



CCE104 – Fundamentals of Database

Library Borrowing and Returning Management System

First Term, First Semester SY 2025-2026

Submitted by:

Lourde Vincent M. Pablo

Submitted to:

Jenny Espadero

Chapter 1

A. Introduction

The business entity in this study is the Learning and Information Center (Library) of University of Mindanao. The library provides services such as borrowing and returning of books, assisting students in research, and maintaining records of available learning materials. Disclaimer: The university has no prior knowledge that the researcher utilized the LIC as a reference for this project. The information presented is solely derived from the researcher's personal experiences in conducting transactions within the university's LIC.

Currently, transactions involve students borrowing books, staff processing checkout/return, and tracking due dates. A book that is currently borrowed (not yet returned) cannot be checked out again by another member until it is returned. Each process includes important details such as the student ID, book barcode/code, transaction date, and due date. However, the problematic area lies in the manual recording of transactions. At times, it is difficult to monitor which books are borrowed, who borrowed them, and whether they are returned on time. Delays, misplaced records, and lack of automated reminders for overdue books are common issues. (Marlindawati ., Misinem ., & Adhiatma, 2024)

Hence, the solution proposed in this study is intended to address the issues faced by a non-sectarian college—St. John Paul II College of Davao—that still processes book borrowing and returning manually. The researcher personally experienced this situation, having been a former student at the said college. In contrast, the University of Mindanao Library and Information Center (UM LIC) have already implemented an automated system. With the increase of book collections and the expansion of readers' scale in college libraries, how to improve the efficiency of borrowing and returning books has become an important topic in the operation and management of college libraries (Mengping, 2023).

The problem to be solved is the inefficient tracking of book borrowing and returning, which can lead to loss of books, delayed returns, and inaccurate inventory. The proposed database solution is a Library Management Database System that will:

- ✓ Store student and staff information.
- ✓ Record book details using barcode numbers.
- ✓ Manage checkout and return transactions.
- ✓ Track due dates and generate reports.

This system will improve accuracy, reduce errors, and make retrieval of information faster and more reliable (Song, 2018).

The scope of this system is limited to the physical borrowing and returning of books in the library. Based on an interview with one of the staff members at UM LIC, the book category in the borrowing process is not considered essential.

The primary objective of the borrowing process is to record which book a member wishes to borrow, along with the corresponding due date and any possible penalties that may arise from late returns (Andri, Sopiah, & Oktaviani, 2025).

B. Business Rule

- A **member** must be registered in the library before performing any borrow transaction.
- A **member** may borrow **zero, one, or many books** over time, but each **borrow transaction** must be linked to exactly **one member**.
- A **borrow transaction** must be processed by a **staff** (librarian). A **staff** may process many transactions, but a transaction is linked to only one **staff**.
- A **book** may be borrowed multiple times, but at any given transaction, it may only be linked once. Some **books** may never be borrowed, but if a **borrow detail** exists, it must be linked to one book.
- A **borrow transaction** may include **one or many books**, but it cannot exist without at least one book.
- Each **borrow details** must be linked to exactly **one borrow transaction** and exactly **one book**.
- A **borrow transaction** must record the following information:
 - Transaction ID
 - Member ID
 - Staff ID
 - Date Borrowed
 - Due Date
 - Date Returned

