

**数据结构课程设计**

**题目：** 图书管理信息系统的设计与实现

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一、课程设计内容

**设计要求：**图书信息表所表示的是一个数据库文件。图书管理一般包括：图书采编、图书编目、图书查询及图书流通（借、还书）等等。

具体设计要求如下：

1. **建立一个图书信息数据库文件，输入若干种书的记录，建立一个以书号为关键字的索引文件；在主数据库文件中建立书名、作者及出版社作为次关键字的索引以及对应的索引文件；**
2. **实现关于书号、书名、作者及出版社的图书查询；**
3. **实现图书的借还子系统，包括建立读者文件、借还文件、读者管理及图书借还等的处理。**

二、算法设计

**这次的实验虽然代码的长度不俗，但是还是比较简单的，代码中多处都为重复的。本次主要就是思路要清晰，首先要建三个表，分别为图书信息表、借阅信息表、读者信息表，再往后我采用的就是用链表来存储文件里的信息，链表更改的时候就把文件里的内容重写一遍。总结起来，就是链表和文件的应用**

三、核心代码实现

#include<iostream>

#include<stdlib.h>

#include<fstream>

using namespace std;

struct book{

string book\_no;

string book\_name;

string author;

string press;

int flag;

struct book \*next;

};

struct borrow{

string book\_no;

string reader\_no;

float borrow\_time;

float return\_time;

int flag;

struct borrow \*next;

};

struct reader{

string reader\_no;

string name;

string sex;

string company;

int top;

int number;

int flag;

struct reader \*next;

};

void insert\_book(book \*head){

ifstream fin;

fin.open("图书信息表.txt",ios::in);

if(!fin.is\_open()) {

std::cerr<<"未打开文件"<<endl;

exit(0);

}

fin>>head->book\_no>>head->book\_name>>head->author>>head->press>>head->flag;

head->next=NULL;

book \*q=head;

while(!fin.eof()) {

book \*p=new book;

fin>>p->book\_no>>p->book\_name>>p->author>>p->press>>p->flag;

p->next=NULL;

q->next=p;

q=q->next;

}

fin.close();

}

void insert\_borrow(borrow \*head){

ifstream fin;

fin.open("借阅信息表.txt",ios::in);

if(!fin.is\_open()) {

std::cerr<<"未打开文件"<<endl;

exit(0);

}

fin>>head->book\_no>>head->reader\_no>>head->borrow\_time>>head->return\_time>>head->flag;

head->next=NULL;

borrow \*q=head;

while(!fin.eof()) {

borrow \*p=new borrow;

fin>>p->book\_no>>p->reader\_no>>p->borrow\_time>>p->return\_time>>p->flag;

p->next=NULL;

q->next=p;

q=q->next;

}

fin.close();

}

void insert\_reader(reader \*head){

ifstream fin;

fin.open("读者信息表.txt",ios::in);

if(!fin.is\_open()) {

std::cerr<<"未打开文件"<<endl;

exit(0);

}

fin>>head->reader\_no>>head->name>>head->sex>>head->company>>head->top>>head->number>>head->flag;

head->next=NULL;

reader \*q=head;

while(!fin.eof()) {

reader \*p=new reader;

fin>>p->reader\_no>>p->name>>p->sex>>p->company>>p->top>>p->number>>p->flag;

p->next=NULL;

q->next=p;

q=q->next;

}

fin.close();

}

void print\_book(book \*head){

cout<<"图书信息表："<<endl;

while(head!=NULL){

cout<<head->book\_no<<" "<<head->book\_name<<" "<<head->author<<" "<<head->press<<" ";

if(head->flag==0)

cout<<"可借"<<"\n";

else

cout<<"已借出"<<"\n";

head=head->next;

}

cout<<endl;

}

void print\_borrow(borrow \*head){

cout<<"借阅信息表："<<endl;

while(head!=NULL){

cout<<head->book\_no<<" "<<head->reader\_no<<" "<<head->borrow\_time<<" ";

if(head->return\_time!=0){

cout<<head->return\_time<<"（已归还）"<<" ";

