

15.1-5 Given an element  $x$  in an  $n$ -node order-statistic binary tree and a natural number  $i$ , how can the  $i$ th successor of  $x$  be determined in  $O(\lg n)$  time.

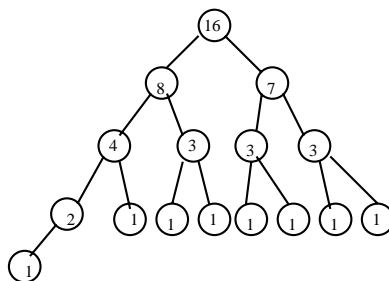
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This problem can be solved if our data structure supports two operations:

- $\text{Rank}(x)$  – what is the position of  $x$  in the total order of keys?
- $\text{Get}(i)$  – what is the key in the  $i$ th position of the total order of keys?

What we are interested in is  $\text{Get}(\text{Rank}(x) + i)$ .

In an order statistic tree, each node  $x$  is labeled with the number of nodes contained in the subtree rooted in  $x$ .



Implementing both operations involves keeping track of how many nodes lie to the left of our path.