

EUROPEAN APPROACH TOWARDS ENERGY EFFICIENT HIGH PERFORMANCE COMPUTING

Mont-Blanc at ISC14



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Lesson learned from EU supercomputer prototypes



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Mont-Blanc collaborates with...



The specific goal of **NUMEXAS** is the development of numerical methods for multiphysics problems in engineering based on validated models that enable scaling to millions of cores along the complete simulation pipeline:

- parallel pre-processing and grid generation
- new numerical methods for parallel structured/unstructured multidisciplinary field solvers of high order
- optimum design of parallel solvers considering uncertainties
- parallel in-solver visualization and feature extraction

The major challenge in **NUMEXAS** will be the development of a new set of numerical methods and computer codes that will allow industries, governments and academia to routinely solve multidisciplinary large-scale class problems in applied sciences and engineering with high efficiency and simplicity. **NUMEXAS** strives to demonstrate good scalability of up to several tens of thousands of cores in practice and to predict the theoretical capability of significant further performance gains with even higher orders of numbers of cores.

www.numexas.eu



Message from the coordinator

Welcome to the fifth edition of the Mont-Blanc Newsletter, published shortly after the 2014 edition of the International Supercomputing Conference (ISC14) in Leipzig.

As you may have heard already, I will soon be leaving Barcelona Supercomputing Center to continue my research career in Silicon Valley, California. It has been a great pleasure to be a part of the Mont-Blanc project; it has been an amazing project so far, and I have enjoyed it greatly. We have done a lot more than anyone could have expected in a mere FP7 project, and there is still a lot more that Mont-Blanc can do. I firmly expect to keep hearing great things about Mont-Blanc.

The project coordinator role will be transferred to Filippo Mantovani, who has been working by my side on Mont-Blanc for the past eight months. I hope you’ll join us in welcoming Filippo, who will now introduce the latest Mont-Blanc developments.

My sincere thanks to Alex for his kind introduction. It is a great honour for me to work on the Mont-Blanc project and I have learned from every single moment that I have spent with Alex. When I first joined the project I had responsibility for the Mont-Blanc prototype ecosystem, before increasingly becoming involved in all of the project’s challenges. I will do my best to promote, advance and coordinate our “crazy but great ideas”.

At the ISC14 exhibition, Mont-Blanc was featured in a joint booth with the other European projects responding to the challenges of the approaching exascale era: Deep/DeepER, Cresta, Numexas, Exa2CT and Epigram. Representing Mont-Blanc at the booth was a great experience: as it was the first time we had unveiled our current prototype, a huge number of people visited the booth. The interest of the visitors was consistently genuine, positive and enthusiastic, so I would like to take the opportunity to thank everyone who stopped by... [Read full article](#)

Alex Ramirez & Filippo Mantovani
Mont-Blanc Coordinators

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A second but far from negligible factor in the booth's success, in my opinion, was the strengthened collaboration between the European Exascale Projects: both in the booth and in the joint BoF session "The European Approach to Exascale", the projects demonstrated how they could join forces while taking different approaches in order to tackle the most important future computational challenges. Here I would like to stress that it is the different and interdisciplinary nature of the projects that made the booth and the joint activities really valuable. Thanks again to all partners in the Exascale European Projects.

As mentioned above, the current Mont-Blanc prototype has now been unveiled. The first 60 computational nodes are fully operational at Bull's compute facilities in France and can be accessed remotely. In addition to the "bigger brother" Mont-Blanc prototype, the ecosystem of small prototype clusters is growing: as well as the development installations (Arndale and Pedraforca), we have now clusters based on big.LITTLE architectures (Odroid and Arndale Octa) and one based on the brand new Nvidia Jetson K1. All these computational resources are available for project partners – but not exclusively. Over the last few months, we have been promoting the End-User Group, part of the project's dissemination strategy, which allows companies and academic institutions to access our prototypes. Once more, I invite anyone wishing to try out our embedded technology-based HPC platforms to contact us.

Thanks to all project followers and supporters!

Stay tuned for future Mont-Blanc news and look forward to seeing you at Supercomputing 2014 (SC14) in New Orleans, at booth #1039.

Alex Ramirez & Filippo Mantovani
Mont-Blanc Coordinators



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Alex Ramirez, Team Leader at Barcelona Supercomputing Center and coordinator of the Mont-Blanc project, was one of the panellists in the session “Future Supercomputing Directions”.

Meanwhile, Mont-Blanc participated in the Birds-of-Feather (BoF) session titled “**The European Approach to Exascale**”, organized in collaboration with the European exascale projects DEEP/DEEP-ER, CRESTA, EPIGRAM, EXA2CT and NUMEXAS. The session started with a short presentation of each project, followed by an open discussion about exascale challenges and open issues.

Alex Ramirez was also a panellist in the “Embedded Technologies for Supercomputers” BoF session, where different exponents of embedded computing environments presented their perspectives about the influence and impact of embedded technology on HPC.

On the 25th of June a BoF session titled “**Energy Efficiency Benchmarks & Metrics at Exascale: The Application Perspective**” took place at the ISC conference in Leipzig. Simon McIntosh-Smith, head of the Microelectronics Group at University of Bristol, presented in the context of Energy Efficient HPC Working Group about the techniques and the tools available to software developers to profile, understand and optimise the energy efficiency of their codes running at exascale. The session was also run by Natalie Bates from the Energy Efficient HPC working group, and Marie-Christine Sawley, from Intel’s Exascale lab in Paris.

