

CHAPTER 9

Priority Queues

All the programs in this file are selected from

Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed
“Fundamentals of Data Structures in C /2nd Edition”,
Silicon Press, 2008.

Outline

- Single- and Double-Ended Priority Queues
- Leftist Trees
- Min-Max Heaps
- Double-Ended Heap (Deap)

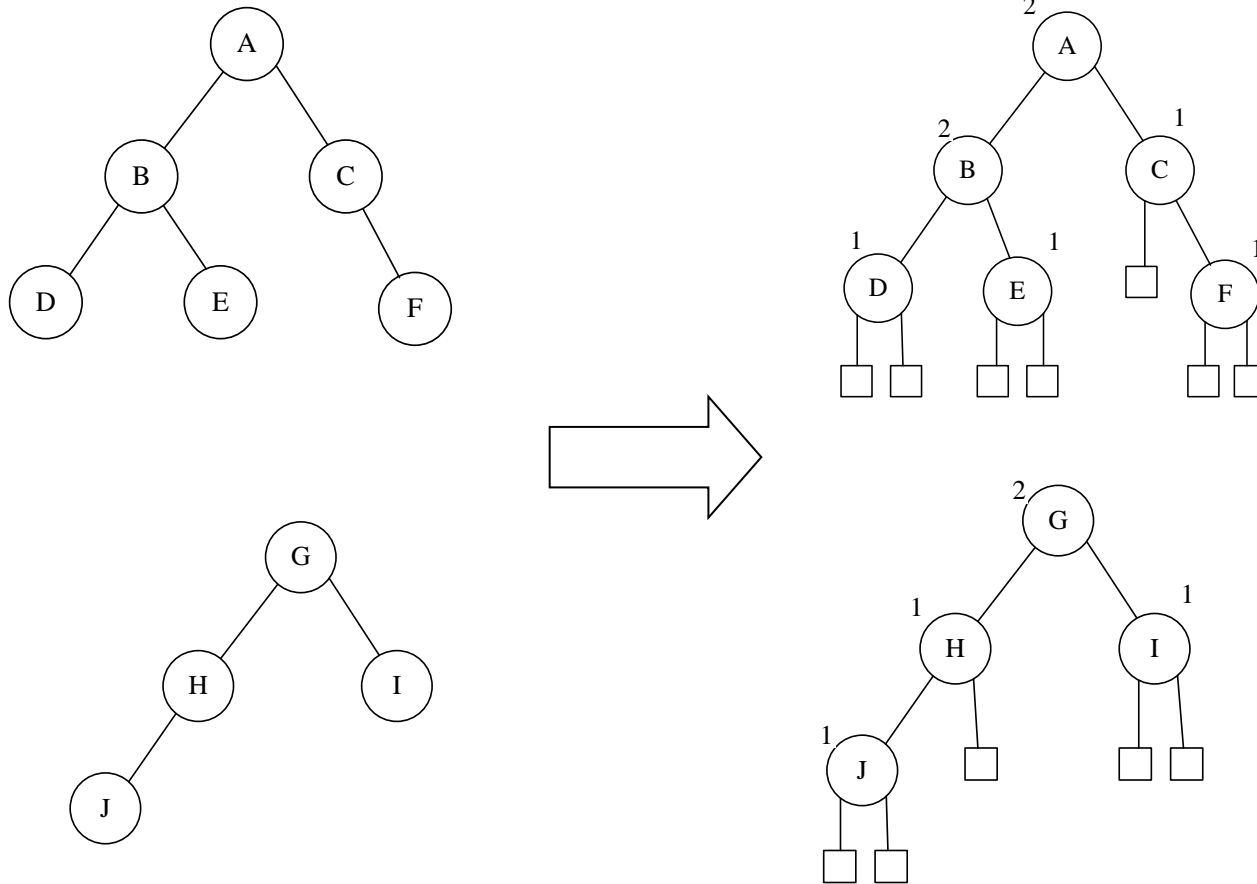
Single- and Double-Ended Priority Queues(1/2)

- Single-Ended Priority Queues
 - Return an element with minimum priority
 - Insert an element with an arbitrary priority
 - Delete an element with minimum priority

Single- and Double-Ended Priority Queues(1/2)

- Double-Ended Priority Queues
 - Return an element with minimum priority
 - Return an element with maximum priority
 - Insert an element with an arbitrary priority
 - Delete an element with minimum priority
 - Delete an element with maximum priority

