

LIBRARY MANAGEMENT SYSTEM

Entities and Attributes:

- **Books:**
 - book_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - isbn (VARCHAR(20), UNIQUE)
 - title (VARCHAR(255), NOT NULL)
 - publication_year (INT)
 - publisher_id (INT, FOREIGN KEY referencing Publishers)
 - edition (VARCHAR(50))
- **Authors:**
 - author_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - author_name (VARCHAR(255), NOT NULL)
- **Book_Authors (Linking table for many-to-many relationship):**
 - book_id (INT, FOREIGN KEY referencing Books)
 - author_id (INT, FOREIGN KEY referencing Authors)
 - PRIMARY KEY (book_id, author_id)
- **Publishers:**
 - publisher_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - publisher_name (VARCHAR(255), NOT NULL)
- **Members:**
 - member_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - member_name (VARCHAR(255), NOT NULL)
 - address (VARCHAR(255))
 - phone_number (VARCHAR(20))

- email (VARCHAR(255), UNIQUE)
- join_date (DATE)
- **Loans:**
 - loan_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - book_id (INT, FOREIGN KEY referencing Books)
 - member_id (INT, FOREIGN KEY referencing Members)
 - loan_date (DATE)
 - return_date (DATE)
 - due_date (DATE)
- **Categories:**
 - category_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - category_name (VARCHAR(255), NOT NULL)
- **Book_Categories (Linking table for many-to-many relationship):**
 - book_id (INT, FOREIGN KEY referencing Books)
 - category_id (INT, FOREIGN KEY referencing Categories)
 - PRIMARY KEY (book_id, category_id)
- **Reservations:**
 - reservation_id (INT, PRIMARY KEY, AUTO_INCREMENT)
 - book_id (INT, FOREIGN KEY referencing Books)
 - member_id (INT, FOREIGN KEY referencing Members)
 - reservation_date (DATE)
 - status VARCHAR(50) -- e.g., "Pending", "Completed", "Cancelled"

Relationships:

- **One-to-many:**
 - Publishers to Books (A publisher can publish many books)
 - Members to Loans (A member can borrow many books)

- Books to Loans (A book can be borrowed multiple times, but one loan record per borrowing)
- **Many-to-many:**
 - Books to Authors (A book can have multiple authors, and an author can write multiple books)
 - Books to Categories (A book can belong to multiple categories, and a category can have multiple books)
- **One-to-many (Self-referencing):**
 - Members to Members (Optional: For tracking referrals or relationships between members)

SQL Query

- Table creation query
 - CREATE TABLE Publishers (

publisher_id INT PRIMARY KEY AUTO_INCREMENT,

publisher_name VARCHAR(255) NOT NULL

);
 - CREATE TABLE Authors (

author_id INT PRIMARY KEY AUTO_INCREMENT,

author_name VARCHAR(255) NOT NULL

);
 - CREATE TABLE Books (

book_id INT PRIMARY KEY AUTO_INCREMENT,

isbn VARCHAR(20) UNIQUE,

```

title VARCHAR(255) NOT NULL,

publication_year INT,

publisher_id INT,

edition VARCHAR(50),

FOREIGN KEY (publisher_id) REFERENCES Publishers(publisher_id)

);

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➤ CREATE TABLE Book_Authors (

book_id INT,

author_id INT,

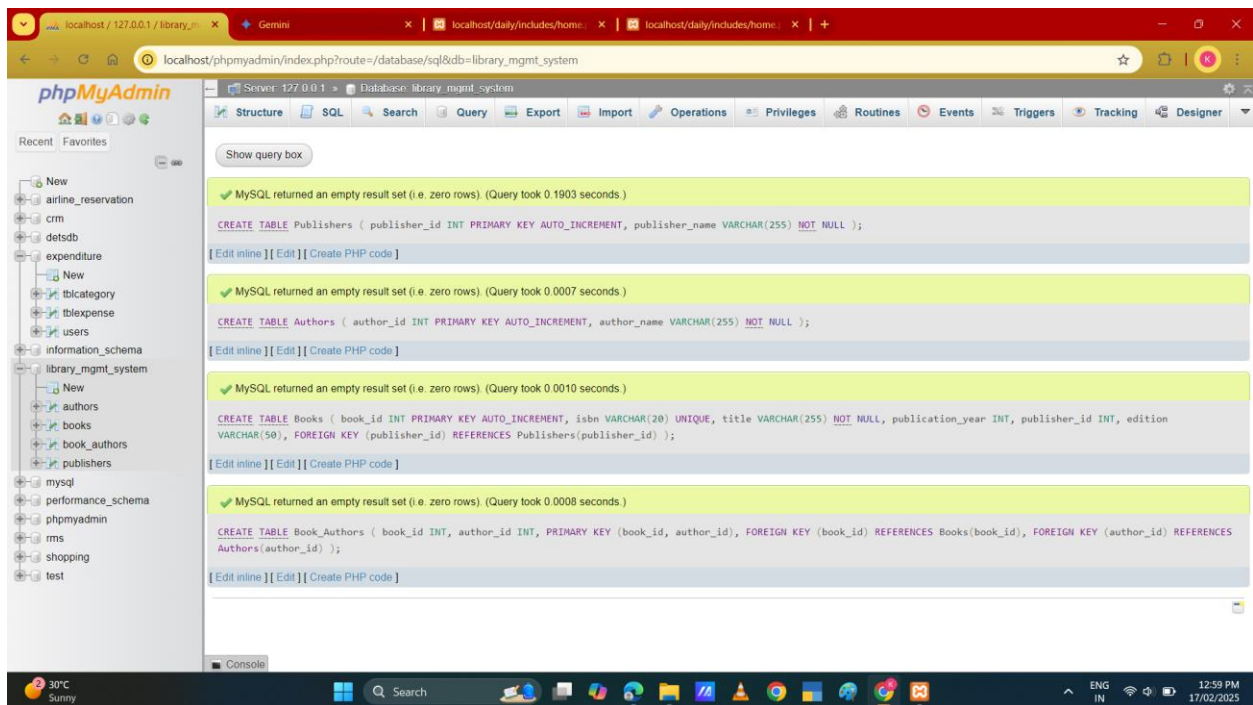
PRIMARY KEY (book_id, author_id),

FOREIGN KEY (book_id) REFERENCES Books(book_id),

FOREIGN KEY (author_id) REFERENCES Authors(author_id)

);

