

# Library System Project

**Documentation**

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#### Description:

This aim of this project is to build a program that is able to deal with day-to-day actions a library administrator would want to perform. The program offers a number of functions that allow a library administrator to easily manage the library members, books and borrowing transactions. The program's main features:

- Registering new books, new members and borrowing transactions
- Deleting existing books and members
- Registering the return of borrowed books
- Viewing the most popular books (most borrowed books from the library)
- Viewing the overdue borrowing transactions

## User Manual

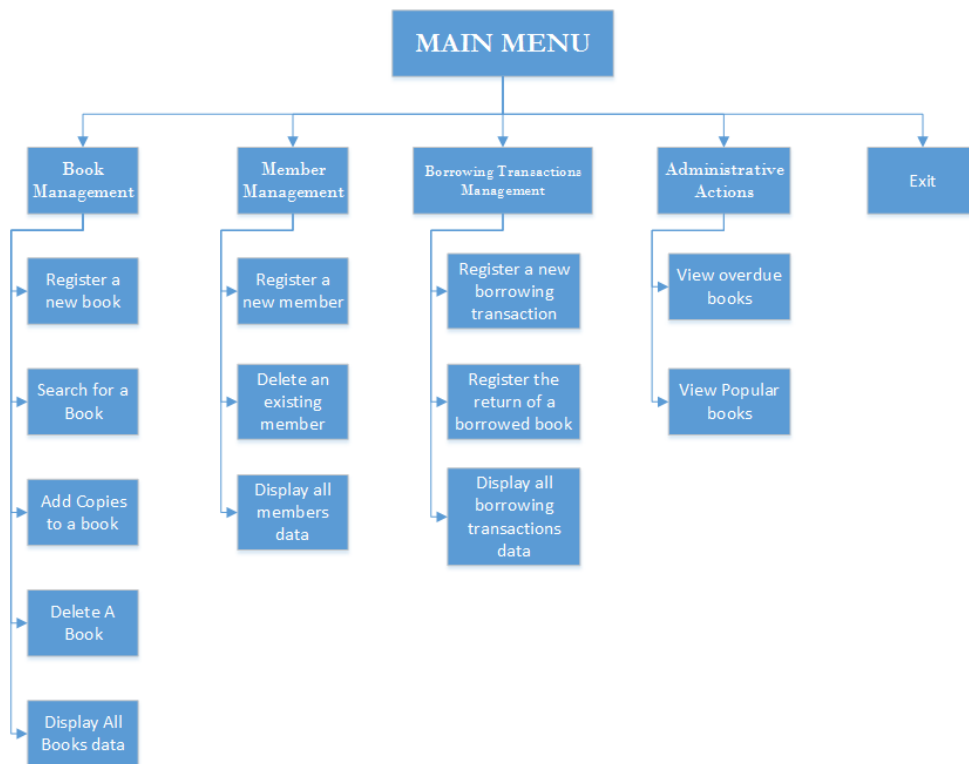
As the user starts up the program, they will be welcomed with a screen showing our most popular books. Upon full review, the user will be asked to just press any key to proceed to the main menu.

Due to certain technical limitations, users are only allowed to enter numeric values in the main menu and any other menu they encounter throughout their using this program.

To aid users correctly input data to access their desired features, an example is added at the end of each section the user is asked to make an entry.

```
Please choose an action (1-6):  
1- Book Management  
2- Member Management  
3- Borrowing Management  
4- Administrative Actions  
5- Save  
6- Exit
```

Below is a map to help users easily access their desired features.



