SQL queries - I

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Follow along

https://github.com/sebinbenjamin/mission-ready-hq-training/tree/sept-2020/week-9

Structured Query Language

- Structured Query Language (SQL) is the standard language for interacting with DBMS.
- SQL syntax is similar to the English language, which makes it relatively easy to write, read, and interpret.
    - SQL is a ‘Question, we ask the database a question by using SQL.
    - SQL is used by writing declarative statements, often referred to as **queries**.
- Many RDBMSs use SQL (and variations of SQL) to access the data in tables.
- SQL is not case-sensitive, convention - use CAPITAL for keywords.
    - Linebreaks and spaces are ignored.

SQL is basically combination of four different languages, they are

- DQL (Data **Query** Language)
  - DQL is used to **fetch** the information from the database which is already stored there.
- DDL (Data Definition Language)
  - DDL is used to **define table** schemas.
- DCL (Data Control Language)
  - DCL is used for user & permission management. It **controls the access** to the database.
- DML (Data **Manipulation** Language)
  - DML is used for **inserting, updating and deleting** data from the database.

https://dev.mysql.com/doc/refman/8.0/en/sql-statements.html

Data Control Language

```
GRANT USAGE ON *.* TO `demoUser`@`%`


GRANT
    SELECT, INSERT, UPDATE, DELETE, CREATE, DROP,
    REFERENCES, INDEX, ALTER, EXECUTE, CREATE VIEW,
    SHOW VIEW, CREATE ROUTINE, ALTER ROUTINE, TRIGGER
ON `demo`.* TO `demoUser`@`%`
```

Data Manipulation Language and Data Query Language

- **SELECT** : Retrieve rows of data.
- **INSERT** : Place new rows of data in the database.
- **UPDATE** : Replace existing values in the database with new values.
- **DELETE** : Delete rows of data in the database.

SELECT

- SELECT is used to ***retrieve*** rows selected from one or more tables
- SELECT is the most commonly used data manipulation language (DML) command.

```
SELECT column1, column2, …
FROM table_name;
```

- **FROM** - Specifies from which table to get the data.

Optional clauses for SELECT

- WHERE
  - Specifies which rows to retrieve. It filter the results and apply conditions
- GROUP BY
  - Groups rows sharing a property so that an aggregate function can be applied to each group.
- HAVING
  - Selects among the groups defined by the GROUP BY clause.
- ORDER BY
  - Specifies how to order the returned rows.

Operators in The WHERE Clause

=	Equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
<> or !=	Not equal
BETWEEN	Between a certain range, eg - WHERE Price BETWEEN 10 AND 20;
LIKE	Search for a pattern, eg WHERE Sname LIKE 'Seb%'
IN	To specify multiple possible values for a column. Eg WHERE Country IN ('NZ', 'SG')

MySQL :: MySQL 8.0 Reference Manual :: 12.4 Operators

DISTINCT modifier

- The SELECT DISTINCT statement is used to **return only distinct (different) values**.

```
SELECT DISTINCT column1, column2, …
FROM table_name;
```

- When only one expression is provided in the DISTINCT clause, the query will return the unique values for that expression.
- When more than one expression is provided in the DISTINCT clause, the query will retrieve ***unique combinations*** for the expressions listed.

LIKE Operator

Used for ***pattern matching*** using an SQL pattern. Compares data with an expression using wildcard operators

```
SELECT column1, column2, ...
FROM table_name
WHERE columnN LIKE pattern;
```

Two wildcard characters in the pattern:

- **%** - any number of characters, even zero characters.
- **_** - exactly one character.

NOT LIKE - similar, but exclude those rows which are matching the criterion

AS keyword (Aliases)

To give a column a ***descriptive name***, we could use a column alias.

```
SELECT
   [column_1 | expression] AS `descriptive name`
FROM
   Table_name;
```

AS keyword is optional, you can omit it in the statement

```
SELECT
   [column_1 | expression] `descriptive name`
FROM
   Table_name;
```

SQL Functions

MySQL has many built-in functions

- String Functions
  - UPPER, TRIM, LENGTH, CONCAT, CONCAT_WS
- Numeric Functions
  - SUM, MIN, MAX, COUNT, AVG, COUNT(DISTINCT)
- Date Functions
  - NOW, DATE, MONTH
- Misc Functions
  - DATABASE, USER, VERSION

MySQL 8.0 Reference Manual :: 12.1 SQL Function and Operator Reference

ORDER BY

Arranges the retrieved data in sorted order.

