Laboratory work 1

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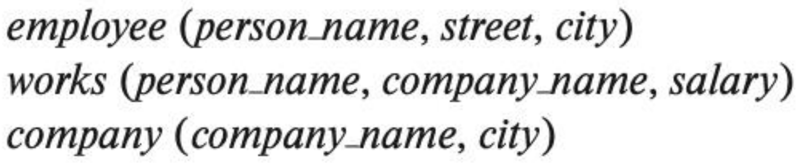
1. Consider the employee database of figure below. Give an expression in the relational algebra to express each of the following queries:



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”.

- 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.

Solutions:

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

2)$\Pi_{id,person\_name,city}(\sigma_{company\_name=\text{“BigBank”}}(employee \bowtie_{\text{employee.id=works.id}} works))$

3)$\Pi_{id,person\_name,street,city}(\sigma_{company\_name=\text{“BigBank”} \wedge \text{ salary>10000}}(employee \bowtie_{\text{employee.id=works.id}} works))$

4)$\Pi_{id,person\_name}(\sigma_{employee.city=company.city \wedge employee.id=works.id \wedge works.company\_name = company.company\_name}(employee \times works \times company))$

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

Solutions:

1)$\Pi_{id,person\_name}(\sigma_{company\_name\ \text{!="BigBank"}}(works))$

2) $\Pi_{id,person\_name}(\sigma_{works.salary \geq avg(works.salary)}(employee \bowtie_{\text{employee.id=works.id}} works))$

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.

Would cause a violation of the foreign-key constraint:

1) By inserting new data(tuple), namely, new dept_name into the instructor relation, that doesn't exist in referencing dept_name of the department relation.

2)By deleting data(tuple) that consists referencing dept_name of the department relation, that exists in referenced dept_name of the instructor relation.

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

1)In the employee relation the super keys are {id}, {id, person_name}. The candidate key is {id}, so we can conclude that the appropriate primary key is {id}.

2)In the works relation the super keys are {id}, {id, person_name}, {id, person_name, company_name}. The candidate key is {id}, so we can conclude that the appropriate primary key is {id}.

3)In the company relation the super keys are {company_name}, {company_name, city}. The candidate key is {company_name}, so we can conclude that the appropriate primary key is {company_name}.