Assignment 2 Report

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一、 作业要求

- ✧ 熟悉 SQL 查询语句
- ✧ 使用 SQL 查询语句完成指定的 12 个查询

二、 使用平台和工具

- ✧ Windows 10
- ✧ MS Access 2019

三、 实现方案

（一） 作业内容

Content

- SQL queries on university database
- Write SQL queries that answer the questions below (one query per question) and run them on the Microsoft ACCESS Database System using its SQL interpreter. The query answers must not contain duplicates, but you should use the SQL keyword **distinct** only when necessary.
- The SQL interpreter in ACCESS is not quite the same as the one described in the textbook. If the query you write is not accepted by ACCESS (usually it gives you some strange errors), try different ways until you get one that works with ACCESS. For this assignment, creation of temporary tables is not allowed, i.e., for each question you have to write exactly one SQL statement.

下方为 12 条指定的查询：

Questions

1. Print the names of professors who work in departments that have fewer than 50 PhD students.
2. Print the name(s) of student(s) with the lowest gpa.
3. For each Computer Sciences class, print the cno, sectno, and the average gpa of the students enrolled in the class.
4. Print the course names, course numbers and section numbers of all classes with less than six students enrolled in them.
5. Print the name(s) and sid(s) of the student(s) enrolled in the most classes.
6. Print the names of departments that have one or more majors who are under 18 years old.
7. Print the names and majors of students who are taking one of the College Geometry courses. (Hint: You'll need to use the "like" predicate and the string matching character in your query.)
8. For those departments that have no majors taking a College Geometry course, print the department name and the number of PhD students in the department.
9. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.
10. Print the age difference between the oldest and youngest Computer Sciences major(s).
11. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.
12. Print the ids, names, and GPAs of the students who are currently taking all of the Civil Engineering courses.

（二） 作业要求

Demand

- This is an individual assignment – no group submissions are allowed. Hand in an ACCESS database that contains the answers to the twelve questions. The database should contain twelve queries, named as follows:

  Query1

  Query2

  …

  Query12
- Test the function of index with query related with student table
- Hand in a report which indicates your answers

（三） 作业具体实现

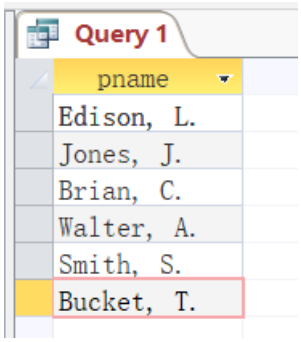
本部分将会具体给出 12 条查询的内容，结果。

1. Print the names of professors who work in departments that have fewer than 50 PhD students.

① SQL 语句

```
SELECT p.pname
FROM Prof AS p, Dept AS d
WHERE p.dname = d.dname AND d.numphds < 50;
```

② 运行结果

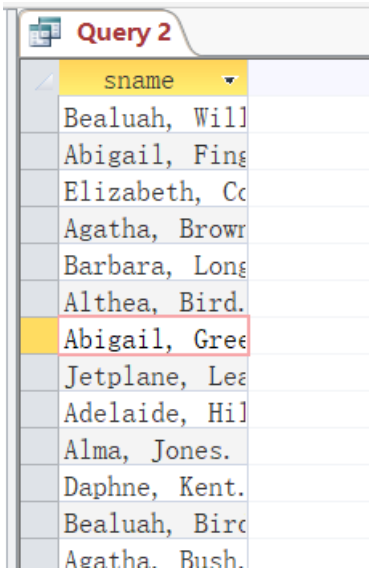


2. Print the name(s) of student(s) with the lowest gpa.

① SQL 语句

```
SELECT sname
FROM Student
WHERE gpa = (SELECT MIN(gpa)
             FROM Student);
```

② 运行结果（结果元组数量多，此处截图只包含部分，具体请查看 **university_A2.accdb**）



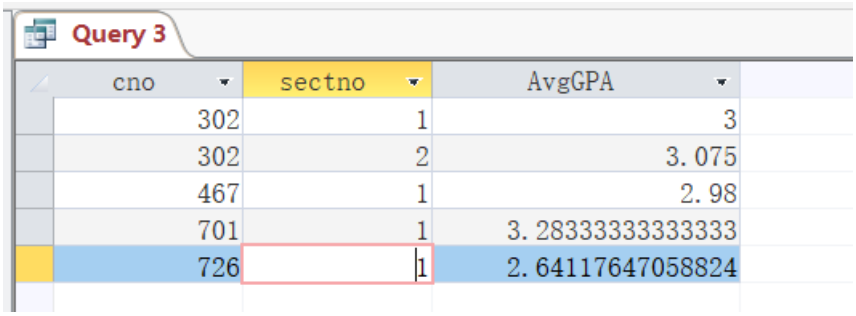
3. For each Computer Sciences class, print the cno, sectno, and the average gpa of the students enrolled in the class.

