《数据库系统原理》实验报告（）					
题目：交互式 **SQL**					
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实验环境：docer 中的 mariadb 容器					

实验步骤及结果截图：

一. 创建数据库

```
MariaDB [(none)]> CREATE DATABASE exp2;
Query OK, 1 row affected (0.000 sec)
```

二. 创建数据表

1. depts1

```
MariaDB [exp2]> CREATE TABLE depts1 (
    -> no INT NOT NULL AUTO_INCREMENT,
    -> name VARCHAR(30) NOT NULL,
    -> PRIMARY KEY (no));
Query OK, 0 rows affected (0.016 sec)
```

2. students1

```
MariaDB [exp2]> CREATE TABLE students1 (
    -> no INT NOT NULL AUTO_INCREMENT,
    -> name VARCHAR(20) NOT NULL,
    -> gender VARCHAR(6) NOT NULL,
    -> CHECK (gender='Male' OR gender='Female'),
    -> age INT NOT NULL,
    -> d_no INT NOT NULL,
    -> PRIMARY KEY (no),
    -> CONSTRAINT st_c_1 FOREIGN KEY (d_no) REFERENCES depts1(no));
Query OK, 0 rows affected (0.016 sec)
```

3. courses1

```
MariaDB [exp2]> CREATE TABLE courses1 (
    -> no INT NOT NULL AUTO_INCREMENT,
    -> name VARCHAR(20) NOT NULL,
    -> credit INT NOT NULL,
    -> d_no INT NOT NULL,
    -> PRIMARY KEY (no),
    -> CONSTRAINT con_c_1 FOREIGN KEY (d_no) REFERENCES depts1(no));
Query OK, 0 rows affected (0.015 sec)
```

4. scores1

```
MariaDB [exp2]> CREATE TABLE scores1 (
    -> s_no INT NOT NULL,
    -> c_no INT NOT NULL,
    -> score INT NOT NULL,
    -> CONSTRAINT sc_c_1 FOREIGN KEY (s_no) REFERENCES students1(no),
    -> CONSTRAINT sc_c_2 FOREIGN KEY (c_no) REFERENCES courses1(no));
Query OK, 0 rows affected (0.019 sec)
```

三. 执行插入操作

```
MariaDB [exp2]> insert into depts1 (no,name) values (1,'Computer Science');
Query OK, 1 row affected (0.010 sec)

MariaDB [exp2]> insert into depts1 (no,name) values (2,'Mathematics');
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into depts1 (no,name) values (3,'Architecture');
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into depts1 (no,name) values (4,'Management');
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (1,'Database',5
Query OK, 1 row affected (0.008 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (2,'Mathematics',
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (3,'Information System',
Query OK, 1 row affected (0.001 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (4,'Operating System',
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (5,'Data Structure',
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (6,'Data Processing',
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into courses1 (no,name,credit,d_no) values (7,'PASCAL',3
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into students1 (no,name,gender,age,d_no) values (200215120,'Mile','Male',2
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into students1 (no,name,gender,age,d_no) values (200215121,'Tom','Male',2
Query OK, 1 row affected (0.001 sec)

MariaDB [exp2]> insert into students1 (no,name,gender,age,d_no) values (200215122,'Jerry','Female',1
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into students1 (no,name,gender,age,d_no) values (200215123,'Alice','Female',
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into students1 (no,name,gender,age,d_no) values (200215125,'Bob','Male',
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into scores1 (s_no,c_no,score) values (200215121,1,
Query OK, 1 row affected (0.007 sec)
```

```
MariaDB [exp2]> insert into scores1 (s_no,c_no,score) values (200215121,2,8
Query OK, 1 row affected (0.008 sec)

MariaDB [exp2]> insert into scores1 (s_no,c_no,score) values (200215121,3,8
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into scores1 (s_no,c_no,score) values (200215122,2,
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into scores1 (s_no,c_no,score) values (200215122,3,
Query OK, 1 row affected (0.007 sec)
```

