

## Laboratory work №1

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*)

- 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.

**Answer:**

1)  $\pi_{ID, person\_name} (\sigma_{company\_name = "Big Bank"} (works))$

2)  $\pi_{ID, person\_name, city} (\sigma_{company\_name = "Big Bank"} (employee \times works))$

3)  $\pi_{ID, person\_name, street, city} (\sigma_{company\_name = "Big Bank" \wedge salary > 10000} (works \times employee \times company))$

4)  $\pi_{ID, person\_name} (\sigma_{company.city = employee.city} (employee \times company))$

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 the name of each employee who earns at least as much as every employee in the database.

**Answer:**

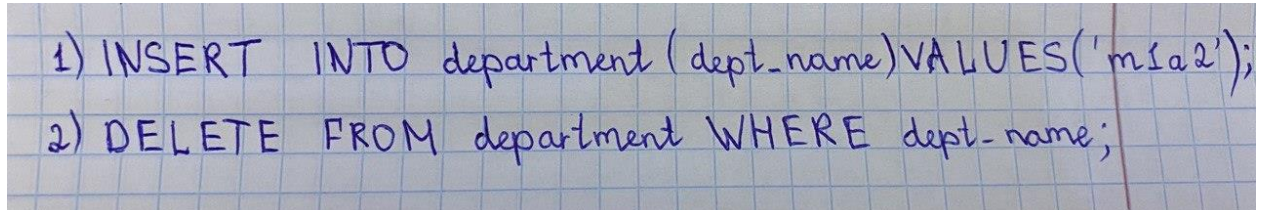
1)  $\pi_{ID, person\_name} (\sigma_{\neg company\_name = "Big Bank"} (works))$

2)  $\pi_{ID, person\_name} (\sigma_{salary = \max(salary)} (works))$

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.

**Answer:**

We can insert a row with non-existing department to the instructor relation and delete some row from department relation.



1) INSERT INTO department (dept\_name) VALUES ('m1a2');  
2) DELETE FROM department WHERE dept\_name;

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

**Answer:**

Conditionally we have an ID on the database “employee”, therefore ID will be primary key, otherwise person\_name.