AS - Chapter 8 Practice1 Solution

Question 1

Allen owns an online store. He has a database that stores details about the Customers, Employees, Products and Orders. The database, **Online_Shopping**, has the following structure:

Customers *(CustomerID, CustomerName, ContactName, Address, City, PostalCode, Country)*

Employees *(EmployeeID, LastName, FirstName, BirthDate, Photo, Notes)*

Products *(ProductID, ProductName, SupplierID, CategoryID, Unit, Price)*

Orders *(OrderID, CustomerID, EmployeeID, OrderDate, ShipperID)*

(a) Give the definition of the following database terms, using an example from the database **Online_Shopping** for each definition. [Definition of Terminology]

Term	Definition and Example
Field	A column in a table e.g. CustomerID in Customers
Entity	Anything that data can be stored about e.g. Customers or Orders
Foreign key	A field/attribute in one table that is linked to a primary key in another table e.g. EmployeeID/ CustomerID in Orders table
Primary key	An field or a smallest set of fields that has unique values in a table e.g. OrderID in Orders table

[6]

(b) Tick (3) **one** box to identify whether the database **Online_Shopping** is in Third Normal Form (3NF) or not in 3NF. [Normalization process]

Justify your choice using one or more examples from the database**Online_Shopping**.

In 3NF	✓
Not in 3NF	

Justification: All fields in all tables are dependent fully on the primary key.

e.g. all fields ,*CustomerID, EmployeeID, OrderDate and ShipperID*, are dependent fully on primary key (OrderID) in Orders table

[2]

(c) Example data from the table **ExampleOrders** are given:

OrderID	CustomerID	EmployeeID	OrderDate	ShipperID
10248	90	5	1996-07-04	3
10249	81	6	1996-07-05	1
10250	34	4	1966-07-08	2
10251	48	3	1996-07-08	1

(i) Write a Data Definition Language (DDL) statement to define the table **ExampleOrders**.
[CREATE, TABLE, PRIMARY KEY] Running code here

```
CREATE TABLE ExampleOrders (
    OrderID INTEGER,
    CustomerID INTEGER,
    EmployeeID INTEGER,
    OrderDate DATE,
    ShipperID INTEGER,
    PRIMARY KEY (OrderID)
);
```

[6]

(ii) After creating the Orders table, Allen found that he had not added a foreign key. Please write a **Data Definition Language** (DDL) statement to add foreign key **ShipperID,**that refers to Shippers table**,** in **ExampleOrders** [ALTER TABLE, ADD, FOREIGN KEY…REFERENCES…]

```
ALTER TABLE ExampleOrders
ADD FOREIGN KEY (ShipperID) REFERENCES Shippers (ShipperID);
```

[2]

(iii) Those DDL statements are interpreted by the DDL interpreter and recorded in the database's data dictionary. Please give **three** items that are stored in a **data dictionary**.
[Data dictionary]

- Table name, Field name // attribute

- Data type, Type of validation

- primary key and foreign key, relationships

[3]

(iv) Write a **Data Manipulation Language** (DML) statement to add a record to the **ExampleOrders** table. (OrderID: 10444, CustomerID: 66, EmployeeID: 5, OrderDate: 2022-01-31, ShipperID: 1)
[INSERT INTO, VALUES] Running code here

```
INSERT INTO ExampleOrders
VALUES (10444, 66, 5, "2022-01-31", 1)
```

[2]

(v) Allen wants to use a **Database Management System** (DBMS) to set up and manage the database. [Query Processor]

Describe, using examples, how the online store can use the following DBMS tools:

Development interface

To create user friendly features e.g. forms to enter new orders

To create outputs e.g. report orders on a given date

To create interactive features e.g. buttons and menus

Query Processor

To create SQL queries

To search for data that meets set criteria, e.g. all orders for last week

To perform calculations e.g. the number of orders.

