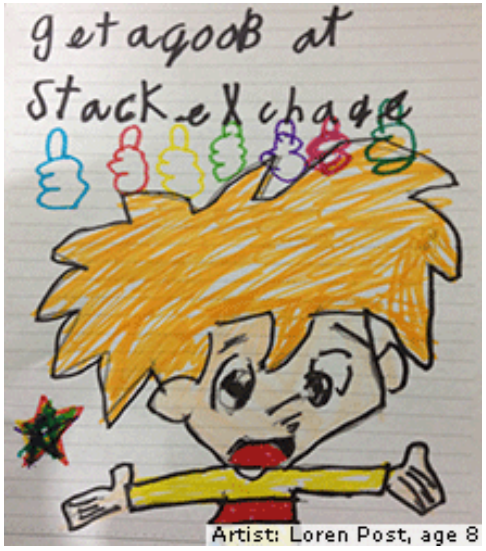
Difference between inner and outer join

asked **5 years ago**
viewed **680685 times**
active **17 days ago**



1324

What is the difference between `INNER JOIN` and `OUTER JOIN`?

sql join inner-join outer-join

718

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edited Sep 1 '12 at 9:28
hims056
12.9k ●10 ●28 ●57

asked Sep 1 '08 at 22:36
cdv
9,040 ●4 ●16 ●24

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13 Answers

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2183

Assuming you're joining on columns with no duplicates, which is by far the most common case:

- An inner join of A and B gives the result of A intersect B, i.e. the inner part of a venn diagram intersection.
- An outer join of A and B gives the results of A union B, i.e. the outer parts of a venn diagram union

Examples

Suppose you have two Tables, with a single column each, and data as follows:

```
A    B
-    -
1    3
2    4
3    5
4    6
```

Note that (1,2) are unique to A, (3,4) are common, and (5,6) are unique to B.

Inner join

An inner join using either of the equivalent queries gives the intersection of the two tables, i.e. the two rows they have in common.

```
select * from a INNER JOIN b on a.a = b.b;
select a.*,b.*  from a,b where a.a = b.b;

a | b
--+--
3 | 3
4 | 4
```

Left outer join

A left outer join will give all rows in A, plus any common rows in B.

```
select * from a LEFT OUTER JOIN b on a.a = b.b;
select a.*,b.*  from a,b where a.a = b.b(+);

a |  b
--+-----
1 | null
2 | null
3 |    3
4 |    4
```


Linked

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1 SQL join and left outer join: why are the results differents?

0 what is the difference between inner and outer joins sql server

Full outer join

A full outer join will give you the union of A and B, i.e. All the rows in A and all the rows in B. If something in A doesn't have a corresponding datum in B, then the B portion is null, and vice versa.

```
select * from a FULL OUTER JOIN b on a.a = b.b;

 a    |  b
------+-----
   1  | null
   2  | null
   3  |    3
   4  |    4
null  |    6
null  |    5
```

share | improve this answer

edited Mar 12 '12 at 18:18

Peter Mortensen
7,087 ●8 ●49 ●80

answered Sep 1 '08 at 22:59

Mark Harrison
71.1k ●63 ●181 ●281

243 Excellently explained – HLGEM Nov 24 '08 at 22:22

27 One of the best explanations I have seen! – Lea Hayes Apr 25 '11 at 16:35

94 An excellent explanation, however this statement: *An outer join of A and B gives the results of A union B, i.e. the outer parts of a venn diagram union.* isn't phrased accurately. An outer join will give the results of A intersect B in addition to one of the following: all of A (left join), all of B (right join) or all of A and all of B (full join). Only this last scenario is really A union B. Still, a well written explanation. – Thomas May 3 '11 at 19:57

25 Simple explanations are often the best. This FAR EXCEEDS the Wikipedia on joins haha. Truly excellent examples with just enough data to see a clear picture. Thanks Mark :) – Chiramisu Aug 2 '11 at 18:26

