

Keynote Speaker

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The Quantum Step in Parallel Execution through Dynamic Adaptive Runtime and Programming Strategies

Abstract:

With the technology asymptote of nano-scale and the approaching end of Moore's Law, continued performance gains must rely on other than incremental extensions of conventional practices and exploit innovations in execution concepts, system (hardware and software) structures, and operational methods. An expanding community of researchers and developers are actively exploring the quantum step of dynamic adaptive computing techniques for significant gains in efficiency and scalability for performance advantage. These approaches have severally involved runtime control, programming models, compiler enhancements, and even architecture extensions to break the bottlenecks of blocking due to overheads, contention, latencies and starvation due to static supervision. Instead, these new tools and environments enable dynamic resource management and task scheduling with various degrees of introspection including parallelism discovery from extracted and exploited from meta-data. But this inchoate revolution is challenged in an exciting way with a diversity of open issues, wide variation in integrated semantics, and alternatives of implementation mechanisms. Perhaps most importantly is that the opportunity for advantage has still yet to be proven or rigorously bounded. This presentation will provide a discussion of the domain of choices and questions that this pioneering discipline is investigating and the cross-cutting system solutions that have yet to be determined. Specific examples will be drawn from the speakers experiences with HPX-5 runtime but references to the broad range of endeavors will be included. Questions from the audience are welcome and encouraged throughout this address.