

Library Management System

Software Requirement Specification

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Final Deliverable Submission

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1 INTRODUCTION

1.1 General System Definition

The Library Management System is the tool for organizing, managing, monitoring and controlling the transactions of books in the library.

1.2 Purpose

The Library management system SRS main goal is to provide the view of working of the system and expectations by the end user. It provides the cost analysis to show how much budget is required to build and complete the project within the time constraint, analysis of requirements such as functional and nonfunctional requirements to provide the development team with detailed understanding of the system and design with flow of the library management system.

1.3 Scope of the Project

Library consists of thousands of books, and with the increase in the number of readers it needs to be well organized. So, LMS obligation is to provide the facility of organization of books, monitoring them and controlling the transactions. It maintains the details of books and members. It provides the ease of searching the available books in the library. It provides the functionality of reserving the books and adding new books. Our Library Management System will have two end users: Librarian and Members. Librarian will be able to check member's details, check in or check out books from the library, manage the books. Members would be able to view their account, check for their details such as list of books borrowed, view the due date, and view the payment history.

The main objective of this LMS software is to simplify day to day process of library. It will be able to provide quick and efficient service in a quick manner. This system will be able to remove the drawbacks of large customer information physical files and catalog which were tough to manage. Secure Transaction, quick retrieval of information, ease of use, quick recovery of errors, fault tolerance are some of the benefits that development team will be working on to achieve end user satisfaction.

1.4 Definitions, Acronyms and abbreviations

SRS	Software Requirement Specifications
LMS	Library Management System
FR	Functional Requirement
NFR	Non-Functional Requirement
CEO	Chief Executive Officer
IT	Information Technology
ROI	Return On Investment: Measurement of profit or loss generated from the investment.
NPV	Net Present Value: It's the difference between present value of cash inflows and present value of cash outflows.
BEP	Break Even Point: It's point of production where total revenue equals total expenses.

1.5 References

- [1] System Analysis and Design, 5th edition- Denis, Wixom, Roth
- [2] IEE STD 830-1998 Standard Recommended Practice For Software Requirement Specification

1.6 Overview of the Document

The remainder section of this SRS document provides the System Planning, Overall Description, Specific Requirements, Use Case Analysis, Process Model, Data Model and System Design of the product. System Planning consists of system request of business plan, feasibility analysis and work plan. Overall Description includes Product Functions, User Characteristics, and General Constraints. Specific Requirements consists of Functional Requirements, Non Functional Requirements, UI Interface Requirement, Communication Interface Requirement, and Hardware and Software Specifications. Then, Use Case Analysis provides with 10 use cases. Process Model gives us Context Level Diagram, Level 0 DFD, and Level 1 DFD. Data Model provides entity relationship diagram with constraints. System Design consists of System Architecture, and User Interface Design. Then Follows the Appendix Section.

2 System Planning

2.1 System Request

Project Sponsor: Paras Raj Pahari, CEO, TalkDigitTalk INC.

Business Need: Most of the colleges, schools and organizations consists of library with thousands of books and hundreds of members. They need to be properly organized.

Our library management system is commercial based application which will target such organizations who are in need of proper automation, management, monitoring and controlling of their daily transactions in their library.

Business Requirements: Library Management System provides the automated ease of access to end users. Functionalities that our system should have the following:

- Register Resources
- Register members
- Search for availability of books
- Check in or Check out of books
- Control the transactions or payment.

Business Value: LMS is expected to be subscribed by several hundreds of organization at the first year around. Also, we will make the requirements of each members registered to LMS from the organizations pay certain amount.

Estimations of business value to the company include the following:

- \$336,000 sales from subscriptions
- \$193, 9200 sales from member registration sales

Return on Investment is estimated to be 48.38%

Break Even Point is 1.625 years

Special Issues or Constraints:

- LMS completion deadline is by Dec 30 ,2017

2.2 Feasibility Study

Feasibility analysis was carried out for Library Management System.

2.2.1 Technical Feasibility

Our LMS is considered technical feasible. Our IT department has enough experience to carry out the project with the association of cloud storage and web development technology. We have enough consultants to help us throughout the completion project. All the resources and technology required for the project is readily available.

The Project size is considered minimal risk. The project will likely have team of around 10 or lesser people. The project time frame is a bit narrow, but our team have experience of working in tight schedules.

2.2.2 Economic Feasibility

A sales projection and cost benefit analysis was performed and they are provided in the **APPENDIX 1A & 1B** with estimation, evaluation and calculation.

Following result was obtained after cost benefit analysis:

ROI over 3 Years: **48.38%**

BEP: **1.625 years**

NPV over 3 years: **\$50, 8640**

LMS has good chance of improving the finance of the company. The project is a go through the economic feasibility perspective.

2.2.3 Organizational Feasibility

From an organizational perspective, the project is considered to be Low Risk. CEO as well as Board Members from the company have high interest and they are providing the high motivation for the completion project. Marketing team is interest to promote the project. There's a high demand among the users.

