**Assignment – 2**

**Schema Design & Table Creation (DDL & DML Commands)**

**1. Define a schema for a Library Management System with the following entities:**

**- Books**

**- Authors**

**- Members**

**- Borrow\_Records**

**Ans –**

**1. Entity: Authors**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Description** | **Constraints / Notes** |
| author\_id | integer | unique identifier for the author. | **primary key** (pk) |
| first\_name | varchar(100) | author's first name. | not null |
| last\_name | varchar(100) | author's last name. | not null |
| birth\_year | year | year of the author's birth. |  |

**2. Entity: Books**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Description** | **Constraints / Notes** |
| book\_id | integer | unique identifier for the book. | primary key (pk) |
| title | varchar(255) | full title of the book. | not null |
| author\_id | integer | links the book to its author. | foreign key (fk) referencing authors(author\_id) |
| isbn | varchar(13) | international standard book number. | unique, not null |
| publication\_year | year | year the book was published. |  |
| genre | varchar(50) | category or subject of the book (e.g., fiction, science, history). |  |

**3. Entity: Members**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Description** | **Constraints / Notes** |
| member\_id | integer | unique identifier for the library member | **primary key** (pk) |
| first\_name | varchar(100) | member's first name. | not null |
| last\_name | varchar(100) | member's last name. | not null |
| email | varchar(150) | member's email address | unique |
| phone\_no | varchar(15) | member's contact number. |  |
| join\_date | date | date the member registered. | not null |

**4. Entity: Borrow\_Records**

|  |  |  |  |
| --- | --- | --- | --- |
| **Attribute Name** | **Data Type** | **Description** | **Constraints / Notes** |
| record\_id | integer | unique identifier for the loan record. | **primary key** (pk) |
| book\_id | integer | the book that was borrowed. | **foreign key** (fk) referencing **books(book\_id)**, **not null** |
| member\_id | integer | the member who borrowed the book. | **foreign key** (fk) referencing **members(member\_id)**, **not null** |
| borrow\_date | date | date the book was borrowed. | not null |
| due\_date | date | expected date for the book to be returned (e.g., 14 days after borrowing). | not null |
| return\_date | date | actual date the book was returned. | **can be null** (if the book is still out) |

**Key Relationships in the Schema**

1. **Authors** and **Books**: A **One-to-Many** relationship. One author can write many books, but each book is typically associated with a single primary author in this simplified schema.
   * *Relationship is enforced by:* author\_id in the Books table.
2. **Books** and **Borrow\_Records**: A **One-to-Many** relationship. One book can be part of many borrow records over time.
   * *Relationship is enforced by:* book\_id in the Borrow\_Records table.
3. **Members** and **Borrow\_Records**: A **One-to-Many** relationship. One member can have many borrow records.
   * *Relationship is enforced by:* member\_id in the Borrow\_Records table.

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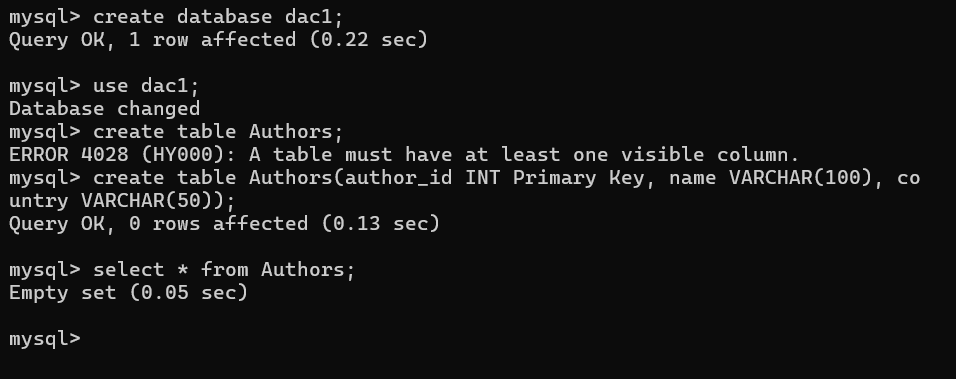
**2. Write the SQL command to create a table Authors with the following fields:**

