

| 《数据库系统原理》实验报告 6  |         |    |     |    |            |
|--|---------|----|-----|----|------------|
| 题目：SQL 综合实验  |         |    |     |    |            |
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| 实验环境：在 docker 上下载 mariadb:latest 镜像，创建容器，在该容器中进行实验   |         |    |     |    |            |
| <p>实验步骤及结果截图：</p> <p>1.建表</p> <p>①Book:</p> <p>语句：</p> <pre>MariaDB [finalexp]&gt; create table Book( -&gt; bno varchar(10) primary key, -&gt; bname varchar(30), -&gt; author varchar(30), -&gt; price float);</pre> <p>结果：</p> <pre>Query OK, 0 rows affected (0.012 sec)</pre> <p>②Student:</p> <p>语句：</p> <pre>MariaDB [finalexp]&gt; create table Student( -&gt; sno varchar(10) primary key, -&gt; sname varchar(30), -&gt; grade varchar(5));</pre> <p>结果：</p> <pre>Query OK, 0 rows affected (0.006 sec)</pre> <p>③Borrow:</p> <p>语句：</p> <pre>MariaDB [finalexp]&gt; create table Borrow( -&gt; sno varchar(10), -&gt; bno varchar(10), -&gt; rdate datetime, -&gt; primary key(sno,bno), -&gt; foreign key(sno) references Student(sno) on delete cascade, -&gt; foreign key(bno) references Book(bno) on delete cascade);</pre> <p>结果：</p> <pre>Query OK, 0 rows affected (0.015 sec)</pre> <p>2.插入样例数据</p> <p>①Book</p> <p>语句：</p> |         |    |     |    |            |

```
MariaDB [finalexp]> insert into Book values
-> ('T1001','Java程序设计','李新民',23.5),
-> ('T1002','数据库原理及应用','王珊',27),
-> ('T1003','Java高级编程','陈海',23.5),
-> ('T1004','大学英语','张宁',18.5),
-> ('T1005','C++程序设计','马品三',33.5),
-> ('T1006','数据结构','刘子单',35);
Query OK, 6 rows affected (0.007 sec)
Records: 6 Duplicates: 0 Warnings: 0
```

结果:

```
MariaDB [finalexp]> select * from Book;
+-----+-----+-----+-----+
| bno   | bname                | author  | price |
+-----+-----+-----+-----+
| T1001 | Java程序设计          | 李新民  | 23.5  |
| T1002 | 数据库原理及应用      | 王珊    | 27    |
| T1003 | Java高级编程          | 陈海    | 23.5  |
| T1004 | 大学英语              | 张宁    | 18.5  |
| T1005 | C++程序设计            | 马品三  | 33.5  |
| T1006 | 数据结构              | 刘子单  | 35    |
+-----+-----+-----+-----+
6 rows in set (0.000 sec)
```

## ②Student

语句:

```
MariaDB [finalexp]> insert into Student values
-> ('K001','张三','大一'),
-> ('K002','李四','大二'),
-> ('K003','王五','大三'),
-> ('K004','赵六','大四'),
-> ('K005','刘七','大四');
Query OK, 5 rows affected (0.002 sec)
Records: 5 Duplicates: 0 Warnings: 0
```

结果:

```
MariaDB [finalexp]> select * from Student;
+-----+-----+-----+
| sno   | sname | grade |
+-----+-----+-----+
| K001  | 张三  | 大一  |
| K002  | 李四  | 大二  |
| K003  | 王五  | 大三  |
| K004  | 赵六  | 大四  |
| K005  | 刘七  | 大四  |
+-----+-----+-----+
5 rows in set (0.000 sec)
```

## ③Borrow

语句:

```
MariaDB [finalexp]> insert into Borrow values
-> ('K001','T1006','2022-10-9'),
-> ('K001','T1001','2022-3-1'),
-> ('K001','T1004','2022-5-7'),
-> ('K002','T1002','2022-6-9'),
-> ('K002','T1003','2022-12-5'),
-> ('K002','T1001','2022-11-3'),
-> ('K003','T1005','2022-9-4'),
-> ('K004','T1002','2022-2-5');
Query OK, 8 rows affected (0.007 sec)
Records: 8 Duplicates: 0 Warnings: 0
```

