Exercise 2 "Implementation of Databases"
Due until Tuesday, 2nd of May 2006 (before lecture) SS 06

2.1 SQL

Given are the following relations from a games database:

- **published** with attributes *game* and *publisher*, which contains the publishers of each game.
  \[ \text{published} = \{\text{game}, \text{publisher}\} \]
- **designed** with attributes *game* and *designer*, which contains the designers of each game.
  \[ \text{designed} = \{\text{game}, \text{designer}\} \]
- **reviewed** with attributes *game* and *reviewer*, which contains the reviewers of each game.
  \[ \text{reviewed} = \{\text{game}, \text{reviewer}\} \]

Every relation represents a n:m-relationship, i.e. the key is formed by all attributes of the relation.

Define the following queries as expressions in SQL:

- a) Find all designers of the game “Tetris”.
- b) Find all publishers of all games designed by “Schmidt”.
- c) Find all designers who have designed more than two games.
- d) Find all reviewers who have reviewed at least one game that has not yet been published.

2.2 Tuple and Domain Calculus, Relational Algebra

- a) Represent the queries of the exercise 2.1 using the tuple and domain calculus formalisms.
- b) Define the queries of the exercise 2.1 as expressions in Relational Algebra.

2.3 DPNF Transformation

Transform the following query in DPNF using the transformation rules given in the lecture notes (section 2.3). Then generate an expression in relational algebra from the DPNF:

\[
\langle c.\text{name}\rangle \text{ OF EACH } c \in \text{COURSE}: \\
\quad (c.\text{quota} > 35) \text{ AND} \\
\quad \text{(SOME } p \text{ in PROF, SOME } s \text{ in STUDENT:} \\
\quad \quad (c.\text{teacher}=p.\text{id}) \text{ AND}
\]
NOT (SOME a in ATTENDS
    (a.course=c.id AND a.student=s.id)))