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Theme

# **DESIGN AND DEVELOPMENT OF A WEB APPLICATION FOR E-LIBRARY MANAGEMENT**

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# *Dedication*

First and foremost, all gratitude is owed to **Allah**, the Almighty, whose will has made this achievement possible. Without His guidance, I would not have reached this point. Alhamdulillah for everything.

I am so grateful to my wonderful **parents** for their unending love, support, and sacrifice. This accomplishment is a direct result of your care and prayers. I will always be appreciative of you both.

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*Baraa*

# إهداء

إلهي لا تطيب الليل إلا بشرك ولا تطيب النهار إلا بطاعتك ولا تطيب اللحظات إلا بتذكرك ولا تطيب الجنة إلا ببرؤيتك.

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إلى كل هؤلاء أهدي هذا العمل

## إهداء

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## ملخص

تُعد إدارة مكتبات الجامعات بفعالية أمراً أساسياً لإتاحة الموارد الأكاديمية والوثائقية. ويتطلب تزايد عدد الكتب وتنوع احتياجات الطلاب والباحثين تطبيق نظام رقمي جيد لتحسين إدارة استعارة الكتب والفهرسة والبحث الوثائقي.

تُقدم هذه الدراسة لمحة عامة عن تطوير نظام إدارة مكتبات (LMS) مُصمم لتسهيل إدارة سجلات الأعضاء، ومعاملات الكتب، ومجموعات الوثائق الإلكترونية. تواجه أنظمة المكتبات اليدوية التقليدية تحديات عديدة، منها تلف الكتب، وقطاع الملفات، وارتفاع التكاليف، وعدم الكفاءة في تلبية احتياجات المستخدمين. وللمعالجة هذه المشكلات، نقتح نظام إدارة مكتبات قائماً على الويب يُؤتمت ويُحسب عمليات المكتبة الرئيسية، مثل حجز الكتب، واستعارتها، وإعادتها.

يستخدم النظام لغات Java و PHP و HTML و MySQL لإنشاء واجهة رسومية سهلة الاستخدام وواجهة خلفية

قوية لإدارة البيانات. ومن خلال الانتقال من العمليات اليدوية إلى العمليات المحوسبة، يُقلل نظام إدارة المكتبات من الأعمال الورقية، ويُقلل من أخطاء السجلات، ويُعزز الكفاءة العامة لعمليات المكتبة. بالإضافة إلى ذلك، يوفر النظام ميزة المكتبة الإلكترونية، مما يتيح للمستخدمين وصولاً غير مقيد إلى الوثائق الإلكترونية كالمجلات والصحف. يهدف هذا المشروع إلى تبسيط مهام أمناء المكتبات، وتحسين تجربة المستخدم، وضمان الحفاظ على موارد المكتبة على المدى الطويل. لا يقتصر النظام المقترح على معالجة قيود المكتبات التقليدية فقط، بل يوفر أيضاً حلاً قُبلاً للتطوير. وأما بمنظور إدارة المكتبات الحديثة.

## Résumé

La gestion efficace des bibliothèques universitaires est essentielle pour rendre accessibles les ressources académiques et documentaires. Le nombre croissant de livres et les besoins divers des étudiants et des chercheurs rendent nécessaire la mise en place d'un nouveau système numérique pour une meilleure gestion de l'emprunt, du catalogage et de la recherche documentaire.

Cette étude donne un aperçu de l'élaboration d'un **système de gestion des bibliothèques (SGA)** conçu pour faciliter la gestion des dossiers des membres, des transactions de livres et des collections de documents électroniques.

Les systèmes traditionnels de bibliothèques manuelles sont confrontés à de nombreux défis, notamment des livres endommagés, des fichiers perdus, des coûts élevés et des inefficacités pour répondre aux demandes des utilisateurs. Pour résoudre ces problèmes, nous proposons un système de gestion des bibliothèques sur le Web qui automatise et informatise les principales opérations des bibliothèques, comme les réservations de livres, l'emprunt et les retours.

Le système utilise **Java, PHP, HTML et MySQL** pour créer une interface graphique conviviale (GUI) et un backend robuste pour la gestion des données. En passant des processus manuels aux processus informatisés, le SGA réduit la paperasserie, minimise le travail humain et améliore l'efficacité globale des opérations de bibliothèque. En outre, le système offre une fonction de bibliothèque électronique qui permet aux utilisateurs d'accéder sans restriction à des documents électroniques tels que livres, magazines et journaux.

Ce projet a pour but de simplifier les tâches des bibliothécaires, d'améliorer l'expérience utilisateur et d'assurer la préservation à long terme des ressources des bibliothèques. Le système proposé répond non seulement aux limites des bibliothèques traditionnelles, mais offre également une solution évolutive, sécurisée et à l'épreuve du temps pour la gestion moderne des bibliothèques.

## **Abstract**

Managing university libraries effectively is essential to making academic and documentary resources accessible. The growing number of books and the diverse needs of students and researchers necessitate the implementation of a new digital system for better management of book borrowing, cataloging, and document research.

This study provides an overview of the development of a **Library Management System (LMS)** designed to facilitate the management of member records, book transactions, and electronic document collections.

Traditional manual library systems face numerous challenges, including damaged books, lost files, high costs, and inefficiencies in meeting user demands. To address these issues, we propose a **web-based library management system** that automates and computerizes key library operations, such as book reservations, borrowing, and returns.

The system leverages **Java, PHP, HTML, and MySQL** to create a **user-friendly graphical interface (GUI)** and a robust backend for data management. By transitioning from manual to computerized processes, the LMS reduces paperwork, minimizes human labor, and enhances the overall efficiency of library operations. Additionally, the system provides an **e-library feature**, offering users unrestricted access to electronic documents such as books, magazines, and newspapers.

This project aims to simplify tasks for librarians, improve user experience, and ensure the long term preservation of library resources. The proposed system not only addresses the limitations of traditional libraries but also provides a **scalable, secure, and future-proof solution** for modern library management.

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**List of acronyms:**

|                  |  |
|------------------|--|
| <b>LMS</b>       | Library Management System  |
| <b>UML</b>       | Unified Modelling Language   |
| <b>PDFs</b>      | Portable Document Format   |
| <b>URL</b>       | Uniform Resource Locator   |
| <b>UX</b>        | User Experience  |
| <b>DB</b>        | Database   |
| <b>OPAC</b>      | Online Public Access Catalog   |
| <b>e-library</b> | Electronic Library   |
| <b>OSS:</b>      | Open Source Software   |
| <b>e-books</b>   | Electronic Books   |
| <b>OAI</b>       | Open Archive Initiative  |
| <b>PHP</b>       | Hypertext Preprocessor   |
| <b>HTML</b>      | Hypertext Markup Language  |
| <b>CSS</b>       | Cascading Style Sheets   |
| <b>ILS</b>       | Integrated Library Systems   |
| <b>MySQL</b>     | My Structured Query Language   |
| <b>HTTP:</b>     | Hypertext Transfer Protocol  |
| <b>NCSA</b>      | National Center for Supercomputing Applications  |
| <b>RDBMS</b>     | Relational Database Management System  |
| <b>VS Code</b>   | Visual Studio Code   |
| <b>macOS:</b>    | Macintosh Operating System   |
| <b>BUN :</b>     | Bibliothèque Universitaire Numérique (Digital University Library)  |
| <b>STEM</b>      | Science, Technology, Engineering, and Mathematics  |
| <b>BU.UMC :</b>  | Bibliothèque Universitaire de l'Université Mentouri Constantine (Digital Library of the University of Constantine 1) |

# **General Introduction**

## General Introduction

---

With the increasing digitization of the world, modernization of library management systems has emerged as a critical imperative to enhance resource accessibility, operation effectiveness, and end-user gratification for educational institutions. This thesis presents an in-depth analysis of the design, development, and implementation of a novel Electronic Library Management System (elms) that has been crafted to circumvent the intrinsic inefficiencies of traditional library paradigms. By a comprehensive review of systems that are currently in existence. This study lists key inadequacies, including manual loan procedures, limited user access, and outdated technology systems. Building on this foundational research, the project sees a ground breaking, web-based system utilizing cutting-edge technologies.

Php for backend operations, mysql for dynamic database management, and

Html/css/java script for adaptive frontend user interfaces to deliver a seamless, scalable, and secure system. The system introduces revolutionary functionalities, including role-based access control (for administrators, teachers, students, and guests), automated borrowing/return processes, real-time catalog search, and digital resource management, all designed to eliminate redundancies and improve user interactions. Apart from its technological novelty, this thesis underscores the overall importance of digital transformation for university libraries as far as cost saving, sustainability, and catching up with global trends in higher education is concerned. Through stringent uml modeling, feasibility studies, and incremental testing, Elms is an example of a paradigm shift within library sciences which not only solves existing problems but also paves the way for future developments in AI-driven recommendations and scalability through the cloud. This study, therefore, is both a theoretical and pragmatic manual to reconfiguring library ecosystems in the digital era.

# Chapter I

## Chapter I: Context and state of art

### Introduction

The term "**library**" originates from the Latin word **liber**, meaning "book," and has evolved over centuries to represent a collection of knowledge and resources. Traditionally, libraries were physical spaces where books were stored and accessed for reading or study. However, with the advent of digital technology in the mid-20th century, the concept of libraries has expanded beyond physical boundaries. Today, **digital libraries** and **virtual libraries** have emerged as comprehensive sources of information, accessible remotely through internet connections and advanced information retrieval systems [01].

Digital libraries have revolutionized how information is stored, organized, and accessed. They eliminate the need for physical storage and provide users with instant access to a vast array of resources, including books, journals, and multimedia content. This shift has been driven by advancements in telecommunications, computer systems, and internet technologies, enabling seamless access to information from anywhere in the world.

The definition of an Online Library Management System (LMS) is broad, it's a powerful tool that simplifies library operations, improves user experience, and optimizes resource management [02].

The primary goal of this initiative is to create a **web-based Library Management System** that will enhance the operational efficiency of university libraries by overcoming the limitations of traditional library management systems and offering a user-friendly, easily scalable solution for the efficient administration of library resources.

**Our system aims to simplify library operations, improve accessibility, and ensure the long-term preservation of digital and physical resources.**

### I.1 Problem Statement

Like many institutions, academic libraries frequently encounter numerous challenges, including manual borrowing management, poor return tracking, and difficulty accessing documents in real time [03]. Without a structured system, mistakes are more likely to occur, administrative tasks become more complicated, and the user experience becomes impractical. Therefore, it is important to design a digital solution that tackles these issues and improves the efficiency of document management.

## **I.2 Literature Review**

The concept of library management systems has evolved significantly over the past century. In the early 20th century, libraries relied entirely on manual systems for tasks such as cataloging, circulation, and record-keeping [04]. The introduction of punch card systems in the 1930s marked the first steps toward automation, but these systems were limited in scope and functionality.

The advent of digital technology in the mid-20th century revolutionized library operations. The development of integrated library systems (ILS) in the 1970s and 1980s enabled libraries to automate key tasks such as cataloging, circulation, and inventory management. However, these early systems were often expensive and required significant technical expertise to implement and maintain [01].

In recent years, the rise of the internet and web-based technologies has transformed library management systems once again. Modern systems, such as *Koha and Evergreen* [05], offer a wide range of features, including online catalogs, electronic resource management, and user-friendly interfaces. These systems are designed to meet the needs of today's libraries, which must manage increasingly diverse collections and provide access to digital resources. Despite these advancements, many libraries continue to face challenges in implementing and maintaining modern library management systems. Issues such as limited budgets, lack of technical expertise, and resistance to change can hinder the adoption of new technologies [04]. However, the benefits of automation such as improved efficiency, reduced costs, and enhanced user experience make it essential for libraries to embrace these systems.

## **I.3 The Need for a Library Management System**

Up to now, there isn't a great deal of research literature on the subject. Libraries have been dealing with the difficulties. This has been the case for almost ten years. During this time, they have been developing and implementing library automation.

beginning in the late 1990s. It was brought forth by the ever-changing Internet and Web 2.0 technology, as well as the increasing number of knowledgeable internet users [10]. When it came to providing people with the information they needed, libraries were falling behind other sources (like Internet search engines). The traditional library system's lack of flexibility frequently irritates library employees.

*Marshall Breeding* noted as early as 2007 that "as librarians continue to operate with scarce resources, performing ever more services with increasingly varied collections but without adding more employees" [06]. He purposefully states that "dissatisfaction with the current state of ILS products runs high" in his 2009 article [07]. Their user interfaces that do not meet modern web standards and their incapacity to handle electronic content are the main causes for concern. According to Andrew Pace [08]

"the effort required to maintain print collections, especially in academic libraries, was rapidly overtaken by web-based content, licensed resources, born digital documents, and institutionally significant digital collections." The open-source software movement is another prominent development in the field of library technology that is happening concurrently with a comparable trend in the world of general information technology [09]. The Open Archive Initiative (OAI), DSpace, and Koha are just a few examples of open Source Software (OSS) initiatives, according to Pace, since a comprehensive list would overtake the reader-challenged commercial proprietary systems, frequently in terms of sophistication and functionality as well as market share [10].

## I.4 Some existing Library Management System

- **University of Algiers 1 Digital Library (BUN):**

### Overview

As Algeria's largest academic archive, BUN houses an exhaustive reservoir of study material like overseas publications through collaboration with overseas publishers like Springer. Despite its well-heeled endowment, complicated sign-up system in the library, and lag when servers hit busy times enormously restrict access as well as client satisfaction.

