

theLibrary

a programming project by

<i>Nour Mohammed Atef</i>	<i>8129</i>
<i>Ali Tarek Helaly</i>	<i>8154</i>
<i>Menna Magdy</i>	<i>8082</i>
<i>Saif eldeen Adel</i>	<i>8139</i>

Overview

A library system built using C that allows users to login and perform multiple actions on books stored. These actions include:

- Adding a new book to the system
- Deleting a book from the system
- Modifying a book's data
- Searching for a specific book using ISBN
- Searching book titles using keywords.
- Sorting books by Title, Date and Price.

User Manual

Full demonstration of how the program works and a walkthrough of all the features.

LOGIN MENU

- LOGIN
 - Prompts user for username
 - Prompts user for password
 - Once both are correct, user is allowed access to action menu
- QUIT
 - Exits program

ACTION MENU

- ADD
 - Prompts user for book data.
 - Book added **temporarily** (choose SAVE in the action menu to permanently add).
- DELETE
 - Prompts user for ISBN they wish to delete.
 - Book deleted **temporarily** (choose SAVE in the action menu to permanently delete).
- MODIFY
 - Prompts user for ISBN they wish to modify.
 - Prompts user for all of the book's properties for modifying.
 - Book modified **temporarily** (choose SAVE in the action menu to permanently modify).
- SEARCH
 - Prompts user for ISBN they wish to search for.
 - If found, all of the book details are printed.
- ADVANCED SEARCH
 - Prompts user keyword they wish to search for in all of the titles stored.
 - If any matches are found, all of them are printed out.
- PRINT
 - User is given three choices of sorting before printing: **Date, Title, Price**
 - **Date:** Prints all books sorted by date, oldest to newest.
 - **Title:** Prints all books sorted by titles alphabetically.
 - **Price:** Prints all books sorted by prices, lowest to highest.
 - To save the sorted books, choose SAVE in the action menu.
- SAVE
 - Saves all changes done by the user permanently.
- QUIT
 - Exits program without saving any changes done before choosing SAVE.

Documentation

Function	Description / Pseudocode
<code>login()</code>	<ul style="list-style-type: none">- Opens <code>credentials.txt</code>- Takes username input, loops over lines in file until it finds username.- If username is not found, appropriate message displayed, asked again.- If username found, asks for password, and compares it with next line.- If password is wrong, appropriate message displayed, asked again.
<code>load()</code>	<ul style="list-style-type: none">- Opens <code>books.txt</code>- Grabs lines one by one- Create book object- Splits line on commas- Store each property in appropriate book property- Add book object to book array- Repeat to populate array

<code>main()</code>	<ul style="list-style-type: none">- Runs login and load functions- Displays main menu with all options- Depending on the menu option chosen, run one of the functions below.
---------------------	---

<code>add()</code>	<ul style="list-style-type: none">- Asks user to input book data- Appropriate validation for each property- Adds new book to books array
<code>modify()</code>	<ul style="list-style-type: none">- Asks user to input ISBN, validates ISBN- If ISBN is found, scans for input for all other properties- Appropriate validation for each property- Updates book object in books array
<code>delete()</code>	<ul style="list-style-type: none">- Asks user to input ISBN, validates ISBN- If ISBN is found, removes the book from the books array
<code>query()</code>	<ul style="list-style-type: none">- Asks user to input ISBN, validates ISBN- If ISBN is found, prints all book data- If not found, appropriate message is displayed.
<code>advSearch()</code>	<ul style="list-style-type: none">- Asks user to input keyword- Looks for keyword in each title and gets all titles that match- Print all books that match
<code>print()</code>	<ul style="list-style-type: none">- Asks user for their sorting choice- Runs sorting function- Prints all books, sorted.
<code>save()</code>	<ul style="list-style-type: none">- Opens <code>books.txt</code>- Loops over book array, writes each book's properties in one line, comma separated.

Helper Functions

To avoid copying and pasting blocks of code, some helper functions were created to replace logic that repeated throughout our program such as validating ISBN format and validating integer input. Others were created to make our code more modular and understandable instead of being crammed in one huge messy block.