2.3 Work Plan

Number	Task	Start	End	Duration	2017											
					January	February	March	April	May	June	July	August	September	October	November	December
1	Requirement Definition	1/1/2017	1/31/2017	21												
1.1	Interview Session with end users	1/1/2017	1/17/2017	11												
1.2	Extract Functional Requirement	1/17/2017	1/23/2017	5												
1.3	Define Non Functional Requirement	1/23/2017	1/31/2017	7												
2	Define Use Case	2/1/2017	2/16/2017	11												
3	Prepare Process Model	2/20/2017	4/20/2017	41												
3.1	Prepare Context DFD	2/20/2017	2/28/2017	6												
3.2	Prepare Level 0 DFD	3/1/2017	3/14/2017	10												
3.3	Prepare Level 1 DFD	3/14/2017	4/20/2017	26												
4	Prepare Data model	4/20/2017	4/30/2017	7												
4.1	Member Data Modeling	4/20/2017	4/30/2017	7												
4.2	Resource Data Modeling	4/20/2017	4/30/2017	7												
5	Prepare Design Models	5/1/2017	6/30/2017	44												
5.1	Define Architecture	5/1/2017	5/15/2017	11												
5.2	Specify Hardware/Software Specification	5/15/2017	5/20/2017	5												
5.3	Prepare Interface Structure	5/20/2017	5/30/2017	6												
5.4	Define Use Case Scenario	6/1/2017	6/5/2017	3												
5.5	Design Data Flow	6/5/2017	6/10/2017	5												
5.6	Design Database	6/10/2017	6/30/2017	15												
6	Implementation	7/1/2017	9/30/2017	62												
6.1	Identifies modules	7/1/2017	7/15/2017	9												
6.2	Program the modules	7/15/2017	8/30/2017	33												
6.3	Test modules	9/1/2017	9/15/2017	10												
6.4	Integrate Module	9/15/2017	9/30/2017	10												
7	System Testing	10/1/2017	11/30/2017	41												
8	Prepare training manual	12/1/2017	12/30/2017	19												

3 Overall Description

3.1 Product Functions

There will be two different users who can use this product in different way:

a) Librarian

- Librarian will have access to any information and main control.
- Librarian can add, modify or delete resource
- Librarian can register new members
- Librarian can check in check out resources.
- Librarian have control to payment system.

b) Registered Members

- Member can search the availability of needed resources
- Members can renew their resource
- Members can view their membership information, rental history information, payment information, due dates...etc. from online

3.2 User Characteristics

There are 2 users in our LMS product:

- a) **Librarian:** They have administrator control over their portion of library system. They can access any of their member's information. They can manage the resource and perform operation on resource such as adding, removing or modifying the resource information that are in library database server. They checks in/checks out resource for members. Librarian are expected to have basic knowledge of on how to use computer system/software. They need to take a week training on how to use LMS.
- b) **Registered Members:** Users are supposed to be registered first in the LMS and pay the membership fee to be registered member of the library. Then, they will have access to library resources. They can search for the available resources. They can also view the account with the information such as rental history, due dates, payment information, and membership information. Members are at least required to know how to use the LMS software.

3.3 General Constraints

- 1. **Storage Constraint:** Every Library subscribed to LMS will have 20 GB of Cloud Storage allocated.
- 2. **High Level Language Requirement:** Software should be in English language.
- 3. **Reliability Constraint:** System should be updated to backup server frequently in order to provide fault tolerance capability.
- 4. **Implementation Constraints:** Implementation of application should be in Python.

4 Specific Requirements

4.1 Functional Requirements

4.1.1 Members

4.1.1.1 Logging In

FR1. The System shall verify valid ID and Password.

FR2. The System shall not allow to enter the system with invalid ID or Password

FR3. The System shall allow member to enter with valid ID and Password

4.1.1.2 Search

FR4. The System shall allow members to be able to search for available resource by title,
Resource ID, Author Name.

FR5. The System shall display the search results with the details of preferred Resource.

4.1.1.3 Renew Resource

FR6. The System shall allow members to renew the resource within 72 hours before due date.

4.1.1.4 Manage/View Account

FR7. The System shall allow members to view history containing information such as list of resource rented, due date, renewal date, and status.

FR8. The System shall allow update their personal information such as phone number, address, email address, password.

4.1.1.5 Payment Management

FR9. The System shall display the due payment, description and deadline to the customer.

FR10. The System shall provide member payment facility that will store payment information and data.

FR11. The system shall collect and verify payment information made by member.

FR12. The System shall allow member to see their payment history containing information such as purpose, payment ID, date of payment.

4.1.2 Librarian

4.1.2.1 Admin Access

FR13. The System shall verify admin login info to provide all access privilege.

4.1.2.2 Register Members

FR14. The System shall store the registered id in the membership database.

4.1.2.3 Update Resource

FR15. The System shall allow add, delete or edit resource with their details such as resource id, resource name, description of resource, location, category and author.

4.1.2.4 Check In/Check Out

FR16. The System shall record the transaction details such as Resource ID, Member ID, Due Date, Check out Date, Checked in Date, Status.

4.2 Non- Functional Requirements

4.2.1 Performance Requirements

NF1. Database should be updated within a second.

NF2. Search results should be displayed within a second.

NF3. User Interface shall not take more than 3 seconds to load.

NF4. Login should be validated within 2 seconds.

4.2.2 Security Requirements

NF5. Every external communication between data server and end user takes place through VPN.

NF6. Payment Information are protected and encrypted.

NF7. Payment transaction is done with HTTP over Secure Protocol.

4.2.3 Safety Requirements

NF8. In the event of failure, there should be another data server be on standby to provide fault tolerance capability.