- author\_id (Primary Key, INT)

- name (VARCHAR(100))

- country (VARCHAR(50)

**Ans-**mysql> create table Authors(author\_id INT Primary Key, name VARCHAR(100), country VARCHAR(50));**))**



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**3. Write the SQL command to create a table Books with the following fields:**

- book\_id (Primary Key, INT)

- title (VARCHAR(150))

- author\_id (Foreign Key referencing Authors)

- published\_year (YEAR)

- available\_copies (INT)

**Ans –**

mysql> CREATE TABLE Books (

-> book\_id INT PRIMARY KEY,

-> title VARCHAR(150) NOT NULL,

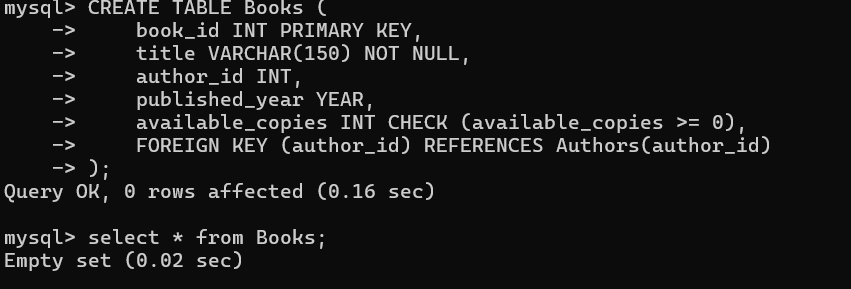
-> author\_id INT,

-> published\_year YEAR,

-> available\_copies INT CHECK (available\_copies >= 0),

-> FOREIGN KEY (author\_id) REFERENCES Authors(author\_id)

-> );

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**4. Write the SQL command to create a table Members with:**

- member\_id (Primary Key, INT)

- name (VARCHAR(100))

- email (VARCHAR(100), unique)

- phone (VARCHAR(15))

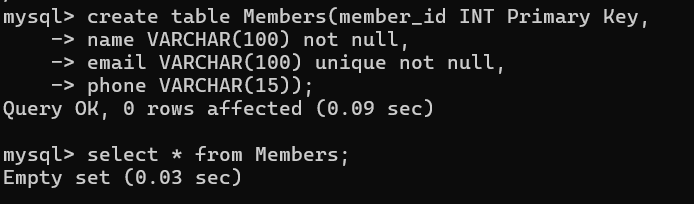
**Ans-**

mysql> create table Members(member\_id INT Primary Key,

-> name VARCHAR(100) not null,

-> email VARCHAR(100) unique not null,

-> phone VARCHAR(15));

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**5. Write the SQL command to create a table Borrow\_Records with:**

- record\_id (Primary Key, INT)

- member\_id (Foreign Key referencing Members)

- book\_id (Foreign Key referencing Books)

- borrow\_date (DATE)

- return\_date (DATE)

**Ans:-**

mysql> create table Borrow\_Records(record\_id INT Primary Key,

-> member\_id INT,

-> book\_id INT,

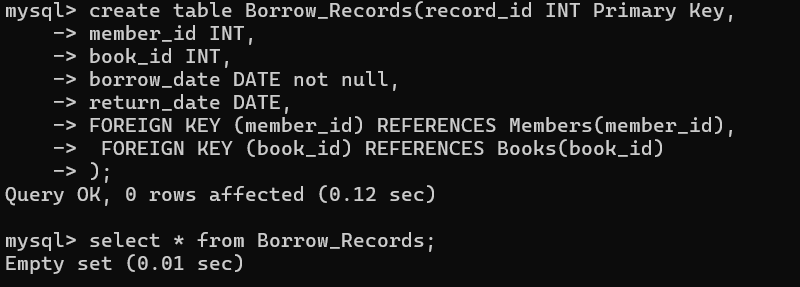
-> borrow\_date DATE not null,

-> return\_date DATE,

-> FOREIGN KEY (member\_id) REFERENCES Members(member\_id),

-> FOREIGN KEY (book\_id) REFERENCES Books(book\_id)

-> );

