



សាកលវិទ្យាល័យភ្នំពេញ
ROYAL UNIVERSITY OF PHNOM PENH

Library Management System (Phase 2)

Software Engineering
Professor: Lim Lyheng
Class: M1
Group: 8

Group Member



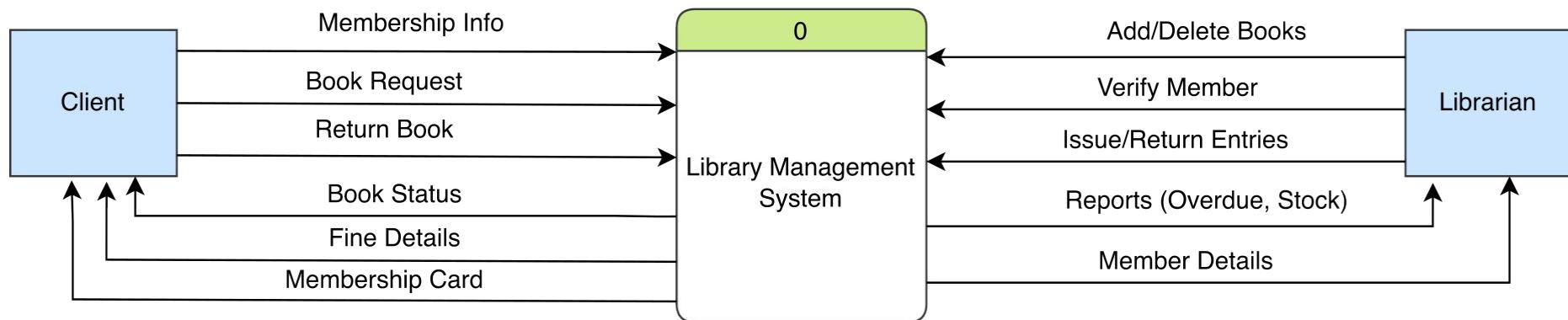
Name	Name in khmer	Role
Sou Chanrojame	សុខ ចាន្តរ៉ែម	Leader
Orn Pheakdey	អន ភកី	Follower
Long Neron	ឡុង និរន្ត	Follower
Sokkong Somnang	សុខគង់ សំណង	Follower

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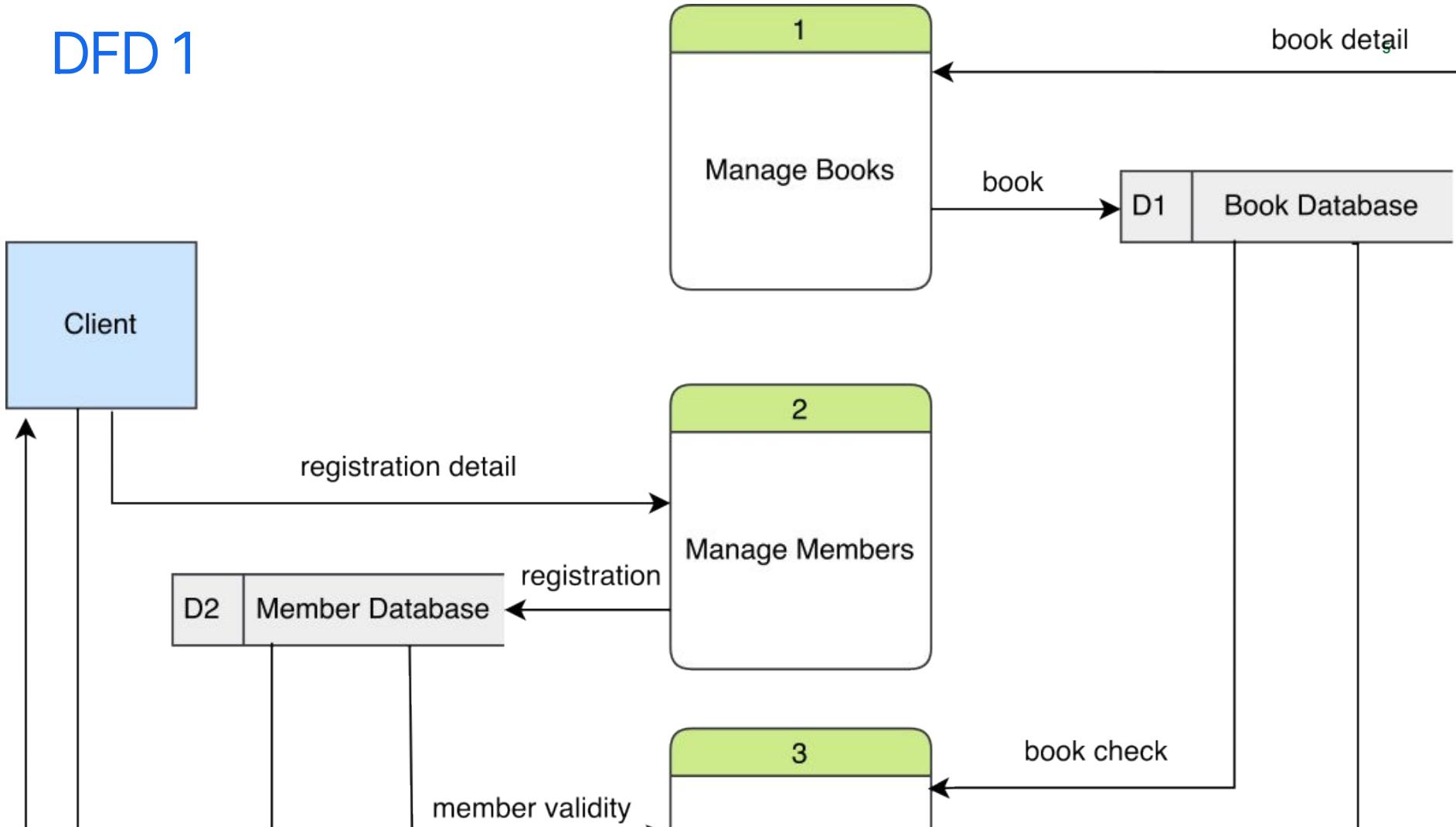
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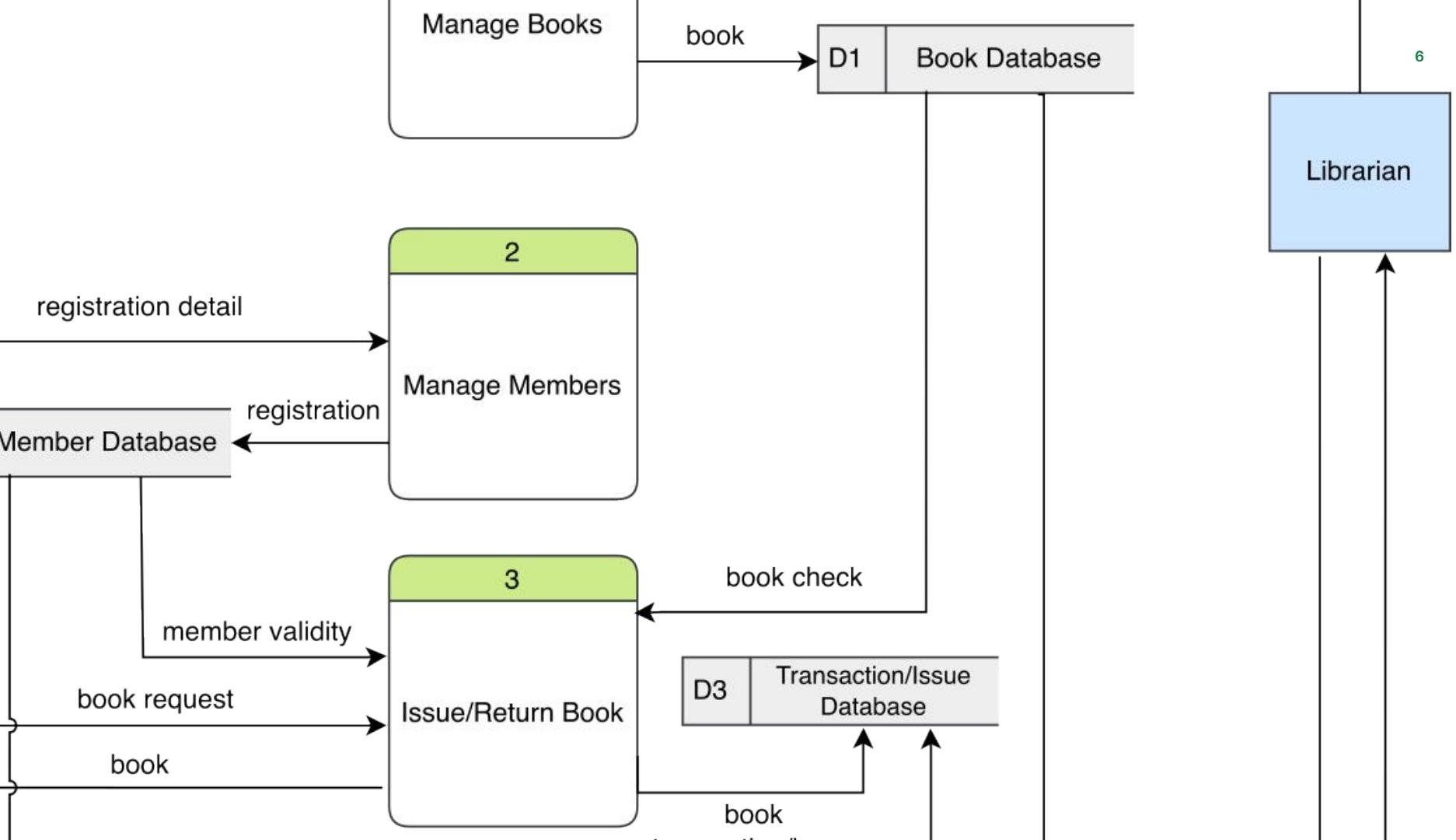
DFD 0 (Context Diagram)

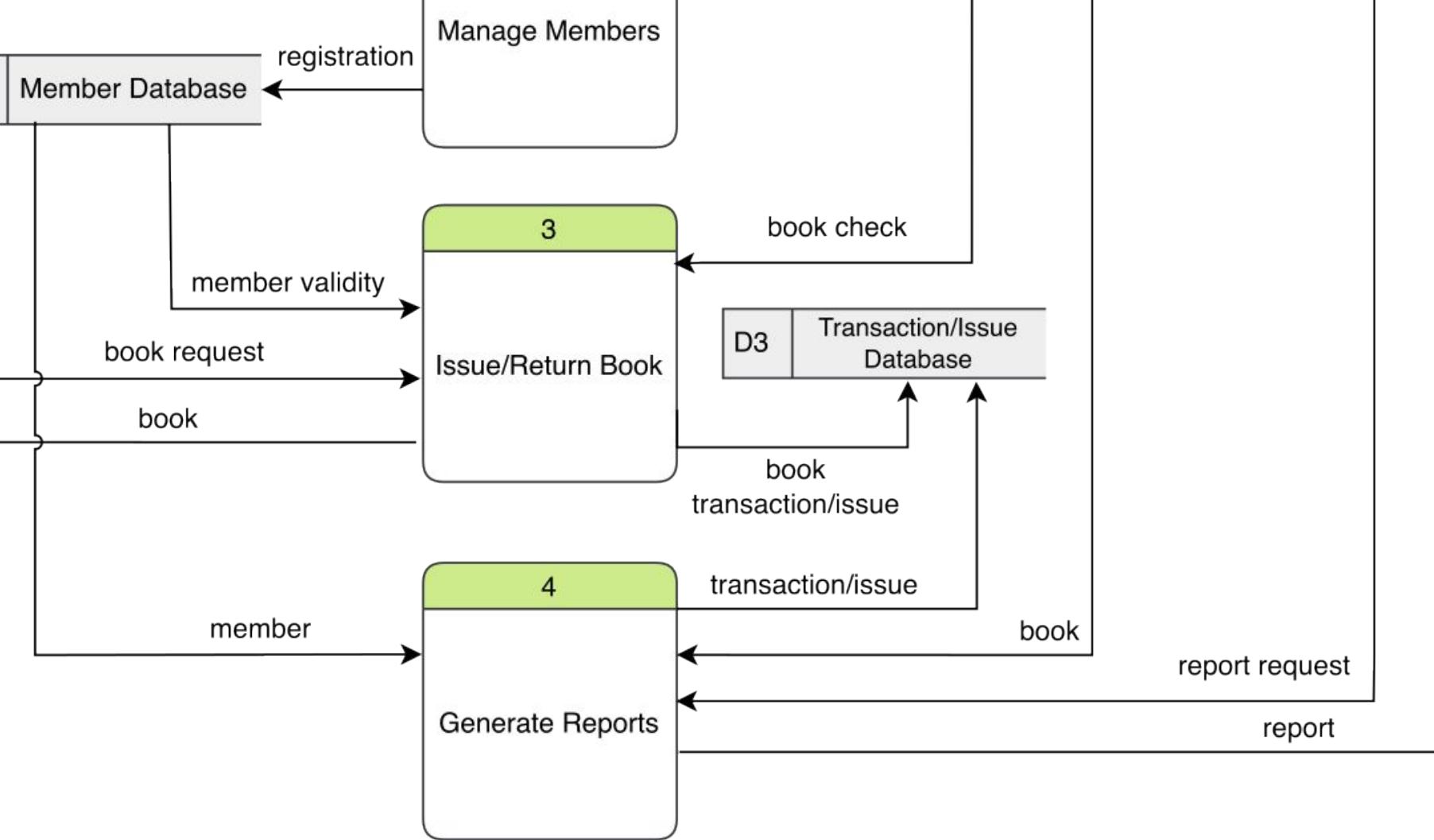
We use Gane-Sarson notation for Data Flow Diagram.



