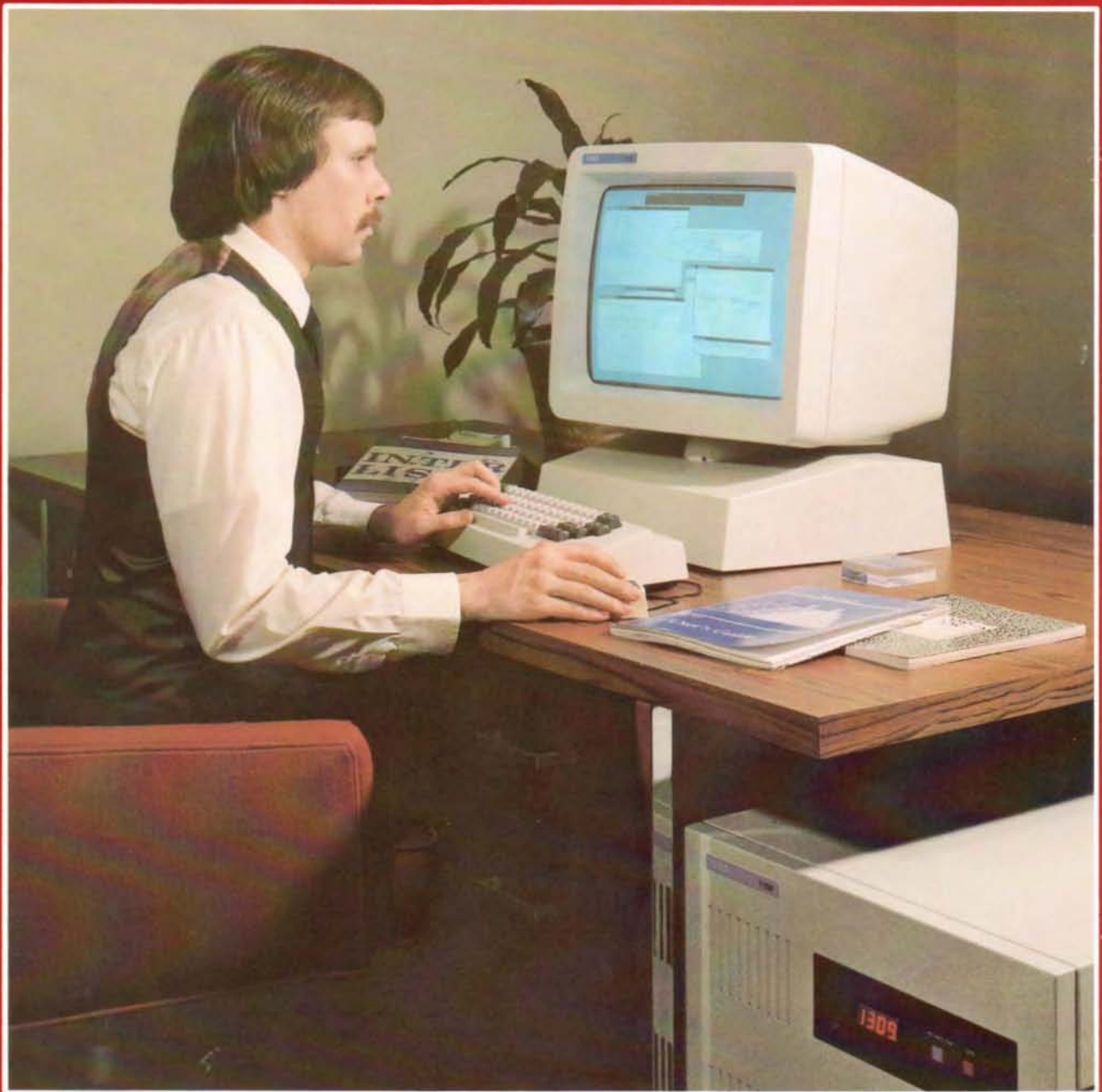


XEROX

The 1100 Scientific Information Processor A Personal Interlisp Environment



Xerox Electro-Optical Systems



Interlisp is a language and an environment for exploratory programming. Software system design often requires prototyping and exploration of alternative designs. Interlisp's integrated, interactive programming environment actively supports this process of exploration. By facilitating the investigation of design alternatives, Interlisp greatly enhances programming productivity.

A Decade of Development

Originally developed at Bolt Beranek & Newman and Xerox Palo Alto Research Center, Interlisp has become widely used for research and development in artificial intelligence and other areas of experimental computing. Many very large systems have been implemented in Interlisp, including the MYCIN system for infectious disease diagnosis, the KL-ONE knowledge representation language, and the West tutoring system.