4.2.4 Capacity Requirements

NF9. Not more than 10,000 members to be registered.

4.3 User Interface Requirement

The UI is loaded from the server to any web browser. So our UI is compatible to any browser such as Mozilla Firefox, Google Chrome, Safari, Internet Explorer etc. It also provide responsive design so it can be viewed or operated from the Mobile Browsers as well.

4.4 Communication Interface

We will be using HTTPS/HTTP protocol for the communication over the server.

4.5 Hardware and Software Specifications

	Standard Client	Standard Web Application Server	Standard Database Server
Hardware	<ul style="list-style-type: none">• 200 GB HDD• Dual Core Processor 1 GHz• Monitor 1024x768• 1 GB RAM	<ul style="list-style-type: none">• 1TB HDD• Quad Core Processor 3 GHZ	<ul style="list-style-type: none">• 20TB HDD• RAID• Quad Core Processor
Operating System	<ul style="list-style-type: none">• Any	<ul style="list-style-type: none">• Linux	<ul style="list-style-type: none">• Linux
Software	<ul style="list-style-type: none">• Any Web Browser	<ul style="list-style-type: none">• Apache/Python	<ul style="list-style-type: none">• Mongo DB
Network	<ul style="list-style-type: none">• 1 Mbps Ethernet	<ul style="list-style-type: none">• Dual 100 Mbps Ethernet	<ul style="list-style-type: none">• Dual 500 Mbps Ethernet

5 Use Case Analysis

Use Case Name: Register the member	ID: UC1	Priority: High
Actor: Librarian		
Description: Librarian collects the information of the person who wishes to get membership, fill up the information in the portal and registers for the library.		
Trigger: A person requests librarian to register for the library.		
Preconditions: 1. The librarian collects required credentials and information to be registered as member.		
Normal Course: 1. The librarian opens the membership database portal. 2. Fills Up the required information such as name, address, contact, ID of the member. 3. Submits the filled information to the registered member. 4. Server verifies and validate the filled information. 5. Librarians post the payment for the registered member. 6. Server verifies the authenticity of the payment for membership registration. 7. Server creates the profile for registered member.		
Post conditions: Newly registered member is activated and fully unlocked to use LMS service.		

Use Case Name: Add a resource	ID: UC2	Priority: High
Actor: Librarian		
Description: It adds the available information and description of the resource.		
Trigger: 1. Resource is newly available		
Preconditions: 1. Librarian logs in the librarian portal. 2. Librarian identity is verified. 3. Generates resource id, and collects the information on new resource		
Normal Course: 1. Librarian enters into resource database portal 2. Librarian clicks on add on. 3. System requests the information on resource. 4. Librarian enters the details of resource. 5. System updates the resource details on the resource database.		
Post conditions: System updates the newly added resource's status as available.		

Use Case Name: Delete a resource	ID: UC3	Priority:
Actor: Librarian		
Description: When a resource is no more available, resource needs to be deleted and librarian has access to perform the delete resource operation		
Trigger: Resource is no more available		
Preconditions: <ol style="list-style-type: none">1. Librarian logs in the librarian portal.2. Librarian identity is verified.3. Identifies the resource to be removed from the database.		
Normal Course: <ol style="list-style-type: none">1. Librarian enters into resource database portal2. Librarian search for the resource in the database.3. System shows the details on the searched resource.4. Librarian selects the remove operation on resource5. System asks for the confirmation.6. Librarian confirms the operation.7. System deletes the resource from database.		

Use Case Name: Modify Resource	ID: UC4	Priority: High
Actor: Librarian		
Description: When a resource is information needs to be changed, resource details on database has to be updated.		
Trigger: Resource information has changed.		
Preconditions: <ol style="list-style-type: none">1. Librarian logs in the librarian portal.2. Librarian identity is verified.3. Identifies the resource to be modified.		
Normal Course: <ol style="list-style-type: none">1. Librarian enters into resource database portal2. Librarian search for the resource in the database.3. System shows the details on the searched resource.4. Librarian selects the modify operation on resource5. System enables the modification operation and allows to modify the previous details.6. Librarian confirms the operation.7. System updates the resource information.		

Use Case Name: Check Out	ID: UC5	Priority: High
Actor: Librarian		
Description: When a member picks up the resource from library to rent, then librarian need to check out the books.		
Trigger: Member wants to rent resource from library		
Preconditions: <ol style="list-style-type: none">1. Librarian logs in the librarian portal.2. Librarian identity is verified.		
Normal Course: <ol style="list-style-type: none">1. Librarian scans the resource barcode.2. Resource details is displayed.3. Librarian clicks on check out.4. System request the member ID to whom resource is being rented.5. Librarian provides the member ID.6. System updates the status of resource to 'Rented'7. System updates the member's entry of list of rents.8. System updates the due date on the respective entry.		

Use Case Name: Check In	ID: UC6	Priority: High
Actor: Librarian		
Description: When a member drops up the resource, then librarian have to check in the book.		
Trigger: Member brings the resource back to library.		
Preconditions: <ol style="list-style-type: none">1. Librarian logs in the librarian portal.2. Librarian identity is verified.		
Normal Course: <ol style="list-style-type: none">1. Librarian scans the resource barcode.2. Resource details is displayed.3. Librarian clicks on check in.4. System updates the status of resource to 'Available'5. System removes the entry from the member's list of rents.		

