数据库原理(1)
第4章 结构化查询语言SQL 课程作业

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1 S(SNO,SNAME,AGE,SEX,SDEPT) SC(SNO,CNO,GRADE) C(CNO,CNAME,CDEPT,TNAME) 试用SQL的查询语句表达下列查询:

1.1 检索LIU老师所授课程的课程号和课程名

```sql
SELECT CNO AS '课程号', CNAME AS '课程名'
FROM C
WHERE TNAME = 'LIU';
```

1.2 检索年龄大于23岁的男学生的学号和姓名

```sql
SELECT SNO AS '学号', SNAME AS '姓名'
FROM S
WHERE AGE > 23 AND SEX = '男';
```

1.3 检索学号为S3的学生所学课程的课程名和任课教师名

```sql
SELECT CNAME AS '课程名', TNAME AS '任课教师名'
FROM SC, C
WHERE SC.CNO = C.CNO AND CNO = 'S3';
```

1.4 检索至少选修LIU老师所授课程中一门课程的女学生姓名

1.4.1 方法一: 联合操作

```sql
SELECT SNAME AS '姓名'
FROM S, SC, C
WHERE S.SNO = SC.SNO
  AND SC.CNO = C.CNO
  AND C.TNAME = 'LIU'
  AND S.SEX = '女';
```

1.4.2 方法二: 嵌套操作

```sql
SELECT SNAME AS '姓名'
FROM S
WHERE SEX = '女'
  AND SNO IN
      (SELECT SNO
       FROM SC
       WHERE CNO IN
             (SELECT CNO
              FROM C
              WHERE TNAME = 'LIU'));
```

1.5 检索WANG同学不学的课程的课程号

1.5.1 方法一

```sql
SELECT CNO AS '课程号'
FROM C
WHERE CNO NOT IN (SELECT CNO
                  FROM SC, S
                  WHERE SC.SNO = S.SNO
                    AND S.SNAME = 'WANG');
```

1.5.2 方法二

```sql
SELECT CNO AS '课程号'
FROM C
WHERE EXISTS(SELECT *
             FROM S
             WHERE SNAME = 'WANG'
               AND NOT EXISTS(SELECT *
                              FROM SC
                              WHERE S.SNO = SC.SN0
                                AND C.CNO = SC.CNO));
```

1.6 检索至少选修两门课程的学生学号

```sql
SELECT SNO AS '学号'
FROM SC
GROUP BY SNO
HAVING COUNT(CNO) >= 2;
```

1.7 检索全部学生都选修的课程的课程号与课程名

```
SELECT CNO AS '课程号', CNAME AS '课程名'
FROM C
WHERE NOT EXISTS(SELECT *
                 FROM S
                 WHERE NOT EXISTS(SELECT *
                                  FROM SC
                                  WHERE SNO = S.SNO
                                    AND CNO = C.CNO))
```

1.8 检索选修课程包含LIU老师所授课程的学生学号

```
SELECT DISTINCT SNO AS '学号'
FROM S
         JOIN SC ON SC.SNO = S.SNO
WHERE SC.CNO IN (SELECT CNO
                 FROM SC
                 WHERE CNO IN (SELECT CNO
                               FROM C
                               WHERE TNAME = 'LIU'));
```

2 试用SQL查询语句表达下列对教学数据库中三个基本表S、SC、C的查询

2.1 统计有学生选修的课程门数

```
SELECT COUNT(DISTINCT CNO) AS '课程门数'
FROM SC;
```

2.2 求选修C4课程的学生的平均年龄

```
SELECT AVG(AGE) AS '平均年龄'
FROM S,
     SC
WHERE S.SNO = SC.SNO
  AND CNO = 'C4';
```

2.3 求LIU老师所授课程的每门课程的学生平均成绩

```sql
SELECT SC.CNO AS '课程号', AVG(GRADE) AS '平均成绩'
FROM SC,
     C
WHERE SC.CNO = C.CNO
  AND TNAME = 'LIU'
GROUP BY SC.CNO;
```

2.4 统计每门课程的学生选修人数(超过10人的课程才统计）。要求输出课程号和选修人数查询结果按人数降序排列，若人数相同，按课程号升序排列

```sql
SELECT CNO AS, COUNT(DISTINCT SNO) AS NUM
FROM SC
GROUP BY CNO HAVING NUM>5
ORDER BY NUM DESC,CNO ASC;
```

