

Networking for high performance computing

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Credit: Luis Quintero from Pexels

From drug simulation to predicting tsunamis and sea vehicle tracking, high-performance computing has revolutionised the way companies and governments operate. Similarly, embedded computing has revolutionised the way we observe and control the physical world: GPS, cell phones, fly-by-wire, self-driving cars and robotics.

But the days of rapid [performance improvements](#) are coming to an end, the sticking point being [power efficiency](#). Preparing to tackle this challenge head-on, Europe has brought together more than 1200 [computing systems](#) researchers in one massive network.

The HiPEAC ('High Performance and Embedded Architecture and Compilation') Network of Excellence was first formed in 2004. It has been so successful in strengthening computing in Europe that it has had its mandate renewed twice.

HiPEAC was created to organise Europe's computing systems community. Today the principal research goal is getting energy-efficient and low-cost [computing technologies](#) into the full spectrum of devices and systems - from mobile and embedded systems to data centres and supercomputers. Increased collaboration between the different research groups working in this area will not only reduce the risk of duplicated research, but encourage knowledge-sharing.

HiPEAC stimulates innovation at all levels of the computing system stack, encouraging global optimization and creation of innovative products. Mastering all aspects of computing systems is key to efficient innovation and the creation of market value.

HiPEAC recently published a roadmap for computing systems of the future, identifying mobile, embedded and data centre computing as key strategic areas, and [energy consumption](#), system complexity and dependability as major challenges.

"The computing world currently faces technological limitations in nearly every area," explains HiPEAC coordinator Koen De Bosschere of Belgium's Ghent University. "We can no longer just increase the physical speed or ignore the [energy output](#) of computer systems. Technological limitations are preventing the seemingly effortless

performance increases of the past."

Meanwhile computing systems are being placed in ever larger and more intensive and critical roles.

Research backed by the network has already produced exciting results. The 2013 HiPEAC conference saw a demonstration of MPPA256 - the world's first supercomputer on a chip. The device comprises 256 computing cores (the units that read and execute instructions), and is expected to enable a new class of embedded and industrial applications in image and signal processing, control, communications and data security.

HiPEAC strengthens Europe's computing systems research community through training, internships, grants, sabbaticals, technology transfer and networking.

The annual conference has become the network's flagship event, tripling attendance between 2011 and 2012 and becoming the second-largest computing systems conference in Europe. The HiPEAC summer school is also recognised as having a significant impact. It brings together around 200 students and researchers from around the world each year.

The current HiPEAC is receiving EUR 3.8 million in EU funding for 2012-2015. The two previous editions received EUR 8.7 million between them.

More information: www.hipeac.net/

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