

GIT Department of Computer Engineering
CSE 222/505 - Spring 2020
Homework 6
Report

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Problem Solution Approach

I design a library automation system. The system has two types of users: administrators who can update information and users who browse books. For that purpose I create firstly a `LibraryAutomationSystem` class. In that class I create administrator and user `ArrayLists` which are Express the administrator and users as a array. And I create outer map which is type of

Outer: `Map < String , Map < String , Set < String > > >`

Inner: `Map < String , Set < String > >`

And finally create location array which Express the which location is free, which location is full. If location's value is 1, which means, that location is full, otherwise means empty.

Beginning of the creating library, I fill the location array as a empty. With library Access ability, We can create administrator and user membership. When I adding administrator, If any admin has not added, we add that admin directly without scanning. If administrator size is not zero, we are scanning if there is same admin in the `ArrayList`. If I did not find that admin, now I add to `ArrayList`. If the admin I want to add is already on `ArrayList`, System says Admin has already exists and throws an exception. When I adding user, if any user has not added, we add that user directly without scanning. If user size is not zero, we are scanning if there is same user in the `ArrayList`. If I did not find that user, now I add to `ArrayList`. If the user I want to add is already on `ArrayList`, System says user has already exists and throws an exception.

After creating administrator, we give an Access ability to administrators. For that purpose I create a login method in `LibraryAutomationSystem` class. I asked the user's name, surname and password. If this informations match with someone from administrator arraylist, I give an access ability and throw the login method from administrator class. Administrator can add book to library, remove book from library update the information and can view all books. For that purpose, I control in login method in `libraryAutomationSystem.java` file. If that login methods give to user access ability, user come this method. In this method, I ask the what he/she want to do. If user want the exit, we quit from administrator membership.

In add method; That method adds the book to the library. Firstly I control is there any empty space or not. If there is no empty space, I throw an exception about library is full. Otherwise I generate location with my `generateLocation()` method. And start to search the author name. If the author name and title name is same, I extend the location set. If the same author's another book already in library, put the title to inner map. Otherwise create add directly and turn the location to 1 and increase the current number of book.

