Library Management System

CS262 - Final Project Requirement Document

Project Supervisor

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1 Project Description

In today's world, where we can find information easily online, libraries are still super important. They're like treasure chests full of books and other stuff that anyone can use. No matter who you are, you can find something useful in a library. They have all kinds of books, stories, and things to learn about, and they're free for everyone to use.

Previously, our library maintained records manually, where all transactions, including book borrowing and user information, were recorded in registers. Whenever a user borrowed a book, a handwritten receipt was issued, detailing the book borrowed and the time of borrowing. However, this manual system had its limitations, including the risk of errors, time-consuming processes, and difficulty in accessing information.

To overcome the limitations, We develop an **advanced automated Library management system**. We are unable to keep all the record books manually. So, this system automates the library management. Initially we have three types of users. An admin, Staff and a Student. A student can register himself and then login into the system. Only students can register while staff cannot register and can only be added by an admin. Admin can also log in the system. An admin can add students, staff, and another admin. These three users have different roles based on their roles. When the admin logs in, they will see the admin menu. The admin can handle CRUD operations of Student and has the authority to add or delete staff.

An admin will add certain things such as categories which specify the type of book, publishers, and locations to indicate which locations is available in the library for the placement of the Book. By adding details about publishers to the library system, the admin provides students with valuable information about the origin of the books available in the library. An admin will add authors, and when adding books, they will add information such as the publisher, title, category of that book. Book are also managed efficiently in this advanced system. The students can easily search for their desired book.

When a student logs in with their credentials, they will be presented with the student menu. Students can request to borrow a book. When a student requests a book, if it is available, the system will record the request. If the book is not available at the moment, the system will inform the Student about its unavailability and provide nearest time for when the book will be available. This ensures that students are informed about the status of their requests and can plan accordingly for when they can access the book. Students can also provide reviews for books. If a user has borrowed a book and fails to return it by the due date, they will have to pay fine imposed by the staff/librarian. They will not be able to borrow any books until they pay the fine.

The librarian will be responsible for reviewing student requests and issuing books accordingly. If a student fails to return a book before the due date, the librarian will impose a fine. The student will not be able to borrow another book until the fine is paid.

The Reports that were previously manually compiled will now be generated automatically by the system. This will sae the time.

To make this system more efficient we design a User-friendly User interface which is easily to handle and control. A user-friendly interface enhances the experience for librarians making it easier to navigate the system and find desired resources. This management system automates a lot of work which reduces the workload of librarians.

There are lots of benefits to using our new system. First, it stops mistakes because everything is done by the computer. Second, it saves time for the library staff because they don't have to do everything manually. Third, it makes it easier for students to find and borrow books. Finally, it makes sure everyone follows the rules by giving fines for late returns.

Overall, our new system makes the library run smoother and helps everyone find what they need faster and easier.

2 Project Features

2.1 Student Management

Student can register themselves into the system by providing necessary details such email along with a password. Once registered, their profiles will be created, and they will be able to log in to the system. This login access allows students to interact with various features and functionalities of the library management system. The admin has the authority to add students directly into the system. This feature enables the admin to manage the registration process efficiently and ensure that all eligible students are included in the system.

2.2 Staff Management

In this library system, there is also staff management functionality available. The admin will have the authority to add, delete, and edit staff members within the library. This feature enables the admin to efficiently manage the workforce within the library. accurately maintained.

2.3 Admin Management

Administrators have the privilege to add other administrators to the system, enhancing administrative capabilities. Admins can perform CRUD (Create, Read, Update, Delete) operations on user data, Books Data and administrative records. It involves creating, deleting, and updating admin accounts.

2.4 Book Management

This feature will be for managing the library's collections. New books can be added, existing book details updated along with its details. When adding a book, information about the book's publisher and author is also recorded, enriching the database.

2.5 Author And Publisher Management

Admins can also add authors and publishers to the system. This means they can put in details about who wrote the books and who published them. By doing this, admins make it easier to assign books to specific authors and publishers. It helps keep everything organized in the library system and makes it simpler for people to find the books.

2.6 Request Book

This feature will provide students with the ability to request books. When a student requests a book, if it is available, the system will record the request. If the book is not available at the moment, the system will inform the Student about its unavailability and provide nearest time for when the book will be available. This ensures that students are informed about the status of their requests and can plan accordingly for when they can access the book.

2.7 Book Issue

When a student requests to borrow a book, the request will be forwarded to the librarian, who will issue the book to the student. This process ensures a seamless and efficient workflow in the library management system.

