Data structure and Programming II

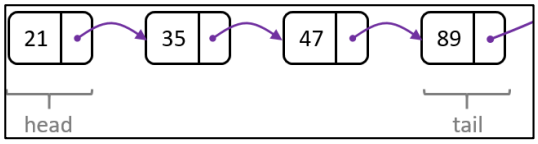
TP05: Linked list

- Objective:
  - To practice create linked list advanced data structure that is able to store unlimited data
  - Apply C++ programming
- Individual work
- Submit to Moodle (do not zip)
  - *A pdf report (cover, exercise and solution with screenshot)*

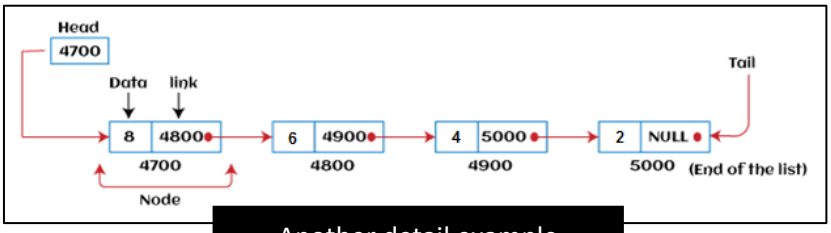
Deadline:
6 days

Write C++ programs to create and implement linked list data structure below.

1. Given a list below. Describe what does it store. Let's create structures that can hold all of those data.



An example



Another detail example

Remark: Do not write the full implementation of linked list. You are just asked to define two structures such as the element structure and the list structure.

2. Define a data structure that can store unlimited data of ITC students. Each student has ID, name, year and program degree. Let's create an element for student then a list that contains head, tail and pointer.

```
struct ..... {
        ....
        ....
        ....
};
```

```
struct ListStudent {
        ....
        ....
        ....
};
```

3. In addition to Exercise #1, create 2 functions such as: create an empty list, and add student to list. After that, in the main program, call to these functions and add 5 students of your classmate that you like the most.

```
ListStudent   *createEmptyList {
            ....
            ....
            ....
};
```

```
void   add(Student s, ListStudent LS {
            ....
            ....
            ....
};
```

4. Create a function to display all data in the list that implemented in the exercises 2 and 3 above. Test your program in main. Finally, add 2 more students to the list. Display all data.

5. Write a program that can store numbers as many as possible using linked list data structure. The program ask user for a number at a time then add to the list. Keep asking the user for another number and add to the list if the input number is not 0.
    a. When the user inputs 0 twice, display all data in the list and stop the program.
    b. Finally, compute the summation of all data in the list and show the result.

```
*** A program to store number as many as possible: ***
Enter a number: 10
Enter a number: 95
Enter a number: -5
Enter a number: 25
Enter a number: 1
Enter a number: 0
        You have entered the number 0 once. Only 1 more left. We will quit the program.
Enter a number: 4
Enter a number: 9
Enter a number: 75
Enter a number: 0
        You have entered the number 0 twice so far. The program is going to stop now.


All data in the list are: 10  95  -5  25  1  4  9  75.
Summation of all numbers is: 214
```