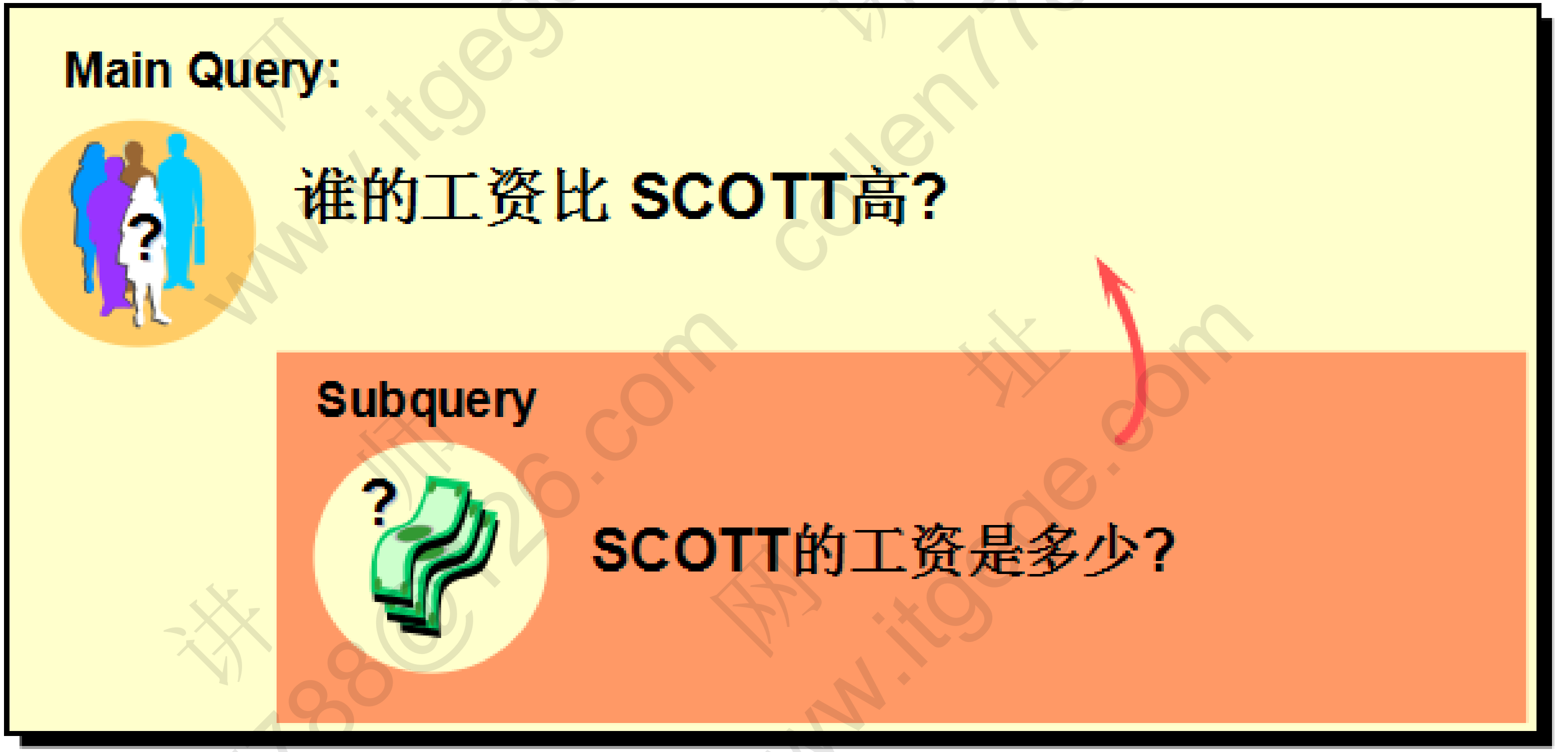
子查询

本章目标

1. 描述子查询可以解决的问题
2. 定义子查询。
3. 列出子查询的类型。
4. 书写单行子查询和多行子查询

使用子查询解决问题

- 谁的工资比 SCOTT高?



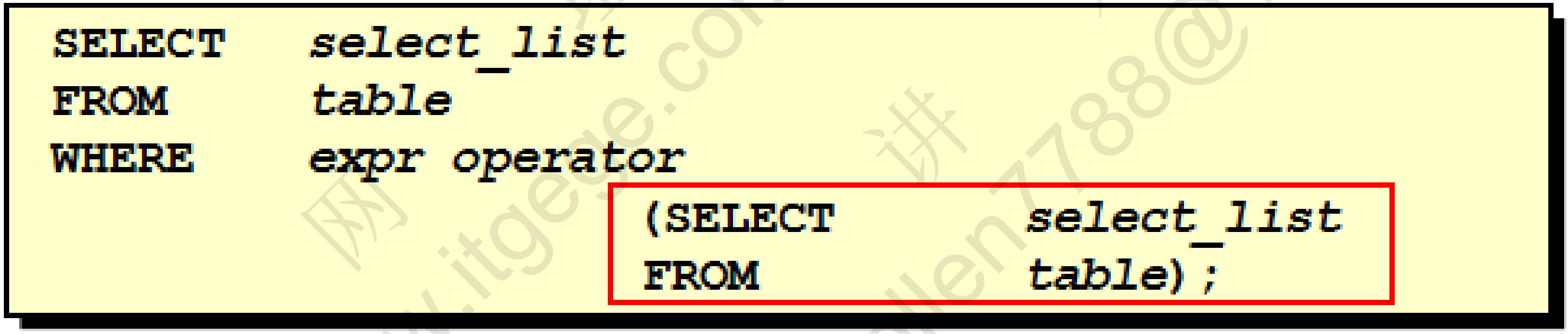
Main Query:

谁的工资比 SCOTT高?

