COMP4019 - Lab Session 8 – Fibonacci Heaps

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1 Understanding Fibonacci Heaps

Draw the internal structure of a Fibonacci heap after each of the following steps, starting with an empty heap. State what is returned when relevant.

1. Insert 5, 3, 7, 8, 9
2. Minimum
3. Insert 4, 2
4. Extract
5. Insert 1, 10, 12
6. Extract

2 Simplified Fibonacci Heap Implementation

Implement (in the programming language of your choice) the Fibonacci heap data structure in its simplified form, namely without the `decreaseKey` operation, and without arbitrary `search` or `delete` operations. Test your implementation and confirm the complexity of the main operations.

Alternatively, use a (trustworthy) library that implements the Fibonacci heap (I suggest boost, a C++ library), and test the cost of its operations thoroughly.

In either case, observe the difference in time for an `extract` operation between (1) directly following another `extract` or (2) following a large number of `insert` operations. Make sure you use sufficiently many nodes and a statistically significant number of samples. If you used your own implementation, correlate the size of the root wheel to the time taken by the `extract` operation.