COP 5536 Project

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Run the code

1. Please unzip the file
2. Run the command below in the directory of my project
   `$make`

- if no output file is specified
  `$java hashtagcounter input_file_name`
- if there is an output file specified in the command line
  `java hashtagcounter input_file_name output_file_name`

1. Then, the input file will be passed into my program.
2. If the output file is specified, it will be under the same directory.

Code Structure

> FibonacciHeap.java
> Makefile
> hashtagcounter.java

FibonacciHeap.java

Basic

```
class FibonacciNode {...}
```

Before implementing Fibonacci heap, firstly we should define a basic class about nodes.

1.Variables

```
int value;
String key;
int degree;
FibonacciNode parent;
FibonacciNode child;
FibonacciNode left;
FibonacciNode right;
boolean mark;
```

2.Methods

```
FibonacciNode(String key, int value) {...} //Initialization
```

Fibonacci Heap

```
public class FibonacciHeap {...}
```

In order to implement Fibonacci Heap

1.Variables

```
private int size;
private FibonacciNode max;
```

2.Methods

```
public FibonacciHeap() {...}
public FibonacciNode insert(String key, int value) {...}
public void increase(FibonacciNode target, int value) {...}
public FibonacciNode pop() {...}
private FibonacciNode deleteChild(FibonacciNode target) {...}
private void insertToRootList(FibonacciNode node) {...}
private void updateMaxAndMerge() {...}
private FibonacciNode addDegreeNode(Map<Integer, FibonacciNode> degreeNodesMap, FibonacciNode node) {...}
private void insertChildToNode(FibonacciNode parent, FibonacciNode child) {...}
private void insertChild(FibonacciNode target, FibonacciNode node) {...}
private void deleteNodeOnList(FibonacciNode node) {...}
private void addChildrenToRootList(FibonacciNode node){...}
private void deleteParent(FibonacciNode node){...}
private void meld(FibonacciNode target) {...}
private void cut(FibonacciNode parent) {...}
```

Three Main Operations

- **insert** performs the insert operation.
- **increase** performs the increase value operation
- **pop** moves the maximum element.

Other helper functions

The functions below help completing the above three operations.
Here are some characteristics of Fibonacci heap, and these helper functions are based on them.

(1) For the insert operation:
insertToRootList： Insert the newly created node into the root linked list. If it is the smallest value, update it to the smallest node of the heap. The insertion position is not specified, it is generally used to insert to the left of min.

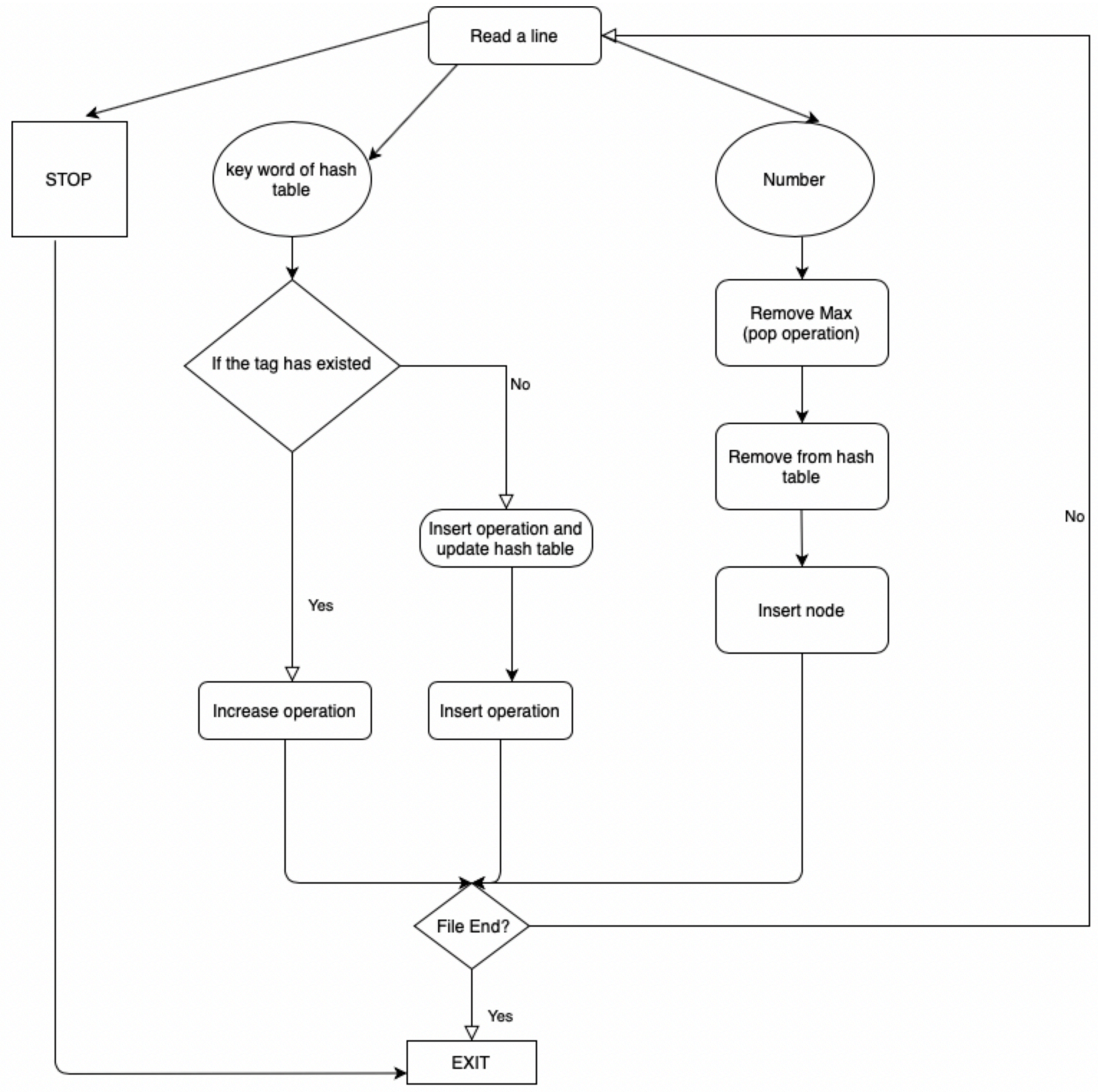
(2)For the increase operation:
deleteChild, **meld** and **cut**: If it is a minimum heap, we should only increase the key value. However, If it is not a minimum heap after increasing the key, we should let it merge into the root linked list and unmark it. Then, if the parent node has no mark (no child lost), set it to mark. If the parent node is already a mark, merge the parent node into the root linked list and set it to unmark.

