

ARCHER2: embedded CSE (eCSE)

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www.archer2.ac.uk



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Overview

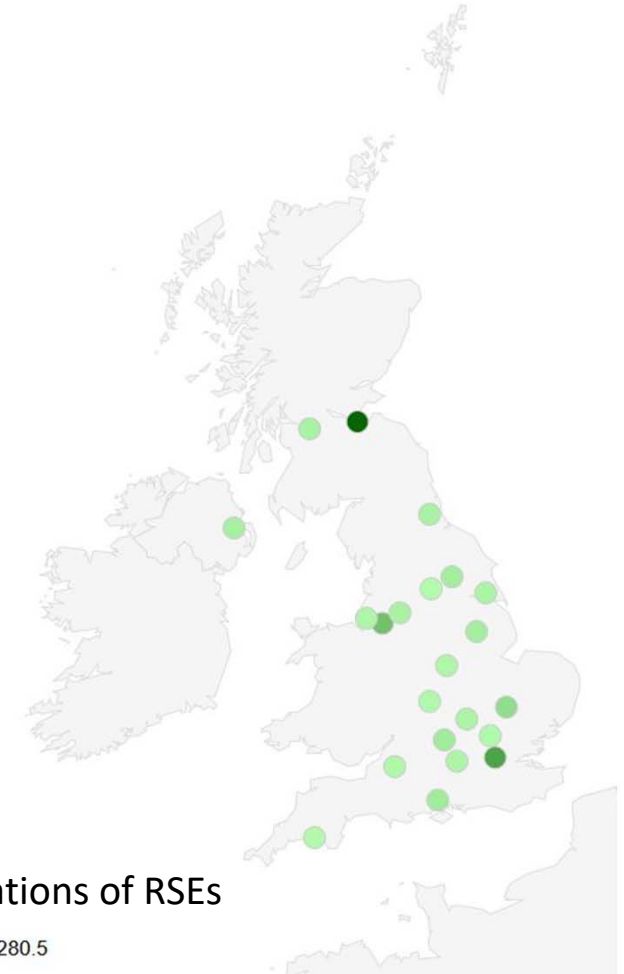
- eCSE Overview
- Purpose and aims
- Examples of eCSE work
- Applying for a project
- Questions

What is eCSE funding for?

- Embedded CSE (eCSE) support funds software development to support the ARCHER2 user community
- Allows software to be developed in a sustainable manner to improve research on the ARCHER2 service
- Allows the employment of a Research Software Engineer (RSE) to carry out software development of codes leading to research within the EPSRC remit
 - Note that NERC codes are not eligible for this call
- ARCHER2 hardware is described on the ARCHER2 website
 - eCSE is for projects focussing on the CPU hardware rather than GPU

ARCHER eCSE Programme

- The ARCHER2 eCSE programme follows on from the very successful eCSE programme under ARCHER
- 14 FTEs of effort were available throughout most of 6-year ARCHER service
- 973 person months awarded across 100 projects
 - This included 32 extra person months above original commitment
 - Over 100 RSE involved across 26 institutions
 - See map opposite for locations



1.5  280.5

ARCHER eCSE Projects

- Lots of examples on ARCHER website
- See “Community” section of website
 - <http://www.archer.ac.uk/community/eCSE/>
 - Overview of completed projects shown
 - Links to more detailed technical report
- Also see ARCHER training section for webinars given from previous projects
 - <http://www.archer.ac.uk/training/virtual/>

Embedded CSE (eCSE) support

Through a series of regular calls, Embedded CSE (eCSE) support provides funding to the ARCHER user community to develop software in a sustainable manner to run on ARCHER.

There are currently no calls open. The list of all funded eCSE projects can be found on the [funded eCSE projects](#) page.

Useful Links

- [List of all eCSE projects funded](#)
- [Codes worked on during eCSE projects](#)
- [eCSE Final report template](#)
- [Acknowledgement of eCSE funding](#)

The eCSE programme provides tangible software enhancements to the communities exploiting software on ARCHER. This in turn has led to significant scientific advancements and both economic and social benefits to society.

