NAME : DHRUV JITENDRA JAIN BATCH: JUNE23 -T305/DS/SQL ESS/SW/ 4TH JULY/3PM-5PM

LIBRARY MANAGEMENT SYSTEM

1. Description:

Following database schema is designed to function as a backend storage database for a web application built to manage a library.

By storing information in a relational database, all the tasks related to daily functioning of the library can be performed easily and much more efficiently. Some of the benefits of using this system to store data over traditional paper registers are as follows:

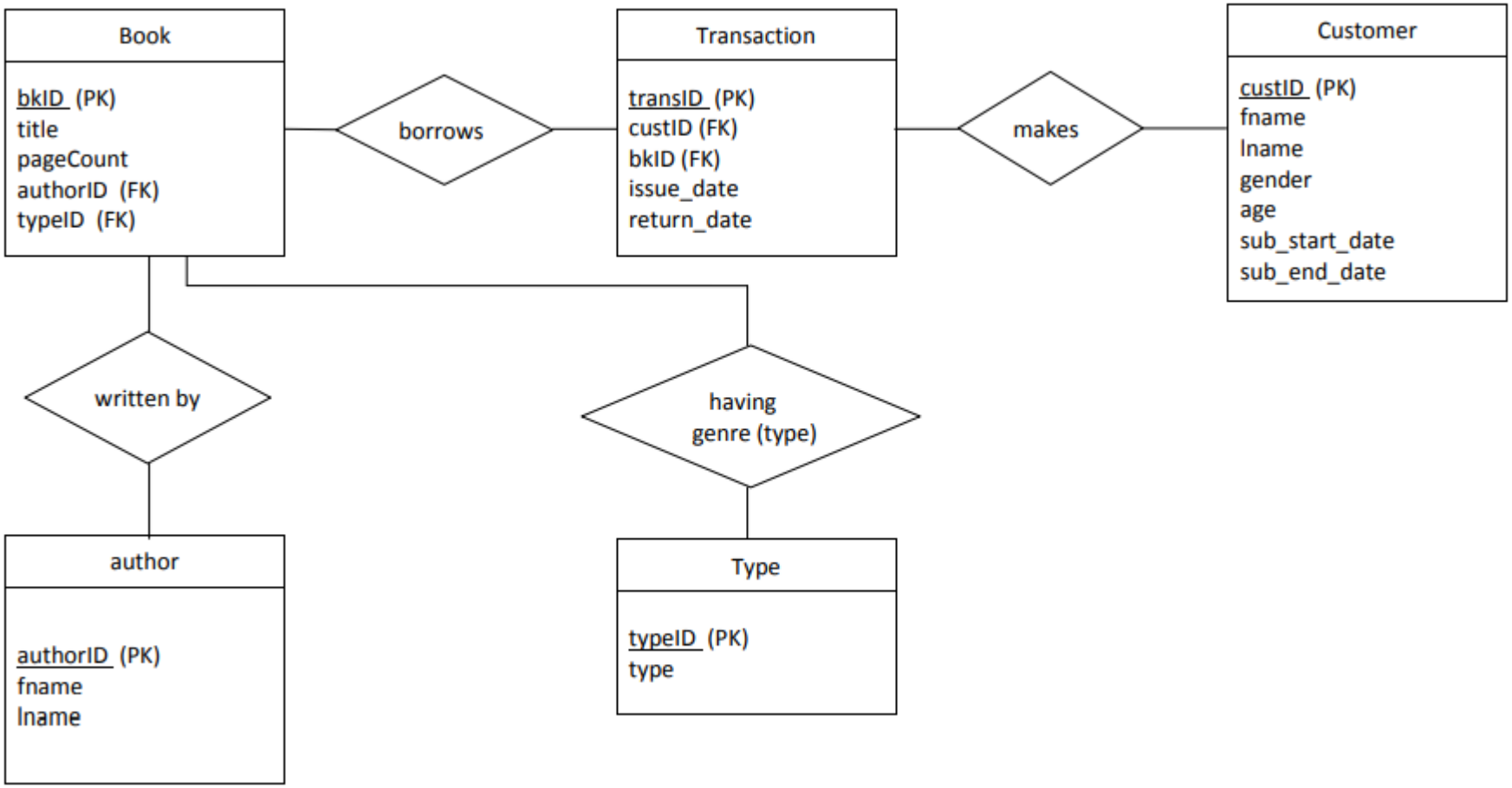
- Updating and modifying booklist in the library is much easier and efficient
- Maintaining customer details and their account is easy and efficient.
- Calculations like due payments can be done automatically by DBMS, thus eliminating human error
- RDBMS provides many ways to analyze available data, thus helping in making more informed decisions about inventory management and other aspects of library management

This database contains 5 tables:

1. Author
2. Type (Genre of book)
3. Book
4. Customer
5. Transaction

How these tables/entities are related to each other is shown pictorially on next page through ER diagram, i.e., Entity Relationship Diagram.

