CS 340 - Assignment 2 - Programming Part
Total: 70pts

Min-Max Heap [70pts]

A **min-max heap** is a data structure that supports both `deleteMin` and `deleteMax` in $O(\log N)$ per operation. The structure is identical to a binary heap, but the heap-order property is that for any node, X, at even depth, the element stored at X is smaller than the parent but larger than the grandparent (where this makes sense), and for any node X at odd depth, the element stored at X is larger than the parent but smaller than the grandparent (see figure 1).

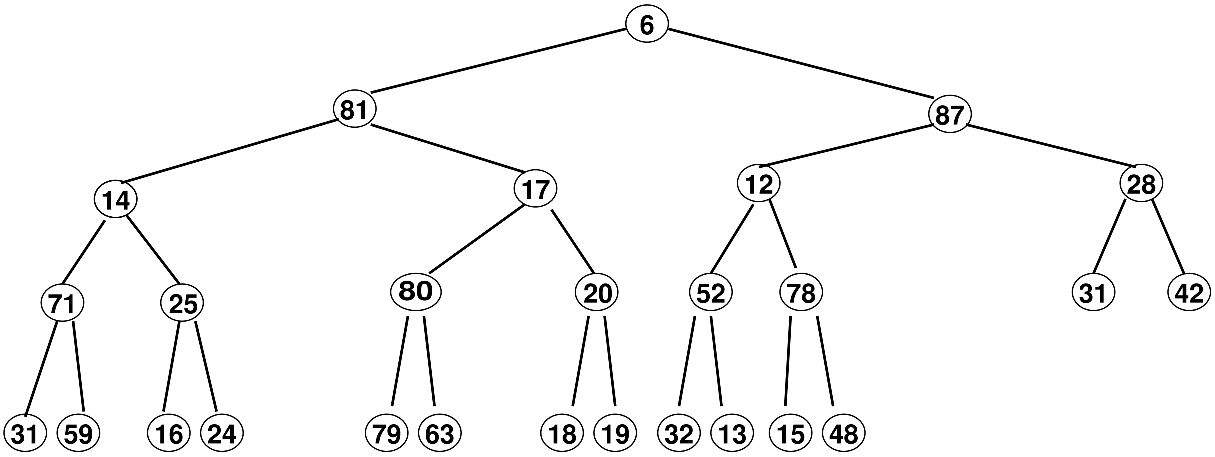

Figure 1: A min-max heap.

Using an array to represent the min-max heap structure (in the same way as for min heap or max heap), implement the following operations.

1. `buildHeap`: Builds a min-max heap from a list of naturals read from standard input.
2. `findMin` and `findMax`: Returns the minimum (resp the maximum) element.
3. `insertHeap`: Inserts a new element into the min-max heap.
4. `deleteMin` and `deleteMax`: Deletes the minimum (resp the maximum) element.

Marking scheme

1. Readability : 10pts
2. Compiling and execution process : 10pts
3. Correctness : 50pts

1 Hand in

Using UR Courses, submit all source files in one single zip file named: **assign2username.zip**. Your source files should include the following:

1. README file listing your name and ID #, and the compiling and execution commands of your program on Titan. Any requirement regarding the input format should also be listed.

2. A screenshot showing your command line for execution and the execution results for different examples.

3. headers (.h)

4. implementations (.cpp)

5. the Makefile :

   - should be named "**makefile**". In the makefile, the generated executable should be named : "**assign2username**"

You can give any name to your source files. The marker will run "**make**" to compile your program and "**assign2username**" to execute it.