2.8 Fine Management

If a student forgets to return the book before the due date, the system will automatically apply fines. Similarly, if a user forgets to returns the book till the due date, the system will mark the book as overdue and apply fines accordingly. When the fine applies, students will not be able to borrow any other books until the fines are paid. The system notify the students about the amount to be paid.

2.9 Student Reviews

Students can access and fill the review form available in the system if they wish to provide feedback on specific books available in the library. The review form will allow students to share their opinions, comments, or concerns about individual books they have read. Reviews provided by students will be recorded and displayed alongside the respective books for other student to reference and consider.

3 Technology Stack

Technology	**Tools**
Language	C#
Platform	Desktop
Frontend Technology	• Winforms in .Net Framework • Guna.UI2.WinForms 2.0.4.6
IDEs	• Microsoft Visual Studio 2022

Table 1: Technology Stack

4 Project Actors

There are 3 actors in our Library Management System. They are as follows

4.1 Admin

Admin controls the whole system.The admin can handle tasks such as adding or removing books from the system, as well as managing students and staffs by adding new ones or removing previous.The admin has control over the entire system. The main role of admin is to manage books, keeps track of publishers and authors.

4.2 Staff/Librarian

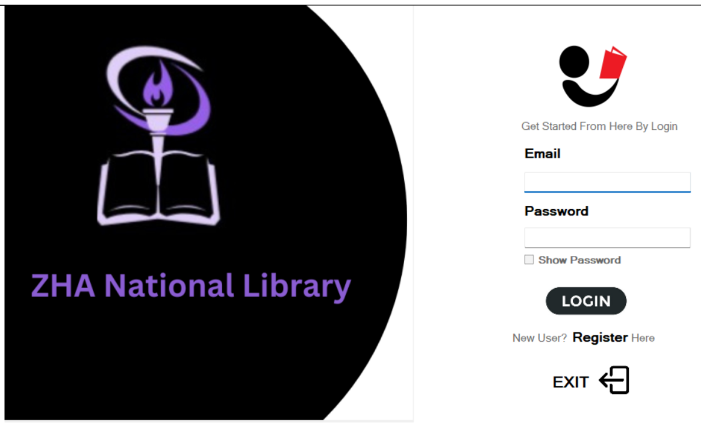
The librarian can reviewing the student requests and issuing books accordingly. It also impose fines on students who fail to return the books by the due date. Librarian also manages the circulation of the books within the library. Moreover, they can view their salary and personal information.

4.3 Students

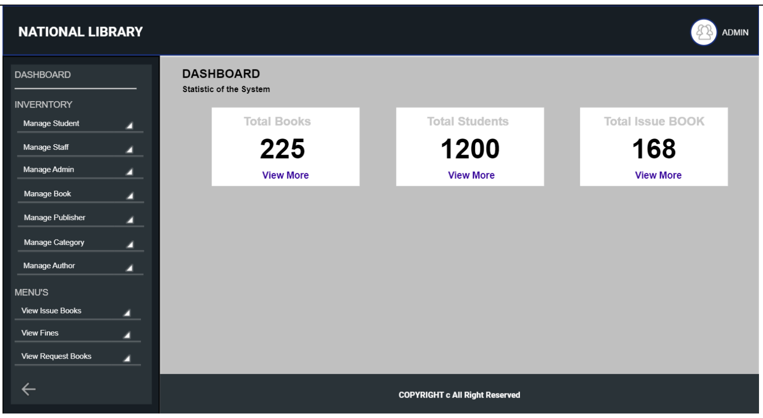
The role of the students in library management system is significant. They can request book for borrowing. They can view the status of their requests and are responsible for returning borrowed books on time to avoid from fines. Studens also contribute to library management by giving reviews for the book they borrowed. They interact with the system to access various library features. Students play an important role in utilizing library resources effectively.

