TOBB University of Economics and Technology
Department of Computer Engineering
BIL395 Programming Languages
Instructor: Dr. Osman Abul

Assignment 2

Date due: March 15, 2019

Subject: Using programming language constructs (pointer, enumeration, record and union types) in C.

Problem: In this assignment, you are expected to write a C program capable of described functions using the specified programming language constructs.

Description: In a bookstore, there are three kinds of publications on sale: books, periodicals and encyclopedia. For each publication, a set of fields are maintained. The fields along with their types are given in the table below. For string types, the numbers in parenthesis show the maximum length.

Book		Periodical		Encyclopedia	
Field name	Type	Field name	Type	Field name	Type
Name	String(60)	Name	String(60)	Name	String(60)
Author	String(40)	Editor	String(40)	Publisher	String(40)
Price	Integer	Price	Float	Price	Integer
Isinstock	Boolean	Isinstock	Boolean	Isinstock	Boolean
		VolNo	Integer		

There is a text file named "`inputbookdb.txt`" storing all the publications. The file consists of a number of lines where each line is a publication, the format of which depends on the publication kind as specified next.

Book	B # Name # Author # Price # Isinstock
Periodical	P # Name # Editor # Price # Isinstock # VolNo
Encyclopedia	E # Name # Publisher # Price # Isinstock

Upon invocation, your program is expected to read the file "`inputbookdb.txt`" and construct a single <u>singly linked list</u> of heterogeneous publications dynamically in the heap. In the linked list, there is a node for each publication and name of the publication serves as the key. Your program should be interactive and should provide the user with the facility of traversing the list of publications and showing the details upon request. Also, the program is expected to provide the user with adding new publications and removing existing ones. The content of the publication list should be able to stored in the file "`outputbookdb.txt`" that has the same format as "`inputbookdb.txt`". You are expected to keep the list, input and output files sorted (non-decreasing order) in their key.

The functionality is detailed next.

- Display: Display the content of the i*th* (smallest) node. Node numbering starts from 1. If there exists no i*th* node issue a warning and continue.

- Insertion: Add a new publication to the list. Do not forget that the list should be sorted at any time, so insert it in the right place.

- Deletion: Delete the i*th* (smallest) node. If there exists no i*th* node issue a warning and continue.

- Size: Show the number of entries within the list.

- Saving: Save the content of the list into the file named "`outputbookdb.txt`".

- Quitting: Quit the program.

Some other key information about the assignment;

- Use C style memory allocation/deallocation, i.e. `malloc` and `free` functions. Do not use C++ style memory allocation/deallocation, i.e. the functions `new` and `delete`.

- You are expected to define and use enumeration, union and record types as appropriate. Do not use class constructs.

- Implement the singly linked list yourself using pointers, i.e., do not use libraries. Also pay attention that implementations not using pointers will be awarded marginally.

- For uniformity, you have to use **gcc** C compiler, which is freely available on most Linux installations. You may also use it through Cygwin (http://www.cygwin.com/) under Windows platform. Cygwin is also for free.

- Develop your program as a console application, i.e. application with no graphical user interface.

A sample "`inputbookdb.txt`" file with four publications will look like (note that the content is already sorted);

```
E # Britannica # Encyclopedia Britannica # 800 # F
B # Concepts of Programming Languages # Robert Sebesta # 70 # T
P # IEEE Spectrum # Susan Hassler # 2.50 # T # 762
B # PL concepts and paradigms # David Watt # 80 # F
```

Delivery: Compress all source files into a rar file and email to the course assistant.