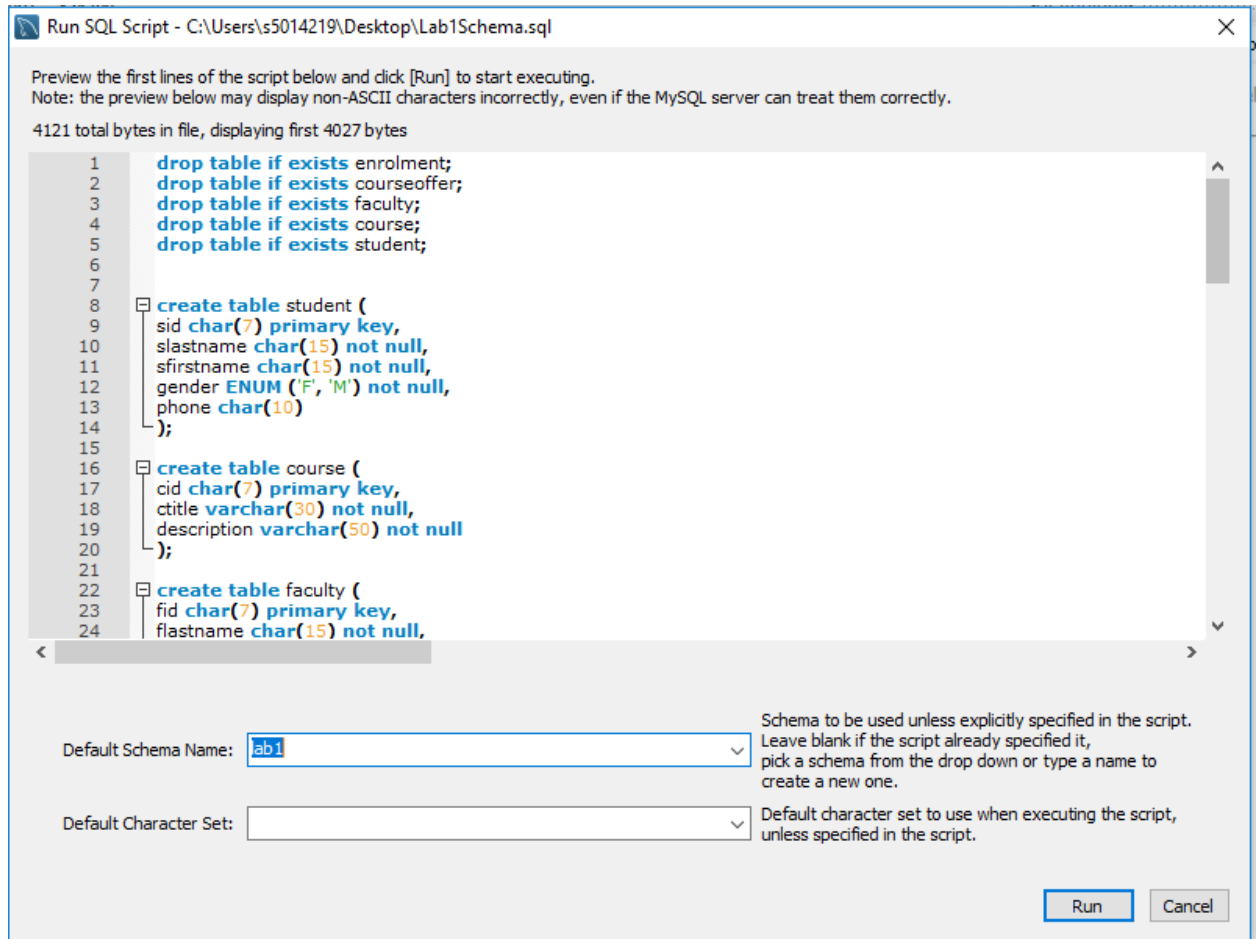1. **Create a database called Lab1, use the database, and create the above tables using the give script file lab1data.sql**