4 Using Venn diagrams in the explanation instantly helped me understand! – emurano Oct 13 '11 at 3:50

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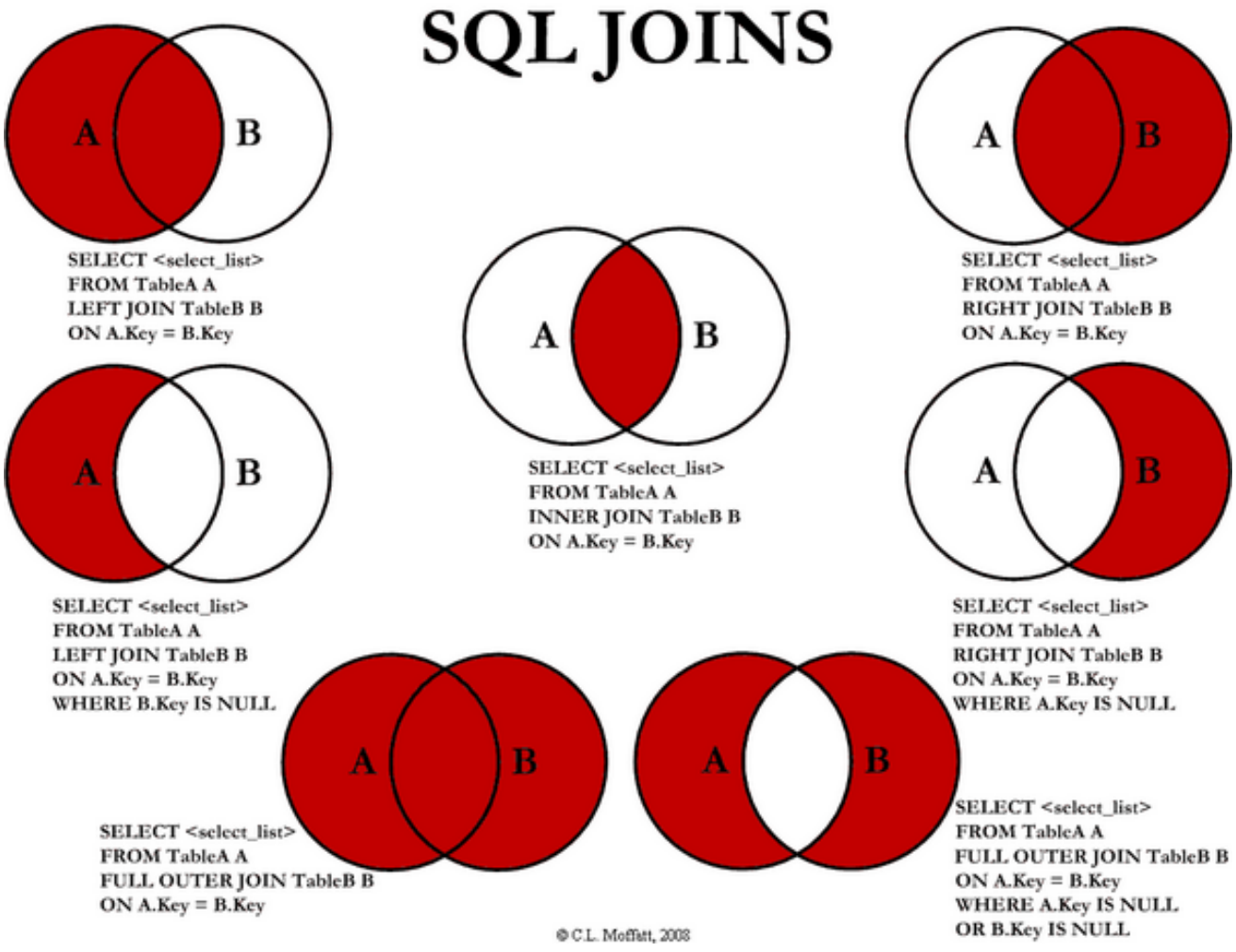
203 Difference between JOIN and INNER JOIN

231 INNER JOIN ON vs

Also you can consider following schema for different join types;

488



Source: http://www.codeproject.com/Articles/33052/Visual-Representation-of-SQL-Joins

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edited Jan 11 at 19:37

answered May 16 '13 at 23:03

WHERE clause

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Teoman shipahi
5,433 1 6 18

41 A classic example of when a picture is more worth than hundreds words ... – aleroot Aug 31 '13 at 11:53

I wish I could give this visual representation more than one votes! It has helped my understanding immensely. – mezoid Mar 7 at 3:15

I know this is old, but I'm doing some training sessions for some of our employee's here on Crystal Reports/SQL and this will come in Immensely handy! Thanks~! – Evan L Mar 10 at 22:49

