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### Table in library database

```
mysql> show tables;
+-----+
| Tables_in_library |
+-----+
| books              |
| lenders            |
| transactions       |
+-----+
3 rows in set (0.00 sec)

mysql>
```

```
mysql> desc books;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra          |
+-----+-----+-----+-----+-----+-----+
| id    | int           | NO   | PRI | NULL    | auto_increment |
| title | varchar(255)  | YES  |     | NULL    |                |
| author | varchar(255)  | YES  |     | NULL    |                |
| year  | int           | YES  |     | NULL    |                |
| copies | int           | YES  |     | NULL    |                |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> desc lenders;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra          |
+-----+-----+-----+-----+-----+-----+
| id         | int           | NO   | PRI | NULL    | auto_increment |
| name       | varchar(255)  | YES  |     | NULL    |                |
| email      | varchar(255)  | YES  | UNI | NULL    |                |
| phone      | varchar(15)   | YES  |     | NULL    |                |
| joined_on  | date          | YES  |     | NULL    |                |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> desc transactions;
+-----+-----+-----+-----+-----+-----+
| Field          | Type          | Null | Key | Default          | Extra          |
+-----+-----+-----+-----+-----+-----+
| id             | int           | NO   | PRI | NULL             | auto_increment |
| book_id        | int           | NO   | MUL | NULL             |                |
| member_id      | int           | NO   | MUL | NULL             |                |
| date_issued    | timestamp     | YES  |     | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
| date_returned  | date          | YES  |     | NULL             |                |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

## Available features

```
gyan@gyan-VirtualBox:~$ ./lib
Connection success
Query executed successful
Database selected successfully
Query executed successful
Query executed successful
Query executed successful
All tables created successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
```

- 1 . Inserting a book &
- 10. Listing all books

```
1
Enter Book Title: titanic
Enter Author: noOne
Enter Year: 2001
Enter Available Copies: 3
Query executed successful
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
10
Books Available:
ID: 1, Title: fnbaidbf, Author: fadfa, Year: 1012, Copies: 3
ID: 2, Title: titanic, Author: noOne, Year: 2001, Copies: 3
1. Insert a book
```

## 2. Adding a new member to library & 11. Listing all members

```
13. Exit
2
Enter Member Name: gyan
Enter Email: gyan123@gmail.com
Enter Phone Number: 9955187719
Member added successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
11
Library Members:
ID: 1, Name: fasdfa, Email: fadfad, Phone: 442424242, Joined On: 2025-04-02
ID: 2, Name: gyan, Email: gyan123@gmail.com, Phone: 9955187719, Joined On: 2025-04-02
```

## 3. Lending a book & 12. Listing the transaction

```
Enter Book ID: 2
Enter Member ID: 1
Book lent successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
12
Transactions:
ID: 1, Book ID: 1, Member ID: 1, Issued: 2025-04-02 21:22:08, Returned: 2025-04-02
ID: 2, Book ID: 2, Member ID: 1, Issued: 2025-04-02 21:33:22, Returned: Not Returned
```

#### 4. Returning a book & 12. Listing the transaction

```
4
Enter Transaction ID: 2
Book returned successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
12
Transactions:
ID: 1, Book ID: 1, Member ID: 1, Issued: 2025-04-02 21:22:08, Returned: 2025-04-02
ID: 2, Book ID: 2, Member ID: 1, Issued: 2025-04-02 21:33:22, Returned: 2025-04-02
1. Insert a book
```

#### 5. Updating book details & 10. Listing all books

```
5
Enter Book ID to Update: 1
Enter New Title: ramayan
Enter New Author: ram
Enter New Copies Count: 9
Book updated successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
10
Books Available:
ID: 1, Title: ramayan, Author: ram, Year: 1012, Copies: 9
ID: 2, Title: titanic, Author: noOne, Year: 2001, Copies: 3
1. Insert a book
```

## 6. Updating member details & 11. Listing all members

```
6
Enter Member ID to Update: 1
Enter New Name: ramesh
Enter New Email: ram@gmail.com
Enter New Phone Number: 949494942
Member updated successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
11
Library Members:
ID: 1, Name: ramesh, Email: ram@gmail.com, Phone: 949494942, Joined On: 2025-04-02
ID: 2, Name: gyan, Email: gyan123@gmail.com, Phone: 9955187719, Joined On: 2025-04-02
1. Insert a book
```

## 7. Deleting a book & 10. Listing all books

