

# Coin-HSL

## Category

Software/HSL

## A collection of HSL packages for use with IPOPT

Latest version: 2024.05.15

HSL provides a number of linear solvers that can be used in IPOPT. We provide several different ways for IPOPT users to download our codes.

### Which solver?

For general use we recommend HSL\_MA97. For small or highly sparse problems use MA57. For huge problems use HSL\_MA86 (if factors fit in memory) or HSL\_MA77 (if they don't).

Solver	Free to all	Free to academics	Problem size	Parallel	Repeatable answers	Notes
MA27	<a href="#">Yes</a>	Yes	Small	No	Yes	Outdated, relatively slow. <a href="#">Can be downloaded as a standalone package.</a>
MA57		Yes	Small / Medium	Threaded BLAS	Yes	
HSL_MA77		Yes	Huge	Limited	Yes	Out-of-core
HSL_MA86		Yes	Large	Highly	No*	Designed for multicore
HSL_MA97		Yes	Small / Medium / Large	Yes	Yes	Slower than HSL_MA86 on large problems

\* **Note:** HSL\_MA86 achieves repeatable answers in serial, however when running in parallel operations may be reordered for better performance. This leads to different (but equally valid) solutions.

### Performance tips

- Try different scaling options using solver specific settings in ipopt.opt.
- For many problems scaling is not necessary. In particular try "ma57\_automatic\_scaling no" when using MA57 on small problems.
- See our report [On the effects of scaling on the performance of Ipopt](#) for a review of these effects.
- When using HSL\_MA86 or HSL\_MA97 ensure MeTiS ordering is compiled into Ipopt to maximize parallelism.

## Learn more

