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Hypertext . . . Information at Your Fingertips

ABSTRACT

Hypertext is an alternative to traditional linear text and has been used successfully to create useful indexes on various types of computers. HyperRez, from MaxThink, is discussed in detail, as is the creation of the major Internet index, HYTELNET. Reference is also made to hypertext utilities currently under development that make use of the HyperRez software.

HYPERTEXT DEFINED

Simply put, hypertext is the nonlinear representation of text and graphics. In other words, it is information that is organized in such a fashion that a user can jump from topic to topic easily and quickly.

Good hypertext allows a user to find, browse, and comprehend information by indexing ideas and concepts, not merely words. With just a series of keystrokes, a user can instantly see the relationships between topics within a given hierarchy. Information is only useful if it is well organized and accessible. A reader of traditional, linear text may not be able to comprehend the ideas being propounded by the author since his ideas may appear unstructured if merely read from beginning to end. Hypertext, on the other hand, clearly shows those concepts.

HYPERTEXT SOFTWARE

Generally speaking, hypertext is best suited for use on computers. There are many hypertext programs running on many different types of computer platforms. Most people will have heard of HyperCard, which runs on Macintosh computers, and many of those people will, indeed, equate hypertext with HyperCard. However, the Amiga computer has its own hypertext program, The Thinker; the Atari has Spectre 128; and the Apple II has Tutor-tech. Hypertext systems are also available for the IBM personal computer family. These include such programs as Black Magic, EMPOWERment, HyperPad, HyperSprint, and PC-Browse.

This paper will concentrate its efforts on describing just one hypertext system, HyperRez,[1] written by Neil Larson of MaxThink in 1988. This particular system has been chosen since it is the one with which this author is most familiar, and it has been used to run a number of utilities including HYTELNET,[2] which recently won the Research and Education Networking Application Award.

HYPERREZ

Here are a few facts about HyperRez. HyperRez was released in 1988. It is an easy to learn and use program, which remains resident when loaded into the computer's random access memory. It can be invoked at any time by depressing a hot-key sequence, which a developer may customize, and can be returned to memory by pressing the Escape key.

HyperRez makes rapid jumps to pure ASCII files and certain types of graphics files with the keyboard's arrow and page up/page down keys. The program may be used royalty-free for any utility created by a developer. To construct a hypertext utility, a developer need only write files on a word processor that can save files as pure ASCII. This includes all the major MS-DOS packages such as WordPerfect, Word, and QEdit. The key to making jumps is to embed angle-bracket links within the ASCII files. Jumps can be made to the first page of a file, a specified screen of a file, a specified screen and line, or a specified word within a file. A developer can create customized help files for other software packages. For example, it would be possible to embed a link in a database program, one screen of which could contain an angle-bracket link. Once that screen is displayed, HyperRez could be invoked and the appropriate file presented.

For all the reasons stated above, this author chose HyperRez as the hypertext utility of choice. Many utilities have been designed with the software, for example, HYDOS,[3] which gives instant access to all

known DOS commands; HYPERVAX,[4] which is a browser for getting help with VAX electronic mail commands; and HYENVOY,[5] which is a browser for finding help with the Canadian telecommunications software ENVOY100. These utilities are freely available to Internet users and may be downloaded from various sites.

HYDIRECT, a hypertext version of *The Directory of Electronic Journals, Newsletters, and Academic Discussion Lists,* published by the Association of Research Libraries, is in the process of development. The paper version has entries for 769 scholarly lists, 36 journals, 80 newsletters, and 17 as yet unclassified titles. It is an ideal candidate for hypertext treatment since new titles are being announced on an almost daily basis. A user should not have to wait for a new paper version to be published to keep up with this rapidly changing information resource.

Perhaps the most popular of this author's utilities is HYTELNET, a browser that gives a user almost instant access to all known Internet sites that can be reached with the TELNET utility. For those of you not familiar with TELNET, it is a program that allows an Internet user to make remote connections to library catalogs, bulletin boards, campuswide information systems, Free-Nets, and a host of useful databases and full-text resources. TELNET can be run on most mainframes, Macintoshes, and IBM personal computers.

The number of diverse sites currently accessible is enormous. The number of potential sites is staggering. The challenge is to organize the information necessary to access the sites in as simple and straightforward a fashion as possible.