```
7
Enter Book ID to Delete: 2
Book deleted successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
10
Books Available:
ID: 1, Title: ramayan, Author: ram, Year: 1012, Copies: 9
1. Insert a book
```

## 8. Deleting a member & 11. Listing all members

```
8
Enter Member ID to Delete: 2
Member deleted successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
11
Library Members:
ID: 1, Name: ramesh, Email: ram@gmail.com, Phone: 949494942, Joined On: 2025-04-02
1. Insert a book
```

## 9. Deleting a transaction & 12. Listing all transactions

```
9
Enter Transaction ID to Delete: 2
Transaction deleted successfully!
1. Insert a book
2. Add new member to library
3. Lend a book
4. Return a book
5. Update book details
6. Update member details
7. Delete a book
8. Delete a member
9. Delete a transaction
10. List all books
11. List all members
12. List all transactions
13. Exit
12
Transactions:
ID: 1, Book ID: 1, Member ID: 1, Issued: 2025-04-02 21:22:08, Returned: 2025-04-02
1. Insert a book
```

# Library Management System - Documentation

## Introduction

The Library Management System is a C++ application that integrates with MySQL to manage books, members, and transactions in a library. It provides a command-line interface to perform CRUD (Create, Read, Update, Delete) operations on books, members, and lending transactions.

## Features

- Add, update, and delete books.
- Register, update, and remove members.
- Lend and return books.
- View a list of books, members, and transactions.
- MySQL database integration for persistent storage.

## Technologies Used

- **Programming Language:** C++
- **Database:** MySQL
- **Library:** MySQL Connector/C++
- **Development Environment:** Ubuntu

## Database Schema

The system consists of three main tables:

### 1. books Table

Column	Type	Description
id	INT (PK, AI)	Unique book ID
title	VARCHAR(255)	Title of the book
author	VARCHAR(255)	Author name
year	INT	Year of publication
copies	INT	Available copies

### 2. lenders Table

Column	Type	Description
id	INT (PK, AI)	Unique member ID
name	VARCHAR(255)	Member name
email	VARCHAR(255)	Unique email

Column	Type	Description
phone	VARCHAR(15)	Contact number
joined_on	DATE	Membership start date

### 3. transactions Table

Column	Type	Description
id	INT (PK, AI)	Unique transaction ID
book_id	INT (FK)	References books(id)
member_id	INT (FK)	References lenders(id)
date_issued	TIMESTAMP	Book issue date
date_returned	DATE (NULL)	Date when book was returned

## Installation & Setup

### 1. Install MySQL

```
sudo apt update
sudo apt install mysql-server
```

### 2. Install MySQL Connector/C++

```
sudo apt install libmysqlclient-dev
```

### 3. Compile the C++ Program

```
g++ library.cpp -o library -lmysqlclient
```

### 4. Run the Program

```
./library
```

## Functionalities

### 1. Adding a Book

Prompts the user for book details and inserts them into the `books` table.

```
void addBook(MYSQL *conn);
```

### 2. Registering a Member

Registers a new library member with contact details.

```
void addMember(MYSQL *conn);
```

### 3. Lending a Book

Records a transaction when a book is borrowed.

```
void lendBook(MYSQL *conn);
```



#### **4. Returning a Book**

Updates the date\_returned field in transactions.

```
void returnBook(MYSQL *conn);
```

#### **5. Updating Book Details**

Modifies book information such as title, author, and copies.

```
void updateBook(MYSQL *conn);
```

#### **6. Updating Member Details**

Modifies member information like name, email, and phone number.

```
void updateMember(MYSQL *conn);
```

#### **7. Deleting a Book**

Removes a book entry from the database.

```
void deleteBook(MYSQL *conn);
```

#### **8. Deleting a Member**

Deletes a library member from the database.

```
void deleteMember(MYSQL *conn);
```

#### **9. Deleting a Transaction**

Removes a transaction record.

```
void deleteTransaction(MYSQL *conn);
```

#### **10. Listing All Books**

Displays all books in the library.

```
void listBooks(MYSQL *conn);
```

#### **11. Listing All Members**

Displays all registered members.

```
void listMembers(MYSQL *conn);
```

#### **12. Listing All Transactions**

Displays all lending transactions.

```
void listTransactions(MYSQL *conn);
```

## **Conclusion**

This Library Management System provides essential functionalities to manage a small to medium-sized library efficiently. With MySQL integration, data persistence and reliability are ensured, making it a robust system for library operations.

