Database Systems Project Report:

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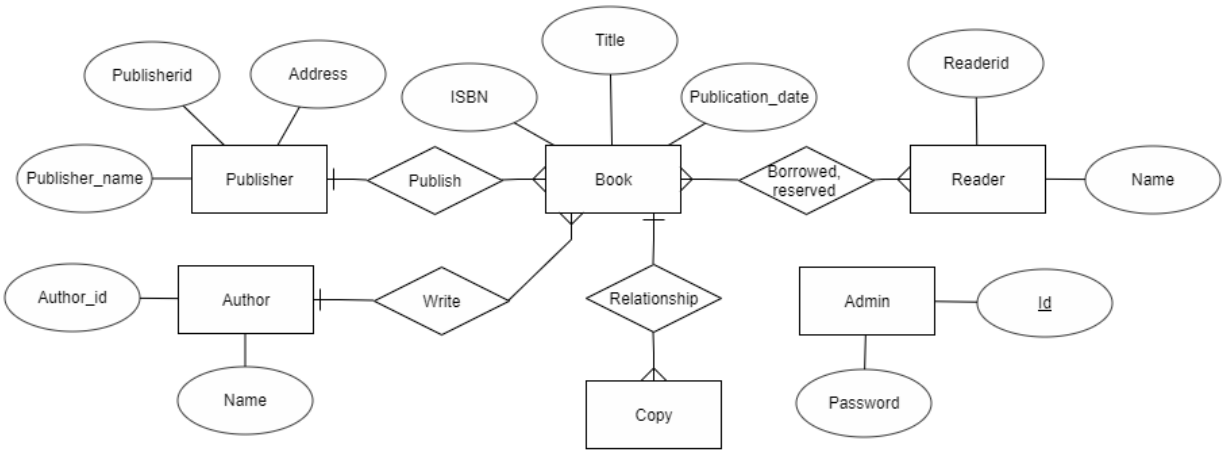
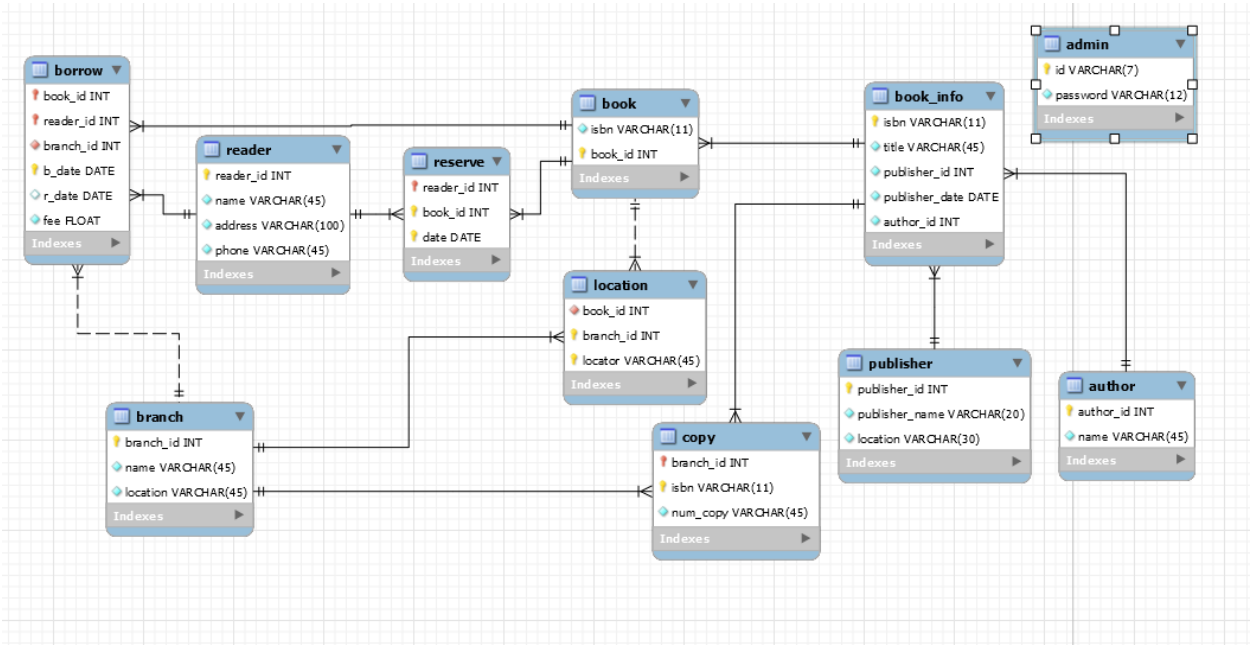
For the final Database Systems project, we used Java(Eclipse) to create the GUI and compute the database related operations. And we used MySql and ERplus to create tables and ER diagrams. To introduce our projects, we are planning to our library system “LibraryMe” into two sections which includes database introduction and the demonstration of our database system.

I. Database Introduction:

1. ER Diagram



2. Data Model



In our data model, we have 11 tables which include: admin, reader, borrow, reserve, publisher, location, copy, author, branch, book and book _info.

1) **admin:** this table is only for store password and user id of administrator login. And it does not have relation to other tables.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
id	VARCHAR(7)	☑	☑	☐	☐	☐	☐	☐	☐	
password	VARCHAR(12)	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

2) **book:** book table is conjunction table which hold isbn and id of each book. The primary key of this table is book_id and isbn is referring to the isbn in book_info table. When every time adding a new book into the table, it will generate a new book_id incrementally.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
isbn	VARCHAR(11)	☐	☑	☐	☐	☐	☐	☐	☐	
book_id	INT	☑	☑	☐	☐	☐	☐	☑	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

3) **book_info:** book_info table contains data such as isbn(Primary Key), title, publisher_id(its referring the publisher_id in publisher table), publisher_date and author_id(its referring to the author_id in author table).

