

SELECT Algorithm

The SELECT algorithm determines the i th smallest of an input array of n elements by executing the following steps.

1. Divide the n elements of the input array into $\lfloor n/5 \rfloor$ groups of 5 elements each and at most one group made up of the remaining $n \bmod 5$ element.
2. Find the median of each of the $\lfloor n/5 \rfloor$ groups by insertion sorting the elements of each group (of which there are 5 at most) and taking its middle element. (If the group has an even number of elements, take the larger of the two medians.)
3. Use SELECT recursively to find the median x of the $\lfloor n/5 \rfloor$ medians found in step 2.
4. Partition the input array around the median-of-median x using a modified version of PARTITION. Let k be the number of elements on the low side of the partition, so that $n - k$ is the number of elements on the high side.
5. Use SELECT recursively to find the i th smallest element on the low side if $i \leq k$, or the $(i - k)$ th smallest element on the high side if $i > k$.