《数据库概论》实验一：用 SQL 进行数据操作 实验报告

姓名 吴紫航 学号 171860659 联系方式 邮箱：401986905@qq.com

实验环境

[一句话介绍你使用的操作系统、软件版本]
操作系统：windows 10
软件版本：MySQL Workbench 8.0 CE

实验过程

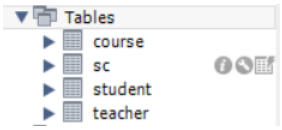
[实验的详细过程，必须包含所有 SQL 语句和要求的实验截图]

1.建立四个基本表

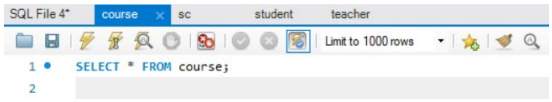
SQL 语句:

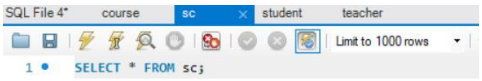
```
 CREATE TABLE   IF NOT EXISTS `Course`(
`id` Int NOT NULL,
`title` char(20) NOT NULL,
`dept_name` char(2),
`credit` INT,
PRIMARY KEY (`id`)
);

CREATE TABLE IF NOT EXISTS `Student`(
`id` INT NOT NULL,
`name` CHAR(20) NOT NULL,
`dept_name` CHAR(20),
PRIMARY KEY (`id`)
);

CREATE TABLE IF NOT EXISTS `SC`       (
`student_id` INT NOT NULL,
`course_id` INT NOT NULL,
`year` INT,
`grade` INT,
PRIMARY KEY(`student_id`,`course_id`)
);

CREATE TABLE IF NOT EXISTS `Teacher`(
`id` INT NOT NULL,
`name` CHAR(8) NOT NULL,
`dept_name` CHAR(2),
`salary` INT,
PRIMARY KEY(`id`));
```

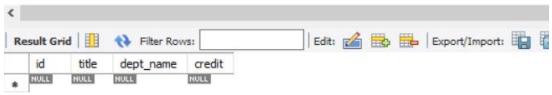
截图：

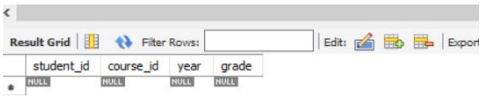


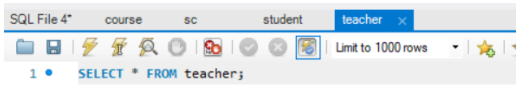
4 个 table 如下

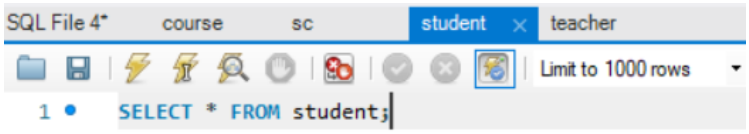












2.修改基本表

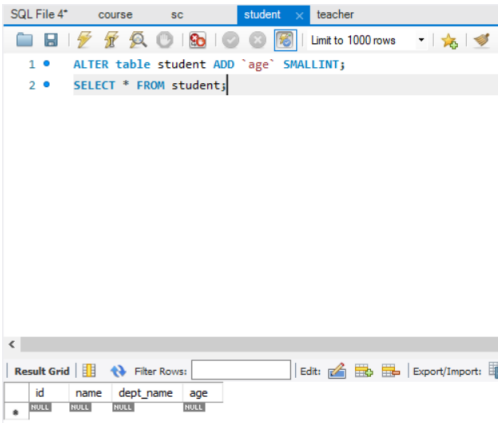
2.1. 在 Student 表中加入属性 age（smallint 型)

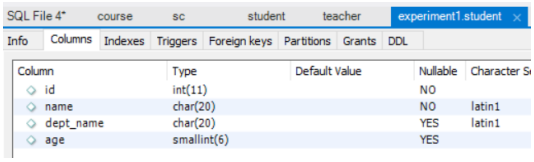
SQL 语句:

ALTER table student ADD `age` SMALLINT;

SELECT * FROM student;

截图：





增加了列 age smallint

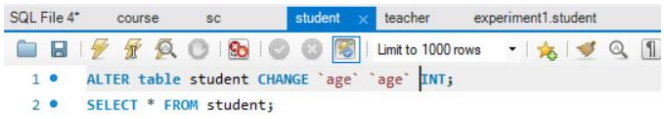
2.2. 将 Student 表中的属性 age 类型改为 int 型.

