GTU Department of Computer Engineering
CSE 222 - Spring 2023
Homework 6 Report

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14.05.2023

1-System Requirements

• In this homework:

• PART 1:

An input string was taken, declared within the code. The string should only contain lowercase letters and no non-alphabetic characters. The original and modified strings were printed, where the modification was done using regex.

• PART 2:

A myMap object was constructed with the modified string. Each letter should only be added once, and if a letter is repeated, the count of the Info object should be increased, and the word should be added.

• PART 3:

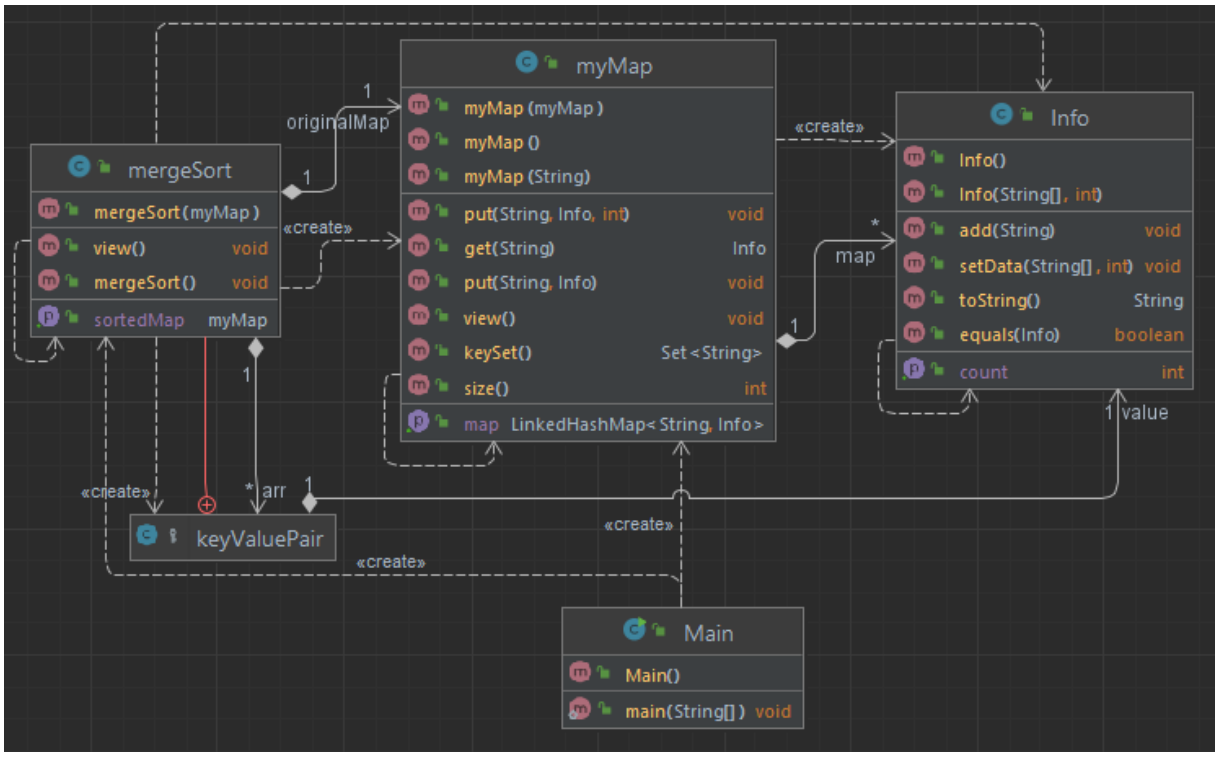
A mergeSort object was constructed with the myMap object. The myMap object was sorted using the merge sort algorithm via the mergeSort method. The original myMap object and the sorted myMap object were printed.