Subquery

SCOTT的工资是多少?

子查询语法

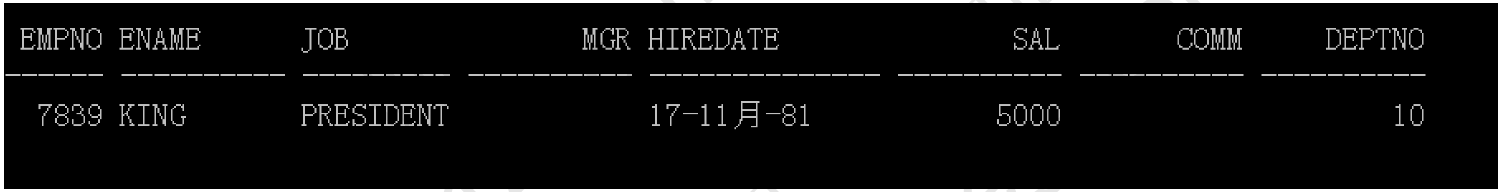


```
SELECT    select_list
FROM      table
WHERE     expr operator
                      (SELECT         select_list
                       FROM           table);
```

- 子查询 (内查询) 在主查询之前一次执行完成。
- 子查询的结果被主查询使用 (外查询)。

子查询

```
SELECT *
FROM EMP
WHERE SAL > (SELECT SAL
             FROM EMP
              WHERE ENAME = 'SCOTT');
```



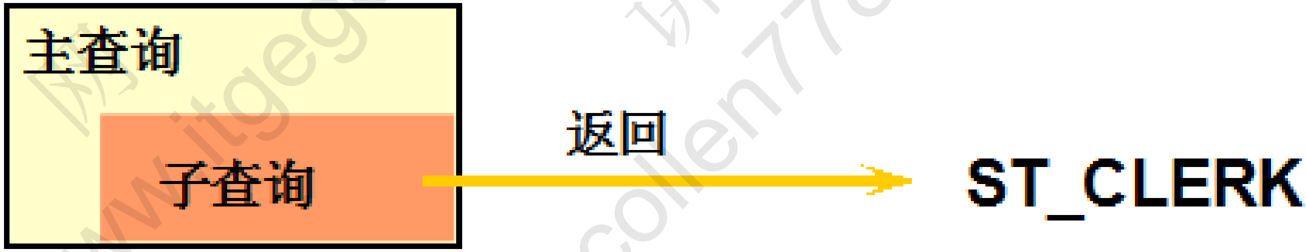
```
 EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO
------ ---------- ---------- ---------- -------------- ---------- ---------- ----------
  7839 KING       PRESIDENT             17-11月-81           5000                    10
```

