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Advanced Web Technology (CIT1303)
University Library Management System
Final PHP Project
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Project Description

We created a web application called the "University Library Management System". This system handles the core operations of a library, including inventory management, user authentication, and book lending. It allows an Admin to manage the entire book catalog, track current loans, and manage all user accounts (students and staff). Students can log in to view their active loans and check due dates. Non-logged-in Guests can search and view the public catalog for book availability. The application is built using a secure PHP backend and a responsive front-end design.

Database Structure

We used MySQL to store all system data. There are three essential tables that link together using Foreign Keys to maintain data integrity:

- **users Table:** Stores student and admin information, including ID, username, password (hashed), and user_type.
- **books Table:** Holds the library inventory, including book titles, authors, ISBN, total_copies, and available_copies.
- **loans Table:** Tracks all lending transactions, linking a specific user_id to a book_id, along with loan_date, due_date, and return_date.

The screenshot shows the phpMyAdmin interface for the 'library_db' database. The left sidebar displays a tree view of databases and tables. The main content area shows a table structure with columns: Table, Action, Rows, Type, Collation, Size, and Overhead. Three tables are listed: books, loans, and users. Below the table, there are buttons for 'Check all' and 'With selected'. At the bottom, there is a 'Create new table' form with fields for Table name (set to 'New') and Number of columns (set to 4), with a 'Create' button.

Figure 1: Database structure showing all tables and relationships.

The screenshot shows the phpMyAdmin interface for the 'users' table within the 'library_db' database. The left sidebar lists databases and tables. The main area shows the table structure with columns: id, username, password, user_type, name, and email. Two rows of data are displayed: one for an administrator ('admin') and one for a student ('ahmed10'). Below the table, there are buttons for 'Edit', 'Copy', 'Delete', and 'Export'. At the bottom, there is a 'Query results operations' section with options for 'Print', 'Copy to clipboard', 'Export', 'Display chart', and 'Create view'.

Figure 2: Structure view of the users table.

The screenshot shows the phpMyAdmin interface for the 'library_db' database. The left sidebar lists databases: New, ct_feedback_db, information_schema, library_db (selected), mysql, performance_schema, phpmyadmin, and test. Under 'library_db', there are tables: New, books, loans, and users. The main panel displays the 'books' table structure. The table has columns: book_id, isbn, title, author, publication_year, category, total_copies, and available_copies. Two rows are shown:

	book_id	isbn	title	author	publication_year	category	total_copies	available_copies
1	1	978-0134764125	PHP Basics	SMITH	2023	Computer Science	5	3
2	3	978-0134764324	Clean Code	Robert Martin	2008	Computer Science	8	7

Below the table, there are buttons for Edit, Copy, Delete, and Export. The status bar at the bottom right shows 4:28 AM 11/26/2025.

Figure 3: Structure view of the books table.

The screenshot shows the phpMyAdmin interface for the 'library_db' database. The left sidebar lists the same databases as Figure 3. The main panel displays the 'loans' table structure. The table has columns: loan_id, book_id, user_id, loan_date, due_date, and return_date. One row is shown:

	loan_id	book_id	user_id	loan_date	due_date	return_date
1	3	3	5	2025-11-26	2025-12-03	NULL

Below the table, there are buttons for Edit, Copy, Delete, and Export. The status bar at the bottom right shows 4:29 AM 11/26/2025.

Figure 4: Structure view of the loans table.

System Pages and Features

The system is split into protected portals and public access areas.

Public Access

The system uses the Login Page to authenticate users and the Public Catalog Page (catalog.php) to allow guests to view the entire inventory.