Chapter 2

Entity Relationship Diagram

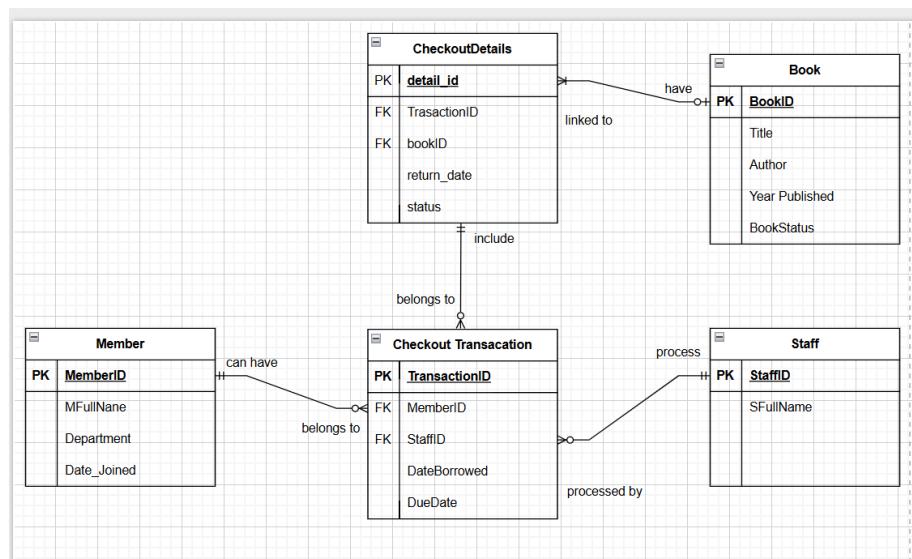


Figure 1: Library borrowing and returning System ERD

Logic Design

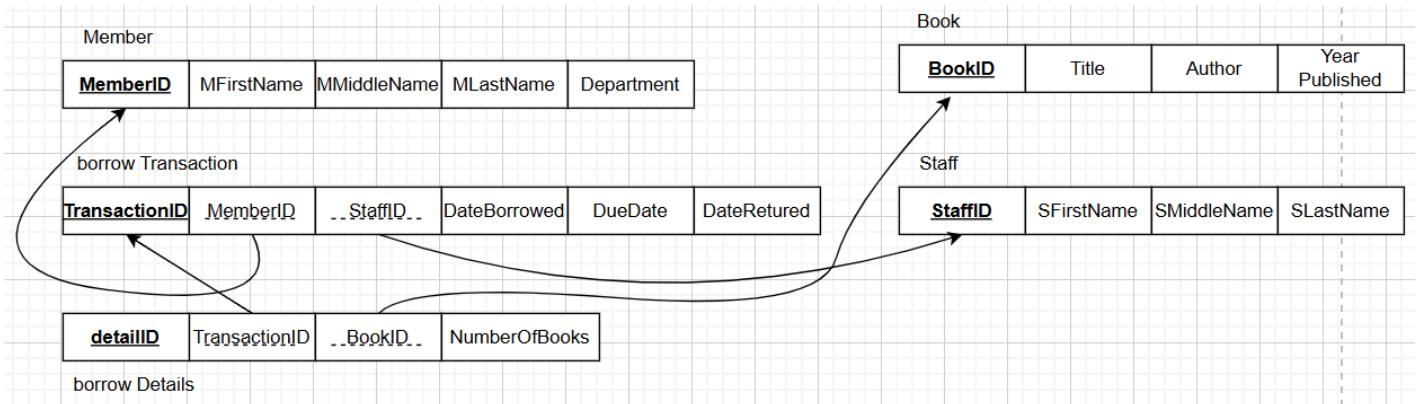


Figure 2: Library borrowing and returning System Mapping Relations

Normalization

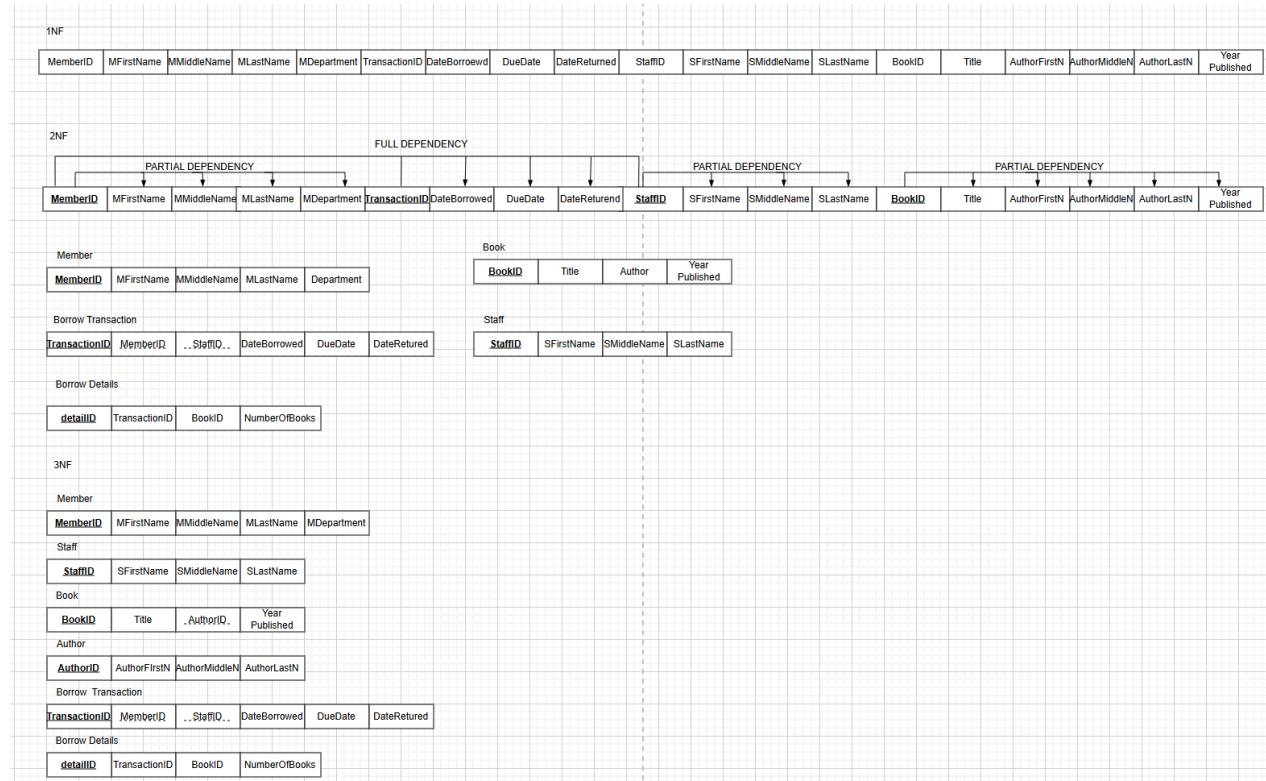


Figure 3: Library borrowing and returning System Normalization

Chapter 3

Physical Designs

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** member
- Structure Tab:** Selected tab.
- SQL Tab:** Available.
- Search Tab:** Available.
- Query Tab:** Available.
- Export Tab:** Available.
- Import Tab:** Available.
- Operations Tab:** Available.
- Show query box:** A button.
- Warning Message:** "Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are disabled." (highlighted in yellow).
- Success Message:** "Your SQL query has been executed successfully."
- Text Area:** Shows the command `DESCRIBE member;` and buttons [Edit inline], [Edit], and [Create PHP code].
- Extra Options:** A button.
- Table Structure:**

Field	Type	Null	Key	Default	Extra
memberID	varchar(7)	NO	PRI	NULL	
department	varchar(20)	NO		NULL	
FirstName	varchar(50)	NO		NULL	
MiddleName	varchar(50)	NO		NULL	
LastName	varchar(50)	NO		NULL	
Date_Joined	date	NO		NULL	
- Query results operations:** A button.

