# Slowsort

**Slowsort** is a sorting algorithm. It is of humorous nature and not useful. It's based on the principle of *multiply and surrender*, a tongue-in-cheek joke of divide and conquer. It was published in 1986 by Andrei Broder and Jorge Stolfi in their paper *Pessimal Algorithms and Simplexity Analysis*[1] (a parody of optimal algorithms and complexity analysis).

## Algorithm

Slowsort is a recursive algorithm.

An in-place implementation in pseudo code:

```
procedure slowsort(A, i, j)                         // sorts Array A[i],...,A[j]
    if i ≥ j then
        return
    m := ⌊(i+j) / 2⌋
    slowsort(A, i, m)                               // (1.1)
    slowsort(A, m+1, j)                             // (1.2)
    if A[j] < A[m] then
        swap A[j] and A[m]                          // (1.3)
    slowsort(A, i, j-1)                             // (2)
```

- Sort the first half recursively (1.1)
- Sort the second half recursively (1.2)
- Find the maximum of the whole array by comparing the results of 1.1 and 1.2 and place it at the end of the list (1.3)
- Recursively sort the entire list without the maximum in 1.3 (2).

An implementation in Haskell (purely functional) may look as follows.

```haskell
slowsort :: Ord a => [a] -> [a]
slowsort xs
  | length xs <= 1 = xs
  | otherwise      = slowsort xsnew ++ [max llast rlast]  -- (2)
    where
      l     = slowsort $ take m xs  -- (1.1)
      r     = slowsort $ drop m xs  -- (1.2)
      llast = last l
      rlast = last r
      xsnew = init l ++ min llast rlast : init r
      m     = fst (divMod (length xs) 2)
```

## Complexity

The runtime $T(n)$ for Slowsort is $T(n) = 2T(n/2) + T(n-1) + 1$. A lower asymptotic bound for $T(n)$ in Landau notation is $\Omega\left(n^{\frac{\log_2(n)}{(2+\epsilon)}}\right)$ for any $\epsilon > 0$. Slowsort is therefore not in polynomial time.

Even the best case is worse than Bubble sort.

## References

1. "CiteSeerX — Pessimal Algorithms and Simplexity Analysis" (http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.116.9158). *Citeseerx.ist.psu.edu*. Retrieved 2017-07-26.

---