HOW TO CREATE HYPERTEXT

To explain and demonstrate the creation of a hypertext utility that can be run with HyperRez, let us look at the design of HYTELNET. Fortunately, HYTELNET is merely a hypertext index—there is no philosophy here, no abstract notions that need to be linked—so the descriptions will be easy to comprehend.

To create a hypertext utility with HyperRez, a developer needs to set up a new subdirectory that will house the files. Then two major ASCII files need to be written: START.TXT and HELP.TXT. Figure 1 shows the START.TXT file. These files are essential since HyperRez needs to load them first in order to operate properly. As soon as the HyperRez hot-key is invoked, START.TXT will be displayed on the screen, covering any existing display.

Let's analyze the START.TXT file. Notice the terms surrounded by angle brackets. These are the initial hypertext jumps. To access one

```
┌─────────────────────────────────────────────┐
│ Welcome to HYTELNET  version 5.0│           │
│                                              │
│        What is HYTELNET?    <WHATIS>         │
│                                              │
│ Telnet-accessible library catalogs  <SITES1>│
│                                              │
│     Other telnet-accessible sites  <SITES2> │
│                                              │
│   Help files for on-line catalogs  <OP000>  │
│                                              │
│            Internet Glossary    <GLOSSARY>   │
│                                              │
│          Cataloging systems    <SYS000>      │
│                                              │
│         Understanding Telnet    <TELNET>     │
│                                              │
│        Key-stroke commands    <HELP.TXT>     │
│ ┌──────────────────────────────────────────┐│
│ │    HYTELNET 5.0 was written by Peter Scott,│
│ │U of Saskatchewan Libraries, Saskatoon, Sask, Canada.   1992│
│ └──────────────────────────────────────────┘│
└─────────────────────────────────────────────┘
```

Figure 1. The START.TXT file

```
┌─────────────────────────────────────────────┐
│ ┌──────────────────────────────────────────┐│
│ │ HYTELNET...... Program Description.....   ││
│ └──────────────────────────────────────────┘│
│ HYTELNET is designed to assist you in reaching all of the│
│          INTERNET-accessible libraries, Freenets, CWISs,│
│          Library BBSs, & other information sites by Telnet.│
│ HYTELNET is designed specifically for users who access│
│          Telnet via a modem or the ethernet from an│
│          IBM compatible personal computer.│
│ HYTELNET, when loaded, is memory-resident. Once loaded hit│
│          Control + Backspace to activate the program. To│
│          leave the program temporarily hit ESC. To remove│
│          from memory hit ALT-T while in the program.│
│                                              │
│ For information on customizing the program see <CUSTOM>│
│ For accessible Library on-line catalogs see <SITES1>│
│ For other information sites see <SITES2>     │
│ ┌──────────────────────────────────────────┐│
│ │For extra information on loading the program and how to│
│ │    contact the author go to the <READ.ME> file│
│ └──────────────────────────────────────────┘│
└─────────────────────────────────────────────┘
```

Figure 2. The WHATIS file

of these files, a user merely moves the cursor with the down arrow key then hits the right arrow key. The WHATIS file is shown in Figure 2.

Notice that the WHATIS file also contains links. Hitting the link for accessible library online catalogs brings up the SITES1 file, as shown

in Figure 3. This file is a listing of all the countries that have online catalogs available.

```
┌─────────────────────────────────────────────────┐
│  ┌───────────────────────────────────────────┐  │
│  │ Library Catalogs arranged by country      │  │
│  └───────────────────────────────────────────┘  │
│                                                  │
│         <AT000>     Australia                    │
│         <CN000>     Canada                       │
│         <FI000>     Finland                      │
│         <GE000>     Germany                      │
│         <HK000>     Hong Kong                    │
│         <IR000>     Ireland                      │
│         <IS000>     Israel                       │
│         <MX000>     Mexico                       │
│         <NE000>     Netherlands                  │
│         <NZ000>     New Zealand                  │
│         <ES000>     Spain                        │
│         <SW000>     Sweden                       │
│         <SZ000>     Switzerland                  │
│         <UK000>     United Kingdom               │
│         <US000>     United States                │
└─────────────────────────────────────────────────┘
```

Figure 3. The SITES1 file

If we select Sweden, we are presented with a list of Swedish sites, as shown in Figure 4. Arrowing down and selecting SW001, we are presented with the file for Lund University, as shown in Figure 5.

The SW001 file is a typical site file. It contains all the information a user needs to connect and log in to this particular site. As an added bonus, there is also information regarding which cataloging system is used at the site. In this case, it is VTLS. Before logging into a site, a user may wish to know which search commands will have to be issued. Notice that OP017 is a link file. Depressing it brings up the help screen for the VTLS system (Figure 6).

