

浙江大学

数据库系统实验报告

作业名称: SQL 数据完整性

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实验名称

一、 实验目的

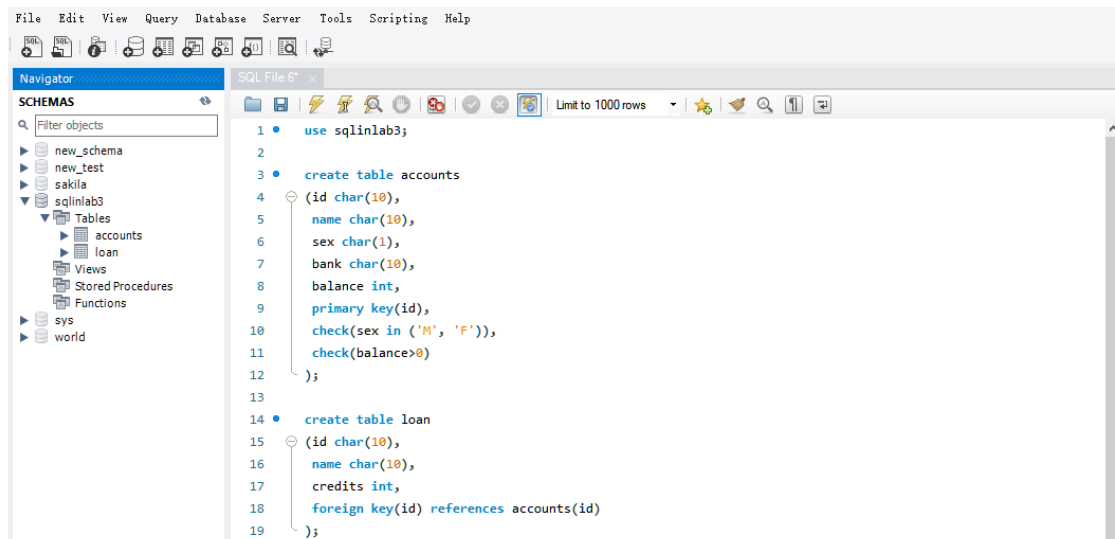
1. 熟悉通过 SQL 进行数据完整性控制的方法。

二、 实验环境

1. 数据库管理系统：MySQL

三、 实验流程

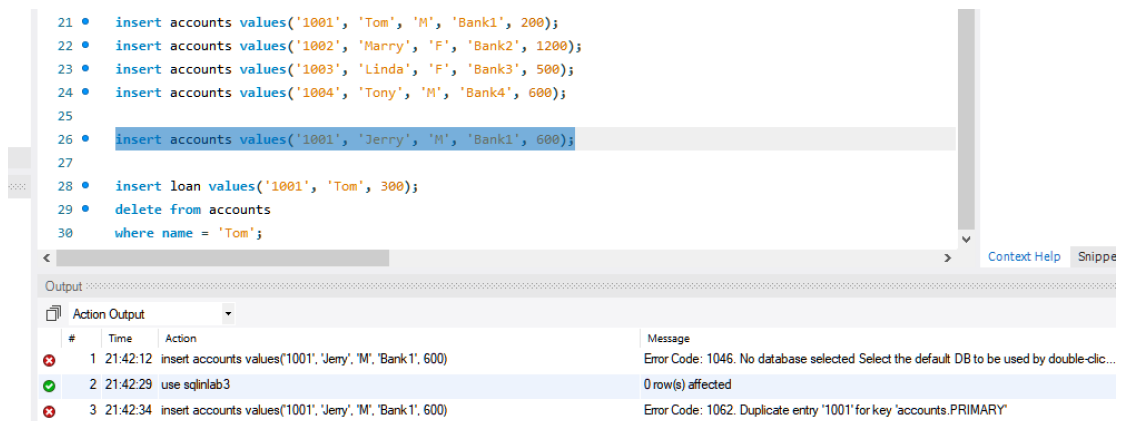
1. 在实验过程中，截图所用命令和实验结果
2. 定义若干表，其中包括 primary key, foreign key 和 check 的定义。



The screenshot shows the MySQL Workbench interface. The left sidebar displays the 'SCHEMAS' tree with 'sqlinlab3' selected. The main editor window shows the following SQL code:

```
1 • use sqlinlab3;
2
3 • create table accounts
4   (id char(10),
5    name char(10),
6    sex char(1),
7    bank char(10),
8    balance int,
9    primary key(id),
10   check(sex in ('M', 'F')),
11   check(balance>0)
12  );
13
14 • create table loan
15   (id char(10),
16    name char(10),
17    credits int,
18    foreign key(id) references accounts(id)
19  );
```

