Contents

数据库系统实验六-数据更新

实验目的

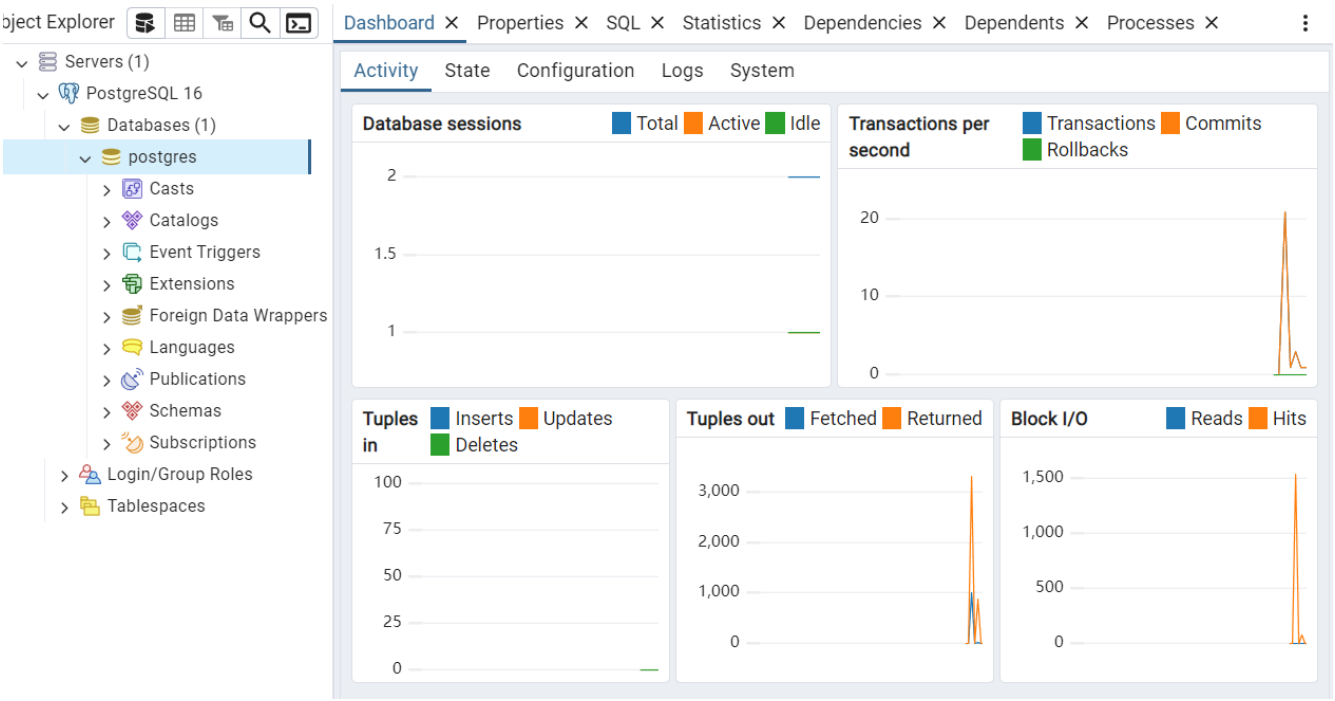
熟悉数据库的数据更新操作，能够使用 SQL 语句对数据库进行数据的插入、更新、删除操作。

