4.4 Query Optimization

"Rewrite" the query statements submitted by user first, and then decide the most effective operating method and steps to get the result. The goal is to gain the result of user's query with the lowest cost and in shortest time.

4.4.1 Summary of Query Optimization

- **Algebra Optimization**
- **Operation Optimization**

Example

S(SNUM, SNAME, CITY)
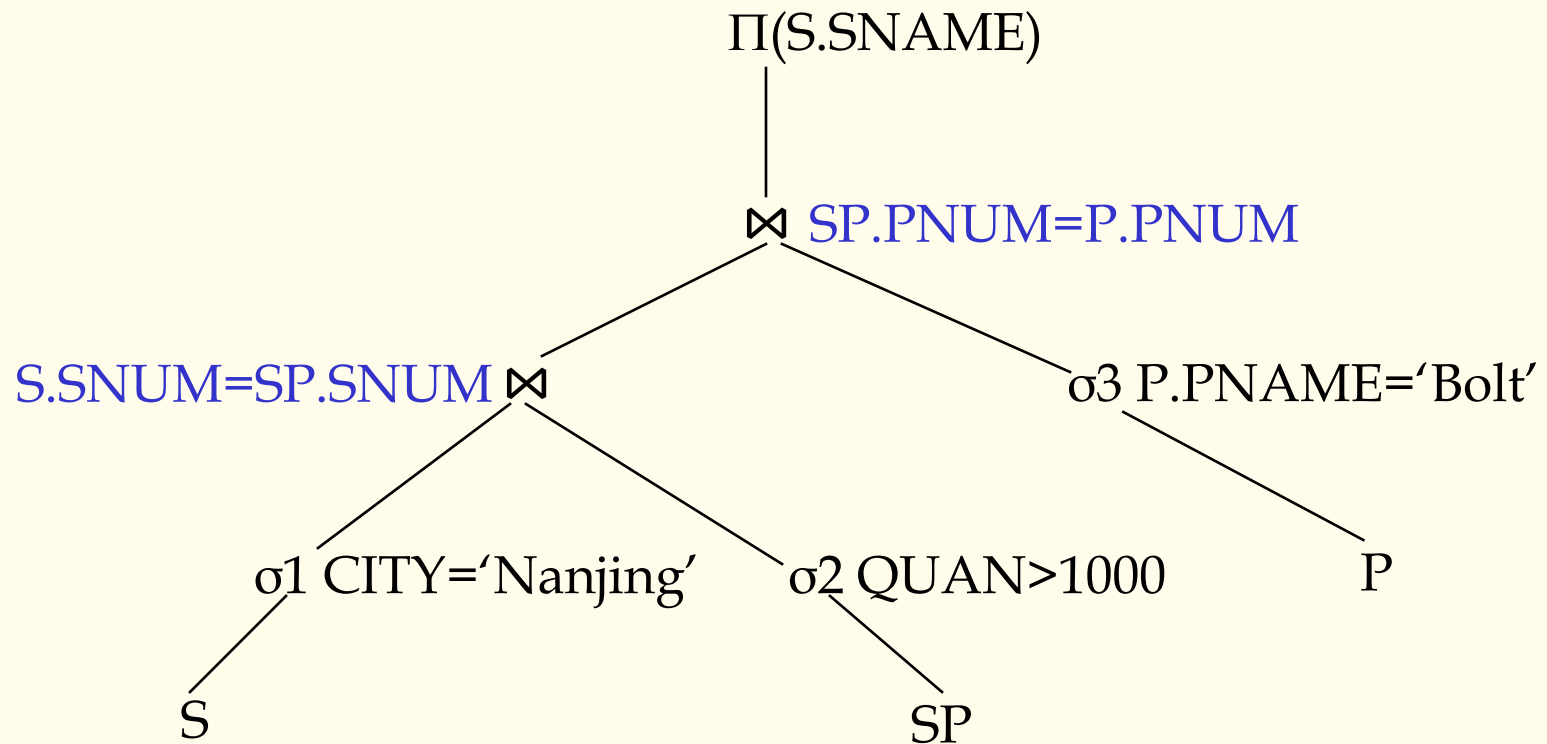SP(SNUM, PNUM, QUAN)
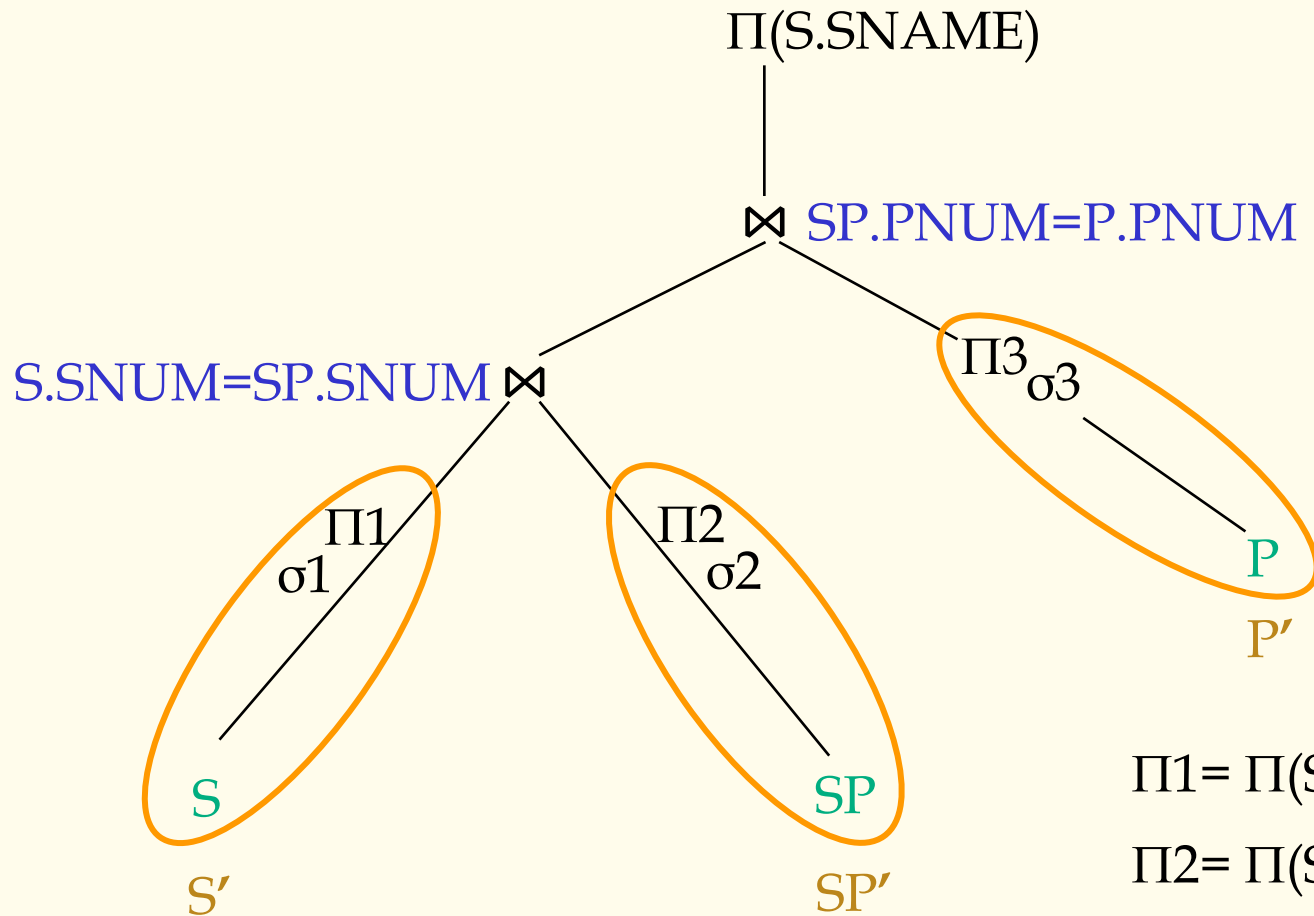P(PNUM, PNAME, WEIGHT, SIZE)

SELECT SNAME
FROM S, SP, P
WHERE   S.SNUM=SP.SNUM AND
        SP.PNUM=P.PNUM AND
        S.CITY='Nanjing' AND
        P.PNAME='Bolt' AND
        SP.QUAN>1000;

Query tree

Π(S.SNAME)

$\bowtie$ SP.PNUM=P.PNUM

S.SNUM=SP.SNUM $\bowtie$

σ3 P.PNAME='Bolt'

σ1 CITY='Nanjing'

σ2 QUAN>1000

P

S

SP

After equivalent transform (Algebra optimization) :

Π(S.SNAME)

$\bowtie$ SP.PNUM=P.PNUM

S.SNUM=SP.SNUM $\bowtie$

$\Pi3$ $\sigma3$

P

P′

$\Pi1$
$\sigma1$

$\Pi2$
$\sigma2$

S

SP

S′

SP′

$\Pi1 = \Pi$(S.SNUM,S.SNAME)

$\Pi2 = \Pi$(SP.SNUM,SP.PNUE)

$\Pi3 = \Pi$(P.PNUM)