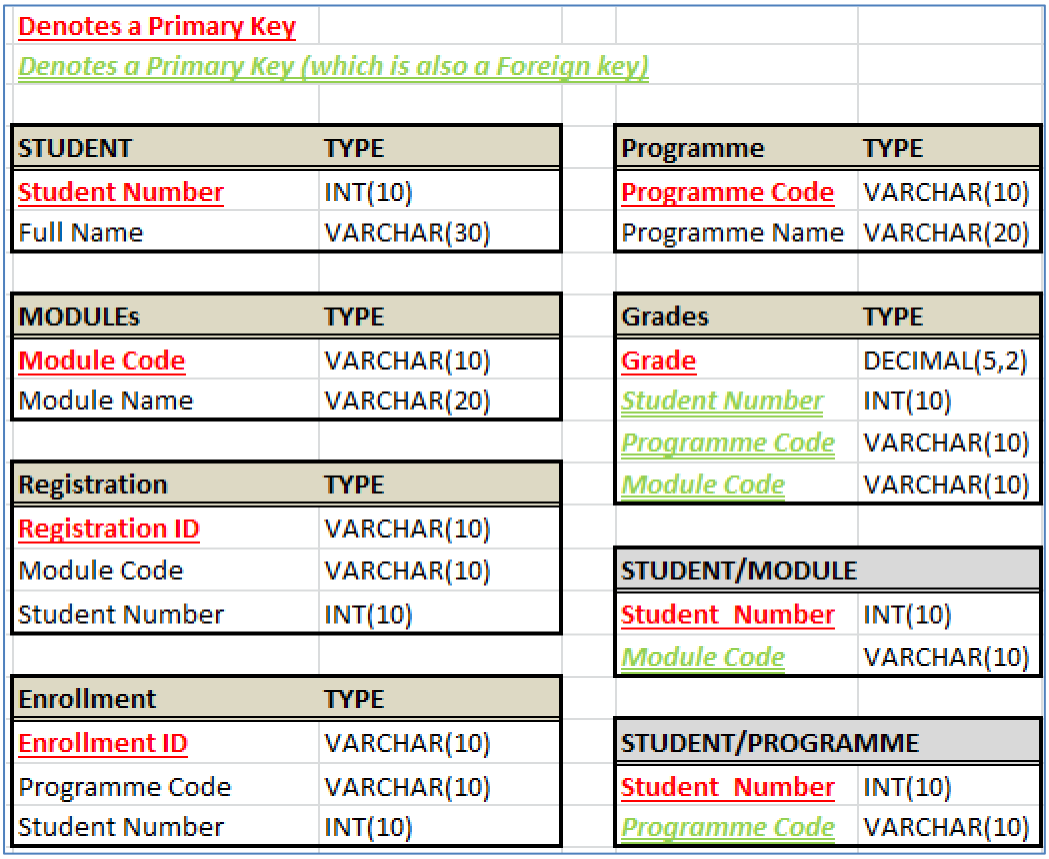
TABLE OF CONTENTS

BUSINESS RULES

1. Students must complete enrolment, but can only complete it once.
2. Many students can complete an enrolment.
3. An enrolment must involve a programme.
4. There is only one enrolment per programme and vice versa.
5. Students must complete registration.
6. Many students may complete registration.
7. A particular registration will involve only one module.
8. Many students may achieve a grade.
9. A grade involves one student.
10. A grade relates to a particular module.
11. Many modules may have grades.
12. Many students may complete many modules.

TABLE DESIGN



Denotes a Primary Key

Denotes a Primary Key (which is also a Foreign key)

STUDENT	TYPE
Student Number	INT(10)
Full Name	VARCHAR(30)

Programme	TYPE
Programme Code	VARCHAR(10)
Programme Name	VARCHAR(20)

MODULEs	TYPE
Module Code	VARCHAR(10)
Module Name	VARCHAR(20)

Grades	TYPE
Grade	DECIMAL(5,2)
Student Number	INT(10)
Programme Code	VARCHAR(10)
Module Code	VARCHAR(10)

Registration	TYPE
Registration ID	VARCHAR(10)
Module Code	VARCHAR(10)
Student Number	INT(10)

STUDENT/MODULE	
Student Number	INT(10)
Module Code	VARCHAR(10)

Enrollment	TYPE
Enrollment ID	VARCHAR(10)
Programme Code	VARCHAR(10)
Student Number	INT(10)

STUDENT/PROGRAMME	
Student Number	INT(10)
Programme Code	VARCHAR(10)

TABLE DATA

MODULES TABLE	
Module Code	**Module Name**
FIT01	Commercial Gyms
FIT02	Crossfit Gyms
FIT03	Cardio Exercises
FIT04	Weight Training
SPORT01	Football
SPORT02	Golf
SPORT03	Sports Psychology
HEALTH01	Nutrition
HEALTH02	Surgery
HEALTH03	Consulting

Grades			
Grade	**STUDENT NR**	**Programme Code**	**Module Code**
0.35	12252388	SS1	FIT01
0.2	1225388	SS1	FIT02
0.82	102013	SS2	SPORT01
0.51	102013	SS2	SPORT02
0.75	202013	SS2	SPORT03
0.86	202013	SS2	SPORT01
0.95	112013	SS3	HEALTH01
0.65	112013	SS3	HEALTH03
0.98	72013	SS1	FIT04
0.98	72013	SS1	FIT03

STUDENT TABLE	
STUDENT NR	**FULL NAME**
12252388	Andrew Doyle
102013	Wayne Rooney
202013	Robin Van Persie
112013	Ryan Giggs
72013	Cristiano Ronaldo

STUDENT/MODULE	
STUDENT NR	**Module Code**
12252388	FIT01
12252388	FIT02
102013	SPORT01
102013	SPORT02
202013	SPORT03
202013	SPORT01
112013	HEALTH01
112013	HEALTH03
72013	FIT04
72013	FIT03

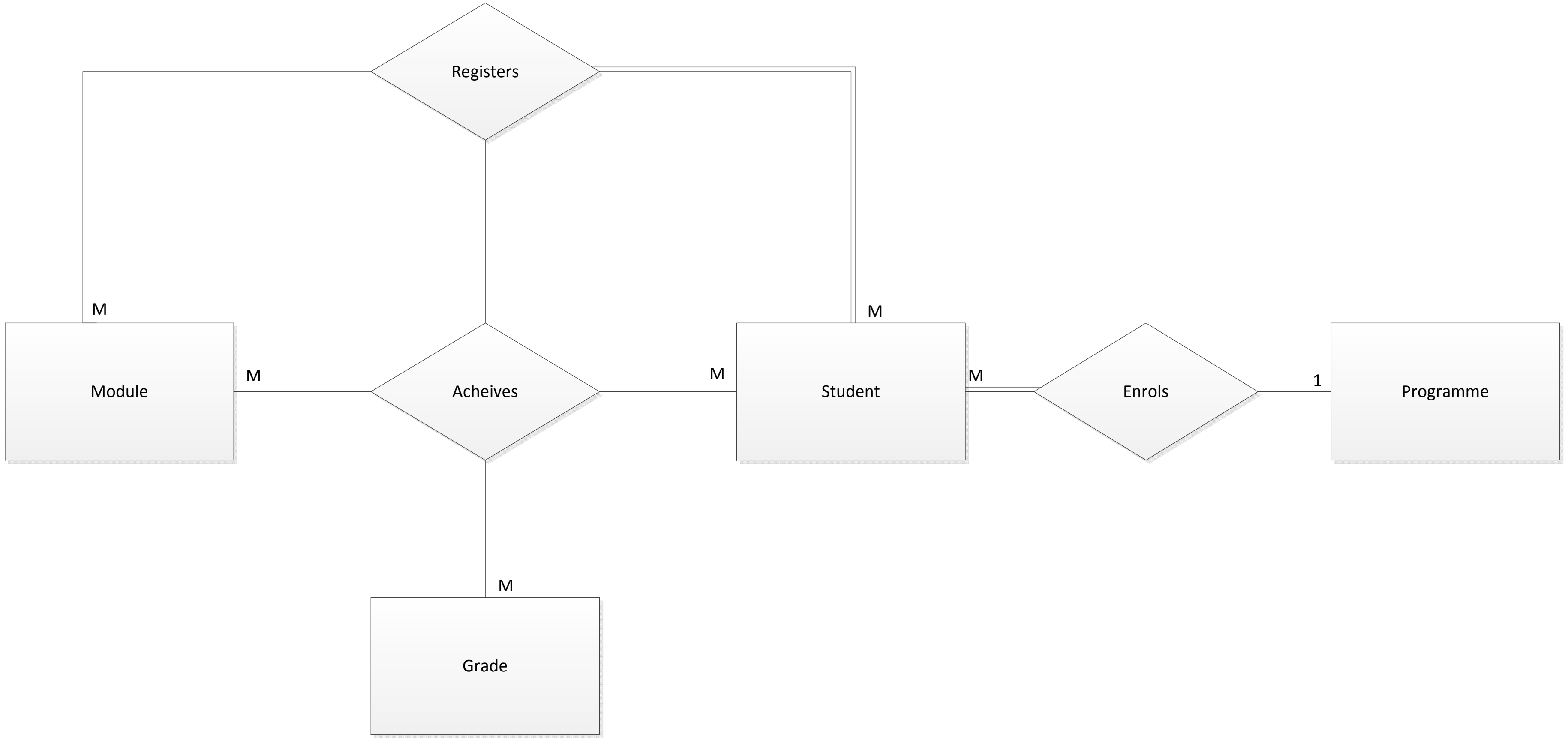
STUDENT/PROGRAMME	
STUDENT NR	**Programme Code**
12252388	SS1
102013	SS2
202013	SS2
112013	SS3
72013	SS1

Programme Table	
Programme Code	**Programme Name**
SS1	Fitness
SS2	Sports Science
SS3	Health Science

