Designing the E-library management system

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Abstract: It is the goal of the library's management system to create a computerised system that can handle all of the library's everyday operations. User login is one of the functions that can't be found in most library management systems. n. The admin may keep tabs on the whole system using the admin login feature. After login onto their account, students may check what books they've borrowed and when they've returned them, as well as fill out a form to request the library to add additional books. The librarian may monitor the status of book issuance, return, and new book additions after login into his account, which is the administrator account. Ultimately, our paper is designed to assist students and library staff alike manage the library in the most efficient manner possible, while simultaneously reducing the amount of human labour required.

Keywords: E-library, website, admin, student, books.

I. INTRODUCTION

A new way of thinking is needed in the library and information services sector as it adapts to new ways of delivering information, new technologies, and changing financial conditions. Information on the most recent studies, cutting-edge theories, and successful organisational strategies may be found in the Library Management System.

Automation and digitization of library work are the goals of the library management system. When compared to the manual process, the Library Management System is much more user-friendly, quicker, and easier to manage. Using it, the librarian can more securely handle all of the library's data in a single database across several tables than she could before. When students ask a librarian for a specific book, he or she has to manually search for it, which takes a lot of time and has the potential for human error. In a library, tasks such as issuing/returning/add new students/add new books/checking any discrepancies in stock/calculating fines for overdue books etc. are performed every day. LMS, on the other hand, streamlines the book search process such that the librarian simply has to input the book id into the application's search field. Similarly, adding or removing a student from the library's list of registered users has never been easier. Using a library management system, all of these tasks may be digitised and carried out more quickly and effectively.

II. RELATED WORK

They discuss the advantages of effective information system management and library system sustainability in those works [6], [7]. They pointed out that the rapid growth in the variety of data kinds makes it more difficult to get precise information. But our system concentrates on providing the library's users with more useful information, and the system administrator has complete control over the material that is updated. The library is an invaluable resource for expanding one's knowledge base and honing one's analytical and communication abilities. When it comes to sustaining the long-term viability of our library system, we have a notion in common with their publications. [8] "the art of accomplishing things via people" is used to describe management in this text. In the eyes of the public, a manager is someone who motivates people to achieve their full potential in order to forward the aims of the company. The topic of whether management is a science or an art remains up to debate, but it is clear that contemporary management in the context of technology is becoming more scientific-based than art-based. Management for MIS is also described as the process of planning, organising, coordinating and regulating the work of the organization's members in order to achieve its stated goals and objectives. People may read, study, or use reference materials at the library, according to Asmait Futsumbrhan's definition, since libraries house collections of books and other informational resources. It has been simpler for everyone who enjoys reading and discovering new information to locate what they are looking for in the library's vast collection

of publications. Printed items, such as manuscripts, books, newspapers, magazines, maps, and pictures, are preserved in contemporary libraries. However, we were disappointed to see that her explanation was

restricted to library use. In addition, we're moving all of our paperwork to a computer system and introducing an eBook system so that users may access the library's collection both inside and outside the building. Knowledge and information

are the primary goals of a library's primary mission. Libraries' reward for this role is the preservation of priceless cultural artefacts for future generations. It is important to remember that libraries are a bridge between the past, the present, and the future. Libraries must ensure that the cultural record is maintained and accessible for future generations, regardless of whether the record is included in books or other media. Libraries make it possible for people to receive the knowledge they need to do their jobs and further their education. People in a wide range of vocations rely on library resources for help throughout their workdays. In spite of the fact that they utilise to gather knowledge about their interests or to acquire leisure items like books. It is a place for students to develop new skills in research and to enhance their reading habits by using the library as a resource. Provide information and services that are crucial to the study and growth of one's knowledge is a high-valued library activity [10]. Library Director Ato. Efrem Matiwos says this new service saves time and energy for readers. This new method is a stride forward in the history of the library and a motivating factor for the Library's patrons, he said. They have a public library, which provides service to the community, hence their library system is mostly focused on providing public material. Students and teachers will be the focus of our research. The Library System was described by this author [11] as a rapidly expanding database for information retrieval that aims to establish computerised systems to maintain the library's everyday operations. Users will benefit from the digital library's quick and efficient service. For them, the term "library system" refers to a computerised system for managing library operations and activities. Many of its structures, such as user login, are unavailable in manual LMS. As an added bonus, we recommended a digital archive to store electronic data that would be compatible with each of their respective bodies of work. This new system contains a feature that allows the administrator to log in and monitor the whole system. The purpose of this research is to construct and establish a database for the records and other computer application capabilities. To construct a list of books by doing a variety of searches to determine the ease of use of the library's collection.