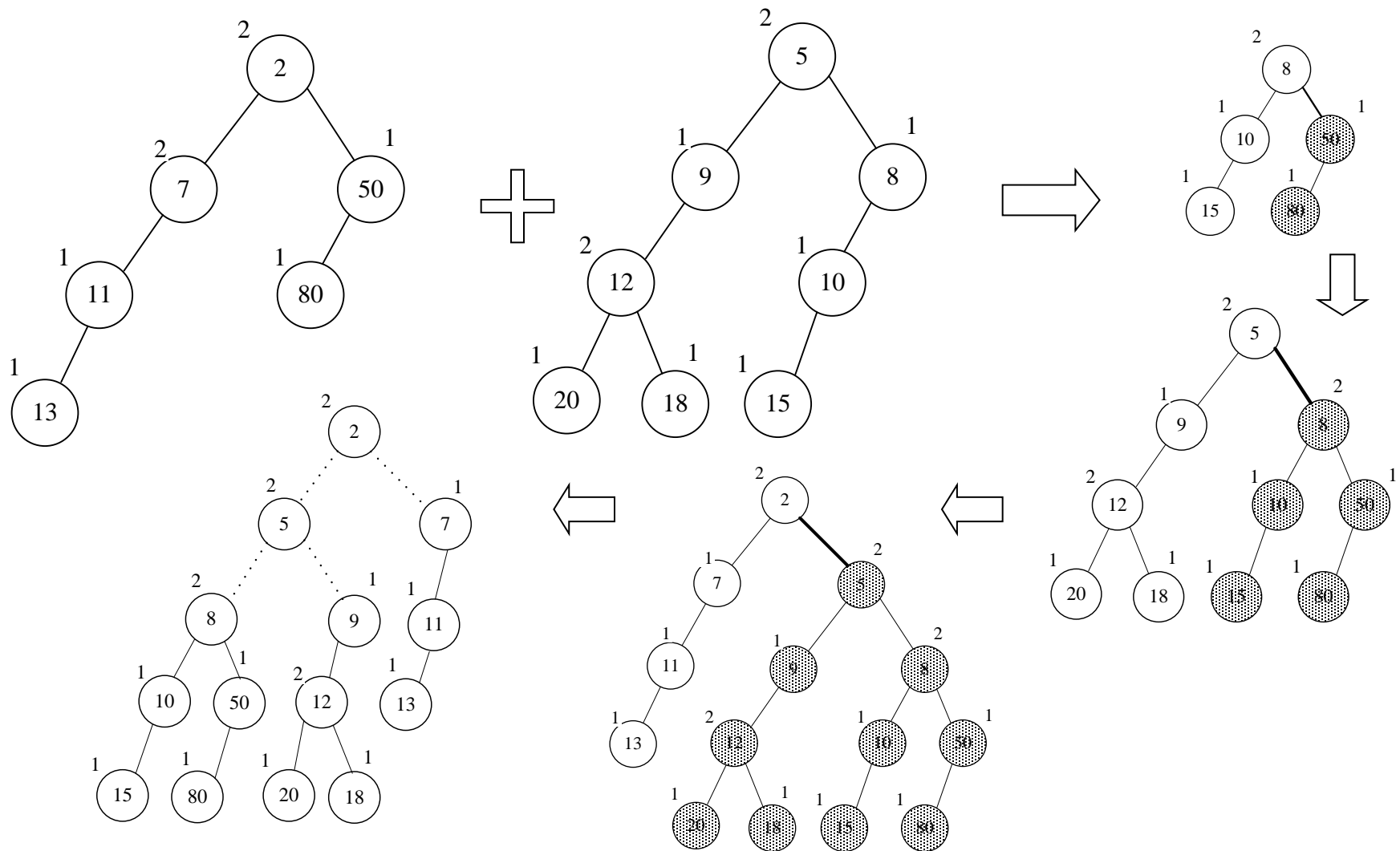
Leftist Trees-Extended binary trees



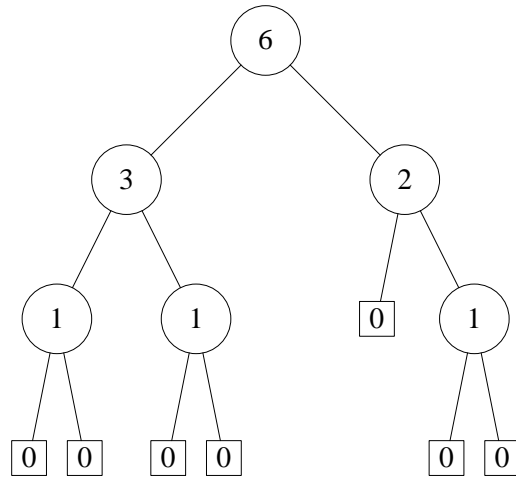
Leftist Trees

- $Shortest(x)$: the length of a shortest path from x to an external node
- A *leftiest Tree* is a binary tree such that if it is not empty, then
$$Shortest(leftchild(x)) \geq Shortest(rightchild(x))$$