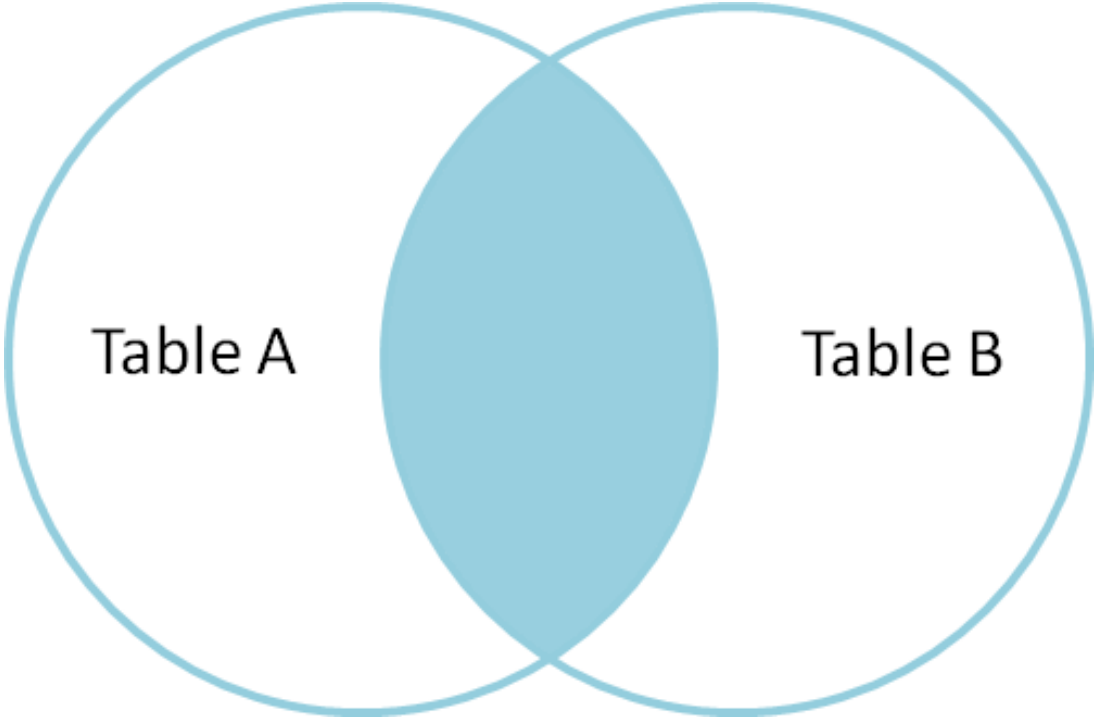
Note: There's no FULL OUTER JOIN in MySQL. stackoverflow.com/questions/12473210/… – Michael Ozeryansky Mar 25 at 2:25

