



GUROBI
OPTIMIZATION

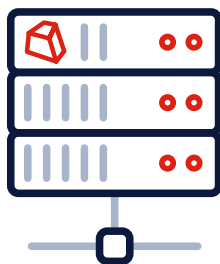
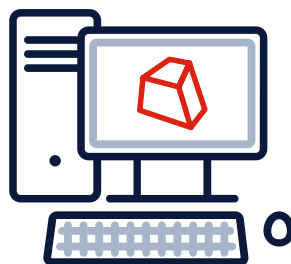
The World's Fastest Solver

Product Brochure

Gurobi Product Ecosystem

Gurobi Optimizer

Generate optimal solutions and enable optimal decision making with the world's fastest and most powerful mathematical optimization solver.



Gurobi Compute Server

Build and deploy your mathematical optimization applications on one or more dedicated servers grouped in a cluster.

Gurobi Instant Cloud

Launch one or more computers, pre-loaded with the latest Gurobi software, on your dedicated cloud servers.

The Gurobi Optimizer

Unlock the value of your data and unleash the potential of your business with the world's fastest solver.

Introduction

The Gurobi Optimizer is simply the best mathematical optimization solver out there.

More than 2,500 companies around the world and across over 40 different industries rely on the Gurobi Optimizer to help them tackle their complex, real-world business problems, make automated, optimal decisions, and achieve their business goals.

Here's why:

Superior Performance: The Gurobi Optimizer is the most powerful mathematical optimization solver in the world, bar none. Our solver is more than 50% faster than our closest competitor's solver and with every new release, we crank up the speed even more – with an average annual increase of nearly 60%. Besides speed, the Gurobi Optimizer also sets the standard when it comes to solver robustness and ease of use. Our solver is capable of handling just about any business problem – no matter how large it is in scope or how high it is in complexity – and delivering an optimal solution.

Continuous Development: At Gurobi, mathematical optimization is all we do. Our development team – which is made up of the brightest minds in the mathematical optimization software field – is totally dedicated to continuously improving the Gurobi Optimizer. We are constantly raising the bar in terms of solver speed and redefining what is possible in terms of solver functionality.

World-Class Support: Our global support team of PhD-level mathematical optimization experts is committed to delivering exceptional technical support for our customers – ensuring they get the assistance they need to succeed in implementing and using our solver.

Flexible Licensing: We offer a wide range of licensing options so that you can find the right licensing package that fits your needs.

Find out why so many leading companies are using the Gurobi Optimizer to optimally solve their most challenging problems – across a broad spectrum of business functions including production, distribution, purchasing, finance, capital investment, and human resources – and enable automated, optimal decision making.

Key Features

Problem-Solving Power

The results of benchmark tests consistently show that the Gurobi Optimizer finds both feasible and proven optimal solutions faster than competing solvers, with the performance gap growing as model size and difficulty increase.

The Gurobi Optimizer is capable of solving all major problem types (convex and non-convex):

- Linear programming (LP)
- Mixed-integer linear programming (MILP)
- Quadratic programming (QP)
- Mixed-integer quadratic programming (MIQP)
- Quadratically-constrained programming (QCP)
- Mixed-integer quadratically-constrained programming (MIQCP)

Ease of Use

The Gurobi Optimizer is an out-of-the-box solver that – without any customization of code – can be used in a vast array of applications to tackle a whole host of real-life business problems.

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Our solver supports a full range of interfaces and programming and modeling languages – making it easy for new users to develop, deploy, and maintain their mathematical optimization applications.

All of our object and matrix-oriented interfaces are implemented as lightweight, modern APIs. These include:

- Object-oriented interfaces for Python, C++, Java, and .NET
- Matrix-oriented interfaces for C, MATLAB®, and R
- Links to standard modeling languages including AIMMS, AMPL, GAMS, and MPL
- Links to Excel through Frontline Solvers

We have recently added new functionality in the Gurobi Optimizer to improve your workflow including:

- Piecewise-Linear (PWL) Constraints: Users can now add PWL constraints directly as a modeling construct instead of having to represent them as a combination of linear and SOS constraints – thereby greatly simplifying their use.
- MIP Scenario Analysis: This new feature allows users to construct multiple scenarios and run them simultaneously.
- 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.

