National University of Computer and Emerging Sciences
Lahore Campus

Database Systems

Course code: CS2005
Total Marks: 90
Total Questions: 3
Section: BS(DS)-4A
Semester: Spring 2025
Weight:

Assignment #1

Out Date: 31-01-2025
Due Date: 10-02-2025
Course Instructor(s)
Mr. Muhammad Naveed

Instructions:

- This assignment is an individual assignment.
- Clearly mention any assumption you have made.
- You are required to submit the soft copy(on GCR) & hard copy of your assignment at the start of your class.
- Plagiarism will result in zero marks.
- For any query, please contact your TA.

Topic: Relational Data Model

CLO #4: Use SQL for database definition and manipulation in any DBMS.

Q1. Consider the following database. In this schema primary keys (PKs) are underline and Production.productID, Order.productID, Order.customerID are foreign keys (FKs).
[7x5=35 marks]

Product

ProductID	ProductName	PricePerUnit	QuantityInStore
1	Chicken Cutlets	250	600
2	Chicken Tenders	300	500
3	Potato Fries	150	800

Production

ProductID	BatchNo	UnitsProduced	PricePerUnit	ExpiryDate
1	1-1001	1000	01-Feb-2021	01-Feb-2022
1	1-1002	6000	06-Feb-2021	06-Feb-2022
3	1-1002	1000	06-Jan-2021	06-Jan-2022
2	1-1026	2000	06-Jan-2021	06-Jan-2022

Customer

CustomerID	CustomerName	Address	ContactNo
1	Metro	Model Town	042-31234567
2	Jalal Sons	Gulberg	042-31234568
3	Rainbow	Bahria Town	042-31234569

Order

OrderNo	CustomerID	ProductID	OrderDate
1	1	3	01-Feb-2021
2	2	1	08-Feb-2021
3	1	1	01-Feb-2021

Apply following operations on the above database. State if the operation would be carried out successfully or not. In case of successful operation indicate the changes that will be made to the above database. Also state all the integrity constraints violated by each operation, if any. Please note that **all operations are independent**.

1. **For INSERT Operation:**

a. INSERT INTO Product VALUES (null, 'Chicken Nuggets', 120, 100);
b. INSERT INTO Production VALUES (1,'1-2001', 300, '01-Feb-2021', '01-Feb-2022');
c. INSERT INTO Production VALUES (1, null, 300, '01-Feb-2021', '01-Feb-2022');
d. INSERT INTO Customer VALUES (1,'Packages', 'DHA', '042-31234567');
e. INSERT INTO Order VALUES (5, 10, 1, '09-Feb-2021');

2. **For DELETE Operation - Assume that foreign key with CASCADE option is implemented.**

a. DELETE FROM Product WHERE ProductID=2*;*
b. DELETE FROM Customer WHERE CustomerID=1*;*
c. DELETE FROM Production WHERE BatchID='1-1002'*;*
d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;
e. DELETE FROM Order WHERE OrderNo=4*;*

3. **For DELETE Operation - Assume that foreign key with SET NULL option is implemented.**

a. DELETE FROM Product WHERE ProductID=2*;*
b. DELETE FROM Customer WHERE CustomerID=1
c. DELETE FROM Production WHERE BatchID='1-1002'*;*
d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;
e. DELETE FROM Order WHERE OrderNo=4*;*

4. **For DELETE Operation - Assume that foreign key with No ACTION option is implemented.**

a. DELETE FROM Product WHERE ProductID=2*;*
b. DELETE FROM Customer WHERE CustomerID=1*;*
c. DELETE FROM Production WHERE BatchID='1-1002'*;*
d. DELETE FROM Order WHERE CustomerID=1 OR ProductID=1;
e. DELETE FROM Order WHERE OrderNo= 4*;*

5. **For UPDATE Operation - Assume that foreign key with CASCADE option is implemented.**

a. UPDATE Order SET CustomerID=10 WHERE CustomerId=2;
b. UPDATE Product SET ProductID=21 WHEREProductID=3;
c. UPDATE Order SET OrderDate= null WHERE ProductID=1;
d. UPDATE Production SET CustomerID=1 WHERE BatchID='1-1002';
e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;

6. **For UPDATE Operation - Assume that foreign key with SET NULL option is implemented.**

a. UPDATE Order SET CustomerID=10 WHERE CustomerId=2;
b. UPDATE Product SET ProductID=21 WHERE ProductID=3;
c. UPDATE Order SET OrderDate= null WHEREProductID=1;
d. UPDATE Production SET CustomerID=1 WHERE BatchID='1-1002';
e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;

7. **For UPDATE Operation - Assume that foreign key with NO ACTION option is implemented.**

a. UPDATE Order SET CustomerID=10 WHERE CustomerId=2;
b. UPDATE Product SET ProductID=21 WHERE ProductID=3;
c. UPDATE Order SET OrderDate= null WHEREProductID=1;
d. UPDATE Production SET CustomerID=1 WHERE BatchID='1-1002';
e. UPDATE Production SET BatchNo= null WHERE UnitsProduced=6000;

CLO #4: Use SQL for database definition and manipulation in any DBMS.