四. 执行查询操作

```
MariaDB [exp2]> select * from students1;
+-----------+-------+--------+-----+------+
| no        | name  | gender | age | d_no |
+-----------+-------+--------+-----+------+
| 200215120 | Mile  | Male   | 21  | 3    |
| 200215121 | Tom   | Male   | 20  | 1    |
| 200215122 | Jerry | Female | 19  | 1    |
| 200215123 | Alice | Female | 18  | 2    |
| 200215125 | Bob   | Male   | 19  | 3    |
+-----------+-------+--------+-----+------+
5 rows in set (0.000 sec)

MariaDB [exp2]> select * from courses1;
+----+--------------------+--------+------+
| no | name               | credit | d_no |
+----+--------------------+--------+------+
| 1  | Database           | 5      | 1    |
| 2  | Mathematics        | 2      | 2    |
| 3  | Information System  | 1      | 4    |
| 4  | Operating System   | 6      | 1    |
| 5  | Data Structure     | 4      | 1    |
| 6  | Data Processing    | 2      | 4    |
| 7  | PASCAL             | 3      | 1    |
+----+--------------------+--------+------+
7 rows in set (0.000 sec)

MariaDB [exp2]> select * from depts1;
+----+------------------+
| no | name             |
+----+------------------+
| 1  | Computer Science |
| 2  | Mathematics      |
| 3  | Architecture     |
| 4  | Management       |
+----+------------------+
4 rows in set (0.000 sec)
```

```
MariaDB [exp2]> select * from scores1;
+-----------+------+-------+
| s_no      | c_no | score |
+-----------+------+-------+
| 200215121 |    1 |    92 |
| 200215121 |    2 |    85 |
| 200215121 |    3 |    88 |
| 200215122 |    2 |    90 |
| 200215122 |    3 |    80 |
+-----------+------+-------+
5 rows in set (0.000 sec)
```

五. 上机题目

- students1(no, name, gender, age, d_no)

- courses1(no, name, credit, d_no)【d_no:系编号】

- scores1(s_no, c_no, score)【s_no:学生学号, c_no:课程号】

- depts1(no, name)

1.
```
MariaDB [exp2]> select name,age
    -> from students1
    -> where age<21;
+-------+-----+
| name  | age |
+-------+-----+
| Tom   |  20 |
| Jerry |  19 |
| Alice |  18 |
| Bob   |  19 |
+-------+-----+
4 rows in set (0.000 sec)
```

2.
```
MariaDB [exp2]> select students1.no
    -> from students1,scores1
    -> where students1.no=scores1.s_no and
    -> scores1.c_no=2 and
    -> scores1.score between 80 and 90;
+-----------+
| no        |
+-----------+
| 200215121 |
| 200215122 |
+-----------+
2 rows in set (0.001 sec)
```

3.

```
MariaDB [exp2]> select name from students1 where name like '_e%';
+-------+
| name  |
+-------+
| Jerry |
+-------+
1 row in set (0.000 sec)
```

4.

```
MariaDB [exp2]> select no,d_no,age
    -> from students1
    -> order by d_no asc,age desc;
+-----------+------+-----+
| no        | d_no | age |
+-----------+------+-----+
| 200215121 |    1 |  20 |
| 200215122 |    1 |  19 |
| 200215123 |    2 |  18 |
| 200215120 |    3 |  21 |
| 200215125 |    3 |  19 |
+-----------+------+-----+
5 rows in set (0.000 sec)
```

5.

```
MariaDB [exp2]> select count(*),avg(age)
    -> from (select age from students1 where gender='Female') as subquery;
+----------+----------+
| count(*) | avg(age) |
+----------+----------+
|        2 |  18.5000 |
+----------+----------+
1 row in set (0.000 sec)
```

6.

```
MariaDB [exp2]> select max(score),min(score),sum(score)
    -> from (select score from scores1 where c_no=3 and score > 60) as subquery;
+------------+------------+------------+
| max(score) | min(score) | sum(score) |
+------------+------------+------------+
|         88 |         80 |        168 |
+------------+------------+------------+
1 row in set (0.001 sec)
```