2.5 检索学号比 WANG 同学大，而年龄比他小的学生姓名

```sql
SELECT Y.SNAME AS '学生姓名'
FROM S AS X,
     S AS Y
WHERE X.NAME = 'WANG'
  AND Y.SNO > X.SNO
  AND Y.AGE < X.AGE;
```

2.6 检索姓名以 WANG 打头的所有学生的姓名和年龄

```sql
SELECT SNAME AS '学生姓名', AGE AS '年龄'
FROM S
WHERE SNAME LIKE 'WANG%';
```

在 SQL 中，通配符与 SQL LIKE 操作符一起使用。

SQL 通配符用于搜索表中的数据。在 SQL 中，可使用以下通配符：

通配符	描述
%	替代 0 个或多个字符
_	替代一个字符
[*charlist*]	字符列中的任何单一字符
[^*charlist*] 或 [!*charlist*]	不在字符列中的任何单一字符

2.7 在SC中检索成绩为空值的学生学号和课程号

```
SELECT SNO AS '学生学号', CNO AS '课程号'
FROM SC
WHERE GRADE IS NULL;
```

2.8 求年龄大于女同学平均年龄的男学生姓名和年龄

```
SELECT SNAME AS '男学生姓名', AGE AS '年龄'
FROM S
WHERE SEX = '男'
  AND AGE > (SELECT AVG(AGE)
             FROM S
             WHERE SEX = '女');
```

2.9 求年龄大于所有女同学年龄的男学生姓名和年龄

```
SELECT SNAME AS '男学生姓名', AGE AS '年龄'
FROM S
WHERE SEX = '男'
  AND AGE > (SELECT ALL(AGE)
             FROM S
             WHERE SEX = '女');
```

注意:

- min()和max()属于聚集函数，括号内只能填入**列名**或者'*'
  any()和all()属于谓词，括号内只能填入**子查询语句**
- where后面**能直接用**any()和all()，但是**不能直接**用min()和max()
  (注：where后面不能使用聚集函数)

3 试用SQL更新语句表达对教学数据库中三个基本表S、SC、C的各个更新操作

3.1 向基本表S中插入一个学生元组('S9','WU',18)

```
INSERT INTO S(SNO, SNAME, SAGE)
VALUES ('S9', 'WU', 18);
```

3.2 在基本表S中检索每一门课程成绩都大于或等于80分的学生学号、姓名和性别，并将检索结果保存到另一个已存在的基本表STUDENT(SNO, SNAME, SEX)中

```sql
INSERT INTO STUDENT
SELECT SNO, SNAME, SEX
FROM S
WHERE 80 <= (SELECT GRADE FROM SC WHERE SC.SNO = S.SNO);
```

3.3 基本表SC中删除尚无成绩的选课元组

```sql
DELETE
FROM SC
WHERE GRADE IS NULL;
```

3.4 把WANG同学的学习选课和成绩全部删去

```sql
DELETE
FROM SC
WHERE SNO IN (SELECT SNO
              FROM S
              WHERE SNAME = 'WANG');
```

3.5 把选修MATHS课不及格的成锁全改为空值

```sql
UPDATE SC
SET GRADE = NULL
WHERE GRADE < 60
  AND CNO IN (SELECT CNO
              FROM C
              WHERE CNAME = 'MATHS');
```

3.6 把低于总平均成绩的女同学成绩提高 5%

```sql
UPDATE SC
SET GRADE = GRADE * 1.05
WHERE GRADE < (SELECT AVG(GRADE) FROM SC)
  AND SNO IN (SELECT SNO FROM S WHERE SEX = '女');
```

3.7 在基本表 SC中修改C4 课程的成绩，若成绩小于等于75时提高5%，若成绩大于75分时提高4% (用两个 UPDATE 语句实现)

```
UPDATE SC
SET GRADE=GRADE * 1.05
WHERE CNO = '4'
  AND GRADE <= 75 UPDATE SC
SET GRADE = GRADE * 1.04 WHERE CNO='4' AND GRADE>75;
```