实验课-第9次-18308045-谷正阳

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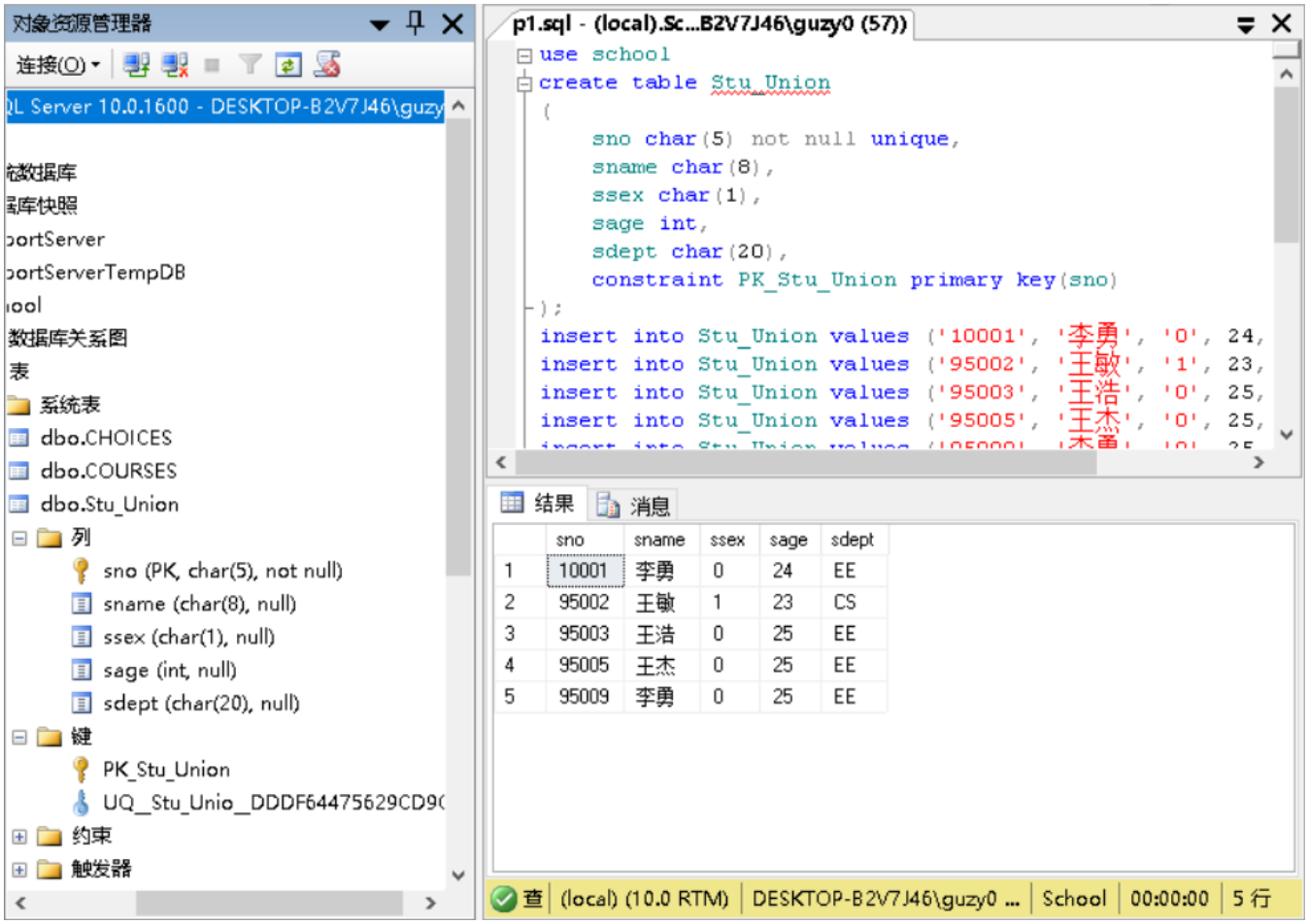
练习1

