

CASE STUDY King of the crop: Arm tools enable the Earlham Institute to save world food issues at faster pace

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Decoding Living Systems

These are exciting times at the Earlham Institute. The planet will be home to 9 billion people by 2050. With the population soaring and crop yields plateauing, scientists are working tirelessly to find ways to increase calorie production by 60% in three decades time.

CHALLENGE

Speed up the delivery of important life science research at the Earlham Institute. The team had been using open source software to analyze code performance issues – a very slow, manual process with little integration, which didn't highlight where the problem was, or how to modify code to their advantage.

SOLUTION

Arm MAP and Performance Reports - which have sped up application performance by 50%, delivering Earlham's research quicker, as well as saving costs for investigation work.

At the Earlham Institute, a life science research centre based in Norwich, scientists are applying computational science and biotechnology to help find the answers to these most pressing world problems and part of the work carried out at the Institute is assembling the wheat genome. Wheat is one of the three major crop plants: find a high quality wheat genome and the world is on the way to increasing yield stability and vastly boosting crop production.

SPEED UP RESEARCH TIME

As resources have become cheaper and technology advances, the group is developing a method of mapping-by-sequencing using three SGI supercomputers, an SGI UV2000 with three partitions, and two new SGI UV300s – all with Intel processors.

Scientific Computing Specialist, Luis Yanes, supports the work of the researchers by finding the right tools to work on the systems used and he has turned to Arm MAP, part of the Arm Forge suite of tools, and Performance Reports, to speed up research time.

“Before, we were using open source software to analyze performance issues,” he says. “There were problems though as this was a very slow, manual process. MAP's integration with SLURM and PBS schedulers allowed us to easily queue the profiling jobs to use the busy servers. Open source tools aren't as robust and didn't clearly show us where the problem was or how to modify the algorithms to our advantage.”



ARM MAP PINPOINTS EXACTLY WHERE CODE IS LOSING PERFORMANCE

Luis and the team turned to Arm MAP to boost research time. Arm MAP is a profiler that shows developers exactly where code is losing performance. As it is so straightforward the team is able to spend its time on science and code - and not waste valuable server time battling with complicated tools. Once implemented at Earlham, the group was able to speed up the run time of applications by 50% in one instance. Research was delivered much faster bringing their goals closer to fruition.

Luis explains that the wheat genome application had previously spent too much time in synchronization, accessing memory (because researching the wheat genome requires Tera bytes of active memory with some of the tools!) instead of doing actual work. But using Arm MAP allows a deep insight into memory usage and vectorization relating to the Intel processors – something the team found invaluable.

CHOOSE THE FASTEST AND MOST EFFICIENT ALGORITHMS

The researchers at the Earlham Institute have also found Performance Reports a fantastic and clear way to understand the performance of high performance

application runs. Arm Performance Reports answers questions such as: is this application well-optimized for the system and the processors it is running on?; are there I/O, networking or threading bottlenecks affecting performance?; and which hardware, software or configuration changes can we make to improve performance further? Using Performance Reports, Earlham's principle investigators are able to investigate the effectiveness of external software used for research and choose the fastest and most efficient algorithms for their needs. This presents an additional potential time and cost saving.

"MAP and Performance Reports have transformed our work- for example now we just run the command and get on with other tasks," says Luis. "Before I would use open source software to gather the information which was a slower, more manual process, but with Arm tools I can have an I/O profile as well as a bigger picture on where we need to focus first, increasing productivity significantly."

ACHIEVE FASTER ADVANCES IN RESEARCH

The Earlham team are delighted with the faster, all-encompassing view of behaviour and huge application speed up Arm MAP and Performance Reports has given them and feel confident that their research will be able to isolate any wheat gene within the next two to three years.



Luis Yanes,
Scientific Computing Specialist

"We've been able to achieve much faster advances in our research as a result of the Arm products and if I want to use them I simply open them up and have no interruptions until I have finished," says Luis. "Using MAP and Performance Reports has sped up application performance by 50%, delivering research quicker and even saving costs for investigation work."



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