Example showing how π works differently for sets vs. bags.

π_{first} Student

id	first	Last	major
1	Bob	Smith	CS
2	Bob	Jones	Math
1	Bob	Smith	CS
3	Mary	Jones	~~Math~~ CS

set semantics

Bob
Mary

π with bag semantics

Bob
Bob
Bob
Mary

Example of queries - rel. alg. equiv. on slide 8

$$\sigma_{age > 21}\left(\sigma_{gender = 'male'}\, Student\right)$$

$$\sigma_{gender = 'male'}\left(\sigma_{age > 21}\, Student\right)$$

$$\sigma_{gender = 'male' \text{ and } age > 21}\, Student$$

$$\pi_{\ldots}\left(\sigma_{cond} R\right) \equiv \sigma_{cond}\left(\pi_{\ldots} R\right)$$

Summary of data in agentbob and agentdavid

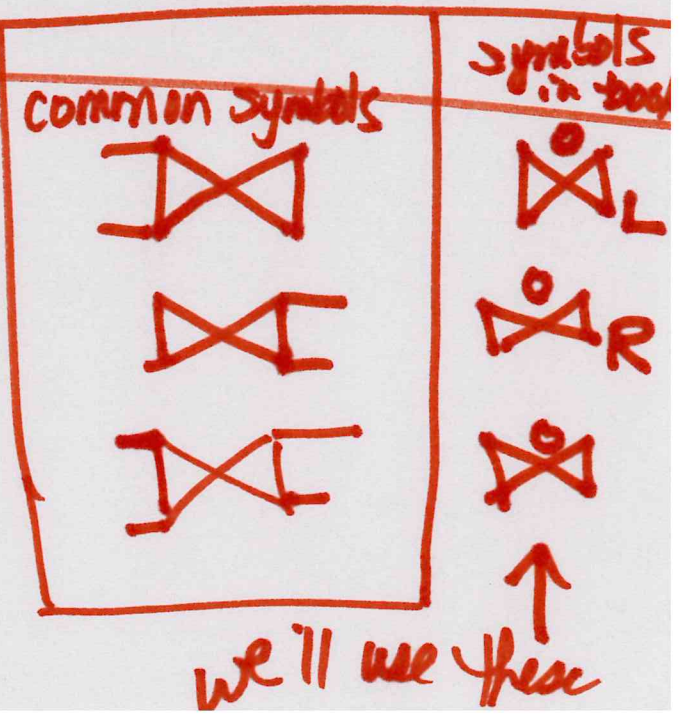
Bob	5	6 times	David	6	2 times
Bob	3	2 times	David	5	3 times
Bob	2	once	David	3	2 times
Bob	1	once	David	1	3 times

Symbols used to represent outer join.

Left outer join

Right outer join

Full



Counterexample showing $\sigma_{cond_1 \text{ OR } cond_2}(R)$ is not equivalent to $\sigma_{cond_1}(R) \cup \sigma_{cond_2}(R)$ for bags!

id	first	last	major
1	Bob	Smith	CS
2	Bob	Jones	Math
1	Bob	Smith	CS
3	Mary	Jones	~~Math~~ CS

$\sigma_{first='Bob' \text{ or } major='CS'}(Student)$

1 Bob Smith CS
2 Bob Jones Math
1 Bob Smith CS
3 Mary Jones ~~Math~~ CS

$(\sigma_{first='Bob'}(Stu)) \cup (\sigma_{major='CS'}(Stu))$

1 Bob Smith CS
2 Bob Jones CS
1 Bob Smith CS

1 Bob Smith CS
1 Bob Smith CS
3 Mary Jones CS

union has 4 times!
1 Bob Smith CS
compared to