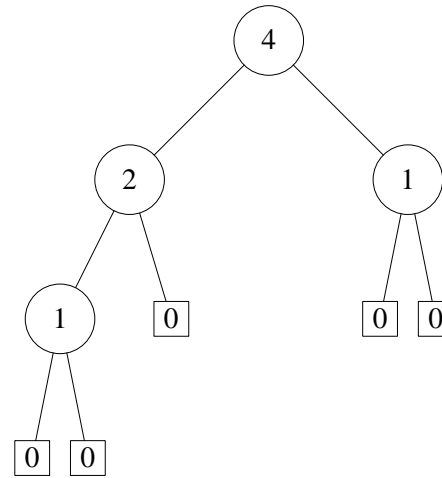
Height-Biased Leftist Trees



Weight-Biased Leftist Trees

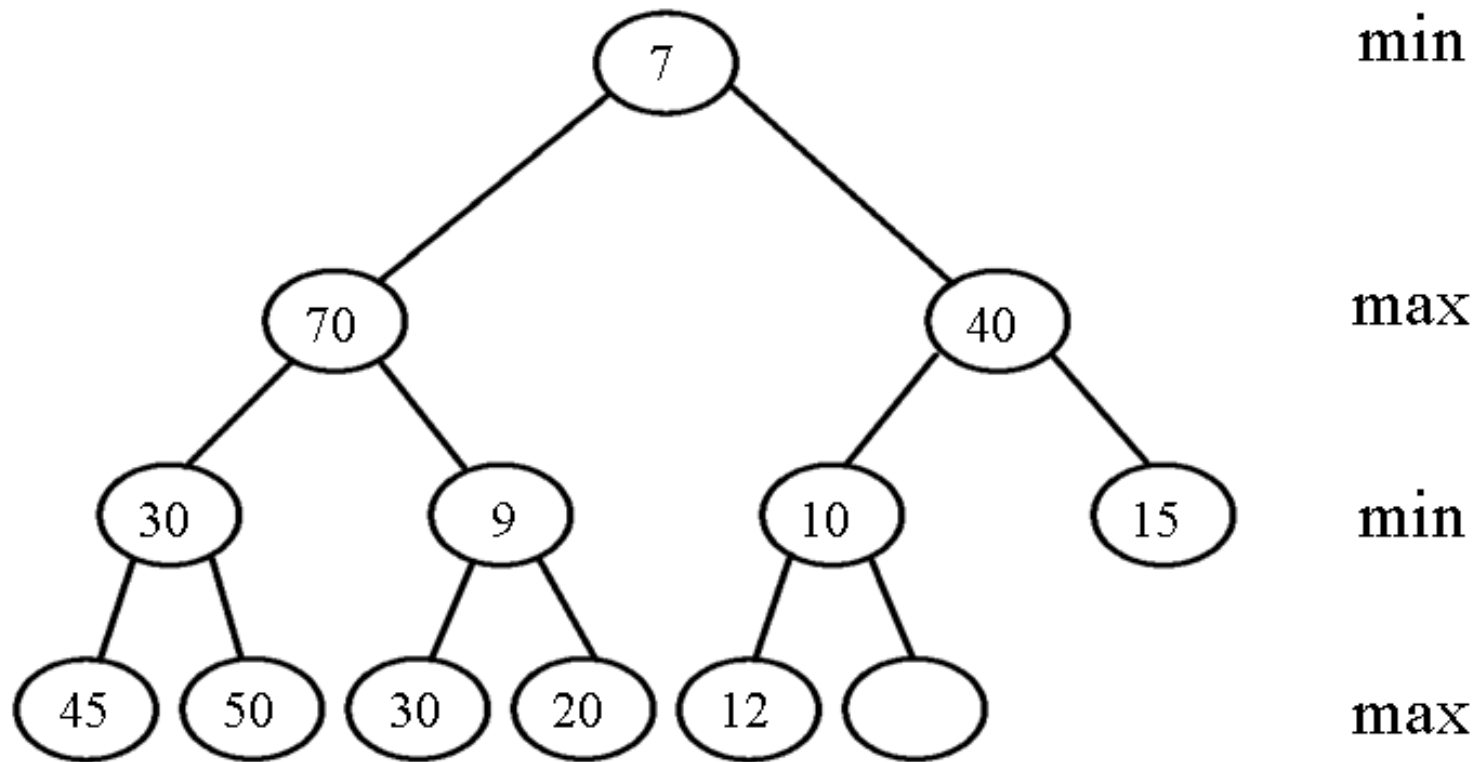