Figure 4: Member Table

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** staff
- Browse Tab:** Selected tab.
- Structure Tab:** Available.
- SQL Tab:** Available.
- Search Tab:** Available.
- Insert Tab:** Available.
- Operations Tab:** Available.
- Show query box:** A button.
- Success Message:** "Your SQL query has been executed successfully."
- Text Area:** Shows the command `DESC staff;` and buttons [Edit inline], [Edit], and [Create PHP code].
- Extra Options:** A button.
- Table Structure:**

Field	Type	Null	Key	Default	Extra
staffID	varchar(7)	NO	PRI	NULL	
StaffFirstName	varchar(50)	NO		NULL	
StaffMiddleName	varchar(50)	NO		NULL	
StaffLastName	varchar(50)	NO		NULL	
- Query results operations:** A button.

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pablolibsystem
- Table:** member
- Toolbar Buttons:** Browse, Structure, SQL, Search, Insert, E.
- Message Bar:** Your SQL query has been executed successfully.
- SQL Query:** DESC books;
- Buttons:** [Edit inline], [Edit], [Create PHP code].
- Extra Options:** Extra options button.
- Table Definition:**

Field	Type	Null	Key	Default	Extra
bookID	varchar(20)	NO	PRI	NULL	
Title	varchar(100)	NO		NULL	
AuthorFirstName	varchar(50)	NO		NULL	
AuthorMiddleName	varchar(50)	YES		NULL	
AuthorLastName	varchar(50)	NO		NULL	
YearPublished	int(5)	NO		NULL	
BookStatus	varchar(20)	NO		NULL	
- Operations:** Query results operations.

Figure 6: books Table

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pablolibsystem
- Toolbar Buttons:** Structure, SQL, Search, Query, Export, Import, Operations.
- Message Bar:** Your SQL query has been executed successfully.
- SQL Query:** DESC borrow_details;
- Buttons:** [Edit inline], [Edit], [Create PHP code].
- Extra Options:** Extra options button.
- Table Definition:**

Field	Type	Null	Key	Default	Extra
detail_id	int(11)	NO	PRI	NULL	auto_increment
TransactionId	int(11)	NO	MUL	NULL	
bookID	varchar(11)	NO	MUL	NULL	
return_date	date	YES		NULL	
status	enum('BORROWED','RETURNED')	YES		BORROWED	
- Operations:** Query results operations.

Figure 7: borrow_details Table

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** borrow_details
- Structure View:** Shows the table structure with columns: TransactionID, memberID, staffID, Date_Borrowed, and Due_Date.
- SQL View:** Displays the SQL command: DESC borrow_transactions;
- Search View:** Shows a success message: Your SQL query has been executed successfully.
- Query View:** Contains the same DESC command as the SQL view.
- Export View:** Contains links for Edit inline, Edit, Create PHP code, and Refresh.
- Import View:** Contains Extra options.
- Operations View:** Contains a link for Query results operations.

Figure 8: borrow_transactions Table

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** member
- Structure View:** Shows the table structure with columns: memberID, department, FirstName, MiddleName, LastName, and Date_Joined.
- SQL View:** Displays the SQL command: SELECT * FROM `member`;
- Search View:** Shows a success message: Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)
- Query View:** Contains the same SELECT command as the SQL view.
- Export View:** Contains links for Profiling, Edit inline, Edit, Explain SQL, Create PHP code, and Refresh.
- Import View:** Contains Show all, Number of rows: 25, Filter rows: Search this table, Sort by key: None, and Extra options.
- Operations View:** Contains a table of member records with 10 rows:

	memberID	department	FirstName	MiddleName	LastName	Date_Joined
<input type="checkbox"/>	M001	STUDENT	Lourde	Vincent	M.	Pablo
<input type="checkbox"/>	M002	FACULTY	Jenny			Espadero
<input type="checkbox"/>	M003	STUDENT	Teressa	H.		Corpuz
<input type="checkbox"/>	M004	STUDENT	Maria	H.		Gomez
<input type="checkbox"/>	M005	STUDENT	Renz			Arriola
<input type="checkbox"/>	M006	STUDENT	Andria			Mendoza
<input type="checkbox"/>	M007	FACULTY	James			Cruz
<input type="checkbox"/>	M008	FACULTY	Andy			Co
<input type="checkbox"/>	M009	STUDENT	Maysie			Pajarillaga
<input type="checkbox"/>	M010	STUDENT	Rochel			Tunilla

- Import View:** Contains links for Check all, With selected:, Edit, Copy, Delete, and Export.

Figure 9: Member Records

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** staff
- Toolbar:** Browse, Structure, SQL, Search, Insert, Export, Import.
- Message Bar:** Showing rows 0 - 4 (5 total, Query took 0.0004 seconds.)
- SQL Editor:** SELECT * FROM `staff`
- Filter:** Show all, Number of rows: 25, Filter rows: Search this table, Sort by key:.
- Extra Options:** Extra options button.
- Table View:**

	staffID	StaffFirstName	StaffMiddleName	StaffLastName
<input type="checkbox"/>	S001	Pedro	Reyes	Garcia
<input type="checkbox"/>	S002	Ana		Lopez
<input type="checkbox"/>	S003	Carlos	M.	Fernandez
<input type="checkbox"/>	S004	Jessa	Magsanay	Perez
<input type="checkbox"/>	S005	Marie	J.	Mendez
- Action Buttons:** Check all, With selected: Edit, Copy, Delete, Export.

Figure 10: Staff Records

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** books
- Toolbar:** Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, Operations, Tracking, Triggers.
- Message Bar:** Showing rows 0 - 9 (10 total, Query took 0.0004 seconds.)
- SQL Editor:** SELECT * FROM `books`
- Filter:** Show all, Number of rows: 25, Filter rows: Search this table, Sort by key: None.
- Extra Options:** Extra options button.
- Table View:**

	bookID	Title	AuthorFirstName	AuthorMiddleName	AuthorLastName	YearPublished	BookStatus
<input type="checkbox"/>	000001	Introduction to Python	Jenny		Espadero	2024	AVAILABLE
<input type="checkbox"/>	000002	Introduction of C++	Jenny		Espadero	2023	AVAILABLE
<input type="checkbox"/>	B001	Introduction to Algorithms	Thomas	H.	Cormen	2020	AVAILABLE
<input type="checkbox"/>	B002	Clean Code	Robert	P.	Martin	2019	AVAILABLE
<input type="checkbox"/>	B003	Python	Erich		Matteh	2018	AVAILABLE
<input type="checkbox"/>	B004	Harry Potter and the Philosopher's Stone	J.K		Rowling	1997	AVAILABLE
<input type="checkbox"/>	B005	The Da Vinci Code	Dan		Brown	2003	AVAILABLE
<input type="checkbox"/>	B006	The Art of Computer Programming	Donald	E.	Knuth	1968	BORROWED
<input type="checkbox"/>	B007	The C Programming Language	Brian W. Kernighan		& Dennis M. Ritchie	1978	BORROWED
<input type="checkbox"/>	B008	Clean Code: A Handbook of Agile Software Craftsman...	Robert	C.	Martin	2008	BORROWED
- Action Buttons:** Check all, With selected: Edit, Copy, Delete, Export.

Figure 11: books Records

Server: 127.0.0.1 » Database: pabolibsystem » Table: borrow_transactions

[Browse](#) [Structure](#) [SQL](#) [Search](#) [Insert](#) [Export](#) [Import](#) [Privileges](#)

`SELECT * FROM `borrow_transactions``

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

[Extra options](#)

		TransactionID	memberID	staffID	Date_Borrowed	Due_Date
<input type="checkbox"/>	Edit Copy Delete	1	M001	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	2	M002	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	3	M001	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	4	M001	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	5	M001	S003	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	6	M001	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	7	M001	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	8	M001	S001	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	9	M003	S003	2025-09-20	2025-09-27
<input type="checkbox"/>	Edit Copy Delete	10	M001	S002	2025-09-23	2025-09-25
<input type="checkbox"/>	Edit Copy Delete	11	M001	S001	2025-09-23	2025-09-30
<input type="checkbox"/>	Edit Copy Delete	12	M001	S001	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	13	M001	S001	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	14	M009	S001	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	15	M009	S001	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	16	M009	S001	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	17	M009	S005	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	18	M010	S004	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	19	M007	S001	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	20	M005	S002	2025-09-24	2025-10-01
<input type="checkbox"/>	Edit Copy Delete	21	M001	S005	2025-09-24	2025-10-01

[Check all](#) With selected: [Edit](#) [Copy](#) [Delete](#) [Export](#)

Figure 13: borrow_transactions Records

Utilizing Functions

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** books
- Query:** `SELECT bookID, UPPER>Title AS Uppercase_Title FROM books;`
- Results:** The table displays 9 rows of book titles converted to uppercase.

bookID	Uppercase_Title
000001	INTRODUCTION TO PYTHON
000002	INTRODUCTION OF C++
B001	INTRODUCTION TO ALGORITHMS
B002	CLEAN CODE
B003	PYTHON
B004	HARRY POTTER AND THE PHILOSOPHER'S STONE
B005	THE DA VINCI CODE
B006	THE ART OF COMPUTER PROGRAMMING
B007	THE C PROGRAMMING LANGUAGE
B008	CLEAN CODE: A HANDBOOK OF AGILE SOFTWARE CRAFTSMAN...

Figure 14: Function UPPER()

The UPPER() function converts text to uppercase. In the library system, it is used to standardize book titles for easier searching and reporting.

The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** member
- Query:** `SELECT memberId, CONCAT(FirstName, ' ', MiddleName, ' ', LastName) AS FullName FROM member;`
- Results:** The table displays 10 rows of member full names.

memberId	FullName
M001	Lourde Vincent M. Pablo
M002	Jenny Espadero
M003	Teressa H. Corpuz
M004	Maria H. Gomez
M005	Renz Arriola
M006	Andria Mendoza
M007	James Cruz
M008	Andy Co
M009	Maysie Pajarillaga
M010	Rochel Tunilla

Figure 15: Function CONCAT()

The CONCAT() function combines multiple fields into one string. It is applied to display a member's full name by merging first, middle, and last names.