## Book Management:

To access this function you simply press 1 in the Main Menu then enter. Shortly after doing so, a new menu will appear, that is to show the following features:

1. Registering a new book
2. Searching for a book
3. Adding copies to an existing book
4. Deleting a book
5. Displaying all books' data

### New Book:

To access this feature, the user is required to enter 1 in the Book Management menu. Thereafter, the user will be asked for the following information about the book they are to enter:

```
Please enter the book title:New Book
Please enter the author's name:New Author
Please enter the publisher's name:New Publisher
Please enter Date Published:(DD enter MM enter YYYY enter)
25
12
2017
Enter the book ISBN (ex: 978-3-16-148410-0):
964-3-23-122345-0
Enter the number of copies:
60
Enter the book category:
New Category
Book Successfully added
Press Any Key to Continue
=
```

- Book Name
- Author's Name
- Publisher Name
- Date of Publication
- Book ISBN
- Number of copies to be entered
- Book Category

However, the user is not allowed to enter

- Incorrect dates. (dates that are later than today)
- ISBNs that are less or more than 13 digits.
- ISBNs that are not registered in the system

## Search for a Book:

To access this feature, the user is required to enter 2 in the Book Management menu. Thereafter, the user will be asked to choose whether they want to search for

a book according to the book's ISBN or according to a multi-search of Title and/or Author Name and/or Category.

If the user chooses to search by ISBN, the user is prompted to enter an ISBN of an existing book in the system. If the user fails to enter such data, an error message is displayed explaining the mistake made.

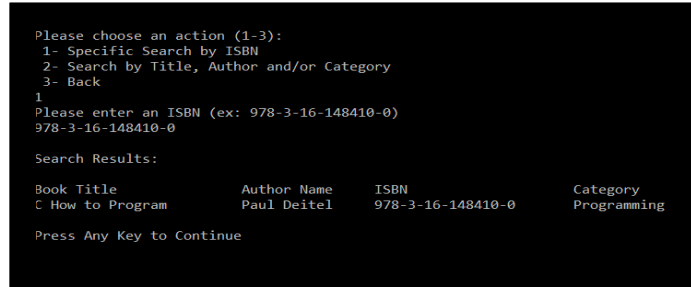
The user is not allowed to enter:

- ISBNs that aren't registered in the system
- ISBNs that are less or more than 13 digits

If the user chooses to search for a book by the multi-search of Title and/or Author Name and/or Category, they will be prompted to enter all 3 of those. However, the user is allowed to leave any of those fields blank in order to skip searching by that field. The user is allowed to search for a Title or Author Name using parts of that field.

The user is not allowed to enter:

- Titles, Author Names, Categories that aren't registered in the system
- Part of category



```
Please choose an action (1-3):
1- Specific Search by ISBN
2- Search by Title, Author and/or Category
3- Back
1
Please enter an ISBN (ex: 978-3-16-148410-0)
978-3-16-148410-0

Search Results:

Book Title      Author Name     ISBN            Category
C How to Program Paul Deitel     978-3-16-148410-0 Programming

Press Any Key to Continue
```

### Add copies to an existing book

To access this feature, the user is required to enter 3 in the Book Management menu. Thereafter, the user will be asked to enter an ISBN of a book that already exists in the

```
Please enter book ISBN:
978-3-16-148410-0
Book wanted is: C How to Program by Paul Deitel
How many copies do you want added:
20
Copies have been added successfully!

Press Any Key to Continue
■
```

system. If the entry is successful, the user is asked to enter the number of copies.

The user is not allowed to enter:

- ISBNs that aren't registered in the system
- ISBNs that are less or more than 13 digits
- Non-numeric entry for number of copies

### Delete an existing book

To access this feature, the user is required to enter 4 in the Book Management

```
Please enter the ISBN of the book to be deleted: (ex: 978-3-16-148410-0,
943-1-90-567345-0)
Book data has been deleted successfully!

Press Any Key to Continue
```

menu. Thereafter, the user will be asked to enter an ISBN of a book that already exists in the system.

