CS 309A- Database Management Systems

Aggregate functions

- SQL can perform some statistics for you
  - Counting the number of rows
  - Finding the minimum/maximum values
  - Summing the values in a specified column
  - Average the values in a specified column

- MySQL aggregate functions:

http://dev.mysql.com/doc/refman/5.7/en/group-by-functions.html

MySQL aggregate functions

Name	Description
AVG()	Return the average value of the argument
BIT_AND()	Return bitwise AND
BIT_OR()	Return bitwise OR
BIT_XOR()	Return bitwise XOR
COUNT()	Return a count of the number of rows returned
COUNT(DISTINCT)	Return the count of a number of different values
GROUP_CONCAT()	Return a concatenated string
MAX()	Return the maximum value
MIN()	Return the minimum value
STD()	Return the population standard deviation
STDDEV()	Return the population standard deviation
STDDEV_POP()	Return the population standard deviation
STDDEV_SAMP()	Return the sample standard deviation
SUM()	Return the sum
VAR_POP()	Return the population standard variance
VAR_SAMP()	Return the sample variance
VARIANCE()	Return the population standard variance

COUNT

COUNT always returns the number of non-null values in the given column.

- How many vendors are providing products now?

```
SELECT COUNT(DISTINCT V_CODE)
FROM   PRODUCT;
```

```
+-----------------------+
| COUNT(DISTINCT V_CODE) |
+-----------------------+
|                     6 |
+-----------------------+
```

- How many vendors are providing products with prices that are no more than $10?

```
SELECT COUNT(DISTINCT V_CODE)
FROM   PRODUCT
WHERE  P_PRICE <= 10;
```

```
+-----------------------+
| COUNT(DISTINCT V_CODE) |
+-----------------------+
|                     3 |
+-----------------------+
```

- How many products in the system?

```
SELECT COUNT(*)
FROM   PRODUCT;
```

```
+----------+
| COUNT(*) |
+----------+
|       16 |
+----------+
```

MAX and MIN

- What is the price of the most expensive product?

```
SELECT MAX(P_PRICE)
FROM   PRODUCT;
```

```
+--------------+
| MAX(P_PRICE) |
+--------------+
|       256.99 |
+--------------+
```

- What is the price of the cheapest product?

```
SELECT MIN(P_PRICE)
FROM   PRODUCT;
```

```
+--------------+
| MIN(P_PRICE) |
+--------------+
|         4.99 |
+--------------+
```

ATTENTION: the numeric functions yield ***only one value*** based on all the values found in the table: a single maximum value, a single minimum value, a single count, or a single average value.

MAX and MIN

- What is the most expensive product? Suppose we want to know its code, description and price.

```
SELECT P_CODE, P_DESCRIPT, P_PRICE
FROM   PRODUCT
WHERE  P_PRICE = MAX(P_PRICE);
```

Error!

```
mysql> select p_code, p_descript, p_price
    -> from product
    -> where p_price = max(p_price);
ERROR 1111 (HY000): Invalid use of group function
```

MAX/MIN(*columnname*) can be used only with a SELECT st

```
SELECT P_CODE, P_DESCRIPT, P_PRICE
FROM   PRODUCT
WHERE  P_PRICE = (SELECT MAX(P_PRICE)
                  FROM PRODUCT);
```

Correct!

```
mysql> select p_code, p_descript, p_price
    -> from product
    -> where p_price = (select max(p_price) from product);
+----------+-------------------------+---------+
| p_code   | p_descript              | p_price |
+----------+-------------------------+---------+
| 89-WRE-Q | Hicut chain saw, 16 in. |  256.99 |
+----------+-------------------------+---------+
1 row in set (0.00 sec)
```

```
mysql> select p_code, p_descript, p_price
    -> from product
    -> where p_price in (select max(p_price) from product);
+----------+-------------------------+---------+
| p_code   | p_descript              | p_price |
+----------+-------------------------+---------+
| 89-WRE-Q | Hicut chain saw, 16 in. |  256.99 |
+----------+-------------------------+---------+
1 row in set (0.00 sec)
```

Practice 5

- Which product has the oldest date?
- What is the most recent product?
- What product has the highest inventory value?
  - Inventory value can be calculated by P_QOH * P_PRICE

SUM

- The **SUM** function computes the total sum for any specified attributes.
- What is the total amount owned by customers?

```
SELECT SUM(CUS_BALANCE) AS TOTALBALANCE
FROM   CUSTOMER;
```

```
+--------------+
| TOTALBALANCE |
+--------------+
|      2089.28 |
+--------------+
```

- What is the total value of all products in inventory?

```
SELECT SUM(P_QOH * P_PRICE) AS TOTALVALUE
FROM   PRODUCT;
```

```
+------------+
| TOTALVALUE |
+------------+
|   15084.52 |
+------------+
```

AVG

- What is the average price of products?

```
SELECT AVG (P_PRICE)
FROM   PRODUCT;
```

```
+---------------+
| AVG (P_PRICE) |
+---------------+
|     56.421250 |
+---------------+
```

Similar to MAX/MIN, AVG can be used only wit a SELECT statement

- Find the products which have prices over the average product price. The products are listed by price in descending

```
SELECT   *
FROM     PRODUCT
WHERE    P_PRICE > ( SELECT AVG(P_PRICE) FROM PRODUCT )
ORDER BY P_PRICE DESC;
```

```
+----------+-------------------------------------+------------+-------+-------+---------+------------+---------+
| P_CODE   | P_DESCRIPT                          | P_INDATE   | P_QOH | P_MIN | P_PRICE | P_DISCOUNT | V_CODE  |
+----------+-------------------------------------+------------+-------+-------+---------+------------+---------+
| 89-WRE-Q | Hicut chain saw, 16 in.             | 2012-02-07 |    11 |     5 |  256.99 |       0.05 |   24288 |
| WR3/TT3  | Steel matting, 4'x8'x1/6", .5" mesh | 2012-01-17 |    18 |     5 |  119.95 |       0.10 |   25595 |
| 11QER/31 | Power painter, 15 psi., 3-nozzle    | 2011-11-03 |     8 |     5 |  109.99 |       0.00 |   25595 |
| 2232/QTY | B&D jigsaw, 12-in. blade            | 2011-12-30 |     8 |     5 |  109.92 |       0.05 |   24288 |
| 2232/QWE | B&D jigsaw, 8-in. blade             | 2011-12-24 |     6 |     5 |   99.87 |       0.05 |   24288 |
+----------+-------------------------------------+------------+-------+-------+---------+------------+---------+
```

Practice 6:

- How many products in inventory are from vendor 24288?

- What is the average balance of customers who live in area ‘615’?
- Find the customers who live in area ‘615’ and have the balance lower than their local average. List customers by their balance in descending.

Thank you & Questions