}

else cout<<"尚未归还"<<" ";

if(head->flag==0)

cout<<"完成"<<endl;

else if(head->flag==1)

cout<<"进行中"<<endl;

else

cout<<"超期"<<endl;

head=head->next;

}

cout<<endl;

}

void print\_reader(reader \*head){

cout<<"读者信息表："<<endl;

while(head!=NULL){

cout<<head->reader\_no<<" "<<head->name<<" "<<head->sex<<" "<<head->company<<" "<<head->top<<" "<<head->number<<" ";

if(head->flag==0)

cout<<"正常可借"<<endl;

else

cout<<"异常"<<endl;

head=head->next;

}

cout<<endl;

}

void reader\_borrow(borrow \*borrow\_head,book \*book\_head,reader \*reader\_head){

cout<<"输入借书的书号、读者号、借阅时间"<<endl;

int flag1=0;

int flag2=0;

string a,b;

float c;

cin>>a>>b>>c;

while(borrow\_head->next!=NULL){

borrow\_head=borrow\_head->next;

}

borrow \*p=new borrow;

p->book\_no=a;

p->reader\_no=b;

p->borrow\_time=c;

p->return\_time=0;

p->flag=1;

p->next=NULL;

borrow\_head->next=p;

fstream f;

f.open("借阅信息表.txt",ios::out|ios::app);

f<<endl;

f<<a<<" "<<b<<" "<<c<<" "<<0<<" "<<1;

f.close();

book\* q=book\_head;

while(book\_head->next!=NULL){

if(a==book\_head->book\_no){

break;

flag1=1;

}

book\_head=book\_head->next;

}

if(a==book\_head->book\_no)

flag1=1;

if(flag1=1){

book\_head->flag=1;

}

fstream f1;

f1.open("图书信息表.txt",ios::out);

while(q->next!=NULL){

f1<<q->book\_no<<" "<<q->book\_name<<" "<<q->author<<" "<<q->press<<" "<<q->flag<<endl;

q=q->next;

}

f1<<q->book\_no<<" "<<q->book\_name<<" "<<q->author<<" "<<q->press<<" "<<q->flag;

f1.close();

reader\* w=reader\_head;

while(reader\_head->next!=NULL){

if(b==reader\_head->reader\_no){

break;

flag2=1;

}

reader\_head=reader\_head->next;

}

if(b==reader\_head->reader\_no)

flag2=1;

if(flag2=1){

reader\_head->number++;

}

if(reader\_head->number>reader\_head->top)

reader\_head->flag=1;

fstream f2;

f2.open("读者信息表.txt",ios::out);

while(w->next!=NULL){

f2<<w->reader\_no<<" "<<w->name<<" "<<w->sex<<" "<<w->company<<" "<<w->top<<" "<<w->number<<" "<<w->flag<<endl;

w=w->next;

}

f2<<w->reader\_no<<" "<<w->name<<" "<<w->sex<<" "<<w->company<<" "<<w->top<<" "<<w->number<<" "<<w->flag;

f2.close();

}

void book\_return(borrow \*borrow\_head,book \*book\_head,reader \*reader\_head){

cout<<"输入归还的书号、读者号、归还时间"<<endl;

int flag1=0;

int flag2=0;

int flag3=0;

string a,b;

float c;

cin>>a>>b>>c;

borrow \*e=borrow\_head;

while(borrow\_head!=NULL){

if(borrow\_head->book\_no==a&&borrow\_head->reader\_no==b){

flag1=1;

break;

}

borrow\_head=borrow\_head->next;

}

if(flag1==1){

borrow\_head->return\_time=c;

if(c<borrow\_head->borrow\_time+2)

borrow\_head->flag=0;

else

borrow\_head->flag=2;

}

fstream f;

f.open("借阅信息表.txt",ios::out);

while(e->next!=NULL){

f<<e->book\_no<<" "<<e->reader\_no<<" "<<e->borrow\_time<<" "<<e->return\_time<<" "<<e->flag<<endl;

e=e->next;

