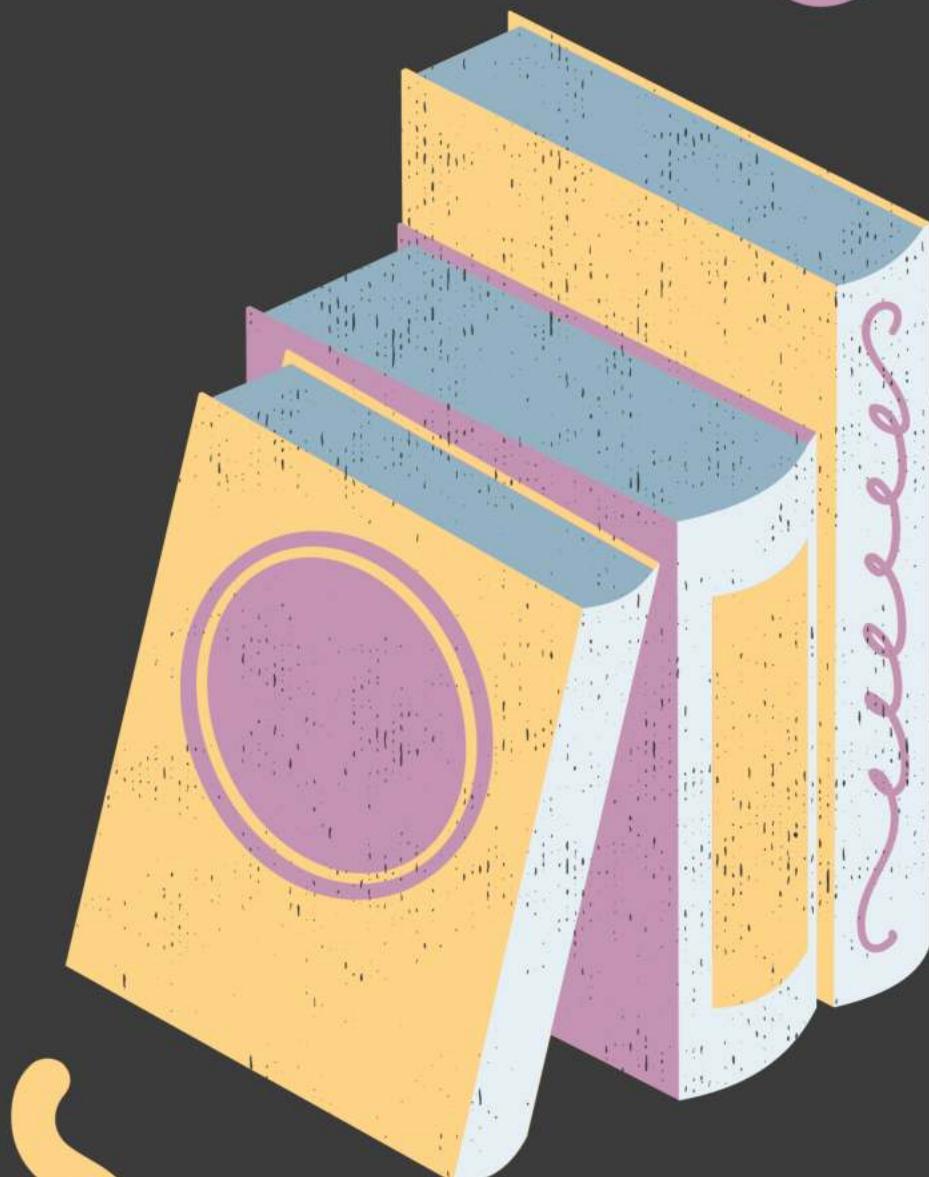


# LIBRARY MANAGEMENT SYSTEM

TEAM NO:21

AYESHA SIDDIQ(002319519)

SHAMAMA FIRDOUS(002058858)



# PROBLEM STATEMENT:

Libraries must manage large volumes of data, including book inventories, member information, borrow/return transactions, and fine calculations. Manual processes or poorly designed systems lead to data inconsistencies, inefficient operations, and potential security breaches. There is a need for an automated system that ensures data accuracy and security, particularly when multiple users interact with the system simultaneously.



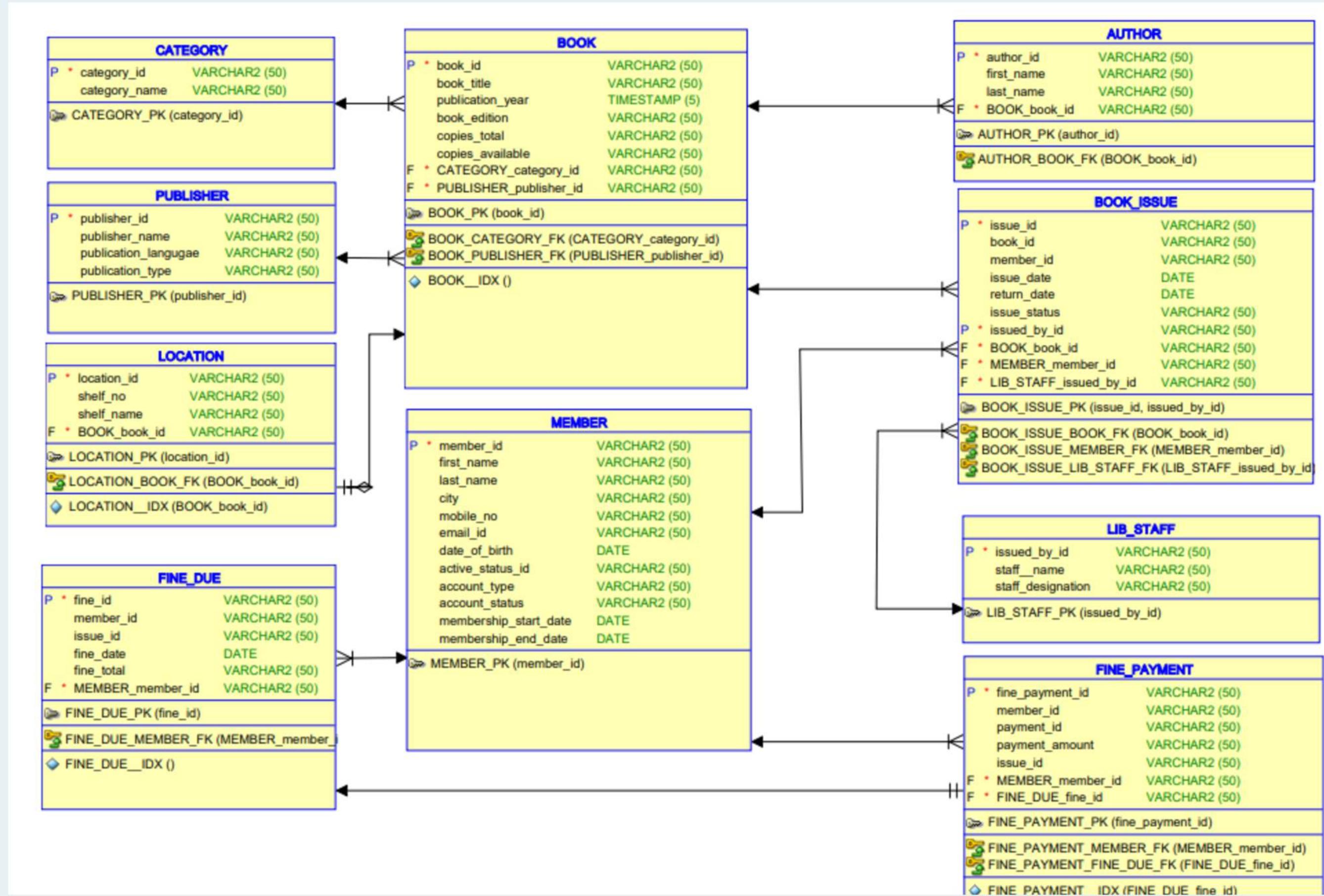
# BUSINESS RULES:

- 01** Library staff can see who has borrowed a book, who has checked out a book in the past, when members have joined, type of membership and status of member
- 02** Members of the library can search for books by title, author, category and publication details.
- 03** Membership is active only if the current date falls within the start and end dates of the membership period.
- 04** When a book is issued, Copies\_available is reduced by 1. When returned, it is increased by 1.

