MATHEMATICAL OPTIMIZATION WITH THE GENERAL ALGEBRAIC MODELING SYSTEM (GAMS)

Mathematical optimization is the task of finding the best solution to a given problem from a set of possible alternatives. It usually involves maximizing desired factors or minimizing undesired ones.

Applications include e.g. minimizing shipment costs or production idle time, maximizing returns, or finding an optimal solution to a supply chain problem.

Optimization is widely used for solving real life problems in a number of different areas and industries such as Energy, Agriculture, Engineering, Policy Making, Economics, Production, Pharmaceutical, or Chemical Engineering.
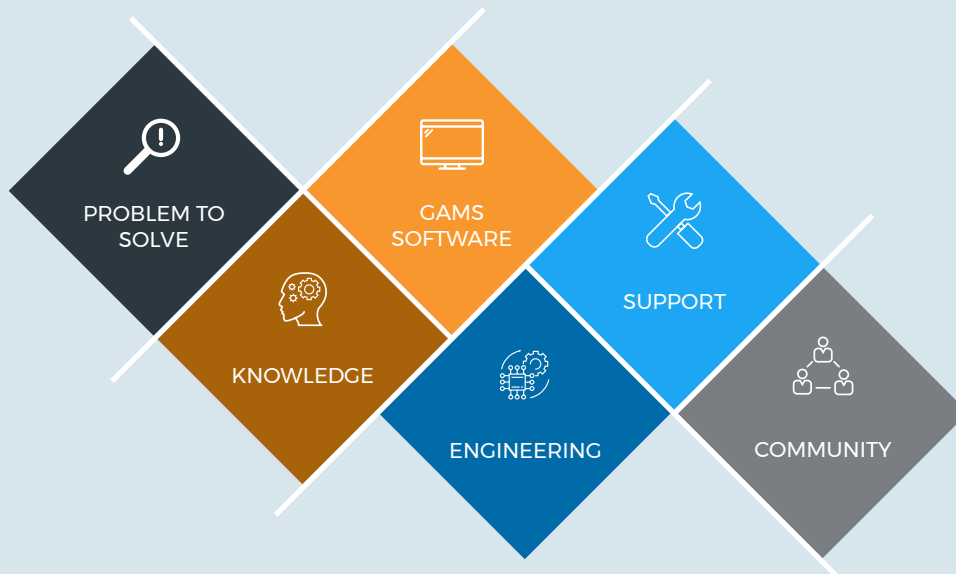
FREE DEMO VERSION

Download GAMS with all solvers:
gams.com/download

THE GAMS CONCEPT OF PROBLEM SOLVING

Today's computational infrastructure landscape already provides a wide range of routes to take from an idea to a deployed optimization application. But to find the best solution for their problem modelers need to keep in mind that the center of an optimization application should be the problem to be solved, not the model nor the solution technology. Building a successful optimization application requires many ingredients: IT (software, hardware), data, knowledge and experience in modeling, optimization, and algorithms.

GAMS provides everything needed to support the development and deployment of optimization applications. The layered concept of the GAMS software is very flexible, enabling many different deployment schemes. Similarly important, GAMS engineers support clients during the entire process and our service goes beyond answering optimization modeling questions.

>> PROBLEMS AND THEIR SOLUTIONS DIFFER, BUT **WITH GAMS YOU HAVE THE BEST-FITTING TOOLS** FOR SOLVING THE PROBLEM AT HAND.

Take a look at our YouTube Channel with instructional videos

www.youtube.com/GAMSlessons

GAMS AT A GLANCE

GAMS helps you to build large maintainable optimization models that can be adapted quickly to new situations. This high-level modeling system for optimization and equilibrium problems consists of a language compiler and a multitude of integrated high-performance solvers. GAMS is specifically designed for modeling linear, nonlinear, mixed integer optimization and complementarity problems.

FOCUSING ON THE MODELER

GAMS allows its users to formulate optimization models in a way that is very similar to their mathematical description. A GAMS model is a readable, flexible, portable specification of an optimization problem - in short, it is thinking made public. Models can be developed, maintained and read not only by programmers, but also by the actual domain experts. This facilitates a natural and productive modeling experience for the user and helps make collaboration with others easy.

INDEPENDENCE OF MODEL, SOLVER, DATA, AND INTERFACE

Model, solver, data, platform and user interface are separated in independent layers, making it easy to switch a solver, use multiple datasets, run on multiple platforms, and integrate GAMS into existing applications, structures, and workflows.

