

Supported Operating Systems

Windows 7, Vista, XP SP2 (32/64-bit)
Macintosh OS X 10.5.7, 10.6 Intel (32/64-bit)
Linux kernel 2.6.9, glibc 2.3.4, gtk 2.4.13 (32/64-bit)
Sun SPARC Solaris 10 command line mode only (32/64-bit)
Sun x86_64 Solaris 10 command line mode only (64-bit)

Data Structures & Types

Scalar
Vector
Array
Aggregate structures
1 to 8 dimensions
Byte
16, 32, 64-bit signed/unsigned integer
String
Single & double-precision float
Single & double-precision complex
Pointers - circular, self-referential data structures
!NULL
LIST & HASH (dictionary)
Infinity
Missing data (IEEE NaN)

File Formats

Read and/or write for a variety of file formats
Formatted I/O (default or user-specified)
Direct access unformatted binary I/O
Save/Restore compiled IDL format
ASCII & CSV
BMP
JPEG
JPEG 2000
TIFF
GeoTIFF
PNG
GIF
PICT
WMF
Motion JPEG 2000
MPEG
HDF5 1.8.4
HDF 4.2r3
HDF-EOS 2.8
netCDF 4.1
netCDF 3.6
CDF 3.3
ESRI Shapefile
DICOM
PDF
Postscript
Encapsulated Postscript
DXF
SRF
SYLK
XML
VRML
Windows WAV
XDR
XWD
Zip file compression/decompression

Remote File Access

TCP/IP socket support (client-side)
HTTP & FTP server
OGC WMS & WCS server

2D Graphics & Image Display

Line plot, scatter plot, histogram, bar plot
Error bar plot, polar plot, vector flow plot, dendrogram
Contour plot, multiple contour levels & fill
Image display
Zoom & pan
Annotation
RGB, HLS, HSV, indexed color display
Contrast enhancement
Animation
2-D transformations
Image tiling
Double precision plot
Date/time
Linestyle, pattern, plot symbols
Log, semi-log & linear scaling
Overplot multiple data sets

3-D Graphics

Surface, 3-D scatter plot, isosurface, isocontour
Streamline & particle trace
3-D object rendering
Volume rendering
Flat & Gouraud shading
Texture mapping
3-D symbols & text
Lighting model effects
Interactive light object editor
Opacity & layering control
Surface area & volume
3-D transformations
Mesh generation from volumetric data
Mesh surface plots with hidden line removal
Mesh operations for polygonal & tetrahedral meshes
Multiple clipping planes
Decimation
Smoothing
Interactive DXF viewer

Mapping

Display maps with georeferenced image overlay
High-resolution map database
30+ geographic mapping transformations (includes USGS GCTP)
Warp images onto arbitrary projections

Image & Signal Processing

Continuous & discrete wavelet transform
Frequency domain (FFT) filtering & analysis
Convolution & frequency-domain block convolution
Generalized image arithmetic
Image statistics
Spectral analysis
Time-series analysis
Watershed segmentation
Bi-level, pseudo- & true-color thresholding
Histogram equalization
High- & low-pass filtering
Edge enhancement: Canny, difference of gaussians, emboss, Laplacian, Prewitt, Roberts, Sobel, shift difference

Morphological operators: erode, dilate, distance mapping & thinning
Noise reduction & image restoration: Butterworth, band pass, band reject, hurl, impulse response, least squares, mean, median, order statistic, pick, Savitsky-Golay, scatter, slur, Wiener
Geometric transformations: magnification, reduction, rotation, polynomial warping
Region growing
Region of interest
Unsharp masking
Hough transform
Radon transform
Lomb periodogram
Mixed Radix

Wavelet Toolkit

Interactive interface
Multiresolution analysis

Differentiation & Integration

Differential equations: adaptive & Runge-Kutta
Iterated Gaussian quadrature
Newton-Cotes integration of tabulated data
Romberg integration over an open or closed interval
Simpson integration over a closed interval

Linear Algebra

LAPACK
Numerical Recipes
Condition number
Determinant
Generalized inverse
Transpose
Infinity & Euclidean norms
Eigenvectors & eigenvalues
Singular value decomposition
Cholesky, Gauss-Seidel, LU, Cramer's, least squares & tridiagonal methods for solving systems of linear equations

Sparse Linear Systems

Dense-to-sparse & sparse-to-dense conversions with thresholds
Iterative biconjugate-gradient algorithm for solving linear equations
Multi-dimensional optimization
Row-indexed sparse storage format
Sparse format file I/O
Sparse matrix-matrix & matrix-vector multiply

Nonlinear Systems & Root Finding

Broyden's & Newton's globally-convergent algorithms
Laguerre's algorithm for polynomial root-finding
Muller's algorithm for real & complex root-finding

Special & Transcendental Functions

Beta & incomplete beta functions
Error & exponential integral functions
Exponentials & logarithms
Forward & inverse Chebyshev polynomial expansion
Gamma, incomplete gamma & logarithmic gamma functions
I-, J-, K- & Y-Bessel functions

