Library Management System

A Project Report

Submitted in partial fulfillment of the requirements for the award of a degree of

BACHELOR OF TECHNOLOGY (B. TECH)

School of Computer Science and Engineering

Submitted By

Rahul Kumar
Roll Number: B43
(Section: KEO62)

Department of Intelligent Systems - I

School of Computer Science and Engineering

Lovely Professional University

Jalandhar, Punjab

April - 2023

<u>Student Declaration</u>

To whom so ever, it may concern

I, **Rahul Kumar**, **11906677**, hereby declare that the work done on "**Library Management System**" from February 2023 to April 2023, is a record of original work for the partial fulfillment of the requirements for the award of the degree, **B-Tech in CSE**.

Signature of Student

Rahul Kumar (11906677)

Roll No. - 43

Place: Jalandhar, Punjab

Dated: 28 March 2023

BONAFIDE CERTIFICATE

Certified that this report "**LIBRARY MANAGEMENT SYSTEM**" is the bonafide work of "**RAHUL KUMAR"** who carried out the project work under my supervision.

Bhupinder Singh

ID: 28636

Department of Intelligent Systems - I

School of Computer Science and Engineering

Place: Jalandhar, Punjab

Dated: 28 March 2023

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Chapter 1: Introduction

1.1 Technology used

ASP.NET: The name ASP stands for Active Server Pages and .NET stands for Network Enabled Technologies. It is an open-source, server-side web application framework developed by Microsoft and it allows programmers to build dynamic websites, applications, and services. It is the successor of Classic ASP and was first released in January 2002. Because it is based on the Common Language Runtime (CLR), developers can use any .NET language to write ASP.NET code. C# and VB are the most common programming languages used in ASP.NET.

ASP.NET Page Life Cycle: There are different phases in the execution lifecycle of a web page. These stages include initialization, instantiation, state maintenance, and restoration, among others.

1. Page request - This phase comes first in the lifecycle. ASP.NET parses and assembles the page that the user requests.

2. Start - Page attributes like Request and response are set at this stage. It also establishes the type of Request.

3. Initialization - The UniqueID property for each control is set at this point. The page is subjected to the master page.

4. Load - If the page request is a postback, information is loaded into the control properties during this phase.

5. Postback event handling - If the page request is a postback, the event handler is called at this point. All validator controls are then called by the Validate method.

6. Rendering - The page and all controls' view states are saved before rendering. Each control's Render method is called by the page throughout the rendering process, and each control is given a text writer that outputs to the OutputStream object of the page's Response property.

7. Unload - The requested page has now finished rendering and is prepared to close. All properties have been unloaded at this point, and cleanup has been done.

ASP.NET Page Life Cycle Events: A requested page is initially processed and transmitted to the browser after being loaded into the server's memory. It is finally removed from the

server's memory. At each stage of the page lifecycle, ASP.NET offers methods and events that we may leverage in our application.

The following are the events -

1. PreInit - After the start stage is through, but before initialization, this event is raised.

2. Init - After all controls have been initialized, this event takes place. It can be used to read or initialize control properties.

3. InitComplete - After the conclusion of the page's initialization phase, this event takes place. We can use this event to make changes to the view state that we want to make sure are persisted after the next postback.

4. PreLoad - Before the post-back data is fed into the controls, this event takes place.

5. Load - The page raises this event for the first time, and all child controls are then raised iteratively.

6. Control events - This event is used to handle particular control events, such as the click event for a button control.

7. LoadComplete - After the event-handling phase, this event takes place. Changes to the view state that we want to ensure will be kept after the subsequent postback can be made using this event.

8. PreRender - This event happens following the creation of all necessary controls by the page object to render the page.

9. PreRenderComplete - Any data-bound control that has its DataSourceID property set will call its DataBind function to trigger this event.

10. SaveStateComplete - It is triggered once the page and all controls' view state and control state have been saved.

11. Render - This is not an event; rather, the Page object is calling this method on each control at this point in the processing.

12. Unload - This event happens first for each control, then for the page.

ASP.NET supports many programming models for building web applications:

ASP.NET Core is a successor of ASP.NET. It is a reimplementation of ASP.NET as a modular web framework. It is also cross-platform and uses a new open-source .NET Compiler Platform (codename "Roslyn"). ASP.NET MVC, ASP.NET Web API, and ASP.NET Web Pages have been merged into a unified MVC 6.

ASP.NET Web API is a framework for building Web APIs on top of the .NET framework. It makes it easy to build HTTP services that can be accessed from any client including browsers and mobile devices.