结果:

```
MariaDB [finalexp]> select * from Borrow;
+-----+-----+-----+
| sno  | bno  | rdate                |
+-----+-----+-----+
| K001 | T1001 | 2022-03-01 00:00:00 |
| K001 | T1004 | 2022-05-07 00:00:00 |
| K001 | T1006 | 2022-10-09 00:00:00 |
| K002 | T1001 | 2022-11-03 00:00:00 |
| K002 | T1002 | 2022-06-09 00:00:00 |
| K002 | T1003 | 2022-12-05 00:00:00 |
| K003 | T1005 | 2022-09-04 00:00:00 |
| K004 | T1002 | 2022-02-05 00:00:00 |
+-----+-----+-----+
8 rows in set (0.000 sec)
```

3. 查询书名中包含“程序设计”的图书信息，输出所有信息（包括书名、书号、作者、单价），并按照单价降序排列

语句:

```
MariaDB [finalexp]> select * from Book
-> where bname like '%程序设计%'
-> order by price desc;
```

结果:

```
+-----+-----+-----+-----+
| bno  | bname          | author  | price |
+-----+-----+-----+-----+
| T1005 | C++程序设计    | 马品三  | 33.5  |
| T1001 | Java程序设计    | 李新民  | 23.5  |
+-----+-----+-----+-----+
2 rows in set (0.000 sec)
```

4. 查询借阅了书名为“数据库原理及应用”的学生信息，输出该学生的学号、姓名和年级;

语句:

```
MariaDB [finalexp]> select Student.sno,Student.sname,Student.grade
-> from Borrow
-> inner join Student on Borrow.sno=Student.sno
-> inner join Book on Borrow.bno=Book.bno
-> where Book.bname='数据库原理及应用';
```

结果:

```
+-----+-----+-----+
| sno | sname | grade |
+-----+-----+-----+
| K002 | 李四  | 大二  |
| K004 | 赵六  | 大四  |
+-----+-----+-----+
2 rows in set (0.001 sec)
```

5. 统计每个学生借书信息，输出每个学生的学号、借书书名和还书日期；

语句:

```
MariaDB [finalexp]> select Student.sno,Book.bname,Borrow.rdate
-> from Borrow
-> inner join Student on Borrow.sno=Student.sno
-> inner join Book on Borrow.bno=Book.bno;
```

结果:

```
+-----+-----+-----+
| sno | bname                | rdate                |
+-----+-----+-----+
| K001 | Java程序设计          | 2022-03-01 00:00:00 |
| K001 | 大学英语              | 2022-05-07 00:00:00 |
| K001 | 数据结构              | 2022-10-09 00:00:00 |
| K002 | Java程序设计          | 2022-11-03 00:00:00 |
| K002 | 数据库原理及应用      | 2022-06-09 00:00:00 |
| K002 | Java高级编程          | 2022-12-05 00:00:00 |
| K003 | C++程序设计           | 2022-09-04 00:00:00 |
| K004 | 数据库原理及应用      | 2022-02-05 00:00:00 |
+-----+-----+-----+
8 rows in set (0.001 sec)
```

6. 查询所有借阅已过期图书的信息，输出学生姓名、书名和还书日期；

语句:

```
MariaDB [finalexp]> select Student.sname,Book.bname,Borrow.rdate
-> from Borrow
-> inner join Student on Borrow.sno=Student.sno
-> inner join Book on Borrow.bno=Book.bno
-> where Borrow.rdate<'2022-11-8';
```

结果:

```

+-----+-----+-----+
| sname | bname                | rdate                |
+-----+-----+-----+
| 张三  | Java程序设计          | 2022-03-01 00:00:00 |
| 张三  | 大学英语              | 2022-05-07 00:00:00 |
| 张三  | 数据结构              | 2022-10-09 00:00:00 |
| 李四  | Java程序设计          | 2022-11-03 00:00:00 |
| 李四  | 数据库原理及应用      | 2022-06-09 00:00:00 |
| 王五  | C++程序设计           | 2022-09-04 00:00:00 |
| 赵六  | 数据库原理及应用      | 2022-02-05 00:00:00 |
+-----+-----+-----+
7 rows in set (0.001 sec)

```

7. 查询没有借阅过书的学生信息，输出学生姓名和学号；

语句：

```

MariaDB [finalexp]> select sname,sno from Student
-> where sno not in
-> (select sno from Borrow);

