Monte Carlo Integration and MPI

September 6, 2016

The homework questions are due at the 23:59 on Friday 17 September. Please turn in source codes, compilation, submission scripts used and also output files. Please cite any references you use.

1 Monte Carlo Integration

Homework question 1

a) Explain why using Monte Carlo to evaluate

\[ \int_{0}^{1} \frac{4}{1 + x^2} \, dx \]

allows you to find \( \pi \) and, in your own words explain what the serial and parallel programs do. It may be helpful to checkout/look at a calculus book from the library.

b) Find the time it takes to run the parallel Fortran, Python and Java monte carlo programs in the references on 20, 40, 80, 160 and 320 cores.

c) Using a language with MPI bindings, write serial and parallel monte carlo programs to evaluate the volume of the six dimensional unit sphere

\[ 1 \geq \sum_{i=1}^{6} x_i^2 \]

d) Find the time it takes to run your parallel program on 20, 40, 80, 160 and 320 cores.
2 General background

Homework question 2

a) Find three upcoming conferences related to parallel computing. Where will they be held and on what dates? Give titles of one paper you find interesting from the previous versions of each of the three conferences.

b) Find and summarize a journal article, conference article or thesis on mobile (smartphone/tablet) computing using GPUs.

References


[6] Dalcin, L. “MPI4PY compute-pi example - release 2.0” https://bitbucket.org/mpi4py/mpi4py/src/a2d80977c7b74ae5c7cf89ebbdc76de173ab02d2/demo/compute-pi/?at=2.0.0