

Tutorial 2: Relational algebra

- (1) Consider the database DB with three relations EMPL, MANAGING and JUNIORS in Tutorial 1. Evaluate the following RA expressions on DB.

$$\begin{aligned}
 e_1 &:= \pi_2(\text{EMPL}) \\
 e_2 &:= \text{EMPL} \bowtie_{1=1} \text{JUNIORS} \\
 e_3 &:= \pi_1(\text{EMPL}) - \text{JUNIORS} \\
 e_4 &:= \left(\text{EMPL} \bowtie_{1=1} \text{MANAGING} \right) \bowtie_{4=1} \text{EMPL} \\
 e_5 &:= \pi_2(\text{EMPL}) - \pi_2\left(\text{EMPL} \bowtie_{1=2} \text{MANAGING} \right)
 \end{aligned}$$

- (2) Write down the RA expressions that result in the following.
- (a) The names of all the junior employees.
 - (b) The names of the employees that are managed by somebody.
 - (c) The names of the employees that are *not* managed by anybody.
 - (d) The names of the employees that manage somebody in the *same* department.
 - (e) The names of the employees that manage somebody in *different* department.
- (3) Describe an algorithm for the following problem.

Input: An RA expression e and a database DB.

Task: Compute $e(\text{DB})$.