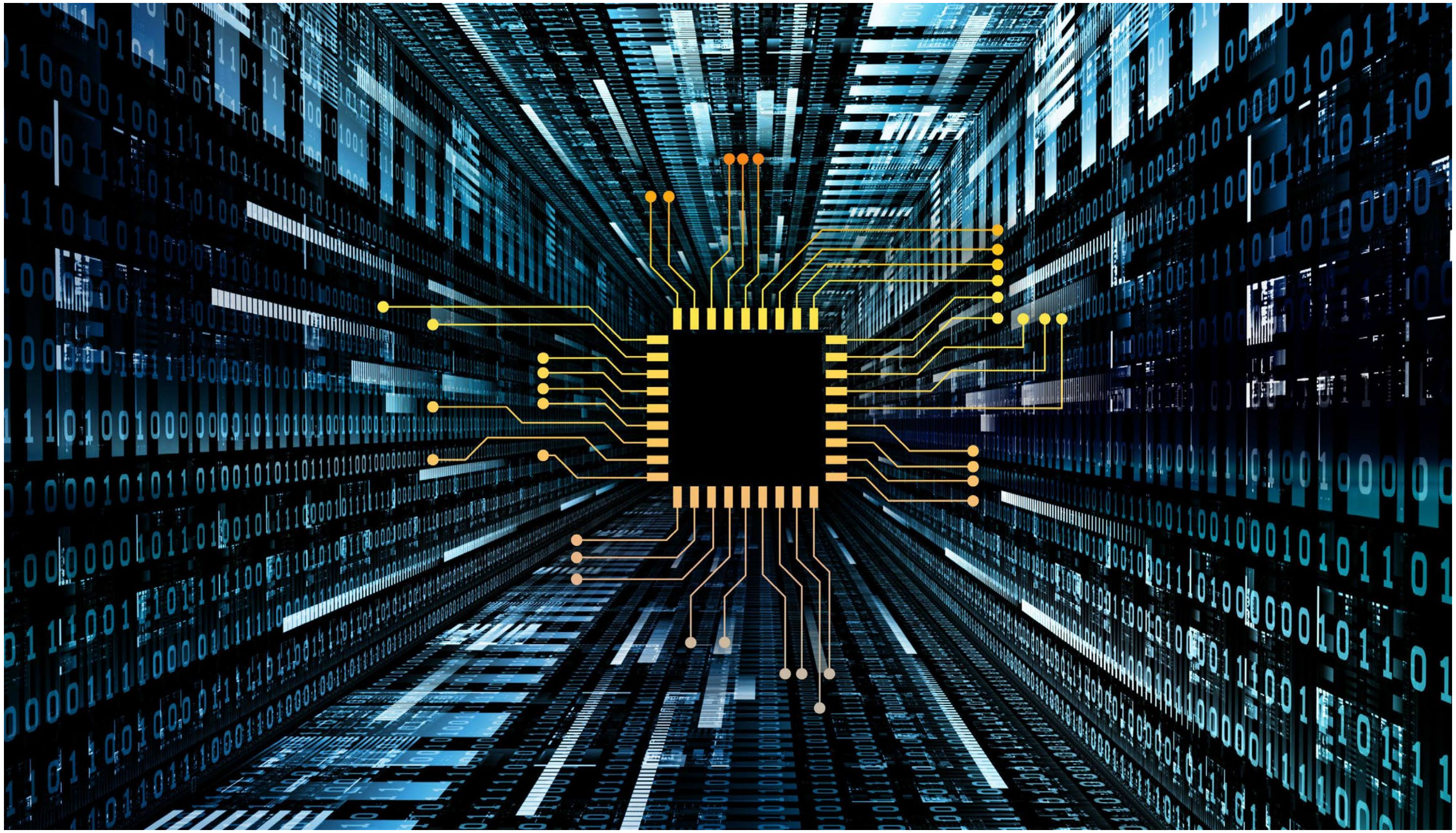


2021级《数据库原理与应用》第5周

2024.3.27

中山大学数学学院 黄志洪

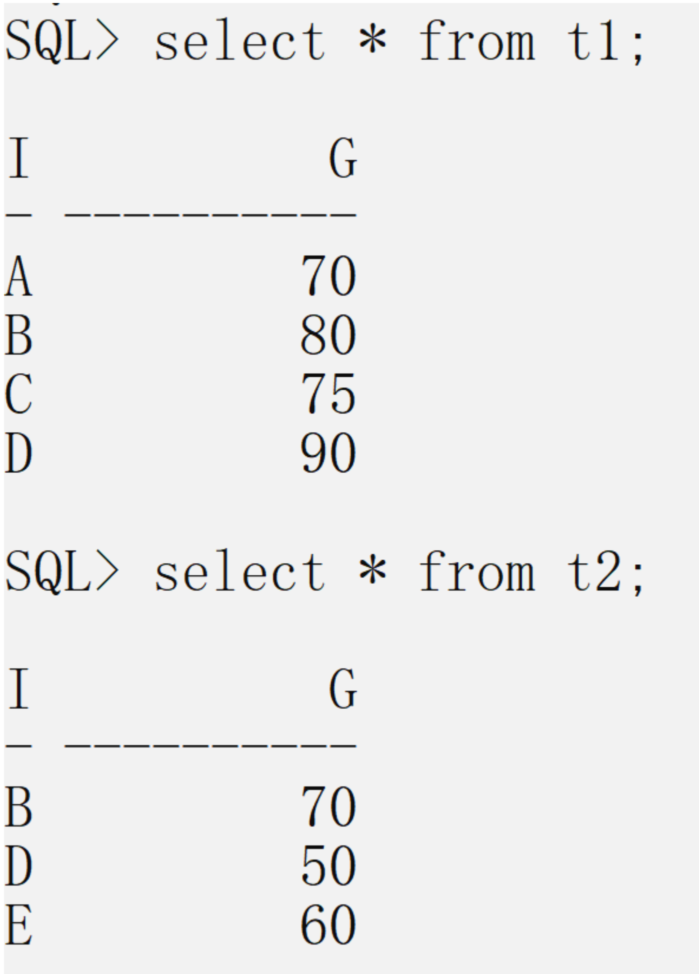
多表连接

```
create table t1 (id char(1), g number(3));
create table t2 (id char(1), g number(3));
create table t3 (id char(1), g number(3));


INSERT INTO t1 VALUES('A',70);
INSERT INTO t1 VALUES('B',80);
INSERT INTO t1 VALUES('C',75);
INSERT INTO t1 VALUES('D',90);
```

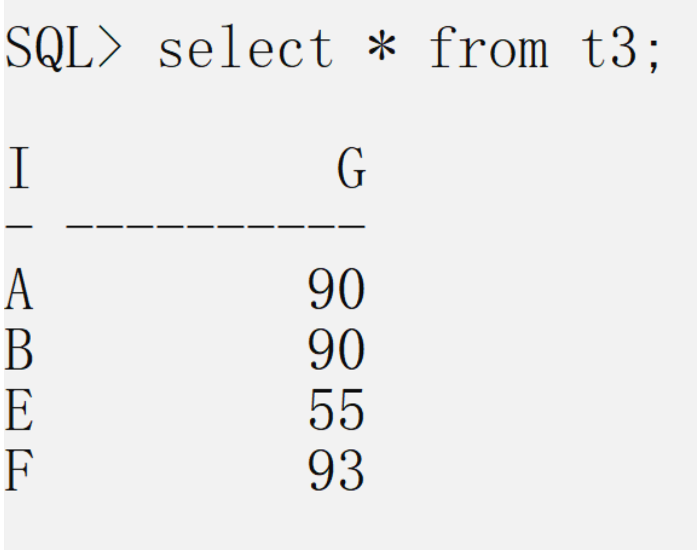
多表连接

```
INSERT INTO t2 VALUES('B',70);
INSERT INTO t2 VALUES('D',50);
INSERT INTO t2 VALUES('E',60);

INSERT INTO t3 VALUES('A',90);
INSERT INTO t3 VALUES('B',90);
INSERT INTO t3 VALUES('E',55);
INSERT INTO t3 VALUES('F',93);

commit;
```

多表连接

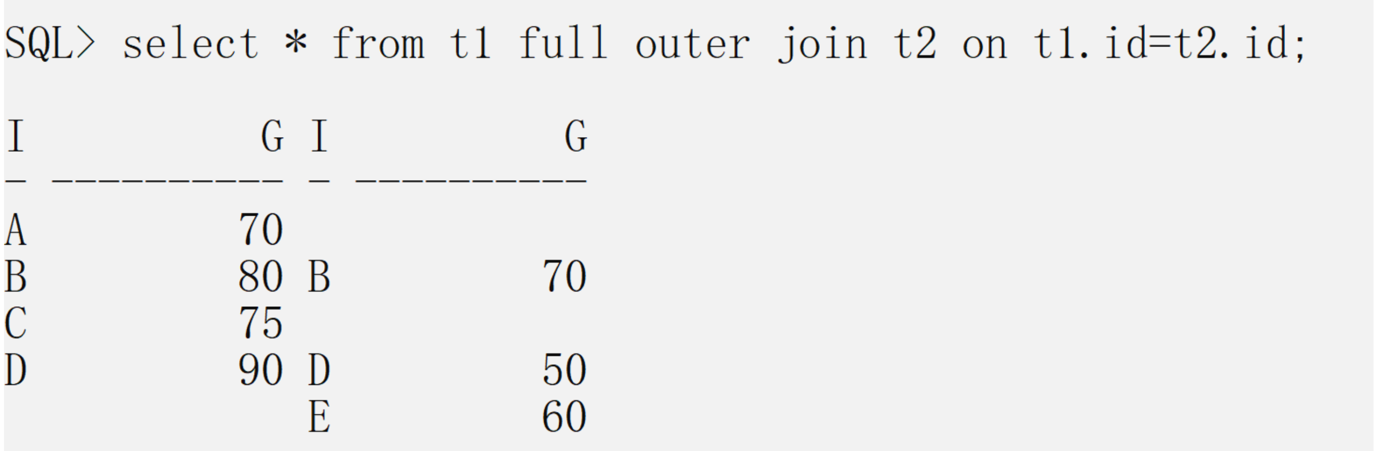


```
SQL> select * from t1;

I          G
- ----------
A         70
B         80
C         75
D         90

SQL> select * from t2;

I          G
- ----------
B         70
D         50
E         60
```

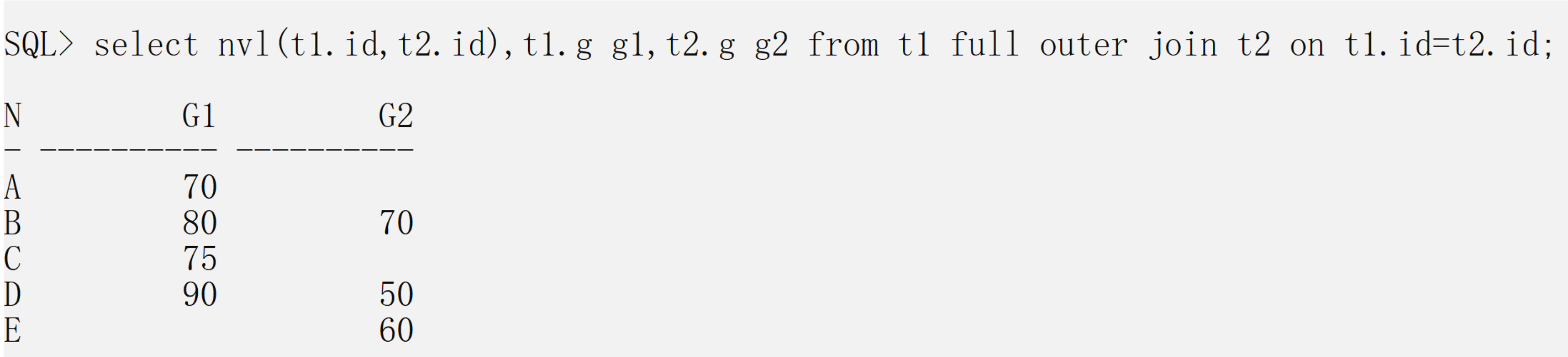


```
SQL> select * from t3;

I          G
- ----------
A         90
B         90
E         55
F         93
```

整合两个表



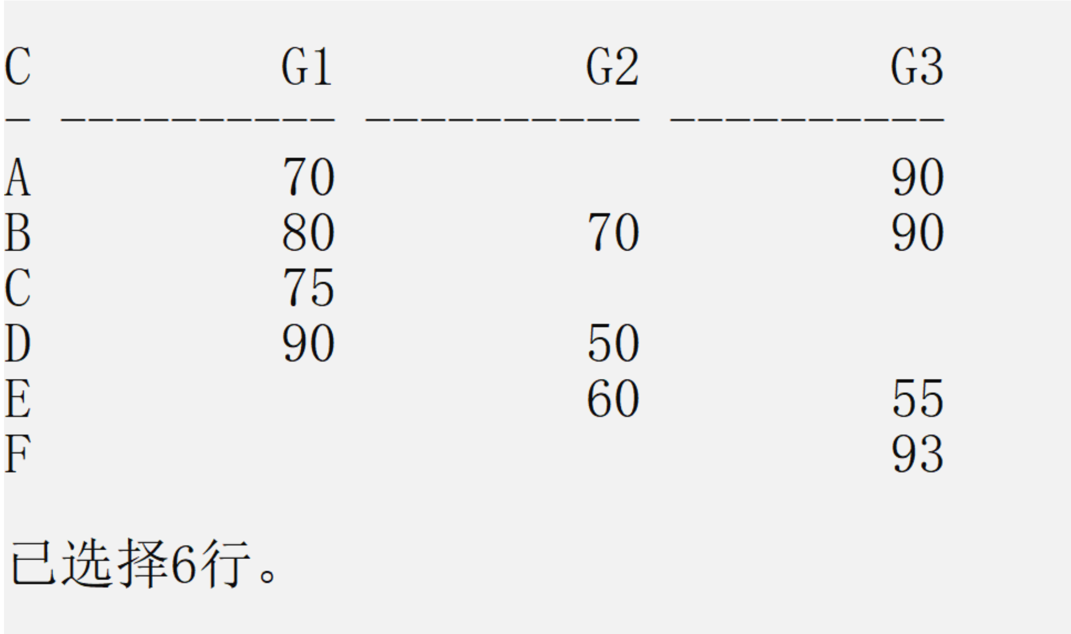
```
SQL> select * from t1 full outer join t2 on t1.id=t2.id;

I          G I          G
- ---------- - ----------
A         70
B         80 B         70
C         75
D         90 D         50
             E         60
```



```
SQL> select nvl(t1.id,t2.id),t1.g g1,t2.g g2 from t1 full outer join t2 on t1.id=t2.id;

N         G1         G2
- ---------- ----------
A         70
B         80         70
C         75
D         90         50
E                    60
```

问题

- 怎样整合三个以上的表？ （经典的窄表，宽表转换问题）



```
C         G1         G2         G3
- ---------- ---------- ----------
A         70                    90
B         80         70         90
C         75
D         90         50
E                    60         55
F                               93

已选择6行。
```

2024.3.27

聚组

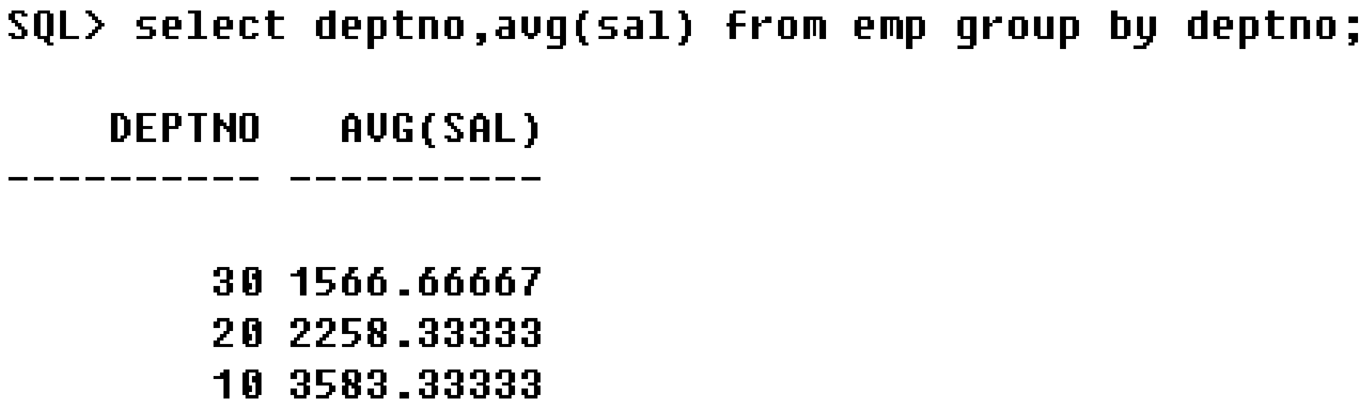
- Group by 子句
- 聚组函数
- Having子句

常见聚组统计函数

- Avg( )
- Sum( )
- Count( )
- Max( )
- Min( )
- Stddev( )
- Variance( )
- 更多的聚组统计函数参考《SQL Reference》