The screenshot shows a MySQL Workbench interface with a query results table. The table displays member ID, member name, and the total number of books borrowed. The data is as follows:

memberID	MemberName	Total_Borrowed
M001	Lourde Vincent Pablo	11
M002	Jenny Espadero	1
M003	Teressa Corpuz	1
M005	Renz Arriola	1
M007	James Cruz	1
M009	Maysie Pajarillaga	4
M010	Rochel Tunilla	1

Figure 16: Function COUNT()

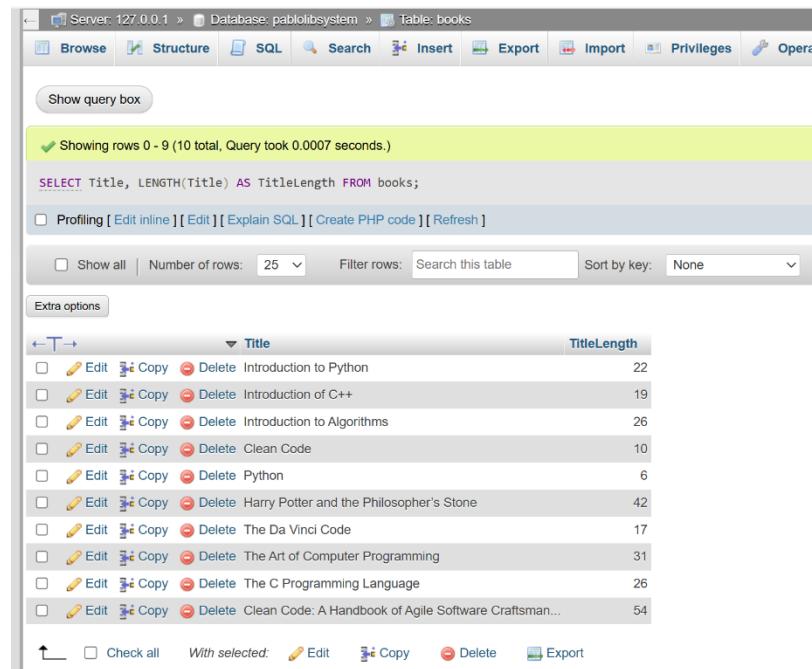
The COUNT() function returns the number of records that meet a condition. In the library system, it shows how many books each member has borrowed.

The screenshot shows a MySQL Workbench interface with a query results table. The table displays member ID, borrower name, book title, borrowing date, return date, and the number of days borrowed. The data is as follows:

memberID	Borrower	Title	Date_Borrowed	return_date	Days_Borrowed
M001	Lourde Vincent Pablo	Introduction to Python	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Introduction to Algorithms	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Introduction to Algorithms	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Introduction to Algorithms	2025-09-20	2025-09-20	0
M003	Teresa Corpuz	Introduction to Algorithms	2025-09-20	2025-09-24	4
M001	Lourde Vincent Pablo	Introduction to Algorithms	2025-09-24	2025-10-08	14
M002	Jenny Espadero	Clean Code	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Clean Code	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Clean Code	2025-09-23	2025-10-01	8
M001	Lourde Vincent Pablo	Clean Code	2025-09-24	2025-10-09	15
M001	Lourde Vincent Pablo	Python	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Python	2025-09-20	2025-09-20	0
M001	Lourde Vincent Pablo	Python	2025-09-23	2025-10-01	8

Figure 17: Function DATEDIFF()

The DATEDIFF() function calculates the number of days between two dates. It is useful for tracking borrowing duration and identifying overdue books.



The screenshot shows the MySQL Workbench interface with the following details:

- Server:** 127.0.0.1
- Database:** pabolibsystem
- Table:** books
- Query Result:**

```
SELECT Title, LENGTH>Title AS TitleLength FROM books;
```

Showing rows 0 - 9 (10 total, Query took 0.00007 seconds.)
- Table View:**

	Title	TitleLength
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Introduction to Python	22
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Introduction of C++	19
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Introduction to Algorithms	26
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Clean Code	10
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Python	6
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Harry Potter and the Philosopher's Stone	42
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete The Da Vinci Code	17
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete The Art of Computer Programming	31
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete The C Programming Language	26
<input type="checkbox"/>	Edit <input type="checkbox"/> Copy <input type="checkbox"/> Delete Clean Code: A Handbook of Agile Software Craftsman...	54
- Buttons:** Show query box, Profiling, Edit inline, Explain SQL, Create PHP code, Refresh, Show all, Number of rows: 25, Filter rows: Search this table, Sort by key: None, Extra options, Up, Check all, With selected: Edit, Copy, Delete, Export.

Figure 18: Function LENGTH()

The LENGTH() function returns the number of characters in a string. In the library system, it can be used to measure the length of book titles or member names, helping with data validation and formatting.

Chapter 4

Prototype

The screenshot shows the 'LIBRARY BOOK MANAGEMENT SYSTEM' interface. On the left is a sidebar with the 'OwlReg' logo and navigation links: Discover, Add Book, Add Member, Library, Borrow, Return book, Books, and Members. The main content area has a blue header bar with the text 'LIBRARY BOOK MANAGEMENT SYSTEM'. Below it is a button labeled 'Add Book' with a book icon. The central part of the screen is a form titled 'Book Information' containing fields for Book ID, Book Title, Author First Name, Author Middle Name, Author Last Name, and Year Published. At the bottom are 'Back' and 'Add' buttons.

Figure 19: Add book navigation

```

1 INSERT INTO books (
2     bookID, Title, AuthorFirstName, AuthorMiddleName,
3     AuthorLastName, YearPublished, BookStatus
4 )
5 VALUES ('B001', 'Introduction to Python', 'Guido', '', 'Rossum', 1991, 'AVAILABLE');

```

The screenshot shows the 'LIBRARY BOOK MANAGEMENT SYSTEM' interface. The sidebar is identical to Figure 19. The main content area has a blue header bar with the text 'LIBRARY BOOK MANAGEMENT SYSTEM'. Below it is a button labeled 'Membership' with a person icon. The central part of the screen is a form titled 'Member Registration' containing fields for Member ID, Department, First Name, Middle Name, and Last Name. At the bottom are 'Back' and 'Add' buttons.