add comment

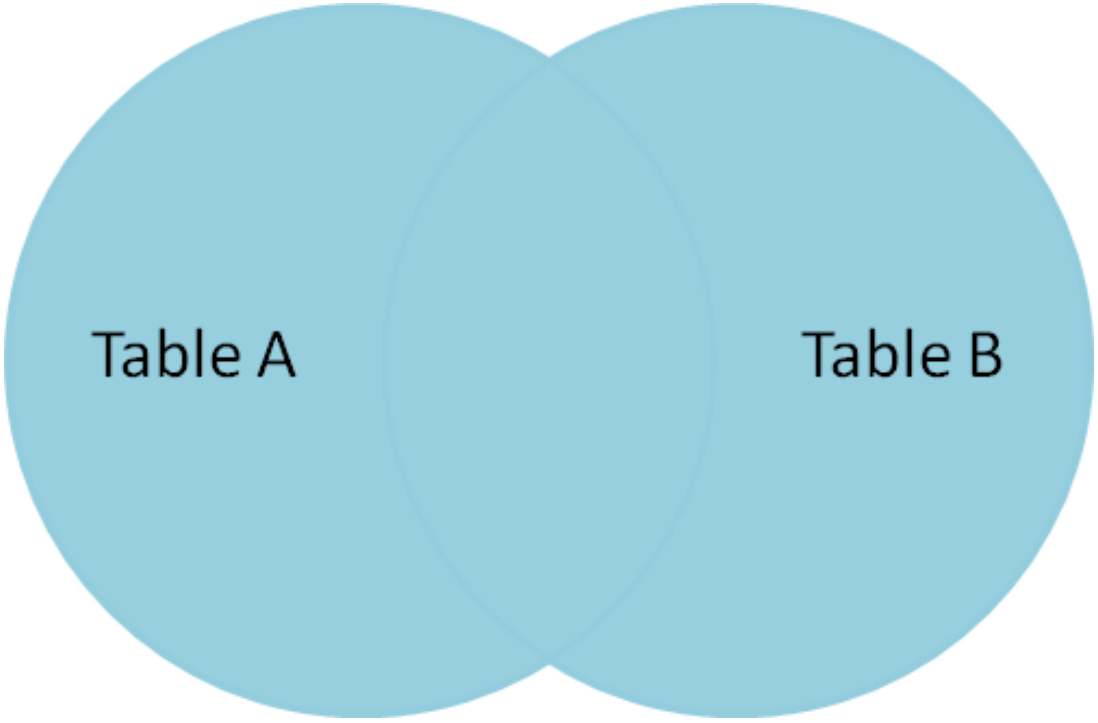
322

I recommend Jeff's blog article. The best description I've ever seen, plus there is a visualization, e.g.:

Inner Join:



Full Outer Join:



share | improve this answer

edited Mar 10 at 22:29
Dan
659 ●7 ●25

answered Aug 30 '09 at 11:52
ya23
6,048 ●2 ●27 ●29

17 This diagram is a bit misleading for the concept. Read the comments in the post as well. – Pratik Aug 30 '09 at 12:56

3 Excellent explanation that allows to remember the meaning! – Budda Apr 20 '12 at 16:44

@ya23: what does you mean by full outer join? – ursitesion Feb 12 at 9:20

add comment

137

The following was taken from the article "MySQL - LEFT JOIN and RIGHT JOIN, INNER JOIN and OUTER JOIN" by Graham Ellis on his blog Horse's Mouth.

In a database such as MySQL, data is divided into a number of tables which are then connected (`Joined`) together by `JOIN` in `SELECT` commands to read records from multiple tables. Read this

example to see how it works.

First, some sample data:

```
people
    mysql> select * from people;
    +------------+--------------+------+
    | name       | phone        | pid  |
    +------------+--------------+------+
    | Mr Brown   | 01225 708225 |    1 |
    | Miss Smith | 01225 899360 |    2 |
    | Mr Pullen  | 01380 724040 |    3 |
    +------------+--------------+------+
    3 rows in set (0.00 sec)

property
    mysql> select * from property;
    +------+------+----------------------+
    | pid  | spid | selling              |
    +------+------+----------------------+
    |    1 |    1 | Old House Farm       |
    |    3 |    2 | The Willows          |
    |    3 |    3 | Tall Trees           |
    |    3 |    4 | The Melksham Florist |
    |    4 |    5 | Dun Roamin           |
    +------+------+----------------------+
    5 rows in set (0.00 sec)
```

REGULAR JOIN

If we do a regular JOIN (with none of the keywords INNER, OUTER, LEFT or RIGHT), then we get all records that match in the appropriate way in the two tables, and records in both incoming tables that do not match are not reported:

```
mysql> select name, phone, selling
from people join property
on people.pid = property.pid;
+----------+--------------+----------------------+
| name     | phone        | selling              |
```

```
+----------+--------------+----------------------+
| Mr Brown  | 01225 708225 | Old House Farm       |
| Mr Pullen | 01380 724040 | The Willows          |
| Mr Pullen | 01380 724040 | Tall Trees           |
| Mr Pullen | 01380 724040 | The Melksham Florist |
+----------+--------------+----------------------+
4 rows in set (0.01 sec)
```

LEFT JOIN

If we do a LEFT JOIN, we get all records that match in the same way and IN ADDITION we get an extra record for each unmatched record in the left table of the join - thus ensuring (in this example) that every PERSON gets a mention:

```
mysql> select name, phone, selling
 from people left join property
 on people.pid = property.pid;
 +-----------+--------------+----------------------+
 | name       | phone        | selling              |
 +-----------+--------------+----------------------+
 | Mr Brown   | 01225 708225 | Old House Farm       |
 | Miss Smith | 01225 899360 | NULL <<-- unmatch    |
 | Mr Pullen  | 01380 724040 | The Willows          |
 | Mr Pullen  | 01380 724040 | Tall Trees           |
 | Mr Pullen  | 01380 724040 | The Melksham Florist |
 +-----------+--------------+----------------------+
 5 rows in set (0.00 sec)
```

RIGHT JOIN

If we do a RIGHT JOIN, we get all the records that match and IN ADDITION an extra record for each unmatched record in the right table of the join - in my example, that means that each property gets a mention even if we don't have seller details:

```
mysql> select name, phone, selling
from people right join property
on people.pid = property.pid;
+----------+--------------+----------------------+
| name      | phone        | selling              |
```

```
+----------+--------------+----------------------+
| Mr Brown  | 01225 708225 | Old House Farm       |
| Mr Pullen | 01380 724040 | The Willows          |
| Mr Pullen | 01380 724040 | Tall Trees           |
| Mr Pullen | 01380 724040 | The Melksham Florist |
| NULL      | NULL         | Dun Roamin           |
+----------+--------------+----------------------+
5 rows in set (0.00 sec)
```

