Lab work 1

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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”.

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

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

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

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

$\Pi_{person.ID,\ person\_name,\ street,\ person\_city}\ (\sigma_{\ company\_name="BigBank"}\ \Lambda_{salary\ >\ 10000\$}(works\ X\ employee))$

• 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)