

# Point Location

Kirkpatrick Structure  
- Optimal And Simpler

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## Optimal Solution for 2D-PL

- ❖ [R. J. Lipton](#), [R. E. Tarjan](#), Applications of a planar separator theorem  
Proc. 18th IEEE Symp. on Foundations of Computer Science, **1977**, 162-170
- ❖ [LT77] were the first to show **theoretically** that  
an optimal solution for 2D-PL problem is possible, with
  - **$O(\log n)$**  query time,
  - **$O(n)$**  storage, and
  - **$O(n \log n)$**  preprocessing
- ❖ However, for practical applications  
their method was too complicated and  
the **CONSTANT** hidden in the  **$O(\log n)$**  query time is too large

## Optimal And Simpler Solution

### ❖ D. G. Kirkpatrick

Optimal search in planar subdivisions

SIAM Journal on Computing, 12:28-35, **1983**

- ❖ [Kir83] supported Lipton and Tarjan's declaration by establishing
  - a concrete hierarchical data structure (Kirkpatrick structure) and
  - an optimal algorithm

### ❖ Unfortunately,

Kirkpatrick's algorithm is still **impractical**

for the **big constant factor** of its complexity

- ❖ Nevertheless, it is still regarded as a milestone in this direction