COLBY COLLEGE
Department of Mathematics
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Fall 1998

Assignment 8: Heaps

Design due Wednesday 18 November, Plan due Friday 20 November, Implementation due Monday 23 November.

Reading: Standish Chapter 8.1 – 8.3 and 8.5

In this assignment you will build an implementation of a heap based on the linked tree data structure we saw on the exam. You will use this implementation to sort the lines in a file. Each line will contain an exam score (an integer) and a student's name. You program will output the lines from the file in descending order accoring to exam score.

Here are the pieces you will need to assemble:

1. The Tree code at `http://rocky.colby.edu/cs231/code/Tree/Tree.java`
2. The code for reading files that we used a couple of assignments ago:
   `http://rocky.colby.edu/cs231/code/Eval/Eval.java`
3. The algorithm explained in Chapter 8.5.
4. Your own algorithm for inserting something into a Heap.

The end result should be two class definitions, Heap and Sorter. Sorter will contain `main` and `inputLoop` and will use a Heap object to store and sort the items from the file.

The Design

Here are some of the design decisions you will have to make:

1. How will you store names and exam scores in the Heap?
2. How will you maintain the heap property after each operation?
3. What requirements will you impose on the format of the input file and how will you deal with errors?
4. What are the primary methods you will need and what are their interfaces? Think about which methods might best be written recursively and design their interfaces accordingly (maybe adding helper methods).

The Plan

Make a plan for this assignment that includes:

1. Detailed pseudocode (with pictures) for each of the heap operations, and for `inputLoop` and any additional methods you use.
2. A developlment plan that includes at least three intermediate testable programs.
3. A testing strategy for checking the correctness and robustness of your program.

The Implementation

Produce a beautiful implementation of your plan that is visibly, provably correct, robust, readable, well-documented, and presented in a way that is aesthetically pleasing.