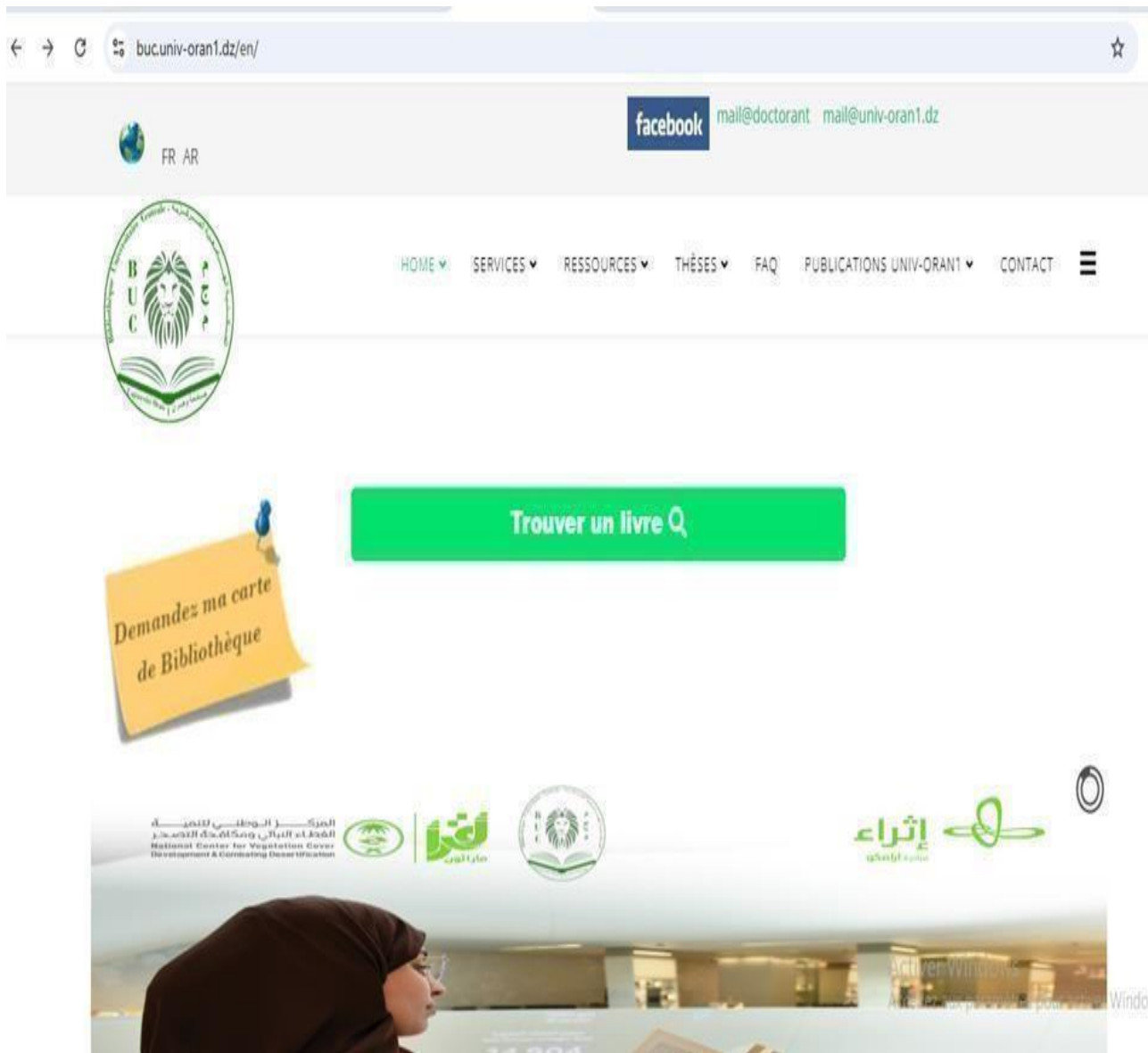


**Figure I.1** University of Algiers 1 Digital Library (BUN)

## • University of Oran 1 Digital Library

### ✚ Overview

This regional digital library is designed to support francophone researchers in western Algeria with large collections of French and Arabic theses and traditional humanities works. Its simple interface renders it easily readable at a basic level, although its absence of contemporary resources and inconsistent content updates diminish its longterm research value.



*Figure I.2 University of Oran 1 Digital Library*

- **University of Setif 2 Digital Library - Technical Specifications**

- **Overview:**

A digital university library for Setif 2 University, which is STEM-content specialized in Arabic and French. While it is relatively modern in terms of other Algerian university libraries, it lacks English content and is slow during peak usage hours. The site offers very basic search functionality and thesis accessibility but lacks more advanced features like smart recommendations or semantic search functionalities.

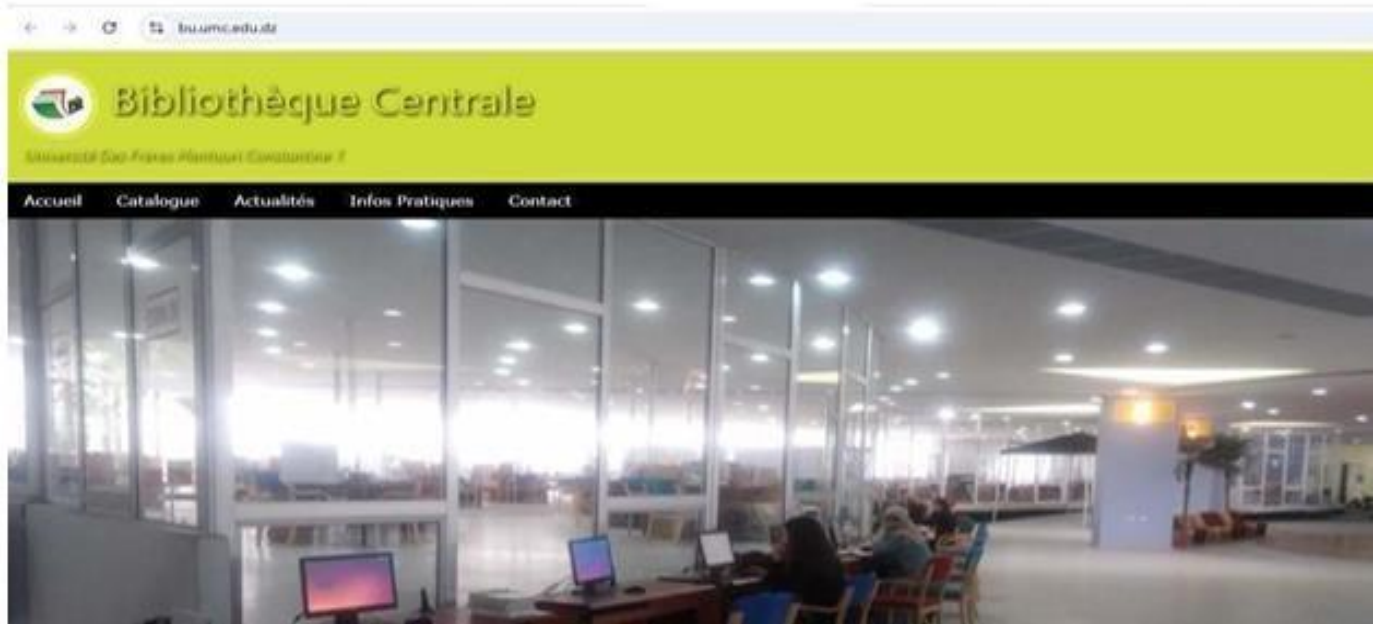


*Figure I.3 University of Setif 2 Digital Library - Technical Specifications*

- **BU.UMC Digital Library (University of Constantine 1)**

- **Overview**

BU.UMC Digital Library is the central scholarly repository of University of Constantine 1, comprising over 50,000 collections of theses, e-books, and peer-reviewed articles. It is among eastern Algeria's largest scholarly portals with a central emphasis on regionally-produced French and Arabic content and limited international partnerships

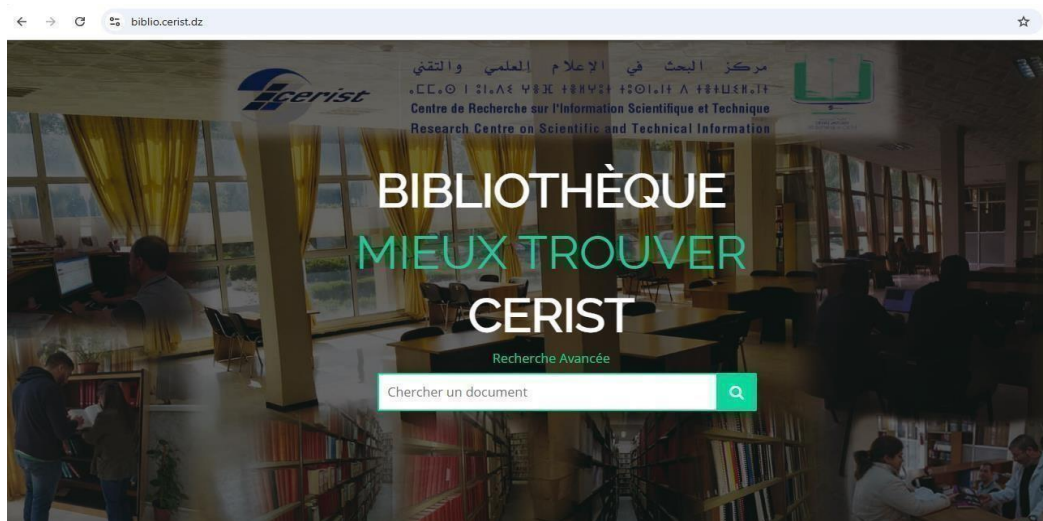


*Figure I.4 BU.UMC Digital Library (University of Constantine 1)*

- **CERIST Digital Library (Research Center)**

- ✚ **Overview:**

CERIST's digital library is Algeria's premier STEM research center, delivering one of the country's richest collection of scientific literature. It has developed since 1994 as an indispensable tool for Algeria's research community with:



*Figure I.5 CERIST Digital Library (Research Center)*

❖ Detailed Comparison of existing libraries:

|             |   |   |   |   |   |
|-------------|---|---|---|---|---|
| Criterion   | BUN (Univ. Algiers)   | Oran 1  | Setif 2   | BU.UMC (Univ. Constantine)                                  | CERIST  |
| URL         | <a href="http://bu.univ-alger.dz/">http://bu.univ-alger.dz/</a> | <a href="https://buc.univoran1.dz/ar/">https://buc.univoran1.dz/ar/</a> | <a href="https://bc.univsetif2.dz/index.php/en/">https://bc.univsetif2.dz/index.php/en/</a> | <a href="https://bu.umc.edu.dz/">https://bu.umc.edu.dz/</a> | <a href="https://biblio.cerist.dz/">https://biblio.cerist.dz/</a> |
| Design & UX | Outdated (2015 standards)                                       | Simplified francophone UI   | Semimodern (2018)   | Traditional academic portal                                 | Research focused, technical                                       |
| Tech Stack  | - Backend : Python (Django)                                     | - PHP (Laravel)   | - Java (Spring Boot)  | - Python  | - Java  |

|                            |                        |                        |                   |                   |                       |
|----------------------------|------------------------|------------------------|-------------------|-------------------|-----------------------|
| <b>DB</b>                  | - DB: PostgreSQL       | - MySQL                | - MariaDB         | - PostgreSQL      | - PostgreSQL          |
| <b>Search Capabilities</b> | Basic full-text search | Limited keyword search | Apache Lucene 7.7 | Basic text search | Advanced STEM-focused |
| <b>Load Time</b>           | 3-5 seconds            | 4-6 seconds            | 3-5 seconds       | 4-7 seconds       | 2-4 seconds           |
| <b>Integrations</b>        | Limited REST API       | None                   | Minimal           | Limited           | OAI-PMH Support       |
| <b>Security</b>            | TLS 1.2                | TLS 1.0 (vulnerable)   | TLS 1.2           | TLS 1.2           | Shibboleth (SAML)     |

|                    |                           |                        |                        |                               |                             |
|--------------------|---------------------------|------------------------|------------------------|-------------------------------|-----------------------------|
| <b>Key Content</b> | Springer partnerships     | Francophone humanities | STEM-focused           | University theses             | Scientific journals/patents |
| <b>Limitations</b> | - Python 2.7 dependencies | - PHP 5.6 Risks        | - Hybrid cloud stalled | - Student access restrictions | - Niche coverage            |

*Table 1: Detailed Comparison of existing libraries:*

## **I.5 Proposed Solution**

To solve the traditional issue, we are building a **Web development** project of library management system using **Html, Php** and **MYSQL**.

The **Library Management System (LMS)** is designed to address the diverse needs of modern libraries, offering a range of functionalities that benefit users, guests, and administrators. Its applicability includes the following key areas:

### **I.5.1 Functions of Administration**

- Managing book transactions involves selecting borrowers, establishing due dates, and monitoring transactions.
- Book Inventory Management: View, add, edit, or remove entries in the physical book collection to keep the inventory up to date.
  - E-Book Management: download, edit, and remove e-books to manage the digital library.
- Member Administration: Add, edit, and remove member records.
- Managing Notifications: To maintain the flow of books in circulation, monitor pending book returns and approve user-submitted return requests.
- The system coordinates purchasing procedures and receives and processes requests for new books and materials.

### **I.5.2 User Functions**

- Search and Discovery: Provide a robust search engine that allows users to quickly locate books, articles, and other resources within the library's collection.

- Resource Request: Allow users to request new materials, ensuring the library's collection meets their needs and interests.
- Profile management: Provides users with the ability to access and modify their personal data, including passwords.

### **I.5.3 Guest Functions**

- Simple Search: To find resources in the library, guests can do simple searches by title, author, or category.
- Resource Access: guests are free to browse and download resources that are openly accessible.

By incorporating these features, the LMS ensures efficient library operations, enhances user satisfaction, and supports the long-term sustainability of library resources.

## **I.6 Project Aims and Objectives**

The primary aim of the **Library Management System (LMS)** project is to develop a **web- based application** that streamlines the management of users(students/teachers), book, guest, and member details. By automating key library operations, the system reduces manual labor, minimizes errors, and enhances overall efficiency. Below are the specific objectives of the project:

### ✓ **Improve Efficiency**

- Automate routine tasks such as bookkeeping, classification, indexing, and recordkeeping.
- Enable quick verification of book stock and availability within a few hours, significantly reducing the time required compared to manual systems.
- Simplify book searches by organizing the library catalog by author, title, and subject.

### ✓ **Reduce Operational Costs**

- Minimize the need for paperwork and manual labor, thereby lowering stationery and staffing costs.
- Decrease the likelihood of errors in record-keeping, reducing the time and resources spent on corrections.

### ✓ **Enhance User Experience**

- Provide users with a user-friendly interface to search for books and check availability with a single click.
- Enable librarians to respond quickly to user inquiries about book availability and other library services.

### ✓ **Ensure Accessibility**

- Offer a web-based platform that allows students and members to access the library's database remotely, including via smartphones.

- Ensure that the system is accessible to both novice and experienced users through an intuitive interface.

- Add multi-language support to cater to a diverse user base.

- ✓ **Modernize Library Operations**

- Transition from manual to automated processes, ensuring the library remains competitive and up-to-date with technological advancements.

- Provide a scalable and secure solution for managing library resources, ensuring long term reliability.

By achieving these objectives, the Library Management System aims to transform traditional library operations into a modern, efficient, and user-friendly experience for both librarians and users.

## **I.7 conclusion**

Our web application increases the productivity of university libraries by creating and simplifying the administration of resource documents. It was designed to support staff such as administrators, librarians, and students. As a result, it can enable quicker access to publications and simplify routine operations. By looking at the things that are already out there, we have figured out what is needed for a great library. An entire set of tools is provided by our solution, including collections, appliances, digital content accessibility, and reservation management. You can make your libraries more accessible, open new windows, meet needs, and deliver a better experience and efficiency. This solution will allow the university's libraries to easily provide access to knowledge. It represents a significant step forward in modernizing library operations. By integrating advanced technologies, the system addresses the limitations of traditional libraries and provides a scalable, secure, and user-friendly solution. the LMS not only simplifies library management but also enhances the overall user experience. This project aims to transform libraries into dynamic, accessible, and efficient hubs of knowledge, ensuring their relevance in the digital age

# **Chapter II**

## **Analysis & system design**

## Chapter II: Analysis & system design

### Introduction

Various modelling techniques can be used when designing a digital library management system to ensure it is well-structured and effective. When developing an electronic library application, it is important to use the Unified Modelling Language (UML) to define and document the system. As an application has its own system, UML can be used to systematically document the digital library application. During the design phase, UML diagrams should be used to represent the system in full context in order to communicate and design effectively with stakeholders, designers, and developers. The UML diagrams to be used include class, use case, sequence and activity diagrams.

