

HPC: Learn from the Past, Build the Future

Daniel Reed

dan.reed@utah.edu

www.hpcdan.org

Presidential Professor

Scientific Computing and Imaging Institute

University of Utah

The philosopher, George Santayana, famously said, “Those who cannot remember the past are condemned to repeat it.” It is a wise observation, one whose truth has been repeatedly demonstrated. It is no less true in computing. If there is any enduring lesson in computing, it is the constancy of change, some predictable and some unexpected, that repeatedly disrupts the status quo. The era of bespoke supercomputers, whose development shaped the entire computing industry, gave way to the commodity PC ecosystem, where the “attack of the killer micros” birthed large-scale HPC clusters, which were later augmented with GPU accelerators. Although we rode the PC wave for over twenty years, radical change is again afoot.

Today’s computing innovation is increasingly dictated by the demands of the hyperscaler cloud and AI markets, tempered by the technical and financial challenges of a post-Moore semiconductor environment, all within a shifting geopolitical landscape. The message is clear – we must again adapt, while recognizing that our direct market influence has waned. Make no mistake, there are promising ways forward, though they likely require different technical approaches and different mindsets. This talk will draw some perspectives from the history of computing and offer some thoughts on possible futures shaped by technology – semiconductors, AI, biology, mathematics, and software – and shaped by geopolitical policy and economics.