# BUSINESS RULES:

- 05** There may be more than one copy of a book owned by the library.
- 06** Members can borrow books, and the system will store the date that they borrowed the book.
- 07** Fines can be imposed on members if books are not returned within 15 days of borrowing them. Members can pay the fines that have been added to their account

# E-R DIAGRAM:



# DATAFLOW DIAGRAM:

THIS DIAGRAM REPRESENTS A LIBRARY BOOK LENDING PROCESS IN THE FORM OF A FLOWCHART. HERE'S A STEP-BY-STEP EXPLANATION:

**1. Start:** The process begins when a library member requests a book.

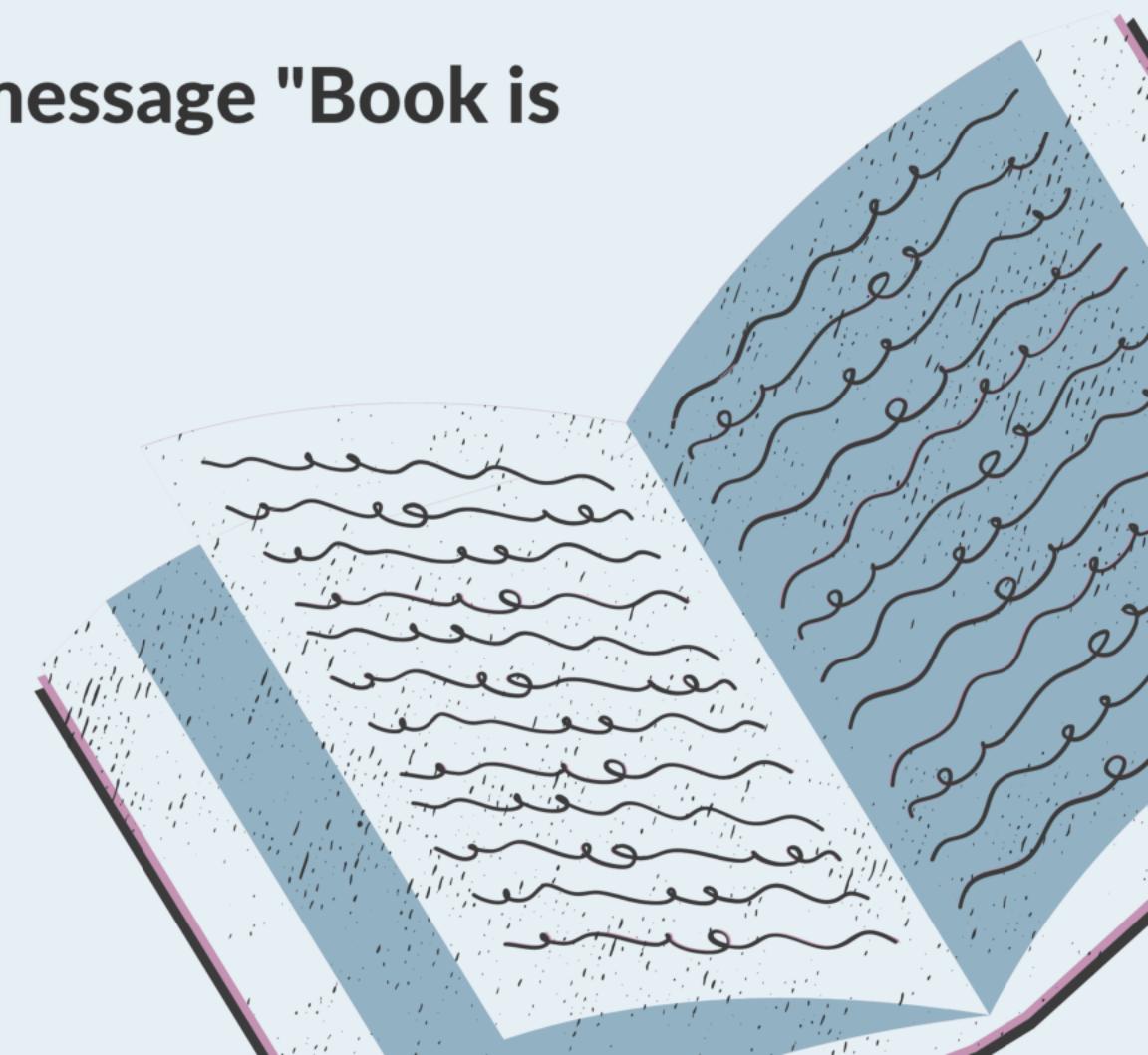
**2. Check Availability:**

- a) The librarian checks if the requested book is available.
- b) If the book is not available, the librarian notifies the member with the message "Book is not available" and the process ends.
- c) If the book is available, the librarian proceeds to the next step.

**3. Issue the Book:** The librarian issues the book to the member.

**4. Check Return on Time:**

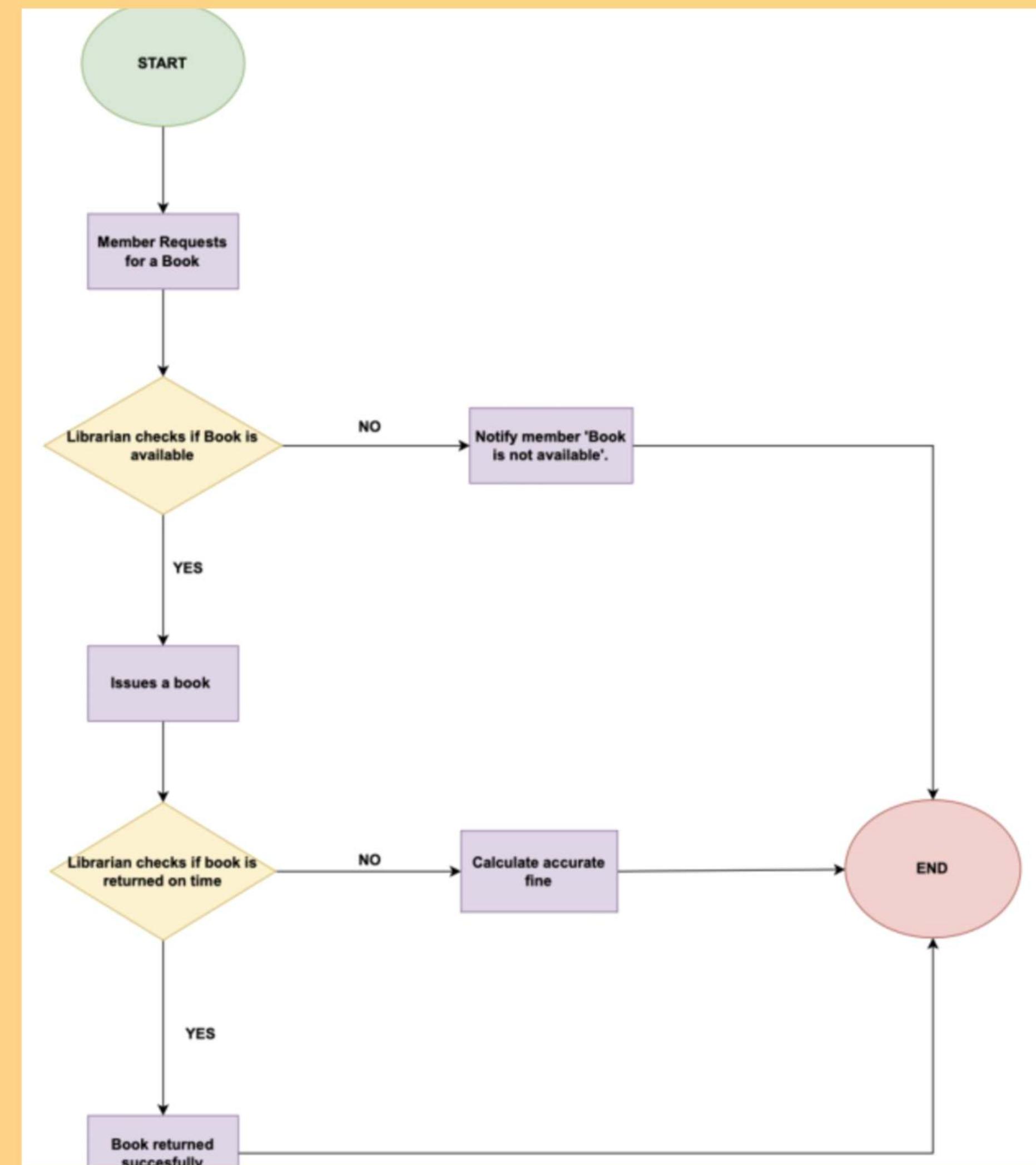
- a) After the book is issued, the librarian waits for the return.
- b) The librarian checks if the book is returned on time.



