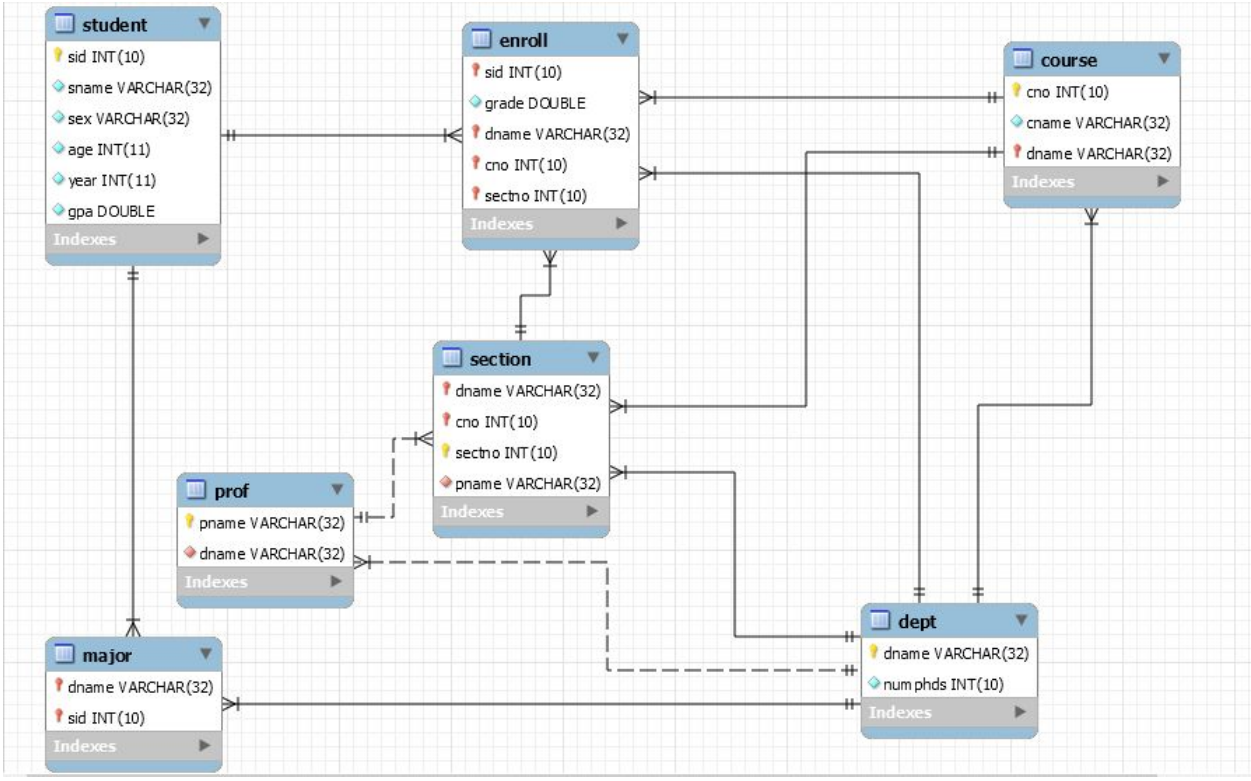
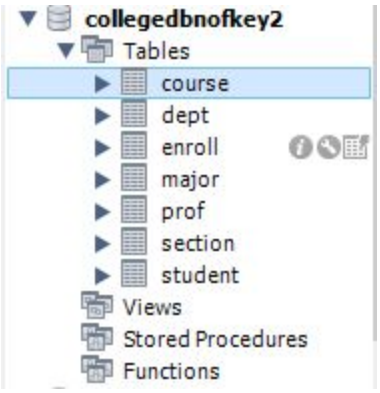
Database Project

Model of the Database:



Some of the that was ignored while loading it from the files as it was set to be a unique. This could be notice in Major Table that constrained students to have only one major at a time and not to be a dual major. This could affect some other outputs of my later queries.