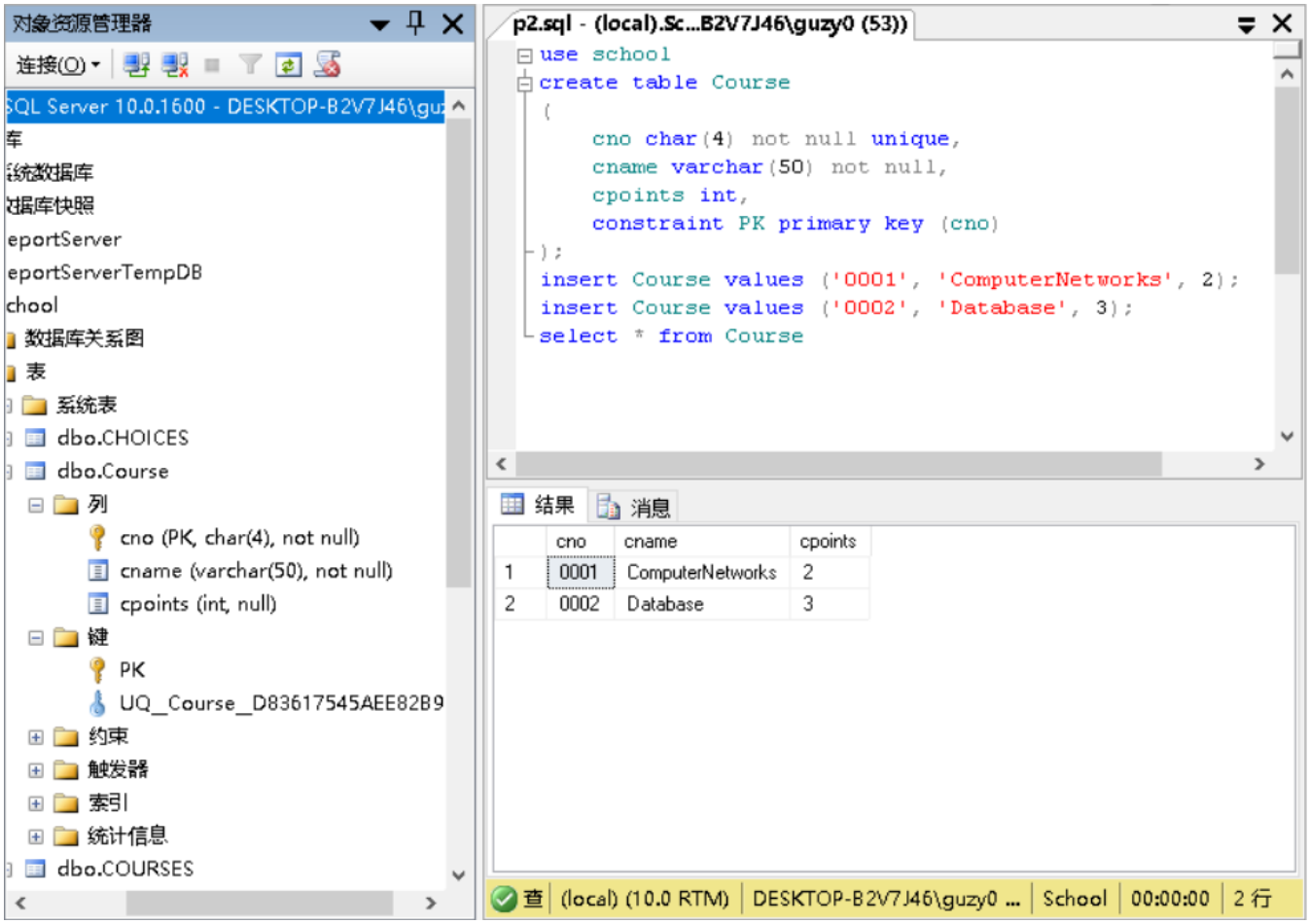
- 在数据库 school中建立表 Stu_Union,设置sno为主键。

```
use school
create table Stu_Union
(
    sno char(5) not null unique,
    sname char(8),
    ssex char(1),
    sage int,
    sdept char(20),
    constraint PK_Stu_Union primary key(sno)
);
insert into Stu_Union values ('10001', '李勇', '0', 24, 'EE');
insert into Stu_Union values ('95002', '王敏', '1', 23, 'CS');
insert into Stu_Union values ('95003', '王浩', '0', 25, 'EE');
insert into Stu_Union values ('95005', '王杰', '0', 25, 'EE');
insert into Stu_Union values ('95009', '李勇', '0', 25, 'EE');
select * from Stu_Union;
```



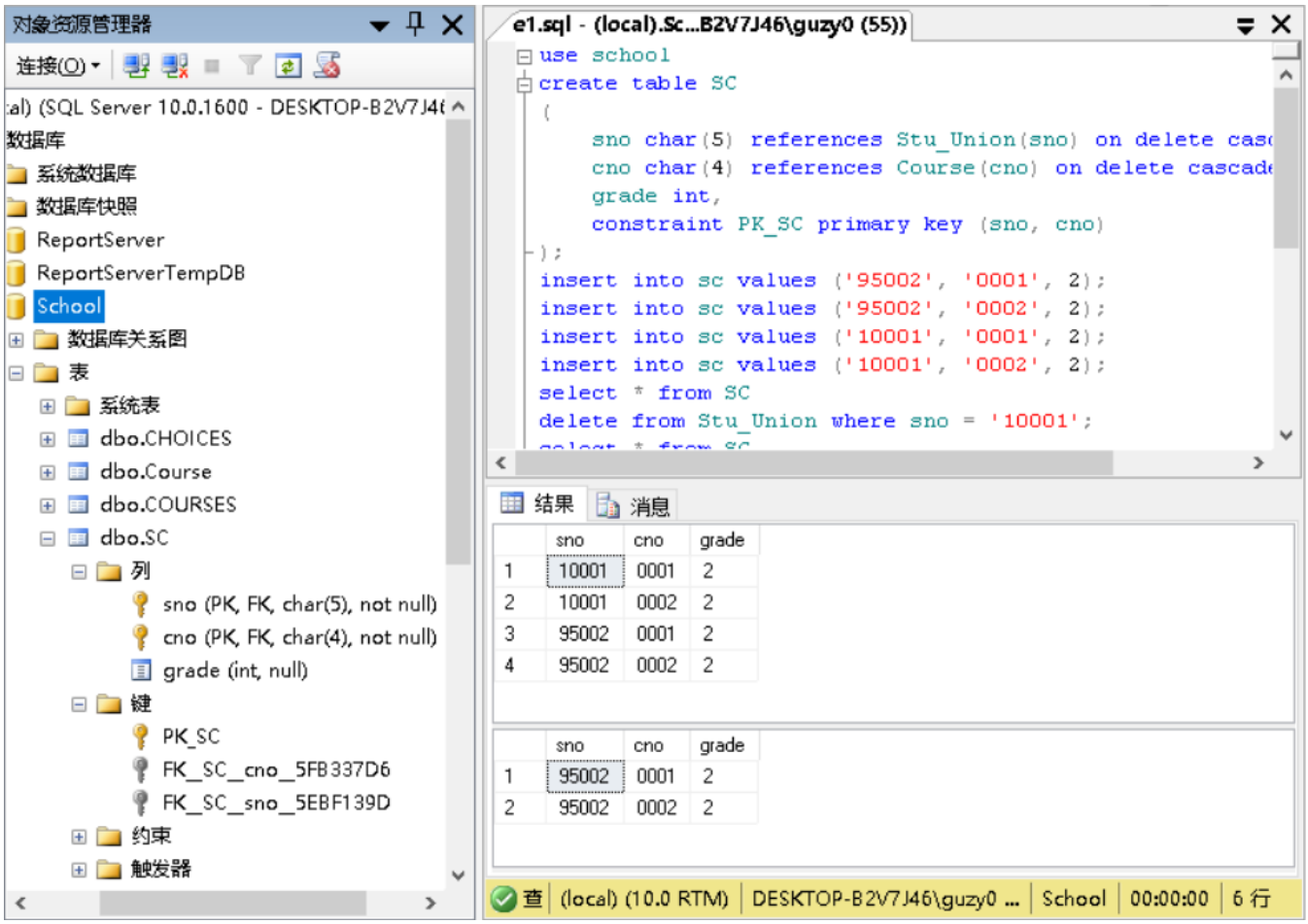
- 在数据库 school中建立表Course,令cno为主键。

```
use school
create table Course
(
    cno char(4) not null unique,
    cname varchar(50) not null,
    cpoints int,
    constraint PK primary key (cno)
);
insert Course values ('0001', 'ComputerNetworks', 2);
insert Course values ('0002', 'Database', 3);
select * from Course
```



