

SQL Queries

Join Expressions

Cross Join

- select * from Product, PC
- select * from Product **cross join** PC
- The two statements are identical
- **cross join** is Cartesian product
- **cross join** is only *syntactic sugaring*

Join and Inner Join

- select * from Product P, PC where P.model=PC.model
- select * from Product P **join** PC **on** P.model=PC.model
- select * from Product P **inner join** PC **on** P.model=PC.model
- The three statements are identical
- **join** and **inner join** are only *syntactic sugar*ing
- **Cross join, join, and inner join do not provide any additional functionality beyond what can be expressed in WHERE**

Natural Join

- select * from Product P, PC where P.model=PC.model
- select * from Product P **join** PC **on** P.model=PC.model
- select * from Product P **natural join** PC
- The three statements are almost identical
- **natural join** implies equality predicates between the attributes with the same name across the two tables
- select * from Product **natural join** Printer
- select * from Product P, Printer Pr where P.model = Pr.model and **P.type = Pr.type**
 - This is probably not intended
- Only one copy of the join attribute is kept in result since they are equal
 - {P.model, PC.model} → {model}

Outer Joins

$R(A,B)$ $S(B,C)$

0 1 0 1

2 3 2 4

0 1 2 5

2 4 3 4

0 2

3 4 3 4

$R \bowtie S$

[natural join]

(A,B,C)

2 3 4

2 3 4

$R \bowtie S$ [full outer join]

(A,B,C)

2 3 4

2 3 4

0 1 -

0 1 -

2 4 -

3 4 -

- 0 1

- 2 4

- 2 5

- 0 2

Left (Right) Outer Joins

| R(A,B) | S(B,C) |
|--------|--------|
| 0 1 | 0 1 |
| 2 3 | 2 4 |
| 0 1 | 2 5 |
| 2 4 | 3 4 |
| 2 4 | 0 2 |
| 3 4 | 3 4 |
| - | - 0 2 |

$R \bowtie S$ [full outer join]

(A,B,C)

2 3 4
2 3 4

0 1 -
0 1 -

2 4 -
3 4 -

- 0 1

- 2 4

- 2 5
- 0 2

$R \bowtie_L S$

[left outer join]
(A,B,C)

2 3 4

2 3 4

0 1 -

0 1 -

2 4 -

3 4 -

$R \bowtie_R S$

[right outer join]
(A,B,C)

2 3 4

2 3 4

- 0 1

- 2 4

- 2 5

- 0 2

SQLite

- Only **left outer join** is supported
- select * from Product P **left outer join** PC on P.model = PC.model
where P.type = 'pc'
- select * from Product P **left outer join** PC on P.model = PC.model
- select * from Product P **natural left outer join** PC
- select * from Product P **natural left outer join** PC
where P.type = 'pc'

Examples

- Computers
- TPC-H