Tables in the database:



The Course Table:

```
1 •  SELECT * FROM collegedbnofkey2.course;
```

sult Grid | Filter Rows: | Edit:

cno	cname	dname
302	Intro to Programming	Computer Sciences
310	Thermodynamics	Chemical Engineering
365	City Planning	Civil Engineering
375	Highway Engineering	Civil Engineering
461	College Geometry 1	Mathematics
462	College Geometry 2	Mathematics
467	Intro to Data Structures	Computer Sciences
514	Manpower Utilization	Industrial Engineering
561	Advanced City Planning	Civil Engineering
701	Compiler Construction	Computer Sciences
726	Nonlinear Programming	Computer Sciences
NULL	NULL	NULL

The Dept Table:

dname	numphds
Sanitary Engineering	3
Chemical Engineering	32
Industrial Engineering	41
Computer Sciences	47
Civil Engineering	88
Mathematics	129
NULL	NULL

The Prof Table:

pname	dname
Edison, L.	Chemical Engineering
Brown, S.	Civil Engineering
Clark, E.	Civil Engineering
Randolph, B.	Civil Engineering
Brian, C.	Computer Sciences
Jones, J.	Computer Sciences
Smith, S.	Industrial Engineering
Walter, A.	Industrial Engineering
Robinson, T.	Mathematics
Bucket, T.	Sanitary Engineering
NULL	NULL

The Enroll Table:

sid	grade	dname	cno	sectno
1	3	Chemical Engineer...	310	1
2	3	Computer Sciences	302	1
3	3.5	Civil Engineering	375	1
4	4	Mathematics	461	1
5	3	Industrial Enginee...	514	1
6	3.5	Computer Sciences	302	2
7	4	Computer Sciences	302	1
8	4	Computer Sciences	302	1
9	3	Civil Engineering	375	1
10	2	Computer Sciences	302	1
11	3	Computer Sciences	302	2
12	2.5	Computer Sciences	302	2
13	2.5	Computer Sciences	302	2
14	2.5	Mathematics	462	1
15	3	Chemical Engineer...	310	1
16	3	Computer Sciences	467	1
16	3	Computer Sciences	701	1

The Major Table:

dname	sid
Mathematics	0
Computer Sciences	1
Computer Sciences	2
Computer Sciences	3
Computer Sciences	4
Computer Sciences	5
Computer Sciences	6
Computer Sciences	7
Computer Sciences	8
Computer Sciences	9
Computer Sciences	10
Computer Sciences	11
Computer Sciences	12
Computer Sciences	13
Computer Sciences	14
Computer Sciences	15
Computer Sciences	16

The Section Table:

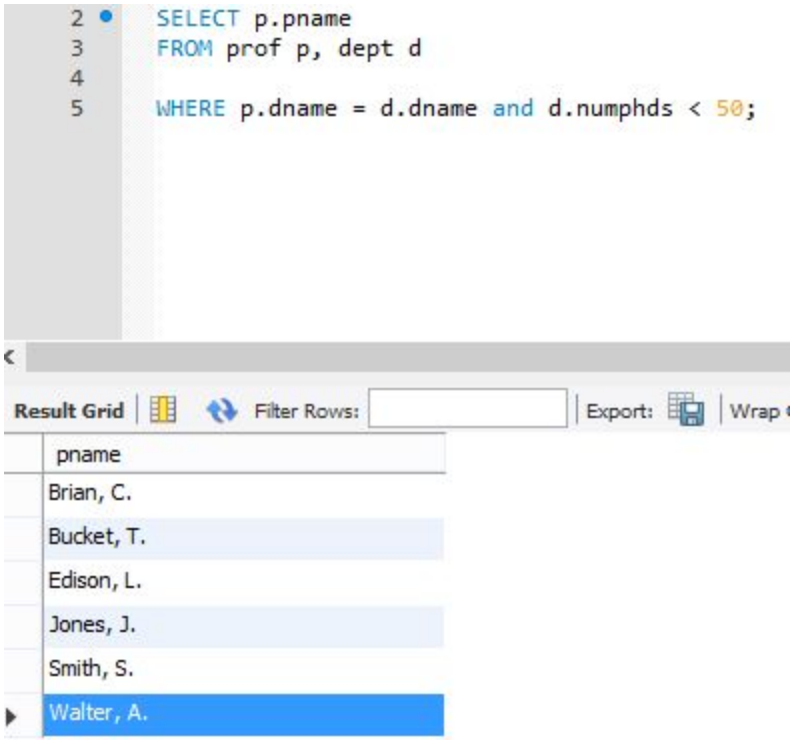
dname	cno	sectno	pname
Computer Sciences	726	1	Brian, C.
Civil Engineering	375	1	Brown, S.
Computer Sciences	701	1	Clark, E.
Chemical Engineering	310	1	Edison, L.
Computer Sciences	302	1	Jones, J.
Computer Sciences	467	1	Jones, J.
Civil Engineering	365	1	Randolph, B.
Civil Engineering	561	1	Randolph, B.
Mathematics	461	1	Robinson, T.
Mathematics	462	1	Robinson, T.
Computer Sciences	302	2	Smith, S.
Industrial Engineering	514	1	Walter, A.