Let's return for a moment to the START.TXT file. Notice that there are links to other files, which, in turn, make links to further files. SITES2 will link a user to a file that lists other types of resources available on the Internet. OP000 is a list of help files for online catalogs. GLOSSARY is a file containing terms relating to various aspects of the Internet. SYS000 lists the many different cataloging systems being

```
                           Sweden

<SW003> Karolinska Institute
<SW001> Lund University
<SW004> Royal Institute of Technology, Stockholm
<SW002> University of Umea
```

Figure 4. The SW0 file

```
                      Lund University

To access:

1.      Type TELNET LOLITA.LU.SE
2.      Select terminal type 10.  If you have a terminal
        that supports Scandinavian 7-bit ASCII, select 4.
3.      Enter 100 as the location code
4.      Type /LANG 1 to select English

OPAC = VTLS <OP017>

To exit:

1.      Type /QUIT.
2.      Enter Y to confirm.
```

Figure 5. The SW001 file

used in libraries and makes deeper links to the sites that use those systems. TELNET is a file containing a description of that program, plus various tips and tricks to help make remote sessions successful. Finally, HELP.TXT describes the actions of the arrow and page keys. It can also be invoked by depressing the F1 key. All of the files shown so far are written in pure ASCII and are, therefore, easy to edit with any word processor. Much of the information gathered to create the files was found in the Internet sites themselves and captured with a telecommunications program. Many already existed in other documents freely available for downloading.

The current version of HYTELNET contains hundreds of small, discrete ASCII files, so the chore of updating existing files and adding new ones is not burdensome. Traditional linear indexes, with which we are all familiar, are extremely tedious to update, especially if they contain page references that have to be altered each time information is added or deleted. There is also a tendency with linear indexes not to update on a regular basis. It is just too much trouble and far too

```
                          Using VTLS

Advanced User Search System:

Author searches:To search for a particular author, use the A/ searc
                command followed by the author's name.

                   Example:   A/Hemingway, Ernest

Title searches: To search for a particular title, use the T/ search
                command followed by the title.  Omit any leading
                articles such as THE, A, AN, LA, ...

                   Example:   T/Sun also rises

Subject searches:    To search for a particular subject, use the S/
                     search command followed by the subject.

                     Example:   S/Metals

Keyword searches:    To search for a keyword, use the W/ search
                     command followed by the subject.

                     Example:   W/Computers

Boolean Keyword:     To search for keywords with boolean operators,
                     use the B/ search command followed by a
                     keyword, then an operator, and then the second
                     keyword.

                     Example:   B/Ocean and Island
                                B/Dog or Cat
Help:                To see help, type /HELP.

Previous Screen:To see previously displayed screens, type PS.

Next Screen:    The next screen is usually displayed by typing NS.
```

Figure 6. The VTLS file

frustrating. Hypertext indexes, on the other hand, are a joy to update. When changing information in HYTELNET, it is generally only necessary to alter one or two files. Also, when a particular category of information begins to grow too large to fit on one or two screens, it can be split into smaller files and those files renamed. It then becomes necessary to rename any links to those files. Again, this is not an onerous task.

The number of accessible Internet sites continues to grow on an almost daily basis. Keeping current on all the additions has been made easier by the formation of the LIB—HYTELNET[6] mailing list. The list currently has over 350 members from around the world. When a new site is discovered, all members of the list are informed. They may, if they wish, add those new files to their copy of the HYTELNET program so that it is as up to date as possible. Members freely share information regarding sites that may have changed their login

procedures or that have added new and interesting databases. Some members have completely rearranged the information in certain files. For example, one user moved the United States entry to be the first entry on the SITES1 file since most of his users were more likely to want to connect to an American site. Currently, the United States entry sits last because the file's arrangement is alphabetic. Other members have decided that they do not wish to have particular files in their copy because of limited disk space or because they have no interest in certain information and have, therefore, deleted those files.

A user of HYTELNET may also wish to create links to files that represent a unique local situation. For instance, it may be felt pertinent to add an extra help file for one's own online catalog system or TELNET escape sequence. As long as the new links lead to the correct information, then all is well.