III. PROPOSED METHODLGY

i. The proposed methodology is discussed in this sub-section, *Designing the database*

Database design is the process of creating a complete data model for a database by controlling the duplication of data. Modeling in a Data Definition Language necessitates having an accurate representation of the data that will be stored (DDL). Create a database using DDL. Each entity in a fully attributed data model has all of its characteristics. Database designers play an important role in the process of database design. As a rule, the designer must adhere to these guidelines.

ii. *Logical Design*

Data must be organised into an ordered set of logical connections, referred to as entities and attributes, before logical design can be completed. Entities are used to represent a specific piece of data. Tables serve as normal mappings in relational databases. A module of an entity, an attribute aids in the definition of the uniqueness of the entity. Attribute corresponds to a column in relational databases, while entity corresponds to raw data.

iii. *Physical Design*

In this phase of design, the plan for the tables, including acceptable data, kinds of fields and the size of the attributes domains, is given. There must be sufficient information in the plan to allow anybody to comprehend and utilise it to develop a database. Indexes and attribute domains are not included in the physical architecture for this project. There were no physical constraints on the conceptual or logical design. However, we're focused on the relational paradigm and constructing a database management system (DBMS) utilising MySQL as our primary emphasis.

Design of modules

All applications have three parts: a front end, a back end, and a database, as we all know. They're all in here, too, in this application.

The front-end element of the database allows the administrator and librarian interact with it.

Sections of the front-end are further subdivided into three application components Application modules like the Librarian Module or the Student Module are available. By interacting with the application's front-end interfaces, administrators, librarians, and students may each have access to the aforementioned modules. Each module is linked to the database and to the backend.
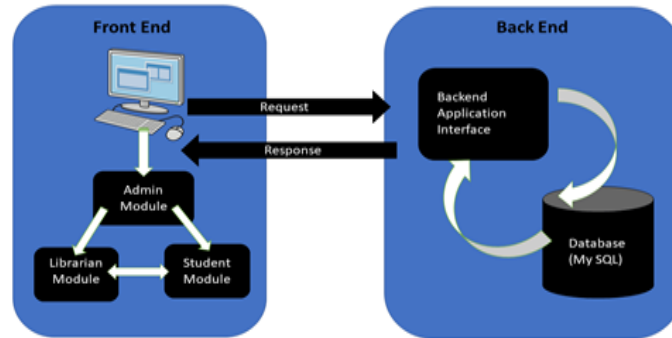
Figure 1: Design flow of the model.