注意事项

- 子查询要包含在括号内。
- 将子查询放在比较条件的右侧。
- 单行操作符对应单行子查询，多行操作符对应多行子查询。

子查询类型

- 单行子查询



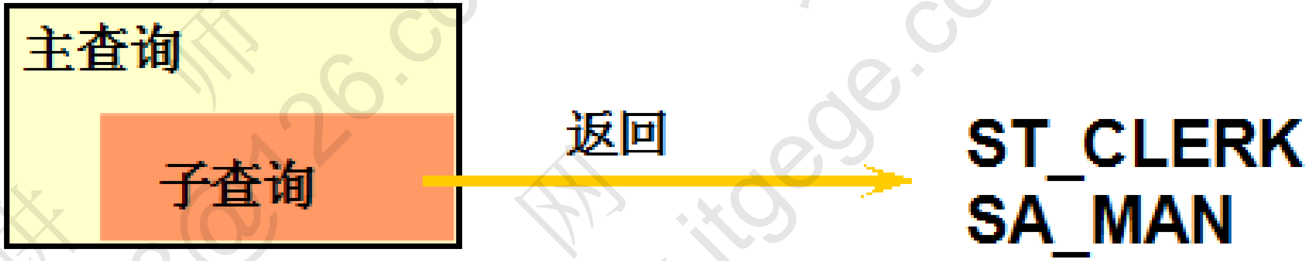
主查询

子查询

返回

ST_CLERK

- 多行子查询



主查询

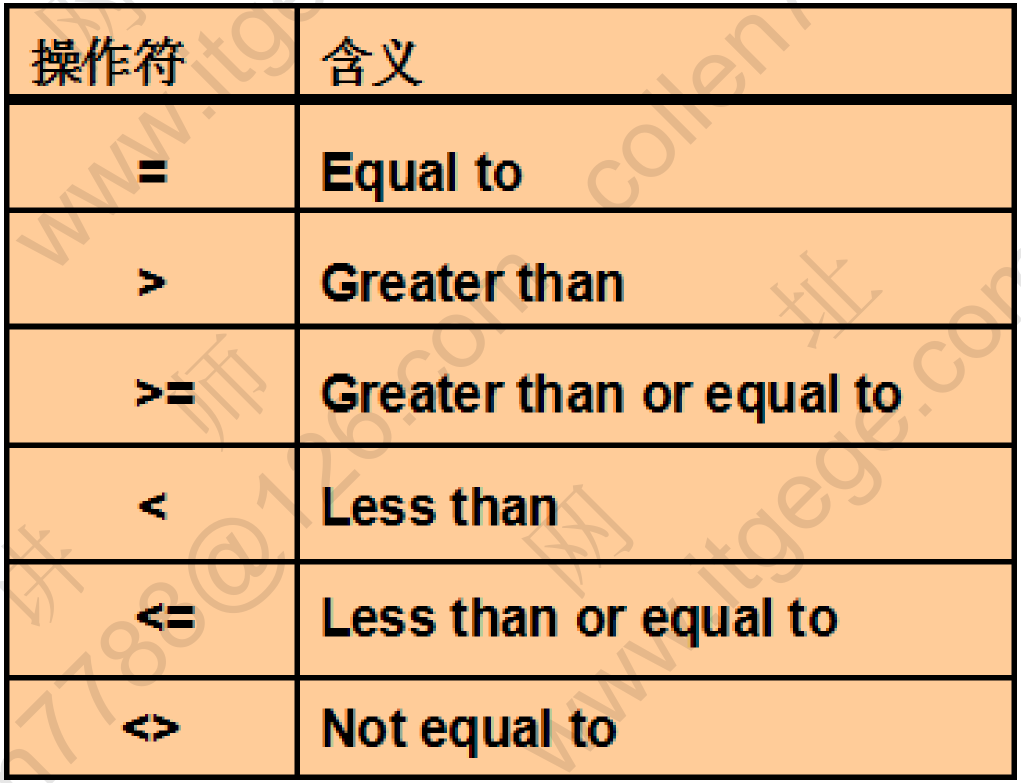
子查询

返回

ST_CLERK
SA_MAN

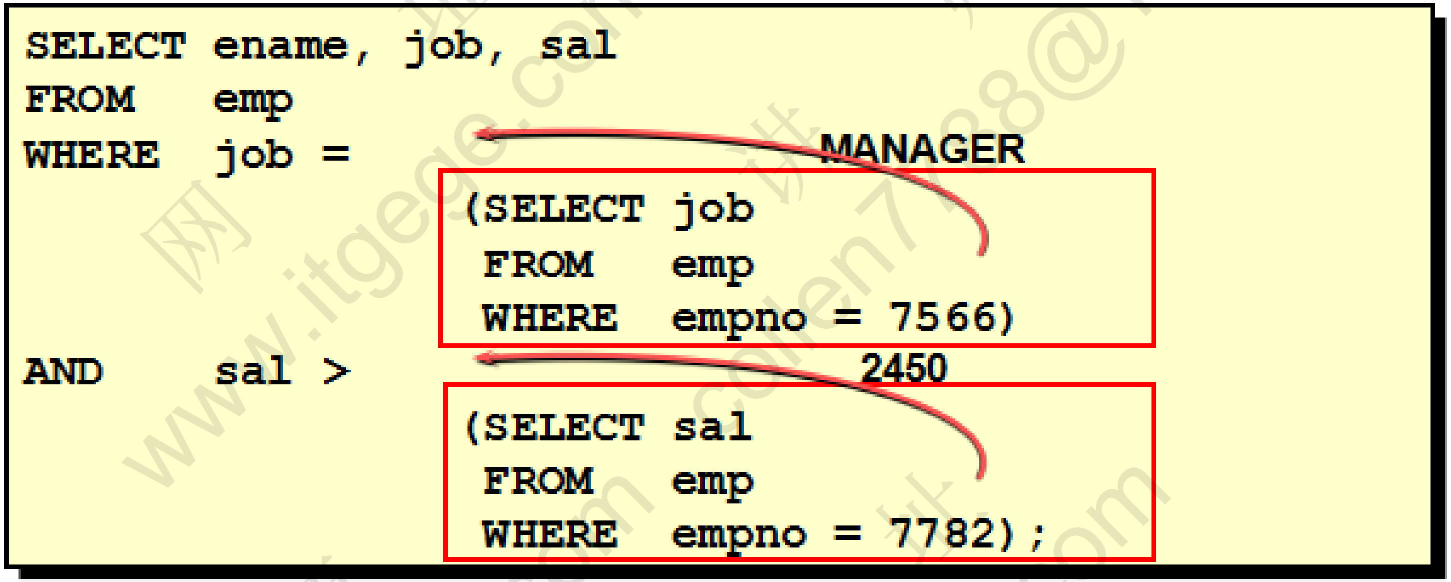
单行子查询

- 只返回一行。
- 使用单行比较操作符。

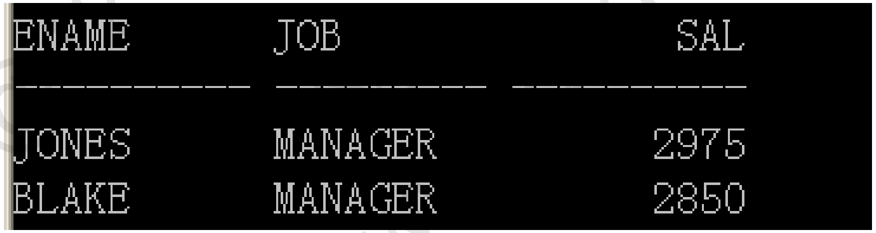


操作符	含义
=	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
<>	Not equal to

执行单行子查询



```
SELECT ename, job, sal
FROM   emp
WHERE  job =
                (SELECT job
                 FROM   emp
                 WHERE  empno = 7566)
AND    sal >
                (SELECT sal
                 FROM   emp
                 WHERE  empno = 7782);
```