Function prototype	Description / Pseudocode
<code>int checkISBN(char isbn[])</code>	<ul style="list-style-type: none">- Takes in an ISBN string- Returns 1 if ISBN contains 13 digits- Return 0 if not.
<code>int findBook(char isbn[])</code>	<ul style="list-style-type: none">- Takes in valid ISBN string- Finds ISBN in array using Linear Search- Returns index of book found- Returns -1 if not found
<code>char *monthName(int n)</code>	<ul style="list-style-type: none">- Converts month number to name Ex. 4 → April
<code>void printBook(int index)</code>	<ul style="list-style-type: none">- Takes in the index of a book in array- Prints book details in required format
<code>char *stringToLower(char str[])</code>	<ul style="list-style-type: none">- Takes in a string- Loops every character and creates a new string that's lowercase- Returns lowercase string
<code>int checkIntInput(char input[])</code>	<ul style="list-style-type: none">- Takes in string input- Checks if every character is a digit- Returns the integer value of the string if so- Returns -1 if any character is not a digit
<code>void sortByDate()</code> <code>void sortByTitle()</code> <code>void sortByPrices()</code>	<ul style="list-style-type: none">- Sorts chosen book property using Bubble Sort- Rearranging all the books in the array.
<code>void waitForESC()</code>	<ul style="list-style-type: none">- Creates loop that waits for the user to exit using ESC.

Algorithms

Searching

The main search algorithm used in this program was Linear Search wherein each array element is sequentially checked until the desired element is found. This was mostly used when searching for a specific ISBN.

Sorting

The main sort algorithm used in this program was the Bubble Sort algorithm where the array is iterated over taking pairs of elements and comparing them to each other and if they are in the wrong order, they will be swapped. This was used in the sorting functions.

Sample Runs

LOGIN

```
1 - LOGIN
2 - QUIT
Choose option: 1
```



```
LOGIN
Enter username: saif
Enter password: 8139
```

ACTION MENU

```
1- ADD
2- DELETE
3- MODIFY
4- SEARCH
5- ADVANCED SEARCH
6- PRINT
7- SAVE
8- QUIT - (All changes will be discarded if chosen before SAVE)
Choose action: 1
```

Adding a Book

```
                ADDING A NEW BOOK

ISBN(13 digits): 1234567890123
Title: A Little Life
Author: Hanya Yanagihara
Quantity: 6
Price: 7.99
Month of Publication: 3
Year of Publication: 2015
Book successfully added!

Press ESC to go back to menu:

```

Deleting a Book

```
                DELETING A BOOK

Enter the ISBN of the book you wish to delete (13 digits): 9780136019702
Book successfully deleted!

Press ESC to go back to menu:

```

Modifying a Book

```
MODIFYING A BOOK

Enter the ISBN of the book you wish to modify (13 digits): 1234567890123
Title: A Little Life
Author: Saif eldeen Adel
Quantity: 20
Price: 10.99
Month of Publication: 3
Year of Publication: 2016

Book successfully modified!

Press ESC to go back to menu:
█
```

Querying a Book

```
SEARCH BY ISBN

Enter ISBN (13 digits): 1234567890123

ISBN: 1234567890123
Title: A Little Life
Author: Saif eldeen Adel
Quantity: 20
Price: 10.99
Date: March 2016

Press ESC to go back to menu:
█
```

Advanced Search

```
SEARCH BY KEYWORD

Keyword to search for: chem
ISBN: 9780136019701
Title: An Introduction to Organic Chemistry
Author: Timberlake Karen
Quantity: 10
Price: 3.54
Date: December 2008

ISBN: 9780136019702
Title: Chemotherapy
Author: Karen
Quantity: 1
Price: 2.54
Date: January 2002

Press ESC to go back to menu:
█
```

Printing Books (sorting by title)

Sorted by Title:

ISBN: 1234567890123

Title: A Little Life

Author: Saif eldeen Adel

Quantity: 20

Price: 10.99

Date: March 2016

ISBN: 9781152304222

Title: Advanced Mathematics Techniques

Author: Antony Smith

Quantity: 5

Price: 5.21

Date: February 2007

ISBN: 9780136019701

Title: An Introduction to Organic Chemistry

Author: Timberlake Karen

Quantity: 10

Price: 3.54

Date: December 2008

ISBN: 9780136019702

Title: Chemotherapy

Author: Karen

Quantity: 1

Price: 2.54

Date: January 2002

ISBN: 9781506304213

Title: Discrete Mathematics

Author: Jonathan

Quantity: 15

Price: 19.73

Date: October 2013

Saving - (sorted)

Books saved!

Press ESC to go back to menu:

 books.txt

- 1 1234567890123,A Little Life,Saif eldeen Adel,20,10.99,3-2016
- 2 9781152304222,Advanced Mathematics Techniques,Antony Smith,5,5.21,2-2007
- 3 9780136019701,An Introduction to Organic Chemistry,Timberlake Karen,10,3.54,12-2008
- 4 9780136019702,Chemotherapy,Karen,1,2.54,1-2002
- 5 9781506304213,Discrete Mathematics,Jonathan,15,19.73,10-2013
- 6