7.

```
MariaDB [exp2]> insert into students1 (no,name,gender,age,d_no) values (200215199,'jing','Male',20,1);
Query OK, 1 row affected (0.007 sec)

MariaDB [exp2]> insert into scores1 (s_no,c_no,score) values (200215199,1,72);
Query OK, 1 row affected (0.007 sec)
```

```
MariaDB [exp2]> select * from scores1;
+-----------+------+-------+
| s_no      | c_no | score |
+-----------+------+-------+
| 200215121 |    1 |    92 |
| 200215121 |    2 |    85 |
| 200215121 |    3 |    88 |
| 200215122 |    2 |    90 |
| 200215122 |    3 |    80 |
| 200215199 |    1 |    72 |
+-----------+------+-------+
6 rows in set (0.000 sec)
```

8.
```
MariaDB [exp2]> select avg(score)
    -> from scores1
    -> group by s_no
    -> having avg(score)>75
    -> order by s_no;
+------------+
| avg(score) |
+------------+
|    88.3333 |
|    85.0000 |
+------------+
2 rows in set (0.007 sec)
```

9.
```
MariaDB [exp2]> select name from students1,scores1 where students1.no=scores1.s_no and scores1.c_no=1
    -> union
    -> select name from students1,scores1 where students1.no=scores1.s_no and scores1.c_no=2;
+-------+
| name  |
+-------+
| Tom   |
| jing  |
| Jerry |
+-------+
3 rows in set (0.001 sec)
```

10.
```
MariaDB [exp2]> select name
    -> from students1
    -> where
    -> no in (select s_no from scores1 where c_no=1)
    -> and
    -> no in (select s_no from scores1 where c_no=2);
+------+
| name |
+------+
| Tom  |
+------+
1 row in set (0.001 sec)
```

11.

```
MariaDB [exp2]> select name
    -> from depts1
    -> where no in
    -> (select d_no
    -> from students1
    -> where no in
    -> (select r1.s_no
    -> from (select sc1.s_no,sc1.c_no
    -> from scores1 as sc1,scores1 as sc2
    -> where sc1.c_no=sc2.c_no and sc1.score>sc2.score) as r1
    -> where r1.c_no in (select no from courses1 where name='Database')));
+------------------+
| name             |
+------------------+
| Computer Science |
+------------------+
1 row in set (0.001 sec)
```

12.

```
MariaDB [exp2]> create view view1 as
    -> select students1.no as sno,students1.name as sname,students1.age as sage,depts1.name as deptname
    -> from students1,depts1
    -> where students1.d_no=depts1.no;
Query OK, 0 rows affected (0.015 sec)

 MariaDB [exp2]> select * from view1;
 +-----------+-------+------+------------------+
 | sno       | sname | sage | deptname         |
 +-----------+-------+------+------------------+
 | 200215120 | Mile  |   21 | Architecture     |
 | 200215121 | Tom   |   20 | Computer Science |
 | 200215122 | Jerry |   19 | Computer Science |
 | 200215123 | Alice |   18 | Mathematics      |
 | 200215125 | Bob   |   19 | Architecture     |
 | 200215199 | jing  |   20 | Computer Science |
 +-----------+-------+------+------------------+
 6 rows in set (0.001 sec)
```

出现的问题：

1.语法使用不熟练

比如 between and，匹配模式，升序降序，聚合表达式，group by having 等

2.有外键约束的插入

scores1 表有外键的约束，直接插入会失败

3.复杂子句编写

第 11 题的语句相对复杂，使我花了一些时间才理清句子结构

解决方案：

1.语法使用不熟练

查阅资料，了解语法并使用后就渐渐熟悉了

2.有外键约束的插入

先插入 students1 表，再插入 scores1 表

3.复杂子句的编写

从内到外一层一层依次编写

解决方案：

1.语法使用不熟练

查阅资料，了解语法并使用后就渐渐熟悉了

2.有外键约束的插入

先插入 students1 表，再插入 scores1 表

3.复杂子句的编写

从内到外一层一层依次编写