SQL JOINs Cheat Sheet

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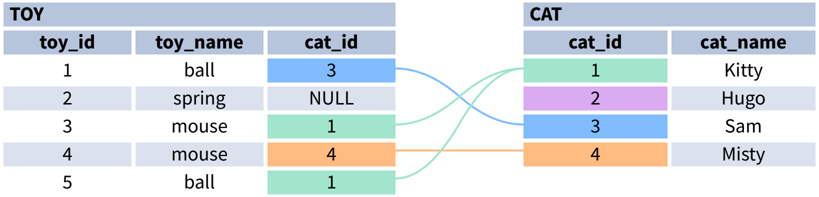
JOINING TABLES

JOIN combines data from two tables.



TOY

toy_id	toy_name	cat_id
1	ball	3
2	spring	NULL
3	mouse	1
4	mouse	4
5	ball	1

CAT

cat_id	cat_name
1	Kitty
2	Hugo
3	Sam
4	Misty

JOIN typically combines rows with equal values for the specified columns. **Usually**, one table contains a **primary key**, which is a column or columns that uniquely identify rows in the table (the cat_id column in the cat table). The other table has a column or columns that **refer to the primary key columns** in the first table (the cat_id column in the toy table). Such columns are **foreign keys**. The JOIN condition is the equality between the primary key columns in one table and columns referring to them in the other table.

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JOIN

JOIN returns all rows that match the ON condition. JOIN is also called INNER JOIN

```
SELECT *
FROM toy
JOIN cat
  ON toy.cat_id = cat.cat_id;
```

toy_id	toy_name	cat_id	cat_id	cat_name
5	ball	1	1	Kitty
3	mouse	1	1	Kitty
1	ball	3	3	Sam
4	mouse	4	4	Misty

There is also another, older syntax, but it **isn't recommended**. List joined tables in the FROM clause, and place the conditions in the WHERE clause.

```
SELECT *
FROM toy, cat
WHERE toy.cat_id = cat.cat_id;
```

JOIN CONDITIONS

The JOIN condition doesn't have to be an equality – it can be any condition you want. JOIN doesn't interpret the JOIN condition, it only checks if the rows satisfy the given condition.

To refer to a column in the JOIN query, you have to use the full column name: first the table name, then a dot (.) and the column name:

```
  ON cat.cat_id = toy.cat_id
```

You can omit the table name and use just the column name if the name of the column is unique within all columns in the joined tables.

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NATURAL JOIN

If the tables have columns with the same name, you can use `NATURAL JOIN` instead of `JOIN`.

```
SELECT *
FROM toy
NATURAL JOIN cat;
```

The common column appears only once in the result table.

Note: `NATURAL JOIN` is rarely used in real life.

cat_id	toy_id	toy_name	cat_name
1	5	ball	Kitty
1	3	mouse	Kitty
3	1	ball	Sam
4	4	mouse	Misty

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LEFT JOIN

`LEFT JOIN` returns all rows from the **left table** with matching rows from the right table. Rows without a match are filled with `NULL`s. `LEFT JOIN` is also called `LEFT OUTER JOIN`.

```
SELECT *
FROM toy
LEFT JOIN cat
  ON toy.cat_id = cat.cat_id;
```

toy_id	toy_name	cat_id	cat_id	cat_name
5	ball	1	1	Kitty
3	mouse	1	1	Kitty
1	ball	3	3	Sam
4	mouse	4	4	Misty
2	spring	NULL	NULL	NULL

whole left table

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RIGHT JOIN

`RIGHT JOIN` returns all rows from the **right table** with matching rows from the left table. Rows without a match are filled with `NULL`s. `RIGHT JOIN` is also called `RIGHT OUTER JOIN`.

```sql
SELECT *
FROM toy
RIGHT JOIN cat
  ON toy.cat_id = cat.cat_id;
```

toy_id	toy_name	cat_id	cat_id	cat_name
5	ball	1	1	Kitty
3	mouse	1	1	Kitty
NULL	NULL	NULL	2	Hugo
1	ball	3	3	Sam
4	mouse	4	4	Misty

whole right table

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FULL JOIN

`FULL JOIN` returns all rows from the **left table** and all rows from the **right table**. It fills the non-matching rows with `NULL`s. `FULL JOIN` is also called `FULL OUTER JOIN`.

```
SELECT *
FROM toy
FULL JOIN cat
  ON toy.cat_id = cat.cat_id;
```

toy_id	toy_name	cat_id	cat_id	cat_name
5	ball	1	1	Kitty
3	mouse	1	1	Kitty
NULL	NULL	NULL	2	Hugo
1	ball	3	3	Sam
4	mouse	4	4	Misty
2	spring	NULL	NULL	NULL
whole left table			whole right table	

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CROSS JOIN

`CROSS JOIN` returns **all possible combinations** of rows from the left and right tables.

```
SELECT *
FROM toy
CROSS JOIN cat;
```

Other syntax:

```
SELECT *
FROM toy, cat;
```

toy_id	toy_name	cat_id	cat_id	cat_name
1	ball	3	1	Kitty
2	spring	NULL	1	Kitty
3	mouse	1	1	Kitty
4	mouse	4	1	Kitty
5	ball	1	1	Kitty
1	ball	3	2	Hugo
2	spring	NULL	2	Hugo
3	mouse	1	2	Hugo
4	mouse	4	2	Hugo
5	ball	1	2	Hugo
1	ball	3	3	Sam
···	···	···	···	···

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COLUMN AND TABLE ALIASES

Aliases give a temporary name to a **table** or a **column** in a table.

