Hackathon Submission Template (Level-2-Solution)

Use Case Title:

Library Management System

Student Name:

Manikandan

Register Number:

C2S11661

Institution:

Arulmigu Palaniandavar College of Arts and Culture

Department:

Bachelor of Computer Applications

Date of Submission:

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1. Problem Statement

In traditional libraries, manual record-keeping leads to issues like misplaced books, inefficient tracking, lack of real-time availability, and no fine calculation system for overdue returns. These inefficiencies affect both students and librarians, especially in large institutions.

This project proposes a **Smart Library Management System** that uses a structured SQL database to automate key processes like:

- Managing books and student data

- Handling issue and return of books
- Automatically calculating late return fines
- Requesting books that are out of stock

2. Database Design & Implementation

2.1 Database Creation & Tables

```
-- Create the database
create database mani;
USE mani;

-- Table: Students
CREATE TABLE Students (
   StudentID INT AUTO_INCREMENT PRIMARY KEY,
   Name VARCHAR(100),
   Email VARCHAR(100) UNIQUE,
   Department VARCHAR(100),
   Year INT
);

-- Table: Authors
CREATE TABLE Authors (
   AuthorID INT AUTO_INCREMENT PRIMARY KEY,
   Name VARCHAR(100)
);

-- Table: Categories
CREATE TABLE Categories (
   CategoryID INT AUTO_INCREMENT PRIMARY KEY,
```

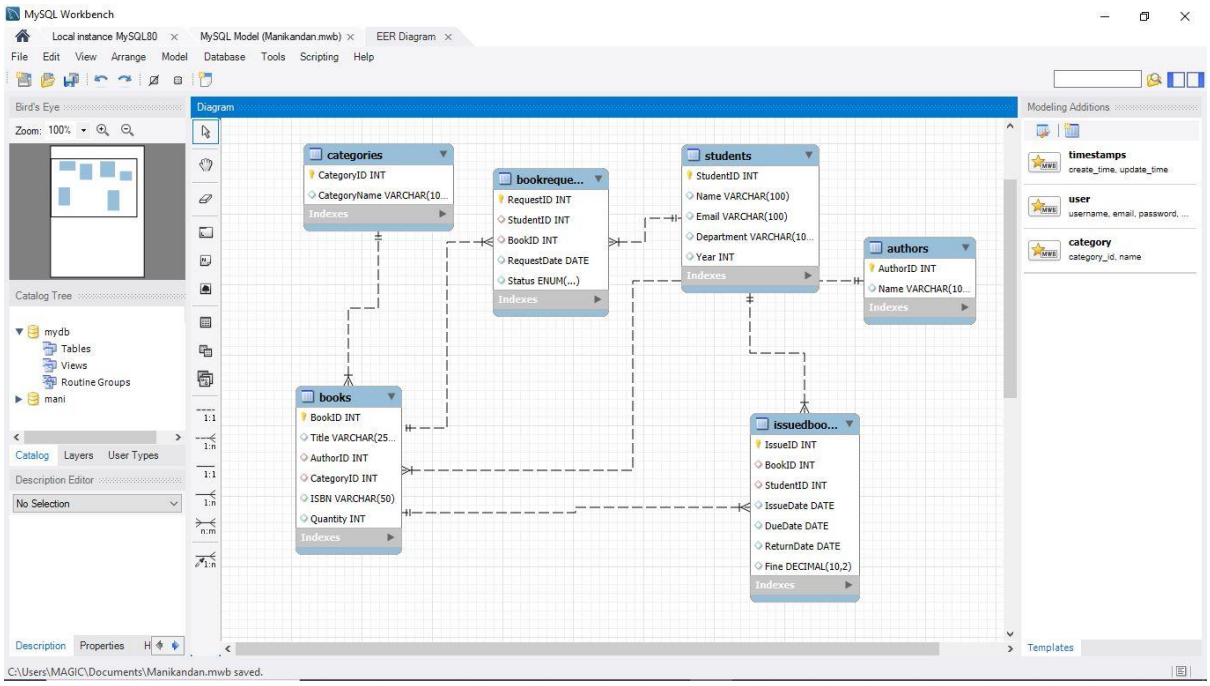
```
    CategoryName VARCHAR(100)
);

-- Table: Books
CREATE TABLE Books (
    BookID INT AUTO_INCREMENT PRIMARY KEY,
    Title VARCHAR(255),
    AuthorID INT,
    CategoryID INT,
    ISBN VARCHAR(50) UNIQUE,
    Quantity INT CHECK (Quantity >= 0),
    FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID),
    FOREIGN KEY (CategoryID) REFERENCES Categories(CategoryID)
);

-- Table: IssuedBooks
CREATE TABLE IssuedBooks (
    IssueID INT AUTO_INCREMENT PRIMARY KEY,
    BookID INT,
    StudentID INT,
    IssueDate DATE,
    DueDate DATE,
    ReturnDate DATE,
    Fine DECIMAL(10,2),
    FOREIGN KEY (BookID) REFERENCES Books(BookID),
    FOREIGN KEY (StudentID) REFERENCES Students(StudentID)
);
```

```
-- Table: BookRequests (NEW)
CREATE TABLE BookRequests (
  RequestID INT AUTO_INCREMENT PRIMARY KEY,
  StudentID INT,
  BookID INT,
  RequestDate DATE,
  Status ENUM('Pending', 'Approved', 'Rejected') DEFAULT 'Pending',
  FOREIGN KEY (StudentID) REFERENCES Students(StudentID),
  FOREIGN KEY (BookID) REFERENCES Books(BookID)
);
```