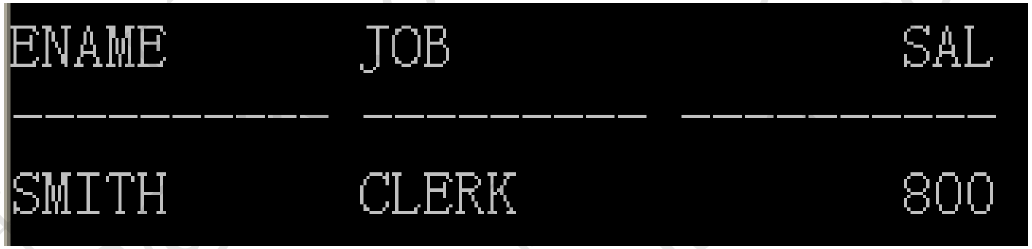


```
ENAME      JOB              SAL
---------- --------- ----------
JONES      MANAGER         2975
BLAKE      MANAGER         2850
```

在子查询中使用组函数

```
SELECT ename, job, sal
FROM   emp
WHERE  sal =
                (SELECT MIN(sal)
                 FROM   emp);
```

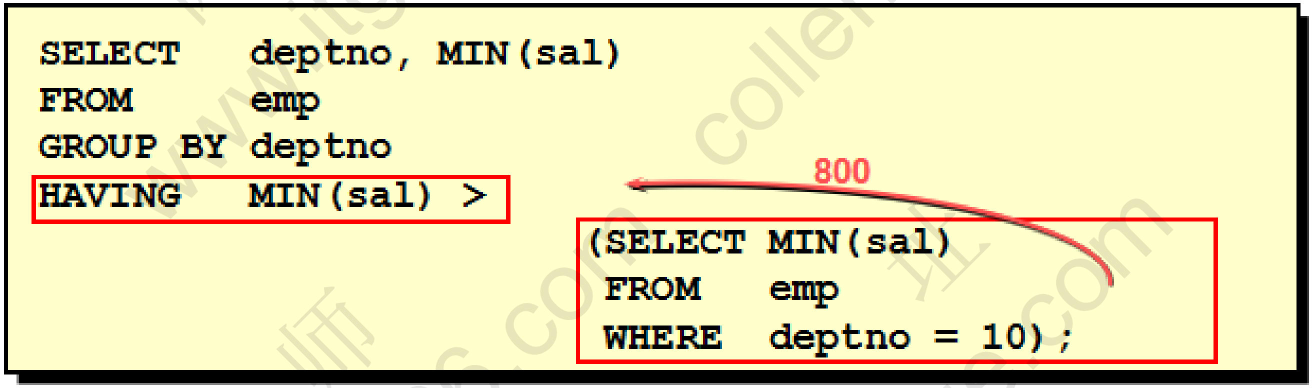
800



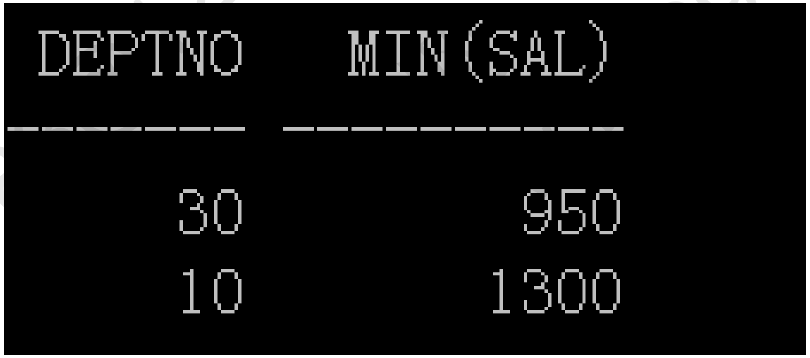
```
ENAME       JOB              SAL
----------- ---------- ----------
SMITH       CLERK            800
```

子查询中的 HAVING 子句

- 首先执行子查询。
- 向主查询中的**HAVING** 子句返回结果。



```
SELECT   deptno, MIN(sal)
FROM     emp
GROUP BY deptno
HAVING   MIN(sal) >
                       (SELECT MIN(sal)
                        FROM   emp
                        WHERE  deptno = 10);
```



```
DEPTNO    MIN(SAL)
-------- -----------
      30        950
      10       1300
```

非法使用子查询

```
SELECT empno, ename
FROM   emp
WHERE  sal =
                (SELECT   MIN(sal)
                 FROM     emp
                 GROUP BY deptno);
```

```
ERROR at line 4:
ORA-01427: single-row subquery returns more than
one row
```