(a)

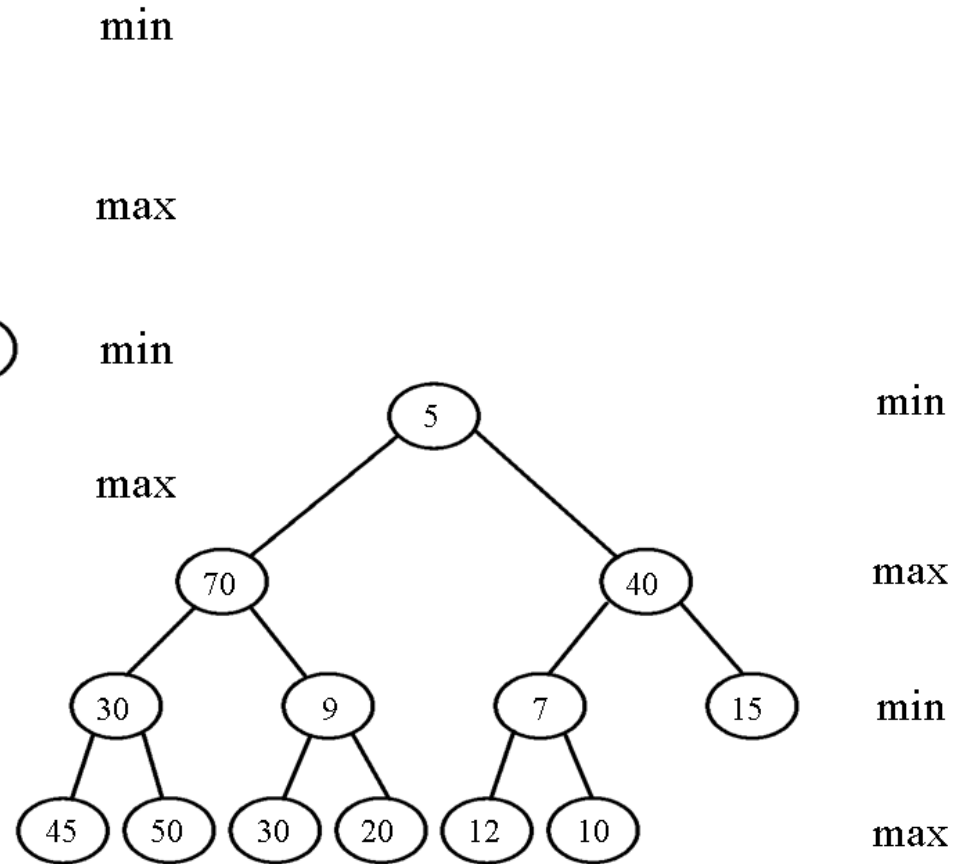
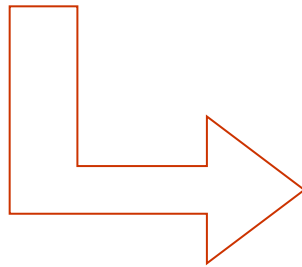
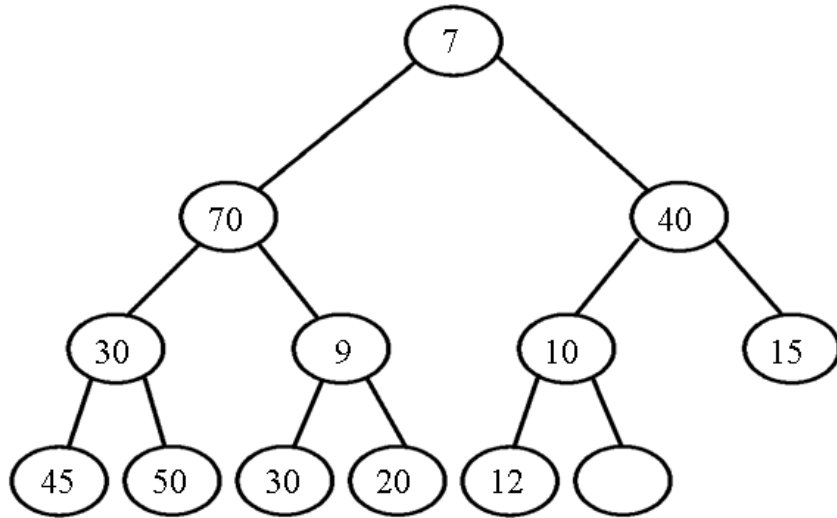