State-of-the-Art Algorithms

The Gurobi Optimizer provides advanced implementations of the latest algorithms including:

- LP algorithms – simplex, parallel barrier with crossover, concurrent and sifting.
- QP algorithms – simplex and parallel barrier QCP algorithms – parallel barrier (SOCP).
- MIP algorithms – deterministic parallel, non-traditional search, heuristics, solution improvement, cutting planes, and symmetry breaking.

User-Friendly Development Environment

With the Gurobi Optimizer, you can quickly develop mathematical optimization models and turn them into full-featured applications.

The Gurobi distribution includes our own interactive interface built on our Python object-oriented API. The interface can be used as a development environment to build complex models, and then transition these models to full applications.

Gurobi's Python API includes higher-level modeling constructs that make it easier to build optimization models. Python users can choose to use the Anaconda Python distribution with pre-built libraries to support application development, Spyder for graphical development, and Jupyter notebook-style development. Together, Gurobi's Python API and distributions, like Anaconda, give you the ease of a modeling language with the power of a programming language.

Also, we have recently added a Python Matrix API, which is an extension of the Gurobi Optimizer's Python interface to support matrix-oriented modeling using NumPy or SciPy matrices.

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Flexible Deployment

With the Gurobi Optimizer, you can deploy your mathematical optimization model where and how you want. One user can solve a single model on one machine or many users can solve multiple models using many machines. Models can also be solved locally or on an internal or public cloud.

Our licenses may be used for both development and deployment. We offer a wide variety of license types to meet your specific business requirements.

Performance Tuning

The Gurobi Optimizer provides a wide variety of parameters that allow you to control the operation of the mathematical optimization engines. The easy-to-use Gurobi tuning tool will help you find the right setting to improve model performance. In addition, we provide free tuning services to speed up the search for robust parameter settings.

Responsive Support

We provide our customers with direct access to our support team, which is composed of PhD-level experts with years of experience working with commercial mathematical optimization models. With Gurobi, you get the assistance you need, when you need it.

We are there to assist you with every step of the process of implementing and using the Gurobi Optimizer – from modeling and deployment to tuning and maintenance.

Learn More

Visit gurobi.com/compute-server

Gurobi Compute Server

Easily build and effectively deploy high-performance mathematical optimization applications

Introduction

With the Gurobi Compute Server, you can create high-performance, fault-tolerant mathematical optimization applications that make more efficient use of your computing resources and mathematical optimization software licenses.

The Gurobi Compute Server is designed to greatly simplify the task of building and deploying modern mathematical optimization applications. It allows you to seamlessly offload your optimization computations onto a set of one or more dedicated mathematical optimization servers grouped in a cluster. Users and applications can share the servers thanks to advanced queuing and load balancing capabilities. Users and administrators can monitor and manage the servers and jobs.

Key Features

Seamless Client-Server Integration

The Gurobi Optimizer library allows you to use existing interfaces to write a single program that can either run locally or, with the flick of a switch, can offload mathematical optimization computations to one or more Gurobi Compute Servers.

Powerful Queuing and Load Balancing Capabilities

Make the most of your computing resources with built-in queuing and load balancing capabilities.

Fault-Tolerant Technology

If a server goes offline, the remaining servers will continue to operate unimpeded.

Secure and Efficient Communication

The Gurobi Compute Server uses HTTP or HTTPS for improved security, ease of deployment, and robustness. It also performs on-the-fly data compression to reduce the volume of transmitted data.

Clustering and Management Tools

Clustering allows nodes to be added to and removed from clusters dynamically. Command line tools enable users to monitor the servers and the jobs. Administrators can list the licenses, abort jobs, and manage the servers. The supported REST API allows you to programmatically monitor and manage your cluster.

We have recently added numerous new features to the Gurobi Compute Server to enhance clustering and management capabilities including:

- **New Cluster Manager:** The Cluster Manager is a new server component that can be installed with Gurobi Compute Server nodes. It provides better security with user authentication and API keys and also expands the capabilities of the cluster nodes with a unified management of interactive and non-interactive optimization tasks.
- **New Non-Interactive Solve (Batch Mode) and APIs:** With the Cluster Manager, users can build an optimization model locally, submit it as a non-interactive optimization task, and then disconnect from the server. Once the batch is completed, the user can retrieve the results.
- **New Web User Interface:** With the Cluster Manager, users can easily monitor and administrate user accounts, cluster nodes, jobs, and batches. Users can also submit batches from files using a drag-and-drop interface.