The user is not allowed to enter:

- ISBNs that aren't registered in the system
- ISBNs that are less or more than 13 digits

Display all books

| Book Title             | Author Name  | ISBN              | Category    | Publisher              | Publication date | Copies registered | Copies Available |
|------------------------|--------------|-------------------|-------------|------------------------|------------------|-------------------|------------------|
| . C How to Program     | Paul Deitel  | 978-3-16-148410-0 | Programming | Pearson Education. Inc | 29/10/2009       | 25                | 23               |
| ! De Gea saved my GPA  | Mohamed Agwa | 974-3-14-148432-0 | Engineering | Agwa. Inc              | 12/12/2017       | 100               | 96               |
| ! I hope this works    | Maro Mokhles | 965-3-16-784650-0 | Coding      | LeRou. Inc             | 12/12/2017       | 100               | 98               |
| ! Arsenal actually won | Youssef Alaa | 988-3-29-123674-0 | Sports      | TheJoe. Inc            | 12/12/2017       | 100               | 99               |
| ! How to be serious?   | Maro Mokhles | 967-4-23-176296-0 | Life        | LeRou.Inc              | 23/11/2012       | 50                | 50               |
| ! AnimalLife           | Macmillan    | 865-4-65-267547-8 | DIY FIXFAX  | Mac.Inc                | 20/10/2010       | 100               | 100              |

Press Any Key to Continue

To access this feature, the user is required to enter 5 in the Book Management menu.

Thereafter, the user will be able to view all the books' data from our system.

## Member Management:

To access this function you simply press 2 in the Main Menu then enter. Shortly after doing so, a new menu will appear, that is to show the following features:

1. Registering a new member
2. Deleting an existing book
3. Displaying all members' data

### New Member:

To access this feature, the user is required to enter 1 in the Member Management menu. Thereafter, the user will be asked for the following information about the member they are to enter:

- Member Surname
- Member Last Name
- Member Email
- Member ID
- Member Address (City, Street, Building no.)
- Member Age
- Member Phone Number

However, the user is not allowed to enter

- Non-numeric entry in ID, Age, Phone Number and Building Number
- Phone numbers that are not exactly 7 digits
- Emails that are not in the correct format (example@example.com)
- ID Numbers that are not within the range of 1000 and 9999

```
Please enter the surname:
brad
Please enter the last name:
smith
Please enter the Email:(ex: example@mail.com)
bradsmith@hotmail.com
Enter the member ID:
6001
Please enter the member's city of residence:
cairo
Please enter the member house's street:
black
Please enter the member house's building number:
34
Enter the member's age:
54
Enter the member's phone number: (ex: 5123867)
4512387

Member added successfully!

Press Any Key to Continue
```



## Delete an existing book

To access this feature, the user is required to enter 2 in the Member Management menu. Thereafter, the user will be asked to enter an ID of a member that already exists in the system.

```
Please enter the ID of the member to be deleted:
4955
Member data has been deleted successfully!

Press Any Key to Continue
```

The user is not allowed to enter:

- ID Numbers that are not within the range of 1000 and 9999
- ID numbers for members that have borrowed a book and haven't returned it yet
- Non numeric entry for ID numbers

## Display all Members data

```
Please choose an action (1-3):
1- Register a new member
2- Delete an existing member
3- Display all members data
4- Back
3
  Surname      Last Name   Age  ID      Phone Number  Email Address      Home Address
1  Youssef      Alaa        19  5021    1234567      TheJoe@yahoo.com   45,Ahmed Shawky,Alexandria
2  Marouane     Mokhles     20  4926    1234567      LeRou@yahoo.com    30,Mostafa Kamel,Alexandria
3  Mohamed      Agwa        20  5022    1234567      AgwaMo@gmail.com   50,Smouha,Alexandria
4  Hamada       Hamdy       26  9531    1234567      Hamada@gmail.com    35,Shatby,Alexandria
5  Hughman      Jack        19  5012    1234567      HughJack@yahoo.com  45,Ahmed Shawky,Alexandria
6  Hamada       Omar        26  9500    1234567      Hamada@gmail.com    35,Shatby,Alexandria
7  brad         smith       54  6001    4512387      bradsmith@hotmail.com 34,black,cairo

Press Any Key to Continue
```

To access this feature, the user is required to enter 3 in the Member Management menu. Thereafter, the user will be able to view all the Members' data from our system.

