SCHOOL OF SOFTWARE, TSINGHUA UNIVERSITY

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.

$T \leftarrow \sigma_{company\_name="SmallBankCorporation"}(company)$

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