5 Use Cases

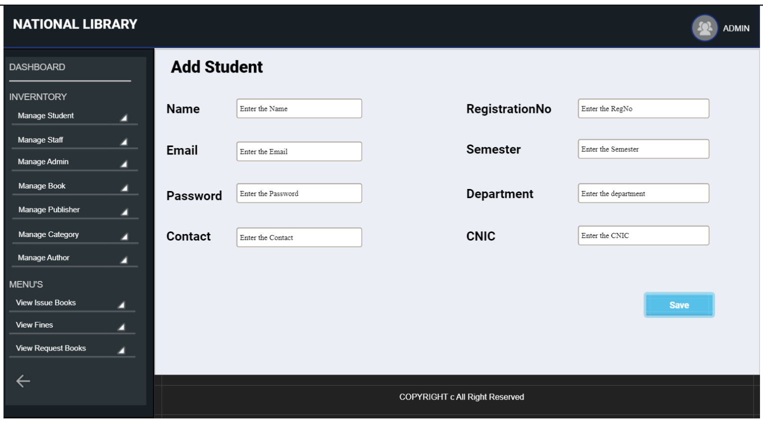
5.1 Sign In

UseCaseId	U01
Name	Sign In
Actor	Admin, Students, Staff
Description	This is the Sign In page. It's where users can authenticate and access their accounts.These three actors sign in using their username and password. For this purpose, two text boxes are used for username and password.
Layout In Pencil Tool	 ZHA National Library Get Started From Here By Login Email Password □ Show Password LOGIN New User? Register Here EXIT
Validators	If actors can enter wrong email or password an error message occur that the email or password is invalid.If actor enters wrong email or password Which is not exist in database then the error occurs.

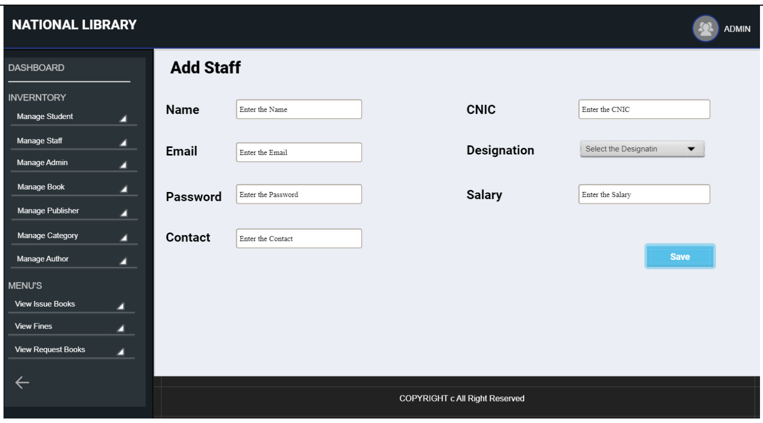
5.2 Admin Dashboard

UseCaseId	U02
Name	Admin Dashboard
Actor	Admin
Description	This is the main page of the administrator. By using this page admin can control the whole functionality of the system. The admin can also view the status of the total number of students, Book as well as Issue Books. This dashboard contain the navigation of other forms by using this form admin control this system efficiently and easily.
Layout In Pencil Tool	 NATIONAL LIBRARY ADMIN DASHBOARD INVERNTORY Manage Student Manage Staff Manage Admin Manage Book Manage Publisher Manage Category Manage Author MENU'S View Issue Books View Fines View Request Books DASHBOARD Statistic of the System Total Books 225 View More Total Students 1200 View More Total Issue BOOK 168 View More COPYRIGHT c All Right Reserved
Validators	The Admin Dashboard does not contain any validation.

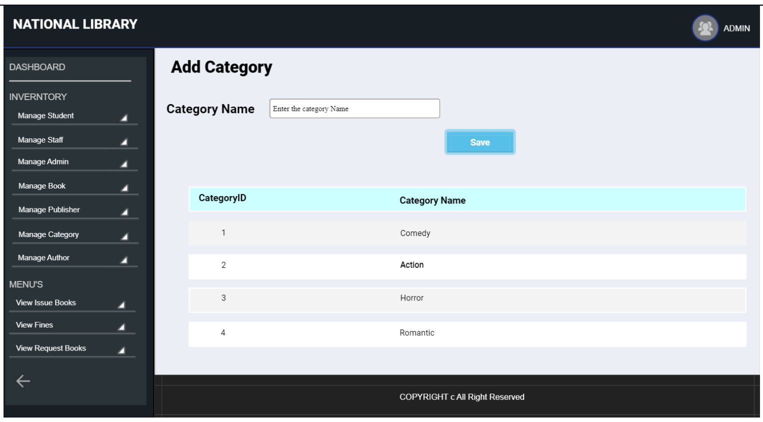
5.3 Add Student

UseCaseId	U03
Name	Add Student
Actor	Admin
Description	Administrator can perform student related operation by using this form. By using this form admin can add the student in the system using their credentials like Name, CNIC, Email,Contact, Department etc
Layout In Pencil Tool	 NATIONAL LIBRARY ADMIN DASHBOARD INVERNTORY Manage Student Manage Staff Manage Admin Manage Book Manage Publisher Manage Category Manage Author MENU'S View Issue Books View Fines View Request Books Add Student Name Enter the Name Email Enter the Email Password Enter the Password Contact Enter the Contact RegistrationNo Enter the RegNo Semester Enter the Semester Department Enter the department CNIC Enter the CNIC Save COPYRIGHT c All Right Reserved
Validators	This form contain proper validations. All fields are required.There is no empty box acceptance.In each text-box the proper data is required like Email Contain ’@’ otherwise the student not added.

