数据库 ass3 实验报告

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1 .概况

本实验实现了一个图书管理系统。支持管理员、学生用户管理，添加、删除、更新、借阅、查询和借阅图书记录，返还图书以及延长借阅期限。程序用 golang 语言编写，通过 library_test.go 对 library.go 进行测试。library.go 的 main 函数提供用户与程序交互功能。

2 .数据表介绍

数据库 ass3 中包含 Admins, Student, Book, BorrowedBook, BorrowHistory 五个数据表，其定义如下：

```
"CREATE TABLE IF NOT EXISTS Admins (id CHAR(11) NOT NULL,password CHAR(15) NOT NULL, primary key(id));",
"CREATE TABLE IF NOT EXISTS Student (id CHAR(11), password CHAR(15), borrowright INT, primary key(id));",
"CREATE TABLE IF NOT EXISTS Book (title CHAR(32), author CHAR(20), isbn CHAR(13), bookid CHAR(15), borrowflag INT, primary key(bookid));",
"CREATE TABLE IF NOT EXISTS BorrowedBook (isbn CHAR(13), studentid CHAR(11), bookid CHAR(15), rettime DATE, extendtimes INT, primary key(bookid));",
"CREATE TABLE IF NOT EXISTS BorrowHistory (isbn CHAR(13), studentid CHAR(11), bookid CHAR(15), rettime DATE, brwtime DATE);",
```

其中 Admin 数据表包含管理员 id 和密码信息；Student 数据表包含学生 id、密码以及账户是否被暂停使用的信息；Book 数据表包含图书馆中书的书名、作者、ISBN 码、id（ISBN 码+两位十进制数序号）、是否被借走信息；BorrowedBook 数据表包含当前被借出的书的 ISBN 码、借出的学生 id、借出的书的 id、要求归还时间和延长结束时间的次数信息；BorrowHistory 包含所有曾被借出的书的 ISBN 码、借出的学生 id、借出书的 id、已经/预计归还书的时间及借出书的时间。

3 .后端函数介绍

```
func (lib *Library) ConnectDB() //连接数据库
func (lib *Library) CreateTables()//创建数据表
func (lib *Library) init()//出于方便测试的目的，清空数据库并填入初始数据
func (lib *Library) QueryALLUser()//显示所有用户（管理员，学生）信息，功能 14
func (lib *Library) QueryALLBook()//显示所有书的信息，功能 15
func (lib *Library) QueryALLBorrowing()//显示所有正被借书的信息，功能 16
func (lib *Library) QueryALLBorrowHis()//显示历史借书信息，功能 17
func (lib *Library) CheckAdmin(id, password string)//检查管理员登录账号密码
func (lib *Library) CheckStudent(id, password string)//检查学生登录账号密码
func (lib *Library) AddAdm(id, password string)//添加管理员，功能 1
func (lib *Library) AddStu(id, password string)//添加学生，功能 2
func (lib *Library) AddBook(title, author, ISBN string)//添加书，功能 3
func (lib *Library) RemoveBook(bookid string)//移除书，功能 4
func (lib *Library) Checkborrow(studentid string)//检查学生是否有三本及以上超时未归还书，功能 13
func (lib *Library) BorrowBook(isbn, studentid string)//借书，功能 5
```

```
func (lib *Library) QueryBook(bookinfo, swit string)//根据书名/作者/ISBN 码查找书，功能 6
func (lib *Library) QueryHis(studentid string)//查询学生历史借书信息，功能 7
func (lib *Library) QueryBorrowing(studentid string)//查询学生当前借书信息，功能 8
func (lib *Library) CheckDDL(studentid, isbn string)//查询最迟还书时间，功能 9
func (lib *Library) ExtendDDL(studentid, isbn string)//延长最迟还书时间（1 month），功能 10
func (lib *Library) CheckOver(studentid string)//检查是否有超时未还书，功能 11
func (lib *Library) RetBook(isbn, studentid string)//还书，功能 12
func main()//主调用函数，程序运行逻辑为：先输入系统自带初始账号（1）和密码（a）启动程序，再选择学生/管理员模式，输入对应账号和密码以进入操作菜单，在菜单中选择允许使用的功能进行操作，操作完成后退出当前账号，之后可在选择登录管理员/学生账号或者退出数据库程序。
```