The following sections of this paper will present and discuss these diagrams to inform the design of an effective, scalable digital library management system.

### II.1 UML (Unified Modeling Language)

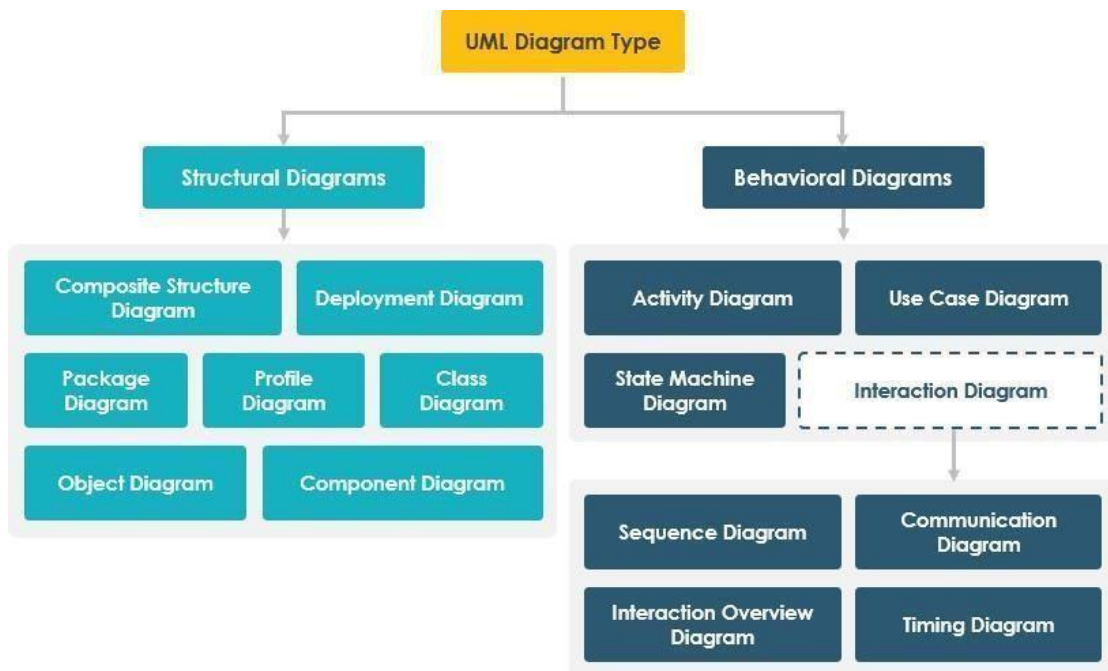
#### II.1.1 definition

The **Unified Modeling Language** (UML) is a standardized visual modeling language used to represent, specify, construct, and document the components of an object-oriented software system. It provides a graphical notation to model real-world objects as a foundational step in designing an object-oriented system. [11]

Apart from its graphical representation, UML provides a standardized way for developers, designers and stakeholders to communicate. It standardizes how systems are modelled, ensuring that everyone involved in a project understands the architecture and flow of the system. UML's concepts incorporate best practices, such as being 'modular' and 'scalable', which in turn allow for robust, maintainable applications. UML provides a wide range of diagrams, including structural diagrams such as class diagrams and behavioral diagrams such as use case and activity diagrams, which give developers great flexibility when dealing with the different components and concerns of system implementation.

#### II.1.2 UML diagrams

Fourteen different types of diagrams, classified as either structural or behavioral, are defined by the UML standard. A subset of diagrams known as the interaction diagrams are included in the behavioral diagrams. Figure II.1.2 illustrates how these diagrams are grouped according to the UML definition. [11]



*Figure II.1 UML diagrams*

## II.2 Objective of the Project

The goal of our project is to develop a web application that will enable an online library to manage books, users and resources effectively. This system aims to improve accessibility and the user experience for administrators, members and visitors, while also streamlining library operations.

## II.3 Opportunity study

There is a lot of scope for modernizing and upgrading traditional library operations as well as providing high-tech services along with university members to outside visitors through implementing a web application for the running of the electronic library unique to our university. This system provides the following benefits:

- **Ease of access:** An online platform allows students, instructors, staff and outside visitors to access the library's electronic materials at any time and from any location. Visitors can easily explore and download e-books.
- **Self-registration:** Self-registration simplifies the onboarding process for university members, who can register themselves in the system using their unique registration number, thereby reducing the administrative burden.

- **Faculty contributions and guest access:** External visitors can download PDFs or e-books
- **Centralization and organization:** Clearly outlined user roles such as the administrator, the library members, and guests. Also, the integrated dashboard allows for the proper management of transactions, physical book, e-books, and notifications. Centralized operations enable the above factor and Optimal resource utilization for both the materials and available spaces in the library.
- **Optimal resource utilization:** This is a key characteristic since it allows the organization to manage physical books and digital resources such as PDFs easily.
- **Alignment with modern needs:** Secure authentication, account management and data validation ensure that the system aligns with modern requirements.

## II.4 Feasibility Study

The university must have the appropriate personnel and material resources (administration staff, servers, databases, equipment, etc.) for such an application. The features that our application will support are listed below:

### **For the Administrator**

Access the application dashboard homepage via login/password authentication

- User management (add/edit/delete/print).
- Book catalog management (add/edit/remove/print books) .
- Digital resources management (e-books) .
- Loan management (track borrowings/returns) .
- Manage overdue book alerts and approve/reject borrow/return requests.
- Add or manage books needing procurement.
- Change admin information.

### **For University Members (Students, Teacher Faculty)**

users can access the application homepage through login/password authentication or register for a new account, with direct access to the OPAC page once authenticated.

The user can register as a student, staff, or teacher.

- Search/browse library books.
- Borrow/return book request.
- Consult and update profile.

### **For Guests (External Users)**

Guests can access certain functionalities without authentication.

- Search for digital resources.
- Preview or download available PDFs.
- Contribute resources (requires Teacher Login for uploading documents) .

## **II.5 Analysis**

Clearly defining the e-library application's requirements is the goal of this section. Outlining the application's general scope is required to do this. At this stage, we focus on identifying the system's actors, their respective areas, and the context of the application.

### **II.5.1 Identification of Application Actors**

Through our study, we have identified the primary actors who will be the future users of the e-library application. These actors include:

#### **II.5.1.1 Administrator**

To ensure that both digital and physical library resources are handled effectively, the administrator plays a crucial role in system administration. Their duties include:

- Manage users.
- Manage books (physical and electronic).
- Approve borrowing and returning requests.
- Manage notifications (e.g., overdue books).
- Manage purchase requests for new books.
- Monitor transactions (borrowing, returning, and overdue records) .
- Updating admin profile.

#### **II.5.1.2 Users (members)**

Faculty members contribute to the e-library's content and utilize its resources for :

- Search catalog (basic and advanced).
- Submit requests to borrow or return books.
- Managing their account settings and passwords.

#### **II.5.1.3 Guests (External Users)**

Students are the primary users of the e-library for academic research and learning. Their functionalities include:

- Search digital resources .
- Preview or download electronic resources (e.g., PDFs).
- Contribute resources (requires Teacher Login for uploading documents) .

### **II.5.2 Identifying spaces:**

Each actor is assigned a space that groups together all the tasks he or she can perform. In our case, we have identified three spaces:

1/Administrator space. 2/User space. 3/Guest space.

## II.4.1 System Design

This phase represents the most complex stage of the project. The main objective is to optimize the model for use with the architectural elements. A methodical strategy has been employed to ensure a robust and effective design.

We used the four UML diagrams (class, use case, sequence and activity) to efficiently structure and visualize the system in this phase.

### II.4.1.1 Use case diagrams

A **use-case diagram** is a type of Unified Modeling Language (UML) diagram that models the behavior of a system by capturing its functional requirements and illustrating the interactions between the system and its external actors. These diagrams provide a high-level overview of the system's functionalities and help define its scope. They are particularly useful during the early phases of a project to ensure that all stakeholders have a clear understanding of the system's intended behavior.[12]

➤ **Use cases related to the user:** we have identified the following cases:

- Access the home page.
- Register if an account does not exist .
- Authenticate using registration number and password.
- Update personal profile .
- Conduct a simple or advanced search .
- Submit a book borrowing request (subject to admin approval and limited to one borrow at a time) .
- Submit a book return request .

➤ **Use cases related to the administrator:** we have identified the following cases:

- Authenticate.

#### **User management:**

- Add a user
- Edit a user
- Delete a user

#### **Book management:**

- Add a book

- Edit a book
- Delete a book
- Print book information

**E-book management:**

- Delete an e-book
- Download an e-book
- Print e-book information

**Member management:**

- Add a member
- Edit a member
- Delete a member

**Transaction management:**

- View borrowed books
- View returned books

**Purchase requests:**

- Add a purchase request
- Delete a purchase request
- Print a purchase request
- Download purchase requests

**Notifications management:**

- View overdue book
- Approve borrow request
- Reject borrow request
- Approve return request
- Reject return request

**System settings:**

- Update admin information

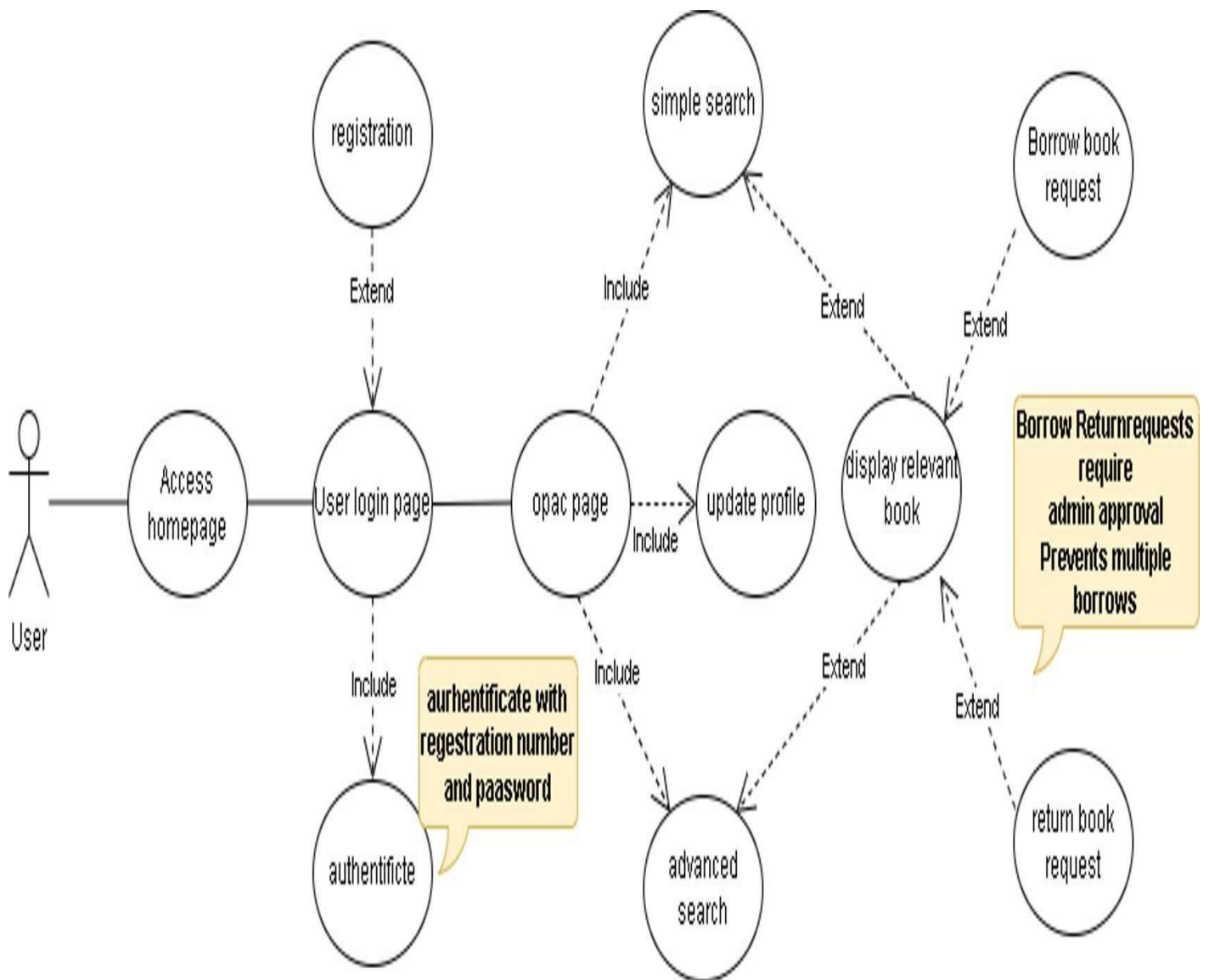
**Logout**

➤ **Use cases related to the guest: we have identified the following cases:**

- Access the homepage
- Access the guest home page
- Search resource
- Preview / download resource

In this space contributing resources requires that the teacher who is a member of the library log in to upload the e-books and then log out.

