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## **The Dawning of the Neo-Digital Age in the Era of Nano-Scale Technology**

*Wednesday, 6 December 2017 18:00 (45 minutes)*

This is the Dawning of the Neo-Digital Age; a unique period brought on by the end of Moore's Law as semiconductor fabrication enters its final phase with nano-scale feature size. The Neo-Digital Age also corresponds to a time when energy constraints at the chip level and the system level bound power consumption and indirectly the clock rate of device logic. It will prove to be an epoch of innovation, in part out of desperation to achieve yet further significance performance gains even with the emerging barriers, but also through an explosion of creativity in computer architecture not seen since the 1980s. Ideas are already percolating and being considered by academia, industry, and even industry who has held fast to approaches based on incremental changes to otherwise conventional methodologies. Such currently pursued strategies include neuromorphic, quantum computing, cellular automata and others. Some of these have their roots in research of prior decades. This plenary presentation will discuss in some detail one possible neo-digital class of computing, the Continuum Computer Architecture, and at greater depth one specific example being explored, the Simultac Fonton. Analysis suggests that the Simultac non-von Neumann architecture using today's semiconductor technology could deliver a peak exaflops performance at 10% the expected cost of a conventional derivative machine at exascale, 10% power consumption, and 1% size. The Simultac use of dynamic adaptive introspection and the HPX+ runtime system software support based on the ParalleX execution model (previously discussed) will significantly enhance efficiency, scalability, and user productivity. Questions will be encouraged by participants throughout the presentation as well as the Q&A session at the end.

### **HPC content**

Included in abstract

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