## Borrowing Transactions Management:

To access this function you simply press 3 in the Main Menu then enter. Shortly after doing so, a new menu will appear, that is to show the following features:

1. Registering a new borrowing transaction
2. Register the return of a book
3. Displaying all borrowing transactions' data

### New Borrowing transaction

To access this feature, the user is required to enter 1 in the Borrowing Management menu. Thereafter, the user will be asked for the following information about the borrowing transaction they are to enter:

- ID of the borrowing member
- ISBN of the borrowed book
- Date Due for the book's return

However, the user is not allowed to enter

- Non-numeric entry in ID, Date due for book's return
- ISBNs that aren't registered in the system
- ISBNs that are less or more than 13 digits
- ID Numbers that are not within the range of 1000 and 9999

```
Please choose an action (1-2):
1- Register a new borrowing transaction
2- Register the return of a book
3- Display all borrowing transactions
4- Back
1
Please enter the ID of the borrowing member:
6001
Please enter the ISBN of the book to be borrowed:(ex: 978-3-16-148410-0)
967-4-23-176296-0
Book wanted is: How to be serious? by Maro Mokhles
Please enter Date due to return. (DD enter MM enter YY enter)
30
1
2020
Borrow transaction added successfully!
Press Any Key to Continue
=
```

## Register the return of a book

To access this feature, the user is required to enter 2 in the Borrowing transactions menu.

Thereafter, the user will be shown a list of books that are not yet returned. The user is asked to pick one of those to register today's date as the date returned.

The user is not allowed to enter:

- Non numeric entry for Transaction Number
- A Transaction number that is not shown in the list above

```
Please choose an action (1-2):
1- Register a new borrowing transaction
2- Register the return of a book
3- Display all borrowing transactions
4- Back
2
Books that are yet to be returned:
Transaction ID ISBN Date due
1 9531 978-3-16-148410-0 22/11/2017
3 4926 965-3-16-784650-0 27/12/2017
4 4926 974-3-14-148432-0 20/12/2017
5 5022 974-3-14-148432-0 20/12/2017
6 5022 974-3-14-148432-0 20/12/2017
7 5022 974-3-14-148432-0 20/12/2017
8 5021 988-3-29-123674-0 20/12/2017
9 5021 978-3-16-148410-0 12/12/2017
10 5021 967-4-23-176296-0 2/1/2018
11 6001 967-4-23-176296-0 30/1/2020
Please enter Transaction number:
11
Book's return was registered successfully!

Press Any Key to Continue
```

## Display all Borrowing Transactions data

To access this feature, the user is required to enter 3 in the Member Management menu.

Thereafter, the user will be able to view all the Members' data from our system.

```
Please choose an action (1-2):
1- Register a new borrowing transaction
2- Register the return of a book
3- Display all borrowing transactions
4- Back
3
Transaction ISBN Borrower ID Issued Date Due Date Return Date
1 978-3-16-148410-0 9531 17/11/2017 22/11/2017 Not yet returned
2 965-3-16-784650-0 4926 25/11/2017 23/12/2017 25/12/2017
3 965-3-16-784650-0 4926 25/11/2017 27/12/2017 Not yet returned
4 974-3-14-148432-0 4926 31/12/2017 20/12/2017 Not yet returned
5 974-3-14-148432-0 5022 31/12/2017 20/12/2017 Not yet returned
6 974-3-14-148432-0 5022 31/12/2017 20/12/2017 Not yet returned
7 974-3-14-148432-0 5022 31/12/2017 20/12/2017 Not yet returned
8 988-3-29-123674-0 5021 31/12/2017 20/12/2017 Not yet returned
9 978-3-16-148410-0 5021 11/1/2018 12/12/2017 Not yet returned
10 967-4-23-176296-0 5021 20/12/2017 2/1/2018 Not yet returned
11 967-4-23-176296-0 6001 24/12/2017 30/1/2020 24/12/2017

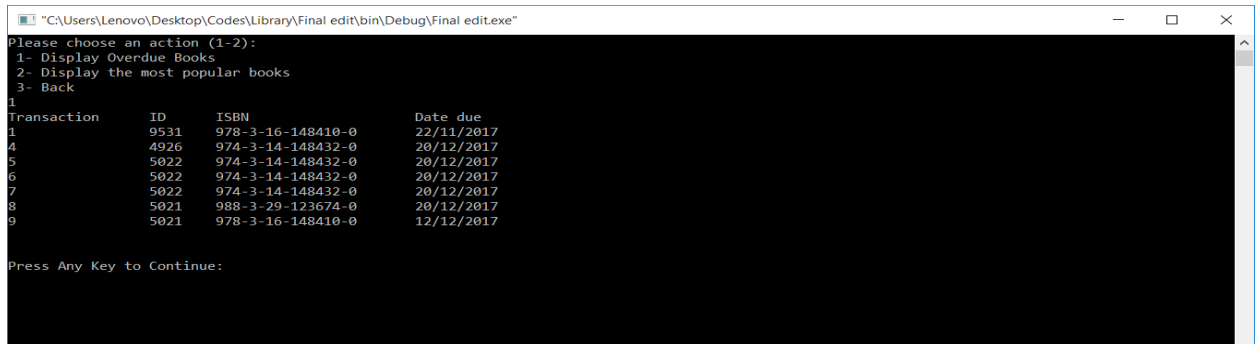
Press Any Key to Continue
```

