The ssBooks System Report

By

Tian Wu、Bingkai Su

ID：202108060109、2021080060112

Class: Information Security 2021

in

College of Computer Science and Electronic Engineering , Hunan University

Supervisor

Teacher Liu Yang

December 31, 2021

0.1 Problem description

H University Library invites you to set up a library information management system.

1. Design a text interactive library management system.
2. The library must support the storage of at least 10,000 books, bonus points if the dynamic growth of books can be achieved.
3. Book information includes: name、ISBN/ISSN、author、classification.
4. The library system provides two user modes,one is user's mode,the another is admin's mode, please design different user. classes for them
5. Design library category, including library list, user list and other members, library records, user borrowing records and so on.
6. The library system provides the function of searching books based on any information.
7. Bonus points (total score not exceeding 100 points)
   (1) Support big data, such as book records exceeding one million and the number of users exceeding ten thousand;
   (2) Close to the actual library management system, a number of new functions;
   (3) To create, read and write files;
   (4) Consider user experience, such as ease of use;
   (5) search performance inspection, investigation, thinking, design to strengthen the search performance, this is only suitable for students who have the power to learn;

0.2 Experimental analysis and structure design:

1. In order to realize the dynamic growth of books,we chose to use vector.
2. For good performance, we defined map , with all look-up responding at the log level.
3. To prevent login exceptions, we changed the return value type of the function called during login to bool,which imitated the throw exception in python.
4. To practice our rigorous programming style,we learnt and adopted the Google's style guide of open source.For example,we set const for all reference arguments in the function argument list.And to funciton naming, we used the underscore naming method whenever necessary.
5. Considering the potential enormous data process,we adopted dynamic alloc memory,which could realize advanced memory management.
6. Considering at the end of a line in Windows txt file has two line break,we had to 'wash' txt before we read it.

7. Structure sketch map :

图 1: Program main structure design

0.3 Inspection project:

1. Login interface:

```
Welcome to ssBooks system!
Please enter your library name:
 > HNUlib
Loading file HNUlib.db ...
Loading books...
Loading users...
Loading records...
Loading finish.

Welcome to HNUlib !
 Type 'help' for help.
Guest > login
 > Username: admin
 > Password: 123456
Welcome back, admin! :)
```

图 2: Login interface

```
admin > help

Welcome to ssBooks system! :)
 HNU homework by SBK & SkyWT.
 A tiny but delicate library manager.

Global Commands:
  search        Search for a book
  login Login as a user/admin
  quit  Quit the program
User Commands:
  borrow        Borrow a book
  return        Return a book
  change_pass   Change your password
  list_records  List your records
  logout        Logout your account
Admin Commands:
  add_book      Add a book
  delete_book   Delete a book
  add_user      Add a user
  delete_user   Delete a user
  list_users    List all users
  change_user_pass      Change a user's password
  reset_user_pass       Reset a user's password to '123456'
```

图 3: The guide of using

2. The test of admin's function:

```
Guest > login
 > Username: skywt
 > Password: 123456
Welcome back, skywt! :)

skywt > search
 > What do you want to search by? (name/isbn/author/catelogy)
skywt > name
 > Please input the name of the book:
skywt > 信任的真相

Name:   信任的真相
ISDB:   978-7-5060-3668-9
Author: (澳)瓦妮莎·霍尔著 宫照丽
Type:   F/830.56/4
In library:     1
Borrowed:       0
```

图 4: Search book

```
admin > add_book
 > Please input the name of the book:
admin > Fundementals of compiling
 > Please input the ISBN of the book:
admin > 978-7-115-09916-7
 > Please input the author(s) of the book, seperate by ',':
admin > Alfred Aho
 > Please input hte category of the book, formatted:
admin > C12
 > Please input the total number you want to add:
admin > 100
 > Is that all right? Enter 'yes' to confirm, or else exit.
admin > yes
Success! New book added successfully.
admin > delete_book
 > Please input the name of the book you want to delete:
admin > Fundementals of compiling
 > Are you sure you want to delete 'Fundementals of compiling' ? Input 'yes' to confirm
, or else exit.
admin > yes
!01A342D0 Success! Book deleted successfully.
```

图 5: Add and delete book

```
Guest > login
 > Username: admin
 > Password: 123456
!!!admin
!!!sbk
!!!skywt
Welcome back, admin! :)

admin > add_user
 > Please input the id of the new user:
admin > test
Success! The password is '123456' by default.

admin > logout
Bye, admin!

Guest > login
 > Username: test
 > Password: 123456
!!!admin
!!!sbk
!!!skywt
!!!test
Welcome back, test! :)

test > logout
Bye, test!

Guest > login
 > Username: admin
 > Password: 123456
!!!admin
!!!sbk
!!!skywt
!!!test
Welcome back, admin! :)

admin > delete_user
 > Please input the id of the user you want to delete:
admin > test
 > Are you sure you want to delete 'test' ? Input 'yes' to confirm, or else exit.
admin > yes
Success! User deleted successfully.
```