实验环境

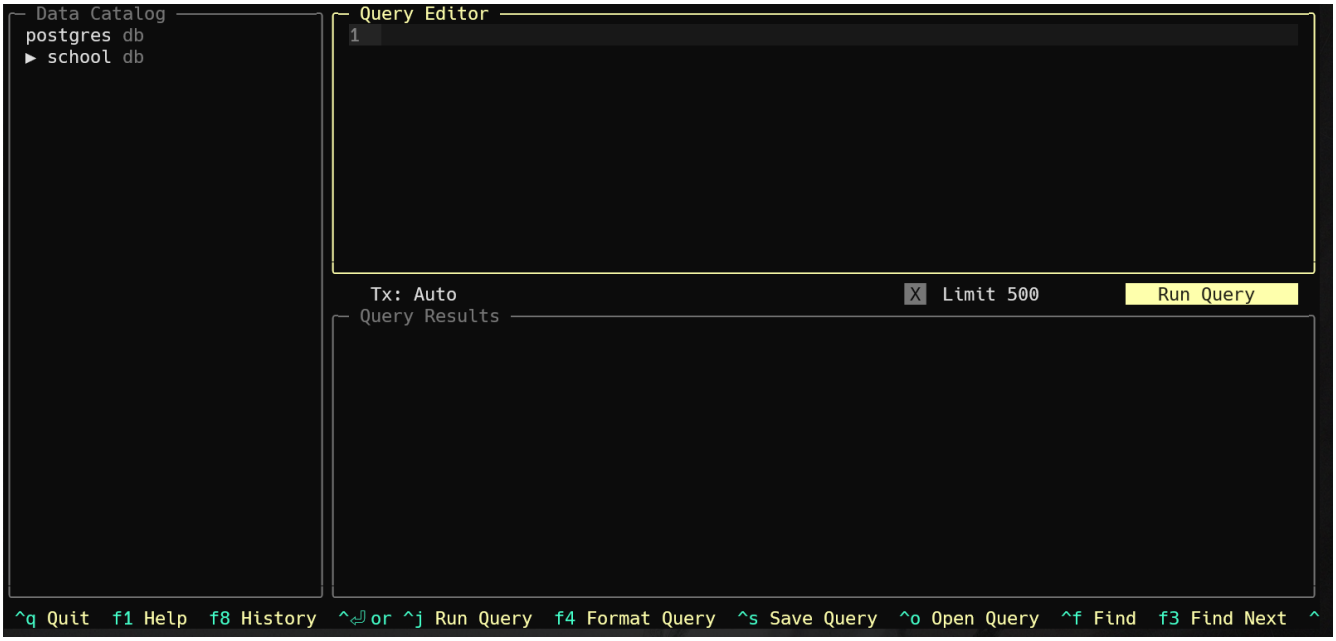
- OS: Windows 11

```
OsName                                  : Microsoft Windows 11 企业版
OsType                                  : WINNT
OsOperatingSystemSKU                    : EnterpriseEdition
OsVersion                               : 10.0.22631
```

- Database: PostgreSQL 16



- UI: harlequin-postgres



实验内容

在本次实验中，主要的内容是如何使用 SQL 语句对数据进行更新。

本节实验的主要内容包括：

- 使用 INSERT INTO 语句插入数据，包括插入一个元组或将子查询的结果插入到数据库中两种方式。
- 使用 SELECT INTO 语句，产生一个新表并插入数据。
- 使用 UPDATE 语句可以修改指定表中满足 WHERE 子句条件的元组，有三种修改的方式：修改某一个元组的值，修改多个元组的值，带子查询的修改语句。
- 使用 DELETE 语句删除数据：删除某一个元组的值，删除多个元组的值，带子查询的删除语句。

注：“SELECT INTO”是 SQL 查询语句的一部分，用于将查询的结果插入到新表中。它的语法如下：

```
SELECT column1, column2, ...
INTO new_table
FROM existing_table
WHERE condition;
```

其中：

column1, column2, ... 是要选择的列。

new_table 是要将结果插入的新表。

existing_table 是要从中选择数据的现有表。

condition 是可选的筛选条件。

这个语句执行时，它会从现有表中选择指定列的数据，并将结果插入到新表中

课内实验

要求：

以 school 数据库为例 (与前两次实验的数据同)，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)

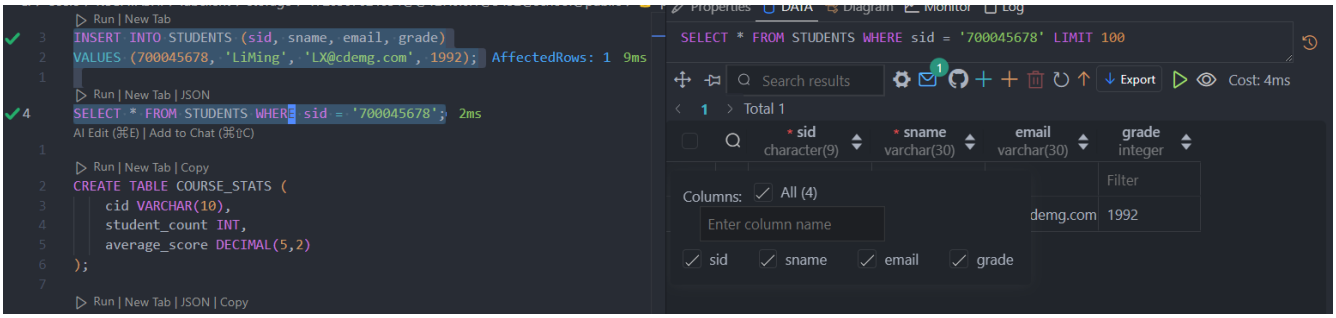
COURSES(cid,cname,hour)

