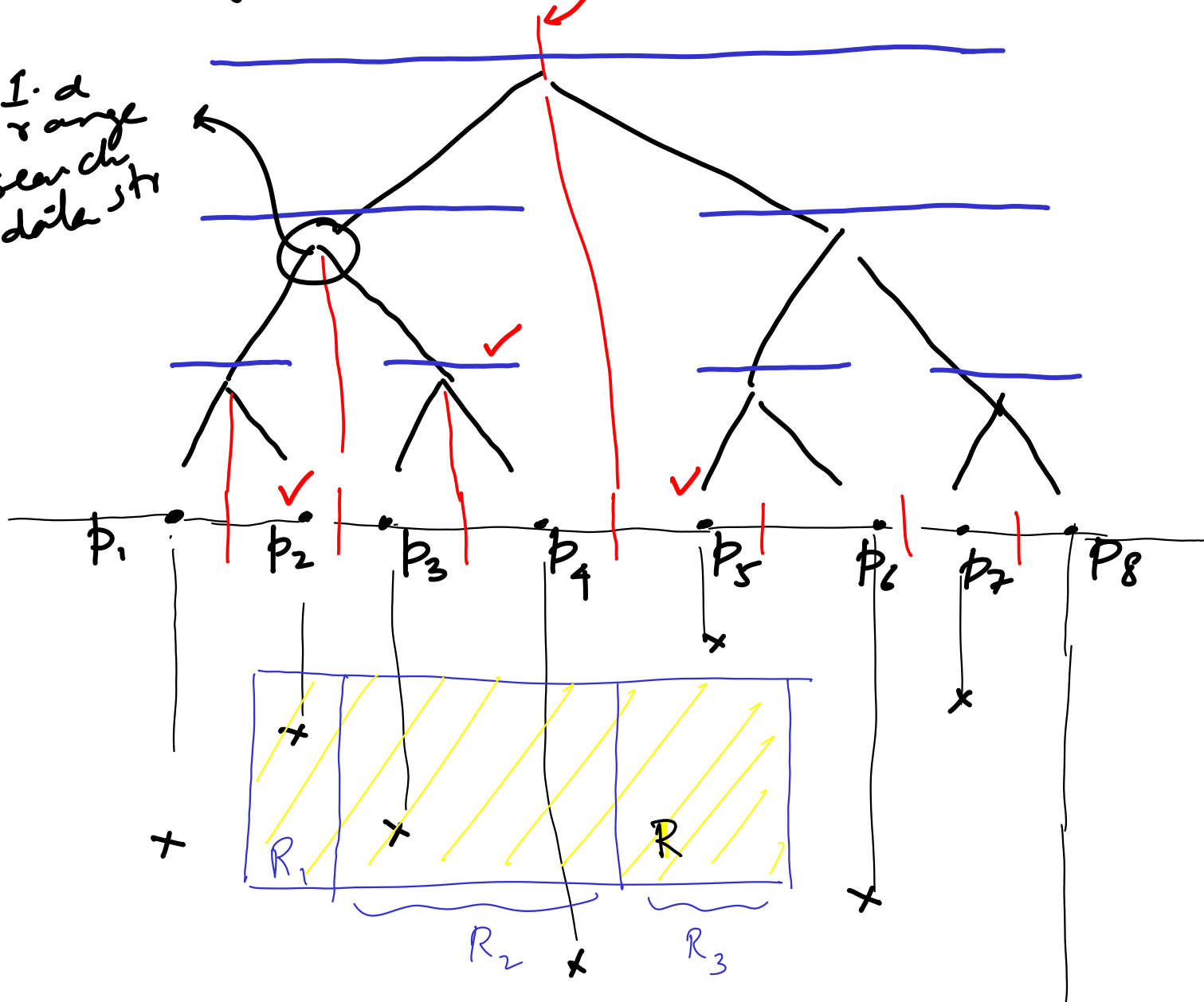


Range Search Tree

vertical split

1-d
range
search
data str



Search time : \bigcup Almost $2 \log n$ 1-d data
 constant structures
 in intervals of R $= O(\log^2 n)$

$$\begin{aligned} \text{Space} &= O(n) \text{ per level} \Rightarrow O(n \log n) \\ &= c \cdot n + c \cdot \left(\frac{n}{2} + \frac{n}{2}\right) + c \cdot \left(4 \cdot \frac{n}{4}\right) + \dots \end{aligned}$$