5.4 Add Staff

UseCaseId	U04
Name	Add Staff
Actor	Admin
Description	This is the staff control form.By using this form admin can add the new staff. The admin can add their credentials like Email, Password, Designation etc.
Layout In Pencil Tool	 NATIONAL LIBRARY ADMIN DASHBOARD INVERNTORY Manage Student Manage Staff Manage Admin Manage Book Manage Publisher Manage Category Manage Author MENU'S View Issue Books View Fines View Request Books Add Staff Name Enter the Name Email Enter the Email Password Enter the Password Contact Enter the Contact CNIC Enter the CNIC Designation Select the Designatin Salary Enter the Salary Save COPYRIGHT c All Right Reserved
Validators	Adding Staff form contain proper validation. In this form their is no empty field all the fields are required with the proper format.

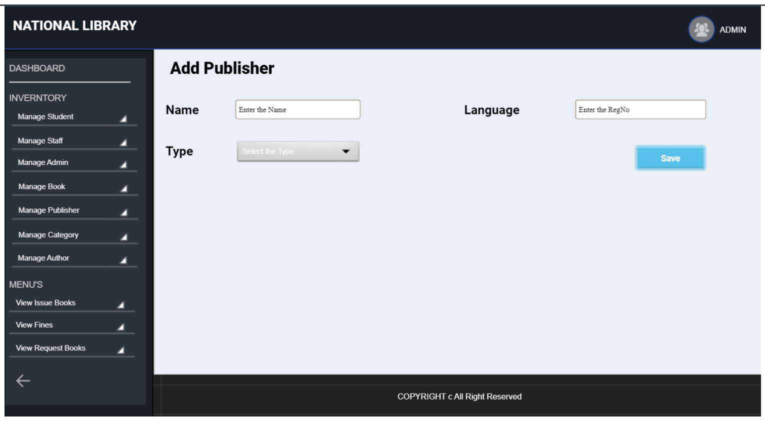
5.5 Add Category

UseCaseId	U05
Name	Add category
Actor	Admin
Description	This form is used to add the category of the book. Each book has the specific category. Admin can assign a category.
Layout In Pencil Tool	
Validators	This form contain only one validation. The category name text box does not empty.

