

Union

- “join” two tables – the same number of columns

```
select RA2000, DEC2000, TWOMASSID from TWOMASS WHERE ID <5
union all
select RA2000, DEC2000, USNOID from USNOA2 where ID < 5;
```

RA2000	DEC2000	TWOMASSID
0.012392	30.008553	00000297+3000307
359.998131	29.985722	23595955+2959085
0.010651	30.011211	00000255+3000403
0.001064	30.019468	00000025+3001100
0.012162	30.008659	1200-00000459
359.997975	29.98575	1125-20024335
359.98835	30.012439	1200-20142709
359.994289	29.98172	1125-20024228

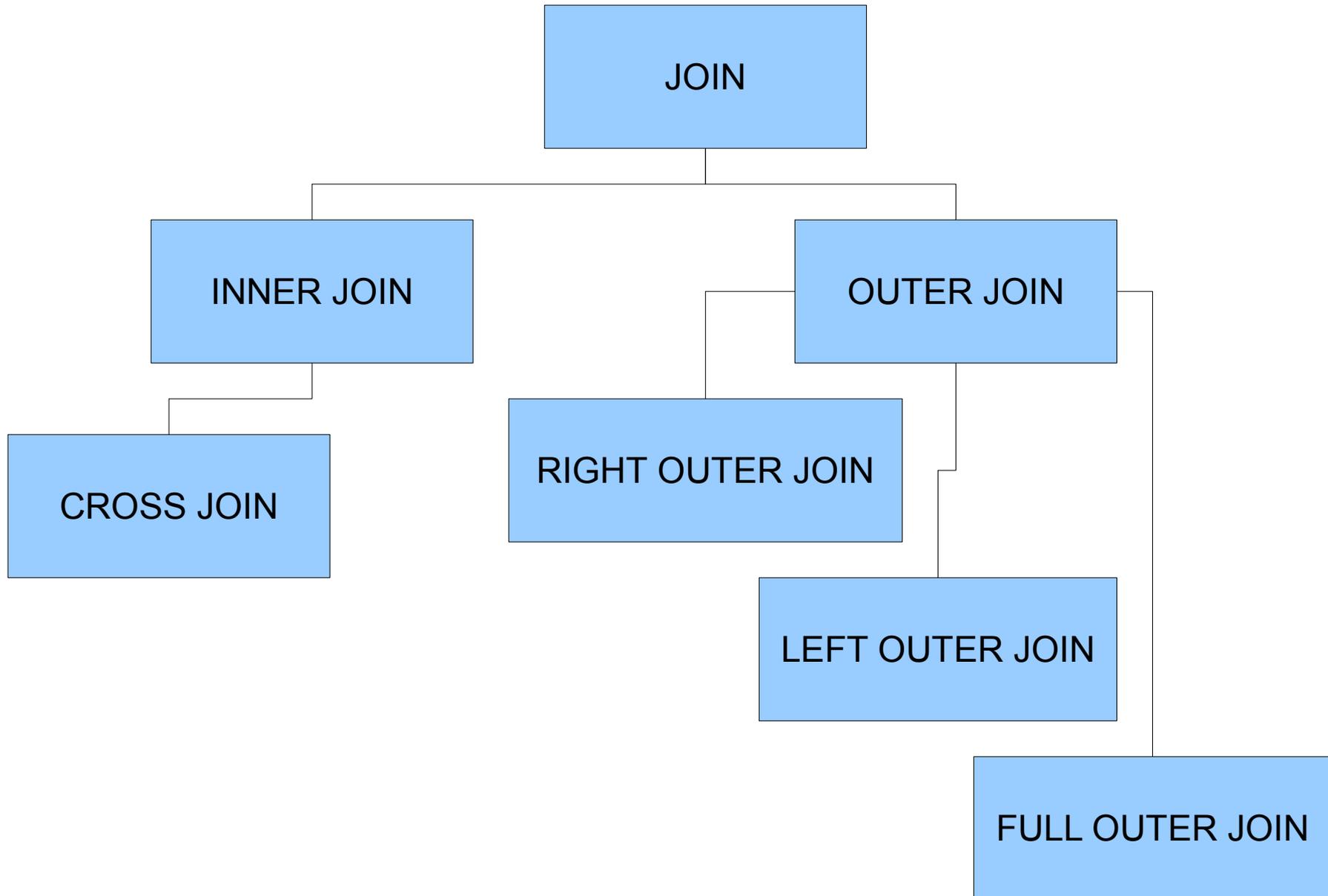
+-----+-----+-----+

8 rows in set (0.00 sec)

C = A U B

A – first 4 records from TWOMASS
B - first 4 records from USNOA2

JOIN types



CROSS JOIN

- $C = A \times B$ - all possible combinations of two sets

```
select CROSSID, IDTWOMASS
      from CROSSID
     where IDTWOMASS < 4;
```

CROSSID	IDTWOMASS
1	1
2	2
3	3

A

```
select ID from TWOMASS where ID < 4;
```

ID
1
2
3

B

```
select t1.CROSSID, t1.IDTWOMASS, t2.ID from
(select CROSSID, IDTWOMASS from CROSSID
 where CROSSID < 4) AS t1
CROSS JOIN
(select ID from TWOMASS where ID <4) AS t2
```

