# CHAPTER TWO

# PROPOSAL FOR A UNIVERSAL ELECTRONIC PUBLISHING SYSTEM AND ARCHIVE

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CHAPTER 2

# PROPOSAL FOR A UNIVERSAL ELECTRONIC PUBLISHING SYSTEM AND ARCHIVE

*We are all agreed that your theory is crazy. The question which divides us is whether it is crazy enough to have a chance of being correct. My own feeling is that it is not crazy enough.*

Niels Bohr
quoted in Kenneth Brower,
The Starship and the Canoe, 46

## PLAN OF THIS CHAPTER

This chapter is in nine sections, which introduce and elaborate on a very particular and precise design and plan. This chapter, design and plan are the heart of this book, a crossroad through which you are asked to pass repeatedly.

Some readers, especially those who may not have given these matters any thought, may find this material tough sledding the first time through. Therefore a summary level has been provided. (The bigger type.) Stick to that the first time through, or if you're in a hurry later on to pass to another Chapter Three.

If this chapter is long and tedious to read, that is only because it strives for completeness. I am sure that a few years from now everything in it will be quickly divined by small children sitting at a console which enacts these principles.

# 2.1 AN ELECTRONIC LITERARY SYSTEM

Here is the right way to do something by computer: first figure out what you really want to do and think about, instead of staying bogged down in what you usually do and think about when you don't use a computer.

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What will be described here is the way we think information should be handled. In the later sections of the chapter we will be describing the detailed idea of it, the conceptual structure or virtuality. This chapter is only about this idea, without technicalities. (The few "computer technicalities" are in footnotes.)

We also believe that we have carried out this design in a practical form, and that it will shortly exist as a functioning computer program with many uses. This belief will be proven or disproven in the fullness of time. Meanwhile, what is really being described is what we think we have created. Believing that this is the right virtuality, it is what we have implemented.

The footnotes contain a few kibitzing remarks to those interested in how we have done it.*

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* The Project Xanadu group has for some time been developing software to do what is described here with no complications for the user. Our way of seeing the world, as described here, is reflected in many ways in our unusual data structure.

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For instance, we are going to look at ways of dealing with text based on its "true" structure, if we can figure out what that is.

THE DESIGN

It is difficult to describe an interactive computer system so people can visualize it. Most people have not had practice in visualizing jumping and responding objects on the basis of abstract descriptions.

When we say also that we think this design is simple and basic, like the telephone, that may be hard for some readers to believe, considering that it takes so many words to describe it. Yet we think this design, once understood, is spare, parsimonious and clear. (And that a few years from now, small children will understand it immediately when they get a chance to play with it.)

The structure of documents and links to be described here is, for a computer system, unusually simple. This is all there is; we will describe it completely. We regard the simplicity of this design as its greatest virtue. The user has no direct contact with technicalities. The technicalities underneath are simply the means whereby certain exact and simple services are rapidly performed.

THE INTRINSIC STRUCTURE IS WHAT YOU SHOULD SEE

The structure a user sees should be the intrinsic structure of his material, and not (as in many "word processing" systems) some amalgam combining the material itself with some set

(continued from previous footnote)

To do efficiently what will be described here, we have had to overthrow all conventions and conventional assumptions about data handling and indexing, building from the bottom up a system that we think can grow indefinitely without choking on retrieval and transmission bottlenecks. We believe we have achieved this in our unique proprietary software.

We could only carry out this design with the help of certain technical developments which are for the present proprietary and secret. A number of radical discoveries in the field of computer indexing and retrieval render it possible to offer these services within seconds on configurations of present-day equipment, even, we believe, as the number of documents and service requests expands to astronomical figures. See "The Only Way It Could Work," Chapter 4.

And we are going to create a service that simply stores and sends back different excerpts from this "true" structure of text.

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of obtrusive conventions under which it is stored.

What the thing is-- its natural structure to the user-- is what he should see and work on: nothing less, nothing more, nothing else. It is therefore the representation of this structure-- of whatever structure the user may be concerned with-- that should concern us. However, the complexities of what may be wanted can be staggering. So the problem is to create a general representation and storage system that will permit automatic storage of all structures a user might want to work on, and the faithful accounting of their development.

WORLD AND VIEWPANE:
BACK AND FRONT ENDS

While computer display screens are to be the foci of our coming society, what the world is that will show on the screens is perhaps of greater concern.

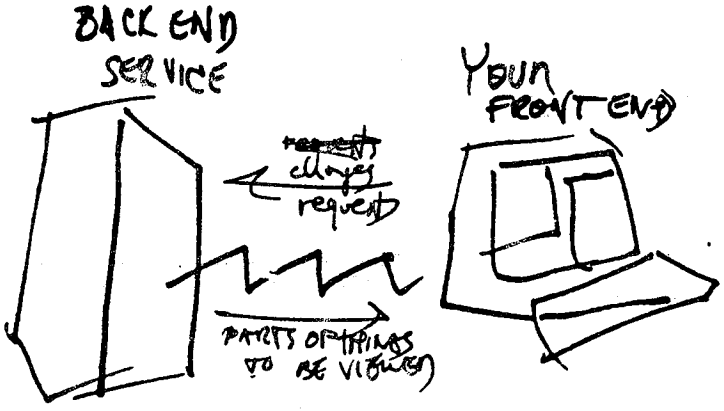
The question in computerizing anything, then, should be what is the true structure? Having answered that, you design a system that stores and shows that true structure.

Storage is fundamental. What you store should be the basic structure of the information you are dealing with-- not some tricky arrangement that is carefully matched to some set of programs or hardware. (How you will look at this world when it is spreadeagled on your screen is your own business: you control it by your choice of screen hardware, by your choice ov viewing program, by what you do as you watch. But the structure of that world is the same from screen to screen.)

What we will discuss here is representation of the true structure of a certain kind of information, not how to show it. We believe that an orderly overall system can be developed for most types of written and graphical information and its instantaneous delivery.

That is the storage system we will be discussing here. Think of it as a "back-end" service that can supply your system. At the screen of your computer you explore what is

stored, change it, add to it. The service we propose takes care of putting it away and sending you whatever part you ask for as fast as possible. That is the back end. What computer you watch it through, and how that machine is programmed, is your "front end" -- a separate problem.




This is a VIRTUALITY. One of the principles of designing virtuality is that there are many possible overall organizations that may be very similar. The problem of choosing among them is not simple. The tricky words that follow, "true structure," suggest utter uniqueness. But this is not the only "true" design. It is the design suggested by the one working precedent that we know of: literature.

Whether it is a good and right design is the central question for the reader to judge. What we describe can be done: if not by us, then by somebody sometime. But if it is not the right system, then it is on the reader's shoulders to come up with a better one.

Suggestons are welcome-- if you are sure you understand this design first (including Balance I. See "Tuning the System," a Chapter 3.)

# 2.2 WHAT IS LITERATURE?

Literature is an ongoing system of interconnecting documents.

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THE LITERARY PARADIGM

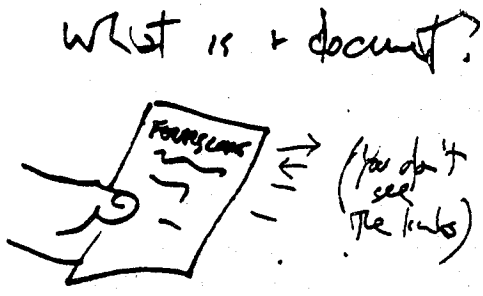
A piece of writing-- say, a sheet of typed paper on the table-- looks alone and independent. This is quite misleading. Solitary it may be, but it is probably also part of a literature.

By "a literature" we do not mean anything necessarily to do with belles-lettres or leather-bound books. We mean it in the same broad sense of "the scientific literature," or that graduate-school question, "Have you looked at the literature?"

A literature is a system of interconnected writings. We do not offer this as our definition, but as a discovered fact. And almost all writing is part of some literature.

The way people write is based in large part on these interconnections.

A person reads an article. He says to himself, "Where have I seen something like that before? Oh, yes --" and the previous connection is brought mentally into play.




Consider how it works in science. A genetic theorist, say, reads current writings in the journals. These refer back, explicitly, to other writings; if he chooses to question the sources, or review their meaning, he is following links as he gets the books and journals and refers to them. He may correspond with colleagues, mentioning

in his letters what he has read, and receiving replies suggesting that he read other things. (Again, the letters are implicitly connected to these other writings by implicit links.) Seeking to refresh his ideas, he goes back to Darwin, and also derives inspiration from other things he reads-- the Bible, science fiction. These are linked to his work in his mind.

In his own writing he quotes and cites the things he has read. (Again, explicit links are being made.) Other readers, taking interest in his sources, read them (following the links).

In our Western cultural tradition, writings in principle remain continuously available-- both as recently quoted, and in their original inviolable incarnations-- in a great procession.

So far we have stressed some of the processes of referral and linkage. But also of great importance are controversy and disagreement and reevaluation.

Everyone agrues over the interpretation of former writings, even our geneticists. One author will cite (or link to) a passage in Darwin to prove Darwin thought one thing, anohter will find another passage to try to prove he thought another.

And views of a field, and the way a field's own past is viewed within it, change. A formerly forgotten researcher may come to light (like Mendel), or a highly respected researcher may be discredited (Cyril Burt). And so it goes, on and on. The past is continually changing-- or at least seems to be, as we view it.

There is no predicting the use future people will make of what is written. Any summary, any particular view, is exactly that: the perspective of a particular individual (or school of thought) at a particular time. We cannot know how things will be seen in the future. We can assume there will never be a final and definitive view of anything.

And yet this system functions.

LITERATURE IS DEBUGGED.

In other words, even though in every field there is an ever-changing flux of emphasis and perspective and distortion, and an ever-changing fashion in content and approach, the ongoing mechanism of written and published text furnishes a flexible vehicle for this change, continually adapting. Linkage structure between documents forms a flux of invisible threads and rubber bands that hold the thoughts together.

Linkage structure and its ramifications are surprisingly similar in the world of business.

A business letter will say, "In reply to your letter of the 13th..." Or a business form, another key communication, may say in effect, "In response to your order of the 24th of last month, we can supply only half of what you have asked for, but can fill the rest of the order with such-and-such item from our catalog." All of these citations may be thought of as cross-linkages among documents.

The point is clear, whether in science or business or belles lettres. Within bodies of writing, everywhere, there are linkages we tend not to see. The individual document, at hand, is what we deal with; we do not see the total linked collection of them all at once. But they are there, the documents not present as well as those that are, and the grand cat's-cradle among them all.

From this fundamental insight, we have endeavored to create a system for text editing and retrieval that will [illegible]ive, and handle, and present, documents with links between them. We believe there is something very right about the existing system of literature; indeed we suspect that there are things right about it that we don't even know, as with Nature. And so we have tried to mirror, and replicate, and extend, existing literary structure as we have here described it.

# 2.3 A TRUE STORAGE SYSTEM FOR TEXT AND OTHER EVOLVING STRUCTURES

We are going to propose a way of keeping information that may seem odd and inefficient at first, but turns out to have remarkable power later on.

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PROLOGUE:
MAKING EXTRA COPIES ALL THE TIME

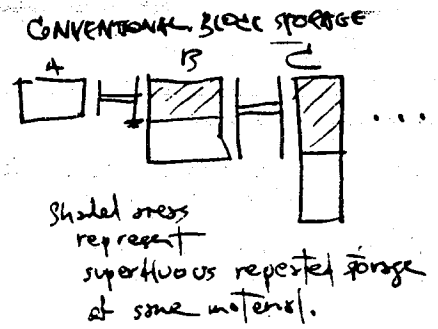
In most computer applications (such as the layman's newest game, "word processing,") it is often necessary to keep repeated copies. This frequent and disagreeable problem has several purposes.

The obvious purpose, often thwarted, is to assure the safety of recent work against various kinds of accident. But that can be gradually ruled out: many systems are coming to make reliable "safety copies" automatically.