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
isbn	VARCHAR(11)	☑	☑	☐	☐	☐	☐	☐	☐	
title	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
publisher_id	INT	☐	☑	☐	☐	☐	☐	☐	☐	
publisher_date	DATE	☐	☑	☐	☐	☐	☐	☐	☐	
author_id	INT	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

4) **author:** this table contains data of author_id(primary key) and name of the author. A new author_id will be automatically generated when a new author is adding to the table.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
author_id	INT	☑	☑	☐	☐	☐	☐	☑	☐	
name	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

5) **publisher:** this table contains data of publisher_id(primary key), name of the publisher and location. A new publisher_id will be automatically generated when a new author is adding to

the table.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
publisher_id	INT	☑	☑	☐	☐	☐	☐	☑	☐	
publisher_name	VARCHAR(20)	☐	☑	☐	☐	☐	☐	☐	☐	
location	VARCHAR(30)	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

6) **copy:** this table contains data of branch_id, isbn and num_copy(number of copies). The branch_id is referring to the branch_id in branch table and isbn is referring to the isbn in book_info table. branch_id and isbn are a composite primary key.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
branch_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
isbn	VARCHAR(11)	☑	☑	☐	☐	☐	☐	☐	☐	
num_copy	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

7) **branch:** this table contains the data of branch_id(primary key), name of the branch and location.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
branch_id	INT	☑	☑	☐	☐	☐	☐	☑	☐	
name	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
location	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

8) **location:** this table contains data of book_id, branch_id and the location of the book. book_id is referring to the book_id in book table and branch_id is referring to the branch_id in branch. Branch_id and locator are a composite primary key.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
book_id	INT	☐	☑	☐	☐	☐	☐	☐	☐	
branch_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
locator	VARCHAR(45)	☑	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

9) **reader:** this table contains reader information which include reader_id(primary key), name, address and phone.

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
reader_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
name	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
address	VARCHAR(100)	☐	☑	☐	☐	☐	☐	☐	☐	
phone	VARCHAR(45)	☐	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

10) **reserve:** this table contains data of reader_id, book_id and date (primary key). The reader_id is referring to the reader_id in reader table and the book_id is referring to the book_id in book. The reader_id and book_id is a composite primary key.

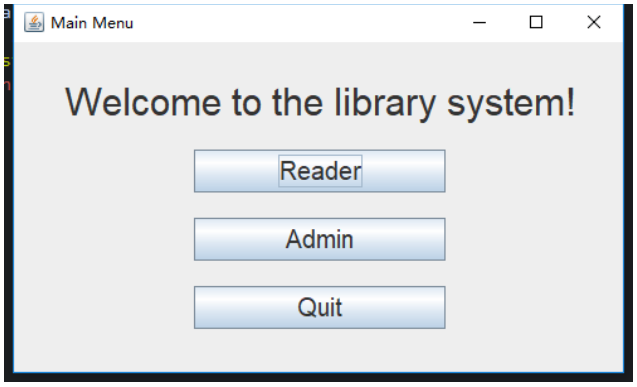
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
reader_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
book_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
date	DATE	☑	☑	☐	☐	☐	☐	☐	☐	
		☐	☐	☐	☐	☐	☐	☐	☐	

11) **borrow:** this table contains data of book_id (referring to the book_id in book table), reader_id (referring to the reader_id in reader table), branch_id (referring the branch_id in branch table), b_date(borrow date), r_date(return date) and fee. The book_id, reader_id and b_date together is the primary key since a reader can borrow the same book more than one time. The default of expression for r_date is NULL and the default of expression for fee is 0.

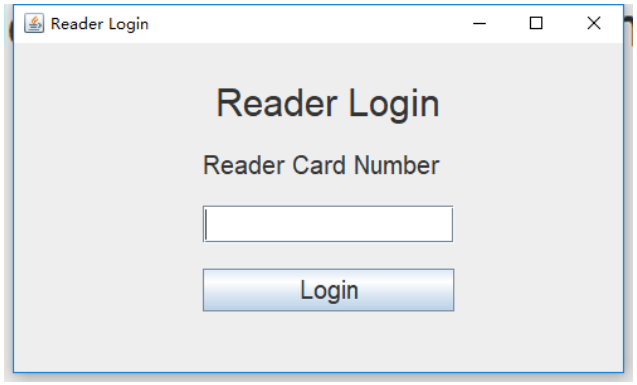
Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
book_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
reader_id	INT	☑	☑	☐	☐	☐	☐	☐	☐	
branch_id	INT	☐	☑	☐	☐	☐	☐	☐	☐	
b_date	DATE	☑	☑	☐	☐	☐	☐	☐	☐	
r_date	DATE	☐	☐	☐	☐	☐	☐	☐	☐	
fee	FLOAT	☐	☐	☐	☐	☐	☐	☐	☐	NULL
borrowcol	VARCHAR(45)	☐	☐	☐	☐	☐	☐	☐	☐	'0'
		☐	☐	☐	☐	☐	☐	☐	☐	

