

Lab03-Divide and Conquer

Exercises for Algorithms by Xiaofeng Gao, 2016 Spring Semester

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1. Draw a sorting network with $n = 16$.
2. Suppose you are choosing between the following three algorithms:
 - (a) Algorithm A solves problems by dividing them into five subproblems of half the size, recursively solving each subproblem, and then combining the solutions in linear time.
 - (b) Algorithm B solves problems of size n by recursively solving two subproblems of size $n - 1$ and then combining the solutions in constant time.
 - (c) Algorithm C solves problems of size n by dividing them into nine subproblems of size $n/3$, recursively solving each subproblem, and then combining the solutions in $O(n^2)$ time.

What are the running times of each of these algorithms (in big- O notation), and which would you choose?

3. Design a divide-and-conquer algorithm to determine whether two given binary trees T_1 and T_2 are identical.
4. You are given two sorted lists of size m and n in ascending order. Give an $O(\log m + \log n)$ time algorithm for computing the k th smallest element in the union of the two lists.