A more fundamental use is to keep track of former states of the work, in case mistakes or wrong decisions need to be undone. This need, backtrack, is serious and important. We do not need to go back through previous material often, but if we need to do it at all we ought to be able to do it right. Here is what doing it right entails.

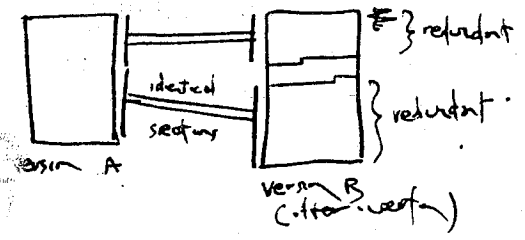
DEPARTMENT OF REDUNDANCY DEPARTMENT

Note, however, that the conventional means of storage is rather silly. It involves making a complete copy of everything you've done so far. If what you're doing is making repeated small changes and additions, then you are repeatedly storing the same material, redundantly.



Under many circumstances the writer, or "text user," needs to reach back to a former condition. This is in the nature of creative work.

Virtually all of computerdom is built around this curious convention.* Most computer people will tell you that is the way God intended computers to be used.

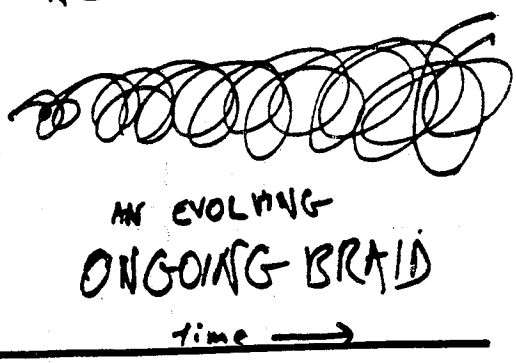



However, we can program computers any way we like, if we throw out the system software, and what we are talking about is creating new ways of doing things.

THE ALTERNATIVE

Suppose we create instead an automatic storage system that takes care of all changes and backtrack automatically. As a user makes changes, the changes go directly into the storage system; filed, as it were, chronologically.** Now with the proper sort of indexing scheme, the storage facility we've mentioned ought also to be able to deal with the problem of historical backtrack.

Think of it this way. An evolving document is really not just a block of text characters, Scrabble™ tiles all in a row; it is an ongoing changing flux. Think of its progress through time as a sort of braid or vortex. A DOCUMENT IS REALLY




* Including block-transfer circuitry, most display buffering, and the disk routines supplied with conventional operating systems.

** (Of course, since the storage system assimilates all changes, it becomes nearly the same as a "word processor," except for the user's front end.)

The true storage of text should be in a system that stores each change and fragment individually, assimilating each change as it arrives, but keeping the former changes; integrating them all by means of an indexing method that allows any previous instant to be reconstructed.

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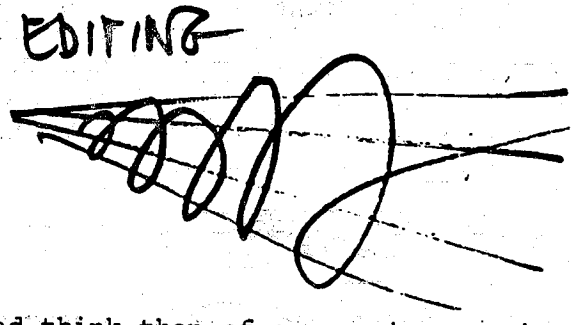
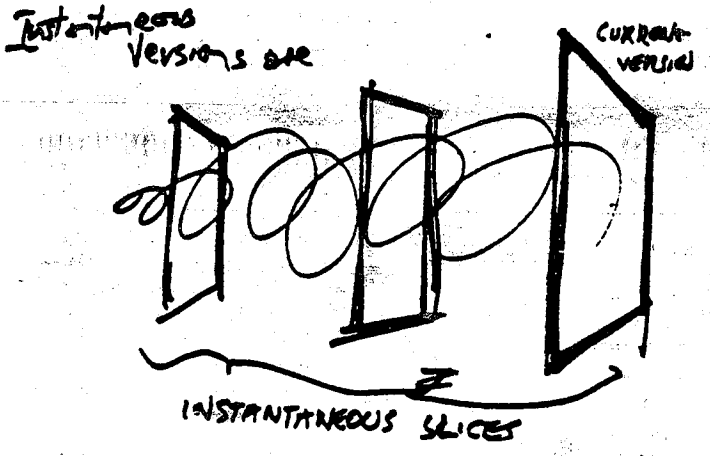
Think of the process of making editorial changes as re-twisting this braid when its parts are rearranged, added or subtracted,

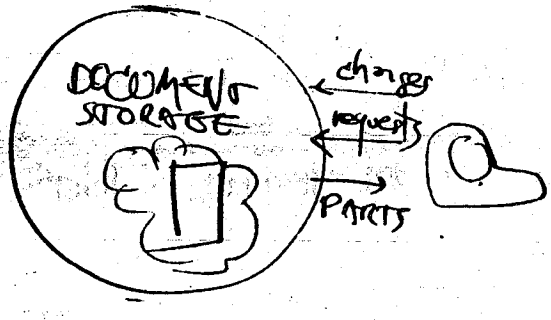



and think then of successive versions of the document, at successive instants of time, as slices in this space-time vortex.




Very well: the file management system we are talking about automatically keeps track of the changes and the pieces, so that when you ask for a given part of a given version at a given time, it comes to your screen.

The user may then refer not merely to the present version of the document; he or she may go back in time to any previous version. The user must also be able to follow a specific section back through time, and study its previous states.



This can be done efficiently if the user is reading from a computer screen; since you can set up the system to reconstruct hastily any piece that is wanted at the instant it is wanted. THE PART YOU WANT COMES WHEN YOU ASK FOR IT.

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PART-POUNCE

This system is built around the assumption that you are reading from a screen, not from paper. When you "go to a certain part" of a document, that whole document is not ready to show; yet the system gives you that part instantly, assembling it on the run from the many fragments of its actual storage.

We call this pounce. You pounce like a cat on a given thing, and it seems to be there, having been constructed while you are, as it were, in midair. Unlike things which dematerialize when you pounce on them, like cotton candy, this materializes when you pounce on it. I can think of no other example, except perhaps Potemkin villages.

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* Obviously such a system departs from conventional "block" storage, and rather stores material in fragments under control of a master directory indexing by time,-- and other factors.


This method stores the document canonically as a system of evolving and alternative versions, instantly constructed as need from the stored fragments, pointers and lists of our unusual data structure. Thus there is no "main" version of a thing, just the ongoing accumulation of pieces and changes, some of whose permutations have names and special linkages. In other words, our system treats all versions of a documetn as views extracted from the same aggregated object. It will be readily apparent that the only way to do this is effectively to have direct track-and-sector access to the disk system.

(footnote continued on next page)

This is the true structure of text, because text is best viewed as an evolving, Protean structure.

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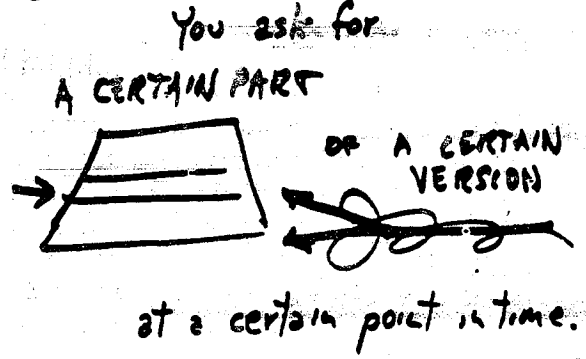
You get the part you want next; the mistake of the conventional computer field has been to assume that the whole document had to be formed and ready.




ANOTHER VISUALIZATION

The canonical documents in this system can store teh same material in numerous different versions-- as, for example, in the successive drafts of a novel.


While the user of a customary editing or word processing system may scroll through an individual document, the user of this system may scroll in

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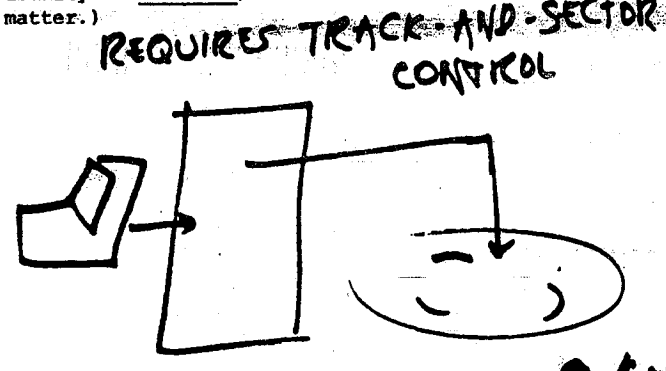
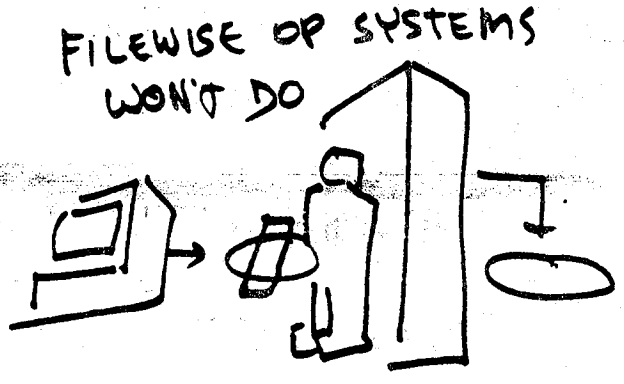
(continued from previous footnote)

This is in contradistinction to conventional operating systems, from CP/M to OS/370, which typically deliver the whole file on every request. The illustration depicts the operating system as Frankenstein's monster with a silver tray. (These features may usually be defeated, but that's another matter.)

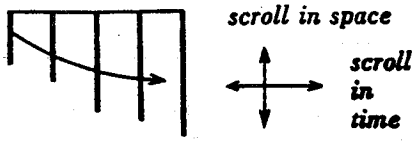



And storage space is saved by not having to keep redundant parts. This in itself is not very important.

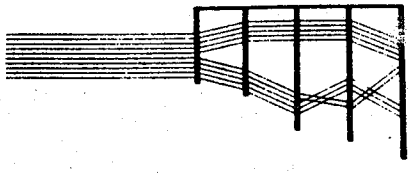
Such storage permits easy reconstruction of previous states for mental clarification, fresh starts, and transfusions of previous ideas. It also permits multiple uses of the same materials for alternative versions and "boilerplate."

time as well as space, watching the changes in a given passage as the system enacts its successive modifications.




Versions of a document set apart for other reasons-- "alternative" versions -- may likewise be flipped through or efficiently compared side by side.

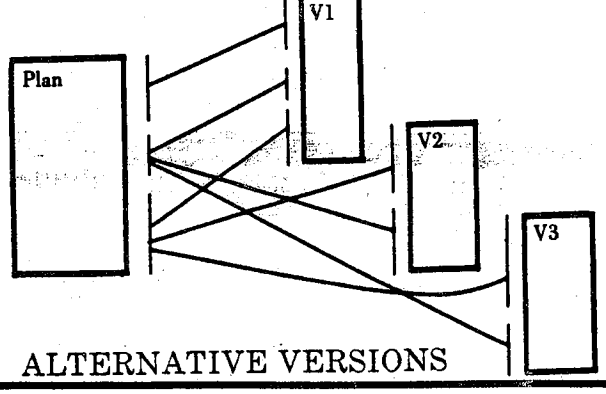
We call this system of storage Prismatic because we may think of a given part, or section, as being prismatically refracted when we pass from one version to another. We believe our Prismatic storage can support virtually instantaneous retrieval of any portion of any version (historical or alternative).



This same approach-- storage as an evolving structure with back-track-- may be extended toall forms of data that are created by individuals.

