European researchers simplify optimal software execution on complex electronics

This week marks the completion of the SAVE project, which challenged a team of engineers and researchers to explore how complex hardware systems can more efficiently execute data intensive applications. SAVE has led to a number of innovations in hardware, software and operating system (OS) components. When integrated together, they can reduce application deployment costs and maximize usage of heterogeneous system computing units, resulting in energy efficiency being improved by up to 20%.

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A range of complex electronic systems stands to benefit from these innovations, including computer data centers, consumer electronics, automotive products and complex industrial electronics.

The computing units can be on chip, for example central processing units (CPUs) ranging from small and low-power to high-end and efficient, graphics processing units (GPUs), and dedicated accelerators. Alternatively, the units can be off chip, such as racks of dedicated accelerators or field-programmable gate arrays (FPGAs).
The prototyped technologies will enable performance and energy-efficiency gains in high-performance computing (HPC) and embedded heterogeneous systems.

Key achievements include:
• Platform behavior monitoring and task dispatching hardware and software: the first toolset closely tracks the performance and use rate of the various computing units available in the heterogeneous systems. The second toolset decides which computing units are best suited for the job.
• Just-in-Time compilation technology: using SAVE technologies, at runtime, a single application-code representation is optimized to the many possible hardware targets

of the platform: CPUs, GPUs, accelerators, FPGAs.
• Hardware and software virtualization technologies: these technologies efficiently expose the dedicated processing engines to the many virtual machines (VM) running on these systems. The teams successfully prototyped virtualized GPUs, virtualized FPGA-based data-flow engines (DFEs), and virtualized application-specific accelerators.

About SAVE
These innovations are the culmination of three years of collaborative research by a team of three academic and four industrial partners. The international team worked together to achieve dynamic optimization of workload assignments across multicore system computation units, operated simultaneously from several virtualized operating systems. These developments lay the foundations for industrial partners to further optimize ever more complex systems, including HPC systems for finance applications and automotive embedded systems.
Funded by the European Commission's Seventh Framework Programme (FP7), the project was launched on 01 September 2013, under the project name SAVE: 'Self-Adaptive Virtualization-Aware High-Performance/Low-Energy Heterogeneous System Architectures'.

SAVE project website: www.fp7-save.eu/

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Parole chiave

hardware | software | operating systems | energy efficiency | complex electronics | CPU | GPU | FPGA | HPC | heterogeneous systems | accelerators | compilation

Paesi

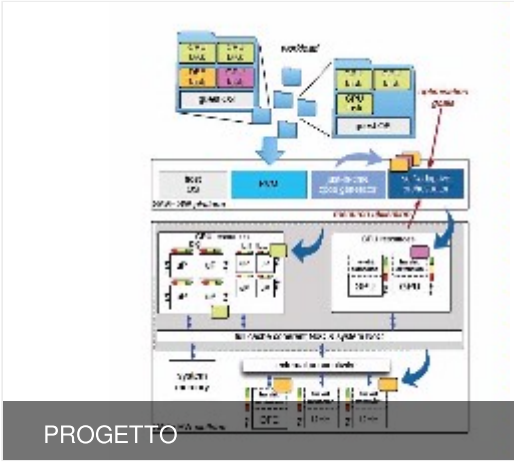
Germany, Greece, France, Italy, United Kingdom

Contributore

Contributo di

Barcelona Supercomputing Center
Sito web

Progetti correlati



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SAVE

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