MONTBLANC – Scaling new heights of computing performance

Computers have been doubling in performance every two years for the last forty years but we are reaching the physical limits of what we can achieve with current semiconductor technology. An EU initiative for High Performance Computing (HPC) is looking to shake up the way in which computer processors are designed and made. The good news is that computers with higher performance will also lead to less power consumption; a win for computing and a win for the environment.

The MONTBLANC project brings together leading researchers from Spain, the UK, France, Italy and Germany with the aim of delivering supercomputers that could revolutionise the way we work. These new machines would be built around 'exascale processors' – processors that can carry out in the order of 10 to the power of 18 (1, followed by eighteen zeroes) operations a second. It's also some nine orders of magnitude faster than your current home or laptop computer.

"There are two things derived from exascale: It's not just solving new big problems, like simulating the human brain," says Alex Ramirez, coordinator of the Mont-Blanc project. "Maybe more important, is to enable wide accessibility to HPC in everyday life, such as having a supercomputer on every doctor's office for genome-based cancer diagnosis. The possibilities of that are huge."

More performance, less energy

As incredible as it may seem, these new processors won't just deliver higher performance – some nine orders of magnitude faster than your existing desktop or laptop processor – but they will also consume less energy. According to Mr Ramirez, the processors that the MONTBLANC project is using will consume between 15 and 30 times less energy that the systems we use today.

The trick is to switch away from the chips we use in our larger devices and to use much more efficient processors like the ones generally used in mobile phones and other small devices instead.

At present, billions of High Performance Computing cycles are offered as a service to businesses and researchers in manufacturing, pharmaceuticals and the financial services industries via the PRACE (Partnership for Advanced Computing in Europe) project. PRACE gives access to six high performance computing clusters that offer, between them, nearly 20 petaflops (20 quadrillion operations per second) of processing power. But, impressive as this is, the PRACE resources cannot meet the current demand for high performance computing from research and industry, and the available processing power it's still two orders of magnitude short of exascale processing.

"The demand for HPC resources is endless," says Dr Ramirez. "Currently there are more projects submitted to PRACE's quarterly calls than can be granted access. MONTBLANC aims at becoming an alternative HPC platform for PRACE and other HPC centres."

Building an 'Airbus for HPC'

In order to build this capacity, the EU has set up a public-private partnership (PPP) to support the development of HPC technologies: the European Technology Platform for High Performance Computing (ETP4HPC, (www.etp4hpc.eu)) is the private partner that joined forces with the Commission to set up this PPP in HPC.

Says Dr Ramirez: "The PPP in HPC offers the opportunity to increase collaboration with European HPC technology providers like European digital systems experts Bull and UK-based chip manufacturer ARM, and enables development of a European HPC ecosystem. It may be the first step towards something like Airbus for HPC, enabling Europe to become an HPC provider, from being an HPC consumer."

The MONTBLANC project is a cornerstone of this PPP, and the project partners intend to develop an exascale processor that will lead the world in efficient, high performance computing. "MONTBLANC will allow HPC centres to compute more with the same power, compute more in the same space, and compute more for less money," says Dr Ramirez.

Link to project's website:

- MONTBLANC-Project.eu

Other links:

- European Commission's Digital Agenda website

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