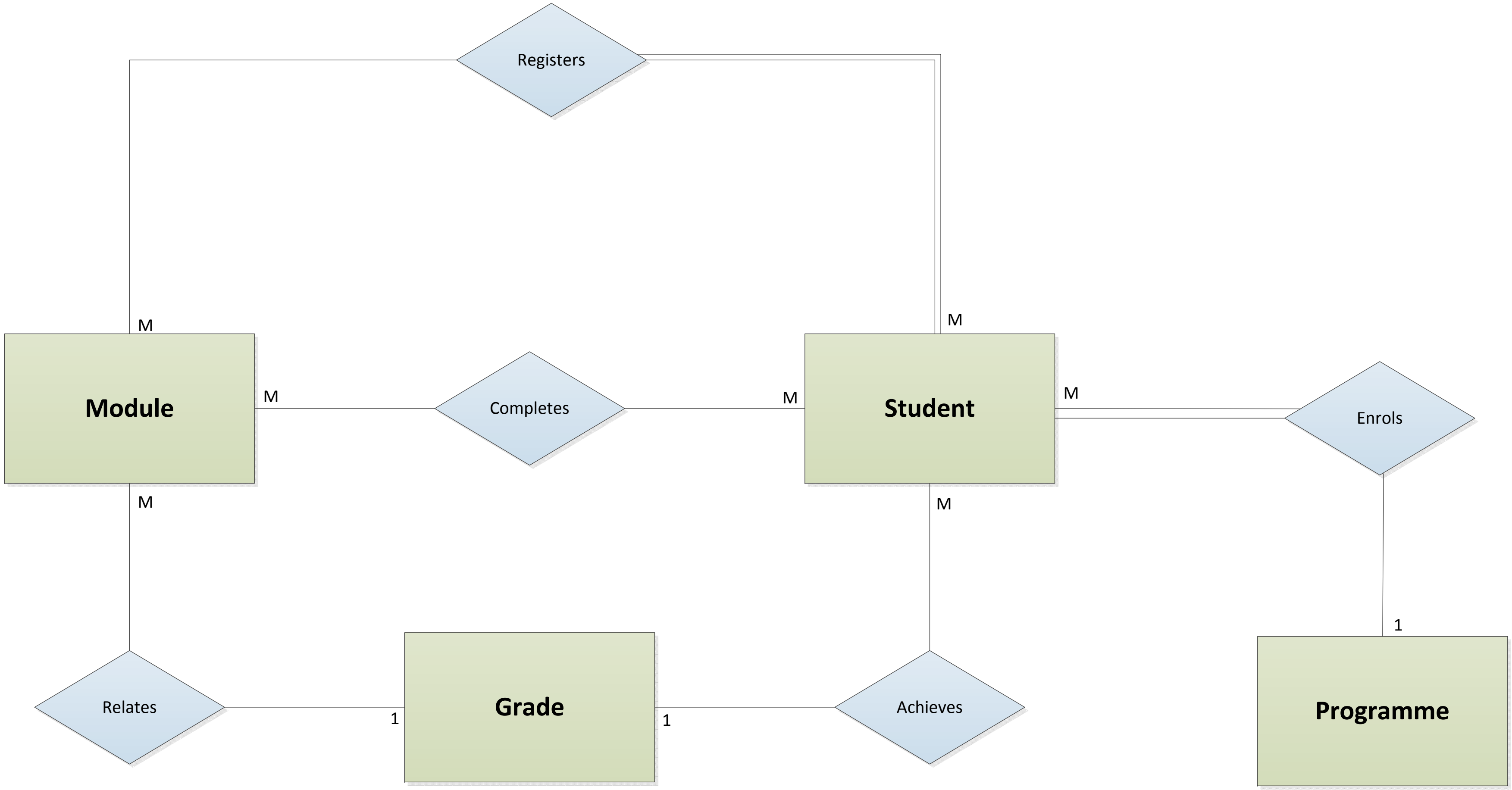
Registration Table		
Registration ID	**Module Code**	**STUDENT NR**
R1	FIT01	12252388
R1	FIT02	12252388
R2	SPORT01	102013
R2	SPORT02	102013
R3	SPORT03	202013
R3	SPORT01	202013
R4	HEALTH01	112013
R4	HEALTH03	112013
R5	FIT04	72013
R5	FIT03	72013

Enrollment Table		
Enrollment ID	**Programme Code**	**STUDENT NR**
E1	SS1	12252388
E2	SS2	102013
E3	SS2	202013
E4	SS3	112013
E5	SS1	72013

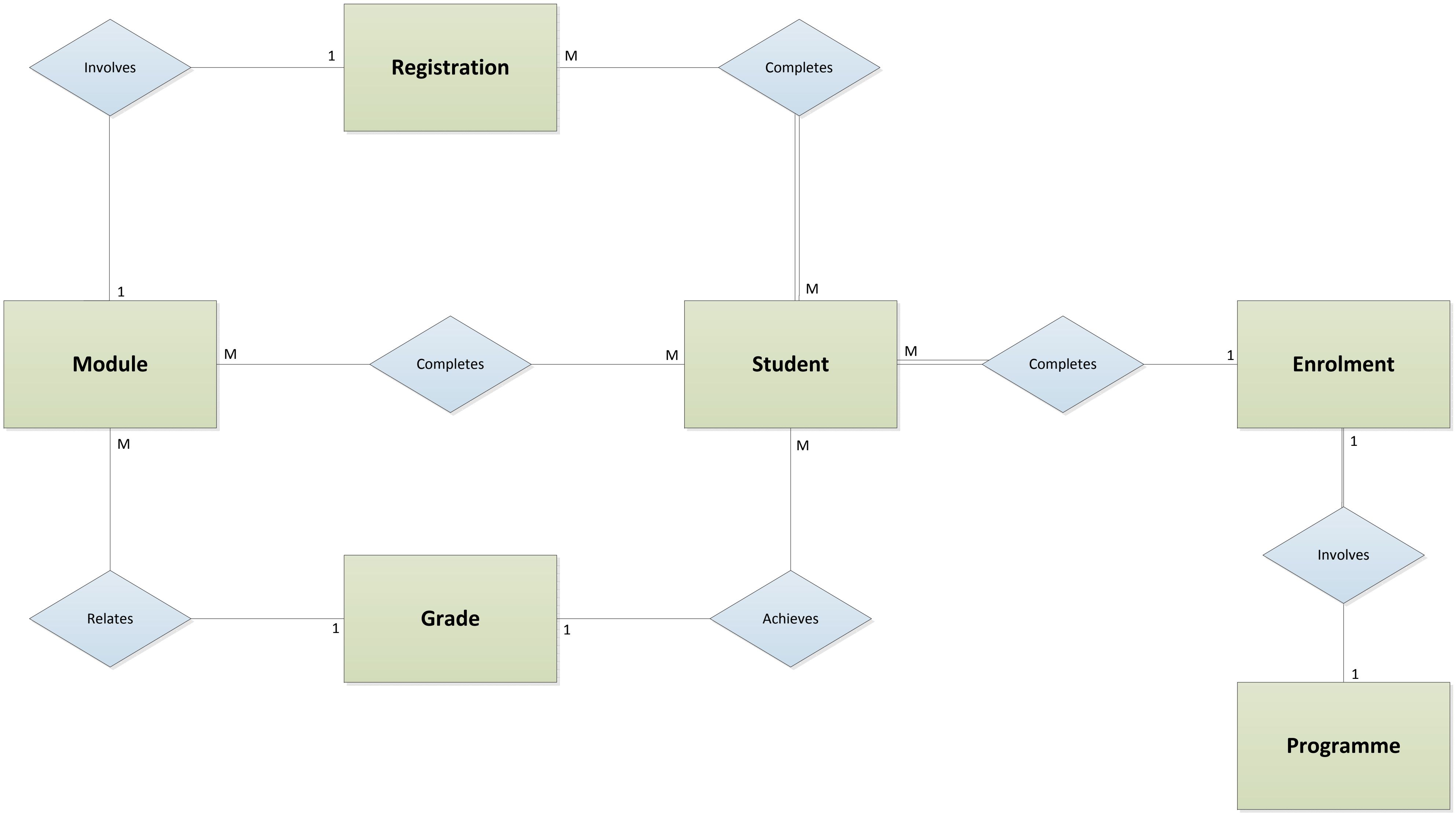
ER DIAGRAM FIRST ITERATION



ER DIAGRAM PHASE 2

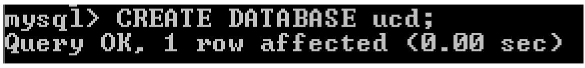


ER DIAGRAM FINAL

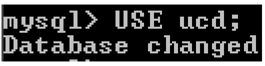


SQL DATABASE IMPLEMENTATION

CREATING AND USING THE DATABASE



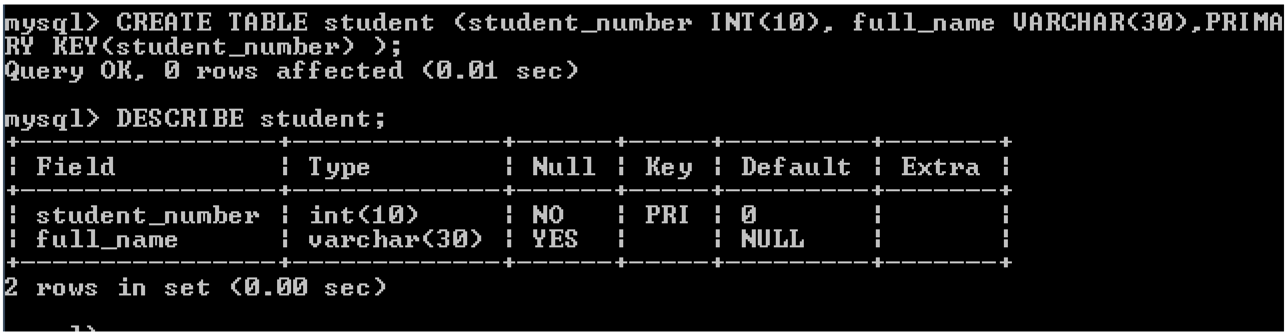
```
mysql> CREATE DATABASE ucd;
Query OK, 1 row affected (0.00 sec)
```



```
mysql> USE ucd;
Database changed
```

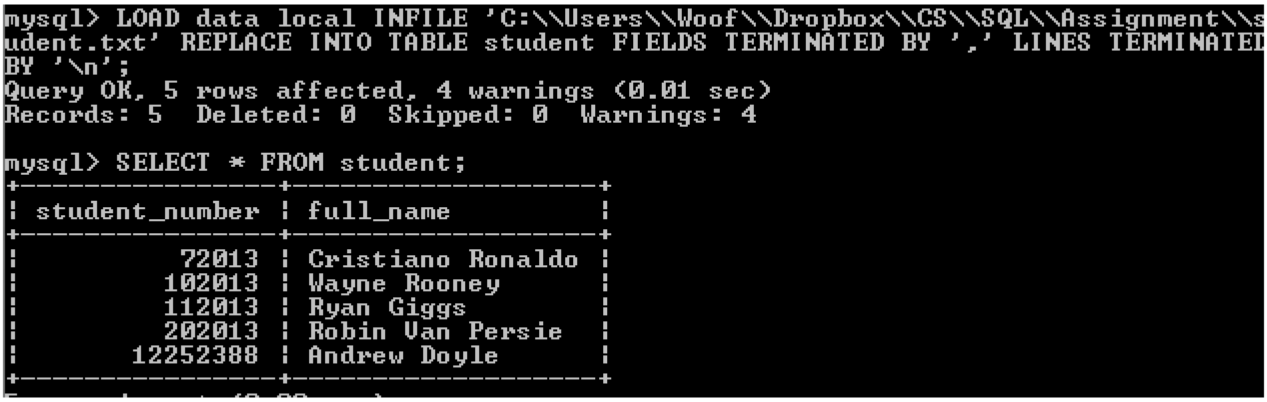
STUDENT TABLE

CREATING TABLE



```
mysql> CREATE TABLE student (student_number INT(10), full_name VARCHAR(30),PRIMA
RY KEY(student_number) );
Query OK, 0 rows affected (0.01 sec)

mysql> DESCRIBE student;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | NO   | PRI | 0       |       |
| full_name      | varchar(30) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)

mysql>
```

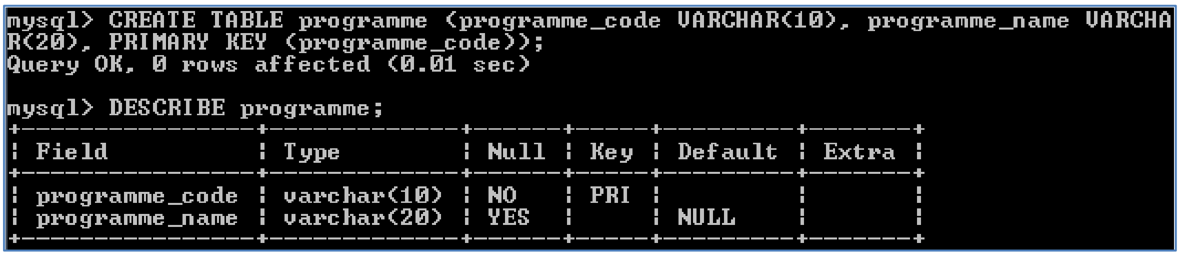
LOADING DATA FROM TEXT FILE



```
mysql> LOAD data local INFILE 'C:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\s
udent.txt' REPLACE INTO TABLE student FIELDS TERMINATED BY ',' LINES TERMINATED
BY '\n';
Query OK, 5 rows affected, 4 warnings (0.01 sec)
Records: 5  Deleted: 0  Skipped: 0  Warnings: 4

mysql> SELECT * FROM student;
+----------------+--------------------+
| student_number | full_name          |
+----------------+--------------------+
|          72013 | Cristiano Ronaldo  |
|         102013 | Wayne Rooney       |
|         112013 | Ryan Giggs         |
|         202013 | Robin Van Persie   |
|       12252388 | Andrew Doyle       |
+----------------+--------------------+
5 rows in set (0.00 sec)
```

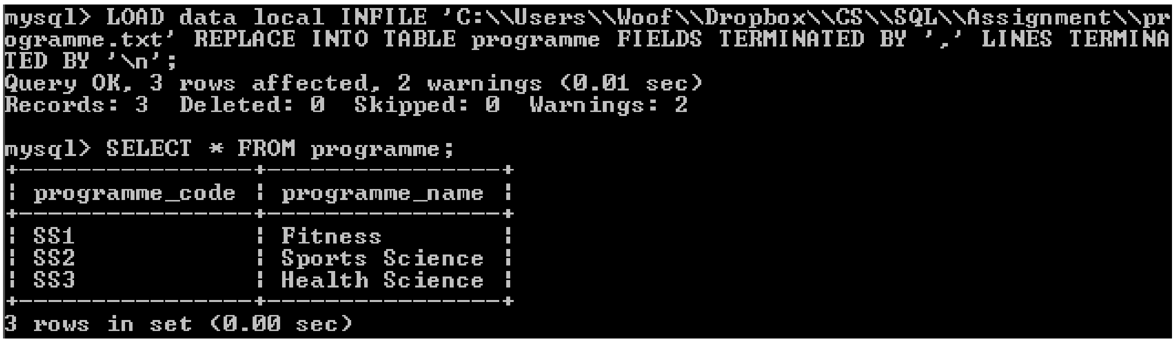
PROGRAMME TABLE

CREATING TABLE



```
mysql> CREATE TABLE programme (programme_code VARCHAR(10), programme_name VARCHA
R(20), PRIMARY KEY (programme_code));
Query OK, 0 rows affected (0.01 sec)

mysql> DESCRIBE programme;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| programme_code | varchar(10) | NO   | PRI |         |       |
| programme_name | varchar(20) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
```

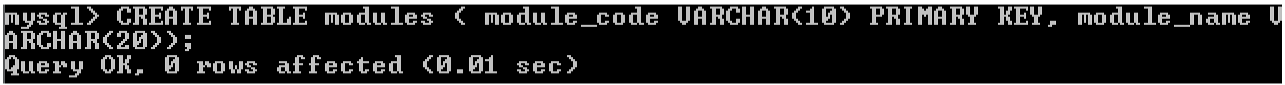
LOADING DATA FROM FILE



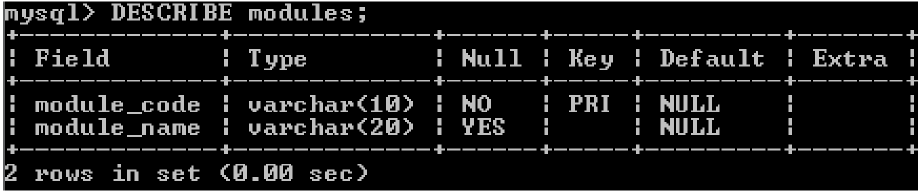
```
mysql> LOAD data local INFILE 'C:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\pr
ogramme.txt' REPLACE INTO TABLE programme FIELDS TERMINATED BY ',' LINES TERMINA
TED BY '\n';
Query OK, 3 rows affected, 2 warnings (0.01 sec)
Records: 3  Deleted: 0  Skipped: 0  Warnings: 2

mysql> SELECT * FROM programme;
+----------------+----------------+
| programme_code | programme_name |
+----------------+----------------+
| SS1            | Fitness        |
| SS2            | Sports Science |
| SS3            | Health Science |
+----------------+----------------+
3 rows in set (0.00 sec)
```

MODULES TABLE

CREATING TABLE

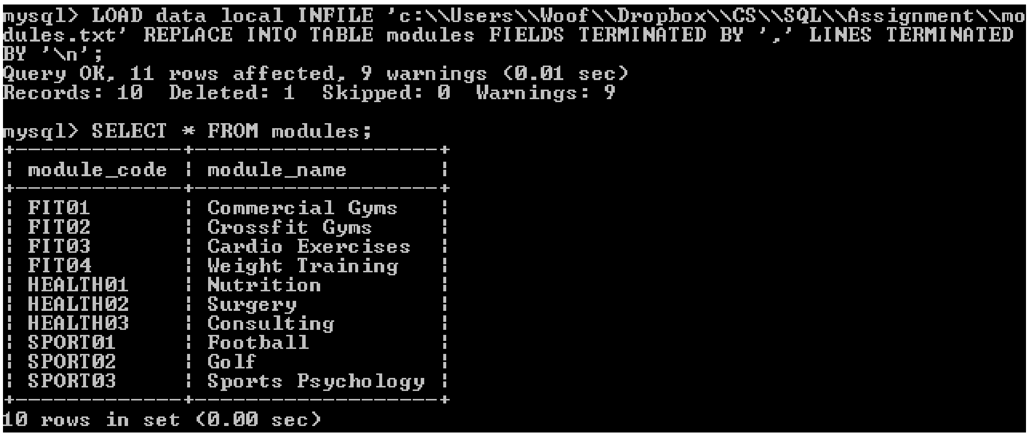


```
mysql> CREATE TABLE modules ( module_code VARCHAR(10) PRIMARY KEY, module_name V
ARCHAR(20));
Query OK, 0 rows affected (0.01 sec)
```