(b)

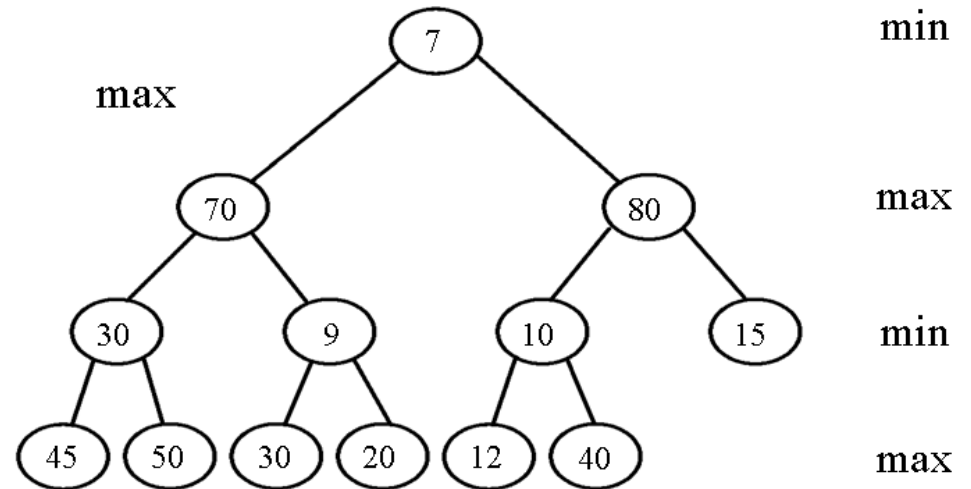
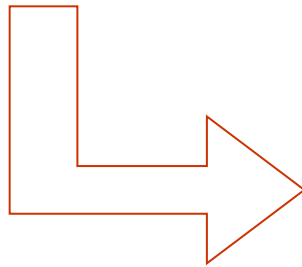
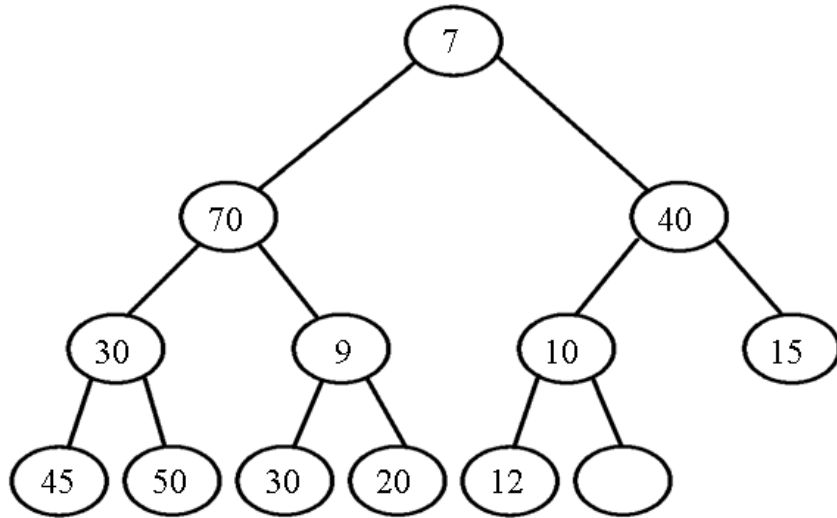
Min-Max Heaps