① SQL 语句

```
SELECT e.cno, e.sectno, AVG(s.gpa) AS AvgGPA
FROM Enroll AS e, Student AS s
WHERE e.sid = s.sid AND e.cno IN (SELECT cno
                                  FROM Course
                                  WHERE dname = "Computer Sciences")
```

GROUP BY e.cno, e.sectno;

② 运行结果



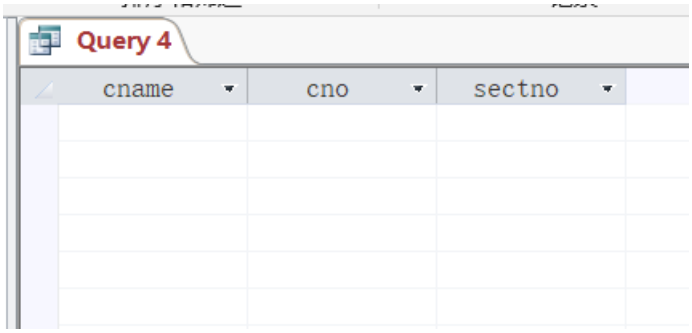
cno	sectno	AvgGPA
302	1	3
302	2	3.075
467	1	2.98
701	1	3.28333333333333
726	1	2.64117647058824

4. Print the course names, course numbers and section numbers of all classes with less than six students enrolled in them.

① SQL 语句

```
SELECT c.cname, c.cno, Temp.sectno
FROM Course AS c, (SELECT cno, sectno
                   FROM Enroll
                   GROUP BY cno, sectno
                   HAVING COUNT(*) < 6)    AS Temp
WHERE c.cno = Temp.cno;
```

② 运行结果（该查询结果为空）



cname	cno	sectno

5. Print the name(s) and sid(s) of the student(s) enrolled in the most classes.

① SQL 语句（本处给出同一 SQL 语句两种排版）

I

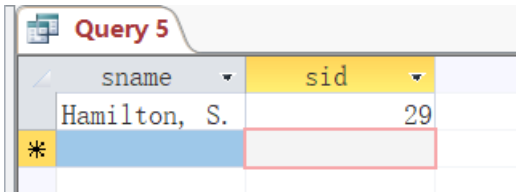
```
SELECT sname, sid FROM Student WHERE sid IN (SELECT sid FROM
(SELECT sid, COUNT(sid) AS myc FROM Enroll GROUP BY sid) WHERE
myc = (SELECT MAX(mycount) FROM (SELECT sid, COUNT(sid) AS
mycount FROM Enroll GROUP BY sid)) GROUP BY sid);
```

II

```
SELECT sname, sid
FROM Student
WHERE sid IN (SELECT sid
                  FROM (SELECT sid, COUNT(sid) AS myc
```

```
                    FROM Enroll
                    GROUP BY sid)
            WHERE myc = (SELECT MAX(mycount)
                         FROM (SELECT sid, COUNT(sid) AS
                    mycount
                               FROM Enroll
                               GROUP BY sid))
                    GROUP BY sid);
```

② 运行结果

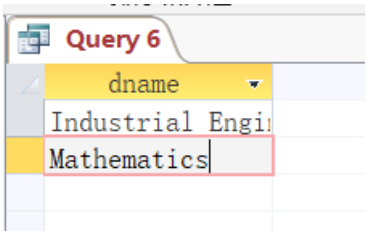


6. Print the names of departments that have one or more majors who are under 18 years old.

① SQL 语句

```
SELECT DISTINCT m.dname
FROM Major AS m, Student AS s
WHERE m.sid = s.sid AND s.age < 18;
```