During the past decade, Interlisp has been continuously extended and improved. In response to the changing needs of the large Interlisp user community, an extensive set of program development tools has evolved, gaining wide use and acceptance.

Integrated Programming Tools

Interlisp provides a *unified environment* for all phases of programming, including interactive facilities for program writing, editing, executing, debugging, sharing, filing, and documenting. Incremental compilation, dynamic linking, and the ability to mix interpreted and compiled code freely eliminates significant amounts of wasted programming time. A designer can explore new ideas quickly and get immediate feedback.

Continuity and Growth

Although Interlisp has grown and continues to grow rapidly, it has maintained a large user community with considerable investment in existing Interlisp programs. The long-standing policy of making significant changes backward compatible protects this investment in existing programs as Interlisp is extended.

Multiple Compatible Implementations

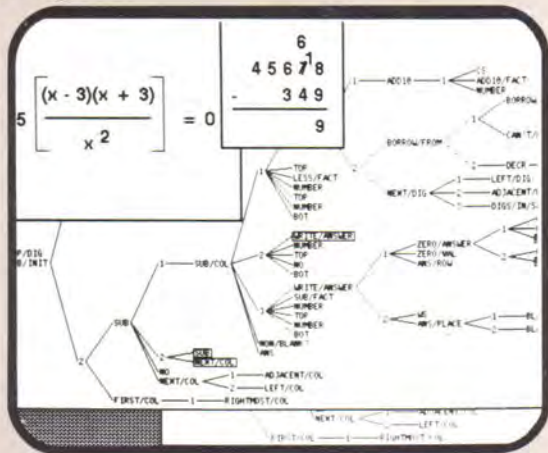
The usefulness and popularity of Interlisp have prompted implementations for a number of different machines including the DECsystem 10/20, the DEC VAX, and the experimental Jericho computer, in addition to the Xerox 1100. Considerable effort is invested in maintaining a high degree of compatibility between these implementations.

Interlisp-D on the Xerox 1100

Until recently, Interlisp was only available on large timesharing systems. Now, the Xerox 1100 Scientific Information Processor provides Interlisp-D, the first personal machine implementation of Interlisp. The program development environment has been extended to take advantage of the personal machine features of the Xerox 1100, providing a dramatic extension of Interlisp's capabilities. While retaining the facilities that have made Interlisp widely used in research and development, the Xerox 1100 also makes it feasible to use Interlisp to deliver end-user applications in areas such as interactive symbolic computation, computer aided design, knowledge engineering, and expert systems.

THE INTERLISP-D ENVIRONMENT FOR THE XEROX 1100

Interlisp-D is a complete Interlisp; some of the largest existing Interlisp programs have been transferred to Interlisp-D with little or no conversion. In addition, Interlisp-D uses the Xerox 1100's personal machine capabilities, such as graphic displays and local networking.

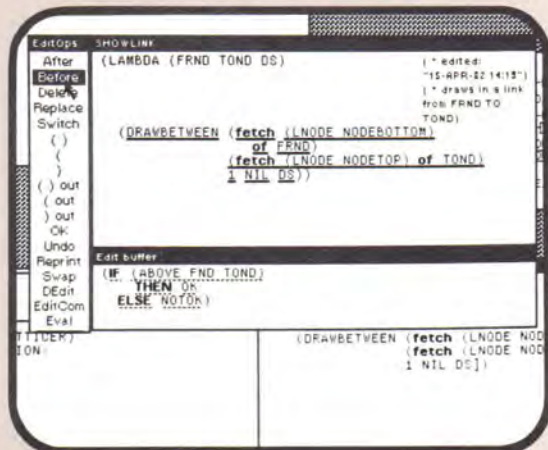


Interactive graphics

The Xerox 1100 includes a high-resolution raster display and a pointing device called a mouse. Interlisp-D provides a complete set of raster graphics functions, allowing the user to display text in multiple fonts, manipulate raster images, and draw lines and spline curves.