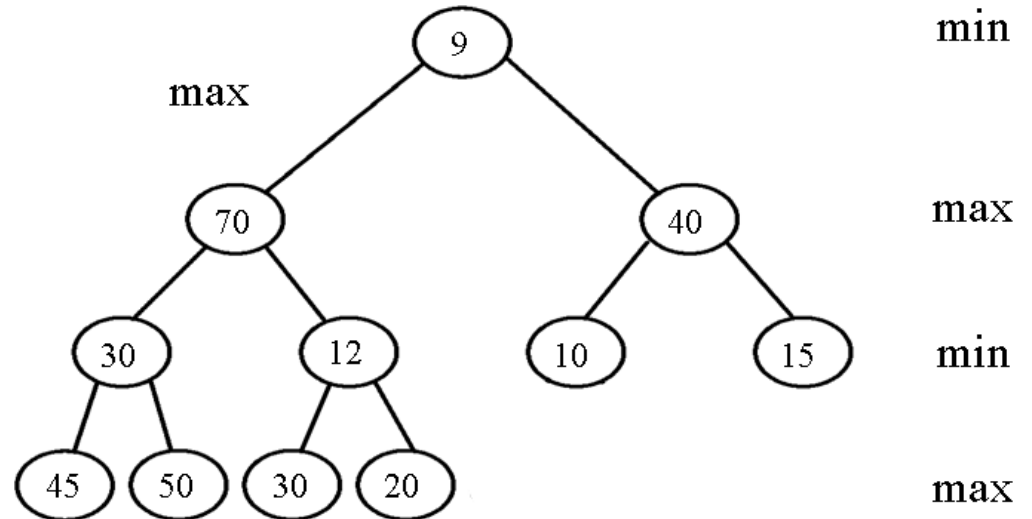
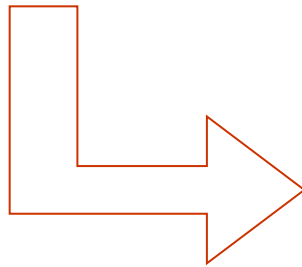
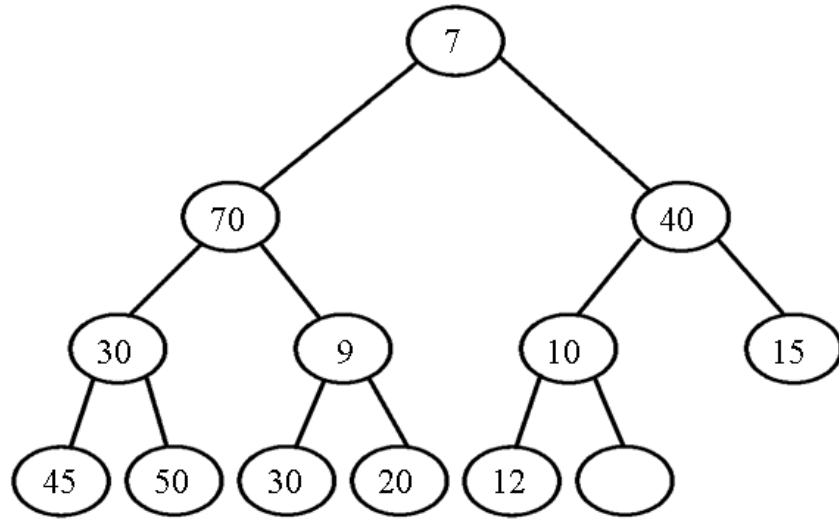
Min-Max Heaps-Insert 5