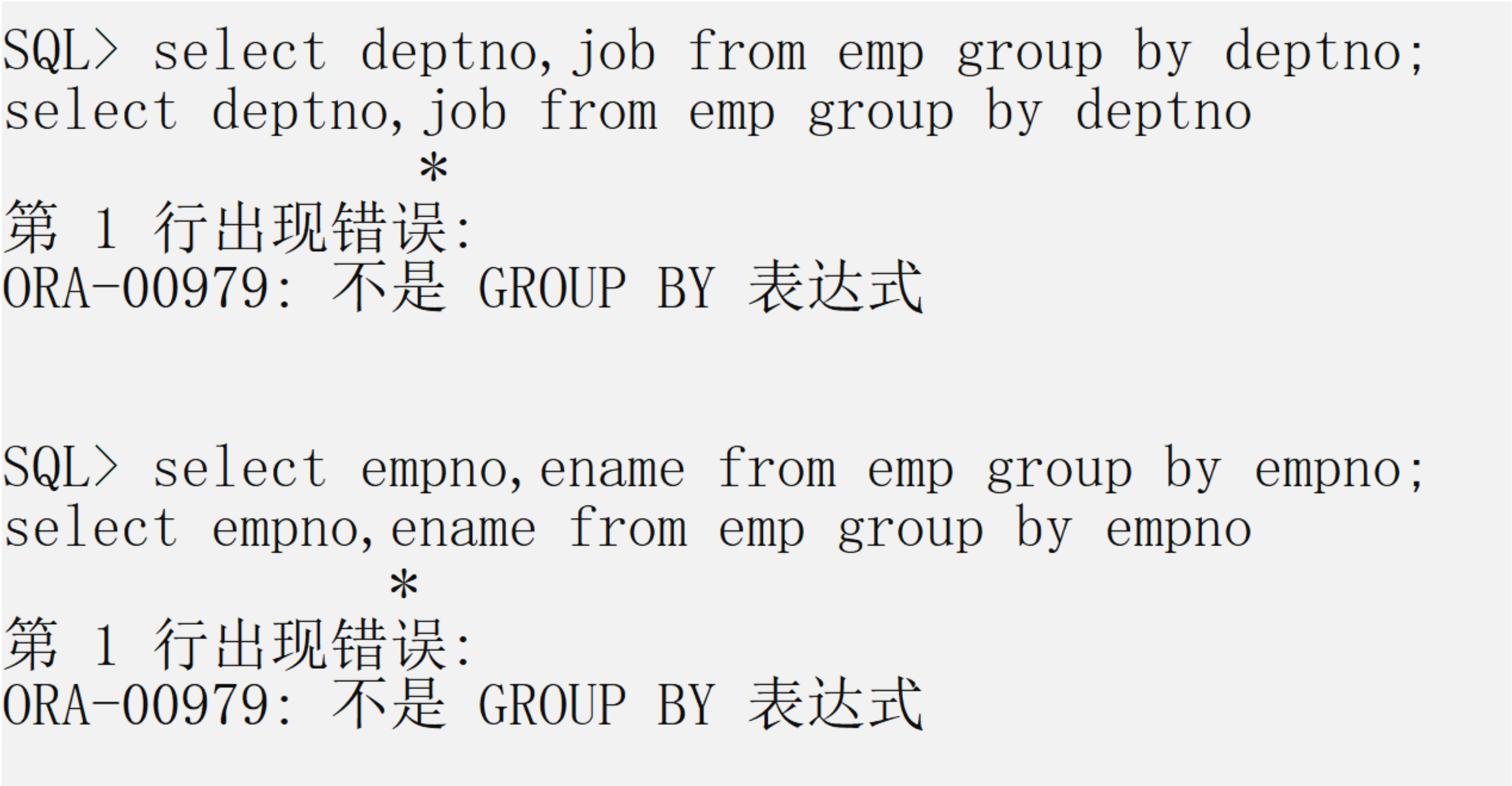
Group by子句

- 聚组表达式的意义
- Select后面可以出现什么?
- 例子：求每个部门的平均工资



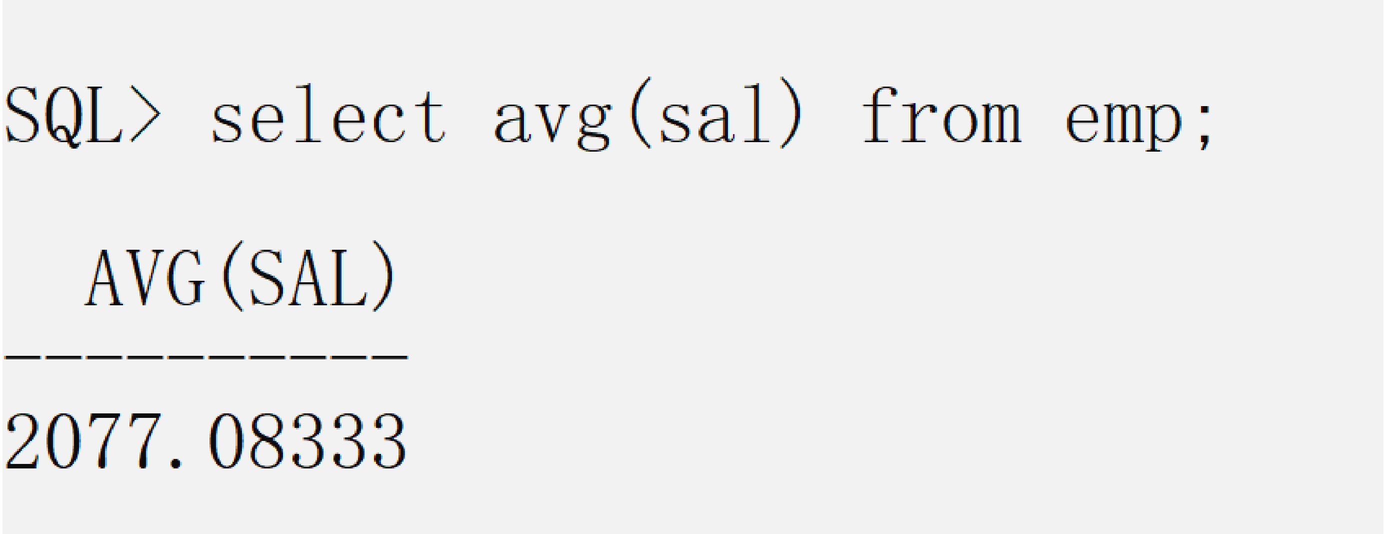
```
SQL> select deptno,avg(sal) from emp group by deptno;

    DEPTNO   AVG(SAL)
---------- ----------

        30 1566.66667
        20 2258.33333
        10 3583.33333
```

Select后面可以出现什么?



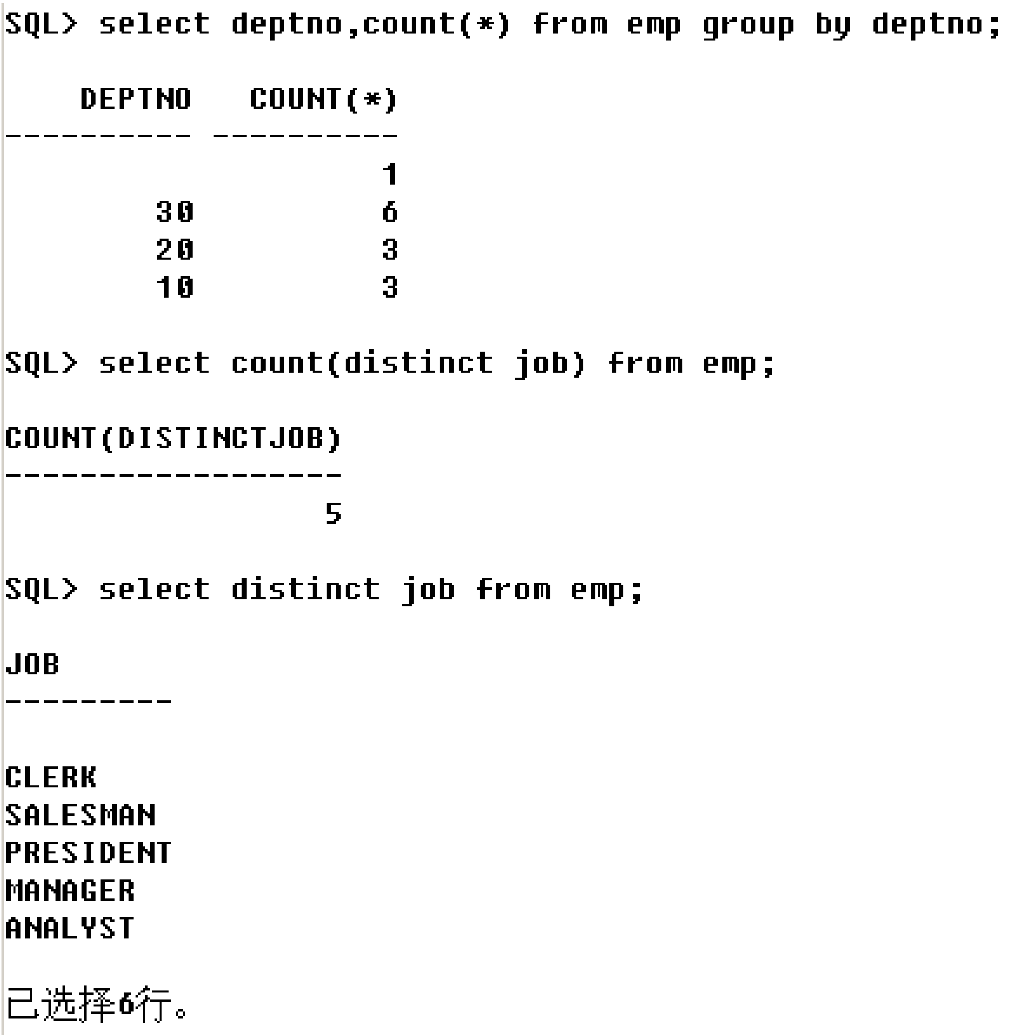
```
SQL> select deptno,job from emp group by deptno;
select deptno,job from emp group by deptno
              *
第 1 行出现错误:
ORA-00979: 不是 GROUP BY 表达式


SQL> select empno,ename from emp group by empno;
select empno,ename from emp group by empno
             *
第 1 行出现错误:
ORA-00979: 不是 GROUP BY 表达式
```

不带group by的情形



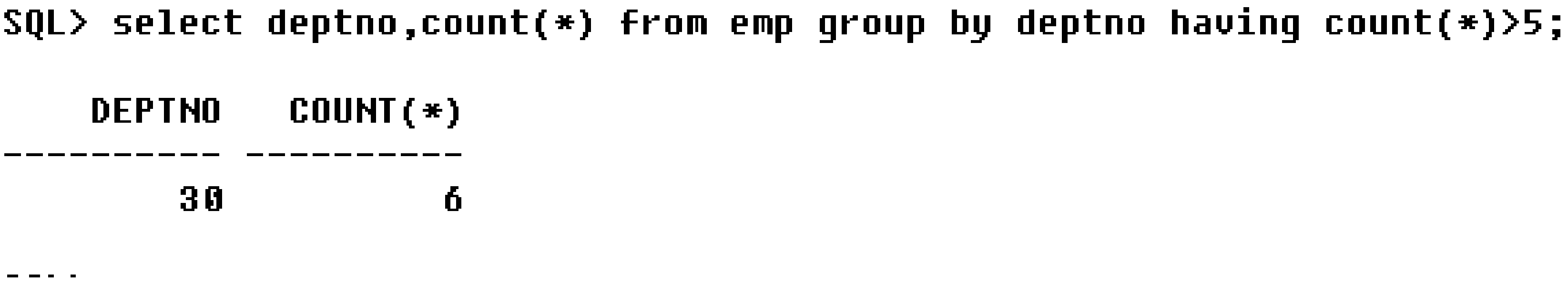
```
SQL> select avg(sal) from emp;

  AVG(SAL)
----------
2077.08333
```

Count和count distinct



```
SQL> select deptno,count(*) from emp group by deptno;

    DEPTNO   COUNT(*)
---------- ----------
                    1
        30          6
        20          3
        10          3

SQL> select count(distinct job) from emp;

COUNT(DISTINCTJOB)
------------------
                 5

SQL> select distinct job from emp;

JOB
---------

CLERK
SALESMAN
PRESIDENT
MANAGER
ANALYST

已选择6行。
```

Having子句



```
SQL> select deptno,count(*) from emp group by deptno having count(*)>5;

    DEPTNO   COUNT(*)
---------- ----------
        30          6

- -- -
```

2024.3.27

Select语句各种子句的执行顺序

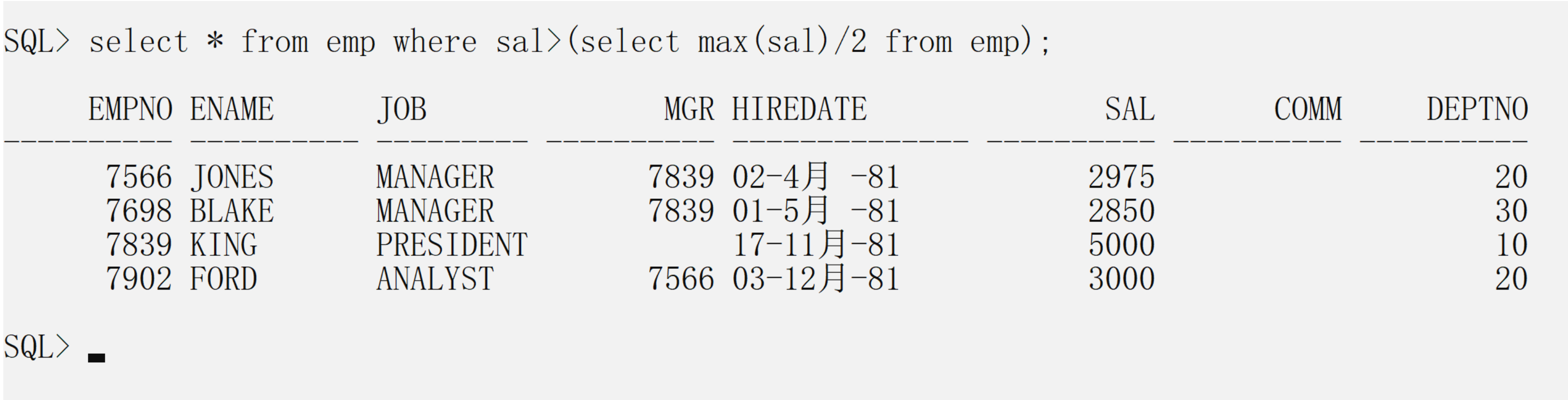
- Where->group by->having->order by

综合练习

- 列出工资比最高工资的一半要高的员工
- 列出平均工资超过公司平均工资的部门名称
- 列出人数最多的两个工种
- 列出人数最多的部门名称
- 列出工资差（最高-最低）最大的部门名称