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

在数据库 school 中按下列要求进行数据更新。

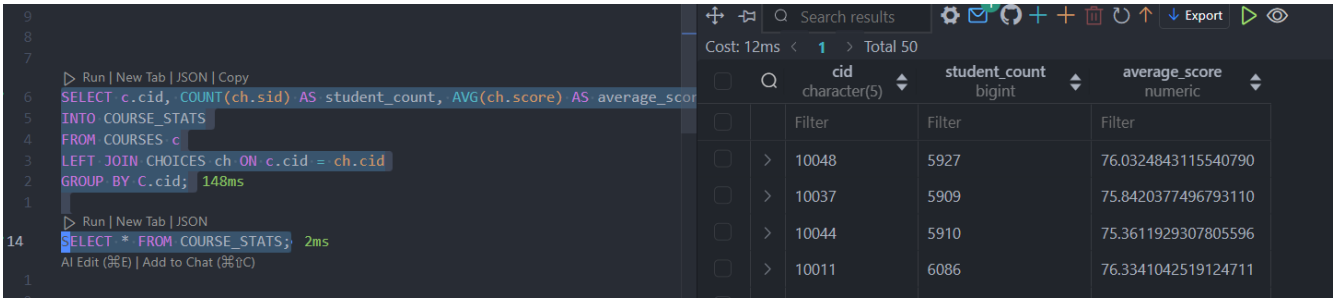
1. 使用 SQL 语句向 STUDENTS 表中插入元组 (编号：700045678；名字：LiMing；EMAIL：LX@cdemg.com；年级：1992);

```
INSERT INTO STUDENTS (sid, sname, email, grade)
VALUES (700045678, 'LiMing', 'LX@cdemg.com', 1992);
```



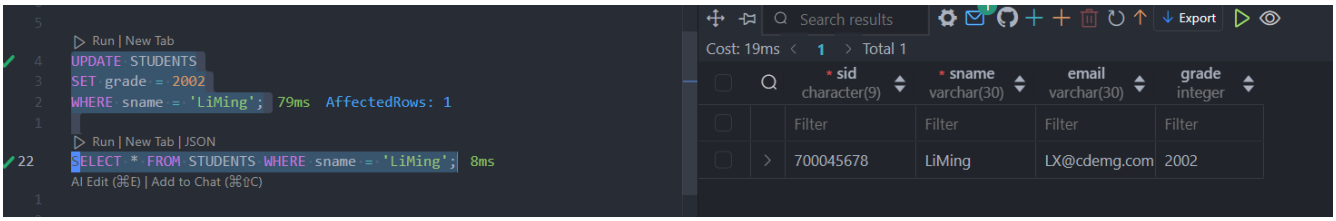
2. 对每个课程，求学生的选课人数和学生的平均成绩，并把结果存入数据库。使用 SELECT INTO 和 INSERT INTO 两种方法实现。(提示：可先创建一个新表再插入数据)；

```
SELECT c.cid, COUNT(ch.sid) AS student_count, AVG(ch.score) AS average_score
INTO COURSE_STATS
FROM COURSES c
LEFT JOIN CHOICES ch ON c.cid = ch.cid
GROUP BY C.cid;
```



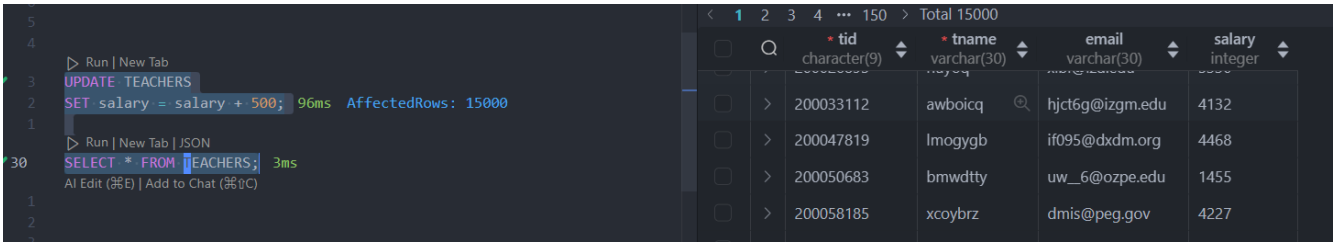
3. 在 STUDENTS 表中使用 SQL 语句将姓名为“LiMing”的学生的年级改为“2002”；

```
UPDATE STUDENTS
SET grade = 2002
WHERE sname = 'LiMing';
```