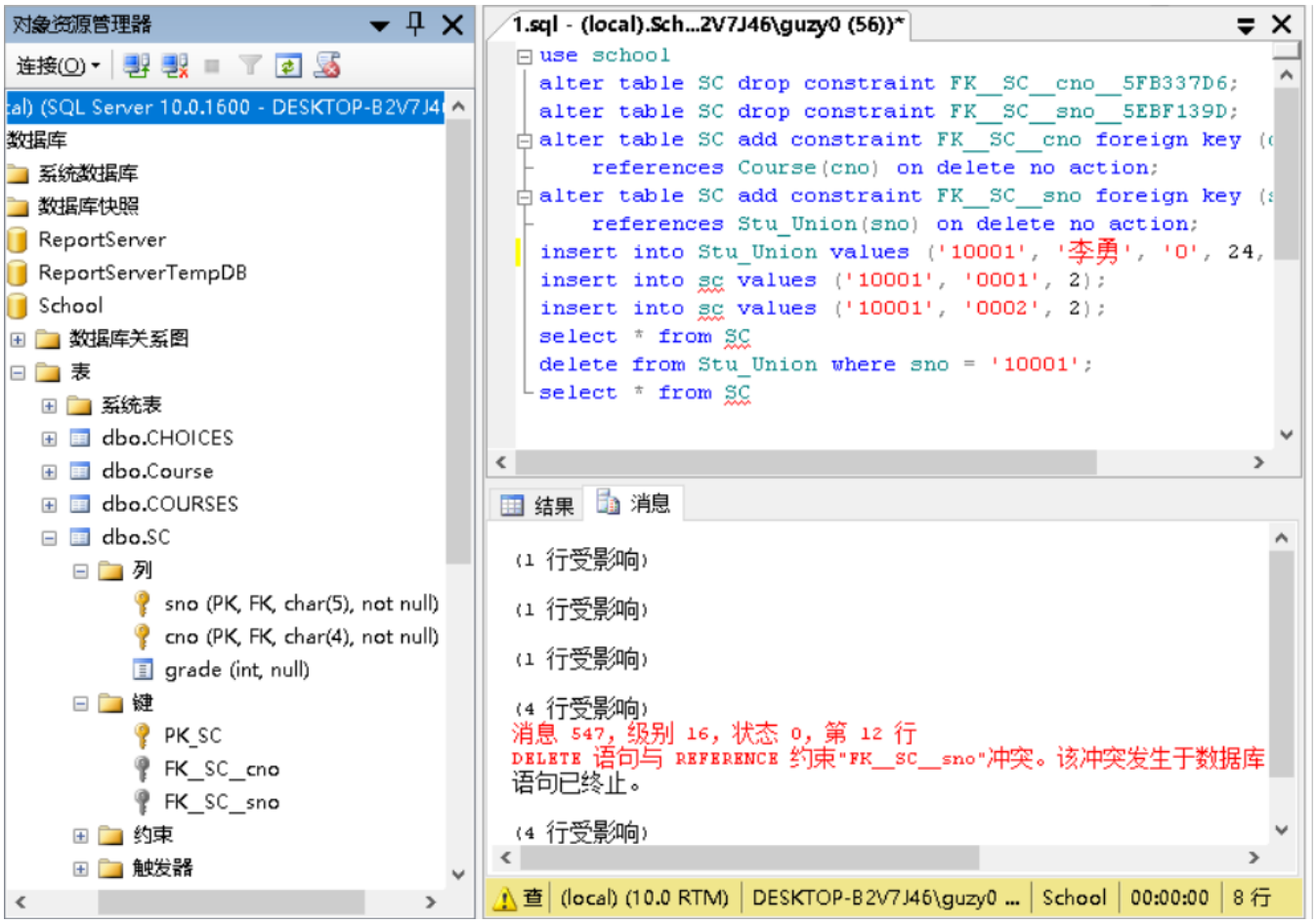
- 建立表SC，令sno和cno分别为参照Stu_Union表以及Course表的外键，设定为级联删除，并令（sno，cno）为其主键。在不违反参照完整性的前提下，插入数据。在主表Stu_Union中删除数据，演示级联删除。

```
use school
create table SC
(
    sno char(5) references Stu_Union(sno) on delete cascade,
    cno char(4) references Course(cno) on delete cascade,
    grade int,
    constraint PK_SC primary key (sno, cno)
);
insert into sc values ('95002', '0001', 2);
insert into sc values ('95002', '0002', 2);
insert into sc values ('10001', '0001', 2);
insert into sc values ('10001', '0002', 2);
select * from SC
delete from Stu_Union where sno = '10001';
select * from SC
```



