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"KLA: a new algorithmic paradigm for parallel graph computations" discusses the gains that can be made in parallel graph computations by using a hybrid approach that combines level-synchronous and asynchronous parallel approaches. In parallel graph algorithms, a level-synchronous approach explores the vertices of a graph level by level. Each level is explored fully before the next level is processed. Asynchronous parallel graph algorithms synchronize vertex exploration within each vertex instead of at a more global level. Each of these techniques has advantages and disadvantages depending on the specific characteristics of the graph (size, connectivity etc…). KLA use a variable, k, to determine the level of asynchrony to use, which can range from fully level-synchronous to completely asynchronous. Since the performance of KLA is dependent on the k value, the authors suggest two ways to calculate an effective k value, the adaptive approach tries successive values of k to narrow in on an optimal value, the model approach can be used to calculate an optimal k value without the trial and error of the adaptive approach. The authors conducted various experiments of the potential speedup time offered by implementation of KLA with well known graph algorithms, including BFS and PageRank. Based on their results, KLA most often offers speedups of 1 to 2 times over traditional parallel implementations.

Harshvardhan et al. "KLA: a new algorithmic paradigm for parallel graph computations" in *Proc. 23rd Int. Conf. Parallel architectures and compilation* 2014 27-38

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