UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Department of Computer Science
Faculty of Computing

Assignment 2

(Linked List Implementation)

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1.0 Objective

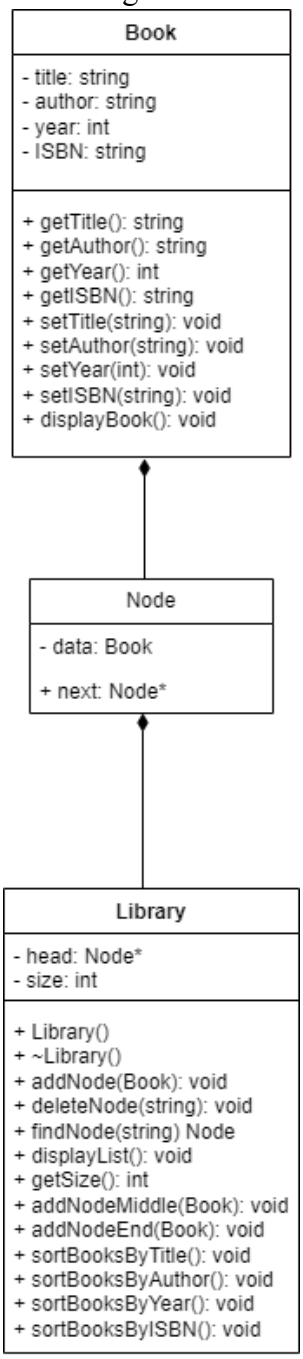
The main objective of the program is to create a library management system that is efficient whilst utilizing the linked list data structure. The created system will have the ability to add, find, delete, sort the books in the system, The system can also display the existing list of books..

2.0 Synopsis

Linked list will be used in the program to store information about the books. Each book is represented by an instance of the Book class. The linked list is implemented using the Node and Library classes. Each book is a node. The Library class will have methods that perform operations on the nodes, such as adding new nodes to the list either at the front, middle or end , deleting a node from the front, middle or end., finding specific nodes based on the title or ISBN of the book, sorting the list of books based on different attributes., and displaying books. The system will display a menu that the users can interact with to use the system.

3.0 Design

Class Diagram



Pseudocode :

1. Start the program.
2. Display the main menu.
   2.1. Display the menu options such as “Add Book”, “Find Book”, “Delete Book”, “Sort Books”, “Display Books”, and “Exit”.
   2.2. Users are prompted to enter a choice.
3. If the user enters choice : 1, users will be able to add books into the existing book list.
   3.1. Sub-menu for adding books at Front, Middle, or End will be displayed.
   3.2. Users are then prompted to enter a choice based on the 3 choices.
   3.3. After entering a choice, users will enter book details.
   3.4. The book will be added into the list and the updated list will be displayed.
   3.5. A question will be asked whether the user still wants to continue using the program.
      3.5.1. If the user enters “Y” or “y”, the program will go back to the main menu.
      3.5.2. If the user enters “N” or “n”, jump to step 8.

4. If the user enters choice : 2, users will be able to find books from the existing book list.
   4.1. Sub-menu for users to enter a search key.
   4.2. Users will need to enter either the book title or ISBN number of the book.
   4.3. The book will be searched from the list of books.
   4.4. Display the found book details or a "not found" message
   4.5. A question will be asked whether the user still wants to continue using the program.
      4.5.1. If the user enters “Y” or “y”, the program will go back to the main menu.
      4.5.2. If the user enters “N” or “n”, jump to step 8.

5. If the user enters choice : 3, users will be able to delete books from the existing book list.
   5.1. Sub-menu for users to enter a delete key.
   5.2. Users will need to choose whether to delete a book from the front, middle, or end.
   5.3. The book will be deleted from the list of books.
   5.4. Display the updated list of books.
   5.5. A question will be asked whether the user still wants to continue using the program.
      5.5.1. If the user enters “Y” or “y”, the program will go back to the main menu.
      5.5.2. If the user enters “N” or “n”, jump to step 8.

6. If the user enters choice : 4, users will be able to sort books in the existing book list.
   6.1. Sub-menu for sorting options will be displayed. The books can be sorted by title, author, year or ISBN number.
   6.2. Users are then prompted to enter a choice based on the 4 choices.
   6.3. After entering a choice, the books will be sorted.
   6.4. The updated list will be displayed.
   6.5. A question will be asked whether the user still wants to continue using the program.
      6.5.1. If the user enters “Y” or “y”, the program will go back to the main menu.
      6.5.2. If the user enters “N” or “n”, jump to step 8.

7. If the user enters choice : 5, the current list of books will be displayed.
   7.1. A question will be asked whether the user still wants to continue using the program.
      7.1.1. If the user enters “Y” or “y”, the program will go back to the main menu.
      7.1.2. If the user enters “N” or “n”, jump to step 8.

8. If the user enters choice : 6, the program will stop.
   8.1. A thank you message will be displayed.
9. End.

4.0 Implementation Of Linked List

The program's linked list is a crucial component. Book data can be managed dynamically with the help of this data structure. The Library class encompasses functions like appending books to the start, middle, and finish of the list, locating and eliminating books according to their ISBN or title, and organising books according to their ISBN, title, author, year, or sort order.

A new book node is added into the list by using the addBookfront function. This function will add a new book that will act as a node to the current list of books. The book will be added to the front of the list.

In addition,a new node for book is position at the middle or the linked list.The addBookMiddle can add the book to the middle of the book list.The function make it more organised because it is being updated in the middle of the book list depending on how much the total of books following the file and when inserting a new data.

Other than that, users can also add new books to the end of the linked list by using the addBookEnd function. By executing this function, the new book will then appear at the end of the list when the displayBook function is called to display the books.

Next is the findBook function, this will enable the users to find books from the library/linked list based on user input. The user can input either the title of the book or the ISBN number of the book that they want to find.

Finally, the deleteNode function can be used to delete the nodes in the data in the file based on the user input. The user can choose to delete the book/node in the front, middle, or end. After the deletion process, the updated list of books will appear and the user can check whether the book is deleted.

5.0 Implementation Of Sorting

In the program, sorting is also implemented. The type of sorting that is used in the program is the bubble sort. This type of sorting was chosen because it is straightforward and is easier to implement. The user can choose to sort the list of books by the attributes such as title, author, year of publication and ISBN number.