Lab 1

* Find the ID and name of each employee who works for "BigBank".

Answer:

$$\Pi_{E.person\_name}\left(\rho_{(E)}\,employee \bowtie \left(\alpha_{c.company\_name = "BigBank"}\left(\rho_{(c)}\,works\right)\right)\right)$$

* Find the ID, name, and city of residence of each employee who works for "BigBank".

Answer:

$$\Pi_{E.person\_name,\ city}\left(\rho_{(E)}\,employee \bowtie \left(\alpha_{c.company\_name = "BigBank"}\left(\rho_{(s)}\,works\right)\right)\right)$$

* Find the ID, street, address, and city of residence of each employee who works for "BigBank" and earns more than $10,000.

Answer:

$$\Pi_{E.person\_name,\ street,\ city}\left(\rho_{(E)}\,employee \bowtie \left(\alpha_{(c.company\_name = "BigBank") \wedge (salary > 10000)}\left(\rho_{(s)}\,works\right)\right)\right)$$

* 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;

$$\Pi_{E.person\_name}\Big(\big((E.person\_name = C.person\_name) \wedge (C.company\text{-}name = \omega.company\text{-}name) \wedge (E.city = \omega.city)\big)\big(\rho_{(E)}\, employee \times \rho(C)\, works \times \rho(\omega\ Company)\big)\Big)$$

2. Consider the employees 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 earns at least as much as every employee in the database.

Answer:

$$\Pi_{E.person\_name}(employee) - \Pi_{A.Id,\, A.person\_name}\big(employee \times employee.Id\, \rho\, A(work) \times A.salary < B.Salary\, \rho\, B(work)\big)$$

3- consider the foreign-key constraint from the dept_name attribute of instructor to the department relation. Give example of inserts and deletes to these relations that can cause a violation of the foreign-key constraint.

Answer:

Now, example of operations which violate the foreign key constraint:

- when inserting a record:

Consider the case when the department relations does not have any record for History. Now while inserting the below record in the instructor relation violates the foreign key constraint.

(1101, Maiwand Alozi, History, 110000)

- when deleting a record:

Consider the case when the instructor relation contains one or more records with dept_name as Math, now while deleting the below record from the department relation violates the foreign key constraint

(Math, Ahmad Jan, 123000)

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

Answer:

* Here most appropriately in relation employee person_name can be set as a primary key, because street and city will be same for more employees.

* In relation works also person-name is appropriate primary key because multiple person can work ok same company and multiple person can have same salary, so person-name is appropriate primary key.

* In relation company-name is appropriate primary key because multiple companies can present in same city. So we can choose company-name as a primary key for this entity.