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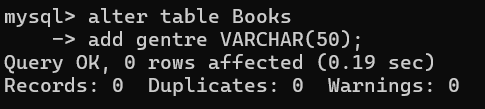
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**6. Modify the Books table to add a column genre of type VARCHAR(50).**

**Ans-**

mysql> alter table Books

-> add gentre VARCHAR(50);

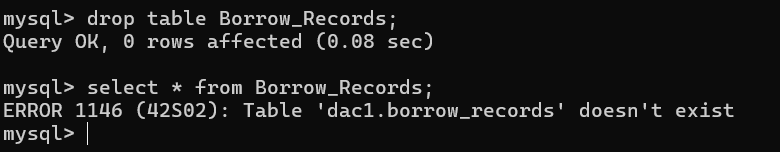
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**7. Write the SQL command to drop the Borrow\_Records table.**

**Ans:-**

mysql> drop table Borrow\_Records;



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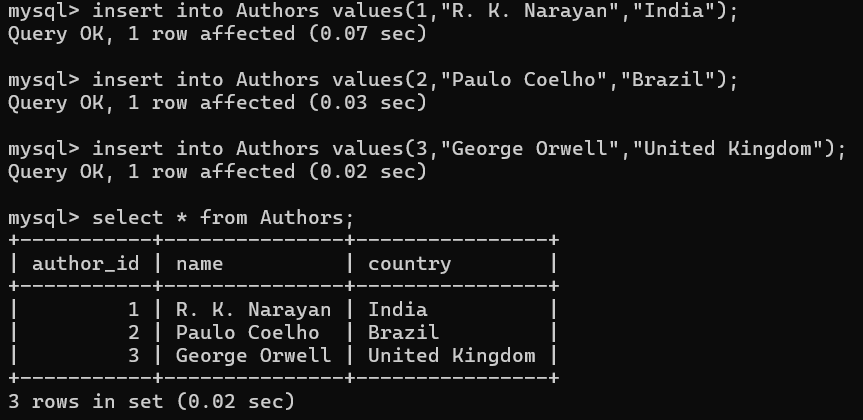
**8. Insert 3 records into the Authors table.**

**Ans:-**

mysql> insert into Authors values(1,"R. K. Narayan","India");

mysql> insert into Authors values(2,"Paulo Coelho","Brazil");

mysql> insert into Authors values(3,"George Orwell","United Kingdom");



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**9. Insert 5 books into the Books table.**

**Ans:-**

**mysql>** INSERT INTO Books (book\_id, title, author\_id, published\_year, available\_copies) values

-> (1, 'The Great Gatsby', 1, 1925, 3);

**mysql>** INSERT INTO Books (book\_id, title, author\_id, published\_year, available\_copies,gentre) values

-> (2, 'To Kill a Mockingbird', 2, 1960, 5,'Historical Fiction');

**mysql>** INSERT INTO Books (book\_id, title, author\_id, published\_year, available\_copies,gentre) values

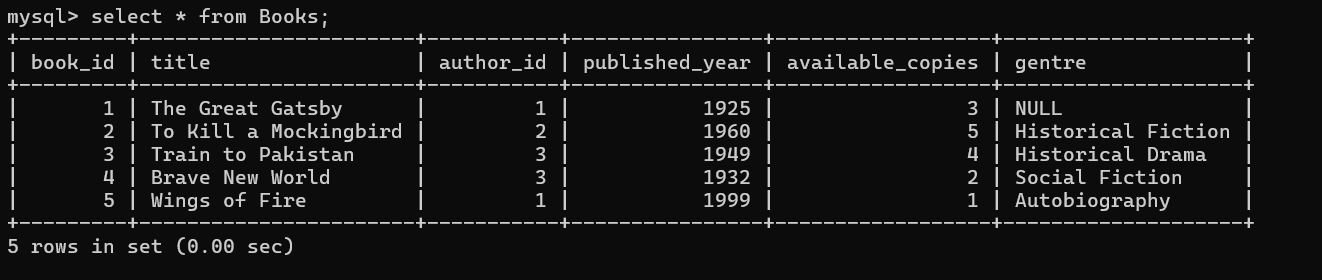
-> (3, 'Train to Pakistan', 3, 1949, 4,'Historical Drama');

