Darshan University

A Project Report on

"Loan Management System"

Under the subject

Software Engineering (2301CS405)

B. Tech, Semester – IV

Computer Science & Engineering Department

Submitted By

Student Name: Kalp Vipul Viradia Enrollment No.: 23010101299

Academic Year

(2024-2025)

Internal Guide	Dean-DIET
Prof. R. B. Gondaliya	Dr. Gopi Sanghani
Darshan University	Darshan University

Computer Science & Engineering Department
Darshan University

DECLARATION

We hereby declare that the SRS, submitted along with the **Software Engineering (2301CS405)** for entitled **"Loan Management System"** submitted in partial fulfilment for the Semester-5 of **Bachelor Technology (B. Tech)** in **Computer Science and Engineering (CSE)** Department to Darshan University, Rajkot, is a record of the work carried out at **Darshan University, Rajkot** under the supervision of R. B. Gondaliya and that no part of any of report has been directly copied from any students' reports, without providing due reference.

(Kalp Vipul Viradia)

Student's Signature

Date: _____

Computer Science & Engineering Department
Darshan University

CERTIFICATE

This is to certify that the SRS on **"Loan Management System" has** been satisfactorily prepared by **Kalp Vipul Viradia** (**23010101299**) under my guidance in the fulfillment of the course **Software Engineering (2301CS405)** work during the academic year 2024-2025.

Internal Guide	Dean-DIET
Prof. R. B. Gondaliya	Dr. Gopi Sanghani
Darshan University	Darshan University

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to my project guide Prof. R. B. Gondaliya and all the faculty members for helping me through my project by giving me the necessary suggestions and advices along with their valuable co-ordination in completing this work.

I also thank my parents, friends and all the members of the family for their precious support and encouragement which they had provided in completion of my work. In addition to that, I would also like to mention the Darshan University personals who gave me the permission to use and experience the valuable resources required for the project from the University premises.

Thus, in conclusion to the above said, I once again thank the faculties and members of **Darshan University** for their valuable support in completion of the project.

Thanking You

Kalp Vipul Viradia

ABSTRACT

The Loan Management System (LMS) is a digital solution designed to automate and streamline the entire loan process for financial institutions. This system simplifies loan application, approval, repayment, and reporting, reducing manual efforts and ensuring accuracy. It offers a user-friendly interface for both clients and loan officers, enabling clients to apply for loans securely and track their repayment schedules. Once a loan application is submitted, loan officers can review, approve, or reject it, with the system automatically updating the status. Clients can view their outstanding balances and make payments through integrated payment gateways.

Administrators can generate comprehensive reports on loan disbursements, repayments, and overdue loans, helping in effective resource management. The system's secure login and data privacy features ensure that client information is protected. By reducing paperwork, minimizing human error, and improving operational efficiency, the LMS enhances both the loan management process and the customer experience, providing a seamless and efficient solution for loan handling.

Main purpose of this system is to reduce human efforts as much as possible.

Table of Contents

List of Figures I
List of Tables II
1 Introduction 1
1.1 Product perspective 1
1.2 Product features 1
1.2.1 There are three different users who will be using this product: 1
1.2.2 The features that are required for the Admin are: 1
1.2.3 The features that are required for the Loan officer are: 1
1.2.4 The features that are required for the Customer are: 1
1.3 Functional Requirement 2
1.3.1 Admin 2
1.3.2 Loan Officer 2
1.3.3 Customer 2
1.4 Non-Functional Requirement 3
1.4.1 Usability: 3
1.4.2 Accuracy: 3
1.4.3 Availability: 3
1.4.4 Maintainability: 3
2 Design and Implementation Constraints 4
2.1 Use case diagram 4
2.2 Activity diagram and Swimlane diagram 5
2.3 Sequence diagram 7
2.4 State diagram 8
2.5 Class diagram 9
2.6 Data flow diagram 10
2.6.1 Context diagram (level-0) 10
2.6.2 DFD Level-1 10
2.6.3 DFD Level-2 11
3 External interface requirement (Screens) 12
3.1 Screen-1: Registration Form 12
3.2 Screen-2: Login Form 13
3.3 Screen-3: Add borrower book 14
4 Database design 15
4.1 List of Tables 15
5 Stories and Scenario 16
5.1 Story-1: Add New Book in Library Catalogue 16
5.1.1 Scenario# S1.1 16

5.1.2 Scenario# S1.2 16
5.1.3 Scenario# S1.3 16
5.2 Story-2: Search Book 17
5.3 Story-3: Manage due date for borrowed book 17
5.4 Story-4: Renew book 17
5.5 Story-5: Generate a report on book usage and availability 17
6 Test cases 18
7 References 22

List of Figures

Figure 2.1-1 Use case diagram for loan management system 4
Figure 2.2-1 Activity diagram for taking loan 5
Figure 2.2-2 Activity diagram for approving loan 5
Figure 2.2-3 Swimlane diagram for taking loan 6
Figure 2.2-4 Swimlane diagram for approving loan 6
Figure 2.3-1 Sequence diagram for taking loan 7
Figure 2.3-2 Sequence diagram for admin user 7
Figure 2.4-1 State diagram for loan 8
Figure 2.4-2 State diagram for payment 8
Figure 2.5-1 Class diagram for Library management system 9
Figure 2.6-1 Context diagram for Library management system 10
Figure 2.6-2 DFD level-1 for Library management system 10
Figure 2.6-3 DFD level-2 for Issue book 11
Figure 3.1-1 Screen-1: Registration Form 12
Figure 3.2-1 Screen-2: Login Form 13
Figure 3.3-1 Screen-3: Add borrower book 14

List of Tables

Table 3.1-1 Screen element of Registration form 12
Table 3.2-1 Screen element of Login form 13
Table 3.3-1 Screen element of Add borrower book.....14
Table 4.1-1 Table: Book.....15
Table 4.1-2 Table: Borrower.....15
Table 4.1-3 Table: Staff.....15
Table 4.1-4 Table: Student 15

1 Introduction

1.1 Product perspective

The **Loan Management System (LMS)** is designed to streamline the processes involved in managing loans, from origination to closure. It serves as a comprehensive solution for financial institutions, providing robust functionality to automate and manage loan-related operations efficiently.

1.2 Product features

1.2.1 There are three different users who will be using this product:

- **Admin**: Oversees the entire system and has full control over its functionality.
- **Loan Officer**: Handle loan operations, customer interactions, and compliance.
- **Customer**: Individuals applying for loan and view their loans.

