

**DALHOUSIE
UNIVERSITY**

Inspiring Minds

New developments in OSiL, OSoL and OS

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Overview

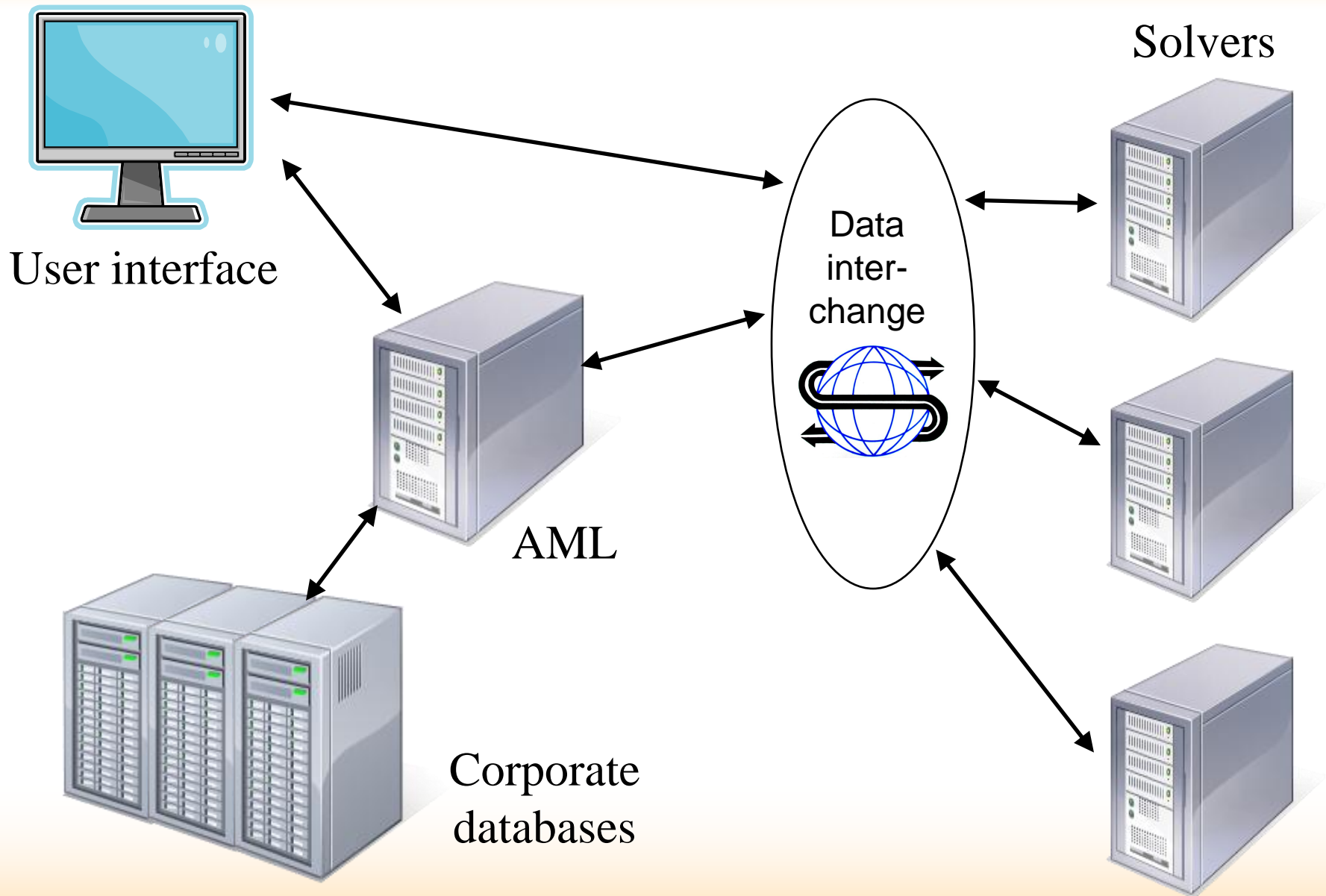
- Introduction
- Robust Optimization
- Special ordered sets
- OSoL parser
- Other recent additions
- Future work



What is Optimization Services?

- Set of standards for optimization
 - OSiL: Problem instances
 - OSrL: Optimization result
 - OSoL: Solver options
- Parsers and solver interfaces for local and distributed computing
- COIN-OR project





OSiL: Optimization Services instance Language

- XML schema for deterministic and stochastic programs:
 - <variables>
 - <objectives>
 - <constraints>
 - <linearConstraintCoefficients>
 - <quadraticCoefficients>
 - <nonlinearExpressions>
 - <specialOrderedSets>
 - <robustOptimization>
 - ...



