With recent changes in multicore and general-purpose computing on graphics processing units, the way parallel computers are used and programmed has drastically changed. It is important to provide a comprehensive study on how to use such machines written by specialists of the domain. The book provides recent research results in high-performance computing on complex environments, information on how to efficiently exploit heterogeneous and hierarchical architectures and distributed systems, detailed studies on the impact of applying heterogeneous computing practices to real problems, and applications varying from remote sensing to tomography. The content spans topics such as Numerical Analysis for Heterogeneous and Multicore Systems; Optimization of Communication for High Performance Heterogeneous and Hierarchical Platforms; Efficient Exploitation of Heterogeneous Architectures, Hybrid CPU +GPU, and Distributed Systems; Energy Awareness in High-Performance Computing; and Applications of Heterogeneous High-Performance Computing.

- Covers cutting-edge research in HPC on complex environments, following an international collaboration of members of the ComplexHPC

- Explains how to efficiently exploit heterogeneous and hierarchical architectures and distributed systems

- Twenty-three chapters and over 100 illustrations cover domains such as numerical analysis, communication and storage, applications, GPUs and accelerators, and energy efficiency
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