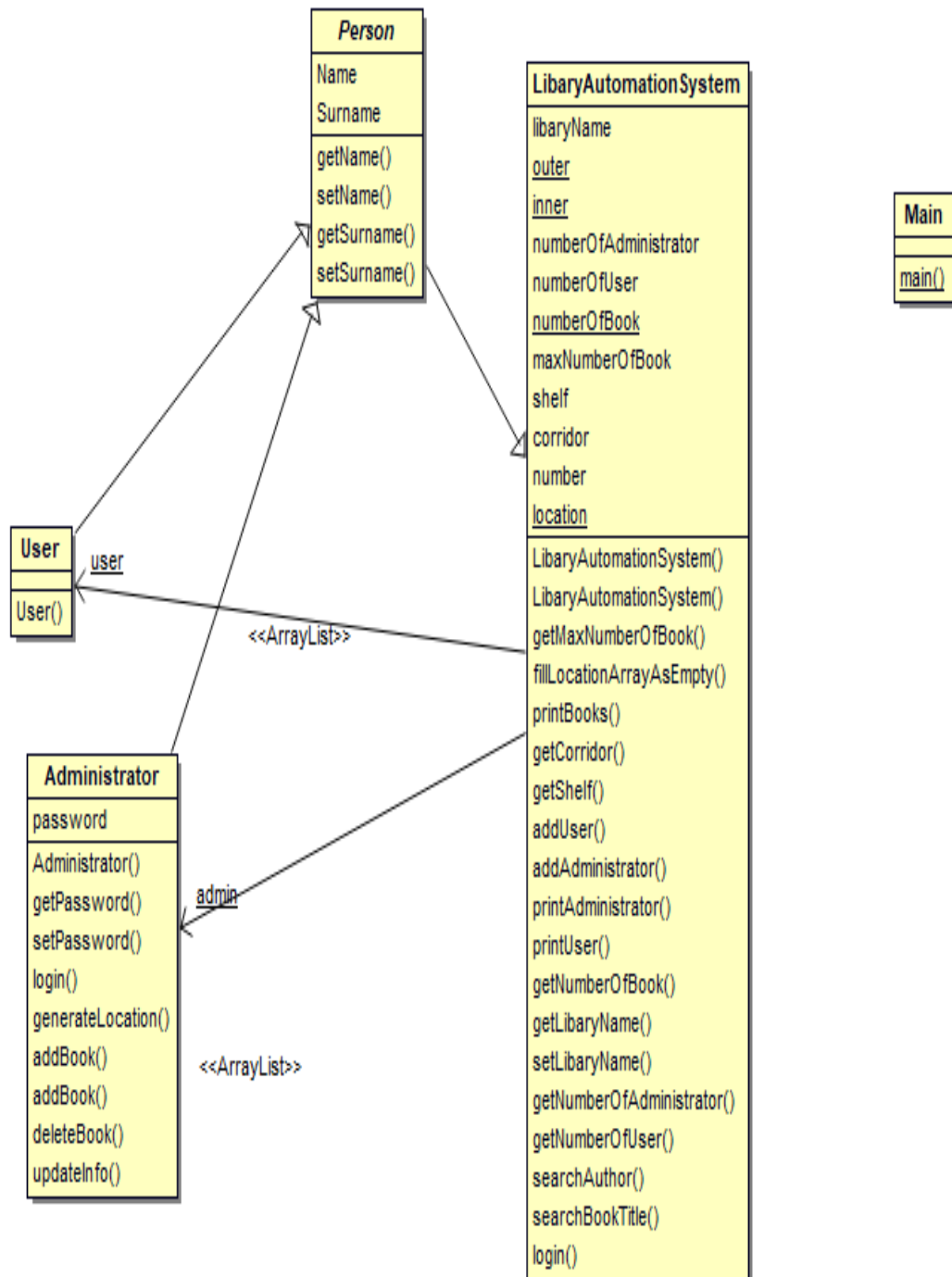
I have an alternative of add method. There is one difference between `addBook(AuthorName, TitleName)` and `addBook(AuthorName, TitleName, location)` is location is specified earlier and send as a parameter.

In delete method, That method delete book from library. Firstly I control the library has book or not. If there is no book in library, I throw an exception about library is empty. Otherwise I start to search respectively author name and title name. When I found both of them, generate location and turn it to String. If author has more than 1 book, I delete title, but author has only one book, I delete the author. and turn location to 1 and decrease the current number of book.

In `updateInfo` method, change the book's location with next empty place.

