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MADALGO seminar by Deepak Ajwani, Aarhus University

I/O-efficient Topological Ordering of DAGs with Small Path Cover

Abstract:

I will present an *O(sort(m))*-I/O algorithm for topologically sorting a directed acyclic graph (DAG) *G* with width *O(M/B)*, assuming that a chain decomposition of *G* is given. Here *M* and *B* are the number of elements that fit in internal memory and a block, respectively, *m* is the number of edges in the DAG, and *sort(m)* denotes the I/O complexity of sorting *m* data items. I will then show that this result can be generalized to all DAGs and the assumption can be relaxed to obtaining a vertex-disjoint path cover of an acyclic supergraph of *G* consisting of *O(M/B)* directed paths.
For some classes of DAGs, such a path cover can be obtained in *O(sort(m) polylog(m))* I/Os, thereby obtaining a topological sorting algorithm of the same complexity for these graph classes.

Joint work with: Norbert Zeh