Reports from completed eCSE projects

Implementation of multi-level contact detection in granular LAMMPS to enable efficient polydisperse DEM simulations

Granular materials occur in many physical and industrial settings, such as geomaterials, avalanches and landslides, crushing of mining ores, food processing and pharmaceuticals. In many cases the grains/granules cover a wide range of particle sizes. For example, the granular filter material used to construct the Bennett Dam in Canada contains particles ranging from 0.08 to 75 mm. Discrete element modelling (DEM) is a computational tool for predicting how such granular materials will respond during loading, flowing or other processes found in nature or in industry. [Read more...](#)

Project Meshes – a HPC geometry library supporting mesh-to-mesh projections

Many mesh-based high performance applications require users to map their data from one discretised geometric representation (mesh) to another mesh multiple times. The Delta library is a tool to handle imports/exports of geometries for use cases as the one above. Realising the above features is usually time consuming and technical. Our code serves as building block to simplify setting up realistic simulations using realistic geometries. [Read more...](#)

Massively Parallel MPI Implementation of the SPH Code DualSPHysics

Smoothed Particle Hydrodynamics (SPH) is a novel computational technique that is fast becoming a popular methodology to tackle industrial problems with violent flows that often occur in nature and industry. The main aim of this project is the implementation of MPI functionality to the open-source DualSPHysics software package, developed by the universities of Manchester, Vigo and Parma, enabling the simulation of violent, highly transient flows using thousands of cores such as slam forces due to waves on offshore and coastal structures, impact loads on high speed ships, ditching of aircraft, sloshing of fuel tanks and many more. [Read more...](#)

Implementation of generic solving capabilities in ParaFEM

In this eCSE project, the PETSc solver library has been interfaced to the ParaFEM finite element analysis (FEA) library. FEA is widely used in engineering to simulate the deformation of structures under load. In FEA, the structure is discretised into small elements (often millions of these), each connected to its neighbours. This leads to a large system of equations to solve and at the heart of every FEA program is an equation solver. The orthopaedic engineering research group at the University of Edinburgh uses the ParaFEM FEA library to simulate the mechanical behaviour of trabecular bone, using a detailed geometry generated through X-ray microtomography in order to assess the response of bone to mechanical loads at the microstructural level. [Read more...](#)

Discrete velocity methods for helicopter multi-block CFD solver: towards real-time wake simulations

This research is a step towards the development of real-time simulations using

Purpose and Aims

- Provide funding to the ARCHER2 user community to develop software in a sustainable manner for ARCHER2
- Sustain key codes for the UK computational science community
- Facilitate efficient use of ARCHER2 resources through enhanced code performance/functionality
- Core values: openness, independence, transparency, not-for-profit service that provides value for money to the HPC user community and beyond

eCSE Programme overview



- Funding
 - EPCC guarantees that an average of at least 12 FTEs per annum for eCSE projects will be provided
 - based on the 80% FEC costing model, or equivalent
 - Funding for eCSE projects can be requested for staff located at
 - institution of the PI
 - third party institution(s)
 - staff from the ARCHER2 centralised CSE support team
 - any combination of the above
 - Individual projects fund 3 to 12 person months in total across all technical staff
- The eCSE funding will be allocated using an open, fair and peer reviewed funding programme

eCSE Programme overview (contd.)



- There will be a regular series of calls for proposals, with three calls per year
- Not-for-Profit
 - Any residual funding will be used to provide additional eCSE staff months of effort
- Support and encourage early career researchers
 - Many RSEs are early career
 - Good opportunity to develop software development skills
- Observers
 - Early career researchers invited to panel meetings as observers
 - Good opportunity to see what reviewers are looking for

Example eCSE work

- Implementation of algorithmic improvements within an existing code in a portable manner
- Improving the scalability of software on higher core counts in a portable manner
- Improving a code to enhance sustainability and maintainability
- Improvements to code that allow new science to be carried out on ARCHER2
- Porting and optimising a code to run efficiently on ARCHER2
- Adding new functionalities to existing codes
- Code development to take a code from a Tier-2 (Regional) or local university cluster to ARCHER2

- Funding cannot be used for scientific research

Lightweight eCSE

- Recognise the need for smaller eCSE projects (up to 3 months)
 - Small improvement projects – larger than in-depth support but less than a full eCSE project
- Lighter weight process to apply for funding
- Funds staff embedded in research groups
- Will be available from the second call
- Seeking input from the panel around appropriate review procedure



Applying for an eCSE Project



First ARCHER2 eCSE Call

- The first call opened on 19th May 2020
- Technical Evaluation document must be submitted to ARCHER2 service desk by **16:00 16th June 2020**
- Final deadline for full proposals is **16:00 7th July 2020**
 - Late proposals will not be considered!
- Projects can start 2-6 months after call has closed
- See <https://www.archer2.ac.uk/ecse/calls/> for details