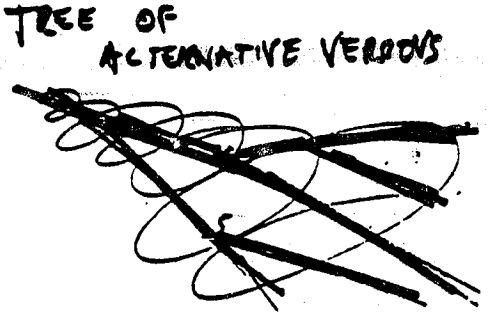
ALTERNATIVE VERSIONS

This same scheme can be expanded to allow alternative versions-- more than one arrangement of the same materials, a facility that writers and programmers would certainly use if it were readily available. Alternative versions (or Alts) are also important in many boilerplate applications, such as law and public relations, where the same materials are churned out repeatedly in different arrangements and variations. A master indexing scheme could greatly reduce storage requirements in these applications, as well as make the relations among the Alts much clearer.*



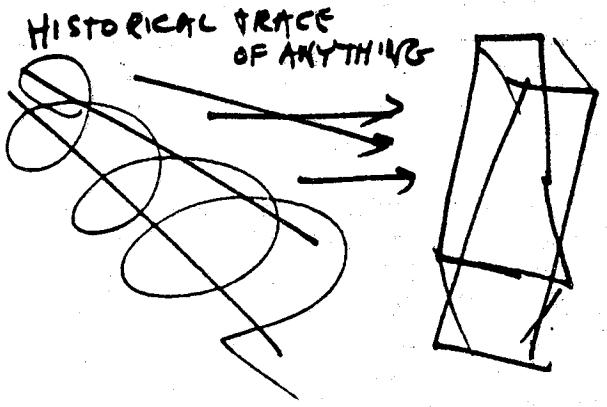

ALTERNATIVE VERSIONS

Actually, we may best visualize these alternative versions as a tree in the ongoing braid, a forking arrangement whereby one document becomes two, each of these daughter documents may in turn become others, etc.




*By arranging for alternative versions to share common storage of the document's fragments, again we save space.

Pictures, and graphical data structures created at a screen, evolve in the same way and should be stored in the same way.




SAMENESS AND DIFFERENCE DISPLAY

Of course, a facility that holds multiple versions of the same material, and allows historical backtrack, is not terribly useful unless it can help you intercompare them in detail -- unless it can show you, word for word, what parts of two versions are the same.

Lawyers need this to compare wordings. Congressmen need this to compare different draft versions of bills. Authors need it to see what has happened to specific passages in their writings between drafts. Biologists and anatomists need it to compare corresponding parts of animals (assuming a graphical data base of physiology that shows evolving structure).

ANY FORMS OF DATA

This storage and indexing by pieces and changes works not merely for text; it can be used for any forms of data structure.

Thus if your are designing a building on a computer screen, as architects now do, you may browse through the changing design in the sequence you modified it over time, and create alternative versions as you like which share the common material.

Example.

An excellent airplane, the Boeing 747, now exists in a dozen or more versions that you may order from the factory. Complex blueprints exist for each of these versions, as well as lists of parts, etc. (Much of this is kept on computers as 3D data structures at Boeing, and perhaps quite well; this is simply a convenient example, and no criticism is intended.)

* (Such intercomparisons would in a more conventional system require writing and invoking search commands of some complexity among the various related files.)

As a first step we propose such an evolutionary structure, the docuplex, as the basic storage structure for electronic literature

Using the data structure and programs we have described, it is possible to store all the 747 designs as one unified data pool, with the forking-version facility reading the variant designs directly out of this single structure.

SIMPLICITY ONE

By creating such a capable storage system, we have greatly simplified the life of the text user. The nuisance of backup (and the spurious nonsense-task of finding names for backup files) are eliminated. But more important, we have unified all versions (previous and alternative) in a unified structure, the docuplex, permitting part-pounce on present, past and variatn structures. The user may scroll through any two versions to see corresponding parts; and much more.

STAGE ONE ALL TOGETHER

I have so far presented several new capabilities that I think are important: alternative versions and historical backtrack, both with sameness display; and links.

These work together; they have to. The links allow the creation of non-sequential writings, bookmarks and jump-structured graphics of many kinds. But if you are going to have links you really need historical backtrack and alternative versions.

Why? Because if you make some links on Monday and go on making changes, perhaps on Wednesday you'd like to follow those links into the present version. They'd better still be attached to the right parts, even though the parts may have moved. And the sameness-display allows complex linked alternatives to be studied and intercompared in depth.

So let us call this Stage One: a system of computer storage that holds pieces of a thing, not big blocks, and assembles them instantly into whatever part of whatever version you ask for; that allows you to create links of any kind you want between any things you want; and shows you which parts are the same between related versions.

Let us call such a storage system a hyperfile.

You don't have to use these facilities. You can store text in long blocks if you wish. But if the facility is there, then the people who need it can use it.

Perhaps most important, these facilities provide a building-block for what is to be described in what follows.

# 2.4 A LINKING SYSTEM FOR TEXT AND OTHER DATA

Assuming that we are storing materials in such an evolutionary structure, the creation of "links" to the material becomes much easier.

## LINKS ARE PART OF THE WRITING

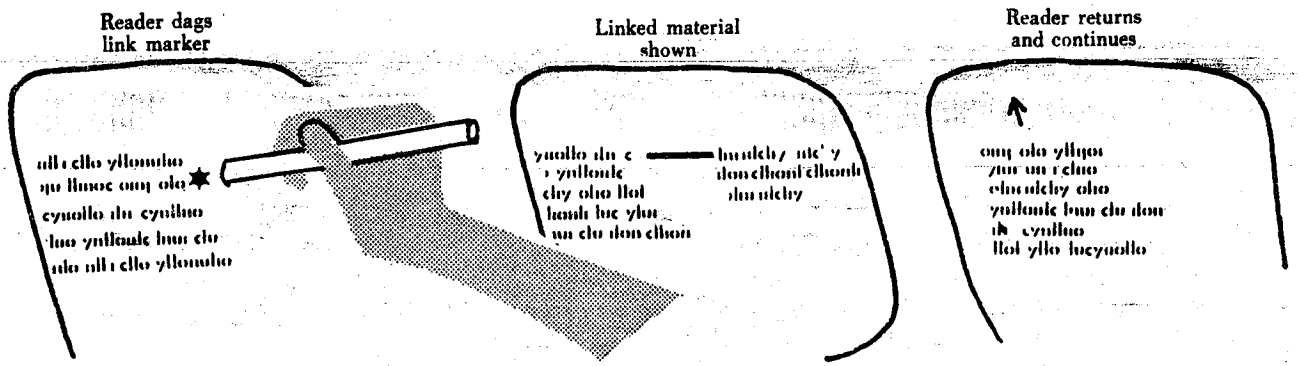
A link is simply a connection between parts of text or other material. It is put in by a human. Links are made by individuals as pathways for the reader's exploration; thus they are parts of the actual document, part of the writing.

As perhaps the simplest type of link, a user may create book-marks--places he may want to re-enter text when returning to it.

## JUMP-LINK

As another simple first example, let us simply think of a link as some sort of a jump opportunity, like a conventional footnote. An asterisk, say, signals that "there's something to jump to from here." If you point at it with your lightpen (or mouse or whatever), Bingo!-- you're now at the footnote, or whatever else the author took you to. If you don't like it there, hit some sort of a Return Button and it pops your previous address from a stack, so here you are back where you were and no harm has been done.

## JUMPING ON A LINK

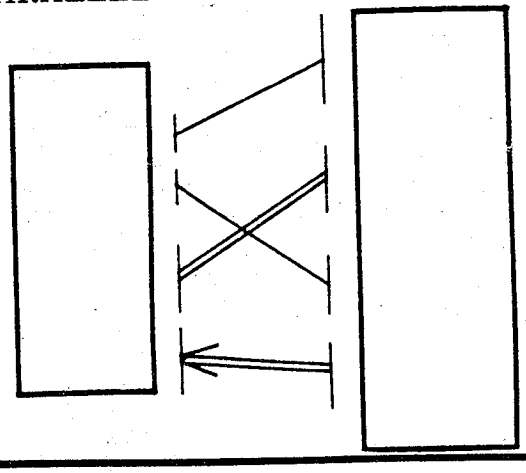


You may want links for commentaries, bookmarks and placemarkers, footnotes, marginal notes, hypertext jumps and innumerable other uses; but they are very hard to keep in place with conventional computer storage structure.

MARGINAL NOTES,
SIDE-BY-SIDE WRITING

Marginal notes are another simple and important type of link. (Where the "margin" of the screen is-- that is, how to show them-- is a matter particular to your own screen setup.)

PARALLEL LINKED TEXT



A user may also make side-by-side connections of other types. On contemplating any two pieces of text, he may make a link between them. Thereafter, when he displays either piece of text, and asks to see the links, a link-symbol is displayed, and the other attached text-- if he wishes to see it.

Naturally, making a marginal note consists of writing the note and hooking the link.

HYPERTEXT

The link facility gives us much more than the attachment of mere odds and ends. It permits fully non-sequential writing, or hypertext.

* LINKS + PRISMATICS → USABILITY

Most computer schemes for linkage face the terrible problem of "updating" the links as text is modified and successive versions come into being. The present scheme dodges this problem smartly (at least at the local level): a link is attached, not to a positional address in a given version, but to specific characters, and simply stays with them wherever they go. Thus Prismatic storage solves a considerable problem.

However, the evolutionary storage we have already described allows any links to be associated firmly with the pieces of data in any evolving structure, wherever those pieces may migrate to as changes occur.

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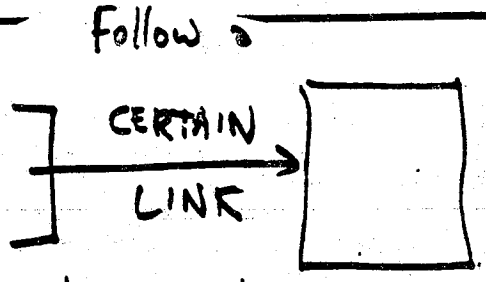
This simple facility-- the jump-link capability-- leads immediately to all sorts of new text forms: for scholarship, for teaching, for fiction, for hyper-poetry. This makes possible a certain free-form serendipitous browsing.

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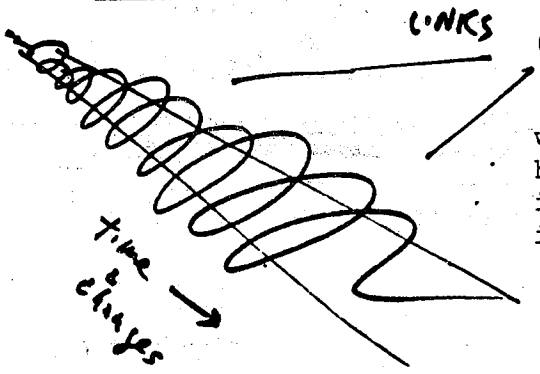
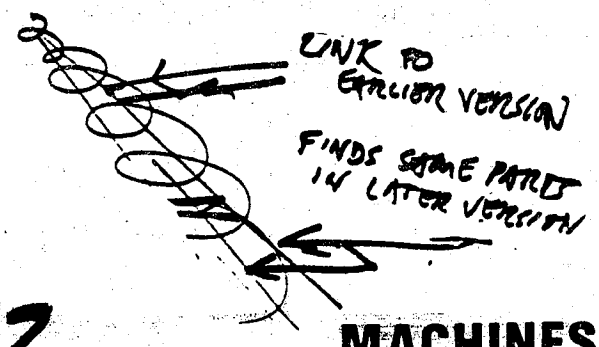



(continued from previous footnote)

Thus the link stays where you put it through historical backtrack and in alternative versions-- if you choose to see it.


