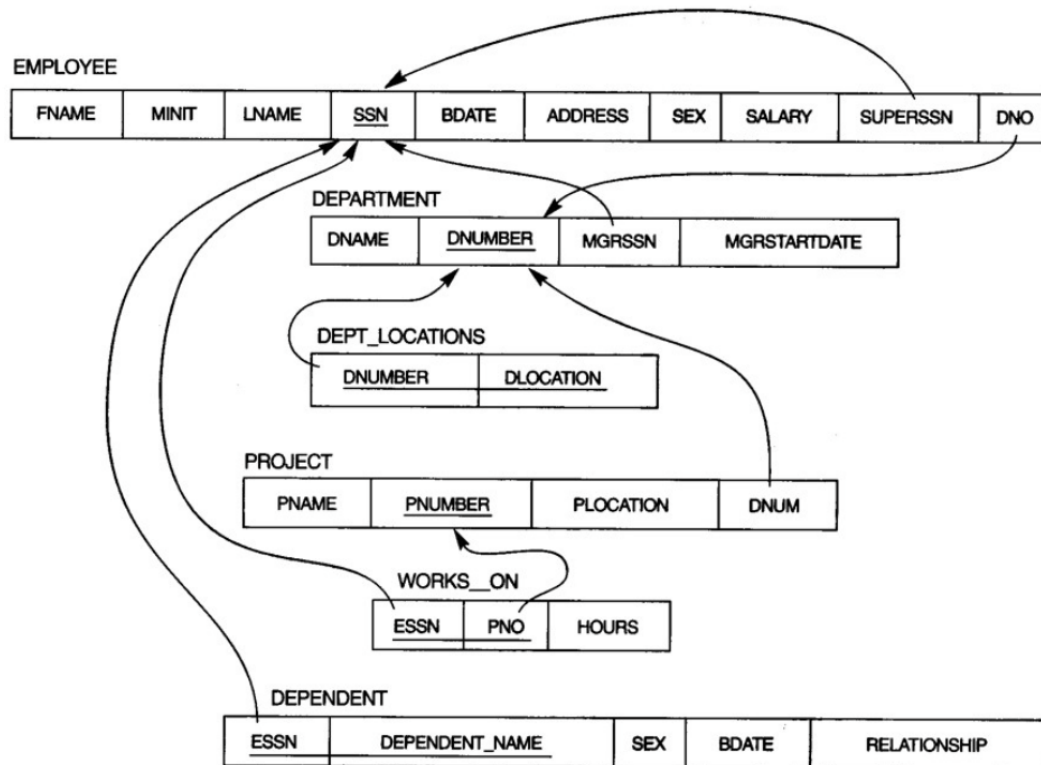


Relational Algebra Assignment



1. List the names of all female daughters along with the employee's SSN to whom the dependent is related.

$$Temp1 \leftarrow \sigma_{Relationship=Daughter}(Dependent)$$

$$Result \leftarrow \pi_{Dependent_name, ESSN}(Temp1)$$

2. Make a list of all birth dates in this database. You should include birth dates of employees as well as those of dependents. There should be only ONE column and duplicates should be eliminated.

$$Dependent_bdates \leftarrow \pi_{Bdate}(Dependent)$$

$$Employee_bdates \leftarrow \pi_{Bdate}(Employee)$$

$$Result \leftarrow Dependent_bdates \cup Employee_bdates$$

3. Show employees that do not work on any projects (ie. they have not logged any hours on any projects). List their SSN and last names.

$$Employees \leftarrow \pi_{SSN}(Employee)$$

$$Working_Employees_{SSN} \leftarrow \pi_{ESSN}(Works_on)$$

$$Not_Working \leftarrow Employees - Working_Employees$$

$$Result \leftarrow \pi_{SSN, Lname}(Not_Working \bowtie Employees)$$

4. What is the average salary of all employees who have the same middle initial?

(This is sure to be useful information!!!)

$Result \leftarrow_{Minit} F_{avg}(Salary)(Employee)$

5. Show the names of all projects located in Houston along with their associated department name and the department's location.

