ABSTRACT
Since early 2000, we have been experiencing two very important developments in computing. One is that a tremendous amount of resources have been invested into innovative applications such as first-principle based models, deep learning and cognitive computing. Many application domains are questioning the conventional “it is too expensive” thinking that led to inaccuracies and missed opportunities. The other part is that the industry has been taking a technological path where application performance and power efficiency vary by more than two orders of magnitude depending on their parallelism, heterogeneity, and locality. Today, most of the top supercomputers in the world are heterogeneous parallel computing systems. New standards such as the Heterogeneous Systems Architecture (HSA) are emerging to facilitate software development. Much has been and needs to be learned about algorithms, languages, compilers and hardware architecture in these movements. What are the applications that continue to drive the technology development? How hard is it to program these systems today? How will we be programming these systems in the future? How will innovations in memory and storage devices present further opportunities and challenges? What is the impact of long-term software engineering cost on applications? In this talk, I will present some research opportunities and challenges that are brought about by this perfect storm.

BIO
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