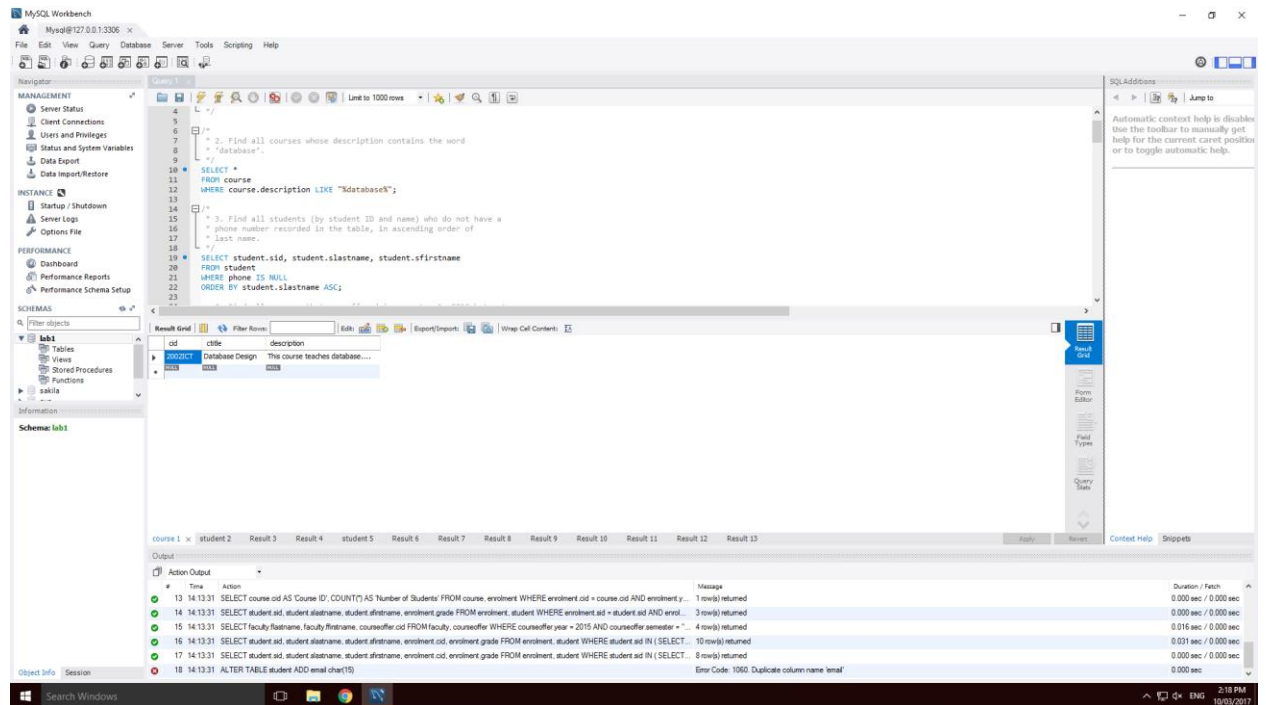

2. **Find all courses whose description contains the word 'database'.**
   SELECT *
   FROM course
   WHERE course.description LIKE "%database%";

   The query uses the LIKE keyword to compare the course description to the string "%database%" where the % is a wild card. This allows the search to find any all of the course descriptions that contain the word database.

cid	ctitle	description
2002ICT	Database Design	This course teaches database....

3. **Find all students (by student ID and name) who do not have a phone number recorded in the table, in ascending order of last name.**
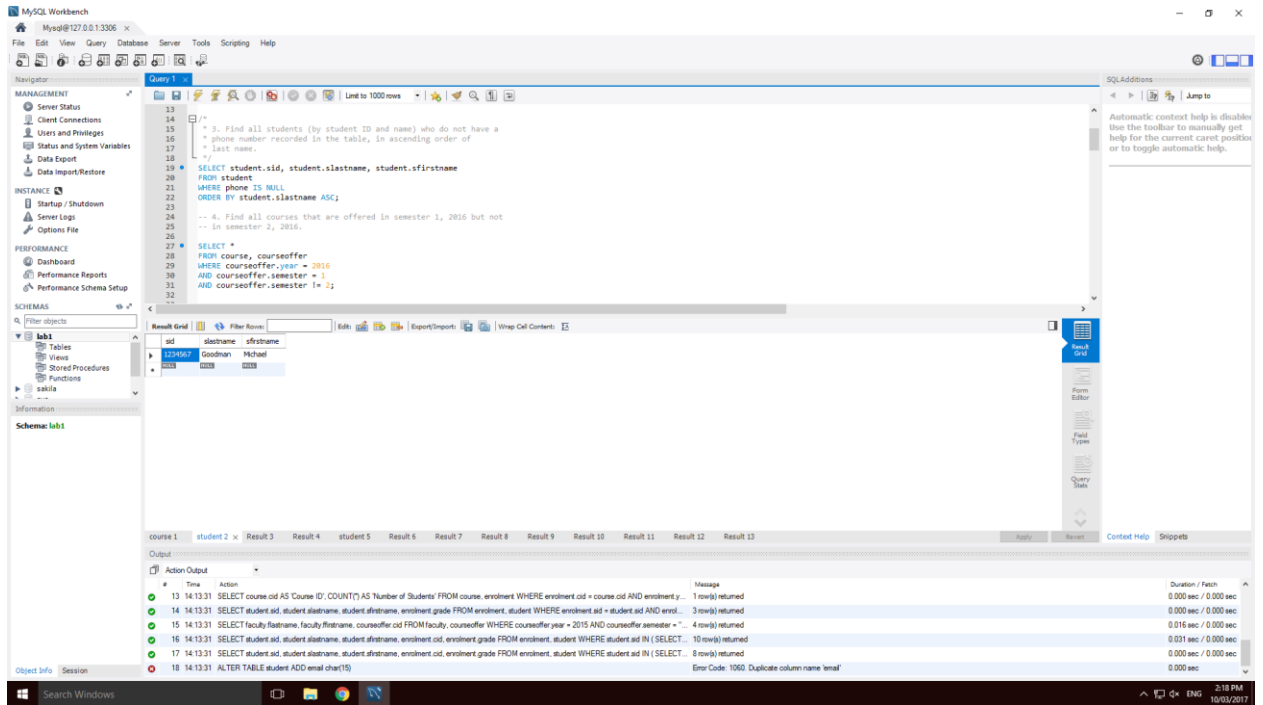SELECT student.sid, student.slastname, student.sfirstname
FROM student
WHERE phone IS NULL
ORDER BY student.slastname ASC;

The query uses the ORDER BY to sort the list of students by lastname in ascending order who have no phone number.

