

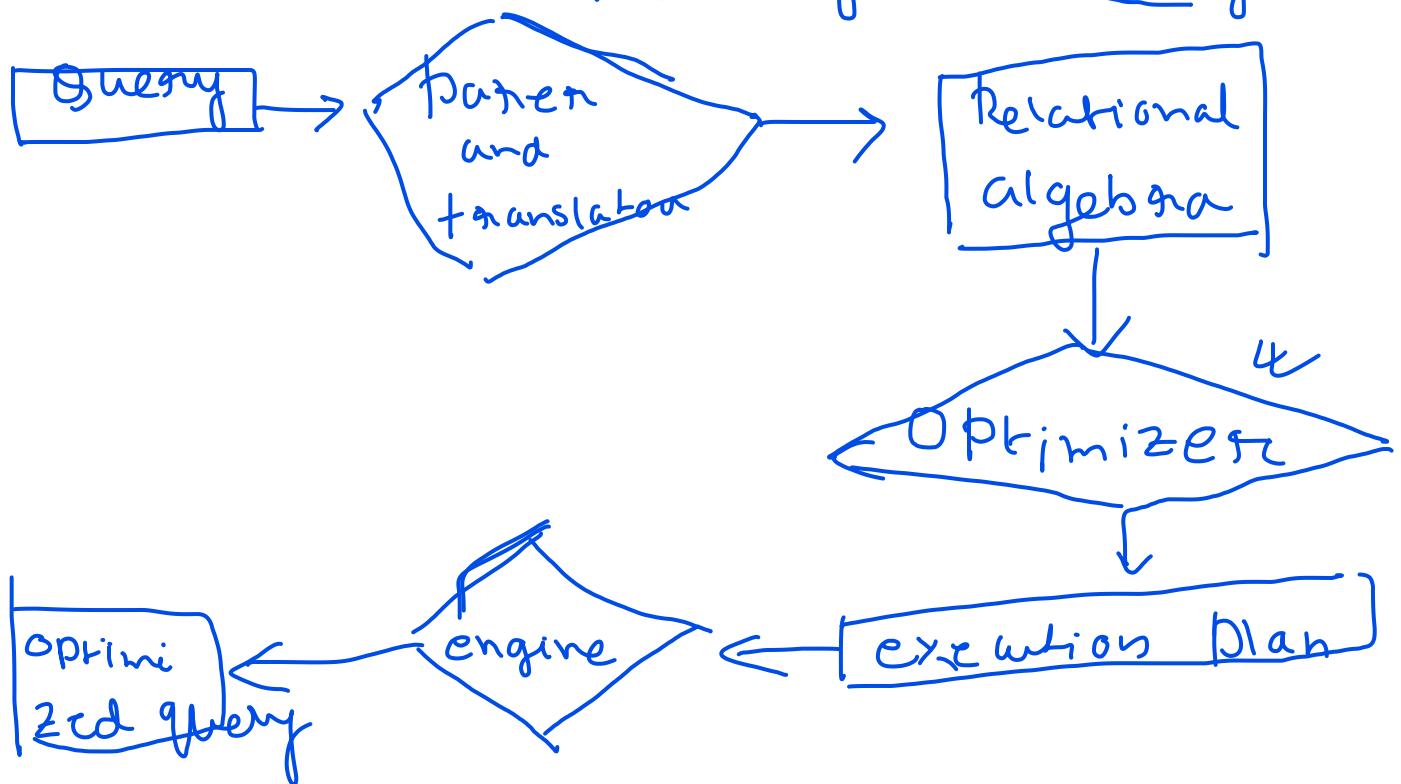
Query Optimization

Make \rightarrow Relation Algebra

① Among all equivalent plan choose one with lowest cost.

② Cost is estimated by using Statistical information i.e. no. of tuples in each relation, size of tuple etc.