图 6: Add and delete user

```
admin > list_user
Invalid command 'list_user'! :(

admin > list_users
 admin
 sbk
 skywt

admin > change_user_pass
 > Please input the id of the user you want to change:
admin > sbk
 > Please input the new password:
admin > qwerty
Success! User password changed successfully.

admin > logout
Bye, admin!

Guest > login
 > Username: sbk
 > Password: qwerty
!!!admin
!!!sbk
!!!skywt
Welcome back, sbk! :)
```

图 7: List users and change user's password

```
Guest > login
 > Username: admin
 > Password: 123456
!!!admin
!!!sbk
!!!skywt
Welcome back, admin! :)

admin > reset_user_pass
 > Please input the id of the user you want to reset:
admin > sbk
Success! User password reseted successfully.

admin > login
ERROR: You have already logged in. Please logout first.
Failed.

admin > logout
Bye, admin!

Guest > login
 > Username: sbk
 > Password: 123456
!!!admin
!!!sbk
!!!skywt
Welcome back, sbk! :)

sbk >
```

图 8: Reset user's password

3. The test of normal user's function:

```
Guest > login
 > Username: skywt
 > Password: 123456
Welcome back, skywt! :)

skywt > borrow
 > Please input the name of the book you want to borrow:
skywt > 信任的真相
Success! You borrowed the book.

skywt > return
 > Please input the name of the book you want to return:
skywt > 信任的真相
Success! The book is returned.
```

图 9: Borrow and return book

```
sbk > list_records
Borrowed:
信任的真相
Returned:
信任的真相

sbk > change_pass
 > Please enter your old password:
sbk > 123456
 > Please enter your new password:
sbk > lovethelife
 > Verify your password:
sbk > lovethelife
Success! Your password has been changed successfully.

sbk > logout
Bye, sbk!

Guest > login
 > Username: sbk
 > Password: lovethelife
Welcome back, sbk! :)

sbk >
```

图 10: List records and change password

0.4 Summary of this practice

Problem encountered and solutions:

1. When library classes access user classes' data directly, the encapsulation of the data is broken——We leave a common interface for user access.
2. When the number of books exceeds Millions of orders of magnitude, the operation of the system requires a longer running time——We took map,which could significantly improve operating efficiency.

Gain through this assignment:

1. In order to make the report more professional, we did not use the traditional Microsoft Word or Kingsoft WPS.Instead we wrote it in LaTex and compiled it into PDF files.We deployed ovorleaf (an open source online LaTex collaboration) with Docker on the server and learned the basic syntax of LaTex, laying the foundation for future professional paper writing.
2. Git is the most popular distributed version control tool right now, which is used in Linux Kernel Collaborative development and versioning of many large projects. In this exercise, we used Git for source code versioning and hosted the code in Github.In the research and practice, we learned the basic usage of Git and gradually got familiar with Git's Repository, Branch,Tag,etc.What'more, we understand some operations like Github platform fork,pull request.Both of us had a deeper experience and understanding of specific development scenarios.
3. We took the plunge with nodeppt to demonstrate our practical results,it's also different from the usual powerpoint.
4. Refer to the stl,we designed a more humanized human-computer interaction page:

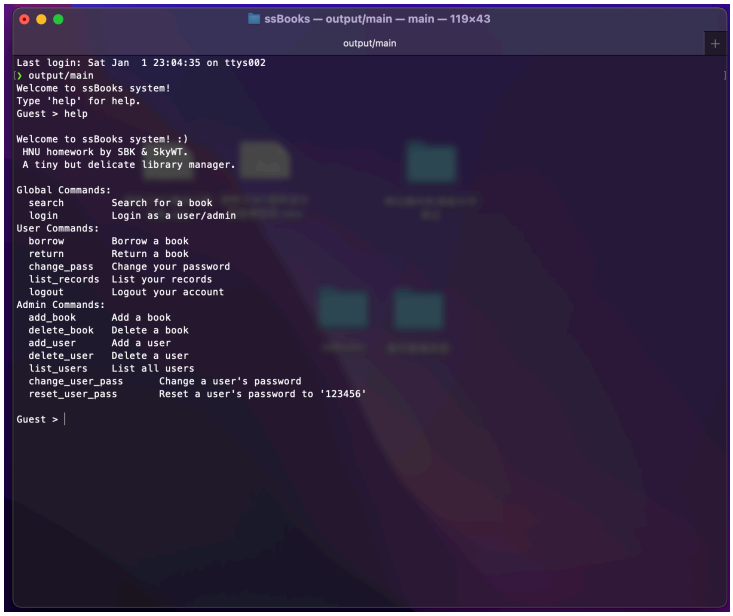

图 11: Operation page

0.5 Specific arrangement

1. Tian Wu : Responsible for most of the code writing , debugging, and pushing the code to the Github's repository.

2. Bingkai Su : Responsibile for part of the code writing , checking out , writing an experiment report by overleaf and making a special ppt by nodeppt.