



"Overall, O-Matrix is the fastest matrix computation package we have tested." - SciViews.org

"O-Matrix has improved the quality of the models that are created and decreased the time necessary to create the final product." - Jerry Conners, Bureau of Corrective Actions, NDEP

"O-Matrix is a must-have addition to your library of mathematical/statistical programming languages. It has now become my programming language of choice for research and classroom instruction and I recommend it without reservation." - Dimitrios D. Thomakos, Florida Intl. University

Matrix-based Computing Environment

For engineers and scientists looking for a powerful tool for algorithm development and numeric computation, O-Matrix[®] provides a matrix-based computing environment that matches or surpasses MATLAB[®] in performance at a far more attractive price. Unlike other alternatives to MATLAB[®], O-Matrix[®] has a direct link to the industry-standard visualization software tools, Tecplot[®] Focus and Tecplot[®] 360, and is backed by the Tecplot[®] team.

Compact and Fast

Dramatically decrease development time with superior power, speed, and ease of use

- Outperforms MATLAB[®] R2007a in 80% of the SciViews.org benchmark tests*
- 59% faster than MATLAB[®] R2007a on matrix calculations*
- 72% faster than MATLAB[®] R2007a on common programming tasks*
- 5X faster start up time (1 second compared to 5 seconds for MATLAB[®])
- 1/10 the memory footprint (6 MB compared to 60 MB for MATLAB[®])
- Extensive math, statistical, and engineering functions for analysis and modeling
- Pre-compile code into binary form using the O-Matrix[®] Development Kit
- Take advantage of: programming constructs that exceed other environments (i.e.
 - multiple data types, more versatile function handling, and greater efficiency in calling C++ or Fortran subroutines at run-time with standard Windows DLL's)
- Access other programs using COM

Affordable

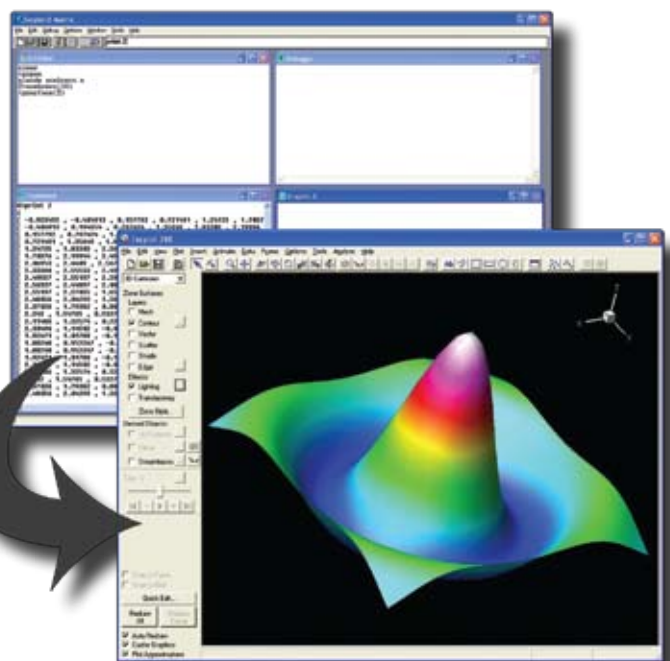
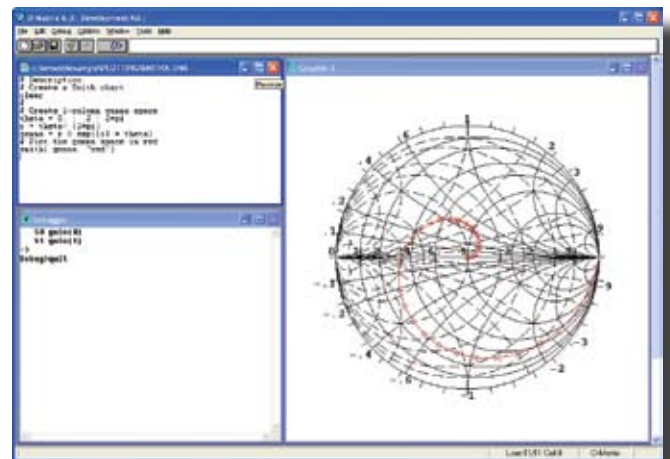
Get the functionality that you need at a fraction of the cost of other mathematical programming tools

- 1/4 the price of MATLAB[®] (\$500 compared to \$1,900 for a single-user license)
- Call O-Matrix[®] scripts from other mathematical programs
- Seamless editing, debugging, and profiling of your applications to enhance the quality and performance of your results
- Run basic MATLAB[®] functions and scripts from O-Matrix[®] programs
- Run basic MATLAB[®]-compatible scripts and programs
- Data Access Toolbox included with every O-Matrix[®] license
- Create custom GUI's for your applications

