LIBRARY MANAGEMENT SYSTEM

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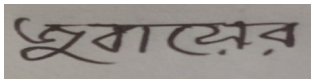

MD. Zubaer Hossain

ABSTRACT

The paper titled “Library Management System” is Library management application for monitoring and controlling the transactions in a library. The paper "Library Management System" is developed mainly in C# which mainly focuses on basic operations in a library like adding new issued books information, and updating information, searching books and members and facility to save the information of borrowed and returned books. "Library Management System" is a website any types of web browsers, designed to help users maintain and organize library. This software is easy to use for both beginners and advanced users.

Keywords—Issue books, Student information, Search Book, Book information

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Our parents also give us support and encouragement to fulfill our graduation. Last but not the least, we are grateful to Nasif Alvi to assist us in our project work.

Dedication

To our parents and our family. Both our parents give enough inspiration and encouragement to complete our project work.

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Chapter 1
Introduction

1.1 Background

The Library Management System is a data processing to perform routine Library activities. This system is concerned with developing a library management system using database software. In this system the library management becomes more efficient and easier to handle with its reliable system components. Library system was developed in order to make computerized the borrowing and returning of elements, return elements, and add elements, search elements and special tools. A library management system, also known as an automated library system is software that has been developed to handle basic housekeeping functions of a library. Library automation is the general term for information and communications technologies (ICT) that are used to replace manual systems in the library. software that is developed to handle basic functions of a Library, and provides a complete solution, Library management system (LMS) known as an automated Library System is for the administration of a library's technical functions and services to the public. These functions range from; tracking the assets held by the library, managing lending, through to supporting the daily work over. These systems are used in almost all libraries large and a small. A Library Management System (LMS) gives access to and manages the resources in your library. A well-chosen system will increase your library's efficiency, save valuable administration time, lead to a better educational experience for pupils and help develop independent learning. This not only deals with the borrowing and returning of materials but also renewals, the management of overdues and user records. This is an online database of all materials held in the library which is made public so users can search and locate books for reading teaching and learning purposes. This project has many features which such as the facility of user login and admin login. Also, on the top of all this, there is an admin who will be managing the entire application's authorization and authentication, not any intruder can login and modify the data, as a login for admin is also available.

1.2 Motivation

The library as an integral and significant part of educational system has undergone phenomenal development in the use of ICTs which have substantial influence in the process of information resources' acquisition, processing, storage and use in developing countries. Consequently, libraries are required to provide access to huge information resources in diverse format such as print (books, Journals) and electronic format (e-books, e-journals/journal articles, CD-ROMs, Internet resources/services) as well as bibliographical information about these resources have influenced the adoption of LMS. Similarly, libraries as a fundamentally service oriented units, where services are rendered to people with diverse information needs, (who are also from different) backgrounds, cultures, emotions, skills and behaviors, are bound to meet these various information needs of its patrons in the easiest, most efficient, and most comprehensive way possible Therefore, there is need for highly efficient technologies/systems and processing tools in order to deliver these services promptly and also accomplish the quest to meet and support the information needs of library users.

1.3 Objectives

The main objective of the Online Library Management System is to manage the details of Student, Books, Issues. The purpose of the project is to build an application program to reduce the manual work for managing the Student, Books, Issue. It tracks all the details about the issues, Student.

Functionalities provided by Library Management System are as follows:

i. Provides the searching facilities based on various factors. Such as Student, Books.
ii. Manage the information of Books.
iii. Show the information and description of the Student, Issues, Books.
iv. Adding and update of record is improved which results in proper which results in proper resource management of Student data.

The goal of the system is to bring down the work load with the increased efficiency and to speed up the activities. With this it is very easy to process course fee that is collected time to time from students who are registered and studying at franchisees.

1.4 Project Organization

Chapter 2 (Background Knowledge): Presents an overview of background knowledge and technical aspects.

Chapter 3 (Related Works): Presents different existing works related to another related project.

Chapter 4 (Proposed Method): It describes in detail the proposed method and system design that comprises a title page and brief summary of the proposal.

Chapter 5 (Evaluation and Results): Evaluation and results presents the effectiveness of the proposed method and for verification of results. In this chapter we will cover the evaluation and results of our proposed strategies.

Chapter 6 (Conclusion): The conclusion is the last part of this thesis paper. This is an important part of finishing the project.

Chapter 2
Background Knowledge

LIBRARY MANAGEMENT SYSTEM

Our software is a library management system. It is a desktop application. Its source code is C#. Microsoft SQL is used as the database here.

2.1 C#

C# is a general-purpose, multi-paradigm programming language encompassing static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines.

Here is a list of types of applications C# can develop:

- Cloud native apps and services.
- Windows client applications.
- Windows libraries and components.
- Windows services.
- Web applications.
- Web services and Web API.
- Native iOS and Android mobile apps.
- Backend services.
- Azure cloud applications and services.
- Video games etc.

C# is a modern programming language that was created to build modern software applications for Windows, Web and mobile. C# is a much more powerful programming language than many of us may realize. Not only can we build traditional Windows client applications and Web applications but we may also use C# to build mobile apps, Windows store apps, and Enterprise applications.

On top of that, C# is cool. Actually, C# was originally named “c cool” but due to trademark issues, it was renamed to “C sharp”.

2.2 Structured Query language

SQL stands for structured query language. SQL is used to communicate with a database. According to ANSI (American National Standards Institute), it is the standard language for relational database management systems.

SQL contains some important features and they are:

- Data Definition language (DDL): it contains of commands which defines the data.
- Data Manipulation language (DML).
- Triggers:
- Client server execution and remote database access:
- Security and authentication:
- Embedded SQL:
- Transaction Control Language:
- Advanced SQL:

- **Data Definition language (DDL):** it contains of commands which defines the data.
- **Data manipulation language (DML):**it contains commands used to manipulate the data.
- **Triggers:** Triggers are actions performed when certain conditions are met on the data. a trigger contains of three parts.
- event- The change in the database that activates the trigger is event.
- Condition-A query or test that is run when the trigger is activated.
- action – A procedure that is executed when trigger is activated and the condition met it true.
- **Client server execution and remote database access:** Client server technology maintains a many to one relationship of clients (many) and server (one). we have commands in SQL that control how a client application can access the database over a network.

