Executive Summary

Several organizations have made significant commitments to building and deploying large-scale systems based on accelerator technologies (e.g., Cell and GPUs). While there are clear performance benefits to be gained by incorporating accelerator technologies in large-scale systems, realizing these benefits requires a great deal of effort on the part of application teams. Moreover, it is not clear that this effort will result in codes that continue to perform well on future systems, i.e., application teams may find that the effort they invested to gain performance on next generation, accelerator-based systems needs to be un-done or re-done to maintain performance on future systems.

The roadmap described in this document is intended to serve two purposes: first, to define the technologies that need to be developed to support application teams in their efforts to realize the performance benefits offered by large scale, accelerator based systems; and second, to provide application development teams with some of the information needed ensure that their efforts to gain performance on accelerator based systems will endure.

The roadmap was developed during an open workshop that was sponsored by the US Department of Energy, Office of Advanced Scientific Computing and coordinated by the Organizing Committee of the Hybrid-Multicore Consortium (HMC).
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San Francisco Airport
1333 Bayshore Hwy
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The roadmap does not provide a timeline for the development of the needed technologies, nor does it provide an ordered list of the priority that should be given to the needed technologies. Developing an linear order these technologies is a complex decision based on many external factors, e.g., availability of funding or individual/team interest in specific technologies, that are beyond the scope of this document.

Instead, the roadmap presents descriptions of technologies that are needed along with a grading of these technologies. The grading is based on five dimensions: **urgency** (how soon is the technology needed), **duration** (how long will the technology be applicable), **responsiveness** (how well will the technology development respond to increased funding), **applicability** (how broadly applicable is the technology), and **timeline** (how soon will the technology provide support for application teams).

The technologies identified in the roadmap and the grading of these technologies represent the general sense of the community. Significant differences of opinion that were expressed during the workshop are captured in the discussion of the technologies.

Need a summary of the grades