DFD 1

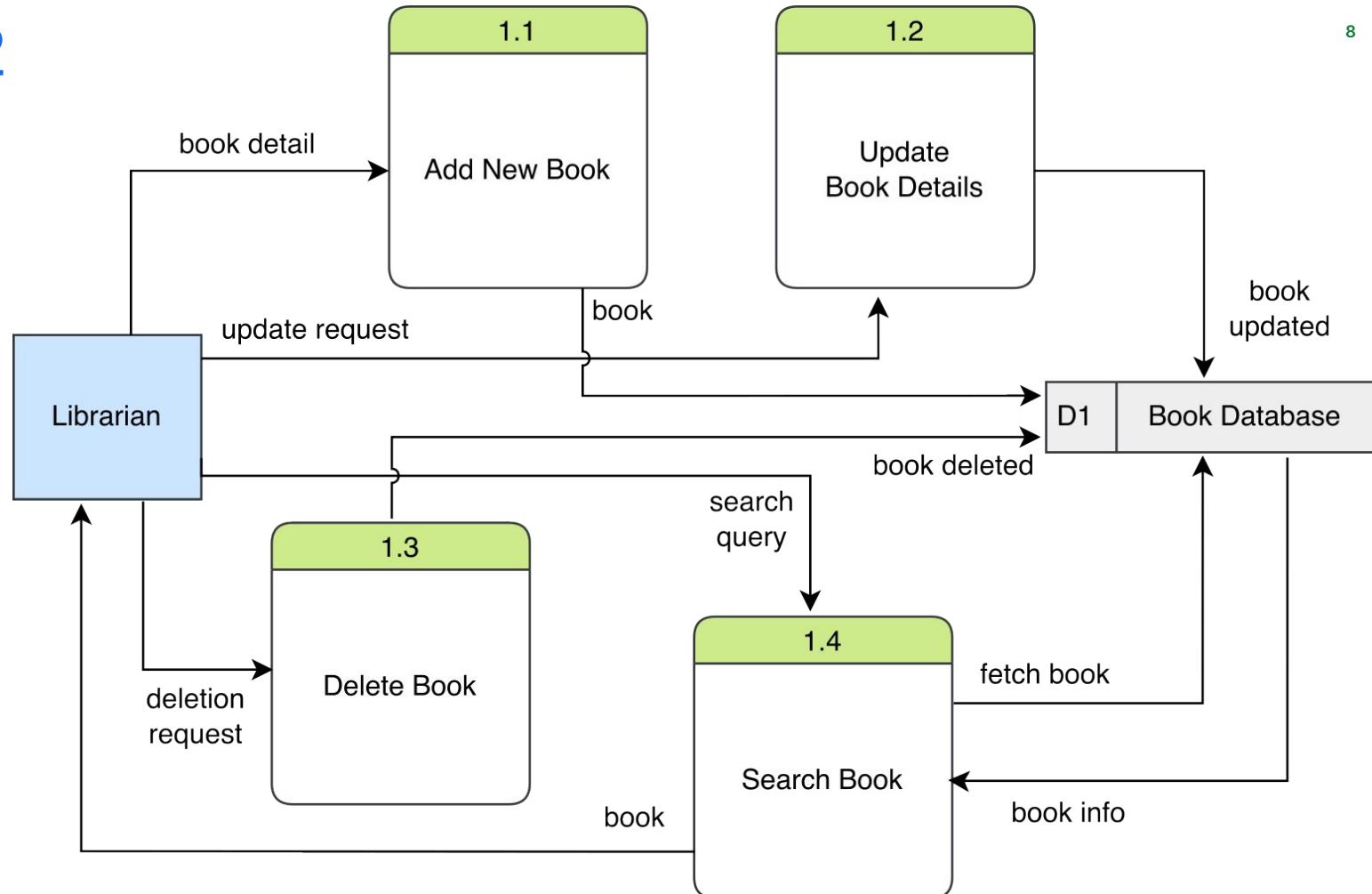


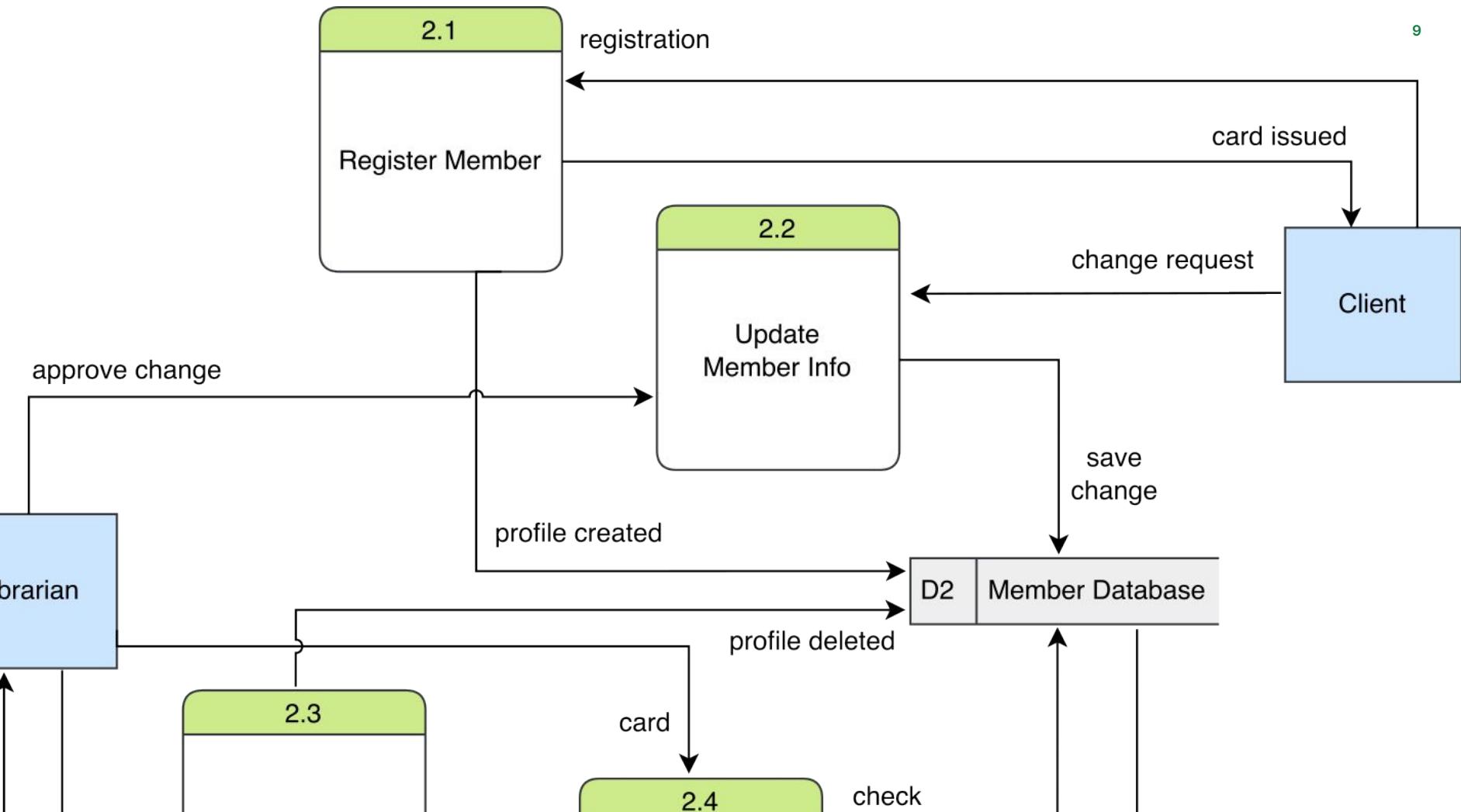


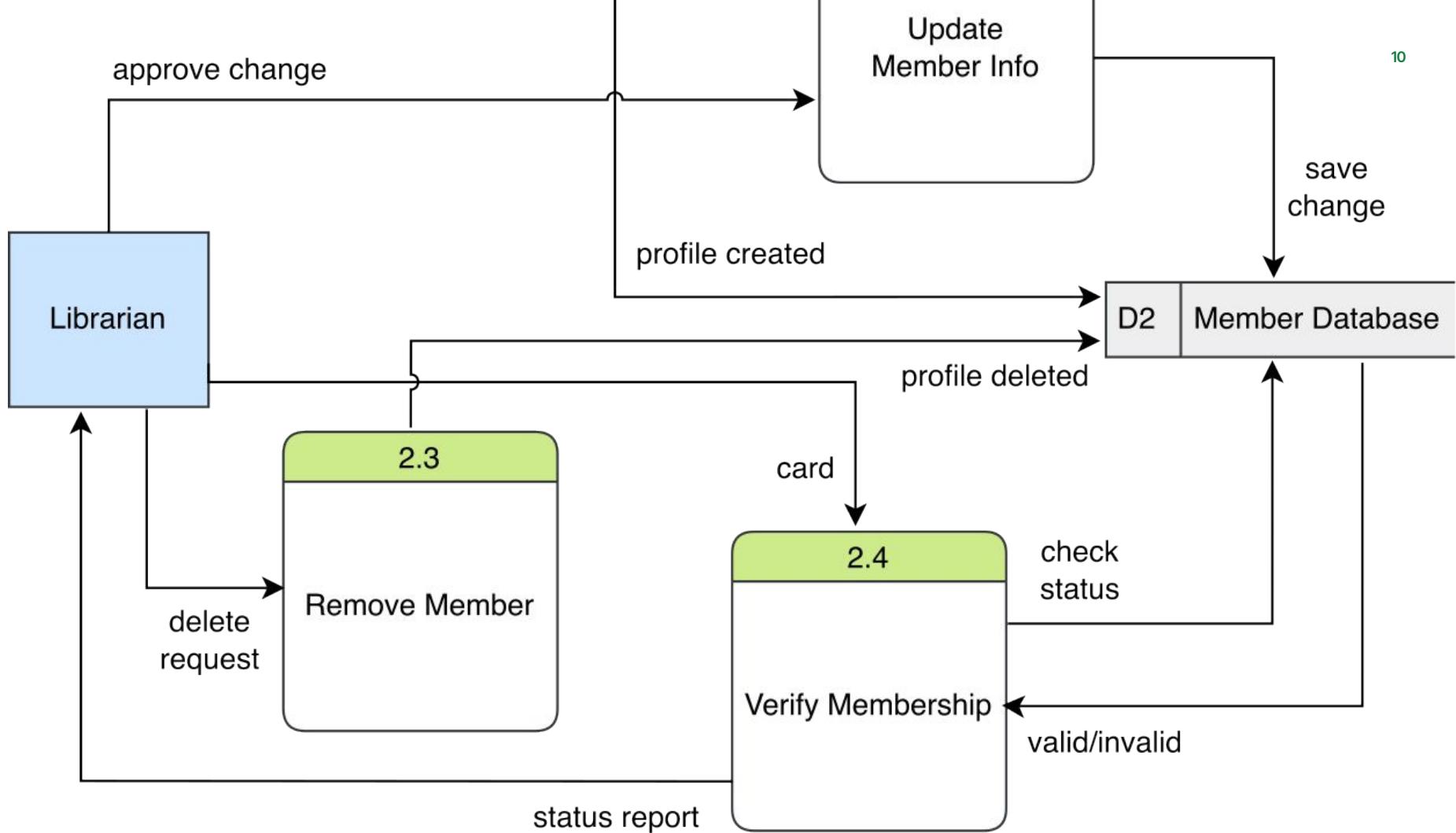


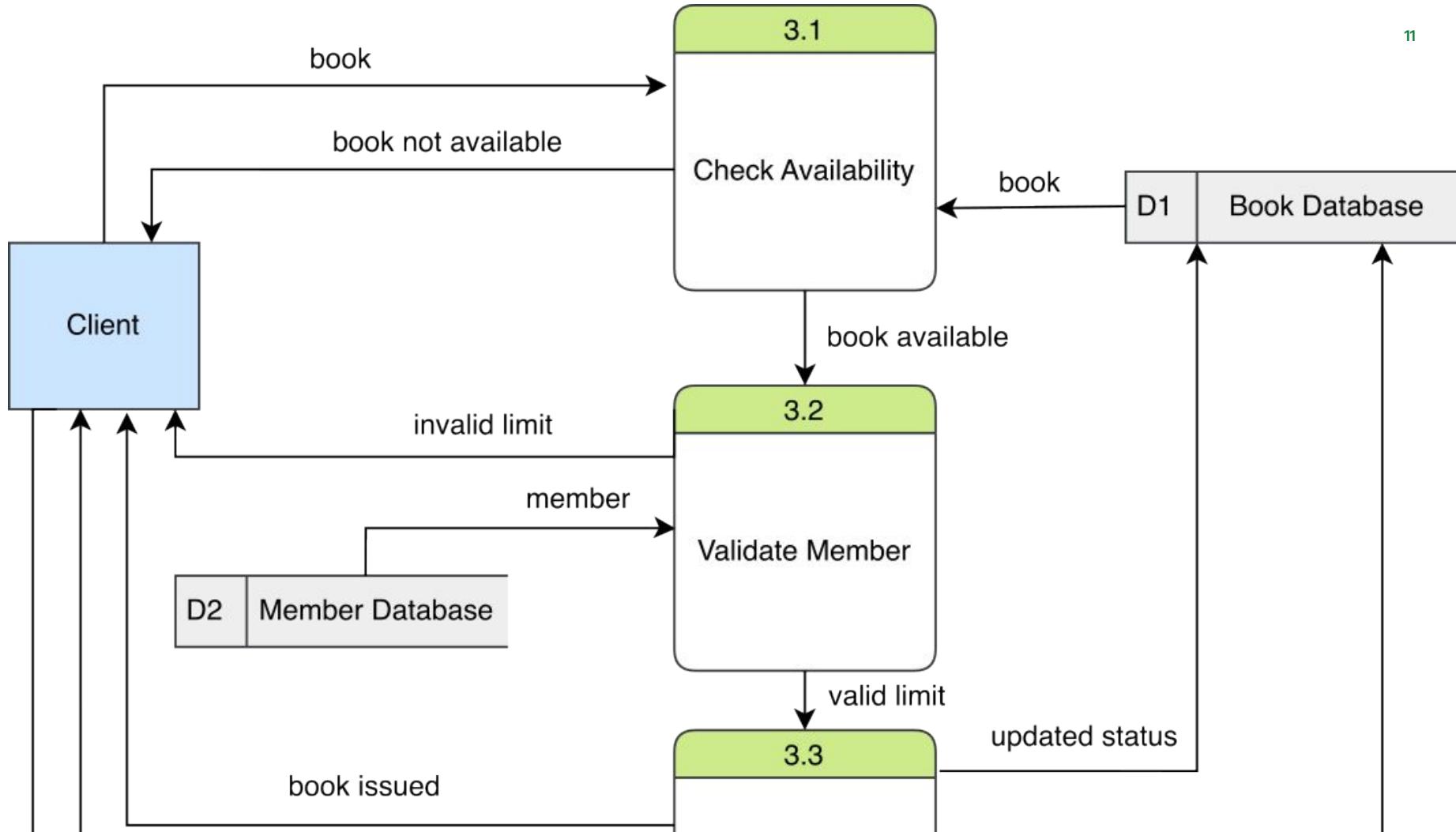
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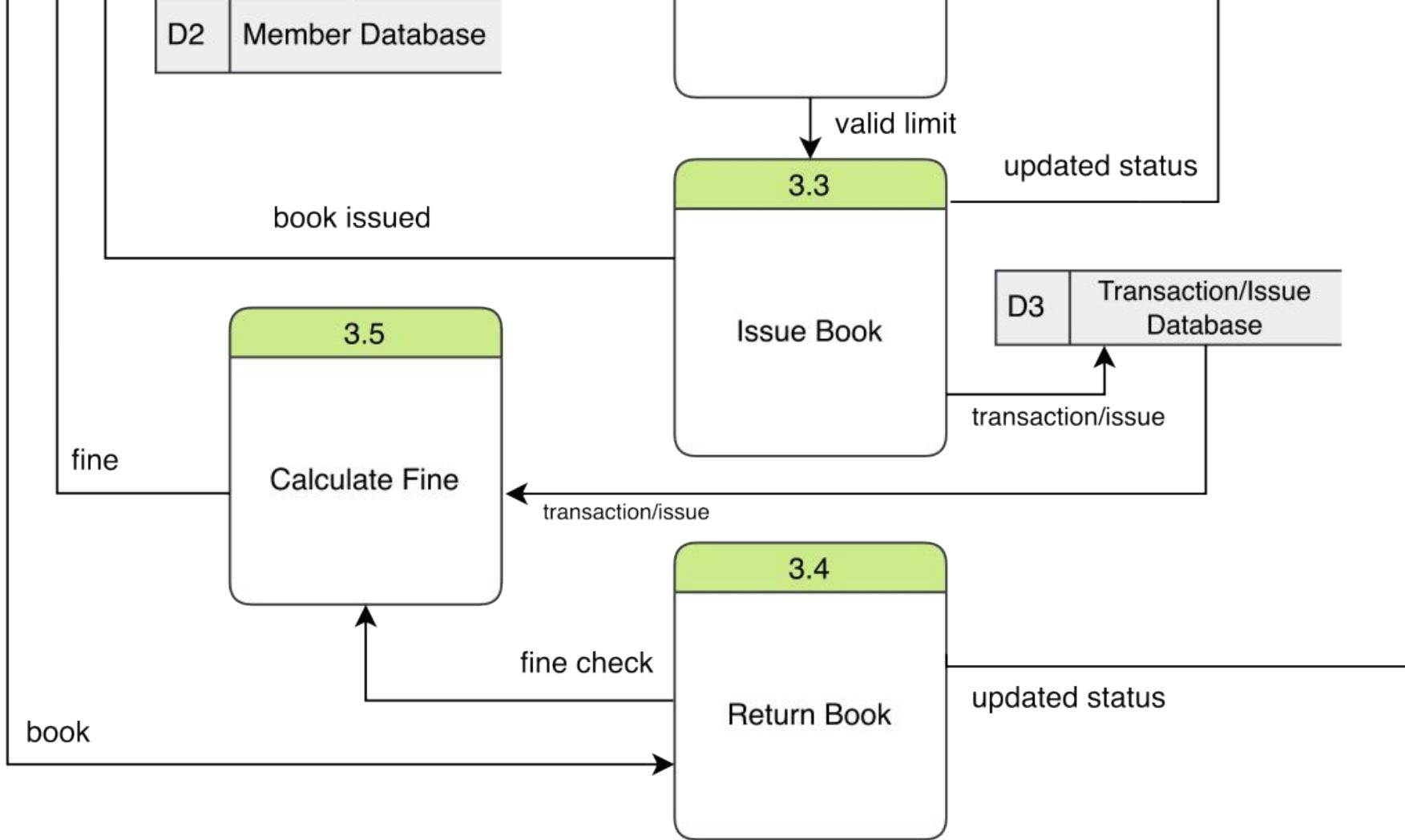
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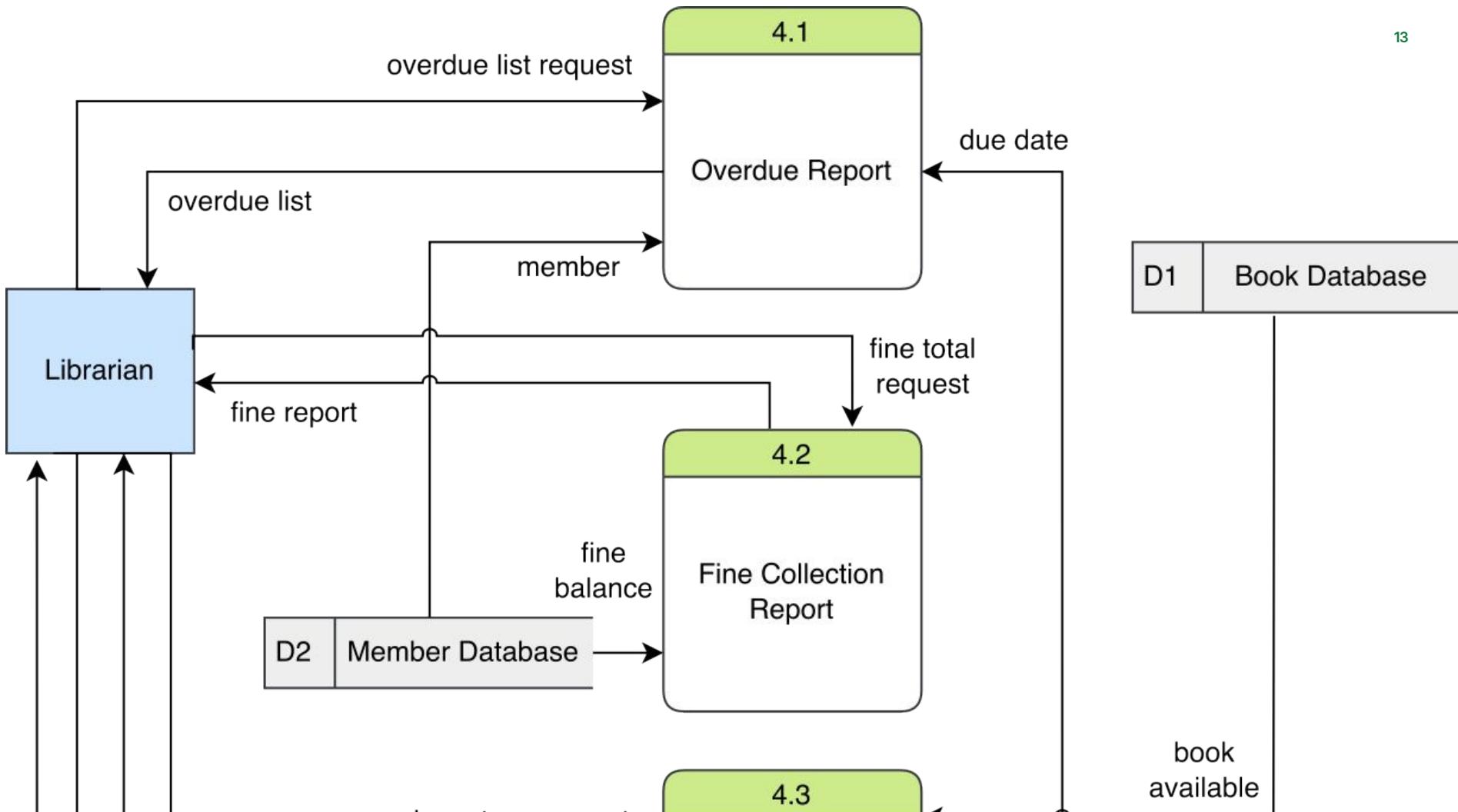