- **Security and authentication:** SQL provide a Mechanism to control the database meaning, it makes sure that only the particular details of the database are to be shown the user and the original database is secured by DBMS.
- **Embedded SQL:** SQL provides the feature of embedding host languages such as C, COBOL, Java for query from their language at runtime.
- **Transaction control language:** Transactions are an important element of DBMS and to control the transactions, TCL is used which has commands like commit, rollback and save point.
- **Advanced SQL:** The current features include OOP ones like recursive queries, decision supporting queries and also query supporting areas like data mining, spatial data and XML (extensible Markup language).

2.3 Extensible Application Markup Language

(XAML /ˈzæməl/ (About this sound listen)) is a declarative XML-based language developed by Microsoft that is used for initializing structured values and objects. It is available under Microsoft's Open Specification Promise. [4] The acronym originally stood for Extensible Avalon Markup Language, Avalon being the code-name for Windows Presentation Foundation (WPF). [5]

XAML is used extensively in .NET Framework 3.0 & .NET Framework 4.0 technologies, particularly Windows Presentation Foundation (WPF), Silverlight, Windows Workflow Foundation (WF), Windows Runtime XAML Framework and Windows Store apps. In WPF, XAML forms a user interface markup language to define UI elements, data binding, events, and other features. In WF, workflows can be defined using XAML. XAML can also be used in Silverlight applications, Windows 10 Mobile (previously Windows Phone) and Universal Windows Platform apps, also called Windows Store apps. XAML elements map directly to Common Language Runtime object instances, while XAML attributes map to Common Language Runtime properties and events on those objects. XAML files can be created and edited with visual design tools like Microsoft Expression Blend, Microsoft Visual Studio, and the hostable Windows Workflow Foundation visual designer. They can also be created and edited with a standard text editor, a code editor like XAML Pad, or a graphical editor like Vector Architect.

Anything that is created or implemented in XAML can be expressed using a more traditional .NET language, such as C# or Visual Basic .NET. However, a key aspect of the technology is the reduced complexity needed for tools to process XAML, because it is based on XML. [6]

XAML and Visual Studio

Microsoft Visual Studio helps you to produce valid XAML syntax, both in the XAML text editor and in the more graphically oriented XAML design surface. When you write XAML for your app using Visual Studio, don't worry too much about the syntax with each keystroke. The IDE encourages valid XAML syntax by providing autocompletion hints, showing suggestions in Microsoft IntelliSense lists and dropdowns, showing UI element libraries in the Toolbox window, or other techniques. If this is your first experience with XAML, it might still be useful to know the syntax rules and particularly the terminology that is sometimes used to describe the restrictions or choices when describing XAML syntax in reference or other topics. The fine points of XAML syntax are covered in a separate topic, XAML syntax guide.

2.4 Cascading Style Sheets (CSS)

CSS is a style sheet language used for describing the presentation of a document written in a markup language like HTML [1]. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript [2]. CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. [3] This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .CSS file, and reduce complexity and repetition in the structural content. Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device. [4] The name cascading comes from the specified priority scheme to determine which style rule applies if more than one rule matches a particular element. This cascading priority scheme is predictable.

2.5 JavaScript

(/ˈjavəˌskrɪpt/), often abbreviated as JS, is a high-level, Interpreted programming language. It is a language which is also characterized as dynamic, weakly typed, prototype-based and multi-paradigm. Alongside HTML and CSS, JavaScript is one of the three core technologies of the World Wide Web [8]. JavaScript enables interactive web pages and thus is an essential part of web applications. The vast majority of websites use it, and all major web browsers have a dedicated JavaScript engine to execute it. As a multi-paradigm language, JavaScript supports event-driven, functional, and imperative (including object-oriented and prototype-based) programming styles. It has an API for working with text, arrays, dates, regular expressions, and basic manipulation of the DOM, but the language itself does not include any I/O, such as networking, storage, or graphics facilities, relying for these upon the host environment in which it is embedded.

2.6 PHP

Hypertext Preprocessor (or simply PHP) is a server-side scripting language designed for Web development, and also used as a general-purpose programming language. It was originally created by Rasmus Lerdorf in 1994[5]; the PHP reference implementation is now produced by The PHP Group. [6] PHP originally stood for Personal Home Page, but it now stands for the recursive initialism PHP: Hypertext Preprocessor. PHP code may be embedded into HTML code, or it can be used in combination with various web template systems, web content management systems, and web frameworks. PHP code is usually processed by a PHP interpreter implemented as a module in the web server or as a Common Gateway Interface (CGI) executable. The web server combines the results of the interpreted and executed PHP code, which may be any type of data, including images, with the generated web page. PHP code may also be executed with a command-line interface (CLI) and can be used to implement standard long graphical applications. [8] The standard PHP interpreter, powered by the Zend Engine, is free software released under the PHP License. PHP has been widely ported and can be deployed on most web servers on almost every operating system and platform, free of charge. The PHP language evolved without a written formal specification or standard until 2014, with the original implementation acting as the de facto

standard which other implementations aimed to follow. Since 2014 work has gone on to create a formal PHP specification.

2.7 MVC

The Model-View-Controller (MVC) is an architectural pattern that separates an application into three main logical components: the model, the view, and the controller. Each of these components are built to handle specific development aspects of an application. MVC is one of the most frequently used industry-standard web development frameworks to create scalable and extensible projects. MVC Components. Following are the components of MVC –

2.7.1 Model

The Model component corresponds to all the data-related logic that the user works with. In fig 2.1 MVC model can represent either the data that is being transferred between the View and Controller components or any other business logic-related data. For example, a Student object will retrieve the student information from the database, manipulate it and update it data back to the database or use it to render data.