Application module

Admin Module, Librarian Module, and Student Module are the three main sections of the programme.
The application's three panels make it easy for users to get to these three areas. There are interconnections between the modules so that information may be exchanged.
Interface Design
UI design involves anticipating what users want to do and verifying that the interface offers elements that are simple to access, understand and apply to smooth out those activities.. [more] Visual design, interaction design, and information architecture all come together in this user interface.
The term "low-level design" is used to describe module design. It is clear that the programmer may begin coding after the planned system has been divided into smaller components or segments and each one has been discussed. Fig.2 depicted the low-level design flowchart for the complete system.
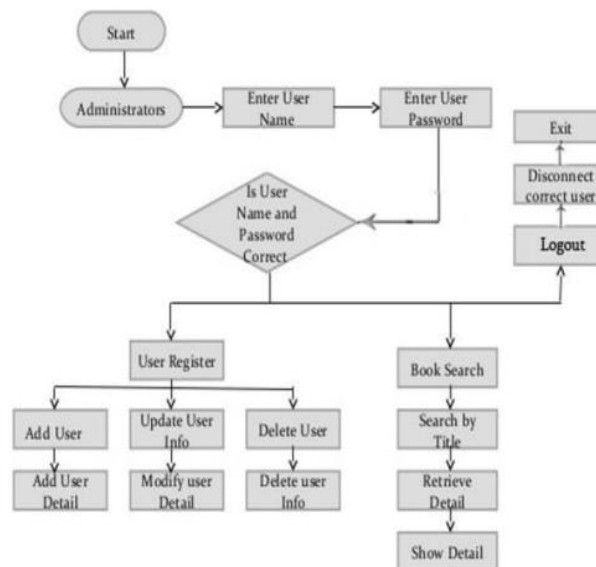
Figure 2: Flow chart of the proposed system.

IV.   Testing on the proposed methodology

The goal of our project's system testing was to uncover all of the project's flaws. This software has been put through its paces, and based on the results, it will be determined whether or not it performs as planned. There are three levels of evaluation: This is referred to as "Unit Testing." the module design phase is when UTPs are created in the V-Model. Using these UTPs, issues may be fixed at the unit or code level. Program modules, for example, are considered Units since they may live on their own. Even if the smallest object is isolated from the rest of the code, unit testing ensures that it is able to do its intended role.

Interoperability Tests During the architectural design phase, integration test plans are put into action. They show that a unit may survive and interact with itself since it was created and confirmed independently. The customer's group is informed of the test findings.

System Analysis When designing a system, the System Test Plan (STP) is created. STP is formed of the client's business group, which has separate unit and integration test plans. An application designer may rest easy knowing that their standards have been satisfied by running a System Test. The functionality, interdependency, and communication of the whole application are rigorously tested. To ensure that all functional and nonfunctional requirements have been satisfied, systems must be tested. It is important to understand that system testing encompasses a variety of different types of tests.

Acceptance Testing for End Users During the analysis stage, UAT techniques are designed. Test Strategies are made up of people from the company. Testing in a user environment that closely mirrors that of production, utilising reliable data, is what UAT stands for. A real-time system is ready for usage when a user acceptance test (UAT) shows that the system fulfils the user's needs.

V. TEST CASES

In this part, we'll go through the outcomes of our suggested system's experiments. Those findings will assist us show that the suggested system is able to effectively and efficiently serve consumers. Table.1 summarises the findings of the test, starting with the requirements of the system, followed by the functional specifications and the design specifications. Although weighing the advantages and drawbacks of a digital system over a manual one is beneficial to consumers,

Test case	Purpose	Condition	Expected outcome	Actual outcome
Login	Validate username & password	Display error if not registered	If user present provide access	If username is current get the access
Add member	Add user to the system	If user is present in database throw error display	New user need to be added	If user is present throw error display if not add to the user.
Add new book	New book added	If book already present increase the number of copies	Book added successfully	All author information and book details need to be updated
Book availability status	To check whether this book is accessible for borrowing or if the borrowed volumes have been returned successfully to the system.	A book may be checked out if it is already in the system. Then we must wait for the return of our loved one	The book should be able to be borrowed and returned successfully.	The entered data of book is not available then it is understanble that the book is barrowed by another student the current stident need to wait for getting the book.

