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Exercise Sheet 12 for Algorithm Engineering, SS 14

Hand In: *Until Monday, 21.07.2014, 10:00 am, email to* `wild@cs...` *or in lecture.*

Problem 27

3 + 3 points

In this exercise we consider sorting in the *external memory model*.

Solutions dealing with the special case $B = 1$ yield partial credit.

a) Compute a precise leading term asymptotic (as $N \to \infty$) for the number of I/Os used in classic (top-down, two-way) Mergesort.

   You may assume that the input size N, the block size B and the main memory size M are all powers of 2.

b) Compute a precise leading term asymptotic for the number of I/Os used in Quicksort (as given in class).

   Hint: Our solution of the Quicksort recurrence in class shows that if the cost for one partitioning step is asymptotically $a\,N + \mathcal{O}(1)$ (as $N \to \infty$), then the overall costs for Quicksort are asymptotically $2a\,N \ln N + \mathcal{O}(N)$.