The Student Table:

sid	sname	sex	age	year	gpa
1	Jacobs, T.	m	29	5	3.6
2	Pierson, E.	m	32	5	3.5
3	Zeene, Ben N.	m	21	5	3.9
4	Sulfate, Barry M.	m	19	2	2.8
5	Form, Clara O.	f	18	1	3.3
6	Scott, Kim J.	m	20	1	3.8
7	Sather, Roberto B.	m	22	4	2.2
8	Stanley, Leotha T.	m	21	3	3.6
9	Smith, Joyce A.	f	21	4	2
10	Jones, David S.	m	19	2	3.5
11	Paul, Mary W.	f	23	5	3.6
12	Soong, V.	f	24	5	3.5
13	Kellerman, S.	f	21	3	2.9
14	Cheong, R.	m	25	4	3
15	Borchart, Sandra L.	f	26	5	3.9
16	Alsberg, David J.	m	25	5	3.5
17	Thorton, James Q.	m	28	4	2.7

1. Print the names of professors who work in departments that have fewer than 50 PhD students

```
SELECT p.pname
FROM prof p, dept d
WHERE p.dname = d.dname and d.numphds < 50;
```



2. Print the name(s) of student(s) with the lowest gpa.

```
SELECT sname, gpa as LowestGPA
from student
where gpa = (select          min(gpa) from student);
```

```
3  SELECT sname, gpa as LowestGPA
4  from student
5  where gpa = (select min(gpa) from student);
6
7
```

Result Grid | Filter Rows: | Export: | Wrap Cell

sname	LowestGPA
Jetplane, Leaving O.	0

3. For each Computer Sciences class, print the cno, sectno, and the average gpa of the students enrolled in the class.

```
select  e.cno, e.sectno, avg(s.gpa)
from enroll e, student s
where e.dname = 'Computer Sciences' and s.sid = e.sid
group by dname, cno, sectno
```

```
3  select  e.cno, e.sectno, avg(s.gpa)
4  from enroll e, student s
5  where e.dname = 'Computer Sciences' and s.sid = e.sid
6  group by dname, cno, sectno
```

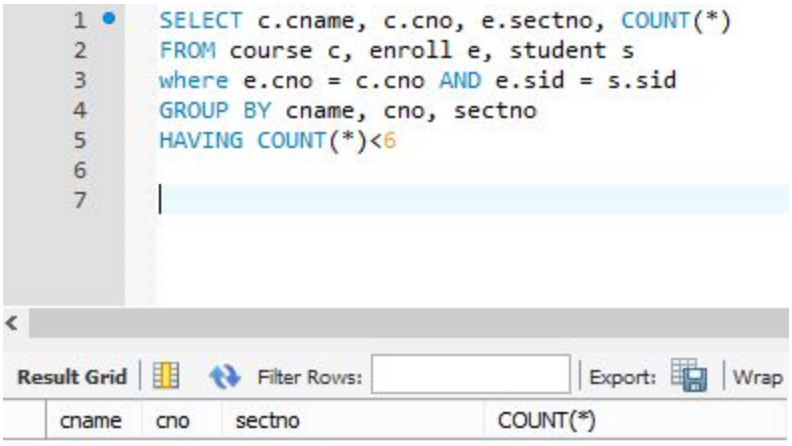
Result Grid | Filter Rows: | Export: | Wrap Cell Content:

cno	sectno	avg(s.gpa)
302	1	3
302	2	3.075
467	1	2.9799999999999995
701	1	3.2833333333333337
726	1	2.6411764705882352