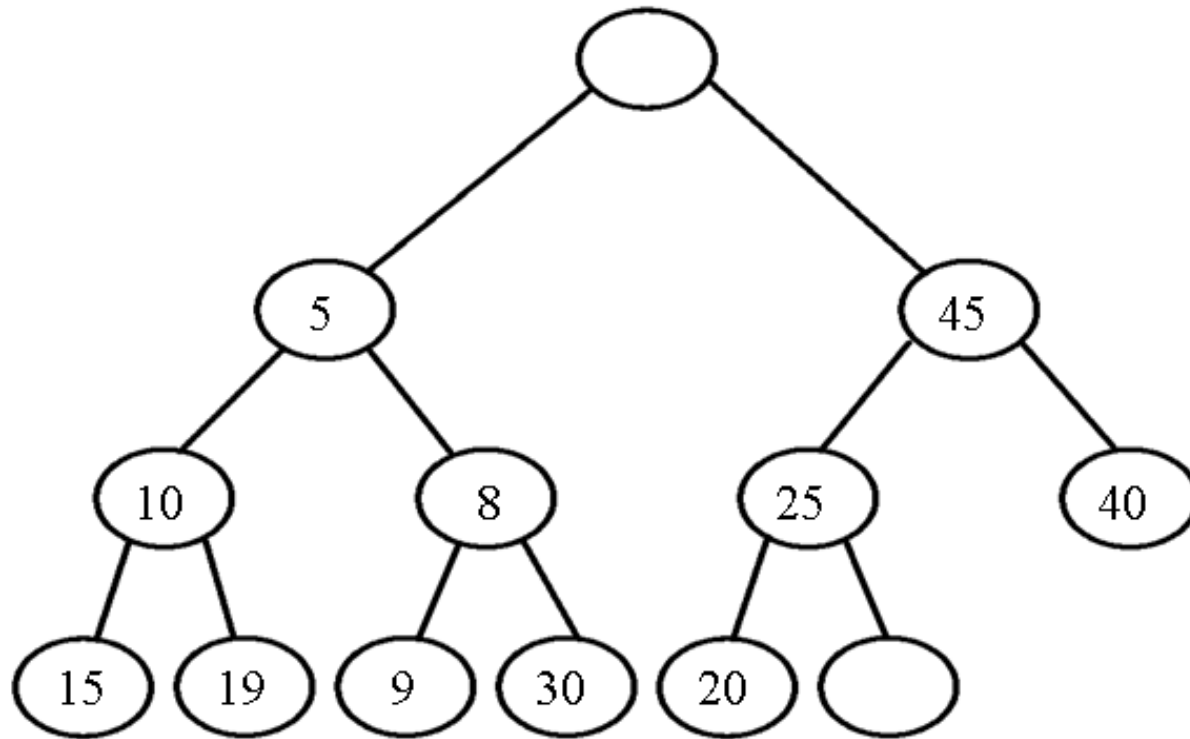
Min-Max Heaps-Insert 80



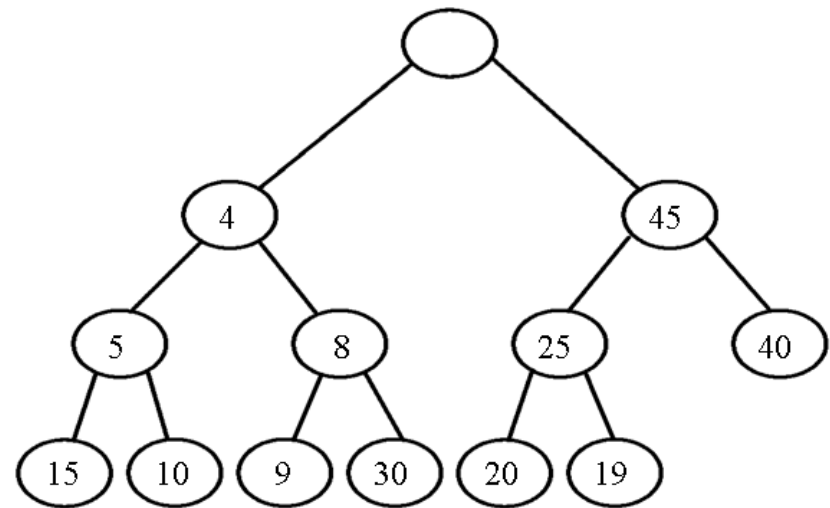
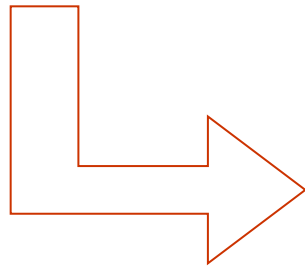
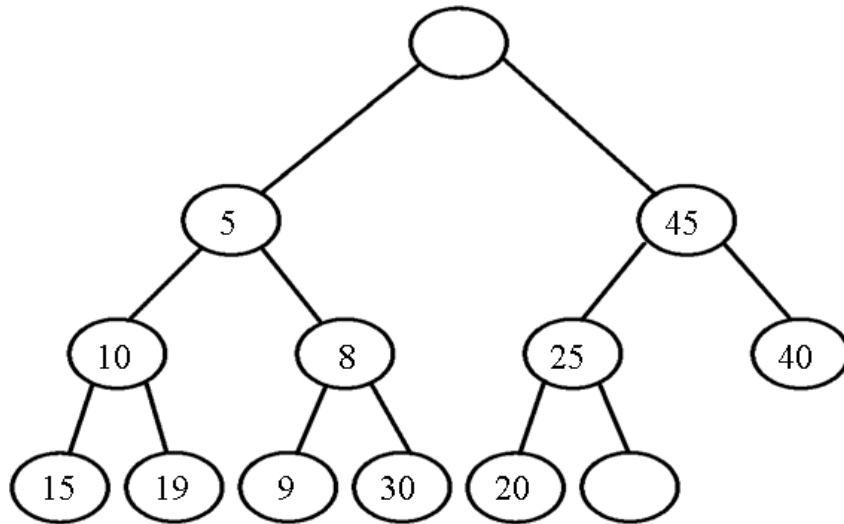
Min-Max Heaps-Delete Minimum