**mysql>** INSERT INTO Books (book\_id, title, author\_id, published\_year, available\_copies,gentre) values

-> (4,"Brave New World",3,1932,2,"Social Fiction");

**mysql>** INSERT INTO Books (book\_id, title, author\_id, published\_year, available\_copies,gentre) values

-> (5,"Wings of Fire", 1, 1999, 1,"Autobiography");



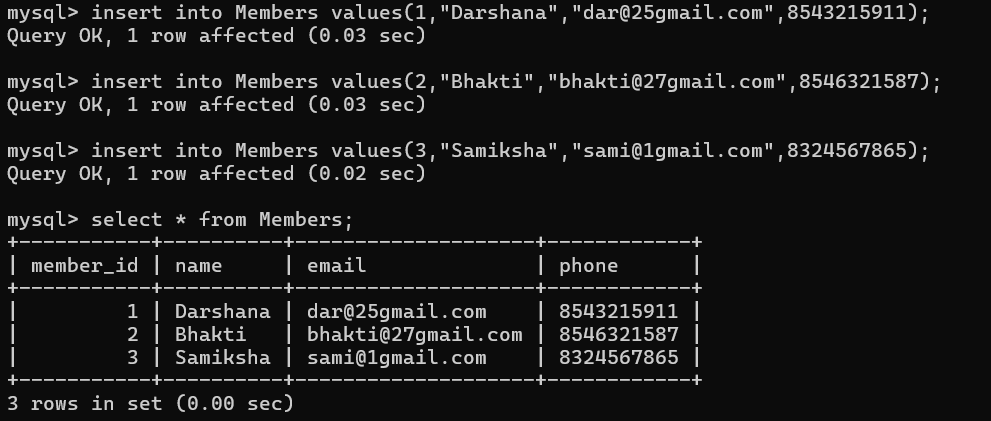
---------------------------------------------------------------------------------------------------------**10. Insert 3 members into the Members table.**

**Ans:-**

**mysql**> insert into Members values (1,"Darshana","dar@25gmail.com",8543215911);

**mysql>** insert into Members values (2,"Bhakti","bhakti@27gmail.com",8546321587);

**mysql>** insert into Members values (3,"Samiksha","sami@1gmail.com",8324567865);



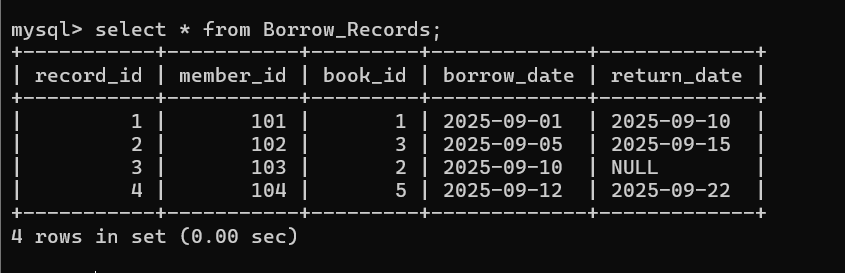
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**11. Insert 4 borrow records into the Borrow\_Records table.**

**Ans:-**

**mysql>** insert into Borrow\_Records values(1, 101, 1, '2025-09-01', '2025-09-10'),(2, 102, 3, '2025-09-05', '2025-09-15');

