Project: ENERGETIC

ENergy-aware hEteRoGenEous compuTIng at sCale (ENERGETIC)

Energy-aware heterogeneous computing at scale.

Abstract

Current, leading-edge high performance computing (HPC) systems are often heterogeneous, comprised of combinations of multiple compute units and accelerators, including (but not limited to) CPUs, GPUs and FPGAs. HPC is a significant contributor to energy usage. However, the energy-to-solution varies between these architectures. In terms of minimising energy consumption, this choice of possible architectures presents various challenges to HPC managers and users.

Currently, there is little data on the energy efficiency of codes or algorithms across different architectures, a lack of an established framework for measuring this on new systems, and little use of existing tools like Performance Application Programming Interface (PAPI) for measuring and comparing power draw from hardware. Due to this lack of data, it is difficult for digital research infrastructure (DRI) managers/users to effectively design codes and systems to meet quantifiable energy budgets that contribute to achieving net-zero goals.

This project aims to test whether the use of heterogeneous architecture could significantly reduce the energy-to-solution and thus the energy consumed by UKRI digital research infrastructures. A workshop and other community engagements are planned involving key stakeholders to aid understanding the current state and enable dissemination of project findings of reducing energy consumption.

Institutions and representatives for the project

Manchester Metropolitan University - Michael Bane

Newcastle University - Deepayan Bhowmik

EPCC/University of Edinburgh – Oliver Brown

University College London – Jamie Quinn

Funding information

This project has been awarded a total of £119,400.00 by the UKRI Net Zero DRI Scoping Project (NERC project NE/W007134/1). This funding is split between the institutions listed above.

Additional information

The UKRI Net Zero DRI Scoping Project will produce clear evidence and recommendations for a roadmap for the UKRI and their community to deliver carbon neutral DRI by 2040 or sooner.

Thie ENERGETIC sub-project was selected for funding via a sandpit event in May 2022. The proposals from teams were assessed on three factors; their excellence, potential to produce conclusive evidence and clarity of planning.

To read more about the UKRI Net Zero DRI Scoping Project visit our website.