1.2.2 The features that are required for the Admin are:

- Oversee all loan operations and monitor system activities.
- Add, edit, or delete loan products, including their terms (interest rates, tenure, and eligibility criteria).
- Monitor system users (Loan Officers and Customers), including account creation, modification, and deactivation.
- Make and analyse detailed reports, including loan disbursement, overdue accounts, and revenue data.
- Configure system settings, including repayment penalties, grace periods, and automated notifications.
- Monitor compliance with regulatory requirements and generate audit reports.
- Handle system backups and data recovery processes.
- Assign roles and permissions for Loan Officers.
- Monitor the performance of Loan Officers through task and target tracking.

1.2.3 The features that are required for the Loan officer are:

- Review and process loan applications, including document verification and credit assessment.
- Approve or reject loans based on customer eligibility and internal guidelines.
- Track the status of loans, including disbursement and repayments.
- View detailed customer profiles, including their loan history, repayment behaviour, and credit scores.
- Send reminders and notifications to customers regarding due dates and overdue payments.
- Generate customer-specific reports, such as outstanding balances and repayment schedules.
- Respond to customer queries or requests for loan restructuring or early closure.
- Record and track interactions with customers for future reference.
- Monitor pending tasks and customer escalations assigned by the Admin.

1.2.4 The features that are required for the Customer are:

- View available loan products with details such as interest rates, tenure, and eligibility requirements.
- Apply for loans by submitting necessary documentation and filling out the application form.
- Track the status of loan applications and receive updates on approvals or rejections.
- Access their loan account to view repayment schedules, outstanding balances, and due dates.
- Make loan repayments through integrated payment gateways or other channels.

- Request changes to loan terms, such as tenure extension or restructuring.
- Access notifications and reminders for upcoming repayments or overdue amounts.
- Update personal details such as address, contact information, or bank account details.

1.3 Functional Requirement

1.3.1 Admin

- **Add Loan Product**: Add new loan products with details such as interest rate, tenure, eligibility criteria, and terms and conditions to the system.
- **Update Loan Product**: Modify existing loan products if there are changes in terms, rates, or eligibility criteria.
- **Delete Loan Product**: Remove discontinued or incorrect loan products from the system.
- **User Management**: Maintain a database of all system users, including Loan Officers and Customers, with details like names, IDs, and permissions.
- **Set User Permissions**: Assign specific roles and access levels to Loan Officers.
- **Generate Reports**: Create detailed reports on loans, overdue accounts, revenue, and regulatory compliance.
- **Backup and Recovery**: Take system backups and ensure data recovery in case of failures.
- **Audit Logs**: Track all system activities and modifications for compliance and accountability.
- **Monitor Loan Officer Performance**: Track tasks and performance metrics of Loan Officers.

1.3.2 Loan Officer

- **Authenticate**: Loan Officers must log in with valid credentials to access the system.
- **Review Loan Applications**: Assess customer loan applications, verify submitted documents, and evaluate eligibility criteria.
- **Approve/Reject Loans**: Decide the approval or rejection of loan applications based on customer creditworthiness and institutional guidelines.
- **Manage Customer Profiles**: Access and update customer records, including personal details and loan histories.
- **Track Loans**: View the lifecycle of loans, including application, disbursement, and repayment.
- **Send Notifications**: Notify customers about due dates, overdue payments, or changes in loan terms.
- **Generate Customer Reports**: Create detailed reports specific to individual customers, such as repayment schedules and outstanding balances.
- **Request Loan Restructuring**: Process customer requests for changes in loan terms, such as tenure extension or repayment restructuring.
- **Handle Customer Queries**: Respond to customer inquiries about loans or system-related issues.

1.3.3 Customer

- **Authenticate**: Customers must log in using valid credentials to access their accounts.
- **Apply for Loan**: Submit loan applications with all required information and supporting documents.
- **Track Loan Application**: View the status of their loan application, including updates on approvals or rejections.
- **View Loan Details**: Access detailed information about their loans, including repayment schedules, interest rates, and outstanding balances.
- **Make Repayments**: Pay EMIs or clear overdue payments through integrated payment gateways.
- **Request Loan Changes**: Submit requests for loan restructuring, early closure, or increases in loan amounts.
- **Search Loan Products**: Browse available loan products and calculate EMIs using a loan calculator.

- **Access Notifications**: View alerts for upcoming due dates, payment confirmations, and system updates.
- **Update Personal Details**: Update account information, including address, contact details, or linked bank accounts.
- **Download Statements**: Retrieve loan account statements and payment receipts for record-keeping.

1.4 Non-Functional Requirement

1.4.1 Usability:

- The UI should be simple enough for everyone to understand and get the relevant information without any special training. Different languages can be provided based on the requirements.

1.4.2 Accuracy:

- The data stored about the books and the fines calculated should be correct, consistent, and reliable.

1.4.3 Availability:

- The System should be available for the duration when the library operates and must be recovered within an hour or less if it fails. The system should respond to the requests within two seconds or less.

1.4.4 Maintainability:

- The software should be easily maintainable and adding new features and making changes to the software must be as simple as possible. In addition to this, the software must also be portable.