2. ER-Diagram (Entity Relation – Diagram) for Library Management System:



3. Table Descriptions:

1. **Author:**

Field	Type	Null	Key	Default	Extra
authorID	int(11)	NO	PRI	NULL	
fname	varchar(50)	YES		NULL	
lname	varchar(50)	YES		NULL	

2. **Type (Genre):**

Field	Type	Null	Key	Default	Extra
typeID	int(11)	NO	PRI	NULL	
type	varchar(50)	YES		NULL	

3. **Book:**

Field	Type	Null	Key	Default	Extra
bkID	int(11)	NO	PRI	NULL	
title	varchar(50)	YES		NULL	
pageCount	int(11)	YES		NULL	
authorID	int(11)	YES	MUL	NULL	
typeID	int(11)	YES	MUL	NULL	

4. **Customer:**

Field	Type	Null	Key	Default	Extra
custID	int(11)	NO	PRI	NULL	
fname	varchar(30)	YES		NULL	
lname	varchar(30)	YES		NULL	
gender	varchar(5)	YES		NULL	
age	int(3)	YES		NULL	
sub_start_date	date	YES		NULL	
sub_end_date	date	YES		NULL	

5. **Transaction:**

Field	Type	Null	Key	Default	Extra
transID	int(11)	NO	PRI	NULL	
custID	int(11)	YES	MUL	NULL	
bkID	int(11)	YES	MUL	NULL	
issue_date	datetime	YES		NULL	
return_date	datetime	YES		NULL	

4. Commands:

```
CREATE DATABASE lms;
USE lms;
CREATE TABLE author (
authorID INT,
fname VARCHAR(50),
lname VARCHAR(50),
PRIMARY KEY(authorID)
);
select*from author;
INSERT INTO author VALUES
(1, 'William Dean', 'Howells'),
(2, 'Frederic', 'Brown'),
(3, 'Jack', 'London'),
(4, 'Albert', 'Blaisdell'),
(5, 'Ellis', 'Butler'),
(6, 'Arthur', 'Machen'),
(7, 'Titus', 'Lucretius'),
(8, 'Rabindranath', 'Tagore'),
(9, 'Isaac', 'Asimov'),
(10, 'Charles', 'Dickens'),
(11, 'Ralph Waldo', 'Emerson'),
(12, 'Dorothy', 'Canfield'),
(13, 'Givoanni', 'Boccaccio'),
(14, 'George', 'Orwell'),
(15, 'Publius', 'Ovid'),
(16, 'Robert Louis', 'Stevenson'),
(17, 'Virginia', 'Woolf'),
(18, 'George', 'Eliot'),
(19, 'Amelia B.', 'Edwards'),
(20, 'Fyodor', 'Dostoevsky'),
(21, 'Emily', 'Dickinson'),
(22, 'Edna', 'Ferber'),
(23, 'Joseph Sheridan', 'LeFanu'),
(24, 'John', 'DosPassos'),
(25, 'Ruth', 'Stuart'),
(26, 'Vladimir', 'Nabokov'),
(27, 'Johanna', 'Spyri'),
(28, 'Ernest', 'Dowson'),
(29, 'Mary Hallock', 'Foote'),
(30, 'Zane', 'Grey'),
(31, 'H. P.', 'Lovecraft'),
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```
(32, 'Samuel', 'Pepys'),
(33, 'Kate Dickinson', 'Sweetser'),
(34, 'William', 'Lampton'),
(35, 'Mother', 'Goose'),
(36, 'Eleanor Hallowell', 'Abbott');
CREATE TABLE type (
typeID INT,
type VARCHAR(50),
PRIMARY KEY (typeID)
);
select*from type;
INSERT into type VALUES
(1, 'Science fiction'),
(2, 'Satire'),
(3, 'Drama'),
(4, 'Action and Adventure'),
(5, 'Romance'),
(6, 'Mystery'),
(7, 'Horror'),
(8, 'Health'),
(9, 'Guide'),
(10, 'Diaries'),
(11, 'Comics'),
(12, 'Diaries'),
(13, 'Journals'),
(14, 'Biographies'),
(15, 'Fantasy'),
(16, 'History'),
(17, 'Science'),
(18, 'Art');
CREATE TABLE book (
bkID INT,
title VARCHAR(50),
pageCount INT,
authorID INT,
typeID INT,
PRIMARY KEY (bkID),
CONSTRAINT fk_bk_author FOREIGN KEY (authorID) REFERENCES author(authorID),
CONSTRAINT fk_bk_type FOREIGN KEY (typeID) REFERENCES type(typeID)
);
INSERT INTO book VALUES
(1, 'A Daughter of the Snows', 199, 3, 9),
(2, 'The Near East: 10,000 Years of History', 298, 9, 13),
```

