数据库实验报告 实验四 数据查询 (连接、集 合查询)

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一、实验目的

熟悉SQL语句的数据查询语言,能够使用SQL语句对数据库进行连接查询和集合查询。

二、实验环境

数据库: Mysql

图形化工具: Navicat Premium 16

三、实验内容

本节实验的主要内容包括:

- 笛卡儿连接和等值连接
- 自然连接
- 外连接
- 复合条件连接。
- 多表连接
- 使用保留字UNION进行集合或运算
- 采用逻辑运算符AND或OR来实现集合交和减运算

四、课内实验

以school数据库为例(可在本实验单元的课时材料或作业附件中下载),在该数据库中存在4张表格,分别为:

STUDENTS(sid,sname,email,grade)

TEACHERS(tid,tname,email,salary)

COURSES(cid,cname,hour)

CHOICES(no,sid,tid,cid,score)

在数据库中,存在这样的关系:学生可以选择课程。一个课程对应一个教师。在表CHOICES中保存学生的选课记录。

1. 查询编号800009026的学生所选的全部课程的课程名和成绩

```
SELECT choices.sid,choices.cid,cc.cname,score
FROM choices
LEFT OUTER JOIN(
SELECT courses.cid,courses.cname
FROM courses) as cc
on choices.cid = cc.cid
WHERE choices.sid = 800009026;
```

部分结果如下:

	cid	cname	SC
)26	10015	tcp/ip protocol	
)26	10021	j2me	
)26	10042	С	

2. 查询所有选了database的学生的编号

```
1  SELECT choices.sid,cc.cname
2  FROM choices
3  LEFT OUTER JOIN(
4  SELECT courses.cid,courses.cname
5  FROM courses) as cc
6  on cc.cid = choices.cid
7  WHERE cc.cname = 'database';
```

部分结果如下:

	sid	cname
١	870899566	database
	830652286	database
	818285935	database
	891145052	database
	882649811	database
	896389791	database
	875474472	database
	885336151	database
	813866325	database

3. 求出选择了同一个课程的学生对

```
SELECT x.sid as s1,y.sid as s2
FROM choices x,choices y
WHERE x.cid = y.cid and x.no < y.no
LIMIT 1000</pre>
```

因为输出条数过大,通过limit关键字限制输出行数。

s2
803918060
830749707
875381250
815780422
897689534
896071994
895512053
860054626
866027825

4. 求出至少被两名学生选修的课程编号

```
1    SELECT *
2    FROM
3    (SELECT choices.cid,COUNT(any_value(choices.sid)) as cout_sid
4    FROM choices
5    GROUP BY cid) as cc
6    WHERE cc.cout_sid>2;
```

部分结果如下:

	cid	cout_sid
١	10001	5898
	10002	6013
	10003	5975
	10004	6110
	10005	6031
	10006	6090
	10007	5965
	10008	5985
	10009	5965
	10010	6027
	10011	6086

5. 查询选修了编号800009026的学生所选的某个课程的学生编号

```
1 SELECT y.sid
2 FROM choices x,choices y
3 WHERE x.cid = y.cid and x.sid = 800009026
```

	sid
Þ	820248718
	893821981
	846251641
	889127830
	881781896
	828875165
	839555343
	823412117
	831447161
	806803776
	865542267

6. 查询学生的基本信息及选修课程编号和成绩

```
SELECT students.*,choices.cid,choices.score
FROM students
LEFT OUTER JOIN choices
on students.sid = choices.sid;
```

部分结果如下:

	sid	sname	email	grade	cid	score
١	800001216	gfxrgs	hhce4@qhl	1992	10004	60
	800001216	gfxrgs	hhce4@qhl	1992	10034	60
	800001216	gfxrgs	hhce4@qhl	1992	10026	67
	800002933	vnbqz%svv	pvhxd4l@zd	2002	10008	79
	800002933	vnbqz%svv	pvhxd4l@zd	2002	10022	60
	800002933	vnbqz%svv	pvhxd4l@zd	2002	10046	82
	800002933	vnbqz%svv	pvhxd4l@zd	2002	10042	(Null)
	800005753	waqcj	hlhq0h8@jc	1992	10005	66
	800006682	fiiluommh	ihzd6_k@kz	1992	10023	94
	800006682	fiiluommh	ihzd6_k@kz	1992	10045	77
	800006682	fiiluommh	ihzd6_k@kz	1992	10035	96
	800006941	ogvmu	62sfbd@lrt.	1995	10009	81

7. 查询学号850955252的学生的姓名和选修的课程名称及成绩

```
SELECT cc.sname,courses.cname,cc.score
FROM courses

JOIN

(SELECT students.sname,choices.score,choices.cid
FROM students
RIGHT OUTER JOIN choices
on choices.sid = students.sid
WHERE students.sid = 850955252)as cc
on cc.cid = courses.cid;
```

部分结果如下:

	sname	cname	score
١	baqzmo	j2me	54
	baqzmo	data mining	62
	baqzmo	embeded system	94
	baqzmo	project management	76

8. 利用集合运算,查询选修课程C++或课程Java的学生的编号

```
SELECT sid
FROM choices
WHERE cid = ( SELECT cid

UNION
SELECT sid
FROM courses.cname = 'C++')

Here cid = ( SELECT cid
FROM choices
WHERE cid = ( SELECT cid
FROM courses
WHERE cid = ( SELECT cid
WHERE courses.cname = 'Java')
```

