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Lab 1

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

*employee (id, person\_name, street, city)*

*works (id, person\_name, company\_name, salary)*

*company (company name, city)*

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

π (id, person\_name

(σ(works.company\_name = “BigBank”)works)))

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

π (id, person\_name, city

(employee ⋈ employee.id = works.id

(σ(company\_name = “BigBank”)works)))

1.3 Find the ID, name, street address, and city of residence of each employee who works for “BigBank” and earns more than $10 000.

π (id, person\_name, city, street

(σ(company\_name = “BigBank” ^ salary > 10000)

works.id ⋈ employee.id)))

1.4 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.

π (id, person\_name

(σ(employee.city = company.city)

employee ⋈ works ⋈ company))

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

2.1 Find the ID and name of each employee who does not work for “BigBank”.

π (id, person\_name

(σ(works.company\_name **≠** “BigBank”)works)))

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

π (id, person\_name

(σ(salary1 > salary2)works.id ⋈ employee.id))

1. 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.

Inserting a tuple (34, Marty, IT, 10000) into the instructor table, where the department table does not have the department IT, would violate the foreign key constant

Deleting the tuple (gas industry, Joey, 8000) from the department table, where at least one student or instructor tuple has dept\_name as gas industry, would violate the foreign key constraint .

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

*employee (id, person\_name, street, city)*

*works (id, person\_name, company\_name, salary)*

*company (company name, city)*

*Employee* primary keys: *id, person\_name, street*

*Works* primary keys: *salary*

*Company* primary keys: *company\_name, city*