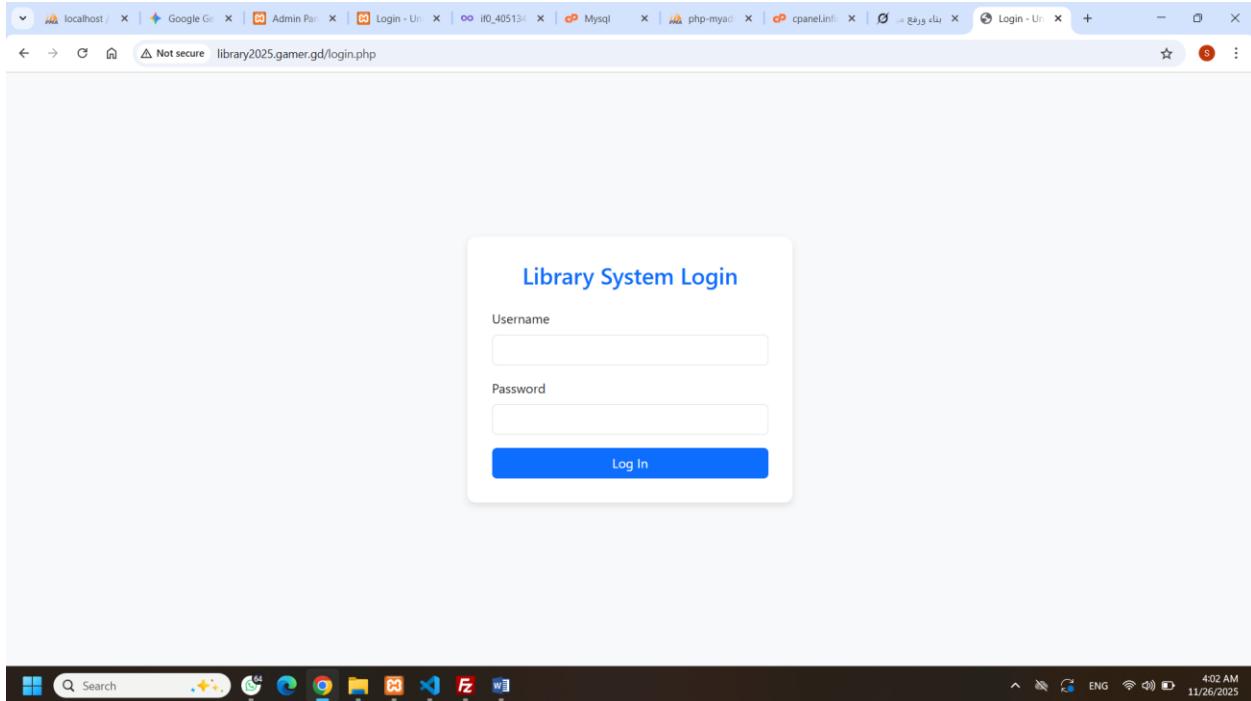


Figure 5: Login page for students and admin.

Library Catalog (Public View)

Log In

All Available Books				
Title	Author	Category	ISBN	Availability
Clean Code	Robert Martin	Computer Science	978-0134764324	Available (7 copies)
PHP Basics	SMITH	Computer Science	978-0134764125	Available (3 copies)

Figure 6: Public Catalog page showing all books and their availability (Guest View).

Admin Portal

The Admin controls all CRUD operations:

- Admin Dashboard: Shows key statistics (Total Books, Current Loans, Total Users).
- Manage Books: Allows the admin to Add (C), View (R), Edit (U), and Delete (D) book records.
- Manage Loans: Allows the admin to perform Check Out (C) and Check In (U) transactions.
- Manage Users: Allows the admin to Add (C), View (R), Edit (U), and Delete (D) user accounts.

