

## Get the picture: visualization with IRIS Explorer

Data visualization can be defined as the gaining of insight by making a picture out of numbers, and the important role that it plays in the effective interpretation of numerical data has been recognized for a long time. The requirement of users in this area is for visualization applications that are:

- powerful – so that they offer the user a range of relevant visualization techniques,
- easily modified – so that the user can, if necessary, experiment with a variety of techniques which can be applied to their data,
- easily extended – so that the user can make use of new techniques or methods as they are developed.

In this article, we briefly introduce IRIS Explorer as a modular data visualization system and describe some of the features that may be found in the latest release, which has just appeared for the Windows NT platform.

IRIS Explorer can be described as a toolkit for data visualization, in which the tools are manipulated by visual programming. More specifically, when working with IRIS Explorer, users interactively create their application by using a collection of software modules.

Modules are represented on the screen as objects that can be manipulated via a familiar point-and-click interface; each module is a routine that operates on its input data to produce some output.

In building an application, users interactively connect module inputs and outputs together to define the way in which data flows through the application. This type of interface makes building new applications (or modifying old ones) easy to do, because the user sees a direct, visual, representation of the structure of the application. Finally, the IRIS Explorer module suite can be extended through the creation of new modules, written in a standard language such as C, C++ or Fortran 77.

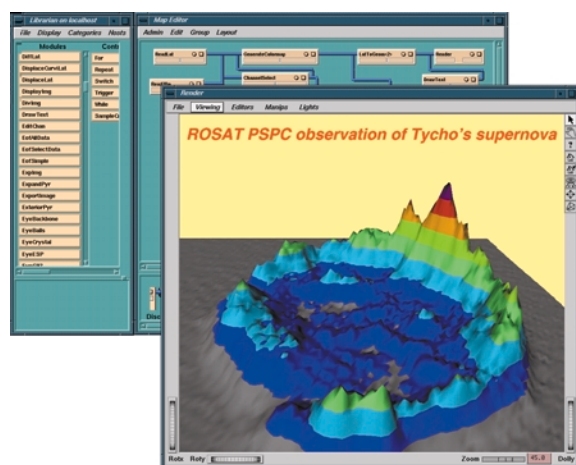


Figure 1 shows an application running inside IRIS Explorer. (see colour plate IV, 1)

The module librarian is on the left, and modules are dragged from there to the region on the right where they are connected together to build the application. This is a visualization of Tycho's supernova using a Position Sensitive Proportional Counter on board the ROSAT satellite; the dataset is the intensity count in the 0.1-2.4 keV X-ray energy range, and it is displayed as a solid contoured sheet.

The latest release of IRIS Explorer contains a variety of new features. Many of these enhancements have been added in response to user requests, but some of them break completely new ground for a visualization system, giving IRIS Explorer 4.0 features which are unmatched by other products in this arena.

For example, IRIS Explorer 4.0 is the first system to allow collaborative visualization. Here, users working on separate machines anywhere on the Internet can use IRIS Explorer 4.0 to build multi-user visualization applications. This offers support for teams of co-workers who are geographically disparate, but who need to come together to jointly examine and analyse their datasets. Working within IRIS Explorer's familiar dataflow pipeline, in which modules are connected together to construct the application, all team members can share data from any point in the pipeline, or share control over any of the constituent modules. In addition, they can pass individual modules or pipeline fragments to their colleagues, allowing direct collaboration on the construction of the application.

Collaborative visualization is useful in a number of areas such as teaching, helpdesk support or joint research. The collaborative functionality in IRIS Explorer 4.0 has come from work done at the IRIS Explorer Center of Excellence at the University of Leeds. More details of that research can be found on their website at <http://www.scs.leeds.ac.uk/iecoe/>

Other new features in IRIS Explorer 4.0 have concentrated on the graphing of one-dimensional data – plotting  $y$  as a function of  $x$ . This area has seen considerable enhancement since NAG took over the development of IRIS Explorer in 1994. New features include logarithmic axes, independent control of plot colour, line and symbol style, domain specification, multiple curves (independently labelled) on one plot, and improved support for axis labelling. As well as appearing in new modules, this new functionality has been added at the API level, allowing users to create their own new modules for specialised plots. Other new modules have been added to layout multiple plots, and to provide high-quality printing using vector PostScript.

Data input and output have been improved as well. Along with the new modules for plotting one-dimensional data, a simple-to-use format for this data –

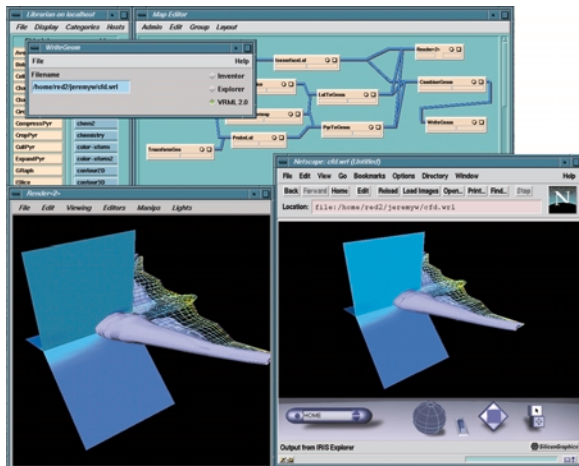


Figure 2 shows the creation of VRML in IRIS Explorer 4.0 (see colour plate IV, 2)

Explorer Chart Format – has been introduced, together with a reader module. In addition, the close relationship between IRIS Explorer and VRML (IRIS Explorer is built using Open Inventor, whose file format is the basis for VRML) is enhanced in release 4.0 with improved output options for VRML 2.0.

The window of the Render module at bottom left contains the scene, which consists of a variety of geometry, which are then saved as a VRML 2.0 file. The file is then viewed using a suitable browser (here, the Cosmo Player plug-in for Netscape Navigator) in the bottom right-hand corner. Clearly, although both displays are on the same machine here, in general, the VRML could be viewed anywhere on the Web.

Finally, IRIS Explorer 4.0 incorporates a simplified installation procedure and new licensing options for developers who are building applications. Whatever your needs, you will find something to help you in this exciting new release, which is already available from NAG for Windows NT, and will shortly be available for popular UNIX platforms (including, for the first time, Linux). So, why not take a look at IRIS Explorer? It's just waiting to help you!

More information on IRIS Explorer can be obtained from the IRIS Explorer Center website at [http://www.nag.co.uk/Welcome\\_IEC.html](http://www.nag.co.uk/Welcome_IEC.html)

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