

High Performance Computing - Overview

Prof Matt Probert

<http://www-users.york.ac.uk/~mijp1>

Books

- “*Introduction to High Performance Computing for Scientists and Engineers*”, Georg Hager and Gerhard Wellein, CRC Press (2011)
- “*High Performance Computing (2nd edition)*”, Kevin Dowd and Charles Severance, O'Reilly (1999) (paperback, now out of print)
 - also available as free e-book at <http://cnx.org/content/col11136/latest>
 - Also mirrored on the HPC website
- “*Writing Scientific Software: A Guide to Good Style*”, Suely Oliveira & David Stewart, CUP (2006)

Aims of the Module

- Show how the historical developments in high performance computing have come about
- Show how these impact on current technologies
- Show how to best utilise these technologies for numerically intensive calculations
- Indicate what future developments are likely

Syllabus (I)

- Hardware Issues
 - History of the Supercomputer
 - History and Internals of a Typical Computer
 - Networking and Communications
 - Benchmarking
- Software Issues
 - Evolution of Languages & Programming
 - Floating Point Numbers
 - General Programming Techniques
 - Tools
 - Profiling

Syllabus (II)

- High Performance Computing
 - Optimising a Serial Program
 - Introduction to Parallel Programming
 - How to Write a Parallel Program
 - Illustration of CUDA Programming
- Example Applications
- The Future

Assessment

- Programming Challenges
 - 25% of module
 - set weekly
 - Start with pre-written code and then move on to writing own
- Final assessment
 - 75% of module
 - Split into two parts, both set in T1 week 10, handed in T2 week 1 and T2 week 3
 - will contain a parallel programming challenge!