Essentially, the link seizes a point or span (or any other structure) in the Prismatic Document and holds to it. Links may be refractively followed from a point or span in one version to corresponding places in any other version. Thus a link to one version of a Prismatic Document is a link to all versions.

The effects, then, of links, alts and backtrack are in some sense multiplicative: together they give you a united facility of great power.



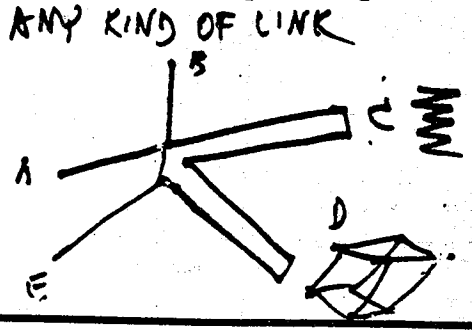
And any types of links may be created.

---

ANY TYPES OF LINK$

A proper system should allow any types of link whatever, and there are myriads of types.

In principle we allow any types of link to be defined by the sophisticated user. These include point-to-point links, point-to-span, and span-to-span, having any separate names and functions desired. We also allow links with multiple endpoints.

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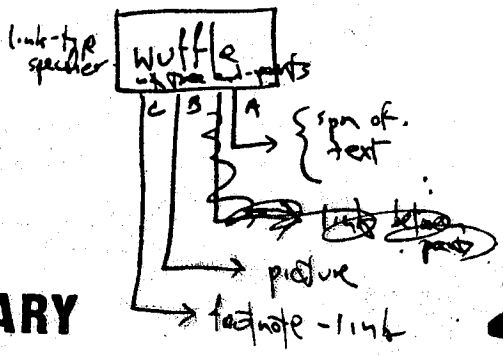
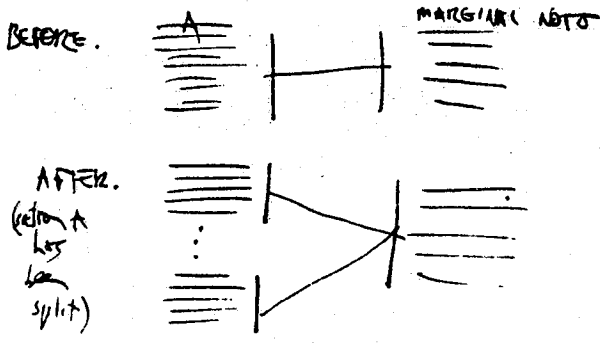
END-SETS

Links may attach to other links. Thus we have the concept of an end-set, the several types of object that a given link may attach to.

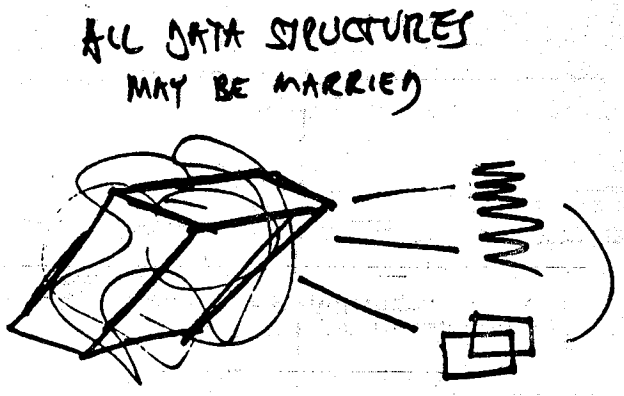
Consider, for example, an arbitrary type of link which we may call a "wuffle." A wuffle, let us say, connects a span of text, a picture, and a footnote. These are the endparts; together they constitute a wuffle's end-set.




Directionality, if any, is given in the link-type definition. Note that end-parts may not hang together as they evolve (e.g. text sections):

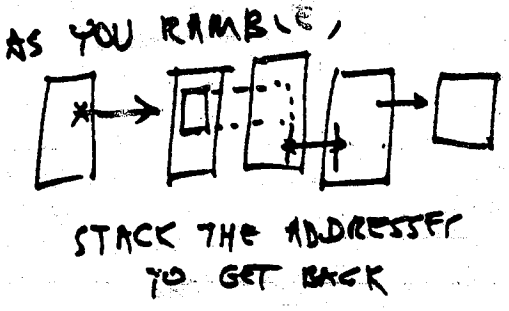


LINKING AMONGST ALL DATA TYPES

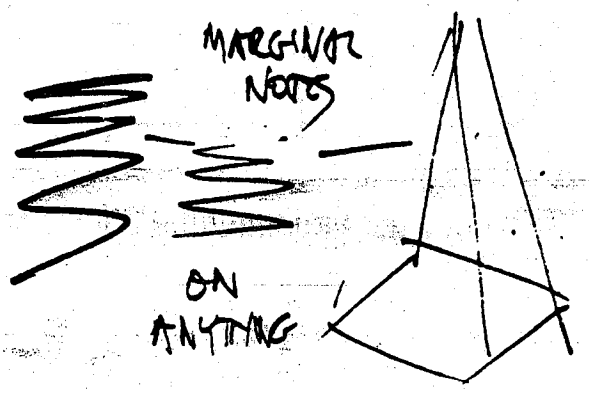



LINKS AND FRONT ENDS

How to show links is a Front-End Function. So is the problem of keeping track of where you have been as you browsed; the front end must manage your stacks for you.




It is vital that a general system not have restrictions. For instance, why should you just have links on text? We believe you should be able to put footnotes and marginal notes on pictures, on music-- on any forms of data.



## 2.5 THE DOCUMENT CONVENTION

From these beginnings, it will be possible to create many **levels of** organization and overlay-- but first we will adopt by **convention** a fundamental unit.

---

So far we allow the storage of any sort of text (etc.) and any sort of links between points and passages of text. If anybody may put in and change anything, we stand to get simply a chaotic blur, a single muddy pool.

The solution is straightforward and traditional, and derives from literature as we have known it. We make sure that everything stored is divided precisely into separate documents.

An interesting choice has been made in the design of this structure.

A document consists of anything that someone wishes to store. A document is something designated by a person to be a document, containing text and/or links that he has created. We call a thing a "document" whether it contains text, or links, or both.

Thus the Gettysburg Address is a document; "Jabberwocky" is a document; and a set of links between them, were someone to create it, could be yet a separate document.

By this convention, then, everything in the system is a document and has an owner. No free-floating materials exist. What this convention really does is stress the singularity of each document, its external and internal borders. Thus, we focus on the integrity of the "document" as we've known it. Evolutionary continuity is unambiguous.

Every document has an owner. The rightful copyright holder, or someone who has permission from the copyright holder and pays for storage, is essentially the owner as far as the system is concerned. Only the owner has a right to change or withdraw a document.

We will call this unit a "document." It has an owner and (ordinarily) a name.

It normally consists of contents-- text, graphics, music, etc.-- and links to other documents.

---

(Although there are ways that others may conveniently have the use of changed versions that suit their needs, as we will see in a later section.)

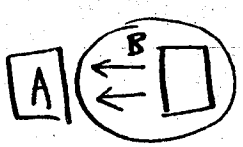
Ancient documents are owned by the system-- or preferably by some high-minded literary body that oversees their royalties (to be discussed later).

OWNERSHIP OF LINKS

Links may be created within or between documents. But each link resides in one place.

Links, just like text, are owned. Every link is part of a particular document and has an owner.

However, links in one document may attach to another document.



Every link, then, is part of a document.

Putting it another way, a document consists of its contents and its out-links.

And that's all.

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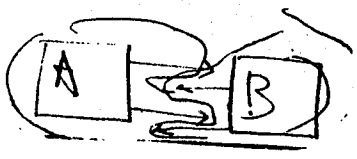
Ordinarily a document consits of its contents (including history and alternatives) and its out-links. These out-links are under control of its owner, whereas its in-links are not.*

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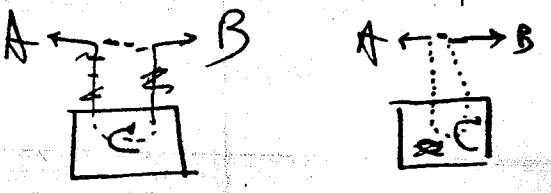
links between documents may reside .. yet others




* More elaborate cases are possible, however. For instance, links between documents may reside in yet others.

# 2.6 COMPOUND DOCUMENTS

This ground rule allows us to have complex multi-level document structures-- criss-crossing superdocuments of many parts-- collected in new structural wholes.

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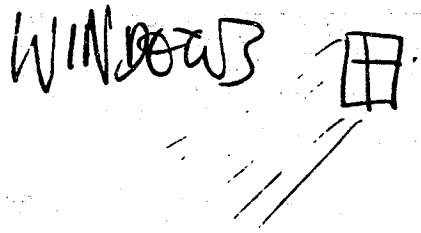
Once you have the package, the docuplex that allows linkage and back-track, why not extend it?

Why not allow anyone to create links between documents, allowing you to jump straight from one to another?

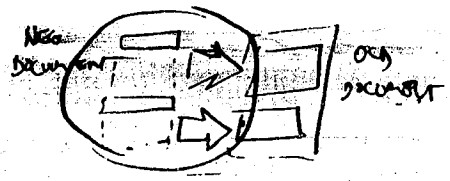



Given the exact document boundaries and ownership already mentioned, we can now create an orderly arrangement permitting far more complex documents to be stored. We also provide an arrangement allowing other individuals freely to make their own modifications on the stored documents. This we do by allowing so-called "compound documents."

The logic of these compound documents is simple and derives from the concept of document ownership. Every document has an owner. The integrity of this document is maintained; no one may change it but the owner.

But someone else may create a document which quotes it as much as desired. This mechanism we call the quote-window or quote-link. Through a "window" in the new document we see a portion of the old.

Thus a new document may consist of the quote-links and new material, if any.



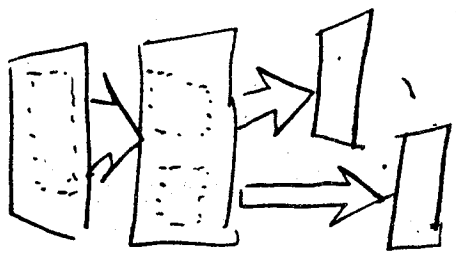
Through the same document conventions, the compound structures mentioned earlier maintain the same conventions of integrity and ownership.

Each collection is likewise a document, and likewise has an owner.

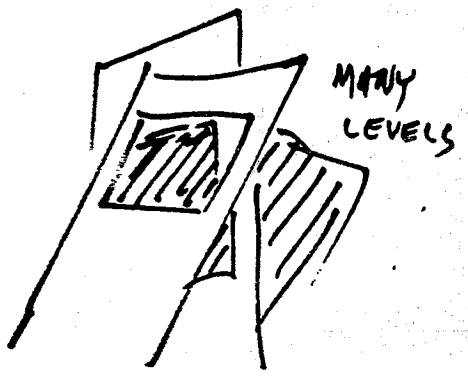
---

The secondary document, too, has its own integrity, though the windowed materials are still part of the original document.

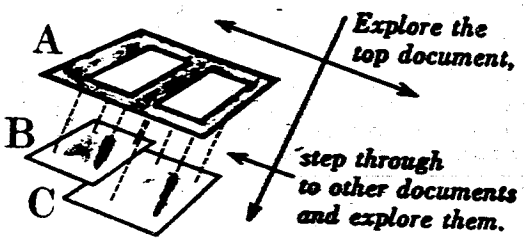
A document may have a window to another document, and that one to yet another, indefinitely. Thus A contains part of B, and so on. One document can be built upon another, and yet another document can be built upon that one, indefinitely: each having links to what was already in place.



Anything stored by one user on the system may be quoted-- adopted into a document-- by another person writing on the system (provided the second user has legitimate access). This freedom of windowing applies, of course, to all forms of data, including pictures, musical notation, etc.




