

# Gurobi Version 9.1

The world's fastest solver provides the next level in performance, accuracy, and productivity.

## Gurobi Optimizer

### Faster than Ever

- ✓ **Primal simplex:** 17% faster overall, 37% faster on models that take at least 100 seconds.
- ✓ **Dual simplex:** 29% faster overall, 66% faster on models that take at least 100 seconds.
- ✓ **Barrier:** 15% faster overall, 34% faster on models that take at least 100 seconds.
- ✓ **Mixed-integer linear programming (MILP):** 5% faster overall, 10% faster on models that take at least 100 seconds.
- ✓ **Convex mixed-integer quadratic programming (MIQP):** 6% faster overall, 20% faster on models that take at least 100 seconds.
- ✓ **Convex mixed-integer quadratically constrained programming (MIQCP):** 13% faster overall, 57% faster on models that take at least 100 seconds.
- ✓ **Non-convex mixed-integer quadratically constrained programming (non-convex MIQCP):** 4.1x faster overall, 9.6x faster on models that take at least 100 seconds.
- ✓ **Irreducible Infeasible Set (IIS) computation:** 2.6x faster overall, 5.7x faster on models that take at least 100 seconds.
- ✓ **Better MIP feasible solutions:** Heuristics are significantly better at finding high-quality solutions earlier.

### New Features

- ✓ **NoRel Heuristic** – This new heuristic finds high-quality solutions in situations where the linear programming (LP) relaxation of the mixed-integer programming (MIP) problem is too expensive to solve.
- ✓ **Integrality Focus** – This new feature allows users to be much stricter on integrality constraints, thus avoiding many undesirable results (including trickle flows) that can come from small integrality violations.
- ✓ **Python Matrix API Enhancements** – Gurobi's Python interface – gurobipy – has been extended and improved to better support matrix-oriented modeling.
- ✓ **Pip Install Support** – Users can now utilize pip, a Python tool, to install Gurobi in their Python environment.
- ✓ **Releasing the GIL in Python API** – When the `optimize()` method is called, gurobipy now releases the Global Interpreter Lock (GIL). This allows user programs to execute other Python code in a separate Python thread while Gurobi's optimizer is running.
- ✓ **Tuning Tool Enhancements** – We added a number of additional controls to our tuning tool.
- ✓ **Record/Replay for Compute Server and Cloud** – We now support the record/replay feature for Gurobi Compute Server and Gurobi Instant Cloud.
- ✓ **Pre-specified User Cuts** – By setting the Lazy linear constraint attribute to the new value -1, one can declare a linear constraint to be a user cut. This means that the constraint is redundant to the model and should only be added to the LP relaxation if it allows to cut off an LP solution that is encountered during the MIP solving process.

# Gurobi Version 9.1

The world's fastest solver provides the next level in performance, accuracy, and productivity.

## Commercial Evaluation License

Get a free, full-featured license of Gurobi to experience the performance, support, benchmarking, and tuning services we provide as part of our product offering.

To request a free evaluation of Gurobi, visit [gurobi.com/eval](http://gurobi.com/eval)

## Academic License

We offer free, full-featured copies of Gurobi for use in class and for research.

Visit [gurobi.com/academic](http://gurobi.com/academic) to learn more

## Take Gurobi With You

Our goal is to help graduating students continue to use Gurobi as they move from their academic studies to a commercial environment. To help with this transition, Gurobi pioneered the Take Gurobi with You program. This program provides a one year commercial named-user license at no cost to either the graduating student or their new employer.

You may use a free Academic License of Gurobi with an existing license for AMPL, GAMS, or MPL

Request your free license at [gurobi.com/TGWY](http://gurobi.com/TGWY)

### A Few of Our Customers



## Contact us

We're happy to assist you! Send us an email or call, and a Gurobi representative will get back to you shortly.

[Info@gurobi.com](mailto:Info@gurobi.com)

1 (713) 871-9341

[www.gurobi.com](http://www.gurobi.com)