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Algorithm Theory
Exercise Sheet 6

Due: Friday, 1st of December 2023, 10:00 am

Exercise 1: Fibonacci Heap Simulation *(10 Points)*

Do a consolidation operation on this heap then a delete-min.

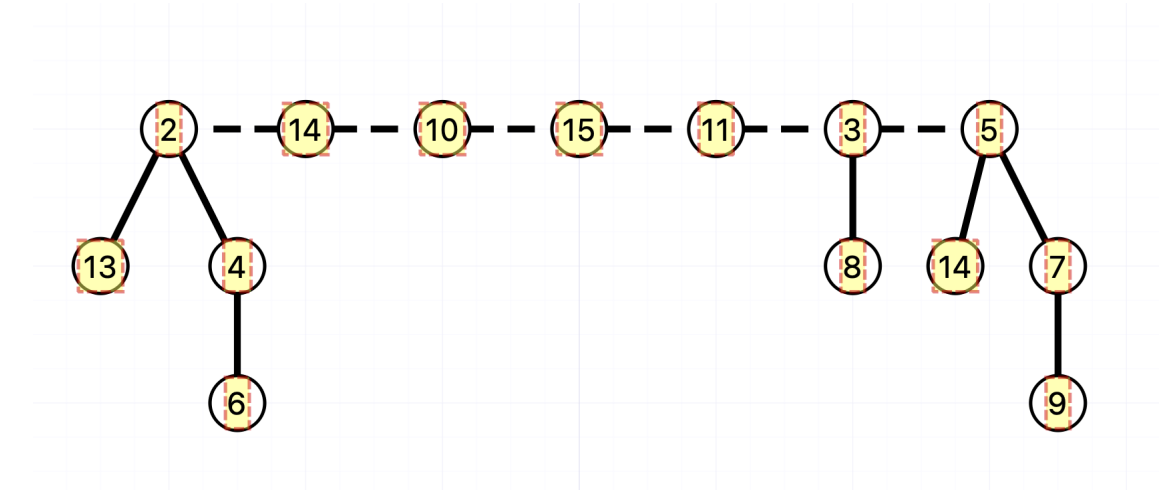

Figure 1: Before consolidation

Give the Fibonacci heap after the operations. Important: Follow the algorithm exactly as described on https://ac.informatik.uni-freiburg.de/teaching/ws23_24/algo_theo/pdf/Chapter5_PartIV.pdf.

Exercise 2: Fibonacci Heap Properties *(3+7 Points)*

(a) Create a new method called Delete-node(v), which deletes node v from the Fibonacci heap in $O(\log n)$ amortized time.

(b) A crazy person at the bus stop claims that for every tree in a Fibonacci heap, the height is $O(\log n)$ (in other words: at most $c \log n$), where n is the number of nodes in the heap. Show that there is a Fibonacci heap that consists of only one tree, which is a chain (path) of n nodes.