## Administrative Actions:

To access this function you simply press 4 in the Main Menu then enter. Shortly after doing so, a new menu will appear, that is to show the following features:

1. Display Overdue Books
2. Display most popular Books

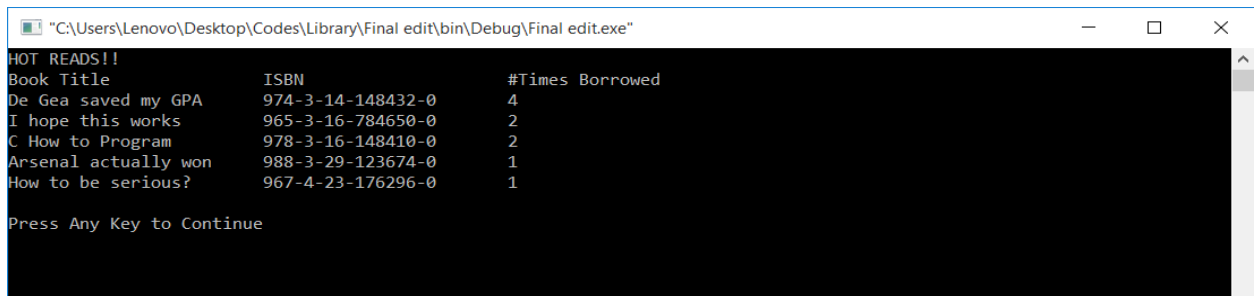
Pressing 1 then enter, the user is show the books whose due date has passed (overdue)



```
"C:\Users\Lenovo\Desktop\Codes\Library\Final edit\bin\Debug\Final edit.exe"
Please choose an action (1-2):
1- Display Overdue Books
2- Display the most popular books
3- Back
1
Transaction  ID      ISBN                Date due
1           9531   978-3-16-148410-0   22/11/2017
4           4926   974-3-14-148432-0   20/12/2017
5           5022   974-3-14-148432-0   20/12/2017
6           5022   974-3-14-148432-0   20/12/2017
7           5022   974-3-14-148432-0   20/12/2017
8           5021   988-3-29-123674-0   20/12/2017
9           5021   978-3-16-148410-0   12/12/2017

Press Any Key to Continue:
```

Pressing 2 then enter, the user is shown the 5 most popular books in the library



```
"C:\Users\Lenovo\Desktop\Codes\Library\Final edit\bin\Debug\Final edit.exe"
HOT READS!!
Book Title      ISBN                #Times Borrowed
De Gea saved my GPA  974-3-14-148432-0   4
I hope this works  965-3-16-784650-0   2
C How to Program  978-3-16-148410-0   2
Arsenal actually won  988-3-29-123674-0   1
How to be serious?  967-4-23-176296-0   1

Press Any Key to Continue:
```

## Most Important Algorithms

In this section, the most important algorithms used to tackle certain functions is explained in simple pseudocode.

