Faculty of Engineering, University of Jaffna
Department of Computer Engineering
EC5080: Software Construction
Lab – 04: Data Collections

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Date: 21ˢᵗ May 2021   **Duration: 3 Hours**

1) Write a program that reads strings from input and outputs them sorted, by length, shortest string first. If a subset of input strings has the same length, your program should output them in alphabetical order.   [30 Marks]

2) Write a method that takes a Map<String,String> as a parameter and returns a new Map<String,String> in which keys and values are swapped. Throw an exception if there are duplicate values in the map that is passed as a parameter.

[20 Marks]

3) A MultiSet is like a Set, but allows duplicates. Consider the following interface for a MultiSet:

```
public interface MultiSet<AnyType>
{
        void add( AnyType x );
        boolean contains( AnyType x );
        int count( AnyType x );
        boolean removeOne( AnyType x );
        boolean removeAll( AnyType x );
        AnyType [] toArray( AnyType [] arr );
}
```

There are many ways to implement the MultiSet interface. A TreeMultiSet stores items in sorted order. The data representation can be a TreeMap, in which the key is an item that is in the multiset, and the value represents the number of times the item is stored. Implement the TreeMultiSet, and make sure toString is provided.

[50 Marks]

Instructions:
- Create a zip file named L4_2018_E_xxx which contains Java programs.
- Upload the zip file on/before given deadline via team.
- Any plagiarized work will be given 0 marks.