4 .数据库系统使用及测试结果

4.1 打开程序进入程序与主菜单界面展示

library.go 中用 const 定义的 User，Password，DBName 代表当前计算机下 MySQL 账户的用户名、密码和数据库名称。在命令指示符中 library.go 地址下运行 go run library.go 即可打开程序。下图为打开程序分别进入管理员模式和学生模式的运行截图：

```
Welcome to the Library Management System!
Please enter the activation account:
1
Please enter the activation password:
a
Please enter the usage mode:
 0: Student mode  1: Administrator mode  2: Exit
1
Please enter the account:
1
Please enter the password:
a
1: Add Administrator (Admin Only)
2: Add Student (Admin Only)
3: Add Book (Admin Only)
4: Remove Book (Admin Only)
5: Borrow Book (Student Only)
6: Query Book
7: Query Student`s Borrowing History
8: Query Student`s Borrowing Books
9: Check the Deadline of Returing Book (Student Only)
10: Extend the Deadline of Returing Book (Student Only)
11: Query If a Student Has Overdue Books
12: Return Book (Student Only)
13: Check and Suspend Student's Account (Admin Only)
14: Check all the administrators and students (Admin Only)
15: Check all the book infomation (Admin Only)
16: Check all the borrowing book infomation (Admin Only)
17: Check all the borrow history (Admin Only)
0: Exit Account
Please enter the function mode:
```

```
Welcome to the Library Management System!
Please enter the activation account:
1
Please enter the activation password:
a
Please enter the usage mode:
 0: Student mode  1: Administrator mode  2: Exit
0
Please enter the account:
stu01
Please enter the password:
123456
1: Add Administrator (Admin Only)
2: Add Student (Admin Only)
3: Add Book (Admin Only)
4: Remove Book (Admin Only)
5: Borrow Book (Student Only)
6: Query Book
7: Query Student`s Borrowing History
8: Query Student`s Borrowing Books
9: Check the Deadline of Returing Book (Student Only)
10: Extend the Deadline of Returing Book (Student Only)
11: Query If a Student Has Overdue Books
12: Return Book (Student Only)
13: Check and Suspend Student's Account (Admin Only)
14: Check all the administrators and students (Admin Only)
15: Check all the book infomation (Admin Only)
16: Check all the borrowing book infomation (Admin Only)
17: Check all the borrow history (Admin Only)
0: Exit Account
Please enter the function mode:
```

菜单栏包含 18 项功能，仅允许学生使用和仅允许管理员使用功能分别用 Student Only 和 Admin Only 标注出。

4.2 go test 运行截图

library_test.go 中每个测试程序针对初始化（lib.init( )）后的数据库进行各种操作的实验。初始状态 libraary.go 中 lib.init( )程序为数据库输入的初始数据如下：

id	password
1	a
12345678	asdfghjk

2 rows in set (0.00 sec)

id	password	borrowright
stu01	123456	1
stu02	147258	1
stu03	147258	0
stu04	147258	1

4 rows in set (0.02 sec)

title	author	isbn	bookid	borrowflag
title001	author01	isbn0001	isbn000101	1
title001	author01	isbn0001	isbn000102	0
title002	author02	isbn0002	isbn000201	1
title003	author01	isbn0003	isbn000301	0
title003	author04	isbn0004	isbn000401	1
title003	author05	isbn0005	isbn000501	1
title003	author06	isbn0006	isbn000601	1