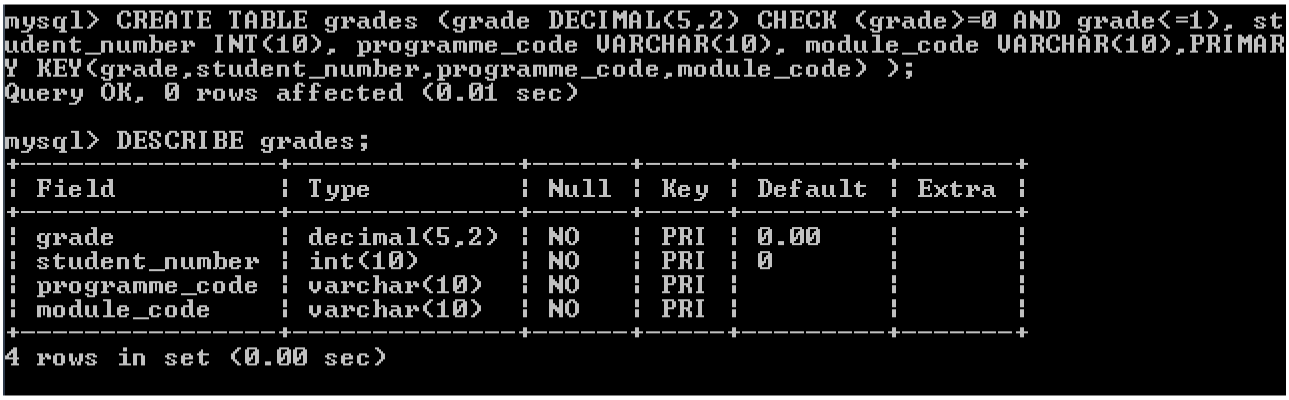
```
mysql> DESCRIBE modules;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| module_code | varchar(10) | NO   | PRI | NULL    |       |
| module_name | varchar(20) | YES  |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

LOADING DATA FROM FILE



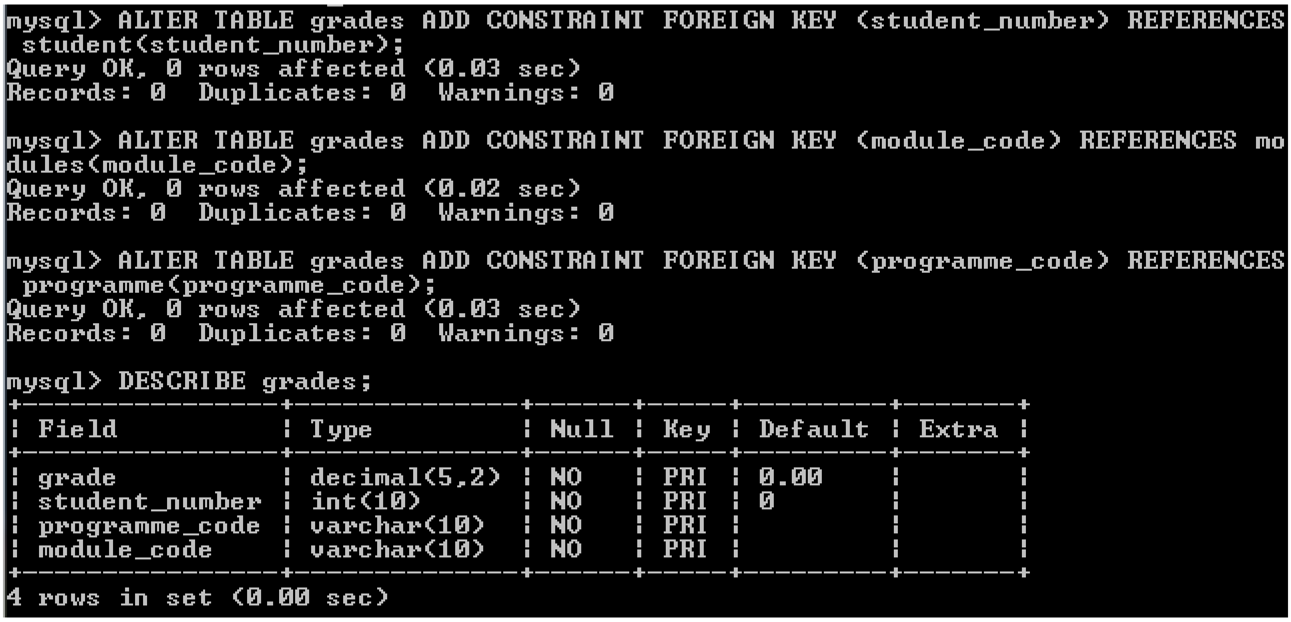
```
mysql> LOAD data local INFILE 'c:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\mo
dules.txt' REPLACE INTO TABLE modules FIELDS TERMINATED BY ',' LINES TERMINATED
BY '\n';
Query OK, 11 rows affected, 9 warnings (0.01 sec)
Records: 10  Deleted: 1  Skipped: 0  Warnings: 9

mysql> SELECT * FROM modules;
+-------------+-------------------+
| module_code | module_name       |
+-------------+-------------------+
| FIT01       | Commercial Gyms   |
| FIT02       | Crossfit Gyms     |
| FIT03       | Cardio Exercises  |
| FIT04       | Weight Training   |
| HEALTH01    | Nutrition         |
| HEALTH02    | Surgery           |
| HEALTH03    | Consulting        |
| SPORT01     | Football          |
| SPORT02     | Golf              |
| SPORT03     | Sports Psychology |
+-------------+-------------------+
10 rows in set (0.00 sec)
```

GRADES TABLE



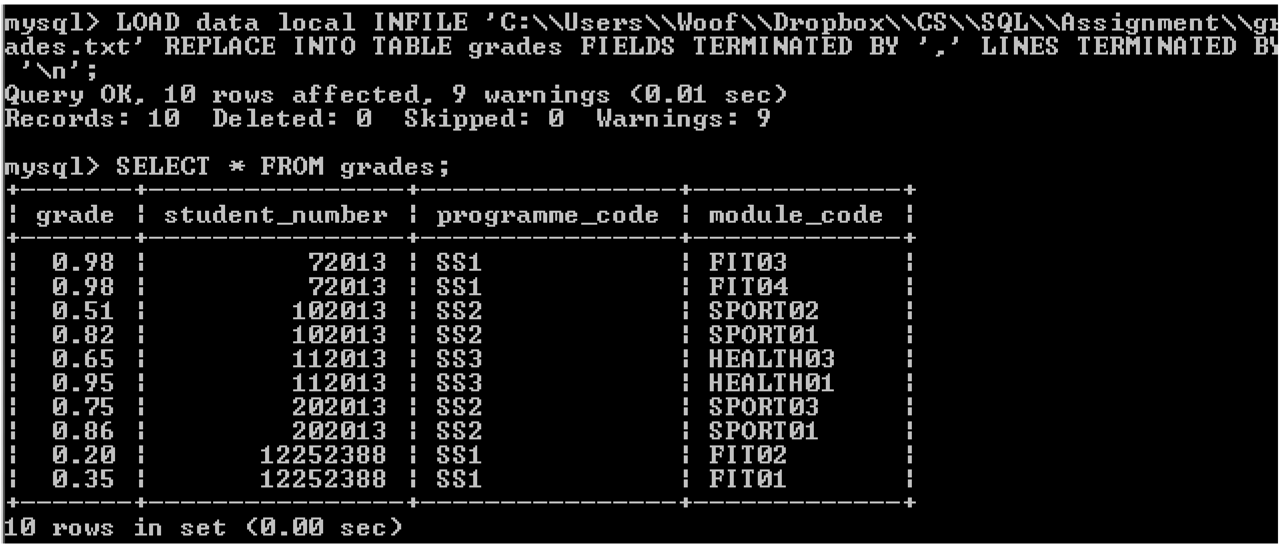
```
mysql> CREATE TABLE grades (grade DECIMAL(5,2) CHECK (grade>=0 AND grade<=1), st
udent_number INT(10), programme_code VARCHAR(10), module_code VARCHAR(10),PRIMAR
Y KEY(grade,student_number,programme_code,module_code) );
Query OK, 0 rows affected (0.01 sec)

mysql> DESCRIBE grades;
+----------------+--------------+------+-----+---------+-------+
| Field          | Type         | Null | Key | Default | Extra |
+----------------+--------------+------+-----+---------+-------+
| grade          | decimal(5,2) | NO   | PRI | 0.00    |       |
| student_number | int(10)      | NO   | PRI | 0       |       |
| programme_code | varchar(10)  | NO   | PRI |         |       |
| module_code    | varchar(10)  | NO   | PRI |         |       |
+----------------+--------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

ADDING FOREIGN KEYS TO GRADES TABLE



```
mysql> ALTER TABLE grades ADD CONSTRAINT FOREIGN KEY (student_number) REFERENCES
 student(student_number);
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> ALTER TABLE grades ADD CONSTRAINT FOREIGN KEY (module_code) REFERENCES mo
dules(module_code);
Query OK, 0 rows affected (0.02 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> ALTER TABLE grades ADD CONSTRAINT FOREIGN KEY (programme_code) REFERENCES
 programme(programme_code);
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> DESCRIBE grades;
+----------------+--------------+------+-----+---------+-------+
| Field          | Type         | Null | Key | Default | Extra |
+----------------+--------------+------+-----+---------+-------+
| grade          | decimal(5,2) | NO   | PRI | 0.00    |       |
| student_number | int(10)      | NO   | PRI | 0       |       |
| programme_code | varchar(10)  | NO   | PRI |         |       |
| module_code    | varchar(10)  | NO   | PRI |         |       |
+----------------+--------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

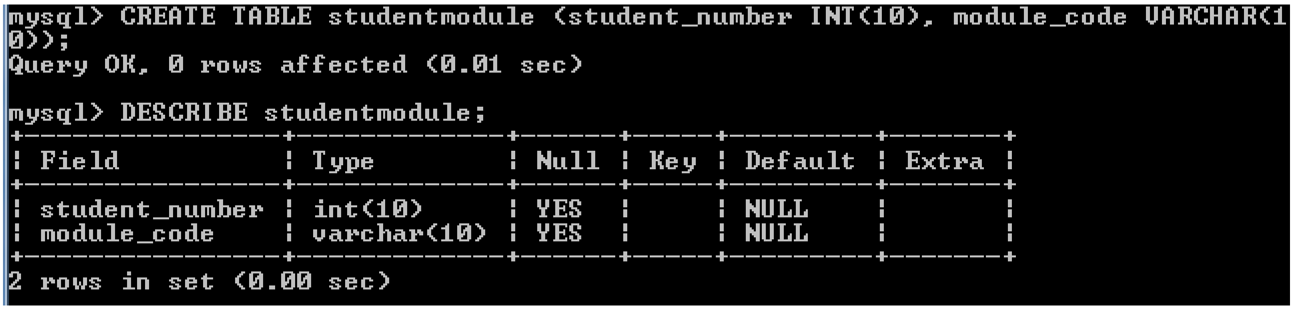
LOADING DATA FROM TEXT FILE TO GRADES TABLE



```
mysql> LOAD data local INFILE 'C:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\gr
ades.txt' REPLACE INTO TABLE grades FIELDS TERMINATED BY ',' LINES TERMINATED BY
 '\n';
Query OK, 10 rows affected, 9 warnings (0.01 sec)
Records: 10  Deleted: 0  Skipped: 0  Warnings: 9

mysql> SELECT * FROM grades;
+-------+----------------+----------------+-------------+
| grade | student_number | programme_code | module_code |
+-------+----------------+----------------+-------------+
|  0.98 |          72013 | SS1            | FIT03       |
|  0.98 |          72013 | SS1            | FIT04       |
|  0.51 |         102013 | SS2            | SPORT02     |
|  0.82 |         102013 | SS2            | SPORT01     |
|  0.65 |         112013 | SS3            | HEALTH03    |
|  0.95 |         112013 | SS3            | HEALTH01    |
|  0.75 |         202013 | SS2            | SPORT03     |
|  0.86 |         202013 | SS2            | SPORT01     |
|  0.20 |       12252388 | SS1            | FIT02       |
|  0.35 |       12252388 | SS1            | FIT01       |
+-------+----------------+----------------+-------------+
10 rows in set (0.00 sec)
```

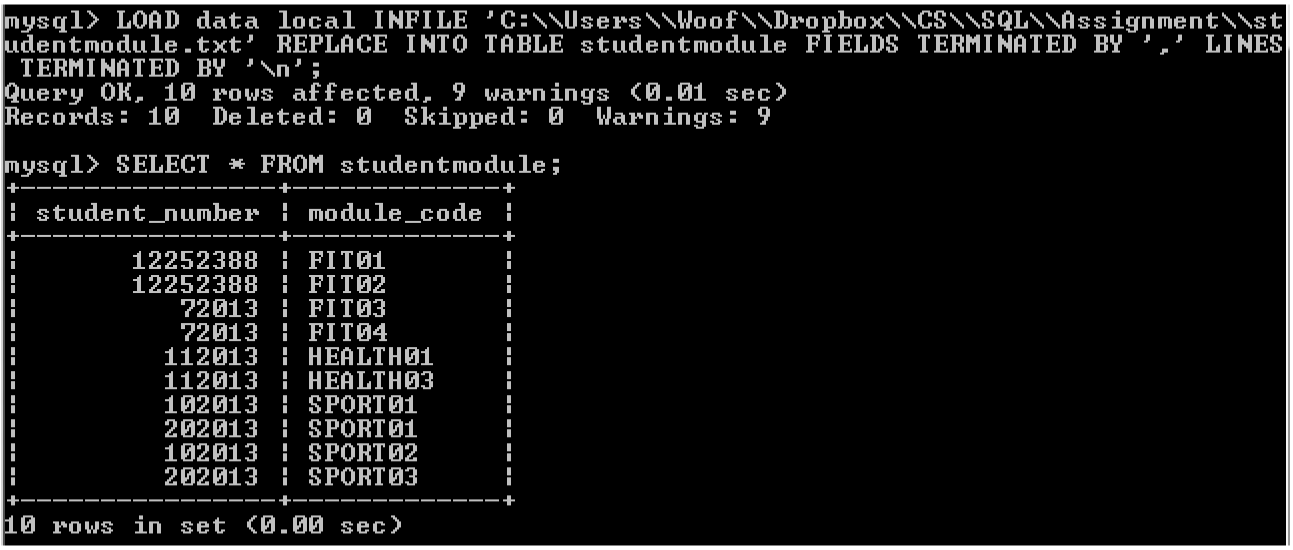
STUDENT/MODULE TABLE

CREATING TABLE



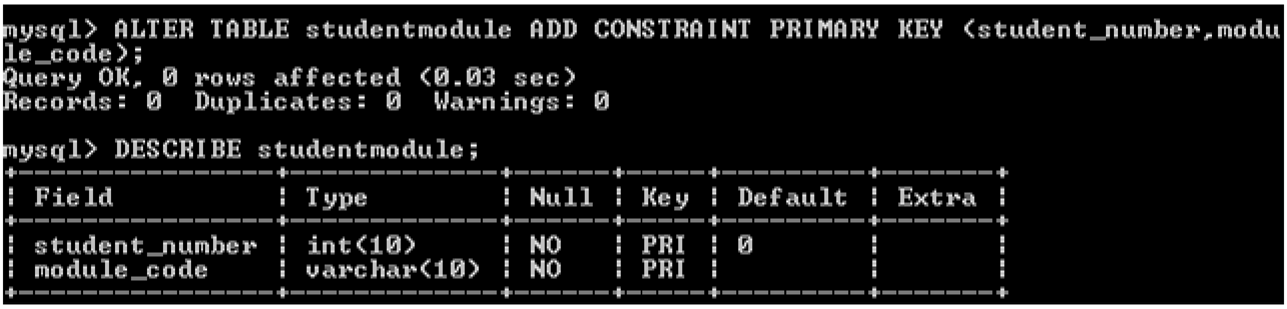
```
mysql> CREATE TABLE studentmodule (student_number INT(10), module_code VARCHAR(1
0));
Query OK, 0 rows affected (0.01 sec)

mysql> DESCRIBE studentmodule;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | YES  |     | NULL    |       |
| module_code    | varchar(10) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

LOADING DATA FROM FILE



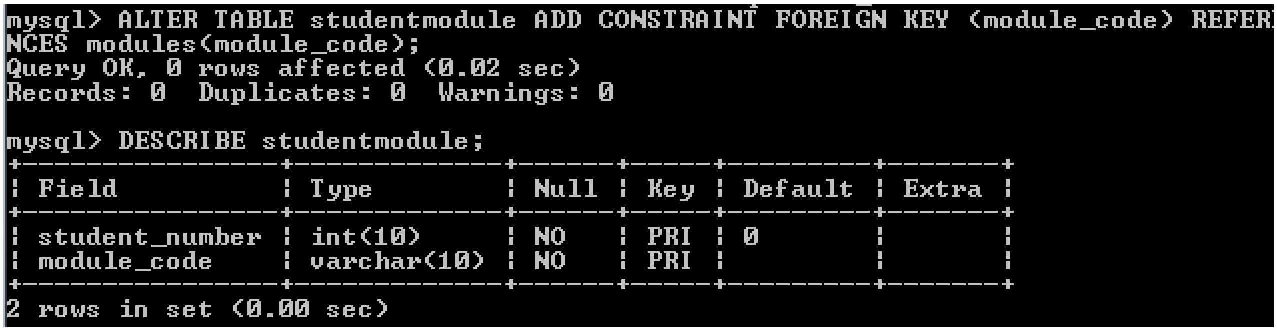
```
mysql> LOAD data local INFILE 'C:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\st
udentmodule.txt' REPLACE INTO TABLE studentmodule FIELDS TERMINATED BY ',' LINES
 TERMINATED BY '\n';
Query OK, 10 rows affected, 9 warnings (0.01 sec)
Records: 10  Deleted: 0  Skipped: 0  Warnings: 9

mysql> SELECT * FROM studentmodule;
+----------------+-------------+
| student_number | module_code |
+----------------+-------------+
|       12252388 | FIT01       |
|       12252388 | FIT02       |
|          72013 | FIT03       |
|          72013 | FIT04       |
|         112013 | HEALTH01    |
|         112013 | HEALTH03    |
|         102013 | SPORT01     |
|         202013 | SPORT01     |
|         102013 | SPORT02     |
|         202013 | SPORT03     |
+----------------+-------------+
10 rows in set (0.00 sec)
```

ADDING PRIMARY KEYS TO THE TABLE



```
mysql> ALTER TABLE studentmodule ADD CONSTRAINT PRIMARY KEY (student_number,modu
le_code);
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> DESCRIBE studentmodule;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | NO   | PRI | 0       |       |
| module_code    | varchar(10) | NO   | PRI |         |       |
+----------------+-------------+------+-----+---------+-------+
```

