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Case Study: University of Luxembourg boosts research capabilities with Allinea MAP

Snapshot

Client: The University of Luxembourg's powerful 4,110 core High Performance Computing platform is expanding the research capabilities of all faculties.

Challenge: System users compete for system time, and to get more results from their supercomputer and speed up research need to run their applications faster.

Solution: The Allinea MAP profiling tool to complement the existing installation of the Allinea DDT debugger.

Results: Researchers are developing faster applications – with accessible and easy-to-use tools enabling untapped potential to be realized.

Summary quote: "Researchers in areas like engineering just want to improve and run their simulations, without having to learn too much about the detail of the system – and Allinea Software's tools are ideal for helping them." — Dr. Xavier Besseron, Research Associate, University of Luxembourg.

Using high performance computing transforms research possibilities – and possibilities grow faster when applications and users reach their full potential.

Researchers shouldn't have to become computer scientists to be able to complete work faster. That's the view of the management team of the University of Luxembourg's High Performance Computing (HPC) platform – that's why they rely on the user-friendly unified development interface of Allinea DDT and Allinea MAP.

Luxembourg University's HPC system has over 4110 cores and runs at up to 43.53 teraflops – and is shared amongst about 250 users. Researchers in a wide range of disciplines understand what it can do for them – and the system is extremely busy. With usage on the rise, it is now more important than ever that the software applications run correctly, and run at full speed.

The University has been using Allinea DDT for over two years to provide simple, clear debugging for users developing their own codes. Recently they started to analyze their codes with Allinea MAP, the parallel profiling tool.

Dr. Xavier Besseron is a research associate at the University. Along with his team, LuXDEM, he is developing an application called XDEM (Extended Discrete Element Method) - advanced simulation technology for multi-physics applications.

His work on XDEM initially raised the need for a parallel debugger, and Dr. Besseron worked alongside Research Scientist, Dr. Sébastien Varrette, who manages the HPC platform, to choose the best option for his own needs and those of other researchers across the University.

"We tried other tools, but we really needed the power of a parallel debugger – and one that our users could work with. We knew it would save time for us and our users. Allinea DDT was exactly what we needed – as a developer of distributed applications, it's been very useful," he says.

Uncloaking Performance Mysteries

With debugging codes now as painless as possible, the focus turned to application performance – discovering when applications were not running well on the system and adapting the code to run faster. Dr. Besseron recognized they would need some help.

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That help came in the form of Allinea MAP. With Allinea DDT already in hand, switching to try Allinea MAP at the click of a button was straightforward. Immediately he understood the benefits that this simplicity and integration would bring to him and to the users. "The interface gives an immediate overview of what your application is doing," says Dr. Besseron.

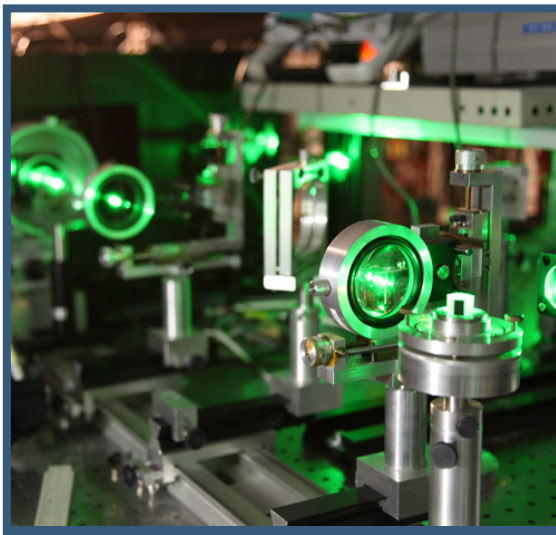
The decision to purchase was an easy one.

"You can use Allinea MAP whenever you make changes to your software and see performance issues. It gives a really simple overview of what time is spent in communication, in computation, and in input and output – exactly what you need," he says.

Wide range of users

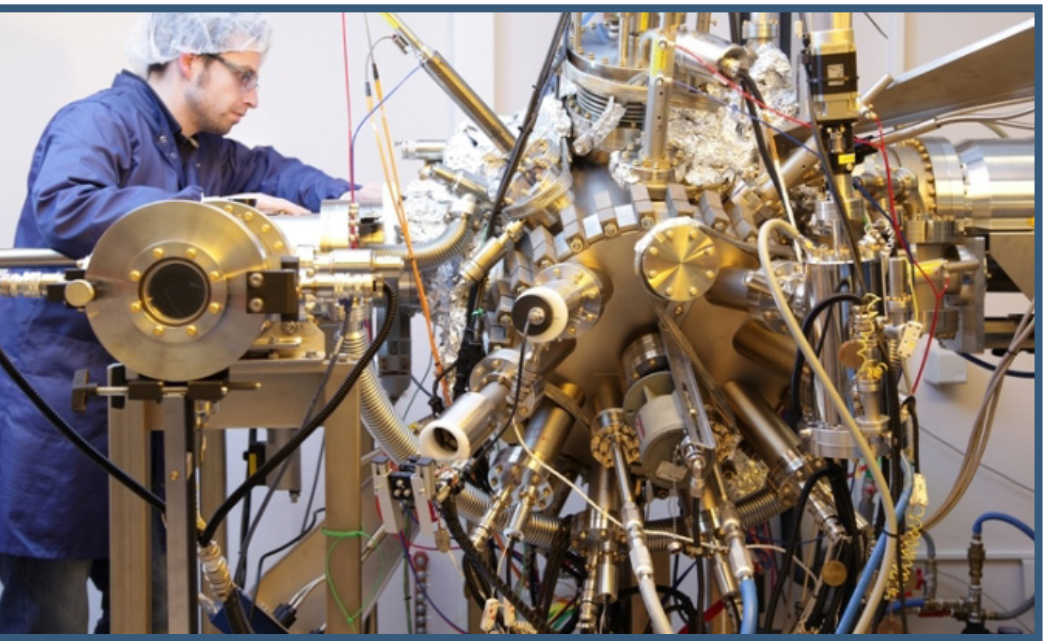
Research teams using the HPC platform include engineering and material scientists, running numerical simulations, life sciences looking at molecular dynamics, bioinformatics, cryptography and cryptanalysis, economics and finance, and of course computer scientists like Dr. Besseron running parallel and distributed algorithms.

Dr. Besseron's a background in computer science means parallel computing comes naturally to him – but he says it can be daunting for other users. The choice of Allinea DDT and Allinea MAP took that into account, as usability is vital for such a disparate user group.



Laser used in the Laboratory for Physics of condensed matter and advanced materials

Photo courtesy of University of Luxembourg



Coating plant used in the production of solar cells in the Laboratory for Photovoltaics

Photo courtesy of University of Luxembourg

Helping users write the code they need

Dr. Varrette says his team do what they can, but are unable to help every user to write the code they need. "We have user meetings and track queries, but we're not able to offer full user support – and for most research projects, limited funding doesn't stretch to hiring people to develop the code. That means the researchers themselves have to do the development, as best they can," he says.

"Researchers in areas like engineering just want to run their simulations, without having to learn too much about distributed applications – and Allinea Software's tools are ideal for helping them," Dr. Besseron says.

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