Session: Parallel Combinatorial Optimization
session chair: Cynthia Phillips

Speaker: Jonathan Eckstein

SAND2007-3650C

Title: Enumeration of Near-Optimal Solutions in Parallel Branch and Bound

Abstract: Optimization model limitations or data inaccuracies may make one interested in multiple near-optimal solutions, rather than a single optimum. We discuss enhancement and generalization of the PEBBL parallel branch-and-bound package's enumeration logic, which includes relative, absolute, and cardinality tolerances. The interaction of parallelism, the cardinality tolerance, and possible duplicate solutions generated by incumbent heuristics makes for a significant implementation challenge.

Speaker: Jean-Paul Watson

Title: Extending Recent MIP Heuristics to Parallel Environments: Architecture and Performance Analysis

Abstract: Several very effective general-purpose MIP heuristics have been introduced over the last 5 years for both incumbent generation and improvement. These include the feasibility pump, local branching, and relaxation-induced neighborhood search. We investigate extensions and applications of these heuristics to parallel computing environments, specifically Sandia's PICO parallel MIP solver. We focus on performance assessment and general management of multiple MIP heuristics in parallel contexts.

Speaker: Jonathan Berry
Co-author: Cynthia Phillips
Tite: Solving facility location problems on massively multithreaded machines
Abstract:

COIN contains an implementation of Barahona and Chudak's "Volume algorithm" (VOL). This is an improvement upon the classical subgradient algorithm for lagrangian relaxation. Although VOL is a general lp solution method, it has been applied with particular success to the p-median and uncapacitated facility location problems. We have developed a modified VOL code that runs on massively multithreaded supercomputers and generated this platform's first optimization results for a COIN-based code.

Speaker: Cynthia Phillips
co-author: Robert Carr

Title: Fractional Decomposition Trees: A new (parallel) heuristic for general mixed-integer programs

abstract:

We present a new algorithm for finding a feasible solution for a integer program that is well suited for parallel implementation. The algorithm runs in time polynomial in the input size and is guaranteed to find a feasible integer solution for any problem class that has a finite integrality gap. The algorithm is based on convex decomposition of scaled linear-programming relaxations, so in general it provides a suite of integer solutions. A faster heuristic gives only one feasible solution.