Bachelor of Software Engineering
Centre for IT Education (CITES)
**Department of Electrical and Computer Engineering**
The Open University of Sri Lanka

EEI3266 – Information Systems and Data Management

Case Study Submission

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Q1) Draw an ER diagram to depict your database. In this diagram, indicate all the entities, relationships (weak & strong), relationship cardinalities and participations, attributes, and primary keys. In addition, specify whether each attribute is single-valued or multi-valued, stored or derived, and atomic or composite.
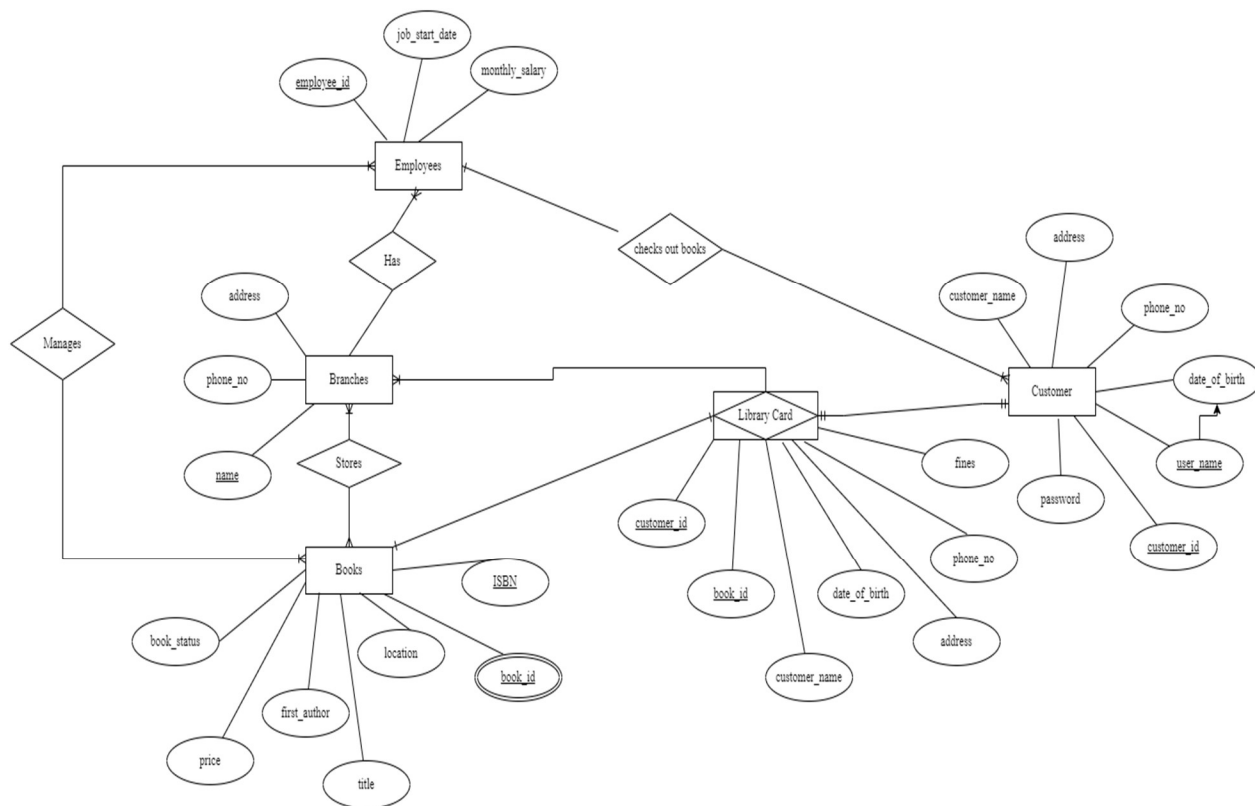
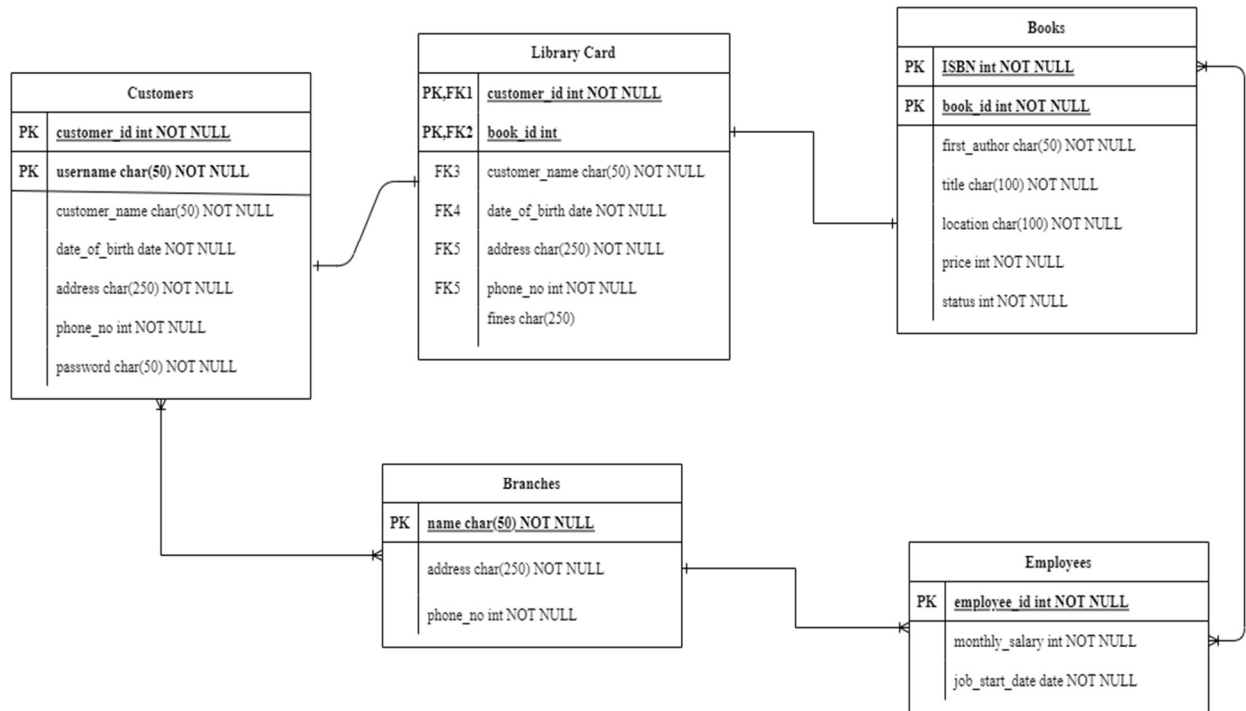**Figure 1 : ER diagram of a Library System**