ADAPTING HYPERREZ TO RUN ON
DIFFERENT PLATFORMS

HyperRez, originally a DOS-based program, has recently been adapted by Earl Fogel of the Computing Services Department at the University of Saskatchewan to run in a UNIX environment.[7] He wrote a shell that not only allows for the retention of the original hypertext links, but also automatically makes a connection to a remote site. This has allowed users without DOS machines to take full advantage of the information available in HYTELNET. Internet users are free to download both the DOS and UNIX versions of HYTELNET. There is also a version of HYTELNET that runs under Windows, called CATALIST,[8] designed by Richard Duggan of the University of Delaware.

Perhaps the best example of the UNIX version of HyperRez can be seen at the University of Western Australia. Deidre Stanton, at Murdoch University Library, Australia, along with some of her colleagues, is in the process of designing an Information Resources Access System for the Australian Academic Research Network (Figure 7).

Note the START.TXT file in Figure 7. Notice the traditional HELP and WHATIS files. Linking to the file IRASINDEX brings up an index of available bibliographies, guides, and directories, plus links to the actual files (Figure 8).

Let's return to the START.TXT file. From this menu, a user can actually run other programs connected to the UNIX machine. These programs include archie, the Gopher, NetLib, HYTELNET, and SWAIS. Archie allows a user to query the anonymous FTP archie server in Australia, to discover if certain files or programs are available for downloading. The Gopher[9] is a distributed document delivery service

```
+---------------------------------------------+   Return to select
|Welcome to the Information Resources Access System|   q  to QUIT
+---------------------------------------------+   arrows to move

                     Key-stroke commands     <HELP>

  What is the Information Resources Access System?   <WHATIS>

         Academic Discussion List Directory   <HYDIRECT>

         Anonymous ftp Database Information    <ARCHIE>

         Distributed Document Delivery Service  <GOPHER>

     Information Resources Access System Index  <IRASINDEX>

         Netlib Library Catalogue Access       <NETLIB>

                  Telnet Site Directory        <HYTELNET>

          Wide Area Information Servers         <SWAIS>
```

Figure 7. IRAS START.TXT

```
            +-------------------------------------------+
            |  INFORMATION RESOURCES ACCESS SYSTEM INDEX  |
            +-------------------------------------------+

                       Key-stroke commands     <HELP>

  Bibliographies on Internet Use and Resources    <BIBLIO>

             Directories to Network Services    <DIRSERV>

Directories to Networked Information Resources    <DIRINFO>

                      Electronic Journals    <EJOURNALS>

               Guides to Network Services     <GDESERV>

    Guides to Networked Information Resources    <GDEINFO>

  Reports and Surveys Related to Use of AARNet    <REPORTS>

    Software Related to Information Resources    <SOFTINFO>
```

Figure 8. IRASINDEX

that allows a user to access various types of data residing on multiple hosts in a hypertext-like interface. The NetLib program provides a user interface to library catalogs around the world using the LIBS.COM software from Sonoma State University. The SWAIS is a collection of programs that provide access to information distributed over wide area networks.

It is obvious, then, that editing, adding, and deleting information in a utility based on HyperRez is a fairly straightforward procedure. In fact, a developer can create many different and useful utilities with the software.

WHAT LIBRARIANS CAN DO WITH HYPERTEXT

Each year libraries produce thousands of paper documents printed in various sizes and colors. A typical piece of paper might be a listing of library-owned information resources of interest to a social studies student. The library dutifully makes 200 copies on pink paper, whereas the list for philosophy students is printed on green paper. Shelf space is made available to house these papers in the hope that the students might be interested enough to pick them up. Other pieces of paper are produced for other purposes and scattered around the library system. How disastrous, though, if there are typographical errors that need correction. After going to the enormous trouble of compiling the information, buying the paper, waiting for the photocopier to warm up, and hand correcting the errors, one might feel that there is a better way.

Instead, would it not be more sensible to make the information available on a disk? Not just a disk containing a series of unrelated files, but, in fact, a hypertext index of all information regarding all aspects of the library's services. This information could be designed in such a way as to allow a reader of the utility to gain information on library hours, special collections, expert staff, library rules and policies, maps of the stack areas, and so on. The original and fully updated hypertext files could be sitting on a personal computer in the reference department. That personal computer itself could be made available for library users to browse the most up-to-date information relevant to their needs. The "new" students are computer literate, and many, indeed, can be seen wandering the halls of academe clutching their laptops. They are the last people who want to be given a handful of colored paper.