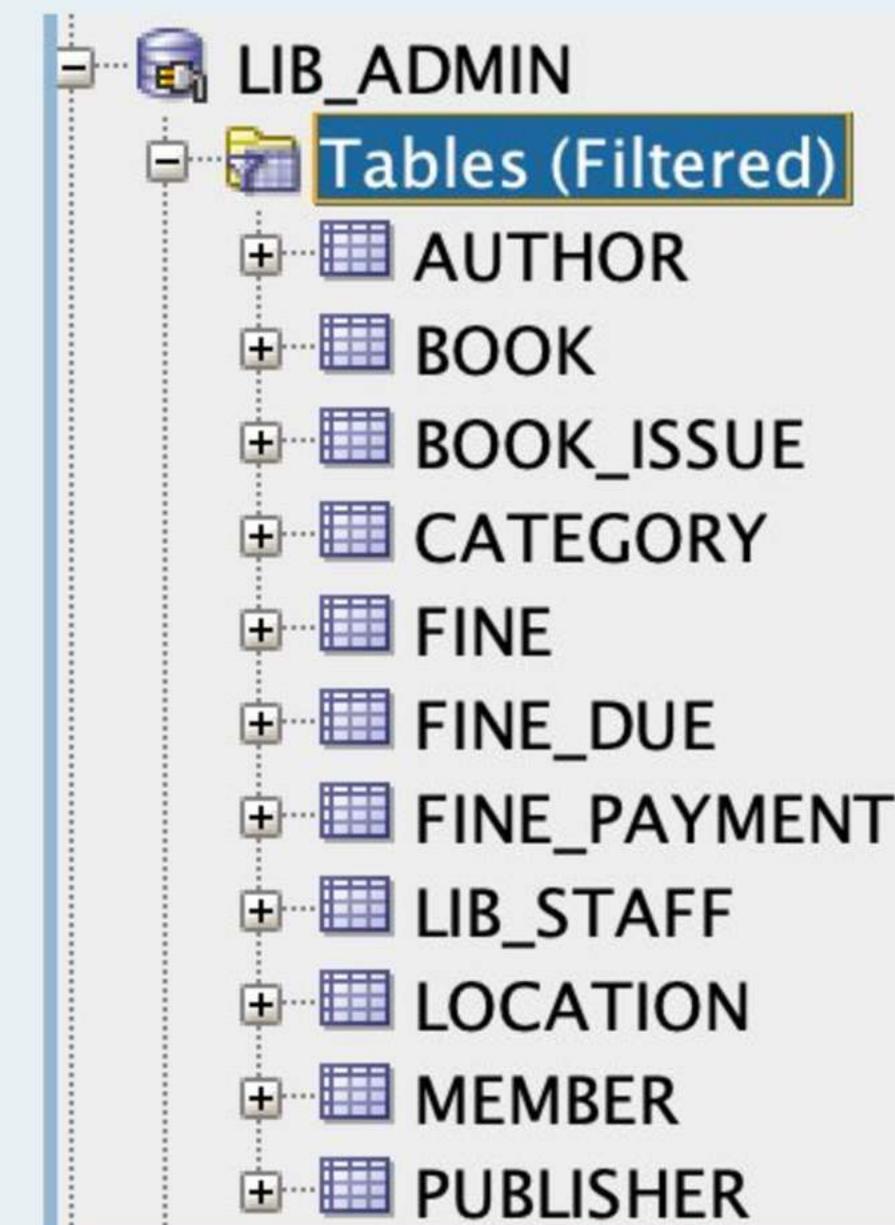
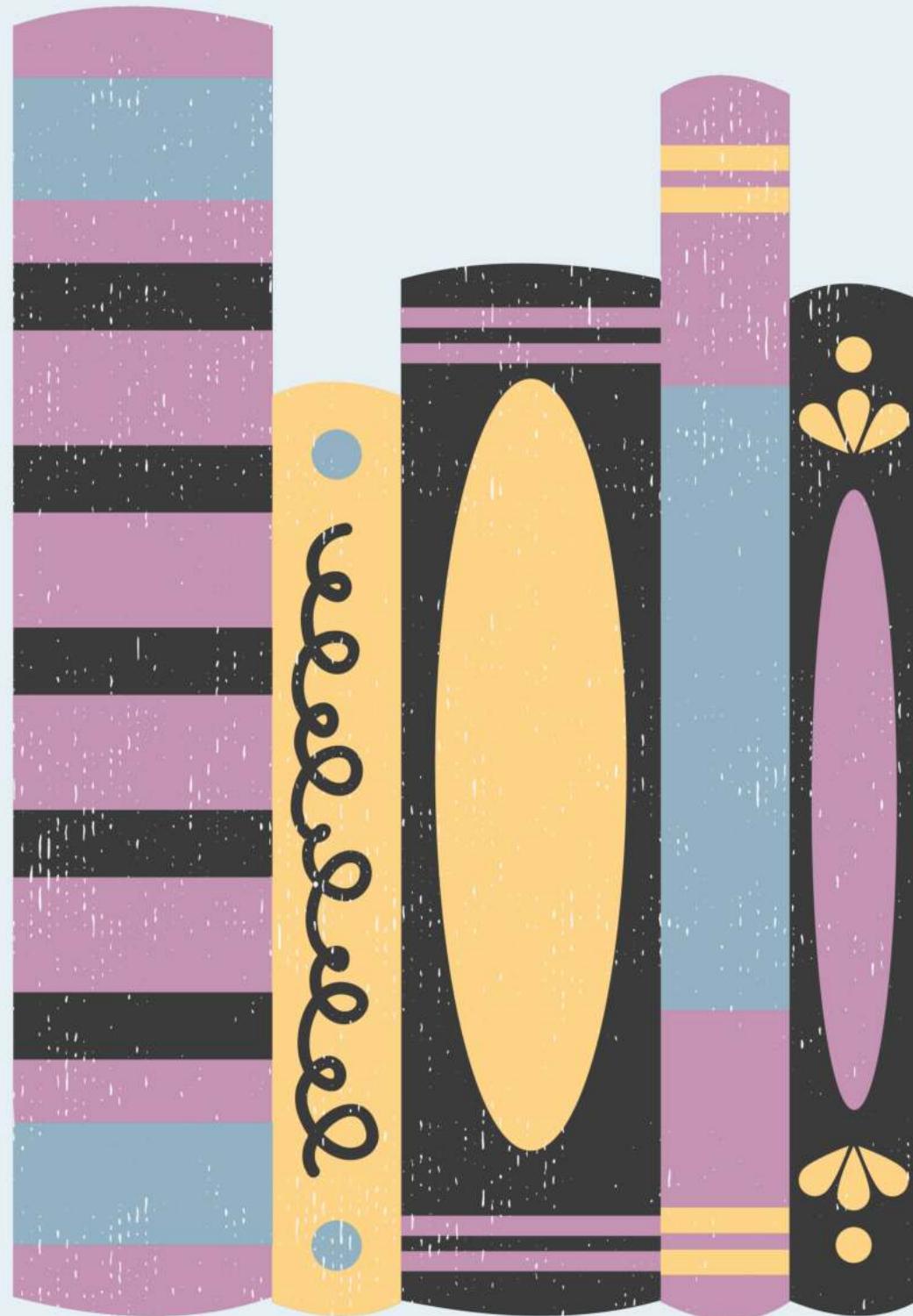
# DATAFLOW DIAGRAM:

5. If the book is returned on time, the process ends with a message saying the book is returned successfully.

6. If the book is not returned on time, the librarian calculates the accurate fine based on the delay and then ends the process.



# TABLES:



# VIEWS OF PROJECT:

View-1

## 1. Member's View: Borrowing History

- A member would be interested in their borrowing history, including books borrowed, issue dates, return dates, and any fines incurred.

*Member\_Borrowing\_History*

View-2

## 2. Library Staff's View: Issued Books by Staff

- Library staff would want to see details of the books they have issued, including the member who borrowed the book and the issue date.

*Staff\_Performance*

View-3

## 3. Administrator's View: Books and Inventory Status

- An administrator may need a holistic view of all the available books, including the total copies, available copies.

*Current\_Book\_Inventory*

# VIEWS OF PROJECT:

**View-4**

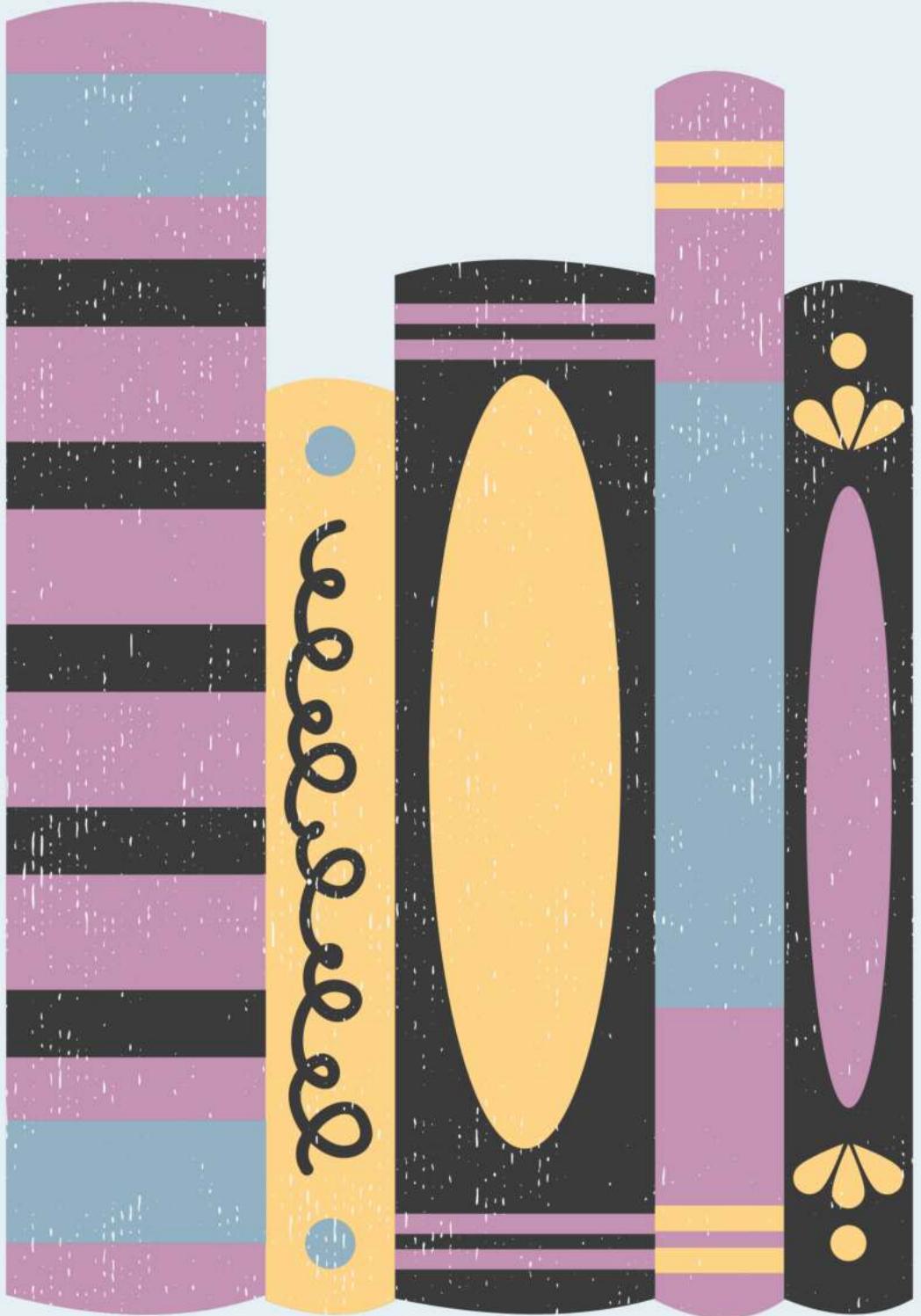
**4.Overdue\_Books View- Overdue\_Books**

*Lists books that are overdue along with their associated member details and due dates.*

**View-5**

**Fine\_Collection\_Status View- Fine\_Collection\_Status**

*Tracks the status of fines, including amounts paid and outstanding balances for each member.*