多行子查询使用单行比较符

单行子查询中的空值问题

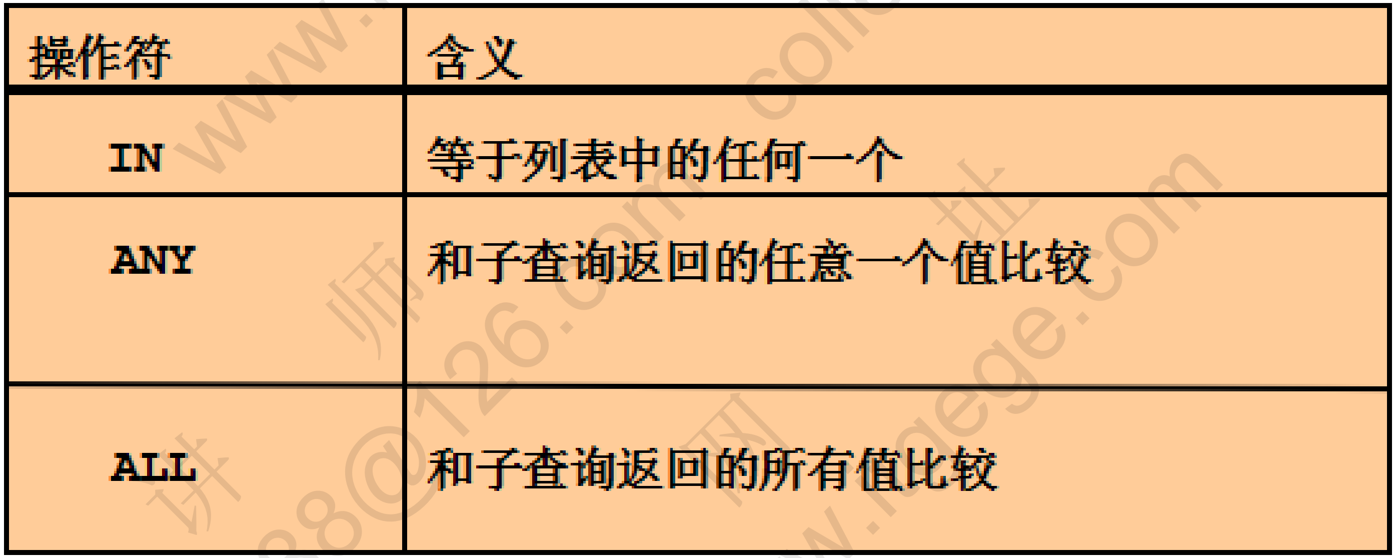
```
SELECT ename, job
FROM   emp
WHERE  job =
                 (SELECT job
                  FROM   emp
                  WHERE  ename = 'Mike');
```

```
no rows selected
```

子查询不返回任何行

多行子查询

- 返回多行。
- 使用多行比较操作符。

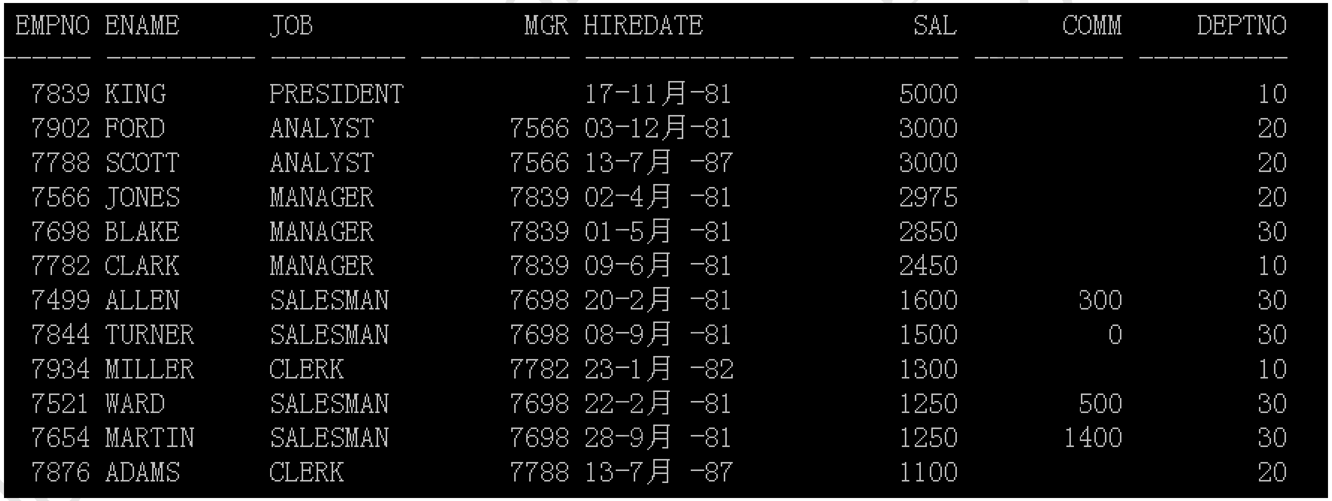


操作符	含义
IN	等于列表中的任何一个
ANY	和子查询返回的任意一个值比较
ALL	和子查询返回的所有值比较

在多行子查询中使用 ANY 操作符

- 查询工资比30号部门任意一个员工高的员工信息

```
SELECT *
FROM emp
WHERE sal > any ( SELECT sal
                  FROM emp
                  WHERE deptno = 30);
```