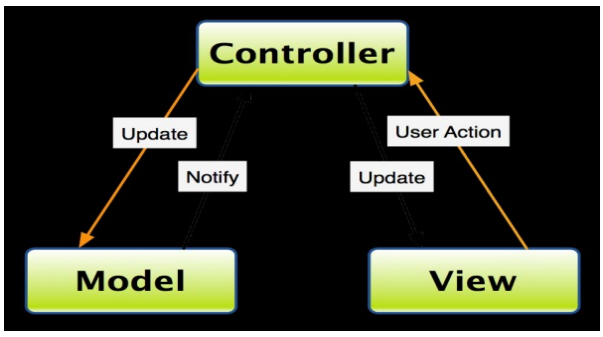

Fig: 2.7.1 MVC Model

2.7.2 View

The View component is used for all the UI logic of the application. For example, the Student view will include all the UI components such as books, registration, etc. that the final user interacts with.

2.7.3 Controller

Controllers act as an interface between Model and View components to process all the issued logic and incoming requests, manipulate data using the Model component and interact with the Views to render the final output.

Chapter 3
Related Works

3.1 Central Library Khulna University of Engineering & Technology

KUET Central Library is the first automated library and pioneer among the public university libraries in Bangladesh and plays the key role to provide the knowledge-based support to its faculty members, researchers, students and all kind of institutional users of South-Western part of Bangladesh. The automation project was implemented by the help of Higher Education Quality Enhancement Project (HEQEP) under University Grants Commission of Bangladesh (UGC, B). The Central Library is running successfully through KOHA-Integrated Library System (ILS), which is an International Standard Open-source Library Management System. Features include issue/circulation based on barcodes as well as other useful features. The most exciting part of the automaton is the web base. Students and faculty members can use the web module for OPAC Search, study and research purposes. Users can visit the Central Library from any part of the world.

3.2 Central Library Khulna University

Khulna University strives to create a knowledge-based just society through accelerating inclusive and transformative growth of Khulna, Bangladesh and the world. The university aims to achieve this vision through cross-cutting research, scholarly enquiry and development of new knowledge. To support the mission of the University for emerging as a premier academic university, embracing traditional values of higher education as well as the knowledge required for the global community in the 21st century. To identify, acquire, organize, store, and provide on-demand access to the available intellectual and research products of scholars and to support teaching, learning, research and creative endeavors. To provide increasing access to digital collections while continuing to build and improve access to collections in all formats to meet the research and teaching needs of the university.

3.3 Dhaka University Library

The Dhaka University Library started in 1921 in the premises of present Dhaka Medical College. The former Principal of the Dhaka College, F.C. Turner, was the first Librarian of the Dhaka University Library. The Library was started with 877 students, 60 teachers of 12 departments under 3 Faculties - Arts, Science and Law. At present the library serves about 35000 individuals, comprising of faculty members, students, researchers, staffs and approval members of other academic communities. There are computers for library users to search different information and books of the library. Manual catalogue card of books is also available here.

3.4 University of Minnesota Library

There are total four library in University of Minnesota. The East Asian Library is one of them. The East Asian Library was established in 1965, and serves the East Asian studies program. Subject Strengths of the collection include Chinese and Japanese history, language and literature, art history and law history. Ming history is the gem of the collection. David Faust is the go-to person for members of the University of Minnesota. He is the founder of East Asian Library. On that time he started the library with 234 academic staff, 2053 under graduates and 387 post graduates students. He also resolves. He also resolves problems with access to books, journals, databases and other resources in his subject area; makes purchasing decisions and takes requests for new materials. Now the library become fully digitalized. The students can read books form the library online. They can publish their journals on the library website.

3.5 Edinburgh University Library

Edinburgh University Library is one of the most important libraries of Scotland. It is located in Edinburgh. The University Library was moved in 1827 to William Playfair's Upper Library in the old college building. The collections in Edinburgh University Old College were moved in 1967 to the purpose built eight story main library building at George Square. Today, Edinburgh University wide library system holds over 3.8m books, e-books and e-journals in total. The University was founded by Royal Charter from King James VI in 1582 and opened in 1583, however the library

pre-dated this by three years. The initial collection was a bequest of 276 theological books from Clement Littill, an advocate who left his collection to the town in 1580. Until 1708, the teaching staff consisted of four regents and the Principal, the former taking each class through a year's part of the whole arts curriculum of logic, metaphysics, ethics and physics, which included the elements of mathematics and astronomy. Until the middle of the 17th century, by which time the library must have exceeded the 2,400-odd volumes listed in Robert Lumsden's shelf catalogue of 1637, the teaching tended to be commentaries on Aristotle. The current librarian to the university of Edinburgh is Gavin McLachlan. The current Director of Library and University Collections is Jeremy Upton. The library of University of Edinburgh has a website to maintain their management system. The site design was based on server-side includes and a great deal of effort was put into conforming to best practice guidelines as they were articulated over five years ago. Now they made a progress on their website and move to XML/XSLT for the development of the website.

Chapter 4

Proposed Method

4.1 User Flow chart

The system flow diagram is a visual representation of all processed in sequential order. In figure 4.1 flowchart of Online library management system diagram is a graphical representation of the relation between all the major parts or step of the system. Flow chart diagram cannot include minor parts of the system.

Entity and Process:

- Managing all the books
- Managing all the issue books
- Managing all the issue books
- Add and delete books
- Search books

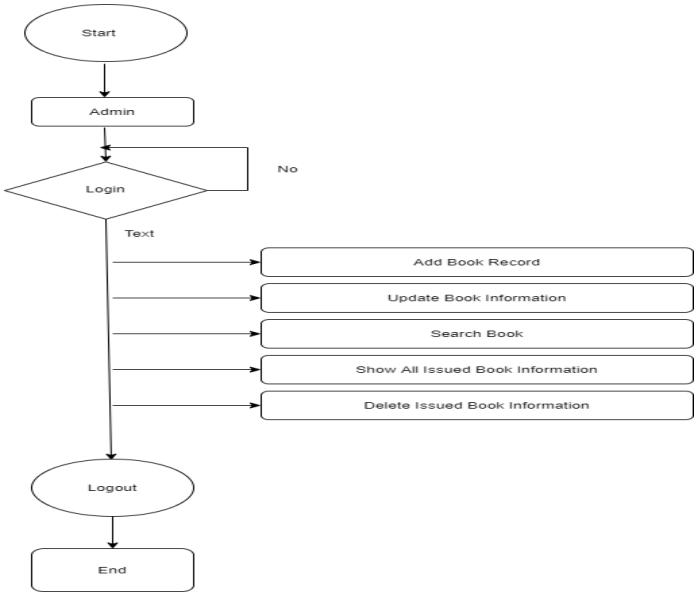

Fig 4.1: Flowchart of Library Management System

4.2 Schema Diagram

The design of the database is called a schema. This tells us about the structural view of the database. It gives us an overall description of the database. A database schema defines how the data is organize using the schema diagram. A schema diagram is a diagram which contains entities and the attributes that will define that schema. A schema diagram only shows us the database design. It does not show the actual data of the database. Schema can be a single table or it can have more than one table which is related. The schema represents the relationship between these tables.

