

# I: Illuminated Stalls

Jeroen Op de Beek

## Problem

- Given  $n \leq 2 \cdot 10^5$  axis-aligned lines in 2D.
- Horizontal lines do not touch horizontal ones, same for vertical.
- Move one line to form a square.



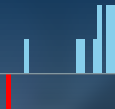
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## Solution

- If there exist a rectangle, it is always possible.
- If there are more than  $2n$  intersections, there exists a rectangle.
- We only look for U-shapes, where the new line is moved to the top.
- For a horizontal line look at its intersections.
- Fix the smaller of the two vertical lines.
- We only need to check the closest taller vertical line to the left and right.





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## Implementation

- For simplicity, try all four 90 degree rotations separately.
- Calculate all intersections via a sweepline, quit if there are too many.
- Iterate over horizontal lines, sort intersecting vertical lines by decreasing height.
- Sweepline over the vertical line, lookup the neighboring lines in a set.
- Check if there already are upper horizontal lines at the correct height.
- Check which length are currently used and if the remaining longest one is enough.
- Careful: you may need to move one of the upper horizontal lines.



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Statistics: 11 submissions, 0 accepted, 10 unknown