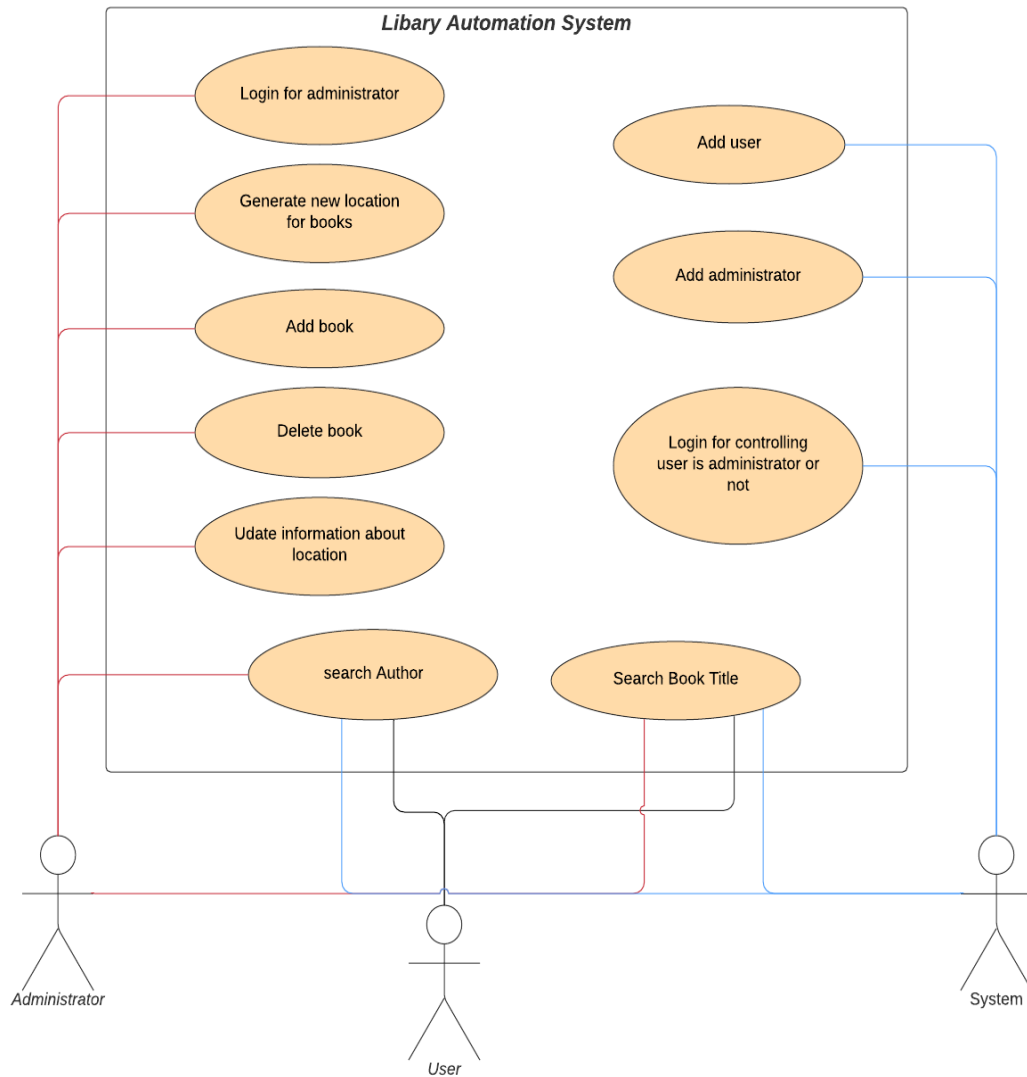
In addition to that methods, I create search author and search title methods. In `searchAuthor()` method, That method search the author. If methods can not find the author, throws an exception. Otherwise, prints all book of author. In `searchBookTitle()` method, That method search the title of book. If methods can not find the title, throws an exception. Otherwise, prints all author and title couple (which include given title). And finally I can print books, administrators and users.

Class Diagrams



Use Case Diagrams

Elif GORAL |



Container

Red lines express administrator's ability
Blue lines express system's ability
Black lines express user's ability

Test Cases

Test Case ID	Test Scenario	Test Steps	Test Data	Expected Results	Actual Results	Pass/Fail
T01	Check no parameter constructor	Call the no parameter constructor	-	-	-	Pass
T02	Check the getLibraryName() method	Call the getLibraryName() method	-	Elif's Library Automation System	Elif's Library Automation System	pass
T03	Check one parameter constructor	Call the one parameter constructor	-	-	-	pass
T04	Check the getLibraryName() method	Call the getLibraryName() method	"GTU library"	GTU Library	GTU Library	pass
T05	Check the addAdministrator() method with valid data	Call the addAdministrator() method with valid data	Elif-Goral-1234	-	-	pass
T06	Check the printAdministrator() method	Call the printAdministrator() method	-	Elif - Goral – 1234	Elif - Goral - 1234	pass
T07	Check the addAdministrator() method with valid data	Call the addAdministrator() method with valid data	Levent-Goral-5678	-	-	pass
T08	Check the printAdministrator() method	Call the printAdministrator() method	-	Elif - Goral – 1234 Levent-Goral-5678	Elif - Goral – 1234 Levent-Goral-5678	pass
T09	Check the addAdministrator() method with valid data	Call the addAdministrator() method with valid data	Abdullah-Goral-12	-	-	pass
T10	Check the printAdministrator() method	Call the printAdministrator() method	-	Elif - Goral – 1234 Levent-Goral-5678 Abdullah-Goral-12	Elif - Goral – 1234 Levent-Goral-5678 Abdullah-Goral-12	pass

