Final Project
Library Management System

Users' Manual
&
Code Analysis

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Contents

Part 1: Users' Manual:

Note: This program is case sensitive.

1- Login

When you run the program, you are first asked whether you would like to log in your account or quit the program. You must enter '1' to log in or '2' to quit the program.

```
Enter 1 to log in or Enter 2 to quit:
```

```
Enter 1 to log in or Enter 2 to quit:
1
Enter username:
yugo
Enter password:
2323
Choose one of the following options
1.Add
2.Delete
3.Modify
4.Search
5.Advanced search
6.Print
7.Save
8.Quit
```

If you chose to log in your account, you will be asked to first enter the correct username then you will be asked for the correct password, one entered in the file "credentials.txt". In the case that the password or username is incorrect you will be back to the first page and you must enter '1' to log in or '2' to quit the program.

Once you successfully login, a menu will appear to allow user to choose from various functions, so you can select the desired option, by choosing the number respective to each option. In the case of a wrong entry, the program will ask you to re-enter a valid option.

2- Add

One uses this function when you want to add a book to the library's information file "books.txt". As you chose the add option, you will be asked to fill the book's information field by field: the ISBN (a 13-digit number that is unique to each book), the title, the name of the Author, quantity of the book in storage (must be a number with no letters), price of book (must be a number with no letters), date of publishing (must be a possible date). In the case of entering any of the data incorrectly, the program will ask you to re-enter the correct information for the book. When the data is successfully added, you will receive the message and will be directed to the menu to choose next course of action.

```
Enter the book's ISBN:
123456789as23
Enter correct ISBN number(contains 13 digit):
123345
Enter correct ISBN number(contains 13 digit):
1234567890123
Enter the book's title:
Advanced Mathematics Techniques
Enter the book's author name:
Antony Smith
Enter the book's quantity:
5
Enter the book's price:
k
Enter the book's price:
4.5
Enter the book's publication date[month & year]:
2
2023

Enter the book's publication date[month & year]:
12
2022
Data is successfully added
Choose one of the following options
```

3- Delete

The program helps you delete a book from the library's information file "books.txt" by searching for the book using its ISBN, entered by the user, and the book associated with that ISBN will be deleted from the system. The program will display that the data is successfully deleted and will be directed to the menu to choose your next action. When the entered ISBN does not exist in the information file, the program will display not found and redirect you to the menu to choose a different option. The program will ask you to re-enter the ISBN if you enter an incompatible value for it; anything that contains a digit or is longer than 13 digits.

```
2
Enter the book's isbn
9781506304211
NOT FOUND
Choose one of the following options
1.Add
2.Delete
3.Modify
4.Search
5.Advanced search
6.Print
7.Save
8.Quit
2
Enter the book's isbn
9781506304212
Data is successfully deleted
```

4- Modify

To modify any of the books in the library's information system, you will be asked to enter the ISBN of the book's information you want to modify. The program then searches for the book, in the case that the book is found you will be asked to re-fill every field to modify the information for that Book. Once you finished entering the data, you will receive the message that the data is successfully modified and will be directed to the menu to choose your next action. If the entered ISBN does not exist in the information file, the program will display not found and redirect you to the menu to choose a different option. The program will ask you to re-enter the ISBN if you enter an incompatible value for it; anything that contains a digit or is longer than 13 digits.

```
3
Enter the book's isbn:
9781506304212
enter the title of the book:
Mathematics for Social Scientists
enter the author of the book:
Kropko Jonathan
Enter the book's quantity:
5
Enter the book's price:
2
Enter the book's publication date[month & year]:
12
1900
Data is successfully modified
```

5- Search

The program will look up information about a specific Book, once you supply its ISBN, and will provide all data for the book of that ISBN then direct you back to the menu. Data should be printed in the following format:

```
4
Enter book ISBN:
9780136019701
ISBN:9780136019701
Title:An Introduction to Organic Chemistry
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2008
```

If the entered ISBN does not exist in the information file, the program will display not found and redirect you to the menu to choose a different option. The program will ask you to re-enter the ISBN if you enter an incompatible value for it; anything that contains a digit or is longer than 13 digits.

6- Advanced Search

You can look for a book by supplying a keyword, and the system will provide you will all data for all books whose title or author name contains that keyword or a message indicating that no matches are found, then you will be directed to menu.

```
5
enter word to find
math
NOT FOUND
Choose one of the following options
1.Add
2.Delete
3.Modify
4.Search
5.Advanced search
6.Print
7.Save
8.Quit
5
enter word to find
Math
ISBN:9781503204212
Title:An Introduction to Mathematics
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2000
```

7- Print

This option helps you print the data of all books available in system, in sorted order. You can choose if the sort should be done based on either title or price or Date of publication. In case of choosing an unavailable number, the program will ask you to re-enter a valid choice. You will then be directed to the menu once data is printed.