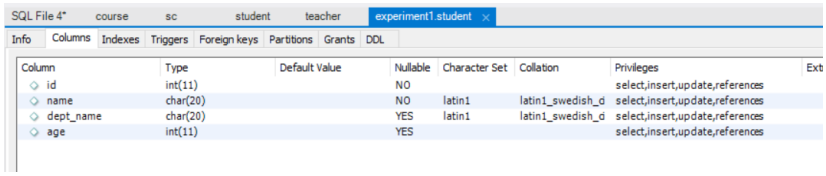
SQL 语句:

ALTER table student CHANGE `age` `age` INT;

SELECT* FROM student;

截图:





3.插入数据

3.1. 向 Student 表插入不少于 10 条数据

SQL 语句:

INSERT INTO student

(`id`,`name`,`dept_name`,`age`)

VALUES

(0000,'N0','D0',20),

(0001,'N1','D1',20),

(0002,'N2','D2',20),

(0003,'N3','D3',20),

(0004,'N4','D4',20),

(0005,'N5','D5',20),

(0006,'N6','D6',20),

(0007,'N7','D7',20),

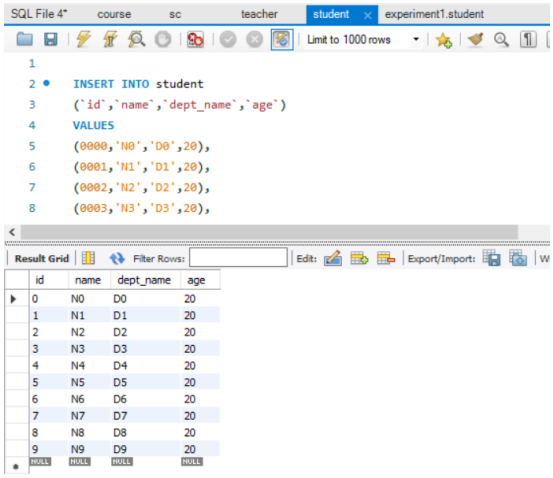
(0008,'N8','D8',20),

(0009,'N9','D9',20)

;

SELECT * FROM student;

截图：

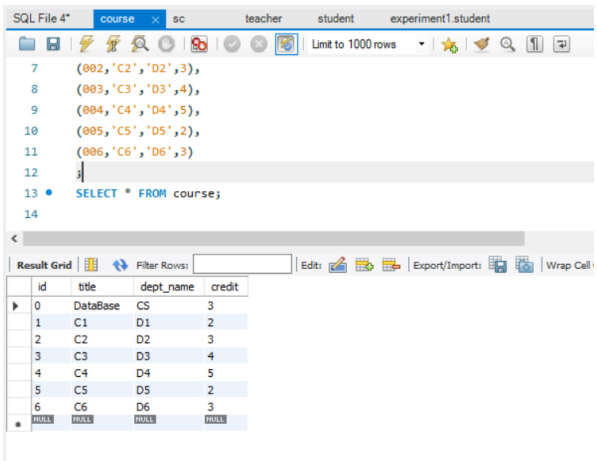


3.2. 向 Course 表插入不少于 5 条数据。注意，应该包含计算机系（CS），包含数据库课（DB）

SQL 语句：

```
INSERT INTO course
(`id`,`title`,`dept_name`,`credit`)
VALUES
(000,'DataBase','CS',3),
(001,'C1','D1',2),
(002,'C2','D2',3),
(003,'C3','D3',4),
(004,'C4','D4',5),
(005,'C5','D5',2),
(006,'C6','D6',3)
;
SELECT * FROM course;
```