ORDER BY ASC | DESC

The Order by clause by **default** sorts the retrieved data in **ascending** order.

To sort the data in descending order **DESC** keyword is used with Order by clause.

```
SELECT * FROM Emp ORDER BY experience DESC;
SELECT * FROM Emp ORDER BY experience DESC, age ASC;
```

GROUP BY

Group the results of a SELECT query based on one or more columns.

```
SELECT column_name(s) | function(col)
FROM table_name
WHERE condition
GROUP BY column_name(s)
ORDER BY column_name(s);
```

- Group By clause will always come at the end of the SQL query, just like the Order by clause.
- Aggregate functions (SUM, AVG etc) operate on sets of values to help us group.

	species	sepal_length	sepal_width	petal_length	petal_width
0	setosa	5.1	3.5	1.4	0.2
1	setosa	4.9	3.0	1.4	0.2
2	setosa	4.7	3.2	1.3	0.2
3	setosa	4.6	3.1	1.5	0.2
4	setosa	5.0	3.6	1.4	0.2
50	versicolor	7.0	3.2	4.7	1.4
51	versicolor	6.4	3.2	4.5	1.5
52	versicolor	6.9	3.1	4.9	1.5
53	versicolor	5.5	2.3	4.0	1.3
54	versicolor	6.5	2.8	4.6	1.5
100	virginica	6.3	3.3	6.0	2.5
101	virginica	5.8	2.7	5.1	1.9
102	virginica	7.1	3.0	5.9	2.1
103	virginica	6.3	2.9	5.6	1.8
104	virginica	6.5	3.0	5.8	2.2