A database is a collection of files that may be accessed by the system. Despite the fact that the database is set up to allow for the addition, deletion, and editing of documents at any point in time. User id, username, password, first name, and last name are all included in the database architecture of the user's table. The database's six tables must be designed first.
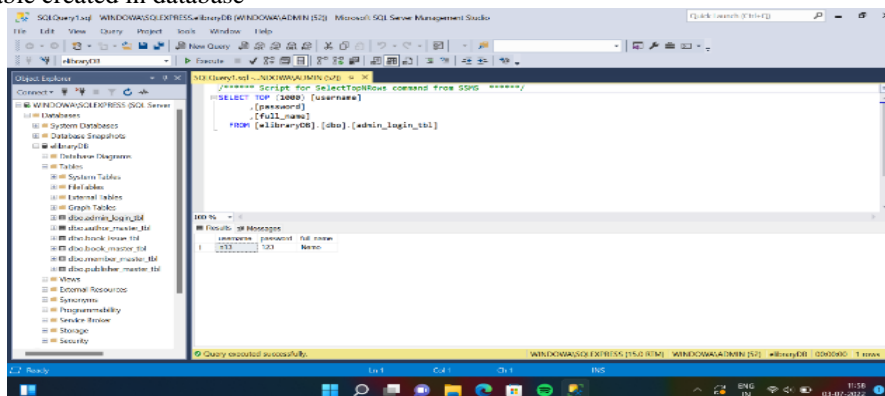
The admin login table created in database
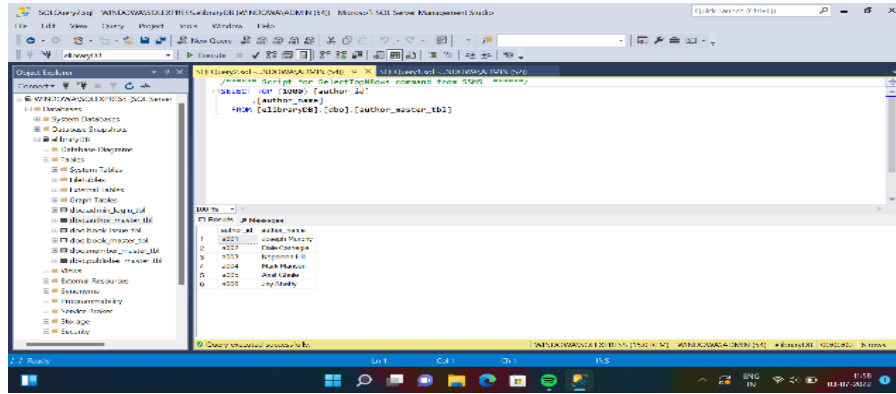