Figure 20: Add member navigation

```

1 INSERT INTO member (
2     memberID, department, FirstName, MiddleName, LastName, Date_Joined
3 )
4 VALUES ('M001', 'STUDENT', 'Juan', 'Dela', 'Cruz', CURDATE());

```

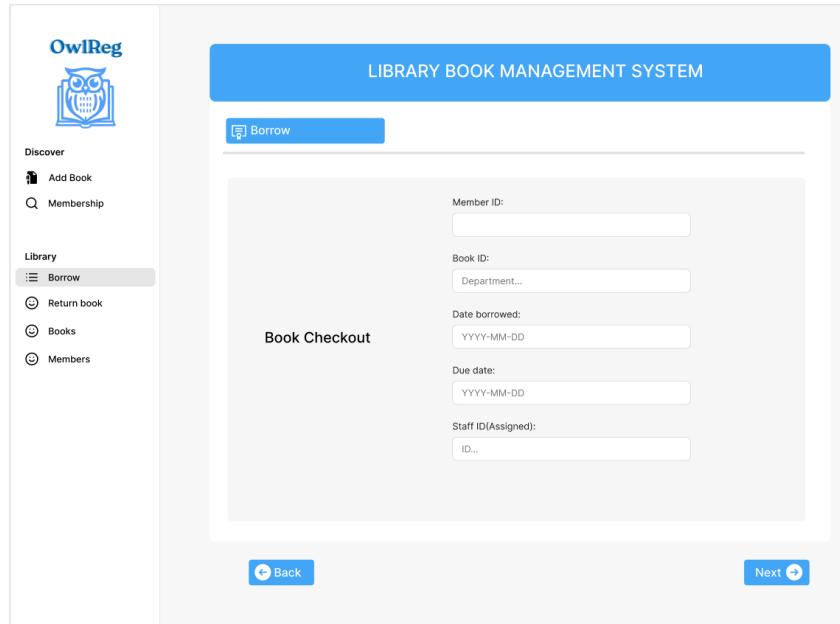


Figure 21: Borrow navigation

```

1 INSERT INTO borrow_transactions (memberID, staffID, Date_Borrowed, Due_Date)
2 VALUES ('M001', 'S001', '2025-09-30', '2025-10-07');
3
4 INSERT INTO borrow_details (TransactionId, bookID, status)
5 VALUES (LAST_INSERT_ID(), 'B001', 'BORROWED');
6
7 UPDATE books SET BookStatus='BORROWED' WHERE bookID='B001';

```

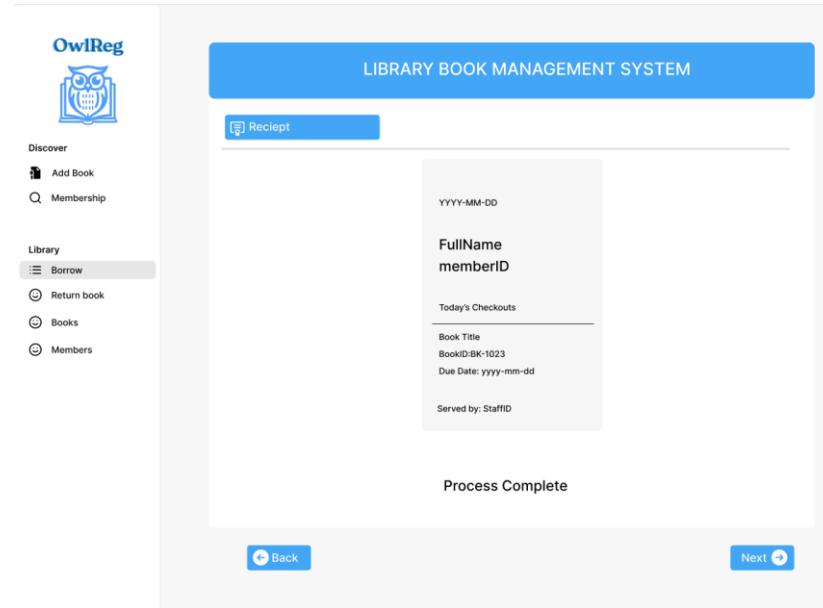


Figure 22: Borrow receipt

```

1 SELECT
2   bt.TransactionID,
3   m.FirstName || ' ' || m.LastName AS MemberName,
4   s.FirstName || ' ' || s.LastName AS StaffName,
5   b.Title,
6   bt.DateBorrowed,
7   bt.DueDate,
8   bd.DateReturned
9 FROM borrowtransaction bt
10 JOIN member m ON bt.MemberID = m.MemberID
11 JOIN staff s ON bt.StaffID = s.StaffID
12 JOIN borrowdetails bd ON bt.TransactionID = bd.TransactionID
13 JOIN books b ON bd.BookID = b.BookID
14 WHERE bt.TransactionID = 1;

