Library Management System Database

This Library Management System (LMS) database is designed to manage and organize essential library functions, including the cataloging of books, tracking of members, authorship records, categorization of books, and management of borrowing transactions. The database comprises six main tables: **Books**, **Members**, **Authors**, **Categories**, **Book Copies**, and **Borrowing Transactions**, all implemented in MySQL with carefully defined data types, constraints, and relationships. This system allows for efficient handling of library resources and user interactions, ensuring smooth operation and record-keeping for library management.

Steps of Constructing ERD

Step 1: Identifying Entities

- **Books**
- **Members**
- **Authors**
- **Categories**
- **Book Copies**
- **Borrowing Transactions**

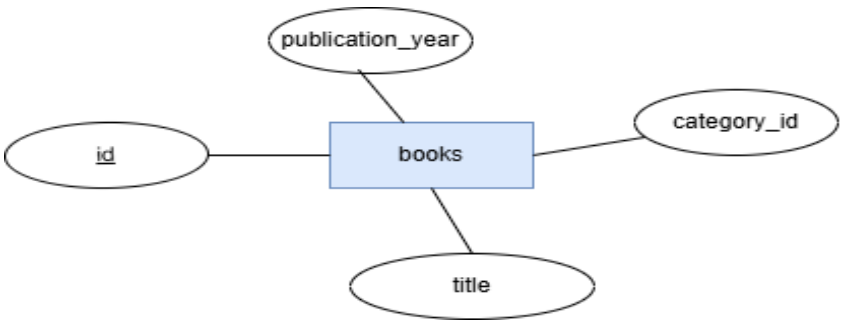
Step 2: Identifying Attributes and PK

- **Books**: id, title, publication_year, category_id.
- **Members**: id, name,address,phone_number,email,copy_id.
- **Authors**: id, name,nationality,birth_year.
- **Categories**: id, category_name.
- **Book Copies**: id, book_id, available,shelf_location
- **Borrowing Transactions**: id, member_id, copy_id, borrow_date, return_date.

  Define Primary Keys: Each entity has a unique identifier (e.g.id,).

Representing Entities with attributes

- **Books**: id, title, publication_year, category_id.



Step 3: Identifying Relationships

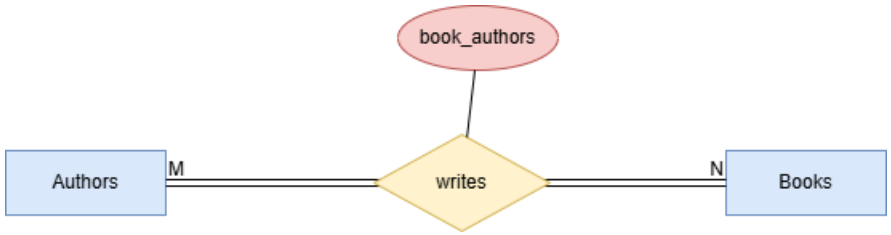
- Authors write Books
- Books belong to a Category
- Books have multiple Book_Copies
- Members borrow Book_Copies
- Book_copies are borrowed in **Borrowing_Transactions**

Step 4: Cardinality Ratio and participation

1. **Authors to Books**: Many-to-Many
2. **Categories to Books**: One-to-Many
3. **Books to Book Copies**: One-to-Many
4. **Book Copies to Borrowing Transactions**: One-to-Many
5. **Books to Categories**: Many-to-one

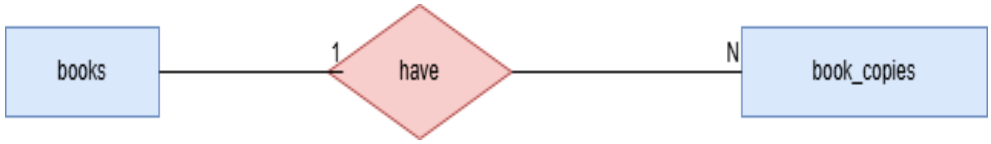
There will a book_authors table (junction tablea) for many to many relationship bwtween books and authors.