ASP.NET MVC provides us with an MVC (Model View Controller) framework for creating dynamic webpages. It offers a clear division of responsibilities and gives you complete markup control for agile development. It also offers a variety of features that make it possible to construct great applications quickly.

ASP.NET Web Pages are used to create dynamic web pages. It provides a fast and lightweight way to combine server code with HTML. It is very similar to PHP and Classic ASP and Web Pages applications are easily extendable with programmable helpers for databases, videos, graphics, social networking, and more.

ASP.NET Web Forms: Web forms are pages your users request using their browser. A combination of HTML, client script, server controls, and server code may be used to create these pages. When users request a page, the framework compiles and executes it on the server, after which it creates the HTML markup that the browser or client device may display.

Web Forms are made up of two components: the visual portion (the .aspx file), and the code behind the form, which resides in a separate class file (the .cs file). For Web Forms, ASP.NET offers a variety of controls, including server controls and HTML controls.

Features of ASP.NET Web Forms:

- Server Controls - A wide range of server controls are offered by Web Forms. When a page is requested, these controls are objects that execute and provide the browser with HTML. Several Web server controls resemble common HTML components like text boxes and buttons. Additionally, it offers controls that we can utilize to access data sources and show data.

- Master Pages - It enables us to design an organized layout for each page of our application. This page outlines the general aesthetic and expected behavior for every page in our program. The content pages merge with the master page when users request them, resulting in an output that mixes the content from the content page with the layout of the master page.

- Client Scripts - By integrating client-script capabilities in ASP.NET Web Form pages, we may improve the aspects of ASP.NET that are server-based. To give users a richer, more responsive user experience, we can use client script. Client script can also be

used to send asynchronous requests to the Web server while a page is being shown in the browser.

- Working with Data - There are numerous choices for storing, accessing, and displaying data with ASP.NET. Data-bound controls are used in ASP.NET Web Forms applications to automatically present or input data into UI components found on web pages, such as tables, text boxes, and drop-down menus.

- Validations - ASP.NET has controls for validation that automatically verify user input without the need for code. Also, we can design custom validation for our application. It includes CompareValidator, RangeValidator, RegularExpressionValidator, RequiredFieldValidator, and ValidationSummary.

Other features are membership, routing, state management, security, performance, deployment, debugging, and error handling.

1.2 Languages used

C#: (C-Sharp) is a general-purpose high-level programming language developed by Microsoft that runs on the .NET Framework. It is used to develop web apps, desktop apps, mobile apps, games, VR, database applications, and much more. It is close to C, C++, and Java, which makes it easy for programmers to switch to C# or vice versa.

HTML: HTML is HyperText Markup Language. It is the standard markup language for describing the structure of Web pages.

CSS: CSS is Cascading Style Sheets. It is a style sheet language that describes the presentation of web pages, including colors, layouts, and fonts.

JavaScript: JavaScript, often abbreviated as JS, is a programming language that is one of the core technologies of the World Wide Web, alongside HTML and CSS. It is used both on the client side and server side which allows us to make web pages interactive. And as of 2022, 98% of websites use JavaScript on the client side for webpage behavior, often incorporating third-party libraries.

MySQL: MySQL is a widely used relational database management system (RDBMS). It is a free and open-source and cross-platform structured query language. It is very fast, reliable, scalable, and easy to use which makes it ideal for both small and large applications. It was first released in 1995 and is developed, distributed, and supported by Oracle Corporation.

Its name is a combination of "My", the name of co-founder Michael Widenius's daughter My, and "SQL", the acronym for Structured Query Language.

1.3 Libraries used

Bootstrap: Bootstrap is the most popular free and open-source CSS framework for developing responsive, mobile-first websites. It includes design templates for text, forms, buttons, navigation, and other interface elements that are based on HTML, CSS, and JavaScript.

jQuery: jQuery is a free open-source JavaScript framework created to make event handling, CSS animation, Ajax, and DOM tree navigation and manipulation easier.

Datatable: DataTables is a powerful Javascript library for adding interaction features to HTML tables. Features like pagination, instant search, multi-column ordering easy theme-able, etc, are a part of this library.

1.3 Software used

Visual Studio 2022: It is the most complete IDE for Windows-based .NET and C++ developers. It can be used to build, edit, and debug the code, after which an app can be published. To improve the software development process compilers, code completion tools, graphical designers, and many other features are included in Visual Studio in addition to the conventional editor and debugger that are offered by the majority of IDEs.