4. 在 TEACHERS 表中使用 SQL 语句将所有教师的工资多加 500 元;

```
UPDATE TEACHERS
SET salary = salary + 500;
```

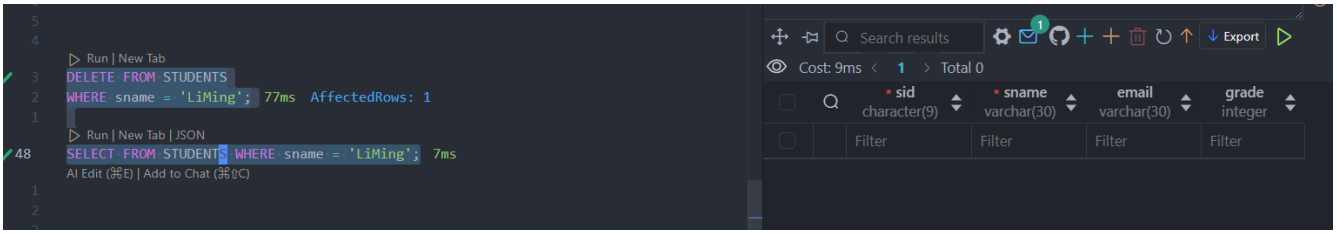


5. 将姓名为 zapyv 的学生的课程“C”的成绩加上 5 分;

```
UPDATE CHOICES
SET score = score + 5
WHERE sid = (SELECT sid FROM STUDENTS WHERE sname = 'zapyv')
  AND cid = (SELECT cid FROM COURSES WHERE cname = 'c');
```

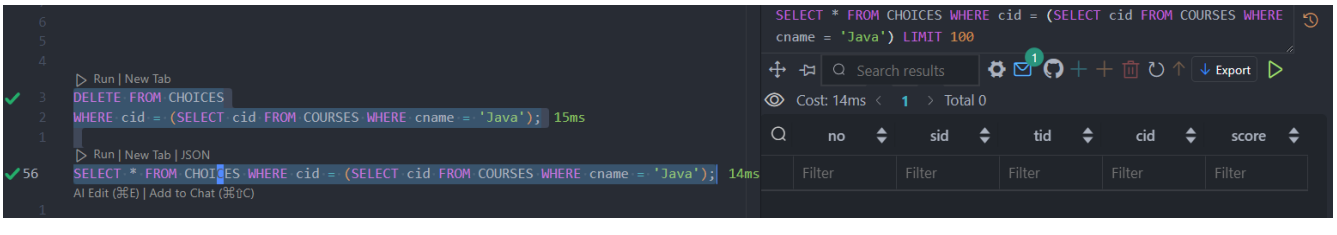
6. 在 STUDENTS 表中使用 SQL 语句删除姓名为“LiMing”的学生信息;

```
DELETE FROM STUDENTS
WHERE sname = 'LiMing';
```



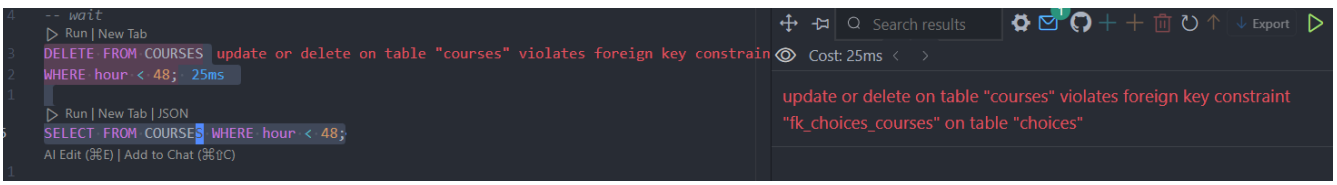
7. 删除所有选修课程“Java”的选课记录;

```
DELETE FROM CHOICES
WHERE cid = (SELECT cid FROM COURSES WHERE cname = 'Java');
```



8. 对 COURSES 表做删去时间 <48 的元组的操作，并讨论该删除操作所受到的约束;

```
DELETE FROM COURSES
WHERE hour < 48;
```



