

## Supported Operating Systems

Windows XP SP2, Vista (32-bit & 64-bit)  
Mac OS X 10.5.1 Power PC (32-bit)  
Mac OS X 10.5.1 Intel (32-bit & 64-bit)  
Linux kernel 2.6.9, glibc 2.3.4,  
gtk 2.4.13 (32-bit & 64-bit)  
Sun SPARC Solaris 10 (32-bit & 64-bit)  
Sun x86 Solaris 10 (64-bit, command line  
mode only)

## Data Formats

Data structures  
Scalar  
Vector  
Array  
Aggregate structures  
Data types  
Byte  
16, 32, 64-bit signed/unsigned integer  
String  
Single & double-precision float  
Single & double-precision complex  
Pointers - circular, self-referential data  
structures  
IEEE support  
Infinity  
Missing data (IEEE NaN)  
Save/Restore facility (binary format)  
Direct access unformatted binary I/O  
Formatted I/O (default or user-specified)  
Scientific data formats  
CDF 3.2  
HDF 4.2r3  
HDF5 5-1.6.7  
HDF-EOS 2.8  
netCDF 3.6.2  
ASCII CSV  
BMP (Microsoft Windows Bitmap)  
DICOM version 3 part 10 support  
DXF (AutoCAD)  
ESRI ArcView Shapefiles  
GeoTIFF  
JPEG  
JPEG 2000  
Motion JPEG 2000  
MPEG  
GIF  
PICT  
PNG  
SRF  
SYLK  
TIFF, ITIFF  
XML  
VRML  
WAV Audio files  
WMF  
XDR  
XWD  
Zip file compression/decompression

## Remote Access

Socket support (client-side TCP/IP)  
HTTP and FTP server access  
Non-Secure OGC WMS and OGC WCS  
server access

## Multi-threaded Computations

Binary & unary operations  
Mathematical routines  
Image processing routines  
Array creation routines  
Array manipulation routines  
Out-of-process server (IDL\_IDL Bridge)

## 2-D Plotting & Graphics

iTools for interactive image analysis,  
contouring & plotting  
OpenGL accelerated image rendering  
2-D transformations  
Opacity and layering control  
Animation  
Image tiling  
RGB, HLS, HSV, indexed color display  
Zoom & pan  
Image annotation  
Interactive contrast enhancement  
Double precision plotting with date/  
time support  
Contour plots, automatic boundary close,  
unlimited contour levels, filled contours  
Line plots, scatter plots, histograms,  
bar graphs, polar plots, error bars,  
dendrograms  
Linestyle, patterns, plot symbols  
Log, semi-log & linear scaling  
Overplot multiple data sets  
Vector flow diagrams

## Surface Plotting & 3-D Graphics

iTools for interactive 3-D graphics,  
surfaces & volumes  
OpenGL accelerated 3-D graphics  
3-D transformations  
4-D data display of gridded or non-gridded  
elevations with overlaid image or  
user-specified shading  
Interactive DXF (AutoCAD) viewer  
Interactive light object editor  
Isosurface & isocontour  
Mesh generation (tetrahedral mesh from  
volumetric data)  
Mesh surface plots with hidden line removal  
Mesh operations (polygonal &  
tetrahedral meshes)  
Clipping  
Decimation  
Smoothing  
Surface area & volume  
Validation  
Particle trace & streamline  
Volume rendering  
3-D plot symbols & text  
Flat & Gouraud shading  
Lighting model effects  
Opacity controls  
Texture mapping (high resolution)  
Multiple clipping planes

## Graphics Architecture

OpenGL accelerated 3-D graphics  
OpenGL Shading Language  
Highly efficient rendering  
Real-time interactivity  
Multibyte text character support in iTools  
& object graphics  
Support for 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

High-quality, scalable TrueType® fonts  
Hershey fonts  
Native print dialogs - page set-up, print job  
Printing directly to a printer device  
Vector & bitmap printing & clipboard  
Printer support: PS, PCL, HPGL2, HP-RTL  
PostScript preview  
User-extensible font set  
WYSIWYG printing

