

Laboratory work 1

Aidana Kinesova 20B030705

1.

- $\prod \text{id, person_name } (\sigma_{\text{company_name} = \text{"BigBank"}} (\text{works}))$
- $\prod \text{employee.id, employee.person_name, city } (\sigma_{\text{company_name} = \text{"BigBank"} \wedge \text{employee.id} = \text{works.id}} (\text{employee x works}))$
 $(\prod \text{employee.id, employee.person_name, city } (\sigma_{\text{employee.id} = \text{works.id}} (\text{employee x } (\sigma_{\text{company_name} = \text{"BigBank"}} (\text{works}))))))$
- $\prod \text{employee.id, employee.person_name, street, city } (\sigma_{\text{company_name} = \text{"BigBank"} \wedge \text{salary} > 10000} (\sigma_{\text{works.id} = \text{employee.id}} (\text{works x employee})))$
 $(\prod \text{employee.id, employee.person_name, street, city } (\sigma_{\text{employee.id} = \text{works.id}} (\text{employee x } (\sigma_{\text{company_name} = \text{"BigBank"} \wedge \text{salary} > 10000} (\text{works}))))))$
- $\prod \text{employee.id, person_name } (\sigma_{\text{company.city} = \text{employee.city}} (\text{company x employee}))$
 $\prod \text{employee.id, employee.person_name } (\sigma_{\text{employee.city} = \text{company.city}} (\sigma_{\text{employee.id} = \text{works.id}} (\text{employee x } (\sigma_{\text{works.company_name} = \text{company.company_name}} (\text{works x company}))))))$
 $(\prod \text{employee.id, employee.person_name } (\sigma_{\text{employee.city} = \text{company.city} \wedge \text{employee.id} = \text{works.id} \wedge \text{works.company_name} = \text{company.company_name}} (\text{employee x works x company})))$

2.

- $\prod \text{employee.id, employee.person_name } (\sigma_{\text{works.id} = \text{employee.id}} (\text{employee x } (\sigma_{\text{company_name} \neq \text{"BigBank"}} (\text{works}))))$
 $(\prod \text{id, person_name } (\sigma_{\text{company_name} \neq \text{"BigBank"}} (\text{works})))$

- $\Pi_{\text{employee.id, employee.person_name}} (\sigma_{\text{salary} \geq \text{avg}(\text{salary})} (\sigma_{\text{employee.id} = \text{works.id}} (\text{employee} \times \text{works})))$
 $(\Pi_{\text{id, person_name}} (\sigma_{\text{salary} \geq \text{avg}(\text{salary})} (\text{works})))$

3.

For example we will consider that we don't have dept_name "Programming" in department relation. And if we will try to insert (01101, Aidana, Programming, 100000) we will get violation of the foreign key constraint.

Also with delete operation. If we will delete this tuple -> (01101, Aidana, Programming, 100000) from department relation, we will get violation of the foreign key constraint.

4.

Superkey K is a candidate key if K is minimal.

One of the candidate keys is selected to be the primary key.

In our case from employee relation we can choose primary key if in employee relation several candidate keys. If ID, person_name, street, city are individually candidate keys, then we can just choose one of them as our primary key. For example: ID. (primary key of works -> ID, company -> company_name).