Think of the present document as a sheet of glass. It may have writing painted on it by the present author; it may have windows to something else, in turn made of more layers of painted glass, with writing on each.




A reader may either explore the immediate document, or "step through the window" to explore the next document, or the one beyond. After exploring a further document, the reader may return to the one that showed him into it, or proceed on tangents that become available.

Document A can include Document B, even though Document B is owned by someone else.

---

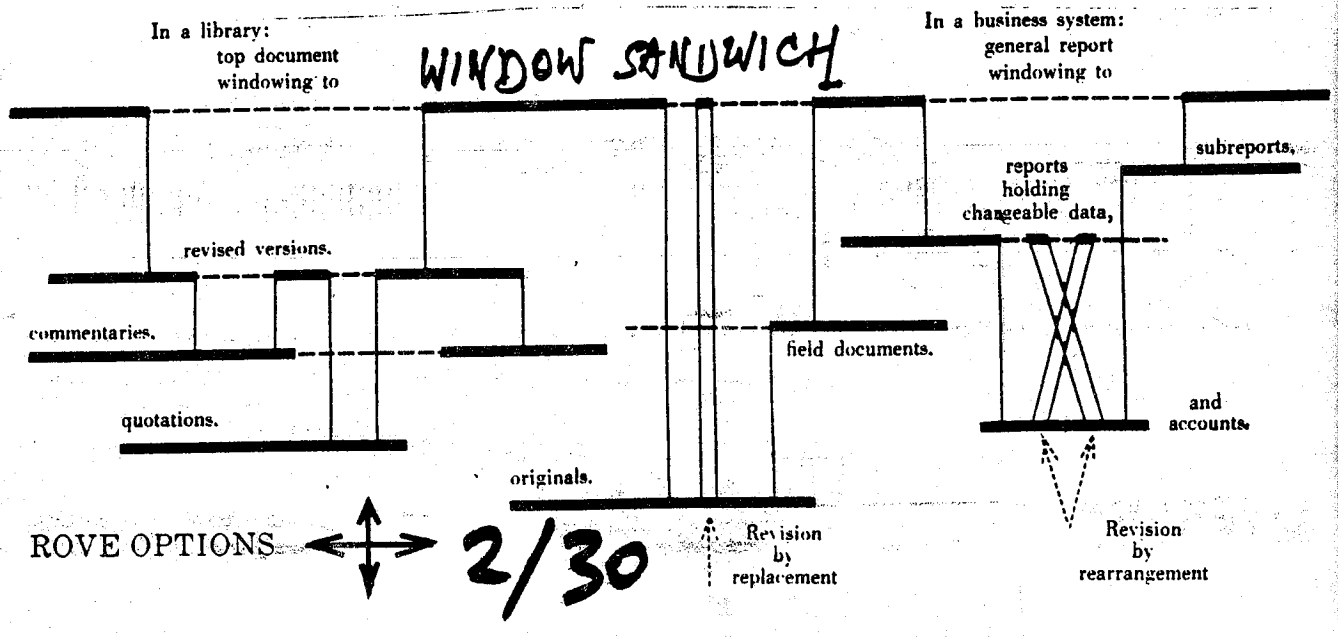
By this simple, sweeping mechanism, all manner of different requirements and specialized uses are reduced to a single structure. Each layer of windows may have, as it were, colored cellophane or opaquing on it. Only when you step through the window-- which you always may at any time-- do you reach the original. But stepping through the window means turning one glass page and going on in the next. Now you are in another work.

Example. The annual report of a corporation has a brief paragraph on every division of the company, with summary operating figures for the year. These paragraphs and figures are quoted from other documents which explain the matters more fully; the reader may easily step through to study them further.

Example. A children's story is illustrated with pictures. If the child wants to "reach through the window," each picture is found to be part of a larger picture, with another story attached.

The windows of a windowing document are themselves actually particular links between documents. No copy is made of the quoted material; rather, a quote-link symbol (or its essential equivalent) is placed in the stored symbol-train of the quoting document. This quotation does not affect the integrity or uniqueness of the original document, since no copy is made. Nor does it affect the ownership.

LAYERS OF WINDOWING TEXT. Each horizontal line is a document.

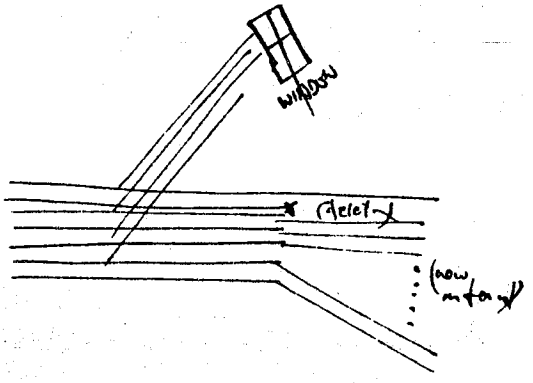


(Note that these methods of storage save a great deal of space, if the same material is used in numerous documents.)

The use of the special links dramatically simplifies a host of problems.

No copying operations are required among the documents throughout the system, and thus the problems of distributed update, so familiar throughout the computer world, are obviated. (But they do reappear on a later level.)

Since quoted material only has to reside in its place of origin, and not in the other documents that quote it, other documents that quote it may be automatically "updated" when its owner changes it.




Note also, however, that a window may be fixed to a document at a certain point in time, in which case revisions are seen by the user only when he asks, "What has this passage become?"

DERIVATIVE DOCUMENTS

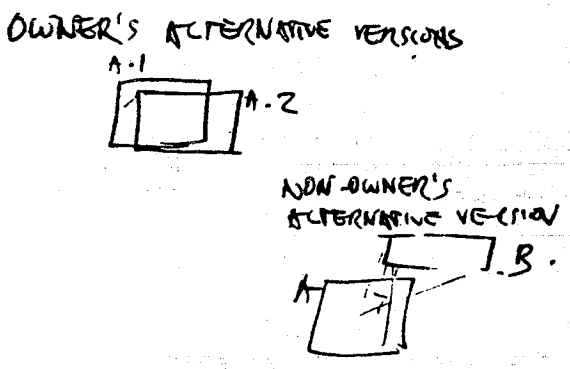
The integrity of each document is maintained by these separations: derivative documents are permanently defined in terms of the originals and the changes. (And stored on that basis.)

A document may consist merely of changes to another document. Thus the modified Gettysburg Address published in MAD by Doodles Weaver may be thought of as two documents: the original, and the changes.

ALTERNATIVE VERSIONS BY NON-OWNERS

A document owner may create alternative arrangements of the same material, all <u>within</u> the same document.*

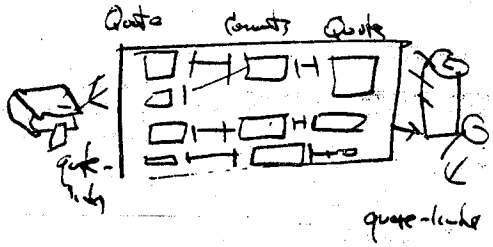
Another user, however, is free to create his own alternative version of the document he does not own. This, then, becomes a <u>windowing</u> document using the same materials.




* The official naming-mechanism of the system has "document" and "version" fields. See "Tumbling through the Docuverse," a Chapter 4.

INTERCOMPARISON DOCUMENTS

A document that points out relations between other documents we may call an "intercomparison document." Such documents may be easily created, say, to point out relations between the Bible and the Dead Sea Scrolls.

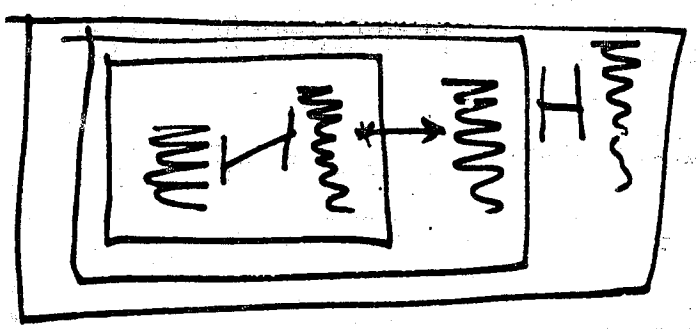


COMPOUNDING OF OTHER LINK TYPES

Any other link types (beside windows) may likewise go from one document to another, and interweave with quote-links.

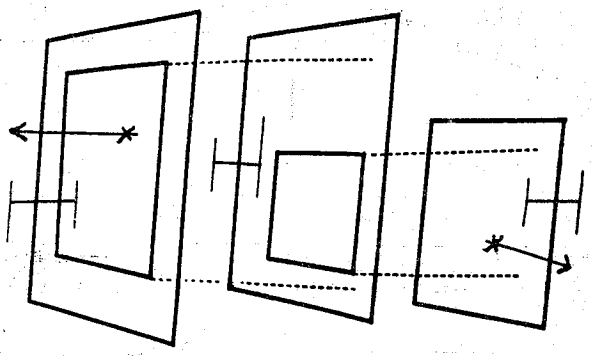
Note that links, like text and picturs, may be quoted.

These structures may of course nest. This makes possible compound documents to any remove, where one document links to another, and so on. One document, embracing another, takes it into itself.



... TO ANY REMOVE

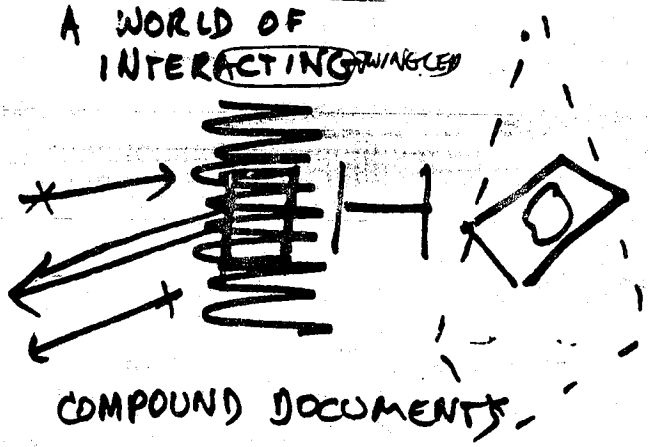
And this creates a basis for all kinds of hypertext-- linked, parallel, windowing.



COMPOUND NESTED LINKS

AN INTERESTING WORLD

It will be noted that we have here defined an interesting and rich sort of world-- a world in which we are relieved of complications from conventional computer filing; yet we have greatly enhanced abilities to specify and express compound relations of every sort.




COMPOUND DOCUMENTS

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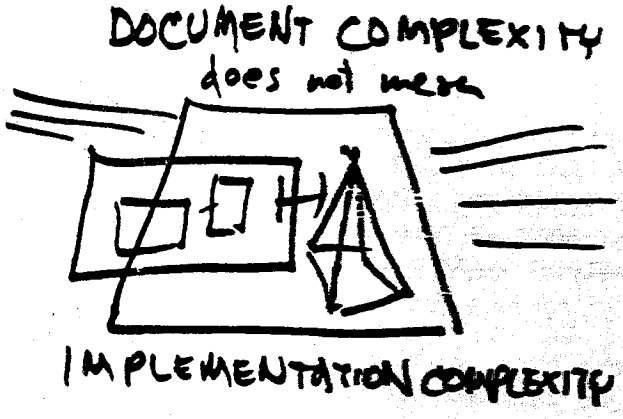
MACHINES

... BUT A SIMPLE ONE

This world nevertheless remains simple in design. The virtuality is simple in structure and repeats in layers.



# 2.7 ELECTRONIC PUBLISHING
## MAKING THE LITERARY SYSTEM UNIVERSAL

Beyond its use as a private facility, we intend that this system be usable as a publication system. Thus a carefully designed system of publication, surprisingly like that of paper, has been worked out.

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The orderliness and power of this approach are very suggestive. Given the hyperfile with links that we just expounded: Why can't we extend it into a full publishing system?