An INNER JOIN does a full join, just like the first example, and the word OUTER may be added after the word LEFT or RIGHT in the last two examples - it's provided for ODBC compatibility and doesn't add an extra capabilities.

share | improve this answer

edited Jan 5 '13 at 11:21

PhiLho
22.6k 1 38 79

answered Feb 14 '11 at 5:53

gt_ebuddy
5,791 2 34 51

Thanks For explaining Regular Join Also – Ranjit Kumar Jun 7 '13 at 10:18

2 `REGULAR JOIN` and `INNER JOIN` are the same thing. What Graham Ellis wanted to say whit `REGULAR` is that INNER JOIN is the "default" JOIN, when none of `LEFT` or `RIGHT` keywords were specified. If you read the whole post, in the end He says "An INNER JOIN does a full join, just like the first example, and the word OUTER may be added after the word LEFT or RIGHT in the last two examples - it's provided for ODBC compatibility and doesn't add an extra capabilities." – vegatripy Aug 19 '13 at 11:04

add comment

35

A (left) inner join only shows rows if there is a matching record on the other (right) side of the join.

A (left) outer join shows rows for each record on the left hand side, even if there are no matching rows on the other (right) side of the join. If there is no matching row, the columns for the other (right) side would show NULLs.

share | improve this answer

answered Sep 1 '08 at 22:38

1800 INFORMATION
53.3k 14 98 170

add comment

24

Joins can be categorized as:

Inner joins (the typical join operation, which uses some comparison operator like = or <>). These include equi-joins and natural joins.

Inner joins use a comparison operator to match rows from two tables based on the values in common columns from each table. For example, retrieving all rows where the student identification number is the same in both the students and courses tables.

Outer joins. Outer joins can be a left, a right, or full outer join.

Outer joins are specified with one of the following sets of keywords when they are specified in the FROM clause:

LEFT JOIN or LEFT OUTER JOIN -The result set of a left outer join includes all the rows from the left table specified in the LEFT OUTER clause, not just the ones in which the joined columns match. When a row in the left table has no matching rows in the right table, the associated result set row contains null values for all select list columns coming from the right table.

RIGHT JOIN or RIGHT OUTER JOIN - A right outer join is the reverse of a left outer join. All rows from the right table are returned. Null values are returned for the left table any time a right table row has no matching row in the left table.

FULL JOIN or FULL OUTER JOIN - A full outer join returns all rows in both the left and right tables. Any time a row has no match in the other table, the select list columns from the other table contain null values. When there is a match between the tables, the entire result set row contains data values from the base tables.

Cross joins - Cross joins return all rows from the left table, each row from the left table is combined with all rows from the right table. Cross joins are also called Cartesian products. (A Cartesian join will get you a Cartesian product. A Cartesian join is when you join every row of one table to every row of another table. You can also get one by joining every row of a table to every row of itself.)

share | improve this answer

edited Jun 11 '12 at 22:13

David Manheim
1,305 ●7 ●23

answered Apr 5 '12 at 19:04

zaid abbas
259 ●2 ●2

3 -1 looks messy in comparison to previous answers. Pay more attention to structuring. – Timur Sadykov Apr 10 '12 at 23:51

8 Agree- presentation matters. On the other hand, you always have the option of editing the answer. –

David Manheim Jun 11 '12 at 21:46

add comment

22

in simple words

inner join retrieve the matched rows only

where as

outer join retrieve the matched rows from one table and all rows in other table ....the result depend on which one you are using

LEFT (MATCHED ROWS IN RIGHT TABLE AND ALL ROWS IN LEFT TABLE)

RIGHT (MATCHED ROWS IN LEFT TABLE AND ALL ROWS IN RIGHT TABLE) or

FULL (ALL ROWS IN ALL TABLES IT DOESN'T MATTERS EVEN MATCH IS THERE OR NOT)

share | improve this answer

answered Jan 12 '13 at 11:07

vidyadhar
875 2 14

add comment

19

Inner joins require that a record with a related ID exist in the joined table.

Outer joins will return records for the left side even if nothing exists for the right side.

For instance, you have an Orders and an OrderDetails table. They are related by an "OrderID".

