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Geometric Range Search

Range Tree: Optimization

- Idea

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❖ So the idea for an improvement is that

we merge all the different lists

into a **single massive** list

∴ Thus, to answer a planar query, we can

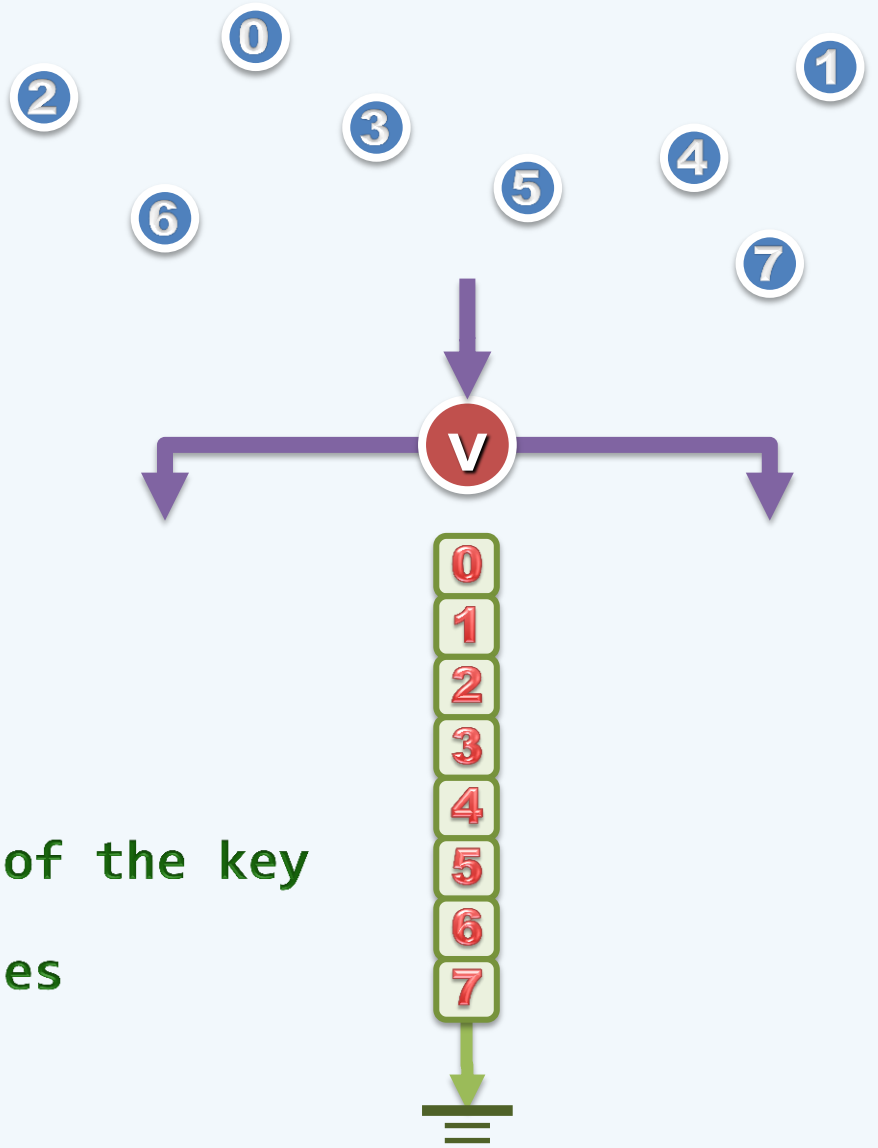
- do a global search in this list

in $O(\log n)$ time, and then

- use the information about the location of the key

to answer each of the remaining y-queries

in $O(1)$ time



- In our case, the massive list on which
  we will do one search is
  the entire set of points,
  sorted by their y-coordinates
- We will do one expensive ($O(\log n)$ time) search
  on the y-list for the root
  // after this, however, we claim that ...
- While descending the x-tree, we can
  keep track of the position of y-range
  in each auxiliary list
  in constant time