}

f<<e->book\_no<<" "<<e->reader\_no<<" "<<e->borrow\_time<<" "<<e->return\_time<<" "<<e->flag;

f.close();

book\* q=book\_head;

while(book\_head->next!=NULL){

if(a==book\_head->book\_no){

break;

flag3=1;

}

book\_head=book\_head->next;

}

if(a==book\_head->book\_no)

flag3=1;

if(flag3=1){

book\_head->flag=0;

}

fstream f1;

f1.open("图书信息表.txt",ios::out);

while(q->next!=NULL){

f1<<q->book\_no<<" "<<q->book\_name<<" "<<q->author<<" "<<q->press<<" "<<q->flag<<endl;

q=q->next;

}

f1<<q->book\_no<<" "<<q->book\_name<<" "<<q->author<<" "<<q->press<<" "<<q->flag;

f1.close();

reader\* w=reader\_head;

while(reader\_head->next!=NULL){

if(b==reader\_head->reader\_no){

break;

flag2=1;

}

reader\_head=reader\_head->next;

}

if(b==reader\_head->reader\_no)

flag2=1;

if(flag2=1){

reader\_head->number--;

}

if(reader\_head->number<reader\_head->top)

reader\_head->flag=0;

fstream f2;

f2.open("读者信息表.txt",ios::out);

while(w->next!=NULL){

f2<<w->reader\_no<<" "<<w->name<<" "<<w->sex<<" "<<w->company<<" "<<w->top<<" "<<w->number<<" "<<w->flag<<endl;

w=w->next;

}

f2<<w->reader\_no<<" "<<w->name<<" "<<w->sex<<" "<<w->company<<" "<<w->top<<" "<<w->number<<" "<<w->flag;

f2.close();

}

void Search\_book\_no(book \*book\_head){

cout<<"输入想要查询的书号："<<endl;

int flag=0;

string a;

cin>>a;

book \*head=book\_head;

while(head!=NULL){

if(head->book\_no==a){

cout<<head->book\_no<<" "<<head->book\_name<<" "<<head->author<<" "<<head->press<<" ";

if(head->flag==0)

cout<<"可借"<<"\n";

else

cout<<"已借出"<<"\n";

cout<<endl;

flag++;

break;

}

head=head->next;

}

if(flag==0)

cout<<"查询失败"<<endl;

}

void Search\_book\_name(book \*book\_head){

cout<<"输入想要查询的书名："<<endl;

string a;

int flag=0;

cin>>a;

book \*head=book\_head;

while(head!=NULL){

if(head->book\_name==a){

flag++;

cout<<head->book\_no<<" "<<head->book\_name<<" "<<head->author<<" "<<head->press<<" ";

if(head->flag==0)

cout<<"可借"<<"\n";

else

cout<<"已借出"<<"\n";

cout<<endl;

}

head=head->next;

}

if(flag==0)

cout<<"查询失败"<<endl;

}

void Search\_book\_author(book \*book\_head){

cout<<"输入想要查询的作者："<<endl;

string a;

int flag=0;

cin>>a;

book \*head=book\_head;

while(head!=NULL){

if(head->author==a){

flag++;

cout<<head->book\_no<<" "<<head->book\_name<<" "<<head->author<<" "<<head->press<<" ";

if(head->flag==0)

cout<<"可借"<<"\n";

else

cout<<"已借出"<<"\n";

cout<<endl;

}

head=head->next;

}

if(flag==0)

cout<<"查询失败"<<endl;

}

void Search\_book\_press(book \*book\_head){

cout<<"输入想要查询的出版社："<<endl;

string a;

int flag=0;

cin>>a;

book \*head=book\_head;

while(head!=NULL){

if(head->press==a){

flag++;

cout<<head->book\_no<<" "<<head->book\_name<<" "<<head->author<<" "<<head->press<<" ";

if(head->flag==0)

cout<<"可借"<<"\n";

else

cout<<"已借出"<<"\n";

cout<<endl;

}

head=head->next;

}

if(flag==0)

cout<<"查询失败"<<endl;

