IRIS Explorer User’s Guide
Release 3

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Introduction

At the turn of the century, someone defined an inventor as a "person who makes an ingenious arrangement of wheels, levers and springs, and believes it civilization."

Footnote: *The Enlarged Devils's Dictionary*, by Ambrose Bierce (Penguin Books, 1967)

Now, nearly a hundred years later, it could be said that an inventor is a person who concocts an ingenious arrangement of computer code and believes it intuitive. Since everyone's intuition has its off–days, the *IRIS Explorer User's Guide* provides a few tips for using IRIS Explorer™, a decidedly "ingenious arrangement."

IRIS Explorer is a system for creating powerful visualization *maps*, each of which comprises a series of small software tools, called *modules.* A map is a collection of modules that carries out a series of related operations on a dataset and produces a visual representation of the result.

IRIS Explorer has three main components:

- the Map Editor, which is a work area for creating and modifying maps
- the DataScribe™, which is a data conversion utility for moving data between IRIS Explorer and other data formats
- the Module Builder, which lets you create your own custom modules (described in the *IRIS Explorer Module Writer's Guide*)

The IRIS Explorer System

To understand how these components interact in the system, think of a factory. The purpose of a factory is to take raw materials and fashion them into an end product, according to a specific design. The raw materials are fed into an assembly line at one end, go through a number of alterations and manipulations as they pass through the machines on the factory floor, and then come out at the other end in the form of a finished product. The product is inspected for the qualities stipulated in the design. If they are not present, or not satisfactory, the machines on the floor can be adjusted until the quality of the product meets requirements.

The factory floor is not the only important area in a factory. To make products, the machines need raw materials that are suitable for the task at hand. The materials may be delivered in usable condition, or they may need processing to get them into a form that the machines can accept. So the materials controller is important.

The factory also needs machines, a different one for each process that takes place on the floor. Some machines may be standard models, but for certain tasks, the factory needs custom–built machines. The machine shop, then, is also very important.

The way in which IRIS Explorer operates is analogous to the workings of this factory. Think of IRIS Explorer itself as the factory. The Map Editor corresponds to the factory floor, and the modules to the machines. The raw materials are the data, fed in at one end and passing through the system into the visualization unit, the inspection area. Here, the finished product, which is the visual object or image, is inspected and, if necessary, tweaked. A little more color here, a slightly smoother isosurface there, and the object is ready for its destiny — to be interpreted.

Alongside the Map Editor is the Module Librarian, where the modules are stored. These correspond to functioning machines, a variety of which are brought out of storage and reconnected each time a new design is implemented on the factory floor. So specific modules are launched in the Map Editor and wired together into a map.

Raw materials are critical to the manufacturing process. The IRIS Explorer factory uses data as the manufacturing unit. It makes some of its own raw materials, in the form of generated lattices. But many designs will require materials from elsewhere, external data that needs to be picked over and cleaned up, sorted through and carefully sieved, before the machines will accept it. The DataScribe performs this task. It accepts external data and lets the user build a module that converts the data into IRIS Explorer lattices, which other IRIS Explorer modules can process.

With data coming in and modules firing, the IRIS Explorer factory produces many interesting and informative geometric objects. However, the day may come when no modules are available in the Module Librarian to fulfill a part of the map design. This calls for a trip to the machine shop, the Module Builder. Here, you can build a module that will do exactly what you want it to do when it is wired into the map. It looks just like the other modules, with the same type of control panel and controls, and it can be stored and used again. Thus the scope of the factory has been enlarged.

However, large factory floors have a disadvantage. They can be noisy and messy, with lots of wires snaking here and looping there, and they tend to be crowded, on the principle that an empty space is immoral. Some machines may be running at less than their full capacity if a couple of their features are not needed for a particular design. Likewise with the IRIS Explorer Map Editor. When you create large maps, you might be tempted to think less of visualization systems and more of a bowl of noodle soup.

