15210: Parallel and Sequential Data Structures and Algorithms

RangeLab

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5.2

When creating ordered table of points on the left of each sweep line, use scani instead of iterh. This makes this step parallel so the span is given by the scani:

$$Span = log|S| \cdot max\{Span(join)\} = log^2 n$$

The work increased by doing this. This is because scani would require additional work while contracting/expanding. But is doesn't change the big-O result.

$$Work_{scani} = |S| + \sum Work(join) = n + n \cdot logn = O(nlong)$$

$$Work_{iterh} = n \cdot logn = O(nlong)$$

5.3

My countTable is defined as:

$$type\ countTable\ =\ Key.t\ table\ table$$

There are n nodes in my countable, corresponding to each input point. The key on each node is the x coordinate, and the value is an OrdTable. Each OrdTable contains all the points on the left (including boundry) of the sweep line on this point ordered by their y coordinates.

Therefore, each OrdTable has one more node than last one. So the space used is

$$1 + 2 + 3 + \cdots + n = O(n^2)$$