2.2. ER Diagram (Reverse Engineered):

ERD Description:

- Students → IssuedBooks (1:M)
- Books → IssuedBooks (1:M)
- Books → BookRequests (1:M)
- Students → BookRequests (1:M)
- Books ↔ Authors & Categories (M:1)



3. Queries for Data Management

3.1 Insert Sample Data

```
-- Insert Authors

INSERT INTO Authors (Name) VALUES

('J.K. Rowling'), ('George Orwell'), ('Sundar Raj');


-- Insert Categories

INSERT INTO Categories (CategoryName) VALUES

('Fiction'), ('Science'), ('History');


-- Insert Books

INSERT INTO Books (Title, AuthorID, CategoryID, ISBN, Quantity) VALUES

('Harry Potter', 1, 1, 'HP001', 3),

('1984', 2, 1, '1984X', 2),

('The Indian Economy', 3, 3, 'IE2024', 1);
```

```
-- Insert Students
INSERT INTO Students (Name, Email, Department, Year) VALUES
('Arun Kumar', 'arun@example.com', 'CSE', 2),
('Divya R', 'divya@example.com', 'ECE', 3),
('Ravi M', 'ravi@example.com', 'IT', 1);

-- Issue a Book
INSERT INTO IssuedBooks (BookID, StudentID, IssueDate, DueDate, ReturnDate, Fine)
VALUES (1, 1, '2024-03-01', '2024-03-10', '2024-03-15', 25.00);

-- Book Request Example
INSERT INTO BookRequests (StudentID, BookID, RequestDate)
VALUES (2, 3, '2024-04-01');
```

3.2 Retrieval Queries (Advanced)

1. **List all books by genre "Fiction":**

```
SELECT Title FROM Books
JOIN Categories ON Books.CategoryID = Categories.CategoryID
WHERE CategoryName = 'Fiction';
```

2. Find overdue books with fines:

```
SELECT Students.Name, Books.Title, IssuedBooks.Fine
FROM IssuedBooks
JOIN Students ON IssuedBooks.StudentID = Students.StudentID
JOIN Books ON IssuedBooks.BookID = Books.BookID
```

```
WHERE ReturnDate > DueDate;
```

3. **Show pending book requests**

```
SELECT Students.Name, Books.Title, RequestDate

FROM BookRequests

JOIN Students ON BookRequests.StudentID = Students.StudentID

JOIN Books ON BookRequests.BookID = Books.BookID

WHERE Status = 'Pending';
```