Orders

- OrderID
- CustomerName

OrderDetails

- OrderDetailID
- OrderID
- ProductName

- Qty
- Price

The request

```
SELECT Orders.OrderID, Orders.CustomerName FROM Orders
INNER JOIN OrderDetails ON Orders.OrderID = OrderDetails.OrderID
```

will only return Orders that also have something in the OrderDetails table.

If you change it to OUTER LEFT JOIN

```
SELECT Orders.OrderID, Orders.CustomerName FROM Orders
LEFT JOIN OrderDetails ON Orders.OrderID = OrderDetails.OrderID
```

then it will return records from the Orders table even if they have no OrderDetails records.

You can use this to find Orders that do not have any OrderDetails indicating a possible orphaned order by adding a where clause like `WHERE OrderDetails.OrderID IS NULL`.

share | improve this answer

edited Jan 5 '13 at 11:02

PhiLho
22.6k ●1 ●38 ●79

answered Sep 1 '08 at 22:47

Brian Boatright
7,762 ●19 ●57 ●82

I appreciate the simple yet realistic example. I changed a request like `SELECT c.id, c.status, cd.name, c.parent_id, cd.description, c.image FROM categories c, categories_description cd WHERE c.id = cd.categories_id AND c.status = 1 AND cd.language_id = 2 ORDER BY c.parent_id ASC` to `SELECT c.id, c.status, cd.name, c.parent_id, cd.description, c.image FROM categories c INNER JOIN categories_description cd ON c.id = cd.categories_id WHERE c.status = 1 AND cd.language_id = 2 ORDER BY c.parent_id ASC` (MySQL) with success. I wasn't sure about the additional conditions, they mix well... – PhiLho Jan 5 '13 at 11:11

add comment

13

`INNER JOIN` requires there is at least a match in comparing the two tables. For example, table A and table B which implies A ∧ B (A intersection B).

`LEFT OUTER JOIN` and `LEFT JOIN` are the same. It gives all the records matching in both tables and

all possibilities of the left table.

Similarly, `RIGHT OUTER JOIN` and `RIGHT JOIN` are the same. It gives all the records matching in both tables and all possibilities of the right table.

`FULL JOIN` is the combination of `LEFT OUTER JOIN` and `RIGHT OUTER JOIN` without duplication.

share | improve this answer

edited Sep 26 '13 at 21:25
A_Pointar
44 ●7

answered Sep 2 '10 at 9:49
naga
131 ●1 ●2

add comment

12

You use INNER JOIN to return all rows from both tables where there is a match. ie. in the resulting table all the rows and colums will have values.

In OUTER JOIN the relulting table may have empty colums. Outer join may be either LEFT or RIGHT

LEFT OUTER JOIN returns all the rows from the first table, even if there are no matches in the second table.

RIGHT OUTER JOIN returns all the rows from the second table, even if there are no matches in the first table..

share | improve this answer

answered Sep 27 '12 at 7:33
vijikumar
746 ●4 ●16

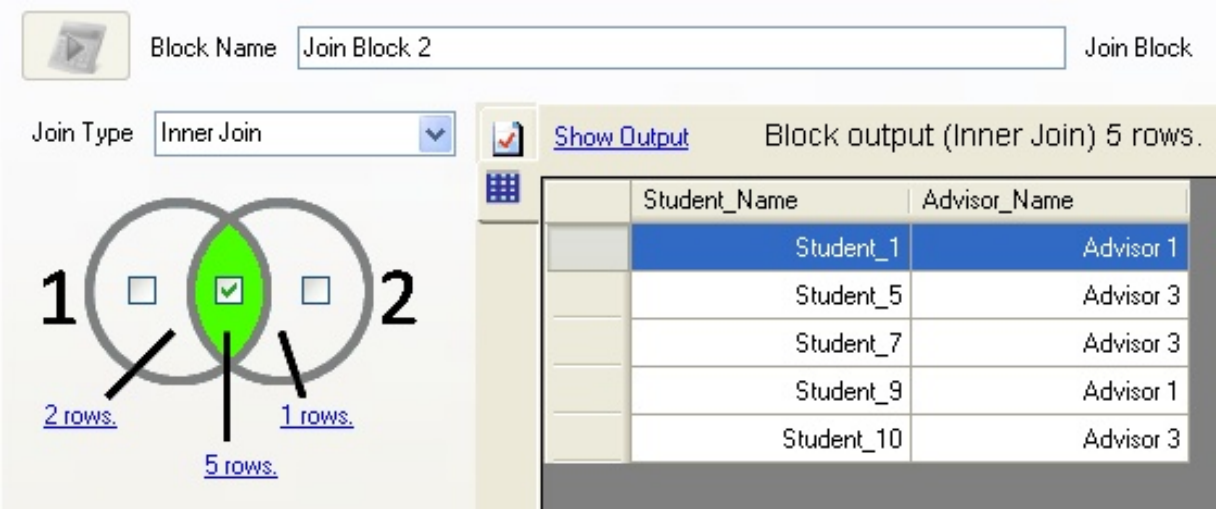
1 This question was asked over four years ago, and had 17 answers before yours. In what way does your answer improve upon those that already exist? – John Saunders Oct 2 '12 at 19:15