答案

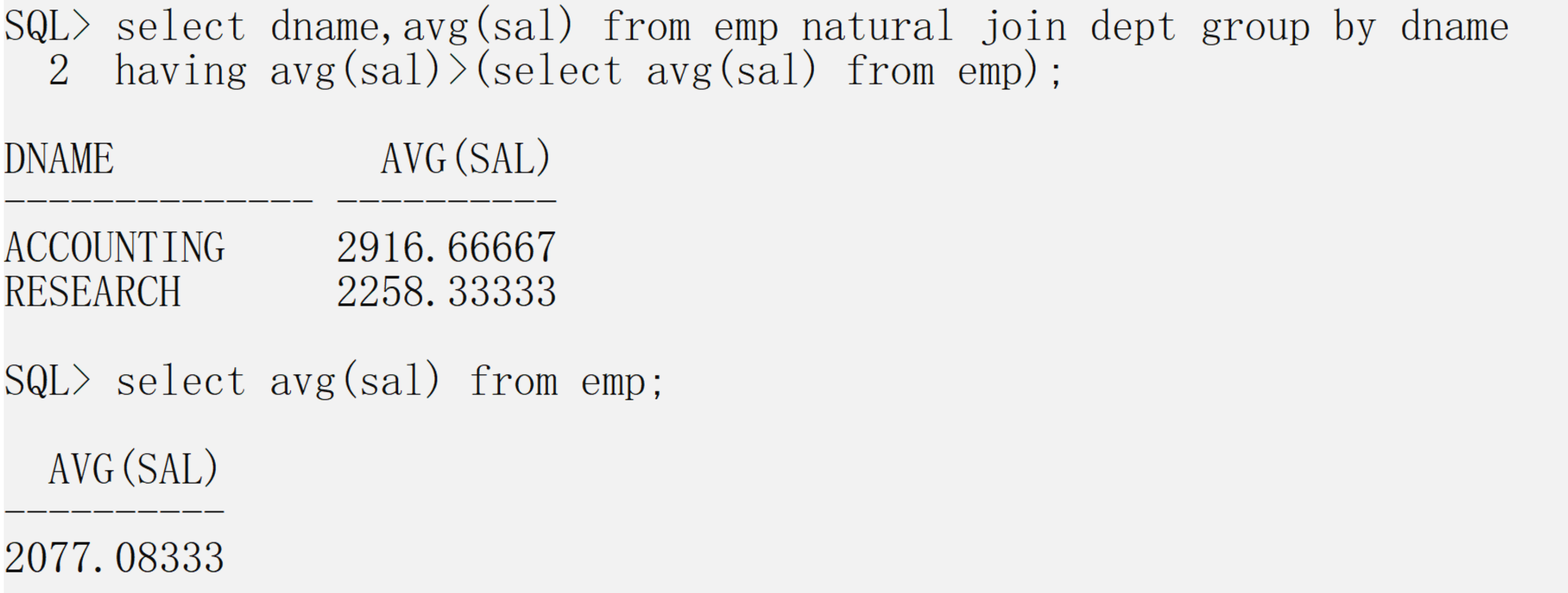
- 列出工资比最高工资的一半要高的员工



```
SQL> select * from emp where sal>(select max(sal)/2 from emp);

     EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO
---------- ---------- --------- ---------- -------------- ---------- ---------- ----------
      7566 JONES      MANAGER         7839 02-4月 -81           2975                    20
      7698 BLAKE      MANAGER         7839 01-5月 -81           2850                    30
      7839 KING       PRESIDENT            17-11月-81           5000                    10
      7902 FORD       ANALYST         7566 03-12月-81           3000                    20

SQL>
```

答案

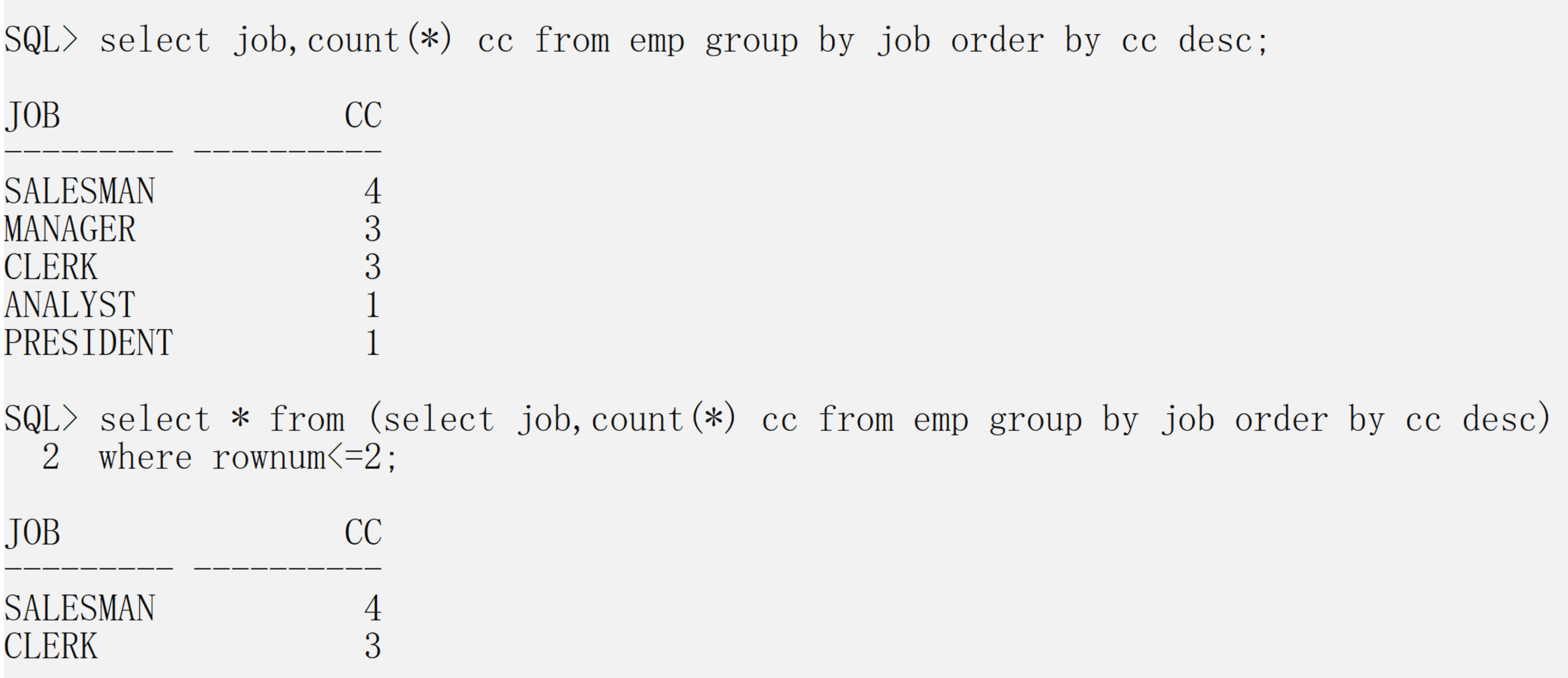
- 列出平均工资超过公司平均工资的部门名称



```
SQL> select dname,avg(sal) from emp natural join dept group by dname
  2  having avg(sal)>(select avg(sal) from emp);

DNAME            AVG(SAL)
-------------- ----------
ACCOUNTING     2916.66667
RESEARCH       2258.33333

SQL> select avg(sal) from emp;

  AVG(SAL)
----------
2077.08333
```

答案

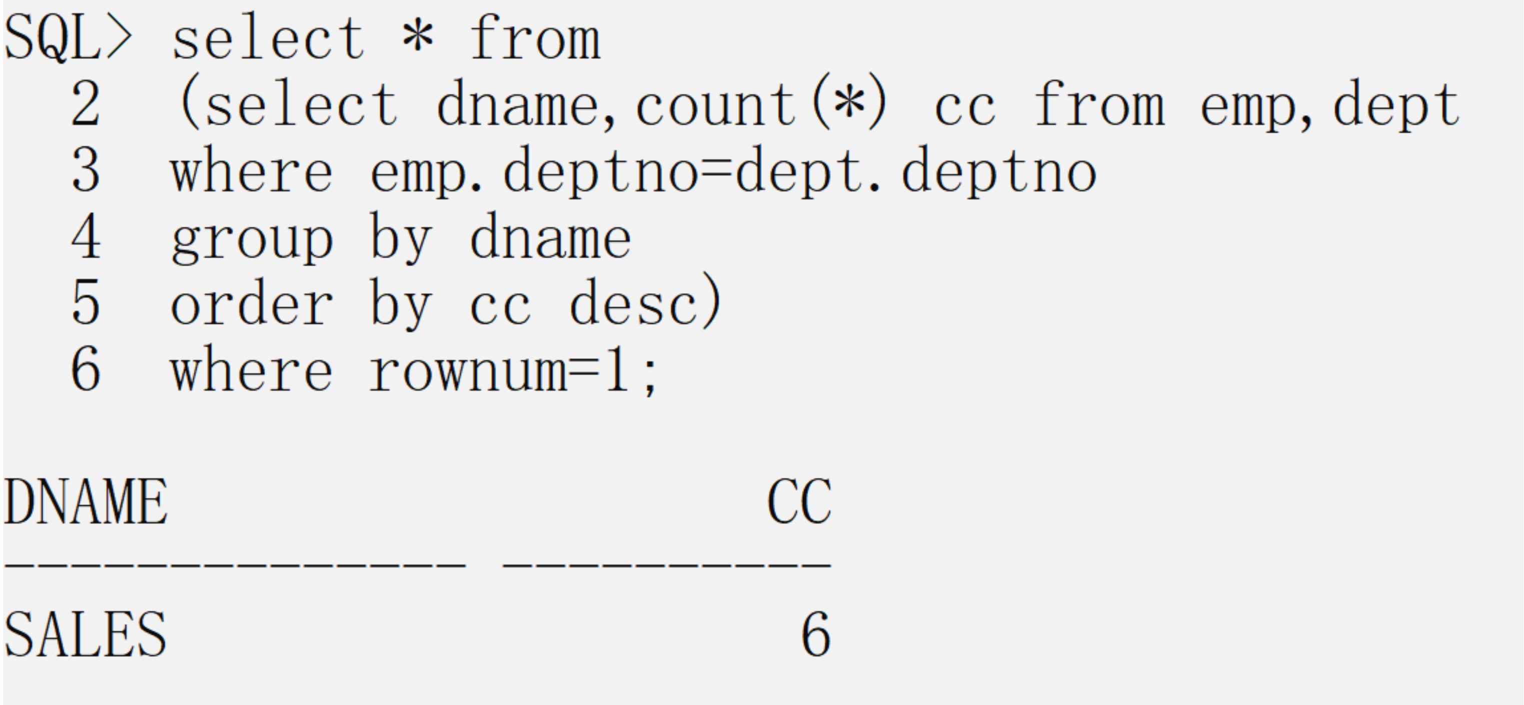
- 列出人数最多的两个工种



```
SQL> select job,count(*) cc from emp group by job order by cc desc;

JOB                 CC
--------- ----------
SALESMAN             4
MANAGER              3
CLERK                3
ANALYST              1
PRESIDENT            1

SQL> select * from (select job,count(*) cc from emp group by job order by cc desc)
  2  where rownum<=2;

JOB                 CC
--------- ----------
SALESMAN             4
CLERK                3
```

答案

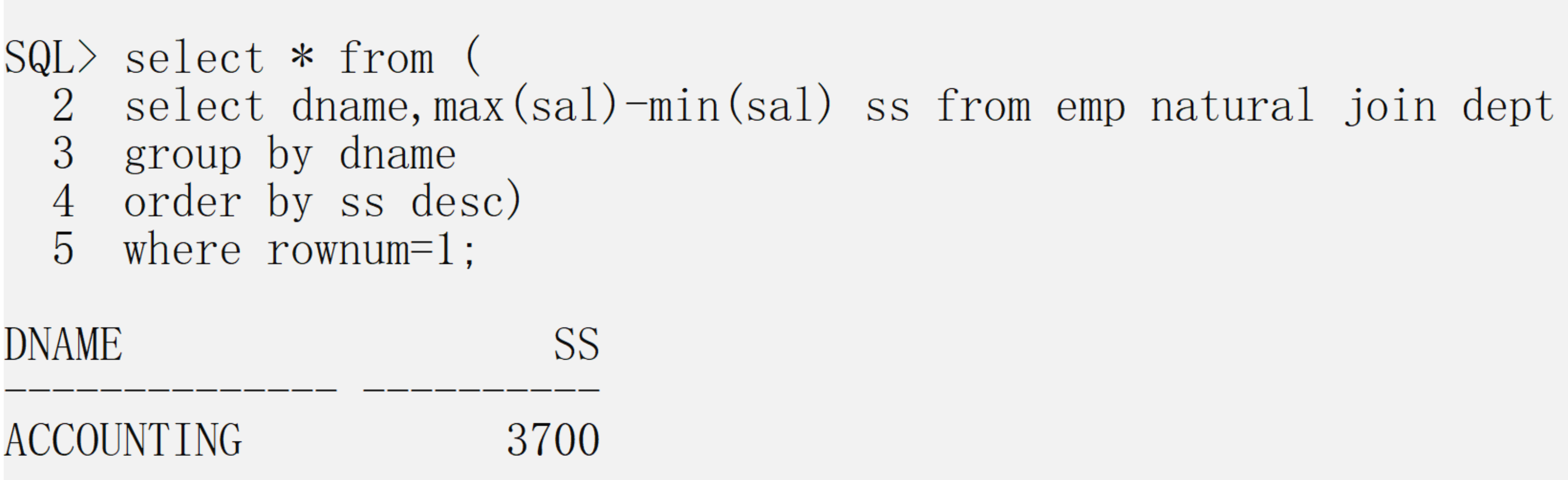
- 列出人数最多的部门名称



```
SQL> select * from
  2  (select dname,count(*) cc from emp,dept
  3  where emp.deptno=dept.deptno
  4  group by dname
  5  order by cc desc)
  6  where rownum=1;

DNAME                  CC
-------------- ----------
SALES                   6
```