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Multiple, Practical Applications

The Gurobi Compute Server has proven to be useful in a wide range of scenarios including:

- High Reliability Requirements
- Demand Spikes
- Multi-Tier Architectures

Support for Multiple Client Platforms

Clients can run on any Gurobi-supported operating system, including .NET Core 2.0, Windows, Linux, and Mac.

Furthermore, clients don't need to run the same operating system as the Gurobi Compute Server.

No Client Licenses Required

The Gurobi Compute Server can support an unlimited number of clients, and no client licenses are required. Simply point your client application at the Gurobi Compute Server and you are ready to go.

Easy Set-Up

Setting up a compute server is easy. On your own machine, just install the Gurobi software and start the Gurobi Compute Server process.

Learn More

Visit gurobi.com/compute-server

Gurobi Instant Cloud

Get up and running quickly with the Gurobi Optimizer using cloud services

Introduction

The Gurobi Instant Cloud is an easy and cost-effective way to get up and running with the Gurobi Optimizer using cloud systems. It allows you to launch one or more computers – pre-loaded with Gurobi software and dedicated to you – to handle whatever your mathematical optimization needs are. Simply choose the subscription plan and deployment option that best meets your requirements, and then pay only for what you use.

The Gurobi Instant Cloud communication is secured with HTTPS encryption. Most Gurobi Instant Cloud plans provide Gurobi Compute Server capabilities, which include queuing and load balancing for an unlimited number of client jobs. These plans also offer distributed optimization capabilities.

Key Features

Ease of Use

We handle all of the behind-the-scene details. All you have to do is install Gurobi software on a local machine, download your license from the Cloud Manager (cloud.gurobi.com), and the Gurobi Instant Cloud automatically connects your computer to the cloud.

Maximum Mathematical Optimization Power

Choose the number and power of machines you want, and even create multiple machine pools. Computers are available across the globe, with up to 768 GB of memory. Scale up or down your machine pools depending on your needs.

Flexible Subscription Plans

Once you have purchased a subscription plan, you pay only for the number and type of machines you use. You can even

upgrade your plan to a higher usage level at any time. There are no restrictions on model sizes, users, or client machines.

Available Anytime

Your dedicated cloud servers are provisioned automatically in a matter of minutes, pre-configured with the latest Gurobi software and a license.

Support for Microsoft Azure® and Amazon EC2®

Gurobi Instant Cloud now supports Microsoft Azure and faster, more powerful machines on Amazon EC2.

Intuitive Web Interface

Use the Cloud Manager to list active machines and jobs, display detailed job information within the job dashboard, or access the history.

Room to Grow

With a simple REST API, your application can control its cloud servers.

Streamlined Billing

With the Gurobi Instant Cloud, you receive one bill covering both license and machine costs.

Learn More

Visit gurobi.com/gurobi-cloud

Gurobi Licenses

Gurobi offers subscription and cloud licenses to meet your specific business needs. Our straightforward pricing is based on the number of cores your machine is running, rather than CPUs. Base licenses allow up to 8 cores. Beyond 8 cores, there is a charge per each additional core.

We are happy to discuss any special licensing requirements or situations.

Subscription

License Type	Overview
Named User	Single machine license for a single named person, unlimited simultaneous uses.
Unlimited Use, Unlimited User	Single machine license for unlimited simultaneous users and uses.
Compute Server	Allows an unlimited number of client machines to submit jobs to a server.

Cloud Licenses

License Type	Overview
Silver	Unlimited simultaneous machines and uses with a defined scope of use and medium-level usage situations.
Gold	Unlimited simultaneous machines and uses with a defined scope of use and high-level usage situations.
Platinum	Unlimited simultaneous machines and uses within the enterprise.

Gurobi Instant Cloud billing is measured in 0.01 hours (36 seconds), with a minimum charge of 0.50 hours. The time is measured from when the cloud computer is started to when it is shut down, regardless of whether the computer is busy or idle.

Other Licensing Agreements

- ALA's (Application License Agreements) and ELA's (Enterprise License Agreements)
- OEM/ISV licensing agreements for customers who wish to embed and distribute the Gurobi Optimizer inside other applications

Maintenance and Support

We provide phone and email support, as well as upgrades to any new versions released during the period of the contract.

Try Gurobi for Free

We are happy to provide a free license of the Gurobi Optimizer for commercial and academic users. To request one, visit www.gurobi.com/eval.

When you register for a commercial evaluation license, you will also get:

- Access to Gurobi's world-class support
- Access to free benchmarking and tuning services
- Two free hours of 1:1 consulting

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