Authors write Books



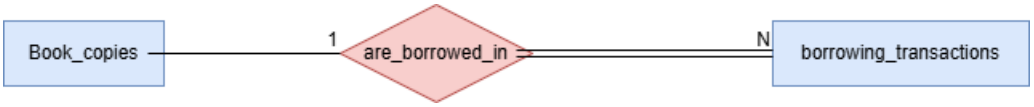
Books belong to Categories

Books have multiple book_Copies

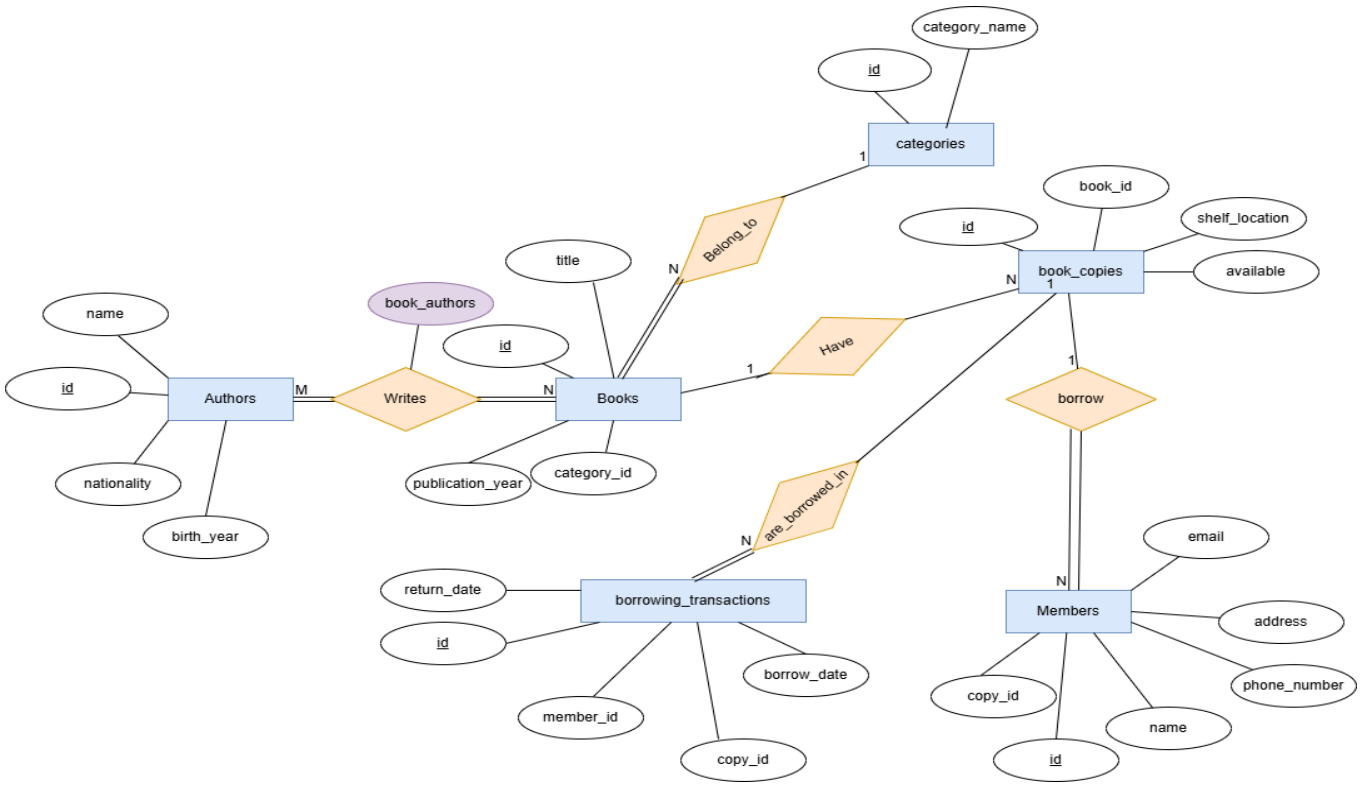


Members borrow Book_Copies

Book_copies are borrowed in Borrowing_Transactions



ERD Of Library Management System



