EE4202 Database Systems

SQL TO RELATIONAL ALGEBRA

MAPPING THEORY

- Select attribute(A1) from relation (R) in SQL maps to a project($\pi_{<A1>}(R)$) in relational algebra. Select * from R maps to just R itself.
- Conditions inside where clause maps to conditions of a select(σ) operation. For a single 'select from where' SQL clause; π and σ are commutative(interchangeable).
- Creating a view corresponds to a rename(ρ) operation.
- Aggregate functions specified for attributes in GROUP BY is mapped to aggregate function (*f*) in relational algebra.

<grouping attributes> *f* <function list> (Relation)

SQL	**Relational Algebra Operation**	**Relational Algebra Symbol**
Cross join	Cartesian product	X
Natural join	Natural join	*
Union	Union	U
Except	Set difference/Minus	-
Left outer join	Left outer join	⟕

MAPPING EXAMPLES

1. select Empl_ID from sch1.EMPLOYEE where Age=15;

$$\pi_{<Empl\_ID>}(\sigma_{<Age=15>}(sch1.Employee))$$

2. select Empl_ID from sch1.EMPLOYEE where Age > ALL(select Age from sch1.employee where Empl_ID='EE001’);

Is equivalent to : select Empl_ID from sch1.EMPLOYEE where Age >(select MAX(Age) from sch1.employee where Empl_ID='EE001’ Group by Age);

$\pi_{<Empl\_ID>}(\sigma_{<\ \ Age>(Age\ \mathit{f}\ \mathit{MAX(Age)}(\sigma_{Empl\_ID='EE001'}(sch1.Employee)))\ >}(sch1.Employee))$

3. select Name from sch2.EMPLOYEE natural join sch2.DEPENDENT

$\pi_{<Name>}(sch2.EMPLOYEE * sch2.DEPENDENT)$

4. Select E.Age, D.Depe_name from sch2.EMPLOYEE as E inner join sch2.DEPENDENT as D on E.Em_ID=D.Empl_ID;

$\pi_{<Age,Depe\_name>}(sch2.EMPLOYEE \bowtie_{<Em\_ID\ =\ Empl\_ID>} sch2.DEPENDENT)$

MAPPING EXAMPLES

5. create view sch2.vie1 as (select Empl_ID,Designation from sch2.EMPLOYEE natural join sch2.HEAD where Dept_Head='Sajitha');

Create view sch2.vie2 as (select Empl_ID,Designation from sch2.EMPLOYEE natural join sch2.PROJECT where Project='Prj_1');

(select * from sch2.vie1)INTERSECT(select * from sch2.vie2);

$\rho_{\text{sch2.vie1}}(\pi_{\text{<Empl\_ID, Designation>}}(\sigma_{\text{<Dept\_Head='Sajitha'>}}(\text{sch2.EMPLOYEE} * \text{sch2.HEAD})))$

$\rho_{\text{sch2.vie2}}(\pi_{\text{<Empl\_ID, Designation>}}(\sigma_{\text{< Project='Prj\_1'>}}(\text{sch2.EMPLOYEE} * \text{sch2.PROJECT})))$

$\text{sch2.vie1} \cap \text{sch2.vie2}$

6. create view sch2.vie3 as (Select Age+5 as New_Age from sch2.EMPLOYEE);

$\rho_{\text{sch2.vie3(New\_Age)}}(\pi_{\text{<Age+5>}}(\text{sch2.EMPLOYEE}))$