4. Top 3 most issued books:

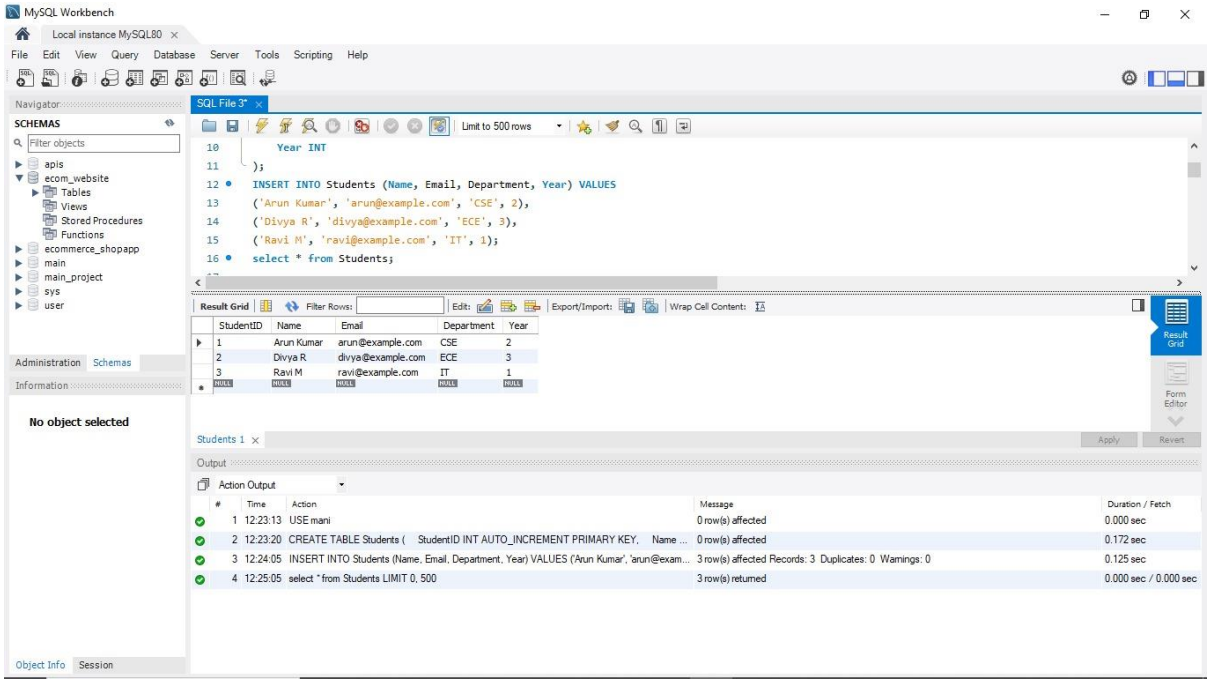
```
SELECT Books.Title, COUNT(*) AS TimesIssued

FROM IssuedBooks

JOIN Books ON IssuedBooks.BookID = Books.BookID

GROUP BY IssuedBooks.BookID

ORDER BY TimesIssued DESC

LIMIT 3;
```