II. Program

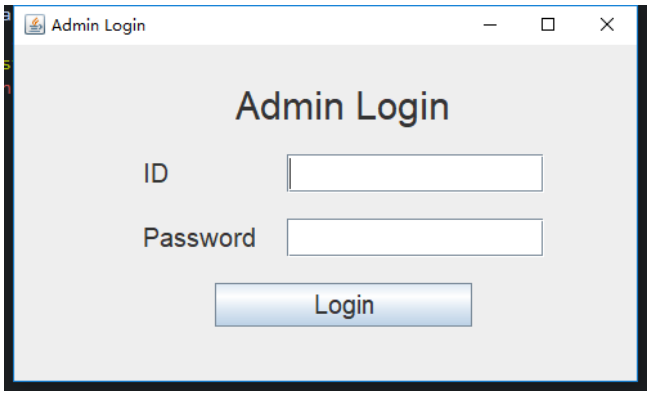
1. Main Menu



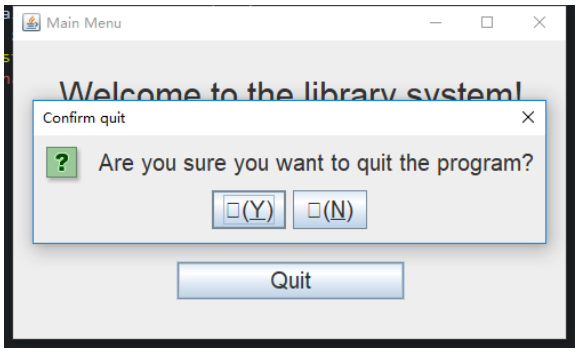
If click on Reader button, the program goes to the reader login page and user need to input the card number to login.



If click on Admin button, the program goes to the admin login page and user need to imput the admin username and password to login.



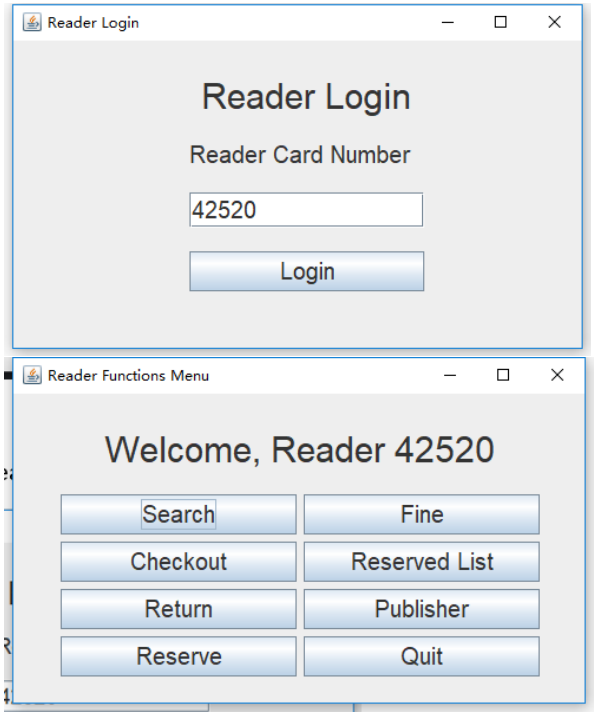
If click on Quit button, the program will ask user to confirm to qui the program



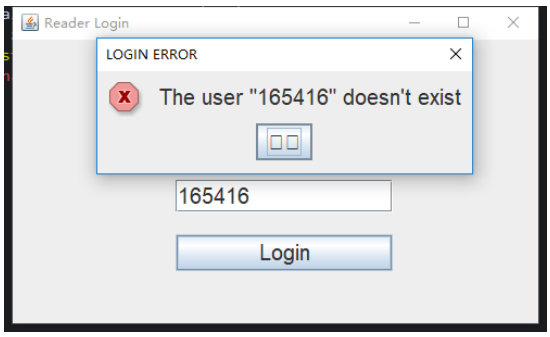
2. Reader Menu

1) Login

Input the right reader card number to login

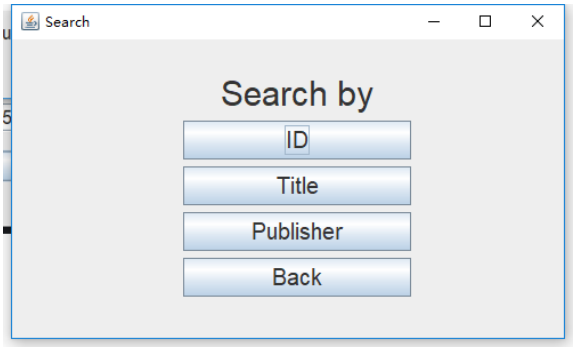


If the card number is wrong, user will see a message

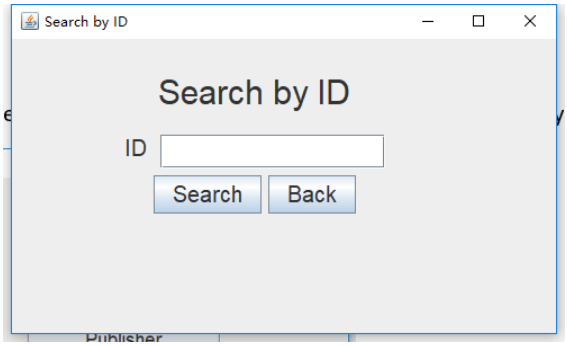


2) Search

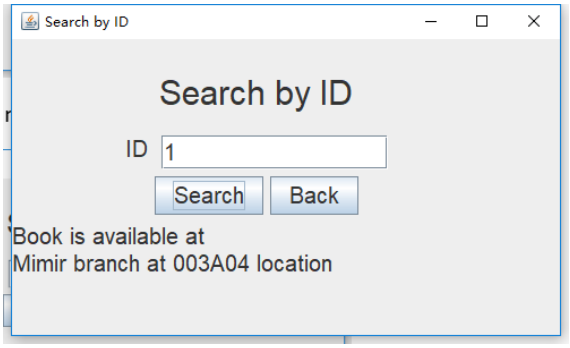
On reader menu, when click on search button, user can do search by different attributes



