Introduction to High Performance Computing

Reusing this material

archer

epcc | THE UNIVERSITY OF EDINBURGH

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 Welcome, Overview and Syllabus
09.45 LECTURE: Why learn about HPC?
10:15 LECTURE: Image sharpening
10:30 PRACTICAL: Sharpen example
11:00 BREAK: Coffee
11:30 LECTURE: Parallel Programming
12:15 PRACTICAL: Sharpen (cont.)
13:00 BREAK: Lunch
14:00 LECTURE: Building Blocks (CPU/Memory/Accelerators)
14:30 LECTURE: Building Blocks (OS/Process/Threads)
15:00 LECTURE: Fractals
15:10 PRACTICAL: Fractal example
15:30 BREAK: Tea
16:00 LECTURE: Parallel programming models
16:45 PRACTICAL: Fractals (cont.)
17:30 CLOSE

Day 2

09:30 LECTURE: HPC Architectures
10:15 LECTURE: Batch systems
10:45 PRACTICAL: Computational Fluid Dynamics (CFD)
11:00 BREAK: Coffee
11:30 PRACTICAL: CFD (cont.)
12:30 LECTURE: Compilers
13:00 BREAK: Lunch
14:00 PRACTICAL: Compilers (CFD cont.)
14:30 LECTURE: Parallel Libraries
15:00 LECTURE: Future of HPC
15:30 BREAK: Tea
16:00 LECTURE: Summary
16:15 PRACTICAL: Finish exercises
17:00 CLOSE

Course materials

- Everything online:
  - Slides, exercise notes, code to use

http://www.archer.ac.uk/training/course-material/2015/03/intro/

Support

- Helpdesk
  - Email support@archer.ac.uk
  - via ARCHER SAFE http://www.archer.ac.uk/safe
  - phone: +44 (0)131 650 5000
  - By post, to:
  - ARCHER Helpdesk
    EPCC
    James Clerk Maxwell Building
    Peter Guthrie Tait Road
    EDINBURGH EH9 3FD
- http://www.archer.ac.uk/community/techforum/

Training opportunities

- ARCHER Training (free to academics):
  - http://www.archer.ac.uk/training/

- EPCC MSc in HPC
  - http://www.epcc.ed.ac.uk/msc/

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
  - Fifth call to opened 31st March 2015
  - Closes on 12th May 2015
  - Happen every 4 months

- See http://www.archer.ac.uk for details

Feedback and follow-up

- http://www.archer.ac.uk/training/feedback/

- Virtual Tutorials
  - Online every second Wednesday of the month
  - http://www.archer.ac.uk/training/virtual/