Analysis, transformation and optimization for high performance parallel computing

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Abstract
This book studies hardware and software specifications at algorithmic level from the point of measuring and extracting the potential parallelism hidden in them. It investigates the possibilities of using this parallelism for the synthesis and optimization of high performance software and hardware implementations. The basic single-block flow model is a result of the algorithm transformation, and is a basis for developing efficient methods of synthesis and optimization of parallel implementations. It supports the generation and optimization of computational pipelines and concurrent net algorithms, which lead to higher performances of the computing systems. This book is useful in training of scientific researchers and graduate students. It is also useful for teaching students and undergraduates in computer science at universities.

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After reading this book, engineers will understand the processes, methodologies, and best practices needed for the development of applications for high-performance embedded computing systems. Year: 2017. The required skills are transversal to various areas encompassing algorithm analysis, target architectures, compiler transformations, and optimizations. Topics related to parallel computing and reconfigurable computing are seen as complementary, and readers with those skills are able to work on more advanced HPEC projects and/or to focus their work on specific technologies. 9. 10. Parallel Computing – It is the use of multiple processing elements simultaneously for solving any problem. Problems are broken down into instructions and are solved concurrently as each resource which has been applied to work is working at the same time. Advantages of Parallel Computing over Serial Computing are as follows: It saves time and money as many resources working together will reduce the time and cut potential costs. It can be impractical to solve larger problems on Serial Computing. It can take advantage of non-local resources when the local resources are finite. Serial Computing ‘w High-performance computing is becoming increasingly important in all scientific disciplines. High-performance computing (HPC) is used in applications such as oil exploration, drug development, weather prediction, and for other scientific computing needs. In this chapter, we provide information on switch fabrics used for HPC. ECL provides a collection of primitive capabilities that are typical for data analysis, such as sorting, aggregation, deduplication, as well as others. With ECL, the declarative model is the source of task parallelism, in which discrete and small units of work can be farmed out to waiting processing units in a cluster and executed in parallel. Is High Performance Computing Language Dependent? 159. 7.1 Introduction. Kevin Wadleigh works in the Mathematical Software Group of Hewlett-Packard Company developing and optimizing high performance algorithms for Hewlett-Packard’s mathematical library MLIB. A substantial portion of his time is spent working with independent software vendors optimizing their algorithms for Hewlett-Packard high performance computers. Kevin holds a Bachelor of Science degree in Mathematics from Oral Roberts University, a Master of Science in Applied Mathematics from the University of Tulsa and a Doctor of Education in Mathematics from Oklahoma State University.