COP 4710: Database Systems
Fall 2006

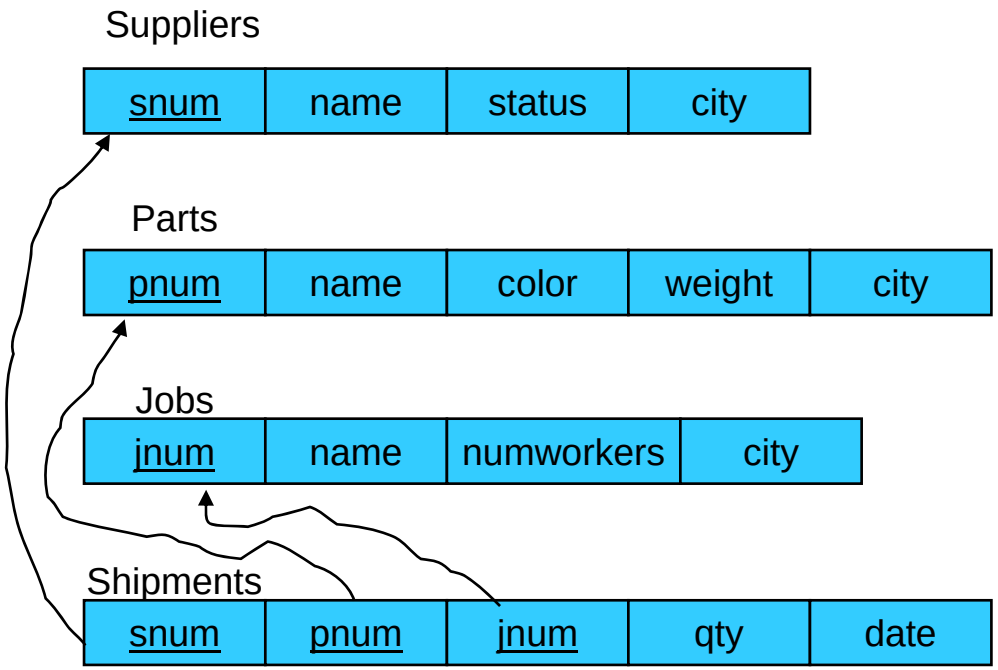
Chapter 4 – In Class Exercises (Part 1)

Instructor : Mark Llewellyn
markl@cs.ucf.edu
CSB 242, 823-2790
http://www.cs.ucf.edu/courses/cop4710/fall2006

School of Electrical Engineering and Computer Science
University of Central Florida

Chapter 4 In Class Exercises

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



- Develop relational algebra query expressions, using only the five fundamental operators, for each of the following queries:

1. List the parts that are either blue or weigh more than 20.

Solution#1: $\sigma_{(color="blue")\ OR\ (weight>20)}(Parts)$

Solution#2: $\sigma_{(color="blue")}(Parts) \cup \sigma_{(weight>20)}(Parts)$

2. List the parts that are blue and weigh more than 20.

Solution#1: $\sigma_{(\text{color}=\text{"blue"})\ \text{AND}\ (\text{weight}>20)}(\text{Parts})$

Solution#2: $\sigma_{(\text{color}=\text{"blue"})}(\text{Parts}) \cap \sigma_{(\text{weight}>20)}(\text{Parts})$

Why isn't the following solution correct?

$$\sigma_{(\text{color}=\text{"blue"})}(\text{Parts}) \cup \sigma_{(\text{weight}>20)}(\text{Parts})$$

3. List only the names of those parts that are not blue.

Solution#1: $\pi_{(\text{name})}(\sigma_{(\text{color} \neq \text{"blue"})}(\text{Parts}))$

4. List the names of those suppliers who ship part number P3.

Solution#1: $\pi_{(\text{name})}(\sigma_{(\text{pnum}=\text{"P3"})}(\text{Shipments} \times \text{Suppliers}))$

Is solution #1 correct?

No, because the Cartesian product pairs all combinations from the two operand tables, even those combinations which are not related.

A Correct Solution

$$\pi_{(\text{name})}(\sigma_{(\text{pnum}=\text{"P3"})\ \text{AND}\ (\text{Shipments.snum}=\text{Suppliers.snum})}(\text{Shipments} \times \text{Suppliers}))$$

This condition eliminates from the Cartesian product unrelated tuples.

5. List only the names of those suppliers who ship a blue part.

Solutions

To shorten the expressions let:

S = Suppliers

P = Parts

SPJ = Shipments

$$\pi_{(\text{name})}\left(\sigma_{(\text{S.snum}=\text{SPJ.snum})}\left(S\times\left(\sigma_{(\text{P.pnum}=\text{SPJ.pnum})}\left(\left(\sigma_{(\text{color}=\text{"blue"})}\left((P)\times SPJ\right)\right)\right)\right)\right)\right)$$

$$\pi_{(\text{name})}\left(\sigma_{(\text{S.snum}=\text{SPJ.snum})}\left(S\times\left(\sigma_{(\text{color}=\text{"blue"})\ \text{AND}\ (\text{P.pnum}=\text{SPJ.pnum})}\left(P\times SPJ\right)\right)\right)\right)$$

$$\pi_{(\text{name})}\left(\sigma_{(\text{S.snum}=\text{SPJ.snum})\ \text{AND}\ (\text{P.pnum}=\text{SPJ.pnum})\ \text{AND}\ (\text{color}=\text{"blue"})}\left(S\times P\times SPJ\right)\right)$$