Emma Thompson - CS201 Final Project

Object-Oriented Programming

Project Title: Library Management System

Abstract:
This project implements a comprehensive library management system using Java and object-oriented design principles. The system manages books, users, and lending operations.

Page 2 - System Design

Class Hierarchy:

1. Book class - represents individual books
   - Properties: ISBN, title, author, available
   - Methods: checkOut(), checkIn(), getInfo()

2. User class - represents library users
   - Properties: userID, name, borrowedBooks
   - Methods: borrowBook(), returnBook(), getHistory()

3. Library class - main system controller
   - Manages book inventory and user operations

Page 3 - Implementation Details

Key Features Implemented:

â€¢ Book Search - by title, author, or ISBN
â€¢ User Registration - create and manage user accounts
â€¢ Borrowing System - check out books with due dates
â€¢ Return Processing - handle book returns and late fees
â€¢ Inventory Management - add/remove books from system

Database Integration:
Used MySQL database to store persistent data
Tables: books, users, transactions, late_fees

Page 4 - Code Examples

Sample Book Class:

```
public class Book {
    private String isbn;
    private String title;
    private String author;
    private boolean available;

    public boolean checkOut() {
        if (available) {
            available = false;
            return true;
        }
        return false;
    }
}
```

Page 5 - Testing and Results

Unit Testing:
â€¢ Tested all major functions with JUnit
â€¢ 95% code coverage achieved
â€¢ All test cases passed successfully

Performance Results:
â€¢ Book search: < 100ms for 10,000 records
â€¢ User operations: < 50ms average

Conclusion:
Successfully implemented a functional library management system meeting all project requirements.