截图：

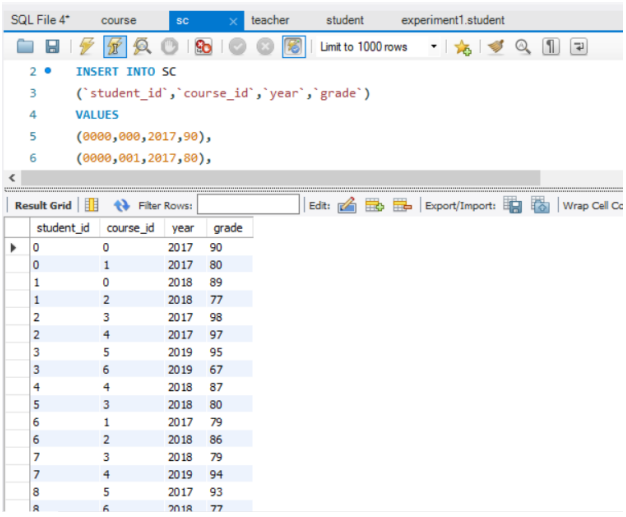


3.3. 向 SC 表插入不少于 20 条数据。注意，应该包含 2018 年前后课程

SQL 语句：

```
INSERT INTO SC
(`student_id`,`course_id`,`year`,`grade`)
VALUES
(0000,000,2017,90),
(0000,001,2017,80),
(0001,000,2018,89),
(0001,002,2018,77),
(0002,003,2017,98),
(0002,004,2017,97),
(0003,005,2019,95),
(0003,006,2019,67),
(0004,004,2018,87),
(0005,003,2018,80),
(0006,001,2017,79),
(0006,002,2018,86),
(0007,003,2018,79),
(0007,004,2019,94),
(0008,005,2017,93),
(0008,006,2018,77),
(0009,003,2018,76),
(0009,001,2018,88),
(0009,000,2018,67)
;
SELECT * FROM SC;
```

截图：



3.4. 向 Teacher 表插入不少于 3 条数据。注意，应该包含姓胡的教师

SQL 语句：

```
INSERT INTO teacher
(`id`,`name`,`dept_name`,`salary`)
VALUES
```

(0000,'Zhangsan','D1',30000),

(0001,'Lisi','D2',20000),

(0002,'Hutao','D3',24000),

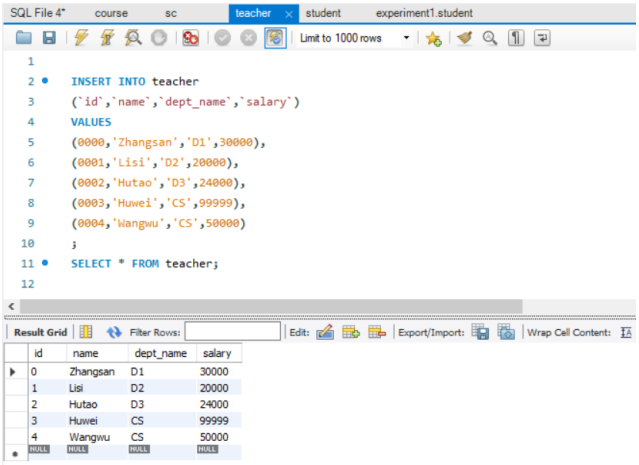
(0003,'Huwei','CS',99999),

(0004,'Wangwu','CS',50000)

;

SELECT * FROM teacher;

截图：



4.1 找出所有至少选修了一门计算机系课程的学生姓名，保证结果中没有重复的姓名。

SQL 语句：

select distinct student.`name`

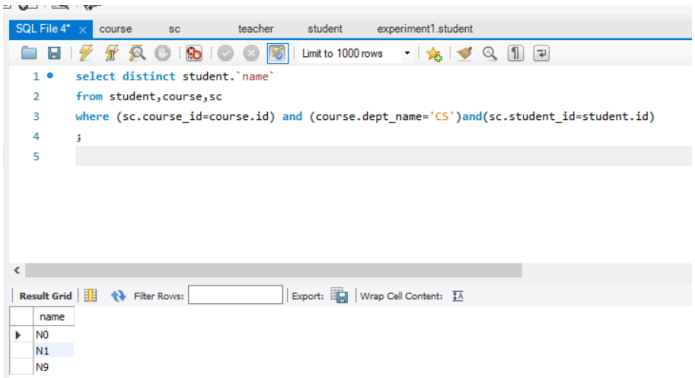
from student,course,sc

where

(sc.course_id=course.id) and (course.dept_name='CS')and(sc.student_id=student.id)

;