- 用alter table语句将SC表中的on delete cascade改为on delete no action,重新插入SC的数据（按照实验一）。再删除Stu_Union中sno为‘10001’的数据。观察结果，并分析原因。

```
use school
alter table SC drop constraint FK__SC__cno__5FB337D6;
alter table SC drop constraint FK__SC__sno__5EBF139D;
alter table SC add constraint FK__SC__cno foreign key (cno)
    references Course(cno) on delete no action;
alter table SC add constraint FK__SC__sno foreign key (sno)
    references Stu_Union(sno) on delete no action;
insert into Stu_Union values ('10001', '李勇', '0', 24, 'EE');
insert into sc values ('10001', '0001', 2);
insert into sc values ('10001', '0002', 2);
select * from SC
delete from Stu_Union where sno = '10001';
select * from SC
```

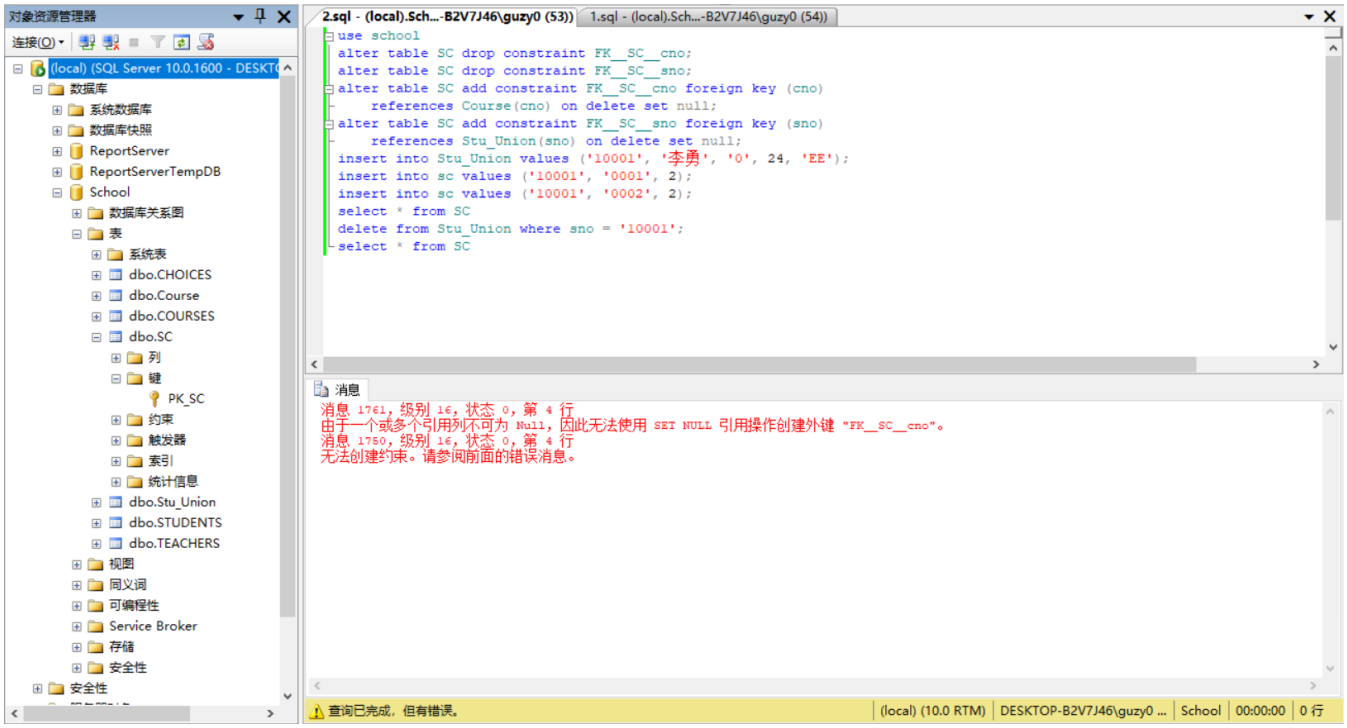


on delete no action意味着当从表中有匹配的记录时，主表中相应的候选键不允许update/delete操作。 `SC(sno)` 参照 `Stu_Union(sno)` ，且设为 `on delete no action` ，因而不能删除。前后都是4行受影响说明没删。

练习2

- 用alter table语句将SC表中的on delete no action改为on delete set NULL,重新插入SC的数据（按照实验一） 。再删除Stu_Union中sno为‘10001’的数据。观察结果，并分析原因。

```
use school
alter table SC drop constraint FK__SC__cno;
alter table SC drop constraint FK__SC__sno;
alter table SC add constraint FK__SC__cno foreign key (cno)
    references Course(cno) on delete set null;
alter table SC add constraint FK__SC__sno foreign key (sno)
    references Stu_Union(sno) on delete set null;
insert into Stu_Union values ('10001', '李勇', '0', 24, 'EE');
insert into sc values ('10001', '0001', 2);
insert into sc values ('10001', '0002', 2);
select * from SC
delete from Stu_Union where sno = '10001';
select * from SC
```

