Lab#1 – Data Structure

Due Date: Jan 28, 2022, 11:59 PM

Purpose: The purpose of this assignment is to help you:

- Become familiar with classic linear data structures
- Have solid understanding of generic collection
- Become familiar with C#

Instructions: Be sure to read the following general instructions carefully:

1. This assignment should be completed individually by all the students.
2. You are encouraged to demonstrate your solution during lab session and submit your solution **through the dropbox**.
3. Include all projects used in **only one solution**.
4. You must name your submission according to the following rule: **studentID(yourlastname)_Labnumber.zip**. e.g., 300123456(**smith)_Lab#1**.zip

Rubric

	Functionality	Marks
Q1	1.1 Array vs linked list	4
	1.2 stack vs queue	4
	1.3 type constraint	2
Q2	2.1 Implementation of the extension method	1.5
	2.2 Consume the extension method	0.5
Q3	3.1 Class that is to model the data	1
	3.2 Loading data into the selected data structure	3
	3.3 Adding new medalist to the data structure	2
	3.4 Deleting a specific medalist from the data structure	2
	3.5 Implementation of generic Search method	4
	3.6 Invoking the implemented generic Search method	1
Overall	Application usability, readability, organization, etc.	1

Question 1 [10 marks]

1.1 Use example(s) to illustrate the differences between array and linked list [4 marks]
1.2 Use example(s) to illustrate the features of stack and queue [4 marks]
1.3 Use example to demonstrate what a type constraint is [2 marks]

Question 2 [2 marks]

Implement an extension method for class ***StringBuilder*** to count the number of words contained in a ***StringBuilder*** object. For example, if a ***StringBuilder*** object ***sb***= "*This is to test whether the extension method count can return a right answer or not*", the number of words contained in ***sb*** is 16.

Question 3[13 marks]

Implement a C# application to load the data from Medals.csv, choose appropriate data structure to organize the data. After the data has been loaded, your app should be able to

1. Add new medalist information to the data structure
2. Delete a specific data from the data structure
3. Implement a generic ***Search*** method that implements the linear-search algorithm. ***Search*** method should compare the search key with each element in the data source until all elements has been processed. The output of this method can be ***IEnumerable<T>***
   Then use the medalist to test your ***Search*** method