sid	slastname	sfirstname
1234567	Goodman	Michael

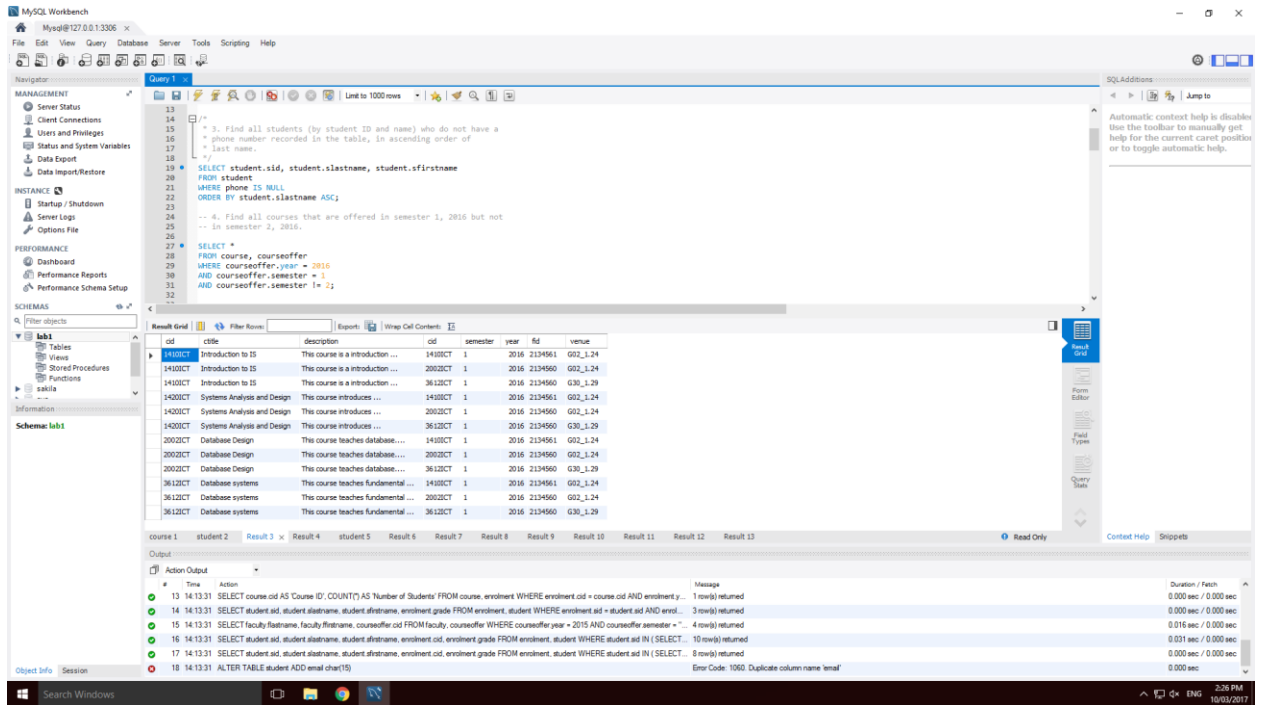**4. Find all courses that are offered in semester 1, 2016 but not in semester 2, 2016.**

SELECT *
FROM course, courseoffer
WHERE courseoffer.year = 2016
AND courseoffer.semester = 1
AND courseoffer.semester != 2;

This query makes use of of the AND and NOT operators in sql.

CSV of the query result
https://docs.google.com/spreadsheets/d/1o5AefFj1GPVM45lAqRW-BlnxuAAw-VOZOW94NaA7Sas/edit?usp=sharing

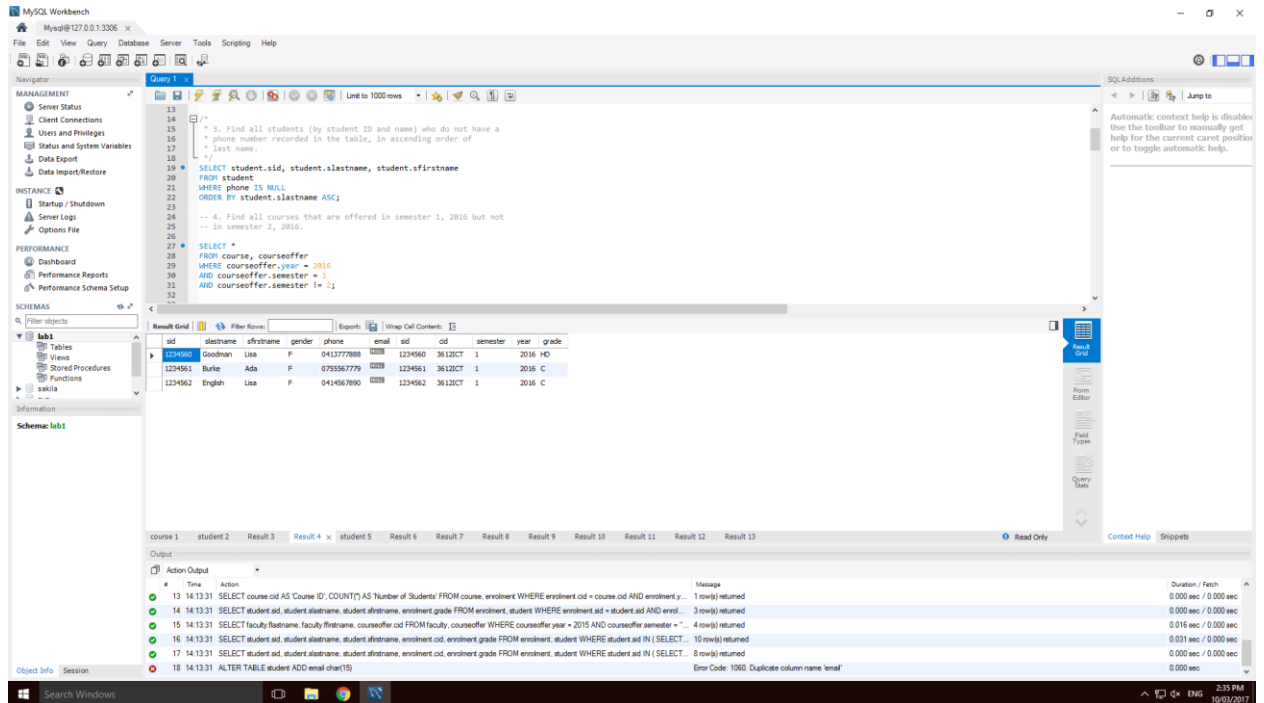**5. Find all students enrolled in 3512ICT in semester 1, 2016.**

SELECT *
FROM student, enrolment
WHERE enrolment.sid = student.sid
AND enrolment.cid = "3612ICT"
AND enrolment.year = 2016
AND enrolment.semester = "1";

This query makes use of selecting attributes from multiple tables.

