Relational Algebra

- Select / Project / union / Intersection / Minus (Difference)
  - Table (Instructor) (Horizontal)

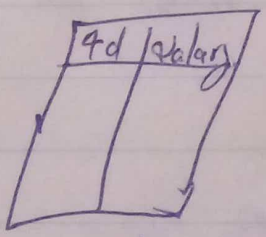
Id	Name	Dept_name	Salary
101	XYZ	Phy	60,000

$\sigma_{Condition}$ (database) (Degree = 4) = No. of attribute of table.

$\sigma_{Dept\_name = "physics"}$ (Instructor)

Project

$\Pi_{id, salary}$ (Instructor)



(Degree = On the basis of Column)

- $\sigma_{(Dept\ name = 'Physics') \wedge (Salary > 60,000)}$ (Instructor)

$\wedge$ - And, $\vee$ - OR, $\neg$ (Not)

- $\Pi_{Name}\left(\sigma_{(Dept\ name = 'Physics') \wedge (Salary > 60,000)}\right)$ (Instructor)

Section (Course-id / sec-id / semester / year / Building / Room-no / Time-slot-id)

Get all course taught in fall 2009 semester

A B
A B C

$\Pi_{Course}(\sigma_{year=2009}(Section))$

$\Pi_{Course}(\sigma_{(year=2009) \wedge (sem='fall')}(Section))$

$\cup$

$\Pi_{Course\text{-}id}(\sigma_{year='2010') \wedge (semester='spring')}(Section)$

- r ∪ s = ① Relation R & S must have the same arity
② Domain of the ith attribute of R & ith attribute of S are must be of the same type

Difference (−)
same as of union. =

- Cartesian Product (x)

⇒ Teacher (id, Course-id, Section-id, Sem, Year)
Dept (id, Name, Course-id, Salary)

the name of all instruct in (Physic) dept together with the Course-id of all the Courses they taught.

$\Pi_{name}(\sigma_{name=Physics}$

$\Pi_{name}\left(\sigma_{name=Physics}\right)$

$\Pi_{name}\left(\sigma_{Dept=Physics}(Instructor)\right) \times \Pi_{Course\_id}(Teaches)$

~~$\Pi_{id}\left(\sigma$~~

$\Pi_{Name, Course}\left(\sigma_{First\ id = Teacherid}\left(\sigma_{dept.name="Physics"}(Teaches \times Instructor)\right)\right)$

Rename $\rho_{P}\ \beta_{In}(E) \rightarrow$

Join $\rightarrow \bowtie$ $\Pi_{name, Course}(Teaches \bowtie Instructor)$

Natural $-$ (1)

Equijoin $\rightarrow$ (Not Repeated) (Col)

$\mathcal{G}_{max(salary)}(Instructor)$

$\Pi \rightarrow$ Col

$\sigma \rightarrow$ row

Employee (person_name, street, city)

Works (person_name, company name, salary)

Company (company_name, city)

Manager (person_name, Mgr_name)

① find the name of all employee who live in the same city & streets as their managers

~~σ π (Person_name (Employee ⋈ Company))~~

Ans:

Π_{person_name} ((Employee ⋈ Manager) ⋈ (Mgr.name = Emp2.person_name ∧ Emp.street = Emp2.street ∧ Emp.city = Emp2.city (ρ_{Emp2} (Employee))))

② Dept (Dept_name, Building, Budget)

Course (Course_id, Title, Dept_name, Credits)

Instructor (id, Name, Dept_name, Salary)

Section (Course_id, sec_id, Sem, year, Building, Room_no, Time_slot_id)

Teaches (Id, Course_id, Sec_id, Semester, year)

Student (Id, Name, Dept_name, Tot_Credit)

Takes (Id, Course_id, Sec_id, Section, year, grade)

① find the name of the employee more than every employee of "ABC"

~~σ_{salary} (works) $\sigma_{person.name}$~~

$V_a = \left(\sigma_{company.name = "ABC"} (company)\right)$

σ_{salary} (work)

$\Pi_{salary}\left(\sigma_{company.name = "ABC"} (company)\right)$

Ans.

$\Pi_{person}(works) - \left(\Pi_{person}\ works \bowtie_{work.salary \le work2.salary} \rho_{work2}(works)\right) \wedge work.comp = "ABC"$

8.3 Write the title of Course in Computer science Dept that has 3 credits.

$\Pi_{title}\left(\sigma_{(credit=3) \wedge dept\_name = CS} (course)\right)$

8.4 find the id of the all student who taught by the instructor name einstein.

$(\sigma_{id.teach = id.instructor}$

$\left(\sigma_{Name = einstein} (instructor)\right)$

S.20

60

Π_{sid} (instructor ⋈ (takes ⋈ teaches))

- find all instructors who have highest salary.

instructor. ($\mathcal{G}_{max(salary)}$ as salary. (instructor))

- (find the enrollment each section Ref was offered in autumn 2009.)

$\mathcal{G}$ (takes)

course_id, sec_id $\mathcal{G}_{count(*)}$ as Enrollment ($year = '2009'$ and $semester = 'fall'$)

Division $R \div S$ = in R Not in S.

find the id of all student who have taken all C.S course.

Π_{id} (