② 运行结果

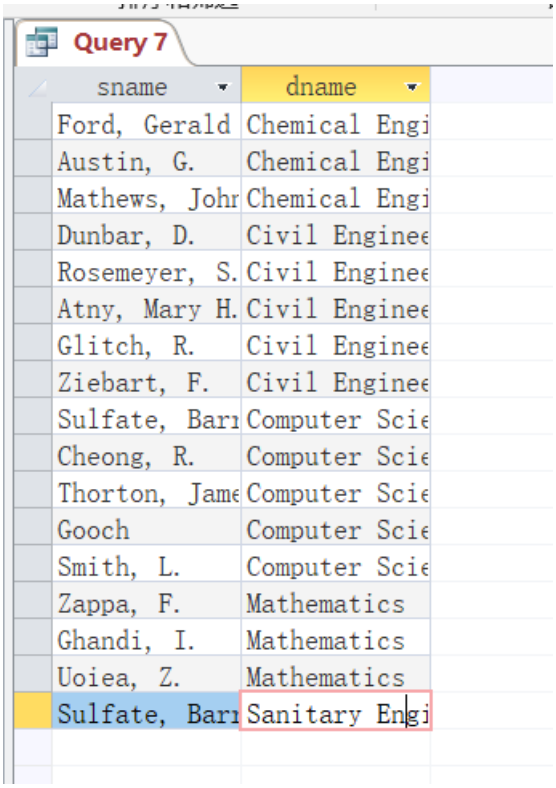


7. Print the names and majors of students who are taking one of the College Geometry courses. (Hint: You'll need to use the "like" predicate and the string matching character in your query.)

① SQL 语句

```
SELECT s.sname, m.dname
FROM Student AS s, Major AS m
WHERE s.sid = m.sid AND s.sid IN (SELECT sid
                                  FROM Enroll
                                  WHERE cno IN (SELECT cno
                                                FROM Course
                                                WHERE cname LIKE
                                                '*Geometry*'));
```

② 运行结果

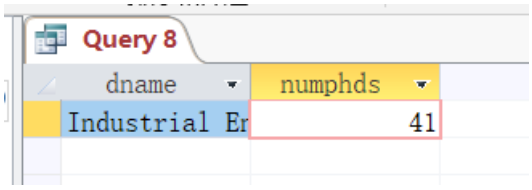


8. For those departments that have no majors taking a College Geometry course, print the department name and the number of PhD students in the department.

① SQL 语句

```
SELECT DISTINCT m.dname, d.numphds
FROM Major AS m, Dept AS d
WHERE m.dname = d.dname AND m.dname IN(SELECT DISTINCT m.dname
FROM Major m
WHERE m.dname NOT IN (SELECT DISTINCT m.dname
FROM Major m
WHERE m.sid IN (SELECT sid FROM Enroll WHERE cno IN (SELECT cno
FROM Course WHERE cname LIKE '*Geometry*'))));
```

② 运行结果



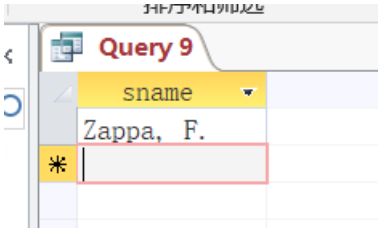
9. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.

① SQL 语句

```
SELECT s.sname
FROM Student AS s
WHERE s.sid IN (SELECT T1.sid FROM (SELECT sid FROM Enroll e
```

WHERE e.dname = "Computer Sciences") AS T1, (SELECT sid FROM Enroll e WHERE e.dname = "Mathematics") AS T2 WHERE T1.sid = T2.sid);

② 运行结果

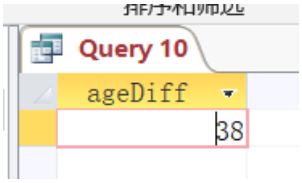


10. Print the age difference between the oldest and youngest Computer Sciences major(s).

① SQL 语句

```
SELECT (MAX(age) - MIN(age)) AS ageDiff
FROM Student AS s
WHERE sid IN (SELECT sid FROM Major WHERE dname = "Computer Sciences");
```

② 运行结果

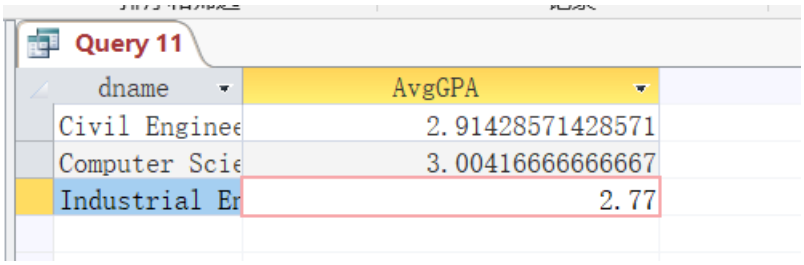


11. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.

