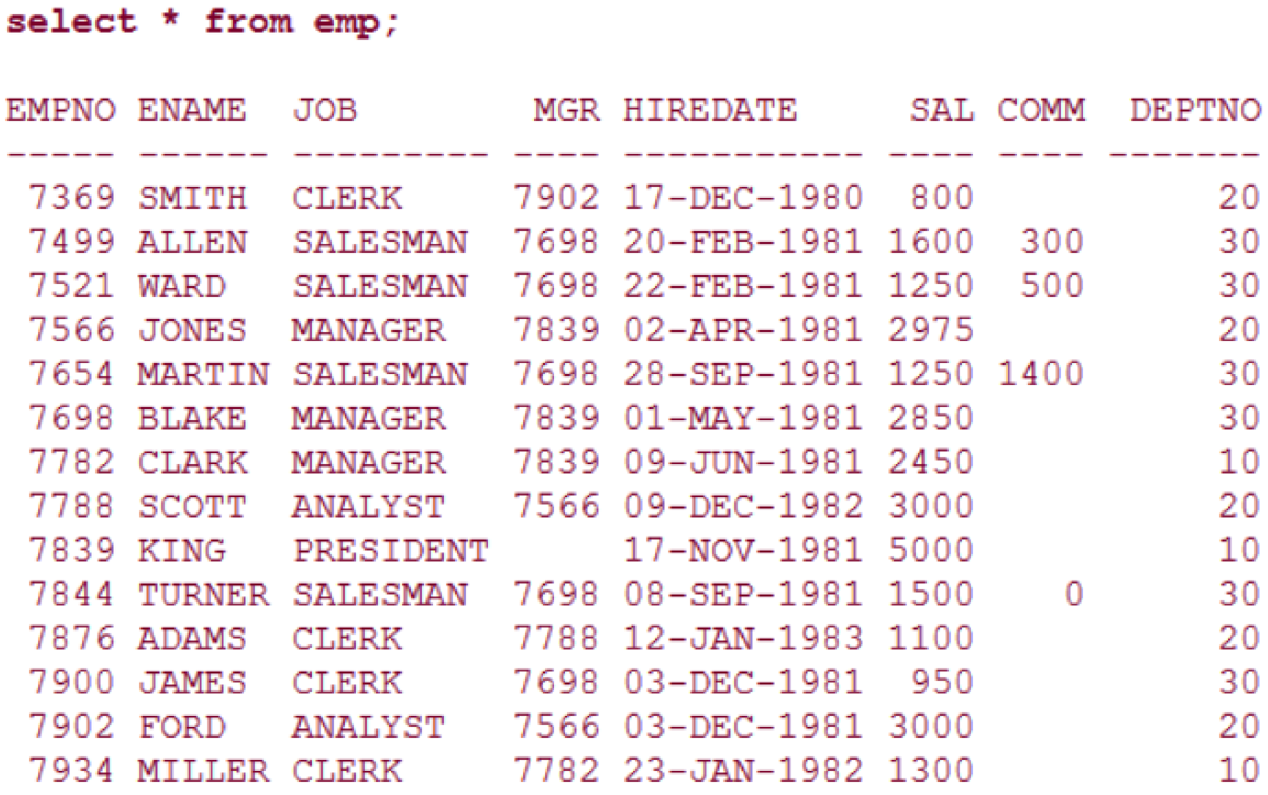
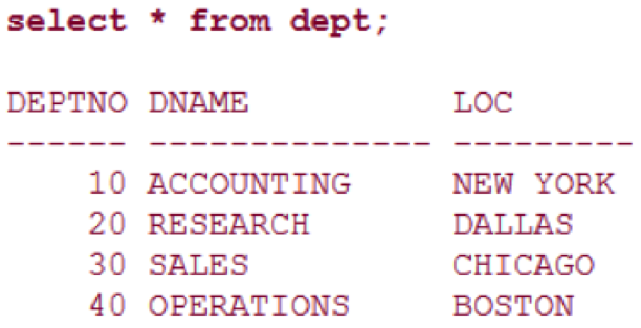
示例使用的相关表和数据



```
select * from emp;

EMPNO ENAME  JOB         MGR HIREDATE     SAL COMM  DEPTNO
----- ------ --------- ---- ----------- ---- ---- -------
 7369 SMITH  CLERK      7902 17-DEC-1980  800           20
 7499 ALLEN  SALESMAN   7698 20-FEB-1981 1600  300      30
 7521 WARD   SALESMAN   7698 22-FEB-1981 1250  500      30
 7566 JONES  MANAGER    7839 02-APR-1981 2975           20
 7654 MARTIN SALESMAN   7698 28-SEP-1981 1250 1400      30
 7698 BLAKE  MANAGER    7839 01-MAY-1981 2850           30
 7782 CLARK  MANAGER    7839 09-JUN-1981 2450           10
 7788 SCOTT  ANALYST    7566 09-DEC-1982 3000           20
 7839 KING   PRESIDENT       17-NOV-1981 5000           10
 7844 TURNER SALESMAN   7698 08-SEP-1981 1500    0      30
 7876 ADAMS  CLERK      7788 12-JAN-1983 1100           20
 7900 JAMES  CLERK      7698 03-DEC-1981  950           30
 7902 FORD   ANALYST    7566 03-DEC-1981 3000           20
 7934 MILLER CLERK      7782 23-JAN-1982 1300           10
```



```
select * from dept;

DEPTNO DNAME          LOC
------ -------------- ---------
    10 ACCOUNTING     NEW YORK
    20 RESEARCH       DALLAS
    30 SALES          CHICAGO
    40 OPERATIONS     BOSTON
```