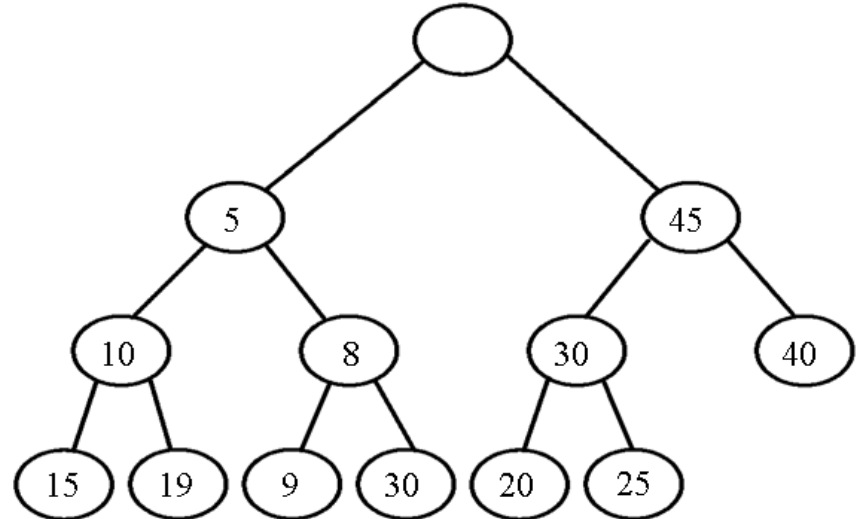
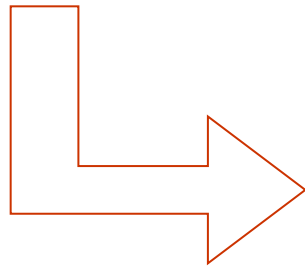
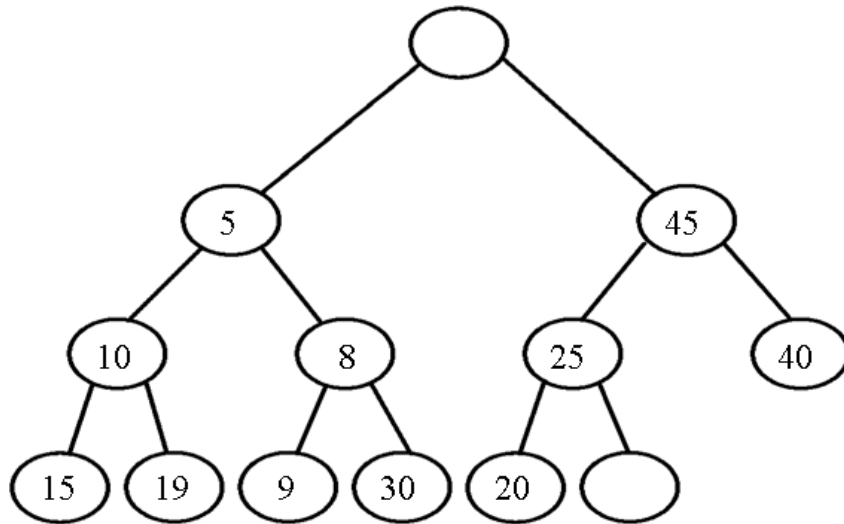
Double-Ended Heap (Deap)



Deap-Insert 4



Deap-Insert 30



Deap-Delete Minimum

