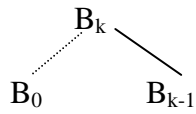



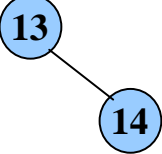
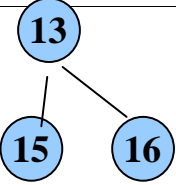
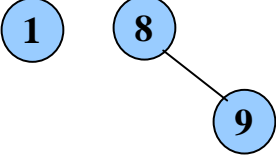
Binomial Tree

Definition

- B_0 is a single node
- B_k is defined recursively
- Binomial tree has heap-order property



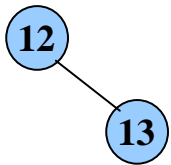
Binomial heap is a set of binomial trees with different ranks

	Binomial Tree	Binomial Heap
	Yes	Yes
	Yes	Yes
	No	No
	No	Yes

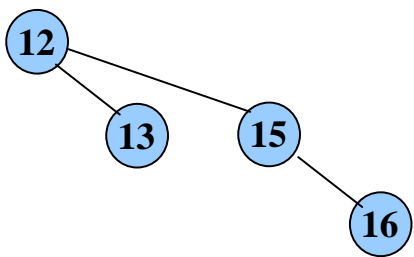
B0



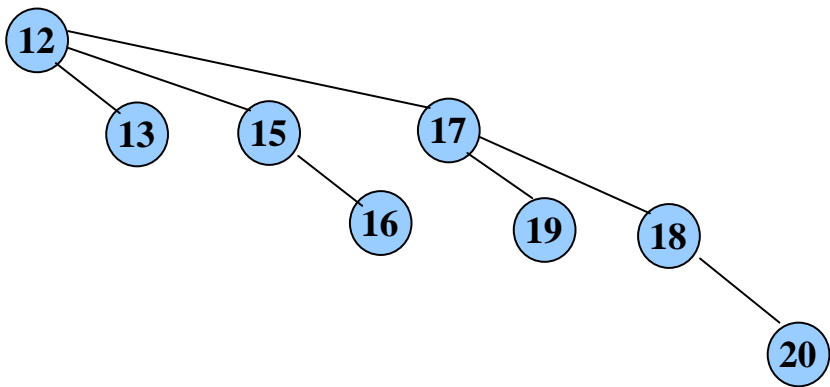
B1



B2



B3

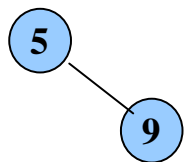
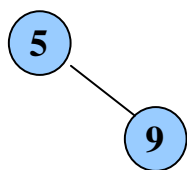


Merge Operation

Rule I: Merge two trees with different size



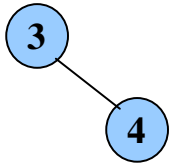
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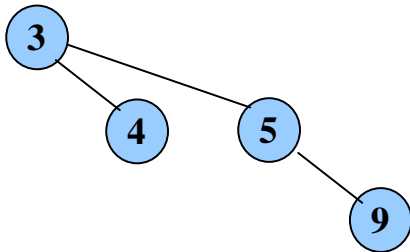
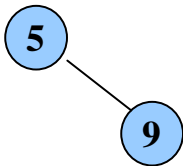
Rule II: Merge two trees with same size

Select the one with the smallest root, and attach the other one to the root as the right most child

example 1:



+

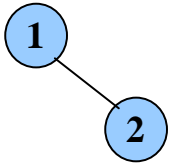


example2:



+



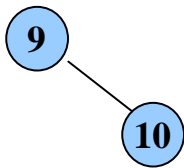


Insert operation: recursively apply rule I and rule II

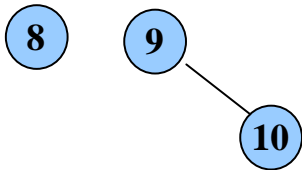
Insert 10:



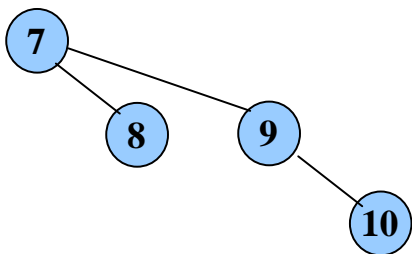
Insert 9:



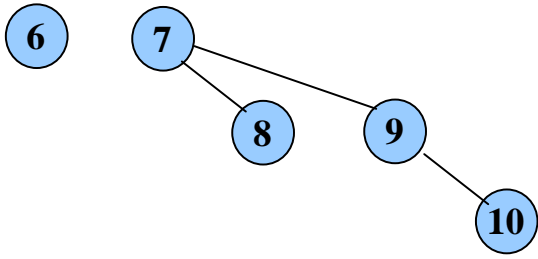
Insert 8:



Insert 7:



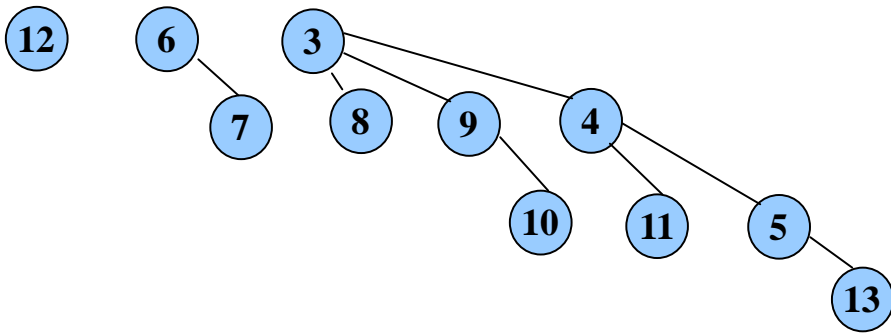
Insert 6:



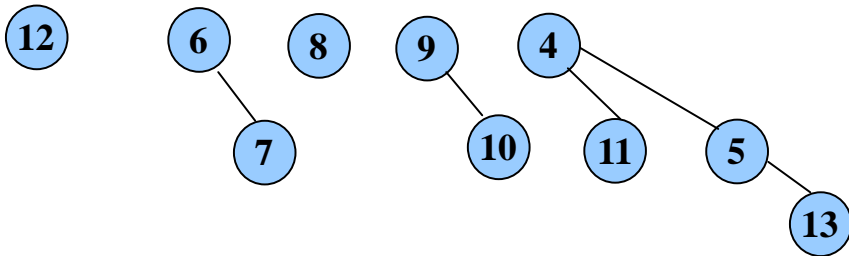
DeleteMin:

1. Find the Min Root
2. Delete the Root
3. Merge

Example:

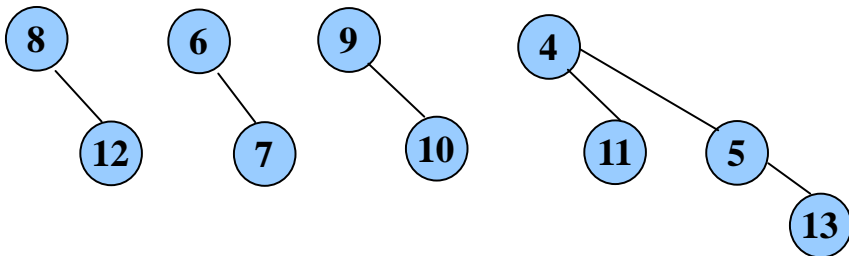


Deleting the min:

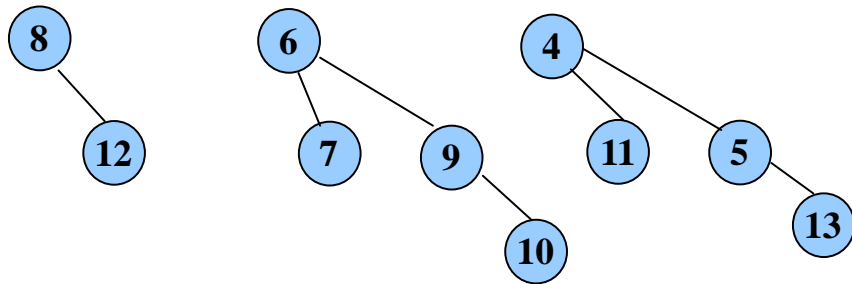


Merging:

Step1:



Step 2:



Step 3:

