

LIBRARY MANAGEMENT SYSTEM

Project for SQL Module

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:

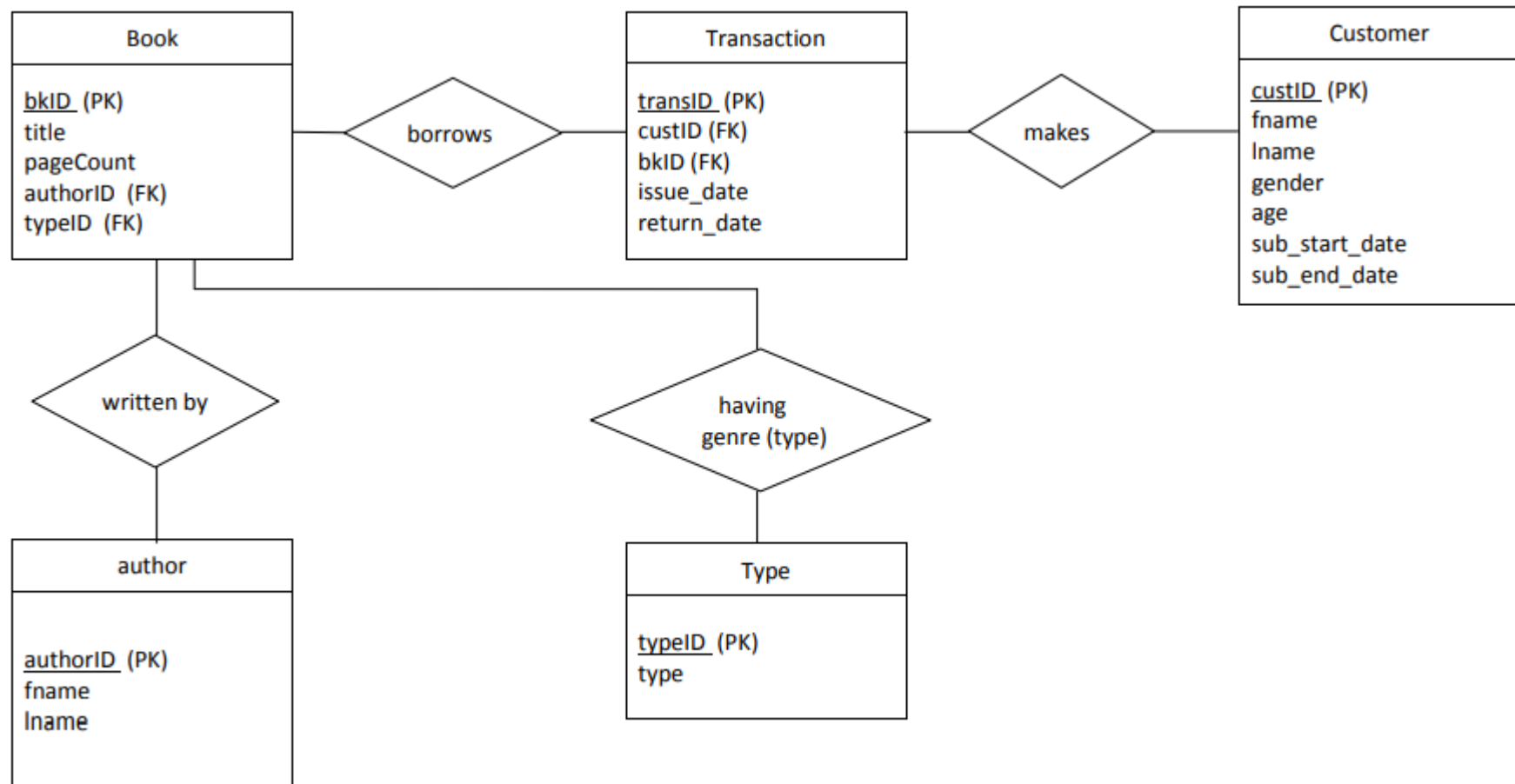
- Updating and modifying booklist in the library is much easier and efficient
- Maintaining customer details and their account is easy and efficient.
- Calculations like due payments can be done automatically by DBMS, thus eliminating human error
- RDBMS provides many ways to analyze available data, 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**
- **Select Database: lms;**

- **Create table named author:**
- **Create table named type:**
- **Create table named book:**
PRIMARY KEY (bkID),
CONSTRAINT fk_bk_author FOREIGN KEY (authorID) REFERENCES author(authorID),
CONSTRAINT fk_bk_type FOREIGN KEY (typeID) REFERENCES type(typeID);

- **Create table named customer:**
- **Create table named transaction:**
CONSTRAINT fk_trans_cust
FOREIGN KEY (custID)
REFERENCES customer(custID),
CONSTRAINT fk_trans_bk
FOREIGN KEY (bkID) REFERENCES
book(bkID));

- **Populate "author" table:**
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'),
(32, 'Samuel', 'Pepys'),
(33, 'Kate Dickinson', 'Sweetser'),
(34, 'William', 'Lampton'),