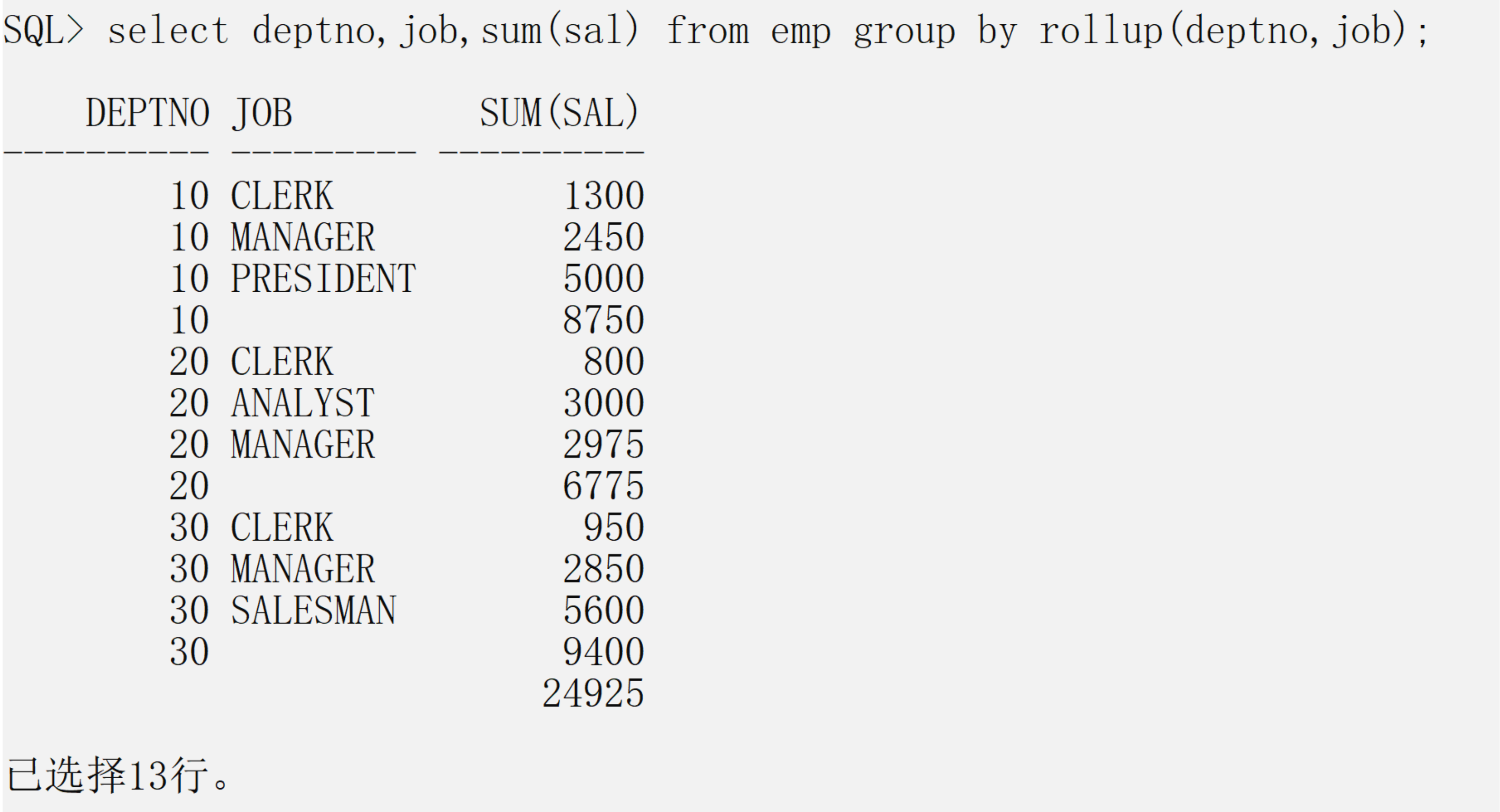
答案

- 列出工资差（最高-最低）最大的部门名称



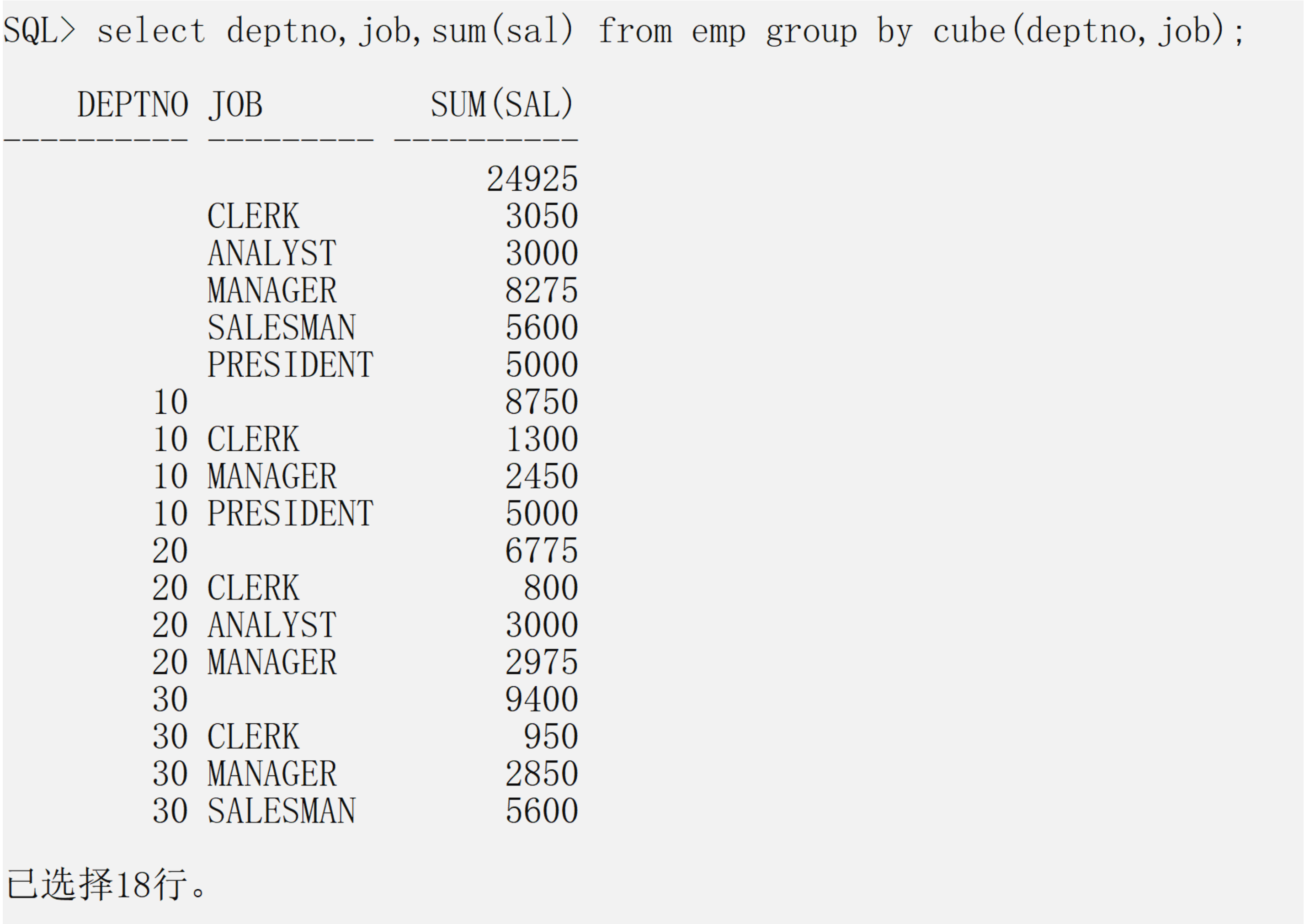
```
SQL> select * from (
  2  select dname,max(sal)-min(sal) ss from emp natural join dept
  3  group by dname
  4  order by ss desc)
  5  where rownum=1;

DNAME                  SS
-------------- ----------
ACCOUNTING           3700
```

ROLLUP操作符



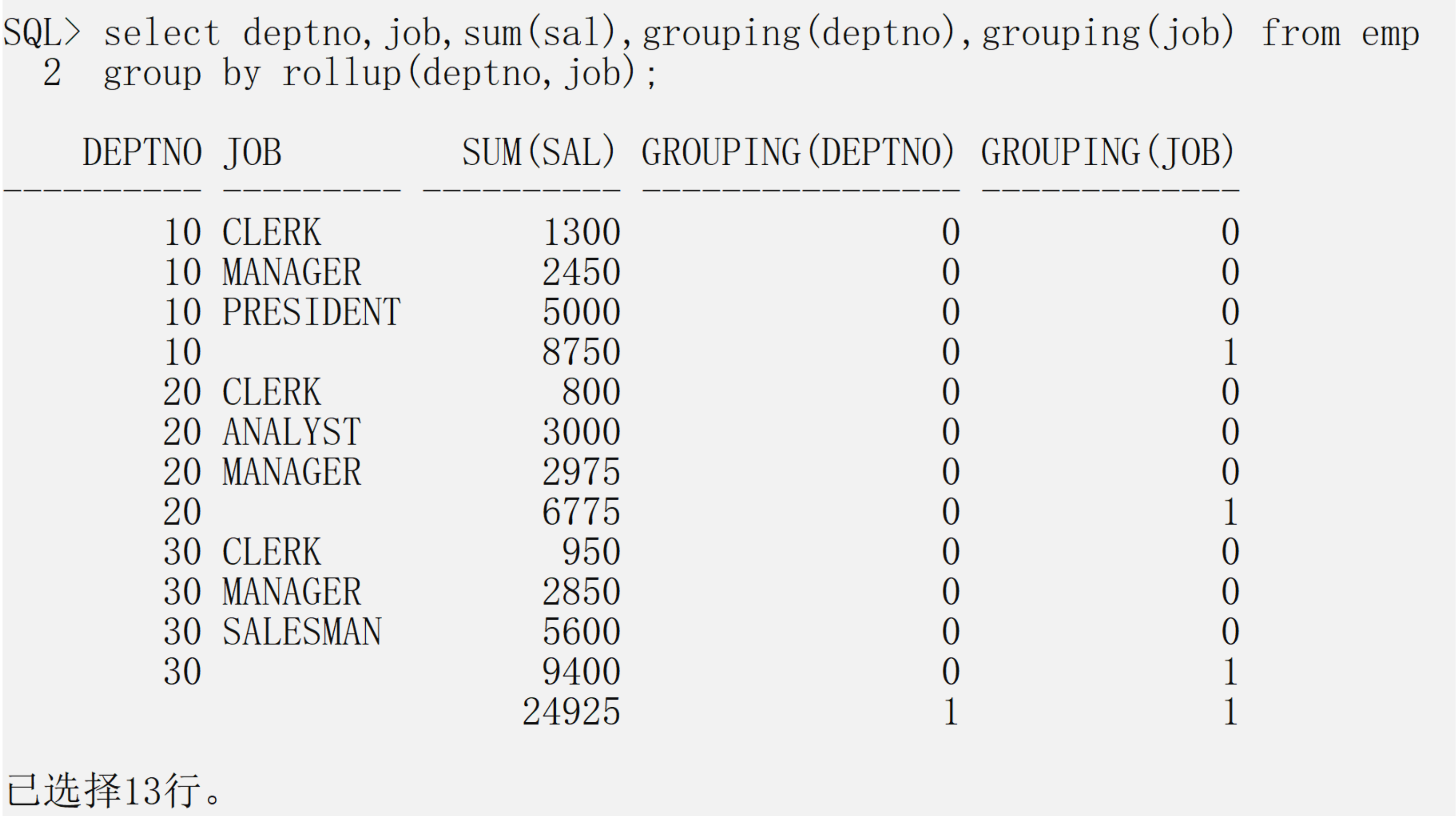
```
SQL> select deptno,job,sum(sal) from emp group by rollup(deptno,job);

    DEPTNO JOB         SUM(SAL)
---------- --------- ----------
        10 CLERK           1300
        10 MANAGER         2450
        10 PRESIDENT       5000
        10                 8750
        20 CLERK            800
        20 ANALYST         3000
        20 MANAGER         2975
        20                 6775
        30 CLERK            950
        30 MANAGER         2850
        30 SALESMAN        5600
        30                 9400
                          24925

已选择13行。
```

CUBE操作符



```
SQL> select deptno, job, sum(sal) from emp group by cube(deptno, job);

    DEPTNO JOB         SUM(SAL)
---------- --------- ----------
                          24925
           CLERK           3050
           ANALYST         3000
           MANAGER         8275
           SALESMAN        5600
           PRESIDENT       5000
        10                 8750
        10 CLERK           1300
        10 MANAGER         2450
        10 PRESIDENT       5000
        20                 6775
        20 CLERK            800
        20 ANALYST         3000
        20 MANAGER         2975
        30                 9400
        30 CLERK            950
        30 MANAGER         2850
        30 SALESMAN        5600

已选择18行。
```

GROUPING函数



```
SQL> select deptno,job,sum(sal),grouping(deptno),grouping(job) from emp
  2  group by rollup(deptno,job);

    DEPTNO JOB          SUM(SAL) GROUPING(DEPTNO) GROUPING(JOB)
---------- --------- ---------- ---------------- -------------
        10 CLERK           1300                0             0
        10 MANAGER         2450                0             0
        10 PRESIDENT       5000                0             0
        10                 8750                0             1
        20 CLERK            800                0             0
        20 ANALYST         3000                0             0
        20 MANAGER         2975                0             0
        20                 6775                0             1
        30 CLERK            950                0             0
        30 MANAGER         2850                0             0
        30 SALESMAN        5600                0             0
        30                 9400                0             1
                          24925                1             1

已选择13行。
```

窄表转宽表：pivot

```
create table DailyIncome(VendorId varchar210), IncomeDay varchar2(10),
IncomeAmount number);


--VendorId 供应商ID,

--IncomeDay 收入时间

--IncomeAmount 收入金额
```

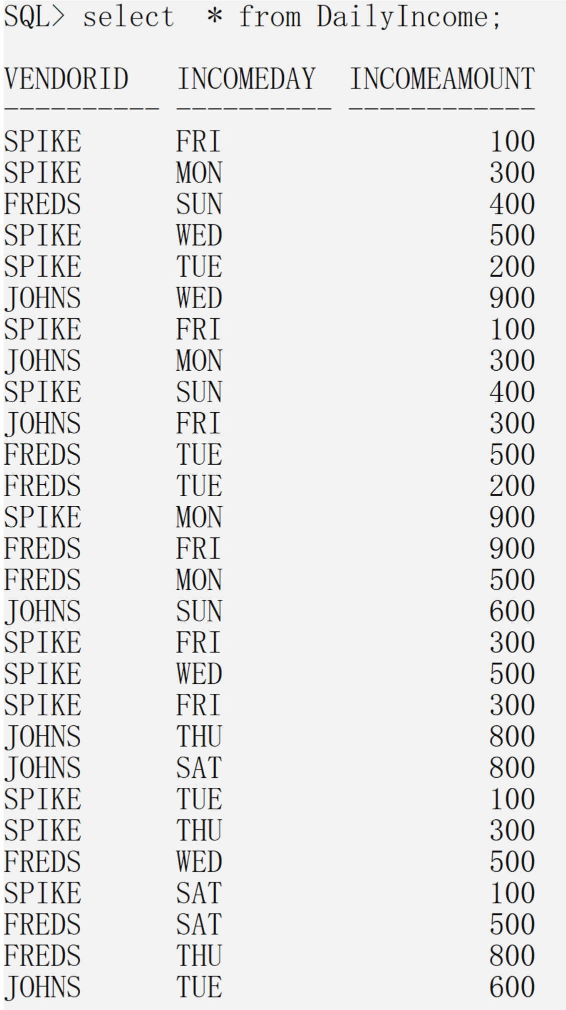
样例数据

```
insert into DailyIncome values ('SPIKE', 'FRI', 100);
insert into DailyIncome values ('SPIKE', 'MON', 300);
insert into DailyIncome values ('FREDS', 'SUN', 400);
insert into DailyIncome values ('SPIKE', 'WED', 500);
insert into DailyIncome values ('SPIKE', 'TUE', 200);
insert into DailyIncome values ('JOHNS', 'WED', 900);
insert into DailyIncome values ('SPIKE', 'FRI', 100);
insert into DailyIncome values ('JOHNS', 'MON', 300);
insert into DailyIncome values ('SPIKE', 'SUN', 400);
insert into DailyIncome values ('JOHNS', 'FRI', 300);
insert into DailyIncome values ('FREDS', 'TUE', 500);
insert into DailyIncome values ('FREDS', 'TUE', 200);
insert into DailyIncome values ('SPIKE', 'MON', 900);
insert into DailyIncome values ('FREDS', 'FRI', 900);
insert into DailyIncome values ('FREDS', 'MON', 500);
insert into DailyIncome values ('JOHNS', 'SUN', 600);
```

样例数据

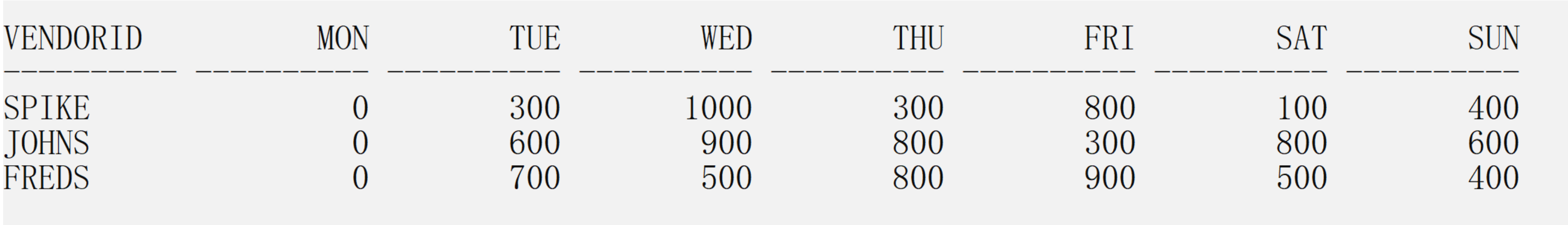
```
insert into DailyIncome values ('SPIKE', 'FRI', 300);
insert into DailyIncome values ('SPIKE', 'WED', 500);
insert into DailyIncome values ('SPIKE', 'FRI', 300);
insert into DailyIncome values ('JOHNS', 'THU', 800);
insert into DailyIncome values ('JOHNS', 'SAT', 800);
insert into DailyIncome values ('SPIKE', 'TUE', 100);
insert into DailyIncome values ('SPIKE', 'THU', 300);
insert into DailyIncome values ('FREDS', 'WED', 500);
insert into DailyIncome values ('SPIKE', 'SAT', 100);
insert into DailyIncome values ('FREDS', 'SAT', 500);
insert into DailyIncome values ('FREDS', 'THU', 800);
insert into DailyIncome values ('JOHNS', 'TUE', 600);
commit;
```

样例数据



```
SQL> select  * from DailyIncome;

VENDORID   INCOMEDAY  INCOMEAMOUNT
---------- ---------- ------------
SPIKE      FRI                 100
SPIKE      MON                 300
FREDS      SUN                 400
SPIKE      WED                 500
SPIKE      TUE                 200
JOHNS      WED                 900
SPIKE      FRI                 100
JOHNS      MON                 300
SPIKE      SUN                 400
JOHNS      FRI                 300
FREDS      TUE                 500
FREDS      TUE                 200
SPIKE      MON                 900
FREDS      FRI                 900
FREDS      MON                 500
JOHNS      SUN                 600
SPIKE      FRI                 300
SPIKE      WED                 500
SPIKE      FRI                 300
JOHNS      THU                 800
JOHNS      SAT                 800
SPIKE      TUE                 100
SPIKE      THU                 300
FREDS      WED                 500
SPIKE      SAT                 100
FREDS      SAT                 500
FREDS      THU                 800
JOHNS      TUE                 600
```