When click on ID button, user can search book by book id

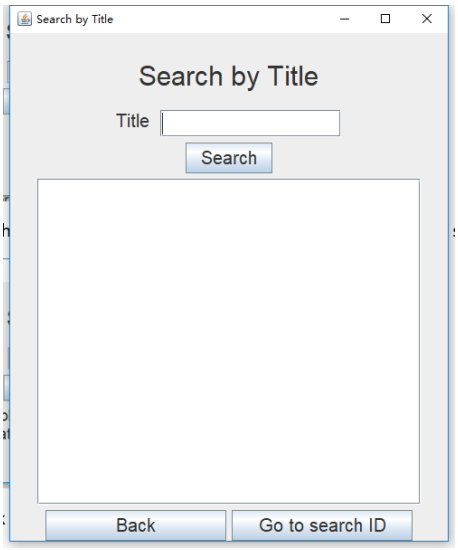


Input the right book id and click on search button to check the book status

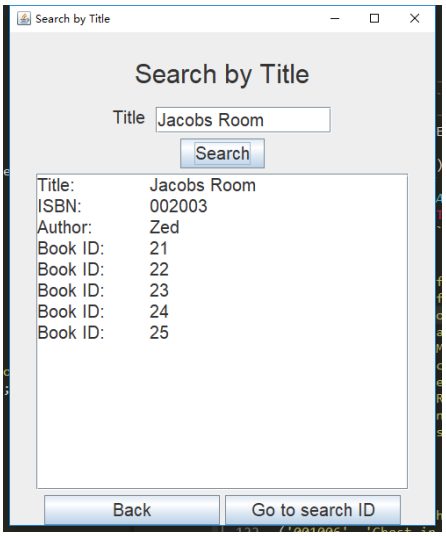


Click on back button to go back to search by page

When click on Title button, user can search the book title



Input the book title and click the search to do search



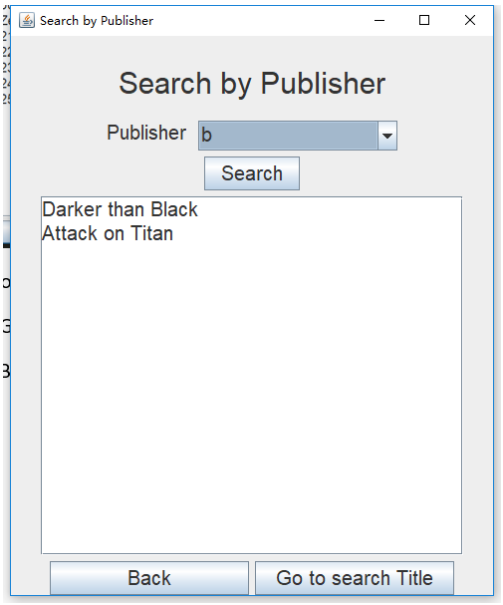
Input a part of the title is the same effect

Click on the Go to button to go the search ID page

Click on the Back button to go back to the search by page

Click on the Publisher butto to search by publisher

Choose a publisher name and click the search button

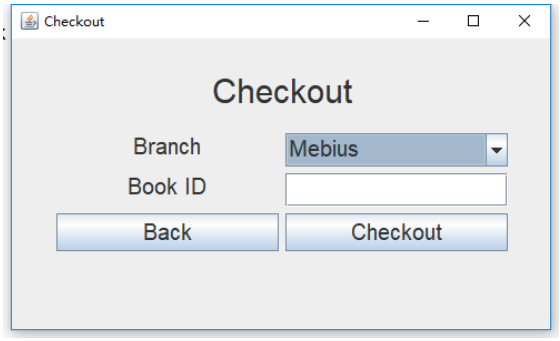


Click on Go to button to go to search title

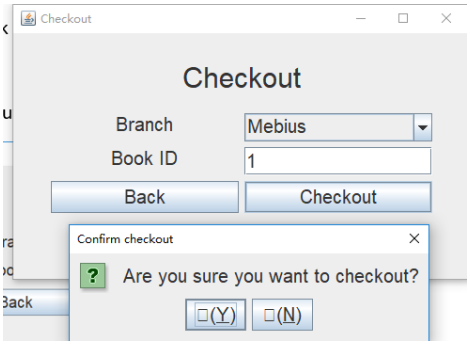
Click on back buton to go back to the search by page

3) Checkout

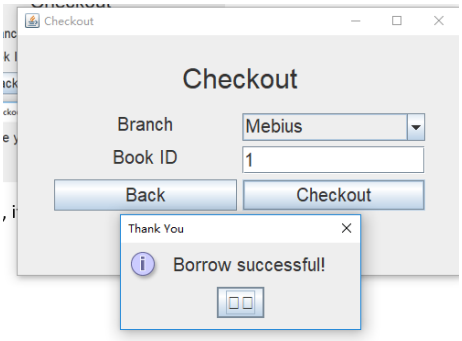
Click checkout button to checkout borrowing



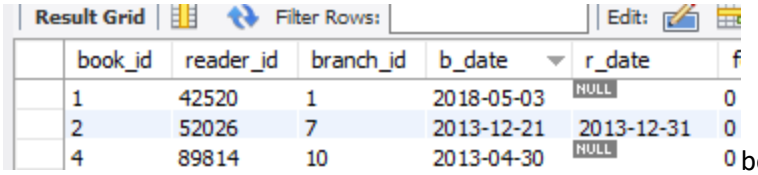
Choose a branch name and input the book ID, then click on the checkout button, user is asked to confirm the checkou