截图：



4.2 找出所有姓胡的教师的姓名和院系

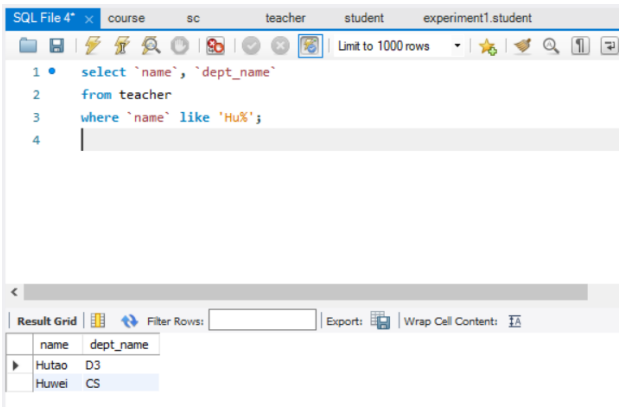
SQL 语句：

select `name`, `dept_name`

from teacher

where `name` like 'Hu%';

截图：



4.3 找出所有没有选修在 2018 年之前（不含 2018 年）开设的任何课程的学生的 ID 和姓名

SQL 语句：

select distinct student.id,student.name

from student

where student.id not in (

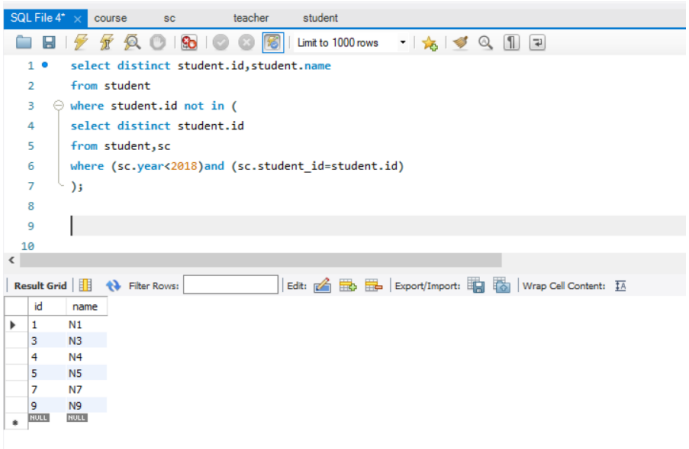
select distinct student.id

from student,sc

where (sc.year<2018)and (sc.student_id=student.id)

);

截图：



4.4 找出每个系教师的最高工资值。可以假设每个系至少有一位教师

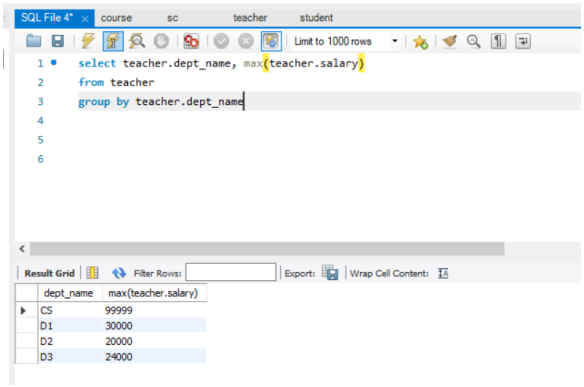
SQL 语句：

select teacher.dept_name, max(teacher.salary)

from teacher

group by teacher.dept_name

截图：



注：因为假设每个院系都有老师，所以直接对 teacher table 操作，按院系分类 group 即可

5. 修改数据

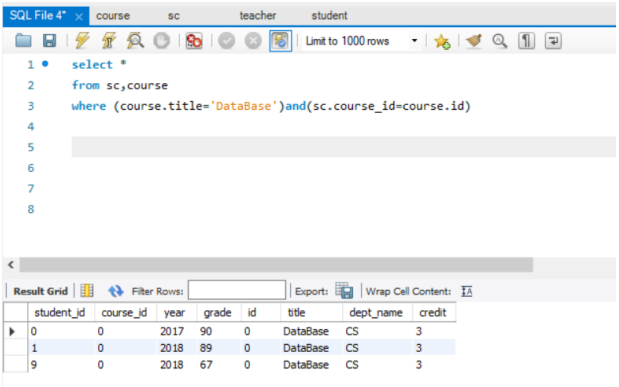
5.1. 将数据库课的学生成绩全部加 2 分

SET SQL_SAFE_UPDATES=0;

