LAB REPORT

Submitted by

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Under the Guidance of

Dr. Gouthaman. P

Assistant Professor, Department of Networking and Communications

In partial satisfaction of the requirements for the degree of

BACHELOR OF TECHNOLOGY
in
COMPUTER SCIENCE AND ENGINEERING

with specialization in Internet of Things

SCHOOL OF COMPUTING

COLLEGE OF ENGINEERING AND TECHNOLOGY SRM

INSTITUTE OF SCIENCE AND TECHNOLOGY

KATTANKULATHUR - 603203

MAY 2023

COLLEGE OF ENGINEERING & TECHNOLOGY SRM
INSTITUTE OF SCIENCE & TECHNOLOGY

S.R.M. NAGAR, KATTANKULATHUE – 603 203

Chengalpattu District

BONAFIDE CERTIFICATE

Register No. _____RA2111032010006_____ Certified to be the

bonafide work done by _____Shaurya Singh Srinet_____ of II Year/IV Sem

B. Tech Degree Course in the **Practical Course – 18CSC206J - Software Engineering and**

Project Management in **SRM INSTITUTE OF SCIENCE AND TECHNOLOGY,**

Kattankulathur during the academic year 2022 – 2023.

SIGNATURE   **SIGNATURE**

Faculty In-Charge   **HEAD OF THE DEPARTMENT**
Dr. Gouthaman. P   **Dr. Annapurani Panaiyappan. K**
Assistant Professor   Professor and Head,
Department of Networking and Communications   Department of Networking and Communications
SRM Institute of Science and Technology   SRM Institute of Science and Technology

ABSTRACT

The management of book libraries in large organizations and companies is a complex and challenging task that requires an efficient and secure system. The current process of managing libraries often lacks efficiency, accuracy, and security, which can lead to data inconsistency and integrity issues. Therefore, this report presents the development of a Library Management System designed to automate the processes involved in managing a library and enhance the user experience.

The proposed system provides a basic set of features that enable librarians to add/update members, add/update books, and manage check-ins. Additionally, the system maintains records of issued books, late fines for students who return books after the due date, and stock availability in the library. The development of the system includes establishing and maintaining a back-end database and front-end application development aspects that ensure strong data security and good libraries.

The system's design aims to enhance the user experience by providing a fully functional and easy-to-use application. The system allows librarians to retrieve details of books available in the library, issue books to students, and maintain their records. The proposed system provides an efficient and secure way to manage book libraries in large organizations and companies.

Overall, the development of this Library Management System provides an opportunity for organizations to streamline their library management processes, reduce the risk of data inconsistency and integrity issues, and improve the user experience. The proposed system can be further improved and customized based on the client's specific requirements and can serve as a model for future library management systems.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

NO	WORD	ABBREVIATION
1	TSV	TREE STRUCTURE VIEW
2	WBS	WORK BREAKDOWN STRUCTURE
3	ER	ENTITY RELATION
4	DFD	DATA FLOW DIAGRAM
5	UI	USER INTERFACE
6	SWOT	STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS
7	RMMM	RISK MITIGATION, MONITORING AND MANAGEMENT

School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	1
Title of Experiment	To identify the Software Project, Create Business Case, Arrive at a Problem Statement
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	20.01.23

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To Frame a project team, analyze, and identify a Software project. To create a business case and Arrive at a Problem Statement for the Library Management System

Team Members:

S. No	Register No	Name	Role
1	RA2111032010006	Shaurya Srinet	Lead/Rep
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Project Title: Library Management System

Project Description:

Usually, large companies and organizations have a vast army of human resources working under them. The Library Management System is an application for assisting a librarian in managing a book library in a university. The system would provide a basic set of features to add/update members, add/update books, and manage check in specifications for the systems based on the client's statement of need. Its Development includes the establishment and maintenance of back-end database and front-end application development aspects. For the former require the establishment of data consistency and integrity of the strong data security and good libraries. As for the latter requires the application fully functional, easy to use and so on. This project aims to build a Library Management System which mainly focuses on basic operations in a library like adding new books, and updating new information, searching books and members, and returning books. We can enter the record of new books and retrieve the details of books available in the library. We can issue the books to the students and maintain their records and can also check how many books are issued and stock available in the library. In this project we can maintain the late fine of students who return the issued books after the due date.

Business Case

The Project:

- The Library Management System aims to streamline the administration system in a Library.
- It provides an interface which provides easy and concise access to the management of a library.
- Work can be done by a very small number of people.
- This project can free up manual labor costs which in turn can be used to implement additional value-added services.

The History:

- In managing a library and its records, excess of physical records which must be stored which takes up space and time.
- The greater amount of funds has been put to the labour in managing the library.
- False return and borrow claims are being forged in various cases.
- Automating the management can help streamline the process safely and securely.

Limitations:

- High end encryptions not used so it can be hacked.
- Multi-Platform usage may be limited.
- Takes time to be integrated into the workflow of the company.
- User level restrictions are very lenient.

Approach:

- The management system can ensure efficient access to information which is imperative for businesses.
- It can facilitate continued professional development and self-lead training.
- Very easy to learn which anyone in staff can make use of it without prior knowledge.
- Electronic information is easier to search through than physical texts.
- Ability to add on additional services if needed.

Benefits:

- The borrower details are stored & maintained.
- It is easy to do library audits any time as records are maintained by the highly efficient software which is easy to access.
- It is simple to maximize performance of the libraries with the dynamic reports, graphs, and charts to review or track progress for better decision-making.
- Such systems are often updated & maintained just to ensure that user databases are confidential and secure at every time.
- The automated system allows flexible information access.
- It also allows the users to access information both offline and online even on their mobile phones.

Result:

Thus, the project team formed, the project is described, the business case was prepared, and the problem statement was arrived.

School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	2
Title of Experiment	Identification of Process Methodology and Stakeholder Description
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	31.01.23

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To identify the appropriate Process Model for the project and prepare Stakeholder and User Description.

Team Members:

Sl No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Rep/Member
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Project Title: Library Management System

Waterfall Methodology

Definition of objectives:
a) To build a system that can receive input and generate automatically output in easy way and short time.
b) To build a monitoring system that can monitor and manage all library operations efficiently.
c) Give an opportunity to librarians to reduce mistakes that always happen during manual method.
d) To store properly the library items to maintain their security.
e) To enter and preserve details of the various issues and keep a track on their returns.

Specifications of requirements:
In this step, there are two main operations: problem comprehension or review and definition of specifications. The goal of problem analysis is to consider the issue and its context, as well as the specifications of the new method to be created. The specifications must be defined in the requirement specification document until the issue is evaluated and the fundamentals understood. Both technical and performance specifications must be defined in the requirements document, the formats of inputs and outputs etc.

System selection:
A library management system is an example of an information system. An information system, whether it is computerised or not, is a system that represents objects in a physical system, for example, information resources in a library collection.

System implementation:
The process starts with the entities involved in the system, with proceeding towards the ER Diagram to identify the meaningful relationship between the entities. Next is the table design which fulfils the normalization principle of relational database systems and finally the physical tables are created with the necessary and relevant data in them.

System evaluation:
- The way the management structure functions.
- Internal operations relating to information materials, such as cataloguing and classification, indexing, etc.
- Library/information services to users.
- New programmes of service delivery.

User Stories:
- As a librarian, I want to be able to store the data of the students who come and issue a book from the library.
- As a developer, I want to be able to find and display topic specific resources so that I can customize a topic based on the library web site.
- As a student, I want to be able to quickly browse through the website so that I can find books related to my topic with minimal time investment.
- As a student, I want to be able to find different genres of books so that l can pick books of my interest.
- As a teacher, I want to be able to find books related to my course so that l can use that as a reference and to make notes for the students.

Information table regarding stakeholders of the project:

Stakeholder Name	Interest	Influence	Priority (High/ Medium/ Low)
Library Owner	Achieve targets, overseeing the daily operations of a library at the public or private level.	High	1
Library Manager	Responsible for the daily operations of a library at the public or private level.	High	3
Cataloguing Librarian	Provide continuous cataloging training for library staff.	High	6
Acquisition Manager	Responsible for ensuring any acquisition made by your employer is sound and reasonable.	High	4
Finance Manager	Oversee the financial health of the organization.	High	5
Library Consultant	Consult on automated services with member libraries in the System.	Low	7
Funders	Organizing fundraising events and working with volunteers. Writing funding proposals and sending these to potential sponsors.	High	2
Students	Opportunities to check on books, conduct their research work and provides feedback.	Low	9
Teachers	Conduct their research work, teaching materials and provide feedback.	Low	8

Result:
Thus, the Project Methodology was identified, and the stakeholders were described.