There are three levels of the schema. The three levels of the database schema are defined according to the three levels of data abstraction.

- View Schema
- Logical Schema
- Physical Schema

View Schema or External Schema

View Schema defines the design of the database at the view level of the data abstraction. It defines how an end-user will interact with the database system. There are many view schemas for a database system. Each view schema defines the view of data for a particular group of people. It shows only those data to a view group in which they are interested and hides the remaining details from them.

Logical Schema or Conceptual Schema

Logical Schema defines the design of the database at the conceptual level of the data abstraction. At this level, we define the entities, attributes, constraints, relationships, etc. and how their relationship would be logically implemented. The programmers and the DBA work at this level and they do all these implementations.

Physical Schema

This is the design of the database defined at the physical level of data abstraction. This tells how the data will be stored in the storage device. The data can be stored in the form of file, indices etc.

It totally depends on the database administrator (DBA) that how he wants to store the data and what are the storage structure that has to be used. It is often hidden from the programmer and the users how the data is stored here. For example, if we are storing the data of employee in the database, this file can be stored anywhere and a user doesn't have any knowledge of it.

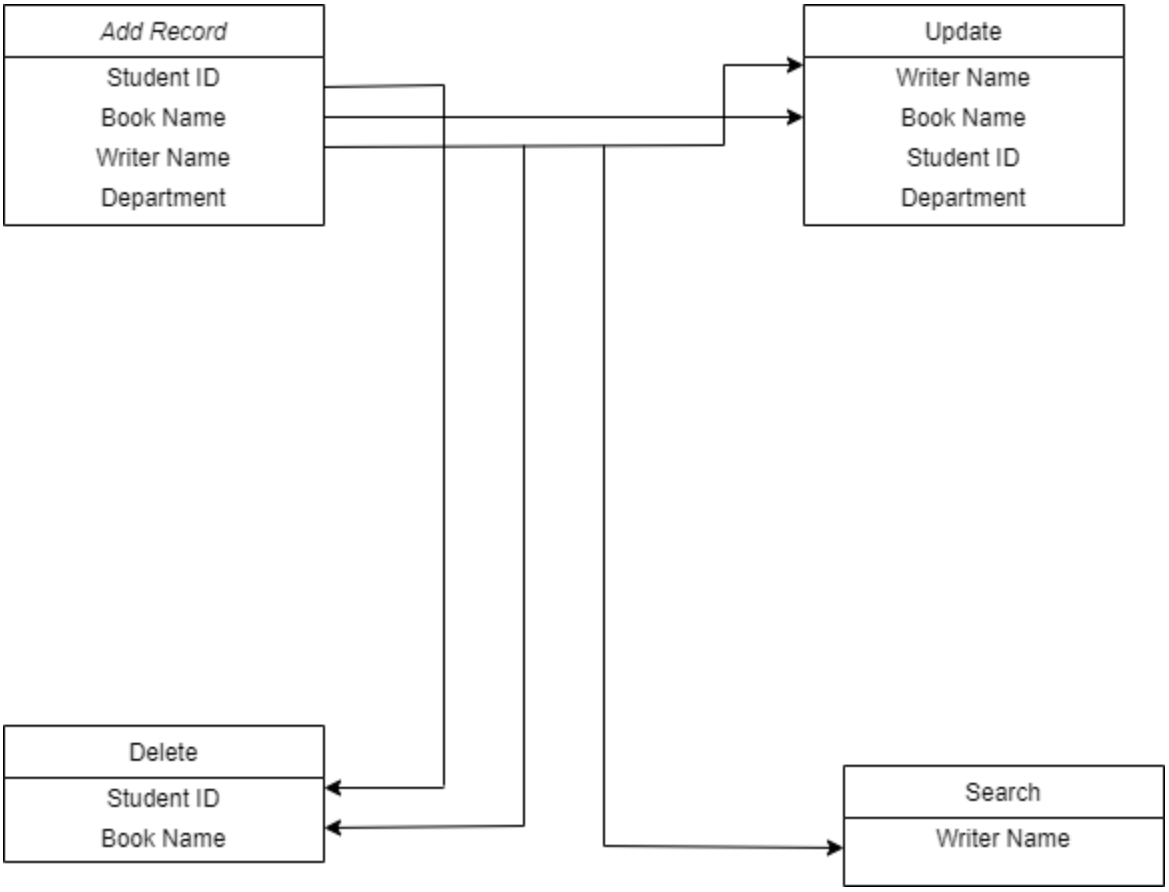

Fig 4.2: Schema Diagram of Library Management System

4.3 List of Tables

All the table list which table are used for develop this system. Each table has different name, different column and data type.

Table 4.1: Admin Table

This table store admin information.

Column Name	Data Type	Allow Nulls
id	int	☐
username	varchar(50)	☑
password	varchar(50)	☑
		☐

Table 4.2: Issue Table

This table store all the issued book information.

Column Name	Data Type	Allow Nulls
id	int	☐
StudentID	varchar(50)	☑
BookName	varchar(50)	☑
WriterName	varchar(50)	☑
Department	varchar(50)	☑
		☐

Chapter-5

Evaluation and Outcomes

5.1 Login Page

Login page is the first page of this application. In figure 5.1 we can see the login page. From this page an admin can enter to the library management system application. She or he have to write the username, password and click the login button to login in the application.

