ILOG CPLEX

Market-leading optimization technology

Better decisions through advanced mathematics

Corporate decision makers must constantly analyze their operations to find new ways to improve efficiency and profits. Their economic planning and operational scheduling must take into account a multitude of strategies, costs, operating constraints, business assumptions, contingencies, time windows and customer service requirements. Fortunately, mathematical programming (MP) and optimization technology can help. ILOG CPLEX solves complex business problems that are beyond the capabilities of the human brain or the modern spreadsheet.

Widely used in critical applications

Whether you need to design an airline network, a six-month production plan, a portfolio management strategy or a workforce schedule, ILOG CPLEX can help. Major companies and software providers in manufacturing, financial services, transportation and logistics, utilities, defense and other industries rely on ILOG CPLEX in a wide variety of applications. In fact, more than 1,000 commercial customers, including more than 30 percent of the Global 500, and researchers at more than 500 universities depend on its unequaled solving power.

Speed, reliability and flexibility

ILOG CPLEX can solve very large, real-world problems with astonishing speed. Its dependability and stability have been proven through thousands of deployments worldwide. Developers access this power through a library of software components designed to integrate ILOG CPLEX into applications running on any of the leading platforms. ILOG CPLEX is the answer for portability and investment protection.

- **Simplex Optimizers**
- **Barrier Optimizer**
- **Mixed Integer Optimizers**
- **Component Libraries**
- **Parallel CPLEX**

ILOG®

Changing the rules of business™

De facto standard for mathematical optimization

Fundamental algorithms

ILOG CPLEX comes with the fastest, most reliable implementations of the fundamental algorithms for solving demanding mathematical optimization problems. ILOG CPLEX provides flexible, high-performance optimizers for solving linear programming, quadratic programming, quadratically constrained programming and mixed integer programming problems. It can handle problems with millions of constraints and variables, and consistently sets performance records for mathematical programming. ILOG's commitment to ongoing product development ensures that every investment in ILOG CPLEX is well protected. ILOG is respected throughout the OR community for constantly delivering improvements in performance, robustness and usability.

Using ILOG CPLEX

Developers can access the ILOG CPLEX algorithms through component libraries or the Interactive Optimizer, a command-line utility that lets users read and write problem files and tune the performance of any ILOG CPLEX algorithm to the needs of a specific problem. All ILOG CPLEX algorithms are tightly integrated with cutting-edge presolve algorithms that reduce problem sizes and solve times without requiring any special user intervention. Each optimizer has numerous options for tuning solving strategies for specific problems.

ILOG CPLEX Simplex Optimizers

The ILOG CPLEX Simplex Optimizers implement the primal simplex and dual simplex methods for linear and quadratic programming. ILOG CPLEX also provides an incredibly fast implementation of the network simplex method, which is specifically designed for network problems (with or without side constraints).

"Hansol is committed to being a world-leading, environmentally friendly paper manufacturing company. We believe superior technology from vendors such as ILOG will help us achieve the goal. By using ILOG optimization software, we are able to reduce paper waste yet still deliver the highest quality products to our customers."

– S. K. Kim
Senior Manager
Hansol Paper Co. Ltd.

ILOG CPLEX Barrier Optimizer

The ILOG CPLEX Barrier Optimizer provides an alternative to the simplex method for solving linear and quadratic problems, and an approach for solving quadratically constrained problems. Based on a primal-dual predictor-corrector method, the ILOG CPLEX Barrier Optimizer provides unmatched performance for solving large-scale linear and quadratic problems. ILOG CPLEX Barrier Optimizer includes the ILOG CPLEX Crossover algorithm, which converts the solutions created by the Barrier algorithm into basic solutions that are typically provided by the simplex method and used for fast restarts and sensitivity analysis.

ILOG CPLEX Mixed Integer Optimizers

ILOG CPLEX Mixed Integer Optimizers employ a branch-and-bound technique that takes advantage of innovative cutting-edge strategies to provide high-performance solutions for the hardest mixed integer programs. ILOG CPLEX can solve mixed integer linear, mixed integer quadratic and mixed integer quadratically constrained problems. ILOG CPLEX Mixed Integer Optimizers provide default settings and parameter settings that work well for most problems, but users can also customize the search strategy or select specialized techniques to take advantage of structures in their specific problems.

ILOG CPLEX Mixed Integer Optimizers include the ILOG CPLEX presolve algorithm, sophisticated cutting-plane strategies and feasibility heuristics. Users can state whether it is more important to find an optimal solution or quickly determine a good feasible one, and ILOG CPLEX Mixed Integer Optimizers will automatically adjust their solution strategies to provide the desired behavior. Users have full control over ILOG CPLEX Mixed Integer Optimizers. They can customize the optimizers' cutting-plane and heuristics strategies, as well as the node and variable selection strategies. Users can also include their own heuristic or cutting-plane strategies when problem-specific techniques are valuable.