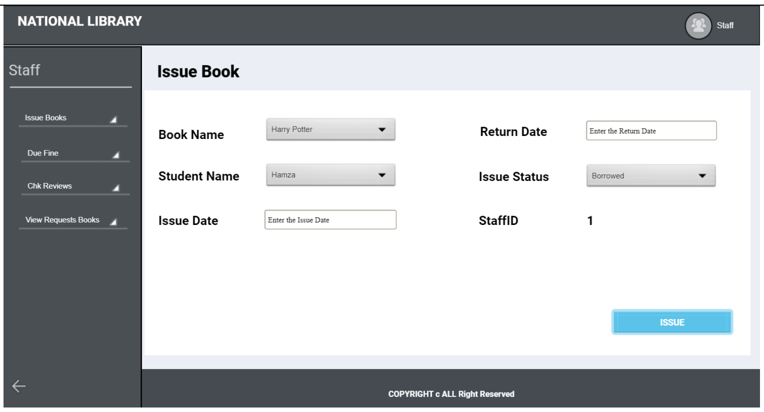
Category Name: Enter the category Name

CategoryID	Category Name
1	Comedy
2	Action
3	Horror
4	Romantic

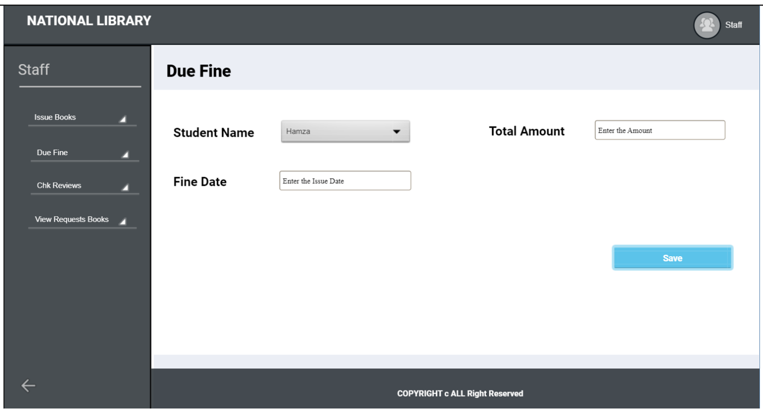
5.6 Add Publisher

UseCaseId	U06
Name	Add Publisher
Actor	Admin
Description	This form is used to add the publisher of the book. The admin add the Publisher name, Language or Type.
Layout In Pencil Tool	 NATIONAL LIBRARY ADMIN DASHBOARD INVERNTORY Manage Student Manage Staff Manage Admin Manage Book Manage Publisher Manage Category Manage Author MENU'S View Issue Books View Fines View Request Books Add Publisher Name Enter the Name Language Enter the RegNo Type Select the Type Save COPYRIGHT c All Right Reserved
Validators	This form contains the proper Validations. None of the empty field is accepted. Proper Name, Language and Type are given otherwise the book publisher does not add in the system.

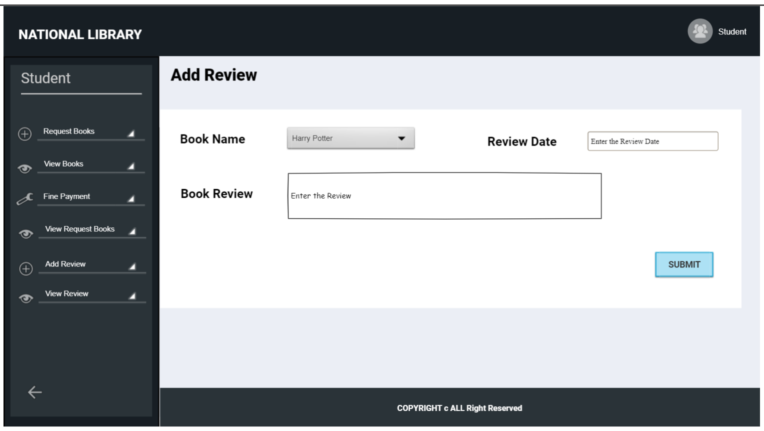
5.7 Issue Book

UseCaseId	U07
Name	Issue Book
Actor	Staff or Librarian
Description	Staff can issue book to students. This form is used to issue book. Staff add the proper information related to book issue like Book name, Student Name, Return Date and issue date etc
Layout In Pencil Tool	 NATIONAL LIBRARY Staff Staff Issue Books Due Fine Chk Reviews View Requests Books Issue Book Book Name: Harry Potter Student Name: Hamza Issue Date: Enter the Issue Date Return Date: Enter the Return Date Issue Status: Borrowed StaffID: 1 ISSUE COPYRIGHT c ALL Right Reserved
Validators	All the fields of the form are required. For issue book to the Student the Staff must add a proper Detail.

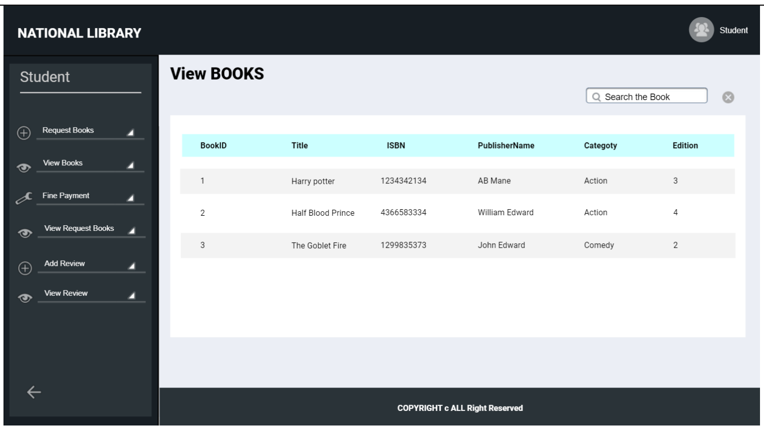
5.8 Due Fine

UseCaseId	U08
Name	Due Fine
Actor	Staff or Librarian
Description	This form is used to issue fine to the student. Staff can add the student name, Fine date and fine amount.
Layout In Pencil Tool	 NATIONAL LIBRARY Staff Staff Issue Books Due Fine Chk Reviews View Requests Books Save COPYRIGHT c ALL Right Reserved Due Fine Student Name: Hamza Total Amount: Enter the Amount Fine Date: Enter the Issue Date
Validators	All field are required. Staff can select student name from Drop down menu and enter proper fine date or fine amount.