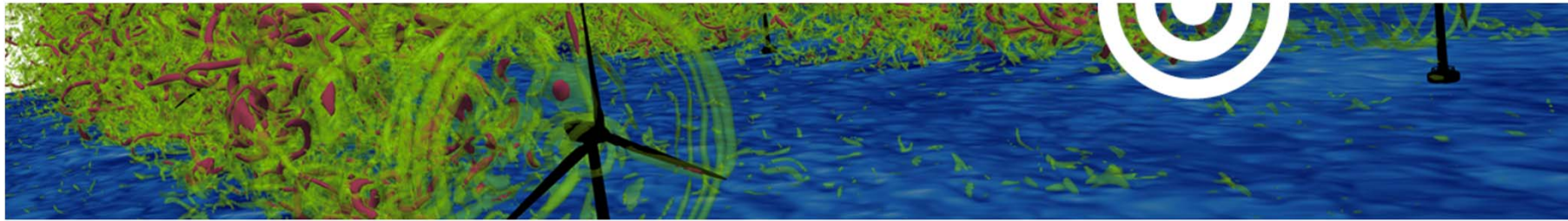
First ARCHER2 eCSE Call on-line



SERVICE STATUS LOGIN: UNAVAILABLE | COMPUTE: UNAVAILABLE SEARCH 



About ▾ Support & Access ▾ Documentation ▾ Training ▾ eCSE ▾ Community ▾ Research ▾



ARCHER2 Embedded CSE (eCSE) support Call

Details of upcoming and open calls

The 1st ARCHER2 eCSE call

The 1st ARCHER2 eCSE call (ARCHER2 eCSE01) opened on the 19 May 2020. The deadline for submitting documents for technical evaluations is 16:00 on 16 June 2020, with the final deadline for proposal submission being 16:00 on 7 July 2020.

Applying for an eCSE Project

- Note that some things have changed since the ARCHER service
- Two stage application process
 - Technical evaluation document must be submitted to service desk by **16:00 16th June 2020**.
 - Completed evaluation will be sent back to you to include in final submission
 - Final deadline for full proposals submitted to the SAFE is then **16:00 7th July 2020**
 - Late proposals will not be considered!
- Any project team members must be invited to a proposal and have accepted the invitation via the SAFE before final submission
 - Otherwise they will not be considered part of the team
 - Allowable roles are PI, Co-I, technical staff, Contact, Member
 - Technical staff add their own CVs
 - Other team members provide track record and describe what they will bring to project
 - When inviting people, please use the email address the use in the SAFE
 - Note that you **cannot submit without technical staff** (or unnamed staff selected)

Costings

- Please provide 100% FEC for each member of technical staff
 - 80% FEC is then calculated and is what will be paid
 - Funding only includes technical staff
 - Should include direct and indirect costs but not additional costs (e.g. PI/Co-I costs)
- Travel is given separately from above
 - Can include project members traveling with UK to meet each other
 - Funds are limited – see guidance
 - Separate fund to allow travel for activities that showcase the outcome of eCSE work
- If your institution does not use FEC, please provide equivalent
 - If not using FEC recommend you get in touch beforehand to discuss
- Supporting documentation must be included
 - Your institution should be able to provide this via Worktribe or equivalent
- Costings do not need to be provided for ARCHER CSE staff or for unnamed staff
- Recommend you use named staff where possible
 - Ability of technical staff to complete the work is assessed
 - Considered together with PI/Co-I expertise

Beginning an eCSE Application

- Call page <https://www.archer2.ac.uk/ecse/calls/> has links to
 - Technical evaluation form (MS Word)
 - Proposal template (MS Word)
 - Guidance document (PDF)
- To begin a proposal, go to ARCHER SAFE and enter Project Title, subject area and research area (i.e. remit)
 - <https://www.archer.ac.uk/safe/>
- Technical evaluation can then be started and should be submitted via the ARCHER2 service desk by 16:00 16th June 2020
- Technical evaluation form asks you to describe the main code(s) to be worked on during project in terms of
 - Performance and scaling of the code on ARCHER or equivalent
 - Sustainability and maintenance
 - Availability of code to ARCHER2 users at the end of the project
- Evaluation will be returned to you as PDF in good time for final submission

Next steps

- While technical evaluation is underway, you can
 - Invite team members
 - Get costing information
 - Complete proposal form
 - Fill out on-line form
 - Get letters of support
- An MS Word proposal template is provided with sections on
 - Project Objectives and success metrics
 - Project Overview, Technical Information and Workplan
 - Impact and Benefits
- This should be completed and attached as PDF to on-line form, along with PDF of completed technical evaluation when returned to you
- On-line form must then be completed with
 - All project members having accepted invitation
 - All relevant documents attached
 - Submitted by **16:00 7th July 2020**

eCSE – Submitting a proposal



Summary

- The first ARCHER2 eCSE call is open
- Technical Evaluation document must be submitted to ARCHER2 service desk by **16:00 16th June 2020** with final deadline for full proposals: **16:00 7th July 2020**
- Details of call
 - <https://www.archer2.ac.uk/ecse/calls/>
- There will be 3 eCSE calls per year for ARCHER2 software development
- Any questions please ask here or via the ARCHER2 service desk
 - support@archer2.ac.uk



Any Questions?

www.archer2.ac.uk

