

Preface

For the next decade, Moore's Law is still going to bring higher transistor densities allowing Billions of transistors to be integrated on a single chip. However, it became more and more obvious that exploiting significant amounts of instruction-level parallelism with deeper pipelines and more aggressive wide-issue superscalar techniques, and using most of the transistor budget for large on-chip caches has come to an dead end. Especially, scaling performance with higher clock frequencies is getting more and more difficult because of heat dissipation problems and too high energy consumption. The latter is not only a technical problem for mobile systems, but is even going to become a severe problem for computing centers because high energy consumption leads to significant cost factors in the budget. Improving performance can only be achieved by exploiting parallelism on all system levels.

Therefore, for high-performance computing systems, for high-end servers as well or for embedded systems, a massive paradigm shift towards multicore architectures is taking place. Integrating multiple cores on a single chip leads to a significant performance improvement without increasing the clock frequency. Multicore architectures offer a better performance/Watt ratio than single core architectures with similar performance.

Combining multicore and coprocessor technology promise extreme computing power for highly CPU-time-consuming applications in scientific computing as well as for special purpose applications in the embedded area. Especially FPGA-based accelerators not only offer the opportunity to speedup an application by implementing their compute-intensive kernels into hardware but also to adapt to the dynamical behavior of an application.

The purpose of this book is to evaluate strategies for future system design in MPSoC architectures. Both aspects, hardware design and tool-integration into existing development tools will be discussed. Also the novel trends in MPSoC combined with reconfigurable architectures are a topic in this book. The main emphasis is on architectures, design-flow, tool-development, applications and system design.

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Karlsruhe, Germany

Jürgen Becker
Michael Hübner



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