5.9 Student Review

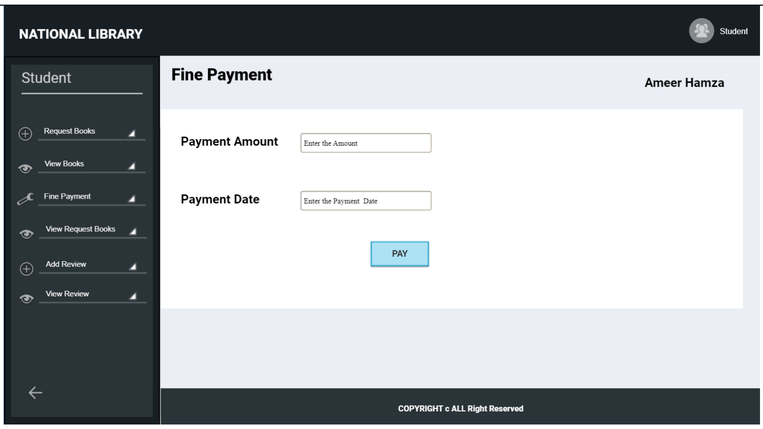
UseCaseId	U09
Name	Student Review
Actor	Student
Description	The student can review of the book by using this form. Student can select Book name and Review date before adding their review.
Layout In Pencil Tool	
Validators	Review Book text box never accept as an empty field. All the field are required.

5.10 View Books

UseCaseId	U10
Name	View Books
Actor	Student
Description	This form is used to see all the book which are available in the system. Admin can easily search any book.
Layout In Pencil Tool	
Validators	This form does not contain any validation.

BookID	Title	ISBN	PublisherName	Categoty	Edition
1	Harry potter	1234342134	AB Mane	Action	3
2	Half Blood Prince	4366583334	William Edward	Action	4
3	The Goblet Fire	1299835373	John Edward	Comedy	2

5.11 Pay Fine

UseCaseId	U11
Name	Pay Fine
Actor	Student
Description	This form is used to pay the fine of the student. Student will pay his fine received f
Layout In Pencil Tool	 NATIONAL LIBRARY Student Student Request Books View Books Fine Payment View Request Books Add Review View Review Fine Payment Ameer Hamza Payment Amount Enter the Amount Payment Date Enter the Payment Date PAY COPYRIGHT c ALL Right Reserved
Validators	Total Amount to be enter is not in characters. Text box never accept as an empty fi

User Interface Details :

Use Case ID	Text Box	Drop Down	Password Box	Table	Data Field	But tons	AC	RB	CB	M	Text Area	Progress Bar
U01	1	0	1	0	0	1	0	1	0	0	0	0
U02	0	7	0	0	0	0	0	0	0	0	0	0
U03	8	1	1	0	0	1	0	0	0	0	0	0
U04	7	1	1	0	0	1	0	0	0	0	0	0
U05	1	0	0	0	0	1	0	0	0	0	0	0
U06	2	1	0	0	0	1	0	0	0	0	0	0
U07	2	3	0	0	0	1	0	0	0	0	0	0
U08	2	1	0	0	0	1	0	0	0	0	0	0
U09	2	1	0	0	0	1	0	0	0	0	0	0
U10	1	0	0	1	0	0	0	0	0	0	0	0
U11	2	0	0	0	0	1	0	0	0	0	0	0

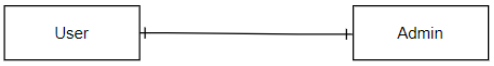
6 Classes

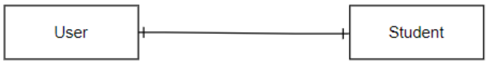
There must be a change can be applied during the implementation. This is not the final view of the classes.

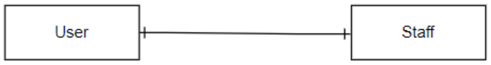
Class Name	Software/Domain	Is Abstract	Is Singleton	Has Parameterized Constructor
Book	Domain	No	No	Yes
User	Domain	yes	No	Yes
Student	Domain	No	No	Yes
Category	Domain	No	No	Yes
Publisher	Domain	No	No	Yes
Admin	Domain	No	No	Yes
Staff	Domain	No	No	Yes
Author	Domain	No	No	Yes
Location	Domain	No	No	Yes
Book Author	Domain	No	No	Yes
Book Issue	Domain	No	No	Yes
Book Request	Domain	No	No	Yes
Fine calculator	Software	No	yes	Yes
Report Generator	Software	No	yes	Yes
Fine Payment	Domain	No	No	Yes
Due Fine	Domain	No	No	Yes

