Using OpenMP: Portable Shared Memory Parallel Programming (Scientific And Engineering Computation)

Synopsis

"I hope that readers will learn to use the full expressibility and power of OpenMP. This book should provide an excellent introduction to beginners, and the performance section should help those with some experience who want to push OpenMP to its limits." -- from the foreword by David J. Kuck, Intel Fellow, Software and Solutions Group, and Director, Parallel and Distributed Solutions, Intel CorporationOpenMP, a portable programming interface for shared memory parallel computers, was adopted as an informal standard in 1997 by computer scientists who wanted a unified model on which to base programs for shared memory systems. OpenMP is now used by many software developers; it offers significant advantages over both hand-threading and MPI. Using OpenMP offers a comprehensive introduction to parallel programming concepts and a detailed overview of OpenMP. Using OpenMP discusses hardware developments, describes where OpenMP is applicable, and compares OpenMP to other programming interfaces for shared and distributed memory parallel architectures. It introduces the individual features of OpenMP, provides many source code examples that demonstrate the use and functionality of the language constructs, and offers tips on writing an efficient OpenMP program. It describes how to use OpenMP in full-scale applications to achieve high performance on large-scale architectures, discussing several case studies in detail, and offers in-depth troubleshooting advice. It explains how OpenMP is translated into explicitly multithreaded code, providing a valuable behind-the-scenes account of OpenMP program performance. Finally, Using OpenMP considers trends likely to influence OpenMP development, offering a glimpse of the possibilities of a future OpenMP 3.0 from the vantage point of the current OpenMP 2.5. With multicore computer use increasing, the need for a comprehensive introduction and overview of the standard interface is clear. Using OpenMP provides an essential reference not only for students at both undergraduate and graduate levels but also for professionals who intend to parallelize existing codes or develop new parallel programs for shared memory computer architectures.

Book Information

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Customer Reviews

The OpenMP specification can be downloaded from the web, but it is not a really a good starting point for learning how to write real programs using the OpenMP constructs. However, this book does have a lot of material that you really don't need just to write programs. This extra information is in the form of context and information on parallel computing in general, since this book is really intended to double as a textbook and a practical guide for professionals. The following briefly describes the contents.Chapter one contains some background information on OpenMP and its applications. You can skip it if you are not interested in this or already know the material.Chapter two is a brief overview of the features of OpenMP at a high level. It discusses how OpenMP deals with problems that come from the complex memory hierarchy that exists on modern computers.Chapter three is a good starting point if you know you need OpenMP, know why you need it, and just need to get something going. It discusses a complete OpenMP program in both C and Fortran that uses a couple of OpenMP's most widely used features, plus it explains the basics of the OpenMP syntax. The problem discussed is specifically how to perform a matrix times a vector operation in parallel.Chapter four is a more complete overview of the OpenMP programming paradigm and it contains many example programs. First the most widely used features are introduced with a focus on those features that enable work to be shared among multiple threads. The scope narrows until the author is down to some of OpenMP's less widely known features. The programs start simple and get more complex as the chapter progresses, always staying within the field of scientific computing.

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