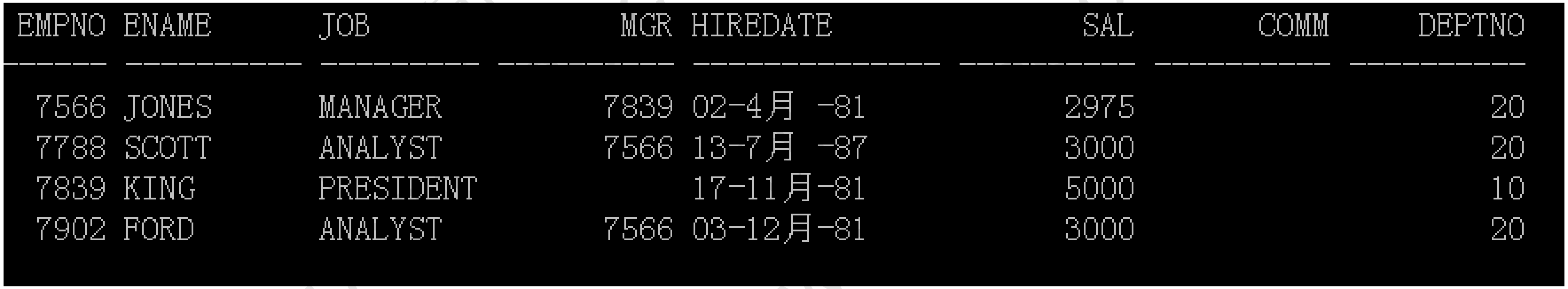


```
EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO
------ ---------- --------- ---------- -------------- ---------- ---------- ----------
  7839 KING       PRESIDENT            17-11月-81          5000                    10
  7902 FORD       ANALYST         7566 03-12月-81          3000                    20
  7788 SCOTT      ANALYST         7566 13-7月 -87          3000                    20
  7566 JONES      MANAGER         7839 02-4月 -81          2975                    20
  7698 BLAKE      MANAGER         7839 01-5月 -81          2850                    30
  7782 CLARK      MANAGER         7839 09-6月 -81          2450                    10
  7499 ALLEN      SALESMAN        7698 20-2月 -81          1600        300         30
  7844 TURNER     SALESMAN        7698 08-9月 -81          1500          0         30
  7934 MILLER     CLERK           7782 23-1月 -82          1300                    10
  7521 WARD       SALESMAN        7698 22-2月 -81          1250        500         30
  7654 MARTIN     SALESMAN        7698 28-9月 -81          1250       1400         30
  7876 ADAMS      CLERK           7788 13-7月 -87          1100                    20
```

在多行子查询中使用 ALL 操作符

- 查询工资比30号部门所有员工高的员工信息

```
SELECT *
FROM emp
WHERE sal > all ( SELECT sal
                  FROM emp
                  WHERE deptno = 30);
```



```
EMPNO ENAME      JOB              MGR HIREDATE              SAL       COMM     DEPTNO
----- ---------- --------- ---------- -------------- ---------- ---------- ----------
 7566 JONES      MANAGER         7839 02-4月 -81           2975                    20
 7788 SCOTT      ANALYST         7566 13-7月 -87           3000                    20
 7839 KING       PRESIDENT            17-11月-81           5000                    10
 7902 FORD       ANALYST         7566 03-12月-81           3000                    20
```

多行子查询中的空值问题

- 查询不是老板的员工信息

```
SELECT *
FROM emp
WHERE empno not in( SELECT mgr
                    FROM emp);
```

```
no rows selected
```

摘自Oracle官方培训讲义

- **Returning Nulls in the Resulting Set of a Subquery**
- The SQL statement on the slide attempts to display all the employees who do not have any subordinates. Logically, this SQL statement should have returned 12 rows. However, the SQL statement does not return any rows. One of the values returned by the inner query is a null value, and hence the entire query returns no rows. The reason is that all conditions that compare a null value result in a null. So whenever null values are likely to be part of the results set of a subquery, do not use the NOT IN operator. The NOT IN operator is equivalent to <> ALL.
- Notice that the null value as part of the results set of a subquery is not a problem if you use the IN operator. The IN operator is equivalent to =ANY. For example, to display the employees who have subordinates, use the following SQL statement:

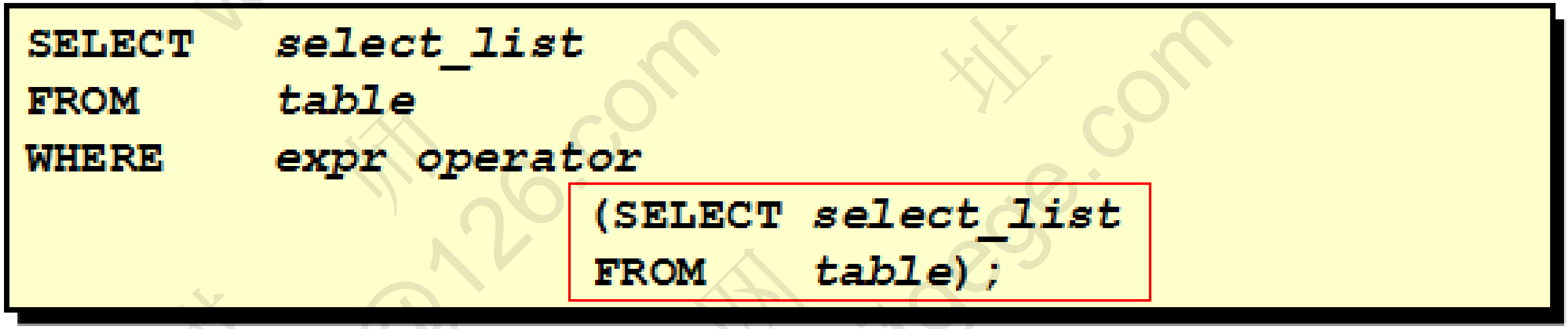
```
SELECT emp.last_name
FROM   employees emp
WHERE  emp.employee_id  IN
                        (SELECT mgr.manager_id
                         FROM   employees mgr);
```

