

HW2 Answers

1.假设 s 表中有如下记录:

S#	Name	age	Class
S1	John	17	c1
S2	Rose	18	c2
S3	Mary	20	c4

执行如下语句:

```
UPDATE S
SET Age = 20, Class = 'c4'
WHERE S# = 'S1';
```

```
SELECT *
FROM S
WHERE S# = 'S1';
```

请写出全部执行后的输出结果。

答案:

按题意执行后, S1 这条记录被更新为:

S#	Name	age	Class
S1	John	20	c4

2.给定基本表:

- Student(sno, sname, birthdate)
- Course(cno, cname, type, credit)
- SC(sno, cno, score, term)

其中:

- type=0 表示必修课
- type=1 表示选修课
- type=2 表示通识课
- type=3 表示公选课

请用 SQL 语句回答下列查询。

(1)查询姓名中含有“科”字的学生学号和姓名 答案:

```
SELECT sno, sname
FROM Student
WHERE sname LIKE '%科%';
```

(2)查询学分不低于 3 分的必修课课程号和课程名 答案:

```
SELECT cno, cname
FROM Course
WHERE type = 0 AND credit >= 3;
```

(3)查询选修了公选课但是缺少成绩的学生学号和姓名 答案:

```
SELECT DISTINCT sno, sname
FROM Student NATURAL JOIN Course NATURAL JOIN SC
WHERE type = 3 AND score IS NULL;
```

(4)查询年龄大于 20 的学生学号、姓名和年龄 答案:

```
SELECT sno, sname, timestampdiff(YEAR, birthdate, now()) AS age
FROM Student
WHERE timestampdiff(YEAR, birthdate, now()) > 20;
```

(5)查询已选必修课总学分大于 16, 并且所选通识课成绩都大于 75 分的学生姓名 答案:

```
SELECT sname
FROM Student
WHERE sno IN (
    SELECT sno
    FROM (SELECT DISTINCT sno, cno FROM SC) disSC, Course
    WHERE type = 0 AND disSC.cno = Course.cno
    GROUP BY sno
    HAVING SUM(credit) > 16
)
AND sno NOT IN (
    SELECT sno
    FROM SC NATURAL JOIN Course
    WHERE type = 2 AND score <= 75
);
```

(6)查询已经修完所有必修课且成绩合格的学生学号和姓名 答案 (PPT 给出多种可接受写法, 下面保留 3 组):

写法 1: 认为某门必修课只要有一次合格即可

```
SELECT sno, sname
FROM Student S
WHERE NOT EXISTS (
    SELECT *
    FROM Course C
    WHERE type = 0
    AND NOT EXISTS (
```

```

        SELECT *
        FROM SC
        WHERE sno = S.sno AND cno = C.cno AND score >= 60
    )
);

```

写法 2: 认为每次修读都必须合格

```

SELECT sno, sname
FROM Student S
WHERE NOT EXISTS (
    SELECT *
    FROM Course C
    WHERE type = 0
        AND NOT EXISTS (
            SELECT *
            FROM SC
            WHERE sno = S.sno AND cno = C.cno
        )
    )
)
AND NOT EXISTS (
    SELECT *
    FROM Course NATURAL JOIN SC
    WHERE type = 0 AND (score IS NULL OR score < 60)
);

```

写法 3: 用 count 判断是否全部修完 (仍按 “有一次合格即可” 理解)

```

WITH CO AS (
    SELECT cno
    FROM Course
    WHERE type = 0
)
SELECT sno, sname
FROM Student S
WHERE (
    SELECT COUNT(*)
    FROM (
        SELECT cno
        FROM CO NATURAL JOIN SC
        WHERE sno = S.sno
        GROUP BY cno
        HAVING MAX(score) >= 60
    ) temp
) = (
    SELECT COUNT(*)

```

```
FROM CO
);
```

(7)查询每门课程的课程名、课程类型、平均成绩和不及格率，要求结果按“通识课、必修课、选修课、公选课”顺序排列 答案（保留 PPT 中较简洁的一种写法）：

```
SELECT cname, type,
        AVG(score) AS avgscore,
        SUM(score < 60) / COUNT(score) AS failrate
FROM Course NATURAL JOIN SC
GROUP BY cno
ORDER BY FIELD(type, 2, 0, 1, 3);
```

补充说明：

- 这里按题意统计的是平均成绩和不及格率；
- count(score) 不会把 null 成绩计入分母；
- 题干提示“课程名可能有重名”，因此真正区分课程时应以 cno 为准。

(8)查询存在课程重修不及格情况的学生学号、姓名以及重修不及格的课程号和课程名 答案：

```
SELECT DISTINCT SC.sno, Student.sname, SC.cno, Course.cname
FROM Student
JOIN SC ON Student.sno = SC.sno
JOIN Course ON SC.cno = Course.cno
WHERE SC.score < 60
      AND EXISTS (
        SELECT *
        FROM SC SC2
        WHERE SC2.sno = SC.sno
              AND SC2.cno = SC.cno
              AND SC2.term < SC.term
      );
```

3.员工表 E(no, name, level) 中，要求输出 no、name 和 level，并按“经理，一般员工，顾问”的顺序输出

答案：

```
SELECT no, name, level
FROM E
ORDER BY FIELD(level, 2, 1, 3);
```

4. 已知关系模式 R(A,B)、S(B,C) 和 T(C,D)，关系代数表达式为：

$$\pi_D((\sigma_{pqr}(R \bowtie S)) \bowtie T)$$

其中：

- p 仅涉及 R.A
- q 仅涉及 R.B
- m 仅涉及 S.C

请写出对应的 SQL 查询语句。

答案：

```
SELECT DISTINCT D
FROM (
  SELECT *
  FROM R NATURAL JOIN S
  WHERE p(A) AND q(B) AND m(C)
) pqmRS NATURAL JOIN T;
```