Fig 5.1: Login Page

5.2 Admin Forget Password

In figure 5.2 we can see the admin forget password page. If admin forget his or her password he or she have to click on the forget password button, then the database automatically sends the user name and password to his or her email address. It also maintains the login security of this application.

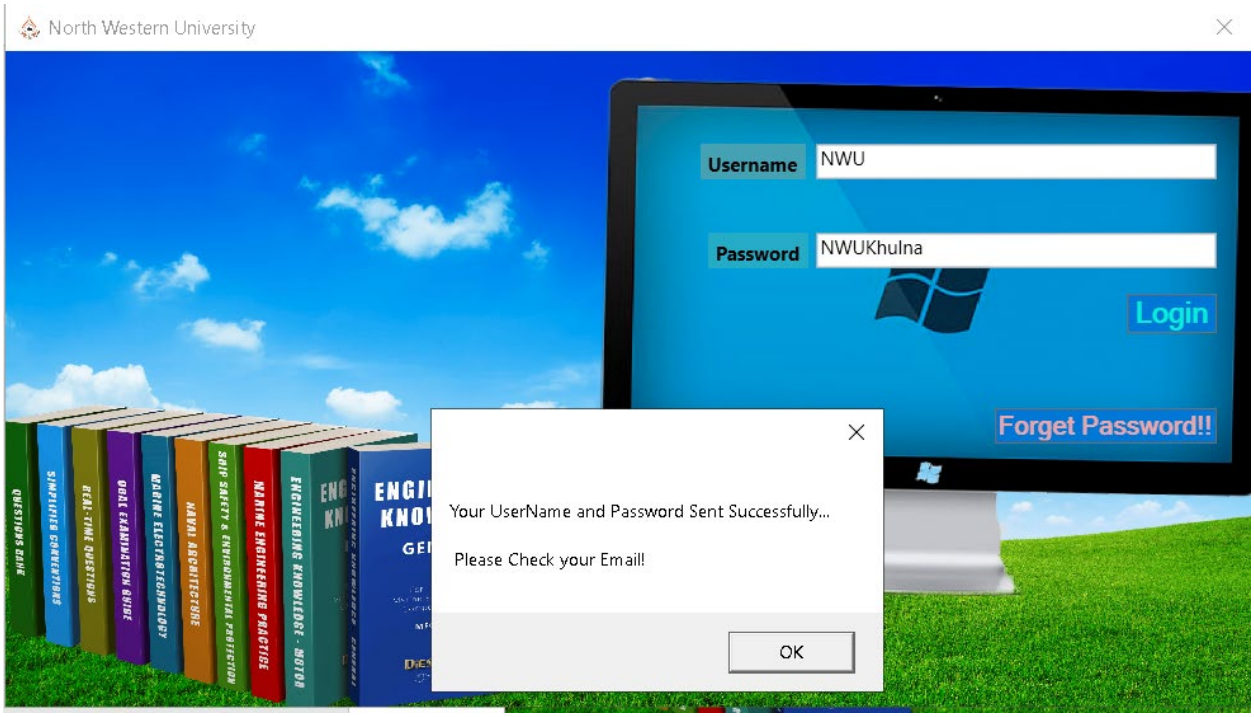

Fig 5.2: Admin Forget Password

5.3 Main Window

This is the main menu page of this application. In figure 5.3 we can see the main window. Here we get some button to operate this application such as add record button, update button, search button, show all button, delete button and exit button.

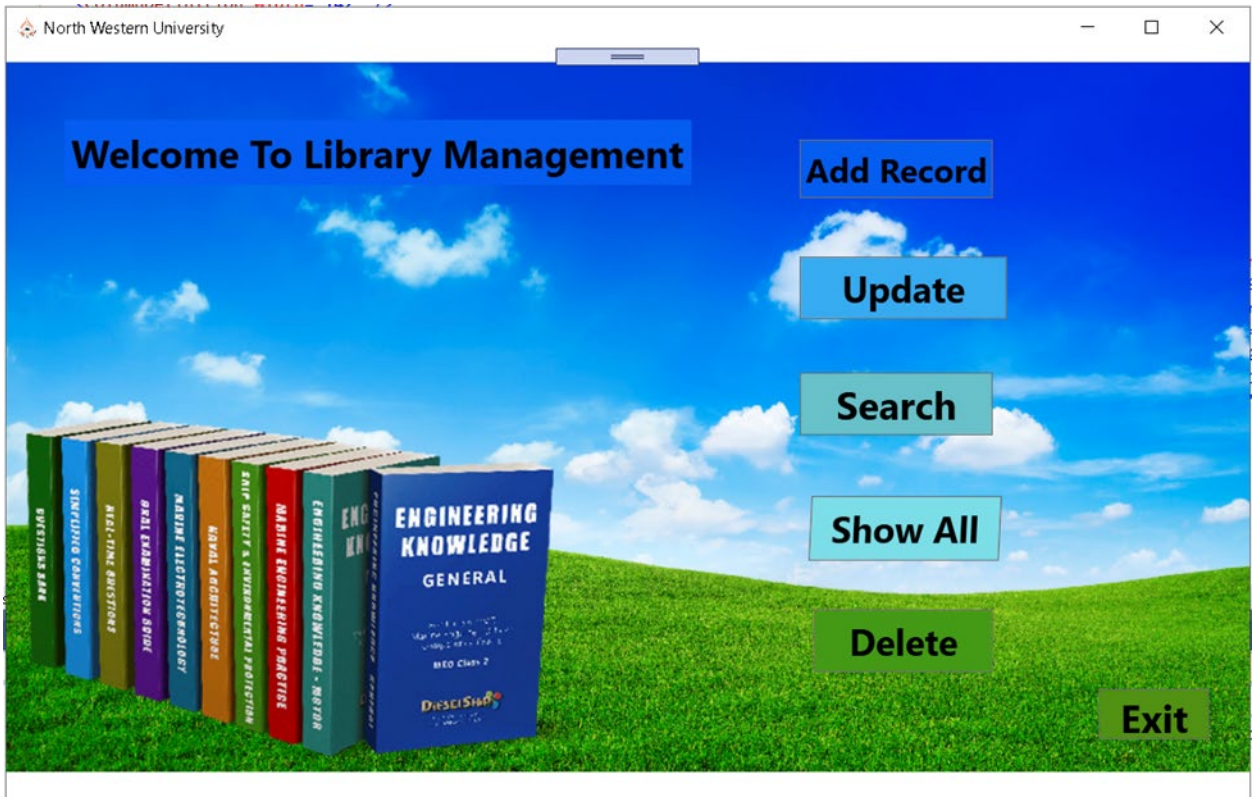

Fig 5.3: Main Window

5.4 Add Book Record page

By using this page admin can add any issued book data for any student to the database. In fig 5.4 we can see the add record page. For adding any issued book data to the database and admin has to enter the student id, book name, writer name and department name. Then he or she have to click the save button.