CSV of query result
https://docs.google.com/spreadsheets/d/1AuiZ4qLLr04DZePeXvhrW4URDu8giZgMjJBQVyxxvac/edit?usp=sharing

6. Find the number of female students enrolled in 2002ICT, in semester 2, 2016.
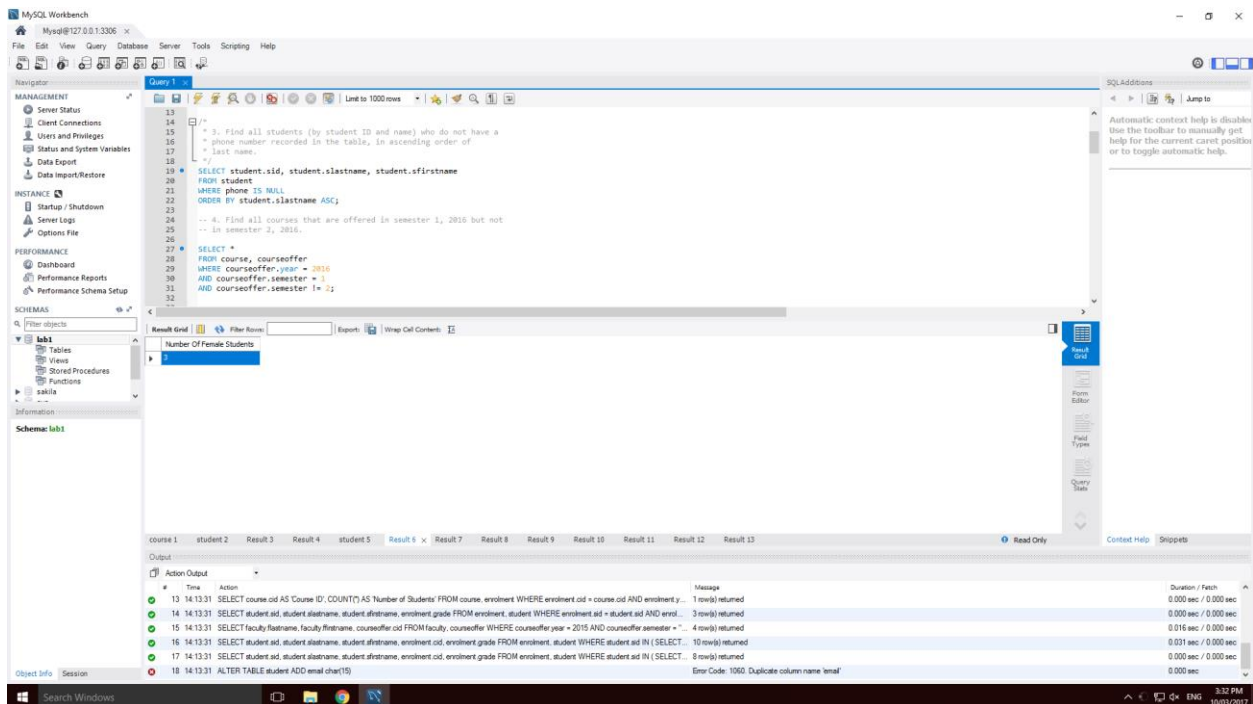
SELECT COUNT(*) AS 'Number Of Female Students'
FROM student
WHERE student.sid IN (
        SELECT enrolment.sid
        FROM enrolment
        WHERE enrolment.cid = "2002ICT"
        AND enrolment.year = 2016
        AND enrolment.semester = "1"
)
AND student.gender = "F";