Click on yes, if the borrowing is successful, user will see a message



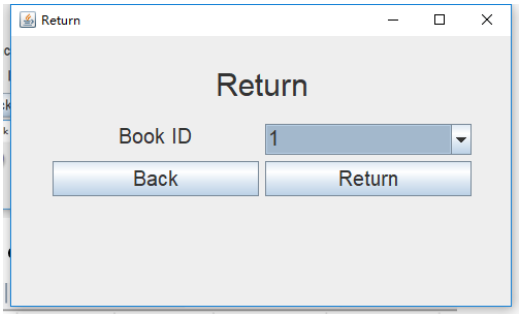
Let's see the database



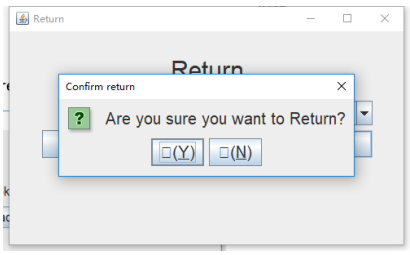
borrow table

4) Return

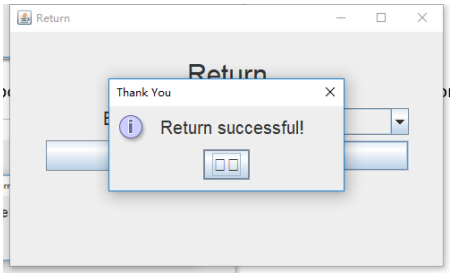
Click on the return button to return a book



Choose the book ID you want to return and click on the return button



Click yes



User will see a message if return successed, let's see the database

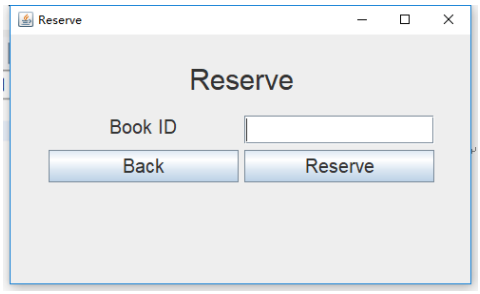
Result Grid | Filter Rows: | Edit:

book_id	reader_id	branch_id	b_date	r_date	fee
1	42520	1	2018-05-03	2018-05-03	0
2	52026	7	2013-12-21	2013-12-31	0

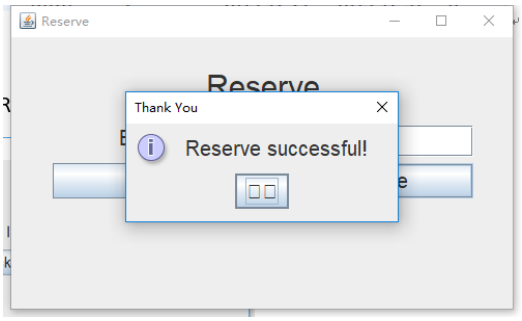
borrow table

5) Reserve

Click on the Reserve button to reserve a book



Input the book id you want to reserve and click on the reserve button



Database:

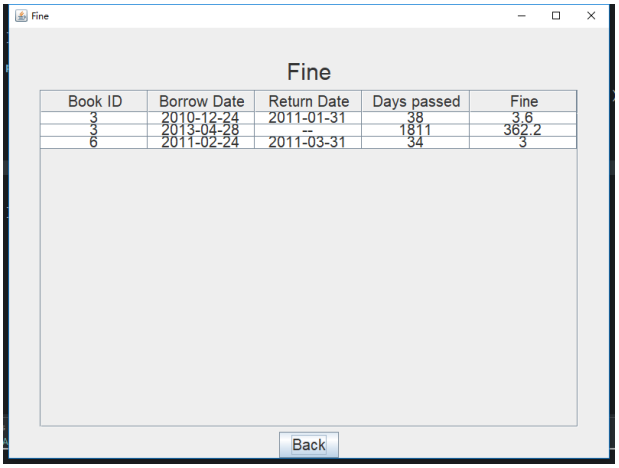
Result Grid | Filter Rows:

reader_id	book_id	date
42520	1	2018-05-03
42520	2	2013-05-01

reserve table

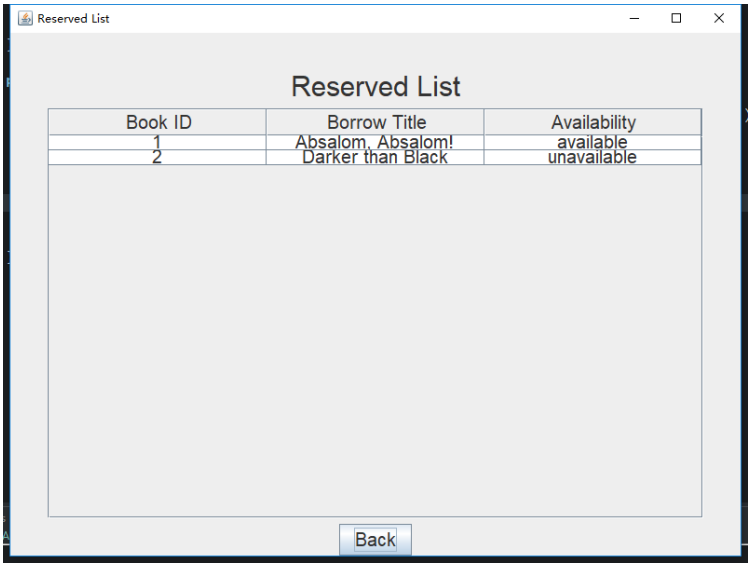
6) Fine

Click on the fine button to see all the borrowing on you and fine of each borrowing



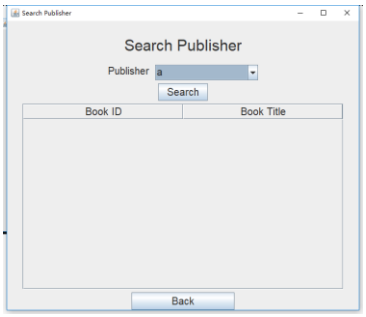
7) Reserve List

Click on the Reserve List button to see all the reservations and their availabilities

