Tackling the fastest and most powerful computing systems on the planet

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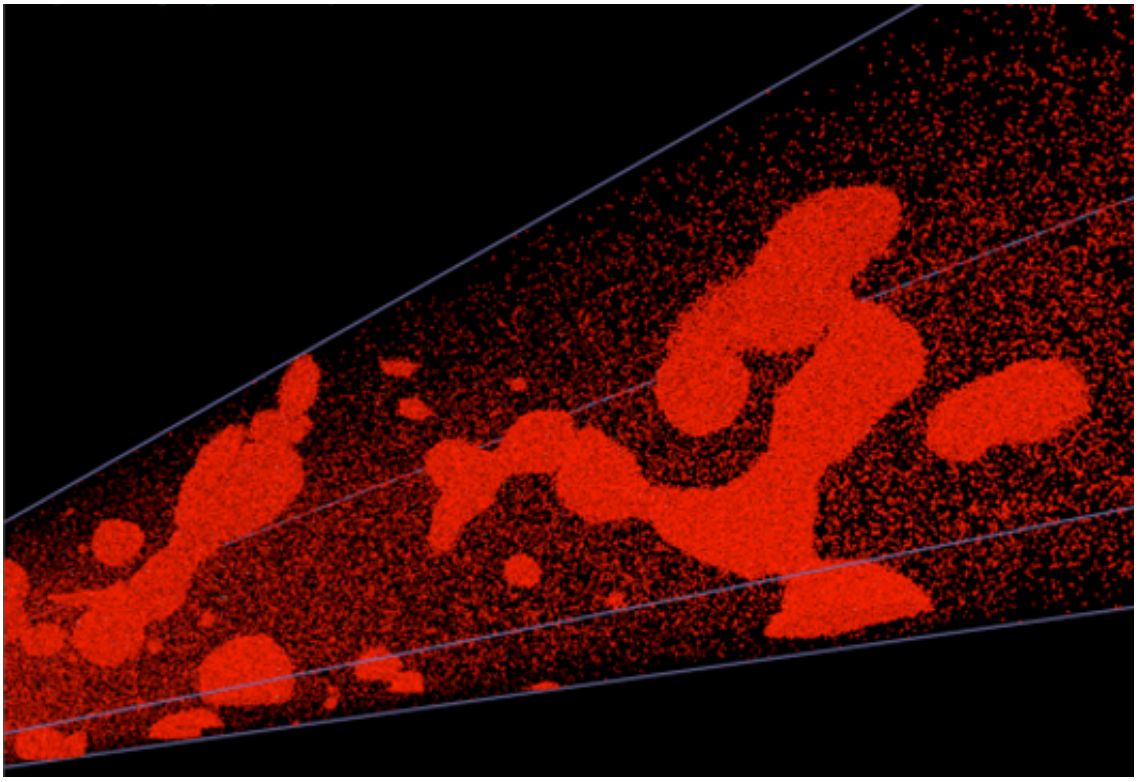

A world-leading team of academic researchers and industrial experts from across Europe are celebrating the conclusion of a four year research collaboration tackling the challenges posed by the fastest and most powerful computing systems on the planet.

The €4.2M ParaPhrase project brought together academic and industrial experts from across Europe to improve the programmability and performance of modern parallel computing technologies.

"Future computers will consist of thousands or even millions of processors, which poses a real problem to traditional programmers not used to thinking in parallel," said project leader Professor Kevin Hammond of the University of St. Andrews.

"The sheer complexity of these systems means that powerful tools are needed to develop software that runs stably and efficiently while making the most of the ability to process in parallel. The technologies we have developed in ParaPhrase make it possible now to really exploit the power of these new systems."

The ParaPhrase researchers have developed an approach that allows large parallel programs to be constructed out of standard building blocks called patterns. A refactoring tool allows these patterns to be reassembled in optimal ways without changing the functionality of the overall program.

Further tools developed on the project allow the program components to be run on the system in ways that make best use of the available processors, maximising throughput and minimising run time of large programs. The tools can even adapt the program while it is running to improve performance.

Professor Hammond said, "It was important to us that our research could be directly exploited by industry and other researchers. That's why we applied ParaPhrase to several important industrial case studies during the project."

Indeed, the project team has used its extensive industrial expertise to

develop Use Case Scenarios in a range of application areas including industrial optimisation, scientific simulation and data mining.

The outputs of the project have been impressive. As well as producing over 80 publications in leading international conferences and journals and being demonstrated at over 100 international conferences and other events, the project has produced a range of new software tools and programming standards to support the growing global community in parallel programming.

A Streaming Parallel Skeleton Library for the Erlang programming language has recently been made available and a new release of the FastFlow parallel programming framework has already seen thousands of downloads. Industrial partners are already applying the technology in their own operations and three recently-launched spin-out companies are set to take full commercial advantage of the technologies produced.

Already, the project partners are looking to the future. A number of follow-on projects are underway and more are in the pipeline. "ParaPhrase has been a tremendous success but significant challenges remain. In the future, parallel programs will need to self-adapt to computing architectures we haven't even thought of yet," said Professor Hammond.

More information: For more information on the project, visit www.paraphrase-ict.eu/

Provided by University of St Andrews

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