# COP 4710: Database Systems
# Fall 2006

## Chapter 4 – In Class Exercises (Part 2)
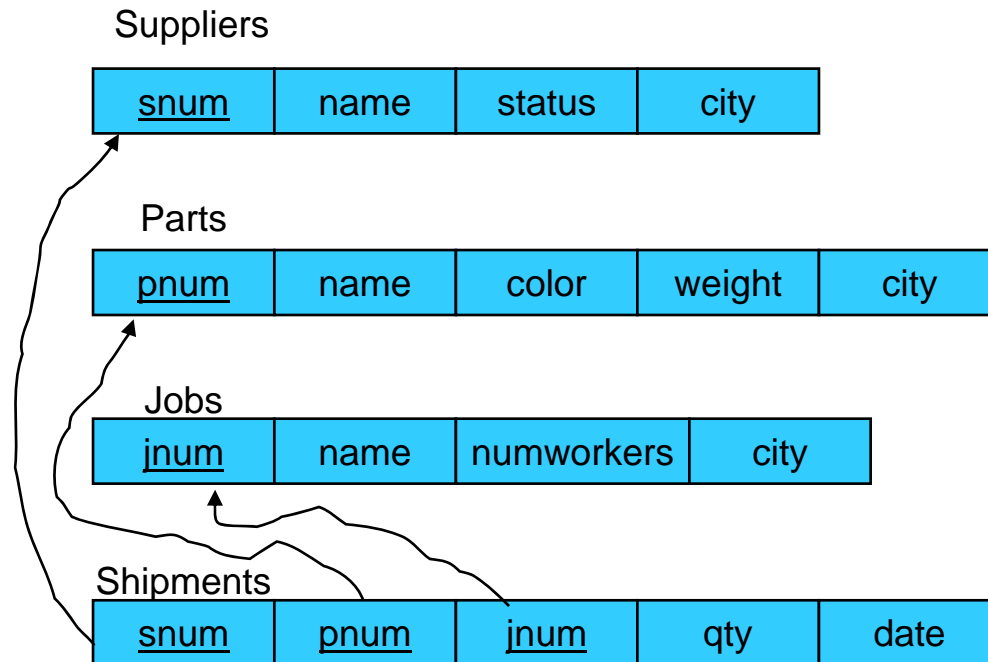
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# Chapter 4 In Class Exercises

- Use the following database scheme for the problems in this exercise.

Suppliers

| snum | name | status | city |
|------|------|--------|------|

Parts

| pnum | name | color | weight | city |
|------|------|-------|--------|------|

Jobs

| jnum | name | numworkers | city |
|------|------|------------|------|

Shipments

| snum | pnum | jnum | qty | date |
|------|------|------|-----|------|

- Develop relational algebra query expressions, using any of the relational operators we've covered, for each of the following queries:

1. List only the names of those suppliers who ship every blue part. (Using only the five fundamental operators.)

Solutions

To shorten the expressions let:

S = Suppliers, P = Parts, SPJ = Shipments

Let $T = \pi_{(pnum)}\left(\sigma_{(color=blue)}(P)\right)$ // all blue parts

Let $U = \pi_{(snum,pnum)}(SPJ)$ // vertical restriction on shipments

Let $A = \{snum, pnum\}$ and $B = \{pnum\}$

$result = \pi_{(A-B)}(U) - \left(\pi_{(A-B)}\left(\left(\pi_{(A-B)}(U) \times T\right) - U\right)\right)$

− or −

$result = \pi_{(snum)}(SPJ) - \left(\pi_{(snum)}\left(\left(\pi_{(snum)}(SPJ) \times \left(\pi_{(pnum)}\left(\sigma_{(color=blue)}(P)\right) - \left(\pi_{(snum,pnum)}(SPJ)\right)\right)\right)\right)\right)$

$final\ result = \pi_{(name)}\left(\sigma_{(S.snum=result.snum)}(S \times result)\right)$

2. List only the names of those suppliers who ship every blue part. (Using the redundant division operator.)

$$\pi_{(name)}\left(S \bowtie \left(\left(\pi_{(snum,pnum)}(SPJ)\right) \div \left(\pi_{(pnum)}\left(\sigma_{(color=blue)}(P)\right)\right)\right)\right)$$

3. List every supplier number for those suppliers that ship both part P2 and part P3.

$$\pi_{(snum)}\left(\sigma_{(pnum='P2'\ AND\ pnum='P3')}(Shipments)\right)$$

What's wrong with this solution?????

A correct solution….

$$\left(\pi_{(snum)}\left(\sigma_{(pnum=P2)}(Shipments)\right)\right) \cap \pi_{(snum)}\left(\sigma_{(pnum=P3)}(Shipments)\right)$$

4.  List the part numbers shipped by a supplier located in Orlando.

$$\pi_{(pnum)}\left(\left(\pi_{(snum)}\left(\sigma_{(city=Orlando)}(Suppliers)\right)\right) \bowtie Shipments \right)$$