Robust optimization

- Example:

$$\min \max f(x, c)$$

$$\text{s.t.} \quad F(x, c) \leq 0$$

$$H(c) \leq 0$$

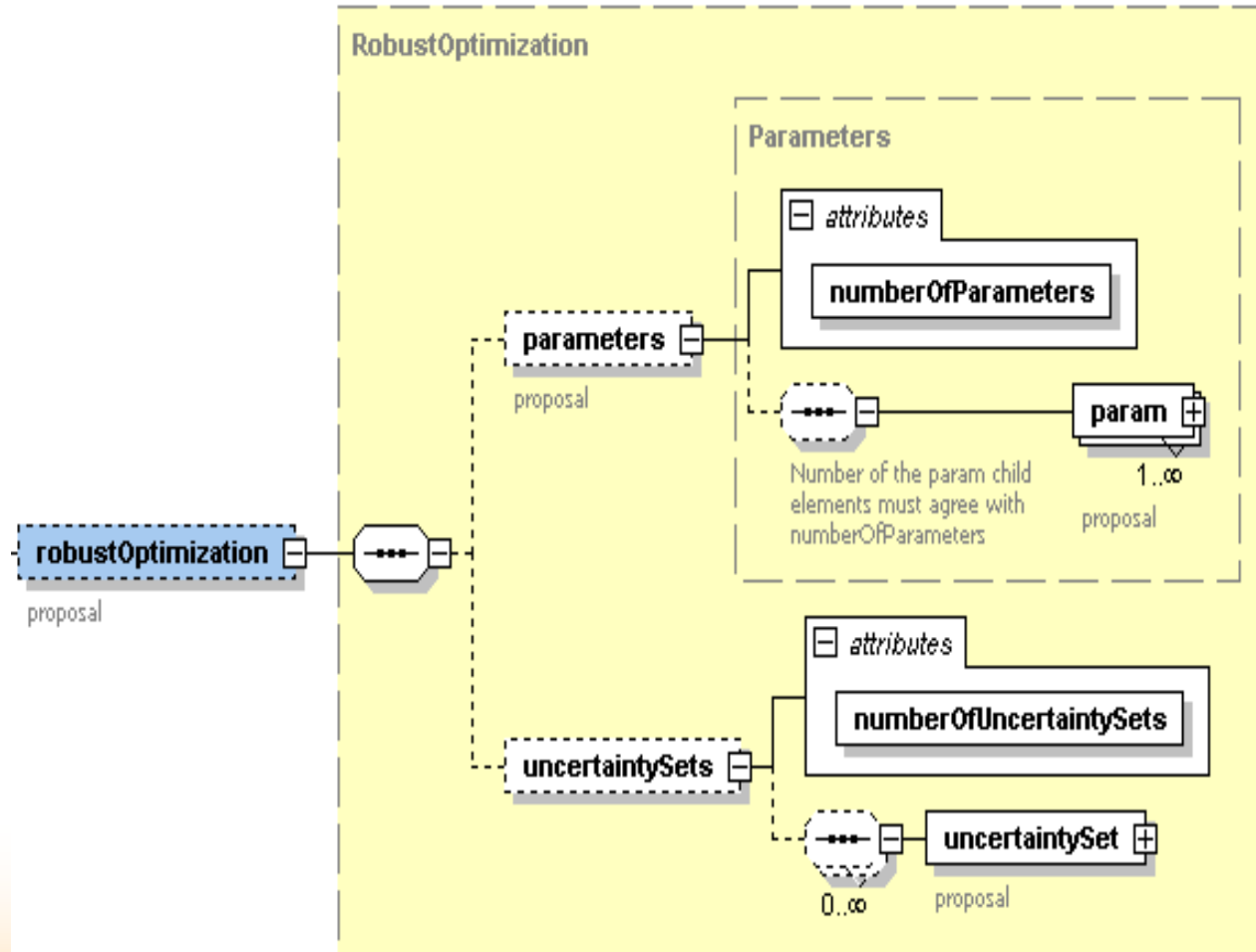
