

***Abstract:***

To reach the goal of Exascale computers, there must be major changes to the applications, system software, architectures, packaging and IC fabrication. Each of these changes will have substantial performance, cost, power, energy and reliability tradeoffs. Because it is impractical to construct prototype systems for evaluation at the desired scale, we must turn to analytical models and simulation to guide design decisions. Fundamental technology and economic changes have reopened possibilities for true codesign, where applications can have substantial effects on the hardware, and the hardware can better inform the application.