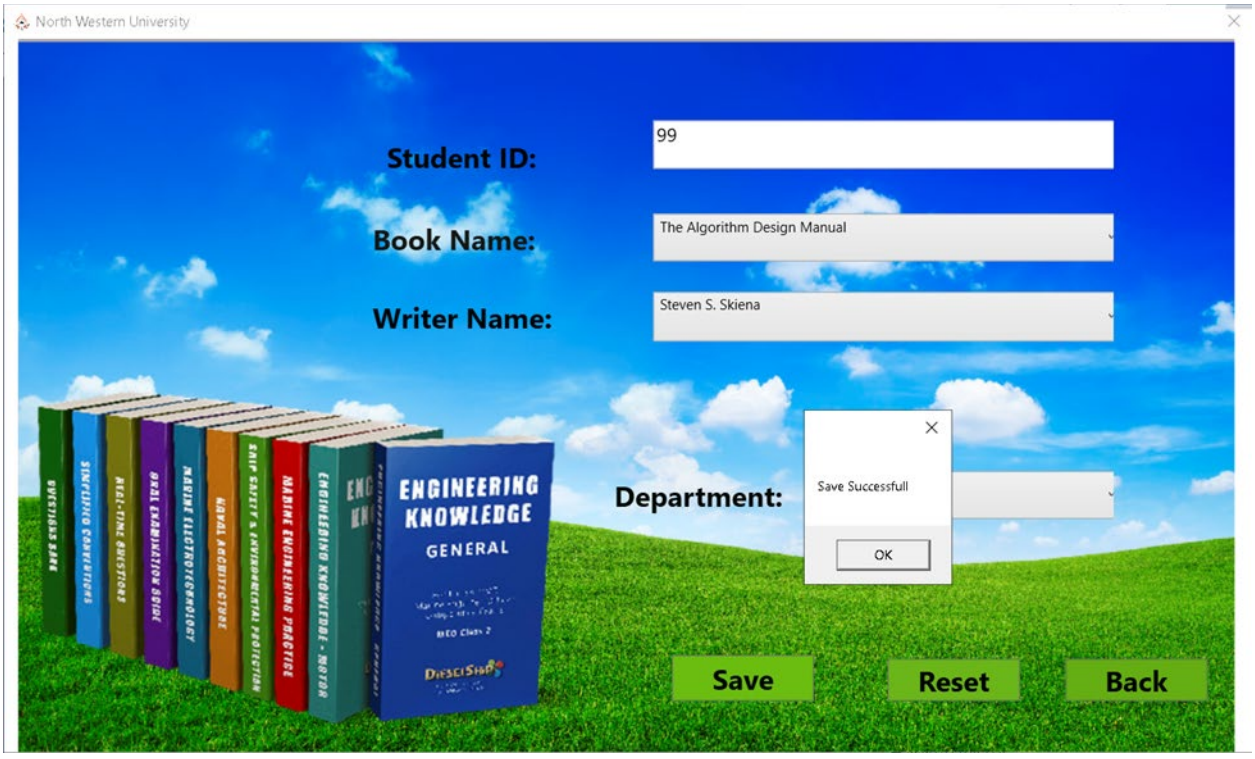

Fig 5.4: Add Book Record Page

5.5 update Book Information Page

By using this page admin can update any issued book data of the saved database. In fig 5.5 we can see the update page.