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SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	3
Title of Experiment	System, Functional and Non-Functional Requirements of the Project
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	7.2.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim

To identify the system, functional and non-functional requirements for the project.

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Rep/Member
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Project Title: Library Management System

System Requirements:

Requirement (#)	Requirement Specification	Department	Name of Business User / Project Team Member	Status
IR1	Development Machine with 6 GB Ram and 4 Cores	Technical Team	Shaurya Singh Srinet	Team Lead
IR2	Code Repository	Technical Team	Parth Galhotra	Team Member, Cross Platform
IR3	AWS S3 Bucket	Technical Team	Shounak Chandra	Team Member, Data Analytics
IR4	IDE – Visual Studio Code	Technical Team	All Members	Technical Team Members

Non-Functional Requirements:

Requirement (#)	Category of NFR	Requirement Specification	Department	Name of Business User	Status
NFR1	Performance	All pages should load within 3 seconds.	Department of Media	Mr. Alok Sharma	Editor in Chief
NFR2	Performance	Search should bring the results less than 7 seconds.	Business Development	Dr. Vivek Bindra	Business Coach
NFR3	Availability	Application should be available for 24x7.	Medical Consultancy	G.N.S Krishna Murthi	Medical Representative
NFR4	Accessibility	Should be easy to use for a 3rd party.	Management	Jivan Anand	Restaurant Owner
NFR5	Scalability	Database should be large enough to support many books.	Tourist	Paul Johnson	Traveller and Photographer
E1NFR1	Security	Should have security to ensure privacy of data.	N/A	Mrs. Das	Housewife

Functional Requirements:

Requirement (#)	Requirement Specification	Department	Name of Business User	Status
E1FR1	The system must be able to add delete and view books we should be able to search book based on book name.	Department of Media	Ms. Ankita Singh	Journalism
E1FR2	System must be able to enter issue information in the database. -System must be able to update number of books.	Resort Management	Mr. Anil Verma	Resort Manager
E1FR3	System should be able to recommend popular books available for purchase	Technical Team, XYZ	XYZ Software Solutions and Consultancy.	SDE 1

Result:

Thus, the requirements were identified and accordingly described.

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	4
Title of Experiment	Prepare Project Plan based on scope, Calculate Project effort based on resources and Job roles and responsibilities
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	09.02.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

  To Prepare Project Plan based on scope, Calculate Project effort based on resources, Find Job roles and responsibilities

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Rep/Member
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Requirements:

1. Project Management Plan:

Focus Area	Details
Integration Management	Governance Framework, Project Team Structure, Roles & Responsibilities of Team, Change Management, (Change Control, Issue Management), Project Closure
Scope Management	Scope Statement, Requirement Management (Gathering, Control, Assumption, Constraint Stakeholder), Define Deliverables, Requirement Change Control, Activities and Sub-Tasks
Cost Management	Estimate Effort, Assign Team, Budget Control
Quality Management	Quality Assurance: Quality assurance will be managed including governance, roles and responsibilities, tools and techniques and reporting Quality Control: Specify the mechanisms to be used to measure and control the quality of the work products
Resource Management	Estimate and manage the need People: People & Skills Required Finance: Budget Required Physical: Facilities, IT Infrastructure
Stakeholder	Identifying, Analyzing, Engaging Stakeholders
Risk Management	Identifying, analyzing, and prioritizing project risks

2. Estimation:

2.1. Effort and Cost Estimation:

Activity Description	Sub-Task	Sub-Task Description	Effort (in hrs)	Cost in INR
Web Application Development	E1R1A1T1	To create desktop level Web Application using Python, Flask and SQL	6-8	SQL dev-100K Frontend-43K Backend-100K
Research and Development	E2R2A2T2	Evaluation of software technology trends and incorporating them with updates and patches	4	For Research - 20K For rolling out patches/updates – 50K
Data Analytics	E3R3A3T3	Administrator of Data, Database Management, Evaluating trends in data	10 with shifts	Data Analyst-100K Data Scientist-90K Database Manager 56K
Help & Support	E4R4A4T4	Customer care	24 with shifts	Customer Care-70K to 80K
Licensing/ Trademarks/ Copyrighting	E5R5A5T5	Database, IDE, Server, Terms, Trademarking, Copyrighting	All time	25K (one time)
Marketing	E6R6A6T6	Advertisements, Public Relations	8-10 On requirement	Manager– 68K Coordinator–50K Assistant–25K
Testers	E7R7A7T7	To test the functionality of the software in expected and unexpected conditions	4	240K (one time)

2.2. Infrastructure/Resource Cost [CapEx]:

Infrastructure Requirement	Qty	Cost per qty	Cost per item
Laptops	3	60,000	1,80,000
Telephones	15	1,500	22,500
PCs	15	80,000	12,00,000
Printers	2	5,000	10,000
Office Rooms (Rent)	5	25,000 per month	1,25,000

2.3. Maintenance and Support Cost [OpEx]:

Category	Details	Qty	Cost per qty per annum	Cost per item
People	Network, DB Admin, Customer support, Developers	4	10,00,000	40,00,000
License	Database, server, Middleware, Government License	3	10,000	30,000
Infrastructures	Server Storage and Network	1	10,000	20,000

3. Project Team Formation:

3.1. Identification Team Members:

Name	Role	Responsibilities
Shaurya Srinet	Project Lead	Design end-to-end architecture, provide training and support, team management, monitoring and controlling
Parth Galhotra	UX Designer	Design overall visual user experience
Parth Galhotra	Frontend Developer	Develop user interface
Shounak Chandra	Backend Developer	Coding and Debugging, UI testing to optimize performance, maintaining database
Shaurya Srinet	Quality Assurance Lead	Come up with questionnaires and surveys, random quality checks
Shounak Chandra	Tester	Perform testing for various test cases, identifying flaws

3.2. Responsibility Assignment Matrix:

RACI Matrix	Team Members			
Activity	Name (BA)	Name (Developer)	Name (Project Manager)	Key Business User
User Requirement Documentation	A	C	I	R
Web Application Development	I	R	A	C
Data Analytics	C	R	A	I
Research and Development	I	R	A	C
Testing	I	R	A	C
Marketing	C	I	A	R

A	Accountable
R	Responsible
C	Consult
I	Inform

Result:

Thus, the Project Plan was documented successfully.

School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	5
Title of Experiment	Prepare Work breakdown structure, Timeline chart, Risk identification table
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	21.02.2023

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To Prepare Work breakdown structure, Timeline chart and Risk identification table

Team Members:

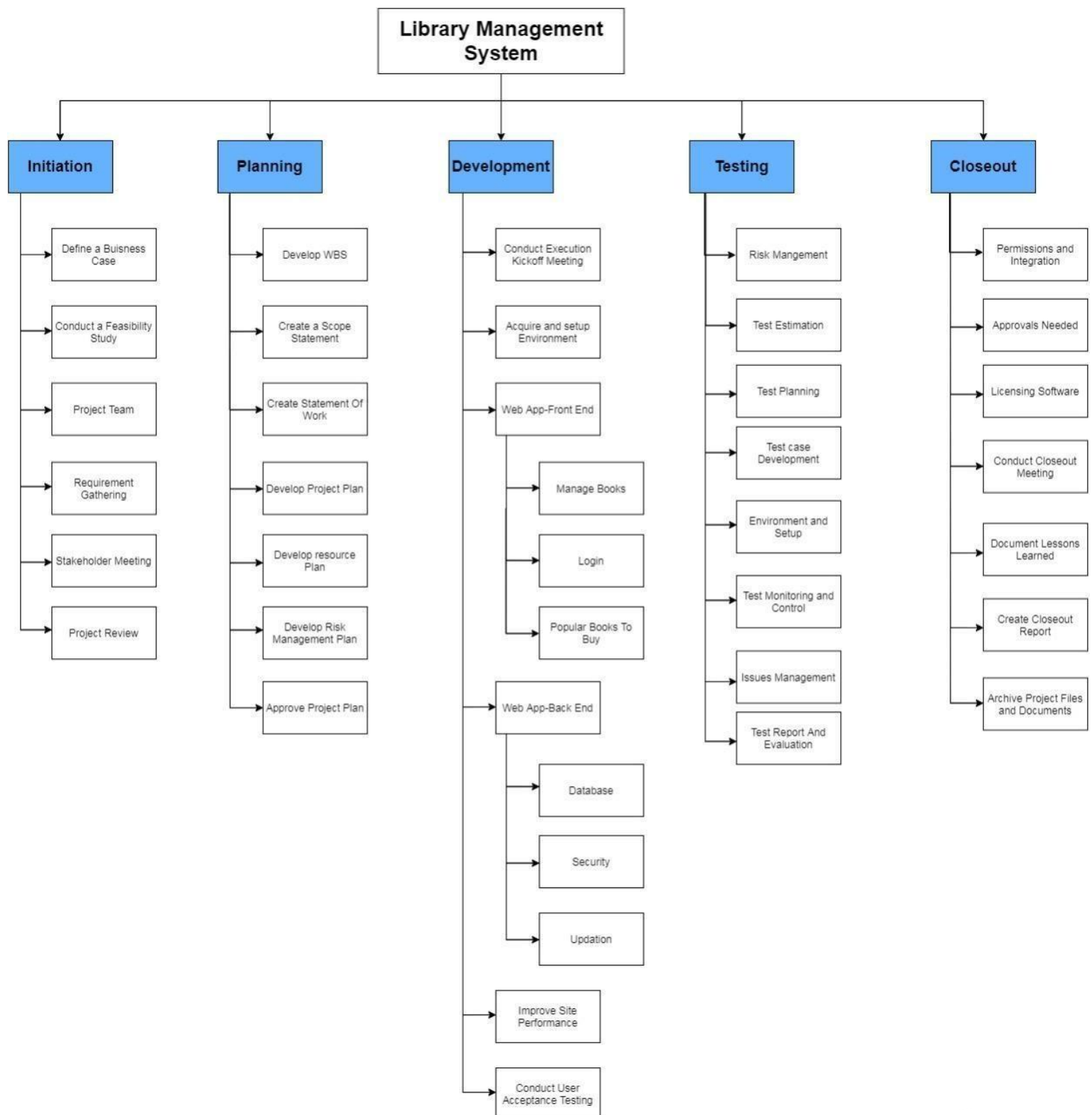| Sl No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Rep/Member
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

WORK BREAKDOWN STRUCTURE:

The WBS is a view into the project that illustrates the work the project encompasses. The Project Manager and project team use the WBS to develop the project schedule, resource requirements, and costs.
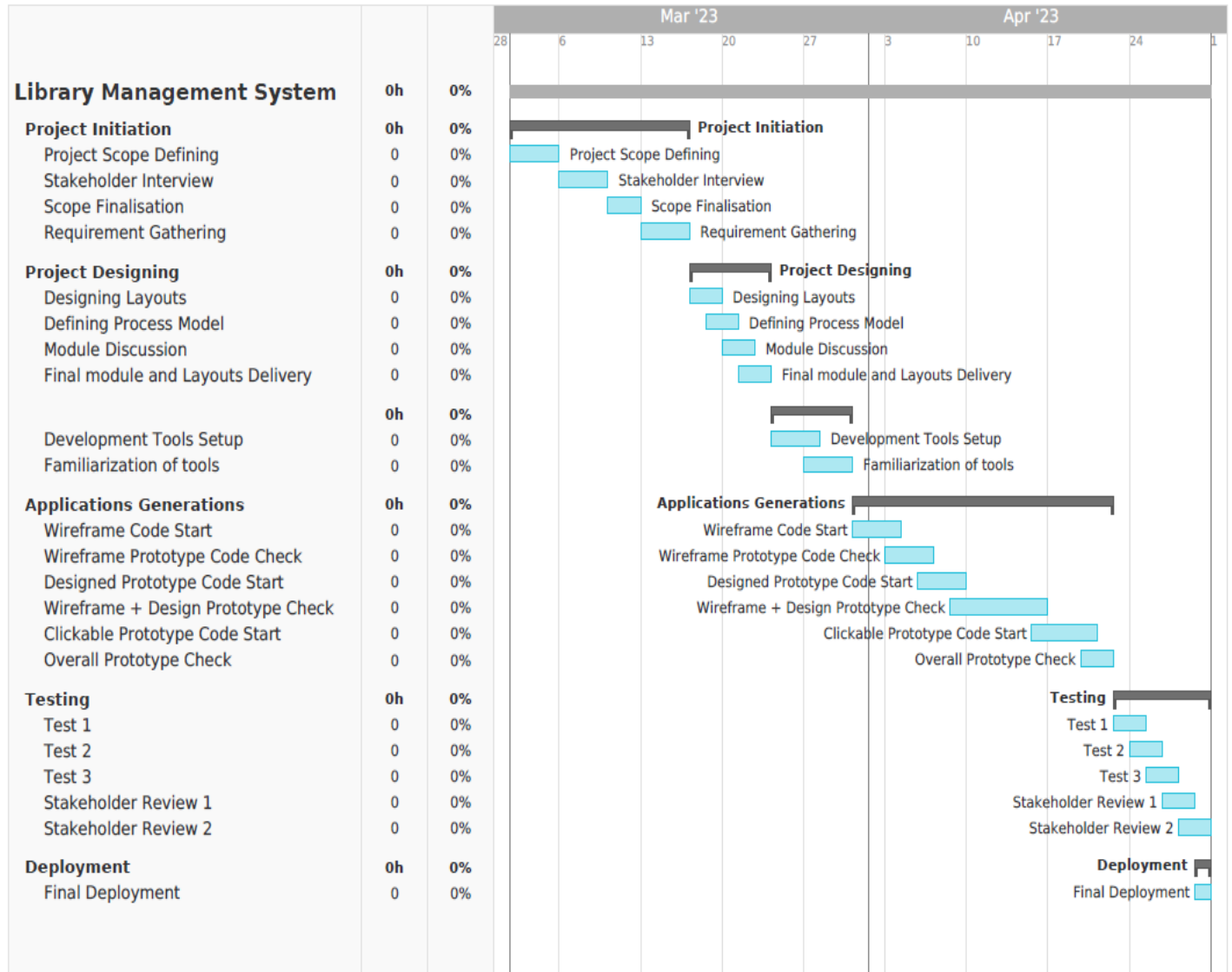
1. Library Management System (Deliverable) scope

1.1. Basic Desktop level Application Frame

1.1.1. Entry Page

1.1.1.1. Login Tab

1.1.1.2. Signup Tab

1.1.1.3. Terms and Conditions Hyperlink

1.1.1.4. Basic Entry Level Support Hyperlink

1.1.2. Home page

1.1.2.1. Dashboard tab

1.1.2.2. Help and Support tab

1.1.2.3. Logout button

1.1.2.4. Credentials tab

1.1.2.5. About Us tab

1.2. Supporting Project scope

1.2.1. Project Management

1.2.2. Security

1.2.3. Software testing

1.2.4. Documentation

TREE STRUCTURE VIEW

The Tree Structure View is the most popular format for the WBS. It presents an easy-to-understand view into the WBS; however, it is also tricky to create without an application specifically designed for creating this organizational chart structure. The Tree Structure below was created using only Microsoft Word and the SmartArt graphics option under the insert menu.

Library Management System

Initiation	Planning	Development	Testing	Closeout
Define a Buisness Case	Develop WBS	Conduct Execution Kickoff Meeting	Risk Mangement	Permissions and Integration
Conduct a Feasibility Study	Create a Scope Statement	Acquire and setup Environment	Test Estimation	Approvals Needed
Project Team	Create Statement Of Work	Web App-Front End	Test Planning	Licensing Software
Requirement Gathering	Develop Project Plan		Test case Development	Conduct Closeout Meeting
Stakeholder Meeting	Develop resource Plan	Manage Books	Environment and Setup	Document Lessons Learned
Project Review	Develop Risk Management Plan	Login	Test Monitoring and Control	Create Closeout Report
	Approve Project Plan	Popular Books To Buy	Issues Management	Archive Project Files and Documents
		Web App-Back End	Test Report And Evaluation	
		Database		
		Security		
		Updation		
		Improve Site Performance		
		Conduct User Acceptance Testing		

