Bootstrap. It offers login-based access for students and admins.

System Design
Models: Book, Student, IssuedBook
Relationships: One-to-One (Student to User), custom links via ISBN & student ID
ER diagram provided in the appendix

2.1.2 Proposed Methodology/ System Design
The system follows a three-tier architecture:

Presentation Layer: The front end of the application (built with HTML, CSS, JavaScript) through which users (admin and members) interact with the system.
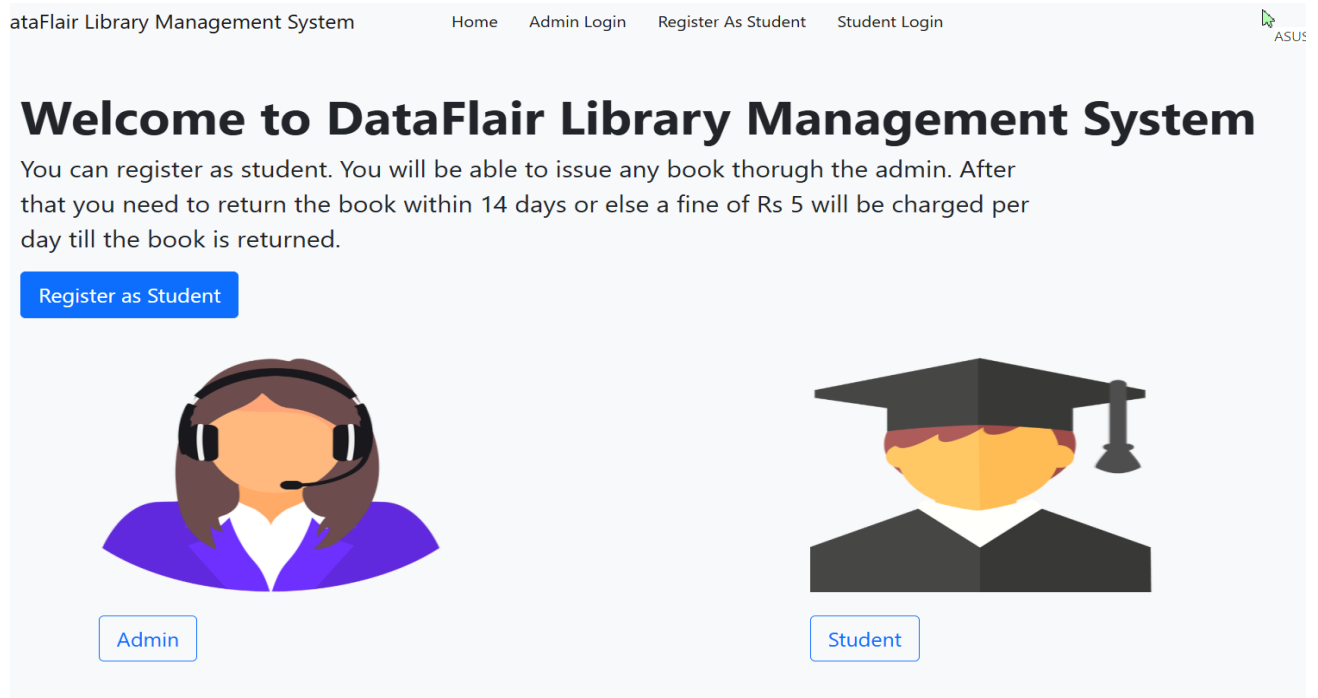
Application Layer: Backend logic (PHP or similar language) that handles business rules and operations such as issuing books, checking fines, etc.

Database Layer: MySQL database where all data (users, books, loans, fines, etc.) is stored and retrieved using SQL

ER Diagram:
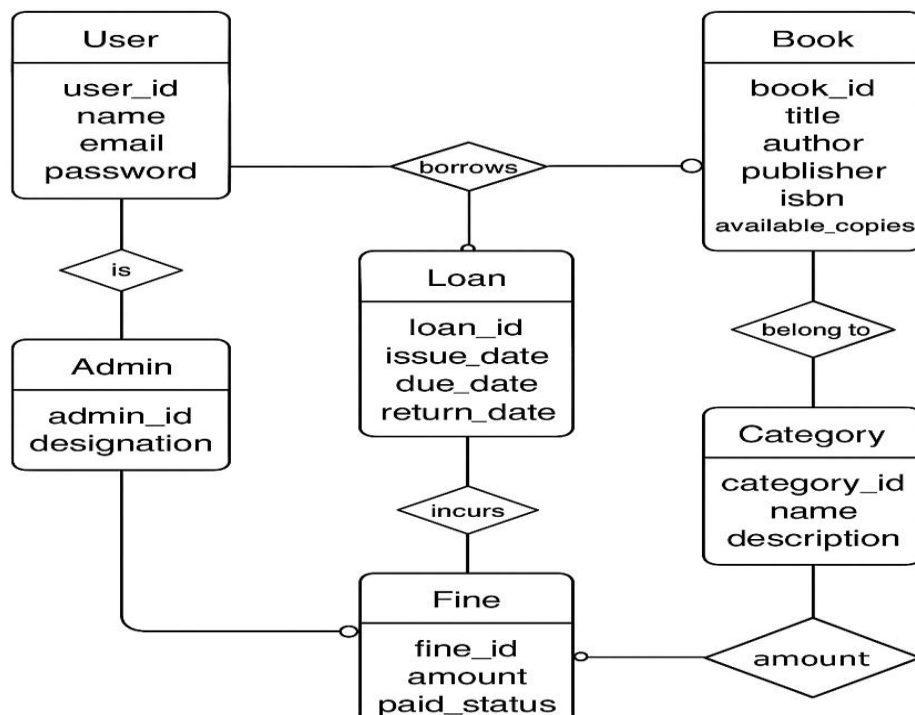
2.1.1   UI Design

Tools and Technologies Used:

Frontend: HTML , python

Backend: PHP (or any other preferred language)

Database: MySQL using XAMPP

ER Diagram Tool: dbdiagram.io / Lucidchart / Draw.io

Security Features

Passwords are stored in hashed format (e.g., MD5/SHA-256).

SQL Injection is prevented using prepared statements.

Role-based access ensures only admins can perform restricted operations

2.2 Overall Project Plan

Requirement Gathering: All necessary information was collected from stakeholders to understand the project's goals and user needs clearly.
• Design and Prototyping: The system architecture and user interface were planned and visualized through wireframes and prototypes.
• Implementation: The approved designs were transformed into a working system by writing clean, efficient, and functional code.
• Testing and Debugging: The system was thoroughly tested to find and fix any bugs, ensuring it worked smoothly and met the requirements.
• Deployment: The final product was deployed in the live environment and made available for users,
with necessary supporrt in place

Chapter 3

Implementation and Results

This chapter outlines the implementation process and results observed.

3.1   Implementation

We used Django's ORM to create and manipulate SQL tables. Sample code:

```
class Book(models.Model):
name = models.CharField(max_length=200)
author = models.CharField(max_length=200)
isbn = models.PositiveIntegerField()
category = models.CharField(max_length=50)
```

3.2   Performance Analysis

SQLite is used for simplicity. While it isn't optimized for large-scale data, it performs well in this small project. Queries using indexes (like ISBN) are fast.

3.3   Results and Discussion

The project met all objectives. All CRUD operations for books and issuing were implemented. Students can log in and view books issued to them. Admins can manage the library completely.

Chapter 4

Engineering Standards and Mapping

This chapter covers ethical, sustainability, and mapping justifications

4.1   Impact on Society, Environment and Sustainability

4.1.1   Impact on Life: Users experience less stress managing books.

4.1.2   Impact on Society & Environment: Reduces paper usage by digitizing book logs.

4.1.3   Ethical Aspects: The system stores student data securely and avoids misuse.

4.1.4   Sustainability Plan: Built using open-source tools, ensuring long-term maintainability.

4.2   Project Management and Team Work

The team worked collaboratively using Git for version control. Each member had a role in frontend, backend, and documentation. No cost incurred.

4.3   Complex Engineering Problem

4.3.1   Mapping of Program Outcome

In this section, provide a mapping of the problem and provided solution with targeted Program Outcomes (PO's).

Table 4.1: Justification of Program Outcomes

PO's	Justification
PO1	Applied relational models and normalization
PO2	Designed, developed, and optimized SQL
PO3	Used modern tools like Django ORM and Git

4.3.2   Complex Problem Solving

In this section, provide a mapping with problem solving categories. For each mapping add subsections to put rationale (Use Table 4.2). For P1, you need to put another mapping with

Handled relational queries with join conditions and filtering logic for issued books using ORM logic

Knowledge profile and rational thereof.

Table 4.2: Mapping with complex problem solving.

EP1 Dept of Knowledge	EP2 Range of Conflicting Requirements	EP3 Depth of Analysis	EP4 Familiarity of Issues	EP5 Extent of Applicable Codes	EP6 Extent Of Stakeholder Involvement	EP7 Inter-dependence
Required strong db and web development expertise	Balancing performance vs security	Need to evaluate multiple solution for cart management		Follow Ow and Asp security standared	User ,Admin, DEveloper	Frontend, backend coupling deploying

4.3.3 Engineering Activities

In this section, provide a mapping with engineering activities. For each mapping add subsections to put rationale (Use Table 4.3).

Table 4.3: Mapping with complex engineering activities.

EA1 Range of resources	EA2 Level of Interaction	EA3 Innovation	EA4 Consequences for society and environment	EA5 Familiarity
Limited to open source tools for cost efficiency	High collaboration between team roles	Creative solution for technical constrain	Reduce carbon footprint in book issues	Mixed experience level in the team

Chapter 5

Conclusion

This chapter summarizes the work, its limitations, and future scope.

5.1 Summary

We developed a functional online library system with three models and implemented complete CRUD and authentication. Students and admins can easily manage library operations.

5.2 Limitations

Limited to one admin panel

No OTP/email notification for overdue

5.4 Future Work

    i. **Add role-based access control**

    ii. **Implement book reservation feature**

    iii. **Integrate SMS/email notifications**

References

W3Schools - SQL Tutorial
https://www.w3schools.com/sql/
- For learning and applying SQL queries in the project.

XAMPP (Apache + MySQL + PHP)
https://www.apachefriends.org/index.html
- Used for backend development and database hosting.

☐ **Elmasri, R., & Navathe, S. B.** (2016). *Fundamentals of Database Systems* (7th ed.). Pearson.
- A comprehensive textbook for database design, ER modeling, normalization, and SQL.