3. 让表中插入数据，考察 primary key 如何控制实体完整性。



The screenshot shows the MySQL Workbench interface with SQL insert statements and the output window. The SQL code is as follows:

```
21 • insert accounts values('1001', 'Tom', 'M', 'Bank1', 200);
22 • insert accounts values('1002', 'Harry', 'F', 'Bank2', 1200);
23 • insert accounts values('1003', 'Linda', 'F', 'Bank3', 500);
24 • insert accounts values('1004', 'Tony', 'M', 'Bank4', 600);
25
26 • insert accounts values('1001', 'Jerry', 'M', 'Bank1', 600);
27
28 • insert loan values('1001', 'Tom', 300);
29 • delete from accounts
30   where name = 'Tom';
```

The output window shows the following messages:

#	Time	Action	Message
1	21:42:12	insert accounts values('1001', 'Jerry', 'M', 'Bank1', 600)	Error Code: 1046. No database selected Select the default DB to be used by double-clc...
2	21:42:29	use sqlinlab3	0 row(s) affected
3	21:42:34	insert accounts values('1001', 'Jerry', 'M', 'Bank1', 600)	Error Code: 1062. Duplicate entry '1001' for key 'accounts.PRIMARY'

4. 删除被引用表中的行，考察 foreign key 中 on delete 子句如何控制参照完整性。

```

28 • insert loan values('1001', 'Tom', 300);
29 • delete from accounts
30   where name = 'Tom';

```

Output

#	Time	Action	Message
1	21:42:12	insert accounts values('1001', 'Jerry', 'M', 'Bank1', 600)	Error Code: 1046. No database selected Select the default DB to be used by double-clicking on the database name in the left pane.
2	21:42:29	use sqllinlab3	0 row(s) affected
3	21:42:34	insert accounts values('1001', 'Jerry', 'M', 'Bank1', 600)	Error Code: 1062. Duplicate entry '1001' for key 'accounts.PRIMARY'
4	21:43:04	insert loan values('1001', 'Tom', 300)	1 row(s) affected
5	21:43:04	delete from accounts where name = 'Tom'	Error Code: 1451. Cannot delete or update a parent row: a foreign key constraint fails ('sqllinlab3', 'loan', CONSTRAINT 'loan_ibfk_1' FOREIGN KEY ('id') REFERENCES 'accounts' ('id'))

5. 修改被引用表中的行的 primary key, 考察 foreign key 中 on update 子句如何控制参照完整性。

```

28 • update accounts
29   set id = '1005'
30   where name = 'Tom';

```

Output

#	Time	Action	Message	Duration / Fetch
2	21:42:29	use sqllinlab3	0 row(s) affected	0.000 sec
3	21:42:34	insert accounts values('1001', 'Jerry', 'M', 'Bank1', 600)	Error Code: 1062. Duplicate entry '1001' for key 'accounts.PRIMARY'	0.016 sec
4	21:43:04	insert loan values('1001', 'Tom', 300)	1 row(s) affected	0.032 sec
5	21:43:04	delete from accounts where name = 'Tom'	Error Code: 1451. Cannot delete or update a parent row: a foreign key constraint fails ('sqllinlab3', 'loan', CONSTRAINT 'loan_ibfk_1' FOREIGN KEY ('id') REFERENCES 'accounts' ('id'))	0.015 sec
6	21:44:13	update accounts set id = '1005' where name = 'Tom'	Error Code: 1451. Cannot delete or update a parent row: a foreign key constraint fails ('sqllinlab3', 'loan', CONSTRAINT 'loan_ibfk_1' FOREIGN KEY ('id') REFERENCES 'accounts' ('id'))	0.016 sec

6. 修改或插入表中数据, 考察 check 子句如何控制校验完整性。

```

32 • insert into accounts values('1005', 'Jake', 'M', 'Bank1', 0);
33 • insert into accounts values('1005', 'Jake', 'L', 'Bank1', 0);

```

Output

#	Time	Action	Message
4	21:43:04	insert loan values('1001', 'Tom', 300)	1 row(s) affected
5	21:43:04	delete from accounts where name = 'Tom'	Error Code: 1451. Cannot delete or update a parent row: a foreign key constraint fails ('sqllinlab3', 'loan', CONSTRAINT 'loan_ibfk_1' FOREIGN KEY ('id') REFERENCES 'accounts' ('id'))
6	21:44:13	update accounts set id = '1005' where name = 'Tom'	Error Code: 1451. Cannot delete or update a parent row: a foreign key constraint fails ('sqllinlab3', 'loan', CONSTRAINT 'loan_ibfk_1' FOREIGN KEY ('id') REFERENCES 'accounts' ('id'))
7	21:46:35	insert into accounts values('1005', 'Jake', 'M', 'Bank1', 0)	Error Code: 3819. Check constraint 'accounts_chk_2' is violated.
8	21:48:54	insert into accounts values('1005', 'Jake', 'L', 'Bank1', 0)	Error Code: 3819. Check constraint 'accounts_chk_1' is violated.

