Lab 9
Deadline: In lab on Nov 30

In this lab, you will write a generic doubly linked list that can save and restore its contents. The linked list stores what is commonly known as a key value pair. Since the hash table was not taught in class, we will have to use a linked list to implement this feature although the performance will not be optimal.

Menu Items
Your program will ask the user for below menu items. I haven't taught you how to do this, but try to come up with a way to do this (hint: use loops).

```
1) Print Keys
2) Print Values
3) Insert KV Pair
4) Save
5) Restore
6) Exit
```

The linked list will store two data types: key and value. They can only be 5 basic C data types (https://www.studytonight.com/c/datatype-in-c.php). Print Keys menu will display all keys in the linked list while Print Values will display all values only. Insert KV Pair will prompt the user the following submenus:

```
Insert key: <user input>
Key data size: <user input>
Insert value: <user input>
Value data size: <user input>
```

Save/Restore from File
Your program will be able to save your contents into a file. You must save your contents into a binary format. When Save menu is selected, the following prompt appears.

```
Type the file name: <user input>
```

Upon hitting the enter, the file will be saved in the SAME directory as where your C files reside. You are free to implement any method you would like to save your file. However, there is a restore menu. It prompts the user for the following:

```
Type the file name: <user input>
```

It will read the file with that exact match in the same directory. It will load the file and restore your linked list. Again, the purpose of the restore is not to retype all KV pairs when I restart the program.

Implementation Details

- When the user inputs an invalid key such as menu option 8, the program will just re-display the same prompt waiting for a valid input
- As you can see from the user prompt, your program must be written in a generic manner, which is the reason why a user is expected to enter the byte size of the data. For example, if you are inserting integer 4 as key, then you must put 4 bytes as the data size. Follow data sizes from this link: https://www.geeksforgeeks.org/data-types-in-c/
- You cannot make a type specific functions. The only exception to this is `printf` functions. When printing, you need to know what data you are printing, so you will have to use `if-else` or `switch` statement depending on which data you are printing.
- When checkpointing a file, there is no restriction how/what gets saved. As long as checkpointing and restoring work, it is sufficient.

Grading

- (4 point) Correct implementation of the lab

Submission Files

- You must submit only one file to Learning Hub: lab9.c
- Submit it to learning hub before the deadline