T11	Check the addAdministrator() method with invalid data which is already exist	Call the addAdministrator() method with invalid data which is already exist	Abdullah-Goral-12	Admin Abdullah Goral has already exists.	Admin Abdullah Goral has already exists.	pass
T12	Check the printAdministrator() method	Call the printAdministrator() method	-	Elif - Goral – 1234 Levent-Goral-5678 Abdullah-Goral-12	Elif - Goral – 1234 Levent-Goral-5678 Abdullah-Goral-12	Pass
T13	Check the setLibraryName() method with valid data	Call the setLibraryName() method with valid data	Library 5	-	-	Pass
T14	Check the getLibraryName() method with valid data	Call the getLibraryName() method with valid data	-	Library 5	Library 5	Pass
T15	Checks the getNumberOfAdministrator() method	Call the getNumberOfAdministrator() method	-	3	3	Pass
T16	Check the addUser() method with valid data	Call the addUser() method with valid data	Aa - Bb	-	-	pass
T17	Check the printUser() method	Call the printUser() method	-	Aa – Bb	Aa - Bb	Pass
T18	Check the addUser() method with valid data	Call the addUser() method with valid data	Cc - Dd	-	-	pass
T19	Check the printUser() method	Call the printUser() method	-	Aa – Bb Cc - Dd	Aa – Bb Cc - Dd	pass
T20	Check the addUser() method with valid data	Call the addUser() method with valid data	Ee - Ff	-	-	pass
T21	Check the printUser() method	Call the printUser() method	-	Aa – Bb Cc – Dd Ee - Ff	Aa – Bb Cc – Dd Ee - Ff	Pass

T22	Check the addUser () method with invalid data(which is already exist)	Call the addUser () method with invalid data (which is already exist)	Ee - Ff	User Ee - Ff has already exists	User Ee - Ff has already exists	pass
T23	Check the printUser() method	Call the printUser () method	-	Aa – Bb Cc – Dd Ee - Ff	Aa – Bb Cc – Dd Ee - Ff	Pass
T24	Checks the getNumberOfUser() method	Call the getNumberOfUser () method	-	3	3	Pass
T25	Checks the login() method	Call the login() method	-	Please be carrefull about capital the letters! Name : Surname : Password:	Please be carrefull about capital the letters! Name : Surname : Password:	Pass
T26	Checks the login() method	Name,surname and password entered with invalid information	E A 45	we are controlling the login process... log in process unsuccesfull	we are controlling the login process... log in process unsuccesfull	Pass
T27	Checks the login() method	Name,surname and password entered with valid information	Elif Goral 1234	we are controlling the login process... log in process succesfull What do you want? press 1 for adding book press 2 for deleting book press 3 for updating information press 4 for printing all books press 5 for exit.	we are controlling the login process... log in process succesfull What do you want? press 1 for adding book press 2 for deleting book press 3 for updating information press 4 for printing all books press 5 for exit.	Pass
T28	Checks the login() method	Press 1	-	Author name : Title of book :	Author name : Title of book :	Pass
T29	Checks the login() method	Author name which is not on map and title is entered	Aa Bb	author: aa ----- title: bb location: c0s0.0 number of books : 1	author: aa ----- title: bb location: c0s0.0 number of books : 1	Pass