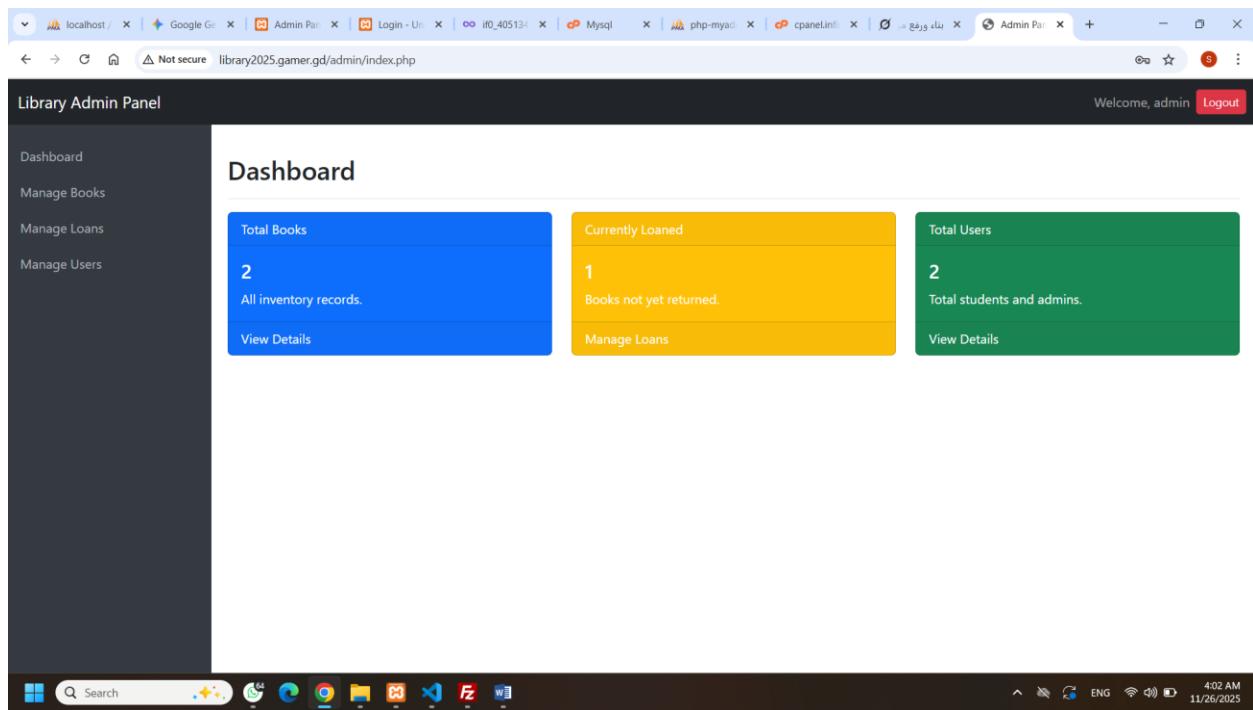


Figure 7: Admin Dashboard with summary statistics.

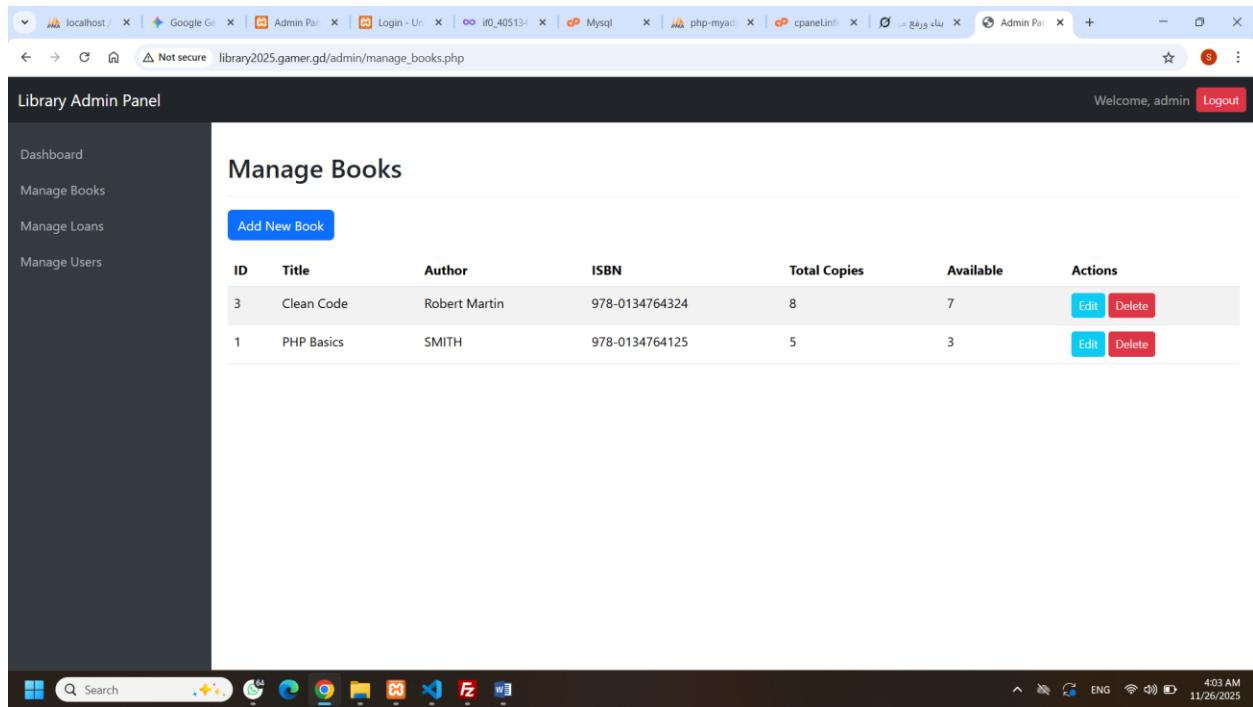


Figure 8: Manage Books page showing CRUD functionality.

