

Programming for Locality and Parallelism with Hierarchically Tiled Arrays

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Abstract

This paper introduces a new primitive data type, hierarchically tiled arrays (HTAs), which could be incorporated into conventional languages to facilitate parallel programming and programming for locality. It is argued that HTAs enable a natural representation for many algorithms with a high degree of locality. Also, the paper shows that, with HTAs, parallel computations and the associated communication operations can be expressed as array operations within single threaded programs. This, is then argued, facilitates reasoning about the resulting programs and stimulates the development of code that is highly readable and easy to modify. The new data type is illustrated using examples written in an extended version of MATLAB.