CROSSID	IDTWOMASS	ID
1	1	1
2	2	1
3	3	1
1	1	2
2	2	2
3	3	2
1	1	3
2	2	3
3	3	3

C

INNER JOIN

- Join all records with matching join criterion:

$$C = \{A \times B : A.F1 = B.F1\}$$

```
select t1.CROSSID, t1.IDTWOMASS, t2.ID from CROSSID as t1
INNER JOIN TWOMASS as t2 ON t1.IDTWOMASS=t2.ID
```

To reduce subset

```
select t1.CROSSID, t1.IDTWOMASS, t2.ID from CROSSID as t1
INNER JOIN TWOMASS as t2 ON t1.IDTWOMASS=t2.ID
WHERE t2.ID < 4
```

CROSSID	IDTWOMASS	ID
1	1	1
2	2	2
3	3	3

Compare with previous result: only records with
TWOMASS.ID==CROSSID.IDTWOMASS
Selected

The same statement

```
select t1.CROSSID, t1.IDTWOMASS, t2.ID
from CROSSID as t1, TWOMASS as t2
WHERE t1.IDTWOMASS=t2.ID AND t2.ID < 4
```

OUTER JOIN

- Join all records with matching join criterion and add non-matching!
- LEFT OUTER JOIN: $C = \{A \times B : A.F1 = B.F1\} \cup \{A \text{ not in } \{A \times B : A.F1 = B.F1\}\}$
- RIGHT OUTER JOIN: $C = \{A \times B : A.F1 = B.F1\} \cup \{B \text{ not in } \{A \times B : A.F1 = B.F1\}\}$
- FULL OUTER JOIN: $C = \{A \times B : A.F1 = B.F1\} \cup \{A \text{ not in } \{A \times B : A.F1 = B.F1\}\} \cup \{B \text{ not in } \{A \times B : A.F1 = B.F1\}\}$

A: select CROSSID, IDTWOMASS from CROSSID where CROSSID>5 AND CROSSID<10;

B: select ID from TWOMASS where ID>5 AND ID<10;

	+-----+	+-----+	+		+----+
	CROSSID	IDTWOMASS			ID
	+-----+	+-----+	+		+----+
A:	6	6		B:	6
	7	7			7
	8	7			8
	9	9			9
	+-----+ <td>+-----+<td>+</td><td></td><td>+----+</td></td>	+-----+ <td>+</td> <td></td> <td>+----+</td>	+		+----+

LEFT OUTER JOIN

- LEFT OUTER JOIN: $C = \{A \times B : A.F1 = B.F1\} \cup \{A \text{ not in } \{A \times B : A.F1 = B.F1\}\}$

C: select t1.CROSSID, t1.IDTWOMASS, t2.ID
from CROSSID AS t1
LEFT OUTER JOIN
TWOMASS AS t2 ON **t1.IDTWOMASS=t2.ID**
where t2.ID > 5 AND t2.ID <10;

CROSSID	IDTWOMASS	ID
6	6	6
7	7	7
8	7	7
9	9	9

RIGHT OUTER JOIN

- RIGHT OUTER JOIN: $C = \{A \times B : A.F1 = B.F1\} \cup \{B \text{ not in } \{A \times B : A.F1 = B.F1\}\}$

C: select t1.CROSSID, t1.IDTWOMASS, t2.ID

from CROSSID AS t1

RIGHT OUTER JOIN

TWOMASS AS t2 ON **t1.IDTWOMASS=t2.ID**

where t2.ID > 5 AND t2.ID < 10;

CROSSID	IDTWOMASS	ID
6	6	6
7	7	7
8	7	7
NULL	NULL	8
9	9	9

Record from B which is not present in A

FULL OUTER JOIN

FULL OUTER JOIN: $C = \{A \times B : A.F1 = B.F1\} \cup \{A \text{ not in } \{A \times B : A.F1 = B.F1\}\} \cup \{B \text{ not in } \{A \times B : A.F1 = B.F1\}\}$

NOT IMPLEMENTED IN MySQL

Write yourself according to formula above:

```
select t1.CROSSID, t1.IDTWOMASS, t2.ID from CROSSID AS t1, TWOMASS AS t2
  where t1.IDTWOMASS=t2.ID AND t2.ID > 5 AND t2.ID <10
```

union all

```
select t1.CROSSID, t1.IDTWOMASS, NULL from CROSSID AS t1
  where t1.IDTWOMASS>5 AND t1.IDTWOMASS<10 AND t1.CROSSID not in
  (select t1.CROSSID from CROSSID AS t1, TWOMASS AS t2
    where t1.IDTWOMASS=t2.ID AND t2.ID > 5 AND t2.ID <10)
```

union all

```
select NULL, NULL, t2.ID from TWOMASS AS t2
  where t2.ID>5 and t2.ID<10 AND t2.ID not in
  (select t2.ID from CROSSID AS t1, TWOMASS AS t2
    where t1.IDTWOMASS=t2.ID AND t2.ID > 5 AND t2.ID <10)
```

VERY INEFFICIENT