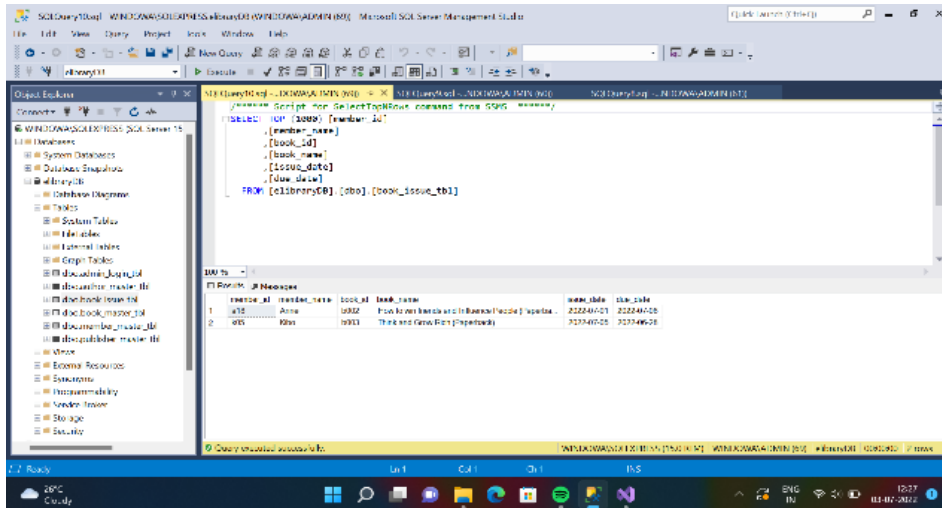*Figure 3: Admin table generation*

Figure 4: master author table
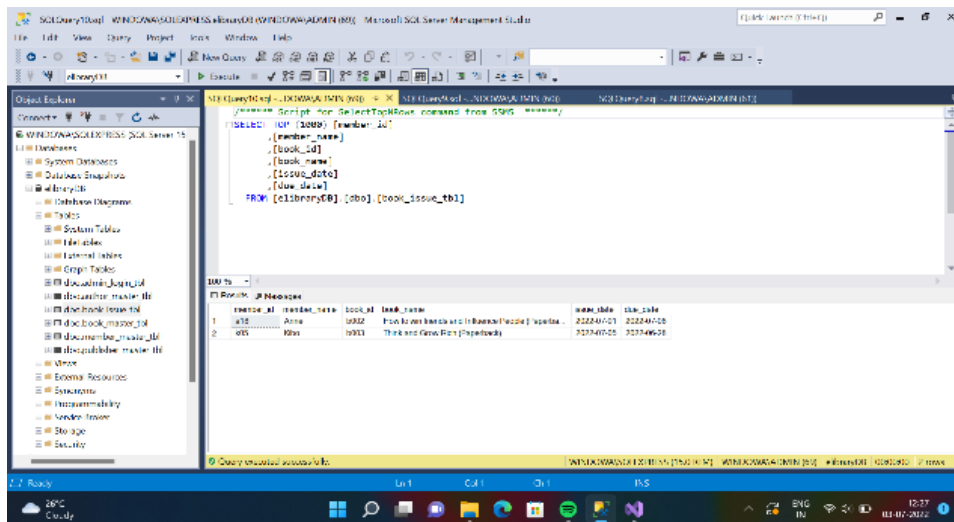

Figure 5: Book issue table
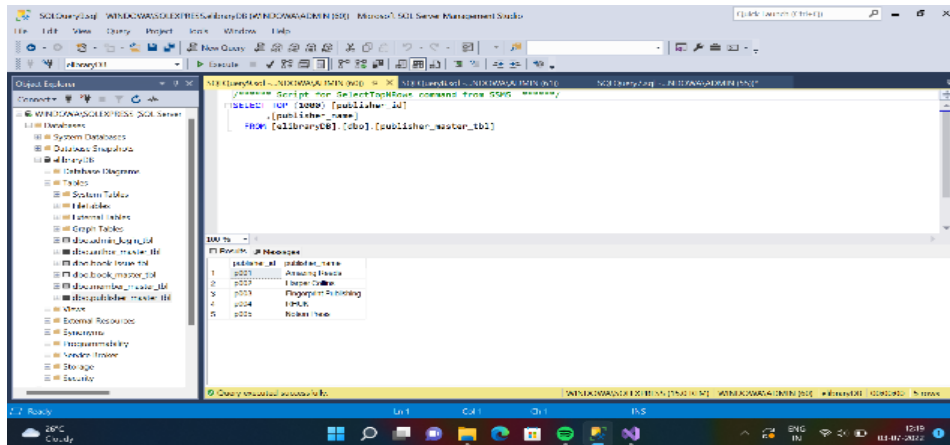

Figure 6: Master book table

Figure 7: Adding new book

The figure 3 stores the username and password for the admin registered. The master author books along with book issuing status is