It provides great support and convenience in developing ASP.NET web applications. For designing ASP.NET Web Forms it has an easy drag and drops feature to arrange server controls on the web forms page. Following that, we can quickly set the page's controls' properties, methods, and events.

SQL Server Management Studio 19: SSMS is a software developed by Microsoft that is utilized for setting up, controlling, and managing every part of Microsoft SQL Server. It is used to create and manage databases that are easy to integrate and connect to web apps. It includes both script editors and graphical tools which work with objects and features of the server.

Chapter 2: Objectives of Project

2.1 Aim of the Project

The goal of this project is to develop a full-fledged web application to fully automate the manual library system that is now in place, making the entire process of borrowing and returning books, preserving book records, managing library members, etc. more effective and convenient.

2.2 Objectives of the Project

- To aid the staff in reducing the time spent on each of their work areas.
- To improve the usability and accessibility of the library's resources.
- To improve the security and integrity of the library's data records.
- To reduce the operational cost of the library.

2.3 Description of the Project

The library management system is a digital E-library system that allows a user to have easy access to the books and resources of the library. And helps the librarian and management maintain a smooth flow of materials in the library. Which includes those books that are in circulation, on the shelves, or borrowed. It can track books that should've been returned on certain dates.

A librarian can add or modify any data about the books and their availability. He/she can also see the list of members in the library and the books they've issued.

Users can use it to register themselves in the library to get the membership and log in to check the books they've issued or returned. The search feature ensures smooth access to find desired books.

The admin or librarian can utilize the automatic 'defaulter list' feature to deactivate the defaulters' accounts or to cancel their membership from the library.

Overall, the library management system is beneficial to both the library management and the users. This fully digital and partly automatic library management system is a better alternative to the most chaotic manual library management systems.

Chapter 3: Features of Project

Digital book inventory: Unlike manual ones, this digital book inventory holds all the details of the books in stock in the library. Users can check the availability of the book with details. This feature allows the users to see the cost of the book, its edition, genre, publishing details, language, description, and many more. It also shows the actual stock of the particular book and the number of books that can be issued.

Search books: To ease the finding and issuing of books from such a huge digital book inventory, a 'search' feature is available. Users can search for books using this feature, with any of the details they have about the book. Such details include the book's name, author, genre, or publisher.

Defaulter list: The 'defaulter list' feature enhances the process of book issues and returns. It automatically marks out the users, who are at fault or who have failed to return the books in time. It will not only reduce librarian work of keeping an eye on such people but also help in maintaining the flow of books.

Analytics dashboard: The librarian/admin has access to a well-designed dynamic dashboard that circulates all the summary and analytics of the data from this application on a single page.

User-friendly interface: The application offers a user-friendly interface with the use of appropriate color formatting, icons, and photos, which makes the application simple and convenient to use.

Mobile responsive: The application has been created using the Bootstrap framework and is entirely responsive, meaning it can be used on any type of device, including a mobile phone, tablet, laptop, or desktop.

User rights management: Based on roles, the entire application is split up into modules. In addition to having access to diverse sets of data and seeing different user interfaces, an admin, a librarian, and a user each has unique sets of privileges and functions that are dependent on their position.

Access and authentication: Anybody attempting to access an account, whether they are a regular user or an administrator, must correctly identify themselves using their ID and password on the login screen. They will need to sign up for this application for the first time.

User input validations: To improve the integrity of the data and prevent users from inputting any noise, appropriate validations have been performed across the application.

Edge cases and errors: Try-and-catch coding mechanism has been used to effectively handle all potential edge cases and faults that may occur in this application, ensuring that it never breaks under any circumstance.