**II.4.1.1.1 Use case diagram for user**



**Figure II.2 Use case diagram for user**

### II.4.1.1.2 Use case diagram for Admin

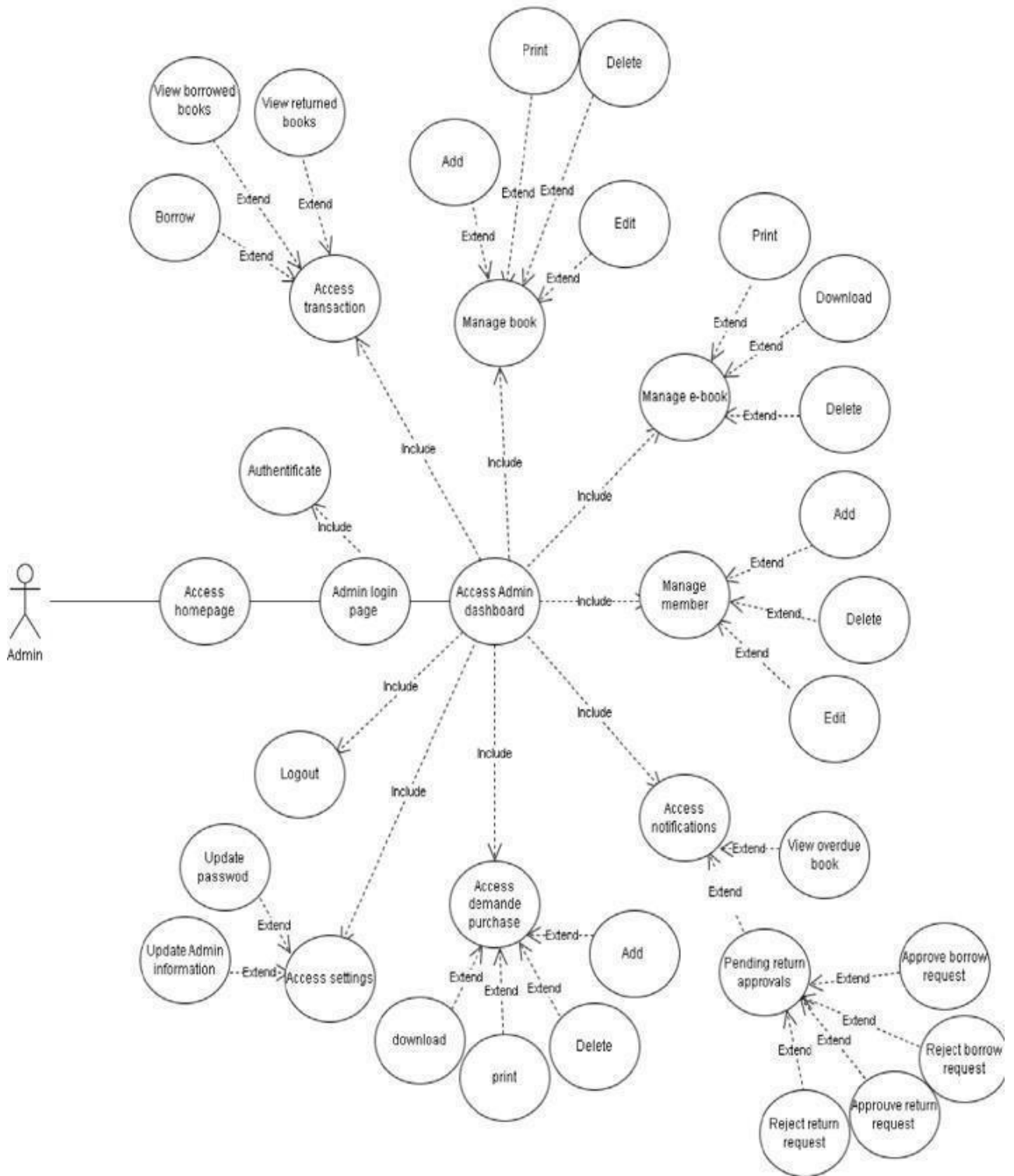
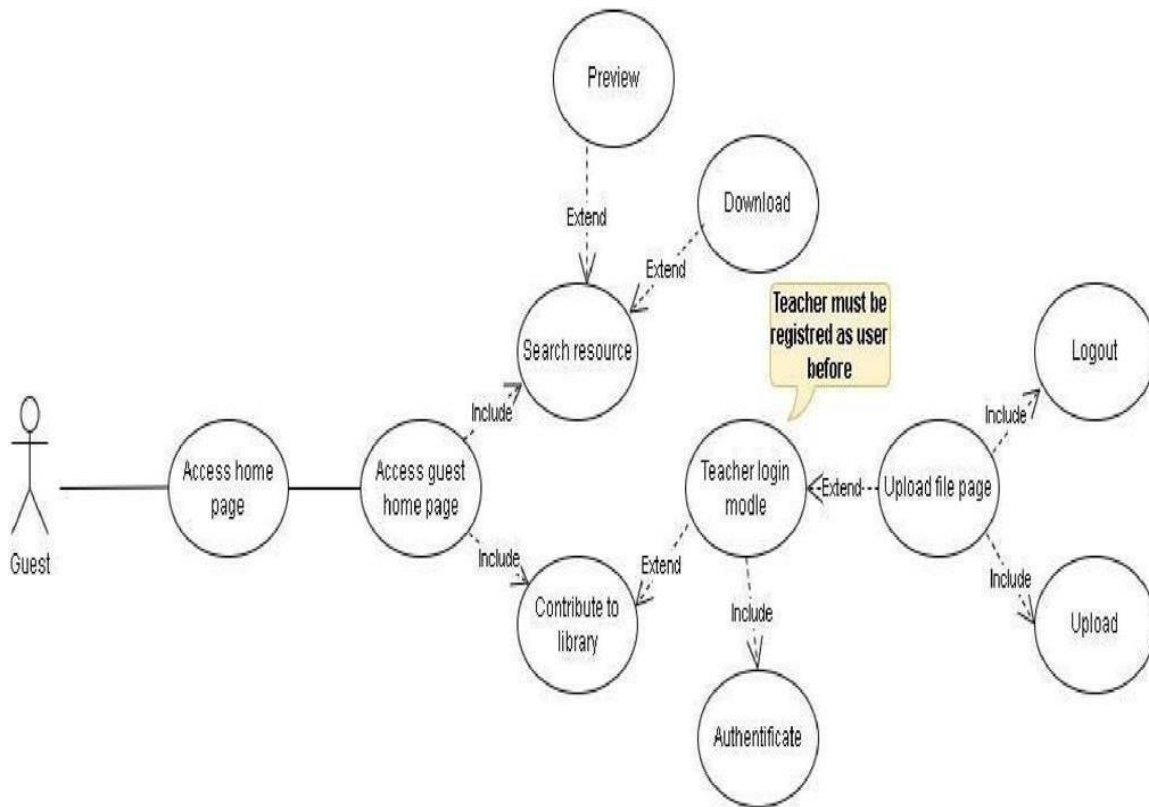


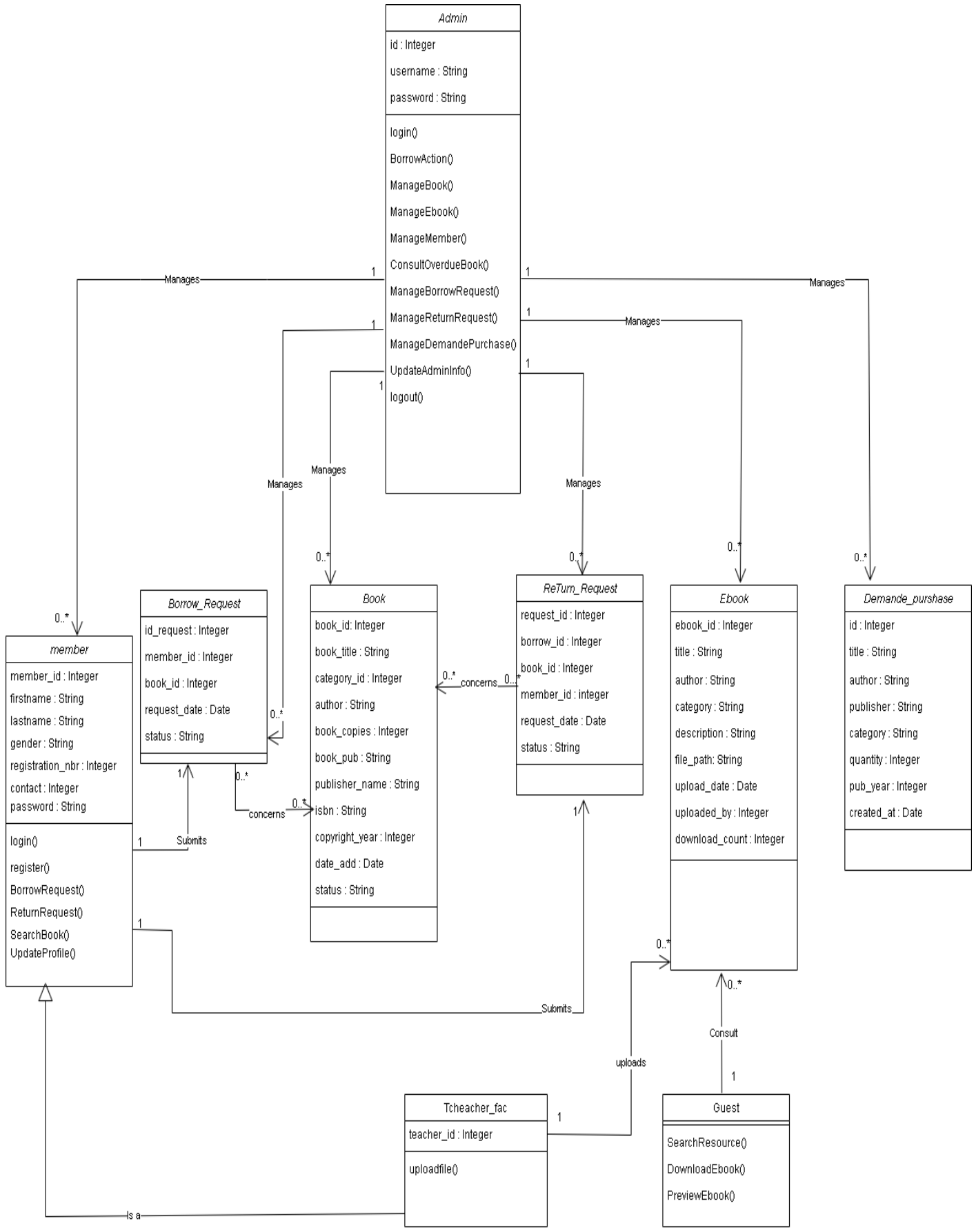
Figure II.3 Use case diagram for Admin



**Figure II.4 Use case diagram for Guest.**

### II.4.1.2 Class Diagram

A class diagram is a type of diagram used in software engineering. It is one of the static diagram types in UML. It provides a high-level overview of a system. It is the most useful type of diagram because it clearly describes the structure of a particular system by modelling its classes, attributes, operations and static relationships between objects, as well as system interfaces. A class diagram shows what interacts, but not what happens during interaction. It has a wide range of uses at different modelling levels, such as the conceptual (domain, analysis) level (Domain Model) and the implementation (code) level (Design Model). [13]



**Figure II.5 class diagram**

### II.4.1.3 sequence diagram

A **sequence diagram** is a type of interaction diagram in the Unified Modeling Language (UML) that illustrates how objects interact in a particular scenario of a use case. It emphasizes the time-ordering of messages, showing the sequence of interactions between objects and actors over time. In a sequence diagram, objects are represented horizontally, while time progresses vertically, with messages depicted as arrows between lifelines. This visual representation helps in understanding the flow of operations and the order in which interactions occur within the system. [14]

Their advantages:

- Represent the details of a UML use case.
- Model the logical flow of a complex procedure, function or operation.
- Show how objects and components interact with each other to perform a process.
- Diagram and understand the detailed operation of an existing or future scenario. We will describe four examples use cases:
  - ✓ User login
  - ✓ Delete member
  - ✓ Purchase book

#### II.4.1.3.1 User login

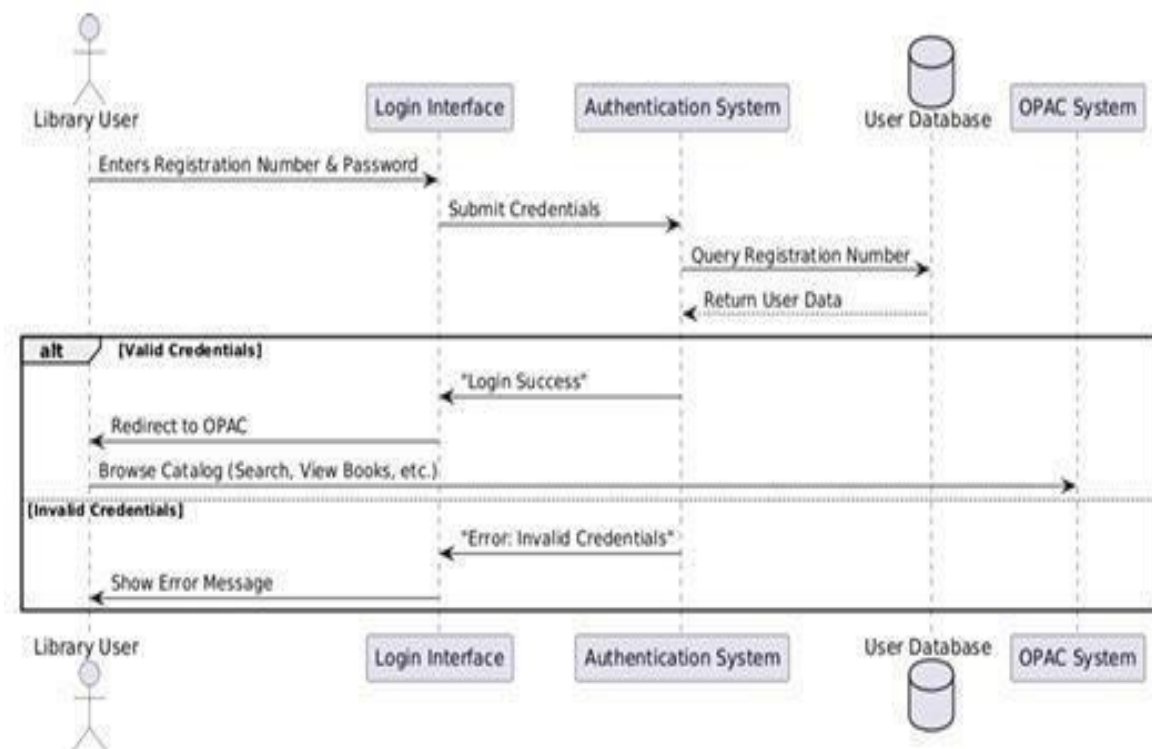


Figure II.6 Sequence diagram for user login

- The user reaches the authentication page.
- The user enters the registration number (login) and password, then submits
- The "Login Interface" then receives the "Submit Credentials" action from the user.
- The system checks. • The "Login Interface" sends the "Submit Credentials" to the "Authentication System"
- The Authentication System queries the User Database with the Query Registration Number
- The "User Database" returns the "User Data" to the "Authentication System" If the registration number and password are correct, it displays its space.
- The Authentication System sends a "Login Success" message to the Login Interface.
- The "Login Interface" redirects the user to the "OPAC System" (Online Public Access Catalog) with the "Redirect to OPAC" action
- The user can then "Browse Catalog (Search, View Books, etc.)" via the "OPAC System", which corresponds to access to his or her own space or to the system's functionalities.
- Otherwise, an error message is displayed.
- The "Authentication System" sends an "Error: Invalid Credentials" message to the "Login Interface".
- The "Login Interface" then displays the "Show Error Message" to the "Library User".