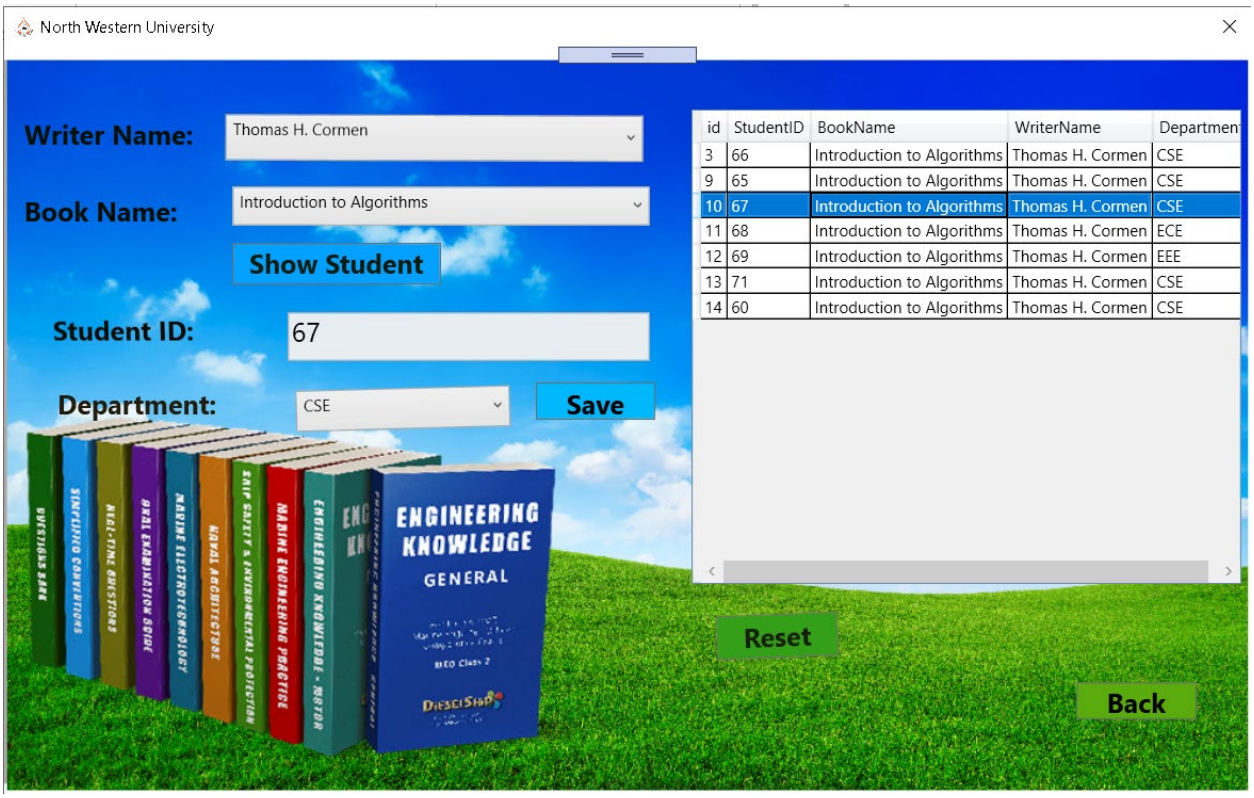

Fig 5.5: Update Book Information Page

5.6 Search Book page

Using this page admin can search any book by its writer name. In fig 5.6 we can see the search page. From this page an admin can see all the book information of that writer book such as the id of that student who issued the book, the book name etc.

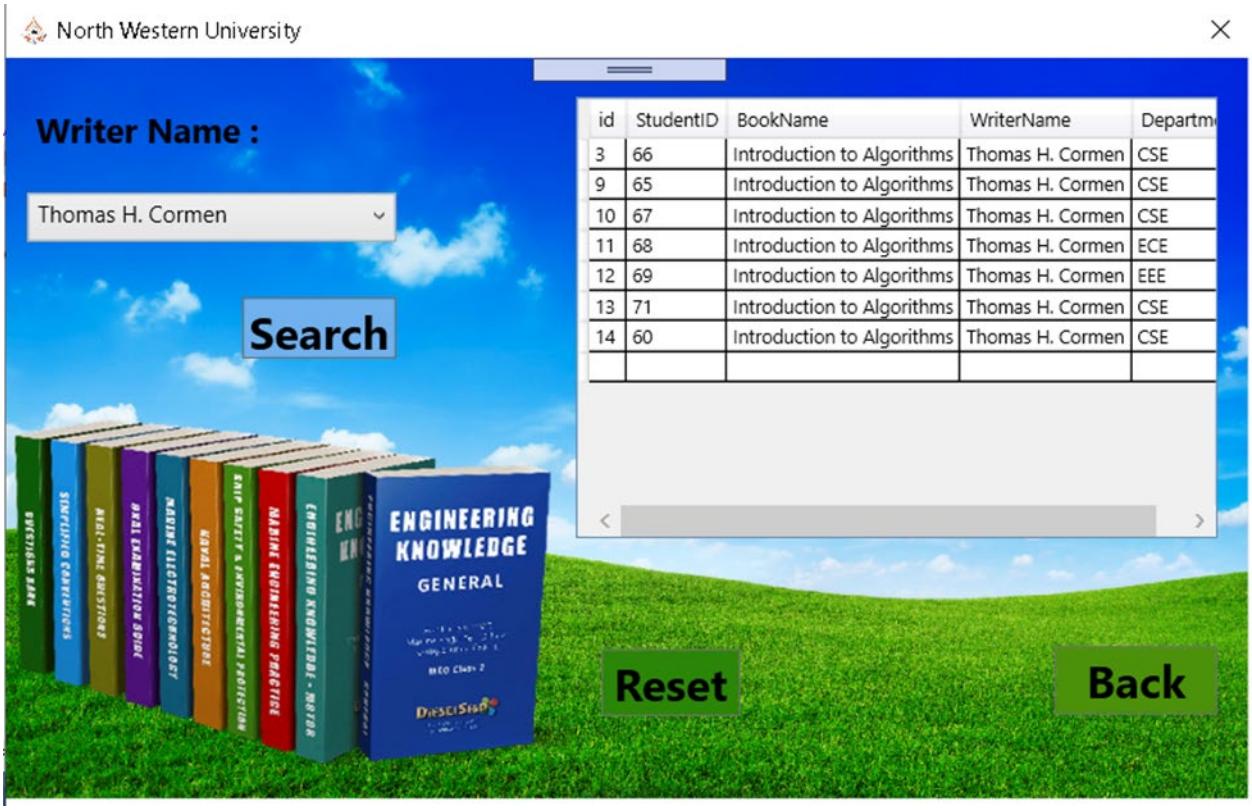

Fig 5.6: Search Book Page

5.7 Show All Issued Book Information Page

By using this page an admin can see all the information of the issued books on that library. In fig 5.7 we can see the show all issued book information page. Just on click in this button and admin can see all the issued book name, the writer name of that book, student id of that student who issued the book and the department.

id	StudentID	BookName	WriterName	Department
4	52	Algorithms	Robert Sedgewick	ECE
5	101	The Algorithm Design Manual	Steven S. Skiena	ECE
6	50	Joel on Software	Joel Spolsky	CSE
7	76	The Society of Mind	Marvin Minsky	Civil
8	82	Programming Pearls	Jon L. Bentley	EEE
9	65	Introduction to Algorithms	Thomas H. Cormen	CSE
10	67	Introduction to Algorithms	Thomas H. Cormen	CSE
11	67	Introduction to Algorithms	Thomas H. Cormen	CSE
12	67	Introduction to Algorithms	Thomas H. Cormen	CSE
13	67	Introduction to Algorithms	Thomas H. Cormen	CSE
14	60	Introduction to Algorithms	Thomas H. Cormen	CSE
15	20	Joel on Software	Joel Spolsky	CSE
16	23	Joel on Software	Joel Spolsky	ECE
17	26	Programming Pearls	Jon L. Bentley	EEE
18	24	Algorithms	Robert Sedgewick	CSE
19	27	Algorithms	Robert Sedgewick	CSE
20	28	Algorithms	Robert Sedgewick	CSE

Fig 5.7: Show All Issued Book Information Page

5.8 Delete Issued Book information page

By using this page an admin can delete any issued book information. In fig 5.8 we can see delete issued book information page. An admin has to write the student id, book name and then click the delete button to delete the information of that book.