Basic Steps for Query Processing



Heuristic query optimization

Employee (Fname, Mname, Lname, SSN, Bdate)
Address, gender, Salary)

Project (Pname, Pnumber, Plocation, Dnum)

Works-on (Essn, Pno, Hours)

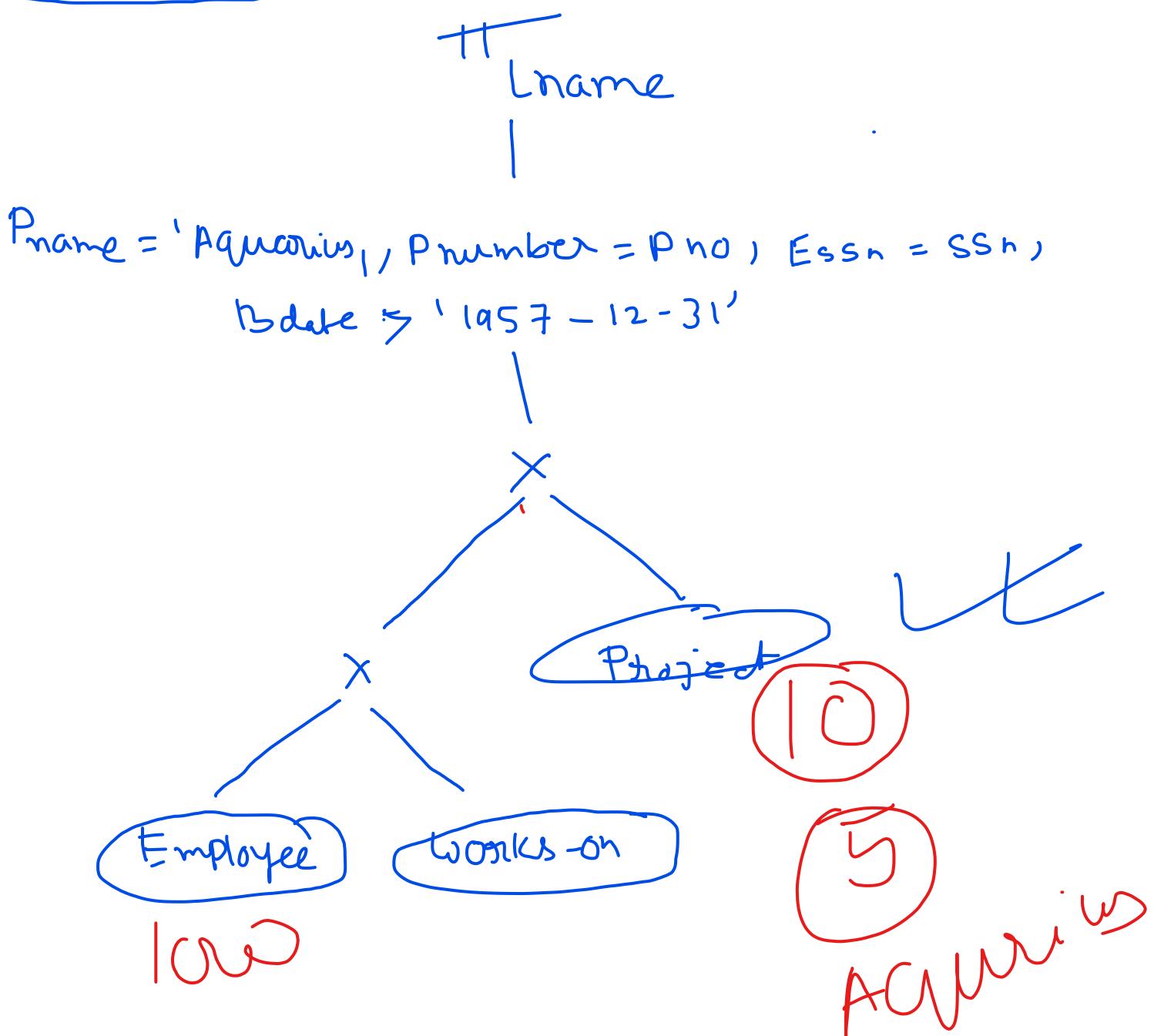
Select Lname from Employee, Works-on,
Project where Pname = ('Aquarius')
And Pnumber = Pno And Essn = SSN
and Bdate > '1957-12-31';