The screenshot shows a web browser window titled "library2025.gamer.gd/admin/manage_loans.php". The title bar also lists several other open tabs, including "localhost", "Google Ge...", "Admin Panel", "Login - Un...", "if0_40513...", "Mysql", "php-myad...", "cpanel.info", and "Admin Panel". The main content area is titled "Manage Loans" and displays a table of "Active Loans". The table has columns: Loan ID, Student, Book Title, Loan Date, Due Date, Status, and Action. One row is shown: Loan ID 3, Student Ahmed, Book Title Clean Code, Loan Date 2025-11-26, Due Date 2025-12-03, Status On Time, and Action "Check In". A green "Check Out Book" button is located above the table. The left sidebar includes links for Dashboard, Manage Books, Manage Loans (which is selected), and Manage Users. The top right corner shows "Welcome, admin" and a "Logout" button. The bottom status bar shows the Windows taskbar with various pinned icons and the date/time as 11/26/2025 at 4:03 AM.

Figure 9: Manage Loans page showing active transactions and Check In option.

The screenshot shows a web browser window titled "library2025.gamer.gd/admin/manage_users.php". The title bar lists several other open tabs, including "localhost", "Google Ge...", "Admin Panel", "Login - Un...", "if0_40513...", "Mysql", "php-myad...", "cpanel.info", and "Admin Panel". The main content area is titled "Manage Users" and displays a table of user accounts. The table has columns: ID, Name, Username, Email, User Type, and Actions. Two users are listed: Ahmed (ID 5) with username ahmed10 and email ahmed@gmail.com, categorized as Student; and System Administrator (ID 2) with username admin and email admin@library.com, categorized as Admin. Each user row includes "Edit" and "Delete" buttons. A blue "Add New User" button is located above the table. The left sidebar includes links for Dashboard, Manage Books, Manage Loans, and Manage Users. The top right corner shows "Welcome, admin" and a "Logout" button. The bottom status bar shows the Windows taskbar with various pinned icons and the date/time as 11/26/2025 at 4:03 AM.

Figure 10: Manage Users page showing user accounts and management tools.

Student Portal

- **Student Portal:** Allows the student to View (R) their active loans, check due dates, and see if any books are overdue.

My Active Loans (Books Currently Checked Out)

Title	Author	Loan Date	Due Date	Status
Clean Code	Robert Martin	2025-11-26	2025-12-03	On Time

Figure 11: Student Portal showing the list of active loans.

CRUD Operations Summary

The system implements complete Create, Read, Update, and Delete operations:

- **Create (C):** Adding new books and users (`manage_books.php`, `manage_users.php`), and creating a new loan transaction (Check Out in `manage_loans.php`).
- **Read (R):** Displaying all data in lists and reports (`manage_books.php`, `manage_loans.php`), and showing user-specific data (My Active Loans).
- **Update (U):** Editing book and user details, and performing a Check In transaction (`manage_loans.php`) which updates the loan status and the book's availability count.
- **Delete (D):** Removing book records and user accounts (`manage_books.php`, `manage_users.php`).

Challenges and Solutions

During development, we successfully overcame critical challenges related to security and database integrity:

1. **Authorization:** We ensured that only users with admin status could access the /admin/ folder by checking the PHP Session (`$_SESSION['user_type']`) on every management page.
2. **Referential Integrity (Foreign Keys):** Deleting a user who had active loans, or deleting a book that was currently checked out, would cause a foreign key error. We solved this by implementing checks in the Delete logic to prevent the action if there is an active dependency (i.e., the user must return the book first).
3. **Cross-Page Design:** We ensured a consistent design across the Admin portal by using `layout_admin_top.php` and `layout_admin_bottom.php` as template files.

Conclusion

The result is a professional and fully operational Library Management System. We applied core concepts learned in the Advanced Web Technology course, including secure database interaction (PDO), authorization control (PHP Sessions), robust data validation, and responsive design (Bootstrap). The project demonstrates a strong understanding of web application development principles and is ready for institutional use.