```

结果：

```

+-----+-----+
| sname | sno |
+-----+-----+
| 刘七  | K005 |
+-----+-----+
1 row in set (0.009 sec)

```

8. 查询借了"Java 程序设计"但没有借"数据库原理及应用"的读者信息，输出这些学生的学号，并按照学号升序排列；

语句：

```

MariaDB [finalexp]> select distinct B.sno from Borrow as B
-> where B.sno in
-> (select sno
-> from Borrow inner join Book on Borrow.bno=Book.bno
-> where bname='Java程序设计')
-> and B.sno not in
-> (select sno
-> from Borrow inner join Book on Borrow.bno=Book.bno
-> where bname='数据库原理及应用')
-> order by B.sno asc;

```

结果：

```

+-----+
| sno |
+-----+
| K001 |
+-----+
1 row in set (0.002 sec)

```

9. 创建过程

添加一列：

```

MariaDB [finalexp]> alter table Borrow add column bstate bool;
Query OK, 0 rows affected (0.027 sec)
Records: 0 Duplicates: 0 Warnings: 0

```

添加过程:

```
MariaDB [finalexp]> create procedure update_bstate()
-> begin
->   declare done int default 0;
->   declare sno_value varchar(10);
->   declare bno_value varchar(10);
->   declare rdate_value date;
->   declare bstate_value bool;
->   declare borrow_cursor cursor for select sno,bno,rdate,false as bstate from Borrow;
->   declare continue handler for not found set done=1;
->   open borrow_cursor;
->   check_loop:loop
->     fetch borrow_cursor into sno_value,bno_value,rdate_value,bstate_value;
->     if done then
->       leave check_loop;
->     end if;
->     if rdate_value<'2022-11-8' then
->       update Borrow set bstate=True where sno=sno_value and bno=bno_value;
->     else
->       update Borrow set bstate=False where sno=sno_value and bno=bno_value;
->     end if;
->   end loop;
->   close borrow_cursor;
-> end $$
Query OK, 0 rows affected (0.011 sec)
```

调用过程:

```
MariaDB [finalexp]> call update_bstate();
Query OK, 8 rows affected (0.014 sec)
```

结果:

```
MariaDB [finalexp]> select * from Borrow;
+-----+-----+-----+-----+
| sno  | bno  | rdate                | bstate |
+-----+-----+-----+-----+
| K001 | T1001 | 2022-03-01 00:00:00 | 1      |
| K001 | T1004 | 2022-05-07 00:00:00 | 1      |
| K001 | T1006 | 2022-10-09 00:00:00 | 1      |
| K002 | T1001 | 2022-11-03 00:00:00 | 1      |
| K002 | T1002 | 2022-06-09 00:00:00 | 1      |
| K002 | T1003 | 2022-12-05 00:00:00 | 0      |
| K003 | T1005 | 2022-09-04 00:00:00 | 1      |
| K004 | T1002 | 2022-02-05 00:00:00 | 1      |
+-----+-----+-----+-----+
8 rows in set (0.001 sec)
```

10. 修改图书表, 在 bname 列上增加唯一性索引 bname\_index, 并按 bname 降序排列;

语句:

```
MariaDB [finalexp]> create unique index index_bname_desc on Book(bname desc)
Query OK, 0 rows affected (0.033 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

结果:

```
MariaDB [finalexp]> select * from Book order by bname desc;
```

| bno   | bname    | author | price |
|-------|----------|--------|-------|
| T1006 | 数据结构     | 刘子单    | 35    |
| T1002 | 数据库原理及应用 | 王珊     | 27    |
| T1004 | 大学英语     | 张宁     | 18.5  |
| T1003 | Java高级编程 | 陈海     | 23.5  |
| T1001 | Java程序设计 | 李新民    | 23.5  |
| T1005 | C++程序设计  | 马品三    | 33.5  |

6 rows in set (0.001 sec)

#### 出现的问题：

在创建过程的题目中，我遇到了如下的问题：1.如何遍历一张表的每一项；2.使用 if 判断语句的时候使用了 Borrow.rdate 导致出错

#### 解决方案：

- 1.使用游标来对表的每一项进行遍历
- 2.不使用表明而使用存储过程的参数来进行比较