- Alternatively, a WHERE clause can be included in the subquery to display all employees who do not have any subordinates:

```
SELECT last_name FROM employees
WHERE  employee_id NOT IN
                      (SELECT manager_id
                       FROM   employees
                       WHERE  manager_id IS NOT NULL);
```

总结

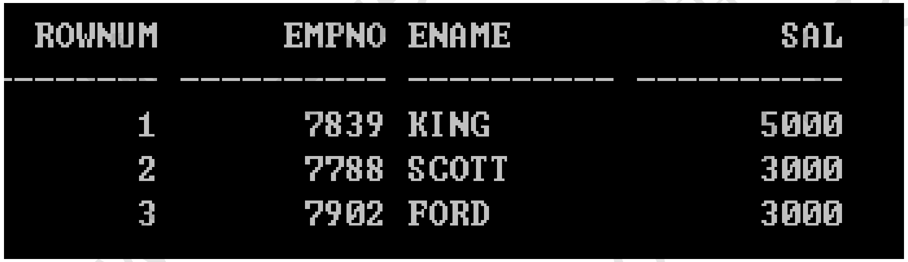
- **通过本章学习，您已经学会:**
  - 如何使用子查询。
  - 在查询是基于未知的值时应使用子查询。



```
SELECT    select_list
FROM      table
WHERE     expr operator
                     (SELECT  select_list
                      FROM    table);
```

课堂练习

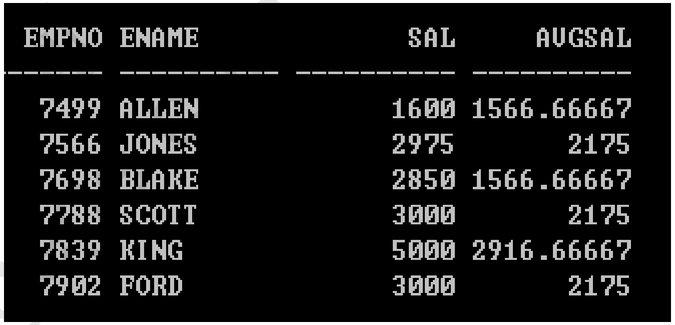
- 找到员工表中工资最高的前三名，如下格式：



```
   ROWNUM      EMPNO ENAME             SAL
--------- ---------- ---------- ----------
        1       7839 KING             5000
        2       7788 SCOTT            3000
        3       7902 FORD             3000
```

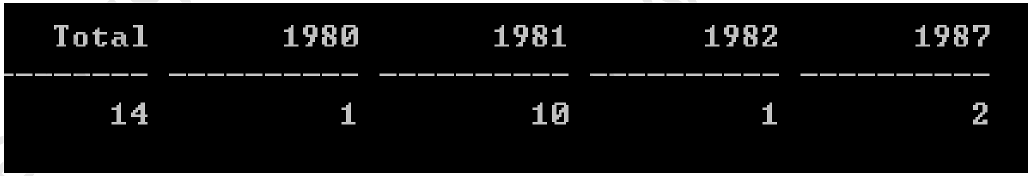
oracle分页.txt

- 找到员工表中薪水大于本部门平均薪水的员工。



```
 EMPNO ENAME             SAL     AVGSAL
------ ---------- ---------- ----------
  7499 ALLEN            1600 1566.66667
  7566 JONES            2975       2175
  7698 BLAKE            2850 1566.66667
  7788 SCOTT            3000       2175
  7839 KING             5000 2916.66667
  7902 FORD             3000       2175
```

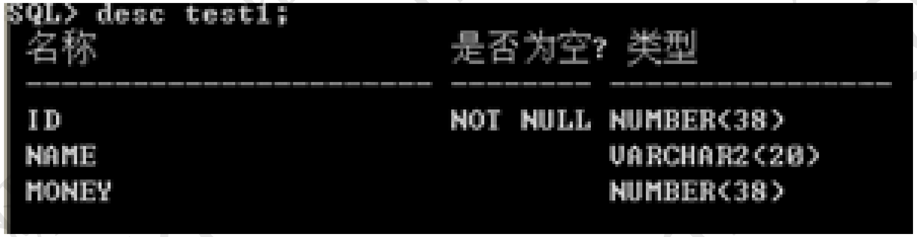
- 统计每年入职的员工个数。



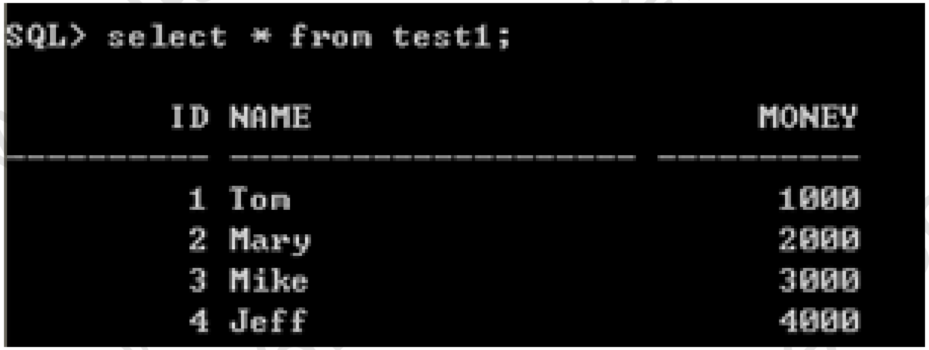
```
   Total       1980       1981       1982       1987
-------- ---------- ---------- ---------- ----------
      14          1         10          1          2
```