LaGuerre & Legendre polynomials
Spherical harmonics
Trigonometric, inverse trigonometric & hyperbolic functions

Curve & Surface Fitting

Multiple linear regression
Nonlinear least-squares
Gradient-expansion
Levenberg-Marquardt
Singular value decomposition
Polynomial spatial warping
Polynomial surface
Weighted/unweighted least-squares polynomial
Thin plate spline

Correlation Analysis & Forecasting

Auto & cross covariances/correlation
Autoregressive modeling/forecasting
Cluster analysis
Differencing/box-car smoothing
Discrete auto/cross correlation
Exponential, geometric, Gompertz, hyperbolic, logistic & logsquare growth models
Kendall & Spearman rank correlations
Lagged auto & cross correlations
Least-absolute-deviation fitting
Linear, multiple & partial correlations
Moving averages/smoothing
Multiple linear regression
Multiple correlation
Nonlinear least-squares fitting
Partial correlation
Principal components
Statistical fitting of data

Hypothesis Testing

Chi-square test
Contingency test for independence
Cumulative binomial (Bernouli)
Gaussian (normal)
F test
Kruskal-Wallis H-test
Lomb frequency test
Mann-Whitney U-test
Median delta test
Normality test
Random numbers
Normal & uniform
Single & double precision
Sign test
Student's T tests
Wilcoxon rank-sum test

Multi-Dimensional Optimization

Davidon-Fletcher-Powell minimization
Gradient-free Powell minimization
Simplex method

Multi-Dimensional Gridding & Interpolation

1-, 2- & 3-D nearest-neighbor & linear
1-, 2- & 3-D cubic convolution
2-D parametric cubic splines
N-D Delaunay triangulation, convex hulls & Voronoi polygons
2-D interpolation
Inverse distance
Faulting
Kriging

Linear
Minimum curvature
Modified Shepard's
Natural neighbor
Nearest neighbor
Polynomial regression
Quintic
Radial basis function
3-D minimum curvature surfaces
3-D polar (r, theta, z) to rectangle
4-D smooth fit
Spherical gridding
Non-uniform gridding

IDL Advanced Math and Stats Module

Optional integrated IMSL™ library of comprehensive mathematical & statistical routines
Adds nearly 200 proven algorithms available from within IDL

Integrated Development Environment - IDL Workbench

Cross-platform native, user interface to edit, run & debug IDL code
Chromacoded editor
Project explorer for source code & files
Console & integrated command line with automatic line wrapping
Syntax highlighting of IDL code
Drag-and-drop editing
Display of matching parentheses & brackets
Mouse over routines displays hover help
Toolbar with resizable icons for file, system, edit & debug operations
Content Assist automatically completes commands
Profiler displays program execution time
Command history display
Display & set current directory
Open & read files into variables view
Keyboard accelerators
Asian & European language internationalization
IDL command line mode available on all platforms

User Interface Toolkit

Create cross-platform graphical user interfaces for IDL applications
Widgets/controls include:
Base
Button
Tab
Tree
Context-sensitive shortcut menu
Push button, toggle button
Drawable (expose, click, drag & wheel events)
Droplist/Combobox
Label
List
Message
Slider
Table
Text
Property Sheet
Animation tool
Annotation tool
Interactive file selector
Interactive color palette editor
Tab key navigation & button accelerators

IDL DataMiner™ Module

ODBC database connectivity option
Same API for all platforms & databases
Create, delete, query tables
Execute arbitrary SQL statements
Get/set/query/add/delete records
Support for Oracle, Informix, Sybase, MS SQL Server, MySQL databases

Multi-threaded Computations

Threaded processing for built-in analysis routines
Binary & unary operations
Mathematics
Image processing
Array creation & manipulation
IDL_IDL bridge out-of-process server

Development & Programming Features

High level, array-based interpretive language
Language features similar to C, C++, Java
Graphics functions with dot (".") syntax simplifies the control of objects & properties
Automatic object garbage collection
Operator overloading
No limit to number of variables, compiled program size, program file names or structure tags
Support for large files (>2GB)
Call Windows DLLs or UNIX sharable object libraries
Export IDL objects into COM/Java
Import COM/Java objects into IDL
IDL_IDL bridge out-of-process server
Run time distribution options, including IDL Virtual Machine to execute compiled IDL code with no license fee

Graphics Architecture

Fast efficient rendering
OpenGL accelerated graphics & shaders
Real-time interactivity
Multibyte & extended ASCII text characters
Multiple monitors
Z-buffered graphics (8-bit, 24-bit)

Color Systems

Convert to/from: CMYK, HSV, HLS, YUV, YIQ, YPbPr, YCbCr
Convert true-color to pseudo-color
Color mapping functions

Printing & Fonts

WYSIWYG high quality printing
Scalable TrueType® fonts
Hershey fonts
User-extensible font set
Native print dialogs - page setup, print job
Printing directly to a printer device
Vector & bitmap printing & clipboard
PostScript preview



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