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# Point Location

## Performance Of Trapezoidal Map

## - Number Of Trapezoids Created (2)

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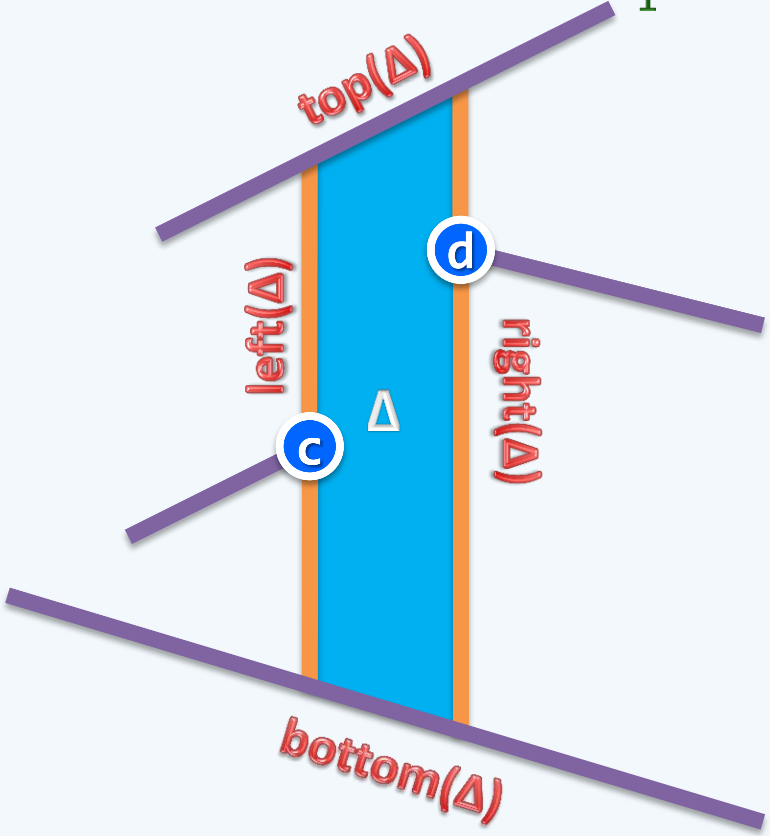
# $E[\ k(i)\ ] = \mathcal{O}(1)$ and $E[\ \sum_{i=1}^{n} k(i)\ ] = \mathcal{O}(n)$

- Note that each trapezoid $\Delta \in TM_i$ would have come into existence $\boxed{\text{if}}$ one of the following $\boxed{\text{4 segments}}$ was the last to be inserted to $S_i$
  - $top(\Delta) \in S_i$
  - $bottom(\Delta) \in S_i$
  - $s \in S_i$ and $RightEndpoint(s) = leftp(\Delta)$
  - $t \in S_i$ and $LeftEndpoint(t) = rightp(\Delta)$




- It follows that

$$
\begin{aligned}
E[k(i)] &= (1/i) \times \sum_{\Delta \in TM_i} \boxed{4} \\
&= (4/i) \times |TM_i| \\
&= (4/i) \times \mathcal{O}(i) = \mathcal{O}(1)
\end{aligned}
$$

# E[ k(i) ] = $\mathcal{O}(1)$ and E[ $\sum_{i=1}^{n} k(i)$ ] = $\mathcal{O}(n)$

❖ Since the number of trapezoids

created with $\boxed{\text{each insertion}}$

is expected-$\mathcal{O}(\boxed{1})$,

the total number of trapezoids

created in the $\boxed{\text{entire process}}$

is expected-$\mathcal{O}(\boxed{n})$