# TRIGGERS:

# 1: Update Book Inventory After an Issue

# Trigger name-Update\_Book\_Inventory\_After\_Issue

## 2: Prevent Out-of-Stock Books from Being Issued

Trigger name- Prevent\_Out\_Of\_Stock\_Books

# 3: Prevent Duplicate Book Titles

Trigger name- Prevent\_Duplicate\_Books

# ROLES:

**LIB\_ADMIN**

**LIB\_ADMIN:** *Full access to all library objects and management capabilities.*

**LIB\_STAFF**

**LIB\_STAFF:** *Can manage books and borrowing transactions.*

**LIB\_MEMBER**

**LIB\_MEMBER:** *Can borrow and return books with limited access to their data*

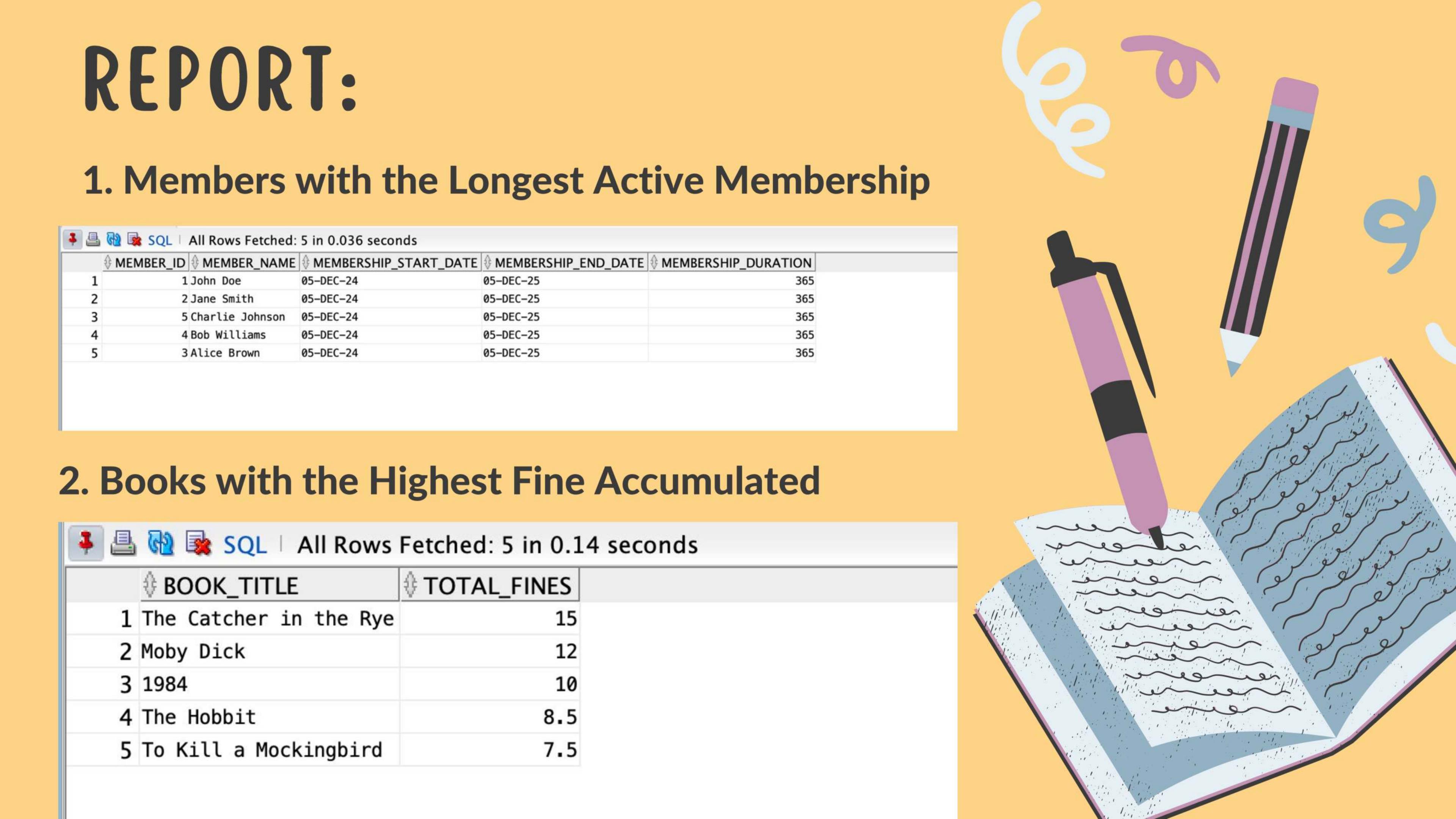
# PROCEDURES & FUNCTIONS

- + SP\_VIEWOVERDUEBOOKS
- + UPDATE\_BOOK\_DETAILS
- + UPDATE\_BOOK\_ISSUE\_STATUS
- + UPDATE\_FINE\_PAYMENT
- + UPDATE\_MEMBER\_DETAILS

- Functions
  - + CALCULATE\_BOOKS\_BORROWED
  - + CALCULATE\_LATE\_FEE
  - + CALCULATE\_STAFF\_BOOKS\_ISSUE
  - + CALCULATE\_TOTAL\_FINE
  - + CALCULATE\_TOTAL\_FINE\_PAID

# REPORT:

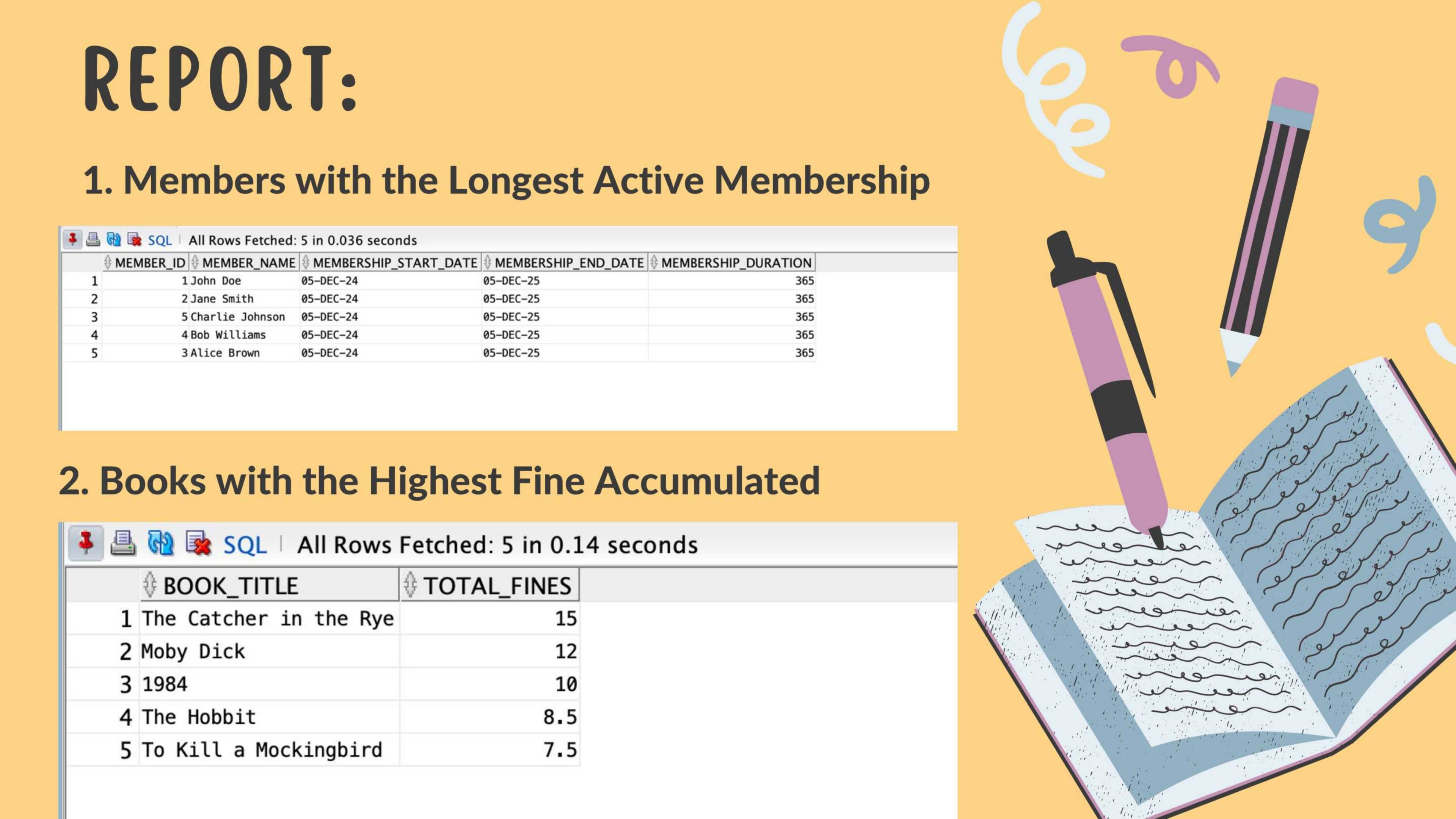
## 1. Members with the Longest Active Membership



A screenshot of a SQL query results window. The title bar says "SQL | All Rows Fetched: 5 in 0.036 seconds". The table has columns: MEMBER\_ID, MEMBER\_NAME, MEMBERSHIP\_START\_DATE, MEMBERSHIP\_END\_DATE, and MEMBERSHIP\_DURATION. The data shows five rows where all members have a duration of 365 days.

