Empirical Modelling of Parallel Linear Algebra Routines*

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Abstract

This paper shows some ways of combining empirical studies with the theoretical modellization of parallel linear algebra routines. We propose some modifications in the traditional formulae. The values of the parameters in the formulae depend on a set of other parameters. A multidimensional function is obtained for each parameter. The table representing the value function must be obtained by experiments with the basic operations in the algorithm. What we propose is to identify the basic routines most widely used, together with the size of the parameters and the data storage and access schemes, and to develop the basic libraries including an engine to estimate these values as they are installed. Thus, the selection of satisfactory values of the parameters can be made automatically and without important additional cost. The user can also be provided with intelligent routines which will execute efficiently, and independently of the system where they are executed and of the user executing them. The application of the proposed ideas has been analyzed with several parallel linear algebra routines. Experiments with the QR and Cholesky factorizations are shown.

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