MOSEK Release notes

Release 10.0.16(BETA)

MOSEK ApS

21 June 2022

Contents

Chapter 1

Supported platforms

Below are the **minimal requirements** for various **MOSEK** interfaces and operating systems. In some cases using **MOSEK** with older versions of the software will be possible, but is neither actively supported nor tested.

Operating systems

Table 1.1: Operating systems

Platform	Minimal OS version	Specific library dependencies
linux64x86	RHEL 7, Ubuntu 18.04 or compatible	`GLIBC 2.17`, `GLIBCXX 3.4.11`
osx64x86	macOS 10.15	
win64x86	Windows 10, Server 2016	
win32x86	Windows 10, Server 2016	
linuxaarch64	Ubuntu 20.04 or compatible	`GLIBC 2.29`, `GLIBCXX 3.4.21`
osxaarch64	macOS 11	

Optimizer API and Fusion API

Table 1.2: Optimizer API and Fusion API.

Platform	C	C++(Fusion)	Java	.NET	.NET Core	Python
linux64x86	Yes	C++11	1.8	–	netstandard2.1	3.6-3.10
osx64x86	Yes	C++11	1.8	–	netstandard2.1	3.6-3.10
win64x86	Yes	C++11	1.8	4.5	netstandard2.1	3.6-3.10
win32x86	Yes	–	–	4.5	–	–
linuxaarch64	Yes	C++11	1.8	–	netstandard2.1	3.7-3.10
osxaarch64	Yes	C++11	17	–	netstandard2.1	3.8-3.10

Optimization Toolbox for MATLAB, Rmosek and other MOSEK tools

Table 1.3: Other APIs and tools.

Platform	MATLAB	R	AMPL Shell	MOSEK to AMPL link	OptServer	lmgrd
linux64x86	R2017a	3.6	—	Yes	Yes	Yes
osx64x86	R2017a	3.6	—	Yes	–	Yes
win64x86	R2017a	3.6	—	Yes	–	Yes
win32x86	–	–	–	Yes	–	Yes
linuxaarch64	–	–	–	–	–	Yes
osxaarch64	–	4.1	–	–	–	Yes

Other distribution channels (stable releases only)

- A Python Anaconda package. https://anaconda.org/MOSEK/mosek
- A Python wheels package. https://pypi.org/project/Mosek/
- A NuGet package. https://www.nuget.org/packages/Mosek/
- A Julia package. https://github.com/MOSEK/Mosek.jl
- A Rust package for the Optimizer API (unofficial). https://lib.rs/crates/mosek

Other remarks

- If you are using a floating license, the license server on Linux requires *Linux Standard Base 3* or newer is installed (package `lsb`).
- Numpy is required in Python Fusion.

Chapter 2

Major changes

Specific information regarding particular APIs, parameters and portability of code from version 9 can be found in the section *Interface changes* towards the end of the respective manual. This section lists general changes throughout **MOSEK**.

2.1 Release notes for 10.0

2.1.1 New features

Platform support

- Introduced native support for Apple Silicon M1 `osxaarch64`.
- Improved support and introduced multithreading for Linux ARM 64bit `linuxaarch64`.

Optimizer

- Introduced new cone types: generalized power cone (primal and dual), geometric mean cone (primal and dual) and the cone of vectorized lower-triangular parts of semidefinite matrices.

Presolve

- Presolve has been improved significantly for conic problems.

Interior-point Optimizer

- Improved performance for large-scale linear problems.
- Significantly improved performance when running on recent AMD CPUs.

Mixed-integer Optimizer

- (Optimizer API and Fusion). Introduced disjunctive constraints (DJC), a language for writing constraints of the form A_1 OR A_2 OR ... OR A_k where A_i are ordinary linear equations or inequalities.
- Improved cutting plane separation; in particular, implied bound cuts, controllable with the parameter `MSK_IPAR_MIO_CUT_IMPLIED_BOUND`, are used by default.
- Improved presolve, in particular probing and the aggregator. The latter can be controled with the new parameter `MSK_IPAR_MIO_PRESOLVE_AGGREGATOR_USE`.
- Introduced symmetry detection and exploitation, controllable with the parameter `MSK_IPAR_MIO_SYMMETRY_LEVEL`.
- Introduced reformulation methods for MIQCQO problems, controllable with the parameter `MSK_IPAR_MIO_QCQO_REFORMULATION_METHOD`. This allows the solution of non-convex MIQCQO problems that are amenable to such a reformulation.

