

Quicksort



The basic algorithm $Quicksort(S)$ consists of the following four steps.

1. If the number of elements in S is 0 or 1, then return.
2. Pick *any* element v in S . It is called the *pivot*.
3. *Partition* $S - \{v\}$ (the remaining elements in S) into two disjoint groups: $L = \{x \in S - \{v\} \mid x \leq v\}$ and $R = \{x \in S - \{v\} \mid x \geq v\}$.
4. Return the result of $Quicksort(L)$ followed by v followed by $Quicksort(R)$.

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8-1

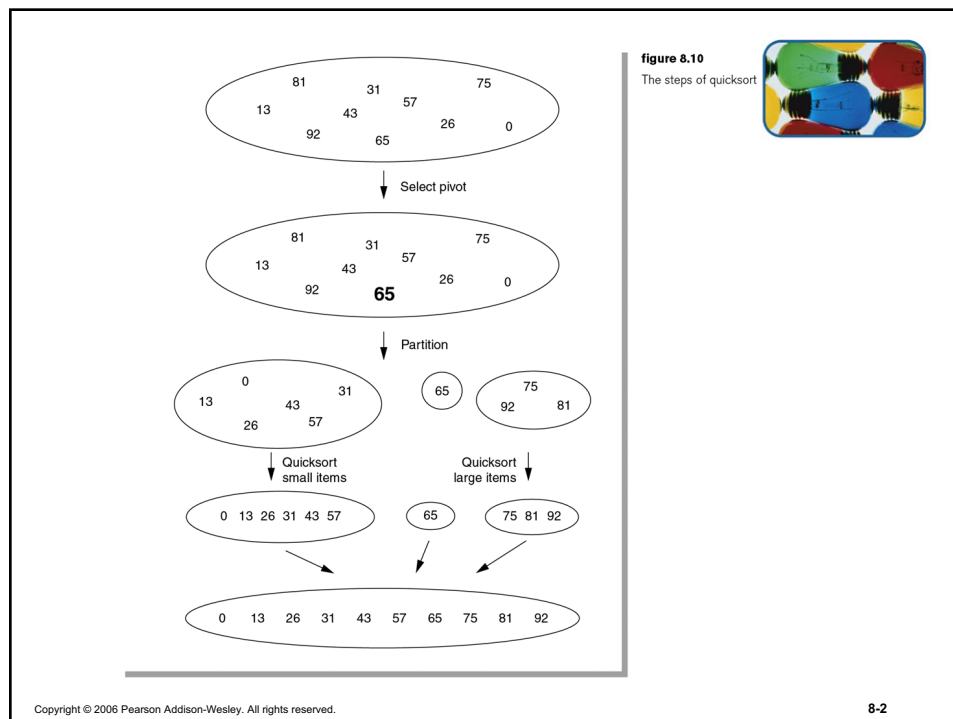


figure 8.10

The steps of quicksort



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8-2

Best Case



- Like MergeSort: $O(n \log(n))$

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8-3

Worst Case



- $T(N) = T(N - 1) + (N-1)$
- $T(N - 1) = T(N - 2) + (N-2)$
- $T(N - 2) = T(N - 3) + (N-3)$
- ...
- $T(0) = 0$
- $T(N) = 0 + 1 + 2 + \dots + (N-1)$
 $= (N-1)(N)/2 = O(N^2)$

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8-4