Chapter 4: Project Screenshots
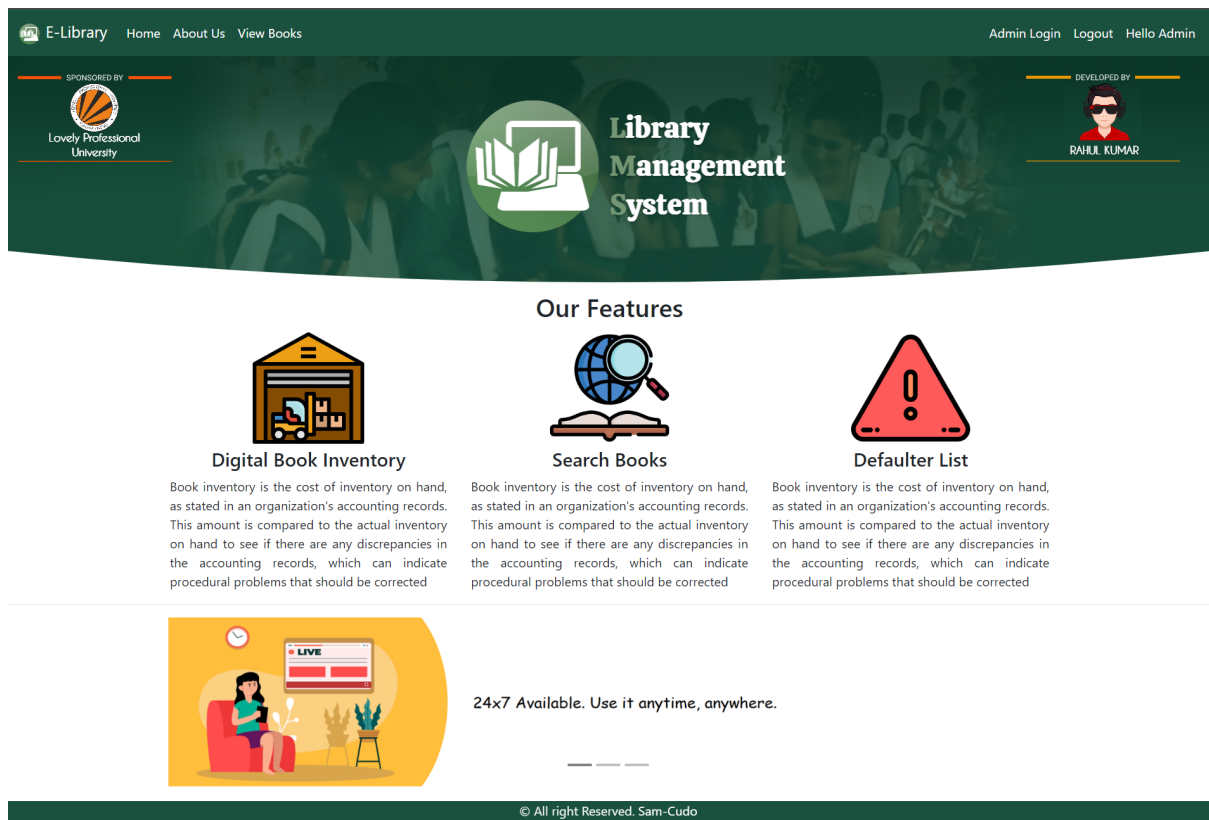
Figure 1: Home Page
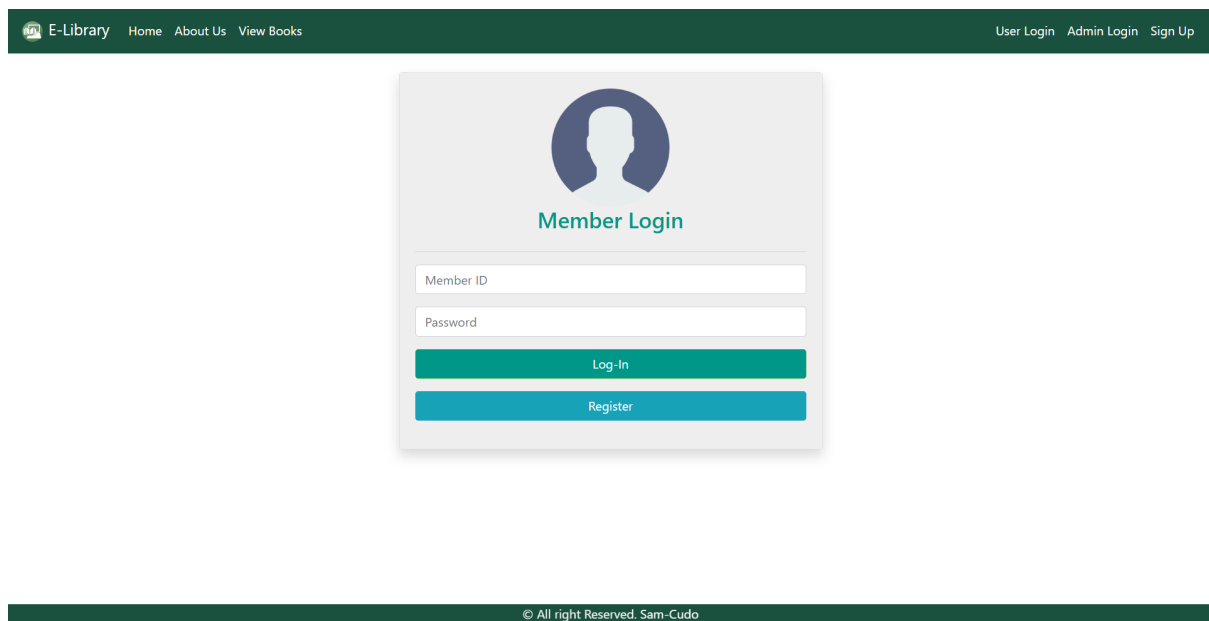
Figure 2: User Login Page