4. Print the course names, course numbers and section numbers of all classes with less than six students enrolled in them.

```
SELECT c.cname, c.cno, e.sectno, COUNT(*)
FROM course c, enroll e, student s
```

where e.cno = c.cno AND e.sid = s.sid
GROUP BY cname, cno, sectno
HAVING COUNT(*)<6



This is inverted answer for question 4:

SELECT c.cname, c.cno, e.sectno, COUNT(*)
FROM course c, enroll e, student s
where e.cno = c.cno AND e.sid = s.sid
GROUP BY cname, cno, sectno
HAVING COUNT(*)>6

```
1  SELECT c.cname, c.cno, e.sectno, COUNT(*)
2  FROM course c, enroll e, student s
3  where e.cno = c.cno AND e.sid = s.sid
4  GROUP BY cname, cno, sectno
5  HAVING COUNT(*)>6
6
```

Result Grid | Filter Rows: | Export: | Wrap

cname	cno	sectno	COUNT(*)
Thermodynamics	310	1	7
City Planning	365	1	8
Intro to Programming	302	2	8
College Geometry 1	461	1	9
College Geometry 2	462	1	9
Highway Engineering	375	1	9
Manpower Utilization	514	1	9
Intro to Data Structures	467	1	10
Intro to Programming	302	1	10
Advanced City Planning	561	1	12
Compiler Construction	701	1	12
Nonlinear Programming	726	1	17

5. Print the name(s) and sid(s) of the student(s) enrolled in the most classes.

```
Select s.sid, s.sname
from student s, enroll e
where e.sid = s.sid
group by s.sid, s.sname
order by count(*) desc limit 1
```

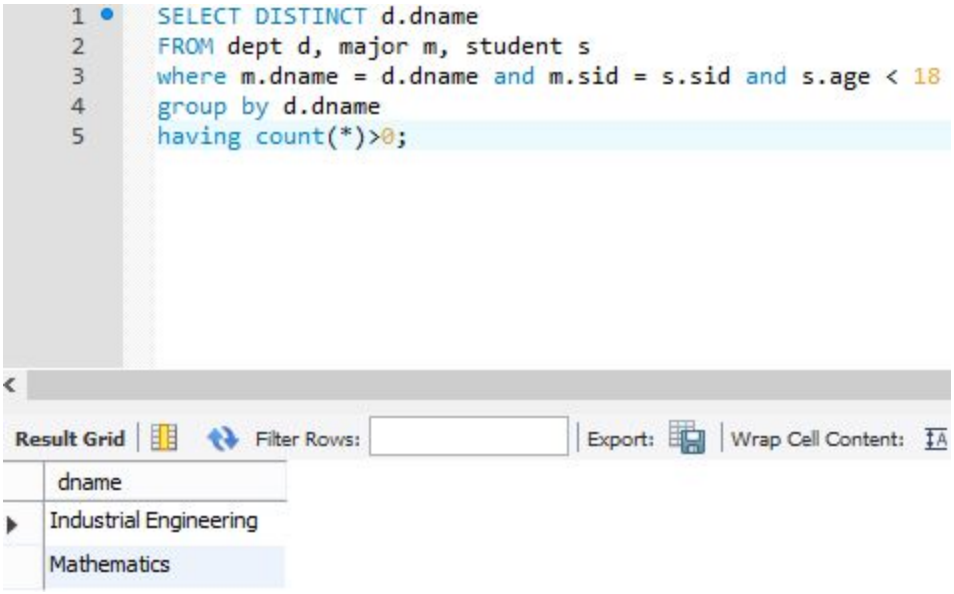
```
4  Select s.sid, s.sname
5  from student s, enroll e
6  where e.sid = s.sid
7  group by s.sid, s.sname
8  order by count(*) desc
9  limit 1
```

Result Grid | Filter Rows:

sid	sname
29	Hamilton, S.