(3)For the pop operation:
the others: Delete the largest node and merge all its children into the root linked list of the heap and update max. Then, merge the trees of the root node so that the ranks of any trees are not equal.

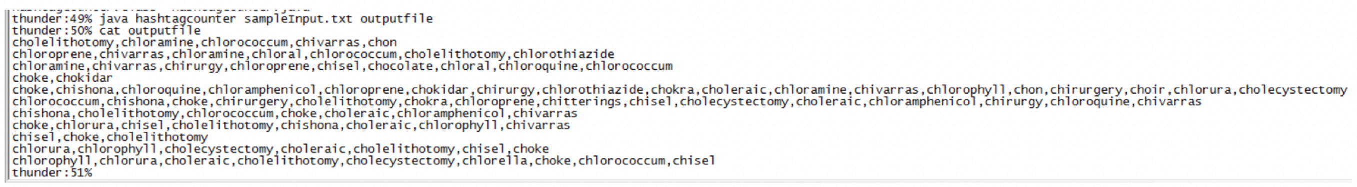
hashtagcounter.java

```
public class hashtagcounter {...}
```

- If it is the key word of hashtag, there are two situdations: 1. the tag has existed: implement the increase operation. 2. no tag: implement the insert operation and then update hashmap.
- If it is the number N, we should remove max.



Run the program



```
thunder:49% java hashtagcounter sampleInput.txt outputfile
thunder:50% cat outputfile
cholelithotomy,chloramine,chlorococcum,chivarras,chon
chloroprene,chivarras,chloramine,chloral,chlorococcum,cholelithotomy,chlorothiazide
chloramine,chivarras,chirurgy,chloroprene,chisel,chocolate,chloral,chloroquine,chlorococcum
choke,chokidar
choke,chishona,chloroquine,chloramphenicol,chloroprene,chokidar,chirurgy,chlorothiazide,chokra,choleraic,chloramine,chivarras,chlorophyll,chon,chirurgery,choir,chlorura,cholecystectomy
chlorococcum,chishona,choke,chirurgery,cholelithotomy,chokra,chloroprene,chitterings,chisel,cholecystectomy,choleraic,chloramphenicol,chirurgy,chloroquine,chivarras
chishona,cholelithotomy,chlorococcum,choke,choleraic,chloramphenicol,chivarras
choke,chlorura,chisel,cholelithotomy,chishona,choleraic,chlorophyll,chivarras
chisel,choke,cholelithotomy
chlorura,chlorophyll,cholecystectomy,choleraic,cholelithotomy,chisel,choke
chlorophyll,chlorura,choleraic,cholelithotomy,cholecystectomy,chlorella,choke,chlorococcum,chisel
thunder:51%
```

Obviously, after reading the sample input file, the output is the same as the content of sampleOutput.txt.