Título: System-Level Design of Energy-Proportional Many-Core Servers for Exascale Computing

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Descripción:

Continuous advances in manufacturing technologies are enabling the development of more powerful and compact high-performance computing (HPC) servers made of many-core processing architectures. However, this soaring demand for computing power in the last years has grown faster than semiconductor technology evolution can sustain, and has produced as collateral undesirable effect a surge in power consumption and heat density in these new HPC servers, which result on significant performance degradation. In this keynote, I advocate to completely revise the current HPC server architectures. In particular, inspired by the mammalian brain, I propose to design a disruptive three-dimensional (3D) computing server architecture that overcomes the prevailing worst-case power and cooling provisioning paradigm for servers. This new 3D server design champions a new system-level thermal modeling, which can be used by novel proactive energy controllers for detailed heat and energy management in many-core HPC servers, thanks to micro-scale liquid cooling. Then, I will show the impact of new near-threshold computing architectures on server design, and how we can integrate new on-chip microfluidic fuel cell networks to enable energy-scalability in future generations of many-core HPC servers targeting Exascale computing.

Biografía:

David Atienza is Associate Professor of Electrical and Computer Engineering and Director of the Embedded Systems Laboratory (ESL) at EPFL, Switzerland. He received his MSc and PhD degrees in Computer Science and Engineering from UCM (Spain) and IMEC (Belgium). His research interests focus on system-level design methodologiesfor energy-efficient multi-processor system-on-chip architectures (MPSoC) and next-generation embedded systems. In these fields, he is co-author of more than 250 publications, seven patents, and received several best paper awards in top conferences. He was the Technical Program Chair of DATE 2015 and General Chair of DATE 2017. He received an ERC Consolidator Grant in 2016, the IEEE CEDA Early Career Award in 2013, the ACM SIGDA Outstanding New Faculty Award in 2012, and a Faculty Award from Sun Labs at Oracle in 2011. He was Distinguished Lecturer of IEEE CASS in 2014 and 2015. He is a senior member of ACM and an IEEE Fellow.