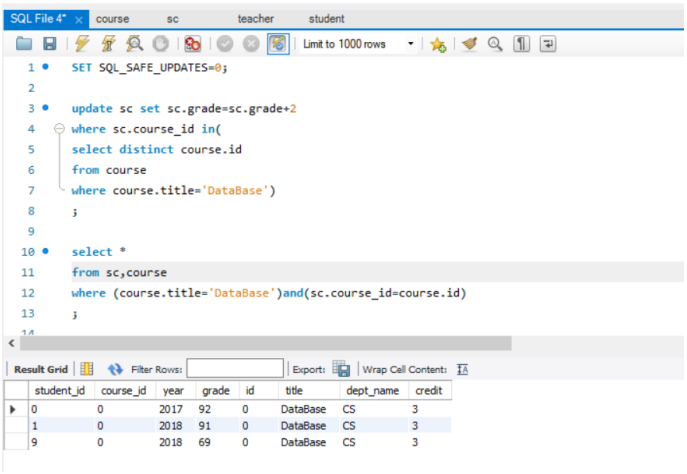
SQL 语句：

```
update sc set sc.grade=sc.grade+2
where sc.course_id in(
select distinct course.id
from course
where course.title='DataBase')
;

select *
from sc,course
where (course.title='DataBase')and(sc.course_id=course.id)
;
```

截图：



增加前



增加 2 分后

这里注意第一行代码，先修改一下安全设置模式，否则更新会报错

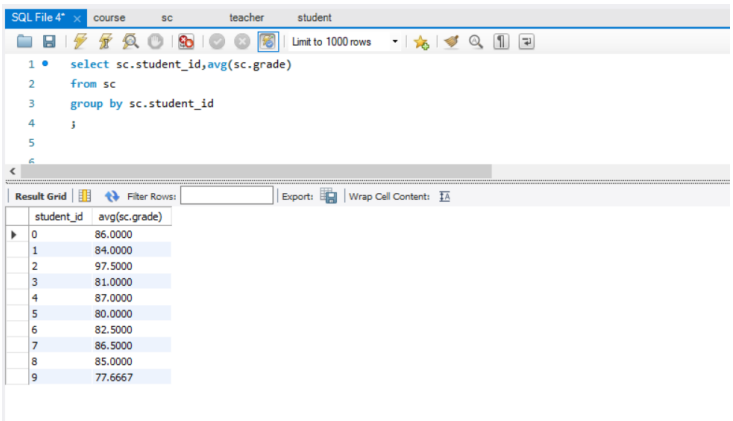
6. 删除数据

6.1. 删除均分不足 80 分的所有学生的选课记录

SQL 语句：

```
delete from sc
where sc.student_id in(
select * from(
select sc.student_id
from sc
group by sc.student_id
having avg(sc.grade)<80
)a)
;

select * from sc;
```

截图：



所有学生的均分

```
select sc.student_id,avg(sc.grade)
from sc
group by sc.student_id
having avg(sc.grade)<80
;
```

student_id	avg(sc.grade)
9	77.6667

不足 80 分学生的均分

```
select * from sc;
```

student_id	course_id	year	grade
2	3	2017	98
2	4	2017	97
3	5	2019	95
3	6	2019	67
4	4	2018	87
5	3	2018	80
6	1	2017	79
6	2	2018	86
7	3	2018	79
7	4	2019	94
8	5	2017	93
8	6	2018	77
9	0	2018	69
9	1	2018	88
9	3	2018	76

删除前选课记录详情

```
delete from sc
where sc.student_id in(
select * from(
select sc.student_id
from sc
```

student_id	course_id	year	grade
1	0	2018	91
1	2	2018	77
2	3	2017	98
2	4	2017	97
3	5	2019	95
3	6	2019	67
4	4	2018	87
5	3	2018	80
6	1	2017	79
6	2	2018	86
7	3	2018	79
7	4	2019	94
8	5	2017	93
8	6	2018	77