shown in the figure 4 and 5. The addition of the new book is stored in the tables which is as shown in the figure 7 and the UI of these are shown in the below figures.
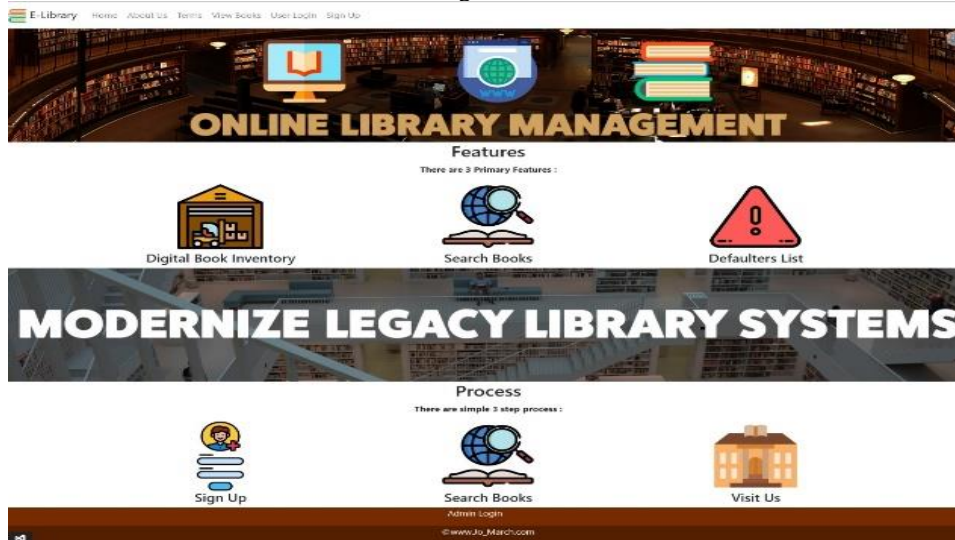
The home page of the website is as shown in the below figure

Figure 8: Home page

The admin login is as shown in the below figure
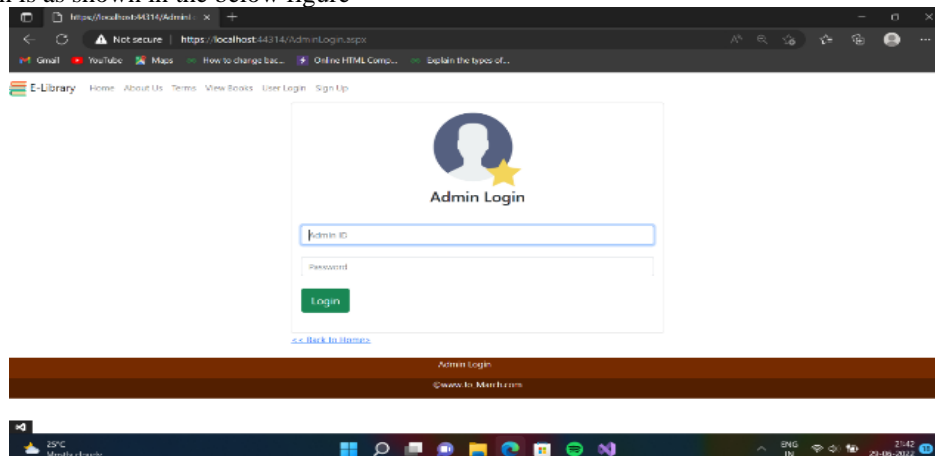
Figure 9: Admin login page