Figure 3: About Us Page

Figure 4: Register Page

Book Inventory List

Show 10 ∨ entries   Search: [   ]

ID ⬘		
B01	**2666** Author - **Roberto Bolano**	Genre - **Drama,Horror,Thriller** Language - **English**	Publisher - **Macmillan**	Publish Date - **2009-01-09** Edition - **1st**	Pages - **898**	Cost - **1899**	Actual Stock - **10**	Available - **10** **Description -** Completed in 2003 shortly before his death, 2666 is not only Roberto Bolaño's masterpiece, but also one of the finest and most important novels of the 21st century. It's an entire world unto itself, one - not unlike our own - filled with horror, neglect, depravity, brilliance, and beauty.	
B02	**All About Love** Author - **Bell Hooks**	Genre - **Self Help,Wellness,Art** Language - **English**	Publisher - **Harper Collin**	Publish Date - **2018-01-30** Edition - **2nd**	Pages - **272**	Cost - **1319**	Actual Stock - **8**	Available - **6** **Description -** We're taught to think of love as something that happens to us. It's a magical but altogether passive experience. In her deeply personal and emphatic All about Love, renowned social activist and feminist bell hooks asserts that, in fact, love is a choice we must all make and it's not nearly as abstract or elusive as many of us have come to believe.	
B03	**Desert Solitaire** Author - **Edward Abbey**	Genre - **Adventure,Autobiography,Science** Language - **English**	Publisher - **Penguin House**	Publish Date - **1990-01-15** Edition - **1st**	Pages - **288**	Cost - **1549**	Actual Stock - **5**	Available - **4** **Description -** In this autobiographical work, Abbey chronicles his time as a park ranger and reflects on landscape, culture, politics, tourism, environmental disregard, and degradation - doing so with a unique blend of ornery charm and breathtaking description.	
B04	**Man's Search for Meaning** Author - **Viktor E. Frankl**	Genre - **Motivation,Personal Development,Autobiography** Language - **English**	Publisher - **Hachete**	Publish Date - **2006-01-06** Edition - **1st**	Pages - **165**	Cost - **1199**	Actual Stock - **5**	Available - **5** **Description -** Based on his experiences in Nazi death camps, including Auschwitz, from 1942 to 1945, Frankl's timeless memoir and meditation on finding meaning in the midst of suffering argues that man cannot avoid suffering but can choose how to cope with it, find meaning in it, and move forward with renewed purpose.	
B05	**The Phantom TollBooth** Author - **Norton Juster**	Genre - **Adventure,Comic Book,Fantasy** Language - **English**	Publisher - **Penguin House**	Publish Date - **1988-10-12** Edition - **3rd**	Pages - **272**	Cost - **699**	Actual Stock - **12**	Available - **12** **Description -** The Phantom Tollbooth is the story of Milo, a very bored boy who comes home one day to find a magical tollbooth in his room. When Milo drives his car through the tollbooth gate, he finds himself in the Lands Beyond, a country inhabited by living language in the forms of animals, magicians, royalty, mountains, seas, and cities.	
B06	**Bhogal PG** Author - **Suryalipsa Sahoo**	Genre - **Autobiography** Language - **English**	Publisher - **Pearson**	Publish Date - **2023-01-02** Edition - **1st**	Pages - **89**	Cost - **99**	Actual Stock - **10**	Available - **8** **Description -** A story book with short stories about a bachelors group living in a pg.	
B07	**Raag Darbari** Author - **Srilala Sukla**	Genre - **Self Help,Motivation,Crime** Language - **Hindi**	Publisher - **Penguin House**	Publish Date - **1968-02-15** Edition - **1st**	Pages - **346**	Cost - **2296**	Actual Stock - **12**	Available - **11** **Description -** Raag Darbari is a satirical Hindi novel written by Sri Lal Sukla, published in 1968. He was awarded the Sahitya Academy Award, the highest Indian literary award, in 1969 for this novel. The novel illustrates the failing values present in post-Independence Indian society.	