$$l_x \leq x \leq u_x$$

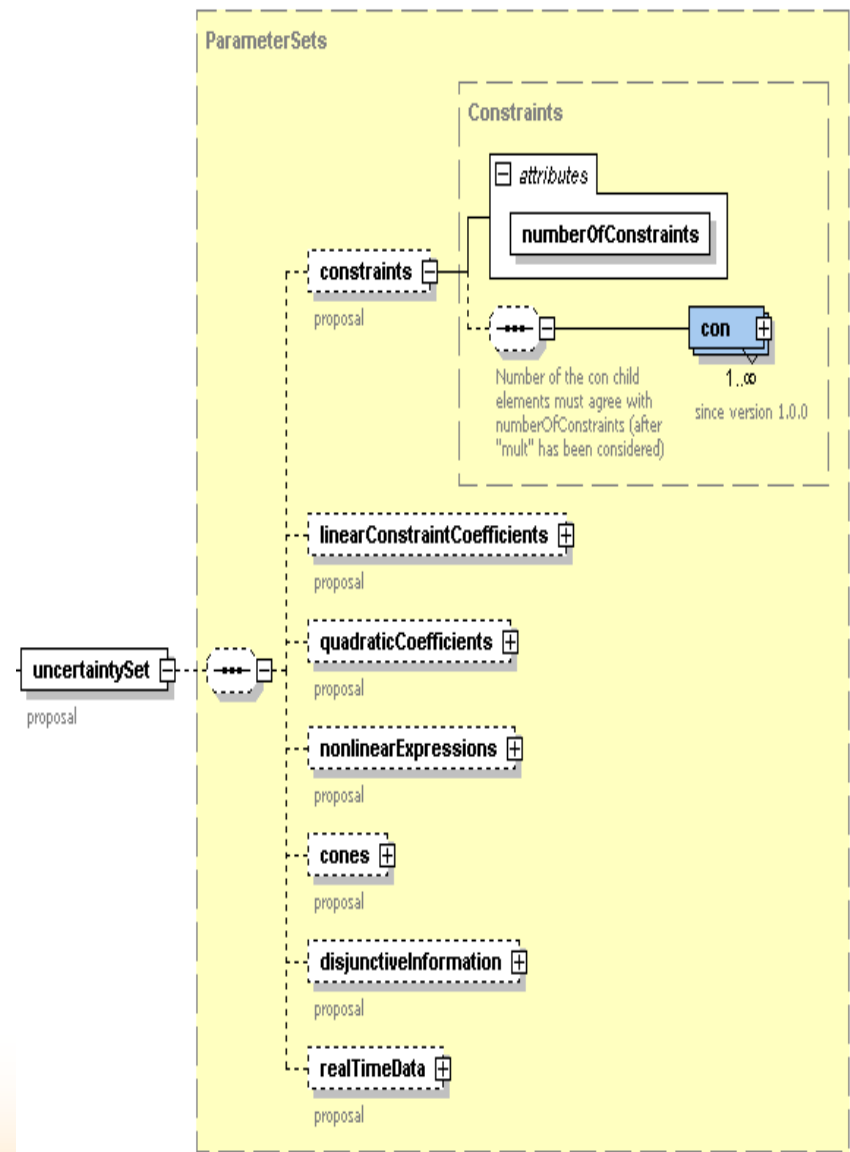
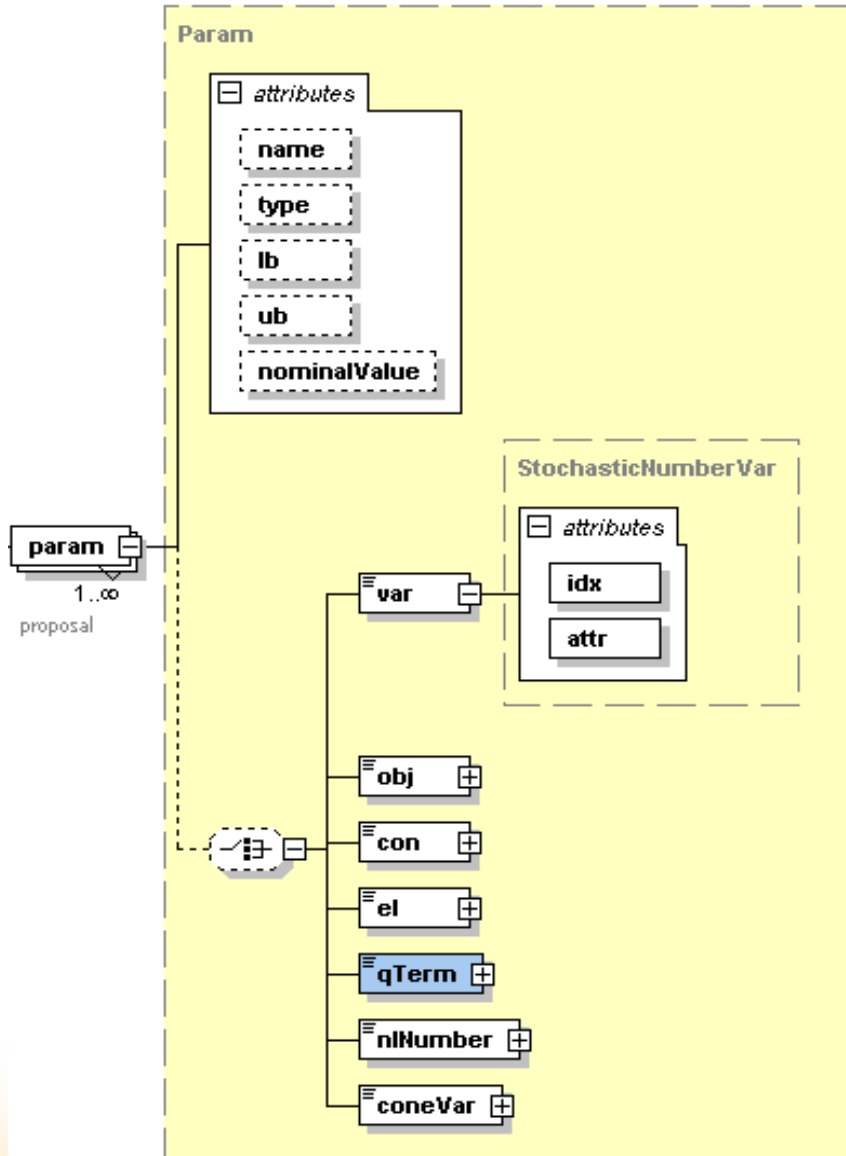
$$l_c \leq c \leq u_c$$