MEMBER_ID	MEMBER_NAME	MEMBERSHIP_START_DATE	MEMBERSHIP_END_DATE	MEMBERSHIP_DURATION
1	John Doe	05-DEC-24	05-DEC-25	365
2	Jane Smith	05-DEC-24	05-DEC-25	365
3	Charlie Johnson	05-DEC-24	05-DEC-25	365
4	Bob Williams	05-DEC-24	05-DEC-25	365
5	Alice Brown	05-DEC-24	05-DEC-25	365

## 2. Books with the Highest Fine Accumulated

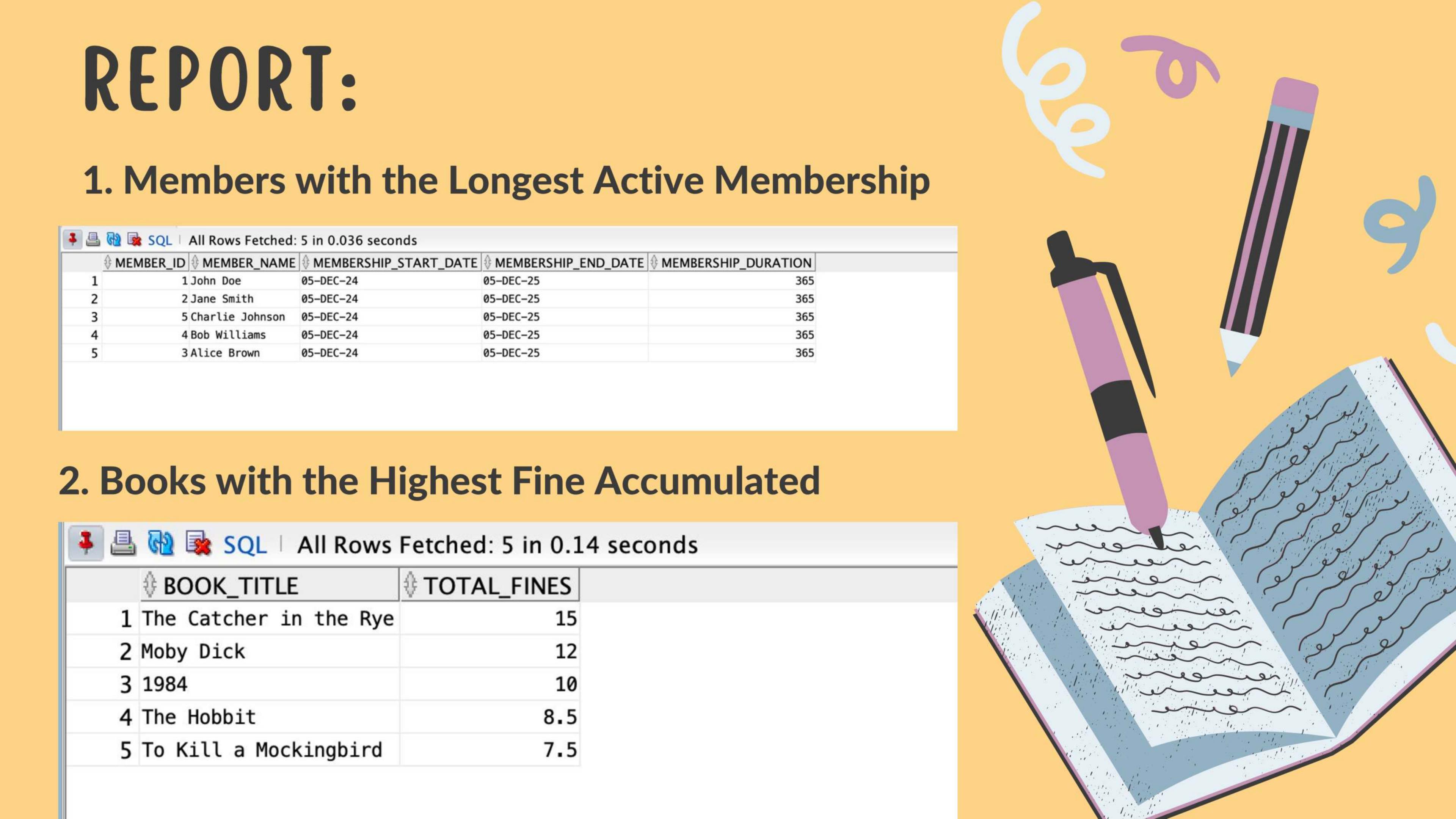


A screenshot of a SQL query results window. The title bar says "SQL | All Rows Fetched: 5 in 0.14 seconds". The table has columns: BOOK\_TITLE and TOTAL\_FINES. The data shows five books sorted by total fines in descending order.

BOOK_TITLE	TOTAL_FINES
The Catcher in the Rye	15
Moby Dick	12
1984	10
The Hobbit	8.5
To Kill a Mockingbird	7.5

# REPORT:

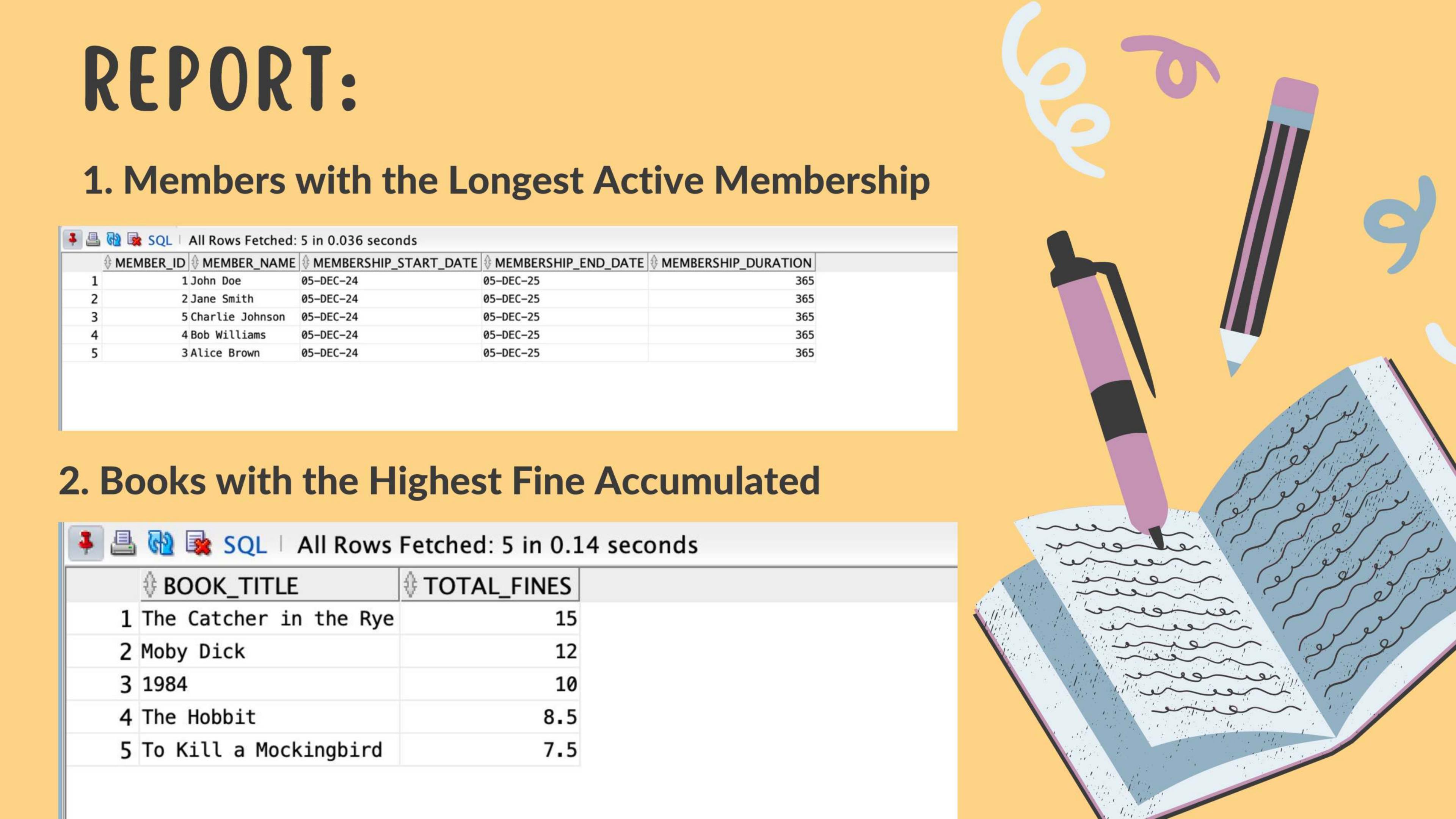
## 1. Members with the Longest Active Membership



A screenshot of a SQL query results window. The title bar says "SQL | All Rows Fetched: 5 in 0.036 seconds". The table has columns: MEMBER\_ID, MEMBER\_NAME, MEMBERSHIP\_START\_DATE, MEMBERSHIP\_END\_DATE, and MEMBERSHIP\_DURATION. The data shows five rows where all members have a duration of 365 days.

