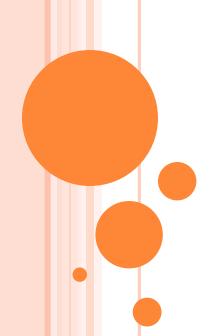




Not seletion Sort

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### Selection Algorithm

Keyword: Sorted!

#### Definition

 Find the k-th smallest number (aka k-th order statistic) in an list or array

### Examples

- Find the minimum
- Find the maximum
- Find the median 中位數

### Time complexity

• O(n) for worst case



# Methods for Selection Algorithms

- Basic methods for selection algorithms
  - Selection by sorting: O(n log(n))
  - Partial selection sort : O(kn)
  - Partition-based selection (Quickselect): O(n) in average
  - Partial heap sort: O(n + k log(n))
- References
  - Wikipedia
  - 寻找第K大的数的方法总结



# Partition-based selection (Quickselect)

- Used by nth\_element() in STL
- Based on the concept of "divide and conquer"
- Pseudo code

```
QS(S, k)
if |S|=1, return x_1
S_L=\{x_i|x_i in S, x_i< x_1\}
S_R=\{x_i|x_i in S, x_i> x_1\}
if |S_L|=k-1, return(x_1)
if |S_L|>k-1, return QS(S_L, k)
if |S_L|< k-1, return QS(S_R, k-|S_L|-1)
```

- Reference
  - Median Selection Algorithm (Part #2 Improving Effeciency)