(35, 'Mother', 'Goose'),
(36, 'Eleanor Hallowell', 'Abbott');

- **Populate “type” table:**

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');

- **Populate “book” table:**

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),
 (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);

- **Populate “customer” table:**

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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'),
  
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(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'),
 (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');

- **Populate “transaction” table:**

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'),
 (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'),
(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');

5. Sub-queries:

1. Select customers who have not borrowed any book from library

RESULT:

custID	name
2	Ashley Marshall
9	Jones Collins
12	Washington Martin
16	Alfie Watson
17	Madison Jackson
18	Beverly Moore
19	Kaden Anderson
26	Wren Chapman
28	Wes Bell
30	Edwin Cook
38	Edwards King
41	Albert Richardson
43	Kaylin Bell
46	Akes White
48	Karson Cook

2. Select book with highest page count

RESULT:

bkID	title
5	Pharaohs, Fellahs and Explorers

3. Select customer who has borrowed some book for longest period

RESULT:

custID	name
50	Sterling Shaw

(P.T.O for queries involving joins)

6. JOINS:

1. Display list of all books along with their authors

RESULT:

bkID	title	author
1	A Daughter of the Snows	Jack London
2	The Near East: 10,000 Years of History	Isaac Asimov
3	The Cocoon: A Rest-Cure Comedy	Ruth Stuart
4	The Freakshow Murders	Frederic Brown
5	Pharaohs, Fellahs and Explorers	Amelia B. Edwards
6	Hard Times	Charles Dickens
7	A Modern Instance	William Dean Howells
8	The Real Mother Goose	Mother Goose
9	A Thousand Miles Up the Nile	Amelia B. Edwards
10	Children of Blood and Bone	Titus Lucretius
11	A pushcart at the curb	John DosPassos
12	The Desert and the Sown	Mary Hallock Foote
13	Three Soldiers	John DosPassos
14	The End of Eternity	Isaac Asimov
15	Annie Kilburn	William Dean Howells
16	A Touch of Sun and Other Stories	Mary Hallock Foote
17	Show Boat	Edna Ferber
18	The Call of the Wild	Jack London
19	My Mark Twain	William Dean Howells
20	Broken Ties	Rabindranath Tagore
21	Short Stories From American History	Albert Blaisdell
22	Mrs Rosie and the Priest	Givoanni Boccaccio
23	So Big	Edna Ferber
24	Monsieur Maurice	Amelia B. Edwards
25	The Master of Ballantrae	Robert Louis Stevenson
26	The Unlived Life of Little Mary Ellen	Ruth Stuart
27	Mouse - The Last Train	Frederic Brown
28	Edith Bonham	Mary Hallock Foote
29	Maybe Mother Goose	Mother Goose
30	The Noble Gases	Isaac Asimov
31	Rainy Week	Eleanor Hallowell Abbott

32	A Hazard of New Fortunes	William Dean Howells
33	A Plot for Murder	Frederic Brown
34	Nature	Ralph Waldo Emerson
35	Hickory Dickory Dock	Mother Goose
36	Big Fat Hen	Mother Goose
37	The Lone Star Ranger	Zane Grey
38	The Great Fire of London	Samuel Pepys
39	White Nights	Fyodor Dostoevsky
40	In a Glass Darkly	Joseph Sheridan LeFanu
41	Fanny herself	Edna Ferber
42	Loaded	Frederic Brown
43	A Foregone Conclusion	William Dean Howells
44	The Hill of Dreams	Arthur Machen
45	Adventure	Jack London
46	A Tagore Reader	Rabindranath Tagore
47	A Tale of Two Cities	Charles Dickens
48	Dombey and Son	Charles Dickens
49	Famous Women	Giovanni Boccaccio
50	Rejection, The Ruling Spirit	Ellis Butler

2. Display list of top 20 most borrowed books

RESULT:

bkID	title	times_borrowed
1	A Daughter of the Snows	4
14	The End of Eternity	4
3	The Cocoon: A Rest-Cure Comedy	3
17	Show Boat	3
20	Broken Ties	3
26	The Unlived Life of Little Mary Ellen	3
31	Rainy Week	3
12	The Desert and the Sown	2

16	A Touch of Sun and Other Stories	2
18	The Call of the Wild	2
24	Monsieur Maurice	2
29	Maybe Mother Goose	2
34	Nature	2
44	The Hill of Dreams	2
47	A Tale of Two Cities	2
48	Dombey and Son	2
50	Rejection, The Ruling Spirit	2
2	The Near East: 10,000 Years of History	1
4	The Freakshow Murders	1
9	A Thousand Miles Up the Nile	1

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

RESULT:

custID	name	books_borrowed
11	Hailey Hill	5
37	Remington Wright	4
23	Henderson Cook	3
32	Nelson Smith	3
36	Cherish Cooper	3
39	Harleigh Taylor	3
49	Hayden Young	2
7	Paxton Foster	2
15	Perez Baker	2
21	Ackland Adams	2