SQL Cookbook, by Anthony Molinaro. Copyright 2006 O'Reilly Media, Inc

Part 2 数值处理

- 2.1 计算平均值
- 2.2 计算最大值最小值
- 2.3 求和
- 2.4 计算行数
- 2.5 累计求和
- 2.6 计算众数
- 2.7 计算中位数
- 2.8 计算百分比
- 2.9 计算平均值时去掉最大值和最小值
- 2.10 修改累计值

2.1 计算平均值

```
1 select avg(sal) as avg_sal
2   from emp

     AVG_SAL
----------------
2073.21429
```

遇到空值怎么办?

```
create table t2(sal integer)
insert into t2 values (10)
insert into t2 values (20)
insert into t2 values (null)
```

```
select avg(sal)
from t2

AVG(SAL)
----------
     15
```

```
select avg(coalesce(sal,0))
  from t2

AVG(COALESCE(SAL,0))
               --------------------
                                 10
```

2.1 计算平均值

```
1 select deptno, avg(sal) as avg_sal
2   from emp
3  group by deptno

DEPTNO      AVG_SAL
----------- ----------------
        10  2916.66667
        20        2175
        30  1566.66667
```

```
1 select avg(sal)
2  from emp
3 group by deptno

    AVG(SAL)
----------------
2916.66667
      2175
1566.66667
```

2.2 查找最大值和最小值

```
select min(sal) as min_sal, max(sal) as max_sal
  from emp

MIN_SAL     MAX_SAL
----------- -------------
      800          5000
```

```
select deptno, min(sal) as min_sal, max(sal) as max_sal
  from emp
 group by deptno

DEPTNO     MIN_SAL      MAX_SAL
----------- ------------- -----------
     10          1300       5000
     20           800       3000
     30           950       2850
```

2.3 求和

```
1 select sum(sal)
2  from emp

  SUM(SAL)
----------
     29025
```

```
1 select deptno, sum(sal) as total_for_dept
2   from emp
3  group by deptno


    DEPTNO  TOTAL_FOR_DEPT
----------  --------------
        10            8750
        20           10875
        30            9400
```

2.4 计算行数

```
1 select count(*)
2  from emp

 COUNT(*)
----------
      14

1 select deptno, count(*)
2   from emp
3  group by deptno

   DEPTNO   COUNT(*)
---------- ----------
      10         3
      20         5
      30         6
```

计算某一列的非空个数

```
select count(comm)
  from emp

COUNT(COMM)
-----------
        4
```

2.5 累计求和（Running Total）

Oracle and DB2（MySQL已经支持了）

```
select ename, sal,
       sum(sal) over (order by sal,empno)
             as running_total
  from emp
  order by 2
```

```
ENAME              SAL        RUNNING_TOTAL
----------         ---------  ----------------------
SMITH              800        800
JAMES              950        1750
ADAMS              1100       2850
WARD               1250       4100
MARTIN             1250       5350
MILLER             1300       6650
TURNER             1500       8150
ALLEN              1600       9750
CLARK              2450       12200
BLAKE              2850       15050
JONES              2975       18025
SCOTT              3000       21025
FORD               3000       24025
KING               5000       29025
```