Question

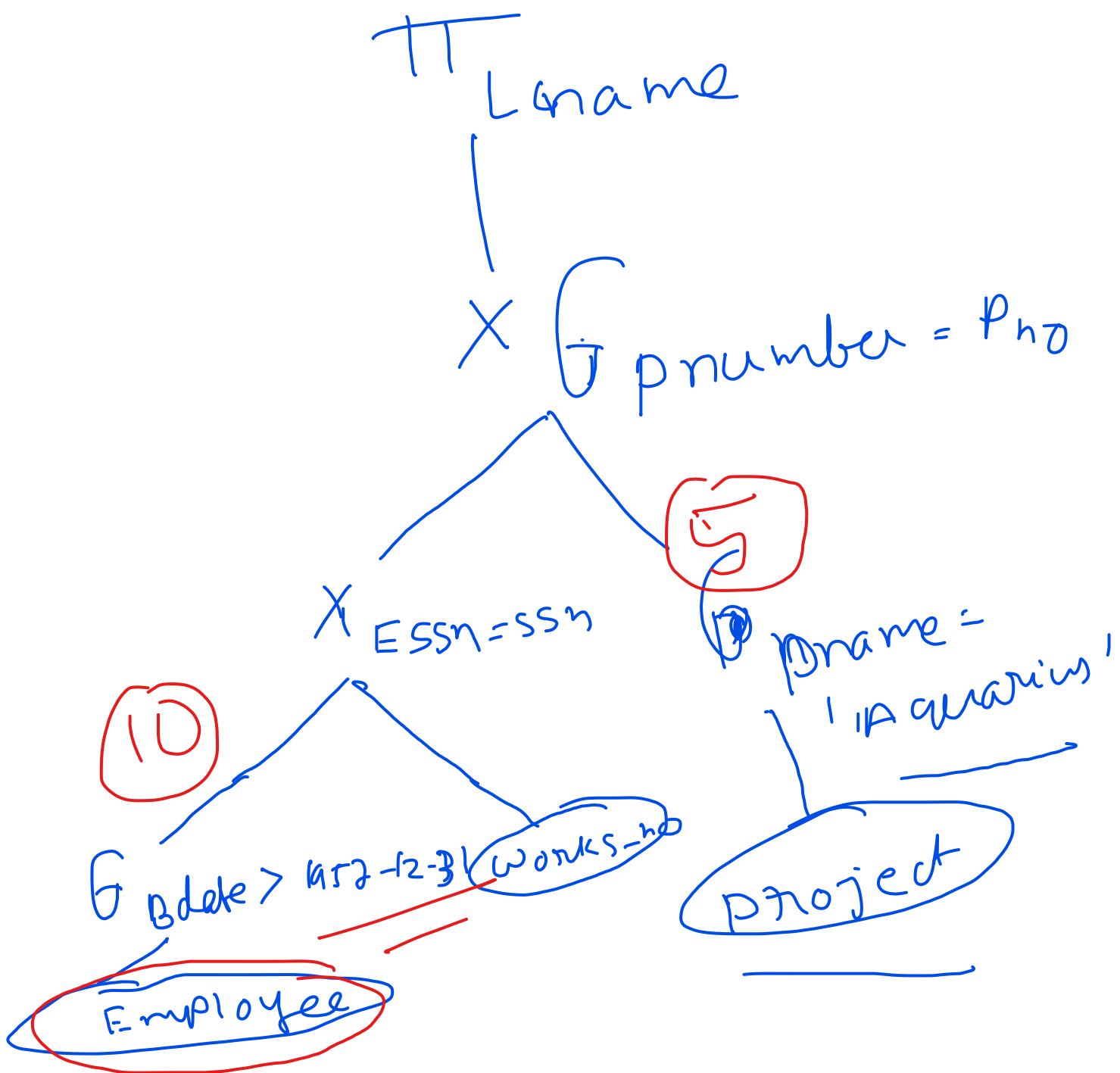
Find out the last name of the employee
who is working on a project "Aquarius"
and date of birth > "1957-12-31";

Π_{Lname} (EMPLOYEE \times WORKS-ON \times PROJECT)
 WHERE Pname = 'Aquarius', Pnumber = Pno, Essn = ssn,
 Bdate > '1957-12-31';

