More SQL

Database Management System (DBMS)
and Programming

AGGREGATE FUNCTIONS

- A function where the values of multiple rows are grouped together to form a single summary value.
  - **MIN() - returns the smallest value of the selected column**
  - **MAX() - returns the largest value of the selected column**
  - **COUNT() - returns the number of rows that matches a specified criterion**
  - **SUM() - returns the total sum of a numeric column**
  - **AVG() - returns the average value of a numeric column**

A mathematical function executes a mathematical operation usually based on input values that are provided as arguments and return a numeric value as the result of the operation.

Functions	Description
ABS()	This SQL ABS() returns the absolute value of a number passed as an argument.
CEIL()	This SQL CEIL() will rounded up any positive or negative decimal value within the function upwards.
FLOOR()	The SQL FLOOR() rounded up any positive or negative decimal value down to the next least integer value.
EXP()	The SQL EXP() returns e raised to the n-th power(n is the numeric expression), where e is the base of natural algorithm and the value of e is approximately 2.71828183.
LN()	The SQL LN() function returns the natural logarithm of n, where n is greater than 0 and its base is a number equal to approximately 2.71828183.
MOD()	This SQL MOD() function returns the remainder from a division.
POWER()	This SQL POWER() function returns the value of a number raised to another, where both of the numbers are passed as arguments.
SQRT()	The SQL SQRT() returns the square root of given value in the argument.

ORDER BY

- Sort the result-set in ascending or descending order

```
SELECT column1, column2, ...
FROM table_name
ORDER BY column1, column2, ... ASC|DESC;
```

- Example

```
SELECT *
FROM EMPLOYEE
ORDER BY SALARY ASC;
```

LIMIT

- Specify the number of records to return.

```
SELECT column_name(s)
FROM table_name
WHERE condition
LIMIT [start_row],number;
```

- Example

```
SELECT *
FROM EMPLOYEE
LIMIT 15;
```

```
SELECT *
FROM EMPLOYEE
LIMIT 3,15;
```

GROUP BY

- Groups rows that have the same values into summary rows
- Used with aggregate functions (COUNT(), MAX(), MIN(), SUM(), AVG()) to group the result-set by one or more column

```
SELECT  aggregate_function(column1)
FROM table_name
GROUP BY column_name;
```

- Example

```
SELECT COUNT(*)
FROM EMPLOYEE
GROUP BY Gender;
```

HAVING

- Statement to specify filter conditions for a group of rows or aggregates.
- Often used with the GROUP BY clause to filter groups based on a specified condition

```
SELECT column_name(s)
FROM table_name
GROUP BY column_name(s)
HAVING condition
```

- Example

```
SELECT Dno
FROM EMPLOYEE
GROUP BY Dno
HAVING AVG(Salary) > 40000;
```

SELECT SYNTAX

SELECT SYNTAX

```
SELECT      column1, column2, ...
FROM    table_name
[WHERE      conditions]
[GROUP BY   column1, column2]
[HAVING     conditions]
[ORDER BY   column1, column2, ... ASC|DESC]
[LIMIT [offset_value,] number_rows ];
```

SUBQUERY

- A query nested within another query such as SELECT, INSERT, UPDATE or DELETE.
- A subquery can be nested within another subquery.

Subquery in the WHERE clause

- Subquery with comparison operators

```
SELECT *
FROM EMPLOYEE
WHERE DNO = 8
AND SALARY = (SELECT MIN(SALARY)
              FROM EMPLOYEE
              WHERE DNO=8);
```

Subquery in the WHERE clause

- subquery with IN and NOT IN operators

```
SELECT *
FROM DEPARTMENT
WHERE dnumber IN (SELECT dnum
                  FROM PROJECT
                  WHERE plocation = 'HOUSTON');
```

Subquery in the FROM clause

- Result set returned from a subquery is used as a temporary table (derived table)

```
SELECT MAX(MEMBERS)
FROM (SELECT COUNT(*) AS MEMBERS
      FROM EMPLOYEE
      GROUP BY dno) AS DMEMBERS;
```

alias

[NOT] EXISTS

- Returns the true or false
- It is used in combination with a subquery
- Checks the existence of data in a subquery.

```
SELECT fname
FROM EMPLOYEE e
WHERE EXISTS (SELECT *
              FROM DEPARTMENT d
              WHERE e.ssn = d.mgrssn);
```

```
SELECT EXISTS (SELECT * FROM DEPARTMENT WHERE dnumber = 3);
```

Class Activity

AGGREGATE FUNCTION

Select aggregate functions on INVOICE table
AVG,
SUM,
MIN,
MAX,
COUNT

ARITHMETIC FUNCTION

- Use SQL to calculate the math formula

  SELECT 2*5 AS answer;

- Use SQL to create new column for VAT 7% of total revenue

Class Activity

SPECIAL

COUNT(*) = counting all records
SELECT COUNT(*) FROM customer;

AGGREGATE FUNCTION + GROUP BY

Find the total number of data in a different group
> Find the number of customers in a different country
**column in GROUP clause by should exist in SELECT clause

ORDER BY

Sorting the data from small to large

>Sorting the file size of each song by bytes