7 rows in set (0.00 sec)

isbn	studentid	bookid	rettime	extendtimes
isbn0001	stu01	isbn000101	2020-06-01	3
isbn0002	stu02	isbn000201	2020-06-01	0
isbn0004	stu03	isbn000401	2020-05-01	0
isbn0005	stu03	isbn000501	2020-05-01	0
isbn0006	stu03	isbn000601	2020-05-01	0

5 rows in set (0.00 sec)

isbn	studentid	bookid	rettime	brwtime
isbn0001	stu01	isbn000101	2020-06-01	2020-02-01
isbn0002	stu02	isbn000201	2020-06-01	2020-05-01
isbn0002	stu01	isbn000201	2020-04-01	2020-03-01
isbn0004	stu03	isbn000401	2020-05-01	2020-04-01
isbn0005	stu03	isbn000501	2020-05-01	2020-04-01
isbn0006	stu03	isbn000601	2020-05-01	2020-04-01

6 rows in set (0.00 sec)

在文件所在地址下命令指示符中运行 go test 得到以下结果：

```
This administrator id has already had its account.
This student id has already had its account.
ISBN: isbn0001, studentid: stu01, bookid: isbn000101, extending times: 3, expected return date: 2020-06-01
ISBN: isbn0002, studentid: stu02, bookid: isbn000201, extending times: 0, expected return date: 2020-06-01
ISBN: isbn0004, studentid: stu03, bookid: isbn000401, extending times: 0, expected return date: 2020-05-01
ISBN: isbn0005, studentid: stu03, bookid: isbn000501, extending times: 0, expected return date: 2020-05-01
ISBN: isbn0006, studentid: stu03, bookid: isbn000601, extending times: 0, expected return date: 2020-05-01
You need to return the overdue books before borrowing new one!
You have already borrowed this book!
Fail Borrowing! Book doesn`t exist or all the same books have been borrowed.
You have Succeeded Borrowing this book!
title: title001, author: author01, ISBN: isbn0001, bookid: isbn000101, the book is borrowed.
title: title001, author: author01, ISBN: isbn0001, bookid: isbn000102, the book isn`t borrowed.
The number of valid infomation is 2.
The book you search is inexistent.
title: title002, author: author02, ISBN: isbn0002, bookid: isbn000201, the book is borrowed.
The number of valid infomation is 1.
title: title001, author: author01, ISBN: isbn0001, bookid: isbn000101, the book is borrowed.
title: title001, author: author01, ISBN: isbn0001, bookid: isbn000102, the book isn`t borrowed.
title: title003, author: author01, ISBN: isbn0003, bookid: isbn000301, the book isn`t borrowed.
The number of valid infomation is 3.
ISBN: isbn0001, studentid: stu01, bookid: isbn000101, borrow date: 2020-02-01, expected return/returned date: 2020-06-01
ISBN: isbn0002, studentid: stu01, bookid: isbn000201, borrow date: 2020-03-01, expected return/returned date: 2020-04-01
All information is as above.
The student stu04 hasn`t borrowed any book yet.
ISBN: isbn0001, studentid: stu01, bookid: isbn000101, extending times: 3, expected return date: 2020-06-01
All information is as above.
The student stu04 isn`t borrowing any book now.
Deadline of returning book(ISBN code: isbn0001) is 2020-06-01.
You didn`t borrow this book.
You have extend this book for 3 times!
You didn`t borrow this book!
Deadline of returning book is extended.
The student stu01 doesn`t have overdue books.
Book which ISBN = isbn0004 is overdue.
Book which ISBN = isbn0005 is overdue.
Book which ISBN = isbn0006 is overdue.
Succeed Returning
The student did not borrow this book!
PASS
ok      github.com/ichn-hu/IDBS-Spring20-Fudan/assignments/ass3/boilerplate     14.530s
```

5 .项目仓库地址

https://github.com/Kimchuls/Library.git

6 .参考网页

6.1 https://www.cnblogs.com/hupengcool/p/4143238.html //Golang 操作数据库

6.2 https://www.jianshu.com/p/31854035d2ce //Golang 数据库操作增删查改