EECS 560 Lab 08: Leftist Heap

Objective

- Get familiar with basic leftist and skew heap implementation with C++.

Specification of the ADT

1. Implement a binary heap class `MyLeftistHeap<ComparableType>`. We assume larger numbers have higher priorities.
2. Implement `bool verifyHeapProperty(void)` to determine whether the leftist heap satisfies both of the heap property and leftist topology. Return TRUE if yes, and FALSE if no.
3. Implement `void increaseKey(HeapNode* t, const unsigned int d)` to increase the priority of the element stored at node `t` by `d`, and restructure the heap to ensure heap property.
4. Implement `void decreaseKey(HeapNode* t, const unsigned int d)` to decrease the priority of the element stored at node `t` by `d`, and restructure the heap to ensure heap property. If the priority is lower than d, set the priority to 0.
5. Implement `MyLeftistHeap& merge(MyLeftistHeap<ComparableType> && rhs)` to merge `rhs` with the current leftist heap. The merged leftist heap should satisfy both the heap property and leftist topology. Your implementation should run in logarithmic time w.r.t the total size of the two heaps being merged.

Testing and Grading

We will test your implementation using the tester main function posted online. The posted input and output examples should be used for a testing purpose, while we will use another set of inputs for grading. Your code will be compiled under Ubuntu 20.04 LTS using g++ version 9.3.0 (default) with C++11 standard.

Your final score will be the determined by the success percentage of your program when fed with many random inputs. Note that if your code does not compile (together with our tester main function), you will receive 0. Therefore, it is very important that you ensure your implementation can be successfully compiled before submission.

Submission and Deadline

Please submit your implementation as a .h file, with a file name "MyLeftistHeap_[YourKUID].h". For example, if my KU ID is c123z456, my submission will be two files named "MyLeftistHeap_c124z456.h". Submissions that do not comply with the naming specification will not be graded. All submission will go through Blackboard. The deadline is Friday Nov 11th, 2022 11:59PM.