2 Design and Implementation Constraints

2.1 Use case diagram

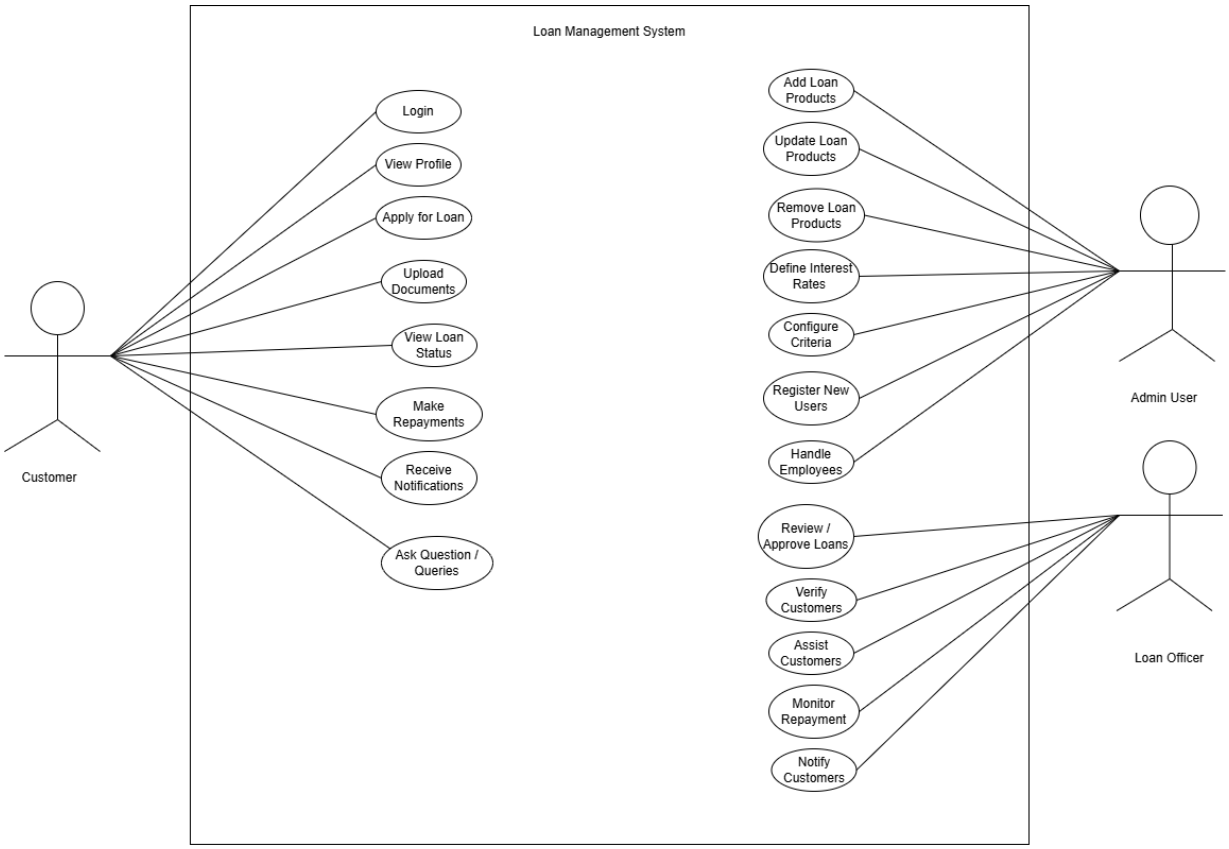

Figure 2.1-1 Use case diagram for loan management system

2.2 Activity diagram and Swimlane diagram

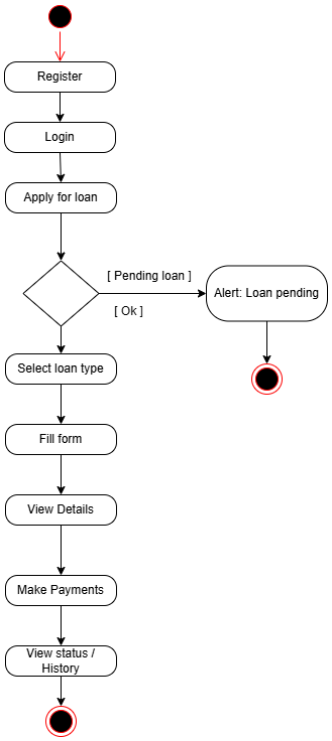

Figure 2.2-1 Activity diagram for taking loan

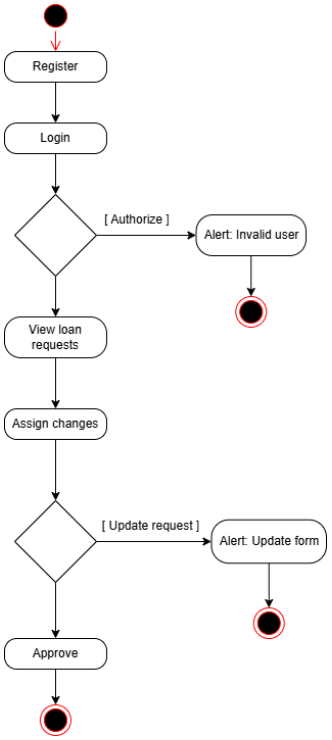

Figure 2.2-2 Activity diagram for approving loan

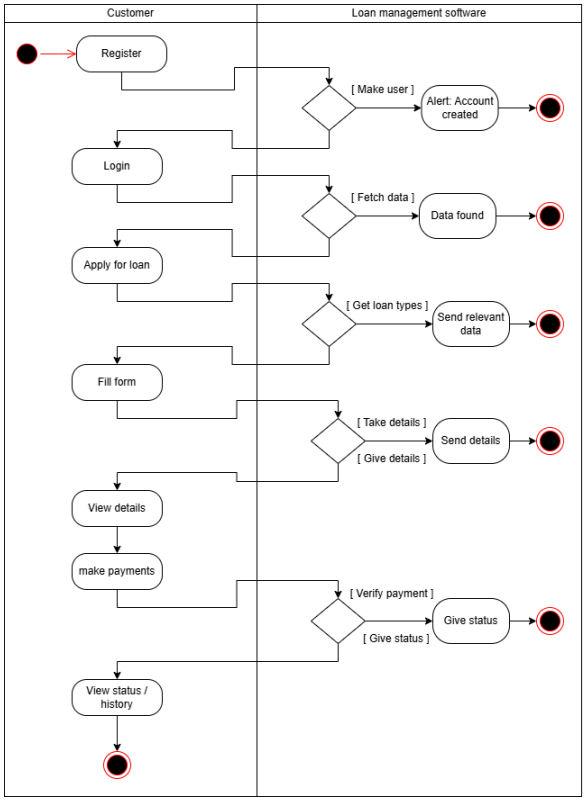

Figure 2.2-3 Swimlane diagram for taking loan

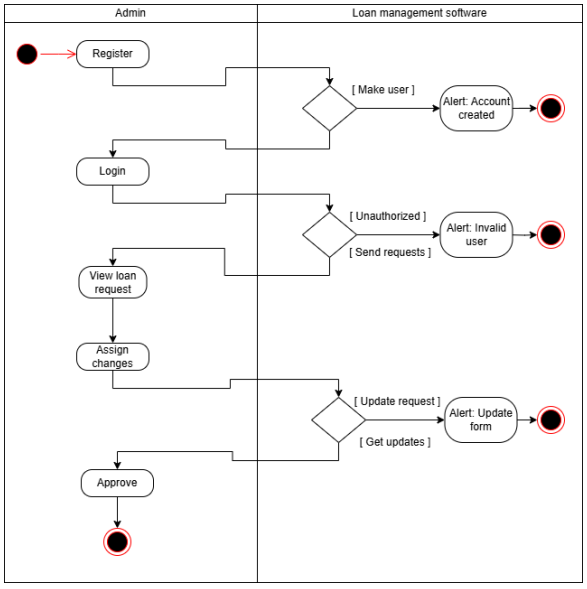

Figure 2.2-4 Swimlane diagram for approving loan

2.3 Sequence diagram

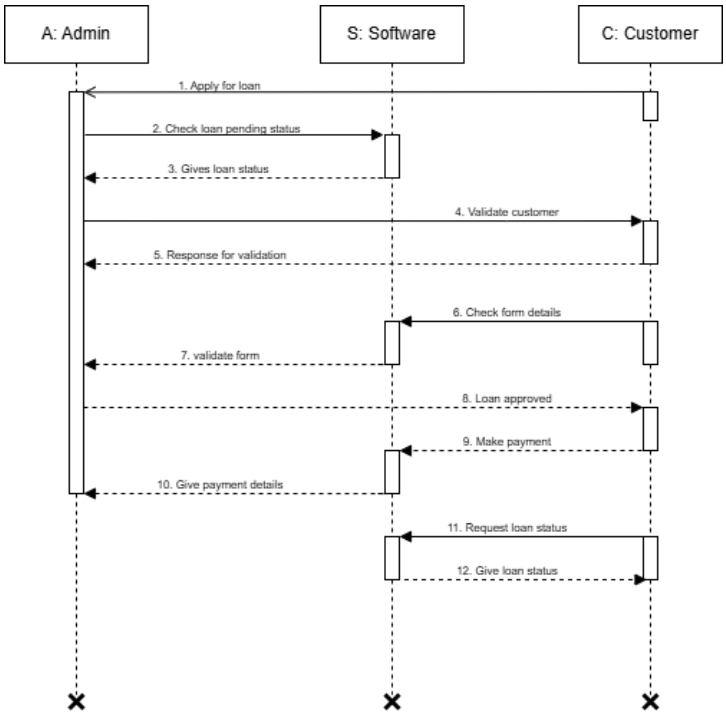