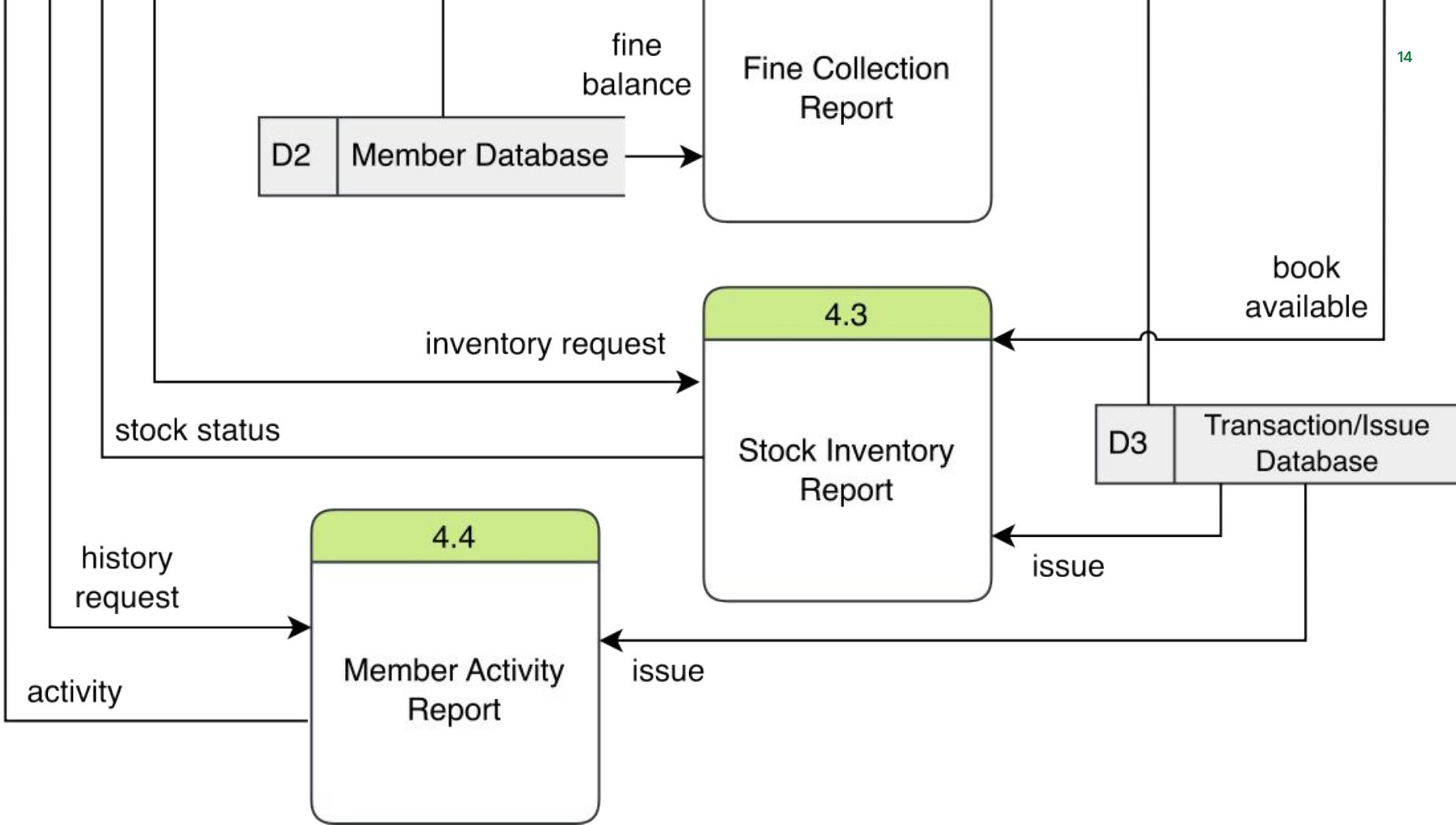






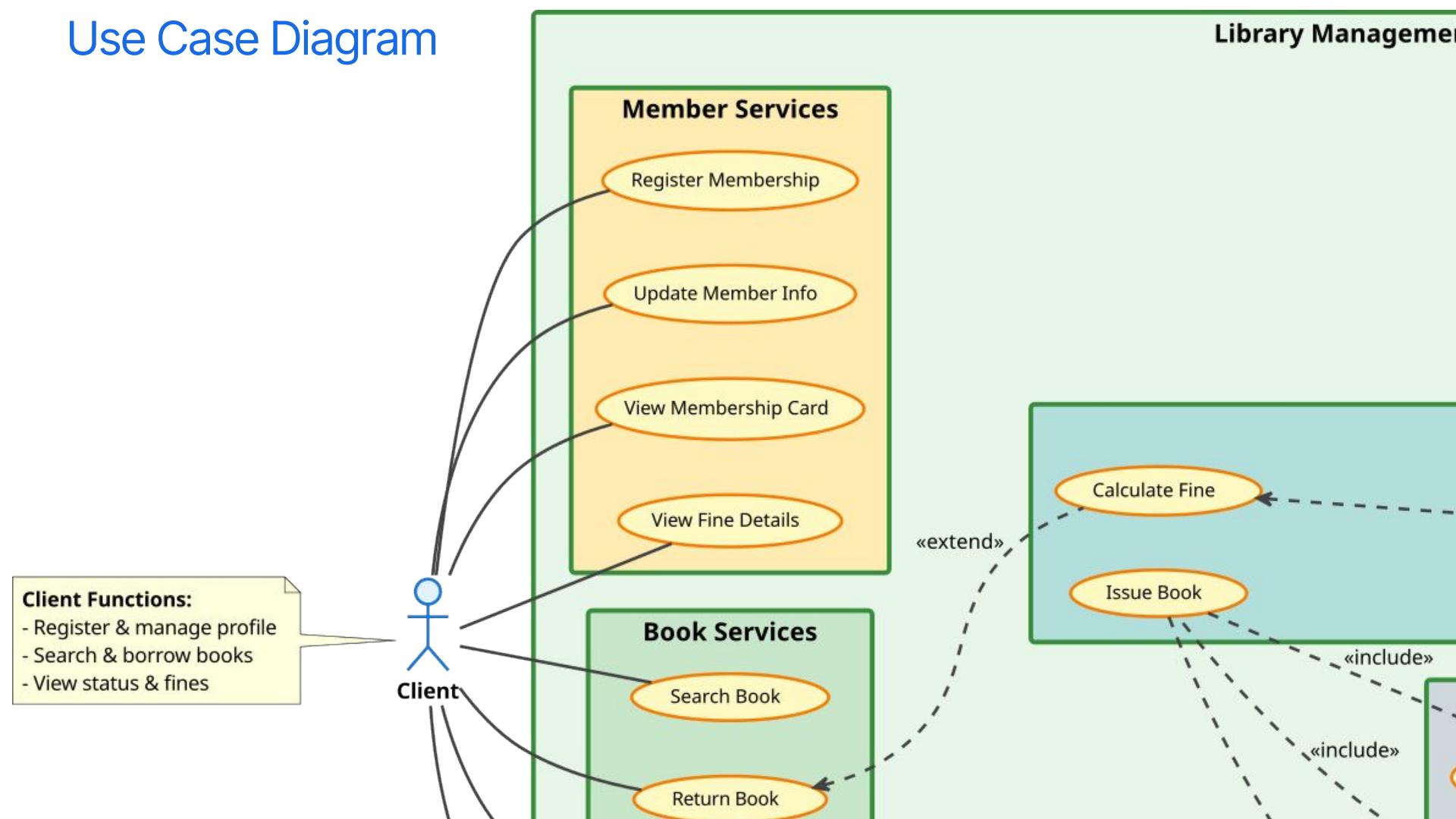




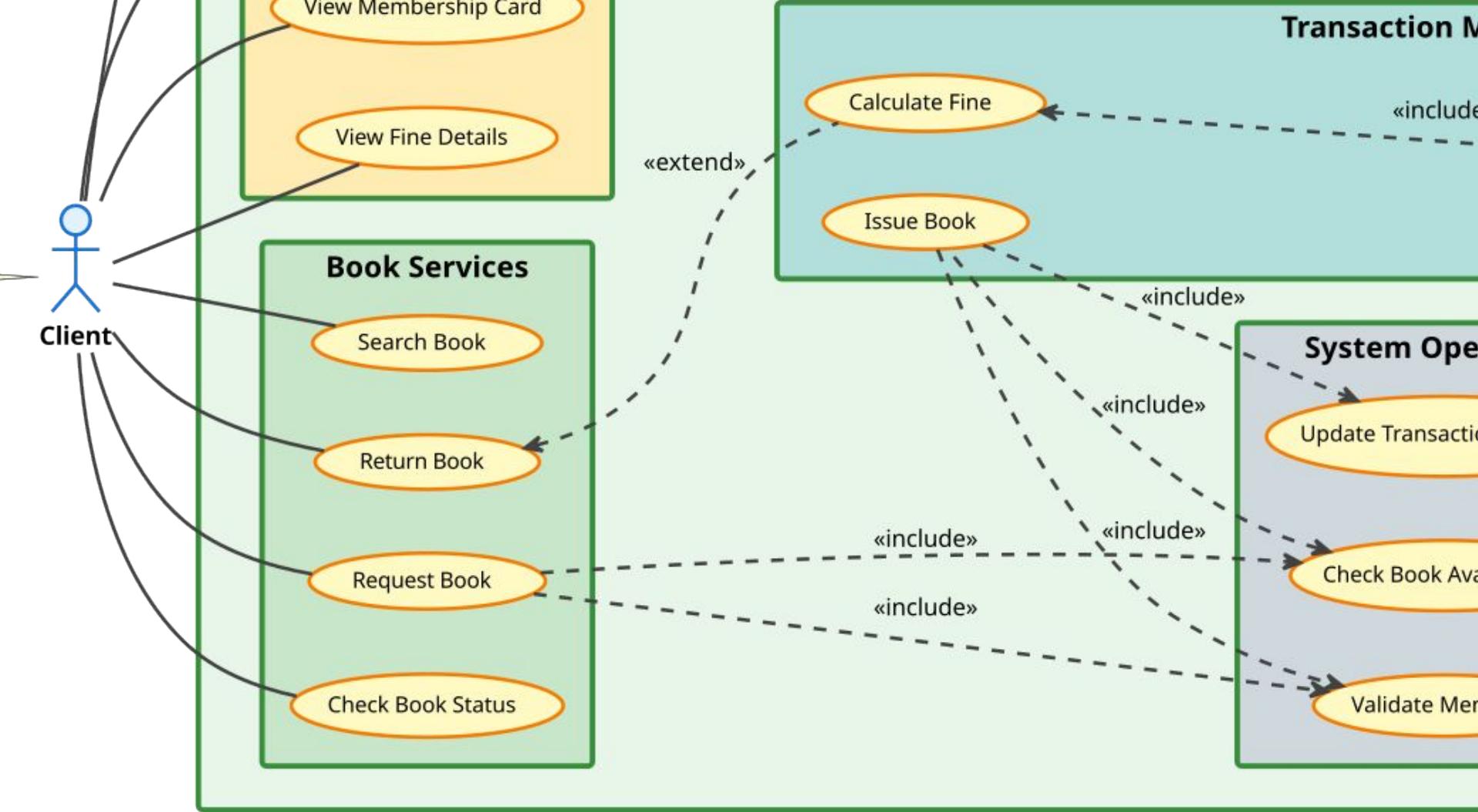


Use Case Diagram

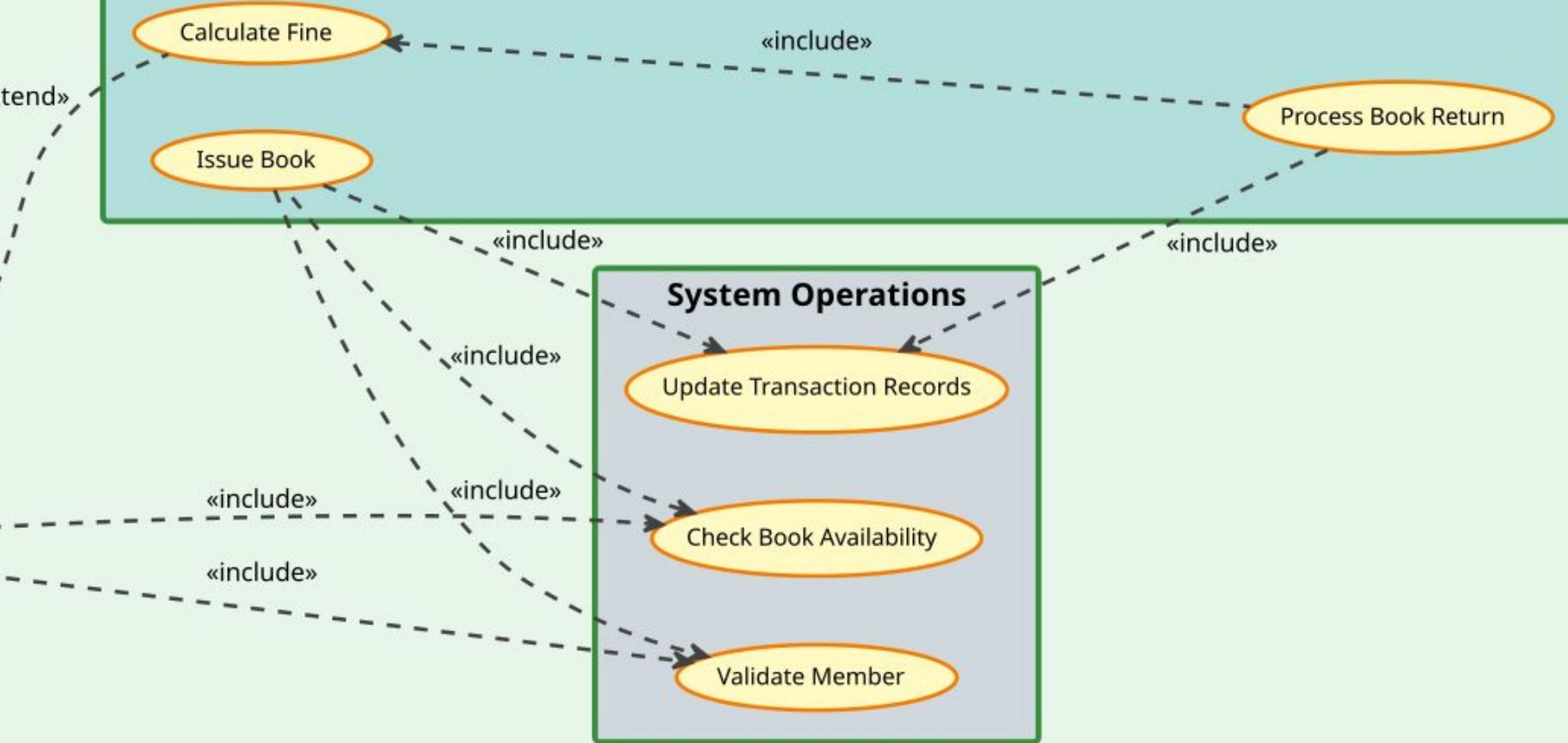
Library Management

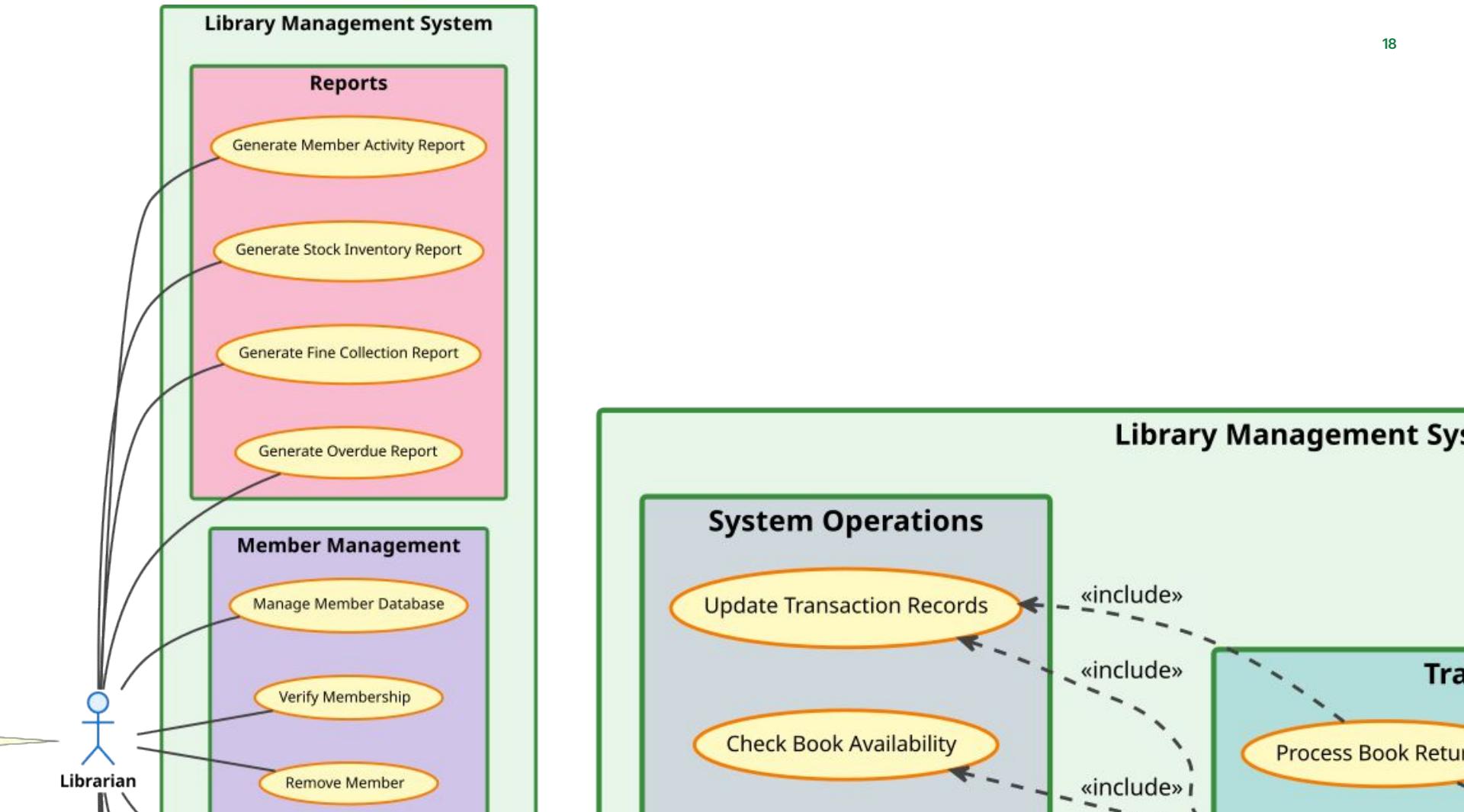


