Tutorial - Week 12

Exam Revision Questions

Note: points allocation may not match points allocation for a similar question in the exam.

Question 1 Normalisation

1A. The table shown below is part of an office inventory database. Identify the design problems and draw a revised table structure in 3rd Normal Form (3NF) that corrects those problems. For each step explicitly identify and discuss which normal form is violated.

(Key: PK = Bold FK = Italic PFK = Bold + Italic)

Inventory (**ItemID**, Description, Quan, Cost/Unit, **Dept**, Dept Name, Dept Head)

ItemID and **Dept** is the candidate key for this table.

* 2nd always create PFK

* 3rd always create PK

The following functional dependencies hold:

Dept ⟶ DeptName, DeptHead

ItemID ⟶ Description, Cost/Unit

Quantity, Cost/Unit ⟶ InventoryValue

ItemID	Description	Dept	Dept Name	Dept Head	Quantity	Cost/Unit	Inventory Value
4011	1.4m Desk	MK	Marketing	Jane Thompson	5	200	1000
4020	Filing Cabinet	MK	Marketing	Jane Thompson	10	75	750
4005	Executive chair	MK	Marketing	Jane Thompson	5	100	500
4036	1.2m Desk	ENG	Engineering	Ahmad Rashere	7	200	1400

Table 1. The Inventory table

(10 marks)

1B. Given the following relation (Inventory), and its functional dependencies - is it possible to demonstrate Armstrong's Axioms of Reflexivity, Augmentation and Transitivity?

Inventory (**ItemID**, Description, Quantity, Cost/Unit, **Dept**, DeptName, DeptHead(

ItemID and **Dept** is the candidate key for this table.

1NF

Department(Dept. DeptName. Depthead)
PK

Inventory (ItemID . Dept . Description, Quantity, Cost, ~~Inventory~~ value)
PK PK=K

2NF

Department(Dept. DeptName. Depthead)
PK

Item(ItemID . Description. Cost/unit)
PK

Inventory (ItemID . Dept . Quantity. ~~inventory value~~)
PFK PFK

Inventory value is

The following functional dependencies hold:

Dept ⟶ DeptName, DeptHead

ItemID ⟶ Cost/Unit

Quantity, Cost/Unit ⟶ InventoryValue

(6 marks)

Question 2 Transactions

A transaction is an indivisible unit of work. Explain what it means. Illustrate your explanation with writing a transaction that moves $500 from account number 324455 to account 783343.

Account table was created using the script below:

```
CREATE TABLE Account (AccNo int, AccountType char(10),
Balance decimal(10,2), PRIMARY KEY(AccNo));
```

To use a variable in SQL:

SET @name='John';

Assume that account balance is sufficient to withdraw $500.

(8 marks)

Question 3 Data Warehouse

3A. Transurban operates toll roads in Australia and the United States of America. Traffic data analysis helps determine road maintenance, RFID reader maintenance, gantry maintenance and capacity management to reduce inefficiencies in its tollway network.

Each part of the tollway is identified by a section (E3), and multiple sections (E1, E2, E3) make up a chunk, (C3) and multiple Chunks make up an entire roadway ("Eastlink"). Many different vehicles on toll roads every day. Each vehicle falls into one category: motorcycles, passenger vehicles, 4WD's, vans, trucks, prime movers, buses, trailers, recreational and miscellaneous machinery (e.g. tractors, cranes, street sweepers, back hoes).

Transurban's management wants to understand the vehicle trips on its road network. They need to understand the number of trips, trip length, trip duration.

Draw a *star schema* to support the design of this data warehouse, showing the attributes in each table. You do not need to select data types. Clearly display the legend for Primary Key, Foreign Key and Primary Foreign Key.

(8 marks)

3B. Why are star schemas preferred over relational database designs to support decision making?

(2 marks)

Question 4 Transactions

A company has a table of products. Table name is Grocery

ItemID	Brand	Description	Weight	CurrentPrice	RRP	PurchPrice
19337	DairyWorks	Edam Sliced Cheese	500 g	7.50	7.50	3.50
19348	DairyWorks	Tasty Sliced Cheese	500 g	7.50	7.50	3.50
19375	Bega	Tasty Cheese Slices	500 g	7.00	9.50	3.00

At the beginning of each new sale period Current prices are updated to either be the same as RRP or determined by discounts applied to RRP.

Write a transaction that removes all previous week's discounts (makes Current price the same as RRP) and then deducts 50 cents from RRP to create a current price for Sliced Cheese by DairyWorks brand.

```
start transaction;
update Grocey
set currentPrice = RRP;
set @discount = 0.5;
update Grocery
set currentPric = RRP - @discout
where Brand = 'DairyWorks' and Description like '% Sliced Cheese';
Commit;
```