

Course A7B36DBS: **Database Systems**

Practice 05:

# **Relational Algebra and Relational Calculi**

**Martin Svoboda**

Faculty of Electrical Engineering, Czech Technical University in Prague

# Assignments

# Database Schema

- Assume the following relational database schema

**Student**(id, name, address)

**Teacher**(id, name, phone, department)  
department  $\subseteq$  Department(name)

**Department**(name, chair)  
chair  $\subseteq$  Teacher(id)

**Course**(code, title, annotation)

**Dependency**(course, requisite)  
course  $\subseteq$  Course(code), requisite  $\subseteq$  Course(code)

**Schedule**(course, teacher, semester, day, time, room)  
course  $\subseteq$  Course(code), teacher  $\subseteq$  Teacher(id), room  $\subseteq$  Room(number)

**Room**(number, building, capacity)

**Enrollment**(student, semester, course, result)  
student  $\subseteq$  Student(id), course  $\subseteq$  Course(code)

# Exercise 1

- Express the following query in RA, DRC and TRC
  - Teachers from department with a name *KS/*

## Exercise 2

- Express the following query in RA, DRC and TRC
  - Names of teachers from all departments that have *Tomas Skopal* as a department chief

# Exercise 3

- Express the following query in RA, DRC and TRC
  - Codes and titles of all courses that are taught on *Mondays* or *Fridays* during this semester (2015-1)

# Exercise 4

- Express the following query in RA, DRC and TRC
  - Codes and titles of all courses that are not taught on *Mondays* and nor on *Fridays* during this semester (2015-1)

# Exercise 5

- Express the following query in RA, DRC and TRC
  - Names and ids of all students that have no enrolled course in this academic year (semesters *2015-1* and *2015-2*)



# Exercise 6

- Express the following query in RA, DRC and TRC
  - Names of students that have enrolled at least one course taught by someone from *KS/* department (regardless a particular semester)

# Exercise 7

- Express the following query in RA, DRC and TRC
  - Names of teachers who have conflicts in their planned schedules for the next semester (*2015-2*)
    - Two scheduled events are in a conflict with each other if and only if...
      - they have overlapping times, but also
      - when there is less than 10 minutes for a break / 45 minutes for a transfer in case of events scheduled within the same / in different buildings respectively
    - Assume that...
      - each schedule event is expected to be 90 minutes long
      - you can use a standard subtraction operator ( $-$ ) on times and expect to get a difference in a number of minutes

# Exercise 8

- Express the following query in RA, DRC and TRC
  - Names of students that are enrolled only in courses taught by teachers from *KSI* during this semester
    - Assume only students with at least one enrolled course

# Exercise 9

- Express the following query in RA, DRC and TRC
  - Names of students that are enrolled in all the courses taught by teachers from *KSI* during this semester
    - Assume only students with at least one enrolled course