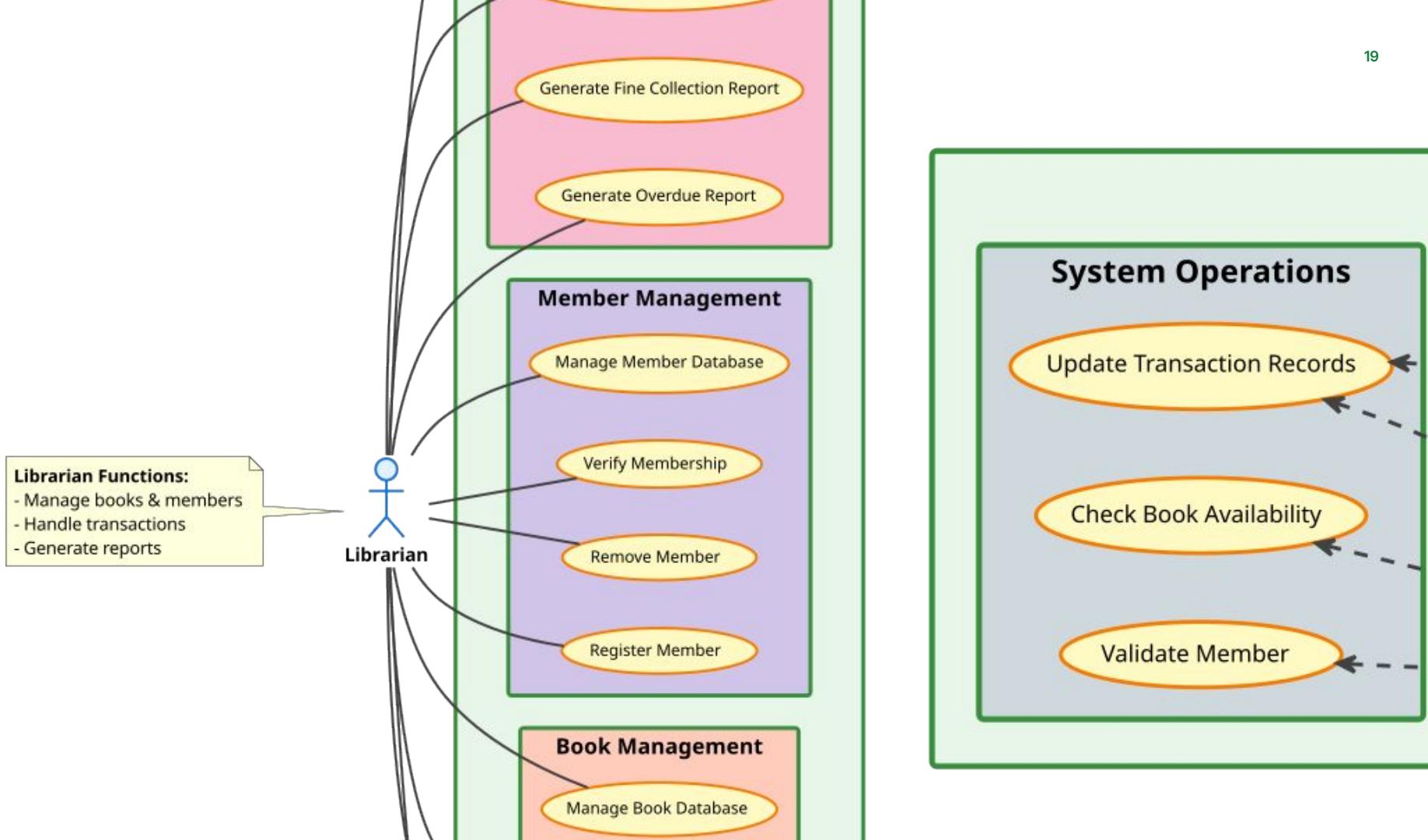
Transaction M



Transaction Management

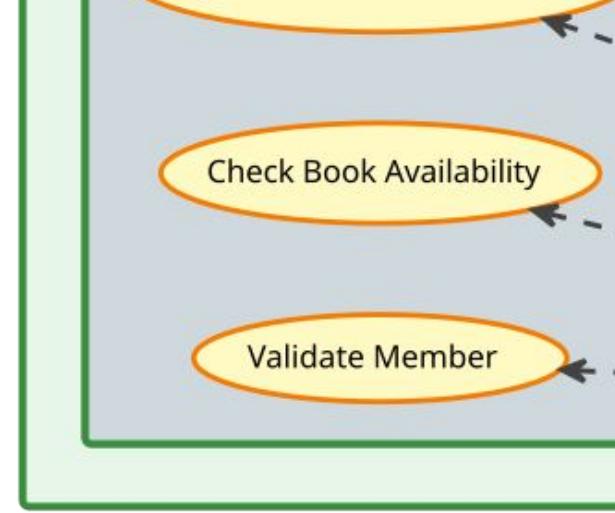
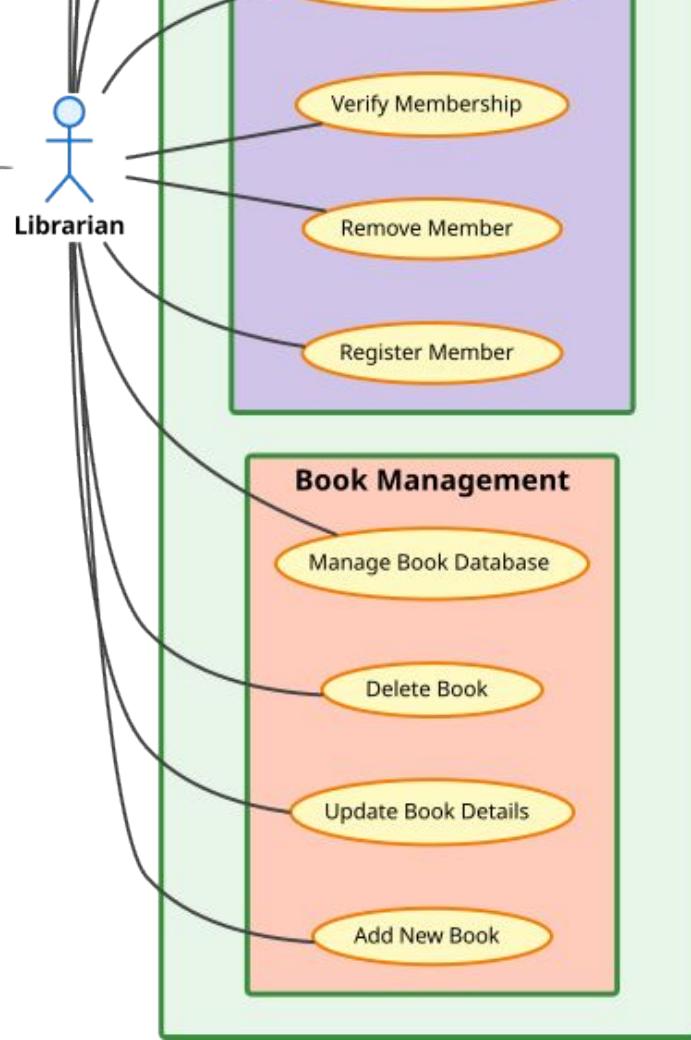




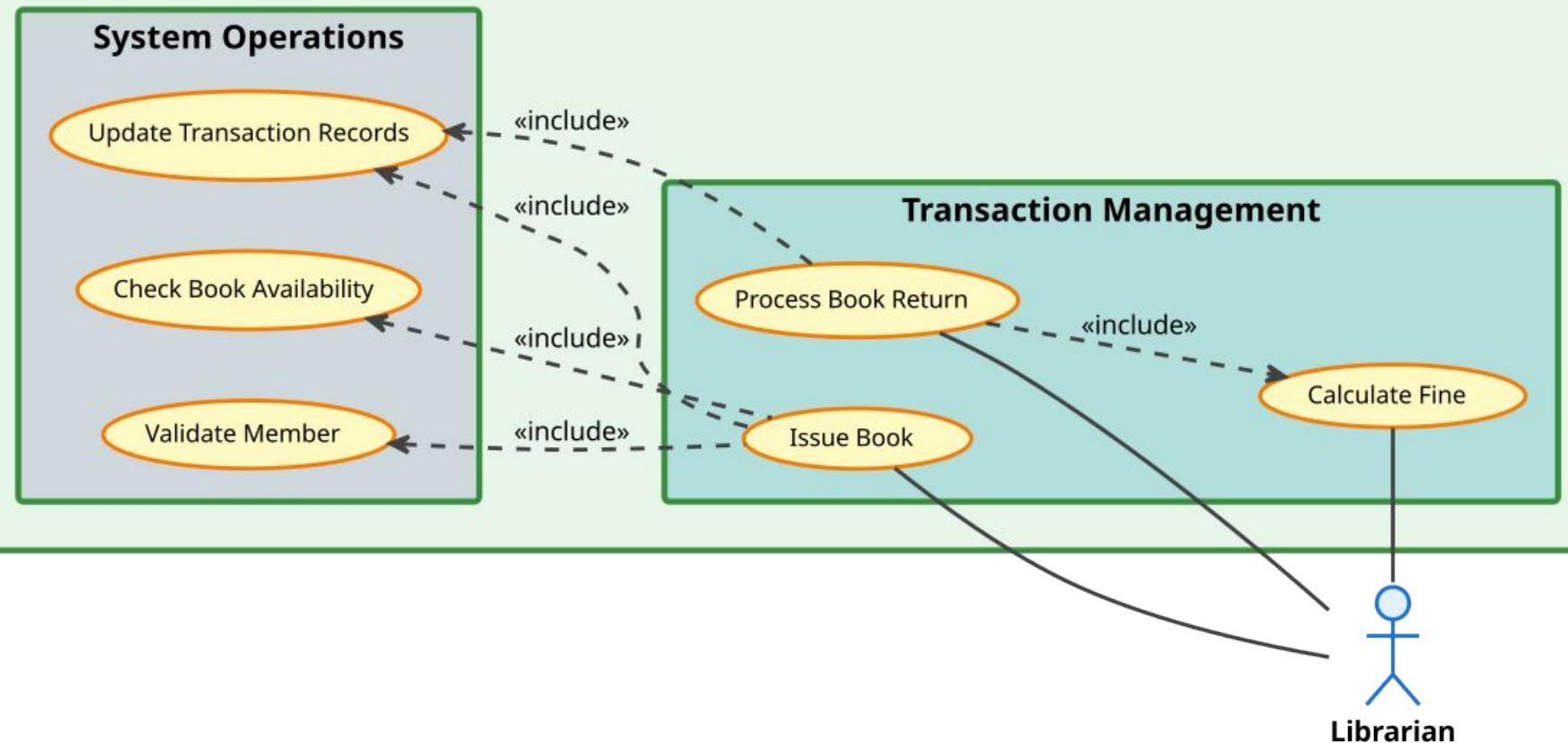


Librarian Functions:

- Manage books & members
- Handle transactions
- Generate reports

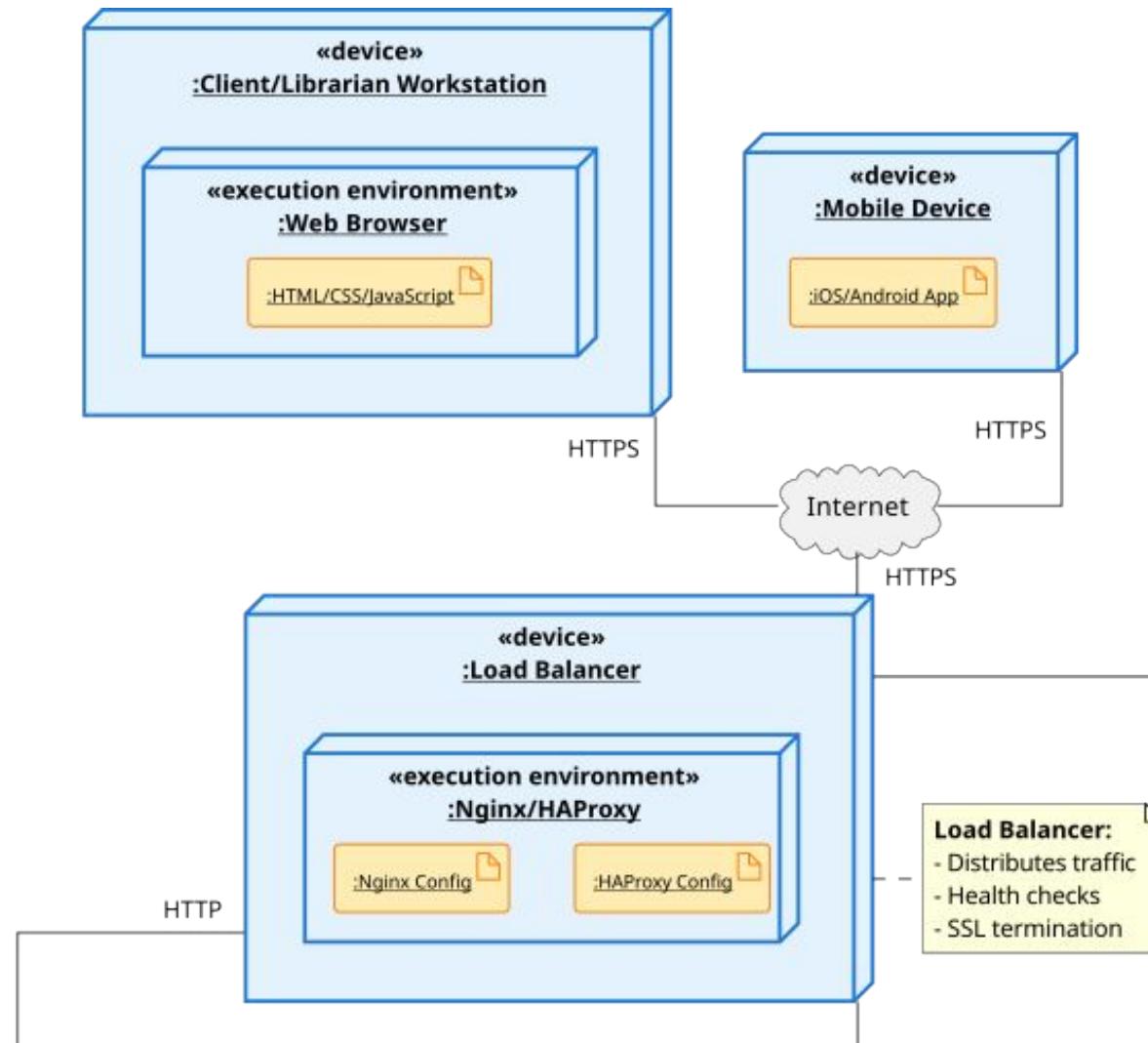


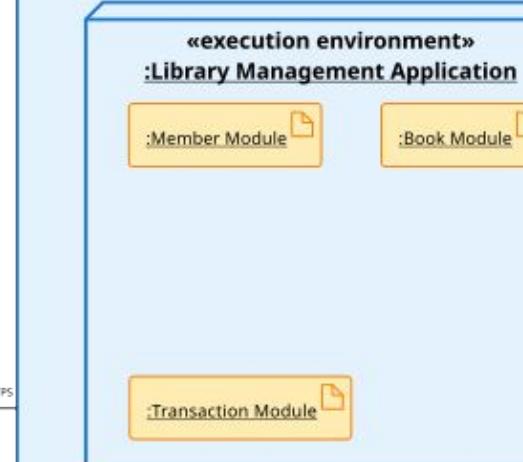
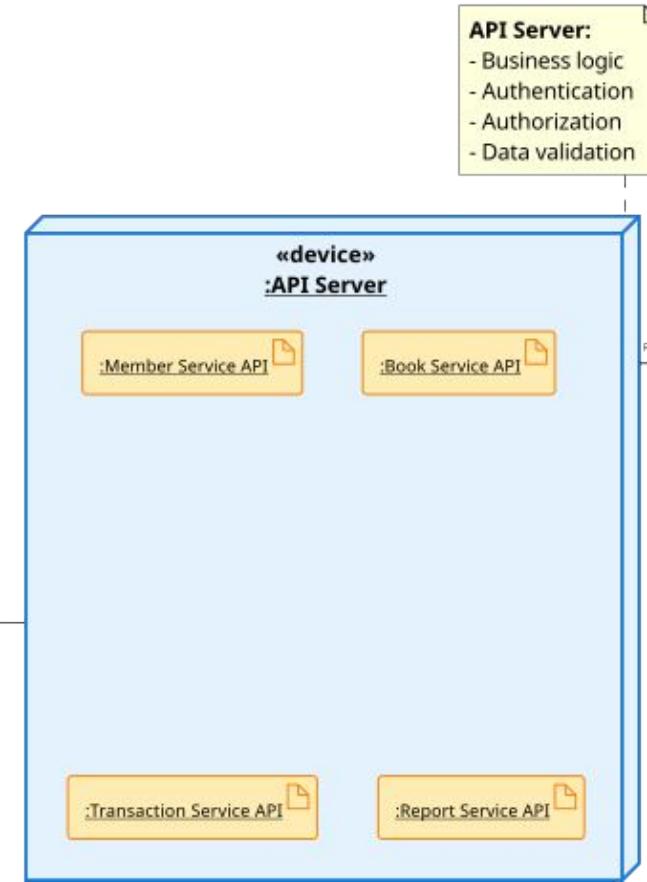
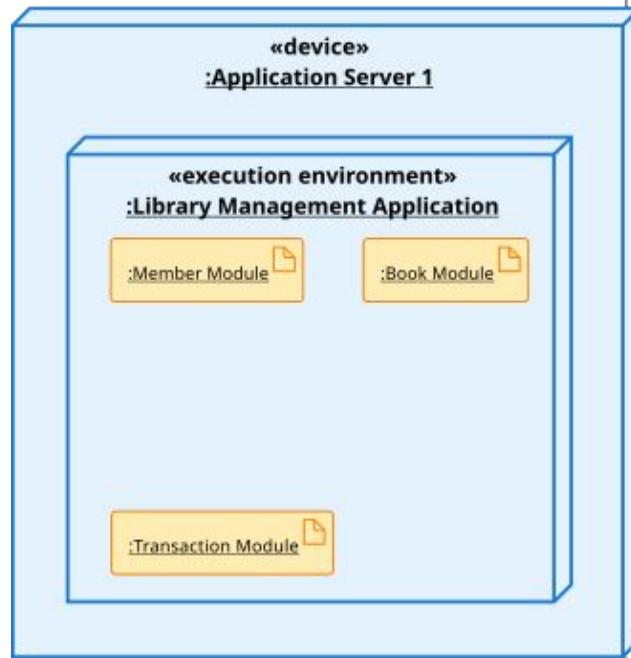
Library Management System

