Lab: Intro to Data Structures

Problems for exercises and homework for the "Data Structures and Algorithms Basics" course from the official "Applied Programmer" curriculum.

You can check your solutions here: https://judge.softuni.bg/Contests/2928/Intro-to-Data-Structures-Lab

1. Linked Strings

Use **`LinkedList<T>`** class and add **`strings`** in a **given order**:

- **First string** becomes **first** in the sequence
- **Second string** becomes **last** in the sequence
- **Third string** should be right **after the first one**
- **Fourth string** should be right **before the last one**

Print all strings in the right order, separated by **", "**.

Examples

Input	Output
First Last After First Before Last	First, After First, Before Last, Last

Input	Output
how today are you	how, are, you, today

Solution

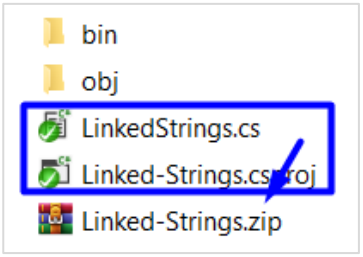
Use **`AddFirst()`**, **`AddLast()`**, **`AddAfter()`** and **`AddBefore()`** methods of **`LinkedList<T>`**, like shown below:

```
static void Main()
{
    LinkedList<string> list = new LinkedList<string>();
    string firstWord = Console.ReadLine();
    string secondWord = Console.ReadLine();
    string thirdWord = Console.ReadLine();
    string fourthWord = Console.ReadLine();
    list.AddFirst(firstWord);
    list.AddLast(secondWord);
    list.AddAfter(list.First, thirdWord);
    list.AddBefore(list.Last, fourthWord);

    Console.WriteLine(string.Join(", ", list));
}
```

Submit to Judge

Go to the **folder** with your **solution** and archive the **`.cs`** and **`.csproj`** files (do not include the **`bin`** and **`obj`** folders) to a **`.zip`** archive:



Submit the **`.zip`** file to Judge as always.

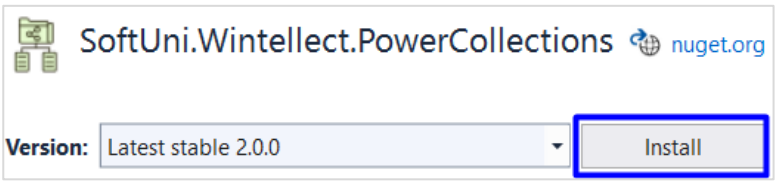
2. Bag of Words

Use the class **`OrderedBag<T>`** to read **n words** from the console and print the words in a **sorted order** and each on a **new line**.

Input	Output
5 Peter Maria Ana Nina Mitko	Ana Maria Mitko Nina Peter

Input	Output
4 apple banana pear watermelon	apple banana pear watermelon

Note that you should first install **`SoftUni.Wintellect.PowerCollections`** from NuGet Packages.



Do not forget to import the namespace **`Wintellect.PowerCollections`** at the start of your C# code:

```
using Wintellect.PowerCollections;
```

Solution

```
OrderedBag<string> bag = new OrderedBag<string>();
int n = int.Parse(Console.ReadLine());

for (int i = 0; i < n; i++)
{
    string word = Console.ReadLine();
    bag.Add(word);
}

foreach (var element in bag)
{
    Console.WriteLine(element);
}
```

3. Phone Book

Use the **MultiDictionary<K, V>** class to read a **phone book**, where each person can have **multiple phone numbers.**

Note that you should first install **`SoftUni.Wintellect.PowerCollections`** from NuGet Packages.

Input

The input consists of:

- **N**- number of lines
- **N lines** with the given structure: **"{name} - {phoneNumber1}"**

Output

Print each **person** with their **phone numbers** the following way: **"{name}: {phoneNumber1,phoneNumber2,…}"**. **Phone numbers** should be separated by **comma** (","). Use the default printing of **MultiDictionary<K, V>** class.

Note that **order** in **MultiDictionary<K, V>** can be different (keys order is unpredictable, values keep their insertion order). Sort result by **name** (ascending).

Examples

Input	Output
5 Peter - 0877 565 565 Peter - 0875 696 969 Maria - 02 875 5645 Ana - 0877 410 456 Peter - 0879 563 021	Ana: {0877 410 456} Maria: {02 875 5645} Peter: {0877 565 565,0875 696 969,0879 563 021}

Hints

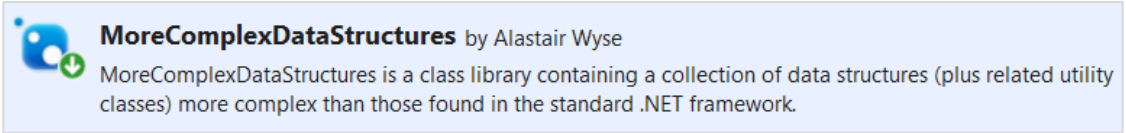
You can print the result as shown below, because **.Value** property formats the result like this: **{phoneNumber1,phoneNumber2,…}.**

```
foreach (var kvp in phoneBook.OrderBy(x => x.Key))
{
    Console.WriteLine($"{kvp.Key}: {kvp.Value}");
}
```

4. Heap of Names

Read **n names** from the console. Use the **MaxHeap<T>** class to sort names in **descending order**. Print each **name**, using the **ExtractMax()** method.

Note that you should first install **MoreComplexDataStructures** from NuGet Packages.



Examples

Input	Output
4 Pesho Kiro Asen	Pesho Miro Kiro Asen

Miro	

Hints

Print the result with the **`ExtractMax()`** method like this:

```
while (heap.Count > 0)
{
    Console.WriteLine(heap.ExtractMax());
}
```