The IRIS Explorer factory has a way to cope with this. The manager scopes out a group of machines that for some reason are logically related, probably because they carry out closely related tasks, and selects certain of their functions to wire into a new control panel. The machines themselves are relegated, still intact, to the basement and the connecting wires come through the factory floor to the administrative, or group, control panel. In one easy move, the factory floor has gained a large open space, the assembly line has increased in efficiency, and the individual machines in the group are unscathed — simply out of sight until fetched up from the basement again. If you plan carefully, you could end up with one sleek control panel on the visualization unit and a completely clean and quiet floor.

The analogy should be clear. You can encapsulate a collection of modules in a group and gain all the benefits of a streamlined work area without sacrificing the integrity of the individual modules.

IRIS Explorer is a powerful and versatile system. The analogy of the factory necessarily simplifies its structure, but the examples in Chapter 1 give you a sense of what can be accomplished.

To use IRIS Explorer effectively, you should know what data you have, but you need no blueprint for what kind of visualization you want to produce. The great strength of IRIS Explorer is that you can innovate without retooling, and the design of your map reveals itself as you go. As with any exploration, you could end up with a map that takes you into uncharted realms of discovery and shows you implications of your data that you would not have thought existed.

The inventors of today have a distinct advantage over their predecessors. An ordinary factory floor is limited by the constraints of matter: the IRIS Explorer factory floor is limited only by the power of your imagination.

How to Use This Guide

The *IRIS Explorer User's Guide* describes how to use IRIS Explorer, which is a system for creating custom visualization programs and applications.

This guide is written for computational scientists and engineers in the fields of fluid dynamics, chemistry, meteorology, cosmology, physics, and mathematics. It addresses high–level users who are experts in their fields but are not programmers, and who will use the visual interface and tools in IRIS Explorer to create their models.

The guide assumes you have a basic understanding of:

- the UNIX® operating system, and can create data files
- the X Window System™ and Motif™, and can use a mouse

Contents of This Guide

The *IRIS Explorer User's Guide* has seven chapters and two appendices. They cover the following topics:

- **Chapter 1, "Getting Started",** provides five sample maps that visualize data from different scientific fields.
- **Chapter 2, "Working with the Map Editor",** explains how to use the Map Editor and Module Librarian to create maps.
- **Chapter 3, "Using Modules",** gives detailed instructions for using some of the more useful or complex IRIS Explorer modules, including loop controllers.
- **Chapter 4, "Editing Control Panels and Functions",** describes the Control Panel and the Parameter Function (P–Func) Editors, used to create module control panels and parameter functions.
- **Chapter 5, "Creating Groups and Applications",** describes how you can encapsulate a collection of modules into a single group and create an application from it.

- **Chapter 6, "Scripting",** explains how to write scripts in the IRIS Explorer Skm language.
- **Chapter 7, "Using the DataScribe",** explains how to convert external data into and out of IRIS Explorer data types through a DataScribe interpreter module.
- **Appendix A, "Configuring Your IRIS Explorer Environment",** describes how each of the IRIS Explorer menu options works.
- **Appendix B, "The Skm Language",** provides information on basic system configuration.

Some of the examples are complete, and some are fragmentary. Maps for all the examples are included with the IRIS Explorer software.

The companion volume to this guide is the *IRIS Explorer Module Writer's Guide*, which provides information on how to build your own modules with the Module Builder. In addition, documentation for all IRIS Explorer modules is provided on−line as *man* and *help* pages for each module. Similarly, the specification for each of the IRIS Explorer Application Programming Interface (API) routines is available via *man*. More information on this is provided in the on−line *IRIS Explorer Reference Pages.*

All of the on−line documentation is available in hard−copy form as the three volumes:

- *IRIS Explorer User's Guide*,
- *IRIS Explorer Module Writer's Guide*,
- *IRIS Explorer Reference Pages*, which contains all the information from the *man* pages for the modules and API routines.

Contact your IRIS Explorer supplier for more details.