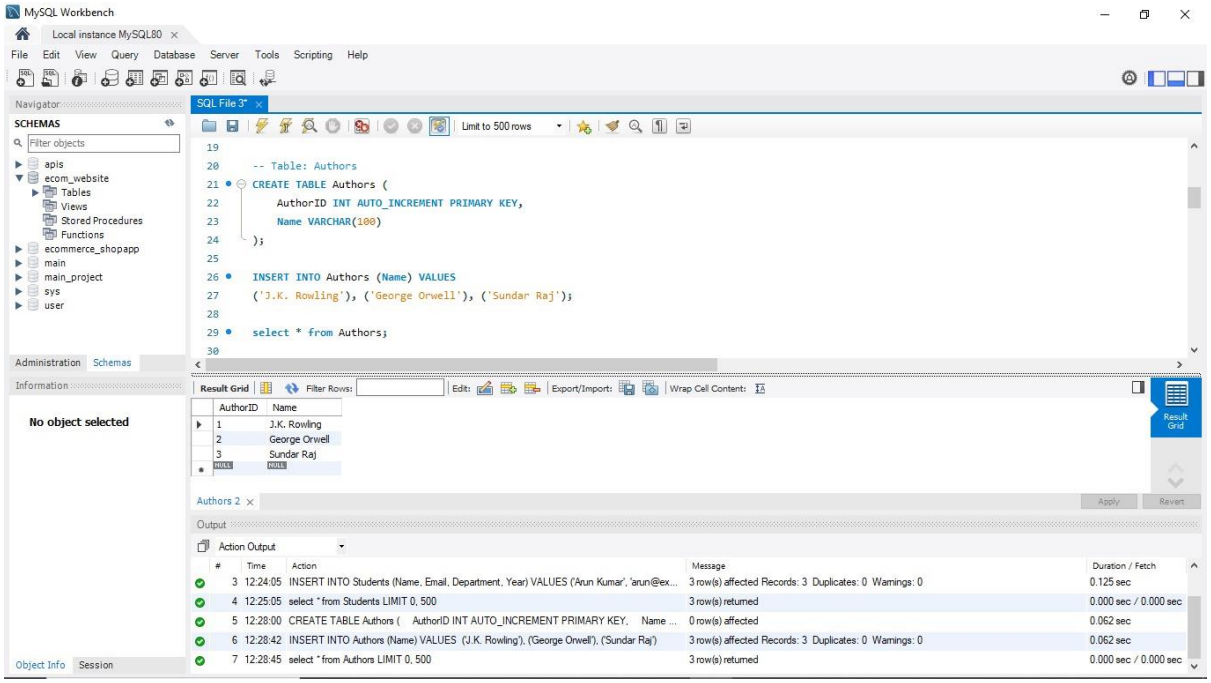
4. Implementation & Results

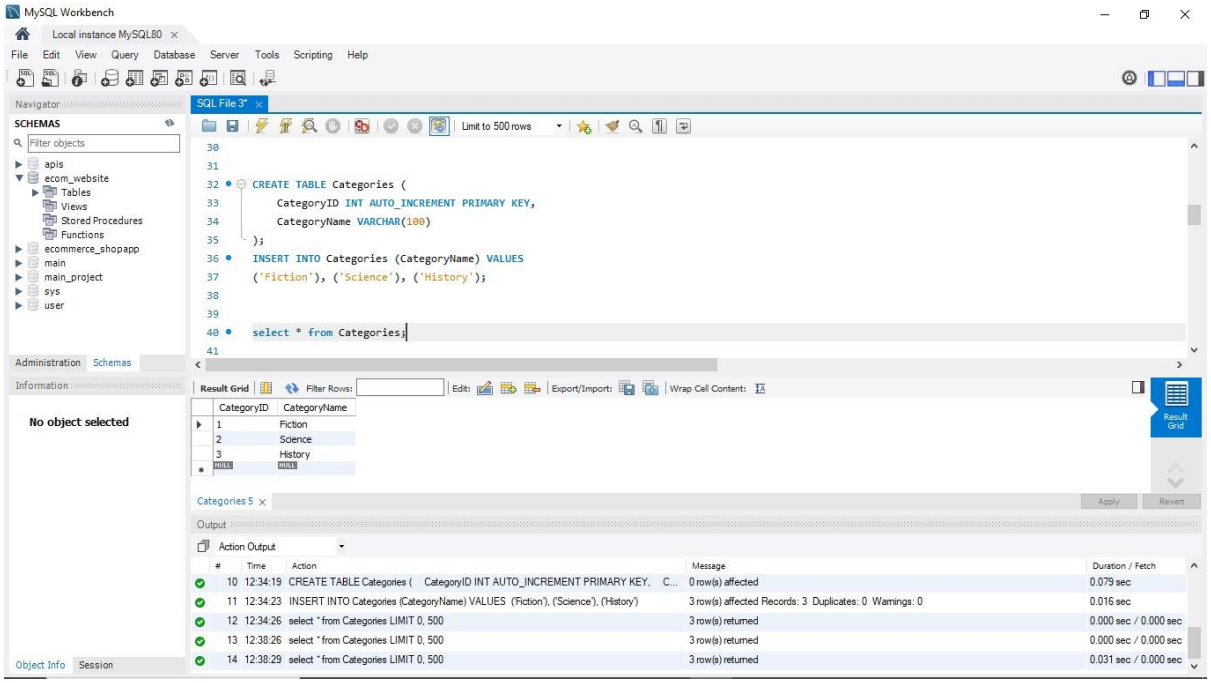
4.1 Execution Environment