This query uses the count function to determine the number of female students in a class. The semester had to be changed to semester 1 since the original query in the question does not return any results.
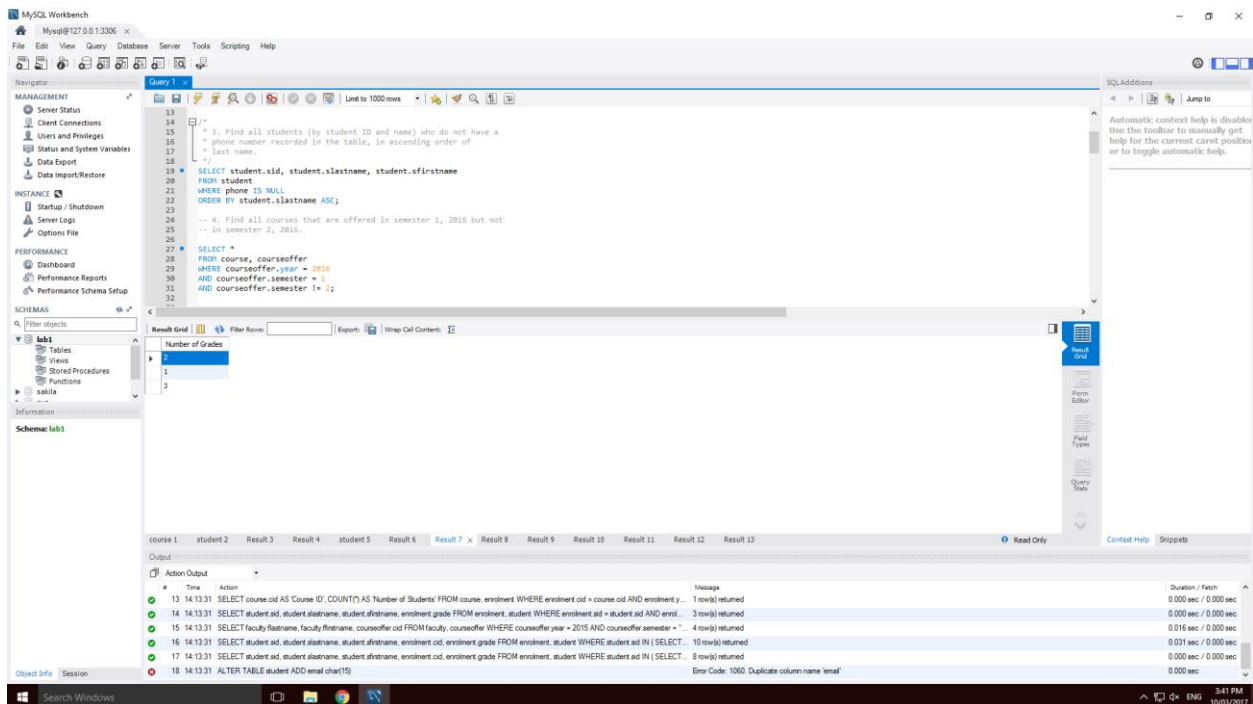
Number Of Female Students
3

7. Find the number of students who received F, P, C, D, and HD respectively in 1420ICT in semester 2, 2016.

SELECT COUNT(*) AS 'Number of Grades'
FROM enrolment, student
WHERE enrolment.sid = student.sid
AND enrolment.cid = "1420ICT"
AND enrolment.year = 2015
AND enrolment.semester = "2"
GROUP BY enrolment.grade;

This query uses the group by statement to aggregate the counts of grades. The year had to be changed to 2015 since 2016 did not return any results.

Number of Grades
2
1
3

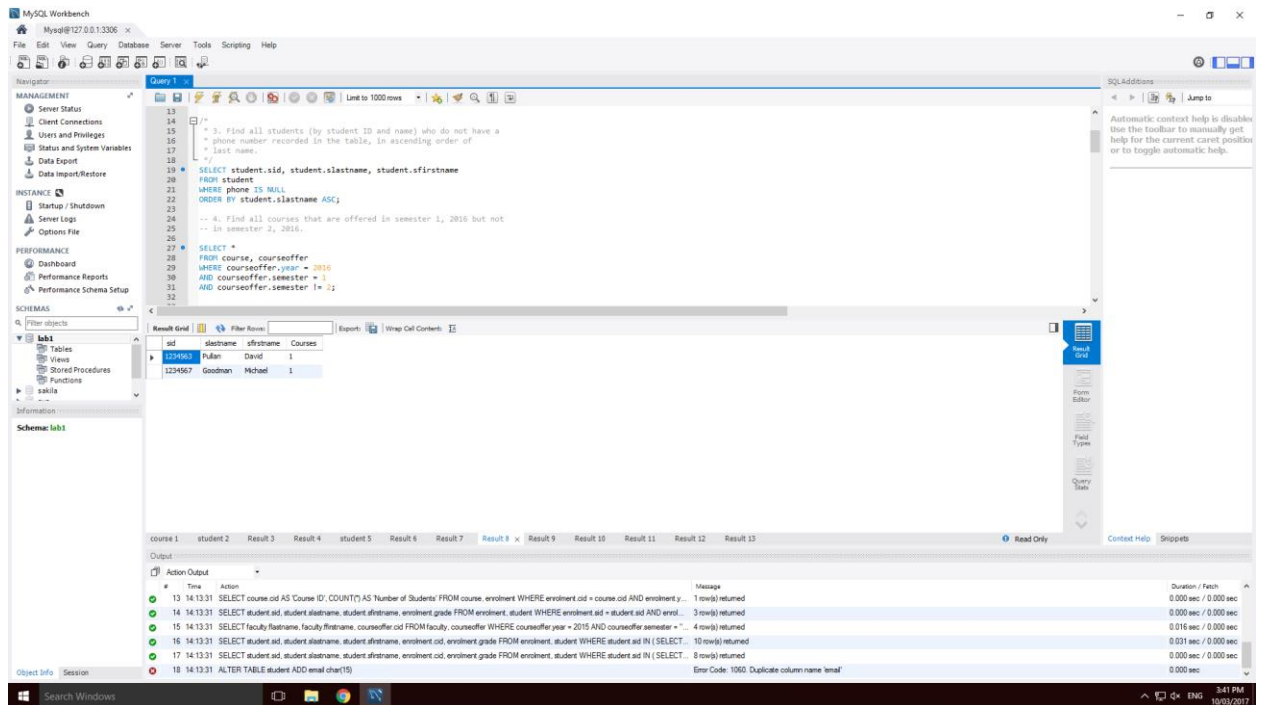8. **Find all students by (ID and name) who enrolled in less than 2 courses in semester 1, 2016.**

SELECT student.sid, student.slastname, student.sfirstname, COUNT(*) AS Courses
FROM enrolment, student
WHERE enrolment.sid = student.sid
AND enrolment.year = 2016
AND enrolment.semester = "1"
GROUP BY student.sid
HAVING COUNT(*) < 2;

