--创建course表

create table course

(

cno char(1) primary key,

cname varchar(20) not null,

credit smallint check (credit in ('1','2','3','4','5','6','7'))

)

--创建class表

create table class

(

clno char(5) primary key,

speciality varchar(20) not null,

inyear char(4) not null,

number integer check(number>1 and number<300),

monitor char(7)

)

--创建student表

create table student

(

sno char(7) primary key,

sname varchar(20) not null,

ssex char(2) not null default '男' check (ssex in ('男','女')),

sage smallint check (sage>14 and sage <65),

clno char(5) not null foreign key(clno) references class(clno) on update cascade

)

--为class表添加参照完整性

alter table class

add constraint monitor foreign key (monitor) references student(sno)

--创建grade表

create table grade

(

sno char(7) not null foreign key (sno) references student(sno) on update cascade on delete cascade,

cno char(1) not null foreign key (cno) references course (cno) on update cascade on delete cascade,

gmark decimal(4,1) check(gmark>0 and gmark<100),

primary key (sno,cno)

)

--插入数据

insert into class (clno,speciality,inyear,number)

values ('00311','计算机软件','2000',120)

insert into course values ('1','数据库',4)

insert into student

values ('2000101','李勇','男',20,'00311')

update class

set monitor='2000101'

where clno='00311'

insert into grade

values ('2000101','1',92)

--① 找出所有被学生选修了的课程号；

select distinct cno

from grade

--② 找出01311班女学生的个人信息；

select \*

from student

where clno='01311' and ssex='女'

--③ 找出01311班、01312班的学生姓名、性别、出生年份；

--法一

select sname,ssex,2013-sage as YoB

from student

where clno='01311' or clno='01312'

--法二

select sname,ssex,sage 2013-sage as YoB

from student

where clno in ('01311','01312')

--法三

select sname,ssex,sage 2013-sage as YoB

from student

where clno='01311'

union

select sname,ssex,sage

from student

where clno='01312'

--如果考虑sage是学生入学时的年龄，则

select sname,ssex,inyear-sage as YOB

from student join class

on student.clno=class.clno

where clno='01311' or clno='01312'

--④ 找出所有姓李的学生的个人信息；

select \*

from student

where sname like '李%'

--⑤ 找出学生李勇所在班级的学生人数；

--法一

select class.clno,number

from class join student on class.clno=student.clno

where sname='李勇'

--法二

select class.clno,number

from class,student

where class.clno=student.clno and sname='李勇'

--法三（只适用于学生表中只可能有一个“李勇”的情况）

select number

from class

where clno=(select clno

from student

where sname='李勇')

--法四（严谨讲，无法避免学生表中可能存在多个“李勇”在不同的班级）

Select clno,number

from class

where clno in

(select clno

from student

where sname='李勇')

--法五

select clno,count(sno) --也可用count(\*)

from student

where clno in (select clno

from student

where sname='李勇')

group by clno

--⑥ 找出课程名为操作系统的平均成绩、最高分、最低分；

select avg=avg(gmark),max=max(gmark),min=min(gmark)

from grade,course

where course.cno=grade.cno and cname='操作系统'

--⑦ 找出选修了课程的学生人数；

select count(distinct sno) as 选课人数

from grade

--⑧ 找出选修了课程操作系统的学生人数；

--法一

select count(sno) as 选操作系统人数

from grade,course

where grade.cno=course.cno and cname='操作系统'

--法二

select count(\*) as 选操作系统人数

from grade

where cno=

(select cno

from course

where cname='操作系统')

--⑨ 找出2000级计算机软件班的成绩为空的学生姓名。

--法一

select distinct sname

from student inner join class

on student.clno=class.clno

join grade

on student.sno=grade.sno

where inyear='2000' and speciality='计算机软件'

and gmark is null

--法二

Select distinct sname

From student,grade,class

Where student.sno=grade.sno and student.clno=class.clno

and speciality='计算机软件' and inyear='2000' and gmark is null

--法三

Select sname

From student

Where clno in (select clno

from class

where speciality='计算机软件' and inyear='2000')

and sno=any(select sno

from grade

where gmark is null)