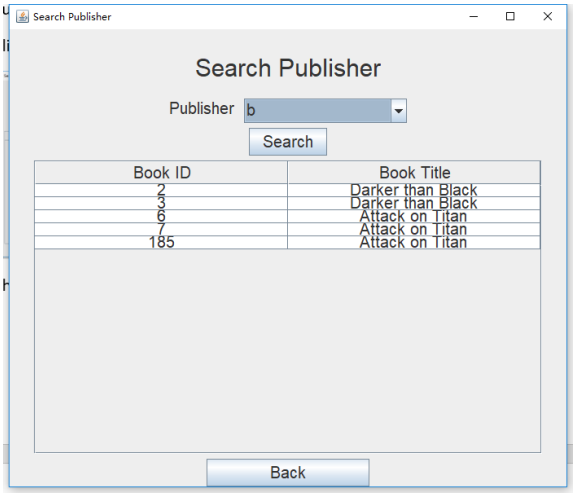


8) Publisher

Click on the publisher button to see all book copies published by a publisher



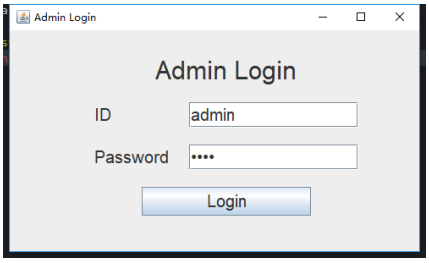
Choose a publisher and click the search button



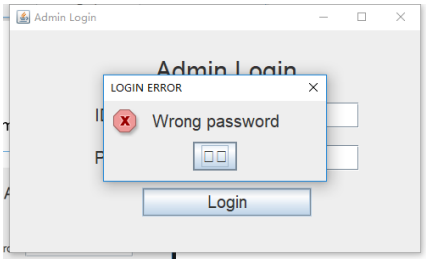
3. Admin Menu

1) Login

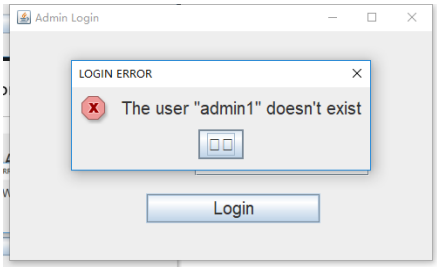
Input the admin ID and password to login



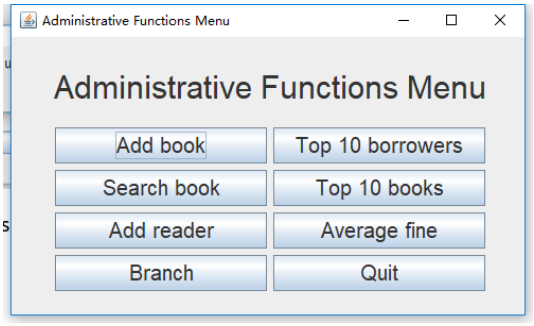
If the password is wrong



If the user is not existing

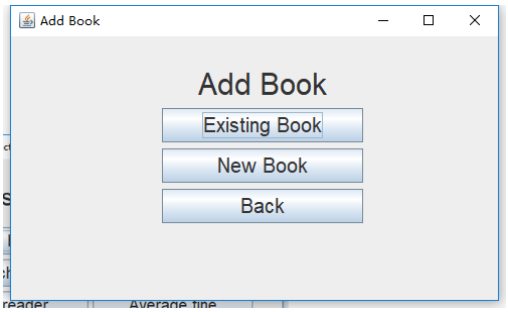


Login successful to see the admin menu

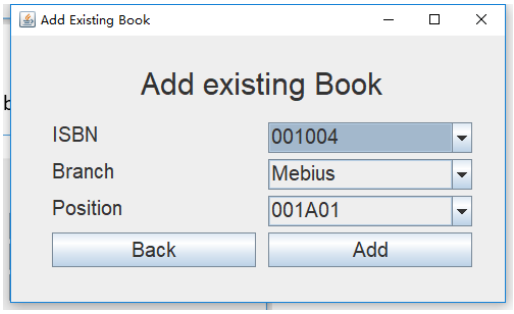


2) Add book

Click on add book button to add a book

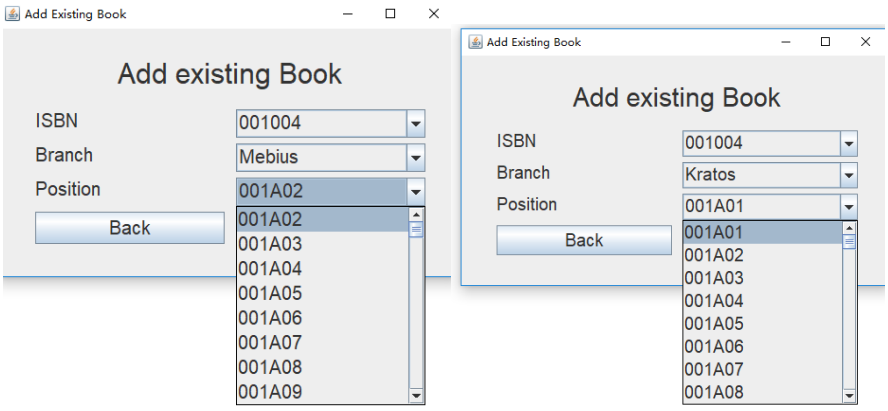


Click on Existing Book button to add a book that has book information in the database already

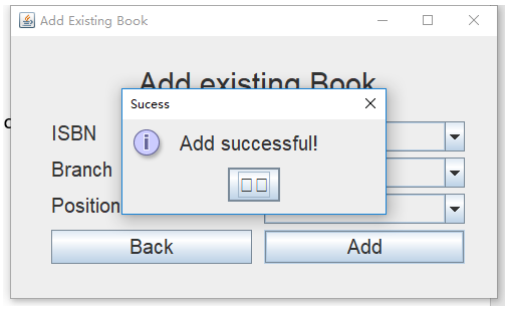


Choose the ISBN of the book, Branch you want add the book copy in and the position the branch to store the book