目标效果

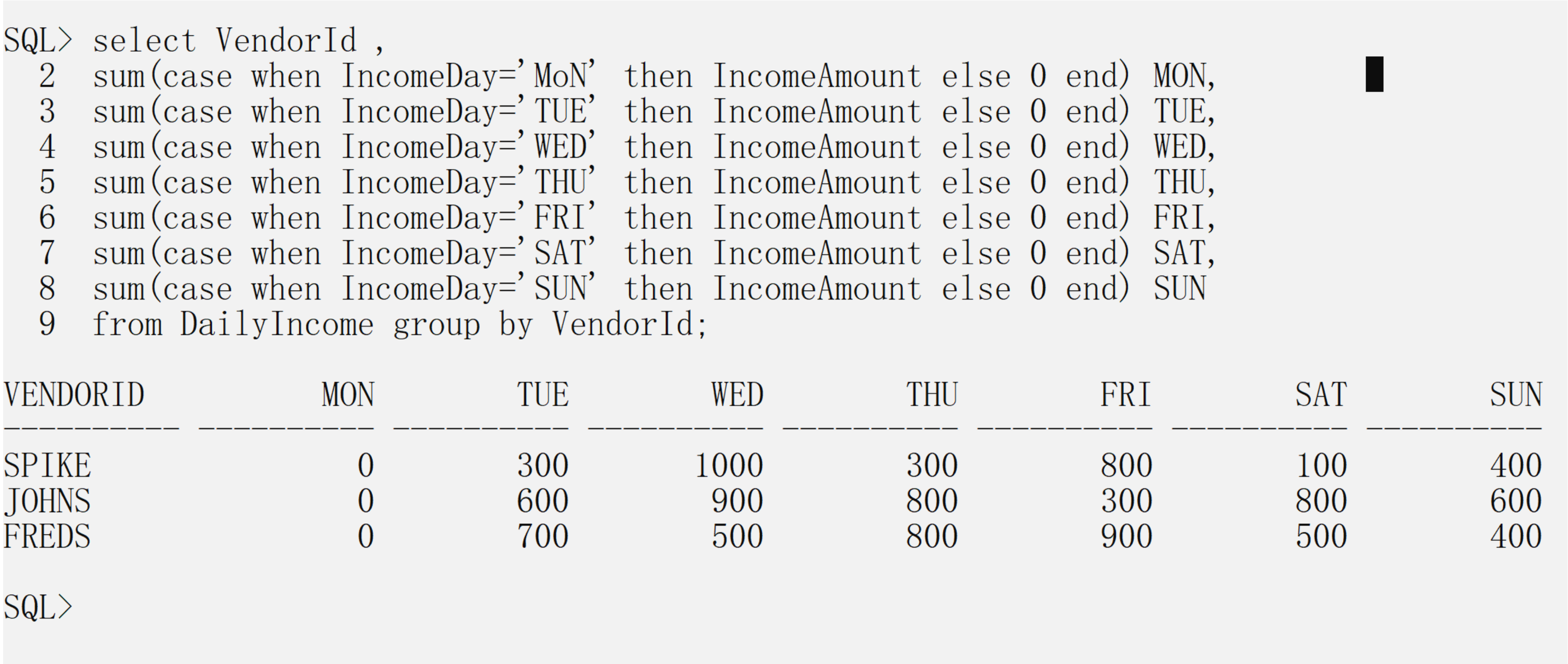


```
VENDORID          MON        TUE        WED        THU        FRI        SAT        SUN
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE               0        300       1000        300        800        100        400
JOHNS               0        600        900        800        300        800        600
FREDS               0        700        500        800        900        500        400
```

使用group by来实现

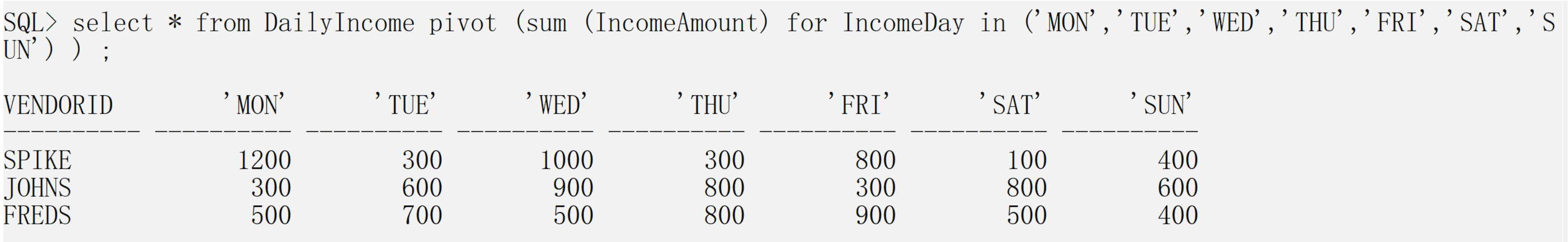
```
select VendorId ,
sum(case when IncomeDay='MoN' then IncomeAmount else 0 end) MON,
sum(case when IncomeDay='TUE' then IncomeAmount else 0 end) TUE,
sum(case when IncomeDay='WED' then IncomeAmount else 0 end) WED,
sum(case when IncomeDay='THU' then IncomeAmount else 0 end) THU,
sum(case when IncomeDay='FRI' then IncomeAmount else 0 end) FRI,
sum(case when IncomeDay='SAT' then IncomeAmount else 0 end) SAT,
sum(case when IncomeDay='SUN' then IncomeAmount else 0 end) SUN
from DailyIncome group by VendorId;
```

结果



```
SQL> select VendorId ,
  2  sum(case when IncomeDay=’MoN’ then IncomeAmount else 0 end) MON,
  3  sum(case when IncomeDay=’TUE’ then IncomeAmount else 0 end) TUE,
  4  sum(case when IncomeDay=’WED’ then IncomeAmount else 0 end) WED,
  5  sum(case when IncomeDay=’THU’ then IncomeAmount else 0 end) THU,
  6  sum(case when IncomeDay=’FRI’ then IncomeAmount else 0 end) FRI,
  7  sum(case when IncomeDay=’SAT’ then IncomeAmount else 0 end) SAT,
  8  sum(case when IncomeDay=’SUN’ then IncomeAmount else 0 end) SUN
  9  from DailyIncome group by VendorId;

VENDORID          MON        TUE        WED        THU        FRI        SAT        SUN
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE               0        300       1000        300        800        100        400
JOHNS               0        600        900        800        300        800        600
FREDS               0        700        500        800        900        500        400

SQL>
```

Pivot函数

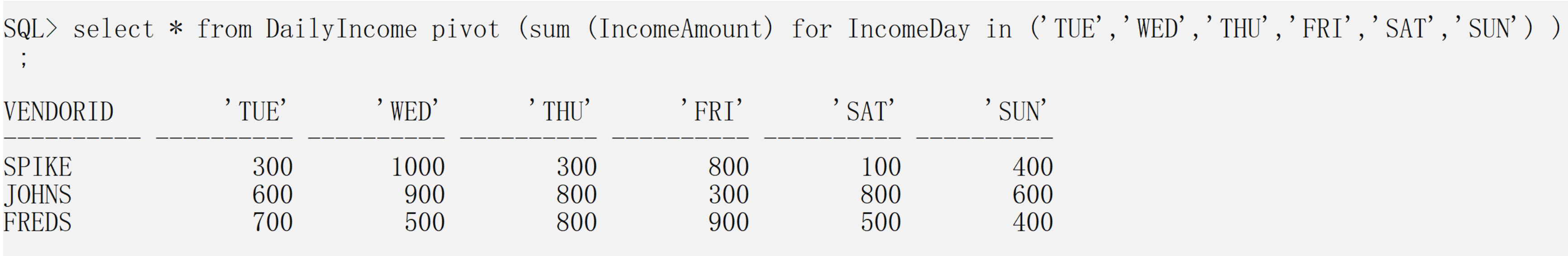


```
SQL> select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (’MON’,’TUE’,’WED’,’THU’,’FRI’,’SAT’,’S
UN’) ) ;

VENDORID        ’MON’      ’TUE’      ’WED’      ’THU’      ’FRI’      ’SAT’      ’SUN’
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE            1200        300       1000        300        800        100        400
JOHNS             300        600        900        800        300        800        600
FREDS             500        700        500        800        900        500        400
```

Pivot函数

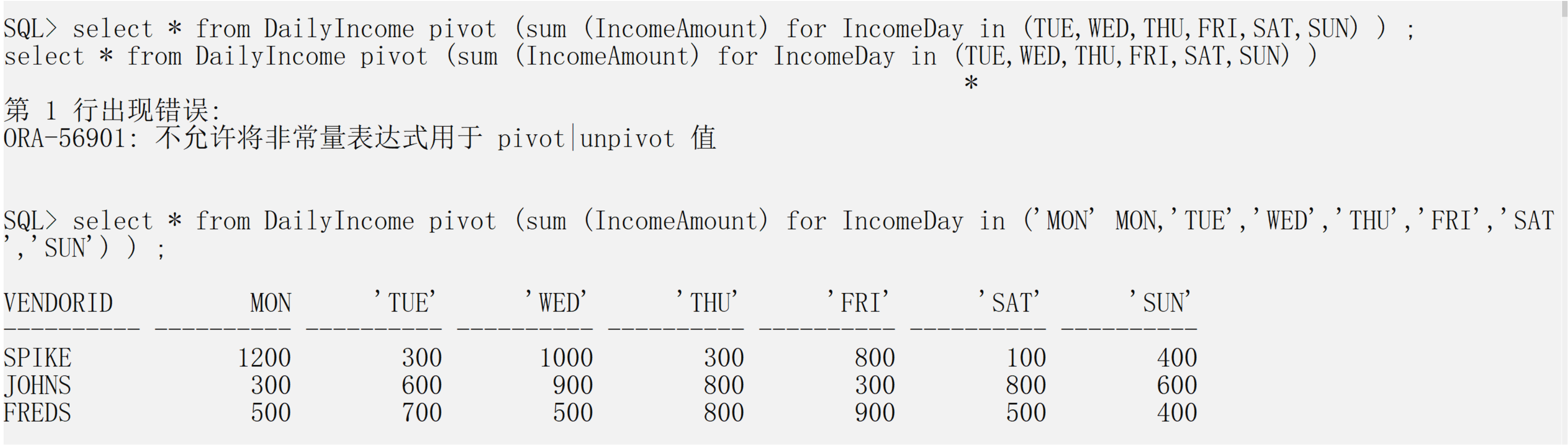
```
select * from DailyIncome ----数据来自 DailyIncome 表
pivot
(
sum (IncomeAmount) ---- 新列的每个取值是怎样计算的
for IncomeDay in ('MON','TUE','WED','THU','FRI','SAT','SUN') ---让 IncomeDay 列的各个取值成为新的列名
) ;
```

测试：缺乏一些取值



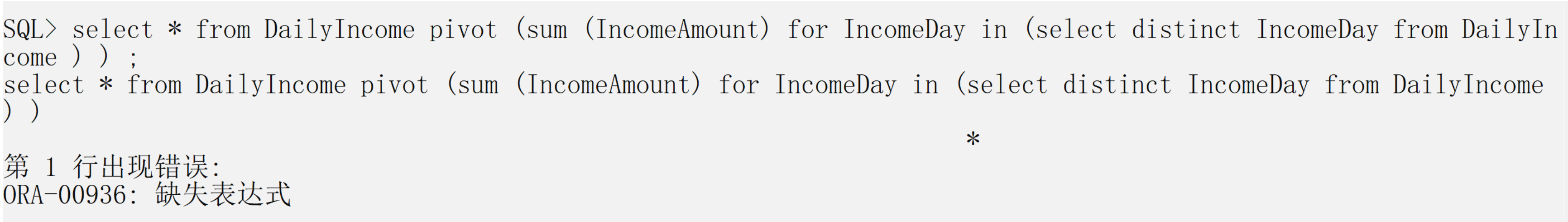
```
SQL> select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (’TUE’,’WED’,’THU’,’FRI’,’SAT’,’SUN’) )
 ;

VENDORID          ’TUE’      ’WED’      ’THU’      ’FRI’      ’SAT’      ’SUN’
---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE             300       1000        300        800        100        400
JOHNS             600        900        800        300        800        600
FREDS             700        500        800        900        500        400
```

测试：改写列头名称



```
SQL> select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (TUE,WED,THU,FRI,SAT,SUN) ) ;
select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (TUE,WED,THU,FRI,SAT,SUN) )
                                                                      *
第 1 行出现错误:
ORA-56901: 不允许将非常量表达式用于 pivot|unpivot 值


SQL> select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (’MON’ MON,’TUE’,’WED’,’THU’,’FRI’,’SAT
’,’SUN’) ) ;

VENDORID          MON      ’TUE’      ’WED’      ’THU’      ’FRI’      ’SAT’      ’SUN’
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE            1200        300       1000        300        800        100        400
JOHNS             300        600        900        800        300        800        600
FREDS             500        700        500        800        900        500        400
```

测试：能否使用子查询?



```
SQL> select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (select distinct IncomeDay from DailyIn
come ) ) ;
select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (select distinct IncomeDay from DailyIncome
) )
                                                                       *
第 1 行出现错误:
ORA-00936: 缺失表达式
```

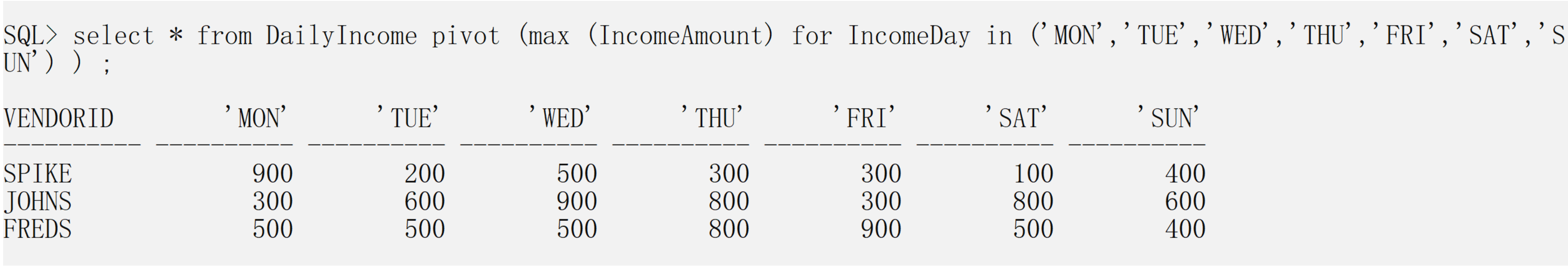
2024.3.27

对于无法完全确定列值的情况怎样处理

- 在PL/SQL下实现：先拼装SQL语句（字符串），然后用执行动态SQL的方法实现转换

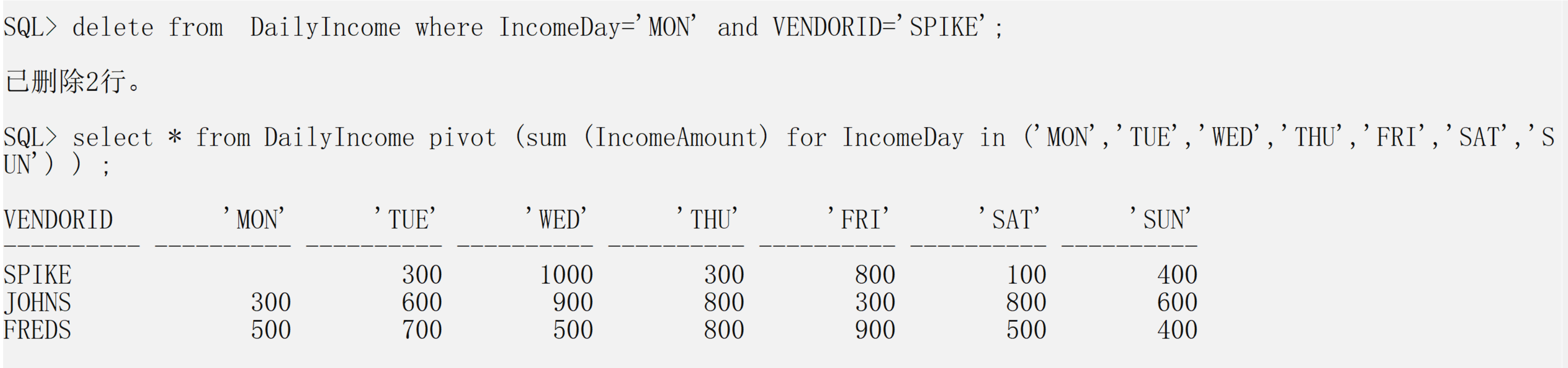
2024.3.27

测试：使用其它聚组函数



```
SQL> select * from DailyIncome pivot (max (IncomeAmount) for IncomeDay in (’MON’,’TUE’,’WED’,’THU’,’FRI’,’SAT’,’S
UN’) ) ;

VENDORID        ’MON’      ’TUE’      ’WED’      ’THU’      ’FRI’      ’SAT’      ’SUN’
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE             900        200        500        300        300        100        400
JOHNS             300        600        900        800        300        800        600
FREDS             500        500        500        800        900        500        400
```