Figure 2.3-1 Sequence diagram for taking loan

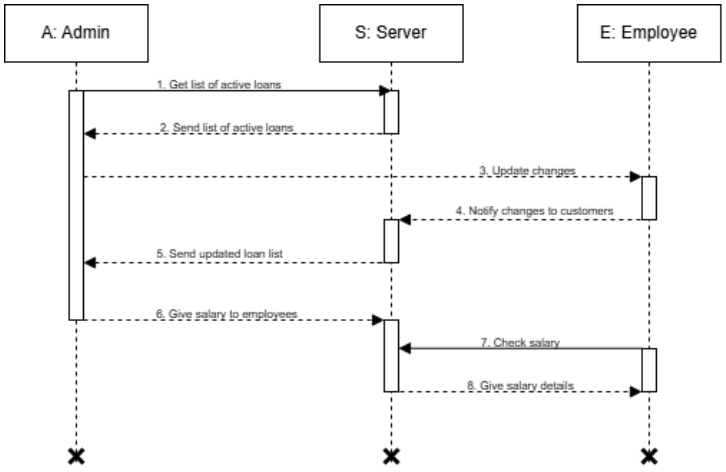

Figure 2.3-2 Sequence diagram for admin user

2.4 State diagram

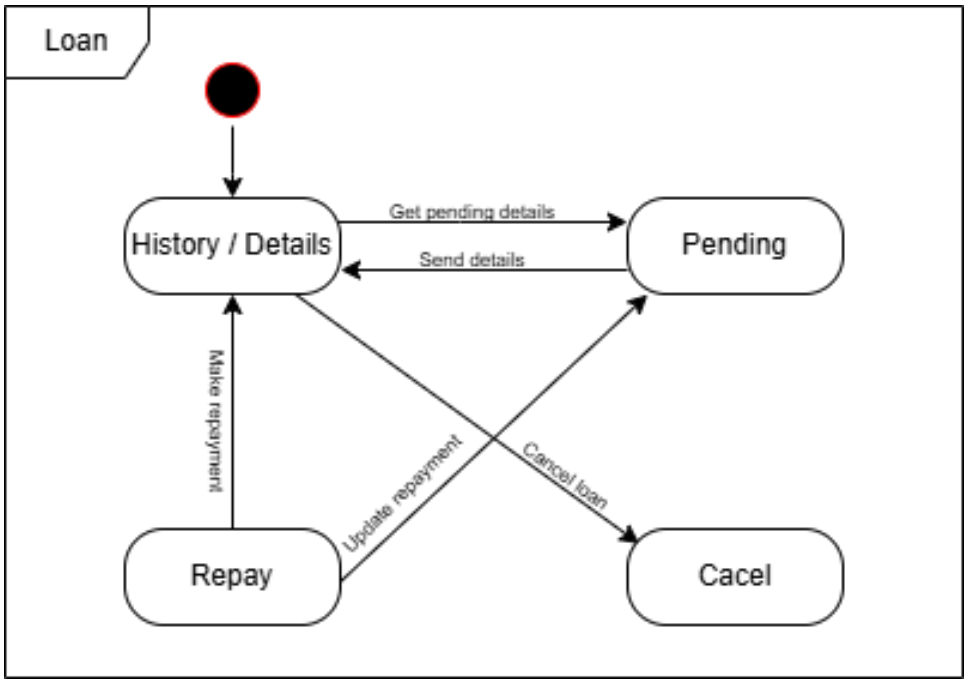

Figure 2.4-1 State diagram for loan

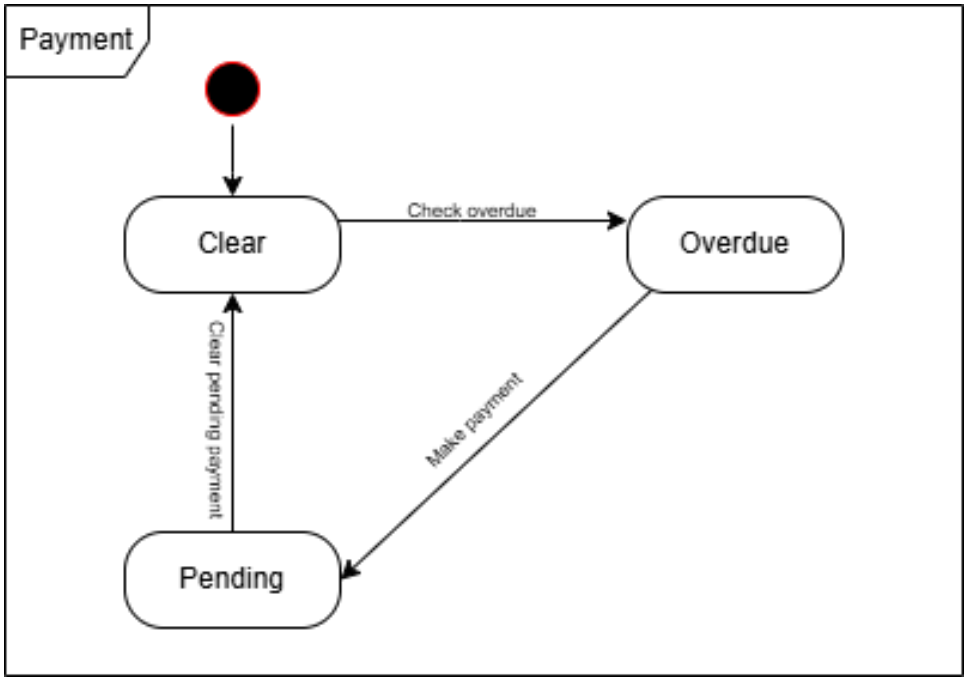

Figure 2.4-2 State diagram for payment

2.5 Class diagram

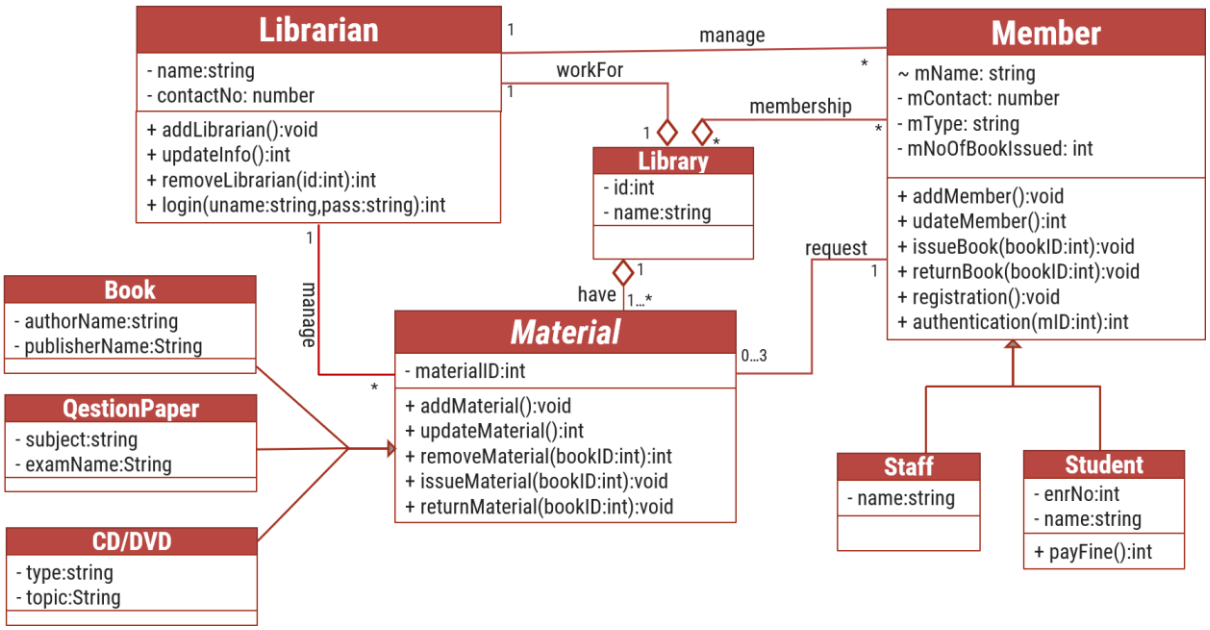

Figure 2.5-1 Class diagram for Library management system

2.6 Data flow diagram

2.6.1 Context diagram (level-0)

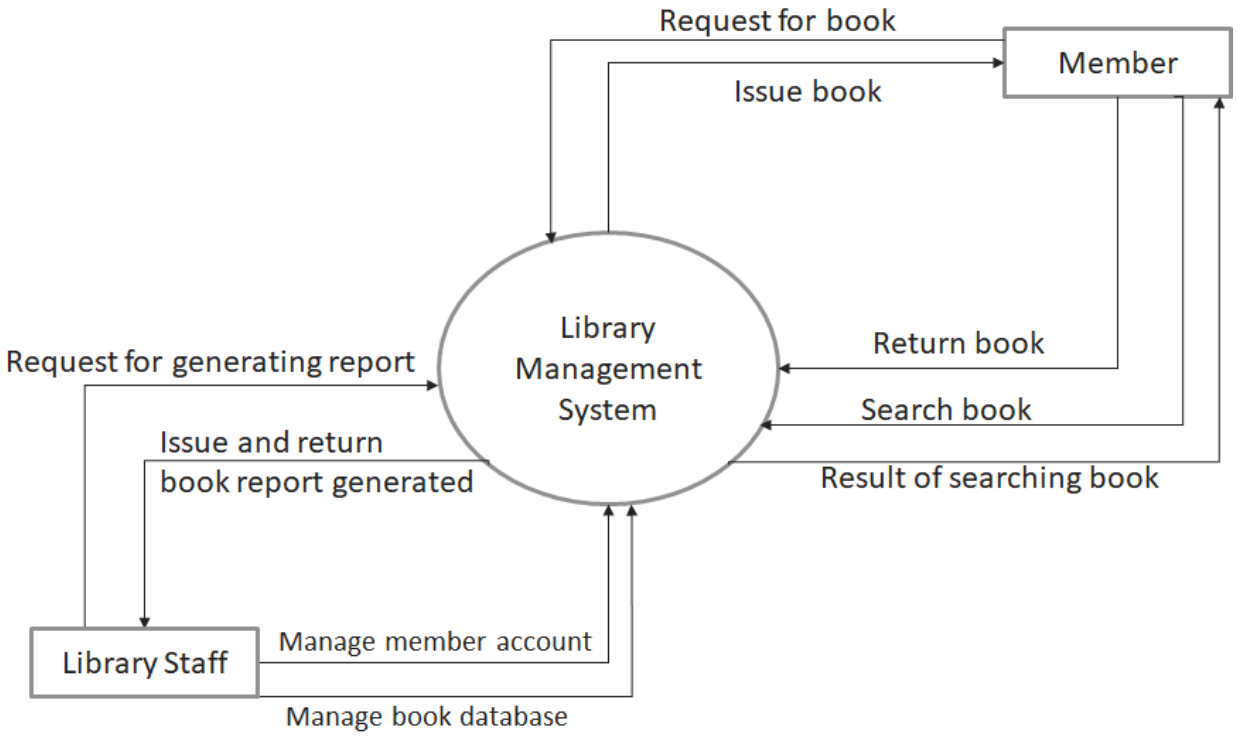

Figure 2.6-1 Context diagram for Library management system

2.6.2 DFD Level-1

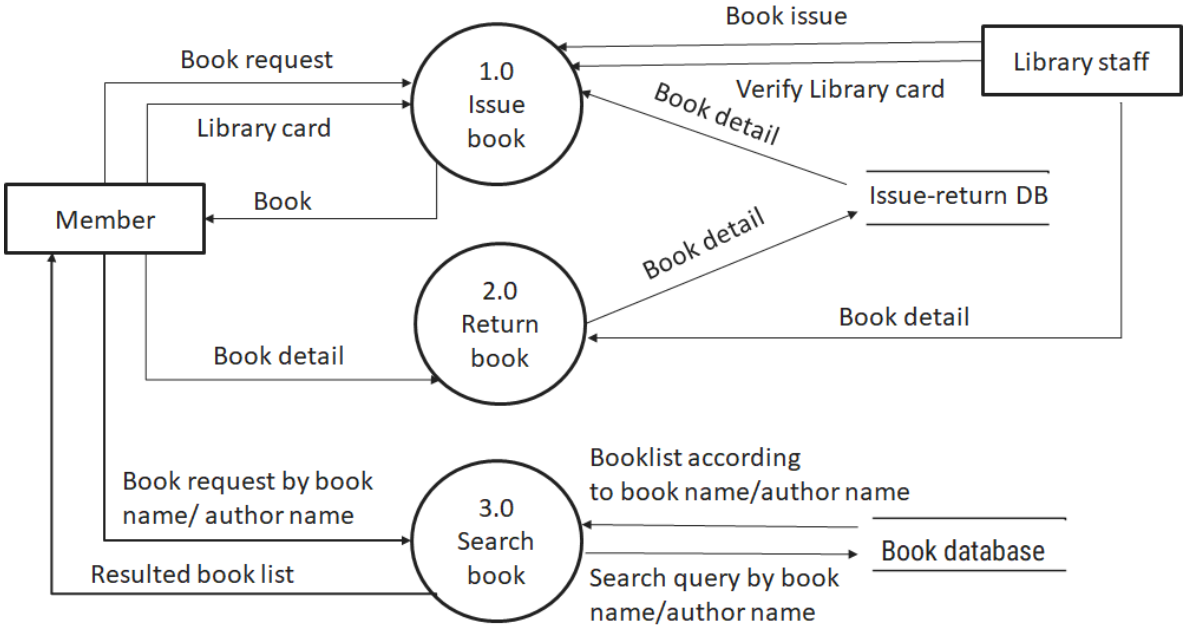