The position list is dynamic by the branch you choose, and it will only show the position that do not have a book



The click the add button



Database:

isbn	book_id
001004	186
001007	185

book table

Result Grid | Filter Rows:

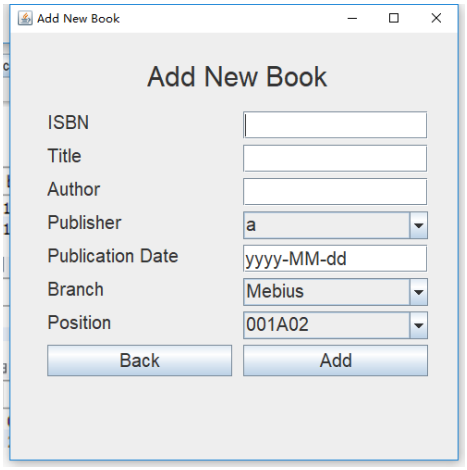
book_id	branch_id	locator
186	1	001A01
86	1	002A02

location table

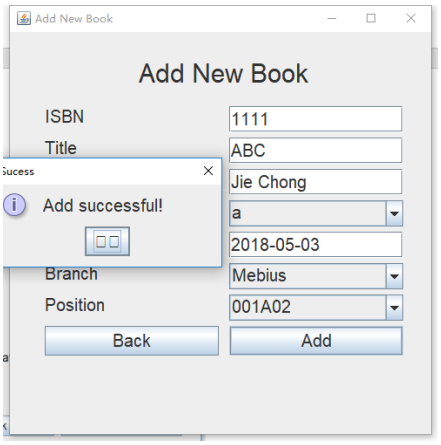
branch_id	isbn	num_copy
1	001004	1
1	2004	1

copy table

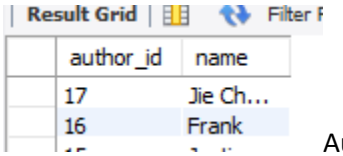
Click on Add new book button to add a book that does not have information in the library



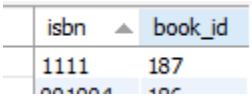
Input and choose all required data and click add button to add.



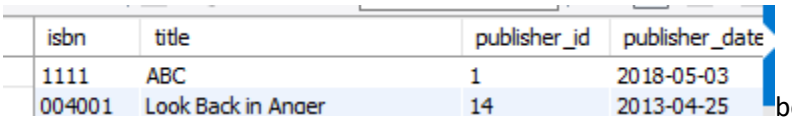
Database:



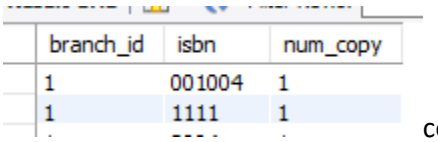
Author table



book table



book_info table



copy table

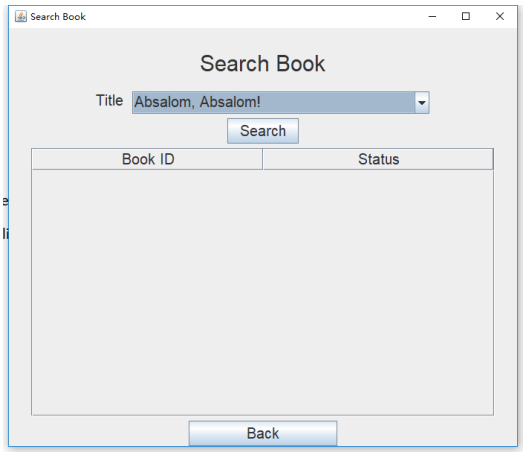
Result Grid | Filter Rows:

book_id	branch_id	locator
186	1	001A01
187	1	001A02
86	1	002A02

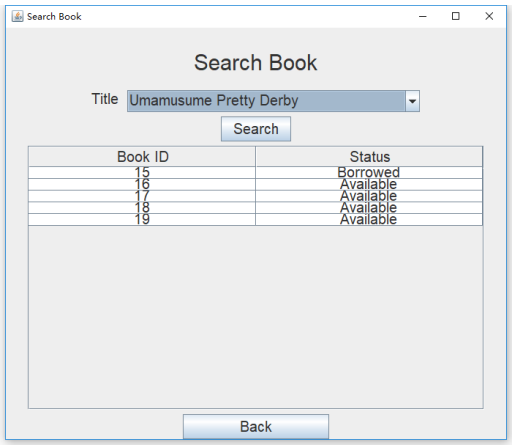
location table

3) Search book

Click on the search button to search book copies by title



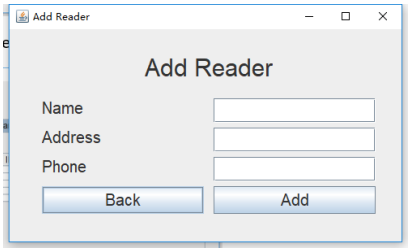
Choose a title and click on search to search



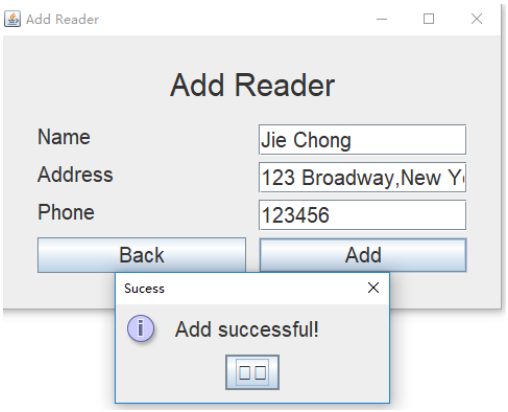
You can see the status on each book copy