(3, 'The Cocoon:A Rest-Cure Comedy', 90, 25, 12),
(4, 'The Freakshow Murders', 321, 2, 3),
(5, 'Pharaohs, Fellahs and Explorers', 367, 19, 9),
(6, 'Hard Times', 293, 10, 1),
(7, 'A Modern Instance', 222, 1, 12),
(8, 'The Real Mother Goose', 88, 35, 1),
(9, 'A Thousand Miles Up the Nile', 110, 19, 18),
(10, 'Children of Blood and Bone', 137, 7, 13),
(11, 'A pushcart at the curb', 95, 24, 1),
(12, 'The Desert and the Sown', 126, 29, 10),
(13, 'Three Soldiers', 223, 24, 16),
(14, 'The End of Eternity', 168, 9, 1),
(15, 'Annie Kilburn', 291, 1, 12),
(16, 'A Touch of Sun and Other Stories', 141, 29, 9),
(17, 'Show Boat', 151, 22, 18),
(18, 'The Call of the Wild', 362, 3, 18),
(19, 'My Mark Twain', 339, 1, 9),
(20, 'Broken Ties', 134, 8, 5),
(21, 'Short Stories From American History', 305, 4, 8),
(22, 'Mrs Rosie and the Priest', 104, 13, 14),
(23, 'So Big', 209, 22, 3),
(24, 'Monsieur Maurice ', 92, 19, 8),
(25, 'The Master of Ballantrae', 236, 16, 13),
(26, 'The Unlived Life of Little Mary Ellen', 99, 25, 6),
(27, 'Mouse - The Last Train', 184, 2, 14),
(28, 'Edith Bonham', 122, 29, 7),
(29, 'Maybe Mother Goose', 161, 35, 14),
(30, 'The Noble Gases', 321, 9, 5),
(31, 'Rainy Week', 98, 36, 7),
(32, 'A Hazard of New Fortunes', 144, 1, 4),
(33, 'A Plot for Murder', 108, 2, 13),
(34, 'Nature', 357, 11, 8),
(35, 'Hickory Dickory Dock', 326, 35, 6),
(36, 'Big Fat Hen', 232, 35, 12),
(37, 'The Lone Star Ranger', 328, 30, 9),
(38, 'The Great Fire of London', 252, 32, 9),
(39, 'White Nights', 265, 20, 14),
(40, 'In a Glass Darkly', 173, 23, 9),
(41, 'Fanny herself', 248, 22, 10),
(42, 'Loaded', 273, 2, 4),
(43, 'A Foregone Conclusion', 121, 1, 15),
(44, 'The Hill of Dreams', 175, 6, 6),
(45, 'Adventure', 217, 3, 8),