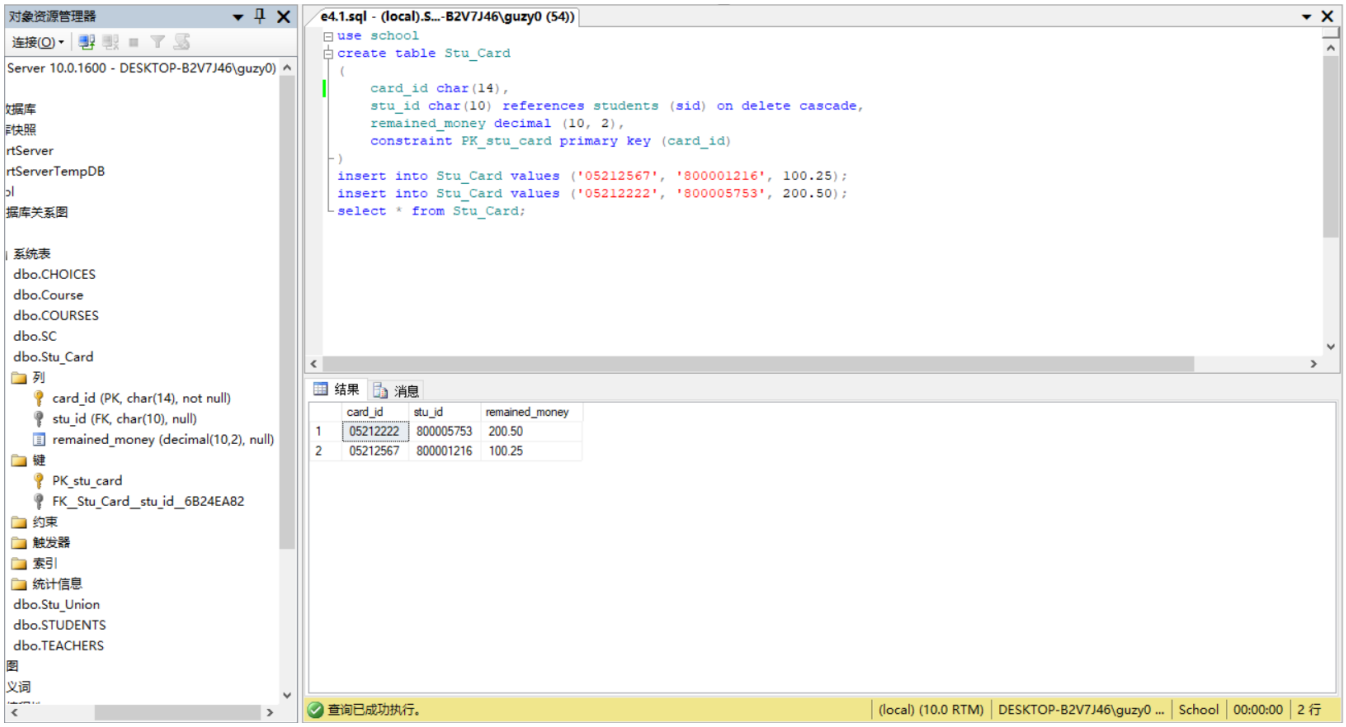


set null当父表更新、删除的时候，字表会把外键字段变为null，所以这个时候设计表的时候该字段要允许为null，否则会出错。 由于 `Course(cno)` 有约束 `not null` ，因而无法将参照它的 `SC(cno)` 设为 `set null`

练习3

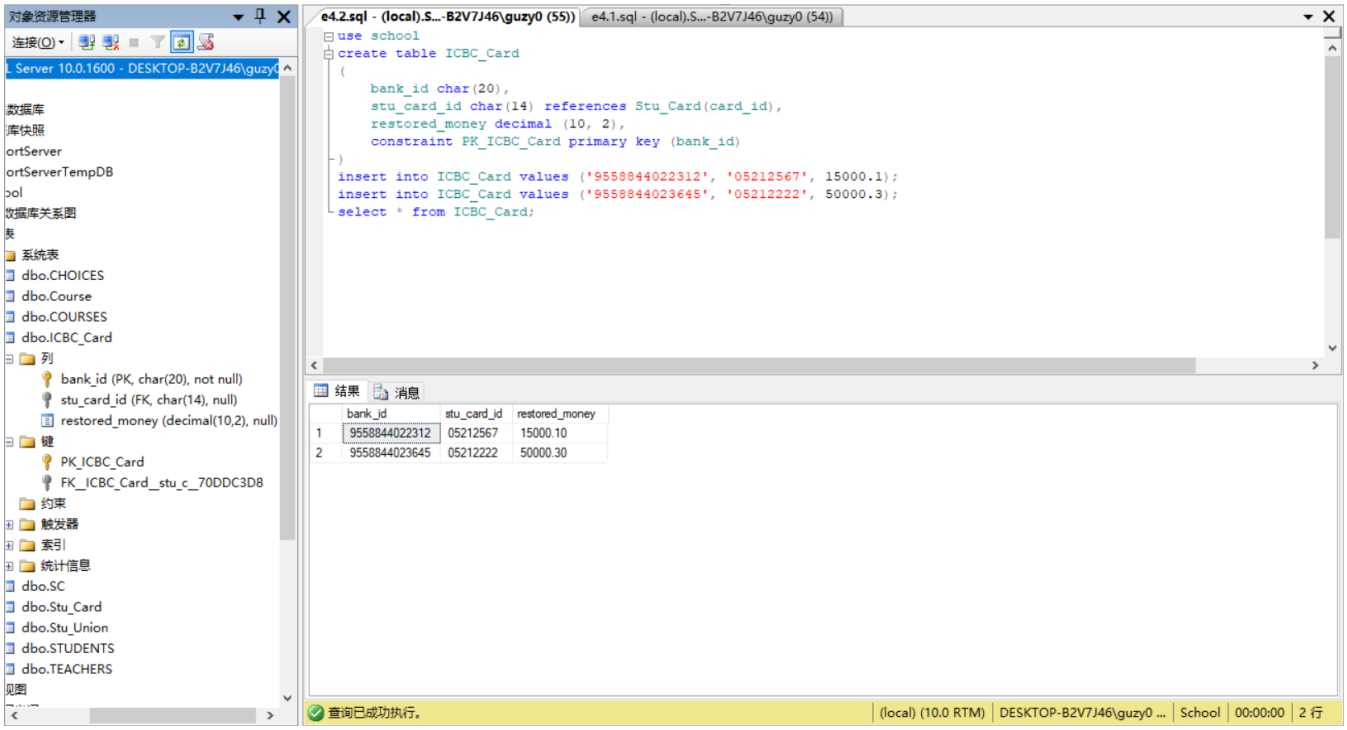
- 建立Stu_Card表：

```
use school
create table Stu_Card
(
    card_id char(14),
    stu_id char(10) references students (sid) on delete cascade,
    remained_money decimal (10, 2),
    constraint PK_stu_card primary key (card_id)
)
insert into Stu_Card values ('05212567', '800001216', 100.25);
insert into Stu_Card values ('05212222', '800005753', 200.50);
select * from Stu_Card;
```