测试：删除部分取值使到宽表出现空值



```
SQL> delete from  DailyIncome where IncomeDay=’MON’ and VENDORID=’SPIKE’;

已删除2行。

SQL> select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (’MON’,’TUE’,’WED’,’THU’,’FRI’,’SAT’,’S
UN’)) ;

VENDORID        ’MON’      ’TUE’      ’WED’      ’THU’      ’FRI’      ’SAT’      ’SUN’
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE                        300       1000        300        800        100        400
JOHNS             300        600        900        800        300        800        600
FREDS             500        700        500        800        900        500        400
```

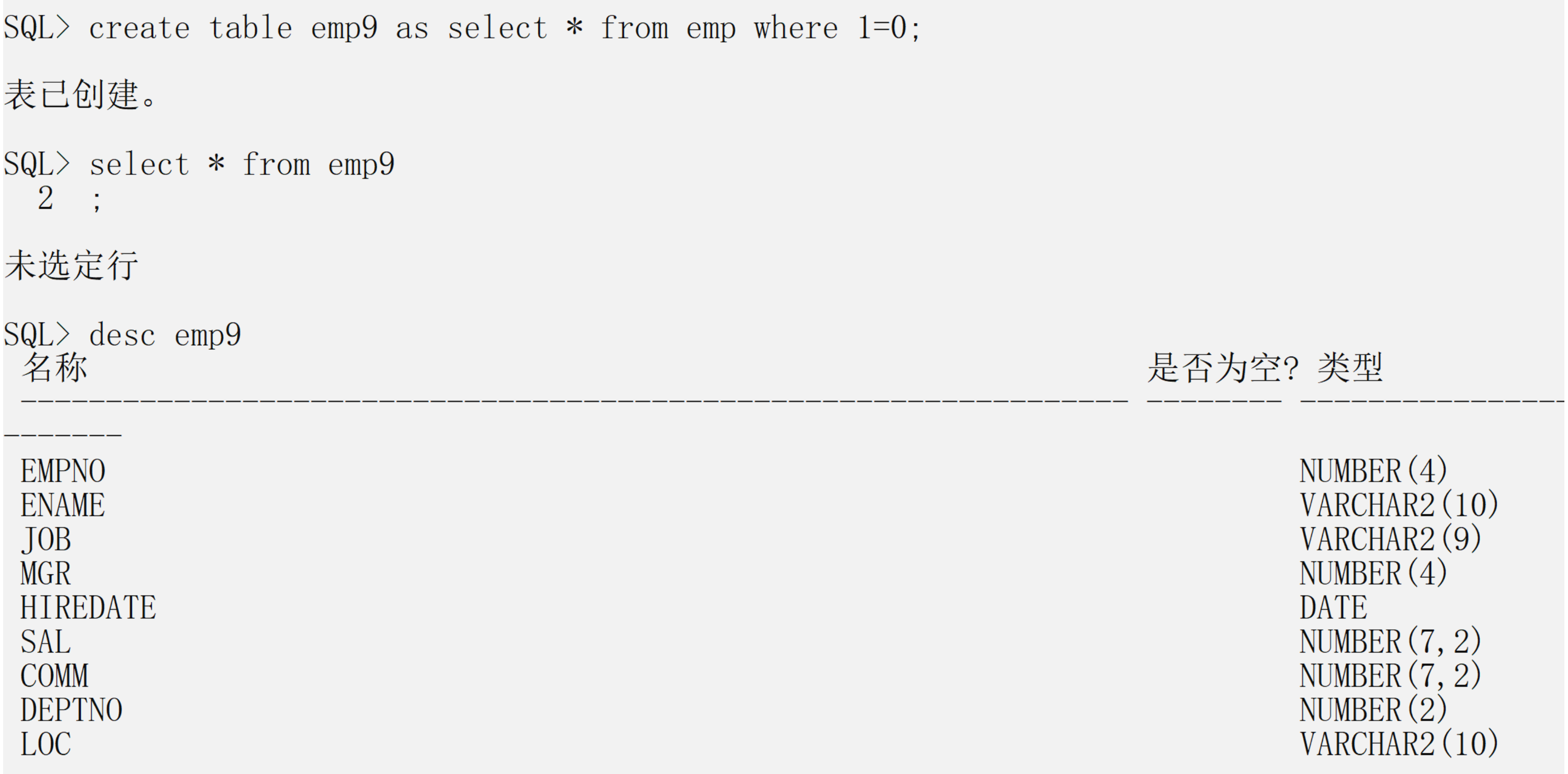
练习

- 在SC表中写入一批选修数据，然后将其转为宽表
- 如果有同学有补考成绩（就是某人特定科目可能有多个成绩），怎样生成宽表?

保存宽表

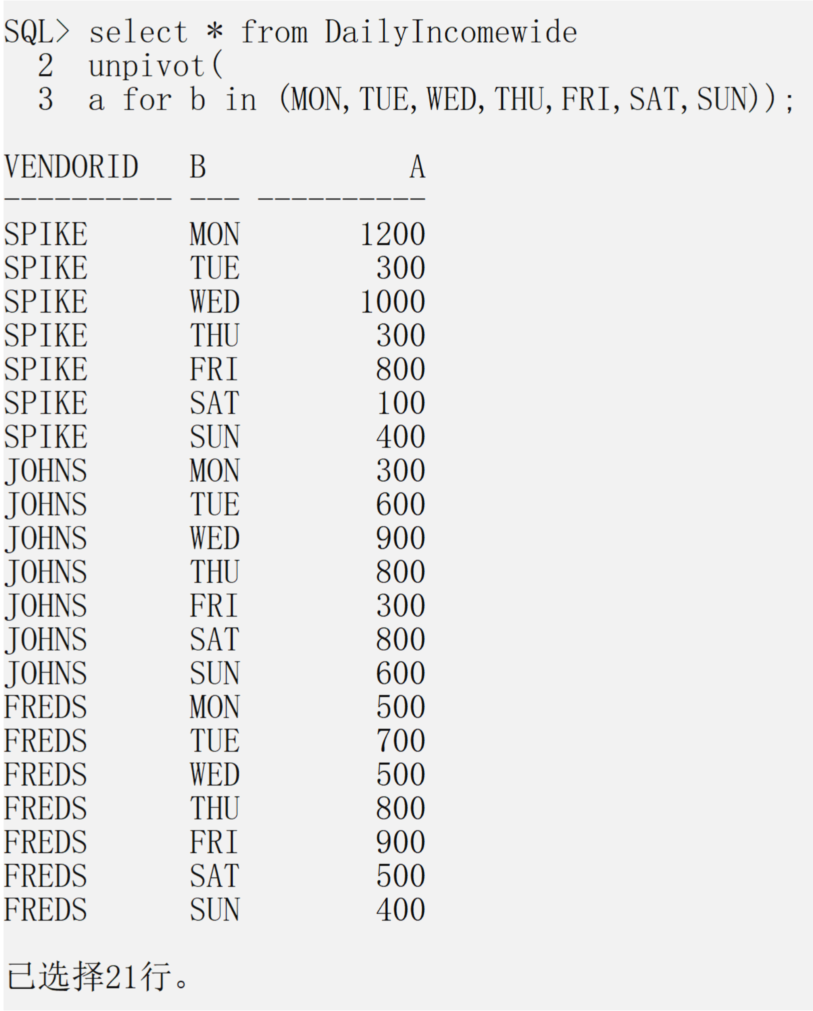
```
SQL> create table DailyIncomewide as
  2  select * from DailyIncome pivot (sum (IncomeAmount) for IncomeDay in (’MON’ MON,’TUE’ TUE,’WED’ WED,’THU’ TH
U,’FRI’ FRI,’SAT’ SAT,’SUN’ SUN) ) ;

表已创建。

SQL> select * from DailyIncomewide;

VENDORID          MON        TUE        WED        THU        FRI        SAT        SUN
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE            1200        300       1000        300        800        100        400
JOHNS             300        600        900        800        300        800        600
FREDS             500        700        500        800        900        500        400
```

技巧：怎样只建立表头，不放置数据?



```
SQL> create table emp9 as select * from emp where 1=0;

表已创建。

SQL> select * from emp9
  2  ;

未选定行

SQL> desc emp9
 名称                                                              是否为空? 类型
 ----------------------------------------------------------------- -------- ---------------
-------
 EMPNO                                                                      NUMBER(4)
 ENAME                                                                      VARCHAR2(10)
 JOB                                                                        VARCHAR2(9)
 MGR                                                                        NUMBER(4)
 HIREDATE                                                                   DATE
 SAL                                                                        NUMBER(7,2)
 COMM                                                                       NUMBER(7,2)
 DEPTNO                                                                     NUMBER(2)
 LOC                                                                        VARCHAR2(10)
```

Unpivot函数：宽表转窄表



```
SQL> select * from DailyIncomewide
  2  unpivot(
  3  a for b in (MON,TUE,WED,THU,FRI,SAT,SUN));

VENDORID   B            A
---------- --- ----------
SPIKE      MON       1200
SPIKE      TUE        300
SPIKE      WED       1000
SPIKE      THU        300
SPIKE      FRI        800
SPIKE      SAT        100
SPIKE      SUN        400
JOHNS      MON        300
JOHNS      TUE        600
JOHNS      WED        900
JOHNS      THU        800
JOHNS      FRI        300
JOHNS      SAT        800
JOHNS      SUN        600
FREDS      MON        500
FREDS      TUE        700
FREDS      WED        500
FREDS      THU        800
FREDS      FRI        900
FREDS      SAT        500
FREDS      SUN        400

已选择21行。
```

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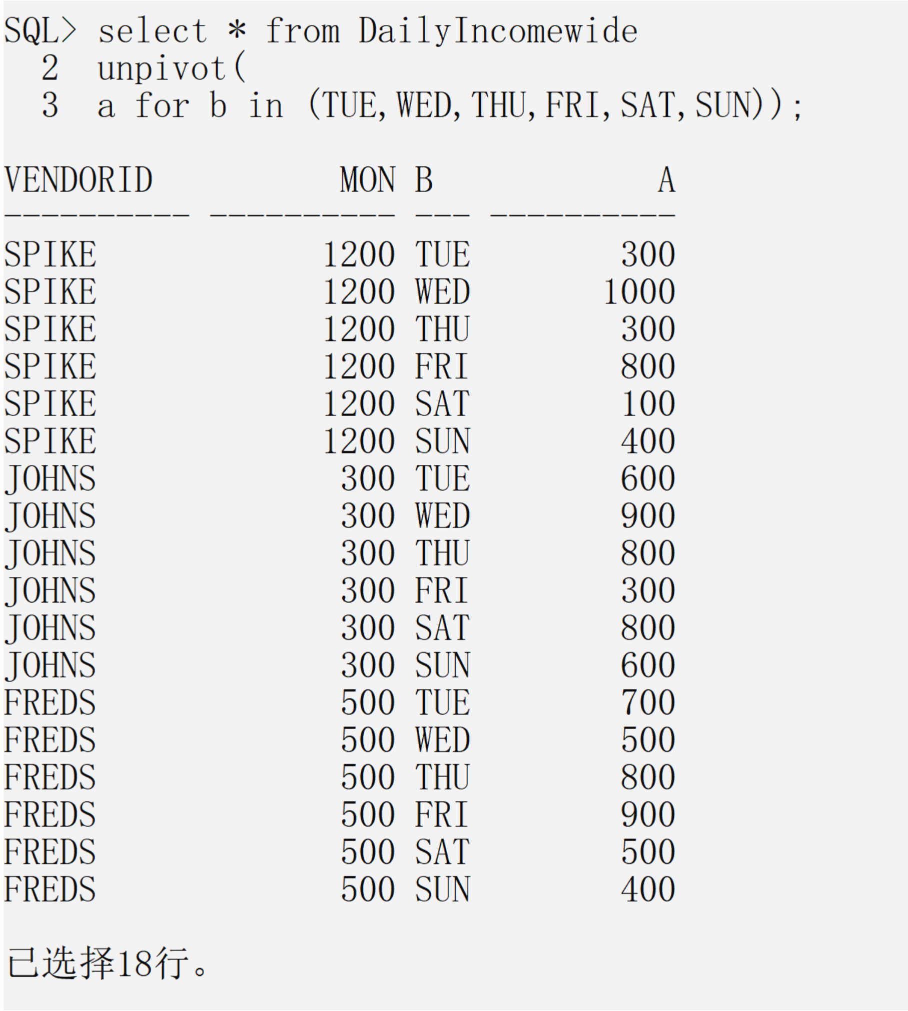
测试：理解unpivot的结果是怎样产生的

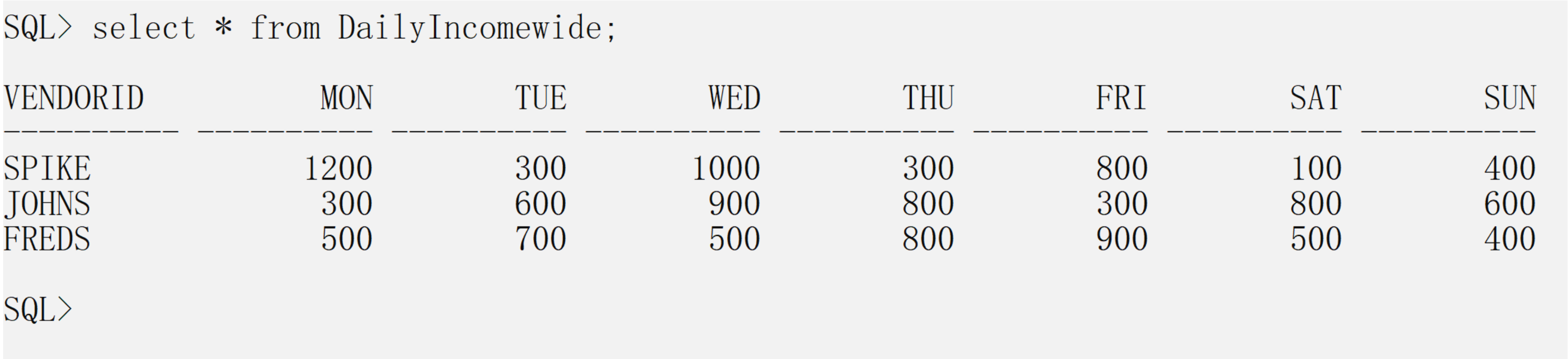


```
SQL> select * from DailyIncomewide
  2  unpivot(
  3  a for b in (TUE,WED,THU,FRI,SAT,SUN));

VENDORID          MON B            A
---------- ---------- --- ----------
SPIKE            1200 TUE        300
SPIKE            1200 WED       1000
SPIKE            1200 THU        300
SPIKE            1200 FRI        800
SPIKE            1200 SAT        100
SPIKE            1200 SUN        400
JOHNS             300 TUE        600
JOHNS             300 WED        900
JOHNS             300 THU        800
JOHNS             300 FRI        300
JOHNS             300 SAT        800
JOHNS             300 SUN        600
FREDS             500 TUE        700
FREDS             500 WED        500
FREDS             500 THU        800
FREDS             500 FRI        900
FREDS             500 SAT        500
FREDS             500 SUN        400

已选择18行。
```