```



Author table Schema

The screenshot displays the phpMyAdmin interface for the 'library_mgmt_system' database, specifically the 'authors' table structure. The table has two columns: 'author_id' (int(11), PRIMARY, AUTO_INCREMENT) and 'author_name' (varchar(255), utf8mb4_general_ci). The interface includes tabs for Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, Operations, Tracking, and Triggers. The 'Structure' tab is active, showing the table structure and options to add, drop, or change columns. The 'Indexes' section shows a PRIMARY index on 'author_id'. The 'Partitions' section indicates no partitioning is defined.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	author_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	author_name	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More

Indexes

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Rename Drop	PRIMARY	BTREE	Yes	No	author_id	0	A	No	

Create an index on 1 column(s) after author_name Go

Books table Schema

The screenshot displays the phpMyAdmin interface for the 'library_mgmt_system' database, specifically the 'books' table structure. The table has six columns: 'book_id' (int(11), PRIMARY, AUTO_INCREMENT), 'isbn' (varchar(20), utf8mb4_general_ci), 'title' (varchar(255), utf8mb4_general_ci), 'publication_year' (int(11)), 'publisher_id' (int(11)), and 'edition' (varchar(50), utf8mb4_general_ci). The interface includes tabs for Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, Operations, Tracking, and Triggers. The 'Structure' tab is active, showing the table structure and options to add, drop, or change columns. The 'Indexes' section shows a PRIMARY index on 'book_id'. The 'Partitions' section indicates no partitioning is defined.

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	book_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	isbn	varchar(20)	utf8mb4_general_ci		Yes	NULL			Change Drop More
3	title	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More
4	publication_year	int(11)			Yes	NULL			Change Drop More
5	publisher_id	int(11)			Yes	NULL			Change Drop More
6	edition	varchar(50)	utf8mb4_general_ci		Yes	NULL			Change Drop More

Indexes

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Rename Drop	PRIMARY	BTREE	Yes	No	book_id	0	A	No	
Edit Rename Drop	isbn	BTREE	Yes	No	isbn	0	A	Yes	
Edit Rename Drop	publisher_id	BTREE	No	No	publisher_id	0	A	Yes	

Create an index on 1 column(s) after edition Go

Book_authors Schema

The screenshot displays the phpMyAdmin interface for the 'library_mgmt_system' database, specifically the 'book_authors' table. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	book_id	int(11)			No	None			Change Drop More
2	author_id	int(11)			No	None			Change Drop More

Below the table structure, the 'Indexes' section shows the following:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Rename Drop	PRIMARY	BTREE	Yes	No	book_id 0	A		No	
Edit Rename Drop	author_id	BTREE	No	No	author_id 0	A		No	

The 'Partitions' section indicates 'No partitioning defined'.

Publishers Schema

The screenshot displays the phpMyAdmin interface for the 'library_mgmt_system' database, specifically the 'publishers' table. The table structure is as follows:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	publisher_id	int(11)			No	None		AUTO_INCREMENT	Change Drop More
2	publisher_name	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More

Below the table structure, the 'Indexes' section shows the following:

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit Rename Drop	PRIMARY	BTREE	Yes	No	publisher_id 0	A		No	

The 'Partitions' section indicates 'No partitioning defined'.