Schema Diagram

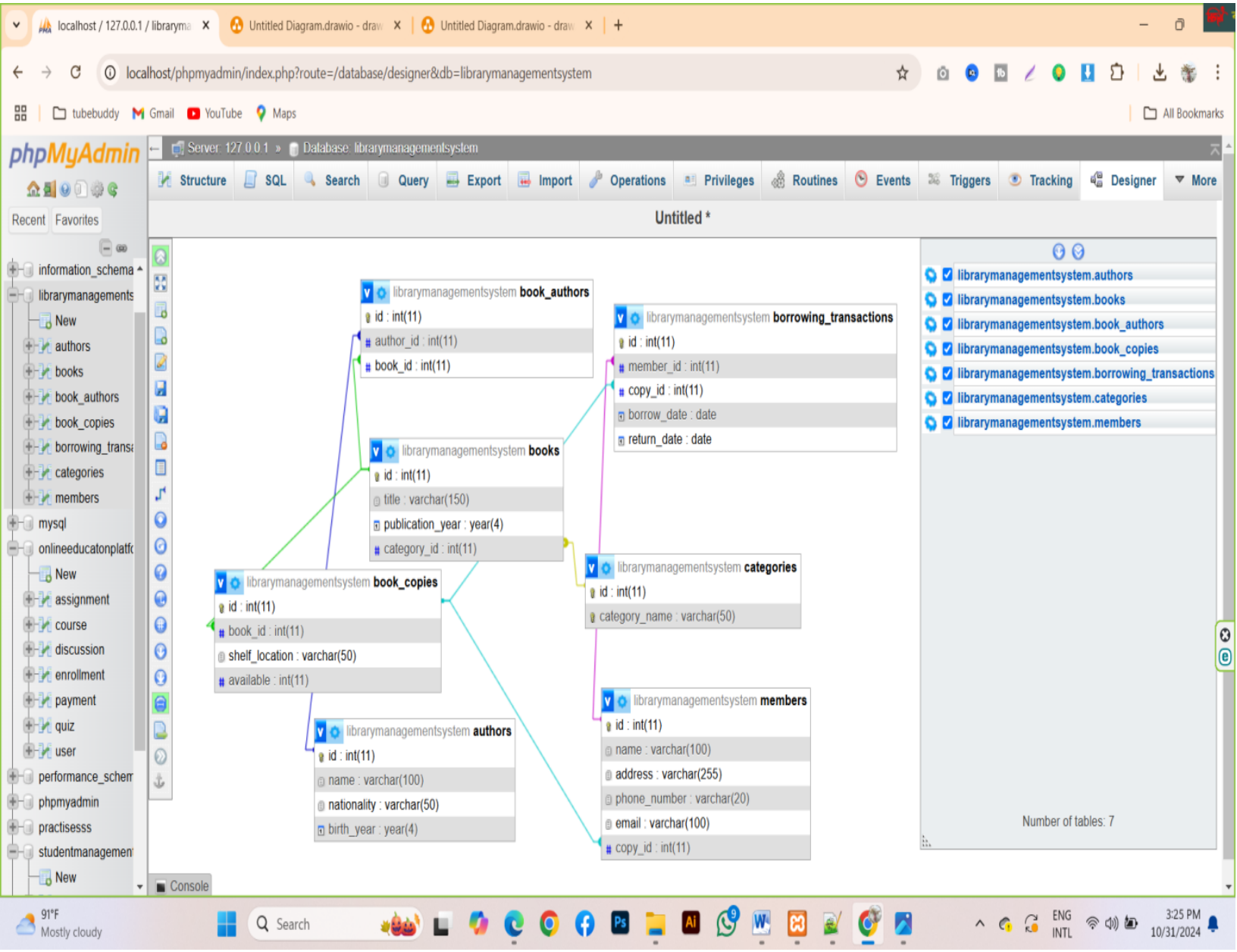
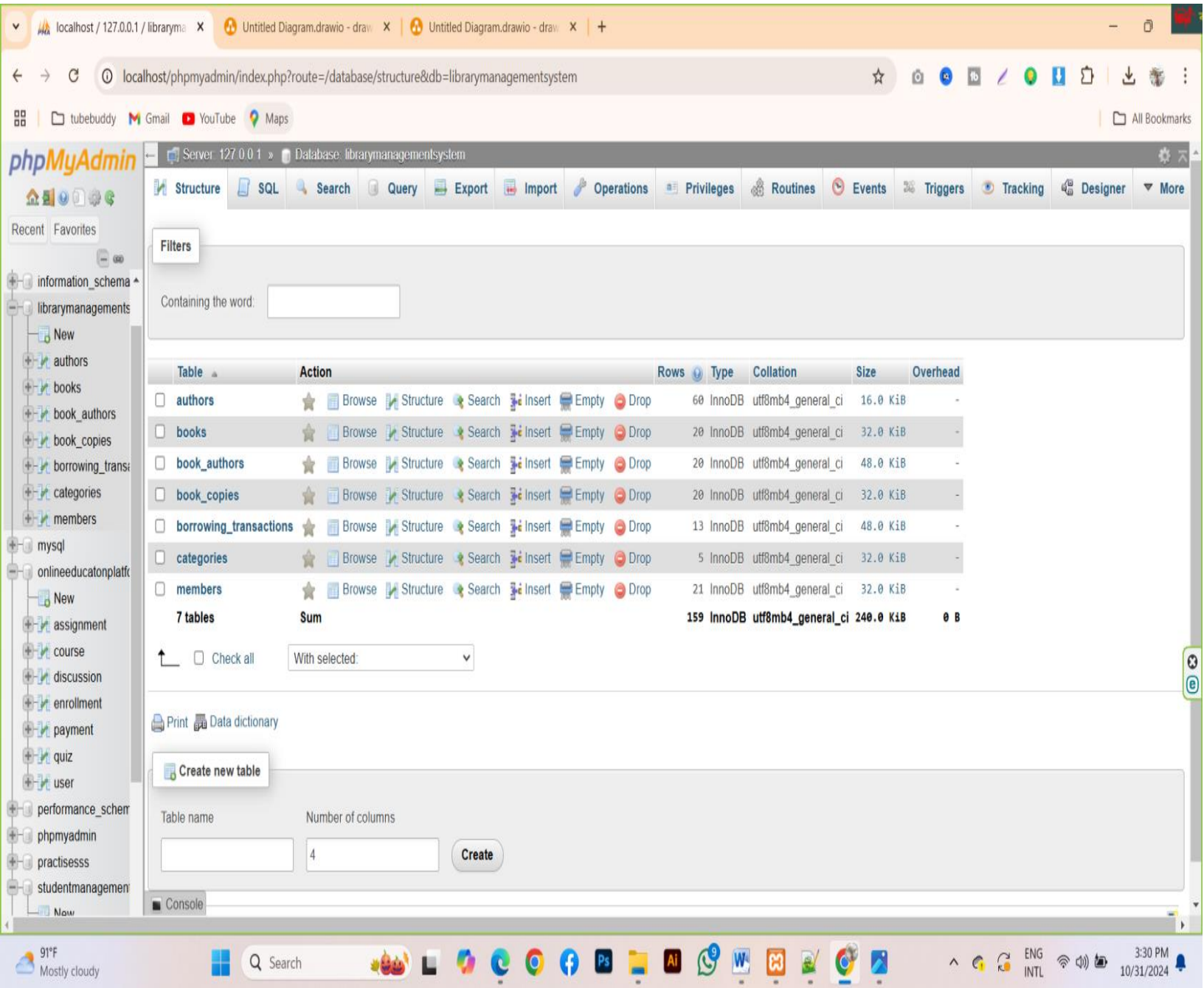
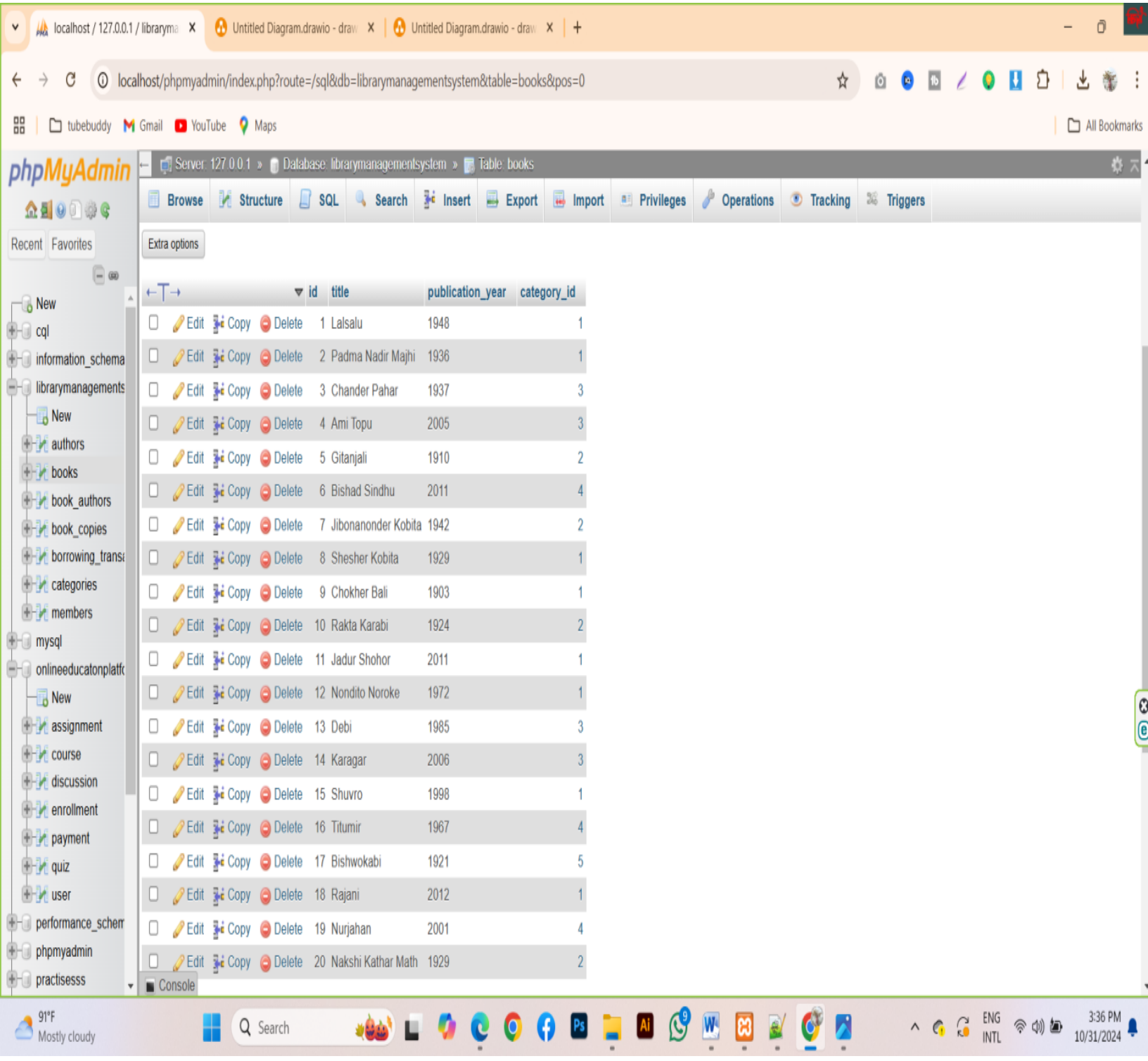