删除均分不足 80 学生的所有选课记录后

7. 视图操作

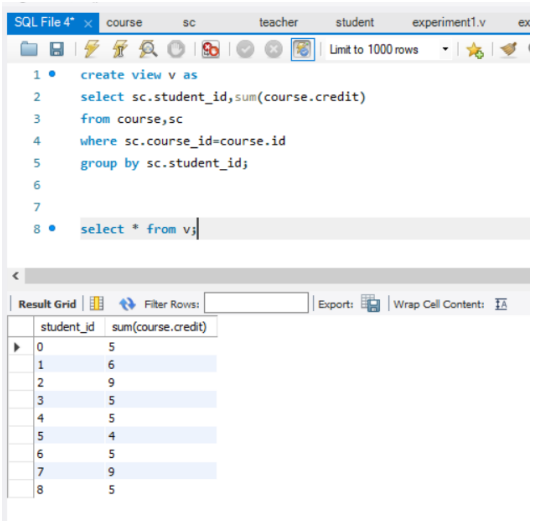
7.1. 创建一个视图，记录每位学生已修课程的总学分数

SQL 语句：

```
create view v as
```

```
select sc.student_id,sum(course.credit)
from course,sc
where sc.course_id=course.id
group by sc.student_id;

select * from v;
```

截图：



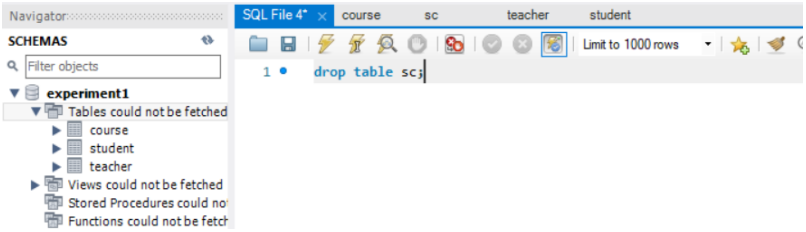
8. 删除基本表

8.1. 删除 SC 表

SQL 语句：

```
drop table sc;
```

截图：



实验中遇到的困难及解决办法

[详细说明你认为本次实验中比较困难的地方，也可以对实验设计提出建议]

(1)刚开始使用 mysql 时，发现修改表后，要 refresh 一下才能刷新出新状态

解决方法：和室友讨论得出解决方案

(2)一些关键词的使用语法和课本讲述并不完全一致比如 create

解决方法：搜索引擎搜索、重复尝试

(3)第六题的代码

```
delete from sc
where sc.student_id in(
select * from(
select sc.student_id
from sc
group by sc.student_id
having avg(sc.grade)<80
)a)
;
```

如果改成直观的

```
delete from sc
where sc.student_id in(
select sc.student_id
from sc
group by sc.student_id
having avg(sc.grade)<80
)
;
```

在 mysql 中会报错 **You can't specify target table for update in FROM clause**，查询搜索引擎后了解到需要再多加一层封装，mysql 中特有的问题，比如 oracle 中就没有

(4)关于均分少于 80 的学生那题，所谓均分是否考虑加权均分，即每门课的 credit 学分数目是否需要考虑，如果需要考虑，则情况变得复杂，按题目本意应该是直接调用 AVG 函数

解决方案：和胡伟老师讨论，得出不需要考虑加权

(5)第五题需要先修改安全设置模式，否则会报错：无法修改

解决方案：搜索引擎

参考文献及致谢

[如果你参考了任何书籍、网页，或与他人进行了讨论，请在此注明]

(1)参考书籍：

数据库系统实用教程/徐洁磐，柏文阳，刘奇志.北京：高等教育出版社，2006.6 ISBN,7-04-019584-4

(2)参考网址：

https://www.runoob.com/mysql/mysql-tutorial.html 菜鸟教程 MYSQL

https://blog.csdn.net/yihanzhi/article/details/81065573 IN 的用法

https://www.cnblogs.com/hhe0/p/9556070.html GROUP BY 的用法

https://blog.csdn.net/qqxyy99/article/details/79980005 MAX 的用法

https://www.jianshu.com/p/d69a269d8018 UPDATE 的用法

https://blog.csdn.net/a837201942/article/details/78713775 安全更新模式的设置问题

https://blog.csdn.net/fdipzone/article/details/52695371 You can't specify target table for update in FROM clause 错误的解决方法

(3)致谢讨论人：感谢舍友徐浩、老师胡伟