

SCHOOL OF SOFTWARE, TSINGHUA UNIVERSITY

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# Computer System Software(2)

## *Relational Model*

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## I. PROBLEM 1

Find the names of all employees who work for "First Bank Corporation".

$$\Pi_{person\_name}[\sigma_{company\_name="First Bank Corporation"}(works)]$$

## II. PROBLEM 2

Find the names of all employees in this database who do not work for "First Bank Corporation".

$$\Pi_{person\_name}(works) - \Pi_{person\_name}[\sigma_{company\_name="First Bank Corporation"}(works)]$$

## III. PROBLEM 3

Find the names of all employees who live in the same city and on the same street as do their managers.

$$T \leftarrow \sigma_{employee1.person\_name=manages.person\_name, employee2.person\_name=manages.manager\_name}(employee \times manages \times employee)$$

$$\Pi_{employee1.person\_name}[\sigma_{employee1.city=employee2.city, employee1.street=employee2.street}(T)]$$

## IV. PROBLEM 4

Find the names of all employees who earn more than every employee of "Small Bank Corporation".

$$T \leftarrow \sigma_{company\_name="Small Bank Corporation"}(works)$$

$$\Pi_{works.person\_name}(works) - \Pi_{works.person\_name}[\sigma_{T.salary > works.salary}(T \times works)]$$

## PROBLEM 5

Find the names and cities of residence of all employees who work for "First Bank Corporation".

$$T \leftarrow \sigma_{employee.person\_name=works.person\_name}(employee \times works)$$

$$\Pi_{employee.person\_name, employee.city} \sigma_{works.company\_name="FirstBankCorporation"}(T)$$

## V. PROBLEM 6

Find the names, street addresses, and cities of residence of all employees who work for "First Bank Corporation" and earn more than \$10,000.

$$T \leftarrow \sigma_{employee.person\_name=works.person\_name}(employee \times works)$$

$$S \leftarrow \sigma_{works.company\_name="FirstBankCorporation", works.salary > 10000}(T)$$

$$\Pi_{employee.person\_name, employee.street, employee.city}(S)$$

## VI. PROBLEM 7

Find the names of all employees in this database who live in the same city as the company for which they work.

$$T_1 \leftarrow \sigma_{employee.person\_name=works.person\_name}(employee \times works)$$
$$T_2 \leftarrow \sigma_{employee.city=company.city} \sigma_{T_1.company\_name=company.company\_name}(T_1 \times company)$$
$$\Pi_{employ.person\_name}(T_2)$$

## VII. PROBLEM 8

Assume the companies may be located in several cities. Find all companies located in every city in which "Small Bank Corporation" is located.

$$T \leftarrow \sigma_{company\_name="SmallBankCorporation"}(company)$$
$$\Pi_{T.company\_name} \sigma_{T.city=company.city}(T \times company) \bowtie company$$