Solving routing and scheduling problems using LocalSolver

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In this talk, we introduce LocalSolver, a heuristic solver for large-scale optimization problems. It provides good solutions in short running times for problems described in their mathematical form without any particular structure. Models supported by LocalSolver involve linear and nonlinear objectives and constraints, including algebraic and logical expressions, in continuous and discrete variables. LocalSolver starts from a possibly infeasible solution and iteratively improves it by exploring some neighborhoods. A differentiator with classical solvers is the integration of small-neighborhood moves whose incremental evaluation is fast, allowing exploring millions of feasible solutions in minutes on some problems.

We will present the set-based modeling formalism recently introduced in LocalSolver. Offering set decisions (sets/lists of integers) and operators (count, at, indexOf, contains, disjoint, partition), this mathematical formalism allows to model routing and scheduling problems naturally and compactly, as well as to solve them more efficiently than the traditional Boolean modeling approach related to mixed-integer linear programming. We will show application examples on basic combinatorial problems (traveling salesman, vehicle routing, flow shop scheduling) together with performance benchmarks.