

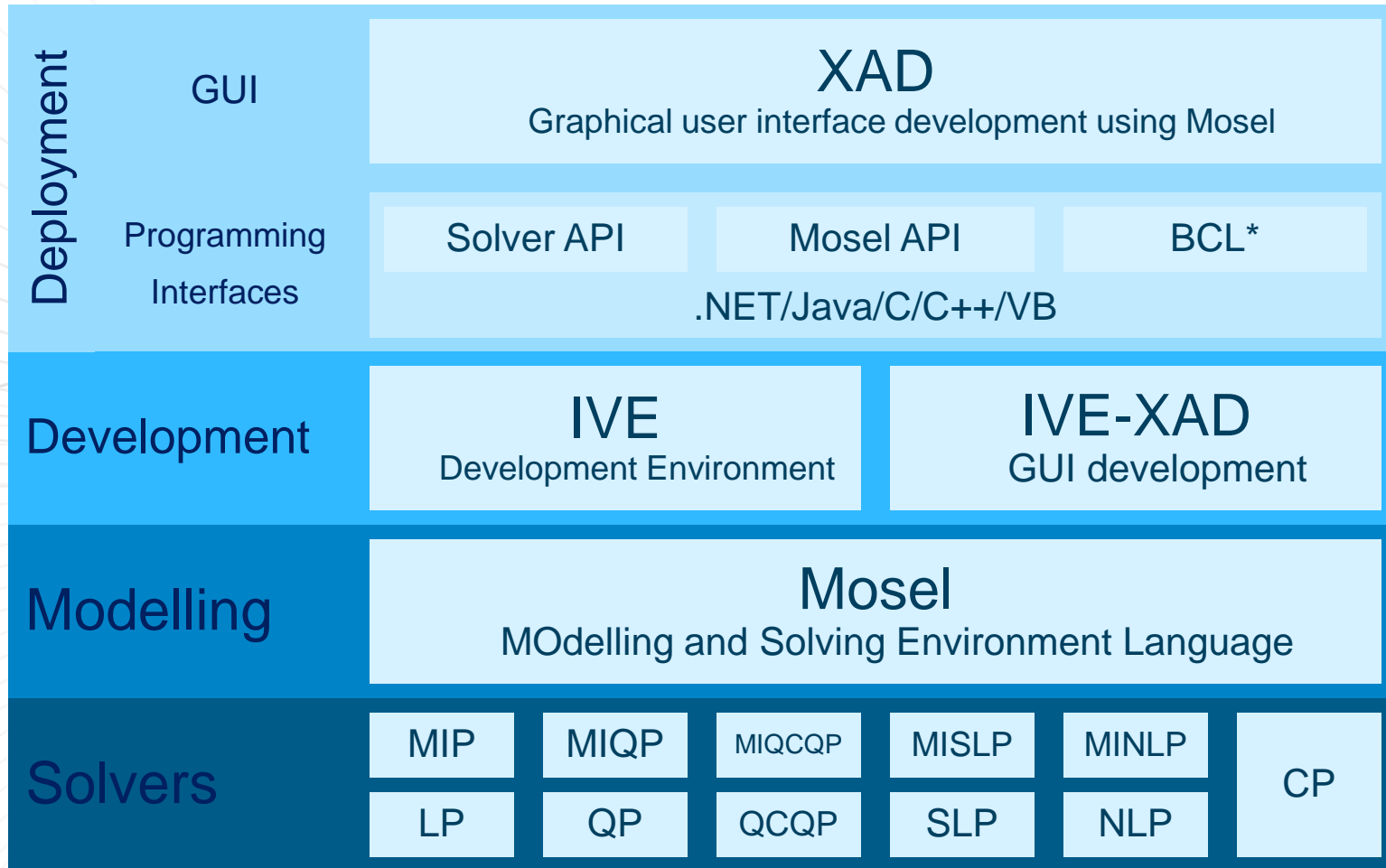
Ultra-Large Scale Optimization with FICO Xpress Optimization Suite 7.1

Facts

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* Builder Component Library for modelling in a programming language

» **Solve much bigger problems**

- » The possibilities are limitless with the enhanced optimization and modeling support for solving ultra-large-scale models where the number of coefficients can exceed 2 billion.

» **Solve large problems faster**

- » Cut solution times dramatically by leveraging distributed execution of Mosel models that can now be controlled from a master model across a heterogeneous set of machines.

» **Get solutions faster with significantly improved solver performance**

- » Average increase of 50% arithmetic/50% geometric for multi-threaded MIP
- » Average increase of 50% arithmetic/25% geometric for single-threaded MIP
- » Average increase of 50% arithmetic/70% geometric for MIQP
- » Significant improvements to speed and stability of quadratic simplex and SLP non-linear algorithms

» **Improved developer usability**

» Developers will also enjoy greater productivity from usability improvements to the development environment and enhanced modeling functionality such as the MIIS automated modeling error/infeasibility detection.

» **Easier to integrate with other applications**

» Optimization programmers will be pleased by the addition of simplified and more robust data exchange capabilities between Mosel and applications.

Some Further Highlights

- » Matlab Interface
- » MIIS (Mixed Integer Irreducible Infeasible Subset)
- » Reducing Fractionals in Degenerate MILPs
- » Clique Implied Bound Cuts and Conflict Cuts
- » Improved Branching strategies
- » Deterministic concurrent solver for fast MIP root solves
- » Reproducibility of runs stopped by a time criterion

- » 26 years of experience in modelling and optimization
 - » 24 years of experience in mixed integer optimization
 - » 12 years of experience in nonlinear optimization
 - » 10 years Xpress-Mosel, modelling and solving environment
-
- » Integration of modelling and solving
 - » Focus on (potentially) exact solution methods
 - » Xpress-Solvers often can prove optimality of the solution
 - » They always give you information on the quality of the solution

» Solving

- » 1983: LP solver running on PCs
- » 1992: parallel MIP (1997 on distributed PC/Linux networks)
- » 1995/1996 : commercial branch and cut algorithm
- » 1998: bound switching in dual simplex
- » 2003: lift-and-project cuts
- » 2009: parallel MIP heuristics
- » 2010: LP/MIP solver crosses 64-bit coefficient indexing threshold

» Modelling

- » 1983: general purpose algebraic modelling language (mp-model)
- » 2001: algebraic modelling language combining modelling, solving, and programming (Mosel)
- » 2005: profiler and debugger for a modelling language
- » 2005: user-controlled parallelism at the model level
- » 2010: algebraic modelling language supporting distributed computing

Xpress Optimization Suite Users

FICO™



ORACLE®

AVIS®



P&G



Honeywell



Our Experience in detail



- » Supply chain optimization
- » Portfolio generation + maintenance
- » Personnel scheduling
- » Production scheduling
- » Vehicle routing
- » Process industries (blending)
- » Trade optimization
- » Marketing optimization
- » Generalized assignment (e.g. facility location)
- » Auctions
- » Airline operations
- » Electricity generation, supply and pricing

- » Unique capabilities for large scale optimization including ability to solve ultra-large problems (true64bit capabilities) and support for distributed modeling and optimization
- » Complete set of state-of-the-art optimization engines that are robust, reliable and faster than competing solutions
- » An easy-to-learn, powerful modeling and programming language, Xpress-Mosel
- » The premier visual development environment, IVE, for developing mathematical models
- » An intuitive drag-and-drop editor for creating GUIs that seamlessly integrate with the model for rapid prototyping and deployment
- » A partner committed to solving all of your most difficult optimization problems

THANK YOU

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