

Database Project Proposal

EL-GEM: Library Borrowing Tracker

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Abstract—This project proposal introduces EL-Gem (Electronic Library Gadjah Mada), a web-based system designed to streamline and automate the book borrowing process in library environments. The system assists both library staff and users by providing an efficient and organized platform for managing digital book collections and borrowing activities. EL-Gem allows users to access and manage digital library resources efficiently, while the system automatically regulates borrowing activities by enforcing access permissions, maintaining availability, and ensuring fair resource distribution among users. Developed using a MySQL database, EL-Gem emphasizes accuracy, automation, and user convenience to minimize manual record keeping. By integrating these features, the system offers a reliable and modern solution for libraries aiming to enhance accessibility, efficiency, and management of digital resources.

I. INTRODUCTION AND BACKGROUND

In today's digital era, libraries are no longer limited to managing physical books. Many institutions, including universities, have adopted digital collections that allow users to access e-books and other electronic materials online. However, managing the borrowing and returning process for these digital resources can still be challenging when done manually. Traditional record-keeping methods are often time-consuming, prone to human error, and inefficient in tracking borrowing limits or availability in real time.

To address these issues, our group proposes **EL-Gem (Electronic Library Gadjah Mada)**—a web-based library borrowing tracker that provides an automated solution for managing digital book lending. The system is designed to help library staff efficiently handle book records while also offering convenience for students who wish to borrow e-books. Using a **MySQL** database as its foundation,

EL-Gem organizes information about users, books, and borrowing transactions in a structured and secure manner.

EL-Gem is developed with the goal of creating a more efficient, reliable, and user-friendly library experience. The system enforces borrowing rules such as maximum borrowing time, limited number of books per user, and automatic access expiration after the borrowing period ends. Through automation and database integration, EL-Gem simplifies library management and enhances accessibility to digital resources for both staff and users.

II. RESEARCH PROBLEM OR MOTIVATION

Many libraries still rely on manual or semi-manual processes to manage book borrowing activities, which often results in inefficiencies and inaccuracies. In traditional systems, staff members must track borrowing and returning records by hand, which can lead to lost data, duplicate entries, or delayed updates. As libraries continue to adopt digital resources such as e-books, these manual methods become even less practical due to the need for real-time access control and automated record management.

The motivation behind developing **EL-Gem (Electronic Library Gadjah Mada)** is to overcome these limitations by providing a fully automated and database-driven borrowing system. EL-Gem aims to improve the efficiency of borrowing transactions, reduce staff workload, and provide users with a smoother experience when accessing digital books. By implementing automation and structured data management through **MySQL**, the system ensures accurate tracking, easy maintenance, and reliable

access control, ultimately enhancing the overall effectiveness of the library's digital operations.

III. METHODOLOGY

In developing **EL-Gem (Electronic Library Gadjah Mada)**, our group follows a structured, step-by-step approach to ensure the system is well-designed, functional, and efficient. The development process involves several key stages: planning, system design, database development, implementation, testing, and deployment.

A. Planning

In the planning stage, we identify the main objectives and requirements of the library borrowing system. This includes determining the features needed by both administrators and users, such as book borrowing, returning, and access control. We also define borrowing rules, such as the maximum borrowing duration and the limit of books that each user can borrow.

B. System Design

During this stage, we design the architecture of EL-Gem, focusing on the database structure and the web-based interface. The database schema is modeled using **MySQL**, defining tables for users, books, and transactions. The web interface is designed using **HTML, CSS, and JavaScript** to ensure a simple and user-friendly experience.

C. Database Development and Integration

We create and configure the database according to the design. Relationships between tables are established to ensure efficient data retrieval and integrity. The system's web interface is then connected to the MySQL database to enable real-time data interaction, such as checking book availability and recording borrowing activities.

D. Implementation and Testing

After integration, we implement all system functions and conduct testing to ensure each feature works correctly. This includes verifying the borrowing and returning process, enforcing access control after the borrowing period, and validating user interactions. Testing helps identify bugs or logical errors that must be fixed before deployment.

E. Deployment and Evaluation

Finally, the completed system will be deployed to a hosting website for access by both users and administrators. After deployment, we will evaluate system performance, gather user feedback, and make necessary improvements to enhance usability and reliability.

Through this methodology, our group ensures that EL-Gem is developed in a systematic and efficient manner, resulting in a fully functional and accessible online library borrowing system.

IV. EXPECTED RESULTS AND CONTRIBUTIONS

The development of **EL-Gem (Electronic Library Gadjah Mada)** is expected to produce a fully functional web-based prototype that automates the library borrowing process. The system will allow students to borrow and return digital books efficiently, while administrators can manage book collections and monitor borrowing activities in real time. By implementing a structured database using **MySQL** and a web interface built with **HTML, CSS, and JavaScript**, EL-Gem aims to demonstrate a practical and scalable digital library management solution.

The expected outcome includes a fully working online platform capable of enforcing borrowing rules such as time limits and book quotas per user, as well as automated access control once the borrowing period expires. The system will also provide an intuitive and user-friendly interface that simplifies both user and administrative tasks.

In addition to the functional prototype, this project will contribute practical benefits and valuable learning experiences. For libraries, EL-Gem offers an efficient and accessible solution that reduces manual tracking, minimizes errors, and enhances user convenience. For our team, this project provides hands-on experience in web development, database design, system integration, and collaborative software engineering—skills that are essential for future projects and professional growth.

REFERENCES

- [1] M. A. Yaqin, "Strategy of Library Development Towards Digital Library," *Khatulistiwa Journal*, vol. 2, no. 2, pp. 52–69, Jun. 2022. Available: <https://garuda.kemdikbud.go.id/documents/detail/3186612>

- [2] S. Ali, M. Habes, E. Youssef, and M. N. Al Adwan, "A Cross-Sectional Analysis of Digital Library Acceptance and Dependency During Covid-19," *International Journal of Computing and Digital Systems*, vol. 10, no. 1, pp. 1415–1425, Dec. 2021. Available: <https://journals.uob.edu.bh/handle/123456789/4101>
- [3] N. Harum, N. M. Khambari, and N. Harum, "Library Management System," in *Proc. Conf. Business, Social Sciences and Technology (CONESCINTECH)*, vol. 3, no. 1, pp. 56–64, Melaka, Malaysia, Aug. 2023. Available: https://www.researchgate.net/publication/377768169_Library_Management_System
- [4] T. W. Araya and A. Mengsteab, "Designing Web-based Library Management System," *International Journal of Engineering Research & Technology (IJERT)*, vol. 9, no. 10, pp. 272–277, Oct. 2020. Available: <https://www.ijert.org/research/designing-web-based-library-management-system-IJERTV9IS100131.pdf>