add comment

10

Inner Join

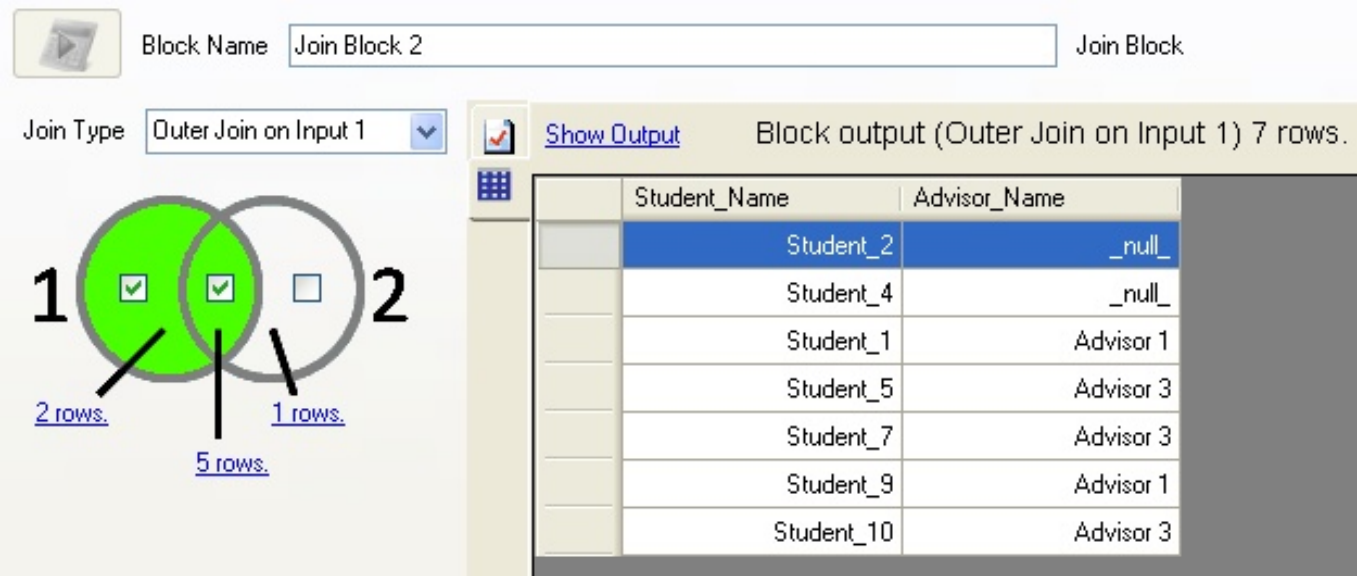
Retrieve the matched rows only i.e `A intersect B`




```
SELECT *
FROM dbo.Students S
INNER JOIN dbo.Advisors A
    ON S.Advisor_ID = A.Advisor_ID
```