**mysql>** insert into Borrow\_Records values(3, 103, 2, '2025-09-10', NULL),(4, 104, 5, '2025-09-12', '2025-09-22');

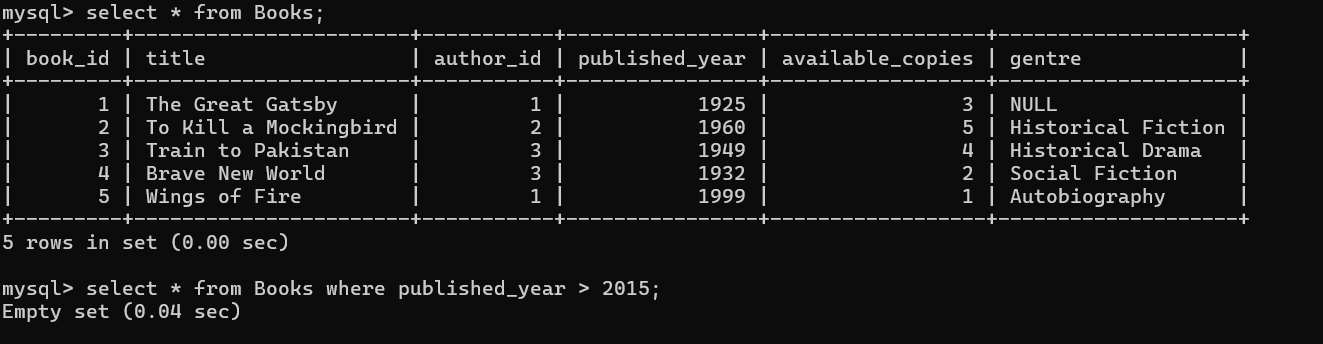


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**12. Write an SQL query to select all books where published\_year is after 2015.**

**Ans:-**

**mysql>** select \* from Books where published\_year > 2015;



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**13. Write a SQL query to create a foreign key & primary key relationship between two tables.**

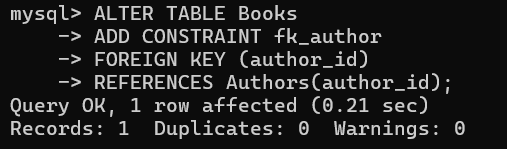
**Ans:-**

**mysql>** ALTER TABLE Books

-> ADD CONSTRAINT fk\_author

-> FOREIGN KEY (author\_id)

-> REFERENCES Authors(author\_id);

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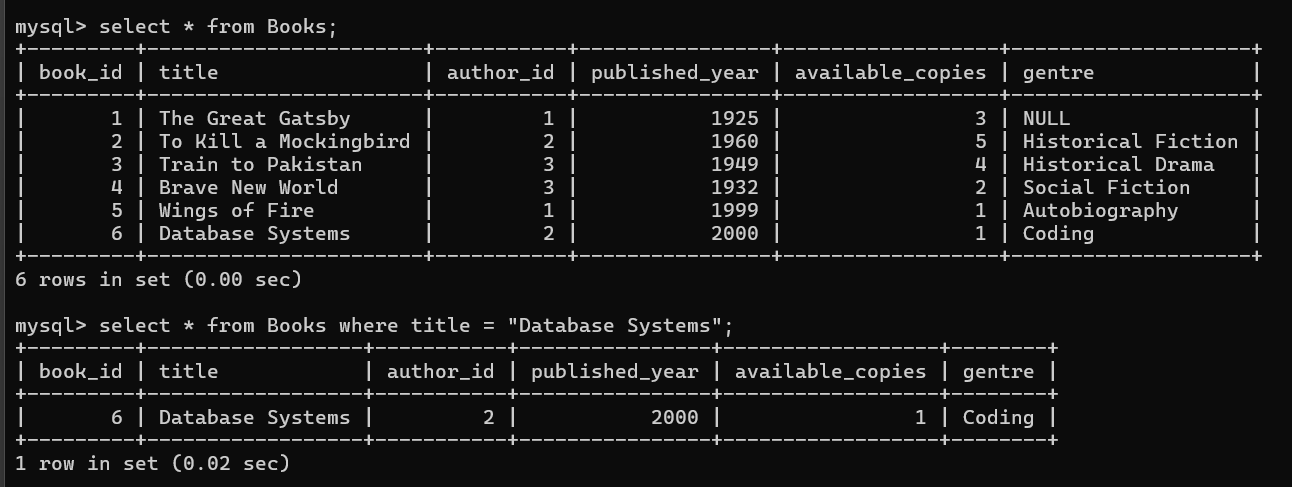
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**14. Write an SQL query to find all members who have borrowed the book with title 'Database Systems'.**

