

Lab 1(Databases) Mukhit Nassyrov

1. Consider the employee database of figure below. Give an expression in the relational algebra to express each of the following queries:

*employee (person_name, street, city)
works (person_name, company_name, salary)
company (company_name, city)*

Figure

- Find the ID and name of each employee who works for “BigBank”.
- Find the ID, name, and city of residence of each employee who works for “BigBank”.
- Find the ID, name, street address, and city of residence of each employee who works for “BigBank” and earns more than \$10000.
- Find the ID and name of each employee in this database who lives in the same city as the company for which she or he works.

1.

- $\prod_{ID, person_name} (\sigma_{company_name = "BigBank"}(works))$
- $\prod_{ID, person_name, city} (\sigma_{company_name = "BigBank"}(works \bowtie employee))$
- $\prod_{ID, person_name, street, city} (\sigma_{company_name = "BigBank"} \wedge salary > 10,000(works \bowtie employee))$
- $\prod_{ID, person_name} (works \bowtie employee \bowtie company)$

2. Consider the employee database of figure above. Give an expression in the relational algebra to express each of the following queries:

- Find the ID and name of each employee who does not work for “BigBank”.
- Find the ID and name of each employee who earns at least as much as every employee in the database.

2.

- $\prod_{ID, person_name} (\sigma_{company_name \neq "BigBank"}(employee \bowtie works))$
- $E1 = \prod_{ID, person_name, salary}(works), E2 = \prod_{ID, person_name, salary}(works).$
 $\prod_{ID, person_name}(works - (E1 \bowtie_{salary < salary} E2))$

3. Consider the foreign-key constraint from the *dept_name* attribute of instructor to the *department* relation. Give examples of inserts and deletes to these relations that can cause a violation of the foreign-key constraint.

3.

If we try to insert tuple to instructor relation that has value of attribute *dept_name* that does not exist in department relation or delete some *dept_name* from department realtion, it can cause a violation.

For example, assume that department relation has values Physics, Math, Music of attribute *dept_name* and we try to insert some row with key Healthcare of attribute *dept_name*. If we delete Math from department relation and if some row has key Math of *dept_name*.

4. Consider the employee database of figure above. What are the appropriate primary keys?

4.

I think {ID} would be very appropriate, also {ID, person_name} would be good.