

Towards greener and smarter personal computers



Energy is as important as bread and butter for today's tech-savvy society: we need power to run the world, from charging our laptops, mobile phones, electric appliances, to large data centers. As the applications on these devices increase in complexity, connectivity, capabilities and functionality, they need more and more performance as well as more energy to run, in all levels. In addition, the applications are not running exclusively in one device, many of these applications have components running in different locations at the same time, from the handheld, to the corporate server as well as in the cloud. In the past, there were two ways to increase performance: increasing the clock frequency of the processor or improving the microarchitecture (microarchitecture studies how to construct and combine processor components). However, increasing the frequency as well as microarchitecture improvements result in significant power dissipation. Eventually these approaches hit what we term the "power wall". So greener solutions are needed.

To overcome these problems, we need new computing paradigms that are radically more energy efficient. The objective of the European project called ParaDime ("Parallel Distributed Infrastructure for Minimization of Energy"), is to attack the power-wall problem by radical software-hardware techniques that are driven by future circuit and device characteristics on the hardware side, and by a programming model based on message passing, and in a smart scheduling of the workload of data centers on the software side. Launched in September 2012, this three year research project has a total budget of 3,2M€, including 2,5M€ funding from the European Community's Seventh Framework Programme. Coordinated by Barcelona Supercomputing Center (BSC), the national Spanish supercomputing center, ParaDIME brings together five leading partners: IMEC (Belgium), Technische Universität Dresden (Germany), Université de Neuchâtel (Switzerland) and AoTerra GmbH (Germany) and BSC (Spain).

The ParaDime project aims to come up with a new hardware-software stack using heterogeneous processor architecture based on emerging device technologies, new programming model based on efficient message passing, new runtime system and also new scheduling system at data center level. Accordingly, ParaDime will conduct research on: smart data centers that power down servers according to demand, using an efficient message passing programming model, running in unsafe low power mode when is suitable, using accelerators extensively, and by aggressively utilizing emerging hardware.

"We have a holistic view to resolve the power wall problem, from devices to cloud computing, with all levels of the stack operating have operating synergistically", says Adrián Cristal, ParaDime Coordinator.

More information is available on page:

<http://www.paradime-project.eu/>

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Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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