Parallel Programming with Fortran Coarrays: Overview of Exercises

MSc in HPC

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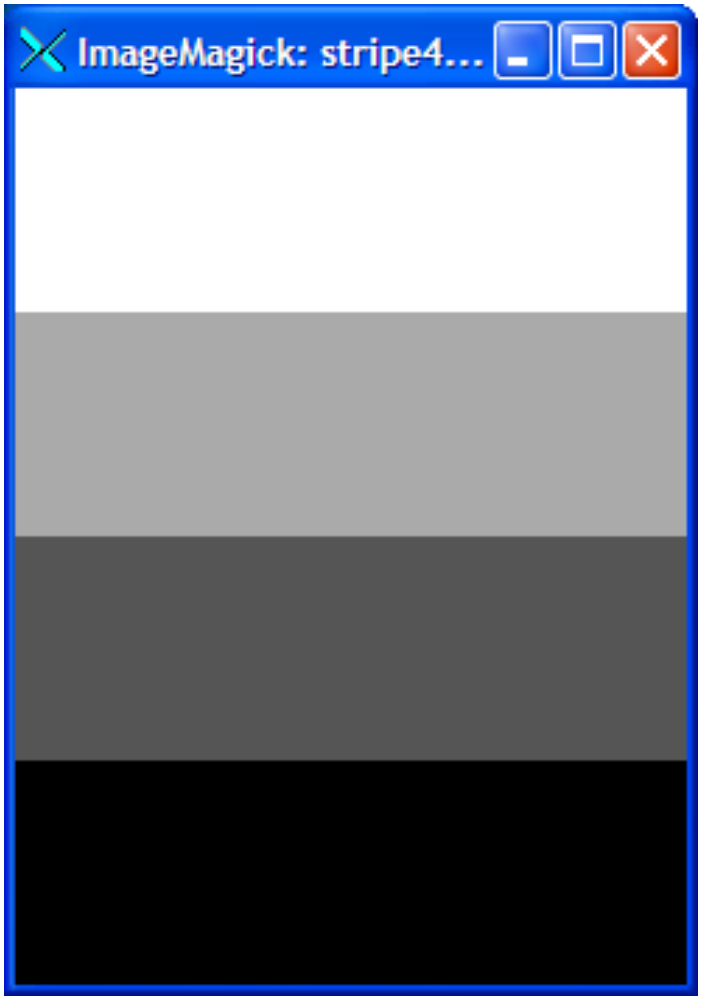
Exercise 1

- Hello world example
  - check you can log on, compile, submit and run
- Writing arrays as pictures
  - declare and manipulate coarrays
  - write out arrays in PGM picture format
  - view them using **`display`** from ImageMagick
  - use both remote reads and remote writes

Sample output on 4 images



Exercise 2

- Perform simple edge detection of features in a picture
  - halo communication between 1D grid of images
- Reconstruct picture from supplied edges
  - an iterative algorithm
  - computationally intensive so worth parallelising
- Terminate based on some stopping criterion
  - requires global sums
- Use global or point-to-point synchronisation
- Look at scalability

Edge detection and picture reconstruction

single pass

hundreds
of iterations

Exercise 3 (Extra)

- Decompose picture across a 2D grid of images
  - using multiple codimensions

Documentation

- Full instructions in exercise notes
  - PDF copy in doc/ subdirectory

- **Go at your own pace**
  - no direct dependencies between practicals & lectures
  - each exercise follows on from the last

- If you're not sure what to do or if you have any other questions then please ask us!