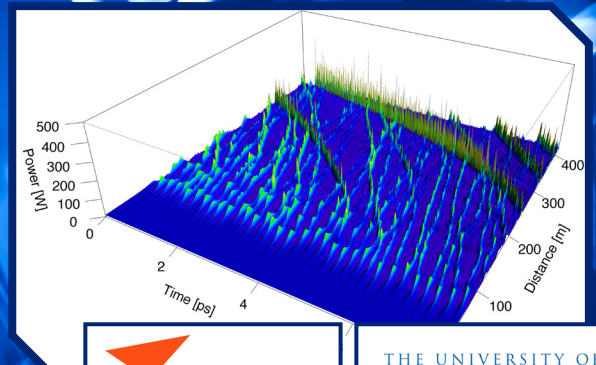


Making light work of fibre optic optimisation



Hartree Centre
Science & Technology Facilities Council



THE UNIVERSITY OF
WARWICK

Intense computing at the Hartree Centre has enabled researchers from Aston University and the University of Warwick to test pioneering simulation software that could improve fibre optic cable performance.

Challenge

From telecommunications to computer networks, the fast-growing digital economy is underpinned by fibre optics. Still, there remains substantial scope to improve the efficiency and cost effectiveness of this technology – for example, by mitigating the effects of short, sharp power pulses or “rogue waves” that can occur. These high intensity pulses cause transmission errors and severely degrade system performance. As a step towards resolving such issues, a team from Aston and Warwick Universities took on the challenge of developing massively-parallel modelling software providing for the first time a systematic and statistically accurate understanding of the so-called “rare event” nature of rogue waves. Because the software needed to work across many parallel Central Processing Units (CPUs), it was vital to test it using powerful supercomputing facilities to prove its suitability and readiness for future demanding industrial use.

Solution

One of the top 30 supercomputers in the world, the Hartree Centre’s Blue Joule incorporates over 130,000 CPUs and can carry out over a thousand trillion calculations a second. Harnessing around 400,000 hours of core time, the team successfully tested the scalability and runtime behaviour of their software, with Blue Joule being the only machine of sufficient size to convincingly prove the linear scalability of the code over five orders of magnitude in core count. Specialists at the Hartree Centre provided essential support in the adaptation of the code to run optimally on Blue Joule.

Benefits

The outcome was an innovative software tool that is useful for researchers and designers of fibre optic networks as well as component manufacturers of transmission system equipment. The software is a faster, more affordable alternative to physical experiments, so cuts costs and time-to-market. The software is ready for industry to use and run on facilities such as those at the Hartree Centre. Potential also exists to set up a dedicated spin-out company to deliver industry-focused consultancy and enable the software’s full capabilities to be exploited commercially.

“The Hartree Centre has been vital for the development of this software, which supports key research objectives of the rapidly evolving digital revolution. It is a potential game changer in the way optical communication systems will be simulated in the future.”

– Dr Marc Eberhard, School of Engineering and Applied Science, Aston University

“Accessing a supercomputing resource of this calibre – a resource beyond the capacity of most academic or industrial organisations to establish in-house – delivers a much-needed extra dimension to the development and utilisation of novel software.”

– Prof Rudolf A Roemer, Centre for Scientific Computing, University of Warwick

Work with us

We collaborate with industrial clients and research partners on projects that create insights and value using high performance computing, big data analytics, simulation and modelling.

By combining our world-class facilities with access to our specialists and computational scientists, we can enable your organisation to produce better outcomes, products and services more quickly and cost-effectively than through conventional R&D workflows.

With our partners we are developing the next generation of supercomputing architectures and software, combining existing best practice with innovation to deliver faster, cooler and more sustainable solutions capable of meeting the challenges of data intensive computing.

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