}

int main(){

book \*book\_head=new book;

borrow \*borrow\_head=new borrow;

reader \*reader\_head=new reader;

insert\_book(book\_head);

insert\_borrow(borrow\_head);

insert\_reader(reader\_head);

cout<<"1、查看文件内容"<<endl<<"2、插入借阅记录"<<endl<<"3、插入还书记录"<<endl;

cout<<"4、查询书号"<<endl<<"5、查询书名"<<endl<<"6、查询作者"<<endl<<"7、查询出版社"<<endl<<"8、退出系统"<<endl;

while(1) {

int z;

cin>>z;

switch(z) {

case 1:

print\_book(book\_head);

print\_borrow(borrow\_head);

print\_reader(reader\_head);

break;

case 2:

reader\_borrow(borrow\_head,book\_head,reader\_head);

break;

case 3:

book\_return(borrow\_head,book\_head,reader\_head);

break;

case 4:

Search\_book\_no(book\_head);

break;

case 5:

Search\_book\_name(book\_head);

break;

case 6:

Search\_book\_author(book\_head);

break;

case 7:

Search\_book\_press(book\_head);

break;

case 8:

exit(0);

}

}

return 0;

}

图书信息表：

213 Python编程从入门到实践 Eric.Matthes 人民邮电出版社 0

214 Python编程从入门到实践 Eric.Matthes 人民邮电出版社 1

110 计算机操作系统 汤小丹 西安电子科技大学出版社 0

