Notes: ∪ : union

$\pi_{A_1,\dots A_n}(R)$ Select $A_1,\dots A_n$ from R ;

∩ : intersection

$\sigma_{bar="Joe's"}(Sells)$ Select * from R where bar = "Joe's";

- : difference.

$R \times S$ Cross product

Bar Info := Sells $\bowtie_{Sells.bar = Bars.name}$ Bars

Natural Join: Sells $\bowtie$ Bars

$R_1 := \rho_{R_1(A_1,\dots A_n)}(R_2) \Leftrightarrow R_1(A_1,\dots A_n) := R_2$

Problem No.1:

Sol: ① $\pi_{pname}(Prof \bowtie_{dept.numphds > 12} dept)$

②
$\pi_{sname}(Student) -$
$\quad \pi_{S_1.name}(\sigma_{S_1.age = S_2.age}(\rho_{Student(S_1d, age)}(S_1) \times \rho_{Student(S_2d, age)}(S_2)))$

③
$\qquad\qquad (Student)$
$\sigma_{sex="woman"}(enroll \bowtie Student)$ this get all registration for women, but
$\qquad$ Since we don't have count() function in relational algebra, cannot go further.

④ similar reason to ③, since we don't have count() function it cannot be done.

⑤ $\pi_{sname}(\sigma_{dname="computer science"}(Student \bowtie_{Student.sid = major.sid} major)) \cap$

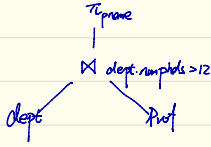$\pi_{sname}(\sigma_{dname="Mechanical Engineering"}(Student \bowtie_{Student.sid = major.sid} major)$

⑥ In this case we need average function or count() function both of which cannot be expressed in relational algebra.

⑦ $\pi_{dname, numphds}(dept) - \pi_{dname, numphds}(dept \bowtie major \bowtie \sigma_{cname="Programming"}(course))$

⑧ $\pi_{pname}(prof \bowtie major \bowtie \sigma_{age < 18}(Student))$

Problem No.2:

a. ① $\pi_{pname} (Prof \bowtie_{dept.numprofs>12} dept)$

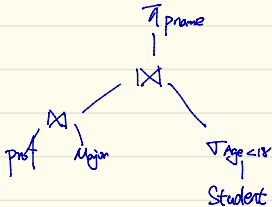π_{pname}
|
$\bowtie_{dept.numprofs>12}$
dept   Prof

⑤ $\pi_{sname} (\nabla_{dname='computer\ science'} (Student \bowtie_{Student.sid=major.sid} major) \cap$

$\pi_{sname} (\nabla_{dname='Mechanical\ Engineering'} (Student \bowtie_{Student.sid=major.sid} major)$

$\cap$

π_{sname} π_{sname}
| |
$\nabla_{dname="Computer\ science}$ $\nabla_{dname="Computer\ science}$
| |
$\bowtie_{student.sid=major.sid}$ $\bowtie_{student.sid=major.sid}$
Student   Major.   Student   Major.

⑧ $\pi_{pname} (prof \bowtie major \bowtie \nabla_{age<18} (student))$
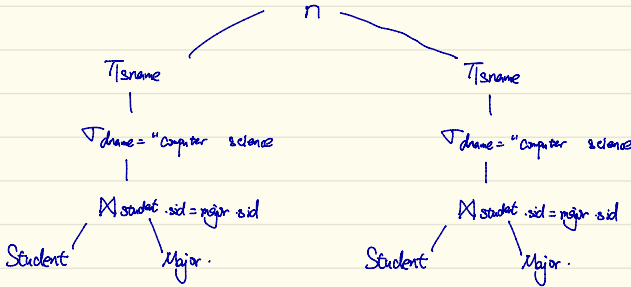
π_{pname}
|
$\bowtie$
$\bowtie$ $\nabla_{Age<18}$
Prof   Major   Student

2.b: Calculate the intersection of supplier's name, two groups are

① cost of items are less than 100$; color is red: join Catalog and Supplies first then Parts

② cost of items are less than 100$; color is green: join Parts and Catalog first, then Suppliers

HW 2

Haoyang Han

Hhr8512

Problem No 3:
Creating order should be:

Create less relevant table at the beginning and then more related table.

Create table Salary
(Salary_level char (50),
Mon_Salary integer,
Primary key (Salary_level));

Create table Job
(Job_code integer,
Job_title char (50),
Primary key (Job_code));

Create table Employee
(Emp_no integer,
Emp_name char (50),
Room_no integer,
Primary key (Emp_no),
Manager_id char (50),
Foreign key references Employee(Manager_id),
Foreign key references Department(Dept_no));

Create table Department
(Dept_no integer,
Dept_name char (50),
Dept_head char (50),
Primary key (Dept_no),
Foreign key references Employee(Emp_no));

Create table Project
(Proj_code integer,
Proj_name char (50),
Start_date integer,
End_date integer,
Primary key (Proj_code),
Foreign key references Employee(Emp_no));