MAKING SUPERCOMPUTING ACCESSIBLE TO ALL COMPANIES

Luxembourg's supercomputer MeluXina is among the 40 most powerful systems in the world. It is also unique in its strong focus on value to businesses. We spoke to Senior Solution Engineer Luis Vela at LuxProvide about solutions and services available for clients that want to harness the full power of data.

Dr Vela, why is supercomputing relevant for businesses?

Luis Vela: The amount of data available on the global level is growing exponentially. Almost all organisations also have an increasing quantity of data that, if not used, is not worth anything. However, the moment you start using it to discover trends, find patterns and extract insights, it can become an absolute gold mine. I doubt that any company will be really competitive in 15 years or so without having a strategy for using data.

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Data analytics can be done on an ordinary laptop, but when it is a matter of vast quantities of data, a supercomputer can run highly complex processes in a fraction of the time or perform analyses that are not feasible on lesser systems. We call this HPDA – high performance data analytics. Launching into the HPC field means seizing opportunities presented by the data available today and getting prepared for the future by starting to build competitive advantages.

How does LuxProvide support companies that want to use the Luxembourg supercomputer?

First of all, we manage the access to MeluXina. If our clients need to run their software, programmes and workloads on a supercomputer, we help them make that happen.

However, LuxProvide does much more than that. The Supercomputing & Data Solutions team that I'm part of advises potential users and helps them get on board – in particular if they are attempting to use HPC facilities for the very first time. We provide expert support on a number of aspects, such as:

- **Scaling** software solutions so that they can deal efficiently with much larger amounts of data than they were originally developed for
- **Parallelising** solutions to make them run in an optimal way on a high number of CPUs (central processing units) mobilised within the HPC
- **Accelerating** software so that it works on a different type of resources, GPUs (graphics processing units), that can be hundred-fold faster than CPUs for the correct workloads
- **Optimising** software so that it can take advantage of the different resources used within the supercomputer in the best way possible
- **Monitoring and debugging** software so that it remains as efficient as possible. To do this, you need to observe a number of different parameters: the time of execution, memory use, bottlenecks and so on
- **Designing and prototyping** software solutions that are fully tailored to customers' needs, taking into account the their level of digitalisation
- **Consulting** on defining the journey to become HPC and/or HPDA ready

Most of our clients need support in one or several of these areas. Even our most experienced customers have discovered that with some help from our experts, they can considerably improve their processes with minor adjustments to their code.

Who are your clients?

Our private-sector customers range from start-ups to large groups. We also partner with research centres. While our users from academia tend to be explorers and go for the state of the art and new, untested territory, industrial clients want to use top-notch technologies that are proven: computer vision and natural language applications, for example, as well as simulations, which historically have been the main HPC use case.

Most of our clients are based in Luxembourg, but we also work with organisations from Europe, the Middle East and South-East Asia.

What type of cooperation contracts do you offer them?

We always start by sitting down with our clients to discuss where they are today in terms of computing and data use, where they want to be in the future and what path would be the best to make their vision come true. In many cases, our collaboration starts with a small benchmarking project where clients have the opportunity to run one of their processes on the supercomputer and see the advantages compared to other platforms.

The ultimate goal is to reach full-scale production, where we have improved the projects' software pipeline for use in the HPC context and the clients decide to execute their full workload on MeluXina.

Another possibility is a proof-of-value project aimed at quantifying the benefits of using HPC on a regular basis. This type of project takes into account the whole workflow, from HPC integration to analyses of the impact that we could have by providing expertise on parallelisation, optimisation, acceleration, and so on.

The ultimate goal is to reach full-scale production, where we have improved the projects' software pipeline for use in the HPC context and the clients decide to execute their full workload on MeluXina. We use an agile methodology, focused on bringing value to the customer as soon as possible by allowing production runs while still improving the performance of the solutions provided.

What is the difference between working with MeluXina and cooperating with a more traditional academic supercomputer?

Most publicly accessible supercomputers are in academic or research centres, which focus on teaching or public research. They competitively award access to resources to highly qualified researchers with a proven track record. Even for these experienced researchers, the process of being granted resources is often long and tedious.

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LuxProvide, on the other hand, is making companies, including SMEs, first-class citizens for the usage of MeluXina. We speak in business terms about the time to products and the revenue that an improved workflow could generate for a company. We have a business-to-business interaction and tailor our approach to the maturity of our customers by providing the appropriate support level.

By partnering with research centres such as the University of Luxembourg's Interdisciplinary Centre for Security, Reliability and Trust (SnT) and the Luxembourg Institute of Science and Technology (LIST), we are able to offer state-of-the-art solutions valorising a large part of Luxembourg's R&D and innovation.

How would you say that MeluXina stands out compared to other supercomputers?

MeluXina stands out in many ways. For the brevity of the argument, allow me to limit myself to two.

The first and most critical dimension is trust, safety and reliability. We host MeluXina in the secure and trusted environment of a Tier IV datacentre and have specific processes for ensuring customer data and processing separation that is unique among HPC centres.

We have a strong desire to help and improve the whole ecosystem around us – businesses and research organisations – and help it prepare for the future.

A second point, which is a competitive advantage compared to any other HPC centre in Europe and probably worldwide, is that our team has a unique combination of skills and has the digital transformation of the Luxembourg ecosystem as its core target. We have a strong desire to help and improve the whole ecosystem around us – businesses and research organisations – and help it prepare for the future. As en

example, we would love to be able to jumpstart the next data-driven “unicorn” start-up from Luxembourg.

Photo credit: LuxProvide

Are you interested in working with the MeluXina supercomputer? The Luxembourg National Competence Centre in High Performance Computing (HPC) promotes the use of HPC linked to computing, data analytics or artificial intelligence by industry – in particular SMEs – academia and public administration.