AACS3013 DB Dev. & Applications

21-09-18 PYQ

Question 1

Part A

1. Computer file-based system utilizes files and directories as a structure to store data. Each files containing data are organized in folders and directories.
2. 3 problems:
    1. **Every task need extensive programming.**
        1. Time-consuming, difficult 3GL programming is required to complete tasks based on a file-based system.
    2. **Structural dependency**
        1. Once the file structure changes, data access method also require changes.
    3. **Data dependency**
        1. Change in the metadata of data require change in all the programs that access the file.

Part B

1. 3 DBMS function ensuring integrity and consistency of data
    1. **Database Dictionary Management**: Defines entities and their relationships
    2. **Database storage management:** Store data and their metadata
    3. **Database transformation and presentation:** Translate logical requests into requests to obtain data
2. 3 potential threats to data security
    1. Accidental damage
    2. Theft and fraud
    3. Loss of privacy

Question 2

Part A

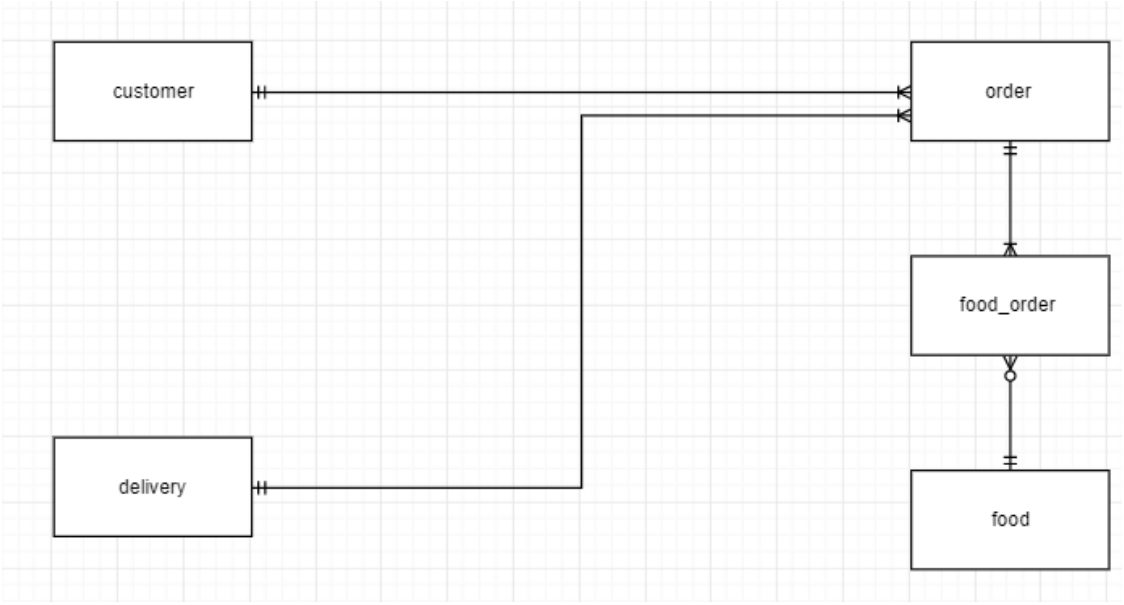
Defining clear set of business rules

Benefit 1: Reducing costs. It is easier to train employees to use the database when all rules are explicitly stated in the system, rather than requiring the employees to memorize them.

Benefit 2: Reusability. By defining clear set of business rules, they can be reused in multiple queries without requiring reevaluation of unclear business rules.

Part B

1.



2. DBDL Format
    1. **customer**(custId, custName, custContact, email)
    2. **order**(orderNo, orderDate, orderAmount, remarks, custId*, deliveryNo*)
    3. **food**(foodId, description, price, restaurantName)
    4. **delivery**(deliveryNo, vehicleNo, staffName, staffContact, deliveryTime)
    5. **food_order**(orderNo*, foodId*)

Question 3

Part A

1. **Primary key**: An attribute or a group of attributes of a table that uniquely identifies a row on a table.
2. **Foreign key:** An column that derives its value from another table, and forms a link between two tables.

Part B

1. **Insertion anomaly**: A new item cannot be added without adding another customer.
2. **Modification anomaly:** By modifying the description of item code CO98 from 'Phone case' to 'Colorful Phone case', similar items with same description will also need to be modified. If not, will cause data inconsistency.
3. **Deletion anomaly:** By deleting the customer 'AMD Sdn Bhd' (CustID: AMD12), we will also delete the Item with Description, 'Dust plug' (ItemCode: DP12).

Part C

(Extra) 0NF: Unnormalized

PurchaseDelivery(DeliveryOrderNo, DeliverOrderDate, CustId, CustName, Address, ItemCode, Description, Qty)

1NF, Remove repeating groups

Delivery(DeliveryOrderNo, DeliverOrderDate, CustId, CustName, Address)

Purchase(ItemCode, Description, Qty, DeliveryID*)

2NF: Remove partial dependencies

Delivery(DeliveryOrderNo, DeliverOrderDate, CustId, CustName, Address)

Purchase(ItemCode*, Qty, DeliveryID*)

Item(ItemCode, Description)

3NF: Remove transitive dependencies

Delivery(DeliveryOrderNo, DeliverOrderDate, CustId*)

Customer(CustId, CustName, Address)

Purchase(ItemCode*, Qty, DeliveryID*)

Item(ItemCode, Description)

Question 4

Part A

```sql
CREATE TABLE ExamGrade (
  StudentID      CHAR(12),
  SubjectCode    CHAR(16),
  SemesterYear   CHAR(10),
  Marks          DECIMAL(5, 2),
  Grade          CHAR(2),
  ExamFees       DECIMAL(7, 2),
  PRIMARY KEY    (StudentID, SubjectCode, SemesterYear),
  FOREIGN KEY    (StudentID) REFERENCES Student(StudentID),
  FOREIGN KEY    (SubjectCode) REFERENCES     Subject(SubjectCode),
  CHECK          (Marks > 0 AND Marks <= 100)
);

```

Part B

```sql
SELECT  *
FROM    Subject S, Faculty F
WHERE   S.FacultyId = F.FacultyId AND
        F.FacultyName = 'Computer Science Faculty';
```

Part C

```sql
SELECT  COUNT(*) AS 'No. of Students'
FROM    ExamGrade E, Subject S
WHERE   E.SubjectCode = S.SubjectCode AND
        S.SubTitle = 'Database Development and Applications' AND
        E.SemesterYear = '2018Sem1';
```