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CMSC 127 – 1 LAB
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Laboratory Activity 3.1

Writeup Structure (each answer is worth 10 points, use questions below as answer headers):

1. What entities/ tables are in your database?

Answer: *attempts, contains, course, enrolsin, program, student*

```
MariaDB [univ]> SHOW TABLES;
+----------------+
| Tables_in_univ |
+----------------+
| attempts       |
| contains       |
| course         |
| enrolsin       |
| program        |
| student        |
+----------------+
6 rows in set (0.000 sec)
```

2. What columns does each table have and what data types do the columns hold?

From the *attempts* table: Year, Semester, Mark, Grade, Student_ID, CourseID

```
MariaDB [univ]> show columns from attempts;
+------------+-------------+------+-----+---------+-------+
| Field      | Type        | Null | Key | Default | Extra |
+------------+-------------+------+-----+---------+-------+
| Year       | year(4)     | NO   | PRI | NULL    |       |
| Semester   | char(2)     | NO   | PRI | NULL    |       |
| Mark       | smallint(6) | YES  |     | NULL    |       |
| Grade      | char(4)     | YES  |     | NULL    |       |
| Student_ID | char(8)     | YES  | MUL | NULL    |       |
| Course_ID  | char(8)     | YES  | MUL | NULL    |       |
+------------+-------------+------+-----+---------+-------+
6 rows in set (0.005 sec)
```

From the *contains* table: Semester, Year, Course_ID, Program_ID

```
MariaDB [univ]> show columns from contains;
+------------+---------+------+-----+---------+-------+
| Field      | Type    | Null | Key | Default | Extra |
+------------+---------+------+-----+---------+-------+
| Semester   | char(2) | YES  |     | NULL    |       |
| Year       | year(4) | YES  |     | NULL    |       |
| Course_ID  | char(8) | NO   | PRI | NULL    |       |
| Program_ID | char(8) | NO   | PRI | NULL    |       |
+------------+---------+------+-----+---------+-------+
4 rows in set (0.006 sec)
```

From the *course* table: Name, Course_ID, CreditPoints, YearCommenced

```
MariaDB [univ]> show columns from course;
+---------------+-------------+------+-----+---------+-------+
| Field         | Type        | Null | Key | Default | Extra |
+---------------+-------------+------+-----+---------+-------+
| Name          | char(40)    | YES  |     | NULL    |       |
| Course_ID     | char(8)     | NO   | PRI | NULL    |       |
| CreditPoints  | smallint(6) | YES  |     | NULL    |       |
| YearCommenced | year(4)     | YES  |     | NULL    |       |
+---------------+-------------+------+-----+---------+-------+
4 rows in set (0.005 sec)
```

From the *enrolsin* table: Student_ID, Program_ID

```
MariaDB [univ]> show columns from enrolsin;
+------------+---------+------+-----+---------+-------+
| Field      | Type    | Null | Key | Default | Extra |
+------------+---------+------+-----+---------+-------+
| Student_ID | char(8) | NO   | PRI | NULL    |       |
| Program_ID | char(8) | NO   | PRI | NULL    |       |
+------------+---------+------+-----+---------+-------+
2 rows in set (0.006 sec)
```

From the *program* table: Name, Program_ID, CreditPoints, YearCommenced

```
MariaDB [univ]> show columns from program;
+---------------+-------------+------+-----+---------+-------+
| Field         | Type        | Null | Key | Default | Extra |
+---------------+-------------+------+-----+---------+-------+
| Name          | char(40)    | YES  |     | NULL    |       |
| Program_ID    | char(8)     | NO   | PRI | NULL    |       |
| CreditPoints  | smallint(6) | YES  |     | NULL    |       |
| YearCommenced | year(4)     | YES  |     | NULL    |       |
+---------------+-------------+------+-----+---------+-------+
4 rows in set (0.006 sec)
```

From the *student* table: GivenNames, Surname, Student_ID, DateOfBirth, YearEnrolled, Program_ID