--法四

Select sname

From student

Where sno like '2000%'

and clno in (select clno

from class

where speciality='计算机软件')

and sno=any(select sno

from grade

where gmark is null)

--针对以上四个表，用SELECT的嵌套查询完成以下各项查询：

--① 找出与李勇在同一个班级的学生信息；

select \*

from student

where clno=

(select clno

from student

where sname='李勇') and sname<>'李勇'

--② 找出所有与学生李勇有相同选修课程的学生信息；

select \*

from student

where sno in

( select distinct sno

from grade

where cno in

( select cno

from grade

where sno=

( select sno

from student

where sname='李勇')))

--③ 找出年龄介于学生李勇和25岁之间的学生信息；

--法一

select \*

from student

where sage between ( select sage

　　　　　　　　 from student

　　　　　　　　 where sname='李勇') and 25

--法二

select s1.\*

from student s1,student s2

where s1.sage between s2.sage and 25 and s2.sname='李勇' and s2.sno<s1.sno

--④ 找出选修了课程操作系统的学生学号和姓名；

--法一

select sno,sname

from student

where sno in

(select sno

from grade

where cno=

(select cno

from course

where cname='操作系统'))

--法二

Select sno,sname

from student

where exists

(select\*

from grade

where sno=student.sno

and cno= (select cno

from course

where cname='操作系统'))

--法三

select student.sno,sname

from student,grade,course

where student.sno=grade.sno and grade.cno=course.cno

and course.cname='操作系统'

--⑤ 找出所有没有选修1号课程的学生姓名；

--法一

select sname

from student

where sno not in --“ not in ”等同于“ <> all ”

(select sno

from grade

where cno='1')

--法二

select sname

from student

where sno <> all

(select sno

from grade

where cno='1')

--法三，适用于高版本的SQL SERVER

select sname

from student

except

select sno

from grade

where cno='1'

--法四

select sname

from student

where not exists

(select \*

from grade

where sno=student.sno and cno='1')

--⑥ 找出选修了全部课程的学生姓名。

--（提示：可找出这样的学生，没有一门课程是他不选修的。）

--法一

select sname

from student

where not exists

( select \*

from course

where not exists

( select \*

from grade)

where grade.sno=student.sno

and grade.cno=course.cno))

--法二

Select sname from student

Where not exists ( select cno from course

Except

Select cno from grade where grade.sno=student.sno )

--法三

select sname

from student

where sno in ( select sno

from grade

group by sno

having count(cno) > ( select count(cno)

from course ) )

--法四

select sname from student

where sno not in （select sno --查找没有选修全部课程的学生

from (select sno,cno from student,course

except

select sno,cno from grade) stu\_non

--针对以上四个表，用SQL语言完成以下各项查询：

--① 查询选修了3号课程的学生学号及其成绩，并按成绩的降序排列；

select sno,gmark

from grade

where cno='3'

order by gmark desc

--② 查询全体学生信息，要求查询结果按班级号升序排列，同一班级学生按年龄降序排列；

select \*

from student

order by clno,sage desc

--③ 求每个课程号及相应的选课人数；

select cno,count(distinct sno) as 选课人数

from grade

group by cno

--考虑全部课程，即包括没有学生选修的课程

--法一

select c.cno,count(sno)

from course c left outer join grade g

on c.cno=g.cno

group by c.cno

--法二

select cno,count(distinct sno) as 选课人数

from grade

group by cno

union

select cno,0

from course

where cno <> all -- <> all 等价于 not in

(select cno

from grade)

--④ 查询选修了3门以上课程的学生学号。

Select sno ,count(cno) as 选修课程数 --count(Cno) 等价于count(\*)