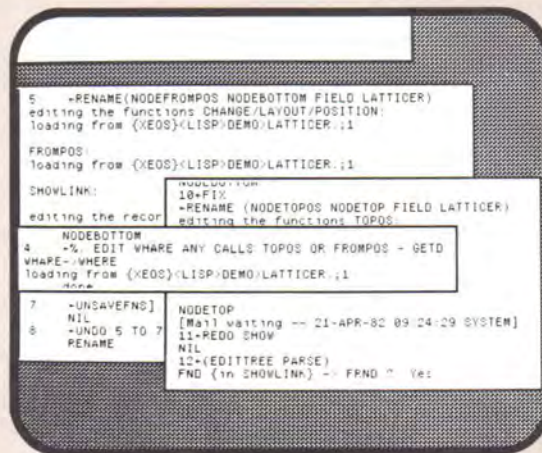
Interlisp-D also includes a sophisticated display management system that supports multiple windows, menu driven selection, and a wide range of graphic utilities, all controllable either by program or by mouse action. Windows accept user specifications for a wide range of behavior, such as reshaping, horizontal and vertical scrolling, and redisplaying.

The graphics capabilities are fully integrated into the Interlisp-D I/O system, making it easy to experiment with display-based user interfaces. In addition, these new facilities are *completely backward compatible*, so existing programs will continue to work unchanged until they are upgraded to take advantage of the display.



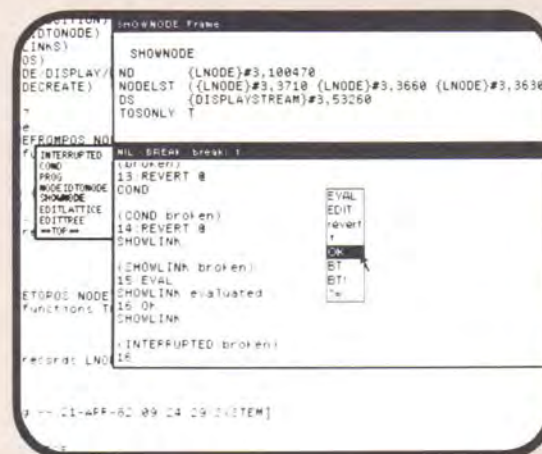
Display Editor and Inspector

The Interlisp-D display-based structure editor allows one to interactively edit function definitions and other list structure data objects. Structure-based editing exploits the form of an object, emphasizes the meaning of its parts, and thus reduces errors. The data inspector extends this philosophy to both system and user data types, allowing meaningful browsing and modification of any object in the system.



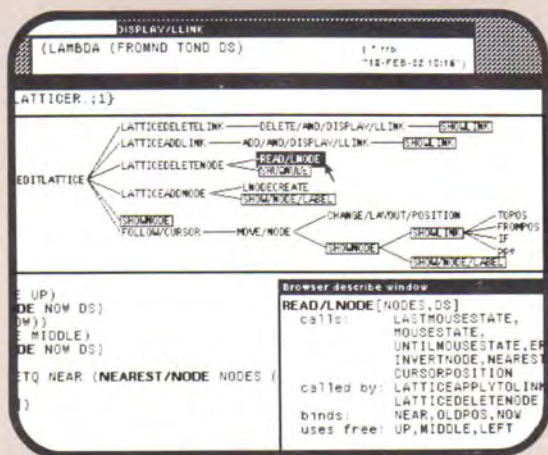
Programmer's Assistant

The Interlisp-D Programmer's Assistant provides the services of an *intelligent assistant and bookkeeper* to free the programmer from much mundane detail. For example, a *history* is kept of the commands typed, their side-effects, and the results. Thus, one can request that a previous command be repeated, modified and then repeated, or even *undone* (which undoes all the changes it may have caused). Also provided is a *spelling corrector* that automatically corrects spelling mistakes using information from the local context. To simplify *file management* for the programmer, Interlisp-D automatically keeps track of where in the file system each object is stored and which ones have been modified. In response to a simple request, the system can therefore save the user's state, updating all changed files, automatically.



Debugging Tools

Interlisp-D contains debugging tools that allow the user to break and trace arbitrary functions, and examine the state of the machine at any desired level of detail. Not only can the state of a suspended computation be displayed and perused graphically, just like a data object, using the inspector, but it can be manually unwound to a specified point, the offending program edited and execution resumed, all without loss of state. Also included is the capability of specifying complex, user-defined intervention conditions, such as allowing breaks only when a given function is called from another given function. These debugging tools allow bugs to be tracked down quickly and easily.

