



Exercise Sheet 6: Relational Algebra (until Thursday 08.12.2011)

Please note that you need **50%** of all exercise points to receive the “Studienleistung”. Exercises have to be turned in until **Thursday** of each respective week and must be completed in teams of two students each. You may hand in your solutions either on paper **before the lecture** or into the mailbox at the IFIS floor (Mühlenpfordtstraße 23, 2nd floor). Please do not forget your “Matrikelnummer” and your tutorial group number on your solutions. Your solutions may be in German or English. Please note: To pass the “RDB I Modul” you need the exercise points and the exam!

Database Schema

The following database schema stores information about movies and all participating people. The *Movie* relation includes an id, the movie title, the year of publication, the country where the movie was produced, its box-office takings, and a type (e.g. cinema or TV). A person is identified by an id, has a name, a sex and a birthdate. The *Plays* relation contains all actors with their respective roles. The *Crew* relation contains people attending in the respective movie, e.g. as a director or producer (type='director' ,...). Furthermore, each movie is associated with a number of genres in the *Has_Genre* relation.

Movie (mid, title, year, country, box_office_takings, type)

Person (pid, name, sex, birthdate)

Crew(person → Person, movie → Movie, type)

Plays (person → Person, movie → Movie, role)

Has_Genre(movie → Movie, genre → Genre)

Genre(name, description)

Exercise 6.1 (15 points)

- Show a list of all movies (title) that were produced in 'Japan' in 2005. (1 point)
- Show the titles of all movies having a role 'teacher'. (1 point)
- How many action movies have been produced in Germany between 1980 and 2000? (2 points)
- Show the names of all people that participated in the same movie as a director and also as an actor. (2 points)
- Which actors (name) played in more than two movies from 'Peter Jackson' (director), but never played a 'Hobbit' (role)? (4 points)
- Show a list of all people (name) that includes the number of movies they have participated in as an actor. Of course, the list should also include all people that have never participated in a movie as an actor. (2 points)
- Show a list of all female actors (name) whose box-office takings exceeded 10.000.000 \$ regarding all their movies from 1995. (3 points)

Exercise 6.2 (4 points)

- a) Prove the correctness of the following expression or find a counter-example (NULL values are not allowed): For all relations R and S which have at least one attribute A holds: (3 points)

$$\pi_A(R \cap S) = \pi_A(R) \cap \pi_A(S)$$

- b) How can you rewrite the statement $R \times S$ using the basic operators of relational algebra? (1 point)