7 ER Design

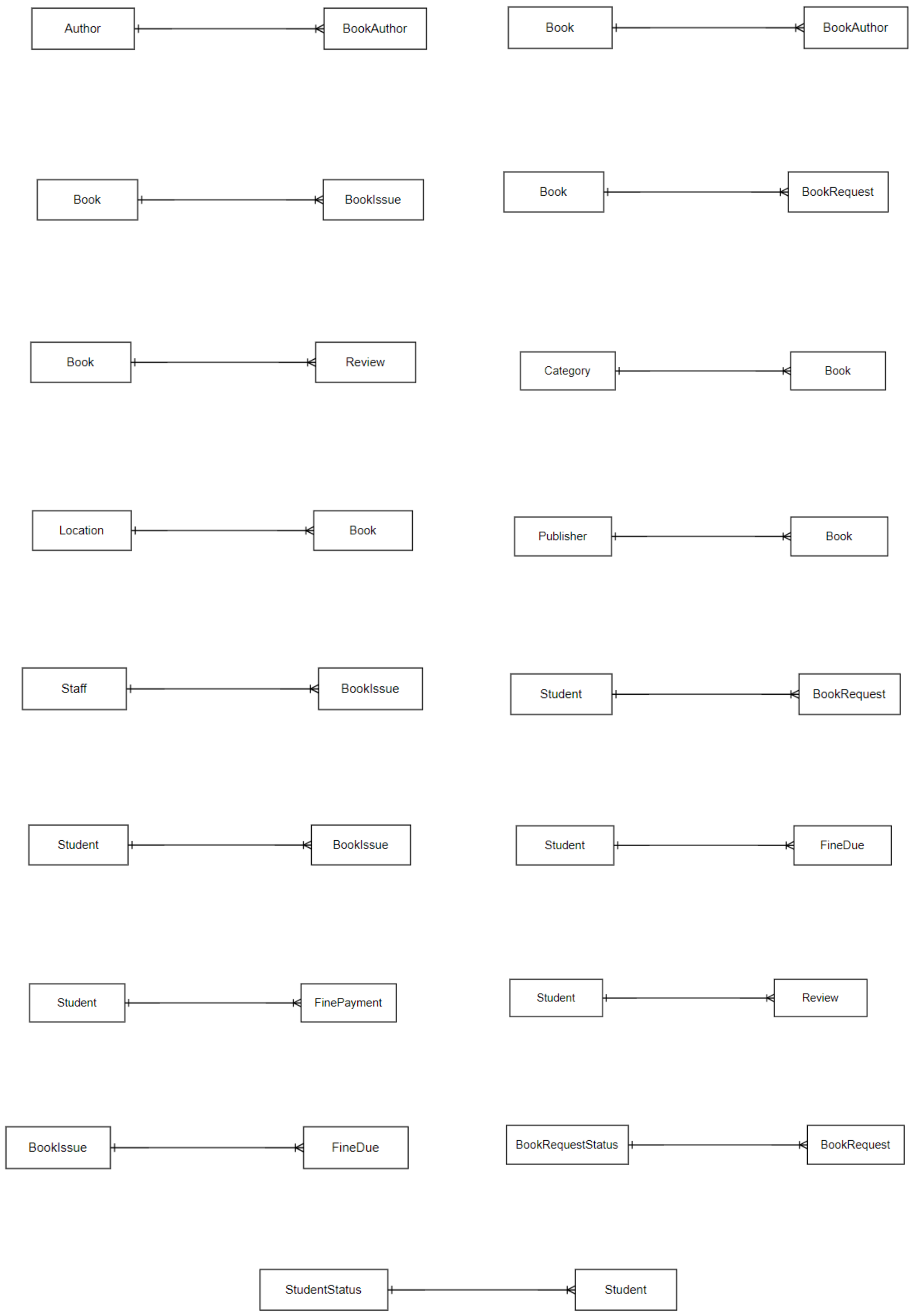
7.1 One to One Relationship



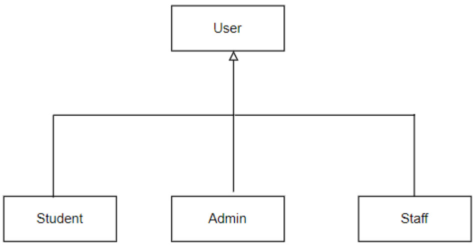




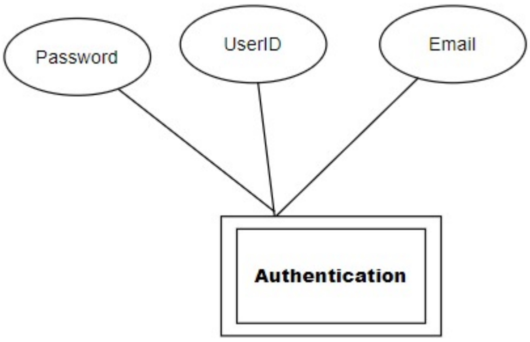
7.2 One to Many Relationship

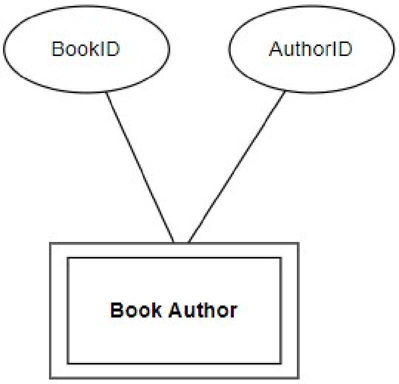

Author
BookAuthor
Book
BookAuthor
Book
BookIssue
Book
BookRequest
Book
Review
Category
Book
Location
Book
Publisher
Book
Staff
BookIssue
Student
BookRequest
Student
BookIssue
Student
FineDue
Student
FinePayment
Student
Review
BookIssue
FineDue
BookRequestStatus
BookRequest
StudentStatus
Student

7.3 Multi-Level Inheritance

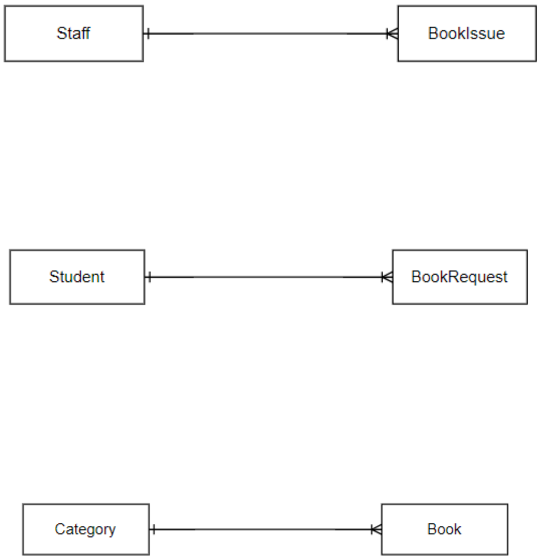


7.4 Weak Entities

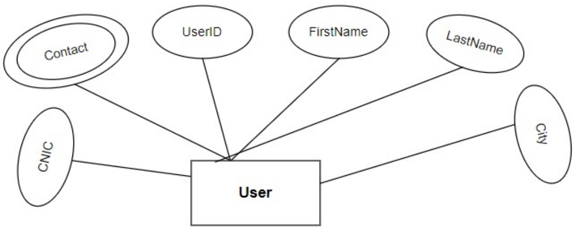




