EFREI 2006-2007

# Relational Database Management Systems : Exam

All documents allowed except books. 2 hours. Points given per question are indicative.

## *Exercise I : SQL Requests (8 points)*

The database of a car insurance company has the following schema, primary keys are underlined and foreign keys are in italic.

- CLIENT (ClientID, Name, Address, Age)
- VEHICLE(VehID, Type, Horsepower, Brand, Year)
- CONTRACT(ContractID, *ClientID*, *VehID*, Date, Nature, Coefficient, Bonus)
- ACCIDENT(AccidentID, *ContractID*, Date, Responsibility)

Answer the following requests in SQL :

1. Give the **Name** and **Age** of all clients which have no accident declared.

2. Produce a table with a field **Age** and a field **NumberAccidents** giving the number of accidents declared by persons of this age. Order by decreasing number of accidents.

3. Return the brand of vehicles that have less than 30 accidents declared.

4. What is the average **Bonus** of contracts (overall).

5. What is the average **Bonus** of contracts of young drivers (Ages 18 to 25).

6. Write the creation script for table **Contract**.

- Fixed length 5 character strings are used as ID,
- Date has the date type
- Nature is a string that may take one of the values : 'AR' Any risk, 'CR' civil responsibility, 'CRWD' civil responsibility and window damage, 'CRT' civil responsibility and theft.
- Coefficient is a percentage and bonus is a currency value expressed as euros and cents.

Do not forget primary and foreign key constraints.

7. Write a constraint to check that clients are aged 18 or more.

## *Exercise II : Design (8 points)*

The following schema represents part of a database intended to collect medical information for a healthcare organism. The data concerns policy-holders (clients), doctors who may be specialists or general practicioners, and consultations. Each policy-holder has a single referent doctor (attribute refDocID in table PolicyHolder).

- PolicyHolder(phID, name, adr, age, *refDocID*)
- Consultation(*phID*,*docID*,date)
- GeneralPrac(docID, name, adr)
- Specialist(docID, name, adr, specialty)

### Question 1

Can the schema store the information that (Answer by yes or no) :

1. A policy-holder has consulted several times with a given doctor the same day ?
2. A policy-holder consults other doctors than his referent doctor ?
3. The referent doctor of a policy-holder is a specialist ?

### Question 2

Create an entity relationship schema representing as accurately as possible this relational schema. Comment the schema as needed.

### Question 3

The database needs to be extended to take into account new information. Modify and extend the previous schema to represent the new facts that need to be stored :

- A specialist may have several specialties
- Each drug prescribed has an identifier, a name, a name of active ingredient, a price and a reimbursement ratio
- Drugs are prescribed by doctors during a consultation
- A prescription indicates the number of doses per day, and the duration of the treatment

### Question 4

Apply translation rules to derive a relational schema for the database from your answer at question 3.

## *Exercise III : Database technology (4 points)*

Answer precisely the following questions (max 5 lines per answer).

### Question 1 :

What is a trigger ? In what context(s) can it be useful ?

### Question 2 :

How does one interact with a database from within a program ? Describe how it is done from your favourite programming language.

### Question 3 :

How is the administrative data (users, privilege, settings…) stored and maintained in an Oracle database ? Give some examples.

### Question 4 :

What conditions need to be met create a new table ? To update an existing table ?

### Question 5 :

Describe the nature and role of an index in a database.