## 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

## Image & Signal Processing

iTools for interactive image display and  
processing  
Adaptive Fast Fourier Transform  
Mixed Radix  
1 to 8 dimensions  
Multi-threaded  
Bi-level, pseudo- & true-color thresholding  
Butterworth filter  
Canny filter  
Convolution & frequency-domain  
block convolution  
Edge Enhancement  
Roberts  
Sobel  
Edge detection filters: Difference of Gaussians,  
Emboss, Laplacian, Prewitt, Shift difference  
Unsharp masking  
Frequency domain filtering & analysis  
Generalized image arithmetic  
Geometric transformations: magnification,  
reduction, rotation, polynomial warping  
Hough transform  
High- & low-pass filtering  
Histogram equalization & processing  
Adaptive histogram equalization  
Image statistics  
Impulse Response filter  
Lomb periodogram  
Median filtering  
Morphological operators: erode, dilate, distance  
mapping & thinning  
Noise functions: hurl, pick, scatter, slur  
Noise reduction & image restoration filters:  
BAND\_PASS, BAND\_REJECT, LEAST\_SQUARES,  
MEAN, ORDER\_STATISTIC, WIENER  
Radon transform  
Region growing  
Region of interest (ROI) utility  
Savitsky-Golay filter  
Spectral analysis  
Time-series analysis  
Watershed segmentation  
Continuous & discrete wavelet transform

## 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 routines  
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

## **Multi-Dimensional Optimization**

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

## **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

## **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  
Runs test for randomness  
Sign test  
Student's T tests  
Wilcoxon rank-sum test

## **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

## **Mapping**

iTools for interactive exploration of georeferenced image and contour data  
High-resolution map database  
30+ geographic mapping transformations (includes USGS GCTP)  
Warp images onto arbitrary projections

## **Development & Programming Tools**

Support for large files (>2GB)  
Programming language features similar to C  
Macintosh Altivec acceleration  
Callable UNIX sharable object library & Windows DLL  
Out-of-process server (IDL\_IDL Bridge)  
Extensible: add FORTRAN or C code with child processes or dynamic linking  
Export IDL objects into COM/Java  
Import COM/Java objects into IDL  
Immediate execution of interactive statements  
Object oriented programming interface  
System constants  
File manipulation routines  
Unlimited compiled program size  
Unlimited number of variables  
Unlimited program file names  
Unlimited structure tags  
Distribution options, including free IDL Virtual Machine\_

## **Integrated Development Environment - IDL Workbench**

Cross-platform native, user interface (UI)  
Edit, run, debug IDL code  
Keyboard accelerators  
Syntax highlighting of IDL code  
Drag-and-drop editing  
Hover Help display from the mouse cursor position  
Content Assist helps complete a routine  
Display of matching parentheses and brackets  
Debug view displays the IDL call stack in graphical format  
Profiler view shows execution time  
Projects organize source code and files  
File menu to open & read files into Variables view  
Drag & drop variables to Tool Palette to render visualizations  
IDL session command line access  
RSS feeds for news and update information  
Internationalized and localized UI supports several Asian and European languages  
Plug-in updates and extensions to IDL

## **User Interface Toolkit**

Cross-platform tools for creating graphical user interfaces (GUI) with native look & feel  
Animation tool  
Annotation tool  
Interactive file selector  
Interactive color palette editor  
Tab key navigation and button accelerators  
Widgets/Controls  
Base  
Button  
Tab  
Tree (with drag and drop)  
Context-sensitive shortcut menu  
Push button, toggle button  
Drawable (expose, click, drag & wheel events)  
Droplist/Combobox  
Label  
List  
Message  
Slider  
Table  
Text  
Property Sheet

## **IDL DataMiner™ Module**

Same API for all platforms & databases  
Create, delete, query tables  
Execute arbitrary SQL statements  
Get/set/query/add/delete records  
Drivers for: Oracle, Informix, Sybase, MS SQL Server, MySQL

## **DICOM Read/Write Module**

Read, clone & create DICOM part 10 files  
Public & private attributes including sequences & groups  
JPEG compression (Windows & UNIX)  
Windows, SPARC Solaris, Mac OS X (PPC only) & Linux

## **DICOM Network Services**

Query/Retrieve SCU  
Storage SCU, SCP  
Echo SCU, SCP  
Windows, SPARC Solaris, Mac OS X (PPC only) & Linux



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