Direct Link to Tecplot Data Visualization

Impress with presentation-quality plots and animations from Tecplot[®] data visualization

- Exclusive partnership with Tecplot[®], Inc.
- Transfer data and results directly to and from Tecplot[®] Focus and Tecplot[®] 360
- Create, read, and manipulate Tecplot[®] data with 30 new O-Matrix[®] functions
- Create Tecplot[®] graphs directly with new O-Matrix[®] Tecplot[®] plotting functions
- Interactively enhance your plot for final presentation inside Tecplot[®] software



* Benchmark performed on Dell Latitude D410 Intel Pentium M 1.86GHz with 1GB of RAM. Visit www.tecplot.com/products/omatrix/omatrix_main.htm for the detailed benchmark results.



O-Matrix 6.2 Feature Highlights

Analysis Functions

Matrix Functions: Cholesky, QR, SVD, condition number, determinant, matrix exponential, rank, eigenvalues and eigenvectors, trace, tridiagonal and Toeplitz, Kronecker product, Schur, LU, norms, systems of equations.

Optimization: Simplex methods, extended least squares, linear least squares, nonlinear least squares with and without box constraints and with or without derivatives, quadratic and general nonlinear programming, linear complementary problems.

Calculus: Fourth-order Runge-Kutta, exponential method, stiff methods for solving ordinary differential equations, one and two-dimensional Gaussian quadrature methods for direct integration, numerical integration to infinity, computing Gauss-Legendre Quadrature Weights, numerical derivatives with automatic step size control, testing calculation of the gradient of a function, testing calculation of Hessian function.

Fourier Analysis: One and two-dimensional forward and inverse complex transforms, spectral estimation, discrete prolate spheroidal windows, convolution, special FFT's for real data.

Curve Fitting and Interpolation: Linear, bilinear, and polynomial interpolation, cubic splines, smoothing splines of arbitrary order in any dimension.

Special Functions: Carlson and Legendre elliptic integrals, Kolmogorov-Smirnov test, Lentz's method, beta and incomplete beta functions, error, gamma, Y and J Bessel functions.

Filtering: normalized Butterworth and Tchebycheff filters, conversion of normalized filters to continuous lowpass, continuous bandpass, digital lowpass, and digital highpass filters; auto-regressive moving average (ARMA) filters.

Kalman-Bucy Filtering: linear and nonlinear Kalman -Bucy filtering and smoothing.

Wavelets: Haar and Daubechies wavelet transforms.

Polynomials: addition, multiplication, composition, creation of a polynomial from its zeros, derivatives of a polynomial, roots of a polynomial, multidimensional monomials and their derivatives.

General Functions: trigonometric, hyperbolic, inverse trigonometric and hyperbolic, exponential, logarithmic, roots, forward and backward difference approximations to the derivatives of vector-valued functions.

Statistics

Descriptive Statistics: Mean, median, standard deviation, variance, mode, correlation, mean absolute deviation, median absolute deviation, norms, percentiles, kurtosis, skewness, convolution, 2D convolution, histograms.

Statistical Distributions: Uniform, normal, exponential, Cauchy, gumbel, Laplace, log normal, Weibull, gamma, binomial, poisson, autoregressive process simulation.

Probability Density Functions: Normal, exponential, uniform, t-statistic.

Cumulative Distribution Functions: Normal, exponential, uniform, inverse normal.

GUI Tools

O-Matrix® contains a complete set of functions for creating custom interfaces for your applications. Design windows with buttons, pop-ups, checkboxes, error messages, modal dialogs, tables, bitmap displays, etc. Add custom menus and HTML or WinHelp files.

The GUI tools in O-Matrix® are designed to simplify application interface development. Interfaces can be developed in O-Matrix® in a fraction of the time of compiled languages, and much easier than typical integrated analysis environments.

Documentation

Guide: O-Matrix® comes with extensive, tutorial-style documentation that simplifies getting started for new users, and accessing new capabilities for advanced users.

Reference: Online indexing, hyperlinking, and cross-referencing provide quick, solution-oriented access to documentation.

Example Navigator: The Example Navigator is a GUI based help file that provides hundreds of examples that illustrate O-Matrix® concepts and functions, serve as canned solutions for common analysis tasks, and provide the framework for building larger more specialized applications.

Check it Out: The entire O-Matrix® manual is provided online. Browse the Table of Contents to see what is available, review the tutorial to get an overview, or go right to the index to search for something specific.

O-Matrix Language

Program Control: O-Matrix® provides standard constructs for: while, for, if-then-else, and goto. There is no limit for the length of variable or function names and all names are case sensitive. Variables can be defined as constant.