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(46, 'A Tagore Reader', 285, 8, 4),
(47, 'A Tale of Two Cities', 331, 10, 13),
(48, 'Dombey and Son', 344, 10, 14),
(49, 'Famous Women', 273, 13, 1),
(50, 'Rejection, The Ruling Spirit', 358, 5, 2);
select*from book;
CREATE TABLE customer (
custID INT,
fname VARCHAR(30),
lname VARCHAR(30),
gender TINYINT,
age INT(3),
sub_start_date DATE,
sub_end_date DATE,
PRIMARY KEY (custID)
);
INSERT INTO customer VALUES
(1, 'Hazel', 'Green', 'F', 28, '2020-05-15', '2023-05-15'),
(2, 'Ashley', 'Marshall', 'F', 20, '2020-10-28', '2023-10-28'),
(3, 'Ansley', 'Green', 'F', 22, '2021-07-12', '2024-07-12'),
(4, 'Alcock', 'Chapman', 'F', 22, '2020-01-25', '2023-01-25'),
(5, 'Meadow', 'Taylor', 'F', 23, '2020-12-30', '2023-12-30'),
(6, 'Green', 'Wright', 'M', 32, '2020-03-09', '2023-03-09'),
(7, 'Paxton', 'Foster', 'M', 34, '2020-03-03', '2023-03-03'),
(8, 'Gray', 'King', 'M', 62, '2020-06-26', '2023-06-26'),
(9, 'Jones', 'Collins', 'M', 25, '2020-01-26', '2023-01-26'),
(10, 'Leslie', 'Young', 'F', 42, '2020-02-10', '2023-02-10'),
(11, 'Hailey', 'Hill', 'F', 27, '2021-01-16', '2024-01-16'),
(12, 'Washington', 'Martin', 'M', 24, '2021-05-23', '2024-05-23'),
(13, 'Ramirez', 'Green', 'M', 33, '2020-08-28', '2023-08-28'),
(14, 'Morgan', 'Smith', 'M', 29, '2021-05-15', '2024-05-15'),
(15, 'Perez', 'Baker', 'M', 53, '2020-10-27', '2023-10-27'),
(16, 'Alfie', 'Watson', 'M', 26, '2021-04-05', '2024-04-05'),
(17, 'Madison', 'Jackson', 'F', 35, '2021-02-15', '2024-02-15'),
(18, 'Beverly', 'Moore', 'F', 22, '2020-11-19', '2023-11-19'),
(19, 'Kaden', 'Anderson', 'M', 26, '2021-11-11', '2024-11-11'),
(20, 'Carter', 'Adams', 'M', 27, '2021-07-08', '2024-07-08'),
(21, 'Ackland', 'Adams', 'F', 28, '2021-05-19', '2024-05-19'),
(22, 'Hadley', 'Parker', 'F', 37, '2020-11-21', '2023-11-21'),
(23, 'Henderson', 'Cook', 'M', 38, '2021-08-06', '2024-08-06'),
(24, 'Wright', 'Young', 'M', 35, '2021-05-14', '2024-05-14'),
(25, 'Lindsey', 'Wilkinson', 'F', 28, '2021-10-08', '2024-10-08'),
(26, 'Wren', 'Chapman', 'F', 25, '2021-11-06', '2024-11-06'),
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(27, 'Love', 'Chapman', 'F', 19, '2021-10-15', '2024-10-15'),
(28, 'Wes', 'Bell', 'M', 23, '2021-01-25', '2024-01-25'),
(29, 'Tyler', 'Carter', 'M', 27, '2021-08-24', '2024-08-24'),
(30, 'Edwin', 'Cook', 'M', 39, '2021-08-17', '2024-08-17'),
(31, 'Sally', 'Wood', 'F', 45, '2020-06-07', '2023-06-07'),
(32, 'Nelson', 'Smith', 'M', 27, '2020-11-15', '2023-11-15'),
(33, 'Arabelle', 'Brown', 'F', 52, '2021-03-11', '2024-03-11'),
(34, 'Carter', 'Harrison', 'M', 21, '2021-11-30', '2024-11-30'),
(35, 'Baker', 'Bell', 'M', 20, '2021-03-24', '2024-03-24'),
(36, 'Cherish', 'Cooper', 'F', 34, '2020-01-31', '2023-01-31'),
(37, 'Remington', 'Wright', 'M', 29, '2020-08-14', '2023-08-14'),
(38, 'Edwards', 'King', 'M', 24, '2020-02-01', '2023-02-01'),
(39, 'Harleigh', 'Taylor', 'F', 26, '2020-05-05', '2023-05-05'),
(40, 'Ryleigh', 'Clark', 'F', 45, '2020-10-29', '2023-10-29'),
(41, 'Albert', 'Richardson', 'F', 57, '2021-03-19', '2024-03-19'),
(42, 'Lee', 'Ward', 'M', 36, '2020-05-13', '2023-05-13'),
(43, 'Kaylin', 'Bell', 'F', 28, '2020-09-12', '2023-09-12'),
(44, 'Agard', 'Young', 'F', 23, '2021-04-03', '2024-04-03'),
(45, 'Turner', 'Hall', 'M', 24, '2021-01-07', '2024-01-07'),
(46, 'Akes', 'White', 'F', 20, '2021-03-08', '2024-03-08'),
(47, 'Lewis', 'Lee', 'M', 35, '2021-01-30', '2024-01-30'),
(48, 'Karson', 'Cook', 'M', 30, '2021-06-26', '2024-06-26'),
