Invited Talk

Solving Optimization Problems Using Parallel and Grid Computing

Jorge Nocedal, Northwestern U., USA

Optimization problems involving millions of variables arise in three classes of applications: optimal control, inverse problems and shape optimization. In all these cases the simulation requires the solution of 3D partial-differential equations, which must be performed using parallel computing environments. We will present case studies illustrating the state-of-the-art of this field, which is often called “PDE-constrained optimization”, and we will discuss open problems and future research directions.

The second part of the talk will be devoted to the solution of discrete/continuous optimization problems using Grid Computing. We describe how a master-slave driver can harness hundreds of workstations to explore the solution space and identify a solution. The computing is controlled by the Condor management system.

We conclude the talk by outlining the computing environments that will be needed by the next generation of climate modeling and weather forecasting systems, and in the simulation of flow in nano tubes.

Short Biography

Jorge Nocedal obtained his B.S. in Physics from the National University of Mexico and a Ph.D. in Mathematical Sciences from Rice University. His areas of research are scientific computing and numerical optimization. Prior to moving to Northwestern in 1983, he taught at the National University of Mexico and the Courant Institute of Mathematical Sciences.

He has developed five popular software packages, including L-BFGS and Knitro. In 1994 he founded, together with Steve Wright, the Optimization Technology Center, which is operated jointly by Argonne National Lab. and Northwestern University. In 1998 he was appointed Bette and Neison Harris Professor at Northwestern. In 2001 he became the president of Ziena Optimization, a Chicago-based company devoted to optimization software. He is currently the director of the the Cross-School Initiative on Computational Science at Northwestern University.

He has served in the editorial board of SIAM J. Optimization, Mathematical Programming (both as co-editor and associate editor) and Mathematics of Computation. In 1999 he published the book “Numerical Optimization” in collaboration with Steve Wright.