Assumptions :

- one customer can borrow only one book at a time.
- one customer can use their library card for every branch of the library.

Q2) Define the actors in the library system and their functions.

Actors	Functions
Branches	Storing books, Keeping Library Cards
Books	
Customers	Signing up to a Library Card, Borrowing Books
Employees	Working for a Library Branch,
Library Card	Storing data of Customers

Q3) Convert the above ER diagram into relational model (tables) and then store the tables in the mySQL database. Write the relational Database Schema. Also make sure that you have populated (inserted) sufficient data into the database in order to test your schemas.

Customers

PK	customer_id int NOT NULL
PK	username char(50) NOT NULL
	customer_name char(50) NOT NULL
	date_of_birth date NOT NULL
	address char(250) NOT NULL
	phone_no int NOT NULL
	password char(50) NOT NULL

Library Card

PK,FK1	customer_id int NOT NULL
PK,FK2	book_id int
FK3	customer_name char(50) NOT NULL
FK4	date_of_birth date NOT NULL
FK5	address char(250) NOT NULL
FK5	phone_no int NOT NULL
	fines char(250)

Books

PK	ISBN int NOT NULL
PK	book_id int NOT NULL
	first_author char(50) NOT NULL
	title char(100) NOT NULL
	location char(100) NOT NULL
	price int NOT NULL
	status int NOT NULL

Branches

PK	name char(50) NOT NULL
	address char(250) NOT NULL
	phone_no int NOT NULL

Employees

PK	employee_id int NOT NULL
	monthly_salary int NOT NULL
	job_start_date date NOT NULL

Figure 2.1 : Relational Database Schema of a Library System

Customers

customer_id	username	name	date_of_birth	address	phone_no	password
1	abcd	Ava	14/12/1989	32, Old Butchers Street, 11 Colombo	07155518	123wx
2	efgh	Noah	08/04/1990	135, Old Moor Street, 12 Colombo	07255565	456yz
3	ijkl	Olivia	23/09/1991	150, Stace Road, 14 Colombo	07055555	789ab
4	mnop	Emma	09/12/1991	222, Keyzer Street, 11 Colombo	07655568	987cd
5	qrst	Liam	18/07/1993	438, Deans Road, 10 Colombo	07555520	654ef
6	uvxy	Lucas	15/05/1990	255, Main Street, 11 Colombo	07155578	321jk

Figure 2.2 : Table of customers

Library Card

customer_id	customer_name	date_of_birth	address	phone_no	book_id	fines
1	Ava	14/12/1989	32, Old Butchers Street, 11 Colombo	07155518	3	500
2	Noah	08/04/1990	135, Old Moor Street, 12 Colombo	07255565	4	
3	Olivia	23/09/1991	150, Stace Road, 14 Colombo	07055555		
4	Emma	09/12/1991	222, Keyzer Street, 11 Colombo	07655568	5	50
5	Liam	18/07/1993	438, Deans Road, 10 Colombo	07555520		
6	Lucas	15/05/1990	255, Main Street, 11 Colombo	07155578	6	50

