

# 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

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# 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

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# 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

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# 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*

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# 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

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# 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

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