Jon Summers, University of Lulea

Reviewing the relationship between information and energy, and the physical limits of computation

Abstract:

Turning the globe in the 21st century relies heavily on infrastructure that manages, stores, processes, transacts, manipulates and transmits digital information within controlled, protected, resilient and reliable operating spaces maintaining constant availability. The link between energy and information started in 1948 with the work by the father of the digital age, Claude Shannon. In 1961 the German born physicist, Rolf Landauer, whilst working for IBM wrote a paper on “Irreversibility and Heat Generation in the Computing Process." Landauer’s work encompassed some theories behind the physical limits of processing digital information in terms of the thermodynamics. Reviewing the historical perspectives of computation together with the broad range of technologies available for processing digital information this presentation will take a naïve look at the future in terms of the required energy and the physical limits in computation.

Speaker biography:

Jon Summers is Scientific Leader in Data Centres at Research Institutes of Sweden (RISE), Adjunct Professor in Fluid Mechanics at Lulea Technical University in Sweden and a senior academic from the Institute of Thermofluids at the University of Leeds in the UK. During the last 25 years, he has worked on a number of government and industry funded projects which have required different levels of computational modelling. Having built and managed compute clusters to support many research projects, Jon chaired the High Performance Computing User Group for 20 years at the University of Leeds. In the last eight years Jon’s research has focused on a range of thermal management and energy flow projects within the Data Centre, Heating Ventilation and Air Conditioning and industrial sectors. Since early 2013 Jon has been involved in liquid cooled IT research projects, focussing both at the data centre and the microprocessor scales, which has been further transformed by the opportunities in integrated digital infrastructure research at RISE. As a result of this activity around the thermal and energy management of microelectronic systems, Jon has developed an interest of the physical limits of digital processes, which has led to many invited talks to the data centre community.