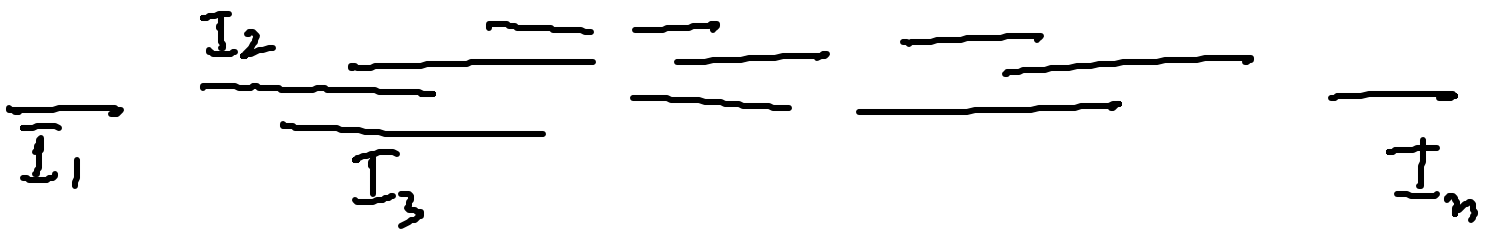
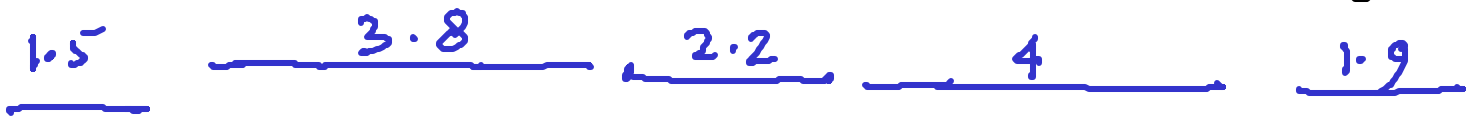


Computational Geometry Lecture 6

Line Sweep continued

Area of Union of Rectangles



The sum of the union of intervals

$$y : 1.5 + 3.8 + 2.2 + 4 + 1.9$$

If we sweep by Δx where y doesn't change, - then the total area swept by the vertical line
 $= \underline{y} \cdot \Delta x$

y can change only when (i) rectangle begins

(ii) rectangle ends

How do we keep-track of y ?

To compute y , we solve the one dimensional problem, i.e. sum of the union of intervals by line-sweep method. ∴

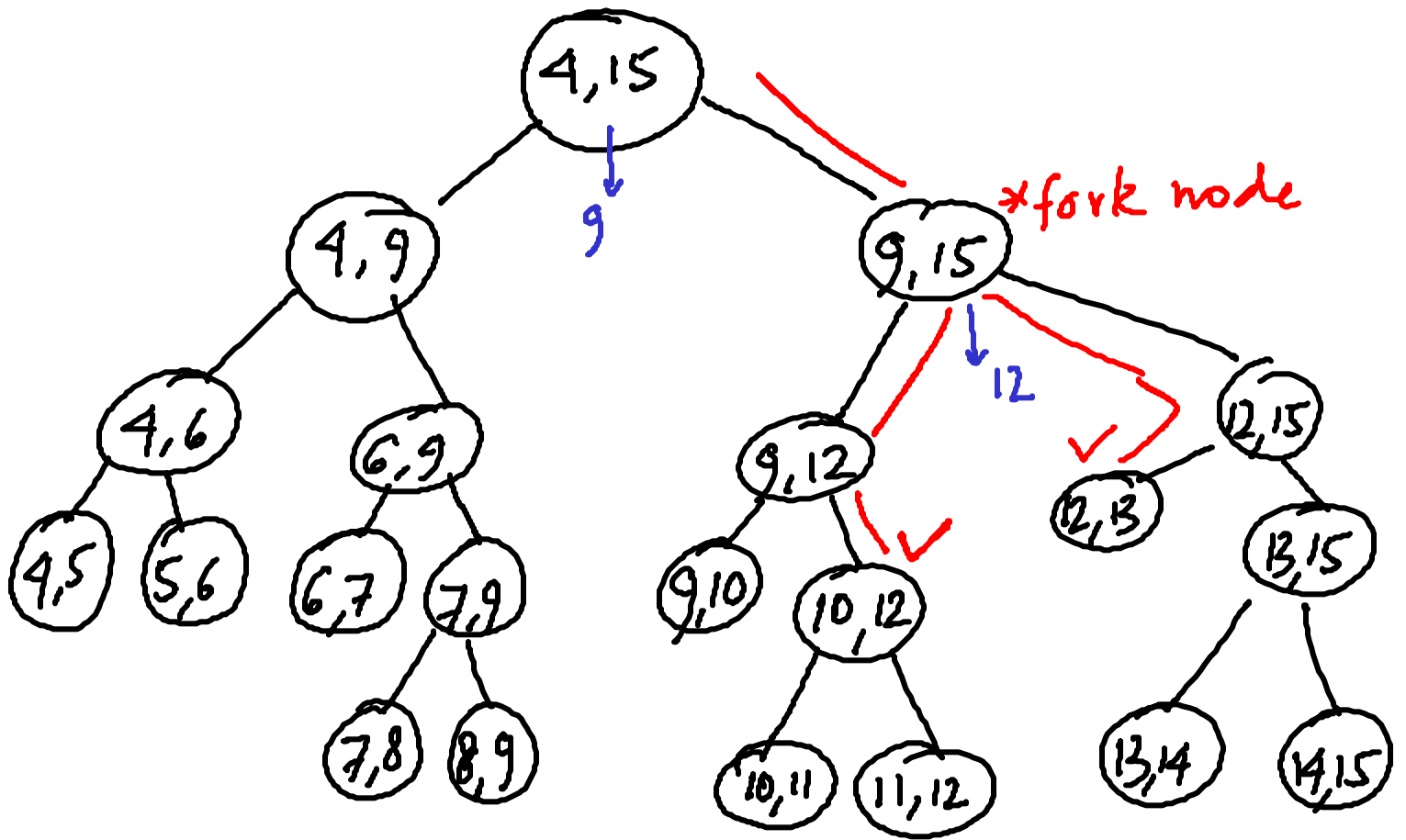
$$O(n \log n)$$

There are $2n$ event points corresponding to the left and right vertical boundaries of the n rectangles

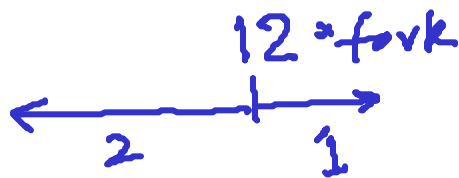
$$∴ O(n \log n \cdot 2n) \sim O(n^2 \log n)$$

Observation about "Interval Trees"

1. Each interval is stored in at most $2 \log n$ nodes
2. The total number of nodes visited when we walk towards the root from the "allocated nodes" $\leq 2 \log n$



Interval $[10, 13)$



Allocation nodes for $|12-10|$ & $|13-12|$

"Binary representation"