

CHAPTER ZERO  
(added for Edition 87.1, May 1987)

# HYPERWORLD

All men dream, but not equally.  
Those who dream by night,  
in the dusty recesses of their minds,  
wake in the day to find that it was vanity.  
But the dreamers of the day are dangerous men,  
for they may act their dreams with open eyes  
to make it possible.

*T. E. Lawrence*

LITERARY 0/1 MACHINES

## HYPERMEDIA AT LARGE

Suddenly, everyone is talking about hypertext. You hear the word on every side. At a conference in March 1987 I overheard the word nine times walking through the lounge.

Similarly, in the new area we may call Interactive Show Biz--where they are now creating branching videodiscs and other interactive productions--the word of the hour seems to be "hypermedia."

I am bemused by this, and find it somewhat ironic. I coined the term "hypertext" over twenty years ago, and in the ensuing decades have given many speeches and written numerous articles preaching the hypertext revolution: telling people hypertext would be the wave of the future, the next stage of civilization, the next stage of literature and a clarifying force in education and the technical fields, as well as art and culture. Same for "hypermedia" (a term first published somewhat later).

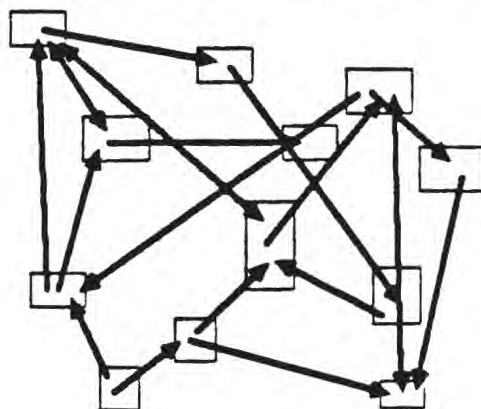
For years I got the impression that no one had heard or read any of this at all. And now, abruptly, it seems that many people did indeed hear, and many have begun to agree. (The first hypertext conference not my own doing is scheduled for November 1987.) The strange thing is that all this took so long and then happened so suddenly.

But what is it all about?

Well, by "hypertext" I mean *non-sequential writing*--text that branches and allows choices to the reader, best read at an interactive screen.

As popularly conceived, this is a series of text chunks connected by links which offer the reader different pathways.\*

## "ORDINARY" HYPERTEXT



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\*This is the structure, for example, of the "Notecards" system, programmed by Frank Halasz and Randy Trigg at Xerox Palo Alto Research Center and offered by Xerox on its D-class computers. It is also the structure offered on the Hypertext Abstract Machine under development at Tektronix by Mayer Schwartz and Norm Delisle.

# LITERARY 0/2 MACHINES

I will not argue with this definition here, but I hope it will become clear throughout the book how much more I think hypertext can be.

## MOST GENERAL WRITING

Hypertext can include sequential text, and is thus the most general form of writing.\* Unrestricted by sequence, in hypertext we may create new forms of writing which better reflect the structure of what we are writing *about*; and readers, choosing a pathway, may follow their interests or current line of thought in a way heretofore considered impossible.

This generality is a vital aspect of the idea. Because computer text systems are in a calamitous state.

The world of paper is at least unified and compatible. Objects can be easily mixed and matched. Books, manuscripts and notes can be stored on the same shelf, opened on the same desk. You need not start up, initialize or insert a disk before opening a magazine.

But now enter the world of computer text systems. There is "word processing" and "outline processing," "teleconferencing," "networks," bulletin boards, "videotext" (in whose name true atrocities have been proposed), electronic mail, version control

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\*In one direction of generalization, it is also the most general form of language.

systems, pop-up note pads, electronic sticky notes, and now various systems called "hypertext."

Even among nonlinear text systems, quite a variety are now available for the desktop computer. They variously offer jumps around text, outlining and text expansion; the ability for different users to put separate notes onto linear documents; the categorization of messages according to social-strategic type (inquiries, commitments, fulfillments).

This variety of innovations is laudable. The dark side, however, is the general incompatibility of it all. These colorful and varied facilities cannot be combined or used at the same time, let alone have their contents easily shared and combined and displayed side-by-side. No longer on the same shelf, these things must be turned on differently, at different times, used on different computers and stored on different disks--and the user typically must *keep paper notes* as to their particulars. Not only the different kinds of disks must be saved, and directions as to their use, but also *papers to tie them all together*.

