Week 8: Data Structures and Algorithms

Double Linked Lists

	Q1	Q2	Total
	3 + 3 + 3 + 3 + 3	5 + 5 + 5	30

Watch the following videos prior to doing this assignment:

Lecture	Topics	Reading
15 16	**Double linked list:** Basics, creating and traversing a double linked list, adding and deleting nodes.	1. Double linked list: https://youtu.be/TszBywzEBa8 2. Creating a double linked list: https://youtu.be/Pi-ilr8uYXA 3. Traversing a double linked list: https://youtu.be/4PW3D56g7Xo 4. Deleting nodes: https://youtu.be/uKPAUiSWPIc 5. Deleting nodes (B): https://youtu.be/TlB8fmWS-VI 6. Adding nodes – double linked list: https://youtu.be/w9gRUitH4vY 7. Adding sorted nodes: https://youtu.be/NXh30s9OhiQ 8. All functions – double linked list: https://youtu.be/BNskx-TOL6w

Q1) Write a **program** that implements the following for a **double linked list**:

1	Functions: a) create( ): adding the very first node. b) add( ): the method should insert numbers in sorted order. c) delete( ): the function should clearly show, with appropriate comments, deleting a node (if it is present), and "not found" if the requested node is absent. d) length( ): informs the user of the length of the linked list, e) traverse( ), simply prints the elements of the list either in increasing or decreasing order.	3 3 3 3 3
2	A main( ) function that a) calls upon an external file containing the numbers [1, 3, 7, 99, 101, 103,107] (you can create a text file yourself), b) creates and populates the linked list with all the elements presented to it in the text file of part (2a), c) thereafter, the function asks the user a series of actions that he/she would like to continue to perform iteratively up until he/she chooses to stop. Actions are: (i) add a node (ii) delete a node (iii) enumerate the elements of the list in increasing/decreasing order. (iv) length of the list (v) end – stop the process and stores the current linked list in an external file called "output.txt"	5 5 5

Rubrics (Associated Marks)

S. No.	Content	Meets Criteria (1)	Marks	Does not meet expectations (0)	Marks
1	Indentation	Perfect	100%	Code not indented properly	0
2	Code works	Code compiles and executes properly for any variable sized matrices	100%	Code has errors	Based on the code
3	Comments	Code is properly commented	100%	Code is not properly commented.	0

Sample output: Inputs by the user are marked in red.

The program should run from the command line interface and may look something like this:
> program.exe
> Dear User, the program requires four inputs:
[1] program.exe
[2] Name of file containing list of numbers: for example, "input.txt" or "file.txt"

[-] E.g.: program.exe input.txt

> program.exe input.txt
Dear User, reading file "input.txt"

Linked List created.
Items included are: 1 – 3 – 7 – 99 – 101 – 103 – 107

What would you like to do next? Options are
(1) add a node,
(2) delete a node,
(3) enumerate the elements of the list,
(4) length of the list, and
(5) stop the process

User: 2
Enter the number: 99
Deleted 99, new List: 1 – 3 – 7 – 101 – 103 – 107

What would you like to do next? Options are
(1) add a node,
(2) delete a node,
(3) enumerate the elements of the list,
(4) length of the list, and
(5) stop the process

User: 4
OK. Length: 6

What would you like to do next? Options are
(1) add a node,
(2) delete a node,
(3) enumerate the elements of the list,
(4) length of the list, and
(5) stop the process

User: 5

OK. Thank you.
Your final list has been printed in file 'output.txt'