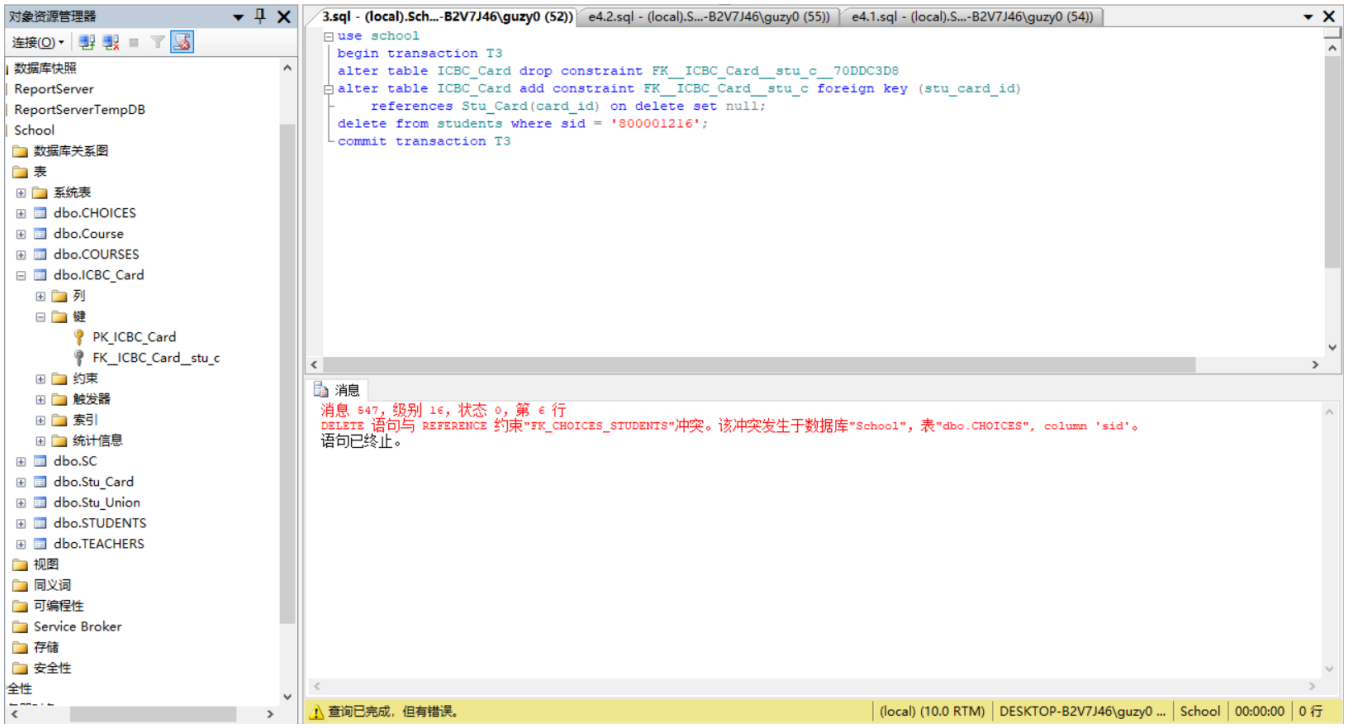
- 建立表ICBC_Card表:

```
use school
create table ICBC_Card
(
    bank_id char(20),
    stu_card_id char(14) references Stu_Card(card_id),
    restored_money decimal (10, 2),
    constraint PK_ICBC_Card primary key (bank_id)
)
insert into ICBC_Card values ('9558844022312', '05212567', 15000.1);
insert into ICBC_Card values ('9558844023645', '05212222', 50000.3);
select * from ICBC_Card;
```