OTHER RULES

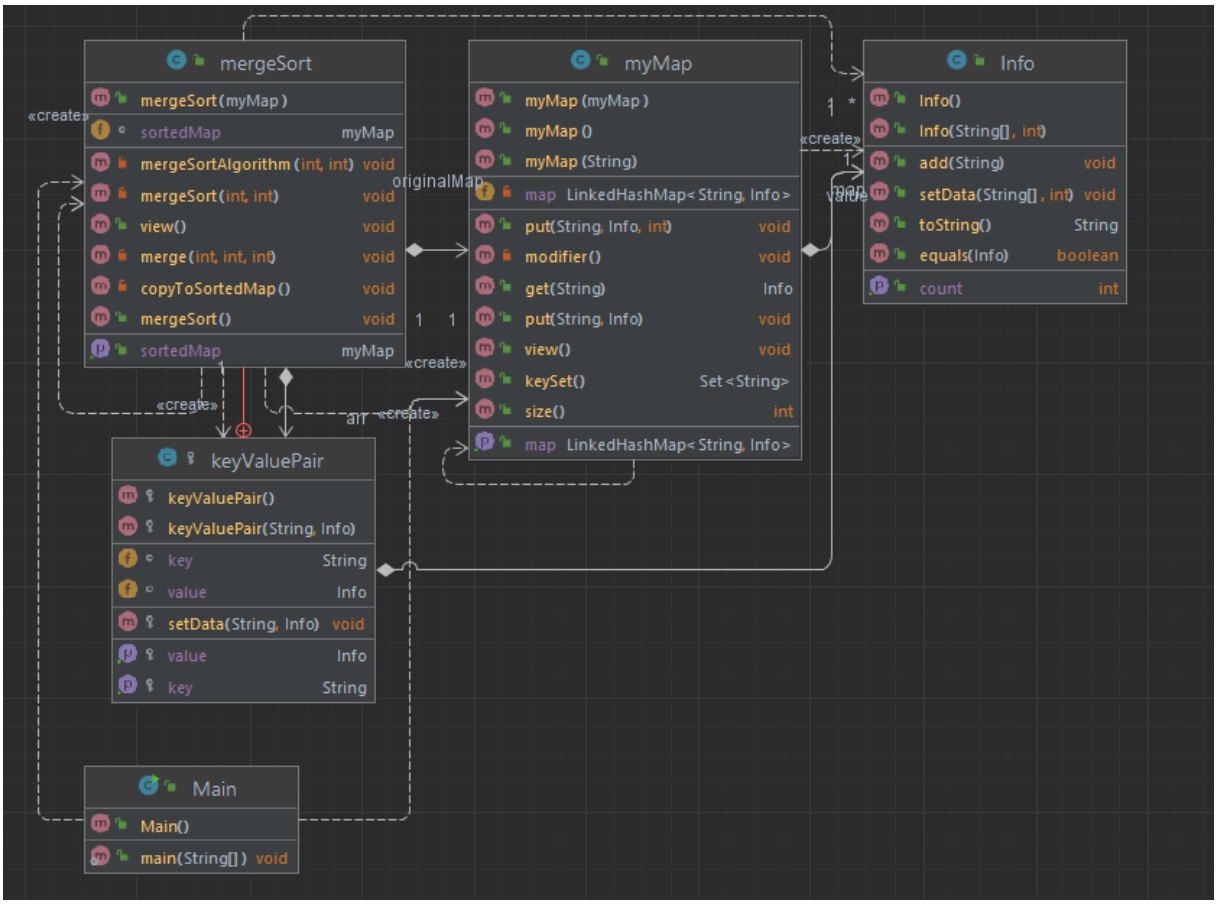
- myMap class should contain :
  - LinkedHashMap<String, Info> map
  - int mapSize
  - String str
- Info class should contain :
  - int count
  - String [] words
- mergeSort class should contain :
  - myMap originalMap
  - myMap sortedMap
  - a helper data type for key values (may be string, but I use a nested class for it named keyValuePair that I am going to mention later.