测试

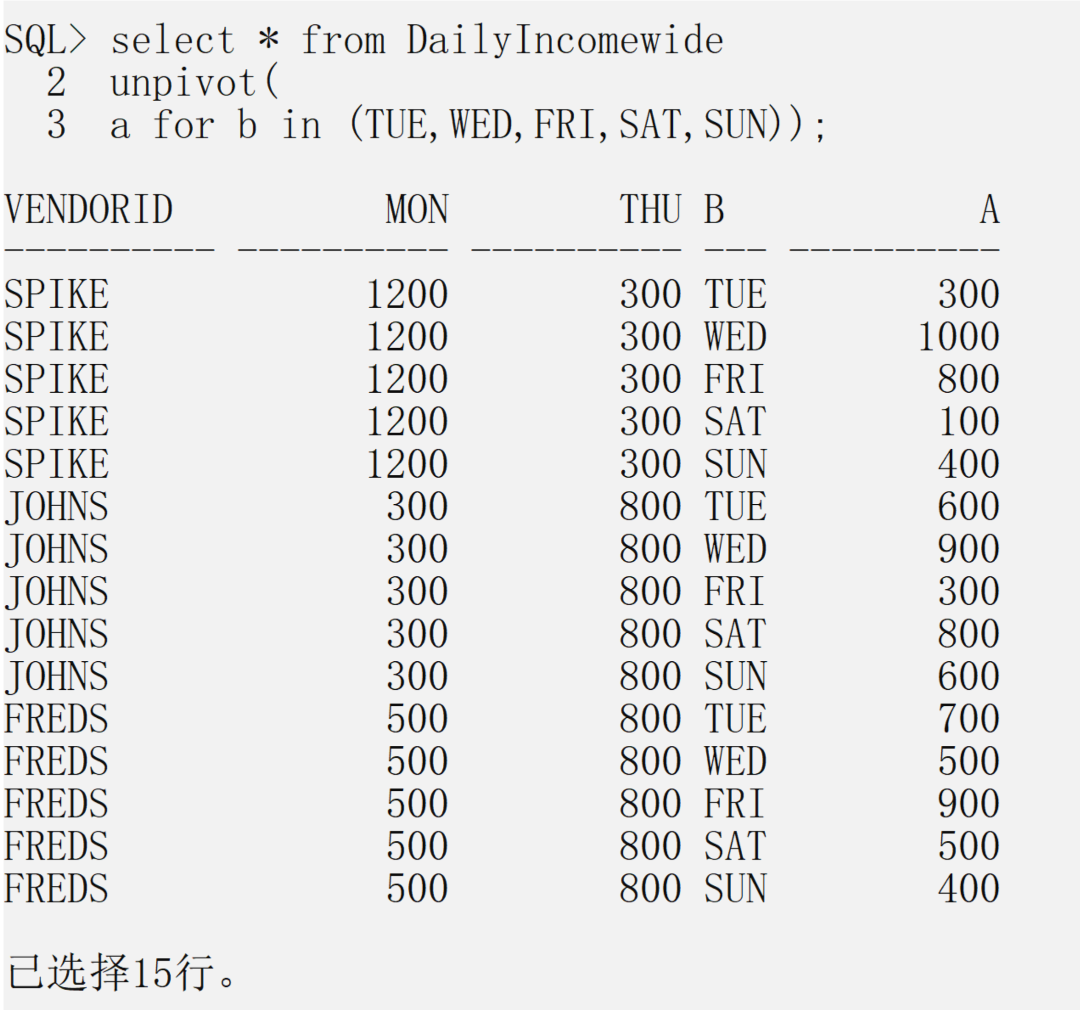


```
SQL> select * from DailyIncomewide;

VENDORID          MON        TUE        WED        THU        FRI        SAT        SUN
---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
SPIKE            1200        300       1000        300        800        100        400
JOHNS             300        600        900        800        300        800        600
FREDS             500        700        500        800        900        500        400

SQL>
```

测试

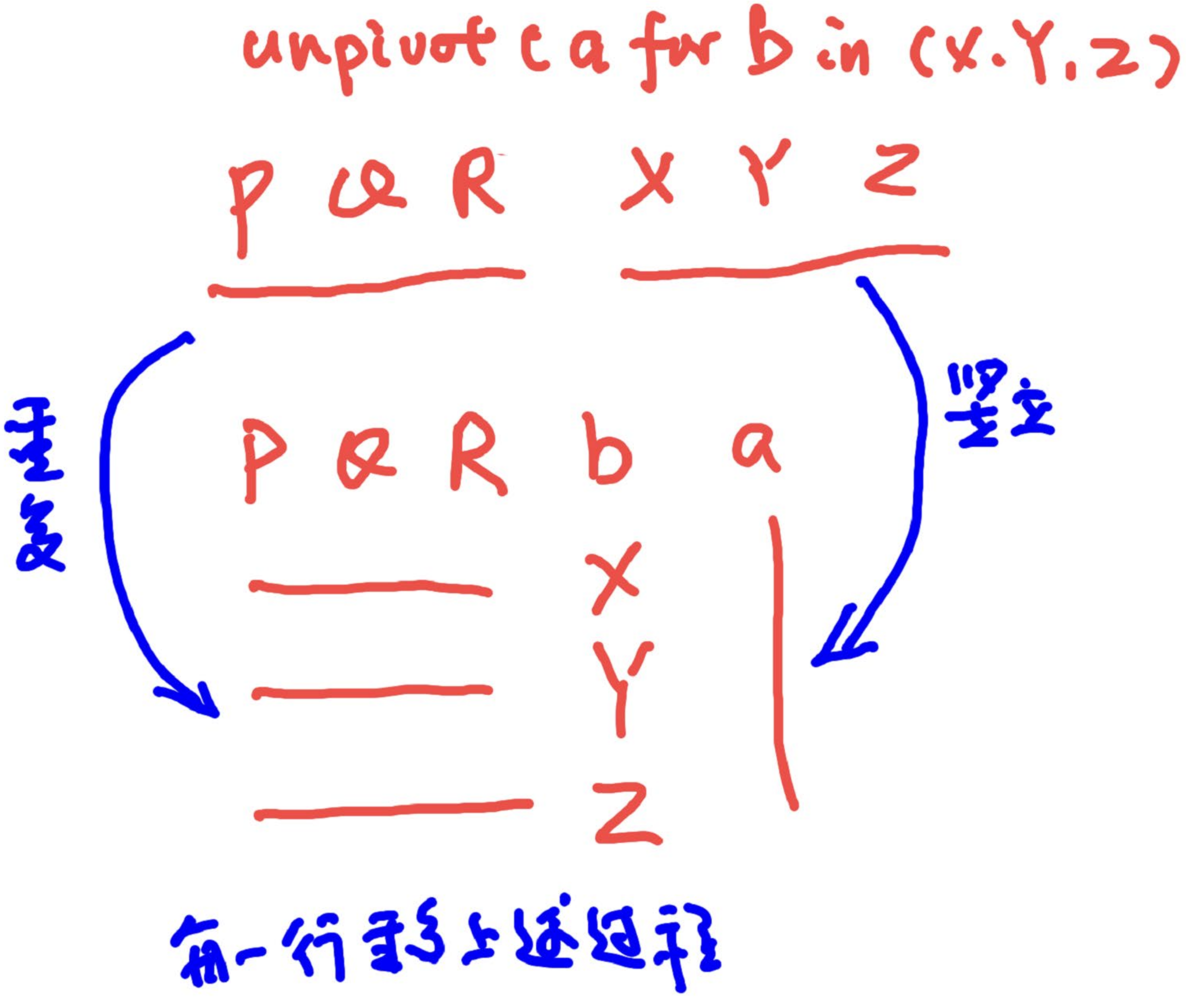


```
SQL> select * from DailyIncomewide
  2  unpivot(
  3  a for b in (TUE,WED,FRI,SAT,SUN));

VENDORID          MON        THU B            A
---------- ---------- ---------- --- ----------
SPIKE            1200        300 TUE        300
SPIKE            1200        300 WED       1000
SPIKE            1200        300 FRI        800
SPIKE            1200        300 SAT        100
SPIKE            1200        300 SUN        400
JOHNS             300        800 TUE        600
JOHNS             300        800 WED        900
JOHNS             300        800 FRI        300
JOHNS             300        800 SAT        800
JOHNS             300        800 SUN        600
FREDS             500        800 TUE        700
FREDS             500        800 WED        500
FREDS             500        800 FRI        900
FREDS             500        800 SAT        500
FREDS             500        800 SUN        400

已选择15行。
```

Unpivot的结果是怎样产生的?



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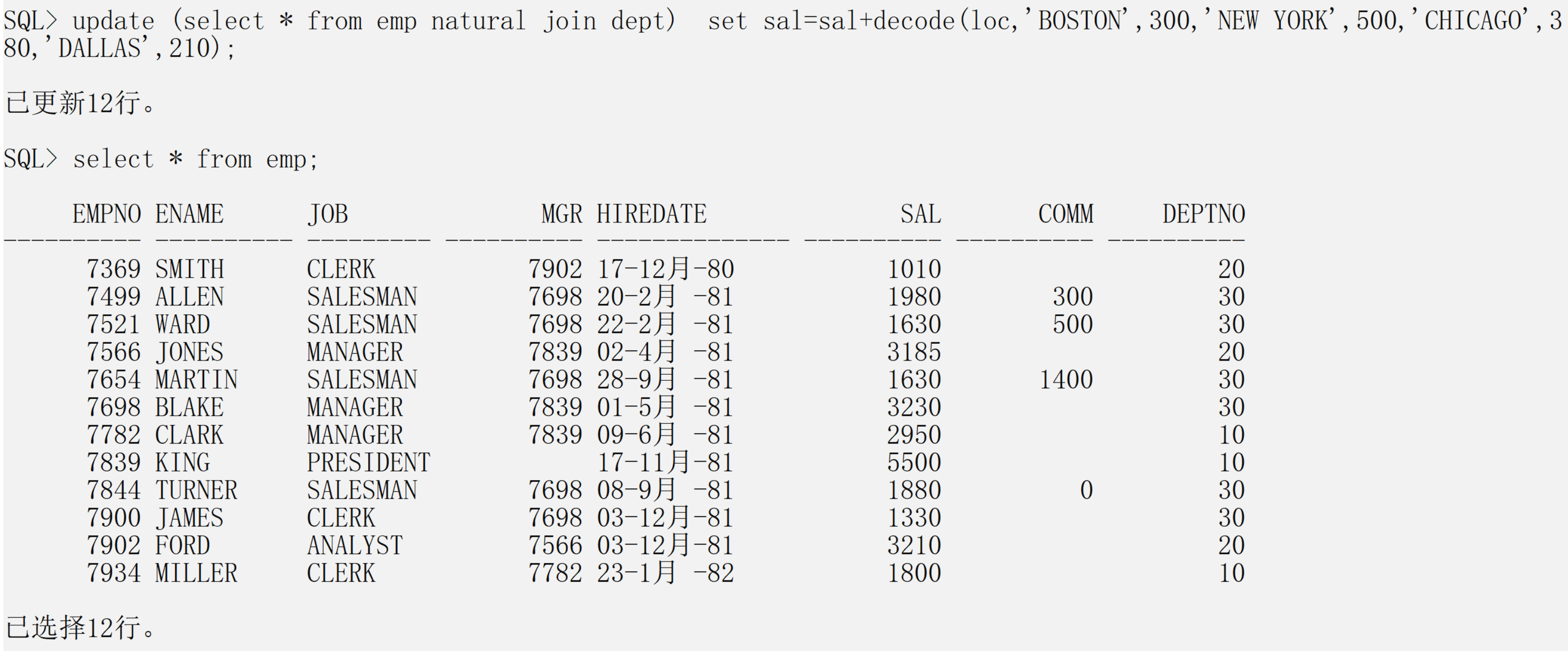
作业答案

- 给在波士顿，纽约，芝加哥，达拉斯的员工分别加薪300，500，380，210美元（要求1条语句完成）



```
SQL> update (select * from emp natural join dept)  set sal=sal+decode(loc,’BOSTON’,300,’NEW YORK’,500,’CHICAGO’,3
80,’DALLAS’,210);

已更新12行。

SQL> select * from emp;

     EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO
---------- ---------- --------- ---------- -------------- ---------- ---------- ----------
      7369 SMITH      CLERK           7902 17-12月-80           1010                    20
      7499 ALLEN      SALESMAN        7698 20-2月 -81           1980        300         30
      7521 WARD       SALESMAN        7698 22-2月 -81           1630        500         30
      7566 JONES      MANAGER         7839 02-4月 -81           3185                    20
      7654 MARTIN     SALESMAN        7698 28-9月 -81           1630       1400         30
      7698 BLAKE      MANAGER         7839 01-5月 -81           3230                    30
      7782 CLARK      MANAGER         7839 09-6月 -81           2950                    10
      7839 KING       PRESIDENT            17-11月-81           5500                    10
      7844 TURNER     SALESMAN        7698 08-9月 -81           1880          0         30
      7900 JAMES      CLERK           7698 03-12月-81           1330                    30
      7902 FORD       ANALYST         7566 03-12月-81           3210                    20
      7934 MILLER     CLERK           7782 23-1月 -82           1800                    10

已选择12行。
```

夹带知识点：decode函数

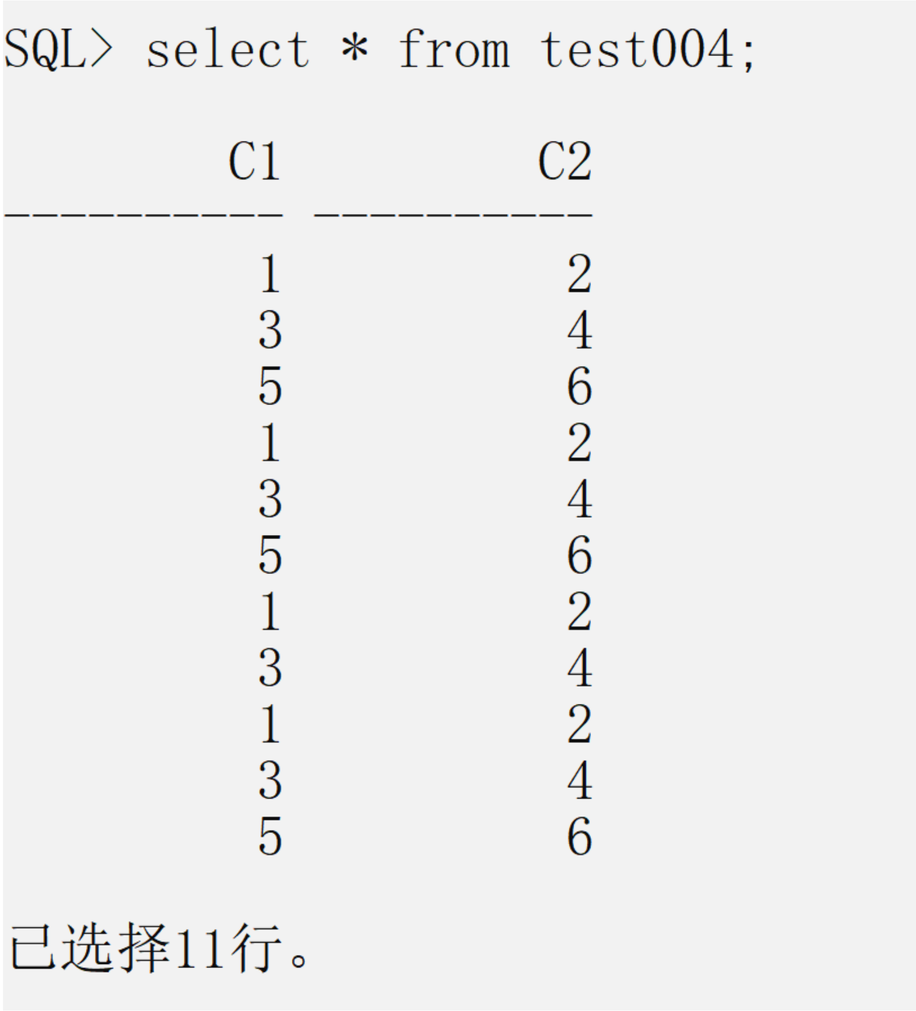
- decode(loc,‘BOSTON’,300,‘NEW YORK’,500,‘CHICAGO’,380,‘DALLAS’,210)

作业答案

- 建立一个有（多种）重复行的表，然后把每种重复的行删除到只剩下一行。

```
create table test004 (c1 number, c2 number);


insert into test004 values (1,2);
insert into test004 values (3,4);
insert into test004 values (5,6);
insert into test004 values (1,2);
insert into test004 values (3,4);
insert into test004 values (5,6);
insert into test004 values (1,2);
insert into test004 values (3,4);
insert into test004 values (1,2);
insert into test004 values (3,4);
insert into test004 values (5,6);
```