MySQL and PostgreSQL and SQL Server

```
select e.ename, e.sal,
       (select sum(d.sal) from emp d
         where d.empno <= e.empno) as running_total
  from emp e
 order by 3
```

```
ENAME              SAL  RUNNING_TOTAL
----------         ---------- -------------
SMITH              800        800
ALLEN              1600       2400
WARD               1250       3650
JONES              2975       6625
MARTIN             1250       7875
BLAKE              2850       10725
CLARK              2450       13175
SCOTT              3000       16175
KING               5000       21175
TURNER             1500       22675
ADAMS              1100       23775
JAMES              950        24725
FORD               3000       27725
MILLER             1300       29025
```

2.6 计算众数

```
select sal
  from emp
 where deptno = 20
 order by sal
```

```
       SAL
----------
       800
      1100
      2975
      3000
      3000
```

Oracle

```
select max(sal)
       keep(dense_rank first order by cnt desc) sal
  from (
select sal, count(*) cnt
  from emp
 where deptno=20
 group by sal
      )
```

MySQL and PostgreSQL

```
select sal
  from emp
 where deptno = 20
 group by sal
having count(*) >= all ( select count(*)
                            from emp
                           where deptno = 20
                           group by sal )
```

2.7 计算中位数

```
select sal
  from emp
 where deptno = 20
 order by sal
```

```
       SAL
----------
       800
      1100
      2975
      3000
      3000
```

MySQL and PostgreSQL

```
select avg(sal)
  from (
select e.sal
  from emp e, emp d
 where e.deptno = d.deptno
   and e.deptno = 20
 group by e.sal
having sum(case when e.sal = d.sal then 1 else 0 end)
                        >= abs(sum(sign(e.sal - d.sal)))
       ) x
```

Oracle

```
select median(sal)
  from emp
 where deptno=20
```

2.8 计算百分比

MySQL and PostgreSQL

```
select (sum(
         case when deptno = 10 then sal end)/sum(sal)
        )*100 as pct
  from emp
```

DB2, Oracle, and SQL Server

```
select distinct (d10/total)*100 as pct
  from (
select deptno,
       sum(sal)over( ) total,
       sum(sal)over(partition by deptno) d10
  from emp
       ) x
 where deptno=10
```

2.9 计算平均值时去掉最大值和最小值

MySQL and PostgreSQL

```
select avg(sal)
  from emp
 where sal not in (
    (select min(sal) from emp),
    (select max(sal) from emp)
 )
```

DB2, Oracle, and SQL Server

```
select avg(sal)
  from (
select sal, min(sal)over() min_sal, max(sal)over( ) max_sal
  from emp
       ) x
 where sal not in (min_sal,max_sal)
```

2.10 修改累计值

- 问题，你想依据另一列的值来修改累计值。有这样一个场景，你希望显示一个信用卡账户的交易历史，并显示每一笔交易完成后的余额。

```
create view V (id,amt,trx)
        as
        select 1, 100, 'PR' from t1 union all
        select 2, 100, 'PR' from t1 union all
        select 3, 50,  'PY' from t1 union all
        select 4, 100, 'PR' from t1 union all
        select 5, 200, 'PY' from t1 union all
        select 6, 50,  'PY' from t1
```

```
select * from V

ID      AMT  TR
--  ----------  -----
 1      100  PR
 2      100  PR
 3       50  PY
 4      100  PR
 5      200  PY
 6       50  PY
```

```
TRX_TYPE        AMT    BALANCE
--------------- ---------- -------------
PURCHASE        100       100
PURCHASE        100       200
PAYMENT          50       150
PURCHASE        100       250
PAYMENT         200        50
PAYMENT          50         0
```

2.10 修改累计值

DB2 and Oracle

```
select case when trx = 'PY'
            then 'PAYMENT'
            else 'PURCHASE'
       end trx_type,
       amt,
       sum(
        case when trx = 'PY'
            then -amt else amt
        end
       ) over (order by id,amt) as balance
from V
```

MySQL, PostgreSQL, and SQL Server

```
select case when v1.trx = 'PY'
            then 'PAYMENT'
            else 'PURCHASE'
       end as trx_type,
       v1.amt,
      (select sum(
               case when v2.trx = 'PY'
                    then -v2.amt else v2.amt
               end
              )
         from V v2
        where v2.id <= v1.id) as balance
 from V v1
```

思考题

- 2.5是进行累加，你看看怎么做累计乘法，和累计减法。
- 如果有时间，希望你把这一讲中所有的例子在你的数据库中尝试一下

End

下一讲，我们讲讲日期