Use Case Name: View Member Information	ID: UC7	Priority: High
Actor: Librarian		
Description: When Librarian need to get details of member		
Trigger: Someone authorized requests the information on member, it can be member itself as well		
Preconditions: <ol style="list-style-type: none">1. Librarian logs in the librarian portal.2. Librarian identity is verified.		
Normal Course: <ol style="list-style-type: none">1. Librarian search for member by ID or Name2. Members display icons shows3. Librarian clicks member icon.4. System Displays member account window5. System display member's personal information, rental status and history, and payment history/info.		

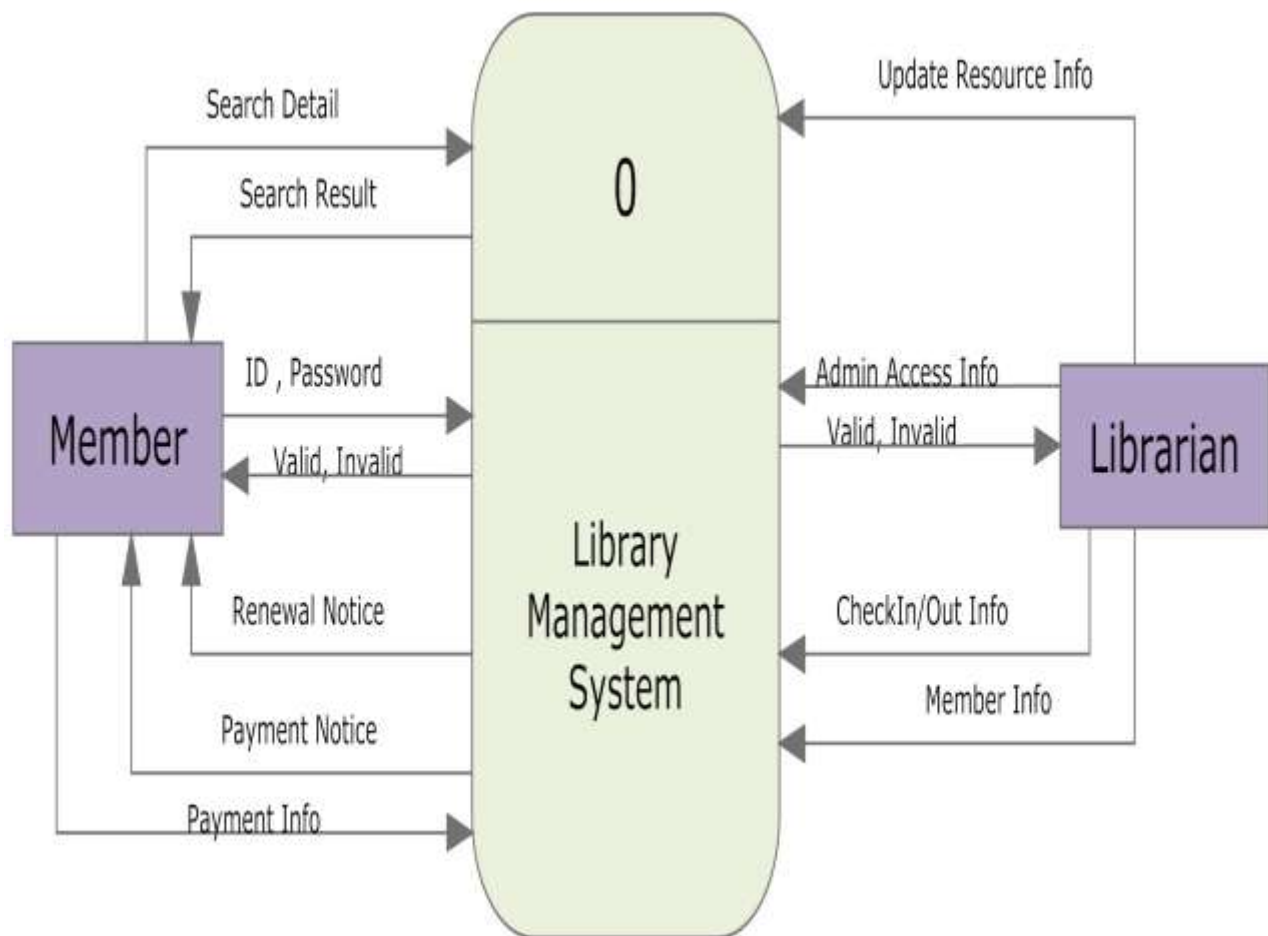
Use Case Name: Search for Resource	ID: UC8	Priority: High
Actor: Member		
Description: When members require to check whether the necessary resource is available in the library or not, they need to search in the resource database.		
Trigger: Members looks for the resource		
Preconditions: 1. Registered member logs into LMS.		
Normal Course: 1. Members clicks on search window. 2. System requests any information on resource such as Resource ID, Name and Author. 3. Member enters the information and clicks on search. 4. System response with list of available resource that matches the search.		

Use Case Name: Renew Resource	ID: UC9	Priority: High
Actor: Member		
Description: Resources that are within 72 hrs. Before due date needs to be renewed by member.		
Trigger: 72 hrs. Before the due date.		
Preconditions: 1. Registered member logs into LMS.		
Normal Course: 1. Members are notified it's time to renew their book or check in. 2. Member's click on the resource entry that's to be renewed. 3. Members renew the resources. 4. System extends the due date.		