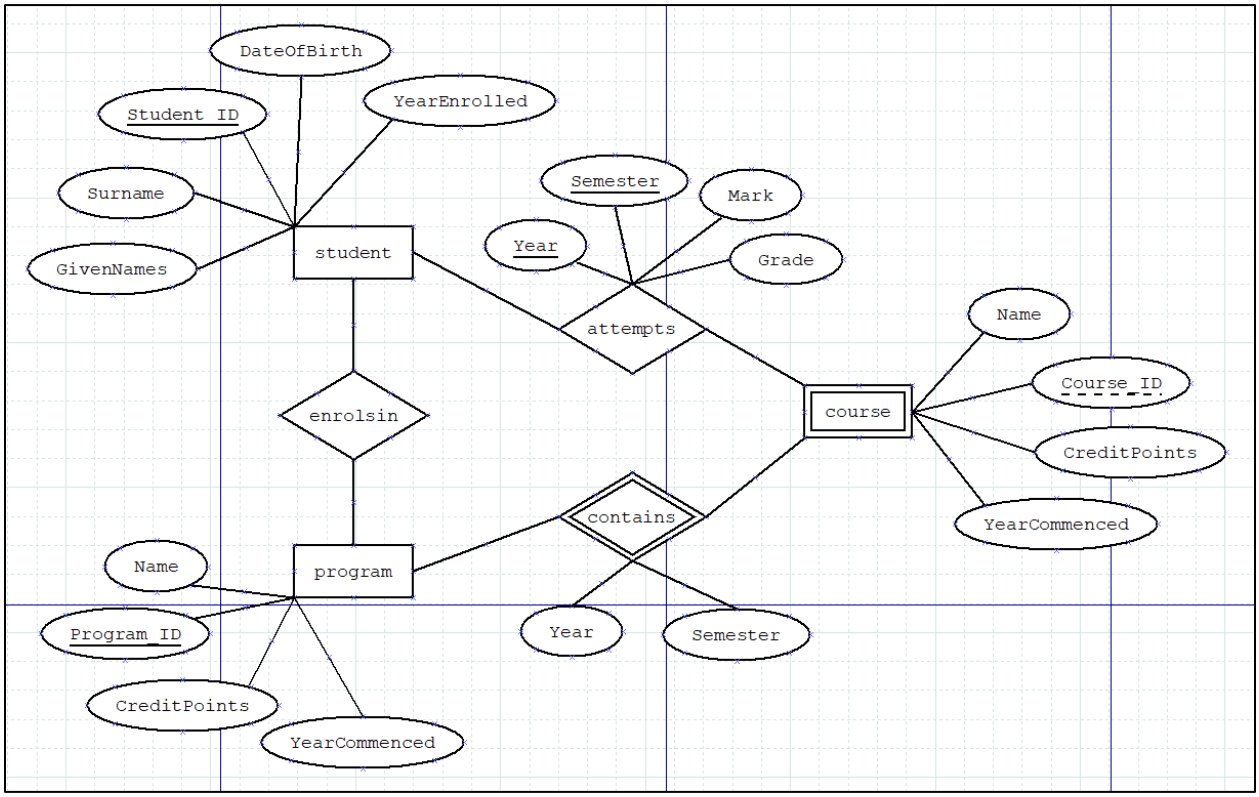
```
MariaDB [univ]> show columns from student;
+--------------+----------+------+-----+---------+-------+
| Field        | Type     | Null | Key | Default | Extra |
+--------------+----------+------+-----+---------+-------+
| GivenNames   | char(40) | YES  |     | NULL    |       |
| Surname      | char(45) | YES  |     | NULL    |       |
| Student_ID   | char(8)  | NO   | PRI | NULL    |       |
| DateOfBirth  | date     | YES  |     | NULL    |       |
| YearEnrolled | year(4)  | YES  |     | NULL    |       |
| Program_ID   | char(8)  | YES  |     | NULL    |       |
+--------------+----------+------+-----+---------+-------+
6 rows in set (0.005 sec)
```

3. Explain what primary and secondary keys are and list which primary and secondary keys exist in your database.

Answer: A primary key is a single attribute that identifies each tuple uniquely, while a secondary key may be one or more attributes that is also capable of identifying tuples uniquely in a table. Secondary keys are the candidate keys that weren't chosen as the primary key, also known as the "alternate keys". The following are the primary and secondary keys that exists in the database in this laboratory:

Primary Keys	Secondary Keys
Course_ID	There are no Secondary keys that exist in the database.
Program_ID	
Student_ID	
Year & Semester	

4. Draw an Entity Relationship Diagram (ERD) of your database. You must use either Microsoft Visio or any of the Free Open Source Software (FOSS) alternatives such as Dia. Include a screenshot of your drawing in the final write up file.



5. Give an example of each of the following from your database and describe in detail why your example satisfies the definition:
    a. One-to-one relationship
        - There's no one-to-one relationship that exist in the database.
    b. One-to-many relationship
        - Program and Course are involved in a one-to-many relationship since a Program can be associated with zero or multiple Courses, and multiple courses can only be involved in one program.
    c. Many-to-many relationship
        - Student and Course are involved in a many-to-many relationship since many students can have zero or multiple courses, and several courses can also have zero or more students.
    d. Recursive relationship
        - There's no recursive relationship that exist in the database.