011 数据库系统概论 王珊 高等教育出版社 0

1231 高等数学 佚名 高等教育出版社 0

借阅信息表：

110 250 5.4 6.1 0

111 2 2.2 12.1 2

213 1 4.1 5.1 0

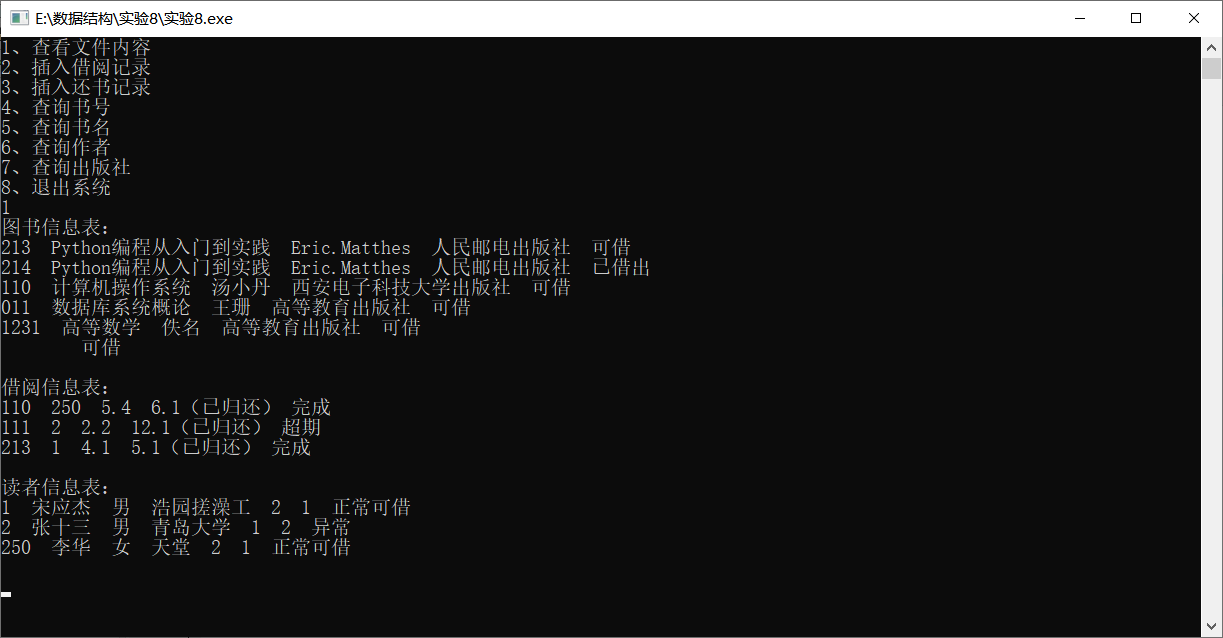
读者信息表：

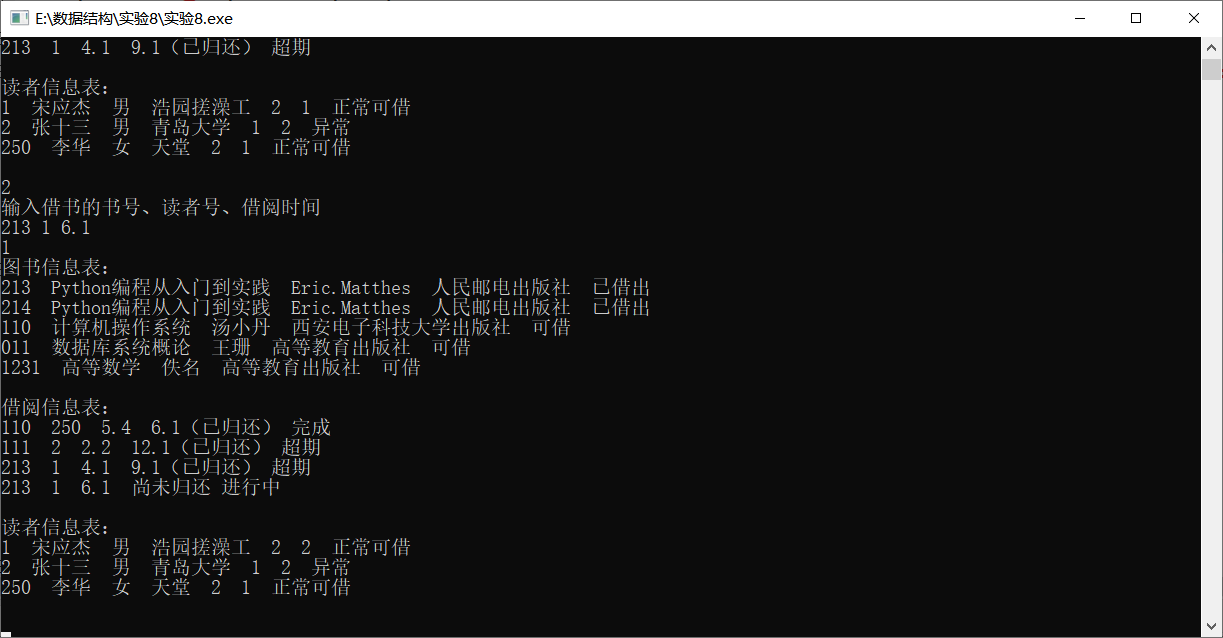
1 宋应杰 男 浩园搓澡工 2 1 0

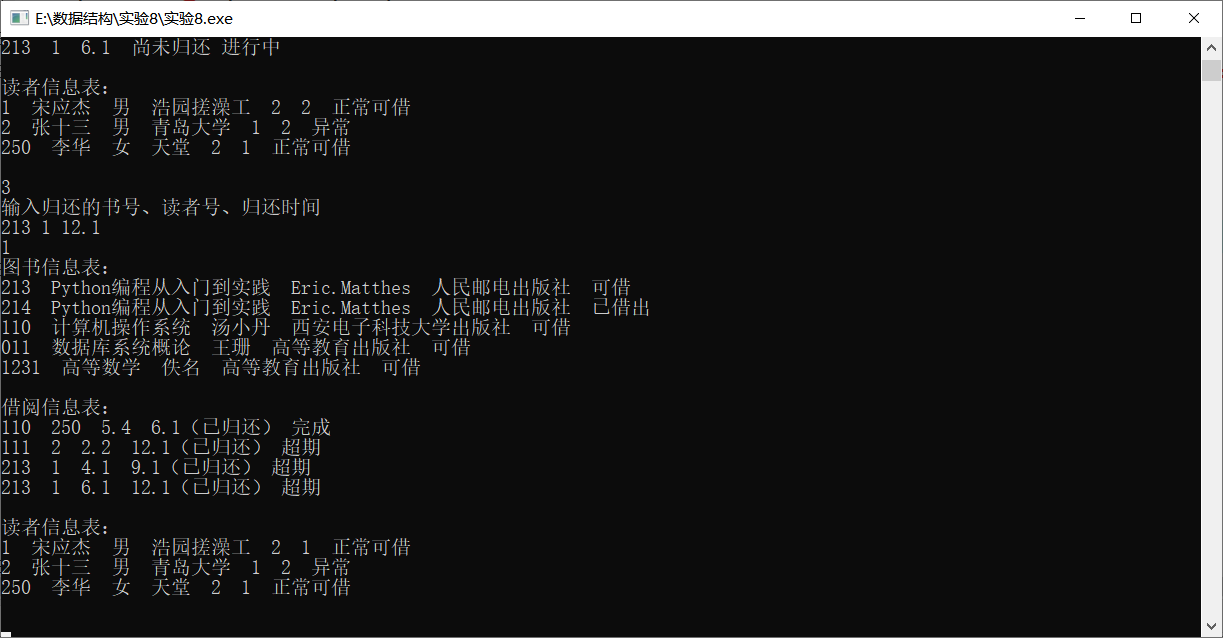
2 张十三 男 青岛大学 1 2 1

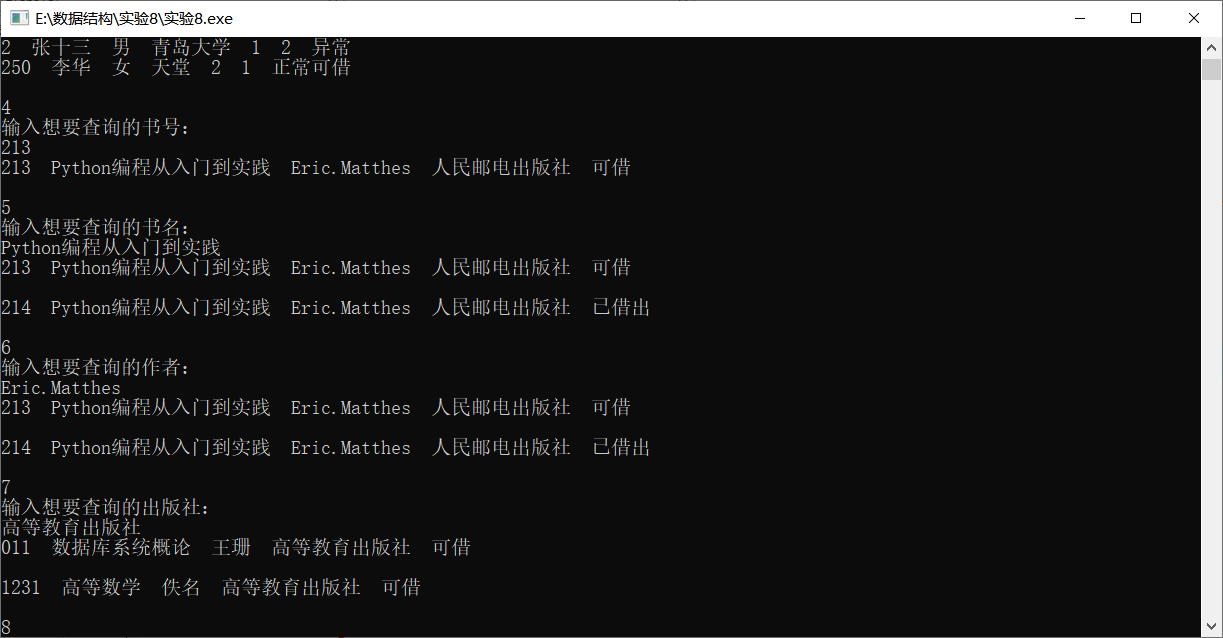
250 李华 女 天堂 2 1 0

四、测试与分析









五、总结及体会

这是本学习最后一次的实验了，代码看起来是比较多的，但是其实并不是很难，无非就是一个对文件的取和写的操作，过程中采用合适的存储方式进行存储，并不是很难，经过一个学期的课程设计，让我体会到了编程不一定是要解那些多难得题，落实在应用方面也是很有成就感的。

1. 参考书目和网络资源

无