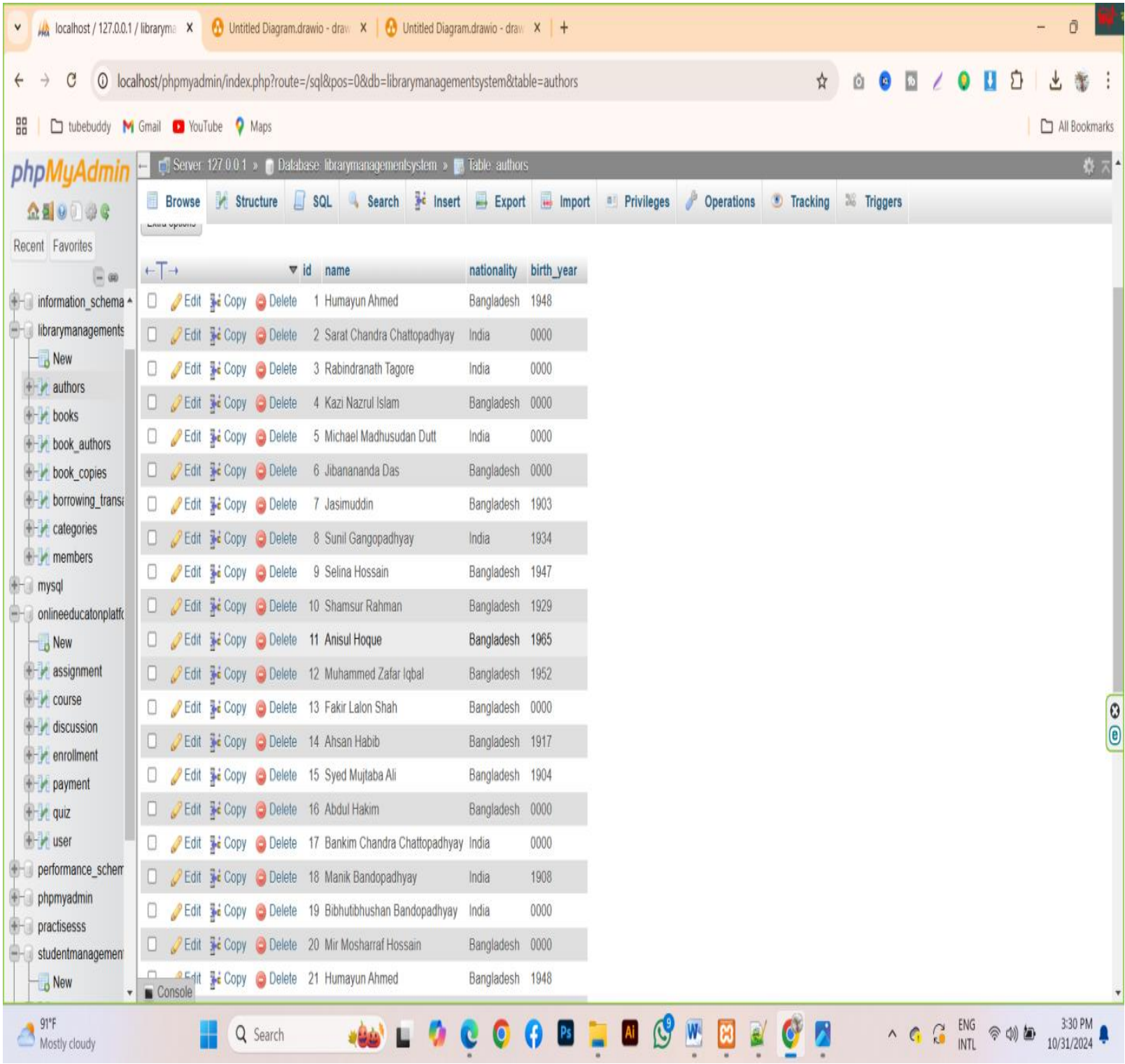
Table Screenshots



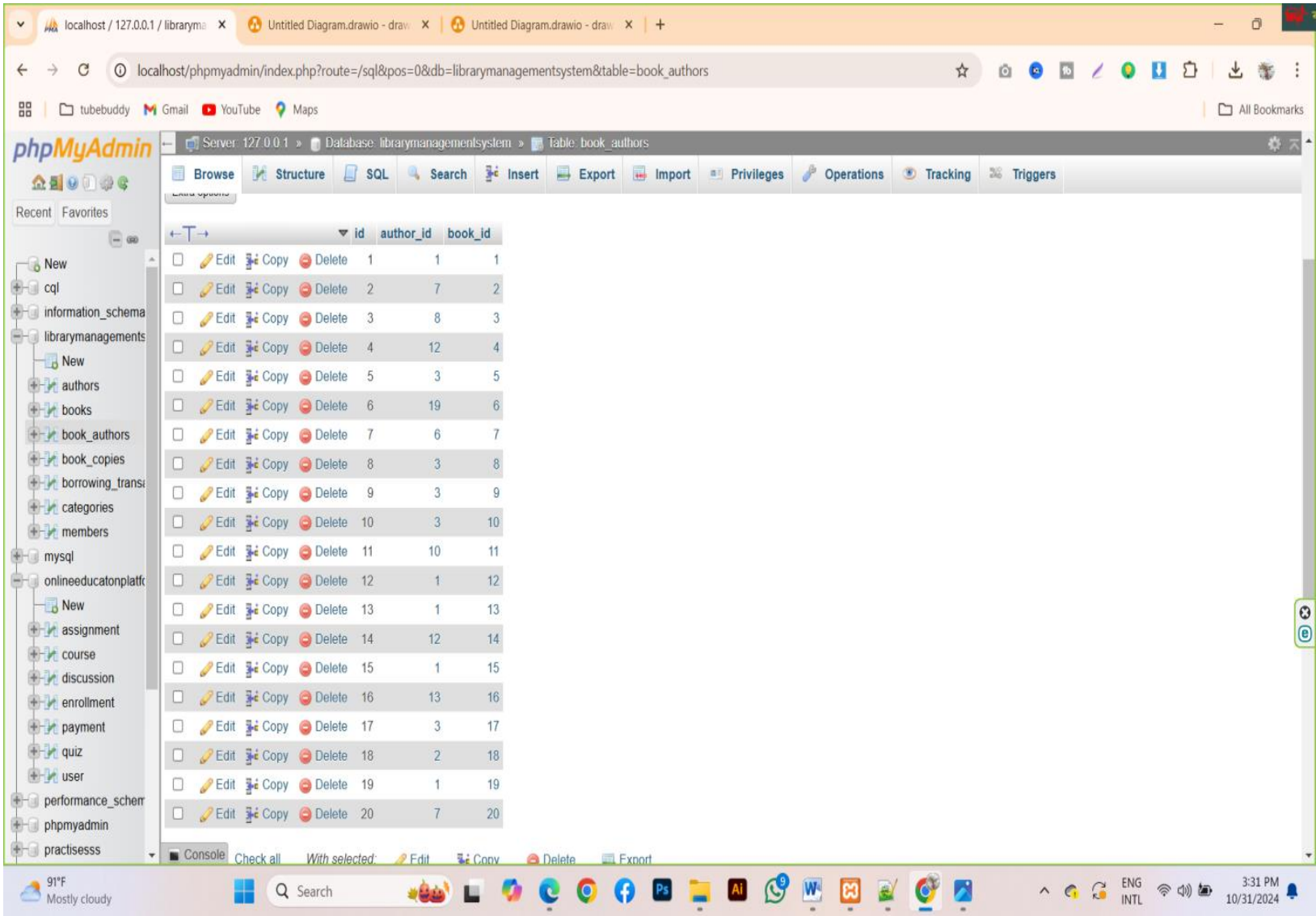