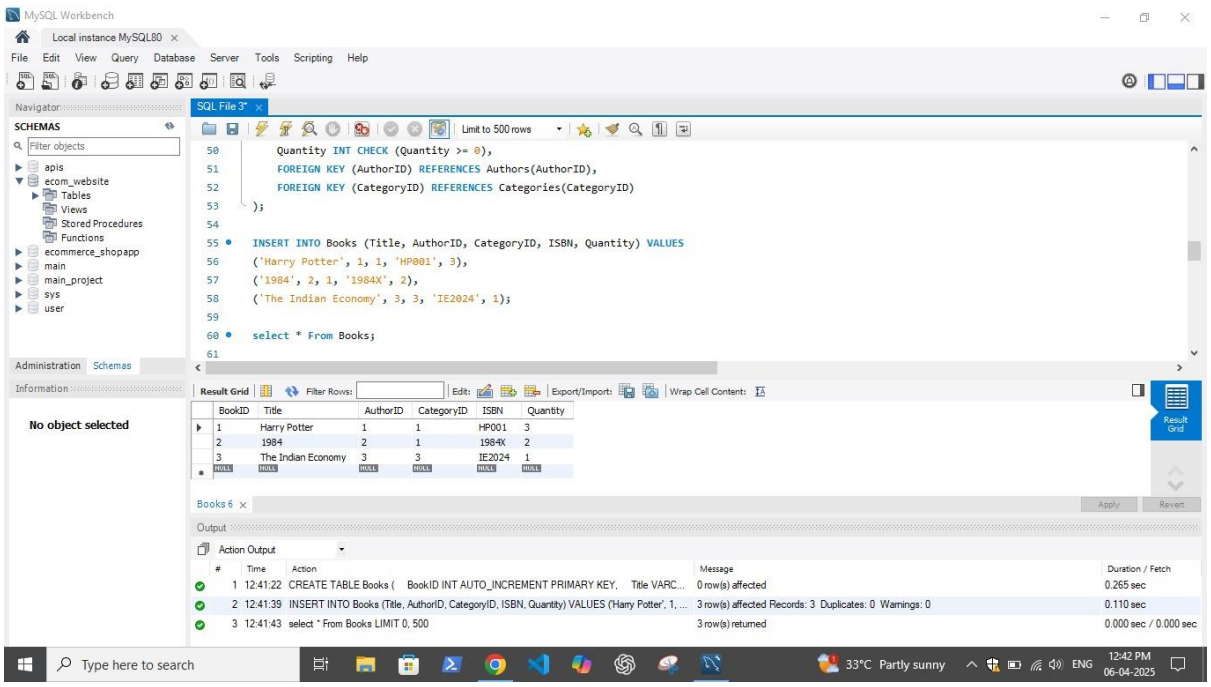
- **Database Management System**: MySQL Workbench
- **SQL Execution Tool**: MySQL Workbench

