

# Database



# Aggregation (grouping) functions

**EMP**

DEPTNO	SAL
10	2450
10	5000
10	1300
20	800
20	1100
20	3000
20	3000
20	2975
30	1600
30	2850
30	1250
30	950
30	1500
30	1250

**“maximum  
salary in  
the EMP table”**

**MAX (SAL)**

**5000**

# Types

Function	Description
AVG([DISTINCT  <u>ALL</u> ] <i>n</i> )	Average value of <i>n</i> , ignoring null values
COUNT({* [DISTINCT  <u>ALL</u> ] <i>expr</i> })	Number of rows, where <i>expr</i> evaluates to something other than null (Count all selected rows using *, including duplicates and rows with nulls.)
MAX([DISTINCT  <u>ALL</u> ] <i>expr</i> )	Maximum value of <i>expr</i> , ignoring null values
MIN([DISTINCT  <u>ALL</u> ] <i>expr</i> )	Minimum value of <i>expr</i> , ignoring null values
STDDEV([DISTINCT  <u>ALL</u> ] <i>x</i> )	Standard deviation of <i>n</i> , ignoring null values
SUM([DISTINCT  <u>ALL</u> ] <i>n</i> )	Sum values of <i>n</i> , ignoring null values
VARIANCE([DISTINCT  <u>ALL</u> ] <i>x</i> )	Variance of <i>n</i> , ignoring null values

# Using grouping function

```
SELECT      [column,] group_function(column)  
FROM        table  
[WHERE      condition]  
[GROUP BY   column]  
[ORDER BY   column];
```

# Example

```
SQL> SELECT  AVG(sal), MAX(sal),  
2           MIN(sal), SUM(sal)  
3 FROM      emp  
4 WHERE     job LIKE 'SALES%';
```

AVG (SAL)	MAX (SAL)	MIN (SAL)	SUM (SAL)
1400	1600	1250	5600

# Data Type

Max and Min can be used with any data type

```
SQL> SELECT MIN(hiredate), MAX(hiredate)
           2 FROM emp;
```

MIN(HIRED	MAX(HIRED
-----	-----
17-DEC-80	12-JAN-83

# Data Type

```
SQL> SELECT      MIN(ename) , MAX(ename)
      2  FROM      emp ;
```

MIN(ENAME)	MAX(ENAME)
-----	-----
ADAMS	WARD

- Sum, Avg, STDDEV, Variance can be used with numeric values only.

# Count

- Count(\*) returns number of rows retrieved by the query.

```
SQL> SELECT COUNT(*)  
2 FROM emp  
3 WHERE deptno = 30;
```

```
COUNT(*)  
-----  
6
```

ID	deptno	comm	.....
1	30	10	
2	30		
3	30	10	
4	30	10	
5	30		
6	30	20	
7	20		
8	10		
9	10	20	
10	20		
11	10	10	
12	10		
13	10	20	
14	20		



# Count(expr)

- Count(expr) returns number of non null rows

```
SQL> SELECT COUNT(comm)
      2 FROM emp
      3 WHERE deptno = 30;
```

```
COUNT (COMM)
```

```
-----
4
```

ID	deptno	comm	.....
1	30	10	
2	30		
3	30	10	
4	30	10	
5	30		
6	30	20	
7	20		
8	10		
9	10	20	
10	20		
11	10	10	
12	10		
13	10	20	
14	20		

# Example

Display the number of departments in the EMP table.

```
SQL> SELECT      COUNT(deptno)
      2  FROM      emp ;

COUNT (DEPTNO)
-----
              14
```

Display the number of distinct departments in the EMP table.

```
SQL> SELECT      COUNT(DISTINCT (deptno))
      2  FROM      emp ;

COUNT (DISTINCT (DEPTNO))
-----
```

ID	deptno	comm	.....
1	30	10	
2	30		
3	30	10	
4	30	10	
5	30		
6	30	20	
7	20		
8	10		
9	10	20	
10	20		
11	10	10	
12	10		
13	10	20	
14	20		

# Data Groups

## EMP

DEPTNO	SAL
10	2450
10	5000
10	1300
20	800
20	1100
20	3000
20	3000
20	2975
30	1600
30	2850
30	1250
30	950
30	1500
30	1250

2916.6667

2175

1566.6667

**“average  
salary  
in EMP  
table  
for each  
department”**

DEPTNO	AVG (SAL)
10	2916.6667
20	2175
30	1566.6667

# The use of group by

```
SELECT      column, group_function(column)
FROM        table
[WHERE      condition]
[GROUP BY  group_by_expression]
[ORDER BY  column];
```

# Example

```
SQL> SELECT deptno, AVG(sal)
2 FROM emp
3 GROUP BY deptno;
```

DEPTNO	AVG(SAL)
10	2916.6667
20	2175
30	1566.6667

# Example

```
SQL> SELECT    AVG(sal)
  2   FROM      emp
  3   GROUP BY deptno;
```

```
AVG (SAL)
-----
2916.6667
      2175
1566.6667
```

# Example

```
SQL> SELECT deptno, job, sum(sal)
2 FROM emp
3 GROUP BY deptno, job;
```

DEPTNO	JOB	SUM(SAL)
10	CLERK	1300
10	MANAGER	2450
10	PRESIDENT	5000
20	ANALYST	6000
20	CLERK	1900
...		

9 rows selected.

deptno	JOB	SAL
10	CLERK	650
10	CLERK	650
10	MANAGER	816
10	MANAGER	816
10	MANAGER	818
10	PRESIDENT	5000
20	ANALYST	2000
20	ANALYST	2000
20	ANALYST	2000
20	CLERK	1900
...	...	...

# Having

```
SQL> SELECT    deptno, max(sal)
  2  FROM      emp
  3  GROUP BY  deptno
  4  HAVING    max(sal)>2900;
```

DEPTNO	MAX (SAL)
10	5000
20	3000



# Summary

```
SELECT      column, group_function(column)
FROM        table
[WHERE      condition]
[GROUP BY   group_by_expression]
[HAVING     group_condition]
[ORDER BY   column];
```