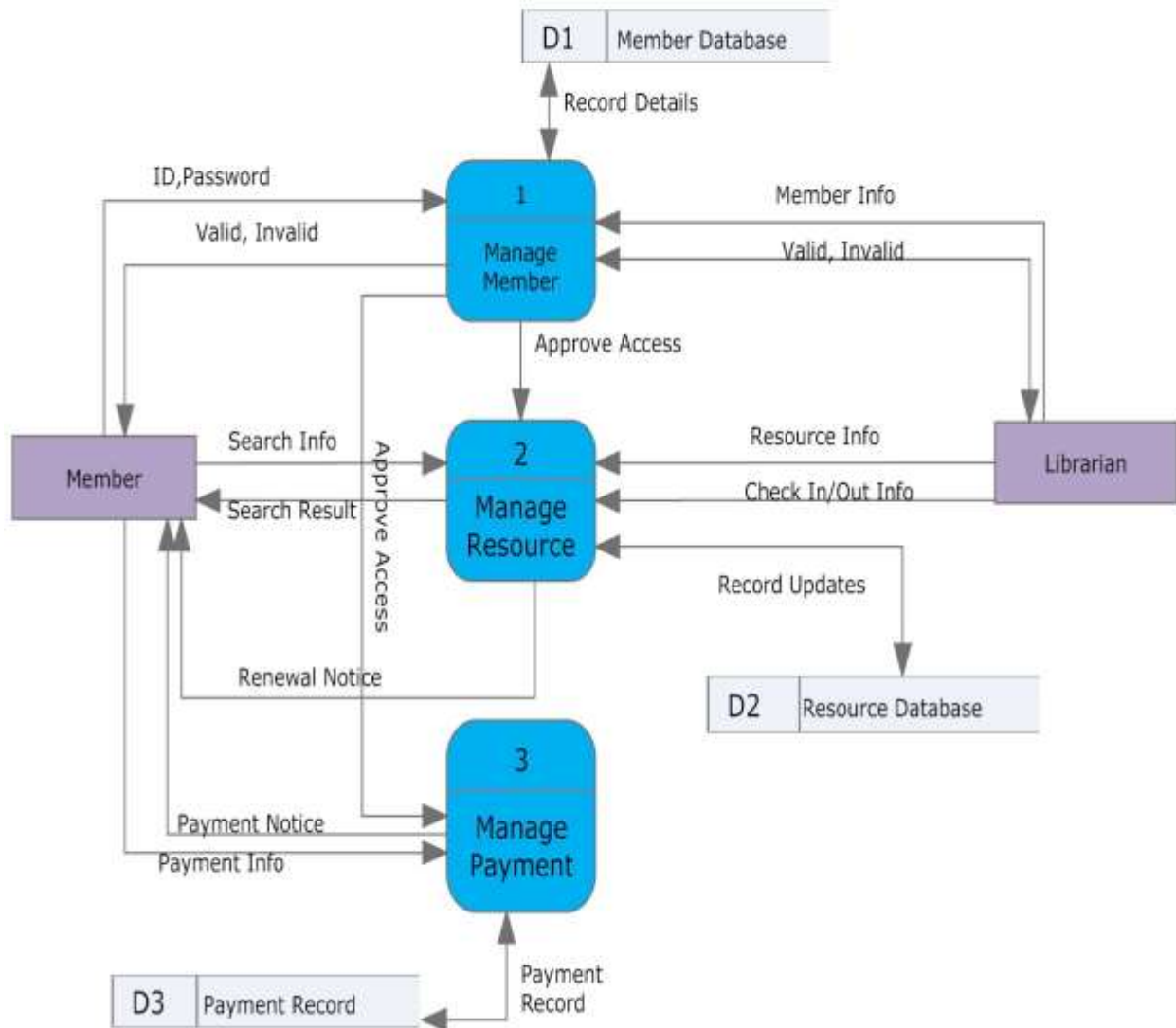
Use Case Name: Pay the due	ID: UC10	Priority: High
Actor: Member		
Description: Dues and the description are displayed on the members account and need to be paid through the payment portal.		
Trigger: <ol style="list-style-type: none">1. Membership Renewal2. Fine after due date of resource rental3. When member rents the resource that costs for rent.		
Preconditions: <ol style="list-style-type: none">1. Registered member logs into LMS.		
Normal Course: <ol style="list-style-type: none">1. Amount to be paid are displayed on member's account.2. Members click on the payment portal.3. System request the payment information.4. Member provides the payment information.5. System process the payment6. System provides the payment receipt7. Updates the payment information in the data server.		