CAT AS c			
cat_id	**cat_name**	**mom_id**	**owner_id**
1	Kitty	5	1
2	Hugo	1	2
3	Sam	2	2
4	Misty	1	NULL

OWNER AS o	
id	**name**
1	John Smith
2	Danielle Davis

A **column alias** renames a column in the result. A **table alias** renames a table within the query. If you define a table alias, you must use it instead of the table name everywhere in the query. The AS keyword is optional in defining aliases.

```
SELECT
  o.name AS owner_name,
  c.cat_name
FROM cat   AS c
JOIN owner AS o
  ON c.owner_id = o.id;
```

cat_name	owner_name
Kitty	John Smith
Sam	Danielle Davis
Hugo	Danielle Davis

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SELF JOIN

You can join a table to itself, for example, to show a parent-child relationship.

CAT AS child

cat_id	cat_name	owner_id	mom_id
1	Kitty	1	5
2	Hugo	2	1
3	Sam	2	2
4	Misty	NULL	1

CAT AS mom

cat_id	cat_name	owner_id	mom_id
1	Kitty	1	5
2	Hugo	2	1
3	Sam	2	2
4	Misty	NULL	1

Each occurrence of the table must be given a **different alias**. Each column reference must be preceded with an **appropriate table alias**.

```
SELECT
  child.cat_name AS child_name,
  mom.cat_name   AS mom_name
FROM cat AS child
JOIN cat AS mom
  ON child.mom_id = mom.cat_id;
```

child_name	mom_name
Hugo	Kitty
Sam	Hugo
Misty	Kitty

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NON-EQUI SELF JOIN

You can use a **non-equality** in the ON condition, for example, to show **all different pairs** of rows.

TOY AS a

toy_id	toy_name	cat_id
3	mouse	1
5	ball	1
1	ball	3
4	mouse	4
2	spring	NULL

TOY AS b

cat_id	toy_id	toy_name
1	3	mouse
1	5	ball
3	1	ball
4	4	mouse
NULL	2	spring

```
SELECT
  a.toy_name AS toy_a,
  b.toy_name AS toy_b
FROM toy a
JOIN toy b
  ON a.cat_id < b.cat_id;
```

cat_a_id	toy_a	cat_b_id	toy_b
1	mouse	3	ball
1	ball	3	ball
1	mouse	4	mouse
1	ball	4	mouse
3	ball	4	mouse

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MULTIPLE JOINS

You can join more than two tables together. First, two tables are joined, then the third table is joined to the result of the previous joining.

TOY AS t

toy_id	toy_name	cat_id
1	ball	3
2	spring	NULL
3	mouse	1
4	mouse	4
5	ball	1

CAT AS c

cat_id	cat_name	mom_id	owner_id
1	Kitty	5	1
2	Hugo	1	2
3	Sam	2	2
4	Misty	1	NULL

OWNER AS o

id	name
1	John Smith
2	Danielle Davis

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JOIN & JOIN

```
SELECT
  t.toy_name,
  c.cat_name,
  o.name AS owner_name
FROM toy t
JOIN cat c
  ON t.cat_id = c.cat_id
JOIN owner o
  ON c.owner_id = o.id;
```

toy_name	cat_name	owner_name
ball	Kitty	John Smith
mouse	Kitty	John Smith
ball	Sam	Danielle Davis

JOIN & LEFT JOIN

```
SELECT
  t.toy_name,
  c.cat_name,
  o.name AS owner_name
FROM toy t
JOIN cat c
  ON t.cat_id = c.cat_id
LEFT JOIN owner o
  ON c.owner_id = o.id;
```

toy_name	cat_name	owner_name
ball	Kitty	John Smith
mouse	Kitty	John Smith
ball	Sam	Danielle Davis
mouse	Misty	NULL

LEFT JOIN & LEFT JOIN

```
SELECT
  t.toy_name,
  c.cat_name,
  o.name AS owner_name
FROM toy t
LEFT JOIN cat c
  ON t.cat_id = c.cat_id
LEFT JOIN owner o
  ON c.owner_id = o.id;
```

toy_name	cat_name	owner_name
ball	Kitty	John Smith
mouse	Kitty	John Smith
ball	Sam	Danielle Davis
mouse	Misty	NULL
spring	NULL	NULL

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JOIN WITH MULTIPLE CONDITIONS

You can use multiple `JOIN` conditions using the **ON** keyword once and the **AND** keywords as many times as you need.

CAT AS c

cat_id	cat_name	mom_id	owner_id	age
1	Kitty	5	1	17
2	Hugo	1	2	10
3	Sam	2	2	5
4	Misty	1	NULL	11

OWNER AS o

id	age	name
1	18	John Smith
2	10	Danielle Davis

```
SELECT
  cat_name,
  o.name AS owner_name,
  c.age  AS cat_age,
  o.age  AS owner_age
FROM cat c
JOIN owner o
  ON c.owner_id = o.id
 AND c.age < o.age;
```

cat_name	owner_name	cat_age	owner_age
Kitty	John Smith	17	18
Sam	Danielle Davis	5	10

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