

# Introduction to High Performance Computing

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EPSRC



NERC SCIENCE OF THE ENVIRONMENT



WHPC Working towards equal representation in HPC  
WOMEN IN HIGH PERFORMANCE COMPUTING



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THE SUPERCOMPUTER COMPANY



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# Course Parameters

- Pre-requisites
  - None, this course is designed for everyone, from computing novices upwards, to be able to participate in and complete
- Hands-on practicals form an integral part of the course.
  - We will help with these, and do not expect any programming experience of attendees (although you're free to dive into the programs if you have more computing experience)



# Aims

- Why do people use HPC?
- What do people use HPC for?
- Understanding of computer hardware
  - Which parts matter for performance in modelling and simulation?
- Understanding of processes and threads
- Understanding of parallel programming models
- How to interact with a HPC resource
- Knowledge of current HPC architectures
- Knowledge of current parallel programming libraries
- Appreciation of the future of HPC



# Timetable

## Day 1

09.30-09.45 Welcome  
09.45-10.15 Why learn about HPC?  
10.15-11.45 Using HPC machines  
10.45-11.15 Coffee Break  
11.15-12.30 Practical  
12.30-13.00 Building Blocks 1: CPUs,  
Memory, and Accelerators  
13.00-14.00 Lunch  
14.00-14.30 Building Blocks 2:  
Operating Systems  
14.30-15.00 What does parallel  
computing mean?  
15.00-15.30 Coffee Break  
15.30-17.00 Practical

## Day 2

09.30-10.00 Current HPC Architectures  
10.00-10.30 Parallel Programming:  
Libraries and Implementations  
10.30-11.00 Practical  
11.00-11.30 (Coffee Break)  
11.30-12.00 Practical  
12.00-12.30 Software support  
12.30-13.00 The Future of HPC and  
Wrap Up  
13.00-14.00 Lunch with WHPC launch



# Support

- Helpdesk
  - Email [support@archer.ac.uk](mailto:support@archer.ac.uk)
  - via ARCHER SAFE <http://www.archer.ac.uk/safe>
  - phone: +44 (0)131 650 5000
  - By post, to: Liz Sim  
EPCC  
University of Edinburgh  
JCMB  
The King's Buildings  
Mayfield Road  
EDINBURGH EH9 3JZ
- <http://www.archer.ac.uk/community/techforum/>



# Training opportunities

- ARCHER Training (free to academics):
  - <http://www.archer.ac.uk/training/>
- EPCC M.Sc. in HPC
  - <http://www.epcc.ed.ac.uk/msc/>



# ARCHER Training Schedule

Tools for Large-Scale Parallel Debugging and Profiling	29 April – 1 May	EPCC, Edinburgh
Advanced OpenMP	6-8 May	Oxford
Introduction to F95	12-13 May	Daresbury
Advanced OpenMP	6-8 May	Oxford
Programming the Xeon Phi	29-30 May	Bristol
Message Passing with MPI	2-4 July	EPCC, Edinburgh





# Funding calls

- Embedded CSE 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 for running on ARCHER. Funding will enable the employment of a researcher or code developer to work specifically on the relevant software to enable new features or improve the performance of the code
  - Apply for funding for development effort
  - Second call opened 1<sup>st</sup> April 2014
  - Closes in May 2014
  - Planned every 4 months
- See <http://www.archer.ac.uk> for details



# Feedback and follow-up

- <http://www.archer.ac.uk/training/feedback/>
- Virtual Tutorial
  - Experts available
  - Likely to be 14<sup>th</sup> May 2014