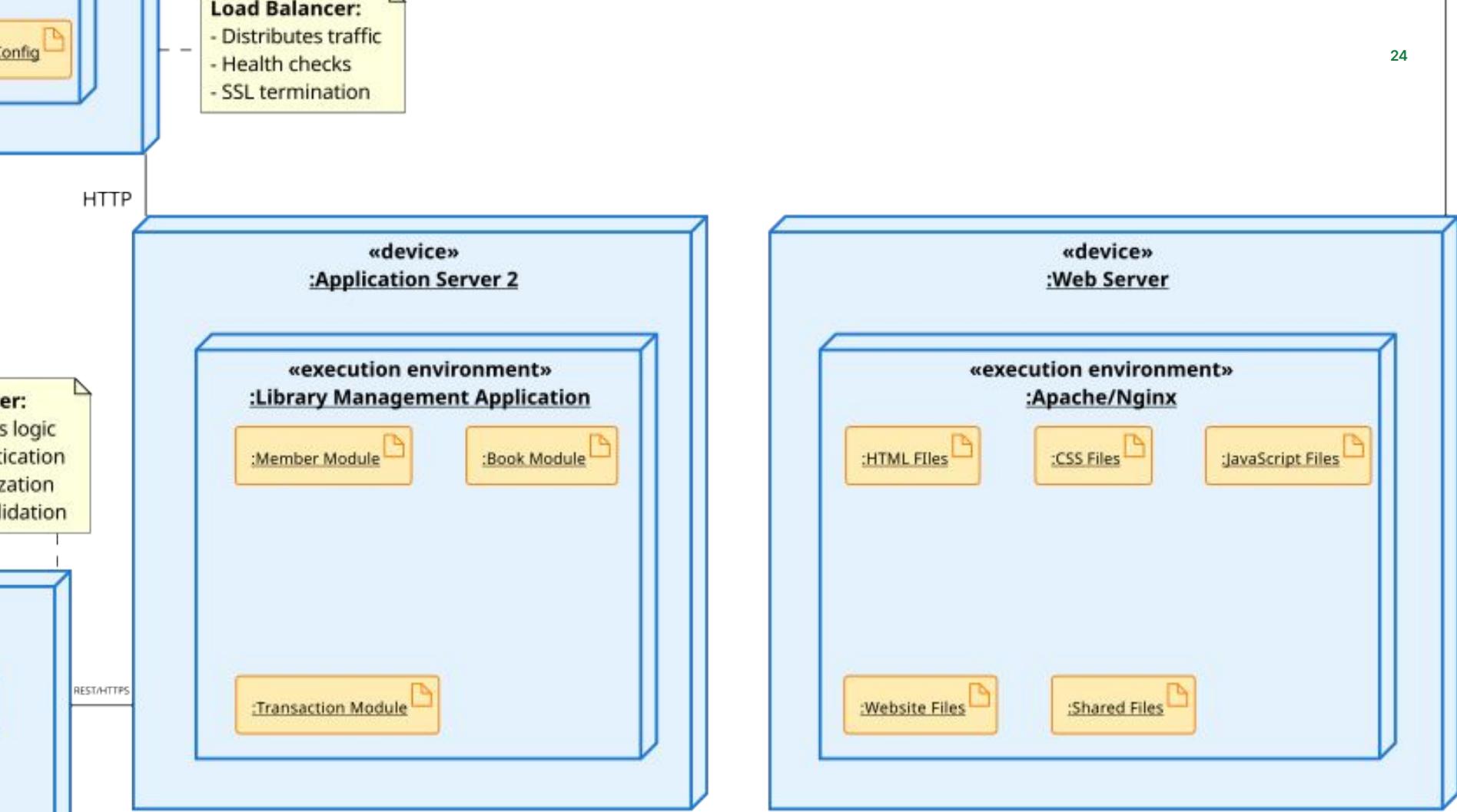


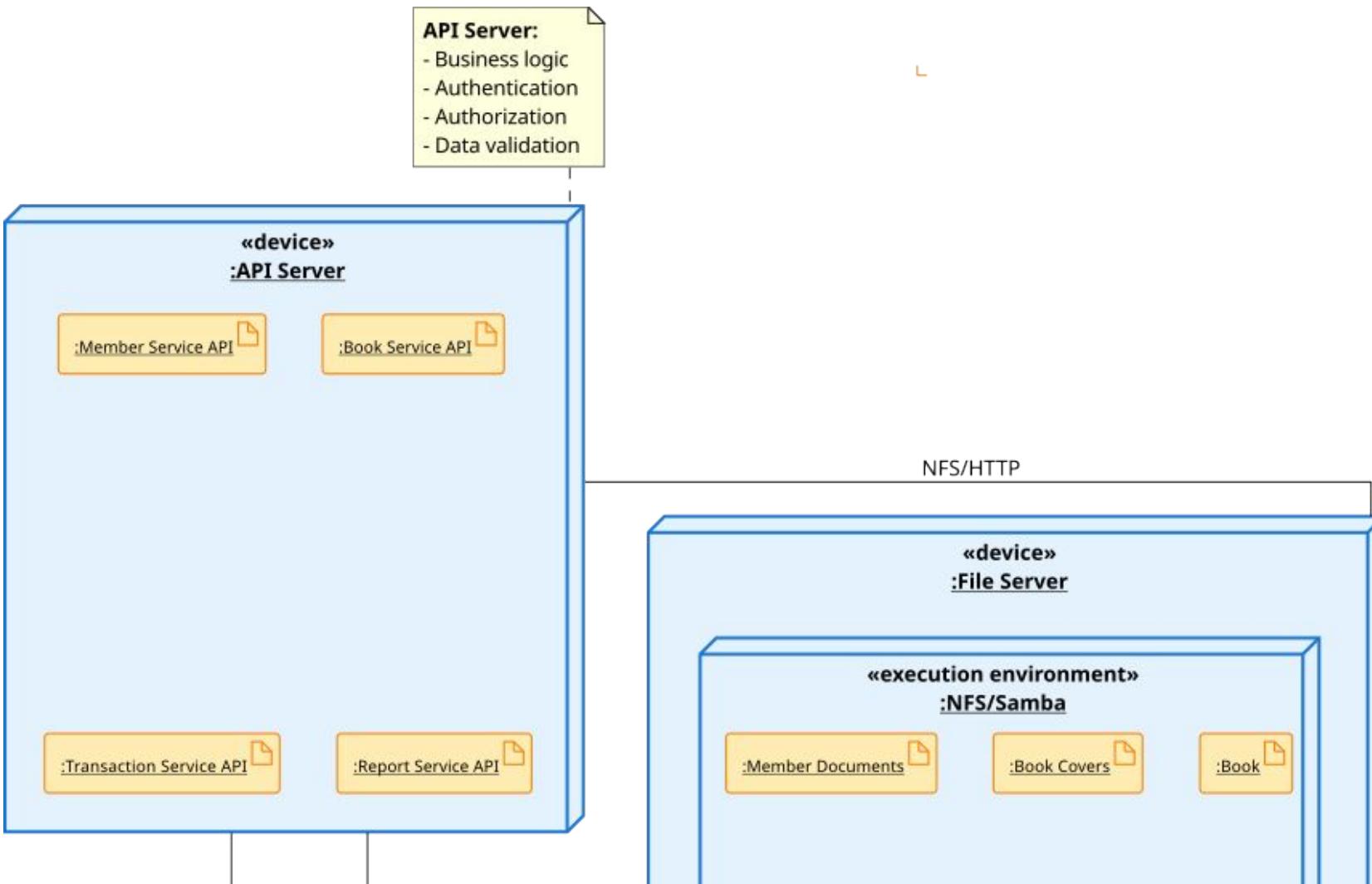
Deployment Diagram

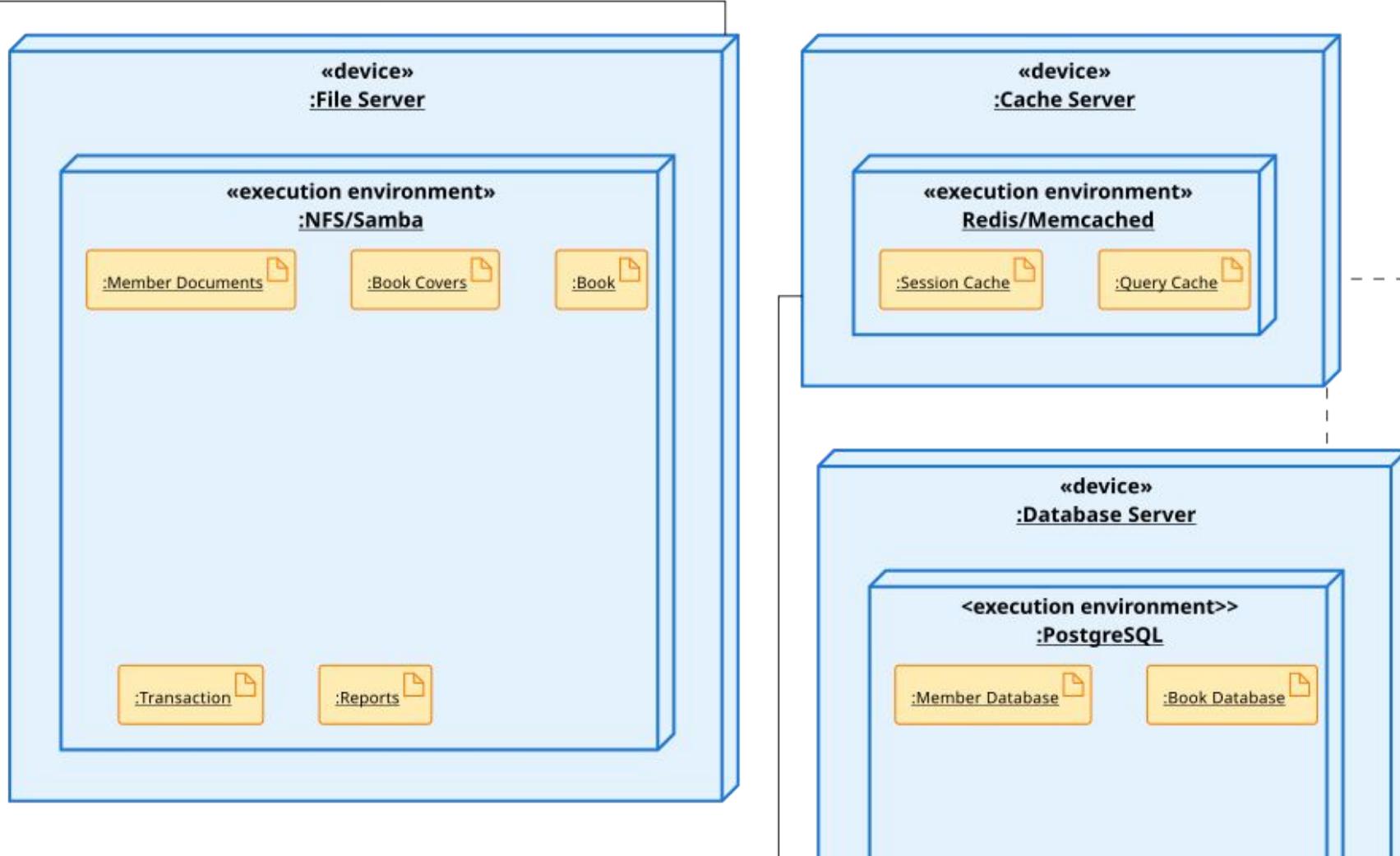
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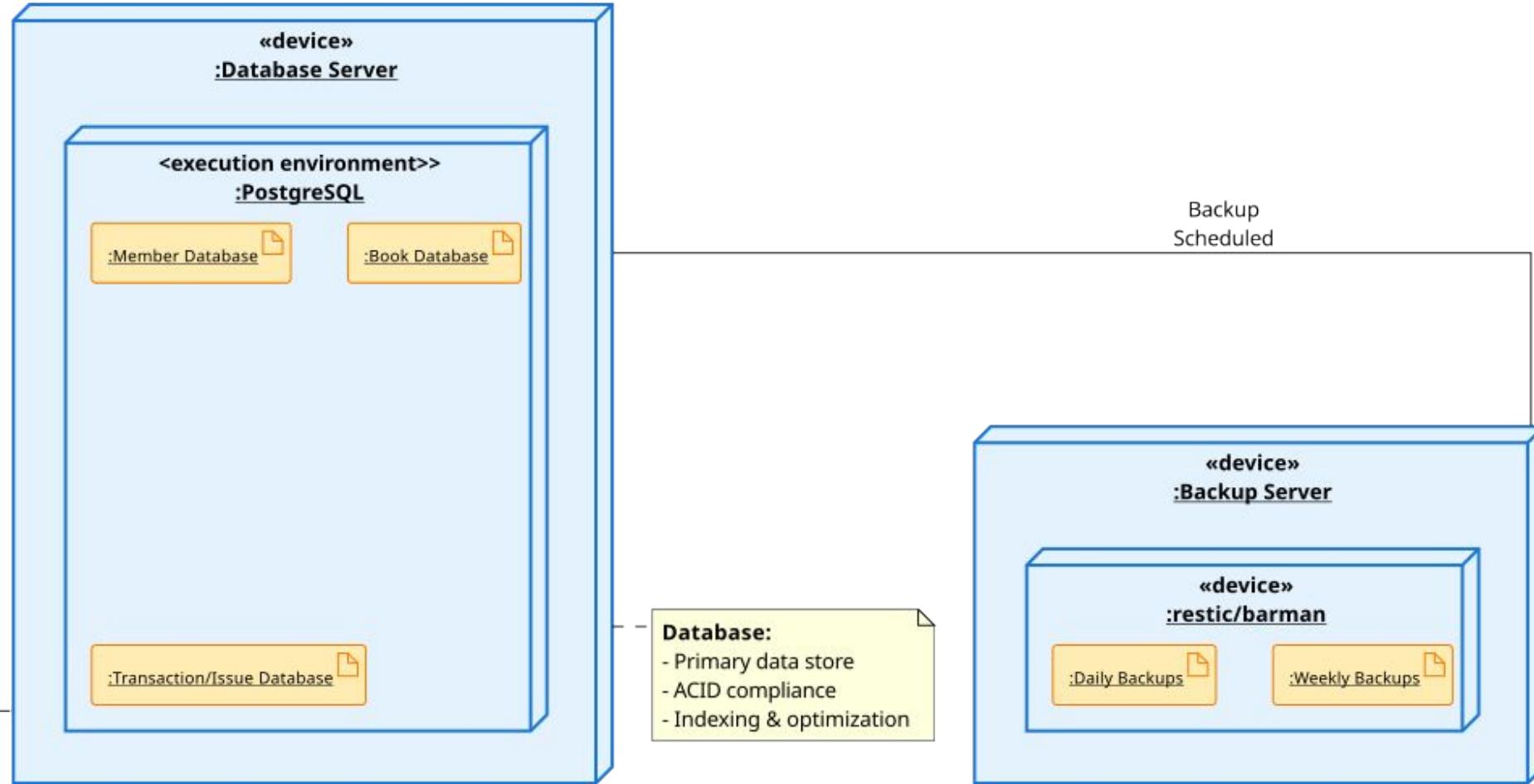






Caches

- Session
- Query
- Persistence



ERD (Entity Relationship Diagram)

Book_Authors		
string	ISBN	PK,FK
int	AuthorID	PK,FK

DigitalAccessLogs		
int	AccessID	PK
int	UserID	FK
int	AssetID	FK
string	AccessTimestamp	
string	IPAddress	

We use Crow's Foot
Notation for ERD.

