Programming Assignment 1

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Problem Statement: Implement 3-ary heap

Write a C++ or Java program that can handle three basic operations of 3-ary heap:

- Insert : IN
- Decrease-Key: DK
- Extract-Min: EM

Your program (**Heap.java or Heap.cpp**) will take input instructions from a file named **inputFile.txt**. So, you need to read the input file instruction by instruction and thereby perform that operation on the heap. Make sure that the names of all the files are the same as given.. The output should print the result of the last Extract-Min (EM) operation with a newline appended to it.

Input File: This is a sample input file. You can use this to test your program. The comments show the state of the array after each instruction.

```
11      # Total number of instructions
IN 10   # [10]
IN 15   # [10, 15]
IN 27   # [10, 15, 27]
EM      # [15, 27]
IN 13   # [13, 27, 15]
IN 11   # [11, 27, 15, 13]
IN 5    # [5, 11, 15, 13, 27]
IN 6    # [5, 6, 15, 13, 27, 11]
DK 5 4 # Decrease Key of the element at array position 5 to
         value 4. [4, 5, 15, 13, 27, 6]
IN 3    # [3, 4, 15, 13, 27, 6, 5]
EM      # Last EM operation
```

Output:

```
3       # Printing the result of last EM operation
```

Submission: Submit the file Heap.cpp or Heap.java to gradescope. It will run a custom test case and return the result of the test. If everything goes well, you can directly see how well your program performed. Additionally, if it fails, then

you can submit it as many times as you want before the deadline. Best of luck!!!

Java class: This class is for reference. These are the basic methods that should be there in the Java or C++ class. You can add your own classes on the top of these classes.

```
public class Heap {
    private int array[];
    private int arraySize; // max array size
    private int heapSize;  // current heap size

    // init method
    public Heap(int arraySize){
        // initiate your class variables
    }

    // Private Class methods
    private void floatUp (int index);
    private void sinkDown (int index);

    // Public Class methods
    public void insert (int element);
    public void decreaseKey (int index, int newElement);
    public int extractMin ();
}
```