ASP: Adaptive Online Parallel Disk Scheduling[†]

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Abstract

In this work we address the problems of prefetching and I/O scheduling for read-once reference strings in a parallel I/O system. We use the standard parallel disk model with D disks and a shared I/O buffer of size M. We design an on-line algorithm ASP (Adaptive Segmented Prefetching) with ML-block lookahead, $L \geq 1$, and compare its performance to the best on-line algorithm with the same lookahead. We show that for any reference string the number of I/Os done by ASP is within a factor $\Theta(C)$, $C = \min\{\sqrt{L}, D^{1/3}\}$, of the number of I/Os done by the optimal algorithm with the same amount of lookahead.

Keywords: Parallel I/O, Prefetching, I/O Scheduling, Dynamic Programming, On-Line Ratio.

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