GAMS offers an exceptionally extensive and diverse portfolio of more than 40 solvers, including all the expected commercial solvers. Selecting the solver to use is simple - just change one line of code or adjust one option setting. No need to reimplement

KEY FEATURES

- ROBUST, SCALABLE STATE-OF-THE-ART MODELING TECHNOLOGY

- TAILORED FOR COMPLEX, LARGE-SCALE OPTIMIZATION APPLICATIONS

- PRODUCTIVITY GAINS THROUGH RAPID DEVELOPMENT ENVIRONMENT

- BROAD ACADEMIC AND COMMERCIAL NETWORK IN MORE THAN 120 COUNTRIES

- 30+ YEARS OF EXPERIENCE IN INDUSTRY AND ACADEMIA

anything in order to compare solver performance or see what improvements are possible. Similarly, you can switch easily between model types (e.g. linear and nonlinear), so experimenting with different formulations is easy.

You can write the model independently of the data and include data from many different kinds of sources, from plain ASCII to Excel or databases and many others, for example using the GDX (GAMS Data eXchange) file format. Models are fully portable between platforms - write once, run everywhere.

The GAMS APIs allow the seamless integration of GAMS into an application by providing appropriate classes for the interaction with GAMS. They are available for .NET, Java, Python, and C++. In addition to the APIs, GAMS offers smart links to applications like MS Excel, MatLab, or R.
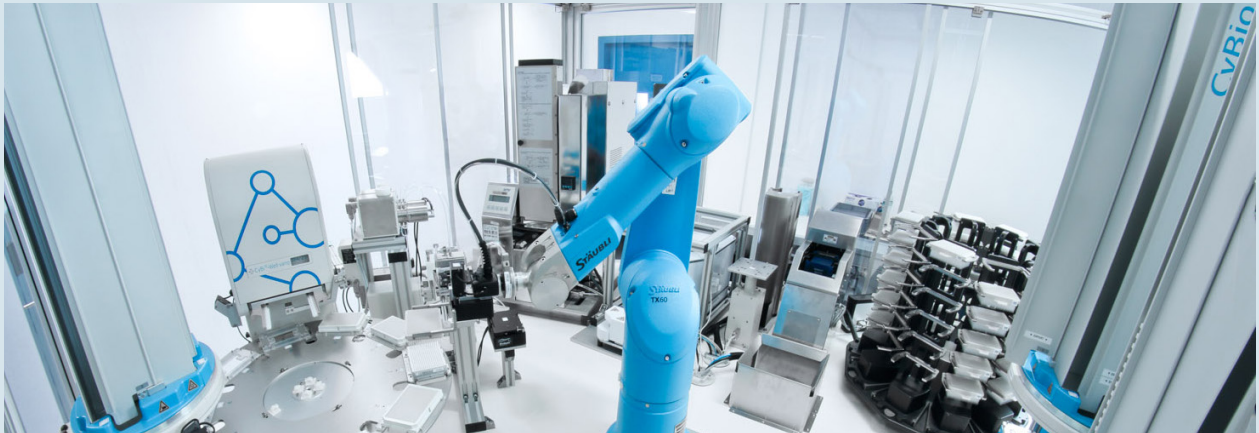
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CYBIO SCHEDULER – SCHEDULING SOFTWARE FOR HIGH THROUGHPUT SCREENING

High Throughput Screening is a scientific experimentation method widely used in the pharmaceutical industry, especially in the field of drug discovery. Because the large number of promising compounds for new drugs cannot be analyzed by manual labor, the screening process is automated using robotics. Robotic screening systems are used to handle and transport micro plates containing chemical compounds, to analyze these compounds, and to process the experimentation data.

CyBio, now merged into Analytik Jena AG, and the Max Planck Institute Magdeburg apply optimiza-tion involving GAMS to increase the throughput of robotic screening systems. A GAMS model is the integral part of the CyBio Scheduler – the scheduling software used for planning optimal activity timing. The output of the model parametrizes the screening systems to ensure the most efficient utilization ratio for critical resources, thereby minimizing idle time. The fast handling of the micro plates reduces systematic errors caused by sedimentation, decay, or temperature drift, thus resulting in higher data quality.

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www.analytik-jena.de

>> OPTIMIZATION USING GAMS HAS **SIGNIFICANTLY BOOSTED THE SCREENING SYSTEM'S OVERALL THROUGHPUT** BY INCREASING PROCESS SPEED, IMPROVING PRODUCTIVITY, AND REDUCING VARIANCE FOR HIGH QUALITY DATA.