① SQL 语句

```
SELECT m.dname, AVG(s.gpa) AS AvgGPA
FROM Student AS s, Major AS m
WHERE s.sid = m.sid
GROUP BY m.dname
HAVING 0 < (SELECT COUNT(*) FROM Student WHERE sid IN (SELECT sid FROM Major WHERE dname = m.dname) AND gpa < 1.0);
```

② 运行结果

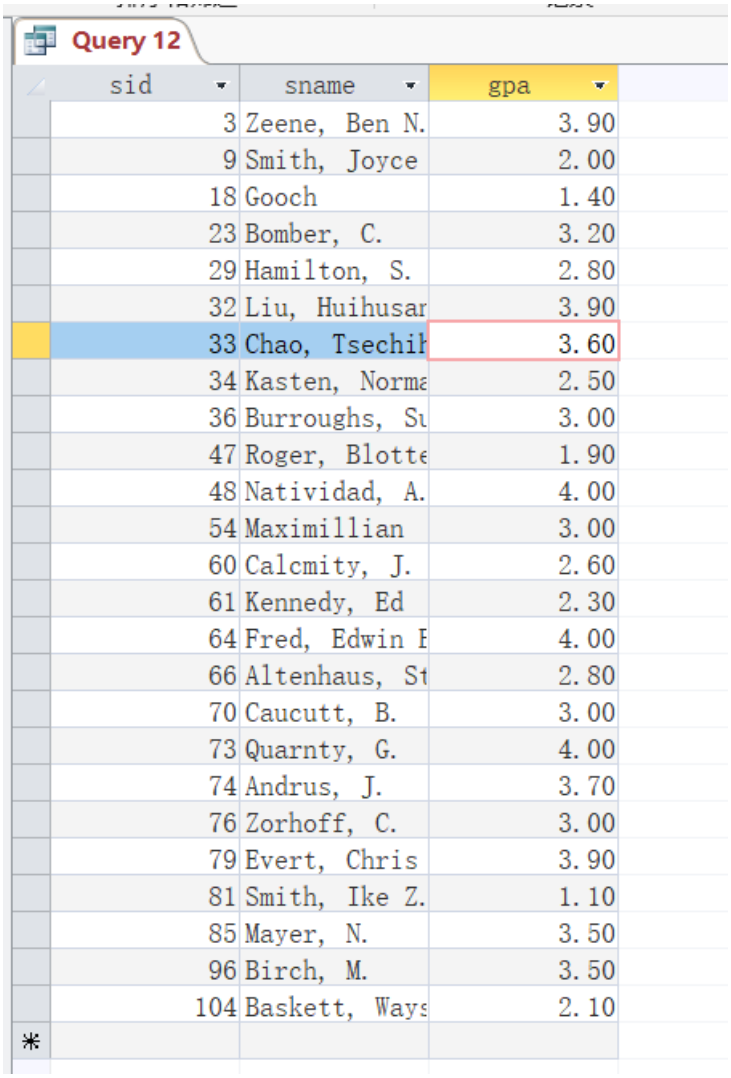


12. Print the ids, names, and GPAs of the students who are currently taking all of the Civil Engineering courses.

① SQL 语句

```
SELECT s.sid, s.sname, s.gpa
FROM Student AS s
WHERE s.sid IN (SELECT sid FROM Enroll WHERE cno IN (SELECT cno
FROM Course WHERE dname = "Civil Engineering"));
```

② 运行结果



Query 12

sid	sname	gpa
3	Zeene, Ben N.	3.90
9	Smith, Joyce	2.00
18	Gooch	1.40
23	Bomber, C.	3.20
29	Hamilton, S.	2.80
32	Liu, Huihusar	3.90
33	Chao, Tsechih	3.60
34	Kasten, Norma	2.50
36	Burroughs, Su	3.00
47	Roger, Blotte	1.90
48	Natividad, A.	4.00
54	Maximillian	3.00
60	Calcmity, J.	2.60
61	Kennedy, Ed	2.30
64	Fred, Edwin E	4.00
66	Altenhaus, St	2.80
70	Caucutt, B.	3.00
73	Quarnty, G.	4.00
74	Andrus, J.	3.70
76	Zorhoff, C.	3.00
79	Evert, Chris	3.90
81	Smith, Ike Z.	1.10
85	Mayer, N.	3.50
96	Birch, M.	3.50
104	Baskett, Ways	2.10

四、 总结

通过两周的 SQL 语句学习，掌握了 SQL 语句使用的理论基础，再通过本次作业的练习，加深了对于 SQL 语句的理解，能够较好的使用 SQL 语句对数据库进行查询操作，希望以后能够更好掌握 SQL 语句，更好使用 SQL，完成更强大的功能。