```

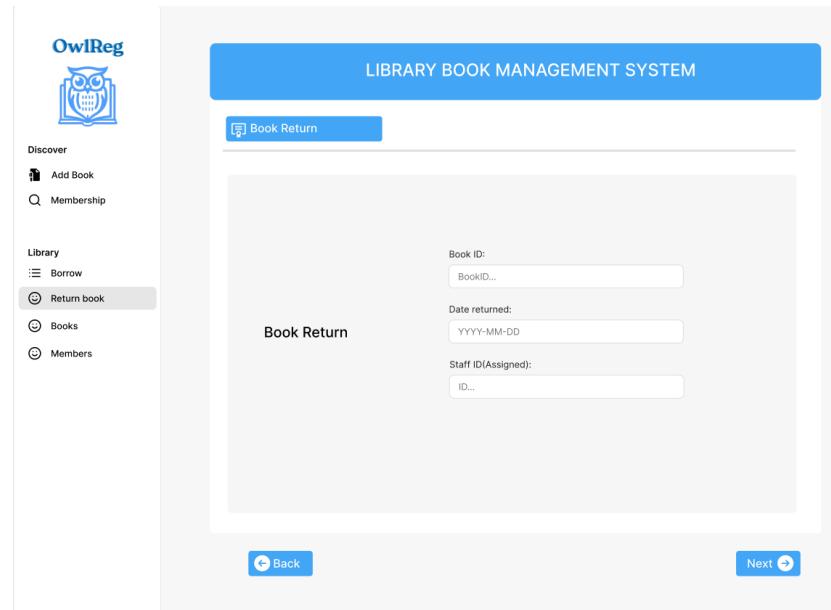


Figure 23: Book Return navigation

```

1 UPDATE borrow_details
2 SET return_date='2025-10-05', status='RETURNED'
3 WHERE detail_id=123;
4
5 UPDATE books SET BookStatus='AVAILABLE' WHERE bookID='B001';

```

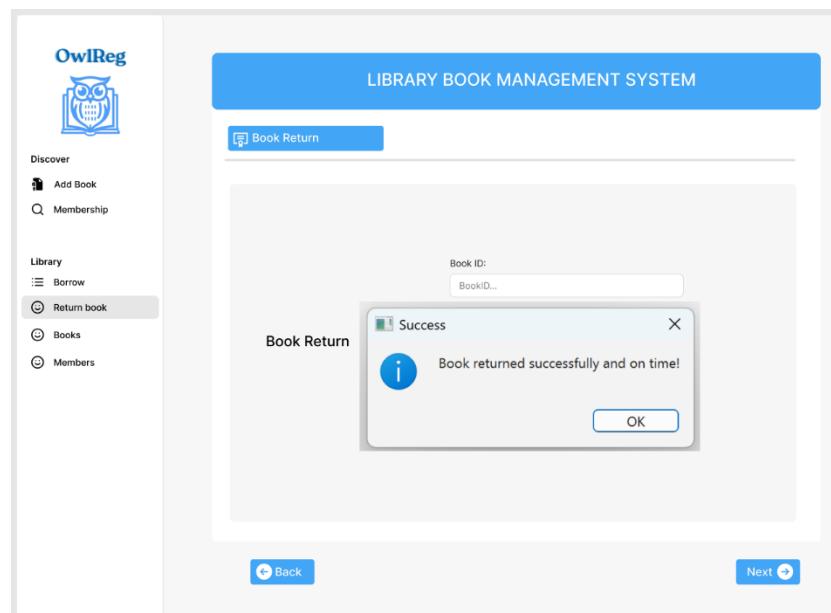


Figure 24: Book Return confirmation

The screenshot shows a web-based library management system. On the left, there's a sidebar with a logo of an owl and sections for 'Discover', 'Add Book', 'Add Member', 'Library' (with options for Borrow, Return book, Books, and Members), and a search bar. The main area has a blue header 'LIBRARY BOOK MANAGEMENT SYSTEM'. Below it, a tab labeled 'Books Available' is selected. A table titled 'Book Information' lists 10 books with columns for BookID, Title, and Entry Status (Available or Borrowed). Each row has 'Edit' and 'Delete' buttons.

BookID	Title	Entry Status
BK-101	Introduction to CSS	Available
BK-102	Introduction to C++	Borrowed
BK-104	Introduction to Java	Available
BK-105	Introduction to Python	Available
BK-106	Introduction to C#	Available
BK-107	Introduction to MySQL	Available
BK-108	Introduction to HTML	Borrowed
BK-109	How to become a Professional IT	Borrowed
BK-110	Harry Potter the goblet of fire	Borrowed

Figure 25: Books list table

```

1 SELECT
2   bookID, Title, AuthorFirstName, AuthorMiddleName,
3   AuthorLastName, YearPublished, BookStatus
4 FROM books
5 ORDER BY bookID;

```

The screenshot shows the same library management system. The sidebar and main header are identical to Figure 25. The 'Member Information' tab is selected. A table lists 10 members with columns for ID, Member Name, and Department (Student or Faculty). Each row has 'Edit' and 'Delete' buttons.

ID	Member Name	Department
ST-101	Juan Cruz	Student
ST-102	Vince Diay	Student
FC-104	Sarah Discaya	Faculty
ST-105	Sandro Marcos	Student
ST-106	Inday Gomez	Student
FC-107	Maria Lourdez	Faculty
ST-108	John Loyd	Student
FC-109	Maria Leonora Teressa	Faculty
FC-110	Maria Defensor Santiago	Faculty

Figure 26: Members list table

```

1 SELECT
2   memberID, department, FirstName, MiddleName, LastName
3 FROM member
4 ORDER BY memberID;

```

Transaction/Processes Design

The screenshot shows the 'LIBRARY BOOK MANAGEMENT SYSTEM' interface. On the left, there's a sidebar with 'OwlReg' logo and navigation links: Discover, Add Book, Membership, Library (with Borrow selected), Return book, Books, and Members. The main area has a blue header 'LIBRARY BOOK MANAGEMENT SYSTEM' with a 'Borrow' button. Below it is a 'Book Checkout' form with fields: Member ID (input field), Book ID (input field), Date borrowed (input field with placeholder 'YYYY-MM-DD'), Due date (input field with placeholder 'YYYY-MM-DD'), and Staff ID(Assigned) (input field). At the bottom are 'Back' and 'Next' buttons.