(49, 'Hayden', 'Young', 'M', 31, '2020-12-15', '2023-12-15'),
(50, 'Sterling', 'Shaw', 'M', 26, '2021-06-24', '2024-06-24');
select*from customer;
CREATE TABLE transaction (
transID INT,
custID INT,
bkID INT,
issue_date DATETIME,
return_date DATETIME,
PRIMARY KEY (transID),
CONSTRAINT fk_trans_cust FOREIGN KEY (custID) REFERENCES customer(custID),
CONSTRAINT fk_trans_bk FOREIGN KEY (bkID) REFERENCES book(bkID));
INSERT INTO transaction VALUES
(1, 37, 24, '2021-08-31 04:30:00', '2021-09-17 00:15:00'),
(2, 32, 17, '2021-10-01 14:28:00', '2021-10-07 11:22:00'),
(3, 40, 29, '2021-10-02 10:45:00', '2021-10-10 17:16:00'),
(4, 36, 44, '2021-10-03 15:57:00', '2021-10-09 10:43:00'),
(5, 11, 16, '2021-10-07 13:19:00', '2021-10-15 18:55:00'),
(6, 29, 34, '2021-10-09 08:32:00', '2021-10-14 08:17:00'),
(7, 23, 26, '2021-10-09 15:48:00', '2021-10-21 10:51:00'),
(8, 3, 34, '2021-10-10 19:55:00', '2021-10-15 09:20:00'),
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(9, 37, 50, '2021-10-14 10:25:00', '2021-10-14 12:52:00'),
(10, 36, 39, '2021-10-16 08:53:00', '2021-10-29 18:47:00'),
(11, 47, 14, '2021-10-24 10:50:00', '2021-11-05 18:19:00'),
(12, 32, 30, '2021-10-24 13:48:00', '2021-10-28 19:33:00'),
(13, 7, 33, '2021-10-27 08:10:00', '2021-11-10 14:34:00'),
(14, 32, 12, '2021-10-27 09:27:00', '2021-11-13 18:23:00'),
(15, 44, 19, '2021-10-29 14:39:00', '2021-11-07 18:34:00'),
(16, 11, 1, '2021-11-03 15:11:00', '2021-11-04 19:42:00'),
(17, 15, 3, '2021-11-06 11:51:00', '2021-11-12 11:49:00'),
(18, 4, 36, '2021-11-06 16:24:00', '2021-11-11 14:00:00'),
(19, 8, 44, '2021-11-12 14:02:00', '2021-11-13 15:21:00'),
(20, 33, 21, '2021-11-14 20:35:00', '2021-11-30 07:56:00'),
(21, 23, 18, '2021-11-16 07:40:00', '2021-11-24 11:57:00'),
(22, 13, 29, '2021-11-17 18:29:00', '2021-11-18 11:27:00'),
(23, 42, 31, '2021-11-19 18:54:00', '2021-12-05 14:59:00'),
(24, 11, 48, '2021-11-20 17:26:00', '2021-11-26 08:16:00'),
(25, 29, 42, '2021-11-23 12:20:00', '2021-11-24 10:13:00'),
(26, 37, 48, '2021-11-24 12:45:00', '2021-11-27 10:13:00'),
(27, 7, 20, '2021-11-26 19:55:00', '2021-12-03 15:55:00'),
(28, 39, 31, '2021-12-02 12:51:00', '2021-12-17 08:13:00'),
(29, 49, 17, '2021-12-14 10:11:00', '2021-12-21 09:41:00'),
(30, 37, 3, '2021-12-14 12:11:00', '2021-12-14 12:13:00'),
(31, 1, 49, '2021-12-15 15:21:00', '2021-12-17 09:45:00'),
(32, 49, 10, '2021-12-16 11:16:00', '2022-01-02 13:42:00'),
(33, 34, 26, '2021-12-19 17:38:00', '2021-12-30 09:59:00'),
(34, 21, 28, '2021-12-21 11:05:00', '2022-01-06 17:13:00'),
(35, 31, 14, '2021-12-22 09:48:00', '2022-01-06 16:37:00'),
(36, 10, 20, '2021-12-22 14:12:00', '2021-12-22 16:44:00'),
(37, 25, 50, '2021-12-22 15:27:00', '2021-12-29 08:56:00'),
(38, 25, 32, '2021-12-22 19:01:00', '2022-01-04 11:16:00'),
(39, 11, 24, '2021-12-26 19:09:00', '2022-01-11 19:14:00'),
(40, 45, 31, '2021-12-28 19:35:00', '2022-01-07 09:41:00'),
(41, 36, 17, '2022-01-05 12:30:00', '2022-01-08 17:51:00'),
(42, 21, 16, '2022-01-07 12:04:00', '2022-01-12 16:31:00'),
(43, 27, 47, '2022-01-11 16:47:00', '2022-01-11 17:20:00'),
(44, 1, 23, '2022-01-12 08:13:00', '2022-01-22 13:34:00'),
(45, 11, 1, '2022-01-14 10:22:00', '2022-01-26 13:43:00'),
(46, 5, 20, '2022-01-14 13:19:00', '2022-01-22 10:37:00'),
(47, 22, 14, '2022-01-16 18:40:00', '2022-02-02 12:10:00'),
(48, 14, 14, '2022-01-19 13:28:00', '2022-01-23 19:36:00'),
(49, 45, 9, '2022-01-27 12:06:00', '2022-02-02 15:06:00'),
(50, 20, 13, '2022-01-27 13:47:00', '2022-02-10 11:31:00'),
(51, 24, 18, '2022-01-29 15:54:00', '2022-02-02 08:59:00'),