TIMELINE – GANTT CHART

teamgantt
Created with Free Edition

			Mar '23	Apr '23
			28 6 13 20 27	3 10 17 24 1
Library Management System	**0h**	**0%**		
Project Initiation	**0h**	**0%**	Project Initiation	
Project Scope Defining	0	0%	Project Scope Defining	
Stakeholder Interview	0	0%	Stakeholder Interview	
Scope Finalisation	0	0%	Scope Finalisation	
Requirement Gathering	0	0%	Requirement Gathering	
Project Designing	**0h**	**0%**	Project Designing	
Designing Layouts	0	0%	Designing Layouts	
Defining Process Model	0	0%	Defining Process Model	
Module Discussion	0	0%	Module Discussion	
Final module and Layouts Delivery	0	0%	Final module and Layouts Delivery	
	0h	**0%**		
Development Tools Setup	0	0%	Development Tools Setup	
Familiarization of tools	0	0%	Familiarization of tools	
Applications Generations	**0h**	**0%**	Applications Generations	
Wireframe Code Start	0	0%	Wireframe Code Start	
Wireframe Prototype Code Check	0	0%	Wireframe Prototype Code Check	
Designed Prototype Code Start	0	0%	Designed Prototype Code Start	
Wireframe + Design Prototype Check	0	0%	Wireframe + Design Prototype Check	
Clickable Prototype Code Start	0	0%	Clickable Prototype Code Start	
Overall Prototype Check	0	0%	Overall Prototype Check	
Testing	**0h**	**0%**		Testing
Test 1	0	0%		Test 1
Test 2	0	0%		Test 2
Test 3	0	0%		Test 3
Stakeholder Review 1	0	0%		Stakeholder Review 1
Stakeholder Review 2	0	0%		Stakeholder Review 2
Deployment	**0h**	**0%**		Deployment
Final Deployment	0	0%		Final Deployment

RISK ANALYSIS – SWOT & RMMM

SWOT Analysis:

Strengths	**Weaknesses**
• Efficient management of library resources • Improved user experience • Automation of library tasks • Accurate reporting	• Initial implementation costs • Technical issues • Dependence on technology • Limited flexibility
Opportunities	**Threats**
• Integration with other systems • Cloud-based systems • Mobile accessibility • E-books and digital media	• Budget constraints • Competition from other libraries • Security threats • Resistance to change

RMMM Risk Table:

The risks are categorized based on their likelihood and potential impact, with high-risk events requiring more attention and mitigation strategies. Mitigation strategies may include regular maintenance and equipment replacement planning, security audits and updates, backup systems in place, staff training on data protection, and contingency plans.

Level of Risk	Description	Likelihood	Impact	RMMM Plan
High	Major security breach	High	High	Regular security audits and updates, encryption of sensitive data, staff training on data protection
Medium	Major equipment Failure	Medium	High	Regular maintenance and equipment replacement planning, backup systems in place, contingency plans
Medium	Loss of library materials	Medium	Medium	Regular inventory checks, security measures to prevent theft, backup copies or digitization of important materials
Low	Staff Shortage	Low	Low	Cross-training of staff, flexible scheduling, recruitment, and retention strategies
Low	Minor equipment failure	Low	Low	Regular maintenance and repair, backup systems in place
Low	Minor security breach	Low	Low	Regular security audits and updates, staff training on data protection

Result:

Thus, the work breakdown structure with timeline chart and risk table were formulated successfully

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	6
Title of Experiment	Design a System Architecture, Use Case and Class Diagram
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	28.2.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To Design a System Architecture, Use case and Class Diagram

Team Members:

S. No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Representative
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

SYSTEM ARCHITECTURE
Architecture of library management system:
Library management system has 4 architectures.
1. Add or create user and book.
2. Delete user or book
3. Update information
4. Search book or user
Basic architecture of a library management system is given below:
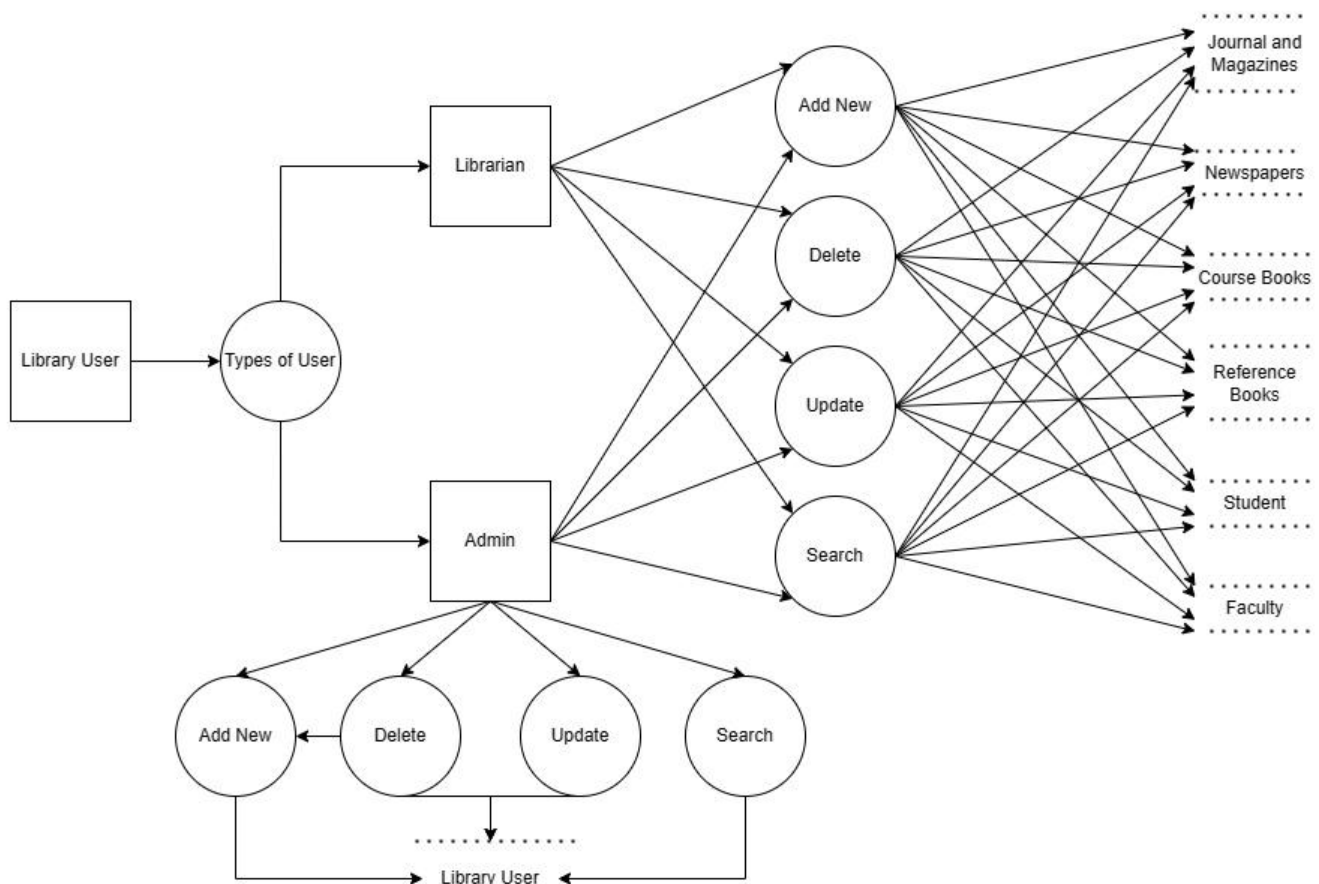
USE CASE DIAGRAM

