

# Introduction to ARCHER

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Outline of course



EPSRC

The EPSRC logo consists of the letters 'EPSRC' in a bold, purple, sans-serif font. It is framed by two horizontal teal lines, one above and one below the text.

NERC SCIENCE OF THE ENVIRONMENT

The NERC logo features the word 'NERC' in white, bold, sans-serif font on a dark olive green rectangular background. To its right, the words 'SCIENCE OF THE ENVIRONMENT' are written in a smaller, white, sans-serif font on a light yellow-green rectangular background.

archer

The ARCHER logo features a stylized target icon on the left, composed of three concentric circles in red, white, and red. To the right of the icon, the word 'archer' is written in a white, lowercase, sans-serif font on a black rectangular background.

CRAY  
THE SUPERCOMPUTER COMPANY

The Cray logo features the word 'CRAY' in a large, blue, stylized, sans-serif font. Below it, the words 'THE SUPERCOMPUTER COMPANY' are written in a smaller, blue, sans-serif font.

epcc

The epcc logo features the lowercase letters 'epcc' in a dark blue, sans-serif font. The letters are flanked by two vertical red lines on either side.

# Reusing this material



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# Course Parameters

- Pre-requisites
  - Familiarity with parallel programming is assumed
  - E.g. you have previous experience on
    - other HPC systems
    - compute clusters
  - Or have attended the “Hands-on Introduction to HPC” course



# Learning Outcomes

- On completion of this course attendees should be able to:
  - Understand the ARCHER hardware environment.
  - Compile and run parallel programs on ARCHER.
  - Port applications to ARCHER.
  - Undertake the ARCHER driving test
    - [http://www.archer.ac.uk/training/course-material/online/driving\\_test.php](http://www.archer.ac.uk/training/course-material/online/driving_test.php)
    - on successful completion of the test, you can apply for an account an 80,000 core-hours (1,200 “kAUs”) on ARCHER for a 12-month period



# ARCHER Service

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Overview and Introduction



EPSRC



NERC SCIENCE OF THE ENVIRONMENT



archer



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epcc



# ARCHER Partners

- EPSRC
  - Managing partner on behalf of RCUK
- Cray
  - Hardware provider
- EPCC
  - Service Provision (SP) – Systems, Helpdesk, Administration, Overall Management (also input from STFC Daresbury Laboratory)
  - Computational Science and Engineering (CSE) – In-depth support, training, embedded CSE (eCSE) funding calls
  - Hosting of hardware – datacentre, infrastructure, etc.



# EPCCC's Advanced Computing Facility



# ARCHER in a nutshell

- UK National Supercomputing Service
  - £43 million 4-year project from 2013
- Cray XC30 Hardware
  - Nodes based on 2xIntel Ivy Bridge 12-core processors
  - 64GB (or 128GB) memory per node
  - 4920 nodes in total (118080 cores)
  - Linked by Cray Aries interconnect (dragonfly topology)
- Cray Application Development Environment
  - Cray, Intel, GNU Compilers (all support OpenMP)
  - Cray Parallel Libraries (including optimised MPI)
  - DDT Debugger, Cray Performance Analysis Tools





# Storage

- /home – NFS mounted, not accessible on compute nodes
  - For source code and critical files
  - **Backed up**
  - > 200 TB total
- /work – Lustre, accessible on all nodes
  - High-performance parallel filesystem
  - **Not backed-up**
  - > 4PB total
- RDF – GPFS, not accessible on compute nodes
  - Research Data Facility
  - **Long term data storage**

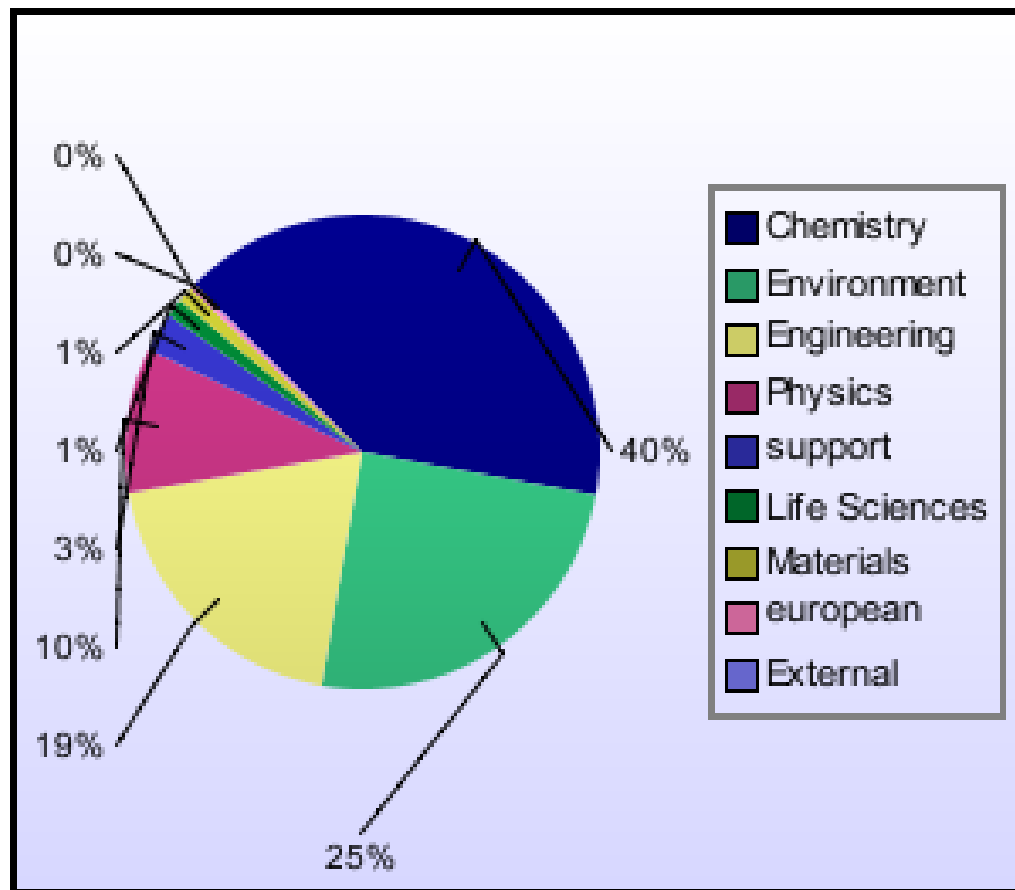


# Data Management

- Most of your online storage is in /work/
  - fast but not backed up!
  - you **must not** rely on /work/ for storage of critical data
  - you should copy elsewhere, e.g. the RDF
- For advice and instructions
  - <http://www.archer.ac.uk/documentation/data-management/>



# What is it used for?



# Summary

- ARCHER is a Cray XC30
  - It uses standard Intel processors
    - 2 processors per node, 24 cores per shared-memory Linux node
    - 64 GB memory on the majority of nodes (some have 128 GB)
    - Nodes similar to many other HPC systems
  - Cray ARIES switch
    - High performance, optimised for large parallel jobs
    - Standard usage but can get very good performance
  - Large storage and high performance filesystem
    - 4 PB high performance filesystem; 200 TB home space
  - Intel, GNU, and Cray compilers
    - Lots of standard scientific packages, libraries, and software installed
  - Compute nodes accessed via PBS batch system