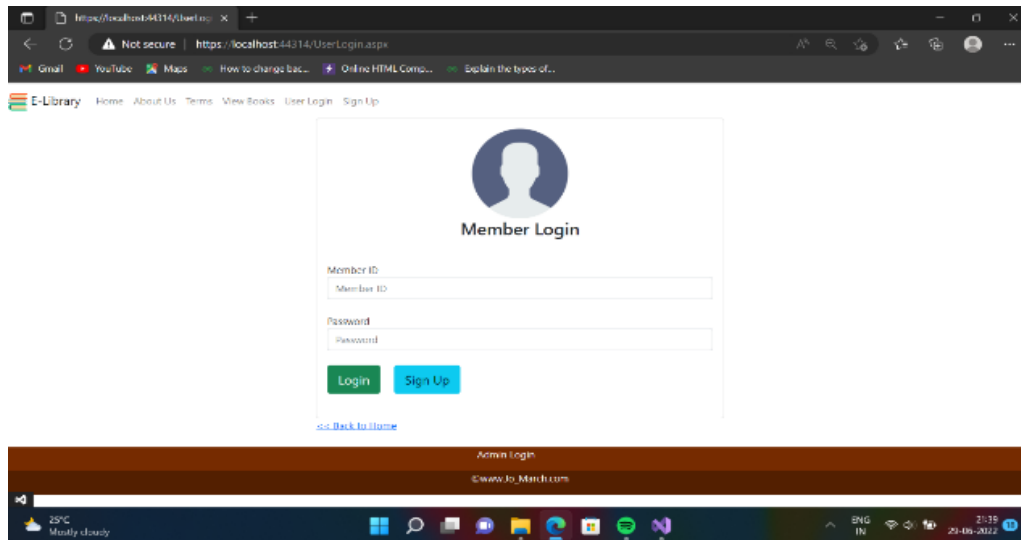The user login UI is as shown in the below figure

Figure 10: User login.

Adding and delete of the members from the admin login is as shown in the below figure
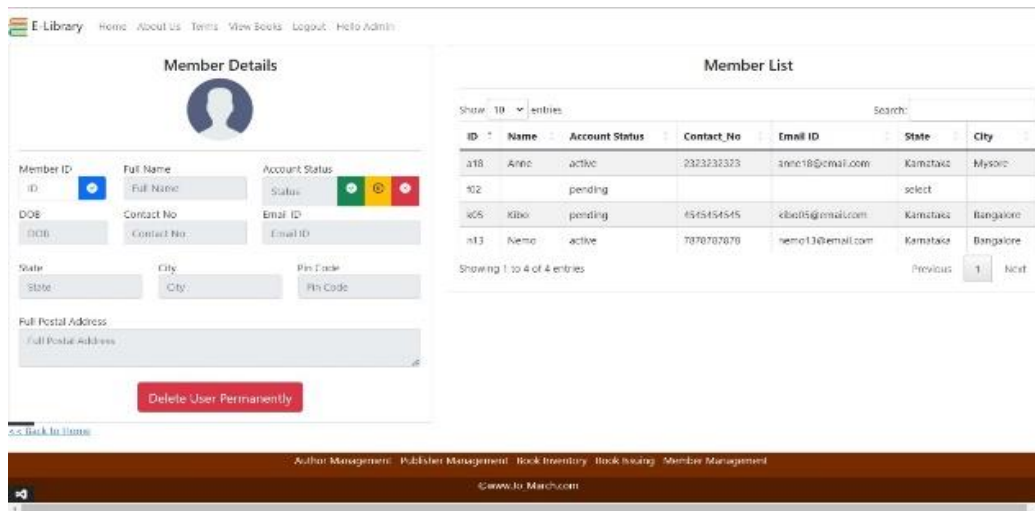

Figure 11: Member addition and delate

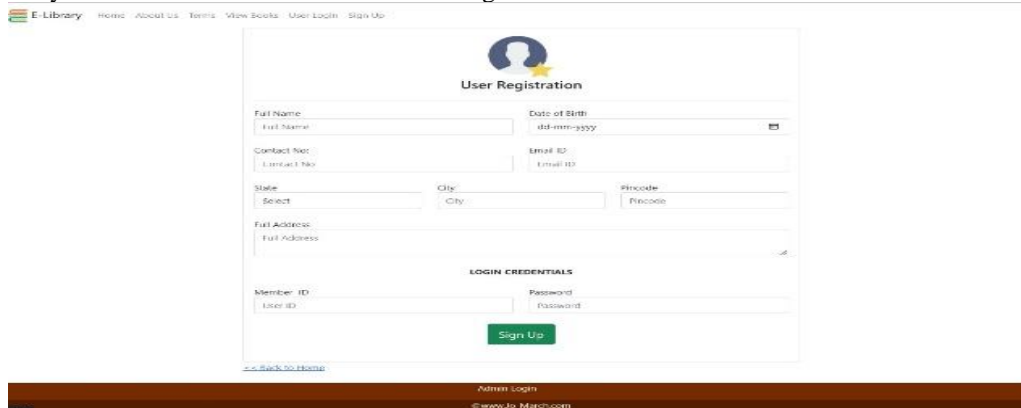The login facility for the user is as shown in the below figure