#### II.4.1.3.2 Delete member

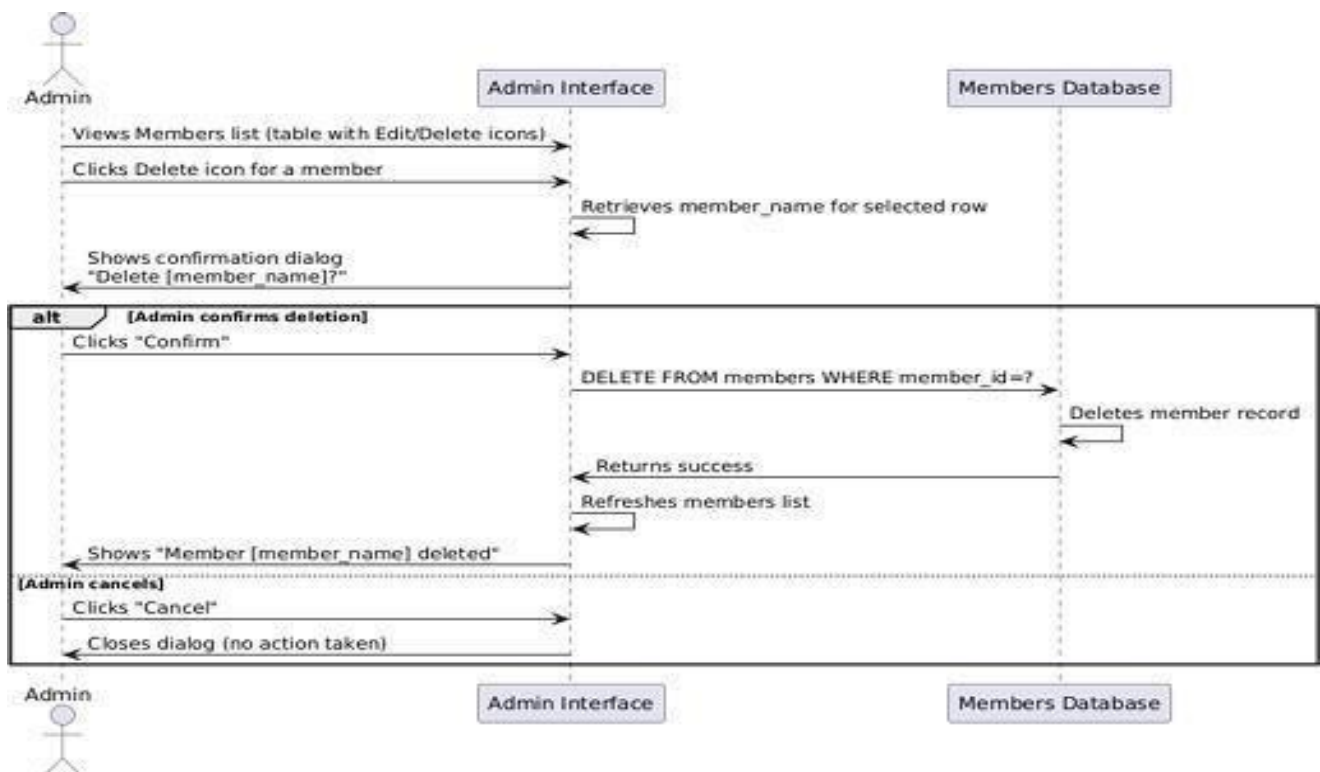


Figure II.7 Sequence diagram for delete member.

- The administrator views the member list: this is represented by the "Views Members list (table with Edit/Delete icons)" action performed by the "Admin" on the "Admin Interface".
- The administrator clicks the delete icon for a member.
- The "Clicks Delete icon for a member" action is performed by the "Admin" on the "Admin Interface".
- The "Admin Interface" retrieves the "member\_name" for the selected row.
- The "Admin Interface" displays a confirmation dialog to the administrator: "Shows confirmation dialog "Delete [member\\_name]?"".
- The system waits for confirmation or cancellation from the administrator.
- This is represented by the `alt` structure with two branches: `[Admin confirms deletion]` and `[Admin cancels]`.
- If the administrator confirms the deletion: the administrator clicks "Confirm".
- The Admin Interface sends a deletion request ("DELETE FROM members WHERE member\\_id=?") to the Members Database
- The Members Database deletes member record and returns "Returns success" to the Admin Interface.
- The Admin Interface refreshes the members list and displays the message "Shows "Member [member\\_name] deleted""
- If the administrator cancels the deletion: the administrator clicks "Cancel".
- The Admin Interface closes the dialog (no action taken)," meaning the deletion operation is canceled and no changes are made to the database.

#### II.4.1.3.3 Purchase book

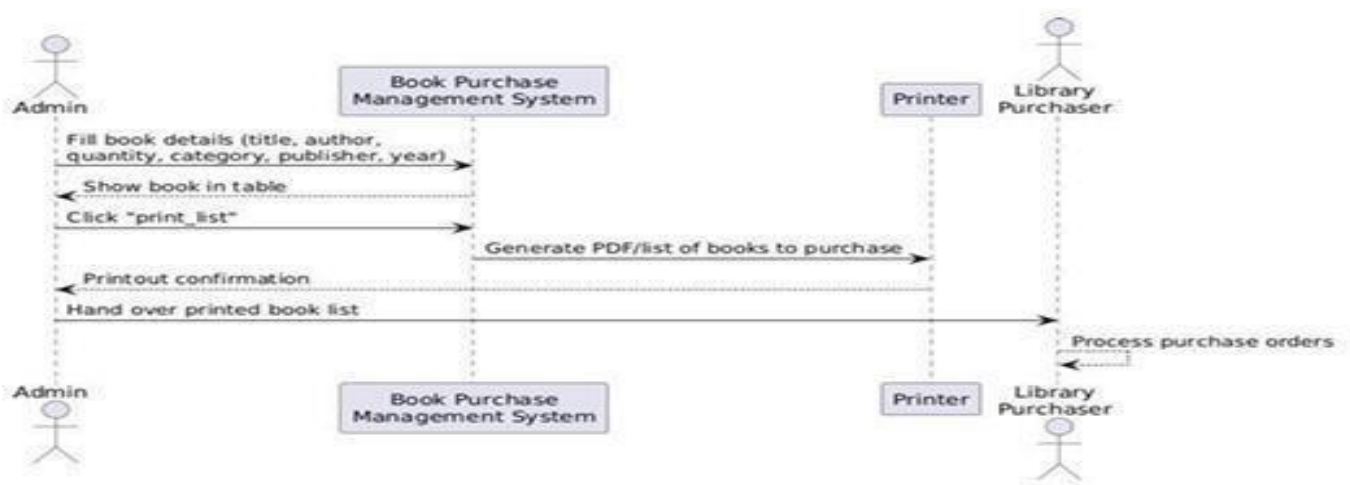


Figure II.8 Sequence diagram for purchase book.

1. Admin fills in book details for purchase.
  - The “Admin” performs the “Fill book details (title, author, quantity, category, publisher, year)” action on the “Book Purchase Management System”.
  - The “Book Purchase Management System” responds with “Show book in table” to the “Admin”.
2. The administrator asks to print the list of books to be purchased.
  - The “Admin” clicks “print\_list” on the “Book Purchase Management System”.
  - The “Book Purchase Management System” “Generate PDF/list of books to purchase” and sends this information to the “Printer”.
3. The administrator manages the printing of the list and gives it to the library buyer.
  - The “Printer” sends a “Printout confirmation” to the “Book Purchase Management System”, which is then forwarded to the “Admin”.
  - The “Admin” “Hand over printed book list” to the “Library Purchaser”.
4. The Library Purchaser processes the purchase orders.
  - Library Purchaser Process purchase orders", which represents the finalization of the book purchase process.

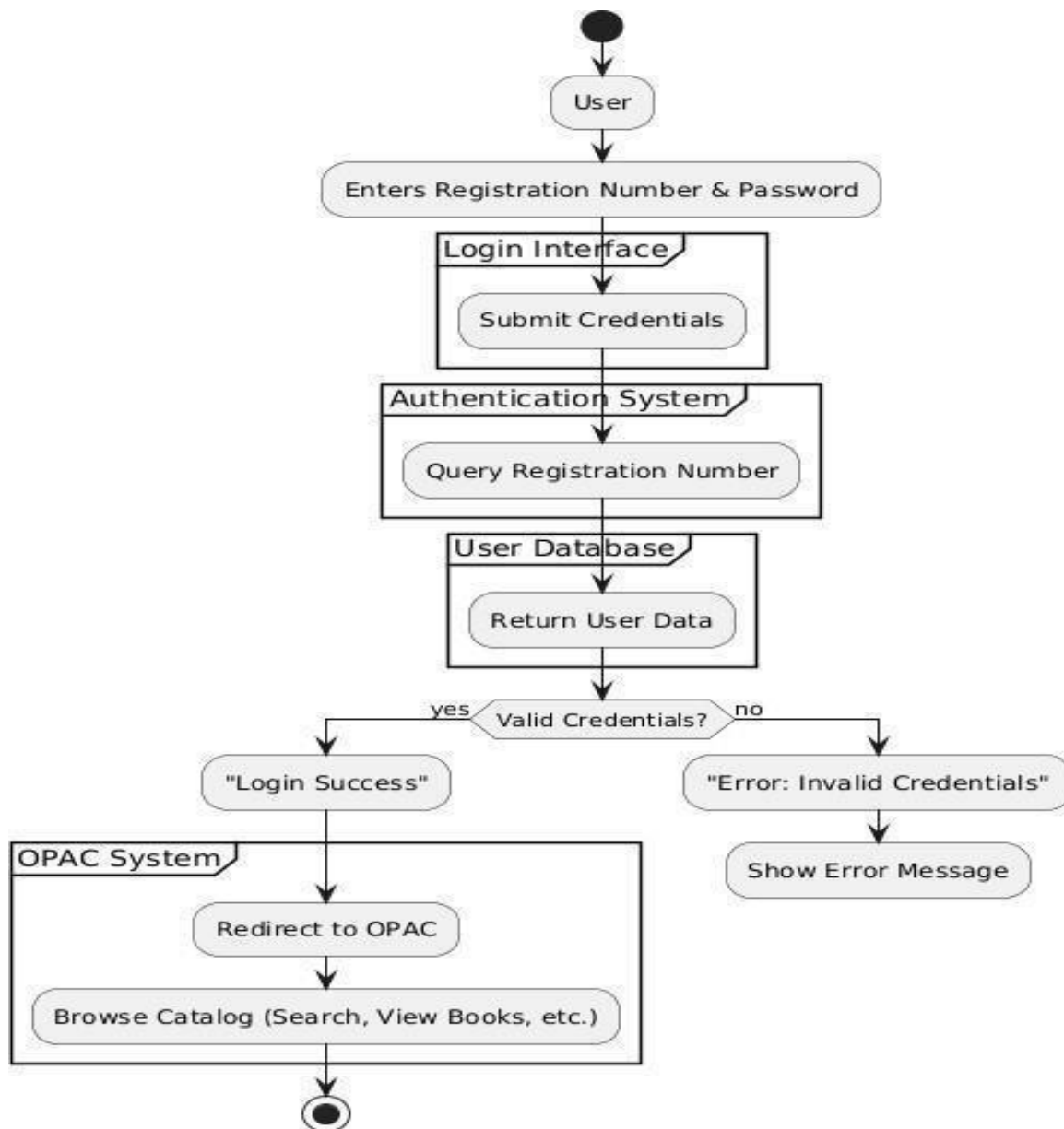
#### II.4.1.4 Activity diagram

An **activity diagram** is a type of behavioral diagram in the Unified Modeling Language (UML) that visually represents the flow of activities within a system. It illustrates the sequence and conditions for coordinating lower-level behaviors, showing the dynamic aspects of the system. Activity diagrams are particularly useful for modeling business processes, workflows, and the logic of complex operations. They employ elements such as actions, decisions, parallel processes (forks and joins), and swim lanes to depict responsibilities across different components or actors. This makes them effective tools for analyzing and designing both software systems and organizational procedures. [14] They are useful in the following phases of a project:

- Before starting a project: create activity diagrams to model the main workflows.

- During the requirements phase, create activity diagrams to illustrate the flow of events described in use cases.
- During the analysis and design phases, use activity diagrams to help define the behavior of operations.

#### II.5.3.4.1 User login



*Figure II.9 Activity diagram for user login*

1. Start of the activity (Initial Node).

The activity begins with the "User" actor.

2. The user enters their registration number and password.

The user performs the action "Enters Registration Number & Password".

3. The login system submits the credentials.

The activity moves to the "Login Interface" which performs the action "Submit Credentials".

4. The authentication system queries the user database.

The activity moves to the "Authentication System" which performs the action "Query Registration Number".

5. The user database returns the user data.

The activity moves to the "User Database" which performs the action "Return User Data".

6. The system checks if the credentials are valid (Decision Node).

A decision is made regarding the validity of the credentials ("Valid Credentials?").

7. If the credentials are valid ("yes"):

- The system displays the message "Login Success".
- The activity moves to the "OPAC System" which "Redirect to OPAC". The user can then "Browse Catalog (Search, View Books, etc.)".

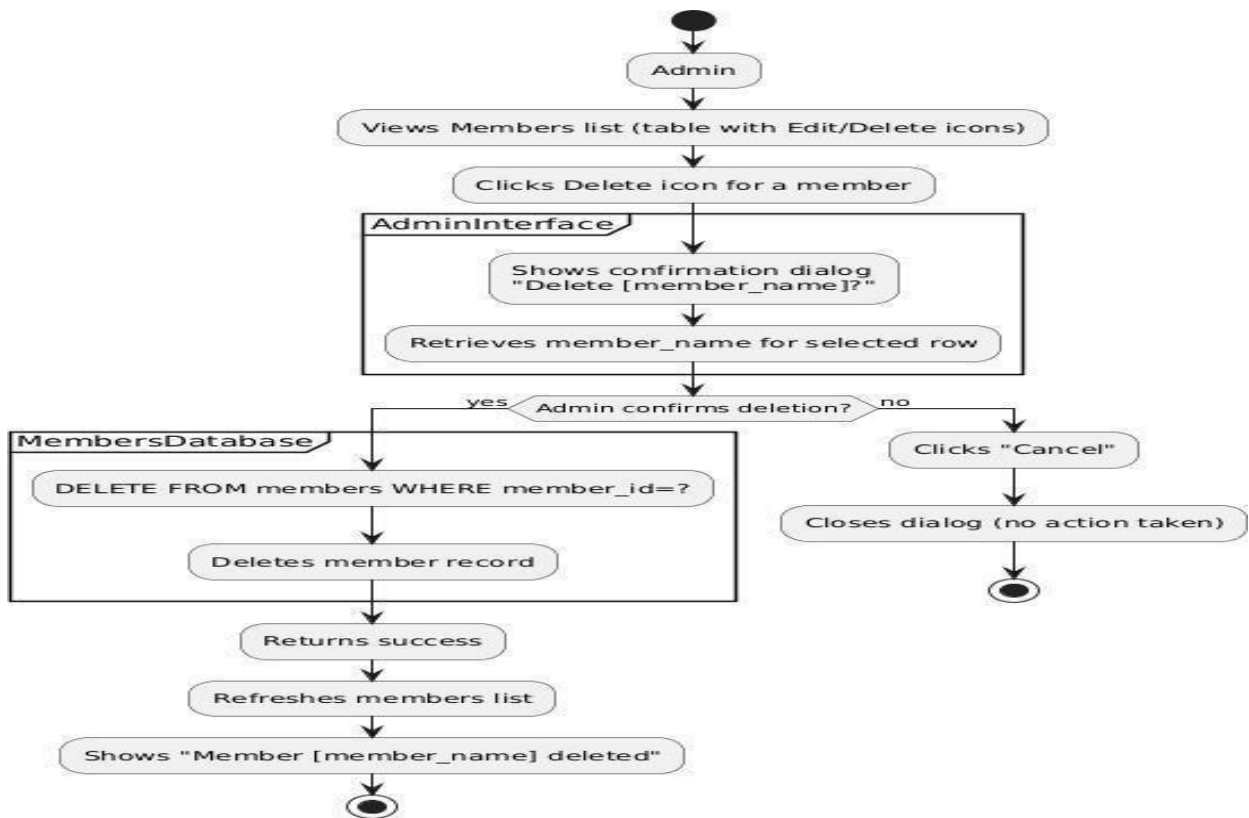
8. If the credentials are invalid ("no"):

- The system displays the message "Error: Invalid Credentials".
- The system "Show Error Message" to the user.

