National University of Computer & Emerging Sciences, Karachi
Fall-2024 School of Computing (BSCS, BSSE, BSCY, BSAI)

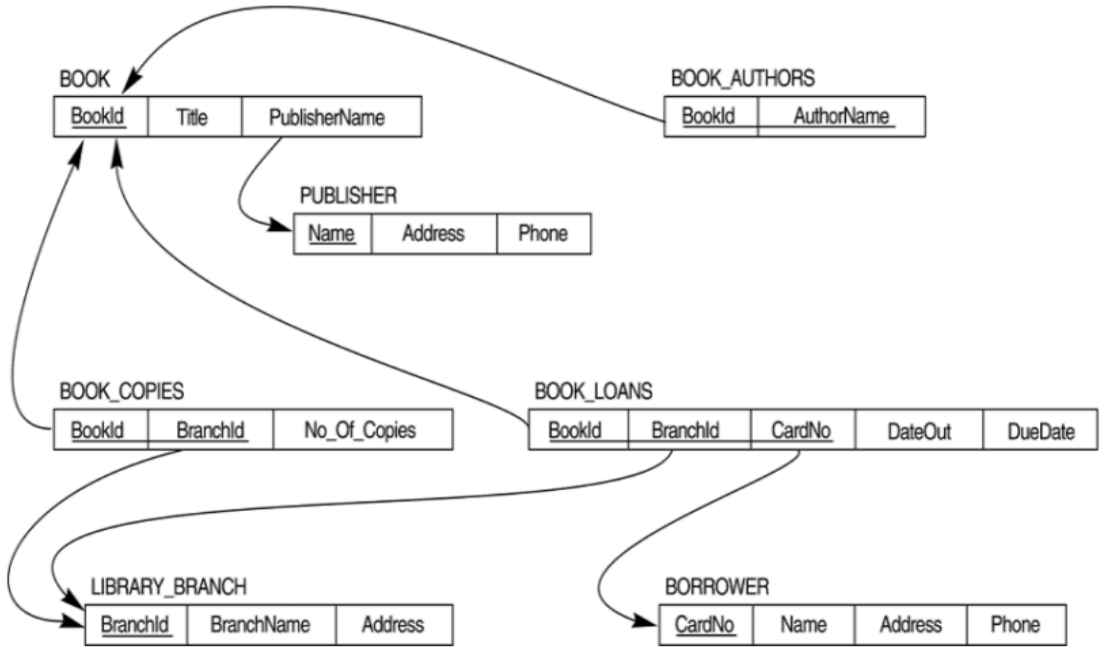
Assignment # 1

Subject: Database Systems -CS2005	**Post Date: 6/9/2024**
Total Marks: 40	**Due Date:** 19/9/2024
Course Instructors: Dr. Zulfiqar, Dr. Anam Qureshi, Omer Qureshi, Basit Jasani, Abeer Gauher, Atiya Jokiyo, Fizza Aqeel, Javeria Farooq, Zain Noreen, Alina Arshad	

Instructions to be strictly followed.

- For all questions involving SQL Queries:
  - ***Submit the SQL Scripts in a .txt file.***
- It should be obvious that submitting your work after the due date will result in zero points being awarded.
- Plagiarism (copying/cheating) and late submissions result in a zero mark.

Question #1: Consider the schema given below and answer the following parts.



a) How many entities (tables) are there in the schema? List their names.
b) List the primary keys for all the tables.
c) Identify which foreign keys exist and explain their purpose.
d) What should be the domain of each attribute for each table?
e) Describe the relationship between Book and Book_Author. How would you represent an author who has written multiple books in this schema?

Question #2: Consider the schema given below and answer the following parts.

Hospital (h_id, h_name, location)
Patient(p_num,p_name,age,h_id)
Doctor(d_id,d_name,h_id)
Operation_Room(o_name, time, room, d_id)
Surgery_Details (p_num, o_name)

a) Retrieve the names of the doctors operating in room 'R-11'.
b) Identify the names of patients who are over 15 years old and are admitted to AKU (Karachi).
c) Determine the total number of patients admitted to AKU.
d) List the names of doctors who have operated in more than one operation room.
e) Provide the names of hospitals and the corresponding number of patients admitted to each, sorted in descending order by the number of patients.
f) Find the names of patients who are not admitted to AKU.
g) List the names of patients admitted exclusively to Liaquat (Lahore).
h) Identify the patient numbers and names of those who have been operated on only by Dr. Muhammad Rafi.
i) List the names of doctors who are not operating in room 'R-109'.
j) Identify the name of the patient who has undergone the highest number of surgeries.

Question #3: Consider the schema given below and write each of the following queries in SQL.

Books(book_id: integer, title: string, author_id: integer, genre: string, price: real)
Authors(author_id: integer, author_name: string, nationality: string)
Orders(order_id: integer, customer_id: integer, order_date: date, total_amount: real)
Customers(customer_id: integer, customer_name: string, email: string, join_date: date)
OrderDetails(order_id: integer, book_id: integer, quantity: integer)
Reviews(review_id: integer, book_id: integer, customer_id: integer, rating: integer, comment: string)
Inventory(book_id: integer, stock_quantity: integer, reorder_level: integer)

a) Find the titles of books that have received a rating of 5 from all customers who reviewed them.
b) List the names of authors who have written more than three books in the "Science Fiction" genre.
c) Identify the customers who have placed orders totaling over $500 in a single month.
d) Find the books whose price is less than the average price of all books by the same author.
e) Retrieve the titles of books that have never been ordered by any customer.

f) List the customer names who have given at least one review with a rating below 3.
g) For each author, display their name and the total number of books they have written.
h) Find the names of customers who joined in the same month and year as the customer who placed the highest-value order.
i) List the genres that have at least one book currently below its reorder level in the inventory.
j) Identify the authors who have at least one book with no reviews.

Q4) 1) A) What is the referential integrity constraint?

B) Under what conditions can the foreign key be NULL. Give two examples and explain with the help of a diagram

C) When the referential integrity is violated, what are the different actions SQL can take?

2) Discuss and differentiate inherent model based constraints, schema based constraints, and application based constraints

3) A key is a superkey but not vice versa. Explain this statement with an example

Good Luck!