6. Print the names of departments that have one or more majors who are under 18 years old.

```
SELECT DISTINCT d.dname
FROM dept d, major m, student s
where m.dname = d.dname and m.sid = s.sid and s.age < 18
group by d.dname
having count(*)>0;
```



7. Print the names and majors of students who are taking one of the College Geometry courses.

```
SELECT (
select sname
from student
where sid=major.sid)
AS sname, dname
FROM major
WHERE exists(
select * from course,enroll
where enroll.dname = 'Mathematics'
and enroll.cno in (461,462)
and enroll.sid = major.sid);
```

```
SELECT (
sele
from
where sid=major.sid)
AS sname, dname
FROM major
WHERE exists(
select * from course,enroll
where enroll.dname = 'Mathematics'
and enroll.cno in (461,462)
and enroll.sid = major.sid);
```

Execute the statement under the keyboard cursor

Result Grid | Filter Rows: | Export: | Wrap

sname	dname
Atny, Mary H.	Civil Engineering
Austin, G.	Chemical Engineering
Cheong, R.	Computer Sciences
Dunbar, D.	Civil Engineering
Ford, Gerald	Chemical Engineering
Ghandi, I.	Mathematics
Glitch, R.	Civil Engineering
Gooch	Computer Sciences
Mathews, John W.	Chemical Engineering
Rosemeyer, S.	Civil Engineering
Smith, L.	Computer Sciences
Sulfate, Barry M.	Computer Sciences
Thorton, James Q.	Computer Sciences
Uoiea, Z.	Mathematics

8. For those departments that have no majors taking a College Geometry course, print the department name and the number of PhD students in the department.

```
SELECT dname, numphds
FROM dept d  WHERE not exists(
  select * from enroll e, major m
  where e.dname = 'Mathematics'
  and e.cno in (461,462)
  and e.sid = m.sid
  and m.dname = d.dname);
```

```
1  SELECT dname, numphds
2  FROM dept d  WHERE not exists(
3    select * from enroll e, major m
4    where e.dname = 'Mathematics'
5    and e.cno in (461,462)
6    and e.sid = m.sid
7    and m.dname = d.dname);
```

Result Grid | Filter Rows: | Edit:

dname	numphds
Sanitary Engineering	3
Industrial Engineering	41
NULL	NULL

9. Print the names of students who are taking both a Computer Sciences course and a Mathematics course.

```
SELECT s.sid, s.sname
FROM student s
JOIN enroll e1 ON e1.sid=s.sid
JOIN course c1 ON c1.cno=e1.cno
JOIN enroll e2 ON e2.sid=s.sid
JOIN course c2 ON c2.cno = e2.cno
WHERE c1.dname LIKE '%Mathematics%'
AND c2.dname LIKE '%Computer Science%'
GROUP BY s.sid
```