A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.
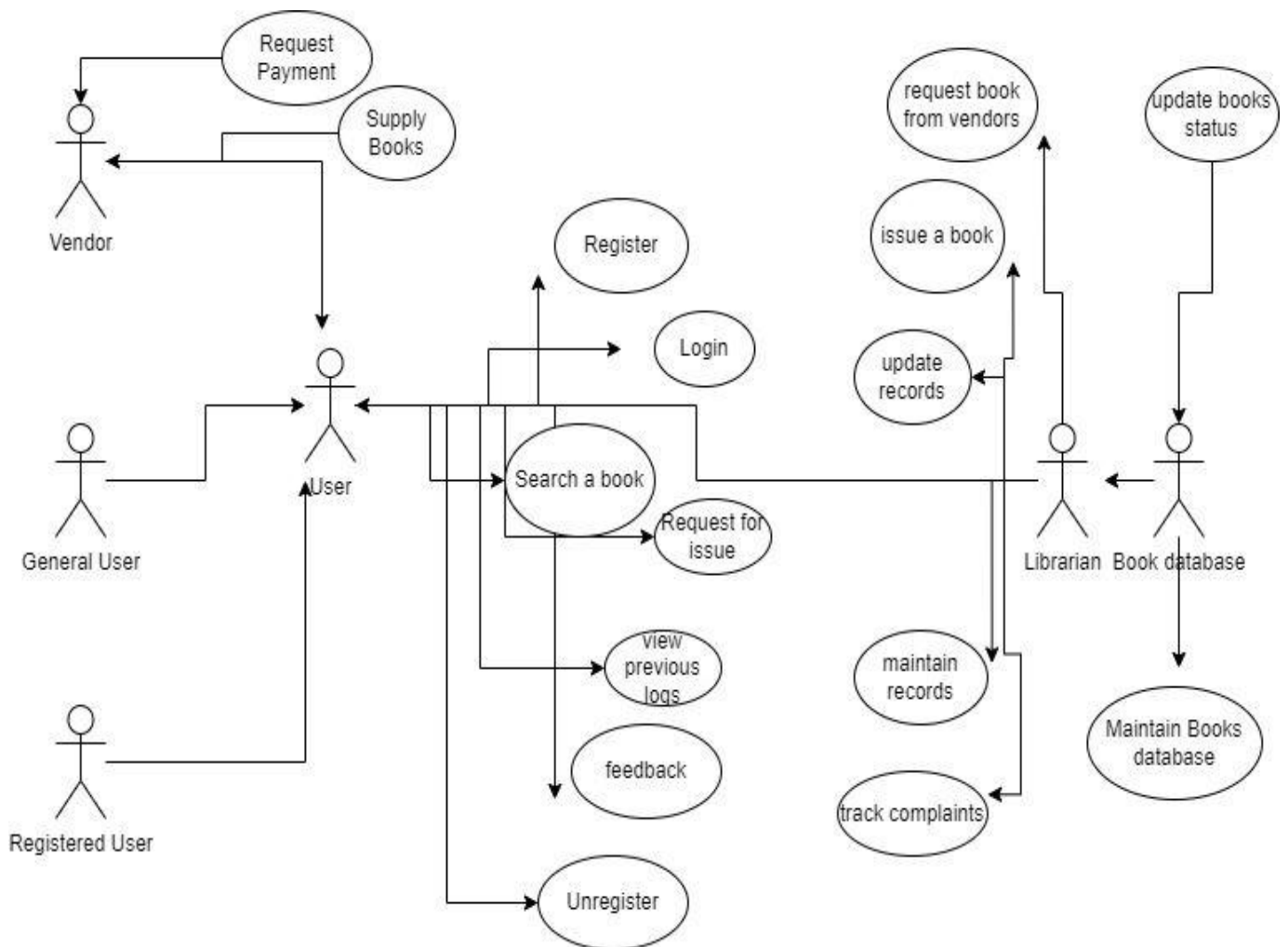
CLASS DIAGRAM

Class diagram is a static diagram. It represents the static view of an application. Class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application.

Books
+BookId: int
+BookName: string
+BookAuthor: string
+YearofPub: string
+Price: float
+Status: string
+AddNewBooks()
+DeleteBooks()
+DisplayBookDetails()
+InquiryBook()

Librarian
+id: int
+Name: string
+SearchBook(name: string)
+VerifyMember(id: int): Boolean
+OrderBook()
+SellBooks()

Publisher
+id: int
+Name: string
+Address: string
+PhoneNo: int
+AddPub()
+ModifyPub()
+DeletePub()
+OrderStatus()

User
+UserId: int
+UserName: string
+UserAddress: string
+PhoneNo: int
+ReturnBooks()
+PayFine(Dt: date): int
+AddNewUser()
+DeleteUser()
+UpdateDetails()
+BookPurchase()

Result:

Thus, the system architecture, use case and class diagram created successfully.

School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	7
Title of Experiment	Design an Entity relationship diagram
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	7.3.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To create the Entity Relationship Diagram

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Representative
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

ER Diagram:
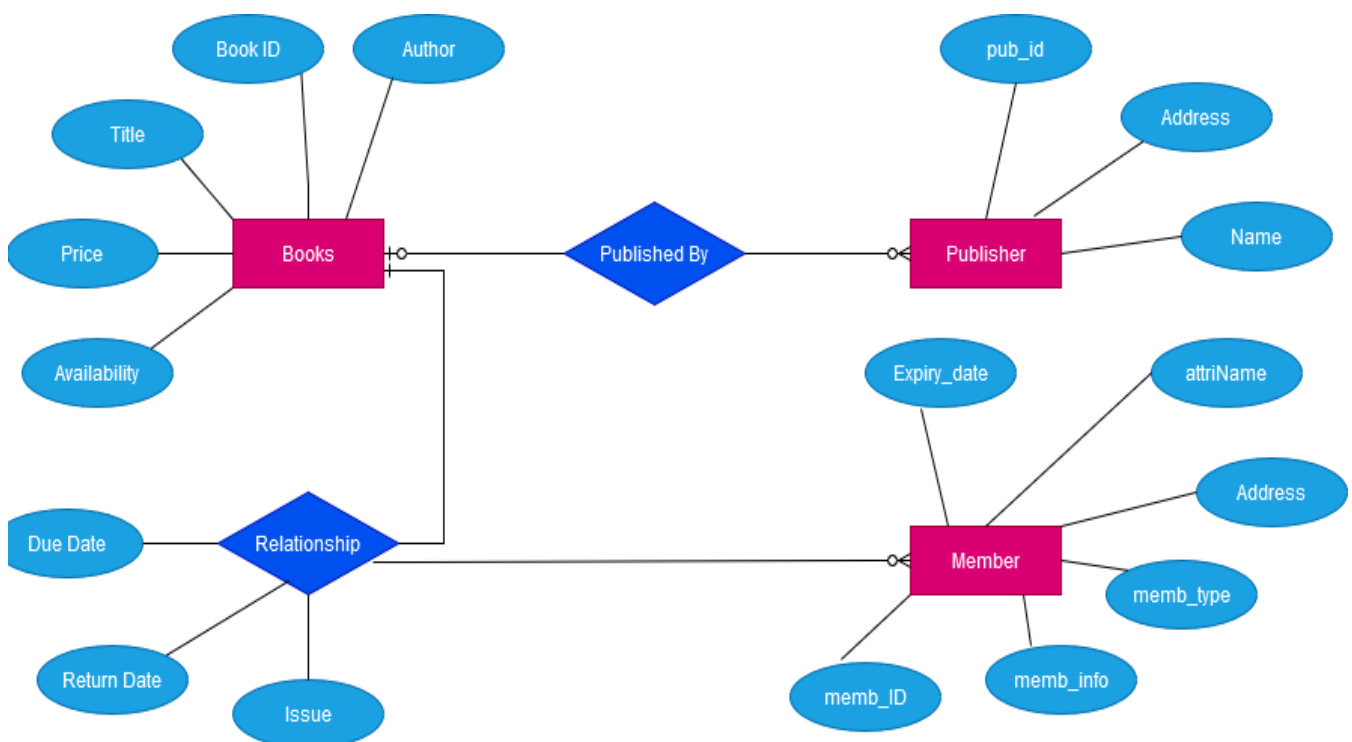
Result:

Thus, the entity relationship diagram was created successfully.

School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	8
Title of Experiment	Develop a Data Flow Diagram (Process-Up to Level 1)
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	15.3.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
	Total	**10**	

Staff Signature with date

Aim:

To develop the data flow diagram up to level 1 for the Library Management System.