Left Outer Join

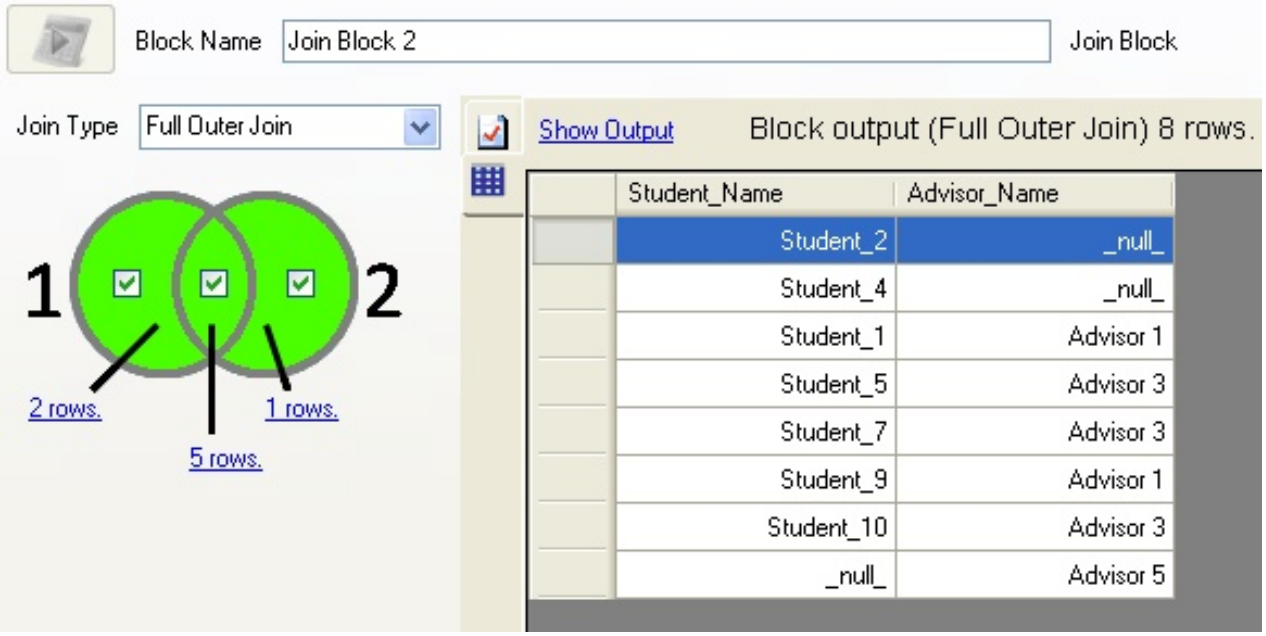
select all records from the first table, and any records in the second table that match the joined keys.




```
SELECT *
FROM dbo.Students S
LEFT JOIN dbo.Advisors A
    ON S.Advisor_ID = A.Advisor_ID
```

Full Outer Join

select all records from the second table, and any records in the first table that match the joined keys.




```
SELECT *
FROM dbo.Students S
FULL JOIN dbo.Advisors A
    ON S.Advisor_ID = A.Advisor_ID
```

Reference

Inner and outer joins SQL examples and the Join block

SQL: JOINS

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answered Jan 27 at 12:16

Tushar Gupta

24.7k ● 11 ● 21 ● 39

3 What is the name of tool? I find it is interesting as it shows number of rows and venn-diagrams – Grijesh Chauhan Jan 27 at 12:23

1 @GrijeshChauhan Datamartist :) – Tushar Gupta Jan 27 at 12:25

1 @Trushar :(it is not for Linux system.. – Grijesh Chauhan Jan 27 at 12:27

1 @GrijeshChauhan Yeah But you can Try to run it using wine . – Tushar Gupta Jan 27 at 12:30

1 @GrijeshChauhan All the best, Let me know if u get successful :) – Tushar Gupta Jan 27 at 12:38

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6

The difference is in the way tables are joined if there are no common records.

- `JOIN` is same as `INNER JOIN` and means to only show records common to both tables. Whether the records are common is determined by the fields in join clause. For example:

  ```
  FROM t1
  JOIN t2 on t1.ID = t2.ID
  ```

  means show only records where the same `ID` value exists in both tables.

- `LEFT JOIN` is same as `LEFT OUTER JOIN` and means to show all records from left table (i.e. the one that precedes in SQL statement) regardless of the existance of matching records in the right table.

- `RIGHT JOIN` is same as `RIGHT OUTER JOIN` and means opposite of `LEFT JOIN`, i.e. shows all records from the second (right) table and only matching records from first (left) table.

Source: What's the difference between LEFT, RIGHT, INNER, OUTER, JOIN?

share | improve this answer

edited Sep 18 '13 at 7:33

JJD

6,655 ●6 ●36 ●84

answered Sep 18 '13 at 2:36

Aldee Mativo

687 ●15 ●33

add comment

3

I don't see much details about performance and optimizer in the other answers.

Sometimes it is good to know that only inner join is associative which means the optimizer has the most option to play with it. It can reorder the join order to make it faster keeping the same result. The optimizer can use the most join modes.

Generally it is a good practice to try to use inner joins instead of the different kind of outers.

share | improve this answer

answered Nov 17 '13 at 12:59

Lajos Veres
6,105 2 11 25

add comment

---

protected by Kev Jul 21 '12 at 21:51

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