Figure 2.6-2 DFD level-1 for Library management system

2.6.3 DFD Level-2

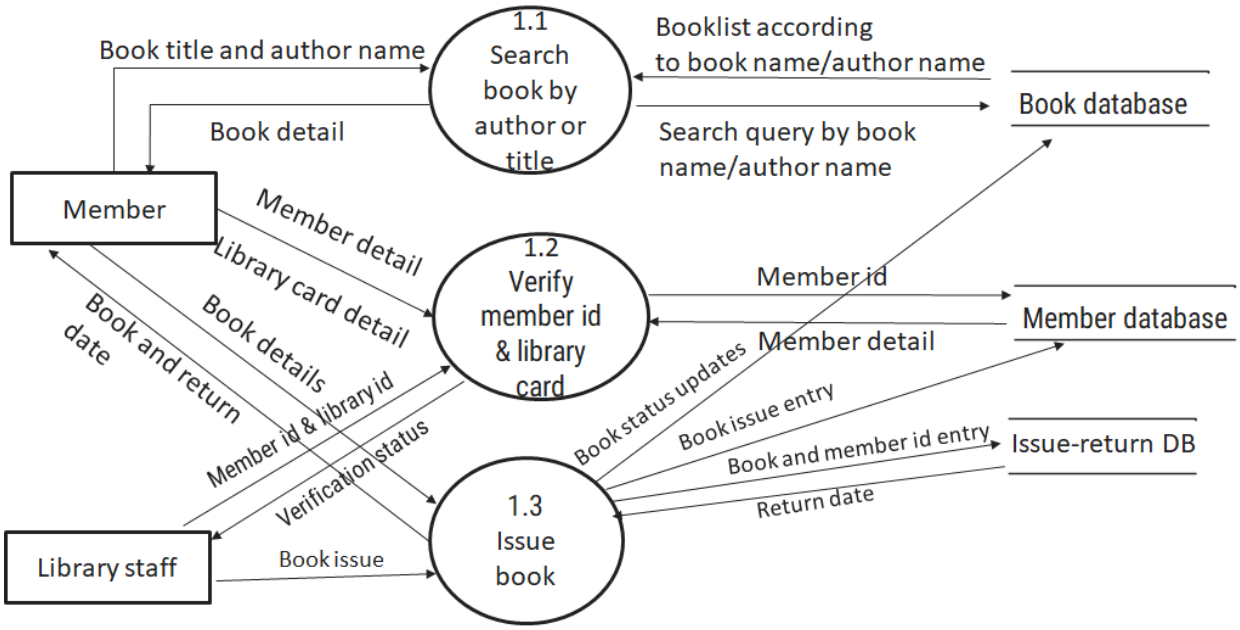

Figure 2.6-3 DFD level-2 for Issue book

3 External interface requirement (Screens)

3.1 Screen-1: Registration Form

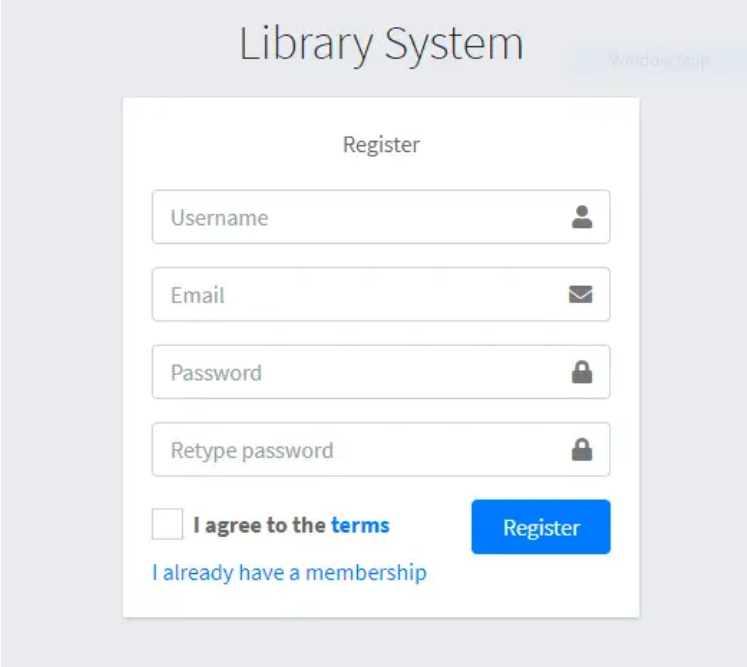

Figure 3.1-1 Screen-1: Registration Form

Purpose: This form will allow the target end-users to register in the system. To register , the following information will be encoded in the system.

Table 3.1-1 Screen element of Registration form

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Username	Textbox	M	1	Username field should be editable and accept the Username.
2	Email	Textbox	M	1	Email field should be editable and accept the email with proper format.
3	Password	Password	M	1	Password field should be editable and accept the password and display as star or dot.
4	Retype password	Password	M	1	Retype Password field should be editable and accept the password and display as star or dot.
5	I agree to the terms	Checkbox	M	1	Checkbox for accepting terms and condition.
6	I already have a membership	Link	------	------	Link for navigate to login page for registered user.
7	Register	Button	------	------	Register is a button for store the entered data into database.

