

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, glibc 2.5, gtk 2.10 (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
KML/KMZ
TIFF
GeoTIFF
PNG
GIF
GRIB/GRIB2
PICT
WMF
Motion JPEG 2000
MPEG-4 (AVI, MP4)
HDF5
HDF
HDF-EOS
netCDF 4 & 3
CDF
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
Map symbols
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 (Bernoulli)
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 Shepards
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
Source control tools: CVS, Git, Perforce, Subversion
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
Internationalization routines that convert strings from one encoding to another
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

EXELIS

Visual Information Solutions