At least there is a background sense of openness and pluralism. Though incompatible, the different text systems have a point of view in common: that the different contributions of different users are important, and so they offer new pluralistic styles based on many people adding to the body of writing. The initiatives and contributions of many people are assumed to be worthwhile.

But there is at present no way to gather, and save, and publish, the many documents and scraps that people are writing on screens and sharing through an immense variety of incompatible systems.

Such incompatibilities are only one aspect of the dismal state of the computer field.\* The computer, and now the personal computer, have opened whole new realms of disorder, difficulty and complication for humanity. With so-called "computer basics" and so-called "computer literacy," beginners are taught a world of prevailing but unnecessary complication. Nearly everything has to be fitted into oppressive and inane hierarchical structure and coded into other people's conceptual frameworks, often seeming rigid and highly inappropriate to the user's own concerns. The files in which we must keep things on conventional computer systems are detached from their relationships and history, and (for many if not all users) entwine like wire coathangers in a tangle of unknown relationships and increasing disorder.

#### MORE GENERAL HYPERMEDIA

In the realm of the more high-bandwidth hypermedia--interactive movies, graphics, sound and music--even more confusion reigns. There is great momentum behind interactive videodisc, especially things called CD-ROM, CDI and DVI. These have not

caught on or even been seen, but they are being pushed by Big Corporations with Big Track Records.

Supposedly when they come out these media will be mass-marketed disks, sold only in a final form, and thus, like phonograph records, delivered by the Information Lords to the Information Peons. This is rather unlike the prevailing thought among computer-text-system people, where everyone's contribution is thought to be valued.

Some people like all this incompatibility and complication, and say it is the new world we must learn to live in. Others, already hating computers, correctly dread these matters and hope vainly to stop the computer tide. I propose a third approach: to unify and organize in the *right* way, so as to clarify and simplify our computer and working lives, and indeed to bring literature, science, art and civilization to new heights of understanding, through hypertext.

As the most general form of writing, hypertext will not be "another type" of obscure structure, but a framework of reunification. (Note that in the original hypertext system of Douglas Engelbart, who invented electronic text systems, it *was* all together; it is the others who have torn it all apart into incompatible pieces.)

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\*For continuing remarks in this vein, see my book *Computer Lib*, second edition from Microsoft

Press, fall of 1987; especially the early chapter, "A Field of Rubble."

For I believe that the potential for a new Golden Age, through such a unification of electronic text systems, lies before us, and just in time, too.

## PROJECT XANADU

Project Xanadu, which this book is about, has been a long-term venture to develop a hypertext system to support all the features of these other systems, and many more. Project Xanadu began in the fall of 1960,\* and put a prototype on line for experimentation in January of 1987. We hope to offer a commercial version in 1988, at three levels: a single-user version; a network server for offices; and a public-access system to be franchised like hamburger stands. All this will be discussed later.

The reason it has taken so long is that *all* of its ultimate features are part of the design. Others begin by designing systems to do less, and then add features; we have designed this as a unified structure to handle it all. This takes much longer but leads to clean design.

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\*This is the first hypertext system to be so called (though Engelbart's NLS system at Stanford Research Institute was *really* the first hypertext system).

After approximately fifty man-years of effort, the Xanadu program is operational in prototype and available for experimentation at the end of a phone line. The back-end program presently runs on a Sun Workstation under Unix. It is written in C and

The problem is not hardware. It is *generalized, clean software design*. And when the problems above, in their generality, become clear to others, we think they will see that it makes much more sense to adopt an existing, unified solution than to keep nailing features where they weren't originally planned.

## THE STRUCTURE

The Xanadu system is a unique form of storage for text and other computer data. The system is based upon one pool of storage, which can be shared and simultaneously organized in many different ways. This makes it possible easily to *make new things out of old*, sharing material between units. Described simply:

all materials are in a shared pool of units, but every element has a unit in which it originated;

new units can be built from material in previous units, in addition to new material;

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presently (May 87) compiles to about 137K of 68000 native code on the Sun. This does not include buffer space, of which the more the merrier (1 megabyte and up recommended).

Front-end programs should include our protocol manager, a module which handles sending and receiving in the FEBE(tm) Front End-Back End protocol. It presently compiles to about 30K on the Sun.

# LITERARY 0/5 MACHINES