面试题一：

- 已知：



```
SQL> desc test1;
 名称                                      是否为空? 类型
 ----------------------------------------- -------- ----------------------------
 ID                                        NOT NULL NUMBER(38)
 NAME                                               VARCHAR2(20)
 MONEY                                              NUMBER(38)
```

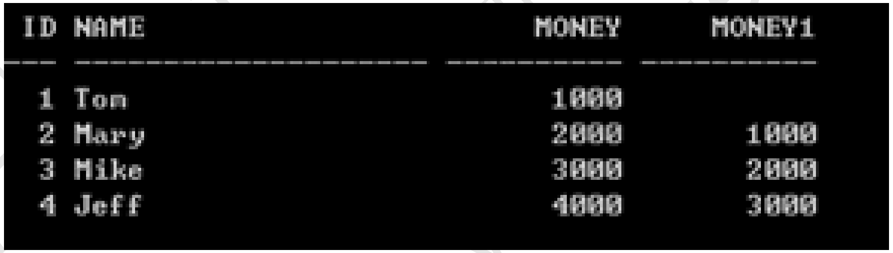


```
SQL> select * from test1;

        ID NAME                                     MONEY
---------- ---------------------------------------- ----------
         1 Tom                                       1000
         2 Mary                                      2000
         3 Mike                                      3000
         4 Jeff                                      4000
```

(.txt)

- 要求：

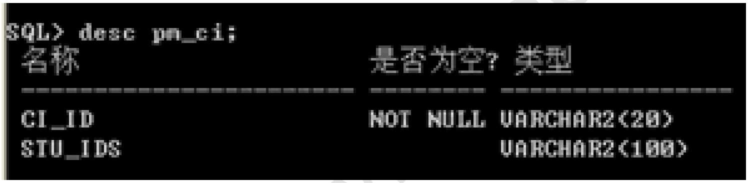


```
 ID NAME                      MONEY     MONEY1
--- -------------------- ---------- ----------
  1 Tom                        1000
  2 Mary                       2000       1000
  3 Mike                       3000       2000
  4 Jeff                       4000       3000
```

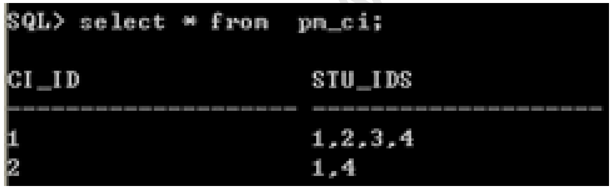
面试题二：

(.txt)

- 表 pm_ci



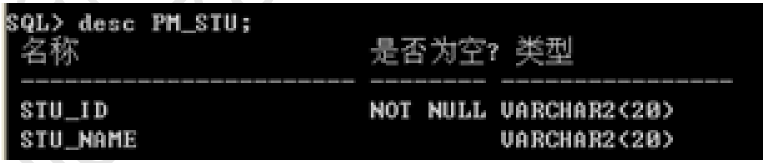
```
SQL> desc pm_ci;
 名称                                      是否为空? 类型
 ----------------------------------------- -------- ----------------------------
 CI_ID                                     NOT NULL VARCHAR2(20)
 STU_IDS                                            VARCHAR2(100)
```



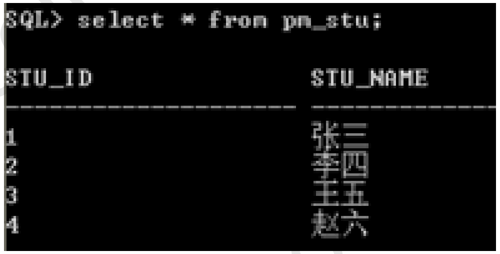
```
SQL> select * from  pm_ci;

CI_ID                STU_IDS
-------------------- --------------------
1                    1,2,3,4
2                    1,4
```

- 表 pm_stu



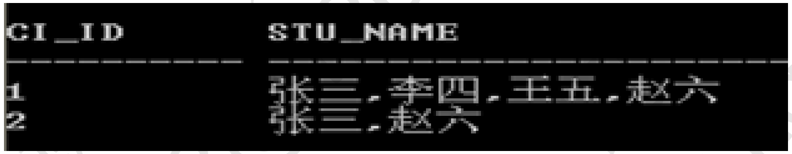
```
SQL> desc PM_STU;
 名称                                      是否为空? 类型
 ----------------------------------------- -------- ----------------------------
 STU_ID                                    NOT NULL VARCHAR2(20)
 STU_NAME                                           VARCHAR2(20)
```



```
SQL> select * from pm_stu;

STU_ID               STU_NAME
-------------------- --------------------
1                    张三
2                    李四
3                    王五
4                    赵六
```

- 要求：



```
CI_ID       STU_NAME
----------- ------------------------------
1           张三,李四,王五,赵六
2           张三,赵六
```

Thank you