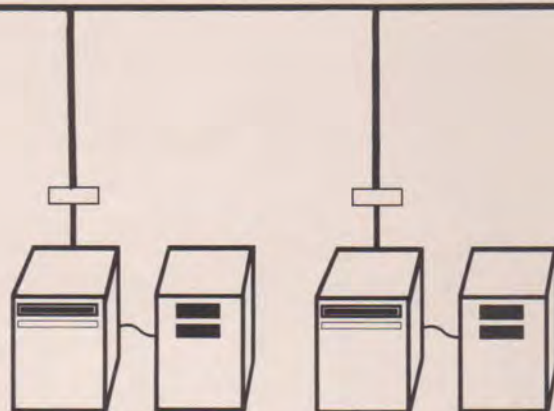


Program Analysis Tools

Interlisp-D continues to support application systems throughout their life cycle. The Masterscope facility can analyze a system of programs and assist the process of making modifications. Information about their calling structure, variable and data structure usage, and side effects can be graphically displayed and used to provide a map or browser for the system. The same information can be used to make systematic changes automatically. Further, Interlisp-D's measurement tools can be used to analyze the behavior of a system of programs after it has been developed, to pinpoint those areas that may need improvement.

Local Network

Interlisp-D contains facilities for interfacing to a local communications network. Such a network can be used to interconnect a number of different machines, such as distributed file storage and printing facilities. Interlisp-D fully supports remote files, so that files on a file server can be accessed in exactly the same manner as those on the local disk. In addition, Interlisp-D can print complex text and graphics on a raster scanning printer.



INTERLISP-D - AN APPLICATIONS ENVIRONMENT

Interlisp-D on the Xerox 1100 is more than just a program development system. It is also an excellent delivery vehicle for complex application systems. Interlisp-D provides an excellent base for applications in a number of different areas.

User Interfaces

The Xerox 1100 provides a dedicated personal computer with a high-resolution display. Interlisp-D allows the rapid implementation of highly responsive user-oriented systems. Together, they constitute an ideal environment for producing user friendly, responsive front-end systems to provide sophisticated user interfaces to other, possibly remote, applications systems.

Text Manipulation

One important area of interactive systems is text manipulation. Interlisp-D provides an excellent environment for building special purpose text processing, formatting, and printing systems. The Xerox 1100's high-resolution display can be used to display high-quality text in multiple fonts.

Knowledge Based Systems

Originally developed for research on artificial intelligence, Interlisp-D is ideally suited for the development of knowledge based, or expert systems. The Xerox 1100 provides the facilities and processing power that makes large knowledge-based applications truly practical. Until now, such systems have only existed in the laboratory. Interlisp-D allows these powerful systems to be delivered in a user environment.

Computer Aided Design

One rapidly-growing application area is the use of powerful systems for VLSI design and other CAD tasks. Interlisp-D provides an ideal system for such applications.

Communications

Customized electronic mail systems, and other communications applications, are also straightforward to implement using sophisticated network communications and display facilities of Interlisp-D.

Note:

All data shown in illustrations are actual photographs of the Xerox 1100 screen.

XEROX®

Technical Information

Processor

4M words (8Mbytes) virtual address space
576-768K words (1.15-1.5Mbytes) main memory
200 ns micro-instruction cycle time
Rigid disk, capacity 23 Mbytes formatted
(29 Mbytes unformatted)

Serial I/O port:

RS232C

Parallel I/O port:

8 output lines, 5 input lines

8 bidirectional tristate lines

Local network interface

Display

Large format CRT display (17" diagonal)
High resolution bitmap (1024 x 808 pixels)
Usable viewing area: 12.75" wide by 10" high
Refresh rate: 38.5 frames per second, interlaced
Distance from processor: up to 250 feet

Keyboard

64 keys, both downstroke and upstroke sensed

Pointing Device

3-button mouse

Communications

Local network controller, transceiver, and cable connector
Xerox 1100s have been networked with DECsystem-10/20s,
DEC VAXs, and other mainframes.

Software

Interlisp-D

Direct microcode support
Deep binding
CDR encoded 32-bit CONS cell
Transaction garbage collection
Raster scan graphics
Communications software

Service

The Xerox 1100 is designed for reliable field deployment. Modular design and extensive diagnostics simplify maintenance. In addition, the 1100 is backed by Xerox Electro-Optical Systems service and parts support.

Training

Xerox Electro-Optical Systems offers user training at customer sites and at various Xerox locations.

Size

Processor

19" wide x 23" high x 28" deep

Display Unit

17" wide x 19" high x 15" deep

Keyboard

17" wide x 3.25" high x 7" deep

Pointing Device (Mouse)

2" wide x 2.5" high x 3.25" deep

Power

Processor

115V 60Hz 10 amps

Display

115V 60Hz 1 amp

Weight

Processor

200 lb

Display Unit

60 lb

Keyboard

5 lb



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