6 Process Model

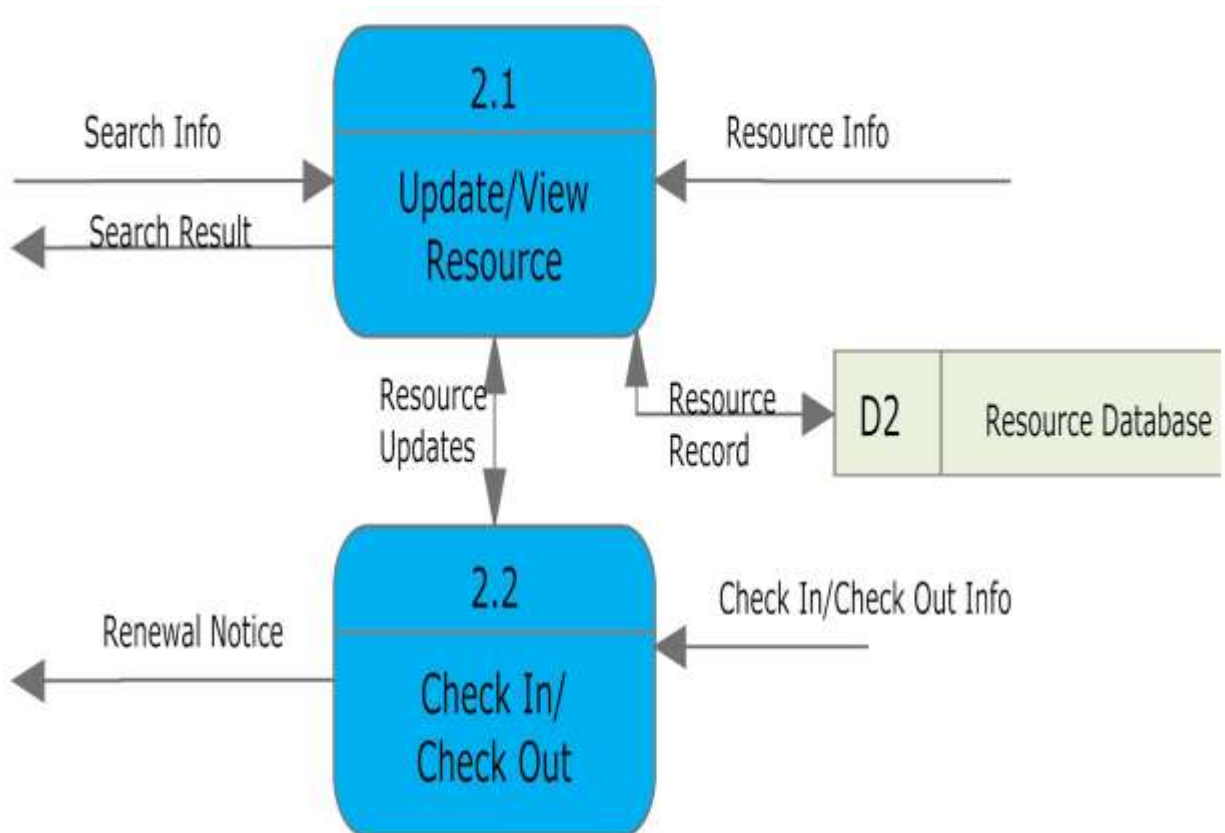
6.1 Context Diagram



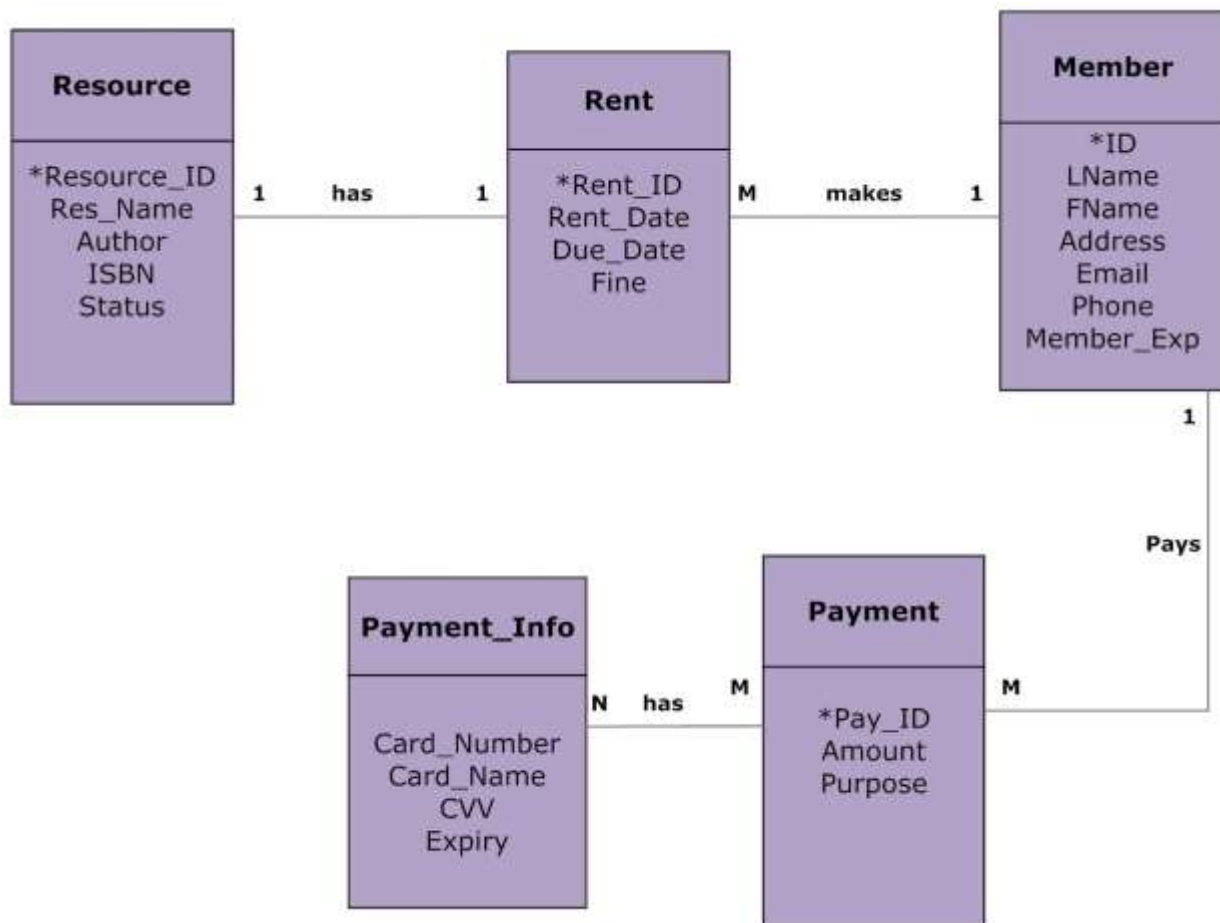
6.2 Level 0 DFD



6.3 Level 1 DFD

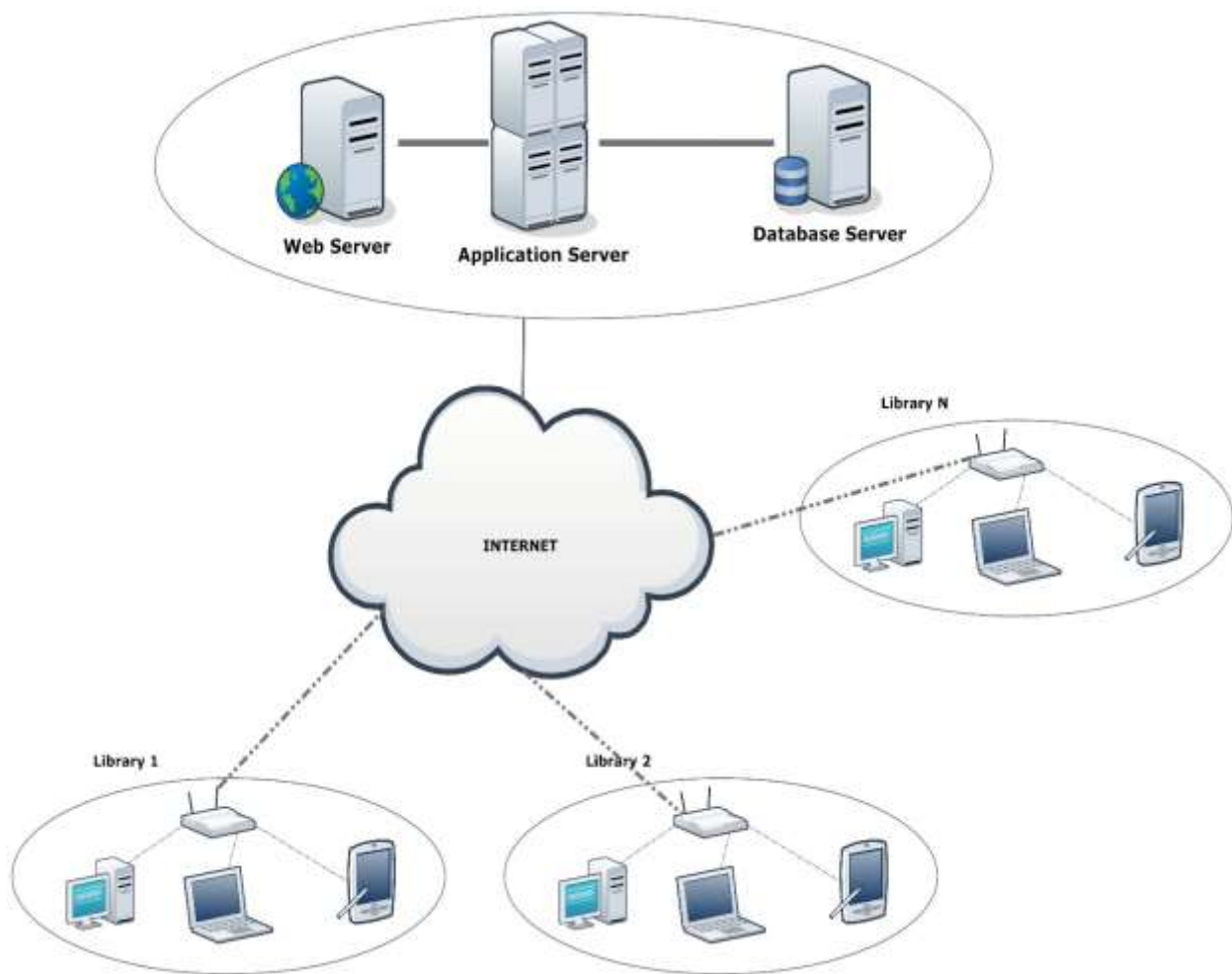


7 Data Model



8 System Design

8.1 System Architecture



8.1 System Architecture of LMS

8.2 User Interface

8.2.1 Login Page

Library Management System

UserID someone@example.com

Password ••••••• | Login

8.2.2 Admin Page

Library Management System Control Page

Logout | Search Member/Resource

[Home](#)
[Member Management](#)
[Payment Management](#)
[Resource Management](#)
[Check In/Check Out History](#)

CHECK IN

Resource ID:

Member ID:

Resource Name:

Member Name:

ISBN:

Email:

Author:

Phone:

Check IN Date:

Due Date:

Check IN

CHECK OUT

Resource ID:

Member ID:

Resource Name:

Member Name:

ISBN:

Email:

Author:

Phone:

Check OUT Date:

Fine:

Pay

Check Out

Help | Terms and Conditions | Disclaimer

Talk Digit Talk Inc.