Note: Data will be printed the same way as in (Search)

```
6
please enter the number of sorting:
1.by price
2.by date
3.by title
4
Enter a valid number
please enter the number of sorting:
1.by price
2.by date
3.by title
1
ISBN:9781503204212
Title:An Introduction to Mathematics
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2000

ISBN:9780136019701
Title:An Introduction to Organic Chemistry
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2008
```

8- Save

The actions you took as the program runs are not saved on the main system files. To Save the actions done, you must use this function (or save before quitting as shown in 9- quit). When you chose this option, the program will show the message that the data is successfully saved and will direct you to the menu.

```
8
WARNING! your data will be discarded once you quit
Do you want to save[yes,no]:
yes
Data is successfully saved
```

9- Quit

If you chose this option and you have saved all the process using the 8th point, you will immediately Exit the program. But if you didn't, the program will display a warning that all of the changes will be discarded and will ask if you would like to save. If you type yes, the program will save the changes you made then exit. If you type no, the program will not save the changes you made and will exit immediately.

Part 2: Code Analysis

1- Structures

We use structures to create a type of input. So, we create structures for the two most recurrent. We create date that contains two integers one for the month and other for year. While the book structure contains character strings ISBN, title, and author and integer value for quantity and float for price, and a date for the date of publication.

2- Global Variables

Global variables are initiated outside all functions to use in all of them and be able to change in the number through them all. As "i" is used to save the number of books in the file, so its value can be used in all other functions. Saving space for an array of the books contained in files to be saved in, bk is initialized with size 1000. We also used an array of strings called months to assign each month its number, so the user could enter dates using numbers.

3- Login

User is required to enter username and password to access system's functionality. To allow user to do that we have 4 strings to fill: pass, to save the password provided by the user, user, to save the username provided by the user, userfile and passfile, to save the username and password scanned from the file "credentials.txt", respectively.

The value entered by the user when he first is faced by the interface is "Enter 1 to log in or Enter 2 to quit:" the number entered by the user is saved in string logquit. As stated in point 14 we use Validation_int(logquit) to determine if the entry is acceptable if not the program is asked to re-enter the value and we use the do while loop to achieve the recursive action of re asking the question and scanning the value for validation until the input is valid. When theinput is valid, function strcmp is used for comparing strings is used to check whether the value is 1 or 2, and accordingly proceed. This function compares the user entered credentials with the username and password that are stored in the text file, save using strcmp function again.

If the username and email are identical to the ones in the file, the program will go to function load, check point 4, then menu, check point 13. If they are not identical, the message "username or password incorrect" will pop up to the user and the function calls itself. Making it a recursive function.

4- Load (read from file)

We open the library's books' information file "books.txt". In this function the data is scanned from file till the comas as it is added in the file since the function 'scanf' will take till the first space and gets will take the full line. In this function we use the while loop to scanned the information and count number of books in the variable 'i'. Each entry must contain the ISBN, Title, Author name, quantity, price, publication date.

5- Query/Search

The system processes a request made by the user from the menu function (see point 13) to look up information about a specific Book. After the user supplies the Book's ISBN, the system compares the ISBN scanned to every ISBN in the library's information file "books.txt", using a for loop looping from 0 to 'i' and prints all data for the book of that ISBN or a message indicating that the specified ISBN is not found by using if conditions then the menu function is called. The integer flag is used to determine whether the book was found or not.

6- Advanced Search

The function scans keyword entered by user and we store it in string c. We initialized the variable flag with value zero. A pointer is used as a cruiser to stop when keyword is found. Searching in all books by using the for loop, the function searches the titles and the author's name. With each time it finds a match the system prints the books information until the loop has gone through all the books included in the books information file. It then redirects you to the menu. In case you find a match, the flag value is changed to one if not it remains zero and prints not found then you are directed to menu.

7- Add

Function scans the new book's ISBN then we use the Validation_ISBN function if not valid you are re-asked to enter a valid ISBN when a valid ISBN is entered the user is asked to enter the book's title then the book's author name, quantity of books in storage, and book's price. The user is then asked to enter the publication date and we use function Validation_pubdate(mon,ye) to validate the date. If the date is valid then the information is transferred to the book structure. Then the system will show the message "Data is successfully added" then we add 1 to the i , number of books in the file, and redirect to the menu function.

8- Delete

This function asks the user to input the ISBN of the book the user wants to delete from the system's information file. It uses the flag variable to determine found '1' or not found '0'. After the ISBN is validated (see in point 14), The function uses the ISBN to find the book that the user wants to delete. The function then switches the positions of the book we want to delete with the last book in the file. Then 1 is subtracted from the value of 'i' so we delete the last book in the file. "Data is successfully deleted" is then printed and the variable flag is changed to value 1 function then directs you to menu. If ISBN is not in the file of the library's books' information, flag is still zero, then the function prints "NOT FOUND" and redirects you to the menu function.

