Introduction to Parallel Scientific Computing

Graham Horton

Parallel solution of a PDE with the Jacobi and Gauß-Seidel methods

The partial differential equation $-\Delta u = f$ is to be solved on the unit square. Implement parallel versions of the Jacobi and Gauß-Seidel methods. It is best to use vertical strip partitioning of the grid.

There is a sequential version of the program available in which the exact solution is $u = x^2 + y^2$, i.e. $f = -4.0$.

N.B. The Gauß-Seidel program is very easy to derive from the Jacobi program.

1. Compare the speedups of the two methods as a function of number of processors and grid size.
2. Compare the number of iterations needed for a given accuracy.
3. Which method is better overall? Why?