[5]

(vi) Write a Data Manipulation Language (DML) statement to change the EmployeeID as 4, where OrderID is 10444 in ExampleOrders. [UPDATE, SET, WHERE] Running code here

```
UPDATE ExampleOrders
SET EmployeeID = 4
WHERE OrderID = 10444;
```

[2]

(vii) Write a **Data Manipulation Language** (DML) statement to delete the record where OrderID is 10444 in the ExampleOrders table. [DELECT, WHERE] Running code here

```
DELETE FROM ExampleOrders
WHERE OrderID = 10444
```

[2]

(viii) Write a Date Manipulation Language (DML) statement to return CustomerID and OrderDate after 1996-07-04 and sort the records with **descending** order of CustomerID. [SELECT, FROM, ORDER BY, WHERE] Running code here

```
SELECT Customers.CustomerID, Orders.OrderDate
FROM Customers, Orders
Where Orders.OrderDate > '1996-07-04'
AND Customers.CustomerID = Orders.CustomerID
ORDER BY Customers.CustomerID DESC
```

[5]

Question 2

Unnormalized data - 0NF (ORDER TABLE)

Order ID	Customer	City	Province	Country	Product Code	Product Name	Product Price
5	Bill Jones	London	Greater London	UK	1	Table	US$ 50.00
					2	Desk	US$ 35.00
					3	Chair	US$ 20.00
8	Maria Torres	Barcelona	Catalonia	Spain	2	Desk	US$ 35.00
					7	Cupboard	US$ 70.00
14	Anne Smith	Chicago	Illinois	USA	5	Cabinet	US$ 60.00
2	Li Zhang	Suzhou	Jiangsu	China	7	Cupboard	US$ 70.00
					1	Table	US$ 50.00
					2	Desk	US$ 35.00

1NF

1NF (ORDER TABLE)

Order ID	Customer	City	Province	Country	Product Code	Product Name	Product Price
5	Bill Jones	London	Greater London	UK	1	Table	US$ 50.00
5	Bill Jones	London	Greater London	UK	2	Desk	US$ 35.00
5	Bill Jones	London	Greater London	UK	3	Chair	US$ 20.00
8	Maria Torres	Barcelona	Catalonia	Spain	2	Desk	US$ 35.00
8	Maria Torres	Barcelona	Catalonia	Spain	7	Cupboard	US$ 70.00
14	Anne Smith	Chicago	Illinois	USA	5	Cabinet	US$ 60.00
2	Li Zhang	Suzhou	Jiangsu	China	7	Cupboard	US$ 70.00
2	Li Zhang	Suzhou	Jiangsu	China	1	Table	US$ 50.00
2	Li Zhang	Suzhou	Jiangsu	China	2	Desk	US$ 35.00
Primary key would be Order ID + Product Code							

2NF

ORDER TABLE

Order ID	Product Code
5	1
5	2
5	3
8	2
8	7
14	5
2	7
2	1
2	2

PRODUCT TABLE

Product Code	Product Name	Product Price
1	Table	US$ 50.00
2	Desk	US$ 35.00
3	Chair	US$ 20.00
5	Cabinet	US$ 60.00
7	Cupboard	US$ 70.00

CUSTOMER TABLE

Order ID	Customer	City	Province	Country
5	Bill Jones	London	Greater London	UK
8	Maria Torres	Barcelona	Catalonia	Spain
14	Anne Smith	Chicago	Illinois	USA
2	Li Zhang	Suzhou	Jiangsu	China

3NF

ORDER TABLE

Order ID	Product Code
5	1
5	2
5	3
8	2
8	7
14	5
2	7
2	1
2	2

PRODUCT TABLE

Product Code	Product Name	Product Price
1	Table	US$ 50.00
2	Desk	US$ 35.00
3	Chair	US$ 20.00
5	Cabinet	US$ 60.00
7	Cupboard	US$ 70.00

Customer TABLE

Order ID	Customer	City
5	Bill Jones	London
8	Maria Torres	Barcelona
14	Anne Smith	Chicago
2	Li Zhang	Suzhou

City TABLE

City	Province	Country
London	Greater London	UK
Barcelona	Catalonia	Spain
Chicago	Illinois	USA
Suzhou	Jiangsu	China

Qeustion 3

The database In 3NF as follows:

Order (OrderID, ProductCode)
Product (ProductCode, ProductName, ProductPrice)
Customer (OrderID, Customer, City)
City (City, Province, Country)

(a) Create the entity-relationship (E-R) diagram for the database