

NEOS

XML-standard formats

Problem analysis and solver choice

Web services

Benchmarking and verification

. . . with Jorge Moré, Todd Munson, Jason Sarich

XML-Based Standard Formats

Motivation

- Simplify connecting modeling systems to solvers
- Simplify connections to other applications

Prototype for LP & MIP

- Schema
- Libraries
- Compression

Plans

- Extensions to more difficult problem types
- High-profile examples

. . . with Leo Lopes, Kipp Martin

Problem Analysis & Solver Choice

Motivation

- Encourage NEOS use by non-experts
- Gather data for NEOS job scheduling

Problem analysis

- Information included with problem instance
- Characteristics determined by analyzer
- Convexity

Solver choice

- Queries on relational database

Plans

- Initial release due soon
- Extensive testing of convexity analyzers
- Addition of submission statistics to database

. . . with Dominique Orban, John Chinneck

Web Services

Motivation

- Take advantage of new web service standards
- Scale up remote services for optimization

“NEOS of the future”

- More general, flexible design: SOAP, UDDI, WSDL
- Less centralized architecture
- Better use of computer power: idle time, grids, etc.

Plans

- Still being formulated

. . . with Jun Ma, Gautam Mitra

Benchmarking

Motivation

- Assess overall performance of competing solvers
- Help people choose solvers for particular applications

Current operation

- Run multiple solvers on the same problem, same machine
- Verify solver results
- Summarize performance

Plans

- Run multiple solvers on multiple problems
- Extend to new problem types: SDP/SOCP, MPEC
- Automatically generate performance profiles
- Automatically post & update results on standard benchmarks

. . . with H.M., GAMS people?

AMPL

New formulations for combinatorial optimization

Support of SDP/SOCP problems

Support of stochastic programming problems

. . . with David Gay, Brian Kernighan

Combinatorial Optimization

Motivation

- Handle discrete problems that have weak MIP formulations
- Take advantage of constraint programming solvers

New expression and constraint types

- and, or, not
- atmost, atleast
- all-different, number-of
- variables in subscripts

Plans

- Add final extensions to AMPL translator
- Finish connection to solver

... with ILOG

Stochastic Programming

Motivation

- Support use of SP solvers
- Encourage modeling of optimization under uncertainty

Projects using AMPL

- SAMPL preprocessor: retains extensive indexing
- StAMPL preprocessor: hides time and scenario indexing
- Random AMPL parameters

Plans

- Complete and report these projects
- Rationalize solver connections

. . . with Leo Lopes; Gautam Mitra et al.

SCP & SOCP

Motivation

- Support through modeling languages
- Recognize in standard nonlinear formulations

Plans

- Nothing (semi-)definite yet

Noisy Distributed Objectives

Motivation

- Apply optimization to complex design problems
- Employ decentralized simulations & databases

Examples at Motorola

- Circuit board design

Plans

- Derive non-confidential examples from Motorola problems
- Adapt ideas that worked at Motorola
- Study surrogate functions and other approaches

. . . with Jun Ma