

## [BSC, leader of programming models in the revolutionary AXIOM project](#)



Three members of the Barcelona Supercomputing Center (BSC) participated in the kick-off meeting of [AXIOM](#), a project funded by the European Commission aimed at building a revolutionary embedded computer to address the needs of current and future intelligent systems. In this meeting, the BSC members presented the objectives and tasks of programming models' work package.

The main goal of AXIOM is to build cutting-edge technologies in order to provide good performance over energy-consumption ratios and easy parallel programmability. SECO, the partner in charge of actually building the system, is working with the consortium to address these expectations designing a nimble, scalable, powerful I/O module based on FPGA technology, in the context of so-called "Smart Cyber-Physical Systems" (Smart CPS). The project is one of the few that has been funded among over 140 projects by the European Commission's Horizon 2020 programme, with about 4 million euros in 3 years.

"From the Programming Models Team at BSC we will contribute with our OmpSs programming model, performance prediction and analysis tools and our experience to easy the programmability of heterogeneous systems based on FPGAs and embedded technologies", says Xavier Martorell, Parallel Programming Models Group Manager at BSC.

Coordinated by the University of Siena (Italy), the consortium aggregates research centers - such as Barcelona Supercomputing Center and FORTH - and trailblazer industrial partners like EVIDENCE, Herta Security, SECO and VIMAR. The project relies on the consolidated expertise of the University of Siena in Computer Architecture and Interaction Design and the solid know-how of SECO in board design. It is worth

noting that previous experimentations in the Computer Architecture field of SECO, a top global leader in embedded technology, with the University of Siena finally led to [UDOO](#), the first world-famous single-board computer integrating both a powerful ARM Quad Core and an Arduino-compatible microcontroller. The expertise of Barcelona Supercomputing Center in High Performance Computing (HPC) provides also fundamental contributions such as an easier programmability and acceleration tools, widening the area of research in the direction to low-consumption, highly efficient supercomputers. The partner FORTH will be in charge of developing the interconnection, while EVIDENCE will take care to integrate real-time management, given its recent success in integrating the Earliest Deadline First (EDF) real-time scheduling algorithm in Linux 3.14. But overall EVIDENCE will provide a low-cost and efficient solution for work balancing across distributed systems.

As usual in hardware and software development, there will be also test scenarios to validate the achievements. Video-Surveillance, claimed as “The Biggest Data” among Big Data, and Home Automation have been chosen as test benches. Herta Security is the interested partner for Smart Video-Surveillance, while VIMAR will focus on designing a domotic central unit, scalable and suitable for future applications with the municipalities.

The current solutions to provide enough computational power are based on multi-core architectures, while GPUs and FPGAs are claimed as the most energy--efficient. In order to fulfil the goal, the AXIOM project is analyzing both ARM multi-cores, common in mobile devices, and FPGA accelerators, with an open-source approach and a particular focus on scalability, real-time usability and easy-programmability. The first kick-off meeting has therefore investigated and defined a detailed road map to achieve the goal.

More information about the project on <http://www.axiom-project.eu>

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**Source URL (retrieved on 24 Dic 2024 - 18:05):** <https://www.bsc.es/es/news/bsc-news/bsc-leader-programming-models-the-revolutionary-axiom-project>