This query uses the having clause to display only those students who take less than 2 courses in semester 1 in 2016.

sid	slastname	sfirstname	Courses
1234563	Pullan	David	1
1234567	Goodman	Michael	1

9. Find the courses which have an enrolment of less than five students in semester 1, 2016.
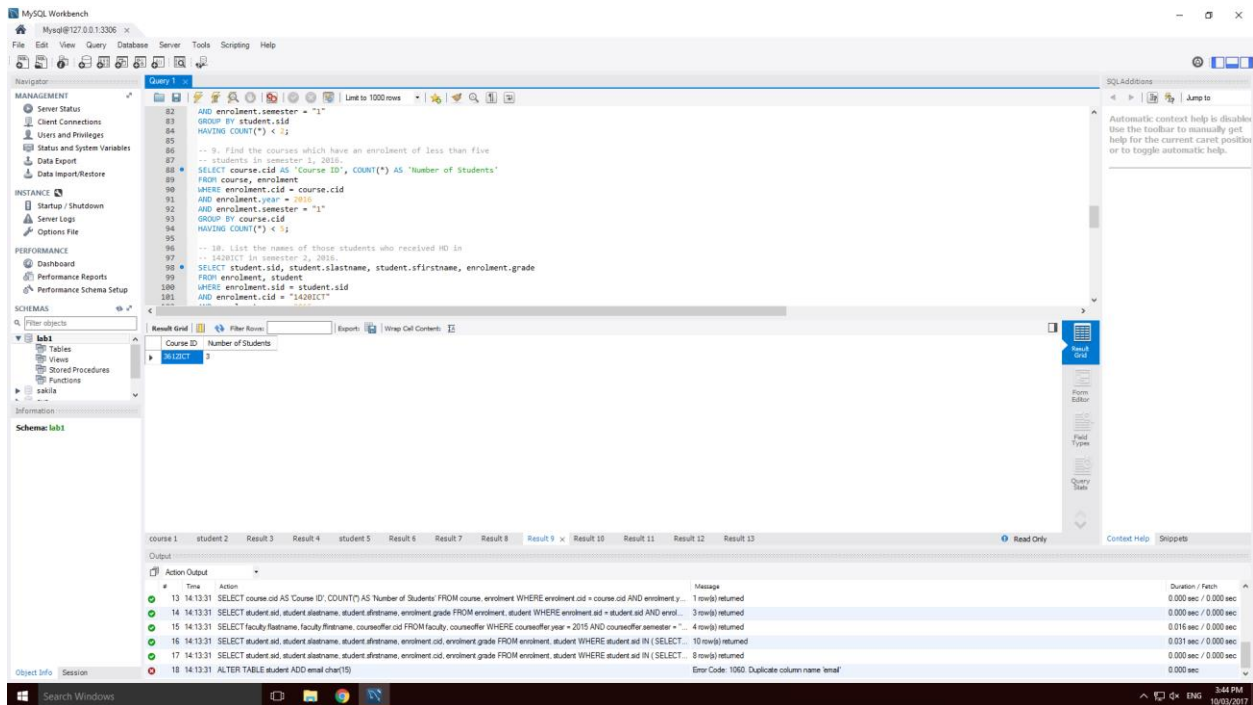
SELECT course.cid AS 'Course ID', COUNT(*) AS 'Number of Students'
FROM course, enrolment
WHERE enrolment.cid = course.cid
AND enrolment.year = 2016
AND enrolment.semester = "1"
GROUP BY course.cid
HAVING COUNT(*) < 5;

This query also using having clause to make sure only courses with less than 5 students in semester 1 2016 are displayed.

Course ID	Number of Students
3612ICT	3

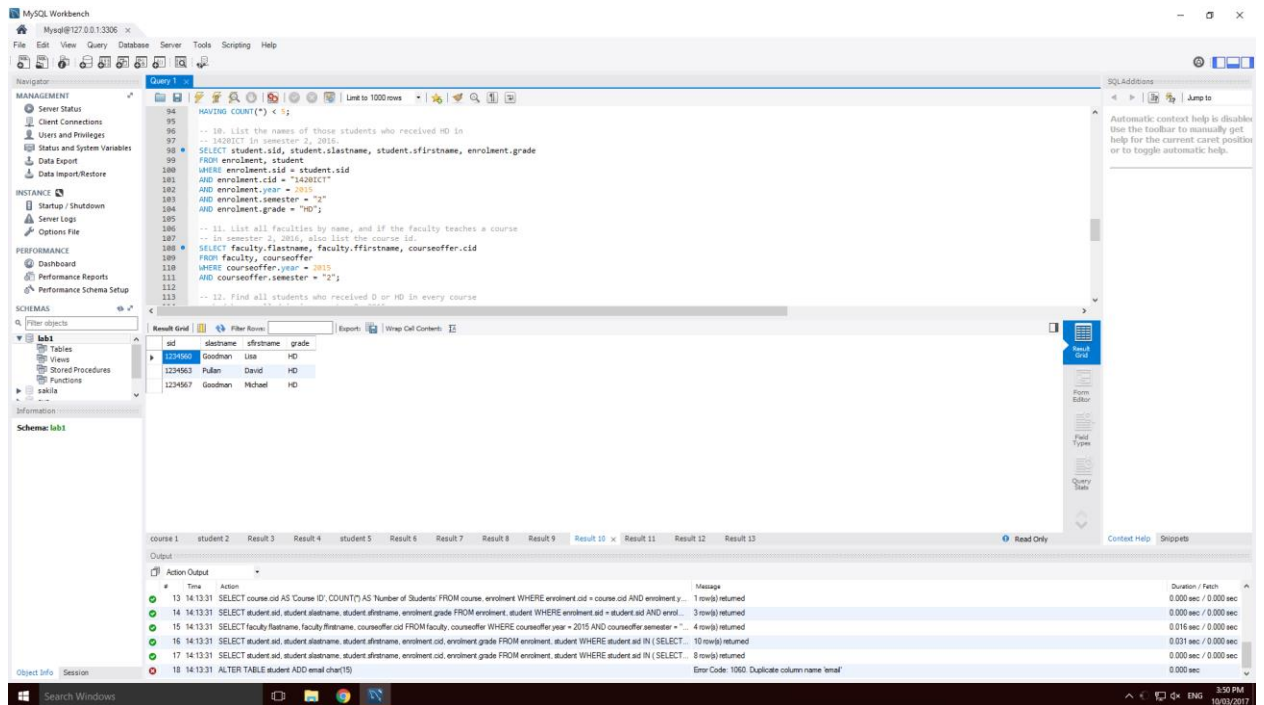**10.** . **List the names of those students who received HD in 1420ICT in semester 2, 2016.**