该删除操作所受到的约束：CHOICES 表中的外键约束

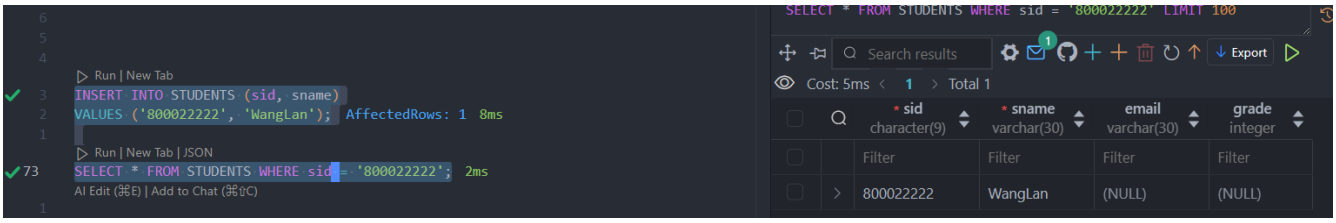
修改后的 sql 语句应为：

```
ALTER TABLE CHOICES
DROP CONSTRAINT FK_CHOICES_COURSES;

DELETE FROM CHOICES
WHERE cid IN (SELECT cid FROM COURSES WHERE hour < 48);

DELETE FROM COURSES
WHERE hour < 48;

ALTER TABLE CHOICES
ADD CONSTRAINT FK_CHOICES_COURSES
FOREIGN KEY (cid) REFERENCES COURSES(cid);
```

自我实践

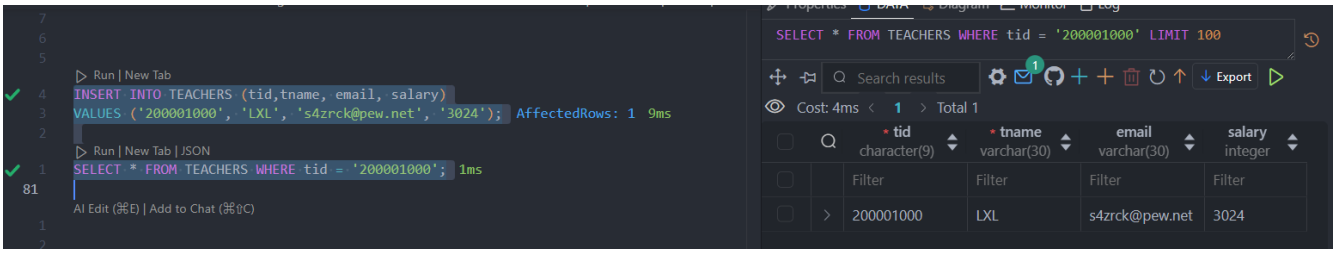
1. 向 STUDENTS 表插入编号是“800022222”且姓名是“WangLan”的元组;

```
INSERT INTO STUDENTS (sid, sname)
VALUES ('800022222', 'WangLan');
```



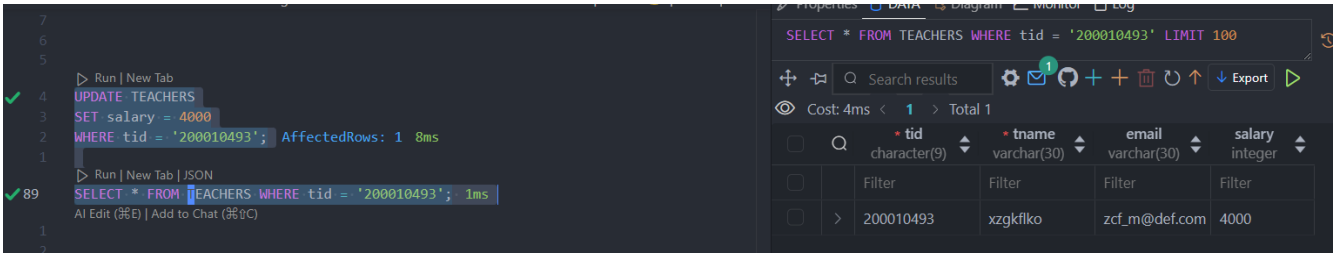
2. 向 TEACHERS 表插入元组（“200001000”,“LXL”,“s4zrck@pew.net”,“3024”）;

```
INSERT INTO TEACHERS (tid,tname, email, salary)
VALUES ('200001000', 'LXL', 's4zrck@pew.net', '3024');
```