ILOG CPLEX Component Libraries

ILOG CPLEX Component Libraries provide the features and flexibility that mathematical programming application developers require to develop customized solution strategies for solving both simple and complex optimization problems. The libraries include C, C++, .NET and Java programming interfaces that allow developers to use most programming languages to efficiently embed ILOG CPLEX technology directly into their applications. They provide a comprehensive set of routines for defining, solving, analyzing, querying and creating reports for mathematical programming problems and solutions. For example, routines are provided to direct the solution process and completely control ILOG CPLEX messages, and help developers debug their own ILOG CPLEX applications.

ILOG CPLEX provides both a traditional matrix orientation for representing mathematical models and a higher-level representation that uses modeling objects to allow the developer to take advantage of object-oriented programming approaches. Developers can state their constraints in the traditional MP form, using linear or quadratic expressions on these modeling objects, or alternatively they can state constraints using logical expressions to improve readability and maintainability. Modeling objects are easily accessible to programmers using C++, Java and .NET languages, and help reduce development time.

> "Our ability to deliver high-performance, cutting-edge applications that give our customers a significant competitive advantage is the key to our success. These requirements mean that we must seek out the best technology partners. We have enjoyed a long association with ILOG for the high quality of its products and because of the company's acknowledged leadership in supply chain and manufacturing optimization solutions."
>
> – Hiroshi Namie
> Group Leader
> Nippon Steel Solutions Corporation

ILOG CPLEX

ILOG Parallel CPLEX

ILOG Parallel CPLEX applies multiple CPUs to solve extremely difficult industrial problems. Alternatively, it can use different algorithms on different CPUs in a race to find the best approach to solve a problem. ILOG has partnered with leading computer vendors to enable ILOG Parallel CPLEX users to solve previously unsolvable problems on a wide range of high-performance computers. ILOG Parallel CPLEX includes implementations of ILOG CPLEX Barrier Optimizer and ILOG CPLEX Mixed Integer Optimizers. ILOG Parallel CPLEX can substantially reduce the time for solving large linear and difficult mixed integer problems.

At the heart of an integrated system

ILOG CPLEX is the engine that powers ILOG's Optimization Decision Management System (ODMS), which supports all aspects of optimization model-based application development and execution. In addition to ILOG CPLEX, ILOG's complete system includes ILOG OPL Development Studio for model development and testing by OR experts, and ILOG Optimization Decision Manager for fast development of decision support applications that feature extensive support for what-if analysis, goal programming and scenario comparison by business users. ILOG ODMS makes optimization more widely accessible than ever before.

Learn more

For more information on ILOG CPLEX, please contact an ILOG Sales Representative near you or visit the ILOG CPLEX Web pages at http://cplex.ilog.com.

> "SAP and ILOG have a strong partnership. The combination of ILOG's leading optimization technology with SAP's expertise in inter-enterprise software development has enabled us to give our customers a best-in-class supply-chain management solution."
>
> – Albrecht Diener
> Senior Vice President
> and Head of Supply-Chain Management
> SAP AG

ABOUT ILOG

ILOG delivers software and services that empower customers to make better decisions faster and manage change and complexity. Over 2,000 global corporations and more than 400 leading software vendors rely on ILOG's market-leading business rule management system (BRMS), optimization and visualization software components, to achieve dramatic returns on investment, create market-defining products and services, and sharpen their competitive edge. The BRMS market share leader, ILOG was founded in 1987 and employs more than 600 people worldwide.

ILOG Worldwide Information Center - Tel: 1-800-FOR-ILOG (US only) or 1-775-881-2800 (International) • URL: http://www.ilog.com
Australia - ILOG - Sydney - Tel: +61 (0) 2 9955 7210 - E-mail: info@ilog.com
China - ILOG (S) Pte. Ltd. - Beijing Representative Office - Tel. +86 10 8518 1080 - E-mail: info@ilog.com.sg
France - ILOG S.A. - Gentilly - Tel: +33 (0)1 49 08 35 00 - E-mail: info@ilog.fr
Germany - ILOG Deutschland GmbH - Bad Homburg v.d.H. - Tel: +49 6172 40 60 - 0 - E-mail: info@ilog.de
Japan - ILOG Co., Ltd - Tokyo - Tel: +81 3 5211 5770 - E-mail: info@ilog.co.jp
Singapore - ILOG (S) Pte. Ltd. - Singapore - Tel: +65 67 73 06 26 - E-mail: info@ilog.com.sg
Spain - ILOG S.A. - Madrid - Tel: +34 91 710 2480 - E-mail: info@ilog.es
UK - ILOG Ltd. - Bracknell - Tel: +44 (0) 1344 66 16 00 - E-mail: info@ilog.co.uk
USA - ILOG, Inc. - Mountain View, CA - Tel: +1 650 567-8000 - E-mail: info@ilog.com
Representatives and distributors in other countries

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