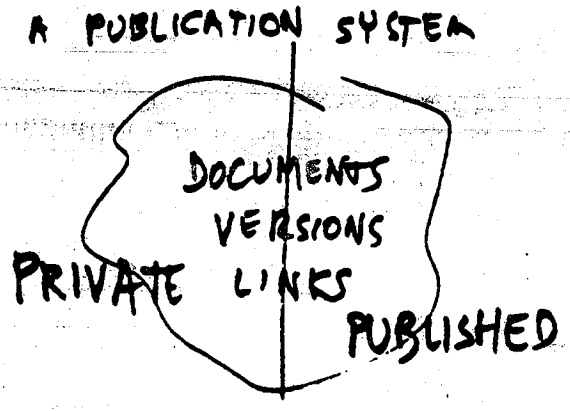
Suppose that the hyper-documents already stored could be reached and used by anyone. All that we need additionally is the ability to create links among them-- to make your own bookmarks and marginal notes, to quote from them by direct excision. And why not, indeed, allow users to publish assemblies and collections of compound documents building on the others?

Very well. Let us try to put together a publishing system-- that is, an overall arrangement where some of the documents stored in the "true" structure I have described may be made available publicly.

What does this mean exactly? Well, a publishing system, as we see it, should include provisions for privacy, copyright, royalty and accounting.

PUBLIC AND PRIVATE

The idea of "publication" in this system, as it is clarified below, will show what we mean by both private and public documents.



We can therefore have a system of electronic publishing that feeds to your computer screen exactly what you ask for, as soon as you ask for it; with royalties divided between the document owners in exact proportion to how much of their materials are transmitted or used.

---

A document may be private or published. A published document may include text, links, alternative versions and historical backtrack. But it need not.

Any user may store anything on the system. Unless specified otherwise it is a private document. A private document may be read and linked-to only by the owner and his associates. A published document is available to anyone, and may be read and linked-to by anyone.

INTERNAL COPYRIGHT CONVENTION

To bypass legal problems, we intend to establish a copyright convention internal to the network and agreed upon by all participants. To wit, if you publish a thing through the network, you have to agree to the same rules as everybody else-- which are intended to create a fair balance of incentives. More on this later, when the choices described here will be further discussed.

LINKING TO WHAT-HAVE-YOU

Any user may read, or otherwise employ, any published document on the system, or any private document to which he has legitimate access. He can make any kind of links to it from his own cocuments, private or not.

NO CONTROL OVER IN-LINKS

Accessibility and free linking make a two-sided coin. On the one hand, each user is free to link to anything privately or publicly. By the same token, each author of a published work is relinquishing the right to control links into that work. This relinquishment is part of the publishing contract.

"Private" materials are available only to their owners or designees; "published" materials are available to anyone, yielding a royalty to the owners.

---

THE ACT OF PUBLICATION

If the user chooses to publish a document, he may do so with relative ease, making it available to anyone throughout the network. It is then a published document.

Because publication is an important act, both for authors and readers, we make publication a solemn event, to be undertaken cautiously. Since publishing can be instantaneous and unrestricted, merely a "publish" button on the console could do it-- but the dangers of rash publication to an individual's reputation and career could be great. Some formalized technique would therefore be required for "committing to publish"-- probably a ceremony and signature; presumably signing a contract on something very like a credit-card triplicate slip. The author signs an "I hereby publish" form, after which not only is the document universally available, but he can't withdraw it.

NO WITHDRAWAL; SUPERSESSION; OTHERS' LINKS

Publishing is a solemn act, and it is in the common interest that a thing once published stay published, as in the world of paper. Consequently its author may not withdraw it except by lengthy due process.

However, the author may readily publish a superseding document, but the former version remains on the network. This is vital because of the links other users may have made to it-- which can reach through from the previous version to which they are attached into the newer version.

SUPERSESSION WITH NOTICE

It can easily be assured that fresh readers turning to an old version of a document may be directed to the new, unless they have reason to consult the old.

Private documents can link and window to public ones.

PRIVASHING

An author who wishes to render his work universally available, but wishes also to retain the right to withdraw it at any time, has a simple means for so doing. He simply designates his document as a private document with unrestricted distribution. Anyone may have access to it or use it, but the owner is free to withdraw it or change it irrecallably at any time.

No royalty is received for the use of privashed documents.

PRIVATE SALE OF INFORMATION

Those information purveyors not satisfied with our private rates are free to store what they like as private encoded documents and then sell access, or sell the secret code to make them readable, or whatever. This is a private transaction and does not involve the system.

ROYALTY FOR USE

In our planned service, a standard proportional fee is paid automatically by the user to the owner every time a fragment is summoned. Each owner must consent to the standard royalty-- say, a few cents per screen hour-- and each reader contributes those few cents automatically as he reads along. If the back-end cost of servicing a user is, say, $2 per screen-hour, then the royalty will be 5¢ to 10¢ for that hour. This is deducted automatically from the back-end fees.

Since there is no controlling what happens at the user end, this royalty should be largely based on transmission time. An hour, five minutes, or one second of a thing, each contribute proportionally to the copyright holders' accounts. (The question of whether to allow different rates of royalty will be discussed later.)

The royalty goes to the owner. We say "owner" here to avoid having to distinguish between authors and publishers; but this is a matter of private arrangements that is of no concern at the system level.

This is a radical and daring idea; a new form of reading and writing, in a way just like the old, with quotations and marginalia and citations. Yet it will also be socially self-constructing into a vast new traversible framework, a new literature.

---

THE REAL POWER:
PUBLISHING COMPOUND DOCUMENTS

The windowing approaches already mentioned automatically furnish a general solution to the "copyright problem" with regard to quotation and citation, simply by this means: authors who are windowed automatically get royalties as well. If the windowing document is electronically published, royalties are paid to the owner of each document seen in proportion to its use.

Since the copyright holder gets an automatic royalty, anything may be quoted without further permission. That is, permission has already been granted: for part of the publication contract is the provision, "I agree that anyone may link and window to my document." Publication through such a net requires your permission for your work to be quoted ad lib. You publish something, anyone can use it, you always get a royalty automatically. Fair.

PUBLISHING MODIFIED VERSIONS

You can create new published documents out of old ones indefinitely, making whatever changes seem appropriate -- without damaging the originals.

This means a whole new pluralistic publishing form. If anything which is already published can be included in anything newly published, any new viewpoint can be fairly presented. (Especially if the reader can always say, "Show me what this was originally.")

If a modified document is read, the original owner and the modifier split the royalty in proportion to who wrote what, as determined automatically. (For royalties on links, see "Tuning," Chapter 2.)

For example, my great-grandfather, Edmund Gale Jewett, believed that one word in Hamlet was incorrect. (It should have been siege of troubles, not "sea" of troubles, in the well-known soliloquy.)

Very well: if Hamlet is already on the system, then E.G. Jewett could publish his own Hamlet very easily: a quote-link to the whole original, except for "sea," which is changed to "siege."

Given that anything on such a network may be available instantly, such an arrangement promises an extraordinary new level of capability. For not only may simple documents be accessed at once, but compounded and windowing documents may be overlaid on anything -- promising a new degree of understandability through what is added later.

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Now, the obvious rules of the road should be as follows:

1. Shakespeare's Hamlet is of course unchanged and available instantly.

2. Jewett's modified version of Hamlet, composed almost entirely of the original, is also available instantly. (Jewett may give it any title he wants.)

3. Shakespeare-- or presumably the Authors' Fund-- gets the royalties for whatever of Shakespeare's Hamlet is summoned by readers.

4. When people read Jewett's Hamlet, the Authors' Fund still gets the royalty on Shakespeare's behalf almost all the time. But Jewett gets a minute proportional royalty for the change he has made, whenever a reader encounters that part.

5. Anyone reading Jewett's Hamlet can say, "Show me the original of this next to it," or just "Take me to the original."

6. Anyone reading Shakespeare's Hamlet can say: "What documents have links to this?" or "Are there any alternative versions?" and get a list that includes Jewett's version.*

SECURITY RAMIFICATIONS OF WINDOWING

These ideas simplify the creation of rationally-ordered document dissemination systems with clear-cut security. A document can only window documents with the same, or lesser, security level. For instance, a private document may window a published document, but not vice versa.

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* Note also the modest cost should Jewett publish this; the storage cost for a few hundred bytes (ID, pointers and changes).

It is our unusual hope and vision that this, with its simplicity of approach and efficiency of implementation, may become the standard publishing medium of the future.

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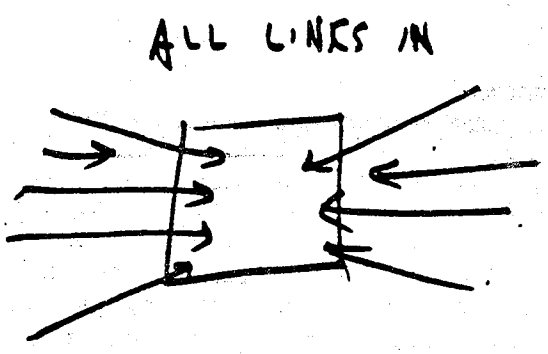
SHOWING AND SIEVING IN-LINKS

The reader should be able to ask, for a given document or place in the document, "What connects here from other documents?"-- and be shown all these outside connections without appreciable delay.*




But there may be too many. Indeed, for "Alice in Wonderland" or the U.S. Constitution, the number could be in the squillions.

Thus it becomes necessary to apply some kind of filter, saying, "What links come in from Spain? From last week? From last year in Marienbad?"-- and see the number of such links at once, followed by the linked documents themselves if desired.

This must all be fast enough to please the impatient on-line user. And we believe it can be done. This filtering by different attributes we call "sieving"; and it can only be set up for a comparatively small number of traits-- say, location and author and time.**

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* Technically knowledgeable readers may note that this is the hardest feature. This is the stopper. But we believe it can be done.

** Of course, any amount of additional sieving can be put in at the front end.

ALL END-USE IS LEGITIMATE

The user may employ any terminal, graphical or printing. Viewing-methods and manipulations are up to the terminal designer. No restraint is contemplated as to what use may be made of the materials found on the system, since no restraint is possible.

There is no way whatever to ascertain or control what happens at the users' terminals. Therefore perforce all use whatever is legitimate, and anyone who plans to be vulnerable to "misuse," whatever he thinks that may be, had better keep his stuff off the system.

PRINTOUT AT USER TERMINAL

Users are thus free to make printed copies for their own use. Note that if a user prints out a document, he has paid a royalty on its transmission. It is paid up, just as a paperback bought at the drugstore has had its royalty paid up. And if a copyright holder cannot be satisfied with this arrangement-- even knowing no other is possible-- he had better withhold his stuff from this system.

Note also that he who makes a paper copy is losing all dynamic link connections, and is left with the inert, non-interactive copy. And while some of you may have trouble believing it, that will be a considerable deprivation in the world we are talking about.

WHAT'S A PUBLISHER?

Traditionally, an author is someone who creates a work, whether or not on his own initiative. A publisher is a businessman or business firm that takes the business initiatives, deciding to publish the work, fronting the money to print, warehouse, and advertise. He, or it, also assumes certain legal risks from which he usually guards the author. The publisher may also encourage and cajole the author, buck him up, advance him money for work unfinished, and finally erect a plaque to his memory on the Hotel Chelsea.

Ownership and copyright are split between author and publisher according to their own negotiated private arrangement.

If compound united hypertext is the printing press of the future, the publisher of the future can do all these things in exactly the same way. Except now there is no "printing and warehousing," but a certain required minimum disk rental. Thus a "publisher" is someone who pays for the rapid accessibility of materials and benefits from their use along with the author.

ON-LINE BOOKS AND MAGAZINES

Just the fact that things are on an electronic system does not threaten their integrity; indeed, every unit fully retains its integrity in the present system.