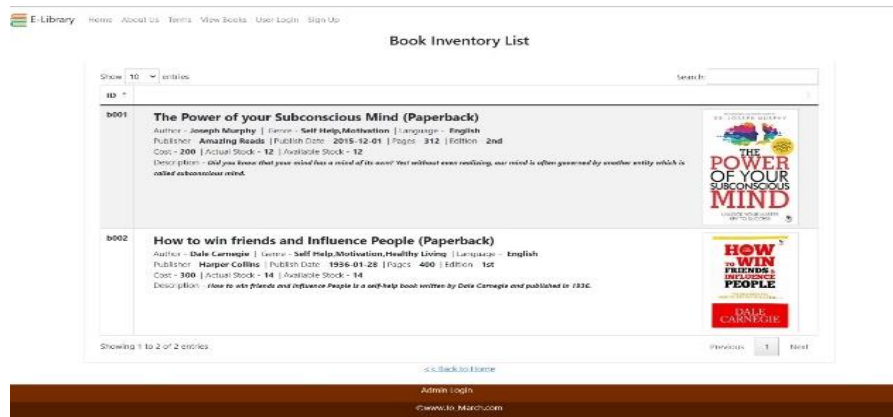*Figure 12: User registration*

The books listed in the website

Figure 13: List of books

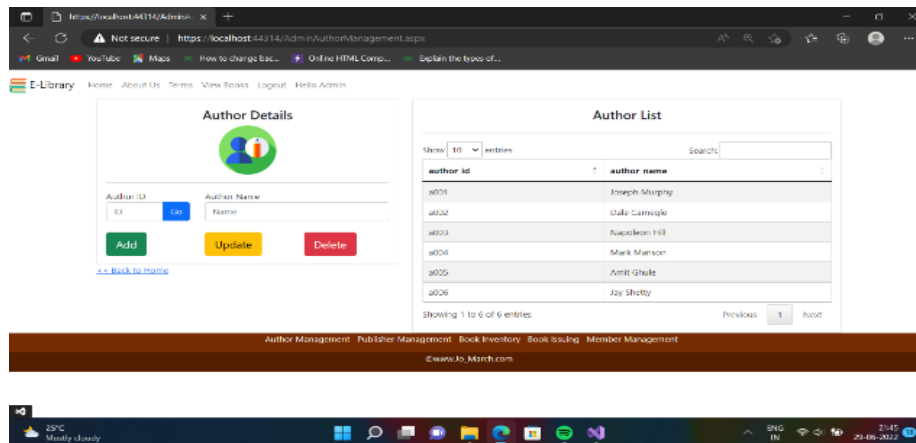Management of the author information is as shown in the below figure,

Figure 14: Author information addition/delete

VI. CONCLUSION

The goal of making life simpler and quicker has led to the computerization of many procedures. Many industries, including the educational sector, have been transformed by computer technology. Using a Web-based LMS, library operations, such as adding new books, updating user records, and the process of borrowing books, may all be managed in order to promote technology-driven education. It is fair to conclude that the system is an efficient, useful, and trustworthy LMS based on the correct study and evaluation of the design. It's doing what it's supposed to, and it does so within the parameters set forth in the original proposal. The new technology is designed to improve the efficiency of the library system for both consumers and employees. Even if it delivers electronic records over Wi-Fi and users may read an endless number of e-books at a time, this computerised system uses the most advanced method to provide access for users in various ways.

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