SUM

SUM

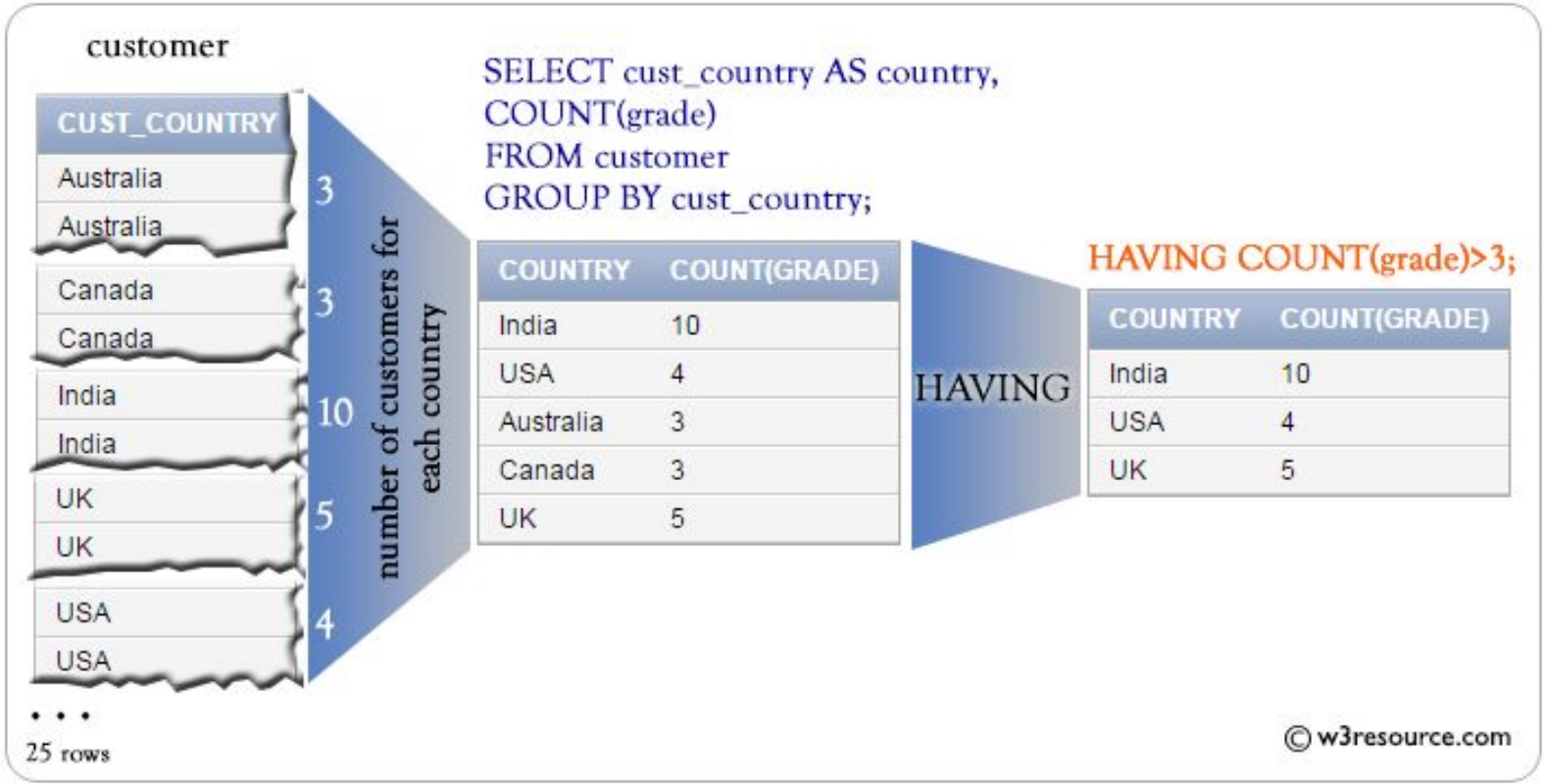
SUM

species	sepal_length	sepal_width	petal_length	petal_width
setosa	24.3	16.4	7.0	1.0
versicolor	32.3	14.6	22.7	7.2
virginica	32.0	14.9	28.4	10.5

HAVING

The SQL HAVING clause is used in combination with the GROUP BY clause to ***restrict the groups of returned rows*** to only those whose the condition is TRUE.

```
SELECT expression1, expression2, ... expression_n,
       aggregate_function (aggregate_expression)
FROM tables
[WHERE conditions]
GROUP BY expression1, expression2, ... expression_n
HAVING condition;
```



https://www.w3resource.com/sql/having-clause/sql-having-clause.php

LIMIT clause

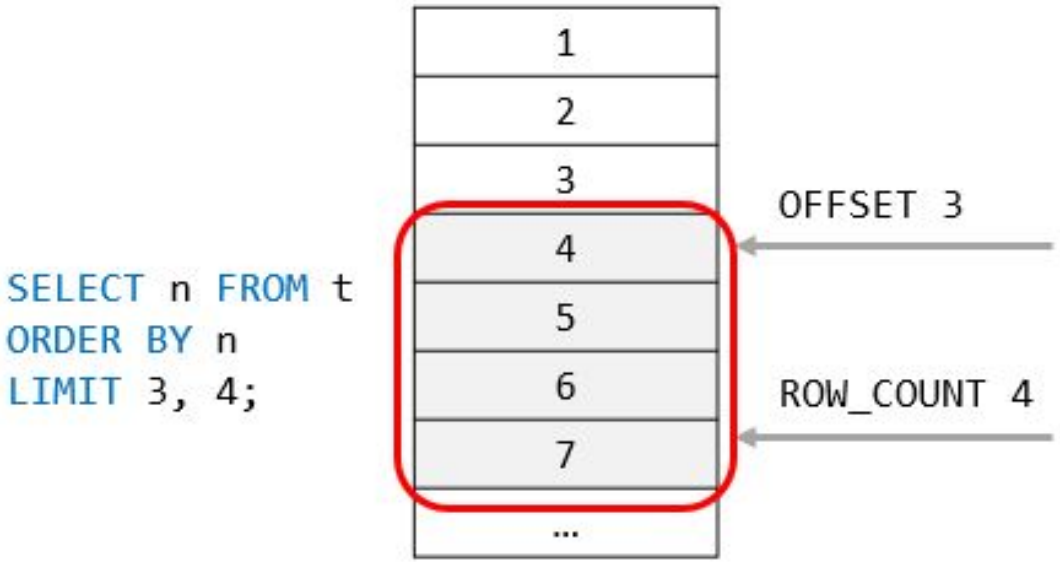
LIMIT is used in a query to return up to a ***specific number of rows*** in the results

- Use a LIMIT clause in the query, rather than fetching the whole result set and throwing away the extra data.
  - Comes after the WHERE clause if there is one.
- SELECT statement without an ORDER BY clause returns rows in an unspecified order.
- The LIMIT clause accepts one or two arguments : offset, row_count
  - The values of both arguments must be zero or positive integers.

https://dev.mysql.com/doc/refman/8.0/en/limit-optimization.html

```
SELECT
    select_list
FROM
    table_name
LIMIT [offset,] row_count;
```

- The **offset** specifies the ***offset of the first row*** to return.
    - The offset of the first row is 0, not 1.
- The **row_count** specifies the maximum number of rows to return.



Order of Evaluvation

Thank you