SELECT student.sid, student.slastname, student.sfirstname, enrolment.grade
FROM enrolment, student
WHERE enrolment.sid = student.sid
AND enrolment.cid = "1420ICT"
AND enrolment.year = 2015
AND enrolment.semester = "2"
AND enrolment.grade = "HD";

This query returns a list of all students who received a HD in semester 2 2015, I had to change the year to 2015 since the 2016 query did not return any results.

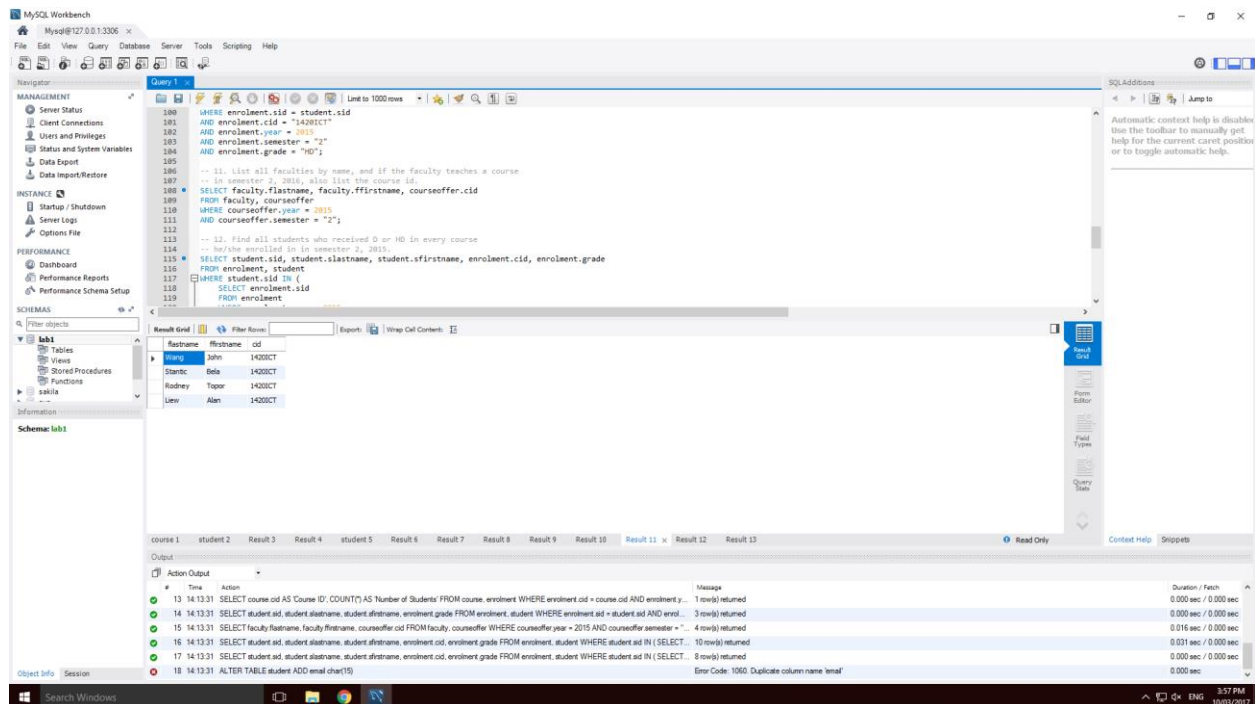| sid	slastname	sfirstname	grade
1234560	Goodman	Lisa	HD
1234563	Pullan	David	HD
1234567	Goodman	Michael	HD

11. List all faculties by name, and if the faculty teaches a course in semester 2, 2016, also list the course id.

SELECT faculty.flastname, faculty.ffirstname, courseoffer.cid
FROM faculty, courseoffer
WHERE courseoffer.year = 2015
AND courseoffer.semester = "2";

This query gets a list of faculty teachers who teach a course in 2015 semester 2 since the original question asks for 2016 and the query doesn't return any results I had to change the year.

flastname	ffirstname	cid
Wang	John	1420ICT
Stantic	Bela	1420ICT
Rodney	Topor	1420ICT
Liew	Alan	1420ICT

12. Find all students who received D or HD in every course he/she enrolled in in semester 2, 2015.

SELECT student.sid, student.slastname, student.sfirstname, enrolment.cid, enrolment.grade
FROM enrolment, student
WHERE student.sid IN (
       SELECT enrolment.sid
       FROM enrolment
       WHERE enrolment.year = 2015
       AND enrolment.semester = "2"
       AND enrolment.grade = "D"
       OR enrolment.grade = "HD"
)
AND enrolment.grade != "F"
AND enrolment.grade != "P"
AND enrolment.grade != "C"
GROUP BY student.sid, enrolment.grade;