3.2 Screen-2: Login Form

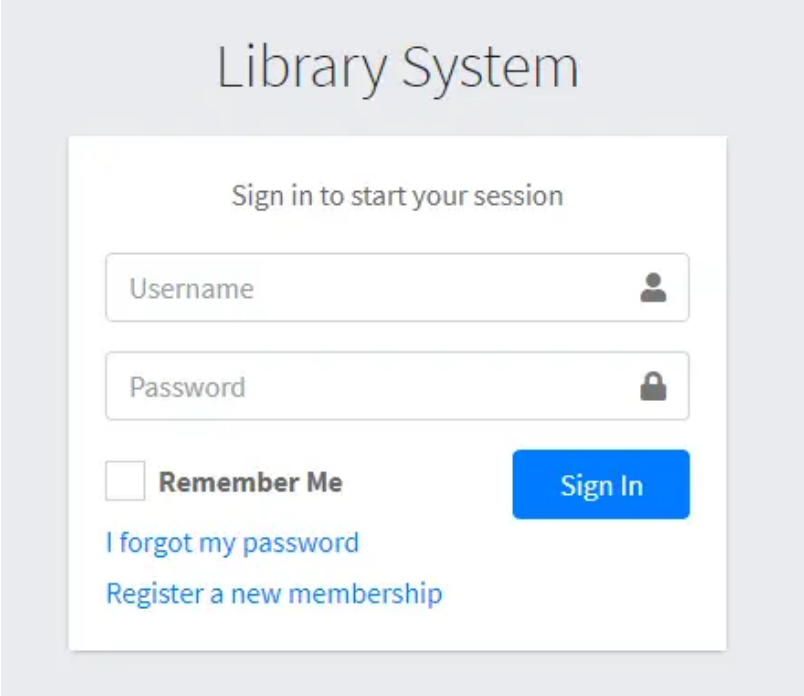

Figure 3.2-1 Screen-2: Login Form

Purpose: This form will be used by the system's users to access records and features of the system. The users will input the correct combination of their username and password to be able to login to the system.

Table 3.2-1 Screen element of Login form

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Username	Textbox	M	1	Username field should be editable and accept the Username.
2	Password	Password	M	1	Password field should be editable and accept the password and display as star or dot.
3	Remember Me	Checkbox	M	1	Saving login credentials through remember me checkbox
4	I forgot my password	Link	------	------	Link for navigate to Forgot password page for allows users to recover password.
5	Register a new membership	Link	------	------	Link for navigate to membership registration.
6	Sign in	Button	------	------	Login button navigates to another page even if valid login credentials.

3.3 Screen-3: Add borrower book

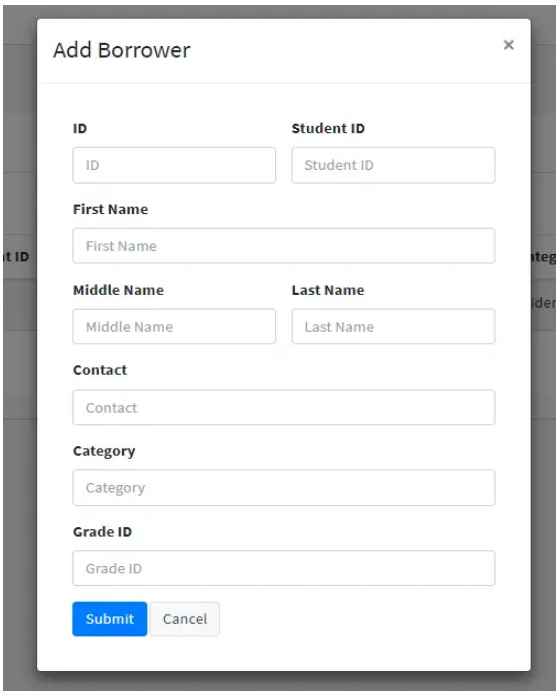

Figure 3.3-1 Screen-3: Add borrower book

Purpose: This module will allow the system administrator to add, edit, update or delete borrowers of book. The admin can add borrower information and manage it.

Table 3.3-1 Screen element of Add borrower book

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Borrower ID	Textbox	M	1	Borrower ID field should be editable and fill autogenerated Borrower ID.
2	Student ID	Textbox	M	1	Student ID field should be editable and accept Student barcode id.
3	First Name	Textbox	M	1	First Name field should be editable and accept only string as a borrower first name.
4	Middle Name	Textbox	O	1	Middle Name field should be editable and accept only string as a borrower middle name.
5	Last Name	Textbox	M	1	Last Name field should be editable and accept only string as a borrower last name.
6	Contact	Textbox	M	1	Contact field should be editable and accept only 10-digit mobile number.
7	Grade Id	Textbox	O	1	Auto fetch detail from the database if proper student id is entered.
8	Submit	Button	-----	-----	Submit is a button for store the entered data into database.
9	Cancel	Button	-----	-----	Cancel is a button for close add borrower dialog.

4 Database design

4.1 List of Tables

- Book
- Borrower
- Student
- Staff

Table 4.1-1 Table: Book

Column	Data Type	Null	Keys & Constrains	Default Value & Description
BookID	int	NN	PK (Auto Increment)	
BookName	varchar(100)	NN		
ISBN	varchar(100)	AN		
Publication_year	int	AN		
Language	varchar(50)	AN		

Table 4.1-2 Table: Borrower

Column	Data Type	Null	Keys & Constrains	Default Value & Description
BorrowerID	int	NN	PK (Auto Increment)	
BookID	varchar(100)	NN	FK	Reference of Book Table
BorrowedFromDate	DateTime	AN		
BorrowedToDate	DateTime	AN		
ActualReturnDate	DateTime	AN		
IssuedBy	int	NN	FK	Reference of Student and Staff Table

Table 4.1-3 Table: Staff

Column	Data Type	Null	Keys & Constrains	Default Value & Description
StaffID	int	NN	PK (Auto Increment)	
StaffName	varchar(100)	AN		
IsAdmin	Boolean	AN		
Designation	varchar(100)	AN		

Table 4.1-4 Table: Student

Column	Data Type	Null	Keys & Constrains	Default Value & Description
StudentID	int	NN	PK (Auto Increment)	
StudentName	varchar(100)	AN		
Gender	varchar(100)	AN		
DOB	DateTime	AN		
Department	varchar(100)	AN		
Contact	number(10,0)	AN		

5 Stories and Scenario

5.1 Story-1: Add New Book in Library Catalogue

*Story # **S1***	:	**As a** Librarian, **I want to** add a new book in library catalogue **So that** everyone can easily find and borrow it.
Priority	:	High
Estimate	:	XL
Reason	:	The addition of a new book to the library catalogue is crucial for ensuring that the library's collection is up-to-date and accessible to everyone.