A book is still a comparatively large unit of writing or anthology, written and published by specific peopel on specific dates.

A magazine or journal is still a collection of shorter pieces (perhaps windowing from elsewhere) which is regularly edited by the same person or people, and regularly published at a specific time.

Magazines and journals will have great importance in such a publishing system (as they do in the paper world) because they will furnish stabilized views of the world, offering a predictable kind of material, and bringing in, evaluating, and now windowing, ideas from all over.

DIRECTORIES AND CATEGORIES

Two system directories, maintained by the system itself, are anticipated: author and title, no more.

Other directories would essentially involve categorization, like the Dewey Decimal and Library of Congress catalog systems, or the Yellow Pages of the phone book.

There is nothing wrong with categorization. It is, however, by its nature transient: category systems have a half-life, and categorizations begin to look fairly stupid after a few years. (Indeed, simple categorizations of computer articles in computer bibliographies of ten years ago have already begun to look stupid.) The army designation of "Pong Balls, Ping" has a certain universal character to it.

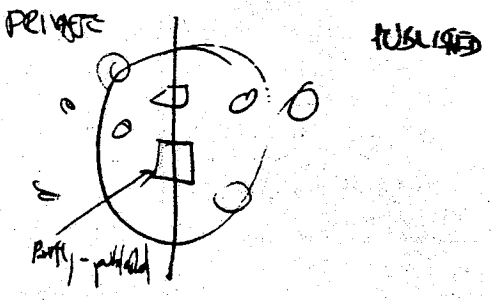
All category-systems make some sense, few stay good for long. (However, the Yellow Pages categories are an interesting exception, being dreadful to begin with, and, though supposedly updated from time to time, do not seem to improve. Try to find from them the nearest place to make paper copies.)

What is the solution for our system? Keep categorizing directories out of the system level. This is user business; let them handle it and collect royalties.

Provision will exist for anyone to publish his own document lists, categorized in any way he imagines, and have users bounce through them in search of whatever they think they may find.

PARTIAL PUBLICATION

A whole document need not be published. That is, someone may publish what to him is only part of a document, keeping the rest private. Very well: now his private document is windowing into the materials he has published as part of the "real" larger document that still appears on his screen.

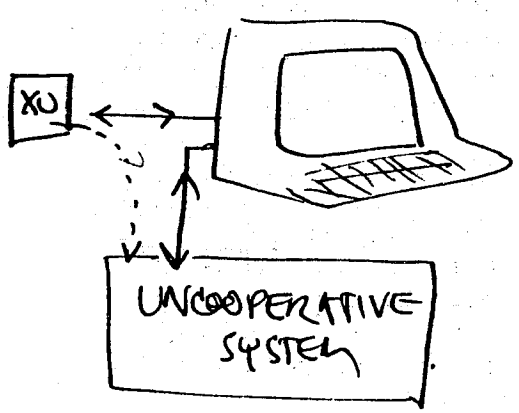



Historical backtrack, alts, etc., may also be held privately in a common pool with documents which have entered the "published" world.

USE WITH OTHER DATA STORES

There are many purveyors of lesser services who say, in effect, "Ha ha, we've got the copyrighted material, you can go hang."

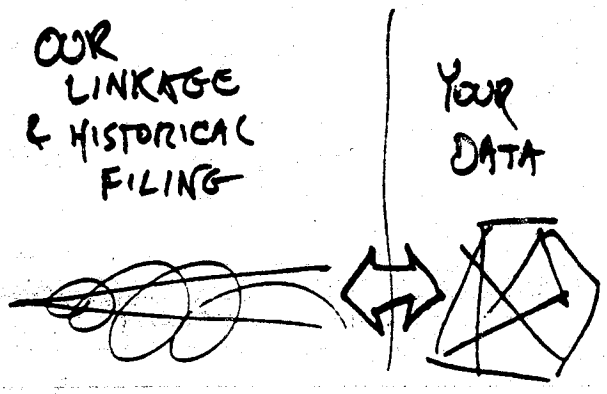
Maybe yes, maybe no. Suppose that Company Y has some key legal document on line-- say, the Napoleonic Code-- and you need to make marginal notes; they offer no such facility.




Well then! Connect to ours and theirs at the same time. Write your marginal notes on our system, with the linking information; then your front end can call up the Controlled Document and show it with the notes you've stored on our system.

In the general case, then, we can marry our data structures and linking facility even to the dog-in-the-manger on-line material whose purveyours do not wish to cooperate.

Or suppose you have private material you do not wish to expose through communication lines, even in encrypted form. Nevertheless, the system we are discussing can help you with detailed linkages, backtracks, etc., even though it runs on a public system: for you may use its indexing facilities to control your data, sight unseen. Your data stays home, blind indexing is stored on the net under your control-- with the contents it controls wholly unknowable to any parties but you.



VIDEODISC CONNECTIONS

There has been a great deal of whoop-te-do recently about videodiscs, the storage devices that hold one or more hours of TV on a platter. Several of these are now available and incompatible. Some of them offer freeze-frame and random frame addressability. Very well: they are a fast image play-out that can be hooked up to our indexing for complex purposes.

(The widely-touted notion that videodiscs will be useful for text libraries seems a little silly, since they make it possible to access only what you actually have right there, while a hypertext network could allow immediate access to everything on it; a vast difference.)

((Another use of the term "videodisc," causing total confusion, is its use to refer to certain high-density write-once digital disks under development by Phillips. We are often asked whether these "videodiscs" will be useful for our system, and the answer is yes, but they aren't videodiscs.))

# 2.8 DISTRIBUTION AND NETWORKING

It might be possible to do all this out of one feeder machine, but there are disadvantages.

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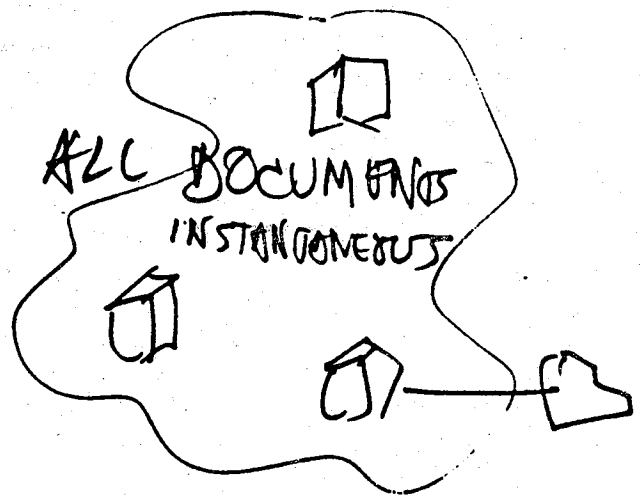
In the previous sections of this chapter we have discussed virtuality, in particular, the conceptual structure of the proposed system. So far, the service might be provided from a single computer, or "centralized data bank." We have more or less assumed a single-processor version of this system, one which easily treats all documents and their versions as an interconnected whole because they are stored in the same place.

However, there are fairly definite limits on what one machine can hold and the number of users it can provide services to. For the services described here to be seriously expanded to large numbers, it will be necessary to "network" the service through multiple computers distributed throughout the nation, and/or the world.

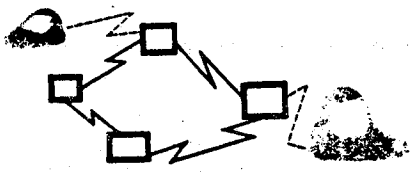
The system should be able to grow without size limit, containing in the body of available writings whatever anyone has stored from any place on the network.

So we turn to the idea of storing the materials on a network of computers. But we do not want the virtuality to change. A user should get anything he asks for an instant after the request, even if it comes from far away-- however widely scattered its parts may be in their storage and ownership, even if some parts of it come from one faraway place, other parts from other faraway places.




All of storage near and far becomes a united whole-- what is now called a "distributed data base." Actual locations are essentially invisible to the user; or, in that traditional phrase, "You don't care where it's stored." The documents and their links unite into what is essentially a swirling complex of equi-accessible unity, a single great universal text and data grid, or, as we call it, a "docuverse."

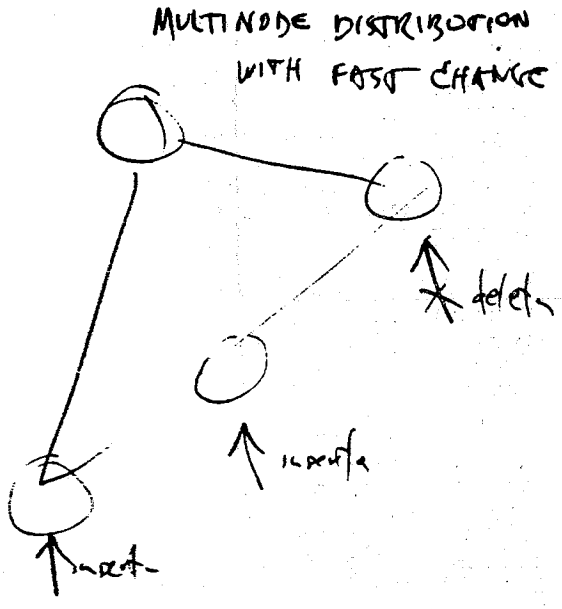
In principle it is possible to extend this system of storage and publication to a whole network of feeder computers.



A user at any location may store what he or she wishes; links may be created by anyone, from anywhere, to bring a document (or part of one) to the inquiring user. Given today's network technologies, this is not really difficult; this part of the system-- the immediate delivery of anything from within a large arbitrary network of computers-- is not far-fetched. From a nuts-and-bolts point of view the material is more efficiently dispersed among holding stations united by a communication network. This is essentially state of the art.

From the software point of view -- needing to unite the documents into a single, instantly-available docuverse-- a number of challenges exist.

One is that multiple copies of each document must be distributed about the network for safety-- in a shifting distribution that keeps up with demand and other needs. Another is that these copies-- even with their historical-trace backpacks-- must be updated in place. And a change must somehow be known throughout the network the instant it happens, with new things at once assimilated to the great corpus.



The stored literary contents of all the computers on the network may be continually united into a single, accessible whole.

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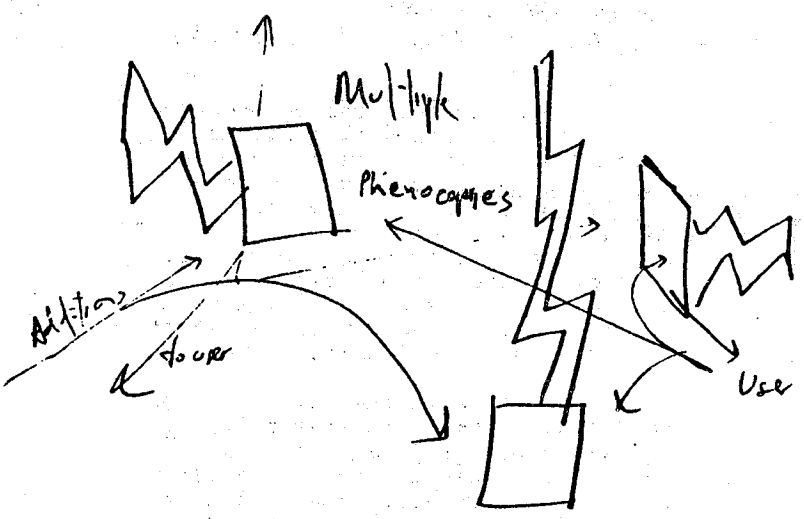
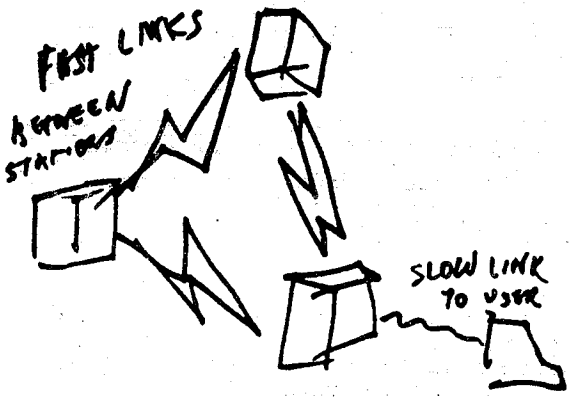
Moreover, while copies of all information cannot be stored in each location, enough of a trace or string must be in each place to pull in whatever is needed from wherever it is-- a "ripcord" to unleash any selected document.



