Parallel Science and Engineering Applications: The Charm++ Approach (Series in Computational Physics)

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Developed in the context of science and engineering applications, with each abstraction motivated by and further honed by specific application needs, Charm++ is a production-quality system that runs on almost all parallel computers available. **Parallel Science and Engineering Applications: The Charm++ Approach** surveys a diverse and scalable collection of science and engineering applications, most of which are used regularly on supercomputers by scientists to further their research.

After a brief introduction to Charm++, the book presents several parallel CSE codes written in the Charm++ model, along with their underlying scientific and numerical formulations, explaining their parallelization strategies and parallel performance. These chapters demonstrate the versatility of Charm++ and its utility for a wide variety of applications, including molecular dynamics, cosmology, quantum chemistry, fracture simulations, agent-based simulations, and weather modeling.

The book is intended for a wide audience of people in academia and industry associated with the field of high performance computing. Application developers and users will find this book interesting as an introduction to Charm++ and to developing parallel applications in an asynchronous message-driven model. It will also be a useful reference for undergraduate and graduate courses in computer science and other engineering disciplines. Courses devoted to parallel programming and writing of parallel CSE applications will benefit from this book.

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