9. End of the activity (Final Node).

- The activity ends after the user has accessed the OPAC or an error message has been displayed.

### II.5.3.4.2 Delete member

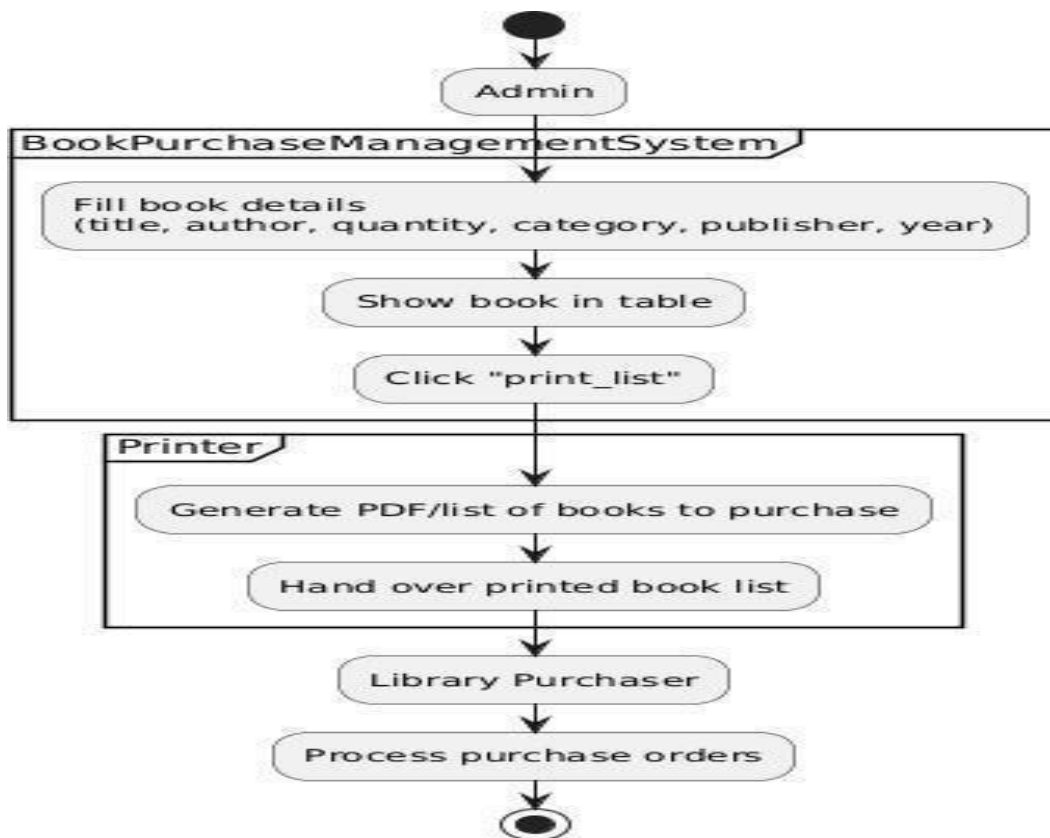


*Figure II.10 Activity diagram for delete member*

1. Start of the activity (Initial Node).
- The activity begins.
2. The Admin views the members list.
- The "Admin" performs the action "Views Members list (table with Edit/Delete icons)".
3. The Admin clicks the delete icon for a member.
- The "Admin" performs the action "Clicks Delete icon for a member".
4. The Admin Interface shows a confirmation dialog.
- The activity moves to the "AdminInterface" which "Retrieves member\_name for selected row" and then "Shows confirmation dialog "Delete [member\_name]?"".
5. A decision is made based on Admin confirmation.

- A decision node "Admin confirms deletion?" is reached.
6. If the Admin confirms deletion ("yes"):
    - The activity moves to the "MembersDatabase".
    - The "MembersDatabase" executes "DELETE FROM members WHERE member\_id=?" and "Deletes member record".
    - The system "Returns success".
    - The system "Refreshes members list".
    - The system "Shows "Member [member\_name] deleted"".
  7. End of the activity (Final Node).
  8. If the Admin cancels deletion ("no"):
    - The "Admin" performs the action "Clicks "Cancel"".
    - The system "Closes dialog (no action taken)".
  9. End of the activity (Final Node).

#### II.5.3.4.3 Purshace book



*Figure II.11 Activity diagram for purchase book*

1. Start of the activity (Initial Node).
  - The activity begins.
2. The Admin interacts with the Book Purchase Management System.
  - The "Admin" is the initial actor.
  - The activity moves into the "BookPurchaseManagementSystem" swimlane.
  - The Admin performs the action "Fill book details (title, author, quantity, category, publisher, year)".
  - The system then "Show book in table".
  - The Admin "Click "print\_list"".
3. The system generates and prepares the printed list.
  - The activity moves into the "Printer" swimlane.
  - The system performs the action "Generate PDF/list of books to purchase".
  - The system then performs the action "Hand over printed book list".
4. The Library Purchaser processes the orders.
  - The activity moves to the "Library Purchaser" role.
  - The "Library Purchaser" performs the action "Process purchase orders".
5. End of the activity (Final Node).
  - The activity concludes.

## **II.5 Conclusion**

This chapter outlines the architectural and functional design of our e-library management system, providing a strong foundation for its construction. We established the system's structure, user interactions and workflows using uml diagrams, including class, use case, sequence and activity diagrams. These technologies have ensured a unified and scalable design by clearly visualizing the relationships between people, resources, and processes. The safe administration of library materials, operational effectiveness and user accessibility were the main considerations in creating the e-library system. Essential features include guest access to digital resources, resource borrowing and return, user registration and authentication, and thorough administrative control of both digital and physical assets. Thanks to its thorough and organized system architecture, the e-library administration platform is guaranteed to satisfy the various needs of administrators, visitors from outside the university and university users. It also offers a robust foundation for the next stage of development, ensuring a smooth transition from design to execution.

With this robust design in place, the project is well-positioned to deliver an effective, scalable and user-friendly e-library solution to our university community.

# **Chapter III**

## **Realization**

## Chapter III: Realization

### Introduction

For any application development, the right tools and technologies must be chosen to make implementation easier. We'll outline the technology and various tools used in this chapter, then we After discussing the system architecture and the tools required for the web application's deployment, we will finally go over its features by showcasing a few example interfaces.

### III.1 Development and Implementation Environment

This section outlines the technologies and tools used to develop the Electronic Library Management System, a web-based application connected to a database. The system was built using the following stack:

- ✓ **Backend:** PHP (server-side scripting for business logic and data processing).
- ✓ **Frontend:** HTML & CSS (structure and styling), JavaScript (client-side interactivity).
- ✓ **Database:** MySQL (efficient data storage and querying for books, users).

### III.2 development tools

#### Apache Web Server

An HTTP server that is open-source and free for Linux, MacOS, Windows, and Unix. The server is used to host several websites and is among the most popular HTTP servers on the internet. It is simple to configure and personalize Apache by using configuration files and extra software modules. Among the many web technologies, it manages are PHP, Perl, and Python. [15].

#### MySQL Database

- The relational database solution for our system offers:
- Fast SQL query processing for book searches/transactions
- Scalable storage for growing library collections
- PHP compatibility through MySQL/PDO extensions
- Transaction support for loan processing integrity [16]

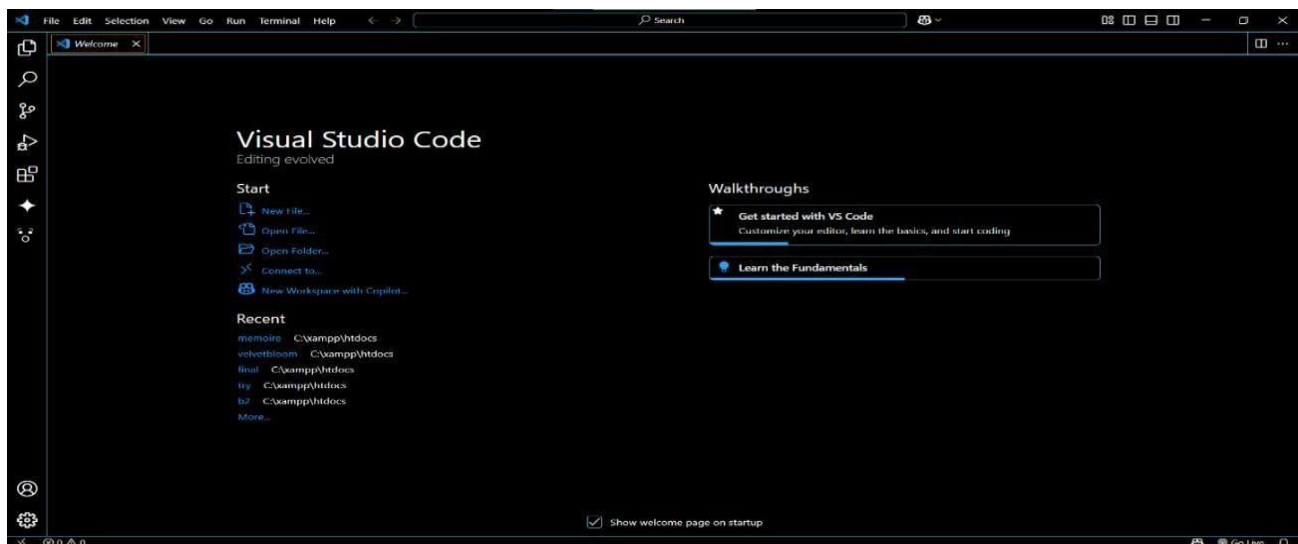
## PHP

It is a general-purpose language for creating dynamic Web content. Its combination with an Apache web server and a MySQL database creates a free, reliable, and strong solution that can be installed on many platforms, including Windows. [17]

### III.3 Software used

#### Visual Studio Code (VS Code)

is a free, open-source, and cross-platform code editor developed by Microsoft that provides developers with a lightweight yet powerful environment featuring IntelliSense smart code completion, built-in debugging, Git integration, an extensive extensions marketplace, and customizable interface - making it one of the most popular choices for web, app, and cloud development across Windows, macOS, and Linux systems. [18]



*Figure III.1 Visual Studio Code interface.*

#### XAMPP:

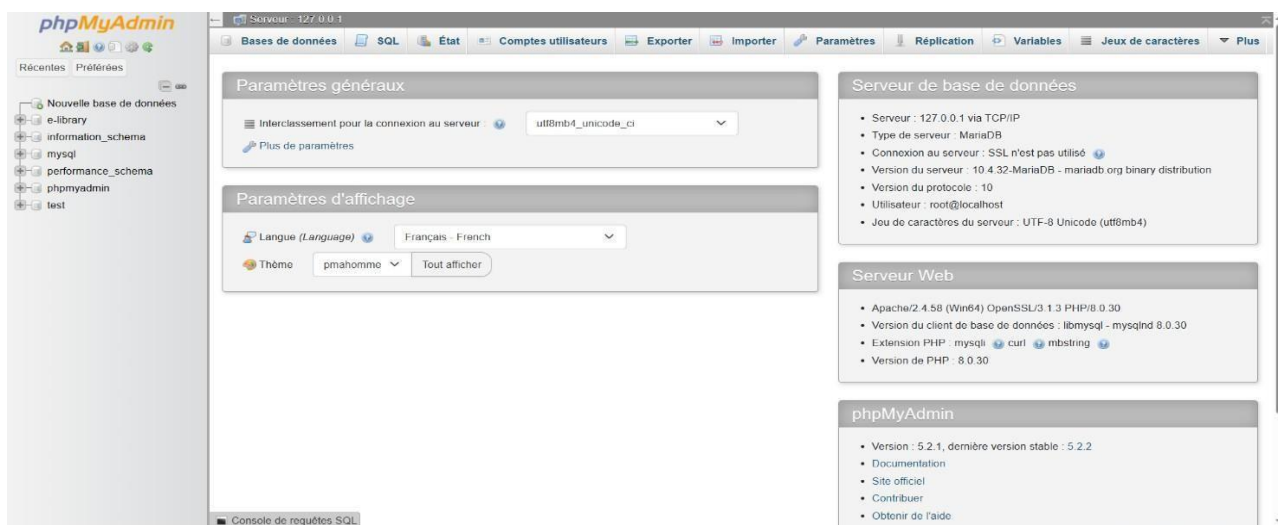
is a free, open-source, cross-platform web server solution stack that provides developers with a complete local development environment by bundling Apache (web server), MySQL/MariaDB (database), PHP/Perl (scripting languages), and phpMyAdmin (database management) in a single easy-to- install package, enabling quick setup of a fully-functional testing server on Windows, Linux, and macOS systems for building and debugging web applications offline before deployment to production environments. [19]



*Figure III.2 XAMPP interface*

### phpMyAdmin

is an open-source, free utility for MySQL and MariaDB administration. One of the most widely used MySQL administration tools, particularly for web hosting providers, is a portable online application that is mainly written in PHP. [20]



*Figure III.3 Php My Admin interface*

## III.4the programming language used

### HTML

The HyperText Markup Language, or HTML, is a type of descriptive computer language. More specifically, it refers to a data format used in the Internet universe to create page layouts. Among other things, it enables the writing of hypertext and the introduction of multimedia resources into a piece of content. [21]

## CSS

The computer language CSS, which stands for Cascading Style Sheets (or "feuilles de style en cascade" in French), is used to describe how HTML and XML documents are visually presented. It makes it possible to manage the look and placement of a web page's elements, separating its presentation (CSS) from its content (HTML). [22]

## PHP

Hypertext Preprocessor, also known as PHP (auto-reference language), is a free programming language. It is primarily used to create dynamic Web pages through a web server, but it can also work with any language that is locally interpreted. PHP is an object-oriented programming language. [23]

## JavaScript

JavaScript is a programming language for scripts that is mostly used in interactive web pages and, as such, is the foundation of online applications. Web developers use JavaScript as the foundational language, together with HTML and CSS. It is used by the vast majority of websites and most web browsers have a JavaScript interpreter. [24]

## MySQL

Based on the structured SQL query language, MySQL is an open source database management system (SGBDR) with a client-server architecture. The most popular relational database management system in the world is called MySQL. It is used by many websites and online apps, including Facebook, Google, Adobe, Alcatel Lucent, and Zappos. [25]

## Bootstrap

Bootstrap is a group of helpful tools for creating the design of websites and web apps, including graphics, animation, and user interactions. It is a collection of HTML and CSS codes, forms, buttons, navigation tools, and other interactive elements, together with optional JavaScript additions. It is one of the most well-known projects on the GitHub development management platform. [26]

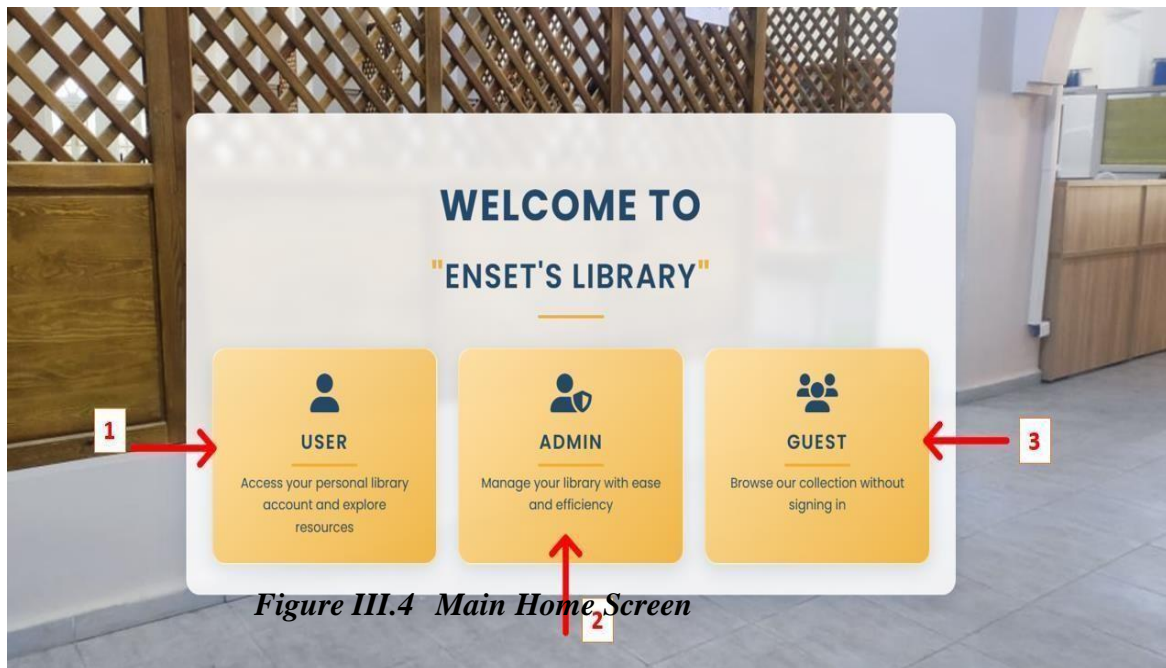
### **III.5 Interface realization**

HTML, CSS, PHP, and JavaScript are among the web technologies that are used to create interfaces. The professional editor Visual Studio Code, which makes it easier to organize, code, and assemble the many web site components, has been used to integrate these languages. A clear presentation, well-organized content, and optimal compatibility across many platforms are all guaranteed by the design.

