

Developing a framework to improve fusion research

STFC Hartree® Centre is helping to make commercial fusion energy a reality by optimising data analysis with a Daskhub framework as part of Fusion Computing Lab, a collaboration with the UK Atomic Energy Authority.

Challenge

Scientists have long harnessed the power of computers to tackle grand challenges like climate change. To address these challenges, a range of computing architectures and programmes are rapidly being developed. At the same time newer, more efficient computing languages are being designed to help improve scientific computation and create more accurate simulations. These new languages, while popular, are not always compatible with the different types of new computing architectures being developed. As a part of the Fusion Computing Lab, a collaboration with the UK Atomic Energy Authority (UKAEA) to help make fusion energy a reality, the Hartree Centre designed a tool for scientists to get the best results from novel architectures while using newer more efficient computing languages.

Approach

Our software engineers sifted through possible programming solutions to optimise the simulation process for fusion scientists. Our experts developed a Daskhub framework to work across very large datasets simultaneously, which are needed to simulate fusion devices. Daskhub is a multi-user platform for scaling computing code across large, distributed supercomputing clusters, making big data processing simpler and more accessible. We used GPU hardware to speed up data analysis and make it easier to handle large volumes of test data. This approach should easily scale up and manage the massive datasets expected from a live fusion device, helping to streamline and speed up real-time data analysis.

“The Daskhub framework enabled us to quickly set up a solution to a computationally challenging data analysis problem. It was straightforward to build out and worked brilliantly.”

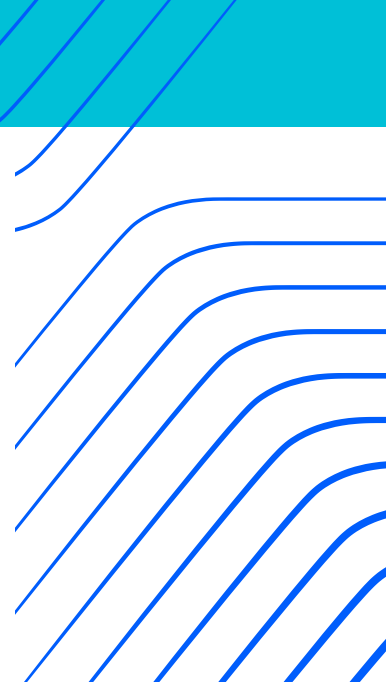
Robert Gledhill
Fusion Computing Lab



Credit: Adobe Stock

Benefits

The new Daskhub framework enables scientists to adopt modern programming languages and efficiently run code on new computing tools, a critical step toward making fusion energy a viable, clean energy solution. By using the Daskhub, our experts have been able to analyse huge amounts of data from the UKAEA fusion device simultaneously across multiple supercomputer nodes. This framework allows Fusion Computing Lab to process data faster, manage it more effectively, and handle the large data volumes expected from live fusion devices. Ultimately, this tool enables scientists to achieve top results from new computing architectures helping to advance fusion technology.



At a glance

- Helped to advance fusion technology with supercomputers to support a low-carbon, sustainable energy future to address climate change
- Created a tool which is able to handle massive data streams expected from fusion devices
- Used Daskhub to optimise data analysis by running large datasets in parallel across multiple supercomputer nodes
- Developed a framework to make advanced computing tools more accessible for scientists.

Who we are

The Hartree Centre was created by UK Government to help businesses and public sector organisations accelerate the adoption of high performance computing (HPC), big data analytics, artificial intelligence (AI) and quantum technologies. We play a key role in realising UK Government's Industrial Strategy by stimulating applied digital research and innovation, creating value for the organisations we work with and generating economic and societal impact for the UK. We are proud to be part of UK Research and Innovation.

What we do

- Boost productivity and innovation for industry
- Offer training and skills development
- Provide insights into future technologies
- Give tailored business development support
- Build bespoke small teams around your project