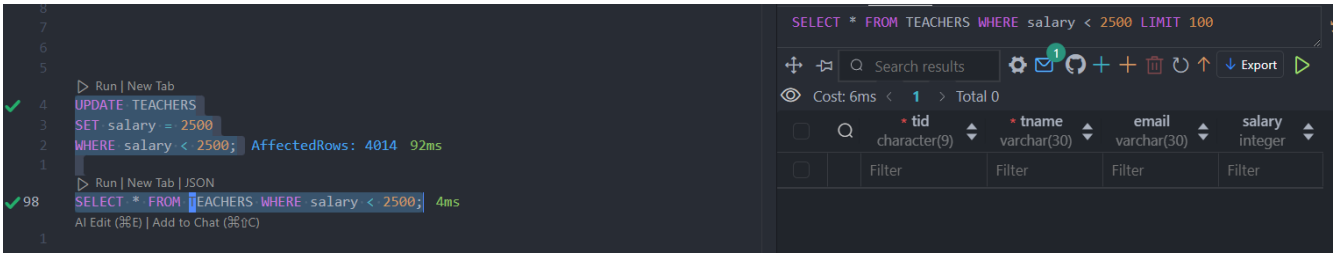
3. 将 TEACHERS 表中编号为“200010493”的老师工资改为 4000;

```
UPDATE TEACHERS
SET salary = 4000
WHERE tid = '200010493';
```



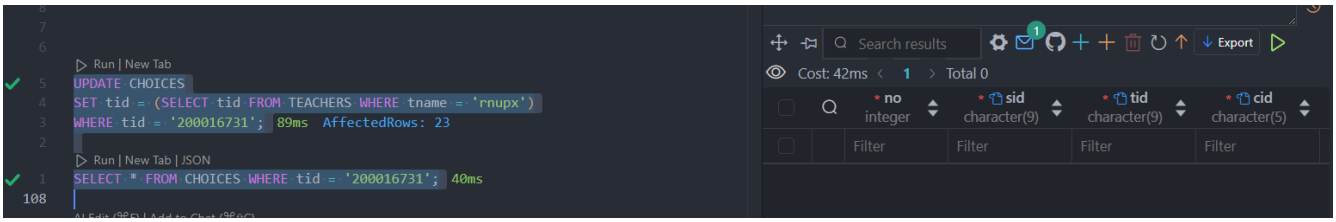
4. 将 TEACHERS 表中所有工资小于 2500 的老师工资改为 2500;

```
UPDATE TEACHERS
SET salary = 2500
WHERE salary < 2500;
```



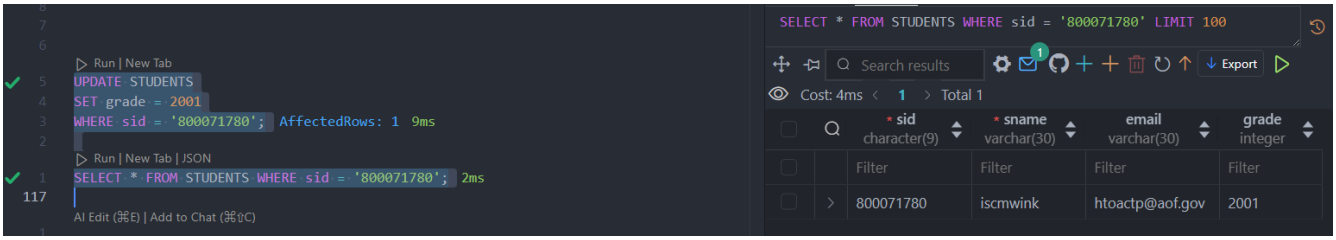
5. 将由编号为“200016731”的老师讲授的课程全部改成由姓名为“rnupx”的老师讲授;

```
UPDATE CHOICES
SET tid = (SELECT tid FROM TEACHERS WHERE tname = 'rnupx')
WHERE tid = '200016731';
```



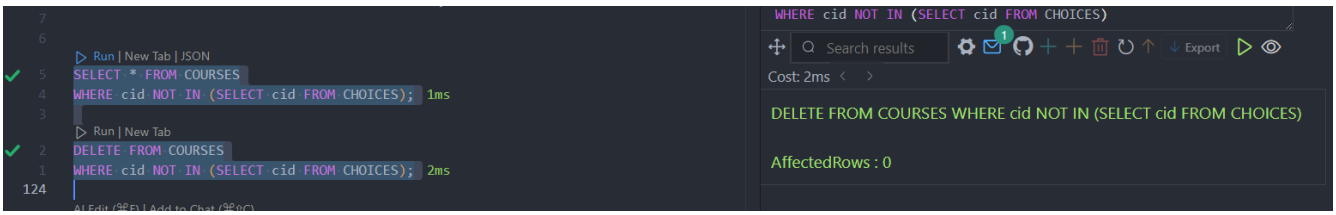
6. 更新编号“800071780”的学生年级为“2001”;

```
UPDATE STUDENTS
SET grade = 2001
WHERE sid = '800071780';
```



7. 删除没有学生选修的课程;