From grade

Group by sno

Having count(cno)>=3

--针对以上四个表，用SQL语言完成以下各项操作：

--①对每个班，求学生的平均年龄，并把结果存入数据库；

--对原有CLASS表新增列存放平均年龄

ALTER TABLE CLASS

add avgage smallint

--错误解法

update class

set avgage = case

when clno='00311' then (select avg(sage) from student where clno='00311')

when clno='00312' then (select avg(sage) from student where clno='00312')

when clno='01311' then (select avg(sage) from student where clno='01311')

end

--正解

update class

set avgage=(select avg(sage) from student

where clno=class.clno)

--新增一张新表来存放每个班及平均年龄

--法一

select clno,avg(student.sage) as avg\_age

into class\_avg\_age

from student

group by clno

--法二

create table t\_avg

(clno char(6) primary key,

avg\_age int)

go

insert into t\_avg

select clno,avg(sage)

from student

group by clno

--新增一视图（虚表），来存放每个班及平均年龄

create view v\_avg\_age

as

select clno,avg(sage) as avg\_age

from student

group by clno

--②将01311班的全体学生的成绩置零；

update grade

set gmark=0

where sno in (select sno

from student

where clno='01311')

--③删除2001级计算机软件的全体学生的选课记录；

--法一（错误）

delete grade

from grade,student,class

where grade.sno=student.sno and student.clno=class.clno and speciality='计算机软件' and inyear='2001'

--法二

delete from grade

where sno in

(select sno

from student

where clno in

(select clno

from class

where inyear='2001' and speciality='计算机软件'))

--④学生李勇已退学，从数据库中删除有关他的记录。]

--删除李勇同学的选课记录

delete

from grade

where sno=

(select sno

from student

where sname='李勇')

go

--更新李勇所在班级的班级人数，此求解只适用于学生表中只有一个“李勇”的情况

update class

set number=number-1

where clno=

(select clno

from student

where sname='李勇')

go

--更新李勇所在班级的班级人数，严谨讲，或许有多个不同班级的“李勇”退学的情况

update class

set number=number-(select count(sno)

from student

where sname='李勇'

and student.clno =class.clno)

--李勇退学，假如李勇是班长，则需更新李勇所在班的班长为空值

--法一

update class

set monitor = null

where clno in (select clno from student

where sname='李勇')

--法二

update class

set monitor= case

when monitor=(select sno from student where sname='李勇') then ''

end

where clno in (select clno from student where sname='李勇')

--法三

if (select monitor from class where clno=(select clno from student where sname='李勇'))

= (select sno from student where sname='李勇')

update class

set monitor = null

where clno=(select clno from student where sname='李勇')

--删除student表有关李勇的数据

delete from student

where sname='李勇'

--视图操作：

--① 建立01312班选修了1号课程的学生视图Stu\_01312\_1；

create view Stu\_013121\_1

as

select student.\*

from student,grade

where student.sno=grade.sno and clno='01312' and cno='1'

--② 建立01312班选修了1号课程并且成绩不及格的学生视图Stu\_01312\_2；

create view Stu\_013121\_2

as

select student.sno,sname,ssex,sage,clno

from student,grade

where student.sno=grade.sno

and clno='01312' and cno='1' and gmark<60

create view Stu\_013121\_21

as

select Stu\_013121\_1.\*

from Stu\_013121\_1,grade

where Stu\_013121\_1.sno=grade.sno and gmark<60

--③ 建立视图Stu\_year，由学生学号、姓名、出生年份组成。

Create view Stu\_year

As

Select sno,sname,2012-sage as sbirthyear

From student

--④ 查询1990年以后出生的学生姓名。

Select sname

From Stu\_year

Where birth\_yeah > 1990

--⑤ 查询01312班选修了1号课程并且成绩不及格的学生的学号、姓名、出生年份。

Select \*

From stu\_year

Where sno in (select sno

　　　　　　　From Stu\_013121\_2)