- 建立事务T3，修改ICBC_Card表的外键属性，使其变为on delete set NULL,尝试删除students表中一条记录。观察结果，并分析原因。

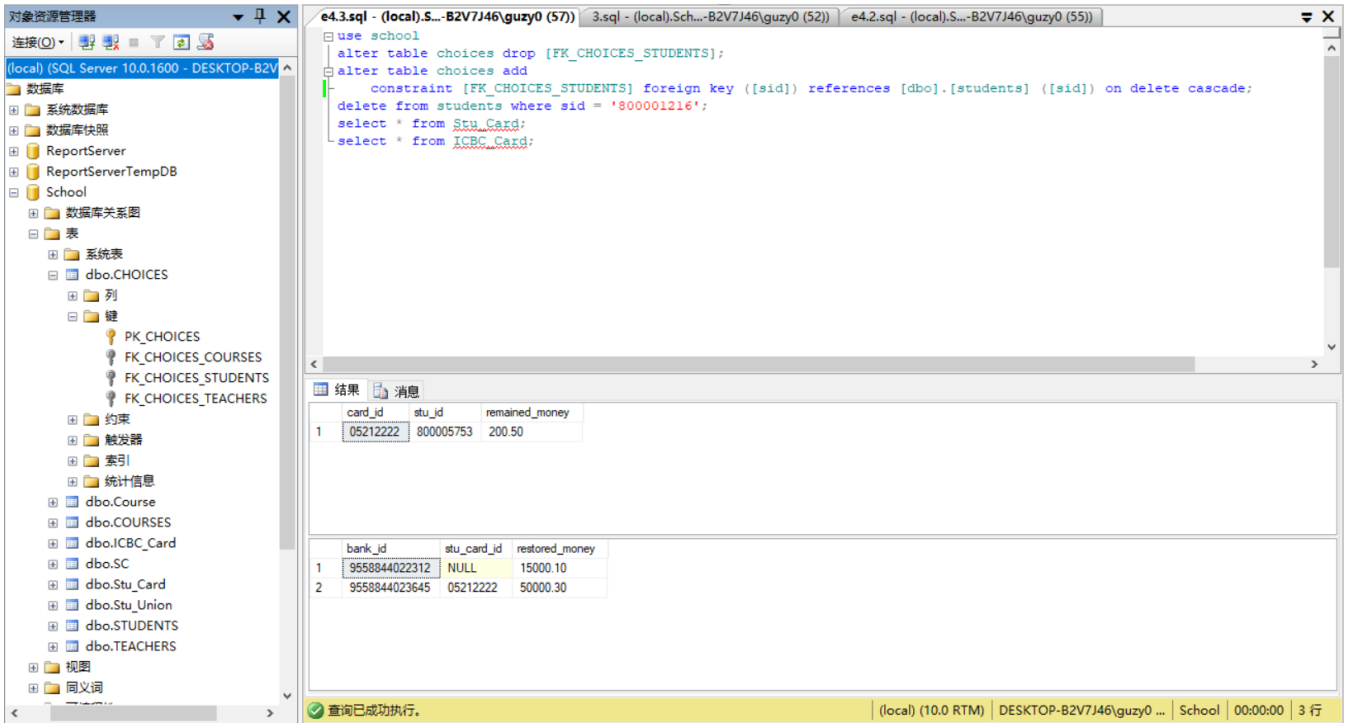
```
use school
begin transaction T3
alter table ICBC_Card drop constraint FK__ICBC_Card__stu_c__70DDC3D8
alter table ICBC_Card add constraint FK__ICBC_Card__stu_c foreign key (stu_card_id)
    references Stu_Card(card_id) on delete set null;
delete from students where sid = '800001216';
commit transaction T3
```



删除数据出错原因：由于数据库中原有表Choices使用了外键关联Students表，采用on delete no action （即当从表中有匹配的记录时，主表中相应的候选键不允许update/delete操作）。所以直接在students中删除数据会出错。

- 要演示多重级联删除，必须去除表choices原有约束，然后建立新的外键约束，并将其外键设置为级联删除。操作如下：

```
use school
alter table choices drop [FK_CHOICES_STUDENTS];
alter table choices add
    constraint [FK_CHOICES_STUDENTS] foreign key ([sid])
    references [dbo].[students] ([sid]) on delete cascade;
delete from students where sid = '800001216';
select * from Stu_Card;
select * from ICBC_Card;
```

