===Lab Info===

* 100 points

* Due 11:59pm on Sunday 10/25/2015 for Monday Lab and 10/27/2015 for Wednesday Lab.

==Assignment==

In this assignment you will work on designing a class for a Min 5-Heap. You are to read in the numbers from a data file of integers and insert each number in a Min 5-heap.

In Min 5-Heap:

1- The root of T is at A[0].

2- The parent of A[i] is at A[floor((i-1)/5)], if it exists.

3- The j^{th} child of A[i] is at A[5i+j], 1<= j <=5, if it exists.

Use the **bottom-up method** for building the heap. (If a different approach is used, the results will be different. For the bottom-up approach, put all of the elements in the heap, and then try to heapify starting from the last parent, and continue heapifying towards the root). The file of numbers you read from will be data.txt. You may hard code the file name in your program if you wish.

In this lab, like our previous labs, you should first make the heap using the samples which are in the data.txt. After that, your program should have a simple menu like this:

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit.

By inserting the appropriate number or typing the command (specify it), the command should be applied to the structure. The commands insert and remove will also need to insert or remove a number.

The array should be of size 500. Heaps can have duplicate numbers, so when you want to remove an element, you need to remove all of the duplicate elements from the heap. For deletemin and deletemax, just delete one element from the heap. The max element is in one of the leaves, and the index of the first leaf can be found using A[floor((last used index in array-1)/5) + 1].

===Min 5-Heap===

The Min 5-Heap methods should be implemented as follows:

* insert(x) should insert x in the Min 5-Heap.

* deletemin() should delete the smallest value from the Min 5-Heap.

* deletemax() should delete the smallest value from the Min 5-Heap.

* remove(x) should remove x from the Min 5-Heap.

* levelorder() should print out all the elements of the Min 5-Heap (We have called it level order, but it is simply printing out the elements of the array).

===Output===

data.txt elements: 100 205 150 44 95 117 402 317 82 66 11 17 1 70 87 99

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

> 5

Level order:

1

11 17 44 95 117

402 317 82 66 205 - 100 150 70 87 99

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>2

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>5

Level order:

11

66 17 44 95 117

402 317 82 99 205 - 100 150 70 87

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>2

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>5

Level order:

17

66 70 44 95 117

402 317 82 99 205 - 100 150 87

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>1

Please insert the number that you want to be inserted in the heap

>2

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>5

Level order:

2

66 17 44 95 117

402 317 82 99 205 - 100 150 87 70

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>3

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>5

Level order:

2

66 17 44 95 117

70 317 82 99 205 - 100 150 87

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>4

Please insert the number that you want to remove from the 5-Heap

>66

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>5

Level order:

2

70 17 44 95 117

87 317 82 99 205 - 100 150

.....

Please choose one of the following commands:

1- insert

2- deletemin

3- deletemax

4- remove

5- levelorder

6- exit

>6

===Files===

* Files to include in folder:

** All source files

** A functioning <tt>makefile</tt>

* Folder name: <tt>Lastname_Lab7</tt>

* Compressed file name: <tt>Lastname_Lab7.zip</tt> (or <tt>.rar</tt> or <tt>.tar.gz</tt>)

* Executable name: <tt>lab7</tt>