ABSTRACT

Stochastic optimization is a paradigm for incorporating uncertainty into decision models. We provide a brief introduction to stochastic optimization, and then proceed to present PIPS, a novel hybrid parallel solver for Sample Average Approximation (SAA) problems based on a Schur-complement technique for decomposing structured optimization problems. We developed a specialized parallel factorization procedure for dense Schur-complement systems, together with a streamlined method for assembling such matrices. PIPS is applied to a stochastic economic dispatch problem which has important applications for a future smart grid. Strong scaling efficiency of 96% is obtained on 32 racks (131,072 cores) of the “Intrepid” Blue Gene/P system at Argonne National Laboratory.