Pairing Heaps

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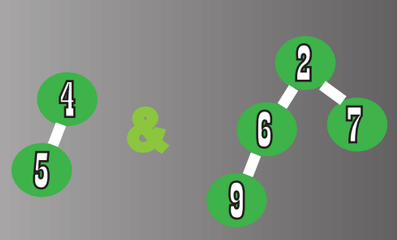
What?

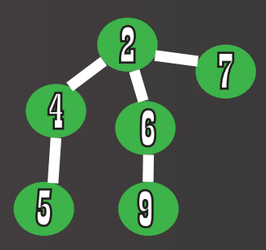
Pairing heaps are a specific implementation of the heap

Why?

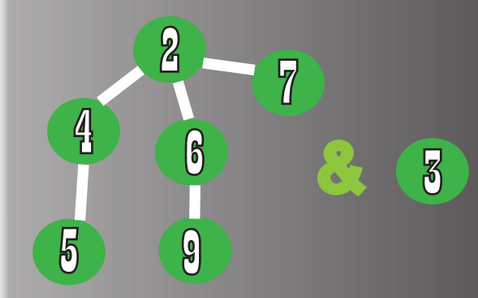
They have fast amortized running times for their operations.



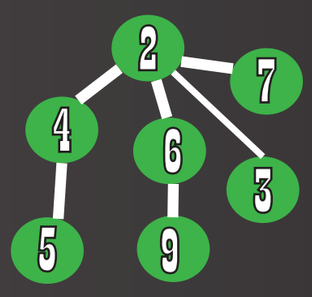
Merge



Inserting an element is like merging the element with the heap.



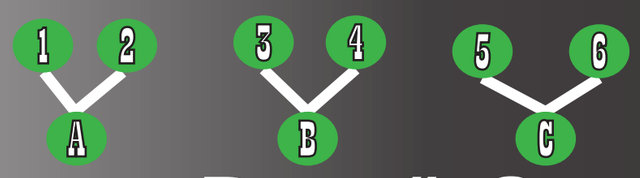
Insert



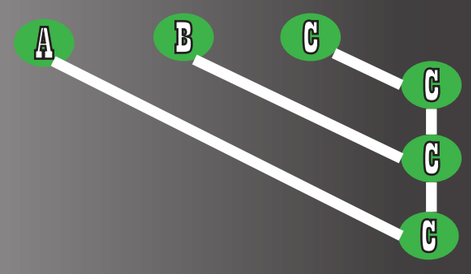
If merging occurs between a non-empty pairing heap and an empty pairing heap, merge just returns the non-empty pairing heap

Extract Minimum

Pass # 1



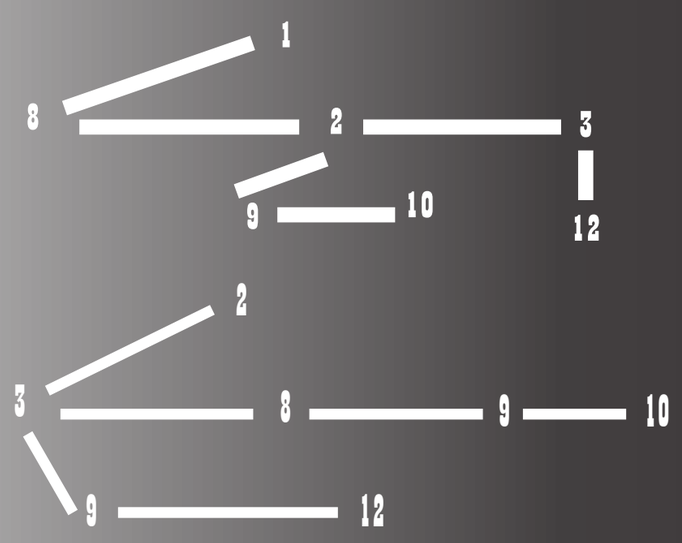
Pass # 2



In a min heap, the minimum element is the root of the heap. To delete this element, delete the root node.

Operation	Actual Running Time	**Amortized** Running Time:
Insert	O(1)O(1)O(1)O(1)	
Remove	O(n)O(n)O(\log n)O(logn)	
Extract Min	O(n)O(n)	O(\log n)O(logn)
Merge	O(1)O(1)	O(\log n)O(logn)

Remove a 1,8,2,3 and 6



To delete a node nn, detach the subtree that is rooted at node nn. Then, delete nn from the tree and merge its subtrees into one subtree using a two-pass method (as described in the extract-min section). Merge the detached subtree with the subtree resulting from the two-pass.