Under suitable conditions, the complexity of the problem is not changed by the introduction of uncertain parameters



OSiL: <robustOptimization>



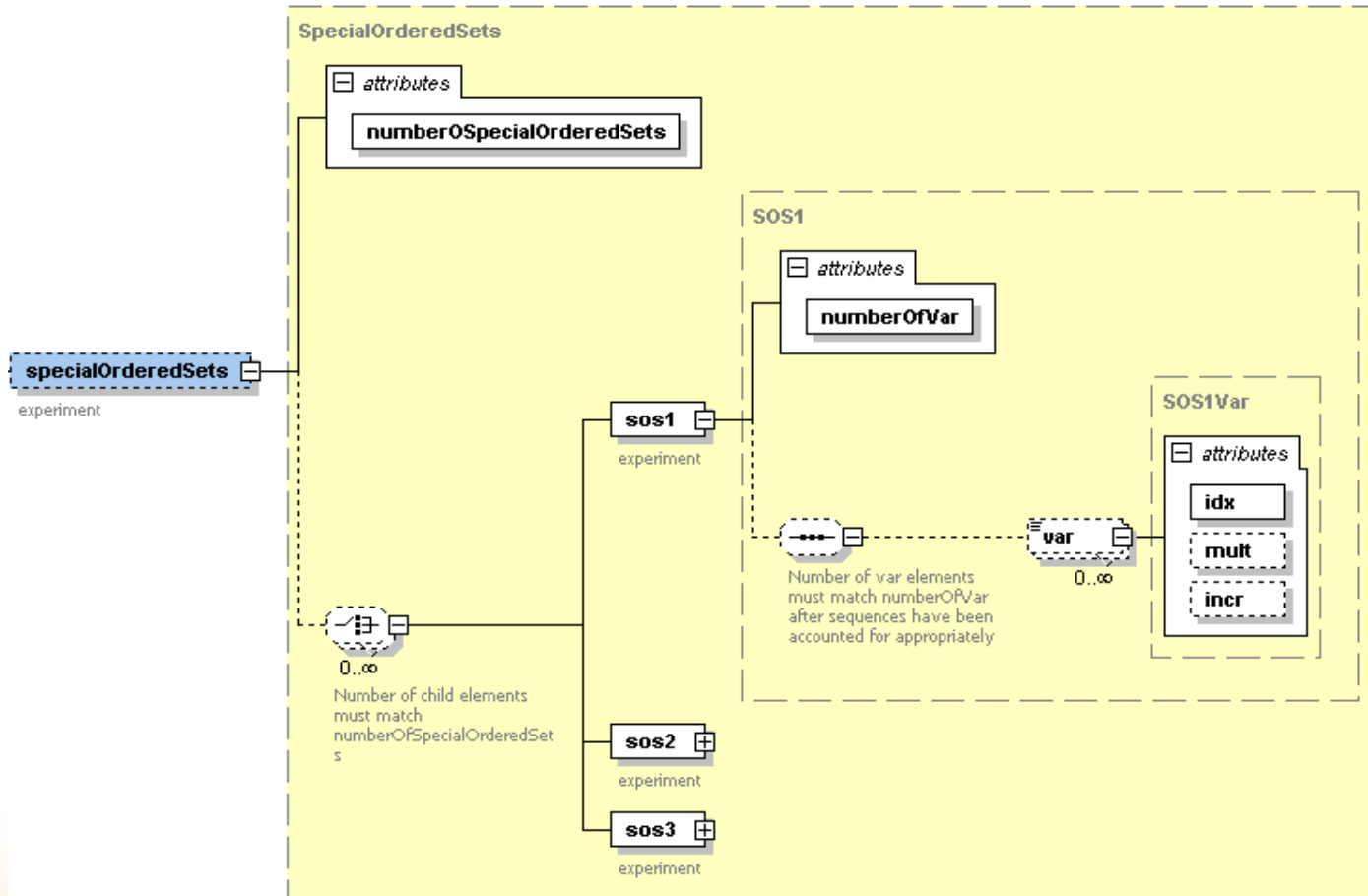


Special ordered sets

- SOS Type 1
 - At most one variable in the set can be nonzero
- SOS Type 2
 - At most two variables in the set can be nonzero ...
 - ... and they must be consecutive
- SOS Type 3
 - Like SOS1, but there is an explicit convexity row



OSiL: <specialOrderedSets>



OSoL: Optimization Services option Language

- XML schema for solver options
 - General options for distributed computing
 - Username, password, location, etc.
 - System options
 - Disk space, CPU requirements
 - Job options
 - Dependency on other jobs, file and directory options, time limits, etc.