**Ans:-**

**mysql>** insert into Books values(6,"Database Systems",2,2000,1,"Coding");

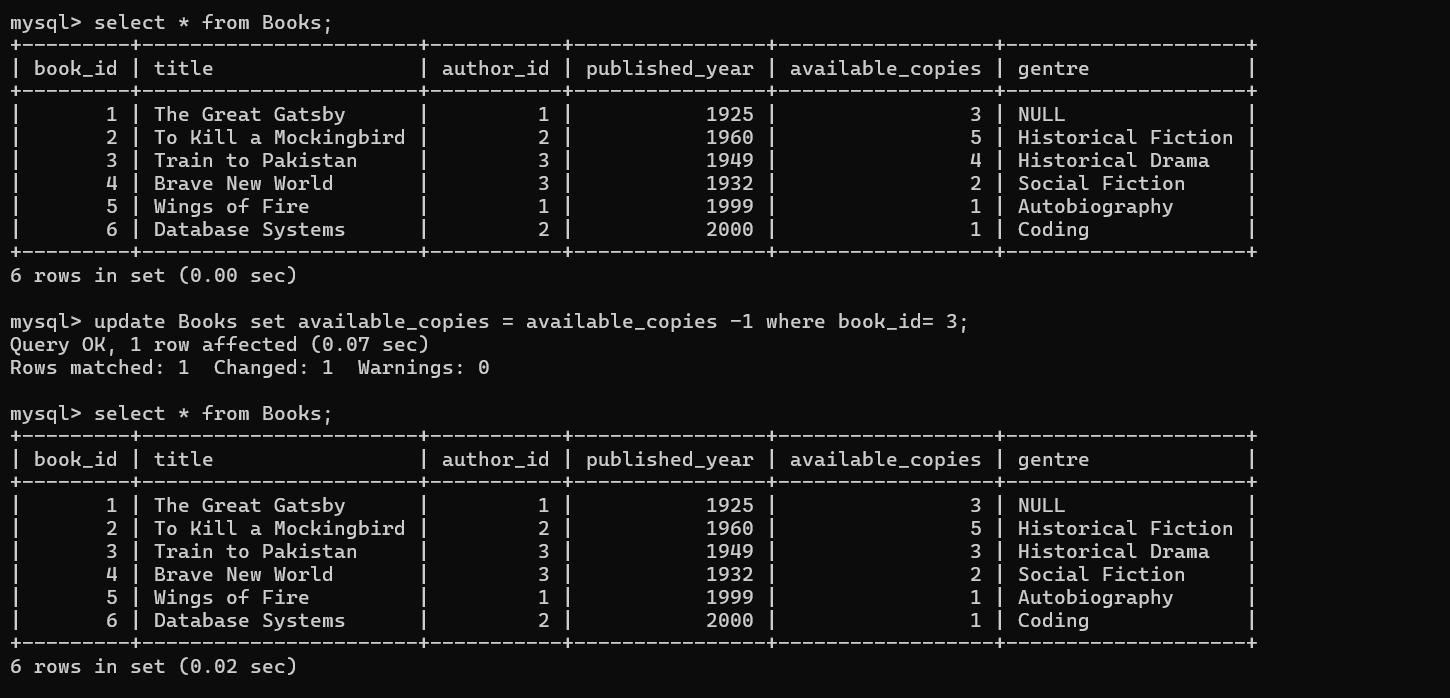
**mysql>** select \* from Books where title = "Database Systems";



---------------------------------------------------------------------------------------------------------**15. Update the available\_copies column of a specific book (choose any book) by reducing it by 1 after it is borrowed.**

**Ans:-**

mysql> update Books set available\_copies = available\_copies -1 where book\_id= 3;