部分结果如下:

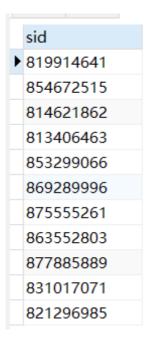
	sid
Þ	826310502
	880275978
	883794999
	852880400
	812844702
	891133170
	837089679
	879230818
	804706477
	845947855
	890918686
	861996649

9. 实现集合交运算,查询既选修课程C++又选修课程Java的学生的编号

sql实现集合交运算,可以用Intersect关键字。但是mysql没有这个关键字,所以用内连接代替实现。如下:

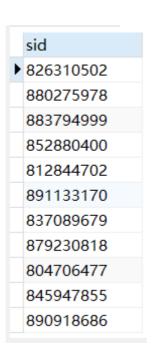
```
1 | SELECT DISTINCT sid
   FROM (SELECT sid
3 FROM choices
   WHERE cid = ( SELECT cid
                              FROM courses
 6
                              WHERE courses.cname = 'C++')) t1
7
   INNER JOIN
8
   (SELECT sid
9 FROM choices
10 WHERE cid = ( SELECT cid
11
                              FROM courses
12
                              WHERE courses.cname = 'Java')) t2
13 USING(sid);
```

部分结果如下:



10. 实现集合减运算,查询选修课程C++而没有选修课程Java的学生的编号 sql实现集合差运算,可以用except 关键字。但是mysql没有这个关键字,所以用左连接代替。

```
1 | SELECT DISTINCT sid
2 FROM (SELECT sid
3 FROM choices
4 WHERE cid = ( SELECT cid
5
                             FROM courses
                             WHERE courses.cname = 'C++')) t1
6
   LEFT JOIN
7
8
   (SELECT sid
9 FROM choices
10 WHERE cid = ( SELECT cid
11
                              FROM courses
12
                             WHERE courses.cname = 'Java')) t2
13 USING(sid)
14 WHERE t2.sid IS NULL;
```



自我检测

1. 查询选修Java的所有学生的编号及姓名

```
SELECT students.sid,students.sname
FROM students
WHERE sid = any(
FROM choices
WHERE choices.cid = (
FROM courses

WHERE courses.cid

WHERE courses.cname = 'Java'))
```

部分结果如下:

	sid	sname
	833961570	bzbogqep
	856259316	qnsmnk
Þ	840205068	vtyzpxh
	870755799	gjikyychh
	811353704	wcgatkwjn
	881617726	ikmsab
	806836750	rryeair
	898186633	oaxmzg

2. 分别使用等值连接和谓词IN两种方式查询姓名为sssht的学生所选的课程的编号和成绩等值连接:

```
SELECT choices.cid, choices.score
FROM choices
WHERE choices.sid = ( SELECT students.sid

FROM students
WHERE students.sname = 'sssht');
```

谓词连接:

```
SELECT choices.cid, choices.score
FROM choices
WHERE choices.sid IN ( SELECT students.sid

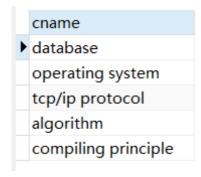
FROM students
WHERE students.sname =
'sssht');
```

部分结果如下:

sid	sname
833961570	bzbogqep
856259316	qnsmnk
▶ 840205068	vtyzpxh
870755799	gjikyychh
811353704	wcgatkwjn
881617726	ikmsab
806836750	rryeair
898186633	oaxmzg
895459694	tzaaptnIn
828744353	tcnib
834474228	dihliewsh

3. 查询其他课时比课程C++多的课程的名称

```
SELECT courses.cname
FROM courses
WHERE courses.`hour` > (SELECT courses.`hour`
FROM courses
WHERE courses.cname =
'C++');
```



4. 实现集合交运算,查询既选修课程Database又选修课程UML的学生的编号

```
1 | SELECT DISTINCT sid
2
   FROM
3 (SELECT sid
4 FROM choices
   WHERE cid = ( SELECT cid
 6
                             FROM courses
                             WHERE courses.cname = 'Database')) t1
8 INNER JOIN
9
   (SELECT sid
10 FROM choices
11 WHERE cid = ( SELECT cid
12
                              FROM courses
13
                              WHERE courses.cname = 'UML')) t2
14 USING(sid);
```

部分结果如下:



5. 实现集合减运算,查询选修课程Database而没有选修课程UML的学生的编号

```
1 | SELECT DISTINCT sid
2 FROM (SELECT sid
3 FROM choices
4 WHERE cid = ( SELECT cid
                              FROM courses
                              WHERE courses.cname = 'Database')) t1
 6
   LEFT JOIN
   (SELECT sid
   FROM choices
10 WHERE cid = ( SELECT cid
11
                              FROM courses
12
                             WHERE courses.cname = 'UML')) t2
13 USING(sid)
14 WHERE t2.sid IS NULL;
```

	sid
١	870899566
	830652286
	818285935
	891145052
	882649811
	896389791
	875474472
	885336151
	813866325
	827173338
	830131870