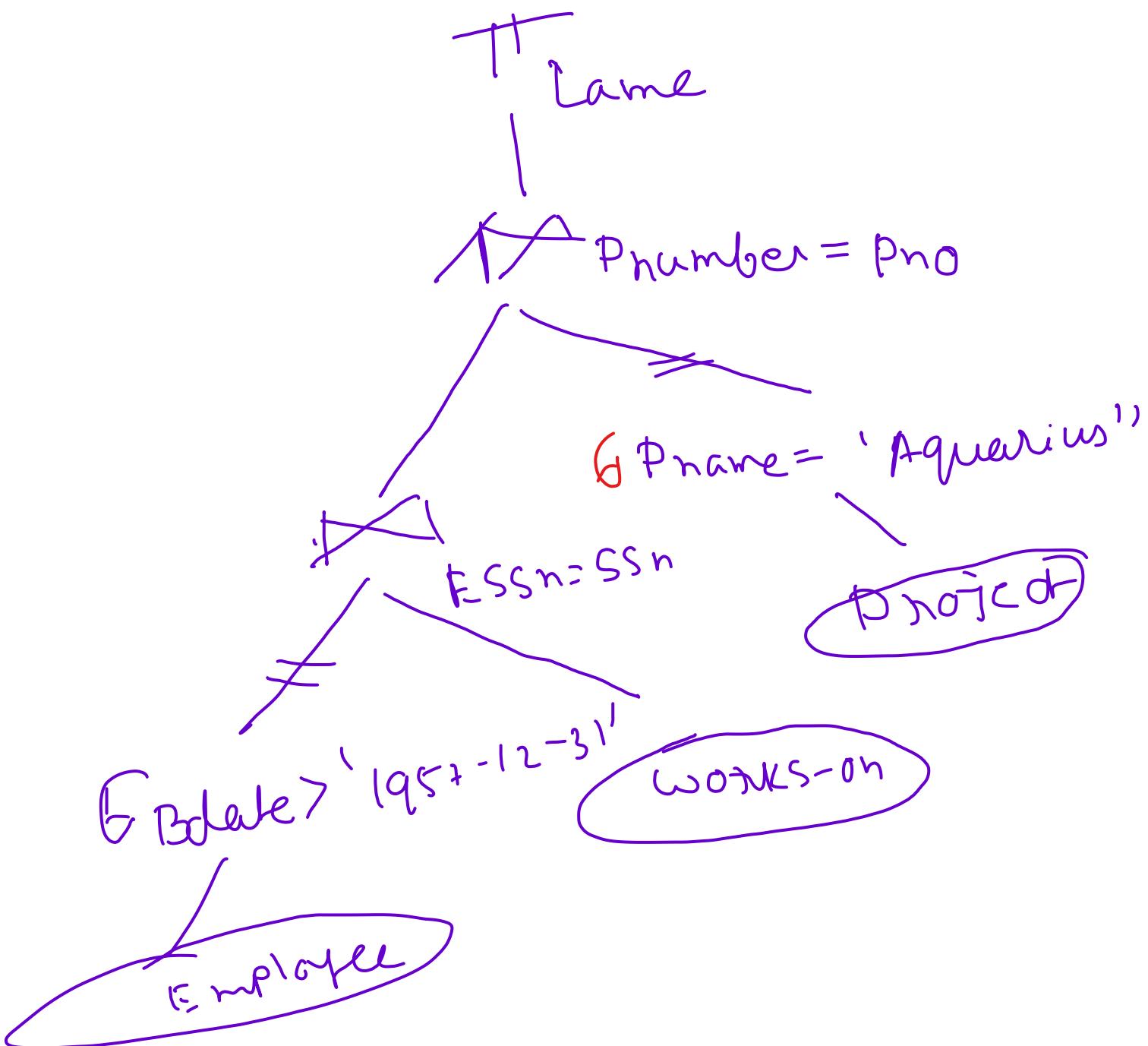
Query Tree



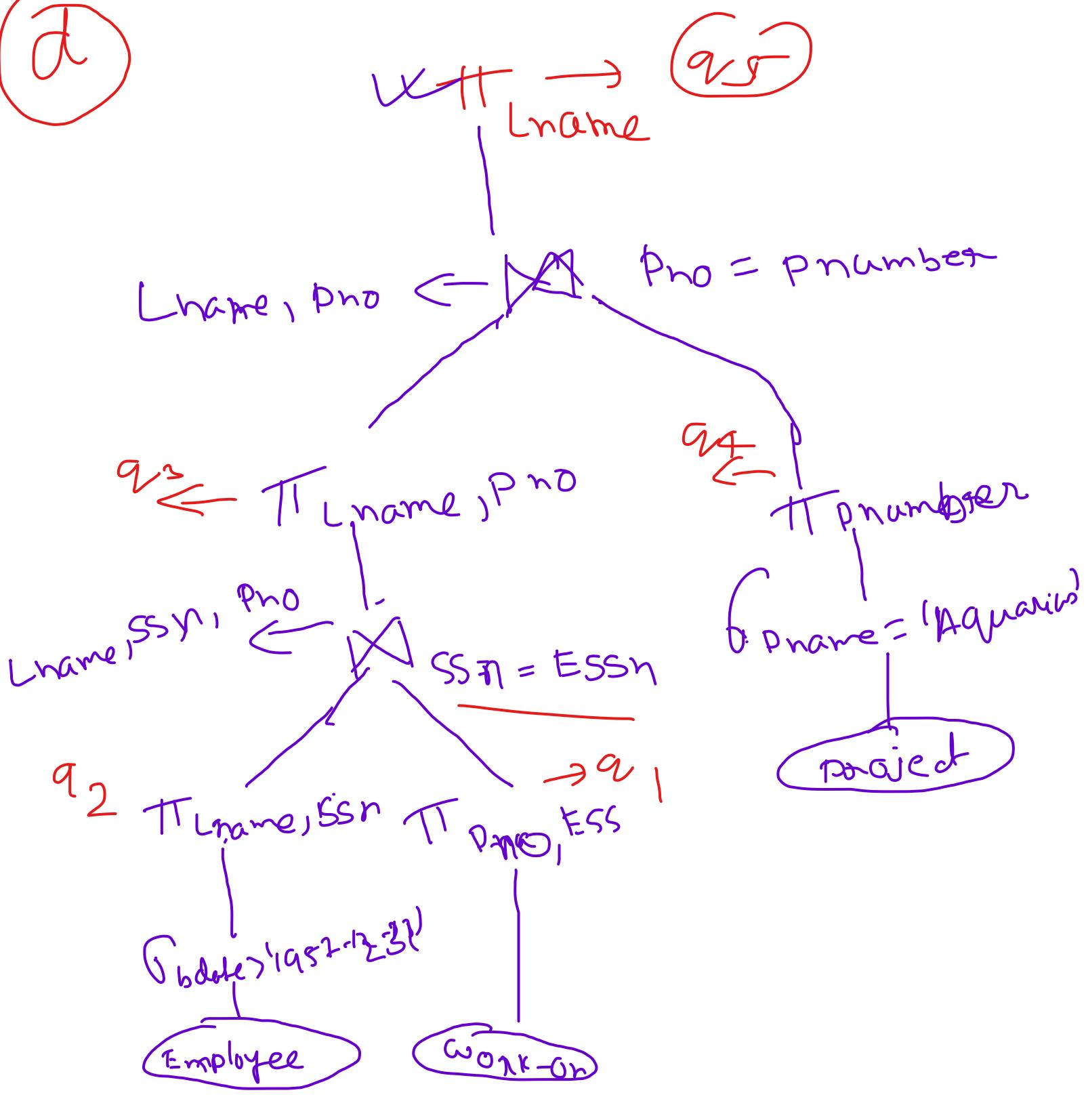
② Moving Select Operation
down the query tree



C Replace cartesian product
and ~~j₁ × j₂~~ joint with
natural join.



(d)



$$q_1 = \pi_{Pno, ESS} \leftarrow \pi_{Pno, ESS} (\text{works-on})$$

$$q_2 = \pi_{\text{Lname}, \text{SSN}} \{ \begin{array}{l} \text{Employee} \\ \text{bdate} \end{array} \}_{\text{bdate} \geq '1952-12-31'}$$
$$q_3 = \pi_{\text{Lname}, \text{Pno}} (q_1 \bowtie_{\text{ESSN} = \text{SSN}} q_2)$$
$$q_4 = \pi_{\text{Pnumber}} \{ \text{pname} = 'Aquarius' \}$$
$$q_5 = \pi_{\text{Lname}} (q_3 \bowtie_{\text{Pno} = \text{Pnumber}} q_4)$$

Student (Stu-id, name, Major)

Grades (Stu-id, Crs-id, Grade)

Course (name, Cns-id, Dept)

Find out student id, name
whose grade is "A", Dept:
'CSE' and Major = Math.