MEMBER_ID	MEMBER_NAME	MEMBERSHIP_START_DATE	MEMBERSHIP_END_DATE	MEMBERSHIP_DURATION
1	John Doe	05-DEC-24	05-DEC-25	365
2	Jane Smith	05-DEC-24	05-DEC-25	365
3	Charlie Johnson	05-DEC-24	05-DEC-25	365
4	Bob Williams	05-DEC-24	05-DEC-25	365
5	Alice Brown	05-DEC-24	05-DEC-25	365

## 2. Books with the Highest Fine Accumulated

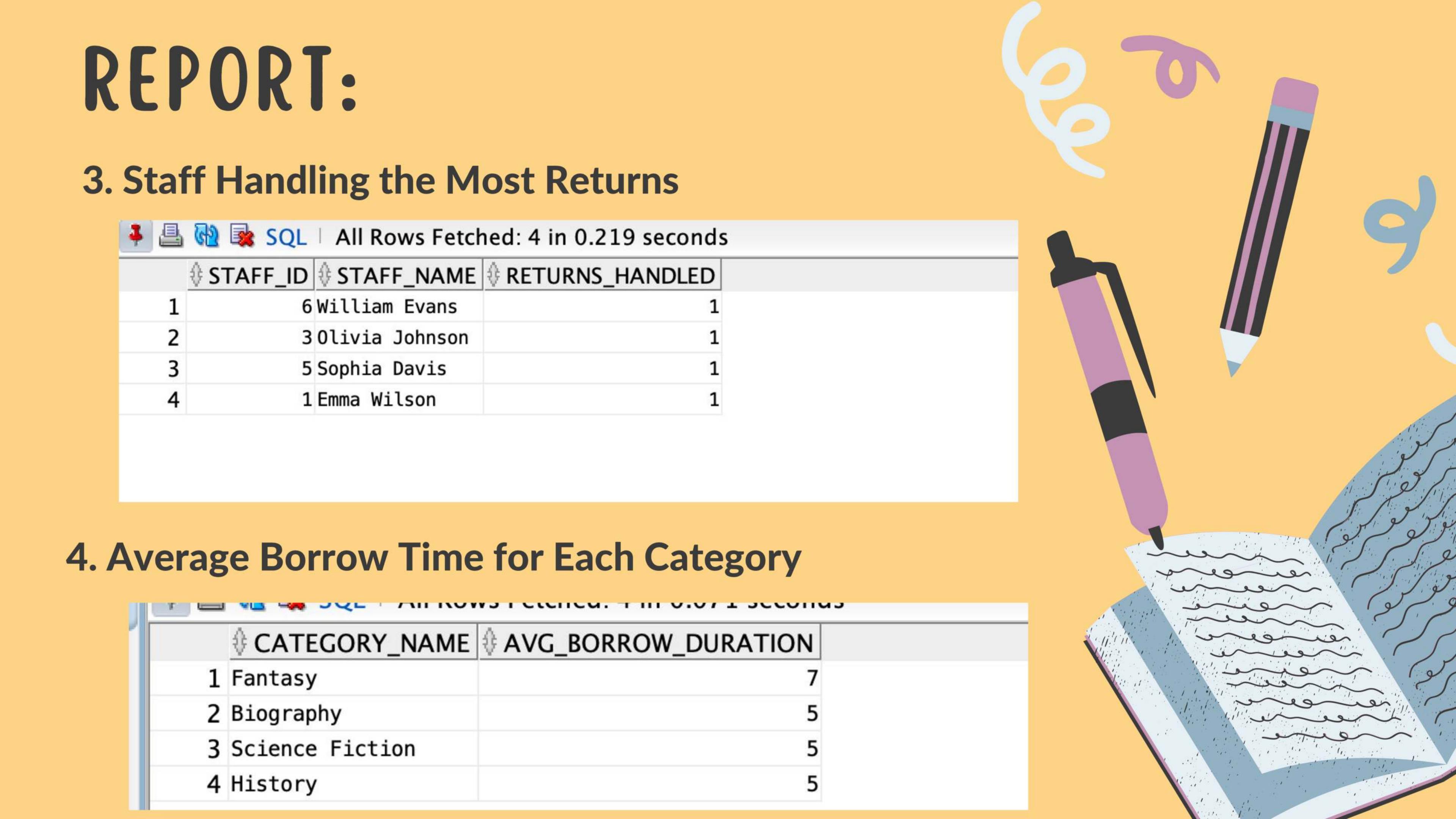


A screenshot of a SQL query results window. The title bar says "SQL | All Rows Fetched: 5 in 0.14 seconds". The table has columns: BOOK\_TITLE and TOTAL\_FINES. The data shows five books sorted by total fines in descending order.

BOOK_TITLE	TOTAL_FINES
The Catcher in the Rye	15
Moby Dick	12
1984	10
The Hobbit	8.5
To Kill a Mockingbird	7.5

