

A Genetic Algorithms Approach to Modeling the Performance of Memory-bound Computations

Title: [A Genetic Algorithms Approach to Modeling the Performance of Memory-bound Computations.](#)

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Abstract: Benchmarks that measure memory bandwidth, such as STREAM, Apex-MAPS and MultiMAPS, are increasingly popular due to the "Von Neumann" bottleneck of modern processors which causes many calculations to be memory-bound. We present a scheme for predicting the performance of HPC applications based on the results of such benchmarks. A Genetic Algorithm approach is used to "learn" bandwidth as a function of cache hit rates per machine with MultiMAPS as the fitness test. The specific results are 56 individual performance predictions including 3 full-scale parallel applications run on 5 different modern HPC architectures, with various CPU counts and inputs, predicted within 10% average difference with respect to independently verified runtimes.

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