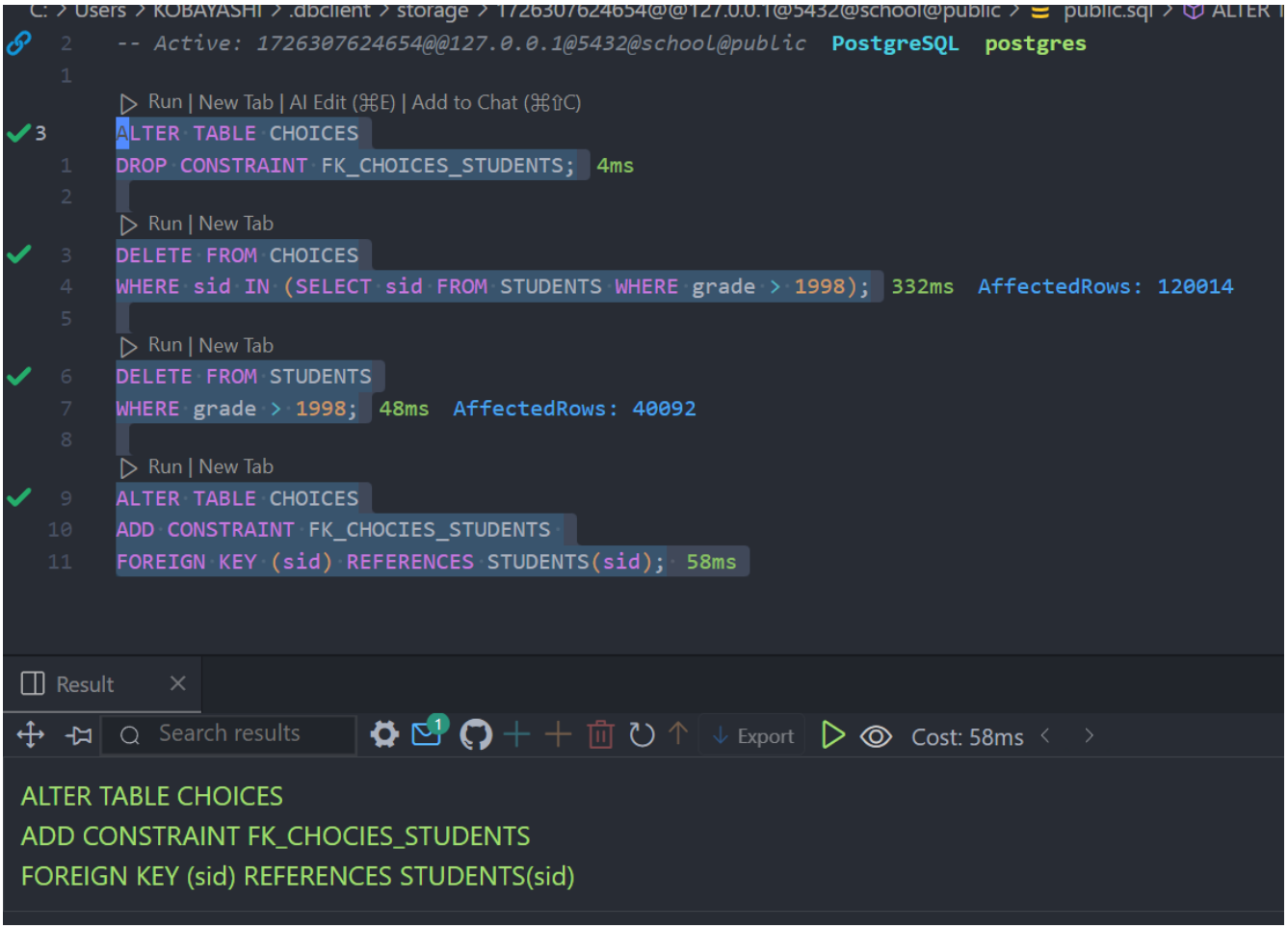
```
DELETE FROM COURSES
WHERE cid NOT IN (SELECT cid FROM CHOICES);
```



8. 删除年级高于 1998 的学生信息;

