Point Location

Performance Of Trapezoidal Map - Query Time

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Search Length

❖ Since q could fall thru

up to 3 levels in SS(S)

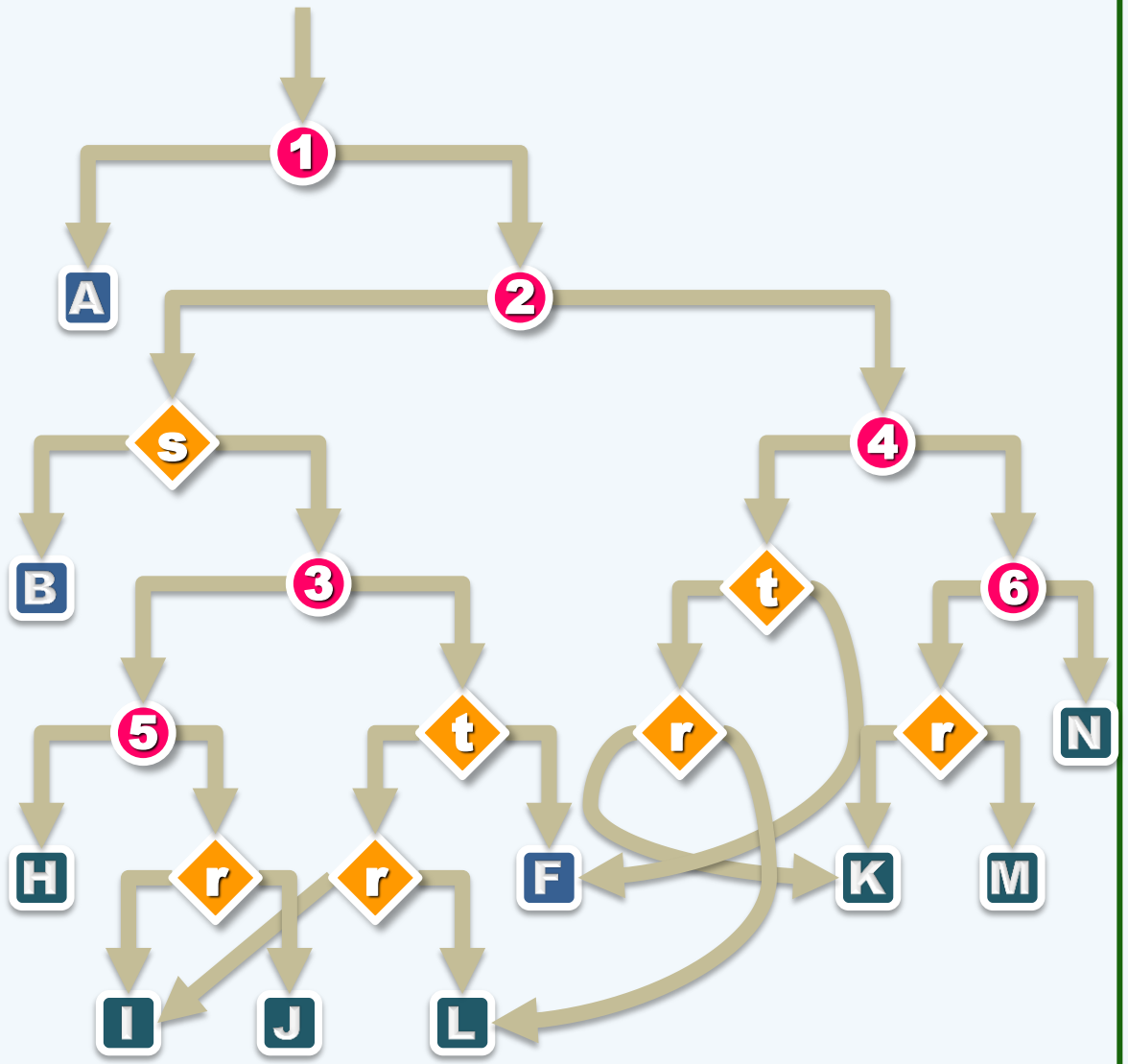
as a result of the insertion,

the expected length of

the search path of q in SS(S)

is at most:

$$3 \times (P_1 + P_2 + \ldots + P_n)$$



E[Query Time] = $O(\log n)$

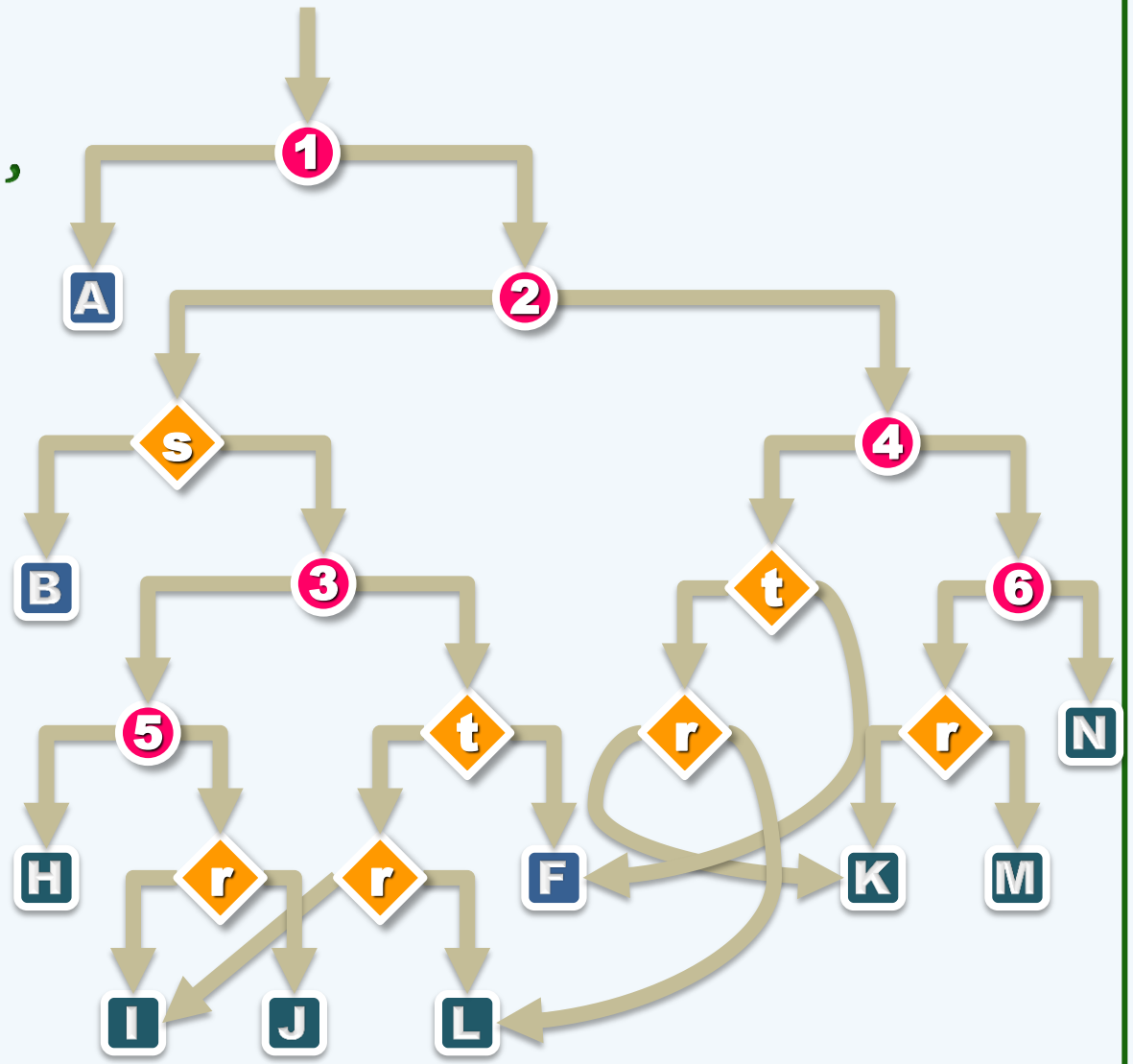
❖ Using **backward analysis** once again,

we can prove that $P_k \le 4/k$

❖ Hence, the expected length

$\le 3 \times (4/1 + 4/2 + \ldots + 4/n)$

$= 12 \times \Theta(\ln n) = O(\log n)$



Any Way, Time For a Conclusion

- Given a set of n non-crossing line segments in the plane,
  - in expected-O(nlogn) time, it is possible
    to construct a search structure
  - of size expected-O(n)
  - that answers point location queries in expected-O(logn)
- It's worthy to mention again that
  the expectations here are taken
  over all permutations of the input segments
- What does this mean in practice?