Loans		
int	LoanID	PK
string	ICRNL	FK

Loans

int	LoanID	PK
string	ISBN	FK
int	UserID	FK
int	StaffID	FK
string	IssueDate	
string	DueDate	
string	ReturnDate	
enum	Status	

DigitalAssets

int	AssetID	PK
string	ISBN	FK
enum	FileFormat	
decimal	FileSizeMB	
string	DownloadURL	
enum	AccessLevel	

processed by

references

digital version of

logs access to

Diagram illustrating the Readers entity structure:

Readers		
int	UserID	PK
string	FirstName	
string	LastName	
string	Email	UK
string	PhoneNumber	
string	Address	
string	JoinDate	

Diagram illustrating the Staffs entity structure:

Staffs		
int	StaffID	PK
string	StaffName	
string	LoginID	UK
string	Password	
bool	CanManageDigital	

Diagram illustrating the Books entity structure:

Books	
string	ISBN
string	Title
string	Editor
decimal	Price
enum	BookType
int	PubYear
int	Category

published by

belongs to

processed by

references

processes by

Staffs		
int	StaffID	PK
string	StaffName	
string	LoginID	UK
string	Password	
bool	CanManageDigital	

references

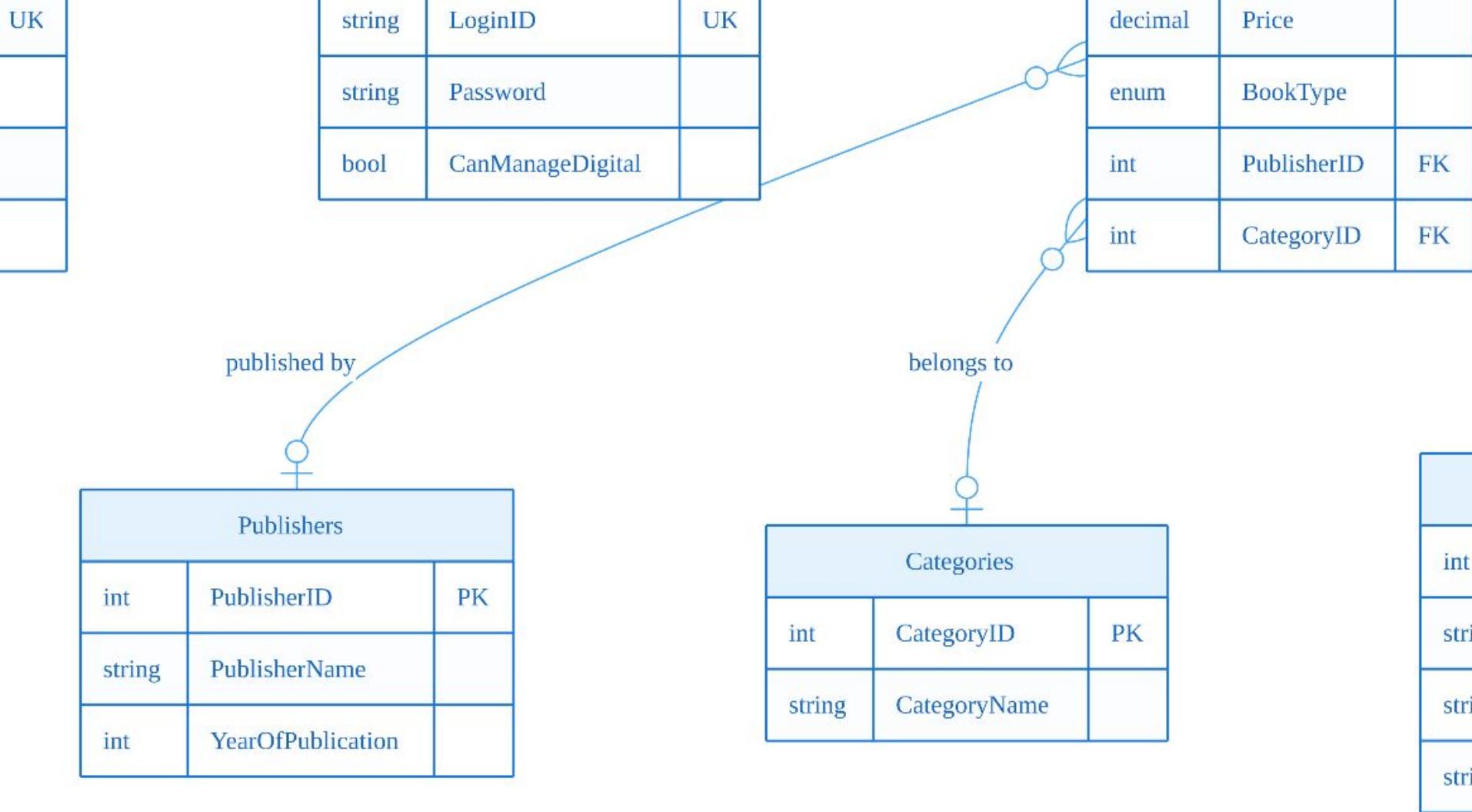
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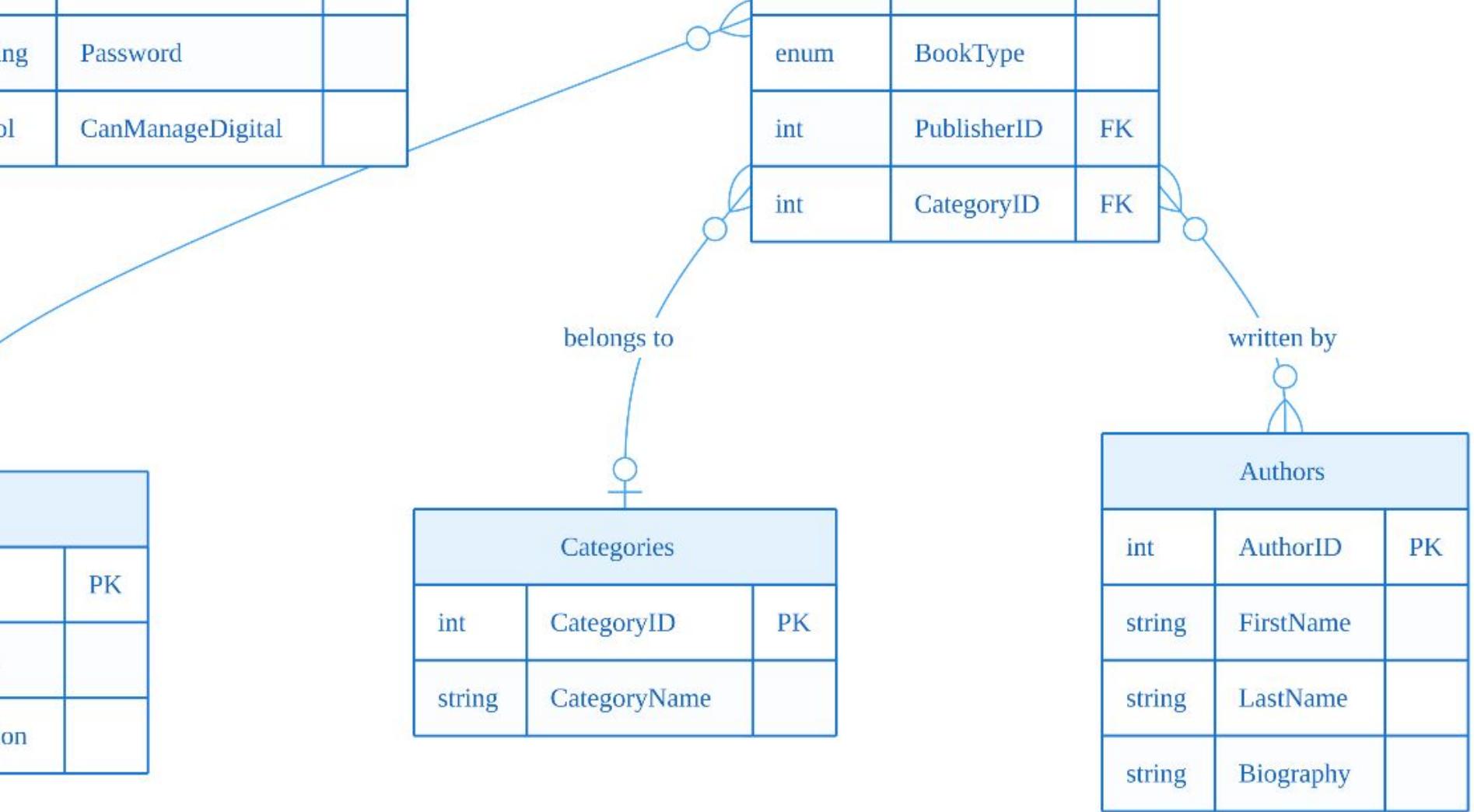
written by

published by

belongs to

string	ISBN	PK
string	Title	
string	Edition	
decimal	Price	
enum	BookType	
int	PublisherID	FK
int	CategoryID	FK





Role

Value ▾

Username

Value

Password

Value

Sign In

[Forgot password?](#)

Email

Value

Cancel **Reset Password**

Username

Value

Email

Value

Password

Value

Register

Dashboard

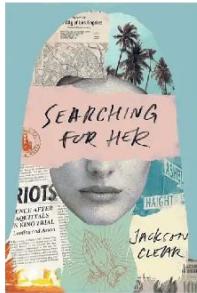
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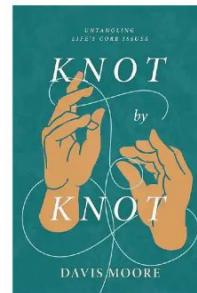
Oldest



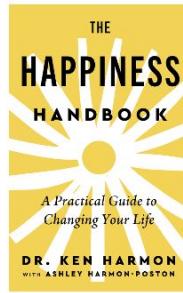
Searching For Her
Rick Mofina



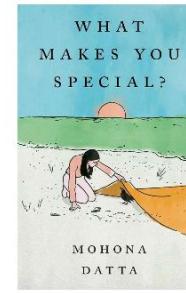
For Love I Will
C. D. Sterling



Knot by Knot
Davis Moore



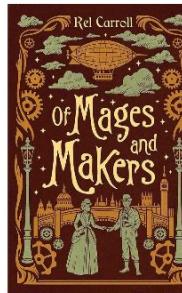
The Happiness Handbook
Landon Carter



What Makes You Special
Britt Hallowell



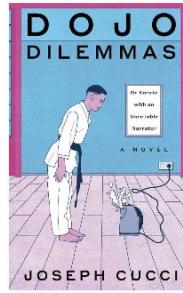
Dalia Does a Mitzvah
Jenna D.



Of Mages and Makers
Rel Carroll



Manly Man of God
Katharine Strange



Dojo Dilemmas
Joseph Henry Cucci



Beyond the Ocean Door
Britt Hallowell







Sou Chanrojame



Sample document

Sample document



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Sample document



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what is java language?

Java is a high-level, object-oriented programming language created by Sun Microsystems (now owned by Oracle). It is designed to be platform-independent, meaning a Java program can run on different operating systems without modification by using the Java Virtual Machine (JVM).

Java is widely used to build web applications, mobile apps (especially Android), desktop software, enterprise systems, and server-side applications. It emphasizes security, reliability, and performance, with features such as automatic memory management (garbage collection), strong typing, and a rich standard library.

Because of its "write once, run anywhere" principle, strong community support, and scalability,

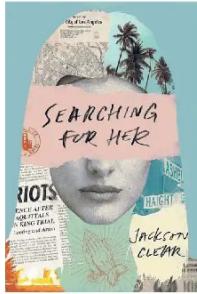
Java is commonly used in large systems like banking software, enterprise platforms, and cloud services.