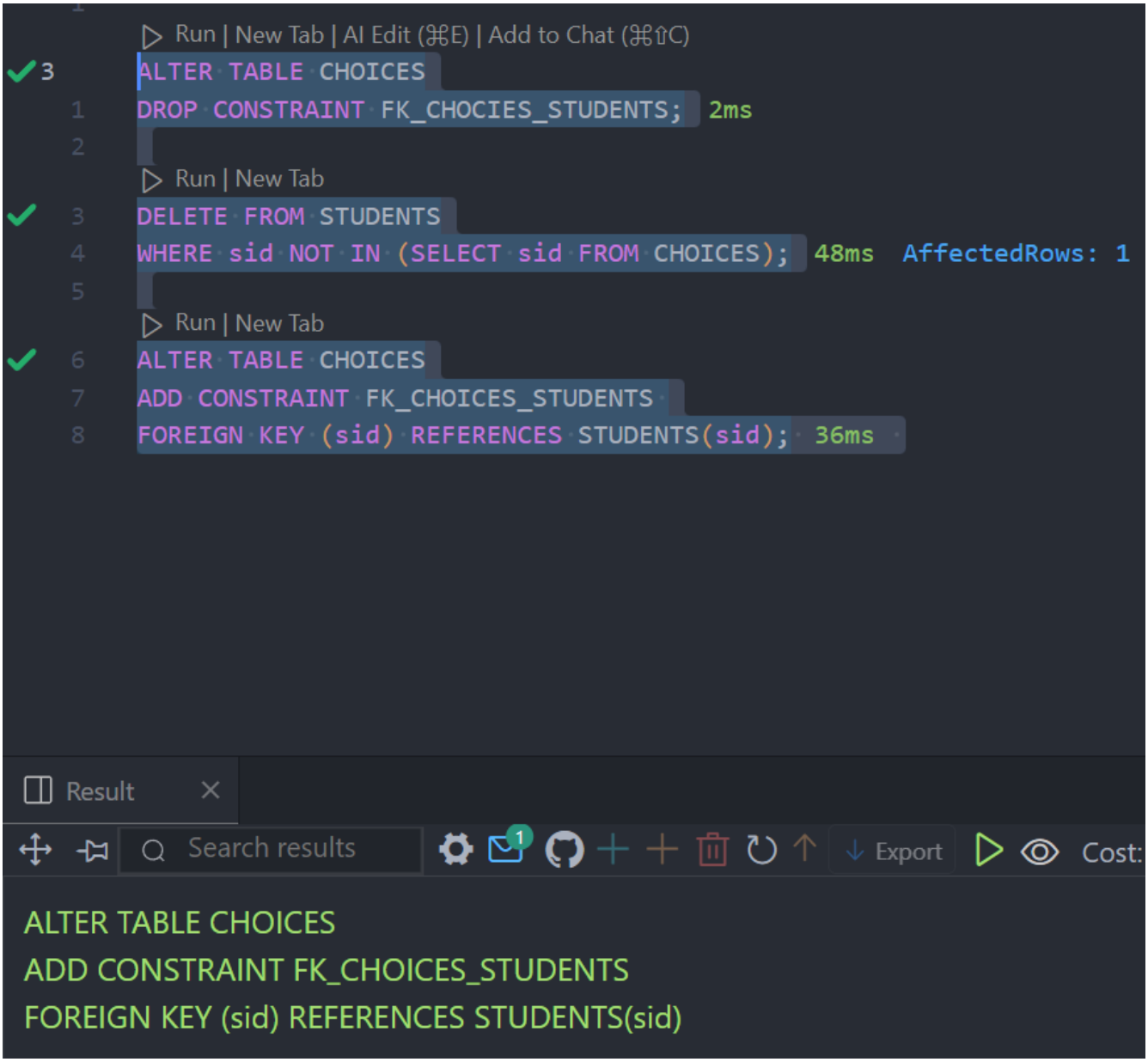
```
ALTER TABLE CHOICES
DROP CONSTRAINT FK_CHOICES_STUDENTS;

DELETE FROM CHOICES
WHERE sid IN (SELECT sid FROM STUDENTS WHERE grade > 1998);

DELETE FROM STUDENTS
WHERE grade > 1998;

ALTER TABLE CHOICES
ADD CONSTRAINT FK_CHOICES_STUDENTS
```

```
FOREIGN KEY (sid) REFERENCES STUDENTS(sid);
```



9. 删除没有选修课程的学生信息;

```
ALTER TABLE CHOICES
DROP CONSTRAINT FK_CHOICES_STUDENTS;

DELETE FROM STUDENTS
WHERE sid NOT IN (SELECT sid FROM CHOICES);

ALTER TABLE CHOICES
ADD CONSTRAINT FK_CHOICES_STUDENTS
FOREIGN KEY (sid) REFERENCES STUDENTS(sid);
```



10. 删除成绩不及格的选课记录;

```
DELETE FROM CHOICES
WHERE score < 60;
```