

Gurobi Version 9.0

Breakthrough new capabilities in Gurobi Optimizer, plus major new features for Gurobi Compute Server.

Gurobi Optimizer

Breakthrough New Capability

Find globally optimal solutions to bilinear pooling and blending problems.

- ✓ **Non-Convex Quadratic Optimization** – We added a new bilinear solver that allows you to solve problems with non-convex quadratic constraints and objectives.

Faster than Ever

Our maniacal focus on speed continues.

Gurobi Version 9.0 delivers performance improvements across LP, MIP, and MIQP problem types.

- ✓ **LP** – In default settings is 7% faster.
- ✓ **Barrier** – 7% faster and an additional 4% faster with computers supporting AVX 512.
- ✓ **MIP** – 18% faster overall and 26% faster on difficult models that take more than 100 seconds to solve.
- ✓ **MIQP** – 24% faster.

Ease of Use

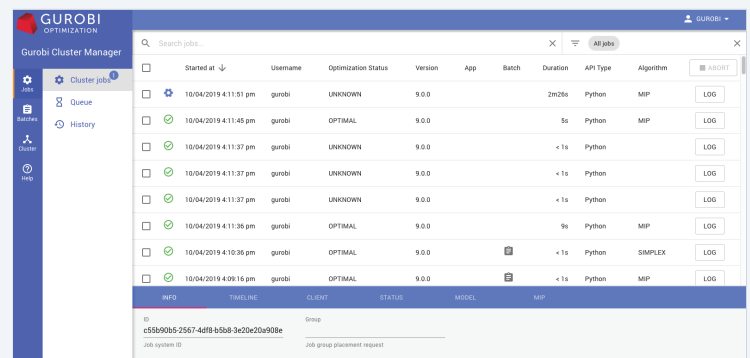
New functionality in the Optimizer simplifies your workflow.

- ✓ **Python Matrix API** – We have extended our Python interface to support matrix-oriented modeling using NumPy or SciPy matrices.
- ✓ **Piecewise-Linear (PWL) Constraints** – You can now add PWL constraints directly as a modeling construct instead of having to represent them as a combination of linear and SOS constraints.
- ✓ **Function Constraints With Automatic PWL Translation** – This release allows you to add nine basic, nonlinear, univariate function constraints, including polynomial, exponential, logarithmic, and trigonometric functions. We will perform an automatic piecewise-linear approximation of these functions.
- ✓ **MIP Scenario Analysis** – This new feature allows you to describe multiple sets of changes to a model (scenarios) and computes the impact of these changes on the solution.
- ✓ **New Solution Improvement Heuristic** – New, much more effective heuristic for focusing on improving MIP solutions.
- ✓ **Intermediate Solution Files** – We now allow you to write solutions found during the MIP solution process to files as soon as they are discovered.

Gurobi Compute Server

New functionality for on-premises and private cloud deployment.

- ✓ **New Non-Interactive Solve (Batch Mode) and APIs** – With the Cluster Manager, clients can now submit a non-interactive optimization task. A client can build an optimization model locally, submit it, and then disconnect from the server. Once the batch is completed, the client can retrieve the results.
- ✓ **New Web User Interface** – With the Cluster Manager, users can now easily monitor and administrate user accounts, cluster nodes, jobs, and batches. Users can also submit batches from files using a drag-and-drop interface.
- ✓ **New Job/Batch History** – With the Cluster Manager, users can now keep persistent records of submitted jobs and batches, so you can monitor the cluster usage by user, application, or time range.
- ✓ **Support for Lazy Constraints Callbacks** – Now, applications that need to add lazy constraints on the fly from within the callback can also run on the Compute Server or the Cluster Manager.
- ✓ **New Cluster Manager** – The Cluster Manager is a new server component that can be installed with your Compute Server nodes. It provides better security with user authentication and API keys. It also expands the capabilities of the cluster nodes with a unified management of interactive and non-interactive optimization tasks.



Started at	Username	Optimization Status	Version	App	Batch	Duration	API Type	Algorithm	LOG
10/04/2019 4:11:51 pm	gurobi	UNKNOWN	9.0.0			Zm26s	Python	MIP	LOG
10/04/2019 4:11:45 pm	gurobi	OPTIMAL	9.0.0			5s	Python	MIP	LOG
10/04/2019 4:11:37 pm	gurobi	UNKNOWN	9.0.0			< 1s	Python		LOG
10/04/2019 4:11:37 pm	gurobi	UNKNOWN	9.0.0			< 1s	Python		LOG
10/04/2019 4:11:37 pm	gurobi	UNKNOWN	9.0.0			< 1s	Python		LOG
10/04/2019 4:11:36 pm	gurobi	OPTIMAL	9.0.0			9s	Python	MIP	LOG
10/04/2019 4:10:36 pm	gurobi	OPTIMAL	9.0.0			< 1s	Python	SIMPLEX	LOG
10/04/2019 4:09:16 pm	gurobi	OPTIMAL	9.0.0			< 1s	Python	MIP	LOG

Figure: Cluster Manager UI