5.1.1 Scenario# S1.1

*Scenario# **S1.1***	:	Adding a New Book with Valid Information
Prerequisite	:	Librarian is logged in to the Library management system.
Acceptance Criteria	:	**Given:** The Librarian is navigated to the library catalog management page. Valid book information, including title, author, ISBN, and other relevant details is added. **When:** The librarian selects the "Add New Book" option And The librarian enters valid book details The librarian clicks the "Save" button to add the book to the catalog. **Then t**he system successfully adds the book to the catalog and the librarian receives a confirmation message with the book's identification number.

5.1.2 Scenario# S1.2

*Scenario# **S1.2***	:	Adding a New Book with Invalid Information.
Prerequisite	:	The librarian is logged into the library management system.
Acceptance Criteria	:	**Given:** The librarian is on the library catalogue management page **When:** The librarian selects the "Add New Book" option and the librarian enters an incomplete or incorrect book details and librarian clicks the "Save" button to add the book to the catalogue. **Then t**he system displays error messages for the incorrect or missing information and the book is not added to the catalogue.

5.1.3 Scenario# S1.3

*Scenario# **S1.3***	:	Attempting to Add a Duplicate Book
Prerequisite	:	The librarian is logged into the library management system and the librarian is on the library catalogue management page
Acceptance Criteria	:	**Given**: The book information, including title, author, ISBN, and other relevant details, is available and the book with the same ISBN is already in the catalogue. **When**: User Clicks on “Add book” button. Enter a number of copies with the same book detail mentioned in the field.

	Then: Generate unique book id, barcode and spine label for various book of same title.

5.2 Story-2: Search Book

*Story # **S2***	:	**As a** Librarian or member, **I want to** search for books by title, author, or keyword, **So that** I can quickly find books that match my interests.
Priority	:	High
Estimate	:	M
Reason	:	Implementing a search functionality is essential for enhancing the user experience, as it allows librarian and member to efficiently discover and access the library's resources.

5.3 Story-3: Manage due date for borrowed book

*Story # **S3***	:	**As** Librarian, **I want** to manage due dates for borrowed books **So that** I can ensure that books are returned on time and avoid overdue fines.
Priority	:	High
Estimate	:	M
Reason	:	Proper due date management is crucial for maintaining the library's collection and ensuring that books are available for all members.

5.4 Story-4: Renew book

*Story # **S3***	:	**As** Librarian, **I want** to renew a book that I have borrowed **So that** I can extend my borrowing period if needed.
Priority	:	Medium
Estimate	:	M
Reason	:	Book renewal functionality is a convenience feature for librarian, allowing them to keep a book for an extended period if no one else has requested it.

5.5 Story-5: Generate a report on book usage and availability

*Story # **S3***	:	**As** Librarian, **I want** to generate reports on library usage and book availability **So that** I can make informed decisions about library's books.
Priority	:	Medium
Estimate	:	L
Reason	:	Reporting functionality helps librarians track the usage of library resources and make data-driven decisions to improve services and collections.

6 Test cases

Project Name:	**EMI Calculator**	**Test Designed by:**	**P. U. Jadeja**
Module Name:	**Login**	**Test Designed date:**	01-10-2023
Release Version:	**1.0**	**Test Executed by:**	**R. B. Gondaliya**
		Test Execution date:	15-01-2023

Pre-condition: **Web application should be accessible**				
Test Case ID	**Test Title**	**Test Type**	**Description**	**Test Case ID**
TC_001	Login to web application with valid credential	Functional	Login to Library management system web application through valid credential	TC_001
TC_002	Login to web application with invalid credential	Functional	Login to Library management system web application through invalid credential	TC_002
TC_003	Varify login page elements	GUI	varify that all elements are availabe on login page	TC_003

Test Case Title	Login to web application with valid credential
Test Type	Functional
Test Priority	High
Pre-condition	Web application should be accessible

Test Step	Test Case Description	Expected Result	Actual Result	Status	Comment	Data	BUG ID
1	Access Web application URL	The site launched properly	Site launched successfully	Pass		https://accounts.google.com/ServiceLogin	
2	Enter valid Username in username field	Username field should be editable and accept the Username	Username input accepted	Pass		Username: Rbgondaliya@gmail.com	
3	Enter valid Password in Password field	Password field should be editable and accept the password and display as star or dot	Password input displayed in dot and accepted	pass		Password: rbgondaliya	
4	Enter valid captcha code in captch field	Captch field should editable and accept captcha and captcha is case sensitive	Captcha input accepted	Pass	Step required when human action validation	get captcha from image which is near by captcha field	

					perfor m		
5	Click on login button	User should login into site and navigated to dashboard	User navigated to dashboard and username should br display in top of the right side.	pass			

Test Case Title	Login to web application with invalid credential
Test Type	Functional
Test Priority	Medium
Pre-condition	Web application should be accessible

Test Step	Test Case Description	Expected Result	Actual Result	Status	Comment	Data	Bug ID
1	Verify that User is not able to Login with invalid Username and invalid Password	Should be display an error message enter wrong username or password	Display an error of wrong username and password	Pass			
2	Verify that User is not able to Login with Valid Username and invalid Password	Should be display an error message enter wrong password	Display an error of wrong password	Pass			
3	Verify that User is not able to Login with	Should be display an error message	Display an error Username not found	Pass			

	invalid Username and Valid Password	User not found					
4	Verify that User is not able to Login with blank Username or Password	Set required field validation message for Username and Password	Display an error of wrong username and password	Fail	Not performa a validation function fix it		Bug_002

Test Case Title	Varify login page elements
Test Type	GUI
Test Priority	Medium
Pre-condition	Web application should be accessible

Test Step	Test Case Description	Expected Result	Actual Result	Status	Comment	Data	Bug ID
1	Launch application with the given url	The site launched properly	Site launched successfully	Pass		https://accounts.google.com/ServiceLogin	
2	Verify that the login screen contains elements such as Username, Password, Sign in button, Remember password check box, Forgot password link, and Create an account link.	All listed control displayed properly on the page	Login page loaded successfully	Pass			

3	Verify that cursor is focused on "Username" text box on the page load	Cursor is focused in Username textbox	Cursor focus in Username textbox	Pass			
4	Verify that tab functionality is working properly or not	When tab pressed cursor move in next control	Cursor moving in next control	Pass			
5	Verify that all the fields such as Username, Password has a valid placeholder	All text fields have proper placeholder	All text fields have proper placeholder	Pass			
6	Verify that the labels float upward when the text field is in focus or filled (In case of floating label)	When field is focused or filled, label display on top of the filled	When field is focus or filled, label display on top of the filled	Pass	step required when fields with floating label		
7	verify that forgot password link working properly	when click on forgot password load forgot passworg page	forgot password link not working	Fail			

7 References

- http://www.w3schools.com/html/html_intro.asp
- https://www.w3schools.com/php/default.asp
- https://www.javatpoint.com/uml