CSE102 – Computer Programming

Homework #10

Linked List

Due Date: 12/06/2023 23:59

Hand in: A student with number 20180000001 should hand in a zip file named 20180000001.zip for this homework.

You have been assigned to develop a library book management system using linked lists. The system should support various operations such as adding books, deleting books, updating book information, filtering and sorting books, and reversing the book list.

Data Structures:

Book Structure: The structure to hold book information (ISBN number, title, author, publication year, reserved status).

Student Structure: The structure to hold student information (name, ID, borrowed books).

Text File: The book information, student information, and the status of borrowed books should be stored in a text file for persistence. The program should read the data from the text file at startup and update the file whenever a change is made to the library. By implementing the above functions and utilizing linked lists and text files, you can develop a library book management system that meets the specified requirements.

Function Definitions

Student's Borrowed Books List [10 points]: This function displays the list of books borrowed by a student. The student's ID will be provided as a parameter, and the function should iterate through the linked list of students, find the student with the matching ID, and display the list of books borrowed by that student.

Add Book [10 points]: This function allows the user to add a new book to the library. The user will be prompted to enter the book's ISBN number and its details (title, author, publication year). The function should add the book to the linked list based on the chosen book management method (FIFO or LIFO).

void addBook(char* isbn, char* title, char* author, int publicationYear, int method)

- isbn: The ISBN number of the book to be added.
- title: The title of the book, in string format.
- author: The author of the book, in string format.
- publicationYear: The publication year of the book, as an integer.
- method: The book management method chosen by the user. 0 for FIFO, 1 for LIFO.

Delete Book [10 points]: This function allows the user to delete a book from the library based on its ISBN number. If the book is found, it should be removed from the linked list, and the user should be notified that the deletion was successful. If the book is not found, the user should be informed that the book does not exist.

void deleteBook(char* isbn)

- isbn: The ISBN number of the book to be deleted.

Update Book [10 points]: This function allows the user to update the information of a book in the library based on its ISBN number. The user will be prompted to enter the ISBN number of the book to be updated, as well as the name of the feature to be updated and the new value for that feature. The ISBN number cannot be updated.

void updateBook(char* isbn, char* feature, char* value)

- isbn: The ISBN number of the book to be updated.
- feature: The name of the feature to be updated (title, author, or publication year).
- value: The new value for the specified feature.

Filter and Sort Books [20 points]: This function allows the user to filter and sort the books in the library based on specified criteria. The user can choose to filter the books by author or publication year and sort the filtered results by title, author, or publication year.

void filterAndSortBooks(int filterChoice, char* filter, int sortChoice)

- filterChoice: The user's choice for filtering the books. 0 for filtering by author, 1 for filtering by publication year.
- filter: The filter criteria in string format.
- sortChoice: The user's choice for sorting the books. 0 for sorting by title, 1 for sorting by author, 2 for sorting by publication year.

Reverse Book List [10 points]: This function reverses the order of books in the linked list based on their ISBN numbers. After the reversal, the list of books should be displayed to the user.

void reverseBookList()

Search Books [10 points]: This function allows the user to search for books based on the ISBN number, author, or title. The user will enter the search criteria and value. The function should list the matching books or inform the user if the book was not found.

void searchBooks(int searchChoice, char* searchValue)

- searchChoice: The user's choice for searching the books. 0 for searching by ISBN number, 1 for searching by author, 2 for searching by title.
- searchValue: The value based on the search criteria.

Borrow and Return Books [20 points]: This function allows the user to borrow and return books. The user will be prompted to enter the ISBN number of the book to be borrowed, and the function should update the book's status as borrowed. When the book is returned, the status should be updated as available.

void borrowBook(char* isbn)

void returnBook(char* isbn)

- isbn: The ISBN number of the book to be borrowed or returned.

General Rules:

1. We do not give you any function prototypes. We expect that you are experienced enough to understand when to use methods and name them. These will also be graded.
2. The program must be developed on given version of OS and must be compiled with GCC compiler, any problem which rises due to using another OS or compiler won't be tolerated.
3. Note that if any part of your program is not working as expected, then you can get zero from the related part, even if it is working partially.
4. Zip your homework files before uploading them to MS Teams. The zip file must contain the C file with your solution and screenshots of the valid outputs of the program.
5. Put all the output screens in a pdf file by running your code.
6. You can ask any question about the homework by sending an email to zbilici@gtu.edu.tr or by using the homework channel on the MS Teams page of the course.