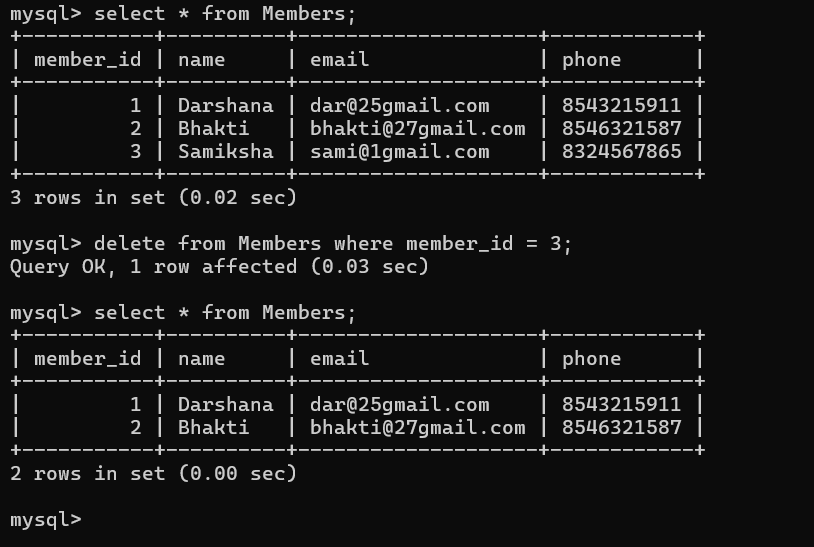


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**16. Delete a record from Members where member\_id = 3.**

**Ans:-**

**mysql>** delete from Members where member\_id = 3;

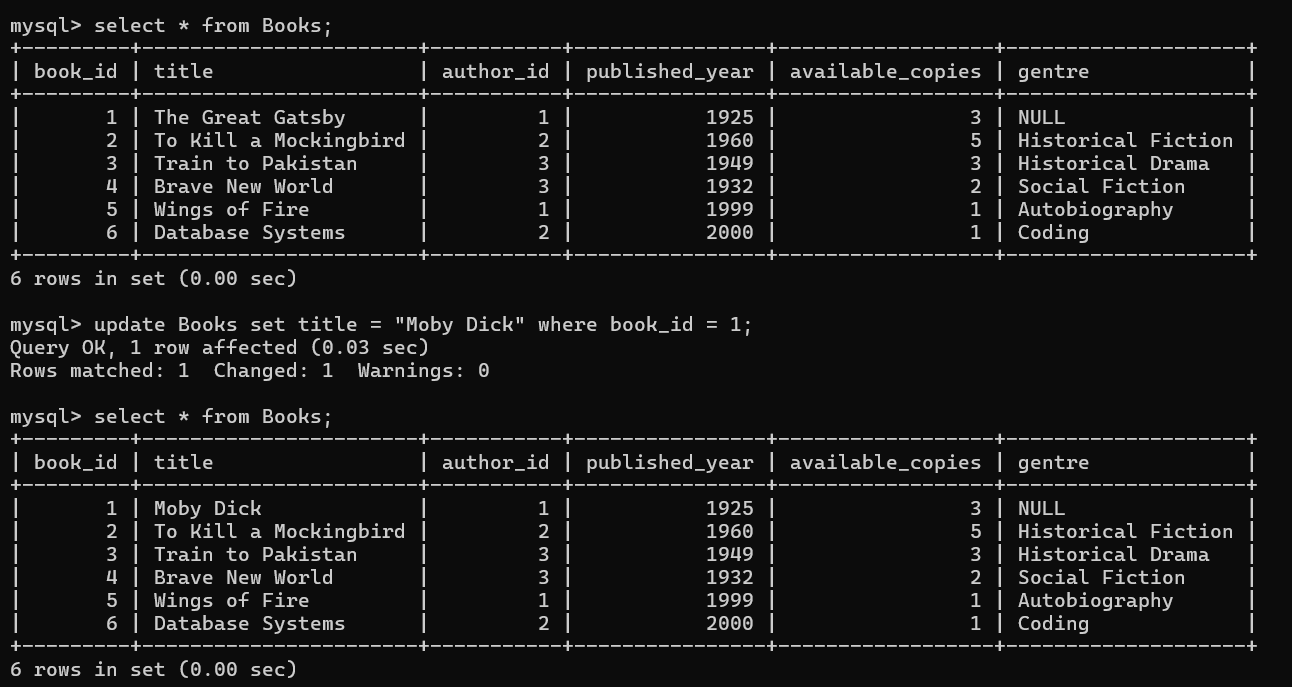


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**17. Update a Book name record from Book table with id = 1**.