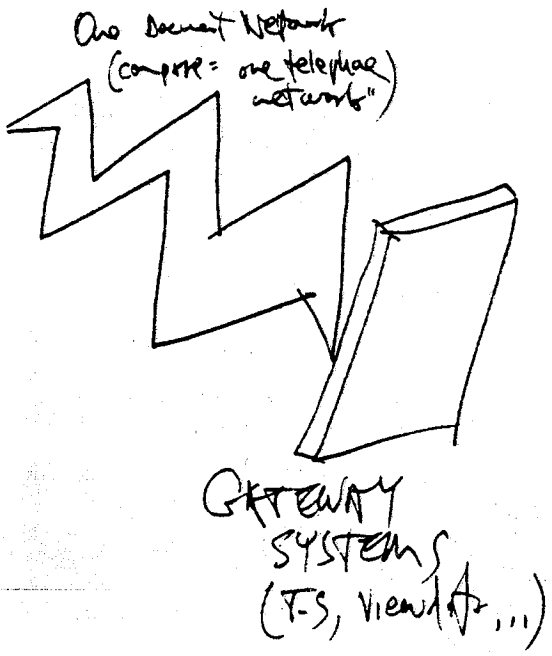

(Schemes for all these needs exist, having been worked out within our proprietary data-structure framework.)

NETWORK CONNECTIONS

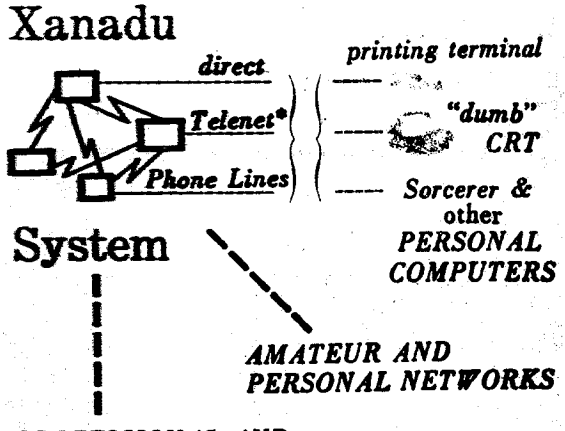
Essentially the network will have two connection speeds: the fast lines that unite the stations, and the slow links to users.



For connection to users, the contemplated network should of course hook up by whatever channels are most convenient for them: directly (at Stations), and via communication links such as Telenet* and telephone. It should also tie to other digital networks, either in the amateur market (such as The Source and PCNet), or the professional world (such as ARPAnet).

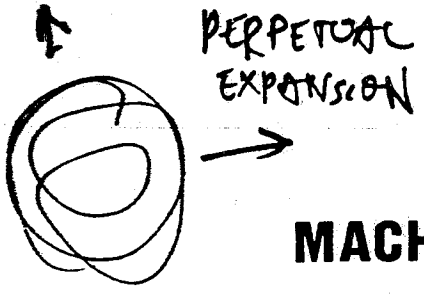



It is intended that the contemplated service will hook up to all ethical vendors who wish to offer gateway service to our docuverse.




For the connections between stations, the mechanics of computer networking are fairly straightforward, and we need not go into them here. The so-called "packet" approach (now being standardized under the name X.25) allows direct commercial hookup via Telenet. More high-budget and high-flying approaches can use direct satellite links between stations, which are available and feasible now.

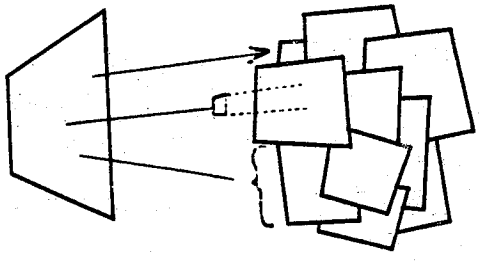
"How big will the total storage be?" people ask. The answer is, as big as people will pay for. Everything stored has to have money behind it. The system will grow as long as paying demand increases-- which should be for a considerable period. No matter how big it grows, you will be able to get anything in it very quickly-- as long as disks are added to the system.



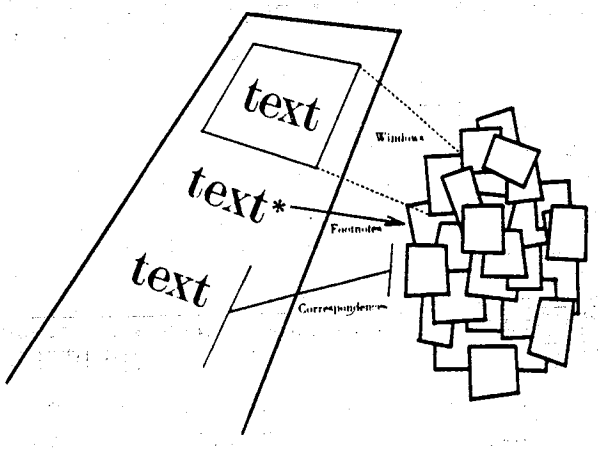

**LITERARY** **MACHINES**

Example:

A scholar writes a new interpretation of ancient Greek society, with numerous quotations from the writings of those times. Each quotation is a window, allowing the reader to step through and read the original.



ANY SUBSET, SUBSTRUCTURE OR GROUPING



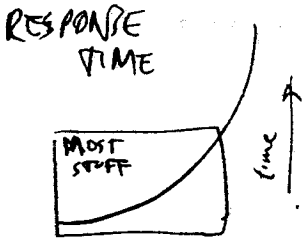

WINDOWING INTO THE PRIOR LITERATURE—previous public contents of entire network

THE GREAT HOPE AND CONJECTURE
OF INSTANT UNIFICATION

Perhaps the most important thing, and certainly the hardest part to believe, is that everything on such a network can come immediately, even as it grows to tremendous size.

First, let's be clear what we mean by "immediately." We mean very quickly, even though there will be variations. If you telephone San Francisco from Chicago, you get through "immediately"-- that is, within perhaps three to fifteen seconds, with an off chance of having to wait thirty. We're talking about figures like that. *

In any case, for comparatively local service (on-planet or nearby), we may look forward to "instant" retrieval of whatever is asked for. This means essentially that all documents become a single instantaneous whole.




This in turn means that compound documents of any kind become effectively as accessible as simple ones. And we may read and write accordingly.

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* Now, as human habitation grows beyound the planet and speed-of-light considerations become significant, obviously performance will degrade. For off-planet users (or earthbound users calling an off-planet station), the usual performance figure must be added to the transmission time. Obviously, too, if interstellar travel is ever achieved, transmission delays will degrade response time to months and years. (However, some thought has been given to this problem in the overall design: see "Tumbling through the Docuverse," Chapter 4.)

## 2.9 VITAL ISSUES

Thus we have the framework of a complete, radically different way of handling information.

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### USER PRIVACY: A VITAL ISSUE

The network will not, may not monitor who reads what or who writes what in private documents. This is vital. It is not easy to guarantee and impossible to make fully automatic. This important problem will be taken up later, in Chapters Three.

### A PRINTING PRESS

We consider that this system may best be considered as a "printing press" of the future.

### FREEDOM OF THE PRESS

If this system is a printing press, we can brook no greater restriction on its functions than on conventional printing. Freedom of the press has been challenged by tyrants and scoundrels since Gutenberg. It will happen again, and worse, on this new playing-field. We must be ready.

### LEGAL GOOD BEHAVIOR

Plainly, the system must live within the law. However, what the law is may often not be clear. Grey areas (for the USA) involve pornography, libel, and "national security" (often meaning matters embarrassing to a political administration).

There is no thinking out all these eventualities. But this is a libertarian system: restrict it, and all will lose.

Numerous issues of personal freedom are conspicuously present.

JOHN DOE PUBLICATION

Normally publication will be by stable individuals and companies with known residence or place of business. Still, there is no reason that anonymous publication by walk-in and transient users of the system should not be allowed.

PEREMPTORY CHALLENGE
OF JOHN DOE PUBLICATION

However, John Doe publication is more sensitive to challenge, since the John Does do not hang around to defend their acts.

Hence peremptory challenges of John Doe publications must carry weight.

Consider libelous or uncomplimentary John Doe graffiti defaming specific individuals. If John Doe is not available, the affected individual should be able to effect removal of the materials by peremptory challenge.

CHALLENGE OF DEFENDED MATERIALS

However, where materials are published by stable and accountable individuals or firms, peremptory challenge no longer holds water, and removal must be by negotiation or by court order.

What we call "tuning" the system is the development of simple, fair and well-balanced arrangements and pricing that will balance users' incentives for the flexible and reasonable use of the system. (See "Tuning," Chapter 4.)

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COPYRIGHT VIOLATIONS

Once materials are outside the system and the user's terminal, normal copyright law applies. Thus making magnetic or paper copies of documents, and giving them away or selling them, is tortious and illegal, as it would be without our system. Enforcement, of course, is the victim's problem.

Since the use of any material on the system by windowing is defined as fair use, people are much freer to do what they like with whatever is available.

One form of copyright violation is quite esoteric. That it is frequently mentioned suggests that people are reaching rather far for objections.

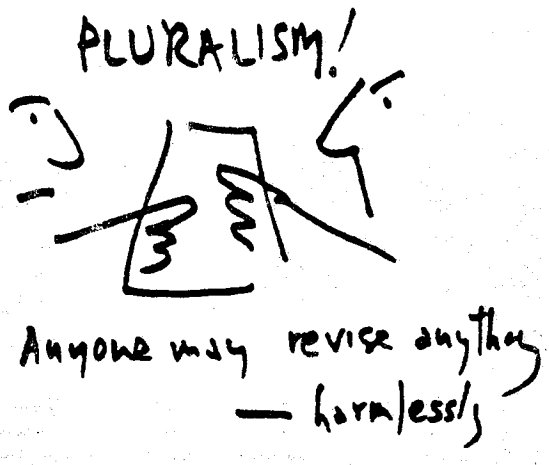
It is this: what if someone makes a copy of materials published by someone else on the system, then re-enters them as his own in order to obtain royalties?

As long as it went undetected, this scheme would work. However, the violator is exposing himself, if detected to a prima facie case of copyright violation.

PLURALISM-- AND NEW UNDERSTANDING

What is in such a publishing network may be revised by anyone, reinterpreted, redesigned. Anyone can publish a new version of Thomas Aquinas, Ayn Rand, Einstein, or whoever else's writings are on the system, attempting to reach the true and correct formulations that always seem to elude the person ahead of you. And no harm is done, no credit lost, to the originals.

The same applies to explanations. Most scientists and philosophers are not the ones to clarify their own work. The writings of a Niebuhr or a Talcott Parsons need to be considerably clarified by other commentators before most people can understand them.




Very well. With the capacity for any number of compound windowing documents, good explainers-- the Asimovs of tomorrow-- can take what is already there, and add the many clarifications that will bring understanding.

Is this chaos? Not at all. Because at any one time, you are within one specific document, the work of a specific author. If this work is windowing to other documents, nevertheless you are not "in" the others, but viewing them through the present author's filter.

ETERNAL REVISION

There is no Final Word. There is always a new view, a new idea, a reinterpretation. Windowing hypertext offers the possibility that all writings (never mind the word "knowledge") may be forever revised and reinterpreted by new scholars, summarizers, popularizers, anthologizers.