Mont-Blanc also featured in the ISC14 exhibition, both at the exascale booth in partnership with related projects funded by the European Commission (EC) (number 833) and at booths run by project partners (Forschungszentrum Jülich GmbH -940-, LRZ -940-, Barcelona Supercomputing Center -825-, HLRS -940-, Cineca -921-, Bull -340-, Allinea -763-, CEA -725-).

The booth was visited by over 100 people interested in the project; all of them expressed positive and encouraging comments when they saw and touched the first blade of the Mont-Blanc prototype.



Lesson learned from EU supercomputer prototypes

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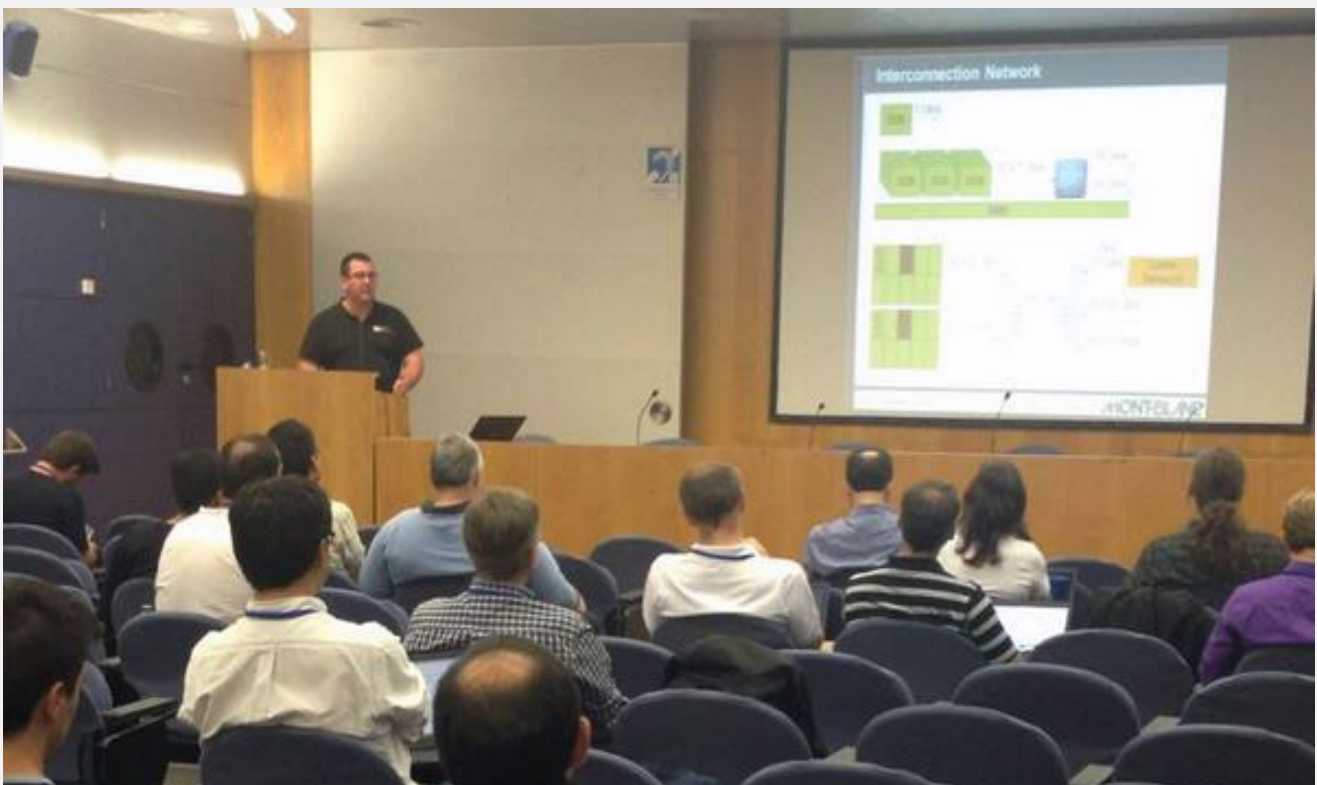
Understanding the growing relationship between computer architectures, new programming models and new cooling technologies in order to progress towards exascale supercomputing was identified as one of the new issues to be confronted.

Alex Ramirez, coordinator of the Mont-Blanc project and one of the speakers at the Workshop, explained that “supercomputing is no longer a matter of assembling shiny and powerful pieces of hardware. Rather, it involves several important aspects, from programming techniques to building structures for power-efficient computer facilities, crossing very different areas of science, computer science and engineering”. He also pointed out that “having experts from all over Europe in the same room, sharing their experiences in several of these fields, is a greatly enriching experience for the European supercomputer community”.

The output of the workshop will be a report summarizing the experiences and results of the most significant prototypes developed in Europe over the last few years. This report will be taken into account by the European Commission when drafting the Work Programme 2016-2017 as part of Horizon2020.

The workshop was hosted in Barcelona immediately prior to PRACEdays14, the first Scientific and Industrial Conference held by PRACE, themed “HPC for Innovation – when Science meets Industry”.

The presentations are available on the new Prototypes section of the Mont-Blanc website (<http://montblanc-project.eu/arm-based-platforms>) where you can also find details about prototypes being evaluated as part of the Mont-Blanc project.



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The EUG consists of representatives from various industries, including (but not limited to) automotive, energy, oil/gas, aerospace, pharmaceutical and financial.



The companies participating have an opportunity not only to test their applications on novel architectures but also to take part in the official training plan rolled out by the project.

- remote access to Mont-Blanc prototype platforms
- online documentation and training materials
- support for platform evaluation and performance analysis
- an invitation to join the Mont-Blanc training programme

A membership invitation can be requested from the EUG coordinator,
Marcin Ostasz (marcin.ostasz@bsc.es).

