Department of Computer Science and Software Engineering
Xi'an Jiaotong-Liverpool University

Assignment 2

Learning Outcomes

On successful completion of this assignment, students are expected to:

- understand and be able to apply a variety of data structures together with their internal representation and algorithms;
- be able to select, with justification, appropriate data structures to ensure efficient implementation of an algorithm.

To Do

Design and implement a JAVA program called 'Library'.

Data

Your system should store books' information. A book in your library should contain:

- **ISBN**: ISBN is the acronym for International Standard Book Number. It is a 10 or 13-digit number used to identify a specific book.
- **Title**: each book has one title, but different books can have the same title.
- **Author**: each book has one author, but different books can have the same author.
- **Category**: each book belongs to one of these 6 categories: Arts, Business, Comics, IT, Cooking, Sports.
- **How many copies in total of this book**: no more than 20 copies per book.
- **How many copies available for lending**.

Note: Different books with the same title cannot share the same author.

Functionality

Your system should provide at least 5 types of functions including: input, update, delete, display and search book information:

- **Add**:
  a) Add a **new** book by providing all the information required.
- **Delete**:
  a) Delete a book by providing
    - The book's ISBN
    - Or by providing the title **together with** the author name.
    - Note: When some copies of the book have been lent out, this book cannot be deleted.
- **Search:**
  a) Search a book by providing an input of any kind, you method should display everything that matches the input. Information of results books should be displayed in a table format and displayed in a descending order based on the **total copy number** of the books.
- **Update:**
  a) Find the book by ISBN and then update any information of the book (except ISBN).

- **Display**:
  a) Display all books' information in table format. Allowing user to choose group by:
     - Category: display books by category.
     - Or author: display books by author.

Note: All your methods should provide console display of the results.

Example

The following shows a typical scenario of user interactions with the system (user commands or inputs are rendered in *italics*):

- Library
- Welcome to the library management system, functions provided include the following:
  - Add – to add a new book
  - Update – to update book info
  - Search – to enquire about book info
  - Delete – to delete a book
  - Display– to display book(s) info
  - Quit – to exit from the current level of interactions

- Enter your command here(Enter 'Quit' at any time to exit from current level): *Add*
  - Enter a new book ISBN: *7302061866*
    ISBN: 7302061866 Entered.
  - Enter the title: *Data Structure*
    Title: Data Structure Entered.
  - Enter the author: *Michael Main*
    Author: Michael Main Entered.
  - Enter category: *IT*
    Category: IT Entered.
  - Enter total copy number: *20*
    Ready to add book: 7302061866; Data Structure; Michael Main; IT;20;20
  - Enter 'Y' to add new book. Anything else to quit: *Y*
    New book added successfully.
  - Note: automatically exit from current level.

- Enter your command here(Enter 'Quit' at any time to exit from current level): *Add*
  - Enter a new book ISBN: *7302061867*
    ISBN: 7302061867 Entered.
  - Enter the title: *Data Structure*
    Title: Data Structure Entered.
  - Enter the author: *Michael Main*
    Book Data Structure by Michael Main exists in system.
  - Please re-enter Author or enter 'T' to re-enter title: *T*
  - Enter the title: *Data Structure II*
  - Enter category: *IT*
    Category: IT Entered.
  - Enter total copy number: *20*

Ready to add book: 7302061867; Data Structure II; Michael Main; IT; 20; 20

- Enter 'Y' to add new book. Anything else to quit: *Y*
  New book added successfully.
- Note: automatically exit from current level.

➢ Enter your command here: (Enter 'Quit' at any time to exit from current level): *Delete*

- Enter the book's ISBN or title + author: *7302061867*
  Found book:

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302061867	Data Structure II	Michael Main	IT	20	20

- Enter 'Y' to delete the book. Anything else to quit: *Y*
  Book with ISBN 7302061867 has been deleted successfully.
- Note: automatically exit from current level.

➢ Enter your command here: (Enter 'Quit' at any time to exit from current level): *Delete*

- Enter the book's ISBN or title + author: *Data Structure + Michael Main*
  Found book:

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302061866	Data Structure	Michael Main	IT	20	18

Sorry this book cannot be deleted. There are 2 copies have been lent out.

