IS NULL and IS NOT NULL

Used to test whether a value is assigned or not.

List all books for which no advance has been recorded

```
SELECT *
FROM titles
WHERE advance IS NULL
```

List all books for which an advance has been recorded

```
SELECT *
FROM titles
WHERE advance IS NOT
NULL
```

OR

```
SELECT *
FROM titles
WHERE NOT advance IS
NULL
```

GROUP BY

Row grouping based on the value of one or more columns.

List the publishers' cities

```
SELECT city
FROM publishers
GROUP BY city
```

List the publishing dates of the books

```
SELECT YEAR(pubdate)
FROM titles
GROUP BY YEAR(pubdate)
```

List the publishers' countries and states

```
SELECT state, country
FROM publishers
GROUP BY state, country
```

Aggregate functions

To perform a calculation on a set of values.

Example with **COUNT** (*)
(line count)

Count the number of books
(no GROUP BY clause to group all rows)

```
SELECT COUNT(*)
FROM titles
```

Count the number of books of each type

```
SELECT type, COUNT(*)
FROM titles
GROUP BY type
```

Aggregate functions

Count of the number of publishers publishing our books

```
SELECT COUNT (DISTINCT
pub_id)
FROM titles
```

Same, but for each type of book

```
SELECT    type,
          COUNT (DISTINCT
          pub_id)
FROM titles
GROUP BY
type
```

Aggregate functions

Other Aggregate functions :

MAX ([**ALL** | **DISTINCT**] expression)
   returns the maximum value of a set of values

MIN ([**ALL** | **DISTINCT**] expression)
   returns the minimum value on a set of values

SUM ([**ALL** | **DISTINCT**] expression)
   returns the sum of a set of values

AVG ([**ALL** | **DISTINCT**] expression)
   returns the average of a set of values

HAVING

Selection criterion in a GROUP BY.

List the countries with more than 2 publishers

```
SELECT country, COUNT(*) AS 'Number of publishers'
FROM publishers
GROUP BY country
HAVING COUNT(*)>2
```

**The condition associated with HAVING must
contain an aggregate function and / or
a column name of the GROUP BY**

1. Which states contain more than one author? Display the state and number of authors.
2. From the titles table, obtain the average advance and the sum of the current sales for the year (ytd_sales) for each of the book categories. Also Display the number of books by category.
3. From the previous list we want to retain only the results for categories containing more than 2 books.
4. What types of books have an average royalty of between 10 and 13? Display the type and average royalty.

1. Which states contain more than one author?
Display the state and number of authors.

```
SELECT state,
    count(*) AS 'Number of Authors'
FROM authors
GROUP BY state
HAVING count(*)>1
```

2. From the titles table, obtain the average advance and the sum of the current sales for the year (ytd_sales) for each of the book categories. Also Display the number of books by category.

```
SELECT  type,
        AVG(advance) AS 'Average Advance',
        SUM(ytd_sales) AS 'Sales',
        COUNT(*) AS 'Number of Books'
FROM titles
GROUP BY type
```

3. From the previous list we want to retain only the results for categories containing more than 2 books.

```
SELECT    type,
          AVG(advance) AS 'Average Advance',
          SUM(ytd_sales) AS 'Sales',
          COUNT(*) AS 'Number of Books'
FROM titles
GROUP BY type
HAVING COUNT(*) >2
```

4. What types of books have an average royalty of between 10 and 13? Display the type and average royalty.

```
SELECT    type,
          AVG(royalty) AS 'Average Royalty'
FROM titles
GROUP BY type
HAVING AVG(royalty)  BETWEEN 10 AND 13
```

5. What types of books have an average royalty between 10 and 13 and have more than 3 books? Display the type, the average royalty and the number of books.

6. What is the number of US publishers?

7. Display the number of books published per year.

8. What is the number of books published in 1991?

9. What is the number of books published in June of 1991?

5. What types of books have an average royalty between 10 and 13 and have more than 3 books? Display the type, the average royalty and the number of books.

```sql
SELECT  type,
        AVG(royalty) AS 'Average Royalty',
        COUNT(*) AS 'Nb. Books'
FROM titles
GROUP BY type
HAVING  AVG(royalty) BETWEEN 10 AND 13 AND
        COUNT(*)>3
```

6. What is the number of US publishers?

```
SELECT COUNT(*) AS 'Nb. American publishers'
FROM publishers
GROUP BY country
HAVING country='USA'
```

OR

```
SELECT COUNT (*) AS 'Nb. American publishers'
FROM publishers
WHERE country='USA'
```

7. Display the number of books published per year.

```
SELECT    YEAR(pubdate) AS 'Year',
          COUNT(*) AS 'Nb. Books'
FROM titles
GROUP BY YEAR(pubdate)
ORDER BY COUNT(*)
```

8. What is the number of books published in 1991?
1991 ?

```
SELECT COUNT(*) AS 'Nb. Books'
FROM titles
GROUP BY YEAR(pubdate)
HAVING YEAR(pubdate) = 1991
```

9. What is the number of books published in June of 1991?

```
SELECT COUNT(*) AS 'Nb. Books'
FROM titles
GROUP BY YEAR(pubdate), MONTH(pubdate)
 HAVING  YEAR(pubdate) = 1991 AND
          MONTH(pubdate)=6
```

1. Number of authors per city.

2. Cities that have two authors.

3. Types of books whose average price is greater than 15?

4. Display maximum and minimum royalty for books by year of publication.

5. Display the number of books of the publisher number 1389 by category (type).

6. Display the number of books by category, only consider books with a price over $ 15.

7. Number of authors (with a phone number 9) by state.