FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO
Integrated Master in Informatics and Computing Engineering

Database Technology

Lab assignment nº 2

OBJECT RELATIONAL ASSIGNMENT

ASSIGNMENT GOALS

Think about the possibilities open by the object-relational schema, with respect to the relational schema, namely the use of user defined types, with objects combining data structures and the functions to manipulate them, inheritance, nested tables and vectors, object references and comparison and sorting methods. Develop a small illustrative database.

TEAM

The assignment must be executed by teams of one or two elements.

SUBJECT

The situation is about recording the teaching service of professors giving classes in courses. It is described from the relational model of a database that you will use as source to populate the Object Relational model you will design. The tables of the relational database are available in the user GTD10 in the Oracle server (connection: BD, user: <user>, password: <pass>, host: oraalu.fe.up.pt, port: 1521, SID: ALU).
There are courses (table XUCS), described by a code (codigo), a designation (designacao), an acronym (sigla_uc) and a program (curso). Courses have occurrences in several years. Each occurrence is recorded by a row in the table XOCORRENCIAS, with information on the course code (codigo), academic year (ano_letivo), period of classes (periodo, that may be A- annual, 1S- first semester, 1T- first trimester, etc.), number of enrolled students (inscritos), students with distributed assessment (com_frequencia), number of approved (aprovados), course goals (objetivos) and content (conteudo), and department in charge (departamento). Each occurrence may have one or more class types (T-theoretic, P-practical, L-laboratory, TP- theoretic/practical, OT- tutorial guidance). Each class type for an occurrence is recorded on table XTIPOSAULA with the number of similar classes (turnos), the number of week hours for each class (horas_turno), and in some cases the number of weekly classes (n_aulas).
The table XDSD records the teaching service distribution, in each semester, for each professor. More specifically, it records, for each class type of an occurrence, how many weekly hours are assigned to that professor. If a professor is teaching, in a single class, more than one course at the same time, for example from different programs, the weight of that course, in the perspective of the professor, may be less than 1 and recorded in attribute fator. Otherwise, the attribute fator will be 1. From the program perspective, the attribute fator is ignored. The attribute ordem enables listing the set of professors of a specific course occurrence in a specific order.
The professors are recorded in the table XDOCENTES with a number (nr), a name (nome), an acronym (sigla), a category code (categoria), a given name (proprio), a family name (apelido), and a status (estado: A-active, NA-non active, R-retired).

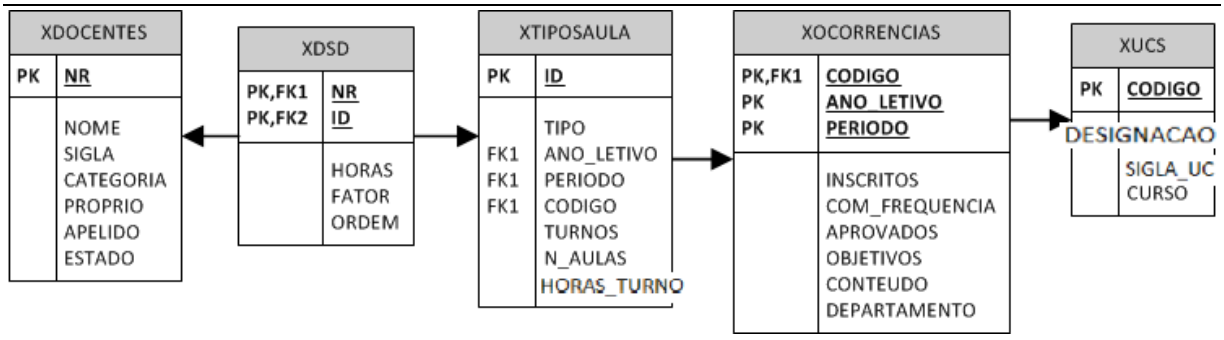

Figure 1 – Relational model for the case Teaching Service.

1) Design an object-relational data model for this situation, exploiting the SQL3 extensions. The model may be drawn schematically and then in actual DDL and implemented.
2) Populate the object relational model with the data in the relational database.
3) Add some methods that may be useful for some common SQL queries.
4) Execute some queries on the OR DB.
   a) How many class hours of each type did the program 233 got in year 2004/2005?
   b) Which courses (show the code, total class hours required, total classes assigned) have a difference between total class hours required and the service actually assigned in year 2003/2004?
   c) Who is the professor with more class hours for each type of class, in the academic year 2003/2004? Show the number and name of the professor, the type of class and the total of class hours times the factor.
   d) Which is the average number of hours by professor by year in each category, in the years between 2001/2002 and 2004/2005?
   e) Which is the total hours per week, on each semester, that an hypothetical student enrolled in every course of a single curricular year from each program would get.
   f) Add a query that illustrates the use of OR extensions.