- Introduced parameters MSK_IPAR_MIO_NUMERICAL_EMPHASIS_LEVEL and MSK_IPAR_MIO_MEMORY_EMPHASIS_LEVEL that may be used to reduce numerical and memory issues, respectively.
- Distinction between complete and partial initial user solutions, the exploitation of the latter being controllable with the parameter MSK_IPAR_MIO_CONSTRUCT_SOL.

Multithreading

- Switch from Cilk to the oneTBB library for multithreading in the interior-point optimizer. The reason is Cilk has been deprecated in the Intel C compiler tool chain. Moreover, compared to Cilk oneTBB allows fine grained control of the number of threads employed in each optimization.
- Introduce parallel optimization of a number of tasks (optimizebatch) in the Optimizer API.
- Support for multithreading has been enabled on the linuxaarch64 platform.

Licensing

- Updated FLEXlm to version 11.18.3. Upgrade of floating license servers is required to use **MOSEK** 10 clients.
- License server available for all platforms.

Interface

- (Optimizer API). Introduced affine conic constraints (ACC) as a preferred method of expressing conic problems. An affine conic constraints allows the user to directly write

  $$Fx + g \in \mathcal{K}$$

  without introducing slack variables.
- (Optimizer API). Introduced the possibility to create tasks without an environment.

Various

- Faster file writing of MPS and CBF files.
- The PTF format replaces the OPF format as a read/write human-readable file format for conic problems, supporting also semidefinite variables.
- Allow writing data files to streams instead of files.
- Allow more flexible naming in *Fusion*.

2.1.2 Changes compared to version 9

- The function computesparsecholesky has changed API: the argument previously indicating whether to use multiple threads or not is now an integer denoting the number of threads to use, with 0 meaning that **MOSEK** makes the choice.

2.1.3 Removed features

- Support for Python 2.7 on all platforms.
- Support for Java on Windows 32 bit.
- Support for all versions of Python on Windows 32 bit.

2.1.4 Deprecated features

- Conic constraints restricted to $x \in \mathcal{K}$ for a variable x are deprecated as a method of representing conic problems in favor of affine conic constraints (ACC) of the form $Fx + g \in \mathcal{K}$. This affects mainly the Optimizer API, in a minor degree the Optimization Toolbox for MATLAB and Rmosek, and does not affect *Fusion* where this language was already used.
- The OPF file format for conic problems is deprecated in favor of PTF.
- It is recommended to move away from Windows 32 bit platform.

Chapter 3

Known issues

Chapter 4

Bug fixes

10.0.16(BETA)

- Improved performance for some semi-definite problems, particularly when using multiple threads.
- Fixed some issues related to file formats.

10.0.15(BETA)

- Improved documentation.
- Environment-free task creation in optimizer API.
- Fixed a multithreading issue on Linux ARM64.

10.0.14(BETA)

- The (plain) solution file now contains the solution for the affine conic constraints when present.
- Fixed a bug occuring when deleting one or more variables.
- Documented new naming possibilities in Fusion.
- Removed some debug output.

10.0.13(BETA)

- Downgrade Linux 64x86 platform requirements to RHEL 7, Ubuntu 18.04.
- Downgrade MATLAB version requirement to R2017a.
- Fixes in the remote optimization server and improved communication with the server.
- Writing files to streams.
- Batch optimization also available in Fusion.
- Fixed a bug that in rare cases caused an assert in the interior-point optimizer.

10.0.12(BETA)

- First beta release.
- See Sec. 2 and the *Interface changes* section towards the end of your API manual.