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(52, 6, 4, '2022-01-30 15:25:00', '2022-02-04 09:19:00'),
(53, 39, 2, '2022-01-30 17:01:00', '2022-02-13 11:13:00'),
(54, 47, 26, '2022-02-02 11:02:00', '2022-02-12 11:36:00'),
(55, 39, 47, '2022-02-11 08:55:00', '2022-02-24 12:40:00'),
(56, 23, 35, '2022-02-12 17:59:00', '2022-02-24 08:56:00'),
(57, 35, 1, '2022-02-13 19:07:00', '2022-02-17 11:01:00'),
(58, 35, 1, '2022-02-16 07:08:00', '2022-02-17 11:14:00'),
(59, 50, 3, '2022-02-26 17:54:00', '2022-03-16 11:53:00'),
(60, 15, 12, '2022-02-27 15:38:00', '2022-03-11 14:44:00');
select*from transaction;
/* select customers who have never bought any books from library*/
select custID, concat(fname, lname) as name
from customer
where custID not in (select distinct custID from transaction);
/*select book with highest pagecount*/
select bkID, title from book where pageCount=(select max(pageCount)from book);
/* select customer who has borrowed some book for logest period*/
select customer.custID, concat(customer.fname, customer.lname) as
name,datediff(return_date,issue_date) as days
from customer
join transaction
on customer.custID=transaction.custID
order by days desc limit 1;
/*display list of all books along withb their authors*/
select book.bkid, book.title, concat (author.fname,author.lname) as author
from book
left join author
on book.authorID=author.authorID ;
/* display list of top 20 most borrowed books*/
select book.bkID, book.title, count(transaction.bkID) as times_borrowed
from book
left join transaction
on book.bkID=transaction.bkID
group by book.bkID
order by times_borrowed desc limit 20;
/* display list of top 10 customers who have  borrowed  most books*/
select customer.custID, concat(customer.fname, customer.lname) as name,
