Query: List names of dependents of female emp.

$$\pi_{dependent\_name}(\sigma_{SSN=ESSN \wedge emp.sex='F'}(EMP \times DEPENDENT))$$

$$\pi_{dep\_name}(\sigma_{SSN=ESSN}(\pi_{SSN}(\sigma_{sex='F'}(EMP)) \times DEP))$$

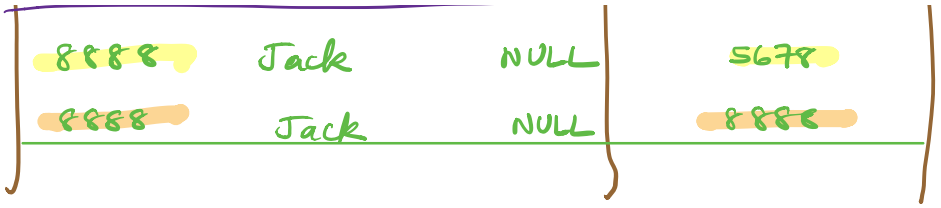
Query List name, SSN of emp who are supervisors.

| SSN | Name | Super |
|---|---|---|
| 1234 | Mary | 5678 |
| 5678 | Ann | 8888 |
| 9111 | Joe | 5678 |
| 8888 | Jack | NULL |

| Supervisor | SSSN |
|---|---|
| Ann | 5678 |
| Jack | 8888 |

$$EMP \times \rho_{(SSSN)}(\pi_{super}(EMP))$$

| SSN | Name | Super | SSSN |
|---|---|---|---|
| 1234 | Mary | 5678 | 5678 |
| 1234 | Mary | 5678 | 8888 |
| 5678 | Ann | 8888 | 5678 |
| 5678 | Ann | 8888 | 8888 |
| 9111 | Joe | 5678 | 5678 |
| 9111 | Joe | 5678 | 8888 |




$$\pi_{Name, SSN}\left(\sigma_{SSN = SSSN}\left(EMP \times \rho_{(SSSN)}\left(\pi_{super}(EMP)\right)\right)\right)$$

Query : List name, SSN of emp who are not supervisors

$$\pi_{Name, SSN}\left(\sigma_{SSN \neq SSSN}\left(EMP \times \rho_{SSSN}\left(\pi_{super}(EMP)\right)\right)\right)$$

Set A = SSN of supervisors $\quad \pi_{super}(EMP)$

Set B = all SSN $\quad \pi_{SSN}(EMP)$

B − A = SSN of emp who are not supervisors

$$\rho_{SSSN}(B) - \rho_{SSSN}(A)$$

$$\pi_{FName, SSN}\left(\sigma_{SSN = SSSN}\left(EMP \times \right)\right)$$

Query: List Dno, Dname, Dlocation

$$\pi_{department.dnumber, dname, dlocation}\left(\right.$$

$$\sigma_{dep.dnumber = dept\_loc.dnumber}$$

$(Dept \times Dept\_locations))$

Query: List Fname of employee along with Fname of supervisor.

EMP ≡ E

EMP ≡ S

E X S

| SSN | Name | Super | SSN | Name | Super |
|---|---|---|---|---|---|
| 1234 | Mary | 5678 | 1234 | Mary | 5678 |
| | | | 5678 | Ann | 8888 |
| | | | 9111 | Joe | 5678 |
| | | | 8888 | Jack | NULL |
| 5678 | Ann | 8888 | 1234 | Mary | 5678 |
| | | | 5678 | Ann | 8888 |
| | | | 9111 | Joe | 5678 |
| | | | 8888 | Jack | NULL |

$$\pi_{E.name, S.Name}\left(\sigma_{E.super = S.SSN}\left(\rho_E(EMP) \times \rho_S(EMP)\right)\right)$$

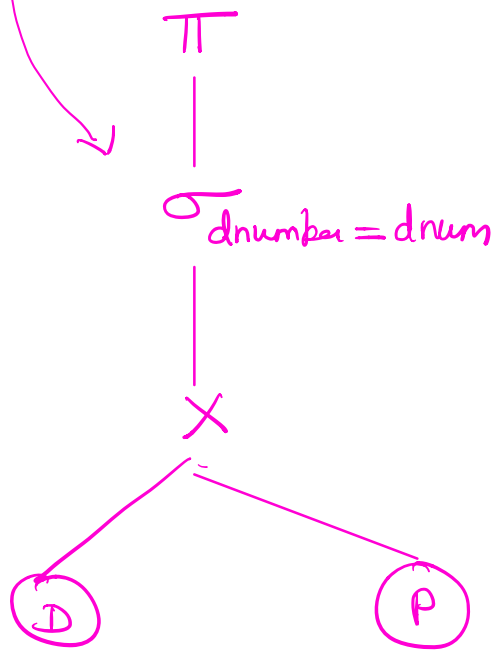
Ch 8 : 8.3, 8.4.3, 8.4.4 (new)
Ch 8 6.3, 6.4.3, 6.4.4 (old)

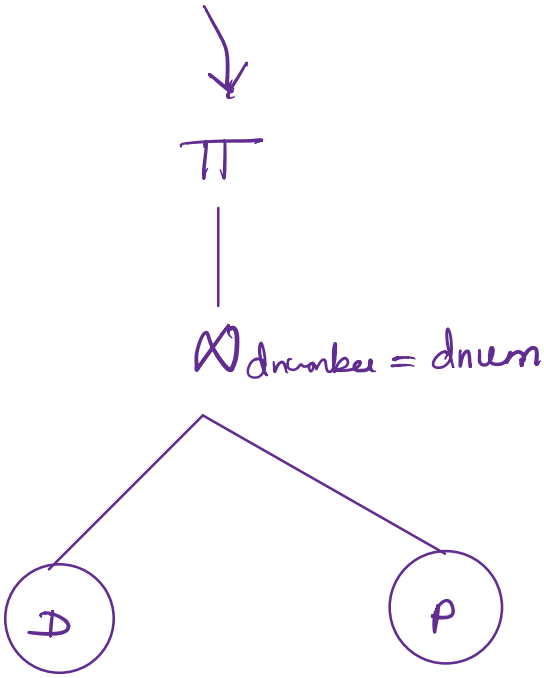
Join $\bowtie$ $\equiv$ $\times$ followed by $\sigma$

Query: List Pname, Dname

$$\pi_{Pname, Dname}(\sigma_{Dnumber = Dnum}(Dept \times Project))$$

$$\pi_{Pname, Dname}(Dept \bowtie_{Dnumber = Dnum} Project)$$



In textbook:

$\bowtie$ $*$ Natural Join

$\bowtie_=$ Equijoin

$\bowtie_\theta$ Theta join

$<$
$>$
$=$
$<>$

## Natural Join $\bowtie$ $*$

**Query:** List Dname, Dnumber, Dlocation

$\pi_{Dname, Dnumber}(Department) \bowtie Dept\_Loc$

$\pi_{Dname, Dnumber, Dlocation}(Dept \bowtie Dept\_Loc)$

$(Dept * Dept\_Loc)$

$Dept.dnumber = Dept\_Loc.dnumber$