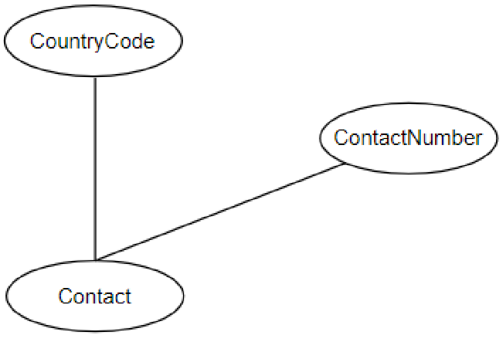
7.5 Strong Relationship



7.6 Multivalued Attributes



7.7 Complex Attributes



8 Project Plan

Use Case Id	Use Case Name	Member Name	Estimated Completion Date
U01	Sign In	Abdullah Fassi	20-04-2024
U02	Admin Form	Ameer Hamza	21-04-2024
U03	Add Student	Ameer Hamza	22-04-2024
U04	Add Staff	Ameer Hamza	22-04-2024
U05	Add Category	Ameer Hamza	24-04-2024
U06	Add Publisher	Ameer Hamza	24-04-2024
U07	Issue Book	Abdullah Fassi	23-04-2024
U08	Due Fine	Abdullah Fassi	24-04-2024
U9	Student Review	Muhammad Zubair	22-04-2024
U10	View Book	Muhammad Zubair	23-04-2024
U11	Pay Fine	Muhammad Zubair	25-04-2024