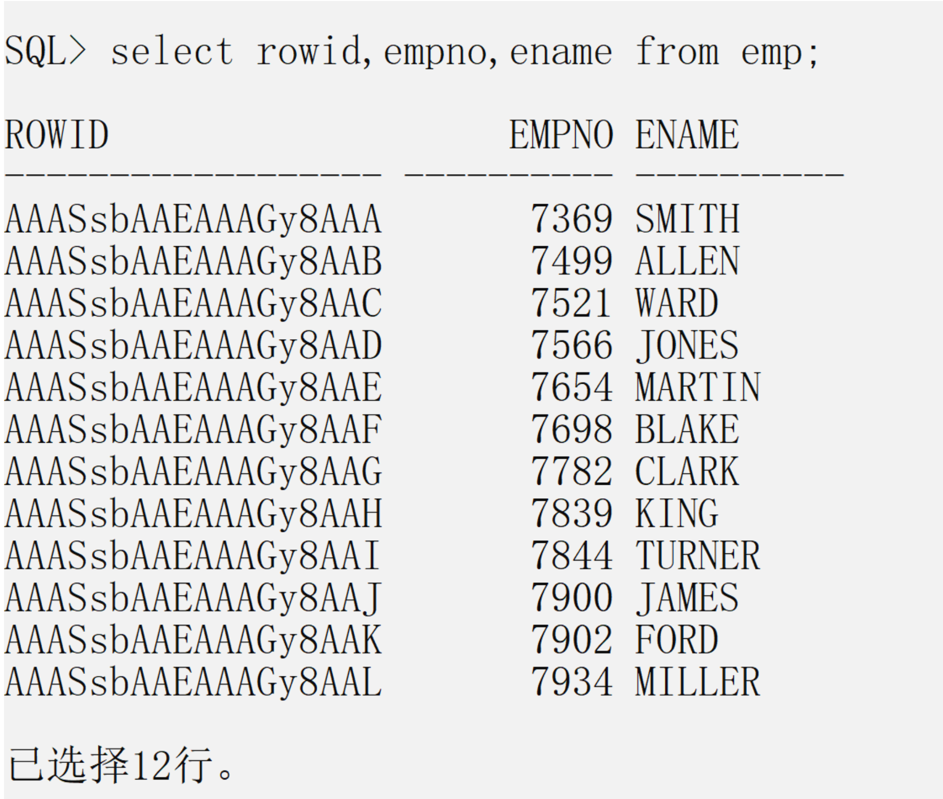
作业答案



```
SQL> select * from test004;

        C1         C2
---------- ----------
         1          2
         3          4
         5          6
         1          2
         3          4
         5          6
         1          2
         3          4
         1          2
         3          4
         5          6

已选择11行。
```

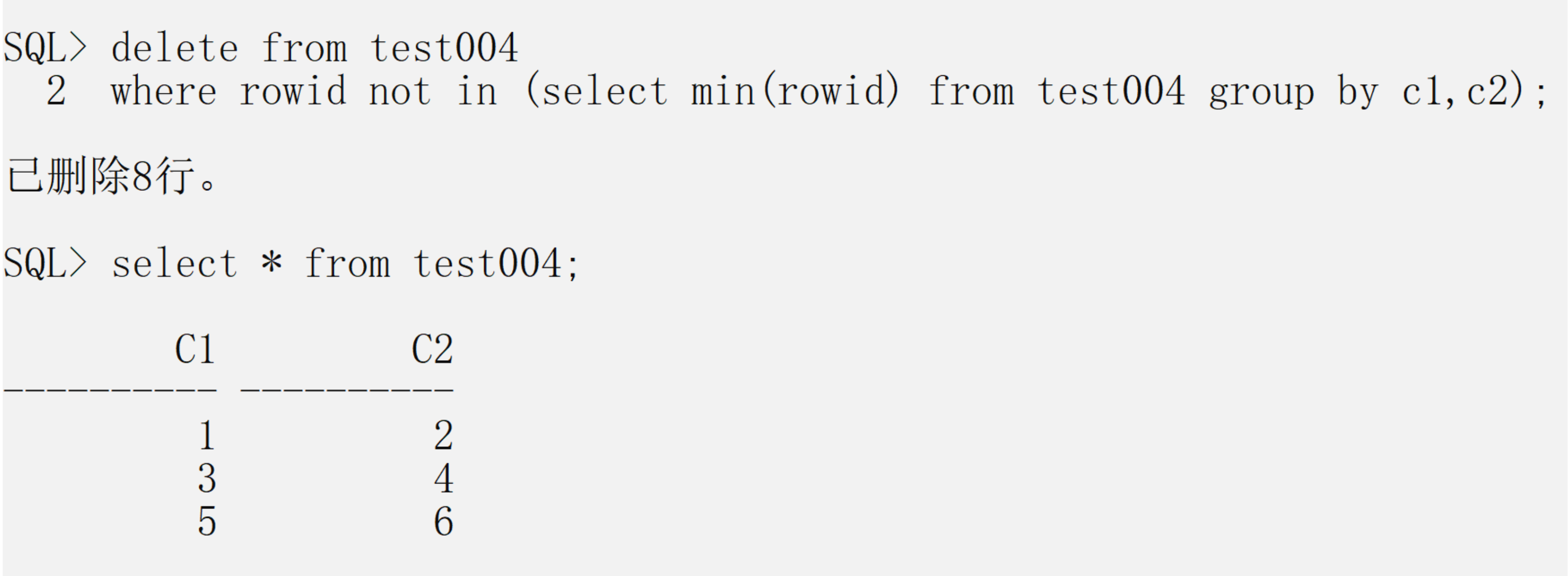
夹带知识点：rowid

- 伪列函数的一种，返回行物理标识，任何表的每一行都有全局唯一的rowid
- 物理标识：数据文件（data file）id+块（block）id+slot id



```
SQL> select rowid,empno,ename from emp;

ROWID                   EMPNO ENAME
------------------ ---------- ----------
AAASsbAAEAAAGy8AAA       7369 SMITH
AAASsbAAEAAAGy8AAB       7499 ALLEN
AAASsbAAEAAAGy8AAC       7521 WARD
AAASsbAAEAAAGy8AAD       7566 JONES
AAASsbAAEAAAGy8AAE       7654 MARTIN
AAASsbAAEAAAGy8AAF       7698 BLAKE
AAASsbAAEAAAGy8AAG       7782 CLARK
AAASsbAAEAAAGy8AAH       7839 KING
AAASsbAAEAAAGy8AAI       7844 TURNER
AAASsbAAEAAAGy8AAJ       7900 JAMES
AAASsbAAEAAAGy8AAK       7902 FORD
AAASsbAAEAAAGy8AAL       7934 MILLER

已选择12行。
```

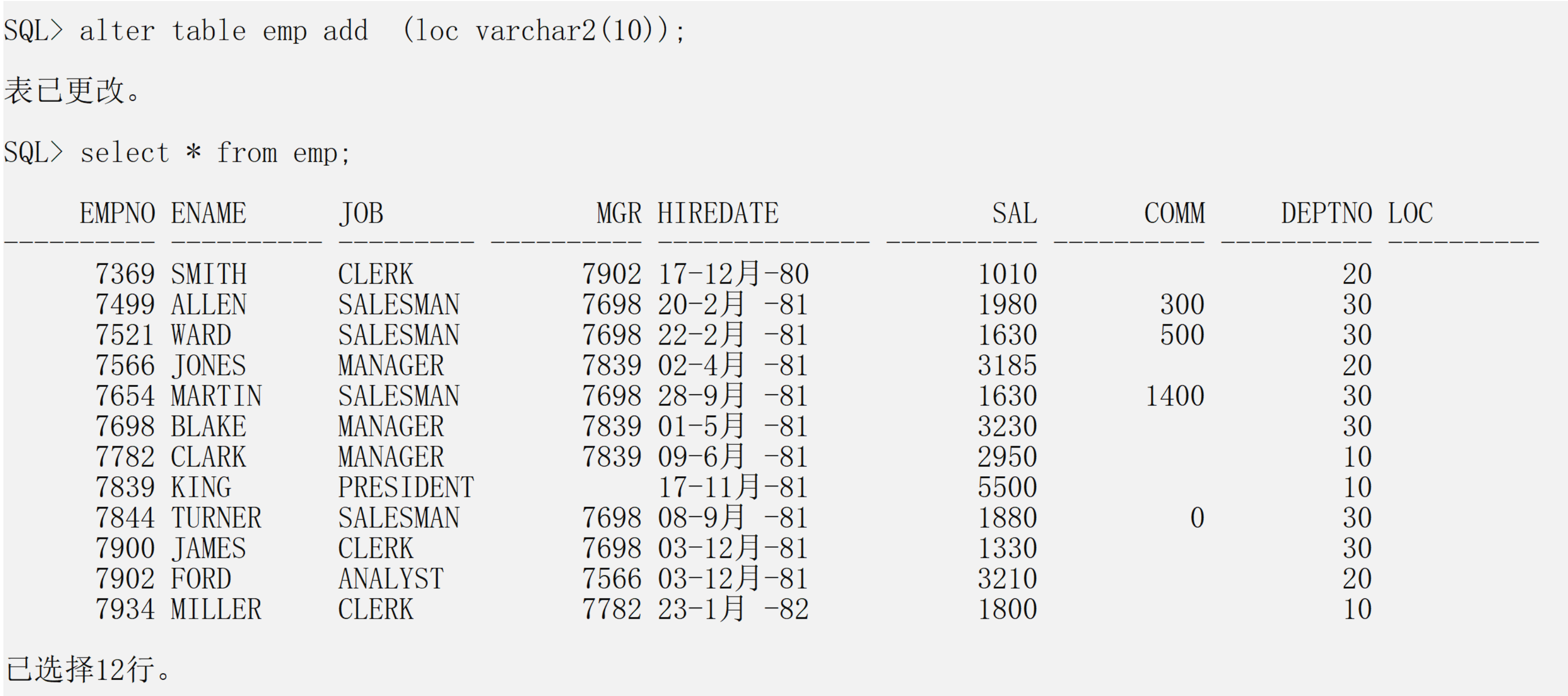
作业答案



```
SQL> delete from test004
  2  where rowid not in (select min(rowid) from test004 group by c1,c2);

已删除8行。

SQL> select * from test004;

        C1         C2
---------- ----------
         1          2
         3          4
         5          6
```

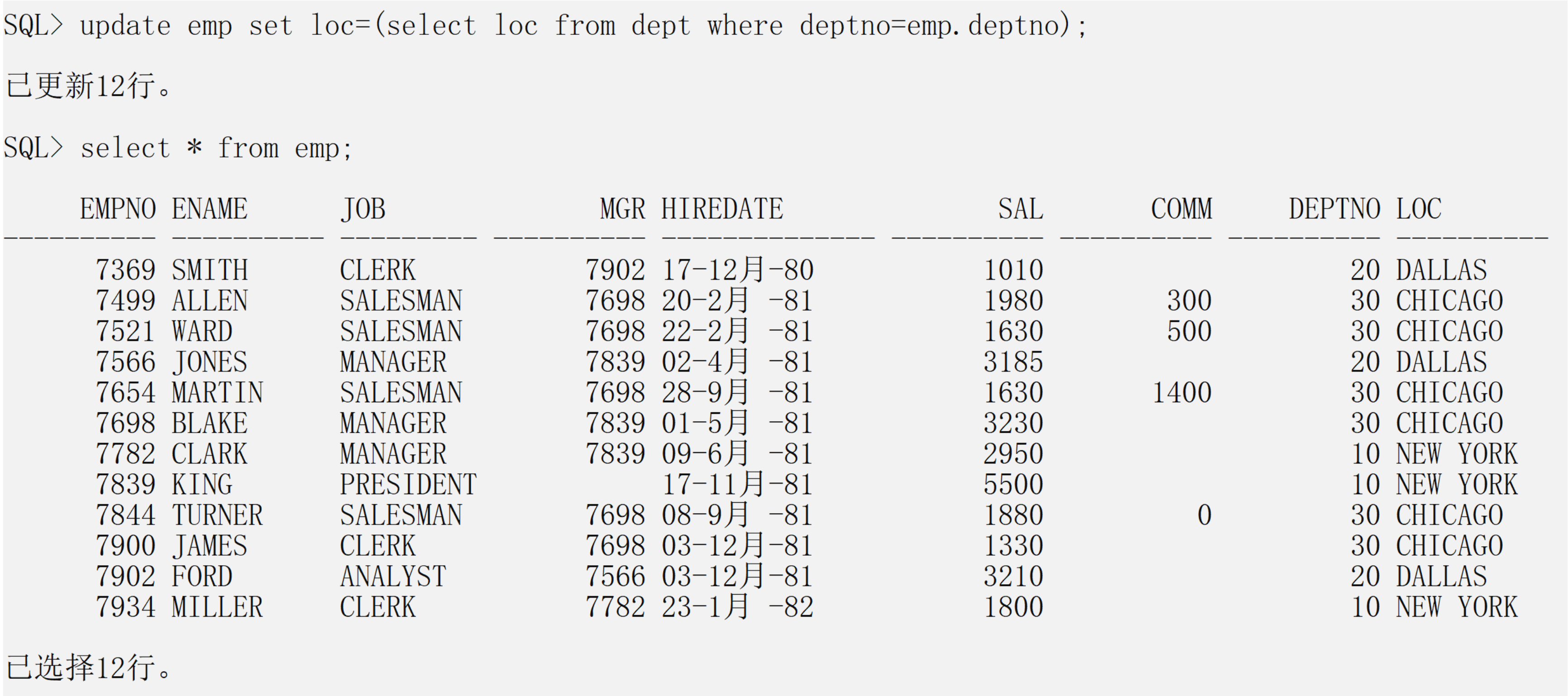
作业答案

- 给EMP表增加一列LOC，然后记录每位员工所在城市



```
SQL> alter table emp add  (loc varchar2(10));

表已更改。

SQL> select * from emp;

     EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO LOC
---------- ---------- --------- ---------- -------------- ---------- ---------- ---------- ----------
      7369 SMITH      CLERK           7902 17-12月-80           1010                    20
      7499 ALLEN      SALESMAN        7698 20-2月 -81           1980        300         30
      7521 WARD       SALESMAN        7698 22-2月 -81           1630        500         30
      7566 JONES      MANAGER         7839 02-4月 -81           3185                    20
      7654 MARTIN     SALESMAN        7698 28-9月 -81           1630       1400         30
      7698 BLAKE      MANAGER         7839 01-5月 -81           3230                    30
      7782 CLARK      MANAGER         7839 09-6月 -81           2950                    10
      7839 KING       PRESIDENT            17-11月-81           5500                    10
      7844 TURNER     SALESMAN        7698 08-9月 -81           1880          0         30
      7900 JAMES      CLERK           7698 03-12月-81           1330                    30
      7902 FORD       ANALYST         7566 03-12月-81           3210                    20
      7934 MILLER     CLERK           7782 23-1月 -82           1800                    10

已选择12行。
```

作业答案



```
SQL> update emp set loc=(select loc from dept where deptno=emp.deptno);

已更新12行。

SQL> select * from emp;

     EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO LOC
---------- ---------- --------- ---------- -------------- ---------- ---------- ---------- ----------
      7369 SMITH      CLERK           7902 17-12月-80           1010                    20 DALLAS
      7499 ALLEN      SALESMAN        7698 20-2月 -81           1980        300         30 CHICAGO
      7521 WARD       SALESMAN        7698 22-2月 -81           1630        500         30 CHICAGO
      7566 JONES      MANAGER         7839 02-4月 -81           3185                    20 DALLAS
      7654 MARTIN     SALESMAN        7698 28-9月 -81           1630       1400         30 CHICAGO
      7698 BLAKE      MANAGER         7839 01-5月 -81           3230                    30 CHICAGO
      7782 CLARK      MANAGER         7839 09-6月 -81           2950                    10 NEW YORK
      7839 KING       PRESIDENT            17-11月-81           5500                    10 NEW YORK
      7844 TURNER     SALESMAN        7698 08-9月 -81           1880          0         30 CHICAGO
      7900 JAMES      CLERK           7698 03-12月-81           1330                    30 CHICAGO
      7902 FORD       ANALYST         7566 03-12月-81           3210                    20 DALLAS
      7934 MILLER     CLERK           7782 23-1月 -82           1800                    10 NEW YORK

已选择12行。
```

中山大學

SUN YAT-SEN UNIVERSITY

Thanks

FAQ时间