

## Compute memory trends: from application requirements to architectural needs

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Large-scale High-Performance Computers have had a significant impact on the design of processor, memory and network technologies for almost seventy years. In many cases HPC users are early adopters of novel hardware designs in an effort to find the best combination of performance, cost and capability. Our community focus today on Exascale-class systems, which will provide greater than 50 times increase in performance, is no exception and is pushing the boundaries of modern computing architecture. In this talk I will give an overview of our requirements for the systems we are currently deploying and intend to deploy in the coming years, explaining how some of our application memory access patterns create challenges for both memory latency and bandwidth. Towards the end of the talk I will also discuss node concepts being evaluated for HPC systems and use these to initiate a discussion of potential benefits and costs as we move into the Exascale computing era and beyond.

Si Hammond is a Principal Member of the Technical Staff in the Scalable Computer Architectures group at Sandia National Laboratories. In the last ten years, his career has focused on application porting, optimization and performance analysis for high-end HPC systems in support of the Department of Energy's (DOE) Exascale Computing Project. During that time he was the Hardware Evaluation Technical Lead for the DOE and a technical reviewer for the several NNSA/ASC supercomputing deployments, as well as the application deployment lead for Sandia's Vanguard program, deploying, Astra, the world's first petascale Arm system.