



Exascale and Beyond: Computing in the Day After Tomorrow

Prof. Brian J. d'Auriol

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Exascale computing (10^{18}) represents the next supercomputing milestone which is expected to be achieved by 2019/20. Much of the present-day petascale computing relies on commodity components augmented by hardware accelerators and fast message-passing networks some of which may incorporate opto-electronic components; but such may not scale up to support faster computing environments. In the near future, computing technologies based on present-day supercomputing vendor development infrastructures augmented by intensive research and development of all aspects of an exascale computing ecosystem are under development for deployment aimed at computational intensive applications. Yet, convergence technologies such as optical and nano-optical are rapidly maturing and are poised to offer exciting alternatives by the next decade. At the same time, new types of big data information stream-based applications will need to be supported as information societies continue to grow and expand.

This talk introduces the OLARPBS exascale bandwidth all-optical parallel computing model as a viable alternative to support exascale and beyond computing in the next decade with specific applications to big data information stream-based applications. Unique features of this model include the elimination of the traditional separation of computational and communication phases thereby also eliminating issues with message-passing, optical registers as the primary data storage memory thereby also introducing both spatial and temporal positioning of data, reconfigurable interconnections thereby also increasing flexibility while decreasing latency of communications and intrinsic physical layout geometries. Architecture, organization, operative aspects, algorithm design and performance along with future research and development requirements of this novel model for the future are discussed in this talk.

Brian J. d'Auriol received the BSc(CS) and Ph.D. degrees from the University of New Brunswick (Canada) in 1988 and 1995, respectively. He has held various research and professorial appointments and positions in the U.S. (Universities of Texas at El Paso, Akron, and Wright State), Canada (Universities of Manitoba and New Brunswick), and Korea (SUNY, Kyung Hee University) and published over 90 peer-reviewed papers in international journals and conferences. His research is described as visual enabled computing and includes: insightful serviceable visualizations aimed at understanding and knowledge, via learning, insight, impression and emotion to facilitate creativity and decision-making; exascale and beyond bandwidth optical conduit-based parallel computing; and design of a personal visualization assistant which is a big data application.



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