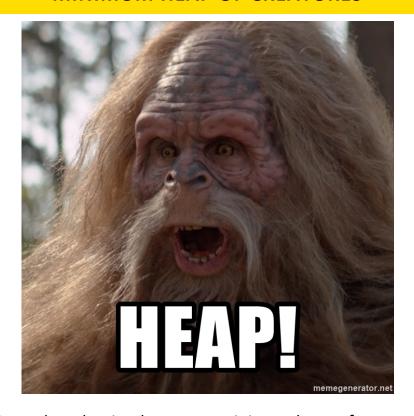
# CSC 1310 LAB 10

MINIMUM HEAP

# MINIMUM HEAP OF CREATURES



Write an **ArrayMinHeap** class that implements a minimum heap of creatures where the minimum is based on the creature's name. You are given the Creatures class, CreatureBinaryTree class, and the Zoo (driver) source file. The <u>logic</u> of the Zoo.cpp source file should not be changed.

Your program should not use the CreatureBinaryTree class at all – I only provide it because the current version of Zoo uses this class. Your program should use the ArrayMinHeap class instead.

### **ARRAYMINHEAP**

Refer to the sample ArrayMinHeap class demonstrated in class to help you write your own class.

# **Private attributes:**

Creature *heapArray
int capacity;
int heap size;

Private functions:		
	swap	
	parent	
	left	
	right	
<u>Public</u>	<u>c functions:</u>	
	constructor (accepts an integer capacity & creates heapArray based on this capacity)	
	destructor (releases heapArray memory)	
	minHeapify (recursive method to adjust the heap to make sure all nodes follow the min	
	heap rule)	
	peek (returns root creature)	
	remove (remove minimum element (or root) from min heap)	
	Note – you will need to return a Boolean from this function to indicate if a creature was	
	removed (none will be removed if there are no nodes). Also, you will need to return the	
	creature removed. I suggest passing the creature to be removed by reference and	
	returning the Boolean.	
	C:\Users\acrockett\Desktop\CSC\CSC Fall 2018\CSC1310-001\LABS\LAB 11 - heap\solution>a	
	What would you like to do?  1. Enter Magical Creature  2. List/Print Creatures.	
	3. Remove Next-Creature. 4. End Program. Enter 1, 2, 3, or 4.	
	CHOICE: 3  Error: there are no nodes in the heap.	
	No creatures were removed.	
	What would you like to do?  1. Enter Magical Creature 2. List/Print Creatures. 3. Remove Next Creature. 4. End Program.	
	insert (insert new creature in heap – Creature is sent to this function)	
	resizeArray (make an array 2 times as big as original)	
	isEmpty (returns true if heap_size is zero and false otherwise)	
	getNumberOfNodes (returns heap_size)	
	getHeight (returns the ceiling of log base 2 of heap_size plus 1)	
	display (traverses the array starting at 1 <sup>st</sup> element and prints out the name of each creature – one per line)	
	saveToFile (traverses the array starting at 1 <sup>st</sup> element and calls the printCreatureToFile	

function sending "savedCreatures.txt" to this function.

# ZOO, CPP

Modify the given **Zoo.cpp** to create a heap of creatures instead of a binary tree. You will create a minimum heap that has a capacity of **100** creatures.

Add an additional option (option 3) to remove the next creature. Remember that when you remove from the heap you always remove the root – which is the creature that comes first in the alphabet in this program.

Refer to the sample output below to see how your program should work.

# SAMPLE OUTPUT

User input is highlighted in yellow.

```
What would you like to do?
        1. Enter Magical Creature
        List/Print Creatures.
        3. Remove Next Creature.
        4. End Program.
       Enter 1, 2, 3, or 4.
CHOICE: 1
Do you want to enter the creature(s)
        1. Manually?
        2. From a file?
ENTER 1 or 2: 2
What is the name of the file you want to read from?
FILENAME: creatureFile.txt
6 creatures from creatureFile.txt have been read from the file.
What would you like to do?
        1. Enter Magical Creature
        List/Print Creatures.
        3. Remove Next Creature.
        4. End Program.
       Enter 1, 2, 3, or 4.
CHOICE: 2
Banshee
Beholder
Mike Wazowski
Sasquatch
Troll
Unicorn
What would you like to do?
        1. Enter Magical Creature
           List/Print Creatures.
        3. Remove Next Creature.
```

```
4. End Program.
        Enter 1, 2, 3, or 4.
CHOICE: 3
You have removed Banshee
What would you like to do?
        1. Enter Magical Creature
        List/Print Creatures.
        3. Remove Next Creature.
        4. End Program.
        Enter 1, 2, 3, or 4.
CHOICE:
Beholder
Sasquatch
Mike Wazowski
Unicorn
Troll
What would you like to do?
        1. Enter Magical Creature
        List/Print Creatures.
        3. Remove Next Creature.
        4. End Program.
        Enter 1, 2, 3, or 4.
CHOICE: 8
Your choice was invalid. Choose a number 1 through 4.
CHOICE: 4
Would you like to save your creature list to a file? (y or n) y
Beholder was printed to savedCreatures.txt
Sasquatch was printed to savedCreatures.txt
Mike Wazowski was printed to savedCreatures.txt
Unicorn was printed to savedCreatures.txt
Troll was printed to savedCreatures.txt
GOODBYE!
```

#### WHAT TO TURN IN

Please put the files below in a zipped folder and upload to ilearn submission folder.

ArrayMinHeap.h
Creature.cpp
Creature.h
creatureFile.txt
Zoo.cpp