T30	Checks the login() method	Press 1	-	Author name : Title of book :	Author name : Title of book :	Pass
T31	Checks the login() method	Author name which is not on map and title is entered	Cc Dd	location: c0s0.1 author: aa ----- title: bb location: c0s0.0 author: cc ----- title: dd location: c0s0.1 number of books : 2	location: c0s0.1 author: aa ----- title: bb location: c0s0.0 author: cc ----- title: dd location: c0s0.1 number of books : 2	Pass
T32	Checks the login() method	Press 1	-	Author name : Title of book :	Author name : Title of book :	Pass
T33	Checks the login() method	Author name which is on map and title is entered	Aa Ff	location: c0s0.2 author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd location: c0s0.1 number of books : 3	location: c0s0.2 author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd location: c0s0.1 number of books : 3	Pass
T34	Checks the login() method	Press 1	-	Author name : Title of book :	Author name : Title of book :	Pass
T35	Checks the login() method	Author name which is not on map and title is entered	Ee Gg	location: c0s1.3 author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd	location: c0s1.3 author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd	Pass

				location: c0s0.1 author: ee ----- title: gg location: c0s1.3 number of books : 4	location: c0s0.1 author: ee ----- title: gg location: c0s1.3 number of books : 4	
T36	Checks the login() method	Press 1	-	Author name : Title of book :	Author name : Title of book :	Pass
T37	Checks the login() method	Author name which is not on map and title is entered	Ee Hh	location: c0s1.4 author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd location: c0s0.1 author: ee ----- title: gg location: c0s1.3 title: hh location: c0s1.4 number of books : 5	location: c0s1.4 author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd location: c0s0.1 author: ee ----- title: gg location: c0s1.3 title: hh location: c0s1.4 number of books : 5	Pass
T38	Checks the login() method	Press 2	-	Author name : Title of book :	Author name : Title of book :	Pass
T39	Checks the login() method	Valid Author name and title name couple entered	Ee Hh	author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd	author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd	Pass

				location: c0s0.1 author: ee ----- title: gg location: c0s1.3 number of books : 4	location: c0s0.1 author: ee ----- title: gg location: c0s1.3 number of books : 4	
T40	Checks the login() method	Press 2	-	Author name : Title of book :	Author name : Title of book :	Pass
T41	Checks the login() method	invalid Author name and title name couple entered	Xx Cc	there is no that book(xx - cc) in library.	there is no that book(xx - cc) in library	Pass
T42	Checks the login() method	Press 2	-	Author name : Title of book :	Author name : Title of book :	Pass
T43	Checks the login() method	Valid Author name and title name couple entered	Ee Gg	author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd location: c0s0.1 number of books : 3	author: aa ----- title: bb location: c0s0.0 title: ff location: c0s0.2 author: cc ----- title: dd location: c0s0.1 number of books : 3	Pass
T44	Checks the login() method	Press 3	-	Author name : Title of book :	Author name : Title of book :	Pass
T45	Checks the login() method	Valid Author name and title name couple entered	Aa Bb	update location author: aa ----- title: ff location: c0s0.2 title: bb location: c0s1.5 author: cc ----- title: dd location: c0s0.1	update location author: aa ----- title: ff location: c0s0.2 title: bb location: c0s1.5 author: cc ----- title: dd location: c0s0.1	Pass

				number of books : 3	number of books : 3	
T46	Checks the login() method	Press 1	-	Author name : Title of book :	Author name : Title of book :	Pass
T47	Checks the login() method	Value (Author and Title couple which is already exist)	Cc Dd	author: aa ----- title: ff location: [c0s0.2] title: bb location: [c0s1.5] author: cc ----- title: dd location: [c0s0.1, c0s0.0] number of books : 4	author: aa ----- title: ff location: [c0s0.2] title: bb location: [c0s1.5] author: cc ----- title: dd location: [c0s0.1, c0s0.0] number of books : 4	Pass
T48	Checks the login() method	Press 4	-	author: aa ----- title: ff location: [c0s0.2] title: bb location: [c0s1.5] author: cc ----- title: dd location: [c0s0.1, c0s0.0] number of books : 4	author: aa ----- title: ff location: [c0s0.2] title: bb location: [c0s1.5] author: cc ----- title: dd location: [c0s0.1, c0s0.0] number of books : 4	Pass
T49	Checks the login() method	Press 5	-	exiting from administrator..	exiting from administrator..	Pass
T50	Check printBooks() method after exiting administrator membership.	Call printBooks() method after exiting administrator membership.	-	author: aa ----- title: ff location: c0s0.2 title: bb location: c0s1.5 author: cc ----- title: dd	author: aa ----- title: ff location: c0s0.2 title: bb location: c0s1.5 author: cc ----- title: dd	Pass