1.Books table



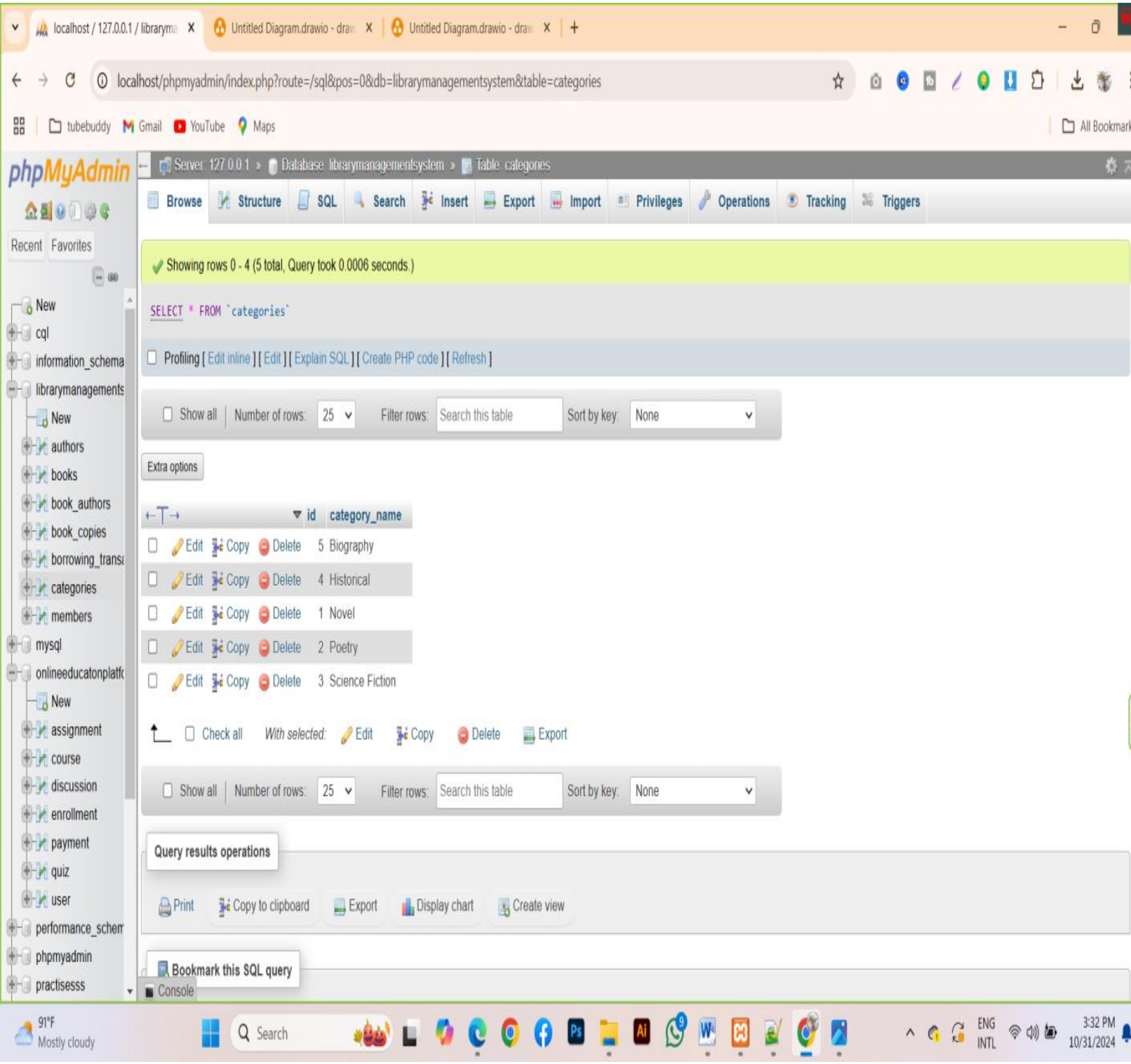
2. Authors table