Preprocessing Time :

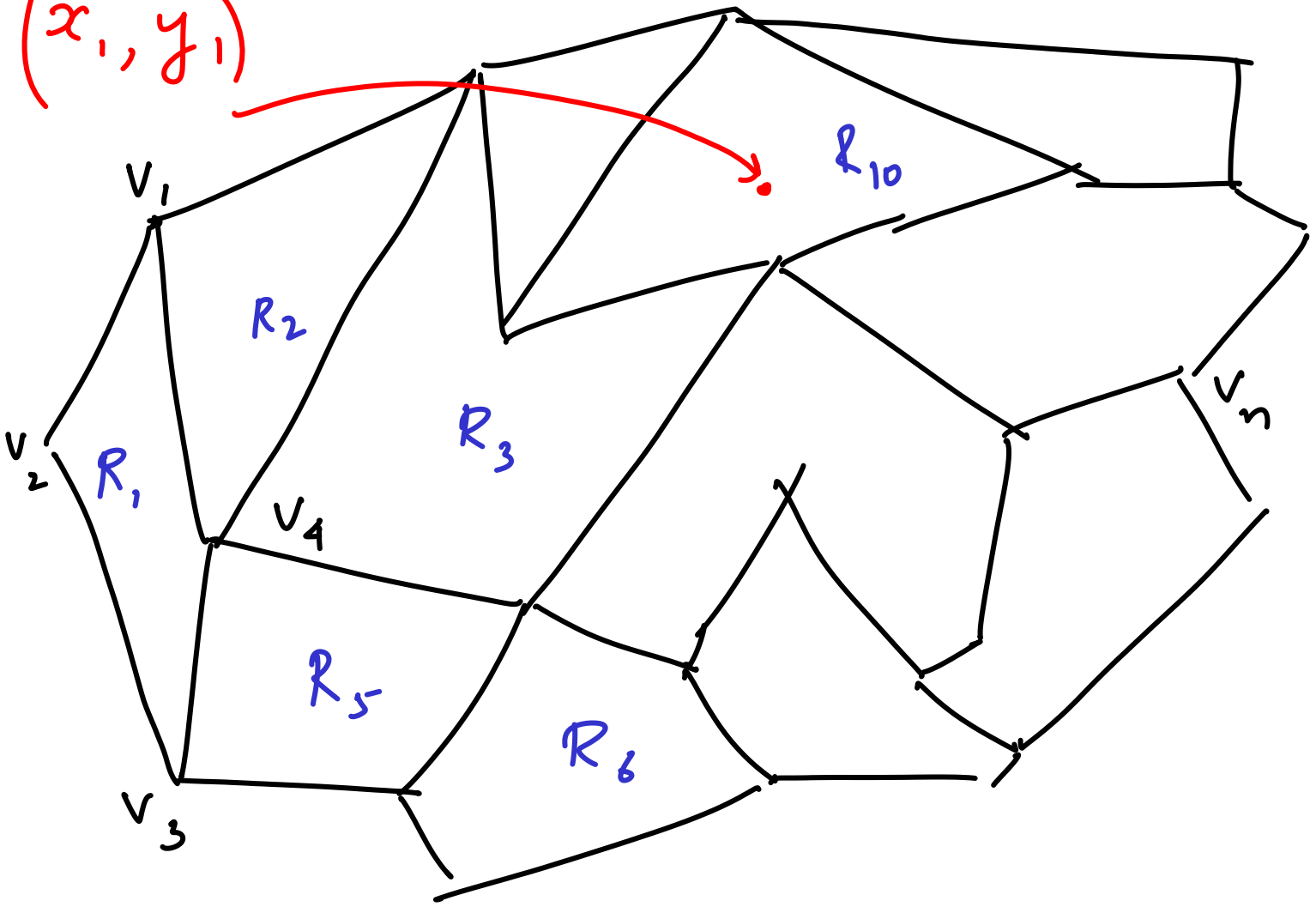
Related data structures

1. Segment - trees
2. Interval Trees

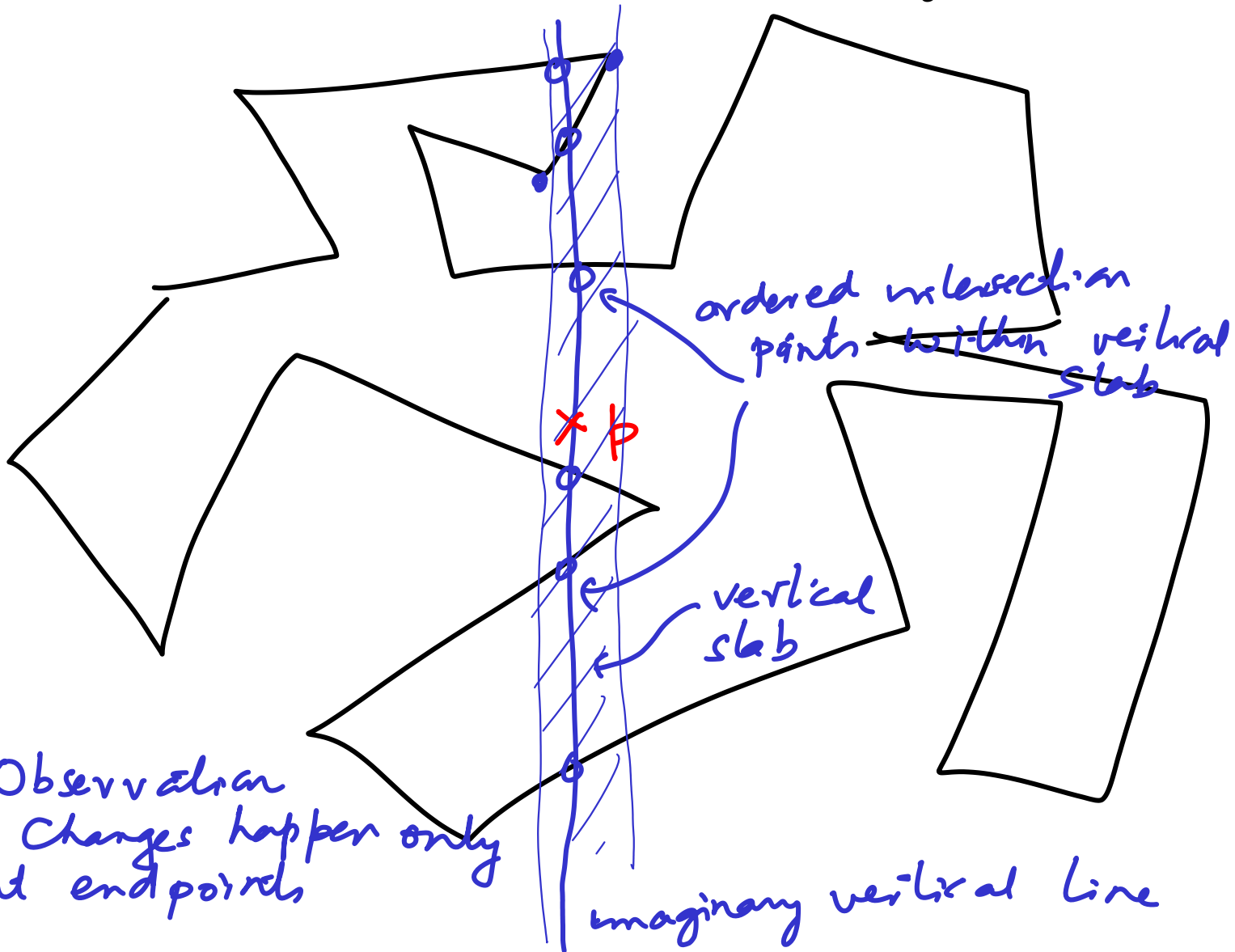
Multidimensional Data Structures
(including k-d-trees)

Point location in Planar regions

(x_1, y_1)



Point location in simple polygon



There are $2n$ vertical slabs

First do binary search in x direction
and then " " " y direction
(within a slab) Total $2 \log n$ time

Space $\hookrightarrow O(n) \cdot O(n) \Rightarrow O(n^2)$

too much \nearrow