Figure 2.3 : Table of library card

Books

ISBN	book_id	first_author	title	location	price	status
9780141199610	1	Leo Tolstoy	Anna Karenina	2nd floor (142.780973 C826e)	3,000	1
9780141441146	2	Charlotte Bronte	Jane Eyre	1st floor (851.963472 S054t)	500	1
9780141441146	3	Charlotte Bronte	Jane Eyre	1st floor (952.408631 H703t)	500	2
9780230633193	4	Charles Dickens	Great Expectations	2nd floor (806.549821 G018e)	100	1
9780141441146	5	William Shakespeare	Hamlet	ground floor (PS3608.O832 K58 2003)	50	2
9780141441146	6	William Shakespeare	Hamlet	ground floor (PS4535.B593 F46 8900)	50	2

Figure 2.4 : Table of books

Branches

name	address	phone_no
Codex Library	149, 4th Cross Street, 11 Colombo	(011) 2431206
Central Park Library	219, Panchikawatte Road, 10 Colombo	(011) 2421554
Reader's Garden Library	28, Jethawana Road, 14 Colombo	(011) 2451975
Legacy Library	24, Deal Place, 03 Colombo	(011) 2324974
Prime Library	323 1/1, Dam Street, 12 Colombo	(011) 2439290

Figure 2.5 : Table of branches

Employees

employee_id	job_start_date	monthly_salary
1	23/01/2018	43,400
2	10/12/2018	43,400
3	04/03/2019	32,500
4	15/04/2019	32,500
5	31/05/2021	28,600

Figure 2.6 : Table of employees

Q4) Write SQL statements to create the tables and add records to each table in your database with sufficient data for testing.

Figure 3.1 : Screenshot of the Library_Customers table in SQL

Figure 3.2 : Screenshot of the Library_Card table in SQL

Figure 3.3 : Screenshot of the Library_Books table in SQL

Figure 3.4 : Screenshot of the Library_Branches table in SQL

Figure 3.5 : Screenshot of the Library_Employees table in SQL

Q5) Write a SQL query to obtain the following results.

i)   To find the status of a given book.

Figure 4.1 :   Status of the book, 'Great Expectations'

ii)   To view the customer card by giving the Customer ID.

Figure 4.2 :   Customer Card details of Customer 4

iii)   Remove a book from the library with all its copies.

Figure 4.3 :   Updated table after removing the book, 'Hamlet' from the library

iv)   Change the status of a book.

Figure 4.4 :   The book, 'Great Expectations' after changing the status to 2 (checked out)

v)   View the total amount of fines the customer has to pay.
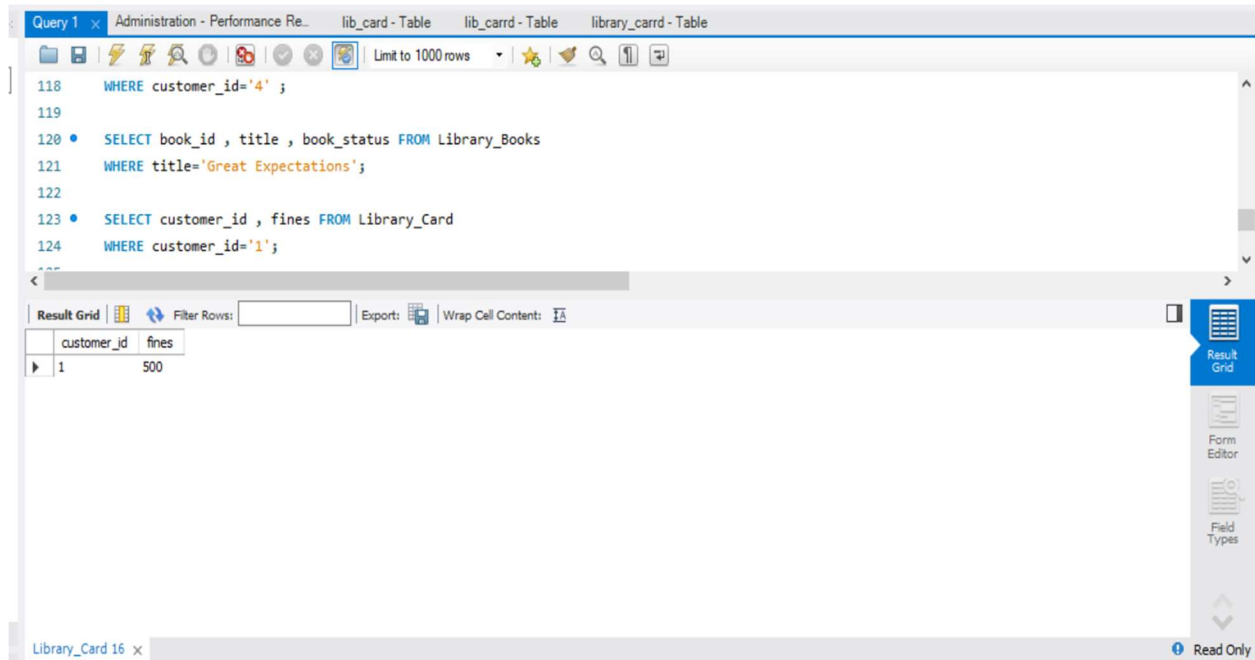
Figure 4.5 :   The total amount of fines, Customer 1 has to pay