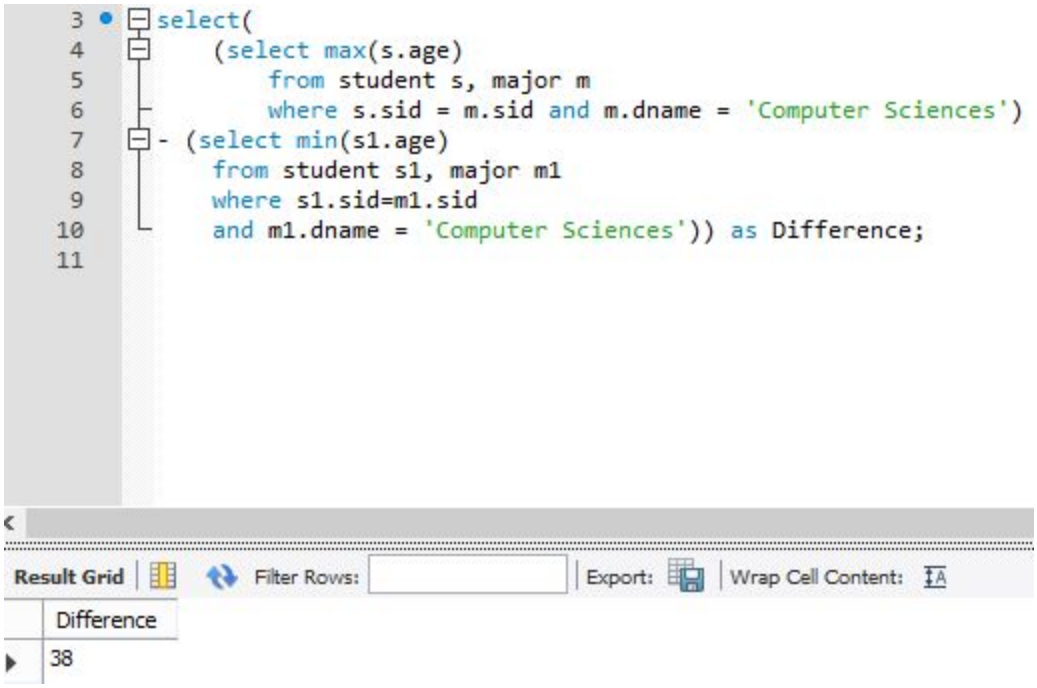
```
1  SELECT s.sid, s.sname
2  FROM student s
3  JOIN enroll e1 ON e1.sid=s.sid
4  JOIN course c1 ON c1.cno=e1.cno
5  JOIN enroll e2 ON e2.sid=s.sid
6  JOIN course c2 ON c2.cno = e2.cno
7  WHERE c1.dname LIKE '%Mathematics%'
8  AND c2.dname LIKE '%Computer Science%'
9  GROUP BY s.sid
```

Result Grid | Filter Rows: | Export:

sid	sname
90	Zappa, F.

10. Print the age difference between the oldest and youngest Computer Sciences major(s)

```
select(
    (select max(s.age)
            from student s, major m
      where s.sid = m.sid and m.dname = 'Computer Sciences')
- (select min(s1.age)
    from student s1, major m1
    where s1.sid=m1.sid
   and m1.dname = 'Computer Sciences')) as Difference;
```



11. For each department that has one or more majors with a GPA under 1.0, print the name of the department and the average GPA of its majors.

```
SELECT dname, avg(gpa) AS avgpa
FROM major, student
WHERE dname in(
SELECT dname FROM major, student
where major.sid = student.sid and student.gpa < 1.0
group by dname)  and major.sid = student.sid GROUP BY dname;
```

```
3  SELECT dname, avg(gpa) AS avgpa
4  FROM major, student
5  WHERE dname in(
6  SELECT dname FROM major, student
7  where major.sid = student.sid and student.gpa < 1.0
8  group by dname)  and major.sid = student.sid GROUP BY dname;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

dname	avgpa
Civil Engineering	2.9142857142857137
Computer Sciences	3.004166666666667
Industrial Engineering	2.7700000000000005

12. Print the ids, names, and GPAs of the students who are currently taking all of the Civil Engineering courses.

```
SELECT s.sid, s.sname, s.gpa
 FROM student s
 WHERE not exists(
 select * from course c
 where c.dname = 'Civil Engineering'
 and c.cno  not in (
 select e.cno from enroll e
 where e.cno = c.cno
 and e.sid = s.sid) );
```

```
3  SELECT s.sid, s.sname, s.gpa
4   FROM student s
5  WHERE not exists(
6  select * from course c
7  where c.dname = 'Civil Engineering'
8  and c.cno  not in (
9  select e.cno from enroll e
10 where e.cno = c.cno
11 and e.sid = s.sid) );
```

sult Grid | Filter Rows: | Edit:

sid	sname	gpa
29	Hamilton, S.	2.8
NULL	NULL	NULL