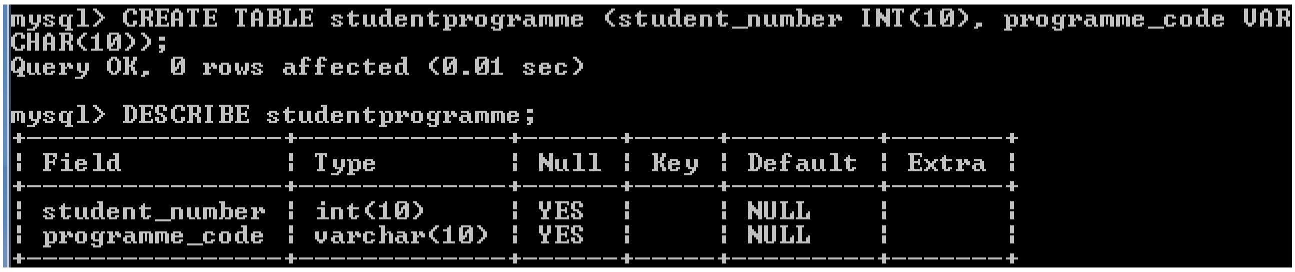
ADDING A FOREIGN KEY TO THE TABLE



```
mysql> ALTER TABLE studentmodule ADD CONSTRAINT FOREIGN KEY (module_code) REFER
NCES modules(module_code);
Query OK, 0 rows affected (0.02 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> DESCRIBE studentmodule;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | NO   | PRI | 0       |       |
| module_code    | varchar(10) | NO   | PRI |         |       |
+----------------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

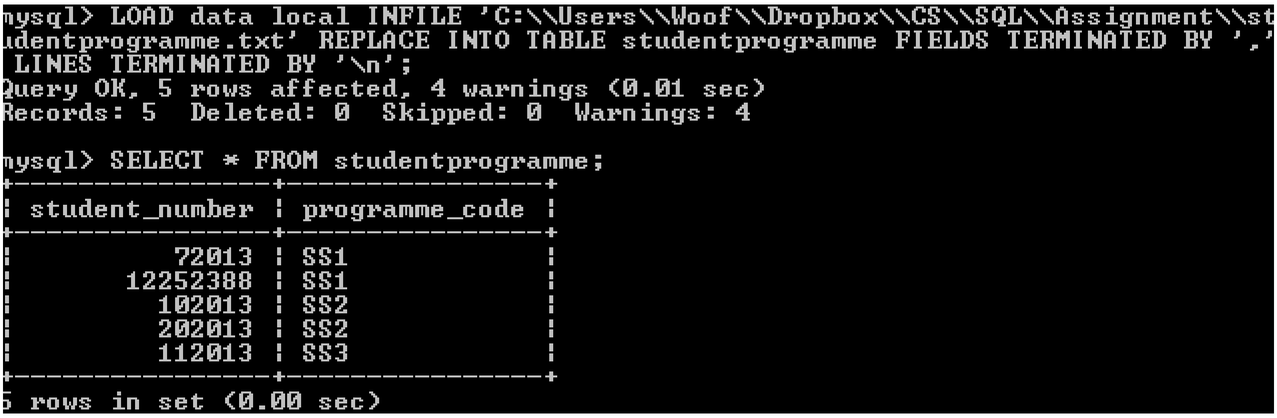
STUDENT/PROGRAMME TABLE

CREATING TABLE



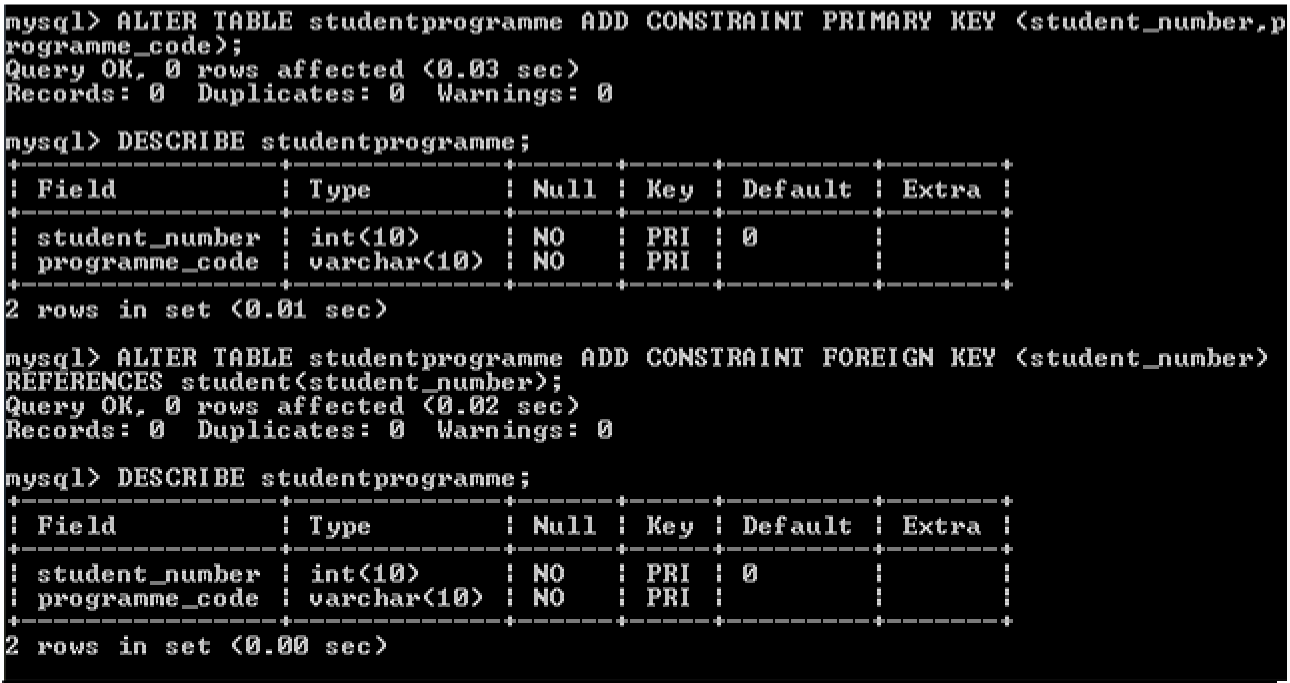
```
mysql> CREATE TABLE studentprogramme (student_number INT(10), programme_code VAR
CHAR(10));
Query OK, 0 rows affected (0.01 sec)

mysql> DESCRIBE studentprogramme;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | YES  |     | NULL    |       |
| programme_code | varchar(10) | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
```

LOADING DATA FROM FILE

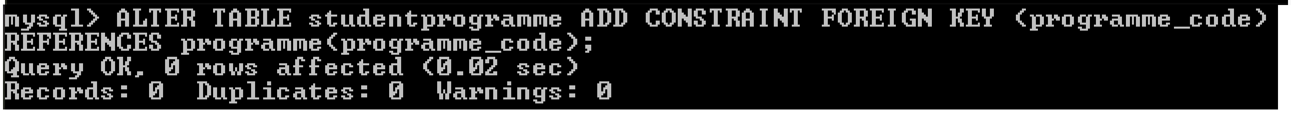


```
nysql> LOAD data local INFILE 'C:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\st
udentprogramme.txt' REPLACE INTO TABLE studentprogramme FIELDS TERMINATED BY ','
 LINES TERMINATED BY '\n';
Query OK, 5 rows affected, 4 warnings (0.01 sec)
Records: 5  Deleted: 0  Skipped: 0  Warnings: 4

nysql> SELECT * FROM studentprogramme;
+----------------+----------------+
| student_number | programme_code |
+----------------+----------------+
|          72013 | SS1            |
|       12252388 | SS1            |
|         102013 | SS2            |
|         202013 | SS2            |
|         112013 | SS3            |
+----------------+----------------+
5 rows in set (0.00 sec)
```

ADDING PRIMARY AND FOREIGN KEYS TO THE TABLE



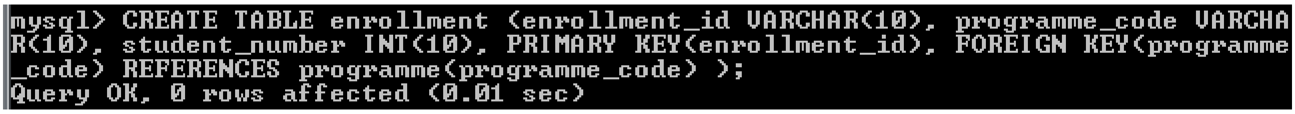
```
mysql> ALTER TABLE studentprogramme ADD CONSTRAINT PRIMARY KEY (student_number,p
rogramme_code);
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> DESCRIBE studentprogramme;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | NO   | PRI | 0       |       |
| programme_code | varchar(10) | NO   | PRI |         |       |
+----------------+-------------+------+-----+---------+-------+
2 rows in set (0.01 sec)

mysql> ALTER TABLE studentprogramme ADD CONSTRAINT FOREIGN KEY (student_number)
REFERENCES student(student_number);
Query OK, 0 rows affected (0.02 sec)
Records: 0  Duplicates: 0  Warnings: 0

mysql> DESCRIBE studentprogramme;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| student_number | int(10)     | NO   | PRI | 0       |       |
| programme_code | varchar(10) | NO   | PRI |         |       |
+----------------+-------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```



```
mysql> ALTER TABLE studentprogramme ADD CONSTRAINT FOREIGN KEY (programme_code)
REFERENCES programme(programme_code);
Query OK, 0 rows affected (0.02 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

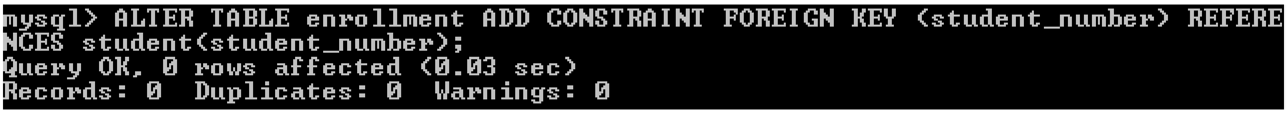
ENROLMENT TABLE

CREATING TABLE



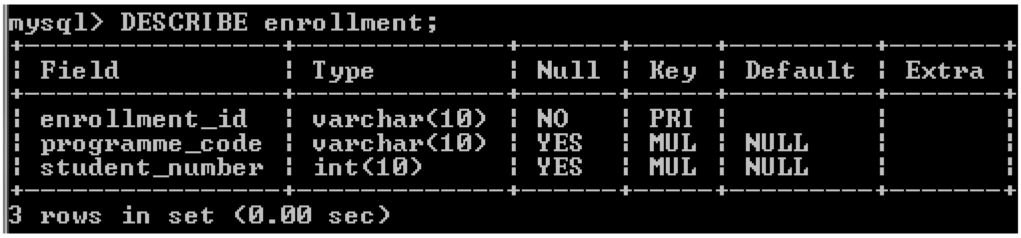
```
mysql> CREATE TABLE enrollment (enrollment_id VARCHAR(10), programme_code VARCHA
R(10), student_number INT(10), PRIMARY KEY(enrollment_id), FOREIGN KEY(programme
_code) REFERENCES programme(programme_code) );
Query OK, 0 rows affected (0.01 sec)
```

ADDING FOREIGN KEY



```
mysql> ALTER TABLE enrollment ADD CONSTRAINT FOREIGN KEY (student_number) REFERE
NCES student(student_number);
Query OK, 0 rows affected (0.03 sec)
Records: 0  Duplicates: 0  Warnings: 0
```

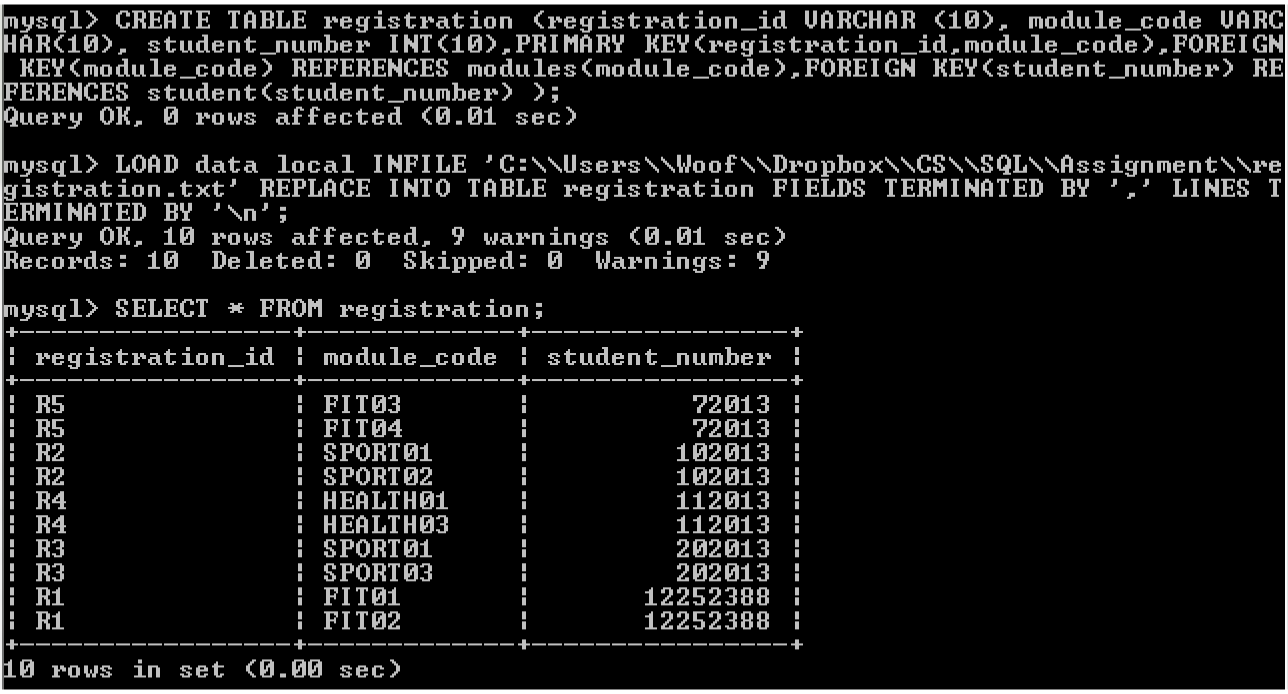
RESULTING TABLE



```
mysql> DESCRIBE enrollment;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| enrollment_id  | varchar(10) | NO   | PRI |         |       |
| programme_code | varchar(10) | YES  | MUL | NULL    |       |
| student_number | int(10)     | YES  | MUL | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

REGISTRATION TABLE

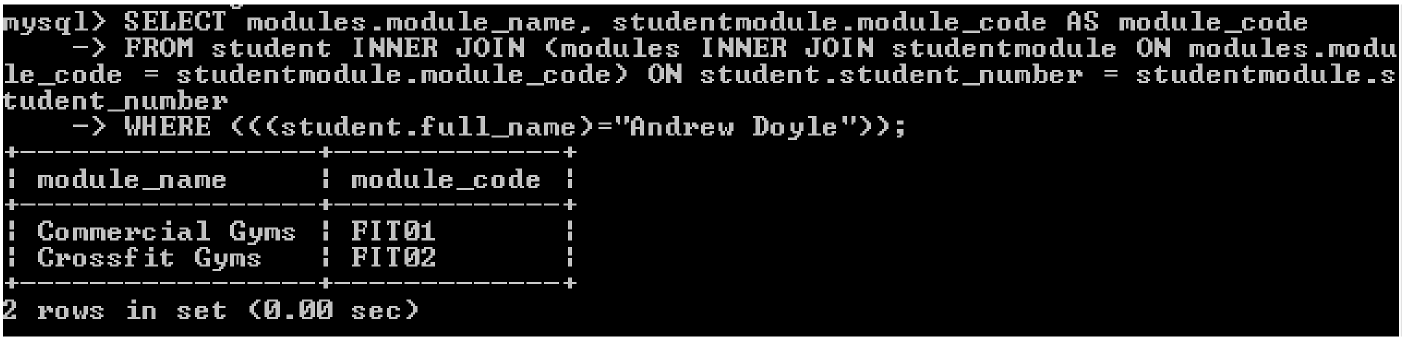
CREATE TABLE, AND LOAD DATA



```
mysql> CREATE TABLE registration (registration_id VARCHAR (10), module_code VARC
HAR(10), student_number INT(10),PRIMARY KEY(registration_id,module_code),FOREIGN
 KEY(module_code) REFERENCES modules(module_code),FOREIGN KEY(student_number) RE
FERENCES student(student_number) );
Query OK, 0 rows affected (0.01 sec)

mysql> LOAD data local INFILE 'C:\\Users\\Woof\\Dropbox\\CS\\SQL\\Assignment\\re
gistration.txt' REPLACE INTO TABLE registration FIELDS TERMINATED BY ',' LINES T
ERMINATED BY '\n';
Query OK, 10 rows affected, 9 warnings (0.01 sec)
Records: 10  Deleted: 0  Skipped: 0  Warnings: 9

mysql> SELECT * FROM registration;
+-----------------+-------------+----------------+
| registration_id | module_code | student_number |
+-----------------+-------------+----------------+
| R5              | FIT03       |          72013 |
| R5              | FIT04       |          72013 |
| R2              | SPORT01     |         102013 |
| R2              | SPORT02     |         102013 |
| R4              | HEALTH01    |         112013 |
| R4              | HEALTH03    |         112013 |
| R3              | SPORT01     |         202013 |
| R3              | SPORT03     |         202013 |
| R1              | FIT01       |       12252388 |
| R1              | FIT02       |       12252388 |
+-----------------+-------------+----------------+
10 rows in set (0.00 sec)
```

SQL QUERIES

QUERY 1



```
mysql> SELECT modules.module_name, studentmodule.module_code AS module_code
    -> FROM student INNER JOIN (modules INNER JOIN studentmodule ON modules.modu
le_code = studentmodule.module_code) ON student.student_number = studentmodule.s
tudent_number
    -> WHERE (((student.full_name)="Andrew Doyle"));
+------------------+-------------+
| module_name      | module_code |
+------------------+-------------+
| Commercial Gyms  | FIT01       |
| Crossfit Gyms    | FIT02       |
+------------------+-------------+
2 rows in set (0.00 sec)
```

```
SELECT modules.module_name, studentmodule.module_code AS module_code

FROM student INNER JOIN (modules INNER JOIN studentmodule ON
modules.module_code = studentmodule.module_code) ON student.student_number =
studentmodule.student_number

WHERE (((student.full_name)="Andrew Doyle"))
```

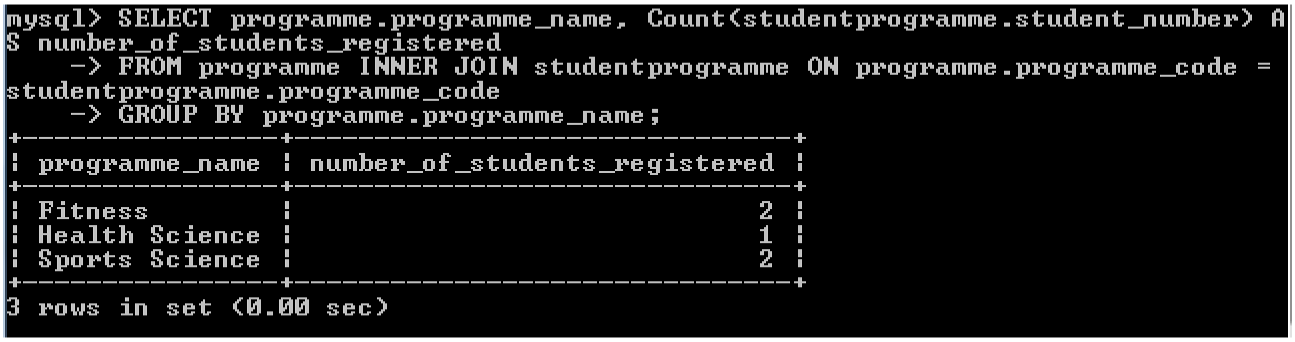
This query displays the module choices of the student ‘Andrew Doyle’. The **SELECT** statement is used to retrieve **module_name** information from the **modules** table and **module_code** information from the **studentmodule** table (the **AS** keyword is used as an alias to provide a name for the column).

The **FROM** statement specifies where information is obtained from. The **student** table is required to specify the information required (student name) in the **WHERE** clause. The **INNER JOIN** specifies the relationship between tables in the **FROM** clause. The **modules** table is joined to the **studentmodule** table where **modules.module_code** is equal to **studentmodule.module_code**. (studentmodule.module_code is a foreign key of modules.module_code). This condition is known as the **ON** clause.

