

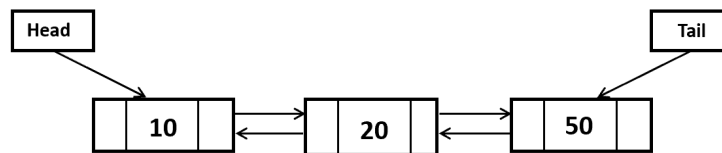
# Assignment 1 of ELEC 278

Due: Oct 11, 2022, 11:59PM

Q1: Define data structure of a doubly linked list and write functions following the instructions in a-e. The main function *main()* should be added to call the functions and display (print) the results (use the nodes in LList A to LList E to test the program and display the results). You can define the display function *display()* for simplifying the code).

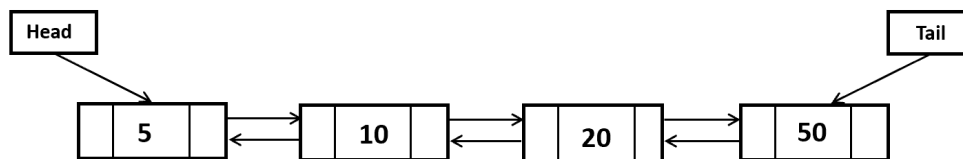
**Hint:** You can hardcode the node values of LLists in the functions you create in a-e or define *main()* to receive the input from the user to initialize the LLists. Both solutions are acceptable. You can also define other functions to help simplify the code for each function.

- a. Write a function *void create()* to create a doubly linked list, LList A, and display the LList A.



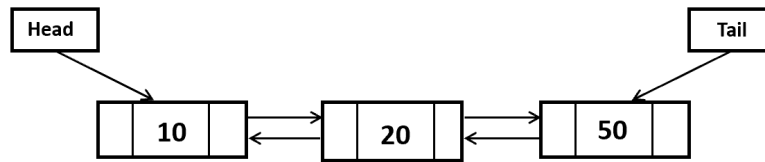
LList A

- b. Write a function *void insertfirst()* to insert a new node 5 in the beginning of LList A and display the LList B.



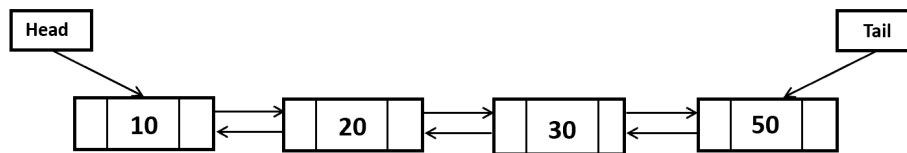
LList B

- c. Write a function *void deletefirst()* to delete the first node 5 in the LList B and display the LList C.



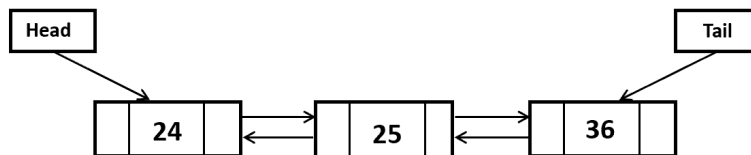
LList C

- d. Write a function *void insertpos()* to insert a node 30 in the right position and display the LList D, which is a sorted linked list.



LList D

- e. Write a function *void merge()* to merge LList D and LList E in a sorted way (the nodes are in ascending order) and display the merged doubly linked list.



LList E

Q2: Create a stack to solve the problem: Given a string containing opening and closing braces, check if it represents a balanced expression or not.

For example,

- `{{{ } } } [ ( )`, `{ { } } }`, `[ ] { } ( )` are balanced expressions.
- `{ ( ) } D`, `{ ( }` are not balanced.

Write the functions `pop()`, `push()`, and `main()` to test your program and show your results (if the input expression is balanced, output 1; otherwise, output 0).

Q3: Given an integer `k` and a queue of integers, the task is to reverse the order of the first `k` elements of the queue, leaving the other elements in the same relative order.

Examples:

Input: `Q = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]`, `k = 5`

Output: `Q = [50, 40, 30, 20, 10, 60, 70, 80, 90, 100]`

Input: `Q = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]`, `k = 4`

Output: `Q = [40, 30, 20, 10, 50, 60, 70, 80, 90, 100]`

**Hint:** You cannot define a simple array like `array[k]`, because `k` is a variable, instead of a constant. Please use array-based queue/stack or linked list-based queue/stack to address this question.

**Deliverables:** Submit the source code of three programs (Q1.c, Q2.c, Q3.c) and a word document to keep the screenshot of the test results (use the given examples to test the programs).