Courses B0B36DBS, A7B36DBS: **Database Systems**

Practical Class 12:

Relational Algebra

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Exercises

- Assume the following relational database schema

Student(id, name, address)

Teacher(id, name, phone, department)
department ⊆ Department(name)

Department(name, chair)
chair ⊆ Teacher(id)

Course(code, title, annotation)

Dependency(course, requisite)
course ⊆ Course(code), requisite ⊆ Course(code)

Schedule(course, teacher, semester, day, time, room)
course ⊆ Course(code), teacher ⊆ Teacher(id), room ⊆ Room(number)

Room(number, building, capacity)

Enrollment(student, semester, code, result)
student ⊆ Student(id), code ⊆ Course(code)

Exercise 1

- Express the following query in RA
  - **Names of teachers from department *KSI***

Teacher(<u>id</u>, name, phone, department)
department ⊆ Department(name)

Department(<u>name</u>, chair)
chair ⊆ Teacher(id)

Exercise 2

- Express the following query in RA
  - **Study results of a student with identifier *4301* within the previous semester (*161*)**
    - Return course codes, titles, and the actual results
    - Order the rows according to the actual study results and then also course names in descending order

Student(<u>id</u>, name, address)

Course(<u>code</u>, title, annotation)

Enrollment(<u>student, semester, code</u>, result)
student ⊆ Student(id), code ⊆ Course(code)

Exercise 3

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

Teacher(<u>id</u>, name, phone, department)
department ⊆ Department(name)

Department(<u>name</u>, chair)
chair ⊆ Teacher(id)

Exercise 4

- Express the following query in RA
  - **Codes and titles of all courses that are taught on *Mondays* or *Fridays* during this semester (*162*)**

Course(<u>code</u>, title, annotation)

Schedule(course, <u>teacher, semester, day, time</u>, room)

course ⊆ Course(code), teacher ⊆ Teacher(id), room ⊆ Room(number)

Exercise 5

- Express the following query in RA
  - **Codes and titles of all courses that are not taught on *Mondays* and nor on *Fridays* this semester (*162*)**

Course(<u>code</u>, title, annotation)

Schedule(course, <u>teacher, semester, day, time</u>, room)

course ⊆ Course(code), teacher ⊆ Teacher(id), room ⊆ Room(number)

Exercise 6

- Express the following query in RA
  - **Students without any enrolled course this year (semesters *161* and *162*)**
    - Return student names and addresses

Student(<u>id</u>, name, address)

Enrollment(<u>student, semester, code</u>, result)
student ⊆ Student(id), code ⊆ Course(code)

Exercise 7

- Express the following query in RA
  - **Identifiers of students who have enrolled in all the courses that are taught during this semester *(162)***

Schedule(course, <u>teacher, semester, day, time</u>, room)
course ⊆ Course(code), teacher ⊆ Teacher(id), room ⊆ Room(number)

Enrollment(<u>student, semester, code</u>, result)
student ⊆ Student(id), code ⊆ Course(code)

Exercise 8

- Express the following query in RA
  - **Names of teachers who have time conflicts in their schedules for the next semester (*171*)**
    - Two events are in a conflict 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
    - Each event is 90 minutes long

Teacher(<u>id</u>, name, phone, department)
department ⊆ Department(name)

Schedule(course, <u>teacher, semester, day, time</u>, room)
course ⊆ Course(code), teacher ⊆ Teacher(id), room ⊆ Room(number)

Room(<u>number</u>, building, capacity)