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Representative
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Data Flow Diagram (Level 0) of Library Management System
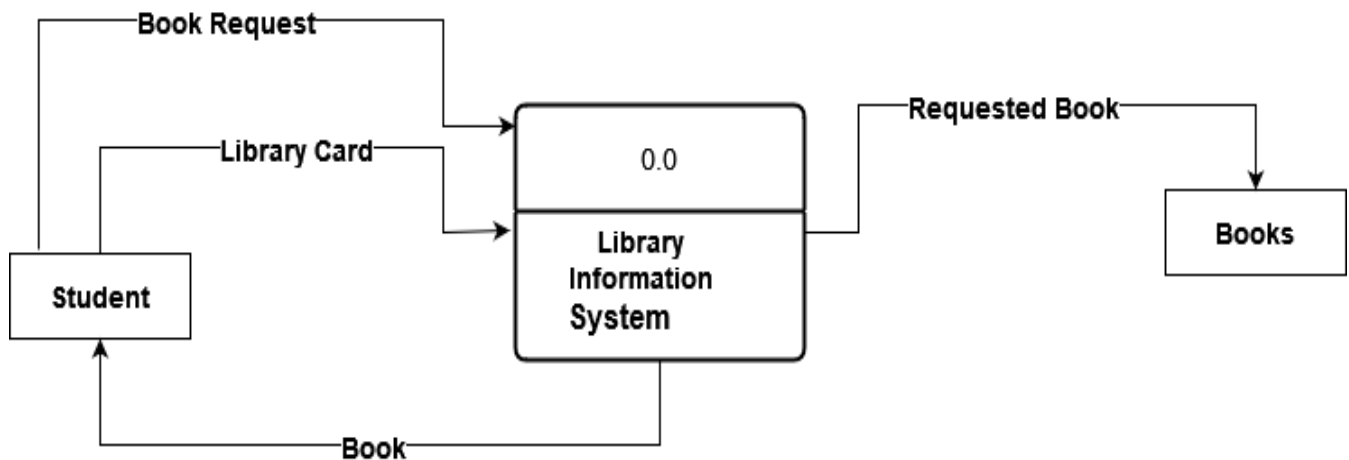
Data Flow Diagram (Level 1) of Library Management System
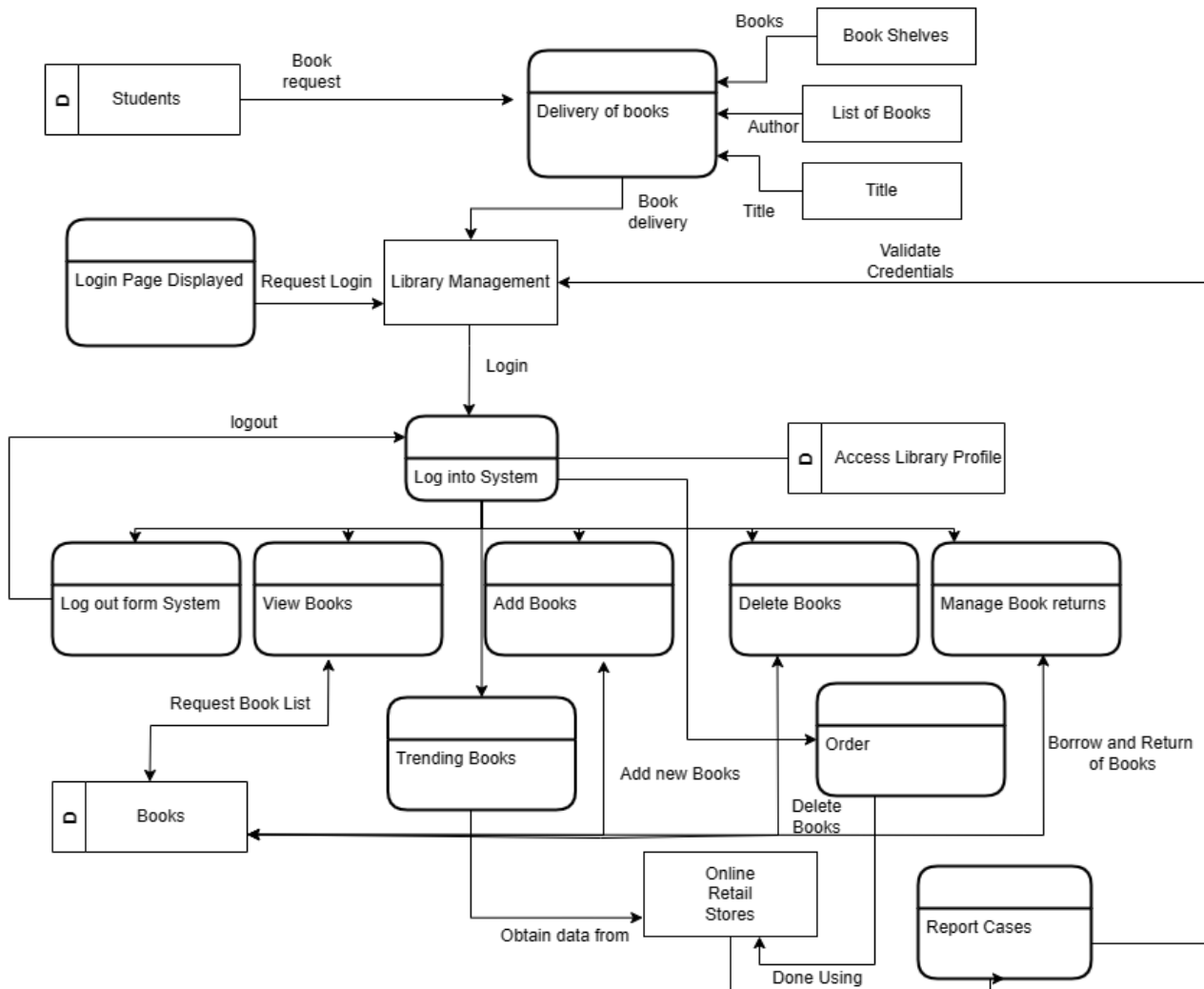
Result:

Thus, the data flow diagrams have been created for the Library Management System.

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SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	9
Title of Experiment	Design a Sequence and Collaboration Diagram.
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	15.3.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
	Total	**10**	

Staff Signature with date

Aim:

To create the sequence and collaboration diagram for the Library Management System.

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Representative
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Sequence Diagram:
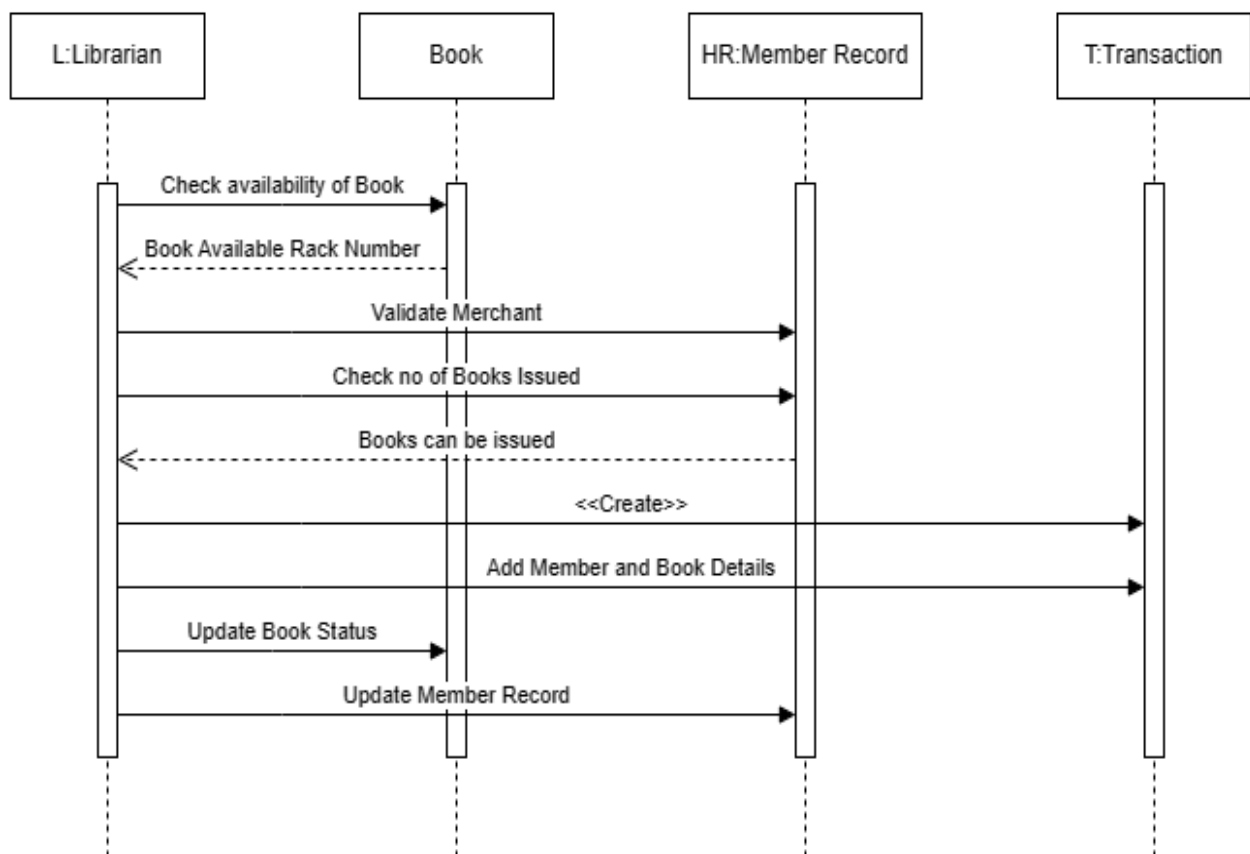
Collaboration Diagram:
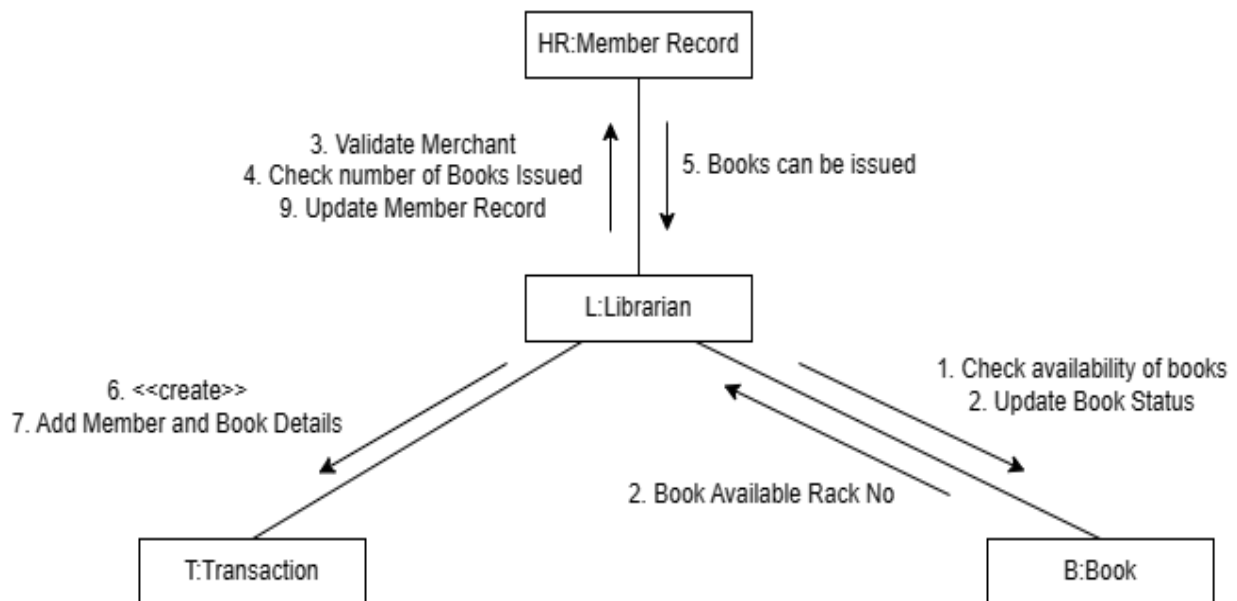
Result:

Thus, the sequence and collaboration diagrams were created for the Library Management System.

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SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	10
Title of Experiment	Developing a Testing Framework/User Interface
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	30.3.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To develop the testing framework and/or user interface framework for the Library Management System.

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Rep/Member
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Executive Summary:

This Module is used to manage the list of books that have been stored in database. It displays a tabular view of all the books owned by the library i.e the User. It also Gives the option to Delete A certain book from the database. A search bar may be added for additional user convenience in the same page. The module to Issue and return books has also been integrated with the current one which allows the user to issue and return books. It also tells us about the availability of the books in their current status and enables us to distinguish between them. The functionality to add books is better left as another module due to its dependencies and requirements. Further background design and QOL features may also be added to stylize the page if time permits.
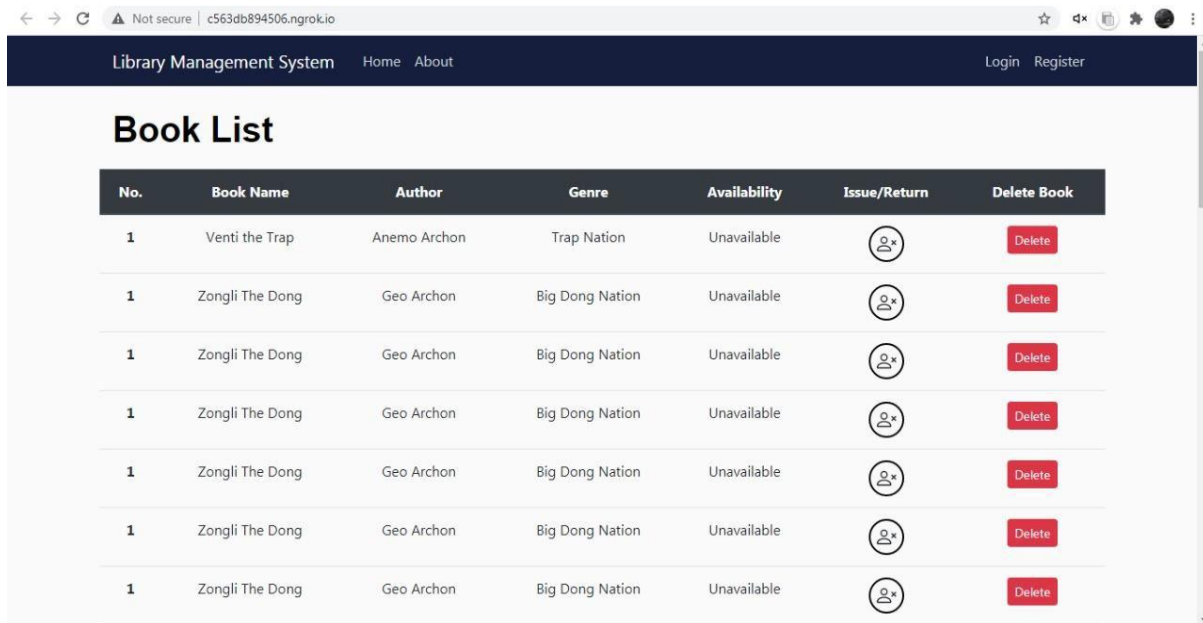
Test Plan

Scope of Testing

The scope of testing for an online library management system project includes creating distinct product users based on their roles and permissions, authenticating users at their login, providing a list of books that users can borrow, and providing facilities to reserve books that are available. The system should also provide a status page for all users to view books reserved by them and allow them to cancel reservations made earlier. Additionally, it should provide a status page for all users to view books borrowed by them, their individual due dates, and their individual penalties if any. The system should also provide an interface for users to view and edit their own profile, adjust account settings such as passwords, and reset their password in case they forget it. Staff should be provided with an interface to add or delete books.

Types of Testing, Methodology, Tools

Category	Methodology	Tools Required
Functional Requirements	Use case testing to ensure all required functionality is working.	Test management tools (e.g. TestRail), Test automation tools (e.g. Selenium), Debugging tools (e.g. Visual Studio Debugger)
Non-functional Requirements	Performance testing to ensure the system can handle expected loads.	Load testing tools (e.g. Apache JMeter), Security testing tools (e.g. OWASP ZAP), Usability testing tools (e.g. UserTesting.com)
User Interface Testing	Manual testing to ensure the user interface is intuitive and easy to use.	Documentation tools (e.g. Confluence), Screen capture tools (e.g. Snagit), Word templates for test case documentation.
Integration Testing	API testing to ensure that API calls to external systems work correctly.	Programming languages (e.g. Java), Frameworks (e.g. Spring), Libraries (e.g. Apache HttpClient), Databases (e.g. MySQL), Tools (e.g. Postman)
Category	Methodology	Tools Required
Acceptance Testing	User acceptance testing to ensure that the system meets user requirements.	Collaboration tools (e.g. Microsoft Teams), Test management tools (e.g. Zephyr), Test automation tools (e.g. Selenium WebDriver)
Book Listing and Availability	Automated testing to ensure that the book listing and availability are accurate and up-to-date.	Test automation tools (e.g. Selenium WebDriver), Programming languages (e.g. Python), Libraries (e.g. BeautifulSoup)
Issue and Return of Books	End-to-end testing to ensure that the system can properly issue and return books.	Test management tools (e.g. TestRail), Test automation tools (e.g. Selenium), Debugging tools (e.g. Visual Studio Debugger)

UI Design Example

Result

Thus, the testing framework/user interface framework has been created for the Library Management System.

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SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	11
Title of Experiment	Test Case and Reporting
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	6.4.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To develop the test cases manual with manual test case report for the Library Management System.

