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Julia Smooth Optimizers: Streamlined Research and Recent Developments of the Ecosystem

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Julia Smooth Optimizers (JSO) is an organization created in 2015 focused on streamlining the development of research-level optimization solvers and providing high-performance linear algebra and optimization packages for end-users. We are the maintainers of the packages NLPModels.jl, CUTEst.jl, Krylov.jl, LinearOperators.jl, Percival.jl, JSOSolvers.jl, and around 40 other packages. In this talk, we will provide an overview of how JSO streamlines the process of going from a prototype to a high-performance solver and recent advances in some of our packages, especially end-user packages.

We provide the tools to allow quick prototyping and evaluation of new optimization solvers while permitting an upgrade to publication-ready benchmarking and reporting. The researcher can test their code with problems created with single-line AD-powered models, convert from JuMP or AMPL, or load from CUTEst. They can run benchmarks on our existing problem repositories and export the results to LaTeX tables and performance profiles. Furthermore, we provide tools to enable high-performance implementations, such as matrix factorization packages, matrix-free linear systems and least squares solvers, and trust-region and line search subsolvers.

Another endeavour inside JSO is to provide end-user solutions as well. We deliver optimization solvers, matrix-free and factorization-based linear system solvers, and least squares solvers. More recently, we have been working on a user-friendly interface for JSO solvers that will be a one-stop solution for all optimization needs. It is, at the time of writing, yet unreleased.

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