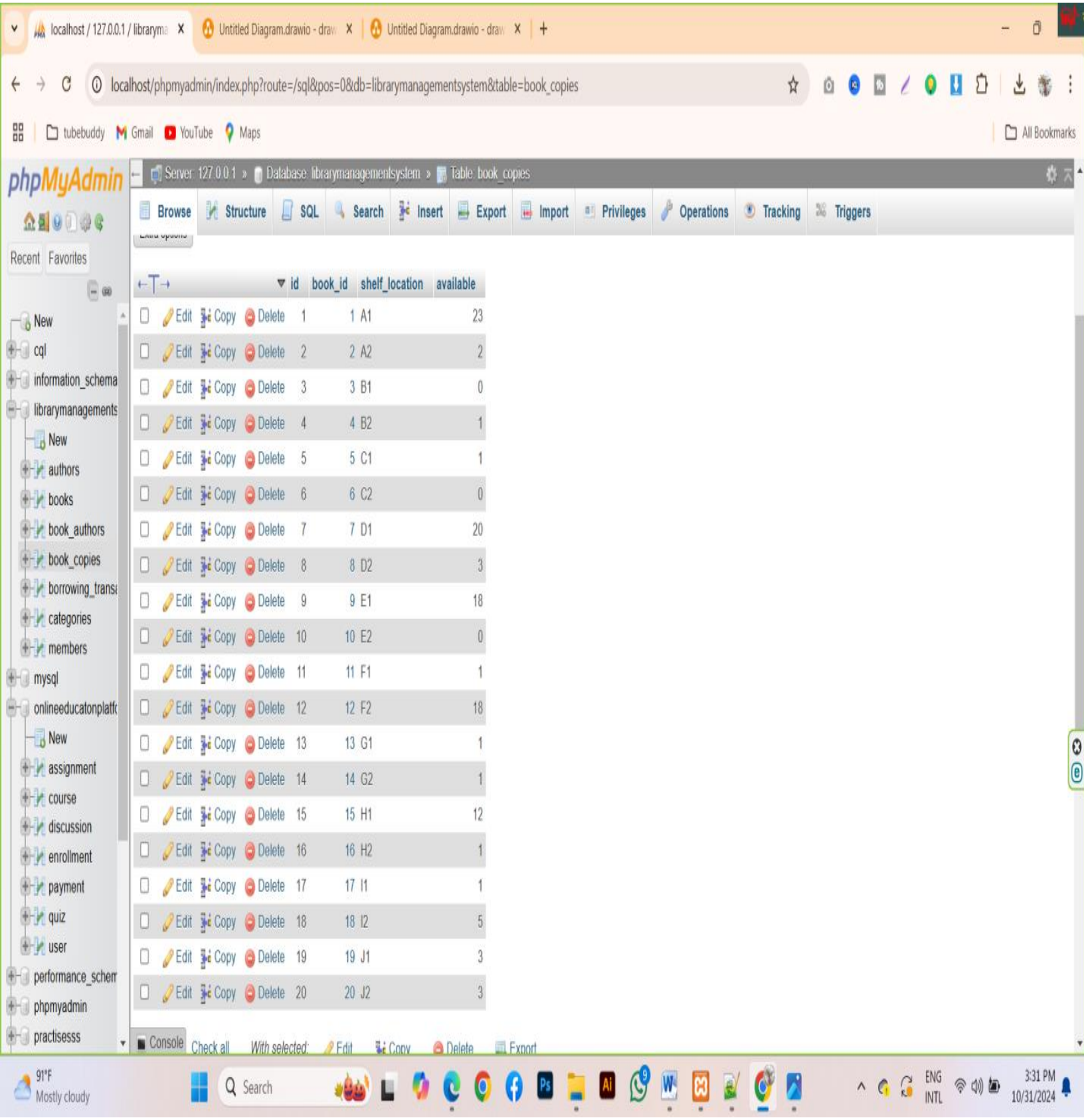
3.book_authors table(junction table)