Figure 27: Borrow Transaction

```

1 -- Insert into borrow_transactions
2 INSERT INTO borrow_transactions (memberID, staffID, Date_Borrowed, Due_Date)
3 VALUES ('M001', 'S002', '2025-09-30', '2025-10-07');
4
5 -- Link the book into borrow_details
6 INSERT INTO borrow_details (TransactionId, bookID, status)
7 VALUES (LAST_INSERT_ID(), 'B011', 'BORROWED');
8
9 -- Update book status to BORROWED
10 UPDATE books
11 SET BookStatus = 'BORROWED'
12 WHERE bookID = 'B011';

```

The screenshot shows the 'LIBRARY BOOK MANAGEMENT SYSTEM' interface. The sidebar is identical to Figure 27. The main area has a blue header 'LIBRARY BOOK MANAGEMENT SYSTEM' with a 'Book Return' button. Below it is a 'Book Return' form with fields: Book ID (input field with placeholder 'BookID...'), Date returned (input field with placeholder 'YYYY-MM-DD'), and Staff ID(Assigned) (input field). At the bottom are 'Back' and 'Next' buttons.

Figure 28: Return Transaction

```

1 -- Update borrow_details with return date
2 UPDATE borrow_details
3 SET return_date = '2025-10-05', status = 'RETURNED'
4 WHERE TransactionId = 21 AND bookID = 'B011';
5
6 -- Update book status back to AVAILABLE
7 UPDATE books
8 SET BookStatus = 'AVAILABLE'
9 WHERE bookID = 'B011';

```

Reports

List of All Borrowed Books

```

1 SELECT b.bookID, b.Title, m.FirstName, m.LastName, bt.Date_Borrowed, bt.Due_Date
2 FROM borrow_details bd
3 JOIN books b ON bd.bookID = b.bookID
4 JOIN borrow_transactions bt ON bd.TransactionId = bt.TransactionID
5 JOIN member m ON bt.memberID = m.memberID
6 WHERE bd.status = 'BORROWED';

```

Borrowing History of a Member

```

1 SELECT m.memberID, m.FirstName, m.LastName, b.Title, bt.Date_Borrowed, bd.return_date, bd.status
2 FROM borrow_transactions bt
3 JOIN member m ON bt.memberID = m.memberID
4 JOIN borrow_details bd ON bt.TransactionID = bd.TransactionId
5 JOIN books b ON bd.bookID = b.bookID
6 WHERE m.memberID = 'M001';

```

Most Borrowed Books

```

1 SELECT b.Title, COUNT(bd.bookID) AS TimesBorrowed
2 FROM borrow_details bd
3 JOIN books b ON bd.bookID = b.bookID
4 GROUP BY bd.bookID
5 ORDER BY TimesBorrowed DESC
5 LIMIT 5;

```

Transactions Processed by Staff

```

1 SELECT s.StaffFirstName, s.StaffLastName, COUNT(bt.TransactionID) AS TransactionsHandled
2 FROM borrow_transactions bt
3 JOIN staff s ON bt.staffID = s.staffID
4 GROUP BY bt.staffID
5 ORDER BY TransactionsHandled DESC;

```

Daily Transaction summary

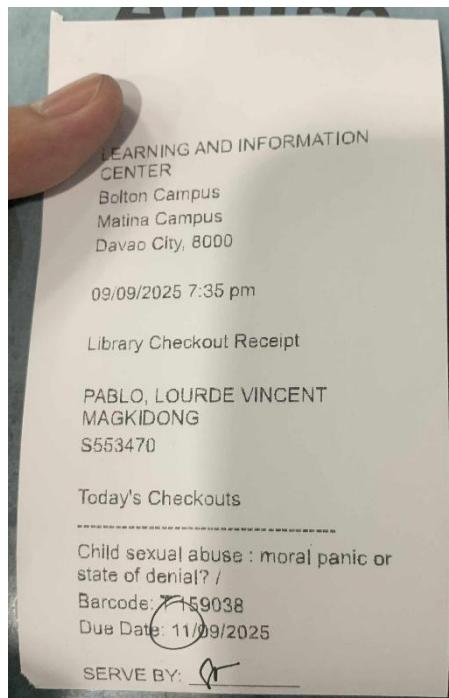
```

1 SELECT Date_Borrowed, COUNT(TransactionID) AS TotalTransactions
2 FROM borrow_transactions
3 GROUP BY Date_Borrowed
4 ORDER BY Date_Borrowed DESC;

```

Appendix A

LIC Receipt



References

- Andri, A., Sopiah, N., & Oktaviani, N. (2025). Development of a book borrowing & returning system using the extreme programming method. *Journal of Information Systems and Application Innovation*, 6(2). Retrieved from <https://doi.org/10.26486/jisai.v6i2.239>
- Marlindawati ., Misinem ., & Adhiatma, P. (2024). Analyzing and Enhancing Data Management for the E-Library Transaction System. *Journal of Data Science*, 2024. Retrieved from <https://iuojs.intimal.edu.my/index.php/jods/article/view/558>
- Mengping, C. (2023). Strategies and practices to enhance the efficiency of borrowing and returning books in college libraries. *Academic Journal of Humanities & Social Sciences*, 6(22), 53–58. . Retrieved from <https://doi.org/10.25236/AJHSS.2023.062209>
- Song, W. (2018). Analysis of new library borrowing and returning mode based on book transfer system. In *Proceedings of the 2018 International Workshop on Advances in Social Sciences (IWASS 2018)*. Retrieved from https://www.webofproceedings.org/proceedings_series/ESSP/IWASS%202018/IWASS1231018.pdf