# REPORT:

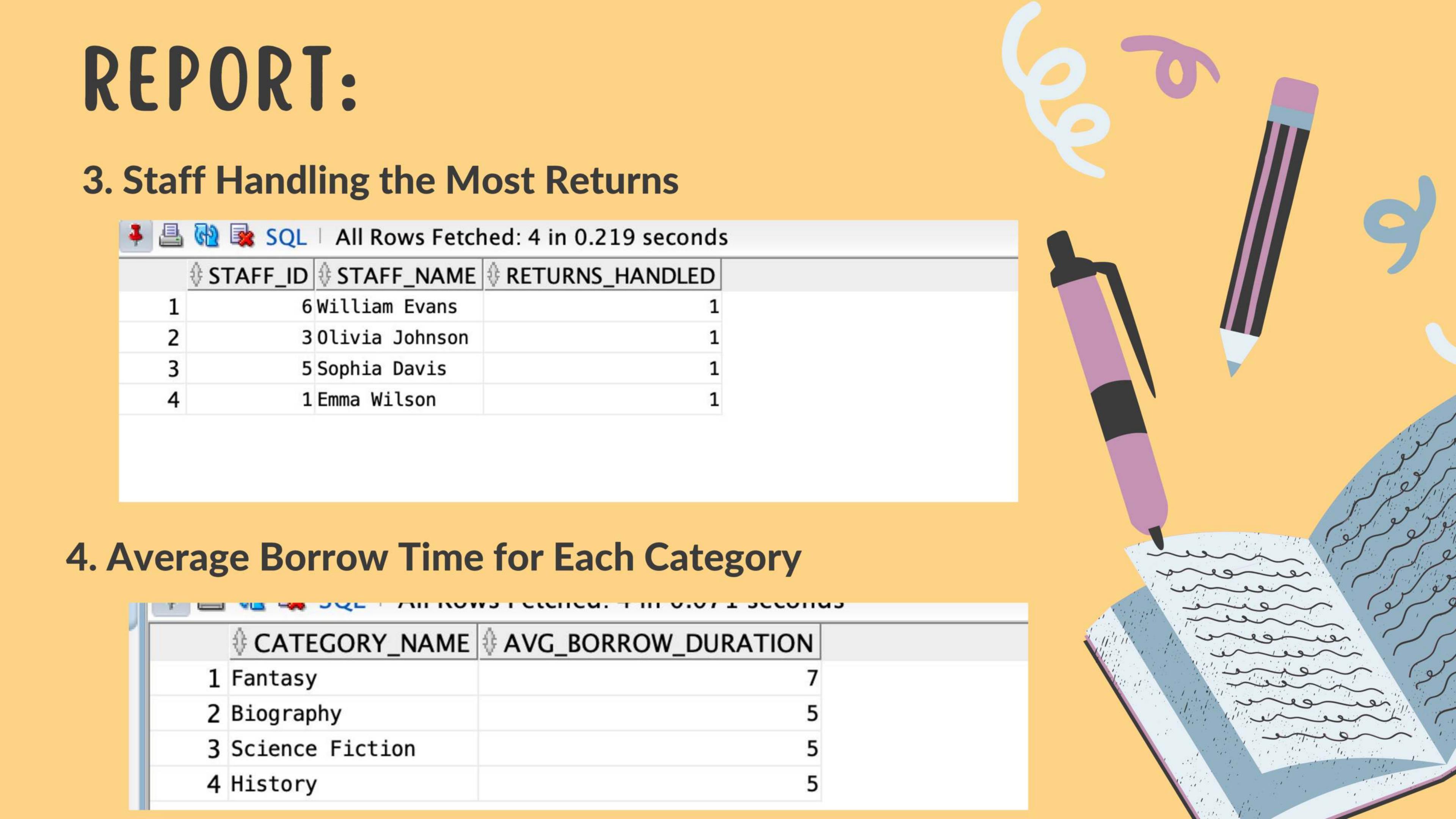
## 3. Staff Handling the Most Returns



A screenshot of a database query results window. The title bar says "SQL | All Rows Fetched: 4 in 0.219 seconds". The table has columns: STAFF\_ID, STAFF\_NAME, and RETURNS\_HANDLED. The data shows four staff members, each handling one return.

	STAFF_ID	STAFF_NAME	RETURNS_HANDLED
1	6	William Evans	1
2	3	Olivia Johnson	1
3	5	Sophia Davis	1
4	1	Emma Wilson	1

## 4. Average Borrow Time for Each Category



A screenshot of a database query results window. The title bar says "SQL | All Rows Fetched: 4 in 0.071 seconds". The table has columns: CATEGORY\_NAME and AVG\_BORROW\_DURATION. The data shows average borrow times for four book categories.

	CATEGORY_NAME	AVG_BORROW_DURATION
1	Fantasy	7
2	Biography	5
3	Science Fiction	5
4	History	5

# VALIDATIONS:



- 1. Unique Book ID:** Ensure each book has a unique `book_id` to avoid duplicates.
- 2. Member Search:** Validate inputs for searching books by title, author, category, etc.
- 3. Membership IDs:** Assign unique membership identifiers to each member.
- 4. Return Deadlines:** Validate that books are returned within 15 days, applying fines for overdue returns.
- 5. Fine Calculation:** Ensure accurate fine status and overdue day calculations for members.

# SECURITY:

## USER LEVEL ACCESS AND PERMISSIONS

### 1. Access Control:

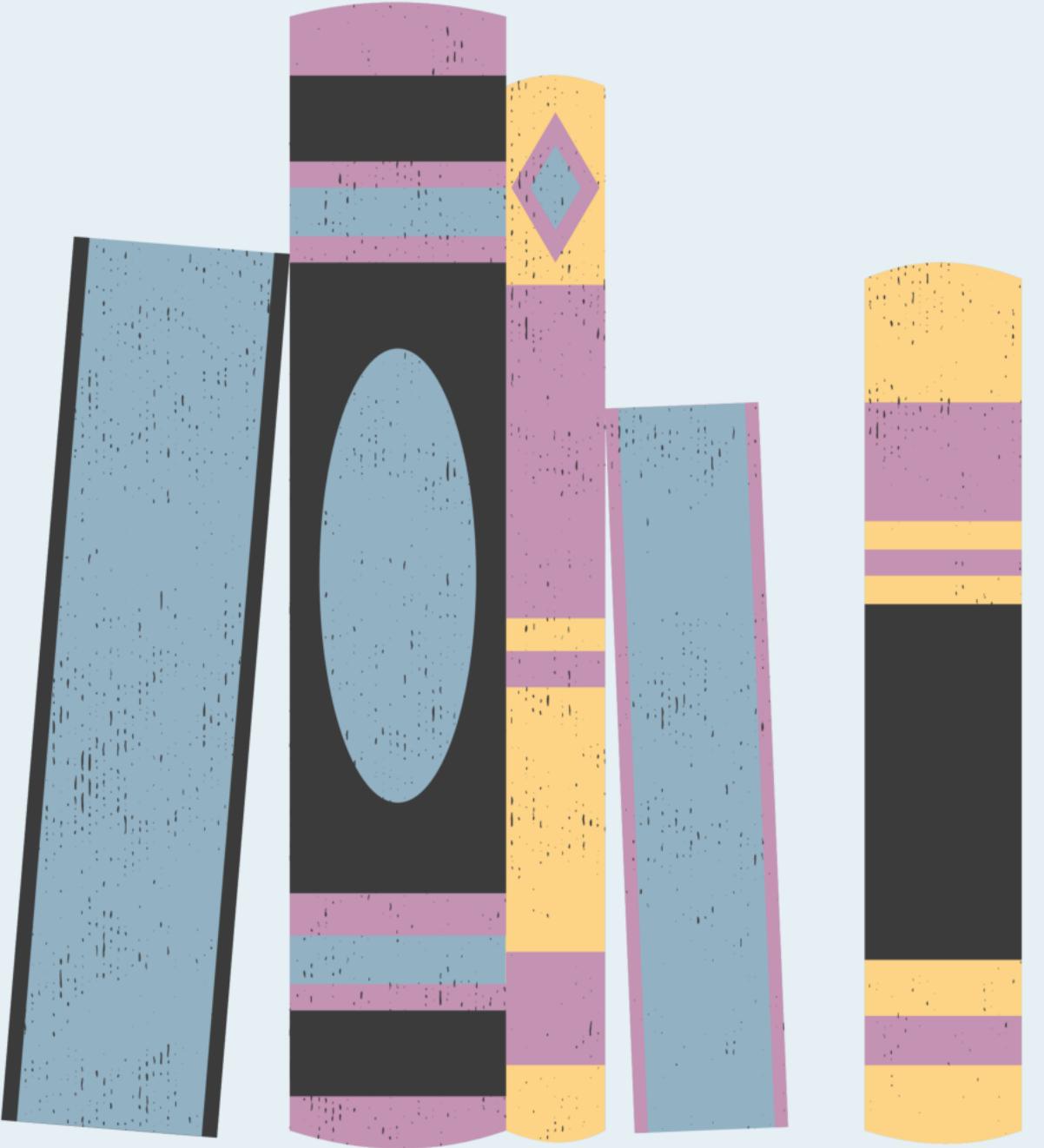
**Librarians:** Full access to manage book inventories, member details, and transactions. Can also handle fines and overdue books.

**Members:** Can view their own borrowing history and check book availability but cannot modify any records.

### 2. Permissions:

**Admin Roles:** Can create, update, or delete records, manage access control, and generate system-wide reports.

**Limited Roles:** Have restricted access based on their tasks, such as issuing books or handling returns.



# THANK YOU