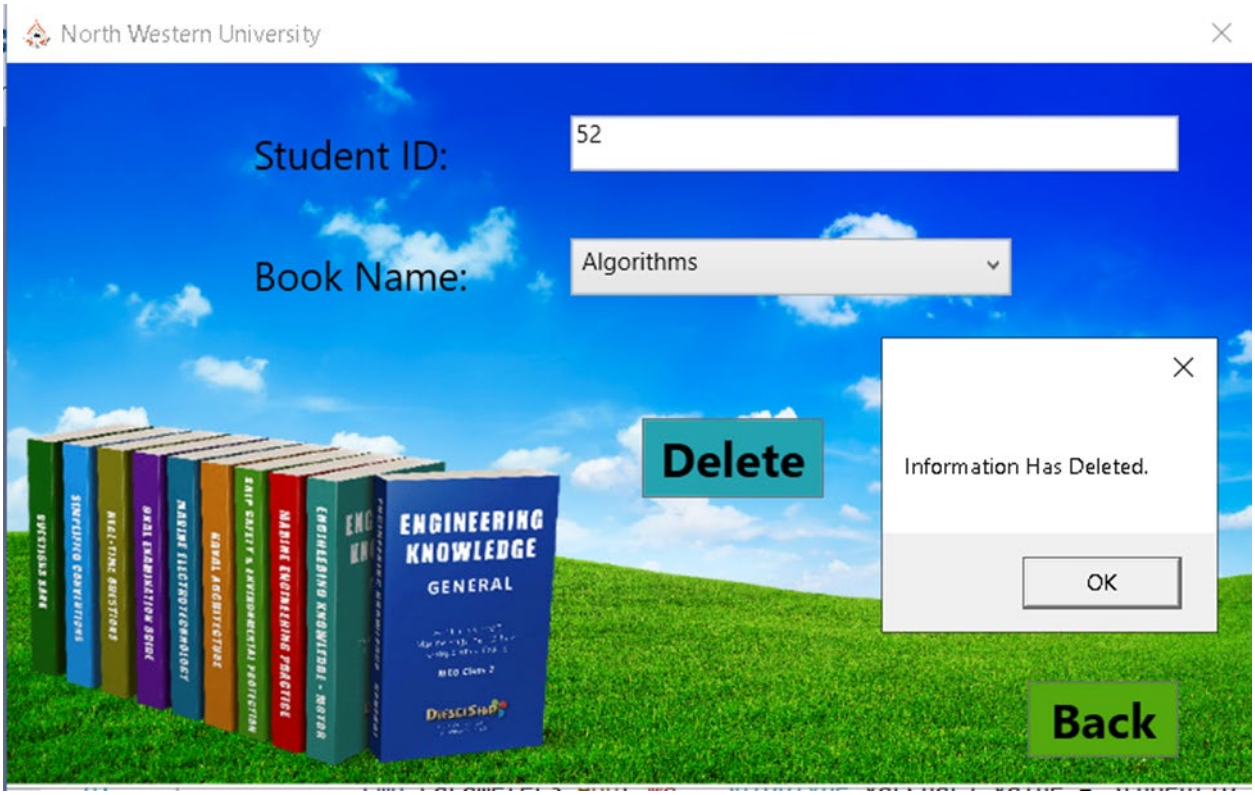

Fig 5.8: Delete Issued Book information page

Chapter 6
Conclusion

6.1 Discussion & Conclusion

This application provides a electronic version of library management system which will benefit the staff to maintain the library properly. It makes entire process easier where the staff can see the whole information of issued books, update the information of issued books, delete the information of issued books etc. It also has a facility for admin login where admin can login and use the application.

6.2 Limitation

The main limitation of this library management system application is students cannot use this. The user of this application is only the staff member of a library. Students can not issue any book form this application automatically because this is not an online application.

6.3 Future Goal

The steps we are presenting here is the first approach of our application. We are thinking to work a lot on this. Our main future goal for this application is to convert this into online. Then we want that the students can use this application. They can read the books from this application. We will add the feature so that the students can issue books online. We are working on a SMS notification system for the students. By this notification system we can notify the students about the expiry date for issued books. In future we want to work on a review feature, to help the students to pick the right books for themselves.

Appendix

A.6.1 Code for Adding Book Record

Programming logic: In figure A.6.1 we can see the code that for adding book record. The logic is, if the condition find row =0 then show the message “invalid” and if the condition find row>0 then show the message “save successful”.

```
private void insertSave(object sender, RoutedEventArgs e)
{



    if (StudentID.Text == "" || WriterName.Text == "" || BookName.Text == "" || Department.Text == "")
    {
        MessageBox.Show("Insert Valid Data !");
        return;
    }


    string connectionstring = @"Data Source=.;Initial Catalog=Library;Integrated Security=True";
    SqlConnection sqlcon = new SqlConnection(connectionstring);

    SqlCommand cmd = new SqlCommand("insert into bookData(StudentID,BookName,WriterName,Department) values(@a,@b,@c,@d)", sqlcon);

    cmd.Parameters.Add("@a", SqlDbType.VarChar).Value = StudentID.Text;
    cmd.Parameters.Add("@b", SqlDbType.VarChar).Value = BookName.Text;
    cmd.Parameters.Add("@c", SqlDbType.VarChar).Value = WriterName.Text;

    cmd.Parameters.Add("@d", SqlDbType.VarChar).Value = Department.Text;
    sqlcon.Open();
    int rows = cmd.ExecuteNonQuery();
    if (rows > 0)
        MessageBox.Show("Save Successfull");
    sqlcon.Close();
}
```

Fig A.6.1: Code for Adding Book Record

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