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*)

Figure

• Find the ID and name of each employee who works for “BigBank”.

$\Pi_{person.ID,\ person\_name}\ (\sigma_{company\_name=\text{“BigBank”}}\ (works)\ )$

• Find the ID, name, and city of residence of each employee who works for “BigBank”.

$\Pi_{person.ID,\ person\_name,\ person\_city}\ (\sigma_{company\_name=\text{“BigBank”}}\ (works\ X\ employee))$

• Find the ID, name, street address, and city of residence of each employee who works for “BigBank” and earns more than $10000.

$\Pi_{person.ID,\ person\_name,\ street,\ person\_city}\ (\sigma_{company\_name=\text{“BigBank”}}\ \Lambda\ _{salary\ >\ 10000\$}\ (works\ X\ employee))$

• 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.

$\Pi_{person.ID,\ person\_name}\ (\sigma_{employee\_city\ =\ company\_city}\ (company\ X\ employee))$

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”.

$\Pi_{person.ID,\ person\_name}\ (\sigma_{company\_name\ \neq\ \text{“BigBank”}}\ (works\ X\ employee))$

• Find the ID and name of each employee who earns at least as much as every employee in the database.

$\Pi_{person.ID,\ person\_name}\ (\sigma_{company\_name \neq \text{“BigBank”}}\ (works\ X\ employee))$

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.

instructor(ID, name, **dept name**, salary)
department(dept name, building, budget)

* insert to Instructor table:
(001452, Jack,Pysics, 550000)

where the department table does not have the department Pysics, would violate the foreign-key constraint.

* delet from department table:
(Math, California, 4200000)

where at least one instructor tuple has dept_name as Math, would violate the foreign-key onstraint.

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

employee (person name, street, city)
works (person name, company name, salary)
company (company name, city)