2- Uml Diagram

a. Only public methods



b.All methods



3-Problem Solution Approach

- PART 1 :
  Using regex I created a new string according to the desired properties and assigned it to the old string.
- PART 2 :
  I added each character to a LinkedHashMap, checking if it already existed. If a character already existed, I accessed the Info object for that key, incremented the count using the add method of the Info class, and added the word.
- PART 3 :
  I created an inner class called KeyValuePair within the mergeSort class, which holds a String and an Info object. Before performing the merge sort, the data in the originalMap is placed in a KeyValuePair array, and this array is then used for the merge sort. At the end, this array is copied to sortedMap.

4- *Test Cases – Running and Results*

- ***Input : Buzzing bees buzz.***

```
original string: Buzzing bees buzz.
modified string: buzzing bees buzz

------------------Original Map---------------------
Letter: b - Count: 3 - Words: [buzzing bees buzz]
Letter: u - Count: 2 - Words: [buzzing buzz]
Letter: z - Count: 4 - Words: [buzzing buzzing buzz buzz]
Letter: i - Count: 1 - Words: [buzzing]
Letter: n - Count: 1 - Words: [buzzing]
Letter: g - Count: 1 - Words: [buzzing]
Letter: e - Count: 2 - Words: [bees bees]
Letter: s - Count: 1 - Words: [bees]
Map Size: 8
------------------Sorted Map---------------------
Letter: i - Count: 1 - Words: [buzzing]
Letter: n - Count: 1 - Words: [buzzing]
Letter: g - Count: 1 - Words: [buzzing]
Letter: s - Count: 1 - Words: [bees]
Letter: u - Count: 2 - Words: [buzzing buzz]
Letter: e - Count: 2 - Words: [bees bees]
Letter: b - Count: 3 - Words: [buzzing bees buzz]
Letter: z - Count: 4 - Words: [buzzing buzzing buzz buzz]
Map Size: 8
```

- ***Input : 'Hush, hush!' whispered the rushing wind.***

```
original string: 'Hush, hush!' whispered the rushing wind.
modified string: hush hush whispered the rushing wind

------------------Original Map---------------------
Letter: h - Count: 7 - Words: [hush hush hush hush whispered the rushing]
Letter: u - Count: 3 - Words: [hush hush rushing]
Letter: s - Count: 4 - Words: [hush hush whispered rushing]
Letter: w - Count: 2 - Words: [whispered wind]
Letter: i - Count: 3 - Words: [whispered rushing wind]
Letter: p - Count: 1 - Words: [whispered]
Letter: e - Count: 3 - Words: [whispered whispered the]
Letter: r - Count: 2 - Words: [whispered rushing]
Letter: d - Count: 2 - Words: [whispered wind]
Letter: t - Count: 1 - Words: [the]
Letter: n - Count: 2 - Words: [rushing wind]
Letter: g - Count: 1 - Words: [rushing]
Map Size: 12
```

```
------------------Sorted Map---------------------
Letter: p - Count: 1 - Words: [whispered]
Letter: t - Count: 1 - Words: [the]
Letter: g - Count: 1 - Words: [rushing]
Letter: w - Count: 2 - Words: [whispered wind]
Letter: r - Count: 2 - Words: [whispered rushing]
Letter: d - Count: 2 - Words: [whispered wind]
Letter: n - Count: 2 - Words: [rushing wind]
Letter: u - Count: 3 - Words: [hush hush rushing]
Letter: i - Count: 3 - Words: [whispered rushing wind]
Letter: e - Count: 3 - Words: [whispered whispered the]
Letter: s - Count: 4 - Words: [hush hush whispered rushing]
Letter: h - Count: 7 - Words: [hush hush hush hush whispered the rushing]
Map Size: 12
```

- ***Input : abc aba***

```
original string: abc aba
modified string: abc aba

------------------Original Map----------------------
Letter: a - Count: 3 - Words: [abc aba aba]
Letter: b - Count: 2 - Words: [abc aba]
Letter: c - Count: 1 - Words: [abc]
Map Size: 3
------------------Sorted Map----------------------
Letter: c - Count: 1 - Words: [abc]
Letter: b - Count: 2 - Words: [abc aba]
Letter: a - Count: 3 - Words: [abc aba aba]
Map Size: 3
```