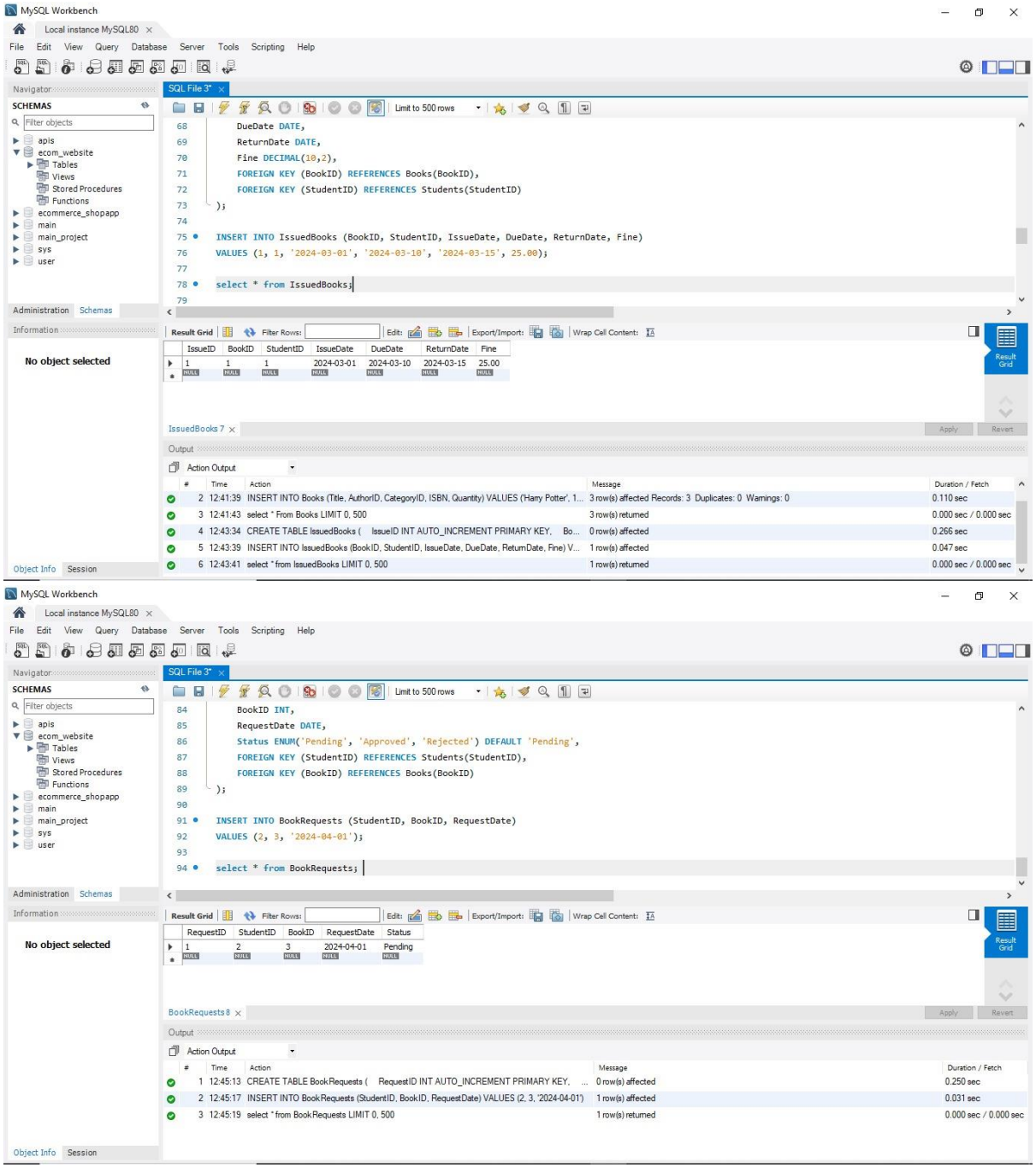
4.2 Screenshots of Execution Results






MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
SCHEMAS
apis
ecom_website
Tables
Views
Stored Procedures
Functions
ecommerce_shopapp
main
main_project
sys
user
SQL File 3*
Limit to 500 rows
30
31
32 CREATE TABLE Categories (
33 CategoryID INT AUTO_INCREMENT PRIMARY KEY,
34 CategoryName VARCHAR(100)
35);
36 INSERT INTO Categories (CategoryName) VALUES
37 ('Fiction'), ('Science'), ('History');
38
39
40 select * from Categories;
41
Result Grid
CategoryID CategoryName
1 Fiction
2 Science
3 History
Categories 5
Output
Action Output
Time Action Message Duration / Fetch
10 12:34:19 CREATE TABLE Categories (CategoryID INT AUTO_INCREMENT PRIMARY KEY, C... 0 row(s) affected 0.079 sec
11 12:34:23 INSERT INTO Categories (CategoryName) VALUES ('Fiction'), ('Science'), ('History') 3 row(s) affected Records: 3 Duplicates: 0 Warnings: 0 0.016 sec
12 12:34:26 select * from Categories LIMIT 0, 500 3 row(s) returned 0.000 sec / 0.000 sec
13 12:38:26 select * from Categories LIMIT 0, 500 3 row(s) returned 0.000 sec / 0.000 sec
14 12:38:29 select * from Categories LIMIT 0, 500 3 row(s) returned 0.031 sec / 0.000 sec
No object selected


MySQL Workbench
Local instance MySQL80
SQL File 3*
50 Quantity INT CHECK (Quantity >= 0),
51 FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID),
52 FOREIGN KEY (CategoryID) REFERENCES Categories(CategoryID)
53);
54
55 INSERT INTO Books (Title, AuthorID, CategoryID, ISBN, Quantity) VALUES
56 ('Harry Potter', 1, 1, 'HP001', 3),
57 ('1984', 2, 1, '1984X', 2),
58 ('The Indian Economy', 3, 3, 'IE2024', 1);
59
60 select * From Books;
61
Result Grid
BookID Title AuthorID CategoryID ISBN Quantity
1 Harry Potter 1 1 HP001 3
2 1984 2 1 1984X 2
3 The Indian Economy 3 3 IE2024 1
Books 6
Output
Action Output
Time Action Message Duration / Fetch
1 12:41:22 CREATE TABLE Books (BookID INT AUTO_INCREMENT PRIMARY KEY, Title VARC... 0 row(s) affected 0.265 sec
2 12:41:39 INSERT INTO Books (Title, AuthorID, CategoryID, ISBN, Quantity) VALUES ('Harry Potter', 1, ... 3 row(s) affected Records: 3 Duplicates: 0 Warnings: 0 0.110 sec
3 12:41:43 select * From Books LIMIT 0, 500 3 row(s) returned 0.000 sec / 0.000 sec
No object selected
Type here to search
33°C Partly sunny
ENG
12:42 PM
06-04-2025



5. GitHub Repository

5.1 Repository Link

https://github.com/mku2062022bca11/Hackathonlevel2.git

5.2 Uploaded Files in Repository