Showing 1 to 7 of 7 entries   Previous   1   Next
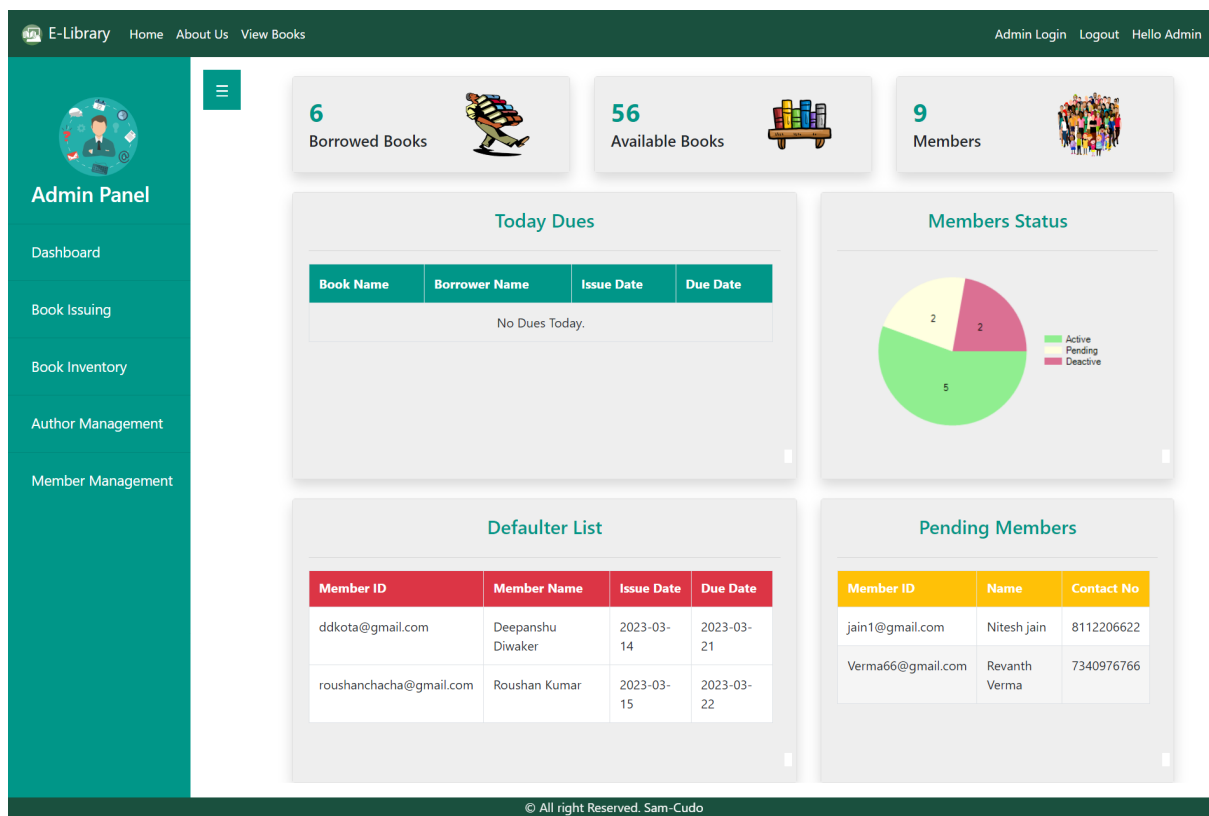
Figure 5: View Books Page