9- Modify

This function asks for the ISBN of the book the user wants to modify from the system's information file as input from the user. After the ISBN is validated (see in point 14), It uses the flag variable to determine found '1' or not found '0'. The function uses the ISBN to find the book that the user wants to modify. If found the program asks the user to re-enter the book's modified information: the title of the book, the author of the book, the quantity of the book in storage, and the price of the book. When user inputs the publication death the function validates the date first when it's a valid date it is saved in the structure. The function then shows "Data is successfully modified" then it's directed to menu. In case the ISBN wasn't in the system's information file, the program will show the message "Not found" then redirects you to the menu function.

10- Sorted Print

a- Sort by title

We use bubble sorting to sort all the books in the array that contains the information in the system information file (bk). We use a pass variable to sort each one element in the whole array. The element that we compare the whole array with, then we subtract pass from i because we already compared with the last element we sorted. We use strcmp to check which string is bigger, which means the title that comes first is according to alphabetical order, which means the title for j would come after the title of j+1. The function then prints the sorted array of books and then redirects to the menu function.

```
6
please enter the number of sorting:
1.by price
2.by date
3.by title
3
ISBN:9781503204212
Title:An Introduction to Mathematics
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2000

ISBN:9780136019701
Title:An Introduction to Organic Chemistry
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2008
```

b- Sort By Price

We use bubble sorting to sort all the books in the array that contains the information in the system information file (bk). We use a pass variable to sort each one element in the whole array. The element that we compare the whole array with, then we subtract pass from i because we already compared with the last element we sorted. We then compare the Prices. They are sorted that the price for j would come after the title of j+1. The function then prints the sorted array of books and then redirects to the menu function.

```
6
please enter the number of sorting:
1.by price
2.by date
3.by title
1
ISBN:9781503204212
Title:An Introduction to Mathematics
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2000

ISBN:9780136019701
Title:An Introduction to Organic Chemistry
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2008
```

c- Sort By Date

We use bubble sorting to sort all the books in the array that contains the information in the system information file (bk). We use a pass variable to sort each one element in the whole array. The element that we compare the whole array with, then we subtract pass from i because we already compared with the last element we sorted. We first compare the years together and when the years are the same the function compares the months. They are sorted from newest to oldest. The function then prints the sorted array of books and then redirects to the menu function.

```
please enter the number of sorting:
1.by price
2.by date
3.by title
2
ISBN:9780136019701
Title:An Introduction to Organic Chemistry
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2008

ISBN:9781503204212
Title:An Introduction to Mathematics
Author:Timberlake Karen
Quantity:10
Price:3.540000
Published:December 2000
```

11- Save

Save the books data by writing them out to the same file in a format similar to that explained in the Load command. The actions you took as the program runs are not saved on the main system files. So, this function saves the data inside the actual file. The program then displays the message that the data is successfully saved and calls the menu function.

12- Quit

This function will immediately Exit the program, if the function save has been implemented on all previous actions. Otherwise, the program will display a warning that all of the changes will be discarded and will ask if you would like to save. If you type yes, the program will save the changes you made then exit. If you type no, the program will not save the changes you made and will exit immediately. The string entered is compared to ‘yes’ and ‘no’ to take the different course of actions accordingly.

13- Menu

Function that provides a menu of all possible courses of action the program can run and runs function according to the user’s choice. After the user logs in successfully the Load function is called by default. User can select one of the following: add, delete, modify, Search, Advanced search, Print, Save, and Quit.

14- Validations

a- Validation ISBN:

To validate an ISBN, it needs to consist of 13 digits. So, the variable temp is used to check for length of entered string and kee is checking for whether its only digits or not. If these two variables remain initialized as zero then there is an issue with the validity of the ISBN. When the string length found by strlen isn't 13 the function asks the user to "Enter correct ISBN number (contains 13 digit)" the while will keep looping until the length of string entered is 13, then we change the value of temp to 1 to determine that there is no issue with the length of the string no more.

To validate that the string is only digits you must assume that and initialize that kee =1 and check using for loop that each element is a digit starting from 0 to 9 inclusive. For any element not included as a digit the value of kee = zero. If the length of string is 13 but it contains a character the function displays "Enter correct ISBN number (contains 13 digit):" until the string's length is 13 and it only contains integers.

b- Validation of Publication Date

Using the global variable month string, the function will check the value of the month entered by user sent from another function to the validation function to link the month the user entered with its name. The function checks that there's no characters in any of the elements of the string for months. If character was found the function will return 0 to the function that called on the validation. The function then changes from character to integer "sum of all elements in string mon", because the total non-characters can still not be in the 12 months, if not the function will return zero to the function that called the validation.

The function checks that there's no characters in any of the elements of the string for the years. If character was found the function will return 0 to the function that called on the validation. The function checks the year entered as must be earlier than 2022 since that is when any soonest possible publication could be in, if not the function will return zero to the function that called the validation.

c- Validation of integer values

The function loops on all elements in the string provided by the previous function to check whether all the elements are integers(between 0-9,inclusively) or not, if a non-integer value is found the function will return 0 to the function that called on this function. Change the characters to digits so I can check for the number in any function.