				location: c0s0.1 number of books : 3	location: c0s0.1 number of books : 3	
T51	Check searchAuthor() method with existing value	Call searchAuthor() method with existing value	Aa	author: aa ----- title: ff location: c0s0.2 title: bb location: c0s1.5	author: aa ----- title: ff location: c0s0.2 title: bb location: c0s1.5	Pass
T52	Check searchBookTitle() method with existing value	Call searchBookTitle() method with existing value	Bb	author: aa title: bb location: c0s1.5	author: aa title: bb location: c0s1.5	Pass
T53	Check searchAuthor() method with not existing value	Call searchAuthor() method with not existing value	Xx	Author (xx) not found in library.	Author (xx) not found in library.	Pass
T54	Check searchBookTitle() method with not existing value	Call searchBookTitle() method with not existing value	Elif	Book (elif) not found in library.	Book (elif) not found in library.	Pass
T55	Check getStatus method with exist value	call getStatus method with exist value	Aa Bb	Avaliable	Avaliable	Pass
T56	Check getStatus method with not exist value	call getStatus method with not exist value	Xx Yy	Not Avaliable	Not Available	Pass

Running Commands and Results

T01-T02-T03-T04

```
library's name: Elif's Library Automation System
library 2's name: GTU library
```

T05-T06

```
Add administrator(Elif,Goral,1234);
```

```
printing administrator array...
Elif - Goral - 1234
```

T07-T08

```
Add administrator(Levent,Goral,5678);
```

```
printing administrator array...
```

```
Elif - Goral - 1234
```

```
Levent - Goral - 5678
```

T09-T10

```
Add administrator(Abdullah,Goral,12);
```

```
printing administrator array...
```

```
Elif - Goral - 1234
```

```
Levent - Goral - 5678
```

```
Abdullah - Goral - 12
```

T11-T12

```
Add administrator(Abdullah,Goral,12)
```

```
java.lang.Exception: Admin Abdullah Goral has already exists.
```

```
printing administrator array...
```

```
Elif - Goral - 1234
```

```
Levent - Goral - 5678
```

```
Abdullah - Goral - 12
```

T13-T14

```
Setting library's name to 'Library 5' ..  
library's name: Library 5
```

T15

```
admin number: 3
```

T16-T17-T18-T19-T20-T21-T22-T23-T24

```
Add user(aa,bb)  
aa - bb
```

```
Add user(cc,dd)  
aa - bb  
cc - dd
```

```
Add user(ee,ff)  
aa - bb  
cc - dd  
ee - ff
```

```
Add user(ee,ff)  
java.lang.Exception: User ee ff has already exists.  
aa - bb  
cc - dd  
ee - ff
```

```
user number: 3
```

T25-T26-T27-T28-T29

Login process for administrator:
Please be carrefull about capital the letters!

Name :

Elif

Surname :

Goral

Password:

1234

Name : Elif

Surname : Goral

Password: 1234

we are controlling the login process...

log in process succesfull

What do you want?

press 1 for adding book

press 2 for deleting book

press 3 for updating information

press 4 for printing all books

press 5 for exit.

1

1

Author name :

aa

Title of book :

bb

location: c0s0.0

author: aa

title: bb

location: c0s0.0

number of books : 1

T30-T31

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

```
1
```

```
1
```

```
Author name   :
```

```
cc
```

```
Title of book :
```

```
dd
```

```
location: c0s0.1
```

```
author: aa
```

```
-----
```

```
title: bb
```

```
location: c0s0.0
```

```
author: cc
```

```
-----
```

```
title: dd
```

```
location: c0s0.1
```

```
number of books : 2
```


T32-T33

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

1

1

```
Author name   :
```

aa

```
Title of book :
```

ff

```
location: c0s0.2
```

```
author: aa
```

```
title: bb
```

```
location: c0s0.0
```

```
title: ff
```

```
location: c0s0.2
```

```
author: cc
```

```
title: dd
```

```
location: c0s0.1
```

```
number of books : 3
```

