Ketron Optimization
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C-WHIZ
Linear Programming Optimizer

FAST, POWERFUL, PROVEN

C-WHIZ is a high performance linear programming optimizer based on the revised simplex algorithm. Two optimizers are embodied in *C-WHIZ,* Primal and Dual.

C-WHIZ is a C-coded version of WHIZARD, the highly regarded mainframe optimizer. WHIZARD earned an enviable reputation for speed and stability on IBM and compatible mainframe computers. This speed and the many other contemporary features are the result of continued evolutionary development. Both WHIZARD and *C-WHIZ* employ an unparalleled presolve and post-solve capability, unique exploitation of matrix supersparsity, and state-of-the-art simplex strategies.

C-WHIZ is available in two sizes:
- Standard Solver handles up to 32,767 constraints.
- Plus Solver has no limit on the number of constraints.

C-WHIZ is currently available for use on personal computers and selected UNIX workstations. It is offered as a stand-alone optimizer or as one component of either MPSIII/pc or MPSIII/ws, two of the comprehensive mathematical programming systems that you can obtain from Ketron. *C-WHIZ* is the optimizer incorporated into the Optimization and Modeling Library (OML) on all platforms including the IBM mainframe.

The personal computer version of *C-WHIZ* runs in all popular PC operating system environments: DOS and all versions of Windows (windows 95 or newer). Model size is ultimately limited only by the size of available RAM. *C-WHIZ* resource requirements are quite modest; it runs on any computer big enough to run Windows.

C-WHIZ is one product within Ketron's expanding family of mathematical programming products. Ketron provides software and consulting support for optimization on a full range of hardware platforms -- personal computers, selected UNIX workstations, IBM and compatible mainframe computers, and supercomputers.

There are versions of *C-WHIZ* available for use with the modeling languages AMPL, MPL, and GAMS.

FEATURES

C-WHIZ is designed to give you high-speed performance in a minimum amount of random access memory:

PRESOLVE-POSTSOLVE
Each model is reduced to its essential core in an extensive and automatic presolve phase. In addition to removing free rows and fixed columns, Presolve identifies redundant rows, degenerate rows and columns, singleton rows, transfer columns, etc. The reduced model is then optimized much more efficiently. Postsolve extends the optimal solution of the reduced model to fit the original model in order to provide a complete set of solution values.

FACTORIZATION
Two excellent matrix factorization (inversion) algorithms are used. One algorithm (P^4 inversion) is designed for speed; the other (Markowitz LU factorization) is biased to numerical accuracy. *C-WHIZ* automatically selects the appropriate algorithm to assure fast and accurate optimization of both easy and difficult models.

SUPERSPARSITY
Exploitation of supersparsity permits processing the matrix entirely in a minimum amount of RAM (random access memory), thus eliminating time-consuming input/output operations on auxiliary storage. Processing speed is further enhanced by *C-WHIZ*'s design that takes advantage of sequential memory access and hardware caching.

ALGORITHMS
Numerous innovative processing refinements reduce the work required per simplex iteration and advanced algorithmic concepts reduce the number of iterations required to optimize your models.

COMPOSITE FUNCTIONS
The composite right-hand-side and composite objective-function features enhance the power of *C-WHIZ* to handle a series of parametrically related models.

C-WHIZ is highly reliable

The continuing evolution of *C-WHIZ* provides a contemporary product with a solid foundation based upon years of experience and wide customer usage.

C-WHIZ is accurate

Sophisticated heuristics are used to automatically adjust to the degree of numerical difficulty encountered, thus assuring accurate solutions to even the most numerically intractable models.

Special techniques are invoked to overcome problems arising from degeneracy. This eliminates frequently encountered problems that adversely affect the accuracy and speed of solution.

C-WHIZ makes efficient use of resources

Large models can be run on smaller computers because *C-WHIZ* exploits supersparsity to pack the model into a minimum amount of memory.

C-WHIZ is coded entirely in C, thus providing portability to many hardware platforms and the ability to approximate the efficiency and data structures of assembly language.

C-WHIZ is easy to use

The *C-WHIZ* driver gives you several screens of menus and dialogue boxes to set all of the *C-WHIZ* parameters. The first driver screen includes all the information usually needed to setup and quickly optimize your model.

The DATAFORM verb, OPTIMIZE, invokes *C-WHIZ* as though it were a subprogram. Upon completion, *C-WHIZ* can leave the matrix in memory for direct update by the DATAFORM program. The optimal solution is in the *C-WHIZ* workspace from where DATAFORM can immediately access any of the solution values, including marginal values. This is an integrated modeling system at its best.

The Optimization and Modeling Library (OML) provides the same comprehensive functionality as DATAFORM but from your C, FORTRAN, or Visual Basic application.

You can also invoke *C-WHIZ* from an operating system prompt. This gives you the convenience of setting control parameters and calling the optimizer from a batch file.

COMPATIBLE KETRON PRODUCTS

MIPIII: Mixed-Integer programming optimizer that solves models with binary, semi-continuous, and general integer variables and both type 1 and type 2 special-ordered-sets.

DATAFORM: A complete model management system that allows the user to generate a matrix, call the optimizer, interrogate the solution, modify the matrix, and resolve the problem all as one step.

OML: The Optimization and Modeling Library permits imbedding optimization and model management functions in a C-, Visual Basic, or FORTRAN-coded application program. OML with *C-WHIZ* is available on the mainframe.

LOPTIS: The Logistics Optimization System is a comprehensive production and distribution planning application system.

SUPPORT

Technical assistance, training, and consulting services are available from Ketron. A telephone/email hotline is maintained to assist with questions about model building and system usage. Seminars are offered on various topics.

Consulting services range from model formulation through the construction of complete mathematical programming application systems.

For further information, contact:

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