### Examples of interfaces of our application:

**Remark:** Considering the large number of interfaces that our application offers, we will just highlight a few.

- **Main Home Screen (ENSET Library):** Login as a user(student/teacher), admin or a guest.



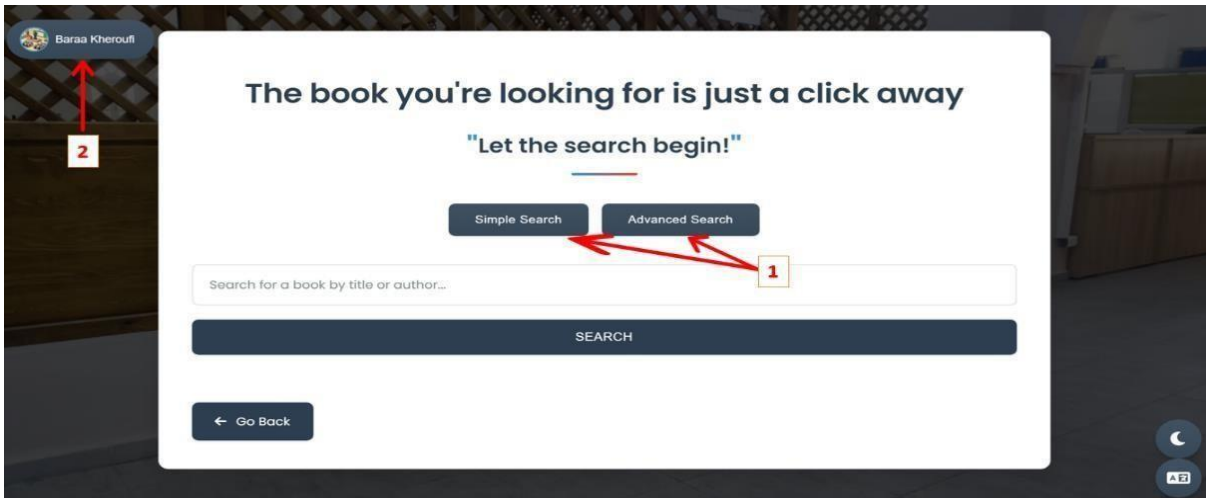
*Figure III.4 Main Home Screen*

Depending on your role, you can move from this main screen to particular sections:

1. **User:** Teachers and students should use this section, they may manage their personal account, search books, borrow or return them ..
2. **Admin:** To manage the entire library system, the administrator interface offers many options. This include managing all library operations like adding new books, registering users, manage notifications and more other functions.
3. **Guest:** For guests who would want to browse our collection without log in, the guest section offers restricted search and resource viewing capabilities.

## 1. User interface

Teachers and students are the two user roles that our system supports. Users can access the OPAC by logging into the system after registering.

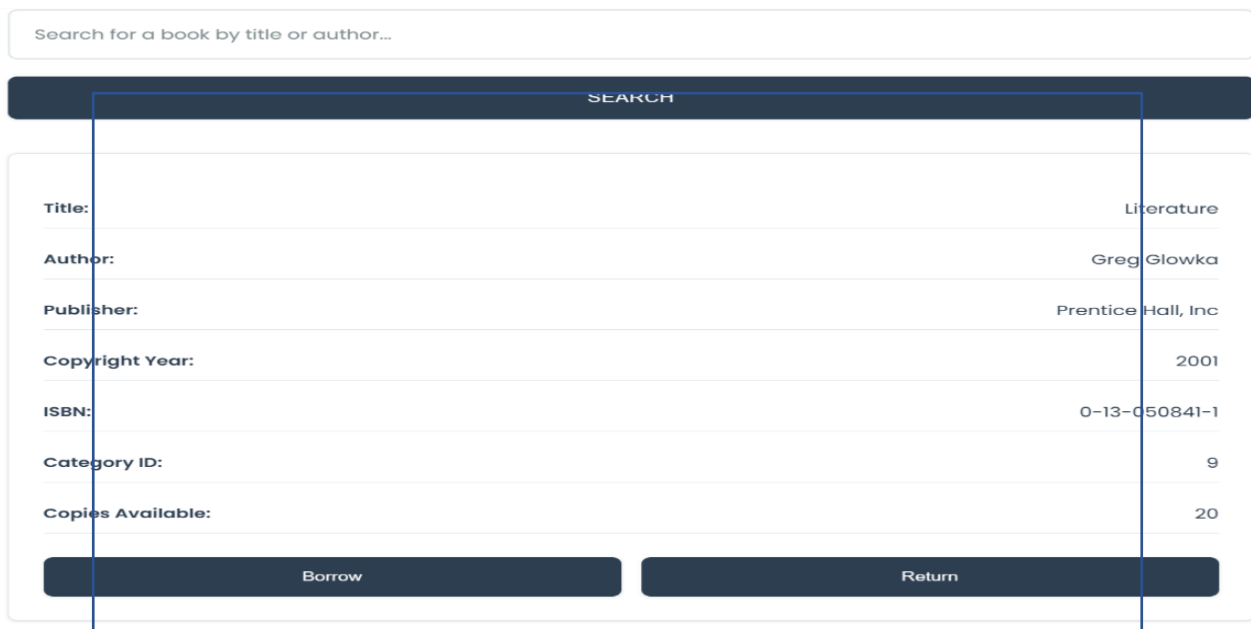


*Figure III.5 OPAC interface*

Once you're logged in, The Online Public Access Catalog (OPAC) serves as your main resource for managing your library interactions and finding resources once you've log in. It includes:

### 1. Search

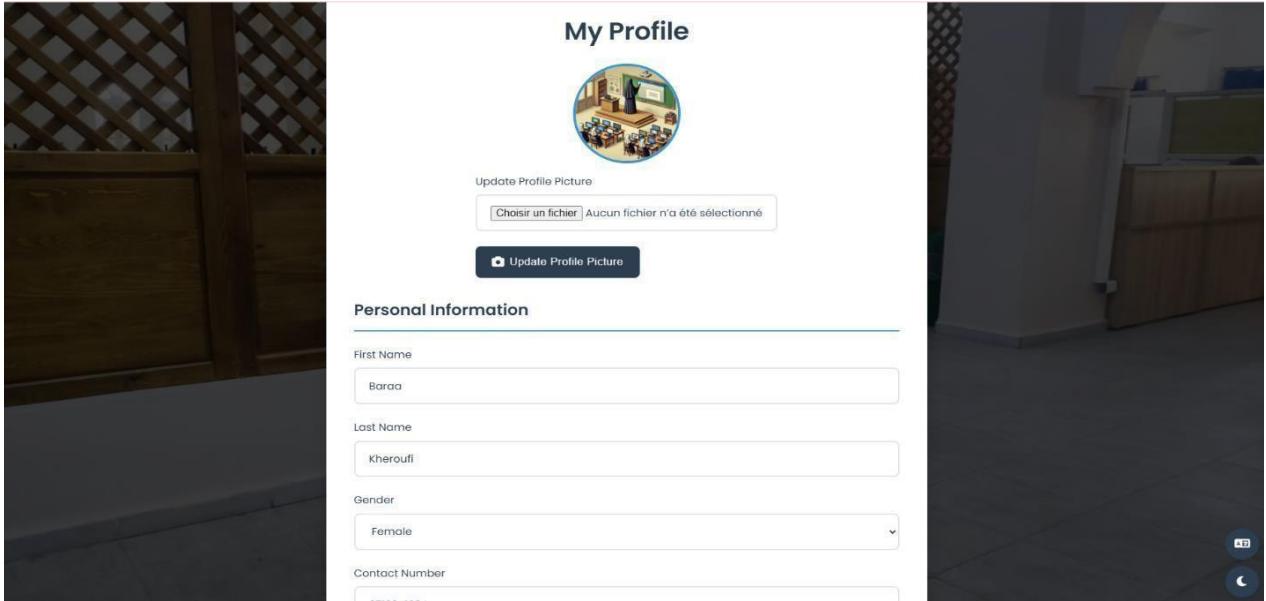
You can find what you need more quickly thanks to this. For fast keyword lookups, use simple search, for more focused results, use advanced search. The system walks you through the books to borrow or return them after you've located one.



*Figure III.6 Example of search*

## 2. User profile

You can manage your personal information with a user profile. Easily update information, modify profile pictures, and change passwords.

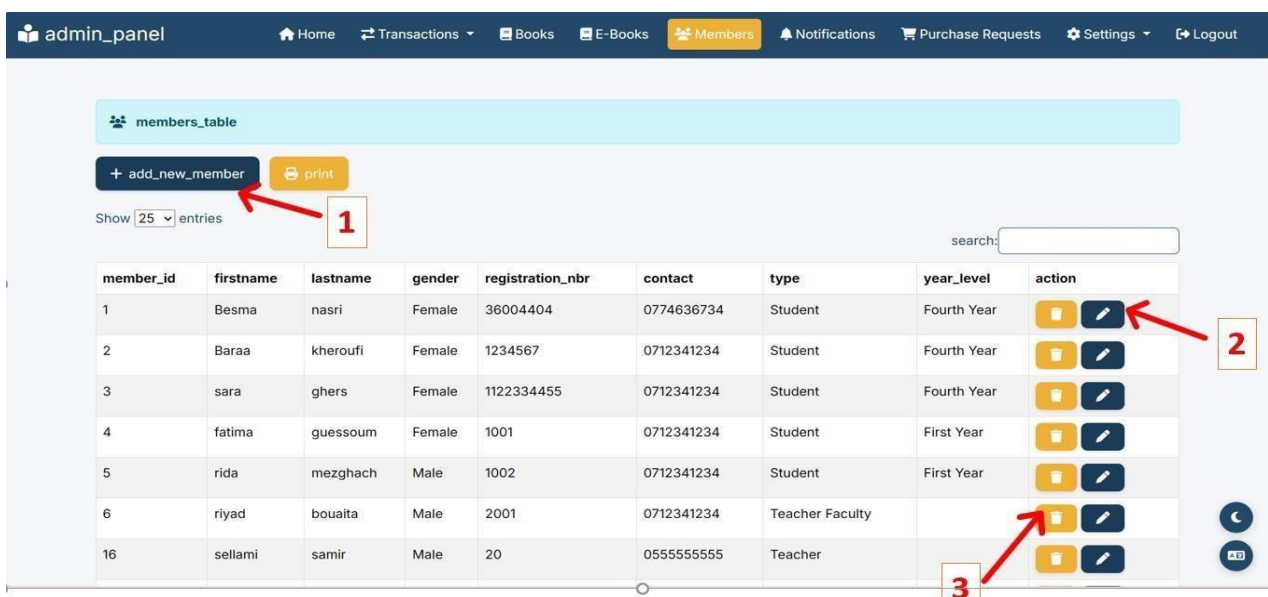


*Figure III.7 User profile*

## 2. Admin interface

### 2.1 Interfaces for user management

Administrators may effectively add, edit, and manage library members using the Members Management Interface in the admin panel. With obvious labels and actions, every control in the interface is made to simplify user management.



*Figure III.8 Interfaces for user management*

1. **Add new member:** The admin can create a new member account by inputting the member's details into the system.
2. **Edit member:** Modify an existing member's information, including their name, email address, phone number, or address.
3. **Delete member:** The member's record can be permanently deleted from the system by selecting Delete Member icon.

## 2.2 Borrow interface

The borrow interface, which consists of a book selection table and a borrower information area, is depicted in the figure below. The administrator can choose books from the list of available books for borrowing, choose a borrower, and establish a due date.