$Houston \leftarrow \pi_{Pname, Dnum}(\sigma_{Plocation=Houston}(Project))$
 $Temp1 \leftarrow \pi_{Pname, Dnum, Department.Dname}(Houston \bowtie_{Dnum=Dnumber} Department)$
 $Houston_Dept_{Pname, Dnumber, Dname} \leftarrow Temp1_{Pname, Dnum, Department.Dname}$
 $Result \leftarrow \pi_{Pname, Dname, Dlocation}(Houston_Dept \bowtie Dept_locations)$

6. Employees spend some number of hours on each of their projects. For each project, list the project number and the names of all employees that work on that project for more than the average number of hours. To clarify, if Karen, Shari and Ron all work on project #3 and Karen works 20 hours, Shari works 10 hours and Ron works 15 hours, the average number of hours worked on this project by all employees is 15. In this case, only Karen works on the project for more hours than the average. Your resulting table will have 3 columns (names can differ from these): Project Number and employee first name and last name.

$Temp1 \leftarrow Employee \bowtie_{SSN=ESSN} Works_on$
 $Temp2_{SSN, Pno, Hours} \leftarrow \pi_{SSN, Works_on.Pno, Works_on.Hours}(Temp1)$
 $Avg_hours \leftarrow_{Pno} F_{avg}(Hours) \text{ as } avg_hrs(Temp2)$
 $Temp3 \leftarrow Temp2 \bowtie_{Hours > avg_hrs} Avg_hours$
 $Above_avg \leftarrow \pi_{Pno, SSN}(Temp3)$
 $Result \leftarrow \pi_{Pno, Fname, Lname}(Above_avg \bowtie Employee)$

7. List the employees that work on BOTH (not either or) a project located in Belfast and a project located in Houston (as indicated by the Plocation attribute. List their SSN and last name.

$Proj_Hous \leftarrow \sigma_{Plocation=Houston}(Project)$
 $Proj_Belf \leftarrow \sigma_{Plocation=Belfast}(Project)$
 $Emp_Hous \leftarrow \pi_{SSN, Lname}(Employee \bowtie_{Dno=Dnum} Proj_Hous)$
 $Emp_Belf \leftarrow \pi_{SSN, Lname}(Employee \bowtie_{Dno=Dnum} Proj_Belf)$
 $Result \leftarrow Emp_Hous \cap Emp_Belf$

8. Make a list of all employee's last names along with the last name of their supervisor. (Use superssn from the employee table to find their supervisor's name). Your resulting table should have two columns named: EmployeeName, SupervisorName.

$Temp1 \leftarrow \pi_{SuperSSN}(Employee)$
 $Temp2 \leftarrow Employee \bowtie_{SSN=SuperSSN} Temp1$
 $Supervisor_{Sup_name, Sup_SSN} \leftarrow \pi_{Lname, SSN}(Temp2)$
 $Temp3 \leftarrow Supervisor \bowtie_{Sup_SSN=SSN} Employee$

$Result_{EmployeeName, SupervisorName} \leftarrow \pi_{Employee.Lname, Sup_name}(Temp3)$

9. Which department has the most employees? Show the name(s) of the department(s) with the most employees.

$Temp1 \leftarrow_{Dno} F_{count(*) \text{ as workers}}(Employees)$
 $Max \leftarrow F_{max_workers \text{ as most_emp}}(Temp1)$
 $Max_emp \leftarrow Temp1 \bowtie_{workers=most_emp} Max$
 $Result \leftarrow \pi_{Dname}(Department \bowtie_{Dnumber=Dno} Max_emp)$

10. Show the ESSNs of employees who have a spouse but not a son.

$Relations \leftarrow \pi_{ESSN, Relationship} Dependent$
 $Have_Spouse \leftarrow \sigma_{Relationship=Spouse} Relations$
 $Have_Son \leftarrow \sigma_{Relationship=Son} Relations$
 $Result \leftarrow \pi_{ESSN}(Have_Spouse - Have_Son)$