Ask anything



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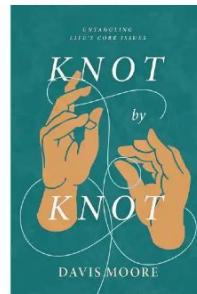
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Rick Mofina

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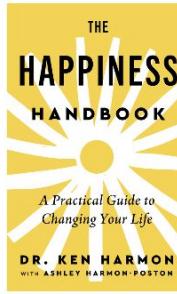
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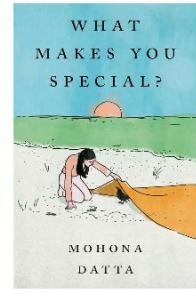
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Librarian



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Book



Report



Member



Fine



Loan



Profile

 Search Book

Sou Chanrojame



First name

Chanrojame

Last name

Sou

Password

Current password

New password

Role

Librarian

Save



Book Management



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Sou Chanrojame



Add book

Title ↓	Edition ↓	Price ↓	Status ↓	Type ↓	Author ↓	Action ↓
Searching For Her	1	\$1	Active	Physical	Rick Mofina	<button>Edit</button> <button>Delete</button>
For Love I Will	2	\$2	Inactive	Physical	C. D. Sterling	<button>Edit</button> <button>Delete</button>
Knot by Knot	4	\$4	Active	Both	Davis Moore	<button>Edit</button> <button>Delete</button>
The Happiness Handbook	1	\$1	Active	Physical	Landon Carter	<button>Edit</button> <button>Delete</button>
What Makes You Special	2	\$2	Active	Digital	Britt Hallowell	<button>Edit</button> <button>Delete</button>
Dalia Does a Mitzvah	3	\$3	Inactive	Digital	Jenna D.	<button>Edit</button> <button>Delete</button>
Of Mages and Makers	4	\$4	Active	Physical	Rel Carroll	<button>Edit</button> <button>Delete</button>
Manly Man of God	1	\$1	Active	Both	Katharine Strange	<button>Edit</button> <button>Delete</button>
Dojo Dilemmas	3	\$3	Active	Digital	Joseph Henry Cucci	<button>Edit</button> <button>Delete</button>
What Makes You Special	5	\$5	Active	Both	Britt Hallowell	<button>Edit</button> <button>Delete</button>



Member



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Sou Chanrojame

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First name ↓	Last name ↓	Email ↓	Phone number ↓	Join Date ↓	Action ↓
Thida	Sok	sokthida168@gmail.com	016 689 732	1/2/2003	Edit Delete
Vuth	Meas	measvuth168@gmail.com	016 689 733	1/2/2003	Edit Delete
Sovann	Da	dasovann168@gmail.com	016 689 734	1/2/2003	Edit Delete
Dara	Sam	samdara168@gmail.com	016 689 735	1/2/2004	Edit Delete
Oudom	Ty	tyoudom168@gmail.com	016 689 737	1/2/2003	Edit Delete
Mike	Catty	cattymike168@gmail.com	016 683 732	1/2/2003	Edit Delete
Robert	Cathy	cathyrobert168@gmail.com	013 689 732	1/2/2003	Edit Delete
Vatey	Som	somvatey168@gmail.com	019 689 732	1/2/2003	Edit Delete
Somnang	Ly	lysomnang168@gmail.com	019 189 732	1/2/2003	Edit Delete
Thorn	Van	vanthorn168@gmail.com	019 649 732	1/2/2003	Edit Delete

Loan



Search Book



Sou Chanrojame



Add Loan

Username	Staff name	Issue Date	Due Date	Return Date	Action
Pov Dara	Yem Thida	2/3/2015	2/3/2016	N/A	<button>Edit</button> <button>Delete</button>
Meas Thida	Yi Da	2/3/2015	2/3/2016	2/9/2015	<button>Edit</button> <button>Delete</button>
Chan Samuth	Lim Horn	2/3/2015	2/3/2016	2/7/2015	<button>Edit</button> <button>Delete</button>
Robert Julie	Lam Qi	2/3/2015	2/3/2016	2/7/2015	<button>Edit</button> <button>Delete</button>
Park jung	Sen Monika	2/3/2015	2/3/2016	2/7/2015	<button>Edit</button> <button>Delete</button>
Ma Sokleng	Bu Yi	2/3/2015	2/3/2016	N/A	<button>Edit</button> <button>Delete</button>
Mat Tokio	Om Dara	2/3/2015	2/3/2016	2/7/2015	<button>Edit</button> <button>Delete</button>
Tana Daigo	Albert Einstein	2/3/2015	2/3/2016	N/A	<button>Edit</button> <button>Delete</button>
Dai Zamasu	Bai Ma	2/3/2015	2/3/2016	N/A	<button>Edit</button> <button>Delete</button>
Om Pheak	Jack Heng	2/3/2015	2/3/2016	2/7/2015	<button>Edit</button> <button>Delete</button>

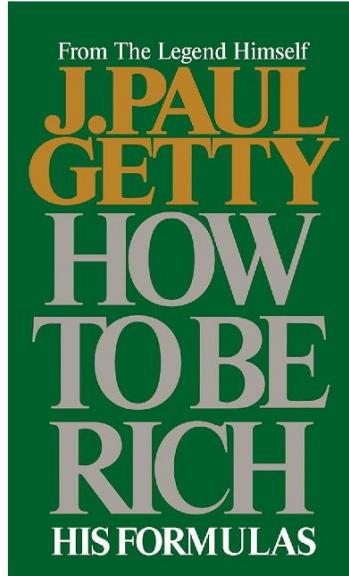
Add book



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Sou Chanrojame



Cover

ISBN
0515087378

Title
How to Be Rich

Edition
1

Price
\$2

Book Type
Value

Publisher
Value

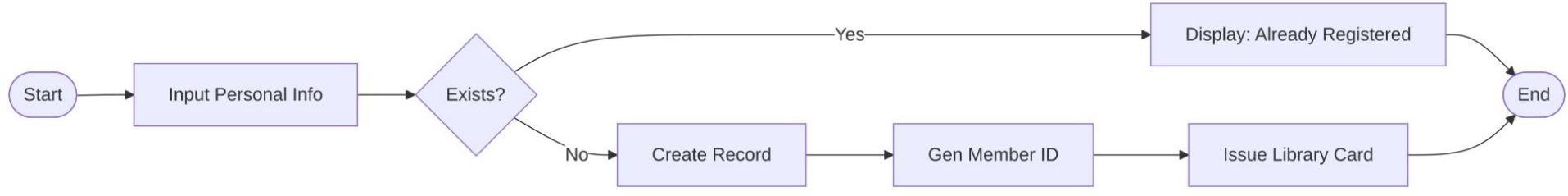
Category
Value

Save

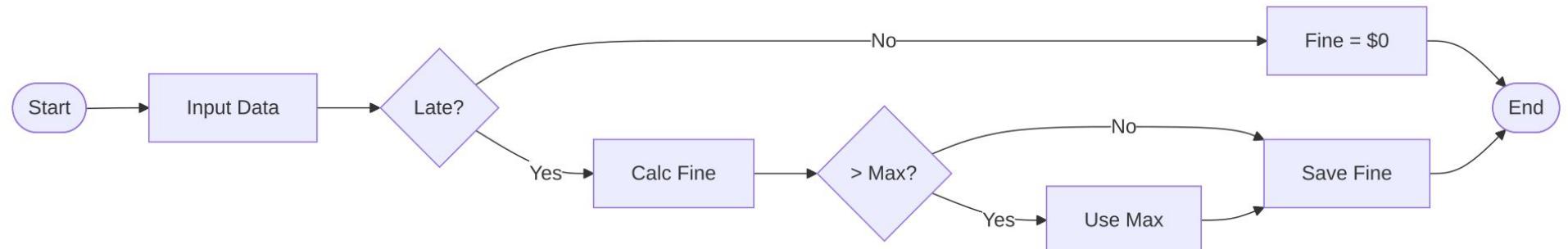


Program Design

We have flowcharts, pseudocode, and test data before coding.



Flowchart for member registering



Flowchart for calculating fine



```
1 START
2   DISPLAY "Enter Member ID"
3   INPUT memberID
4
5   IF memberID is valid THEN
6     IF memberHasFines is TRUE THEN
7       DISPLAY "Access Denied: Please pay outstanding fines."
8     ELSE
9       DISPLAY "Enter Book ISBN"
10      INPUT bookISBN
11
12      IF bookStatus IS "Available" THEN
13        UPDATE bookStatus TO "Loaned"
14        SET dueDate = currentDate + 14 days
15        DISPLAY "Success! Book due on: " + dueDate
16      ELSE
17        DISPLAY "Error: Book is already checked out."
18      ENDIF
19    ENDIF
20  ELSE
21    DISPLAY "Error: Invalid Member ID"
22  ENDIF
23 END
```

Pseudocode for borrowing a book



```
1 START
2   DISPLAY "Scan or Enter Book ISBN:"
3   INPUT bookID
4
5   // Step 1: Verify the book was actually checked out
6   IF bookStatus IS NOT "Loaned" THEN
7     DISPLAY "Error: This book is not marked as checked out."
8   ELSE
9     // Step 2: Calculate Fines
10    SET returnDate = currentDate
11    SET dueDate = getDueDate(bookID)
12
13   IF returnDate > dueDate THEN
14     SET daysOverdue = returnDate - dueDate
15     SET fineAmount = daysOverdue * 0.50 // Assuming $0.50 per day
16     DISPLAY "Book is Late! Fine incurred: $" + fineAmount
17     ADD fineAmount TO memberRecord
18   ELSE
19     DISPLAY "Book returned on time."
20   ENDIF
21
22   // Step 3: Update System State
23   UPDATE bookStatus TO "Available"
24   MARK loanRecord AS "Completed"
25
26   DISPLAY "Return successful. Thank you."
27 ENDIF
28 END
```

Pseudocode for returning a book

Test Case	Member ID	Book Status	Has Fines?	Expected Result
Normal	M101 (Valid)	Available	No	Success, Status -> Loaned
Fine Block	M102 (Valid)	Available	Yes	Error: "Please pay fines"
Unavailable	M101 (Valid)	Loaned	No	Error: "Book already checked out"
Invalid User	X999 (Invalid)	Available	No	Error: "Invalid Member ID"

Test data for borrowing a book

Input	Processing	Output
Book ISBN / ID	Find the active loan record	Return Confirmation
Return Date	Calculate days between Due Date and Return Date	Fine Amount (if applicable)
Member ID	Update Book status to "Available"	Updated Member Account

Test data for returning a book

Test Case	ID Number	Database Status	Expected Result
New User	12345	Not Found	Record Created, New ID Issued
Existing User	12345	Already Found	Error: "Already Registered"
Missing Info	(Empty)	N/A	Error: "Fields cannot be blank"

Test data for member registration

Report Design

Report on loans

Username	↓	Staff name	↓	Issue Date	↓	Due Date	↓	Return Date	↓
Pov Dara		Yem Thida		2/3/2015		2/3/2016		N/A	
Meas Thida		Yi Da		2/3/2015		2/3/2016		2/9/2015	
Chan Samuth		Lim Horn		2/3/2015		2/3/2016		2/7/2015	
Robert Julie		Lam Qi		2/3/2015		2/3/2016		2/7/2015	
Park jung		Sen Monika		2/3/2015		2/3/2016		2/7/2015	
Ma Sokleng		Bu Yi		2/3/2015		2/3/2016		N/A	
Mat Tokio		Om Dara		2/3/2015		2/3/2016		2/7/2015	
Tana Daigo		Albert Einstein		2/3/2015		2/3/2016		N/A	
Dai Zamasu		Bai Ma		2/3/2015		2/3/2016		N/A	
Om Pheak		Jack Heng		2/3/2015		2/3/2016		2/7/2015	

Report on members

First name ↓	Last name ↓	Email ↓	Phone number ↓	Join Date ↓
Thida	Sok	sokthida168@gmail.com	016 689 732	1/2/2003
Vuth	Meas	measvuth168@gmail.com	016 689 733	1/2/2003
Sovann	Da	dasovann168@gmail.com	016 689 734	1/2/2003
Dara	Sam	sam dara168@gmail.com	016 689 735	1/2/2004
Oudom	Ty	tyoudom168@gmail.com	016 689 737	1/2/2003
Mike	Catty	cattymike168@gmail.com	016 683 732	1/2/2003
Robert	Cathy	cathyrobert168@gmail.com	013 689 732	1/2/2003
Vatey	Som	somvatey168@gmail.com	019 689 732	1/2/2003
Somnang	Ly	lysomnang168@gmail.com	019 189 732	1/2/2003
Thorn	Van	vanthorn168@gmail.com	019 649 732	1/2/2003

Dashboard

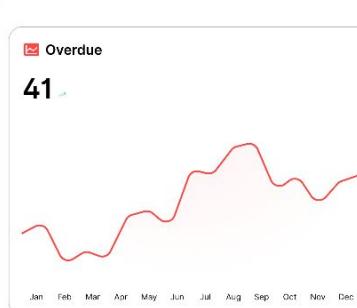
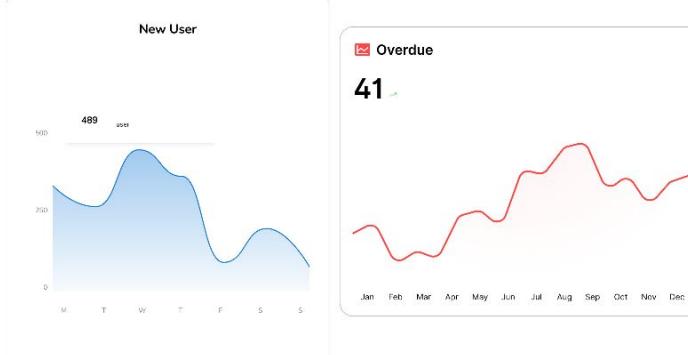
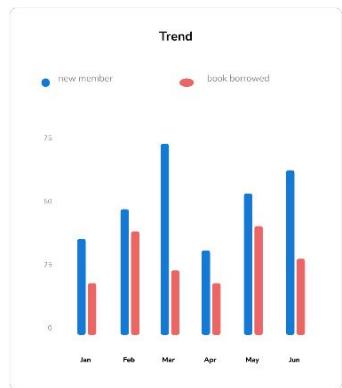
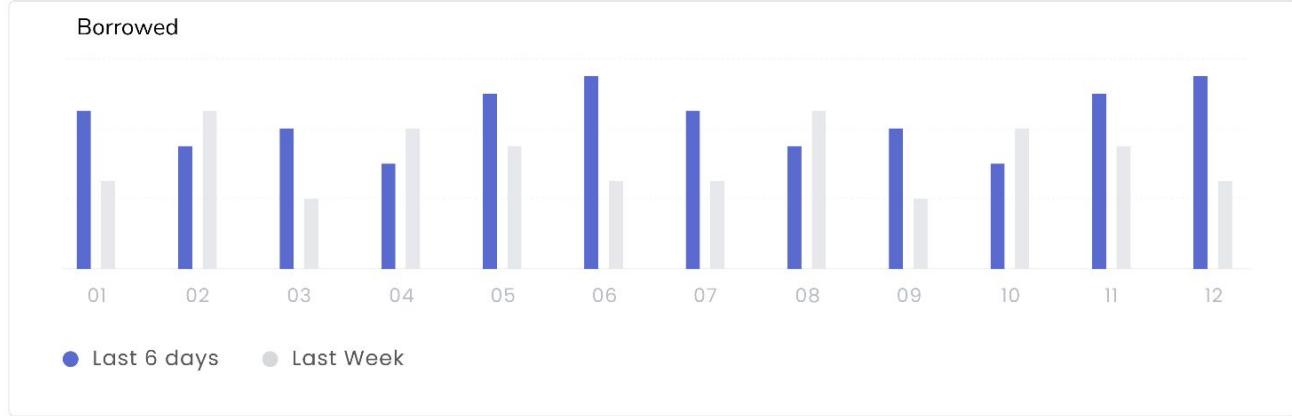
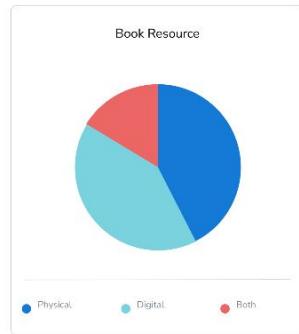
Search Book



Sou Chanrojame



Export



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