

University GPU Club

Friday 18 March 2011

Agenda

- GPU Computing at UoM
 - IT Services for Research
- Initial Experiences with OpenCL
 - Sam Proctor
- Tools for GPU
 - Igor Kozin
- Experiences porting C to CUDA
 - Daniel Goodman
- News plus Q&A

GPU Computing at UoM

IT Services for Research

Robin Pinning

Michael Croucher

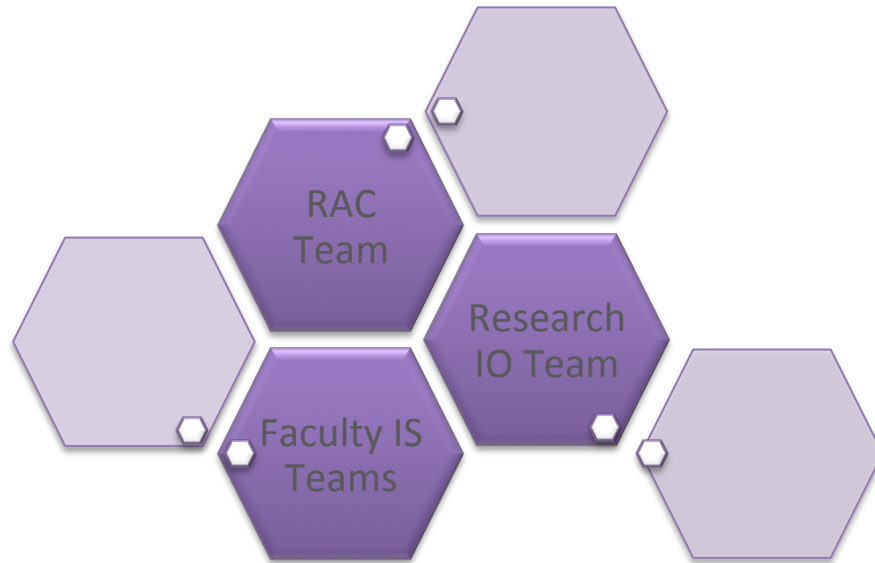
George Leaver

GPU Resources for the Computational Science Community

IT Services for Research

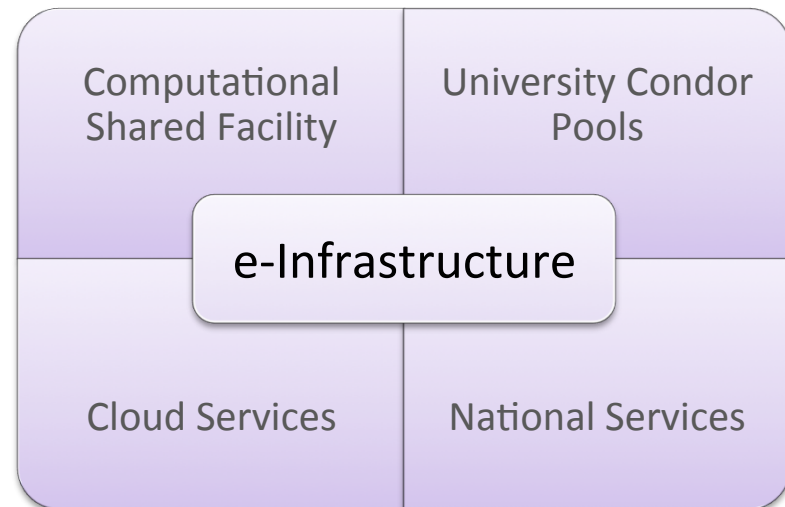
Robin Pinning

IT Services for Research



- Training
- Application Support
- In-depth Support

- IT Research Lead
- Virtual, cross campus team
- Academically-led



GPU Facilities

- Computational Shared Facility
 - GPU based contribution
 - HPC and single GPU configurations
 - Research funded
 - Pump-priming access
- STFC Daresbury Disco
 - nVidia, AMD
 - Infiniband connected
- Amazon CCI – Cycle Computing

GPU Enabled Software at Manchester

Michael Croucher

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Mathematica 8 : OpenCL and CUDA

- Integrated as a built-in core component of *Mathematica*.
- Hand-optimized GPU functions for linear algebra, financial computation, and image processing.
- Load user-defined CUDA and OpenCL programs, binaries, or libraries.
- Platform-independent way to compile CUDA and OpenCL programs.
- Symbolically generate CUDA or OpenCL programs.
- Easy setup, using *Mathematica*'s paclet system to get required user software.
- *OpenCLLink* support for both NVIDIA and ATI hardware.
- Compatibility with CUDA compute architectures 1.0 to 2.0 with support for both double and single precision.
- *CUDALink* and *OpenCLLink* scale to utilize all GPUs on the system.

Standalone licenses available now on request
Full campus release expected April 2011

MATLAB and the Parallel Computing Toolbox: CUDA

- Data manipulation on NVIDIA GPUs
- GPU-accelerated MATLAB operations
- Integration of CUDA kernels into MATLAB applications without low-level C or Fortran programming
- Compute level 1.3 or above only
- Limited support on 2010b, better support on 2011a

PCT currently unavailable to campus

EPS are funding 100 licenses, Humanities funding 40

Waiting to hear from center and other faculties

Optimistic PCT, 2011a release to campus: April 2011

Realistic release: May 2011

PGI Accelerator Compilers: CUDA compiler directives

```
!$acc region
  do k = 1,n1
    do i = 1,n3
      c(i,k) = 0.0
      do j = 1,n2
        c(i,k) = c(i,k) + a(i,j) * b(j,k)
      enddo
    enddo
  enddo
!$acc end region
```

Planned network licenses for Fortran and C
Jointly funded by ITSfR and Manchester academics
Expected availability: April or May 2011

GPU Training

George Leaver

Training

- AMD: OpenCL
 - Andre Heidekruger (AMD GmbH)
 - GPGPU & AMD software stack
 - 1 Day Workshop, 9th May 2011
- NAG: OpenCL / CUDA
 - Oxford, aimed at HECToR users.
 - Intro to CUDA 23/24 May.
 - Intro to OpenCL 25/26 May.
 - Negotiating Manchester courses

Training

- ITSfR: OpenCL
 - Follow-up course
 - Summer/Autumn 2011

- ITSfR Courses

<http://www.rcs.manchester.ac.uk/courses>