Librarians could also begin the process of producing customized hypertext information packages on demand. Not only would this be a valuable exercise in its own right, but it would also allow the librarians to gain a renewed credibility in the eyes of their patrons. They would be seen as disseminators of information rather than its wardens.

There is no reason why librarians should not take an active role in the design and implementation of a campuswide information system based on the principles of hypertext indexing. Apart from the usual opening-hours statement, librarians could also add interesting

bibliographies, electronic journals, important conference announcements, and other useful Internet resource packages. Once the information has become outdated, it is just a matter of deleting the appropriate file.

OTHER HYPERTEXT FOUND ON THE INTERNET

When browsing around the Internet, one can find many hypertext utilities designed by both computer specialists and librarians. One such is HYCLASS, developed by Clifford Urr, Director of Information and Library Services, James Martin Associates. HYCLASS is designed to be run under HyperRez. Its subject matter aids librarians who need to access Library of Congress classifications assigned to computer- and software-related materials. A cataloger may instantly access the utility by depressing the hot-key and browse the files to find the most appropriate classification number. Once identified, the number is noted, the program returned to memory, and the number is then entered into the cataloging software. This process can save the cataloger a great deal of time, and it is more likely that correct information is found by this method than by wading through the paper indexes. Of course, this program could be expanded to include all Library of Congress classifications.

Librarians in acquisitions departments could also develop and make use of hypertext indexing. Take for instance the vendor file. This is usually a computer-produced paper index, sorted alphabetically by vendor name. This is useful if only a name is being searched, but what if someone wanted to find a particular vendor specializing in foreign language material or perhaps a vendor situated in a particular country? Clearly hypertext is the solution.

Reference was made earlier to the Internet utilities Gopher and SWAIS. These are both hypertext-like resources that allow a browser to discover useful information in a hierarchical structure. The Gopher opens with a main menu, rather like the opening screen of a HyperRez utility. The user selects a line number to start the process of deep jumps. One such jump would lead to a submenu containing the names of other accessible Gophers. Selecting a number would connect the user to that site almost immediately, even if it were a continent away. The menu process begins again with the new site. The Gopher allows links not only to remote sites but also to fully searchable databases, such as electronic versions of public domain books, newspapers, and information files concerning many topics. The current version will also send a retrieved file to the searcher's electronic mail address, wherever it happens to be.

SWAIS, the Simple Wide Area Information Server, also has hypertext qualities. After logging in, a user is presented with a menu of over 120 databases situated on sites worldwide. Any number of these databases may be selected by merely hitting the space bar. A keyword or phrase is entered, and the argument is run against the selected files. The result is returned in a menu structure, allowing the user to read each individual file. The SWAIS will also mail selected files to a user's electronic mail address. Billy Barron,[10] at the University of North Texas, has loaded the information contained in HYTELNET to a server at his site. A SWAIS searcher may select that file and issue a keyword argument. The server will return all the files containing that term. This example shows how one hypertext utility can interact with another.

These two programs can be run on many different types of computer platforms, and developers are free to add any type of information that they feel is useful to the community.

This paper has been stressing the uses to which HyperRez can be put. MaxThink has also produced a stablemate called Hyplus,[11] which is based on a similar philosophy of file linking but which contains some extra features. It is not memory-resident, running instead in a stand-alone mode. It can search for a term with a glossary utility and can also run another program simultaneously. It has the ability to dial a telephone number and allow a user to see a list of all previous jumps— a useful feature if an immediate jump to a particular file is required.

Whichever of the two programs a developer chooses to create utilities, one thing is for sure. He or she will gain a greater understanding of the subject matter being organized. This also holds true for the user. You are invited to test this statement by obtaining a copy of the software packages described above and by creating your own utilities. (More information on the software packages is given in the Appendix.)

APPENDIX

Hypertext Software and Utilities Available from
wuarchive.wustl.edu
(Directory PD1:<MSDOS.HYPERTEXT>)*