T34-T35

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

1

1

```
Author name   :
```

ee

```
Title of book :
```

gg

```
location: c0s1.3
```

```
author: aa
```

```
title: bb
```

```
location: c0s0.0
```

```
title: ff
```

```
location: c0s0.2
```

```
author: cc
```

```
title: dd
```

```
location: c0s0.1
```

```
author: ee
```

```
title: gg
```

```
location: c0s1.3
```

```
number of books : 4
```

T36-T37

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

1

1

Author name :

ee

Title of book :

hh

location: c0s1.4

author: aa

title: bb

location: c0s0.0

title: ff

location: c0s0.2

author: cc

title: dd

location: c0s0.1

author: ee

title: gg

location: c0s1.3

title: hh

location: c0s1.4

number of books : 5

T38-T39

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

2

2

Author name :

ee

Title of book :

hh

author: aa

title: bb

location: c0s0.0

title: ff

location: c0s0.2

author: cc

title: dd

location: c0s0.1

author: ee

title: gg

location: c0s1.3

number of books : 4

T40-T41

```
What do you want?
press 1 for adding book
press 2 for deleting book
press 3 for updating information
press 4 for printing all books
press 5 for exit.
2
2
Author name   :
xx
Title of book :
cc
java.lang.Exception: there is no that book( xx - cc ) in library.

author: aa
-----
title: bb
location: c0s0.0

title: ff
location: c0s0.2

author: cc
-----
title: dd
location: c0s0.1

author: ee
-----
title: gg
location: c0s1.3

number of books : 4
```

T42 - T43

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

2

2

```
Author name   :
```

ee

```
Title of book :
```

gg

```
author: aa
```

```
title: bb
```

```
location: c0s0.0
```

```
title: ff
```

```
location: c0s0.2
```

```
author: cc
```

```
title: dd
```

```
location: c0s0.1
```

```
number of books : 3
```

T44 – T45

```
What do you want?  
press 1 for adding book  
press 2 for deleting book  
press 3 for updating information  
press 4 for printing all books  
press 5 for exit.
```

```
3
```

```
3
```

```
Author name   :
```

```
aa
```

```
Title of book :
```

```
bb
```

```
update location
```

```
author: aa
```

```
-----
```

```
title: ff
```

```
location: c0s0.2
```

```
title: bb
```

```
location: c0s1.5
```

```
author: cc
```

```
-----
```

```
title: dd
```

```
location: c0s0.1
```

```
number of books : 3
```

T46-T47

```
author: aa
-----
title: ff
location: [c0s0.2]

title: bb
location: [c0s1.5]

author: cc
-----|---
title: dd
location: [c0s0.1, c0s0.0]

number of books : 4
```

T48

```
4
author: aa
-----
title: ff
location: [c0s0.2]

title: bb
location: [c0s1.5]

author: cc
-----
title: dd
location: [c0s0.1, c0s0.0]

number of books : 4
```


T49

```
What do you want?
press 1 for adding book
press 2 for deleting book
press 3 for updating information
press 4 for printing all books
press 5 for exit.
5
5
exiting from administrator..
```

T50

```
printing books...
author: aa
-----
title: ff
location: [c0s0.2]

title: bb
location: [c0s1.5]

author: cc
-----
title: dd
location: [c0s0.1, c0s0.0]

number of books : 4
```

T51 – T52

```
searching author 'aa' ...
author: aa
-----
title: ff
location: c0s0.2

title: bb
location: c0s1.5

searching title 'bb' ...
author: aa
title: bb
location: c0s1.5
```

T53 – T54

```
searching author 'xx' ...
java.lang.Exception: Author ( xx ) not found in library.
searching title 'elif' ...
```

```
java.lang.Exception: Book ( elif ) not found in library.
```

T55 – T56

```
getStatus(aa,bb)
Avaliable

getStatus(xx,yy)
Not avaliable
```