Q2: Consider the database of a book store, to keep the information of books

- Publisher (PublisherID, PublisherName, Address)
- Aurthor (AuthorID, AurtorName, Gender, BirthDate, Country)
- Book (ISBN, AuthorID, PublisherID, PublishDate, BookTitle)

Identify the domain of each attribute, primary keys, and foreign keys for all the relations. Also populate each relation with at least 5 sample tuples so that none of the constraints is violated. [15 marks]

CLO #4: Use SQL for database definition and manipulation in any DBMS.

Q3. Consider the following schema

Store Table(Store_Id ,City ,Region)
Product Table (Product_Id ,Description ,Brand)
Sales Table(Store_Id ,Product_Id ,Sales,Cost,Profit)

Part A:

DDL Questions for Store, Product, and Sales Database

1. **Create all tables** – Write SQL queries to create Store, Product, and Sales tables with appropriate constraints.
2. Add constraints on all foreign key ON DELETE CASCADE ON UPDATE No Action using ALTER command.
3. Ensure City and Region in Store table cannot be NULL
4. Enforce uniqueness on the combination of City and Region in Store table
5. Ensure that Profit in the Sales table is always non-negative
6. Set a default value for Region column in Store table as 'Unknown'
7. Modify the Sales table to include a Sales_Date column with a default value of the current date.
8. Change the Description column in Product table to ensure it cannot be NULL.
9. Add a new column Store_Name to Store table ensuring it cannot be NULL.
10. Rename the Cost column in Sales table to Purchase_Cost.
11. Increase the length of the Description column in the Product table to 500 characters.
12. Delete all records from the Sales table where Profit is less than 1000 without deleting the table.

Part B:

Insert records into Store Table

```
INSERT INTO Store (Store_Id, City, Region) VALUES
(1, 'New York', 'East'),
(2, 'Los Angeles', 'West'),
(3, 'Chicago', 'Midwest'),
(4, 'Houston', 'South'),
(5, 'Phoenix', 'West'),
(6, 'Philadelphia', 'East'),
(7, 'San Antonio', 'South'),
(8, 'San Diego', 'West'),
(9, 'Dallas', 'South'),
(10, 'San Jose', 'West'),
(11, 'Austin', 'South'),
(12, 'Jacksonville', 'South'),
(13, 'Fort Worth', 'South'),
(14, 'Columbus', 'Midwest'),
(15, 'Charlotte', 'East'),
(16, 'Indianapolis', 'Midwest'),
(17, 'San Francisco', 'West'),
(18, 'Seattle', 'West'),
(19, 'Denver', 'West'),
(20, 'Boston', 'East');
```

Insert records into Product Table

```
INSERT INTO Product (Product_Id, Description, Brand) VALUES
(1, 'Laptop', 'Dell'),
(2, 'Smartphone', 'Apple'),
(3, 'Tablet', 'Samsung'),
(4, 'Headphones', 'Sony'),
(5, 'Smartwatch', 'Fitbit'),
(6, 'Gaming Console', 'Microsoft'),
(7, 'TV', 'LG'),
(8, 'Camera', 'Canon'),
(9, 'Router', 'Netgear'),
(10, 'Monitor', 'HP'),
(11, 'Printer', 'Epson'),
(12, 'Keyboard', 'Logitech'),
(13, 'Mouse', 'Razer'),
(14, 'Speakers', 'Bose'),
(15, 'Projector', 'BenQ'),
(16, 'External HDD', 'Seagate'),
(17, 'SSD', 'Samsung'),
(18, 'Graphics Card', 'Nvidia'),
(19, 'RAM', 'Corsair'),
(20, 'Power Bank', 'Anker');
```

Insert records into Sales Table

```
INSERT INTO Sales (Store_Id, Product_Id, Sales, Cost, Profit) VALUES
(1, 1, 50, 40000, 10000),
(2, 2, 30, 30000, 9000),
(3, 3, 40, 25000, 7500),
(4, 4, 20, 15000, 5000),
(5, 5, 35, 18000, 6000),
(6, 6, 25, 22000, 7000),
(7, 7, 15, 50000, 12000),
(8, 8, 10, 8000, 2000),
(9, 9, 28, 12000, 4000),
(10, 10, 34, 17000, 5000),
(11, 11, 21, 14000, 4500),
(12, 12, 38, 9000, 3000),
(13, 13, 44, 11000, 3500),
(14, 14, 29, 32000, 9000),
(15, 15, 23, 27000, 8000),
(16, 16, 18, 13000, 4000),
(17, 17, 31, 29000, 8500),
(18, 18, 26, 35000, 11000),
(19, 19, 37, 19000, 7000),
(20, 20, 45, 10000, 3000);
```

Part C:

1. Select all sales where the cost is greater than 15000
2. Select all sales where profit is between 4000 and 10000
3. Select all sales of products with IDs 5, 10, or 15
4. Select all stores in the West region and order by city name
5. Retrieve the top 10 most profitable sales
6. Select stores in regions other than 'South'
7. Find all sales where the sales amount is not equal to 30
8. Find all products where the brand name contains 'S'
9. Find all cities starting with 'S'
10. Retrieve sales where the cost is greater than 20000 and profit is less than 8000
11. Retrieve sales where either sales count is greater than 35 or cost is below 15000
12. Retrieve all unique cities and brands
13. Retrieve all cities that appear in both Store and Product brand names
14. Retrieve all cities that are in Store but not in Product brand names
15. Find all sales where the total value (Sales * Cost) is greater than 500000

[18+7+15=40 marks]

Good Luck