Overview

SAS/OR 14.1 delivers a number of new features and capabilities in its two most active areas, mathematical optimization and discrete-event simulation.

Optimization

A number of new optimization features help shorten optimization time, improve diagnostic capabilities, and make the software easier to use.

Many optimization solvers improve their performance:

- Linear programming (LP) solver: the interior point algorithm is 1.3 times faster, and simplex algorithms are slightly faster.
- The mixed integer linear programming (MILP) solver is 1.35 times faster overall.
- Decomposition algorithm for LP and MILP: The algorithm specified by the METHOD=AUTO option is 2.1 times faster and solves 50% more test problems to optimality within an hour. Solving to a 5% optimality gap is 3.1 times faster.
- Nonlinear programming (NLP) solver: the active-set method is 1.04 times faster for general problems and 1.1 times faster for more difficult problems.

The NLP solver and the quadratic programming (QP) solver each add the IIS= option, which detects an irreducible infeasible set among the linear constraints and decision variable bounds for a problem that is found to be infeasible. Identification of irreducible infeasible sets provides valuable guidance in restoring infeasible problems to feasibility.

The MILP solver runs in parallel mode by default, shortening solution times by using multiple computational cores.

The decomposition (DECOMP) algorithm for linear programming (LP) and mixed integer linear programming (MILP) adds the SET value for the METHOD= option. This value directs the DECOMP algorithm to find a set partitioning or set covering structure in the constraint matrix. If detected, these constraints serve as the linking constraints, and the remaining weakly connected components of the constraint matrix define blocks of constraints for use in the DECOMP algorithm.

The OPTMODEL Procedure

The COFOR loop distributes processing across multiple computational nodes when you specify a value greater than 1 in the NODES= option in the PERFORMANCE statement.

The CLP solver invocation via the SOLVE WITH CLP statement is at production status.

The PROFILE statement enables you to invoke and configure the PROC OPTMODEL profiler, which tracks and reports the time spent processing declarations, the time spent executing statements, and the number of times statements are executed. The profiler can help you identify elements of problem generation, presolve, and the solution process that require large amounts of time, and so can be a useful aid in error detection and performance improvement.

The OPTNET Procedure

PROC OPTNET adds enhancements to three of the algorithms that it uses. The TSP (traveling salesman problem) algorithm can solve asymmetric problems, which are defined on directed graphs; the shortest path algorithm can accept negative link weights; and the default connected components algorithm for undirected graphs is the more efficient union-find algorithm.
PROC OPTNET produces ODS tables as output and supports the use of the PERFORMANCE statement to specify options for computation across multiple cores.

The CLP Procedure
The new WDEG and DOMWDEG values of the VARSELECT= option offer new conflict-directed variable selection strategies.

The new DOMDDEG value of the VARSELECT= option offers a new dynamic variable section strategy.

The PACK and LEXICO statements are promoted to production status.

Simulation
SAS® Simulation Studio 14.1, a component of SAS/OR 14.1 for Windows environments, adds features that improve the accuracy of your models and give you additional controls on model execution. Changes include the following:

- Four blocks (Modifier, Extractor, Gate, and Formula) now include the ability to increase or decrease the execution priority of any dynamically created input or output port. Correct port execution ordering can be critical to ensuring that your model functions properly.
- Centralized controls now enable you to rank the blocks in a model, determining which of several events scheduled for the same simulation clock time are executed first. This block ranking addresses the same type of issue as port execution order, but on a larger scale. The model-wide Block Ranking dialog box enables you to specify tie-breaking priority rules to determine which block’s events execute first.
- The new FairIntegerBased policy for resource entities ensures that any upward or downward adjustments are made in integer increments. Increases are distributed as evenly as possible. This policy closely imitates the adjustment pattern for many real-world resources that are modeled with resource entities.

For More Information
For more information about SAS/OR 14.1, see the SAS/OR 14.1 documentation at http://support.sas.com/documentation/onlinedoc/or/index.html or contact:

Ed Hughes
SAS/OR Product Manager