count(transaction.custID) as books_borrowed
from customer
left join transaction
on customer.custID=transaction.custID
group by customer.custID
order by books_borrowed desc limit 10;
```
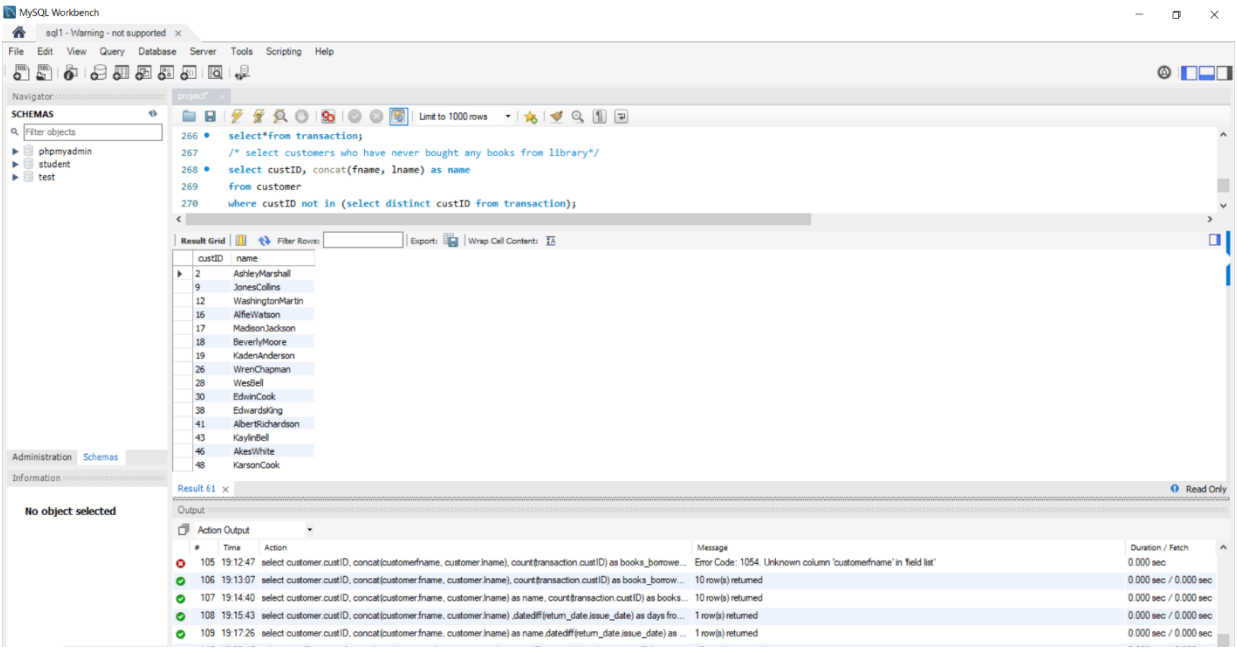

5. Sub-queries:

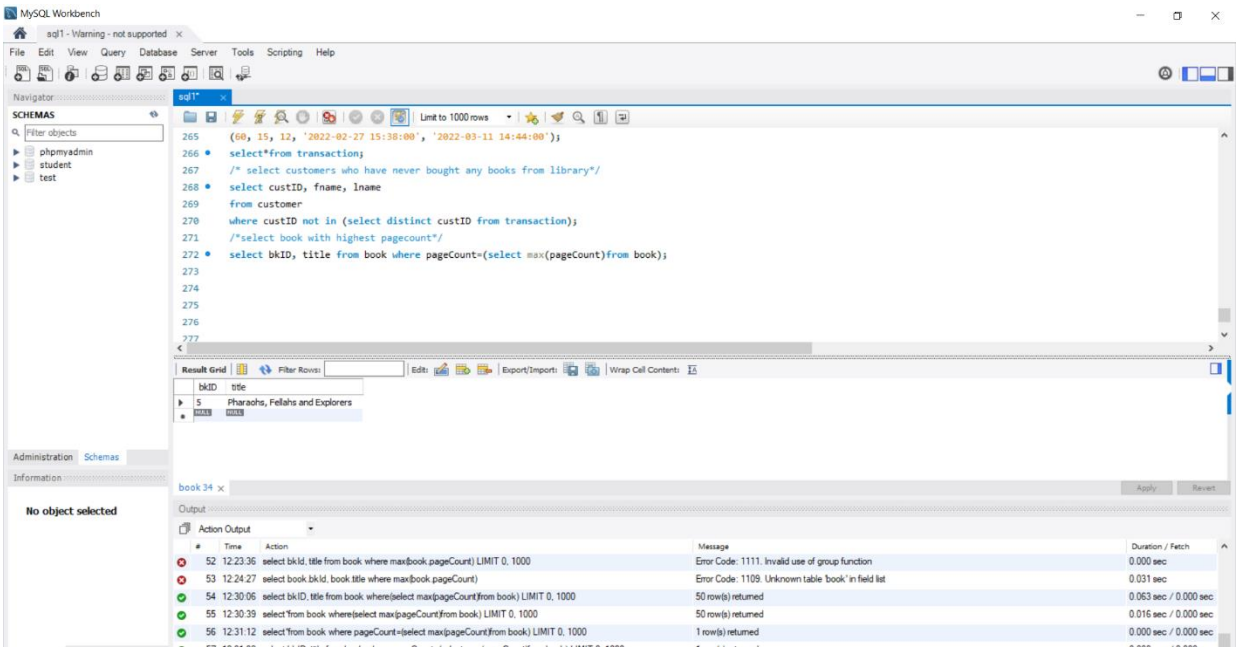
Select customers who have not borrowed any book from library

RESULT:



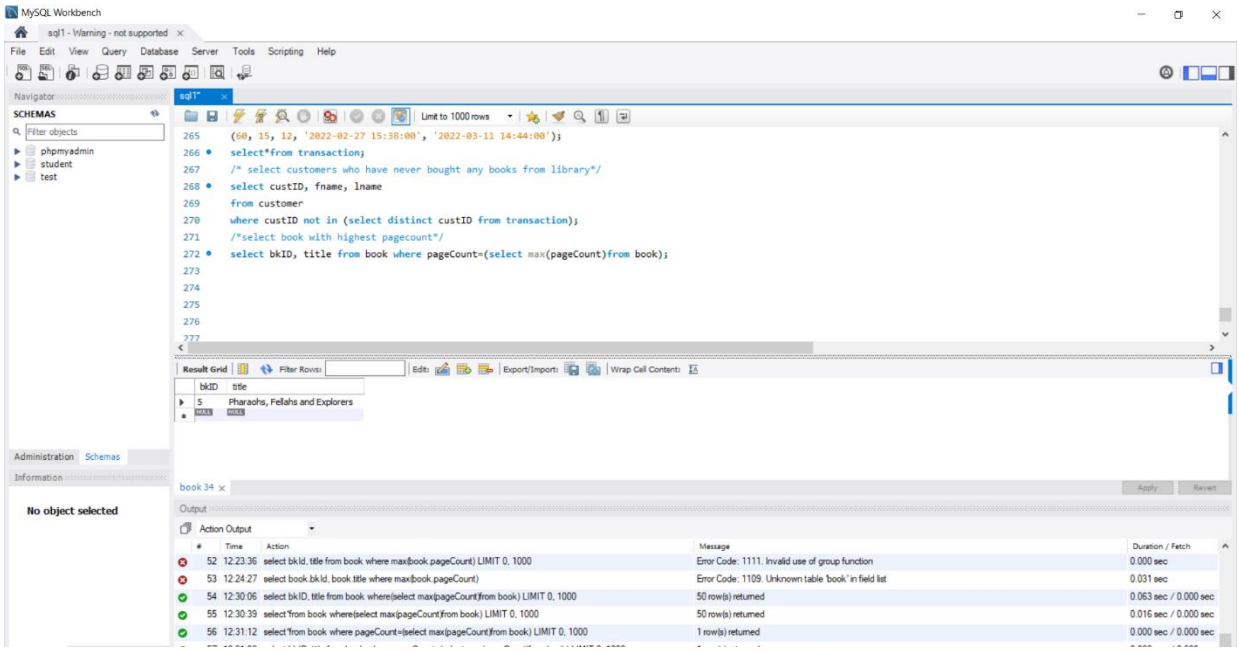
Select book with highest page count

RESULT:



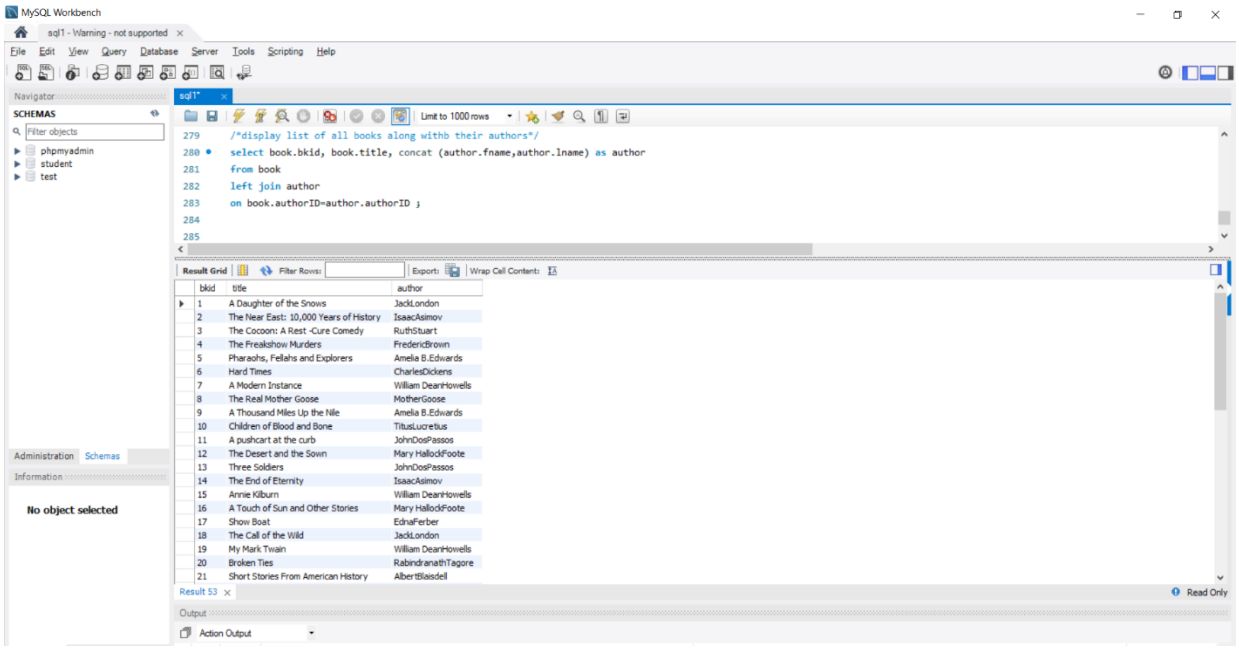
Select customer who has borrowed some book for longest period

RESULT:



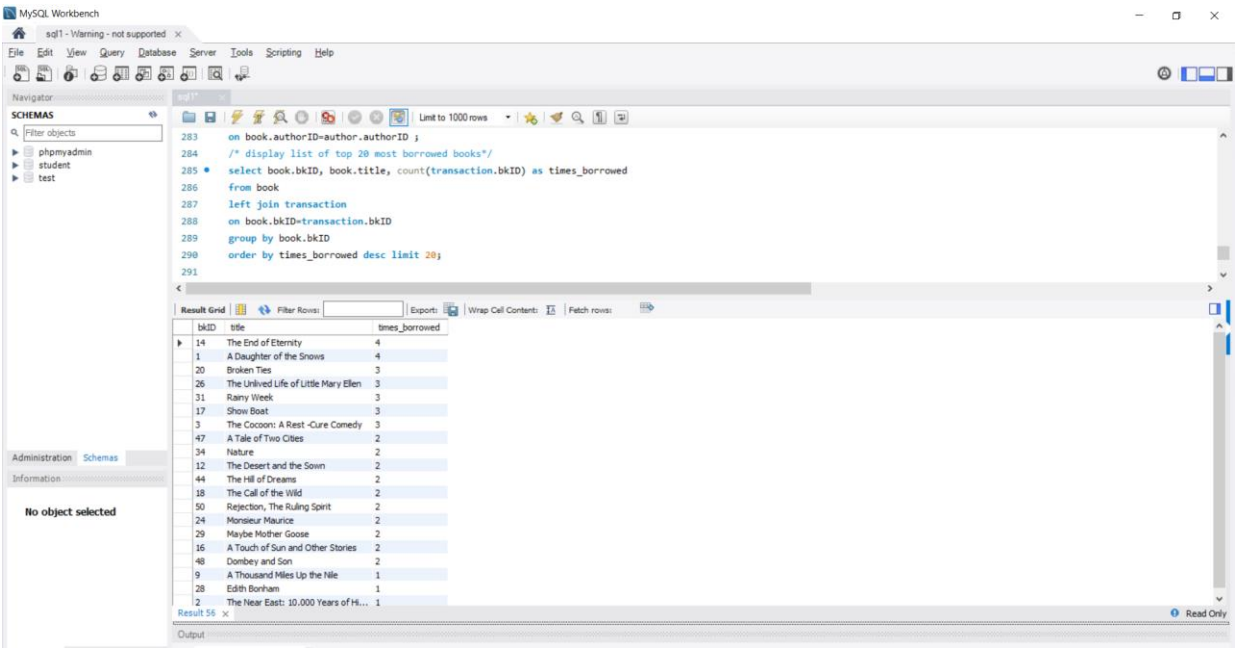
6. JOINS:

1. Display list of all books along with their authors



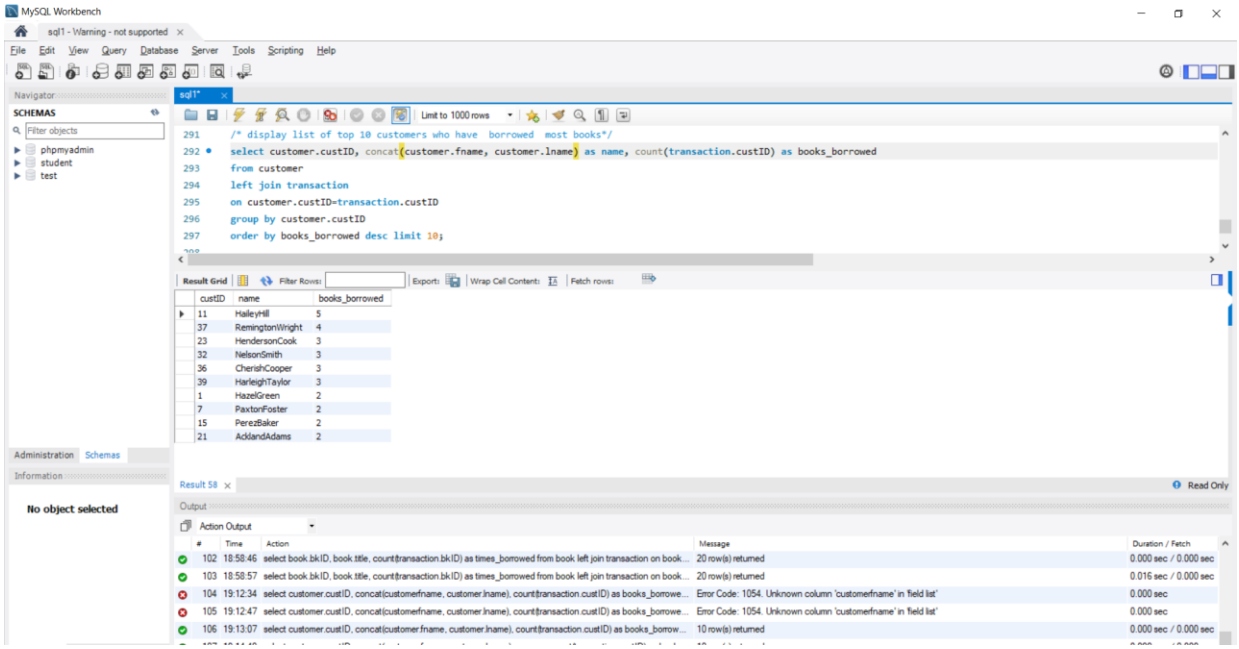
2. Display list of top 20 most borrowed books

RESULT:



3. **Display list of top 10 customers who have borrowed most books**

RESULT:



THANK YOU