Function Definition: In addition to the numerous functions provided with O-Matrix®, users can define their own functions. Recursion, functions with a variable number of arguments, and passing functions as arguments are supported. Functions as variables with and without replacement arguments.

Constructing and Accessing Matrices: Matrices can be constructed from scalars, row vectors, column vectors, and other matrices. Individual elements, rows, columns, and submatrices can be accessed. The dimension of a matrix can be changed (e.g., a 2 by 6 matrix can be reset as a 3 by 4 matrix). Individual matrices can have an unlimited number of rows and columns.

Operators: comparison operators (`=`, `>`, `<`, `>=`, `<=`, `<>`), logical operators (and, or, not), arithmetic operators (+, -, *, %, /, and ^) including matrix and scalar multiplication, linear equations and least squares, Euclidean norms, and matrix transposition.

Data Types: Data can be represented as logical, character, integer, single-precision, double-precision, or complex values.

Variable Scoping: Variables have three levels of scoping: global to entire program, local to a file, and local to a particular function. Functions have two levels of scoping, global to the entire program and local to a file.

Performance: Numerical algorithms are coded in highly optimized C, FORTRAN, and assembly code to provide fast, accurate results. O-Matrix compiles your code to provide maximum efficiency. O-Matrix® is a 32-bit application that runs under Windows Vista, XP or 2000. Execution takes advantage of all available RAM installed on your machine and makes efficient use of Windows virtual memory through use of a proprietary memory allocation algorithm. An integrated profiler is provided to analyze performance of user-written programs. O-Matrix® takes full advantage of modern multi-core CPUs, often doubling the performance of numerically intensive algorithms. O-Matrix® will also utilize multiple CPUs.

DLL Linking: Link your own C, C++ and FORTRAN functions directly into the O-Matrix environment. Once linked, your functions are called like any other functions in O-Matrix®.

Free, No-Hassle Trial Copies of
O-Matrix® are available at:
www.tecplot.com/trial

Plotting

Plot Types: line, contour, surface, mesh, bar, stair, polar, vector, error bar, smith charts, and histogram; line plots can contain unlimited points per curve and hundreds of curves per plot; two- and three-dimensional plotting is supported providing additional flexibility with contours and surface plots; multiple colors, markers, and line types.

Windows and Viewports: O-Matrix® supports plotting in multiple windows, and in multiple viewports within windows. Viewports can be scaled to any portion of a window to produce publication-quality plots. The aspect ratio of plots within a viewport can be either fixed or depend on the window dimensions.

Axis Scaling and Labeling: The axis intercept, x and y grid lines, rotation, scaling (linear or logarithmic), labeling, and minor and major number of divisions can be set for each plot. Autoscale multiple plots to a single axis or have multiple axis on a single plot.

Free Form Text: Text strings and symbols may be placed anywhere in plotting windows using the pointing device or user input coordinates. Text can be drawn at any angle and rotated around any point.

Fonts: Fonts can be selected for all text in plotting windows. Fonts for individual text items may be specified or font attributes for an entire plot may be set. An interactive font browser allows selection of typeface, size, color, overstrike, italics, and underlining.

Client/Server Computing

COM: O-Matrix® provides COM client programming capabilities for connecting with COM servers. O-Matrix® can be used as a COM server.

Link with Tecplot® 360 & Focus: O-Matrix® includes functions to transfer data and results to and from Tecplot® Focus and Tecplot® 360. Create, read, and manipulate Tecplot data. Functions are provided to create Tecplot® graphs of O-Matrix® data which can then be interactively enhanced in Tecplot® Focus or Tecplot® 360.

Interprocess Communication: A Windows DDE-based library provides functions for communicating data and commands between O-Matrix® and other DDE-capable applications. Use this to leverage the capabilities of other DDE-aware applications or build specialized client/server computing applications.

Integrated Debugger

O-Matrix® provides an integrated debugger with sophisticated features that are often only found with traditional compiled languages. Users can set breakpoints, examine active variables, view the current execution stack, list defined functions, set the current execution environment, and print tracebacks. Trace program execution by setting watchpoints or tracing a program as it executes.

Error Detection and Recovery

O-Matrix® provides comprehensive error detection and recovery to accelerate the implementation of complex, calculation-intensive applications. Syntax errors are reported with detailed descriptions of the cause of the error. Error messages link directly to context-sensitive on-line documentation.

Data Manipulation

With O-Matrix®, you can produce output in scientific, engineering, or free format, specify the number of digits and precision, align text using a specified character, convert between uppercase and lowercase, and convert between text and numeric representation of values.

Input/Output: Read files in free format, as text or binary, write files using free or specified formats, determine file size, and execute DOS system commands or batch files. O-Matrix® can read/write Excel® data files, MATLAB® binary data files and can load SigmaPlot® data files. Read and write files over the Internet using an FTP client embedded in O-Matrix®.