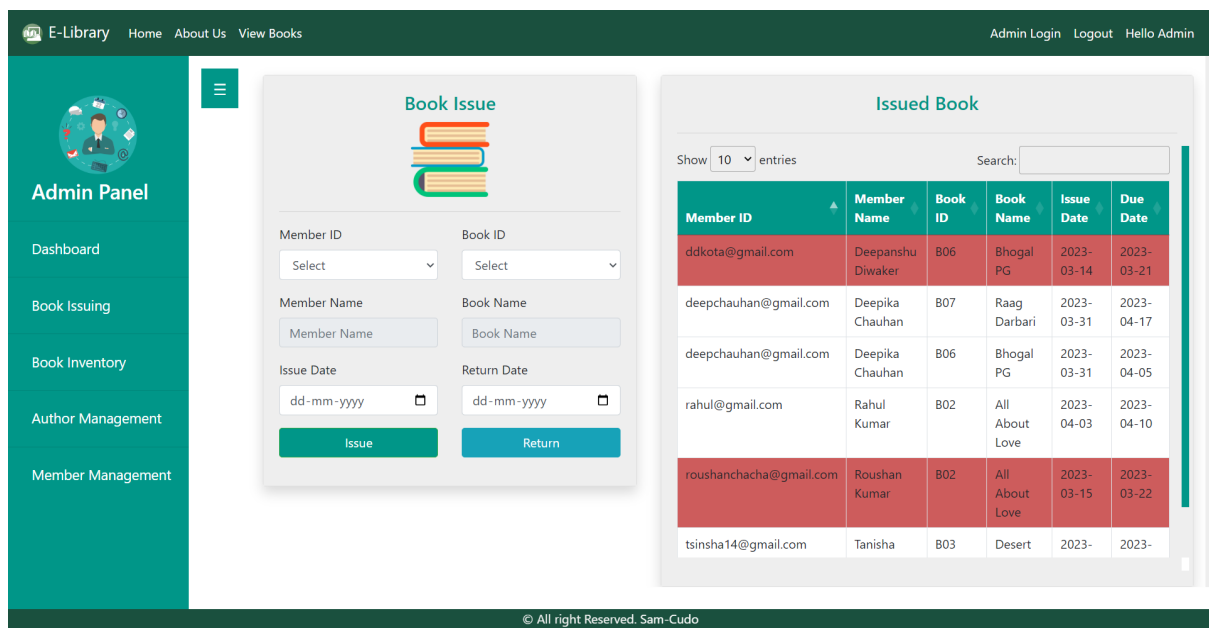**Figure 6: Admin Dashboard Page**

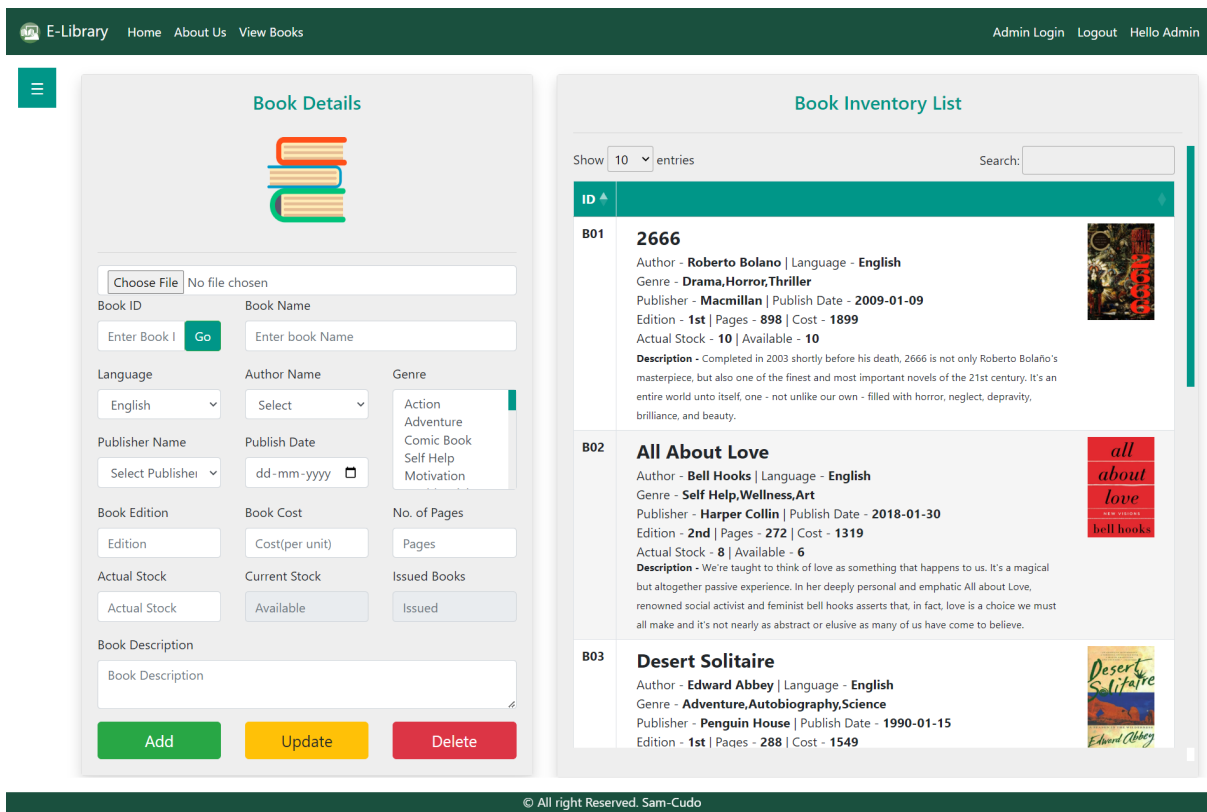**Figure 7: Admin Book Issue Page**
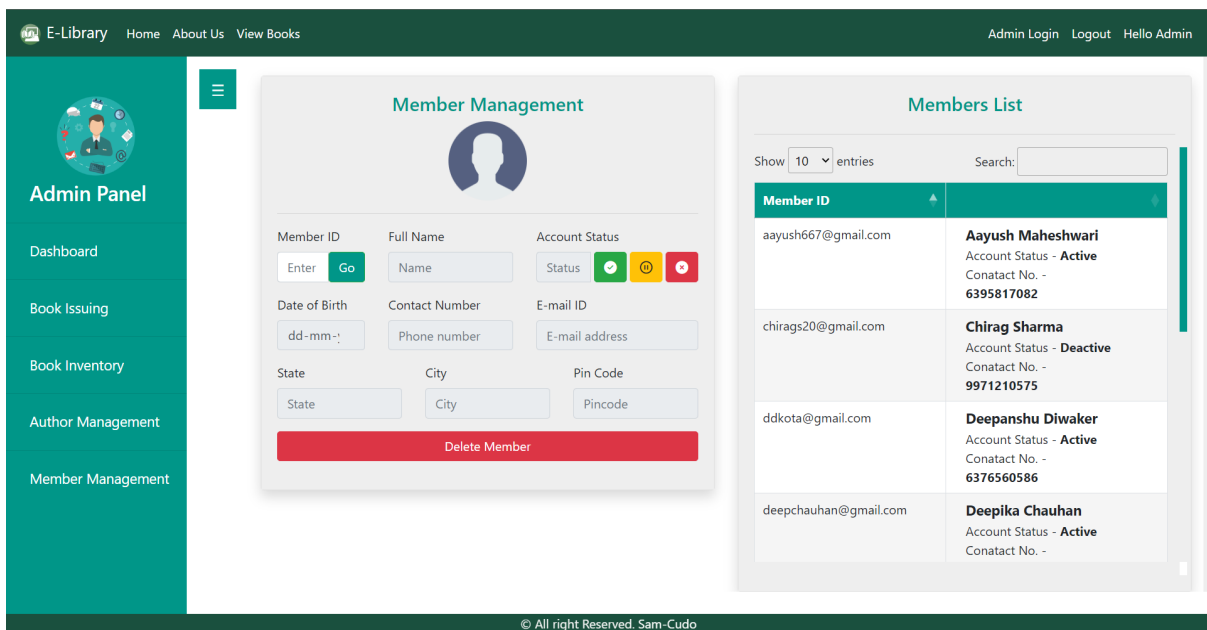
Figure 8: Admin Book Inventory Page

Figure 9: Admin Member Management Page

Chapter 5: Future Scope of Work

The library can be entirely digitalized in the future along with the addition of numerous new features and amenities in the application. For instance, if a person needs to issue a book, he can submit an issue request through this application. An issue token will be generated and reflected on the librarian's account. Once the librarian approves that token, the student will receive a unique receipt and be able to pick up the book from the library whenever it is convenient for him.

Email integration is another feature that can be introduced. It can be used to improve security by allowing for the establishment of legitimate accounts through email verification, and password resets, and also notifications can be sent to students about upcoming due dates.

As is well known, moving library data from a local database to the cloud may be necessary due to the growth in students, books, and other workload complexity. By making the appropriate adjustments, this software application can be moved to a cloud database. With the use of cloud computing, data backup will be easy, remote update and synchronization will be possible, and much more.

There are many potential additions to the data, including PDFs of textbooks and previous year's examinations, and recorded lectures of classes will be beneficial to any academic institution.

To quickly identify users having any problems using this application, a feedback and complaint mechanism can also be added.

Lastly, we can conclude it is expected that the future scope of the library management system will even be more comprehensive whether in respect of the features of this application or the applicability of this application. If properly developed and implemented it has the potential to replace the traditional chaotic manual library management systems that are in place today.