**Ans:-**

**mysql>** update Books set title = "Moby Dick" where book\_id = 1;



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**18. Write an SQL query to list all books along with their authors' names.**

**Ans:-**

mysql> SELECT

-> Books.book\_id,

-> Books.title,

-> Authors.name AS author\_name,

-> Books.gentre,

-> Books.published\_year,

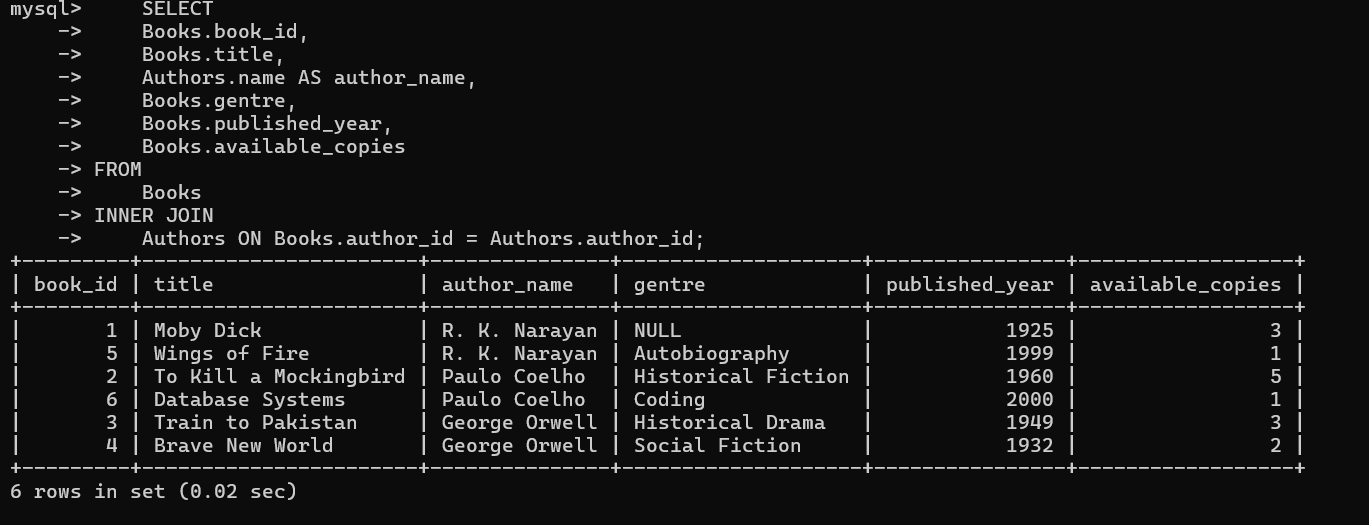
-> Books.available\_copies

-> FROM

-> Books

-> INNER JOIN

-> Authors ON Books.author\_id = Authors.author\_id;

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**19. Write an SQL query to delete all books from the Books table where the published\_year is before 2000.**

**Ans:-** mysql> delete from Books where published\_year<2000;

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**20. Write an SQL query to find all books that are never borrowed (i.e., no records in Borrow\_Records).**

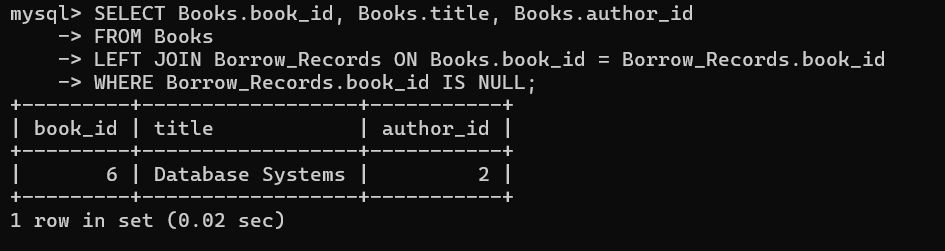
**Ans:-**

mysql> SELECT Books.book\_id, Books.title, Books.author\_id

-> FROM Books

-> LEFT JOIN Borrow\_Records ON Books.book\_id = Borrow\_Records.book\_id

-> WHERE Borrow\_Records.book\_id IS NULL;

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