This query makes use of the inner query to return a list of all the enrolments that have a HD or a D. The outer query then removes the other grades from the results.

sid	slastname	sfirstname	cid	grade

1234560	Goodman	Lisa	2002ICT	D
1234560	Goodman	Lisa	1420ICT	HD
1234563	Pullan	David	2002ICT	D
1234563	Pullan	David	1420ICT	HD
1234565	Moe	Chloe	2002ICT	D
1234565	Moe	Chloe	1420ICT	HD
1234567	Goodman	Michael	2002ICT	D
1234567	Goodman	Michael	1420ICT	HD

13. Find all students who enrolled in some courses and received D or HD in every course he/she enrolled in in semester 2, 2016.

SELECT student.sid, student.slastname, student.sfirstname, enrolment.cid, enrolment.grade
FROM enrolment, student
WHERE student.sid IN (
        SELECT enrolment.sid
        FROM enrolment
        WHERE enrolment.year = 2016
        AND enrolment.semester = "2"
        AND enrolment.grade = "D"
        OR enrolment.grade = "HD"
)
AND enrolment.grade != "F"

AND enrolment.grade != "P"
AND enrolment.grade != "C"
GROUP BY student.sid, enrolment.grade;

This query checks for all the HD and D grades from the enrolment table.

sid	slastname	sfirstname	cid	grade
1234560	Goodman	Lisa	2002ICT	D
1234560	Goodman	Lisa	1420ICT	HD
1234563	Pullan	David	2002ICT	D
1234563	Pullan	David	1420ICT	HD
1234567	Goodman	Michael	2002ICT	D
1234567	Goodman	Michael	1420ICT	HD

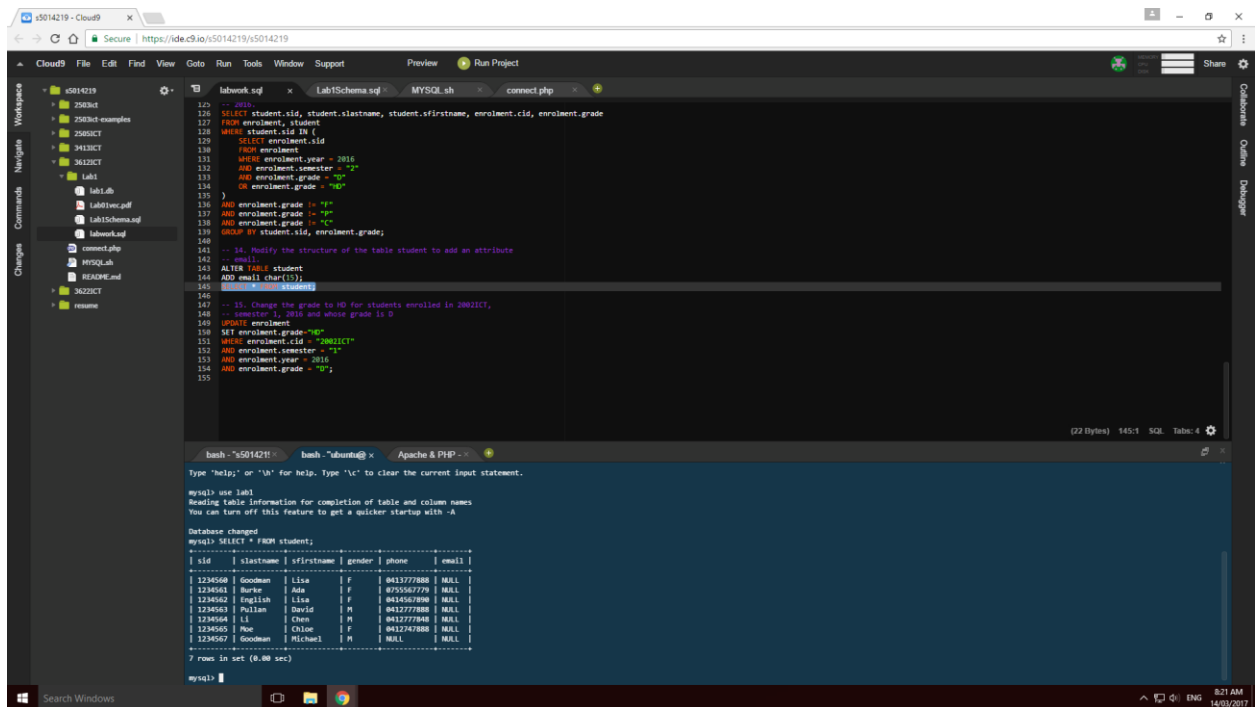**14. Modify the structure of the table student to add an attribute email.**

ALTER TABLE student
ADD email char(15);
SELECT * FROM student;

This query uses the alter command to add attribute to the students table. The table is then displayed using the select all from student table.

15. . **Change the grade to HD for students enrolled in 2002ICT, semester 1, 2016 and whose grade is D**

UPDATE enrolment
SET enrolment.grade="HD"
WHERE enrolment.cid = "2002ICT"
AND enrolment.semester = "1"
AND enrolment.year = 2016
AND enrolment.grade = "D";

This query uses the update command to change the grade attributes for students enrolled in 2002ICT.

The lab was a great refresher of the concepts in SQL that were learned in database design. From joining tables, inner queries to add and update the lab was a great starting point to remember what databases are all about. I also learn that MYSQL has an enum type and how to set up a MYSQL server using the workbench.