- Note: automatically exit from current level.

➢ Enter your command here: (Enter 'Quit' at any time to exit from current level): *Search*

- Enter your keyword: *Data Structure*
  Found book(s):

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302061866	Data Structure	Michael Main	IT	20	18
7302061867	Data Structure II	Michael Main	IT	20	20
7302061000	Algorithm and Data Structure	PAUL ERNEST	IT	18	8
7303158867	Dynamic Data Structure	DANEIL	IT	10	10
7302000677	Data Structure in JAVA	LIU	IT	10	3

- Enter 'Y' to search other books, anything else to quit: *Y*
- Enter your keyword: *Michael*
  Found book(s)

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302061866	Data Structure	Michael Main	IT	20	18
7302061867	Data Structure II	Michael Main	IT	20	20

- Enter 'Y' to search other books, anything else to quit: *7302000677*
  Found book:

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302000677	Data Structure in JAVA	LIU	IT	10	3

- Enter 'Y' to search other books, anything else to quit: *Y*
- Enter your keyword: *Arts*
  Found book(s)

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
4102061866	Interaction of color	Josef Albers	Arts	15	8
4102061867	Digital Arts	J.D	IT	14	10

- Enter 'Y' to search other books, anything else to quit: *N*
- Note: automatically exit from current level.

➢ Enter your command here: (Enter 'Quit' at any time to exit from current level): *Update*

- Enter ISBN*: 7302000677*
  Found book:

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302000677	Data Structure in JAVA	LIU	IT	10	3

- Enter type of information you want to update, 'T' for title, 'A' for author, 'C' for category, 'TC' for total copy number, 'AC' for available number: *TC*
- Enter your new total copy number(***with hint***): *18*
  Book 7302000677's total copy number has been updated from 10 to 18 successfully.
- Note: automatically exit from current level.

➢ Enter your command here: (Enter 'Quit' at any time to exit from current level): *Display*

- Enter 'C' for displaying group by category, or 'A' for displaying group by author: *C*

ISBN	TITLE	AUTHOR	CATEGORY	TOTAL_COPIES	AVAILABLE_COPIES
7302061866	Data Structure	Michael Main	IT	20	18
7302061867	Data Structure II	Michael Main	IT	20	20
7302061000	Algorithm and Data Structure	PAUL ERNEST	IT	18	8
7303158867	Dynamic Data Structure	DANEIL	IT	10	10
7302000677	Data Structure in JAVA	LIU	IT	10	3
4102061866	Interaction of colour	Josef Albers	Arts	15	8

- Note: automatically exit from current level.

Notes

- Capitalization makes no difference. For example 'Add and 'add' can be considered as the same.
- The above scenario is just an example. It is **not** the standard format for your system.
- Above scenario did not consider input validation, however in your system, you **should** validate the inputs.
- Your system must provide hints for user to understand what info to input during the interaction.
- It is up to you to decide what algorithms and data structures to use to keep track of books info in the system, and where to find such info.

CSE 104 – Data Structures & Algorithms

Department of Computer Science and Software Engineering
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Due date

2019-05-24 12:00pm (Submit on ICE)

What to Submit

- A ZIP file of your entire Netbeans project folder.
- A stapled report (not exceeding 5 pages in total):
    - Your report should have a XJTLU front page with module title, student name/number, declaration of non-plagiarism and your signature etc. (1 page)
    - Your report should explain your system structure (UML etc.), what data structure/algorithms (rendered in pseudo code) you have designed and how they are tested. You should also analyze the complexity of your data structures and algorithms used. (Not exceeding 4 pages.)

What to do during the assessment hour during the due date?

TO BE ANNOUNCED.

Marking

Criteria of marking: correctness, conciseness, quality and efficiency of the data structures/algorithms used/developed.

NOTE:

- Being absent of on-spot test will cause direct failure in this assignment.
- Submission of .java file(s) with compiling error will cause marks deduction. Please makes sure you test your methods before submission.
- Comments, code readability and etc. will be considered in "code quality" check.
- Plagiarism will cause direct failure in this course.
- This assignment: 10% of the overall marks for CSE104.

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By Ting Cao