The **student** table is joined to both the **modules** and **studentmodule** table where **student_number** in the tables **student** and **student_module** are equal (**ON** clause).

Finally, the **WHERE** clause is used to specify the specific student who`s module choices are to be displayed; in the above example, the module choices picked by the student *“Andrew Doyle”* are shown.

QUERY 2



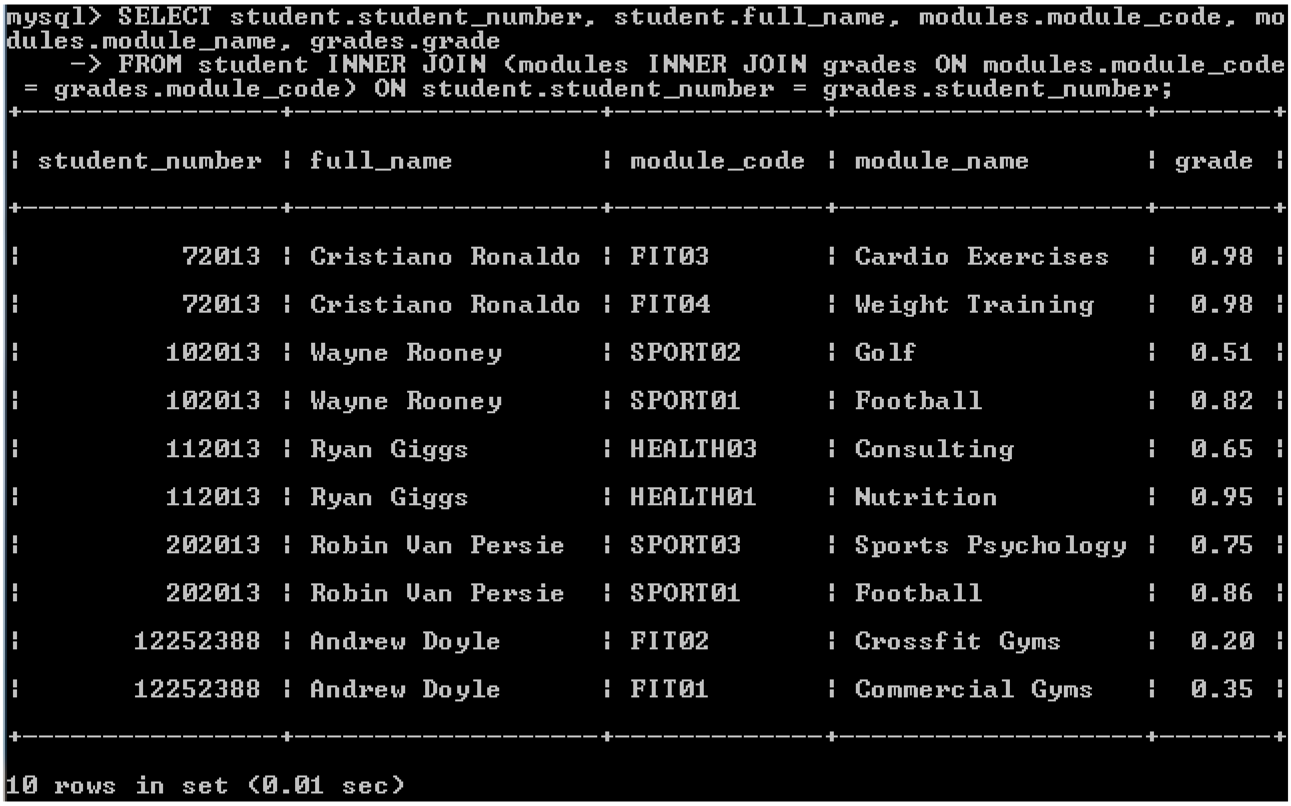
```
mysql> SELECT programme.programme_name, Count(studentprogramme.student_number) A
S number_of_students_registered
    -> FROM programme INNER JOIN studentprogramme ON programme.programme_code =
studentprogramme.programme_code
    -> GROUP BY programme.programme_name;
+----------------+-------------------------------+
| programme_name | number_of_students_registered |
+----------------+-------------------------------+
| Fitness        |                             2 |
| Health Science |                             1 |
| Sports Science |                             2 |
+----------------+-------------------------------+
3 rows in set (0.00 sec)
```

```
SELECT programme.programme_name, Count(studentprogramme.student_number) AS
number_of_students_registered

FROM programme INNER JOIN studentprogramme ON
programme.programme_code=studentprogramme.programme_code

GROUP BY programme.programme_name;
```

This query supplies a list of programmes and the number of students registered on each. The first column displays the **programme_name** from the **programme** table. The second column counts the **student_number** field of the **studentprogramme** table (using the **Count** function).

The information is obtained **FROM** a join between the **programme** and **student programme** table whereby the **programme_code** in both tables is equal (using the **ON** clause). The **GROUP BY** clause instructs the database management system to sort the data and group it by **programme_name**. This ensures the count of students is completed per programme.

QUERY 3



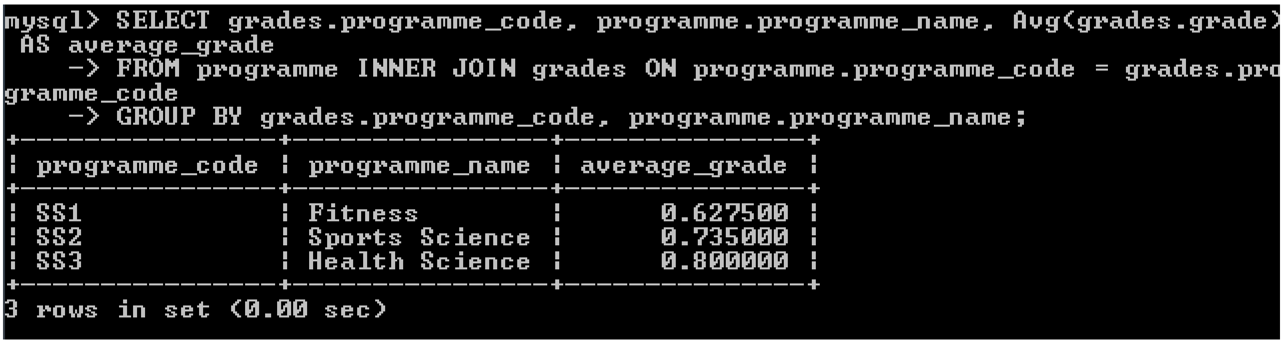
```
mysql> SELECT student.student_number, student.full_name, modules.module_code, mo
dules.module_name, grades.grade
    -> FROM student INNER JOIN (modules INNER JOIN grades ON modules.module_code
 = grades.module_code) ON student.student_number = grades.student_number;
+----------------+-------------------+-------------+-------------------+-------+

| student_number | full_name         | module_code | module_name       | grade |

+----------------+-------------------+-------------+-------------------+-------+

|          72013 | Cristiano Ronaldo | FIT03       | Cardio Exercises  |  0.98 |

|          72013 | Cristiano Ronaldo | FIT04       | Weight Training   |  0.98 |

|         102013 | Wayne Rooney      | SPORT02     | Golf              |  0.51 |

|         102013 | Wayne Rooney      | SPORT01     | Football          |  0.82 |

|         112013 | Ryan Giggs        | HEALTH03    | Consulting        |  0.65 |

|         112013 | Ryan Giggs        | HEALTH01    | Nutrition         |  0.95 |

|         202013 | Robin Van Persie  | SPORT03     | Sports Psychology |  0.75 |

|         202013 | Robin Van Persie  | SPORT01     | Football          |  0.86 |

|       12252388 | Andrew Doyle      | FIT02       | Crossfit Gyms     |  0.20 |

|       12252388 | Andrew Doyle      | FIT01       | Commercial Gyms   |  0.35 |

+----------------+-------------------+-------------+-------------------+-------+

10 rows in set (0.01 sec)
```

```
SELECT student.student_number, student.full_name, modules.module_code,
modules.module_name, grades.grade

FROM student INNER JOIN (modules INNER JOIN grades ON
modules.module_code=grades.module_code) ON
student.student_number=grades.student_number;
```

This query lists all students, their module choices, and corresponding grades. **Student_number** and **full_name** are selected from the **student** table. **Module_code** and **module_name** are selected from the **modules** table. The **grade** is selected from the **grades** table.

The **student** table is joined to the **modules** and **grades** table (which are joined where the **module_code** in **modules** and **grades** are equal) where the **student_number** in **grades** and **student** are equal (**student_number** in grades is a foreign key of **student_number** in student).

QUERY 4



```
mysql> SELECT grades.programme_code, programme.programme_name, Avg(grades.grade)
 AS average_grade
    -> FROM programme INNER JOIN grades ON programme.programme_code = grades.pro
gramme_code
    -> GROUP BY grades.programme_code, programme.programme_name;
+----------------+-----------------+---------------+
| programme_code | programme_name  | average_grade |
+----------------+-----------------+---------------+
| SS1            | Fitness         |      0.627500 |
| SS2            | Sports Science  |      0.735000 |
| SS3            | Health Science  |      0.800000 |
+----------------+-----------------+---------------+
3 rows in set (0.00 sec)
```

```
SELECT grades.programme_code, programme.programme_name, Avg(grades.grade) AS
average_grade

FROM programme INNER JOIN grades ON programme.programme_code =
grades.programme_code

GROUP BY grades.programme_code, programme.programme_name;
```

This query lists the average grade for each programme. The **programme_code** is selected from **grades** whilst the **programme_name** is selected from the **programme** table. An average of **grade** from the **grades** table is calculated using the **Avg** function. In order for the average grade to pertain to a particular programme, the **SELECT** statement is grouped by the programme code and programme name using **GROUP BY** statement.

The information is selecting **FROM** the **programme** table joined to the **grades** table where the **programme_code** in **programme** and **grades** Is equal (using the **ON** keyword).