**LAB 10 / CSC1310**

**heap**

# student heap (prioritized by max GPA)



## Step One – Read the Provided Code

You are provided with a Student class (**Student.h**). Read through this class to become familiar with the private & public members.

You are provided with an ArrayMaxHeap folder which has the sample program that implemented a max heap.

## Step Two – Write a Student Heap class

Create a Heap class (call it **Heap.h**).

Refer to the sample **ArrayMaxHeap** program for an example of these functions.

**However, do NOT make this a template class!**

### Private Members

* Student\* items; - this will be the heap array name
* integer for heap\_size and capacity
* swap function
* parent function
* left function
* right function
* isLeaf function
* heapRebuild function

### Public Members

* Heap constructor
* Heap destructor
* isEmpty function
* getNumberOfNodes function
* getHeight function
* insert function
* remove function

## Step Three – write a driver program to use your Max Heap

**Your main function in Driver.cpp should do the following:**

1. Create a 50-bucket Heap object.
2. Create 10 Student objects with the given data:

|  |  |  |
| --- | --- | --- |
| **GPA** | **NAME** | **MAJOR** |
| 2.6 | Cosette Mealbone | HPC |
| 4.0 | April Crockett | CSSC |
| 3.8 | Beatrix Longbottom | CYBERSECURITY |
| 3.9 | Blaire Strange | DATA SCIENCE |
| 2.9 | Cybil Lidscrew | CSSC |
| 1.4 | Coco Mobo | DATA SCIENCE |
| 3.2 | Alabama Joebob | CSSC |
| 3.6 | Diem Carpefat | HPC |
| 3.9 | Chichi Musicpaper | CSSC |
| 2.7 | Bentlee Caryellow | CYBERSECURITY |

1. Insert each of the 10 Student objects into the Max Heap.
2. Write a loop that will continue to run until the Heap is empty.   
   Inside the loop you should:
   1. Print out the number of nodes (call getNumberOfNodes Heap function)
   2. Print out the height of the heap (call getHeight Heap function)
   3. Remove the student with the highest GPA (call remove Heap function) and then print out this Student that was removed (which should be the student with the highest GPA out of the students left in the heap).

# What to turn in

Place **Driver.cpp, Heap.h, & Student.h** in a zipped folder and upload to ilearn submission folder.

# Sample Output

Student Max Heap:

Number of nodes: 10

Height: 4

GPA: 4, NAME: April Crockett, MAJOR: CSSC

Number of nodes: 9

Height: 4

GPA: 3.9, NAME: Blaire Strange, MAJOR: DATA SCIENCE

Number of nodes: 8

Height: 4

GPA: 3.9, NAME: Chichi Musicpaper, MAJOR: CSSC

Number of nodes: 7

Height: 3

GPA: 3.8, NAME: Beatrix Longbottom, MAJOR: CYBERSECURITY

Number of nodes: 6

Height: 3

GPA: 3.6, NAME: Diem Carpefat, MAJOR: HPC

Number of nodes: 5

Height: 3

GPA: 3.2, NAME: Alabama Joebob, MAJOR: CSSC

Number of nodes: 4

Height: 3

GPA: 2.9, NAME: Cybil Lidscrew, MAJOR: CSSC

Number of nodes: 3

Height: 2

GPA: 2.7, NAME: Bentlee Caryellow, MAJOR: CYBERSECURITY

Number of nodes: 2

Height: 2

GPA: 2.6, NAME: Cosette Mealbone, MAJOR: HPC

Number of nodes: 1

Height: 1

GPA: 1.4, NAME: Coco Mobo, MAJOR: DATA SCIENCE