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Representative
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Manual Test Cases:

1. **Register:**

S. No	Test Case ID	Test Objective	Test Condition	Steps	Sample Input	Expected Output	Actual Output	Test Status
1	LS001	Email without @ (invalid email)	To check Email id	1.Enter valid Email id	sn0273sr mist.edu. in	error	error	reject
2	LS002	invalid password (with space)	To check password	1. Enter valid password	9515162 115	error	error	reject
3	LS003	Proper Email id and password	To check Email id and password	1.Enter valid Email id 2. Enter valid password	sn0273@ srmist.ed u.in 9515162 115	Successful	Successful	accept
4	LS004	Already registered user name	To check User name is registered before or not	1.Enter valid User name	Shaurya Srinet	error	error	reject
5	LS005	Different passwords	To check Password	1. Enter valid password	9515162 115	error	error	reject
6	LS006	Same passwords	To check Password	1. Enter valid password	9515162 115	Successful	Successful	accept

2. **Login:**

S. No	Test Case ID	Test Objective	Test Condition	Steps	Sample Input	Expected Output	Actual Output	Test Status
1	HM001	Non Registered Email	To check Email id	1.Enter valid Email id	sn0273@srmist.edu.in	error	error	reject
2	HM002	Wrong password	To check password	1. Enter valid password	9515162115	error	error	reject
3	HM003	Proper Email id and password	To check Email id and password	1.Enter valid Email id 2. Enter valid password	sn0273@srmist.edu.in 9515162115	Successful	Successful	accept

3. **Forgot Password:**

S. No	Test Case ID	Test Objective	Test Condition	Steps	Sample Input	Expected Output	Actual Output	Test Status
1	HM004	Non Registered Email	To check Email id	1.Enter valid Email id	sn0273@srmist.edu.in	error	error	reject
2	HM005	valid Email id	To check Email id	1.Enter valid Email id	sn0273@srmist.edu.in	Successful	Successful	accept

4. **Reset Password:**

S. No	Test Case ID	Test Objective	Test Condition	Steps	Expected Output	Actual Output	Test Status
1	HM006	Use link sent to Email after 30 mins	Link is working within 30 min of generation	Click the link sent to email After 30 mins	error	error	reject
2	HM007	Use link sent to Email within 30 mins	Link is working within 30 min of generation	Click the link sent to email id within 30 mins	Successful	Successful	accept

5. Add/Delete Book:

S. No	Test Case ID	Test Objective	Test Condition	Steps	Sample Input	Expected Output	Actual Output	Test Status
1	DSB001	Use the name of the magazine	To check Name of the magazine	1.Enter valid Name of magazine	Bone	Successful	Successful	accept
2	DSB002	Access book without logging in	To access book without logging in	1. access book without logging in	Bone	Successful	Successful	accept
3	DSB003	delete book without logging in	To delete book without logging in	1. delete book without logging in	Bone	error	error	reject

6. Account:

S. No	Test Case ID	Test Objective	Test Condition	Steps	Expected Output	Actual Output	Test Status
1	DSB007	Update to already registered user name	TO Update already registered user name	1. Update already registered user name	error	error	reject
2	DSB008	Change profile pic from local files in comp	TO Change profile pic from local files in comp	1. Change profile pic from local files in comp	Successful	Successful	accept
2	DSB009	Use someone else profile pic	To Use someone else profile pic	1. Use someone else profile pic	Successful	Successful	accept

Current status of Testing:

The testing process has been executed and the above test cases have been passed successfully. The Library Management System seems to be working fine without any major issues.

Obstacles to proceed further:

There are no major obstacles that are hindering the testing process. However, there might be some minor issues that could be resolved with additional testing.

Seek help from stakeholders:

If any issues arise during the testing process, the development team can be contacted for assistance. Additionally, stakeholders can be informed about any unexpected behaviour or issues found during testing, which can help to improve the overall quality of the Library Management System.

Result:

Thus, the test case manual and report has been created for the Library Management System.

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SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	12
Title of Experiment	Provide the details of Architecture Design/Framework/ Implementation
Name of the candidate	Shaurya Singh Srinet
Team Members	Shounak Chandra, Parth Galhotra
Register Number	RA2111032010006, RA2111032010026, RA2111032010029
Date of Experiment	13.4.23

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		**10**	

Staff Signature with date

Aim:

To provide the details of architectural design/framework/implementation

Team Members:

S No	Register No	Name	Role
1	RA2111032010006	Shaurya Singh Srinet	Representative
2	RA2111032010026	Shounak Chandra	Member
3	RA2111032010029	Parth Galhotra	Member

Architectural Design:

1. Dashboard(Home) Design
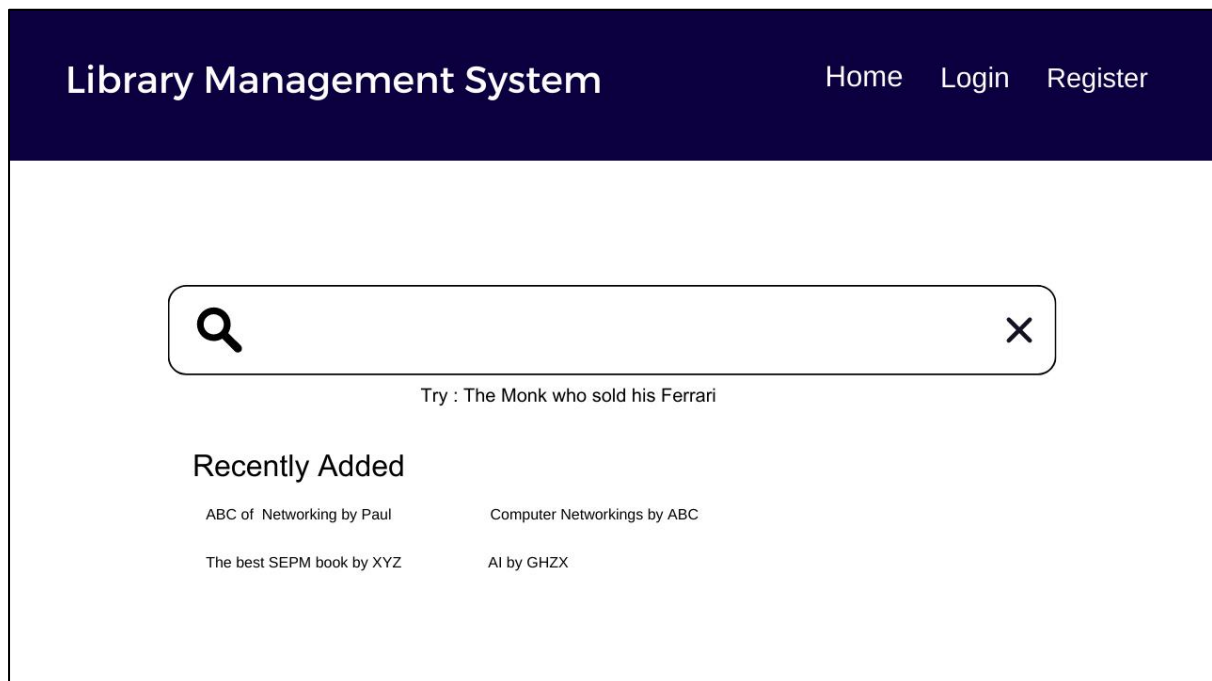
2. Managing Book List Design

3. Issuing/Returning a Book Design

Result:

Thus, the details of architectural design/framework/implementation along with the screenshots were provided.

CONCLUSION

In conclusion, this report has presented the development of a Library Management System designed to address the challenges associated with managing book libraries in large organizations and companies. The proposed system offers a basic set of features that automate the processes involved in managing a library and enhance the user experience. The system's design ensures strong data security and good libraries, which reduces the risk of data inconsistency and integrity issues.

The proposed Library Management System provides an efficient and secure way to manage book libraries, enabling librarians to add/update members, add/update books, manage check-ins, and maintain records of issued books, late fines, and stock availability in the library. The system's design also allows librarians to retrieve details of books available in the library, issue books to students, and maintain their records.

Overall, the proposed Library Management System offers an opportunity for organizations to streamline their library management processes, reduce the risk of data inconsistency and integrity issues, and improve the user experience. The proposed system can be further customized and improved based on the client's specific requirements and can serve as a model for future library management systems.

REFERENCES

[1] R. Kumar, "Design and Development of Library Management System," International Journal of Advanced Research in Computer Science and Software Engineering, vol. 3, no. 3, pp. 199-204, Mar. 2013.

[2] S. Gupta, "Development of Library Management System," International Journal of Engineering Research and Applications, vol. 5, no. 2, pp. 6-9, Feb. 2015.

[3] A. Jain and P. Verma, "Design and Development of Library Management System," International Journal of Computer Science and Mobile Computing, vol. 4, no. 10, pp. 85-91, Oct. 2015.

[4] K. Ahmad, "Development of an Integrated Library Management System," International Journal of Scientific and Research Publications, vol. 4, no. 12, pp. 187-191, Dec. 2014.

[5] M. M. A. Hasan, A. K. Das, and M. R. Islam, "Design and Development of Library Management System," International Journal of Computer Applications, vol. 119, no. 2, pp. 13-17, Jun. 2015.