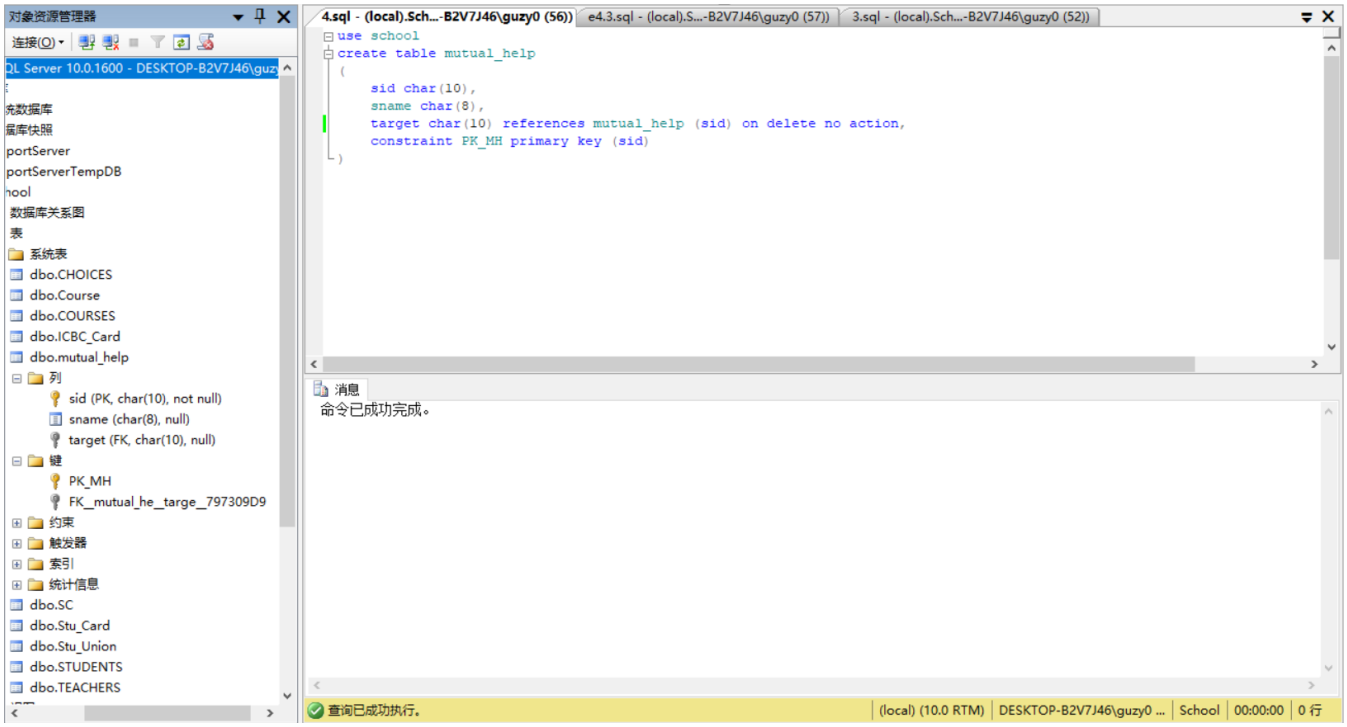


set null当父表更新、删除的时候，字表会把外键字段变为null，所以这个时候设计表的时候该字段要允许为null，否则会出错。 由于 `Stu_Card(card_id)` 没有约束 `not null` ，且参照它的 `ICBC_Card(stu_card_id)` 设为 `set null` ，所以删除时 `ICBC_Card` 对应记录的属性被设为 `null` 。

练习4

- 创建一个班里的学生互助表，规定：包括学生编号，学生姓名，学生的帮助对象，每个学生有且仅有一个帮助对象，帮助对象也必须是班里的学生。（表的自参照问题）

```
use school
create table mutual_help
(
    sid char(10),
    sname char(8),
    target char(10) references mutual_help (sid) on delete no action,
    constraint PK_MH primary key (sid)
)
```

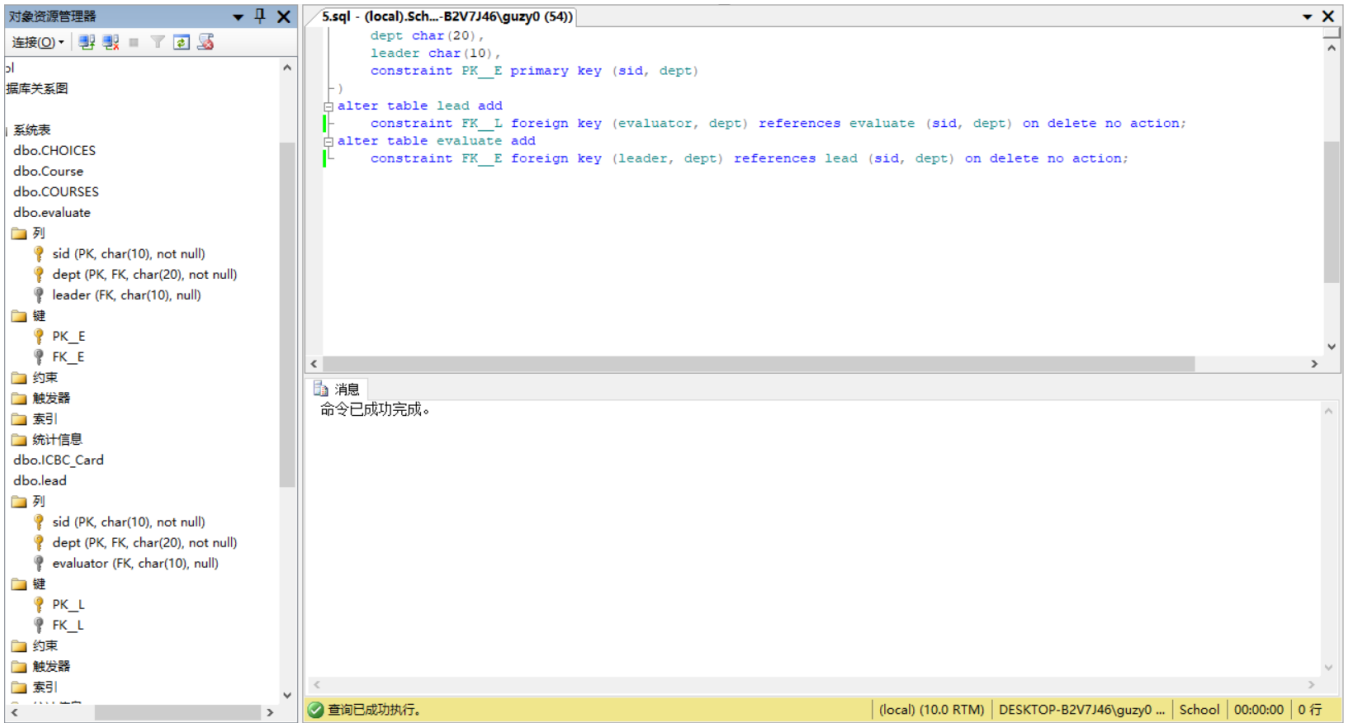


自参照无法设 cascade ， 否则删除/更新可能会引起连锁反应。

练习5

- 学校学生会的每个部门都有一个部长，每个部长领导多个部员，每个部只有一个部员有评测部长的权利，请给出体现这两种关系（领导和评测）的两张互参照的表的定义。（两个表互相参照的问题）

```
use school
create table lead
(
    sid char(10),
    dept char(20),
    evaluator char(10),
    constraint PK__L primary key (sid, dept)
)
create table evaluate
(
    sid char(10),
    dept char(20),
    leader char(10),
    constraint PK__E primary key (sid, dept)
)
alter table lead add
    constraint FK__L foreign key (evaluator, dept) references evaluate (sid, dept);
alter table evaluate add
    constraint FK__E foreign key (leader, dept) references lead (sid, dept);
```



相互参照无法设 cascade ， 否则删除/更新可能会引起连锁反应。（但是此题限制一对一实际上不会出现这种情况）