7. 定义一个 asseration, 并通过修改表中数据考察断言如何控制数据完整性。

```

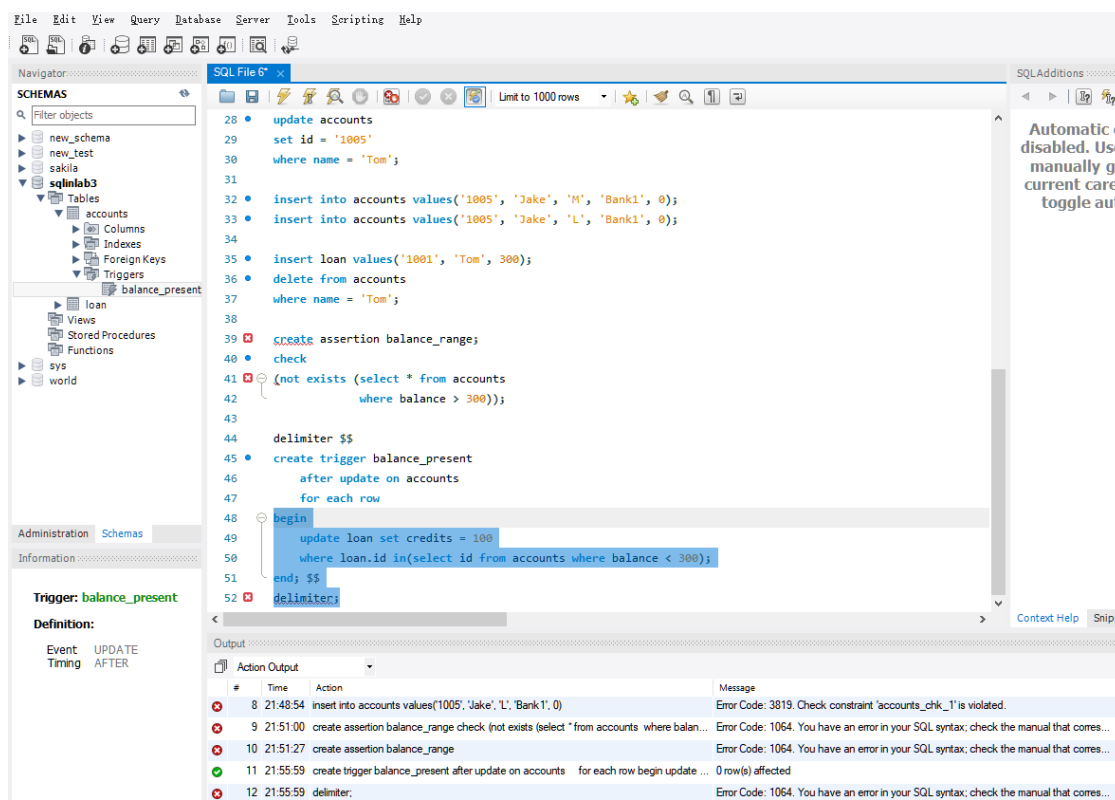
38 • create assertion balance_range;
39 • check
40   (not exists (select * from accounts
41                where balance > 300));

```

Output

#	Time	Action	Message	Duration / Fetch
6	21:44:13	update accounts set id = '1005' where name = 'Tom'	Error Code: 1451. Cannot delete or update a parent row: a foreign key constraint fails ('sqllinlab3', 'loan', CONSTRAINT 'loan_ibfk_1' FOREIGN KEY ('id') REFERENCES 'accounts' ('id'))	0.016 sec
7	21:46:35	insert into accounts values('1005', 'Jake', 'M', 'Bank1', 0)	Error Code: 3819. Check constraint 'accounts_chk_2' is violated.	0.000 sec
8	21:48:54	insert into accounts values('1005', 'Jake', 'L', 'Bank1', 0)	Error Code: 3819. Check constraint 'accounts_chk_1' is violated.	0.000 sec
9	21:51:00	create assertion balance_range check (not exists (select * from accounts where balance > 300))	Error Code: 1064. You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'assertion balance_range' at line 1	0.000 sec

8. 定义一个 trigger, 并通过修改表中数据考察触发器如何起作用。



Delimiter 语句含语法错误

```

53 • select * from accounts;
54 select * from loan;
55
56 update accounts set balance = 200
57 where name = 'Tom';
58
59 select * from accounts;
60 select * from loan;

```

Result Grid			
Filter Rows:			
Export:			
Wrap Cell Content:			
id	name	credits	
1001	Tom	100	
1001	Tom	100	

9. 完成实验报告并提交至学在浙大平台。

四、 遇到的问题及解决方法

1. Check 子句有对应的编译报错
2. Delimiter 语句含语法错误，但并不影响触发器设定

五、 总结

前期实验较为简单，需熟悉各操作，掌握语法和原理