Account Name

Time

Joey

12:17 AM

DATE

Access

05/03/2017

Admin

Recent Check In/Checkouts

No.	Resource ID	Member ID	Status
1	xxxx	Paras	Out
2	xxxx	Jimmy	In
3	xxxx	Lampard	In
4	xxxx	Sally	In
5	xxxx	Jane	Out
6	xxxx	Michael	In
7	xxxx	Rasu	Out
8	xxxx	Paras	In
9	xxxx	Paras	In

8.2.3 Member Main Page

Library Management System

Search Resource

Account Name

Paras Pahari

Membership DATE

dd-mm-yyy

Notifications

Fine

\$ 2.00

Home

View Rental History

View/Make Payment

Search For Resource

Renew Resources

Logout

Get news

Enter your E-mail Address

SUBMIT

Help

Recent Rental Items

No.	Resource	Resource ID	Checked Out Date	Due Date	Status
1	xxxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Checked In
2	xxxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Post Due already
3	xxxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Rented
4	xxxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Post Due Already
5	xxxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Rented
6	xxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Checked In
7	xxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Checked In
8	xxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Checked In
9	xxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Rented
10	xxx	xxxxxxx	dd-mm-yyyy	dd-mm-yyyy	Checked In

8.2.4 Member Registration Page

MEMBER REGISTRATION

Last Name

First Name

Middle Initial

Street

City

State

Zip

Phone

Fax

E-mail

Pay The Registration Fee

Register

Appendix

1A) Sales Projection

Subscription Sales

- **High Level Estimate (Probability: 30%):** Let's assume at least 500 organization subscribes the LMS which costs \$200 per year.
⇒ $500 \text{ organizations} \times \$200 = \$100,000$
- **Medium Level Estimate (Probability: 50%):** Let's assume at least 300 organization subscribes the LMS which costs \$200 per year.
⇒ $300 \text{ organizations} \times \$200 = \$60,000$
- **Low Level Estimate (Probability: 20%):** Let's assume at least 150 organization subscribes the LMS which costs \$200 per year.
⇒ $150 \text{ organizations} \times \$200 = \$30,000$

Average Expected Sales= $(1000,000 * .30) + (60,000 * .50) + (30,000 * .20) = \$336,000$

Member Registration Sales

- **High Level Estimate (Probability: 30%):** Let's assume at least 320,000 members are registered from all organization who subscribed. For each member registration fee \$10 per year
⇒ $320,000 \text{ members} * \$10 = \$320,0000$
- **Medium Level Estimate (Probability: 50%):** Let's assume at least 192,000 members are registered from all organization who subscribed. For each member registration fee \$10 per year
⇒ $192,000 \text{ members} * \$10 = \$192,0000$
- **Low Level Estimate (Probability: 20%):** Let's assume at least 96,000 members are registered from all organization who subscribed. For each member registration fee \$10 per year
⇒ $96,000 \text{ members} * \$10 = \$96,0000$

Average Expected Sales= $(320,0000 * .30) + (192,0000 * .50) + (96,000 * .20) = \$193,9200$

Sales Projections		
	Subscription Sales	Member Registration Sales
High Level Estimate	\$100,000	\$320,0000
Medium Level Estimate	\$60,000	\$192,0000
Low Level Estimate	\$30,000	\$96,0000
Average Expected Sales	\$336,000	\$193, 9200

1B) COST BENEFIT ANALYSIS

	Year 0	Year 1	Year 2	Year 3	Total
Total Benefits		550,000	750,000	1000,000	2300,000
Total Costs	500,000	300,000	350,000	400,000	1550,000
Net Benefits	-500,000	250,000	400,000	600,000	750,000
Cumulative Net Cash Flow	-500,000	-250,000	150,000	750,000	
PV of Total Benefits(10% Rate Of Return)		500000	619834	751314	1871148
PV of Total Costs(10% Rate Of Return)	500,000	272727	289256	300525	1362508
Return on Investment	48.38%				
Break Even Point	1.625 years				
NPV	508640				

Return on Investment:

$$\text{ROI} = (\text{Total Benefits} - \text{Total Costs}) / \text{Total Costs}$$

$$\Rightarrow (2300,000 - 1550,000) / 1550,000$$

$$\Rightarrow 48.38\%$$

Break Even Point:

$$\text{BEP} = \text{No of Years of -ve. Cash Flow} + \frac{\text{Positive Cash Flow Year's Net Cash Flow} - \text{That year's cumulative cash flow}}{\text{That Year's Net Cash Flow}}$$

$$\text{BEP} = 1 + \frac{400,000 - 150,000}{400,000} = 1 + 0.625 = 1.625 \text{ years}$$