Re-Exam IIS/Databases
July 15th, 2010
14-17 PM

Remarks:
-Write readably and clear, using a black or blue pen.
-You may offer your answers in Dutch or in English.
-Write at the top of the first page all relevant data, such as your name, studentnumber, affiliation (TM, TBK, or INF), and the total number of pages.
-Number all of your pages!
-The exam is "closed book"
-Always motivate your answers!

Question1 (ORM modelling, R-Map; 60 points)

Our Universe of Discourse (UoD) pertains to an information system (IS) used by a medical clinic to maintain details about its patients, their treatment plans, and their medication, and costs. Most patients (but not all) are sent to the clinic by their GP (general practitioner), in order to follow a cure for some disease. A GP has a name and a contact code. For each cure, we register the entrance date, the supervising doctor (exactly one), and the associated diagnosis. Each diagnosis is associated to at most one treatment plan, and each treatment plan is headed by exactly one nurse. Supervising doctor and nurse, are both uniquely identified by name, building number and department. A treatment plan consist of one or more treatment sessions. For each treatment session, we keep track of the treatment date, the progress, and the number of previously completed sessions. Also, for each treatment session, we record a separate invoice, involving the cost of the treatment session, and for an invoice we also register whether the invoice has been sent to the Insurance company of the patient being treated. A treatment plan prescribes one or more recipes. Each recipe has a number and a date. A recipe consists of a number of recipe items. A recipe item consists of a description of a certain pill type, along with the quantity of pills to be issued. Each pill type has a certain unit price, and each recipe item records a subtotal of costs for the issued pills. For each recipe we also record the total price of all items prescribed. For each cure we also keep track of the total cost of that cure, consisting of the cost of all treatment sessions and recipes involved in that cure.

(i) Construct an ORM model of the UoD as described above. Make systematic use of the CSDP method for constructing the model. Make sure that you capture all relevant constraints, and describe them accurately in the model.

(ii) Map the ORM model to a relational schema by using the R-Map procedure.

Question 2 (SQL)

Consider the following relational schema

```
Student(Id:Integer, Name:String, Address:String)
Lecturer(Id:Integer, Name:String, DepartmentId:String)
Course(Code:String, DepartmentId:String, CourseName:String)
CourseResult(StudentId:Integer, CourseCode:String, Semester:String,
Grade:Integer)
Lecture(LecturerId:String, CourseCode:String, Semester:String)
```

where `StudentId`, `LecturerId`, and `CourseCode`, are the respective foreign keys for the tables `Student`, `Lecturer`, and `Course`.

Offer SQL-solutions for the following queries and/or updates:

a. For each lecturer, give the number of students that passed some course given by that lecturer.
b. Give all students that have never followed the course with course code "DATABASES 1".
c. Give all names and addresses of students that have followed at least one course given by a lecturer from the department "FEB".
d. Update the result of the course with course code "DB1" to the grade "6", for all those students that followed course "DB1" in semester "2010-2.1" and had achieved the grade "5" for that course.