Algorithms and data structures

Labwork # 2: Linked Lists

After each labwork session:

- You will have one week (or 7 days) to complete the remaining exercises and upload your files to the "Labwork X" assignment in Google Classroom.

- Compress all code source files in a zip file and rename it as FULLNAME-ID-Lab#no.zip (e.g NguyenVanA-BI10-070-Lab1.zip). Save your files according to the exercise number i.e Ex1.cpp, Ex2.c, etc. Incorrect filenames will result in no score for the respective exercises.

- Only code source files (.c or .cpp) should be in the zip files. Other files (.exe, .o) MUST be removed from the zip file.

- - Copy/Paste from any source is not tolerated. Penalty will be applied for late submissions.

NOTE: You must follow the guide. Incorrect zip file names, zip files containing other files (.exe), and copy/paste lead to heavy penalties.

Exercise 1: Suppose that we use a List data structure to represent unbounded integers.

- the first element refers to the sign: 1 is positive and -1 is negative.

- each element in the list represents one digit of these integers.

Implement and test the program in C/C++ using an Array-based List (Static or Dynamic) to manage this unbounded integers:

- add new digits at any place in an integer.

- remove a digit at a specfic position in an integer.

- calculate the sum of all digits from an unbounded integer.

- display the whole number on the screen.

Exercise 2: Assume that a railway train has N railroad cars attached together such as $car_1, car_2, car_3, ..., car_N$. A train can be considered as a list and each car corresponds to a node in this list.

- Each car carries a maximum capacity of passengers (int type) and has an id (char type). Both variables are user-defined values.

- Each car is reserved by a number of passengers (int type) (which should be less than its capacity). If there are any cars that don't have any passengers, they should be removed from the train.

- It is possible to add new cars to the train.

- A function is available to display all cars' information or the length of the train.

Implement a program in C/C++ using Linked List to manage the train and test all functions.