4) Add Reader

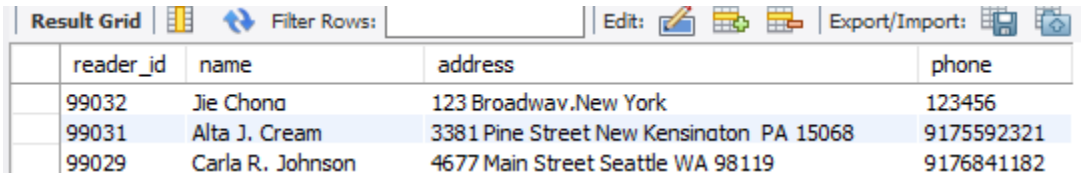
Click on add reader button to add a reader



Input the data and click on add button to add



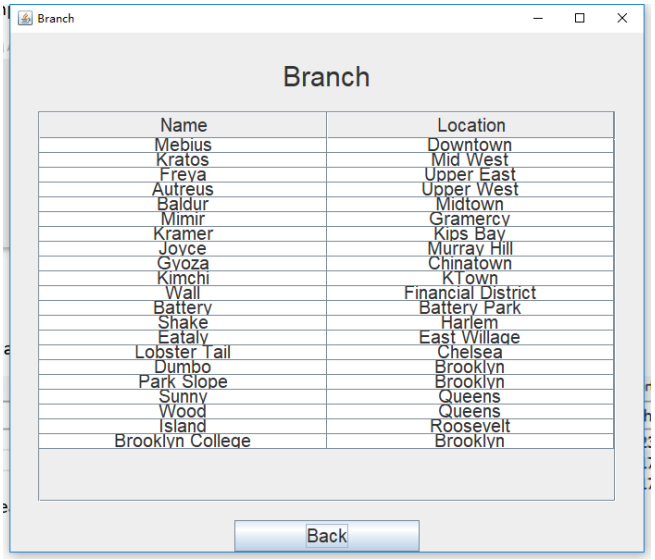
Database



reader table

5) Branch

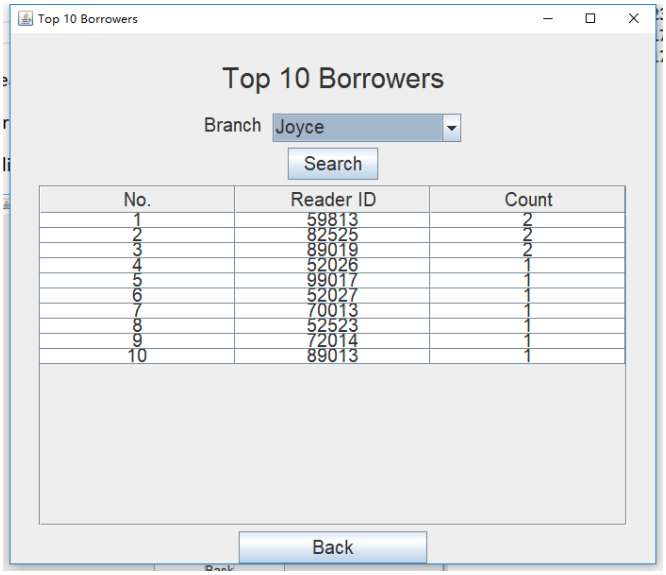
Click the branch button to see all branches information



6) Top 10 Borrowers

Click on top 10 borrowers button to see top 10 most frequent borrowers on each branch

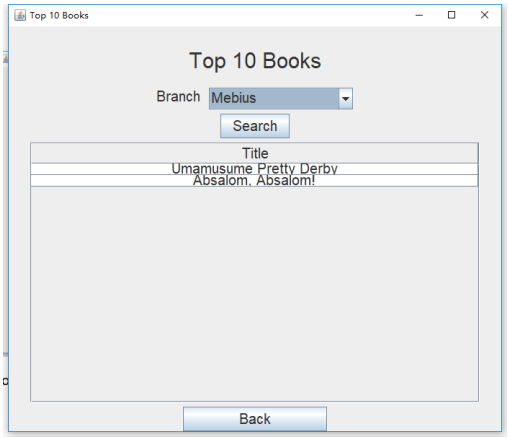
Choose the branch an click on search button



7) Top 10 books

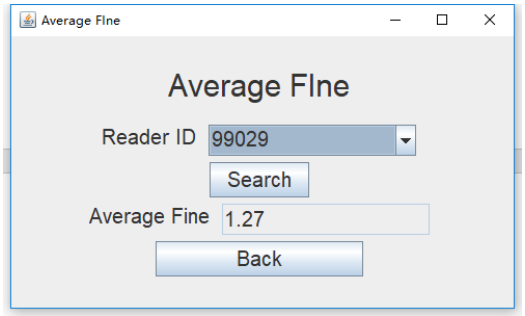
Click on top 10 books to see the top 10 most frequent books to be borrowed on each branch

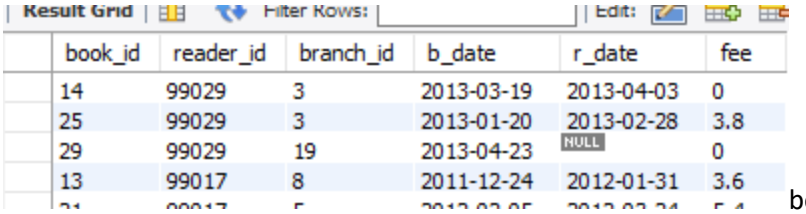
Choose the branch and click on the search button



8) Average Fine

Click on the average fine button to see the average fine on a specific reader





book_id	reader_id	branch_id	b_date	r_date	fee
14	99029	3	2013-03-19	2013-04-03	0
25	99029	3	2013-01-20	2013-02-28	3.8
29	99029	19	2013-04-23	NULL	0
13	99017	8	2011-12-24	2012-01-31	3.6

borrow table

For user 99029, his average fine is 3.8 / 3 = 1.27

The End!