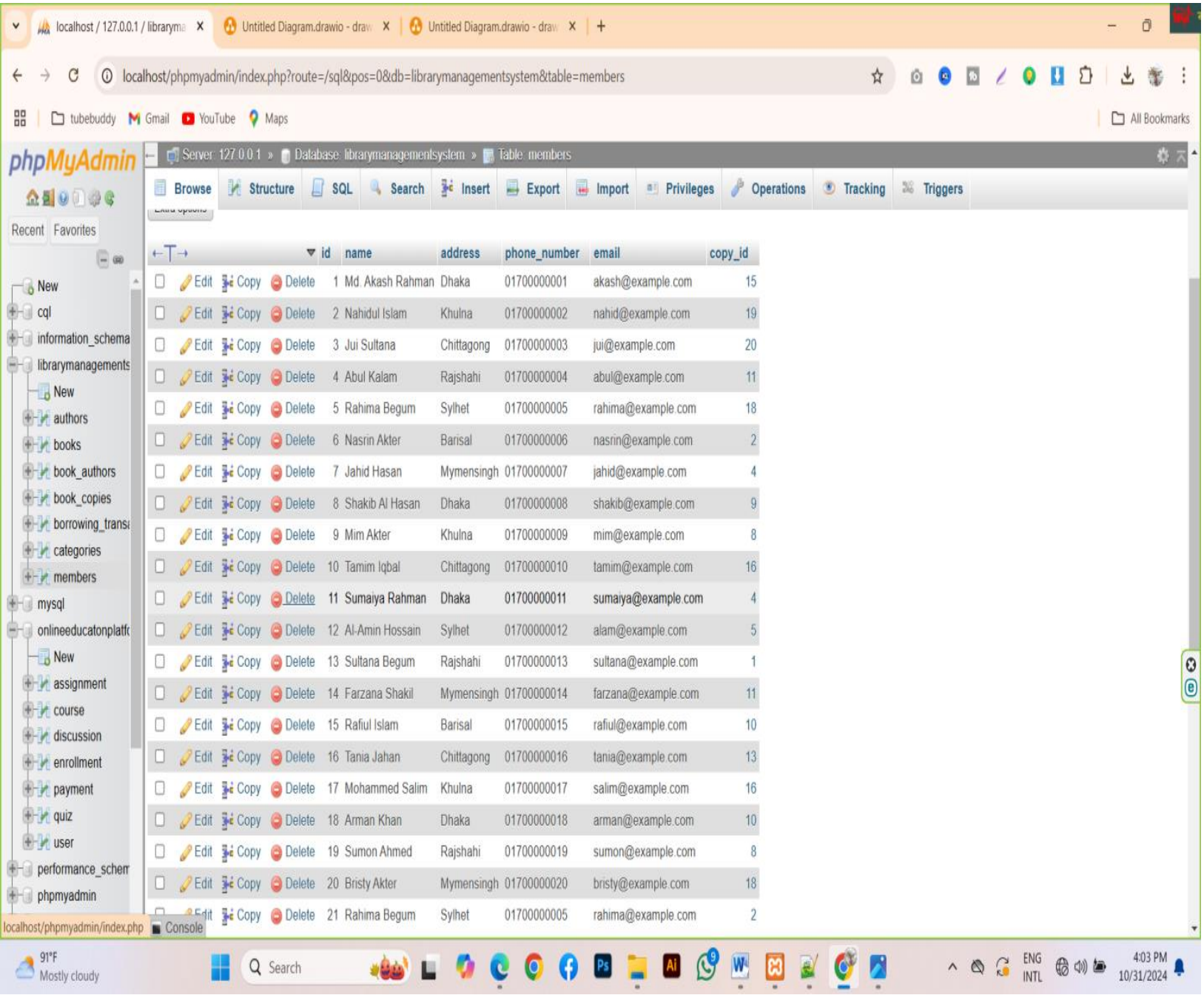
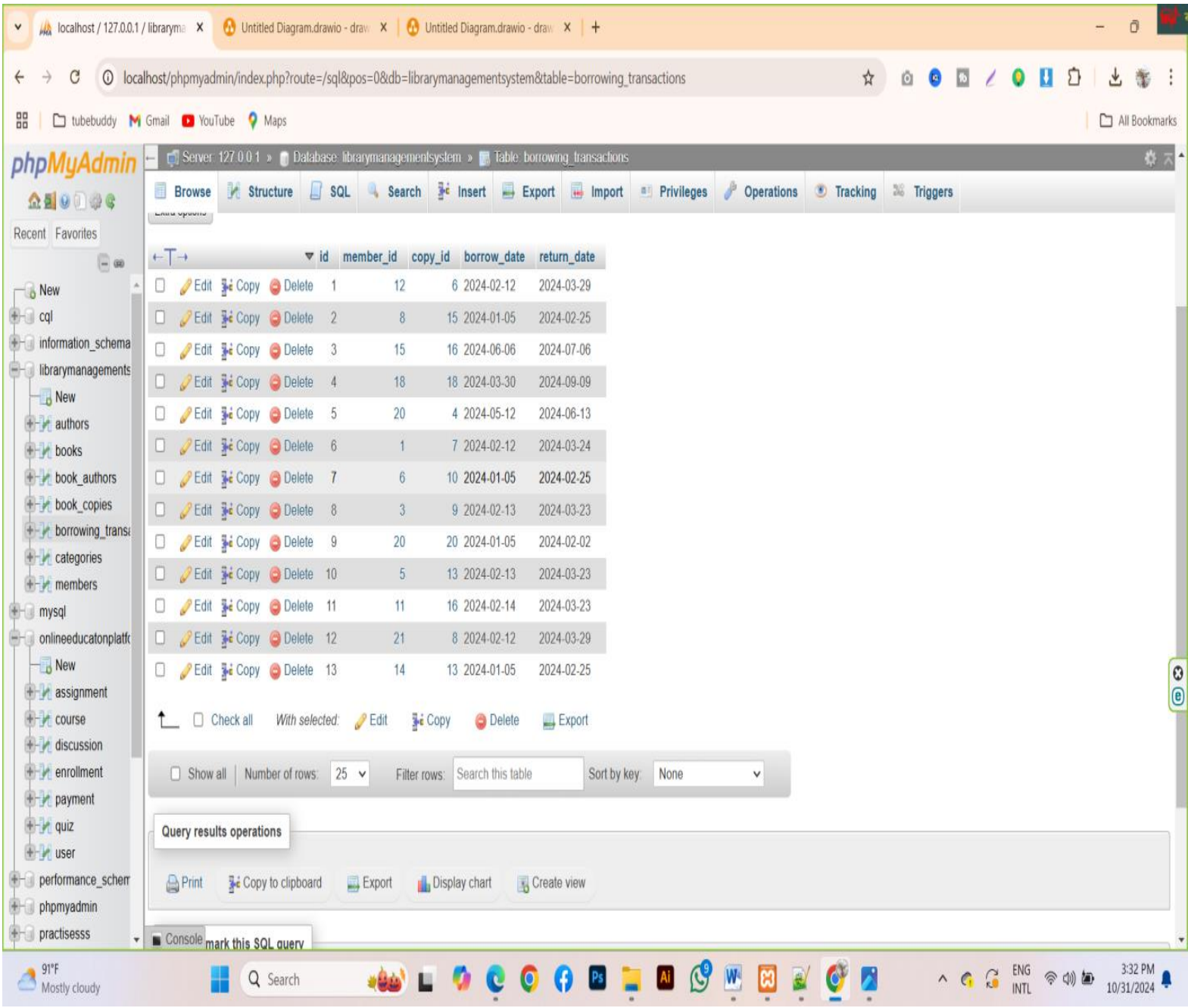
4.Categories table



5.book_copies table



6. members table



7.borrowing_transactions table