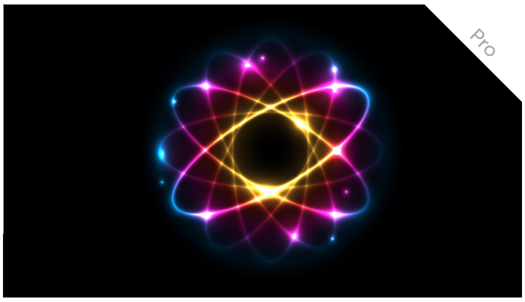
TechCentral.ie

TechPro magazine | Advertise | Contact | About

How open source powers nuclear fusion research

UK's Atomic Energy Authority shows underlying infrastructure at the forefront of nuclear fusion research



(Source: Stockfresh)

Read More: open source

4 April 2019 | 0 Funding was secured this week for Britain's nuclear fusion experimental reactor, JET, which is at the forefront of research into the low-waste alternative to fission.

The contract extension will allow the high performance computing team at the facility to continue their work. Andrew Lahiff of the UK's Atomic Energy Authority explained to Computerworld UK at the Open Infrastructure Day in London the nuts and bolts that have gone into improving the underlying infrastructure, largely based on open source tooling and platforms such as Openstack.

Today's nuclear plants rely on fission reactors, which split atoms, causing energy to be released but alongside a relatively high degree of radioactive waste. Instead, the experiments at JET focus on furthering nuclear fusion research.

Fusion joins particles together at a high enough heat to generate energy, without the problem of as much waste, in a way that's similar to the chemical interplay of nucleosynthesis that powers the stars, including the one at the centre of our solar system.

The Soviet Union pioneered the doughnut-shaped tokamak fusion research machines that would be used to achieve the world's first controlled release of fusion power at JET in the early 1990s.

The Atomic Energy Authority, which runs and operates the CCFE where JET is hosted, is partnering with the European Commission's Horizon 2020 project as a 'science demonstrator' for the upcoming European Open Science Cloud. This cloud will serve as a single hub for software, services and data produced by research within Europe.

CCFE's role in the partnership is in demonstrating how to run workloads such as those handling data from the fusion experiments across multiple clouds at the same time.

"One challenge is that fusion software is a little bit old fashioned, and makes extensive use of modules and software that has been installed in HPC systems," said Andrew Lahiff. "You can only use it in one place. So if you want to run a particular piece of software, you have to get access to that cluster. Part of what we're doing is changing that and trying to convince people to use containers, so they can have a more self-contained job which they can then run anywhere."

A hurdle was that within the pilots, the researchers only had access to a few small clouds that they had to use concurrently.

"Even though there's been lots of work in the past on running HPC on clouds, they hadn't really considered this particular use case," Lahiff said, "so we had to develop our own system that would be able to provision the infrastructure across lots of different clouds, and then run the jobs on them, and delete the infrastructure afterwards."

In the near to medium term, the team will be refining the systems and trying to ensure that the clouds are production ready and able to integrate with various storage systems.

Sign up for Techcentral.ie

Stay on top of the day's tech news with our free **Technology Minute** e-mail newsletter - just add your e-mail here

E-mail

Events

Mon 9 Mar

AZ-300 Microsoft Azure Architect Technologies

New Horizons Ireland

Tue 10 Mar 10-3 am - 1pm

ICS Executive Briefing: Developing a cyber strategy

ICS, Dublin 4

View All Events

Submit Your Event

A-Z Brand index

Although this work within EOSC is not particularly large scale, future projects will be.

The International Thermonuclear Experimental Reactor, for example, is a tokamak-based experimental fusion reactor currently being built in southern France. ITER, which was first proposed in the late 80s but began construction in 2013, is expected to be completed by 2025 – and when the experimental reactor becomes operational, it will be the largest of its type ever.

"That will produce several petabytes of data per day, which is more than the fusion community's ever had in the past, so being able to work at a large scale is definitely important," Lahiff explained.

The feedback for the clouds at CCFE has been positive so far. The user only sees the front end, despite the complexities of building the underlying infrastructure. A report from the first people to have used the platform in its earliest days has recently been published – the work focused on the tritium fuel in the blankets inside a nuclear fusion reactor – with all the computational work performed by Lahiff and his team's platform.

"Without our platform, they probably wouldn't have been able to finish their work – or they'd still be working on it," said Lahiff. "That's been one of the highlights so far."

Computerworld

Read More: open source

More Articles
← Previous Next →

Related Articles

Kubeflow 1.0 solves machine learning workflows with Kubernetes →

Open source companies are thriving in the cloud →

More from this Channel

Coronavirus prompts collaboration tool makers to offer wares for free

Vendors are making some of their chat and video-conferencing services free as demand for remote working booms

Microsoft previews all-cloud printing service

Universal Print described as 'a Microsoft 365 subscription-based service' that allows printing without direct device-to-printer links

Leadership progress for women stalls at global level

Grant Thornton report says 18% of Irish businesses have no women in senior management roles

Intel CSME flaw is unpatchable, researchers warn

Previously known flaw could allow attackers to compromise the cryptographic chain of trust in Intel systems

Perception gaps persist over flexibility and progressiveness, says report

Accenture research shows gulf between employees and leaders over work and equality progress

chLife | TechPro | TechTrade | TechRadio | TechBeat | Blogs

Privacy Policy | Sitemap | About | Contact | Advertise

Published by Mediateam Ltd., Ireland technology media leader since 1976,
55 Spruce Ave, Sandyford, Dublin 18, A94 N125.

mediateam