



## High-Performance Embedded Architecture and Compilation network of excellence

### Publishable final activity report

The HiPEAC network of excellence groups a few hundred European researchers active in the domain of processor architecture and compilers for high performance embedded systems. In the period 2004-2008, the network succeeded in

1. creating a visible and integrated computing systems community which proved to be able to impact the research domain;
2. steering academic research efforts towards industry-relevant or fundamental scientific issues; establishing tight relationships with European industry;
3. making the community more reactive to novel issues and approaches and coordinating its efforts;
4. stimulating cooperation between processor architects and compiler developers.

The HiPEAC consortium is composed of 14 academic and industry partners. On top of these, 79 additional institutions are member of HiPEAC. The HiPEAC membership entitles members to benefit from the HiPEAC resources like research cluster funding, travel grants to excellent conferences, company internships, student grants for the summer school and for the conference.

### Main achievements

HiPEAC has created a very visible HiPEAC brand. It is fair to say that every active professional in the high-performance and embedded computing domain knows HiPEAC through its conference, summer school, journal, newsletter, industrial workshops, cluster meetings, ... HiPEAC has definitely created an identity for the European computing systems community.

HiPEAC created a networking place for European researchers in computing systems. Through its cluster mechanism, HiPEAC members and students could set up small collaborative projects across Europe. Over the four years of the project, 81 clusters for a total of € 800.000 have been approved by the steering committee. In total, 28 research clusters involved company researchers. On top of this, about €1.100.000 has been invested in fellowships and internships, resulting in 245 scientific articles published under the HiPEAC label during the last year of HiPEAC.

HiPEAC tightened the links between academia and industry. Twice a year, the HiPEAC community has organized a three day meeting at a HiPEAC company site. The purpose of the HiPEAC industrial workshops was to let academic researchers in Europe present their work on topics of interest to companies and vice versa. Industrial workshops were open to all European computing systems researchers, both HiPEAC and non HiPEAC members.

The HiPEAC community produced the HiPEAC roadmap. It concisely describes the key research challenges that need to be tackled in the coming decade, in order to achieve scalable performance in multi-core systems and to make them a practical mainstream technology for high-performance embedded systems. A total of 55 challenges are listed, which can serve as a valuable source of reference for researchers active in the field, help companies building their own R&D roadmap, and – although not intended as a tutorial document – it can even serve as an

introduction for scientists and professionals interested in learning about high-performance embedded architecture and compilation. The final version of HiPEAC roadmap, with the inputs from different stakeholders, was published in March 2008.

HiPEAC produced a common simulation and a common compilation platform, and involved both academy and industry participants in their development and implementation. These platforms have been adopted within the HiPEAC community, and have greatly facilitated research collaboration between partners. The simulation platform is called unisim ([www.unisim.org](http://www.unisim.org)), and the compilation platform is gcc for which a HiPEAC development branch was created. The impact of these platforms reach beyond HiPEAC. They have been serving as linchpins in other European projects like SARC, ACOTES and MILEPOST

HiPEAC has also been active in training and education. It broadcasted in total 29 web seminars to the HiPEAC community.

HiPEAC has organized four summer schools in L'Aquila, Italy, each time attracting 200 participants for a world-class summer school program. The HiPEAC Summer School (Advance Computer Architecture and Compilation for Embedded Systems, ACACES) succeeded in attracting a significant number of industry participants and senior HiPEAC members. Yearly, about 60 HiPEAC PhD students received a summer school grant.

HiPEAC created its own international conference that covers the topics of embedded processor architecture and compiler techniques. The HiPEAC conference and co-located events has been organized since 2006 and now regularly attracts 200 participants, making it a well-attended European conference. Extended versions of the best ranked articles from the conference are invited for publication in the HiPEAC journal. The HiPEAC journal is another outlet for research finding of the computing systems community in Europe.

The HiPEAC newsletter appears quarterly since January 2005, and it is one of the most important public communication channels of the network. About 700 hard copies are printed and mailed around the world to computing systems researchers.

The HiPEAC website is the indispensable central collaboration tool of the HiPEAC network. All processes are highly integrated and it is constantly updated and improved.

## **Conclusion**

The HiPEAC network of excellence has reshaped the computing systems community in Europe. It is now a structured and a visible community, ready to determine its own research agenda, to collaborate, and to tackle the research challenges ahead of us in the field of computing systems.



HiPEAC community

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