The screenshot shows the 'admin\_panel' interface. On the left, the 'Borrower Info' section includes a dropdown for 'Borrower Name' (labeled 'Select Borrower') and a date input for 'Due Date' (format: ////mm/aaaa). A yellow 'Borrow' button is at the bottom. On the right, the 'Select Books to Borrow' section contains a table with columns: ACC NO., BOOK TITLE, CATEGORY, AUTHOR, PUBLISHER, STATUS, and SELECT. The table lists four books with their respective details and a checkbox in the 'SELECT' column.

| ACC NO. | BOOK TITLE                         | CATEGORY     | AUTHOR                          | PUBLISHER   | STATUS   | SELECT                   |
|---------|------------------------------------|--------------|---------------------------------|---|----------|--------------------------|
| 17      | Algebra 1                          | Math         | Carolyn Bradshaw, Michael Seals | Prentice Hall, New Jersey                               | Borrowed | <input type="checkbox"/> |
| 20      | Literature                         | References   | Greg Glowka                     | Prentice Hall, Inc                                      | Old      | <input type="checkbox"/> |
| 21      | Lexicon Universal Encyclopedia     | Encyclopedia | Lexicon                         | Pulication Inc., Lexicon                                | Borrowed | <input type="checkbox"/> |
| 22      | Science and Invention Encyclopedia | Encyclopedia | Clarke Donald, Dartford Mark    | Publisher , Westport Connecticut                        | Borrowed | <input type="checkbox"/> |
| 23      | Integrated Science Textbook        | Science      | Merde C. Tan                    | 12536, Araneta Avenue Corner Ma. Clara St., Quezon City | Borrowed | <input type="checkbox"/> |

## 2.3 Book and E-book interface

Both physical books and e-books can be managed by the system administrator. Any book or e-book can be edited, deleted, and new ones can be added.

admin\_panel | Home | Transactions | Books | E-Books | Members | Notifications | Purchase Requests | Settings | Logout

books\_table

+ add\_new\_book | print

Show 25 entries | search:

| Accession number | Book title                     | Category     | Author                          | copies | book_pub                 | publisher_name            | isbn          | copyright_year | date_added          | Status   | action |
|------------------|--------------------------------|--------------|---------------------------------|--------|--------------------------|---------------------------|---------------|----------------|---------------------|----------|--------|
| 17               | Algebra 1                      | Math         | Carolyn Bradshaw, Michael Seals | 201    | Pearson Education, Inc   | Prentice Hall, New Jersey | 0-13-125087-6 | 2004           | 2013-12-11 06:39:17 | Borrowed |        |
| 20               | Literature                     | References   | Greg Glowka                     | 20     | Regency Publishing Group | Prentice Hall, Inc        | 0-13-050841-1 | 2001           | 2013-12-11 06:47:44 | Old      |        |
| 21               | Lexicon Universal Encyclopedia | Encyclopedia | Lexicon                         | 9      | Lexicon Publication      | Pulication Inc., Lexicon  | 0-7172-2043-5 | 1993           | 2013-12-11 06:49:53 | Borrowed |        |
| 22               | Science and Invention          | Encyclopedia | Clarke Donald,                  | 15     | H.S. Stuttman            | Publisher, Westport       | 0-87475-450-x | 1992           | 2013-12-11 06:52:58 | Borrowed |        |

**Figure III.10 Book interface**

admin\_panel | Home | Transactions | Books | E-Books | Members | Notifications | Purchase Requests | Settings | Logout

Ebooks\_table

print

Show 25 entries | search:

| id | title                  | Author          | Category     | description                      | uploaded_by     | upload_date        | downloads | action |
|----|------------------------|-----------------|--------------|----------------------------------|-----------------|--------------------|-----------|--------|
| 1  | Recherche operationnel | Peter Norvig    | technology   | nice book ..                     | fatima guessoum | May 01, 2025 17:14 | 1         |        |
| 2  | algorithmique          | fatima guessoum | non-fiction  | learn c                          | fatima guessoum | May 01, 2025 19:53 | 1         |        |
| 4  | inteligence aectifciel | halima salah    | informatique | history of inteligence artiftiel | fatima guessoum | May 01, 2025 20:05 | 1         |        |
| 5  | systeme d'exploitation | riyad bouaita   | informatique | chapitre 1                       | riyad bouaita   | May 01, 2025 21:58 | 1         |        |

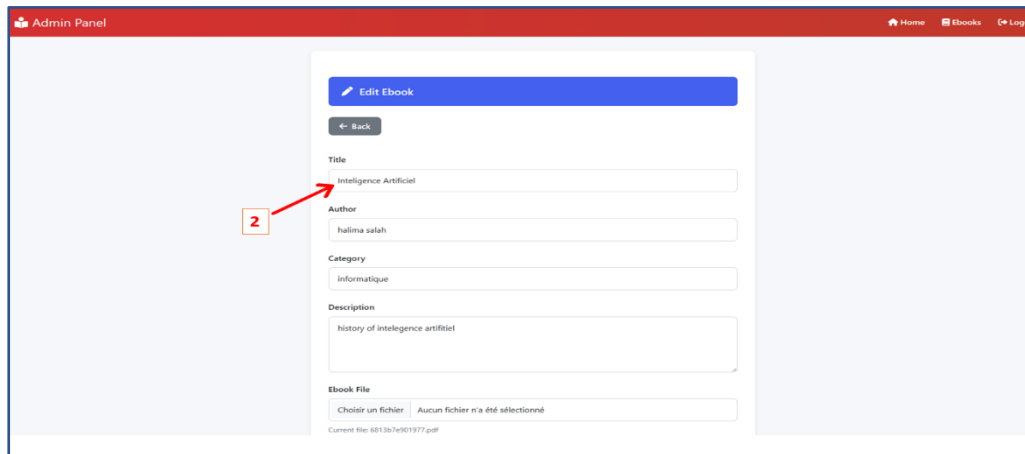
**Figure III.11 E-book interface**

**Example for updating E-book:**


- 1) This e-book has inaccurate information, and it will be updated appropriately.

|   |   |                        |              |              |                                  |                 |                    |   |  |
|---|---|------------------------|--------------|--------------|----------------------------------|-----------------|--------------------|---|--|
| 1 | 4 | inteligence aectifciel | halima salah | informatique | history of inteligence artiftiel | fatima guessoum | May 01, 2025 20:05 | 1 |  |
|---|---|------------------------|--------------|--------------|----------------------------------|-----------------|--------------------|---|--|

- 2) When we click the edit icon, a window will open where we may change the information.



3) Now, the data has been updated.

|          |   |                         |              |              |                                    |                 |                       |   |  |
|----------|---|-------------------------|--------------|--------------|------------------------------------|-----------------|-----------------------|---|--|
| <b>3</b> | 4 | Intelligence Artificiel | halima salah | informatique | history of intelligence artificiel | fatima guessoum | May 01, 2025<br>20:05 | 1 | <br> |
|----------|---|-------------------------|--------------|--------------|------------------------------------|-----------------|-----------------------|---|--|

### 3. Guest home page

Any visitor to the library system who does not log in is intended to use this page. Visitors can browse and download the books on this page without creating an account.

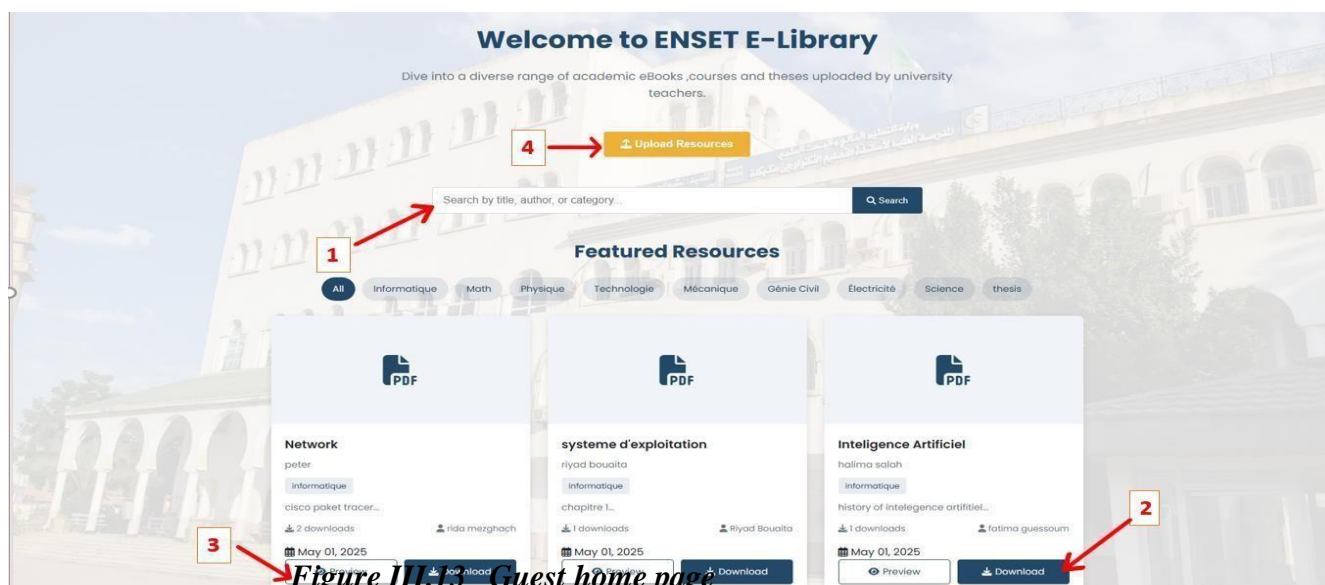


Figure III.15 Guest home page

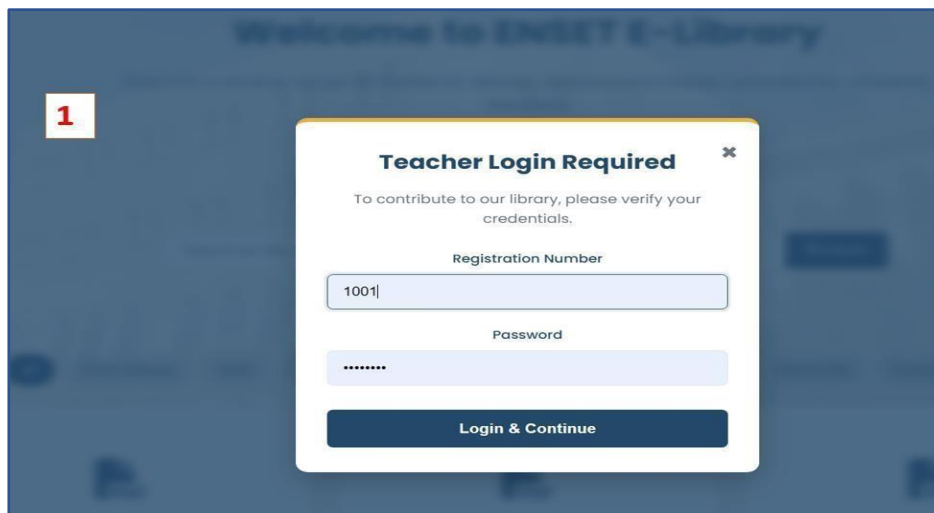
As a guest, you can:

1. **Search for Books:** The library's catalog search feature is fully available to guests. This allows them to do searches.
2. **download:** guests could be able to download e-books or other digital content that is openly accessible and doesn't require a login or subscription.
3. **Preview:** For some digital materials, guests can make use of the preview feature. Usually, this allows book viewing.

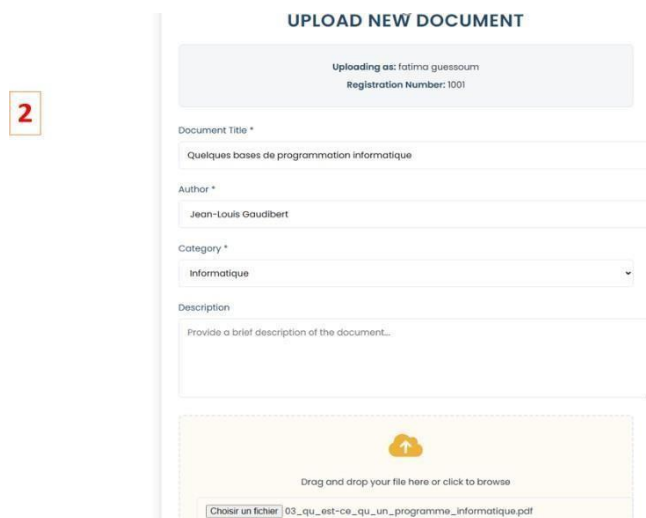
4. **Upload Resources:** Only teachers can upload items like courses, books, and theses on this page.

*Figure III.14 Example of uploading course:*

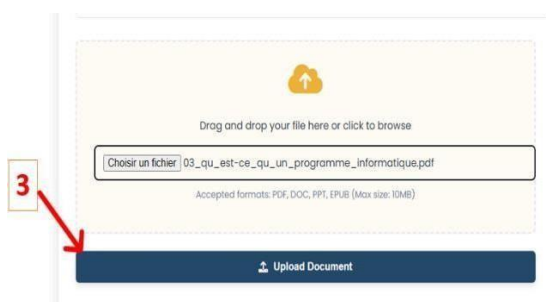
1) The teacher signs in to the system.



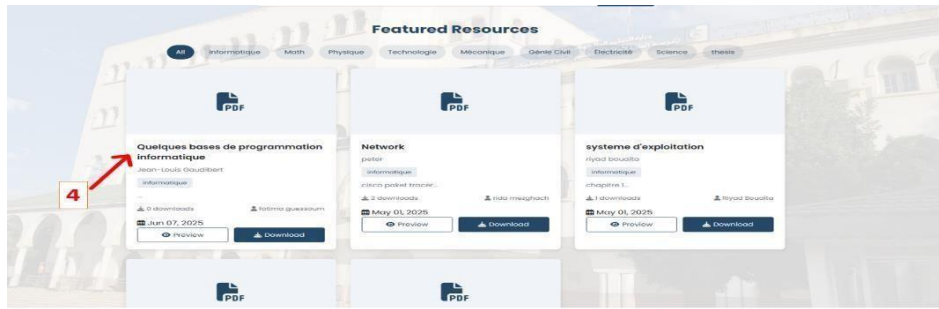
2) he fills out the necessary information about the eBook, courses, or thesis they want to upload.



3) To continue, click the upload button.



4) The chosen resource is then uploaded to the system without any problems.



### III.6 Limitations of the Current Library System

- **Manual and Inefficient Borrowing Process:** Users look up book details and write down the ISBN, which staff members use to find the book. This procedure takes a lot of time and it is lead to errors.
- **Restricted User Access:** Students and teachers are usually the only ones with access. Digital borrowing capabilities and direct login are not available to guests or other users.
- **Complex and Difficult Technology:** Book searching is challenging to comprehend because of the client-server architecture, particularly for non-technical users. The UI is difficult to use and frequently needs help.

### III.7 Enhancements in Our Proposed Library System

- **Digital Borrowing and Returning:** When a user finds a book, they can click "Borrow" or "Return" to submit a request to the admin system. This completely eliminates the need for manual tracking and paper slips.
- **Multiple Roles:** supports various types, such as administrators, teachers, guests, and students. Within the system, each type has particular functionality and access rights.
- **User-Friendly Web Interface:** uses a modern, web-based platform in place of the traditional client-server configuration. Regardless of technical proficiency, it is made to be simple to use and navigate for all kinds of people.

### **III.8 Conclusion**

During the realization phase, our original idea was successfully turned into a functional E-library system. We made sure that every administrator, user, and guest could access aspects that were relevant to their roles by implementing a clear and useful web interface. Because of the platform's dependability, user-friendliness, and ability to adjust to the academic setting, library tasks become quicker and more structured.

# **General Conclusion**

## General Conclusion

---

This research has successfully delivered an innovative Electronic Library Management System that bridges the gap between traditional library services and modern digital expectations. Through careful analysis of existing challenges and systematic implementation of robust technical solutions, we have created a platform that significantly enhances operational efficiency, user accessibility, and resource management. The system architecture, built on secure and scalable technologies, demonstrates how digital transformation can revolutionize academic library services while maintaining intuitive usability. Key achievements include streamlined workflows, automated processes, and data-driven decision-making capabilities that collectively represent a paradigm shift in library administration. This project not only provides immediate practical benefits but also establishes a foundation for future enhancements in areas like artificial intelligence integration and predictive analytics. The successful implementation validates our approach and serves as a replicable model for institutions seeking to modernize their information management systems, ultimately contributing to the broader digital transformation of educational infrastructure.

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