Filename	Type**	Length	Date	Description
ARJHLP23.ZIP	B	327172	920214	HyperText helpfile for ARJ v2.3. Can be TSR
CPPTOUR.ARC	B	72187	891208	Hypertext-based tutorial on using C++
DOSEA5.ZIP	B	128906	910831	Hypertext program explaining DOS 5.0.
EBK.ZIP	B	48545	911005	Topic-oriented hypertext viewing program
EBKSRC.ZIP	B	56013	911005	Borland C++ src for EBK.ZIP hypertext viewer
HS25.ARC	B	301370	890717	HyperShell hypertext browser, v2.5
HTEX06.ZIP	B	246184	920206	Hypertext authoring system, create/convert/edit
HYCLASS.ZIP	B	69120	910414	Hypertext LC class & computer-related material
HYDOS10.ZIP	B	86977	910615	Hypertext browser for all DOS commands, v1.0
HYENVOY1.ZIP	B	64779	910622	Hypertext browser for all ENVOY100 commands
HYPER.ARC	B	171621	880503	Construct your own hypertext network
HYPERH15.ZIP	B	63851	900428	Hypercard-like help util. Make your own stacks
HYPERREZ.ARC	B	113258	891021	Hypertext reader using plain ASCII files
HYPLUS.ZIP	B	155030	910628	Stand-alone Hypertext program from Maxthink
HYPRVX11.ZIP	B	75776	901211	Hypertext browser for VAX/VMS mail help, v1.1
HYTELN50.ZIP	B	348957	920123	Hypertext browser for finding TELNET addresses
MAGIC15A.ARC	B	208998	891126	BlackMagic hypertext reader/ develop. sys. 1of3
MAGIC15B.ARC	B	217234	891126	BlackMagic hypertext reader/ develop. sys. 2of3
MAGIC15C.ARC	B	328463	891126	BlackMagic hypertext reader/ develop. sys. 3of3
NUHLP45.ZIP	B	90642	910628	Norton Utilities 4.5 Hypertext help browser
SENSES.ZIP	B	108544	910414	Demonstration of HYPLUS hypertext compiler
TP55TOUR.ARC	B	63504	891208	Hypertext-based tutorial on using OOP in TP5.5

*This list was created on Saturday, 28 March 1992 20:16:21 MST.
  Some files may have been added or deleted since that date.
  See file PD1:<MSDOS.FILEDOCS>AAAREAD.ME for additional information.
  **Type B is Binary; Type A is ASCII.

NOTES

[1]Larson, Neil. (1989). HyperRez. Berkeley, CA: MaxThink. Available via FTP from wuarchive.wustl.edu in the mirrors/msdos/hypertext subdirectory as hyperrez.arc. Change file type to "binary" when fetching.

[2]Scott, Peter <scott@sklib.usask.ca>. (1992). HYTELNET. Saskatoon, SK: The author. Available via FTP from wuarchive.wustl.edu in the mirrors/msdos/hypertext subdirectory as hyteln50.zip. Change file type to "binary" when fetching.

[3]Scott, Peter <scott@sklib.usask.ca>. (1991). HYDOS. Saskatoon, SK: The author. Available via FTP from wuarchive.wustl.edu in the mirrors/msdos/hypertext subdirectory as hydos10.zip. Change file type to "binary" when fetching.

[4]Scott, Peter <scott@sklib.usask.ca>. (1990). HYPERVAX. Saskatoon, SK: The author. Available via FTP from wuarchive.wustl.edu in the mirrors/msdos/hypertext subdirectory as hyprvx.zip. Change file type to "binary" when fetching.

[5]Scott, Peter <scott@sklib.usask.ca.> (1991). HYENVOY. Saskatoon, SK: The author. Available via FTP from wuarchive.wustl.edu in the mirrors/msdos/hypertext subdirectory as hyenvoy1.zip. Change file type to "binary" when fetching.

[6]LIB—HYTELNET. (1990). To subscribe send an e-mail message to scott@sklib.usask.ca with the subject "Add me to LIB—HYTELNET."

[7]Fogel, Earl <fogel@skyfox.usask.ca.> (1992). Direct all enquiries fogel@skyfox.usask.ca.

[8]Duggan, Richard <duggan@brahms.udel.edu>. (1990). CATALIST. Newark, DE: University of Delaware. Available via FTP from ftp.unt.edu in the library subdirectory.

[9]Internet Gopher. (1992). Telnet to consultant.micro.umn.edu and log in with gopher. Emulate vt100. Use menus to find "libraries" entry.

[10]Barron, Billy <billy@vaxb.acs.unt.edu>. (1992). Telnet to quake.think.com and log in with wais. Find the entry for the "hytelnet" server, hit the space bar to mark, select keyword to search, and hit enter. The file(s) containing your keyword will be retrieved.

[11]Larson, Neil. (1989). Hyplus. Berkeley, CA: MaxThink. Available via FTP from wuarchive.wustl.edu in the mirrors/msdos/hypertext subdirectory as hyplus.zip. Change file type to "binary" when fetching.