

The Future of Computing: From ExaFLOPS to Exotic Processor Technologies

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The field of high-performance computing (HPC) or supercomputing refers to researching, building and using computing systems that are orders of magnitude faster than our common systems. The top supercomputers today can perform in the ExaFLOP range, or over a million trillion (a billion billion) calculations every second. The USA has already deployed one of those, Frontier. Many countries have joined this race and it is even believed that other countries may also have some Exascale supercomputers that are not public. The traditional CMOS technology that has brought all this progress is unfortunately facing many challenges. I will unlikely provide the next x1000 level of performance as it did for decades. In this talk we examine the historic progress in HPC over the years and try to understand the related technology trends. We also examine some of the exotic technology trends that may help shape up Post-Moore's law era of computing.

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Tarek El-Ghazawi is Professor and Chair of the Department of Electrical and Computer Engineering at The George Washington University, where he led the university-wide Strategic Academic Program in High-Performance Computing. His research interests include high-performance computing, computer architectures, reconfigurable and embedded computing, and nanophotonic based computing. El-Ghazawi has over 300 refereed research publications and his work was funded extensively by such government organizations like DARPA, NSF, AFOSR, NASA, DoD and industrial organizations such as Intel, AMD, HP, SGI. Dr. ElGhazawi has served in many editorial roles including an Associate Editor for the IEEE Transactions Parallel and Distributed Computing and the IEEE Transaction on Computers. Professor El-Ghazawi is a Fellow of the IEEE and was selected as a Research Faculty Fellow of the IBM Center for Advanced Studies, Toronto. He was also awarded the Alexander von Humboldt Research Award, the Alexander Schwarzkopf Prize for Technical Innovation, The IEEE Outstanding Leadership Award by the IEEE Technical Committee on Scalable Computing, and the GW SEAS Distinguished Researcher Award. El-Ghazawi had served as a senior U.S. Fulbright Scholar, was selected an IEEE Computer Society Distinguished Visitors Program Speaker and a Distinguished Visiting Fellow by the U.K. Royal Academy of Engineering.