 - Solver options
 - Tolerances, initial values, priority rules for SOS, etc.
- Parser added to OS trunk on October 4



Other recent additions

- Added solver support
 - DyLP
 - Bonmin
- Lossless I/O for transmitting OSiL files
- GAMSlinks
- Visual Studio 9.0 support
- Sparsity patterns for Hessian computation (CppAd)
- Excel VBA interface
- Precompiled Windows binaries
- Current stable version 1.1.1 (released 30 September)

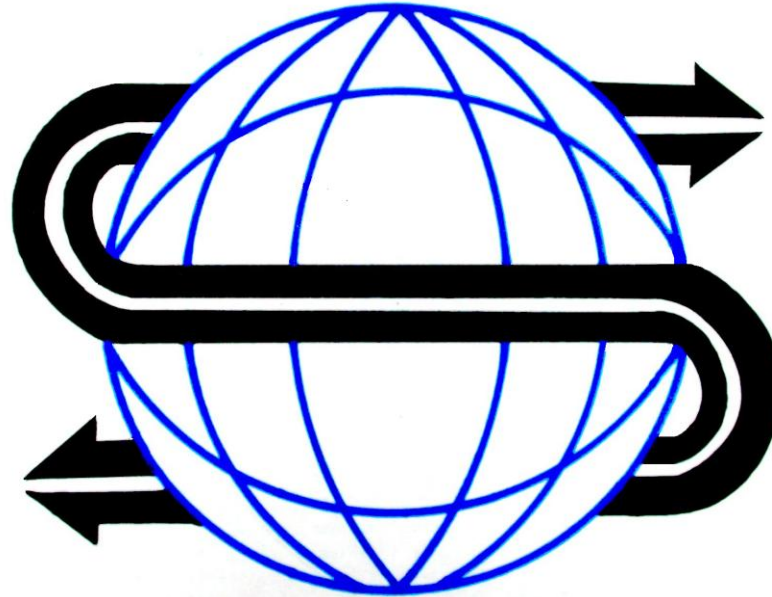


Future work

- Support for stochastic programs
 - Deterministic equivalent
 - Decomposition solver
- Disjunctions
- Cone programming



QUESTIONS?



<http://myweb.dal.ca/gassmann>

<http://www.optimizationservices.org>

<http://www.coin-or.org/projects/OS.xml>

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