Functions that will be explained:

1. CheckEmail( )
2. OverdueBooks( )
3. PopBooks( )
4. DeleteMember( )
5. SearchBook( )
6. Save( )

1- int CheckEmail(char \*mail)

Check if mail has the following characters: )(,;''[]}{/\

Check if mail has space characters

Check if last character in mail is .

if any of the above is present, the email is refused and the function returns 0  
else

Check that there are characters before an @ sign

Check that there are characters between the @ sign and the .

Check that there are characters after the .

if all the above are present, the email is accepted and the function returns 1

2- void OverdueBooks()

Loop from 0 to the end of the BorrowsArray

if the contents of any element in BorrowsArray has return\_date.Day=0 (meaning it hasn't been returned yet)

Check if today is later than DateDue

if all the above is correct, print all the data present about that borrowing transaction

End Loop

3- void PopBooks()

Starting off by having a global array PopularArray that has no elements.

Start Loop from 0 till the end of BorrowsArray

if an ISBN element in PopularArray is equal to any ISBN element in BorrowsArray

Increment occur element in PopularArray (number of occurrences of the borrowing of that book)

if an ISBN element from BorrowsArray wasn't found in PopularArray

Let the last element in PopularArray be that of the BorrowsArray element that had no correspondent ISBN

increment the counter Last (defines the end in the PopularArray)

End Loop

Start Loop from 0 till Last

Start nested loop from 0 till LastBook

if any ISBN element from any member from PopularArray is equal to that of any BooksArray member

let the Title element for that member in PopularArray be that of its correspondent in BooksArray

End nested loop

End loop

Sort the array descendingly using the bubble sort method

4- void DeleteMember()

Prompt user for a Member ID

Check if entered data is numerical

Check if entered data is a valid ID number

Check if entered ID number is present in the system

if all the above is true

Check that said ID number has no borrow in BorrowsArray that has return\_date.Day = 0

if the condition above is false

Display an error message stating that user has an active borrow and can't be deleted unless it's returned

else if the condition above is true

Start loop from position of cell to be deleted

Let MembersArray[counter]=MembersArray[counter+1]

increment counter

end loop

Decrement LastMember

5- void SearchBook()

declare Book SearchArray1, SearchArray2, SearchArray3

prompt user for 1: search by ISBN or 2: Multi Search by Title, Author Name and/or Category

if choice=1

prompt user for ISBN

Check if ISBN is valid

Start loop from 0 to LastBook

if ISBN entered is equal to any of those in BooksArray

print the Title, ISBN, Category and Author Name of that BooksArray member

end loop

if choice=2

prompt user for Category

prompt user for Author Name

prompt user for Title

if Category entered is not NULL

start loop from 0 till LastBook

if Category entered is equal to any of those in BooksArray

translate that element to SearchArray1

counter1++

end loop

else if Category entered is null

Start loop from 0 to LastBook

translate all elements in BooksArray to SearchArray1

counter1++

end loop

if Title entered is not NULL

start loop from 0 till LastBook



```
if Title or part of Title entered is equal to any of those in SearchArray1
    translate that element to SearchArray2
    counter2++
end loop
else if Title entered is null
    Start loop from 0 to LastBook
    translate all elements in SearchArray1 to SearchArray2
    counter2++
end loop
if AuthorName entered is not NULL
    start loop from 0 till LastBook
    if AuthorName or part of AuthorName entered is equal to any of those in SearchArray2
        translate that element to SearchArray3
        counter3++
    end loop
    else if AuthorName entered is null
        Start loop from 0 to LastBook
        translate all elements in SearchArray2 to SearchArray3
        counter3++
    end loop
    if Title & Category & AuthorName entered are NULLs, let there be no results
    else start loop from 0 till counter3
        print all elements in SearchArray3
    end loop
```

6-void Save( )

Open Borrows, Members and Books files with Write mode

start loop from 0 to LastBook

fprintf all elements in BooksArray

end loop

start loop from 0 to LastBorrow

fprintf all elements in BorrowsArray

end loop

start loop from 0 to LastMember

fprintf all elements in MembersArray

end loop

Close Borrows, Members and Books files.