Database Management Systems

Sample Questions

- Write SQL query to create a table for describing a book. The table should have Book Title, Author, Publisher, Year published, and ISBN fields. Your table should have a primary key. For each field determine the "null" constraint too.
- Create table

```
( BookTitle  varchar(255) NOT NULL,
  Author     varchar(255) NOT NULL,
  Publisher  varchar(255) NOT NULL,
  yearPublished  integer,
  ISBN       varchar(20) PRIMARY KEY )
```

- Give the definitions of the followings:
  - Relation
  - Relation Schema
  - Database Schema
  - Foreign Key
  - Constraint
  - Transaction
  - Schema
  - Entity

- The following question considers a company which is selling some products to its customers.
  - Write SQL queries to create tables for customers and products of the company. The customer table should have ID, name, address, phone fields. The product table should include ProductID, name, type, and price fields. Your tables should have primary keys. For each field determine the "null" constraint too.
  - Assume orders from customers for different products are received by the company. Besides, assume each order can include several items of only one product type. The number of items ordered and the order date should also be stored. Explain how the order can be added to your database. Write necessary SQL commands.

- Create table product(ProductID integer Primary key,
  name varchar(255) not null,
  type varchar(255),
  price real)

Create table customer (ID integer primary key,
  name varchar(255) not null,
  address varchar(255),
  phone varchar(20))

Create table order (pid integer references product(ProductID),
  cid integer references customer(ID),
  quantity integer not null,
  orderDate date,
  PRIMARY KEY (pid, cid)

)

- Assume the lists of instructors and courses are stored in two tables. The main attributes are given as below:
- Instructor< ID, Name, Office, Department >
- Course<ID, Name, Credits, Department>
  - Write necessary SQL commands to create the tables. Consider necessary constraints.
  - Assuming that the tables should include the relationships between a course and the instructor offering that course, make necessary changes in your tables
  - Write SQL commands to insert a course and an instructor data into the tables
  - Write SQL command to change the office of the instructor you just entered.

```
CREATE   TABLE Instructor (
    ID  Integer PRIMARY KEY,
    Name   Varchar(255)  NOT NULL,
    Office   Varchar(255),
    Department  Varchar(255) )
CREATE   TABLE Course(
    ID   Integer  PRIMARY KEY,
    Name Varchar(255)  NOT NULL,
    Credits Integer  NOT NULL,
    Department  Varchar(255) NOT NULL)
```

Assuming that the tables should include the relationships between a course and the instructor offering that course, make necessary changes in your tables

```
CREATE  TABLE Course(
    ID  Varchar(255)  PRIMARY KEY,
    Name Varchar(255)  NOT NULL,
    Credits Integer  NOT NULL,
    Department  Varchar(255) NOT NULL,
    OfferedBy  Integer References Instructor(ID))
```

- Write SQL commands to insert a course and an instructor data into the tables

Insert Into Instructor

Values (100, ‘hasan’, ‘B101’, ‘Economy’)

Insert Into Course

Values (‘ECON200’, ‘Accounting’, 3, ‘Economy’, 100)

- Write SQL command to change the office of the instructor you just entered.

```
UPDATE  Table  Instructor
SET Office = 'B201'
Where ID = 100
```

- What does the following query compute?

```
SELECT  S.name, E.cid
FROM  Students S, Enrolled E
WHERE  S.sid=E.sid AND E.grade="A"
```

sid	cid	grade
53831	Carnatic101	C
53831	Reggae203	B
53650	Topology112	A
53666	History105	B

S.name	E.cid
Smith	Topology112

sid	name	department
53650	Smith	Computer
53666	John	Electronics
53831	Mary	Management

- In the following tables, delete statement is run as shown below. Explain what problem(s) may arise and what solutions are available for them.

Book<BookID,Title, Author, Publisher>

User<UserID, Name, Address>

Borrowed<BookID, UserID, DateBorrowed, DateDue>

The query is:

```
DELETE FROM Book
WHERE BookID =’37623’
```

- After deleting a book, the records from the borrowed table which refer to the deleted book will be invalid. As the solution we can use cascade delete which deletes all records in the borrowed table which refer to this book

Relational Algebra

- Write a relation algebra expression to find the names and surnames of employees who work in '*Administration*' department. Assume Employee relation is defined as below:

  Employee<name, surname, department, city, salary>

$$\Pi_{name,Surname}(\sigma_{department='Administration'}(Employee))$$

Relational Algebra

- Consider the relations r1 and r2 as given below.
  - Write a relational algebra instruction to join r1 and r2 (natural-join)
  - Show the result of join operation as a relation
  - Write a relation algebra instruction to find the name of all employees in the department where 'mori' is the head

r_1

Employee	Department
Smith	sales
Black	production
White	production

r_2

Department	Head
production	Mori
purchasing	Brown

$$r1 \rhd\lhd r2$$

Employee	Department	Head
Black	Production	Mori
White	Production	Mori

Write a relation algebra instruction to find the name of all employees in the department where 'mori' is the head

$$\Pi_{name}(\sigma_{Head='\text{Mori}'}(r1 \rhd\lhd r2))$$

Relational Algebra

- Write a relational algebra expression to find the names, surnames, and the name of the department of employees who work in a department located in '*Ankara*'. Employee and department relations are defined as below:
- ***Employee***<name, surname, DepartmentCode, Age, salary>
- ***Department***<*DepartmentCode, DeptName, Location*>

$$\Pi_{name,surname,DeptName}(\sigma_{Location='Ankara'}(Employee \rhd\lhd Department))$$